RICHARD CROOKES
CONSTRUCTIONS

ALEX AVENUE PUBLIC SCHOOL
NO: 1157

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

3 June 2020

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Written By: Isaac Pinkerton Site Engineer	
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1 INTRODUCTION

1.1 PROJECT OVERVIEW

The Project consists of a new modular built primary school in Schofields of which RCC is the principal contractor. The project is located at end of Farmland Drive and corner of the proposed future Pelican Road. Access to site is off Farmland Drive.

The works are the design and construction of the Alex Avenue Modular Primary Schools. The project offers:

- Extensive school grounds and additional landscaping suitable for 1200 (Core 35) students at Alex Avenue 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. Installation of inground services and construction of an OSD tank have been dealt with under a REF planning approval pathway.

Contract type GC21 Milestones No. 3

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

1.2 HOURS OF WORK

As per condition B14 (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 B14 (a)(ii);

Chris Evans

0400 711 424

EvansC@richardcrookes.com.au

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)
- Construction Noise and Vibration Management Plan (Acoustic Logic)
- Construction Waste Management Plan (EcCell)
- Construction Soil & Water Management Plan (Northrop)
- Unexpected Finds Protocol (Greencap)
- Unexpected Finds Protocol for AHMP (Biosis)
- Detailed Environmental Site Assessment (Greencap)
- Aboriginal and non-Aboriginal Heritage Recommendations (Biosis)

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 28 Farmland Drive, Schofields NSW 2762, 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 B14 (g) and C24 & C25, refer to Appendix K 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 B14 (a)(iii) and C29 & C20, 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 B14 (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 C23, 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 B14 (a)(v) and C21 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 B14 (d) (h) and C26 to C28. For B14 (g) condition requirements, see unexpected find protocol prepared by Greencap Environmental in Appendix J and Appendix L. 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. As per condition B14 (i) the procedures to ensure that the proposed works do not result in a change of contamination risk for the site will be in accordance with C22 of this consent.
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.

ELEMENT	WASTE MANAGEMENT AND MINIMISATION QUALITY
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.
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 C12 to C17 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 B14 (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 B12 and B14 (a) (vii) external lighting to the proposed Alex Avenue 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 B14 (a) (viii), 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 9368).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.

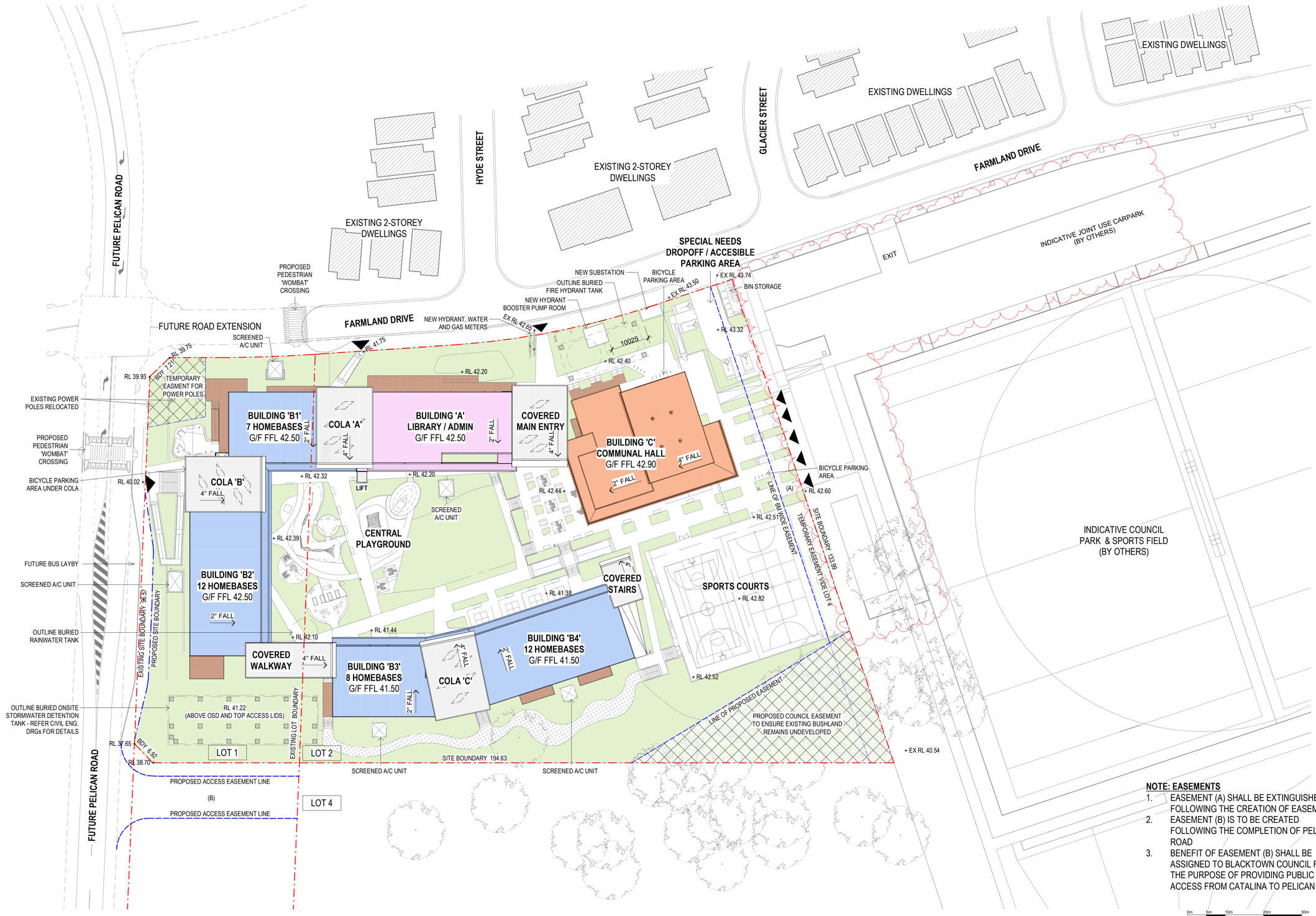
Table 14 details the general procedures to be undertaken when non-compliances and environmental incidents occur.

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.** • **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 & PLAN



1 SITE AND ROOF PLAN
1 : 500

NOTE: EASEMENTS

1. EASEMENT (A) SHALL BE EXTINGUISHED FOLLOWING THE CREATION OF EASEMENT (B)
2. EASEMENT (B) IS TO BE CREATED FOLLOWING THE COMPLETION OF PELICAN ROAD
3. BENEFIT OF EASEMENT (B) SHALL BE ASSIGNED TO BLACKTOWN COUNCIL FOR THE PURPOSE OF PROVIDING PUBLIC ACCESS FROM CATALINA TO PELICAN ROAD

0m 5m 10m 20m 30m

General Notes:
1. This drawing is the copyright of Group GSA Pty Ltd and may not be altered, reproduced or transmitted in any form or by any means in part or in whole without the written permission of Group GSA
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
1	FOR CONSTRUCTION	02.08.2019
2	IFC AMENDED AS INDICATED	15.10.2019
3	SSD SUBMISSION	15.11.2019
4	REVISED SSD SUBMISSION	22.11.2019
5	REVISED SSD SUBMISSION	21.02.2020
6	REVISED SSD SUBMISSION	30.04.2020

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.

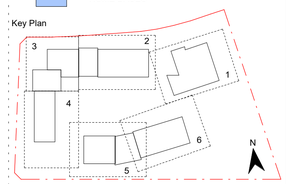
LEGEND

- Site boundary
- Proposed boundary
- Extent of easement
- Existing neighbouring buildings
- Pedestrian entry
- Vehicular entry

ZONES

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

Key Plan



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

T +612 9361 4144 F +612 9332 3458

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

Project Title
ALEX AVENUE 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	JS

Project No	Drawing No	Issue
180645	AA-AR-1100	6

30/04/2020 5:23:30 PM

APPENDIX B – ASBESTOS MANAGEMENT PLAN

RICHARD CROOKES
CONSTRUCTIONS

ALEX AVENUE PUBLIC SCHOOL
1157

ASBESTOS MANAGEMENT PLAN

14 May 2020

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 NSW	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)
14 May 2020	Original issue	

POSITION	NAME	SIGNATURE	REVISIONS			
			<DATE>	<DATE>	<DATE>	<DATE>

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

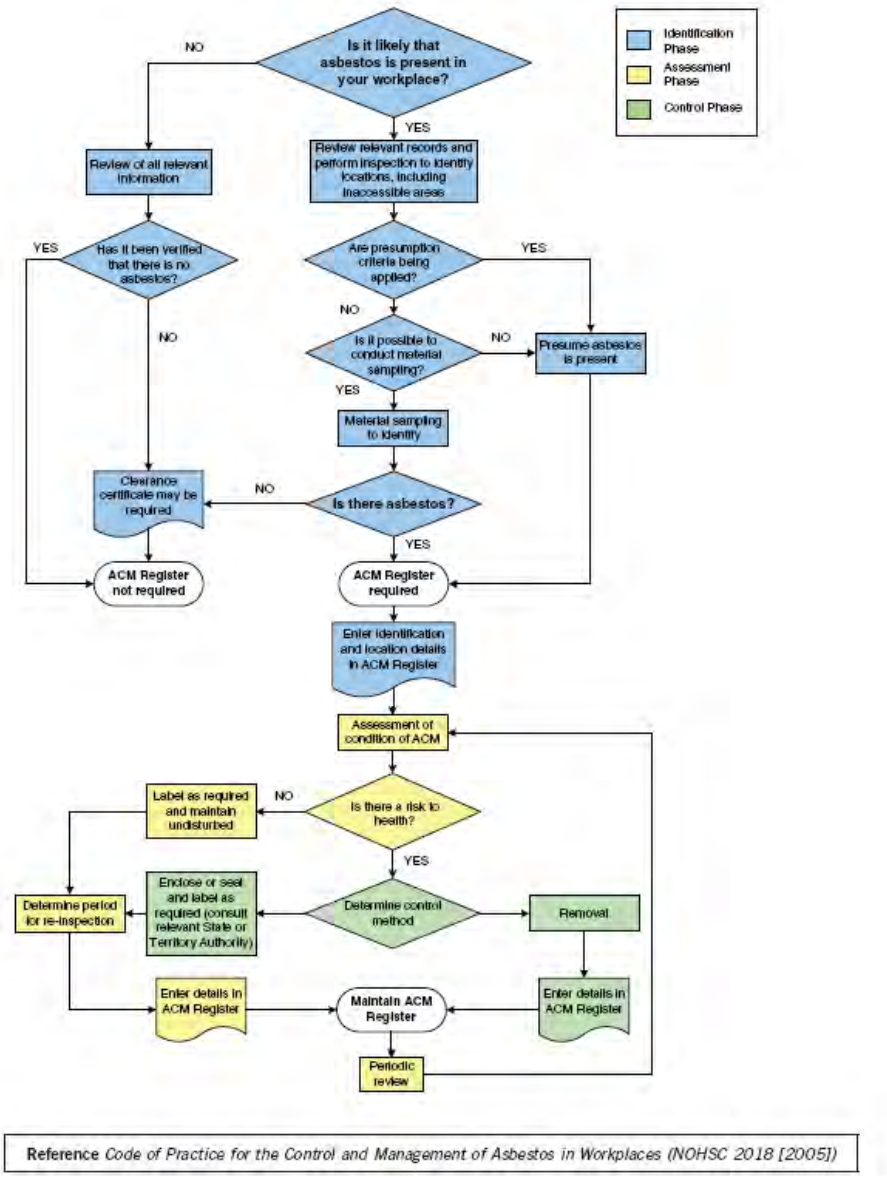


Figure 1: General principles of an asbestos management plan

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/QUEENSLAND

Relevant State legislation includes:

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

3.2 CODE OF PRACTICE/GUIDES

Key Codes of Practice and Guidance Notes include:

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

3.3 RCC REQUIREMENTS

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

4 ORGANISATIONAL RESPONSIBILITIES

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

5 CONTROL OF ASBESTOS HAZARDS

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

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

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

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

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

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

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

5.1 REMOVAL OF ACM

5.1.1 LICENSED CONTRACTORS

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

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

5.1.2 SAFEWORK – NOTIFICATION

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

The Notification is required to be lodged a minimum of seven (7) working days prior to starting the removal works. Safework will review the application and return the first two pages,

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

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

5.1.3 SAFEWORK – PERMIT

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

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

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

5.1.4 AIRBORNE FIBRE MONITORING

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

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

5.1.5 CLEARANCE CERTIFICATES

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

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

5.1.6 WASTE

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

To achieve "final completion" of an asbestos removal activity, RCC require verification that the asbestos waste has been transported and disposed of in accordance with State/Territory legislative requirements. A copy of the EPA Waste Tracking document is the required

documentation for disposal, and a copy of the necessary License for carrying out this removal and disposal is the required documentation for transportation.

5.2 RECORD KEEPING

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

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

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

5.3 LABELLING

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

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

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

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

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

An asbestos removalist must ensure that:

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

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

5.4 WARNING SIGNS

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

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

5.5 SAFE WORK PRACTICES

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

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

5.5.1 MAINTENANCE PROCEDURES

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

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

5.5.2 TOOLS AND EQUIPMENT

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

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

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

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

Vacuum cleaners used for asbestos cleaning must comply with:

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

5.5.3 RCC ASBESTOS REMOVAL PERMIT

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

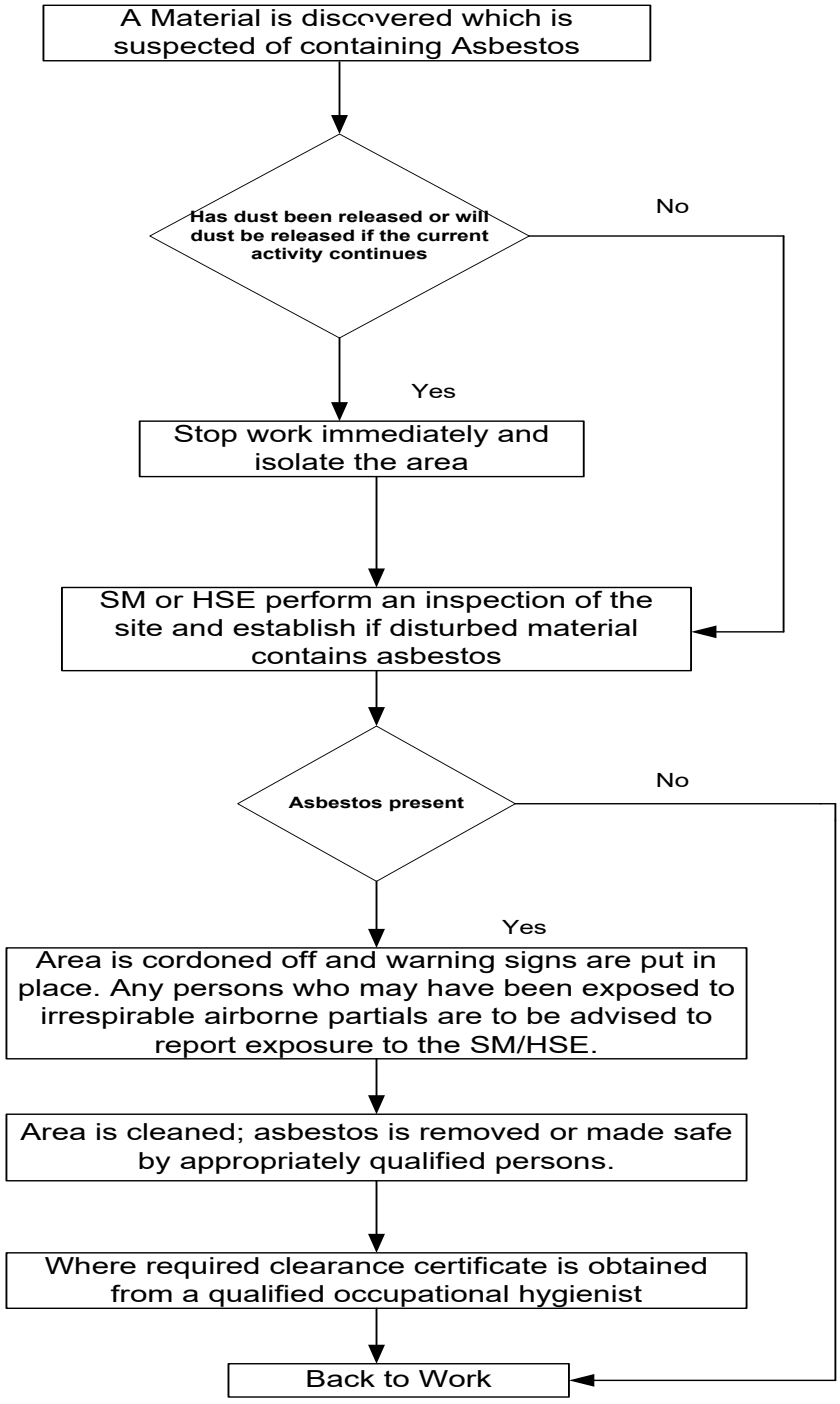
Before being issued with an Asbestos Removal Permit, individuals will be required to peruse the RCC Asbestos Management Plan and the Asbestos Register. Where practicable, contractors should be made aware of the requirements of the plan prior to tendering to ensure they allow for such requirements when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

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

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

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

6 INCIDENT RESPONSE FLOW CHART



7 DOCUMENTATION REQUIREMENTS

7.1 ASBESTOS CONTAINING MATERIAL (ACM) REGISTER FORM 21.1A

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

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

Supporting information that should be included in the register is:

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

7.2 ASBESTOS REMOVAL PERMIT FORM 21.1B

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

The requirements for supporting documentation are listed within the permit.

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

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

8 TRAINING

8.1 ASBESTOS AWARENESS TRAINING

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

8.2 ASBESTOS REMOVAL TRAINING

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

APPENDIX 1 – 21.11 ASBESTOS CONTAINING MATERIAL (ACM) REGISTER

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

APPENDIX 2 – 21.11A ASBESTOS REMOVAL PERMIT

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

Asbestos Type

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

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

RCC Emergency Contact information

Name of RCC Contact:		Tel:	( )

Authorisation by company representative

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

RCC Representative Name:	Position:	Signature:

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

Weekly Review of Permit

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

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

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

Project Name:		Project Number :	

Clearance Certificate location / item details

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

Air Monitoring Results

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

Completion sign off by competent person

Copy of final clearance certificate attached ☐	Copy of waste transport receipt attached ☐	
Copy of waste disposal dockets attached ☐	Copy of ACM work permit attached ☐	

Name:		Position:		Signature:		Date:	

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

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

How will the SWMS control measures be			
Review date:		**Reviewer's signature:**	

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

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

		plastic bag 200 micron) All PPE to remain on till area is decontaminated. Scrape / clean off excess materials from boots, tools etc with damp rag, into Asbestos waste bag. All disposable PPE to be placed in Asbestos waste bag and not re-used.
Disposal of waste	Incorrect disposal of waste	Materials to be disposed of at registered waste management fascility, capable of receiving Hazardous waste. Receipts of waste disposal to be collected and recorded in Asbestos register.
Other items as identified		

Project _____ Company _____

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Plant & Equipment: (Log books to be supplied)	

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

Project Company

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

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

SYDNEY

LEVEL 3, 4 BROADCAST WAY
ARTARMON NSW 2064

PO BOX 1024
CROWS NEST NSW 1585

PHONE: +61 2 9902 4700
FAX: +61 2 9439 1114

NEWCASTLE

LEVEL 1, 118A BELFORD ST
BROADMEADOW NSW 2292

PO BOX 835
HAMILTON NSW 2303

PHONE: +61 2 9902 4700
FAX: +61 2 6766 3022

TAMWORTH

SUITE 1, 493 PEEL ST
TAMWORTH NSW 2340

PO BOX 576
TAMWORTH NSW 2340

PHONE: +61 2 6766 5225
FAX: +61 2 6766 3022

ACT

UNIT 1, 155 NEWCASTLE ST
FYSHWICK ACT 2609

PO BOX 771
FYSHWICK ACT 2609

PHONE: +61 2 6143 2900
FAX: +61 2 6280 8774

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Delivering Certainty

APPENDIX C - EXTERNAL LIGHTING COMPLIANCE

CERTIFICATE OF INSTALLATION

ELECTRICAL – EXTERNAL LIGHTING DURING CONSTRCTION

Site Details:					
Project Name.	Alex Avenue Public School				
Level/Unit no.	Ground	Street no. / Street name:	34 Farmland Drive		
Suburb:	Schofields	State:	**NSW**	Postcode:	2762
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:-

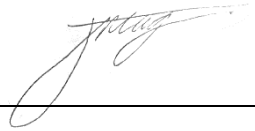
a)	The following Australian Standards:	AS 3000-2018, AS 4282 -2019

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:	14/05/2020

APPENDIX E - COMMUNITY CONSULTATION & COMPLAINTS HANDLING

NSW GOVERNMENT | Education

May 2020

School Infrastructure NSW

Community Communication Strategy

New primary school for the Alex Avenue community

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 B11**	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 Section 6 Section 8.5
• Through which the Applicant will respond to enquiries or feedback from the community; and	Section 8.5

State Significant Developments B11**	The community communications strategy addresses this in section
• 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
Include any specific requirements around traffic, noise and vibration, visual amenity, flora and fauna, soil and water, contamination and heritage	Section 3

1. Context

The NSW Government is investing $6.7 billion over 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, along with a record $500 million for the sustainable Cooler Classrooms program to provide air conditioning to schools. This is the largest investment in public education infrastructure in the history of NSW.

A new primary school for the Alex Avenue community in Schofields, located on Farmland Drive is underway. The project will include:

- Flexible learning spaces
- A library, hall, canteen and covered outdoor learning area (COLA)
- Staff and administration facilities
- Special program rooms
- Multipurpose games court

The new Alex Avenue primary school is classified as a state significant development, and has been assessed by the Department of Planning, Industry and Environment (DPIE). Consent was provided on 21 May 2020.

DPIE's web page on the project is https://www.planningportal.nsw.gov.au/major-projects/project/10036.

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 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, Industry & Environment (DPIE) and consent has been granted.

3.2.2. Project benefits

A project is underway to provide a new public school for the Alex Avenue community in Schofields. The project will include:

- 19 flexible learning spaces
- a library, hall, canteen and covered outdoor learning area (COLA)
- administration and staff facilities.

The new school is designed to accommodate up to 500 students from years K-6 and to allow for future expansion of up to 1000 students.

3.2.3. High-quality learning environment

The project will provide flexible 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 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, vibration 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. All works will be conducted in accordance with the Contractor's approved Construction Noise Management Plan. Vibration from works will be minimal and kept within acceptable levels of the Assessing Vibration: a technical guideline vibration criteria for day time periods.

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.

Construction works, including the delivery of materials to and from the site, will take place between 7am and 6pm Monday to Friday and 8am and 1pm on Saturdays. No night work is scheduled for this project. In line with the NWs

Environmental Planning and Assessment (COVID-19 Development – Construction Work Days) Order 2020, School Infrastructure NSW construction sites will now operate on weekend and public holidays during the COVID-19 pandemic.

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 construction activities as referenced in Condition C5 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 new primary school Alex Avenue 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

3.3.6. Fauna and vegetation

School Infrastructure NSW is committed to ensuring construction work has a minimal impact upon fauna and vegetation.

School Infrastructure NSW will comply with all Development Consent Conditions relating to the protection of fauna and vegetation, and will comply with all relevant mitigation measures listed in the Environmental Impact Statement (EIS).

Prior to construction, a Construction Environmental Management Plan (CEMP) will be prepared to govern the completion of all construction works. The CEMP will detail measures to be taken for the protection and management of fauna and vegetation, will be prepared in accordance with relevant guidelines and performance indicators, and will be prepared to the satisfaction of DPIE.

3.3.7. Soil and water

School Infrastructure NSW is committed to the appropriate management of soil and water on the construction site.

School Infrastructure NSW will comply with all Development Consent Conditions relating to soil and water management, and will comply with all relevant mitigation measures listed in the EIS.

Prior to construction, a CEMP will be prepared to govern the completion of all construction works. The CEMP will detail measures for the management of soil and water, will be prepared in accordance with relevant guidelines and performance indicators, and will be prepared to the satisfaction of the DPIE.

A suitably qualified and experienced consultant will prepare a Construction Soil and Water Management Sub-Plan (CSWMSP), which will form part of the CEMP. The CSWMSP will:

- describe erosion and sediment control measures to be implemented during construction
- provide a plan of how construction works will be managed in wet-weather events

- detail flows from the site to surrounding area
- describe the measures to be taken to manage stormwater and flood flows for small and large sized events
- include an Acid Sulfate Soils Management Plan (if required).

Erosion and sediment controls will be installed and maintained in accordance with the “Blue Book” – *Managing Urban Stormwater: Soils and Construction (4th edition)*. These controls will be implemented prior to the commencement of any other site disturbance works.

A rainwater harvesting system will be installed onsite and used on-site during construction. Approval will be obtained prior to the discharge of onsite stormwater to Council’s stormwater drainage system or street gutter.

Only approved soil and fill types will be used onsite. Accurate records will be kept on the volume and type of fill used onsite.

3.3.8. Visual amenity

Prior to construction, a CEMP will be prepared to govern the completion of all construction works. The plan will detail measures to maintain visual amenity, will be prepared in accordance with relevant guidelines and performance indicators, and will be prepared to the satisfaction of the DPIE.

The CEMP will include provisions for the management of outdoor lighting. The installation and operation of outdoor lighting will comply with both AS 4282-2019 – Control of the Obtrusive Effects of Outdoor Lighting and AS 1158.3.1-2005 – Lighting for Roads and Public Spaces – Part 3.1: Pedestrian Area (Category P) Lighting.

Visual amenity impacts will be limited during construction via the installation of appropriate site fencing and adherence to site housekeeping procedures.

3.3.9. Contamination

Prior to construction, a CEMP will be prepared to govern the completion of all construction works. The CEMP will detail contamination management measures, will be prepared in accordance with relevant guidelines and performance indicators, and will be prepared to the satisfaction of the DPIE.

The project site has been tested for contamination and is considered to be safe and suitable.

The CEMP will include protocols for the management of unexpected contamination discovered during the course of construction works.

3.3.10. Heritage

Prior to construction, a CEMP will be prepared to govern the completion of all construction works. The plan will detail measures to protect heritage matters, will be prepared in accordance with relevant guidelines and performance indicators, and will be prepared to the satisfaction of the DPIE.

The CEMP will include unexpected finds protocols for objects of Aboriginal or Historic heritage.

In the event that relics of Aboriginal heritage are discovered, all works in the immediate area will cease immediately, and consultation will occur with a suitably qualified archaeologist, registered Aboriginal representatives and DPIE to determine an appropriate management strategy.

In the event that relics of historic heritage are discovered, all works in the immediate area will cease immediately, and consultation will occur with DPIE to determine an appropriate management strategy.

3.4. Handover phase

3.4.1. Traffic and access

Construction work on the new primary school Alex Avenue 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, Alex Avenue in Schofields was completed today, and delivered brand new facilities including:

- 19 flexible learning spaces
- a library, hall, canteen and covered outdoor learning area (COLA)
- administration and staff facilities.

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)

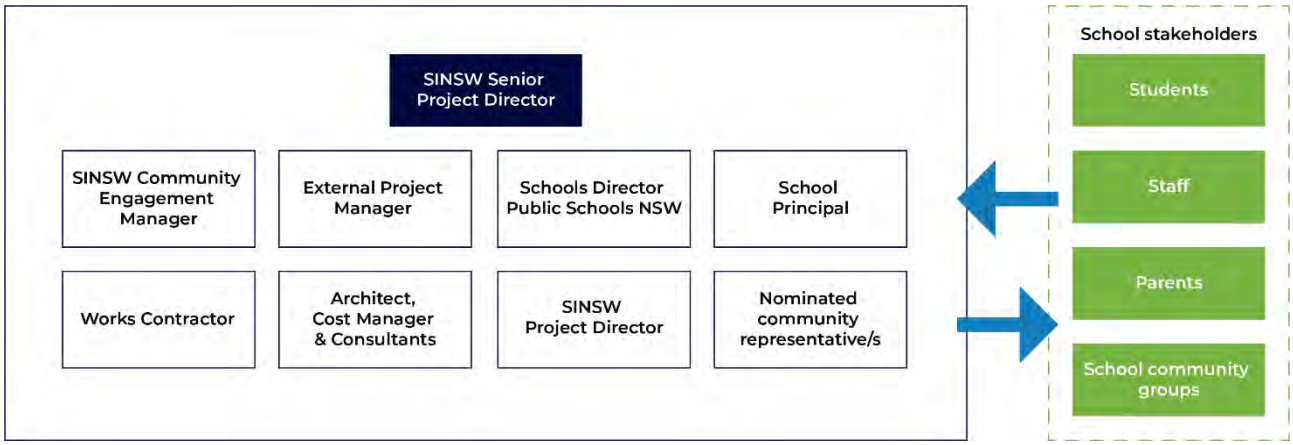
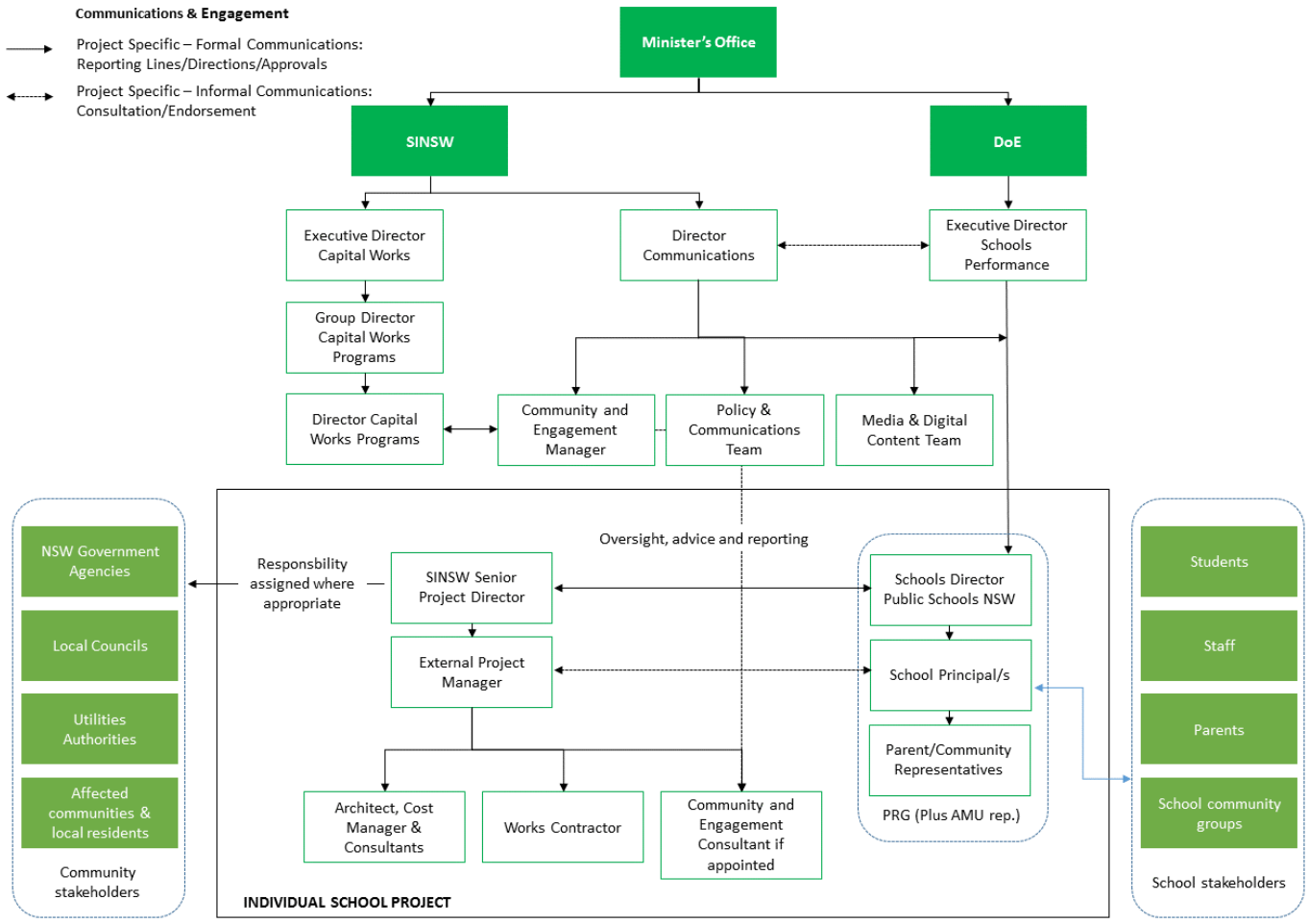


Figure 2 below maps how the department and SINSW will communicate both internally and externally.

Figure 2: SINSW Project Governance



5. Stakeholders

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 Government Member for Riverstone – *Kevin Conolly* ▪ Federal Government Member for Greenway – *Michelle Rowland*	▪ Meeting the economic, social and environmental objectives of state and federal governments ▪ Deliver 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, Industry and Environment ▪ NSW Environmental Protection Authority ▪ NSW Rural Fire Service ▪ Sydney Water ▪ NSW Heritage Council ▪ NSW Office of Environment, Energy and Science ▪ 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
Cultural and heritage interest ▪ Local Aboriginal Land Council ▪ Local heritage groups	▪ Discovery of cultural and heritage artefacts during construction
Local Council – Blacktown City Council ▪ Mayor ▪ General Manager ▪ Councillors ▪ Bureaucrats	▪ Schedule for construction and opening of school ▪ Impacts to the local community including noise, congestion and traffic ▪ Shared use of community spaces ▪ Providing infrastructure to meet the increase in 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 school during construction ▪ Construction impacts and mitigations ▪ Quality of infrastructure and resources upon project completion ▪ How to access the new school once completed

Stakeholders	Interest and involvement
Local community • All residents and businesses to the south of Schofields Road, up to Burdekin Road (bounded to the east by First Ponds Creek and Railway Terrace in the west)	▪ Noise and truck movements during construction ▪ Increased traffic and congestion on nearby streets ▪ Local traffic and pedestrian safety ▪ Changed traffic conditions for pick-up and drop-off ▪ Shared use of school facilities and amenities ▪ Visual amenity
Nearby public schools • Schofields Public School • Hambledon Public School • Riverbank Public School	▪ Impact on school resources ▪ Impact on current students ▪ Implications for teaching staff ▪ Possible impacts on enrolments and boundary changes ▪ Opportunities to view the new facilities
Adjoining affected landowners and businesses • All landowners on Farmland Drive • All landowners on Belford Street • All landowners on Glacier Street • All landowners on Hyde Street • All landowners on Heathland Avenue • Landowner - Blacktown City Council • Landowner – Catalina Developments • Landowner – Toplace Developments • Woolworths and BWS Schofields • HCafe • Dipeksha Hair and Beauty • Thirty 7 Candles • FJ Electrical • Rogue Cosmetique	▪ Noise and truck movements during construction ▪ Increased traffic and congestion on nearby streets ▪ Local traffic and pedestrian safety ▪ Changed traffic conditions for pick-up and drop-off ▪ Shared use of school facilities and amenities ▪ Environmental impacts during construction ▪ Visual amenity

6. Engagement Approach*

*** From 30 March 2020, the way we communicate has temporarily changed, please refer to Appendix A for a detailed up to date list of changed communication methods and tools. This particularly refers to face to face communication channels such as door knocks, information booths/sessions, face to face meetings and briefings.**

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

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 Infrastructure 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 To be distributed at info sessions or at other bigger events/ milestones in hard copy and also made available electronically.	As required

Communications Tool	Description of Activity	Frequency
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
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. Distributed 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 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.	Project completion (actual photography and video of completed project) Prior to project completion - artist impressions, flythrough, site plans and construction progress images are used
Presentations	Details project information for presentations to stakeholder and community groups.	As required

Communications Tool	Description of Activity	Frequency
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 Alex Avenue, in Schofields. 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 the new primary school Alex Avenue in Schofields is located on the SINSW website - https://www.schoolinfrastructure.nsw.gov.au/projects/a/alex-avenue-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. ▪ **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.	Project completion only

7. Engagement Delivery Timeline*

*** From 30 March 2020, the way we communicate has temporarily changed, please refer to Appendix A for more details on changed methods and tools. The table below outlines both traditional and alternative methods to be used in line with the changes.**

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

Table 4: Engagement timeline

Project Phase / milestone	Target Audiences	Proposed communication tools / activities / purpose as per Table 3	Timing / implementation
Prior to first delivery of components (modular buildings)	Near neighbours Local community	**Planned** • Works notification online and distributed to surrounding community • No doorknock – letterbox drop with 'door knock' letter template to adjacent landowners • Website update • SINSW email address and hotline • FAQs	June/July 2020
Main Construction works, including but not limited to: ▪ Works commenced ▪ Key impact periods – noise, dust, traffic, vibration ▪ Construction milestones	Local community Adjacent landowners Local Council State agencies Local teachers Prospective parents and students	**Planned** • Project update: letterbox drop and online • Works notifications • Door knocking to discuss works • Information booth • Information packs • Information boards • Website update • SINSW email address and hotline • Media release • Contact cards • FAQs • Project signage **Alternative methods where applicable:** • No doorknock – letterbox drop with 'door knock' letter template • Digital information booth (if required) with information boards and pack online	June 2020 to completion (at key construction events as required, as per our notification process in Table 5)
Term prior to project completion	School community Local community Adjacent landowners	**Planned** • Project update: letterbox drop and online • Information booth and	Term 4, 2020

Project Phase / milestone	Target Audiences	Proposed communication tools / activities / purpose as per Table 3	Timing / implementation
	Local Council Prospective parents and students	presentation • Information pack • Information boards • Website update • SINSW email address and hotline • Media release • Site visits **Alternative methods where applicable:** • Digital information booth (if required) with information boards and pack online	
Handover and welcome to new school	School community Local community	**Planned** • Media release • Website update • SINSW email address and hotline • Site visits • Thank you pack • Welcome pack	Day 1 Term 1, 2021
Opening	All	**Planned** • Media release • Official opening ceremony	TBC
Post-opening	All	**Planned** • Website remains live • Project signage remains installed • 1300 phone and email still active, and CRM still maintained for complaints and enquiries.	2021-2022 (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

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:

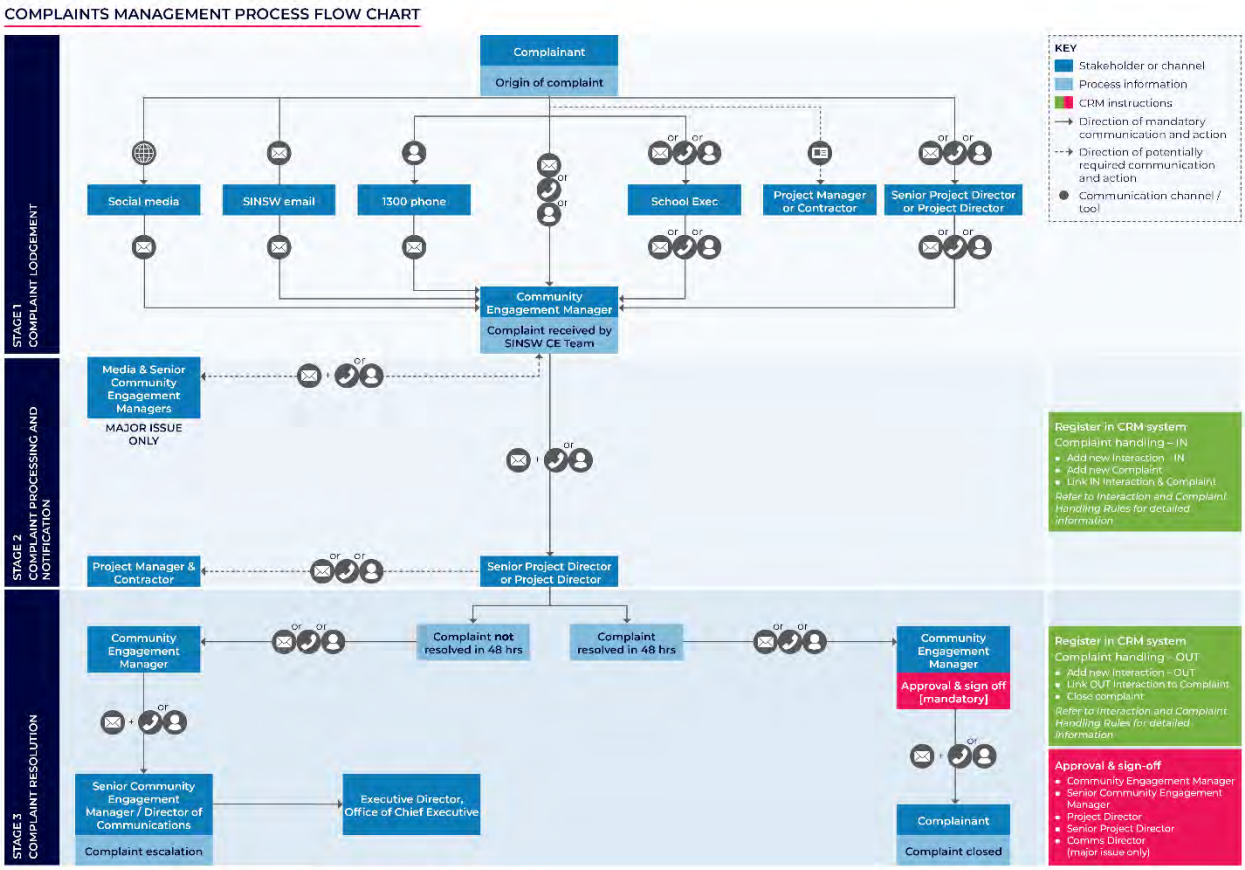
Table 6: Complaint and enquiry response time

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

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, Industry & Environment (DPIE) (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, Industry 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 A – Changing the way we communicate – community engagement alternative methods

Below are proposed alternatives to our standard mandatory requirements for community engagement effective as of 30 March 2020. These alternatives are proposed to ensure we continue to comply with SSD and DA conditions and that our communities can remain informed about our projects while adhering to social distancing requirements and NSW Health advice.

Our engagement principles for this period should continue to ensure our communications are:

- Simple
- Streamlined
- Accessible.

Mandatory requirements and alternatives at a glance:

SSD CONDITION	ALTERNATIVE
1300 community information line	No change
Advertising (print)	Promote online info session / generic single advert?
Call centre scripts	No change
Community contact cards	Contractors to hand out as required
CRM database	No change
Display boards	Digital version
Door knocks	No door knocks, use letterbox drop*
Face-to-face meetings/briefings	Phone call or teleconferencing
FAQs	No change
Information booths	No info booths: issue project update instead
Information sessions (drop in)	Digital version
Information pack	Digital version
Media releases/events	No change to media releases, no events to be held
Notifications	Distributed to school community via email from Principal Distributed to near neighbours via letterbox drop*
Photography, time-lapse photography and videography	Source photography if health advice permits

SSD CONDITION	ALTERNATIVE
	Use images and time-lapse from similar projects if unable to photograph site
Presentations	Digital version for PRGs/stakeholder meetings
Priority correspondence (RML)	No change
Project Reference Group	Skype meetings / teleconferencing
Project signage	No change if production and installation still possible; A4 print out delivered
Site visits	Site visits via phone/video/photography
School Infrastructure NSW email	No change
School Infrastructure NSW website	No change (may publish updates more frequently)
Welcome pack/ thank you pack	Welcome pack: Do not issue until school resumes Thank you pack: Issued when project is entirely complete

*alternative may change depending on distributor operations

Artist impression of the new primary school for Alex Avenue

New primary school for Alex Avenue community

Project update

May 2019

Investing in our schools

The NSW Government is investing $6 billion over the next four years to deliver more than 170 new and upgraded schools to support communities across NSW. In addition, a record $1.3 billion is being spent on school maintenance over four years. This is the largest investment in public education infrastructure in the history of NSW.

New primary school for Alex Avenue community

A project is underway to provide a new public school for the community in Schofields. The project will deliver core facilities to accommodate approximately 500 students, including:

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

The school will be designed to allow future expansion of up to 1,000 students.

Progress summary

Site establishment has been completed. A Development Application (DA) has been submitted to Blacktown Council for early works. The next stage of work can begin once the DA is approved.

Early works begin soon

Early works including bulk earthworks will begin once the DA is approved.

Once approved, work will take place between 7am and 6pm, Monday – Friday and 7am – 1pm on Saturdays.

Site signage is in place and shade cloth installed to minimise dust and ensure the safety of the local community.

We will continue to work with the contractor, Richard Crookes Constructions, to ensure any disruption to our neighbours is kept to a minimum.

We will provide further updates as the project progresses. Information about enrolments will be made available shortly.

If you have any questions about this project please contact us on the details below.

For more information contact:

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

NSW GOVERNMENT

APPENDIX F - CONSTRUCTION TRAFFIC & PEDESTRIAN MANAGEMENT SUB-PLAN

Version 2.3
29/05/2020

Construction Traffic Management Plan

Job Site End of Farmland Drive,
Schofields, 2762

RICHARD CROOKES
CONSTRUCTIONS

Jim's Traffic Control

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About This Project

Background:

This CTMP relates to development of The Proposed Development.
Company responsible for Construction: Richard Crookes Construction®
Approved: TBC
Consent to Operate from: TBC
Consent to Lapse on: TBC

Location:

The Work Site is located at the end of Farmland Drive, Schofields, 2762

Figure 1 – Location of Work Site

Figure 2 – Location of Work Site

Purpose:

The Purpose of this report is to satisfy the RMS and Blacktown City 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 Blacktown City 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 5.

