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Construction Soil and Water Management Plan

Newcastle High School Redevelopment

Prepared for: Hansen Yunken

Document no:NA230761 R04

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Revisions

Revision	Description	Date	Prepared by	Approved by
01	CC1	26.03.2024	J Rhodes	U Knight
02	CC1 – updated plans	28.03.2024	J Rhodes	U Knight
03	Compliance table added	5.04.2024	J Rhodes	U Knight
04	Updated for DPHI Comments	7.05.2024	J Rhodes	U Knight

Review Panel

Division/ office	Name
Newcastle	U.Knight

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1 SSD Compliance

SSD Condition Number	Requirement	Report Reference
B18	The Applicant must prepare a Construction Soil and Water Management Sub-Plan (CSWMSP) and the plan must address, but not be limited to the following:	
	a) be prepared by a suitably qualified expert, in consultation with Council;	The plan was developed by Josh Rhodes and reviewed by Ulrika Knight who are both CPEng and NER Civil Engineers with over 20 years of experience developing sediment and erosion control plans for developments. CVs for Josh and Ulrika are attached in Appendix D. The plans have been developed generally in accordance with the plans provided for DA that were approved by the City of Newcastle. The CSWMP was provided to the City of Newcastle on 2 May for comment. No comments had been received prior to updating the report. The email to Council is shown in Appendix E.
	b) measures to ensure that sediment and other materials are not tracked onto the roadway	Refer to Section 4 of this report and the attached plans in Appendix A
	c) describe all erosion and sediment controls to be implemented during construction, including as a minimum, measures in accordance with the publication Managing Urban Stormwater: Soils & Construction (4th edition, Landcom 2004) commonly referred to as the 'Blue Book';	Refer to section 4 of this report and the attached plans in Appendix A
	d) include an Acid Sulfate Soils Management Plan, if required, including measures for the management, handling, treatment and disposal of acid sulfate soils, including monitoring of water quality at acid sulfate soils treatment areas	Refer to section 5 of this report and the attached plans in Appendix C

SSD Condition Number	Requirement	Report Reference
	e) provide a plan of how all construction works will be managed in a wet-weather event (i.e. storage of equipment, stabilisation of the site);	Refer to section 4 of this report and the attached plans in Appendix A
	f) detail all off-site flows from the site;	Refer to section 4 of this report and the attached plans in Appendix A
	g) describe the measures that must be implemented to manage stormwater and flood flows for small and large sized events, including, but not limited to 1 in 5-year ARI and 1 in 100-year ARI.	Refer to the Construction Flood Emergency Management Plan in Appendix F

2 Introduction

2.1 Project Description

Hansen Yunken engaged ACOR Consultants to undertake the civil design for the Newcastle High School Redevelopment Project located at 25A National Park Street, Newcastle West. Part of the scope of the civil scope is the preparation of a Construction Soil and Water Management Plan.

3 Development

3.1 Proposed Development

The redevelopment works consist of the demolition of several existing buildings on site, construction of a three storey Library/Learning Hub, a Multi-Purpose Facility, the relocation of a building as well as associated pathways and landscaping. Figure 1 shows the proposed redevelopment works.

3.2 Earthworks

The construction works on site will include significant site regrading. Figure 2 shows the extent of the earthworks cut and fill for the development.

4 Construction Soil and Water Management Plan

4.1 General

During the construction phase of the development, a Construction Soil and Water Management Plan (CSWMP) will be implemented to minimise water quality impacts. The CSWMP has been prepared in accordance with "Managing Urban Stormwater – Soils and Construction" by Landcom. This document is the industry standard for the management of stormwater runoff during construction in NSW. The control measures for the works include a sediment basin, sediment fences, cut-off drains for polluted stormwater, gully pit sediment barriers, field inlet sediment traps and temporary infiltration tank protection.

Details of the required construction phase control measures are provided on the detailed engineering drawings in accordance with the required standards. The contractor is responsible for the provision of the construction phase water quality infrastructure implementation and maintenance onsite. The erosion and sediment controls will continuously change throughout the construction phase. The contractor will minimise the amount of disturbed

areas throughout the construction program. Where possible, catchments will be limited to below 2500m² to avoid the construction of unnecessarily large sediment basins. The erosion and sediment control plans, construction notes and details are shown in Appendix A.

The following information is provided to identify controls and procedures required to be incorporated into the Erosion and Sediment Control Program and responsible parties.

4.2 Pre-Construction

- Establish a single stabilised entry/exit point for each stage of construction. This point should also include a vehicle shakedown device to mitigate the transportation of dust and dirt.
- Sediment fences are to be placed along the low side of the site to slow flows, reduce scour and capture sediment runoff.
- Sediment fences are to be constructed at the base of fill embankments.
- Divert up-slope water around the work site and appropriately stabilise any drainage channels.
- Areas for plant and construction material storage are to be designated along with associated diversion drains and spillage holding ponds.
- Diversion banks are to be created at the upstream boundary of construction activities to ensure upstream runoff is diverted around any areas to be exposed. Catch drains are to be created at the downstream boundary of construction activities.
- A temporary sediment basin shall be constructed including dirty water channels to direct runoff from the disturbed areas to the basin for treatment prior to discharge to the downstream stormwater network. Sizing of the proposed sediment basin has been undertaken using the design spread in accordance with “Managing Urban Stormwater: Soils and Construction”. The sediment basin was sized for a Type C soil which is consistent with the sand subgrade on site.

  The proposed location of the sediment basin will be the northeast corner of the site. The maximum disturbed area draining to this basin will be approximately 6,500m^2. All other disturbed areas onsite will be limited to below 2,500m^2. If greater areas are disturbed on site during construction, the requirements for the sediment basin size will need to be updated.

  Calculations showing the size of the sediment basin for a disturbed area of 6,500m² are shown in Appendix B.
- Site personnel are to be educated on the utilisation of the sediment and erosion control measures implemented on site and maintenance requirements.

4.3 During Construction

- Progressive stabilization of fill areas and fill batters.
- Construction activities are to be confined to the necessary construction areas.
- The provision of a construction entry/exit to prevent the tracking of debris from tyres of vehicles onto public roads and to limit the movement of construction equipment.
- The topsoil stockpile location will be nominated to coincide with areas previously disturbed. A sediment fence is to be constructed around the bottom of the stockpile to trap sediment. A diversion drain is to be installed upstream of the stockpile if required.
- Roof downpipes should be installed as soon as practicable after the roof is constructed.
- Transport loads that are subject to loss through wind or spillage shall be covered or sealed to prevent entry of pollutants to the stormwater system.

- Regular inspection and maintenance of sediment fences, sediment basin and other erosion control measures. Following rainfall events greater than 50mm, an inspection of erosion control measures and removal of collected material should be undertaken. Replacement of any damaged equipment should be performed immediately.
- The weather forecast is monitored by Hansen Yuncken staff. If a wet-weather event is forecast than a Pre-Rainfall Inspection will be completed and logged in our safety management system 'Hammertech' to identify areas such as stockpiles that require stabilising, review sediment/erosion controls and store relevant equipment. A Post-Rainfall Inspection will be completed in Hammertech following the wet-weather event to review the site controls and rectify areas as needed.

4.4 Post Construction

- The Contractor/ Developer will be responsible for the maintenance of erosion and sediment control devices from the possession of the site until stabilisation has occurred to the satisfaction of the superintendent and Principal.
- The Erosion and Sediment Control Management Plans should be provided to all people involved with the site, including sub-contractors, private certifiers, body corporates and regulators.

4.5 Management of Small and Large Storm Events

- For smaller storm events, the runoff will be controlled by the proposed stormwater facilities including cut off drains, sediment fence, pit filters and the sediment basin.
- For large flood events, a Construction Flood Emergency Management Plan was prepared for the site by BMT dated March 2024. Refer to Appendix E for the report. In the event of a flood event, the recommendations of this plan will be adhered to on site.

4.6 Monitoring and Maintenance

Regular maintenance of the erosion and sediment control facilities is required through the construction phase of the project. Table 1 outlines the treatment measures and the frequency of maintenance for each.

Table 1: Frequency of maintenance for treatment measures

Treatment Measure	Maintenance Frequency	Description
Sediment Fence	Weekly inspections and following rainfall events to check for signs of sediment build up, erosion or weak points	Remove sediment build up. Reinforce weak points. Maintain alignment.
Pit Sediment Traps	Weekly inspections and following rainfall events to check for signs of sediment build up, broken filters and sediment in the pit.	Remove sediment and debris build up from around the pit or inside the pit. Repair or replace any damaged pit filters
Sediment Basins	Following significant rainfall events up to 50mm/day.	Review sediment buildup at the base as well as at the inlet and outlet structures. Maintain sediment storage zone volume from the design. Remove built up sediment.

Treatment Measure	Maintenance Frequency	Description
Diversion Drains	Weekly inspections and following rainfall events to check for signs of sediment build up, erosion or weak points	Remove sediment build up.
Vehicle Shakedown Device	Weekly inspections and following rainfall events to check for signs of sediment build up.	Remove sediment build up.

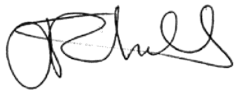
5 Acid Sulfate Management

An investigation into the presence of Acid Sulfate Soil (ASS) or Potential Acid Sulfate Soil (PASS) on site was undertaken as part of the original geotechnical investigation by Martins and reviewed in a further investigation by Douglas Partners. Testing of soils indicated that those above 8.3m depth (at approximate 4.3m AHD) were not ASS or PASS soils. As all proposed works are above this level, an Acid Sulfate Management Plan is not required for the site. Refer to Appendix C for the Douglas Partners report confirming the above.

6 Conclusion

The above report details the requirements of the Construction Soil and Water Management Plan for the Redevelopment of Newcastle High School project. The report covers the required erosion and sediment control infrastructure, the maintenance frequency, and requirements for the proposed development.

Yours faithfully,
ACOR Consultants Pty Ltd



Josh Rhodes
National Civil Leader, Principal Civil Engineer

Appendix A Erosion and Sediment Control Plans

LEGEND

- DESIGN BOXOUT CONTOURS 0.5m INTERVALS
- DESIGN BOXOUT CONTOURS 0.1m INTERVALS
- SEDIMENT FENCE TO SD 6-8
- MESH AND GRAVEL INLET FILTER TO SD 6-11
- GEOTEXTILE INLET FILTER TO SD 6-12
- STABILISED SITE ACCESS TO SD 6-14
- CONCRETE WASHBAY
- MATERIAL STOCKPILE (LOCATION TO BE CONFIRMED ON SITE)
- DIRTY WATER DIVERSION SWALE
- NO GO ZONE TO PROTECT AND RETAIN EXISTING TREES

NATIONAL PARK STREET

ADJOINS C103-0002

BLOCK G

BLOCK M

BLOCK C

TREES TO BE RETAINED

INDICATIVE LOCATION OF STABILISED SITE ACCESS

ADJOINS C103-0002

ADJOINS C103-0003

ADJOINS C103-0003

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Issue	Description	Date	Drawn	Approved
B	ISSUED FOR PRELIMINARY REVIEW	28.03.24	MDM	JPR
A	ISSUED FOR PRELIMINARY REVIEW	19.03.24	MDM	JPR

North

Scale: SCALE BAR 1:250 @A1 1:500 @A3 (0, 2.5, 5, 10, 15m)

PRINT IN COLOUR

Client: SCHOOL INFRASTRUCTURE NSW
8/259 GEORGE STREET, SYDNEY NSW 2000
T: 1300 482 651

NSW GOVERNMENT

Architect: EJE ARCHITECTURE
412 KING STREET, NEWCASTLE NSW 2300
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Project: NEWCASTLE HIGH SCHOOL REDEVELOPMENT
CONSTRUCTION CERTIFICATE 1 - EARLY WORKS
25A NATIONAL PARK STREET
NEWCASTLE WEST NSW 2302

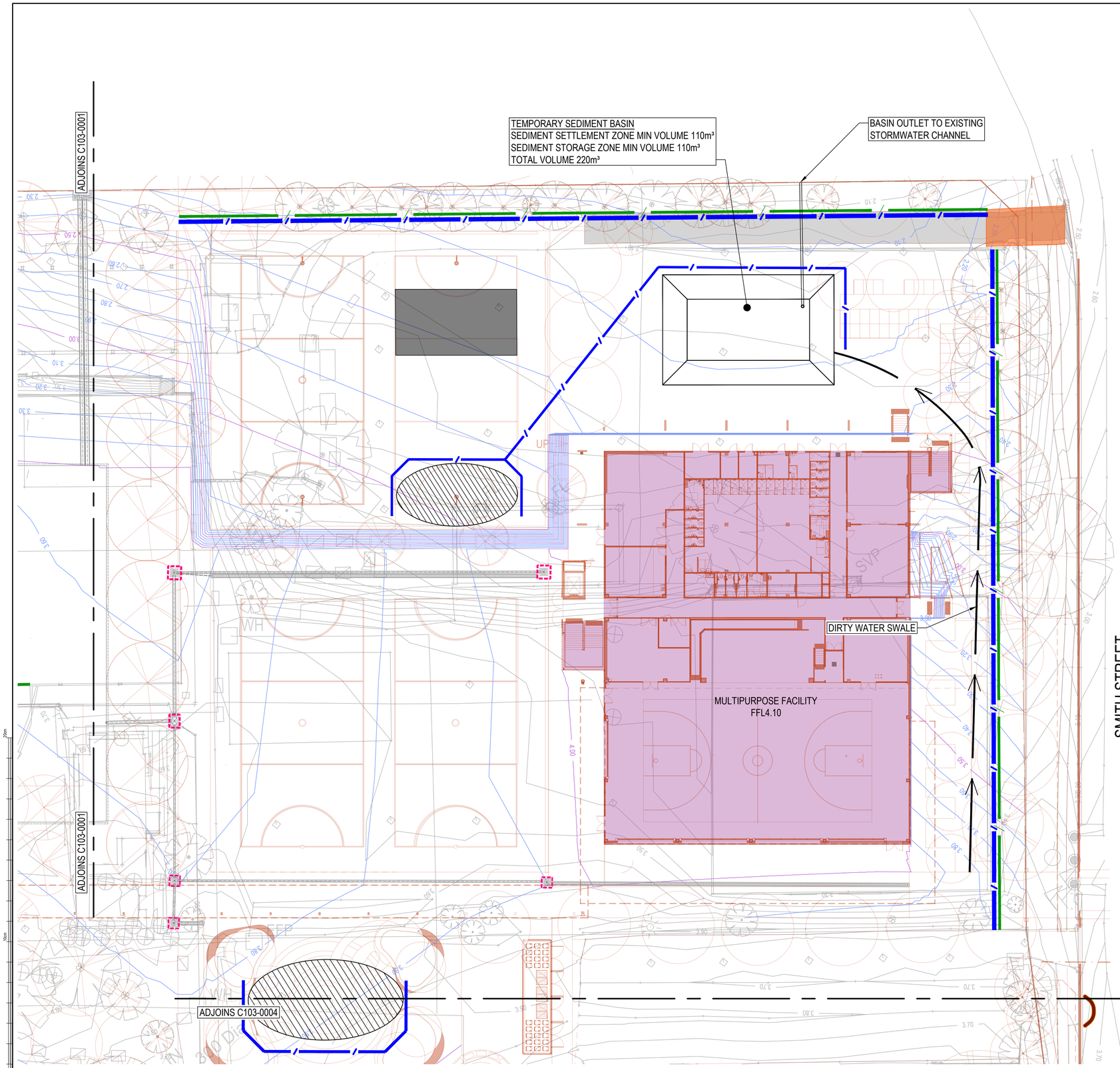
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EROSION AND SEDIMENT CONTROL PLAN
SHEET 1

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Project No.	Drawing No.	Issue
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EROSION AND SEDIMENT CONTROL PLAN
SHEET 2

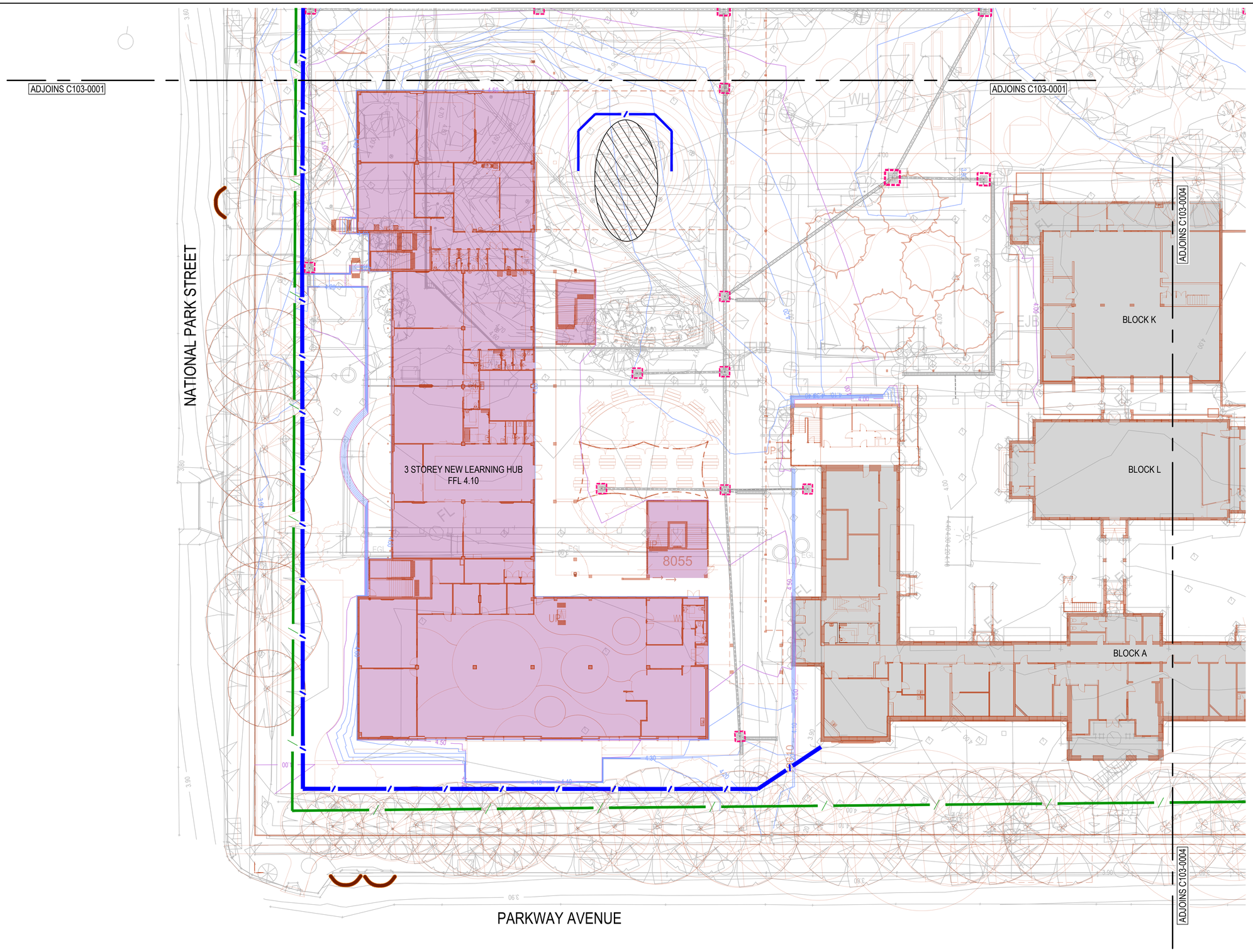
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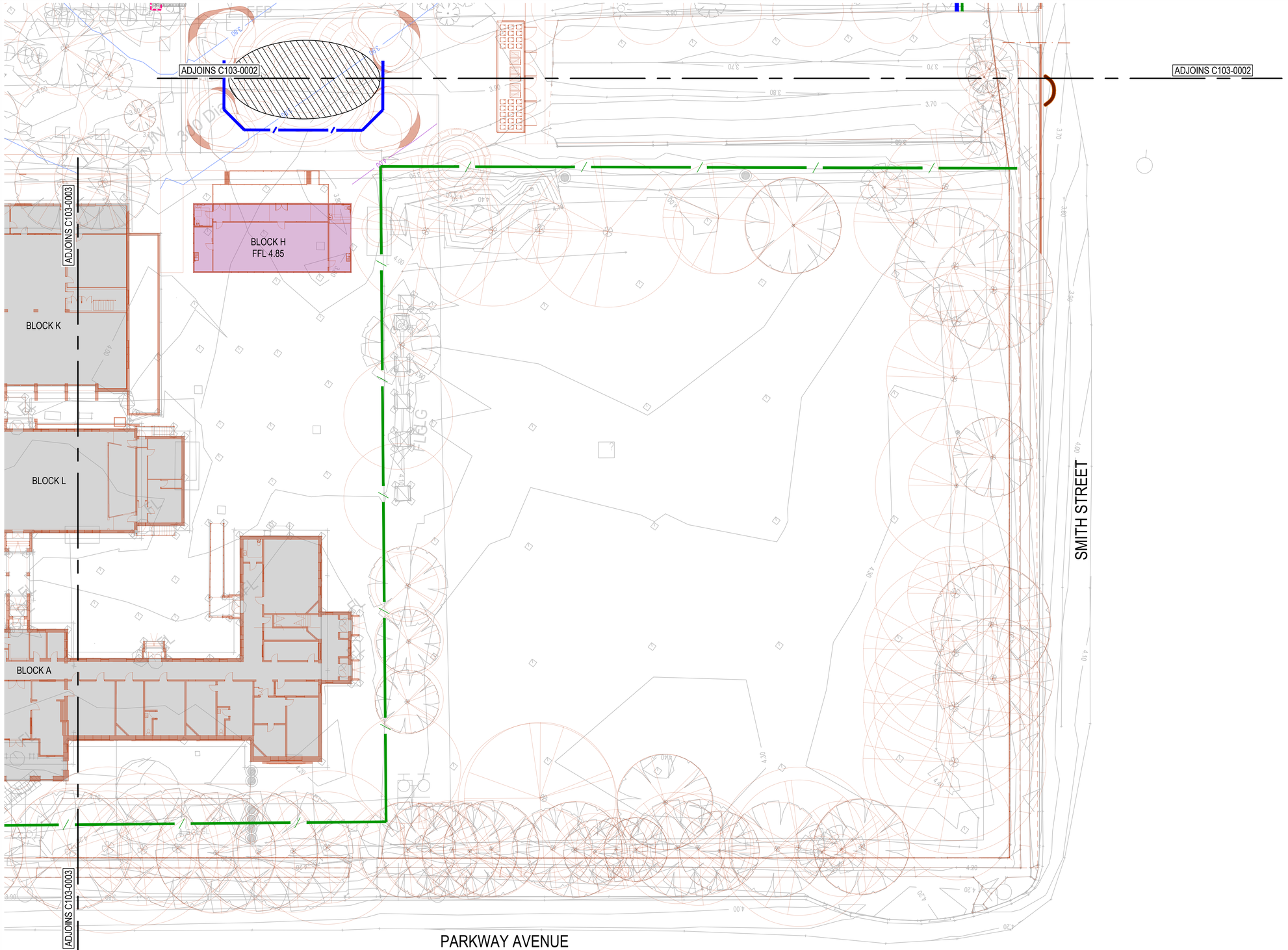
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SHEET 4

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EROSION AND SEDIMENT CONTROL NOTES

GENERAL:

1. SWMP REFERS TO SOIL AND WATER MANAGEMENT PLAN.

2. SEDIMENT, INCLUDES, BUT IS NOT LIMITED TO, CLAY, SILT, SAND, GRAVEL, SOIL, MUD, CEMENT, AND CERAMIC WASTE THAT CAN BE WASHED FROM SITE.

3. ANY REFERENCE TO THE BLUE BOOK REFERS TO MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION. LANDCOM, 2004.

4. ANY REFERENCE TO THE IECA WHITE BOOKS (2008) REFERS TO IECA 2008. BEST PRACTICE EROSION AND SEDIMENT CONTROL. BOOKS 1-6. INTERNATIONAL EROSION CONTROL ASSOCIATION (AUSTRALASIA). PICTON NSW.

5. ANY MATERIAL DEPOSITED IN ANY CONSERVATION AREA FROM WORKS ASSOCIATED WITH THE DEVELOPMENT SHALL BE REMOVED IMMEDIATELY BY MEASURES INVOLVING MINIMAL GROUND AND/OR VEGETATION DISTURBANCE AND NO MACHINERY, OR FOLLOWING DIRECTIONS BY COUNCIL AND/OR WITHIN A TIMEFRAME ADVISED BY COUNCIL.

THE ESCP:

6. THE ESCP AND ITS ASSOCIATED ESC MEASURES SHALL BE CONSTANTLY MONITORED, REVIEWED, AND MODIFIED AS REQUIRED TO CORRECT DEFICIENCIES. COUNCIL HAS THE RIGHT TO DIRECT CHANGES IF, IN ITS OPINION, THE MEASURES THAT ARE PROPOSED OR HAVE BEEN INSTALLED ARE INADEQUATE TO PREVENT POLLUTION.

7. PRIOR TO ANY ACTIVITIES ONSITE, THE RESPONSIBLE PERSON(S) IS TO BE NOMINATED. THE RESPONSIBLE PERSON(S) SHALL BE RESPONSIBLE FOR THE ESC MEASURES ONSITE. THE NAME, ADDRESS AND 24 HOUR CONTACT DETAILS OF THE PERSON(S) SHALL BE PROVIDED TO COUNCIL IN WRITING. COUNCIL SHALL BE ADVISED WITHIN 48 HOURS OF ANY CHANGES TO THE RESPONSIBLE PERSON(S), OR THEIR CONTACT DETAILS, IN WRITING.

8. AT LEAST 14 DAYS BEFORE THE NATURAL SURFACE IS DISTURBED IN ANY STAGE, THE CONTRACTOR SHALL SUBMIT TO THE CERTIFIER, A PLAN SHOWING ESC MEASURES FOR THAT STAGE. THE DEGREE OF DESIGN DETAIL SHALL BE BASED ON THE DISTURBED AREA (UNLESS NOTED OTHERWISE).

9. AT ANY TIME, THE ESC MEASURES ONSITE SHALL BE APPROPRIATE FOR THE AREA OF DISTURBANCE AND ITS CHARACTERISTICS INCLUDING SOILS (IN ACCORDANCE WITH THOSE REQUIRED FOR THE SITE AS PER DCP).

10. THE IMPLEMENTATION OF THE ESCP SHALL BE SUPERVISED BY PERSONNEL WITH APPROPRIATE QUALIFICATIONS AND/OR EXPERIENCE IN ESC ON CONSTRUCTION SITES.

11. THE APPROVED ESCP SHALL BE AVAILABLE ON-SITE FOR INSPECTION BY COUNCIL OFFICERS WHILE WORK ACTIVITIES ARE OCCURRING.

12. THE APPROVED ESCP SHALL BE UP TO DATE AND SHOW A TIMELINE OF INSTALLATION, MAINTENANCE AND REMOVAL OF ESC MEASURES.

13. ALL ESC MEASURES SHALL BE APPROPRIATE FOR THE SEDIMENT TYPE(S) OF THE SOILS ONSITE, IN ACCORDANCE WITH THE BLUE BOOK, IECA WHITE BOOKS OR OTHER CURRENT RECOGNISED INDUSTRY STANDARD FOR ESC FOR AUSTRALIAN CONDITIONS.

14. ADEQUATE SITE DATA, INCLUDING SOIL DATA FROM A NATA APPROVED LABORATORY, SHALL BE OBTAINED TO ALLOW THE PREPARATION OF AN APPROPRIATE ESCP, AND ALLOW THE SELECTION, DESIGN AND SPECIFICATION OF REQUIRED ESC MEASURES.

15. ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE APPROVED ESCP (AS AMENDED FROM TIME TO TIME) UNLESS CIRCUMSTANCES ARISE WHERE:

    a) COMPLIANCE WITH THE ESCP WOULD INCREASE THE POTENTIAL FOR ENVIRONMENTAL HARM; OR
    b) CIRCUMSTANCES CHANGE DURING CONSTRUCTION AND THOSE CIRCUMSTANCES COULD NOT HAVE BEEN FORESEEN; OR
    c) COUNCIL DETERMINES THAT UNACCEPTABLE OFF-SITE SEDIMENTATION IS OCCURRING AS A RESULT OF A LAND-DISTURBING ACTIVITY. IN EITHER CASE, THE PERSON(S) RESPONSIBLE MAY BE REQUIRED TO TAKE ADDITIONAL, OR ALTERNATIVE PROTECTIVE ACTION, AND/OR UNDERTAKE REASONABLE RESTORATION WORKS WITHIN THE TIMEFRAME SPECIFIED BY THE COUNCIL.

16. ADDITIONAL ESC MEASURES SHALL BE IMPLEMENTED, AND A REVISED ESCP SUBMITTED FOR APPROVAL TO THE CERTIFIER (WITHIN FIVE BUSINESS DAYS OF ANY SUCH AMENDMENTS) IN THE EVENT THAT:

    a) THERE IS A HIGH PROBABILITY THAT SERIOUS OR MATERIAL ENVIRONMENTAL HARM MAY OCCUR AS A RESULT OF SEDIMENT LEAVING THE SITE; OR
    b) THE IMPLEMENTED WORKS FAIL TO ACHIEVE COUNCIL'S WATER QUALITY OBJECTIVES SPECIFIED IN THESE CONDITIONS; OR
    c) SITE CONDITIONS SIGNIFICANTLY CHANGE; OR
    d) SITE INSPECTIONS INDICATE THAT THE IMPLEMENTED WORKS ARE FAILING TO ACHIEVE THE "OBJECTIVE" OF THE ESCP.

17. A COPY OF ANY AMENDED ESCP SHALL BE FORWARDED TO AN APPROPRIATE COUNCIL OFFICER, WITHIN FIVE BUSINESS DAYS OF ANY SUCH AMENDMENTS.

EROSION AND SEDIMENT CONTROL NOTES

SITE ESTABLISHMENT INCLUDING CLEARING AND MULCHING:

18. NO CLEARING SHALL BE UNDERTAKEN UNLESS PRECEDED BY THE INSTALLATION OF ADEQUATE DRAINAGE AND SEDIMENT CONTROL MEASURES, UNLESS SUCH CLEARING IS REQUIRED FOR THE PURPOSE OF INSTALLING SUCH MEASURES, IN WHICH CASE, ONLY THE MINIMUM CLEARING REQUIRED TO INSTALL SUCH MEASURES SHALL OCCUR.

19. BULK TREE CLEARING AND GRUBBING OF THE SITE SHALL BE IMMEDIATELY FOLLOWED BY SPECIFIED TEMPORARY EROSION CONTROL MEASURES (E.G. TEMPORARY GRASSING OR MULCHING) PRIOR TO COMMENCEMENT OF EACH STAGE OF CONSTRUCTION WORKS.

20. TREES AND VEGETATION CLEARED FROM THE SITE SHALL BE MULCHED ONSITE WITHIN 7 DAYS OF CLEARING.

21. APPROPRIATE MEASURES SHALL BE UNDERTAKEN TO CONTROL ANY DUST ORIGINATING DUE TO THE MULCHING OF VEGETATION ONSITE.

22. ALL OFFICE FACILITIES AND OPERATIONAL ACTIVITIES SHALL BE LOCATED SUCH THAT ANY EFFLUENT, INCLUDING WASH-DOWN WATER, CAN BE TOTALLY CONTAINED AND TREATED WITHIN THE SITE.

23. ALL REASONABLE AND PRACTICABLE MEASURES SHALL BE TAKEN TO ENSURE STORMWATER RUNOFF FROM ACCESS ROADS AND STABILISED ENTRY/EXIT SYSTEMS, DRAINS TO AN APPROPRIATE SEDIMENT CONTROL DEVICE.

24. SITE EXIT POINTS SHALL BE APPROPRIATELY MANAGED TO MINIMISE THE RISK OF SEDIMENT BEING TRACKED ONTO SEALED, PUBLIC ROADWAYS.

25. STORMWATER RUNOFF FROM ACCESS ROADS AND STABILISED ENTRY/EXIT POINTS SHALL DRAIN TO AN APPROPRIATE SEDIMENT CONTROL DEVICE.

26. THE APPLICANT SHALL ENSURE AN ADEQUATE SUPPLY OF ESC, AND APPROPRIATE POLLUTION CLEAN-UP MATERIALS ARE AVAILABLE ON-SITE AT ALL TIMES.

27. ALL TEMPORARY EARTH BANKS, FLOW DIVERSION SYSTEMS, AND SEDIMENT BASIN EMBANKMENTS SHALL BE MACHINE-COMPACTED, SEEDED AND MULCHED WITHIN TEN (10) DAYS OF FORMATION FOR THE PURPOSE OF ESTABLISHING A VEGETATIVE COVER, OR LINED APPROPRIATELY.

28. SEDIMENT DEPOSITED OFF SITE AS A RESULT OF ON-SITE ACTIVITIES SHALL BE COLLECTED AND THE AREA CLEANED/REHABILITATED AS SOON AS REASONABLE AND PRACTICABLE.

29. CONCRETE WASTE AND CHEMICAL PRODUCTS, INCLUDING PETROLEUM AND OIL-BASED PRODUCTS, SHALL BE PREVENTED FROM ENTERING ANY INTERNAL OR EXTERNAL WATER BODY, OR ANY EXTERNAL DRAINAGE SYSTEM, EXCLUDING THOSE ON-SITE WATER BODIES SPECIFICALLY DESIGNED TO CONTAIN AND/OR TREAT SUCH MATERIAL. APPROPRIATE MEASURES SHALL BE INSTALLED TO TRAP THESE MATERIALS ONSITE.

30. BRICK, TILE OR MASONRY CUTTING SHALL BE CARRIED OUT ON A PERVIOUS SURFACE (E.G. GRASS OR OPEN SOIL) AND IN SUCH A MANNER THAT ANY RESULTING SEDIMENT-LADEN RUNOFF IS PREVENTED FROM DISCHARGING INTO A GUTTER, DRAIN OR WATER. APPROPRIATE MEASURES SHALL BE INSTALLED TO TRAP THESE MATERIALS ONSITE.

31. NEWLY SEALED HARD-STAND AREAS (E.G. ROADS, DRIVEWAYS AND CAR PARKS) SHALL BE SWEPT THOROUGHLY AS SOON AS PRACTICABLE AFTER SEALING/SURFACING TO MINIMISE THE RISK OF COMPONENTS OF THE SURFACING COMPOUND ENTERING STORMWATER DRAINS.

32. STOCKPILES OF ERODIBLE MATERIAL SHALL BE PROVIDED WITH AN APPROPRIATE PROTECTIVE COVER (SYNTHETIC OR ORGANIC) IF THE MATERIALS ARE LIKELY TO BE STOCKPILED FOR MORE THAN 10 DAYS.

33. STOCKPILES, TEMPORARY OR PERMANENT, SHALL NOT BE LOCATED IN AREAS IDENTIFIED AS NO-GO ZONES (INCLUDING, BUT NOT LIMITED TO, RESTRICTED ACCESS AREAS, BUFFER ZONES, OR AREAS OF NON-DISTURBANCE) ON THE ESCP.

34. NO MORE THAN 150m OF A STORMWATER, SEWER LINE OR OTHER SERVICE TRENCH SHALL TO BE OPEN AT ANY ONE TIME.

35. SITE SPOIL SHALL BE LAWFULLY DISPOSED OF IN A MANNER THAT DOES NOT RESULT IN ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.

36. WHEREVER REASONABLE AND PRACTICABLE, STORMWATER RUNOFF ENTERING THE SITE FROM EXTERNAL AREAS, AND NON-SEDIMENT LADEN (CLEAN) STORMWATER RUNOFF ENTERING A WORK AREA OR AREA OF SOIL DISTURBANCE, SHALL BE DIVERTED AROUND OR THROUGH THAT AREA IN A MANNER THAT MINIMISES SOIL EROSION AND THE CONTAMINATION OF THAT WATER FOR ALL DISCHARGES UP TO THE SPECIFIED DESIGN STORM DISCHARGE.

SITE MANAGEMENT INCLUDING DUST:

37. PRIORITY SHALL BE GIVEN TO THE PREVENTION, OR AT LEAST THE MINIMISATION, OF SOIL EROSION, RATHER THAN THE TRAPPING OF DISPLACED SEDIMENT. SUCH A CLAUSE SHALL NOT REDUCE THE RESPONSIBILITY TO APPLY AND MAINTAIN, AT ALL TIMES, ALL NECESSARY ESC MEASURES.

EROSION AND SEDIMENT CONTROL NOTES

38. MEASURES USED TO CONTROL WIND EROSION SHALL BE APPROPRIATE FOR THE LOCATION AND PREVENT SOIL EROSION AND EMISSIONS FROM SITE AT ALL TIMES, INCLUDING WORKING HOURS, OUT OF HOURS, WEEKENDS, PUBLIC HOLIDAYS, AND DURING ANY OTHER SHUTDOWN PERIODS.

39. THE APPLICATION OF LIQUID OR CHEMICAL-BASED DUST SUPPRESSION MEASURES SHALL ENSURE THAT SEDIMENT-LADEN RUNOFF RESULTING FROM SUCH MEASURES DOES NOT CREATE A TRAFFIC OR ENVIRONMENTAL HAZARD.

40. ALL DISTURBED AREAS SHALL BE STABILISED IN ACCORDANCE WITH TIME LINES IN THE BLUE BOOK.

41. ALL REASONABLE AND PRACTICABLE MEASURES SHALL BE TAKEN TO PREVENT, OR AT LEAST MINIMISE, THE RELEASE OF SEDIMENT FROM THE SITE.

42. SUITABLE ALL-WEATHER MAINTENANCE ACCESS SHALL BE PROVIDED TO ALL SEDIMENT CONTROL DEVICES.

43. SEDIMENT CONTROL DEVICES, OTHER THAN SEDIMENT BASINS, SHALL BE DE-SILTED AND MADE FULLY OPERATIONAL AS SOON AS REASONABLE AND PRACTICABLE AFTER A SEDIMENT-PRODUCING EVENT, WHETHER NATURAL OR ARTIFICIAL, IF THE DEVICE'S SEDIMENT RETENTION CAPACITY FALLS BELOW 75% OF ITS DESIGN RETENTION CAPACITY.

44. ALL EROSION AND SEDIMENT CONTROL MEASURES, INCLUDING DRAINAGE CONTROL MEASURES, SHALL BE MAINTAINED IN PROPER WORKING ORDER AT ALL TIMES DURING THEIR OPERATIONAL LIVES.

45. WASHING/FLUSHING OF SEALED ROADWAYS SHALL ONLY OCCUR WHERE SWEEPING HAS FAILED TO REMOVE SUFFICIENT SEDIMENT AND THERE IS A COMPELLING NEED TO REMOVE THE REMAINING SEDIMENT (E.G. FOR SAFETY REASONS). IN SUCH CIRCUMSTANCES, ALL REASONABLE AND PRACTICABLE SEDIMENT CONTROL MEASURES SHALL BE USED TO PREVENT, OR AT LEAST MINIMISE, THE RELEASE OF SEDIMENT INTO RECEIVING WATERS. ONLY THOSE MEASURES THAT WILL NOT CAUSE SAFETY AND PROPERTY FLOODING ISSUES SHALL BE EMPLOYED. SEDIMENT REMOVED FROM ROADWAYS SHALL BE DISPOSED OF IN A LAWFUL MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.

46. SEDIMENT REMOVED FROM SEDIMENT TRAPS AND PLACES OF SEDIMENT DEPOSITION SHALL BE DISPOSED OF IN A LAWFUL MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.

SEDIMENT BASINS - INSTALLATION, MAINTENANCE AND REMOVAL INCLUDING SEDIMENT TRAPS:

47. AS-CONSTRUCTED PLANS SHALL BE PREPARED FOR ALL CONSTRUCTED SEDIMENT BASINS AND ASSOCIATED EMERGENCY SPILLWAYS. SUCH PLANS SHALL VERIFY THE BASIN'S DIMENSIONS, LEVELS AND VOLUMES COMPLY WITH THE APPROVED DESIGN DRAWINGS. THESE PLANS MAY BE REQUESTED BY THE CERTIFIER OR COUNCIL.

48. SEDIMENT BASINS SHALL BE CONSTRUCTED AND FULLY OPERATIONAL PRIOR TO ANY OTHER SOIL DISTURBANCE IN THEIR CATCHMENT.

49. INSTALL AN INTERNAL GATED VALVE, OR SIMILAR, IN ANY OUTLET PIPE ONCE PIPES INSTALLED, OR INSTALL A SACRIFICIAL PIPE FROM BASIN THROUGH WALL TO EXTERNAL OUTLET POINT. THE VALVE SHALL BE CONNECTED TO A RISER MADE FROM SLOTTED PIPE IN THE BASIN. THE VALVE MAY BE OPENED ONCE CAPTURED WATER MEETS WATER QUALITY REQUIREMENTS. THE FINAL SETUP FOR TEMPORARY INTERNAL OUTLET STRUCTURES TO BE CONFIRMED PRIOR TO CONSTRUCTION WITH COUNCIL. THIS SETUP WILL ENABLE DISCHARGE OF TREATED WATER FROM SITE WITHOUT NEED FOR PUMPING.

50. A SEDIMENT STORAGE LEVEL MARKER POST SHALL BE WITH A CROSS MEMBER SET JUST BELOW THE TOP OF THE SEDIMENT STORAGE ZONE (AS SPECIFIED ON THE APPROVED ESCP). AT LEAST A 75mm WIDE POST SHALL BE FIRMLY SET INTO THE BASIN FLOOR.

51. THE SITE MANAGER SHALL OBTAIN THE RELEVANT APPROVALS FROM THE RELEVANT ORGANISATIONS TO DISCHARGE TREATED WATER FROM ANY EXISTING BASINS. ORGANISATIONS MAY INCLUDE, BUT NOT BE LIMITED TO, HUNTER WATER, AND COUNCIL.

52. WHERE MORE THAN ONE STAGE IS TO BE DEVELOPED AT ONE TIME, OR BEFORE THE PRECEDING STAGE IS COMPLETE, THE SEDIMENT BASIN(S) FOR THESE STAGES SHALL HAVE SUFFICIENT CAPACITY TO CATER FOR ALL AREA DIRECTED TO THE BASIN(S).

53. PRIOR TO ANY FORECAST WEATHER EVENT LIKELY TO RESULT IN RUNOFF, ANY BASINS/TRAPS SHALL BE DEWATERED TO PROVIDE SUFFICIENT CAPACITY TO CAPTURE SEDIMENT LADEN WATER FROM THE SITE.

54. SUFFICIENT QUANTITIES OF CHEMICALS/AGENTS TO TREAT CAPTURED WATER SHALL BE PLACED SUCH THAT WATER ENTERING THE BASIN MIXES WITH THE CHEMICAL/AGENTS AND IS CARRIED INTO THE BASIN TO SPEED UP CLARIFICATION.

55. ANY BASIN SHALL BE DEWATERED WITHIN THE X-DAY RAINFALL DEPTH USED TO CALCULATE THE CAPACITY OF THE BASIN, AFTER A RAINFALL EVENT.

56. SUFFICIENT QUANTITIES OF CHEMICALS/AGENTS TO TREAT TURBID WATER SHALL BE SECURELY STORED ON-SITE TO PROVIDE FOR AT LEAST THREE COMPLETE

EROSION AND SEDIMENT CONTROL NOTES

TREATMENTS OF ALL BASINS REQUIRING CHEMICALLY TREATMENT ONSITE.

57. PRIOR TO THE CONTROLLED DISCHARGE (E.G. DE-WATERING ACTIVITIES) FROM SITE INCLUDING EXCAVATIONS AND/OR SEDIMENT BASINS, THE FOLLOWING WATER QUALITY OBJECTIVES SHALL BE ACHIEVED:
    A) TOTAL SUSPENDED SOLIDS (TSS) TO A MAXIMUM 50 MILLIGRAMS/L;
    B) WATER PH BETWEEN 6.5 AND 8.5, UNLESS OTHERWISE REQUIRED BY THE COUNCIL;
    C) TURBIDITY (MEASURED IN NTUS) TO A MAXIMUM OF 60 NTU); AND
    D) EC LEVELS NO GREATER THAN BACKGROUND LEVELS.

60. THE DEVELOPMENT APPROVAL MAY REQUIRE TESTING OF ADDITIONAL WATER QUALITY ELEMENTS PRIOR TO DISCHARGE. E.G. INCLUDING BUT NOT LIMITED TO METALS, ORGANIC SUBSTANCES, CHEMICALS OR BACTERIOLOGICAL INDICATORS.

61. A SAMPLE OF THE RELEASED TREATED WATER SHALL BE KEPT ONSITE IN A CLEAR CONTAINER WITH THE SAMPLE DATE RECORDED ON IT.

62. WATER QUALITY SAMPLES SHALL BE TAKEN AT A DEPTH NO LESS THAN 200MM BELOW THE WATER SURFACE OF THE BASIN.

63. NO ALUMINIUM BASED PRODUCTS MAY BE USED TREAT CAPTURED WATER ONSITE WITHOUT THE PRIOR WRITTEN PERMISSION FROM AN APPROPRIATE COUNCIL OFFICER. THE APPLICANT SHALL HAVE A DEMONSTRATED ABILITY TO USE SUCH PRODUCTS CORRECTLY AND WITHOUT ENVIRONMENTAL HARM PRIOR TO ANY APPROVAL.

64. THE CHEMICAL/AGENT USED IN TYPE D AND TYPE F BASINS TO TREAT CAPTURED WATER CAPTURED IN THE BASIN SHALL BE APPLIED IN CONCENTRATIONS SUFFICIENT TO ACHIEVE COUNCIL'S WATER QUALITY OBJECTIVES WITHIN THE X-DAY RAINFALL DEPTH USED TO CALCULATE THE CAPACITY OF THE BASIN, AFTER A RAINFALL EVENT.

65. ALL MANUFACTURERS' INSTRUCTIONS SHALL BE FOLLOWED FOR ANY CHEMICALS/AGENTS USED ONSITE, EXCEPT WHERE APPROVED BY THE RESPONSIBLE PERSON OR AN APPROPRIATE COUNCIL OFFICER.

66. THE APPLICANT SHALL ENSURE THAT ON EACH OCCASION A TYPE C BASIN WAS NOT DE-WATERED PRIOR TO BEING SURCHARGED BY A FOLLOWING RAINFALL EVENT, A REPORT IS PRESENTED TO AN APPROPRIATE COUNCIL OFFICER WITHIN 5 DAYS IDENTIFYING THE CIRCUMSTANCES AND PROPOSED AMENDMENTS, IF ANY, TO THE BASIN'S OPERATING PROCEDURES.

67. SETTLED SEDIMENT SHALL BE REMOVED AS SOON AS REASONABLE AND PRACTICABLE FROM ANY SEDIMENT BASIN IF:
    a) IT IS ANTICIPATED THAT THE NEXT STORM EVENT IS LIKELY TO CAUSE SEDIMENT TO SETTLE ABOVE THE BASIN'S SEDIMENT STORAGE ZONE; OR
    b) THE ELEVATION OF SETTLED SEDIMENT IS ABOVE THE TOP OF THE BASIN'S SEDIMENT STORAGE ZONE; OR
    c) THE ELEVATION OF SETTLED SEDIMENT IS ABOVE THE BASINS SEDIMENT MARKER LINE.

