AGILITY ENGINEERING

REMEDIAL ACTION PLAN

Lots 14 and 15 Section L DP 8993
No. 7 James Street
Argenton

for

Alesco Senior College
C/o: Untapped Planning

Ref: 2019233

30 September 2019

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TABLE OF CONTENTS

ATTACHMENTS

1. Drawing 2019233-RAP-01
2. Development Plans provided by Untapped Planning (job no: 2018-150, Sheet no. A-01 & A-02, dated 04/10/2018)
3. Summary of Results
4. General Notes

1. INTRODUCTION

This document presents a Remedial Action Plan (RAP) for the development works proposed to be undertaken at Lots 14 and 15 Section L DP 8993, No. 7 James Street, Argenton. This RAP was developed following the previous findings of a Preliminary Contaminated Site Investigation undertaken by Forum Consulting Engineers in February 2016.

The proposed development works should be undertaken in accordance with this RAP, relevant regulatory authorities and requirements of the Lake Macquarie City Council (Council).

1.1 OBJECTIVES

The primary objectives of the RAP are to:

- Provide a remedial/management strategy that mitigates risk to human health and the environment during and after the development works;
- Outline the possible requirements for further investigation, validation, site controls, environmental management plans and occupational health and safety (OH&S) plans prior, during and after development works; and
- Provide procedures to manage potentially contaminated materials, should excavation into the site soils be required during or after construction.

This RAP has been prepared in accordance with the relevant sections of the following:

- The NSW Office of Environment and Heritage (OEH), Guidelines for Consultants Reporting on Contaminated Sites, 2011.
- National Environment Protection Council, National Environment Protection (Assessment of Site Contamination) Measure (NEPC), 1999 (Amended April 2013).

1.2 SITE DESCRIPTION

The site supports a 400m^2 metal roofed and brick veneer building located in the north western portion of the site. The brick building was previously used as a gym and recreational office space. The south eastern portion of the site was paved with asphalt hardstand and used as a carpark.

Two storage container sheds and one small tool storage shed were located to the north/northeast of the existing building. The storage container sheds were founded on concrete hardstand which extended along the north western boundary.

Cemented sandy gravel hardstand material was located to south/southeast of the storage container sheds. This area was used as a storage area for household and building refuse such as timber beams, bricks, agricultural irrigation pipes, metal beams/poles etc.

A small children's playground was located to the west/southwest of the existing building. The area was approximately 60m^2 and the ground surface was covered with woodchips/mulch.

Small gardens were located surrounding the southern and northern boundaries of the carpark, along the south eastern boundary of the existing building and along south eastern boundary of the site.

1.3 SITE IDENTIFICATION AND HISTORY

The subject site was identified as Lots 14 and 15 Section L DP 8993, No. 7 James Street, Argenton. Additional site details are shown in Table 1.

Table 1 – Additional Site Details

Site Detail	Description
Lot and DP	Lots 14 and 15 Section L DP 8993
Zoning	R2 – Low density residential Identified as being within a "Lead Contamination Notification Area" (possible lead contamination).
Approximate size of site :	1500m^2
Land use:	
Current:	Site currently un-occupied. Previously used as a gym and recreational office area.
Proposed:	Secondary School Education Centre. It is proposed that the existing building and carpark hardstand remain intact and it is proposed that the open areas northeast/east and southwest/west of the existing building be replaced with hardstand.
Surrounds:	James Street and a railway line to the south/southeast and low density residential on the remaining sides.
Closest Environmental Receptor	Cockle Creek (approximately 680m to the West of the site).
Closest Human Health Receptor	Surrounded by residential development and Argenton Public School approximately 150m to the West of the site.

The site is surrounded by Second Street to the north and by residential dwellings on the remaining sides.

Topographically, the site was generally flat with a gentle slope from east to west of between 1 - 2°.

The site has been identified to be within an area of 'lead fallout' originating from the pre-existing Pasminco lead and zinc smelter (Pasminco). The boundary of Pasminco was located approximately 75m to the southeast of the site. During Pasminco's operation, lead fines were emitted into the atmosphere and settled on the surrounding suburbs. This is commonly described as the Pasminco 'lead fallout'. Additionally, waste ore material (slag) produced by Pasminco's operations was commonly used for building and construction purposes across the Lake Macquarie region.

Across the 'lead fallout' affected areas, previous remedial works were undertaken in accordance with the "Lead Abatement Strategy". The remedial works for the lead abatement strategy across the suburbs affected by lead fallout area vary depending on identified contaminant concentrations.

These remedial works may have consisted of either no works being undertaken, tilling of the land and placement of topsoil and/or turf, cover with topsoil or excavate/remove and replace with topsoil/turf. Agility Engineering was provided with details of a previous investigation undertaken at the site by Forum Consulting Engineers as discussed in Section 1.5, however no details of Lead Abatement Strategy remediation works have been provided.

1.4 PROPOSED DEVELOPMENT

It is proposed that the existing site structures will be retained and refurbished, however the proposed outdoor play area in the north eastern portion of the site was reported to have elevated lead concentrations and required remediation to make the area suitable for the proposed use.

Details of the current site layout are shown on Drawing 2019233-RAP-01 attached to this report.

Development plans provided by Untapped Planning (job no: 2018-150, Sheet no. A-01 & A-02, dated 04/10/2018) are shown in the attachment section of this report. Details for any sub-surface works should be prepared with consideration to the recommendations of this RAP.

1.5 PREVIOUS INVESTIGATIONS

1.5.1 FORUM CONSULTING ENGINEERS – 3 March 2016 (revised 4 March 2019)

This Forum Consulting Engineers Report (ref: 902079) details the findings of a preliminary contaminated site investigation undertaken at the site in February 2016. Works consisted of a desktop review of site history and the collection of 7 soil samples from four locations across the site. The site history review identified the potential sources of contamination at the site to be the use of fill material at the site and the site being located within the Lead Contaminant Survey Grid, potentially being subject to lead fallout.

Laboratory analysis of collected soil samples for lead reported all concentrations below the applicable guidelines with the exception of sample TP1 B collected from a depth of 0.4 – 0.45m below the existing surface level. Sample TP1 B reported a concentration of lead greater than 250% of the applicable guideline, indicating that remediation/management was required in this portion of the site.

A copy of the summary of results for this investigation is provided in the attachments section of this report.

1.6 SITE GEOLOGY AND HYDROGEOLOGY

Reference to the 1:100 000 Newcastle Coalfield Regional Geology Map published by Department of Mineral Resources indicates that the site lies within the Croudace Bay Formation of the Boolaroo Subgroup. The Croudace Bay Formation separates the Upper Pilot Seam from the overlying Fassifern Seam. The Croudace Bay Formation consists largely of the Belmont Conglomerate Member. The Belmont Conglomerate Member has a recorded maximum thickness of approximately 60m but shows very rapid variation over very short distances.

