RICHARD CROOKES
CONSTRUCTIONS

JORDAN SPRINGS PUBLIC SCHOOL
NO: 1157

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

1 May 2020

DOCUMENT INFORMATION

CLIENT:	RICHARD CROOKES CONSTRUCTIONS (RCC)
Project:	Jordan Springs Public School
Project Number:	1157
Report Title:	CEMP – Jordan Springs Public School
Date:	1 May 2020
Document Name:	1157-JSPS-CEMP (Rev6)
Revision Number	Revision 6
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Reviewed By: Darren Vozzo Project Manager	

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1 INTRODUCTION

1.1 PROJECT OVERVIEW

The Project consists of a new modular built primary school in Jordan Springs of which RCC is the principal contractor. The project is located on Cullen Avenue and Lakeside Parade. Access to site is off Lakeside Parade.

The works are the design and construction of the Jordan Springs Modular Primary Schools. The project offers:

- Extensive school grounds and additional landscaping suitable for 1200 (Core 35) students at Jordan Springs Core school.
- New Teaching Facilities including new learning spaces
- Additional Support Space for learning
- Additional Administration floor space
- More Aesthetically pleasing & functional landscapes, gardens & playground equipment
- Canteen facilities
- Special programmes space
- OSHS support facilities

The works are planned for a 21-week design period and 32 week construction period. All being 53 weeks in total. This CEMP is to be used for the main portion of the works only under the SSD consent. Bulk earthworks have been covered under a Early Works DA from PCC.

Contract type GC21 Milestones No. 3

- Milestone 1: Home base and Admin blocks complete for operational readiness
- Milestone 2: Home bases and staged landscape areas complete for operational readiness
- Milestone 3: Hall, landscape areas and remaining works complete for operational readiness

1.2 HOURS OF WORK

As per condition B13 (a)(i) and C3 – C6, the works are to be carried out within the operating hours of;

Monday to Friday – 7am – 6pm

Saturday – 8am – 1pm

No works Sundays or Public Holidays

1.3 24 HOUR CONTACT DETAILS OF SITE MANAGER

As per condition B13 (a)(ii);

Chris Evans

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1.4 CEMP OBJECTIVES

This document is an operational CEMP which provides the framework necessary to implement the required management measures associated with the proposed excavation and construction works. Once implemented the objective of the management measures will be to ensure that the excavation of materials present at the site can be carried out without significant adverse impact on the environment or the health of the site workers and neighbouring residence. The management and monitoring aspects and Principal Contractor responsibilities covered in this CEMP include air quality, sediments, surface water, waste, site security, emergencies and the relevant sub-plans referenced within the appendices.

RCC notes that this CEMP will focus on mitigating and managing environmental and human health issues associated with the excavation works proposed at the site. The CEMP will provide task specific (i.e. operational hours, noise mitigation, traffic control, environmental management, erosion sediment control plan) measures for the proposed construction works.

The primary objective of the CEMP is to provide a management framework to mitigate potential environmental and human health risks associated with excavation and early construction works. The objectives can be summarised as follows:

- Prevent, reduce and effectively manage potential impacts to the environment resulting from excavation works, material handling and associated spoil disposal;
- Ensure that environmental management is undertaken in accordance with relevant legislative and policy requirements;
- To ensure the site is suitable for the proposed land use, in reference to contamination; and
- Promote environmental awareness amongst employees and contractors.

1.5 REPORTS RELIED UPON IN PREPARING THIS CEMP

The CEMP framework provided in this document has relied upon information provided in the following reports;

- Construction Traffic and Pedestrian Management Plan (Jim's Traffic Control): Ref Version 2.0
- Construction Noise and Vibration Management Plan (Acoustic Logic): Ref 20190240.4/R3
- Construction Waste Management Plan (EcCell) Ref: V7
- Construction Soil & Water Management Plan (Northrop) Ref: S182535-01-CR04 Rev 5
- Flood Emergency Response Plan (Molino Stewart) Ref: 1149
- Unexpected Finds Protocol (WSP) Ref: PS114979-CLM-LTR-UFP RevA
- Unexpected Finds Protocol for AHMP (Biosis) Ref: 30341.30325
- Detailed Environmental Site Assessment (WSP) Ref: PS110032

2 ROLES AND RESPONSIBILITIES

The following sections set out the organisational structure for the project:

2.1 PROJECT ORGANISATIONAL STRUCTURE

All personnel including the Consultants, Contractors, Subcontractors and all other personnel associated with undertaking excavation and construction works on the project at 14 – 28 Cullen Avenue Jordan Springs NSW 2747, ultimately report to the Principal Contractor.

The Principal Contractor will be responsible for implementing this CEMP. This will specifically involve monitoring the environmental performance of the works and ongoing compliance with legislative requirements, this CEMP, and all other associated environmental management documentation, development of a construction management plan (CMP), operational and post-construction monitoring and reporting.

2.2 PARTIES AND RESPONSIBILITIES

The parties involved with, and their responsibilities during, the environmental management of the works are provided in Table 1.

Table 1: Project Parties and Responsibilities

PARTY	RESPONSIBILITIES	REPORTS TO
THE PRINCIPAL CONTRACTOR **RICHARD CROOKES CONSTRUCTIONS**	• Ensure all works are implemented in accordance with the CEMP. • Promote awareness of appropriate environmental management and occupation health and safety (OHS) practices to the Project Manager. • The Project Manager is to be made aware of the CEMP and site specific issues. • Review risks and identify potential opportunities and issues with the project. • Monitor and inspect activities for compliance with relevant environmental requirements, including ensuring suitable management plans have been submitted and approved prior to undertaking works. • All environmental incidents and non- compliances are to be reported promptly and investigated. • Undertake environmental audits on the project at a frequency deemed appropriate to the length of the project. • Periodically review the performance of the Project Manager in meeting the objectives of their CEMP via regular audits. The audits will review the Project Manager's activities to assess if environmental hazards have the appropriate mitigation controls in place. Improvement requests and non-compliances will be monitored and corrective action undertaken. • Maintain an environmental audit register to • record close out of any actions issued.	The Superintendent TSA Management
THE SUPERINTENDENT	• The Superintendent is appointed by the Client	The Client

PARTY	RESPONSIBILITIES	REPORTS TO
	• SINSW as a primary contact overseeing the day to day operations at the Site. • Primary contact for all personnel in relation to site works and environmental management. • Review risks and identify potential opportunities and issues with the project. • Monitor and inspect activities for compliance with relevant environmental requirements, including ensuring suitable management plans have been submitted and approved prior to undertaking works. • Ensure environmental incidents and non- compliances are reported promptly and investigated.	School Infrastructure NSW
ENVIRONMENTAL SPECIALIST / ENGINEER **ENVIRONMENTAL STRATEGIES**	• Comply with this CEMP. • Provide advice where required to the Principal Contractor in relation to environmental issues associated with the works, if requested. • Responsible for implementing this CEMP and all required environmental controls. • Undertake onsite and offsite air monitoring. • Conduct environmental incident investigations, if requested by the Project Manager. • Demonstrate an understanding and management of the potential environmental impacts associated with the project. • Review risks and identify potential opportunities and issues with the project. • All Subcontractors under their control are appropriately informed of the relevant components of environmental management documentation. • Report all environmental incidents, hazards, non-compliances and near misses to the Project Manager immediately. • Implement corrective action responses to environmental incidents and non-compliances in consultation with the Project Manager. • Provide a validation report at the end of the project for review of the Site Auditor.	The Principal Contractor
SUB-CONTRACTORS	• Implement and comply with relevant components of this CEMP. • Report all environmental incidents, hazards, non-compliances and near misses to the Principal Contractor immediately. • Implement corrective action responses to environmental incidents and non-compliances as required by the Contractor.	The Principal Contractor

3 IMPLEMENTATION OF CEMP

3.1 SITE INDUCTIONS AND TRAINING

All personnel, including the Principal Contractors staff and subcontractors, who will be working on the project or will require regular access to the sites will be required to undertake training and site inductions including environmental requirements as required by the Principal Contractor. All personnel should demonstrate an understanding of potential environmental issues and the measures that will be implemented to protect the environment and local community, as detailed in this document.

3.2 CEMP INDUCTION

The CEMP awareness induction will cover:

1. Outlining the objective and purpose of the works; and
2. Contents of the CEMP and their (the workers) responsibility.

All site workers will sign the CEMP induction register acknowledging receipt and understanding of this CEMP. All induction sessions will be recorded in the induction register.

3.3 TOOLBOX MEETINGS

The Principal Contractor will conduct toolbox meetings with all personnel to review management procedures and identify / discuss daily site conditions and potential hazards. Site inductions and toolbox talks will highlight specific environmental requirements and activities being undertaken at the worksite.

A record of toolbox meetings should be maintained for future audit.

3.4 PERSONAL PROTECTIVE EQUIPMENT

All site personnel will be provided with & utilise personal protective equipment (PPE). PPE requirements will depend on the activity or situation, but may include the following:

- High visibility clothing;
- Protective clothing and footwear;
- Eye protection;
- Respirable (half-face) masks as required;
- Hard hat as required (i.e. in the vicinity of the working excavator or other overhead plant); and
- Sun protection as required (long sleeves, sunscreen, hat or hard hat fitted with wide brimmed sun protection).

PPE requirements should be detailed in the Safe Work Method Statements (or similar) which will be provided to the Principal Contractor for review and endorsement. Additional PPE will be required to carry out some aspects of the construction process and the PPE outline above should only be considered as the basic requirements. Additional PPE will be required if works are to be conducted in asbestos work environs.

3.5 RESPONSIBILITY AND REPORTING

The Principal Contractor is responsible for ensuring that all personnel under their jurisdiction have been provided with adequate training in the areas outlined in this document.

The principal contractor will complete weekly safety and environmental walks, with the critical information included in the monthly report.

The Principal Contractor will maintain records of all personnel who have undergone training in relation to the CEMP and general environmental responsibilities. Records of trained personnel will be maintained in a log to be kept on site. A record of issues covered in toolbox meetings should be maintained.

The Principal Contractor will provide training to anyone who appears to lack an understanding in the above areas.

4 LEGISLATION

The following is a summary of statutory requirements to be satisfied by RCC. Table 2 includes the required permits, licenses and consents under the relevant acts, regulation or policy.

Table 2: Summary of Acts, Regulations and Guidelines Applicable to Project

ACT/ REGULATION / PLANNING POLICY	KEY PROJECT REQUIREMENTS	JURISDICTION
PROTECTION OF THE ENVIRONMENT OPERATIONS ACT 1997 (POEO ACT) AND REGULATIONS	Undertake all activities so as to minimise harm to the environment (in particular pollution of air and water and noise emissions) and not cause an offence under the Act. Discharge to stormwater may require a license under the Act. Some transporters of waste are required to be licensed under the Act. Some waste disposal/processing facilities are required to be licensed under the Act.	State
PROTECTION OF THE ENVIRONMENT OPERATIONS (WASTE) REGULATION 2014	Requirements in relation to transportation, collection, storage or disposal of waste including asbestos waste.	State
PROTECTION OF THE ENVIRONMENT OPERATIONS (CLEAN AIR) REGULATION 2010	Requirements in relation to emission from vehicles and general obligations that the occupiers of non-residential premises do not cause air pollution by failing to operate or maintain plant, carry out work or deal with materials in a proper and efficient manner.	State
ENVIRONMENTAL PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999	Requirements in relation to protection and management of nationally and internationally important flora, fauna, ecological communities and heritage places.	Commonwealth
WORK HEALTH AND SAFETY ACT 2011	Requirements in relation to work safety that are enforceable by law.	Commonwealth
ROADS AND RAIL TRANSPORT (DANGEROUS GOODS) ACT 1997	Transport of waste classified as Dangerous Goods in accordance with Regulations	State
NSW EPA ASBESTOS AND WASTE TYRES GUIDELINES (2015).	Outlines the legal requirements that consignors, transporters, and occupiers of premises must meet in addition to their obligations under the Waste Regulation.	State
THE WASTE AVOIDANCE AND RESOURCE RECOVERY ACT 2001	Minimise the amount of waste for disposal, where possible recycle	State
ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979	Compliance with Development Consent Conditions issued by Consent Authority (Cumberland Council) to manage effects on the environment.	State
SYDNEY WATER ACT (NSW) 1994	Written agreement of Sydney Water is to be obtained if discharge of certain substances to sewer is required. Approval required for any works that will affect Sydney Water's sewer, water mains, stormwater and or easements.	State

ACT/ REGULATION / PLANNING POLICY	KEY PROJECT REQUIREMENTS	JURISDICTION
NSW ASMAC ACID SULFATE SOIL MANUAL (AUGUST 1998)	Outline a stepwise process for site assessment and management of proposals in areas containing acid sulfate soils	State
NSW EPA (2014) WASTE CLASSIFICATION GUIDELINES	Requirements in relation to permits required-soil/water that may need to be transported to landfill and appropriate waste classification will be required.	State
NSW HERITAGE ACT 1977.	Requirements in relation to Protection of heritage listed items	State
ENVIRONMENTALLY HAZARDOUS CHEMICALS ACT 1985	Requirements in relation to a legal framework capable of regulating priority/high-risk chemicals throughout their entire life cycles	State

All work shall be conducted, as appropriate, in accordance with (but not limited to) the following environmental codes of practice:

- Australian Standard (AS) 2436-1981: Guide to Noise Control on Construction, Maintenance and Demolition Sites;
- AS 2601 - 2001: Demolition of Structures;
- AS 2436- 1981: Guide to Noise Control on Construction, Maintenance and Demolition Sites;
- AS 2986.1-2003 Workplace air quality - Sampling and analysis of volatile organic compounds by solvent desorption;
- AS 2986.2-2003 Workplace air quality – Part 2: Diffusive sampling method;
- AS NZS ISO 19011-2003 Guidelines for quality and or environmental management systems auditing;
- AS/NZS 3012-2003: Electrical Installations- Construction and Demolition sites;
- BS6472 -1992: Evaluation and Human Exposure to Vibration in Buildings (1 to 80Hz);
- BS7385 Part 2-1993: Evaluation and measurement of Vibration in Buildings Part 2;
- DEC (now EPA), NSW (2005): Approved Methods for the Modelling and Assessment of Air Pollutants in NSW;
- DEC (now EPA), NSW (2007): Approved methods for the Sampling and Analysis of Air Pollutants in NSW;
- Department of Conservation and Land Management, CALM (1992): Urban Erosion Control and Sediment Control;
- National Environmental Protection Measure (NEPM) on Ambient Air Quality;
- National Environment Protection Council (1998): National Environment Protection NSW DEC (2007): Noise Guide for Local Government;
- NEPM (1999) Assessment of Site Contamination, as amended 2013;
- National Occupational Health and Safety Commission, 2nd Edition [NOHSC: 2002 (2005)]: Code of Practice for the Safe Removal of Asbestos;
- NSW Department of Housing (1998): Managing Urban Stormwater- Soils and Construction;
- SafeWork, NSW (1993). Code of Practice: Safe Work on Roofs, Part 1, Commercial and Industrial Buildings;
- SafeWork, NSW (1997). Code of Practice: Amenities for Construction Work;

- SafeWork, NSW (1997). Code of Practice: Cutting and Drilling of Concrete and Other Masonry Products;
- SafeWork, NSW (1992). Code of Practice: Electrical Practices for Construction Work;
- SafeWork NSW (July 2014): Code of Practice: Excavation Work;
- WorkCover NSW (March 2014): Managing asbestos in or on soil; and
- Other NSW EPA endorsed relevant guidelines.

In addition to any regulatory compliance required by the above mentioned Acts and Guidelines, the contractor will be responsible to carry out the site works in a manner that will endeavour to achieve the following;

- Practical minimisation of all wind-borne dust leaving the confines of the site;
- No water containing any suspended matter or contaminants is to be allowed to leave the confines of the site in such a manner that it could pollute any nearby waterway;
- Material originating from onsite is not to be tracked outside the site boundary and any material present on road surfaces must be removed immediately;
- Noise levels at the site boundary are to comply with the legislative requirements;
- Odour levels at the site boundary are to comply with the requirements as per this CEMP.

The CEMP will be explained to all contractors and a copy will be maintained on site during excavation and future construction works.

5 OCCUPATIONAL HEALTH AND SAFETY

The following Health and Safety plan contains procedures and requirements that are to be implemented as a minimum during the site works.

The objectives of the health and safety plan are:

- To apply standard procedures that reduces risks resulting from the above works;
- Employees are provided with appropriate training, equipment and support to consistently perform their duties in a safe manner; and
- To have procedures to protect other site workers and the general public. These objectives will be achieved by:
- Assignment of responsibilities;
- An evaluation of hazards;
- Establishment of personal protection standards and mandatory safety practices and procedures; and
- Provision for contingencies that may arise while operations are being conducted at the site.

This health and safety plan does not provide safety information specific to construction and other demolition or excavation activities carried out by contractors, such as the safe operation, maintenance and inspection of plant, etc. Contractors will be required to prepare their own Safe Work Method Statements for their work activities. All parties working on the site shall comply with all applicable Work Health and Safety legislation, regulations, codes and guidelines.

5.1 RESPONSIBILITIES

Principal Contractor

RCC is responsible for ensuring that the work is carried out in accordance with the health and safety plan. This will include:

- Ensuring a copy of the health and safety plan and CEMP is available at the site during the excavation/construction activities;
- Confirming individuals are competent in performing assigned tasks;
- Liaison with the contractor representatives, as appropriate, regarding safety matters; and
- Investigation and reporting of incidents and accidents.

Every individual worker is responsible for conducting their allocated tasks in a safe manner and in accordance with their training and experience. They must give due consideration to the safety of all others in their proximity and cooperate in matters of health and safety. All workers must leave their work areas in such a condition that the location will not be hazardous to others at any time.

5.2 HAZARDS

The known or potential hazards associated with the work activities described are listed below:

- Potential chemical hazards;
- Physical hazards, including;

- Work in or near excavations;
- Operating machinery;
- Heat stress and UV exposure;
- Underground or overhead services;
- Manual handling; and
- Noise.

In the event of the discovery of any condition that would suggest the existence of a situation more hazardous than anticipated, or of any new hazard that could potentially cause serious harm to personnel or the environment, work will be suspended until the Project Manager has been notified and appropriate instructions have been provided to field personnel.

5.3 POTENTIAL CHEMICAL HAZARDS

The main potential chemical hazards associated with the excavation/construction works is petroleum hydrocarbons, PAHs, heavy metals, asbestos and soil gasses.

When working with identified contaminated materials in general, care needs to be taken so that the contamination is not introduced to the worker via ingestion, inhalation or dermal contact. The personal protective equipment (PPE) and decontamination requirements outlined in Section 3.4 shall be followed to control the risks posed by chemical hazards at the site.

Potential hazards associated with working with asbestos or asbestos containing material (ACM) are addressed in detail in the Asbestos Management Plan (AMP) and should be read in conjunction to this document (refer to Appendix B).

5.4 PHYSICAL HAZARDS

Operating Machinery

Heavy plant and equipment operating in the vicinity of field personnel presents a risk of physical injury. Personnel should always be cognisant of their position in relation to operating machinery .

Never walk behind or to the side of any operating equipment without the operator's knowledge. Do not assume that the operator knows your position. Personnel should stay at least 2 m from the operational area of heavy equipment and should not stand directly below any load or piece of equipment (eg. excavators).

Working in or Near Excavations

All excavations shall be shored, sloped or otherwise constructed, so as to comply with SafeWork Authority safety regulation to minimise the potential for collapse.

Geotechnical advice, given to the slopes and treatment of batters, should be adhered to at all times.

Cuts and Abrasions

The manual work associated with the site works gives rise to the risk of cuts and abrasions to personnel working in the area. As well as the direct consequences of any cut or abrasion, such injuries can lead to the possibility of exposure to contaminants through the wound as well as diseases such as tetanus. To minimise the risk of direct or indirect injury, personnel will wear the personal protective equipment described.

Heat Stress and UV Exposure

Site personnel may experience heat stress due to a combination of elevated ambient temperatures and the concurrent use of personal protection equipment; this depends in part on the type of work and the time of year.

There are four main types of heat stress related problems:

- Heat Rash - caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Decreased ability to tolerate heat, as well as being a nuisance.
- Heat Cramps - caused by profuse perspiration with inadequate fluid intake and chemical replacement. Signs: muscle spasms and pain in the extremities and abdomen.
- Heat Exhaustion – is caused by increased stress on various organs as they meet the increasing demand to cool the body. Signs: shallow breathing; pale, cool, moist skin; profuse sweating; dizziness, and lassitude
- Heat Stroke - result of overworked cooling system. Heat Stroke is the most severe form of heat stress. Body must be cooled immediately to prevent severe injury and/or death. Signs: red, hot, dry skin; no perspiration, nausea; dizziness and confusion; strong, rapid pulse and coma. Medical help must be obtained immediately.

In addition to the above, overexposure to UV radiation in sunlight can result in sunburn to exposed skin. The use of a high protection sunscreen (SPF15 or greater) on all exposed skin is recommended. Hats (including hard hats in specified areas) will also provide additional sun protection during the peak (i.e. 10:00 am to 3:00 PM) sun period. Sunglasses should be worn (where appropriate) to protect eyes from effects of UV exposure.

5.5 UNDERGROUND SERVICES

There is the potential for underground services (electricity, natural gas lines, water, telephone, sewer, and stormwater) to be present beneath the work area. Appropriate procedures will be taken to minimise the risk associated with excavation near services. This should include but not be limited to dial before you dig plan review, service provider notification and work clearance, service location by an approved contractor, manual test pitting, adherence to safe excavation distances (for overhead and below ground services), spotting during excavation, assessment of structural considerations etc.

5.6 ABOVE GROUND ELECTRICAL HAZARDS

All electrical plant and equipment must comply with the requirements of Australian Standard AS 3000. Hand held portable tools shall comply with AS/NZS 3160 "hand-held portable electric tools" and shall be double insulated. A Residual Current Device (RCD) shall protect plug-in portable equipment, which is connected to a supply above Extra Low Voltage - 12-24 Volts (including equipment supplied from a generator or welding set). RCD protection shall be provided during the maintenance of portable electrical equipment. RCD protection shall be provided at all times, while the equipment is connected to a power supply above Extra Low Voltage, irrespective of whether power is switched ON or OFF. RCD's shall comply with AS 3190 and shall be type II units, rated to trip at or below 30 milliamps within 40 milliseconds.

No excavator may work within 2 m of overhead distribution power lines.

5.7 MANUAL HANDLING

When lifting or handling heavy objects, use correct lifting techniques, bending the knees not the back. If the item to be lifted is too heavy or awkward for one person to lift, seek assistance from other employees or use mechanical help.

5.8 NOISE

Long-term exposure to high levels of noise is unlikely. However, operating machinery may cause significant noise exposures for short periods. Earplugs, earmuffs or a combination of both shall be worn in any situation where noise levels make normal conversation difficult.

6 ENVIRONMENTAL MANAGEMENT

The remaining sections of this document set out the environmental management activities and management measures, which will be implemented during the works. The Principal Contractor will ensure that personnel responsible for undertaking the works are aware of their roles and responsibilities detailed in this CEMP.

6.1 POTENTIAL ENVIRONMENTAL ISSUES

The potential environmental issues associated with the proposed construction works include:

- Air emissions from contaminated soils and groundwater;
- Impact of noise and air emissions from plant, equipment and vehicles used in the project and associated transport of infrastructure;
- Potential impacts to terrestrial and aquatic ecology within close proximity to the work area and the surrounding areas;
- Disturbance to, and release of potentially contaminated soil and groundwater to the local environment; and
- Disruption to amenity of any residents and other land users in the vicinity of the site.
- As per condition B13 (h) and C25 to C27, refer to Appendix L Unexpected Finds Protocol prepared by Biosis.

6.2 GENERAL STRUCTURE OF ENVIRONMENTAL MANAGEMENT

Individual management measures have been prepared to address the issues listed in Environmental Elements 1 to 9. The numbering order should not be considered as a ranking of priority of each element as each element will have some over laps in procedures and monitoring requirements. Each plan is comprised of a number of elements, each with an overall associated management policy, mechanisms of policy implementation, proposed monitoring programs and potential corrective actions as described in Table 3.

Table 3: Structure of CEMPs

EMP ELEMENT	DESCRIPTION OF CONTENT
ELEMENT	The environmental aspect of construction or operation requiring management consideration.
POTENTIAL IMPACTS	The potential impacts in relation to the environment.
MANAGEMENT ACTIONS	The procedures to be undertaken to avoid or minimise potential impacts
PERFORMANCE OBJECTIVES	The target or strategy to be achieved through the specific management actions.
PERFORMANCE INDICATOR	The criteria against which the implementation of the actions and the level of achievement of the performance objectives will be measured, as well as the success of the implementation of the policy.
MONITORING	The intended monitoring program and the process of measuring actual performance.
RESPONSIBILITY	The entity assigned responsibility for carrying out each action.

EMP ELEMENT	DESCRIPTION OF CONTENT
REPORTING	The process of documenting actual performance, or how well the policy has been achieved, including the format, timing and responsibility for reporting and auditing of the monitoring results.
CORRECTIVE ACTION	The action to be implemented and by whom in the case where a performance requirement is not met.

7 MANAGEMENT OF DUST & ODOUR: AIR QUALITY

As per condition B13 (a)(iii and C20 & C21, Section 7 addresses these requirements.

7.1 SUMMARY OF POTENTIAL IMPACTS

Potential impacts to air quality resulting from the works include emissions from exposed soils, asbestos dust, groundwater, plant and equipment and dust generated during earthworks and land clearance and demolition work. Air monitoring has been implemented around site to assess if air quality is being impacted upon.

Potential odour / vapour impacts may also occur as a result of the release of odours from impacted soils / groundwater / gases and exposure from unexpected finds, hydrocarbon hotspots and soil gas pathways within any uncontrolled fill.

Ambient Air Levels will likely vary as earth works proceed. Earth works will also be conducted up to the site boundaries in some areas and odour / soil gas will be subject to changes in wind direction and weather conditions. The application and effectiveness of odour suppressant mitigation will need to be well managed under the discretion of the Principal Contractor and the environmental consultant.

If the measures outlined within the CEMP are not implemented correctly sounding neighbours, local businesses and workers may be impacted.

Procedures

A summary of the minimum plan requirements is provided in Table 4.

Table 4: Summary of Air Quality Management Procedures

ELEMENT	AIR QUALITY
PERFORMANCE OBJECTIVES	The objective of this management measure is not to generate any dust, odours or gasses and to adopt the necessary management strategy and PPE if presented with the occurrence to minimise the impacts of odours and/or vapours if encountered. Avoid or minimise the potential for odour and/or vapour emissions during the handling of exposed soils. Maintain plant and equipment such that exhaust emissions are minimised. Avoid or minimise disruption to amenity of residents and other land users in the vicinity of site works.
MANAGEMENT ACTIONS	Use of surfactant spray (onsite in close proximity of the earth works and at the site boundary/fences) is required for odour suppressant during works (this is up to the discretion of the Project Manager and the environmental consultant). Heavy equipment and vehicles will be appropriately maintained to minimise exhaust emissions. Appropriate methods of dust suppression will be implemented, such as ensuring earthworks materials remain moist to minimise dust generation during the works. Evaluate weather conditions prior to works commencing and during any change in wind direction. Cease works if dust or odour generation is excessive.

ELEMENT	AIR QUALITY
	A shaker grid and wheel wash bay will be implemented on site at all times and a water cart will be used during excavation works to minimise and manage generation of dust and odours. All dust/odour control measures will be kept in good operating condition and be functional at all times, with regular maintenance. All loads are to be covered and appropriately fitted with tarpaulins to contain dust and/or odour during transport. A complaints register will be established and maintained to receive and address complaints from the community regarding the detection of nuisance odour during the works. Residents in the vicinity of the proposed works will be informed of potential dust/odour impacts prior to the commencement of works.
PERFORMANCE INDICATOR	No complaints from location residents, surrounding businesses or site personnel. Goal of nil complaints relating to dust quality issues. Vapour emissions (Chlorinated VOCs) are likely to occur however the number of complaints should be kept to a minimum. All complaints will be responded to within 2 business days No onsite observation of dust generation during excavation works by Project team. No visual evidence of exhaust smoke during idle of equipment. No visual evidence of tracked material on public roads. A reduction in the number of complaints received in relation to air quality each month.
MONITORING	Implementation of visual monitoring of dust, material tracking, truck tarping, water spray use, exhaust plumes and stockpile covering. If unexpected fines protocol detects contaminants a review of air born testing is to be undertaken.
RESPONSIBILITY	The Principal Contractor is responsible for ensuring that if a monitoring program is required to be implemented, ,appropriately trained/qualified staff are engaged to do so. This program may be sub-contracted out to a specialist sub-consultant as required.
REPORTING	Maintenance of records on site of visual, PID and Asbestos monitoring undertaken if required.
CORRECTIVE ACTION (AS REQUIRED)	If required replace or repair emission control devices. Provide equipment to enable wetting of exposed soils if required. Should excessive dust be generated during works will also cease, until weather conditions improve and/or additional dust suppression measures have been implemented. The use of PPE with appropriate filters, inside the works zone will be mandatory, in the event that PID readings exceed the limits set by the environmental consultant for the Site/area. The level set by the environmental consultant is exceeded the following action shall be undertaken: • Backfill any excavation or cover with plastic sheeting; • Temporarily cease works until levels drop; and • Increase the use of suppressant near the excavation. In the event that boundary monitoring exceeds the daily works shall be stopped immediately. The earthworks shall be quickly backfilled and the situation reassessed if odour / gasses are identified and deemed excessive by the environmental consultant, the application of odour suppressants should be used / increased and then works can recommence once suitably qualified environmental consultant has assessed ambient air quality to be satisfactory.

8 MANAGEMENT OF ASBESTOS DUST

8.1 SUMMARY OF POTENTIAL IMPACTS

Possible asbestos dust-generating activities include the mechanical removal of building materials, demolition and earth disturbance works along with vehicle movement over asbestos impacted soils. The generation of asbestos dust should be minimised and meet relevant air quality standards as specified in the NOHSC:1003 (1995) Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment. Additional information is outlined in detail in the Asbestos Management Plan attached in Appendix B.

Air monitoring when disturbing contaminated soils across the site should be implemented. Any air monitoring of asbestos should be performed in accordance with the NOHSC:3003 (2005) Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres.

8.2 PROCEDURES

A summary of the minimum Asbestos Air Monitoring plan requirements is provided in Table 5 with addition measures for asbestos removal air monitoring covered in Section 7.1.2 in the Asbestos Management Plan in Appendix B.

Table 5: Summary of Asbestos Dust Management Procedures

ELEMENT	AIR QUALITY
PERFORMANCE OBJECTIVES	The objective of this management measure is not to generate any asbestos dust and to adopt the necessary PPE if presented with the occurrence of asbestos dust and to minimise the impacts of dust levels encountered. Avoid or minimise the potential for dust emissions during the handling of exposed soils and asbestos containing material (predominantly located within the existing buildings as identified in the hazardous building materials survey). Maintain plant and equipment such that decontamination procedures are followed and cross contamination outside the impacted work areas are minimised. Avoid or minimise disruption to amenity of residents and other land users in the vicinity of site works.
MANAGEMENT ACTIONS	Use of water spray (onsite in close proximity of the earthworks and at the site boundary/fences) is required for dust suppressant during earthworks. Water sprays might be used during demolition works on the removal of ACM within the current buildings on the site (this is up to the discretion of the Project Manager and the environmental consultant). Once the earthworks of each area is finished, this area of the site should be covered with plastic sheeting or the use of water spray to minimise dust generation (this to the discretion of the Project Manager and the environmental consultant). Use of enclosed and over-pressurized cabins on excavation equipment and trucks entering the site or work area as required. This should prevent ambient air (potentially contaminated with asbestos dust) and dust to intrude into the cabin where an asbestos hazard is present. Appropriate methods of dust suppression will be implemented where an asbestos hazard is present., such as ensuring earthwork and material removal. Soils and materials are to remain moist to minimise the risk that dust is generated during works. Evaluate weather conditions prior to works commencing and during any change in wind direction. Cease works if dust generation is excessive.

ELEMENT	AIR QUALITY
	All dust control measures will be kept in good operating condition and functional at all times, with regular maintenance. All loads are to be covered and appropriately fitted with tarpaulins to contain dust during transport. A complaints register will be established and maintained to receive and address complaints from the community regarding the detection of nuisance dust during the works. Residents in the vicinity of the proposed works will be informed of potential dust impacts prior to the commencement of works.
PERFORMANCE INDICATOR	No complaints from location residents, surrounding businesses or site personnel. Goal of nil complaints relating to dust quality issues. All complaints will be responded to within 2 business days No onsite observation of dust generation during excavation works by Project team. No visual evidence of tracked material on public roads. A reduction in the number of complaints received in relation to air quality each month.
MONITORING	The air quality will be evaluated by the Project Manager and assessed by a suitably qualified environmental consultant. Continuous exclusion zone boundary monitoring during excavation works using asbestos air monitoring equipment is required. The air pumps should be calibrated to the required flow rate in accordance with Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)]. • Fence line sampling for Asbestos. Four (1) samples/day, airborne fibres testing in accordance with the NOHSC: 3003 (2005) method. Action level is 0.1 fibres/mL (with air monitoring filters to be situated within 10m of the location of asbestos removal work) during works where asbestos will be disturbed. Implementation of visual monitoring of dust, material tracking, truck tarping, water spray use, exhaust plumes and stockpile covering.
RESPONSIBILITY	The Principal Contractor is responsible for ensuring that the monitoring program is implemented by appropriately trained/qualified staff. This program may be sub-contracted out to a specialist sub-consultant as required.
REPORTING	Maintenance of records on site of visual dust and Asbestos monitoring must be undertaken by a suitably qualified environmental consultant. Daily asbestos air monitoring results should be made available 24hr after collection and notification of the results made available at the site lunch shed.
CORRECTIVE ACTION (AS REQUIRED)	Replace or repair dust control devices. Provide equipment to enable wetting of exposed soils and materials if required. Should excessive dust be generated works will also cease, until weather conditions improve and/or additional dust suppression measures have been implemented. The use of PPE with appropriate filters, inside the works zone will be mandatory, in accordance with the requirements outlined in the AMP. The level presented in the CEMP prevails. When the 0.1 f/mL (Fibres per millilitre of air) level with the work area is exceeded the following action shall be undertaken: • Backfill any excavation or cover ground surface with plastic sheeting; • Temporarily cease works until levels drop; and • Increase the use of suppressant near the excavation. In the event that boundary monitoring exceeds the 0.1 f/mL (Fibres per millilitre of air) works shall be stopped immediately. The earth works shall quickly backfill any excavation and the area cover with black plastic and the situation

ELEMENT	AIR QUALITY
	reassessed if by the Principal Contractor, the application of dust suppressants should be used/increased and then works can recommence once suitably qualified environmental consultant has assessed ambient air quality to be satisfactory.

9 STORMWATER CONTROL & DISCHARGE: SURFACE WATER

As per condition B13 (a)(iv), works must comply with requirements for storm water management in accordance with Managing Urban Storm water – Soils and Construction (Landcom, 2004) to minimise direct or indirect un-authorised release of surface water during site works to minimise impacts to surface water quality of surrounding environs. A written agreement of Sydney Water is to be obtained if discharge of certain substances to sewer is required. As per condition C24, refer to Northrop Consulting Soil and Water Management Plan within Appendix I.

In the event groundwater is intercepted during excavation works, a temporary water collection pit shall be excavated in the bottom of the excavation pit or graded surface. Water samples should be collected and tested for chemical of concern prior to discharge/disposal. The principal contractor should assess if the volume of expected groundwater requires relevant authority approval. Excavation pump out water (if any) shall be pumped from the excavation by a licensed contractor and disposed of off-site as "liquid waste" in accordance with NSW EPA (2014). The Principal Contractor will need to obtain the relevant approvals (from discharge authorities like Sydney Water etc.) should be obtained prior to the commencement of dewatering.

9.1 SUMMARY OF POTENTIAL IMPACTS

The following potential impacts from surface water may occur as part of the works program:

- Complaints from local residents;
- Breaches in Regulatory requirements;
- Increased turbidity and sediment concentrations due to accidental release;
- Increased sediment load on storm water drains and infrastructure;
- Ruts and gullies in soil surfaces;
- Unsuitable conditions for construction works;
- Safety and Health related issues; and
- Damage to local ecological receptors.

Any impacts would be expected to be temporary only in nature and generally localised to the area of adjoining active works, but may have longer term impacts to local ecological communities.

9.2 PROCEDURES

A summary of the minimum plan requirements is provided in Table 7 and are further outlined within the Construction Soil & Water Management Sub-Plan prepared by Northrop Consulting Engineers reference in Appendix I.

Table 7: Summary of Water Quality Management Procedures

ELEMENT	WATER QUALITY
PERFORMANCE OBJECTIVES	Avoid or minimise the disturbance to, and release of potentially contaminated soil or sediment laden water to the surrounding environs. Prevent increased water flows causing erosion damage to drainage infrastructure and water ways. Prevent safety related incidents associated with wet or slippery work conditions.
MANAGEMENT ACTIONS	Assessment of weather during excavation operations and consideration of temporarily halting works until more favourable conditions are encountered. Install sediment control structures (i.e. silt fencing and/or hay bales) should be implemented in accordance with Managing Urban Storm water Soils and Construction (Landcom, 2004) prior to the commencement of works. This would include strategic placement of such structures down- gradient of temporary stockpiles and slopes to minimise sediment entrainment. These measures should also be placed on the up-slope side of any storm water collection channels. Control of drainage on the site by interception and redirection of clean storm water in a controlled manner. Collection of storm water on-site in trenches and sumps for appropriate management. Provide inlet protection to be provided for any potentially impacted locations. Site contractors will be required to observe any sediment control and/or storm water control measures to assess if they are working at a satisfactory level. Provision of a Spill clean-up kit on all sites where bulk fuel is stored or is being transferred. Maintain a hardstand or lined and bunded area for the refuelling and storage of equipment. Cease works if excessive surface water makes conditions unsuitable for construction works. Cease works if excessive surface water makes creates safety concerns. A shaker grid and wheel wash bay will be implemented on site at all times and a water cart will be used during excavation works to minimise the risk of sediment and other materials being tracked onto the roadway by vehicles leaving the site.
PERFORMANCE INDICATOR	The prevention of increased storm water runoff is the best approach. Site contractors will be required to observe any increases in sediment loads and volumes in storm water drains when working close to surface drains and report any discharges beyond the site boundaries. Site contractors will be required to observe any sediment control and/or storm water control measures to assess if they are working at a satisfactory level. Zero records of near miss or injury in relation to wet conditions
MONITORING	Regular observations will be made by the Site Contractors and the Project Manager and mitigation measures put into place if sediment loaded runoff is likely to occur or a rainfall event is predicted. Monitoring requirements from a pump-out-permit or other required license shall always be adhered to.
RESPONSIBILITY	The Project Manager is responsible for ensuring that each of the monitoring programs is implemented by appropriately trained/qualified staff. These programs may be sub-contracted out to a specialist sub- consultant as required.
REPORTING	Records of all corrective actions and known sediment releases will be kept. Records of Near Miss and Injuries will be kept. The Project Manager will immediately report to the Contract Administrator any incidents of water discharging off site.

10 MEASURES OF SEDIMENT CONTROL

As per condition B13 (a)(v) and C22 refer to Table 6.

10.1 SUMMARY OF POTENTIAL IMPACTS

Potential impacts from sediments resulting from the works include dust emissions and surface water generated during earthworks/land clearance and construction. Dust emissions and surface water sediment impacts are further elaborated within Section 7 and Section 9 of the CEMP.

The following potential impacts from sediments may occur as part of the works program:

- Complaints from residents;
- Breaches in Regulatory requirements;
- Increased turbidity and sediment concentrations due to accidental release;
- Increased sediment load on storm water drains and infrastructure;
- Damage to local ecological receptors.

Any impacts would be expected to be temporary only in nature and generally localised to the area of adjoining active works and transport routes but may have longer term impacts to local ecological communities.

10.2 PROCEDURES

A summary of the minimum plan requirements is provided in Table 6 and are further outlined within the Construction Soil & Water Management Sub-Plan prepared by Northrop Consulting Engineers referenced in Appendix I.

Table 6: Summary of Sediment Management Procedures

ELEMENT	SEDIMENTS
PERFORMANCE OBJECTIVES	The objective will be to avoid an impact on water quality in surface water and drains which eventually discharge offsite by implementing prevention measures to control any sediment that is generated. Avoid or minimise soil migration and loss to surface waters and drains. Avoid or minimise pollution of creeks and waterways. Avoid or minimise increased sediment load on storm water drains and infrastructure.
MANAGEMENT ACTIONS	Prior to the start of the works a stormwater and sediment control plan should be prepared by the Principal Contractor. This Plan should be in accordance with Councils regulations. Site contractors will be required to observe any increases in sediment load in storm water drains when excavations are close to surface drains or waterways. Sediment control structures (i.e. silt fencing and/or hay bales) should be implemented in accordance with the Stormwater and Sediment Control Plan prior to the commencement of works. Evaluate weather conditions prior to works commencing and during any change in wind direction. Cease works if dust generation is excessive (by visual assessment).

ELEMENT	SEDIMENTS
	All sediment control measures will always be kept in good operating condition and functional with regular maintenance. Strategic placement of such structures down-gradient of stockpiles and slopes to minimise sediment entrainment. These measures should also be placed on the up-slope side of any storm water collection channels. If a significant rain event occurs, fieldwork will cease. There will be sediment control measures available for placement down gradient of the work area; and Works will also be conducted in a manner to minimise the potential for sediment and soil migration, whereby excavated material will be hauled offsite as soon as practicable and/or reinstated and compacted. A shaker grid and wheel wash bay will be implemented on site at all times and a water cart will be used during excavation works to minimise the risk of sediment and other materials being tracked onto the roadway by vehicles leaving the site.
PERFORMANCE INDICATOR	The prevention of sediment runoff is the best approach. Site contractors will be required to observe any increases in sediment load in storm water drains when excavating close to surface drains and site boundaries. No complaints from location residents, surrounding businesses or site personnel. Goal of nil complaints relating to sediment issues. No onsite observation of dust generation during excavation works by Project team. No visual evidence of tracked material on public roads.
MONITORING	Regular observations will be made by the Site Manager and mitigation measures put into place if sediment loaded runoff is likely to occur or a rainfall event is predicted. Records of all corrective actions and known sediment releases will be kept. Implementation of visual monitoring of dust, material tracking, truck tarping, water spray use, exhaust plumes and stockpile covering.
RESPONSIBILITY	The Project Manager is responsible for ensuring that the monitoring program is implemented by appropriately trained/qualified staff.
REPORTING	Maintenance of records on site of visual monitoring undertaken
CORRECTIVE ACTION (AS REQUIRED)	Clean-up of sediment. Installation of sediment and erosion controls. Additional storm water control measures. Altered excavation works. Cease works if a major storm event is likely to occur. Replace or repair sediment and erosion control devices. Should excessive dust be generated excavation works will also cease, until weather conditions improve and/or additional dust suppression measures have been implemented.

11 ENVIRONMENTAL MANAGEMENT MEASURE ELEMENT: WASTE MANAGEMENT

Refer to Construction Waste Management Plan prepared by EcCell within Appendix H with regards to B13 (d) (i) and C30 to 32. For B13 (g) and C28 to C29 condition requirements, see unexpected find protocol prepared by WSP in Appendix K and Appendix M. Excess soils requiring offsite disposal will require additional assessment and should be stockpiled onsite prior to sampling and any additional assessment by a suitably qualified environmental consultant.

All excavated material removed from site will need to have appropriate Waste Tracking Certificates and no material is permitted to leave site prior to receiving a waste classification letter. Each truckload should be filled before leaving the site. A transportation form shall accompany each truckload and should be handed back to the Environmental Specialist upon return to the site. The waste docket should be attached to this transportation form.

Storm water and/or groundwater collected on-site in trenches and sumps will be subject to waste management if offsite disposal is to take place. Disposal via the storm water system may be undertaken subject to relevant authorities discharge license conditions.

Should excavations require dewatering, water samples will be collected by the Environmental Specialist and analysed prior to pump-out and offsite disposal. Waste liquid disposal dockets should be maintained onsite for inspection.

If during any site earthworks or excavation, asbestos, evidence of gross contamination or unknown type of material not previously detected is observed (Unexpected Finds), site works are to cease until the Project Manager has been notified and appropriate instructions have been provided to field personnel. Further works in such a location should be conducted under the supervision of a suitably qualified environmental consultant after a formal notification to the Site Auditor. All additional work would be documented and detailed in a validation report prepared by the Environmental Specialist and reviewed by the Site Auditor.

Other waste, excluding soils and groundwater, generated during the redevelopment works may include:

1. Domestic waste generated by site workers;
2. Asbestos contaminated waste to follow recommendations of UFP;
3. Concrete Slab;
4. Liquid waste; and
5. Inert building materials

Asbestos waste and decontamination disposal waste should be conducted as per consultant's advice and site auditors' requirements.

Each outbound truck should be logged as clean prior to dispatch along with information pertaining to the amounts of loads and number of trucks leaving the site in addition to copies of all waste classifications certificates, waste tracking certificates, weigh bridge dockets, and any council approvals should be maintained onsite for inspection.

11.1 SUMMARY OF POTENTIAL IMPACTS

The following potential impacts from waste management may occur as part of the works program:

- Complaints from local residents;
- Breaches in Legislative/Regulatory requirements; and
- Damage to local ecological receptors.

Any impacts would be expected to be temporary only in nature and generally localised to the area of adjoining active works, but may have longer term impacts to local ecological communities.

11.2 PROCEDURES

A summary of the minimum plan requirements is provided in Table 8 and further outlined in the Construction Waste Management Sub-Plan prepared by EcCell Environmental referenced in Appendix H.

Table 8: Summary of Waste Management and Minimisation Procedures

ELEMENT	WASTE MANAGEMENT AND MINIMISATION QUALITY
PERFORMANCE OBJECTIVES	The objective will be to minimise and control any wastes and waste categories that are generated, and that they will be appropriately disposed of. Avoid or minimise environmental impacts related to waste management and handling of potentially contaminated soils. Avoid or minimise impacts due to unexpected finds. Avoid or minimise health risks associated with potentially contaminated soil exposure and dust generation.
MANAGEMENT ACTIONS	Provision of a Spill clean-up kit on all sites where bulk fuel is stored or is being transferred. Maintain a hardstand or lined and bunded area for the refuelling and storage of equipment. Trucks to be used for transport of soil are to be fitted with cover tarpaulins to contain the load. Each truck prior to exiting site, shall be inspected prior to dispatch and either logged out as clean (wheels and chassis), or hosed down within a wheel wash down bay. All trucks leaving the site should be accompanied with a waste transportation form (Appendix B). Cease site works until the Project Manager has been notified of any unexpected finds and appropriate instructions have been provided to field personnel to address the issue. Project Manager to inform the Contract Administrator of any unexpected finds.
MONITORING	Regular observations will be made by the Project Manager and measures put into place if sediment loaded runoff is likely to occur or a rainfall event is predicted. Records of all corrective actions and known sediment releases will be kept. An up to date record of waste tracking shall be kept by the Environmental Specialist.
RESPONSIBILITY	The Principal Contractor is responsible for ensuring that the monitoring program is implemented by appropriately trained/qualified staff. This program may be sub-contracted out to a specialist sub-consultant (the Environmental Specialist) as required.
REPORTING	Maintenance of records on site of equipment inspections undertaken and landfill disposal/waste tracking and weigh bridge dockets, and any council approvals should be maintained onsite for inspection.

ELEMENT	WASTE MANAGEMENT AND MINIMISATION QUALITY
CORRECTIVE ACTION (AS REQUIRED	Revision of the works strategy including relocation and alteration to the operating procedure if waste is shown to be entering the surrounding environment.

12 ENVIRONMENTAL MANAGEMENT MEASURE ELEMENT 5: NOISE MANAGEMENT

See Acoustic Logic Noise and Vibration Management Plan referenced in Appendix G for condition C11 to C18 requirements. The findings and recommendations in the Noise Management Plan will be used in conjunction with the procedures outlined below.

Site works will be conducted from 7:00 a.m. to 6:00 p.m. Monday to Friday, with work on Saturdays between 8:00 a.m. and 1:00 pm if required. Work outside these hours will be in accordance with local council regulations and approvals.

12.1 SUMMARY OF POTENTIAL IMPACTS

The following potential impacts from Noise may occur as part of the works program:

- Complaints from local residents;
- Breaches in Regulatory requirements; and
- Safety and Health related issues.

Any impacts would be expected to be temporary only in nature and generally localised to the area of adjoining active works and transport routes, but may have longer term impacts to Safety and Health related issues.

12.2 PROCEDURES

A summary of the minimum plan requirements is provided in Table 9 and outlined in the Construction Noise and Vibration Management Sub-Plan prepared by Acoustic Logic referenced in Appendix G.

Table 9: Summary of Environmental Noise Management Procedures

ELEMENT	NOISE MANAGEMENT
PERFORMANCE OBJECTIVES	Avoid or minimise the impact of noise emissions from plant, equipment and vehicles used in the works.
MANAGEMENT ACTIONS	Plant and equipment will not be permitted to 'warm-up' before the nominated working hours. Where possible, plant and equipment will be located / orientated to direct noise away from the closest sensitive receivers. Undertake regular maintenance of plant and equipment to minimise noise emissions. All machinery will be kept in good working order and will comply with noise attenuation standards. Other noise control measures, including acoustic barriers, will be examined and put in place should the need arise. Selection of the quietest suitable machinery reasonably available for each work activity. All plant and equipment to have efficient low noise muffler design and be well-maintained. Offset distance between noisy items of plant/machinery and nearby sensitive receivers to be maximized were possible.

ELEMENT	NOISE MANAGEMENT
	Where practicable, noisy plant/machinery are not to work simultaneously in close proximity to sensitive receivers. Queuing of trucks is not to occur adjacent to any residential receiver. Where queuing is required engines are to be switched off. Trucks will follow the designated haulage route between locations. Trucks will adhere to the designated speed limits. Trucks will refrain from using compression breaking where possible. Any pumps or generators used will be encapsulated or appropriately encased to minimise noise generation and emissions.
PERFORMANCE INDICATOR	No complaints from surrounding residents.
MONITORING	Noise generation is considered to be minimal if no complaints are received from the neighbours and areas of excavator use are in isolated areas away from any onsite facilities or neighbours.
RESPONSIBILITY	The Principal Contractor is responsible for ensuring that the monitoring program is implemented by appropriately trained/qualified staff. This program may be sub-contracted out to a specialist sub-consultant as required.
REPORTING	Maintenance of records on site of equipment inspections undertaken, and results of noise surveys.
CORRECTIVE ACTION (AS REQUIRED)	Revision of the works plan including revision to working hours as necessary or staggering use of noisy equipment to minimise impacts.

13 ENVIRONMENTAL MANAGEMENT MEASURE ELEMENT 6: VIBRATION

Due to no structures within close proximity to the site boundaries the Principal Contractor will not be undertaking a structural integrity assessment by a suitably qualified engineer or specialised consultant of the buildings and structures. As such the below minimum requirements outlined in Table 10 will be followed.

13.1 SUMMARY OF POTENTIAL IMPACTS

The following potential impacts from Vibration may occur as part of the works program:

- Complaints from local residents;
- Breaches in Regulatory requirements;
- Safety and Health related issues; and
- Damage to local infrastructure.

Any impacts would be expected to be temporary only in nature and generally localised to the area of adjoining active works and transport routes, but may have longer term impacts to local infrastructure and Heritage listed buildings.

13.2 PROCEDURES

A summary of the minimum plan requirements is provided in Table 10 and outlined in the Construction Noise and Vibration Management Sub-Plan prepared by Acoustic Logic referenced in Appendix G.

Table 10: Summary of Vibration Management Procedures

ELEMENT	VIBRATION MANAGEMENT
PERFORMANCE OBJECTIVES	Minimise the effects of the project has on adjacent public utilities, structures and buildings from vibration.
MANAGEMENT ACTIONS	Prior to activities that may pose a risk to adjacent public utilities, structures and buildings a visual inspection will be undertaken to access potential damage associated with vibration impacts including cracks and other indications of settlement. Select appropriately sized machinery and equipment and design procedures for use in order to comply with vibration limits and to reduce vibration generation. Establish communication with relevant authorities and residents. Machinery proposed to be used to be appropriately sized to prevent over- loading and over-revving.
PERFORMANCE INDICATOR	Goal of nil complaints relating to vibration issues during the project. Zero damage to adjacent public utilities, structures and residential buildings from vibration. Zero detrimental health problems to personnel in the vicinity of the vibration source.
MONITORING	Vibration monitoring to be adopted upon receiving a complaint or under direction from a government agency.

ELEMENT	VIBRATION MANAGEMENT
RESPONSIBILITY	The Principal Contractor is responsible for ensuring that vibration control is implemented, and building & infrastructure inspections are completed as required.
REPORTING	Inspection, monitoring and surveillance by the project manager and contractors. Maintenance of records relating to any complaints received, including subsequent non-compliance forms and corrective actions.
CORRECTIVE ACTIONS REQUIRED	Where vibration results in damage to structures, temporary protection/ rectification works will be completed prior to recommencement of site works. Work practices will be reviewed and modified as appropriate to minimise on going damage where possible.

14 ENVIRONMENTAL MANAGEMENT MEASURE ELEMENT 7: TRAFFIC MANAGEMENT

For B13 (b) and C8 condition requirements, see Jim's CTMP in Appendix F. The findings and recommendations in the Construction Traffic Management Plan will be read in conjunction with the minimum requirements outlined below. A summary of the minimum plan requirements is provided in Table 11. These requirements are a minimum and are in addition to the CTMP & TCP.

14.1 SUMMARY OF POTENTIAL IMPACTS

The following potential impacts from Traffic may occur as part of the works program:

- Complaints from local residents;
- Breaches in Regulatory requirements;
- Safety and Health related issues; and
- Damage to local infrastructure.

Any impacts would be expected to be temporary only in nature and generally localised to the area of adjoining active works and transport routes but may have longer term impacts to Safety and Health related issues.

14.2 PROCEDURES

A summary of the minimum plan requirements is provided in Table 11 and are further outlined in the Construction Traffic Management Plan prepared by Jim's Traffic Control referenced in Appendix F.

Table 11: Summary of Traffic Management Procedures

ELEMENT	TRAFFIC MANAGEMENT
PERFORMANCE OBJECTIVES	Minimise the effect project related traffic movements (including parking availability and pedestrian movement) has on the local area and chosen haulage routes.
MANAGEMENT ACTIONS	Truck loading to be provided for on-site where possible. Truck movements to and from the site to be restricted to designated truck routes through the area. The management of the site works will be the responsibility of the site contractor. Pedestrian warning signs to be utilised in the vicinity of the site access points. Pedestrian arrangements, construction activity and erection of safety fencing will be provided in accordance with Safework requirements.
PERFORMANCE INDICATOR	Goal of nil complaints relating to traffic issues during the project
MONITORING	Low potential for impact

ELEMENT	TRAFFIC MANAGEMENT
RESPONSIBILITY	The Principal Contractor is responsible for ensuring that the traffic management plan is implemented by appropriately trained/qualified staff.
REPORTING	Maintenance of records relating to any complaints received, including subsequent non-compliance forms and corrective actions. A log of all truck and heavy equipment movements to be retained by the Principal Contractor.
CORRECTIVE ACTION AS REQUIRED	Revision of the traffic plan including revision to working hours as necessary, staggering truck access or adopting alternate haulage routes.

15 MEASURES TO PREVENT GROUNDWATER CONTAMINATION

The site history indicated that groundwater impacts at the site were not considered likely and, thus, a soil investigation only was undertaken, which is referenced in Appendix M. It was considered appropriate to investigate soil contamination only during the DSI, with the understanding that a groundwater investigation may need to be considered at a later stage, if significant visual / olfactory evidence of contamination was noted. No significant visual or olfactory evidence of contamination was noted and analytical results from soils sampling did not record any evidence of significant contamination, therefore a groundwater assessment was not undertaken and therefore not required to be a part of this CEMP.

16 EXTERNAL LIGHTING

As per Condition B11 and B13 (a) (vi) external lighting to the proposed Jordan Springs Public School complies with the AS4282-2019 – Control of the obtrusive effects of outdoor lighting. This is further substantiated with the design certificate prepared by Ergo Group which can be referenced in Appendix C.

17 MONITORING REQUIREMENTS

17.1 AUDITING AND RECORDS

The Project Manager will conduct regular audits of the Principal Contractors implementation of the CEMP. Audits will involve a review of all environmental documents, records and reports to assess compliance with the requirements of the CEMP. If non- compliance is detected, the Principal Contractor will initiate to the satisfaction of the Superintendent the appropriate corrective action.

Key environmental and procedural issues to be covered by the audit will include, but may not be limited to:

- Environmental management measures presented in Environmental Elements 1 to 7;
- Environmental management measures presented in the AMP;
- Adherence to reporting procedures;
- Complaint and incident management; and
- Legislative requirements.

Records of auditing and reporting will be maintained to demonstrate compliance with environmental requirements.

Environmental and construction records will include, but may not be limited to:

- Complaint records;
- Incident, non-conformance and corrective action reporting;
- Communications with stakeholders;
- Monthly waste management reporting;
- HGG monitoring if required;
- Daily asbestos monitoring if required; and
- CEMP audit documentation.

17.2 COMMUNITY COSULTATION & COMPLAINTS HANDLING

In accordance with condition B13 (a) (vii), members of the general public impacted by the construction phase are able to enquire and complain about environmental impacts via the following channels:

- Information booths and information sessions held at the school or local community meeting place, and advertised at least 7 days before in local newspapers, on our website and via letterbox drops
- 1300 number that is published on all communications material, including project site signage
- School Infrastructure NSW email address that is published on all communications material, including project site signage

COMPLAINT	ACKNOWLEDGEMENT TIMES	RESPONSE TIMES
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.
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.

Refer to SINSW Community Consultation Strategy referenced in Appendix E of this document for detail on our enquiries and complaints process.

18 ENVIRONMENTAL EMERGENCY

Specific and immediate responses to emergencies and environmental incidents will be determined by the Principal Contractor.

Table 13: Environmental Emergency Contacts

Pollution type or source	Organisation responsible	Telephone
Transport of dangerous goods	EPA	131 555
Chemical spills	Fire Brigade (HAZMAT) & EPA	000 or 131 555
Contaminated sites	EPA	131 555
Fertilisers, pesticides, herbicides	EPA	131 555
Radiation	EPA	131 555
Oil spillage in ports		
Garie Beach to the Victoria border	Port Kembla Port Corporation	02 4274 4571
Oil spillage in estuaries and inland waters	Fire Brigade	02 9319 7000 (Sydney) or 1800 422 281 (outside Sydney)
Other pollution of beaches, estuaries, tidal lakes, rivers, creeks, streams and lakes	EPA	131 555
Drinking water catchments		
Sydney and Wollongong	Sydney Water	132 090 (24 hours)
Elsewhere in NSW	N/A	N/A
Other water pollution		
Storm water channels	Sydney Water EPA	132 090 (24 hours) 131 555
Sewer overflows	Sydney Water	132 090 (24 hours)
Fish kills	EPA	131 555

19 SECURITY AND PUBLIC SAFETY

19.1 RESTRICTION TO ACCESS

Perimeter fencing and/ barricades that restrict access to the proposed work zone and stockpile area will be installed. Only authorised persons wearing the appropriated PPE will be able to enter the excavation/construction and stockpile/staging areas during works.

Whilst excavations remain open, the site is unattended and works are not active, high visibility fencing will be placed around the boundary of the excavation to alert any people on site to the presence of the excavation.

19.2 PEDESTRIAN AND TRAFFIC CONTROL

Relevant signage will be in place during the excavation works to warn and protect pedestrians and other traffic of the potential exposures in the vicinity of the work area.

Signage shall also be erected to inform the public whom to contact in case of any complains

20 REPORTING

Environmental Elements 1 to 8 of the Project include Performance Objectives to be applied to specific aspects of the works and Corrective Actions that may be adopted should non-conformances or environmental incidents occur.

