

Sunfield Developments Limited

GEOTECHNICAL ASSESSMENT REPORT

Sunfield Landholding, Ardmore

Project Reference: J01627 December 6, 2024

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This report represents the results of the geotechnical investigations and analyses carried out by LDE Limited for and in accordance with instructions received from Sunfield Developments Limited with regard to a consent application for the Sunfield Landholding, Ardmore.

If you have any queries or you require any further clarification on any aspects of this report, please do not hesitate to contact the engineers listed above.



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Appendix 3: Field Investigation Records Appendix 4: Laboratory Test Results

Appendix 5: Slope Stability

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Undrained shear strength (kPa)

Appendix 7: Liquefaction

SYMBOLS:

S...

Ou.	Orialanica shear strength (kt a)		Liquid Lillin (70)
N-value:	recorded from SPT	PL:	Plastic Limit (%)
q _c :	CPT cone resistance (MPa)	PI:	Plasticity Index (%)
m _v :	coefficient of volume compressibility (m²/MN)	LS:	Linear Shrinkage (%)
y :	Bulk unit weight (kN/m³)	e ₀ :	Initial Void Ratio
c':	Effective cohesion (kPa)	e _f :	Final Void Ratio
Ø':	Effective friction angle (degrees)	$ ho_{\sf d,i}$:	Initial Dry Density (t/m³)

11.

Liquid Limit (%)



1 EXECUTIVE SUMMARY

This summary outlines the principal geotechnical issues, design considerations and advice presented as part of our investigation and assessments for the Sunfield Development, Ardmore. Further details are presented in the relevant sections in the main body of the report.

Report Ref.	Geotechnical Consideration	Summary advice/recommendation
6.1 – 6.5	Ground Conditions	The site is underlain by extensive soft to firm organic PEAT soils and soft CLAY deposits generally in the western part of the site with variable depths of inorganic / organic stained crust up to 2.2m thick, although generally less than 1m thick. Isolated PEAT soils are also located along the eastern boundary adjacent to Ardmore Airport. The eastern part of the study area is generally defined by silty CLAY and clayey SILT deposits underlain by East Coast Bays Formation (ECBF) bedrock at depths of between 3.7m and 19.4m. For the purposes of site classification, the above soil groups (types) are referred to collectively as Zone 1 (peats) and Zone 2 (inorganic clays) respectively throughout this report – refer Figure 2.1.
6.6	Groundwater	Groundwater levels were recorded in piezometers on 30 April 2021, 30 July 2021, 27 October 2021, 17 January 2022, and 9 February 2023 at depths of between 0.20m and 7.17m below existing ground levels, although most locations recorded groundwater depths between 1.0m and 3m. This is considered to be generally representative of a year-round seasonal groundwater regime, with the February 2023 groundwater readings being undertaken during a historic high rainfall period in Auckland, however these show no significant deviations from the established trends.
6.7, 8.7	Percolation	Falling head percolation testing has determined that minimum percolation rates of between 0.0743 L/m2/min in Zone 2 soils and 0.01 L/m2/min in Zone 1 soils. It is paramount to minimise widespread consolidation settlements post-development that groundwater levels are maintained in Zone 1 soils through recharge of stormwater runoff via soakage pits and/or swales.
7.2	Slope Stability	Slope stability of the proposed 1(v) in 4(h) stormwater channel has been analysed and is considered satisfactory. Precedence has also been set by the recently constructed Takanini Stormwater Conveyance Channel, which is a larger system. Similarly, natural or proposed slopes elsewhere on the site will not exceed 1(v) in 4(h) and computer slope stability analysis is not usually warranted in this case.