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

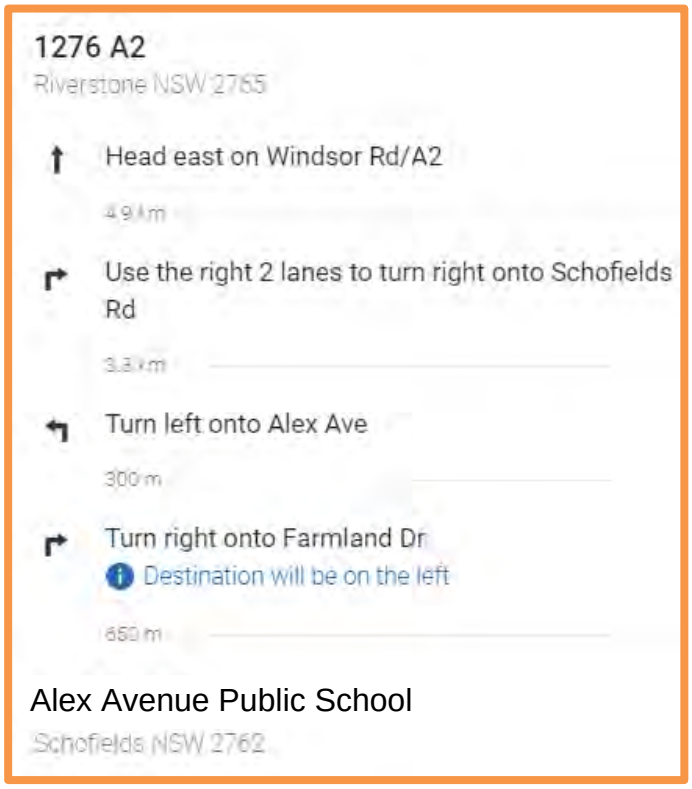
Access Routes:

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

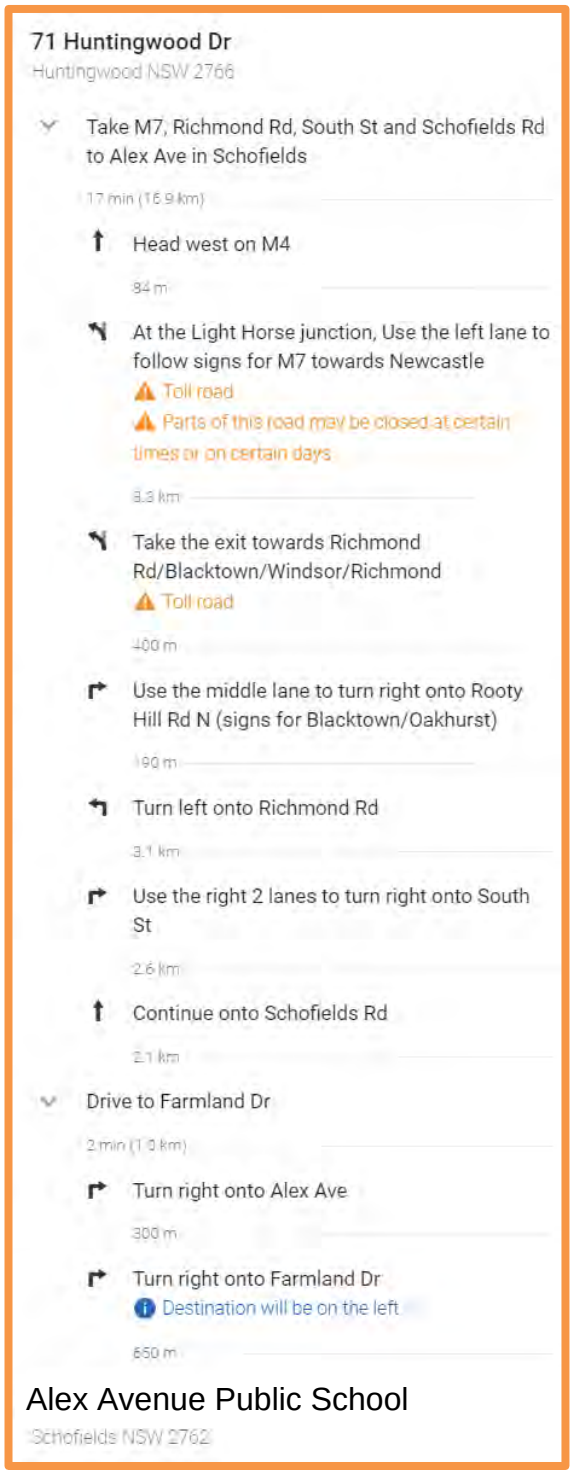
Vehicles accessing the site will use State roads unless otherwise stated in this document.

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

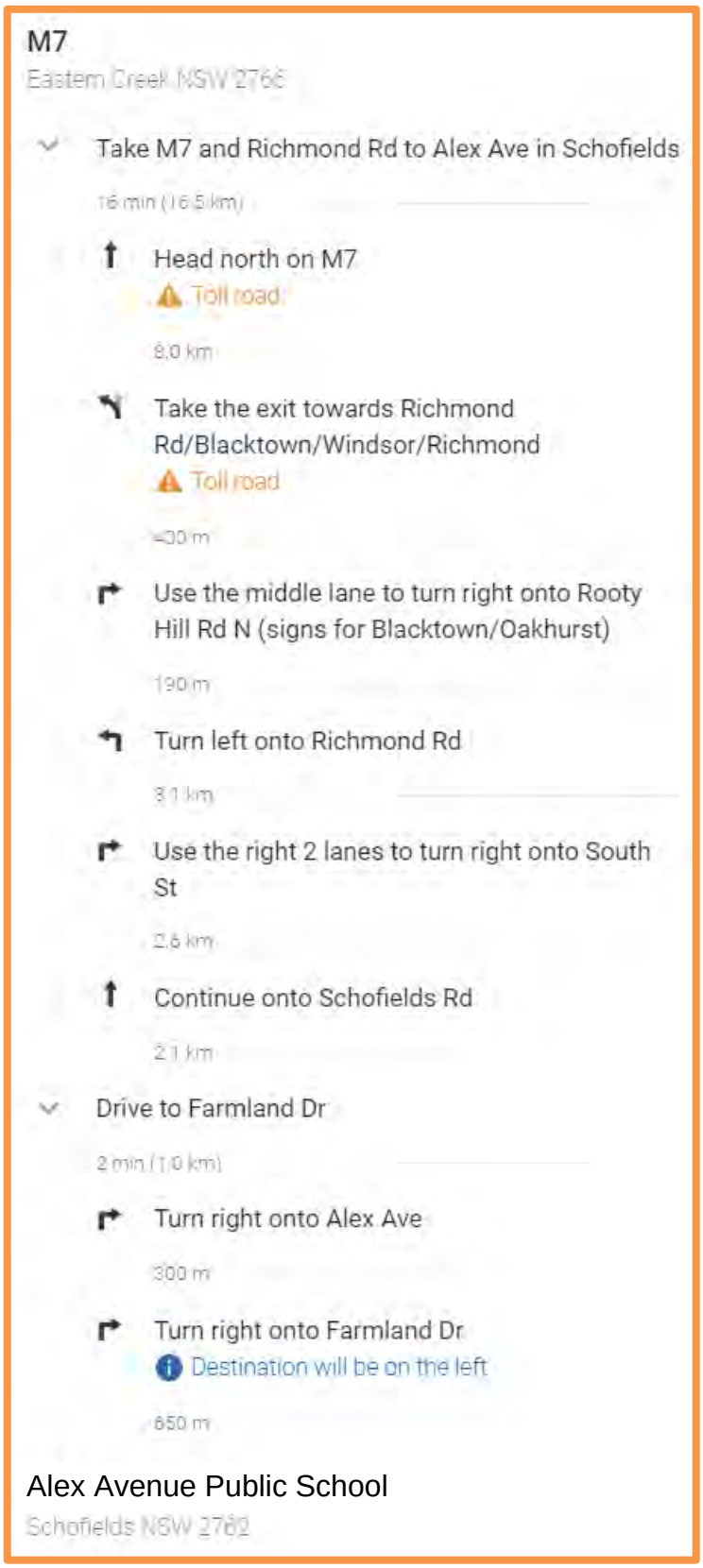
Northern Access:



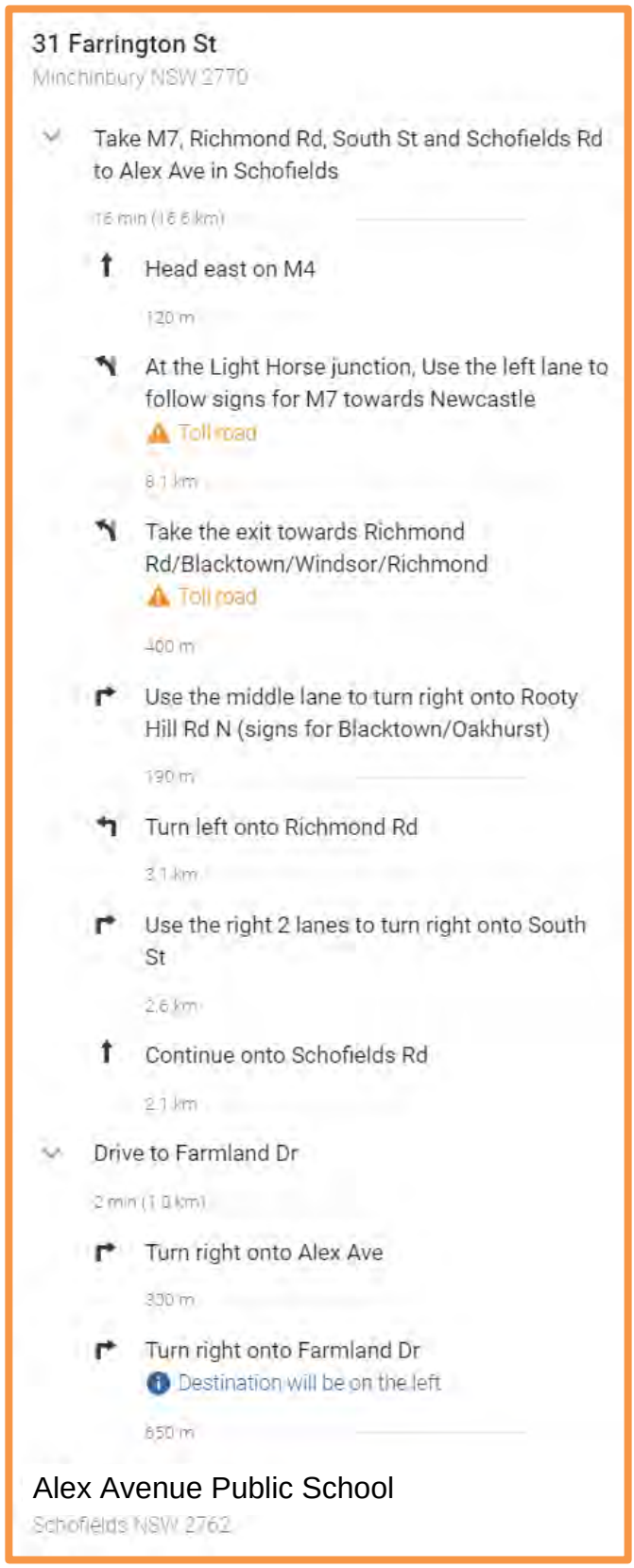
Eastern Access:



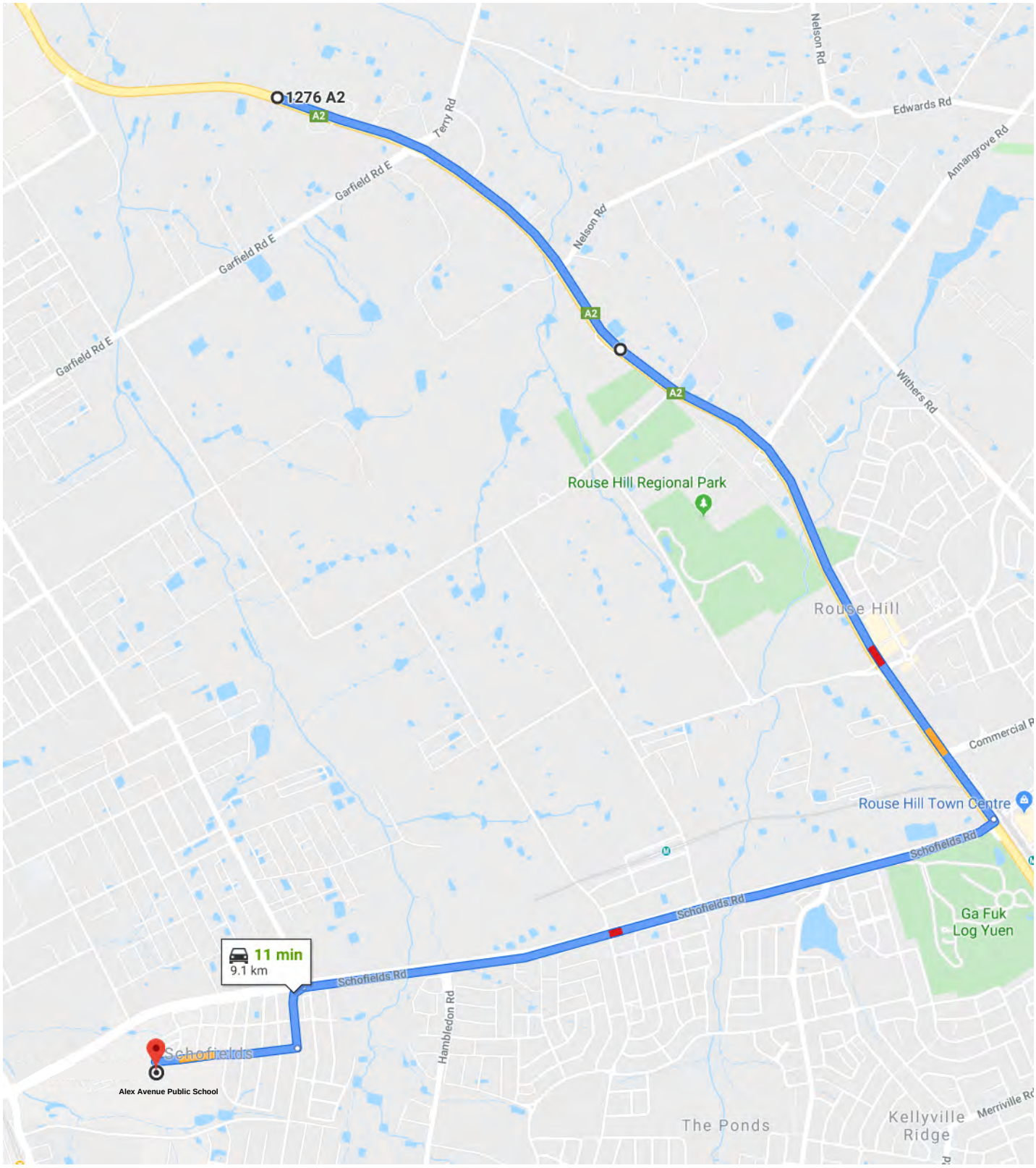
Southern Access:



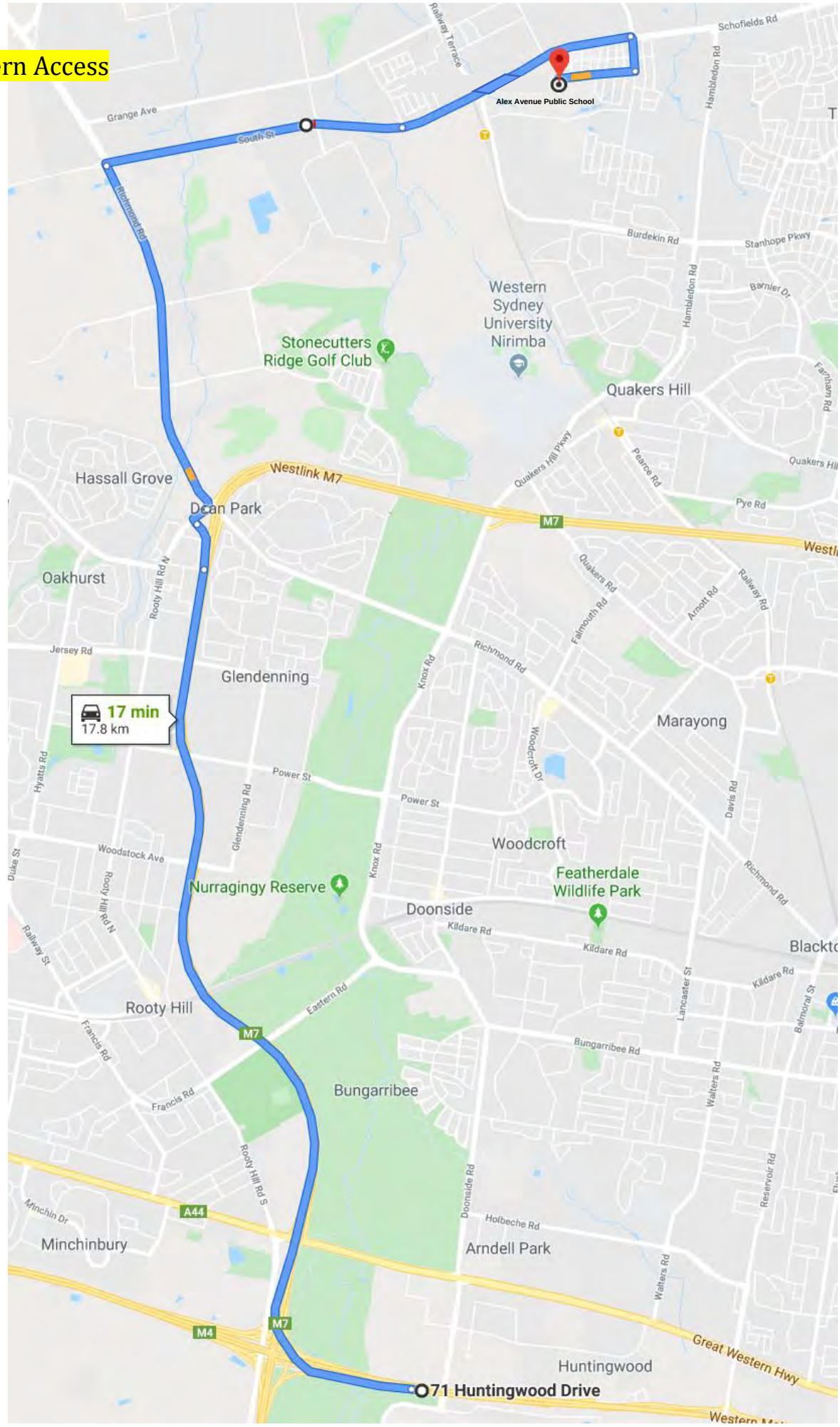
Western Access:



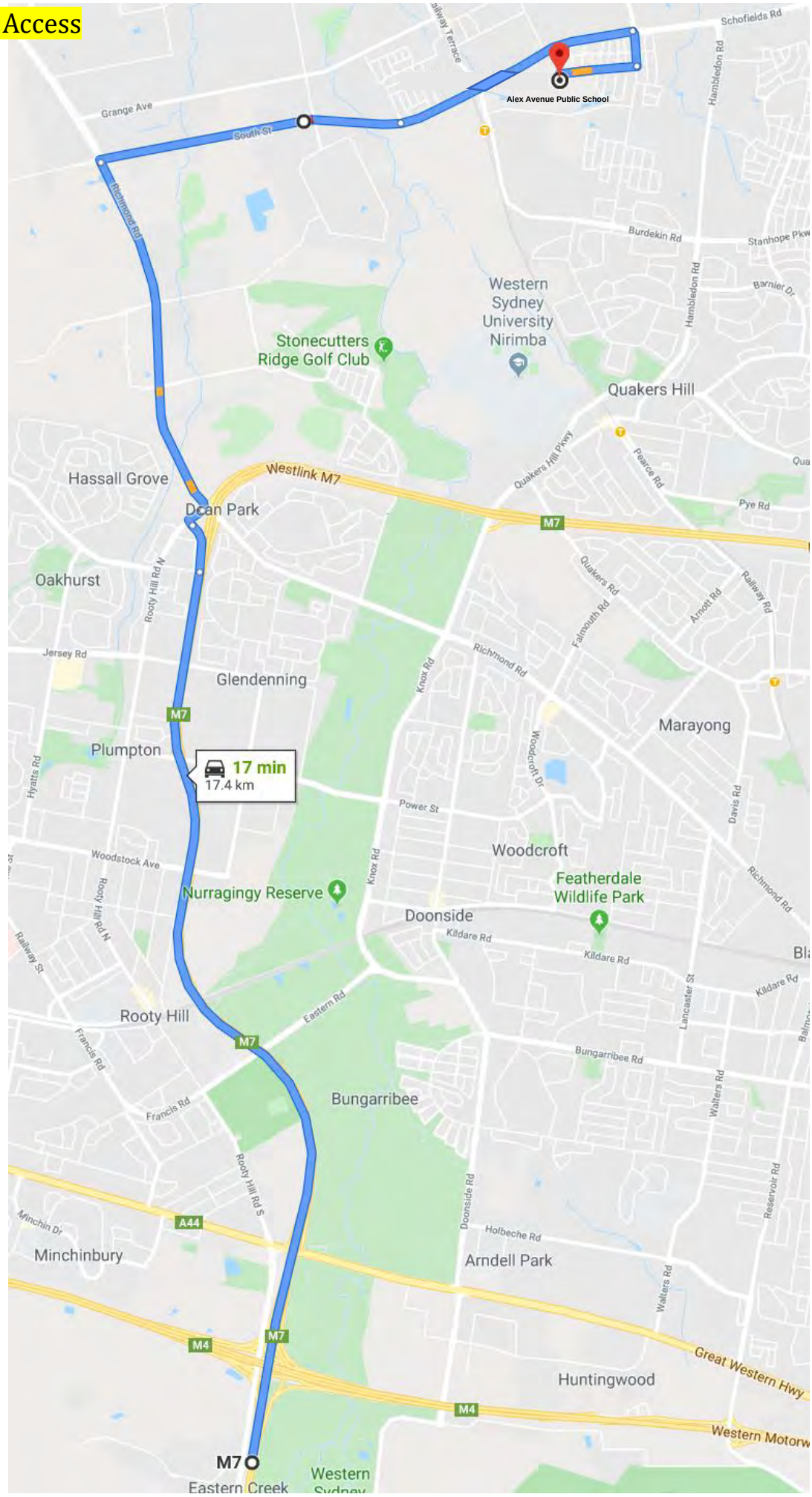
Northern Access



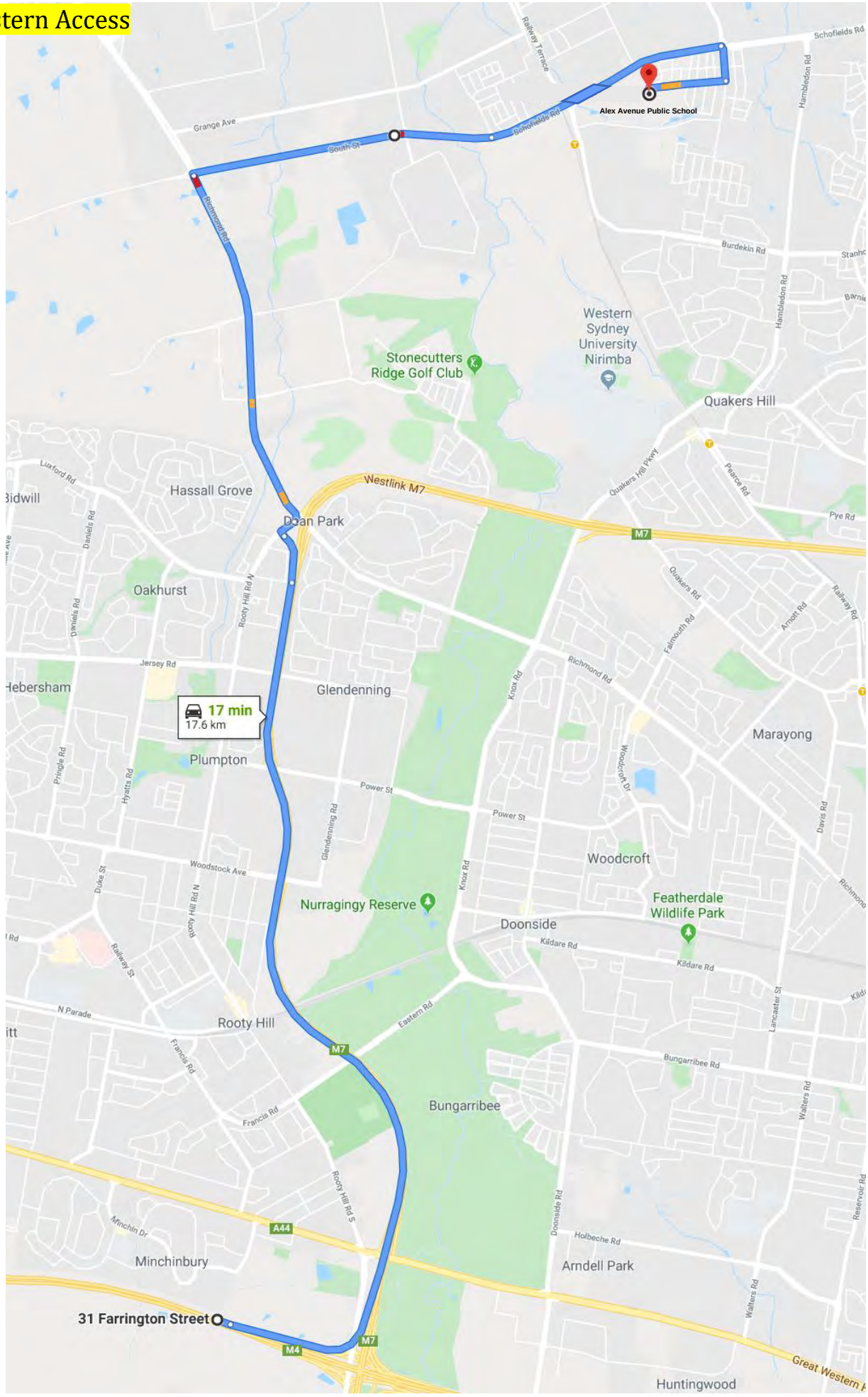
Eastern Access



Southern Access



Western Access



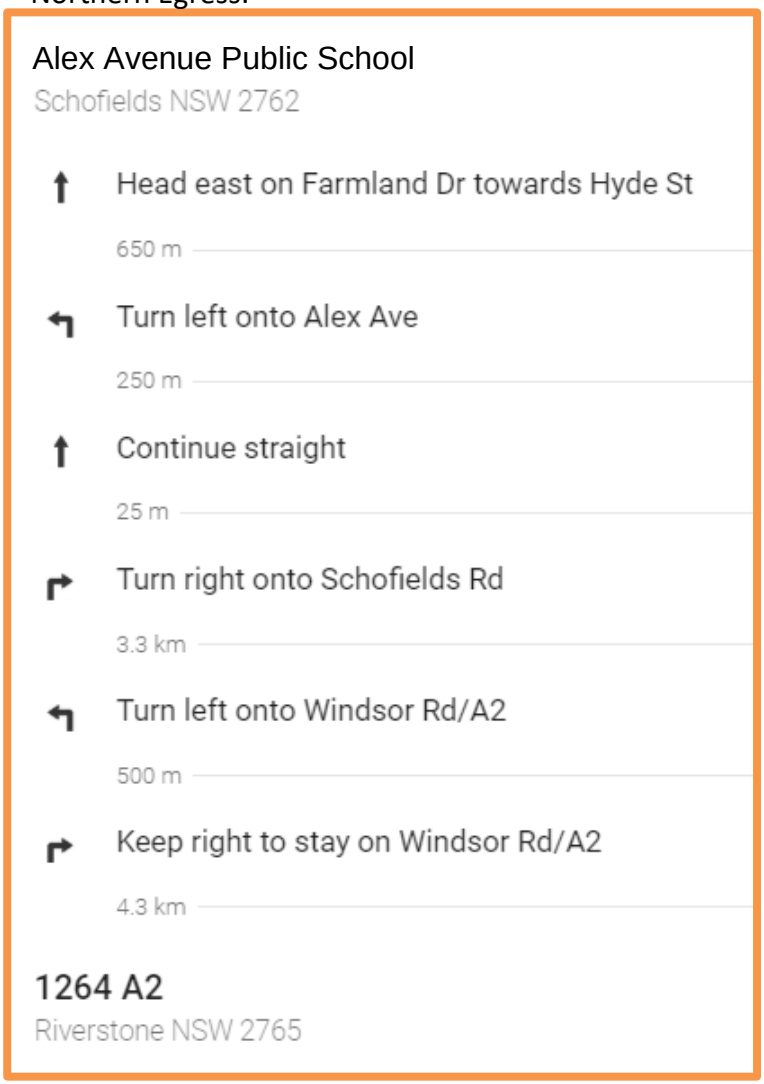
Egress:

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:

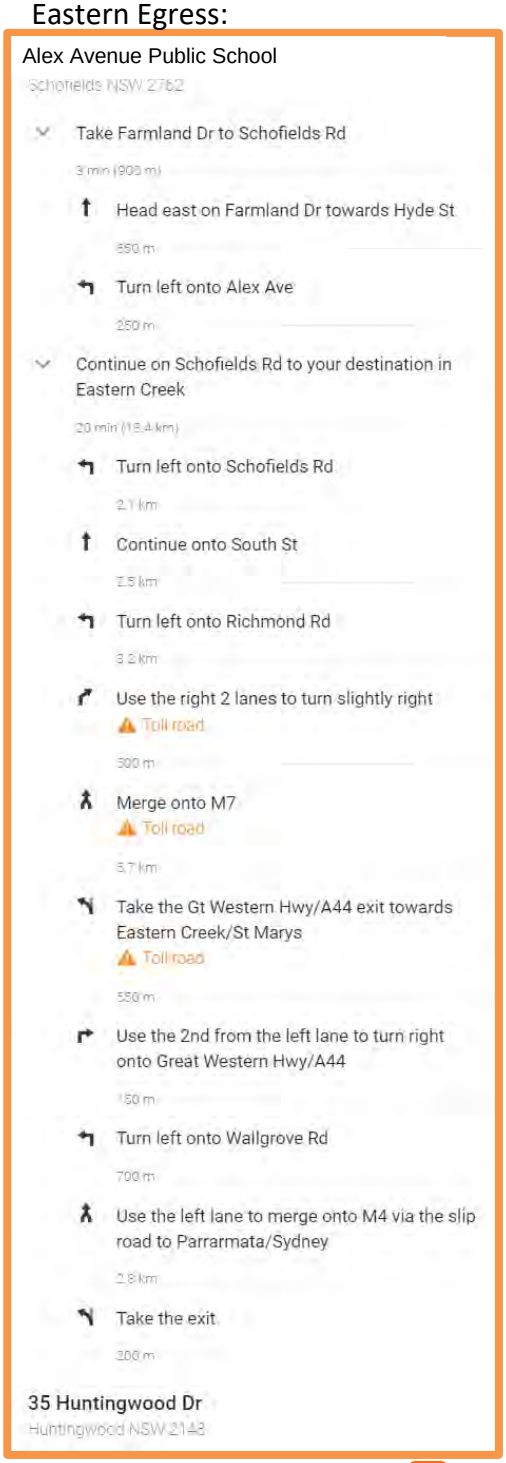
Egress from the site will be from one location as with the access point – Eastern end of Farmland Drive as seen below.

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

Northern Egress:



Eastern Egress:



Southern Egress:

Alex Avenue Public School
Schofields NSW 2762

- Head east on Farmland Dr towards Hyde St
  650 m
- Turn left onto Alex Ave
  250 m
- Turn left onto Schofields Rd
  2.1 km
- Continue onto South St
  2.5 km
- Turn left onto Richmond Rd
  3.2 km
- Use the right 2 lanes to turn slightly right
  Toll road
  500 m
- Merge onto M7
  Toll road
  8.4 km

M7
Eastern Creek NSW 2766

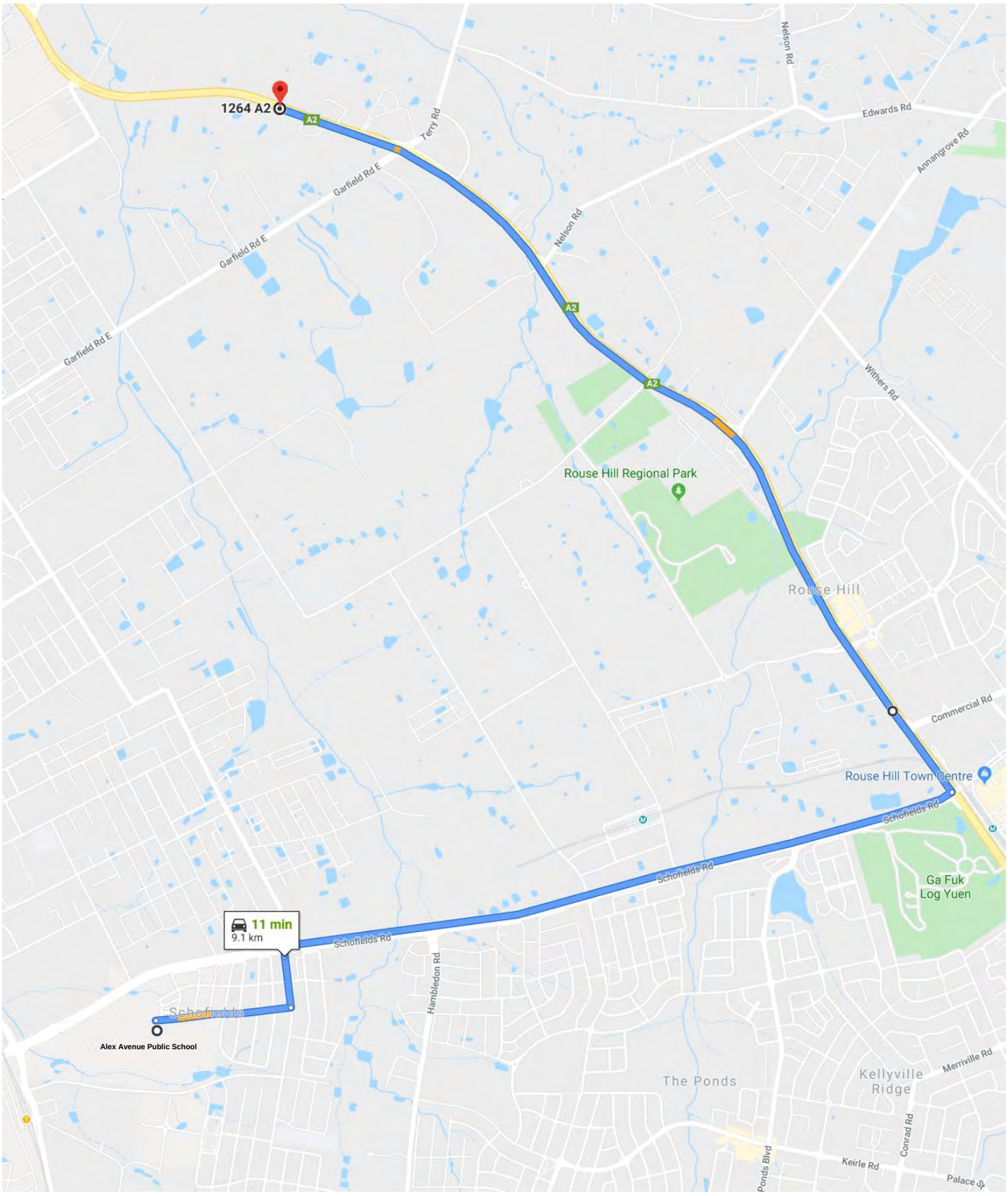
Western Egress:

Alex Avenue Public School
Schofields NSW 2762

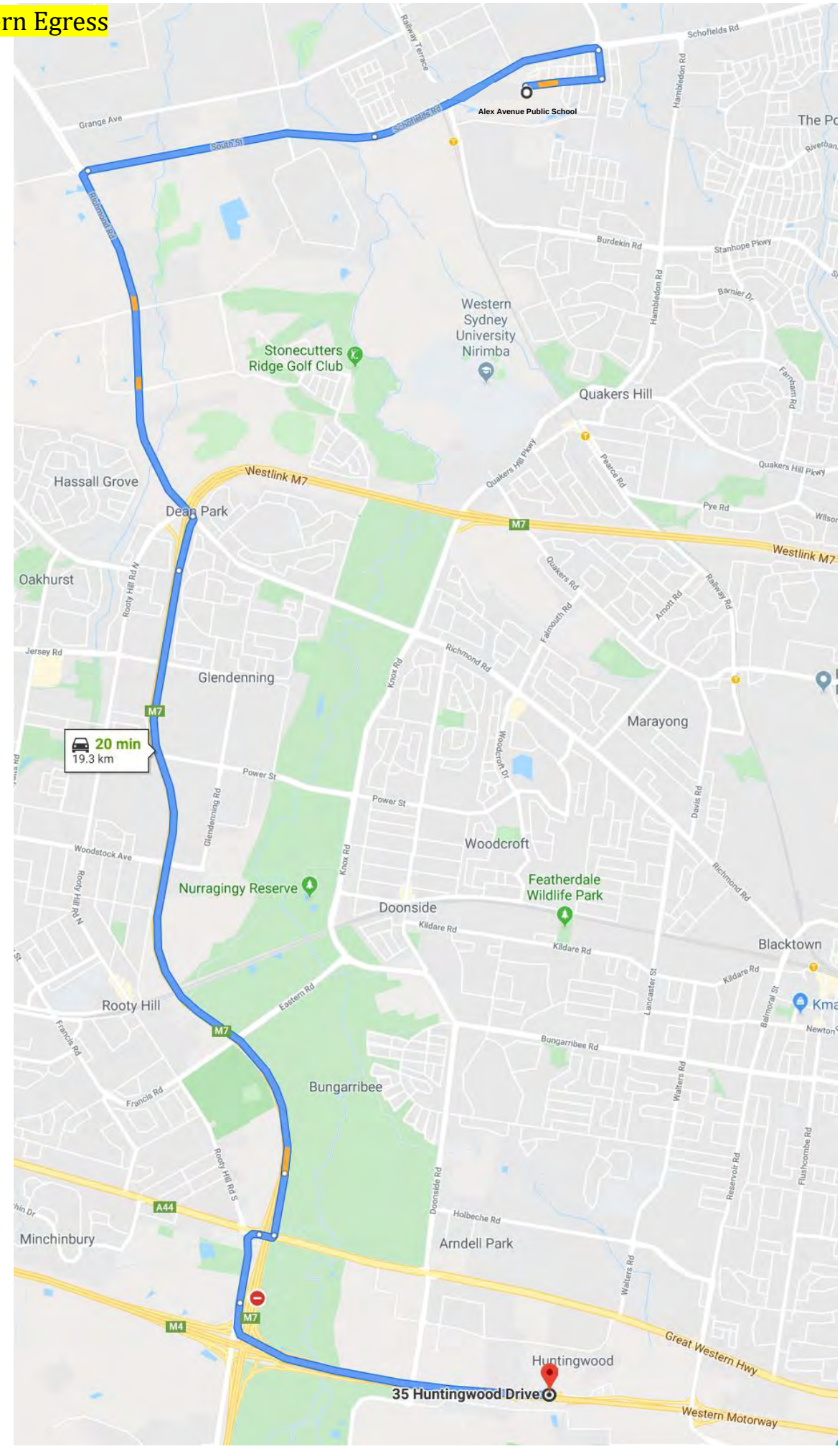
- Take Farmland Dr to Schofields Rd
  3 min (900 m)
  - Head east on Farmland Dr towards Hyde St
    650 m
  - Turn left onto Alex Ave
    250 m
- Continue on Schofields Rd. Take South St, Richmond Rd and M7 to Western Motorway/M4 in Eastern Creek
  20 min (17.7 km)
  - Turn left onto Schofields Rd
    2.1 km
  - Continue onto South St
    2.5 km
  - Turn left onto Richmond Rd
    3.2 km
  - Use the right 2 lanes to turn slightly right
    Toll road
    500 m
  - Merge onto M7
    Toll road
    5.7 km
  - Take the Gt Western Hwy/A44 exit towards Eastern Creek/St Marys
    Toll road
    350 m
  - Use the 2nd from the left lane to turn right onto Great Western Hwy/A44
    150 m
  - Turn left onto Wallgrove Rd
    1.1 km
  - Turn right to merge onto Western Motorway/M4 towards Penrith/Blue Mts
    1.9 km

26 Barossa Dr
Minchinbury NSW 2770

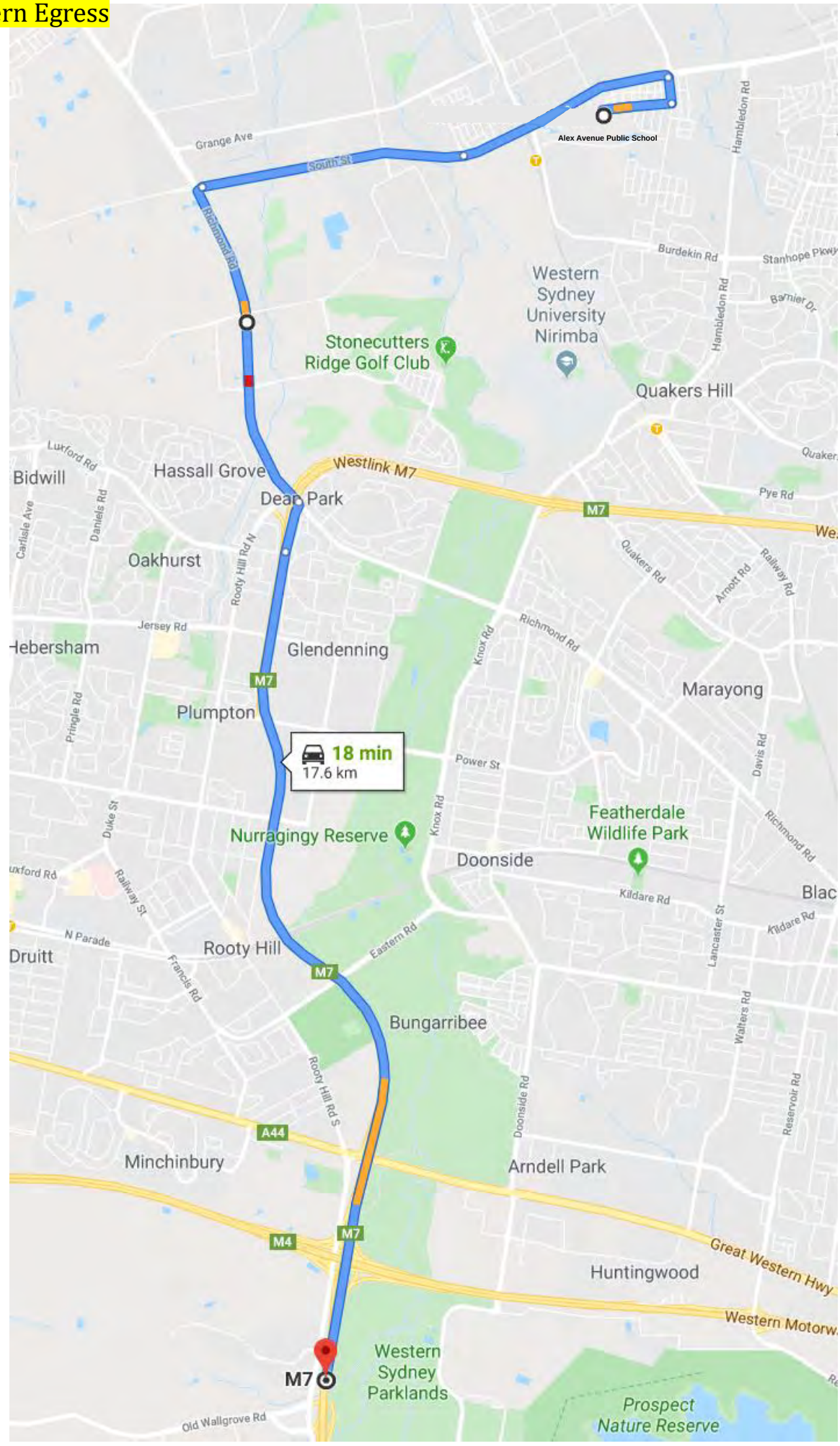
Northern Egress



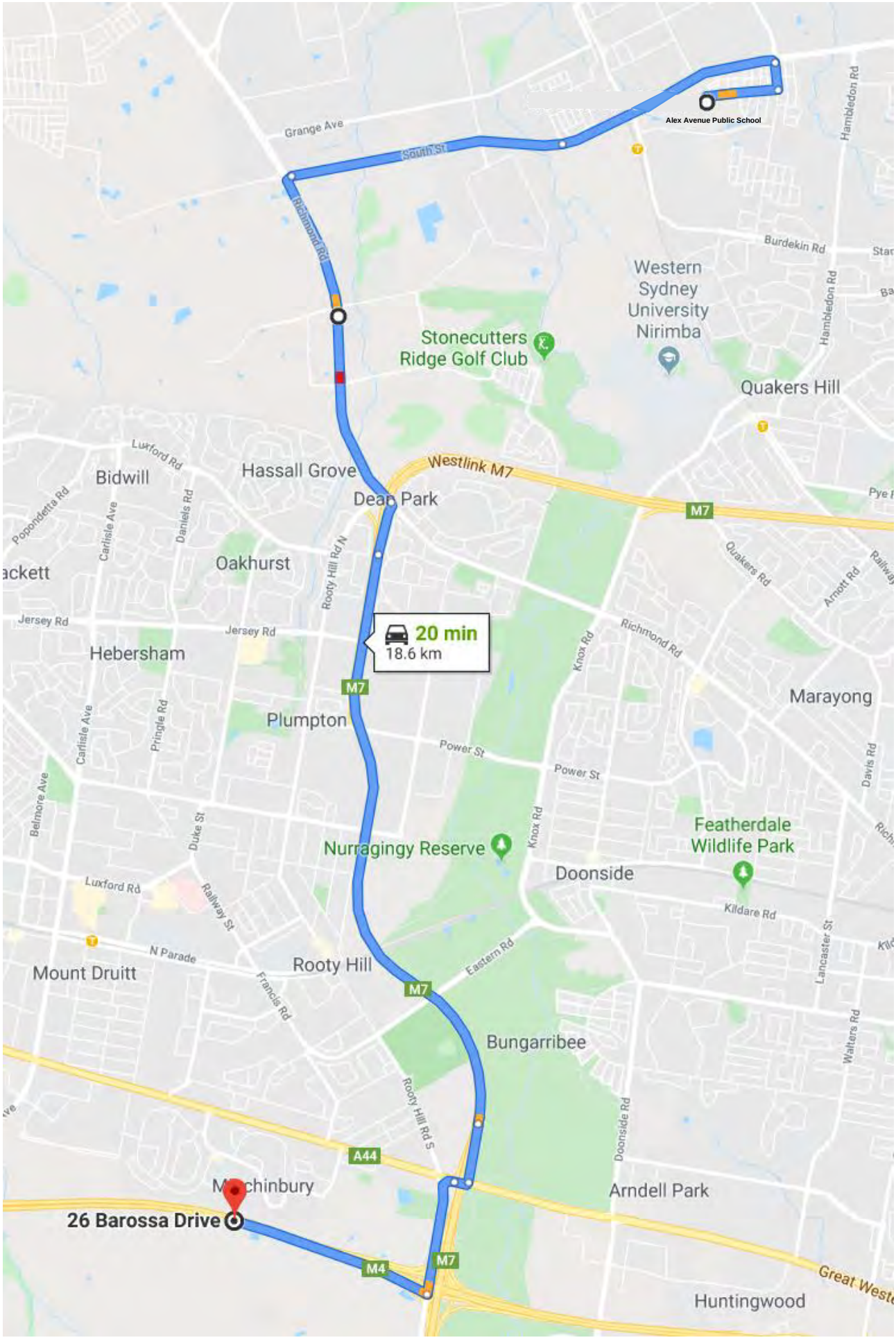
Eastern Egress



Southern Egress



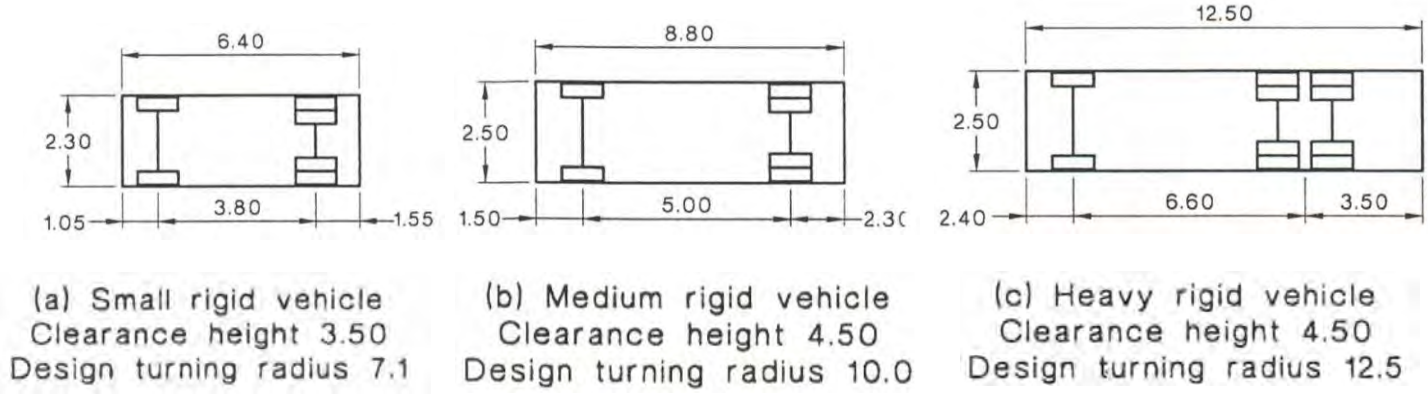
Western Egress



Transport Vehicles:

Richard Crookes Construction® will have an active and ongoing involvement in the management and monitoring of works during construction. They will ensure, as previously mentioned, that no vehicle will make deliveries outside Blacktown City 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.