20.1 NON-COMPLIANCE

A non-conformance is defined as a failure to fulfil a requirement of this consent (SSD 9354).All non-compliances must immediately be reported to the Contract Administrator, and the appropriate details of the non-compliance should be submitted (in writing via email) within 24 hours of the occurrence of the non-compliance.

The Project Manager or Subcontractors may identify and report a non-conformance.

20.2 ENVIRONMENTAL INCIDENT

An environmental incident is defined as an unplanned event or occurrence that causes, or threatens to cause, material harm and which may or may not be, or cause, a noncompliance. In the event of an environmental incident, the Contract Administrator should be notified immediately. The details of the environmental incident will be supplied to the Project Manager on reporting of any incident.

20.3 REPORTING AND CORRECTIVE ACTIONS

When reporting a non-compliance or environmental incident, all immediate corrective actions which have been taken to rectify the situation will be documented. Further corrective action should be recommended if required at the time of reporting. Relevant agencies which require notification should also be identified.

The Principal Contractor will maintain a register of all non-compliances and environmental incidents, along with the corrective and preventative actions which have been implemented to mitigate and/or prevent further recurrences. The Principal Contractor must verify that corrective actions to control environmental impacts, and avoid future non-compliances have been undertaken by the appropriate personnel.

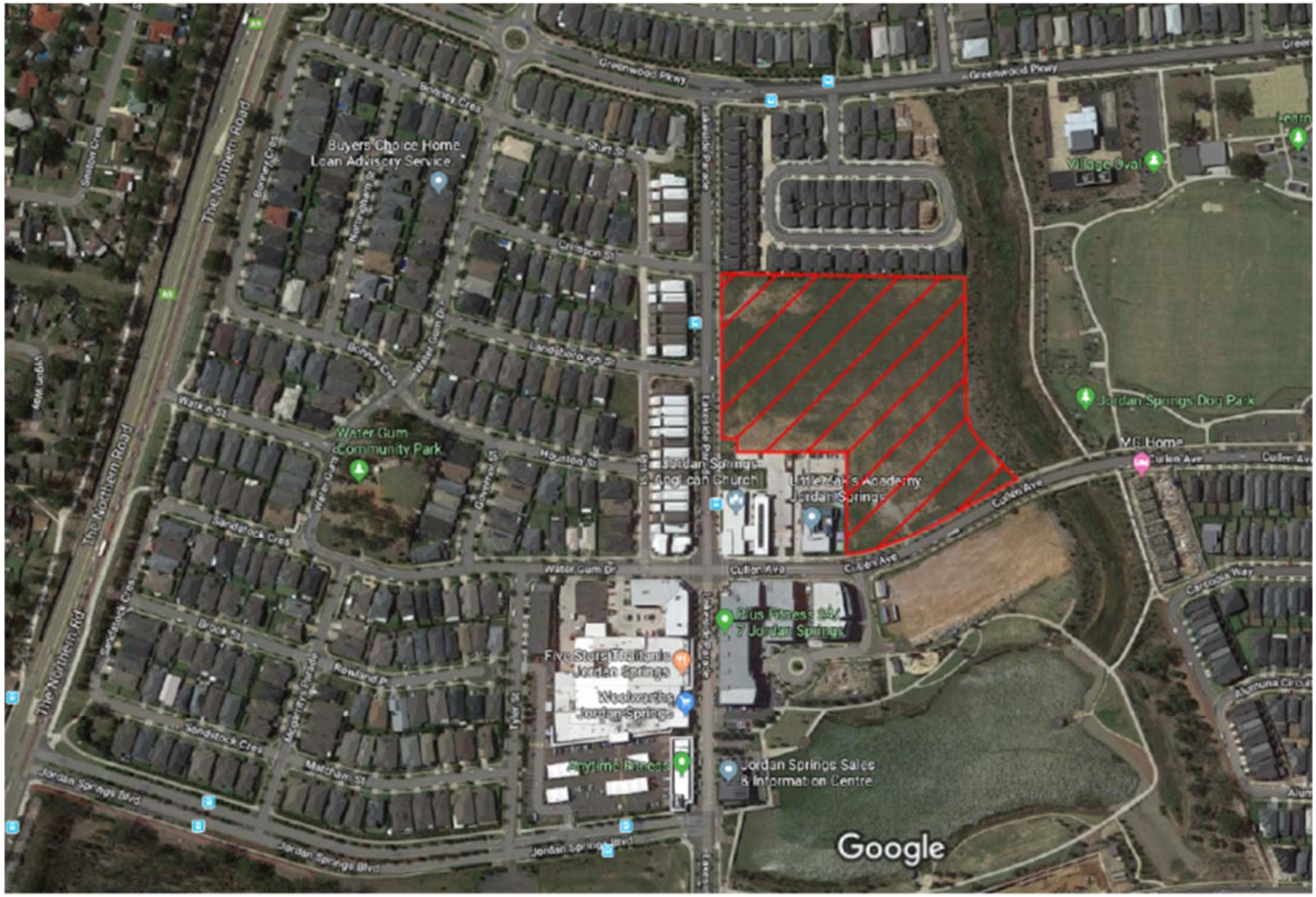
Table 14 details the general procedures to be undertaken when non-compliances and environmental incidents occur.

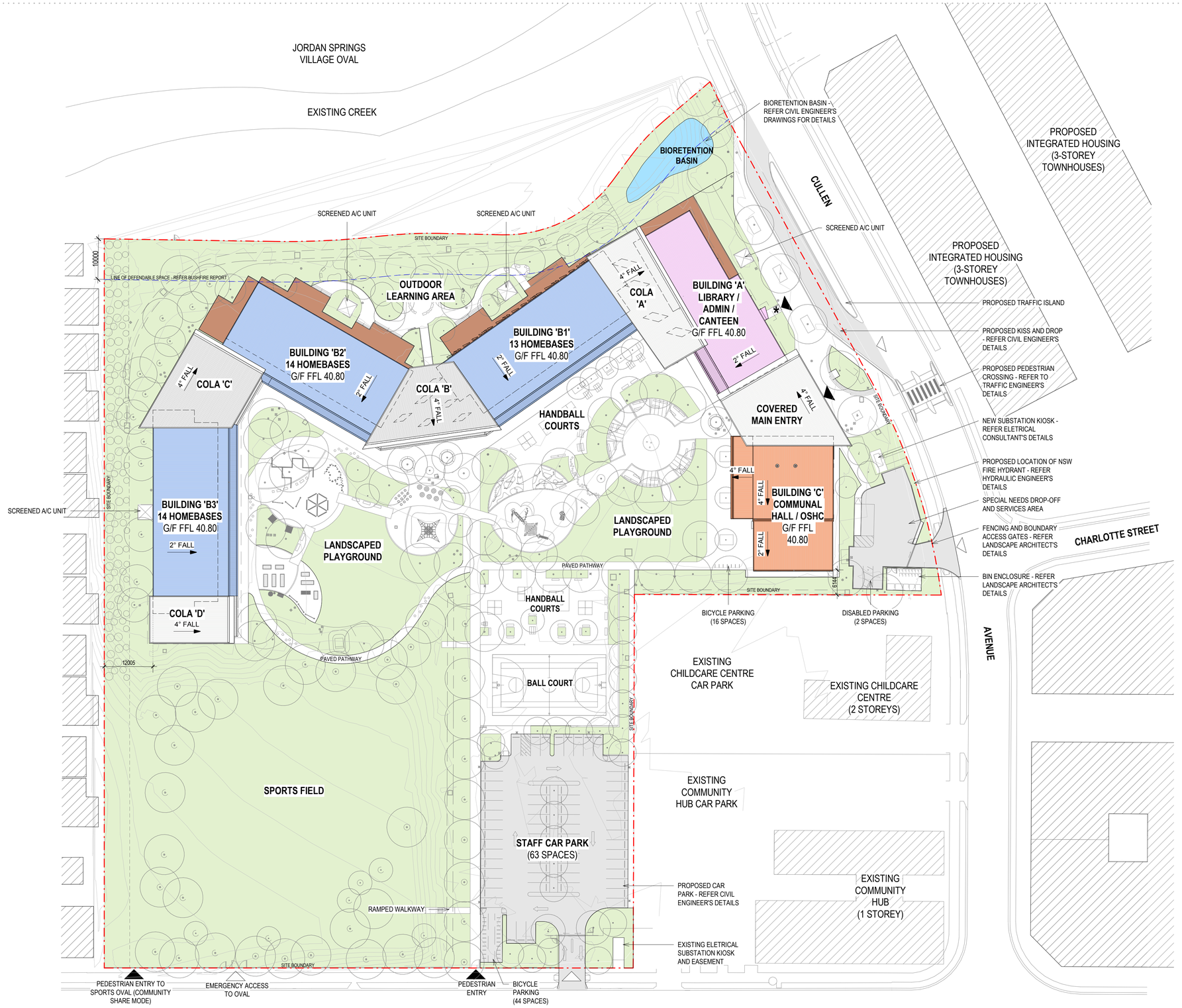
Table 14: Corrective and Preventative Action Procedures

ELEMENT	MANAGEMENT
OBJECTIVE	To implement a system to identify, document, analyse and implement corrective and preventative actions for environmental non-conformance issues
MANAGEMENT ACTIONS	When a non-conformance or environmental incident occurs the Principal Contractor is to verify corrective and preventive actions are implemented by: • Assigning personnel to undertake investigation as per 'Environmental Incident Investigation Report' Form or 'Non- Compliance Report' Form and designate lead investigator. • Maintain documentation of Investigation Report Forms and their corrective/preventive actions on site; • Report environmental non-conformances identified that cause or have the potential to cause a significant environmental impact immediately to the Contract Administrator.

ELEMENT	MANAGEMENT
	• Provide a summary of environmental non-conformances with • Outstanding corrective actions to the contract administrator as requested. • Utilise corrective/preventative actions to revise and update CEMP and/or CEMP objectives, operational controls, and other aspects as required. • Review outstanding corrective action status.
RESPONSIBILITY	All Staff and Subcontractors are: • Responsible for informing their immediate manager of environmental non-conformances. • Responsible for undertaking corrective/preventative actions and • effectiveness determinations as assigned.
REPORTING	Maintenance of records of '*Environmental Incident Investigation Report'* Forms and '*Non-Compliance Report*' Forms completed for the duration of the project.

APPENDIX A - SITE LOCATION & PROPOSED DEVELOPMENT PLAN


Greenwood Pkwy
Buyers Choice Home Loan Advisory Service
The Northern Road
Village Oval
Jordan Springs Dog Park
Water Gum Community Park
Jordan Springs Anglican Church
Lutheran's Academy Jordan Springs
Cullen Ave
Water Gum Dr
Five Senses Italiano Jordan Springs
Woolworths Jordan Springs
Anytime Fitness
Jordan Springs Sales & Information Centre
Jordan Springs Blvd
Google



1 SITE AND ROOF PLAN
1 : 500

NOTES - SITE PLANS

1. Refer Landscape Achitect's documentation for planting, fencing, and outdoor furniture equipment details.
2. Refer Civil Engineer's documentation for details of site and ground works, including pavements and retaining walls.
3. Refer Bushfire Report for requirements and details for Defendable Space.

0m 5m 10m 20m 30m N

General Notes:

2. Drawings to be printed in colour.
3. Do not scale drawings. Dimensions govern.
4. All dimensions are in millimetres unless noted otherwise.
5. All dimensions shall be verified on site before proceeding
6. Any areas indicated on this sheet are approximate and indicative only.

Drawing Notes:
1. Refer to **COM-AR-9010** for legend of all symbols and codes.
2. Refer to **COM-AR-9011/9012** for all drawing notes.
3. Refer to **COM-AR-9700** for Technical Schedule

Amendments

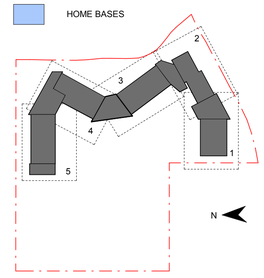
Issue	Description	Date
A	FOR COORDINATION	27.03.2019
B	PROGRESS ISSUE	10.05.2019
C	VEHICULAR CROSSINGS INDICATED	13.05.2019
D	PEDESTRIAN CROSSING ADDED	16.05.2019
E	TRAFFIC ISLAND ADDED	17.05.2019
F	GENERALLY AMENDED	22.05.2019
G	SSD SUBMISSION	31.05.2019
H	DRAFT DETAILED DESIGN	14.06.2019
I	DETAILED DESIGN ISSUE	21.06.2019
J	DD ADDENDUM 2	19.07.2019
1	FOR CONSTRUCTION	02.08.2019

LEGEND

- Site boundary
- Line of bushfire defendable space
- Existing neighbouring buildings
- Main pedestrian entry
- Vehicular entry
- * Administration Building entry

ZONES

- ADMIN / LIBRARY / CANTEEN
- HALL / OSHC
- HOME BASES



Contractor
RICHARD CROOKES CONSTRUCTIONS

Client
NSW GOVERNMENT Education

GROUP GSA
Group GSA Pty Ltd ABN 76 002 113 779
Level 7, 80 William St East Sydney NSW
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www.groupgsa.com

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architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title
JORDAN SPRINGS PUBLIC SCHOOL

Drawing Title
PROPOSED SITE AND ROOF PLAN

Scale @ A1	1 : 500
Drawing Created (date)	30/05/2019
Drawing Created (by)	DN
Plotted and checked by	DN
Verified	JS
Approved	MB

Project No 180646 Drawing No JS-AR-1100 Issue 1

2/08/2019 4:55:35 PM

APPENDIX B – ASBESTOS MANAGEMENT PLAN

RICHARD CROOKES
CONSTRUCTIONS

JORDAN SPRINGS PS
1157

ASBESTOS MANAGEMENT PLAN

6 June 2019

This plan has been approved for use by the following:

Approved by / Date

Project Manager

Approved by / Date

Craig Richmond, Business Systems , QA/Env Manager

Approved by / Date

Garry Mansfield WHS Manager

Approved by / Date

Ian West, General Manager – Commercial & Risk

AUTHORITY POSITION	COMPANY NAME	NO. OF COPIES
<Client / Superintendent>	School Infrastructure / TSA Management	1 copy
<Project Manager>	Richard Crookes Constructions	1 copy
<Site Manager>	Richard Crookes Constructions	1 copy

REVISION REGISTER

REVISION DATE	REVISION DESCRIPTION	PMS INITIALS (ACCEPTANCE OF CHANGES)
June 2019	Original issue	DV

POSITION	NAME	SIGNATURE	REVISIONS

DELETE IF NOT REQUIRED

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.

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

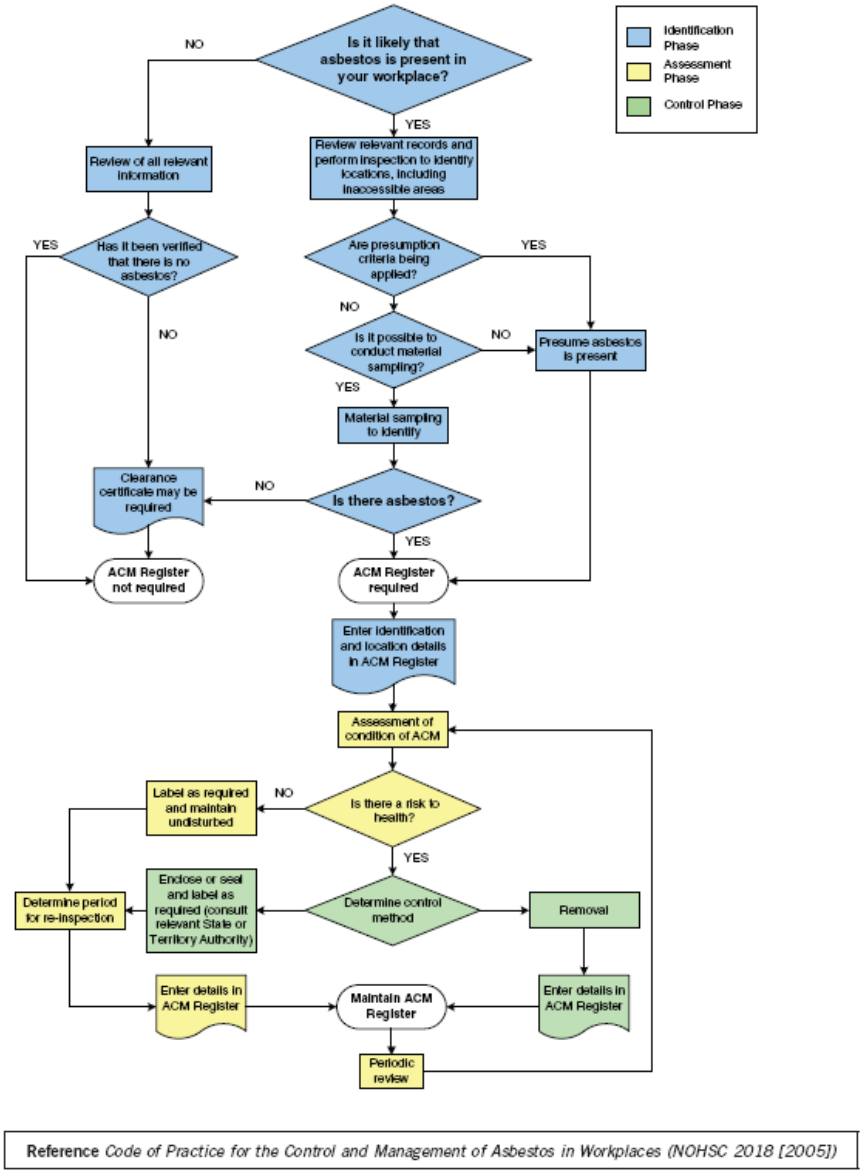


Figure 1: General principles of an asbestos management plan

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

Relevant State legislation includes:

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

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-Dec 2011
- COP- How to safely remove asbestos-Dec 2011

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.
Site Manager (SM) Health Safety and Environmental Coordinator (HSE)	▪ Obtain from Subcontractor, copy of WorkCover 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 ▪ 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: 2002 (2005)].

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 WORKCOVER – NOTIFICATION

For Bonded ACM, in quantities greater than 10m^2, requiring a licensed contractor (AS-B) to complete the removal works, a WorkCover 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. WorkCover will review the application and return the first two pages,

stamped with an official WorkCover approval. No works are to proceed prior to the receipt of the Notification.

RCC will require a copy of the WorkCover stamped 'Notification' prior to issuing an RCC Asbestos removal permit.

5.1.3 WORKCOVER – PERMIT

For all Friable removal works, regardless of quantity, a suitably licensed contractor (AS-A) must apply to WorkCover 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. WorkCover will review the application and return the first two pages stamped with an official WorkCover 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 WorkCover '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 in to 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 WorkCover 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 into the area indicating that 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 WorkCover 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.

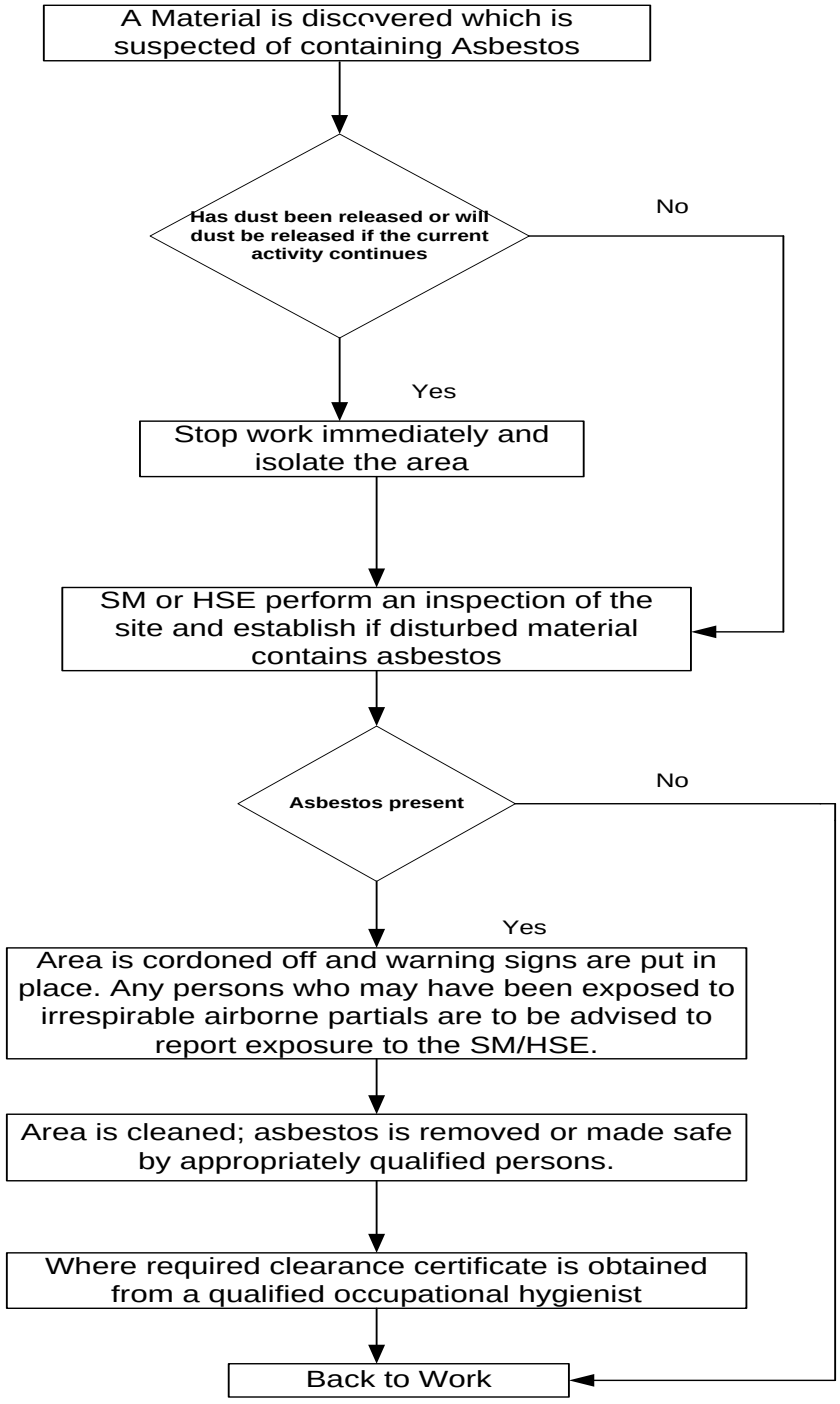
Before being issued with an Asbestos Removal Permit, individuals will be required to peruse the RCC Asbestos Management Plan and the Asbestos Register. Where practicable, contractors should be made aware of the requirements of the plan prior to tendering to ensure they allow for such requirements when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

APPENDIX 1 – 21.11 ASBESTOS CONTAINING MATERIAL (ACM) REGISTER

Project Name:	Jordan Springs PS	Report date:	
Project Number:	1157		

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:	Alex Avenue and Jordan Springs PS	Project Number :	1157

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 / WorkCover 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 2011
Codes of Practice: COP For the safe removal of Asbestos [NOHSC:2002(2005)] COP- How do manage and control asbestos in the workplace- Dec 2011 COP- How to safely remove asbestos- Dec 2011
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

SYDNEY

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ARTARMON NSW 2064

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APPENDIX C - EXTERNAL LIGHTING COMPLIANCE

CERTIFICATE OF INSTALLATION

ELECTRICAL – EXTERNAL LIGHTING DURING CONSTRCTION

Site Details:					
Project Name.	Jordan Springs Public School				
Level/Unit no.	Ground	Street no. / Street name:	14 Cullen Ave		
Suburb:	Jordan Springs	State:	**NSW**	Postcode:	2747
Description of Work:	**External Lighting – During Construction**				

Pursuant to the provisions of the Environment Planning and Assessment Regulations 2000 and Clause A2.2 of the Building Code of Australia:

I Jacob Maguire (name) of Ergo Group Pty Ltd (company)

hereby certify that the external lighting has been installed / implemented / constructed in the above building/development and they have been inspected, assessed and tested (where appropriate) in accordance with:-

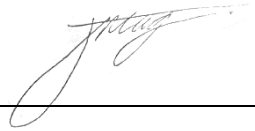
a)	The following Australian Standards:	AS 3000-2018, AS 4282 -2019

Exclusions: ~~Yes~~ or No

Details of any exclusions: .....

Where there are no exclusions, I certify that this certificate covers all electrical – external lighting installations within the whole building / development.

I also certify that I am an appropriately qualified and competent person practicing in the relevant area of work. I have recognised relevant experience in the area of work being certified. I / my employer hold/s appropriate current professional indemnity insurance to the satisfaction of the building owner or the principal authorising the design work being certified.

Name:	Jacob Symington Maguire	*Licence No.:*	244354C
Company Name:	Ergo Group Pty Ltd	*ABN No:*	48 154 689 380
Company Address:	Unit 25 17-21 Bowden Street, Alexandria NSW 2015	*Tel:*	02 9519 1179
Signature:		*Position Title:*	Supervisor
		Date:	12/09/2019

APPENDIX E - COMMUNITY CONSULTATION & COMPLAINTS HANDLING

NSW GOVERNMENT Education

September 2019

School Infrastructure NSW

Community Communication Strategy

Jordan Springs new primary school

Contents

Document Purpose

This Community Communication Strategy (CCS) has been developed to:

- Successfully consider and manage stakeholder and community expectations as integral to the successful delivery of the project.
- Outline interfaces with other disciplines, including safety, construction, design and environment, to ensure all activities are co-ordinated and drive best practice project outcomes.
- Inform affected stakeholders, such as the local community or road users about construction activities.
- Provide a delivery strategy which enables the open and proactive management of issues and communications.
- Highlight supporting procedures and tools to enable the team to deliver this plan effectively.
- Provide support for the broader communications objectives of School Infrastructure NSW (SINSW), including the promotion of the project and its benefits.

This Community Consultation Strategy (CCS) will be implemented through the design and construction phase of the project, and for 12 months following construction completion.

Plan review

The CCS will be revised regularly to address any changes in the project management process, comments and feedback by relevant stakeholders, and any changes identified as a result of continuous improvement undertakings. This will be done in close consultation with the SINSW Senior Project Director, appointed Project Management Company and/or Contractor and SINSW Community Engagement Manager.

Approval

The CCS is reviewed and approved by the SINSW Senior Project Director, in close consultation with Schools Operations and Performance, with final endorsement from the SINSW Community Engagement Senior Manager before being submitted to the Planning Secretary for approval.

Table 1: List of SSD requirements and where they are addressed

State Significant Developments B8	The community communications strategy addresses this in section
Identify people to be consulted during the design and construction phase	▪ Section 4 ▪ Section 5
Set out procedures and mechanisms for the regular distribution of accessible information about or relevant to the development	▪ Section 6 ▪ Section 7 ▪ Section 8.4
Provide for the formation of community-based forums, if required, that focus on key environmental management issues for the development	▪ Section 4
Set out procedures and mechanisms:	
▪ Through which the community can discuss or provide feedback to the Applicant	▪ Section 4, PRG ▪ Section 6 ▪ Section 8.5
▪ Through which the Applicant will respond to enquiries or feedback from the community; and	▪ Section 8.5
▪ To resolve any issues and mediate any disputes that may arise in relation to construction and operation of the development, including disputes regarding rectification or compensation.	▪ Section 8.5

1. Context

The NSW Government is investing $6.7 billion over the next four years to deliver more than 190 new and upgraded schools to support communities across NSW. In addition, a record $1.3 billion is being spent on school maintenance over five years. This is the largest investment in public education infrastructure in the history of NSW.

A project is underway to provide a new public school for Jordan Springs. The project will include:

- innovative learning spaces
- a library and a hall
- modern core facilities such as staff and administration areas
- a covered outdoor learning area (COLA).

The Jordan Springs new primary school is classified as a state significant development, and has been assessed by the Department of Planning and Environment (DPE). Consent was provided on 5 September 2019.

DPE's web page on the project is https://www.planningportal.nsw.gov.au/major-projects/project/13046 .

2. Community Engagement Objectives

SINSW's mission is to provide school infrastructure solutions by working collaboratively with all our stakeholders to create learning environments across NSW that serve our future needs and make us all proud.

This CCS has been developed to achieve the following community engagement objectives:

- Promote the benefits of the project
- Build key school community stakeholder relationships and maintain goodwill with impacted communities
- Manage community expectations and build trust by delivering on our commitments
- Provide timely information to impacted stakeholders, schools and broader communities
- Address and correct misinformation in the public domain
- Reduce the risk of project delays caused by negative third party intervention
- Leave a positive legacy in each community.

3. Key Messages

Through each phase of the project, the key messages and means of engagement will be regularly reviewed, refined and updated. Information that is currently in the public domain is outlined below.

3.1. High level messaging

The NSW Government is investing $6.7 billion over the next four years to deliver 190 new and upgraded schools to support communities across NSW. In addition, a record $1.3 billion is being spent on school maintenance over five years. This is the largest investment in public education infrastructure in the history of NSW.

3.2. Project messaging

3.2.1. Project status

The State Significant Development Application has been assessed by the Department of Planning & Environment and consent has been granted.

3.2.2. Project benefits

A project is underway to provide a new public school for Jordan Springs. The project will include:

- innovative learning spaces
- a library and a hall
- modern core facilities such as staff and administration areas
- a covered outdoor learning area (COLA).

3.2.3. High-quality learning environment

The project will provide state-of-the-art classrooms and learning spaces that make use of the latest technology to enhance the learning experience for the next generation of students. Furthermore, the contemporary and sustainable facilities provide an outstanding working environment for school staff.

Flexible learning spaces are adaptable to accommodate small or large groups and facilitate students use of modern technology, while working independently and collaboratively.

3.2.4. Environmental benefits

The new school will be built in accordance with current sustainability principles. School Infrastructure NSW is committed to environmentally conscious construction and maintenance practices.

3.3. Construction phase

3.3.1. Traffic management

The construction contractor has developed a Traffic Management Plan to ensure that vehicle movements are managed with minimal disruption to the local community. All construction vehicles (excluding worker vehicles) are to be contained wholly within the site, except if located in an approved on-street work zone, and vehicles must enter the site before stopping.

3.3.2. Safety

School Infrastructure NSW is committed to ensuring that work is completed safely and efficiently and with minimal impact to the local community. Prior to construction starting, any hazardous material is required to be removed from the site. This work will be carried out in accordance with regulatory requirements including the provisions of SafeWork NSW.

3.3.3. Noise and dust

Any activity that could exceed approved construction noise management levels will be managed in strict accordance with the Protection of the Environment Operations Act 1997.

Mitigation measures will be in place to manage noise and dust levels, including hoarding to minimise the effects of noise and dust and hosing down as required to ensure the safety of the school and local community.

These measures will be discussed with local residents at community engagement sessions prior to construction commencement,

Construction works, including the delivery of materials to and from the site, will take place between 7am and 6pm Monday to Friday and between 8am and 1pm on Saturdays. No night work is scheduled for this project and no work will occur on Sundays or public holidays.

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.

Activities may be undertaken outside of these hours if required:

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

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

3.3.4. Disruptive works

Construction work for the Jordan Springs new primary school is underway. The following activities are planned for the upcoming weeks (*works will be outlined*). You can contact us directly using the details below to discuss any aspect of this work.

3.3.5. Get involved

We are committed to working together with our school communities and other stakeholders to deliver the best possible learning facilities for students. Your feedback is important to us. For more information contact us via the details below.

- Email: schoolinfrastructure@det.nsw.edu.au
- Website: schoolinfrastructure.nsw.gov.au
- Phone: 1300 482 651

3.4. Handover phase

3.4.1. Traffic and access

Construction work on the Jordan Springs new primary school has been completed. We are now in a position to confirm access provisions for the new school, including pick-up and drop-off arrangements.

3.5. Official school opening

- A new primary school in Jordan Springs was completed today, and delivered brand new facilities including innovative learning spaces, a library and a hall, modern core facilities such as staff and administration areas and a covered outdoor learning area (COLA).

Thank you for your patience during construction and we are thrilled to deliver this project for the school community.

4. Project Governance

4.1. Project Reference Group

The Department's engagement process strives to engage with key stakeholders from the school community. As part of this process, a Project Reference Group (PRG) is established early in the project with nominated representatives from the school community to ensure input from, and consultation with, impacted stakeholders.

The PRG provides key information from an operational, educational, change and logistics perspective into the planning, through the design and construction phases of the project.

The PRG will receive project briefings and key progress updates on project progress to support its responsibilities in assisting to communicate updates to school staff, parents and stakeholders in the wider local community.

The Project Reference Group will be conducted as two separate groups during the development and delivery of all projects:

(a) Project Reference Group – Planning

A nominated group (limited to 10) will participate in workshops to develop the Educational Principles and Education Rationale which will inform the Functional Design Brief. These workshops are chaired by the SINSW Senior Project Director (or delegate) and may be facilitated by an Education Consultant. This activity will inform the development of the building design.

(b) Project Reference Group – Delivery

The purpose of the group is to seek input and inform design processes and provide operational requirements and information to help minimise the impact of the project on school operations. These workshops are chaired by the Senior Project Director (or delegate) and may be facilitated by the appointed architectural consultant, as required. The PRG will provide key information from an operational and logistics perspective to assist project delivery.

Specifically to communications and engagement related matters, the PRG will also:

- Provide a forum for discussion and exchange of information relating to the planning and delivery of the project
- Identify local issues and concerns to assist the project team with the development of mitigation strategies – to manage and minimise construction and environmental impacts to the school community and local residents
- Provide feedback to the communications and community engagement team on key messages and communications and engagement strategies
- Provide advice on school engagement activities
- Assist to disseminate communications to the school community and other stakeholders.

As per all department led delivery projects, the PRG acts as a consultative forum and not a decision-making forum for the planning and delivery of this school infrastructure.

Figure 1: Project Reference Group (PRG)

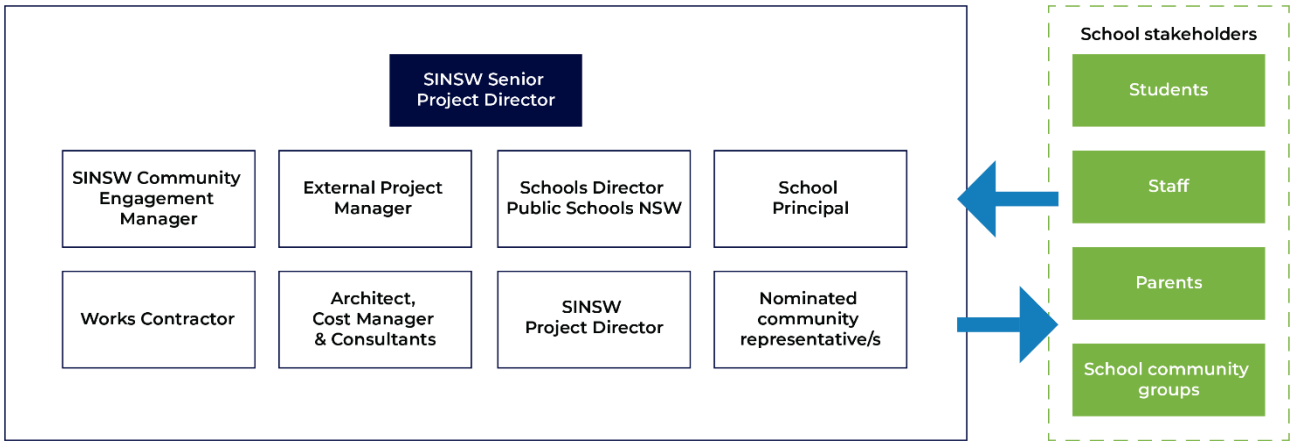
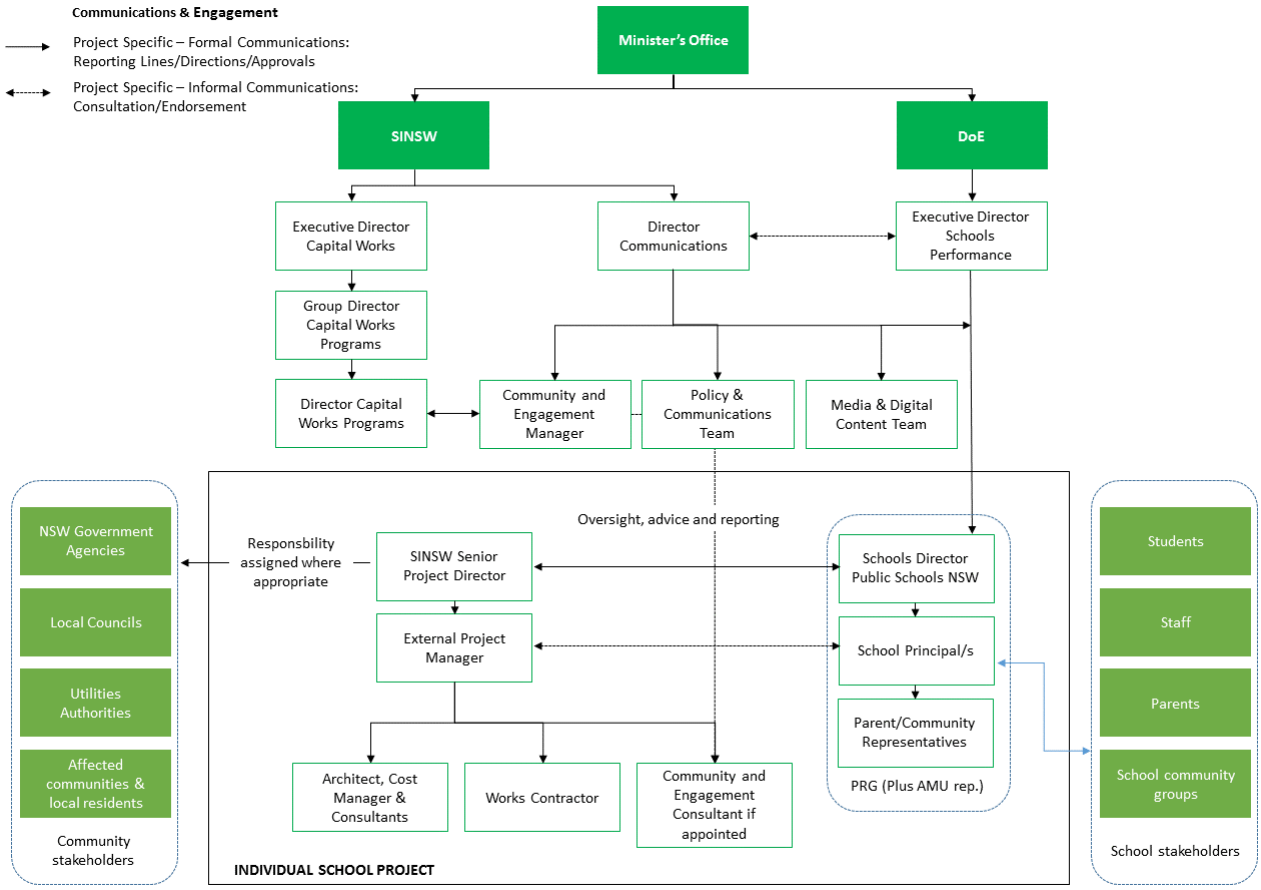


Figure 2 below maps how the department and SINSW will communicate both internally and externally.

Figure 2: SINSW Project Governance



5. Stakeholders

Per Condition B8(a), the stakeholder list below summarises who will be consulted during the design and construction phase via ongoing face to face meetings, communications collateral and digital engagement methods.

Table 2: Stakeholders

Stakeholders	Interest and involvement
Local Members of Parliament: ▪ State Member for Londonderry Prue Car ▪ Federal Member for Lindsay Melissa Macintosh	▪ Meeting the economic, social and environmental objectives of state and federal governments ▪ Delivering increased public education capacity on time ▪ Delivering infrastructure which meets expectations ▪ Addressing local issues such as traffic, congestion and public transport solutions
Government agencies and peak bodies: ▪ Transport for NSW ▪ Roads and Maritime Services NSW ▪ Fire and Rescue NSW ▪ NSW Department of Education ▪ NSW Department of Planning and Environment ▪ NSW Environmental Protection Authority ▪ NSW Rural Fire Service ▪ Sydney Water ▪ NSW Heritage Council ▪ NSW Office of Environment and Heritage ▪ NSW Department of Premier and Cabinet	▪ Traffic and congestion on the local road system ▪ Adequate public transport options and access ▪ Ensuring new infrastructure meets standard requirements for safety and fire evacuation ▪ Ensuring the development is compliant ▪ Ensuring the development does not impact heritage items ▪ Easing overcrowding in local schools
Local Council – Penrith City Council ▪ Councillors ▪ Bureaucrats ▪ Mayor ▪ General Manager	▪ Schedule for construction and opening of school ▪ Plans for enrolled students during the operation of the temporary school ▪ Impacts to the local community including noise, congestion and traffic ▪ Shared use of community spaces ▪ Providing amenities to meet increase population density
School community ▪ Principal (once appointed) ▪ Teachers (once appointed) ▪ Staff (once appointed) ▪ Prospective parents and carers ▪ Prospective students	▪ Safe pedestrian and traffic access to the temporary school during construction ▪ Construction impacts and how these will be minimised ▪ Quality of infrastructure and resources upon project completion ▪ How to access the new school once completed
Local community	▪ Noise and truck movements during construction

Stakeholders	Interest and involvement
Greenwood Parkway Lakeside Parade Cullen Avenue Sturt Street Crimson Street Landsborough Street Governer Street Houston Street Water Gum Drive Jordan Springs Boulevard Tyler Street McGarritys Parade Rowland Place Matcham Street Sandstock Crescent Alinta Promenade Alumna Circuit Carcoola Way Cabarita Way Barrow Circuit Pitt Street	▪ Increased traffic and congestion on nearby streets ▪ Local traffic and pedestrian safety ▪ Changed traffic conditions during pick-up and drop-off ▪ Shared use of school facilities and amenities
Nearby public schools ▪ Cranebrook High School ▪ Cambridge Gardens Public School ▪ Kingswood Park Public School ▪ Samuel Terry Public School ▪ Corpus Christi Catholic Primary School ▪ Llandilo Public School	▪ Impact on school resources ▪ Impact on current students ▪ Implications for teaching staff ▪ Possible impacts on enrolments ▪ Opportunities to view the new facilities
Adjoining affected landowners and businesses ▪ Deerubbin Local Aboriginal Land Council ▪ Penrith Valley Chamber of Commerce ▪ Jordan Springs Anglican Church ▪ Little Zak's Academy ▪ Terry White Chemist ▪ Lendlease	▪ Noise and truck movements during construction ▪ Increased traffic and congestion on nearby streets ▪ Local traffic and pedestrian safety ▪ Changed traffic conditions during pick-up and drop-off ▪ Shared use of school facilities and amenities ▪ Environmental impacts during construction

6. Engagement Approach

The key consideration in delivering successful outcomes for this project is to make it as easy as possible for anyone with an interest to find out what is going on. In practice, the communications approach across all levels of engagement will involve:

- Using uncomplicated language
- Taking an energetic approach to engagement
- Encouraging and educating whenever necessary
- Engaging broadly including with individuals and groups that fall into harder to reach categories
- Providing a range of opportunities and methods for engagement
- Being transparent
- Explaining the objectives and outcomes of planning and engagement processes.

In addition to engagement with Government Departments and Agencies and Council, two distinct streams of engagement will continue for the project as follows:

- School community for existing schools being upgraded, or surrounding schools for new schools, and
- Broader local community.

This allows:

- School-centric involvement from school communities (including students, parents/caregivers, teachers, admin staff) unencumbered by broader community issues, and
- Broad community involvement unencumbered by school community wants and needs. Broad community stakeholders include local residents, neighbours and local action groups.

6.1. General community input

Condition B8(b) requires the Department of Education to set our procedures and mechanicisms for the regular distribution of information regarding the development. See Table 3 for this information. Condition B8(c) requires the provision for community based forums, see Table 3, particularly *Information Booths* for details.

Members of the general public impacted by the construction phase are able to enquire and complain about environmental impacts via the following channels:

- Information booths and information sessions held at the school or local community meeting place, and advertised at least 7 days before in local newspapers, on our website and via letterbox drops
- 1300 number that is published on all communications material, including project site signage
- School Infrastructure NSW email address that is published on all communications material, including project site signage

Refer to Section 8.5 of this document for detail on our enquiries and complaints process.

A number of tools and techniques will be used to keep stakeholders and the local community involved as summarised in table 3 below.

For reference, project high level milestones during the delivery phase include:

- Site establishment/early works
- Commencement of main works construction
- Term prior to project completion
- Project completion
- First day of school following project completion
- Official opening

Table 3: School Infrastructure NSW Communications Tools

Communications Tool	Description of Activity	Frequency
1300 community information line	The free call 1300 482 651 number is published on all communication materials and is manned by SINSW. All enquiries that are received are referred to the appointed C&E Manager and/or Senior Project Director as required and logged in our CRM. Once resolved, a summary of the conversation is updated in the CRM.	Throughout the life of the project and accessible for 12 months post completion
Advertising (print)	Advertising in local newspapers is undertaken with at least 7 days' notice of significant construction activities, major disruptions and opportunities to meet the project team or find out more at a face to face event.	At project milestones or periods of disruption
Call centre scripts	High level, project overview information provided to external organisations who may receive telephone calls enquiring about the project, most namely stakeholder councils.	Throughout the project when specific events occur or issues are raised by stakeholders
Community contact cards	These are business card size with all the SINSW contact information. The project team/ contractors are instructed to hand out contact cards to stakeholders and community members enquiring about the project. Cards are offered to school administration offices as appropriate. Directs all enquiries, comments and complaints through to our 1300 number and School Infrastruture NSW email address.	Throughout the life of the project and available 12 months post completion
CRM database	All projects are created in SINSW's Customer Relationship Management system – Darzin - at project inception. Interactions, decisions and feedback from stakeholders are captured, and monthly reports generated. Any enquiries and complaints are to be raised in the CRM and immediately notified to the Senior Project Director, Project Director and Community Engagement Manager.	Throughout the life of the project and updated for 12 months post completion
Display boards	A0 size full colour information boards to use at info sessions or to be permanently displayed in appropriate places (school admin office for example).	As required
Door knocks	Provide timely notification to nearby residents of upcoming construction works, changes to pedestrian movements, temporary bus stops, expected impacts and proposed mitigation. Provide written information of construction activity and contact details.	As required prior to periods of construction impacts
Face-to-face meetings/briefings	Activities include meeting, briefings and "walking the site" to engage directly with key stakeholders, directly impacted residents and business owners and the wider community.	As required

Communications Tool	Description of Activity	Frequency
FAQs	Set of internally approved answers provided in response to frequently asked questions. Used as part of relevant stakeholder and community communication tools. These are updated as required, and included on the website if appropriate.	Throughout the life of the project
Information booths	Information booths are held locally and staffed by a project team member to answer any questions, concerns or complaints on the project. Info booths are scheduled from the early stages of project delivery through to project completion. Information booths are to be held both at the school/ neighbouring school, as well for the broad community: ▪ School information booths are held at school locations at times that suit parents and caregivers, with frequency to be aligned with project milestones and as required. ▪ Community information booths are usually held at local shopping centres, community centres and places that are easily accessed by the community. They are held at convenient times, such as out of work hours on weekdays and Saturday's. Collateral to be provided include community contact cards, latest project notification or update, with internal FAQs prepared. All liaison to be summarised and loaded in the CRM. Notice of at least 7 days to be provided.	At project milestones and as required
Information sessions (drop in)	Information sessions are a bigger event than an info booth, held at a key milestone or contentious period. We have more information on the project available on display boards/ screens and an information pack handout – including project scope, planning approvals, any impacts on the school community or residents, project timeline, FAQs. Members from the project and communications team will be available to answer questions about the project. These events occur after school hours on a week day (from 3pm – 7pm to cover working parents). All liaison summarised and loaded on the CRM.	As required
Information pack	A 4 page A4 colour, fold out flyer that can include: ▪ Project scope ▪ Project update ▪ FAQs ▪ Contact information ▪ Project timeline	As required

Communications Tool	Description of Activity	Frequency
	To be distributed at info sessions or at other bigger events/ milestones in hard copy and also made available electronically.	
Media releases/events	Media releases are distributed upon media milestones. They promote major project milestones and activities and generate broader community awareness.	Media milestones: ▪ Project announcement ▪ Concept design completed ▪ Planning approval lodged ▪ Planning approval granted ▪ Construction contract tendered ▪ Construction contract awarded ▪ SOD turning opportunity ▪ Handover ▪ Official opening
Newsletters	Available in hard copy and electronic format. A monthly or quarterly newsletter providing updated information on project scope, benefits, construction progress, achievement of project milestones and other project related issues of interest. Similar to an info pack in content, but used as a regular high level update for the community.	As required, related to high level project milestones
Notifications	A4, single or double sided, printed in colour that can include FAQs if required Notifications are distributed under varying templates with different headings to suit different purposes: ▪ **Works notification** are used to communicate specific information/ impacts about a project to a more targeted section of the community. This template doesn't have an image so it can be more appropriately targeted for matters like hazardous material. ▪ **Project update** is used when communicating milestones and higher level information to the wider community i.e. project announcement, concept design/DA lodgement, construction award, completion. Always includes the project summary, information booths/ sessions if scheduled, progress summary and contact info.	As required according to the construction program. Distibuted via letterbox drop to local residents and via the school community at least 5-7 days prior to construction activities or other milestones throughout the life of the project. Specific timings indicated in table 5 – Section 8.
Photography, time-lapse photography and videography	Captures progress of construction works and chronicles particular construction activities. Images to be used in notifications, newsletters and report, on the website and	Project completion (actual photography and

Communications Tool	Description of Activity	Frequency
	Social Media channels, at information sessions and in presentations. Once the project is complete, SINSW will organise photography of external and internal spaces to be used for a range of communications purposes.	video of completed project) Prior to project completion - artist impressions, flythrough, site plans and contruction progress images are used
Presentations	Details project information for presentations to stakeholder and community groups.	As required
Priority correspondence	Ministerial (and other) correspondence that is subject to strict response timeframes. Includes correspondence to the Premier, Minister, SINSW and other key stakeholders. SINSW is responsible for drafting responses as requested within the required timeframes.	As required
Project Reference Group	SINSW facilitated Project Reference Group sessions providing information on the design solution, construction activities, project timeframes, key issues and communication and engagement strategies.	Meets every month or as required More information on the PRG is detailed in Section 4
Project signage	A0 sized, durable aluminium signage has been installed at the new primary school site. Provides high level information including project scope, project image and SINSW contact information. Fixed to external fencing/ entrances etc. that are visible and is updated if any damage occurs.	Throughout the life of the project and installed for 12 months post completion
Site visits	Demonstrate project works and progress and facilitate a maintained level of interest in the project. Includes media visits to promote the reporting of construction progress.	As required
School Infrastructure NSW email address	Provide stakeholders and the community an email address linking direct to the Community Engagement team. Email address (schoolinfrastructure@det.nsw.edu.au) is published on all communications materials.	Throughout the life of the project
School Infrastructure NSW website	A dedicated project page for Jordan Springs new primary school is located on the SINSW website - https://www.schoolinfrastructure.nsw.gov.au/projects/j/jordan-springs-new-primary-school.html	Updated at least monthly and is live for at least 12 months post completion of the project
Welcome pack/ thank you pack	At project completion the following flyers are utilised: ▪ **Welcome pack** – project completion for school community - A 2 to 4 page A4 flyer which is provided to the school community on the first day/week they are returning to school when new facilities are opening, or attending a new school. Includes project overview, map outlining access to the school and key locations, FAQs, contact information.	Project completion only

Communications Tool	Description of Activity	Frequency
	▪ **Thank you pack** – A 2 to 4 page A4 flyer tailored to the local residents to thank them for their patience and support of the project.	

7. Engagement Delivery Timeline

The following engagement delivery timeline maps tailored communications tools and activities by key milestone.

Table 4: Engagement timeline

Milestone	Audience	Channels	Timing
Prior to first delivery of components	▪ Neighbours ▪ Local community	▪ Letterbox drop project update ▪ Works notification ▪ Door knock to houses on affected street ▪ Website update ▪ SINSW email address and hotline ▪ Media release	Late September 2019
Main construction works, including but not limited to: ▪ Remediation ▪ Construction milestones Key impact periods – noise, dust, traffic, vibration	▪ Neighbours ▪ Local community ▪ Potential future students and parents ▪	▪ Information session ▪ Project update letterbox drop ▪ Website update ▪ Contact cards ▪ SINSW email address and hotline ▪ Media release	Late 2019 (at key construction events as required, as per our notification process in Table 5)
Term prior to project completion	▪ Neighbours ▪ Local community ▪ Future students and parents ▪ Future staff	▪ Information session ▪ Project update letterbox drop ▪ Website update ▪ Contact cards ▪ SINSW email address and hotline	Late 2020
Handover and welcome to new school	▪ Future students and parents ▪ Future staff ▪ Local community	▪ Project update letterbox drop ▪ Website update ▪ SINSW email address and hotline ▪ Media release ▪ Site tours	Early 2021
Opening	▪ New students and parents ▪ New staff	▪ Official opening ceremony	Early 2021
Post-opening	All	▪ Website remains live ▪ Project signage remains installed ▪ 1300 phone and email still active, and CRM still maintained for complaints and enquiries.	Early 2022 (at least 12 months post construction completion)

8. Protocols

8.1. Media engagement

SINSW manages all media relations activities, and is responsible for:

- Responding to all media enquiries and instigating all proactive media contact.
- Media interviews and delegation to SINSW media spokespeople who are authorised to speak to the media on behalf of the project
- Informing the Minister's Office and SINSW project team members and communications representatives of all media relations activities in advance and providing the opportunity to participate in events where possible.

8.2. Site visits

SINSW in partnership with Schools Operations and Performance organises and hosts guided project site tours and media briefings as required by the Minister's Office. The Project Team will ensure the required visitor site inductions are undertaken and that all required Personal Protective Equipment (PPE) is worn.

For media site visits and events, SINSW creates, or contributes to, the production of an event pack. This will include an event brief, media release, speaking notes and Q&As.

8.3. Social, online and digital media

SINSW initiates and maintains all social and online media channels. These channels can include Facebook, Twitter, LinkedIn and the website. The SINSW Online Content Team upload to the SINSW website.

8.4. Notification process

Notifications (titled works notifications or project updates as per Table 3) are SINSW's prescribed notification requirement and are the primary mechanism to inform the community and key stakeholders about the impact of school construction on the local area. Notifications provide advance warning of activities and planned disruptions, as per the notice periods in Table 5 below, allowing stakeholders and community members to plan for the impacts and make alternative arrangements where required. Notifications are distributed in person via door knocks, via letterbox drop, via the school and electronically via email.

The C&E Manager advises the project team of the relevant notification requirements and timeframes to be met. The team obtains the information necessary to meet these timeframes by:

- Having oversight of the project delivery program
- Visiting site as required
- Attending and participating in construction meetings, planning meetings, and Risk and Opportunity workshops.

Table 5: Notifications periods

Works activity	Minimum community notification period
Notification to communities following major incident	Same day
Emergency works/unforeseen events	Same day
Contamination management and notification	Within 48 hours
Upcoming works notification (minimum disruption)	5- 7 days
Invitation/notification of community event (e.g. info booth)	5 – 7 days
Notifications regarding traffic changes, parking impacts, road closures, major detours	10 – 14 days
Pedestrian route changes and other impacts	10 – 14 days

Works activity	Minimum community notification period
Notifications regarding operational changes for the school community (school drop-off points, entry and exit points)	10 - 14 days
Major construction impacts (out of hours/ significant noise/ demolition)	10 – 14 days
Major impacts to school community e.g. relocation to temporary school	6 months

8.5. Enquiries and complaints management

Condition B8(d)(i) and (ii) requires procedures and mechanisms through which the community can provide feedback and the Department of Education will respond. 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.

During project delivery, a complaint is defined as in regards to construction impacts – *such as* – safety, dust, noise, traffic, congestion, loss of parking, contamination, loss of amenity, hours of work, property damage, property access, service disruption, conduct or behaviour of construction workers, other environmental impacts, unplanned or uncommunicated disruption to the school.

If a phone call, email or face- to- face complaint is received during construction, they must be logged in our CRM, actively managed, closed out and resolved by SINSW within 24-48 hours.

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.

If the complainant is not satisfied with 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:

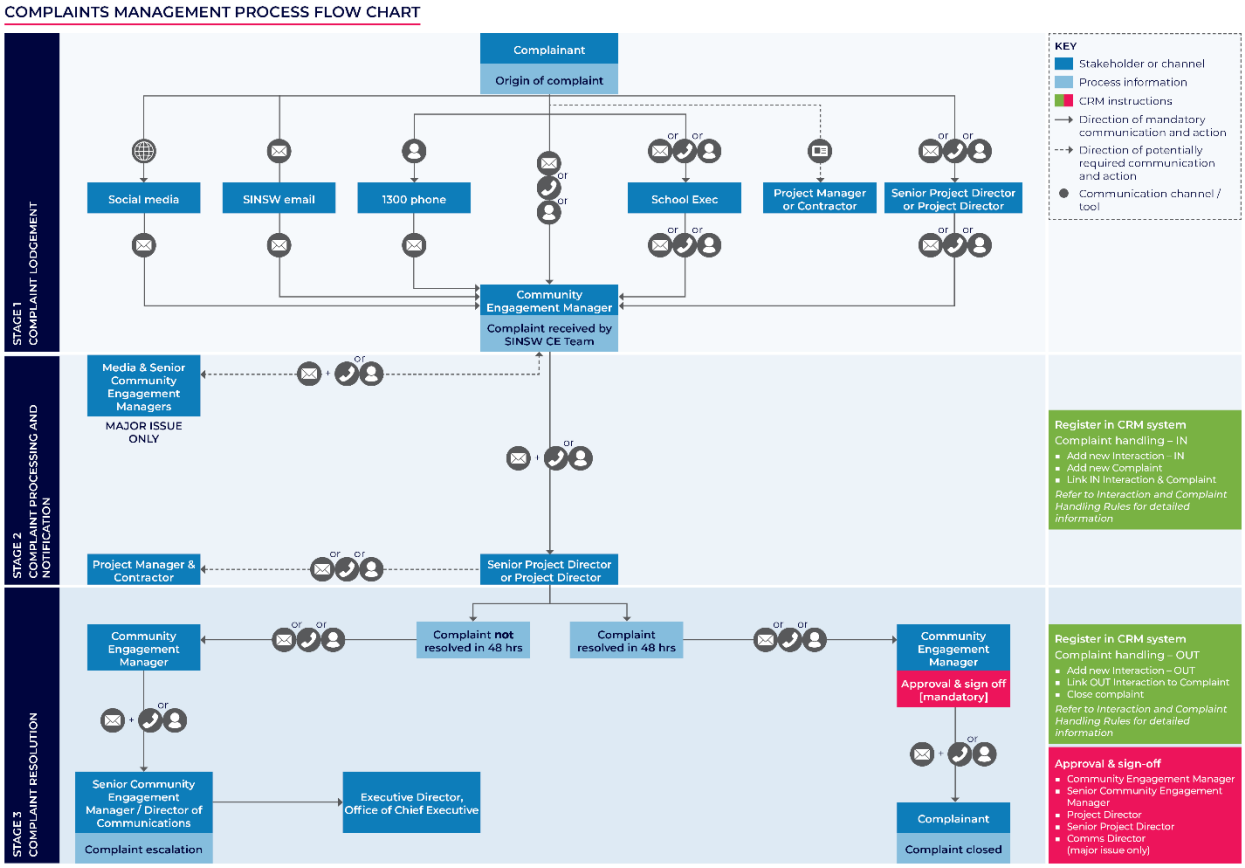
Table 6: Complaint and enquiry response time

Complaint	Acknowledgement times	Response times
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.

Complaint	Acknowledgement times	Response times
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.
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.

Figure 3 - Internal Complaints Process



8.5.1. Disputes involving compensation and rectification

Per condition B8(d)(iii) requirements, School Infrastructure NSW is committed to working with the school and broader community to address concerns as they arise. Where disputes arise that involve compensation or rectification, the process for resolving community enquiries and complaints will be followed to investigate the dispute. Depending upon the results of the investigation, School Infrastructure NSW may seek legal advice before proceeding.