68. SCOUR PROTECTION MEASURES PLACED ON SEDIMENT BASIN EMERGENCY SPILLWAYS SHALL APPROPRIATELY PROTECT THE SPILLWAY CHUTE AND ITS SIDE BATTERS FROM SCOUR, AND SHALL EXTEND A MINIMUM OF 3M BEYOND THE DOWNSTREAM TOE OF THE BASIN'S EMBANKMENT.

69. SUITABLE ALL-WEATHER MAINTENANCE ACCESS SHALL BE PROVIDED TO ALL SEDIMENT CONTROL DEVICES.

70. MATERIALS, WHETHER LIQUID OR SOLID, REMOVED FROM ANY ESC MEASURE OR EXCAVATION DURING MAINTENANCE OR DECOMMISSIONING, SHALL BE DISPOSED OF IN A MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION, WATER POLLUTION OR ENVIRONMENTAL HARM.

71. ALL SEDIMENT BASINS SHALL REMAIN FULLY OPERATIONAL AT ALL TIMES UNTIL THE BASIN'S DESIGN CATCHMENT ACHIEVES 70% GROUND COVER OR SURFACE STABILISATION ACCEPTABLE TO COUNCIL.

72. THE ESC MEASURES INSTALLED DURING THE DECOMMISSIONING AND REHABILITATION OF A SEDIMENT BASIN SHALL COMPLY WITH SAME STANDARDS SPECIFIED FOR THE NORMAL CONSTRUCTION WORKS.

73. A SEDIMENT BASIN SHALL NOT BE DECOMMISSIONED UNTIL ALL UP-SLOPE SITE STABILISATION MEASURES HAVE BEEN IMPLEMENTED AND ARE APPROPRIATELY WORKING TO CONTROL SOIL EROSION AND SEDIMENT RUNOFF..

74. IMMEDIATELY PRIOR TO THE CONSTRUCTION OF THE PERMANENT STORMWATER TREATMENT DEVICE, APPROPRIATE FLOW BYPASS CONDITIONS SHALL BE ESTABLISHED TO PREVENT SEDIMENT-LADEN WATER ENTERING THE DEVICE.

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Issue	Description	Date	Drawn	Approved
B	ISSUED FOR PRELIMINARY REVIEW	28.03.24	MDM	JPR
A	ISSUED FOR PRELIMINARY REVIEW	19.03.24	MDM	JPR

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Project
NEWCASTLE HIGH SCHOOL REDEVELOPMENT
CONSTRUCTION CERTIFICATE 1 - EARLY WORKS
25A NATIONAL PARK STREET
NEWCASTLE WEST NSW 2302

Drawing Title
CIVIL SERVICES
EROSION AND SEDIMENT CONTROL NOTES
SHEET 1

Drawn	Designed	Q.A. Check	Date	Scale @ A1
MDM	JK	JPR	28.03.24	N.T.S.

Project No.	Drawing No.	Issue
NS230761	C103-0101	B

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EROSION AND SEDIMENT CONTROL NOTES

REVEGETATION/STABILISATION:

75. TEMPORARY STABILISATION MAY BE ATTAINED USING VEGETATION, NON REWETTABLE SOIL POLYMERS, OR PNEUMATICALLY APPLIED EROSION CONTROLS.

76. AT THE COMPLETION OF FORMATION IN ANY SECTION, ALL DISTURBED AREAS SHALL BE STABILISED IN ACCORDANCE WITH TIME LINES IN THE BLUE BOOK.

77. THE CITY OF NEWCASTLE SEED MIX SHALL BE USED UNLESS STATED ON THE ESCP/SWMP.

78. THE PH LEVEL OF TOPSOIL SHALL BE APPROPRIATE TO ENABLE ESTABLISHMENT AND GROWTH OF SPECIFIED VEGETATION PRIOR TO INITIATING THE ESTABLISHMENT OF VEGETATION.

79. NON REWETTABLE BINDER SHALL BE USED IN ALL HYDROMULCH/HYDROSEED/POLYMER MIXES ON SLOPES OR WORKS ADJACENT TO A WATER COURSE.

80. SOIL AMELIORANTS SHALL BE ADDED TO THE SOIL IN ACCORDANCE WITH AN APPROVED LANDSCAPE PLAN, VEGETATION MANAGEMENT PLAN, AND/OR SOIL ANALYSIS.

81. SURFACE SOIL DENSITY, COMPACTION AND SURFACE ROUGHNESS SHALL BE ADJUSTED PRIOR TO SEEDING/PLANTING IN ACCORDANCE WITH AN APPROVED LANDSCAPE PLAN, VEGETATION MANAGEMENT PLAN, AND/OR SOIL ANALYSIS.

82. PROCEDURES FOR INITIATING A SITE SHUTDOWN, WHETHER PROGRAMMED OR UN-PROGRAMMED, SHALL INCORPORATE REVEGETATION OF ALL SOIL DISTURBANCES UNLESS OTHERWISE APPROVED BY COUNCIL. THE STABILISATION WORKS SHALL NOT RELY UPON THE LONGEVITY OF NON-VEGETATED EROSION CONTROL BLANKETS, OR TEMPORARY SOIL BINDERS.

SITE MONITORING AND MAINTENANCE:

83. THE APPLICANT SHALL ENSURE THAT APPROPRIATE PROCEDURES AND SUITABLY QUALIFIED PERSONNEL ARE ENGAGED TO PLAN AND CONDUCT SITE INSPECTIONS AND WATER QUALITY MONITORING THROUGHOUT THE CONSTRUCTION AND MAINTENANCE PHASE.

84. ALL ESC MEASURES SHALL BE INSPECTED AND ANY MAINTENANCE UNDERTAKEN IMMEDIATELY:
    A) AT LEAST DAILY (WHEN WORK IS OCCURRING ON-SITE); AND
    B) AT LEAST WEEKLY (WHEN WORK IS NOT OCCURRING ON-SITE); AND
    C) WITHIN 24HRS OF EXPECTED RAINFALL; AND
    D) WITHIN 18HRS OF A RAINFALL EVENT THAT CAUSES RUNOFF ON THE SITE.

85. WRITTEN RECORDS SHALL BE KEPT ONSITE OF ESC MONITORING AND MAINTENANCE ACTIVITIES CONDUCTED DURING THE CONSTRUCTION AND MAINTENANCE PERIODS, AND BE AVAILABLE TO COUNCIL OFFICERS ON REQUEST.

86. ALL ENVIRONMENTALLY RELEVANT INCIDENTS SHALL BE RECORDED IN A FIELD LOG THAT SHALL REMAIN ACCESSIBLE TO ALL RELEVANT REGULATORY AUTHORITIES.

87. ALL WATER QUALITY DATA, INCLUDING DATES OF RAINFALL, DATES OF TESTING, TESTING RESULTS AND DATES OF WATER RELEASE, SHALL BE KEPT IN AN ON-SITE REGISTER. THE REGISTER IS TO BE MAINTAINED UP TO DATE FOR THE DURATION OF THE APPROVED WORKS AND BE AVAILABLE ON-SITE FOR INSPECTION BY ALL RELEVANT REGULATORY AUTHORITIES ON REQUEST.

88. AT NOMINATED INSTREAM WATER MONITORING SITES, A MINIMUM OF 3 WATER SAMPLES SHALL BE TAKEN AND ANALYSED, AND THE AVERAGE RESULT USED TO DETERMINE QUALITY.

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Issue	Description	Date	Drawn	Approved
B	ISSUED FOR PRELIMINARY REVIEW	28.03.24	MDM	JPR
A	ISSUED FOR PRELIMINARY REVIEW	19.03.24	MDM	JPR

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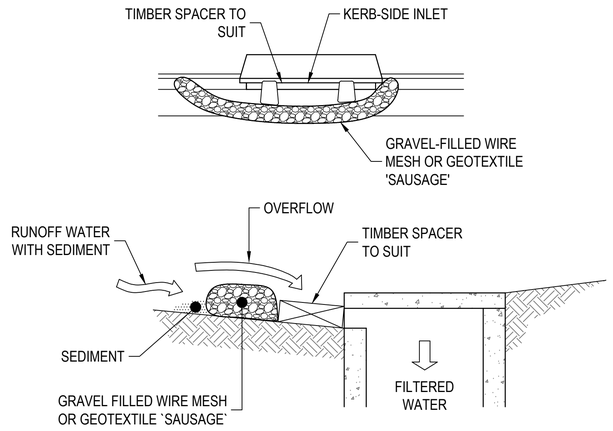
Drawing Title
CIVIL SERVICES
EROSION AND SEDIMENT CONTROL NOTES
SHEET 2

Drawn	Designed	Q.A. Check	Date	Scale @ A1
MDM	JK	JPR	28.03.24	N.T.S.

Project No.	Drawing No.	Issue
NS230761	C103-0102	B

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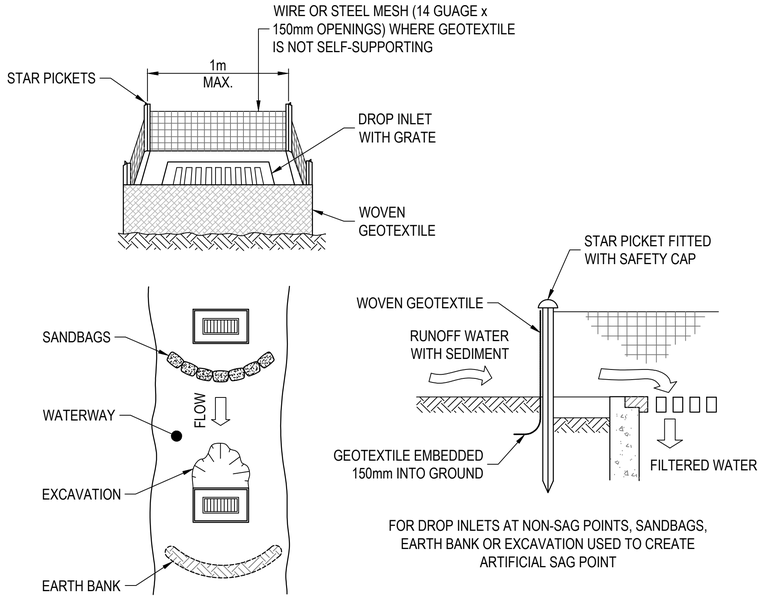
NOTE:
THIS PRACTICE ONLY TO BE USED WHERE SPECIFIED IN AN APPROVED SWMP/ESCP.

MESH AND GRAVEL INLET FILTER - SD6-11

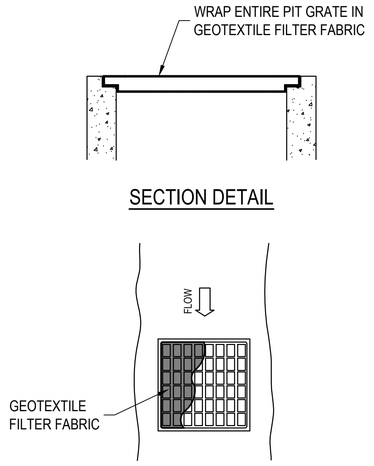
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CONSTRUCTION NOTES:

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 20m 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.

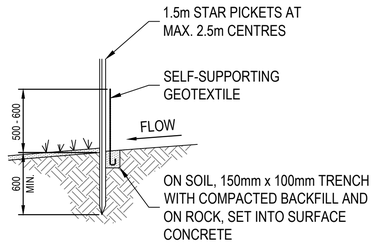


FOR DROP INLETS AT NON-SAG POINTS, SANDBAGS, EARTH BANK OR EXCAVATION USED TO CREATE ARTIFICIAL SAG POINT



GEOTEXTILE WRAPPED GRATE

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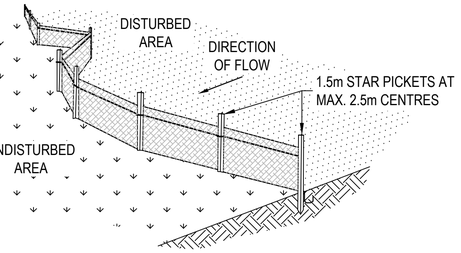
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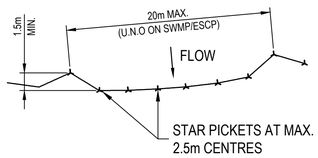
GEOTEXTILE INLET FILTER CONSTRUCTION NOTES:

1. FABRICATE A SEDIMENT BARRIER 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 1m 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 DETAIL (TO SD6-12)

NOT TO SCALE





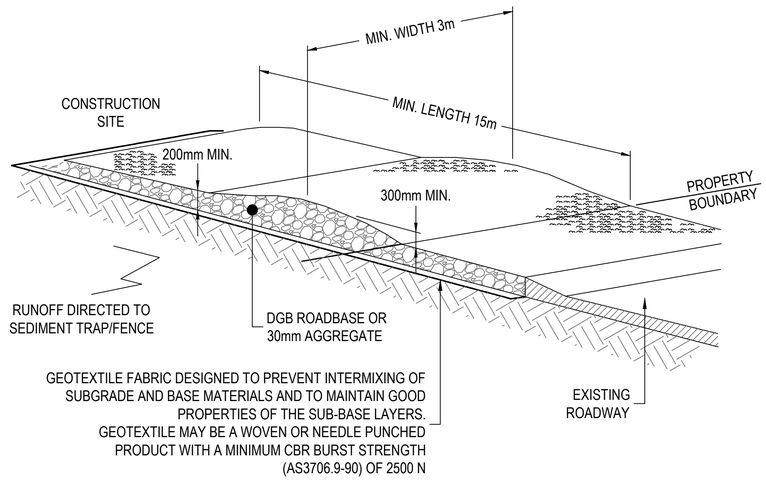
PLAN

SEDIMENT FENCE CONSTRUCTION NOTES:

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO 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 50L PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10 YR 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 1.5m LONG STAR PICKETS INTO GROUND AT 2.5m INTERVALS (MAX) AT THE DOWN SLOPE 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 RECCOMENDED 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 THROUGHLY OVER THE GEOTEXTILE.

SEDIMENT CONTROL FENCE DETAIL (TO SD6-8)

NOT TO SCALE



STABILISED SITE ACCESS CONSTRUCTION NOTES:

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT 200mm THICK PAD OVER GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15m LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3m 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 DETAIL (TO SD6-14)

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Project: NEWCASTLE HIGH SCHOOL REDEVELOPMENT
CONSTRUCTION CERTIFICATE 1 - EARLY WORKS
25A NATIONAL PARK STREET
NEWCASTLE WEST NSW 2302

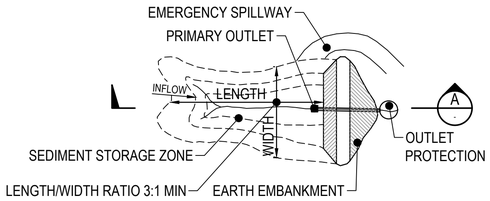
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EROSION AND SEDIMENT CONTROL DETAILS
SHEET 1

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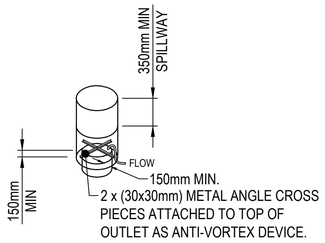
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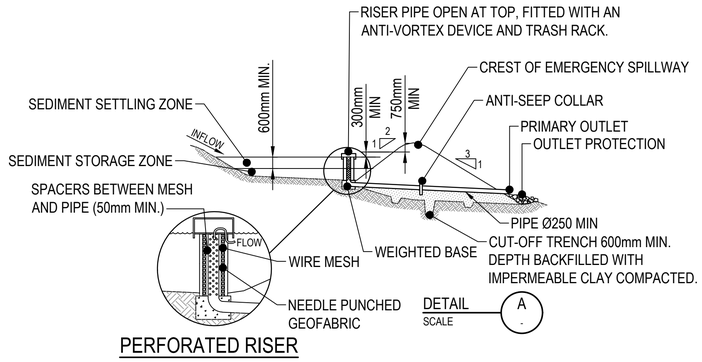
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PLAN VIEW



TRASH RACK/ANTI-VORTEX DEVICE

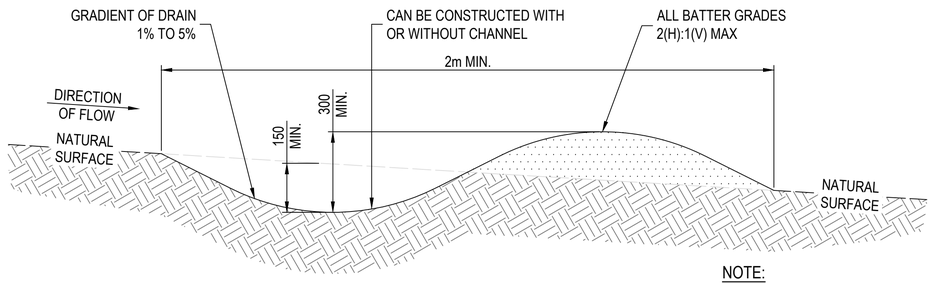


PERFORATED RISER

EARTH BASIN - DRY (SD 6-3)

CONSTRUCTION NOTES

1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.
2. FORM A CUT OFF TRENCH UNDER THE CENTRELINE OF THE EMBANKMENT 600mm DEEP AND 1200mm WIDE, EXTENDING TO A POINT ON THE WATERCOURSE WALL ABOVE THE RISER SILL LEVEL.
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 ACCORDING TO THE SWMP THAT IS FREE FROM ROOTS, WOOD, ROCK, LARGE STONE OR FOREIGN MATERIAL.
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING TO AT LEAST 100mm TO HELP BOND THE 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. INSTALL THE PIPE OUTLET WITH SEEPAGE COLLARS AS SPECIFIED IN THE SWMP AND STANDARD DRAWING 6-3B.
8. FORM BATTER GRADES AT 2(H):1(V) UPSTREAM AND 3(H):1(V) DOWNSTREAM OR AS SPECIFIED IN THE SWMP.



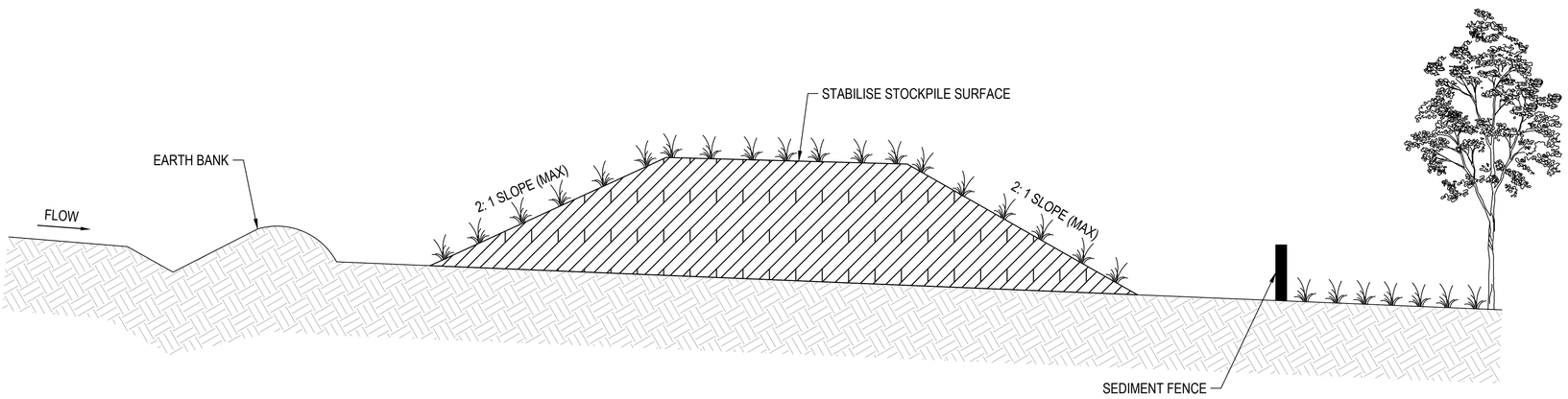
DIRTY WATER DIVERSION DRAIN (TO SD5-5)

NOT TO SCALE

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

CONSTRUCTION NOTES:

1. BUILD WITH GRADIENTS BETWEEN 1% AND 5%.
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.



STOCKPILE DETAIL (TO SD4-1)

NOT TO SCALE

STOCKPILE CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES 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 UPSLOP SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2 METRES DOWNSLOPE.

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Appendix B Sediment Basin Calculations

Note: These "Standard Calculation" spreadsheets relate only to low erosion hazard lands as identified in figure 4.6 where the designer chooses to not use the RUSLE to size sediment basins. The more "Detailed Calculation" spreadsheets should be used on high erosion hazard lands as identified by figure 4.6 or where the designer chooses to run the RUSLE in calculations.

1. Site Data Sheet

Site name: Newcastle High School

Site location: Newcastle High School

Precinct: Newcastle High School

Description of site: School Redevelopment

Site area	Site						Remarks
	1	2	3	4	5	6	
Total catchment area (ha)	0.65						
Disturbed catchment area (ha)	0.65						

Soil analysis

Soil landscape							DIPNR mapping (if relevant)
Soil Texture Group	C						Sections 6.3.3(c), (d) and (e)

Rainfall data

Design rainfall depth (days)	5						See Sections 6.3.4 (d) and (e)
Design rainfall depth (percentile)	85						See Sections 6.3.4 (f) and (g)
x-day, y-percentile rainfall event	38.9						See Section 6.3.4 (h)
Rainfall intensity: 2-year, 6-hour storm	9.84						See IFD chart for the site
Rainfall erosivity (R-factor)	2150						Automatic calculation from above data

Comments:

2. Storm Flow Calculations

Peak flow is given by the Rational Formula:

$$Qy = 0.00278 \times C_{10} \times F_Y \times I_{y,\,tc} \times A$$

where:

- Q_y is peak flow rate (m^3/sec) of average recurrence interval (ARI) of "Y" years
- C_{10} is the runoff coefficient (dimensionless) for ARI of 10 years. Rural runoff coefficients are given in Volume 2, figure 5 of Pilgrim (1998), while urban runoff coefficients are given in Volume 1, Book VIII, figure 1.13 of Pilgrim (1998) and construction runoff coefficients are given in Appendix F
- F_y is a frequency factor for "Y" years. Rural values are given in Volume 1, Book IV, Table 1.1 of Pilgrim (1998) while urban coefficients are given in Volume 1, Book VIII, Table 1.6 of Pilgrim (1998)
- A is the catchment area in hectares (ha)
- $I_{y,\,tc}$ is the average rainfall intensity (mm/hr) for an ARI of "Y" years and a design duration of "tc" (minutes or hours)

Time of concentration (t_c) = $0.76 \times (A/100)^{0.38}$ hrs (Volume 1, Book IV of Pilgrim, 1998)

Note: For urban catchments the time of concentration should be determined by more precise calculations or reduced by a factor of 50 per cent.

Peak flow calculations, 1

Site	A (ha)	tc (mins)	Rainfall intensity, I, mm/hr						C_{10}
			$1_{yr,tc}$	$5_{yr,tc}$	$10_{yr,tc}$	$20_{yr,tc}$	$50_{yr,tc}$	$100_{yr,tc}$	
1	0.65	7	73.7	122	149	177	218	252	0.82
2									
3									
4									
5									
6									

Peak flow calculations, 2

ARI yrs	Frequency factor (F_y)	Peak flows						Comment
		1	2	3	4	5	6	
		(m^3/s)	(m^3/s)	(m^3/s)	(m^3/s)	(m^3/s)	(m3/s)	
$1_{yr,\,tc}$	0.8	0.087						
$5_{yr,\,tc}$	0.95	0.172						
$10_{yr,\,tc}$	1	0.221						
$20_{yr,\,tc}$	1.05	0.275						
$50_{yr,\,tc}$	1.15	0.371						
$100_{yr,\,tc}$	1.2	0.448						

3. Volume of Sediment Basins: *Type C* Soils

Basin volume = settling zone volume + sediment storage volume

Settling Zone Volume

The settling zone volume for *Type C* soils is calculated to provide capacity to allow the design particle (e.g. 0.02 mm in diameter) to settle in the peak flow expected from the design storm (e.g. 0.25-year ARI). The volume of the basin's settling zone (V) can be determined as a function of the basin's surface area and depth to allow for particles to settle. Peak flow/discharge for the 0.25-year, ARI storm is given by the Rational Formula:

$$Q_{tc,\,0.25} = 0.5 \times [0.00278 \times C_{10} \times F_y \times I_{1yr,\,tc} \times A\,] \ (m^3/sec)$$

where:

$Q_{tc,0.25}$ = flow rate (m^3/sec) for the 0.25 ARI storm event

C_{10} = runoff coefficient (dimensionless for ARI of 10 years)

F_y = frequency factor for 1 year ARI storm

$I_{1\,yr,tc}$ = average rainfall intensity (mm/hr) for the 1-year ARI storm

A = area of catchment in hectares (ha)

Basin surface area (A) = area factor x $Q_{tc,\,0.25}$ m^2

Particle settling velocities under ideal conditions (Section 6.3.5(e))

Particle Size	Area Factor
0.100	170
0.050	635
0.020	4100

Volume of settling zone = basin surface area x depth (Section 6.3.5(e)(ii))

Sediment Storage Zone Volume

In the standard calculation, the sediment storage zone is 100 percent of the setting zone. However, designers can work to capture the 2-month soil loss as calculated by the RUSLE (Section 6.3.5(e)(iv)), in which case the "Detailed Calculation" spreadsheets should be used.

Total Basin Volume

Site	$Q_{tc,\,0.25}$ (m^3/s)	Area factor	Basin surface area (m^2)	Depth of settling zone (m)	Settling zone volume (m^3)	Sediment storage volume (m^3)	Total basin volume (m^3)	Basin shape		
								L:W Ratio	Length (m)	Width (m)
1	0.044	4100	179	0.6	107	107	215			
2		4100								
3		4100								
4		4100								
5		4100								
6		4100								

Appendix C Douglas Partners Acid Sulfate Soil Management Plan

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Integrated Practical Solutions

Acid Sulfate Soil Management Plan

Newcastle High School Upgrade
25a National Park Street, Newcastle West

Prepared for
School Infrastructure NSW

Project 213618.02
May 2023



Douglas Partners
Geotechnics / Environment / Groundwater

Document History

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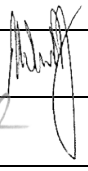
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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
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Reviewer		23 May 2023

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Appendix A:	About This Report
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	Sampling, Testing and Excavation Methodology
	Rock Descriptions
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	Borehole Logs (Bores 1a, 5a and 107a) – DP (2022)
	Borehole Log (Bore 4) – DP (2022)
	Borehole Logs (Bores 201A to 220 and 301 to 303) – DP (2023)
	Test Pit Logs (304 to 316) – DP (2023)
Appendix B:	Martens (2021) Borehole Logs and Explanatory Notes
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	Envirolab Laboratory Reports (Martens, 2021)
Appendix C:	Drawing 1 - Test Location Plan (DP, 2023)
	Map 01 - Testing Plan (Martens, 2021)
	Site Plan – Building Work Location - EJE Architecture (Ref 13331, C, 1A-0421-A)
	Preliminary Bulk Earthworks Plan (Stantec Australasia Pty Ltd)

Acid Sulfate Soil Management Plan
Newcastle High School Upgrade
25a National Park Street, Newcastle West

1. Introduction

Douglas Partners Pty Ltd (DP) has prepared this acid sulfate soil management plan (ASSMP) for the proposed Newcastle High School (NHS) upgrade located at 25a National Park Street, Newcastle West (the 'site'). The proposed development comprises a new three storey learning hub, new multipurpose hall and the demolition of some existing structures.

It is understood that the ASSMP is required based on the potential for the disturbance of acid sulfate soils (ASS) during construction for the proposed development.

The ASSMP provides methods and strategies to minimise the potential for adverse impact associated with the disturbance of ASS during construction of the proposed development. This ASSMP provides the following:

- ASS management strategies;
- Monitoring program for soil and water quality; and
- Contingency procedures.

This ASSMP has been prepared based on the results of a previous geotechnical and preliminary ASS investigation conducted by Martens (2021) within the site). In lieu of ASS data for deeper soils extending to the full depth of proposed piling, this ASSMP has also been prepared based on DP's experience in the area with respect to ASS conditions.

This ASSMP was prepared with reference to the following:

- *Acid Sulfate Soil Manual*, Acid Sulfate Soil Management Advisory Committee [ASSMAC] (Stone, Ahern, & Blunden, 1998);
- *Acid Sulfate Soils Laboratory Methods Guidelines. In Queensland Acid Sulfate Soils Manual 2004* [QASSIT] (Ahern, McElnea, & Sullivan, 2004);
- *Queensland Acid Sulfate Soil Technical Manual, Soil Management Guidelines* (Dear, et al., 2014); and
- *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Sampling and Identification Methods Manual* (Sullivan, et al., 2018).

2. Proposed Development

It is understood that the development at the Newcastle High School (Newcastle Education Campus) will include the following scope:

- Demolition of eight (8) existing buildings;
- Construction of a new three (3) storey learning hub located on the southwestern corner of the campus, including a new library, canteen, covered outdoor learning area (COLA), support learning unit, general learning spaces, hospitality teaching spaces, and science labs;
- Construction of a new multi-purpose facility (MPF) located in the north-eastern corner of the campus including a gymnasium, stage, fitness lab, flexible learning spaces, outdoor courts, and end-of-trip (EOT) facilities;
- Internal refurbishment works within the existing administration building on Parkway Ave to form a new student hub;
- New student entry from Parkway Avenue;
- Relocation of Block H approximately 50m South;
- Ancillary works to enable the proposed upgrades and include new civil infrastructure and a comprehensive landscaping strategy.

Plans of the proposed development are shown in Appendix C.

Preliminary earthworks plans provided in Appendix C indicate generally minor cuts (260 m^3) and more substantial fill (8,964 m^3) for an overall balance of fill at 8,664 m^3. It is understood that the north-eastern part of the site will remain at similar levels for flooding requirements. Furthermore, stormwater infiltration beds are proposed around the school area.

It is understood, however, that continuous flight auger (CFA) piles are proposed for some structures, notably the MPF building in the north-eastern corner of the campus. Piles may be founded to depths of 8 m to 10.5 m below ground level (down to approx. RL -8.5 AHD) to target the medium dense to dense sand layer reported in DP (2022).

3. Site Description

Site Address	25a National Park Street, Newcastle West, NSW.
Legal Description	Part Lot 1 Deposited Plan (D.P) 150725; Part Lot 1 D.P. 575171; Part Lot 1 D.P. 794827.
Area	Site investigation area approximately 21,700 m^2 (2.17 ha) – red in Figure 1; Total area of above lots (overall school) approximately 46,000 m^2 (4.6 ha) – yellow in Figure 1.
Zoning	Zone R2 Low density residential.

Local Council Area	Newcastle City Council.
Current Use	Secondary (high) school.
Surrounding Uses	North / North-east: • Fearnley Dawes Athletic Centre (private recreational field); • Merewether Scout Hall. North-east / east: • Public netball courts and playing fields (National Park No 5 and 6 Sportsground); • Private recreation (Wanderers Rugby Club and National Park No 2 Sportsground. South-east, south, west and north-west: • Residential.

The site is shown on Figure 1.



Figure 1: School Boundary (yellow) and site investigation boundary 'the site' (red)

4. Environmental Setting

Site Topography	Reference to the NSW Contours Hunter and Central Coast LiDAR indicates ground levels range from about RL 4 / 4.5 (AHD) on the southern and western parts to about RL 2.5 on the eastern site of the lot. The land falls gently to the north-east for most of the site, which terraces down to the lowest areas in the north-east near the northern lot boundary.
Regional Topography	The surrounding area is located at RLs 5-6 with locally lower areas, typically in drainage canals. More regionally, the topography varied greatly near the coastal and Newcastle Harbour areas.
Soil Landscape	Reference to the Newcastle 1:100,000 Soil Landscapes Sheet indicates the site is located within the Hamilton soil landscape comprising quaternary deposits in the Hunter Plain region. This group comprises 'deep' soils (>15cm), well-drained weak Podzols with some 'deep' (>100cm) well-drained Brown Podzolic Soils on fans. Limitations include wind erosion hazard, groundwater pollution hazard, strong acidity, non-cohesive soils.
Geology	Reference to the Newcastle Coalfields Surface Geology Sheet, published by BHP, indicates that the site is underlain by alluvial soils which overlie rock strata of the Newcastle Coal Measures. The rock strata are of Permian age and typically comprise sandstone, siltstone, claystone and multiple coal seams. Reference to the NSW Seamless Geology mapping indicates the site is underlain by the following: • Clastic sediment (QP_u) in the southern and central portion of the school site which typically comprises clay, silt and marine sand; • Anthropogenic deposits (Q_h) in the northern portion of the school site which typically comprises anthropogenic fill; and • Alluvial floodplain deposits (QH_af) in the north western portion of the site which typically comprises silt, sand and clay. The boundary line for the mapped anthropogenic deposits is shown on DP (2023) test location plan provided in Appendix C.
Acid Sulfate Soils (ASS)	Published ASS risk mapping indicates that the site is mapped as a low probability occurrence of ASS greater than 3 m below the ground surface. It is noted that ASS typically occur at levels of approximately RL 5 AHD or below, but typically at elevations less than 1 AHD in coastal environments. Previous ASS testing has been undertaken at the site my Martens (2021) which is discussed further in Section 5.2.

5. Previous Investigations

5.1 Overview

Several investigations have been undertaken for the proposed development including geotechnical, contamination and ASS assessments. A summary of the previous investigations where relevant to this ASSMP has been provided below.

5.2 Martens (2021) – Geotechnical Investigation

Martens Consulting Engineers (Martens) has undertaken a geotechnical investigation at the site. The investigation included drilling of 11 bores to depths up to 9.0 m, collection of soil samples for ASS and geotechnical testing purposes and laboratory analysis.

Pertinent results from this investigation include:

- Subsurface conditions at the site consist of:
  - Fill (mainly sand) to depths ranging between 0.2 m and 2.5 m; underlain by
  - Alluvial soils initially comprising sand which transitioned into clayey sand from depths of 5 m to 7.5 m and further into sandy clay from below about 8.0 m to 8.5 m depth.
- Deepest fill was observed in the north-eastern portion of the site;
- Groundwater was encountered at depths ranging between 2.4 m and 5.6 m;
- Laboratory analysis indicated that the samples tested were predominately sand sized with some minor proportions of sand, silt and gravel. The percentage of clay and silt was greater in the samples collected below about 7 m to 8 m depth.
- Limited ASS chromium suite testing for natural alluvial soils was undertaken for samples ranging from 1.1 m to 8.3 m bgl (approximate RL 2.9 AHD to -4.3 AHD). The results below indicated:
  - Chromium reducible sulfur (Scr – potential acidity) or total actual acidity (TAA) was not detected above the limit of reporting (LOR) for tested upper soils to about 5.5 m bgl (approximate RL 2.9 to RL-2.1);
  - Potential acidity (Scr) was identified in three samples which were at depths of 5.6 m, 5.7 m and 8.3 m bgl (approximate RL -1.7 to -4.3), with results below the adopted action criteria (0.03% S). It was reported by Martens that the soils tested were not considered to be actual or potential ASS. It is noted that the clayey soils typically had higher potential acidity (Scr) results, with the deeper sandy clay materials tested at 8.3 m depth (approximate RL -4.3) having the highest potential acidity result only marginally below the action criteria.
- Martens indicated that excavations for the proposed development were unlikely to exceed 2 m depth. Based on the results of the preliminary testing conducted by Martens and the proposed excavation depth Martens considered an ASSMP and/or further ASS testing was not required.

Envirolab laboratory reports and a results summary from the Martens (2021) investigation including groundwater depths noted by Martens at each relevant bore have been summarised in Appendix B which also includes the borehole logs from the investigation.

It is noted that Martens (2021) did not conduct ASS screening tests that are normally undertaken at regular depth intervals to profile ASS conditions and inform detailed laboratory testing requirements with reference to current guidelines (Sullivan, et al., 2018). On this basis, the ASS results in in Martens (2021) report may be considered preliminary and, therefore, variable ASS conditions may exist at the site.

5.3 DP (2022) – Geotechnical Investigation

DP has undertaken a geotechnical investigation at the site. The investigation included seven cone penetration tests (CPTs) to depths ranging between 12.34 m and 32.10 m and three bores to depths ranging between 1.1 m and 2.2 m.

Pertinent findings include the following:

- Subsurface conditions at the site consists of mainly sandy fill up to 1.2 m depth overlying alluvial soils to approximately 30 m depth. The alluvial soils consisted of predominately sand with a clay layer at about 6 m to 8 m depth. The sand layer continued to depths of 12.3 m to 14.4 m and was underlain by a layer of clay to the top of weathered rock at depths of approximately 29 m to 35 m;
- Bores confirmed the presence of abandoned mining within the Borehole Seam at a depth of approximately 55 m;
- Deepest fill was observed in the north-eastern portion of the site.

Groundwater was encountered at depths ranging between 0.5 m and 1.7 m (approximate RL 1.8 to RL 2.5). It should be noted that several measurements were undertaken following cone penetration testing and these results may be artificially higher because there may not have been sufficient time for the groundwater levels to stabilise before the measurement was taken. The water levels in the drilled bores (DP, 2023) were in the range of approximate RL 0.5 AHD to RL 2.0 AHD (discussed below).

Borehole logs for the geotechnical investigation have been provided in Appendix A.

5.4 DP (2023) – Draft Detailed Site Investigation (Contamination) (DSI)

Douglas Partners Pty Ltd (DP) has undertaken a detailed site investigation (DSI) for the proposed upgrade. The objectives of the DSI were to assess the suitability of the site for the proposed development and whether further investigation and/or management is required regarding the proposed development.

The investigation included a brief desktop / site history review, site inspection, subsurface investigation via test pits and bores, laboratory testing for contamination purposes and preparation of a draft report.

Pertinent findings from the investigation relevant to this ASSMP are presented below:

Fill:	Found in all test locations. Generally comprising sand, silty sand, clayey sand, gravelly sand, sandy gravel, silt, clay, silty clay with trace anthropogenic inclusions such as metal, glass, ceramic, plastic, brick, fibro, wire, rubber, terracotta, concrete, coal / coal chitter, ash, slag, asphalt to depths of between 0.1 m and 3.15 m bgl (refer to logs for details).
Sand / Silty Sand:	Found in most test locations beneath fill except at Bores 201A, 202A, 204, 205, 212 to 218, 301 and 303 and Pits 305 and 306. The remaining test locations terminated in this material between depths of 0.6 m to 2.7 m.

Free groundwater was observed in Pits 225, 305 and 306 at depths of 1.1 m to 2.8 m bgl (approximate RL 1.8 to RL -0.5). It should be noted that groundwater levels are affected by climatic conditions and soil permeability and will therefore vary with time.

No testing for ASS was undertaken as part of the geotechnical or contamination assessments conducted by DP.

Test pit and borehole logs from the DSI have been provided in Appendix A.

6. Potential to Oxidise Soil

Preliminary ASS testing conducted to date by Martens (2021) was limited to testing to depths up to 8.3 m depth (approximate RL -4.3). While the soils tested were found to have existing and potential acidity results below the adopted action criteria, soils at depth (in particular clayey soils) were found to have some potential for acid generation upon oxidation suggesting deeper soils or soils with higher clay contents may have higher existing and potential acidity results.

In the absence of site-specific testing at depths below 8.3 m depth (approximate RL-4.3), it is recommended that alluvial soils below this depth are considered as ASS as a precaution.

Based on available information and our understanding of the proposed development, the following activities may therefore expose ASS to oxidising conditions during construction:

- Installation of CFA piles (understood to reach depths of 8 m to 10.5 m below ground level (approximate RL -4.0 to RL -8.5)) that disturb ASS and bring spoil/cuttings to the surface;
- Excavation/dewatering of ASS for service installations or other underground infrastructure (understood to be < 2 m bgl).

The recommended management option for excavated ASS is neutralisation by full lime treatment and oxidation.

To confirm the presence and extent of ASS at depths greater than 8.3 m (~RL-4.3), site-specific investigation should be conducted to determine soil and groundwater conditions prior to the commencement of construction.

7. Management Strategy

7.1 Soil Treatment

Neutralisation of ASS may be required for natural sandy clays/clayey sands below 8.3 m (~RL -4.3). Treatment should be undertaken with reference to Dear et al (2014) and Stone, Ahern & Blunden (1998) as discussed below. It is noted that limited guidance on management of ASS is provided in the *National Acid Sulfate Soils Guidance* (Sullivan, et al., 2018).

ASS should be segregated from overlying soils including potentially contaminated fill and natural soils which are not ASS. Segregation should also be undertaken with reference to the subsurface conditions provided in the RAP, with due consideration of the contamination status of overlying soils/fill. In the case of CFA pile installation, particular procedures and equipment will be required to facilitate appropriate segregation in consultation with the piling contractor.

Excavated and segregated ASS should be treated within a suitable contained and bunded area prior to off-site disposal and/or re-use on-site.

The location of the bunded area should be selected to minimise the potential for impact on nearby sensitive receptors, including nearby water bodies (i.e., Cottage Creek and Hunter River downstream). Any leachate produced in the bunded area should be contained for monitoring and treatment as discussed below.

If a suitable located bunded area is not available on-site, consideration could be given to progressive treatment of soils immediately adjacent to the excavation as the material is excavated (i.e., treated within 4 hours of excavation).

Suitable neutralising agents for ASS include Grade 1 agricultural lime ($CaCO_3$), calcined magnesia (MgO or $Mg(OH)_2$) and dolomite ($MgCO_3.CaCO_3$), although Grade 1 agricultural lime is recommended due to the potential for dolomite and calcined magnesia to degrade water quality as a result of the soluble product magnesium sulfate produces in the process of neutralising acids.

An assessment of the dosing rate for lime treatment can be calculated from the results of detailed laboratory testing, using the following equation, which includes a factor of safety.

Alkali Material Required (kg) per unit volume of soil (m^3) $= \left(\frac{\%\ S \times 623.7}{19.98}\right) \times \frac{100}{ENV(\%)} \times D \times FOS$

Where: *%S = existing and potential acidity (% S units);*
623.7 = % S to mol H^+ / t;
19.98 = mol H^+ / t to kg $CaCO_3$ / t;
D = Bulk density of soil (t/m^3);
FOS = safety factor (usually 1.5);
ENV = Effective Neutralising Value (e.g., 80% for Grade 1 Agricultural lime).

Note: *The ENV is calculated based on the molecular weight, particle size and purity of the neutralising agent and should be assessed for proposed materials in accordance with Dear SE et al (2014).*

It is recommended that Grade 1 agricultural lime is used for the neutralisation of ASS excavated during the construction.

Martens (2021) previously conducted ASS testing to a maximum depth of 8.3 m (~RL-4.3) at the site and concluded that ASS conditions were not present to the depth of testing. It is understood, however, that piling may extend deeper than the previous assessment (approximately 10.5 m (~RL-8.5)). In lieu of available ASS data for deeper soils (i.e. >8.3 m / ~RL-4.3) and based on DP's previous experience in the area, an initial liming rate of **5 to 10 kg lime/tonne (~8 to 16kg lime/m^3)** should be adopted for pile spoil generated from depths greater than 8.3 m / ~RL-4.3.

The above liming rates are based on the use of Grade 1 agricultural lime with an effective neutralising value (ENV) of 80% and an estimated bulk density of 1.8 tonne/m^3 for sands and 1.4 tonne/m^3 for excavated clays (Note: A bulk density of 1.6- tonne/m^3 has been utilised in the above estimates given the clayey sand/sandy clays encountered at depth).

Site specific testing will be required to confirm ASS conditions at depths greater than 8.3 m / ~RL-4.3, to confirm ASS conditions and where present calculate site-specific initial liming rates to minimise the risk of over-liming or unnecessary treatment. Given the preliminary nature of previous ASS testing by Martens (2021) it is also recommended that the additional sampling and testing of deeper soils also include systematic sampling and testing comprising screening testing and detailed ASS (Scr suite) testing of upper natural soils for confirmation purposes.

7.2 Liming and Monitoring Procedure

The initial liming rates should be trialled to minimise the risk of over-liming. Lime rates should be confirmed and modified as required during the works through validation testing.

The following liming / monitoring procedures for the treatment of ASS are recommended:

- The surface of the bunded soil treatment area/stockpile area adjacent to the excavation should be dosed with approximately 1 kg/m^2 of agricultural lime as a precautionary measure. If ASS are to be treated over existing concrete / asphalt pavements, treatment areas should be appropriately bunded with fill/treated ASS or hay bales etc and lined with black plastic;
- All excavated ASS should be contained within the suitably bunded area(s) and kept moist to minimise oxidation, prior to treatment with lime. Progressive neutralisation will minimise the area required for bunding;
- The neutralising agent and ASS should be thoroughly mixed and aerated using, for example, an agricultural lime spreader and excavator or rotary hoe. The soil should be treated in layers up to 300 mm thick to encourage aeration;
- Stockpiled ASS soil should be limed as soon as practicable following excavation initially at the estimated lime application rate (refer to Section 7.1). Application rates at the site may vary depending on soil conditions encountered at depths greater than 8.3 m (~RL 4.3);
- The actual lime rate required will also depend on the results of monitoring during neutralisation. Additional lime will be required if monitoring results indicate that appropriate neutralisation has not been achieved. Conversely the liming rate may decrease if monitoring suggests over-liming has occurred;

- Sampling and testing should be undertaken in accordance with Section 7.5 to verify the neutralisation treatment. The acceptance criteria are discussed in Section 7.6. Depending on the results of testing, reapplication of lime may be necessary to gain adequate neutralisation. Care should be taken to avoid over-liming of soils;
- Upon verification of treatment, the neutralised ASS could be re-used on site or disposed to a licensed landfill following confirmation of the waste classification by an appropriately qualified consultant. It is noted that ASS must be appropriately neutralised prior to off-site landfill disposal in accordance with NSW EPA *Waste Classification Guidelines - Part 4: Acid Sulfate Soils* (NSW EPA, 2014). Alternatively, the NSW EPA may assess an application for reuse of the treated soils on another site, via classification with a specific exemption. The requirements for the exemption should be confirmed prior to construction;
- The geotechnical and contamination suitability of the treated soils should be confirmed if proposed for re-use.

It is noted that there is a potential for piling spoil brought to the surface to be intermixed with concrete materials that will generally raise the soil pH and potentially neutralise ASS conditions to some degree. It is recommended that initial screening / testing of pile spoil is conducted prior to lime application to confirm liming requirements and avoid over application.

7.3 Neutralising Leachate

Leachate water collected from the bunded area(s) should be neutralised as necessary before disposal. Calcined magnesia (magnesium hydroxide, burnt magnesite, or magnesia) is the recommended neutralising agent as it produces a two-step reaction, which proceeds rapidly at acidic pH and slows down as higher pH is approached, and hence reduces the potential for over-neutralisation to occur.

The amount of neutraliser required to be added to the leachate can be calculated from the following equation:

$$\textit{Alkali Material Required (kg)} = \frac{M_{Alkali} \times 10^{-pH\ initial}}{2 \times 10^{3}} \times V$$

where: pH initial = initial pH of leachate

V = volume of leachate (litres)

M_{Alkali} = molecular weight of alkali material (g/mole)

Note: molecular weight of calcined magnesia (M_{MgO}) = 40 g/mole.