Report Ref.	Geotechnical Consideration	Summary advice/recommendation	
7.3.1, 8.1	Consolidation Settlements	Ground improvements to address consolidation settlements in Zone 1 soils will generally comprise ground improvements involving undercutting beneath building footprints and reinstatement with compacted hardfill or sand and/or preloading. Precedence has typically been set in the Takanini / Ardmore for these types of ground improvements in many significant subdivisions just to the west of Cosgrave Road.	
7.3.2	Drawdown Settlements	Drawdown settlements are likely limited to the proposed stormwater channel which will incise below the surface of the surrounding (prevailing) topography. This should be addressed at Engineering Plan Approval (EPA) stage.	
7.4	Liquefaction	Most Zone 1 soils have been determined to be susceptible to liquefaction, especially where limited or no stiff crust is present. This is due to cyclic softening of the soft cohesive materials rather than dramatic 'sand boils' or lateral spreading. Ground improvements to address liquefaction can be addressed by the same ground improvements required for consolidation settlement (i.e. pre-loading and raft foundation design for buildings). Liquefaction induced total settlements should be considered in the subdivision design levels with regard to overland flow paths and floodplains, in order to maintain 'free board' following such an event. However, consolidation settlements from imposed earthworks and building loads is by far the greatest geotechnical engineering issue fo	
8.1	Foundations	Foundations within Zone 1 areas for NZS3604 one to two storey light weight timber frame construction, heavier two storey, terraced (i.e. conjoined dwellings) or three storey dwellings will likely require some degree of ground improvement and stiffened raft foundations as outlined in Section 7.3, in conjunction with preloading. Buildings exceeding these loadings / storeys will likely be subject to piled foundations. Subject to further investigations, foundations in Zone 2 should be suitable for standard NZS 3604-type (i.e. lightweight) construction up to three storeys utilising strip and pad footings designed in accordance with AS 2870 and related documents. For commercial / industrial buildings within Zone 1, the foundation solution will be commensurate on end use and as such will require site specific investigations and foundation design. Examples of specific buildings and ground improvement / foundation solutions are presented in Section 8.1.1. For commercial / industrial within Zone 2 more conventional shallow foundations solutions are possible dependent on end-use, however,	



Report Ref.	Geotechnical Consideration	Summary advice/recommendation	
8.1 (cont.)	Foundations (cont.)	these types of buildings will generally require site specific investigation and foundation design.	
		A summary table of preloading and/or localised ground improvement requirements and specific foundation design criteria is presented in Table 6.2 (Appendix 6.1).	
8.2	Expansive Soils	Likely MBIE and/ or AS2870:2011 expansive site class classification for the finished subdivision is likely to fall within Classes M to H. Further assessments involving laboratory shrink-swell testing in accordance with MBIE guidelines should be completed at subdivision stage, provided undisturbed samples can be successfully obtained tested in the peats (our understanding is that this is virtually imposs in type S1a geology).	
8.3	Non-engineered Fills	An area of non-engineered fill has been identified in the south-eastern portion of the site. This material will need to be undercut and reinstate or ground improvement completed within proposed dwelling, infrastructure or roading areas subject to future master planning. There may be other areas of non-engineered fill and further comprehensive geotechnical site investigations prior to construction should minimise the risk of unforeseen areas of non-engineered fills in this regard.	
8.4	Earthworks and Civil Works	Within Zone 1 areas, ground improvements will be required to mitigate settlements resulting from the proposed earthworks and building loads, which may include undercut and replacement, preloading and/or lagperiods following earthworks to allow settlements to attenuate. Earthworks in these areas require the use of track-rolled peat materials which are not covered by normal subdivisional compaction specifications.	
		Within Zone 2, the cut materials should be suitable for re-use in other Zone 2 areas as certified clay fills which will need to be compacted to standard subdivisional compaction specifications. However, some degree of conditioning will likely be required to achieve suitable moisture contents for maximum compaction.	
		Within the flatter Zone 2 areas (Stratum S2a), saturated and/or pumiceous soils can often be sensitive to disturbance (via pumping and weaving under earthwork plant). If/where this is encountered, undercutting and replacement of the affected soils will likely by necessary.	