Schofields Station is located approx. 2.4km from the site. Bus routes 732 run along Lakeside Parade approx. 850m 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 the Eastern end of Farmland Drive.

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® will engage council and appropriate authorities' priority to the lodgement and initiation of the project.

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 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 can be referenced in the Richard Crookes Construction® CEMP (Section 14, Table 11).

Traffic Control Plan (TCP)

A TCP is defined in the RMS's TCWS Manual version 5 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 5.
- Traffic management records and plans will be maintained as well as record/log.
- Richard Crookes Construction® may be required to provide records in the following event instances:
    - That a breach imposed by the NSW Police Service, on a motorist who does not comply with a regulatory sign is challenged in courts or,
    - In the event of an accident is alleged to have occurred when temporary traffic control is in place.
- Ongoing and frequent onsite reviews of traffic management setups and conditions will be reviewed with Richard Crookes Construction® for the duration of the project at (but not limited to):
    - The beginning of each new phase
    - The beginning of a new major activity (e.g. concrete pours, mobile crane usage etc)

Credentials:

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

Traffic Control Signs and Devices:

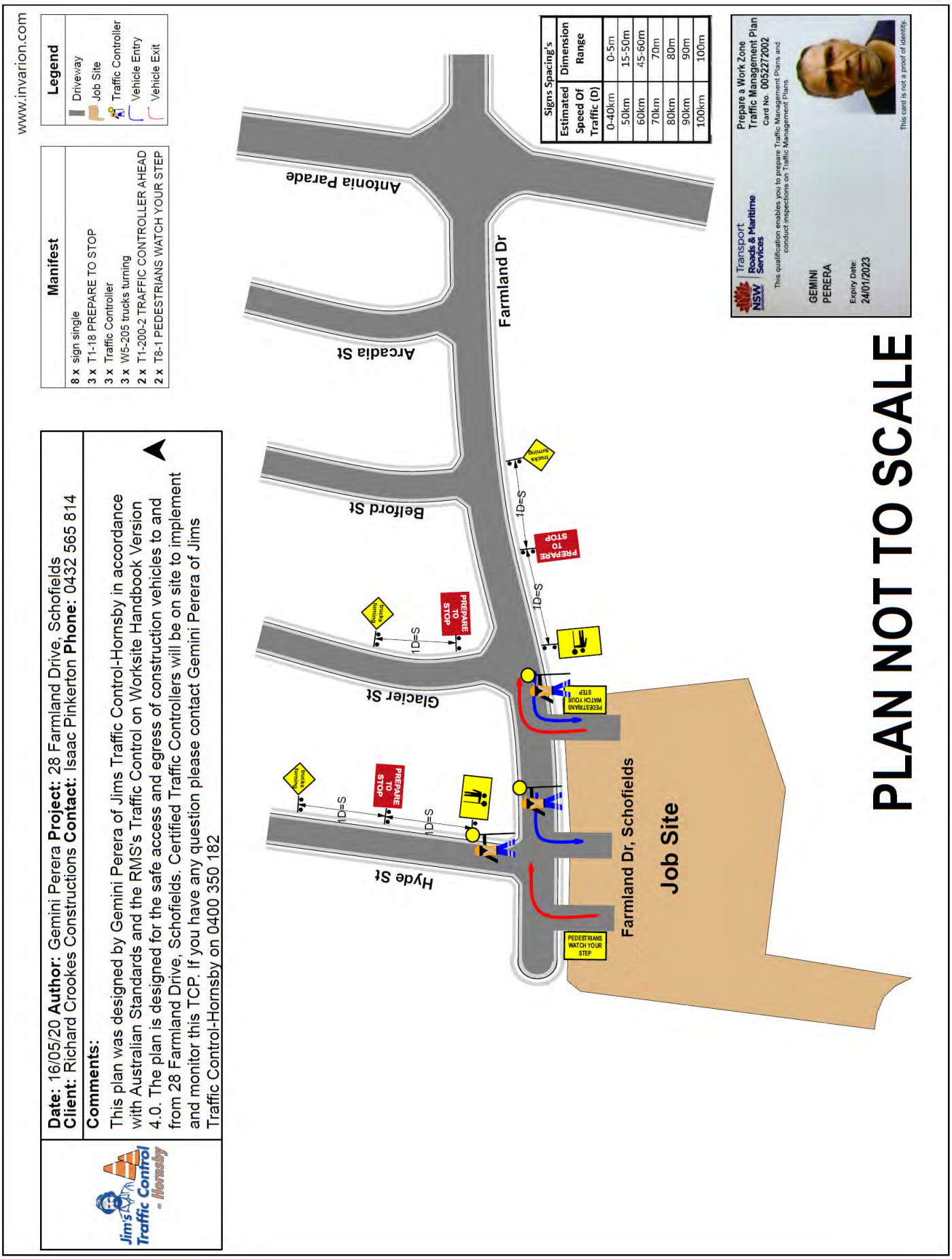
Traffic control devices are an important tool for influencing the safety of road users, in particular where temporary traffic controls are implemented at work sites. During the construction of this project Richard Crookes Construction® will assess the warrant for traffic control devices in accordance with the relevant guides/standards such as: RMS's – TCWS Manual Version 5, 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 5, AUSTROADS Guide to Traffic Engineering Practice, Part 8 – Traffic Control Devices and the Relevant parts of Australian Standard 1742.

Appendix A TCP:



Appendix B RMS Road Limits and Special Signage:

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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

B16 – Traffic and Pedestrian Management Sub-Plan

Identified Party to Consult:	Blacktown City Council – Traffic Engineers
Consultation type:	Email correspondence
When is consultation required?	Prior to commencement
Why	B16 – Construction Traffic and Pedestrian Management Sub-Plan, prepared in consultation with Council
When was consultation held	15 May 2020 – 21 May 2020, email correspondence
Identify persons and positions who were involved	**Andy Karklins** Traffic Management Officer, Blacktown City Council **Nadeem Shaikh** Coordinator Traffic Management, Blacktown City Council **Fiona Frost** Road Safety Officer, Blacktown City Council **Tom Hemmett** Project Engineer, Richard Crookes Constructions **Isaac Pinkerton** Site Engineer, Richard Crookes Constructions
Provide the details of the consultation	Consultation with Blacktown City Council has been undertaken in relation to those works specifically, and the site and project more generally. Email correspondence was sent to Blacktown City Council on 15 May 2020 to review and comment on the Construction Traffic and Pedestrian Management Sub-Plan. 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 and reviewed by Mr Karklins. It was noted by Mr Karklins that the CTPMSP appears to be in order based on the information provided. It is the project managers responsibility to implement the traffic control measures as identified in the CTPMSP.
What matters were resolved?	Nil issues were raised at the time.
What matters are unresolved?	Nil
Any remaining points of disagreement?	No

How will SINSW address matters not resolved?	Not applicable

Isaac Pinkerton

To: Tom Hemmett
Subject: RE: Alex Avenue Public School Consultation

From: Andy Karklins
Sent: Thursday, 21 May 2020 12:32 PM
To: Tom Hemmett
Cc: Nadeem Shaikh
Subject: RE: Alex Avenue Public School Consultation

Good afternoon Tom

I have reviewed the attached CTMP for Richard Crookes Constructions at 28 Farmland Drive, Schofields for the Alex Avenue Public School. It appears to be in order based on the information provided. It is the project managers responsibility to implement the traffic control measures as identified in the CTMP.

Regards

Andy Karklins
Traffic Management Officer

9839 6305
0401 714 012
Andy.Karklins@blacktown.nsw.gov.au
PO Box 63 Blacktown NSW 2148
blacktown.nsw.gov.au

Follow us on social media

From: Nadeem Shaikh
Sent: Thursday, 21 May 2020 11:09 AM
To: Andy Karklins <Andy.Karklins@blacktown.nsw.gov.au>
Subject: FW: Alex Avenue Public School Consultation

Can you please check the CTMP and advise Tom accordingly.
Thanks

Nadeem Shaikh
Coordinator Traffic Management

9839 6017
0409 735 657
Nadeem.Shaikh@blacktown.nsw.gov.au

PO Box 63 Blacktown NSW 2148
blacktown.nsw.gov.au

Follow us on social media

From: Tom Hemmett <HemmettT@richardcrookes.com.au>
Sent: Tuesday, 19 May 2020 9:15 AM
To: Nadeem Shaikh <Nadeem.Shaikh@blacktown.nsw.gov.au>
Cc: Isaac Pinkerton <PinkertonI@richardcrookes.com.au>; Fiona Frost <Fiona.Frost@blacktown.nsw.gov.au>
Subject: RE: Alex Avenue Public School Consultation

Hi Nadeem,

Further to the below, please find attached CTMP for the Alex Ave Public School project for your review & comment.

Aside from the CTMP, do you require any other information in order to complete your review?

Thanks

Regards,

Tom Hemmett, Site Engineer

RICHARD CROOKES
CONSTRUCTIONS

Direct 02 9902 4700 | Fax 02 9439 1114 | Mobile 0437 969 849
Level 3, 4 Broadcast Way, Artarmon NSW 2064
www.richardcrookes.com.au

From: Fiona Frost <Fiona.Frost@blacktown.nsw.gov.au>
Sent: Friday, 15 May 2020 2:09 PM
To: Tom Hemmett <HemmettT@richardcrookes.com.au>
Subject: RE: Alex Avenue Public School Consultation

Hi Tom
Nadeem usually handles this and he will be back from leave on Monday. I'll follow up with him then and get back to you.

Regards
Fiona

Fiona Frost
Road Safety Officer

9839 6363
0428 403 834
Fiona.Frost@blacktown.nsw.gov.au
PO Box 63 Blacktown NSW 2148
blacktown.nsw.gov.au

Follow us on social media

From: Tom Hemmett <HemmettT@richardcrookes.com.au>
Sent: Friday, 15 May 2020 11:42 AM
To: Fiona Frost <Fiona.Frost@blacktown.nsw.gov.au>; Nadeem Shaikh <Nadeem.Shaikh@blacktown.nsw.gov.au>
Subject: Alex Avenue Public School Consultation

Hi Fiona & Nadeem,

We are working on the Alex Avenue Public School project on behalf of Schools Infrastructure.

As per the draft conditions of consent received to date, we are required to consult with TfNSW & Blacktown City Council regarding our construction traffic management plan.

We are in the final stages of finalising the draft CTMP and are looking to provide this to you early next week for review & comment.

Aside from the CTMP, do you require any other information in order to complete your review?

Thanks

Regards,

Tom Hemmett, Site Engineer

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www.richardcrookes.com.au

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

B16 – Traffic and Pedestrian Management Sub-Plan

Identified Party to Consult:	Transport for New South Wales (TfNSW)
Consultation type:	Email correspondence
When is consultation required?	Prior to commencement
Why	B16 – Construction Traffic and Pedestrian Management Sub-Plan, prepared in consultation with TfNSW
When was consultation held	28 May 2020 – 2 June 2020, email correspondence
Identify persons and positions who were involved	**Mohammed Irfan** Network and Safety Officer, West Precinct Sydney **Katrina Loader** A/Associate Director Sydney Region Planning **Isaac Pinkerton** Site Engineer, Richard Crookes Constructions
Provide the details of the consultation	Consultation with TfNSW has been undertaken in relation to those works specifically, and the site and project more generally. Email correspondence was sent to TfNSW on 14 May 2020 to review and comment on the Construction Traffic and Pedestrian Management Sub-Plan. The purpose was to open the dialogue between the project team and TfNSW.
What specific matters were discussed?	The Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) was provided and reviewed by Mr Irfan. It was noted by Mr Irfan that the CTPMSP has been approved by TfNSW for use as per the conditions of approval.
What matters were resolved?	Site address was updated as per Google Maps address.
What matters are unresolved?	Nil
Any remaining points of disagreement?	No
How will SINSW address matters not resolved?	Not applicable

Construction Traffic Management Plan

Site Details

Address: Job Site end of Farmland Drive, Schofields, 2762	**LGA:** Blacktown
Ref / Version: 2.2	**Date of TMP Submission:** 19/05/2020

Construction Traffic Management Plan (CTMP)

Truck Movements (per day):

Excavation:	1.5 months
Site establishment:	0.25 months
Construction:	9 months
Landscaping and finishing works	1.5 months

Agreed Times:
7am - 6pm | Monday to Friday,
8am - 1pm | Saturday, and
No work on Sunday or public holiday(s)

Construction Duration: 12.5 months

Road Occupancy Licence: Not Required

Swept Paths Required: No

Swept Paths Provided: No

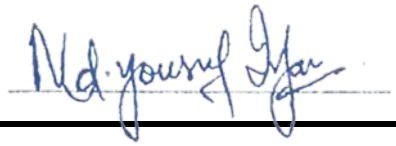
Risk Rating (Low, Medium, High): Not provided

Conditions of Approval:

The submission from **Richard Crookes Constructions** has satisfactorily addressed the necessary requirements of the CTMP and is **Recommended for Concurrence** subject to the following:

- Any Traffic Control Plans (TCP) prepared are to comply with A51742.3 and RMS's "Traffic Control at Worksites" manual (2018) and be signed by a person with RMS certification to prepare TCP's. A copy of the TCP is to be held on site at all times by the responsible traffic controllers.
- No construction vehicle movements are to occur during school drop-off (8.00am to 9.30am) and pick up (2.30pm to 4.00pm) times on school days.
- Provision of RMS accredited traffic controllers to assist truck and pedestrian movements;
- No traffic should be stopped along any State Road;
- No trucks/other vehicles to queue / wait on Schofields Road or any other State Road.
- Barricades and signs to be provided in accordance with Australian Standards;
- Appropriate advanced signage to warn drivers about changes in road conditions;
- Access be maintained for emergency vehicles at all times;
- Any additional conditions that Council may require.

Recommended:

Network & Safety Officer: Mohammed Irfan	**Comments:** Concurred
Signed: 	**Date:** **29/05/2020**

Network & Safety Manager: David Lance	**Comments:** Approved
Signed: 	**Date:** 02/05/2020

APPENDIX G - CONSTRUCTION NOISE & VIBRATION MANAGEMENT SUB-PLAN

MATTHEW PALAVIDIS
VICTOR FATTORETTO
MATTHEW SHIELDS

Alex Avenue Public School

Construction Noise Vibration Management Plan

SYDNEY
9 Sarah St
MASCOT NSW 2020
(02) 8339 8000

ABN 11 068 954 343
www.acousticlogic.com.au

Project ID	20190060.7
Document Title	Construction Noise Vibration Management Plan
Attention To	Richard Crookes Constructions Pty Ltd

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	04/07/19	20190240.3/0407A/R0/GK	GK		VF
1	29/04/20	20190240.3/2904A/R1/GK	GK		VF
2	03/06/20	20190060.7/0306A/R2/GK	GK		GK

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

This construction noise vibration management plan (CNVMP) presents the results of an assessment of potential noise and vibration impacts associated with the earthworks, excavation and construction components of the proposed Alex Avenue Public School, Schofields.

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 the 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.

The Plan addresses item 12 of the Secretary's Environmental Assessment Requirements (SEARs) requirements for the SSD 18_9368.

- Item 12 (SSD18_9368)

  Identify and provide a quantitative assessment of the main noise and vibration generating sources during site preparation, bulk excavation, construction. Outline measures to minimise and mitigate the potential noise impacts on surrounding occupiers of land.

This Construction Noise Vibration Management Plan should also be updated during the construction period in response to information gathered during this period

2 SITE DESCRIPTION

The subject site is located along Farmland Drive, Schofields. The project site is bounded by residential properties to the northern and eastern boundaries of the project site. Antonia Parade is located to the east of the site and further than that are residential properties. Vacant land bounds the southern boundary of the project site whilst the western boundary is bounded by private property. Future residential properties are proposed to be constructed along the eastern boundary of the project site.

For a detailed description please see the figure below.

3 RECIEVER LOCATIONS

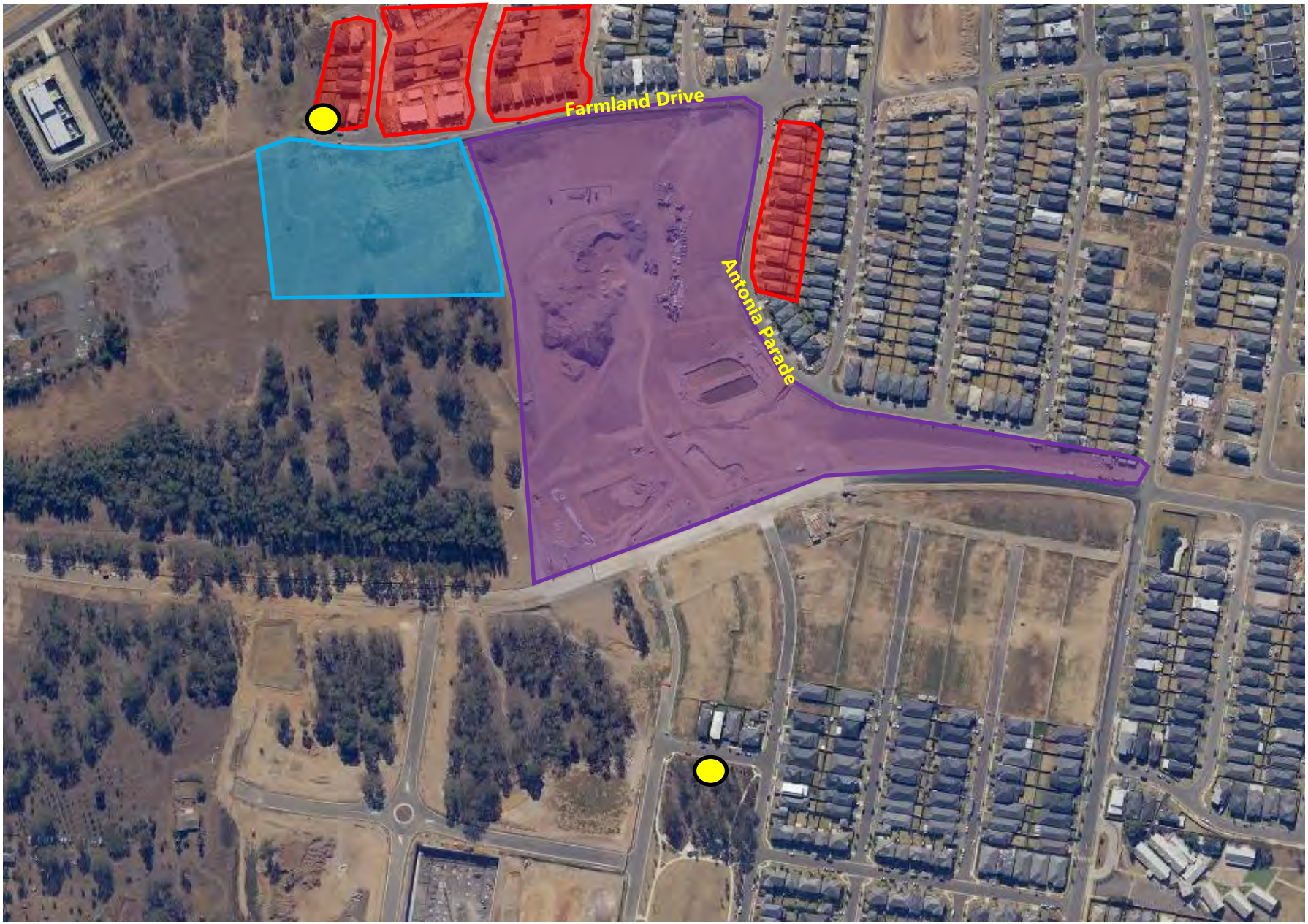
The potentially most impacted sensitive receiver locations are presented below. In addition, these have been identified in the figure below, on the following page.

Receiver 1 – Residential dwellings located along Farmland Drive, Schofields to the northern boundary of the site;

To the east of the site are recreation fields so the noise prediction has been calculated to the nearest residents on the eastern side of Antonia Parade.

Receiver 2 – Residential dwellings located to the east of the project site, Antonia Parade.

There are no nearby residences to the south and west.



Unattended Noise Monitor

Project Site

Future Residential Properties

Residential Receivers

Figure 1 – Site Map and Receiver Locations Sourced from SixMaps NSW

4 PROPOSED CONSTRUCTION WORKS

The proposed construction works will include the following:

- Excavation Phase
- Construction Phase

The proposed works have been divided into a number of main work phase, along with the main noise producing equipment and activities likely to occur in each phase.

Table 1 – Excavation and Construction Activities

Construction Activity	Equipment	Sound Power Level dB(A)L_{Max}
Excavation Phase	Excavator Mounted Hydraulic Hammer	120
	Excavator with Bucket, Bobcat	105
	Builders Hoist	105
	Hand Held Scrabbling Drills	105
	Trucks	105
General Construction works	Trucks	105
	Concrete Pumps	110
	Crane	105
	Builder's Hoist	105
	Concreting – Vibrator and Helicopter Float	105
	Powered Hand Tools	100

The noise levels presented in the above table are derived from the following sources:

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

5 CONSTRUCTION HOURS

The construction hours are as follows. These have been formulated based on NSW EPA *Interim Construction Noise Guideline (ICNG) 2009*.

NSW EPA *Interim Construction Noise Guideline (ICNG) 2009*.

- *Recommended Standard Hours:*
  - 7:00am-6:00pm Monday to Friday.
  - Saturday 8am to 1pm.
  - No work on Sundays or public holidays.

6 CONSTRUCTION NOISE CODES AND GUIDELINES

The NSW EPA *Interim Construction Noise Guideline (ICNG) 2009* details specific construction noise and vibration management levels applicable to construction sites within NSW.

Where feasible and practical measures may be applied to the construction site is to endeavour to comply with the noise management levels outlined in the guideline. A summary of the code is detailed below.

6.1 NSW EPA INTERIM CONSTRUCTION NOISE GUIDELINE (ICNG) 2009

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)$L_{eq(15\text{-}minutes)}$ for work during standard construction hours (7:00am-6:00pm Monday to Friday and 8am to 1pm on Saturdays); and
  - 5dB(A)$L_{eq(15\text{-}minutes)}$ for work outside standard construction hours (6:00pm-7:00pm Monday to Friday and 1:00pm to 4:00pm on Saturdays); and
- "*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 management levels for standard hours of construction are presented below:

Table 2 – Construction Noise Management Level (Residents)

Receiver Type	"Noise Affected" Level dB(A)$L_{eq(15\text{-}minutes)}$	"Highly Noise Affected" Level dB(A)$L_{eq(15\text{-}minutes)}$
Residential Receiver	Background + 10dB(A) (Standard Construction Hours)	75
	Background + 5dB(A) (Outside Standard Construction Hours)	N/A

6.2 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. 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.

7 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 along Willis Street within the project site.

Please see figure 1 above.

Table 3 – Measured Rating Background Noise Level

Location	Time Period	Noise level dB(A)$L_{90(Period)}$
Northern Boundary	7:00am-6:00pm	40

The results of the monitoring are summarised in the following table. In view of the significant distance separation to the receivers to the south, significant construction noise impacts are not expected at these receivers. The background at the nearest receiver to the south was similar to the northern receivers. If required the same background noise level can be adopted to assess these receivers.

8 CONSTRUCTION NOISE AND VIBRATION MANAGEMENT LEVELS

8.1 NOISE

Resultant Noise Management Levels (NMLs) have been summarised below, these have been determined based on the information in section 5 and rating background noise levels in section 6.

Table 4 – Resultant Noise Management Levels (NML's)

Hours of Work	Receivers	Noise Management Level dB(A)$L_{eq(15\text{-}minute)}$
Standard Construction Hours (7:00am-5:00pm Monday to Friday; and 8:00am to 1:00pm on Saturday)	All Residential Receivers	50dB(A)$L_{eq(15\text{-}minute)}$ (BG + 10dB(A)) (40dB(A)$L_{90(Period)}$ + 10dB(A))

8.2 VIBRATION

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.

8.2.1 Damage Criteria

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 5 – 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

8.2.2 Human Comfort and amenity

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 6 – 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).

9 PREDICTED CONSTRUCTION NOISE LEVELS

Noise from the worst-case construction works for each phase of the development have been predicted to the nearest most affected sensitive receiver.

The following tables presents the predicted noise levels for each item of typically loudest plant.

Table 7 – Noise Emission Assessment Receiver 1
(Residential Dwellings Northern Boundary, Farmland Drive)

Activity	Sound Power Level	Predicted Level at Receiver dB(A)$L_{eq(15\text{-}minute)}$
Excavator Hydraulic Hammer	120	70-82
Excavator Bucket	110	60-72
Hand Held Scrabbling Tools	112	65-77
Trucks	105	55-67
Concrete Pumps	110	60-72
Crane	105	55-67
Concreting Helicopter	105	55-67
Powered Hand Tools	94	44-56

Table 8 – Noise Emission Assessment Receiver 2
(Residential Dwellings Eastern Boundary, Antonia Parade)

Activity	Sound Power Level	Predicted Level at Receiver dB(A)$L_{eq(15\text{-}minute)}$
Excavator Hydraulic Hammer	120	61-65
Excavator Bucket	110	51-55
Hand Held Scrabbling Tools	112	56-60
Trucks	105	46-50
Concrete Pumps	110	51-55
Crane	105	46-50
Concreting Helicopter	105	46-50
Powered Hand Tools	94	35-39

10 ASSESSMENT OF VIBRATION LEVELS

10.1 VIBRATION PRODUCING ACTIVITIES

Proposed activities that have the potential to produce significant ground vibration include:

- Excavator mounted hydraulic hammer;
- Excavator mounted saw;
- Excavator with bucket.

10.2 RECOMMENDED VIBRATION CRITERIA

It is recommended to adopt maximum 5mm/s PPV criteria to protect residential buildings adjacent to the project site based on requirements of DIN 4150.

- Alarm Level – 3mm/s PPV at vibration at receiver location, SMS alarm message will be sent to operator, project manager and acoustic engineer if magnitude of vibration events exceed this level. Project manager shall respond immediately by taking courteous work methodology.
- Stop work level -5mm/s PPV at vibration at receiver location, SMS alarm message will be sent to operator, project manager and acoustic engineer if magnitude of vibration events exceed this level. Project manager shall stop the work at amenity of geophone immediately.

10.3 SAFEGUARDS TO PROTECT SENSITIVE STRUCTURES

It is impossible to predict the vibrations induced by the excavation operations on site at potentially affected receivers. This is because vibration level is principally proportional to the energy impact which is unknown nature of terrain in the area (type if soil), drop weight, height etc.

However, as works are proposed to be undertaken in rock, it would be recommended that vibration monitoring be undertaken from time to time.

10.4 ACOUSTIC SCREENS

In relation to the potential for acoustic screens to be employed around the site to reduce the emission of construction noise to surrounding receivers.

However, given that the residences on Farmland Drive are 2 storey residences and the fall of the land sloping down from Farmland Drive to the school site, to be effective any screens to the most impacted northern receivers would need to be very high. It is not reasonable to install such screens given the works proposed.

10.5 EXCAVATOR MOUNTED HAMMERERING AND PILING

Excavator mounted hammering and Piling (if required) will typically produce the loudest noise levels emanating from the site and have the highest potential for noise impacts on surrounding receivers. All other activities on the site are unlikely to produce an exceedance of the HNAML. On this basis, it is recommended that surrounding receivers are consulted on the processes of the excavation (particularly rock breaking). Management processes will include:

- To reduce the impacts from excavator mounted hammering it is recommended that the following respite periods are introduced when operating within 75m of a residential receiver:
    - they are only undertaken after 8.00 am,
    - they are only undertaken over continuous periods not exceeding 3 hours with at least a 1 hour respite every three hours, and.
    - 'continuous' means any period during which there is less than an uninterrupted 60 minute respite between temporarily halting and recommencing any of the intrusive and annoying work referred to in Interim Construction Noise Guideline section 4.5.

- All surrounding receivers should be notified of the duration and extent of the works proposed during the excavation stage via letterbox drops, with a detailed engagement plan and contact information for all relevant personnel on site.

10.6 EXCAVATOR NOISE

Excavators are expected to be used for most of the time during the excavation period.

Where prolonged excavator use is necessary, excavators could be moved to another part of the site to offer the receiver closest to the excavator some respite. Where practical and feasible, by moving the excavator from working on one part of the site to the opposite side of the site can provide up to a 10dB(A) reduction in noise levels impacting residential receiver locations.

10.7 ANGLE GRINDERS

Angle grinders would only be typically used sporadically. Notwithstanding, where practical, the use of angle grinders should be limited to areas which are screened from surrounding receiver locations.

10.8 VEHICLE NOISE AND CONCRETE PUMPS

Trucks must turn off their engines when on site to reduce impacts on adjacent land use (unless truck ignition needs to remain on during concrete pumping).

Where feasible locate concrete pumping plant away from residential receivers.

10.9 VIBRATION MONITORING

Attended vibration monitoring should be conducted in response to complaints. Where a number of complaints are received continuous unattended monitors should be deployed with SMS alarms to alert site staff when vibration generated is approaching the vibration management levels.

11 CONTROL OF CONSTRUCTION NOISE AND VIBRATION

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.

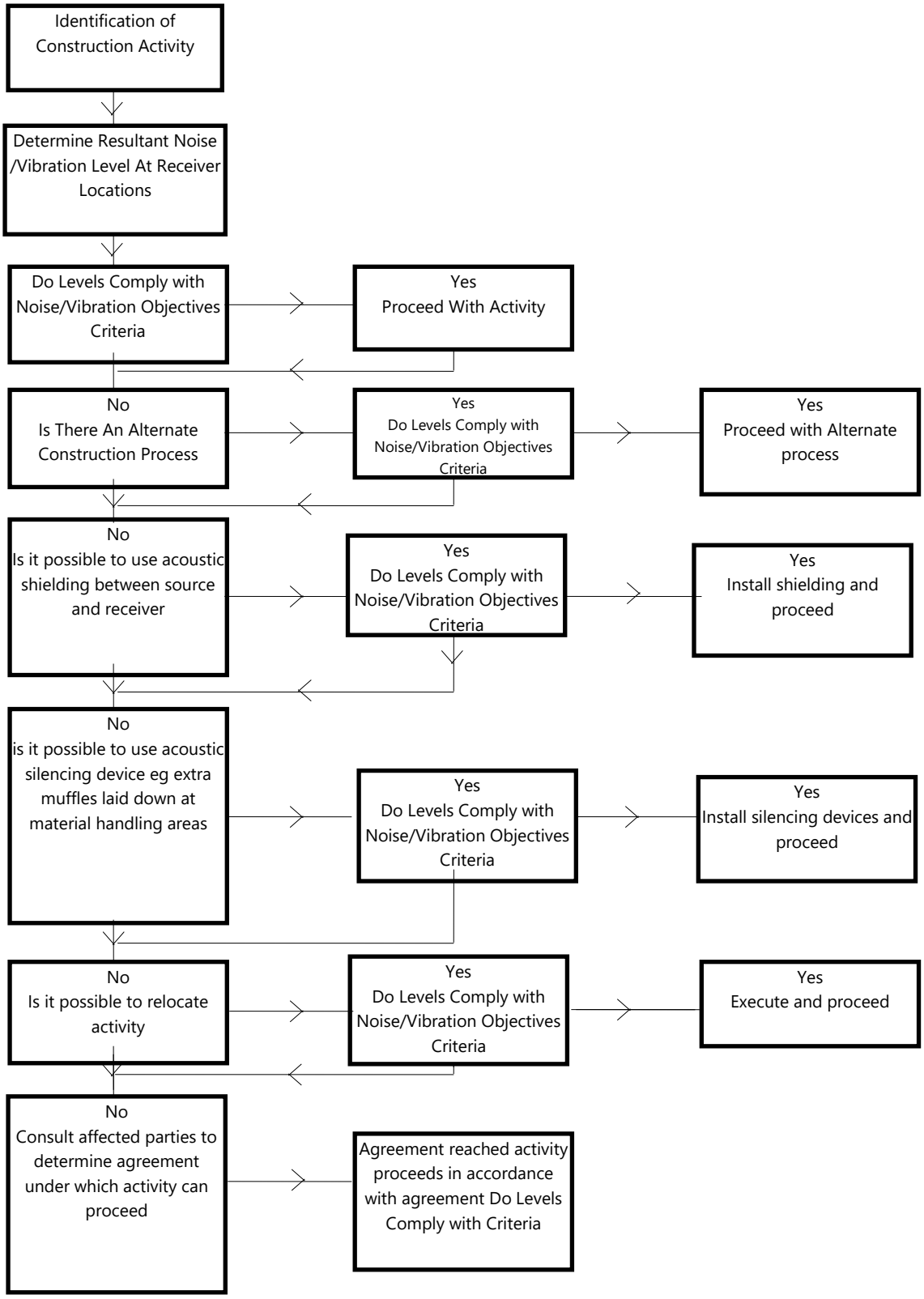


Figure 2 – Process Flowchart

12 NOISE AND VIBRATION 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.

12.1 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.

12.2 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.

12.3 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).

12.4 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.

12.5 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 excavation and construction activities on site.

12.6 COMBINATION OF METHODS

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

12.7 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.

12.8 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.

12.9 MONTHLY ATTENDED NOISE MEASUREMENTS

Monthly attended noise measurements should be conducted to monitor and report the impacts and environmental performance of the development and the effectiveness of the management measures adopted in the Construction Noise and Vibration Management Plan in accordance with condition B12(d).

13 COMMUNITY INTERACTION AND COMPLAINTS HANDLING

13.1 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).

13.2 COMMUNITY CONSULTATION UNDERTAKEN

The following has been provided to this office from Richard Crooks in regard to the Community Consultation undertaken:

'Community Consultation has been undertaken with an online focus, due to the restrictions associated with the legislated restrictions around social distancing. An information package outlining the construction activities, and what mitigation measures have been implemented to reduce noise and vibration levels propagating beyond the site boundaries, has been provided to the community via the following mediums:

- *Project Update distributed via letterbox drop*
- *Information package via SINSW website*
- *Information board via SINSW website*

Consultation has been undertaken by providing the community the above mentioned information and providing FAQs. SINSW has sought feedback from the community via email or phone on the mitigation strategies proposed by the contractor. The Community was provided 7 days to comment.

Feedback received at the end of the 7 days has been incorporated in the CNVMSP and CEMP where practical and appropriate. The community will also be updated on how feedback has been received by the project team.'

13.3 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.

13.4 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.

13.5 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

14 CONCLUSION

This report presents an assessment of noise impacts associated with the excavation and construction activities to be undertaken for the residential development to be constructed at Farmland Drive, Schofields.

Expected noise levels associated with these works have been predicted and compared to noise management levels determined using the methodology in the Interim Construction Noise Guideline. The outcomes are as follows:

- There is likely to be periodic exceedances above the Highly Noise Affected Level (i.e. 75dB(A)) during the excavation works with the use of excavator and relevant attachments (i.e. hydraulic hammers) when operating close to sensitive receivers. To mitigate these exceedances, respite periods have been recommended when operating close to residential receivers.

- General construction works will have significantly lower impact (and typically less than the Highly Noise affected Level of 75dB(A)) at surrounding receivers due to the quieter items of plant (i.e. hand tools etc). Notwithstanding, in all circumstance's construction noise levels from the site should be minimised as practically possible during the construction period using the recommendations of this management plan.

With regards to vibration levels, predicted vibration levels are unlikely to exceed the nominated criteria and monitoring is recommended in case of complaints only or if rock hammering occurs within 20m of a residence.

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
George Kinezos

APPENDIX H - CONSTRUCTION WASTE MANAGEMENT SUB-PLAN

ALEX AVENUE PUBLIC SCHOOL CONSTRUCTION WASTE MANAGEMENT PLAN

VERSION NUMBER:

VERSION 5

REPORT DATE:

21/11/2019

SUBMITTED TO:

RICHARD CROOKES CONSTRUCTIONS

PRESENTED BY:

JO DRUMMOND

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

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1. INTRODUCTION

Overview

This Construction Waste Management Plan (CWMP) has been prepared by EcCell Environmental on behalf of Richard Crookes Constructions for the new Alex Avenue Public School at the corner of Farmland Drive and future realignment of Pelican Road in Schofields (the site). The site is legally described as proposed Lots 1 and 2, being part of existing Lot 4 in DP1208329 and Lot 121 in DP1203646.

The new school will cater for approximately 1,200 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 four 2-storey classroom buildings (Block B) containing 40 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, storeroom areas and amenities;
- Associated site landscaping and open space including associated fences throughout and games courts;
- Pedestrian access points along both Farmland Drive and the future Pelican Road;
- Substation on the north-east corner of the site; and
- School signage to the front entrance.

All proposed school buildings will be connected by a covered walkway providing integrated covered outdoor learning areas (COLAs). School staff will use the Council car park for the adjacent sports fields pursuant to a Joint Use agreement. The proposed School pick up and drop off zone will also be contained within the future shared car park and will be accessed via Farmland Drive.

Purpose

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

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; and (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, 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.

2. OBJECTIVES & TARGETS

The project construction waste 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. A waste data file will be maintained on site.

All entries in the Waste Data File will 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 Council 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
Components that can be reused after deconstruction	Architect, Engineer & Builder
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

6. MONITORING & 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 corrective action 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, or maintenance or waste management issues, 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 Environmental Management Representative and Health and Safety Manager where required.

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;
- School Infrastructure NSW email address 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

10.WASTE MANAGEMENT PLAN APPLICATION

PROJECT:
Alex Avenue Public School
ADDRESS:
CNR Farmland Drive and future realignment of Pelican Road in Schofields
Details of Application:
RICHARD CROOKES CONSTRUCTIONS
Description of buildings and other structures currently on the site:
No buildings and other structures on the site and no demolition is required.
Brief description of proposal:
Construction of: • A 2-storey library, administration and staff building (Block A); • Four 2-storey classroom buildings (Block B) containing 40 homebases; • 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, storeroom areas and amenities; • Associated site landscaping and open space including associated fences throughout and games courts.
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 materials.

	Name	Signed	Contact Number	Date
Prepared by :	Jo Drummond	Jo Drummond	0412214233	20/11/2019

PHASE: DEMOLITION

There is no demolition as this is a greenfield site.

PHASE 1: 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 Greenfield site			2,672 m^3	NA	Grasshopper Environmental	Transferred to licenced receiving facility
Sub Total	**2,672 m^3**					
TOTAL	**2,672 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.

The Detailed Site Investigation (Greencap report reference C122140:J160656_Detailed Site Investigation_Proposed Alex Avenue Public School) did not identify any unacceptable human health or ecological risk associated with the surface soil quality. The investigation tested for potential pollutants common to this type of site including Hydrocarbons, Heavy Metals, Pesticides 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.

This excludes general considerations that are relevant to unexpected finds.

PHASE 2: 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 that 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

Alex Avenue Public School

Lot 4 DP1208329 & Lot 121 DP1203646

PREPARED FOR
Richard Crookes Constructions
Level 3, 4 Broadcast Way

Artarmon NSW 2064
Tel: (02) 9902 4700

Ref: S182535-01-CR03
Rev: 3
Date: 16.05.20

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
11.11.19	2	Draft	J. Grinsell	J. Gilligan
16.05.20	3	Final	J. Grinsell	J. Gilligan

Northrop Consulting Engineers Pty Ltd

ACN 064 775 088 | ABN 81 094 433 100

Level 2, 3 Horwood Place, Parramatta NSW 2150

02 9241 4188 | sydney@northrop.com.au | www.northrop.com.au

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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 Alex Avenue Primary School development at Proposed Lots 1 & 2 Being part of Lot 4 DP1208329 & Lot 121 DP1203646, Farmland Drive, Schofields.

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. Blacktown Development Control Plan 2006 Part R Soil Erosion and Sediment Control Guidelines

1.3 The Development

1.3.1 Precinct and Surrounds

The site is located within the suburb of Schofields in the Blacktown City Council (Council) Local Government Area (LGA). The site is approximately two (2) hectares, bound by Farmland Drive to the north, the proposed Pelican Road extension to the west and existing developments to the south and east.

The existing site is largely undeveloped farm land dominated by grassed fields which generally falls to the north to south. There is a regional detention basin to the south which accommodates flows generated from the development site.

1.3.2 Proposed Development

This development is proposed on Proposed Lots 1 & 2 Being Part of Lot 4 DP1208329 & Lot 121 DP1203646, Schofields NSW, which consists of a new public school. The development includes in the construction 6 building blocks and pedestrian access points along Farmland Drive.

The proposed site grading generally falls to a proposed bio-retention basin at the south-west corner of the site to minimise earthworks where possible. All pavement and landscaping fall away from the buildings to ensure nuisance stormwater runoff is avoided. There are no upstream catchments that are directed through the site.

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 overflows for rainfall events in excess of the design criteria specified in NSW Department of Housing Manual, “Managing Urban Stormwater Soil & Construction” 2004 (Blue Book).

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 0;
- 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 Proposed Lots 1 & 2 Being part of Lot 4 DP1208329 & Lot 121 DP1203646, Farmland Drive, Schofields. 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. Relevant CV's 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 into the verge of Pelican Road. The project design team have approached Blacktown 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.

B20. The applicant must prepare a Construction Soil and Water Management Plan (CSWMSP) and the plan must address, but not be limited to the following:

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 and 1 in 5- year ARI.**

Northrop Commentary

In addition to the items identified in Section 2.2 of this report, drainage swales have been proposed adjacent to the north, west and south boundaries. These drainage swales have been proposed to capture and convey surface runoff generated from the site during the construction phase of the project and direct flows to a Temporary Sediment Basin. These are typically sized to capture and convey flows up to the 1 in 10-year ARI storm event as prescribed in the Blue Book

Similarly, in Section 2.1 a Sediment Basin has been proposed in the south west corner of the site to capture flows from the drainage swales. Stormwater collected in the basin is intended to reside for a period of time to allow suspended solids to settle. This is typically expedited by flocculating the water with a gypsum additive – prior to discharge of clean 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 Blacktown 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 BLACKTOWN CITY COUNCIL DEVELOPMENT GUIDELINES. READ IN CONJUNCTION WITH THE NOTES PROVIDED BELOW.
IF CONFLICT ARISE, BLACKTOWN CITY COUNCIL GUIDELINES AND SPECIFICATIONS TAKE PRECEDENCE. WHERE BLACKTOWN CITY COUNCIL GUIDELINES AND SPECIFICATIONS ARE SILENT, THE SPECIFICATION NOTES BELOW TAKE PRECEDENCE.

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 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. 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.

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

FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
1	ISSUED FOR INFORMATION	JT		JRG	08.04.19
A	ISSUED FOR CONSTRUCTION	VC		JRG	31.05.19
B	RE-ISSUED FOR CONSTRUCTION	JO		JRG	20.06.19
C	RE-ISSUED FOR CONSTRUCTION	CP		JRG	29.07.19
D	ISSUED FOR APPROVAL	JO		JRG	19.11.19

CLIENT: RICHARD CROOKES CONSTRUCTIONS

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

ARCHITECT: GROUP GSA

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NORTHROP
Sydney
Level 11 345 George Street, Sydney NSW 2000
Ph (02) 9241 4188 Fax (02) 9241 4324
Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT: ALEX AVENUE PRIMARY SCHOOL
PELICAN ROAD, SCHOFIELDS

DRAWING TITLE: CIVIL DOCUMENTATION CONSTRUCTION CERTIFICATE
SPECIFICATION NOTES - SHEET 01

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

LEGEND

- BOUNDARY LINE
- EASEMENT LINE
- EXISTING KERB
- EXISTING ELECTRICITY
- EXISTING ELECTRICITY (OVERHEAD)
- EXISTING ELECTRICITY (UNDERGROUND)
- EXISTING GAS
- EXISTING WATER
- EXISTING STORMWATER
- EXISTING CONTOURS
- SEDIMENT FENCE
- SECURITY FENCE
- PROPOSED BUILDING FOOTPRINT
- WIRE MESH AND GRAVEL SEDIMENT FILTER
- GEOTEXTILE INLET FILTER TRAPS
- DRAINAGE SWALE
- STABILISED SITE ACCESS
- STOCKPILE
- EARTH BASIN - WET

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
B	RE-ISSUED FOR CONSTRUCTION	JO		JRG	20.06.19
C	RE-ISSUED FOR CONSTRUCTION	CP		JRG	12.07.19
D	RE-ISSUED FOR CONSTRUCTION	VC		JRG	13.08.19
E	RE-ISSUED FOR CLIENT REVIEW	JO		JRG	15.11.19
F	ISSUED FOR APPROVAL	JO		JRG	19.11.19
G	ISSUED FOR APPROVAL	CP		JRG	21.11.19

CLIENT
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ARCHITECT
GROUPGSA

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

NORTHROP
Sydney
Level 11 345 George Street, Sydney NSW 2000
Ph (02) 9241 4188 Fax (02) 9241 4324
Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT
ALEX AVENUE PRIMARY SCHOOL

PELICAN ROAD, SCHOFIELDS

DRAWING TITLE
CIVIL DOCUMENTATION CONSTRUCTION CERTIFICATE

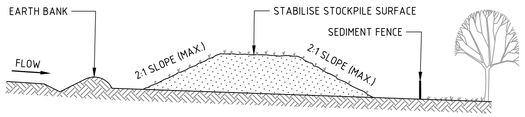
SEDIMENT AND SOIL EROSION CONTROL PLAN

JOB NUMBER **182535**

DRAWING NUMBER **C02.01**

REVISION **G**

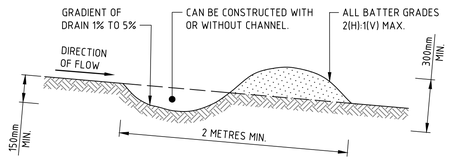
DRAWING SHEET SIZE = A1



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.