8.6. Incident management

An incident is 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 is harm that:

(a) involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial; *or*

(b) 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).

8.6.1. Roles and responsibilities following an incident

In the event of an incident, once emergency services are contacted, the incident must be immediately reported to the SINSW Senior Project Director who will inform:

- SINSW Executive Director
- SINSW C&E Manager
- SINSW Senior Manager, C&E
- SINSW Communications Director

SINSW Communications Director will:

- Lead and manage all communications with the Minister's office in the event of an incident, with assistance as required

- Direct all communications with media to the SINSW Media Manager in the first instance for management
- Notify all other key project stakeholders of an incident.

The school and local community will be notified within 24 hours in the event of an incident, as per our notification timelines in Table 5.

The SINSW Senior Project Director will issue a written incident notification to Department of Planning & Environment (DPE) (compliance@planning.nsw.gov.au) and Local Council immediately following the incident to set out the location and nature of the incident.

This must be followed within seven days following the incident of a written notification to the Department of Planning and Environment (compliance@planning.nsw.gov.au) that:

(a) identifies the development and application number;

(b) provides details of the incident (date, time, location, a brief description of what occurred and why it is classified as an incident);

(c) identifies how the incident was detected;

(d) identifies when SINSW became aware of the incident;

(e) identify any actual or potential non-compliance with conditions of consent;

(f) describes what immediate steps were taken in relation to the incident;

(g) identifies further action(s) that will be taken in relation to the incident; and

(h) provides the contact information for further communication regarding the incident (the Senior Project Director).

Within 30 days of the date on which the incident occurred or as otherwise agreed to by the Planning Secretary, SINSW will provide the Planning Secretary and any relevant public authorities (as determined by the Planning Secretary) with a detailed report on the incident addressing all requirements below:

(a) a summary of the incident;

(b) outcomes of an incident investigation, including identification of the cause of the incident;

(c) details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence; and

(d) details of any communication with other stakeholders regarding the incident.

8.7. Reporting process

Throughout the project, data will be recorded on participation levels both face to face and online, a record of engagement tools and activities carried out in addition to queries received and feedback against emerging themes.

Stakeholder and community sentiment will be evaluated throughout to ensure effectiveness of the engagement strategy and to inform future activities.

Reporting will include but not be limited to:

- Stakeholder engagement reporting – numbers of forums, participation levels and a summary of the outcomes Community sentiment reporting – outputs of all community engagement activities, including numbers in attendance at events, participation levels and feedback received against broad themes
- Online activity – through the project website and via social media
- Media monitoring – as part of the proactive media campaign
- Engagement risk register - to be updated regularly.

APPENDIX F - CONSTRUCTION TRAFFIC & PEDESTRIAN MANAGEMENT SUB-PLAN

Version 2.0
13/09/2019

Construction Traffic & Pedestrian Management Plan

Job Site 14-28 Cullen Avenue,
Jordan Springs, 2747

RICHARD CROOKES
CONSTRUCTIONS

Jim's Traffic Control

Table of Contents

About This Project

Background:

This CTMP relates to SSOA 9354 for the construction of a 2-storey library, administration and staff building (Block A), three 2-storey learning hubs, a single storey assembly hall (Block C), associated landscaping, pick-up and drop-off zone (Cullen Avenue), Pedestrian access points (Cullen Avenue and Lakeside Parade), 62 space carpark, school associated signage and a new substation.
Company responsible for Construction: Richard Crookes Construction®
Approved: 6th September 2019
Consent to Operate from: July 2019
Consent to Lapse on: 6th September 2024

Location:

The Work Site is located at 14-28 Cullen Avenue, Jordan Springs, 2747

Figure 2 – Location of Work Site

Purpose:

The Purpose of this report is to satisfy the RMS and Penrith Council's 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 CTMP are:

- To satisfy RMS and Penrith council conditions related to Traffic, Transport and Access. Placeholder for Council Consultation to be organised following approval of consent from DPIE.
- 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 RMS's – 'Traffic Control at Work Sites' Handbook Version 4.

Construction

Construction Activities:

Stage 1: Excavation (6 weeks)
Stage 2: Site Establishment (1 week)
Stage 3: Construction (36 weeks)
Stage 3: Landscaping and finishing works (6 weeks).

Working Hours:

Monday – Friday: 7am – 6pm
Saturday: 8am – 1pm
No work is permitted on Sundays or Public Holidays

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.

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

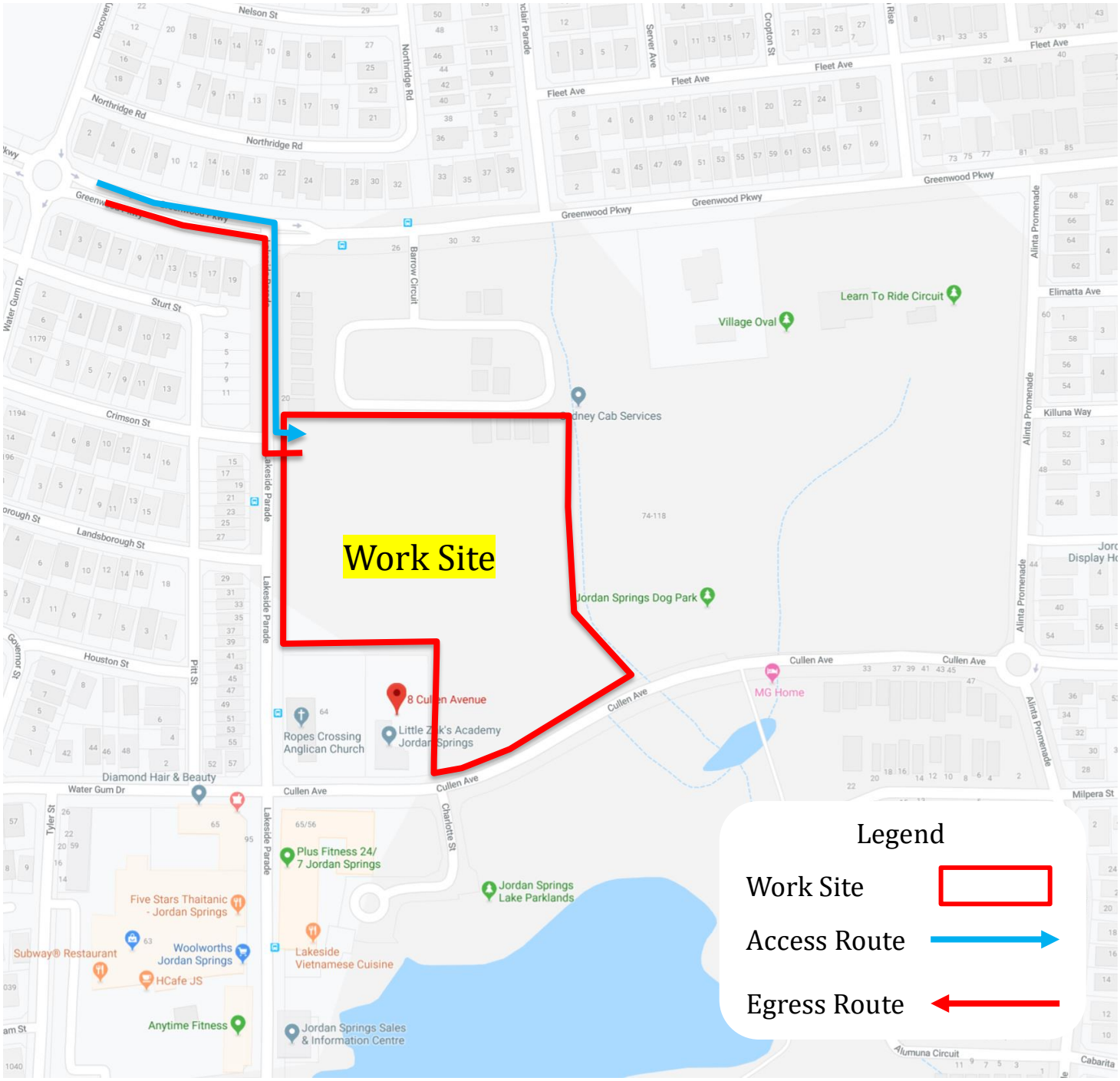


Figure 3 – Main Access Route

Access Routes:

Access to the site will take place at one location. This will be from the Northern end of Lakeside Parade 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 Northern or Southern 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.

Northern Access:

22 Montague Dr
Jordan Springs NSW 2747

Head south-west on The Northern Rd/A9

210 m

Turn left onto Greenwood Pkwy
Go through 1 roundabout

300 m

Turn right onto Lakeside Parade

150 m

29 Lakeside Parade
Jordan Springs NSW 2747

Southern Access:

36 Pensax Rd
Cranebrook NSW 2749

Head north on The Northern Rd/A9 towards Jordan Springs Blvd

650 m

Use the right 2 lanes to turn right onto Greenwood Pkwy
Go through 1 roundabout

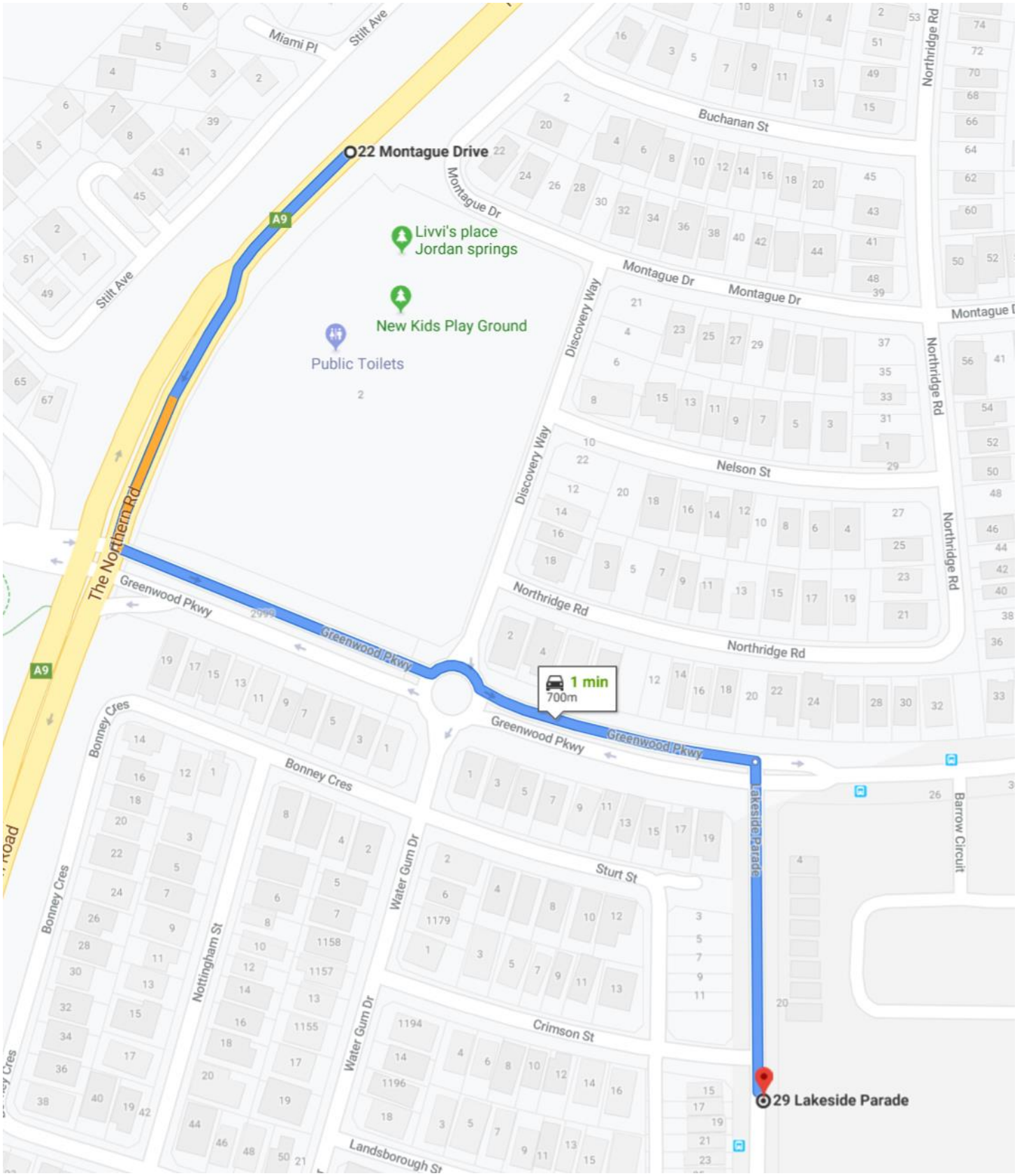
350 m

Turn right onto Lakeside Parade

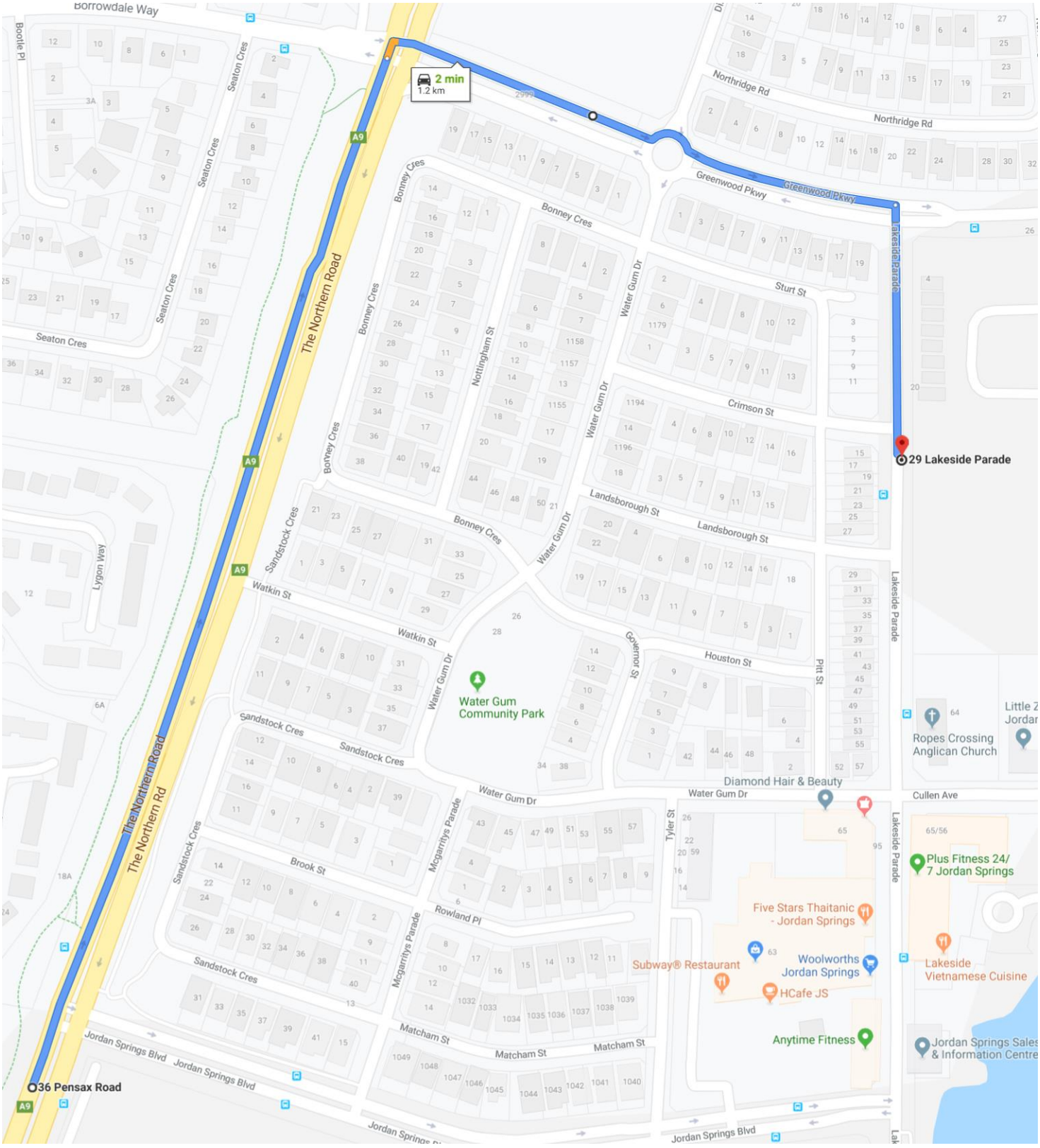
150 m

29 Lakeside Parade
Jordan Springs NSW 2747

Northern Access



Southern Access



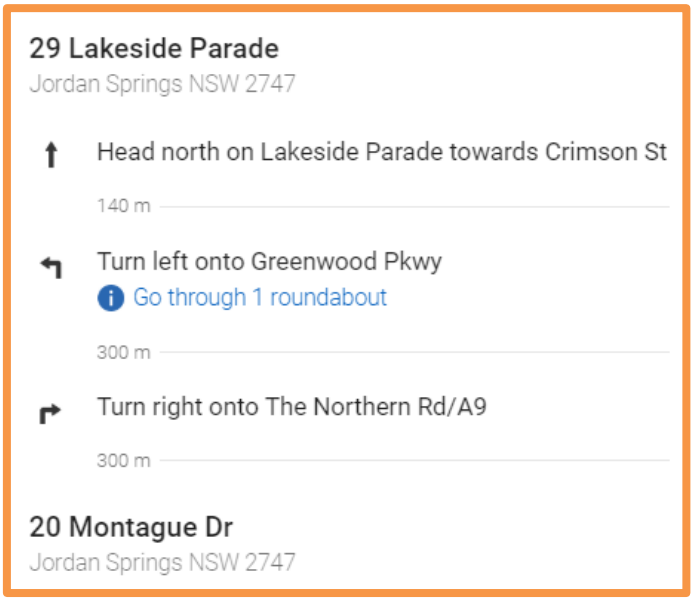
Egress:

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:

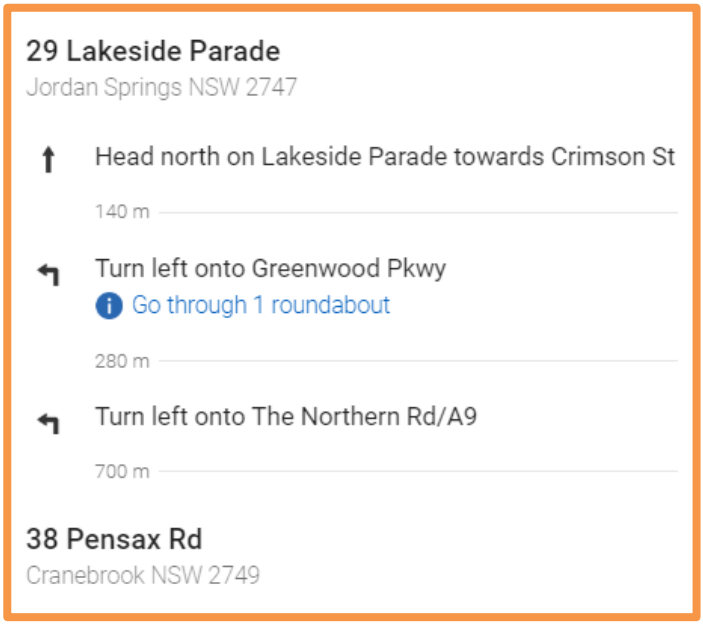
Egress from the site will be from one location as with the access point – Northern end of Lakeside Parade as seen below.

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 Northern or Southern egress routes below.
3. Vehicles exiting the site will do so as shown below moving in a forward direction.

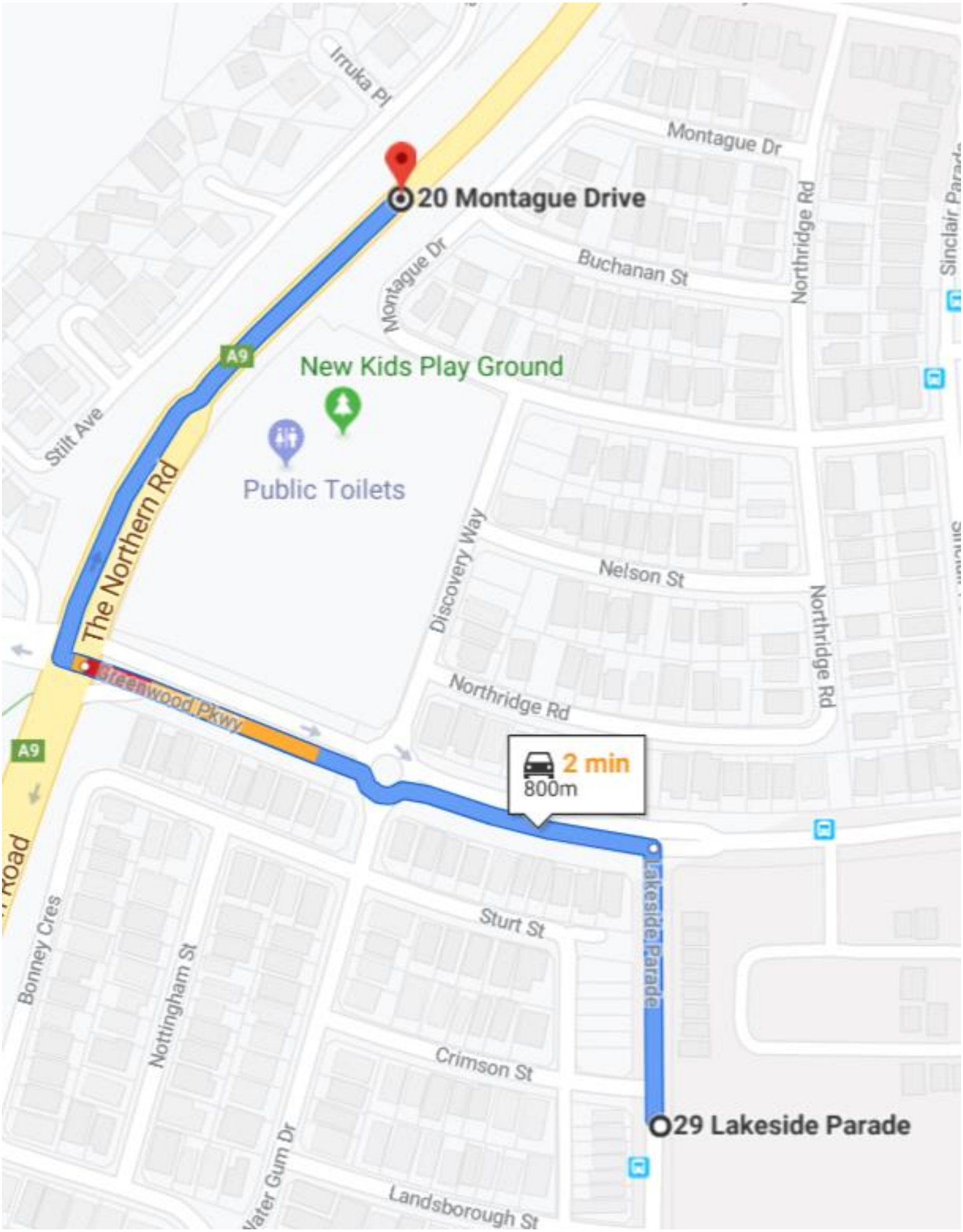
Northern Egress:



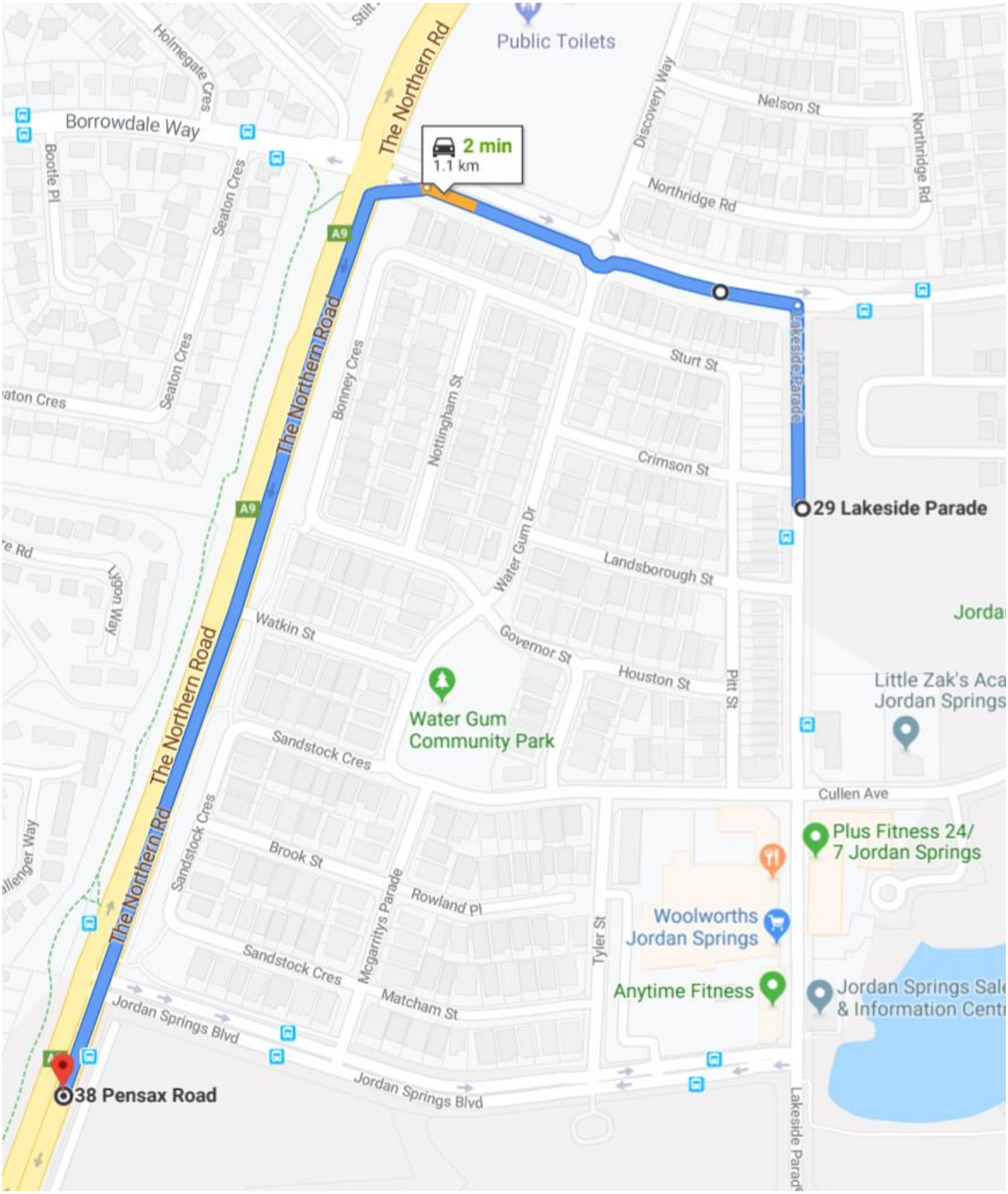
Southern Egress:



Northern Egress



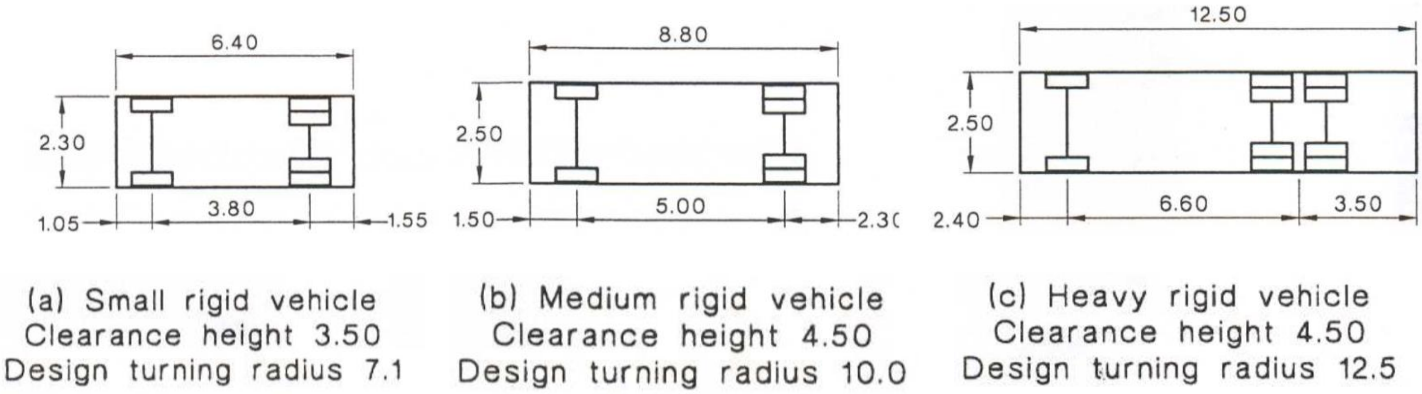
Southern Egress



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 Penrith Council's 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.



(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
Excavation	10-15/day	SRV, MRV, HRV, AV	AV
Site Establishment	5/day	MRV, HRV, AV	AV
Construction	15/day	SRV, MRV, HRV, AV	AV
Landscaping + Finishing Works	5/day	SRV, MRV, HRV, AV	AV

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 (1.8m chain wire fencing will surround the perimeter), if not inducted to the site. 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.

Kingswood Station is located approx. 4.8km from the site. Bus routes 783 run along Lakeside Parade approx. 20m 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 during the initial construction phase. On street parking will be available for the duration of construction.

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 Lakeside Parade or Cullen Avenue.

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 CTMP 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 CTMP.
- 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.

Council Consultation:

Richard Crookes Construction® has consulted with council and appropriate authorities' prior to the lodgement and initiation of the project (Reference B15 CTPMSP review on 5 September 2019 at Penrith City Council Chambers) attached to this CTPMSP.

Tree Protection:

There are no Tree protection zones indicated on this site.

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 plant to mange any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible can be reference in the Richard Crookes Construction® CEMP (Section 14, Table 11) to address condition B12 (e) and (g)(i).

Traffic Control Plan (TCP)

A TCP is defined in the RMS's TCWS Manual version 4 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 CTMP, 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 Yellow Card 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 CTMP.
- All traffic control devices and traffic control arrangements will be inspected daily to ensure the adequacy of such devices and arrangements as per the TCWS Manual Version 4.
- 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® to address condition B12 (h) 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, RMS Prepare a Work Zone Traffic Management Plan Number 0037667321.

Traffic Control Signs and Devices:

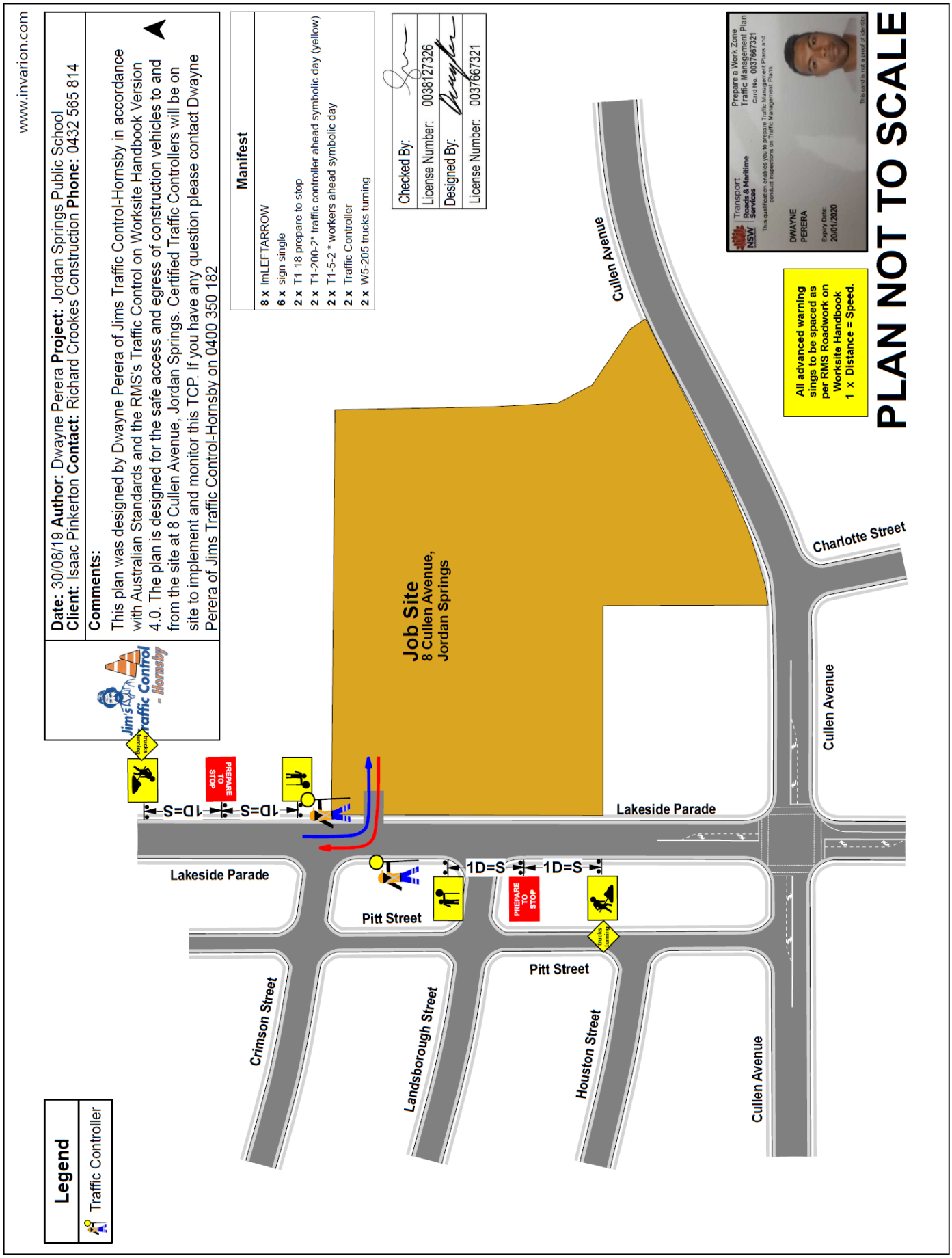
Traffic control devices are an important tool for influencing the safety of road users, in particular where temporary traffic controls are implemented at work sites. During the construction of this project Richard Crookes Construction® will assess the warrant for traffic control devices in accordance with the relevant guides/standards such as: RMS's – TCWS Manual Version 4, 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:

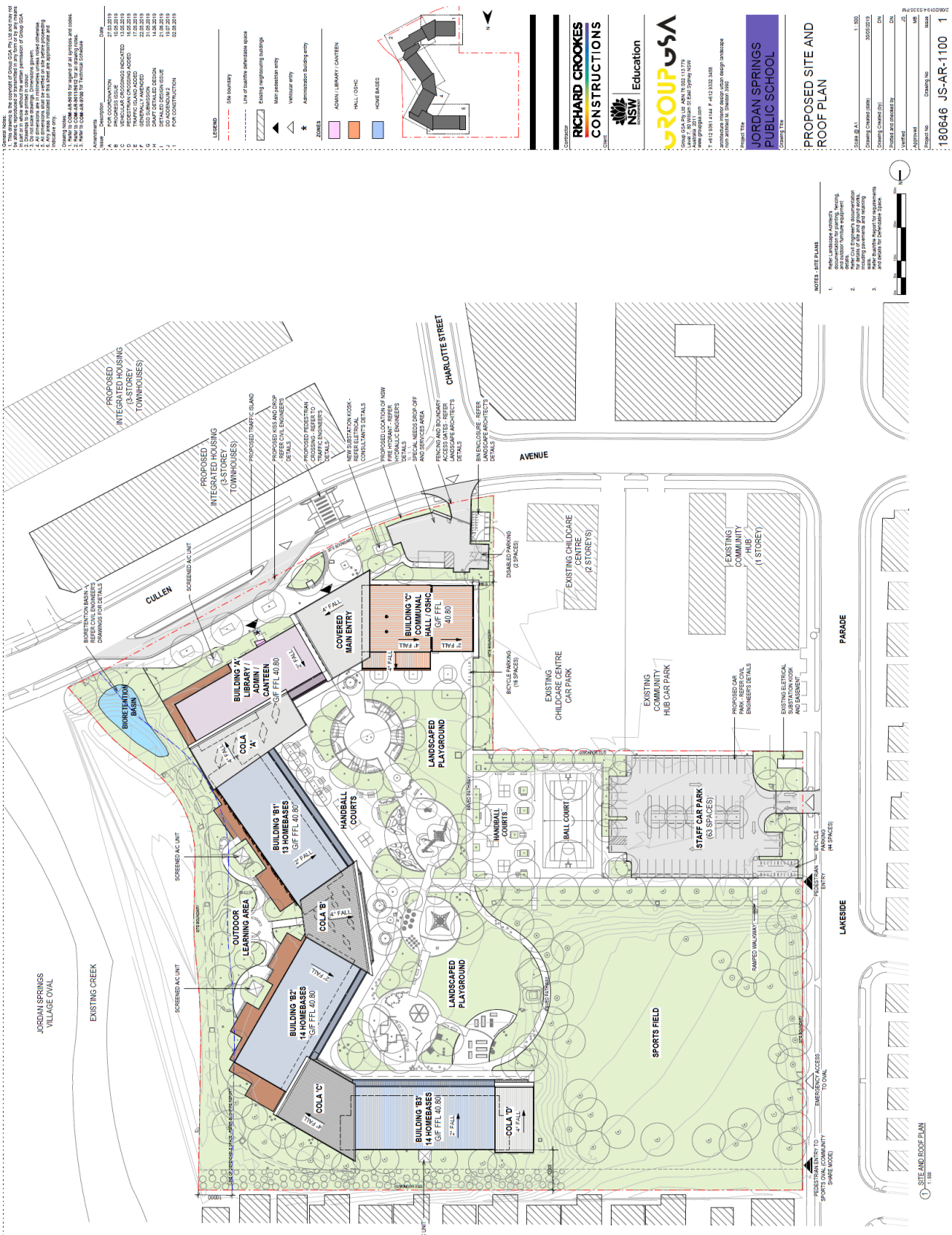
- Assessed for use in accordance with the appropriate warrants.
- Manufactured in accordance with the requirements of the Australian Standards.
- Installed in accordance with the relevant guides and standards.
- Not contradictory to existing signs or markings.
- When unwarranted, covered or removed.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

All signposting installed throughout the project will comply with the requirements outlined in the RMS's TCWS Manual Version 4, AUSTROADS Guide to Traffic Engineering Practice, Part 8 – Traffic Control Devices and the Relevant parts of Australian Standard 1742.

Appendix A TCP:



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.

Post Approval – Consultation

Consultation needs to be meaningful, done with courtesy and respect and be well documented. These are people/ organisations that we need to be building meaningful relationships with.

Conditions of all consent can require consultation with a range of stakeholders. Consultation in the post approval world needs to be well documented to satisfy the condition requirements.

Examples include Council, service providers (eg. Electricity gas etc.), consult with local bus provider and TfNSW.

Read each condition carefully, any reference to consult triggers consultation.

Typically on State Significant Development, there will be a specific consultation condition as to how this piece can be appropriately addressed.

Consultation is not:

- A token gesture
- Done at the end of the piece of work,
- An email to the relevant stakeholder with no response;
- A meeting with the stakeholder with no meeting minutes.

Consultation is:

- Meaningful
- Done prior to the requirement,
- Captures an outcome,
- Identifies matters resolved,
- Identifies matters unresolved,
- Any disagreements are disclosed; and
- How we are going to address unresolved matters?

How to capture all the relevant details on consultation requirements? Any consultation requirement in a condition is required to be accompanied with the following table:

Education
School Infrastructure

Post Approval Consultation Record

B15 – Traffic and Pedestrian Management Sub-Plan

Identified Party to Consult:	Penrith City Council – Traffic Engineer
Consultation type:	Meeting
When is consultation required?	Prior to commencement
Why	B15 – Construction Traffic and Pedestrian Management Sub-Plan, prepared in consultation with Council
When was consultation held	5 September 2019, Penrith City Council Chambers
Identify persons and positions who were involved	**Gavin Cherry** Development Assessment Coordinator, Penrith Council **Stephen Masters** Acting Development Engineering Coordinator, Penrith Council **Graham Green** Senior Traffic Engineer, Penrith Council **Joshua Romeo** Senior Waste Planning Officer, Penrith Council **Carlie Fulton** Senior Environmental Health Officer, Penrith Council **Jim Lewis** Project Director, School Infrastructure **Jacqueline Sellen** Assistant Project Manager, TSA Management **Darren Vosso** Project Manager, Richard Crookes Construction **Tom Hemmett** Project Engineer, Richard Crookes Construction
Provide the details of the consultation	The Jordan Springs Public School project has an approved council DA for the Early Works completed onsite. Consultation with Penrith Council has been undertaken in relation to those works specifically, and the site and project more generally. The meeting held on 5 September 2019 was an introduction to the relevant Council members who will be involved throughout the completion of the main works. The purpose was to open the dialogue between the project team and Council.
What specific matters were discussed?	The Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) was provided prior to the meeting and reviewed by Mr Green during the meeting. It was noted that the traffic routes and access points are the same for the main works as those already constructed and used during the Early Works. It was confirmed that

	unnecessary traffic through the Jordan Springs shopping plaza would be avoided. It was noted that RMS involvement was not triggered due to the location of the project. Penrith Council confirmed they are in receipt of the Dilapidation Report issued in late August which documents Council assets. No concerns or issues were raised by Penrith Council in relation to the CTPMSP.
What matters were resolved?	Nil issues were raised at the time of the meeting. An open dialogue was established and communication lines confirmed for future correspondence. Penrith Council confirmed that email correspondence will be sufficient for traffic matters and a discipline specific meeting will be scheduled only if required.
What matters are unresolved?	Nil
Any remaining points of disagreement?	No
How will SINSW address matters not resolved?	Not applicable

APPENDIX G - CONSTRUCTION NOISE & VIBRATION MANAGEMENT SUB-PLAN

MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

Jordan Springs Detailed Design

Jordan Springs Construction Noise Vibration Management Plan

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Project ID	20190240.4
Document Title	Jordan Springs Construction Noise Vibration
Attention To	Richard Crookes Constructions Pty Ltd

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	9/07/2019	20190240.4/0907A/R0/GK	GK		VF
1	29/08/2019	20190240.4/2908A/R1/GK	VF		VF
2	8/09/2019	20190240.4/0809A/R2/GK	VF		VF
3	9/09/2019	20190240.4/0909A/R3/GK	GK		VF

TABLE OF CONTENTS

1 INTRODUCTION

This Construction Noise and Vibration Management Plan (CNVMP) presents the results of an assessment of potential noise and vibration impacts associated with the construction component of the construction of the proposed Jordan Springs Public School, Jordan Springs. All early works conducted onsite have been covered in Acoustic Logic document reference number: (20190060.4/2805A/R1/GK).

This assessment has been conducted in accordance with the NSW EPA *Interim Construction Noise Guideline (ICNG) 2009* and having regard to Australian Standard AS 2436 *"Guide to Noise Control on Construction, Maintenance and Demolition Sites."*

Noise control strategies have been formulated within this Plan to ensure that construction noise impacts from the site are minimised. In particular, a detailed outline of the community consultation procedures proposed for the site which has been included which will form the basis of the noise control strategy.

The Construction Noise and Vibration Management Plan (CNVMP) should also be updated during the construction period in response to information gathered during this period.

State Significant Development Application 9354 approval conditions B12, B16, C12 and C13 have been addressed in this report and are repeated below:

Environmental Management Plan and Requirements

Condition B12:

- *Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:*
    - *Detailed baseline data;*
    - *Details of:*
        - *The relevant statutory requirements (including any relevant approval licence or lease conditions);*
        - *Any relevant limits or performance measures and criteria; and*
        - *The specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;*
    - *A description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;*
    - *A programme to monitor and report on the:*
        - *Impacts and environmental performance of the development;*
        - *Effectiveness of the management measures set out pursuant to paragraph © above;*
    - *A contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;*
    - *A performance to investigate and implement ways to improve the environmental performance of the development over time;*
    - *A protocol for managing and reporting any:*
        - *Incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);*
        - *Compliant;*
        - *Failure to comply with statutory requirements; and*
    - *A protocol for periodic review of the plan.*

Condition B16:

The Construction Noise and Vibration Management Sub-Plan must address, but not be limited to, the following:

- *Be prepared by a suitably qualified and experienced noise expert;*
- *Describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009);*
- *Describe the community consultation undertaken to develop the strategies in condition B8;*
- *Include a complaints management system that would be implemented for the duration of the construction; and*
- *Include a programme to monitor and report on the impacts and environmental performance of the development and the effectiveness of the management measures in accordance with condition B12(d).*

Construction Noise Limits

Condition C12:

- *The Applicant must ensure construction vehicles (including concrete agitator trucks) do not arrive at the site or surrounding residential precincts outside of the construction hours of work outlined under condition C3.*

Condition C13:

- *The Applicant must implement, where practicable and without compromising the safety of construction staff or members of the public, the use of 'Quakers' to ensures noise impacts on surrounding noise sensitive receivers are minimised.*

2 SITE DESCRIPTION

The proposed school site is located on Cullen Avenue between Lakeside Parade and Alinta Promenade, Jordan Springs.

The surrounding area includes future residential receivers to the south of the site on Cullen Avenue, and to the north, existing commercial receiver (including child care centre and community centre to the south-west), residential receivers further to the west on Lakeside Parade and playing fields to the east.

The surrounding area includes future residential receivers to the south of the site on Cullen Avenue, and to the north, existing commercial receiver (including child care centre to the south-west), residential receivers further to the west on Lakeside Parade and playing fields to the east.

The surrounding area includes future residential receivers to the south of the site on Cullen Avenue, and to the north, existing commercial receiver (including child care centre to the south-west), residential receivers further to the west on Lakeside Parade and playing fields to the east.

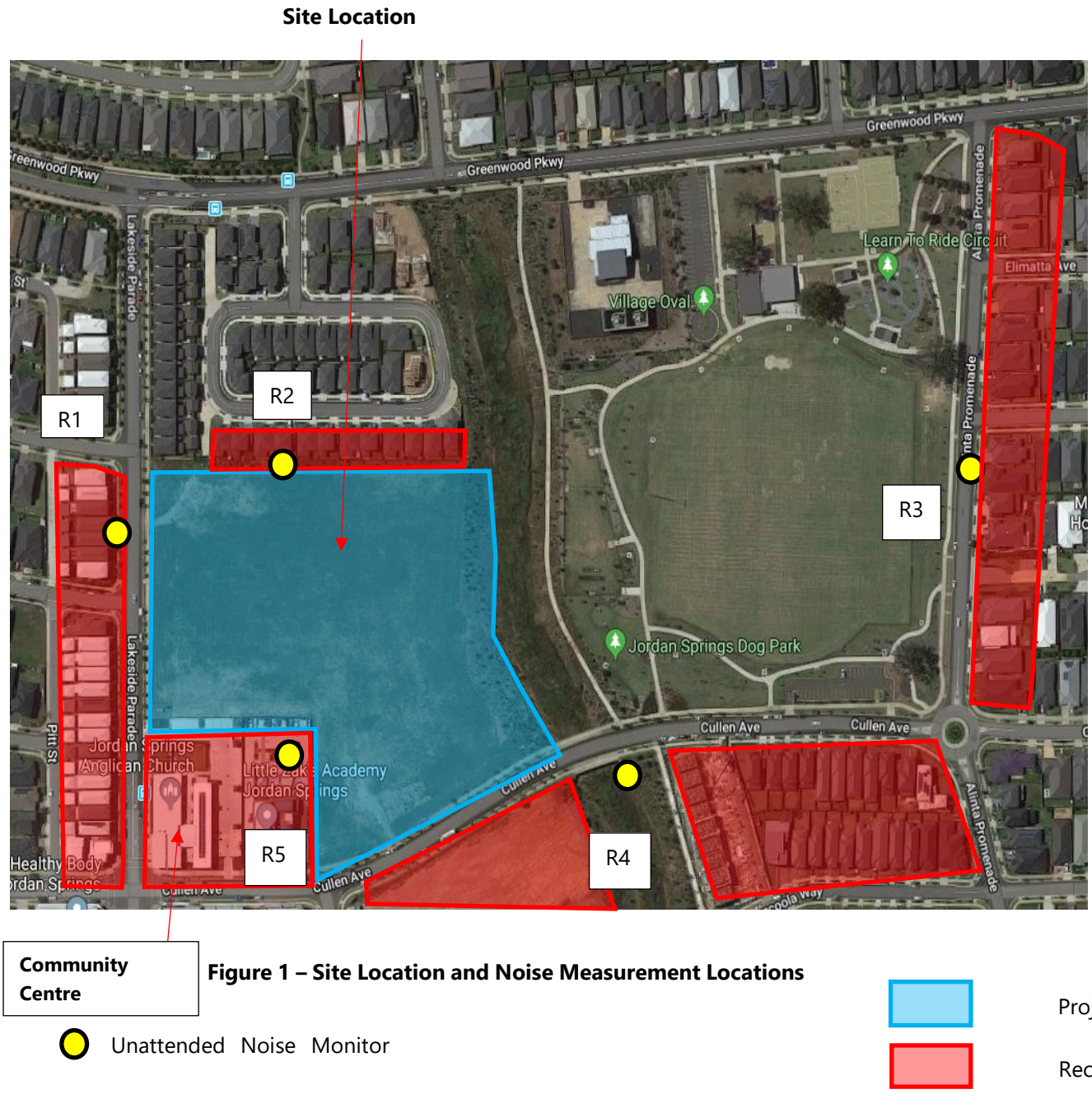


Figure 1 – Site Location and Noise Measurement Locations

3 PROPOSED CONSTRUCTION WORKS

3.1 PLANT AND ACTIVITIES

The management plan covers the construction phase of the project. The main noise producing equipment and activities likely to occur are provided in the following table.

Table 1 – Construction Equipment Activities

Construction Activity	Equipment	Sound Power Level
Construction Phase	Trucks	105
	Concrete Pumps	110
	Crane	105
	Builders Hoist	105
	Concrete Vibrator and Helicopter	105
	Powered hand tools	94

The noise levels presented above are derived from the following sources

1. Table D2 of Australian Standard 2436-1981.
2. Data Held by this office from other similar studies.

3.2 CONSTRUCTION HOURS

The consent permits the following construction hours:

- Mondays to Fridays – 7am to 6pm
- Saturdays – 8am to 1pm
- No work Sundays and Public Holidays

4 NOISE MANAGEMENT LEVELS

The noise emission from the construction of project site shall satisfy the requirements of the following:

- NSW Environmental Protection Authority (EPA) document – *"Interim Construction Noise Guideline (ICNG) 2009"*; and
- Australian Standard AS 2436:2010 – *"Guide to noise and vibration control on construction, demolition and maintenance sites"*.

4.1 NSW ENVIRONMENTAL PROTECTION AUTHORITY (EPA) DOCUMENT – "INTERIM CONSTRUCTION NOISE GUIDELINE (ICNG) 2009"

The following sections present the construction noise for residential and commercial receivers.

4.1.1 Residential Receivers

EPA guidelines adopt differing strategies for noise control depending on the predicted noise level at the nearest residences:

- *"Noise affected" level*. Where construction noise is predicted to exceed the "noise effected" level at a nearby residence, the proponent should take reasonable/feasible work practices to ensure compliance with the "noise effected level". For residential properties, the "noise effected" level occurs when construction noise exceeds ambient levels by more than:
    - 10dB(A)$L_{eq(15min)}$ for work during standard construction hours (7am-6pm Monday to Friday and 8am to 1pm on Saturdays); and
    - 5dB(A)$L_{eq(15min)}$ for work outside standard construction hours.
- "*Highly noise affected level*". Where noise emissions are such that nearby properties are "highly noise effected", noise controls such as respite periods should be considered. For residential properties, the "highly noise effected" level occurs when construction noise exceeds 75dB(A)$L_{eq(15min)}$ at nearby residences. Highly noise affected level only applies during standard construction hours.

A summary of noise emission goals for standard hours of construction are presented below:

Table 2 – Construction Noise Emission Management Levels (Residents)

Receiver Type	Construction Hours	"Noise Affected" Level – dB(A)$_{Leq(15min)}$	"Highly Noise Affected" - dB(A)$L_{eq(15min)}$
Residential Receivers	Standard Construction Hours	Background + 10dB(A)	75
	Outside Standard Construction Hours	Background + 5dB(A)	N/A

4.1.2 Child Care Centre

EPA guidelines recommend that construction noise to child care centres is 45dB(A)$L_{eq(15min)}$ internally for classrooms and 55dB(A)$L_{eq(15min)}$ for external play area.

4.1.3 Australian Standard AS 2436:2010 "Guide to Noise Control on Construction, Maintenance and Demolition Sites"

Australian Standard AS 2436 provides guidance on noise and vibration control in respect to construction and demolition sites, the preparation of noise and vibration management plans, work method statements and impact studies.

The Standard states that:

- "Some construction and demolition activities are by their very nature noisy. The authorities responsible for setting noise level criteria for essential works will take note of the constraints imposed by such activities, especially when they are of short duration."

- Construction, demolition and maintenance works pose different problems of noise and vibration control when compared with most other types of industrial activity, since (a) they are mainly carried on in the open; (b) they are often temporary in nature although they may cause considerable disturbance whilst they last; (c) the noise and vibration arise from many different activities and kinds of plant, and their intensity and character may vary greatly during different phases of the work; and (d) the sites cannot be separated by planning controls, from areas that are sensitive to noise and vibration.

The standard provides advice and guidelines for the prediction of impacts and the methods available to manage impacts. In the guideline promulgates feasible and reasonable mitigation strategies and controls, and stakeholder liaison, in the effort to reach a realistic compromise between site activities and impacts on neighbouring properties.

5 VIBRATION MANAGEMENT LEVELS

Vibration caused by construction at any residence or structure outside the subject site must be limited to:

- For structural damage vibration, German Standard DIN 4150-3 *Structural Vibration: Effects of Vibration on Structures; and*
- For human exposure to vibration, British Standard BS 6472 – 'Guide to Evaluate Human Exposure to Vibration Buildings (1Hz to 80Hz.

The criteria and the application of this standard are discussed in separate sections below.

5.1 STRUCTURE BORNE VIBRATION

German Standard DIN 4150-3 (1999-02) provides vibration velocity guideline levels for use in evaluating the effects of vibration on structures. The criteria presented in DIN 4150-3 (1999-02) are presented in Table 2.

It is noted that the peak velocity is the absolute value of the maximum of any of the three orthogonal component particle velocities as measured at the foundation, and the maximum levels measured in the x- and y-horizontal directions in the plane of the floor of the uppermost storey.

Table 3 - DIN 4150-3 (1999-02) Safe Limits for Building Vibration

Type of Structure		Peak Particle Velocity (mms^{-1})			
		At Foundation at a Frequency of			Plane of Floor of Uppermost Storey
		< 10Hz	10Hz to 50Hz	50Hz to 100Hz	All Frequencies
1	Buildings used in commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

5.2 HUMAN COMFORT

The British Standard BS 6472 – 'Guide to Evaluate Human Exposure to Vibration Buildings (1Hz to 80Hz' will be used to assess construction vibration for human comfort.

This guideline provides procedures for assessing tactile vibration and regenerated noise within potentially affected buildings. The recommendations of this guideline should be adopted to assess and manage vibration from the site. Where vibration exceeds, or is likely to exceed, the recommended levels then an assessment of reasonable and feasible methods for the management of vibration should be undertaken.

Table 4 - BS 6472 Vibration Criteria

		RMS acceleration (m/s^2)		RMS velocity (mm/s)		Peak velocity (mm/s)	
Place	**Time**	**Preferred**	**Maximum**	**Preferred**	**Maximum**	**Preferred**	**Maximum**
Continuous Vibration							
Residences	Daytime	0.01	0.02	0.2	0.4	0.28	0.56
Offices		0.02	0.04	0.4	0.8	0.56	1.1
Workshops		0.04	0.08	0.8	1.6	1.1	2.2
Impulsive Vibration							
Residences	Daytime	0.3	0.6	6.0	12.0	8.6	17.0
Offices		0.64	1.28	13.0	26.0	18.0	36.0
Workshops		0.64	1.28	13.0	26.0	18.0	36.0

Note 1: Continuous vibration relates to vibration that continues uninterrupted for a defined period (usually throughout the daytime or night-time), e.g. continuous construction or maintenance activity. (DECC, 2006)

Note 2: Impulsive vibration relate to vibration that builds up rapidly to a peak followed by a damped decay and that may or may not involve several cycles of vibration (depending on frequency and damping), with up to three occurrences in an assessment period, e.g. occasional loading and unloading, or dropping of heavy equipment. (DECC, 2006)

6 EXISTING BACKGROUND NOISE LEVELS

Existing rating background noise levels (RBL) have been measured by Acoustic Logic for this project. Rating background noise levels have been determined using unattended monitoring around the site. Unattended noise monitoring was conducted using one Acoustic Research Laboratories Pty Ltd noise logger. The logger was programmed to store 15-minute statistical noise levels throughout the monitoring period. The equipment was calibrated at the beginning and the end of each measurement using a Rion NC-73 calibrator; no significant drift was detected. All measurements were taken on A-weighted fast response mode. The noise monitor was installed on the northern boundary of the project site.

Please see figure 1 above.

The results of the monitoring are summarised in the following table.

Table 5 – Measured Rating Background Noise Level

Location	Time Period	Noise level dB(A)$L_{90(Period)}$
Barrow Circuit	7:00am-6:00pm	52
Lakeside Parade		38
Little Zak's Academy		33
Cullen Avenue		40
Alinta Promenade		35

7 SITE SPECIFIC CONSTRUCTION NOISE MANAGEMENT LEVELS

Resultant Noise Management Levels (NMLs) have been summarised below, these have been determined based on the ICNG and measured rating background noise levels.

Table 3 – Noise Management Levels

Location	"Noise Affected" Level - dB(A)$L_{eq(15min)}$	"Highly Noise Affected" Level - dB(A)$L_{eq(15min)}$
Residential Receiver R1	48	75
Residential Receiver R2	48	75
Residential Receiver R3	45	75
Residential Receiver R4	50	75
Child Care Centre	55	n/a
Community Centre	Internal noise level based on AS 2107	n/a

8 PREDICTED CONSTRUCTION NOISE LEVELS

8.1 GENERAL

Noise from the worst-case construction works for each phase of the development have been predicted to the nearest most affected sensitive receiver groups. The following tables presents the predicted noise levels for each item of typically loudest plant. It is noted that a range of noise levels is provided depending on where the item of plant is located on the site. Due to the size of the site, the higher noise levels will be present for relatively short periods of time at any one receiver.

Table 4 – Construction Equipment Activities

Receiver	Equipment	Sound Power Level	Predicted Noise Level
Receiver 1	Trucks	105	51-67
	Concrete Pumps	110	56-72
	Crane	105	51-67
	Builders Hoist	105	51-67
	Concrete Vibrator and Helicopter	105	51-67
	Powered hand tools	94	40-56

The assessment indicates that for these receivers the NML's will be exceeded for most equipment, but the HNML is not likely to be exceeded.

Table 5 – Construction Equipment Activities

Receiver	Equipment	Sound Power Level	Predicted Noise Level
Receiver 2	Trucks	105	52-73
	Concrete Pumps	110	57-73
	Crane	105	52-73
	Builders Hoist	105	52-73
	Concrete Vibrator and Helicopter	105	52-73
	Powered hand tools	94	41-62

The assessment indicates that for these receivers the NML's will be exceeded for most equipment, but the HNML is not likely to be exceeded.