Report Ref.	Geotechnical Consideration	Summary advice/recommendation
8.5	Pipes and Buried Services in Peat Soils	Public service lines excavated in Zone 1 peat soils face a high risk of settlement of the pipes and redundancy should be built into the service design, such as oversizing pipeline internal diameters, careful consideration in selection of trench backfill materials, seepage cut off collars at regular intervals to prevent the pipe bedding media acting as a groundwater drawdown drain, increased bedding thicknesses, etc. Service lines will also need to be designed to withstand long-term corrosion and specialist advice will need to sought in this regard.
8.6	Roading	Within Zone 1 areas, road subgrades will require subgrade improvement due to the peats / weak crustal deposits. Precedence has been set in the Takanini / Ardmore area for 500mm to 900mm undercuts reinstated with 'black sand' laid upon geotextile cloth, whereupon targeted beam deflection values have then been achievable. Within Zone 2 areas, likely minimum CBR's of between 2% and 4% should be available for pavement design purposes, and a more conventional approach to pavement construction should be available.



2 SCOPE OF REPORT

LDE Limited (previously trading as Lander Geotechnical Consultants Limited) have been engaged by Sunfield Developments Limited to prepare a Preliminary Geotechnical Assessment Report (PGAR) in support of a specified development project (referred to herein as "the development proposal").

We understand the application seeks to develop approximately 244 hectares for urban purposes. The development proposal area consists of numbers 80, 85 & 92 Hamlin Road, 55, 55A, 101, 103, 119, 119A, 121A, 123, 131 & 143 Cosgrave Road, 508 Old Wairoa Road, and 279 Airfield Road. The study area is as outlined on the Maven Associates Limited drawings (Appendix 1).

Our work has entailed:

- A review of published geology maps, aerial photograph interpretation and observations of prevailing site geomorphology.
- A review of relevant geotechnical reports relating to the site as well as recent developments in the Takanini / Ardmore area (refer Section 3 below).
- A review of 15 No. Cone Penetrometer Tests (CPTs) undertaken by Initia within 279 Airfield Road in August 2022.
- A field investigation including:
 - The drilling of a series of hand auger boreholes (41 No.) to characterise near surface foundation and groundwater conditions to depths of up to 5m (bgl).
 - The drilling of a series of rotary cored machine boreholes (15 No.) to prove soil conditions beyond the reach of hand augers, to depths up to approximately 30m (bgl), and the installation of a piezometer within each machine borehole for the purposes of groundwater monitoring. Five groundwater monitoring rounds have been completed to date, with the first four rounds completed in April 2021, July 2021, October 2021, and January 2022 encompassing a full seasonal year of readings across the site, and the fifth round completed in February 2023 within 279 Airfield Road following the completion of further drilling at this property in December 2022.
 - The excavation of a series of trial pits (8 No.) to characterise near surface ground conditions and groundwater levels within the proximity of proposed stormwater channel or possible stormwater pond areas to depths of up to 3.2m (bgl).
 - The execution of 22 No. Cone Penetrometer Tests (CPTs) and 7 No. Dilatometer Tests (DMTs) to characterise the soils at depth.
 - The measurement of percolation (soakage) tests (2 No.) in accordance with TR 2013/040,
 Appendix A, Annexure C, Worksheet W1 Falling Head Percolation Test
- Laboratory testing to characterise plasticity, particle size, pH (acidity) and compressibility characteristics
 of the various soil types.
- An assessment of slope stability risk within proposed permanent stormwater channel areas as per the recommendations of the Auckland Council Code of Practice (ACCoP), Chapter 2, 24 September 2013.
- An assessment of the settlement from the proposed earthworks and hypothetical foundation loadings to determine the magnitude of total and differential settlements.



- An aassessment of liquefaction risk in accordance with the latest guidance regarding liquefaction
 assessments, specifically MBIE "Planning and engineering guidance for potentially liquefaction-prone
 land: Resource Management Act and Building Act aspects"1, and MBIE/NZGS Module 3: "Identification,
 assessment and mitigation of liquefaction hazards"2.
- The preparation of a preliminary geotechnical assessment report summarising our findings.

Further analysis for an Engineering Plan Approval (EPA) application will need to be undertaken in due course, once earthworks plans are finalised and subdivision scheme plans have been progressed, and the data herein may be introduced into such report(s). It should be noted that potential flooding hazards are considered by others for this application (i.e. not LDE).