STOCKPILE

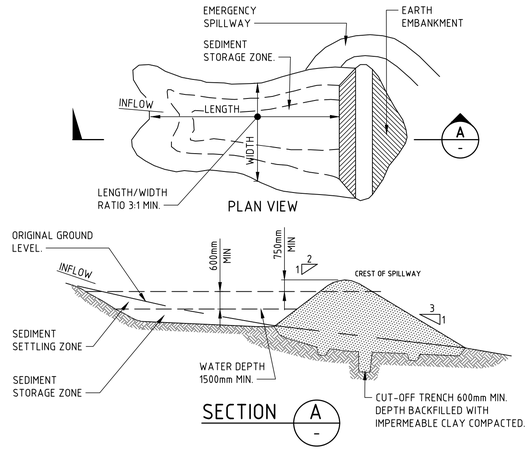


CONSTRUCTION NOTES

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.

DRAINAGE SWALE

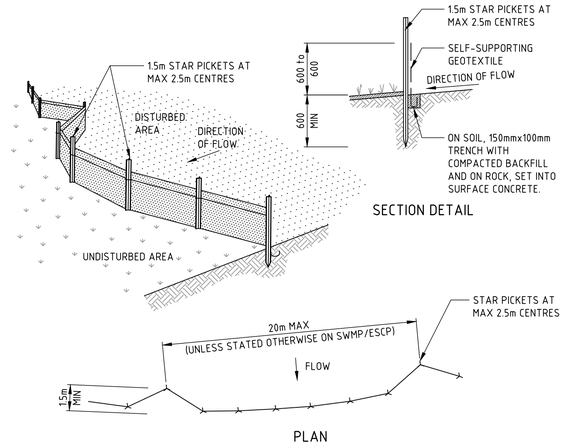


CONSTRUCTION NOTES

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)

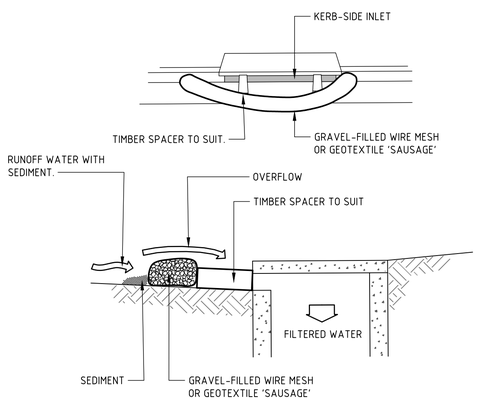
SEDIMENT BASIN



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

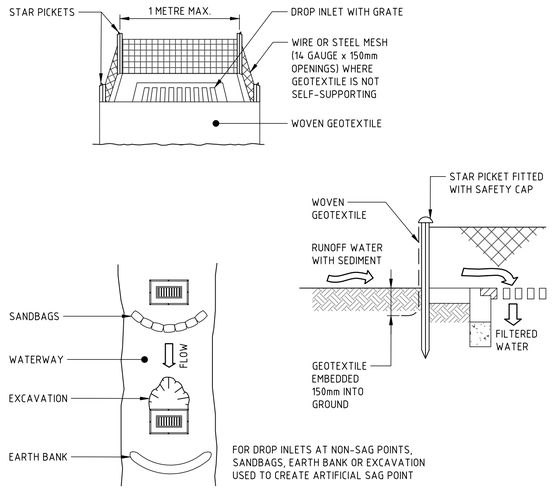


NOTE:THIS PRACTICE ONLY TO BE USED WHERE SPECIFIED IN APPROVED SWMP/ESCP.

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.

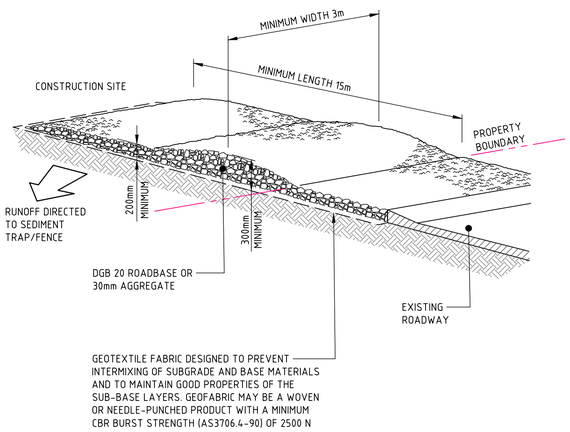
WIRE MESH AND GRAVEL SEDIMENT FILTER



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 TRAPS



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

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

FOR CONSTRUCTION

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
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D	RE-ISSUED FOR CONSTRUCTION	JO		JRG	15.11.19
E	ISSUED FOR APPROVAL	JO		JRG	19.11.19

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

ARCHITECT
GROUP GSA

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NOT TO SCALE

NORTHROP
Sydney
Level 11 345 George Street, Sydney NSW 2000
Ph (02) 9241 4188 Fax (02) 9241 4324
Email sydney@northrop.com.au ABN 81 094 433 100

PROJECT
ALEX AVENUE PRIMARY SCHOOL

PELICAN ROAD, SCHOFIELDS

DRAWING TITLE
CIVIL DOCUMENTATION CONSTRUCTION CERTIFICATE

SEDIMENT AND SOIL EROSION CONTROL DETAILS

JOB NUMBER **182535**

DRAWING NUMBER **C02.11**

REVISION **E**

DRAWING SHEET SIZE = A1

Appendix B – Sediment Basin Calculations

Sedimentation basin calculation

Project Number: 182535
Project Name: Alex Avenue Primary School

According to the Geotechnical Report prepared by JKGeotechnics (ref:30598PHrpt) the majority of the soil encountered on site was classified as Silty Clay

Parameter	Adopted value	
Total area (ha)	2	
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	24.6	See Sheet x-day-y-p%
Soil Hydrological Group	D	
Cv	0.5	See 4) Cv
Settling zone volume (m^3)	246.000	(calculated)
Sediment storage volume (m^3)	123.000	(calculated)
Total basin volume (m^3)	**369.000**	(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)

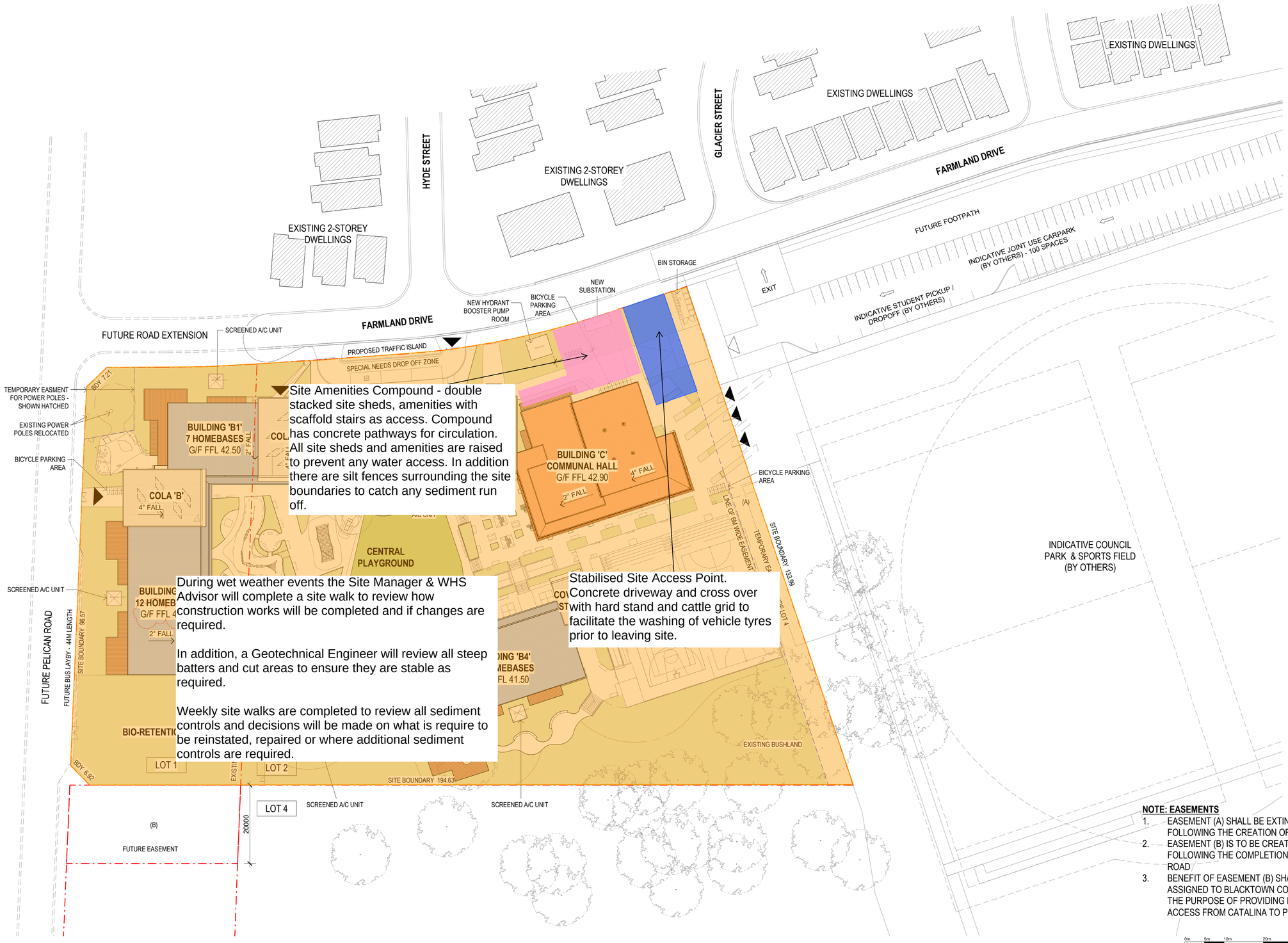
Soil Hydrologic Group	Design Rainfall depth (mm)							Runoff potential
	<20	21-25	26–30	31–40	41-50	51-60	61-80	
A	0.01	0.05	0.08	0.15	0.22	0.28	0.37	very low
B	0.10	0.19	0.25	0.34	0.42	0.48	0.57	low to moderate
C	0.25	0.35	0.42	0.51	0.58	0.63	0.70	moderate to high
D	0.39	0.50	0.56	0.64	0.69	0.74	0.79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



Site Amenities Compound - double stacked site sheds, amenities with scaffold stairs as access. Compound has concrete pathways for circulation. All site sheds and amenities are raised to prevent any water access. In addition there are silt fences surrounding the site boundaries to catch any sediment run off.

During wet weather events the Site Manager & WHS 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 site walks are completed to review all sediment controls and decisions will be made on what is require to be reinstated, repaired or where additional sediment controls are required.

Stabilised 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.

NOTE: EASEMENTS

1. EASEMENT (A) SHALL BE EXTINGUISHED FOLLOWING THE CREATION OF EASEMENT (B)
2. EASEMENT (B) IS TO BE CREATED FOLLOWING THE COMPLETION OF PELICAN ROAD
3. BENEFIT OF EASEMENT (B) SHALL BE ASSIGNED TO BLACKTOWN COUNCIL FOR THE PURPOSE OF PROVIDING PUBLIC ACCESS FROM CATALINA TO PELICAN ROAD

0m 5m 10m 20m 30m

1 SITE AND ROOF PLAN
1 : 500

General Notes:
1. This drawing is the copyright of Group GSA Pty Ltd and may not be altered, reproduced or transmitted in any form or by any means in part or in whole without the written permission of Group GSA
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	ISSUE FOR COORDINATION	27.03.2019
B	PROGRESS ISSUE	10.05.2019
C	GENERALLY AMENDED	22.05.2019
D	REVISED SUBMISSION	23.05.2019
E	FOR SSD SUBMISSION	31.05.2019
F	REVISED SSD ISSUE	13.06.2019
G	DETAILED DESIGN	21.06.2019
H	DETAILED DESIGN ADDENDUM	12.07.2019
1	FOR CONSTRUCTION	02.08.2019
2	IFC AMENDED AS INDICATED	15.10.2019

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.

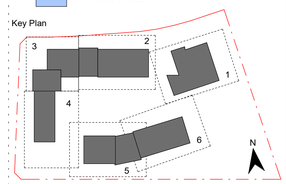
LEGEND

- Site boundary
- Extent of easement
- Existing neighbouring buildings
- Pedestrian entry
- Vehicular entry

ZONES

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

Key Plan



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

T +612 9361 4144 F +612 9332 3458

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

Project Title
ALEX AVENUE 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	Drawing No	Issue
180645	AA-AR-1100	2

15/10/2019 12:49:56 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:

Education
School Infrastructure

Post Approval Consultation Record

B19 Construction Soil and Water Management Sub-Plan

Identified Party to Consult:	Blacktown City Council (BCC)
Consultation type:	Email correspondence & Phone calls
When is consultation required?	Prior to commencement
Why	B19 – Construction Soil & Water Management Sub-Plan (CSWMSP), prepared in consultation with BCC.
When was consultation held	Request for CSWMSP contact within BCC – 22/5/20 Contact confirmed as David Yee – 22/5/20 CSWMSP issued to David Yee for review – 25/5/20 Follow up email sent to David Yee – 27/5/20 Follow up phone call to David Yee – 29/5/20 Follow up email sent to David Yee – 2/6/20 Follow up phone call to David Yee – 2/6/20 Follow up email sent to David Yee – 3/6/20 New BCC contact received – 4/6/20 Phone call to Danny Zabakly re CSWMSP – 4/6/20 CSWMSP issued to Danny Zabakly via email for review – 4/6/20 Two follow up calls to Danny Zabakly – 5/6/20
Identify persons and positions who were involved	**Danny Zabakly** Team Leader, Blacktown City Council **David Yee** Engineering Coordinator, Blacktown City Council **Isaac Pinkerton** Site Engineer, Richard Crookes Constructions **Tom Hemmett** Site Engineer, Richard Crookes Constructions
Provide the details of the consultation	Consultation with Blacktown City Council has been attempted through numerous emails and phone calls. During a phone conversation with Danny Zabakly, he had agreed to review the CSWMSP. If any comments and or updates are required for the CSWMSP these will be updated accordingly.
What specific matters were discussed?	During a phone conversation with Danny Zabakly, he had agreed to review the CSWMSP. If any comments and or updates are required for the CSWMSP these will be updated accordingly.
What matters were resolved?	Nil
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 – UNEXPECTED FINDS PROTOCOL FOR CONTAMINATION

Greencap Pty Ltd
ABN: 76 006 318 010
Level 2 / 11-17 Khartoum Road
North Ryde NSW 2113
Australia
P: (02) 9889 1800
www.greencap.com.au

26 July 2019

C107881:J163717 JG

Isaac Pinkerton
Site Engineer
Richard Crookes Constructions Pty Ltd
Level 3, 4 Broadcast Way,
Artarmon NSW 2064

Dear Isaac,

Re: Unexpected Finds Protocol - 34-38 Schofields Road, Schofields NSW

Introduction

This document specifies the procedures and controls to be implemented in the event that any unexpected soil and/or groundwater contamination is identified during the earthworks and construction phase at 34-38 Schofields Road, Schofields NSW (hereafter referred to as the site).

This Unexpected Finds Protocol (UFP) was prepared by Greencap at the request of Isaac Pinkerton of Richard Crookes Constructions Pty Ltd. The UFP has been prepared with reference to the *National Environmental Protection (Assessment of Site Contamination) Measure 1999 (2013 amendment*), NEPC 2013.

Unexpected Finds Protocol

In the event that potential soil and/or groundwater contamination is identified during the works, the following procedures must be implemented:

The workers that encounter the potential contamination must stop work immediately and notify their supervisor. The supervisor must then immediately notify Richard Crookes Constructions Pty Ltd Project Manager. Work must cease in this area until further assessed and advice provided by a suitably qualified person (e.g. Environmental Consultant or Occupational Hygienist).

- If the encountered contamination presents an immediate risk to human health or the environment (e.g. ruptured oil drum or friable asbestos), controls must be immediately implemented to contain and prevent further release of the contaminant. Workers initiating such controls must be suitably competent and wearing suitable personal protective equipment (PPE), which should be stored on site. Chemical spill kits should also be stored on site.
- Richard Crookes Constructions Pty Ltd is to immediately notify the Environmental Consultant to undertake a preliminary assessment of the potential contamination. Based on the findings of the preliminary assessment, further sampling and investigation may be required.
- Once confirmed that a contamination risk has been identified, Richard Crookes Constructions Pty Ltd is to verbally advise the Auditor of the unexpected find. Written notification should follow,

which will provide relevant information relating to any special recommendations to site workers/employees, further sampling, investigation and remediation that may be required.

- If remediation is required, Richard Crookes Constructions Pty Ltd must notify their client and relevant regulatory authorities (as required) of the planned commencement and completion dates and details of the remediation strategy to be adopted. Any information/reports relating to assessment, investigation or remediation of the unexpected contamination must be included as part of this notification.
- Richard Crookes Constructions Pty Ltd have a responsibility to keep regulatory authorities updated throughout the duration of any remediation works. If validation testing/validation programs are required on completion of the remediation works, a validation report will be prepared by the Environmental Consultant. Copies of any validation results and clearance reporting must be provided by Richard Crookes Constructions Pty Ltd to all relevant parties.

If you have any questions regarding this correspondence, please do not hesitate to contact James Green on 0437 646 386.

Yours sincerely,

James Green
Consultant - Environment | CLM East

Authorised by:

Matthew Barberson
Team Manager – Environment | CLM East

Statements of Limitations

All and any Services proposed by Greencap to the Client are subject to the Terms and Conditions listed on the Greencap website at: www.greencap.com.au/about-greencap/terms-and-conditions. Unless otherwise expressly agreed to in writing and signed by Greencap, Greencap does not agree to any alternative terms or variation of these terms if subsequently proposed by the Client. The Services are to be carried out in accordance with the current and relevant industry standards of testing, interpretation and analysis. The Services are to be carried out in accordance with Commonwealth, State or Territory legislation, regulations and/or guidelines. The Client will be deemed to have accepted these Terms when the Client signs the Proposal (where indicated) or when the Company commences the Services at the request (written or otherwise) of the Client.

The services are carried out for the Specific Purpose, outlined in the body of this Proposal. To the fullest extent permitted by law, Greencap, its related bodies corporate, its officers, consultants, employees and agents assume no liability, and will not be liable to any person, or in relation to, any losses, damages, costs or expenses, and whether arising in contract, tort including negligence, under statute, in equity or otherwise, arising out of, or in connection with, any matter outside the Specific Purpose.

The Client acknowledges and agrees that proposed investigations rely on information provided to Greencap by the Client or other third parties. Greencap makes no representation or warranty regarding the completeness or accuracy of any descriptions or conclusions based on information supplied to it by the Client, its employees or other third parties during provision of the Services. The Client releases and indemnifies Greencap from and against all Claims arising from errors, omissions or inaccuracies in documents or other information provided to Greencap by the Client, its employees or other third parties. Under no circumstances shall Greencap have any liability for, or in relation to, any work, reports, information, plans, designs, or specifications supplied or prepared by any third party, including any third party recommended by Greencap.

The Client will ensure that Greencap has access to all sites and buildings as required by or necessary for Greencap to undertake the Services. Notwithstanding any other provision in these Terms, Greencap will have no liability to the Client or any third party to the extent that the performance of the Services is not able to be undertaken (in whole or in part) due to access to any relevant sites or buildings being prevented or delayed due to the Client or their respective employees or contractors expressing safety or health concerns associated with such access.

Greencap, its related bodies corporate, its officers, employees and agents assume no liability and will not be liable for lost profit, revenue, production, contract, opportunity, loss arising from business interruption or delay, indirect or consequential loss or loss to the extent caused or contributed to by the Client or third parties, suffered or incurred arising out of or in connection with our Proposals, Reports, the Project or the Agreement. In the event Greencap is found by a Court or Tribunal to be liable to the Client for any loss or damage arising in connection with the Services, the Client's entitlement to recover damages from Greencap shall be reduced by such amount as reflects the extent to which any act, default, omission or negligence of the Client, or any third party, caused or contributed to such loss or damage. Unless otherwise agreed in writing and signed by both parties, Greencap's total aggregate liability will not exceed the total consulting fees paid by the client in relation to this Proposal. For further detail, see Greencap's Terms and Conditions available at www.greencap.com.au/about-greencap/terms-and-conditions.

July 2019

Unexpected Finds Protocol

34-38 Schofields Road, Schofields NSW

Richard Crookes Constructions Pty Ltd

Appendix A: Unexpected Finds Protocol Flowchart

Unexpected Finds Protocol – 34-38 Schofields Road, Schofields NSW

The Unexpected Finds Procedure will be applied by workers when triggers such as suspected asbestos containing material (ACM), buried building materials, odours (such as hydrocarbon), staining, and/ or underground storage tanks (UST's) are unexpectedly found on site. Such an occurrence may occur:

- During excavation works/encountering groundwater;
- During building work;
- Following soil disturbance after a storm or some other unexpected event; and/or
- As a result of illegal dumping.

The following procedure will be applied when an unexpected find occurs:

Unexpected Find Occurs

The Workers will:

- Immediately cease work;
- leave the area;
- Isolate the area;
- Stop airflow (e.g. air conditioning/fans) within the area; and
- Contact the Site Manager as soon as possible.

Site Manager

- Install controls to further manage the isolation of the area. This may be achieved by use of warning signage and barricading;
- For soil stockpiles/in-situ material where unexpected contamination (i.e. asbestos & buried building materials) is identified:
  - Wet down the stockpile with a gentle water spray, avoiding generation of water run-off,
  - Carefully place a tarpaulin over the pile; and
  - Install appropriate stormwater and sediment controls to prevent the uncontrolled escape of potential contaminants leaving the area.
- For soil stockpiles/in-site material where unexpected contamination in the form of staining/odours is identified:
  - Isolate the area and cover the surface area extent with a tarpaulin.
- For groundwater where unexpected contamination (i.e. odours & visual triggers) is identified:
  - Avoid generation of run-off and install appropriate controls to contain the groundwater and prevent the uncontrolled escape of potential contaminants of groundwater leaving the source area.
- Inform Environmental Manager and Health and Safety manager.

Environmental Manager

- Engage the services of an Environmental Consultant to assess the work area for potential contaminants.

Health and Safety Manager

- Provide advice regarding necessary PPE requirements.

Site Manager

- Implement the initial requirements specified by the Environmental and Health and Safety Managers.

Environmental Consultant Attends Site

The Environmental Consultant will investigate the type and extent of contamination at the area and evaluate if there is an immediate risk to human health or the environment.

No contamination Present

The Protocol Controller should:

- Inform workers that the suspected material is not contaminated;
- Direct workers that they may recommence work; and
- Attach relevant documentation used in the contamination assessment into the site safety plan.

Contamination Present

The Protocol Controller should:

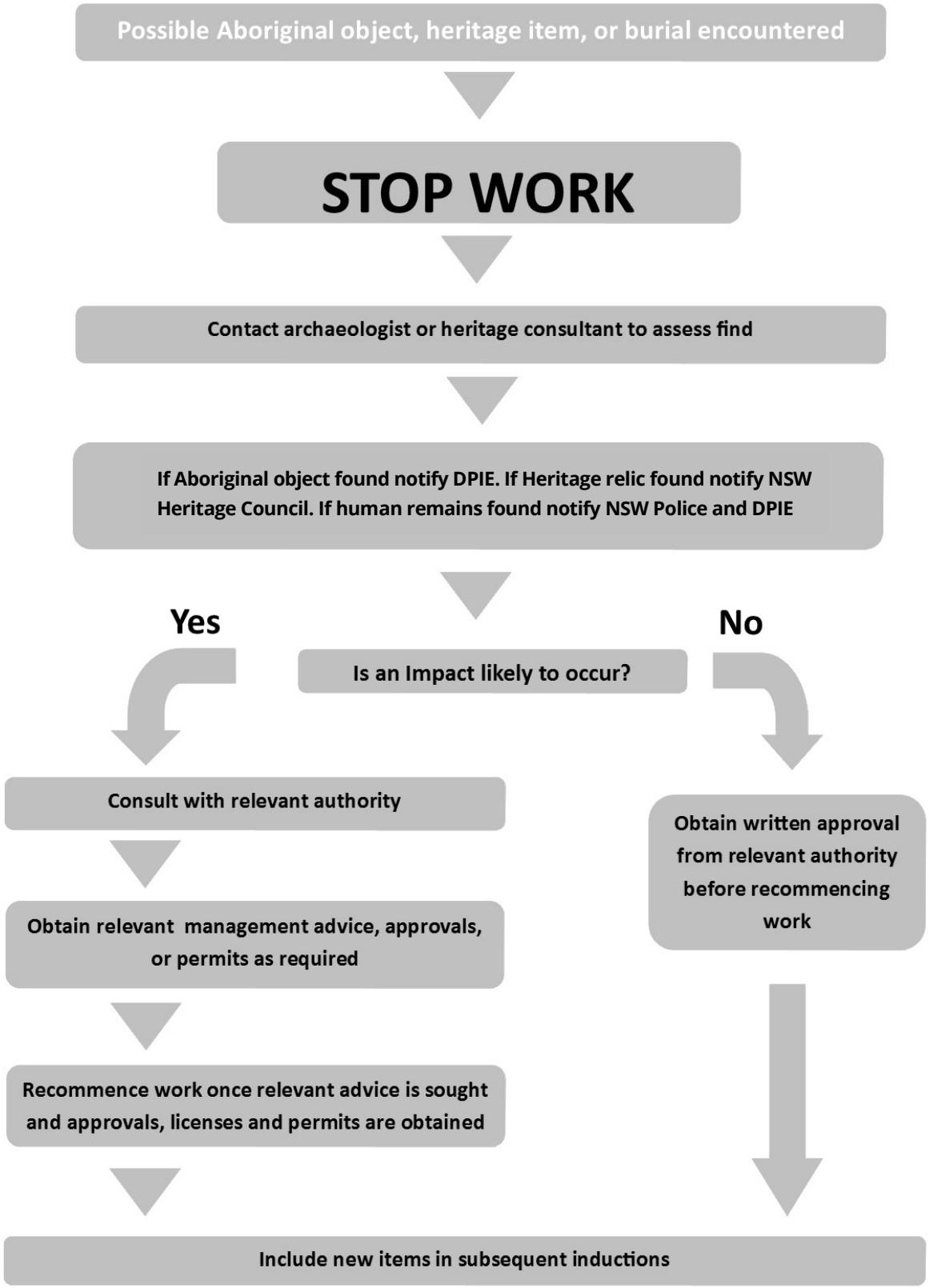
- Implement the recommendations of the Environmental Consultant and Environmental Manager;
- Arrange necessary remediation & management measures; and/or
- Consider redesigning the work process so that the contaminated material is not disturbed.

Area Safe to Re-Enter

Once the area has been deemed by a competent person to be safe to re-enter, the Site Manager will:

- Inform Workers that the work area is safe to re-enter; and
- Include any relevant documents (e.g. further investigation results, validation reports, asbestos removal clearance certificates, bulk sample analysis results and air monitoring results) into the site safety plan.

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


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

APPENDIX L – WASTE CLASSIFICATION AND VALIDATION

GREENCAP
Going Further in Managing Risk

Level 2 / 11 Khartoum Road
North Ryde NSW 2113
Australia
T: (02) 9889 1800

DETAILED SITE INVESTIGATION

January 2019
J160656

GROUP GSA

Proposed Alex Avenue Public School, Schofields NSW

C122140 : NB

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The Report is provided for the exclusive use of the Client for this Project only, in accordance with the Scope and Specific Purpose as outlined in the Agreement, and only those third parties who have been authorised in writing by Greencap. It should not be used for other purposes, other projects or by a third party unless otherwise agreed and authorised in writing by Greencap. Any person relying upon this Report beyond its exclusive use and Specific Purpose, and without the express written consent of Greencap, does so entirely at their own risk and without recourse to Greencap for any loss, liability or damage. To the extent permitted by law, Greencap assumes no responsibility for any loss, liability, damage, costs or expenses arising from interpretations or conclusions made by others, or use of the Report by a third party. Except as specifically agreed by Greencap in writing, it does not authorise the use of this Report by any third party. It is the responsibility of third parties to independently make inquiries or seek advice in relation to their particular requirements and proposed use of the site.

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Document Control

Document Quality Management Details		
Report Name:	Detailed Site Investigation	
Site Details:	Corner of Farmland Drive and future realignment of Pelican Road, Schofields NSW 2762	
Project Number:	J157372	
Client Name:	Group GSA, c/o Richard Crookes Construction	
Client Number:	C122140	
Signatures:	Prepared By:  Nicole Boukarim **Consultant** - Environment	Authorised By:  Matthew Barberson **Team Manager** - Environment

Issue Status

Version No.	Date	Creator	Reviewer
Draft	14/12/2018	Nicole Boukarim	Matthew Barberson
1	21/12/2018	Nicole Boukarim	Matthew Barberson
2	15/01/2019	Nicole Boukarim	Matthew Barberson
3	21/01/2019	Nicole Boukarim	Matthew Barberson

Document Circulation

No of Copies	Type	Customer Name	Position & Company
1	Electronic	Frederic Terreaux	Group GSA – Associate Director

Executive Summary

Greencap Pty Ltd (Greencap) was engaged by Richard Crookes Construction ('RCC') to undertake a Detailed Site Investigation (DSI) at the site of proposed school: Alex Avenue Public School ('the site').

This Detailed Site Investigation report has been prepared by Greencap Pty Ltd ('Greencap') on behalf of Schools Infrastructure NSW (SINSW) (the Applicant). It accompanies an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD 18_9368) for the new Alex Avenue Public School at the corner of Farmland Drive and future realignment of Pelican Road in Schofields (the site). The site is legally described as proposed Lots 1 and 2, being part of existing Lot 4 in DP1208329 and Lot 121 in DP1203646.

Refer to Figure 1, Appendix A for site location and boundary. Alex Avenue Public School is the proposed to be constructed on the approximately 2.5 ha site.

Richard Crookes has been appointed by SINSW as the head contractor for the project, as of January 2019.

Objective and Scope

The purpose of this DSI is to identify potential sources of contamination and contaminants of concern on the site, evaluate the presence of contamination in the identified areas of concern, close out any data gaps specified in the Preliminary Site Investigation (PSI) report for the site and assess site suitability for its intended use as a Primary School. This report will subsequently also provide recommendations for remediation actions and/or further investigations if required.

To achieve the above-mentioned project objectives, the following scope was undertaken: a desktop study and review of previously developed PSI Report, a site walkover, soil sampling, laboratory analysis, and preparation of this report.

Chemical results obtained from these investigations were compared with applicable human health and ecological criteria and regulation threshold levels for further investigation and corrective action. Consequently, the site Conceptual Site Model (CSM) was updated to inform the decision-making process for further investigations and remedial actions. Specifically, this DSI provides conclusions regarding the suitability of the land for future land use consistent with *Residential A* defined in the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1) ('NEPM', NEPC, 2013), which includes Children's day care centres, preschools and Primary Schools.

Response to SEARs

This DSI is required by the Secretary's Environmental Assessment Requirements (SEARs) for SSD 18_9368. The table below identifies the SEARs and relevant reference within this report.

Table 1: SEARs and Relevant Reference

SEARs Item	Relevant report Reference
12. Contamination Assess and quantify any **soil** and groundwater contamination and demonstrate that the site is suitable for the proposed use in accordance with SEPP 55	Soil contamination: This DSI including attached Salinity Report (Appendix B)

While no significant potential sources of groundwater contamination were identified as a result of this DSI, groundwater testing was outside the scope of this investigation. For information specific to groundwater and groundwater contamination, other reports prepared for the site may be referred to, none of which Greencap was involved in preparing.

Findings and Conclusion

This DSI report satisfies the conditions of Clause 7 (subclause 3) of SEPP 55 (Remediation of Land).

The results of this investigation indicated the surface soil quality on site satisfied the land use standards for its intended use as a Primary School. This Detailed Site Investigation did not identify any unacceptable human health or ecological risk associated with the surface soil quality.

This investigation did not reveal any analysis results that require further investigation. All analysis results for the contaminants of potential concern were below applicable criteria for the site. Furthermore, the findings of the soil salinity report identified no evidence of any current existing significant salinity hazard/risk on the site. Therefore, the site is considered suitable for the intended land use as the Proposed Alex Avenue Public School, consistent with '*Residential A'* land use as defined in the NEPM.

Recommendations

As a result of the findings of this investigation, Greencap recommends the following action:

- Any material to be taken off-site must be classified in accordance with the NSW EPA Waste Classification Guidelines (2014).

Detailed Site Investigation

Group GSA c/o Richard Crookes Construction

Cnr of Farmland Drive & future realignment of Pelican Road, Schofields NSW

Table of Contents

1 Introduction and Background

Greencap Pty Ltd (Greencap) was engaged by Richard Crookes Construction ('RCC') to undertake a Detailed Site Investigation (DSI) at the site of proposed school: Alex Avenue Public School ('the site').

This Detailed Site Investigation report has been prepared by Greencap Pty Ltd ('Greencap') on behalf of Schools Infrastructure NSW (SINSW) (the Applicant). Richard Crookes has since been appointed by SINSW as the head contractor for the project, as of January 2019. This report accompanies an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD 18_9368) for the new Alex Avenue Public School at the corner of Farmland Drive and future realignment of Pelican Road in Schofields (the site). The site is legally described as proposed Lots 1 and 2, being part of existing Lot 4 in DP1208329 and Lot 121 in DP1203646.

The new school will cater for approximately 1,000 primary school students and 70 full-time staff upon completion. The proposal seeks consent 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 four 2-storey classroom buildings (Block B) containing 40 home-bases 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, store room areas and amenities;
- Associated site landscaping and open space including associated fences throughout and games courts;
- Pedestrian access points along both Farmland Drive and the future Pelican Road;
- Substation on the north-east corner of the site; and
- School signage to the front entrance.

All proposed school buildings will be connected by a covered walkway providing integrated covered outdoor learning areas (COLAs). School staff will use the Council car park for the adjacent sports fields pursuant to a Joint Use agreement. The proposed School pick up and drop off zone will also be contained within the future shared car park and will be accessed via Farmland Drive.

2 Project Objectives

This DSI provides further assessment of the site following a Preliminary Site Investigation (PSI) previously prepared for the site by Environmental Investigation Services (EIS, August 2017).

The purpose of this DSI report is to identify potential sources of contamination and contaminants of concern on the site, evaluate the presence of contamination in the identified areas of concern, close out any data gaps specified in the Preliminary Site Investigation (PSI) report for the site, and assess site suitability for its intended use as a Primary School. This report will subsequently also provide recommendations for remediation actions and/or further investigations if required.

In particular, this DSI provides conclusions regarding the suitability of the land for future land use consistent with *Residential A* defined in the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1) ('NEPM', NEPC, 2013), which includes Children's day care centres, preschools and Primary Schools.

3 Response to SEARs

This DSI is required by the Secretary's Environmental Assessment Requirements (SEARs) for SSD 18_9368. The table below identifies the SEARs and relevant reference within this report.

Table 1: SEARs and Relevant Reference

SEARs Item	Relevant report Reference
12. Contamination Assess and quantify any **soil** and groundwater contamination and demonstrate that the site is suitable for the proposed use in accordance with SEPP 55	Soil contamination: This DSI including attached Salinity Report (Appendix B) Groundwater contamination: Addressed in water-related reports prepared, external to Greencap contribution

While no significant potential sources of groundwater contamination were identified as a result of this DSI, groundwater testing was outside the scope of this investigation. For information specific to groundwater and groundwater contamination, other reports prepared for the site may be referred to, none of which Greencap was involved in preparing.

4 Project Scope

To achieve the above project objectives, the following scope of work was undertaken. Where relevant, the scope was undertaken with reference to the *National Environmental Protection (Assessment of Site Contamination) Measure 1999* (2013 amendment, referred to here as the 'NEPM') as well as other relevant guidance;

4.1 Desktop Review

A desktop review was undertaken, which encompassed the following:

- Review of the Preliminary Site Investigation (PSI) previously prepared for the site by Environmental Investigation Services (EIS, August 2017).
- Review of Council records and aerial photographs to help identify landfilling, including potential asbestos landfill;
- Review of available references relating to the local topography, geology, hydrogeology, acid sulfate soils risks, and salinity risks; and
- Preparation of relevant safety information (JSEA and SWMS) and requesting underground service plans from Dial Before You Dig data base.

4.2 Site Walkover and Soil Contamination Investigation

A detailed site walkover was undertaken on the 16th November 2016, by suitably qualified Greencap scientists to identify: key site features, any visible Asbestos Containing Materials (ACM) on surface soils and any visible signs of possible salinity effects.

Soil sampling and analysis was undertaken for the site, which involved the following:

- Engagement of an excavation sub-contractor for test pitting;

- Soil sampling consisting of the following:
  - Test pitting, soil logging and soil sampling at 15 locations to a depth of maximum 1 metres below ground level (mBGL) or 0.5 mBGL into natural soil profile (whichever is encountered first)—*applies to the fill area noted in the PSI Report* (EIS, 2017);
  - Test pitting, soil logging and soil sampling at 20 locations to a depth of maximum 0.5 mBGL—*applies to the rest of the site for sampling density coverage*.
- At each sample location, a field log was completed by a suitably qualified Greencap scientist, detailing a description of the soil texture, odours, pH and any other notable inclusions;
- Quality Assurance and Quality Control (QA/QC) samples were collected at a rate of 1 duplicate sample per 10 primary samples. Eurofins Australia was used as the primary laboratory (approx. 1 in 20 intra-laboratory duplicates), while ALS was used as the secondary laboratory (1 in 20 inter-laboratory duplicates);
- Soil sample submission to a NATA-Accredited laboratory for chemical analysis of relevant combinations of the following Chemicals of Potential Concern (CoPC):
  - Total Recoverable Hydrocarbons (TRH);
  - Benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN);
  - Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc)
  - Polycyclic Aromatic Hydrocarbons (PAH);
  - Organochlorine pesticides (OCPs)
  - Organophosphate pesticides (OPPs);
  - Polychlorinated biphenyls (PCBs);
  - Asbestos in soils (presence/ absence); and
  - Salinity Characteristics (total soluble salts, soluble chloride, electrical conductivity, saturated resistivity).

4.3 Reporting

Reporting scope included the following:

- Preparation of this DSI Report evaluating the overall site condition including the contamination concerns identified in the PSI and laboratory results of the analysed soil samples. This report has been prepared in accordance with the NSW EPA (2011) '*Guidelines for Consultants Reporting on Contaminated Sites'* and relevant schedules from the NEPM.
- Preparation of a Salinity Report in accordance with the Department of Land and Water Conservation (2002) *Site investigation for urban salinity* (refer to Appendix B).

5 Site Description Summary

The site location and boundary are depicted in Figure 1, Appendix A. The site is currently vacant vegetation-covered land, zoned as "R3: Infrastructure: Educational Establishment". The site covers a surface area of approximately 2.5ha and is currently in initial planning stages of development as a Primary School site consisting of several buildings and both sealed and unsealed outdoor areas.

The site occupies the northern portion of Lot 4 in Deposited Plan (DP) 1208329 (hereafter referred to as 'proposed Lot 2') and a small area of Lot 121 DP1203646 (hereafter referred to as 'proposed Lot 1').

General site information is provided in Table 12. Site locality and layout maps are provided in Figure 1 and Figure 2.

Table 1: Site Information		
Site Address:	Corner of Farmland Drive and future realignment of Pelican Road, Schofields NSW 2762	
Property Identification:	Proposed Lot 2: Part of Lot 4 DP1208329	
	Proposed Lot 1: Part of Lot 121 DP1203646	
Local Government Area	City of Blacktown	
Approximate Area:	~2.5ha	
Current Zoning:	SP2: Infrastructure: Educational Establishment	
Current Site Use:	Vacant land	
Proposed Site Use:	Primary School – Alex Avenue Public School	
Surrounding Site Use:	**North**	Under construction during the investigation
	East	Under construction during the investigation
	South	Vacant grass and vegetation-covered land
	West	Vacant grass-covered land (to be future road: planned realignment of Pelican Road)
Surface Water Bodies:	**West/South-west**	An unnamed creek is located approximately 275m south of the site.

5.1 Site Surrounds and Sensitive Receptors

During the time of this investigation, the site was bound to the south and west by vacant land, occupied by grass and sparse vegetation. Information provided by Hayball Pty Ltd indicates that the area directly east of the site is a council park under construction at the time of this investigation. Multi-unit residential development is to be built west of the site, in addition to the planned realignment of Pelican Road. The areas to the north was observed to be under construction, presumably for medium-density (single-dwelling) residential development. Further west of the site, Schofields Zone Substation was located to the north-west whole. An unnamed creek was located to the far south-west, south of Lot 4 DP1208329.

5.1.1 On-Site Receptors

While no existing human receptors were identified on-site during the investigation, during development of the site, on-site human receptors will include civil workers and other personnel involved in the site construction works.

Following the completion and occupation of the Primary School, human sensitive receptors on site will include: school staff (including teaching and administrative staff and cleaners), students and other temporary visitors to the site such as parents, maintenance workers, as well as workers involved in any future development work on the site.

No ecological receptors were identified on the site.

5.1.2 Off-Site Receptors

Off-site human receptors include residents and visitors of the neighbouring residential areas to the north and east of the site. No human offsite receptors were identified to the site's immediate south and west due to the absence of any information regarding proposed uses of these areas, and at the time of this investigation both areas consist of vacant, grass-covered land.

The unnamed creek located down-gradient, approximately 460m south-west of the site is considered to be the nearest potential ecological receptor.

5.2 Site Setting

The site is underlain by Middle Triassic Bringelly Shale of the Wianamatta Group. This is characterised by shale, carbonaceous claystone, claystone, laminate, fine-to medium-grained lithic sandstone and rare coal and tuff. The site soil landscape is the Blacktown Residual soil landscape. Fill material was noted in the site PSI, consisting of two small stockpiles identified in the central area of the site (less than 1 tonne each) (EIS, 2017).

The elevation of the site ranges generally between 37-43 mAHD. The site slopes down-gradient towards the south, with the highest elevation at the north-eastern corner of the site. Topographic contours are presented in the PSI Appendix (EIS, 2017).

Based on site topography, surface water runoff is expected flow in a southern direction, towards the unnamed creek south of the site. Infiltration into on-site aquifers is also expected across the site due to the absence of any sealed surfaces or built structures. The PSI identified porous, extensive aquifers of low to moderate productivity on the site. Regional groundwater is expected to flow in a southern/south-western direction consistent with the regional topography. However, the possibility remains that groundwater flow may not follow this expected direction, particularly as groundwater data and water table depth were not available for the site and its surrounds, therefore further investigation would be required for confirmation.

6 Summary of Key Findings of the PSI (EIS, 2017)

A stage 1 Preliminary Site Investigation (PSI) was undertaken by EIS in August 2017.

The PSI identified three potential contamination sources on the site:

- Fill material identified on site during the site walkover;
- Former agricultural land use in the northern portion of the site; and
- The general use of pesticides on the site.

It was noted that based on the scope of works undertaken as part of the assessment, that the historical land uses and these potential sources of contamination would not preclude the proposed development of the school.

Based on review of historical information collected as part of the assessment, the site has remained largely vacant from 1956 to present. Surrounding areas appeared to be used for rural and agricultural purposes such as grazing. During the site walkover conducted by EIS no visible or olfactory indicators of contamination were identified, with the exception of two small stockpiles identified in the central area of the site (less than 1 tonne each).

The PSI recommended the following:

- Assessment of soil contamination conditions on the site, including soil sampling and analysis; and
- A Stage 2 Detailed Site Investigation (DSI) if the site following review of the findings.

The PSI identified areas of high risk dryland salinity directly west-adjacent to the site, with minor overlap onto the site's far south-western corner.

The PSI also included review of Australian Dryland Salinity Assessment 2000. Based on the derived maps of "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050", the land directly west-adjacent to the site were identified as areas of high salinity hazard/risk, with minor overlap along the site's lower western boundary and far south-western corner.

6.1 PSI Site boundary

It should be noted that the site boundary for which the PSI pertains, has since been changed and finalised, and as a result, the PSI does not encompass the entirety of the site.

The site boundary for which the PSI pertains to, consisted of Proposed Lot 2 of the site, but did not include proposed lot 1. Furthermore, the PSI site boundary extended further south, past the finalised/actual site southern boundary.

The finalised site boundary (to which this DSI pertains) has since been expanded to include both proposed lots, and also does not extend as far south as was originally marked as part of the PSI investigation.

7 Sampling Density and Rationale

Total area of the open surfaces at the School was estimated as ~ 2.5 ha. In order to comply with the sampling density requirements for systematic assessment provided in NSW EPA (1995) 'Sampling Design Guidelines', a minimum of 35 investigation locations were required for the soil assessment. This sampling density corresponds to 14 points per hectare and is designed to capture a hotspot with a diameter greater than or equal to 31.5 m with 95% confidence. The vertical extent of the investigation targeted the depth of fill material (where encountered). Test pits were terminated with the observation/ sampling of natural material (maximum 1.0 m into natural soil).

In the scope of this assessment 35 surface samples were collected and analysed. As depicted in Figure 2, sample locations were selected in a grid pattern to ensure adequate site coverage.

8 Field Investigations

8.1 Site Walkover

A site walkover was conducted on the 16th November 2018 and 10th December 2018 by qualified Greencap consultants to visually inspect the site, corroborate site features with those identified in the PSI report, and assess the proposed site sampling design prior to beginning soil sampling. Photographs from the site inspection are provided in Appendix C.

Site observations made during the walkover were consistent with those detailed in the PSI. The site was confirmed to be vacant land, dominated by grass-covered land with sparse tree cover clustered in the south-western corner of the site, with no sealed surfaces or built structures observed on the site. (Refer to Photos 1-8). Local site topography was observed to slop generally to the south (refer to photos 3, 4 & 5), with small mounds/undulating areas along the southern boundary, presumed to be areas of fill material (refer to photo 3). Based on the observed topography and observed site surfaces, surface water drainage on the site is expected to be dominated by infiltration, with excess water runoff directed south of the site, towards a natural drainage channel identified far south of the site.

A visual inspection of surface soil conditions and the presence of any potential asbestos-containing material (ACM) on the site ground-surface was undertaken. There was no visual evidence of potential asbestos containing materials (ACM) observed on the surface of the Site and no ACM fragments were encountered at

any of the 35 test pit locations during excavation. It is noted that due to dense vegetation coverage in the far south-east of the site obscuring soil visibility, some areas of surface soil could be visually assessed.

The following observations were made during the site walkover:

- There was no olfactory evidence of odours detected on the site;
- There was no visual evidence of chemical spillage or surface staining observed on the site;
- There were no sealed surfaces or built structures (permanent or temporary) present on the site;
- There was no visual evidence of underground storage tanks (e.g. fill points, dip points, breather lines) or above ground storage tanks observed;
- The two stockpiles of fill material identified in the PSI report were located as described. Refer to Figure 3 for stockpile locations;
- There was no visual evidence of phytotoxic impact (i.e. plant stress or dieback) observed on the site with the exception of the bare patch of, otherwise-grass-covered, soil within proposed Lot 1, described below (refer to Photo 11);
- No visible indicators of salinity were identified on proposed Lot 2 of the site such as bare and scaled soil patches, visible salt crystals or white crusts, black soil staining or salt-impacted vegetation growth; and
- A visible indicator of salinity was identified on proposed Lot 1 of the site in the form of a bare/scaled patch of soil at test pit location TP29A (refer to Figure 2 for test pit locations), suggesting dryland salinity impact to vegetation growth. However, no visible salt crystals, white crusts, or black soil staining was observed in this location, nor on the remainder of the site. Vegetation growth immediately surrounding the observed clear patch appeared consistent with the remainder of the site vegetation type, and did not suggest salt-impacted vegetation species occurrence (refer to Photo 11).