Table 6 – Construction Equipment Activities

Receiver	Equipment	Sound Power Level	Predicted Noise Level
Receiver 3	Trucks	105	43-47
	Concrete Pumps	110	48-52
	Crane	105	43-47
	Builders Hoist	105	43-47
	Concrete Vibrator and Helicopter	105	43-47
	Powered hand tools	94	32-36

Table 7 – Construction Equipment Activities

Receiver	Equipment	Sound Power Level	Predicted Noise Level
Receiver 4	Trucks	105	49-71
	Concrete Pumps	110	54-76
	Crane	105	49-71
	Builders Hoist	105	49-71
	Concrete Vibrator and Helicopter	105	49-71
	Powered hand tools	94	38-60

Table 8 – Construction Equipment Activities

Receiver	Equipment	Sound Power Level	Predicted Noise Level
Receiver 5 (Childcare Centre)	Trucks	105	53-73
	Concrete Pumps	110	58-73
	Crane	105	53-73
	Builders Hoist	105	53-73
	Concrete Vibrator and Helicopter	105	53-73
	Powered hand tools	94	42-62

The Child Care Centre will be exposed to noise levels higher than the noise management levels (notwithstanding the noise reduction provided by the barrier around the child care centre) when the plant is operating close to the centre. When the plant is located away from the centre the noise exposure will be less than the NML.

8.2 PILING AND HYDRAULIC HAMMERING – NOISE AND VIBRATION ASSESSMENT

It is proposed to undertake screw piling using an attachment mounted to a Sumitomo sh135sx-3 excavator (14t excavator) or similar. The main noise source from this activity will be engine noise from the excavator. In this respect noise emissions and impacts from this activity will be similar to that of an excavator.

The most affected receivers will be those located to the north of the site. Piling works could be as close as 12m from the site boundary. The applicable noise management levels at this location have been determined using the EPA Interim Construction Noise Guideline (ICNG) and the measured background noise levels, and are:

- NAML – 48 dB(A)
- HNAML – 75 dB(A)

Based on the minimum distance separation and the sound power level of an excavator (105 dB(A)), noise from piling operations may result in a noise level of up to 75 dB(A) at these most impacted residences.

Noise levels will generally exceed the NAML but would generally comply with the HNAML.

Given this, the following noise mitigation is recommended in accordance with the ICNG:

- Piling is not to be undertaken within 30m of a residential boundary between 7am and 8am.
- Within 30m of a residential boundary, provide a minimum 1hour respite period (where operation of this machinery in this zone is prevented) for every 3 hours of operation.

Vibration generated by screw piling is not expected to exceed the management levels permitted in the ICNG.

It is noted that Consent Condition 16C refers to "high noise generating activities such as piling". It is noted that this likely to be intended to relate to unusually noisy activities such as impact piling, which is not proposed, or hammering using excavator mounted hydraulic hammers, which is also not envisaged to be required.

In respect of hydraulic hammering, if required, noise impacts should be addressed via the imposition of respite periods, typically limiting operation to:

- 9am – 12pm, Monday to Friday
- 3pm – 5pm Monday to Friday; and
- 9am to 12pm, Saturday

9 SITE SPECIFIC AMELIORATIVE MEASURES

9.1 SATURDAY MORNING WORKS (7AM TO 8AM)

The use of general construction phase equipment between 7am and 8am will be audible at residential receivers and is therefore not permitted by the consent. Maintenance and other quiet activities (as long as it does not require the running of engines) can occur between 7am and 8am.

9.2 BARRRIERS TO CHILD CARE CENTRE

Site investigations indicate the child care centre currently has an existing boundary fence that meets the requirements of the recommendation in the ALC report referenced in condition 9 of the consent. Notwithstanding, a temporary fence constructed of 1300TempFence Acoustic Blankets would satisfy the condition, either constructed as a separate temporary fence or laid over the existing fence.

9.3 LIAISON WITH CHILD CARE CENTRE

Liaise with the child care centre so as to the use of construction phase equipment operating within 50m of the play area during sleep periods. Based on discussion with the child care centre noise producing construction should be scheduled not to occur close to the child care centre boundary between midday and 2pm weekdays.

9.4 OPERATION CLOSE TO RESIDENTIAL RECIEVERS

Given the extent, timing and nature of the works it is not reasonable to provide physical barriers to prevent noise levels exceeding the noise management levels. Provided the recommended precautions are followed no receiver would but subjected to noise exceeding the Highly Noise Affected management Level, nor is any of the proposed plant categorised as highly annoying. Therefore, respite periods are not required.

9.5 REVERSING ALARMS

Vehicles required to have reversing alarms to use a non-tonal reversing beacon (subject to OH&S requirements) to minimise potential disturbance of neighbours.

9.6 CONSTRUCTION VECHICLES ARRIVAL TIME ON SITE

Construction vehicles including concrete agitator trucks must not arrive at the project site or surrounding residential precincts outside of the construction hours of work outlined in condition C3 of SSD Application 9354.

9.7 USE OF QUACKERS

The applicant must implement, where practicable and without compromising the safety of construction staff or members of the public, the use of 'quackers' to ensure noise impacts on surrounding noise sensitive receivers are minimised.

9.8 GENERAL OPERATION OF EQUIPMENT

Avoid careless dropping of construction materials into empty trucks.

Trucks, trailers and concrete trucks (if feasible) should turn off their engines during idling to reduce noise impacts (unless truck ignition needs to remain on during concrete pumping).

Where practical stagger equipment operation around the site to minimise extended periods of noise exposure at one receiver.

9.9 COMPLAINTS

Complaints handling - In the event of complaint, the procedures outlined in section 12.

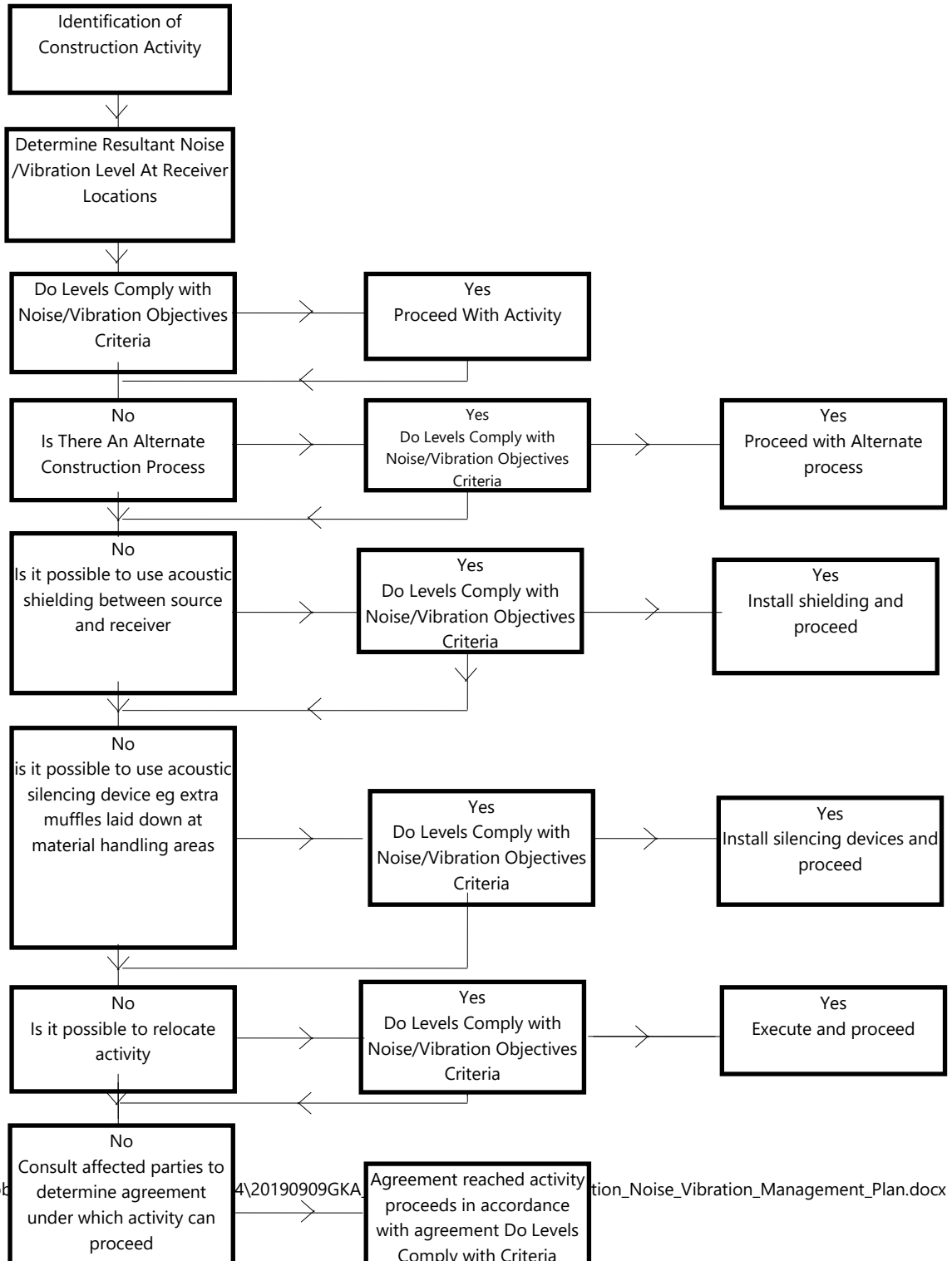
9.10 SITE INDUCTIONS

A copy of the Noise Management Plan is to be available to contractors. The location of the Noise Management Plan should be advised in any site induction.

10 CONTROL OF CONSTRUCTION NOISE AND VIBRATION GENERALLY

The execution of this work will facilitate the formulation of noise control strategies for this project.

The flow chart presented in Figure 2 illustrates the process that will be followed in assessing construction activities.



11 NOISE AND VIBRAION CONTROL METHODS

The determination of appropriate noise control measures will be dependent on the particular activities and construction appliances. This section provides an outline of available methods.

11.1 SELECTION OF ALTERNATE APPLIANCE OR PROCESS

Where a particular activity or construction appliance is found to generate excessive noise levels, it may be possible to select an alternative approach or appliance. For example; the use of a hydraulic hammer on certain areas of the site may potentially generate high levels of noise. By carrying this activity by use of pneumatic hammers, bulldozers ripping and/or milling machines lower levels of noise will result.

11.2 ACOUSTIC BARRIER

Barriers or screens can be an effective means of reducing noise. Barriers can be located either at the source or receiver.

- The placement of barriers at the source is generally only effective for static plant (tower cranes). Equipment which is on the move or working in rough or undulating terrain cannot be effectively attenuated by placing barriers at the source.
- Barriers can also be placed between the source and the receiver however this will not beneficial in this instance due to receivers overlooking the site.

The degree of noise reduction provided by barriers is dependent on the amount by which line of sight can be blocked by the barrier. If the receiver is totally shielded from the noise source reductions of up to 15dB(A) can be gained. Where only partial obstruction of line of sight occurs, noise reductions of 5 to 8dB(A) may be achieved. Where no line of sight is obstructed by the barrier, generally no noise reduction will occur.

As barriers are used to provide shielding and do not act as an enclosure, the material they are constructed from should have a noise reduction performance that is approximately 10dB(A) greater than the maximum reduction provided by the barrier. In this case the use of a material such as 10mm or 15mm thick plywood (radiata plywood) would be acceptable for the barriers.

11.3 SILENCING DEVICES

Where construction process or appliances are noisy, the use of silencing devices may be possible. These may take the form of engine shrouding, or special industrial silencers fitted to exhausts.

11.4 MATERIAL HANDLING

The installation of rubber matting over material handling areas can reduce the sound of impacts due to material being dropped by up to 20dB(A).

11.5 TREATMENT OF SPECIFIC EQUIPMENT

In certain cases, it may be possible to specially treat a piece of equipment to dramatically reduce the sound levels emitted.

11.6 ESTABLISHMENT OF SITE PRACTICES

This involves the formulation of work practices to reduce noise generation. It is recommended that all available and reasonable treatments and mitigation strategies presented in this report be adopted to minimise noise emissions from the construction activities on site.

11.7 COMBINATION OF METHODS

In some cases, it may be necessary that two or more control measures be implemented to minimise noise.

11.8 MAINTENANCE OF PLANT, EQUIPMENT AND MACHINERY

All plant, equipment and machinery should be regularly serviced and maintained at optimum operating conditions, to ensure excessive noise emissions are not generated from faulty, overused or unmaintained machinery.

11.9 STAFF TRAINING AND REPORTING MECHANISM

All construction staff (including subcontractors) on site, as part of the site induction process, will be informed of the surrounding sensitive receivers on site and the site-specific recommendations to reduce noise and vibration impacts to these receivers.

12 COMMUNITY INTERACTION AND COMPLAINTS HANDLING

12.1 ESTABLISHMENT OF DIRECT COMMUNICATION WITH AFFECTED PARTIES

In order for any construction noise management programme to work effectively, continuous communication is required between all parties, which may be potentially impacted upon, the builder and the regulatory authority. This establishes a dynamic response process which allows for the adjustment of control methods and criteria for the benefit of all parties.

The objective in undertaking a consultation process is to:

- Inform and educate the groups about the project and the noise controls being implemented;
- Increase understanding of all acoustic issues related to the project and options available;
- Identify group concerns generated by the project, so that they can be addressed; and
- Ensure that concerned individuals or groups are aware of and have access to a Constructions Complaints Register which will be used to address any construction noise related problems should they arise.

Community consultation should be conducted prior to any works commencing on site, with letterbox notifications to all identified however not limited to surrounding sensitive receivers (refer section 3).

12.2 DEALING WITH COMPLAINTS

Should ongoing complaints of excessive noise or vibration criteria occur immediate measures shall be undertaken to investigate the complaint, the cause of the exceedances and identify the required changes to work practices. In the case of exceedances of the vibration limits all work potentially producing vibration shall cease until the exceedance is investigated.

The effectiveness of any changes shall be verified before continuing. Documentation and training of site staff shall occur to ensure the practices that produced the exceedances are not repeated.

If a noise complaint is received the complaint should be recorded on a Noise Complaint Form. The complaint form should list:

- The name and address of the complainant (if provided);
- The time and date the complaint was received;
- The nature of the complaint and the time and date the noise was heard;
- The name of the employee who received the complaint;
- Actions taken to investigate the complaint, and a summary of the results of the investigation;
- Required remedial action, if required;
- Validation of the remedial action; and
- Summary of feedback to the complainant.

A permanent register of complaints should be held. All complaints received should be fully investigated and reported to management. The complainant should also be notified of the results and actions arising from the investigation.

The investigation of a complaint shall involve where applicable;

- Noise measurements at the affected receiver;
- An investigation of the activities occurring at the time of the incident;
- Inspection of the activity to determine whether any undue noise is being emitted by equipment; and
- Whether work practices were being carried out either within established guidelines or outside these guidelines.

Where an item of plant is found to be emitting excessive noise, the cause is to be rectified as soon as possible. Where work practices within established guidelines are found to result in excessive noise being generated then the guidelines should be modified so as to reduce noise emissions to acceptable levels. Where guidelines are not being followed, the additional training and counselling of employees should be carried out.

Measurement or other methods shall validate the results of any corrective actions arising from a complaint where applicable.

12.3 REPORTING REQUIREMENTS

The following shall be kept on site:

1. A register of complaints received/communication with the local community shall be maintained and kept on site with information as detailed in section 14.2.

2. Where noise/vibration complaints require noise/vibration monitoring, results from monitoring shall be retained on site at all times.

3. Any noise exceedances occurring including, the actions taken and results of follow up monitoring.

12.4 CONTINGENCY PLANS

Where non-compliances or noise complaints are raised the following methodology will be implemented.

1. Determine the offending plant/equipment/process

2. Locate the plant/equipment/process further away from the affected receiver(s) if possible.

3. Implement additional acoustic treatment in the form of localised barriers, silencers etc where practical and reasonable.

4. Selecting alternative equipment/processes where practical

12.5 COMMUNITY CONSULTATION PRIOR TO COMMENCEMENT AND ONGOING

12.5.1 Generally

The Department of Education held an Information Booth at the Jordan Springs Community Hub, adjacent to the site, to provide the community an opportunity to review the proposed construction activities. Residents in the vicinity were provided 7 days notice. Comments were captured per the NSW Department of Education Community Communication Strategy protocol.

The NSW Department of Education Community Communication Strategy for complaints management will be implemented on this project. Note, for the duration of the project a free call 1300 community information line is accessible and manned by Schools Infrastructure NSW. A contact number for the builder would also be displayed at the site.

12.5.2 Child Care Centre

The adjacent child care centre has been consulted to determine their sensitive period (see below) which is from 12 -2pm. During this period the precautions recommended in this Plan should be observed.

Tom Hemmett RICHARD CROOKES CONSTRUCTIONS PTY LIMITED	Little Zak's Academy Sleep Period GENERAL CORRESPONDE...	29/05/2019 RCC-GCOR-000352
Jacqueline Sellen TSA MANAGEMENT	Re: Little Zak's Academy Sleep Period GENERAL CORRESPONDE...	30/05/2019 TSA-GCOR-000101

JSPS
201 Kent St
Sydney
2000 Australia

MAIL TYPE	MAIL NUMBER	REFERENCE NUMBER
General Correspondence	TSA-GCOR-000101	RCC-GCOR-000352

Re: Little Zak's Academy Sleep Period

From	Jacqueline Sellen - TSA Management
To (3)	Mr Tom Hemmett - Richard Crookes Constructions Pty Limited (+2 more...)
Cc	Mr Darren Vozzo - Richard Crookes Constructions Pty Limited
Sent	Thursday, 30 May 2019 12:18:20 PM AEST (GMT +10:00)
Status	N/A

MESSAGE

Hi Tom,

I've spoken with the Supervisor, Leanne at Little Zak's. She's advised that lunch/rest time is 12-2pm. They are well versed in construction noise, positioned as they are in a developing area, so not overly concerned about the disruption.

One thing she has requested is that any smokers avoid loitering around the boundary adjoining their site or out the front of the centre. It's a no brainer, but can you please ensure the message is passed on to sub-contractors.

Kind regards,

JACQUELINE SELLEN
Assistant Project Manager
Level 15, 207 Kent Street | Sydney NSW 2000
T: 02 9276 1400 | M: 0424 194 440
W: tsamanagement.com.au | E: jsellen@tsamanagement.com.au
smart people smarter solutions

From: T Hemmett
Sent: 29/05/2019 9:47:05 AM AEST (GMT +10:00)
To: Craig Butler, Martin Fenn, Jacqueline Sellen
Cc: Darren Vozzo
Mail Number: RCC-GCOR-000352
Subject: Little Zak's Academy Sleep Period

Team TSA,

13 MONITORING PROGRAMME

The following monitoring programme shall be undertaken during the works:

a. At the commencement of any new phase of works involving significant noise producing activities as identified in the assessment conduct attended monitoring at the sensitive receiver locations to establish noise levels generated. Provide a report that indicates the activities occurring, and noise control measures implemented at the time, measured noise levels and the corresponding management levels.
b. In response to complaints provide monitoring and reporting as per a) at the complainants property.
c. Where there are ongoing, valid complaints establish continuous, unattended monitoring at these locations and provide reporting on a twice monthly basis until completion of the stage of works leading to the complaints.

14 CONCLUSION

This report presents an assessment of noise impacts associated with the construction phase activities to be undertaken for the Jordan Springs Public School development to be constructed at Jordan Springs. Predictions of expected noise levels associated with these works have been made the outcomes are as follows:

- Recommendations to minimise and manage noise and vibration emissions have been made in the CNVMP. These should be adopted throughout the project to regulate construction activity so as to minimise impacts.
- It is unlikely to be exceedances of Highly Noise Affected Level (i.e. 75dB(A)) during the construction phase works and respite periods are not required.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
George Kinezos

Qualifications

Bachelor of Mechanical Engineering (Hons, Class1) (1982)

Member of the Acoustic Society of Australia (M.A.A.S)

1994 - Current	Director, Acoustic Logic Consultancy
1992 to 1994	Associate Director, Renzo Tonin and Associates
1989 to 1992	Project Engineer, Renzo Tonin and Associates
1981 to 1989	Engineer, NSW Public Works Department

Outline of Experience

Between 1981 and 1989 Victor was employed with the NSW Public Works Department as a professional engineer. His work involved the investigation, design and construction supervision of mechanical services (air conditioning, ventilation heating, solar design) for new and existing public buildings throughout the state as well as acoustics.

Victor joined Renzo Tonin and Associates, a Sydney-based acoustics and vibration consultancy, in 1989 as a project engineer, and was made an associate director of the firm in 1992. In 1994 he became a director of Acoustic Logic Consultancy.

Victor's areas of expertise include:

Building acoustics and building services noise control
Environmental noise modelling and assessment
Vibration isolation and structural dynamics
Traffic noise prediction
Helicopter & aircraft noise
Industrial Noise Control

Project Experience

Victor has undertaken a number of environmental noise and vibration impact assessments for a variety of projects. Some of these are listed below.

M5 East - Kyeemagh to King Georges Road EIS (Study Director)
Trinity Grammar Masterplan
Liverpool to Hornsby Transport Link (Study Director)
Sydney Olympics
Eastern Distributor
Very Fast Train Project
Austrak
North Tahmoor Mine Project (Study Director)
Honeysuckle, Newcastle (Study Director)
North Arncliffe Local Environment Plan. (Study Director)
Epping Road, Lane Cove Upgrade (Study Director)
M5 - King Georges Road to Moorebank Section
Pacific Highway Oak Flats to Dunmore Noise Assessment (Study Director)

Qualifications
Bachelor of Audio Engineering and Sound Production (2016)

2017 – 2018	Technical Assistant, Acoustic Logic Consultancy
2018 - Current	Project Engineer, Acoustic Logic Consultancy

Outline of Experience

Whilst at ALC George has been trained in measurement and analysis of noise and vibration. George has worked in detailed assessment of acoustic impacts and been involved in the design of noise/vibration attenuation systems to meet relevant statutory codes (BCA, EPA guidelines and Australian Standards)

His work involves the investigation, design and construction supervision of noise control measures associated with mechanical services and building works.

Whilst being employed with Acoustic Logic, George has been responsible for noise and vibration engineering for residential, commercial and special projects including;

Building acoustics and building services noise control.
Environmental noise modelling and assessment.
Traffic, train and aircraft noise prediction.
Industrial Noise Control.
Construction Noise and Vibration.
NSW Office of Liquor, Gaming and Racing acoustic assessment.
Testing and assessment of walls/floors/glazing/building services.

Project Experience

A sample of projects George has been or is currently involved with as a Project Engineer include the following:

Aged Care Projects
- 510 King Street, Newcastle
- RSL Life Care, Narrabeen
- John Paul Village, Heathcote

Residential Projects
- Bennelong Apartments, Sydney
- Meriton Group Projects (Mascot (several), Roseberry and Ryde)
- 15 Clarence Street, Burwood.
- Summer Hill Flour Mill Project - Stage 1, 2, 3 and 4.
-

School Buildings
- Clarence Street Public School.
- Alexandria Park Public School.

Hospital Buildings
- Wagga Wagga Base Hospital.
- Westmead Hospital.
- Nepean Hospital

Green Star Acoustic Testing
- 55 Mann Street, Gosford (Australian Taxation Office)

APPENDIX H - CONSTRUCTION WASTE MANAGEMENT SUB-PLAN

environmental management pty ltd

JORDAN SPRINGS PUBLIC SCHOOL CONSTRUCTION WASTE MANAGEMENT PLAN

VERSION NUMBER:

VERSION 7

REPORT DATE:

6/09/2019

SUBMITTED TO:

RICHARD CROOKES CONSTRUCTIONS

PRESENTED BY:

JO DRUMMOND

ECCELL ENVIRONMENTAL MANAGEMENT PTYLTD
35 WAVERLY CRST, BONDI JUNCTION NSW 2022

TABLE OF CONTENTS

1. INTRODUCTION

Overview

This Construction Waste Management Plan (CWMP) has been prepared by EcCell Environmental on behalf of Richard Crookes Constructions for the new Jordan Springs Public School at 14-28 Cullen Avenue, Jordan Springs (the site).

The new school will cater for approximately 1,000 primary school students and 70 full-time staff upon completion. The plan is for:

- Construction of a 2-storey library, administration and staff building (Block A) comprising:
  - School administrative spaces including reception;
  - Library with reading nooks, makers space and research pods;
  - Staff rooms and offices;
  - Special programs rooms;
  - Amenities;
  - Canteen;
  - Interview rooms; and
  - presentation spaces.
- Construction of three 2-storey learning hubs containing 42 homebases comprising:
  - Collaborative learning spaces;
  - Learning studios;
  - Covered outdoor learning spaces;
  - Practical activity areas; and
  - Amenities.
- Construction of a single storey assembly hall (Block C) with a performance stage and integrated covered outdoor learning area (COLA). The assembly hall will have OOSH facilities and store room areas;
- Associated site landscaping and open space including associated fences throughout and sporting facilities;
- Pick-up and drop-off zone from Cullen Avenue;
- Pedestrian access points along both Cullen Avenue and Lakeside Parade;
- Construction of an at-grade carpark containing 62 spaces accessible from Lakeside Parade and 2 spaces accessible from Cullen Avenue;
- School signage to the front entrance; and
- new substation fronting Cullen Avenue.

All proposed school buildings will be connected by a double storey covered walkway providing integrated covered outdoor learning areas (COLAs).

Purpose

The purpose of this CWMP is to meet the requirements of the State Significant Development Application (SSDA) conditions of consent, particularly Condition B17 B 12 this includes:

a) Identify, quantity and classify waste streams to be generated during construction.
b) Describe measures to be implemented to manage, reuse, and recycle and safely dispose of the waste.
c) Identify servicing arrangements including but not limited to waste management loading zones.
d) Prepare a site drawing for Construction Waste Management Loading Zones.

Condition of Approval (CoA) B12and B17

CoA Reference	CoA Detail
B12	(d) a program to monitor and report on the: (i) impacts and environmental performance of the development; (ii) effectiveness of the management measures (e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible; (g) a protocol for managing and reporting any: (i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria); (ii) complaint; (iii) failure to comply with statutory requirements; (h) a protocol for periodic review of the plan.
B17	**Construction Waste Management Plan** (a) detail the quantities of each waste type generated during construction and the proposed reuse, recycling and disposal locations; (b) removal of hazardous materials, particularly the method of containment and control of emission of fibers to the air, disposal at an approved waste disposal facility in accordance with the requirements of the relevant legislation, codes, standards and guidelines, prior to the commencement of any building works.

2. OBJECTIVES & TARGETS

The project objectives include:

- Meeting all waste management standards while ensuring the health and safety of the workers on the project.
- Maximising the quantities of materials diverted from landfill by reusing, recycling and reprocessing off-site.
- Disposal of no more than 20% of residual waste materials to a licensed landfill in accordance with both regulatory and legal requirements.
- The diversion from landfill of 80% of construction waste by weight, to meet the criteria of the NSW State Government's waste legislation, waste policy settings and regulatory regime.

3. 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 2001
- Protection of the Environment Operations (Waste} Regulation 2014
- NSW Department of Planning and Environment, Secretary's Environmental Assessment Requirements (SEARs).
- SSDA Conditions of Consent

4. SERVICING ARRANGMENTS

The current legislation determines that the generator of waste is the owner of the waste until the waste crosses a weighbridge into a licensed facility. Waste contractors including construction contractors are the primary transporters of waste off-site, accordingly contractors will be required to provide monthly reports on waste reused, reprocessed or recycled, thus diverted from landfill or waste sent to landfill. These reports have a direct bearing on the generator's regulations.

The CWMP will be implemented on site throughout excavation and construction.

All entries in the Waste Data File must include:

- Classification of the waste
- Time and Date of material removed
- Description and size of waste
- Waste facility used
- Vehicle registration and Waste Contractors Company name

The Waste Data File will be available for inspection to any authorized officer at any time during 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.

5. WASTE MANAGEMENT STRATEGIES

The waste management strategy for the project will operate over the design, procurement, and construction including fit out of the project.

Management Strategies	Responsibilities
Design:	
Use of modular components in design	Architect & Engineer
Use of prefabricated components in design	Architect, Builder, Subcontractors.
Design for materials to standard sizes	Architect, Subcontractors
Design for operational waste minimisation	Architect & Builder
Procurement:	
Select recycled and reprocesses materials	Architect, Engineer, Builder & Sub Contractors
Select components that can be reused after deconstruction	Architect, Engineer & Builder
Select modular components	
Pre-construction	
Waste management plan to be reviewed & approved prior to construction	Builder
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 & monitor the correct usage of bins	Builder & Waste Contractor
Audit and monitor the Waste Contractor	Builder
Update the CWMP when any changes occur	Builder

6. MONITORING and REPORTING

Regular observations will be made by the Construction Site Manager and measures put into place to monitor the waste bins on site. The Site Manager will review any

- Incident, non-conformance and document any corrective action when required;
- Monthly waste management reporting; including ensuring all waste quantities generated are recorded, including tracking of receipts for waste, recycling or disposal via the appointed waste contractor;
- Record waste classification and testing results;
- Update the CWMP in light of any changes to construction activities or further information, which may alter waste management practices;
- Auditing of waste management generation and practices across the site as a component of broader environmental site audits;
- Visual inspections daily to ensure waste management controls are implemented and maintained across site;
- Final review of the CWMP upon project completion to ensure information accurately reflects site activities, and to assist future waste management planning; and
- Ensure compliance with Approval, Permit and License sections that are relevant to current operations

7. CORRECTIVE ACTION

Where formal auditing, daily visual inspections or incident reporting identify incorrect storage or disposal procedures, of waste , observations will be promptly
reported to the Construction Site Manager and recorded. The Construction Site Manager will determine appropriate measures to rectify the issues in a timely manner in consultation with the Health and Safety Environmental Manager.

8. COMPLAINTS HANDELING

Members of the general public impacted by the construction phase are able to enquire and complain about environmental impacts via the following channels:

- Information booths and information sessions held at the school or local community meeting place, advertised at least 7 days before in local newspapers, on our website and via letterbox drops
- 1300 number that is published on all communications material, including project site signage

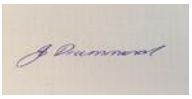
9. CONSTRUCTION WASTE MANAGEMENT PLANNING REVIEW

Richard Crooks have in place an external environmental auditing programme this will include a prestart and an annual review of site waste documentation including:

- Compliance with Approval, Permit and Licence sections that are relevant to current operations
- Compliance with the CWMP
- Compliance with waste disposal records
- Monthly waste contractor reports

10.WASTE MANAGEMENT PLAN APPLICATION

PROJECT:
Jordan Springs Public School
ADDRESS:
14-28 Cullen Avenue, Jordan Springs
Details of Application
RICHARD CROOKES CONSTRUCTIONS
Description of buildings and other structures currently on the site:
No demolition on site
Brief description of proposal:
Construction of a 2-storey library, administration and staff building (Block A) comprising: Construction of three 2-storey learning hubs containing 42 homebases comprising: Construction of a single storey assembly hall (Block C) with a performance stage and integrated covered outdoor learning area (COLA). The assembly hall will have OOSH facilities and store room areas; Associated site landscaping and open space including associated fences throughout and sporting facilities;
If materials / waste is reused on site or off site, how will it be re-used:
Reuse of soil and excavation material on site ,reuse of drums,pallets and rio bar,timber,plasterboard and formwork .

Prepared by :	Jo Drummond		0412214233	7/09/2019

PHASE 1: DEMOLITION

There is no demolition as this is a greenfield site.

PHASE 2: 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 VENM with potential traces of gravel aggregate and anthropogenic material			413 m^3	NA	Grasshopper Environmental	Transferred to licenced receiving facility
Sub Total	**413 m^3**					
TOTAL	**413 m^3 taken off site**					

Narrative: There is minimal excavation of virgin excavated natural material (VENM). Material, which will be used back on the site for landscaping. This material will be covered to reduce soil displacement and prevent air pollution.

Based on the analytical results provided in the "Stage 2 Environmental Site Assessment" (WSP Consulting report reference PS110032-Jordan Springs Phase 2-CLM-REP-001_RevC), there was negligible soil contamination impact identified on or beneath the site. The investigation tested for potential pollutants common to this type of site including TRH fractions, OCPs, OPPs, PAHs, PCBs, Heavy Metals and Asbestos fibres. No results were reported above the adopted assessment criteria in any of the tested samples. Given this, it is unlikely that contaminated soils or asbestos material with the potential to become airborne would be encountered during the excavation and construction phase of the development.

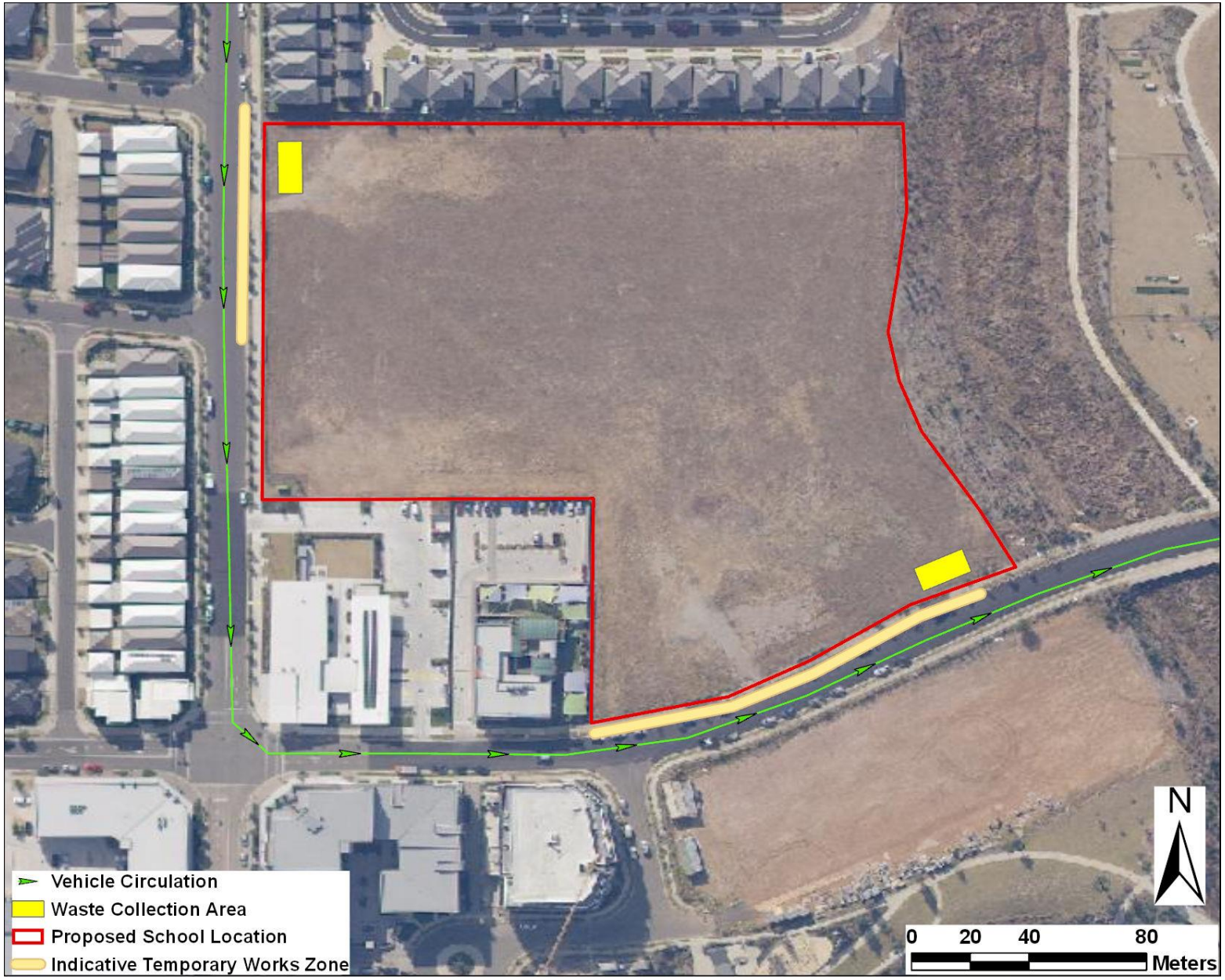
Section (b) removal of hazardous materials, particularly the method of containment and control of emission of fibres to the air, and disposal at an approved waste disposal facility in accordance with the requirements of the relevant legislation, codes, standards and guidelines, prior to the commencement of any building works.

PHASE 3: 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 Location / Contractor	Waste Depot, Recycling Outlet or Landfill site
Concrete Brick Block-work & Tile		247m^3		Co-mingled Bins	Grasshopper Environmental Pty Ltd	Crushed for road base
Metals		160m^3		Co-mingled Bins		Scrap Metal Dealer for smelting
Timber off-cuts		287m^3		Co-mingled Bins		Recycled for chips and mulch
Cardboard		179m^3		Co-mingled Bins		Recycled into cardboard
Plasterboard		254m^3		Co-mingled Bins		Recycled as soil conditioner
Plastics, plastic packaging, paint drums*, containers		182m^3	25 m^{3-}	Co-mingled Bins		- Styrene and plastic to landfill * Paint drums nested and recycled
Pallets and Reels	190 units			Separated onsite		Returned to the supplier
Liquid Waste			27 m^3	Separated onsite		Transferred to licenced landfill
General Waste			297 m^3	Co-mingled Bins		Transferred to licenced landfill
Sub Total	**NB:190 units**	**1,311m^3**	**349 m^3**			
TOTAL	**1,660m^3**			**NB: Plus, an additional 190 pallets (single units returned to suppliers for reuse)**		

Narrative:
All waste will be co-mingled and taken for off-site separation and reuse or recycling except Pallets and Reels.
It is not anticipated that any hazardous wastes will be generated during construction however during any disposal and material recovery activities, one should beware of potentially hazardous materials such as fluorescent tubes, laboratory chemicals, batteries, asbestos, pesticides and herbicides. If these types of wastes are identified, ensure the site unexpected finds protocol is adopted and that the waste is transported to a place that can lawfully accept it under Section 143 of the Protection of the Environment Operations Act 1997.

APPENDIX A – WASTE MANAGEMENT LOADING ZONE



APPENDIX B: CONTINGENCY PLAN

No	Activity	Aspect Impact	Inherent Risk	Actions / Control Measure	Residual risk Score	Action By	Contingency Plan
Waste Management							
1.1	All waste would be assessed, classified, managed and disposed of legally	Soil Contamination	13	All waste will be assessed, classified, managed and disposed of in accordance with the Waste Classification Guidelines (DECC, 2008).	6	Environmental Manager	No waste to leave the site without a waste classification.
.2	All waste materials removed from the site will only be directed to a waste management facility lawfully permitted to accept the materials	Illegal dumping of waste	13	Waste Tracking System Provide monthly waste reports with tipping dockets indicating that waste has been taken to a licensed waste facility.	6	Waste Contractor	Withhold payment unless dockets provided and correlated.
1.3	Waste tracking reporting and auditing of waste volumes and disposal destinations	Illegal dumping of material	13	Waste Tracking System	6	Waste Contractor	Audit waste contractor to ensure they comply with current legislation.
1.4	All waste materials removed from the site shall only be directed to a waste management facility or premises lawfully permitted to accept the materials	Illegal dumping of waste material. Waste taken to an unlicensed facility.	13	Waste Tracking System provided by Waste Contractor docketing documenting waste leaving the site and crossing a weighbridge to a licenses waste facility.	6	Waste Contractor	Withhold payment unless dockets provided. Waste contractor to advise Richard Crooks if waste has been taken to un unlicensed facility
1.5	All liquid waste generated on the site shall all be assessed and classified in accordance with Waste Classification Guidelines	Incorrect classification	13	Waste Tracking System documenting liquid waste leaving the site and crossing a weighbridge to a licenses liquid waste facility.	18	Waste Contractor	Request disposal dockets for all liquid waste leaving the site.

APPENDIX I - CONSTRUCTION SOIL & WATER MANAGEMENT SUB-PLAN

NORTHROP

CIVIL ENGINEERING REPORT: SOIL & WATER MANAGEMENT PLAN

Jordan Springs Public School

Lot 22, DP1194338 Cullen Avenue, Jordan Springs

PREPARED FOR
Richard Crookes Constructions
Level 3, 4 Broadcast Way

Artarmon NSW 2064
Tel: (02) 9902 4700

Ref: S182535-01-CR04
Rev: 5
Date: 13.09.19

Civil Engineering Report: Soil & Water Management Plan

Revision Schedule

Date	Revision	Issue	Prepared By	Approved By
28.05.19	1	For Review	J. Grinsell	J. Gilligan
31.08.19	2	For Review	J. Grinsell	J. Gilligan
09.09.19	3	For Review	J. Grinsell	J. Gilligan
10.09.19	4	For Review	J. Grinsell	J. Gilligan
13.09.19	5	For Review	J. Grinsell	J. Gilligan

Northrop Consulting Engineers Pty Ltd

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Table of Contents

1. General

1.1 Introduction

Northrop Consulting Engineers Pty Ltd (Northrop) have been engaged by Richard Crookes Constructions to prepare the Civil Engineering design and documentation in support of a Construction Certificate for the proposed Jordan Springs Primary School development at Lot 2, DP1194338, 14-28 Cullen Avenue, Jordan Springs.

This report covers the works shown as the Northrop Drawing Package required for the development of the site including:

- Erosion and Sediment control;

1.2 Related Reports and Documents

This report is to be read in conjunction with the following reports and documents:

1. Detailed Design Phase Civil Documentation prepared by Northrop:
   - 182535 C01.11 [1] Specification Notes – Sheet 01
   - 182535 C02.01 [1] Sediment and Soil Erosion Control Plan
   - 182535 C02.11 [1] Sediment and Soil Erosion Control Details
2. NSW Department of Housing Manual, “Managing Urban Stormwater Soil & Construction” 2004 (Blue Book)
3. Penrith City Council’s Engineering Construction Specification for Civil Works

1.3 The Development

1.3.1 Precinct and Surrounds

The site is located within the suburb of Jordan Springs in the Penrith City Council (Council) Local Government Area (LGA). The site is approximately two (2) hectares, bound by existing residential development to the north, Lakeside Parade to the west Cullen Avenue to the south and an existing drainage channel to the east.

The existing site is largely undeveloped farm land dominated by grassed fields which generally falls to the west to east.

1.3.2 Proposed Development

This development is proposed on Lot 2, DP1194338, 14-28 Cullen Avenue, Jordan Springs NSW, which consists of a new public school to cater for approximately 1,000 students and 70 full-time staff. The development includes in the construction 5 building blocks, a drop-off and pick-up bay located on Cullen Avenue, pedestrian access points along Cullen Avenue and Lakeside Parade and 2 carparks facilitating access from both Cullen Avenue and Lakeside Parade.

2. Erosion and Sediment Control

The objectives of the erosion and sediment control for the development site are to ensure:

- Adequate erosion and sediment control measures are applied prior to the commencement of construction and are maintained throughout construction; and
- Construction site runoff is appropriately treated in accordance with Blacktown City Council requirements.

As part of the works, the erosion and sedimentation control will be constructed in accordance with Council requirements and the NSW Department of Housing Manual, “Managing Urban Stormwater Soil & Construction” 2004 (Blue Book) prior to any earthworks commencing on site. The Concept Sediment and erosion control measures are documented in Northrop’s detailed design drawings 182535 C01.11, C02.01 & C02.11

2.1 Sediment Basin

A temporary sediment basin has been designed to capture site runoff during construction and has been located towards the north eastern side of the site, in the lowest point. The construction of the basin will be undertaken in stages to enable maximum runoff capture assisted by diversion swales and direct runoff to the basin.

Calculations to determine the concept design basin size have been based on available geotechnical information regarding soil types and through the use of the Soils and Construction Volume 1 Manual.

To ensure the sediment basin is working effectively it will be maintained throughout the construction works. Maintenance includes ensuring adequate settlement times or flocculation and pumping of clean water to reach the minimum storage volume at the lower level of the settling zone. The settling zone will be identified by pegs to clearly show the level at which design storage capacity is available.

The pumped water from the sediment basin can be reused for dust control during construction.

Overflow weirs are to be provided to control over flows for rainfall events in excess of the design criteria which caters for a storm event up to and including the 1% AEP storm event.

The concept sediment basin sizing is summarised in the table below. Detailed sediment basin sizing, configuration and location shall form part of the Construction Certificate application.

The sediment basin has been located for future conversion into the permanent water quality basin.

2.2 Sediment and Erosion Control Measures

Prior to any earthworks commencing on site, sediment and erosion control measure shall be implemented generally in accordance with the Construction Certificate drawings and the “Blue Book”. The measures shown on the drawings are intended to be a minimum treatment only as the contractor will be required to modify and stage the erosion and sedimentation control measures to suit the construction program, sequencing and techniques. These measures will include:

- A temporary site security/safety fence is to be constructed around the site, the site office area and the proposed sediment basin;
- Sediment fencing provided downstream of disturbed areas, including any topsoil stockpiles;
- Dust control measures including covering stockpiles, installing fence hessian and watering exposed areas;
- Placement of hay bales or mesh and gravel inlet filters around and along proposed catch drains and around stormwater inlets pits; and
- The construction of a temporary sediment basin as noted above in Section 2.1;
- Stabilised site access at the construction vehicle entry/exits.

Any stockpiled material, including topsoil, shall be located as far away as possible from any associated natural watercourses or temporary overland flow paths. Sediment fences shall be installed to the downstream side of stockpiles and any embankment formation. All stockpiles and embankment formations shall be stabilised by hydroseeding or hydro mulching on formation.

3. Further Commentary

3.1 SSD Conditions

The Minister for Planning and Open Spaces has provided Conditions of Consent (Application Number: SSD 9354) for the proposed development at 14-28 Cullen Avenue, Jordan Springs. Conditions associated with the Construction Soil and Water Management Plan have been provided below with further commentary for consideration by School Infrastructure NSW and the Certifying Authority.

B12. Environmental Management Plan Requirements

Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:

- **(a) Detailed baseline data;**
- **(b) Details of:**
  - **(i) The relevant statutory requirements (including any relevant approval, license or lease conditions);**
  - **(ii) Any relevant limits or performance measures and criteria; and**
  - **(iii) The specific performance indicators that are proposed to be used to judge the performance of, or guide implementation of, the development or any management measures**
- **(c) A description of the measures to be implemented to comply with the relevant statutory requirements, limits or performance measures and criteria;**
- **(d) A program to monitor and report on the:**
  - **(i) Impacts and environmental performance of the development;**
  - **(ii) Effectiveness of the management measure set out pursuant to paragraph (c) above;**
- **(e) A contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;**
- **(f) A program to investigate and implement ways to improve the environmental performance of the development over time;**
- **(g) A protocol for managing and reporting any:**
  - **(i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);**
  - **(ii) complaint;**
  - **(iii) failure to comply with statutory requirements; and**
- **(h) a protocol for periodic review of the plan**

Northrop Commentary

The Construction Environmental Management Plan prepared by Richard Crookes Construction has addressed a number of these items as referenced in the table below.

(a) detailed baseline data;	Richard Crookes Construction, CEMP, Section 9
(b) details of: (i) the relevant statutory requirements (including any relevant approval, license or lease conditions);	Richard Crookes Construction CEMP, Section 4
(ii) any relevant limits or performance measures and criteria; and	Richard Crookes Construction CEMP, Section 9 and Section 10
(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	Richard Crookes Construction CEMP, Section 9 and Section 10
(c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;	Richard Crookes Construction CEMP, Section 9 and Section 10
(d) a program to monitor and report on the: (i) impacts and environmental performance of the development;	Richard Crookes Construction CEMP, Table 7 and Section 10, Table 8
(ii) effectiveness of the management measures set out pursuant to paragraph (c) above;	Richard Crookes Construction CEMP, Section 9, Table 7 and Section 10, Table 8
(e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	Refer to Appendix C – RCC Wet Weather Management Plan.
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Northrop Commentary (e), p8
(g) a protocol for managing and reporting any: (i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);	Richard Crookes Construction CEMP, Section 20.1
(ii) complaint;	Richard Crookes Construction CEMP, Section 17.2
(iii) failure to comply with statutory requirements; and	Richard Crookes Construction CEMP, Section 20.1

(h) a protocol for periodic review of the plan.	This plan is to be reviewed bi-monthly to ensure it is reflective of the construction staging of the development until such time that all exposed soil surfaces have been covered. In addition, the plan shall also be reviewed after significant rainfall events to coincide with the inspection of Sediment and Soil Erosion Control devices as instructed by Richard Crookes Constructions.

Construction Environmental Management Plan

B18. The Applicant must prepare a Construction Soil and Water Management Plan (CSWMSP) and the plan must address, but not be limited to the following:

a) **Be prepared by a suitably qualified expert, in consultation with Council;**
b) **Describe all erosion and sediment controls to be implemented during construction;**
c) **Provide a plan of how all construction works will be managed in a wet weather events (i.e. storage of equipment, stabilization of the Site);**
d) **Detail all off-Site flows from the site; and**
e) **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 1-year ARI, 1 in 5-year ARI and 1 in 100-year ARI).**

Northrop Commentary

(a) This Construction Soil and Management Plan has been prepared under the guidance of an experienced Chartered Senior Civil Engineer and in consultation with Penrith City Council. Relevant CV's and consultation form have been provided in the appendices.
(b) Erosion and Sediment Controls to be implemented during construction are briefly described in Section 2.2 of this report and documented on the civil engineering plans
(c) The management of construction works during wet weather is identified on the attached Wet Weather Management Plan prepared by Richard Crookes Constructions (Appendix C) which address procedures during such events. This is further noted in the Construction Environmental Management Plan prepared by Richard Crookes Constructions in Appendix D Sections 9 & 10. It is understood that general construction equipment is stored in containers during wet weather. Machinery / Plant is positioned away from flow paths to ensure that surface flows to the basin are not impeded. Typically, after a wet weather event, a 20-50mm layer of the subgrade is stripped and stockpiled to dry and be recompacted.
(d) The soil and water management plan prepared by Northrop Consulting Engineers has been updated to indicate direction of flows on site during rain events.
(e) Surface flows generated during storm events up to the 1 in 10-year storm event are directed over land or within the constructed pit and pipe network to the sediment basin. Stormwater runoff that has accumulated in the basin is to be flocculated prior to discharge to the existing Council stormwater system.
Storm events greater than the 1 in 10 year will still experience flows being directed to the sediment basin however the site will likely become overwhelmed as temporary control measures are not sized to cater for such events. Stormwater will likely overtop the basin and spill in to Cullen Avenue and the existing swale adjacent to the development site. Flows in excess of the 1 in 10-year storm event should be directed to regional detention basins controlled by Penrith City Council. It is noted that Penrith City Council have previously advised that OSD is not required where flows will be managed downstream in the ultimate arrangement. The project design team have approached Penrith City Council to initiate discussions regarding the proposed measures to control soil erosion and sedimentation during construction including proposed methods of discharging stormwater from the site.

C24. Disposal of Seepage and Stormwater

Adequate provisions must be made to collect and discharge stormwater drainage during construction of the building to the satisfaction of the principal certifying authority. The prior written approval of Council must be obtained to connect or discharge site stormwater to Council's stormwater drainage system or street gutter.

Northrop Commentary

The project design team have approached Penrith City Council to initiate discussions regarding the proposed measures to control soil erosion and sedimentation during construction including proposed methods of discharging stormwater from the site. The Post Approval Consultation Record has been provided in Appendix E.

Appendix A – Soil & Water Management Plans

NOTE: ALL CIVIL ENGINEERING CONSTRUCTION WORKS TO BE CARRIED OUT IN ACCORDANCE WITH PENRITH CITY COUNCIL DEVELOPMENT GUIDELINES.THE AFOREMENTIONED GUIDELINES INCLUSIVE OF ALL SPECIFICATIONS TAKE PRECEDENCE OVER NOTES PROVIDED BELOW.

ACCESS AND SAFETY

1. THE CONTRACTOR SHALL COMPLY WITH ALL STATUTORY AND INDUSTRIAL REQUIREMENTS FOR PROVISION OF A SAFE WORKING ENVIRONMENT INCLUDING TRAFFIC CONTROL.
2. THE CONTRACTOR SHALL PROVIDE TRAFFIC MANAGEMENT PLANS FOR THE PROPOSED WORKS COMPLETED BY A SUITABLY QUALIFIED PERSON AND APPROVED BY COUNCIL / REGULATORY AUTHORITY. WORK IS NOT TO COMMENCE ON SITE PRIOR TO APPROVAL OF TRAFFIC MANAGEMENT SCHEME.
3. THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES ACCESS TO BUILDINGS ADJACENT THE WORKS IS NOT DISRUPTED.
4. WHERE NECESSARY THE CONTRACTOR SHALL PROVIDE SAFE PASSAGE OF VEHICLES AND/OR PEDESTRIANS THROUGH OR BY THE SITE.
5. THE CONTRACTOR SHALL ENSURE PUBLIC ACCESS EXTERNAL TO THE SITE IS IN ACCORDANCE WITH COUNCILS REQUIREMENTS.

TREE PROTECTION

1. REFER TO LANDSCAPE / ARCHITECTS PLAN FOR TREES TO BE RETAINED AND PROTECTED.
2. ANY EXISTING TREES WHICH FORM PART OF THE FINAL LANDSCAPING PLAN SHALL BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY;
   - 2.1. PROTECTING THEM WITH BARRIER FENCING OR SIMILAR MATERIALS INSTALLED OUTSIDE THE DRIP LINE.
   - 2.2. ENSURING THAT NOTHING IS NAILED TO ANY PART OF THE TREE.
   - 2.3. CARE IS TAKEN NOT TO CUT ROOTS UNNECESSARILY. COUNCILS AND/OR INDEPENDENT ARBORISTS TO BE CONSULTED WHERE TREE ROOTS ARE TO BE REMOVED AND/OR CUT.

SEDIMENT AND SOIL EROSION

1. THE SEDIMENT & EROSION CONTROL PLAN PRESENTS CONCEPTS ONLY. THE CONTRACTOR SHALL AT ALL TIMES BE RESPONSIBLE FOR THE ESTABLISHMENT & MANAGEMENT OF A DETAILED SCHEME MEETING COUNCILS DESIGN, OTHER REGULATORY AUTHORITY REQUIREMENTS AND MAKE GOOD PAYMENT OF ALL FEES.
2. THE CONTRACTOR SHALL INSTIGATE ALL SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH STATUTORY REQUIREMENTS AND IN PARTICULAR THE 'BLUE BOOK' (MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION), PRODUCED BY THE DEPARTMENT OF HOUSING AND COUNCILS POLICIES. THESE MEASURES ARE TO BE INSPECTED AND MAINTAINED ON A DAILY BASIS.
3. THE SITE SUPERINTENDENT SHALL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE LOCATED AS INSTRUCTED IN THE DRAWINGS AND ADHERE TO ALL REGULATORY AUTHORITY REQUIREMENTS.
4. THE CONTRACTOR SHALL INFORM ALL SUB CONTRACTORS OF THEIR RESPONSIBILITIES IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS.
5. WHERE PRACTICAL, THE SOIL EROSION HAZARD ON THE SITE SHALL BE KEPT AS LOW AS POSSIBLE. TO THIS END, WORKS SHOULD BE UNDERTAKEN IN THE FOLLOWING SEQUENCE;
   - 5.1. CONSTRUCT TEMPORARY STABILISED SITE ACCESS INCLUSIVE OF SHAKE DOWN / WASH PAD.
   - 5.2. INSTALL ALL TEMPORARY SEDIMENT FENCES AND BARRIER FENCES. WHERE FENCES ADJACENT EACH OTHER, THE SEDIMENT FENCE CAN BE INCORPORATED INTO THE BARRIER FENCE.
   - 5.3. INSTALL SEDIMENT CONTROL MEASURES AS OUTLINED ON THE APPROVED PLANS.
6. UNDERTAKE SITE DEVELOPMENT WORKS SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF MINIMUM WORKABLE SIZE.
7. AT ALL TIMES AND IN PARTICULAR DURING WINDY AND DRY WEATHER, LARGE UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL ENSURING CONFORMITY TO REGULATORY AUTHORITY REQUIREMENTS.
8. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) SHALL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.
9. WATER SHALL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN STABILISED AND/OR ANY LIKELY SEDIMENT BEEN FILTERED OUT.
10. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES SHALL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE STABILISED / REHABILITATED.
11. ALLOW FOR GRASS STABILISATION OF EXPOSED AREAS, OPEN CHANNELS AND ROCK BATTERS DURING ALL PHASES OF CONSTRUCTION.
12. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED TO ENSURE THAT THEY OPERATE EFFECTIVELY. REPAIRS AND/OR MAINTENANCE SHALL BE UNDERTAKEN REGULARLY AND AS REQUIRED, PARTICULARLY FOLLOWING RAIN EVENTS.
13. RECEPTORS FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER SHALL BE DISPOSED OF IN ACCORDANCE WITH REGULATORY AUTHORITY REQUIREMENTS. CONTRACTOR TO PAY ALL FEES AND PROVIDE EVIDENCE OF SAFE DISPOSAL.
14. IF A TEMPORARY SEDIMENT BASIN IS REQUIRED, ENSURE SAFE BATTER SLOPES IN ACCORDANCE WITH THE GEOTECHNICAL REPORT. MAINTAIN ADEQUATE STORAGE VOLUME IN ACCORDANCE WITH PLANS. TEMPORARY PUMP 'CLEAN FLOCCULATED' WATER TO COUNCILS STORMWATER SYSTEM . ENSURE WHOLE SITE RUN-OFF IS DIRECTED TO TEMPORARY SEDIMENT BASIN.

EXISTING SERVICES

1. ALL UTILITY SERVICES INDICATED ON THE DRAWINGS ORIGINATE FROM SUPPLIED DATA OR DIAL BEFORE YOU DIG SEARCHES, THEREFORE THEIR ACCURACY AND COMPLETENESS IS NOT GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE AND CONFIRM THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE SUPERINTENDENT. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY. NOTE SERVICE AUTHORITY REQUIREMENTS FOR LOCATING OF SERVICES PRIOR TO COMMENCEMENT OF WORKS.
2. CARE TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATIONS AREA TO BE UNDERTAKEN OVER COMMUNICATION, GAS OR ELECTRICAL SERVICES. HAND EXCAVATION ONLY IN THESE AREAS.
3. THE CONTRACTOR SHALL PROTECT AND MAINTAIN ALL EXISTING SERVICES THAT ARE TO BE RETAINED IN THE VICINITY OF THE PROPOSED WORKS. ANY AND ALL DAMAGE TO THESE SERVICES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR UNDER THE DIRECTION OF THE SUPERINTENDENT AT THE CONTRACTORS EXPENSE.
4. THE CONTRACTOR SHALL ALLOW IN THE PROGRAM FOR THE ADJUSTMENT (IF REQUIRED) OF EXISTING SERVICES IN AREAS AFFECTED BY WORKS.
5. THE CONTRACTOR SHALL ALLOW IN THE PROGRAM FOR THE CAPPING OFF, EXCAVATION AND REMOVAL (IF REQUIRED) OF EXISTING SERVICES IN AREAS AFFECTED BY WORKS UNLESS DIRECTED OTHERWISE ON THE DRAWINGS OR BY THE SUPERINTENDENT.
6. THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES SERVICES TO ALL BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED AND MAINTAINED.
7. PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL GAIN APPROVAL OF THE PROGRAM FOR THE RELOCATION AND/OR CONSTRUCTION OF TEMPORARY SERVICES AND FOR ANY ASSOCIATED INTERRUPTION OF SUPPLY.
8. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.