The alkali should be added to the leachate as slurry. Mixing of the slurry is best achieved using an agitator.

Any discharge / disposal of water (if required) should be conducted in accordance with statutory and regulatory requirements and site-specific approvals from Water NSW (if required).

Regular monitoring of leachate should be conducted as discussed in Section 7.5.

7.4 Dewatering

Groundwater at the site has previously been intercepted during field investigations at a depth range of 0.5 to 5.6 m bgl (DP, 2022; Martens, 2021). For the more recent DSI (DP, 2023), free groundwater was observed in Pits 225, 305 and 306 at depths of 1.1 m to 2.8 m bgl (approximate RL 1.8 to RL -0.5) which is considered more representative of typical groundwater levels.

No information has been provided regarding the potential for dewatering for the proposed development. Dewatering, if required, is expected to be localised for service trenches and shallow excavations. If dewatering activities are required for the project they should be conducted according to appropriate licencing and regulatory requirements (i.e., Hunter Water Corporation, Newcastle City Council etc) as well as the strategies provided below where dewatering is likely to disturb ASS.

Potential options for the management / disposal of extracted groundwater during dewatering include the following:

- Re-injection of groundwater at a location away from the dewatered excavation;
- Overland discharge and infiltration, or infiltration within a temporary pond/basin;
- Disposal to sewer subject to a Trade Waste agreement;
- Stormwater disposal subject to regulatory approval and appropriate water quality treatment and monitoring requirements.

The following procedure is recommended to minimise potential adverse impacts resulting from excavation and dewatering of ASS during construction:

- Minimise the dewatering depth required for installation (i.e., as close as practicable to the invert level of the excavation);
- Minimise the time and volume of exposed ASS (i.e., staged excavations and dewatering);
- If re-injection is proposed, periodic monitoring of reinjected water should be conducted to assess potential impacts from the dewatering process;
- For discharge / infiltration methods, extracted groundwater should be collected in a suitably sized multi-stage sedimentation tank or on-site detention structures and neutralised as necessary prior to disposal;
- The extracted groundwater could then be discharged to a bunded area or constructed pond/basin away from the dewatering site (i.e., reinjected or evaporation/infiltration) or discharged overland or to sewer/stormwater, subject to regulatory requirements and licences;
- Background groundwater pH was measured at 7.0 in December 2022 (DP, 2023), however, pH of the extracted water should be monitored prior to dewatering and discharge. Neutralisation should be undertaken, as discussed below, if discharge water pH falls below natural background levels for re-injection / evaporation / infiltration or outside regulatory requirements (sewer/stormwater disposal);
- Dose the base of temporary excavations (i.e., service trenches, stormwater retention etc.) at a rate of approximately 1 kg/m^2 of agricultural lime prior to construction and cessation of dewatering to counteract the generation of acidic leachate following groundwater recovery;

- Segregate and treat the ASS excavated during construction as discussed in Section 7.1 and 7.2; and
- Undertake monitoring as recommended in Section 7.5.

The following procedure is recommended for neutralising groundwater if required:

- The neutralising agent (e.g., agricultural lime or calcined magnesia) should be added as a slurry at the first stage of a multi-stage sedimentation tank or detention structure to allow the lime to mix with the extracted groundwater prior to discharge;
- The neutralising agent should be added at a constant rate during dewatering. The rate of dosing should be minimal initially and be monitored and adjusted based on the results of regular monitoring of the treated extracted groundwater.

It is noted that the above procedures should be reviewed following completion of the detailed site investigation (DSI) and preparation of a site-specific remediation action plan (RAP) to ensure the procedures are commensurate with contaminated land requirements.

7.5 Monitoring Strategies

7.5.1 Soil Neutralisation / Management

It is recommended that the following inspections and monitoring be undertaken when excavating ASS materials, based on guidelines presented in the ASSMAC (Stone, Ahern, & Blunden, 1998) and QASSIT (Ahern, McElnea, & Sullivan, 2004) manuals:

- Daily inspection of liming operations during initial excavation, to be reviewed following establishment of liming procedures;
- Sampling and testing after lime treatment (i.e., measurements of soil pH in distilled water and pH following oxidation with peroxide) should initially be undertaken at a frequency of at least one sample per 20 m^3 excavated soil to verify the neutralisation treatment. The frequency of testing could be reviewed as treatment progresses. A lower frequency of testing could be considered, subject to consistent results, soil conditions and treatment procedures;
- Analysis of soil samples for chromium suite analysis by a NATA accredited laboratory to confirm appropriate neutralisation, with sampling density in stockpiles as follows:
  - <250 m^3: two samples;
  - 250-500 m^3: three samples;
  - 500-1000 m^3: four samples.
- The frequency of testing could be reduced depending on the results of monitoring and consistency of excavated ASS.

Note: The frequency of testing would also need to comply with NSW EPA requirements in the event that a specific exemption was sought for off-site re-use of treated ASS materials.

7.5.2 Leachate Management

Leachate collected within the bunded area should be temporarily stored and neutralised as necessary. The pH of the leachate should be monitored daily, and prior to any discharge to the environment. The neutralised leachate could be discharged overland within the site (e.g., controlled evaporation/infiltration), or discharged to sewer / stormwater, subject to regulatory requirements and licences/approvals.

Neutralisation/treatment should be undertaken if discharge water pH falls below background levels if overland evaporation/infiltration is proposed, or to within regulatory requirements if discharge is proposed.

A contingency procedure should be in place to allow lime dosing and monitoring to confirm neutralisation prior to discharge.

7.5.3 Dewatering

Extracted groundwater should be temporarily stored and neutralised as necessary. The pH of extracted water associated with areas of ASS should be monitored twice daily (AM, PM) prior to discharge. The groundwater could be reinjected, discharged overland (i.e., evaporation / infiltration) as discussed in Section 7.4, or discharged to sewer or stormwater subject to regulatory requirements and licences.

Neutralisation should be undertaken if discharge water pH falls below natural background groundwater levels (re-injection / evaporation / infiltration) or outside regulatory requirements (stormwater/sewer discharge). Background groundwater pH was recorded at 7.0 from an irrigation bore in the eastern part of the site in December 2022 (DP, 2023). Construction details and depth for the irrigation bore were not known at the time of the DSI and may not to have been representative of groundwater conditions in the area (it was considered that the bore potentially contained tap/town water). Therefore, pH should be retested at the commencement of dewatering.

A contingency procedure should be in place to allow for lime dosing and monitoring confirming that neutralisation has been achieved prior to discharge.

7.5.4 Reporting

A record of treatment of ASS and leachate should be maintained by the contractor and should include the following details:

- Date;
- Location and source of material (e.g., excavation of pile spoil generation);
- Time stockpile has been exposed prior to treatment (i.e., time of excavation and backfilling);
- Neutralisation process undertaken;
- Lime rate utilised;
- Results of soil, leachate and groundwater monitoring;
- Records of ASS disposal to landfill or alternative site under a specific exemption (if applicable);
- Record of location and level placement where treated ASS has been re-used on-site (if any).

A record should also be maintained confirming contingency measures and additional treatment if undertaken. Monitoring should be commensurate with licencing and regulatory requirements.

A final report should be issued upon completion of the works presenting the monitoring regime and results to confirm that no adverse environmental impact has occurred during the works. The report shall include (where required) details of the total volume of ASS excavated, detailed analytical results confirming that acceptable ASS treatment has occurred, water monitoring results of extracted groundwater (where required), site records from contractors and records of the final disposal destination of the materials removed from site (if required).

A report will be prepared by the environmental consultant with reference to the ASSMAC (Stone, Ahern, & Blunden, 1998) and QASSIT (Ahern, McElnea, & Sullivan, 2004) guidelines as well as other appropriate guidance documentation detailing the results of ASS management during construction.

7.6 Acceptance Criteria

7.6.1 Water

Discharge of waters should be conducted in accordance with relevant statutory and regulatory requirements including ANZECC (2000) and ANZG (2018).

Measurement of pH and EC of groundwater at the commencement of construction should be conducted. These measurements in conjunction with those measured during the previous investigation summarised in Table B1 in Appendix B will be used to confirm baseline conditions at the site prior to evaporation / infiltration / re-injection at the site.

Groundwater quality should be assessed in accordance with regulatory requirements if discharge to sewer/stormwater is required.

It is noted that the ANZECC (2000) trigger value range of pH 7.0 to pH 8.5 for estuarine environments is considered to be appropriate for surface water / stormwater discharge, rather than the marine or freshwater criteria as the Hunter River is the closest surface water body receptor. pH adjustment may therefore be required for this option.

7.6.2 Soil

Further treatment of soils may be required if monitoring of the material reveals any of the following properties:

- pH_F is less than background values. Applicable background values are those present within the area proposed for re-use of treated ASS (i.e., background pH of soils within re-use areas). At the commencement of ASS construction activities, the background soil pH should be determined within the nominated re-use areas (where required);
- pH_F minus pH_{FOX} is greater than 1 and pH_F is less than background values;
- Net Acidity results are greater than zero OR the lime associated acid neutralisation capacity (ANC) <1.5 times the Existing and Potential Acidity.

Depending on the results of testing, reapplication of lime may be necessary to gain adequate neutralisation. Care should be taken to ensure over-liming does not occur.

Note: The validation testing would also need to comply with NSW EPA (2014) requirements if a specific exemption was sought for off-site re-use of treated ASS materials.

8. ASS Contingency Plan

Remedial action will be required if the standards or acceptance criteria outlined above are not being achieved. Remedial action could include but not be limited to the following:

- Mixing of additional lime through the excavated material if neutralisation does not satisfy the criteria as provided in Section 7.1;
- Additional neutralisation of leachate if under liming has occurred;
- If monitoring indicates that over-liming has occurred, additional untreated ASS or leachate should be mixed through over-limed soils to reduce pH to acceptable levels. The required mixing rate to remediate the soil or leachate should be confirmed by monitoring tests;
- Cessation of dewatering discharge if monitoring indicates groundwater conditions are outside background values and regulatory requirements (dependent upon the discharge option). Should dewatering discharge be restricted, contingency would include collection, treatment and/or disposal of extracted groundwater to a licensed facility.

During periods of heavy or prolonged rainfall, stockpiled soils should be appropriately contained/covered or temporarily backfilled to minimise leachate generation and runoff.

Sufficient lime should be stored on site during construction for the neutralisation of ASS and contingency measures.

The development should be conducted with due regard to erosion and sediment controls to minimise potential impacts to nearby sensitive receptors, including stormwater drains.

Management of ASS during construction should be conducted by an experienced contractor in accordance with regulatory and statutory requirements. Validation of ASS management should be conducted by an experienced and qualified environmental consultant.

9. References

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Stone, Y., Ahern, C. R., & Blunden, B. (1998). *Acid Sulfate Soil Manual.* Acid Sulfate Soil Management Committee (ASSMAC).

Sullivan, L., Ward, N., Toppler, N., & Lancaster, G. (2018). *National Acid Sulfate Soils Guidance: National Acid Sulfate Soils Sampling and Identification Methods Manual.* Canberra ACT CC BY 4.0: Department of Agriculture and Water Resources.

10. Limitations

Douglas Partners (DP) has prepared this report for this project at 25a National Park Street, Newcastle West with reference to DP's proposal 213618.02.P.001.Rev0 dated 15 June 2022 and approved variation and acceptance received from School Infrastructure. The work was carried out under Part D – Standard Form Agreement (SINSW03434/22) dated 21 July 2022. This report is provided for the exclusive use of School Infrastructure NSW for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after field testing has been completed.

DP's advice is based upon the conditions encountered during previous investigation by DP and others. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental and groundwater components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

About This Report
Terminology, Symbols and Abbreviations
Soil Descriptions
Sampling, Testing and Excavation Methodology
Rock Descriptions
Cone Penetration Testing
Cone Penetration Tests (CPT 101 to 107) – DP (2022)
Borehole Logs (Bores 1a, 5a and 107a) – DP (2022)
Borehole Log (Bore 4) – DP (2022)
Borehole Logs (Bores 201A to 220 and 301 to 303) – DP (2023)
Test Pit Logs (304 to 316) – DP (2023)

About this Report

August 2020

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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Borehole and Test Pit Logs

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

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

Groundwater

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

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

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

continued next page

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

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

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Terminology, Symbols and Abbreviations

August 2020

Introduction to Terminology, Symbols and Abbreviations

Douglas Partners' reports, investigation logs, and other correspondence may use terminology which has quantitative or qualitative connotations. To remove ambiguity or uncertainty surrounding the use of such terms, the following sets of notes pages may be attached Douglas Partners' reports, depending on the work performed and conditions encountered:

- Soil Descriptions;
- Rock Descriptions; and
- Sampling, insitu testing, and drilling methodologies

In addition to these pages, the following notes generally apply to most documents.

Abbreviation Codes

Site conditions may also be presented in a number of different formats, such as investigation logs, field mapping, or as a written summary. In some of these formats textual or symbolic terminology may be presented using textual abbreviation codes or graphic symbols, and, where commonly used, these are listed alongside the terminology definition. For ease of identification in these note pages, textual codes are presented in these notes in the following style `XW`. Code usage conforms with the following guidelines:

- Textual codes are case insensitive, although herein they are generally presented in upper case; and
- Textual codes are contextual (i.e. the same or similar combinations of characters may be used in different contexts with different meanings (for example `PL` is used for plastic limit in the context of soil moisture condition, as well as in `PL(A)` for point load test result in the testing results column)).

Data Integrity Codes

Subsurface investigation data recorded by Douglas Partners is generally managed in a highly structured database environment, where records "span" between a top and bottom depth interval. Depth interval "gaps" between records are considered to introduce ambiguity, and, where appropriate, our practice guidelines may require contiguous data sets. Recording meaningful data is not always appropriate (for example assigning a "strength" to a concrete pavement) and the following codes may be used to maintain contiguity in such circumstances.

Term	Description	Abbreviation Code
Core loss	No core recovery	`KL`
Unknown	Information was not available to allow classification of the property. For example, when auguring in loose, saturated sand auger cuttings may not be returned.	`UK`
No data	Information required to allow classification of the property was not available. For example if drilling is commenced from the base of a hole predrilled by others	`ND`
Not Applicable	Derivation of the properties not appropriate or beyond the scope of the investigation. For example providing a description of the strength of a concrete pavement	`NA`

Graphic Symbols

Douglas Partners' logs contain a "graphic" column which provides a pictorial representation of the basic composition of the material. The symbols used are directly representing the material name stated in the adjacent "Description of Strata" column, and as such no specific graphic symbology legend has been provided in these notes.

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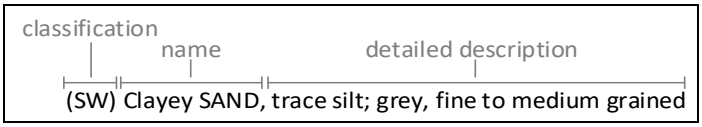
Soil Descriptions

Terminology
Symbols
Abbreviations

August 2020

Introduction

All materials which are not considered to be "in-situ rock" are described in general accordance with the soil description model of AS 1726-2017 Part 6.1.3, and can be broken down into the following description structure:



The "classification" comprises a two character "group symbol" providing a general summary of dominant soil characteristics. The "name" summarises the particle sizes within the soil which most influence it's behaviour. The detailed description presents more information about the soil's composition, condition, structure, and origin.

Classification, naming and description of soils requires the relative proportion of particles of different sizes within the whole soil mixture to be considered.

Particle size designation and Behaviour Model

Solid particles within a soil are differentiated on the basis of size.

The engineering behaviour properties of a soil can subsequently be modelled to be either "fine grained" (also known as "cohesive" behaviour) or "coarse grained" ("non cohesive" behaviour), depending on the relative proportion of fine or coarse fractions in the soil mixture.

Particle Size Fraction	Particle Size (mm)	Behaviour Model	
		Behaviour	Approximate Dry Mass
Boulder	>200	Excluded from particle behaviour model as "oversize"	
Cobble	63 - 200		
Gravel[1]	2.36 - 63	Coarse	>65%
Sand[1]	0.075 - 2.36		
Silt	0.002 - 0.075	Fine	>35%
Clay	<0.002		

[1] – refer grain size subdivision descriptions below

The behaviour model boundaries defined above are not precise, and the material behaviour should be assumed from the name given to the material (which considers the particle fraction which dominates the behaviour, refer "component proportions" below), rather than strict observance of the proportions of particle sizes. For example, if a material is named a "Sandy CLAY", this is indicative that the material exhibits fine grained behaviour, even if the dry mass of coarse grained material may exceed 65%.

Component proportions

The relative proportion of the dry mass of each particle size fraction is assessed to be a "primary", "secondary", or "minor" component of the soil mixture, depending on it's influence over the soils behaviour.

Component Proportion Designation	Definition[1]	Relative Proportion	
		In Fine Grained Soil	In Coarse Grained Soil
Primary	The component (particle size designation, refer above) which dominates the engineering behaviour of the soil	The clay/silt component with the greater proportion	The sand/gravel component with the greater proportion
Secondary	Any component which is not the primary, but is significant to the engineering properties of the soil	Any component with greater than 30% proportion	Any granular component with greater than 30%; or Any fine component with greater than 12%
Minor[2]	Present in the soil, but not significant to it's engineering properties	All other components	All other components

[1] – As defined in AS1726-2017 6.1.4.4

[2] – in the detailed material description, minor components are split into two further sub categories. Refer "identification of minor components" below

Composite Materials

In certain situations a lithology description may describe more than one material, for example, collectively describing a layer of interbedded sand and clay. In such a scenario, the two materials would be described independently, with the names preceded or followed by a statement describing the arrangement by which the materials co-exist. For example "INTERBEDDED Silty CLAY AND SAND".

Classification

The soil classification comprises a two character group symbol. The first symbol identifies the primary component. The second symbol identifies either the grading or presence of fines in a coarse grained soil, or the plasticity in a fine grained soil. Refer AS1726-2017 6.1.6 for further clarification.

Soil Name

For most soils the name is derived with the primary component included as the noun (in upper case), preceded by any secondary components stated in an adjective form. In this way the soil name also describes the general composition and indicates the dominant behaviour of the material.

Component[1]	Prominence in Soil Name
Primary	Noun (eg "CLAY")
Secondary	Adjective modifier (eg "Sandy")
Minor	No influence

[1] – for determination of component proportions, refer component proportions on previous page

For materials which cannot be disaggregated, or which are not comprised of rock or mineral fragments, the names "ORGANIC MATTER" or "ARTIFICIAL MATERIAL" may be used, in accordance with AS1726-2017 Table 14.

Commercial or colloquial names are not used for the soil name where a component derived name is possible (for example "Gravelly SAND" rather than "CRACKER DUST").

Identification of minor components

Minor components are identified in the soil description immediately following the soil name. The minor component fraction is usually preceded with a term indicating the relative proportion of the component.

Minor Component Proportion Term	Relative Proportion	
	In Fine Grained Soil	In Coarse Grained Soil
With	All fractions: 15-30%	clay/silt: 5-12% sand/gravel: 15-30%
Trace	All fractions: 0-15%	clay/silt: 0-5% sand/gravel: 0-15%

Soil Composition

Plasticity

Descriptive Term	Laboratory liquid limit range	
	Silt	Clay
Non-plastic materials	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

Note, Plasticity descriptions generally describe the plasticity behaviour of the whole of the fine grained soil, not individual fine grained fractions.

Grain Size

Type		Particle size (mm)
Gravel	Coarse	19 - 63
	Medium	6.7 - 19
	Fine	2.36 – 6.7
Sand	Coarse	0.6 - 2.36
	Medium	0.21 - 0.6
	Fine	0.075 - 0.21

Grading

Grading Term	Particle size (mm)
Well	A good representation of all particle sizes
Poorly	An excess or deficiency of particular sizes within the specified range
Uniformly	Essentially of one size
Gap	A deficiency of a particular particle size with the range

Note, AS1726-2017 provides terminology for additional attributes not listed here.

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Soil Condition

Moisture

The moisture condition of soils is assessed relative to the plastic limit for fine grained soils, while for coarse grained soils it is assessed based on the appearance and feel of the material. The moisture condition of a material is considered to be independent of stratigraphy (although commonly these are related), and this data is presented in its own column on logs.

Applicability	Term	Tactile Assessment	Abbreviation code
Fine	Dry of plastic limit	Hard and friable or powdery	<PL
	Near plastic limit	Can be moulded	≈PL
	Wet of plastic limit	Water residue remains on hands when handling	>PL
	Near liquid limit	"oozes" when agitated	≈LL
	Wet of liquid limit	"oozes"	>LL
Coarse	Dry	Non-cohesive and free running	D
	Moist	Feels cool, darkened in colour, particles may stick together	M
	Wet	Feels cool, darkened in colour, particles may stick together, free water forms when handling	W

The abbreviation code NDF, meaning "not-assessable due to drilling fluid use" may also be used.

Note, observations relating to free ground water or drilling fluids are provided independent of soil moisture condition.

Consistency/Density/Compaction/Cementation/Extremely Weathered Rock

These concepts give an indication of how the material may respond to applied forces (when considered in conjunction with other attributes of the soil). This behaviour can vary independent of the composition of the material, and on logs these are described in an independent column and are generally mutually exclusive (i.e it is inappropriate to describe both consistency and compaction at the same time). The method by which the behaviour is described depends on the behaviour model and other characteristics of the soil as follows:

- In fine grained soils, the "consistency" describes the ease with which the soil can be remoulded, and is generally correlated against the materials undrained shear strength;
- In granular materials, the relative density describes how tightly packed the particles are, and is generally correlated against the density index;
- In anthropogenically modified materials the compaction of the material is described qualitatively;
- In cemented soils (both natural and anthropogenic), the cemented "strength" is described qualitatively, relative to the difficulty with which the material is disaggregated; and
- In soils of extremely weathered rock origin, the engineering behaviour may be governed by relic rock features, and expected behaviour needs to be assessed based the overall material description

Quantitative engineering performance of these materials may be determined by laboratory testing, or estimated by correlated field tests (for example penetration or shear vane testing), or by tactile methods, as appropriate.

Consistency (fine grained soils)

Consistency Term	Tactile Assessment	Undrained Shear Strength (kPa)	Abbreviation Code
Very soft	Extrudes between fingers when squeezed	<12	VS
Soft	Mouldable with light finger pressure	>12 - ≤25	S
Firm	Mouldable with strong finger pressure	>25 - ≤50	F
Stiff	Cannot be moulded by fingers	>50 - ≤100	ST
Very stiff	Indented by thumbnail	>100 - ≤200	VST
Hard	Indented by thumbnail with difficulty	>200	H
Friable	Easily crumbled or broken into small pieces by hand	-	FR

Relative Density (coarse grained soils)

Tactile assessment of relative density is difficult, and generally requires penetration testing, hence a tactile assessment guide is not provided.

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

Compaction (anthropogenically modified soil)

Compaction Term	Abbreviation Code
Well compacted	WC
Poorly compacted	PC
Moderately compacted	MC
Variably compacted	VC

Cementation (natural and anthropogenic)

Cementation Term	Abbreviation Code
Moderately cemented	MCE
Weakly cemented	WKCE
Cemented	CE
Strongly bound	SB
Weakly bound	WB
Unbound	UB

Extremely Weathered Rock

AS1726-2017 considers weathered rock material to be soil if the unconfined compressive strength is less than 0.6 MPa (i.e. very low strength rock). These materials may be identified as "extremely weathered rock" in reports and by the abbreviation code XWR on log sheets. This identification is not correlated to any specific qualitative or quantitative behaviour, and the engineering properties of this material must therefore be assessed according to engineering principles with reference to any relic rock structure, fabric, or texture described in the description.

Soil Origin

Term	Description	Abbreviation Code
Residual	Derived from in-situ weathering of the underlying rock	RES
Extremely weathered material	Formed from in-situ weathering of geological formations. Has strength of less than 'very low' as per as1726 but retains the structure or fabric of the parent rock.	XWM
Alluvial	Deposited by streams and rivers	ALV
Estuarine	Deposited in coastal estuaries	EST
Marine	Deposited in a marine environment	MAR
Lacustrine	Deposited in freshwater lakes	LCS
Aeolian	Carried and deposited by wind	AEO
Colluvial	Soil and rock debris transported down slopes by gravity	COL
Topsoil	Mantle of surface soil, often with high levels of organic material	TOP
Fill	Any material which has been moved by man	FILL
Littoral	Deposited on the lake or sea shore	LIT
Unidentifiable	Not able to be identified	UID

Cobbles and Boulders

The presence of particles considered to be "oversize" may be described using one of the following strategies:

- Oversize encountered in a minor proportion (when considered relative to the wider area) are noted in the soil description; or
- Where a significant proportion of oversize is encountered, the cobbles/boulders are described independent of the soil description, in a similar manner to composite soils (described above) but qualified with "MIXTURE OF".

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Rock Strength

Rock strength is defined by the unconfined compressive strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $I_{s(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Unconfined Compressive Strength (MPa)	Point Load Index[1] $I_{s(50)}$ MPa	Abbreviation Code
Very low	0.6 - 2	0.03 - 0.1	VL
Low	2 - 6	0.1 - 0.3	L
Medium	6 - 20	0.3 - 1.0	M
High	20 - 60	1 - 3	H
Very high	60 - 200	3 - 10	VH
Extremely high	>200	>10	EH

[1] Assumes a ratio of 20:1 for UCS to $I_{s(50)}$. It should be noted that the UCS to $I_{s(50)}$ ratio varies significantly for different rock types and specific ratios may be required for each site.

On investigation logs only, the following data contiguity codes may be in rock strength tables for layers or seams of material "within rock", but for which the equivalent UCS strength is less than 0.6 MPa.

Scenario	Abbreviation Code
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The properties of the material encountered over this interval are described in the "Description of Strata" and soil properties columns.	SOIL
The material encountered has an equivalent UCS strength of less than 0.6 MPa, and therefore is considered to be soil (as per Note 1 of Table 20 of AS 1726-2017). The prominence of the material is such that it can be considered to be a seam (as defined in Table 22 of AS1726-2017) and the properties of the material are described in the defect column.	SEAM

Degree of Weathering

The degree of weathering of rock is classified as follows:

Weathering Term	Description	Abbreviation Code
Residual Soil[1,2]	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.	RS
Extremely weathered[1,2]	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible	XW
Highly weathered	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.	HW
Moderately weathered	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.	MW
Slightly weathered	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.	SW
Fresh	No signs of decomposition or staining.	FR
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.	DW

[1] – AS1726-2017 6.1.9 provides similar definitions for "residual soil" and "extremely weathered material" as soil origins. Generally, the soil origin terms would be used above the depth at which very low strength or stronger rock material is first encountered, while both soil origin and weathering should may be stated for soil encountered below the first contact with rock material, where appropriate.

[2] –The parent rock type, of which the residual/extremely weathered material is a derivative, will be stated in the description (where discernible).

Degree of Alteration

The degree of alteration of the rock material (physical or chemical changes caused by hot gasses or liquids at depth) is classified as follows:

Term	Description	Abbreviation Code
Extremely altered	Material is altered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.	XA
Highly altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is changed by alteration. Some primary minerals are altered to clay minerals. Porosity may be increased by leaching, or may be decreased due to precipitation of secondary materials in pores.	HA
Moderately altered	The whole of the rock material is discoloured, usually by staining or bleaching to the extent that the colour of the original rock is not recognisable but shows little or no change of strength from fresh rock.	MA
Slightly altered	Rock is slightly discoloured but shows little or no change of strength from fresh rock	SA
Note: If HA and MA cannot be differentiated use DA (see below)		
Distinctly altered	Rock strength usually changed by alteration. The rock may be highly discoloured, usually by staining or bleaching. Porosity may be increased by leaching, or may be decreased due to precipitation of secondary minerals in pores.	DA

Degree of Fracturing

The following descriptive classification apply to the spacing of natural occurring fractures in the rock mass. It includes bedding plane partings, joints and other defects, but excludes drilling breaks. These terms are generally not required on investigation logs where fracture spacing is presented as a histogram, and where used are presented in an unabbreviated format.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq 100 \text{ mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

These terms may be used to describe the spacing of bedding partings in sedimentary rocks. Where used, these terms are generally presented in an unabbreviated format

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Defect Descriptions

Defect Type

Term	Abbreviation Code
Bedding plane	B
Clay seam	CS
Cleavage	CV
Crushed zone	CZ
Decomposed seam	DS
Fault	F
Joint	J
Lamination	LAM
Parting	PT
Sheared zone	SZ
Vein	VN
Drilling/handling break	DB , HB
Fracture	FCT

Rock Defect Orientation

Term	Abbreviation Code
Horizontal	H
Vertical	V
Sub-horizontal	SH
Sub-vertical	SV

Rock Defect Coating

Term	Abbreviation Code
Clean	CLN
Coating	CO
Healed	HE
Infilled	INF
Stained	STN
Tight	TI
Veneer	VEN

Rock Defect Infill

Term	Abbreviation Code
Calcite	CA
Carbonaceous	CBS
Clay	CLY
Iron oxide	FE
Manganese	MN
Silty	SLT

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Rock Defect Shape/Planarity

Term	Abbreviation Code
Curved	CU
Irregular	IR
Planar	PL
Stepped	ST
Undulating	UN

Rock Defect Roughness

Term	Abbreviation Code
Polished	PO
Rough	RO
Slickensided	SL
Smooth	SM
Very rough	VR

Other Rock Defect Attributes

Term	Abbreviation Code
Fragmented	FG
Band	BND
Quartz	QTZ

Defect Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

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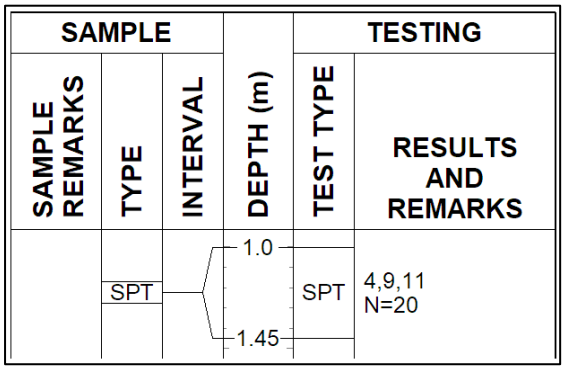
Sampling, Testing and Excavation Methodology

Terminology
Symbols
Abbreviations

August 2020

Sampling and Testing

A record of samples retained and field testing performed is usually shown on a Douglas Partners' log with samples appearing to the left of a depth scale, and selected field and laboratory testing (including results, where relevant) appearing to the right of the scale, as illustrated below:



Sampling

The type or intended purpose for which a sample was taken is indicated by the following abbreviation codes.

Sample Type	Code
Auger sample	A
Acid sulfate sample	ASS
Bulk sample	B
Core sample	C
Disturbed sample	D
Sample from SPT test	SPT
Environmental sample	E
Gas sample	G
Jar sample	J
Undisturbed tube sample	U[1]
Water sample	W
Piston sample	P
Core sample for unconfined compressive strength testing	UCS

[1] – numeric suffixes indicate tube diameter/width in mm

The above codes only indicate that a sample was retained, and not that testing was scheduled or performed.

Field and Laboratory Testing

A record that field and laboratory testing was performed is indicated by the following abbreviation codes.

Test Type	Code
Pocket penetrometer (kpa)	PP
Photo ionisation detector	PID
Standard Penetration Test	SPT
Shear vane (kpa)	V
Unconfined compressive strength, (MPa)	UCS
Point load test, axial (A), diametric (D), irregular (I)	PLT(_)

Field and laboratory testing (continued)

Test Type	Code
Dynamic cone penetrometer, followed by blow count penetration increment in mm (cone tip, generally in accordance with AS1289.6.3.2)	DCP/150
Perth sand penetrometer, followed by blow count penetration increment in mm (flat tip, generally in accordance with AS1289.6.3.3)	PSP/150

Groundwater Observations

▷	seepage/inflow
▽	standing or observed water level
NFGWO	no free groundwater observed
OBS	Observations obscured by drilling fluids

Drilling or Excavation Methods/Tools

The drilling/excavation methods used to perform the investigation may be shown either in a dedicated column down the left hand edge of the log, or stated in the log footer. In some circumstances abbreviation codes may be used.

Method	Abbreviation Code
Excavator/backhoe bucket	B[1]
Toothed bucket	TB[1]
Mud/blade bucket	MB[1]
Ripping tyne/ripper	RT
Rock breaker/hydraulic hammer	RB
Hand auger	HA[1]
NMLC series coring	NMLC
HMLC series coring	HMLC
NQ coring	NQ
HQ coring	HQ
PQ coring	PQ
Push tube	PT [1]
Rock roller	RR[1]
Solid flight auger. Suffixes (TC) and (V) indicate tungsten carbide or v-shaped tip respectively	SFA[1]
Sonic drilling	SON[1]
Vibrocore	VC[1]
Wash bore (unspecified bit type)	WB[1]
Existing exposure	X
Hand tools (unspecified)	HT
Predrilled	PD
Specialised bit (refer report)	SPEC[1]
Diatube	DT[1]
Hollow flight auger	HFA[1]
Vacuum excavation	VE

[1] – numeric suffixes indicate tool diameter/width in mm

CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGH SCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

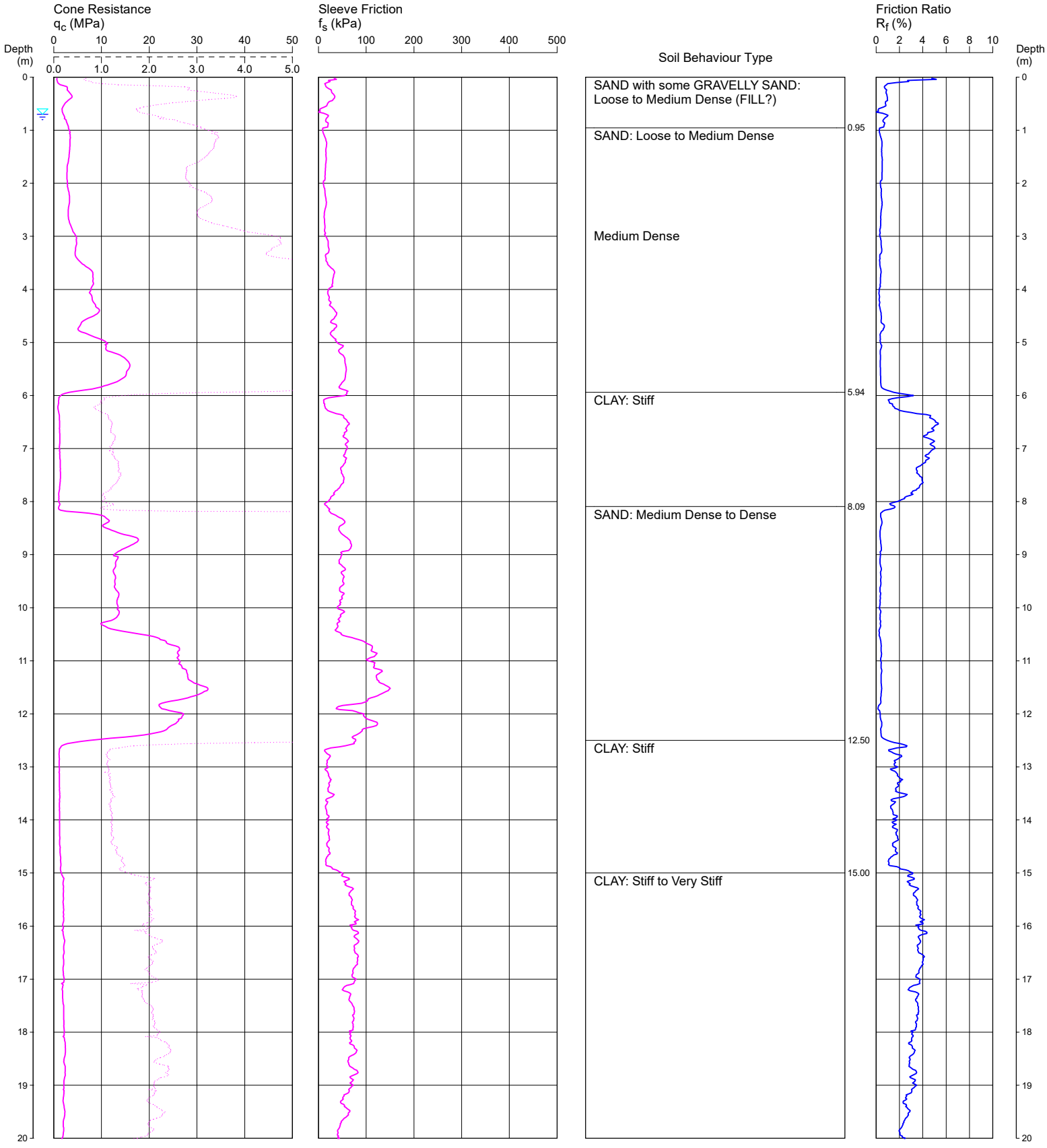
REDUCED LEVEL: 2.6

COORDINATES: 384035.8E 6355583.4N AHD

CPT101

DATE 13/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO SUDDEN BEND ON HARD MATERIAL
GROUNDWATER LEVEL OBSERVED AT 0.7M AFTER WITHDRAWAL OF RODS

Water depth after test: 0.70m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT101.CP5

Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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Geotechnics | Environment | Groundwater

CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGH SCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

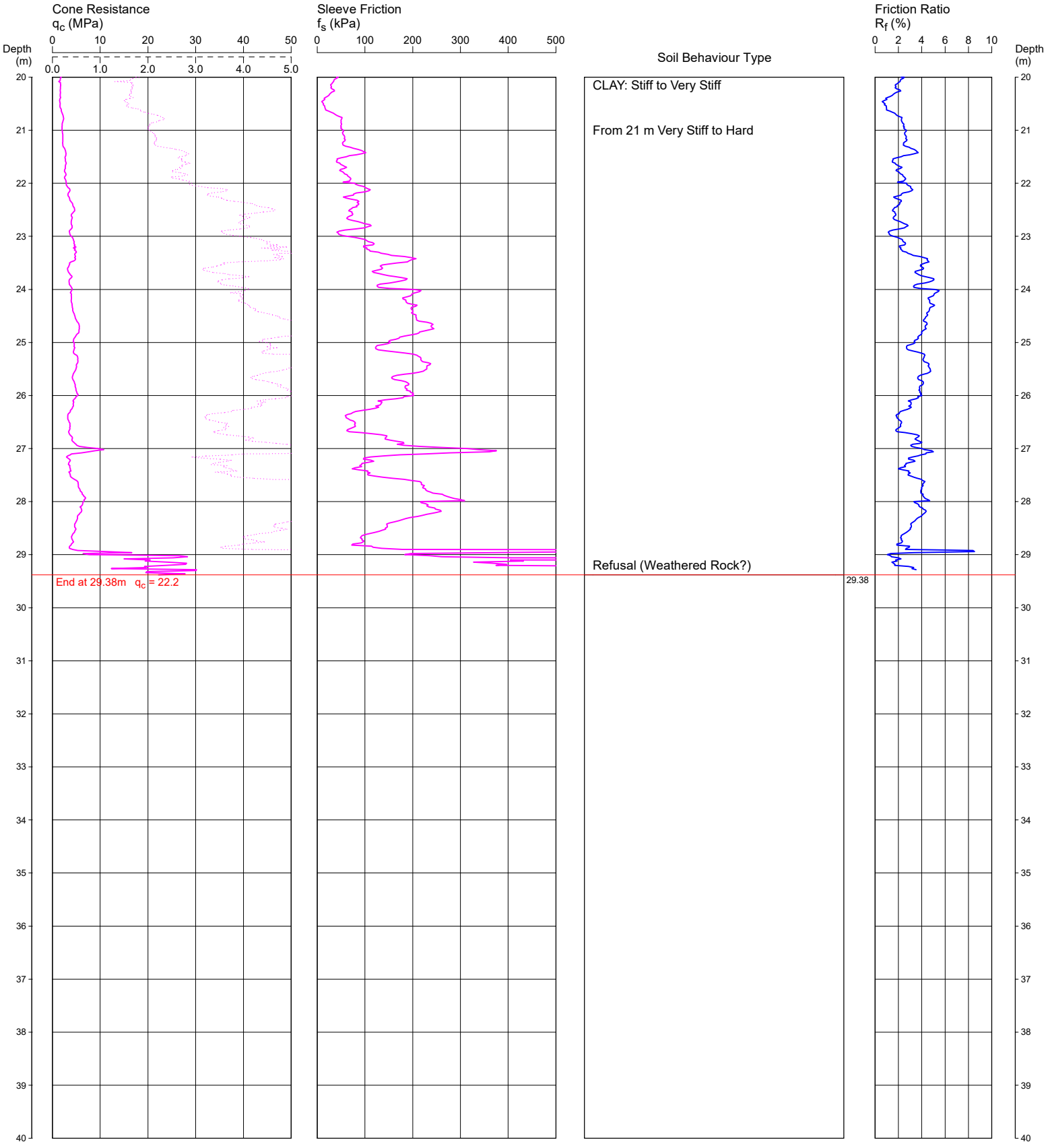
REDUCED LEVEL: 2.6

COORDINATES: 384035.8E 6355583.4N AHD

CPT101

DATE 13/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO SUDDEN BEND ON HARD MATERIAL
GROUNDWATER LEVEL OBSERVED AT 0.7M AFTER WITHDRAWAL OF RODS

Water depth after test: 0.70m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT101.CP5

Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGHSCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

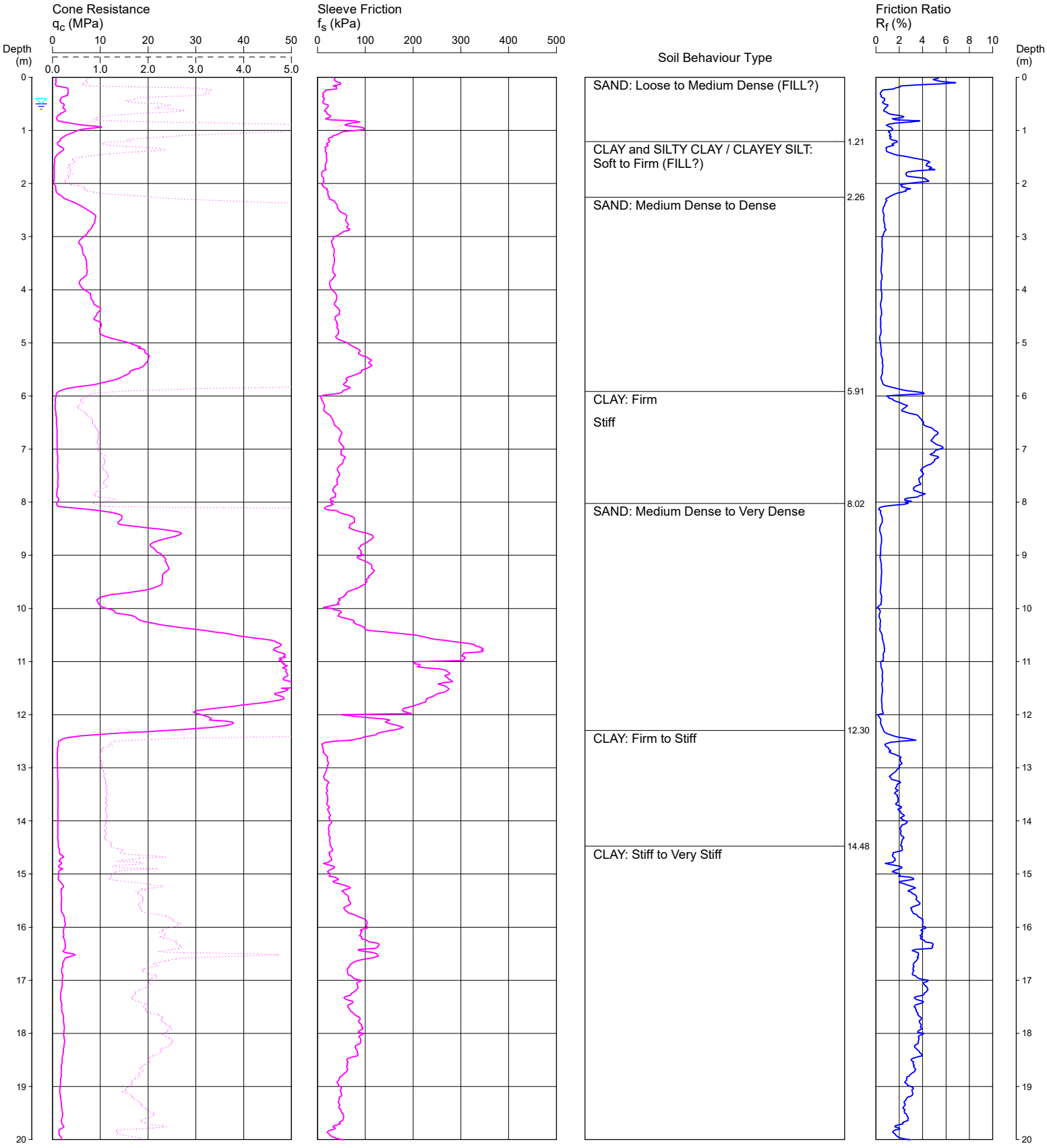
REDUCED LEVEL: 2.3

COORDINATES: 384014.1E 6355610.4N AHD

CPT102

DATE 14/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE ROD BOWING IN INFERRED WEATHERED ROCK
GROUNDWATER LEVEL OBSERVED AT 0.5M AFTER WITHDRAWAL OF RODS

Water depth after test: 0.50m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT102.CP5

Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGHSCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