3 RELATED REPORTS

In preparing this report we have reviewed the following reports prepared by LDE Limited and Lander Geotechnical Consultants Limited (now trading as LDE Limited):

- Winton Study Area in Ardmore Desktop Geotechnical Appraisal. Reference J01627, dated 7 December 2020
- Sunfields Development Trial Preload Design and Settlement Monitoring. Reference J01627, dated 17 November 2021.

We have also reviewed the following reports from GHD Consultants Limited relating to recent stormwater conveyance channel developments in the Takanini / Ardmore area, largely as a resource for soil parameter selection in local soft clays / peats to assist with our analyses:

- Takanini Stormwater Conveyance Channel Geotechnical Investigation Report; Technical Report C. Reference 51/32174, dated December 2015.
- Takanini Stormwater Conveyance Channel Geotechnical and Ground Settlements Effects Report; Technical Report E. Reference 51/32174, dated April 2016.

Based on our review of these reports, the following geotechnical constraints were identified which are also considered relevant to the development proposals at the Cosgrave Road development:

- Slope instability of the 1(v) in 4(h) stormwater channel.
- Soil liquefaction and associated surface settlement deformations due to cyclic softening of the soft cohesive materials. Lateral spreading is a lesser concern due to the flat nature of the site.
- Consolidation of the ground due to the proposed bulk fill and foreseeable end use building loads.

² New Zealand Geotechnical Society (NZGS) and Ministry of Business Innovation & Employment (MBIE) guidelines for Earthquake Geotechnical Practice in New Zealand. "Module 3: Identification, assessment and mitigation of liquefaction hazards" Rev. 1, Issue Date November 2021.



¹ Earthquake Commission (EQC), Ministry of Business Innovation & Employment (MBIE) and Ministry for the Environment (MfE). "Planning and engineering guidance for potentially liquefaction-prone land: Resource Management Act and Building Act aspects" Rev. 0.1, Issue Date September 2017.

 Consolidation of the ground due to groundwater potential drawdown within areas of cut (i.e. specifically where stormwater conveyance channels are proposed).

4 SITE DESCRIPTION, GEOLOGICAL SETTING AND GEOMORPHOLOGY

4.1 Site Description

The site is bound by Cosgrave, Old Wairoa and Airfield Roads as well as similar rural residential properties. Hamlin Road runs through the central-northern portion of the study area. The majority of the site is in pasture. Several overland flow paths are shown to run through the site on Auckland Councils GIS database, however this will be confirmed by site specific survey by other members of the project team. Generally, overland flows are draining eastwards towards individual stormwater catchments or to local gullies / creeks in the south-eastern portions of the study area.

Site gradients across the study area are shown on Maven Associates Limited drawing C-200 (Appendix 1) and are generally less than 1(v) in 10(h), however, gradients up to around 1(v) in 4(h) are present on isolated slopes within the south-eastern portion of the study area. There were no obvious signs of active or relict instability across the study area.

A gas transmission line is present within the Cosgrave Road landholding and the location of this is indicated on the attached Auckland Council GIS service plan (refer Appendix 2).

Significant urban residential development is presently underway immediately adjacent to the north-west and west of the study area (i.e. residential subdivisions along Cosgrave and Grove Roads and the Addison Development). To the north-east is Ardmore Airport which contains several large buildings / hangers.

Our interpretation of available historic photographs on Auckland Council's online GIS database, Google Earth images and historic images from Retrolens.nz generally found only minor land modification on the study area over the period 1940 to 2017, however, an area of localised earthworks is identified on or prior to 1959 within the south-western portion of 508 Old Wairoa Road. The next available aerial photograph in 2001 shows the area to be grassed and in the same condition as of the time of preparing this report. This area is discussed in further detail in Section 6.2. Historic aerial photographs dated 1959 and 2001 are inset below.





<u>Inset A</u>. Left: Photograph dated 1959, retrieved from Auckland Council GIS database. Area of earthworks circled in blue. Right: Photograph dated 2001.