The site falls within the Warners Bay Landscape as identified on the "Soil landscapes of the Gosford-Lake Macquarie 1:100 000 Sheet" published by the Department of Land and Water Conservation. The Warners Bay Landscape is a residual landscape characterised by undulating to rolling rises and low hills on fine-grained sediments of the Newcastle Coal Measures. The Warners Bay Landscape is predominantly extensively cleared tall open-forest.

A groundwater bore search was undertaken using the Water-NSW online groundwater data system (https://realtimedata.waternsw.com.au/water.stm). The groundwater bore search indicated there are no registered groundwater bores within 500m of the site.

2. ROLES AND RESPONSIBILITIES

Table 2 outlines the roles and responsibilities for implementing this RAP.

Table 2 Roles and responsibilities

Role	Responsibility
Owner	Implementing and complying with this RAP, including ensuring the contractor complies with the RAP. Making the plan available to site occupiers.
Council	Retaining a copy of the plan on relevant records for the site.
Contractor	Developing the site in a way that incorporates the RAP.

	Complying with the RAP whilst they are in control of the site. Ensuring sub-contractors comply with the RAP.
Environmental Consultant	Ensuring that the provisions of the RAP have been appropriately met. To confirm that works have been undertaken to a suitable standard. To validate that works have mitigated/eliminated exposure pathways to human and/or ecological receptors.

3. REGULATORY REQUIREMENTS

The proposed works should be undertaken with due regard to appropriate regulatory requirements and provisions of regulatory authorities. The contractor will undertake the proposed development such that all works comply with, but are not limited to, the following regulatory requirements:

- Protection of the Environment Operations Act;
- Contaminated Land Management Act;
- State Environmental Planning Policy No. 55 - Remediation of Land;
- Environmental Assessment & Planning Act;
- National Environment Protection Measure 1999 (as amended 2013);
- Work Health & Safety Act 2011 (amended 2017);
- Work Health & Safety Regulation 2017 (amended 2018);
- NSW DECCW (2014) Waste Classification Guidelines; and
- Any requirements from Council Development Control Approvals.

4. CONCEPTUAL SITE MODEL

The NEPM identifies a conceptual site model (CSM) as a representation of site related information regarding contamination sources, receptors and exposure pathways between those sources and receptors.

The development of a CSM is an essential part of all site assessments. The NEPM identified the essential elements of a CSM as including:

- Known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination;
- Potentially affected media (soil, sediment, groundwater, surface water, indoor and ambient air);
- Human and ecological receptors;
- Potential and complete exposure pathways; and
- Any potential preferential pathways for vapour migration (if potential for vapours identified).

Each of these elements relevant to the subject site are discussed in the following sub-sections.

4.1 CURRENT SITE STATUS

Based on the findings of Forum Consulting Engineers preliminary contaminated site investigation, contamination at the site is considered to include:

- Historical use of fill material containing slag in the north eastern portion of the site:
    - Fill material has been used at the site in shallow soils (identified up to 0.4-0.45m in depth in location TP1. Slag material was observed during site investigation works.
    - Onsite risks are considered possible if exposed to the site surface and likely limited to ingestion of soil and dust, inhalation of dust and to a lesser extent direct dermal contact.
    - Offsite risks are not considered likely due to the presence of underlying residual clay and an expected depth to groundwater greater than 3m.

4.2 HUMAN AND ECOLOGICAL RECEPTORS AND EXPOSURE PATHWAYS

Table 3 summarises potential contaminant sources, contaminants of concern, human and ecological receptors and associated exposure pathways for the site.

Table 3 – Summary of Potential Human Exposures

Contaminant Source	Potential Contaminants of Concern	Release Mechanism	Exposure Pathway	Receptor
Fill material	Lead	Proposed works, potential use of garden beds for fruits/ vegetables, potential excavation of contaminated soil	Ingestion of soil / inhalation of dust/ dermal contact/ secondary ingestion of contamination	Adult and child residents, site visitors, site workers, site trespassers

5. REMEDIAL ACTION PLAN

Due to the extent of slag identified on the site being limited to sample location TP1, it is considered that remediation is to be limited to north eastern portion of the site, known as 'Student Area 01' on the Untapped Planning development plans.

There is considered to be potential for slag fill material to extend under the existing site structure in this area of the site, however as the existing site structures are proposed to remain, it is considered the risk of exposure is managed with the pathway to the existing contamination being cut.

5.1 REMEDIATION GOAL

The selected remedial strategy aims to:

- Provide a sufficient buffer between contaminated soil and human receptors;
- Avoid disturbance of contaminated soils where possible;
- Provide appropriate strategies where disturbance of contaminated soils may occur;
- Provide details for management of proposed site works; and
- Provide management details for the long term use of the site.

5.2 POSSIBLE REMEDIAL OPTIONS

Possible remedial options considered for the site include:

- No Action;
- The management of contaminated soils onsite;
- The offsite disposal of contaminated soils.

<u>No action</u>

This option would consider no remediation or management response to identified contamination during the proposed works and long term use of the site. Agility Engineering considers that this strategy may be a suitable option as the identified slag material is currently buried onsite at a depth of approximately 0.4m below the existing surface level, however it is understood that some site works are required to create the hardstand student area proposed for this portion of the site. It is considered there would be opportunity to incorporate a geo-textile fabric marker layer over the area which has contamination identified at depth for management of future site works/use.

<u>The management of contaminated soils onsite</u>

This option would consider the onsite management of contaminated soils through a management plan, or where contaminated soils are disturbed, by keeping the contaminated soils onsite with a capping layer comprising hardstand, such as dwelling slab, paved courtyard or drive access.

Management strategies for the proposed works and long term use of the site would be implemented for undisturbed contaminated soils of the site. This option is considered feasible and appropriate for the site as it would limit material disposal costs and would manage/eliminate exposure pathways, with the placement of hardstand surfacing over this portion of the site a part of the proposed works.

The offsite disposal of contaminated soils

This option would consider the excavation of all contaminated soil with offsite disposal to a suitably licensed facility following classification in accordance with the NSW EPA Waste Classification Guidelines 2014. Agility Engineering considers that this strategy would be appropriate as the requirement for ongoing site management would be removed, however the anticipated cost of disposal may be prohibitive.

Based on the type, potential extent and distribution of contamination, it was considered that the most appropriate remedial option would be the management/containment of contaminated soils onsite.

5.3 GENERAL EARTHWORKS AND REMEDIATION PROCEDURE

Agility Engineering considers that the following general earthwork and remediation procedure should be undertaken at the site in 'Student Area 01':

- If required to be disturbed, cutting and filling of the area to achieve required levels for the proposed hardstand with the placement of all contaminated fill onsite within proposed hardstand areas of the site. It is expected that the existing slag material would not be required to be disturbed during the proposed site works;
- If required, any removal of material to landfill or an alternative site must follow appropriate classification / certification;
- Excavations for service trenches are to be lined with a geotextile fabric marker layer in the base and side walls prior to backfilling with imported clean material;
- Once grade is achieved for the proposed hardstand, the area is to be covered with a geotextile fabric marker layer;
- Validation of site works as detailed in Section 4.13 of this report through visual inspection, site survey and validation sampling (if required);
- Preparation of Validation Report and Long Term Environmental Management Plan (EMP).