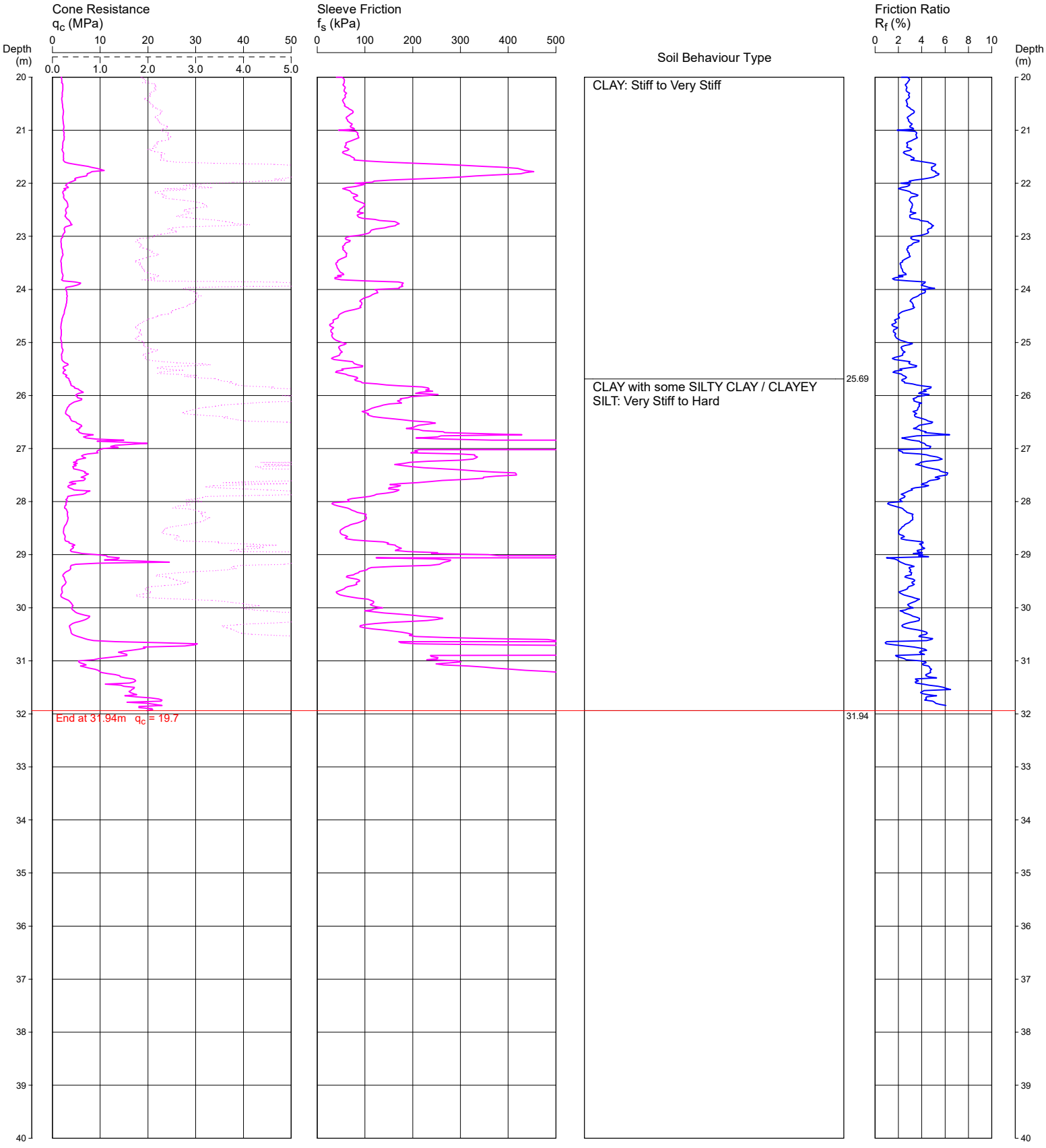
REDUCED LEVEL: 2.3

COORDINATES: 384014.1E 6355610.4N AHD

CPT102

DATE 14/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE ROD BOWING IN INFERRED WEATHERED ROCK
GROUNDWATER LEVEL OBSERVED AT 0.5M AFTER WITHDRAWAL OF RODS

Water depth after test: 0.50m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT102.CP5

Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGHSCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

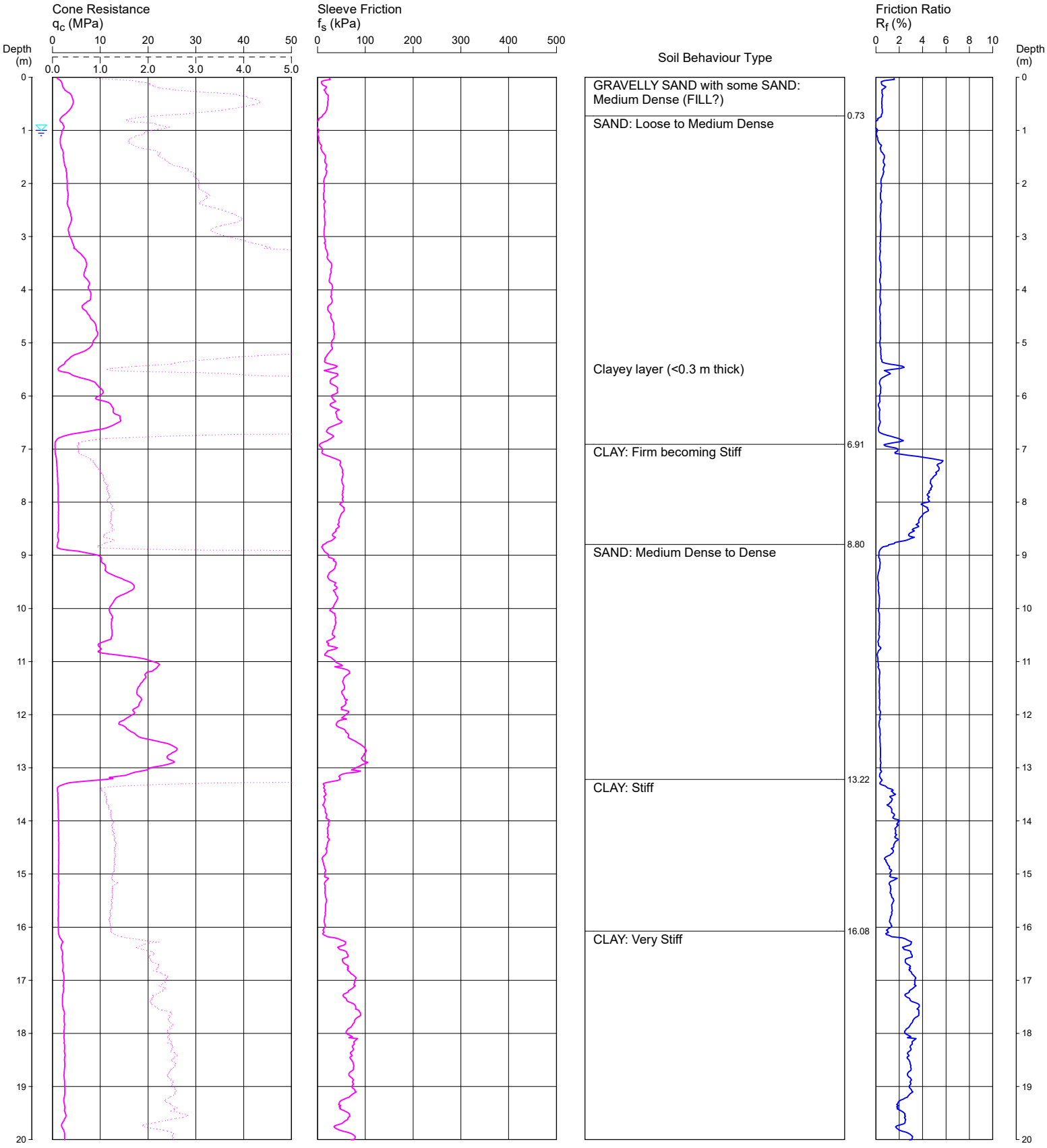
REDUCED LEVEL: 3.3

COORDINATES: 383991.2E 6355578.0N AHD

CPT103

DATE 13/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO SUDDEN BEND ON HARD MATERIAL
GROUNDWATER LEVEL OBSERVED AT 1.0M AFTER WITHDRAWAL OF RODS

Water depth after test: 1.00m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT103.CP5

Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGHSCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

REDUCED LEVEL: 3.3

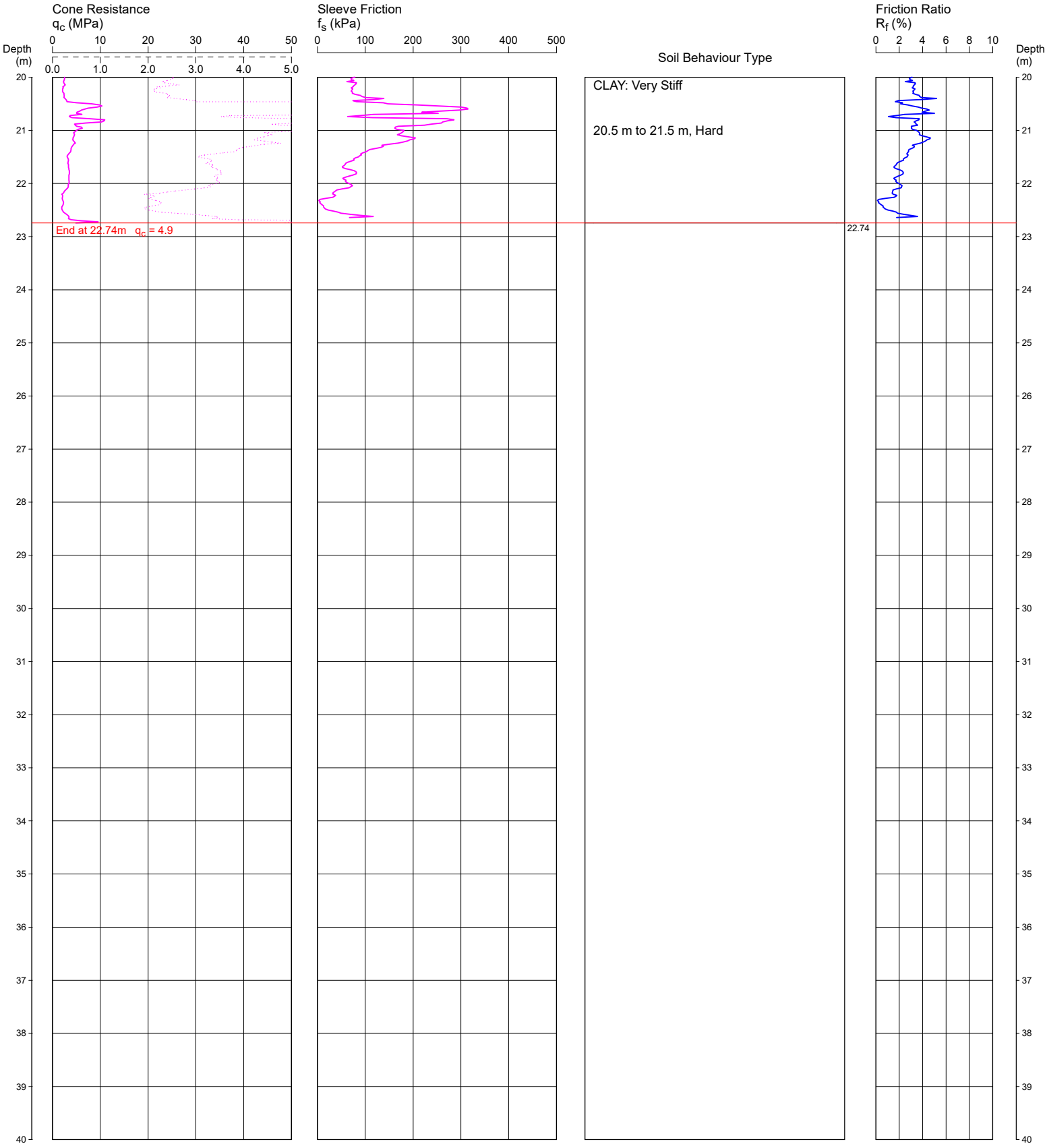
COORDINATES: 383991.2E 6355578.0N AHD

CPT103

Page 2 of 2

DATE 13/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO SUDDEN BEND ON HARD MATERIAL
GROUNDWATER LEVEL OBSERVED AT 1.0M AFTER WITHDRAWAL OF RODS

Water depth after test: 1.00m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT103.CP5
Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2
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CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGH SCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

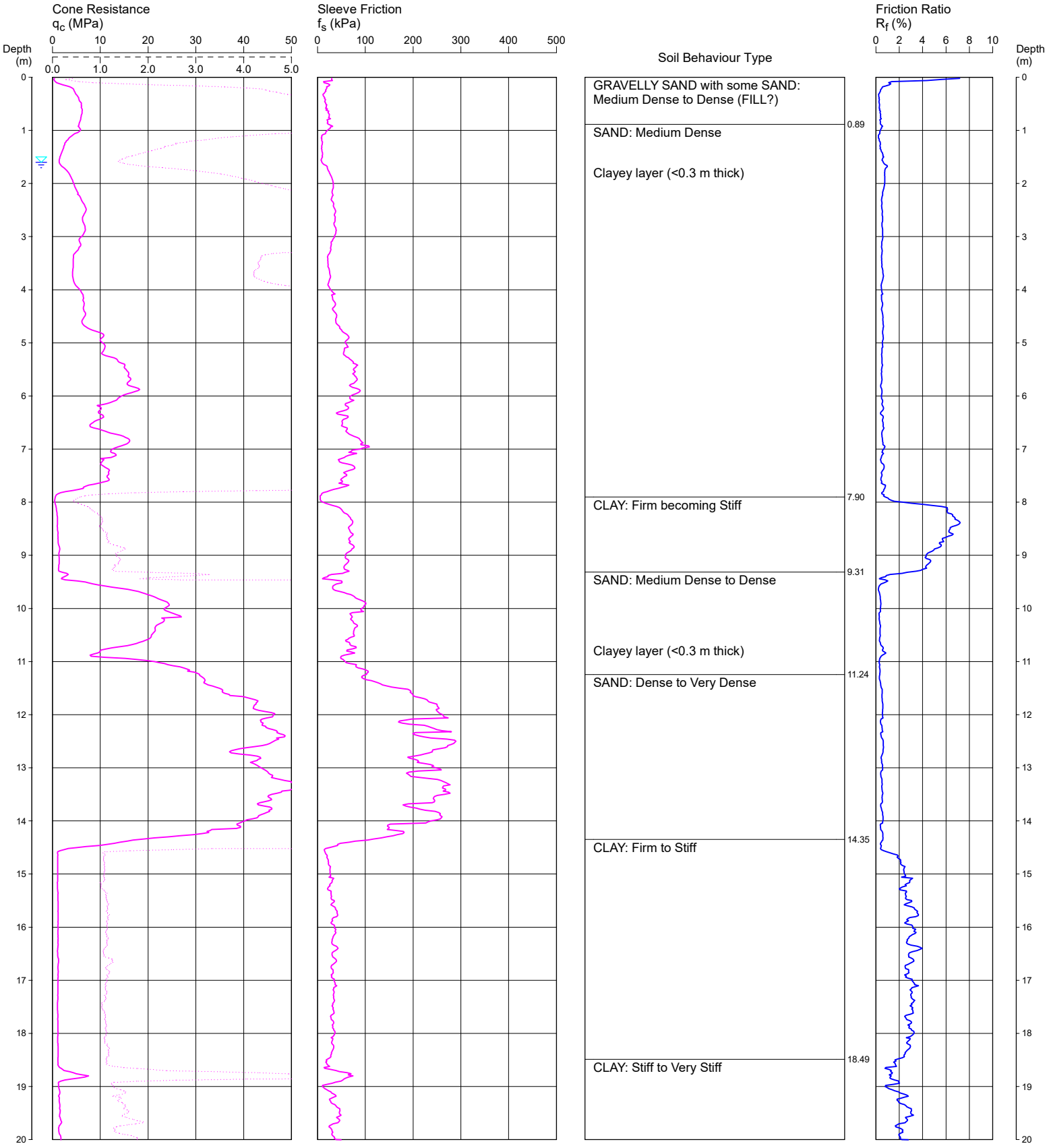
REDUCED LEVEL: 4.1

COORDINATES: 383825.6E 6355634.9N AHD

CPT104

DATE 13/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE ROD BOWING IN INFERRED WEATHERED ROCK
GROUNDWATER LEVEL OBSERVED AT 1.6M AFTER WITHDRAWAL OF RODS

Water depth after test: 1.60m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT104.CP5

Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGH SCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

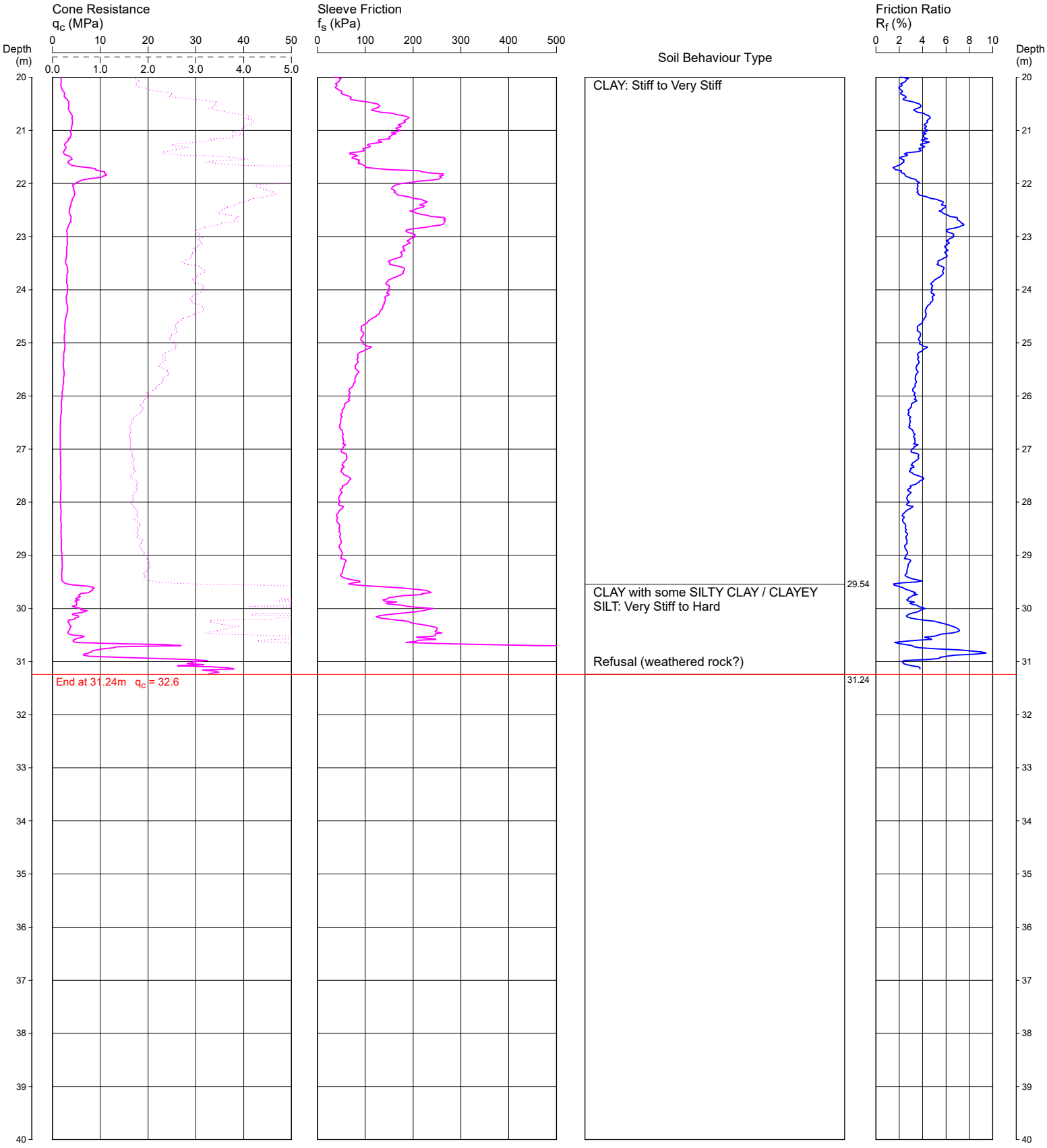
REDUCED LEVEL: 4.1

COORDINATES: 383825.6E 6355634.9N AHD

CPT104

DATE 13/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE ROD BOWING IN INFERRED WEATHERED ROCK
GROUNDWATER LEVEL OBSERVED AT 1.6M AFTER WITHDRAWAL OF RODS

Water depth after test: 1.60m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT104.CP5

Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGH SCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

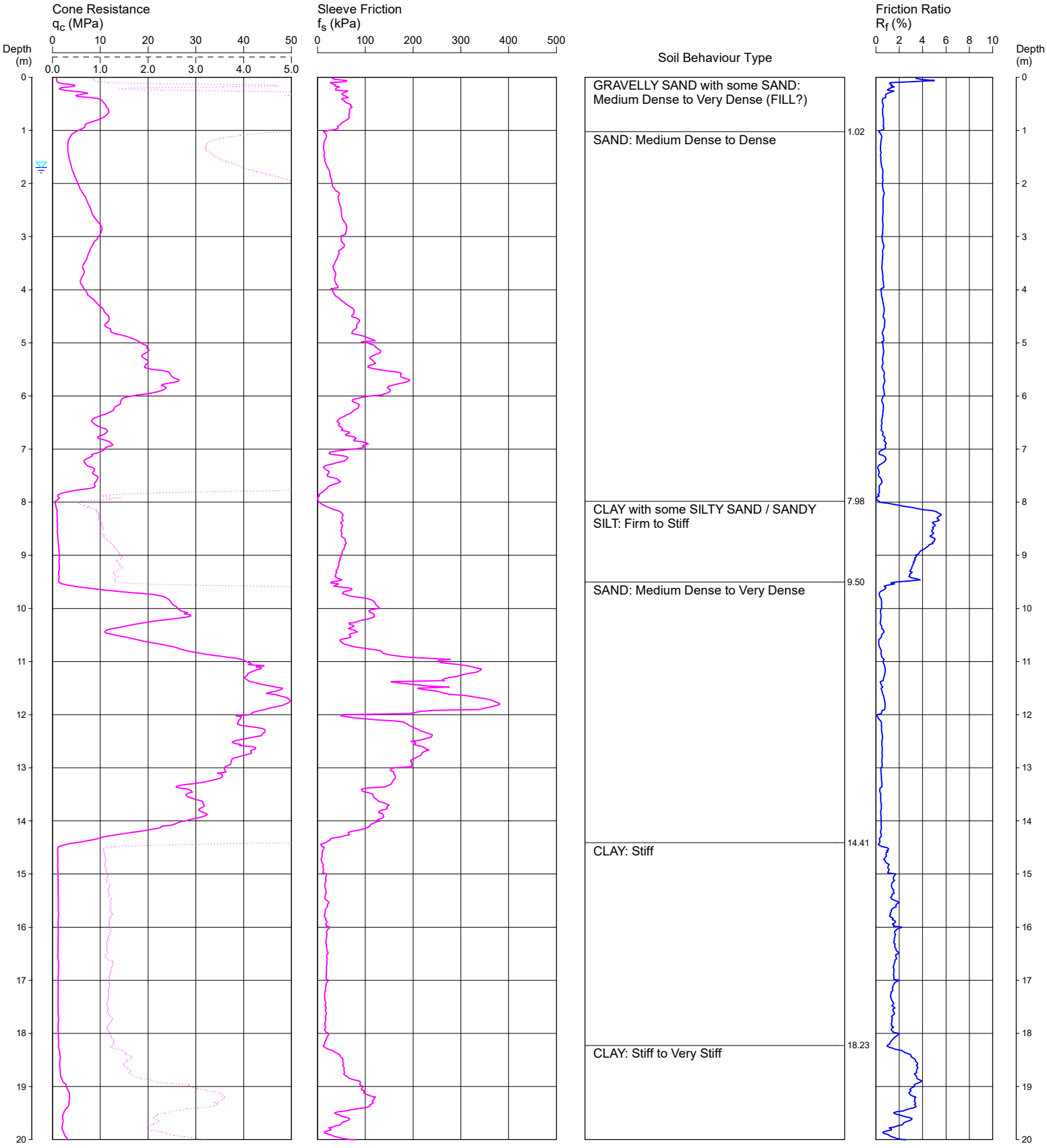
REDUCED LEVEL: 4.1

COORDINATES: 383849.0E 6355627.1N AHD

CPT105

DATE 14/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE ROD BOWING IN INFERRED WEATHERED ROCK
GROUNDWATER LEVEL OBSERVED AT 1.7M AFTER WITHDRAWAL OF RODS

Water depth after test: 1.70m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT105.CP5

Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGH SCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

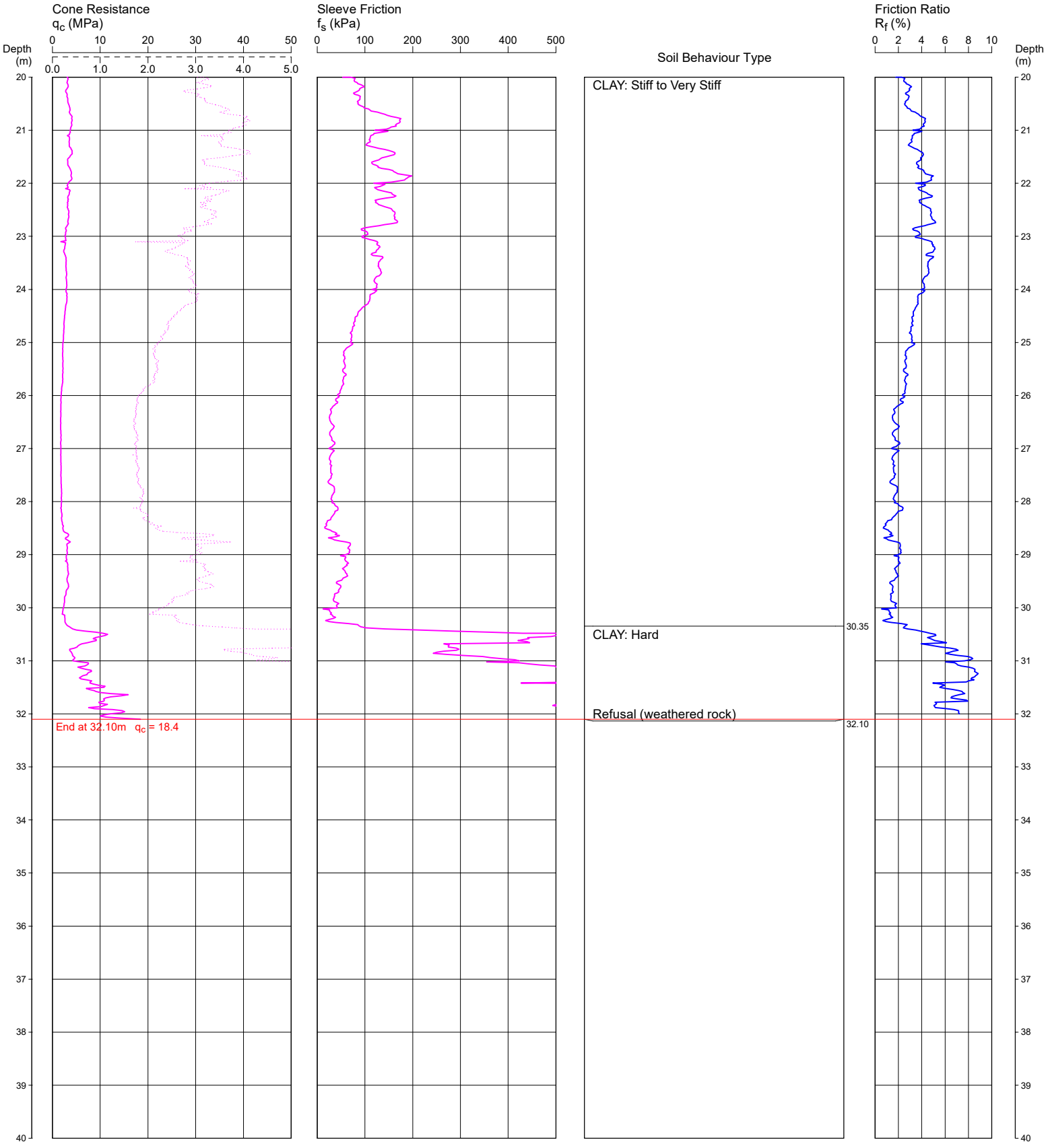
REDUCED LEVEL: 4.1

COORDINATES: 383849.0E 6355627.1N AHD

CPT105

DATE 14/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE ROD BOWING IN INFERRED WEATHERED ROCK
GROUNDWATER LEVEL OBSERVED AT 1.7M AFTER WITHDRAWAL OF RODS

Water depth after test: 1.70m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT105.CP5
Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGHSCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

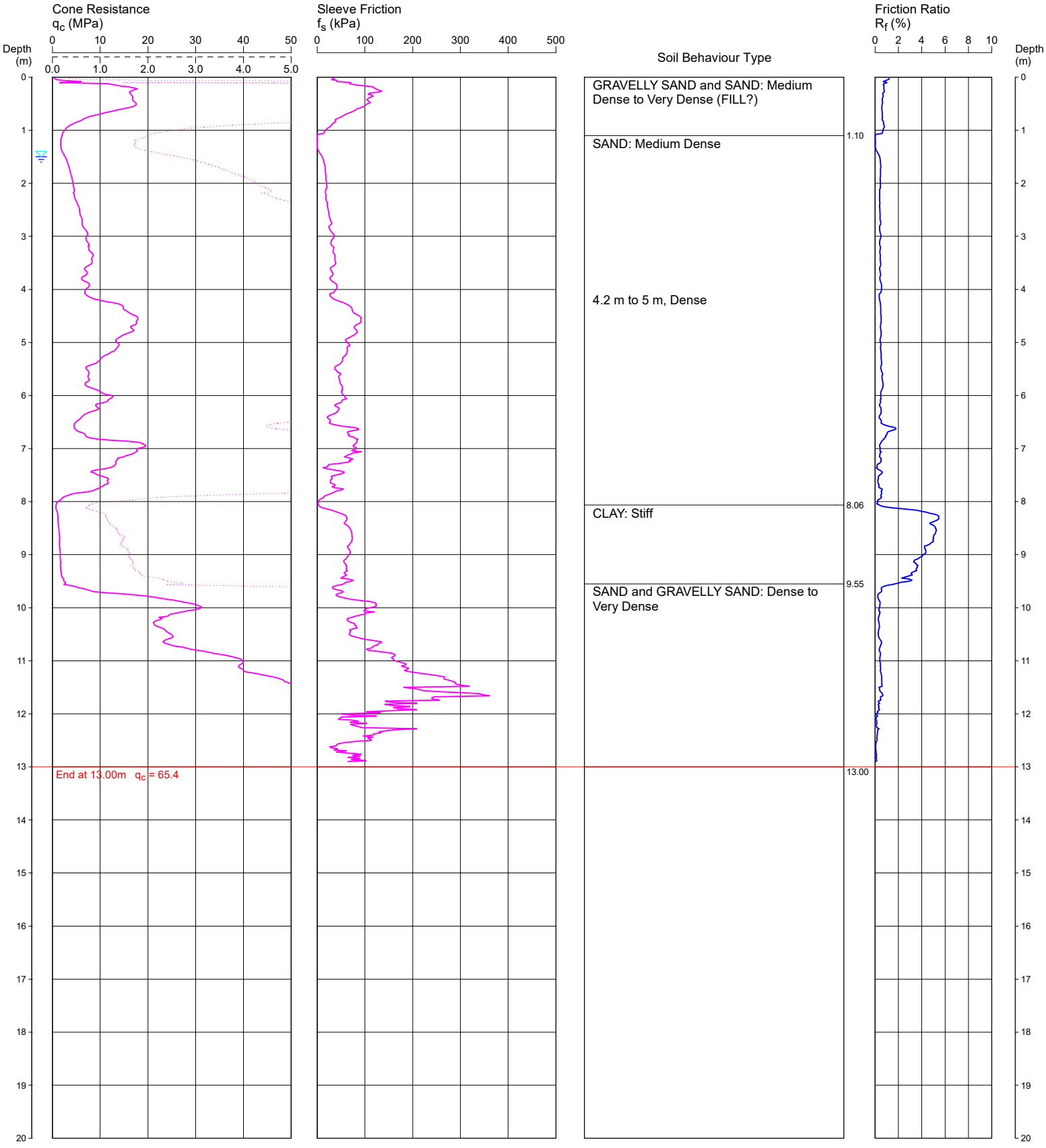
REDUCED LEVEL: 4.0

COORDINATES: 383803.1E 6355604.1N AHD

CPT106

DATE 13/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE BENDING IN VERY DENSE SANDS. ASPHALT 30MM THICK. GROUNDWATER LEVEL OBSERVED AT 1.5M AFTER WITHDRAWAL OF RODS

Water depth after test: 1.50m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT106.CP5

Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SCHOOL INFRASTRUCTURE NSW

PROJECT: NEWCASTLE HIGH SCHOOL UPGRADE

LOCATION: 160-200 PARKWAY AVENUE, HAMILTON SOUTH

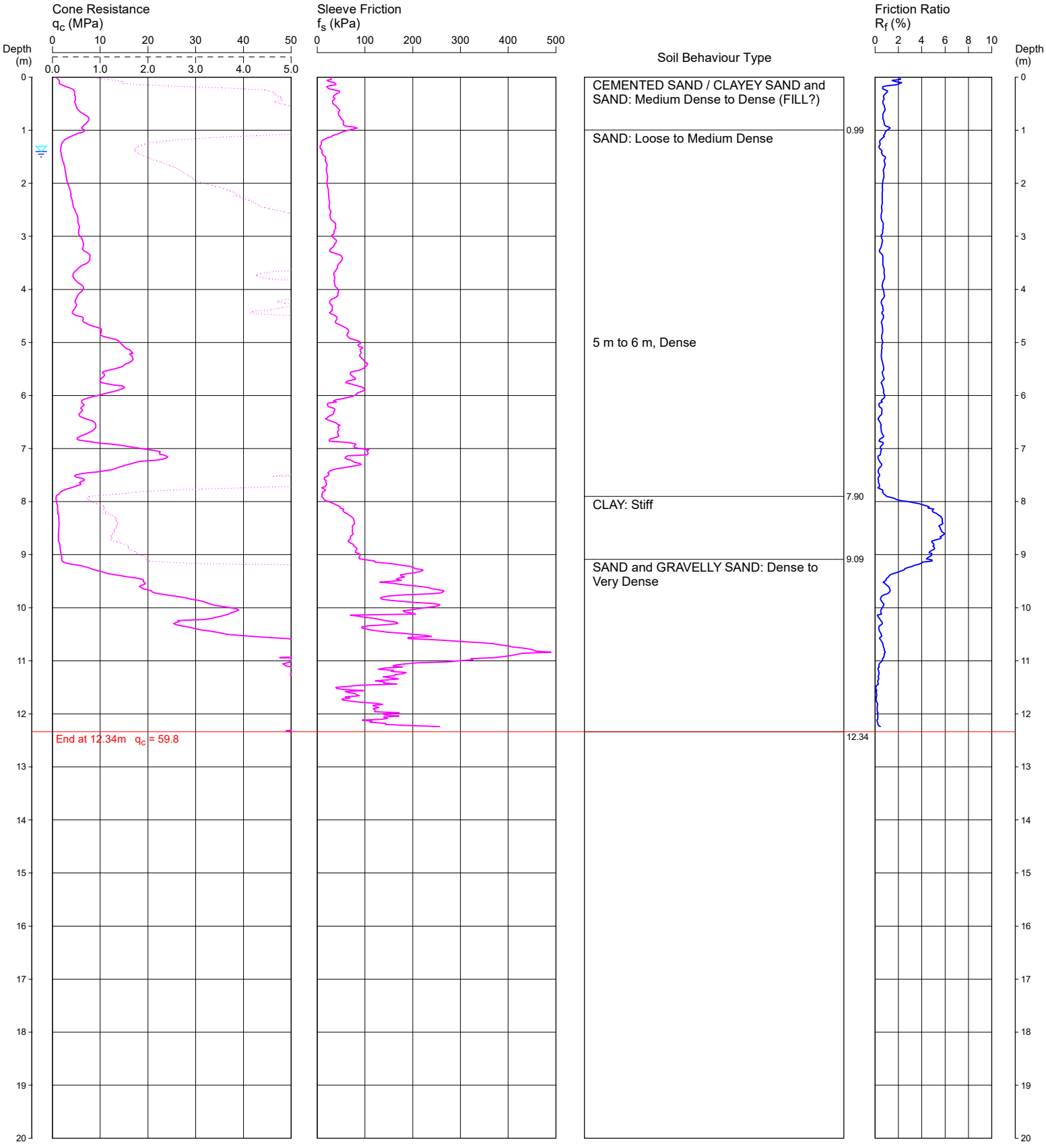
REDUCED LEVEL: 3.9

COORDINATES: 383822.5E 6355565.9N AHD

CPT107

DATE 13/07/2022

PROJECT No: 213618.01



REMARKS: TEST DISCONTINUED DUE TO EXCESSIVE BENDING IN VERY DENSE SANDS
GROUNDWATER LEVEL OBSERVED AT 1.4M AFTER WITHDRAWAL OF RODS

Water depth after test: 1.40m depth (measured)

File: P:\213618.01 - HAMILTON SOUTH, Newcastle High Drilling\4.0 Field Work\CPT Logs\CPT107.CP5
Cone ID: 170705 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: 160-200 Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.2 AHD
COORDINATE E:383998 **N:** 6355595.5
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 1a
PROJECT No: 213618.01
DATE: 08/07/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE	RESULTS AND REMARKS
	3	0.0	FILL/ (ML) Sandy SILT; dark brown; silt fraction fine; sand fraction fine to medium; trace rootlets and organics		FILL	NA	<PL		D		0.0		
		0.15	FILL/ (GP) Sandy GRAVEL; dark brown black; gravel fraction fine to medium; sand fraction fine to coarse; with white inclusions, slag with coal		FILL	NA	M		D		0.1 / 0.15		
		0.25	(SP) SAND, with silt; grey brown		ALV	MD	M		D		0.25 / 0.3 / 0.4		
		0.5	(SP) SAND; pale grey		ALV	MD	M to W		D		0.6 / 0.8		
		0.85	(SP) SAND, with silt, trace gravel; pale brown; gravel fraction fine to medium, sub-rounded		ALV	MD	M to W		D		0.9 / 1		
		1	0.95-1.1m: brown										
		1.1	Borehole discontinued at 1.10m depth partial bore collapse from 0.7m								1.1	PSP/150	5 10 15
	2	2									2		
	1												

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Push Tube Rig
METHOD: PT to 1.1m
REMARKS: Groundwater likely between 0.5m and 0.8m depth

OPERATOR: Chaplin
CASING:

LOGGED: Chaplin

EXPORTED 05/09/22 13:51. TEMPLATE ID: DP_101.02.00_SOILLOG

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: 160-200 Parkway Avenue, Hamilton South

SURFACE LEVEL: 4.1 AHD
COORDINATE **E:**383845 **N:** 6355630
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 5a
PROJECT No: 213618.01
DATE: 08/07/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)	TESTING AND REMARKS: TEST TYPE / RESULTS AND REMARKS
	4	0.0	FILL/ (ML) Sandy SILT; dark brown; low plasticity; trace rootlets and organics		FILL	NA	<PL					
		0.1	FILL/ (ML) Sandy SILT; dark brown; silt fraction low plasticity; sand fraction fine to medium 0.2-0.3m: with concrete rubble		FILL	NA	<PL to =PL					
		0.3	(SP) SAND, with silt; grey; fine to medium 0.35-0.4m: with fine gravel (SR)		ALV	D	M		D		0.5 0.6	PSP/150
		0.7	(SP) SAND; pale grey; fine to medium		ALV	MD	M					
		0.9	(SP) SAND, with silt; brown; fine to medium		ALV	MD	M		D		0.9 1.0	
	3	1.0	(SP) SAND; grey; fine to medium		ALV	MD	M					
			1.2-1.3m: with fine to medium gravel (SR)						D		1.2 1.3	
		1.3	(SP) SAND, with clay; brown dark brown; sand fraction fine to medium; clay fraction fine to medium, sub-rounded		ALV	MD	M					
		1.5	(SP) SAND; pale grey yellow; fine to medium		ALV	MD	M to W					
	2	2							D		1.9 2	
	2	2.1	Borehole discontinued at 2.10m depth Virtual refusal due to hole collapse at 2.1m								2.1	

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: PTR
METHOD: PT to 2.1m
REMARKS:

OPERATOR: Chaplin
CASING:

LOGGED: Chaplin

EXPORTED 27/07/22 11:32. TEMPLATE ID: DP_101.02.00_SOILLOG

Refer to explanatory notes for symbol and abbreviation definitions

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: 160-200 Parkway Avenue, Hamilton South

SURFACE LEVEL: 4 AHD
COORDINATE **E:**383821.8 **N:** 6355566.4
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 107a
PROJECT No: 213618.01
DATE: 08/07/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	DEPTH (m)
No free groundwater observed		0.0	FILL/ (ML) Sandy SILT; dark brown; silt fraction fine; sand fraction fine to medium; with trace rootlets and organics		FILL	NA	<PL		D		0.0
		0.15	(SP) SAND, with silt; grey; fine to medium		ALV	MD	M		D		0.1
		0.5	(SP) SAND; pale grey; fine to medium		ALV	MD	M		D		0.3
		0.8	(SP) SAND, with silt, trace gravel; dark brown; sand fraction fine to medium; gravel fraction fine to medium, sub-rounded		ALV	MD	M		D		0.4
	3	1									0.6
		1.1	(SP) SAND; pale grey; fine to medium		ALV	MD	M		D		0.7
		1.2	(SP) SAND, with silt, trace gravel; grey; sand fraction fine to medium; gravel fraction fine to medium, sub-rounded		ALV	MD	M to W		D		0.9
		1.4	(SP) SAND; pale grey yellow; fine to medium		ALV	MD	M to W		D		1.0
	2	2	1.8-2.2m: pale grey						D		1.3
		2.2	Borehole discontinued at 2.20m depth Virtual refusal due to hole collapse at 1.2m						D		1.4
											1.5
											1.6
											2.0
											2.2

TESTING AND REMARKS

TEST TYPE: PSP/150

RESULTS AND REMARKS: 5 10 15

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: PTR
METHOD: PT to 2.2m
REMARKS: Groundwater likely between 1.2m and 1.4m depth

OPERATOR: Butcher
CASING:

LOGGED: Chaplin

EXPORTED 27/07/22 11:32. TEMPLATE ID: DP_101.02.00_SOILLOG

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: 160-200 Parkway Avenue, Hamilton South

SURFACE LEVEL: 4 AHD
COORDINATE **E:**383791 **N:** 6355598
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 4
PROJECT No: 213618.01
DATE: 06/07/22
SHEET: 2 of 7

CONDITIONS ENCOUNTERED														SAMPLE				TESTING	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (RS, XW, HW, DW, MW, SW, FS, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.01, 0.05, 0.10, 0.50, 1.00, 5.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
1.5			Silty CLAY; medium plasticity *(continued)*														
	-7	11													11		
	-8	12													12		
	-9	13													13		
		13.5															
	-10	14	Clayey SAND; fine to medium												14		
		14.75															
	-11	15	Silty CLAY; dark grey												15		
	-12	16													16		
	-13	17													17		
	-14	18													18		
	-15	19													19		

NOTES: (#)Soil origin is "probable" unless otherwise stated.

EXPORTED 03/08/22 10:14. TEMPLATE ID: DP_102.02.00_ROCKLOG

PLANT: Hanjin 114
OPERATOR: Total Drilling
LOGGED: Millard

METHOD: SFA to 2.5m, then PD to 33.3m, then HQ core to 62.0m
CASING: PQ to 2.5m, HWT to 36.2m

REMARKS: Soil description and depths are based on drillers logs. Information on soil should be obtained fron nearby Cone Penetration Tests (CPT)

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: 160-200 Parkway Avenue, Hamilton South

SURFACE LEVEL: 4 AHD
COORDINATE E:383791 **N:** 6355598
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 4
PROJECT No: 213618.01
DATE: 06/07/22
SHEET: 3 of 7

CONDITIONS ENCOUNTERED															SAMPLE				TESTING	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered) / SOIL MOISTURE)	GRAPHIC	WEATH. (RS, XW, HW, DW, MW, SW, FS, FR)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.01, 0.05, 0.10, 0.50, 1.00, 5.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
1.5	-17	21	Silty CLAY; dark grey *(continued)*												21		
	-18	22													22		
	-19	23													23		
	-20	24													24		
	-21	25													25		
	-22	26													26		
	-23	27													27		
	-24	28													28		
	-25	29													29		

NOTES: (#)Soil origin is "probable" unless otherwise stated.

PLANT: Hanjin 114
OPERATOR: Total Drilling
LOGGED: Millard

METHOD: SFA to 2.5m, then PD to 33.3m, then HQ core to 62.0m
CASING: PQ to 2.5m, HWT to 36.2m

REMARKS: Soil description and depths are based on drillers logs. Information on soil should be obtained fron nearby Cone Penetration Tests (CPT)

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: 160-200 Parkway Avenue, Hamilton South

SURFACE LEVEL: 4 AHD
COORDINATE E:383791 **N:** 6355598
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 4
PROJECT No: 213618.01
DATE: 06/07/22
SHEET: 4 of 7

CONDITIONS ENCOUNTERED																SAMPLE				TESTING	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (where encountered) / SOIL MOISTURE	GRAPHIC	WEATH. (RS, XW, HW, MW, SW, FS, FR; DW)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.01, 0.05, 0.10, 0.50, 1.00, 5.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
1.5	-27	31	Silty CLAY; dark grey *(continued)*													31		
	-28	32														32		
	-29	33														33		
		33.3				MW-HW	33.3	M-H				33.3-33.45m: fragmented						
		33.45	CST SST; pale brown grey				33.45											
			CORE LOSS															
	-30	34														34		
	-31	35	33.45-35.92m: possible pebbly sandstone/conglomerate						13	5						35		
		35.92					35.92											
	-32	36	SILTSTONE; grey			HW		VL-L								36		
							36.15	L	100	0		36.15-36.23m: fragmented						
							36.52					36.62-36.7m: DB						
						FR		M										
	-33	37					37.16	L				37.16-37.22m: fragmented				37		
							37.22											
							37.41					37.41-37.51m: PT SH PL, SM						
												37.63-37.69m: fragmented						
									100	51		37.94-37.97m: fragmented						
	-34	38				SW		M								38		
												38.64m: J 45° PL, SM						
							38.8					38.8-38.84m: fragmented						
	-35	39										39.0-39.37m: J SV PL, RO, <1mm, trace calcite				39		
						FR						39.2-39.32m: PT x6 SH PL, RO						
									100	71								
							39.8	M				39.8-39.82m: fragmented						

NOTES: (#)Soil origin is "probable" unless otherwise stated.

PLANT: Hanjin 114
OPERATOR: Total Drilling
LOGGED: Millard

METHOD: SFA to 2.5m, then PD to 33.3m, then HQ core to 62.0m
CASING: PQ to 2.5m, HWT to 36.2m

REMARKS: Soil description and depths are based on drillers logs. Information on soil should be obtained fron nearby Cone Penetration Tests (CPT)

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Geotechnics | Environment | Groundwater

BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: 160-200 Parkway Avenue, Hamilton South

SURFACE LEVEL: 4 AHD
COORDINATE E:383791 **N:** 6355598
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 4
PROJECT No: 213618.01
DATE: 06/07/22
SHEET: 5 of 7

CONDITIONS ENCOUNTERED																SAMPLE				TESTING	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	SOIL STRENGTH (where encountered) / SOIL MOISTURE	GRAPHIC	WEATH.	DEPTH (m)	STRENGTH	RECOVERY (%)	RQD	FRACTURE SPACING (m)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
1.5			SILTSTONE; grey *(continued)*			DW												
	-37	41						M	100	71		41.6-41.64m: J x3 60° PL, SM 41.84-41.85m: fragmented				41		
	-38	42	42.36-42.45m: lenticular bedding 42.36-42.68m: pale grey				42.36									42		
	-39	43				FR			100	92						43		
	-40	44														44		
	-41	45														45		
	-42	46					46.15	H	100	89		46.09-46.12m: fragmented 46.15m: J 60° PL, FE				46		
	-43	47				FS	47.09					47.09m: J 20° IR, RO, FE				47		
	-44	48				FR										48		
	-45	49							100	79						49		

20% water loss from 46.5m to 55.58m depth

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NOTES: (#)Soil origin is "probable" unless otherwise stated.