8.2 Observed Soil Stratigraphy

The soil profiles encountered across the site were relatively consistent. Surface soils generally consisted of silt material followed by clay.

Below the silt material (natural top soils or fill material) was firm to stiff, red clay with moderate to high plasticity, generally mottled orange/yellow and grey, with grey mottling increasing with depth. Natural clay was generally encountered at depths between 0.2-0.3m Below Ground Level (BGL) across all sample locations.

All test pits were terminated in presumed natural material.

The visible soil profiles encountered are presented in Photos 10-12 Appendix C. Material descriptions of the soil encountered at each sample location are provided in the borehole logs presented in Appendix D.

8.2.1 Fill Material Encountered on Site

Fill material consisted of brown clay-silt or silt and contained some organic plant root material and foreign material such as ceramic, plastic and bituminous asphalt fragments. The surface silt material encountered in the following test pits was deemed to be fill material: TP1, TP2, TP4, TP8, TP9 and TP12. Refer to Figure 2, Appendix A.

8.2.2 Natural Soils

In all remaining test pits, only natural clay-silt or clay soils was encountered, with no evidence to suggest it was fill material.

9 Assessment Criteria

An assessment criterion has been selected to provide an appropriate indication of the environmental status and suitability of the site for the intended land use as a primary school. Greencap refers to the National Environment Protection Council (NEPC) (2013) - *National Environment Protection (Assessment of Site Contamination) Amendment Measure, 1999* (ASC NEPM, 2013) for site assessment criteria.

Typically for contaminant concentration to be considered acceptable for the respective land use criteria, the data set must conform to the following requirements:

- 95% upper confidence limit (UCL) of the arithmetic mean of analytical results is below the site criteria.
- Arithmetic (or geometric in cases where the data is log normally distributed) mean is below the site criteria.
- Standard deviation is less than 50% of the site criteria.
- No single sample analytical result is greater than 250% of the site criteria.

9.1 Investigation Levels

The investigation levels presented in this section are derived from toxicity of substances and estimated exposure of humans under the specified land use scenario.

9.1.1 Health Investigation Levels for Soil

The applicable health-based investigation levels (HILs) for this investigation will include the following:

- HIL A – Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake, (no poultry), also includes children's day care centres, preschools and primary schools.

These HILs are taken from the NEPM (2013) and are presented for reference in Table 2. These HILs will be applied to the open surfaces of the site.

Table 2: HILs for Soil Contaminant

Chemical	HIL A [1] (mg/kg)
Metals	
Arsenic [2]	100
Cadmium	20
Chromium (VI)	100
Copper	6,000
Lead [3]	300
Mercury (inorganic)	40
Nickel	400
Zinc	7,400
PAH	
Carcinogenic PAHs (as BaP TEQ) [4]	3
Total PAHs [5]	300

Notes:

1. Generic land uses are described in detail in Schedule B7 Section 3 of the NEPM 2013
2. Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where appropriate (refer Schedule B7).

3. Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate).
4. Carcinogenic PAHs: HIL is based on the 8 carcinogenic PAHs and their TEFs (potency relative to B(a)P) adopted by CCME 2008 (refer Schedule B7). The B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF, given below, and summing these products.

PAH species	TEF	PAH species	TEF
Benzo(a)anthracene	0.1	Benzo(g,h,i)perylene	0.01
Benzo(a)pyrene	1	Chrysene	0.01
Benzo(b+j)fluoranthene	0.1	Dibenz(a,h)anthracene	1
Benzo(k)fluoranthene	0.1	Indeno(1,2,3-c,d)pyrene	0.1

5. Total PAHs: HIL is based on the sum of the 16 PAHs most commonly reported for contaminated sites (WHO 1998). The application of the total PAH HIL should consider the presence of carcinogenic PAHs and naphthalene (the most volatile PAH). Carcinogenic PAHs reported in the total PAHs should meet the B(a)P TEQ HIL. Naphthalene reported in the total PAHs should meet the relevant HSL.

9.1.2 Ecological Investigation Levels for Soil

The ecological investigation levels (EILs) assigned by the ASC NEPC (2013) *Schedule B5c - EILs for As, Cr, Cu, DDT, Pb, Naphthalene, Ni and Zn* are adopted for this assessment. This guideline presents the methodology for deriving terrestrial EILs using both fresh and aged (i.e. > 2 years old) contamination for soil with the following land use types:

- Areas of ecological significance;
- Urban residential / public open space; and
- Commercial / industrial.

The methodology has been developed to protect soil processes, soil biota (flora and fauna) and terrestrial invertebrates and vertebrates. The current land use on site is primary school and hence the EILs for "Urban residential / public open space" have been adopted for this assessment.

The values presented for zinc, chromium (III), copper and lead are added contaminant limits (ACL) based on added concentrations.

The EIL is calculated from the sum of the ACL and the ambient background concentration (ABC) to derive the site-specific soil quality guideline (SQG) taking into account the effect caused by pH, exchangeable cations, iron and total organic carbon in soil that can affect concentration toxicity data. ACLs are based on soil characteristics of pH, CEC and clay content. Values presented for arsenic and naphthalene are generic EILs based on total concentrations and fresh contaminants. The EIL for lead has been calculated using the most conservative SQG value based upon the reported pH and exchangeable cation values. A summary of the EILs for aged contamination in soil (>2 years) for the current land use are presented in Table 3.

Table 3: Site Specific EILs			
Analyte	Ambient background concentration (mg/kg)[1]	Added contaminant limit (mg/kg)	EIL – Urban residential and public open space (mg/kg)
Arsenic [2]	13	100	113
Naphthalene	ND	170	170
Chromium (III)	17	400	417
Copper	9.4	190	199
Lead	19	1,100	1,119
Nickel	< 5	170	170
Zinc	11	270	281

Notes:

1. Ambient background concentrations (ABC) were determined using natural soil samples analysed from TP23 during this investigation.
2. Added contaminant limits were determined using Tables 1B(1-5), Schedule B1, NEPC (2013); and the following sample analysis results: pH of 5.5 and CEC of 10meq/100g. >10% clay content.

9.2 Screening Levels

9.2.1 Health screening levels (HSLs) for soil

For petroleum hydrocarbons, health screening levels (HSLs) have been derived in ASC NEPM (2013) based upon fraction ranges of hydrocarbons together with soil texture classes. The applied soil texture class is determined according to the observed stratigraphy during field assessment.

Soils encountered on site consisted of clay-silt and clay. In order to safely cover the risks associated with the fill material, a conservative approach was taken and silt soil texture was used for the selection of HSLs to be applied.

The HSL criteria, whilst non-limiting (NL) for vapour intrusion, are provided to prevent the occurrence of phase-separated hydrocarbons (PSH). Fractions F3 (>C16-C34) and F4 (>C34-C40) are semi-volatile and are not of concern for vapour intrusion, however, exposure to human receptors can occur via direct pathways such as dermal contact. The HSL criteria are summarised below in Table 4.

9.2.2 Ecological screening levels (ESLs) for soil

For petroleum hydrocarbons, ESLs have been derived in ASC NEPM (2013) based upon fraction ranges of hydrocarbons, BTEXN and benzo(a)pyrene (BaP) components together with soil texture classes. These ESLs are of low reliability except for the volatile and semi-volatile hydrocarbon fractions which are of moderate reliability. Nonetheless the ESLs will be adopted for the investigation due to the sensitivity of the proposed site use as a primary school.

The adopted ESLs are designed to be protective of soil fauna, soil processes, and plants. The ASC NEPM (2013) states that these factors only apply within the rhizome (i.e. zone in the top two metres of soil) and as such ESL criteria need not be applied to chemical results below this depth. These ESL values are included below in Table 4.

9.2.3 Management limits for hydrocarbon fractions F1-F4 in soil

Management limits for F1 and F2 are applied after consideration of relevant ESL and HSL criteria and are generally to be protective for dermal contact risk. The adopted management limits are based on fine grained soils with criteria summarised below in Table 4.

Table 4: Management Limits, ESLs and HSLs (mg/kg Dry Soil)				
Analyte	Soil Texture	HSL A/ B	ESLs	Management Limits
Land use: Residential				
F1 (C_6- C_{10})	Coarse	40 (0 - < 1m) 65 (1 - < 2m) 100 (2 - < 4m) 190 (4m+)	180 *	700
	Fine			800
F2 (>C_{10}-C_{16})	Coarse	230 (0 - < 1m)	120 *	1,000
	Fine			
F3 (>C_{16}-C_{34})	Coarse	----	300	2,500
	Fine		1,300	3,500
F4 (>C_{34}-C_{40})	Coarse	----	2,800	10,000
	Fine		5,600	
Benzene	Coarse	0.6 (0 - < 1m) 0.7 (1 - < 2m) 1 (2 - < 4m) 2 (4m+)	50	----
	Fine		65	
Toluene	Coarse	390 (0 - < 1m)	85	----
	Fine		105	
Ethyl-benzene	Coarse	----	70	----
	Fine		125	
Xylenes	Coarse	95 (0 - < 1m) 210 (1 - < 2m)	105	----
	Fine		45	
Naphthalene	Coarse	4 (0 - < 1m)	170	----
	Fine			
Benzo(a)pyrene	Coarse	----	0.7	----
	Fine		0.7	

Note: 1. * Moderate reliability criteria

10 Results

10.1 Analytical Schedule

Soil samples were submitted to a NATA-Accredited laboratory *Eurofins* for chemical analysis of relevant combinations of the following Chemicals of Potential Concern (CoPC):

- Total Recoverable Hydrocarbons (TRH);
- Benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN);
- Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc)
- Polycyclic Aromatic Hydrocarbons (PAH);
- Organochlorine pesticides (OCPs)
- Organophosphate pesticides (OPPs);
- Polychlorinated biphenyls (PCBs);
- Asbestos in soils (presence/ absence); and
- Salinity Characteristics (total soluble salts, soluble chloride, electrical conductivity, saturated resistivity).

10.2 Soil Results

Analytical results for soil samples were compared against the assessment criteria (refer to Section 8) and presented on the results summary table in Appendix E (refer to Appendix F for laboratory transcripts). All analysis results were either non-detect (ND; not detected to the Limit of reporting) or below the applicable human health and ecological criteria for all samples.

10.3 Salinity

Due to the relatively consistent soils encountered across the site, the analysed samples are assumed to be characteristic of the soils at similar depths across the site. All samples were classed as non-saline (salinity effects mostly negligible) and non-aggressive for steel and concrete corrosivity according to applicable Australian standards and guidelines.

While the shallow soils sampled were all classified as non-sodic or sodic, the sample taken from depth 0.8-0.9m BGL was classified as highly sodic based on analysis results.

Further details of salinity investigation conducted as part of this DSI are detailed in the Salinity report attached in Appendix B.

10.4 Asbestos in soils

There was no visual evidence of potential asbestos containing materials (ACM) observed on the surface of the Site and no ACM fragments were encountered at any of the 35 test pit locations during excavation.

All soil samples analysed for asbestos by a NATA-Accredited Laboratory, returned negative results for asbestos detected at the reporting limit of 0.01% w/w, and no respirable fibres detected. Refer to Appendix E: Sample Analysis Summary.

10.5 QA/QC Procedures

The evaluation of the QA/QC procedures (refer to Appendix G) demonstrate that the established measurement data quality objectives for this project have been met and the data set is considered to be reliable.

Chain-of-Custody documentation for sample transfer from the site to the laboratory can be found in Appendix F.

11 Conceptual Site Model

A Conceptual Site Model (CSM) of the site can be formed by considering the geophysical characteristics of the site, the contaminant source, potential receptors to site contamination, and the pathways to the receptors. The CSM, as required by the NEPC (2013), is an iterative process constantly being updated during the investigation process as more information becomes available. The following CSM is presented based on the results of this DSI.

11.1 Sources

No on-site sources of contamination were identified on the site as a result of this investigation. The soil on site, however, shall be noted as a potential source of dust.

11.1.1 Chemicals of Potential Concern

Sample analysis results indicated no elevated levels of any of the chemical analytes listed in Section 9.1. However, there is always a possibility (for any site) to encounter contamination outside of the investigation points.

11.2 Pathways

Pathways identified for the fill material:

- Inhalation, ingestion, and dermal contact with contaminants in soil by utility workers during services works; and
- Creation of dust/vapour during potential demolition, excavation or development works where soils are disturbed.

11.3 Receptors

During development of the site, human receptors on site will include civil workers and other personnel involved in the site construction works.

Following the completion and occupation of the Primary School, human sensitive receptors on site will include: school staff (including teaching and administrative staff and cleaners), students and other temporary visitors to the site such as parents, maintenance workers, as well as workers involved in any future development work on the site.

Off-site human receptors include construction workers, residents and visitors of the neighbouring properties.

11.4 Source, Pathway, and Receptor Analysis

As a result of this investigation a CSM has been developed to assess actual or potential risks to human health and the environment. In this scope, a contaminant source, pathway and receptor analysis has been conducted with no identified linkages for the site. This excludes general considerations that are relevant to dust and unexpected finds.

12 Conclusions

This Detailed Site Investigation did not identify any unacceptable human health or ecological risk associated with the surface soil quality. Therefore, it can be concluded that the surface soil within the site boundary is suitable for its intended use as a primary school, consistent with '*Residential A'* land use as defined in the NEPM. This DSI report satisfies the conditions of Clause 7 (subclause 3) of SEPP 55 (Remediation of Land).

This investigation revealed no evidence to suggest a requirement for remediation of the site with respect to land contamination, for its intended use.

13 Recommendations

As a result of the findings of this investigation, Greencap recommends the following:

- Any material to be taken off-site must be classified in accordance with the NSW EPA Waste Classification Guidelines (2014).

14 References

- NEPC (1999), *National Environment Protection (Assessment of Site Contamination) Amendment Measure (ASC NEPM. 2013 amendment).*
- NSW OEH (2011), *Guidelines for Consultants Reporting on Contaminated Sites.*
- Department of Primary industries NSW (2014) *Salinity training Manual – Salinity Identification, Causes and Management.*
- Environmental Investigation Services (EIS*) (2017) Report to Hayball on Preliminary Environmental Site Assessment for Proposed New Primary School Development at 34-38 Schofields Rd, Schofields NSW.* (EIS PSI)
- Department of Land and Water Conservation (2002), '*Site investigations for Urban Salinity'*
- *AS 2159-2009: Australian Standard – Piling – Design and Installation* (Amendment No.1).

January 2019

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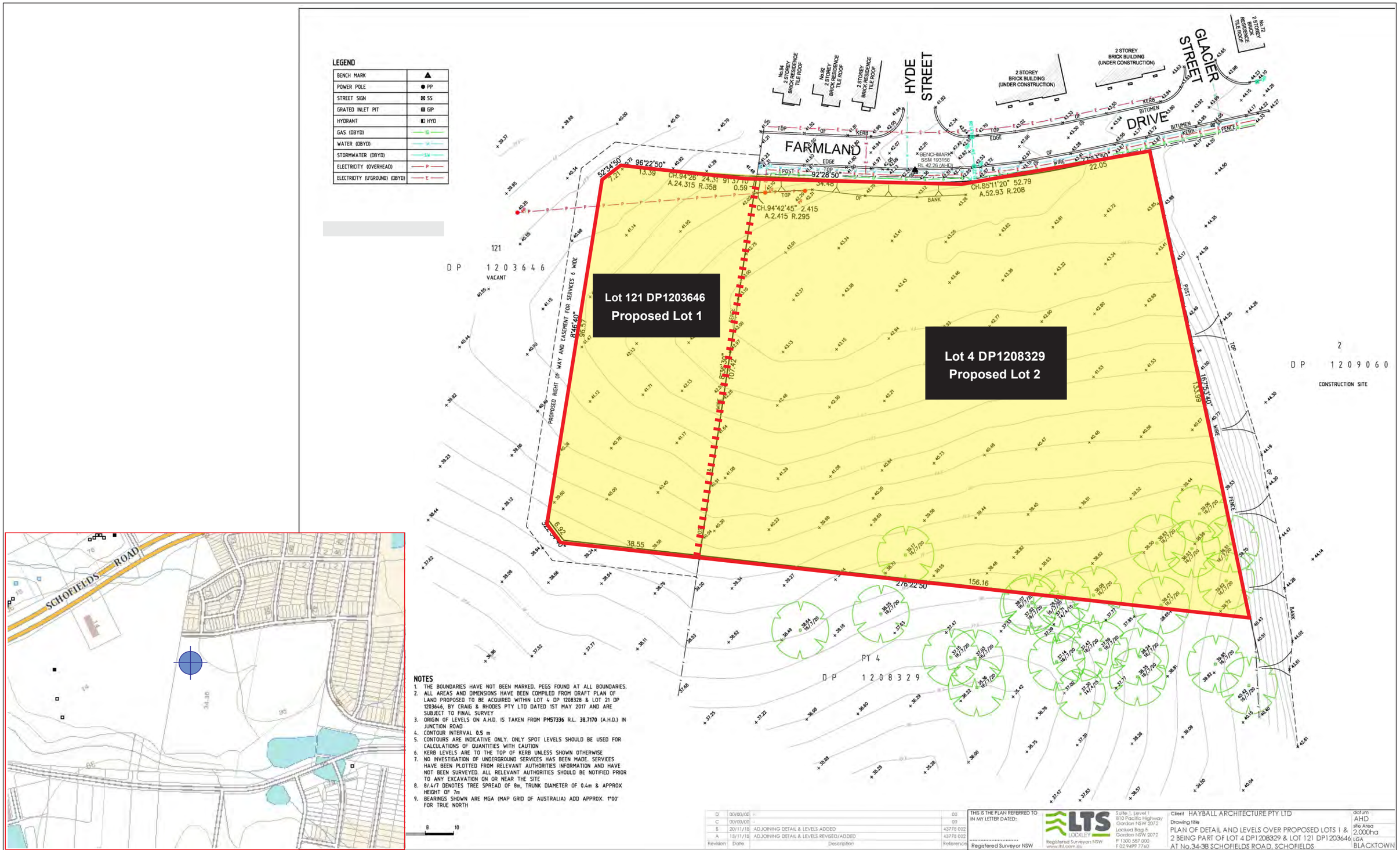
Level 2 / 11 Khartoum Street
North Ryde NSW 2113
Australia
T: (02) 9889 1800

Detailed Site Investigation

Group GSA

Cnr of Farmland Dr & the future realignment of Pelican Rd, Schofields NSW 2762

Appendix A: Figures



Legend:

- Site Boundary

Metres
0 25 50

GREENCAP
Going Further in Managing Risk
Level 2, 11-17 Khartoum Road
North Ryde, NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name:	Group GSA (c/o Richard Crookes Construction)				
Client Number:	C107881	Project Number: J160656			
Project Description:	Detailed Site Assessment				
Address:	Cnr Farmland Dr & future realignment of Pelican Rd, Schofields NSW 2762				
Prepared:	NXB	Reviewed:	MB	Date:	21/01/2019
Figure 1	Site Location and Regional Context				

Legend:

- Site Boundary
- Test-pit Sample Locations

Metres

0 25 50

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Level 2, 11-17 Khartoum Road
North Ryde, NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

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Prepared:	NXB	Reviewed:	MB	Date:	21/01/2019
Figure 1	Sample Locations				

Legend:

- Site Boundary
- Test-pit Sample Locations
- Locations of Salinity Tested Samples
- Test-pit Locations Containing Fill Material

Metres
0 25 50

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Level 2, 11-17 Khartoum Road
North Ryde, NSW 2113
Ph: 02-9889-1800
Fx: 02-9889-1811

Client Name:	Group GSA (c/o Richard Crookes Construction)				
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Project Description:	Detailed Site Assessment				
Address:	Cnr Farmland Dr & future realignment of Pelican Rd, Schofields NSW 2762				
Prepared:	NXB	Reviewed:	MB	Date:	21/01/2019
Figure 1	Locations Samples Tested for Salinity & Encountered Fill Material				

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Level 2 / 11 Khartoum Street
North Ryde NSW 2113
Australia
T: (02) 9889 1800

Detailed Site Investigation

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Cnr of Farmland Dr & the future realignment of Pelican Rd, Schofields NSW 2762

Appendix B: Salinity Report

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North Ryde NSW 2113
Australia
T: (02) 9889 1800

SALINITY REPORT

January 2019
J160656

GROUP GSA

Proposed Alex Avenue Public School, Schofields NSW

C107881: NXB

Document Control

Document Quality Management Details		
Report Name:	Salinity Report	
Site Details:	Cnr Farmland Dr and future realignment of Pelican Rd, Schofields NSW 2762	
Project Number:	J160656	
Client Name:	Group GSA c/o Richard Crookes Construction	
Client Number:	C107881	
Signatures:	Prepared By:  Nicole Boukarim **Consultant -** Environment	Authorised By:  Matthew Barberson **Team Manager -** Environment

Issue Status

Version No.	Date	Creator	Reviewer
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Document Circulation

No of Copies	Type	Customer Name	Company & Position
1	Electronic	Frederic Terreaux	Associate Director – Group GSA

Salinity Report

Group GSA c/o Richard Crookes Construction

Cnr Farmland Dr and future realignment of Pelican Rd, Schofields NSW

Table of Contents

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This Report should be read in whole and should not be copied in part or altered. The Report as a whole sets out the findings of the investigations. No responsibility is accepted by Greencap for use of parts of the Report in the absence (or out of context) of the balance of the report.

1. Introduction and Background

Greencap Pty Ltd ('Greencap') was engaged by Richard Crookes Construction (RCC) on behalf of the NSW Department of Education to undertake a Detailed Site Investigation (DSI) for the property at the Cnr Farmland Dr and future realignment of Pelican Rd, Schofields NSW 2762 ('the site'). The site is currently undeveloped and occupies the northern portion of Lot 4 in Deposited Plan (DP) 1208329 (proposed Lot 2) and a small area of Lot 121 DP1203646 (proposed Lot 1). A salinity report was required as part of the DSI, following the findings of a Preliminary Site Investigation (PSI) previously prepared for the site by Environmental Investigation Services (EIS, August 2017). The PSI identified a small portion of the western side of the site as an area of potentially high hazard/risk of dryland salinity.

A proposed Primary School – Alex Avenue Public School – is to be constructed on the 25,250 m^2 site, consisting of several buildings and both sealed and unsealed outdoor areas. Site location and boundary is depicted in Figure 1 in the Figures section of the DSI Report.

This Salinity Report should be read in conjunction with the DSI report it is an attachment of.

2. Project Objective

The objective of this report was to address the PSI salinity findings of the Preliminary Site investigation conducted by EIS (EIS PSI) in 2017 and assess dryland salinity risk on site. The Site was identified to be directly adjacent to area classified as high hazard or risk defined for years 2000, 2010, 2050 by a Dryland Salinity Assessment, Land and Property information (a division of the department of Finance and Services) 2017 in the EIS PSI, 2017.

3. Methodology and Scope of Work

In order to achieve the above objectives, the following scope of works was undertaken, by taking into consideration the NSW Department of Primary Industries' *Salinity Training Manual* (2014) and the *Site investigations for Urban Salinity* (Department of Land and Water Conservation, 2002), referred to herein as "DPI Salinity Manual" and "The SIUS" respectively:

- A desktop review of site history and environmental context, including review of PSI report (reference here), particularly local topography, geology and hydrogeology, as well as salinity findings;
- A detailed site walkover and surface soil assessment was carried out to evaluate current site use, condition, visible signs of salinity (e.g. bare soil patches, plant dieback etc.), and surrounding site uses.
- Greencap conducted salinity analytical testing at 5 locations across the site. These locations were selected based on the results of the initial surface walkover inspection, as well as for the purposes of ensuring adequate coverage of the site and the encountered soil-types. Field logs from each test pit and borehole location are included in Appendix D and contain a description of the soil profile material, odours, and any other pertinent information. Test pit locations are indicated on Figure 2.
- The analytical analysis was conducted by a NATA-Accredited laboratory, Eurofins mgt., and the samples were analysed for the following analytes:
  - Chloride
  - Conductivity (1:5 aqueous extract at 25°C)
  - Exchangeable Sodium Percentage (ESP)
  - pH (1:5 Aqueous extract at 25°C)
  - Resistivity

- Sulphate (as SO_4)
- Magnesium (exchangeable)
- Potassium (exchangeable)
- Sodium (exchangeable)
- Calcium (exchangeable)
- Cation Exchange Capacity

- Following the receipt of final laboratory results Greencap prepared this report in accordance with *Site investigations for Urban Salinity* (Department of Land and Water Conservation, 2002), stating our findings providing recommendations for further work and management if required.

Further detail on the methodology is provided in section 7.3 of the DSI Report.

3.1 Assessment Criteria and Sample Design

Sampling density was determined using the SIUS recommendations for land use deemed to be moderately intensive construction. Total area of the site is estimated to be ~25,500 m^2.

Five samples were collected and analysed, in accordance with the recommended sampling density of 0.5-4 laboratory samples per km^2 including (<1 per type profile)[1]. Two soil profiles were encountered across the site with shallow layers consisting generally of a silt or clay-silt, and deeper soil profile consisting of natural clay. Accordingly, at least two samples were taken of each profile, and sample locations were selected to ensure adequate site coverage. Care was also taken to target the western side of the site (TP16 and TP29A) in order to target the mapped dryland salinity hazard potential identified in the PSI. Areas in which any visual indicators of salinity were observed were also targeted for sampling (TP29A).

4. Site Description

The site is underlain by Middle Triassic Bringelly Shale of the Wianamatta Group. This is characterised by shale, carbonaceous claystone, claystone, laminate, fine-to medium-grained lithic sandstone and rare coal and tuff. The site soil landscape is the Blacktown Residual soil landscape. Fill material was noted in the site PSI, consisting of two small stockpiles identified in the central area of the site (less than 1 tonne each) (EIS, 2017).

The elevation of the site ranges generally between 37-43 mAHD. The site slopes down-gradient towards the south, with the highest elevation at the north-eastern corner of the site. Topographic contours are presented in the PSI Appendix (EIS, 2017).

Based on site topography, surface water runoff is expected flow in a southern direction, towards the unnamed creek south of the site. Infiltration into on-site aquifers is also expected across the site due to the absence of any sealed surfaces or built structures. The PSI identified porous, extensive aquifers of low to moderate productivity on the site. Regional groundwater is expected to flow in a southern/south-western direction consistent with the regional topography. However, the possibility remains that groundwater flow may not follow this expected direction, particularly as groundwater data and water table depth were not available for the site and its surrounds.

[1] Table 1. Recommended Levels of Site Description, *Site investigations for Urban Salinity* (Department of Land and Water Conservation, 2002).

4.1 Salinity Mapping

The EIS PSI included review of Australian Dryland Salinity Assessment 2000.

This Assessment included mapping of dryland salinity risk and hazard mapping for 2000, 2020 and 2050 within NSW. Areas of risk are based on groundwater levels and air photo interpretation. Based on the derived maps "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050", the land directly west-adjacent to the site were identified as areas of high salinity hazard/risk, with minor overlap along the site's lower western boundary and far south-western corner.

Dryland salinity occurs when deep-rooted native vegetation is replaced with shallow-rooted annuals, leading to increased water leakage to the groundwater system. As a result, the rise in groundwater level brings salt to the soil surface.

Refer to EIS Appendix A, for the Dryland Salinity findings and mapping.

5. Field Observations

5.1 Site Walkover

A site walkover was conducted on the 16th November 2018 and 10th December 2018, by qualified Greencap consultants. Photographs from the site walkovers are provided in Appendix C of the DSI.

During the site walkover, an inspection of any visible indicators of salinity on the site was undertaken. The following observations were made during the site walkover:

Proposed Lot 1 of the site:

- There was no visual evidence of salt crystals or white crusts on any soil surfaces;
- There was no visual evidence of black staining on soils;
- There was no visual evidence of puffy soil surfaces;
- There was no visual evidence of phytotoxic impact (i.e. plant stress or dieback) observed on the site with the exception of the bare patch of otherwise-grass-covered soil in proposed Lot 1, described below (refer to Photo 11); and
- One bare/scaled patch of soil was identified at test pit location TP29A (refer to Figure 2 for test pit locations), suggesting potential dryland salinity impact to vegetation growth. However, no additional indicators (e.g. salt crystals, black soil staining etc) were observed in this location. Vegetation growth immediately surrounding the observed clear patch appeared consistent with the remainder of the site vegetation type, and did not suggest salt-impacted vegetation species occurrence (refer to Photo 11).

Proposed Lot 2 of the site:

- There was no visual evidence of bare and scaled soil patches;
- There was no visual evidence of salt crystals or white crusts on any soil surfaces;
- There was no visual evidence of black staining on soils;
- There was no visual evidence of puffy soil surfaces; and
- There was no visual evidence of phytotoxic impact (i.e. plant stress or dieback) observed to trees or grasses.

For further general site observations noted during the site inspection, refer to section 7 of the DSI report.

5.2 Field observations of soil

The soil profiles encountered across the site were relatively consistent. Surface soils generally consisted of silt material followed by clay. Below top soils or fill material was firm to stiff, red clay with moderate to high plasticity, generally mottled orange/yellow and grey, with grey mottling increasing with depth. Natural clay was generally encountered at depths between 0.2-0.3m Below Ground Level (BGL) across all sample locations.

All soil layers sampled for salinity testing are considered to have been naturally-occurring soils.

The visible soil profiles encountered are presented in Photos 10-12 Appendix C. Material descriptions of the soil encountered at each sample location are provided in the borehole logs presented in Appendix D.

6. Soil Analysis Results

6.1 Results summary

Table 1. Summary of Salinity Lab Analysis Results

Analyte	LOR	Units	TP2	TP15	TP16	TP24	TP29A
			0.60-0.70	0.80-0.90	0.10-0.30	0.10-0.20	0.15-0.30
Chloride	5	ppm	24	46	< 5	14	170
Conductivity (1:5 aqueous extract at 25°C)	10	uS/cm	47	87	11	100	97
Exchangeable Sodium Percentage (ESP)	0.1	%	7.9	20	2	5.8	9.1
pH (1:5 Aqueous extract at 25°C)	0.1	pH units	5.7	5.2	6.1	5.4	6.8
Resistivity*	0.5	ohm.m	210	110	940	93	100
Sulphate (as SO4)	30	ppm	140	82	< 30	52	<30
Magnesium (exchangeable)	0.5	meq/100g	5.7	9.2	3.2	7.1	6.7
Potassium (exchangeable)	0.1	meq/100g	0.4	0.6	0.2	0.3	0.5
Sodium (exchangeable)	0.1	meq/100g	0.8	2.8	0.2	1	1.4
Calcium (exchangeable)	0.1	meq/100g	3.5	1.0	5.3	8.2	6.3
Cation Exchange Capacity	0.05	meq/100g	10	14	8.8	16	15

7. Key Findings & Discussion

7.1 Soil Salinity

Using the electrical conductivity (1:5) results, EC_e values were determined using a correction factor of soil texture to determine the soil salinity class for each sample, tabulated below.

Soil texture was determined using the field testing methods outlined the DPI Salinity Manual.

All analysed samples are classed as non-saline, including samples TP16 and TP29A which were sampled from the area identified by the PSI as a forecasted area of high hazard/risk (Refer to Section 4.1 of this report). In addition, sample TP29A was observed to be an area bare of vegetation and was targeted as a possible salinity-impacted area.

Table 2. Calculated Soil Salinity Classifications					
Sample ID	**Sample depth (m)**	**Soil Type[2]**	**Conversion factor[3]**	**EC_e (dS/m)**	**Soil Salinity Class**
TP2	0.60-0.70	Heavy clay	6.7	0.32	Non-saline (1.5-2 dS/m)
TP15	0.80-0.90	Medium clay	6.7	0.58	Non-saline (1.5-2 dS/m)
TP16	0.10-0.30	Clay loam	8.6	0.95	Non-saline (1.5-2 dS/m)
TP24	0.10-0.20	Clay loam	8.6	0.86	Non-saline (1.5-2 dS/m)
TP29A	0.15-0.3	Loam	9.5	0.92	Non-saline (1.5-2 dS/m)

7.2 Sodicity and Permeability

Sodicity relates to the likely dispersion on wetting, and soil shrinking/swelling properties. When wet, sodic soils create impermeable layers and impeding water movement in the soil.

Sodicity is expressed as the Exchangeable Sodium Percentage (ESP). While saline soils are high in total soluble salts, including any combination of ions (e.g. sodium, calcium or magnesium etc), sodic soils are exclusively high in exchangeable sodium ions.

Using the guidelines for categorising soil sodicity provided in the DPI Salinity Manual, the Sodicity of the analysed samples are summarised below. Refer to Figure 2 for sample locations.

Table 3. Sodicity rating of analysed samples			
Sample ID	**Sample depth (m)**	**ESP (%)**	**Sodicity Rating[4]**
TP2	0.60-0.70	7.9	Sodic (6-15%)
TP15	0.80-0.90	20	Highly Sodic (> 15%)
TP16	0.10-0.30	2	Non-sodic (< 6%)
TP24	0.10-0.20	5.8	Non-sodic (< 6%)
TP29A	0.15-0.3	9.1	Sodic (6-15%)

[2] Soil texture was determined using the field testing methods outlined in Chapter 12 of the DPI Salinity Manual (2014).

[3] Conversions made using *Table 12.4*: *Conversion factors for soil groups,* DPI Salinity Manual (2014), adapted from Slavich and Petterson (1993).

[4] Source: Northcote and Skene (1992), cited in DPI Manual.

Sodicity is the presence of a high amount exchangeable sodium ions relative to other exchangeable cations (positively charged ions) in soil.

Based on the above, the sample taken from TP15 is notably sodic (although not saline). The high sodium in sodic soils may cause poor drainage issues, as water infiltration is likely to be impeded at this depth, which may lead to potential tunnel erosion. Waterlogging is common in sodic soils as swelling and dispersion of clay particles clog pores and hence reduce internal drainage of the soil.

These results are likely to be characteristic of the clay encountered throughout the site at this depth. Similarly, the non-sodic surface layers in samples TP16-TP9A were also encountered at the majority of test pits and can be assumed to be characteristic of the surface soils on the site.

7.3 Corrosivity

All soil samples returned results consistent with AS2159 for soils classified as non-aggressive for concrete and steel corrosivity.

Table 4. Results Comparison with AS2159 Exposure Conditions for **Non-aggressive soils**

Analyte	Units	Exposure conditions for Steel	Exposure conditions for Concrete	TP2	TP15	TP16	TP24	TP29A
				0.60-0.70	0.80-0.90	0.10-0.30	0.10-0.20	0.15-0.3
Chloride	ppm	<5000	–	24	46	< 5	14	170
pH (1:5 Aqueous extract at 25°C)	pH units	>5	>5.5	5.7	5.2	6.1	5.4	6.8
Resistivity	ohm.m	<5000	<5000	210	110	940	93	100
Sulphate (as SO4)	ppm	<5000	–	140	82	< 30	52	< 30

Although the pH of TP15 exceeded the exposure limit for non-aggressive soils for concrete, (to 'moderate aggressiveness'), all other variables for this sample were below the non-aggressive soil exposure conditions, and this condition on its own does not pose a concrete corrosivity risk.
Furthermore, chloride concentration, which is useful indicator subsoil salinity, was notably well below chloride toxicity critical levels[5] provided in the DPI Salinity Manual for all samples.

7.4 Evaluation and Management

This soil salinity assessment did not reveal any analysis results that require further investigation, nor any that would require specific management of salinity risk or corrosivity risk.

All samples were classed as non-saline (salinity effects mostly negligible) and non-aggressive for steel and concrete corrosivity according to the SIUS and AS2159 respectively.

While the shallow soils sampled were all classified as non-sodic or sodic, sample TP15, taken from depth 0.8-0.9m BGL was classified as highly sodic based on analysis results. Due to the relatively consistent soils encountered across the site, the high sodicity of sample TP15 is likely to be characteristic of other soils at similar depths across the site. However, due to the depth of this highly sodic material (0.8-0.9m BGL), the risk of potential impact on development is decreased provided that an upper non-sodic surface layer of silt is not completely removed. According to site plans it the area that TP15 was taken from corresponds to the location of the "shared plaza area" east-adjacent to Block C. Therefore, risks associated with potential decreased soil structure in this area, caused by the deeper soil's sodicity, as well as potential for concrete corrosivity is also reduced. Further risk is also minimised if infiltration of water of effluent is designed to suit the site conditions.

[5] Levels of chloride toxicity in subsoil for sensitive species: Non-toxic: <300 mg/kg, and toxic: <600 mg/kg.

Dryland salinity occurs due to rising groundwater levels bringing salt to the soil surface, often as a result of the removal of deep-rooted native vegetation, causing increased water infiltration into groundwater systems. Due to the future presence of sealed surfaces that will be on the site following construction of the primary school, the risk of increased water infiltration on the site is reduced. However, consideration may be given to the vegetation present on the site post-development.

8. Data Gaps

Data gaps identified in this investigation are noted to include water table depth, and groundwater data including data regarding the identified on-site aquifer, which were not available for review for the site and its surrounds.

9. Conclusions & Recommendations

The investigation did not reveal any analysis results that require further investigation, nor any significant soil salinity contamination or sources of salinity on the site. The findings of this assessment identified no evidence of any current existing significant salinity contamination or risk on the site. Therefore, the site is considered suitable for the intended land use as a primary school and is unlikely to require significant salinity-specific management.

Potential data gaps are noted to include groundwater data and water table depth which were not available for the site and its surrounds.

As a result of this investigation, Greencap recommends maintenance of proper drainage controls on the site during site development/construction.

10. References

- NSW Department of Primary Industries (2014) '*Salinity Training Manual*: Salinity Identification, causes and Management';
- Department of Land and Water Conservation (2002), '*Site investigations for Urban Salinity';*
- *AS 2159-2009: Australian Standard – Piling – Design and Installation* (Amendment No.1); and
- NSW OEH (2011), Guidelines for Consultants Reporting on Contaminated Sites.

January 2019

Level 2 / 11 Khartoum Street
North Ryde NSW 2113
Australia
T: (02) 9889 1800

Detailed Site Investigation

Group GSA

Cnr of Farmland Dr & the future realignment of Pelican Rd, Schofields NSW 2762

Appendix C: Field Photographs

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Site Photographs: 16 November & 10 December 2018

Photo 1. Northern boundary of site along Schofields Road, view east.

Photo 2. Proposed Lot 1, view north-east.

Photo 3. Proposed Lot 2, view north-west

Photo 4. Proposed Lot 2, south of the site, view north

Photo 5. Proposed Lot 2, view south.

Photo 6. Two stockpiles observed on proposed Lot 2, corresponding to description and location of those identified in the PSI.

Photo 7. Proposed Lot 1, view west.

Photo 8. Proposed Lot 1 (and Lot 21), view north-east.

Photo 9. Identified path of bare soil, indicating potential dryland salinity impact, view north.

Photo 10. TP3 with visible soil profile transition on the right-hand side from silt to clay.

Photo 11. TP6 – minimal upper layer of silt, followed by clay characteristic of the site.

Photo 12. TP15, red clay followed by red and grey mottled clay

January 2019

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Going Further in Managing Risk

Detailed Site Investigation

Group GSA

Cnr of Farmland Dr & the future realignment of Pelican Rd, Schofields NSW 2762

Appendix D: Borehole Logs

TEST PIT NUMBER TP1

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed					Grass FILL: Firm, brown, clayey SILT, rootlets, bitumen fragments 1cm diameter ~ <0.5%	TP1 (0.1-0.2)	No olfactory evidence of contamination Moisture (D) PID (0.1)
			0.5			NATURAL: Firm, orange/red, silty CLAY, yellow mottling, high plasticity, increases in grey mottling with depth	TP2 (0.5-0.6)	Moisture (DM) PID (0.1)
			1.0			Borehole TP1 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP2

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed					Grass FILL: Firm, light brown, clayey silty SAND, low plasticity, rock fragments approximately 1cm diameter, rootlets	TP2 (0.01-0.2)	No olfactory evidence of contamination Moisture (D) PID (0.0)
			0.5			NATURAL: Firm, orange/red sandy CLAY, red mottling, high plasticity, grey mottling with depth	TP2 (0.6-0.7)	Moisture (DM) PID (0.0)
			1.0			Borehole TP2 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP3

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass		No olfactory evidence of contamination
						NATURAL: Firm, high density, clayey SILT, with rootlets and other organic matter	TP3 (0.1-0.2)	Moisture (D) PID (0.1)
			0.5			NATURAL: Red/orange, CLAY, medium density, high plasticity, increase in grey and yellow mottling with dapth	TP3 (0.7-0.8)	Moisture (DM) PID (0.2)
			1.0			Borehole TP3 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP4

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass FILL: Firm, light brown, clayey silty SAND, low plasticity, wood chips and roots ~3%		No olfactory evidence of contamination
							TP4 (0.1-0.2)	Moisture (D) PID (0.1)
			0.5					
							TP4 (0.8-0.9)	Moisture (DM) PID (0.0)
			1.0			Borehole TP4 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP5

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed					NATURAL: Loose, brown, gravelly sandy SILT, gravel is ~ 2cm diameter subrounded sandstone		No olfactory evidence of contamination
							TP5 (0.1-0.2)	Moisture (DM) PID (0.0)
						NATURAL: Stiff, red, CLAY		
			0.5				TP5 (0.5-0.6)	Moisture (M) PID (0.0)
						Borehole TP5 terminated at 0.5m (Target depth reached)		
			1.0					
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP6

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass NATURAL: Still, brown clayey SILT with grass roots (no observed rocks)	TP6 (0.0-0.2)	No olfactory evidence of contamination Moisture (DM) PID (0.2)
						NATURAL: Firm, red and yellow mottled CLAY, medium plasticity, yellow mottling increases with depth		
			0.5				TP6 (0.5-0.6)	Moisture (M) PID (0.1)
			1.0			Borehole TP6 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP7

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass NATURAL: Soft to firm CLAY with organic matter (roots)	TP7 (0.1-0.2)	No olfactory evidence of contamination Moisture (D) PID (0.1)
						NATURAL: Firm, red, CLAY, low plasticity, roots	TP7 (0.3-0.4)	Moisture (DM) PID (0.0)
			0.5			Yellow mottling & high plasticity with depth		
			1.0			Borehole TP7 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP8

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			FILL: Loose, brown, sandy SILT with pieces of wood (15%)		No olfactory evidence of contamination
							TP8 (0.1-0.2)	Moisture (DM) PID (0.0)
			0.5			NATURAL: Firm, red, CLAY		
							TP8 (0.7-0.8)	Moisture (M) PID (0.1)
			1.0			Borehole TP8 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP9

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed					FILL: Soft, brown, salny SILT with rootlets and wood pieces	TP9 (0.1-0.3)	No olfactory evidence of contamination Moisture (DM) PID (0.3)
			0.5			NATURAL: Firm, red, CLAY	TP9 (0.4-0.6)	Metal spool noted @0.3m Moisture (M) PID (0.0) Natural black coal inclusions noted (2%) @0.5m
						Borehole TP9 terminated at 0.6m (Target depth reached)		
			1.0					
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP10

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass NATURAL: Firm, dark brown silty SAND, organis matter (grass roots)		No olfactory evidence of contamination
							TP10 (0.2-0.3)	Moisture (D) PID (0.2)
			0.5			NATURAL: Firm, red CLAY, grey/yellow mottling which increases with depth, low plasticity, @ 0.5-0.5 large light grey boulder encountered - flat, angular fine grained sandstone		
							TP10 (0.6-0.7)	Moisture (M) PID (0.3)
			1.0			Borehole TP10 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP11

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed					Grass		No olfactory evidence of contamination
						NATURAL: Loose, light brown, clayey silty SAND, low plasticity	TP11 (0.1-0.3)	Moisture (D) PID (0.1) FD2 taken @ 0.1-0.3
			0.5			NATURAL: Firm, red/brown CLAY, clay grades to yellow/orange @ 0.7m	TP11 (0.6-0.7)	Moisture (DM) PID (0.3)
			1.0			Borehole TP11 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP12

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.5			FILL: Loose, light brown, gravelly SAND. Gravel is ~1-5cm diameter sub rounded rock, plastic pipe and golf ball noted ~0.5m	TP12 (0.3-0.5)	2m3 soil mound No odour Moisture (D) PID (0.4) FD1 taken @ 0.3-0.5
			1.0			NATURAL: Firm, red, CLAY with white mottling	TP12 (1.3-1.4)	Moisture (DM) PID (0.1)
			1.5			Borehole TP12 terminated at 1.5m (Target depth reached)		
			2.0					
			2.5					

TEST PIT NUMBER TP13

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass FILL: Loose, light brown clayey silty SAND, low plasticity, rock fragments 3cm diameter ~5%	TP13 (0.01-0.1)	No olfactory evidence of contamination Moisture (D) PID (0.0)
			0.5			NATURAL: Firm, red CLAY, high plasticity, orange mottling increases with depth, minor natural coal lens 0.5%, grey mottling at 0.8m	TP13 (0.3-0.5)	Moisture (DM) PID (0.0)
			1.0			Borehole TP13 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP14

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed					NATURAL: Loose, brown, SILT with rootlets	TP14 (0-0.1)	No olfactory evidence of contamination Moisture (DM) PID (0.0)
						NATURAL: Stiff, red CLAY		
			0.5				TP14 (0.4-0.6)	Moisture (M) PID (0.0)
						Borehole TP14 terminated at 0.6m (Target depth reached)		
			1.0					
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP15

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass FILL: Stiff, dark brown clayey SILT with roots, no rocks	TP15 (0.1-0.2)	No olfactory evidence of contamination Moisture (D) PID (0.0)
			0.5			NATURAL: Stiff, red CLAY with grey and yellow mottling, medium plasticity, rootlets		
			1.0			NATURAL: Grey CLAY with yellow mottling, firm, high plasticity, rootlets	TP15 (0.8-0.9)	Moisture (DM) PID (0.0)
			1.5			Borehole TP15 terminated at 1m (Target depth reached)		
			2.0					
			2.5					

TEST PIT NUMBER TP16

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass NATURAL: Firm, light brown, sandy clayey SILT, low plasticity		No olfactory evidence of contamination Moisture (DM) PID (0.2)
						NATURAL: Firm, red/orange CLAY, orange increases with depth	TP16 (0.1-0.3)	
			1.0			Borehole TP16 terminated at 1m (Target depth reached)		

BOREHOLE / TEST PIT J160656 - SCHOFIELDS DSI (TEST PITTING).GPJ TESTING TEMPLATE.GDT 23/1/19

TEST PIT NUMBER TP17

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed					Grass		No olfactory evidence of contamination
						FILL: Firm, brown, clayey SILT with rootlets	TP17 (0.25-0.35)	Moisture (D) PID (0.0)
			0.5			NATURAL: Stiff, orange-gold CLAY with black mottling (minor), low plasticity, some white/cream mottline (minor)	TP17 (0.85-0.95)	Moisture (D) PID (0.0)
			1.0			Borehole TP17 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP18