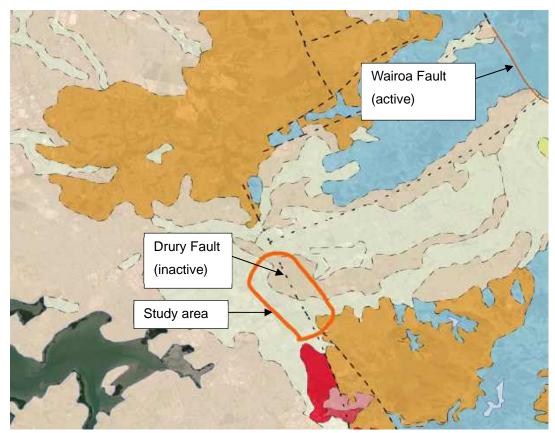
4.2 Geologic Setting

The GNS digital geological QMaps indicate the site is underlain by three geological units, from north to south as follows:

- <u>Tauranga Group</u> (indicated in light green shading, comprises undifferentiated Holocene river deposits) comprising sand, silt mud and clay with local gravel and peat beds.
- <u>Puketoka Formation</u> (indicated in tan shading, comprises late Pliocene to Middle Pleistocene pumiceous river deposits) comprising pumiceous mud, sand and gravel with muddy peat and lignite, rhyolite pumice including non-welded ignimbrite, tephra and alluvial deposits.
- <u>East Coast Bays Formation</u> (indicated in orange shading, comprises early Miocene turbidite deposits) comprising alternating sandstone and mudstone with variable volcanic content and interbedded volcanic grits.

Beyond the site to the south are deposits (Basalt and Ash / Tuff soils) of the South Auckland Volcanic Field (i.e. pink and red shadings on Inset B). The inactive Drury Fault runs through the site in a north-south fashion. Additionally, the Wairoa Fault (reportedly active, but last event unknown) is located approximately 10km to the east of the study area beneath the Hunua ranges. The position of these geological units and faults are summarised in Inset B below, and also in more detail in Figures 2.11 and 2.12 (Appendix 2).





<u>Inset B</u>: Published Geology (Institute of Geological and Nuclear Sciences. QMap geology. KMZ file. Available from https://services.arcgisonline.co.nz).

5 FIELDWORK PROGRAMME

Our fieldwork was undertaken in April 2021 and December 2022, and included the drilling of 41 No. hand auger boreholes (HA), 15 No. machine boreholes (MH), 8 No. trial pits (TP), 2 No. falling head percolation tests, 22 No. cone penetrometer tests (CPTs), and 7 No. dilatometer tests (DMT's). In addition, 15 CPTs undertaken by Initia within 279 Airfield Road have been supplied to us to supplement the tests undertaken under our supervision. Test positions are detailed on our site investigation plan (Figure 2.1; Appendix 2).

A piezometer standpipe was installed in each machine borehole and the site was re-visited approximately one week, three months, six months, and nine months following the completion of April 2022 drilling, as well as approximately two months following the completion of December 2022 drilling, to measure groundwater levels across the site over a full seasonal year. The standing groundwater levels are presented on Figure 2.2 (Appendix 2) and are also collated in Appendix 3.1.

Full records of all in-situ soil tests and groundwater monitoring, together with detailed descriptions and depths of strata encountered in the investigation locations are included in Appendices 3.2 to 3.7, and existing geotechnical data sourced from the New Zealand Geotechnical Database (NZGD) is presented in Appendix 3.8. Laboratory results selected from relevant MH's are included in Appendix 4.



A geotechnical model has been developed based on the available geotechnical information and is presented in Table 3.1 (Appendix 3). Additionally, eleven geotechnical cross sections through the site have been presented on Figures 2.3 to 2.10 (Appendix 2) detailing the thicknesses and depths of the materials across the site, together with measured groundwater levels and proposed earthworks levels (where known). General descriptions of the materials encountered across the study area are given in Section 6 below.

6 SUMMARY OF GROUND CONDITIONS

The site has been delineated into two specific assessment geotechnical zones based on the soil properties (natural soil types) defined as follows:

- Zone 1: includes all areas containing Undifferentiated Holocene deposits (Stratum S1a and S1b and underlying Stratum S2b to S2d) and generally comprises normally consolidated fibrous peats with variable thicknesses of inorganic or organic-stained crust material.
- Zone 2: includes all areas containing near-surface Puketoka Formation or East Coast Bays Formation deposits (Stratum S2a and S3a to S3c) and generally comprises inorganic, stiff to hard, over consolidated soils with Waitemata Group bedrock generally being found at depths of 12m or less.