PLANT: Hanjin 114
OPERATOR: Total Drilling
LOGGED: Millard

METHOD: SFA to 2.5m, then PD to 33.3m, then HQ core to 62.0m
CASING: PQ to 2.5m, HWT to 36.2m

REMARKS: Soil description and depths are based on drillers logs. Information on soil should be obtained fron nearby Cone Penetration Tests (CPT)

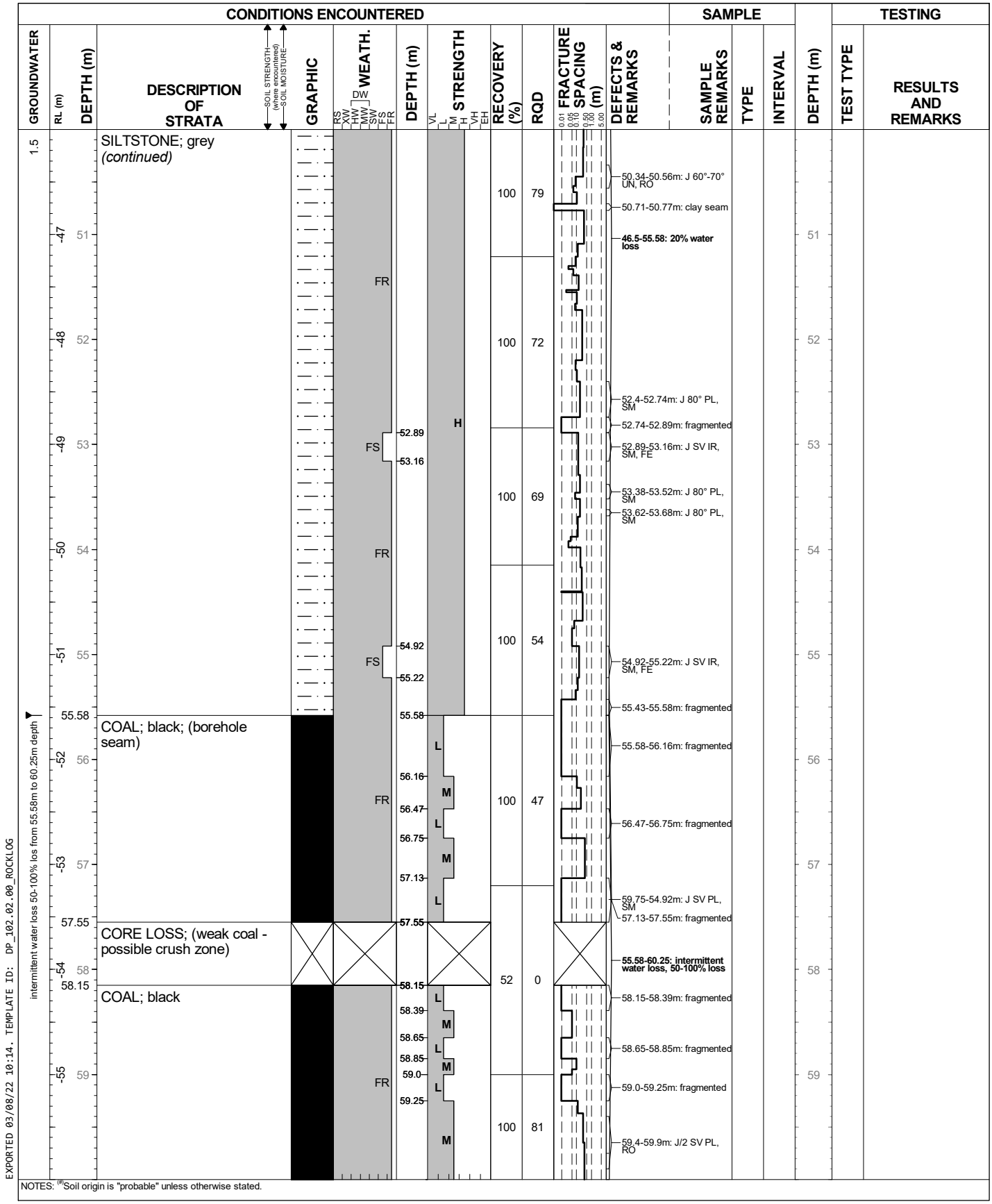
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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: 160-200 Parkway Avenue, Hamilton South

SURFACE LEVEL: 4 AHD
COORDINATE E:383791 **N:** 6355598
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 4
PROJECT No: 213618.01
DATE: 06/07/22
SHEET: 6 of 7



NOTES: (#)Soil origin is "probable" unless otherwise stated.

PLANT: Hanjin 114
OPERATOR: Total Drilling
LOGGED: Millard

METHOD: SFA to 2.5m, then PD to 33.3m, then HQ core to 62.0m
CASING: PQ to 2.5m, HWT to 36.2m

REMARKS: Soil description and depths are based on drillers logs. Information on soil should be obtained fron nearby Cone Penetration Tests (CPT)

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: 160-200 Parkway Avenue, Hamilton South

SURFACE LEVEL: 4 AHD
COORDINATE **E:**383791 **N:** 6355598
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 4
PROJECT No: 213618.01
DATE: 06/07/22
SHEET: 7 of 7

CONDITIONS ENCOUNTERED														SAMPLE				TESTING	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA (SOIL STRENGTH (where encountered), SOIL MOISTURE)	GRAPHIC	WEATH. (RS, XW, HW, MW, SW, FS, FR, DW)	DEPTH (m)	STRENGTH (VL, L, M, H, VH, EH)	RECOVERY (%)	RQD	FRACTURE SPACING (m) (0.01, 0.05, 0.10, 0.50, 1.00, 5.00)	DEFECTS & REMARKS	SAMPLE REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
1.5	60.25		COAL; black *(continued)*			60.0	L				60.0-60.25m: fragmented						
			SILTSTONE; grey			60.25	L				60.25-60.55m: J SV PL, SM						
	60.63		SANDSTONE; pale grey; fine to medium		FR	60.63	H	100	81		60.55-60.58m: fragmented						
	62.0		Borehole discontinued at 62.00m depth			62.0											

NOTES: (#)Soil origin is "probable" unless otherwise stated.

PLANT: Hanjin 114
OPERATOR: Total Drilling
LOGGED: Millard

METHOD: SFA to 2.5m, then PD to 33.3m, then HQ core to 62.0m
CASING: PQ to 2.5m, HWT to 36.2m

REMARKS: Soil description and depths are based on drillers logs. Information on soil should be obtained fron nearby Cone Penetration Tests (CPT)

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.1 AHD
COORDINATE E:384063.3 **N:** 6355617.1
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 201A
PROJECT No: 213618.02
DATE: 30/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	2 / 0.0	FILL/ (SP) Silty SAND, with gravels; grey brown grey; sand fraction fine to medium; gravels fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace rootlets, glass, tape, ceramic, plastic, slag, coal		FILL	NA	D		D E		0.0 0.05	PID	<1
		0.4m: brown						D E		0.25	PID	<1
								D E		0.5	PID	<1
	1 / 0.6	FILL/ (SP) SAND, trace gravel; intermixed brown grey pale grey; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded; trace coal, shells, slag		FILL		M						
		0.9m: fine to coarse sub-angular to sub-rounded gravels						D E		1.0	PID	<1
	1 / 1.1	Test pit discontinued at 1.10m depth Hand refusal on gravels										
	0 / 2									2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel to 0.3m Hand auger to 1.1m
METHOD:
REMARKS: D1/30.11.22 at 0.5m

OPERATOR: Kramer
LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.3 AHD
COORDINATE **E:**383968.0 **N:** 6355688.9
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 202A
PROJECT No: 213618.02
DATE: 30/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	2 / 0.0	FILL/ (SP) SAND; brown; fine to medium; trace rootlets, fine sub-angular to sub-rounded gravels (crushed natural rock)		FILL		D		D E		0.0 0.05	PID	<1
	2 / 0.2	FILL/ (SP) Silty SAND; dark grey; fine to medium; trace glass, ceramic, coal, brick fragments, slag		FILL	NA	M		D E		0.25	PID	<1
								D E		0.5	PID	<1
	0.7											
	0.75	FILL/ (SP) SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded		FILL		M		D E		0.72	PID	<1
	1 / 1	Test pit discontinued at 0.75m depth Hand refusal on gravels								1		
	0 / 2									2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel to 0.3m Hand auger to 0.75m
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

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Refer to explanatory notes for symbol and abbreviation definitions

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.1 AHD
COORDINATE E:383922.4 **N:** 6355610.1
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 203A
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	2 / 0.0	FILL/ (SP) Silty SAND; brown; fine to medium; trace roots / rootlets, plastic		FILL		D to M		D E		0.0 0.05	PID	<1
	0.2	FILL/ (SP) Gravelly SAND; brown pale brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to subrounded (crushed natural rock)		FILL		D		D E		0.25	PID	<1
	0.3	(SP) SAND; pale grey; fine to medium		ALV	NA	D to M		D E		0.5	PID	<1
	0.8	Borehole discontinued at 0.80m depth Limit of investigation										
	1 / 1									1		
	0 / 2									2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kramer
CASING:

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.0 AHD
COORDINATE E:383944.9 **N:** 6355699.7
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 204
PROJECT No: 213618.02
DATE: 11/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND; brown grey; fine to medium; trace fine to medium grained, subangular to subrounded gravel (crushed natural rock), glass, dry		FILL	NA	D to M		D E		0.05	PID	<1
								D E		0.25	PID	<1
		0.4m: fine to medium subangular to subrounded gravels (crushed natural rock)						D E		0.5	PID	<1
	0.7	FILL/ (SP) Silty SAND; dark brown; fine to medium; trace fine to medium subangular to subrounded gravels (crushed natural rock), ceramic, slag, coal reject, brick fragments, dry		FILL				D E		0.8	PID	<1
	0.95	Borehole discontinued at 0.95m depth Hand refusal on cobbles										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: Hand Auger to 0.95m
REMARKS: Co-ordinates by hand held GPS. Approximate surface level based on interpolation from survey plan

OPERATOR: Kramer
CASING: Uncased

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.2 AHD
COORDINATE E:383930.1 **N:** 6355710.6
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 205
PROJECT No: 213618.02
DATE: 11/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND; brown; fine to medium; with silt, trace fine to medium subangular to subrounded gravels (crushed natural rock), glass, slag, ash, brick fragments, dry						D E		0.05	PID	<1
		0.3m: fine to medium subangular to subrounded gravels (crushed natural rock)		FILL	NA	D to M		D E		0.25	PID	<1
	0.6	Borehole discontinued at 0.60m depth Hand refusal on gravels						D E		0.5	PID	<1

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: Hand Auger to 0.6m
REMARKS: Co-ordinates by hand held GPS. Approximate surface level based on interpolation from survey plan

OPERATOR: Kramer
CASING: Uncased

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.6 AHD
COORDINATE E:383907.7 **N:** 6355729.6
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 206
PROJECT No: 213618.02
DATE: 11/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND; grey brown; fine to medium; trace fine to medium subangular to subrounded gravels (crushed natural rock), ash, rootlets, dry		FILL				D, E		0.05	PID	<1
	0.3	(SP) SAND; grey; fine to medium; trace rootlets, dry		ALV	NA	D		D, E		0.5	PID	<1
	0.65	(SP) Silty SAND; brown to dark brown; fine to medium; dry (possible indurated sand)		ALV				D, E		0.7	PID	<1
	0.95	(SP) SAND; pale brown; fine to medium; dry		ALV				D, E		1.0	PID	<1
	1.0	Borehole discontinued at 1.00m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: Hand Auger to 1.0m
REMARKS: Co-ordinates by hand held GPS. Approximate surface level based on interpolation from survey plan

OPERATOR: Kramer
CASING: Uncased

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.6 AHD
COORDINATE **E:**383907.4 **N:** 6355729.8
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 206A
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND, trace gravel; grey brown; sand fraction fine to medium; gravel fraction fine to medium; ash, rootlets, dry to moist		FILL	NA	D to M		D E		0.0 0.05	PID	<1
	0.4	(SP) SAND; grey; fine to medium; trace rootlets		ALV		D		D E		0.5	PID	<1
	0.7	(SP) SAND; brown; fine to medium		ALV		D		D E		0.7	PID	<1
	0.9	Test pit discontinued at 0.90m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.4 AHD
COORDINATE E:383855.8 **N:** 6355704.8
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 207
PROJECT No: 213618.02
DATE: 11/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND; brown to grey; fine to medium; trace fine to coarse subangular to subrounded gravels (crushed natural rock), rootlets, coal reject, roots, dry		FILL	NA	D		D E		0.05	PID	<1
								D E		0.25	PID	<1
								D E		0.5	PID	<1
	1.05	(SP) SAND; brown; fine to medium; dry		ALV				D E		1.0	PID	<1
								D E		1.3	PID	<1
	1.45	Borehole discontinued at 1.45m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: Hand Auger to 1.45m
REMARKS: Co-ordinates by hand held GPS. Approximate surface level based on interpolation from survey plan

OPERATOR: Kramer
CASING: Uncased

LOGGED: Kramer

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Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.7 AHD
COORDINATE E:383885.2 **N:** 6355697.1
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 208
PROJECT No: 213618.02
DATE: 11/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND; brown; fine to medium; with silt, trace fine to medium subangular to subrounded gravels (crushed natural rock), plastic, ash, dry		FILL	NA	D		D E		0.05	PID	<1
	0.25	(SP) SAND; pale grey; fine to medium; dry to moist		ALV	NA	M		D E		0.2	PID	<1
	0.75	Borehole discontinued at 0.75m depth Limit of investigation						D E		0.5	PID	<1

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: Hand Auger to 0.75m
REMARKS: Co-ordinates by hand held GPS. Approximate surface level based on interpolation from survey plan

OPERATOR: Kramer
CASING: Uncased

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 4.0 AHD
COORDINATE E:383812.0 **N:** 6355647.1
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 209
PROJECT No: 213618.02
DATE: 11/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND; grey; fine to medium; with fine to coarse subangular to subrounded gravel (crushed natural rock), trace glass, sandstone cobbles, coal reject, dry		FILL				D, E		0.05	PID	<1
		0.2-0.3m: fibro fragment observed				M		D, E		0.25	PID	<1
	0.3	FILL/ (SP) Gravelly SAND, with gravel; grey brown; sand fraction fine to medium; gravel fraction fine to medium, subangular to subrounded; crushed natural rock, dry		FILL				D, E		0.35	PID	<1
	0.4			FILL				D, E		0.45	PID	<1
	0.5	FILL/ (SP) SAND; brown; fine to medium; trace fine to medium subangular to subrounded gravels (crushed natural rock), dry			NA							
		(SP) SAND; pale grey; fine to medium; dry to moist		ALV				D, E		0.7	PID	<1
	0.85	(SP) SAND; dark brown; fine to medium; dry to moist (indurated sand)		ALV								
	3 1.0	Borehole discontinued at 1.00m depth Limit of investigation						D, E		1.0	PID	<1
	2 2									2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: Hand Auger to 1.0m
REMARKS: Co-ordinates by hand held GPS. Approximate surface level based on interpolation from survey plan

OPERATOR: Kramer
CASING:

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 4.0 AHD
COORDINATE E:383810.8 **N:** 6355648.0
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 209A
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED									SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	4	0.0	FILL/ (SP) SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace rootlets, ash		FILL	NA	D		D E		0.0 0.05	PID	<1
									B				
									D E		0.25	PID	<1
		0.35	FILL/ (SP) Gravelly SAND; brown pale brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock)		FILL		D				0.35	PID	<1
		0.45	(SP) SAND; pale grey; fine to medium		ALV		D to M		D E		0.4	PID	<1
		0.65	Test pit discontinued at 0.65m depth Limit of investigation										
	3	1									1		
	2	2									2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel
METHOD:
REMARKS:

OPERATOR:

LOGGED: Kramer

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Refer to explanatory notes for symbol and abbreviation definitions

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 4.1 AHD
COORDINATE **E:**383813.1 **N:** 6355646.8
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 209B
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	4 / 0.0	FILL/ (SP) SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace rootlets, brick, plastic		FILL		D		D E B		0.0 0.05	PID	<1
	0.25	FILL/ (SP) SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace brick, slag		FILL	NA	D		D E B D E		0.2 0.25 0.5	PID PID PID	<1 <1 <1
	0.6	(SP) SAND; pale grey; fine to medium; trace rootlets		ALV		D				0.6	PID	<1
	0.7	Test pit discontinued at 0.70m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel
METHOD:
REMARKS: D1/20.12.22 @ 0.2m

OPERATOR: Kramer

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.9 AHD
COORDINATE **E:**383810.1 **N:** 6355646.7
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 209C
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED									SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace rootlets		FILL	NA	D		D, E		0.0		
	0.1									0.05	PID	<1
				FILL		D		B				
	0.25	FILL/ (SP) SAND, with silt; brown; fine to medium; trace metal, glass, plastic, fine to medium sub-angular to sub-rounded gravels (crushed natural rock)						D, E		0.2	PID	<1
										0.25	PID	<1
		FILL/ (SP) SAND, trace gravel; brown dark brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock)		FILL		D		D, E		0.5	PID	<1
	0.65	(SP) SAND; pale grey; fine to medium		ALV		D to M		D		0.7	PID	<1
	0.8	(SP) SAND; dark brown; fine to medium		ALV		D to M						
	0.85	Test pit discontinued at 0.85m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 4.0 AHD
COORDINATE **E:**383809.5 **N:** 6355649.2
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 209D
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND, trace gravel; brown grey; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); rootlets		FILL		D to M		D E B D E		0.0 0.05 0.25 0.3	PID PID PID	<1 <1 <1
	0.3	(SP) SAND; brown; fine to medium; trace rootlets 0.5m: pale grey		ALV	NA	D		D E		0.5	PID	<1
	0.6	Test pit discontinued at 0.60m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.9 AHD
COORDINATE **E:**383812.4 **N:** 6355649.9
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 209E
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND, trace gravel; brown grey; sand fraction fine to medium; gravel fraction fine to coarse sub-angular, sub-rounded, angular (crushed natural rock); rootlets, asphalt, brick fragments		FILL		D		D E		0.0 0.05	PID	<1
	0.25	FILL/ (SP) SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace slag and ash		FILL	NA	M		D E B		0.2	PID	<1
	0.55	(SP) SAND; pale brown; fine to medium		ALV		D		D E		0.5	PID	<1
	0.75	Test pit discontinued at 0.75m depth Limit of investigation						D		0.7	PID	<1

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 4.0 AHD
COORDINATE E:383909.5 **N:** 6355620.0
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 210
PROJECT No: 213618.02
DATE: 11/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (GP) Sandy GRAVEL; fine, sub-angular to sub-rounded; with fine to medium grained sand, dry (crusher dust)		FILL				D, E		0.05	PID	<1
	0.07	0.07m: black hessian dividing layer										
		FILL/ (SP) Silty SAND; brown grey; fine to medium; trace fine to medium subangular to subrounded gravels (crushed natural rock), ash, dry		FILL				D, E		0.25	PID	<1
	0.3	(SP) SAND; grey; fine to medium; trace rootlets, dry			NA	D						
		0.5m: pale grey, dry to moist		ALV				D, E		0.5	PID	<1
	0.75	Borehole discontinued at 0.75m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: Hand Auger to 0.75m
REMARKS: Co-ordinates by hand held GPS. Approximate surface level based on interpolation from survey plan

OPERATOR: Kramer
CASING: Uncased

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.7 AHD
COORDINATE E:383929.6 **N:** 6355659.2
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 211
PROJECT No: 213618.02
DATE: 11/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND; brown grey; fine to medium; with silt, trace slag, ash, brick fragments, fine to medium subangular to subrounded gravels (crushed natural rock), sandstone cobble, dry		FILL				D, E		0.05	PID	<1
								D, E		0.25	PID	<1
	0.4	(SP) SAND; grey; fine to medium; trace rootlets, dry			NA	D		D, E		0.5	PID	<1
		0.6m: pale grey		ALV								
	0.9	Borehole discontinued at 0.90m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: Hand Auger to 0.9m
REMARKS: Co-ordinates by hand held GPS. Approximate surface level based on interpolation from survey plan

OPERATOR: Kramer
CASING: Uncased

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 8.2 AHD
COORDINATE E:383936.9 **N:** 6355670.8
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 212
PROJECT No: 213618.02
DATE: 11/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	8.2 / 0.0	FILL/ (SP) SAND; brown; fine to medium; with fine to coarse subangular to subrounded gravel (crushed natural rock), trace plastic, rootlets, cobbles, roots, dry		FILL	NA	D		D E		0.05	PID	<1
								D E		0.25	PID	<1
	7.6 / 0.6	Borehole discontinued at 0.60m depth Limit of investigation						D E		0.5	PID	<1
	7 / 1									1		
	6 / 2									2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD: Hand Auger to 0.6m
REMARKS: Co-ordinates by hand held GPS. Approximate surface level based on interpolation from survey plan

OPERATOR: Kramer
CASING: Uncased

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.7 AHD
COORDINATE E:383864.8 **N:** 6355643.5
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 213
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND, with silt, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock)		FILL		D		D E		0.0 0.05	PID	<1
	0.1	FILL/ (SP) Gravelly SAND, with silt; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace brick		FILL	NA	D		D E		0.25	PID	<1
								D E		0.5	PID	<1
	0.6	Borehole discontinued at 0.60m depth Hand refusal										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kramer
CASING:

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 4.0 AHD
COORDINATE **E:**383863.7 **N:** 6355620.9
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 214
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED									SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed		0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); abundant rootlets		FILL	NA	D		D E		0.0 0.05	PID	<1
		0.1	0.1m: possible pavement Borehole discontinued at 0.10m depth Hand refusal										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS: Bore through garden bed

OPERATOR: Kramer
CASING:

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.9 AHD
COORDINATE **E:**383864.6 **N:** 6355623.4
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 214A
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium, sub-angular to sub-rounded (crushed natural rock); abundant rootlets		FILL		M		D E		0.0 0.05	PID	<1
	0.1	Test pit discontinued at 0.10m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 4.0 AHD
COORDINATE **E:**383866.0 **N:** 6355621.3
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 214B
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	4 / 0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium, sub-angular to sub-rounded (crushed natural rock); abundant rootlets		FILL		M		D E		0.0 0.05	PID	<1
	0.1	Test pit discontinued at 0.10m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

EXPORTED 18/01/23 15:38. TEMPLATE ID: DP_101.02.00_SOILLOG

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.3 AHD
COORDINATE E:383989.8 **N:** 6355656.7
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 215
PROJECT No: 213618.02
DATE: 30/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN[#]	CONSIS.[*] / DENSITY.[*]	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND, with gravel; brown grey; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace rootlets, asphalt, glass, ceramic, metal		FILL		D		D E		0.0 0.05	PID	<1
	0.55	FILL/ (SP) SAND, trace gravel; pale grey pale brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock)		FILL	NA	D		D E		0.25	PID	<1
	0.8	FILL/ (SP) SAND, with silt; intermixed brown pale brown orange; fine to medium 1.1m: with fine to coarse sub-angular to sub-rounded gravels 1.2m: wet		FILL		M		D E		0.5 0.7	PID	<1
	1.3	Test pit discontinued at 1.30m depth Hand refusal on gravels						D E		1.0	PID	<1

NOTES: [#]Soil origin is "probable" unless otherwise stated. [*]Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel to 0.3m Hand auger to 1.3m
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL:
COORDINATE E: N:
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 216
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium subangular to subrounded (crushed natural rock); (crushed natural rock), dry to moist		FILL				D E		0.0 0.05	PID	<1
	0.1	Test pit discontinued at 0.10m depth Limit of investigation										
	1									1		
	2									2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kennedy

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL:
COORDINATE E: N:
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 216A
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium, sub-angular to sub-rounded (crushed natural rock)		FILL		D to M		D E		0.0 0.05	PID	<1
	0.1	Test pit discontinued at 0.10m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

EXPORTED 18/01/23 15:38. TEMPLATE ID: DP_101.02.00_SOILLOG

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL:
COORDINATE E: N:
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 217
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium subangular to subrounded; (crushed natural rock), dry to moist		FILL	NA	D to M		D E		0.0 0.05	PID	<1
	0.1	Test pit discontinued at 0.10m depth Limit of investigation										
	1									1		
	2									2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kennedy

LOGGED: Kramer

EXPORTED 18/01/23 15:38. TEMPLATE ID: DP_101.02.00_SOILLOG

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL:
COORDINATE E: N:
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 217A
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium, sub-angular to sub-rounded (crushed natural rock)		FILL		D to M		D E		0.0 0.05	PID	<1
	0.1	Test pit discontinued at 0.10m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL:
COORDINATE E: N:
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 218
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium subangular to subrounded; (crushed natural rock), dry to moist		FILL	NA	D to M		D E		0.0 0.05	PID	<1
	0.15	Test pit discontinued at 0.15m depth Limit of investigation										
	1									1		
	2									2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kennedy

LOGGED: Kramer

EXPORTED 18/01/23 15:38. TEMPLATE ID: DP_101.02.00_SOILLOG

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL:
COORDINATE E: N:
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 219
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium, sub-angular to sub-rounded (crushed natural rock)		FILL		D to M		D E		0.0		
	0.05	Test pit discontinued at 0.05m depth Limit of investigation								0.05	PID	<1

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL:
COORDINATE E: N:
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 220
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
observed	0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium, sub-angular to sub-rounded (crushed natural rock)		FILL		D to M		D E		0.0		
No free groundwater observed	0.05	Test pit discontinued at 0.05m depth Limit of investigation								0.05	PID	<1

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
METHOD:
REMARKS:

OPERATOR: Kramer

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.0 AHD
COORDINATE E:383938.6 **N:** 6355703.5
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 221
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	3 / 0.0	FILL/ (SP) Silty SAND; brown; fine to medium; with rootlets		FILL		M		D		0.0		
	0.06							E		0.05	PID	<1
	0.11	FILL/ (GP) Sandy GRAVEL, with silt, with slag; brown; medium to coarse, angular to sub-angular, (crushed natural rock); trace brick fragments, glass shards, ceramic shards		FILL		M		D		0.1	PID	<1
		FILL/ (SP) Silty SAND, with gravel; brown dark brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace coal reject, slag (possibly coal tar asphalt), brick fragments		FILL	NA	M		D		0.3	PID	<1
								E				
										0.5	PID	<1
							coal tar sample	D		0.6	PID	<1
								E				
										0.7	PID	<1
	0.75	Test pit discontinued at 0.75m depth Refusal on brick										
	2 / 1									1		
	1 / 2									2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Auger
METHOD:
REMARKS:

OPERATOR: Kramer/Helbig

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.8 AHD
COORDINATE E:383951.7 **N:** 6355696.3
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 222
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); with rootlets		FILL		M		D, E		0.0 0.1	PID	<1
	0.3	FILL/ (SP) SAND, with silt, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular (crushed natural rock); trace slag, concrete pieces, brick (half bricks and fragments), possible coal tar asphalt fragments		FILL	NA	M		D, E		0.4	PID	<1
	0.9	(SP) SAND; brown pale brown; fine to medium		ALV		M		D, E		0.8	PID	<1
	1.1	Test pit discontinued at 1.10m depth Limit of investigation						D		1.0	PID	<1

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel to 0.5m then hand auger to 1.1m
METHOD:
REMARKS:

OPERATOR: Kramer/Helbig

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 1.1 AHD
COORDINATE **E:**384002.6 **N:** 6355660.0
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 223
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	1 / 0.0	FILL/ (SP) Silty SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace rootlets		FILL		M		D, E		0.0 / 0.05	PID	<1
	0.1			FILL		M		D, E		0.15	PID	<1
	0.2	FILL/ (SP) SAND; brown; fine to medium; trace rootlets			NA					0.2	PID	<1
		FILL/ (SP) Silty SAND; brown to dark brown; fine to medium; trace glass shards, brick fragments, ceramic shards, ash, slag, bolts, copper coil, plastic (hard)		FILL		M		D, E, B		0.3	PID	<1
							D2/LAH	D, E		0.5	PID	<1
	0.6	Test pit discontinued at 0.60m depth Limit of investigation								0.6	PID	<1
	0									1		
	1									2		
	-1											
	2											

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel to 0.6m
METHOD:
REMARKS:

OPERATOR: Kramer/Helbig

LOGGED: Kramer

EXPORTED 18/01/23 15:39. TEMPLATE ID: DP_101.02.00_SOILLOG

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 1.8 AHD
COORDINATE E:384022.4 **N:** 6355645.2
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 224
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND; brown; fine to medium; trace rootlets, ceramic shards, slag, metal shards, glass shards, coal reject		FILL	NA	M		D, E		0.0		
										0.05	PID	<1
								B				
								D, E		0.5	PID	<1
	0.65	FILL/ (SP) SAND; pale brown; fine to medium; trace rootlets		FILL		M				0.7	PID	<1
								D, E		0.8	PID	<1
	1.0	FILL/ (SP) SAND, with clay, with gravel; dark brown dark grey; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock)		FILL		M				1		
		1.1m: From 1.1m, trace ceramic and ash				W		D, E		1.1	PID	<1
	1.2	Test pit discontinued at 1.20m depth Limit of investigation								2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Shovel to 0.65m then hand auger to 1.2m
METHOD:
REMARKS:

OPERATOR: Kramer/Helbig

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.9 AHD
COORDINATE E:384047.2 **N:** 6355627.6
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 225
PROJECT No: 213618.02
DATE: 20/12/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
	0.0	FILL/ (SP) Silty SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace rootlets, slag, ash, ceramic shards, glass shards		FILL		M		D E		0.0 0.05	PID	<1
								B				
								D E		0.5	PID	<1
	0.6	FILL/ (SP) SAND; pale brown; fine to medium; trace rootlets, ash, ceramic shards			NA					0.6	PID	<1
				FILL		M		D E		0.8	PID	<1
Free groundwater observed ∇	1.0	FILL/ (SP) SAND, with clay, trace gravel; dark brown dark grey; sand fraction fine to medium; gravel fraction fine to medium sub-rounded (crushed natural rock); pockets of red brown low plasticity sandy clay		FILL		M W	D3/LAH	D E		1.05	PID	<1
	1.2	1.1m: trace glass Test pit discontinued at 1.20m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: Hand Tools
OPERATOR: Kramer/Helbig
LOGGED: Kramer
METHOD: Shovel to 0.6m then hand auger to 1.2m
REMARKS:

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.1 AHD
COORDINATE E:384041.4 **N:** 6355631.2
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 301
PROJECT No: 213618.02
DATE: 04/10/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (ML) SILT, trace sand; brown; silt fraction low plasticity; sand fraction fine to medium; trace rootlets, glass, slag, ash, ceramic, fine to coarse sub-angular to sub-rounded gravel		FILL	NA	W to <PL		D E		0.05	PID	<1
								D E		0.3	PID	<1
								D E		0.5	PID	<1
	0.6	FILL/ (SP) SAND, with silt, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium, sub-angular to sub-rounded; trace ceramic		FILL	NA	M		D E		0.7	PID	<1
	0.8	(SP) SAND; pale brown; fine to medium		ALV		W		D E		1.0	PID	<1
	1.3	Borehole discontinued at 1.30m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 300mm Auger
METHOD: 300mm auger to 1.3m
REMARKS:

OPERATOR: Kramer
CASING:

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.1 AHD
COORDINATE **E:**384012.6 **N:** 6355654.8
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 302
PROJECT No: 213618.02
DATE: 04/10/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED									SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwateer observed	2	0.0	FILL/ (ML) SILT, trace sand; brown; silt fraction low plasticity; sand fraction fine to medium grain; trace rootlets, glass, slag, ash, ceramic, fine to coarse sub-angular to sub-rounded gravel		FILL		W to <PL		D, E		0.05	PID	<1
									D, E		0.3	PID	<1
		0.4	FILL/ (SP) Silty SAND; brown; fine to medium; with fine to medium sub-angular to sub-rounded gravels (Cnr), slag gravels, trace ceramic, coal reject, and rootlets		FILL		D to M		D, E		0.5	PID	<1
		0.8	FILL/ (SP) SAND, with silt; grey; fine to medium; fine to medium sub-angular to sub-rounded gravels, trace ceramic, metal, wire and organics		FILL		M		D, E		1.0	PID	<1
	1	1.1	FILL/ (CL) Silty CLAY, with sand; grey; clay fraction low plasticity; sand fraction fine to medium grain; trace brick, rootlets		FILL	NA	W to <PL		D, E		1.15	PID	<1
		1.2	FILL/ (SP) Silty SAND; grey, dark grey; fine to medium; with fine to medium ash gravels, fine to medium sub-angular to sub-rounded gravels (crushed natural rock), trace organics and coal rejects		FILL		M to W		D, E		1.3	PID	<1
		1.4	FILL/ (SP) SAND; grey; fine to medium; trace fine to medium sub-angular to sub-rounded gravels (crushed natural rock)		FILL		W		D, E		1.5	PID	<1
		1.6	FILL/ (ML) SILT; grey brown; low plasticity; trace rootlets		FILL		W to <PL		D		1.65	PID	<1
		1.7	FILL/ (SP) SAND, with silt; grey; fine to medium; organics, fine to medium sub-angular to sub-rounded gravels (crushed natural rock)), brick, rubber		FILL		W		D, E		1.8	PID	<1
	0	1.9	FILL/ (ML) Clayey SILT, trace gravel; grey; silt fraction low plasticity; gravel fraction fine to medium, sub-angular to sub-rounded; with organics		FILL		W to <PL		D, E		2.0	PID	<1
		2	2.0m: several bones up to 100mm length										
		2.1	Borehole discontinued at 2.10m depth Limit of machine										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 300mm Auger
METHOD: 300mm auger to 2.1m
REMARKS:

OPERATOR: Kramer
CASING:

LOGGED: Kramer

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BOREHOLE LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.5 AHD
COORDINATE E:383964.9 **N:** 6355622.3
DATUM/GRID: MGA94 Zone 56
DIP/AZIMUTH: 90°/---

LOCATION ID: 303
PROJECT No: 213618.02
DATE: 04/10/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND; brown; fine to medium; trace rootlets, bricks, fine to medium sub-angular to sub-rounded gravels (crushed natural rock)		FILL		M		D, E		0.05	PID	<1
								D, E		0.3	PID	<1
	0.5	FILL(?)/ (SP) SAND, with silt; grey; fine to medium; trace rootlets		possibly FILL		M to W		D, E		0.5	PID	<1
								D, E		0.6		
	0.65	FILL(?)/ (CH) CLAY; pale brown mottled grey; high plasticity; trace rootlets, fine rounded gravels (crushed natural rock)		possibly FILL	NA	W to <PL		D, E		1.0	PID	<1
	1.1	(SP) SAND, with silt; grey; fine to medium; trace rootlets		ALV		M		D, E		1.2	PID	<1
	1.3	(SP) SAND; pale grey; fine to medium		ALV		M		D, E		1.5	PID	<1
	1.7	Borehole discontinued at 1.70m depth Limit of investigation								2		

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 300mm Auger
METHOD: 300mm auger to 1.7m
REMARKS:

OPERATOR: Kramer
CASING:

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.4 AHD
COORDINATE E:384044.3 **N:** 6355587.7
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 304
PROJECT No: 213618.02
DATE: 28/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND; brown; fine to medium; trace rootlets, roots, ceramic, glass		FILL		D		D E		0.0 0.05	PID	<1
	0.3	FILL/ (CH) CLAY; grey mottled brown; high plasticity; trace rootlets, fine to medium sub-angular to sub-rounded gravels (crushed natural rock)		FILL		W <PL		D E		0.25 0.4	PID	<1
	0.5	(SP) SAND, with silt; grey; fine to medium 0.85m: pale grey		ALV	NA	M		D E		0.7	PID	<1
	1.0	Test pit discontinued at 1.00m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 1.0m
REMARKS:

OPERATOR: Kramer/Krebs
LOGGED: Kramer/Krebs

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.3 AHD
COORDINATE **E:**384023.0 **N:** 6355612.5
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 305
PROJECT No: 213618.02
DATE: 28/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
Seepage at 1.2m, free groundwater observed at 2.8m	0.0 / 2	FILL/ (SP) Silty SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace rootlets, roots		FILL		D		D E		0.0 0.05	PID	<1
	0.25	FILL/ (SP) Silty Gravelly SAND; dark grey brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace rootlets, fine to coarse slag gravels, ceramic, glass, ash		FILL		M		D E		0.3	PID	<1
	0.5			FILL		M		D E		0.6	PID	<1
	0.65	FILL/ (SP) Silty SAND; brown; fine to medium; trace brick, glass, metal, ceramic 0.6m: fibro fragment observed (305F)										
	1	FILL/ SAND; fine to medium		FILL				D E		1.0	PID	<1
	1.2 / 1	FILL/ SAND; intermixed pale brown grey; fine to medium; trace metal sheets / rods, trace glass, plastic		FILL	NA	W		D E		1.5	PID	<1
	1.8 / 2	FILL/ SILT; dark grey; low plasticity; with organics		FILL		W >PL		D E		2.0	PID	<1
	2.1 / 0	FILL/ (SP) Silty SAND; grey; fine to medium		FILL		M to W		D E		2.5	PID	<1
	3							D E		3.0	PID	<1
	3.15 / -1	Test pit discontinued at 3.15m depth Limit of machine										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 3.15m
REMARKS: D1/28.11.22

OPERATOR: Kramer/Krebs

LOGGED: Kramer/Krebs

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.3 AHD
COORDINATE E:384000.5 **N:** 6355629.8
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 306
PROJECT No: 213618.02
DATE: 28/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED									SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
		0.0	FILL/ (SP) Silty SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace rootlets, roots, ceramic		FILL		D		D E		0.0 0.05	PID	<1
	2	0.3	FILL/ (SP) Silty Gravelly SAND; dark grey brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace rootlets, fine to coarse slag gravels, ceramic, glass, ash		FILL		M		D E		0.4	PID	<1
		0.5	SAND; pale brown; fine to medium				M		D E		0.6	PID	<1
		0.7	SAND, trace gravel; intermixed pale brown grey; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); with rusted metal, trace glass, sandstone cobbles				M						
		1							D E		1.0	PID	<1
	1	1.1	FILL/ Clayey SAND; dark grey; trace metal / gravels, fine to medium sub-angular to sub-rounded (crushed natural rock)		FILL	NA	M		D E		1.2	PID	<1
		1.3	FILL/ Sandy Clayey GRAVEL; dark grey; gravel fraction fine to medium, sub-angular to sub-rounded, (crushed natural rock); sand fraction fine to medium		FILL		W		D E		1.4	PID	<1
		1.5	FILL/ Clayey SAND; grey; fine to medium; trace rootlets		FILL		W		D E		1.6	PID	<1
		2							D E		2.0	PID	<1
	0	2.1	FILL/ (CL) Silty CLAY; dark grey; low plasticity; trace rootlets		FILL		W >PL		D E		2.2	PID	<1
		2.3	Test pit discontinued at 2.30m depth Pit collapse										

Free groundwater observed ∇

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 2.3m
REMARKS:

OPERATOR: Kramer/Krebs
LOGGED: Kramer/Krebs

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 2.5 AHD
COORDINATE E:383985.5 **N:** 6355642.7
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 307
PROJECT No: 213618.02
DATE: 28/11/22
SHEET: 1 of 1

GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	SAMPLE TYPE	SAMPLE INTERVAL	SAMPLE DEPTH (m)	TESTING AND REMARKS: TEST TYPE	TESTING AND REMARKS: RESULTS AND REMARKS
		0.0	FILL/ (SP) Silty SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace rootlets, gravel		FILL		D		D E		0.0 0.05	PID	<1
		0.25	FILL/ Silty SAND, with gravel; grey brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace glass, brick, terracotta, slag, ceramic, coal 0.3-0.5m: abundant fibro fragments (307F) present		FILL				D E		0.3	PID	<1
	2								D E		0.5	PID	<1
		0.7	FILL/ (SP) SAND; pale brown; fine to medium 0.8m: pale brown grey		FILL		D to M		D E		0.8	PID	<1
		0.9	FILL/ (SP) Clayey SAND, trace gravel; intermixed brown grey; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace ceramic, brick, glass, rusted metal		FILL	NA			D E		1.0	PID	<1
	1	1.4	FILL/ SAND, with silt; grey; fine to medium; trace organics		FILL				D E		1.5	PID	<1
		1.6	FILL/ (CL) Silty CLAY; dark grey; low plasticity; trace rootlets		FILL		W >PL		D E		1.8	PID	<1
		2.0	FILL/ Clayey SAND; brown grey; fine to medium; with abundant organics 2.0-2.3m: strong decaying organic odor		FILL		W		D E		2 2.2	PID	<1
Seepage	0	2.3	(SP) SAND; grey pale grey; fine to medium		ALV		W		D E		2.5	PID	<1
		2.7	Test pit discontinued at 2.70m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 2.7m
REMARKS: D2/28.11.22 at 0.3m

OPERATOR: Kramer/Krebs
LOGGED: Kramer/Krebs

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.5 AHD
COORDINATE E:383956.6 **N:** 6355601.0
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 308
PROJECT No: 213618.02
DATE: 28/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND; brown; fine to medium; trace rootlets		FILL		D		D E		0.0 0.05	PID	<1
	0.2	FILL/ (GP) Sandy GRAVEL; grey; fine to medium, sub-angular to sub-rounded, (crushed natural rock); with slag, coal, ash		FILL		D		D E		0.25	PID	<1
	0.35	(SP) SAND; pale grey; fine to medium; trace rootlets		ALV	NA	M		D E		0.5	PID	<1
	0.7	Test pit discontinued at 0.70m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 0.7m
REMARKS:

OPERATOR: Kramer/Krebs
LOGGED: Kramer/Krebs

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.4 AHD
COORDINATE E:383971.8 **N:** 6355591.2
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 309
PROJECT No: 213618.02
DATE: 28/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND; brown; fine to medium; trace rootlets		FILL		D		D E		0.0 0.05	PID	<1
	0.2	FILL/ (GP) Sandy GRAVEL; grey; fine to medium, sub-angular to sub-rounded, (crushed natural rock); with slag, coal, ash		FILL		D		D E		0.25	PID	<1
	0.3	(SP) SAND; pale grey; fine to medium; trace rootlets		ALV	NA	M		D E		0.5	PID	<1
	0.7	Test pit discontinued at 0.70m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 0.7m
REMARKS:

OPERATOR: Kramer/Krebs
LOGGED: Kramer/Krebs

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.3 AHD
COORDINATE **E:**383991.5 **N:** 6355574.4
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 310
PROJECT No: 213618.02
DATE: 28/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	3 / 0.0	FILL/ (SP) Silty SAND; brown; fine to medium; trace rootlets		FILL	NA	D		D E		0.0 0.05	PID	<1
	0.2	(SP) SAND; pale grey; fine to medium; trace rootlets		ALV		M		D E		0.25	PID	<1
								D E		0.5	PID	<1
	0.6	Test pit discontinued at 0.60m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 0.6m
REMARKS:

OPERATOR: Kramer/Krebs
LOGGED: Kramer/Krebs

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.1 AHD
COORDINATE **E:**384002.8 **N:** 6355589.4
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 311
PROJECT No: 213618.02
DATE: 28/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	3 / 0.0	(SP) Silty SAND; brown; fine to medium; trace glass		ALV				D E		0.0 0.05	PID	<1
								D E		0.25	PID	<1
	0.4	(SP) SAND; pale grey; fine to medium; trace rootlets		ALV	NA	M		D E		0.5	PID	<1
	2 / 0.8	Test pit discontinued at 0.80m depth Limit of investigation										
	1									1		
	2									2		
	1											

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 0.8m
REMARKS: D3/28.11.22 at 0.25m

OPERATOR: Kramer/Krebs
LOGGED: Kramer/Krebs

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.8 AHD
COORDINATE E:383891.4 **N:** 6355717.2
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 312
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) Silty SAND; brown; fine to medium; trace rootlets		FILL	NA	M		D, E		0.0		
	0.05									0.05	PID	<1
		FILL/ (SP) SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace brick, terracotta, rootlets, concrete, plastic		FILL		D		D, E		0.25	PID	<1
	0.35	(SP) SAND; pale brown; fine to medium		ALV		M		D, E		0.5	PID	<1
	3											
	1							D, E		1.0	PID	<1
	1.1	Test pit discontinued at 1.10m depth Limit of investigation										
	2									2		
	2											
	1											

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 1.1m
REMARKS:

OPERATOR: Kramer
LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 4.9 AHD
COORDINATE **E:**383843.2 **N:** 6355654.9
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 313
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED									SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m)	DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed		0.0	FILL/ (SP) SAND, with silt, with gravel; brown; sand fraction fine to medium; gravel fraction fine sub-angular to sub-rounded (crushed natural rock); trace plastic, roots		FILL		D		D E		0.0 0.05	PID	<1
		0.1	FILL/ (SP) SAND, trace gravel; pale brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); cobbles		FILL		D						
		0.3	FILL/ (SP) Gravelly SAND; brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace rootlets, (possible pavement gravels)		FILL		M		D E		0.25	PID	<1
		0.6	FILL/ (SP) Gravelly SAND; brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace brick, concrete, terracotta, cobbles, plastic, slate, metal		FILL	NA	D		D E		0.5	PID	<1
	4 1								D E		1.0	PID	<1
		1.3	ASPHALTIC CONCRETE;						D E		1.35	PID	<1
		1.37	FILL/ (SP) Gravelly SAND; pale brown; sand fraction fine to medium; gravel fraction fine to medium sub- angular to sub-rounded; (pavement gravels)		FILL		M		D E		1.5	PID	<1
		1.65	ASPHALTIC CONCRETE;						D		1.67	PID	<1
		1.7	(SP) SAND; pale brown; fine to medium		ALV		M						
	3 2								D E		2.0	PID	<1
		2.2	Test pit discontinued at 2.20m depth Limit of investigation										
	2												

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 2.2m
REMARKS: D1/29.11.22 at 1.0m

OPERATOR: Kramer

LOGGED: Kramer

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 3.9 AHD
COORDINATE E:383857.4 **N:** 6355649.0
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 314
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ (SP) SAND, with silt; brown; fine to medium; trace rootlets		FILL		D		D E		0.0 0.05	PID	<1
	0.1	FILL/ (SP) Gravelly SAND, with silt; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace rootlets, brick		FILL				D E		0.15	PID	<1
	0.2							D E		0.23	PID	<1
	0.25	ASPHALTIC CONCRETE;										
		FILL/ (SP) Gravelly SAND; pale brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded; (pavement gravels)		FILL		M		D E		0.4	PID	<1
	0.5	FILL/ (SP) Gravelly SAND; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock); trace brick fragments		FILL	NA	M		D E		0.55	PID	<1
	0.7	(SP) SAND; pale brown; fine to medium		ALV		M						
	1.1	Test pit discontinued at 1.10m depth Limit of investigation						D E		1.0	PID	<1

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 1.1m
REMARKS:

OPERATOR: Kramer/Krebs
LOGGED: Kramer/Krebs

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 4.9 AHD
COORDINATE E:383836.2 **N:** 6355627.1
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 315
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	0.0	FILL/ Silty SAND; brown; fine to medium		FILL		D		D, E		0.0 / 0.05	PID	<1
	0.1	FILL/ (SP) SAND, trace gravel; pale brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace sandstone cobbles / boulder		FILL				D, E		0.25	PID	<1
								D, E		0.5	PID	<1
	0.6	FILL/ (SP) SAND, with gravel; brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); trace metal, plastic, brick, asphalt, ceramic, terracotta		FILL								
	4							D, E		1.0	PID	<1
	1											
	1.15	FILL/ Gravelly SAND; pale red; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock)		FILL	NA	D to M		D, E		1.2	PID	<1
	1.25	FILL/ SAND, with gravel; dark brown; sand fraction fine to medium; gravel fraction fine to medium (crushed natural rock); trace concrete		FILL				D, E		1.5	PID	<1
	1.85	SAND; grey pale grey; fine to medium										
	3							D, E		2.0	PID	<1
	2	2.1m: brown, moist				M						
	2.4	Test pit discontinued at 2.40m depth Limit of investigation										
	2											

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 2.4m
REMARKS:

OPERATOR: Kramer/Krebs
LOGGED: Kramer/Krebs

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TEST PIT LOG

CLIENT: School Infrastructure NSW
PROJECT: Newcastle High School Upgrade
LOCATION: Parkway Avenue, Hamilton South

SURFACE LEVEL: 5.1 AHD
COORDINATE **E:**383848.7 **N:** 6355618.3
DATUM/GRID: MGA94 Zone 56

LOCATION ID: 316
PROJECT No: 213618.02
DATE: 29/11/22
SHEET: 1 of 1

CONDITIONS ENCOUNTERED								SAMPLE				TESTING AND REMARKS	
GROUNDWATER	RL (m) / DEPTH (m)	DESCRIPTION OF STRATA	GRAPHIC	ORIGIN(#)	CONSIS.(*) / DENSITY.(*)	MOISTURE	REMARKS	TYPE	INTERVAL	DEPTH (m)	TEST TYPE	RESULTS AND REMARKS
No free groundwater observed	5 / 0.0	FILL/ Silty SAND; brown; fine to medium		FILL		D		D, E		0.0		
	0.1	FILL/ (SP) SAND, trace gravel; pale brown; sand fraction fine to medium; gravel fraction fine to coarse sub-angular to sub-rounded (crushed natural rock); sandstone cobbles / boulder		FILL						0.05	PID	<1
								D, E		0.25	PID	<1
								D, E		0.5	PID	<1
	0.75	FILL/ (SP) SAND, with silt; dark brown; fine to medium; trace concrete, brick		FILL	NA	D		D, E		1.0	PID	<1
	4 / 1											
	1.35	FILL/ Gravelly SAND; pale red; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock)		FILL		D to M		D, E		1.4	PID	<1
	1.45	FILL/ (SP) SAND, trace gravel; brown; sand fraction fine to medium; gravel fraction fine to medium sub-angular to sub-rounded (crushed natural rock)		FILL		D to M		D, E		1.5	PID	<1
	1.7	(SP) SAND; pale grey; fine to medium		ALV		M						
	2 / 3							D, E		2.0	PID	<1
	2.2	Test pit discontinued at 2.20m depth Limit of investigation										

NOTES: (#)Soil origin is "probable" unless otherwise stated. (*)Consistency/Relative density shading is for visual reference only - no correlation between cohesive and granular materials is implied.