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			REWORKED NATURAL: Brown, SILT, medium density, tree and grass roots	TP18 (0.1-0.2)	No olfactory evidence of contamination Moisture (DM) PID (0.0)
			0.5			NATURAL: Stiff red/orange and gret nottled CLAY, low plasticity		
			1.0			Borehole TP18 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP19

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed					NATURAL: Loose, brown, clayey SILT with rootlets		No olfactory evidence of contamination
						NATURAL: Stiff, red, CLAY	TP19 (0.3-0.3)	Moisture (M) PID (0.0)
			0.5			Borehole TP19 terminated at 0.5m (Target depth reached)		
			1.0					
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP20

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass		No olfactory evidence of contamination
						FILL: Loose light brown, clayey SILT, low plasticity	TP20 (0.01-0.1)	Moisture (DM)
								PID (0.1)
						NATURAL: Red/orange CLAY, orange mottling increases with depth		
			0.5					
			1.0					
						Borehole TP20 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP21

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass NATURAL: Loose light brown sandy clayey SILT		No olfactory evidence of contamination
						NATURAL: Firm yellow/orange CLAY, yellow mottling, yellow content increase with depth	TP21 (0.2-0.3)	Moisture (M) PID (0.0)
			0.5					
						NATURAL: Grey weathered shale, minor natural coal inclusions		
			1.0			Borehole TP21 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP22

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.5			Grass		No olfactory evidence of contamination
						NATURAL: Loose light brown, clayey SILT, minor rock fragments, diameter 0.5cm ~0.1%, rootlets	TP22 (0.1-0.2)	Moisture (D)
			1.0			NATURAL: Firm red/orange CLAY, clay grades lighter with depth, grey mottling increases with depth		PID (0.0)
			1.5			Borehole TP22 terminated at 1m (Target depth reached)		
			2.0					
			2.5					

TEST PIT NUMBER TP23

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.0			Grass		No olfactory evidence of contamination
						NATURAL: Loose yellow/light brown clayey SILT	TP23 (0.1-0.2)	Moisture (D)
			0.5			NATURAL: Firm orange/red CLAY, grades to red with depth		PID (0.1)
			1.0			Borehole TP23 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP24

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 16/11/18 **COMPLETED** 16/11/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR McMahons **SLOPE** --- **BEARING** -

EQUIPMENT Excavator **TEST PIT LOCATION** _____

TEST PIT SIZE ~1m **LOGGED BY** NXB/JG **CHECKED BY** MB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
E	None Observed		0.5			Grass NATURAL: Firm brown clayey SILT, low plasticity NATURAL: Firm red CLAY, high plasticity, orange mottling increasing with depth	TP24 (0.1-0.2)	No olfactory evidence of contamination Moisture (DM) PID (0.2)
			1.0			Borehole TP24 terminated at 1m (Target depth reached)		
			1.5					
			2.0					
			2.5					

TEST PIT NUMBER TP25A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE **LOGGED BY** MB **CHECKED BY** GB

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Brown silty clay with rootlets		No olfactory evidence of contamination
						NATURAL: Red, stiff clay	TP25A(0.2-0.3)	
			0.5			Borehole TP25A terminated at 0.3m (Target depth reached)		
			1.0					
			1.5					

TEST PIT NUMBER TP26A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE **LOGGED BY** MB **CHECKED BY** GB

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Brown silty clay with rootlets		No olfactory evidence of contamination
						NATURAL: Red/brown, stiff clay	TP26A(0.1-0.3)	
			0.5			Borehole TP26A terminated at 0.3m (Target depth reached)		
			1.0					
			1.5					

BOREHOLE / TEST PIT J160656 - SCHOFIELDS DSI (TEST PITTING 2ND VISIT TP25-35).GPJ TESTING TEMPLATE.GDT 23/1/19

TEST PIT NUMBER TP27A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE **LOGGED BY** MB **CHECKED BY** GB

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Brown silty clay with rootlets		No olfactory evidence of contamination
						NATURAL: Red/brown, stiff clay	TP27A(0.2-0.3)	
			0.5			Borehole TP27A terminated at 0.3m (Target depth reached)		
			1.0					
			1.5					

TEST PIT NUMBER TP28A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE **LOGGED BY** MB **CHECKED BY** GB

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Brown, firm gravelly clay-silt. Gravel is shale: 1-3cm diameter, flat (15%)	TP28A(0.2-0.4)	No olfactory evidence of contamination
			0.5			Borehole TP28A terminated at 0.4m (Target depth reached)		
			1.0					
			1.5					

TEST PIT NUMBER TP29A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE **LOGGED BY** MB **CHECKED BY** GB

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Red and grey stiff clay	TP29A(0.15-0.3)	No olfactory evidence of contamination
			0.5			Borehole TP29A terminated at 0.3m (Target depth reached)		
			1.0					
			1.5					

TEST PIT NUMBER TP30A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE **LOGGED BY** MB **CHECKED BY** GB

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Brown silty clay with rootlets		No olfactory evidence of contamination
						NATURAL: Brown/red, stiff clay	TP30A(0.2-0.3)	
			0.5			Borehole TP30A terminated at 0.3m (Target depth reached)		
			1.0					
			1.5					

TEST PIT NUMBER TP31A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE **LOGGED BY** MB **CHECKED BY** GB

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Brown-red stiff clay	TP31A(0.1-0.2)	No olfactory evidence of contamination
			0.5			Borehole TP31A terminated at 0.3m (Target depth reached)		
			1.0					
			1.5					

TEST PIT NUMBER TP32A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE **LOGGED BY** MB **CHECKED BY** GB

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Red stuff clay	TP32A(0.2-0.3)	No olfactory evidence of contamination
			0.5			Borehole TP32A terminated at 0.3m (Target depth reached)		
			1.0					
			1.5					

TEST PIT NUMBER TP33A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE **LOGGED BY** MB **CHECKED BY** GB

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Brown firm, silty clay with rootlets		No olfactory evidence of contamination
						NATURAL: Red/brown stiff clay	TP33A(0.2-0.25)	
			0.5			Borehole TP33A terminated at 0.3m (Target depth reached)		
			1.0					
			1.5					

TEST PIT NUMBER TP34A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** _____ **DATUM** _____

EXCAVATION CONTRACTOR _____ **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE _____ **LOGGED BY** MB **CHECKED BY** GB

NOTES _____

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Red stiff clay	TP34A(0.1-0.2) & Field Dupliacte Sample FD2A	No olfactory evidence of contamination
			0.5			Borehole TP34A terminated at 0.3m (Target depth reached)		
			1.0					
			1.5					

TEST PIT NUMBER TP35A

GREENCAP

CLIENT C107881 - Richard Crookes Construction **PROJECT NAME** Detailed Site Investigation

PROJECT NUMBER J160656 **PROJECT LOCATION** 34-38 Schofields Road, Schofields NSW

DATE STARTED 10/12/18 **COMPLETED** 10/12/18 **R.L. SURFACE** **DATUM**

EXCAVATION CONTRACTOR **SLOPE** --- **BEARING** ---

EQUIPMENT Manual **TEST PIT LOCATION** Proposed Lot 1 of site

TEST PIT SIZE **LOGGED BY** MB **CHECKED BY** GB

NOTES

Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Material Description	Samples Tests Remarks	Additional Observations
						NATURAL: Brown firm silty clay with rootlets		No olfactory evidence of contamination
						NATURAL: Red stiff clay with yellow/brown mottling	TP35A(0.15-0.25)	
			0.5			Borehole TP35A terminated at 0.3m (Target depth reached)		
			1.0					
			1.5					

January 2019

GREENCAP
Going Further in Managing Risk

Detailed Site Investigation

Group GSA

Cnr of Farmland Dr & the future realignment of Pelican Rd, Schofields NSW 2762

Appendix E: Sample Analysis Results Summary Table

GREENCAP
Going Further in Managing Risk

J160656
Alex Ave Public School, Schofields
Detailed Site Investigation
Soil Analysis Data Summary

December 2018

	Sample ID						TP1	TP2	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10	TP11	TP12	TP13
	Sample Depth (m)						0.1-0.2	0.01-0.2	0.6-0.7	0.1-0.2	0.1-0.2	0.1-0.2	0.0-0.2	0.1-0.2	0.1-0.2	0.1-0.3	0.2-0.3	0.1-0.3	0.3-0.5	0.01-0.1
	Sample Date						16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18
Analyte	Units	LOR	(HIL-A)	HSL - A/B 0 - <1m	EIL	ESL - R (coarse)	ML (coarse)													
BTEX																				
Benzene	mg/kg	0.1		0.6		50		< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	mg/kg	0.1		-		-		< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	mg/kg	0.2		-		-		< 0.2	< 0.2	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	mg/kg	0.1		-		-		< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	mg/kg	0.1		390		85		< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	mg/kg	0.3		-		105		< 0.3	< 0.3	-	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Heavy Metals																				
Arsenic	mg/kg	2	100		113			12	14	-	7.8	8.6	9.8	10	8.7	5.2	8.5	7.3	10	4.5	8.4
Cadmium	mg/kg	0.4	20		-			< 0.4	< 0.4	-	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	mg/kg	5	100		417			18	12	-	9.3	9.1	13	13	11	7.7	12	7.9	13	15	12
Copper	mg/kg	5	6000		199			11	11	-	15	17	15	15	11	7.2	12	15	16	17	14
Lead	mg/kg	5	300		1,119			27	18	-	24	21	15	18	29	10	26	20	31	36	22
Mercury	mg/kg	0.1	40		-			< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	mg/kg	5	400		170			7.2	5.9	-	6.6	7.7	< 5	8.7	6.9	< 5	5.8	8.3	7.1	9.4	6.4
Zinc	mg/kg	5	7400		281			31	25	-	38	43	29	44	31	21	30	42	43	99	26
Organochlorine Pesticides																				
4.4'-DDD	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
4.4'-DDE	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
4.4'-DDT	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
a-BHC	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Aldrin	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Aldrin and Dieldrin (Total)	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
b-BHC	mg/kg	0.1						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Chlordanes - Total	mg/kg	0.05						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
d-BHC	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
DDT + DDE + DDD (Total)	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Dieldrin	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Endosulfan I	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Endosulfan II	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Endosulfan sulphate	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Endrin	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Endrin aldehyde	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Endrin ketone	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Heptachlor	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Heptachlor epoxide	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Hexachlorobenzene	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Methoxychlor	mg/kg	0.05						-	< 0.05	-	-	< 0.05	-	-	< 0.05	-	< 0.05	-	-	-	-
Toxaphene	mg/kg	1						-	< 1	-	-	< 1	-	-	< 1	-	< 1	-	-	-	-
Vic EPA IWRG 621 OCP (Total)	mg/kg	0.1						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
Vic EPA IWRG 621 Other OCP (Total)	mg/kg	0.1						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
Physical Properties																				
Moisture	%	1						7.8	9	12	11	10	14	9.1	8	20	11	9.7	10	8.7	11
Organophosphorus Pesticides																				
Azinphos-methyl	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Bolstar	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Chlorfenvinphos	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Chlorpyrifos	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Chlorpyrifos-methyl	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Coumaphos	mg/kg	2						-	< 2	-	-	< 2	-	-	< 2	-	< 2	-	-	-	-
Demeton-O	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Demeton-S	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Diazinon	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Dichlorvos	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Dimethoate	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Disulfoton	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
EPN	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Ethion	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Ethoprop	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Ethyl parathion	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Fenitrothion	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Fensulfothion	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Fenthion	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Malathion	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Merphos	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Methyl parathion	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Mevinphos	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Monocrotophos	mg/kg	2						-	< 2	-	-	< 2	-	-	< 2	-	< 2	-	-	-	-
Naled	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Omethoate	mg/kg	2						-	< 2	-	-	< 2	-	-	< 2	-	< 2	-	-	-	-
Phorate	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Pirimiphos-methyl	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Pyrazophos	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Ronnel	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Terbufos	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Tetrachlorvinphos	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Tokuthion	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Trichloronate	mg/kg	0.2						-	< 0.2	-	-	< 0.2	-	-	< 0.2	-	< 0.2	-	-	-	-
Polychlorinated Biphenyls																				
Aroclor-1016	mg/kg	0.1						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
Aroclor-1221	mg/kg	0.1						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
Aroclor-1232	mg/kg	0.1						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
Aroclor-1242	mg/kg	0.1						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
Aroclor-1248	mg/kg	0.1						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
Aroclor-1254	mg/kg	0.1						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
Aroclor-1260	mg/kg	0.1						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
Total PCB	mg/kg	0.1						-	< 0.1	-	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-
Polycyclic Aromatic Hydrocarbons																				
Acenaphthene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Acenaphthylene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Anthracene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Benz(a)anthracene	mg/kg	0.5	3			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.5	3			0.7		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Benzo(a)pyrene TEQ (lower bound)	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Benzo(a)pyrene TEQ (medium bound)	mg/kg	0.6	-			-		0.6	-	-	-	0.6	-	0.6	-	0.6	-	-	-	-	-
Benzo(a)pyrene TEQ (upper bound)	mg/kg	1.2	-			-		1.2	-	-	-	1.2	-	1.2	-	1.2	-	-	-	-	-
Benzo(b&j)fluoranthene	mg/kg	0.5	3			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Benzo(g.h.i)perylene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.5	3			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Chrysene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Dibenz(a.h)anthracene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Fluoranthene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Fluorene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Indeno(1.2.3-cd)pyrene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Naphthalene	mg/kg	0.5	-	4	170	170	-	< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Phenanthrene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Pyrene	mg/kg	0.5	-			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Total PAH	mg/kg	0.5	300			-		< 0.5	-	-	-	< 0.5	-	< 0.5	-	< 0.5	-	-	-	-	-
Total Recoverable Hydrocarbons - 1999 NEPM Fractions																				
TRH C10-36 (Total)	mg/kg	50						< 50	< 50	-	< 50	< 50	< 50	< 50	< 50	50	< 50	< 50	< 50	< 50	< 50
TRH C10-C14	mg/kg	20						< 20	< 20	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
TRH C15-C28	mg/kg	50						< 50	< 50	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH C29-C36	mg/kg	50						< 50	< 50	-	< 50	< 50	< 50	< 50	< 50	50	< 50	< 50	< 50	< 50	< 50
TRH C6-C9	mg/kg	20						< 20	< 20	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20

Total Recoverable Hydrocarbons - 2013 NEPM Fractions																				
Naphthalene	mg/kg	0.5				170	-	< 0.5	< 0.5	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16	mg/kg	50				120	1,000	< 50	< 50	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)	mg/kg	50				-	-	< 50	< 50	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH >C10-C40 (total)*	mg/kg	100				-	-	< 100	< 100	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRH >C16-C34	mg/kg	100				300	2,500	< 100	< 100	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRH >C34-C40	mg/kg	100				2,800	10,000	< 100	< 100	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRH C6-C10	mg/kg	20				180	700	< 20	< 20	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)	mg/kg	20				-	-	< 20	< 20	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Asbestos																				
Asbestos	g/g	0.01% w/w						<0.01%	-	-	<0.01%	-	<0.01%	<0.01%	-	-	<0.01%	<0.01%	-	<0.01%	-
Respirable fibres		ND						ND*	-	-	ND*	-	ND*	ND*	-	-	ND*	ND*	-	ND*	-
Salinity																				
Chloride	mg/kg	5						-	-	24	-	-	-	-	-	-	-	-	-	-
Conductivity (1:5 aqueous extract at 25°C)	uS/cm	10						-	-	47	-	-	-	-	-	-	-	-	-	-
Exchangeable Sodium Percentage (ESP)	%	0.1						-	-	7.9	-	-	-	-	-	-	-	-	-	-
Magnesium (exchangeable)	meq/100g	0.1						-	-	5.7	-	-	-	-	-	-	-	-	-	-
pH (1:5 Aqueous extract at 25°C)	pH units	0.1						-	-	5.7	-	-	-	-	-	-	-	-	-	-
Potassium (exchangeable)	meq/100g	0.1						-	-	0.4	-	-	-	-	-	-	-	-	-	-
Resistivity	ohm.m	0.5						-	-	210	-	-	-	-	-	-	-	-	-	-
Sodium (exchangeable)	meq/100g	0.1						-	-	0.8	-	-	-	-	-	-	-	-	-	-
Sulphate (as SO4)	mg/kg	30						-	-	140	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity																				
Calcium (exchangeable)	meq/100g	0.1						-	-	3.5	-	-	-	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05						-	-	10	-	-	-	-	-	-	-	-	-	-

GREENCAP
Going Further in Managing Risk

J160656
Alex Ave Public School, Schofields
Detailed Site Investigation
Soil Analysis Data Summary

December 2018

	Sample ID						TP14	TP15	TP15	TP16	TP17	TP18	TP19	TP21	TP23	TP24	FD01	FD02
	Sample Depth (m)						0.0-0.1	0.1-0.2	0.8-0.9	0.1-0.3	0.25-0.35	0.1-0.2	0.2-0.3	0.2-0.3	0.2-0.3	0.1-0.2	FD01	FD02
	Sample Date						16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18	16/11/18
Analyte	Units	LOR	(HIL-A)	HSL - A/B 0 - <1m	EIL	ESL - R (coarse)	ML (coarse)											
BTEX																		
Benzene	mg/kg	0.1		0.6		50		< 0.1	< 0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	mg/kg	0.1		-		-		< 0.1	< 0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	mg/kg	0.2		-		-		< 0.2	< 0.2	-	-	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	mg/kg	0.1		-		-		< 0.1	< 0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	mg/kg	0.1		390		85		< 0.1	< 0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	mg/kg	0.3		-		105		< 0.3	< 0.3	-	-	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Heavy Metals																			
Arsenic	mg/kg	2	100		113			8.9	28	-	-	40	19	28	12	13	19	4.2	7.6
Cadmium	mg/kg	0.4	20		-			< 0.4	< 0.4	-	-	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	mg/kg	5	100		417			13	17	-	-	11	17	31	9.2	17	15	17	7.8
Copper	mg/kg	5	6000		199			15	21	-	-	28	18	25	33	9.4	34	27	12
Lead	mg/kg	5	300		1,119			26	27	-	-	33	23	31	13	19	17	43	22
Mercury	mg/kg	0.1	40		-			< 0.1	< 0.1	-	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	mg/kg	5	400		170			6	7.8	-	-	17	9	12	11	< 5	9.2	8.8	5.5
Zinc	mg/kg	5	7400		281			28	51	-	-	77	25	37	67	11	66	140	35
Organochlorine Pesticides																			
4.4'-DDD	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
4.4'-DDE	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
4.4'-DDT	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
a-BHC	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Aldrin	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Aldrin and Dieldrin (Total)	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
b-BHC	mg/kg	0.1						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Chlordanes - Total	mg/kg	0.05						-	-	-	-	< 0.1	-	-	-	-	-	-	-
d-BHC	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
DDT + DDE + DDD (Total)	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Dieldrin	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Endosulfan I	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Endosulfan II	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Endosulfan sulphate	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Endrin	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Endrin ketone	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Heptachlor	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Methoxychlor	mg/kg	0.05						-	-	-	-	< 0.05	-	-	-	-	-	-	-
Toxaphene	mg/kg	1						-	-	-	-	< 1	-	-	-	-	-	-	-
Vic EPA IWRG 621 OCP (Total)	mg/kg	0.1						-	-	-	-	< 0.1	-	-	-	-	-	-	-
Vic EPA IWRG 621 Other OCP (Total)	mg/kg	0.1						-	-	-	-	< 0.1	-	-	-	-	-	-	-
Physical Properties																			
Moisture	%	1						14	15	18	11	12	11	15	19	6.9	14	8.9	9.8
Organophosphorus Pesticides																			
Azinphos-methyl	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Bolstar	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Chlorfenvinphos	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Chlorpyrifos	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Chlorpyrifos-methyl	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Coumaphos	mg/kg	2						-	-	-	-	< 2	-	-	-	-	-	-	-
Demeton-O	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Demeton-S	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Diazinon	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Dichlorvos	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Dimethoate	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Disulfoton	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
EPN	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Ethion	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Ethoprop	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Ethyl parathion	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Fenitrothion	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Fensulfothion	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Fenthion	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Malathion	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Merphos	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Methyl parathion	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Mevinphos	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Monocrotophos	mg/kg	2						-	-	-	-	< 2	-	-	-	-	-	-	-
Naled	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Omethoate	mg/kg	2						-	-	-	-	< 2	-	-	-	-	-	-	-
Phorate	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Pirimiphos-methyl	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Pyrazophos	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Ronnel	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Terbufos	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Tetrachlorvinphos	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Tokuthion	mg/kg	0.2						-	-	-	-	< 0.2	-	-	-	-	-	-	-
Trichloronate	mg/kg	0.2						-	-	-	-	< 0.2							
Polychlorinated Biphenyls																			
Aroclor-1016	mg/kg	0.1						-	-	-	-	< 0.1	-	-	-	-	-	-	-
Aroclor-1221	mg/kg	0.1						-	-	-	-	< 0.1	-	-	-	-	-	-	-
Aroclor-1232	mg/kg	0.1						-	-	-	-	< 0.1	-	-	-	-	-	-	-
Aroclor-1242	mg/kg	0.1						-	-	-	-	< 0.1	-	-	-	-	-	-	-
Aroclor-1248	mg/kg	0.1						-	-	-	-	< 0.1	-	-	-	-	-	-	-
Aroclor-1254	mg/kg	0.1						-	-	-	-	< 0.1	-	-	-	-	-	-	-
Aroclor-1260	mg/kg	0.1						-	-	-	-	< 0.1	-	-	-	-	-	-	-
Total PCB	mg/kg	0.1						-	-	-	-	< 0.1	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons																			
Acenaphthene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Acenaphthylene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Anthracene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Benz(a)anthracene	mg/kg	0.5	3			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.5	3			0.7		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Benzo(a)pyrene TEQ (lower bound)	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Benzo(a)pyrene TEQ (medium bound)	mg/kg	0.6	-			-		-	-	-	-	-	0.6	-	-	-	-	-	-
Benzo(a)pyrene TEQ (upper bound)	mg/kg	1.2	-			-		-	-	-	-	-	1.2	-	-	-	-	-	-
Benzo(b&j)fluoranthene	mg/kg	0.5	3			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Benzo(g.h.i)perylene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.5	3			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Chrysene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Dibenz(a.h)anthracene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Fluoranthene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Fluorene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Indeno(1.2.3-cd)pyrene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Naphthalene	mg/kg	0.5	-	4	170	170	-	-	-	-	-	-	< 0.5	-	-	-	-	-	-
Phenanthrene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Pyrene	mg/kg	0.5	-			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Total PAH	mg/kg	0.5	300			-		-	-	-	-	-	< 0.5	-	-	-	-	-	-
Total Recoverable Hydrocarbons - 1999 NEPM Fractions																			
TRH C10-36 (Total)	mg/kg	50						< 50	< 50	-	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH C10-C14	mg/kg	20						< 20	< 20	-	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
TRH C15-C28	mg/kg	50						< 50	< 50	-	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH C29-C36	mg/kg	50						< 50	< 50	-	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH C6-C9	mg/kg	20						< 20	< 20	-	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20

Total Recoverable Hydrocarbons - 2013 NEPM Fractions																			
Naphthalene	mg/kg	0.5				170	-	< 0.5	< 0.5	-	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16	mg/kg	50				120	1,000	< 50	< 50	-	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)	mg/kg	50				-	-	< 50	< 50	-	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH >C10-C40 (total)*	mg/kg	100				-	-	< 100	< 100	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRH >C16-C34	mg/kg	100				300	2,500	< 100	< 100	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRH >C34-C40	mg/kg	100				2,800	10,000	< 100	< 100	-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRH C6-C10	mg/kg	20				180	700	< 20	< 20	-	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)	mg/kg	20				-	-	< 20	< 20	-	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Asbestos																			
Asbestos	g/g	0.01% w/w						-	<0.01%	-	-	-	-	-	-	<0.01%	-	-	-
Respirable fibres		ND						-	ND*	-	-	-	-	-	-	ND*	-	-	-
Salinity																			
Chloride	mg/kg	5						-	-	46	< 5	-	-	-	-	-	100	-	-
Conductivity (1:5 aqueous extract at 25°C)	uS/cm	10						-	-	87	11	-	-	-	-	-	110	-	-
Exchangeable Sodium Percentage (ESP)	%	0.1						-	-	21	2	-	-	-	-	-	5.8	-	-
Magnesium (exchangeable)	meq/100g	0.1						-	-	9.2	3.2	-	-	-	-	-	7.1	-	-
pH (1:5 Aqueous extract at 25°C)	pH units	0.1						-	-	5.2	6.1	-	-	-	-	-	5.4	-	-
Potassium (exchangeable)	meq/100g	0.1						-	-	0.6	0.2	-	-	-	-	-	0.3	-	-
Resistivity	ohm.m	0.5						-	-	110	940	-	-	-	-	-	93	-	-
Sodium (exchangeable)	meq/100g	0.1						-	-	2.8	0.2	-	-	-	-	-	1	-	-
Sulphate (as SO4)	mg/kg	30						-	-	82	< 30	-	-	-	-	-	52	-	-
Cation Exchange Capacity																			
Calcium (exchangeable)	meq/100g	0.1						-	-	1	5.3	-	-	-	-	-	8.2	-	-
Cation Exchange Capacity	meq/100g	0.05						-	-	14	8.8	-	-	-	-	-	16	-	-

GREENCAP
Going Further in Managing Risk

J160656
Alex Ave Public School, Schofields
Detailed Site Investigation
Soil Analysis Data Summary

December 2018

	Sample ID						TP25A	TP26A	TP27A	TP28A	TP29A	TP30A	TP31A	TP32A	TP33A	TP34A	TP35A	FD01A
	Sample Depth (m)						0.2-0.3	0.1-0.3	0.2-0.3	0.2-0.4	0.1-0.3	0.2-0.3	0.1-0.2	0.2-0.3	0.2-0.25	0.1-0.2	0.15-0.25	(TP34A)
	Sample Date						10/12/18	10/12/18	10/12/18	10/12/18	10/12/18	10/12/18	10/12/18	10/12/18	10/12/18	10/12/18	10/12/18	10/12/18
Analyte	Units	LOR	(HIL-A)	HSL - A/B 0 - <1m	EIL	ESL - R (coarse)	ML (coarse)											
BTEX																		
Benzene	mg/kg	0.1		0.6		50		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	mg/kg	0.1		-		-		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	mg/kg	0.2		-		-		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	mg/kg	0.1		-		-		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	mg/kg	0.1		390		85		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	mg/kg	0.3		-		105		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Heavy Metals																		
Arsenic	mg/kg	2	100		113			7.6	9.7	14	28	19	12	20	9.3	8.2	7.7	5.8	13
Cadmium	mg/kg	0.4	20		-			< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	mg/kg	5	100		417			10	11	19	9	17	14	18	11	10	12	9.8	13
Copper	mg/kg	5	6000		199			14	16	17	22	41	27	20	16	18	15	13	20
Lead	mg/kg	5	300		1,119			22	21	19	22	22	19	39	21	23	23	17	14
Mercury	mg/kg	0.1	40		-			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	mg/kg	5	400		170			8.1	9.1	9.6	23	7.9	12	14	12	13	8.6	5.7	6.3
Zinc	mg/kg	5	7400		281			49	180	87	74	41	58	59	51	63	52	32	28
Organochlorine Pesticides																		
4.4'-DDD	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
4.4'-DDE	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
4.4'-DDT	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
a-BHC	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Aldrin	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Aldrin and Dieldrin (Total)	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
b-BHC	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Chlordanes - Total	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
d-BHC	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
DDT + DDE + DDD (Total)	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Dieldrin	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan I	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan II	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Endosulfan sulphate	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Endrin	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Endrin aldehyde	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Endrin ketone	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
g-BHC (Lindane)	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Heptachlor epoxide	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Methoxychlor	mg/kg	0.05						-	-	-	-	-	-	-	-	-	-	-	-
Toxaphene	mg/kg	1						-	-	-	-	-	-	-	-	-	-	-	-
Vic EPA IWRG 621 OCP (Total)	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Vic EPA IWRG 621 Other OCP (Total)	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Physical Properties																		
Moisture	%	1						8.2	7.8	9.7	8.6	6.4	12	9.4	9.7	10	12	6	6.3
Organophosphorus Pesticides																		
Azinphos-methyl	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Bolstar	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Chlorfenvinphos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Chlorpyrifos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Chlorpyrifos-methyl	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Coumaphos	mg/kg	2						-	-	-	-	-	-	-	-	-	-	-	-
Demeton-O	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Demeton-S	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Diazinon	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Dichlorvos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Dimethoate	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Disulfoton	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
EPN	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Ethion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Ethoprop	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Ethyl parathion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Fenitrothion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Fensulfothion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Fenthion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Malathion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Merphos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Methyl parathion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Mevinphos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Monocrotophos	mg/kg	2						-	-	-	-	-	-	-	-	-	-	-	-
Naled	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Omethoate	mg/kg	2						-	-	-	-	-	-	-	-	-	-	-	-
Phorate	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Pirimiphos-methyl	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Pyrazophos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Ronnel	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Terbufos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Tetrachlorvinphos	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Tokuthion	mg/kg	0.2						-	-	-	-	-	-	-	-	-	-	-	-
Trichloronate	mg/kg	0.2						-	-	-	-	-							
Polychlorinated Biphenyls																		
Aroclor-1016	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1221	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1232	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1242	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1248	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1254	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1260	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Total PCB	mg/kg	0.1						-	-	-	-	-	-	-	-	-	-	-	-
Polycyclic Aromatic Hydrocarbons																		
Acenaphthene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Anthracene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Benz(a)anthracene	mg/kg	0.5	3			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Benzo(a)pyrene	mg/kg	0.5	3			0.7		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ (lower bound)	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ (medium bound)	mg/kg	0.6	-			-		-	-	-	0.6	-	-	-	-	-	-	-	-
Benzo(a)pyrene TEQ (upper bound)	mg/kg	1.2	-			-		-	-	-	1.2	-	-	-	-	-	-	-	-
Benzo(b&j)fluoranthene	mg/kg	0.5	3			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Benzo(g.h.i)perylene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.5	3			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Chrysene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Dibenz(a.h)anthracene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Fluoranthene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Fluorene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Indeno(1.2.3-cd)pyrene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	0.5	-	4	170	170	-	-	-	-	< 0.5	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Pyrene	mg/kg	0.5	-			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Total PAH	mg/kg	0.5	300			-		-	-	-	< 0.5	-	-	-	-	-	-	-	-
Total Recoverable Hydrocarbons - 1999 NEPM Fractions																		
TRH C10-36 (Total)	mg/kg	50						< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	83	< 50
TRH C10-C14	mg/kg	20						< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
TRH C15-C28	mg/kg	50						< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH C29-C36	mg/kg	50						< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	83	< 50
TRH C6-C9	mg/kg	20						< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20

Total Recoverable Hydrocarbons - 2013 NEPM Fractions																			
Naphthalene	mg/kg	0.5				170	-	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
TRH >C10-C16	mg/kg	50				120	1,000	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)	mg/kg	50				-	-	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
TRH >C10-C40 (total)*	mg/kg	100				-	-	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRH >C16-C34	mg/kg	100				300	2,500	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRH >C34-C40	mg/kg	100				2,800	10,000	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
TRH C6-C10	mg/kg	20				180	700	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)	mg/kg	20				-	-	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Asbestos																			
Asbestos	g/g	0.01% w/w						-	-	-	-	-	-	-	-	-	-	-	-
Respirable fibres								-	-	-	-	-	-	-	-	-	-	-	-
Salinity																			
Chloride	mg/kg	5						-	-	-	-	170	-	-	-	-	-	-	-
Conductivity (1:5 aqueous extract at 25°C)	uS/cm	10						-	-	-	-	97	-	-	-	-	-	-	-
Exchangeable Sodium Percentage (ESP)	%	0.1						-	-	-	-	9.1	-	-	-	-	-	-	-
Magnesium (exchangeable)	meq/100g	0.1						-	-	-	-	6.7	-	-	-	-	-	-	-
pH (1:5 Aqueous extract at 25°C)	pH units	0.1						-	-	-	-	6.8	-	-	-	-	-	-	-
Potassium (exchangeable)	meq/100g	0.1						-	-	-	-	0.5	-	-	-	-	-	-	-
Resistivity	ohm.m	0.5						-	-	-	-	100	-	-	-	-	-	-	-
Sodium (exchangeable)	meq/100g	0.1						-	-	-	-	1.4	-	-	-	-	-	-	-
Sulphate (as SO4)	mg/kg	30						-	-	-	-	< 30	-	-	-	-	-	-	-
Cation Exchange Capacity																			
Calcium (exchangeable)	meq/100g	0.1						-	-	-	-	6.3	-	-	-	-	-	-	-
Cation Exchange Capacity	meq/100g	0.05						-	-	-	-	15	-	-	-	-	-	-	-

January 2019

GREENCAP
Going Further in Managing Risk

Detailed Site Investigation

Group GSA

Cnr of Farmland Dr & the future realignment of Pelican Rd, Schofields NSW 2762

Appendix F: Laboratory Analysis Reports & CoCs

Greencap NSW P/L
Level 2/11 Khartoum Road
North Ryde
NSW 2113

Attention: **Matthew Barberson**

Report **628453-S-V2**
Project name DSI - SCHOFIELDS
Project ID J157372
Received Date Nov 19, 2018

Client Sample ID			**TP1 0.1-0.2**	**TP2 0.01-0.2**	**TP2 0.6-0.7**	**TP3 0.1-0.2**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-No24369**	**S18-No24370**	**S18-No24371**	**S18-No24372**
Date Sampled			**Nov 16, 2018**	**Nov 16, 2018**	**Nov 16, 2018**	**Nov 16, 2018**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	-	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	-	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	-	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	-	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	-	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	-	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	-	< 0.3
4-Bromofluorobenzene (surr.)	1	%	54	56	-	59
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	-	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	-	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	-	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	-	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	-	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	-	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	-	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	-	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	-	-	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	-	-	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	-	-	-
Acenaphthene	0.5	mg/kg	< 0.5	-	-	-
Acenaphthylene	0.5	mg/kg	< 0.5	-	-	-
Anthracene	0.5	mg/kg	< 0.5	-	-	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	-	-	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	-	-	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	-	-	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	-	-	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	-	-	-
Chrysene	0.5	mg/kg	< 0.5	-	-	-

Client Sample ID			TP1 0.1-0.2	TP2 0.01-0.2	TP2 0.6-0.7	TP3 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24369	S18-No24370	S18-No24371	S18-No24372
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	-	-	-
Fluoranthene	0.5	mg/kg	< 0.5	-	-	-
Fluorene	0.5	mg/kg	< 0.5	-	-	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	-	-	-
Naphthalene	0.5	mg/kg	< 0.5	-	-	-
Phenanthrene	0.5	mg/kg	< 0.5	-	-	-
Pyrene	0.5	mg/kg	< 0.5	-	-	-
Total PAH*	0.5	mg/kg	< 0.5	-	-	-
2-Fluorobiphenyl (surr.)	1	%	94	-	-	-
p-Terphenyl-d14 (surr.)	1	%	77	-	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	-
4.4'-DDD	0.05	mg/kg	-	< 0.05	-	-
4.4'-DDE	0.05	mg/kg	-	< 0.05	-	-
4.4'-DDT	0.05	mg/kg	-	< 0.05	-	-
a-BHC	0.05	mg/kg	-	< 0.05	-	-
Aldrin	0.05	mg/kg	-	< 0.05	-	-
b-BHC	0.05	mg/kg	-	< 0.05	-	-
d-BHC	0.05	mg/kg	-	< 0.05	-	-
Dieldrin	0.05	mg/kg	-	< 0.05	-	-
Endosulfan I	0.05	mg/kg	-	< 0.05	-	-
Endosulfan II	0.05	mg/kg	-	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	-
Endrin	0.05	mg/kg	-	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	-
Endrin ketone	0.05	mg/kg	-	< 0.05	-	-
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	-
Heptachlor	0.05	mg/kg	-	< 0.05	-	-
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	-	-
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	-	-
Methoxychlor	0.05	mg/kg	-	< 0.05	-	-
Toxaphene	1	mg/kg	-	< 1	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	< 0.05	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	-
Dibutylchlorendate (surr.)	1	%	-	87	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	65	-	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	-
Bolstar	0.2	mg/kg	-	< 0.2	-	-
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	-
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	-
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	-
Coumaphos	2	mg/kg	-	< 2	-	-
Demeton-S	0.2	mg/kg	-	< 0.2	-	-
Demeton-O	0.2	mg/kg	-	< 0.2	-	-
Diazinon	0.2	mg/kg	-	< 0.2	-	-
Dichlorvos	0.2	mg/kg	-	< 0.2	-	-

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP1 0.1-0.2 Soil S18-No24369 Nov 16, 2018	TP2 0.01-0.2 Soil S18-No24370 Nov 16, 2018	TP2 0.6-0.7 Soil S18-No24371 Nov 16, 2018	TP3 0.1-0.2 Soil S18-No24372 Nov 16, 2018
Organophosphorus Pesticides						
Dimethoate	0.2	mg/kg	-	< 0.2	-	-
Disulfoton	0.2	mg/kg	-	< 0.2	-	-
EPN	0.2	mg/kg	-	< 0.2	-	-
Ethion	0.2	mg/kg	-	< 0.2	-	-
Ethoprop	0.2	mg/kg	-	< 0.2	-	-
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	-
Fenitrothion	0.2	mg/kg	-	< 0.2	-	-
Fensulfothion	0.2	mg/kg	-	< 0.2	-	-
Fenthion	0.2	mg/kg	-	< 0.2	-	-
Malathion	0.2	mg/kg	-	< 0.2	-	-
Merphos	0.2	mg/kg	-	< 0.2	-	-
Methyl parathion	0.2	mg/kg	-	< 0.2	-	-
Mevinphos	0.2	mg/kg	-	< 0.2	-	-
Monocrotophos	2	mg/kg	-	< 2	-	-
Naled	0.2	mg/kg	-	< 0.2	-	-
Omethoate	2	mg/kg	-	< 2	-	-
Phorate	0.2	mg/kg	-	< 0.2	-	-
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	-
Pyrazophos	0.2	mg/kg	-	< 0.2	-	-
Ronnel	0.2	mg/kg	-	< 0.2	-	-
Terbufos	0.2	mg/kg	-	< 0.2	-	-
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	-
Tokuthion	0.2	mg/kg	-	< 0.2	-	-
Trichloronate	0.2	mg/kg	-	< 0.2	-	-
Triphenylphosphate (surr.)	1	%	-	74	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	-
Total PCB*	0.1	mg/kg	-	< 0.1	-	-
Dibutylchlorendate (surr.)	1	%	-	87	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	65	-	-
Chloride	5	mg/kg	-	-	24	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	-	-	47	-
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	-	-	5.7	-
Resistivity*	0.5	ohm.m	-	-	210	-
Sulphate (as SO4)	30	mg/kg	-	-	140	-
Exchangeable Sodium Percentage (ESP)	0.1	%	-	-	7.9	-
Magnesium (exchangeable)	0.1	meq/100g	-	-	5.7	-
Potassium (exchangeable)	0.1	meq/100g	-	-	0.4	-
Sodium (exchangeable)	0.1	meq/100g	-	-	0.8	-
% Moisture	1	%	7.8	9.0	12	11

Client Sample ID			TP1 0.1-0.2	TP2 0.01-0.2	TP2 0.6-0.7	TP3 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24369	S18-No24370	S18-No24371	S18-No24372
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	12	14	-	7.8
Cadmium	0.4	mg/kg	< 0.4	< 0.4	-	< 0.4
Chromium	5	mg/kg	18	12	-	9.3
Copper	5	mg/kg	11	11	-	15
Lead	5	mg/kg	27	18	-	24
Mercury	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
Nickel	5	mg/kg	7.2	5.9	-	6.6
Zinc	5	mg/kg	31	25	-	38
Cation Exchange Capacity						
Calcium (exchangeable)	0.1	meq/100g	-	-	3.5	-
Cation Exchange Capacity	0.05	meq/100g	-	-	10	-

Client Sample ID			TP4 0.1-0.2	TP5 0.1-0.2	TP6 0.0-0.2	TP7 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24373	S18-No24374	S18-No24375	S18-No24376
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	61	57	63	56
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	-	0.6	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	-	1.2	-
Acenaphthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Acenaphthylene	0.5	mg/kg	< 0.5	-	< 0.5	-
Anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-

Client Sample ID			TP4 0.1-0.2	TP5 0.1-0.2	TP6 0.0-0.2	TP7 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24373	S18-No24374	S18-No24375	S18-No24376
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	-	< 0.5	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Chrysene	0.5	mg/kg	< 0.5	-	< 0.5	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	-	< 0.5	-
Fluoranthene	0.5	mg/kg	< 0.5	-	< 0.5	-
Fluorene	0.5	mg/kg	< 0.5	-	< 0.5	-
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Naphthalene	0.5	mg/kg	< 0.5	-	< 0.5	-
Phenanthrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Pyrene	0.5	mg/kg	< 0.5	-	< 0.5	-
Total PAH*	0.5	mg/kg	< 0.5	-	< 0.5	-
2-Fluorobiphenyl (surr.)	1	%	96	-	98	-
p-Terphenyl-d14 (surr.)	1	%	97	-	68	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	< 0.1	-	-	< 0.1
4.4'-DDD	0.05	mg/kg	< 0.05	-	-	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	-	-	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	-	-	< 0.05
a-BHC	0.05	mg/kg	< 0.05	-	-	< 0.05
Aldrin	0.05	mg/kg	< 0.05	-	-	< 0.05
b-BHC	0.05	mg/kg	< 0.05	-	-	< 0.05
d-BHC	0.05	mg/kg	< 0.05	-	-	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	-	-	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	-	-	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	-	-	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	-	-	< 0.05
Endrin	0.05	mg/kg	< 0.05	-	-	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	-	-	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	-	-	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	-	-	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	-	-	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	-	-	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	-	-	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	-	-	< 0.05
Toxaphene	1	mg/kg	< 1	-	-	< 1
Aldrin and Dieldrin (Total)*	0.05	mg/kg	< 0.05	-	-	< 0.05
DDT + DDE + DDD (Total)*	0.05	mg/kg	< 0.05	-	-	< 0.05
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	< 0.1	-	-	< 0.1
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	< 0.1	-	-	< 0.1
Dibutylchlorendate (surr.)	1	%	80	-	-	85
Tetrachloro-m-xylene (surr.)	1	%	76	-	-	85
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	< 0.2	-	-	< 0.2
Bolstar	0.2	mg/kg	< 0.2	-	-	< 0.2
Chlorfenvinphos	0.2	mg/kg	< 0.2	-	-	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	-	-	< 0.2
Chlorpyrifos-methyl	0.2	mg/kg	< 0.2	-	-	< 0.2

Client Sample ID			TP4 0.1-0.2	TP5 0.1-0.2	TP6 0.0-0.2	TP7 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24373	S18-No24374	S18-No24375	S18-No24376
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Coumaphos	2	mg/kg	< 2	-	-	< 2
Demeton-S	0.2	mg/kg	< 0.2	-	-	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	-	-	< 0.2
Diazinon	0.2	mg/kg	< 0.2	-	-	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	-	-	< 0.2
Dimethoate	0.2	mg/kg	< 0.2	-	-	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	-	-	< 0.2
EPN	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethion	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	-	-	< 0.2
Ethyl parathion	0.2	mg/kg	< 0.2	-	-	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	-	-	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	-	-	< 0.2
Fenthion	0.2	mg/kg	< 0.2	-	-	< 0.2
Malathion	0.2	mg/kg	< 0.2	-	-	< 0.2
Merphos	0.2	mg/kg	< 0.2	-	-	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	-	-	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	-	-	< 0.2
Monocrotophos	2	mg/kg	< 2	-	-	< 2
Naled	0.2	mg/kg	< 0.2	-	-	< 0.2
Omethoate	2	mg/kg	< 2	-	-	< 2
Phorate	0.2	mg/kg	< 0.2	-	-	< 0.2
Pirimiphos-methyl	0.2	mg/kg	< 0.2	-	-	< 0.2
Pyrazophos	0.2	mg/kg	< 0.2	-	-	< 0.2
Ronnel	0.2	mg/kg	< 0.2	-	-	< 0.2
Terbufos	0.2	mg/kg	< 0.2	-	-	< 0.2
Tetrachlorvinphos	0.2	mg/kg	< 0.2	-	-	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	-	-	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	-	-	< 0.2
Triphenylphosphate (surr.)	1	%	83	-	-	85
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1	-	-	< 0.1
Aroclor-1260	0.1	mg/kg	< 0.1	-	-	< 0.1
Total PCB*	0.1	mg/kg	< 0.1	-	-	< 0.1
Dibutylchlorendate (surr.)	1	%	80	-	-	85
Tetrachloro-m-xylene (surr.)	1	%	76	-	-	85
% Moisture	1	%	10	14	9.1	8.0
Heavy Metals						
Arsenic	2	mg/kg	8.6	9.8	10	8.7
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	9.1	13	13	11
Copper	5	mg/kg	17	15	15	11
Lead	5	mg/kg	21	15	18	29

Client Sample ID			TP4 0.1-0.2	TP5 0.1-0.2	TP6 0.0-0.2	TP7 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24373	S18-No24374	S18-No24375	S18-No24376
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Heavy Metals						
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	7.7	< 5	8.7	6.9
Zinc	5	mg/kg	43	29	44	31

Client Sample ID			TP8 0.1-0.2	TP9 0.1-0.3	TP10 0.2-0.3	TP11 0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24377	S18-No24378	S18-No24379	S18-No24380
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	53	62	96	87
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	< 0.5	-	-	-
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	0.6	-	-	-
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	1.2	-	-	-
Acenaphthene	0.5	mg/kg	< 0.5	-	-	-
Acenaphthylene	0.5	mg/kg	< 0.5	-	-	-
Anthracene	0.5	mg/kg	< 0.5	-	-	-
Benz(a)anthracene	0.5	mg/kg	< 0.5	-	-	-
Benzo(a)pyrene	0.5	mg/kg	< 0.5	-	-	-
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	< 0.5	-	-	-
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5	-	-	-
Benzo(k)fluoranthene	0.5	mg/kg	< 0.5	-	-	-
Chrysene	0.5	mg/kg	< 0.5	-	-	-
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5	-	-	-
Fluoranthene	0.5	mg/kg	< 0.5	-	-	-
Fluorene	0.5	mg/kg	< 0.5	-	-	-