EARTHWORKS

1. AT THE COMMENCEMENT OF FILLING OPERATIONS FOR BULK EARTHWORKS A GEOTECHNICAL ENGINEER IS TO VISIT THE SITE & CONFIRM THE SUITABILITY OF THE METHODOLOGY OF ACHIEVING THE REQUIRED COMPACTION REQUIREMENTS.
2. STRIP TOPSOIL, VEGETABLE MATTER AND RUBBLE TO EXPOSE NATURALLY OCCURRING MATERIAL AND STOCKPILE ON SITE AS DIRECTED BY THE SUPERINTENDENT.
3. WHERE FILLING IS REQUIRED TO ACHIEVE DESIGN SUBGRADE, PROOF ROLL EXPOSED NATURAL SURFACE WITH A MINIMUM OF TEN PASSES OF A VIBRATING ROLLER (MINIMUM STATIC WEIGHT OF 10 TONNES) IN THE PRESENCE OF THE SUPERINTENDENT.
4. THE CONTRACTOR IS TO ALLOW FOR A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER TO PROVIDE ADVICE AND CERTIFICATION OF ANY WORKS ASSOCIATED WITH TREATING OR MANAGING UNSUITABLE GROUND CONDITIONS THROUGHOUT THE CONTRACT (e.g. STABILITY OF EXCAVATIONS, POOR SUBGRADE, etc).
5. ALL SOFT, WET OR UNSUITABLE MATERIAL IS TO BE REMOVED AS DIRECTED BY THE SUPERINTENDENT AND REPLACED WITH APPROVED MATERIAL SATISFYING THE REQUIREMENTS BELOW.
6. PROVIDE CERTIFICATES VERIFYING THE QUALITY OF IMPORTED MATERIAL FOR THE SUPERINTENDENTS APPROVAL.
7. ALL FILL MATERIAL SHALL BE PLACED IN MAXIMUM 200mm THICK LAYERS (LOOSE) AND COMPACTED AT OPTIMUM MOISTURE CONTENT (+ OR - 2%) TO ACHIEVE A DRY DENSITY DETERMINED IN ACCORDANCE WITH AS1289.2.1.1, AS1289.5.7.1 AND AS1289.5.8.8 OF NOT LESS THAN THE FOLLOWING STANDARD MINIMUM DRY DENSITY;

LOCATION	COMPACTION REQUIREMENT
LANDSCAPED AREAS	98% SMDD
ROADS	100% SMDD (IN ACCORDANCE WITH COUNCIL SPECIFICATIONS)
PAVED AREAS	100% SMDD (IN ACCORDANCE WITH COUNCIL SPECIFICATIONS)

8. TESTING OF THE SUBGRADE FOR BUILDINGS SHALL BE CARRIED OUT BY AN APPROVED N.A.T.A. REGISTERED LABORATORY.
9. ALLOW THE FOLLOWING COMPACTION TESTING BY N.A.T.A. REGISTERED LABORATORY FOR PLATFORMS AND FILL LAYERS IN ACCORDANCE WITH THE LATEST VERSION OF AS3798. (MINIMUM 3 TESTS PER LAYER) OR 1 TEST PER MATERIAL TYPE PER 2500sq.m OR 1 TEST.
10. WHERE TEST RESULTS ARE BELOW THE SPECIFIED COMPACTION, RECOMPACT AND RETEST UNTIL SPECIFIED COMPACTION STANDARDS ARE ACHIEVED, OTHERWISE SUBGRADE REPLACEMENT IS REQUIRED IF COMPACTION STANDARDS ARE NOT ACHIEVED.
11. ALLOW FOR EXCAVATION IN ALL MATERIALS AS FOUND U.N.O. NO ADDITIONAL PAYMENTS WILL BE MADE FOR EXCAVATION IN WET OR HARD GROUND.
12. WHERE THERE IS INSUFFICIENT EXCAVATED MATERIAL SUITABLE FOR FILLING OR SUBGRADE REPLACEMENT, THE CONTRACTOR IS TO ALLOW TO IMPORT FILL. IMPORTED FILL SHALL COMPLY WITH THE FOLLOWING;
   - 12.1. BE OF VIRGIN EXCAVATED NATURAL MATERIAL OR
   - 12.2. CONTRACTOR TO PROVIDE EVIDENCE IMPORT IS SUITABLE USE
   - 12.3. PLASTICITY INDEX BETWEEN 2-15% AND CBR > 8
   - 12.4. FREE FROM ORGANIC AND PERISHABLE MATTER
   - 12.5. MAXIMUM SIZE 50mm, PASSING 75 MICRON SIEVE (<25%)

EARTHWORKS (cont)

13. THE CONTRACTOR SHALL PROGRAM THE EARTHWORKS OPERATION SO THAT THE WORKING AREAS ARE ADEQUATELY DRAINED DURING THE PERIOD OF CONSTRUCTION. THE SURFACE SHALL BE GRADED AND SEALED OFF TO REMOVE DEPRESSIONS, ROLLERS MARKS AND SIMILAR WHICH WOULD ALLOW WATER TO POND AND PENETRATE THE UNDERLYING MATERIAL. ANY DAMAGE RESULTING FROM THE CONTRACTOR NOT OBSERVING THESE REQUIREMENTS SHALL BE RECTIFIED AT THEIR COST.
14. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE AND MAINTAIN THE INTEGRITY OF ALL SERVICES, CONDUITS AND PIPES DURING CONSTRUCTION, SPECIFICALLY DURING THE BACKFILLING AND COMPACTION PROCEDURE. ANY AND ALL DAMAGE TO NEW OR EXISTING SERVICES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST.
15. TESTING OF THE SUBGRADE SHALL BE CARRIED OUT BY AN APPROVED N.A.T.A. REGISTERED LABORATORY AT THE CONTRACTORS EXPENSE.

DEEP EXCAVATIONS

16. PRIOR TO THE COMMENCEMENT OF EXCAVATION WORKS GREATER THAN 1.5m IN DEPTH, THE CONTRACTOR SHALL OBTAIN THE SERVICES OF A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER TO DETERMINE THE STABILITY OF A NATURAL MATERIAL AND BENCHING REQUIREMENTS.
17. THE CONTRACTOR MUST PROVIDE THE SUPERINTENDENT AND OR THE DESIGN ENGINEER WITH A COPY OF THE GEOTECHNICAL ENGINEERS REPORT.
18. THE CONTRACTOR IS TO PROVIDE SAFETY BARRIERS / FENCING IN ACCORDANCE WITH OH&S AND REGULATORY AUTHORITY REQUIREMENTS.

SERVICE TRENCHES

19. SAWCUT EXISTING SURFACES PRIOR TO EXCAVATION. BACKFILL ALL TRENCHES UNDER EXISTING ROADS, PAVEMENTS AND PATHS WITH STABILISED SAND 5% CEMENT OR DGS40 MATERIAL (5% CEMENT) COMPACTED IN 200mm THICK LAYERS TO 98% MMDD TO UNDERSIDE OF PAVEMENT.
20. BACKFILL ALL TRENCHES NOT UNDER ROADS, PAVEMENTS, PATHS AND BUILDINGS WITH APPROVED EXCAVATED OR IMPORTED MATERIAL COMPACTED TO 95% SMDD.

SITEWORKS

1. ALL WORKS TO BE IN ACCORDANCE WITH RELEVANT LOCAL COUNCIL / REGULATORY AUTHORITIES REQUIREMENTS, ALL SPECIFICATIONS AND AUSTRALIAN STANDARDS. CONFLICTS BETWEEN SAID DOCUMENTS SHALL BE REFERRED TO THE SUPERINTENDENT FOR DIRECTION.
2. THE CONTRACTOR IS TO DESIGN, OBTAIN APPROVALS AND CARRY OUT REQUIRED TEMPORARY TRAFFIC CONTROL PROCEDURES DURING CONSTRUCTION IN ACCORDANCE WITH ALL REGULATORY AUTHORITIES, INCLUSIVE OF LOCAL COUNCIL REGULATIONS AND REQUIREMENTS.
3. THE CONTRACTOR IS TO OBTAIN ALL AUTHORITY APPROVALS AS REQUIRED PRIOR TO COMMENCEMENT OF WORKS.
4. RESTORE ALL PAVED, COVERED, GRASSED AND LANDSCAPED AREAS TO THEIR ORIGINAL CONDITION OR AS DIRECTED BY THE SITE SUPERINTENDENT ON COMPLETION OF WORKS. WHERE PLANTING OF NEW GRASS IS NECESSARY REFER TO LANDSCAPE ARCHITECT AND / OR ARCHITECT DOCUMENTATION.
5. ON COMPLETION OF ANY TRENCHING WORKS, ALL DISTURBED AREAS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR AS DIRECTED BY THE SITE SUPERINTENDENT, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL, GRASSED AREAS AND ROAD PAVEMENTS.
6. THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR PRIOR TO COMMENCEMENT OF WORKS.
7. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING LEVELS ONSITE PRIOR TO LODGMENT OF TENDER AND ONSITE WORKS. THE PRICE AS TENDERED SHALL BE INCLUSIVE OF ALL WORKS SHOWN ON THE TENDER PROJECT DRAWINGS. ADDITIONAL PAYMENTS FOR WORKS SHOWN ON THE TENDER PROJECT DRAWINGS WILL NOT BE APPROVED.
8. DO NOT OBTAIN DIMENSIONS BY SCALING DRAWINGS.
9. IN CASE OF DOUBT OR DISCREPANCY REFER TO SUPERINTENDENT FOR CLARIFICATION OR CONFIRMATION PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
10. WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS OBTAINED. MAKE SMOOTH TRANSITION TO EXISTING FEATURES AND MAKE GOOD WHERE JOINED.
11. TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MIN 50mm IN BITUMINOUS PAVING.
12. ALL CIVIL ENGINEERING DESIGN HAS BEEN DOCUMENTED UNDER THE ASSUMPTION THAT ALL NECESSARY SITE CONTAMINATION REMEDIATION WORKS HAVE BEEN SATISFACTORILY COMPLETED (IF APPLICABLE) AND THAT THE SITE IS NOT AFFECTED BY ANY SOIL STRATA OR GROUNDWATER TABLE CONTAMINATION.

STORMWATER DRAINAGE

1. ALL PIPES SHALL BE CLASS 2 RUBBER-RING JOINTED RCP U.N.O. WHERE uPVC PIPES HAVE BEEN SPECIFIED, THE FOLLOWING CLASS PIPEWORK IS TO BE ADOPTED U.N.O. Ø100mm OR LESS TO BE CLASS 'SN10' AND ABOVE Ø100mm TO BE CLASS 'SN8'.
2. uPVC STORMWATER LINES PASSING UNDER FLOOR SLABS TO BE CONCRETE ENCASED.
3. FRC PIPES EQUAL TO THAT OF THE STEEL REINFORCED CONCRETE PIPE CLASS SPECIFIED ON THE DRAWINGS MAY BE USED SUBJECT TO APPROVAL FROM THE SUPERINTENDENT.
4. ALL PIPE ARE TO BE LAID AT 1.0% MIN GRADE U.N.O.
5. COVERS
   - 5.1. USE HOT DIPPED GALVANISED COVERS AND GRATES COMPLYING WITH RELEVANT COUNCIL AND AUSTRALIAN STANDARDS.
   - 5.2. ALL COVERS AND GRATES TO BE POSITION IN A FRAME AND MANUFACTURED AS A UNIT.
   - 5.3. ALL COVERS AND GRATES TO BE FITTED WITH POSITIVE COVER LIFTING KEYS
   - 5.4. OBTAIN SUPERINTENDENTS APPROVAL FOR THE USE OF CAST IRON SOLID COVERS AND GRATES. CAST IRON SOLID COVERS (IF APPROVED) TO CONSIST OF CROSS-WEBBED, CELLULAR CONSTRUCTION WITH THE RIBS UPPERMOST TO ALLOW INFILLING WITH CONCRETE. INSTALL POSITIVE COVER LIFTING KEYS AND PLASTIC PLUGS.
   - 5.5. UNLESS DETAILED OR SPECIFIED OTHERWISE, COVERS AND GRATES TO BE CLASS 'D' IN VEHICULAR PAVEMENTS AND CLASS 'B' ELSEWHERE.
   - 5.6. ALL GRATED TRENCH DRAINS SHOULD BE 'CLASS D' CAST IRON WITHIN VEHICULAR PAVEMENTS AND CLASS 'B' HEEL SAFE WITHIN PEDESTRIAN PAVEMENTS.
6. ALL PIPE BENDS, JUNCTIONS, ETC ARE TO BE PROVIDED USING PURPOSE MADE FITTINGS OR STORMWATER PITS.
7. ALL CONNECTIONS TO EXISTING DRAINAGE STRUCTURES SHALL BE MADE IN A TRADESMAN-LIKE MANNER AND CEMENT RENDERED TO ENSURE A SMOOTH FINISH.
8. STORMWATER PIPEWORK TO FINISH FLUSH WITH INTERNAL PIT WALLS AND MUST NOT PROTRUDE. CONNECTION TO BE NEATLY RENDER AND MADE NEAT.
9. THE CONTRACTOR SHALL SUPPLY AND INSTALL ALL FITTINGS AND SPECIALS INCLUDING VARIOUS PIPE ADAPTORS TO ENSURE PROPER CONNECTION BETWEEN DISSIMILAR PIPEWORK.
10. U.N.O. MATERIAL USED FOR BEDDING OF PIPES SHALL BE APPROVED NON-COHESIVE GRANULAR MATERIAL HAVING HIGH PERMEABILITY AND HIGH STABILITY WHEN SATURATED AND FREE OF ORGANIC AND CLAY MATERIAL.
11. WHERE TRENCHES ARE IN ROCK, THE PIPE SHALL BE BEDDED ON A MIN 50mm CONCRETE BED (OR 75mm THICK BED OF 12mm BLUE METAL) UNDER THE BARREL OF THE PIPE. THE PIPE COLLAR AT NO POINT SHALL BEAR ON THE ROCK.
12. BEDDING SHALL BE U.N.O TYPE HS2 UNDER ROADS AND H2 UNDER GENERAL AREAS IN ACCORDANCE WITH CURRENT RELEVANT INDUSTRY STANDARDS AND GUIDELINES.
13. THE CONTRACTOR SHALL ENSURE AND PROTECT THE INTEGRITY OF ALL STORMWATER PIPES DURING CONSTRUCTION. ANY AND ALL DAMAGE TO THESE PIPES AS A RESULT OF THESE WORKS SHALL BE REPAIRED BY THE CONTRACTOR UNDER THE DIRECTION OF THE SUPERINTENDENT AND AT NO EXTRA COST.
14. NOTE THAT THE PIT COVER LEVEL NOMINATED IN GUTTERS ARE TO THE INVERT OF THE GUTTER WHICH ARE 40mm LOWER THAN THE PAVEMENT LEVEL AT LIP OF GUTTER. REFER KERB DETAILS FOR CONFIRMATION.

SUBSOIL DRAINAGE

15. Ø100mm SUBSOIL DRAINAGE LINES WITH NON-WOVEN GEOTEXTILE FILTER SOCK SURROUND SHALL BE CONNECTED TO A STORMWATER DRAINAGE PIT (AT MIN 1% LONGITUDINAL GRADE) AND PROVIDED IN THE FOLLOWING LOCATIONS;
   - 15.1. THE HIGH SIDE OF PROPOSED TRAFFICKED PAVEMENT AREAS.
   - 15.2. ALL PLANTER AND TREE BEDS PROPOSED ADJACENT TO PAVEMENT AREAS.
   - 15.3. BEHIND RETAINING WALLS (IN ACCORDANCE WITH RETAINING WALL DETAILS).
   - 15.4. ALL OTHER AREAS SHOWN ON DRAWINGS.
   - 15.5. CONTRACTOR IS TO MAKE ALLOWANCE IN BOTH TENDER AND CONSTRUCTION COSTING TO ALLOW FOR SUBSURFACE DRAINAGE BEHIND ALL RETAINING WALLS / ABOVE LOCATIONS AND TO MAKE CONNECTION TO STORMWATER SYSTEM.
16. WHERE SUBSOIL DRAINAGE PASSES BENEATH BUILDINGS / PAVED AREAS AND/OR PAVEMENTS. CONTRACTOR TO ENSURE Ø100mm CLASS 'SN10' uPVC DRAINAGE LINE IS USED AND THAT PROPRIETARY FITTINGS ARE USED TO RECONNECT SUBSOIL DRAINAGE LINE.
17. THE CONTRACTOR SHALL INSTALL INSPECTION OPENINGS / CLEAROUTS TO ALL SUBSOIL DRAINAGE LINES AND DOWNPIPE LINES AS SPECIFIED ON DRAWINGS AND IN ACCORDANCE WITH COUNCIL SPECIFICATIONS AT MAXIMUM 30m CENTRE AND AT ALL UPSTREAM ENDPOINTS.
18. PROVIDE 3.0m LENGTH OF Ø100 SUBSOIL DRAINAGE LINE WRAPPED IN NON-WOVEN GEOTEXTILE FILTER FABRIC TO THE UPSTREAM SIDE OF STORMWATER PITS, LAID IN STORMWATER PIPE TRENCHES AND CONNECTED TO DRAINAGE PIT.
19. IN AREAS WHERE DUMPED / HAND PLACED ROCK IS USED AS A MEANS OF SCOUR PROTECTION, CONTRACTOR IS TO EXCAVATE A MINIMUM OF 100mm FROM PROPOSED SURFACE, LEVEL AND COMPACT SUBGRADE AS SPECIFIED. ROCK TO THEN BE PLACED ON GEOTEXTILE FILTER FABRIC.

PRECAST STORMWATER PITS

1. THE USE OF PRE-CAST STORMWATER DRAINAGE PITS IS NOT ACCEPTED WITHOUT CONFIRMATION BETWEEN NORTHROP ENGINEERS AND THE CONTRACTOR REGARDING QUALITY CONTROL AND CERTIFICATION OF FINISHES.
2. REFER MANUFACTURERS SPECIFICATIONS FOR INSTALLATION GUIDELINES.
3. PRECAST PIT TO BE PLACED ON MINIMUM 150mm THICK CONCRETE PAD AND BED MINIMUM 50mm WHILST CONCRETE IS STILL PARTIALLY WET.
4. ENSURE PENETRATION IS CORED THROUGH PIT FACE TO ALLOW CONNECTION.
5. ENSURE A SMOOTH SEALED FINISH AT PIPE CONNECTIONS BY HAND APPLYING CONCRETE AROUND THE PIPE ON THE INTERNAL FACE OF THE PIT TO FILL IN ANY VOIDS CREATED WHEN PENETRATION FOR THE PIPE WAS CORED.
6. ENSURE A SEALED FINISH AT PIPE CONNECTIONS BY HAND-APPLYING MINIMUM 150mm THICK CONCRETE AROUND PIPE AT THE EXTERNAL FACE OF THE PIT. ENSURE CONCRETE DOES NOT AFFECT THE INTEGRITY OF THE SUBSOIL DRAINAGE CONNECTED TO THE PIT.
7. ENSURE PIPEWORK DOES NOT PROTRUDE INTO THE BEYOND THE WALL. PIPEWORK IS TO FINISH FLUSH WITH INTERNAL WALL (UNLESS OTHERWISE NOTED OR DETAILED).
8. ENSURE THE OUTLET PIPE IS CONNECTED AT THE INVERT LEVEL OF THE PIT TO DRAIN. ALTERNATIVELY FILL THE BASE OF THE PIT WITH MASS CONCRETE (MIN 50mm THICK) OR APPROVED GROUTING COMPOUND (LESS THAN 50mm THICK) TO DRAIN.
9. PROVIDE CONCRETE BENCHING TO SIDES OF PIT TO SUIT PIPE DIAMETER. HEIGHT TO MATCH MINIMUM 1/3 PIPE DIAMETER.

RAINWATER REUSE

1. PROVIDE RAINWATER RE-USE SYSTEM TO SUPPLY WATER FOR IRRIGATION.
2. GUTTER GUARD TO BE INSTALLED ON ALL EAVES GUTTERS.
3. PRESSURE PUMP / TAP TO BE PROVIDED FOR THE REUSE OF CAPTURED TANK WATER.
4. A PERMANENT SIGN IS TO BE LOCATED IN THE VICINITY OF THE TANK STATING THE WATER IS "NON POTABLE WATER" WITH APPROPRIATE HAZARD IDENTIFICATION.
5. ALL RAINWATER SERVICES SHALL BE CLEARLY LABELLED "NON POTABLE WATER" WITH APPROPRIATE HAZARD IDENTIFICATION.
6. PIPEWORK USED FOR RAINWATER SERVICES SHALL BE COLOURED LILAC IN ACCORDANCE WITH AS1345.
7. ALL VALVES AND APERTURES SHALL BE CLEARLY AND PERMANENTLY LABELLED WITH SAFETY SIGNS TO COMPLY WITH AS1319.
8. AN AIR GAP OR RPZD TO ENSURE BACKFLOW PREVENTION (IF MAINS 'TOP UP' / BYPASS UTILISED)
9. RAINWATER TANK RETICULATION SYSTEM AND MAINS WATER BYPASS ARRANGEMENT TO BE INSTALLED IN ACCORDANCE WITH AS/NZS 3500.1.2-2003 AND THE NSW CODE OF PRACTICE - PLUMBING AND DRAINAGE.
10. A FIRST FLUSH FILTRATION DEVICE IS TO BYPASS THE FIRST 1mm OF RAINWATER.

SIGNAGE AND LINEMARKING

1. ALL SIGNAGE TO BE INSTALLED IN ACCORDANCE WITH AUSTRALIAN STANDARDS 1742 / RMS STANDARDS AND SPECIFICATIONS.
2. LINE MARKING AND PAINT SHALL BE IN ACCORDANCE WITH AS1742.3 AND RMS STANDARDS.
3. PAINT SHALL BE TYPE 3 CLASS 'A' AND THE COLOUR SHALL BE WHITE AND NOT SUBJECT TO DISCOLOURATION BY BITUMEN FROM ROAD SURFACE. ALL PAINT TO BE APPLIED BY MECHANICAL SPRAYER.
4. LINE MARKING SHALL BE SPOTTED OUT AND APPROVED PRIOR TO SPRAYING.
5. PAINT SHALL BE APPLIED AT A WET THICKNESS OF BETWEEN 0.35mm AND 0.40mm.
6. CARPARK LINEMARKING TO BE 80mm WIDE.

LANDSCAPING

1. REFER TO DRAWINGS BY OTHERS FOR DETAILS OF PROPOSED LANDSCAPING TREATMENT.
2. ALL DISTURBED SURFACE TO BE TEMPORARILY STABILISED WITH HYDROMULCH UPON COMPLETION OF WORKS. A 500mm STRIP OF TURF (CT2 COUCH) IS TO BE PLACED BEHIND ALL NEW KERB AND GUTTER / ROLL KERB.

PAVEMENTS

1. ALL PAVEMENT MATERIALS SHALL COMPLY WITH CURRENT RMS SPECIFICATIONS. PROVIDE MECHANICAL ANALYSIS FOR EACH BATCH OF PAVEMENT MATERIAL TO ENSURE CONFORMITY.
2. COMPACTION STANDARDS

BASE	98% MODIFIED MAXIMUM DRY DENSITY
SUBBASE	98% MODIFIED MAXIMUM DRY DENSITY
SUBGRADE	100% STANDARD MAXIMUM DRY DENSITY

3. THE CONTRACTOR SHALL CONFIRM THE DESIGN CBR WITH A MINIMUM OF 3 TESTS TAKEN AT SUBGRADE LEVEL. WHERE DISCREPANCY IS FOUND, CONTACT THE DESIGN ENGINEER.
4. ALLOW FOR COMPACTION TESTING BY A N.A.T.A. REGISTERED LABORATORY FOR BASE LAYER, SUBBASE LAYER AND SUBGRADE LAYER IN ACCORDANCE WITH THE LATEST VERSION OF AS3798 FOR PAVEMENTS (MINIMUM 2 TESTS PER LAYER). ALLOW FOR AT LEAST TWO SUCCESSFUL COMPACTION TESTS IN EACH LAYER.
5. MATCH NEW PAVEMENTS NEATLY AND FLUSH WITH EXISTING
6. AFTER BASE IS APPROVED, SWEEP CLEAN AND PRIME AT NOMINAL RATE OF 1.0L PER 1.0 sq.m.
7. PAVEMENT HOLD POINTS
   - 7.1. SUB-GRADE PROOF ROLL PRIOR TO SET-UP AND FORM FOR CONCRETE POUR.
   - 7.2. INSPECTION OF FORMWORK / STEEL PRIOR TO CONCRETE POUR.
   - 7.3. SUBMISSION OF SUB-GRADE AND BASE DENSITY TESTS.

ASPHALTIC CONCRETE

1. GENERAL
   - 1.1. ALL ASPHALTIC CONCRETE (AC) WORK TO BE PREPARED AND CARRIED OUT IN ACCORDANCE WITH GOOD ASPHALTIC PAVING PRACTICE AS DESCRIBED IN AS2150-2005 "ASPHALT (HOT-MIXED) PAVING - GUIDE TO GOOD PRACTICE" AND CURRENT RMS SPECIFICATIONS.
2. PAVEMENT PREPARATION
   - 2.1. THE FINISHED PAVEMENT SURFACE TO BE SEALED SHALL BE WITHIN +/- 2% OF THE OPTIMUM AND BROOMED BEFORE COMMENCEMENT OF WORK TO ENSURE COMPLETE REMOVAL OF ALL SUPERFICIAL FOREIGN MATTER.
   - 2.2. PRIME ALL SURFACES TO BE SEALED. ALLOW PRIME TO SETTLE FOR A MINIMUM OF 3 DAYS BEFORE APPLYING TACK COAT AND ASPHALT.
   - 2.3. SWEEP PRIMED SURFACES BEFORE APPLYING TACK COAT.
   - 2.4. ALL DEPRESSIONS OR UNEVEN AREAS ARE TO BE TACK-COATED AND BROUGHT UP TO GENERAL LEVEL OF PAVEMENT WITH ASPHALTIC CONCRETE BEFORE LAYING OF MAIN COURSE.
   - 2.5. ALL DEFECTS IN THE BASE COURSE INCLUDING CRACKS, SURFACE DEFORMATION AND THE LIKE SHALL BE REPAIRED AS DIRECTED BY THE SUPERINTENDENT PRIOR TO PLACEMENT OF TACK COAT AND/OR AC COURSES.
3. PLACEMENTS
   - 3.1. ALL ASPHALT SHALL BE PLACED UTILISING APPROVED MECHANICAL PAVING MACHINES. DO NOT HAND PLACE ASPHALT WITHOUT PRIOR APPROVAL FROM ENGINEER.
4. JOINTS
   - 4.1. THE NUMBER OF JOINTS BOTH LONGITUDINAL AND TRANSVERSE SHALL BE KEPT TO A MINIMUM.
   - 4.2. THE DENSITY AND SURFACE FINISH AT JOINTS SHALL BE SIMILAR TO THOSE OF THE REMAINDER OF THE LAYER.
5. COMPACTION
   - 5.1. ALL COMPACTION SHALL BE UNDERTAKEN USING SELF PROPELLED ROLLERS.
   - 5.2. INITIAL ROLLING SHALL BE COMPLETED BEFORE THE MIX TEMPERATURE FALLS BELOW 105°C USING A STEEL DRUM ROLLER HAVING A MINIMUM WEIGHT OF 8 TONNES AND A MAXIMUM UNIT LOAD ON THE REAR DRUM EQUIVALENT TO 55kN/m WIDTH OF DRUM.
   - 5.3. SECONDARY ROLLING SHALL BE COMPLETED BEFORE THE MIX TEMPERATURE FALLS BELOW 80°C USING A PNEUMATIC TYRED ROLLER OF AT LEAST 10 TONNES MASS. A MINIMUM TYRE PRESSURE OF 550kPA AND A MINIMUM TOTAL LOAD OF 1 TONNE ON EACH TYRE.
   - 5.4. ROLLED SURFACES SHALL BE SMOOTH AND FREE OF UNDULATIONS. BONY AND/OR UNEVEN SURFACES WILL BE REJECTED.
   - 5.5. PROVIDE 2 No. MINIMUM COMPACTION TESTS.
6. FINISHED SURFACE PROPERTIES
   - 6.1. FINISHED SURFACES SHALL BE SMOOTH, DENSE AND TRUE OF SHAPE AND SHALL NOT VARY MORE THAN;
     - 6.1.1. 3mm FROM THE SPECIFIED PLAN LEVEL AT ANY POINT.
     - 6.1.2. 3mm FROM THE BOTTOM OF A STRAIGHT EDGE LAID TRANSVERSELY.
     - 6.1.3. 5mm FROM THE BOTTOM OF A STRAIGHT EDGE LAID LONGITUDINALLY.
     - 6.1.4. MINUS 0 TO PLUS 2mm ADJACENT TO OTHER ELEMENTS SUCH AS KERBS AND THE LIKE TO AVOID POOLING OF SURFACE WATER.
     - 6.1.5. MINUS 0 FROM THE SPECIFIED THICKNESS.
7. DO NOT STORE PLANT EQUIPMENT OR TRAFFIC NEWLY LAID ASPHALTIC CONCRETE PAVEMENTS WITHOUT PRIOR APPROVAL FROM THE ENGINEER.
8. DO NOT APPLY MARKING PAINTS UNTIL ASPHALT HAS CURED IN ACCORDANCE WITH PAINT MANUFACTURERS SPECIFICATIONS.

FOR CONSTRUCTION

DRAWN: C. PASKE DESIGNED: J. GRINSELL JOB MANAGER: J. GILLIGAN VERIFIER:

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	WORK IN PROGRESS	JT		JRG	12.04.19
A	ISSUED FOR CONSTRUCTION	VC		JRG	31.05.19

CLIENT: RICHARD CROOKES CONSTRUCTIONS

DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED

ARCHITECT: GROUPGSA

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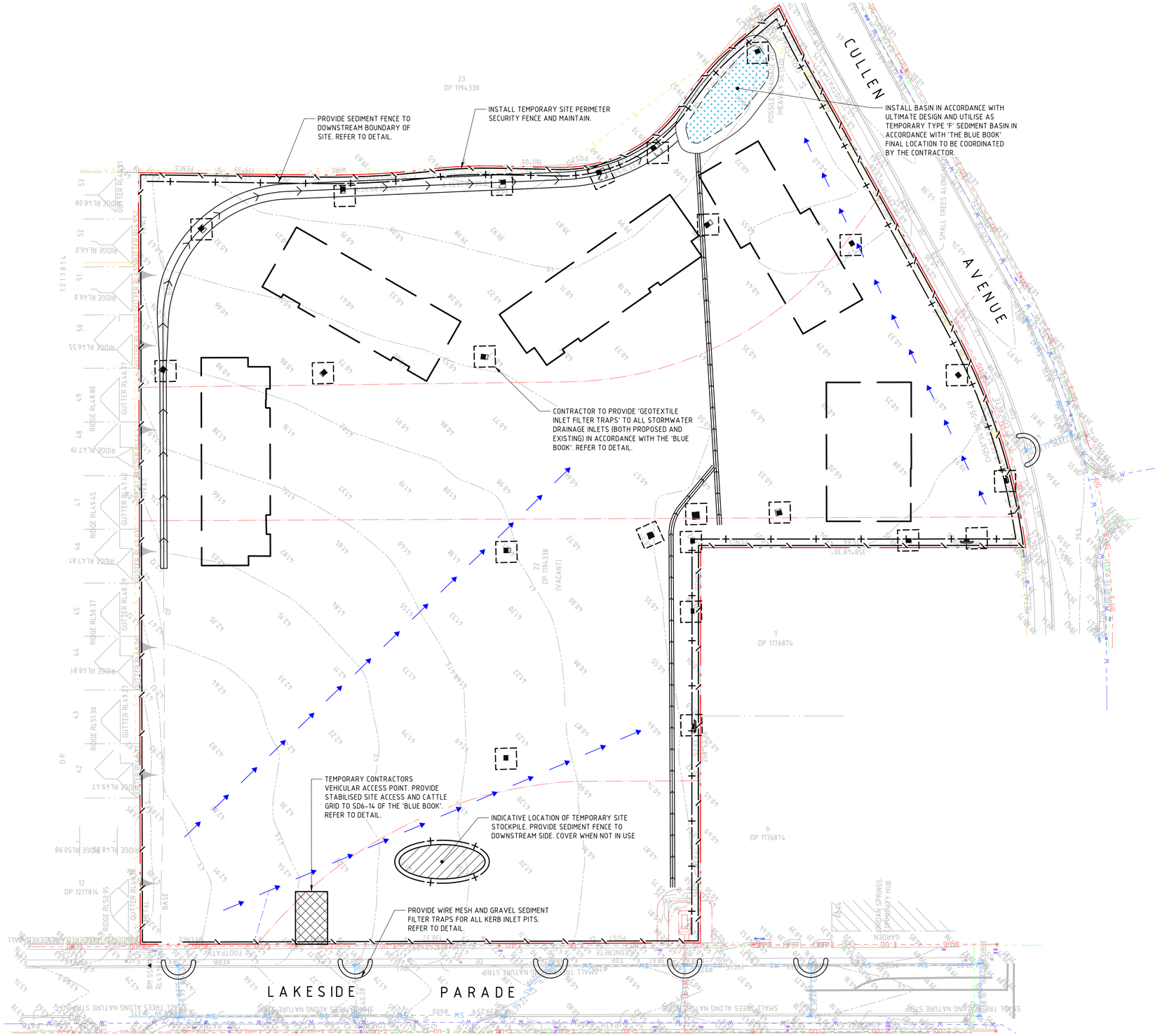
PROJECT: JORDAN SPRINGS PRIMARY SCHOOL
14-28 CULLEN AVENUE, JORDAN SPRINGS

DRAWING TITLE: CIVIL ENGINEERING PACKAGE CONSTRUCTION CERTIFICATE
SPECIFICATION NOTES - SHEET 01

JOB NUMBER: 182535
DRAWING NUMBER: C01.11
REVISION: A
DRAWING SHEET SIZE = A1



LEGEND

- PROPOSED BOUNDARY LINE
- EXISTING BOUNDARY LINE
- EASEMENT LINE
- PROPOSED BUILDING FOOTPRINT
- EXISTING CONTOURS
- SEDIMENT FENCE
- SECURITY FENCE
- WIRE MESH AND GRAVEL SEDIMENT FILTER TRAP
- GEOTEXTILE INLET FILTER TRAP
- DRAINAGE SWALE
- DIVERSION MOUND
- STABILISED SITE ACCESS
- STOCKPILE
- SEDIMENT BASIN

GENERAL NOTES:

1. REFER SPECIFICATIONS NOTES FOR SEDIMENT AND SOIL EROSION CONTROL GENERAL REQUIREMENTS.
2. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
3. ALL SEDIMENT AND SOIL EROSION CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH THE 'BLUE BOOK'. CONTRACTOR TO ENSURE THESE MEASURES ARE IN PLACE AND MAINTAINED AT ALL TIMES DURING CONSTRUCTION WORKS.
4. CONTRACTOR TO PROVIDE 'WIRE MESH AND GRAVEL SEDIMENT FILTER' TO ALL PAVED / ROAD AREAS (BOTH PROPOSED AND EXISTING) IN ACCORDANCE WITH THE 'BLUE BOOK'.
5. CONTRACTOR TO PROVIDE 'GEOTEXTILE INLET FILTER TRAPS' TO ALL STORMWATER DRAINAGE INLETS (BOTH PROPOSED AND EXISTING) IN ACCORDANCE WITH THE 'BLUE BOOK'

DRAWN: C PASKE
DESIGNED: J GRINSELL
JOB MANAGER: J GILLIGAN
VERIFIER:

FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	WORK IN PROGRESS	JT		JRG	12.04.19
A	ISSUED FOR CONSTRUCTION	VC		JRG	31.05.19

CLIENT
RICHARD CROOKES CONSTRUCTIONS
DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED

ARCHITECT
GROUPGSA

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SCALE 1:500@A1 (0 5 10 15 20 25m)

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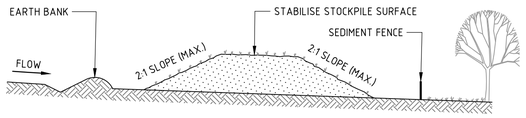
PROJECT
JORDAN SPRINGS PRIMARY SCHOOL
14-28 CULLEN AVENUE, JORDAN SPRINGS

DRAWING TITLE
CIVIL ENGINEERING PACKAGE CONSTRUCTION CERTIFICATE
SEDIMENT AND SOIL EROSION CONTROL PLAN

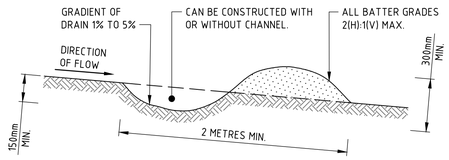
JOB NUMBER **182535**
DRAWING NUMBER **C02.01**
REVISION **A**
DRAWING SHEET SIZE = A1



CONSTRUCTION NOTES

1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.

STOCKPILES (SD 4-1)

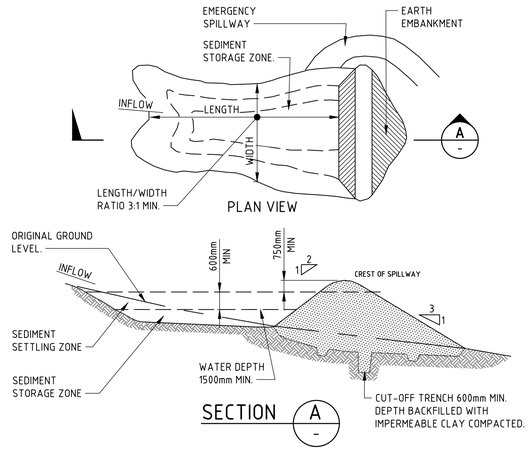


CONSTRUCTION NOTES

1. BUILD WITH GRADIENTS BETWEEN 1 AND 5 PERCENT.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V SHAPED.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.

NOTE: ONLY TO BE USED AS TEMPORARY BANK
WHERE MAXIMUM UPSLOPE LENGTH IS 80 METRES.

EARTH BANK - LOW FLOW (SD 5-5)

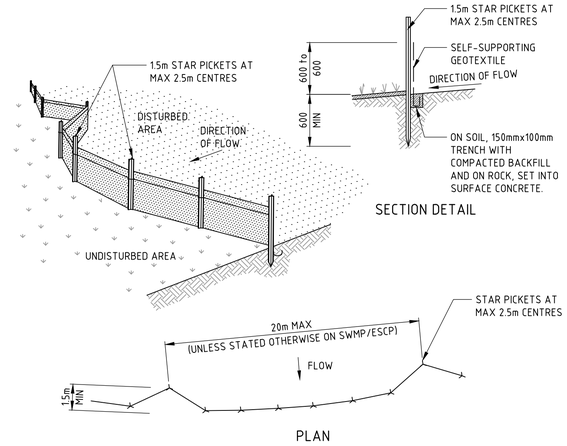


CONSTRUCTION NOTES

1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.
2. CONSTRUCT A CUT-OFF TRENCH 500mm DEEP AND 1200mm WIDE ALONG THE CENTRELINE OF THE EMBANKMENT EXTENDING TO A POINT ON THE GULLY WALL LEVEL WITH THE RISER CREST.
3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIALS WITH EQUIPMENT AS SPECIFIED IN THE SWMP TO 95 PER CENT STANDARD PROCTOR DENSITY.
4. SELECT FILL FOLLOWING THE SWMP THAT IS FREE OF ROOTS, WOOD, ROCK, LARGE STONE OR FOREIGN MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING TO AT LEAST 100mm TO HELP BOND COMPACTED FILL TO THE EXISTING SUBSTRATE.
6. SPREAD THE FILL IN 100mm TO 150mm LAYERS AND COMPACT IT AT OPTIMUM MOISTURE CONTENT FOLLOWING THE SWMP.
7. CONSTRUCT THE EMERGENCY SPILLWAY.
8. REHABILITATE THE STRUCTURE FOLLOWING THE SWMP.

(APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY)

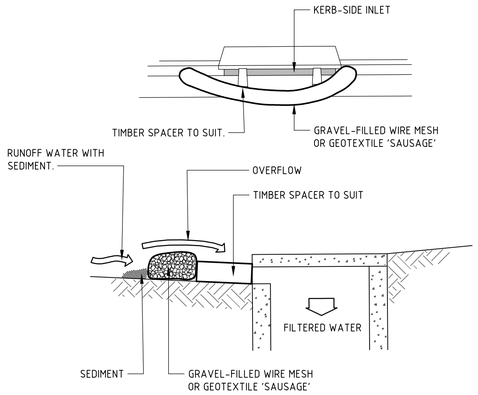
EARTH BASIN - WET (SD 6-4)



CONSTRUCTION NOTES

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUND AT 2.5 METRE INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

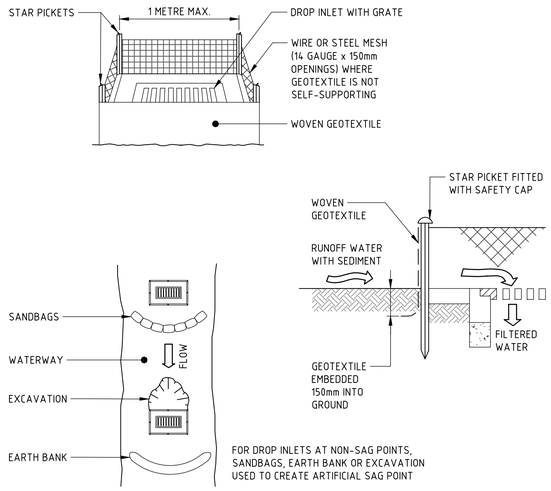
SEDIMENT FENCE (SD 6-8)



CONSTRUCTION NOTES

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

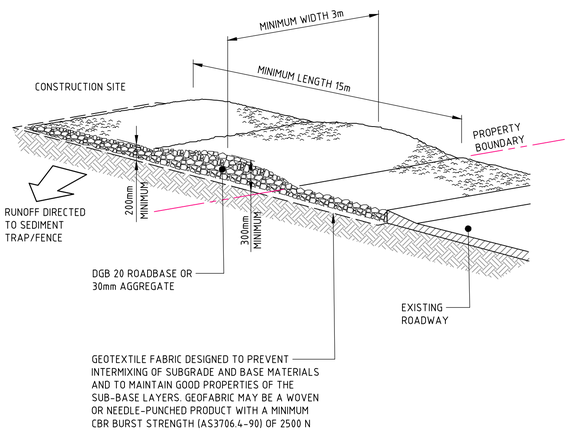
WIRE MESH AND GRAVEL SEDIMENT FILTER (SD 6-11)



CONSTRUCTION NOTES

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER (SD 6-12)



CONSTRUCTION NOTES

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

STABILISED SITE ACCESS (SD 6-14)

DESIGNED: J. GRINSELL
DRAWN: C. PASKE
JOB MANAGER: J. GILLIGAN
VERIFIER:

FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	WORK IN PROGRESS	JT		JRG	12.04.19
A	ISSUED FOR CONSTRUCTION	VC		JRG	30.05.19

CLIENT: RICHARD CROOKES CONSTRUCTIONS
DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED

ARCHITECT: GROUPGSA

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PROJECT: JORDAN SPRINGS PRIMARY SCHOOL
14-28 CULLEN AVENUE, JORDAN SPRINGS

DRAWING TITLE: CIVIL ENGINEERING PACKAGE CONSTRUCTION CERTIFICATE
SEDIMENT AND SOIL EROSION CONTROL DETAILS

JOB NUMBER: 182535
DRAWING NUMBER: C02.11
REVISION: A
DRAWING SHEET SIZE = A1

Appendix B – Sediment Basin Calculations

Sedimentation basin calculation

Project Number: 182535
Project Name: Jordan Springs Primary School

According to the Geotechnical Report prepared by JKGeotechnics (ref:30718PH3rpt) the majority of the soil encountered on site was classified as Silty Clay.

Parameter	Adopted value	
Total area (ha)	3	
Soil Texture Group	F	See 1) Soil Hydrological groups
Design rainfall depth (days)	5	See 2) Rainfall depth (days)
Design rainfall depth (percentille)	80	See 3) Rainfall depth (percentille)
x-day, y-percentile rainfall event	27.4	See Sheet x-day-y-p%
Soil Hydrological Group	D	
Cv	0.5	See 4) Cv
Settling zone volume (m^3)	411.000	(calculated)
Sediment storage volume (m^3)	205.500	(calculated)
Total basin volume (m^3)	**616.500**	(calculated)

For type D and F

V = settling zone + sediment storage zone

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
- 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

1) Soil Texture Group

Source: The Blue Book, Volume 1, 2004. Page 6-12.

Soil Type	Soil characteristics	Treatment process	Basin design capacity	
			Settling zone	Sediment storage zone
Type D (dispersible)	10 percent or more of the soil materials are dispersible. Particle size is irrelevant	Aided flocculation in wet basins	Capacity to contain all runoff expected from the y percentile, x-day rainfall depth where, depending on the sensitivity of the receiving waters and/or the duration that the structure is in use: x is 2, 5, 10 or 20-days y is the 75th, 80th, 85th or 90th percentile	Normally taken as 50 percent of the capacity of the settling zone. However, it can be taken as two months soil loss as calculated by the RUSLE
Type C (coarse)	Less than 33 percent finer than 0.02 mm and less than 10 percent of the soil materials are dispersible	Rapid settling in wet or dry basins	Surface area of 4,100 m^2/m^3/sec in the 3-month ARI flow, minimum depth of 0.6m, and length:width ratio of >3:1	Normally taken as 100 percent of the capacity of the settling zone. However, it can be taken as two months soil loss as calculated by the RUSLE
Type F (fine)	33 percent or more of the particles are finer than 0.02 mm and less than 10 percent of the soil materials are dispersible	Slow settling in wet basins	Capacity to contain all runoff expected from the y percentile, x-day rainfall depth where, depending on the sensitivity of the receiving waters and/or the duration that the structure is in use: x varies between 2 and 20 days y is the 75th, 80th, 85th or 90th percentile	Normally taken as 50 percent of the capacity of the settling zone. However, it can be taken as two months soil loss as calculated by the RUSLE

Table 6.1 Summary of selected sediment basin types and design criteria

2) Rainfall depth (days)

Source: The Blue Book, Volume 1, 2004. Page 6-15.

A **5-day** rainfall depth can be adopted as standard in the design of the settling zone where the soils being disturbed are Type D or Type F. This assumes that five days or less are required following a rainfall event to achieve effective flocculation if necessary, settling and subsequent discharge of the supernatant stormwater (Appendix E and Section 6.3.3(d)).
In certain conditions, basins can be designed for rainfall depths and management periods of between 2 and 20 days, to accommodate a range of site constraints and opportunities that may be present :

(i) Where the site area is insufficient to allow building structures as required for the y-percentile 5-day criterion, a 2, 3 or 4-day rainfall depth can be adopted providing flocculation, settlement and discharge can be achieved in that time. However, this will usually require the use of a special range of flocculants and specialised techniques that will achieve sufficiently fast settling (Section E4.2). Many such flocculants can cause environmental harm if not managed properly and the plans for sediment control must also include a detailed plan of management of these.
(ii) Where site conditions permit the construction of extremely large structures, a 6 to 20-day rainfall depth can be adopted. These large structures allow longer periods for reuse (e.g. dust suppression) or flocculation, settling and discharge.

3) Design rainfall depth (percentille)

Source: The Blue Book, Volume 1, 2004. Page 6-21.

Unless Council's Stormwater Management Plan states differently:[11]
(i) on most sites the 75th percentile storm depth is recommended for use if the duration of disturbance is likely to be six months or less, while the 80th percentile storm depth is recommended if the duration of disturbance is likely to be more than six months;
(ii) where receiving waters are considered particularly sensitive, either by the development proponent/designer, local council or other consent authority, a higher level of protection can be provided, e.g.: the 80th percentile storm depth is recommended for use if the duration of disturbance is likely to be six months or less, while the 85th percentile storm depth is recommended if the duration of disturbance is likely to be more than six months. Longer term land disturbances, such as waste depots, extractive sites and some

4) Cv

Source: The Blue Book, Volume 1, 2004. Appendix F, Page F-4.

Table F2. Runoff coefficients (Cv) for volumetric data in disturbed catchments (adapted from USDA, 1996)

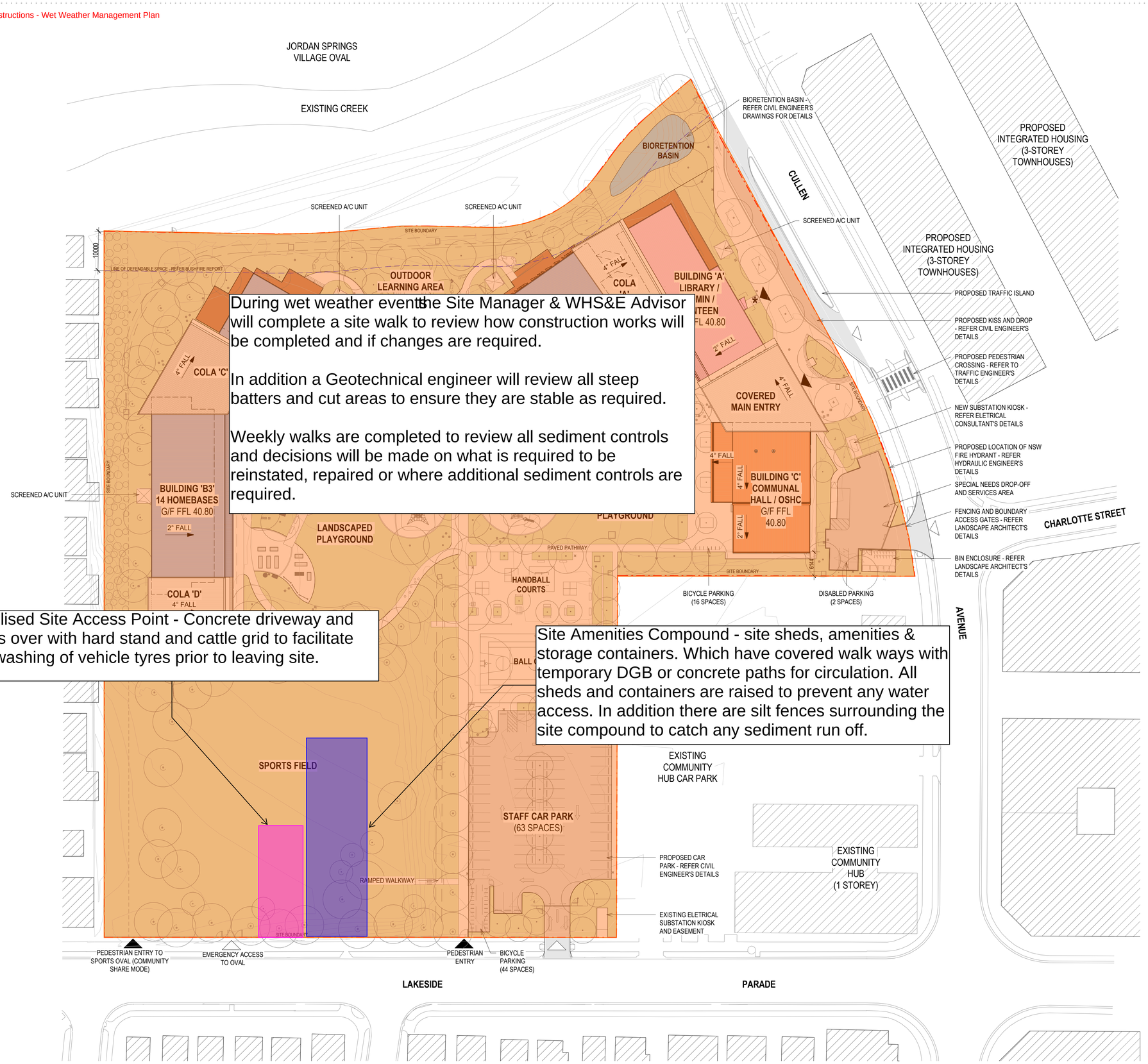
Soil Hydrologic Group	Design Rainfall depth (mm)							Runoff potential
	<20	21-25	26–30	31–40	41-50	51-60	61-80	
A	0.01	0.05	0.08	0.15	0.22	0.28	0.37	very low
B	0.10	0.19	0.25	0.34	0.42	0.48	0.57	low to moderate
C	0.25	0.35	0.42	0.51	0.58	0.63	0.70	moderate to high
D	0.39	0.50	0.56	0.64	0.69	0.74	0.79	high

Where the Soil Hydrologic Group is not known and/or cannot be found out without an additional soil survey (but see Appendix C), adopting a default volumetric runoff coefficient of 0.5 is reasonable. However, higher values should be considered for high-density development or other sites that can be subject to very high levels of surface sealing (e.g. wheel compaction). Alternatively, lower values can be adopted where a significant proportion of the site is to remain undisturbed (i.e. vegetated), if that value is properly justified. However, the correct Soil Hydrologic Group should be determined on all sites where design is to greater than the standard 85th percentile, x-day rainfall depth and/or where the receiving waters are deemed to be highly or extremely sensitive.

Soil hydrological group

A	Group A – very low runoff potential. Water moves into and through these soil materials relatively quickly, when thoroughly wetted. Usually, they consist of deep (>1.0 metres), well-drained sandy loams, sands or gravels. They shed runoff only in extreme storm events.
B	Group B – low to moderate runoff potential. Water moves into and through these soil materials at a moderate rate when thoroughly wetted. Usually, they consist of moderately deep (>0.5 metres), well-drained soils with medium, loamy textures or clay loams with moderate structure. They shed runoff only infrequently.
C	Group C – moderate to high runoff potential. Water moves into and through these soil materials at slow to moderate rates when thoroughly wetted. Usually, they consist of soils that have: - moderately fine (clay loam) to fine (clay) texture - weak to moderate structure and/or - a layer near the surface that impedes free downward movement of water. They regularly shed runoff from moderate rainfall events.
D	Group D – very high runoff potential. Water moves into and through these soils very slowly when thoroughly wetted. Usually, they consist of soils: that are fine-textured (clay), poorly structured, surface-sealed or have high shrink/swell properties, and/or with a permanent high watertable, and/or with a layer near the surface that is nearly impervious. They shed runoff from most rainfall events.

Appendix C – RCC Wet Weather Management Plan



During wet weather events the Site Manager & WHS&E Advisor will complete a site walk to review how construction works will be completed and if changes are required.

In addition a Geotechnical engineer will review all steep batters and cut areas to ensure they are stable as required.

Weekly walks are completed to review all sediment controls and decisions will be made on what is required to be reinstated, repaired or where additional sediment controls are required.

Stablised Site Access Point - Concrete driveway and cross over with hard stand and cattle grid to facilitate the washing of vehicle tyres prior to leaving site.

Site Amenities Compound - site sheds, amenities & storage containers. Which have covered walk ways with temporary DGB or concrete paths for circulation. All sheds and containers are raised to prevent any water access. In addition there are silt fences surrounding the site compound to catch any sediment run off.

1 SITE AND ROOF PLAN
1 : 500

NOTES - SITE PLANS

1. Refer Landscape Achitect's documentation for planting, fencing, and outdoor furniture equipment details.
2. Refer Civil Engineer's documentation for details of site and ground works, including pavements and retaining walls.
3. Refer Bushfire Report for requirements and details for Defendable Space.

0m 5m 10m 20m 30m N

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3. Do not scale drawings. Dimensions govern.
4. All dimensions are in millimetres unless noted otherwise.
5. All dimensions shall be verified on site before proceeding
6. Any areas indicated on this sheet are approximate and indicative only.

Drawing Notes:
1. Refer to **COM-AR-9010** for legend of all symbols and codes.
2. Refer to **COM-AR-9011/9012** for all drawing notes.
3. Refer to **COM-AR-9700** for Technical Schedule

Amendments

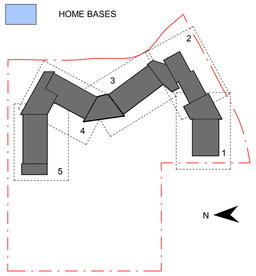
Issue	Description	Date
A	FOR COORDINATION	27.03.2019
B	PROGRESS ISSUE	10.05.2019
C	VEHICULAR CROSSINGS INDICATED	13.05.2019
D	PEDESTRIAN CROSSING ADDED	16.05.2019
E	TRAFFIC ISLAND ADDED	17.05.2019
F	GENERALLY AMENDED	22.05.2019
G	SSD SUBMISSION	31.05.2019
H	DRAFT DETAILED DESIGN	14.06.2019
I	DETAILED DESIGN ISSUE	21.06.2019
J	DD ADDENDUM 2	19.07.2019
1	FOR CONSTRUCTION	02.08.2019

LEGEND

- Site boundary
- Line of bushfire defendable space
- Existing neighbouring buildings
- Main pedestrian entry
- Vehicular entry
- * Administration Building entry

ZONES

- ADMIN / LIBRARY / CANTEEN
- HALL / OSHC
- HOME BASES



Contractor
RICHARD CROOKES CONSTRUCTIONS

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architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title
JORDAN SPRINGS PUBLIC SCHOOL

Drawing Title
PROPOSED SITE AND ROOF PLAN

Scale @ A1	1 : 500
Drawing Created (date)	30/05/2019
Drawing Created (by)	DN
Plotted and checked by	DN
Verified	JS
Approved	MB

Project No 180646 | Drawing No JS-AR-1100 | Issue 1

2/08/2019 4:53:35 PM

Appendix D – Council Consultation

Post Approval – Consultation

Consultation needs to be meaningful, done with courtesy and respect and be well documented. These are people/ organisations that we need to be building meaningful relationships with.

Conditions of all consent can require consultation with a range of stakeholders. Consultation in the post approval world needs to be well documented to satisfy the condition requirements.

Examples include Council, service providers (eg. Electricity gas etc.), consult with local bus provider and TfNSW.

Read each condition carefully, any reference to consult triggers consultation.

Typically on State Significant Development, there will be a specific consultation condition as to how this piece can be appropriately addressed.

Consultation is not:

- A token gesture
- Done at the end of the piece of work,
- An email to the relevant stakeholder with no response;
- A meeting with the stakeholder with no meeting minutes.

Consultation is:

- Meaningful
- Done prior to the requirement,
- Captures an outcome,
- Identifies matters resolved,
- Identifies matters unresolved,
- Any disagreements are disclosed; and
- How we are going to address unresolved matters?

How to capture all the relevant details on consultation requirements? Any consultation requirement in a condition is required to be accompanied with the following table:

Post Approval Consultation Record

B18 – Construction Soil and Water Management Plan

Identified Party to Consult:	Penrith City Council – Development Engineer, Environmental Officer
Consultation type:	Meeting
When is consultation required?	Prior to commencement
Why	B18 – Construction Soil and Water Management Plan, prepared in consultation with Council
When was consultation held	5 September 2019, Penrith City Council Chambers
Identify persons and positions who were involved	**Gavin Cherry** Development Assessment Coordinator, Penrith Council **Stephen Masters** Acting Development Engineering Coordinator, Penrith Council **Graham Green** Senior Traffic Engineer, Penrith Council **Joshua Romeo** Senior Waste Planning Officer, Penrith Council **Carlie Fulton** Senior Environmental Health Officer, Penrith Council **Jim Lewis** Project Director, School Infrastructure **Jacqueline Sellen** Assistant Project Manager, TSA Management **Darren Vosso** Project Manager, Richard Crookes Construction **Tom Hemmett** Project Engineer, Richard Crookes Construction
Provide the details of the consultation	The Jordan Springs Public School project has an approved council DA for the Early Works completed onsite. Consultation with Penrith Council has been undertaken in relation to those works specifically, and the site and project more generally. The meeting held on 5 September 2019 was an introduction to the relevant Council members who will be involved throughout the completion of the main works. The purpose was to open the dialogue between the project team and Council.
What specific matters were discussed?	The Construction Soil and Water Management Plan was provided to Council prior to the meeting. It was confirmed that the measures proposed to manage erosion and sediment have been implemented, per the Early Works requirements. The project team confirmed that this is being managed onsite and no environmental

	breaches have occurred. Mr Masters confirmed that the plan was satisfactory and there was no specific concerns from Council perspective with regards to erosion and sediment controls.
What matters were resolved?	Nil issues were raised at the time of the meeting. An open dialogue was established and communication lines confirmed for future correspondence.
What matters are unresolved?	Nil
Any remaining points of disagreement?	No
How will SINSW address matters not resolved?	Not applicable

Appendix E – CV

James Gilligan

Senior Civil Engineer

BE (Civil) MIEAust CPEng

James is a Senior Civil Engineer with over ten years' experience managing and delivering buildings and complex civil infrastructure projects requiring design from the concept phase through to construction and post construction stages.

James also has particular experience in project management and contract administration.

James' technical background includes civil design of utilities, earthworks, stormwater and roads for subdivision and buildings projects across all types of development including Education, Residential, Commercial& Industrial.