5.4 MANAGEMENT PLAN FOR EXCAVATIONS

Excavations within 'Student Area 01' should be in accordance with the following:

- All excavations will require a soil movement register and will note the location, depth and potential/actual volume of excavated material, and management procedures for handling excavated fill including appropriate personal protective equipment (PPE).

- Excavated contaminated fill material will be placed on plastic sheeting or on an impermeable hardstand area of the site.
- Excavations of contaminated fill material should be placed in a separate stockpile to other stockpiled material, where possible.
- The stockpile heights will be kept to a maximum of approximately 2m.
- Stockpiled material will be covered with plastic sheeting if the material is to remain onsite for more than a 24 hour period or if there is the potential for rainfall.
- Stockpiled contaminated fill, can be re-used onsite underneath hardstand, pavement or slabs, below a geotextile marker layer, or disposed of at an appropriate licenced facility;
- Stockpiled contaminated fill proposed to be disposed offsite at an offsite facility will be laboratory analysed and classified as general, restricted or hazardous solid waste in accordance with NSW DECCW (2014) Waste Classification Guidelines by an appropriate contaminated land consultant prior to removal from site.

General requirements for the handling of excavated fill material are shown in Section 6.3 of this report.

5.5 ACCESSING THE SITE

Conditions of this RAP need to be made known to anyone accessing the site and are enforceable during works undertaken at the site.

5.6 FENCING OF THE SITE

During site works, temporary fencing is to be installed around the Site Area or fencing of a similar nature should remain/be constructed to prevent the public from entering the site. All site works including excavations and stockpiled fill material should be undertaken within the temporary fencing.

5.7 UNEXPECTED FINDS OF CONTAMINATION

If during any further investigation works, site earthworks or excavation, evidence of gross contamination not previously detected is observed or evidence of asbestos is observed, site works are to cease in that area and action is to be taken to appropriately delineate the contamination. This material must be assessed by an appropriate contaminated land consultant.

5.8 IMPORTED FILL

Any imported fill material to the site during the course of construction works must be classified as either Virgin Excavated Material (VENM) as defined by the NSW DECCW (2014) Waste Classification Guidelines or Excavated Natural Material (ENM) as defined by the NSW EPA “The Excavated Natural Martials Order 2014”.

Where a classification certificate from the supplier is not available, imported fill should be inspected, sampled and/or analysed by an environmental consultant prior to delivery at the site, to confirm material classification as either Virgin Excavated Material (VENM) as defined by the NSW DECCW (2014) Waste Classification Guidelines or Excavated Natural Material (ENM) as defined by the NSW EPA "The Excavated Natural Martials Order 2014", with the exception of landscaping or virgin quarry products (eg. gravel or topsoil), which must comply with relevant Australian Standards.

5.9 GROUNDWATER

It is believed that groundwater would not be intercepted during the proposed works and onsite dewatering will not be required. Should groundwater be encountered further consideration will be required with potential for further assessment.

5.10 CONTINGENCY PLAN

A contingency plan is outlined in Table 4, listing potential events that may arise during the remediation and actions that will be undertaken if unexpected finds/conditions occur.

Table 4 – Contingency plan

Unexpected Condition	Action
Identification of unexpected contaminated material during excavations.	Stop work in that area and contact an appropriate contaminated land consultant to investigate potential sources, and advise if further investigation or additional remediation/management is required (other than outlined in this document).
Other	Other unexpected events which may affect the outcome of the remediation would be notified to the owner/site manager. At that time potential actions to address the unexpected event will be assessed and presented.

5.11 SCHEDULE OF WORKS

Currently the schedule of works has not been formalised and it is considered that this will be determined by the site owner upon finalisation of the development application and this RAP.

5.12 HOURS OF OPERATION

Currently the hours of operation have not been formalised, however it is anticipated that hours of operation will be in accordance with Council requirements.

5.13 SITE INSPECTIONS AND VALIDATION OF WORKS

Agility Engineering recommends that an appropriate contaminated land consultant should undertake the following inspections to monitor works, confirm that works have been undertaken to a suitable standard and to validate that works have mitigated/eliminated exposure pathways to site receptors:

- Regular (daily) inspection of excavation works undertaken at the site;
- Inspection of any bulk excavation prior to placement of capping hardstand (slabs/formwork) or geotextile fabric marker layer;
- Validation sampling of excavation base (and walls greater than 0.2m in height) where impacted material has been removed;
- Inspection of any trenches with geotextile fabric lining prior to backfilling with clean material;
- Post development inspection of the site;
- Inspection and classification of materials to be disposed of offsite (if required);
- Validation of imported fill (if required).

A validation report will be prepared by a suitably qualified contaminated land consultant with reference to NSW EPA Guidelines for Consultants Reporting on Contaminated Sites and be submitted to owner/owners representative at the completion of the proposed works.

The validation report will include details on the above site inspections, details of all excavations including total volume of materials removed from the site (if any), photographic record of inspections, detail the onsite and offsite movements of soil material, disposal destination of materials removed from the site, detail of the quantity and type of imported fill used on the site and to verify the suitability of the site for its proposed use.

6. WORK HEALTH AND SAFETY PLAN

All site works must be conducted in a safe and appropriate manner that reflects current work health and safety policies defined by appropriate Authorities. Site workers must have appropriate training, identify potential hazards and implement safe work practices. It is recommended that the site owner / contractor prepares an operational / site specific Work Health and Safety (WHS) plan to supplement the measures identified within this RAP and EMP. The contractors WHS plan should comply with any development approval requirements of Certifying Authority.

6.1 PERSONNEL AND RESPONSIBILITIES

All personnel accessing the site must be made aware of this RAP / EMP and the contractors / owners operational / site specific WHS plan. All personnel should read and understand the contractors WHS plan prior to undertaking any works.

The contractor / owner should identify a specific person whom implements the measures of the WHS plan and EMP and this person should be made known to all personnel accessing the site.

The contractor / owner is responsible for enforcing the conditions of this RAP and ensuring that the employees are also aware of, and comply with the requirements of the WHS plan.

6.2 HAZARDS

Contaminants that have been identified at the site and which are considered to be a potential risk to human health are considered to be limited to lead in soil within 'Student Area 01'.

Potential risks to workers are considered to be limited to ingestion, direct contact or inhalation of dust of contaminated soils if exposed.