Client Sample ID			TP8 0.1-0.2	TP9 0.1-0.3	TP10 0.2-0.3	TP11 0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24377	S18-No24378	S18-No24379	S18-No24380
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5	-	-	-
Naphthalene	0.5	mg/kg	< 0.5	-	-	-
Phenanthrene	0.5	mg/kg	< 0.5	-	-	-
Pyrene	0.5	mg/kg	< 0.5	-	-	-
Total PAH*	0.5	mg/kg	< 0.5	-	-	-
2-Fluorobiphenyl (surr.)	1	%	98	-	-	-
p-Terphenyl-d14 (surr.)	1	%	71	-	-	-
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	< 0.1	-	-
4.4'-DDD	0.05	mg/kg	-	< 0.05	-	-
4.4'-DDE	0.05	mg/kg	-	< 0.05	-	-
4.4'-DDT	0.05	mg/kg	-	< 0.05	-	-
a-BHC	0.05	mg/kg	-	< 0.05	-	-
Aldrin	0.05	mg/kg	-	< 0.05	-	-
b-BHC	0.05	mg/kg	-	< 0.05	-	-
d-BHC	0.05	mg/kg	-	< 0.05	-	-
Dieldrin	0.05	mg/kg	-	< 0.05	-	-
Endosulfan I	0.05	mg/kg	-	< 0.05	-	-
Endosulfan II	0.05	mg/kg	-	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	-	< 0.05	-	-
Endrin	0.05	mg/kg	-	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	-	< 0.05	-	-
Endrin ketone	0.05	mg/kg	-	< 0.05	-	-
g-BHC (Lindane)	0.05	mg/kg	-	< 0.05	-	-
Heptachlor	0.05	mg/kg	-	< 0.05	-	-
Heptachlor epoxide	0.05	mg/kg	-	< 0.05	-	-
Hexachlorobenzene	0.05	mg/kg	-	< 0.05	-	-
Methoxychlor	0.05	mg/kg	-	< 0.05	-	-
Toxaphene	1	mg/kg	-	< 1	-	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	< 0.05	-	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	< 0.05	-	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	< 0.1	-	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	< 0.1	-	-
Dibutylchlorendate (surr.)	1	%	-	74	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	69	-	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	< 0.2	-	-
Bolstar	0.2	mg/kg	-	< 0.2	-	-
Chlorfenvinphos	0.2	mg/kg	-	< 0.2	-	-
Chlorpyrifos	0.2	mg/kg	-	< 0.2	-	-
Chlorpyrifos-methyl	0.2	mg/kg	-	< 0.2	-	-
Coumaphos	2	mg/kg	-	< 2	-	-
Demeton-S	0.2	mg/kg	-	< 0.2	-	-
Demeton-O	0.2	mg/kg	-	< 0.2	-	-
Diazinon	0.2	mg/kg	-	< 0.2	-	-
Dichlorvos	0.2	mg/kg	-	< 0.2	-	-
Dimethoate	0.2	mg/kg	-	< 0.2	-	-
Disulfoton	0.2	mg/kg	-	< 0.2	-	-
EPN	0.2	mg/kg	-	< 0.2	-	-

Client Sample ID			TP8 0.1-0.2	TP9 0.1-0.3	TP10 0.2-0.3	TP11 0.1-0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24377	S18-No24378	S18-No24379	S18-No24380
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Ethion	0.2	mg/kg	-	< 0.2	-	-
Ethoprop	0.2	mg/kg	-	< 0.2	-	-
Ethyl parathion	0.2	mg/kg	-	< 0.2	-	-
Fenitrothion	0.2	mg/kg	-	< 0.2	-	-
Fensulfothion	0.2	mg/kg	-	< 0.2	-	-
Fenthion	0.2	mg/kg	-	< 0.2	-	-
Malathion	0.2	mg/kg	-	< 0.2	-	-
Merphos	0.2	mg/kg	-	< 0.2	-	-
Methyl parathion	0.2	mg/kg	-	< 0.2	-	-
Mevinphos	0.2	mg/kg	-	< 0.2	-	-
Monocrotophos	2	mg/kg	-	< 2	-	-
Naled	0.2	mg/kg	-	< 0.2	-	-
Omethoate	2	mg/kg	-	< 2	-	-
Phorate	0.2	mg/kg	-	< 0.2	-	-
Pirimiphos-methyl	0.2	mg/kg	-	< 0.2	-	-
Pyrazophos	0.2	mg/kg	-	< 0.2	-	-
Ronnel	0.2	mg/kg	-	< 0.2	-	-
Terbufos	0.2	mg/kg	-	< 0.2	-	-
Tetrachlorvinphos	0.2	mg/kg	-	< 0.2	-	-
Tokuthion	0.2	mg/kg	-	< 0.2	-	-
Trichloronate	0.2	mg/kg	-	< 0.2	-	-
Triphenylphosphate (surr.)	1	%	-	96	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	-
Total PCB*	0.1	mg/kg	-	< 0.1	-	-
Dibutylchlorendate (surr.)	1	%	-	74	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	69	-	-
% Moisture	1	%	20	11	9.7	10
Heavy Metals						
Arsenic	2	mg/kg	5.2	8.5	7.3	10
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	7.7	12	7.9	13
Copper	5	mg/kg	7.2	12	15	16
Lead	5	mg/kg	10	26	20	31
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	5.8	8.3	7.1
Zinc	5	mg/kg	21	30	42	43

Client Sample ID			TP12 0.3-0.5	TP13 0.01-0.1	TP14 0.0-0.1	TP15 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24381	S18-No24382	S18-No24383	S18-No24384
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	91	53	61	55
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
% Moisture	1	%	8.7	11	14	15
Heavy Metals						
Arsenic	2	mg/kg	4.5	8.4	8.9	28
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	15	12	13	17
Copper	5	mg/kg	17	14	15	21
Lead	5	mg/kg	36	22	26	27
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	9.4	6.4	6.0	7.8
Zinc	5	mg/kg	99	26	28	51

Client Sample ID			TP15 0.8-0.9	TP16 0.1-0.3	TP17 0.25-0.35	TP18 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24385	S18-No24386	S18-No24387	S18-No24388
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	-	-	< 20	< 20
TRH C10-C14	20	mg/kg	-	-	< 20	< 20
TRH C15-C28	50	mg/kg	-	-	< 50	< 50
TRH C29-C36	50	mg/kg	-	-	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	-	-	< 50	< 50

Client Sample ID			TP15 0.8-0.9	TP16 0.1-0.3	TP17 0.25-0.35	TP18 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24385	S18-No24386	S18-No24387	S18-No24388
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
BTEX						
Benzene	0.1	mg/kg	-	-	< 0.1	< 0.1
Toluene	0.1	mg/kg	-	-	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	-	-	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	-	-	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	-	-	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	-	-	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	-	-	62	69
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	-	-	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	-	-	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	-	-	< 20	< 20
TRH >C10-C16	50	mg/kg	-	-	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	-	-	< 50	< 50
TRH >C16-C34	100	mg/kg	-	-	< 100	< 100
TRH >C34-C40	100	mg/kg	-	-	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	-	-	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	-	-	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	-	-	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	-	-	1.2
Acenaphthene	0.5	mg/kg	-	-	-	< 0.5
Acenaphthylene	0.5	mg/kg	-	-	-	< 0.5
Anthracene	0.5	mg/kg	-	-	-	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	-	-	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	-	-	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	-	-	-	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	-	-	-	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	-	-	-	< 0.5
Chrysene	0.5	mg/kg	-	-	-	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	-	-	-	< 0.5
Fluoranthene	0.5	mg/kg	-	-	-	< 0.5
Fluorene	0.5	mg/kg	-	-	-	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	-	-	-	< 0.5
Naphthalene	0.5	mg/kg	-	-	-	< 0.5
Phenanthrene	0.5	mg/kg	-	-	-	< 0.5
Pyrene	0.5	mg/kg	-	-	-	< 0.5
Total PAH*	0.5	mg/kg	-	-	-	< 0.5
2-Fluorobiphenyl (surr.)	1	%	-	-	-	83
p-Terphenyl-d14 (surr.)	1	%	-	-	-	88
Organochlorine Pesticides						
Chlordanes - Total	0.1	mg/kg	-	-	< 0.1	-
4.4'-DDD	0.05	mg/kg	-	-	< 0.05	-
4.4'-DDE	0.05	mg/kg	-	-	< 0.05	-
4.4'-DDT	0.05	mg/kg	-	-	< 0.05	-
a-BHC	0.05	mg/kg	-	-	< 0.05	-
Aldrin	0.05	mg/kg	-	-	< 0.05	-
b-BHC	0.05	mg/kg	-	-	< 0.05	-
d-BHC	0.05	mg/kg	-	-	< 0.05	-
Dieldrin	0.05	mg/kg	-	-	< 0.05	-

Client Sample ID Sample Matrix Eurofins | mgt Sample No. Date Sampled Test/Reference	LOR	Unit	TP15 0.8-0.9 Soil S18-No24385 Nov 16, 2018	TP16 0.1-0.3 Soil S18-No24386 Nov 16, 2018	TP17 0.25-0.35 Soil S18-No24387 Nov 16, 2018	TP18 0.1-0.2 Soil S18-No24388 Nov 16, 2018
Organochlorine Pesticides						
Endosulfan I	0.05	mg/kg	-	-	< 0.05	-
Endosulfan II	0.05	mg/kg	-	-	< 0.05	-
Endosulfan sulphate	0.05	mg/kg	-	-	< 0.05	-
Endrin	0.05	mg/kg	-	-	< 0.05	-
Endrin aldehyde	0.05	mg/kg	-	-	< 0.05	-
Endrin ketone	0.05	mg/kg	-	-	< 0.05	-
g-BHC (Lindane)	0.05	mg/kg	-	-	< 0.05	-
Heptachlor	0.05	mg/kg	-	-	< 0.05	-
Heptachlor epoxide	0.05	mg/kg	-	-	< 0.05	-
Hexachlorobenzene	0.05	mg/kg	-	-	< 0.05	-
Methoxychlor	0.05	mg/kg	-	-	< 0.05	-
Toxaphene	1	mg/kg	-	-	< 1	-
Aldrin and Dieldrin (Total)*	0.05	mg/kg	-	-	< 0.05	-
DDT + DDE + DDD (Total)*	0.05	mg/kg	-	-	< 0.05	-
Vic EPA IWRG 621 OCP (Total)*	0.1	mg/kg	-	-	< 0.1	-
Vic EPA IWRG 621 Other OCP (Total)*	0.1	mg/kg	-	-	< 0.1	-
Dibutylchlorendate (surr.)	1	%	-	-	80	-
Tetrachloro-m-xylene (surr.)	1	%	-	-	77	-
Organophosphorus Pesticides						
Azinphos-methyl	0.2	mg/kg	-	-	< 0.2	-
Bolstar	0.2	mg/kg	-	-	< 0.2	-
Chlorfenvinphos	0.2	mg/kg	-	-	< 0.2	-
Chlorpyrifos	0.2	mg/kg	-	-	< 0.2	-
Chlorpyrifos-methyl	0.2	mg/kg	-	-	< 0.2	-
Coumaphos	2	mg/kg	-	-	< 2	-
Demeton-S	0.2	mg/kg	-	-	< 0.2	-
Demeton-O	0.2	mg/kg	-	-	< 0.2	-
Diazinon	0.2	mg/kg	-	-	< 0.2	-
Dichlorvos	0.2	mg/kg	-	-	< 0.2	-
Dimethoate	0.2	mg/kg	-	-	< 0.2	-
Disulfoton	0.2	mg/kg	-	-	< 0.2	-
EPN	0.2	mg/kg	-	-	< 0.2	-
Ethion	0.2	mg/kg	-	-	< 0.2	-
Ethoprop	0.2	mg/kg	-	-	< 0.2	-
Ethyl parathion	0.2	mg/kg	-	-	< 0.2	-
Fenitrothion	0.2	mg/kg	-	-	< 0.2	-
Fensulfothion	0.2	mg/kg	-	-	< 0.2	-
Fenthion	0.2	mg/kg	-	-	< 0.2	-
Malathion	0.2	mg/kg	-	-	< 0.2	-
Merphos	0.2	mg/kg	-	-	< 0.2	-
Methyl parathion	0.2	mg/kg	-	-	< 0.2	-
Mevinphos	0.2	mg/kg	-	-	< 0.2	-
Monocrotophos	2	mg/kg	-	-	< 2	-
Naled	0.2	mg/kg	-	-	< 0.2	-
Omethoate	2	mg/kg	-	-	< 2	-
Phorate	0.2	mg/kg	-	-	< 0.2	-
Pirimiphos-methyl	0.2	mg/kg	-	-	< 0.2	-
Pyrazophos	0.2	mg/kg	-	-	< 0.2	-
Ronnel	0.2	mg/kg	-	-	< 0.2	-

Client Sample ID			TP15 0.8-0.9	TP16 0.1-0.3	TP17 0.25-0.35	TP18 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24385	S18-No24386	S18-No24387	S18-No24388
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Organophosphorus Pesticides						
Terbufos	0.2	mg/kg	-	-	< 0.2	-
Tetrachlorvinphos	0.2	mg/kg	-	-	< 0.2	-
Tokuthion	0.2	mg/kg	-	-	< 0.2	-
Trichloronate	0.2	mg/kg	-	-	< 0.2	-
Triphenylphosphate (surr.)	1	%	-	-	78	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1221	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1232	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1242	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1248	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1254	0.1	mg/kg	-	-	< 0.1	-
Aroclor-1260	0.1	mg/kg	-	-	< 0.1	-
Total PCB*	0.1	mg/kg	-	-	< 0.1	-
Dibutylchlorendate (surr.)	1	%	-	-	80	-
Tetrachloro-m-xylene (surr.)	1	%	-	-	77	-
Chloride	5	mg/kg	46	< 5	-	-
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	87	11	-	-
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	5.2	6.1	-	-
Resistivity*	0.5	ohm.m	110	940	-	-
Sulphate (as SO4)	30	mg/kg	82	< 30	-	-
Exchangeable Sodium Percentage (ESP)	0.1	%	21	2.0	-	-
Magnesium (exchangeable)	0.1	meq/100g	9.2	3.2	-	-
Potassium (exchangeable)	0.1	meq/100g	0.6	0.2	-	-
Sodium (exchangeable)	0.1	meq/100g	2.8	0.2	-	-
% Moisture	1	%	18	11	12	11
Heavy Metals						
Arsenic	2	mg/kg	-	-	40	19
Cadmium	0.4	mg/kg	-	-	< 0.4	< 0.4
Chromium	5	mg/kg	-	-	11	17
Copper	5	mg/kg	-	-	28	18
Lead	5	mg/kg	-	-	33	23
Mercury	0.1	mg/kg	-	-	< 0.1	< 0.1
Nickel	5	mg/kg	-	-	17	9.0
Zinc	5	mg/kg	-	-	77	25
Cation Exchange Capacity						
Calcium (exchangeable)	0.1	meq/100g	1.0	5.3	-	-
Cation Exchange Capacity	0.05	meq/100g	14	8.8	-	-

Client Sample ID			TP19 0.2-0.3	TP21 0.2-0.3	TP23 0.2-0.3	TP24 0.1-0.2
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-No24389	S18-No24390	S18-No24391	S18-No24392
Date Sampled			Nov 16, 2018	Nov 16, 2018	Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	54	56	112	53
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Chloride	5	mg/kg	-	-	-	100
Conductivity (1:5 aqueous extract at 25°C as rec.)	10	uS/cm	-	-	-	110
pH (1:5 Aqueous extract at 25°C as rec.)	0.1	pH Units	-	-	-	5.4
Resistivity*	0.5	ohm.m	-	-	-	93
Sulphate (as SO4)	30	mg/kg	-	-	-	52
Exchangeable Sodium Percentage (ESP)	0.1	%	-	-	-	5.8
Magnesium (exchangeable)	0.1	meq/100g	-	-	-	7.1
Potassium (exchangeable)	0.1	meq/100g	-	-	-	0.3
Sodium (exchangeable)	0.1	meq/100g	-	-	-	1.0
% Moisture	1	%	15	19	6.9	14
Heavy Metals						
Arsenic	2	mg/kg	28	12	13	19
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	31	9.2	17	15
Copper	5	mg/kg	25	33	9.4	34
Lead	5	mg/kg	31	13	19	17
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	12	11	< 5	9.2
Zinc	5	mg/kg	37	67	11	66
Cation Exchange Capacity						
Calcium (exchangeable)	0.1	meq/100g	-	-	-	8.2
Cation Exchange Capacity	0.05	meq/100g	-	-	-	16

Client Sample ID			FD01	FD02
Sample Matrix			Soil	Soil
Eurofins | mgt Sample No.			S18-No24405	S18-No24406
Date Sampled			Nov 16, 2018	Nov 16, 2018
Test/Reference	LOR	Unit		
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				
TRH C6-C9	20	mg/kg	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50
BTEX				
Benzene	0.1	mg/kg	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	72	74
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100
% Moisture	1	%	8.9	9.8
Heavy Metals				
Arsenic	2	mg/kg	4.2	7.6
Cadmium	0.4	mg/kg	< 0.4	< 0.4
Chromium	5	mg/kg	17	7.8
Copper	5	mg/kg	27	12
Lead	5	mg/kg	43	22
Mercury	0.1	mg/kg	< 0.1	< 0.1
Nickel	5	mg/kg	8.8	5.5
Zinc	5	mg/kg	140	35

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B6			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Nov 23, 2018	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Nov 23, 2018	14 Day
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 23, 2018	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Nov 23, 2018	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Metals M8	Melbourne	Nov 23, 2018	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins | mgt Suite B7			
Polycyclic Aromatic Hydrocarbons	Melbourne	Nov 23, 2018	14 Day
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Eurofins | mgt Suite B15			
Organochlorine Pesticides	Melbourne	Nov 23, 2018	14 Day
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Organophosphorus Pesticides	Melbourne	Nov 23, 2018	14 Day
- Method: LTM-ORG-2200 Organophosphorus Pesticides by GC-MS			
Polychlorinated Biphenyls	Melbourne	Nov 23, 2018	28 Days
- Method: LTM-ORG-2220 OCP & PCB in Soil and Water			
Chloride	Melbourne	Nov 23, 2018	28 Day
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
pH (1:5 Aqueous extract at 25°C as rec.)	Melbourne	Nov 23, 2018	7 Day
- Method: LTM-GEN-7090 pH in soil by ISE			
Sulphate (as SO4)	Melbourne	Nov 23, 2018	28 Day
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Conductivity (1:5 aqueous extract at 25°C as rec.)	Melbourne	Nov 23, 2018	7 Day
- Method: LTM-INO-4030 Conductivity			
Magnesium (exchangeable)	Melbourne	Nov 24, 2018	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity and ESP			
Potassium (exchangeable)	Melbourne	Nov 24, 2018	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity and ESP			
Sodium (exchangeable)	Melbourne	Nov 24, 2018	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity and ESP			
Cation Exchange Capacity	Melbourne	Nov 24, 2018	180 Days
- Method: LTM-MET-3060 Cation Exchange Capacity by bases & Exchangeable Sodium Percentage			
Exchangeable Sodium Percentage (ESP)	Melbourne	Nov 24, 2018	28 Day
- Method: LTM-MET-3060 - Cation Exchange Capacity (CEC) & Exchangeable Sodium Percentage (ESP)			
% Moisture	Melbourne	Nov 19, 2018	14 Day
- Method: LTM-GEN-7080 Moisture			

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Organochlorine Pesticides							
Chlordanes - Total	mg/kg	< 0.1			0.1	Pass	
4.4'-DDD	mg/kg	< 0.05			0.05	Pass	
4.4'-DDE	mg/kg	< 0.05			0.05	Pass	
4.4'-DDT	mg/kg	< 0.05			0.05	Pass	
a-BHC	mg/kg	< 0.05			0.05	Pass	
Aldrin	mg/kg	< 0.05			0.05	Pass	
b-BHC	mg/kg	< 0.05			0.05	Pass	
d-BHC	mg/kg	< 0.05			0.05	Pass	
Dieldrin	mg/kg	< 0.05			0.05	Pass	
Endosulfan I	mg/kg	< 0.05			0.05	Pass	
Endosulfan II	mg/kg	< 0.05			0.05	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Endosulfan sulphate	mg/kg	< 0.05			0.05	Pass	
Endrin	mg/kg	< 0.05			0.05	Pass	
Endrin aldehyde	mg/kg	< 0.05			0.05	Pass	
Endrin ketone	mg/kg	< 0.05			0.05	Pass	
g-BHC (Lindane)	mg/kg	< 0.05			0.05	Pass	
Heptachlor	mg/kg	< 0.05			0.05	Pass	
Heptachlor epoxide	mg/kg	< 0.05			0.05	Pass	
Hexachlorobenzene	mg/kg	< 0.05			0.05	Pass	
Methoxychlor	mg/kg	< 0.05			0.05	Pass	
Toxaphene	mg/kg	< 1			1	Pass	
Method Blank							
Organophosphorus Pesticides							
Azinphos-methyl	mg/kg	< 0.2			0.2	Pass	
Bolstar	mg/kg	< 0.2			0.2	Pass	
Chlorfenvinphos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos	mg/kg	< 0.2			0.2	Pass	
Chlorpyrifos-methyl	mg/kg	< 0.2			0.2	Pass	
Coumaphos	mg/kg	< 2			2	Pass	
Demeton-S	mg/kg	< 0.2			0.2	Pass	
Demeton-O	mg/kg	< 0.2			0.2	Pass	
Diazinon	mg/kg	< 0.2			0.2	Pass	
Dichlorvos	mg/kg	< 0.2			0.2	Pass	
Dimethoate	mg/kg	< 0.2			0.2	Pass	
Disulfoton	mg/kg	< 0.2			0.2	Pass	
EPN	mg/kg	< 0.2			0.2	Pass	
Ethion	mg/kg	< 0.2			0.2	Pass	
Ethoprop	mg/kg	< 0.2			0.2	Pass	
Ethyl parathion	mg/kg	< 0.2			0.2	Pass	
Fenitrothion	mg/kg	< 0.2			0.2	Pass	
Fensulfothion	mg/kg	< 0.2			0.2	Pass	
Fenthion	mg/kg	< 0.2			0.2	Pass	
Malathion	mg/kg	< 0.2			0.2	Pass	
Merphos	mg/kg	< 0.2			0.2	Pass	
Methyl parathion	mg/kg	< 0.2			0.2	Pass	
Mevinphos	mg/kg	< 0.2			0.2	Pass	
Monocrotophos	mg/kg	< 2			2	Pass	
Naled	mg/kg	< 0.2			0.2	Pass	
Omethoate	mg/kg	< 2			2	Pass	
Phorate	mg/kg	< 0.2			0.2	Pass	
Pirimiphos-methyl	mg/kg	< 0.2			0.2	Pass	
Pyrazophos	mg/kg	< 0.2			0.2	Pass	
Ronnel	mg/kg	< 0.2			0.2	Pass	
Terbufos	mg/kg	< 0.2			0.2	Pass	
Tetrachlorvinphos	mg/kg	< 0.2			0.2	Pass	
Tokuthion	mg/kg	< 0.2			0.2	Pass	
Trichloronate	mg/kg	< 0.2			0.2	Pass	
Method Blank							
Polychlorinated Biphenyls							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB*	mg/kg	< 0.1			0.1	Pass	
Method Blank							
Exchangeable Sodium Percentage (ESP)	%	< 0.1			0.1	Pass	
Magnesium (exchangeable)	meq/100g	< 0.1			0.1	Pass	
Potassium (exchangeable)	meq/100g	< 0.1			0.1	Pass	
Sodium (exchangeable)	meq/100g	< 0.1			0.1	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Cation Exchange Capacity							
Calcium (exchangeable)	meq/100g	< 0.1			0.1	Pass	
Cation Exchange Capacity	meq/100g	< 0.05			0.05	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	84			70-130	Pass	
TRH C10-C14	%	83			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	87			70-130	Pass	
Toluene	%	84			70-130	Pass	
Ethylbenzene	%	81			70-130	Pass	
m&p-Xylenes	%	78			70-130	Pass	
Xylenes - Total	%	79			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	99			70-130	Pass	
TRH C6-C10	%	79			70-130	Pass	
TRH >C10-C16	%	83			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	89			70-130	Pass	
Acenaphthylene	%	90			70-130	Pass	
Anthracene	%	77			70-130	Pass	
Benz(a)anthracene	%	120			70-130	Pass	
Benzo(a)pyrene	%	92			70-130	Pass	
Benzo(b&j)fluoranthene	%	95			70-130	Pass	
Benzo(g.h.i)perylene	%	80			70-130	Pass	
Benzo(k)fluoranthene	%	108			70-130	Pass	
Chrysene	%	111			70-130	Pass	
Dibenz(a.h)anthracene	%	94			70-130	Pass	
Fluoranthene	%	97			70-130	Pass	
Fluorene	%	89			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	77			70-130	Pass	
Naphthalene	%	98			70-130	Pass	
Phenanthrene	%	77			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Pyrene	%	97			70-130	Pass	
LCS - % Recovery							
Organochlorine Pesticides							
4.4'-DDD	%	79			70-130	Pass	
4.4'-DDE	%	99			70-130	Pass	
4.4'-DDT	%	88			70-130	Pass	
a-BHC	%	92			70-130	Pass	
Aldrin	%	90			70-130	Pass	
b-BHC	%	88			70-130	Pass	
d-BHC	%	86			70-130	Pass	
Dieldrin	%	107			70-130	Pass	
Endosulfan I	%	103			70-130	Pass	
Endosulfan II	%	98			70-130	Pass	
Endosulfan sulphate	%	98			70-130	Pass	
Endrin	%	115			70-130	Pass	
Endrin aldehyde	%	95			70-130	Pass	
Endrin ketone	%	95			70-130	Pass	
g-BHC (Lindane)	%	92			70-130	Pass	
Heptachlor	%	85			70-130	Pass	
Heptachlor epoxide	%	104			70-130	Pass	
Hexachlorobenzene	%	81			70-130	Pass	
Methoxychlor	%	75			70-130	Pass	
LCS - % Recovery							
Organophosphorus Pesticides							
Diazinon	%	72			70-130	Pass	
Dimethoate	%	71			70-130	Pass	
Ethion	%	99			70-130	Pass	
Fenitrothion	%	79			70-130	Pass	
Methyl parathion	%	74			70-130	Pass	
Mevinphos	%	71			70-130	Pass	
LCS - % Recovery							
Polychlorinated Biphenyls							
Aroclor-1260	%	82			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	105			80-120	Pass	
Cadmium	%	103			80-120	Pass	
Chromium	%	109			80-120	Pass	
Copper	%	112			80-120	Pass	
Lead	%	106			80-120	Pass	
Mercury	%	87			75-125	Pass	
Nickel	%	109			80-120	Pass	
Zinc	%	104			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M18-No26616	NCP	%	94			70-130	Pass	
Acenaphthylene	M18-No26616	NCP	%	99			70-130	Pass	
Anthracene	M18-No26616	NCP	%	90			70-130	Pass	
Benz(a)anthracene	M18-No26616	NCP	%	100			70-130	Pass	
Benzo(a)pyrene	M18-No26616	NCP	%	88			70-130	Pass	
Benzo(b&j)fluoranthene	M18-No26616	NCP	%	75			70-130	Pass	
Benzo(g.h.i)perylene	M18-No26616	NCP	%	83			70-130	Pass	
Benzo(k)fluoranthene	M18-No26616	NCP	%	88			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Chrysene	M18-No26616	NCP	%	103			70-130	Pass	
Dibenz(a.h)anthracene	M18-No26616	NCP	%	80			70-130	Pass	
Fluoranthene	M18-No26616	NCP	%	87			70-130	Pass	
Fluorene	M18-No26616	NCP	%	100			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M18-No26616	NCP	%	71			70-130	Pass	
Naphthalene	M18-No26616	NCP	%	100			70-130	Pass	
Phenanthrene	M18-No26616	NCP	%	88			70-130	Pass	
Pyrene	M18-No26616	NCP	%	89			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S18-No24370	CP	%	86			70-130	Pass	
TRH C10-C14	S18-No24370	CP	%	74			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S18-No24370	CP	%	79			70-130	Pass	
Toluene	S18-No24370	CP	%	79			70-130	Pass	
Ethylbenzene	S18-No24370	CP	%	79			70-130	Pass	
m&p-Xylenes	S18-No24370	CP	%	77			70-130	Pass	
o-Xylene	S18-No24370	CP	%	78			70-130	Pass	
Xylenes - Total	S18-No24370	CP	%	77			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S18-No24370	CP	%	97			70-130	Pass	
TRH C6-C10	S18-No24370	CP	%	82			70-130	Pass	
TRH >C10-C16	S18-No24370	CP	%	72			70-130	Pass	
Spike - % Recovery									
Organochlorine Pesticides				Result 1					
4.4'-DDD	M18-No22489	NCP	%	128			70-130	Pass	
4.4'-DDE	M18-No22489	NCP	%	128			70-130	Pass	
4.4'-DDT	M18-No22489	NCP	%	106			70-130	Pass	
a-BHC	M18-No22489	NCP	%	77			70-130	Pass	
Aldrin	M18-No22489	NCP	%	98			70-130	Pass	
b-BHC	M18-No22489	NCP	%	102			70-130	Pass	
d-BHC	M18-No22489	NCP	%	96			70-130	Pass	
Dieldrin	M18-No22489	NCP	%	96			70-130	Pass	
Endosulfan I	M18-No22489	NCP	%	99			70-130	Pass	
Endosulfan II	M18-No22489	NCP	%	82			70-130	Pass	
Endosulfan sulphate	M18-No22489	NCP	%	88			70-130	Pass	
Endrin	M18-No22489	NCP	%	104			70-130	Pass	
Endrin aldehyde	M18-No22489	NCP	%	83			70-130	Pass	
Endrin ketone	M18-No22489	NCP	%	101			70-130	Pass	
g-BHC (Lindane)	M18-No22489	NCP	%	87			70-130	Pass	
Heptachlor	M18-No22489	NCP	%	98			70-130	Pass	
Heptachlor epoxide	M18-No22489	NCP	%	96			70-130	Pass	
Hexachlorobenzene	M18-No22489	NCP	%	85			70-130	Pass	
Methoxychlor	M18-No22489	NCP	%	117			70-130	Pass	
Spike - % Recovery									
Organophosphorus Pesticides				Result 1					
Diazinon	M18-No28383	NCP	%	95			70-130	Pass	
Dimethoate	M18-No28383	NCP	%	78			70-130	Pass	
Ethion	M18-No28383	NCP	%	122			70-130	Pass	
Fenitrothion	M18-No28383	NCP	%	79			70-130	Pass	
Methyl parathion	M18-No28383	NCP	%	72			70-130	Pass	
Mevinphos	M18-No28383	NCP	%	88			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Polychlorinated Biphenyls				Result 1					
Aroclor-1260	M18-No30380	NCP	%	100			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S18-No24370	CP	%	105			75-125	Pass	
Cadmium	S18-No24370	CP	%	108			75-125	Pass	
Chromium	S18-No24370	CP	%	109			75-125	Pass	
Copper	S18-No24370	CP	%	122			75-125	Pass	
Lead	S18-No24370	CP	%	104			75-125	Pass	
Mercury	S18-No24370	CP	%	89			70-130	Pass	
Nickel	S18-No24370	CP	%	121			75-125	Pass	
Zinc	S18-No24370	CP	%	121			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S18-No24381	CP	%	119			70-130	Pass	
TRH C10-C14	S18-No24381	CP	%	70			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S18-No24381	CP	%	85			70-130	Pass	
Toluene	S18-No24381	CP	%	90			70-130	Pass	
Ethylbenzene	S18-No24381	CP	%	100			70-130	Pass	
m&p-Xylenes	S18-No24381	CP	%	96			70-130	Pass	
o-Xylene	S18-No24381	CP	%	98			70-130	Pass	
Xylenes - Total	S18-No24381	CP	%	97			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S18-No24381	CP	%	80			70-130	Pass	
TRH C6-C10	S18-No24381	CP	%	106			70-130	Pass	
TRH >C10-C16	S18-No24381	CP	%	78			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S18-No24381	CP	%	114			75-125	Pass	
Cadmium	S18-No24381	CP	%	103			75-125	Pass	
Chromium	S18-No24381	CP	%	124			75-125	Pass	
Copper	S18-No24381	CP	%	135			75-125	Fail	Q08
Lead	S18-No24381	CP	%	113			75-125	Pass	
Nickel	S18-No24381	CP	%	123			75-125	Pass	
Zinc	S18-No24381	CP	%	148			75-125	Fail	Q08
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S18-No24393	CP	%	95			70-130	Pass	
TRH C10-C14	S18-No24393	CP	%	82			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S18-No24393	CP	%	86			70-130	Pass	
Toluene	S18-No24393	CP	%	84			70-130	Pass	
Ethylbenzene	S18-No24393	CP	%	86			70-130	Pass	
m&p-Xylenes	S18-No24393	CP	%	83			70-130	Pass	
o-Xylene	S18-No24393	CP	%	84			70-130	Pass	
Xylenes - Total	S18-No24393	CP	%	84			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S18-No24393	CP	%	98			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C6-C10	S18-No24393	CP	%	90			70-130	Pass	
TRH >C10-C16	S18-No24393	CP	%	79			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S18-No24393	CP	%	106			75-125	Pass	
Cadmium	S18-No24393	CP	%	102			75-125	Pass	
Chromium	S18-No24393	CP	%	104			75-125	Pass	
Copper	S18-No24393	CP	%	110			75-125	Pass	
Lead	S18-No24393	CP	%	92			75-125	Pass	
Mercury	S18-No24393	CP	%	84			70-130	Pass	
Nickel	S18-No24393	CP	%	108			75-125	Pass	
Zinc	S18-No24393	CP	%	121			75-125	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S18-No24403	CP	%	109			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S18-No24403	CP	%	97			70-130	Pass	
Toluene	S18-No24403	CP	%	113			70-130	Pass	
Ethylbenzene	S18-No24403	CP	%	123			70-130	Pass	
m&p-Xylenes	S18-No24403	CP	%	125			70-130	Pass	
o-Xylene	S18-No24403	CP	%	123			70-130	Pass	
Xylenes - Total	S18-No24403	CP	%	124			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S18-No24403	CP	%	70			70-130	Pass	
TRH C6-C10	S18-No24403	CP	%	106			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S18-No24369	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S18-No24369	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S18-No24369	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S18-No24369	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S18-No24369	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S18-No24369	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S18-No24369	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S18-No24369	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S18-No24369	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S18-No24369	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S18-No24369	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S18-No24369	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S18-No24369	CP	mg/kg	< 100	< 100	<1	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S18-No24369	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S18-No24369	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Methyl parathion	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S18-No24369	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S18-No24369	CP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S18-No24369	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S18-No24369	CP	%	7.8	8.5	8.0	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-No24369	CP	mg/kg	12	12	<1	30%	Pass	
Cadmium	S18-No24369	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-No24369	CP	mg/kg	18	15	18	30%	Pass	
Copper	S18-No24369	CP	mg/kg	11	13	15	30%	Pass	
Lead	S18-No24369	CP	mg/kg	27	28	4.0	30%	Pass	
Mercury	S18-No24369	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-No24369	CP	mg/kg	7.2	7.0	3.0	30%	Pass	
Zinc	S18-No24369	CP	mg/kg	31	36	13	30%	Pass	
Duplicate									
Organochlorine Pesticides				Result 1	Result 2	RPD			
Chlordanes - Total	M18-No25615	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
4.4'-DDD	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDE	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
4.4'-DDT	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
a-BHC	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Aldrin	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
b-BHC	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
d-BHC	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Dieldrin	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan I	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan II	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endosulfan sulphate	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin aldehyde	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Endrin ketone	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
g-BHC (Lindane)	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Heptachlor epoxide	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Hexachlorobenzene	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Methoxychlor	M18-No25615	NCP	mg/kg	< 0.05	< 0.05	<1	30%	Pass	
Toxaphene	M18-No25615	NCP	mg/kg	< 1	< 1	<1	30%	Pass	
Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Azinphos-methyl	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Bolstar	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorfenvinphos	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Chlorpyrifos-methyl	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Coumaphos	S18-No24710	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Demeton-S	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Demeton-O	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Diazinon	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dichlorvos	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Dimethoate	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Disulfoton	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
EPN	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethion	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethoprop	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ethyl parathion	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenitrothion	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fensulfothion	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Fenthion	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Malathion	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Merphos	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	

Duplicate									
Organophosphorus Pesticides				Result 1	Result 2	RPD			
Methyl parathion	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Mevinphos	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Monocrotophos	S18-No24710	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Naled	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Omethoate	S18-No24710	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Phorate	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pirimiphos-methyl	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Pyrazophos	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Ronnel	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Terbufos	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tetrachlorvinphos	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Tokuthion	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Trichloronate	S18-No24710	NCP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
Duplicate									
Polychlorinated Biphenyls				Result 1	Result 2	RPD			
Aroclor-1016	M18-No25615	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1221	M18-No25615	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1232	M18-No25615	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1242	M18-No25615	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1248	M18-No25615	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1254	M18-No25615	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Aroclor-1260	M18-No25615	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Total PCB*	M18-No25615	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-No24370	CP	mg/kg	14	15	4.0	30%	Pass	
Cadmium	S18-No24370	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-No24370	CP	mg/kg	12	12	2.0	30%	Pass	
Copper	S18-No24370	CP	mg/kg	11	11	2.0	30%	Pass	
Lead	S18-No24370	CP	mg/kg	18	19	3.0	30%	Pass	
Mercury	S18-No24370	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-No24370	CP	mg/kg	5.9	6.1	4.0	30%	Pass	
Zinc	S18-No24370	CP	mg/kg	25	27	6.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M18-No26700	NCP	mg/kg	14	13	12	30%	Pass	
Sulphate (as SO4)	M18-No26700	NCP	mg/kg	140	130	3.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S18-No24379	CP	%	9.7	9.6	1.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S18-No24380	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S18-No24380	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S18-No24380	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S18-No24380	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S18-No24380	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S18-No24380	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S18-No24380	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S18-No24380	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S18-No24380	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S18-No24380	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S18-No24380	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S18-No24380	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S18-No24380	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S18-No24380	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S18-No24380	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-No24380	CP	mg/kg	10	10	2.0	30%	Pass	
Cadmium	S18-No24380	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-No24380	CP	mg/kg	13	11	15	30%	Pass	
Copper	S18-No24380	CP	mg/kg	16	13	17	30%	Pass	
Lead	S18-No24380	CP	mg/kg	31	26	18	30%	Pass	
Mercury	S18-No24380	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-No24380	CP	mg/kg	7.1	7.0	2.0	30%	Pass	
Zinc	S18-No24380	CP	mg/kg	43	37	17	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-No24381	CP	mg/kg	4.5	4.4	2.0	30%	Pass	
Cadmium	S18-No24381	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-No24381	CP	mg/kg	15	14	<1	30%	Pass	
Copper	S18-No24381	CP	mg/kg	17	17	1.0	30%	Pass	
Lead	S18-No24381	CP	mg/kg	36	36	1.0	30%	Pass	
Mercury	S18-No24381	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-No24381	CP	mg/kg	9.4	9.2	2.0	30%	Pass	
Zinc	S18-No24381	CP	mg/kg	99	100	2.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S18-No24389	CP	%	15	16	4.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S18-No24392	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	S18-No24392	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	S18-No24392	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH C29-C36	S18-No24392	CP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S18-No24392	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S18-No24392	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S18-No24392	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S18-No24392	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S18-No24392	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S18-No24392	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S18-No24392	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S18-No24392	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	S18-No24392	CP	mg/kg	< 50	< 50	<1	30%	Pass	
TRH >C16-C34	S18-No24392	CP	mg/kg	< 100	< 100	<1	30%	Pass	
TRH >C34-C40	S18-No24392	CP	mg/kg	< 100	< 100	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-No24392	CP	mg/kg	19	18	3.0	30%	Pass	
Cadmium	S18-No24392	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-No24392	CP	mg/kg	15	13	11	30%	Pass	
Copper	S18-No24392	CP	mg/kg	34	31	7.0	30%	Pass	
Lead	S18-No24392	CP	mg/kg	17	16	5.0	30%	Pass	
Mercury	S18-No24392	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-No24392	CP	mg/kg	9.2	8.6	7.0	30%	Pass	
Zinc	S18-No24392	CP	mg/kg	66	61	7.0	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-No24393	CP	mg/kg	10	10	<1	30%	Pass	
Cadmium	S18-No24393	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-No24393	CP	mg/kg	13	13	1.0	30%	Pass	
Copper	S18-No24393	CP	mg/kg	14	14	<1	30%	Pass	
Lead	S18-No24393	CP	mg/kg	47	47	1.0	30%	Pass	
Mercury	S18-No24393	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-No24393	CP	mg/kg	5.7	5.7	<1	30%	Pass	
Zinc	S18-No24393	CP	mg/kg	48	48	1.0	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S18-No24399	CP	%	15	14	6.0	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S18-No24402	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S18-No24402	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S18-No24402	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S18-No24402	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S18-No24402	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S18-No24402	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S18-No24402	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	
Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S18-No24402	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S18-No24402	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-No24402	CP	mg/kg	18	18	1.0	30%	Pass	
Cadmium	S18-No24402	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-No24402	CP	mg/kg	24	23	2.0	30%	Pass	
Copper	S18-No24402	CP	mg/kg	22	21	2.0	30%	Pass	
Lead	S18-No24402	CP	mg/kg	22	21	2.0	30%	Pass	
Mercury	S18-No24402	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-No24402	CP	mg/kg	17	16	2.0	30%	Pass	
Zinc	S18-No24402	CP	mg/kg	39	40	2.0	30%	Pass	

Comments

This report has been revised (V2) to exclude samples S18-No24393 - S18-No24404 as per client's request.

Eurofins | mgt accreditation number 1261, corporate site 1254 and 14271 is currently in progress of a controlled transition to a new custom built location at 6 Monterey Road, Dandenong South, Victoria 3175. All results on this report denoted as being performed by Eurofins | mgt 2-5 Kingston Town Close, Oakleigh Victoria 3166 corporate site 1254, will have been performed on either Oakleigh or new Dandenong South site.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

Nibha Vaidya	Analytical Services Manager
Chris Bennett	Senior Analyst-Metal (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Joseph Edouard	Senior Analyst-Organic (VIC)
Julie Kay	Senior Analyst-Inorganic (VIC)
Nibha Vaidya	Senior Analyst-Asbestos (NSW)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Certificate of Analysis

Greencap NSW P/L
Level 2/11 Khartoum Road
North Ryde
NSW 2113

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025–Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention:	Matthew Barberson
Report	628453-V2-AID
Project Name	DSI - SCHOFIELDS
Project ID	J157372
Received Date	Nov 19, 2018
Date Reported	Nov 27, 2018

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence NATA Accreditation does not cover the performance of this service (non-NATA results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name DSI - SCHOFIELDS
Project ID J157372
Date Sampled Nov 16, 2018
Report 628453-V2-AID

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP1 0.1-0.2	18-No24369	Nov 16, 2018	Approximate Sample 72g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP3 0.1-0.2	18-No24372	Nov 16, 2018	Approximate Sample 69g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP5 0.1-0.2	18-No24374	Nov 16, 2018	Approximate Sample 81g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP6 0.0-0.2	18-No24375	Nov 16, 2018	Approximate Sample 61g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP9 0.1-0.3	18-No24378	Nov 16, 2018	Approximate Sample 56g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP10 0.2-0.3	18-No24379	Nov 16, 2018	Approximate Sample 66g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP12 0.3-0.5	18-No24381	Nov 16, 2018	Approximate Sample 88g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.
TP15 0.1-0.2	18-No24384	Nov 16, 2018	Approximate Sample 60g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.

Client Sample ID	Eurofins | mgt Sample No.	Date Sampled	Sample Description	Result
TP23 0.2-0.3	18-No24391	Nov 16, 2018	Approximate Sample 62g Sample consisted of: Brown coarse-grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No respirable fibres detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Sydney	Nov 19, 2018	Indefinite

Internal Quality Control Review and Glossary

General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Advice.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

Terms

Dry	Sample is dried by heating prior to analysis
LOR	Limit of Reporting
COC	Chain of Custody
SRA	Sample Receipt Advice
ISO	International Standards Organisation
AS	Australian Standards
WA DOH	Reference document for the NEPM. Government of Western Australia, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
NEPM	National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended)
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded and/or sound condition. For the purposes of the NEPM, ACM is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
AF	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm x 7mm sieve. Considered under the NEPM as equivalent to “non-bonded / friable”.
FA	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEPM, FA is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory’s remit to assess degree of friability.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres in the matrix.