6.1 Topsoil

Topsoil was encountered in most test locations and was between 100mm and 550mm thick, averaging 250mm.

6.2 Filling

No filling was detected at our borehole locations, however, during site works in July an area of uncertified filling comprising of intermixed topsoil, construction debris and rubbish materials was identified in the south-eastern portion of the study area during topsoil stripping operations for a proposed site office associated with this project. The full depth and extent of these materials are currently being determined by Focus Environmental at the time of preparing this report, however, the eastern extent of the materials identified by LDE Limited was located in approximately the same position as the earthworks operations observed in the 1959 aerial photograph presented in Section 4.1 of this report. The presence of similar rubbish pits should never be discounted elsewhere in farm environments, and further comprehensive geotechnical site investigations prior to construction should service to maximise the potential to discover these (if any).

6.3 Undifferentiated Holocene Alluvium (Zone 1 - 'Peat')

6.3.1 Crust Materials (Stratum S1a)

These materials comprise inorganic and organic stained silty CLAY and clayey SILT of firm to hard shear strength, although generally stiff. The inferred locations of these materials are indicated on Figure 2.1 which are generally



located in the western part of the study area and the materials to depths of between 0.4m and 2.2m from existing ground levels.

6.3.2 Peat (Stratum S1b)

These materials comprise black and brown fibrous PEAT, with some variable beds of amorphous PEAT, CLAY, dilatant pumiceous SILT. These organic materials were very soft to very stiff, although generally firm. It should be noted that in some instances the measured undrained shear strength can be influenced by decomposing organic inclusions (i.e. tree roots or stumps) or skin friction on account of the boreholes collapsing due to the soft nature of the materials.

These materials were encountered beneath stratum S1a materials, however, Figure 2.1 shows the locations where materials were encountered without any surficial crust present, including isolated pockets along the eastern site boundary adjacent to Ardmore Airport. Where encountered, peat materials were typically recorded to depths of 18m to 20m from existing ground levels.

6.4 Puketoka Formation (both Zone 1 'Peat' and Zone 2 'inorganic clays')

6.4.1 Upper Over-consolidated Clays and Silts (Stratum S2a; Zone 2)

These materials comprise inorganic or organic stained silty CLAY and clayey SILT, with some variable beds of organic silty CLAY or organic clayey SILT. The materials were generally stiff to hard, and their locations on site are shown in Figure 2.1 to be in the central northern portions of the study area, generally extended to depths of between 6m to 12m below existing ground levels.

It should be noted that in HA06, HA38, HA39 and MH07, organic soils were present at depths between 0.0m and 2.0m. The presence of such localised organic deposits is not uncommon and has been identified in the nearby Park Estate and Auranga Residential Subdivisions in Drury which also contain similar Puketoka Formation soils.

6.4.2 Normally Consolidated Clays (Stratum S2b; Zone 1)

These materials comprise inorganic and organic CLAY with some variable beds of dilatant pumiceous SILT, and fibrous and amorphous PEATs. The materials are located beneath Stratum S2b materials typically to depths of between 18m and 27m, although in MH10 the materials extended beyond the reach of the 30m borehole depth. These soils are identified as being very soft to stiff, although generally soft to firm.

6.4.3 Loose Sands and Dilatant Silts (Stratum S2c; Zone 1)

These materials comprise very dense dilatant pumiceous SILTs and soft to firm clayey SAND and silty SAND deposits, and are generally located beneath stratum S2b materials (i.e. typically beyond 2m depth), commonly pinching out between the S2b and S2d materials, although in several instances similar materials were encountered



above the S2b materials. These materials are 3m thick on average across all test locations, although an approximately 7m thick layer was encountered in MH14.