Project Experience

Urban Redevelopment

- Frasers Central Park, Broadway
- Tailors Walk, Pemberton Street, Botany
- 150 Epping Road, Lane Cove
- Glebe Affordable Housing Project, Glebe
- Altrove Stage 7 & 9, Schofields
- Airds Subdivision Works, Airds
- Pemulwuy Southern Lands, Pemulwuy
- Stellar Apartments, Ryde
- 10 Hall Street, Bondi
- McEvoy Street, Waterloo

Public Domain and Open Spaces

- Endeavour Energy Southern Carpark, Huntingwood
- Windsor Station Bus Interchange, Windsor
- Waterfall Station Easy Access Upgrade
- New Acton South Carpark, Canberra
- Elara Neighbourhood Centre, Elara
- Hurstville Bus Interchange, Hurstville
- Twin Creeks Golf Club, Luddenham
- Croom Regional Sporting Complex, Croom

Infrastructure / Utilities Coordination

- Southern Sydney Freight Line
- North West Rail Link
- Sydney International Airport – Stage 2B Institutional
- Western Sydney University, Westemead
- St Mary's Aged Care Facility, St Mary's
- Barker College Junior School and Early Learning Centre
- The Abbey Aged Care Facility, Mittagong
- Anglican Retirement Village, Glenhaven
- Oran Park Aged Care Facility, Oran Park

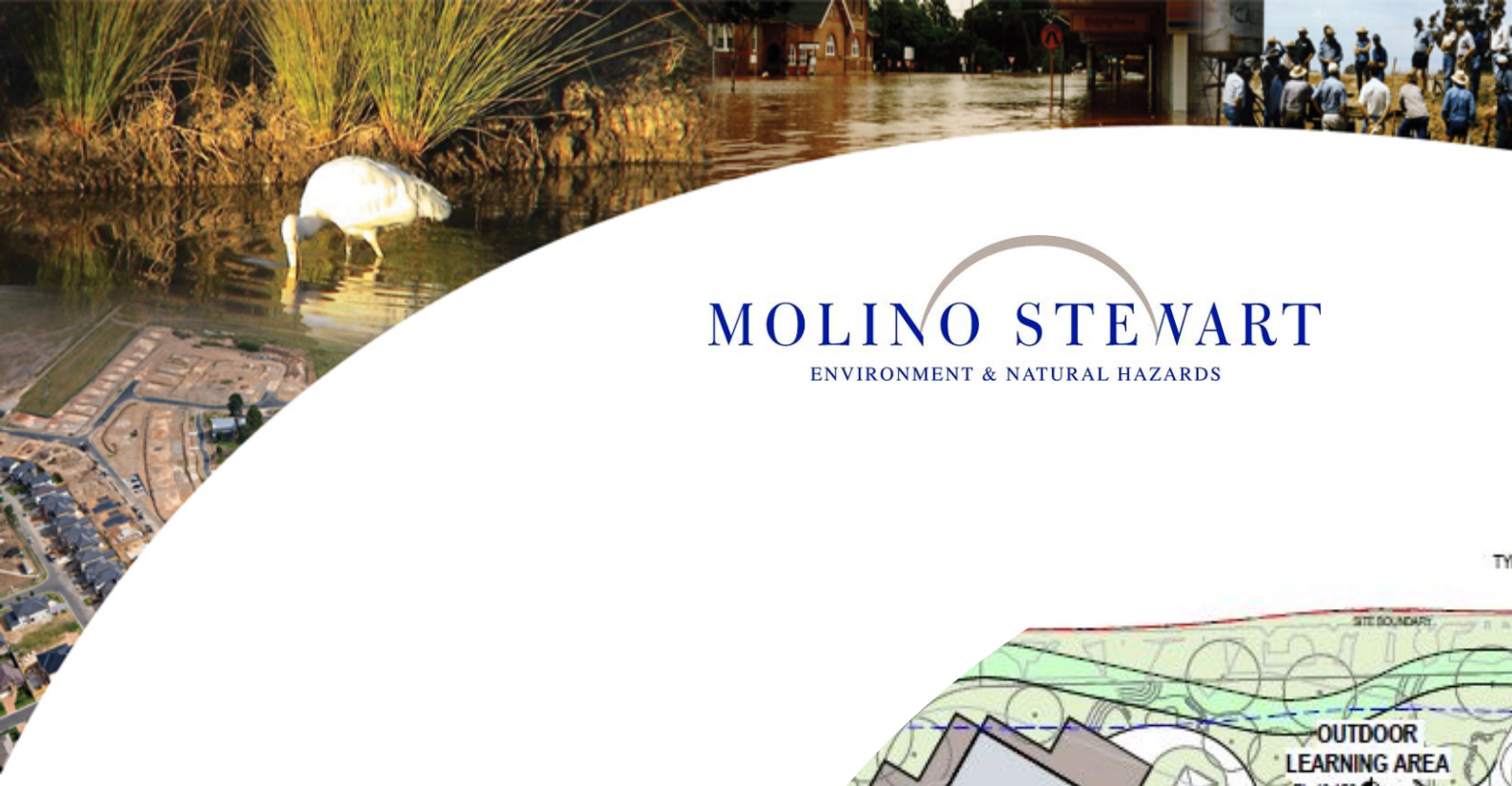
Commercial / Industrial

- Ingram Micro Warehouse
- Goodyear Warehouse
- 1-5 Interchange Drive, Eastern Creek
- 2-4 Interchange Drive Eastern Creek
- 9-11 Interchange Drive, Eastern Creek
- 17-19 Interchange Drive, Eastern Creek
- 21-23 Interchange Drive, Eastern Creek
- Bunnings Distribution Centre, Eastern Creek
- Basalt Road, Greystanes
- Blum Australia Warehouse, Hoxton Park
- Masters Home Improvement, Penrith
- Masters Home Improvement Wagga Wagga
- AMP Shopping Centre, Glenmore Park
- Kingsford Smith Distribution Centre, Mascot
- Danks Hardware Distribution Centre

Institutional & Educational

- Western Sydney University, Westemead
- St Mary's Aged Care Facility, St Mary's
- Barker College Junior School and Early Learning Centre
- Kambah P-10 School Canberra
- The Abbey Aged Care Facility, Mittagong
- Anglican Retirement Village, Glenhaven
- Oran Park Aged Care Facility, Oran Park
- Cumberland West Metal Health Facility
- Edmondson Park Primary and Secondary School

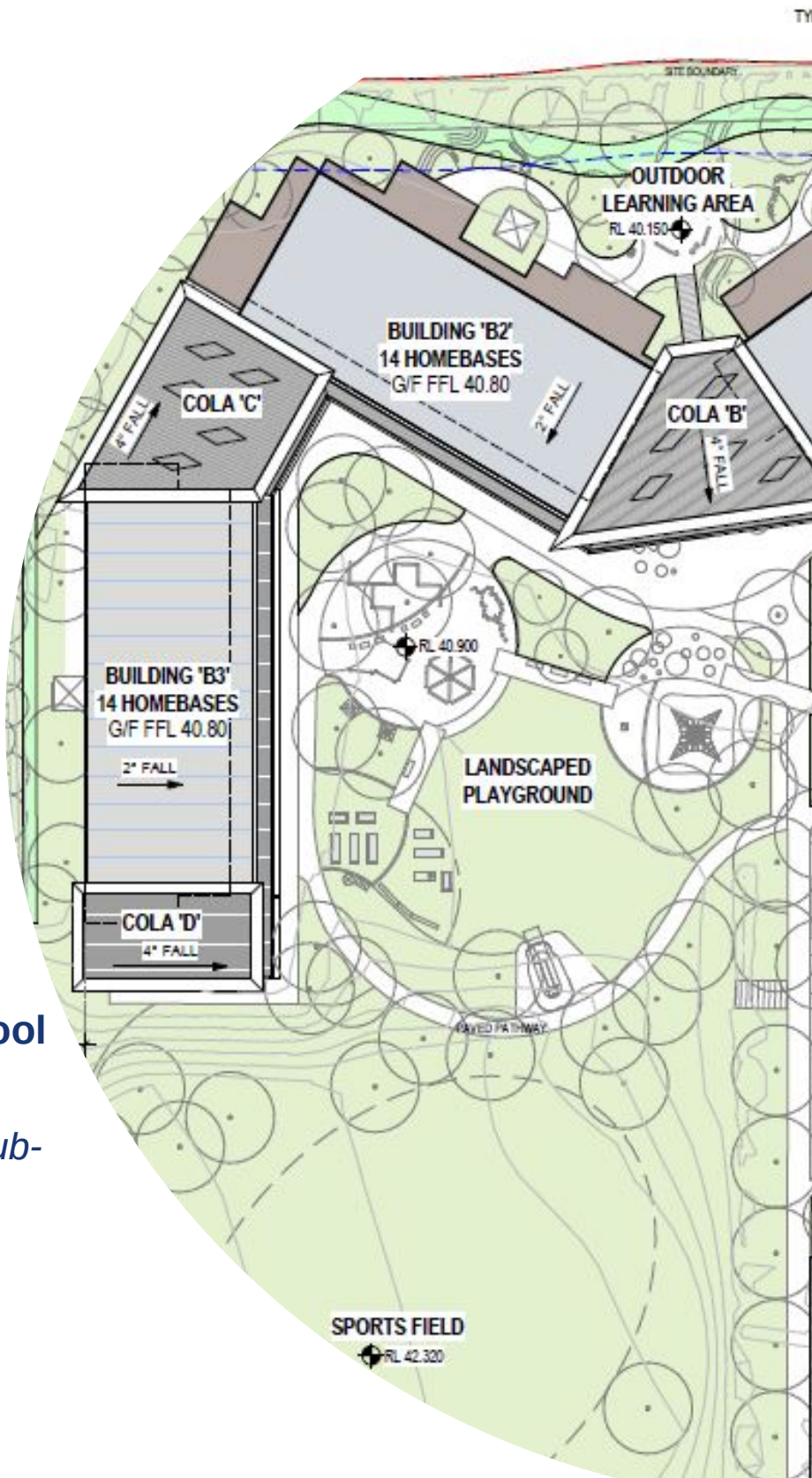
APPENDIX J – FLOOD EMERGENCY RESPONSE



MOLINO STEWART

ENVIRONMENT & NATURAL HAZARDS

Schools Infrastructure NSW



Jordan Springs Public School

Flood Emergency Response Sub-Plan

MOLINO STEWART
ENVIRONMENT & NATURAL HAZARDS

Jordan Springs Public School

FLOOD EMERGENCY RESPONSE SUB-PLAN

for

Schools Infrastructure NSW

by

Molino Stewart Pty Ltd
ACN 067 774 332

SEPTEMBER 2019

MOLINO STEWART PTY LTD ABN 95 571 253 092 ACN 067 774 332
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DOCUMENT CONTROL

Document Reference	1149 FERSP Jordan Springs Public School Final
Project	Jordan Springs Public School
Document Type	Draft Flood Emergency Response Sub-Plan
Author	Jenni Kremer and Steven Molino

REVISION HISTORY

Date	**Version**	**Name**	**Comments**
12/09/2019	1	Jenni Kremer	First draft for internal review
13/09/2019	1.1	Steven Molino	Draft for client review
17/09/19	Final	Jenni Kremer	Finalise report

DOCUMENT APPROVAL

For Molino Stewart	
Name	Steven Molino BSc BE MIEAust NPER 3
Position	Principal
For Schools Infrastructure NSW	
Name	Jim Lewis
Position	Director | Capital Works Services

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1 INTRODUCTION

1.1 BACKGROUND

Development Consent was granted for the construction of a school at Jordan Springs on 5th September 2019. One of the conditions of the development consent (B19) was to produce a Flood Emergency Response Sub-Plan (FERSP), which must address those details listed under subheading 1.6.

1.2 LOCALITY

Jordan Springs Public School is located on the corner of Cullen Avenue and Lakeside Parade, Jordan Springs, NSW and is within the catchment of South Creek (Figure 1).

1.3 PROPOSED LAYOUT OF THE SCHOOL

The proposed layout of the school is 5 buildings on the eastern side of the site, with playgrounds in the middle of the site, and the oval and staff carpark on the western side (Figure 2). The ground level of the buildings will be 40.80m AHD and the first floor level will be 44.72m AHD.

1.4 TOPOGRAPHY AND DRAINAGE

The topography of the site will be such that the highest point is the north-western corner of the oval and the lowest is the south eastern corner, near the bioretention basin (Figure 2). A swale will run around the eastern side of the buildings, between the buildings and the property boundary fronting the creek. The sports field will be the highest point in the school at around 42.32m AHD, while the rest of the school is between 40.0 and 40.9mAHD.

The rainfall catchment for the school is bounded by the school's site boundary as runoff to the north and west is picked up by road and piped drainage in Lakeside Parade and Barrow Circuit.

Runoff from the school grounds will flow to the swale and into the bioretention basin. Excess flows in the swale and basin will overflow into the creek to the east.

1.5 CONSTRUCTION AND OPERATION

Construction duration is expected to be 30 weeks. Construction hours will be from 7:00am to 6:00pm weekdays and 8:00am to 1:00pm on Saturdays. There will be no construction on Sundays or public holidays.

The school population will be 1,200 students. The school hours will be 6 hours per day, nominally 9:00am to 3:00pm, however out of school hours care is expected to be running between 6:30am and 6:30pm during term and 7:00am to 6:00pm during holidays, with a two week shut down period over Christmas and New Year. School will be closed on weekends and public holidays.

1.6 THIS FERSP

This FEFSP is required to meet the requirements of consent condition B19 which are set out in *Table 1*.

Table 1: Conditions of consent

Condition	**Condition requirements**	**Document reference**
B19	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);	See Document Control
	(b) address the provisions of the Floodplain Risk Management Guideline (OEH, 2007);	Section 2
	(c) include details of:	
	(i) the flood emergency responses for both construction and operation phases of the development;	Section 4
	(ii) predicted flood levels;	Section 2
	(iii) flood warning time and flood notification;	Section 3
	(iv) assembly points and evacuation routes;	Section 4
	(v) evacuation and refuge protocols; and	Section 4
	(vi) awareness training for employees and contractors, and students.	Section 4

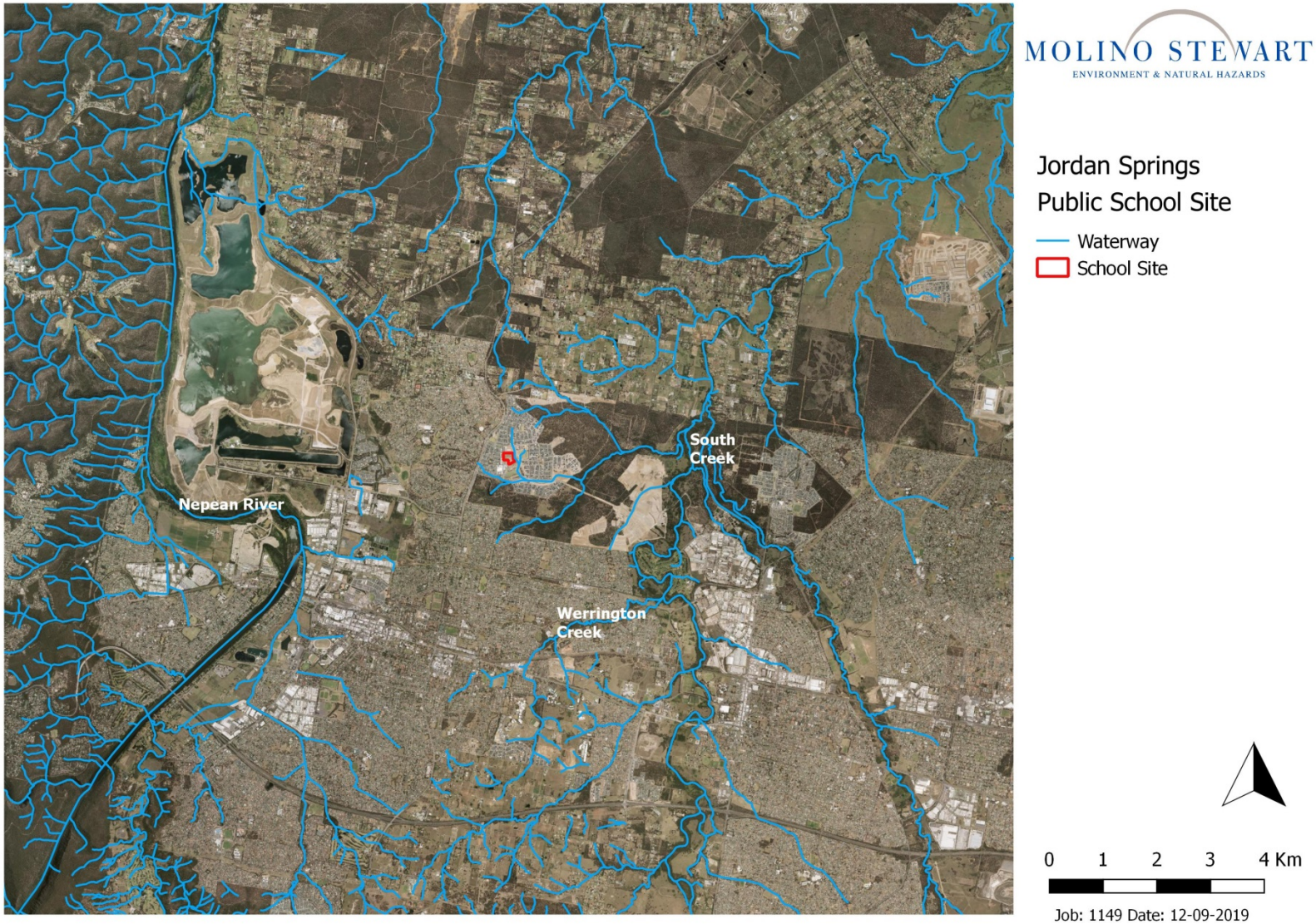


Figure 1: Location of Jordan Springs Public School in relation to Local Waterways

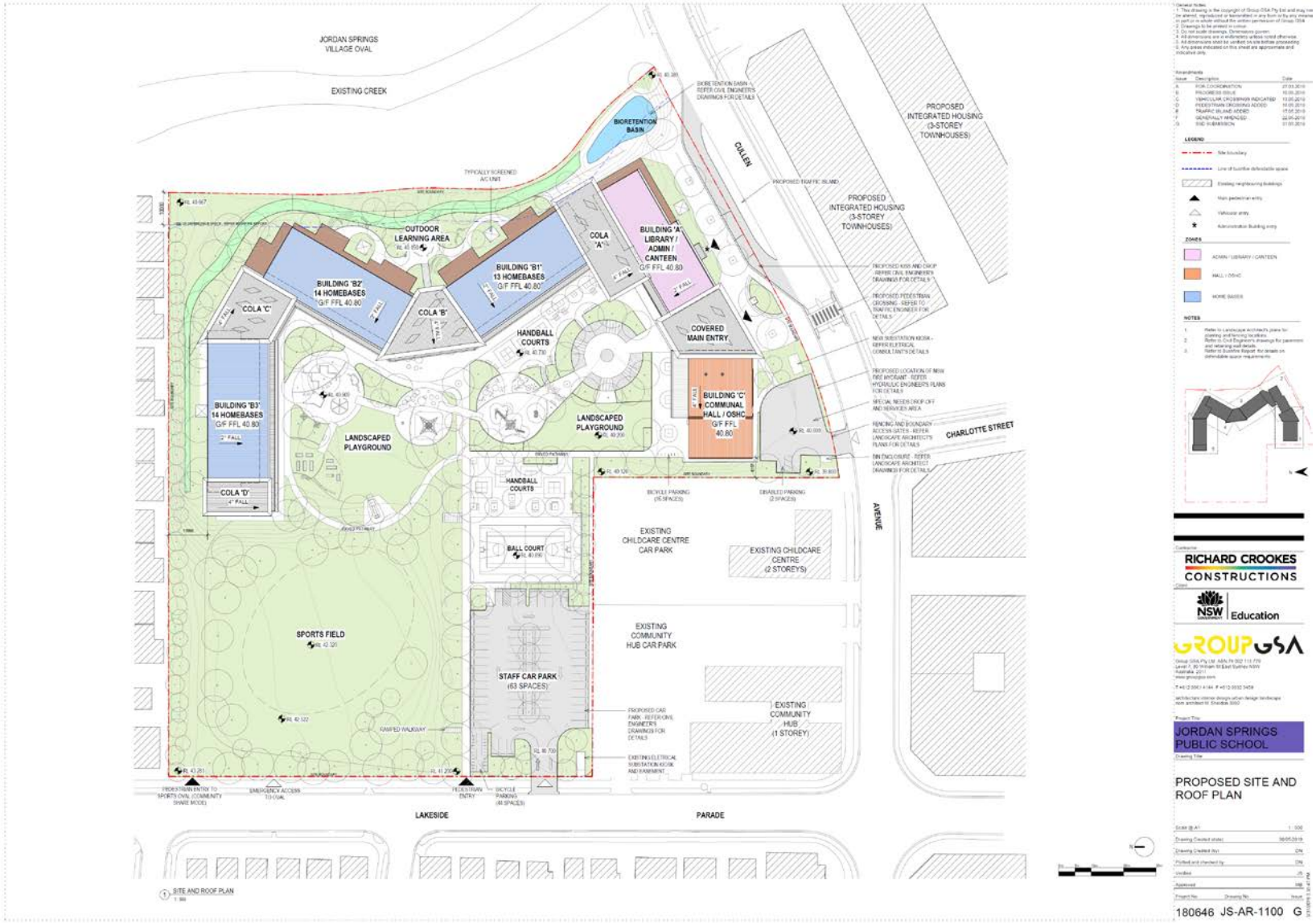


Figure 2: Site Layout

2 FLOOD BEHAVIOUR

Jordan Springs Public School is located in the Hawkesbury/Nepean catchment and while the Nepean River, South Creek and Werrington Creek can all flood and can cause significant impacts on infrastructure and road access this school is well above the reach of any flooding from those creeks and rivers. Its access to Jordan Springs and The Northern Road would not be affected by flooding of any of those creeks or rivers.

The nearest water body is the unnamed creek immediately to the east of the school which has a 1% annual exceedance probability (AEP) flood level of 38.3 to 38.8m AHD in the section nearest the school (SKM, 2012). This is a minimum of 0.5m below the top of the channel, and a minimum of 1.8m below the ground level along the school boundary fronting the creek. The creek would have to rise to 2 m above the 1% AEP flood level in order to flood into the school. This is highly unlikely in a catchment of this size.

The only flooding that it is likely to affect the school is overland. However, as it is only a small catchment, these would only occur in most intense events and would be quite shallow. Furthermore as the landscape is relatively flat the velocity would also be low. Therefore it is highly unlikely that any flooding is going to be hazardous.

The ground floor levels of the buildings will be 0.03m higher than the adjacent paths but to meet Building Code of Australia requirements the ground level must slope away to a level at least 0.15m lower than the floor level. Overland flows would have to exceed this depth before they could enter the buildings.

Any overland flooding on the site would last for less than an hour.

In relation to the NSW Government Flood Risk Management *Guideline Classification of Floodplain Communities for Emergency Management Planning* (DECC 2007), the site has an overland escape route away from the creek to the east. However, as the overland flows will flow through the school grounds towards the creek, the school buildings are best considered to be high flood islands which low probability, short duration isolation.

3 FLOOD FORECASTS AND WARNINGS

There would be no warning of flooding on the site as it would be caused by intense rainfall locally. However, the BOM does issue severe weather warnings which would give an indication of whether intense rainfall is likely to occur and staff can monitor the rainfall radar if heavy rain is expected.

Link to weather warnings:
http://www.bom.gov.au/nsw/warnings/

Link to radar:
http://www.bom.gov.au/products/IDR713.loop.shtml#skip

4 EMERGENCY PREPAREDNESS AND RESPONSE

Because there would be no warning of flooding and the flood waters are unlikely to be hazardous emergency response will need to be reactive to the weather conditions.

4.1 CONSTRUCTION

The site compound and storage will be on the western side, which is the highest part of the site and at the top of the school's catchment. It is unlikely to be affected by flooding. Any outdoor construction during intense rainfall would need to be postponed. Indoor construction can continue during intense rainfall but should cease and power turned off if water started to enter the buildings. If water does enter the buildings all should immediately move upstairs.

4.2 OPERATION

The school is closed for 66% of the time. Therefore, there is an extremely low probability of it being occupied when intense rainfall might cause flooding.

All students and staff should remain indoors during intense rainfall.

If water should enter a building staff and students should move upstairs.

4.3 INDUCTIONS

The risk of overland flooding and the appropriate response will be conveyed to all construction and operation staff during inductions.

Staff will be instructed to follow the directions outlined in Sections 4.1 and 4.2.

5 REFERENCES

Department of Environment and Climate Change (2007) Flood Risk Management Guideline flood emergency response classification of communities

SKM (2012) *St Marys Precinct Development: North/South and East/West Open Channel Report*

Proposed Role: Flood Risk Specialist

STEVEN MOLINO

Current Role

Company Principal

Qualifications

Bachelor of Science (Physical Geography and Environmental Chemistry). University of New South Wales

Bachelor of Engineering (Civil) (Hons). University of New South Wales

Affiliations

Member, Engineers Australia

Registered Professional Engineer NPER 3 Civil and Environmental (1053737)

Why my track record, experience and character makes me ideally suited to this project:

I have been working in floodplain management since 1991 including in the highest risk floodplains in Australia. Having researched and developed methodologies for flood damage assessment, I have estimated flood damages using databases of more than 20,000 properties on several occasions.

My expertise in flood warning, emergency planning and evacuation analysis is recognised internationally and I helped the NSW SES refine and implement its evacuation timeline model which I have used for populations of up to 75,000. I developed the NSW SES timeline model tool which is provided to Councils, developers and their consultants to assess evacuation practicalities for flood prone areas.

I have developed flood emergency response plans for numerous premises and developed the Business FloodSafe toolkit used by the NSW, Victoria SES and SA. I have evaluated several flood warnings and evacuations in NSW and Victoria following major floods.

As the editor of the national newsletter *Floodplain Manager*, and an active participant in the Floodplain Management Association and international research networks, I am abreast of the latest developments in floodplain risk assessment and management.

My technical expertise, analytical skills and ability to communicate technical concepts have been used to good effect in floodplain management, option evaluation and expert testimony in Queensland, New South Wales and Victoria.

Lessons learnt from my past project experience that will be relevant on this program:

There are consistent lessons from all of the flood risk assessment and management projects I have been involved in. They are to:

- fully scope the range of potential risks and potential management options
- understand interdependencies and explore potential event trees
- use a robust risk assessment framework to prioritise risks
- integrate risk management with existing processes

Track Record & Relevant Experience

Project: **Review of Total Flood Warnings – Sept 2010 – Feb 2011**

Client/Location: Victoria Floods Review – Victoria

*Role & Company:*Project Director, Molino Stewart

Duration of Role:June 2011 – Sept 2011Value: $60,000

Description and Relevance of Project:

Between September 2010 and February 2011 there was extensive flooding across almost all of Victoria with 400 towns being flooded, many two or three times. Record flooding occurred on many of the river systems, thousands of residents were advised to evacuate but many were caught unawares by the rapidly rising floodwaters and others did not appreciate just how high the water could come. The Victoria Floods Review was established to investigate all aspects of the floods and make recommendations to the State Government on how the communities and emergency service agencies could be better prepared and changes needed to be made in flood warning and recovery to reduce the extent of damages in the future. Molino Stewart was engaged to prepare a report on all aspects of flood warning from data collection, through forecasting and warning dissemination to community response to warnings. A sample of events across several catchments from September 2010 to February 2011 were investigated.

Key Relevant Tasks Performed:

- Developed methodology for evaluating the accuracy and timeliness of Bureau of Meteorology flood forecasts and applied to several key gauges across the sample events investigated
- Identified how data collection networks and flood forecasting methodologies contributed to warning outcomes
- Interviewed key stakeholders involved in the warning process including forecasters, incident controllers, intelligence officers and local commanders
- Reviewed community feedback and media reporting of events to gauge how well messages were received, understood and acted upon
- Reported findings

Outcomes & Accomplishments Achieved:

- Final Victoria Floods Review Report and its recommendations strongly reflected the findings of our investigations.

Project: **Evacuation Assessment Tool and Guideline**

Client/Location:NSW State Emergency Service – Wollongong

Role & Company:Project Director and Evacuation Modelling Specialist, Molino Stewart

Duration of Role: Mar – Dec 2012Value:$ 50K

Description of Project:

The NSW SES has developed the Flood Evacuation Timeline as a method for planning the evacuation of communities during floods. It can be used to highlight the critical stages of the evacuation and subsequently improve planning for flood events. Additionally, the method can be used by councils and developers in the development planning process by applying the tool to proposed development

This project took the method developed by the SES and developed a technical guideline for implementing the methodology as well as a user friendly Excel-based tool to implement it

Key Relevant Tasks Performed:

- Refinement of the timeline evacuation methodology to include consideration of traffic convergence and pedestrian evacuation
- Verification of SES recommended assumptions
- Creation of a spreadsheet based tool
- Writing of a guide on how to undertake evacuation modelling using the tool.

Outcomes & Accomplishments Achieved:

- Simple to use tool with clear steps for inputting data
- A tool which provides detailed calculations but also a concise summary of the analysis
- Detailed guideline explaining the model concept, potential data sources, logic of assumptions, how to use the tool and how to interpret the outputs

***Project*:**	**Newcastle Floodplain Risk Management Plan**
Client/Location:	Newcastle City Council - Newcastle, NSW
Role & Company:	Project Manager and Flood Specialist, Molino Stewart
Duration of Role:	Sept 09 – Jan 12 Value:$ 500,000

Description of Project:

Newcastle City Council prepared a floodplain risk management plan for ocean, river and flash flooding which affects more than a third of the City's 60,000 properties. Many of the residents and businesses had strong expectations about improving the preparedness and response to the flooding in light of the devastating 2007 event

Key Relevant Tasks Performed:

- Integration of five flood models to assess damages from three types of flooding now and with climate change
- Facilitation of stakeholder workshops in several communities across the City
- Evaluation of structural and non structural floodplain management options
- Reporting of damage assessments and option evaluations.

Outcomes & Accomplishments Achieved:

- Integration of data between flood models, WaterRIDE, GIS and Excel
- Spatial presentation of impacts, options and constraints
- Thorough estimate of tangible and intangible flood damages
- Benefit cost analysis and detailed option evaluation
- Stakeholders consulted in an equitable, transparent and consistent manner
- Reporting of stakeholder views on issues and options
- Clear reporting of methodologies and outcomes

***Project*:**	**North West Sector Flood Evacuation**
Client/Location:	NSW Department of Planning
Role & Company:	Project Manager and Flood Specialist, Molino Stewart
Duration of Role:	2009 – Feb 2011 Value:$50K

Description of Project:

Proposed development on the floodplain of the Hawkesbury-Nepean River presents significant challenges to flood evacuation on an arguably over developed floodplain. The NSW Department of Planning commissioned Molino Stewart to develop a regional flood evacuation model, using the NSW SES Timeline Evacuation Model, of all urban areas within the floodplain. The purpose of the model was to inform planning of regional evacuation and evacuation infrastructure needs and determine the capacity for future development across the floodplain.

Key Relevant Tasks Performed:

- Determination of the at-risk population within the Hawkesbury-Nepean floodplain
- Development of a regional flood evacuation model for the Hawkesbury-Nepean floodplain, which includes some 75,000 residents.
- Evaluation of the capacity of evacuation routes, both now and into the future
- Determination and assessment of options for evacuation route upgrades

Outcomes & Accomplishments Achieved:

- Development of large scale evacuation model with consideration of traffic convergence issues
- Statistical data analysis and parameterisation of variables
- Determination of critical locations along evacuation routes
- Identification and assessment of potential evacuation route upgrades
- Clear reporting of methodologies and outcomes

Project:	**North Byron Parklands – Flood Emergency Response Plan**
Client/Location:	North Byron Parklands, NSW
Role & Company:	Project Manager, Molino Stewart
Duration of Role:	April 2011 – April 2013 Value: $35k

Description and Relevance of Project:

Splendour in the Grass is one of Australia's premier music events and had been held in Byron Bay for several years. It had outgrown its original venue and North Byron Parklands was purchased with the view to develop it as the new venue for Splendour in the Grass. The parklands are expected to host events ranging in size from 300 people to 50,000 people, which would involve the development of permanent infrastructure. The site lies on two floodplains divided by a ridgeline. Molino Stewart was commissioned by the North Byron Parklands owners to develop a flood emergency and advice on flood risk mitigation measures.

Key Relevant Tasks Performed:

- Identified flood safety risks associated with events at the North Byron Parklands
- Quantified numbers of at risk persons, likelihood of flood events occurring and possible consequences of not implementing a flood risk management plan
- Evaluated risks and identified possible controls to mitigate risks
- Developed and undertook Evacuation Timeline Modelling for larger events
- Designed and installed a flash flood warning system which was integrated into existing Bureau of Meteorology gauging infrastructure.
- Prepared a detailed Flood Emergency Response Plan for use before, during and after events.

Outcomes & Accomplishments Achieved:

- Flood risks accurate identified
- Flood risk mitigation options identified and evaluated
- Warning system installed and commissioned

MOLINO STEWART
ENVIRONMENT & NATURAL HAZARDS

Floodplain Management

Strategic Planning

- **Shelter in Place Policy (Fairfield City Council)** Although there has been numerous initiatives since to mitigate flood impacts in this Western Sydney LGA, there remains a legacy of urban areas with significant flood risks. One of the risks which must be managed is risk to life and this has become an issue of considerable debate in recent decades. Currently the NSW SES supports a policy of evacuation with shelter in place only being promoted for existing development where evacuation cannot be effected without increasing risk to life. However, a blanket ban on sheltering in place for any new development is not practical in Fairfield LGA, where warning times are short and evacuation routes are cut early in floods. Council engaged Molino-Stewart to assist in the development of a Shelter in Place Policy that can guide redevelopment and work with its planning instruments and Residential Development Strategy.
- **Parramatta CBD Floodplain Risk Management Plans (Parramatta City Council)** As Sydney's second CBD, Parramatta has been earmarked by the State Government and Parramatta City Council for major redevelopment including expansion of the CBD footprint, increased height limits on buildings and an increase in residential high rise buildings in the city centre. This will be accompanied by revitalisation of public open spaces including the Parramatta River corridor. All of these areas are flood prone and guidance was required to ensure that development was compatible with the flood risk to lives and property. Molino Stewart assisted Parramatta City Council to update its flood policy, update it floodplain risk management plans and provide planning guidelines for residential and commercial redevelopment throughout the CBD. An important consideration was the practicality of evacuation and development controls to ensure any sheltering in place was appropriate.
- **Penrith CBD Floodplain Risk Management Study and Plan (Penrith City Council).** The work, builds upon a flood study covering a 34km^2 catchment with very high resolution, which however required extensive review and upgrades. As part of the project, Molino Stewart is leading an innovative bottom-up approach to community engagement, based on "drop in" session, use of community forums and dedicated communication channels to reach out to specific stakeholders, including the developer community and the Chamber of Commerce. Additional tasks include the identification and evaluation of flood mitigation options. This will result in advanced strategic planning and emergency response measures to balance high-rise redevelopment and flood risk, and may adopt a shelter in place approach where appropriate. It considers the impacts of local flooding on the availability of regional flood evacuation traffic routes.
- **Review of Floodplain Risk Management Plans (Toowoomba Regional Council).** Conducted technical and strategic review of Floodplain Risk Management Plans developed by other consultants for six townships in The Toowoomba LGA. This included review of methodologies and plan content for damage assessment, emergency management, mitigation options and community consultation. Review comments were provided to Toowoomba Regional Council and the consultants throughout the project.
- **Bow Bowing Bunbury Curran Creek Floodplain Risk Management Study and Plan (Campbelltown City Council)** The Bow Bowing Bunbury Curran Creek catchment (90km^2) is located in the City of Campbelltown (population 150,000), 53km south west of the Sydney CBD. The catchment is a mixture of rural, residential, commercial, industrial and open space land use. It is predominantly residential land use with large areas of open space. There are significant localised industrial areas at both Minto and Ingleburn. The main commercial hubs are in Campbelltown/Macarthur and Ingleburn. Prepared a floodplain risk management study and plan for the whole of the catchment.
- **Three Tributaries Floodplain Risk Management Study and Plan (Fairfield City Council).** Engaged by Fairfield Council to undertake the Floodplain Risk Management Study and the development of a Draft Floodplain Risk Management Plan for the three major tributaries of

Prospect Creek within the Fairfield LGA, NSW. The Project addresses the flooding, environmental and planning issues associated with the management of flood prone land within the catchment areas of the tributaries, as well as assessing the status of the 13 detention basins within the catchment and preparing Dam Safety Emergency Plans in accordance with DSC requirements.

- **Canley Corridor Floodplain Risk Management Study and Plan Fairfield City Council)** Floodplain Risk Management Study and Draft Floodplain Risk Management Plan for a catchment subject to overland flows. This was the first for overland flows in the LGA and set planning policy and explored mitigation options not previously considered.
- **Duck River Floodplain Risk Management Study and Plan (Parramatta City Council):** Produced a study and plan for a 40 square kilometre, fully developed urban catchment in western Sydney where the 1% flood affects more than 1,000 properties across four local government areas. Many parts of the remaining open space within the floodplain has high biodiversity values and the communities are culturally and linguistically diverse.
- **Parramatta River City Plan (Parramatta City Council)** Council has a bold plan to redevelop the river channel, public open space along the river corridor and guide redevelopment of buildings along the river banks to create a vibrant reinvigorated section of the CBD in the style of many European Cities. This includes the provision of recreational infrastructure and food outlets below the 1% flood level. Provided a risk based framework for the master planning, detailed design and flood emergency response management of the precinct. This included design guidelines to ensure assets would survive inundation in a 1% flood and more than 50,000 people would be able to safely evacuate from major events were flash flooding to occur.
- **Greater Parramatta Flooding and Drainage Stage 1** (Department of Planning and Environment) As part of the Greater Parramatta Planning Strategy, researched and summarised all of the flood and drainage studies which are available within the study area and highlight gaps where further studies are required.
- **Lismore Hospital Precinct Rezoning (Lismore City Council)** A rezoning was proposed to increase the density of residential and business development in the vicinity of Lismore Base Hospital. Engaged to evaluate the flood risks associated with the proposed intensification and recommended limits to the rezoning.
- **Regional Floodplain Database – Study Advisory Group (Moreton Bay Regional Council).** Providing expert advice on flooding issues as a member of this study group whose role it is to gain a comprehensive knowledge of flood behaviour across the Moreton Bay Region and develop strategies for the management of any flooding problems identified.
- **Cost Benefit Analysis of Natural Hazards Education (Victorian State Emergency Service)**: Prepared an economic analysis to support SES business case to increase its role in community education in relation to floods, tsunami, storms and earthquakes.
- **Review of Council Flood Policy (Parramatta City Council)** Undertook a comprehensive review of Council's Flood Policy and checked for consistency with the NSW Floodplain Development Manual. Reviewed development controls and procedures and provided advice on possible improvements.
- **Literature Survey for Flooding in the Parramatta River Catchment (Parramatta City Council)** Undertook an extensive literature search of all available documents and data on flooding within the Parramatta River Catchment. Provided a comprehensive compendium of files with full referencing.

Emergency Planning

- **On-Site Flood Emergency Plan Guidelines (City of Gold Coast)** The City of Gold Coast is highly exposed to the risk from storm surge and riverine and flash floods and it is estimated that there are 50,000 people living in premises affected by the 1% average exceedance probability (AEP) flood. New development in flood-affected areas needs to comply with the relevant Flood Overlay Code. This includes minimum requirements in relation to access and evacuation. However, a decision by the Queensland Planning and Environment Court (Arora Construction v. Gold Coast City Council) determined that measures to facilitate sheltering in place rather than evacuation, including a Flood Emergency Management Plan (FEMP), are an acceptable alternative solution to reduce risk to life. This project developed guidelines for FEMPs.
- **Floodplain Risk Management Plan – Evacuation (Hawkesbury City Council).** Project managed the review of coarse evacuation models and assessed the capacity available for further development within Hawkesbury LGA to evacuate in accordance with the SES Flood Evacuation Plan. This included considerations of the potential for proposed developments in other surrounding LGAs to impede and affect evacuation options. This also involved an exploration of structural and non-structural options to overcome current capacity deficits and provide additional evacuation capacity.
- **Flood Emergency Response Plan (SBA Architects).** Developed a flood emergency response plan for a proposed Hungry Jacks restaurant in Broadmeadow. This included an analysis of potential flooding, determination of evacuation routes and flood response and the set up of a SES Business FloodSafe Plan and account for the site.
- **Detention Basin Dam Safety Emergency Plans (Liverpool, Blacktown, Fairfield, The Hills Shire councils)** Oversaw preparation of dam break studies and **p**repared or updated dam safety emergency plans for more than 20 flood detention basins to meet Dams Safety Committee requirements.
- **Silverwater Business Flood Emergency Response Plan (Axiom Architects)** Prepared a flood emergency response plan for a proposed warehouse and showroom at Silverwater
- **Caravan Park Flood Risk Review (City Plan Services)** Provided an independent review of a flood risk analysis for a caravan park on the Hawkesbury River.
- **Cultural Precinct FEMP (Gold Coast City Council)** Development of an FEMP for a proposed cultural precinct development on the Gold Coast including amphitheatre and art gallery.
- **Golf Course Redevelopment Flood Risk Advice (Confidential Client)** This involved a pre purchase investigation of a golf course's flood risks to help determine its redevelopment potential for residential development and the investment required in flood mitigation measures.
- **High Rise Development FEMPs (Various Clients)** Provided independent review and certification of FEMPs for several proposed high rise residential developments on the Gold Coast
- **Early Learning Centre Flood Risk Assessment (My Stepping Stones)** Advice on the flood risks at a site which was being investigated for redevelopment as a preschool.
- **Out of School Care FEMP (Penrith City Council)** Developed a flood emergency response plan for an out of school care facility.
- **Preschool Flood Risk Management (Cubby House)** Provided advice on the design of a preschool in a flood prone area, provided expert testimony in the NSW Land and Environment Court and developed a flood emergency response plan.
- **Parramatta CBD Flood Evacuation Analysis (Parramatta City Council)** One of the main constraints to development in Parramatta CBD is the risk of flash flooding from the Parramatta River and its tributaries, which make planning flood emergency responses difficult. The aim of this study was to identify the most suitable flood emergency response strategy for Parramatta CBD, under existing and future population and employment conditions. This was achieved by comparing three possible evacuation strategies: (1) by vehicle at street level, (2) on foot using a network of

elevated walkways, and (3) Shelter In Place. The analyses considered different flood events, development scenarios and times of day that flooding might occur and used multi criteria analysis to identify a preferred option.

- **Gateway Island Flood Evacuation Analysis and Risk Management (Victorian North East Catchment Management Authority)** Analysed the evacuation capacity of Gateway Island on the Victoria NSW border for both existing evacuation vehicles and the potential addition of 3,700 vehicles which might require evacuation as part of the proposed Master Plan.
- **VICSES Role in Flood Education and Warning (Victorian State Emergency Service):** Reviewed the role of the SES in flood education and flood warning with recommendations to SES Board on appropriate actions and resources to improve both through SES initiatives.
- **Penrith Lakes Development (Planning NSW).** Provided expert advice on evacuation strategies, life and property protection and flood planning levels for a proposed 5,000 dwelling development on a rehabilitated mining site on a Nepean River floodplain.
- **Flood Emergency Response Plan (SBA Architects).** Project managed the development of a flood emergency response plan for a proposed KFC restaurant in Newcastle. This included an analysis of potential flooding, determination of evacuation routes and flood response and the set up of a SES Business FloodSafe Plan and account for the site.
- **Pitt Town Evacuation Review (Hawkesbury City Council).** Provided an independent review of SES reports into evacuation of a proposed 1,000 lot residential development at Pitt Town on the Hawkesbury Floodplain.
- **North Bligh Park Evacuation Strategy (Moore Development Group):** Reviewed adequacy of proposed evacuation infrastructure and provided independent advice on the integration of evacuation traffic from a new 1,000 lot urban development with regional flood evacuation traffic in the Hawkesbury Nepean Valley.
- **Camden Residential Development (AEH Group):** Evaluated the flood safety and evacuation risks for a 170 residential unit and 50 bed aged care hostel.
- **Penrith Panthers Redevelopment (ING Real Estate):** Advised on design aspects to manage flood safety risks on redevelopment and expansion of the 70ha site for entertainment, recreational, commercial, tourism and residential development.
- **West Dapto Flood Access (Growth Centres Commission):** Evaluated the impacts of flooding on accessibility for various road network upgrade options for future development of a 14,000 lot growth centre.
- **Grafton Evacuation Review (Clarence Valley Council):** Evaluated the flood evacuation plans for 12,000 people from Grafton.
- **Currumbin Shopping Centre (Bourse):** Assessed flood risks associated with a proposed shopping centre development and worked with designers to address risks.
- **Merrimac Residential Development (Lenmarc):** Assessed flood safety risks and developed an evacuation plan for 100 lot residential development on Gold Coast floodplain
- **Chinderah Flood Risk (Seekchange):** Pre-purchase assessment of flood risks and advice on potential for residential development approval within current and proposed flood planning controls.
- **Evaluation of Proposed Alternative Richmond Flood Evacuation Route (Bencorp Property Development).** Evaluated how a proposed development of 1,000 lots in Richmond would affect current evacuation traffic volumes and determined if its evacuation during a flood was feasible under various scenarios including a proposed alternative flood evacuation route in the form of a high level bridge over the Hawkesbury River.
- **Area 20 Precinct Development (Growth Centres Commission)** Evaluated the flood safety and evacuation risks for a land release of 100 hectares in the North West Growth Centre of Sydney.

- **Riverstone West Flood Evacuation and Education Plan (Paclib):** Developed a flood education and evacuation plan for a proposed 300ha industrial and commercial development.
- **Flood Reference Report (NSW State Emergency Service).** Drafted a Hawkesbury-Nepean Flood reference report for the State Emergency Service.
- **Business Continuity Toolkit (State Emergency Service).** Designed a toolkit to assist businesses to develop business continuity plans to reduce the commercial losses of flooding.
- **Home Floodsafe Toolkit (NSW State Emergency Service):** Designed a toolkit to assist householders to develop flood plans to reduce the losses and disruption of floods.
- **Caravan Park Flood Response Guidelines (Shoalhaven City Council):** Worked with Bewsher Consulting to develop flood response guidelines for about 40 flood prone caravan parks in the Shoalhaven Region.
- **Flood Response Plan Guidelines (Gold Coast City Council):** Prepared guidelines for the development of Flood Response Plans for individual developments on Gold Coast floodplains.
- **Planning Infrastructure for Flood Hazards (Hawkesbury Nepean Floodplain Management Steering Committee).** Consulted with major infrastructure owners and managers to determine their level of awareness of flooding and the strategies which they had in place to protect or replace assets and to maintain or restore service in the event of a flood. Developed briefing papers to guide and assist service providers develop response and recovery programs.
- **Comparative Evaluation of Warning Technologies (State Emergency Service).** Investigated and compared old, new and emerging technologies for disseminating flood alert and warnings.
- **Integrated Flood Warning System (State Emergency Service).** Developed a methodology for selecting a combination of warning methods and technologies to ensure maximum coverage and minimum failure risk.
- **Tamworth Tyre Centre (Taylor Kelso Solicitors)** Provided expert evidence to the NSW Land and Environment Court into the risks associated with a commercial development on the Peel River floodplain.
- **Parraweena Road Development (SMEC):** Provided expert evidence of flood evacuation to the Land and Environment Court for a proposed commercial development in the Sutherland Shire.
- **Hoxton Park Training Facility (Integral Energy):** Evaluated flood safety risks and advised on design features to aid safe flood evacuation of an apprentice training facility
- **Nursing Home Flood Response Plan Review (Gold Coast City Council):** A proposed expansion of a 300 person nursing home and retirement village in the Nerang Valley required the development of a comprehensive flood response plan. Provided an independent review of the plan suggesting significant changes to assumptions and actions
- **North Coast Evacuation Evaluation (NSW State Emergency Service):** Conducted door to door survey of properties on the NSW North Coast following a major flood to determine the effectiveness of flood and evacuation warnings and gauge community attitudes to flood risks and response.
- **North Coast Flood Warning Evaluation (NSW State Emergency Service**): Conducted focus groups and community surveys, including on-line surveys, and reviewed flood warning bulletins on the NSW North Coast to evaluate the appropriateness and effectiveness following a major flooding on three river systems to identify how warnings could be improved.
- **Hunter Flood Warning Evaluation (NSW State Emergency Service):** Evaluated the effectiveness of flood warnings in the Hunter Valley during the June 2007 floods.
- **Gippsland Flood Warning Evaluation (Victoria State Emergency Service):** Evaluated the effectiveness of flood warnings in Gippsland during the June 2007 floods.

- **High Rise Development Flood Response (Minter Ellison):** Assessed flood emergency evacuation and flood response planning for a proposed 270 apartment and commercial complex as part of a Planning and Environment Court appeal.
- **Yarra River Commercial Development (Freehills):** Provided expert opinion on flood evacuation planning for a proposed commercial development on the banks of the Yarra River.
- **Food Outlet Emergency Response Plan (KFC):** Worked with management to develop a practical flood response plan for a takeaway food outlet
- **Hardware Store Response Plan (Brennex):** Worked with site owners to update flood response plan for a Bunnings Hardware store.
- **Caravan Park Emergency Response Plan (Wallacia Park Trust)** Worked with management and permanent residents to develop a practical flood response plan for a caravan park
- **Schofields Release Area Flood Evacuation Evaluation (Department of Planning and Infrastructure)** Assessed the flood evacuation risks and advised on urban design inclusions to avoid entrapment for a 1,700 dwelling greenfield develop and expansion of the Nirimba Education Precinct.
- **Marsden Park Release Area Flood Evacuation Evaluation (Winton Property Group)** Assessed the flood evacuation risks and advised on urban design inclusions to avoid entrapment for a 5,800 dwelling greenfield develop adjacent to South Creek.
- **Review of Total Flood Warning System (Victoria Flood Review)** Led a team investigating the effectiveness and shortcomings of the total flood warning system in Victoria during their floods of September 2010 to February 2011. Considered all aspects of the flood warning system including data collection, forecasting, impact interpretation, warning message construction and dissemination and on-ground response.

Impacts and Mitigation

- **Warragamba Auxiliary Spillway (SWC).** Project manager for a project to bring Sydney's major water supply dam up to international safety standards. A major consideration was finding the appropriate balancing between project costs and downstream flood risks.
- **Warragamba Flood Mitigation Dam (SWC).** Conducted workshops, tours and interactive displays to explain the environmental impacts of a proposed mitigation dam which could have potentially impacted on more than 75 square kilometres of natural areas including national parks and wilderness areas, 200 kilometres of river system, 400 square kilometres of floodplain and a village of 1,800 people. This was a highly controversial project which required consultation with government, peak conservation groups and local residents.
- **Keepit Dam Upgrade (State Water)** Part of an expert panel advising on the flood damage, environmental impact and socio economic implications of options to upgrade Keepit Dam.
- **Flood Damage Methodology Review (confidential client)** Undertook an independent review of a methodology for estimating flood damage exposure for a major insurance company.
- **Victorian Flood Damages (Department Sustainability and Environment)** Part of a team which used a rapid appraisal method to estimate flood damages across the whole of Victoria and estimated the benefits of various interventions to help prioritise areas for future detailed investigations.
- **Hawkesbury-Nepean River Flood Damages (NSW Inter-Departmental Committee).** Estimated the direct, indirect, tangible and intangible cost of flooding in the Hawkesbury Nepean Valley where 17,000 homes, 4,000 businesses and billions of dollars worth of key infrastructure is flood liable.

- **Effects of Hawkesbury-Nepean River Flooding on Communities and Infrastructure (Hawkesbury Nepean Flood Management Advisory Committee).** Assessed impacts of flooding on assets and communities and advised on measures to reduce impacts.
- **Review of Recent and Future Hawkesbury Nepean Development for Emergency Planning (NSW SES)** Reviewed recent and proposed urban and infrastructure development on and adjacent to the floodplain to determine implications for emergency planning.
- **Richmond Road Marsden Park Flooding and Ecological Constraints Report (Goonellabah Pty Ltd).** Prepared a flood and ecological assessment for land adjoining Bells Creek on the Cumberland Plain in Sydney's west, in order to deliver advice regarding the constraints of the site.
- **North Richmond Flood Hazard Evaluation (BuildDev):** Reviewed the flood hazards related to a proposed 2,500 lot residential development in the Hawkesbury Nepean Valley. Compared the flood risks for the site with five other potential development sites in the LGA.
- **Nelson Plains Flood Hazard Evaluation (Hill Top Planners).** Reviewed the flood hazards related to a proposed residential development in a location affected by flooding in the Hunter River Valley.
- **Woronora River House Raising Scheme (Sutherland Shire Council).** Developed a scheme for subsidising the raising of houses which are at a high risk of suffering damage from flooding
- **Escarpment Boardwalk Peer Review (Parramatta City Council)** Undertook a peer review of the design of a proposed boardwalk along the escarpment on the northern foreshore of the Parramatta River downstream of Charles St Weir to ensure that it adequately dealt with flood risks.

APPENDIX K – UNEXPECTED FINDS PROTOCOL FOR CONTAMINATION

Our ref: PS114979-CLM-LTR-UFP RevA.docx

By email
PinkertonI@richardcrookes.com.au

23 August 2019

Isaac Pinkerton
Site Engineer
Level 3,
4 Broadcast Way,
Artarmon
NSW 2064

Dear Isaac

Unexpected Finds Protocol - Jordan Springs Public School

1. BACKGROUND

WSP Australia Pty Ltd (WSP) was engaged by Richard Crookes Constructions (RCC) to undertake test pitting works at a site undergoing redevelopment at 14-28 Cullen Avenue, Jordan Springs NSW 2747.

WSP had previously undertaken sampling of stockpiled material at the site, with a sample from one stockpile (SP08) returning a positive asbestos result.

As a result of the positive asbestos detection, RCC engaged WSP to prepare an Unexpected Finds Protocol (UFP) to implement should further suspected asbestos containing materials be found.

2. UNEXPECTED FINDS PROTOCOL

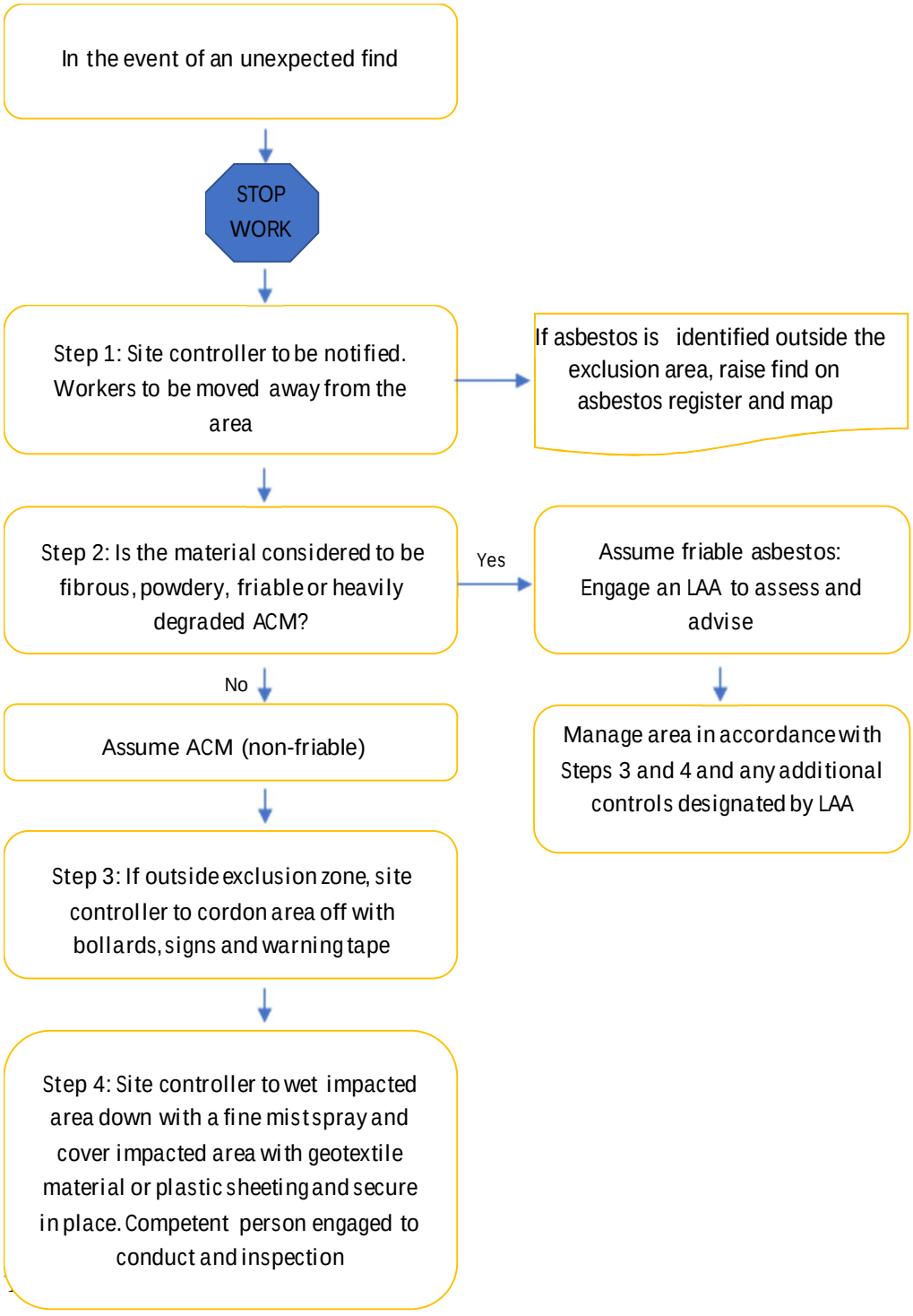
It is acknowledged that previous investigations of the site have been undertaken to assess the identified contaminants of potential concern in selected parts of the site. However, ground conditions between previous sampling points may vary, and further hazards may arise from unexpected sources and/or in unexpected locations during site works.

As a precautionary measure to ensure the protection of the workforce and surrounding community, should additional asbestos be identified (or any other unexpected potentially hazardous substance), the procedure summarised in the below flow chart is to be followed.

Level 27, 680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001

Tel: +61 2 9272 5100
Fax: +61 2 9272 5101
www.wsp.com

Flow Chart 1: UFP Protocol



3. CLOSING

Should you have any questions, relating to this protocol, please contact the undersigned.

Yours sincerely

Nicholas Gilmour
Senior Environmental Consultant

APPENDIX L – UNEXPECTED FINDS PROTOCOL FOR ABORIGINAL & NON-ABORIGINAL HERITAGE

Jordan Springs Public School, Jordan Springs: Aboriginal Heritage Management Plan

FINAL REPORT

Prepared for TSA Management

16 August 2019

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Document information

Report to:	TSA Management
Prepared by:	Anthea Vella
Biosis project no.:	30341

File name: 30341.30325.Jordan.Springs.PS.AHMP.FIN.201907016

Citation: Biosis (2019). Jordan Springs Public School: Aboriginal Heritage Management Plan. Report for TSA Management. Author: A Vella. Biosis Pty Ltd, Newcastle. Project no. 30341.

Document control

Version	Internal reviewer	Date issued
Draft version 01	Taryn Gooley	10/07/2019
Final version	Taryn Gooley	16/08/2019

Acknowledgements

Biosis gratefully acknowledges the contributions of the following people and organisations in preparing this report:

- TSA Management: Jacqueline Sellen.
- Richard Crookes Constructions: Isaac Pinkerton.
- Registered Aboriginal Parties.

Biosis staff involved in this project were:

- Lucy Wilson (mapping).

Contents

Tables

Figures

Glossary

ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information System
AHMP	Aboriginal Heritage Management Plan
AR	Archaeological report
Consultation guidelines	*Aboriginal Cultural Heritage Consultation Requirements for Proponents*
DP	Deposited Plan
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection Biodiversity Conservation Act 1999*
NPW Act	*National Parks and Wildlife Act 1974*
OEH	Office of Environment and Heritage (now Department of Planning Industry and Environment)
DPIE	Department of Planning Industry and Environment
RAP	Registered Aboriginal party
Study area	Defined as Lot 22, DP 1194338
The Code	*The Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*
The project	The construction of Jordan Springs Public School

1 Introduction

This Aboriginal Heritage Management Plan (AHMP) has been developed in order to manage impacts to Aboriginal heritage during the construction of Jordan Springs Public School.