Potential physical hazards that present a risk to workers include, but are not limited to, the following:

- Trip, slip and fall hazards;
- Heat exposure;
- Noise;
- Dust;
- Underground services;
- Excavations;
- Heavy equipment or heavy lifting;
- Electrical equipment.

6.3 SOIL HANDLING PROCEDURES AND PROTECTIVE EQUIPMENT

In order to reduce short and long term health risks associated with the potential exposure to the contaminants of concern and to physical hazards, the minimum level of Personal Protective Equipment (PPE) required for people, during site works, is listed below:

- **Head Protection**: Personnel working around excavation equipment will be required to wear a hard-hat. The hard hat must be in date, worn properly and not altered in ways that would lessen the degree of protection offered.
- **Hi-Vis**: Personnel working onsite are required to wear hi-vis shirt.
- **Skin Protection**: Long sleeves and trousers are to be worn. Skin protection will be required to prevent absorption of contaminated soil into the body. Gloves will be worn by personnel involved in site activities which will come into contact with contaminated soil. Sunscreen (SPF +30) should also be worn to protect exposed skin areas not covered by PPE from the sun.
- **Foot Protection**: Steel toed boots will be worn by on-site personnel.

- **Handling of fill material**: If contaminated soil is required to be manually handled, personnel are required to wear disposable or washable gloves.

Site personnel will be made aware that PPE required to be worn may limit manual dexterity, hearing, visibility and may increase the difficulty of performing tasks. PPE places an additional strain on the user when performing work that requires physical activity.

Eating, drinking, chewing gum or tobacco, smoking or other practices that involves hand to mouth transfer increases the probability of ingestion of foreign matter into the body. Hands must be thoroughly washed before eating, drinking or smoking.

6.4 EMERGENCY RESPONSE PLAN

An Emergency Response Plan should be detailed within the contractor / owners WHS plan and should inform personnel of the appropriate response during an emergency. Agility Engineering considers that, as a minimum, emergencies should be reported to the WHS officer and/or site supervisor and, if necessary, emergency services should be contacted as soon as possible by telephoning 000.

7. ENVIRONMENTAL MANAGEMENT PLAN

The contractor / owner should undertake works such that impacts on the environment are minimised and that statutory requirements are met. The contractor / owner should have a site specific EMP that complies to, but not limited to, the regulatory requirements detailed in Section 3 of this report.

In order to achieve minimal impact to the environmental, the contractor / owner should implement the following as a minimum for the proposed site works.

7.1 SOIL AND STORMWATER MANAGEMENT

Adequate stormwater runoff, run-on and sediment control measures will be put in place for the excavation works.

Where temporary stockpiling of material is required, the stockpiles would need to be managed in a way to prevent harm to the environment and general public from potentially contaminated soils within the stockpiles. The stockpile area should be regularly checked for integrity and repairs undertaken when necessary.

Diversion bunds should be put in place to divert stormwater from stockpiled soils and from any exposed contaminated areas of the site.

Discharge of surface water should meet the requirements of the consent authority. Sampling and analysis of stormwater should be undertaken by the contractor (as required by the consent authority) prior to discharge.

7.2 TRAFFIC MANAGEMENT

A designated haulage route should be determined prior to undertaking works. The haulage route should be implemented for trucks transporting soil, materials, equipment or machinery to and from the site. As a minimum the haulage route and transport of soil materials should meet the following objectives:

- Comply with all road traffic rules;
- Minimise noise, vibration and odour to adjacent premises;
- Securely cover all loads to prevent any dust or odour emissions during transportation;
- Exit the site in a forward direction;
- Use of water sprays when necessary to wash down tyres or equipment such that soil, mud or sediment are not tracked onto the road.

7.3 EXCAVATIONS

All excavations should comply with Section 5.4 of this report. Excavations in soil in excess of 1.0m depth must be supported by an engineered designed retaining wall. Unless advised by a suitably qualified geotechnical engineer, unretained cuts in soil must be battered in accordance with the requirements of the Building Code of Australia, but in no case should be steeper than 2H:1V and must be protected from erosion.

Where applicable, the excavation design should incorporate surcharge loads from slopes, retaining walls, structures and other improvements within the vicinity of the excavation.

Drainage measures should be implemented above and behind all excavations to intercept both surface and subsurface water movement.

Tiered batter slopes must be separated by a minimum distance of 1.5m. Separation distances must not contain a slope in excess of 20H:1V.

It is recommended that the maximum excavation height not exceed 2m without approval from a suitably qualified geotechnical engineer.

7.4 NOISE CONTROL

Noise and vibrations will be restricted to acceptable/required levels. All plant and machinery should not breach noise levels and works should only be conducted during hours of operation in accordance with Council requirements.

7.5 DUST AND ODOUR CONTROL

It is considered that minor dust and odour controls would be required during the proposed works. Control of dust and odour will be maintained by the contractor / owner. Measures to mitigate dust and odour issues may include, but are not limited, to the following:

- Minimising excavations especially during periods of high winds;
- Appropriate measures for stockpiles as detailed in Section 6.1 of this report;
- Monitoring for dust and odour (if required);
- Possible use of water carts or sprays/sprinklers.

8. LONG TERM SITE MANAGEMENT

In conjunction with the validation report, a long term EMP will be compiled detailing the proposed long term use and management of the site. The long term EMP will be produced following the completion of the works to reflect actual conditions of the site and detail any limitations and constraints that become apparent during/after site works.

Long term management of the site will remain the responsibility of the site owner / occupiers to comply with the terms of the long term EMP, including ensuring maintenance workers comply with the EMP and any future works being undertaken at the site is in compliance with this EMP or a suitable EMP is developed for specific site works.

9. CONCLUSION

This document presents a RAP for the development works proposed in 'Student Area 01' to be undertaken on the land identified as Lots 14 and 15 Section L DP 8993, No. 7 James Street, Argenton.

The purpose of the RAP was to provide appropriate guidance for the proposed works in respect to the onsite management of contaminated soils identified during the previous Forum Consulting Engineers preliminary contaminated site investigation.

The results of the previous investigation identified an elevated concentration of lead within an identified slag layer at 0.4m depth in sample location TP1.

Agility Engineering considers the most appropriate remedial strategy to be the onsite management of contaminated soils. This is proposed to be achieved by not disturbing the identified contamination with the placement of a geotextile fabric marker layer over 'Student Area 01' prior to the placement of the hardstand in this area of the site, and the management of undisturbed contaminated soils through a long term EMP. This option is considered feasible and appropriate for the site as it would manage/eliminate exposure pathways to human and/or ecological receptors.

Following the completion of the development works in accordance with this RAP, a validation report will be prepared by a suitably qualified contaminated land practitioner with reference to NSW EPA Contaminated Sites Guidelines for Consultants Reporting on Contaminated Sites and be submitted to the site owner at the completion of the proposed works.