6.4.4 Lower Over-consolidated Clays and Silts (Stratum S2d; Zone 1)

These materials comprise inorganic and organic stained CLAY and silty CLAY with variable beds of fibrous PEAT and SAND. The materials are located beneath stratum S2b or S2c materials and are typically firm to stiff, with shear strengths generally increasing with depth. The materials extended beyond the 30m target depth of the relevant investigation locations.

6.5 East Coast Bays Formation (Zone 2 – 'inorganic clays')

6.5.1 Residual and Transitional Soils (Stratum S3a and S3b)

These materials comprise very stiff to hard inorganic silty CLAY and clayey SILT and are located in the south-eastern portion of the study area which is typically defined by having higher elevations and/or steeper slope gradients (up to 1(v) and 4(h) as mentioned in Section 4.1). Weathered residual soils were recorded to depths of between 3.7m and 4.3m overlying a distinct transitional layer (i.e. transition to bedrock), comprising dark grey, inorganic silty CLAY, clayey SILT and fine SAND deposits with some beds of highly to completely weathered interbedded SILTSTONE and SANDSTONE which become more common with depth.

6.5.2 Bedrock (Stratum S3c)

Bedrock materials were encountered beneath stratum S2a and S3b materials in the northern portions of the study area. The bedrock materials comprise extremely weak to moderately strong, slightly to completely weathered SILTSTONE and SANDSTONE.

6.6 Groundwater

Groundwater was encountered in most hand auger boreholes and trial pits across the site, with groundwater levels being encountered during drilling / excavation at depths of between 0.6m and 3.5m below existing ground level.

As discussed in Section 5, a standpipe piezometer was installed in each machine borehole and groundwater monitoring rounds were undertaken on 30 April 2021, 30 July 2021, 27 October 2021, 17 January 2022, and 9 February 2023 to determine the standing groundwater levels across the site once the groundwater levels had equilibrated following drilling, which is considered to be an accurate representation of the standing groundwater table.

Groundwater levels in the standpipes were measured at depths of between 0.20m and 7.17m below current ground level, however, most locations recorded groundwater depths within the upper 1.0m to 3m below ground level. This is considered to be generally representative of a year-round seasonal groundwater regime, with the February 2023



groundwater readings being undertaken during a historic high rainfall period in Auckland. Full records of groundwater are presented in Table 3.2 (Appendix 3.1).

6.7 Percolation Test Results

Two percolation tests (P01 and P02) were undertaken in the locations indicated on appended Figure 2.1. Tests were undertaken in accordance with TR 2013/040, Appendix A, Annexure C, Worksheet W1 – Falling Head Percolation Test (i.e. autumn conditions). Percolation rates are as indicated on the table below:

Table 1: Percolation Test Summary

Test	Minimum Percolation Rate	Test Depth	Soil Materials Summary	Pre-Soak Conditions
P01	0.0743 L/m²/min	2.0m	Clayey SILT (low plasticity) / silty CLAY (high plasticity), very stiff, moist	7 Days
P02	0.01 L/m²/min	2.0m	Fibrous / amorphous PEAT, soft to firm, moist to wet, low to medium plasticity	48 Hrs

6.8 Laboratory Test Results

Laboratory testing was undertaken to determine Atterberg Index properties, particles size distributions, onedimensional consolidation properties and pH to characterise the subsoils at various locations and depths across the study area.

All results are IANZ (International Accreditation New Zealand) endorsed and these have been summarised in Table 4.1 (Appendix 4). Full laboratory results are included in Appendices 4.2 to 4.5 and are discussed in the following sections of this report.

7 PERCEIVED GEOTECHNICAL HAZARDS

7.1 General

It is apparent based on this preliminary work that with appropriate engineering there should be no insurmountable geotechnical hazards that would prevent future residential intensification. Precedence with residential development upon the alluvial 'Peat' geology setting has been set elsewhere in the Takanini / Ardmore region (i.e. the substantial residential subdivisions along Cosgrave and Grove Roads, Walters Road, Porchester Road and the Addison Development) and it is anticipated that a public reticulation network for stormwater and sewerage will be available for future large-scale subdivision development.