PLANT: 5.5T Excavator with 450mm bucket
METHOD: 450mm bucket to 2.2m
REMARKS: D2/29.11.22

OPERATOR: Kramer/Krebs
LOGGED: Kramer/Krebs

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Appendix B

Martens (2021) Borehole Logs and Explanatory Notes
Table B1 – Summary of Laboratory Results – Acid Sulfate Soils (Martens, 2021)
Envirolab Laboratory Reports (Martens, 2021)

CLIENT	NSW Department of Education	COMMENCED	19/01/2021	COMPLETED	20/01/2021	**REF BH101**
PROJECT	Geotechnical and Land Contamination Assessment	LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School	GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT	4WD ute-mounted hydraulic drill rig	EASTING	151.7594	RL SURFACE	3 m	DATUM AHD
EXCAVATION DIMENSIONS	9.00 m depth	NORTHING	-32.9313	ASPECT		SLOPE

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T				3.00	1 ES 0.10 m 1 D 0.20-0.40 m			SP	FILL: Gravelly SAND; fine to medium grained; dark grey; with silt; trace clay; medium grained gravels.			FILL
	L		1							M		
				2.00								
	H		2	1.00					Coarse grained gravels/boulders encountered.			
				2.50								
				0.50	1 ES 2.60 m			SP	SAND; find to medium grained; dark grey; with silt; trace clay and gravel; sandy clay seams encountered at irregular intervals.			ALLUVIUM
		19/01/21	3		1 D 3.00-3.20 m							
			4									
			5									
	L		6							W		
			7									
			8									
			9	*9.00*					Hole Terminated at 9.00 m (Target depth reached)			

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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CLIENT	NSW Department of Education		COMMENCED	19/01/2021	COMPLETED	20/01/2021	**REF BH102**
PROJECT	Geotechnical and Land Contamination Assessment		LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School		GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.7581	RL SURFACE	3 m	DATUM AHD
EXCAVATION DIMENSIONS		9.00 m depth	NORTHING	-32.9306	ASPECT		SLOPE

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T				3.00								
				0.20	1 ES 0.10 m			SP	FILL: Sandy CLAY; low to medium plasticity; dark brown; with fine to medium grained gravels.			FILL
				2.80	1 B 0.20-0.60 m 1 ES 0.30 m 1 D 0.40-0.60 m			SP	SAND; fine to medium grained; brown; trace silt; trace fine gravels.			ALLUVIUM
				1.00								
			1	2.00					Becoming pale brown/grey.			
			2		1 D 2.00-2.20 m							
			3		1 D 3.00-3.20 m					M	MD - D	
	L		4									
		19/01/21	5		1 D 5.00-5.20 m							
			6									
				7.00								
			7	-4.00	1 D 7.00-7.20 m				Clayey SAND; fine to medium grained; grey; with silt.	W		
	M		8									
				9.00								
			9						Hole Terminated at 9.00 m (Target depth reached)			

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PROJECT	Geotechnical and Land Contamination Assessment		LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School		GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.7576	RL SURFACE	4 m	DATUM AHD
EXCAVATION DIMENSIONS		9.00 m depth	NORTHING	-32.9313	ASPECT		SLOPE

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	M		1	4.00	1 ES 0.10 m 1 B 0.20-0.60 m 1 D 0.30-0.50 m 1 ES 0.60 m			SP	FILL: SAND; fine to medium grained; brown; with medium grained gravels; with silt; trace clay.			FILL
				1.50								
	L	19/01/21	2	2.50 *2.00* 2.00	1 ES 1.60 m 1 D 2.10-2.30 m			SP	SAND; fine to medium grained; pale brown/yellow; trace clay; trace silt. Becoming pale brown.	M		ALLUVIUM
			3									
			4		1 D 4.00-4.20 m							
			5	*5.50* -1.50					Becoming brown/grey.			
			6		1 D 6.00-6.20 m					W		
				6.50 -2.50					Becoming grey; increasing clay content.			
			7		1 D 7.00-7.20 m							
				7.50 -3.50				SC	Clayey SAND; fine to medium grained; grey.			
			8	*8.50* -4.50				CI	Sandy CLAY; medium plasticity; grey; with silt.			
					1 D 8.70-8.90 m							
			9	*9.00*					Hole Terminated at 9.00 m (Target depth reached)			

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PROJECT	Geotechnical and Land Contamination Assessment		LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School		GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.7588	RL SURFACE	4 m	DATUM AHD
EXCAVATION DIMENSIONS		9.00 m depth	NORTHING	-32.9317	ASPECT		SLOPE

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L	19/01/21	0	4.00	1 B 0.10-0.50 m 2 ES 0.10 m 1 D 0.30-0.50 m			SP	SAND; fine to medium grained; pale brown; with silt; trace gravel.			ALLUVIUM
				1.00								
			1	3.00	1 ES 1.10 m			SC	SAND; fine to medium grained; brown/pale brown; trace silt and gravel.			
			2		1 D 2.00-2.20 m					M	MD - D	
			3		1 D 3.00-3.20 m							
			4		1 D 4.10-4.30 m							
			5									
			6							W		
			7									
			8	*8.00* -4.00				CL-CI	Sandy CLAY; low to medium plasticity; grey.			
			9	*9.00*					Hole Terminated at 9.00 m (Target depth reached)			

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PROJECT	Geotechnical and Land Contamination Assessment		LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School		GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.7591	RL SURFACE	3 m	DATUM AHD
EXCAVATION DIMENSIONS		6.00 m depth	NORTHING	-32.9315	ASPECT		SLOPE

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L	19/01/21	0	3.00	2 ES 0.10 m			SC	FILL: Clayey SAND; fine grained; brown/dark brown; trace fine to medium grained gravels.	M		FILL
			1		1 D 0.30-0.50 m							
				1.50								
				1.50				SC	Clayey SAND; find to medium grained; brown/dark grey; trace silt, clay and gravel.		L	ALLUVIUM
			2		1 ES 1.80 m 1 D 1.90-2.10 m							
			3							W	MD - D	
			4		1 D 4.50-4.70 m							
				5.00								
			5	-2.00				SC	Clayey SAND; medium to coarse grained; pale brown.			
					1 D 5.50-5.70 m							
			6	*6.00*					Hole Terminated at 6.00 m (Target depth reached)			
			7									
			8									
			9									

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PROJECT	Geotechnical and Land Contamination Assessment		LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School		GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.7592	RL SURFACE	4 m	DATUM AHD
EXCAVATION DIMENSIONS		6.00 m depth	NORTHING	-32.9319	ASPECT		SLOPE

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L	19/01/21	0	4.00	1 ES 0.10 m 1 D 0.20-0.40 m			SP	SAND; fine grained; grey/pale grey.			ALLUVIUM
				0.80								
			1	3.20	1 ES 0.90 m 1 D 1.00-1.20 m			SM	Silty SAND; fine grained; brown/dark brown.	M	MD	
				1.90								
			2	2.10	1 D 2.00-2.20 m			SP	SAND; fine to medium grained; pale brown.			
			3									
			4		1 D 4.00-4.20 m					W	MD - D	
			5									
				5.40								
				-1.40					Becoming grey/yellowish brown.			
					1 D 5.60-5.80 m							
			6	*6.00*					Hole Terminated at 6.00 m (Target depth reached)			
			7									
			8									
			9									

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CLIENT	NSW Department of Education		COMMENCED	19/01/2021	COMPLETED	20/01/2021	**REF BH107**
PROJECT	Geotechnical and Land Contamination Assessment		LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School		GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.7578	RL SURFACE	4 m	DATUM AHD
EXCAVATION DIMENSIONS		6.00 m depth	NORTHING	-32.9313	ASPECT		SLOPE

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L		0	4.00	1 ES 0.10 m			SP	FILL: SAND; fine to medium grained; brown; with clay and fine to medium grained gravels.			FILL
				0.50								
				3.50				SP	FILL: Gravelly SAND; medium grained; brown; with clay; medium to coarse grained gravels.			ALLUVIUM
			1		1 ES 0.80 m					M		
				1.50								
				2.50	1 ES 1.60 m 1 D 1.70-1.90 m			SP	SAND; fine to medium grained; pale brown/brown, trace clay.			
			2	*2.50*								
		19/01/21		1.50					Becoming pale brown.			
	H		3									
					1 D 3.80-4.00 m					W		
			4									
			5									
				5.50								
				-1.50					Becoming dark grey.			
					1 D 5.70-5.90 m							
			6	*6.00*					Hole Terminated at 6.00 m (Target depth reached)			
			7									
			8									
			9									

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CLIENT	NSW Department of Education		COMMENCED	19/01/2021	COMPLETED	20/01/2021	**REF BH108**
PROJECT	Geotechnical and Land Contamination Assessment		LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School		GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.7574	RL SURFACE	4 m	DATUM AHD
EXCAVATION DIMENSIONS		6.00 m depth	NORTHING	-32.9321	ASPECT		SLOPE

Drilling					Sampling		Field Material Description				
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L	19/01/21	1	4.00 *0.20* 3.80 *0.80* 3.20	2 ES 0.10 m 1 B 0.20-0.60 m 1 ES 0.30 m 1 D 0.40-0.60 m 1 ES 0.90 m 1 D 1.00-1.20 m			SP SP	FILL: SAND; fine to medium grained; brown/dark brown; with pebbles and gravels; trace clay. SAND; fine to medium grained; brown, dark brown/pale brown; with silt. Becoming grey/dark grey.	M	MD	FILL ALLUVIUM
			2		1 D 2.00-2.20 m							
			3	*3.50* 0.50					Pale brown.		MD - D	
			4		1 D 4.00-4.20 m					W		
			5									
			6	*6.00*	1 D 5.60-5.80 m				Hole Terminated at 6.00 m (Target depth reached)			
			7									
			8									
			9									

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CLIENT	NSW Department of Education		COMMENCED	19/01/2021	COMPLETED	20/01/2021	**REF BH109**
PROJECT	Geotechnical and Land Contamination Assessment		LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School		GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.7596	RL SURFACE	3 m	DATUM AHD
EXCAVATION DIMENSIONS		2.00 m depth	NORTHING	-32.9319	ASPECT		SLOPE

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L	Not Encountered	0	3.00	1 ES 0.10 m			SP	SAND; fine to medium grained; grey/brown; trace clay.			ALLUVIUM
					1 ES 0.80 m							
			1	*1.00* 2.00					Pale grey/pale brown.	M	MD	
					1 ES 1.50 m							
			2	*2.00*					Hole Terminated at 2.00 m (Target depth reached)			
			3									
			4									
			5									
			6									
			7									
			8									
			9									

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

MARTENS 2.00 LIB.GLB Log MARTENS BOREHOLE P2007929 BH101 - 111.GPJ <<DrawingFile>> 25/02/2021 11:19 10.02.00.04 Datgel Lab and In Situ Tool - DGD | Lib: Martens 2.00 2016-11-13 Prj: Martens 2.00 2016-11-13

CLIENT	NSW Department of Education		COMMENCED	19/01/2021	COMPLETED	20/01/2021	**REF BH110**
PROJECT	Geotechnical and Land Contamination Assessment		LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School		GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.7591	RL SURFACE	3 m	DATUM AHD
EXCAVATION DIMENSIONS		2.00 m depth	NORTHING	-32.9317	ASPECT		SLOPE

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L	Not Encountered	1	3.00 *0.30* 2.70 *1.10* 1.90 *1.50* 1.50 *2.00*	1 ES 0.10 m 1 ES 0.40 m 1 ES 1.20 m 1 ES 1.60 m			SP SP	FILL: SAND; fine grained; grey/pale brown; trace clay fragments. SAND; fine grained; grey/pale brown. Grey/brown. Brown.	M	MD	FILL ALLUVIUM
			2						Hole Terminated at 2.00 m (Target depth reached)			
			3									
			4									
			5									
			6									
			7									
			8									
			9									

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Engineering Log - BOREHOLE

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CLIENT	NSW Department of Education		COMMENCED	19/01/2021	COMPLETED	20/01/2021	**REF BH111**
PROJECT	Geotechnical and Land Contamination Assessment		LOGGED	DS	CHECKED	JF	Sheet 1 OF 1
SITE	Newcastle High School		GEOLOGY	Quaternary Deposits	VEGETATION	Grass	PROJECT NO. 2007929
EQUIPMENT		4WD ute-mounted hydraulic drill rig	EASTING	151.7576	RL SURFACE	4 m	DATUM AHD
EXCAVATION DIMENSIONS		2.00 m depth	NORTHING	-32.9315	ASPECT		SLOPE

Drilling					Sampling		Field Material Description					
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	*DEPTH* RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USCS / ASCS CLASSIFICATION	SOIL/ROCK MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
AD/T	L	Not Encountered	0	4.00	1 ES 0.10 m			SP	FILL: SAND; fine to medium grained; brown/dark brown; with fine to medium grained gravels; trace clay.			FILL
				0.40								
				3.60				SP	SAND; fine to medium grained; grey/brown; trace clay.			ALLUVIUM
					1 ES 0.60 m							
			1	*1.00* 3.00	1 ES 1.10 m				Orange/brown.	M	MD - D	
				1.50 2.50					Becoming pale brown.			
				2.00								
			2						Hole Terminated at 2.00 m (Target depth reached)			
			3									
			4									
			5									
			6									
			7									
			8									
			9									

EXCAVATION LOG TO BE READ IN CONJUCTION WITH ACCOMPANYING REPORT NOTES AND ABBREVIATIONS

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Information

Important Information About Your Report (1 of 2)

These notes have been prepared by Martens to help you interpret and understand the limitations of your report. Not all are necessarily relevant to all reports but are included as general reference.

Engineering Reports - Limitations

The recommendations presented in this report are based on limited investigations and include specific issues to be addressed during various phases of the project. If the recommendations presented in this report are not implemented in full, the general recommendations may become inapplicable and Martens & Associates accept no responsibility whatsoever for the performance of the works undertaken.

Occasionally, sub-surface conditions between and below the completed boreholes or other tests may be found to be different (or may be interpreted to be different) from those expected. Variation can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact Martens & Associates.

Relative ground surface levels at borehole locations may not be accurate and should be verified by on-site survey.

Engineering Reports – Project Specific Criteria

Engineering reports are prepared by qualified personnel. They are based on information obtained, on current engineering standards of interpretation and analysis, and on the basis of your unique project specific requirements as understood by Martens. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the Client.

Where the report has been prepared for a specific design proposal (e.g. a three storey building), the information and interpretation may not be relevant if the design proposal is changed (e.g. to a twenty storey building). Your report should not be relied upon, if there are changes to the project, without first asking Martens to assess how factors, which changed subsequent to the date of the report, affect the report's recommendations. Martens will not accept responsibility for problems that may occur due to design changes, if not consulted.

Engineering Reports – Recommendations

Your report is based on the assumption that site conditions, as may be revealed through selective point sampling, are indicative of actual conditions throughout an area. This assumption often cannot be substantiated until project implementation has commenced. Therefore your site investigation report recommendations should only be regarded as preliminary.

Only Martens, who prepared the report, are fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report, there is a risk that the report will be misinterpreted and Martens cannot be held responsible for such misinterpretation.

Engineering Reports – Use for Tendering Purposes

Where information obtained from investigations is provided for tendering purposes, Martens recommend that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document.

Martens would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Engineering Reports – Data

The report as a whole presents the findings of a site assessment and should not be copied in part or altered in any way.

Logs, figures, drawings *etc* are customarily included in a Martens report and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), desktop studies and laboratory evaluation of field samples. These data should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Engineering Reports – Other Projects

To avoid misuse of the information contained in your report it is recommended that you confer with Martens before passing your report on to another party who may not be familiar with the background and purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Subsurface Conditions - General

Every care is taken with the report in relation to interpretation of subsurface conditions, discussion of geotechnical aspects, relevant standards and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions - the potential will depend partly on test point (eg. excavation or borehole) spacing and sampling frequency, which are often limited by project imposed budgetary constraints.

Important Information About Your Report (2 of 2)

- Changes in guidelines, standards and policy or interpretation of guidelines, standards and policy by statutory authorities.
- The actions of contractors responding to commercial pressures.
- Actual conditions differing somewhat from those inferred to exist, because no professional, no matter how qualified, can reveal precisely what is hidden by earth, rock and time.

  The actual interface between logged materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

If these conditions occur, Martens will be pleased to assist with investigation or providing advice to resolve the matter.

Subsurface Conditions - Changes

Natural processes and the activity of man create subsurface conditions. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Reports are based on conditions which existed at the time of the subsurface exploration / assessment.

Decisions should not be based on a report whose adequacy may have been affected by time. If an extended period of time has elapsed since the report was prepared, consult Martens to be advised how time may have impacted on the project.

Subsurface Conditions - Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those that were expected from the information contained in the report, Martens requests that it immediately be notified. Most problems are much more readily resolved at the time when conditions are exposed, rather than at some later stage well after the event.

Report Use by Other Design Professionals

To avoid potentially costly misinterpretations when other design professionals develop their plans based on a Martens report, retain Martens to work with other project professionals affected by the report. This may involve Martens explaining the report design implications and then reviewing plans and specifications produced to see how they have incorporated the report findings.

Subsurface Conditions – Geo-environmental Issues

Your report generally does not relate to any findings, conclusions, or recommendations about the potential for hazardous or contaminated materials existing at the site unless specifically required to do so as part of Martens' proposal for works.

Specific sampling guidelines and specialist equipment, techniques and personnel are typically used to perform geo-environmental or site contamination assessments. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Martens for information relating to such matters.

Responsibility

Geo-environmental reporting relies on interpretation of factual information based on professional judgment and opinion and has an inherent level of uncertainty attached to it and is typically far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded.

To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Martens to other parties but are included to identify where Martens' responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Martens closely and do not hesitate to ask any questions you may have.

Site Inspections

Martens will always be pleased to provide engineering inspection services for aspects of work to which this report relates. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site. Martens is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction.

Soil Data

Explanation of Terms (1 of 3)

Definitions

In engineering terms, soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material does not exhibit any visible rock properties and can be remoulded or disintegrated by hand in its field condition or in water, it is described as a soil. Other materials are described using rock description terms.

The methods of description and classification of soils and rocks used in this report are typically based on Australian Standard 1726 and the Unified Soil Classification System (USCS) – refer Soil Data Explanation of Terms (2 of 3). In general, descriptions cover the following properties: strength or density, colour, moisture, structure, soil or rock type and inclusions.

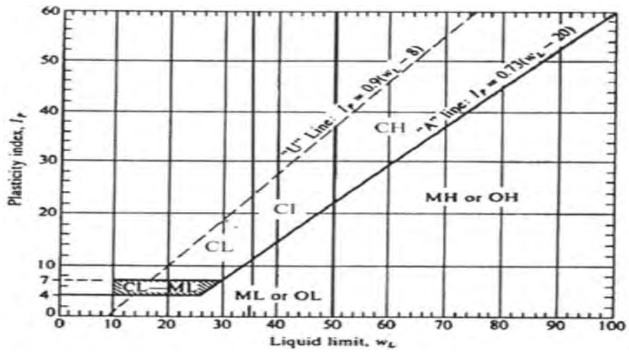
Particle Size

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (e.g. sandy CLAY). Unless otherwise stated, particle size is described in accordance with the following table.

Division	Subdivision		Particle Size (mm)
Oversized	BOULDERS		>200
	COBBLES		63 to 200
Coarse Grained Soil	GRAVEL	Coarse	19 to 63
		Medium	6.7 to 19
		Fine	2.36 to 6.7
	SAND	Coarse	0.6 to 2.36
		Medium	0.21 to 0.6
		Fine	0.075 to 0.21
Fine Grained Soil	SILT		0.002 to 0.075
	CLAY		< 0.002

Plasticity Properties

Plasticity properties of cohesive soils can be assessed in the field by tactile properties or by laboratory procedures.



Soil Moisture Condition

Coarse Grained (Granular) Soil:

Dry (D):	Looks and feels dry. Cemented soils are hard, friable or powdery. Uncemented soils run freely through fingers.
Moist (M):	Feels cool and damp and is darkened in colour. Particles tend to cohere.
Wet (W):	As for moist but with free water forming on hands when handled.

Fine Grained (Cohesive) Soil:

Moist, dry of plastic limit[1] (w < PL):	Looks and feels dry. Hard, friable or powdery.
Moist, near plastic limit (w ≈ PL):	Can be moulded, feels cool and damp, is darkened in colour, at a moisture content approximately equal to the PL.
Moist, wet of plastic limit (w > PL):	Usually weakened and free water forms on hands when handled.
Wet, near liquid limit[2] (w ≈ LL)	
Wet, wet of liquid limit (w > LL)	

[1] Plastic Limit (PL): Moisture content at which soil becomes too dry to be in a plastic condition.

[2] Liquid Limit (LL): Moisture content at which soil passes from plastic to liquid state.

Consistency of Cohesive Soils

Cohesive soils refer to predominantly clay materials.
(Note: consistency is affected by soil moisture condition at time of measurement)

Term	C_u (kPa)	Field Guide
Very Soft (VS)	≤12	A finger can be pushed well into the soil with little effort. Sample exudes between fingers when squeezed in fist.
Soft (S)	>12 and ≤25	A finger can be pushed into the soil to about 25mm depth. Easily moulded by light finger pressures.
Firm (F)	>25 and ≤50	The soil can be indented about 5mm with the thumb, but not penetrated. Can be moulded by strong figure pressure.
Stiff (St)	>50 and ≤100	The surface of the soil can be indented with the thumb, but not penetrated. Cannot be moulded by fingers.
Very Stiff (VSt)	>100 and ≤200	The surface of the soil can be marked, but not indented with thumb pressure. Difficult to cut with a knife. Thumbnail can readily indent.
Hard (H)	> 200	The surface of the soil can only be marked with the thumbnail. Brittle. Tends to break into fragments.
Friable (Fr)	-	Crumbles or powders when scraped by thumbnail. Can easily be crumbled or broken into small pieces by hand.

Density of Granular Soils

Non-cohesive soils are classified on the basis of relative density, generally from standard penetration test (SPT) or Dutch cone penetrometer test (CPT) results as below:

Relative Density	%	**SPT 'N' Value*** (blows/300mm)	CPT Cone Value (q_c MPa)
Very loose	≤15	< 5	< 2
Loose	>15 and ≤35	5 - 10	2 - 5
Medium dense	>35 and ≤65	10 - 30	5 - 15
Dense	>65 and ≤85	30 - 50	15 - 25
Very dense	> 85	> 50	> 25

* Values may be subject to corrections for overburden pressures and equipment type and influenced by soil moisture condition at time of measurement.

Minor Components

Minor components in soils may be present and readily detectable, but have little bearing on general geotechnical classification. Terms include:

Description of components	Proportion of component in:					
	coarse grained soil				fine grained soil	
	% Fines	Terminology	% Accessory coarse fraction	Terminology	% Sand/ gravel	Terminology
Minor	≤5	Trace clay / silt, as applicable	≤15	Trace sand / gravel, as applicable	≤15	Trace sand / gravel, as applicable
	>5,≤12	With clay / silt, as applicable	>15,≤30	With sand / gravel, as applicable	>5,≤30	With sand / gravel, as applicable
Secondary	>12	Prefix soil name as 'silty' or 'clayey', as applicable	>30	Prefix soil name as 'sandy' or 'gravelly', as applicable	>30	Prefix soil name as 'sandy' or 'gravelly', as applicable

Soil Data

Explanation of Terms (2 of 3)

Symbols for Soils and Other

SOILS


COBBLES/BOULDERS


GRAVEL (GP or GW)


Silty GRAVEL (GM)


Clayey GRAVEL (GC)


SAND (SP or SW)


Silty SAND (SM)


Clayey SAND (SC)


SILT (ML or MH)


ORGANIC SILT or CLAY (OH or OL)


CLAY (CL, CI or CH)


Silty CLAY


Sandy CLAY


PEAT (Pt)


Gravelly CLAY

OTHER


FILL


TALUS


ASPHALT


CONCRETE


TOPSOIL

Unified Soil Classification Scheme (USCS)

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 63 mm and basing fractions on estimated mass)					USCS	Primary Name
COARSE GRAINED SOILS More than 65 % of material less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.36 mm.	GRAVEL and GRAVEL-SAND Mixtures (≤ 5% fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes; not enough fines to bind coarse grains; no dry strength	GW	GRAVEL
				Predominantly one size or a range of sizes with some intermediate sizes missing; not enough fines to bind coarse grains; no dry strength	GP	GRAVEL
			GRAVEL-SILT and GRAVEL-SAND-SILT mixtures (≥12% fines) [1]	With excess non-plastic fines (for identification procedures see ML below); zero to medium dry strength; may also contain sand	GM	Silty GRAVEL
				With excess plastic fines (for identification procedures see CL below); medium to high dry strength; may also contain sand	GC	Clayey GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.36 mm	SAND and GRAVEL-SAND mixtures (≤5% fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes; not enough fines to bind coarse grains; no dry strength.	SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing; not enough fines to bind coarse grains; no dry strength	SP	SAND
			SAND-SILT and SAND-CLAY mixtures (≥12% fines) [1]	With excess non-plastic fines (for identification procedures see ML below); zero to medium dry strength;	SM	Silty SAND
				With excess plastic fines (for identification procedures see CL below); medium to high dry strength	SC	Clayey SAND
FINE GRAINED SOILS More than 35 % of material less than 63 mm is smaller than 0.075 mm		IDENTIFICATION PROCEDURES ON FRACTIONS < 0.2 MM				
		DRY STRENGTH (Crushing Characteristics)	DILATANCY	TOUGHNESS	DESCRIPTION	USCS	Primary Name
		None to Low	Quick to Slow	Low	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or silt with low plasticity [2]	ML	SILT [3]
		Medium to High	None to Slow	Medium	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays	CL (or CI[4])	CLAY
		Low to Medium	Slow	Low	Organic slits and organic silty clays of low plasticity	OL	Organic SILT or CLAY
		Low to Medium	None to Slow	Low to Medium	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	MH	SILT [3]
		High to Very High	None	High	Inorganic clays of high plasticity, fat clays	CH	CLAY
		Medium to High	None to Very Slow	Low to Medium	Organic clays of medium to high plasticity, organic silt of high plasticity	OH	Organic SILT or CLAY
HIGHLY ORGANIC SOILS		Readily identified by colour, odour, spongy feel and frequently by fibrous texture				Pt	PEAT

Notes:

1. Between 5% and 12% - dual classification, e.g. GP-GM.
2. Low Plasticity Clay – Liquid Limit W_L ≤35%; Medium Plasticity Clay – Liquid limit W_L >35%, ≤50%; High Plasticity Clay - Liquid limit W_L > 50%.
3. Low Plasticity Silt – Liquid Limit W_L ≤50%; High Plasticity Silt - Liquid limit W_L > 50%.
4. CI may be adopted for clay of medium plasticity to distinguish from clay of low plasticity.

Soil Data

Explanation of Terms (3 of 3)

Soil Agricultural Classification Scheme

In some situations, such as where soils are to be used for effluent disposal purposes, soils are often more appropriately classified in terms of traditional agricultural classification schemes. Where a Martens report provides agricultural classifications, these are undertaken in accordance with descriptions by Northcote, K.H. (1979) *The factual key for the recognition of Australian Soils*, Rellim Technical Publications, NSW, p 26 - 28.

Symbol	Field Texture Grade	Behaviour of moist bolus	Ribbon length	Clay content (%)
S	Sand	Coherence nil to very slight; cannot be moulded; single grains adhere to fingers	0 mm	< 5
LS	Loamy sand	Slight coherence; discolours fingers with dark organic stain	6.35 mm	5
CLS	Clayey sand	Slight coherence; sticky when wet; many sand grains stick to fingers; discolours fingers with clay stain	6.35mm - 1.3cm	5 - 10
SL	Sandy loam	Bolus just coherent but very sandy to touch; dominant sand grains are of medium size and are readily visible	1.3 - 2.5	10 - 15
FSL	Fine sandy loam	Bolus coherent; fine sand can be felt and heard	1.3 - 2.5	10 - 20
SCL$^-$	Light sandy clay loam	Bolus strongly coherent but sandy to touch, sand grains dominantly medium size and easily visible	2.0	15 - 20
L	Loam	Bolus coherent and rather spongy; smooth feel when manipulated but no obvious sandiness or silkiness; may be somewhat greasy to the touch if much organic matter present	2.5	25
Lfsy	Loam, fine sandy	Bolus coherent and slightly spongy; fine sand can be felt and heard when manipulated	2.5	25
SiL	Silt loam	Coherent bolus, very smooth to silky when manipulated	2.5	25 + > 25 silt
SCL	Sandy clay loam	Strongly coherent bolus sandy to touch; medium size sand grains visible in a finer matrix	2.5 - 3.8	20 - 30
CL	Clay loam	Coherent plastic bolus; smooth to manipulate	3.8 - 5.0	30 - 35
SiCL	Silty clay loam	Coherent smooth bolus; plastic and silky to touch	3.8 - 5.0	30- 35 + > 25 silt
FSCL	Fine sandy clay loam	Coherent bolus; fine sand can be felt and heard	3.8 - 5.0	30 - 35
SC	Sandy clay	Plastic bolus; fine to medium sized sands can be seen, felt or heard in a clayey matrix	5.0 - 7.5	35 - 40
SiC	Silty clay	Plastic bolus; smooth and silky	5.0 - 7.5	35 - 40 + > 25 silt
LC	Light clay	Plastic bolus; smooth to touch; slight resistance to shearing	5.0 - 7.5	35 - 40
LMC	Light medium clay	Plastic bolus; smooth to touch, slightly greater resistance to shearing than LC	7.5	40 - 45
MC	Medium clay	Smooth plastic bolus, handles like plasticine and can be moulded into rods without fracture, some resistance to shearing	> 7.5	45 - 55
HC	Heavy clay	Smooth plastic bolus; handles like stiff plasticine; can be moulded into rods without fracture; firm resistance to shearing	> 7.5	> 50

Rock Data

Explanation of Terms (1 of 2)

Symbols for Rock

SEDIMENTARY ROCK


BRECCIA


CONGLOMERATE


CONGLOMERATIC SANDSTONE


SANDSTONE/QUARTZITE


SILTSTONE


MUDSTONE/CLAYSTONE


SHALE


COAL


LIMESTONE


LITHIC TUFF

IGNEOUS ROCK


GRANITE


DOLERITE/BASALT

METAMORPHIC ROCK


SLATE, PHYLLITE, SCHIST


GNEISS


METASANDSTONE


METASILTSTONE


METAMUDSTONE

Definitions

Descriptive terms used for Rock by Martens are based on AS1726 and encompass rock substance, defects and mass.

Rock Material	The intact rock that is bounded by defects.
Rock Defect	Discontinuity, fracture, break or void in the material or minerals across which there is little or no tensile strength.
Rock Structure	The nature and configuration of the different defects within the rock mass and their relationship to each other.
Rock Mass	The entirety of the system formed by all of the rock material and all of the defects that are present.

Degree of Weathering

Rock weathering is defined as the degree of decline in rock structure and grain property and can be determined in the field.

Term	Symbol	Definition
Residual soil[1]	RS	Material is weathered to such an extent that it has soil properties. Mass structure, material texture, and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered[1]	XW	Material is weathered to such an extent that it has soil properties - i.e. it can be remoulded and can be classified according to the Unified Classification System. Mass structure and material texture and fabric of original rock are still visible.
Highly weathered[2]	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the original colour of the rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered[2]	MW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the rock is not recognisable. Rock strength shows little or no change from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	Rock substance unaffected by weathering. No sign of decomposition of individual materials or colour changes.

Notes:
1 RS and EW material is described using soil descriptive terms.
2. The term "Distinctly Weathered" (DW) may be used to cover the range of substance weathering between EW and SW

Rock Strength

Rock strength is defined by the Point Load Strength Index (I_s 50) and refers to the strength of the rock substance in the direction normal to the loading. The test procedure is described by the International Society of Rock Mechanics.

Term (Strength)	I_s (50) MPa	Uniaxial Compressive Strength MPa	Field Guide	Symbol
Very low	>0.03 ≤0.1	0.6 – 2	May be crumbled in the hand. Sandstone is 'sugary' and friable.	VL
Low	>0.1 ≤0.3	2 – 6	Core 150mm long x 50mm diameter may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.	L
Medium	>0.3 ≤1.0	6 – 20	Core 150mm long x 50mm diameter can be broken by hand with considerable difficulty. Readily scored with a knife.	M
High	>1 ≤3	20 – 60	Core 150mm long x 50mm diameter cannot be broken by unaided hands, can be slightly scratched or scored with a knife. Breaks with single blow from pick.	H
Very high	>3 ≤10	60 – 200	Core 150mm long x 50mm diameter, broken readily with hand held hammer. Cannot be scratched with knife. Breaks after more than one pick strike.	VH
Extremely high	>10	>200	A piece of core 150mm long x 50mm diameter is difficult to break with hand held hammer. Rings when struck with a hammer.	EH

Rock Data

Explanation of Terms (2 of 2)

Degree of Fracturing

This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but exclude fractures such as drilling breaks (DB) or handling breaks (HB).

Term	Description
Fragmented	The core is comprised primarily of fragments of length less than 20 mm, and mostly of width less than core diameter.
Highly fractured	Core lengths are generally less than 20 mm to 40 mm with occasional fragments.
Fractured	Core lengths are mainly 30 mm to 100 mm with occasional shorter and longer sections.
Slightly fractured	Core lengths are generally 300 mm to 1000 mm, with occasional longer sections and sections of 100 mm to 300 mm.
Unbroken	The core does not contain any fractures.

Rock Core Recovery

TCR = Total Core Recovery

$$= \frac{\text{Length of core recovered}}{\text{Length of core run}} \times 100\,\%$$

SCR = Solid Core Recovery

$$= \frac{\sum \text{Length of cylindrical core recovered}}{\text{Length of core run}} \times 100\,\%$$

RQD = Rock Quality Designation

$$= \frac{\sum \text{Axial lengths of core} > 100 \text{ mm long}}{\text{Length of core run}} \times 100\,\%$$

Rock Strength Tests

- ▼ Point load strength Index (Is50) - axial test (MPa)
- ▶ Point load strength Index (Is50) - diametral test (MPa)
- ● Uniaxial compressive strength (UCS) (MPa)

Defect Type Abbreviations and Descriptions

Defect Type (with inclination given)

BP	Bedding plane parting
FL	Foliation
CL	Cleavage
JT	Joint
FC	Fracture
SZ/SS	Sheared zone/ seam (Fault)
CZ/CS	Crushed zone/ seam
DZ/DS	Decomposed zone/ seam
FZ	Fractured Zone
IS	Infilled seam
VN	Vein
CO	Contact
HB	Handling break
DB	Drilling break

Planarity

Pl	Planar
Cu	Curved
Un	Undulating
St	Stepped
Ir	Irregular
Dis	Discontinuous

Roughness

Pol	Polished
Sl	Slickensided
Sm	Smooth
Ro	Rough
VR	Very rough

Thickness

Zone	> 100 mm
Seam	> 2 mm < 100 mm
Plane	< 2 mm

Coating or Filling

Cn	Clean
Sn	Stain
Ct	Coating
Vnr	Veneer
Fe	Iron Oxide
X	Carbonaceous
Qz	Quartzite
MU	Unidentified mineral

Inclination

Inclination of defect is measured from perpendicular to and down the core axis.
Direction of defect is measured clockwise (looking down core) from magnetic north.

Test, Drill and Excavation Methods

Explanation of Terms (1 of 3)

martens consulting engineers

Sampling

Sampling is carried out during drilling or excavation to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling or excavation provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples may be taken by pushing a thin-walled sampling tube, e.g. U_{50} (50 mm internal diameter thin walled tube), into soils and withdrawing a soil sample in a relatively undisturbed state. Such samples yield information on structure and strength and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils. Other sampling methods may be used. Details of the type and method of sampling are given in the report.

Drilling / Excavation Methods

The following is a brief summary of drilling and excavation methods currently adopted by the Company and some comments on their use and application.

Hand Excavation - in some situations, excavation using hand tools, such as mattock and spade, may be required due to limited site access or shallow soil profiles.

Hand Auger - the hole is advanced by pushing and rotating either a sand or clay auger, generally 75-100 mm in diameter, into the ground. The penetration depth is usually limited to the length of the auger pole; however extender pieces can be added to lengthen this.

Test Pits - these are excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils and, if it is safe to descend into the pit, collection of bulk disturbed samples. The depth of penetration is limited to about 3 m for a backhoe and up to 6 m for an excavator. A potential disadvantage is the disturbance caused by the excavation.

Large Diameter Auger (e.g. Pengo) - the hole is advanced by a rotating plate or short spiral auger, generally 300 mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube sampling.

Continuous Sample Drilling (Push Tube) - the hole is advanced by pushing a 50 - 100 mm diameter socket into the ground and withdrawing it at intervals to extrude the sample. This is the most reliable method of drilling in soils, since moisture content is unchanged and soil structure, strength *etc.* is only marginally affected.

Continuous Spiral Flight Augers - the hole is advanced using 90 - 115 mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface or, or may be collected after withdrawal of the auger flights, but they are very disturbed and may be contaminated. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability, due to remoulding, contamination or softening of samples by ground water.

Non-core Rotary Drilling - the hole is advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from 'feel' and rate of penetration.

Rotary Mud Drilling - similar to rotary drilling, but using drilling mud as a circulating fluid. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling (eg. from SPT).

Continuous Core Drilling - a continuous core sample is obtained using a diamond tipped core barrel of usually 50 mm internal diameter. Provided full core recovery is achieved (not always possible in very weak or fractured rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation.

In-situ Testing and Interpretation

Cone Penetrometer Testing (CPT)

Cone penetrometer testing (sometimes referred to as Dutch Cone) described in this report has been carried out using an electrical friction cone penetrometer.

The test is described in AS 1289.6.5.1-1999 (R2013). In the test, a 35 mm diameter rod with a cone tipped end is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system.

Measurements are made of the end bearing resistance on the cone and the friction resistance on a separate 130 mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are connected by electrical wires passing through the push rod centre to an amplifier and recorder unit mounted on the control truck. As penetration occurs (at a rate of approximately 20 mm per second) the information is output on continuous chart recorders. The plotted results given in this report have been traced from the original records. The information provided on the charts comprises:

(i) Cone resistance (q_c) - the actual end bearing force divided by the cross sectional area of the cone, expressed in MPa.

(ii) Sleeve friction (q_f) - the frictional force of the sleeve divided by the surface area, expressed in kPa.

(iii) Friction ratio - the ratio of sleeve friction to cone resistance, expressed in percent.

There are two scales available for measurement of cone resistance. The lower (A) scale (0 - 5 MPa) is used in very soft soils where increased sensitivity is required and is shown in the graphs as a dotted line. The main (B) scale (0 - 50 MPa) is less sensitive and is shown as a full line.

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1 % - 2 % are commonly encountered in sands and very soft clays rising to 4 % - 10 % in stiff clays.

In sands, the relationship between cone resistance and SPT value is commonly in the range:

$$q_c \text{ (MPa)} = (0.4 \text{ to } 0.6)\ N \text{ (blows/300 mm)}$$

In clays, the relationship between undrained shear strength and cone resistance is commonly in the range:

$$q_c = (12 \text{ to } 18)\ C_u$$

Interpretation of CPT values can also be made to allow estimation of modulus or compressibility values to allow calculation of foundation settlements.

Inferred stratification as shown on the attached reports is assessed from the cone and friction traces and from experience and information from nearby boreholes *etc.* This information is presented for general guidance, but must be regarded as being to some extent interpretive. The test method provides a continuous profile of engineering properties, and where precise information on soil classification is required, direct drilling and sampling may be preferable.

Standard Penetration Testing (SPT)

Standard penetration tests are used mainly in non-cohesive soils, but occasionally also in cohesive soils as a means of determining density or strength and also of obtaining a relatively undisturbed sample.

The test procedure is described in AS 1289.6.3.1-2004. The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm penetration depth increments and the 'N' value is taken as the number of blows for the last two 150 mm depth increments (300 mm total penetration). In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued. The test results are reported in the following form:

(i) Where full 450 mm penetration is obtained with successive blow counts for each 150 mm of say 4, 6 and 7 blows:

as 4, 6, 7
N = 13

(ii) Where the test is discontinued, short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm

as 15, 30/40 mm.

The results of the tests can be related empirically to the engineering properties of the soil. Occasionally, the test method is used to obtain samples in 50 mm diameter thin walled sample tubes in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

Dynamic Cone (Hand) Penetrometers

Hand penetrometer tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 150mm increments of penetration. Normally, there is a depth limitation of 1.2m but this may be extended in certain conditions by the use of extension rods. Two relatively similar tests are used.

Perth sand penetrometer (PSP) - a 16 mm diameter flat ended rod is driven with a 9 kg hammer, dropping 600 mm. The test, described in AS 1289.6.3.3-1997 (R2013), was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.

Cone penetrometer (DCP) - sometimes known as the Scala Penetrometer, a 16 mm rod with a 20 mm diameter cone end is driven with a 9 kg hammer dropping 510 mm. The test, described in AS 1289.6.3.2-1997 (R2013), was developed initially for pavement sub-grade investigations, with correlations of the test results with California Bearing Ratio published by various Road Authorities.

Pocket Penetrometers

The pocket (hand) penetrometer (PP) is typically a light weight spring hand operated device with a stainless steel loading piston, used to estimate unconfined compressive strength, q_u, (UCS in kPa) of a fine grained soil in field conditions. In use, the free end of the piston is pressed into the soil at a uniform penetration rate until a line, engraved near the piston tip, reaches the soil surface level. The reading is taken from a gradation scale, which is attached to the piston via a built-in spring mechanism and calibrated to kilograms per square centimetre (kPa) UCS. The UCS measurements are used to evaluate consistency of the soil in the field moisture condition. The results may be used to assess the undrained shear strength, C_u, of fine grained soil using the approximate relationship:

$$q_u = 2 \times C_u.$$

It should be noted that accuracy of the results may be influenced by condition variations at selected test surfaces. Also, the readings obtained from the PP test are based on a small area of penetration and could give misleading results. They should not replace laboratory test results. The use of the results from this test is typically limited to an assessment of consistency of the soil in the field and not used directly for design of foundations.

Test Pit / Borehole Logs

Test pit / borehole log(s) presented herein are an engineering and / or geological interpretation of the subsurface conditions. Their reliability will depend to some extent on frequency of sampling and methods of excavation / drilling. Ideally, continuous undisturbed sampling or excavation / 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 test pit / borehole logs 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 test pits / boreholes, the frequency of sampling and the possibility of other than 'straight line' variation between the test pits / boreholes.

Laboratory Testing

Laboratory testing is carried out in accordance with AS 1289 Methods of Testing Soil for Engineering Purposes. Details of the test procedure used are given on the individual report forms.

Ground Water

Where ground water levels are measured in boreholes, there are several potential problems:

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

More reliable measurements can be made by installing standpipes, which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Test, Drill and Excavation Methods

Explanation of Terms (3 of 3)

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DRILLING / EXCAVATION METHOD

HA	Hand Auger	RD	Rotary Blade or Drag Bit	NQ	Diamond Core - 47 mm
AD/V	Auger Drilling with V-bit	RT	Rotary Tricone bit	NMLC	Diamond Core – 51.9 mm
AD/T	Auger Drilling with TC-Bit	RAB	Rotary Air Blast	HQ	Diamond Core – 63.5 mm
AS	Auger Screwing	RC	Reverse Circulation	HMLC	Diamond Core – 63.5 mm
HSA	Hollow Stem Auger	CT	Cable Tool Rig	DT	Diatube Coring
S	Excavated by Hand Spade	PT	Push Tube	NDD	Non-destructive digging
BH	Tractor Mounted Backhoe	PC	Percussion	PQ	Diamond Core - 83 mm
JET	Jetting	E	Tracked Hydraulic Excavator	X	Existing Excavation

SUPPORT

Nil	No support	S	Shotcrete	RB	Rock Bolt
C	Casing	Sh	Shoring	SN	Soil Nail
WB	Wash bore with Blade or Bailer	WR	Wash bore with Roller	T	Timbering

WATER

▽ Water level at date shown ◁ Partial water loss

▷ Water inflow ◀ Complete water loss

GROUNDWATER NOT OBSERVED (NO)	The observation of groundwater, whether present or not, was not possible due to drilling water, surface seepage or cave in of the borehole/test pit.
GROUNDWATER NOT ENCOUNTERED (NX)	The borehole/test pit was dry soon after excavation. However, groundwater could be present in less permeable strata. Inflow may have been observed had the borehole/test pit been left open for a longer period.