Greencap NSW P/L
Level 2/11 Khartoum Road
North Ryde
NSW 2113

NATA Accredited
Accreditation Number 1261
Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: **Matthew Barberson**

Report **632214-S**
Project name
Project ID J157372
Received Date Dec 10, 2018

Client Sample ID			**TP25A**	**TP26A**	**TP27A**	**TP28A**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-De12277**	**S18-De12278**	**S18-De12279**	**S18-De12280**
Date Sampled			**Dec 10, 2018**	**Dec 10, 2018**	**Dec 10, 2018**	**Dec 10, 2018**
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	105	98	91	97
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene TEQ (lower bound) *	0.5	mg/kg	-	-	-	< 0.5
Benzo(a)pyrene TEQ (medium bound) *	0.5	mg/kg	-	-	-	0.6
Benzo(a)pyrene TEQ (upper bound) *	0.5	mg/kg	-	-	-	1.2
Acenaphthene	0.5	mg/kg	-	-	-	< 0.5
Acenaphthylene	0.5	mg/kg	-	-	-	< 0.5
Anthracene	0.5	mg/kg	-	-	-	< 0.5
Benz(a)anthracene	0.5	mg/kg	-	-	-	< 0.5
Benzo(a)pyrene	0.5	mg/kg	-	-	-	< 0.5
Benzo(b&j)fluoranthene[N07]	0.5	mg/kg	-	-	-	< 0.5
Benzo(g.h.i)perylene	0.5	mg/kg	-	-	-	< 0.5
Benzo(k)fluoranthene	0.5	mg/kg	-	-	-	< 0.5
Chrysene	0.5	mg/kg	-	-	-	< 0.5

Client Sample ID			TP25A	TP26A	TP27A	TP28A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De12277	S18-De12278	S18-De12279	S18-De12280
Date Sampled			Dec 10, 2018	Dec 10, 2018	Dec 10, 2018	Dec 10, 2018
Test/Reference	LOR	Unit				
Polycyclic Aromatic Hydrocarbons						
Dibenz(a.h)anthracene	0.5	mg/kg	-	-	-	< 0.5
Fluoranthene	0.5	mg/kg	-	-	-	< 0.5
Fluorene	0.5	mg/kg	-	-	-	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	-	-	-	< 0.5
Naphthalene	0.5	mg/kg	-	-	-	< 0.5
Phenanthrene	0.5	mg/kg	-	-	-	< 0.5
Pyrene	0.5	mg/kg	-	-	-	< 0.5
Total PAH*	0.5	mg/kg	-	-	-	< 0.5
2-Fluorobiphenyl (surr.)	1	%	-	-	-	76
p-Terphenyl-d14 (surr.)	1	%	-	-	-	73
% Moisture	1	%	8.2	7.8	9.7	8.6
Heavy Metals						
Arsenic	2	mg/kg	7.6	9.7	14	28
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	10	11	19	9.0
Copper	5	mg/kg	14	16	17	22
Lead	5	mg/kg	22	21	19	22
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	8.1	9.1	9.6	23
Zinc	5	mg/kg	49	180	87	74

Client Sample ID			TP29A	TP30A	TP31A	TP32A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De12281	S18-De12282	S18-De12283	S18-De12284
Date Sampled			Dec 10, 2018	Dec 10, 2018	Dec 10, 2018	Dec 10, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	< 50	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	< 50	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	70	53	67	68
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100

Client Sample ID			TP29A	TP30A	TP31A	TP32A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De12281	S18-De12282	S18-De12283	S18-De12284
Date Sampled			Dec 10, 2018	Dec 10, 2018	Dec 10, 2018	Dec 10, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
Salinity* (1:5 aqueous extract calc. from EC at 25C)	1	mg/kg	68	-	-	-
% Moisture	1	%	6.4	12	9.4	9.7
Heavy Metals						
Arsenic	2	mg/kg	19	12	20	9.3
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	17	14	18	11
Copper	5	mg/kg	41	27	20	16
Lead	5	mg/kg	22	19	39	21
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	7.9	12	14	12
Zinc	5	mg/kg	41	58	59	51

Client Sample ID			TP33A	TP34A	TP35A	FD1A
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins | mgt Sample No.			S18-De12285	S18-De12286	S18-De12287	S18-De12288
Date Sampled			Dec 10, 2018	Dec 10, 2018	Dec 10, 2018	Dec 10, 2018
Test/Reference	LOR	Unit				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14	20	mg/kg	< 20	< 20	< 20	< 20
TRH C15-C28	50	mg/kg	< 50	< 50	< 50	< 50
TRH C29-C36	50	mg/kg	< 50	< 50	83	< 50
TRH C10-36 (Total)	50	mg/kg	< 50	< 50	83	< 50
BTEX						
Benzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Toluene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
m&p-Xylenes	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
o-Xylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Xylenes - Total	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3
4-Bromofluorobenzene (surr.)	1	%	62	68	75	92
Total Recoverable Hydrocarbons - 2013 NEPM Fractions						
Naphthalene[N02]	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
TRH C6-C10	20	mg/kg	< 20	< 20	< 20	< 20
TRH C6-C10 less BTEX (F1)[N04]	20	mg/kg	< 20	< 20	< 20	< 20
TRH >C10-C16	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C10-C16 less Naphthalene (F2)[N01]	50	mg/kg	< 50	< 50	< 50	< 50
TRH >C16-C34	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C34-C40	100	mg/kg	< 100	< 100	< 100	< 100
TRH >C10-C40 (total)*	100	mg/kg	< 100	< 100	< 100	< 100
% Moisture	1	%	10	12	6.0	6.3

Client Sample ID			TP33A	TP34A	TP35A	FD1A
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins | mgt Sample No.			**S18-De12285**	**S18-De12286**	**S18-De12287**	**S18-De12288**
Date Sampled			**Dec 10, 2018**	**Dec 10, 2018**	**Dec 10, 2018**	**Dec 10, 2018**
Test/Reference	LOR	Unit				
Heavy Metals						
Arsenic	2	mg/kg	8.2	7.7	5.8	13
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	10	12	9.8	13
Copper	5	mg/kg	18	15	13	20
Lead	5	mg/kg	23	23	17	14
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	13	8.6	5.7	6.3
Zinc	5	mg/kg	63	52	32	28

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Eurofins | mgt Suite B6			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Dec 17, 2018	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
BTEX	Melbourne	Dec 17, 2018	14 Day
- Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Dec 17, 2018	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Dec 17, 2018	14 Day
- Method: LTM-ORG-2010 TRH C6-C40			
Metals M8	Melbourne	Dec 17, 2018	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Eurofins | mgt Suite B7			
Polycyclic Aromatic Hydrocarbons	Melbourne	Dec 16, 2018	14 Day
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water			
Salinity* (1:5 aqueous extract calc. from EC at 25C)	Melbourne	Dec 16, 2018	21 Day
- Method: LTM-INO-4030			
% Moisture	Melbourne	Dec 10, 2018	14 Day
- Method: LTM-GEN-7080 Moisture			

ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
2-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Company Name: Greencap NSW P/L
Address: Level 2/11 Khartoum Road
North Ryde
NSW 2113

Project Name:
Project ID: J157372

Order No.:
Report #: 632214
Phone: 02 9889 1800
Fax: 02 9889 1811

Received: Dec 10, 2018 7:39 PM
Due: Dec 17, 2018
Priority: 5 Day
Contact Name: Matthew Barberson

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						HOLD	Salinity* (1:5 aqueous extract calc. from EC at 25C)	Moisture Set	Eurofins | mgt Suite B7	Eurofins | mgt Suite B6
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
External Laboratory										
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**					
1	TP25A	Dec 10, 2018		Soil	S18-De12277			X		X
2	TP26A	Dec 10, 2018		Soil	S18-De12278			X		X
3	TP27A	Dec 10, 2018		Soil	S18-De12279			X		X
4	TP28A	Dec 10, 2018		Soil	S18-De12280			X	X	
5	TP29A	Dec 10, 2018		Soil	S18-De12281		X	X		X
6	TP30A	Dec 10, 2018		Soil	S18-De12282			X		X
7	TP31A	Dec 10, 2018		Soil	S18-De12283			X		X
8	TP32A	Dec 10, 2018		Soil	S18-De12284			X		X
9	TP33A	Dec 10, 2018		Soil	S18-De12285			X		X

ABN– 50 005 085 521
e.mail : EnviroSales@eurofins.com
web : www.eurofins.com.au

Melbourne
2-5 Kingston Town Close
Oakleigh VIC 3166
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
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Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794										
Perth Laboratory - NATA Site # 23736										
10	TP34A	Dec 10, 2018		Soil	S18-De12286			X		X
11	TP35A	Dec 10, 2018		Soil	S18-De12287			X		X
12	FD1A	Dec 10, 2018		Soil	S18-De12288			X		X
13	FD2A	Dec 10, 2018		Soil	S18-De12289	X				
Test Counts						1	1	12	1	11

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	Quality Systems Manual ver 5.1 US Department of Defense
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.1 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	mg/kg	< 20			20	Pass	
TRH C10-C14	mg/kg	< 20			20	Pass	
TRH C15-C28	mg/kg	< 50			50	Pass	
TRH C29-C36	mg/kg	< 50			50	Pass	
Method Blank							
BTEX							
Benzene	mg/kg	< 0.1			0.1	Pass	
Toluene	mg/kg	< 0.1			0.1	Pass	
Ethylbenzene	mg/kg	< 0.1			0.1	Pass	
m&p-Xylenes	mg/kg	< 0.2			0.2	Pass	
o-Xylene	mg/kg	< 0.1			0.1	Pass	
Xylenes - Total	mg/kg	< 0.3			0.3	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/kg	< 0.5			0.5	Pass	
TRH C6-C10	mg/kg	< 20			20	Pass	
TRH >C10-C16	mg/kg	< 50			50	Pass	
TRH >C16-C34	mg/kg	< 100			100	Pass	
TRH >C34-C40	mg/kg	< 100			100	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	mg/kg	< 0.5			0.5	Pass	
Acenaphthylene	mg/kg	< 0.5			0.5	Pass	
Anthracene	mg/kg	< 0.5			0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.5			0.5	Pass	
Chrysene	mg/kg	< 0.5			0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass	
Fluoranthene	mg/kg	< 0.5			0.5	Pass	
Fluorene	mg/kg	< 0.5			0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass	
Naphthalene	mg/kg	< 0.5			0.5	Pass	
Phenanthrene	mg/kg	< 0.5			0.5	Pass	
Pyrene	mg/kg	< 0.5			0.5	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/kg	< 2			2	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Lead	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 5			5	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	116			70-130	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
TRH C10-C14	%	79			70-130	Pass	
LCS - % Recovery							
BTEX							
Benzene	%	105			70-130	Pass	
Toluene	%	114			70-130	Pass	
Ethylbenzene	%	114			70-130	Pass	
m&p-Xylenes	%	110			70-130	Pass	
Xylenes - Total	%	111			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	99			70-130	Pass	
TRH C6-C10	%	110			70-130	Pass	
TRH >C10-C16	%	79			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	%	93			70-130	Pass	
Acenaphthylene	%	106			70-130	Pass	
Anthracene	%	104			70-130	Pass	
Benz(a)anthracene	%	111			70-130	Pass	
Benzo(a)pyrene	%	91			70-130	Pass	
Benzo(b&j)fluoranthene	%	88			70-130	Pass	
Benzo(g.h.i)perylene	%	93			70-130	Pass	
Benzo(k)fluoranthene	%	116			70-130	Pass	
Chrysene	%	107			70-130	Pass	
Dibenz(a.h)anthracene	%	109			70-130	Pass	
Fluoranthene	%	109			70-130	Pass	
Fluorene	%	104			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	100			70-130	Pass	
Naphthalene	%	95			70-130	Pass	
Phenanthrene	%	98			70-130	Pass	
Pyrene	%	105			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Arsenic	%	105			80-120	Pass	
Cadmium	%	101			80-120	Pass	
Chromium	%	119			80-120	Pass	
Copper	%	102			80-120	Pass	
Lead	%	116			80-120	Pass	
Mercury	%	119			75-125	Pass	
Nickel	%	104			80-120	Pass	
Zinc	%	102			80-120	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C10-C14	M18-De15719	NCP	%	101			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
TRH >C10-C16	M18-De15719	NCP	%	102			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1					
TRH C6-C9	S18-De12278	CP	%	102			70-130	Pass	
Spike - % Recovery									
BTEX				Result 1					
Benzene	S18-De12278	CP	%	93			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Toluene	S18-De12278	CP	%	93			70-130	Pass	
Ethylbenzene	S18-De12278	CP	%	108			70-130	Pass	
m&p-Xylenes	S18-De12278	CP	%	111			70-130	Pass	
o-Xylene	S18-De12278	CP	%	110			70-130	Pass	
Xylenes - Total	S18-De12278	CP	%	111			70-130	Pass	
Spike - % Recovery									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1					
Naphthalene	S18-De12278	CP	%	92			70-130	Pass	
TRH C6-C10	S18-De12278	CP	%	98			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S18-De12278	CP	%	110			75-125	Pass	
Cadmium	S18-De12278	CP	%	102			75-125	Pass	
Chromium	S18-De12278	CP	%	117			75-125	Pass	
Copper	S18-De12278	CP	%	102			75-125	Pass	
Lead	S18-De12278	CP	%	116			75-125	Pass	
Mercury	S18-De12278	CP	%	113			70-130	Pass	
Nickel	S18-De12278	CP	%	104			75-125	Pass	
Zinc	S18-De12278	CP	%	80			75-125	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons				Result 1					
Acenaphthene	M18-De15980	NCP	%	94			70-130	Pass	
Acenaphthylene	M18-De15980	NCP	%	100			70-130	Pass	
Anthracene	M18-De15980	NCP	%	101			70-130	Pass	
Benz(a)anthracene	M18-De15980	NCP	%	106			70-130	Pass	
Benzo(a)pyrene	M18-De15980	NCP	%	117			70-130	Pass	
Benzo(b&j)fluoranthene	M18-De15980	NCP	%	109			70-130	Pass	
Benzo(g.h.i)perylene	M18-De15980	NCP	%	80			70-130	Pass	
Benzo(k)fluoranthene	M18-De15980	NCP	%	117			70-130	Pass	
Chrysene	M18-De15980	NCP	%	109			70-130	Pass	
Dibenz(a.h)anthracene	M18-De15980	NCP	%	87			70-130	Pass	
Fluoranthene	M18-De15980	NCP	%	109			70-130	Pass	
Fluorene	M18-De15980	NCP	%	101			70-130	Pass	
Indeno(1.2.3-cd)pyrene	M18-De15980	NCP	%	83			70-130	Pass	
Naphthalene	M18-De15980	NCP	%	93			70-130	Pass	
Phenanthrene	M18-De15980	NCP	%	93			70-130	Pass	
Pyrene	M18-De15980	NCP	%	106			70-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD			
TRH C6-C9	S18-De12277	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C10-C14	M18-De16559	NCP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH C15-C28	M18-De16559	NCP	mg/kg	110	90	16	30%	Pass	
TRH C29-C36	M18-De16559	NCP	mg/kg	190	160	18	30%	Pass	
Duplicate									
BTEX				Result 1	Result 2	RPD			
Benzene	S18-De12277	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Toluene	S18-De12277	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Ethylbenzene	S18-De12277	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
m&p-Xylenes	S18-De12277	CP	mg/kg	< 0.2	< 0.2	<1	30%	Pass	
o-Xylene	S18-De12277	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Xylenes - Total	S18-De12277	CP	mg/kg	< 0.3	< 0.3	<1	30%	Pass	

Duplicate									
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD			
Naphthalene	S18-De12277	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
TRH C6-C10	S18-De12277	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TRH >C10-C16	M18-De16559	NCP	mg/kg	< 50	< 50	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-De12277	CP	mg/kg	7.6	7.3	4.0	30%	Pass	
Cadmium	S18-De12277	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-De12277	CP	mg/kg	10	11	4.0	30%	Pass	
Copper	S18-De12277	CP	mg/kg	14	13	11	30%	Pass	
Lead	S18-De12277	CP	mg/kg	22	20	9.0	30%	Pass	
Mercury	S18-De12277	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-De12277	CP	mg/kg	8.1	7.5	8.0	30%	Pass	
Zinc	S18-De12277	CP	mg/kg	49	44	10	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Arsenic	S18-De12278	CP	mg/kg	9.7	9.9	2.0	30%	Pass	
Cadmium	S18-De12278	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Chromium	S18-De12278	CP	mg/kg	11	11	<1	30%	Pass	
Copper	S18-De12278	CP	mg/kg	16	16	1.0	30%	Pass	
Lead	S18-De12278	CP	mg/kg	21	21	1.0	30%	Pass	
Mercury	S18-De12278	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Nickel	S18-De12278	CP	mg/kg	9.1	9.2	1.0	30%	Pass	
Zinc	S18-De12278	CP	mg/kg	180	180	1.0	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons				Result 1	Result 2	RPD			
Acenaphthene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Acenaphthylene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Anthracene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benz(a)anthracene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(a)pyrene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(b&j)fluoranthene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(g.h.i)perylene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Benzo(k)fluoranthene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Chrysene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Dibenz(a.h)anthracene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluoranthene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Fluorene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Naphthalene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Phenanthrene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Pyrene	S18-De12280	CP	mg/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S18-De12281	CP	%	6.4	6.4	<1	30%	Pass	

Comments

Eurofins | mgt accreditation number 1261, corporate site 1254 and 14271 is currently in progress of a controlled transition to a new custom built location at 6 Monterey Road, Dandenong South, Victoria 3175. All results on this report denoted as being performed by Eurofins | mgt 2-5 Kingston Town Close, Oakleigh Victoria 3166 corporate site 1254, will have been performed on either Oakleigh or new Dandenong South site.

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised By

Nibha Vaidya	Analytical Services Manager
Joseph Edouard	Senior Analyst-Organic (VIC)
Harry Bacalis	Senior Analyst-Volatile (VIC)
Julie Kay	Senior Analyst-Inorganic (VIC)
Chris Bennett	Senior Analyst-Metal (VIC)

Glenn Jackson

General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

January 2019

GREENCAP
Going Further in Managing Risk

Detailed Site Investigation

Group GSA

Cnr of Farmland Dr & the future realignment of Pelican Rd, Schofields NSW 2762

Appendix G: QA-QC Procedures

Appendix E – QA/QC Procedures

Table of Contents

1 Introduction

The aim of quality control and quality assurance (QA/QC) is to deliver data that is:

- Representative of what is sampled;
- Precise;
- Accurate; and
- Reproducible.

As investigations involve both field and laboratory QA/QC, these are similarly divided. The objective of this document is to evaluate and identify the data quality objectives (DQOs) and the data quality indicators (DQIs), which are used to assess whether the DQOs have been met.

The NSW guideline documents used in the evaluation of the data set for this investigation are:

- NSW Department of Environment and Conservation (DEC) (2006). Contaminated sites: Guidelines for NSW Site Auditors Scheme (2nd edition);
- National Environment Protection Council (NEPC) (2013). National Environment Protection (Assessment of Site Contamination) Amendment Measure;
- NSW Environment Protection Authority (EPA) (1995). Contaminated Sites: Sampling design guidelines; and
- NSW Office of Environment and Heritage (OEH) (2011). Contaminated sites: Guidelines for consultants reporting on contaminated sites.

Data quality is typically discussed in terms of precision, accuracy, representativeness, comparability and completeness. These are referred to as the PARCC parameters. The PARCC (and additional QA) parameters are discussed within this report.

The following items form part of the QA/QC appendix:

- Repeatability;
- Precision;
- Accuracy;
- Representativeness;
- Completeness;
- Comparability;
- Sensitivity;
- Holding times;
- Procedures for anomalous samples and confirmation checking.

Quality Assurance (QA) is "a *set of activities intended to establish confidence that quality requirements will be met*" (AS/NZS ISO 9000:2005).

This encompasses all actions, procedures, checks and decisions undertaken to ensure the accuracy and reliability of analysis results. It includes routine procedures which ensure proper sample control, data transfer, instrument calibration, the decisions required to select and properly train staff, select equipment

and analytical methods, and the day to day judgments resulting from regular scrutiny and maintenance of the laboratory system.

Quality Control (QC) is "*a set of activities intended to ensure that quality requirements are actually being met*" (AS/NZS ISO 9000:2005). In other words, the operational techniques and activities used to fulfill the requirements for quality.

These are the components of QA which serve to monitor and measure the effectiveness of other QA procedures by comparison with previously decided objectives. They include measurement of the quality of reagents, cleanliness of apparatus, accuracy and precision of methods and instrumentation, and reliability of all of these factors as implemented in a given laboratory from day to day.

A complete discussion of either of these terms or the steps for implementing them is beyond the scope of this document. It is widely recognised, however, that adoption of sound laboratory QA and QC procedures is essential and readers are referred to documentation available from the National Association of Testing Authorities (NATA), if further information is required.

2 Data Quality Objectives

The Data Quality Objectives (DQOs) process is a systematic approach used to define the type, quantity and quality of data supporting decisions which relate to the environmental condition of a site. Undertaking DQOs for site assessment and remediation is a requirement of the DEC (2006). *Contaminated sites: Guidelines for NSW Site Auditors Scheme*. The DQO process was formulated by the US EPA and provides sound guidance for a consistent approach to understanding site assessment and remediation.

The DQOs are defined in a series of seven steps, outlined and addressed in Table 1.

Table 1. Data Quality Objectives

Step	Description	Comment
1	**State the problem**	There may be a potential for human health and environmental risk associated with the surface soils at the site.
2	**Identify the decision**	Results of the Detailed Site Investigation (DSI) undertaken, provide sufficient data to inform the decision-making process for further investigations and remedial actions (if required).
3	**Identify the inputs for the decision**	Inputs to the decision will include the scientific data collected during the soil assessment, as part of the DSI. This will include but not be limited to: • Borehole logs and observations made by the field scientist; and • Laboratory analysis results of sampled site soils.
4	**Define the boundaries for the study**	Site boundaries are indicated in Figure 1, Appendix A. The horizontal boundary is limited to the provided site boundary of the proposed development on the site (a primary school). The vertical boundary was limited to the first 1m of the surface soils. The temporal boundary of the project is restricted to the timing of the investigations.
5	**Develop a decision rule**	The following decision rules are identified for the DSI: Chemicals of potential concern do not exist in any of the sampled soil material at concentrations which exceed the adopted site criteria. If systematic or judgmental samples fail these decision rules, then further assessment or remediation will be required.

6	**Specify tolerable limits on decision error**	Potential for decision errors will be minimised through an analysis of a site specific worst case scenario. In this context maximum values and peak concentrations of contaminants will be used for comparison against the acceptance criteria threshold concentrations.
7	**Optimise the design for obtaining data**	The following sampling design has been developed to provide the most resource-effective sampling and analysis: Total area of the open surfaces at the site is approximately 2.5 ha. To comply with the sampling density requirements for systematic assessment provided in NSW EPA (1995) 'Sampling Design Guidelines', a minimum of 35 investigation locations were required for the soil assessment. This sampling density corresponds to 14 points per hectare and is designed to capture a hotspot with a diameter greater than or equal to 31.5 m with 95% confidence.

The following measurement data quality indicators (MDQIs) have been established, based on the DQOs of this investigation, provided in Table 2 below.

Table 2. Measurement Data Quality Indicators (MDQIS)

Parameter	Procedure	Minimum Frequency	Criteria	
			(5 to 10x LOR[4])	>10x LOR
Precision	Field Duplicates	1 in 20 - metals	<80 RPD	<50 RPD
		1 in 20 - semi-volatiles	<100 RPD	<80 RPD
		1 in 20 - volatiles	<150 RPD	<130 RPD
	Lab Replicate*	1 in 20	<50 RPD	<30 RPD
Accuracy*	Reference Material	1 in 10	60% to 140%R	80% to 120%R
	Matrix spikes			
	Surrogate spikes			
Representativeness*	Reagent Blanks	1 per batch	No detection	
	Holding Times*	Every sample	-	
Blanks**	Trip Blank	1 per batch	No detection	
Sensitivity	Limit of Reporting	Every sample	LOR < ½ site criteria	

Notes:

1. RPD – relative percentage difference
2. %R – percent recovery
3. LOR – limit of reporting
4. 4 no limit at <5x LOR
5. * the MDQI is usually specified in the standard method. If not, use the default values set out in this table
6. ** only necessary when measuring dissolved metals and volatile organic compounds in water samples. It is noted that dedicated sampling equipment was utilised, therefore rinsate blanks were not required.

Standards Australia (AS4482.1) specifies that typical MDQIs for precision should be ≤50% RPD, although low concentrations and organic compounds in particular can be acceptably outside this range. The standard stipulates that ≤50% RPD be used as a 'trigger' and values above this level of repeatability must be noted and explained.

3 Quality Control and Quality Assurance

3.1 Measurement Data Quality Objectives

Step 7 of the DQO process is a focus on the quality of the information by measurement, that is, measurement data quality objectives (MDQOs). The aim of a quality control and quality assurance (QA/QC) is to deliver data that is representative of what is sampled, precise, accurate and reproducible. As investigations involve both field and laboratory QA/QC, these are similarly divided. The objective of this section is to provide the MDQOs and the measurement data quality indicators (MDQIs), which will be used to establish whether the DQOs have been met.

All soil sampling procedures need to be undertaken according to a standard procedure, for example those procedures set out in:

- NSW Environment Protection Authority (EPA) (1995). *Contaminated sites: Sampling design guidelines*;
- NSW OEH (2011). *Contaminated sites: Guidelines for consultants reporting on contaminated sites*;
- Standards Australia (2005). *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds, (AS 4482.1)*; and
- Standards Australia (1999). *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 2: Volatile substances, (AS 4482.2*).

The laboratories used should be NATA-accredited for the analytical methods performed. Containers, sample preservation (if necessary) and holding times should be consistent with industry practices as set out in NEPM and as defined by ASTM.

Measurement data quality is typically discussed in terms of precision, accuracy, representativeness, comparability and completeness. Although not necessarily considered in list order, the following items should form part of the QA/QC data evaluation:

- Measured Parameters: precision, accuracy, repeatability (comparability), blanks; and
- Assessed Parameters: completeness, representative of site conditions, sensitivity, and holding times.

These QA parameters and the criteria used to evaluate the analytical data obtained as a result of this investigation, are addressed below.

3.2 Repeatability (Field collected intra-laboratory duplicates)

These samples provide a check on the analytical performance of the laboratory. At least 5 percent of samples (1 in 20) per day of sampling from a site are collected in duplicate. For comparability of data, it is important that there is little delay in the sample submission. For split samples, due to error associated with field splitting, an RPD of between 80 and 150% (depending on the substance) will be allowed as the MDQI.

Any value >50% RPD will be noted and discussed, as per Standards Australia requirements, with respect to its acceptability for inclusion in the data-set.

3.3 Precision

Precision is a measure of the reproducibility of results, and is assessed on the basis of agreement between a set of replicate results obtained from duplicate analyses. The precision of a duplicate determination can be measured as relative percentage difference (RPD), and is calculated from the following equation:

$$RPD = \left| \frac{X1 - X2}{\left(\frac{X1 + X2}{2} \right)} \right| \times 100$$

where: X1 is the first duplicate value
X2 is the second duplicate value

The field duplicate (FD1) and inter lab duplicate (FT1) results and calculated RPDs are presented in the following reports. All results are within the acceptable range, RPD calculations area available in the Attachment (RPD Table) of this report.

3.4 Accuracy

Accuracy is a measure of the agreement between an experimental determination and the true value of the parameter being measured. The determination of accuracy can be achieved through the analysis of known reference materials or assessed by the analysis of matrix spikes. Accuracy is measured in terms of percentage recovery as defined by the following equation:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where: %R = percentage recovery of the spike
SSR = spiked sample result
SR = sample result (native)
SA = spike added

Laboratories calculate percentage recoveries of spiked compounds, which are evaluated against control or acceptance limits taken from the appropriate method or the Contract Laboratory Program Statement of Work. If the spike recovery for a sample does not fall within the prescribed control limits, laboratory based corrective action is required.

Surrogate spikes consist of spiking non-target compounds into the sample prior to analysis. The spiked compounds are expected to behave during analysis in the same way as the target compounds. Every sample is spiked prior to extraction or analysis with surrogate compounds that are representative of the analysis. If surrogate spike recovery does not meet the prescribed control limits, samples should be reanalysed.

Spike recover results and surrogate spike recover results are available in the Laboratory Analysis Reports (Appendix F).

3.5 Representativeness

3.5.1 Data Point Evaluation

Representativeness expresses the degree to which sample data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, or an environmental condition.

Representativeness is primarily dependent on the design and implementation of the sampling program. Representativeness of the data is partially ensured by the avoidance of contamination, adherence to sample handling and analysis protocols, and use of proper chain-of-custody and documentation procedures. Blanks, holding times and field duplicates are all QA parameters that can assist in the analysis of representativeness for data point evaluation and will need to be analysed as part of the measurement data quality assessment.

3.5.2 Data Set Evaluation

Whether the data is representative of the site is checked in part by undertaking an evaluation of the whole data set to establish the data is compatible. Data compatibility is authenticated by confirming that the laws of chemistry are upheld (i.e. nitrate is not present when Eh is -250 mV), that intra-laboratory analysis relationships are consistent (i.e. BTEX is a subset of the TPH C_6-C_9 fraction), that observations and field measurements are in agreement with other field data and the laboratory data and that results are consistent with the geology, history and logic.

3.6 Completeness

The following information is required to check for completeness of data sets:

- chain-of-custody forms (completed by Greencap and the laboratory);
- sample receipt forms;
- all requested sample results reported;
- all blank data reported;
- all laboratory duplicates reported and relative percent differences (RPDs) calculated;
- all surrogate spike data reported;
- all matrix spike data reported; and
- NATA stamp on reports.

3.7 Comparability

Comparability is the evaluation of the similarity of conditions (e.g. sample depth, sample homogeneity, sampling procedures) under which separate sets of data are produced to ensure minimal common error. Data comparability should be demonstrated by the use of standardised sampling and analysis procedures. Data comparability was maintained by undertaking the investigations as follows:

- sampling during the monitoring program was conducted by trained Greencap field team using Greencap's standard operating procedures; and
- the same laboratories (Eurofins and Envirolab) were used for organic and inorganic analysis for all relevant samples using the same NATA approved analytical methods.

3.8 Sensitivity

When interferences are present in the sample, a loss of sensitivity can occur resulting in an increase in the method detection limit. In some instances (e.g. where one or more compounds have particularly high concentrations) the sample must be diluted for analysis. This increases the method detection limit by the dilution factor.

The detection limits achieved by the laboratory, when adjusted for interferences from the presence of other chemicals within the sampled matrix, must be less than half the site criteria for all analytes tested (i.e. 2 x LOR <site criteria).

3.9 Blanks

To meet the QC acceptance criteria, laboratory blanks should have no detectable concentrations of the target compounds.

3.10 Holding Times

Where standard holding times are exceeded, a discussion, using professional judgement, as to the integrity of the data will be required, taking into account such factors as field storage, laboratory storage and even sample jar characteristics.

3.11 Confirmation Checking

For blind duplicates, if one sample has more than two analytes exceeding the data quality objectives, the sample is carefully checked. If the error is not apparent, the sample is rejected. If more than three samples are rejected all the samples collected at that time are rejected. These samples are then re-sampled and reanalysed.

3.12 Field QA/QC

3.12.1 Details of Sampling Team

All fieldwork was conducted by qualified and experienced Greencap scientists trained in hazardous field investigation techniques and health and safety procedures.

3.12.2 Sampling Controls

Soil sampling for chemical analyses and the completion of field documentation entailing sample locations, soil borelogs and general field observations were conducted using Greencap standard operating procedures, and in accordance with the *Sampling Design Guidelines* (NSW EPA, 1995), NEPM (NEPC, 2013), AS4482.1-2005.

Boreholes were advanced by an excavator, allowing for ample collection using a decontaminated trowel. All sampling implements were cleaned between sampling locations, and gloves changed between sampling locations. Once collected, the samples were immediately transferred to laboratory-supplied air-tight sample containers of appropriate composition. These containers were then promptly stored on ice, to prevent the loss of potential volatile components and transported to a NATA accredited laboratory.

Samples were delivered to NATA accredited laboratories (Eurofins and Envirolab) under a completed Chain of Custody (CoC). Copies of the CoC documentation and laboratory analysis reports are provided in Appendix F of the main DSI report.

3.13 Laboratory QA/QC

3.13.1 Holding time

All analysed primary samples were extracted and analysed within acceptable holding times as defined in AS4482.1-2005.

As appropriate sampling procedure was followed and samples were kept refrigerated. No significant degradation to samples has been deemed to have occurred.

3.1 QA/QC Data Evaluation

RPD values for soil samples are tabulated in the attachment section of this report (QA/QC Attachment – RPD Tables). All RPD values for intra- and inter-laboratory samples were within the acceptable criteria defined in Table 2. Data quality objectives for all analysis undertaken on this project are reliable and accurate.

Extraction and analysis of primary samples were within the relevant prescribed holding times. As appropriate sampling procedure was followed and samples were kept refrigerated no significant degradation to samples is thought to have occurred.

The internal laboratory control results (blanks, duplicates and spikes) are considered to be acceptable. All results adhered to chemical laws or were not outside logical explanation. Based on information presented in Section 3 it can be confidently stated that the MDQO's for this project have been met and the data set is considered to be reliable.

4 QAQC Appendix References

- American Public Health Association (APHA) 2005, *Standard methods for the examination of water and waste-water*, 21st edition, APHA, Washington DC.
- Australian and New Zealand Environment and Conservation Council 1992, *Australian and New Zealand Guidelines for the assessment and management of contaminated sites,* Australia and New Zealand Environment Council, National Health and Medical Research Council, Melbourne, Victoria.
- Australian/New Zealand Standard 2008, *Quality management systems - Requirements* (AS/NZS ISO 9001:2008) Standards Australia/Standards New Zealand, Sydney/Wellington.
- International Organisation for Standardisation 2005, *Quality management systems – Fundamentals and vocabulary*, (ISO 9000:2005).Lock, WH 1996, *Composite sampling*, National Environmental Health Forum (NEHF), Adelaide, SA.
- National Environment Protection Council (NEPC) 1999, *National environment protection (assessment of site contamination) measure*, National Environment Protection Council, Adelaide, SA.
- NSW Department of Environment and Conservation (2006), Contaminated sites: Guidelines for NSW Site Auditors Scheme (2nd edition).
- NSW Environment Protection Authority (EPA) 1995, *Contaminated sites: Sampling design guidelines,* EPA NSW, Chatswood, NSW.
- NSW EPA 2011, *Contaminated sites: Guidelines for consultants reporting on contaminated sites,* EPA NSW, Chatswood, NSW.
- Rayment, GE & Higginson, FR 1992, Australian laboratory handbook of soil and water chemical methods, Inkarta Press, Melbourne.

5 QA/QC Attachment – RPD Table

SAMPLE BATCH DATA QA SUMMARY SHEET

Project Name: Detailed Site Assessment	**34-38 Schofields Road, Schofields**	**Project Number:**	**J157372 (J160656)**
Primary Laboratory:	**Eurofins**	**Lab Certificate Number:**	**628453-S & 632214-S**
Secondary Laboratory:	**Envirolab**	**Lab Certificate Number:**	**205951**
Date Sampled:	**16/12/2018**	**Sample Medium:**	**Soil**

Sample Information

Number of Primary Samples:	**2**	**Number of Triplicate (Interlab dup) Samples:**	**1**
Number of Duplicate Samples:	**2**	**Number of Other Field QAQC Samples:**	**0**

Documentation and Sample Handling Information

	Y/N	Comments
COC completed properly?	Y	Signed by both field scientists and labs personnel.
All requested analysis completed?	Y	
Samples received in appropriate condition for analysis?	Y	
Samples analysed within appropriate holding times?	Y	
Sample volumes sufficient for QC analysis?	Y	
Are there non-NATA accredited methods used?	N	
Chromatograms supplied as appropriate?	N/A	Not required
Laboratory reports signed by authorised personnel?	Y	

QAQC Sample Information (Method Blank - MB, Rinsate Blank - RB, Field Blank - FB, Trip Blank - TB)

Type	Sample ID	Comments
Lab Method Blanks	Method Blank	All results less than Limit Of Reporting (LOR)
Trip Blank	TB	All results less than Limit Of Reporting (LOR)

Trip Spike Information (BTEX)

Analyte	Spike Concentrations	Recovery Concentration	% Recovery	Comments
Benzene	-	-	105	Trip spike recoveries all pass lab control limits
Toluene	-	-	114	
Ethylbenzene	-	-	114	
meta- & para-Xylene	-	-	110	
Lead	-	-	116	

Laboratory Control Spike (LCS) Analyses

Analyte Group	Comments
TRH, BTEXN, Metals	All recoveries are within lab control limits

Matrix Spike (MS) Analyses

Analyte Group	Comments
TRH, BTEXN, Metals	All recoveries are within lab control limits

Laboratory Duplicates (LD) Analyses

Analyte Group	Comments
TRH, BTEXN, Metals	All values are within 30% acceptance limits

Field Duplicates (FD) Analyses

Analyte Group	Primary ID	Duplicate ID	Comments
TRH, Metals, BTEX	TP12 (0.3-0.5)	FD01	All FD1 RPD results within acceptable RPD criteria. TRH BTEX within acceptable RDP range. Elevated metal RPD. Results less than 5 times LOR, therefore considered acceptable.
TRH, Metals, BTEX	TP11 (0.1-0.3)	FD02	All FD1 RPD results within acceptable RPD criteria. TRH BTEX within acceptable RDP range. Elevated metal RPD. Results less than 5 times LOR, therefore considered acceptable.
TRH, Metals, BTEX	TP34A (0.1-0.2)	FD01A	All FD1 RPD results within acceptable RPD criteria. TRH BTEX within acceptable RDP range. Elevated metal RPD. Results less than 5 times LOR, therefore considered acceptable.

Inter-Lab Duplicates Analyses

Analyte Group	Primary ID	Duplicate ID	Comments
TRH, Metals, BTEX	TP05 (0.5-0.6)	FT1	All FT1 RPD results within acceptable RPD criteria

Surrogate Compound Monitoring Analyses

Analyte Group	Sample ID	Comments
TRH, Metals, BTEX	Primary Samples	For all regular sample matrices, NO surrogate recovery outliers occur.

Overall Comments

This batch has been validated and is considered suitable for interpretive use and site assessment

Note: Data validation assesses each analyte in terms of all the data validation variables and only the exceedances and outliers are reported in this form.
*When concentrations are less than the LOR for both primary and duplicate/triplicate results, not all RPDs are calculated

Performed By: **Nicole Boukarim** **Checked By: Matthew Barberson**
Date: **20/12/2018** **Date: 20/12/2018**

J157372
Field Duplicate/Triplicate RPDs
Detailed Site Assessment: 34-38 Schofields Road, Schofields NSW

							FD1	FT1
Our Label			**TP5 (0.5-0.6)**	**FT1**	**TP12(0.3-0.5)**	**FD01**		
Laboratory Label			S18-No24374	205951-1	S18-No24381	S18-No24405	**RPD Primary vs Duplicate**	**RPD Primary vs Interlab**
Sample Date			16/11/2018	16/11/2018	16/11/201	16/11/2018		
Sample Type			**PS**	**IL**	**PS**	**FD**		
Analyte	**Units**	**LOR**	**Result**					
BTEX								
Benzene	mg/kg	0.1	< 0.1	<0.2	< 0.1	< 0.1	N/A	N/A
Ethylbenzene	mg/kg	0.1	< 0.1	<1	< 0.1	< 0.1	N/A	N/A
m&p-Xylenes	mg/kg	0.1	< 0.2	<2	< 0.2	< 0.2	N/A	N/A
o-Xylene	mg/kg	0.2	< 0.1	<1	< 0.1	< 0.1	N/A	N/A
Toluene	mg/kg	0.1	< 0.1	<0.5	< 0.1	< 0.1	N/A	N/A
Xylenes - Total	mg/kg	0.3	< 0.3	<1	< 0.3	< 0.3	N/A	N/A
Heavy Metals								
Arsenic	mg/kg	2	9.8	7	4.5	4.2	7%	33%
Cadmium	mg/kg	0.4	< 0.4	<0.4	< 0.4	< 0.4	N/A	N/A
Chromium	mg/kg	5	13	9	15	17	13%	36%
Copper	mg/kg	5	15	8	17	27	45%	61%
Lead	mg/kg	5	15	17	36	43	18%	13%
Mercury	mg/kg	0.1	< 0.1	<0.1	< 0.1	< 0.1	N/A	N/A
Nickel	mg/kg	5	< 5	8	9.4	8.8	7%	N/A
Zinc	mg/kg	5	29	38	99	140	34%	27%
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C10-36 (Total)	mg/kg	< 50	< 50	<50	< 50	< 50	N/A	N/A
TRH C10-C14	mg/kg	< 20	< 20	<50	< 20	< 20	N/A	N/A
TRH C15-C28	mg/kg	< 50	< 50	<100	< 50	< 50	N/A	N/A
TRH C29-C36	mg/kg	< 50	< 50	<100	< 50	< 50	N/A	N/A
TRH C6-C9	mg/kg	< 20	< 20	<25	< 20	< 20	N/A	N/A
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	mg/kg	0.5	< 0.5	<1	< 0.5	< 0.5	N/A	N/A
TRH >C10-C16	mg/kg	50	< 50	<50	< 50	< 50	N/A	N/A
TRH >C10-C16 less Naphthalene (F2)	mg/kg	50	< 50	<50	< 50	< 50	N/A	N/A
TRH >C10-C40 (total)*	mg/kg	100	< 100	<50	< 100	< 100	N/A	N/A
TRH >C16-C34	mg/kg	100	< 100	<100	< 100	< 100	N/A	N/A
TRH >C34-C40	mg/kg	100	< 100	<100	< 100	< 100	N/A	N/A
TRH C6-C10	mg/kg	20	< 20	<25	< 20	< 20	N/A	N/A
TRH C6-C10 less BTEX (F1)	mg/kg	20	< 20	<25	< 20	< 20	N/A	N/A

-: Not analysed
PS: Primary Sample
FD: Field Duplicate TP5 (1.4-1.5)
IL: Inter-Laboratory Duplicate
N/A: Not Applicable (RPDs not calculated where one or more result <PQL)

Acceptable RPDs:			<5 x LOR	
			>5 x LOR	

Acceptable RPD limits reached

J157372
Field Duplicate/Triplicate RPDs
Detailed Site Assessment: 34-38 Schofields Road, Schofields NSW

							FD2	FD01A
Our Label			**TP11 (0.1-0.3)**	**FD02**	**TP34A (0.1-0.2)**	**FD01A**		
Laboratory Label			S18-No24380	S18-No24406	S18-De12286	S18-De12288	**RPD**	**RPD**
Sample Date			16/11/2018	16/11/2018	10/12/2018	10/12/2018	**Primary vs**	**Primary vs**
Sample Type			**PS**	**FD**	**PS**	**FD**	**Duplicate**	**Duplicate**
Analyte	**Units**	**LOR**	**Result**					
BTEX								
Benzene	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	N/A	N/A
Ethylbenzene	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	N/A	N/A
m&p-Xylenes	mg/kg	0.1	< 0.2	< 0.2	< 0.2	< 0.2	N/A	N/A
o-Xylene	mg/kg	0.2	< 0.1	< 0.1	< 0.1	< 0.1	N/A	N/A
Toluene	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	N/A	N/A
Xylenes - Total	mg/kg	0.3	< 0.3	< 0.3	< 0.3	< 0.3	N/A	N/A
Heavy Metals								
Arsenic	mg/kg	2	10	7.6	7.7	13	27%	51%
Cadmium	mg/kg	0.4	< 0.4	< 0.4	< 0.4	< 0.4	N/A	N/A
Chromium	mg/kg	5	13	7.8	12	13	50%	10%
Copper	mg/kg	5	16	12	15	20	N/A	N/A
Lead	mg/kg	5	31	22	23	14	34%	40%
Mercury	mg/kg	0.1	< 0.1	< 0.1	< 0.1	< 0.1	N/A	N/A
Nickel	mg/kg	5	7.1	5.5	8.6	6.3	N/A	N/A
Zinc	mg/kg	5	43	35	52	28	21%	39%
Total Recoverable Hydrocarbons - 1999 NEPM Fractions								
TRH C10-36 (Total)	mg/kg		< 50	< 50	< 50	< 50	N/A	N/A
TRH C10-C14	mg/kg		< 20	< 20	< 20	< 20	N/A	N/A
TRH C15-C28	mg/kg		< 50	< 50	< 50	< 50	N/A	N/A
TRH C29-C36	mg/kg		< 50	< 50	< 50	< 50	N/A	N/A
TRH C6-C9	mg/kg		< 20	< 20	< 20	< 20	N/A	N/A
Total Recoverable Hydrocarbons - 2013 NEPM Fractions								
Naphthalene	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5	N/A	N/A
TRH >C10-C16	mg/kg	50	< 50	< 50	< 50	< 50	N/A	N/A
TRH >C10-C16 less Naphthalene (F2)	mg/kg	50	< 50	< 50	< 50	< 50	N/A	N/A
TRH >C10-C40 (total)*	mg/kg	100	< 100	< 100	< 100	< 100	N/A	N/A
TRH >C16-C34	mg/kg	100	< 100	< 100	< 100	< 100	N/A	N/A
TRH >C34-C40	mg/kg	100	< 100	< 100	< 100	< 100	N/A	N/A
TRH C6-C10	mg/kg	20	< 20	< 20	< 20	< 20	N/A	N/A
TRH C6-C10 less BTEX (F1)	mg/kg	20	< 20	< 20	< 20	< 20	N/A	N/A

-: Not analysed
PS: Primary Sample
FD: Field Duplicate TP5 (1.4-1.5)
IL: Inter-Laboratory Duplicate
N/A: Not Applicable (RPDs not calculated where one or more result <PQL)

Acceptable	<5 x LOR	Any RPD acceptable
RPDs:	>5 x LOR	0 - 50% RPD acceptable

Acceptable RPD limits reached

APPENDIX M – SECTION 7 ABORIGINAL CULTURAL HERITAGE ASSESSMENT REPORT

7 Recommendations

The recommendations below respond specifically to the wishes of the RAPs. Recommendations regarding the archaeological value of the site, and the subsequent management of Aboriginal cultural heritage is provided in the archaeological report (Appendix 5).

Recommendation 1: Conditions of AHIP C000550

Although SSD projects are not required to comply with Part 6 of the *National Parks and Wildlife Act 1974* (NPW Act), the Office of Environment and Heritage (OEH) advises that conditions of valid AHIPs are followed by SSDs in order to reduce the risk of impacting Aboriginal heritage values.

OEH also advises that the holder of the AHIP should be contacted to confirm the works that are intended on the area covered by the AHIP.

Recommendation 2: No further archaeological works required for Alex Avenue PS 01 and Alex Avenue PS 02

It is recommended that no further archaeological works are required for Alex Avenue PS 01 and Alex Avenue PS 02 prior to development impacts.

Recommendation 3: Preparation and lodgement of AHIMS site cards for Alex Avenue PS 01 and Alex Avenue PS 02

It is recommended that AHIMS site cards are prepared and lodged with AHIMS for newly identified sites Alex Avenue PS 01 and Alex Avenue PS 02, and that the site numbers are included in the final version of this report.

Following development impacts it will be necessary to update these AHIMS records with AHIMS site impact recording forms for Aboriginal sites Alex Avenue PS 01 and Alex Avenue PS 02. This should occur within four months following completion of development impacts or as otherwise stated in SSD approval conditions.

Recommendation 4: Long term care and control of artefacts

In consultation with TSA Management on behalf of SINSW, it has been determined that there are a number of areas within the study area which will not be subject to development or landscaping as part of the proposed works and will be maintained as a natural ground areas in the south-eastern portion of the study area. It is proposed that the artefacts will be reburied on site somewhere within this location.

Recommendation 5: Discovery of unanticipated heritage items

Aboriginal objects

All Aboriginal objects and Places are protected under the NPW Act. It is an offence to knowingly disturb an Aboriginal site without a consent permit issued by the OEH. Should any Aboriginal objects be encountered during works associated with this proposal, works must cease in the vicinity and the find should not be moved until assessed by a qualified archaeologist. If the find is determined to be an Aboriginal object the archaeologist will provide further recommendations. These may include notifying the OEH and Aboriginal stakeholders.

Aboriginal ancestral remains

Aboriginal ancestral remains may be found in a variety of landscapes in NSW, including middens and sandy or soft sedimentary soils. If any suspected human remains are discovered during any activity you must:

4. immediately cease all work at that location and not further move or disturb the remains
5. notify the NSW Police and OEH's Environmental Line on 131 555 as soon as practicable and provide details of the remains and their location
6. not recommence work at that location unless authorised in writing by OEH.

Recommendation 6: Continued consultation with registered Aboriginal stakeholders

As per the consultation requirements, it is recommended that the proponent provides a copy of this draft report to the Aboriginal stakeholders and considers all comments received. The proponent should continue to inform these groups about the management of Aboriginal cultural heritage sites within the study area throughout the life of the project.

Recommendation 7: Lodgement of final report

A copy of the final report will be sent to the RAPs, the client, OEH and the AHIMS register for their records.

SYDNEY

LEVEL 3, 4 BROADCAST WAY
ARTARMON NSW 2064

PO BOX 1024
CROWS NEST NSW 1585

PHONE: +61 2 9902 4700
FAX: +61 2 9439 1114

NEWCASTLE

LEVEL 1, 118A BELFORD ST
BROADMEADOW NSW 2292

PO BOX 835
HAMILTON NSW 2303

PHONE: +61 2 9902 4700
FAX: +61 2 6766 3022

TAMWORTH

SUITE 1, 493 PEEL ST
TAMWORTH NSW 2340

PO BOX 576
TAMWORTH NSW 2340

PHONE: +61 2 6766 5225
FAX: +61 2 6766 3022

ACT

UNIT 1, 155 NEWCASTLE ST
FYSHWICK ACT 2609

PO BOX 771
FYSHWICK ACT 2609

PHONE: +61 2 6143 2900
FAX: +61 2 6280 8774

richardcrookes.com.au

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