The validation report will include details on the above site inspections, details of all excavations including total volume of materials stockpiled and total volume of materials removed from the site, photographic record of inspections, detail the onsite and offsite movements of soil material, disposal destination of materials removed from the site, detail the quantity and type of imported fill used at the site and verify the suitability of the site for its proposed residential use.

In conjunction with the validation report, a long term EMP will be compiled detailing the long term use and management of the site. The long term EMP will be produced following the completion of the works to reflect actual conditions of the site and detail any limitations and constraints that become apparent during/after site works.

10. LIMITATIONS

Agility Engineering have performed investigation and consulting services for this project in general accordance with current professional and industry standards. The findings contained within this report are the result of site observations, discussions with personnel with knowledge of the site, field investigation and limited laboratory testing. The extent of testing was limited to discrete test locations and variations that cannot be inferred or predicted may occur in ground conditions between test locations. To the best of our knowledge, information presented in this report represents a reasonable interpretation of the general condition of the site. Under no circumstances, however, do these findings represent the actual state of the site at all points.

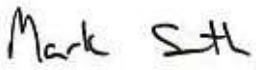
The programme of field sampling, laboratory testing and interpretations presented within this report are limited in nature and Agility Engineering, or any other reputable consultant, cannot provide unqualified warranties, nor does Agility Engineering assume liability for site conditions not accessible during the time of the investigation.

Agility Engineering Consulting Engineers should be contacted immediately should subsurface conditions be found to differ from those described in this report.

AGILITY ENGINEERING PTY LTD

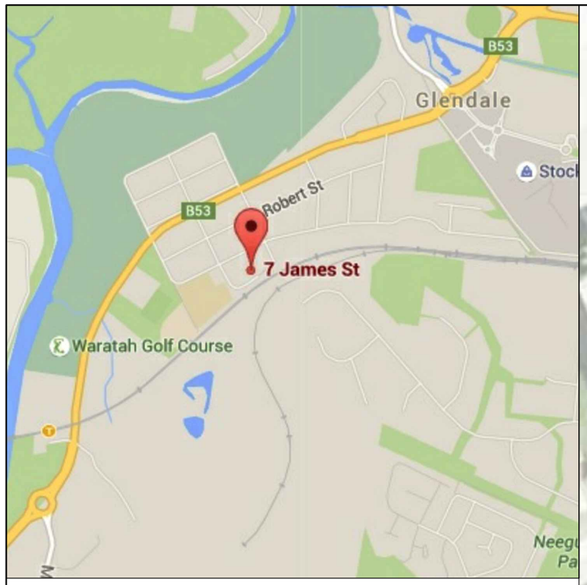
Matthew Clark
Geo-Environmental Scientist