PENETRATION / EXCAVATION RESISTANCE

L	Low resistance: Rapid penetration possible with little effort from the equipment used.
M	Medium resistance: Excavation possible at an acceptable rate with moderate effort from the equipment used.
H	High resistance: Further penetration possible at slow rate & requires significant effort equipment.
R	Refusal/ Practical Refusal. No further progress possible without risk of damage/ unacceptable wear to digging implement / machine.

These assessments are subjective and dependent on many factors, including equipment power, weight, condition of excavation or drilling tools, and operator experience.

SAMPLING

D	Small disturbed sample	W	Water Sample	C	Core sample
B	Bulk disturbed sample	G	Gas Sample	CONC	Concrete Core

U63 Thin walled tube sample - number indicates nominal undisturbed sample diameter in millimetres

TESTING

SPT	Standard Penetration Test to AS1289.6.3.1-2004
4,7,11	4,7,11 = Blows per 150mm.
N=18	'N' = Recorded blows per 300mm penetration following 150mm seating
DCP	Dynamic Cone Penetration test to AS1289.6.3.2-1997. 'n' = Recorded blows per 150mm penetration
Notes:	
RW	Penetration occurred under rod weight only
HW	Penetration occurred under hammer and rod weight only
20/100mm	Where practical refusal or hammer double bouncing occurred, blows and penetration for that interval are reported (e.g. 20 blows for 100 mm penetration)

CPT	Static cone penetration test
CPTu	CPT with pore pressure (u) measurement
PP	Pocket penetrometer test expressed as instrument reading (kPa)
FP	Field permeability test over section noted
VS	Field vane shear test expressed as uncorrected shear strength (sv = peak value, sr = residual value)
PM	Pressuremeter test over section noted
PID	Photoionisation Detector reading in ppm
WPT	Water pressure tests

SOIL DESCRIPTION

Density		Consistency		Moisture	
VL	Very loose	VS	Very soft	D	Dry
L	Loose	S	Soft	M	Moist
MD	Medium dense	F	Firm	W	Wet
D	Dense	St	Stiff	Wp	Plastic limit
VD	Very dense	VSt	Very stiff	Wl	Liquid limit
		H	Hard		

ROCK DESCRIPTION

Strength		Weathering	
VL	Very low	EW	Extremely weathered
L	Low	HW	Highly weathered
M	Medium	MW	Moderately weathered
H	High	SW	Slightly weathered
VH	Very high	FR	Fresh
EH	Extremely high		

Douglas Partners
Geotechnics | Environment | Groundwater

Table B1: Summary of Laboratory Results - Acid Sulfate Soils (Martens, 2021)

Bore ID	Sample Depth (m)	Approximate Surface Ground Level (mAHD)	Approximate Sample RL (m AHD)	Depth to Groundwater (m bgl)	Sample Description	Screening Test Results				Laboratory Results							
						pH			Strength of Reaction[b]	pH_{KCl}	S_{KCl}	Scr %S	s-TAA %S	S_{NAS} %S	s-ANC_{BT} %S	Net Acidity[c] %S	Existing and Potential Acidity %S
						pH_F	pH_{FOX}	pH_F - pH_{FOX}									
102	3.1	3.0	-0.1	4.6	Sand	NT	NT	NT	NT	5.8	<0.005	<0.005	<0.01	NT	NT	<0.005	<0.005
	5.1		-2.1		Sand	NT	NT	NT	NT	5.6	<0.005	<0.005	<0.01	NT	NT	<0.005	<0.005
104	3.1	4.0	0.9	4.0	Sand	NT	NT	NT	NT	5.5	<0.005	<0.005	<0.01	NT	NT	<0.005	<0.005
	8.3		-4.3		Sandy Clay	NT	NT	NT	NT	5.3	<0.005	0.02	<0.01	NT	NT	0.025	0.025
105	5.6	3.0	-2.6	2.4	Clayey Sand	NT	NT	NT	NT	5.4	<0.005	0.01	<0.01	NT	NT	0.011	0.011
108	1.1	4.0	2.9	2.5	Sand	NT	NT	NT	NT	5.3	0.006	<0.005	<0.01	NT	NT	<0.005	<0.005
	2.1		1.9		Sand	NT	NT	NT	NT	5.6	<0.005	<0.005	<0.01	NT	NT	<0.005	<0.005
	5.7		-1.7		Sand	NT	NT	NT	NT	5.4	<0.005	0.005	<0.01	NT	NT	0.009	0.009
Guideline		Coarse sands, poorly buffered				<4[d]	<3.5[e]	≥1[e]	-	Coarse sands, poorly buffered							0.01
		Coarse sands to loamy sands and peats								Coarse sands to loamy sands and peats							0.03
		Medium sandy loams to light clays								Medium sandy loams to light clays							0.06[f]/0.03[g]
		Fine medium to heavy clays & silty clays								Fine medium to heavy clays & silty clays							0.1[f]/0.03[g]

Notes to Table B1:

a Depth below ground surface

b Strength of Reaction
- 1 denotes no or slight reaction
- 2 denotes moderate reaction
- 3 denotes high reaction
- 4 denotes very vigorous reaction
- F denotes bubbling/frothy reaction indicative of organics
- V denotes vapours generated
- B denotes bubbles generated
- H denotes heat generated

c Calculated by the laboratory based on the ABA equation in ASS Laboratory Methods Guidelines

d For actual acid sulphate soils (ASS)

e Indicative value only for Potential Acid Sulphate Soils (PASS)

f QASSIT Action Criteria for disturbance of 1-1000 tonnes of material

g QASSIT Action Criteria for disturbance of more than 1000 tonnes of material

Bold results indicative of ASS

Shaded results indicate an exceedence of QASSIT action criteria

pH_F - Soil pH Test (1:5 soil:distilled water)

pH_{FOX} - Soil Peroxide pH Test (1:4 soil:distilled water following oxidation of soil with 30% hydrogen peroxide (H_20_2))

NT Not tested

*Laboratory methods used to quantify ANC are likely to overestimate environmental effectiveness

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SOIL ANALYSIS CHAIN OF CUSTODY FORM

Project												
Name	P2007929 – Newcastle High School											
Martens Contact Officer	Dean Shi					**Contact Email**	dshi@martens.com.au					
Sampling and Shipping	**Sample Date**	19 - 20 January 2021		**Dispatch Date**	29 January 2021		**Turnaround Time**	Standard				
	Our Reference	P2007929COC02V01				**Shipping Method**	**Hand**		**Post**		**Courier**	X
	On Ice (X)	X	**No Ice (X)**		**Other (X)**							
Laboratory												
Name	EnviroLab											
Sample Delivery Address	12 Ashley Street, Chatswood											
Delivery Contact	**Name**	Aileen		**Phone**	9910 6200	**Fax**		**Email**	samplereceipt@envirolabservices.com.au			
Please Send Report By (X)	**Post**		**Fax**		**Email**	X	**Reporting Email Address**	jfulton@martens.com.au dshi@martens.com.au				

	Sample ID	SCr Suite
1	BH102/3.0-3.2	X
2	BH102/5.0-5.2	X
3	BH104/3.0-3.2	X
4	BH104/8.2-4.8	X
5	BH105/5.5-5.7	X
6	BH108/1.0-1.2	X
7	BH108/2.0-2.2	X
8	BH108/5.6-5.8	X

ENVIROLAB
Environmental Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 26051

Date Received: 29/1/21
Time Received: 13:22
Received By: A
Temp: Cool/Ambient
Cooling: Ice/Icepack
Security: Intact/Broken/None

Head Office
Suite 201, Level 2, 20 George Street
Hornsby NSW 2077, Australia
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customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 260511

Client Details

Client	Martens & Associates Pty Ltd
Attention	Dean Shi
Address	Suite 201, 20 George St, Hornsby, NSW, 2077

Sample Details

Your Reference	**P2007929 - Newcastle High School**
Number of Samples	8 SOIL
Date samples received	29/01/2021
Date completed instructions received	29/01/2021

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	05/02/2021
Date of Issue	05/02/2021

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Results Approved By
Priya Samarawickrama, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

Chromium Suite						
Our Reference		260511-1	260511-2	260511-3	260511-4	260511-5
Your Reference	UNITS	BH102/3.0-3.2	BH102/5.0-5.2	BH104/3.0-3.2	BH104/8.2-4.8	BH105/5.5-5.7
Date Sampled		19-20/01/2021	19-20/01/2021	19-20/01/2021	19-20/01/2021	19-20/01/2021
Type of sample		SOIL	SOIL	SOIL	SOIL	SOIL
Date prepared	-	02/02/2021	02/02/2021	02/02/2021	02/02/2021	02/02/2021
Date analysed	-	02/02/2021	02/02/2021	02/02/2021	02/02/2021	02/02/2021
pH $_{kcl}$	pH units	5.8	5.6	5.5	5.3	5.4
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01	<0.01	<0.01
TAA pH 6.5	moles H^+ /t	<5	<5	<5	<5	<5
Chromium Reducible Sulfur	%w/w	<0.005	<0.005	<0.005	0.02	0.01
a-Chromium Reducible Sulfur	moles H^+ /t	<3	<3	<3	14	6
S_{HCl}	%w/w S	NT	NT	NT	NT	NT
S_{KCl}	%w/w S	<0.005	<0.005	<0.005	<0.005	<0.005
S_{NAS}	%w/w S	NT	NT	NT	NT	NT
ANC_{BT}	% $CaCO_3$	NT	NT	NT	NT	NT
s-ANC_{BT}	%w/w S	NT	NT	NT	NT	NT
s-Net Acidity	%w/w S	<0.005	<0.005	<0.005	0.025	0.011
a-Net Acidity	moles H^+ /t	<5	<5	<5	16	6.7
Liming rate	kg $CaCO_3$ /t	<0.75	<0.75	<0.75	1	<0.75
a-Net Acidity without ANCE	moles H^+ /t	<5	<5	<5	16	6.7
Liming rate without ANCE	kg $CaCO_3$ /t	<0.75	<0.75	<0.75	1.2	<0.75
s-Net Acidity without ANCE	%w/w S	<0.005	<0.005	<0.005	0.025	0.011

Chromium Suite				
Our Reference		260511-6	260511-7	260511-8
Your Reference	UNITS	BH108/1.0-1.2	BH108/2.0-2.2	BH108/5.6-5.8
Date Sampled		19-20/01/2021	19-20/01/2021	19-20/01/2021
Type of sample		SOIL	SOIL	SOIL
Date prepared	-	02/02/2021	02/02/2021	02/02/2021
Date analysed	-	02/02/2021	02/02/2021	02/02/2021
pH $_{kcl}$	pH units	5.3	5.6	5.4
s-TAA pH 6.5	%w/w S	<0.01	<0.01	<0.01
TAA pH 6.5	moles H^+ /t	<5	<5	<5
Chromium Reducible Sulfur	%w/w	<0.005	<0.005	0.005
a-Chromium Reducible Sulfur	moles H^+ /t	<3	<3	<3
S_{HCl}	%w/w S	NT	NT	NT
S_{KCl}	%w/w S	0.006	<0.005	<0.005
S_{NAS}	%w/w S	NT	NT	NT
ANC_{BT}	% $CaCO_3$	NT	NT	NT
s-ANC_{BT}	%w/w S	NT	NT	NT
s-Net Acidity	%w/w S	<0.005	<0.005	0.0090
a-Net Acidity	moles H^+ /t	<5	<5	5.5
Liming rate	kg $CaCO_3$ /t	<0.75	<0.75	<0.75
a-Net Acidity without ANCE	moles H^+ /t	<5	<5	5.5
Liming rate without ANCE	kg $CaCO_3$ /t	<0.75	<0.75	<0.75
s-Net Acidity without ANCE	%w/w S	<0.005	<0.005	0.0090

Method ID	Methodology Summary
Inorg-068	Chromium Reducible Sulfur - Hydrogen Sulfide is quantified by iodometric titration after distillation to determine potential acidity. Based on Acid Sulfate Soils Laboratory Methods Guidelines, Version 2.1 - June 2004.

QUALITY CONTROL: Chromium Suite						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			02/02/2021	1	02/02/2021	02/02/2021		02/02/2021	[NT]
Date analysed	-			02/02/2021	1	02/02/2021	02/02/2021		02/02/2021	[NT]
pH $_{kcl}$	pH units		Inorg-068	[NT]	1	5.8	5.8	0	99	[NT]
s-TAA pH 6.5	%w/w S	0.01	Inorg-068	<0.01	1	<0.01	<0.01	0	[NT]	[NT]
TAA pH 6.5	moles H^+ /t	5	Inorg-068	<5	1	<5	<5	0	98	[NT]
Chromium Reducible Sulfur	%w/w	0.005	Inorg-068	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
a-Chromium Reducible Sulfur	moles H^+ /t	3	Inorg-068	<3	1	<3	<3	0	109	[NT]
S_{HCl}	%w/w S	0.005	Inorg-068	<0.005	1	NT	NT		[NT]	[NT]
S_{KCl}	%w/w S	0.005	Inorg-068	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
S_{NAS}	%w/w S	0.005	Inorg-068	<0.005	1	NT	NT		[NT]	[NT]
ANC_{BT}	% $CaCO_3$	0.05	Inorg-068	<0.05	1	NT	NT		[NT]	[NT]
s-ANC_{BT}	%w/w S	0.05	Inorg-068	<0.05	1	NT	NT		[NT]	[NT]
s-Net Acidity	%w/w S	0.005	Inorg-068	<0.005	1	<0.005	<0.005	0	[NT]	[NT]
a-Net Acidity	moles H^+ /t	5	Inorg-068	<5	1	<5	<5	0	[NT]	[NT]
Liming rate	kg $CaCO_3$ /t	0.75	Inorg-068	<0.75	1	<0.75	<0.75	0	[NT]	[NT]
a-Net Acidity without ANCE	moles H^+ /t	5	Inorg-068	<5	1	<5	<5	0	[NT]	[NT]
Liming rate without ANCE	kg $CaCO_3$ /t	0.75	Inorg-068	<0.75	1	<0.75	<0.75	0	[NT]	[NT]
s-Net Acidity without ANCE	%w/w S	0.005	Inorg-068	<0.005	1	<0.005	<0.005	0	[NT]	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

The recommended maximums for analytes in urine are taken from “2018 TLVs and BEIs”, as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.

Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

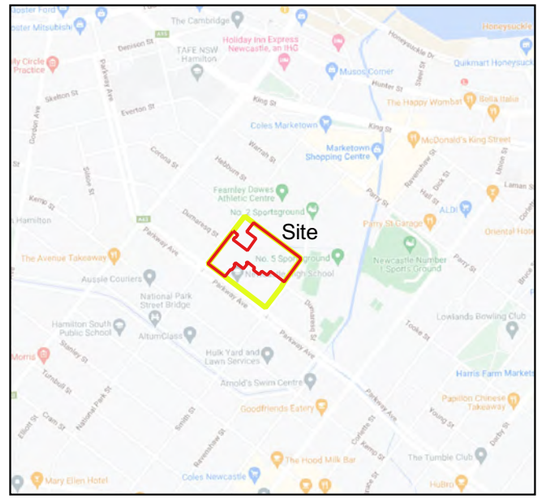
Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Appendix C

Test Location Plan (DP, 2023)
Map 01 - Testing Plan (Martens, 2021)
Site Plan – Building Work Location - EJE Architecture
(Ref 13331, C, 1A-0421-A)
Preliminary Bulk Earthworks Plan (Stantec Australasia Pty Ltd)





Site Location

Legend

Current Investigation Test Locations

- ACM Sample
- Surface Water Sample
- Test Pit
- Hand Auger
- Groundwater Monitoring Well
- Hand Auger
- Test Pit
- Hand Augers / Hand Pits
- Surface Samples

Previous Test Locations

- Geotechnical Bore (DP, 2022b)
- Geotechnical CPT (DP, 2022b)
- Geotechnical Marten (2021)
- Investigation Area
- Site Boundary
- Lot Boundary
- Appoximate Boundary of Mapped Anthropogenic Deposits

0 10 20 30 40 m

Drawing adapted from Metromap image dated 11.06.2022.
Test locations are approximate only and were located using Differential GPS.

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: School Infrastructure NSW		
OFFICE: Newcastle	DRAWN BY: PLH	
SCALE: 1:1,500 @ A3	DATE: 23.May.2023	

TITLE: **Test Location Plan and Site Features**
Newcastle High School Upgrade
25a National Park Street, Newcastle West

PROJECT No:	213618.02
DRAWING No:	1
REVISION:	2



0 10 20 30 40 50 m

1:1500 @ A3

Aerial: Nearmap (2020)

martens
Environment | Water | Geotechnics | Civil | Projects

Map Title / Figure:

Testing Plan

Map 01	Map
160 - 200 Parkway Avenue, Hamilton South, NSW	Site
Newcastle Education Precinct Development	Project
Geotechnical Investigation	Sub-Project
NSW Department of Education C/- SINSW	Client
25/02/2021	Date

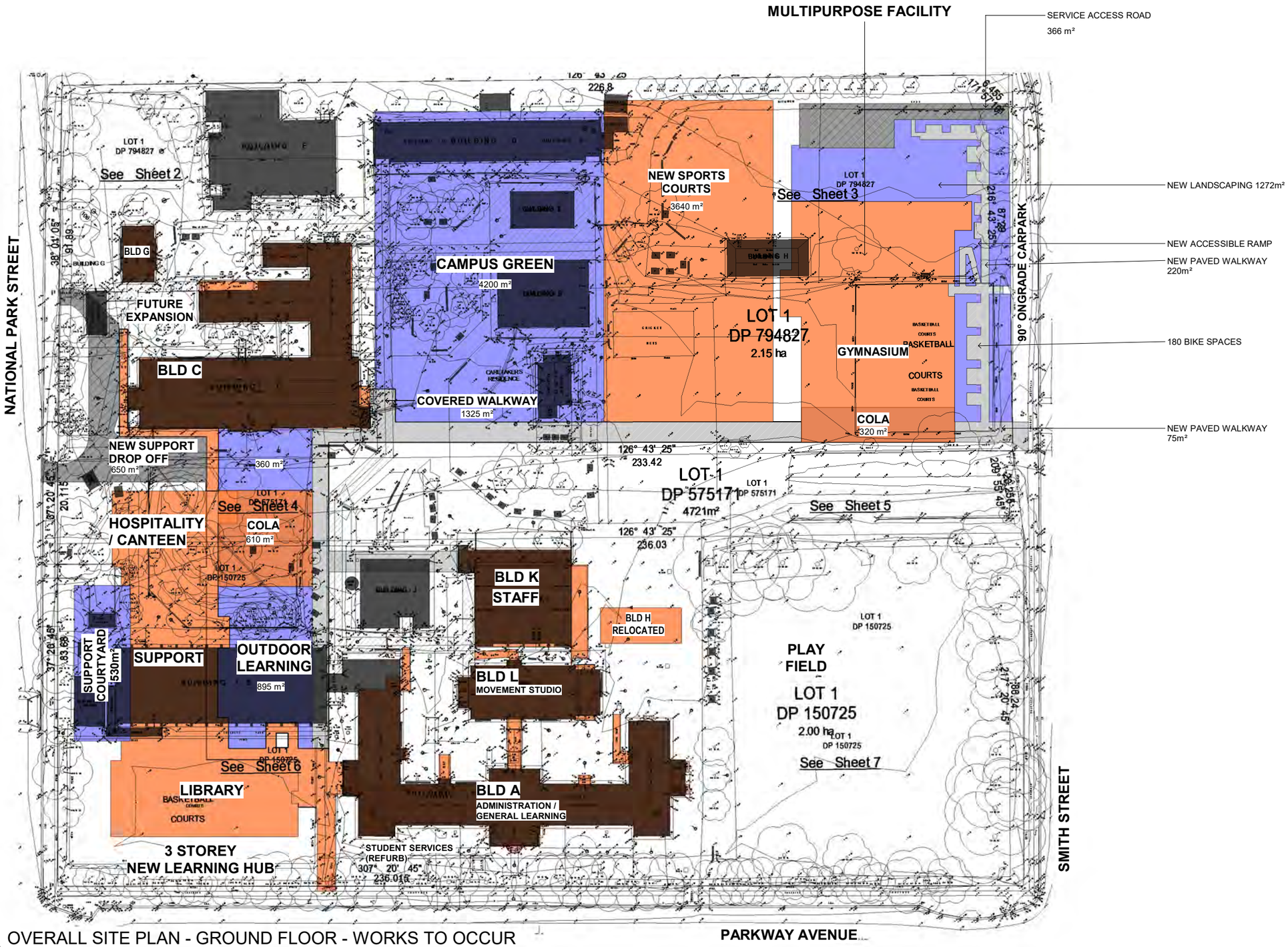
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Project No: P2007929 Map Set: MS04-R01 EPSG: 28356

SITE PLAN - BUILDING WORK LOCATION

TO REFERENCE WHEN PLACING DEMOUNTABLES

LEGEND : NEW AND EXISTING WORKS	
NEW WORK TO OCCUR FOR BUILDINGS	
NEW WORK TO OCCUR FOR LANDSCAPING	
NEW AND EXITING PATHWAYS	
NEW AND EXISTING ROADS	
EXISTING BUILDINGS	



1 OVERALL SITE PLAN - GROUND FLOOR - WORKS TO OCCUR

1 : 500

EJE ARCHITECTURE

ACN 002 912 843 | **ABN** 82 644 649 849
Nominated Architect - Bernard Collins | NSW Architects Registration No: 4438
P +61 2 4929 2353 | **F** +61 2 4926 3069 | **E** mail@eje.com.au | **W** www.eje.com.au
A 412 KING STREET, NEWCASTLE, NSW 2300

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0 25mm 100mm 150mm ON ORIGINAL A1

NSW GOVERNMENT Education School Infrastructure

REV	DATE	COMMENTS	DRN	CHKD	VRFD
A	10/05/2022	ISSUE FOR INFORMATION	MG	KG	

PROJECT : NEWCASTLE EDUCATION CAMPUS

CLIENT : DEPARTMENT OF EDUCATION NSW

SITE : 25A NATIONAL PARK STREET NEWCASTLE WEST 2302

DRAWING : SITE PLAN - WORKS TO BE UNDERTAKEN

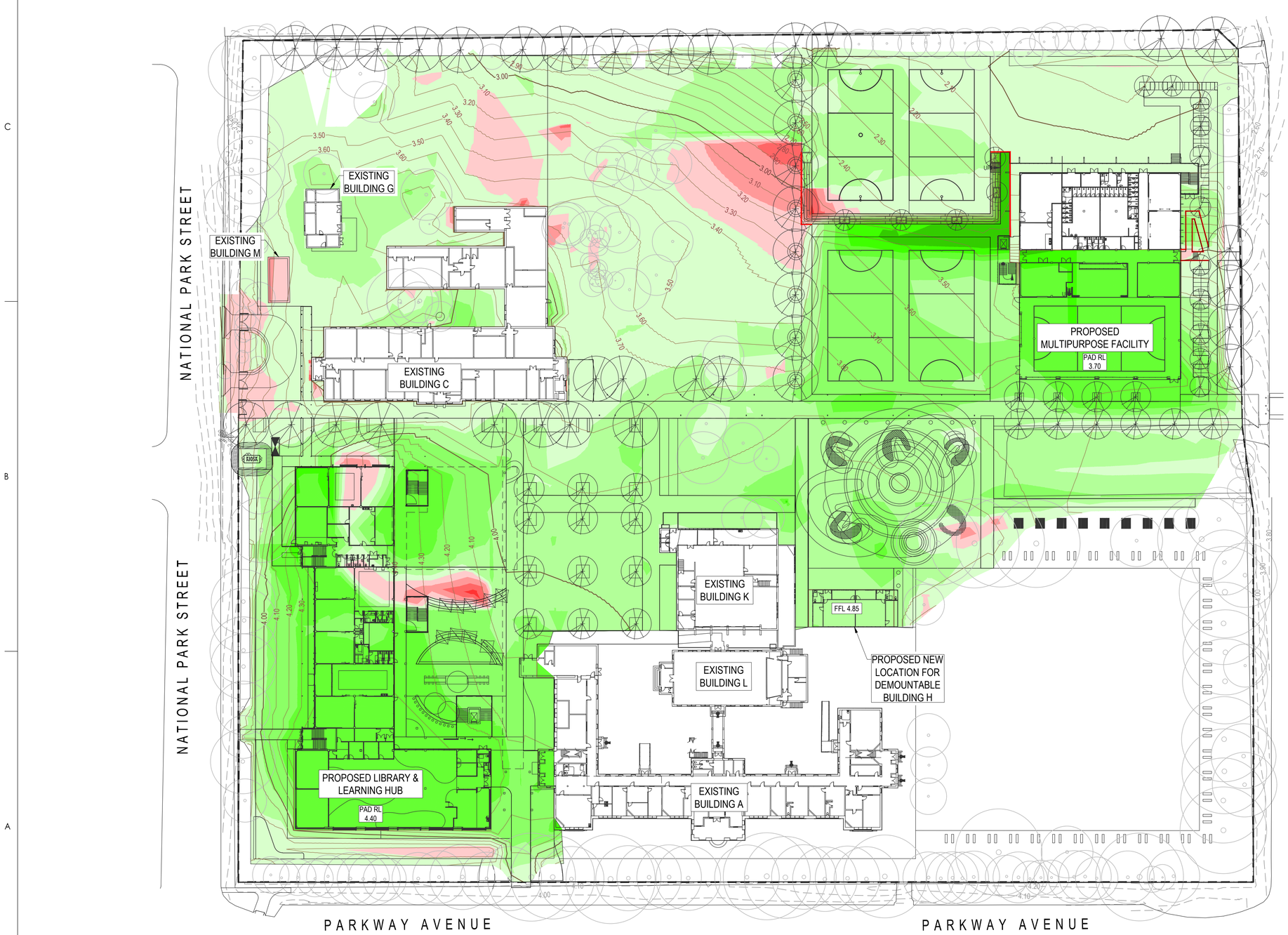
WORK IN FIGURED DIMENSIONS IN PREFERENCE TO SCALE. CHECK DIMENSIONS AND LEVELS ON SITE PRIOR TO THE ORDERING OF MATERIALS OR THE COMPLETION OF WORKSHOP DRAWINGS. IF IN DOUBT ASK. REPORT ALL ERRORS AND OMISSIONS.

P:\13331 - Newcastle Education Precinct (KMG)\EJE Documents\Working Files\Revit Files\13331 - Newcastle Education Precinct - Option 3 STR 9 - CRAWFORD - (R21).rvt

DRAWN :	DATE :	SCALES :
MG	10/05/22	As indicated@ A1 1:1000@ A3

PROJECT No :	PHASE :	DRAWING No :	REV :
13331	C	1A-042	A

EJE architecture



LEGEND

- SITE BOUNDARY
- 14.0 — BULK EARTHWORKS CONTOUR
- 18.0 — EXISTING CONTOURS
- PAD RL — BULK EARTHWORKS LEVEL

NOTES

1. VOLUMES ARE INDICATIVE ONLY AND ARE BASED ON A COMPARISON BETWEEN THE DESIGN SURFACE AND THE SURVEYED SURFACE.
2. NOTE THAT ALL VOLUMES DEPICTED ARE SOLID VOLUMES ONLY AND MAY NOT REFLECT DETAILED EARTHWORKS.
3. NO ALLOWANCE HAS BEEN MADE FOR BULKING FACTORS.
4. NO ALLOWANCE HAS BEEN MADE FOR DETAILED EARTHWORKS; ie INFILTRATION TANKS, RAINWATER TANK, SERVICE TRENCHING, DETAILED EXCAVATION, FOOTINGS, RETAINING WALLS, PAVEMENT BOXING, BUILDING SLABS AND THE LIKE.
5. THE CONTRACTOR SHALL USE FINAL SURFACE LEVELS AND TYPICAL PAVEMENT DETAILS FOR ACTUAL EARTHWORKS LEVELS.
6. BULK EARTHWORKS CUT/FILL VOLUME CONSIDERATIONS:
   - 300mm TOPSOIL HAS BEEN CONSIDERED TO BE REMOVED.
   - 400mm STRUCTURAL SLAB UNDER BUILDING PADS.
   - 200mm THICKNESS FOR PAVEMENTS.
   - 200mm FOR LANDSCAPE AREAS BUILD-UPS.
5. THE SURVEY SURFACE AS PROVIDED HAS BEEN UTILISED FOR COMPARISON PURPOSES.
6. STANTEC DOES NOT TAKE RESPONSIBILITY FOR ACCURACY OF EXISTING SURVEY.

CUT AND FILL VOLUME:

CUT: 260 m^3
FILL: 8,924 m^3
NET: 8,664 m^3 (FILL)

CUT/FILL DEPTH RANGES

COLOUR	LOWER	UPPER
	-2.2	-2.0
	-2.0	-1.8
	-1.8	-1.6
	-1.6	-1.4
	-1.4	-1.2
	-1.2	-1.0
	-1.0	-0.8
	-0.8	-0.6
	-0.6	-0.4
	-0.4	-0.2
	-0.2	0.0
	0.0	0.2
	0.2	0.4
	0.4	0.6
	0.6	0.8
	0.8	1.0
	1.0	1.2
	1.2	1.4

1:500 5 0 5 10 15 20 25 A1
1:1000 A3

Key Plan: (NTS)

D	100% SCHEMATIC DESIGN RE-ISSUE	CPO	JMB	2022.10.10
C	100% SCHEMATIC DESIGN ISSUE	LPT	JMB	2022.09.23
B	90% SCHEMATIC DESIGN ISSUE	MDR	JMB	2022.08.23
A	75% SCHEMATIC DESIGN ISSUE	MDR	JMB	2022.08.02
Issued/Revision		By	Appd	YYYY.MM.DD

Issue Status

PRELIMINARY

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Client/Project Logo

NSW GOVERNMENT Education School Infrastructure

Client/Project

SINSW

NEWCASTLE EDUCATION CAMPUS

25A NATIONAL PARK STREET, NEWCASTLE WEST 2302

File Name: NEC-STNC-XX-XX-DR-C-100001.DWG	Dwn.	Dsgn.	Chkd.	2022.08.02 YYYY.MM.DD

Title

BULK EARTHWORKS PLAN

Project No. 301350909

Scale 1:500

Revision D

Drawing No. **NEC-STNC-XX-XX-DR-C-100001**

Plotted: 11/10/2022 12:45:49 PM By: DIAZ RONDE, MELISSA
P:\301350909\PROJECT DOCUMENTATION\CIVIL\DRAWINGS & DESIGN\NEC-SHEET-ST1

ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD

Appendix D ACOR CVs



Joshua Rhodes

BE (Hons) Civil MIEAust CPEng NER

CIVIL LEADER | NEWCASTLE GENERAL MANAGER

Qualifications

Bachelor of Engineering (Honours) (Civil), University of Newcastle

Hunter Water WSAA Accredited Water and Sewer Reticulation Designer

Affiliations

Member, Institution of Engineers Australia (MIEAust)

Chartered Professional Engineer. (CPEng)

National Engineers Register (NER-Civil)

ACOR CONSULTANTS

ENGINEERS
MANAGERS
INFRASTRUCTURE PLANNERS
DEVELOPMENT CONSULTANTS

Experience

Joshua is an Associate Principal of ACOR and a Senior Civil Engineer with experience in a wide variety of projects, in particular urban, rural and industrial Land Development, Defence, Local Government, Rail and Electrical Substation design.

His experience includes stormwater quantity and quality management, including Water Sensitive Urban Design, road and earthworks design, project management, contract administration, design, specification reviews and site supervision/inspections.

Residential & Industrial Subdivisions

Design and documentation for site works, roads and stormwater drainage at:

- Clifteigh Meadows Residential Development Cliffleigh Stages 7,8, 9a,12, 13 and 15
- Garawon Place subdivision, Fletcher
- Bower Residential Estate stages 1-5
- Sanctuary Residential Development, Fletcher (Stages 14 to 17) 152 residential lots
- Minmi Urban Release Area
  Earthworks, roads and stormwater management for land development rezoning and DA for 3,300 residential lots
- Morisset Park Residential Development
  62 residential lots
- Brush Creek Residential Development, Edgeworth
  (Stages 1-5 & 7 Precinct 2) 200+ residential lots
- Industrial Estate, Gunnedah
  19 Industrial lots
- Mornington Heights Estate, Gunnedah
  344 residential lots
- Oxley Highway, Gunnedah
  28 industrial lots

Defence Projects

- Defence Logistics Transformation Project ($350M)
  New major base entries and main road works as well as design of internal site works, roads and stormwater drainage at Moorebank NSW and Bandiana VIC
- RAAF Base Williamtown NSW – Stage 2 Redevelopment ($275M) - New major base entries & RMS main road works

Local Government

Design & documentation for site works, roads & stormwater drainage at:

- Cooranbong Cycleway, design of over 12km of cycleway from the Watagan Park development, Cooranbong to Morisset Town Centre
- Camden Valley Way, Elderslie
  1.2km dual lane road, signalised intersection and roundabout design
  - RMS road intersections and roundabouts design at:
  - Oxley Highway Gunnedah and Industrial Subdivision
- Dora Street and Ourimbah Street, Morisset (RMS review)
- Design of road works for Hunter Councils:
  - Clarence Town Road, Glen Oak for Port Stephens Council - Design of 2.2km of rural road and associated stormwater culverts
  - Clarence Town Road, Clarence Town for Dungog Council - Design of 2km of rural road and associated stormwater drains
  - East Seaham Road, Seaham 2.2km rural road and associated drainage for Port Stephens Council
- Peppertree Road, Medowie
  Road extension and intersection design and associated stormwater drainage for Port Stephens Council
- Saleyards and Fairydale Lane, Mudgee
  3 km of urban and rural road design and stormwater drainage for Mid-Western Regional Council
- Wollar Road, Wollar
  1.5 km rural road design
- Sanctuary Development stages 1 to 5B swale improvements for New Castle City Council
- North Sydney Education precinct
  Napier and Charles Street and Wheeler Lane upgrades for North Sydney council
- Stormwater Management Croudace Road, Elemovale for New Castle City council

Joshua Rhodes

- James L Boyd Reserve carpark, Swansea for Lake Macquarie City Council
- Balmoral Reserve carpark, Balmoral for Lake Macquarie City Council
- Cooranbong Cycleway approximately 10km of Cycleway from Cooranbong to Morisset

Industrial

- Civil and structural design including earthworks, compound levels, roads, stormwater drainage, secondary separation/oil containment, erosion/sediment controls, yard structures / foundations, blast walls and switch buildings at:
  - Wallerawang 132/66kV substation
  - Tomaree 33/11kV substation
  - Boggabri East switching station
  - Wollar 500/330kV substation
  - Bannaby 500/330kV substation
- Williamsdale 330/132kV substation Earthworks, temporary sediment basin and secondary containment basin design
- Daracon Headquarters and Concrete Batching Plant, Cameron Park
- Pacific National LPC Inspection and Scoping Program:
  - Hunter Bulk Terminal
  - Inner Harbour
  - Outer Harbour
- Newcastle Airport outer Harbour East Apron Expansions Concept Design
- Newcastle Airport Short stay carpark

Mining Materials Handling

- Mine pit top civil infrastructure design including stockpiles, conveyor formations, site works, earthworks, roads and stormwater management at:
  - Ashton Coal, Camberwell
  - Blakefield South Portal Hardstand
  - Drayton Coal Mine Extension, Muswellbrook

Specialist Skills

- Project Management
- Design of Stormwater Management Systems
- Design of Stormwater Quality Systems
- Road and Siteworks Design
- Design of Erosion and Sediment Controls



Ulrika Knight

BE (Hons) MIEAust

ASSOCIATE

SENIOR CIVIL ENGINEER

Qualifications

Bachelor of Engineering (Hons), University of Newcastle

Certificate of Registration under the NSW Design and Building Practitioners Regulations 2021

- Professional Engineering Registration (Civil)
- Design Practitioner Registration (Drainage, Civil Engineering)

Affiliations

Member, Institution of Engineers Australia (MIEAust)
Chartered Professional Engineer (CPEng) National Engineering Register (NER)
APEC Engineer IntPE (Aus)

ACOR CONSULTANTS

ENGINEERS
MANAGERS
INFRASTRUCTURE PLANNERS
DEVELOPMENT CONSULTANTS

Expertise

Ulrika is a Senior Civil Engineer with experience in a wide variety of infrastructure and land development projects, in particular urban, rural and industrial land development; commercial, educational and healthcare infrastructure; local government roads and stormwater drainage facilities; service stations and fuel terminals; defence projects.

Ulrika has expertise in civil design, project management, contract administration and site supervision of major works. She has developed particular skills in the management of design projects and performing quality assurance reviews of design documentation including drawings, design calculations and reports.

Key Projects

Road and Drainage Infrastructure

- RMS road intersections and roundabouts design at:
  - Masters, Pacific Highway Heatherbrae
  - Masters, Manning River Drive Taree
  - Metroll, Awaba Road Toronto
- Various detention and trunk drainage design solutions for Maitland City Council at:
  - Norm Chapman Oval, Rutherford
  - East Maitland Park
  - Hague Street, Rutherford
- Various stormwater drainage design solutions for Muswellbrook Shire Council at
  - Drainage study at Bell Street, Muswellbrook
  - Drainage study at Mill Street, Muswellbrook
  - Stormwater drainage design at Sowerby/Flanders Street, Muswellbrook
  - Stormwater drainage design at Lorne Street, Muswellbrook
  - Ogilvie Street, Denman
- Roads, car parking and stormwater drainage design various developments:
  - Seniors Living Development, Port Macquarie
  - East Maitland Dental Surgery
  - Tuncurry Caravan Park
  - Big 4 Caravan Park, Cessnock
  - Bargo RFS Station
  - Blaxland RFS Station
  - Service Station, Forbes
  - Park Avenue, Kotara - residential unit developments
  - Paterson Road, Bolwarra - residential unit developments
  - Masters Plumbers, Warners Bay - commercial development
  - Kinda Kapers, Mount Hutton - commercial development

Park and Urban Infrastructure Upgrades

- Richley Reserve Stages 1 and 2 Blackbutt Reserve, New Lambton

Residential and Industrial Subdivisions

- Coordination of planning, design and documentation for site works, roads and stormwater drainage including trunk drainage design, stormwater detention and water quality design at:
  - Warnervale – 51 residential lots
  - .Cliftleigh Stage 9A - 48 residential lots
  - Morisset Park - 62 residential lots
  - Links Road, Gunnedah - 50 residential lots
  - Radford Park, Branxton - 165 rural residential lots
  - Mornington Heights Estate, Gunnedah - 344 residential lots
  - Stonebridge Estate, Cessnock - 146 residential lots
  - Nikkinba Ridge Estate, Fletcher - 250 residential lots
  - Bennetts Green - 27 industrial lots
  - Cameron Park Estate, Cameron Park - 35 industrial lots
  - Greenleaf, Fullerton Cove - 234 lot retirement village
  - The Lake Retiremnet Resort, Wyee - 110 lot retirement village
  - Greenleaf, Belmont North - retirement village – 24 units
  - Northlakes Estate Stage 52 – 15 residential lots
  - The Sanctuary, Aberglasslyn – 250 residential lots
  - Kingfisher Grove Estate, Shortland - 45 residential units

Substations and Electrical Infrastructure

- Civil and structural design including earthworks, compound levels, roads, stormwater drainage, secondary separation/oil containment, erosion/sediment controls, yard structures/foundations, blast walls and switch buildings at:
  - Wallerawang 132/66kV for Transgrid with John Holland Group
  - Tomaree 33/11kV substation for Ausgrid
  - Wollar 500/330kV substation for Transgrid with UGL
  - Bannaby 500/330kV substation for Transgrid with UGL
  - Upper Tumut switching station with Transgrid

Ulrika Knight

Key Projects (continued)

Education Infrastructure

- St Bede's Catholic College, Chisholm Stage 1 - Civil design services for DA and CC, and construction inspections
- St Aloysius Primary School, Chisholm Stage 2 - Civil design services for CC, and construction inspections
- Gorokan Public School - Civil design services for redesign and expansion of existing carpark
- Kurri Kurri High School – Civil design services for a new carpark and associated stormwater drainage works
- Eleebana Public School - Civil design for a new disabled access ramp, concrete stairs and drainage works
- Bishop Tyrrell Anglican College - Flood study and civil design for playing fields and courts
- BER NSW Primary Schools Program - Design Phase for Hunter Region - Design manager for the civil and structural design teams. Project included the design of new halls, homebases, administration blocks, canteens, libraries, COLAs etc. at 16 schools.
- BER NSW Primary Schools Program - Construction Phase for Hunter Region - Civil and structural Inspections at various schools.
- All Saints College - St. Mary's Campus Maitland - Civil design for roads, carparking and stormwater drainage.
- St Catherine's High School Singleton - Civil design
- St Joseph's Primary School Bulahdelah - Civil design.

Mining, Industrial and Materials Handling

- PUMA Bitumen Loading Depot, Kwinana - Project design manager; civil and structural design services including earthworks, roads, stormwater drainage, detention, water quality, buildings, concrete bund walls, steel pipe supports, steel access stairs
- PUMA Diesel Depot, Kalgoorlie – Project design manager; civil and structural design services including roads, stormwater drainage, detention, buildings, concrete bunds, pipe supports
- AGC Industries Melville Island Bulk Fuel Facility – Civil design engineer: civil design services including earthworks, roads, stormwater drainage, buildings concrete bund walls and bund floor, steel access stairs
- Mine pit top civil infrastructure design including stockpiles, conveyor formations, roads and stormwater management at:
  - Ashton Coal
  - Blakefield
- Design of earthworks, site works and stormwater management for Daracon at:
  - Martins Creek Quarry
  - Ardglen Quarry
  - Cameron Park Headquarters
  - Cameron Park concrete batching plant

Defence Projects

- HMAS Harman
  This project involved the design of new Living in Accommodation (LIA) at Training 1 Standard to support the current and long-term capability needs at Harman. The civil design included site grading, earthworks, retaining walls, stormwater drainage including detention and water quality, carparking, DDA complaints and coordination of services.
- RAAF Pearce Sewer Infrastructure Works
  This project involved the assessment of the existing sewer assets located at RAAF Base Pearce and detailing and design of refurbishment works of the sewer pump stations, manholes, maintenance shafts, and replacement of existing asbestos cement rising mains. The objective of the project was to repair and replace the assets to extend the life of the sewer network on site.
- RAAF Pearce GM Facility – Source Area D Capping
  This project involved civil design and documentation for the installation of surface capping over PFAS impacted soils located within the ground's maintenance area. The civil works included site grading, earthworks including capping layer, kerbs and stormwater drainage.
- Defence Logistics Transformation Project ($350M) – project elements included new major base entries and main road works at:
  - Moorebank NSW
  - Bandiana VIC

Other Civil Engineering Projects

- The Sanctuary, Aberglasslyn - Site management and construction administration
- Ringwood Raceway, Seaham - review of earthworks and stormwater management report for DA
- Design of roads, footpaths, stormwater drainage. Retaining walls and bus stops for disabled access for Hunter Councils
- Review of design documents including drawings, design calculations and reports for numerous civil and structural projects in accordance with company's quality systems and procedures.

Specialist Skills

- Project Management of multidiscipline projects
- Management of land development and infrastructure projects
- Quality Assurance reviews of design documents
- Design and documentation of roads and site works
- Design of stormwater management systems
- Design of stormwater quality systems
- Design of erosion and sediment controls

Appendix E Request for City of Newcastle Comment on CSWMP

From: Josh Rhodes
To: gmansfield@ncc.nsw.gov.au
Cc: Jordan Walters; Robert Petersen
Subject: CSWMP - Newcastle High School Council Consultation
Date: Thursday, 2 May 2024 10:04:50 AM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
NAZ30761 Construction Soil and Water Management Plan R03.pdf

Hi Geoff,

Thanks for your time on the phone to discuss the CSWMP for the Newcastle high School redevelopment.

We received an RFI from DPHI in regard to consultation with Council relating to condition B18 (a) which states:

1	**B18**	The Applicant must prepare a Construction Soil and Water Management Sub-Plan (CSWMSP) and the plan must address, but not be limited to the following:
2	(a)	be prepared by a suitably qualified expert, in consultation with Council;

As the plan is similar to that provided to Council as part of the DA documentation, we provided the letter from Council dated 9 August 2023 as evidence of consultation with Council. As there were no comments in the letter, and given the plans are similar, it was assumed this condition was met.

Please find attached the CSWMP for CC1 which covers the bulk earthworks required on site and covers the infrastructure proposed to control sediment runoff from the site.

If you could advise if Council have any comments, it would be appreciated. If there are comments, we will incorporate them into an updated revision of the CSWMP.

Happy to discuss with yourself or one of your team if you have any questions.

Cheers,

Josh Rhodes
Civil Leader | Senior Principal Engineer

ACOR Consultants Pty Ltd
The Forum, Suite 1, Level 1, 240-244 Pacific Highway
Charlestown NSW 2290
T +61 2 4926 4811 | **M** 0416 076 454 | **E** **jrhodes@acor.com.au**

ACOR acknowledges the Awabakal People as the Traditional Custodians of Country where we live and work, and their ongoing connection to the land, waters, and community. We pay our respects to Elders, past and present.