1.1 Project background

Biosis Pty Ltd (Biosis) conducted an Aboriginal Cultural Heritage Assessment (ACHA) and archaeological report (AR) to accompany an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD 18_9354) for the new Jordan Springs Public School at 14-28 Cullen Avenue, Jordan Springs (the study area) (Figure 1 and Figure 2).

The ACHA and AR were undertaken in accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH 2011), *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010a) (the Code) and *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010b) (the consultation guidelines). The assessment included a field survey and a review of background resources including soil landscapes, geology, hydrology and past reports and site records to inform predictive statements about the likelihood of Aboriginal heritage sites to occur within the study area.

The assessments have been included in the EIS as:

- Jordan Springs Public School, Jordan Springs: Aboriginal Cultural Heritage Assessment (Biosis Pty Ltd 2019a).
- Jordan Springs Public School, Jordan Springs: Archaeological report (Biosis Pty Ltd 2019b).

1.2 Study area

The study area is located approximately 4.2 kilometres north-east of Penrith and approximately 47 kilometres north-west of the Sydney CBD (Figure 1and Figure 2). It encompasses 2.99 hectares of private land.

The study area is within the:

- Penrith Local Government Area (LGA).
- Parish of Londonderry.
- County of Cumberland.

The study area consists of Lot 22, DP 1194338, and is bounded as follows:

- Lots 12 and 42-53, DP 1217814 on its northern side.
- Lot 23, DP 1194338 on its eastern side.
- 14-28 Cullen Avenue and Lots 6 and 7, DP 1176874 on its southern side.
- Lakeside Parade on its western side.

1.3 General scope of works

The proposed development consists of the Jordan Springs Public School at 14-28 Cullen Avenue, Jordan Springs NSW (Figure 1 and Figure 2) (the project). The new school will have capacity for 1,000 students and 70 staff members (Figure 3). The project involves the following elements:

- A total of 42 collaborative teaching spaces located in a series of two storey buildings.
- A two storey library and special programs building.
- A two storey administration / staff hub and canteen building.
- A single storey school hall and out of school hours centre.
- Covered outdoor learning area.
- Sports courts, covered walkways and interconnected outdoor spaces.
- Parking facilities.

The Department of Planning Industry and Environment (DPIE) (formerly Office of Environment and Heritage) has recommended that an AHMP be developed in consultation with registered Aboriginal parties (RAPs) for the project in order to reduce the risk of impacting Aboriginal heritage and to provide guidance on the appropriate protocol to follow if unanticipated Aboriginal objects are identified.

1.4 Purpose and objectives

The purpose of this AHMP is to describe how Aboriginal heritage values will be protected and managed by TSA Management during the construction of the project. The key objective of the AHMP is to ensure that impacts to Aboriginal heritage are minimised and within the scope permitted by the project approval. Specific objectives include:

- Baseline mapping of any Aboriginal heritage items within and adjoining the development disturbance areas (if any).
- A description of the measures that would be implemented for:
  - Protecting all Aboriginal heritage sites outside the development disturbance area.
  - A contingency plan and reporting procedure if Aboriginal heritage items outside the approved disturbance area are damaged.
  - Minimising and managing the impacts of the development on heritage items within the development footprint (if any).
  - Managing the discovery of any Aboriginal objects or human remains during the development.
  - A contingency plan and reporting procedure if:
    - Previously unidentified Aboriginal objects are found.
    - Aboriginal skeletal material is discovered.
- Cultural heritage induction material to ensure workers on site receive suitable heritage inductions prior to carrying out any development on site, and that records are kept of these inductions.
- An outline of the ongoing consultation process with registered Aboriginal parties during the implementation of the plan.

- An outline of a program to monitor and report on the effectiveness of these measures and any heritage impacts of the project.
- A statement for management of unidentified finds.

This AHMP should be read in conjunction with the following documents:

- Jordan Springs Public School, Jordan Springs: Aboriginal Cultural Heritage Assessment (Biosis Pty Ltd 2019a).
- Jordan Springs Public School, Jordan Springs: Archaeological report (Biosis Pty Ltd 2019b).

1.5 Aboriginal Heritage Management Plan outcomes

The outcomes of the AHMP and their location within this document are described below in Table 1.

Table 1 Aboriginal Heritage Management Plan outcomes

Part	Description	Location within AHMP
(a)	Be prepared by a suitably qualified and experienced person.	Section 1.6
(b)	Be prepared in consultation with DPIE and registered Aboriginal parties.	Appendix B
(c)	Include updated baseline mapping of the heritage items within and adjoining the development disturbance area.	Figure 3 and Figure 4
(d)	A chance finds procedure developed in consultation with DPIE and registered Aboriginal parties for the management of any previously unidentified Aboriginal heritage finds.	Section6.2.4 and 6.2.5
(e)	Include a description of the measures that would be implemented for: • Protecting Aboriginal heritage sites outside the development disturbance area.	Section 6.2.2
	• A contingency plan and reporting procedure if Aboriginal heritage items outside the approved disturbance area are damaged.	Section 6.2.3
	• Ensuring workers on site receive suitable heritage inductions prior to carrying out any development on site, and that records are kept of these inductions.	Section 6.2.1
	• Ongoing consultation with registered Aboriginal parties during the implementation of the plan.	Section 3, and 6.2.6
(f)	A program to monitor and report on the effectiveness of these measures and any heritage impacts of the project.	Section 6.2.7

1.6 Authors

This AHMP was prepared by Anthea Vella, Heritage Research Assistant at Biosis. This AHMP has been reviewed by Taryn Gooley NSW Heritage Team Leader at Biosis.

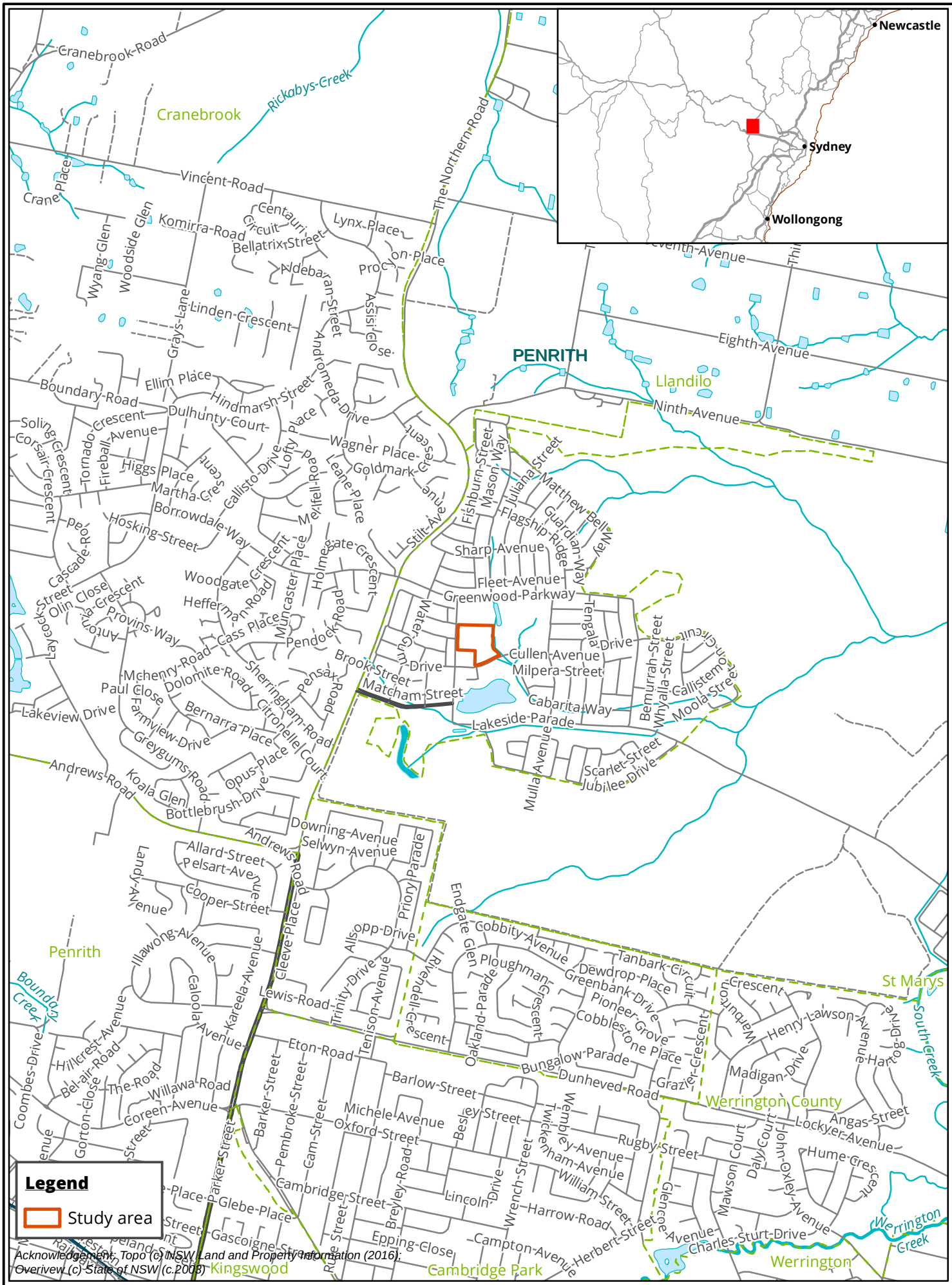

Figure 1 Location of the study area

Acknowledgement: Topo (c) NSW Land and Property Information (2016); Overivew (c) State of NSW (c.2008)

Matter: 30325
Date: 08 July 2019,
Checked by: CLA, Drawn by: LW, Last edited by: lwilson
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0 250 500 750 1,000
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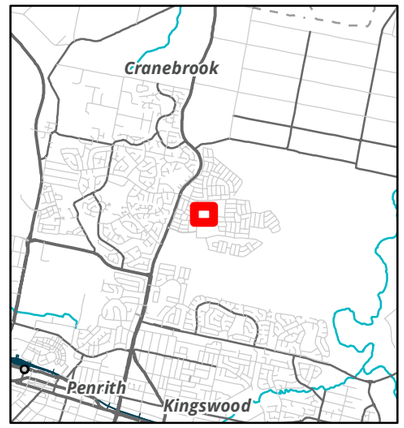
Scale 1:25,000 @ A4, GDA 1994 NSW Lambert



Legend

Study area

Figure 2 Study area detail

0 10 20 30 40 50

Metres

Scale: 1:1,000 @ A3

Coordinate System: GDA 1994 NSW Lambert

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Date: 08 July 2019,
Checked by: CLA, Drawn by: LW, Last edited by: lwilson
Location:P:\30300s\30325\Mapping
30325_F2_StudyArea

1 SITE AND ROOF PLAN
1 : 500

General Notes:
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2. Drawings to be printed in colour.
3. Do not scale drawings. Dimensions govern.
4. All dimensions are in millimetres unless noted otherwise.
5. All dimensions shall be verified on site before proceeding
6. Any areas indicated on this sheet are approximate and indicative only.

Amendments

Issue	Description	Date
A	FOR COORDINATION	27.03.2019
B	PROGRESS ISSUE	10.05.2019
C	VEHICULAR CROSSINGS INDICATED	13.05.2019
D	PEDESTRIAN CROSSING ADDED	16.05.2019
E	TRAFFIC ISLAND ADDED	17.05.2019
F	GENERALLY AMENDED	22.05.2019
G	SSD SUBMISSION	31.05.2019
H	DRAFT DETAILED DESIGN	14.06.2019
I	DETAILED DESIGN	21.06.2019

DRAWING NOTES

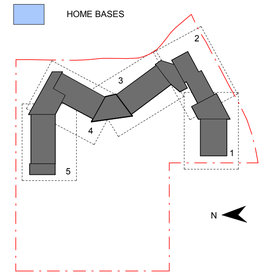
- Refer to **COM-AR-9010** for legend of all symbols and codes.
- Refer to **COM-AR-9011/9012** for all drawing notes.

LEGEND

- Site boundary
- Line of bushfire defendable space
- Existing neighbouring buildings
- Main pedestrian entry
- Vehicular entry
- * Administration Building entry

ZONES

- ADMIN / LIBRARY / CANTEEN
- HALL / OSHC
- HOME BASES



NOTES - SITE PLANS

1. Refer Landscape Achitect's documentation for planting, fencing, and outdoor furniture equipment details.
2. Refer Civil Engineer's documentation for details of site and ground works, including pavements and retaining walls.
3. Refer Bushfire Report for requirements and details for Defendable Space.

0m 5m 10m 20m 30m N

Contractor
RICHARD CROOKES CONSTRUCTIONS

Client
NSW GOVERNMENT Education

GROUP GSA
Group GSA Pty Ltd ABN 76 002 113 779
Level 7, 80 William St East Sydney NSW
Australia 2011
www.groupgsa.com

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architecture interior design urban design landscape
nom architect M. Sheldon 3990

Project Title
JORDAN SPRINGS PUBLIC SCHOOL

Drawing Title
PROPOSED SITE AND ROOF PLAN

Scale @ A1	1 : 500
Drawing Created (date)	30/05/2019
Drawing Created (by)	DN
Plotted and checked by	RF
Verified	JS
Approved	MB

Project No 180646 | Drawing No JS-AR-1100 | Issue I

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2 Environmental requirements

The following section outlines the environmental requirements of the project including relevant legislation and guidelines that have been used to assist in the formulation of this AHMP.

2.1 Relevant legislation and guidelines

Legislation relevant to heritage management includes:

- *Environmental Planning and Assessment Act 1979* (EP&A Act).
- *National Parks and Wildlife Act 1974* (NPW Act).

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

- *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010b).
- *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (2013).
- *The Code Of Practice for the Investigation of Aboriginal Objects in New South Wales 2010* (DECCW 2010a).

2.2 Commitment to cultural heritage preservation

According to Allen and O'Connell (2003), Aboriginal people have inhabited the Australian continent for the last 50,000 years. In NSW, according to Bowler *et al* (2003), Aboriginal people have occupied the land for over 42,000 years. However, preliminary evidence presented by (Biosis Pty Ltd 2016) from a subsurface testing program in South-Western NSW suggests Aboriginal people may have occupied the semi-arid zone of the region for 50,000 years.

Without being part of the Aboriginal culture, and the productions of this culture, it is not possible for non-Aboriginal people to fully understand their meaning to Aboriginal people – only to move closer towards understanding this meaning with the help of the Aboriginal community. Similarly, definitions of Aboriginal culture and cultural heritage without this involvement constitute outsider interpretations.

With this preface, Aboriginal cultural heritage broadly refers to things that relate to Aboriginal culture and hold cultural meaning and significance to Aboriginal people (DECCW 2010a, p.3). There is an understanding in Aboriginal culture that everything is interconnected. In essence, Aboriginal cultural heritage can be viewed as potentially encompassing any part of the physical and/or mental landscape, that is, 'Country' (DECCW 2010a, p.iii).

Aboriginal people's interpretation of cultural value is based on their *"traditions, observance, lore, customs, beliefs and history"* (DECCW 2010a, p.3). The things associated with Aboriginal cultural heritage are continually and actively being defined by Aboriginal people (also see DECCW 2005, p.1, DECCW 2010, p.3). These things can be associated with traditional, historical or contemporary Aboriginal culture (also see DECCW 2005, p.1, DECCW 2010, p.3).

2.2.1 Tangible Aboriginal Cultural Heritage

Three categories of tangible Aboriginal cultural heritage may be defined:

- Things that have been observably modified by Aboriginal people.

- Things that may have been modified by Aboriginal people but no discernible traces of that activity remain.
- Things never physically modified by Aboriginal people (but associated with Dreamtime Ancestors who shaped those things).

2.2.2 Intangible Aboriginal Cultural Heritage

Examples of intangible Aboriginal cultural heritage would include memories of stories and 'ways of doing', which would include language and ceremonies (DECCW 2010b, p.3).

2.2.3 Statutory

Currently Aboriginal cultural heritage, as statutorily defined by the NPW Act, consists of objects and places.

Aboriginal objects are defined as:

> *"any deposit, object or material evidence…relating to the Aboriginal habitation of the area that comprises NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains".*

Aboriginal places are defined as a place that is or was of special Aboriginal cultural significance. Places are declared under section 84 of the NPW Act.

2.2.4 Values

Aboriginal cultural heritage is broadly valued by Aboriginal people as it is used to define their identity as both individuals and as part of a group (also see DECCW 2005, p.1,3, DECCW 2010, p.iii). More specifically it is used:

- To provide a:
  - "*connection and sense of belonging to Country*" (DECCW 2010b, p.iii).
  - Link between the present and the past (DECCW 2010b, p.iii).
- As a learning tool to teach Aboriginal culture to younger Aboriginal generations and the general public (DECCW 2010b, p.3).
- As further evidence of Aboriginal occupation prior to European settlement for people who do not understand the magnitude to which Aboriginal people occupied the continent (also see DECCW 2010, p.3).

The NSW government and all of its entities are committed the protection and preservation of Aboriginal and non-Aboriginal cultural heritage in NSW.

3 Consultation

3.1 Aboriginal consultation undertaken as part of the project approval

Consultation and collaboration with RAPs has been integral to the assessment and management of Aboriginal cultural heritage for the project. Consultation undertaken to date is outlined in the ACHA completed for the project (Biosis Pty Ltd 2019a), and Appendix B below. Aboriginal community consultation has been undertaken in accordance with the consultation requirements (DECCW 2010b).

3.2 Ongoing Aboriginal consultation

Ongoing consultation between TSA Management and RAPs regarding the management of Aboriginal cultural heritage associated with the project will continue throughout the life of this project.

A copy of the draft AHMP was sent to all RAPs for the project on 15 July 2019. As per the consultation guidelines, RAPs were given 28 days to review the document and provide comments. The following RAPs supported the AHMP but did not have any comments:

- Wailwan Aboriginal Digging Group
- Didge Ngunawai Clan
- Widescope Indigenous Group

Kamilaroi Yankuntjatjara Working Group

Phil Khan responded to Biosis via phone and requested a hard copy of the AMHP, which was sent out to Phil Kahn on 16/07/2019. Phil commented later via email on 24/07/2019 on behalf of Kamilaroi Yankuntjatjara Working Group stating that Jordan Springs is a highly sensitive area for Aboriginal people. He concluded by agreeing and offering support for the AHMP.

Aboriginal Archaeology Service

Andrew Williams responded by email on 24/07/2019. In this email he agreed with the recommendations and would like to see any artefacts collected placed in a museum, local government building or local library for public display.

No comments were received from A1 Indigenous Services, Amanda Hickey Cultural Services; Barking Owl Aboriginal Corporation; Barraby Cultural Services; Butucarbin Aboriginal Corporation; Corroborree Aboriginal Corporation; Darug Aboriginal Land Care; Darug Boorooberongal Elders Aboriginal Corporation; Darug Land Observations; Darug Tribal Aboriginal Corporation; Deerubbin Local Aboriginal Land Council; Yulay Cultural Services; or Yurrandaali Cultural Services

Ongoing consultation for the project will consist of the following actions:

- Notification of the commencement of the AHMP.
- Notification of the completion of the AHMP.
- Notification of and subsequent outcomes of any unexpected Aboriginal finds.
- Review of the AHMP.

In the event of an unexpected Aboriginal heritage find TSA Management will consult with registered Aboriginal parties regarding the management of Aboriginal heritage items in line with the processes detailed in section 6.2.

4 Existing environment

The following sections summarise what is known about Aboriginal heritage within and adjacent to the study area based on information provided in:

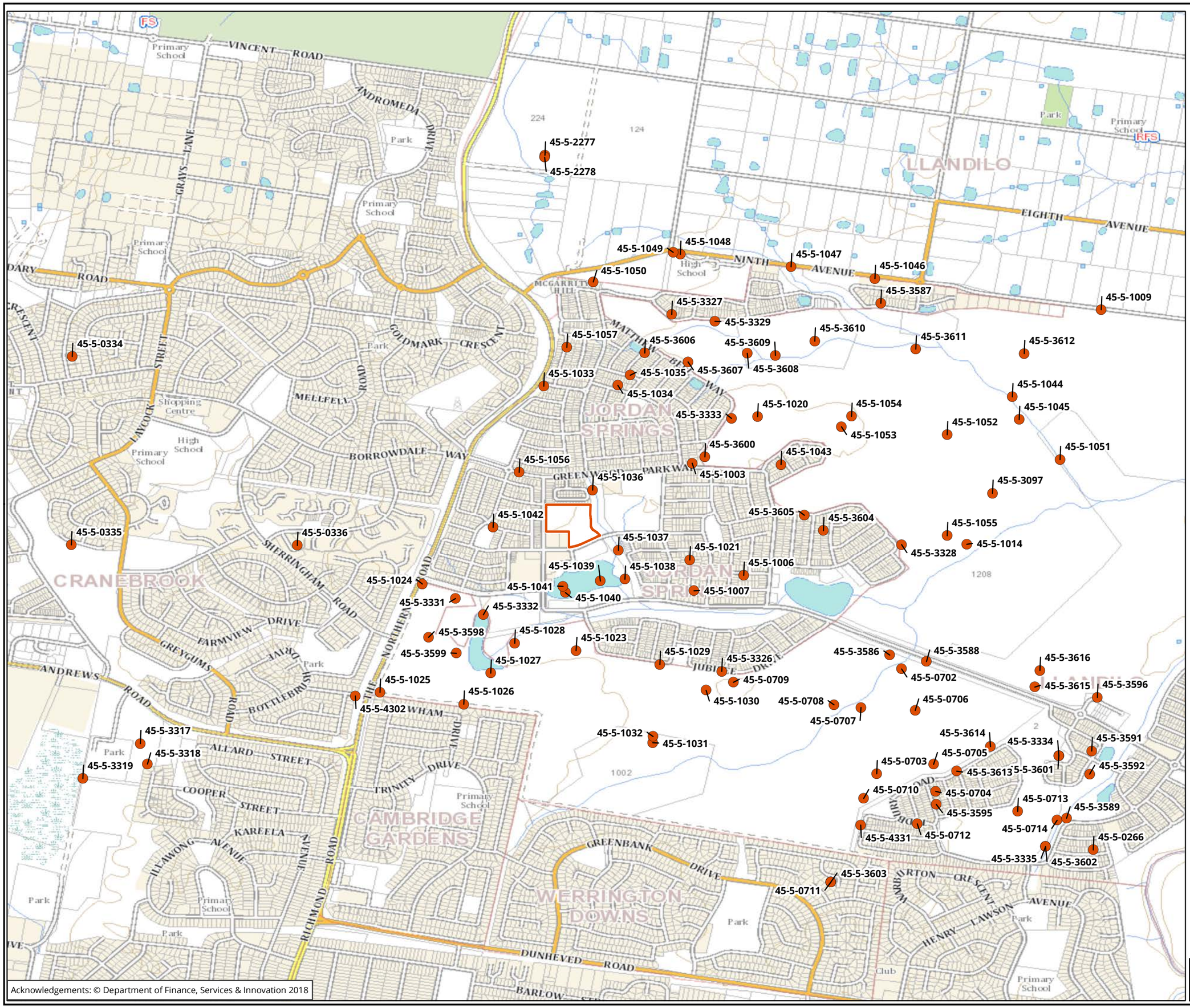
- Jordan Springs Public School, Jordan Springs: Aboriginal Cultural Heritage Assessment (Biosis Pty Ltd 2019a).
- Jordan Springs Public School, Jordan Springs: Archaeological Report (Biosis Pty Ltd 2019b).

4.1 Aboriginal cultural heritage

Aboriginal cultural heritage values associated with the project were subject to assessment through the following processes:

- Literature and database review.
- Archaeological survey.
- Aboriginal community consultation.
- Assessment of significance and proposed impacts.

Based upon these tasks there were no Aboriginal heritage sites identified within the development area, and the site was assessed as holding low archaeological potential (Figure 4 and Figure 5). The closest recorded site, AHIMS# 45-5-1036, is located approximately 100 metres to the north of the study area (see Figure 4).



Acknowledgements: © Department of Finance, Services & Innovation 2018

Legend

- Study area
- AHIMS record

Figure 4 AHIMS search results in the vicinity of the study area

NOT TO BE MADE PUBLIC

0 175 350 525 700 875

Metres
Scale: 1:17,000 @ A3
Coordinate System: GCS GDA 1994

biosis

N

Matter: 28419
Date: 08 July 2019,
Checked by: lwilson, Generated by: lwilson
Location:P:\30300s\30325\Mapping
30325_F4_AHIMS.mxd

Legend

Study area

Archaeological potential

Low

Figure 5 Assessment of archaeological potential

0 10 20 30 40 50

Metres

Scale: 1:1,000 @ A3

Coordinate System: GDA 1994 NSW Lambert

N

Acknowledgements: Basemap © Land and Property Information 2016

Matter: 30325
Date: 08 July 2019,
Checked by: CLA, Drawn by: LW, Last edited by: lwilson
Location:P:\30300s\30325\Mapping
30325_F5_ArchPotential

5 Impacts to Aboriginal heritage

The key construction activities and the associated impacts to Aboriginal heritage values were identified and assessed during the ACHA process. The consequence and likelihood of each activity's impact on Aboriginal heritage values is detailed below.

5.1 Aboriginal heritage impacts

The potential impacts on Aboriginal heritage include:

- Direct impacts and disturbance to the entire site or the majority of a site containing Aboriginal objects due to the construction of the project. This impact can be complete or partial.
- Indirect impacts to Aboriginal objects or cultural values, such as from development related changes to the landscape or scenic context of a site or item.

As outlined in the Jordan Springs Public School ACHA and AR (Biosis Pty Ltd 2019a, 2019b), the entire study area will be subject to impact through the proposed works. The study area does not contain any recorded Aboriginal sites and was assessed with low archaeological potential due to disturbances observed in the study area following the field survey.

6 Mitigation measures

6.1 Construction related measures

Specific mitigation measures to address impacts on Aboriginal heritage are outlined in Table 2. Where required, further details of the proposed mitigation measures are provided in Section 6.2

Table 2 Construction related measures

Strategy	Requirement	Personnel
1	Heritage inductions to be completed as part of the overall site induction	Project Manager/ Archaeologist
2	Protection of Aboriginal heritage sites outside of the development disturbance area	Project Manager/ Archaeologist
3	Procedure to follow in the event of unexpected Aboriginal finds	Construction contractor
5	Procedure to follow in the event of the discovery of human remains	Construction contractor

6.2 Heritage protection management strategies

6.2.1 Strategy 1: Heritage inductions and tool box talks

All contractors and staff involved in ground breaking activities on site will undergo site induction training (or be supervised by a staff member that has had the relevant training) relating to Aboriginal heritage management issues. The induction training will address elements related to heritage management including:

- Requirements of this AHMP and relevant legislation.
- Roles and responsibilities for heritage management.
- Proposed heritage management and protection measures.
- Basic identification skills for Aboriginal artefacts and human remains.
- Procedure to follow in the event of an unexpected heritage item find during construction works.
- Procedure to follow in the event of discovery of human remains during construction works.
- Penalties and non-compliance with this AHMP.

Training records for all contractors and staff involved in ground breaking activities will be kept and maintained in a register detailing names, dates, content and type of training undertaken. This AHMP should be kept on site at all times and be readily accessible. The requirements of the AHMP and the unexpected finds protocols should be incorporated into tool box talks, and the mapping presented in this report should be reviewed and management measures assessed to ensure no impacts beyond the project approval are likely to take place.

6.2.2 Strategy 2: Protection of Aboriginal heritage sites outside the development disturbance area

The boundaries of the development disturbance will be clearly marked with fencing to ensure that no impacts can occur to Aboriginal sites that may be located outside of the areas assessed as part of the ACHA.

6.2.3 Strategy 3: Contingency plan if Aboriginal heritage items outside the approved disturbance area are damaged

In the event that Aboriginal heritage items outside of the approved disturbance area are damaged, TSA Management must advise DPIE immediately. DPIE can be contacted through the Environment Line on 131 555 as soon practicable. An appropriate no go zone area must be established until the area can be inspected and advice sought from DPIE on how to proceed.

6.2.4 Strategy 4: Minimising and managing the impacts of the development on heritage items within the development footprint (if any) and the procedure to follow in the event of unexpected Aboriginal finds

The ACHA conducted by Biosis (Biosis Pty Ltd 2019a) did not identify any Aboriginal sites or objects within the development area.

Should any Aboriginal objects be identified during the course of the development works, the following process should be followed:

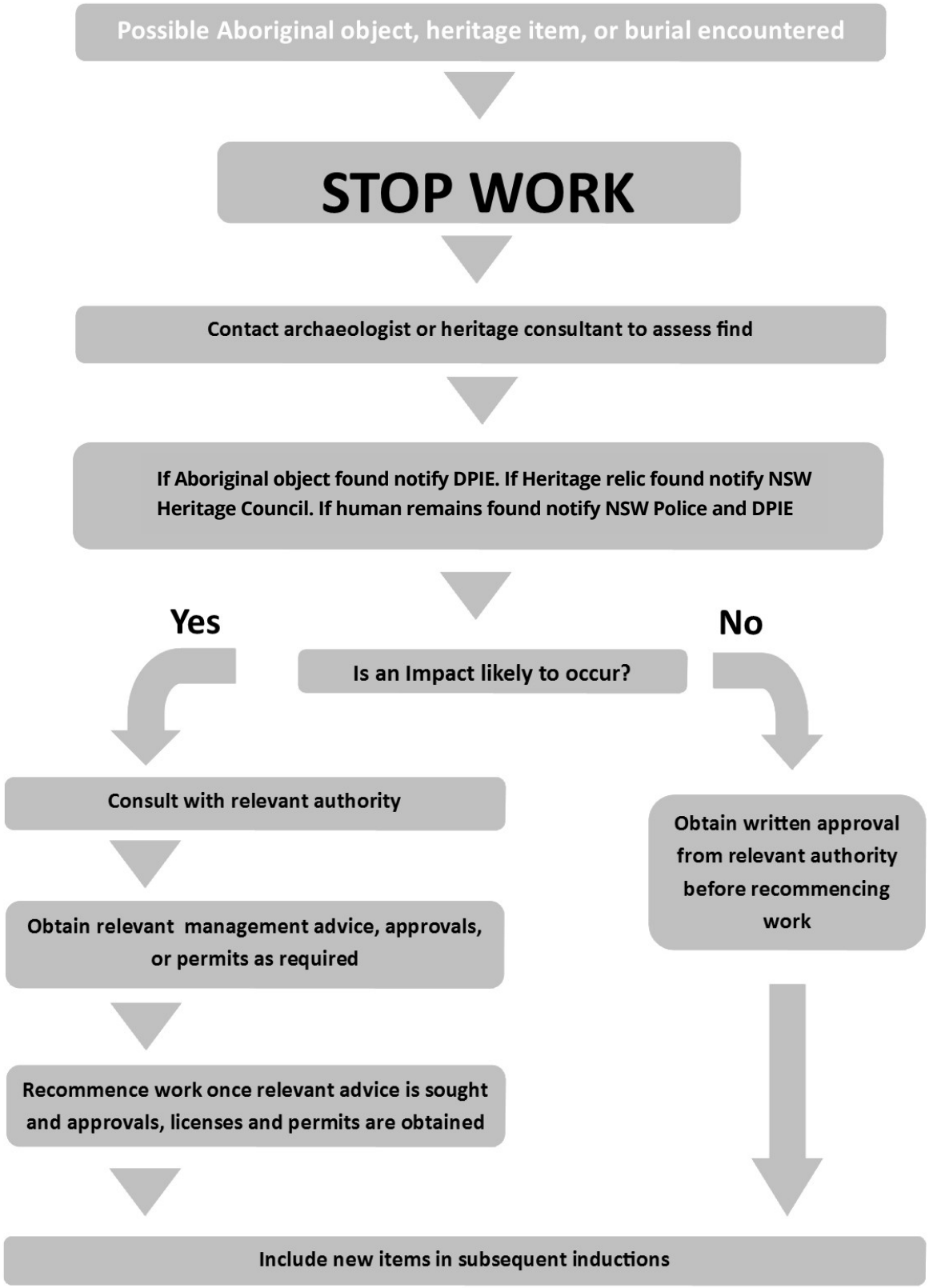
- Works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist.
- The archaeologist will investigate and assess the find to determine the nature, extent and significance of the find. This will enable recommendations to be provided on how work can proceed and whether any further archaeological assessment is required. The archaeologist must supply written advice to the Project Manager providing:
  - A determination of whether the find is an Aboriginal object.
  - Advice on how the project is to proceed and whether the establishment of any no-go areas is necessary.
  - Recommendations regarding further works that may be required and timeframe for completion of these works.
- Any Aboriginal finds will be registered on the Aboriginal Heritage Information Management System (AHIMS). Where sites are impacted, a site impact form will be completed and lodged with AHIMS prior to impact.
- Create a no-go area around the find based upon the advice of the archaeologist.
- The archaeologist's written advice will be supplied to DPIE, the secretary and RAPs for their review. This will include a statement concerning the find, management measures implemented and notification of any further works arising. RAPs are to be involved in any further assessments or works as required. Any comments made by DPIE, the secretary and registered Aboriginal parties will be incorporated into the written advice prior to finalisation and works proceeding.

Should any previously unidentified Aboriginal finds be identified, this will trigger a review of this AHMP in accordance with Section 9. Please note that Appendix A contains guidelines around the identification of Aboriginal objects and site types.

6.2.5 Strategy 5: Procedure to follow in the event of the discovery of human remains

If any suspected human remains are discovered during the proposed works, all activity in the area must cease. The following process must be undertaken:

- Immediately cease all work at that location and not further move or disturb the remains.
- Notify the NSW Police, and the DPIE Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location.
- Establish an appropriate no-go area. This will need to be established in consultation with NSW Police, DPIE and if necessary a qualified archaeologist.
- Works will not be able to recommence within the location of the find until confirmation from NSW Police and DPIE is obtained. If the remains are confirmed as not being human then works may recommence. In the event that remains are human then consultation with NSW Police, DPIE and the registered Aboriginal parties to establish a plan of management will be required.
- Works in the vicinity of the remains will only be able to recommence once the plan of management has been established and approval has been obtained from all relevant parties.
- Should any human remains be identified, this will trigger a review of this AHMP in accordance with Section 9.


Possible Aboriginal object, heritage item, or burial encountered
STOP WORK
Contact archaeologist or heritage consultant to assess find
If Aboriginal object found notify DPIE. If Heritage relic found notify NSW Heritage Council. If human remains found notify NSW Police and DPIE
Yes
No
Is an Impact likely to occur?
Consult with relevant authority
Obtain relevant management advice, approvals, or permits as required
Recommence work once relevant advice is sought and approvals, licenses and permits are obtained
Obtain written approval from relevant authority before recommencing work
Include new items in subsequent inductions

6.2.6 Strategy 6: Ongoing consultation with registered Aboriginal parties

Consultation with RAPs will be continued throughout the life of this project as outlined in Section 3 above.

6.2.7 Strategy 7: Monitoring and reporting

A program to monitor and report on the effectiveness of the measures and any heritage impacts will consist of reassessing the above listed strategies following the completion of works.

Upon completion of the works, a short report will be prepared, documenting:

- The effectiveness of the AHMP measures.

A copy of the report will be provided to RAPs for the project and the DPIE Greater Sydney Branch by email to gs.ach@environment.nsw.gov.au.

7 Compliance management

7.1 Roles and responsibilities

The TSA Management Project Manager is responsible for ensuring all activities in this manual are carried out prior to and during construction, along with reporting any incidents to DPIE.

The construction contractor must comply with the activities outlined in this manual and any deviation to activities outlined in this manual must be reported to the TSA Management Project Manager.

Table 3 Roles and responsibilities and contact details

Name	Role / responsibility	Contact details
TSA Management	Project Manager	TBA
OEH Greater Sydney Planning Team	Regulator/Compliance	131 555 gs.ach@environment.nsw.gov.au
Taryn Gooley	Biosis Heritage Team Leader/project archaeologist	(02) 4911 4041 0407 980 961

7.2 Record keeping

The following records must be kept by the archaeologist, construction contractor and the TSA Management Project Manager:

- Any breaches of the approval conditions and/or this AHMP, and the incident report provided to DPIE.

7.3 Incidents

If an incident occurs that results in actual or potential impacts on known heritage items and/or archaeological items that are discovered unexpectedly, DPIE will be informed as soon as practicable.

The report to DPIE should also be sent to the TSA Management Project Manager and the archaeologist and include the following information:

- Any contravention to the strategies outlined in the AHMP.
- The nature of the incident.
- The actual or likely impact of the incident on Aboriginal objects and/or Aboriginal places.
- The nature and location of the Aboriginal objects and/or places, referring to and providing maps and photos where appropriate.
- The measures which have been taken or will be taken to prevent a recurrence of the incident.

7.4 Reporting

Reporting requirements and responsibilities of heritage related issues should be documented as outlined in Table 4 below:

Table 4 Reporting roles and responsibilities

Action	Responsibility
A short summary of the report	Archaeologist
Describe any ongoing consultation with or involvement of RAPs	Project Manager/Archaeologist
Provide details of the Aboriginal objects which were fully or partially harmed in the course of undertaking the construction	Construction contractor/Project Manager/Archaeologist
Detail any community collection of Aboriginal objects undertaken by the RAPs	Archaeologist
Comment on the effectiveness of any mitigation measures that were implemented	Construction contractor
Comment on the effectiveness of any mitigation plan which was in place	Construction contractor
If any Aboriginal objects were moved to a temporary storage location, a description of the nature and types of Aboriginal objects which are now at that location	Archaeologist
Detail the results of any analysis of Aboriginal objects	Archaeologist
Detail the long term management arrangements for any Aboriginal objects	Archaeologist

8 Training and Awareness

The construction contractor must comply with all TSA Management WHS manuals and procedures.

Prior to the commencement of construction, the construction contractor must undertake a cultural heritage induction which will include the following:

- A description of Aboriginal cultural heritage in Australia.
- A description of Aboriginal cultural heritage in the Sydney region.
- A description of the tangible and intangible aspects of Aboriginal heritage and why it is important.
- An overview of the *National Parks and Wildlife Act 1974* and the *Heritage Act 1977* and the implications and fines applicable for breaching the Acts.
- A general overview of cultural heritage site types.
- The process for reporting unknown cultural heritage sites.
- The process for reporting damage to cultural sites.
- The process for reporting human remains.

9 Review and improvement

9.1 Continuous improvement

Opportunities for the improvement of this AHMP will be found through the ongoing evaluation of environmental management performance against environmental policies, objectives and targets. The purpose of this is to:

- Identify opportunities for the improvement of environmental management and performance.
- Determine the cause or causes of non-conformances and deficiencies.
- Development and implementation of a plan of corrective and preventative actions to address any non-conformances and deficiencies in this AHMP.
- Corroborate the efficiency of the corrective and preventative actions.
- Document any changes in procedures resulting from process improvement.
- Revise the objectives and targets of this AHMP accordingly.

9.2 AHMP update and amendment

This will occur as needed. A copy of the updated AHMP and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure. The AHMP will also be updated and resubmitted for approval in the event a previously unidentified heritage item is found.

References

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DECCW 2005, 'Draft Guidelines for Aboriginal Cultural Impact Assessment and Community Consultation'.

DECCW 2010a, *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*, Department of Environment and Climate Change, Sydney NSW.

DECCW 2010b, *Aboriginal Cultural Heritage Consultation Requirements for Proponents*, Department of Environment and Climate Change, Sydney NSW.

OEH 2011, *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW*, Office of Environment and Heritage.

Appendix A: Identifying Aboriginal objects and site types

Isolated stone artefact

Stone artefacts are any that item of stone material made or modified by people, including any debris left behind when such tools were made. Materials used to make stone artefacts may be found locally, or traded across long distances.

Stone artefact scatter

Stone artefact scatter sites comprise groups of stone tools, debris and the tools used in manufacture (i.e. stone anvils and hammerstones). Artefact scatters can range from high-density concentrations of flaked stone and ground stone artefacts to sparse, low-density 'background' scatters and isolated finds.

Shell midden

Shell middens are the remains of food production and processing areas, where people would have sat down to eat, cook or prepare food. Shell middens occur commonly in coastal areas, however they also occur inland watercourses where freshwater mussels and other edible mollusc species may be present.

Modified tree

A modified tree is any tree from which the back has been cut or harvested for the manufacture of containers (coolamon), canoes, shields, weapons and medicines. Scarring also occurred where toeholds were cut to allow people to climb trees to hunt possums, reptiles, birds or harvest wild honey. A number of modified trees have been identified within the project area.

Burial

Burials comprise any traditional Aboriginal human skeletal remains, intact or fragmentary. Burials are common within the project area. If any suspected human remains are encountered, the procedure set out in Section 6.2.5 must be followed.

Aboriginal gathering and resource location

Resource gathering locations are places where food, medicines and plant material used as twine, in weaving or tool making by Aboriginal people exist. Many such locations are still accessed by contemporary Aboriginal people.

Hearth

A hearth is the remains of a campfire, an oven or other food cooking and processing areas. Hearths commonly contain baked clay, termite mound fragments broken up and used as 'heat retainers', small stones used in cooking, charcoal, burnt bone, shell and other food remnants. Hearths are moderately common within the study area.

Appendix B: Aboriginal consultation

Consultation with the Aboriginal community has been undertaken in accordance with the consultation requirements as detailed below. A consultation log of all communications with RAPs is provided in Appendix 1 of the ACHA report and correspondence relating to this AHMP is detailed below.

A project update to RAPs was sent on 4 July 2019, which notified RAPs that the ACHA has been submitted to DPIE for approval, and that DPIE had recommended an AHMP be developed for the project.

A copy of the draft AHMP was sent to all RAPs on 15 July 2019 (Table 5).

The outcomes of the consultation process are outlined below and detailed responses are included in Table 6.

The following RAPs supported the AHMP but did not have any comments:

- Wailwan Aboriginal Digging Group
- Didge Ngunawai Clan
- Widescope Indigenous Group

Kamilaroi Yankuntjatjara Working Group

Phil Khan responded to Biosis via phone and requested a hard copy of the AMHP, which was sent out to Phil Kahn on 16/07/2019. Phil commented later via email on 24/07/2019 on behalf of Kamilaroi Yankuntjatjara Working Group stating that Jordan Springs is a highly sensitive area for Aboriginal people. He concluded by agreeing and offering support for the AHMP.

Aboriginal Archaeology Service

Andrew Williams responded by email on 24/07/2019. In this email he agreed with the recommendations and would like to see any artefacts collected placed in a museum, local government building or local library for public display.

Table 5 AHMP mail out

Date	Organisation	Comment	Biosis action
15/07/2019	A1 Indigenous Services	Email	Draft AHMP sent for 28 day review
15/07/2019	Aboriginal Archaeology Service	Email	Draft AHMP sent for 28 day review
15/07/2019	Amanda Hickey Cultural Services	Email	Draft AHMP sent for 28 day review
15/07/2019	Barking Owl Aboriginal Corporation	Email	Draft AHMP sent for 28 day review
15/07/2019	Barraby Cultural Services	Email	Draft AHMP sent for 28 day review
15/07/2019	Butucarbin Aboriginal Corporation	Email	Draft AHMP sent for 28 day review

Date	Organisation	Comment	Biosis action
15/07/2019	Corroborree Aboriginal Corporation	Email	Draft AHMP sent for 28 day review
15/07/2019	Darug Aboriginal Land Care	Email	Draft AHMP sent for 28 day review
15/07/2019	Darug Boorooberongal Elders Aboriginal Corporation	Email	Draft AHMP sent for 28 day review
15/07/2019	Darug Land Observations	Email	Draft AHMP sent for 28 day review
15/07/2019	Darug Tribal Aboriginal Corporation	Email	Draft AHMP sent for 28 day review
15/07/2019	Deerubbin Local Aboriginal Land Council	Email	Draft AHMP sent for 28 day review
15/07/2019	Didge Ngunawal Clan	Email	Draft AHMP sent for 28 day review
15/07/2019	Wailwan Aboriginal Digging Group	Email	Draft AHMP sent for 28 day review
15/07/2019	Widescope Indigenous Group	Email	Draft AHMP sent for 28 day review
15/07/2019	Yulay Cultural Services	Email	Draft AHMP sent for 28 day review
15/07/2019	Yurrandaali Cultural Services	Email	Draft AHMP sent for 28 day review
15/07/2019	Kamilaroi Yankuntjatjara Working Group	Email	Draft AHMP sent for 28 day review

Table 6 AHMP review responses

Date	Organisation	Type of contact	Response details
15/07/2019	Wailwan Aboriginal Digging Group	Phone	Wailwan Aboriginal Digging Group has read and reviewed the AHMP and agrees with the AHMP.
16/07/2019	Kamilaroi Yankuntjatjara Working Group	Phone	Phil requested a hardcopy AHMP. Biosis sent out a hard copy to Phil on 16/07/2019.
16/07/2019	Didge Ngunawal Clan	Email	DNC replied, are happy with the methodology of this draft at Jordan Springs, and is happy with proceeding.
16/07/2019	Biosis	Mail	Biosis sent hardcopy of draft AHMP out.
24/07/2019	Kamilaroi Yankuntjatjara Working Group	Email	Phil Kahn on behalf of Kamilaroi Yankuntjatjara Working Group responded: 'Thank you for providing your Draft ACHA Management Plan for the Jorden Springs Public School, located at 14-28 Cullen Avenue, Jorden Springs NSW. Jordon Springs is a highly sensitive area for Aboriginal people therefore I agree and support your Heritage Management Plan. We look forward to working with you in the near future'.
6/08/2019	Aboriginal Archaeology Service	Email	Andrew Williams and Aboriginal Archaeology Service agrees with the recommendations made and would like to see any artefacts collected displayed for all to see in the museum, local library or local government building or reburied in close proximity of the area.
9/08/2019	Widescope Indigenous Group	Email	Steven Hickey 'Thank you, I have viewed and support the draft Aboriginal Heritage Management Plan'.
N/A	A1 Indigenous Services	N/A	No response received
N/A	Amanda Hickey Cultural Services	N/A	No response received
N/A	Barking Owl Aboriginal Corporation	N/A	No response received
N/A	Barraby Cultural Services	N/A	No response received
N/A	Butucarbin Aboriginal Corporation	N/A	No response received
N/A	Corroborree Aboriginal Corporation	N/A	No response received
N/A	Darug Aboriginal	N/A	No response received

Date	Organisation	Type of contact	Response details
	Land Care		
N/A	Darug Boorooberongal Elders Aboriginal Corporation	N/A	No response received
N/A	Darug Land Observations	N/A	No response received
N/A	Darug Tribal Aboriginal Corporation	N/A	No response received
N/A	Deerubbin Local Aboriginal Land Council	N/A	No response received
N/A	Yulay Cultural Services	N/A	No response received
N/A	Yurrandaali Cultural Services	N/A	No response received

APPENDIX M – WASTE CLASSIFICATION AND VALIDATION

RICHARD CROOKES CONSTRUCTIONS

JANUARY 2019

JORDAN SPRINGS PUBLIC SCHOOL ENVIRONMENTAL SITE ASSESSMENT 14 - 28 CULLEN AVENUE, JORDAN SPRINGS, NSW 2747

Question today
Imagine tomorrow
Create for the future

Jordan Springs Public School Environmental Site Assessment
14 - 28 Cullen Avenue, Jordan Springs, NSW 2747

Richard Crookes Constructions

WSP
Level 27, 680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001

Tel: +61 2 9272 5100
Fax: +61 2 9272 5101
wsp.com

REV	DATE	DETAILS
A	29/06/2018	Draft
B	05/11/2018	Final
C	30/01/2018	Final – re-badged

	NAME	DATE	SIGNATURE
Prepared by:	Nicholas Gilmour	30/01/2019	
Reviewed by:	Julie Porter	30/01/2019	
Approved by:	Julie Porter	30/01/2019	

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ABBREVIATIONS

ABC	Ambient background concentration
ACL	Added contaminant limit
ACM	Asbestos containing material
BTEX compounds	Benzene, toluene, ethylbenzene and xylene
CEC	Cation exchange capacity
CHCs	Chlorinated hydrocarbons
CSM	Conceptual site model
DP	Deposited Plan
DQI	Data quality indicator
DQO	Data quality objective
DSI	Detailed site investigation
EIL	Ecological investigation level
ESL	Ecological screening level
F1	TRH C_6-C_{10} minus BTEX compounds
F2	TRH >C_{10}-C_{16} minus naphthalene
F3	TRH >C_{16}-C_{34}
F4	TRH >C_{34}-C_{40}
HIL	Health investigation level
HSL	Health screening level
LEP	Local environmental plan
LGA	Local government area
mAHD	Metres Australian Height Datum
mBGL	Metres below ground level
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	*National Environment Protection (Assessment of Site Contamination) Measure 1999* (as amended 2013)
NL	Non-limiting
NSW EPA	New South Wales Environment Protection Authority
OCPs	Organochlorine pesticides

OPPs	Organophosphate pesticides
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PID	Photoionisation detector
PQL	Practical quantitation limit
PSI	Preliminary site investigation
QA/QC	Quality assurance/quality control
RPD	Relative percentage difference
SAQP	Sampling, analysis and quality plan
SOP	Standard operating procedure
SWL	Standing water level
TCLP	Toxicity characteristic leachate procedure
TEQ	Toxicity equivalent quotient
TRH	Total recoverable hydrocarbons
US EPA	United States Environmental Protection Agency
VOCs	Volatile organic compounds

EXECUTIVE SUMMARY

Richard Crookes Constructions (RCC) commissioned WSP Australia Pty Ltd (WSP) to undertake an environmental site assessment at the 14-28 Cullen Avenue, Jordan Springs NSW 2474 ('the site'). The site comprises an area of vacant land approximately 30,000 m^2 which is proposed for redevelopment. The proposed redevelopment will comprise the construction of a primary school in the south-east portion of the site, with a playing field in the northern portion of the site.

Based on the site inspection and review of documents it was concluded that potential contamination sources identified at the site included:

- uncontrolled fill materials used historically to level the site and surrounding area
- historical or recent localised filling or waste dumping
- potential asbestos containing materials (ACM) from imported materials
- possible minor leaks/spills of oil/petrol from vehicle activity on or adjacent to site
- pesticides used historically and recently to maintain the site
- urban dryland salinity associated with saline groundwater, local land clearing and changed hydrological conditions

Potential contaminants of concern associated with the above activities included:

- heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc)
- total recoverable hydrocarbons (TRH),
- benzene, toluene, ethylbenzene and xylene (BTEX),
- polyaromatic hydrocarbons (PAHs),
- organochlorine and organophosphate pesticides (OCPs/OPPs),
- polychlorinated biphenyls (PCBs)
- asbestos
- herbicides
- trinitrotoluene (TNT)
- hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
- Salinity and sodicity indicator analytes including pH, electrical conductivity (EC), chloride, sulfate and exchangeable cations

Surface soils are generally non-saline to slightly saline. This indicates that in the sites current form, site structures at the surface are unlikely to be affected by dryland urban salinity. Salinity on the site appears to generally increase with depth. Deeper structures (including footings, piles and service trenches) should have salinity resistant materials incorporated into their design.

Soils tested on the site were generally sodic in nature with sodicity increasing with depth. Sodic soils present an elevated erosion hazard on-site. Development works should be planned to accommodate for the elevated potential for erosion and sediment generation in runoff and the final development should ensure adequate protection of soils (e.g. through maintenance of vegetation coverage).

Based on the analytical results, there was negligible soil contamination impact identified on or beneath the site. Soil samples reported no contaminants of concern above the adopted health or environmental guidelines, therefore WSP are of the opinion that the site is suitable for the proposed development.

1 INTRODUCTION

1.1 BACKGROUND

WSP Australia Pty Ltd (WSP) was commissioned by Richard Crookes Construction (RCC) to undertake an environmental site assessment at the 14-28 Cullen Avenue, Jordan Springs NSW 2474 ('the site'). The location and boundaries of the property and the site are shown on Figures 1 and 2 respectively.

The site comprises an area of approximately 28,360 m^2, which is currently vacant. redevelopment is proposed for the site which will comprise the construction of a primary school in the south-east portion of the site, with a playing field in the northern portion of the site.

1.2 OBJECTIVES

The objectives of the investigation were to:

- assess the current contamination status of the site
- assess the potential risks associated with contamination (if identified) at the site, with respect to the proposed future land use as a school
- provide recommendations for potential management or remediation requirements, if required
- undertake salinity testing and provide a salinity assessment for the site.

2 SCOPE OF WORKS

Prior to the commencement of the Stage 2 detailed site investigation (DSI), a desktop review of available current and historical background information pertaining to the site was undertaken in order to establish whether there were any known environmental concerns associated with the site. The findings of this review were then used to prepare a sampling, analysis and quality plan (SAQP) outlining the proposed DSI scope of work and methodology.

The DSI works were undertaken in accordance with the SAQP, and the findings of the desktop review are provided in Section 4 of this report.

The scope of works for the DSI comprised:

- mechanical boring at 40 different locations (TP01-TP40) across the site, using a hand auger to a depth of 1.5 metres below ground level (mBGL) in conjunction with a drill rig to reach a maximum depth of 3.2 mBGL
- collection of soil samples at locations from the surface (0.0-0.1 mBGL), 0.2-0.3 mBGL, 0.4-0.5 mBGL, 0.9-1.0 mBGL, and every metre thereafter (every 0.5 m in the boreholes selected for salinity testing, including in the fill)
- collection of asbestos presence/absence samples at the same depths as the soil samples from all locations
- laboratory analysis of selected representative soil and asbestos samples for the contaminants of concern identified at the site
- preparation of this DSI report which focuses on assessing the soil contamination status of the site (including a dryland salinity assessment), assessing the need for remediation at the site, and evaluating the suitability of the site for the proposed potential future land use.

3 SITE LOCATION AND SETTING

3.1 SITE LOCATION AND IDENTIFICATION

The general site identification details are provided in Table 3.1.

Table 3.1 Summary of general site information

SITE ADDRESS	14-28 CULLEN AVENUE, JORDAN SPRINGS, NSW 2474
Site identification	The site is legally defined as Lot 22 of deposited plan (DP) 1194338.
Local government area (LGA)	Penrith City Council
Site area (approximately)	28,360 m^2
Current site use	The site remains vacant at the current time with no development features present, with dense grass covering the majority of the property. Multiple large gravel patches are present around the gate entrances onto the site.
Surrounding land uses	A childcare centre is present immediately adjacent to the south west of the site, with residential properties surrounding the site to the north, west and south. A small creek is present on the eastern boundary line, with the Jordan Springs Dog Park beyond. A large manufactured lake is present to the south of the site on the other side of Cullen Avenue, with a small shopping centre present to the south west.
Proposed site use	The site is proposed to be developed into a primary school in the south-eastern portion with a playing field in the northern portion of the site.

3.2 SITE INSPECTION

The site was inspected on 4 June 2018 by a WSP environmental scientist and the following observations were noted:

- The site is predominantly surrounded by residential housing to the north, west, east and south. There is a small creek that runs parallel along the eastern boundary of the site, with a cycleway, dog park and large patch of eucalypt forest beyond. To the south, the creek continues to eventually terminate into a manufactured lake on the other side of Cullen Avenue. To the north there is a public oval with residential properties beyond. A small shopping complex, Water Gum community park and residential housing are present to the west
- The site (area to be developed) comprises an open grassed field that is slightly sloping to the south
- No asbestos containing materials (ACM) was observed during the site walkover and during field works
- An assessment of salinity indicator landscapes, surface features and plants was undertaken during the fieldwork.

An aerial plan showing the site features is presented as Figure 2 in Appendix A and site photographs are presented within Appendix B.

3.3 TOPOGRAPHY AND SURFACE WATER DRAINAGE

The site is situated at approximately 40 metres Australian Height Datum (mAHD) and slopes towards the south. This is generally consistent with the level of the surrounding properties. The site appears to have a low potential for flooding, based on the Council's flood planning map as well as the lack of significantly sized water bodies surrounding the site.

The nearest surface water body is a small unnamed creek adjacent to the eastern boundary which terminates in a unnamed manmade lake approximately 150 metres to the south of the site.

3.4 GEOLOGY

The regional geological map of the area (Geological Survey of NSW, 1983, Geological Series Sheet 9130 (Edition 1), Sydney, Scale 1: 100,000 indicates that the site is underlain by Bringelly Shale as part of the Wianamatta Group, which comprises of shale, claystone, fine to medium grained lithic sandstone as well as coal and tuff.

The CSIRO Australian Soil Resource Information System (ASRIS), http://www.asris.csiro.au/index_ie.html, accessed 15 June 2018, indicates that soils underlying the site are mapped as having an extremely low probability of the occurrence of acid sulfate soils (ASS).

The NSW DIPNR (2003) *Salinity Potential in Western Sydney 2002* map indicates that the site and immediate surrounds is situated in an area of moderate salinity potential. Areas of high salinity potential associated with local waterways are located further to the north and south of the site.

3.5 HYDROGEOLOGY

A review of the licenced borehole register on the NSW Government Water Information website (http://allwaterdata.water.nsw.gov.au/water.stm) indicates that there are no registered groundwater bores within 500 m radius of the site.

4 SITE HISTORY REVIEW

4.1 HISTORICAL SEARCHES

A review of historical land use information pertaining to the site was undertaken to identify any known environmental concerns. A summary of the searches undertaken is provided in Table 4.1.

Table 4.1 Summary of historical search results

SEARCH	RESULTS
Titles search	A historical land title search indicated that the section of the site referred to as Portion 111 Parish Londonderry part of The Commonwealth of Australia portfolio from 1941 until 1979, upon which the property was referred to as Lot 1 in various deposited plans until 1989. Formerly, from 1941 to 1945, the property was being used for military purposes by the defence force. From 1992 until 1999, the property and surrounding land remained as Lot 1 under various deposited plan numbers, and was acquired by Australian Defence Industries Pty Limited. From 1993 until the present day, the site and surrounding land listed under various lot and deposited plan numbers, was acquired by St Marys Land Limited. The results of the historical land title search are provided in Appendix D.
Dangerous Goods Search	This has been requested and had not been received at the time of writing. Once received this information will be incorporated and this report will be updated and re-issued.
EPA online notice records	An online search of the NSW EPA *Protection of the Environment Operations Act 1997* public register (http://www.epa.nsw.gov.au/prpoeoapp/) indicated that there are no issued licences within a 1 km radius of the site. An online search of the NSW EPA contaminated land record database (http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx) indicated that there are no current or former notices related to any property in the suburb of Jordan Springs. There are multiple current notices that have been issued to four sites within the LGA of Penrith City Council, however, these sites are more than 3 km away from the site.

4.2 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

WSP were provided with a site audit statement (HLA-Envirosciences Pty Ltd, 1999) which covered the site as well as a large proportion of the surrounding area. The auditor certified that the site is suitable for a range of uses, including for primary schools.

Geotech Testing Pty Ltd undertook fill testing across the site to satisfy requirements of the Penrith City Council development application and the results are presented in *Jordan Springs – Education Site and Village Oval, 11 Lakeside Parade and 14-52 Cullen Avenue, Penrith City Council DA 13/0686 – Condition Nos 13, 16, 24 and 25(c), Statement of Compliance (2015).* This report detailed that 19,000 m^3 of virgin excavated natural material (VENM) was previously imported onto the site, and a VENM report was provided to Geotech Testing. No information was provided to WSP regarding the placement and location of the VENM material.

EIS undertook a desktop study to identify any past or present potentially contaminating activities at the site, and to identify the potential for site specific contamination. The findings of this study are presented in *Preliminary Environmental Site Assessment, 14-28 Cullen Avenue, Jordan Springs, NSW* (EIS, 2017). The study documented the following key findings:

- fill material had been imported across the site and specifically in the north-east corner of the site in the location of the former dam. EIS (2017) states that the fill extends to depths of over 2 mBGL as presented on JK Geotechnics borelogs. However, WSP was not provided with this report
- unknown if the military/defence were using the land for possible fuel or explosives storage
- potential use and or storage of pesticides associated with the Landscape Solutions compound
- potential hazardous building materials in former buildings and through demolition activities (although WSP note that the historical aerial photographs show that no former buildings have been identified at the site)

In addition to the potential contamination sources identified, the site is located in an area of high risk of dryland salinity.