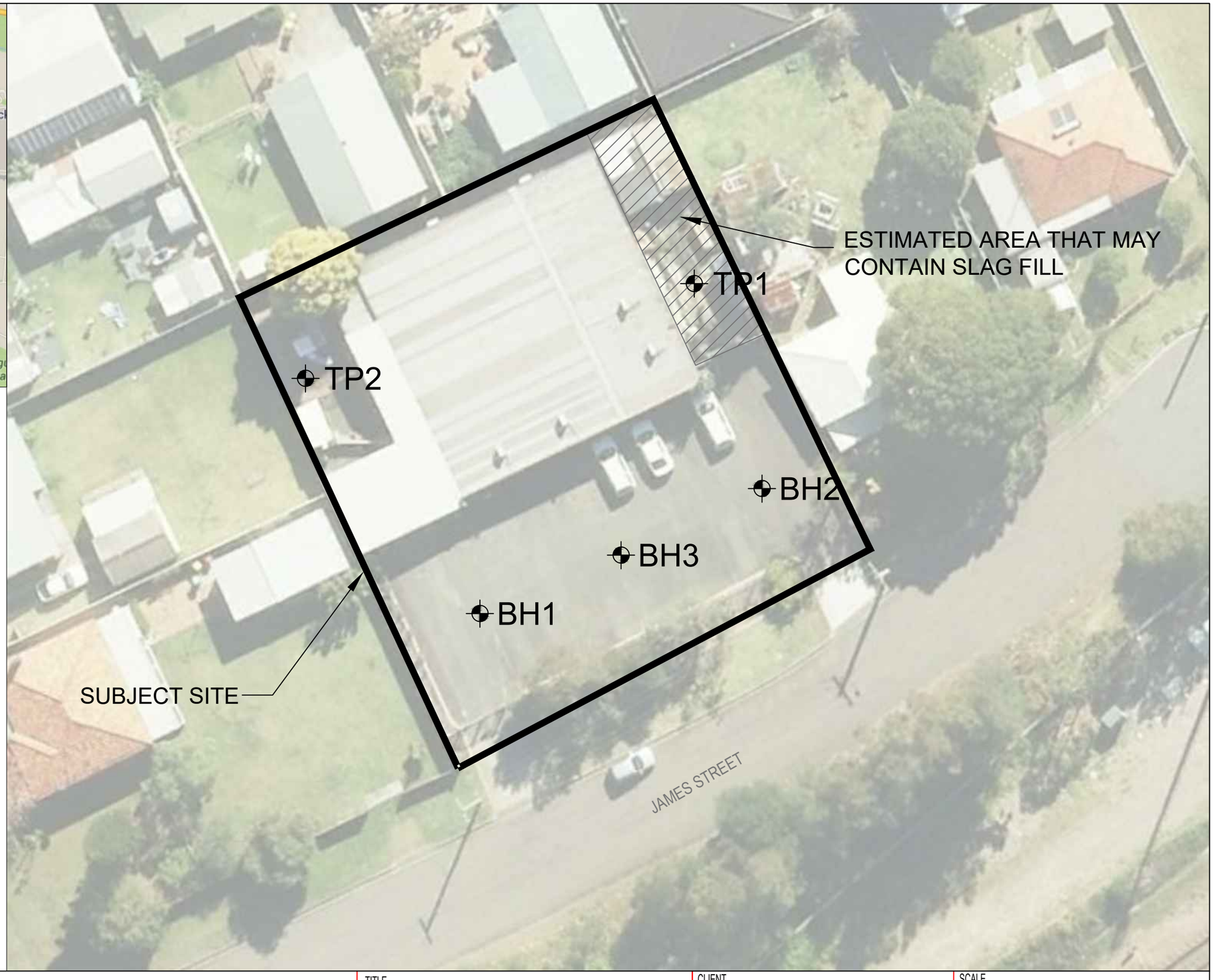
Reviewed



Mark Smith
Geo-Environmental Engineer
Director

ATTACHMENTS



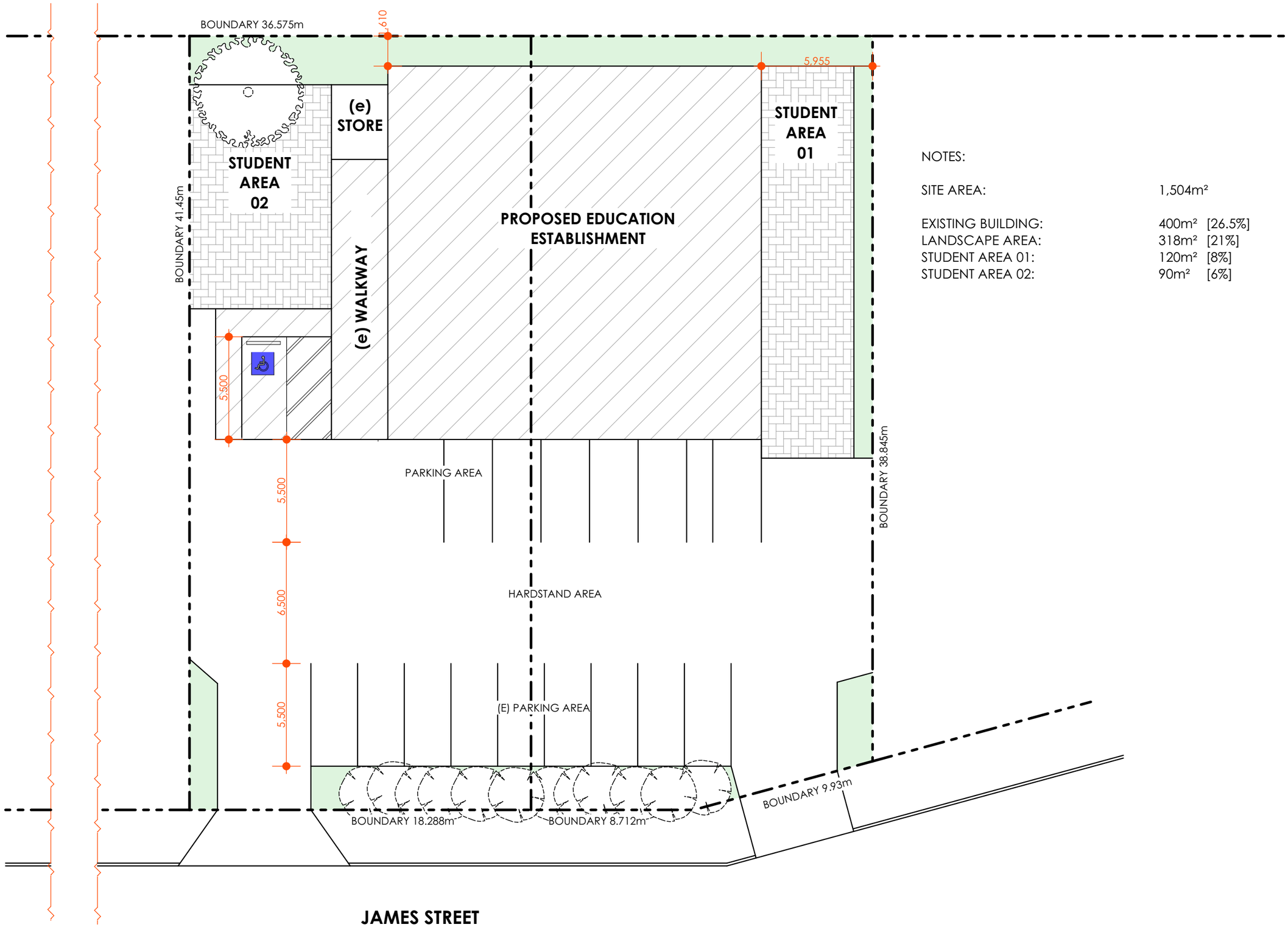


LEGEND:

BH1/TP1 - APPROXIMATE BOREHOLE/TESTPIT LOCATION

AGILITY ENGINEERING

TITLE	SITE PLAN LOTS 14 & 15 SECTION L DP 8993 No. 7 JAMES STREET ARGENTON
CLIENT	ALESCO SENIOR COLLEGE
SCALE	NOT TO SCALE
DATE	19/09/2019
DRAWING No.	2019233-SIT-01
DRAWN	M.C
REVISION	0



NOTES:

SITE AREA:	1,504m²	
EXISTING BUILDING:	400m²	[26.5%]
LANDSCAPE AREA:	318m²	[21%]
STUDENT AREA 01:	120m²	[8%]
STUDENT AREA 02:	90m²	[6%]

ISSUE	REV:	AMENDMENTS:	BY:	DATE:
INF	A	ISSUE FOR INFORMATION	DMC	02.10.18
INF	B	ISSUE FOR APPROVAL	DMC	04.10.18
INF	C	CAR PARKING AMENDMENT	DMC	24.10.18

B	HAND BASIN	OH	OVER HANG
BG	BOX GUTTER	PF	PAINT FINISH
BT	BENCH TOP	RD	ROLLER DOOR
CC	COVED CONCRETE	RF	RENDER FINISH
CPT	CARPET FLOOR FINISH	RST	RAINWATER STORAGE TANK
COL	COLUMN	RH	RAINWATER HEAD
CT	CERAMIC TILE	RW	RETAINING WALL
CL	CLOTHES LINE	SH	SHOWER
DP	DOWNPIPE	SK	SKIRTING
EG	EAVES GUTTER	SS	SHOWER SCREEN
FB	FACE BRICK	SR	SHOWER ROSE
FCL	FINISHED CEILING LEVEL	STC	STEEL TROWEL CONCRETE
FFL	FINISHED FLOOR LEVEL	TB	TIMBER FLOOR BOARDS
FW	FLOOR WASTE	TP	TIMBER POST
HT	HOSE TAP	LT	LAUNDRY TUB
MRS	METAL ROOF SHEET	VG	VALLEY GUTTER
		WC	WATER CLOSET
		WC	WASHING MACHINE
		WBC	WEATHERBOARD CLADDING

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DEN-AD DESIGN & CO.