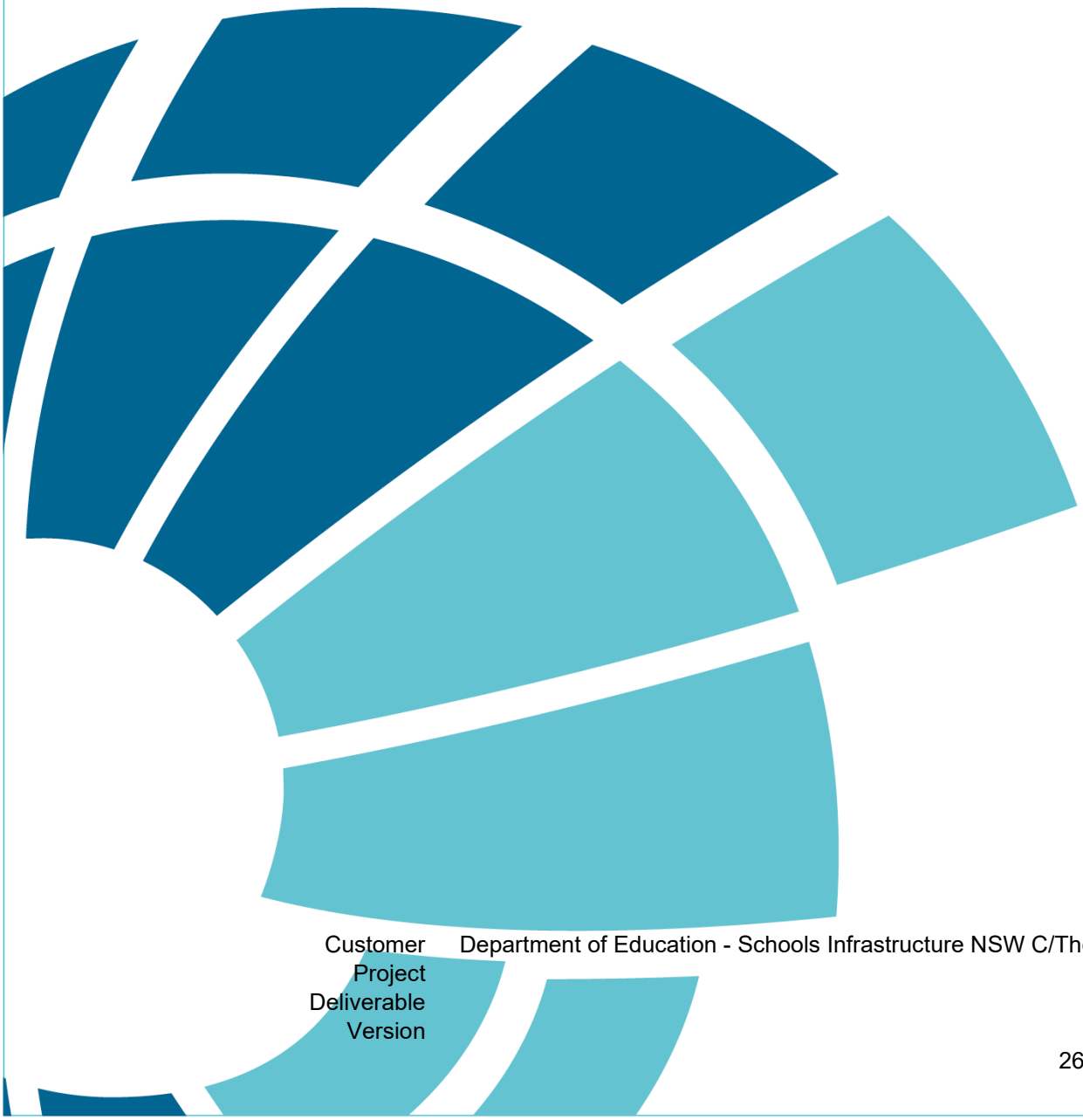
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Appendix F Construction Flood Emergency Management Plan

Construction Flood Emergency Management Plan Newcastle Education Campus



Customer	Department of Education - Schools Infrastructure NSW C/The App Group
Project	A12077
Deliverable	002
Version	01
	26 March 2024

Document Control

Document Identification

Title	Construction Flood Emergency Management Plan Newcastle Education Campus
Project No	A12077
Deliverable No	002
Version No	01
Version Date	26 March 2024
Customer	Department of Education - Schools Infrastructure NSW C/The App Group
Customer Contact	Anthony Harrigan
Classification	BMT (OFFICIAL)
Synopsis	Construction Flood Emergency Management Plan to inform the development of the Newcastle Education Campus
Author	Barry Rodgers
Reviewed By	Owen de Jong
Project Manager	Barry Rodgers

Amendment Record

The Amendment Record below records the history and issue status of this document.

Version	Version Date	Distribution	Record
00	14 March 2024	The App Group	Draft Report
01	26 March 2024	The App Group	Final Report

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1 Introduction

1.1 Background

On 12 January 2024, Development Application SSD-41814831 for staged upgrades to Newcastle Education Campus was approved by the NSW Minister for Planning and Public Spaces. Newcastle Education Campus ("the Site") is located at 25A National Park Street, Newcastle West NSW 2302 (formerly Newcastle Education Precinct, Lot 1 DP794827, Lot 1 DP575171 and Lot 1 DP 150725).

The planning approval is subject to conditions set out within Schedule 2 of the notification of approval. Condition B21 relates to the preparation of a Construction Flood Emergency Management Plan (CFEMP). The full text of condition B21 is provided below and the section reference to this report where each part of the condition has been addressed is shown in bold text.

Construction Flood Emergency Management Plan

Prior to the commencement of each construction stage, a Construction Flood Emergency Management Plan must be prepared by a suitably qualified and experienced person(s) in consultation with NSW State Emergency Services, submitted to the Certifier and a copy to the Planning Secretary for information, including but not limited to:

*(a) Detail on triggers, including rainfall and water level, that require closure of the site; (***Section 2.2***)*
*(b) Detail on how site closure would be communicated to construction workers, before commencement of the work day; (***Section 2.3***)*
*(c) Details of drills, frequency and record management of the drills; (***Section 2.4***)*
*(d) A map showing the flood-free pedestrian route from each construction site to a suitable location free of inundation; (***Section 2.5***)*
*(e) Details of any gauges or warning infrastructure that are to be provided to assist with flood management, including frequency of maintenance, and how these will be monitored; (***Section 2.6***)*
*(f) Identification of suitable locations for evacuation that are free of inundation; (***Section 2.7***) and*
*(g) Flood warning signs around the site to identify areas with Category H3 hazard and higher, in accordance with the Flood Hazard Flood Risk Management Guide FB03, NSW Department of Planning and Environment and are within the overland flow path. (***Section 2.8***)*

The APP Group has engaged BMT to prepare the CFEMP and this is set out within this report. The CFEMP has been prepared by Barry Rodgers of BMT and reviewed by Owen de Jong of BMT. CV's of Barry and Owen are provided in Annex A.

1.2 Supporting Information

The CFEMP draws upon information presented in two reports previously prepared by BMT as part of the planning application for the Site. These reports are as follows:

- Flood Impact Assessment (FIA) which describes the flood behaviour at the Site and assesses the potential for flood impacts as a result of the proposed development. Proposed floor levels are also provided and demonstrate that they are above the flood planning level (reference: R.A12077.001.02_FIA).

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- Flood Emergency Response Plan (FERP) which outlines the proposed strategy for flood emergency management of the Site including the nomination of evacuation routes. The report documents available space for sheltering in place, including for four interim stages of construction (reference: R.A12077.001.07_FERP).

The CFEMP contains only summary details from these two reports and reference should be made to those reports for further information if required.

1.3 Consultation with SES

The NSW State Emergency Service (SES) was consulted during preparation of the FERP and was satisfied that its advice was incorporated into the finalised FERP. In summary, the SES states that the preferred emergency strategy for the school is early closure prior to the commencement of flooding and before the start of the school day. People using the site must be informed of the flood risk during and after the works, for example by using signage, induction etc.

Given the significant overlap between the FERP and this CFEMP and that the SES advice received also related to the construction stages of the development, it is considered that the received SES advice remains applicable for the CFEMP. A draft version of the CFEMP was provided to the SES for review and they concurred that their recommendations for the FERP are also reflected in the CFEMP. A copy of the SES response to the CFERP is provided in Annex B.

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2 Construction Flood Emergency Management Plan

2.1 Overview

A CFEMP has been prepared to address the requirements of condition B21. A key consideration when preparing the CFEMP is that the majority of the Site remains outside of the flood extent for events up to and including the 0.5% AEP event. As such, the likelihood of the Site flooding, particularly during the relatively short construction period (around 2 years) is low. Notwithstanding this, a precautionary approach is applied whereby early evacuation is undertaken when a significant weather event is forecast.

The CFMEP is structured in accordance with the sub-items of B21 and is set out below.

2.2 Triggers for Site Closure

The Site is located within the Cottage Creek catchment and has the potential to be impacted by runoff from a small 110 hectare upstream area. There are no upstream water level gauges and any triggers based on rain which has fallen at nearby rain gauges may not give sufficient time to evacuate.

It is proposed that the NSW Hazards Near Me app is monitored for warnings of extreme weather. This includes severe weather warnings and severe thunderstorm warnings issued by the Bureau of Meteorology and which may include warnings for possible flash flooding. These warnings are also disseminated via various media outlets and are available of the Bureau of Meteorology website. In the event of a local warning advising of the potential for flash flooding it is recommended that the Site is closed and evacuated.

Whereas much of the Site is located at an elevation above 4mAHD, a small proportion of the Site in the north east corner is at lower elevations typically ranging between 2.1 to 2.5 mAHD. In addition to monitoring for severe weather warnings, it is recommended that the site is evacuated if water within Cottage Creek starts to rise and spread over the majority of this lower part of the Site i.e. a flood level of around 2.5mAHD. A flood depth indicator is proposed in this location which will mark a flood height corresponding to 2.5mAHD (see Section 2.6).

2.3 Communication of Site Closure

In the event of Site closure, a safety bulletin should be sent to all workers. BMT understands this can be delivered through the contractor's safety management software, Hammertech. Each worker associated with the project should then receive an SMS with information relating to Site closure.

For workers on site, a nominated worker should assume the role of chief flood warden. In the event of a Site closure, this worker should ensure that the Site is fully evacuated.

2.4 Flood Evacuation Drills

All site workers should be made aware of the potential flood risk to the site during Site induction. This should include awareness of evacuation routes and areas of the Site where floodwater can potentially pose the greatest hazard, namely the eastern corner near the proposed multi-purpose facility. The induction should also make workers aware of suitable buildings where shelter in place can occur in the unlikely event that evacuation is not possible (see Section 2.5).

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It is recommended that a flood evacuation drill for site workers is undertaken on an annual basis. The drill should assume that a severe weather warning has indicated the potential for flash flooding and that the water level in Cottage Creek is rising rapidly. An evacuation to nominated shelter in place locations should be undertaken as part of the drill using nominated routes.

The school will still be operating during the construction stages. It is assumed the requirement for a flood evacuation drill in the CFEMP relates only to construction activities and workers. The students and teachers of the school would not be expected to take part in these drills as they have their own flood emergency management plan.

2.5 Flood Free Pedestrian Evacuation Routes

Evacuation routes to shelter in place locations are presented in the FERP. Annex C of this report presents figures showing flood free pedestrian routes to an area north of Building A for all key stages of construction. If floodwater continues to rise and shelter in place is required then Figure 2.1 shows flood free evacuation routes to shelter in place locations within Building A. Building A is the nominated shelter in place location for workers during all stages of construction as it retains sufficient floor area above the PMF flood level for all construction stages. It is recommended that use of Building A for potential shelter in place for workers is discussed and agreed with the school.

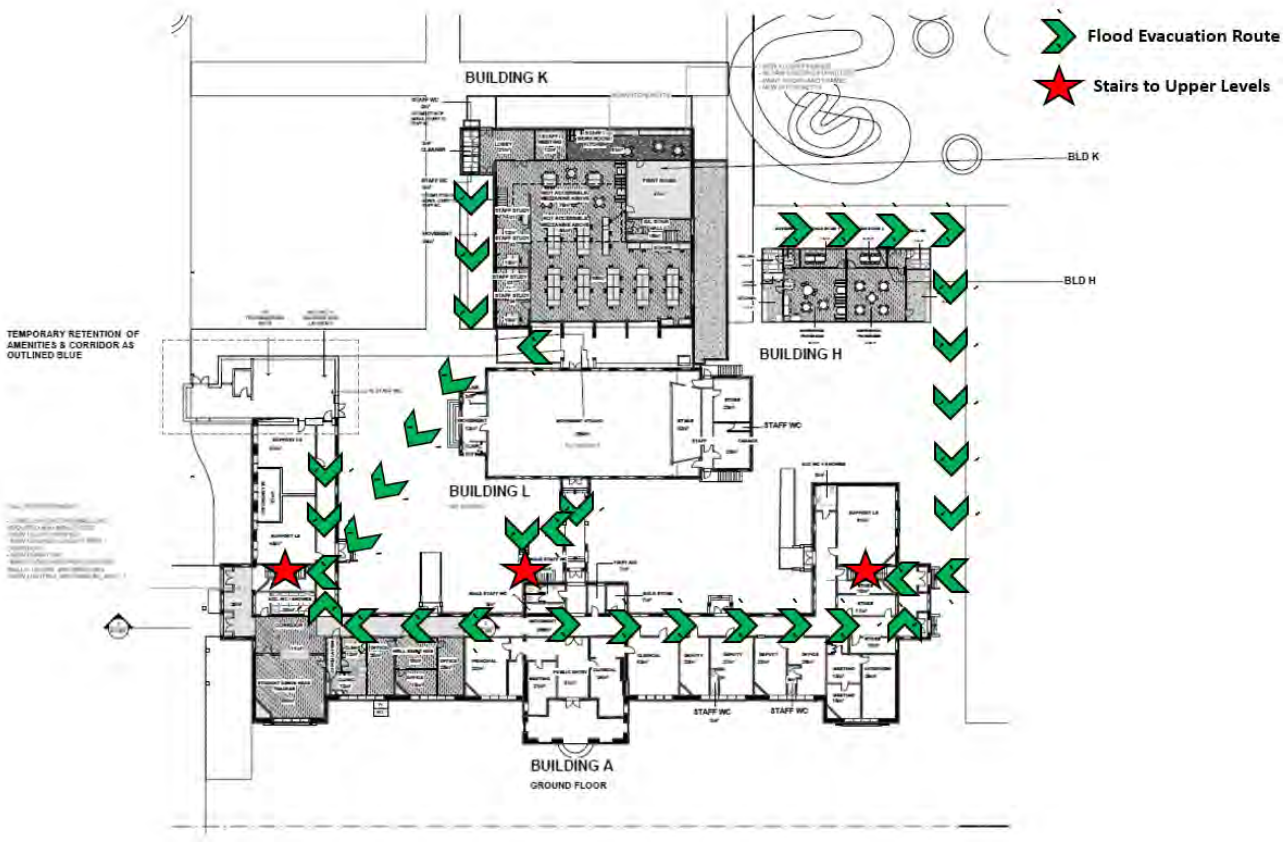


Figure 2.1 Evacuation routes to shelter in place in Building A

2.6 Gauges and Flood Warning Infrastructure

Given the nature of the flooding that has the potential to affect the site is flash flooding, there is limited potential to provide advance warning from installation of gauges within the catchment. A recommendation of the FERP was to install a flood depth indicator in the area north of the proposed multipurpose facility building with indicators for the 5% AEP flood level (2.48mAHD) and the 1% AEP flood level (2.94mAHD). This gauge can be used to monitor the rate of rise of floodwater at the site and can be used to set key triggers as part of an evacuation response.

It is assumed that the gauge would be a manually read gauge with clear markers identifying flood depths and key thresholds. Maintenance of the gauge is expected to be relatively minimal but it should be checked and cleaned after any period of floodwater inundation and retained free of debris.

An example flood depth marker is shown in Figure 2.2. Elevations of the 5% AEP (2.48mAHD) and 1% AEP (2.94mAHD) design floods would need to be determined as a height on the board and indicated with alternative marking.



Figure 2.2
Example Flood Depth Indicator Board

2.7 Suitable locations for Evacuation

The majority of the Site is free from inundation in all modelled events up to and including the 0.5% AEP flood. In the PMF event the entire Site and much of the surrounding area is inundated and so suitable locations for evacuation are limited to internal floor areas of buildings which have floor levels above the PMF level. The FERP identifies these floor areas during each key construction stage and this information is replicated in Figure 2.3 below. The analysis conservatively assumed that the school is at capacity with students and teachers and that these are factored into the calculations. As stated in Section 2.5, it is recommended that Building A is the nominated shelter in place location for workers during all stages of construction as it retains sufficient floor area above the PMF flood level for all construction stages. The newly constructed buildings (New Learning Hub and Multipurpose Facility) will also have floor levels above the PMF level at the end of Stages 2 and 3 and these buildings will be finished during Stages 4 and 5.

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STAGE 1	
-Move Building H to new location	
- Services Infrastructure Upgrades	
- Demolition of Building B and existing Sport Courts	
- Remove trees, other planting	
Site Occupants	1242 ppl
Building A - Level 1	969 m²
Building B - Level 1	60 m² (maintained after demolition)
Building C - Level 1	673 m²
Building C - Level 2	687 m²
Building D - Level 1	377 m²
Building D - Level 2	371 m²
Total Available area	**3137 m²**
Per-capita available space (ppl/m²)	**2.53**

STAGES 2 and 3 (occurring concurrently)	
- Construction of new Learning Hub (Building R)	
- Landscaping walkway and external works	
-New Support drop off zone	
- Construction of newMultipurpose Facility (Building S)	
- Landscaping and external works	
- Demolish Building P	
Site Occupants	1242 ppl
Building A - Level 1	969 m²
Building B - Level 1	60 m² (maintained after demolition)
Building C - Level 1	673 m²
Building C - Level 2	687 m²
Building D - Level 1	377 m²
Building D - Level 2	371 m²
Building R - Level 1	0 m² (construction in progress)
Building R - Level 2	0 m² (construction in progress)
Building S - Level 1	0 m² (construction in progress)
Total Available area	**3137 m²**
Per-capita available space (ppl/m²)	**2.53**

STAGE 4	
- Refurbish Building A & K	
- Demolish Building J & existing walkways to Building K	
- Landscaping , site works	
Site Occupants	1242 ppl
Building A - Level 1	969 m²
Building B - Level 1	60 m² (maintained after demolition)
Building C - Level 1	673 m²
Building C - Level 2	687 m²
Building D - Level 1	377 m²
Building D - Level 2	371 m²
Building R - Level 1	2069 m²
Building R - Level 2	1975 m²
Building S - Level 1	900 m²
Total Available area	**8081 m²**
Per-capita available space (ppl/m²)	**6.51**

STAGE 5 and Project Completion	
- Demolish Buildings D, E & I	
- Construct new Sports Courts	
- Landscaping , site works	
- Campus Green & remaining landscapes, walkways	
Site Occupants	1530 ppl
Building A - Level 1	969 m²
Building B - Level 1	60 m² (maintained after demolition)
Building C - Level 1	673 m²
Building C - Level 2	687 m²
Building D - Level 1	0 m² (demolition in progress)
Building D - Level 2	0 m² (demolition in progress)
Building R - Level 1	2069 m²
Building R - Level 2	1975 m²
Building S - Level 1	900 m²
Total Available area	**7333 m²**
Per-capita available space (ppl/m²)	**4.79**

Figure 2.3 Available area for sheltering in place during a PMF event in project construction stages

2.8 Signage for High Hazard Areas

Pre-construction condition B21 (g) requests that flood hazard is identified for hazard category H3 and above using the Flood Hazard Flod Risk Management Guideline FB03 and that flood warning signs are placed around the Site to identify such areas which also correspond to overland flow paths.

The FIA identified and categorised flood hazard in accordance with Newcastle City Council's DCP. This consisted of five categories of hazard termed 'hydraulic behaviour thresholds'. Guideline FB03 uses a different categorisation consisting of six categories of increasing hazard as shown in Figure 2.4.

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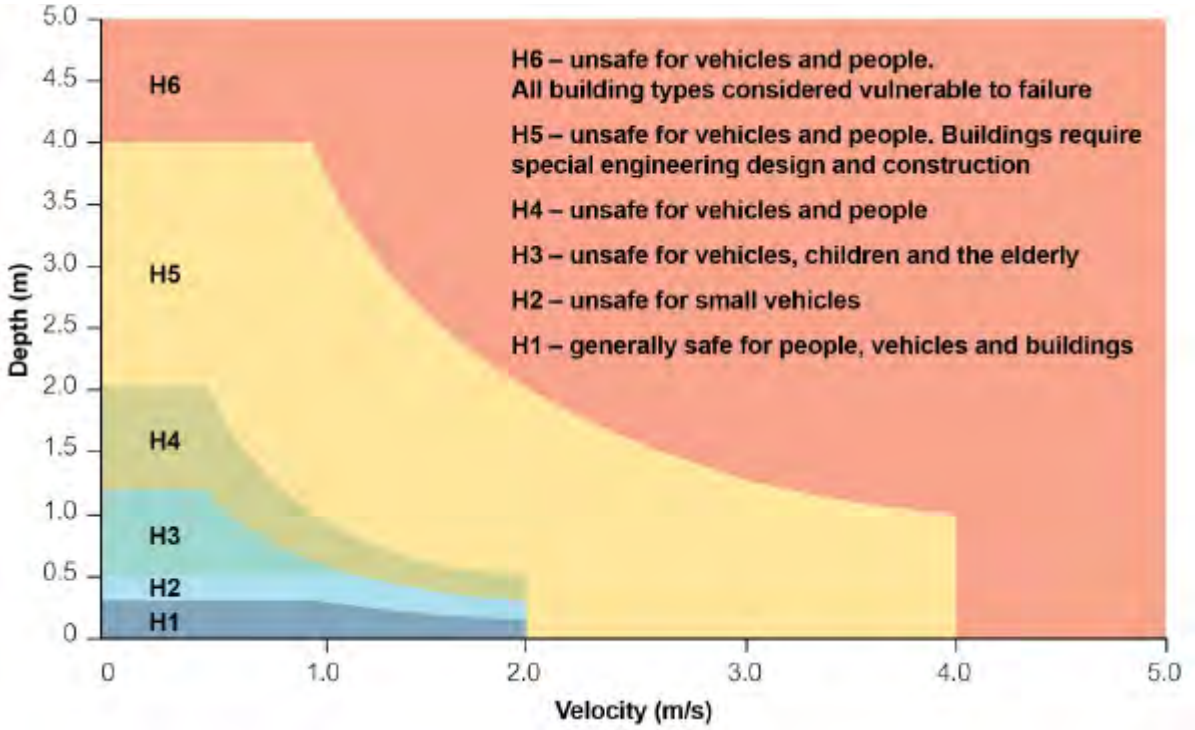


Figure 2.4 General Flood Hazard Vulnerability Curves specified in FB03

The FB03 hazard categories are based on combinations of flood depth and flood velocity. Hazard category 3 and above includes all areas with a depth above 0.5m. If the velocity exceeds 1m/s then the depth threshold for Hazard Category 3 or more is reduced.

Figure 2.5 shows the hazard categories H3 and above mapped across the Site for a PMF. All areas of the Site, apart from existing buildings, are subject to category H3 and above. The pattern of inundation during the PMF event is caused by water rising from Cottage Creek and backing up into the Site. As such the inundation has relatively low velocity and there are no areas that are considered overland flow paths where water flows through the Site. An extract from the peak flood velocity mapping for the PMF event is shown in Figure 2.6 for both the pre- and post- developed cases. It can be seen that velocities within the Site are relatively low and no overland flow paths are apparent.

The condition requests that signage is placed in areas both where it is subject to hazard H3 and above and it is within an overland flow path. No parts of the Site meet the conditions needed for this requirement. Notwithstanding this, it is recognised that the eastern corner of the Site has the potential for high flood hazard (up to H5) due to the potential for significant flood depths during a PMF event, and lower flood depths during more frequent events. It is therefore recommended that signage be included alongside the proposed flood depth indicator to indicate the potential for inundation. A location for the recommended sign is included in Figure 2.6 and an example sign is shown in Figure 2.7.

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Figure 2.5 Flood Hazard Categories H3 or greater shown across the Site

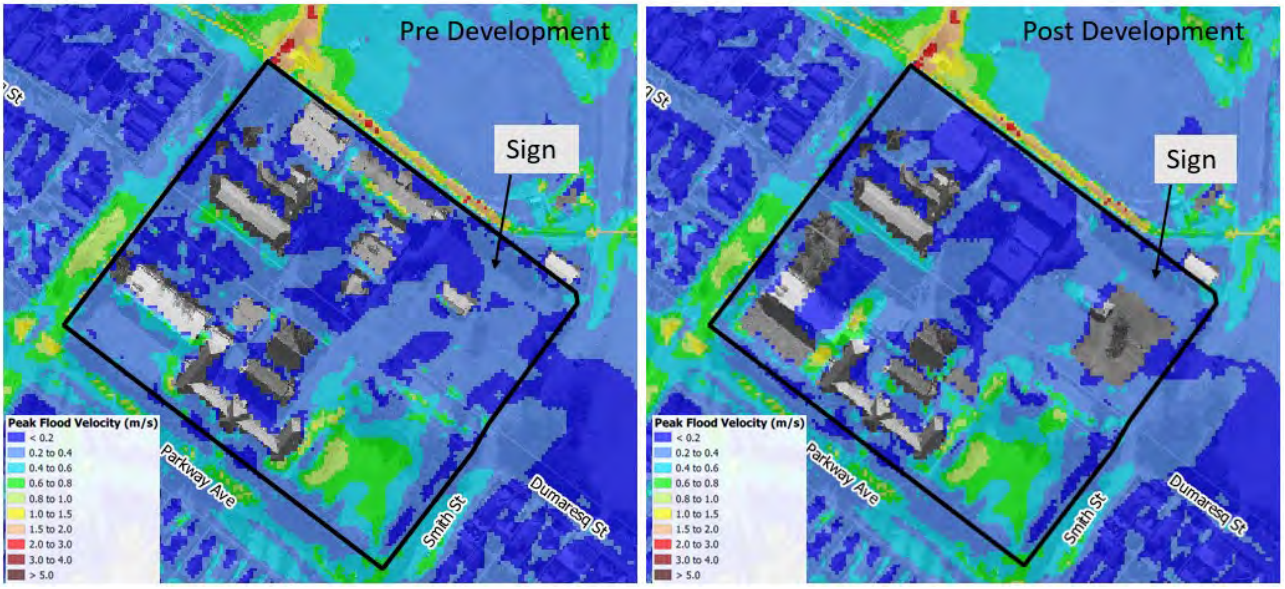


Figure 2.6 Peak PMF Velocity and recommended location for flood hazard signage

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Figure 2.7 Example Signage for Eastern Part of Site

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3 Conclusions

A Construction Flood Emergency Management Plan (CFEMP) is presented for the proposed Newcastle Education Campus upgrades. The CFEMP addresses the requirements of pre-construction condition B21 and is informed from analyses undertaken in the supporting flood impact assessment and flood emergency response plan. The SES was provided with a draft copy of the CFEMP and noted that it's previous recommendations are reflected in the CFEMP.

The preferred strategy during an extreme weather event is early Site closure based on monitoring for flash flood warnings and water levels in lower parts of the Site. Should a sudden and severe rainfall event happen while workers are already on the Site then a shelter in place strategy is advised using Building A.

The CFEMP presented in this report is based on construction staging details available at the time of reporting and use of simulated design floods. In reality, flood events can have characteristics different from those simulated and therefore the flood behaviour presented in this report should be considered indicative only of what can occur.

It is recommended that the CFEMP is reviewed on an annual basis.

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Annex A CVs



Barry Rodgers

CAREER OVERVIEW

Barry joined the BMT flood team in Brisbane in January 2011. He has a Master's degree in hydrology and over 19 years of consultancy experience in Australia and overseas specialising in hydrologic and hydraulic modelling.

He was the lead hydraulic modeller in developing a 2D hydraulic model of the Brisbane River Catchment; one of the largest and most comprehensive studies of its kind in Australia and one that won and Engineers Australia award for technical excellence. He was also the technical lead on a number of other high profile studies including the Swan River Flood Study, the Maroochy River Flood Study Update, the Richmond River Flood Study and the Ipswich Rivers Flood Study update, the latter being one of the first in the country to apply Australian Rainfall and Runoff 2019 techniques at the catchment scale. Barry regularly undertakes technical peer reviews of modelling studies for internal and external clients.

POSITION

Principal Scientist

YEARS OF EXPERIENCE

20

ACADEMIC QUALIFICATIONS

MSc in Hydrology and Water Quality from Lancaster University UK (2004)

BSc in Environmental Science from University of Southampton UK (2001)

EMPLOYMENT HISTORY

2011 to date **Principal Scientist, BMT**

2007 to 2011 **Consultant, Senior Consultant, Entec UK Ltd, Bristol UK**

2004 to 2007 **Assistant Analyst, Analyst, JBA Consulting, Warrington UK**

PROFESSIONAL AFFILIATIONS

- Chartered Institute of Water and Environmental Management, Member (MCIWEM)
- Chartered Scientist (CSci)

FLAGSHIP PROJECT

Brisbane River Flood Study Hydraulic Assessment – Barry was the lead flood modeller in developing a 2D model of the lower Brisbane River. The model was calibrated to a range of flood events and resulted in some key findings in relation to use of supplementary energy losses that were since presented to the industry. The study subsequently won the Engineers Australia RJ Hawkin Award for Engineering Excellence.

AREAS OF EXPERTISE

- Hydrologic Modelling
- Hydraulic Modelling
- Project Management
- Peer Reviews

SPECIFIC PROJECTS

Strategic/Catchment Scale Flood Studies

- Maroochy Flood Mitigation, Sunshine Coast Regional Council (2023-ongoing)
- Clarence Valley Flood Mitigation, Department of Planning and Environment (2023 - ongoing)
- Lower Clarence Flood Model Update, Clarence Valley Council (2021-2023)
- Richmond Valley Flood Study, Richmond Valley Council (2021-2023)
- Lower Clarence River Structural Flood Mitigation Works Investigation, Clarence Valley Council (2020-2022)
- Kapiti Coast District Council, New Zealand - Hydraulic Model Peer Reviews (2020-2022)
- City of Canterbury-Bankstown Urban Drainage Assessments (Various) (2013-2020)
- Insurance Australia Group – Flood Investigations (2013-2020)
- Pioneer River Flood Study Peer Review - Mackay Regional Council (2019)
- New Grafton Bridge Flood Modelling and Mitigation (2015-2019)
- Levee Regulation Framework Scoping Study and Review (2018)
- Ipswich Rivers Flood Study Update (2017-2018)
- Swan and Helena Rivers Flood Study (2016-2017)
- Brisbane River Catchment Flood Study (2014-2017)
- Evans River Flood Study, Richmond River County Council (2014)
- Grafton Bridge – Additional Crossing of the Clarence River at Grafton – Hydraulic Impact Assessment, Roads and Maritime Services (2014)
- Bankstown LGA Wide Piped Network Constraints Analysis, Bankstown City Council (2014)
- Black Snake Creek Flood Investigations, Ipswich City Council (2014)
- Bankstown Stormwater Modelling and Mapping, Bankstown City Council (2013)
- Western Downs Flood Risk Management Study, Western Downs Regional Council (2013)
- Western Downs Flood Study – Peer Review, Western Downs Regional Council (2012)
- CopperString Transmission Line, Leighton Contractors (2011)

Site Specific Assessments

- Singleton Bypass Subject Matter Expert - Flooding, Transport for NSW (2022-ongoing)
- Department of Transport and Main Roads, Butterfield St. Bus Layover Business Case Assessment (2020)
- Transport for NSW, Lismore Road Upgrade Flood Modelling Investigation (2020)
- Glencore Hunter Valley Operations, Peer Review of Flood Modelling (2020)
- West Yamba Flood Impact Assessment (Various) (2014-2019)
- Bennett Street Drain Options Assessment, Bankstown City Council (2015)
- Norman Creek Bikeway Crossing, Brisbane City Council (2014)
- Summerland Way Flood Impact Assessment, Roads and Maritime Services (2014)
- Wryallah Road Flood Impact Assessment, Lismore City Council (2014)

KEY PAPERS/PRESENTATIONS

Richmond Valley Flood Study - An Overview, presented at the Queensland Water Symposium 2023.

A Multi-Criteria Investigation of Structural Flood Mitigation Assets in the Clarence Valley Floodplain, presented at the Floodplain Management Australia 2022 National Conference, Toowoomba, May 2022.

Ipswich Rivers Flood Study Update – Implementing ARR2016 at the catchment scale, presented at Engineers Australia Evening Event, Brisbane, June 2018.

Swan River: A Pragmatic Assessment of the Interaction of Riverine and Coastal Flooding, presented at the Floodplain Management Australia 2018 Conference, Gold Coast, May 2018.

'Brisbane River Catchment Flood Study – Hydraulic Modelling Overview' presented at the Queensland Water Panel Special Event, Engineers Australia, Brisbane, September 2017.

'Brisbane River Catchment Flood Study – Calibration of Hydraulic Models' presented at 13th Hydraulics in Water Engineering Conference, Sydney, November 2017.

Owen de Jong

CAREER OVERVIEW

Owen is an Environmental Engineer and Scientist (CPEng / RPEQ) with 18 years of experience in water engineering and infrastructure across local government, state government and private sectors. Surface water management has been a particular focus, with specific areas of expertise encompassing catchment wide flood studies, floodplain risk management plans, concept and detailed designs, hydrology and flooding for major road and rail infrastructure, dam break assessments, stormwater quality, drainage, stormwater harvesting, water balance, erosion and sediment control, climate change assessments, riparian assessments and policy review.

Other experience includes authoring and presenting papers relating to water engineering, university lecturing, hosting of technical tours and community consultation.

POSITION

Principal Engineer

EMPLOYMENT HISTORY

2022 to date **Principal Engineer, BMT**

2020 to 2022 **Various, Contract Roles**

- Principal Engineer, AECOM
- Flooding+Stormwater Unit Leader (Acting), Wollongong City Council
- Dams Engineer, Wollongong City Council
- Technical Specialist, Transport for NSW

2016 to 2019 **Senior Natural Resources Officer (Floodplain Management), NSW Department of Planning, Industry & Environment**

2010 to 2016 **Manager (Water), Cardno**

2007 to 2010 **Water Engineer, Parsons Brinckerhoff**

2007 to 2007 **Graduate Water Engineer, Brown Consulting**

2005 to 2007 **Undergraduate Water Engineer, Redland Water & Waste**

ACADEMIC QUALIFICATIONS

B.Eng (Hons1) in Environmental Engineering from Griffith University (2006)

B.Sc from Griffith University (2006)

YEARS OF EXPERIENCE

19

PROFESSIONAL AFFILIATIONS

- Member, Institution of Engineers Australia (MIEAust)
- Chartered Practicing Engineer (CPEng)
- Registered Professional Engineer of Queensland (RPEQ)

AREAS OF EXPERTISE

- Catchment hydrology
- Floodplain risk management
- Dams safety management
- Transport infrastructure
- Drainage & water quality
- Erosion & sediment control

AWARDS

Certificate of Appreciation for Contributions to Teaching and Learning at the University of Wollongong, 2018 & 2019.

Best for Project, Albion Park Rail Bypass (Hydrology & Flooding Lead), 2014.

SPECIFIC PROJECTS

Floodplain Management

- Rockhampton Floodplain Risk Management Study (2023-2024)
- NSW Floodplain Management Program, Flood and Risk Management Studies - Technical Assistance for 19 Catchment Wide Studies and Plans (2016-2019)
- NSW Floodplain Management Program, Flood Mitigation Works - Technical Assistance for Investigation & Design of 11 Flood Mitigation Projects. (2016-2019)
- Nowra & Browns Creeks Floodplain Risk Management Study & Plan (2012-2014)

Dams Safety Management

- Review of Logan City Council LGIP Stormwater Basins (2023)
- Wollongong City Council Dams Safety Management System (2021)
- Shell Cove Estate Detention Basin 1 DBA, DSEP and OMM (2015)
- Shellharbour City Centre Basin DBA, DSEP and OMM (2012-2014)

Erosion & Sediment Control

- Veolia Water Soil & Water Management Plan (2014)
- Dargues Gold Mine Pollution Production Program (2013)
- Wongawilli No.2 Ventilation Shaft Project (2011)
- Anglo American Metallurgical Coal (2010)

Flood Impacts & Mitigation

- Northern Silica Project (2023-2024)
- Gladstone Solar Farms (2023-2024)
- Damascus Barracks Zone B (2022)
- Corrimal Schools (2012-2016)
- Innovation Campus (2011-2016)
- University of Wollongong Stormwater & Flooding Rectification Works (2015)
- BlueScope CRM (2014-2014)
- Elderslie Release Area (2013-2014)
- Kembla Grange Employment Lands Flood Study (2014)
- Wollongong Debris Control Structures (2014)

Policy

- NSW Floodplain Management Program, Input for Various Local and State Government Policies (2016-2019)
- Shellharbour Floodplain Risk Management DCP Review (2011-2013)

Expert & Insurance

- ANU (2023)
- Capricorn Copper (2023)
- Ernest Henry Mine (2023)
- United Cinemas (2023)
- Cleanaway New Chum (2023)
- Blackbutt (2013)
- Warilla (2011)

Transport Infrastructure

- Swan Hill Bridge Replacement (2023)
- Gold Coast Light Rail Stage 3 (2022)
- Pacify Motorway Upgrade, Palm Beach to Tugun (2022)
- Inland Freight Route Link (2022)
- Albion Park Rail Bypass (2014-2021)
- Berry to Bomaderry Upgrade (2015-2016)
- Fowlers Road to Fairwater Drive (2014-2016)
- Cleveland Road Upgrade (2016)

Water Cycle Management

- Bunnings Bellambi (2015-2016)
- University of Wollongong (2013-2014)
- McPhails Urban Development (2011-2014)
- Wongawilli Urban Development (2010-2014)

Water Quality

- Inland Rail (2022)
- Shellharbour Regional GPT Designs (2013-2016)
- Shell Cove Wetlands (2011-2013)
- Port Kembla Coal Terminal (PKCT) (2012)
- Hanrahan Refuse Site (2012)

ARTICLES, PAPERS, PRESENTATIONS

Dams Safety Management System Workshop for Wollongong City Council. Authored and presented by Owen de Jong.

Ghetti, I, de Jong, O, Garratt, O & Nunn, P, 2019, 'Cooking up ARR16 Storms in Wollongong – the Importance of Using Local Ingredients'. Presented by Isabelle Ghetti at FMA 2019 Conference, Canberra, ACT.

Guest lecturer at University of Wollongong for Water

ARTICLES, PAPERS, PRESENTATIONS, CONTINUED...

Sensitive Urban Design (WSUD), host of WSUD technical tours and water quality modelling tutorials (2014 to 2019).

Host of World Wetlands Day 2018 at Shell Cove Wetlands (featured on WIN News).

de Jong, O, 2011, ‘Major Flood of March 2011: 1 in 100 year Wipeout for Warilla’. Presented by Owen de Jong at SIA NSW 2011 Conference, Hunter Valley, NSW.

Annex B SES Response to CFEMP

© BMT 2024

Our Ref: ID2354
Your Ref: SSD-41814831

22 March 2024

Soane Puliuvea
The App Group
Level 2, 426 King Street
Newcastle West NSW 2302

email: Soane.Puliuvea@app.com.au
CC: lisa.ignatavicius1@ses.nsw.gov.au

Dear Soane,

Construction Flood Emergency Response Plan for Newcastle Education Campus Site

Thank you for the opportunity to provide comment on the Construction Flood Emergency Response Plan (CFERP) for the proposed development at Newcastle Education Campus. It is understood that this project, a state significant development (SSD-41814831), includes the construction of a new three-story learning hub, a multipurpose hall, and the demolition of certain existing structures.

We refer to our previous correspondences dated 1 March 2023 (FERP), 2 August 2023 (EIS), 20 November 2023 (RtS) and appreciated that BMT have incorporated the NSW SES recommendations in the Flood Emergency Response Plan (FERP) accordingly. These recommendations are also reflected in the CFERP.

The NSW SES has reviewed the CFERP and the flood risk information (e.g. Newcastle Local Flood Plan; Newcastle City Wide Floodplain Management Study and Plan 2012; Council's Flood Certificate; Thorsby, Cottage and CBD Flood Study 2008; Honeysuckle Redevelopment Area Flood Study 2018; the Flood Impact Assessment provided) available to the NSW SES, noting the proposed development is at risk of flooding and the adjacent roads may be cut by floodwaters.

We would like to emphasise:

- It is the preference of NSW SES that all schools follow the application of sound land use planning and flood risk management in accordance with the Flood Prone Land Policy, the Flood Risk Management Manual 2023 (the Manual) and supporting guidelines.
- NSW SES does not have the authority to endorse or approve the private CFERP.
- The CFERP must be regularly exercised, reviewed, and updated to ensure workers are aware of the procedure and that it remains current and relevant and ensure

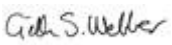
consistency with the contemporary emergency management arrangements relevant to the area, for example the Newcastle City Local Flood Emergency Sub Plan.
- It is the preferred emergency strategy for the school site is early closure prior to the commencement of flooding and before the start of the school day.

In 2023 the NSW SES implemented the Hazards Near Me app, to warn communities about floods, severe weather, and tsunami. Making warnings easier to access during weather events enables the school community to make safer decisions, which is part of our mission to create safer communities. In addition, we recommend the CFERP also:

- Integrate the Hazards Near Me NSW App into the CFERP and FERP for emergency information. School closure will need to be proactive and not rely on receipt of any warnings provided by NSW SES.
- Educate occupants about the Australian Warning System Warning Level (Emergency Warning, Watch and Act, Advice) definition and the implications for the Flood Emergency Response Plan.

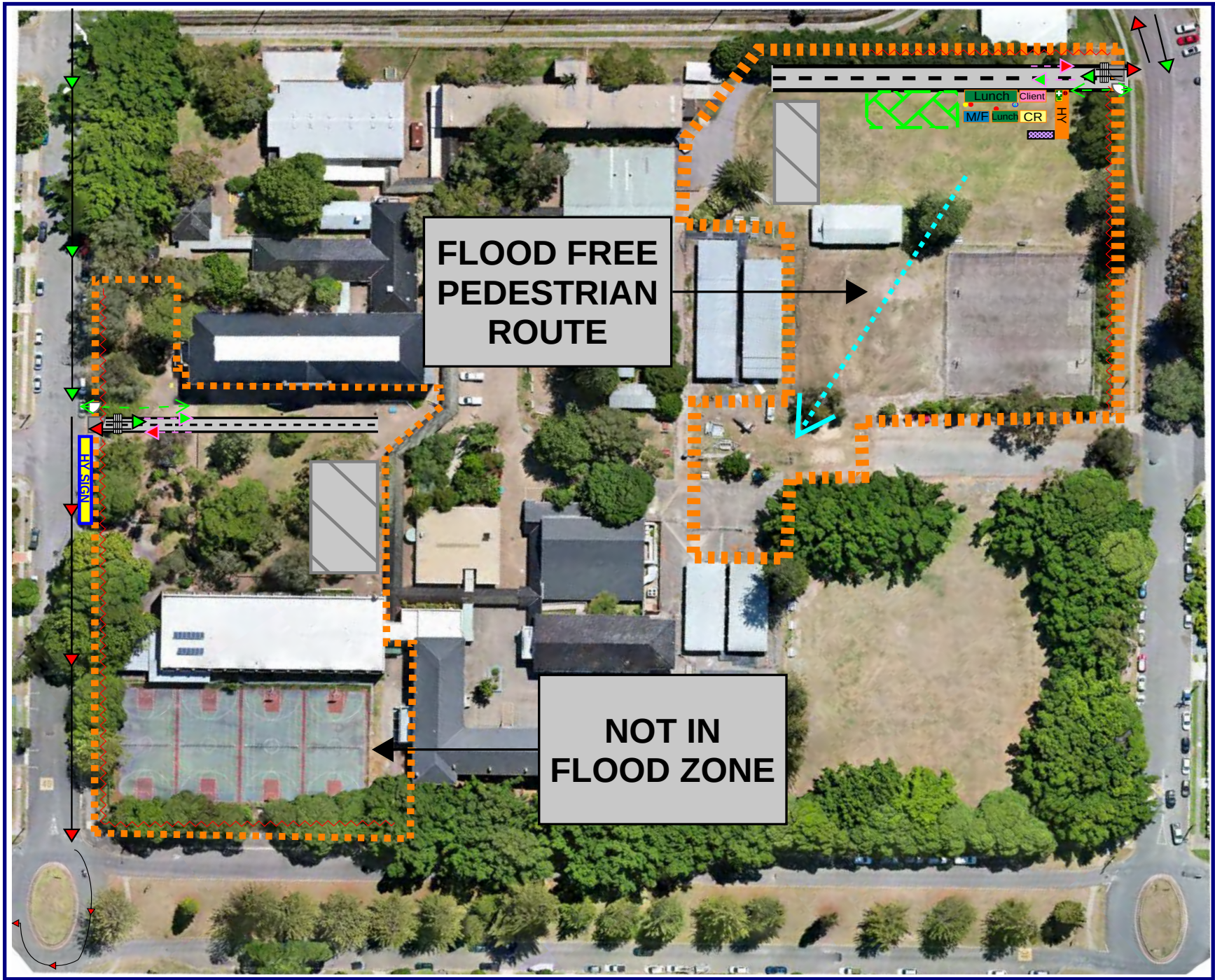
Please feel free to contact Gillian Webber via email at rra@ses.nsw.gov.au should you wish to discuss any of the matters raised in this correspondence. The NSW SES would also be interested in receiving future correspondence regarding the outcome of this referral via this email address.

Yours sincerely



Gillian Webber
Coordinator Emergency Risk Management Regional
NSW State Emergency Service

Annex C Nominated Flood Free Evacuation Routes



Legend of Symbols

- External Perimeter Site Boundary (Type A Fencing)
- Vehicle Gate
- Pedestrian P/A Gate
- HY Statutory Project Site Signage Board
- Laydown Zone
- Site Emergency Evacuation Muster Point
- Internal Site Vehicle Main Path / Road
- Vehicle Access into Project Site
- Vehicle Egress out of Project Site
- Emergency Services Vehicle main Access to / Egress from Project Site
- OH&S First Aid Room with Defrib
- T(m/f) Site Toilets (m=male. f=female)
- L Site Lunchrooms
- HY Site Offices Hansen Yuncken
- CR Site Offices Hansen Yuncken
- Site Container
- Fire Fighting Equipment
- Water Point (non potable)
- Spill Kit
- Evacuation Siren Location
- Main Site Bins / resource recovery
- Site Personnel Entry / Exit / Travel Routes
- Sediment Control Fencing
- Cattle Grate

HY SITE MANAGEMENT & OHS&W PLANNING

Stage 1 Site Layout

North

Revision: 1
Rev Date: 12/02/24

160/200 Parkway Avenue, Hamilton South, NSW 2303

NEWCASTLE HIGH SCHOOL REDEVELOPMENT

HANSENYUNCKEN



Legend of Symbols

- External Perimeter Site Boundary (Type A Fencing)
- Vehicle Gate
- Pedestrian P/A Gate
- HY Statutory Project Site Signage Board
- Laydown Zone
- Site Emergency Evacuation Muster Point
- Internal Site Vehicle Main Path / Road
- Vehicle Access into Project Site
- Vehicle Egress out of Project Site
- Emergency Services Vehicle main Access to / Egress from Project Site
- OH&S First Aid Room with Defrib
- T(m/f) Site Toilets (m=male. f=female)
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- CR Site Offices Hansen Yuncken
- Site Container
- Fire Fighting Equipment
- Water Point (non potable)
- Spill Kit
- Evacuation Siren Location
- Main Site Bins / resource recovery
- Site Personnel Entry / Exit / Travel Routes
- Sediment Control Fencing
- Cattle Grate

HY SITE MANAGEMENT & OHS&W PLANNING

Stage 2 & 3 Site Layout

North

Revision: 1
Rev Date: 12/02/24

160/200 Parkway Avenue, Hamilton South, NSW 2303

NEWCASTLE HIGH SCHOOL REDEVELOPMENT

HANSENYUNCKEN



Legend of Symbols

- External Perimeter Site Boundary (Type A Fencing)
- Vehicle Gate
- Pedestrian P/A Gate
- HY Statutory Project Site Signage Board
- Laydown Zone
- Site Emergency Evacuation Muster Point
- Internal Site Vehicle Main Path / Road
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- HY Site Offices Hansen Yuncken
- CR Site Offices Hansen Yuncken
- Site Container
- Fire Fighting Equipment
- Water Point (non potable)
- Spill Kit
- Evacuation Siren Location
- Main Site Bins / resource recovery
- Site Personnel Entry / Exit / Travel Routes
- Sediment Control Fencing
- Cattle Grate

HY SITE MANAGEMENT & OHS&W PLANNING

Stage 4 & 5 Site Layout

North

Revision: 1
Rev Date: 12/02/24

160/200 Parkway Avenue, Hamilton South, NSW 2303

NEWCASTLE HIGH SCHOOL REDEVELOPMENT

HANSENYUNCKEN



BMT is a leading design, engineering, science and management consultancy with a reputation for engineering excellence. We are driven by a belief that things can always be better, safer, faster and more efficient. BMT is an independent organisation held in trust for its employees.

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