EIS (2017) also stated that unexploded ordinance could pose a potential risk to site users. However, WSP note that the Department of Defence Unexploded Ordnance website does not list the site as having any occurrence of exploded ordnance.

- Potential contaminants of concern were identified as:
  - heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc)
  - total recoverable hydrocarbons (TRH)
  - benzene, toluene, ethylbenzene, xylenes and naphthalene (BTEXN)
  - polycyclic aromatic hydrocarbons (PAHs)
  - organochlorine pesticides (OCPs)
  - organophosphate pesticides (OPPs)
  - polychlorinated biphenyls (PCBs)
  - herbicides
  - volatile organic compounds (VOCs)
  - trinitrotoluene (TNT)
  - hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
  - asbestos.

4.3 PRELIMINARY CONCEPTUAL SITE MODEL

Based on the site inspection and the desktop review of site setting and historical land use information, a preliminary conceptual site model (CSM) was prepared. This is summarised in Table 4.2 below.

Table 4.2 Preliminary CSM

Likely sources of impact	Likely sources of impact at the site include: — uncontrolled fill materials used historically to level the site and surrounding area — historical or recent localised filling or waste dumping — potential asbestos containing materials (ACM) from imported materials — possible minor leaks/spills of oil/petrol from vehicle activity on or adjacent to site — pesticides used historically and recently to maintain the site — urban dryland salinity associated with saline groundwater, local land clearing and changed hydrological conditions.
Potentially impacted media	Soil: Impacts and ACM from contaminated fill, building debris or waste materials, minor fuel leaks, or from pesticides used on-site. Soil sodicity and salinity. Groundwater/water bodies: Migration from soil impacts, although this is considered unlikely given widespread soil contamination is considered unlikely.
Contaminants of concern	Contaminants of concern at the site comprise: — heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) — TRH and BTEX compounds — PAHs — OCPs/OPPs — PCBs — VOCs — asbestos. — herbicides — TNT — RDX — Salinity and sodicity indicator analytes including pH, electrical conductivity (EC), chloride, sulfate and exchangeable cations
Migration pathways	Potential migration pathways include: — vertical migration of contaminants in soil from infiltration of rain water — migration of contaminants through underground service trenches — run-off from surface contaminants in rain water entering the small creek to the east — volatilisation of hydrocarbon contamination — airborne migration of contamination in dust or vapour.

Potential exposure pathways	Potential exposure pathways include: — inhalation of dust or vapours by site users or nearby site users — ingestion or dermal contact with contaminated surface soils or near surface soils by future residential site users or excavation/maintenance workers — ingestion or dermal contact with contaminated water downgradient of the site through the use of downgradient surface water bodies and the small creek present to the east — direct exposure of structures to aggressive soil conditions.
Potential sensitive receptors	Based on the site setting, sensitive receptors potentially include: — proposed site structures (specifically to aggressive soil conditions) — underlying soil and groundwater — the small creek adjacent to the eastern boundary of the site — current open space users and students of the future school proposed to be built on site — ingestion or dermal contact with contaminated water downgradient of the site through the use of downgradient surface water bodies for recreation — surface watercourses receiving groundwater from the site, possibly including the Cooks River located immediately to the south of the site — occupiers of residential properties surrounding and downgradient of the site — on-site and off-site construction or utility workers (those working within service pit trenches).

5 DATA QUALITY OBJECTIVES

Systematic planning is critical to successful implementation of an environmental assessment and is used to define the type, quantity and quality of data needed to inform decisions. The United States Environmental Protection Agency (US EPA) has defined a process for establishing data quality objectives (DQOs) (US EPA, 2000a and 2000b), which has been referenced in the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM, as amended 2013).

DQOs ensure that:

- the study objectives are set
- appropriate types of data are collected (based on contemporary land use and chemicals of concern)
- the tolerance levels are set for potential decision making errors.

The DQO process is a seven-step iterative planning approach. The outputs of the DQO process are qualitative and quantitative statements which are developed in the first six steps. They define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose and specify the performance requirements for the quality of information to be obtained from the data. The output from the first six steps is then used in the seventh step to develop the data collection design that meets all performance criteria and other design requirements and constraints. The DQO process adopted for the DSI works is outlined in Table 5.1.

Table 5.1 DQO process

STEP	DESCRIPTION	OUTCOMES
1	State the problem	WSP understand the site is to be redeveloped for the construction of a primary school in the south-east portion of the site, with a playing field in the northern portion of the site. The purpose of the DSI works is to determine the contamination status of soils beneath the site and assess the potential for urban dryland salinity to impact upon site development.
2	Identify the decisions/goal of the investigation	The decisions to be made based on the results of the investigation are as follows: — has the soil been adequately sampled? — were all the contaminants of concern analysed? — have salinity indicator parameters been assessed in the field and by the laboratory? — is there sufficient data to prepare the DSI report? — is there a risk to future users or occupiers of the site?
3	Identify the inputs to the decision	The inputs required to make the above decisions are as follows: — geological and hydrogeological data — concentrations of contaminants of concern and salinity indicator parameters in soil — site assessment criteria for soil (outlined in Section 7) — observation data including presence of odours and discoloration of the soil — distribution of identified soil contamination.
4	Define the study boundaries/ constraints on data	The boundaries of the investigation have been identified as follows: — spatial boundaries: the spatial boundary of the investigation area is defined as the geographical extent of the investigation area and the potential receptors of concern that need to be considered by the study. — temporal boundaries: the date of the project inception to the completion of the fieldwork under the proposed investigation.

STEP	DESCRIPTION	OUTCOMES
5	Develop a decision rule	The purpose of this step is to define the parameters of interest, specify the action levels and combine the outputs of the previous DQO steps into an 'if…then…' decision rule that defines the conditions that would cause the decision maker to choose alternative actions. The parameters of interest are concentrations of contaminants of concern and salinity indicator parameters (as listed in Table 4.2) in soil. An assessment of the concentrations of the contaminants of concern and interpretation of salinity indicator parameters is to be undertaken to develop the DSI and the suitability for the current open space and proposed future land use. Should concentrations exceed the adopted assessment criteria remedial and management options will be considered.
6	Specify limits on decision errors	The acceptable limits on decision errors to be applied in the investigation and the manner of addressing possible decision errors have been developed based on the data quality indicators (DQIs) of precision, accuracy, representativeness, comparability and completeness and are presented in Table 5.2 and 5.3. Soil pH tested by the NATA accredited laboratory was compared against the field pH screening results for the relevant sample locations and depths.
7	Optimise the design for obtaining data	The purpose of this step is to identify a resource-effective data collection design for generating data that satisfies the DQOs. This assessment has been designed considering the information and data obtained during the desktop review and site inspection (Sections 3 to 4). The resource effective data collection design that is expected to satisfy the DQOs is described in detail in Section 6 (methodology). To ensure the design satisfies the DQOs, DQIs (for accuracy, comparability, completeness, precision and reproducibility) have been established to set acceptance limits on field methodologies and laboratory data collected.

DQIs for sampling techniques and laboratory analyses of collected soil samples define the acceptable level of error for this validation assessment. The adopted field methodologies and data obtained have been assessed by reference to DQIs as follows:

- Precision: a quantitative measure of the variability (or reproducibility) of data
- Accuracy: a quantitative measure of the closeness of reported data to the true value
- Representativeness: the confidence (expressed qualitatively) that data are representative of each media present on the site
- Comparability: a qualitative parameter expressing the confidence with which one data set can be compared with another
- Completeness: a measure of the amount of useable data (expressed as a percentage) from a data collection activity.

A summary of the field and laboratory DQIs for the validation assessment are provided in Tables 5.2 and 5.3 below.

Table 5.2 DQIs for field techniques

DQI	
Precision	— standard operating procedures (SOPs) appropriate and complied with — collection of inter-laboratory and intra-laboratory duplicates
Accuracy	— WSP SOPs appropriate and complied with — collection of field and trip blanks and trip spikes
Representativeness	— appropriate media sampled
Comparability	— same SOPs used on each occasion — experienced sampler — climatic conditions (temperature, rainfall, wind) considered — same type of samples collected
Completeness	— SOPs appropriate and complied with — all required samples collected

Table 5.3 DQIs for laboratory

DQI	ACCEPTABLE LIMITS
Precision	
Analysis of laboratory duplicates for: — PAHs, TRH, BTEX, total metals, PCB's, OCP / OPPs in soil	<10% x PQL - ±30% RPD 4-10% x PQL - ±50-70% RPD <4% x PQL - ± 2 x PQL
Analysis of laboratory prepared trip spikes (one per day per batch volatiles)	70-130%
NATA certified laboratories	NATA accreditation for analyses performed
Accuracy	
Analysis of laboratory prepared trip blanks (one per batch)	Non-detect for contaminants analysed
Analysis of rinsate blanks (one per day)	Non-detect for contaminants analysed
Analysis of laboratory blanks	Non-detect for contaminants analysed
Analysis of laboratory matrix spikes, laboratory control samples and surrogate recoveries	70-130% inorganics/metals 60-140% organics 10-40% semi-volatile organic compounds
Analysis of laboratory duplicates for: — PAHs, TRH, BTEX, total metals, PCB's, OCP / OPPs in soil	<10% x PQL - ±30% RPD 4-10% x PQL - ±50 -70% RPD <4% x PQL - ± 2 x PQL

DQI	ACCEPTABLE LIMITS
Representativeness	
All required samples analysed	as per Section 6 of this report.
Comparability	
Sample analytical methods used (including clean-up)	as per NEPM (2013)
Same units	justify/quantify if different
Same laboratories	justify/quantify if different
Sample practical quantification limits (PQLs)	less than nominated criteria
Completeness	
All critical samples analysed	as per Section 6 of this report.
All required analytes analysed	
Appropriate methods and PQLs	as per NEPM (2013)
Sample documentation complete	
Sample holding times complied with	

6 SAMPLING AND ANALYSIS PROGRAM

6.1 SAMPLING RATIONALE

This SAQP for the DSI was developed by WSP with respect to a mixture of grid-based and targeted locations adopted to sufficiently assess the site. For grid-based sampling, Table A in the NSW EPA 1995, *Sampling Design Guidelines* provides the recommended minimum number of sampling points required for site characterisation based on detecting circular hot spots by using a grid-spaced sampling pattern. The guidelines indicate that a minimum of 40 sampling points are recommended for a 30,000 m^2 site, which would allow for extensive coverage of the site using the grid-spaced sampling pattern. Sampling locations are summarised in Table 6.1 below, with sample locations shown on Figure 2.

Table 6.1 Sampling Rationale

TEST PIT ID	LOCATION JUSTIFICATION	NO. OF PRIMARY SAMPLES TO BE ANALYSED
TP01 to TP18	Grid pattern targeting fill in the vicinity of the future playing field.	18 – heavy metals, TRH, PAHs, BTEX, asbestos 9 – OCPs, OPPs, PCBs 5 – VOCs, TNT, RDX
TP19 to TP20	Targeting the former dam area which may have been backfilled with imported fill.	2 – heavy metals, TRH, PAHs, BTEX, asbestos, OCPs, OPPs, PCBs
TP21 to TP34, TP36, TP37, TP40	Grid pattern targeting fill in the vicinity of the future buildings.	17 – heavy metals, TRH, PAHs, BTEX, asbestos 9 – OCP, OPP, PCBs 5 – VOCs, TNT, RDX
TP35, TP38 and TP39	Targeting the Landscape Solutions compound	3 – heavy metals, TRH, PAHs, BTEX, asbestos 1 – OCPs, OPPs, PCBs 6 –herbicides
20 test pit/borehole locations	Sampling locations will be selected on site depending on the site slope for salinity assessment.	70 – pH and electrical conductivity 20 – sulfate and chloride 20 – CEC

A hand auger was used to reach 1.5 mBGL in all 40 borehole locations (TP01 to TP40), to prevent damage to potentially unidentified underground services. The drill rig was then used to progress the boreholes to a minimum depth of 2-3 mBGL, or 0.5 m into natural material, whichever occurred first, with exception of 20 select locations that were also selected for salinity testing, which were extended to a minimum depth of 3 mBGL. The majority of boreholes across the site were able to reach a minimum depth of 3 mBGL.

Six soil samples were collected from each borehole, comprising:

— three surface / near surface samples (0.1 mBGL, 0.3 mBGL and 0.5 mBGL) collected from every borehole location across the site.

— three deeper samples were also collected (1.0 mBGL, 2.0 mBGL, 3.0 mBGL), to assess the condition of the residual material below the fill material at the surface.

— further samples were collected where significant changes in geology occurred or if specific inclusions were noted.

The site history indicated that groundwater impacts at the site were not considered likely and, thus, a soil investigation was undertaken. It was therefore considered appropriate to investigate soil contamination only during the DSI, with the understanding that a groundwater investigation may need to be considered at a later stage should significant soil contamination be identified at the site.

6.2 FIELDWORK

6.2.1 SOIL SAMPLING METHODOLOGY

Table 6.2 Drilling and soil sampling methodology

ACTIVITY	DETAILS
Service location	Prior to breaking ground, all investigation locations were checked for the presence of buried services by an experienced service locator and cross-checked with DBYD plans obtained from asset owners.
Soil bore locations	Following the clearing of locations, intrusive investigation works were undertaken at the site from 4 to 7 June 2018. A hand auger was used by a WSP environmental scientist to manually advance all 40 boreholes to a maximum depth of 1.5 mBGL, to prevent extensive damage to unidentified underground services. From this depth, a drill rig was used to further advance the boreholes to a minimum depth of 3 mBGL for both the salinity and non-salinity targeted boreholes. Soil bore locations are shown on Figure 2 presented in Appendix A.
Drilling method	Each location was hand augured to 1.5 mBGL to minimise the potential for unidentified underground services to be damaged. Each of the boreholes was progressed to target depth using a drill auger to gain a clear understanding of the geology.
Borehole logging	Soil logging was completed based on field interpretation and was generally in accordance with the Australian Standard 1726–1993 *Geotechnical Site Investigations.* Borehole logs are presented in Appendix C.
Field screening	Soil samples were screened in the field using a PID to assess VOC concentrations. The PID was calibrated to a known concentration of isobutylene gas at the commencements of each day of field work. Calibration certificates are included in Appendix F. Soil samples were tested in a number of boreholes for field pH as an indicator of soil chemistry.

ACTIVITY	DETAILS
Soil sampling method	Soil sampling was undertaken in general accordance with the SAQP for the site, WSP field procedures and Australian Standard AS4482.1.2005. Samples were collected at the following nominal depths: immediately beneath the site surface (approximately 0.0 – 0.1 mBGL) — 0.3 mBGL — 0.5 mBGL — 1.0 mBGL — 2.0 mBGL — 3.0mBGL. Samples were scheduled for analysis based on field observations and screening results. Soil samples were collected directly from the hand auger head or drill auger and placed into laboratory supplied containers. To minimise the risk of cross-contamination, new disposable nitrile gloves were worn during sample collection and all non-disposable sampling equipment was cleaned between samples and sample locations. For the volatile constituent analysis, in accordance with AS 4482.2-1999 Guide to the sampling and investigation of potentially contaminated soil - Volatile substances, a solvent extraction with subsampling method was used. A soil sample of volume considerably larger than that required for the determination, was collected and placed in a borosilicate glass container such that was no headspace. The container was then sealed, cooled to 4°C and transported to the laboratory in this condition. Samples were given unique identification numbers containing the soil boring location and depth. Samples were placed in eskies with appropriate chain-of-custody documentation and preserved on ice after collection and during shipment to the laboratories. Samples were shipped to laboratories accredited by the National Association of Testing Authorities (NATA) for the analyses to be undertaken.
Decontamination procedure	All equipment requiring decontamination (hand auger, trowel) was washed using potable water between sample locations.
Sample preservation	Soil samples for laboratory analysis were collected in laboratory supplied and appropriately preserved containers. Samples were stored on ice on-site and in transit to the laboratory. Samples were received by the laboratories within the required holding times accompanied by chain of custody documentation.
Borehole completion	Soils were be returned to the bore in the order removed and reinstated to a standard to minimise hazards such as trips and falls.
Storage of waste soil	No waste soil was produced.
Surveying of borehole locations	A hand-held global positioning system (GPS) was used to record the coordinates of each sampling location for future reference.

ACTIVITY	DETAILS
Survey of salinity indicator landscapes and vegetation	During the field investigations the WSP field team undertook a preliminary landscape assessment of the site and surrounds with the intent of highlighting geomorphic features indicative of salinity impacted landscapes as well as areas of scalding, salt crusts, water logging, etc. WSP also inspected the site and surrounds for the presence of salinity indicator plants. These field assessments were undertaken in accordance with the following: — NSW DLWC (2002), *Indicators of Urban Salinity* — NSW DIPNR (2005), *Salinity Indicator Plants.*
Quality assurance/quality control (QA/QC)	The following QA/QC samples were collected: — duplicate sample pairs (intra-laboratory and inter-laboratory) were collected in the field at the rate of 1 in 20 primary samples for analysis by each of the primary and secondary laboratories — one equipment rinsate blank was collected and analysed per day of soil investigations. The rinsate was collected to assess the effectiveness of the decontamination processes implemented during the field works program — four trip spikes accompanied the shipment of samples during the journey from the preparing laboratory to the field sampling location, and back to the analytical laboratory. The trip blank was analysed for BTEXN to assess potential cross-contamination from volatiles — four trip blanks accompanied the shipment of samples during the journey from the preparing laboratory to the field sampling location, and back to the analytical laboratory to assess potential cross-contamination from volatiles. The trip blank was analysed for BTEXN and volatile TRH (C_6-C_{10}).

6.3 LABORATORY ANALYSIS

Selected soil samples collected were submitted to the primary analytical laboratory for analysis for contaminants of concern at the site. Soil samples were selected based on a combination of sample location and field observations, including PID results.

Primary samples and intra-laboratory samples were analysed by Australian Laboratory Services Pty Ltd (ALS), with inter-laboratory duplicate samples analysed by SGS Australia Pty Ltd (SGS). Both laboratories are accredited by NATA for the analytical suites requested, with the exception of asbestos quantification.

Table 6.3 below provides a summary of the laboratory analytical schedule for soil samples for the DSI.

Table 6.3 Laboratory sampling and analysis plan - Soil

ANALYTE	PRIMARY SAMPLES	DUPLICATES/ TRIPLICATES	RINSATE BLANK	TRIP BLANK	TRIP SPIKE
TRH	40	4	4	4	-
BTEX compounds	40	4	4	4	4
PAHs	40	4	-	-	-
8 heavy metals	40	4	-	-	-
OCPs/OPPs	23	4	-	-	-
PCBs	23	4	-	-	-
VOCs	6	-	-	-	-
RDX	6	-	-	-	-
Herbicides	6	-	-	-	-
TNT	6	-	-	-	-
Asbestos (quantitative)	40	-	-	-	-
pH and electrical conductivity	70	-	-	-	-
sulfate and chloride	20	-	-	-	-
CEC	20	-	-	-	-

7 ASSESSMENT CRITERIA FOR THE SITE

The assessment criteria for the investigation have been based on an analysis of land uses and potential receptors. Based on this, assessment criteria provided in the following guidelines have been identified as being applicable for assessing laboratory analytical data:

- NEPM (2013) including:
  - Health investigation levels (HILs)
  - Health screening levels (HSLs)
  - Ecological Investigation Levels (EILs)
  - Ecological Screening Levels (ESLs)
- Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) *Technical Report No. 10 Health Screening Levels for Petroleum Hydrocarbons in Soil and Groundwater, Part 2: Application Document* (Friebel & Nadebaum, 2011).

7.1 HEALTH INVESTIGATION LEVELS AND HEALTH SCREENING LEVELS

To assess the presence and extent of soil contamination at a site, the NSW EPA refers to the NEPM (2013) which provides health investigation levels (HILs) and health screening levels (HSLs) for the assessment of impacted soil.

HILs provide an assessment of potential risk to human health from chronic exposure to contaminants, and have been developed based on land use setting. As the purpose of this investigation is to assess the site against both the current and potential future land (as a school), both the 'HIL A' criteria for low density residential land use with gardens/accessible soil and the 'HIL C' criteria for public open space land use have been adopted.

HSLs have been developed for selected petroleum compounds and fractions and are applicable to assessing human health risk via the vapour intrusion and inhalation pathway. The HSLs depend on specific soil physicochemical properties and land use scenarios. They apply to different soil types and depths. For the purpose of this investigation, both the 'HSL A' criteria for low density residential land use with gardens/accessible soil and the 'HSL C' criteria for public open space land use have been adopted.

HSLs have been adopted based on a subsurface comprising of silt. This soil type has been selected based on the soil profile observed at the site.

The CRC CARE Technical Report No. 10 (Friebel & Nadebaum, 2011) provides HSLs for petroleum hydrocarbons specifically for vapour inhalation for intrusive maintenance workers in shallow trenches, and for direct contact. These have also been adopted.

The soil assessment criteria for this investigation is summarised in Table 7.1.

Table 7.1 Soil assessment criteria – HILs/HSLs

ANALYTE	LOW DENSITY RESIDENTIAL LAND USE						PUBLIC OPEN SPACE LAND USE						MAINTENANCE/EXCAVATION WORKERS			
	HSL A (in silt)[1] (mg/kg)				HIL A[2] (mg/kg)	Direct contact[3] (mg/kg)	HSL C (in silt)[1] (mg/kg)				HIL C[2] (mg/kg)	Direct contact[3] (mg/kg)	HSLs (in silt)[4] (mg/kg)			Direct contact[3] (mg/kg)
	0 to <1 m	1 to <2 m	2 to <4 m	4 m +			0 to <1 m	1 to <2 m	2 to <4 m	4 m +			0 to <2 m	2 to <4 m	4 m +	
TRH/BTEX compounds																
TRH C_6-C_{10}	-	-	-	-	-	4,400	-	-	-	-	-	5,100	NL	NL	NL	82,000
TRH C_6-C_{10} minus BTEX (F1)	40	65	100	190	-	-	NL	NL	NL	NL	-	-	-	-	-	-
TRH >C_{10}-C_{16}	-	-	-	-	-	3,300	-	-	-	-	-	3,800	NL	NL	NL	62,000
TRH >C_{10}-C_{16} minus naphthalene (F2)	230	240	440	NL	-	-	NL	NL	NL	NL	-	-	-	-	-	-
TRH >C_{16}-C_{34} (F3)	-	-	-	-	-	4,500	-	-	-	-	-	5,300	-	-	-	85,000
TRH >C_{34}-C_{40} (F4)	-	-	-	-	-	6,300	-	-	-	-	-	7,400	-	-	-	120,000
Benzene	0.6	0.7	1	2	-	100	NL	NL	NL	NL	-	120	250	160	NL	1,100
Toluene	390	-	-	-	-	14,000	NL	NL	NL	NL	-	18,000	NL	NL	NL	120,000
Ethylbenzene	-	-	-	-	-	4,500	NL	NL	NL	NL	-	5,300	NL	NL	NL	85,000
Xylene (Total)	95	210	NL	NL	-	12,000	NL	NL	NL	NL	-	15,000	NL	NL	NL	130,000
PAHs																
Naphthalene	4	NL	NL	NL	-	1,400	NL	NL	NL	NL	-	1,900	NL	NL	NL	29,000
PAHs (Total)	-	-	-	-	300	-	-	-	-	-	300	-	-	-	-	-
Benzo(a)pyrene TEQ[5]	-	-	-	-	3	-	-	-	-	-	3	-	-	-	-	-
OCPs/OPPs																
HCB	-	-	-	-	10	-	-	-	-	-	10	-	-	-	-	-
Heptachlor	-	-	-	-	6	-	-	-	-	-	10	-	-	-	-	-
Aldrin & dieldrin	-	-	-	-	6	-	-	-	-	-	10	-	-	-	-	-
Chlordane	-	-	-	-	50	-	-	-	-	-	70	-	-	-	-	-
Endosulfan	-	-	-	-	270	-	-	-	-	-	340	-	-	-	-	-
DDE, DDD & DDT	-	-	-	-	240	-	-	-	-	-	400	-	-	-	-	-
Endrin	-	-	-	-	10	-	-	-	-	-	20	-	-	-	-	-
Methoxychlor	-	-	-	-	300	-	-	-	-	-	400	-	-	-	-	-
Chlorpyriphos	-	-	-	-	160	-	-	-	-	-	250	-	-	-	-	-
PCBs																
PCBs (Total)	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-
Heavy metals																
Arsenic	-	-	-	-	100	-	-	-	-	-	300	-	-	-	-	-

ANALYTE	LOW DENSITY RESIDENTIAL LAND USE						PUBLIC OPEN SPACE LAND USE						MAINTENANCE/EXCAVATION WORKERS			
	HSL A (in silt)[1] (mg/kg)				HIL A[2] (mg/kg)	Direct contact[3] (mg/kg)	HSL C (in silt)[1] (mg/kg)				HIL C[2] (mg/kg)	Direct contact[3] (mg/kg)	HSLs (in silt)[4] (mg/kg)			Direct contact[3] (mg/kg)
	0 to <1 m	1 to <2 m	2 to <4 m	4 m +			0 to <1 m	1 to <2 m	2 to <4 m	4 m +			0 to <2 m	2 to <4 m	4 m +	
Cadmium	-	-	-	-	20	-	-	-	-	-	90	-	-	-	-	-
Chromium	-	-	-	-	100[6]	-	-	-	-	-	300[6]	-	-	-	-	-
Copper	-	-	-	-	6,000	-	-	-	-	-	17,000	-	-	-	-	-
Lead	-	-	-	-	300	-	-	-	-	-	600	-	-	-	-	-
Mercury	-	-	-	-	40	-	-	-	-	-	80	-	-	-	-	-
Nickel	-	-	-	-	400	-	-	-	-	-	1,200	-	-	-	-	-
Zinc	-	-	-	-	7,400	-	-	-	-	-	30,000	-	-	-	-	-

(1) NEPM (2013) Schedule B1 Table 1A(3) Soil HSLs for vapour intrusion (mg/kg)
(2) NEPM (2013) Schedule B1 Table 1A(1) Health investigation levels for soil contaminants (mg/kg)
(3) CRC CARE (2011) Table A4 Soil HSLs for direct contact (mg/kg)
(4) CRC CARE (2011) Table A3 Soil HSLs for vapour intrusion (mg/kg)
(5) Benzo(a)pyrene toxicity equivalent quotient (TEQ), calculated as a sum of weighted selected PAHs. Further details available in NEPM (2013) Schedule B2
(6) HIL for chromium VI adopted for total chromium as a conservative approach

- No assessment criteria available
NL Non-limiting due to maximum vapour concentrations being below the acceptable health risk level

7.2 ECOLOGICAL SCREENING LEVELS AND ECOLOGICAL INVESTIGATION LEVELS

The NEPM (2013) provides ecological screening levels (ESLs) for TRH, PAH and BTEXN compounds for use as an initial screening risk assessment to determine whether laboratory analysed concentrations of contaminants potentially pose a risk to plant growth. For the purpose of this investigation, ESLs for 'urban residential and public open space' land uses with fine-grained soil textures have been considered. These are outlined in Table 7.2.

Table 7.2 Soil assessment criteria – ESLs

ANALYTE	ESLS FOR URBAN RESIDENTIAL AND PUBLIC OPEN SPACE (mg/kg dry soil)
TRH C_6-C_{10} minus BTEX (F1)	180
TRH >C_{10}-C_{16} minus naphthalene (F2)	120
TRH >C_{16}-C_{34} (F3)	1,300
TRH >C_{34}-C_{40} (F4)	5,600
Benzene	65
Toluene	105
Ethylbenzene	125
Xylene (Total)	45
Benzo(a)pyrene	0.7

The NEPM (2013) also provides ecological investigation levels (EILs), which were developed for metals, naphthalene and pesticides. The EILs take into consideration the physiochemical properties of soil and contaminants and the capacity of the local ecosystem to accommodate increases in the contaminant levels. The EILs are derived using the following equation:

$$EIL = added\ contaminant\ limit\ (ACL) + ambient\ background\ concentration\ (ABC)$$

The ABC is the background contaminant level and requires measurement at appropriate reference points at the site. The ACL, which is provided in the NEPM (2013), is the maximum contaminant concentration added to the naturally occurring background level, exceedances of which may result in adverse effects on plant health. EILs corresponding to urban residential land use were applicable for this investigation and are further discussed in Section 8.2.2.

7.3 SALINITY AND SODICITY CHARACTERISATION

Salinity and sodicity results were assessed against the rankings presented in NSW DLWC (2002), *Site Investigations for Urban Salinity*. Table 7.3 below presents these rankings based on calculated salinity (derived from EC_e calculated from EC and ESP calculated from exchangeable sodium measured against total cation exchange capacity).

Table 7.3 Salinity and Sodicity Ranking System (DLWC 2002)

SOIL SALINITY RANKING	
EC_e <2 dS/cm	Non-saline
EC_e 2-4 dS/cm	Slightly saline
EC_e 4-8 dS/cm	Moderately saline
EC_e 8-16 dS/cm	Very saline
EC_e >16 dS/cm	Highly saline
SOIL SODICITY RANKING	
ESP <5 %	Non-sodic
ESP 5-15 %	Sodic
ESP >15%	Highly sodic

8 INVESTIGATION RESULTS

8.1 SUBSURFACE CONDITIONS

The subsurface profile at the site comprised silty clay fill materials at all investigation locations, underlain by dark brown and then red clay, with occasional shale layers in between. At three boreholes, sandy material and a sandstone layer was encountered towards 3.0 mBGL. Fill materials generally comprised brown and dark brown fine grained silty sand materials with anthropogenic inclusions such as brick and glass fragments, with plastics and ceramics.

Headspace analysis of VOCs was undertaken on all soil samples collected using a calibrated PID. PID readings reported ranged from 0.0 to 0.12 ppm, suggesting that soils were unlikely to contain significant concentrations of VOCs.

No ACM was identified on the ground surface during the site walkover.

intrusive drilling works, no asbestos containing material was identified on the ground surface across the site.

Environmental borehole logs (including GPS coordinates and PID readings) are provided in Appendix C, and sampling locations are shown on Figure 2.

8.2 ANALYTICAL RESULTS

Selected soil samples collected from boreholes and surface sampling locations were analysed for contaminants of concern. Soil samples were selected based on a combination of sample location (to provide site coverage) and field observations (to target areas of potential concern).

The following sections provide a summary of the results of the soil investigation. More detailed summary tables of analytical results are provided in Tables E1 to E6 in Appendix E, and laboratory reports are provided in Appendix G.

8.2.1 HILS/HSLS

Table 8.1 provides a summary of the number of primary samples analysed, analytes tested for, minimum/maximum constituent concentrations, and samples that exceeded the adopted HILs and/or HSLs for the site.

Table 8.1 Summary of soil analytical results with respect to HILs/HSLs

NO. OF PRIMARY SAMPLES	ANALYTE	CONC. (mg/kg)		SAMPLES EXCEEDING ADOPTED HILS/HSLS		
		Min.	Max.	Low density residential	Public open space	Maintenance/ excavation workers
TRH/BTEX compounds						
40	TRH C_6-C_{10}	<10	<10	-	-	-
40	TRH C_6-C_{10} minus BTEX (F1)	<25	<25	-	-	NA
40	TRH >C_{10}-C_{16}	<50	<40	-	-	-
40	TRH >C_{10}-C_{16} minus naphthalene (F2)	<50	<50	-	-	NA
40	TRH >C_{16}-C_{34} (F3)	<90	150	-	-	-
40	TRH >C_{34}-C_{40} (F4)	<100	<100	-	-	-
40	Benzene	<0.2	<0.2	-	-	-
40	Toluene	<0.5	<0.5	-	-	-
40	Ethylbenzene	<0.5	<0.5	-	-	-
40	Xylene (Total)	<0.5	<0.5	-	-	-
PAHs						
40	Naphthalene	<0.5	<0.5	-	-	-
40	PAHs (Total)	<0.5	<0.5	-	-	NA
OCPs/OPPs						
23	Heptachlor	<0.05	<0.05	-	-	NA
23	Aldrin & dieldrin	<0.05	<0.05	-	-	NA
23	Chlordane	<0.05	<0.05	-	-	NA

NO. OF PRIMARY SAMPLES	ANALYTE	CONC. (mg/kg)		SAMPLES EXCEEDING ADOPTED HILS/HSLS		
		Min.	Max.	Low density residential	Public open space	Maintenance/ excavation workers
23	Endosulfan	<0.05	<0.05	-	-	NA
23	DDE, DDD & DDT	<0.2	<0.2	-	-	NA
23	Endrin	<0.05	<0.05	-	-	NA
23	Methoxychlor	<0.2	<0.2	-	-	NA
23	Chlorpyriphos	<0.05	<0.05	-	-	NA
PCBs						
23	PCBs (Total)	<0.1	<0.1	-	-	NA
Asbestos						
40	Bonded ACM / Friable asbestos and asbestos fines	Non detect		-		-
Heavy metals						
40	Arsenic	<5	11	-	-	NA
40	Cadmium	<1	<1	-	-	NA
40	Chromium	6	39	-	-	NA
40	Copper	9	39	-	-	NA
40	Mercury	<0.1	<0.1	-	-	NA
40	Nickel	<2	27	-	-	NA
40	Zinc	11	78	-	-	NA

8.2.2 EILS/ESLS

8.2.2.1 EIL CONCENTRATIONS

As discussed in Section 7.2, EIL concentrations are required to assess the potential ecological impacts of metals, pesticides and naphthalene contamination.

Tables 1B(4) and 1B(5) of the NEPM (2013) provide generic EILs for aged arsenic and lead, and fresh DDT and naphthalene in soils (irrespective of their physicochemical properties). Aged values are applicable for contamination present in soil for at least two years. EILs are provided for various land uses including 'areas of ecological significance', 'urban residential and open space' and 'commercial and industrial'. The 'urban residential and open space' land use EILs have been considered for this investigation.

Table 8.2 outlines the EILs (generic and derived) for this investigation.

Table 8.2 Generic and calculated EIL concentrations

ANALYTE	NEPM (2013) EILS (mg/kg)
	URBAN RESIDENTIAL AND OPEN PUBLIC SPACES
Arsenic[1]	100
Chromium (III)[2]	190
Copper[4]	60
DDT[1]	180
Lead[3]	1,100
Nickel[2]	30
Zinc[5]	70
Naphthalene[1]	170

(1) NEPM (2013) Schedule B1 Table 1B(5) Generic EILs for aged As, fresh DDT and fresh naphthalene in soils irrespective of their physicochemical properties

(2) NEPM (2013) Table 1B(3) Soil-specific added contaminant limits for aged chromium III and nickel in soil

(3) NEPM (2013) Schedule B1 Table 1B(4) Generic added contaminant limits for lead in soils irrespective of their physicochemical properties

(4) NEPM (2013) Table 1B(2) Soil-specific added contaminant limits for aged copper in soils

(5) NEPM (2013) Table 1B(1) Soil-specific added contaminant limits for aged zinc in soil

8.2.2.2 COMPARISON OF ANALYTICAL RESULTS WITH ESLS/EILS

Table 8.3 summarises soil concentrations which exceeded the adopted ESLs/EILs for 'urban residential and open public spaces' land use adopted for the site.

Table 8.3 Summary of soil ESL/EIL exceedances

ANALYTE	SAMPLES EXCEEDING ADOPTED ESLS/EILS
	URBAN RESIDENTIAL AND OPEN PUBLIC SPACES
TRH/BTEX compounds	
TRH C_6-C_{10} minus BTEX (F1)	-
TRH >C_{10}-C_{16} minus naphthalene (F2)	-
TRH >C_{16}-C_{34} (F3)	-
TRH >C_{34}-C_{40} (F4)	-
Benzene	-
Toluene	-
Ethylbenzene	-
Xylene (Total)	-
PAHs	
Naphthalene	-
Benzo(a)pyrene	
OCPs	
DDT	-
Heavy metals	
Arsenic	-
Chromium (III)	-
Copper	-
Lead	-
Nickel	-
Zinc	-

8.3 SALINITY AND SODICITY INVESTIGATION RESULTS

8.3.1 FIELD OBSERVATIONS

During the field investigations, observations of the geomorphology and landscape characteristics of the site and surrounds were made. The site itself appears to have been regraded in parts and areas of open unvegetated land may have been the result of vehicle movement rather than salinity. No substantial evidence of soil erosion was identified on the site during the field investigation.

The creek and associated floodplain to the east, north and south of the site were well vegetated with a range of plants including salinity indicator plants identified in the NSW DIPNR (2005), *Salinity Indicator Plants* (most notably spike rush and swamp oak). In addition to these plants other plants with a lower tolerance to saline soil and groundwater

conditions (e.g. eucalypts) were identified around the site and on the floodplain indicating that saline soils were not substantially affecting plant growth at the time of the investigation.

For the purposes of this salinity assessment, the geology on the site has been split into specific units. This division is to allow for assessment of lateral distribution of salinity rankings across the investigation area to identify zones with elevated risk.

- Fill: Identified in TP02 only and comprising clayey silt with wood and bricks (maximum depth 0.5mBGL)
- Topsoil/Organic Rich Layer: Predominantly clayey silt but also comprising sandy silt with higher composition of organic matter compared to other units in the stratigraphy. Generally ranged in depth from surface to between 0.3 and 1.0 mBGL (though identified as 2.0 mBGL in TP35 and TP37)
- Residual Clay/Weathered Shale: situated beneath the topsoil/organic rich layer and comprising clays and silty clays with varying amounts of shale gravels
- Weathered Sandstone: Encountered at depth in only two test pits (TP18 and TP21) from between 3.0 and 2.0 metres in depth respectively.

8.3.2 LABORATORY RESULTS

The results of the laboratory analysis were interpreted based on the guidance presented in NSW DLWC (2002), *Site Investigations for Urban Salinity*. The results of that interpretation are presented in Appendix E.

8.3.2.1 SALINITY RESULTS

Salinity has been assessed across the site based upon distribution within the soil units identified above. Salinity rankings have been derived from derivation of the EC_e and comparison against NSW DLWC (2002), *Site Investigations for Urban Salinity*.

- Fill: The samples collected from the fill material in TP02 was found to be non-saline to slightly saline.
- Topsoil/Organic Rich Layer: The majority of the soil samples analysed for salinity indicators were found to be non-saline to slightly saline. Three sample locations (TP27, TP32 and TP39) held a ranking of moderate salinity within this soil unit. These locations were situated in the south of the site.
- Residual Clay/Weathered Shale: Three sample locations (TP04, TP14 and TP37) held a ranking of non-saline but saline conditions were found to be prevalent in this soil unit. The majority of the soil samples analysed for salinity indicators were found to be slightly saline to moderately saline.
- Weathered Sandstone: All three samples collected from TP18 and TP21 in this soil unit returned a very saline ranking.

8.3.2.2 SODICITY RESULTS

With the exception of one non-sodic sample result (TP39_01), all soils assessed for sodicity across the investigation area held exchangeable sodium percentages (ESP) indicating sodic or highly sodic conditions. Generally, less sodic conditions were identified in the overlying topsoil/organic rich layer (though with the exception of one sample, all still indicative of sodic conditions). Deeper soils generally held ESPs indicative of highly sodic soils.

9 QUALITY ASSURANCE AND QUALITY CONTROL

The DQIs for sampling techniques and laboratory analyses of collected representative samples define the acceptable level of error required for this investigation. The DQI assessment is presented in Table 9.1.

Table 9.1 Data quality indicators

DQI	DESCRIPTION	APPLICABILITY
Representativeness	The confidence that the data are representative of each media present on the site. Expresses the degree to which sample data accurately and precisely represents a characteristic of a population or an environmental condition. Controlled through selecting sampling locations that exemplify site conditions and obtaining suitable samples.	Consistent and repeatable sampling techniques and methods were utilised.
Precision	The quantitative measure of the variability (or reproducibility) of data. Expressed as relative percentage differences (RPDs), assessed by determining the RPDs between the original and duplicate samples tested. Validity of the data is questioned if the RPD limits are exceeded and upon further investigation a reason cannot be determined.	Work was conducted in accordance with WSP standard procedures. The precision of the data was assessed by calculating the RPDs of duplicate samples following AS 4482.1 (2005).
Accuracy	The quantitative measure of the closeness of reported data to the true values. Accuracy can be undermined by such factors as field contamination of samples, poor preservation or preparation techniques.	Accuracy was assessed by using equipment blanks and laboratory QA/QC analytical results (including laboratory control samples, spikes, and reference samples).
Completeness	The measure of the amount of usable data from a data collection activity. Valid chemical data are the values that have been identified as acceptable or validated.	The completeness goal was set at there being sufficient valid data generated during the study. Measurements made were judged to be valid measurements.
Comparability	The confidence that data may be considered to be equivalent for each sampling analytical event, i.e. the confidence with which one data set can be compared with another. Achieved through qualitative assessment of QA/QC procedures, using comparable field sampling, laboratory sample preparation and analytical procedures and reporting units.	The sampling was in general accordance with the sampling and analysis procedures and as per standard industry procedures. Each sample was analysed using identical methods for each analyte and laboratory practical quantitation limits (PQLs) were consistent over each laboratory batch. A check laboratory was used to provide data to make a comparative assessment of variability between laboratories.

Table 9.2 summarises conformance to specific QA/QC procedures.

Table 9.2 Data quality assurance

ITEM	OBJECTIVES MET
Environmental consultant	The environmental consultant maintains quality assurance systems certified to AS/NZS ISO 9001:2000. Qualified and experienced environmental scientists with 1 to 5 years' experience completed field works.
Procedures	All work was conducted in accordance with relevant statutory work health and safety (WHS) and environmental sampling guidelines, as well as standard company WHS and environmental field procedures. Standard field sampling sheets were used. Details recorded included WSP staff and contractors present, time on/off-site, weather conditions, calibration records and comments.
Sampling	Collection of samples was undertaken by appropriately qualified and experienced personnel following WSP standard field procedures which are based on industry accepted standard practice. Chain of custody was used to ensure the integrity of samples from collection to receipt by the laboratory.
Field equipment	Equipment was serviced and calibrated as per the manufacturer requirements.
Equipment decontamination	Undertaken after each sampling episode where equipment used was not dedicated. Rinsate blanks to be non-detect for the potential contaminants (one rinsate blank per day). Field sampling procedures conformed to WSP QA/QC protocols to prevent cross contamination, preserve sample integrity, and allow for collection of a suitable data set from which to make technically sound and justifiable decisions with data of satisfactory usability. QA/QC sample results are presented in in Appendix E.
Transportation	Samples were stored in chilled eskies on-site and during transport via courier to the laboratory. A chain of custody form was completed on-site and sent with the samples. The laboratory confirmed receipt of the samples and specified the condition on delivery and the scheduled analyses. Appropriate holding times were met. Trip blank samples were carried during field works (at a rate of one per sample batch) to assess contamination through field activities and transport. Results were below laboratory PQLs.
Field QA/QC	Four rinsate blank was collected during the soil field works and analysed for TRH and BTEX compounds. All results were below PQLs. Four trip blanks were analysed for BTEX compounds and naphthalene. All results were below PQLs. One trip spike was analysed for BTEX compounds. Recovery results were reported between 88% and 90%. This was considered acceptable. QA/QC sampling was undertaken to industry standard procedures including approximately 1 in 20 blind duplicates (intra-laboratory) to the primary laboratory and approximately 1 in 20 blind duplicates (inter-laboratory) to the secondary laboratory. Field and laboratory acceptable limits are between 30-50% RPD as stated by AS 4482.1-1997. Non-compliances have been documented in Section 9.2 of this report.
Laboratory analysis	Analysis was carried out by laboratories with NATA certification for the required analyses. Detection limits were considered sufficient to enable comparison against the appropriate guidelines.

ITEM	OBJECTIVES MET
Acceptable limits for QA/QC samples	Primary laboratory QA/QC acceptance limits for recovery of surrogates, control samples are matrix spikes to be 70 to 130% for organics and 80 to 120% recovery for inorganics and waters. All method blanks to be less than PQL.
Reporting	Report generally complies with the NEPM (2013).

9.1 FIELD QA/QC

The following sections discuss the field QA/QC program. Summary tables of QA/QC results are provided as Table E7 in Appendix E, and the results for internal and external QA/QC procedures are provided within the laboratory analysis reports in Appendix G.

9.1.1 BLIND DUPLICATES

9.1.1.1 ANALYTICAL PROGRAM

The field QA/QC soil sampling program comprised collection and analysis of four intra-laboratory duplicate (QA02, QA04, QA05 and QA07) and four inter-laboratory duplicate (QA02A, QA04A, QA05A and QA07A) of primary soil samples TP34_0.1, TP26_0.15, TP09_0.5 and TP05_0.3 respectively and these samples were analysed for the same analytical suite as the corresponding primary samples.

No field duplicate analysis was undertaken for asbestos quantification. The purpose of collecting duplicate samples is to measure the potential for inaccuracy in sample results due to field or laboratory procedures. Analysis of anonymised duplicate samples by the primary and secondary laboratories serves to determine the degree to which sample analyses which should provide identical results do, in fact, provide them. The way this is measured is through the calculation of RPDs.

For contaminants which are discrete within the matrix being sampled, such as bonded asbestos, fibrous asbestos or asbestos fines in soil, the duplication of a particular sample does not logically support the objective of duplicate sampling. Chemical contaminants tend, through a variety of processes, to diffuse towards homogeneous concentrations. However, as asbestos contamination represents foreign bodies present in the soil which do not diffuse except through mechanical mixing there is no logical expectation of similar quantities in any two discrete samples, even two samples split from one larger one. Therefore, the results of the analyses of two such samples should not be expected to adhere to the same RPD criteria by which chemical contaminants are measured.

9.1.1.2 RPDS

RPDs were calculated for the primary and duplicate samples for assessment of the data quality, in particular for assessment of the reproducibility of the analytical data measurements or ‘precision’ given the adopted field and laboratory methods.

The RPDs were calculated using the formula below, and the results are presented in Tables E7in Appendix E.

$$RPD\% = \frac{|Ro - Rd|}{|(Ro + Rd)/2|} \times 100\%$$

Where Ro is the primary sample and Rd is the primary duplicate.

The RPD values were compared to the 30–50% RPD acceptance criterion outlined in Australian Standard AS 4482.1 (for non- and semi-volatiles in soil) and NEPM (2013) Schedule B3. For volatile compounds no published RPD acceptance criteria exists, however RPDs of <100% are considered acceptable where concentrations are at least 10 times the PQL. RPDs for results less than the PQL were not calculated. In instances where results were greater than the PQL for the one

sample, but below PQL for the corresponding primary or duplicate sample, a result equal to the PQL was adopted in order to calculate an RPD.

RPD exceedances were reported as follows:

- Exceedance for chromium (74%) and its corresponding inter-laboratory duplicate (QA02A).
- Exceedances for arsenic (100%) and its corresponding inter-laboratory duplicate (QA04A).
- Exceedances for nickel (85%) and zinc (74%) for primary sample TP09_0.5 and its corresponding inter-laboratory duplicate (QA05A).

It is considered that these RPD exceedances are generally a function of low concentrations of these contaminants being present (less than 10 times the PQL), and that laboratory precision in terms of percentage differences is inherently low when analysing low concentrations.

All other RPDs were considered to be acceptable.

9.1.2 BLANKS/SPIKES

Four rinsate blanks, four trip blank and one trip spike were also collected and analysed for each day of field work. All results for blank samples were below PQLs.

Results for the trip spike were between 80% and 90%, considered to be acceptable.

Quality control parameter frequency compliance, provided by both laboratories, indicated that quality control analysis was undertaken within the required frequency and matrix spike recoveries were reported to be within recovery limits.

9.2 SUMMARY OF QA/QC RESULTS

WSP considers that the sample collection, documentation, handling, storage and transportation procedures utilised are of an acceptable standard and the analytical results provided by the laboratories are deemed reliable and complete, therefore the data are considered fit for purpose.

It is considered that the QA/QC procedures and results were acceptable and that the conclusions of the report have not been significantly affected by the sampling or analytical procedures. Based on the results of laboratory QA/QC samples and the sampling and handling procedures used for the collection and analysis of soil, the data were considered representative and appropriate for use in this assessment.

10 DISCUSSION OF RESULTS

10.1 SOIL

10.1.1 SOIL LABORATORY RESULTS

Soil analytical results are provided in Appendix E with laboratory certificates provided in Appendix G.

Soil samples were generally collected from soil surface (0.0-0.1 mBGL), 0.2-0.3 mBGL, 0.4-0.5 mBGL, 0.9-1.0 mBGL, and every metre thereafter (every 0.5 m in the boreholes selected for salinity testing, including in the fill). At least one sample was analysed from each investigation location.

Concentrations of TRH fractions, OCPs, OPPs, PAHs and PCBs in all soil samples selected for analysis were below the laboratory limit of reporting (LOR) or below the adopted assessment criteria.

Heavy metal concentrations were below the site assessment criteria in all samples.

Asbestos fibres were not detected in any of the 40 samples tested.

10.2 SALINITY AND SODICITY RISK

Soil at the surface was generally non-saline to slightly saline with some zones of moderately saline soils in the south of the site. The underlying residual clays and weathered shales were predominantly ranked slightly to moderately saline. The deeper weathered sandstone identified in TP18 and TP21 were found to be very saline.

The results indicate a general increase of salinity with depth. Soil salinity can impact upon plant growth, suitability of surface water bodies as habitat and affect construction materials and site infrastructure.

Soil testing for ESP indicated that soils on the site were generally sodic to highly sodic with soil sodicity increasing with depth. Soil sodicity reduces the ability of colloids to bind together and thus increases the risk of soil erosion.

10.3 UPDATED CSM

A key component of understanding the risks posed by potential contaminants, and how to manage them is the development of a contaminant Conceptual Site Model (CSM). In essence for a risk to exist there must be a source of contamination, a potential receptor (e.g. a human or ecological community) and a plausible pathway that links the two. This is known as a source-pathway-receptor analysis. If any one of these components is absent there is no unacceptable risk.

Table 10.1 provides a qualitative risk assessment by considering the potential for a pathway to develop between various sources and receptors.

Table 10.1 Source Pathway Receptor analysis

POTENTIAL SOURCE	PLAUSIBLE PATHWAY	POTENTIAL RECEPTOR	QUALITATIVE RISK	COMMENTS / RATIONALE
Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), TRH and BTEX compounds, PAHs, OCPs/OPPs, PCBs, VOCs, asbestos, herbicides, TNT, RDX.	Direct contact or ingestion	Future construction workers	Negligible	All soil results obtained in this investigation are less than direct contact criteria (hydrocarbons) and adopted assessment criteria.
		Future site occupants	Negligible	No soil results obtained in this investigation exceeded health investigation levels for low density residential use.
	Vapour intrusion	Future site occupants	Negligible	No soil results obtained in this investigation exceed HSLs on the site.
	Uptake by plants	Site Flora	Negligible	No soil results obtained in this investigation exceeded ecological thresholds or EILs.
	Migration in groundwater	Ecology of nearby creeks and ponds	Negligible	No soil results obtained in this investigation exceeded ecological thresholds or EILs.
Salinity and sodicity indicator analytes including pH, electrical conductivity (EC), chloride, sulfate and exchangeable cations in soil	Direct exposure of structures to aggressive soil conditions	Future structures on site	Medium	The results indicate a general increase of salinity with depth. Soil salinity can impact construction materials and site infrastructure.
	Potential for erosion and sediment generation in runoff	Future development works	Medium	Soils tested on the site were generally sodic in nature with sodicity increasing with depth. Sodic soils present an elevated erosion hazard on-site.

11 CONCLUSIONS

WSP Australia Pty Ltd (WSP) was commissioned by RCC to undertake an environmental site assessment at the site. The location and boundaries of the property and the site are shown on Figures 1 and 2 respectively.

The site comprises an area of vacant land approximately 28,360 m^2 and the proposed redevelopment will comprise the construction of a primary school in the south-east portion of the site, with a playing field in the northern portion of the site.

The objectives of the investigation were to:

- assess the current contamination status of the site
- assess the potential risks associated with contamination (if identified) at the site, with respect to the proposed future land use as a school
- provide recommendations for potential management or remediation requirements, if required
- undertake salinity testing and provide a salinity assessment for the site.

The scope of works for the DSI comprised:

- mechanical boring at 40 different locations (TP01-TP40) across the site, using a hand auger to a depth of 1.5 metres below ground level (mBGL) in conjunction with a drill rig to reach a maximum depth of 3.2 mBGL
- collection of soil samples at locations from the surface (0.0-0.1 mBGL), 0.2-0.3 mBGL, 0.4-0.5 mBGL, 0.9-1.0 mBGL, and every metre thereafter (every 0.5 m in the boreholes selected for salinity testing, including in the fill)
- collection of asbestos presence/absence samples at the same depths as the soil samples from all locations
- laboratory analysis of selected representative soil and asbestos samples for the contaminants of concern identified at the site
- preparation of this DSI report which focuses on assessing the soil contamination status of the site (including a dryland salinity assessment), assessing the need for remediation at the site, and evaluating the suitability of the site for the proposed potential future land uses.

Surface soils are generally non-saline to slightly saline. This indicates that in the sites current form, site structures at the surface are unlikely to be affected by dryland urban salinity. Salinity on the site appears to generally increase with depth. Deeper structures (including footings, piles and service trenches) should have salinity resistant materials incorporated into their design.

Soils tested on the site were generally sodic in nature with sodicity increasing with depth. Sodic soils present an elevated erosion hazard on-site. Development works should be planned to accommodate for the elevated potential for erosion and sediment generation in runoff and the final development should ensure adequate protection of soils (e.g. through maintenance of vegetation coverage).

Based on the analytical results, there was negligible soil contamination impact identified on or beneath the site. Soil samples reported no contaminants of concern above the adopted HILs, EILs or HSL guidelines, therefore WSP are of the opinion that the site is suitable for the proposed development.

12 LIMITATIONS

Scope of services

This environmental site assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

Reliance on data

In preparing the report, WSP has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP

Environmental conclusions

In accordance with the scope of services, WSP has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions.

Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

Report for benefit of client

The report has been prepared for the benefit of the client and no other party. WSP assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

Other limitations

WSP will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

13 REFERENCES

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NSW Government Water Information website, http://allwaterdata.water.nsw.gov.au/water.stm

WA DoH 2009, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*

APPENDIX N – PENRITH CITY COUNCIL MEETING MINUTES

Minutes.

Meeting Title:	Penrith City Council – Jordan Springs Public School
Date:	5th September 2019
Time:	9am
Location:	Penrith City Council
Attendees:	Gavin Cherry (GC), Development Assessment Coordinator Stephen Masters (SM), Acting Development Engineering Coordinator Graham Green (GG), Senior Traffic Engineer Joshua Romeo (JR), Senior Waste Planning Officer Carlie Fulton (CF), Senior Environmental Health Officer Jim Lewis (JL), School Infrastructure NSW Jacqueline Sellen (JS), TSA Management Darren Vosso (DV), Richard Crookes Construction Tom Hemmett (TH), Richard Crookes Construction
Apologies:	-
Distribution:	Gavin Cherry Richard Crookes Construction SINSW

Jordan Springs Public School is currently pending State Significant Development determination. Notwithstanding documentation issued throughout the SSDA process, per the draft conditions received, the project team would like to commence consultation with Council regarding the development and Council requirements. Please refer to supporting documentation provided:

- B5 116038-Jordan Springs-Dilapidation Report
- B15 Traffic and Pedestrian Management Sub-Plan
- B18 Soil and Water Management dwgs
- B31 Refuse Swept Path
- B28 Landscape Concept Strategy
- B28 Operational Swept Paths

Note, condition numbering is per SSD 9354 determination received 5th September 2019.

Item	Description	Responsible
1.0	**Introductions**	
1.1	Welcome all meeting members. GC will be the conjugate for Council correspondence, JS will coordinate School Infrastructure/Richard Crookes requirements via GC.	Note
2.0	**Project Overview**	
2.1	Jordan Springs Public School State Significant Development Application is expected to be determined by 5/9/19. The project team are targeting getting onsite by	Note

	23/9/19 to maintain program. Penrith Council confirmed they are happy to work with the project team to address consent requirements.	
2.2	The site has completed Early Works per the DA with Penrith Council. A number of SSD conditions relate to works already undertaken as part of the Early Works.	Note
3.0	**B5 Protection of Public Infrastructure**	
3.1	GC confirmed that the dilapidation reports have been received by Council and will be distributed to the Assets team. GC to advise on any feedback received.	GC
4.0	**B15 Construction Traffic and Pedestrian Management Plan (CTPMP)**	
4.1	Construction traffic has been managed suitably by Richard Crookes for the Early Works DA works. The CTPMP for the main works denotes the same truck routes and management systems as those already approved for Early Works.	Note
4.2	CTPMP was reviewed by GG and SM. No issues or concerns were noted with the report.	Note
5.0	**B18 Construction Soil and Water Management Plan (CSWMP)**	
5.1	Per management strategies implemented for the Early Works, construction soil and water management will continue for the main works. No issues raised by CF in relation to the CSWMP.	Note
6.0	**B28 Operational Waste Storage and Processing**	
6.1	TSA issued swept paths and landscaping plans to Council prior to the meeting. Operational waste collection for the site will be via a private contractor. Per the SSD consent conditions, collection will be outside of school hours to minimise any conflicts with pedestrians or other vehicles. Penrith Council design guidelines are available on the website. JR will email items to be reviewed as part of the design. Penrith Council preference is to have a refuse loading area that is separate from carparking to eliminate potential conflicts. *Post meeting update: JR provided guidelines and design notes.*	JR
6.2	Prior to operation a Plan of Operations will be developed (see D31 of the consent conditions). This will include details, as advised by Penrith Council, such as size of refuse vehicle, size of bins, time of collection, acoustic impacts, placement of overhead lines that may impact access of the large truck.	Note
7.0	**B31 Operational Access**	
7.1	Swept paths of the largest refuse vehicle was provided to Penrith Council prior to the meeting. Swept paths demonstrated that has sufficient accessibility for the refuse vehicle with an allowance for driver error.	Note
8.0	**B21 and 22 Roads and Pedestrian Infrastructure**	

8.1	Section 138 to be submitted to Penrith Council via GC per condition timing requirements. DV confirmed public domain works are not programmed to commence immediately. The project team will arrange the required documentation to support the application. Penrith advised that the s138 is to include landscaping plans which are consistent with existing streetscape design.	Note
8.2	Approval of B22 requirements including the raised pedestrian crossing which require Traffic Committee (LTC) approval will take up to three months. The LTC meets the first Monday of each month and GG would require two weeks to review design documentation prior to presenting for approval. *Action: Richard Crookes to submit Concept Design to Council via GC for comment prior to finalising Detailed Design for LTC approval.*	DV/TH
8.3	Council preference is for bus shelters to be provided in lieu of a bus sign only. Council to issue their design standards for bus shelters. *Post meeting update: bus shelter information received.*	Note
9.0	**Playing Field Levels**	
9.1	The project team are reviewing the potential for raising the sports field by approximately 1 meter to manage a large amount of existing fill on the site. Council advised that the acoustic and privacy impacts of this change would require review prior to approval. Landscaping to buffer any impacts should be considered. Council would consider modifying the Early Works DA to address changed ground levels on the site. *Action: Richard Crookes to amend the noise modelling at the Northern boundary to consider the increased level and include a cross section with the existing batter and proposed level change.*	DV/TH
10.0	**B33 Public Domain Works**	
10.1	Public domain works to be consistent with existing streetscape design. The Infrastructure Bond is $100,000, and the Maintenance Bond will be held for 12 months post completion. *Action: DV/TH to submit required documentation for approval, when required per construction program.*	DV/TH
11.0	**Other Business**	
11.1	The design of the man-made creek is required in order for a Flood Emergency Evacuation Plan to be developed. Council confirmed current contacts are correct. *Post meeting update: hydraulic designs received.*	Note
11.2	JS to cc Simone Muscat in GC correspondence.	Note

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