SERVICES:

1. ALL SET OUT OF BUILDING AND STRUCTURES TO BE CARRIED OUT BY A REGISTERED LAND SURVEYOR AND CHECKED PRIOR TO CONSTRUCTION
2. THE RELEVANT AUTHORITIES ARE TO BE CONTACTED TO VERIFY THE LOCATION OF ALL SERVICES
3. ALL HOUSEHOLD SEWERAGE AND WASTE TO BE DISCHARGED INTO SEWER SYSTEM
4. STORMWATER AND ROOF WATER TO BE CONNECTED TO LEGAL POINT OF DISCHARGE IN ACCORDANCE WITH PART 3 OF BCA VOLUME 2 AND LOCAL AUTHORITY REQUIREMENTS APPROVAL TO BE OBTAINED FROM LOCAL AUTHORITY PRIOR TO WORK COMMENCING
5. TERMITE PROTECTION TO AS3660.1 1995 AND BCA PART 3.1.3 AND TO LOCAL COUNCIL REQUIREMENTS

GENERAL NOTES:

1. WRITTEN DIMENSIONS TAKE PRECEDENCE OVER SCALE
2. BUILDER TO VERIFY ALL BOUNDARY CLEARANCES AND SITE SET OUT DIMENSIONS PRIOR TO COMMENCEMENT OF CONSTRUCTION
3. LEVELS AND CONTOURS ARE BASED ON SUPPLIED DATUM PRIOR TO CONSTRUCTION THE RELEVANT AUTHORITY SHIULD BE CONTACTED FOR POSSIBLE MINIMUM FLOOR LEVEL REQUIREMENTS AND FLOOD INFORMATION
4. RETAINING WALLS ARE REQUIRED TO BE ENGINEER DESIGNED AND CERTIFIED WHERE REQUIRED
5. ALL PLUMBING WORKS ARE TO BE STRICTLY IN ACCORDANCE WITH AS3500 AND APPROVED BY COUNCIL
6. THIS DRAWINGS IS TO BE READ IN CONJUNCTION WITH THE ENGINEER'S STRUCTURAL DRAWINGS
7. ALL WINDOW AND GLAZING TO COMPLY WITH AS1288 AND AS2047
8. BATTERS TO COMPLY WITH APPROPRIATE SOIL CLASSIFICATION DESCRIBED IN TABLE3.1.1.1BCA VOLUME 2
9. ENGINEERS TO PROVIDE DESIGN TO ADDRESS FOOTINGS IF BUILT IN CLOSE PROXIMITY TO SEWER STORMWATER OR EASEMENTS
10. VEHICLE CROSSOVER TO BE CONSTRUCTED AS PER LOCAL GOVERNMENT AUTHORITY
11. **DO NOT SCALE OFF PLANS**

Project:

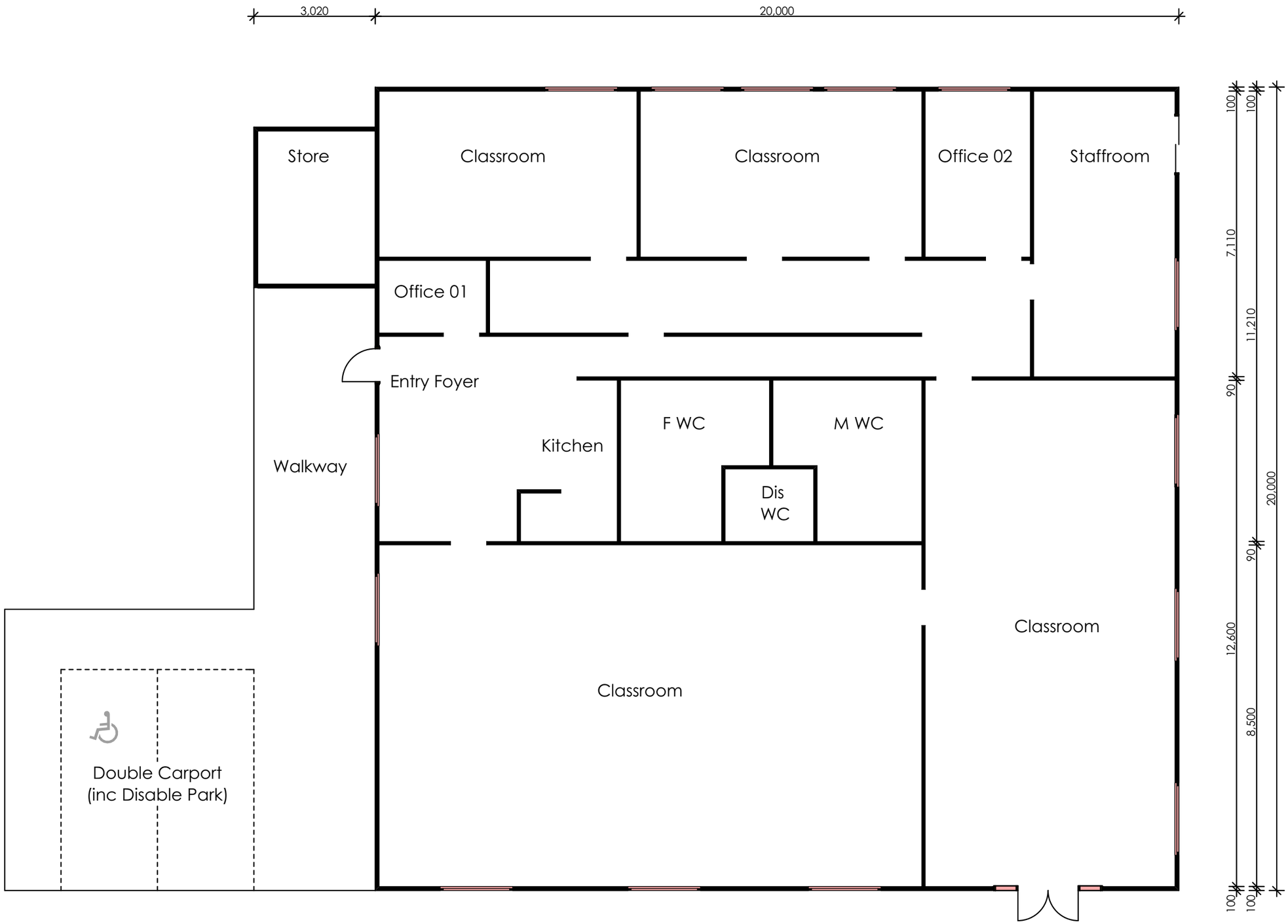
CHANGE OF USE DA

7 JAMES STREET ARGENTON NSW 2284

Site Plan

1:200

Client UNTAPPED PLANNING			Sheet: **A-01**
Drawn By: DMc	Issue Date: 24/10/2018	Scale: 1:200	
Drawing Title: **SITE PLAN**		Project No: **2018-150**	Revision No: **C**



Floor Plan

1:100

ISSUE	REV:	AMENDMENTS:	BY:	DATE:
INF	A	ISSUE FOR INFORMATION	DMC	02.10.18
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Project:

CHANGE OF USE DA

7 JAMES STREET ARGENTON NSW 2284

Client UNTAPPED PLANNING			Sheet: **A-02**
Drawn By: DMc	Issue Date: 4/10/2018	Scale: 1:100	
Drawing Title: **FLOOR PLANS**		Project No: **2018-150**	Revision No: **B**

Sample Identification	Depth (m)	Date Sampled	Filling (F) / Natural (N)	Material type/Geotechnical Unit[A]	Metals	Pb
BH1A	0.25 - 0.4	3.02.16	N	Unit 5		29
BH1B	0.4 - 0.6	3.02.16	N	Unit 6		27
BH2A	0.1 - 0.25	3.02.16	F	Unit 3		31
BH2B	0.8 - 0.9	3.02.16	N	Unit 7		10
TP1 A	0.1 - 0.2	3.02.16	F	Unit 2		220
TP1 B	0.4 - 0.45	3.02.16	F	Unit 4		***1500***
TP2 A	0.1 - 0.25	3.02.16	N	Unit 5		120
Guideline Values				**PQL**		5
*NEPM (2013) HILs for Residential Land Use with garden/accessible soil (HIL A)						300
**NEPM (2013) EIL for Urban Residential/Public Open Space						1100

All units are in mg/kg

PQL = Practical Quantitation Limit

*National Environmental Protection Measure (NEPM) 1999 (Amended April 2013) Health Investigation Level (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

**National Environmental Protection Measure (NEPM) 1999 (AmendedApril 2013) Environmental Investigation Levels (EIL) for Urban Residential/Public Open Space

HIL guideline for chromium is based on chromium (VI)

EIL for lead is derived for aged contamination (>2years)

Adopted EIL for lead are generic contaminant limits for any soil type

[A] Geotechnical unit descriptions are shown in Table 4 in the main body of the report

Bold - Indicates exceedance of NEPM (2013) HIL C criteria values

Italics **-** Indicates exceedance of NEPM (2013) EIL criteria values for Urban Residential/Public Open Space

Shaded **-** Indicates exceedance by 250% of NEPM (2013) HIL C criteria values

Geotechnical General Notes

Introduction
These notes have been provided in order to explain your geotechnical report. Not all elements are necessarily relevant to all reports.

Geotechnical Report
This geotechnical report is based on information gained from personal local experience, understanding of local geology, limited site investigation, subsurface sampling and/or laboratory testing. This report is tailored to provide information relevant to the scope of the project. Agility have performed the geotechnical investigation in general accordance with current professional and industry standards.

The extent of testing was limited to discrete test locations and variations that cannot be inferred or predicted may occur in ground conditions between test locations. To the best of our knowledge, information presented in this report represents a reasonable interpretation of the general condition of the site. Under no circumstances, however, do these findings represent the actual state of the site at all points. For this reason, this report must be regarded as interpretive rather than as a factual document as the report is limited by the scope of information on which interpretations are based upon. Site access constraints such as existing dwellings, steep sloping sites, dense vegetation and underground services may limit the understanding of the sub-surface profile across the site.

This geotechnical engineering report is based on conditions which existed at the time of subsurface exploration. Without approval from Agility Engineering, this report should not be used if there are any changes to the scope of the project or changes to the site conditions. Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and thus, the reliability of this geotechnical report. Without consultation, Agility Engineering will not accept responsibility for problems that occur due to project modifications and/or site modifications. The programme of field sampling, laboratory testing and interpretations presented within this report are limited in nature and Agility Engineering does not assume liability for site conditions not accessible during the time of the investigation.

Agility Engineering should be contacted immediately should subsurface conditions be found to differ from those described in this report.

Engineering Logs
The engineering logs (borehole, test pit logs presented in this report are a geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling and the possibility of other than 'straight line' variations between the test locations.

Groundwater
Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils, groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an inaccurate indication of the true water table;
- Water table levels will vary from time to time with seasons, weather and/or tidal events. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable groundwater observations may be made by installing piezometer standpipes which may be monitored over variable extended timeframes.

Tree Effects
Due to complex tree root geometry, variable moisture extraction by trees and the difficulty in predicting future tree growth, a precise design for the effects of trees is outside current knowledge. The owner must be aware that although precautions have been taken for the effects of trees in our design, some distortion must be accepted. Engineers are not experts in tree growth and cannot be expected to know the anticipated growth and mature height of trees.

Site Inspection
Agility Engineering will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

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Soil & Rock Classification

AGILITY ENGINEERING

Description and Classification Methods

The description and classification of soils and rocks used within this report are based on descriptions and classifications detailed in Australian Standard AS 1726:2017.

Soil Types

AS 1726:2017 defines soil as particulate materials that occur in the ground and can be disaggregated or remoulded by hand in air or water without prior soaking. The dominant soil component is given capital letters and secondary and minor soil components are given lower case letters. FILL and TOPSOIL are also given block letters and are indicated at the beginning of the soil description.

Particle Size of Soil Components

Type		Particle size (mm)
	BOULDERS	>200
	COBBLES	63 - 200
Coarse grained soil	GRAVEL Course	19 - 63
	GRAVEL Medium	6.7 - 19
	GRAVEL Fine	2.36 – 6.7
	SAND Course	0.6 – 2.36
	SAND Medium	0.21 – 0.6
	SAND Fine	0.075 – 0.21
Fine grained soil*	SILT	0.002 - 0.075
	CLAY	<0.002

* Fine grained soils to be described from engineering behaviour by visual tactile techniques

Fine Grained Soil Plasticity

Soil plasticity is characterised from the liquid limit of silts and clays. When laboratory tests are not available, plasticity is estimated using field visual and tactile methods.

Plasticity	Liquid limit for silt	Liquid limit for clay
Non-plastic	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35, ≤50
High plasticity	>50	>50

Course Grained Soil Particle Characteristics

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - one or more intermediate sizes poorly represented
- Gap graded – one or more intermediate sizes absent
- Uniform - an excess of a particular particle size

Where significant, particle shape can be defined as being rounded, sub-rounded, sub-angular, angular, flaky, platy or elongated.

Moisture Condition

Soil Type	Moisture Condition	Description
Course grained soil	Dry (D)	Non-cohesive and free running
	Moist (M)	Soil cool, darkened and sticks together
	Wet (W)	Soil cool dark, free water forms when handling
Fine grained soil	*w*<PL	Soil dryer than plastic limit, hard and friable or powdery
	w ~PL	Soil near plastic limit, can be moulded
	w >PL	Soil wetter than plastic limit, soil usually weakened, free water forms when handling

Cohesive Soil Consistency

Cohesive soils include fine grained soils and coarse grained soils with sufficient fine grained components to induce cohesive behaviour. Consistency describes the ease with which a soil can be remoulded measured by the indicative undrained shear strength of the soil or assessed by field tests.

Consistency	Abbreviation	Undrained shear strength (kPa)
Very Soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very Stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Relative Density of Non-Cohesive, Coarse Grained Soils

Non-cohesive soils are classified on the basis of relative density, generally assessed from penetration test procedures and well-established correlations.

Relative Density	Abbreviation	Density Index %
Very loose	VL	<15
Loose	L	15 - 35
Medium Dense	MD	35 - 65
Dense	D	65 - 85
Very Dense	VD	>85

Rock Classification

The rock type is given in capital letters followed by the grain size, colour, fabric and texture of the rock. The degree of weathering and the rock material strength classification are provided. Where no point load strength index or laboratory testing was undertaken, rock strength will be estimated using field assessment techniques in accordance with AS 1726:2017 or estimated from drilling resistance.