As discussed in Section 3 of this report, the following geotechnical hazards have been identified pertaining to urbanisation of the Sunfield landholding:



- Slope instability of the 1(v) in 4(h) stormwater channel.
- Soil liquefaction and lateral spreading.
- Consolidation of the ground due to the proposed bulk fill and building loads.
- Consolidation of the ground due to groundwater drawdown within areas of cut (i.e. the proposed stormwater channel).

The site-specific geotechnical assessment criteria and assumptions made for the hazard assessments and analyses in the following sections are described in Section 7.1.1 below.

7.1.1 Seismic Site Subsoil Class

The seismic site subsoil class for the study area has been determined in accordance with NZS 1170:5:2004. The assessed site classes for the study have been determined to be Class E (very soft soil sites) in Zone 1 and Class C (shallow soil sites) in Zone 2. For the hazard analyses presented in the following sections, Site Class C has been adopted site-wide as this provides a higher PGA and is therefore the most conservative approach. Further specific seismic testing (e.g. sCPT) during subsequent (more comprehensive investigations) may help classify this further, particularly for the structural design of any infrastructure or buildings.

7.2 Slope Stability

The prevailing topography within Zone 2 soils currently has gradients no steeper than 1(v) in 4(h) with no obvious geomorphic signs of slope instability with the exception of localised over steepened gully flanks within the (S3 type) geology, where shallows seated slips and soil creep are generally observed as is expected.

The proposed earthworks scheme proposes to modify the existing site gradients to reduce slope gradients even further. Slope stability is not considered to be a primary geotechnical constraint within the Zone 2 areas of site because typical prevailing slopes (or proposed grades) do no exceed 1(v) in 4(h). Nevertheless, the proximity of buildings to sloping gully flanks that are left in place should be assessed as part of the future EPA application(s) once the earthworks and subdivision proposals have progressed.

The soils within Zone 1 are considered to be potentially susceptible to slope stability at moderate to flat gradients due to their inherent weak nature, with the primary area of concern being the proposed 1(v) in 4(h) flanks forming the proposed stormwater conveyance which is to be incised entirely within 'crustal' materials or peat soils (i.e. S1 type). The Takanini / Ardmore area has recently seen the construction of the Takanini Stormwater Conveyance Channel which has also been formed at 1(v) in 4(h) gradient which is engineer designed, and to the best of our knowledge has not experienced any slope instability issues.



We have completed an analysis of the proposed 1(v) in 4(h) stormwater channel as shown on the Maven Associates Limited drawings (Appendix 1). The GHD reports^{3,4} have been used to form the basis of our approach to slope stability assessments given that the current proposal involves a similar slope gradients and ground conditions to the Takanini Stormwater Conveyance Channel, although the channel in the landholding is nowhere as big as the GHD designed ones. A full description of our slope stability analyses together with detailed summary tables and full output results are presented in Appendix 5 of this report.

Based on our assessments slope stability assessments, assessed slip surfaces beneath the proposed permanent stormwater channel batters meets the minimum factor of safety criteria prescribed in the Auckland Council Code of Practice and are therefore satisfactory. Nevertheless, the proposed channels are subject to detailed design and it is recommended that further geotechnical assessments are completed once the final channel locations and geometries have been confirmed.

Specific slope stability assessments for lateral spread as outlined in MBIE Module 3⁵ under earthquake loading are discussed in Section 7.4.2 below and in Appendix 5.

7.3 Compressible Soils

7.3.1 Consolidation Settlements

To assess the settlement caused by anticipated future building loads (one, two and three storey), a settlement analysis was completed using the CPT and DMT traces across the study area. A full description of how the building loads are derived, our settlement analysis together with detailed summary table and full output results are presented in Appendix 6 of this report.

Based on the results of the settlement assessment, total settlement beneath building loads are summarised for one, two and three-storey buildings, respectively, as follows:

Zone 1:

- Up to 183mm, 234mm and 286mm (using the DMT data).
- Up to 212mm, 317m and 423mm (using the CPT data)

Zone 2:

Up to 9mm, 18mm and 27mm (using the DMT data).

⁵ New Zealand Geotechnical Society (NZGS) and Ministry of Business Innovation & Employment (MBIE) guidelines for Earthquake Geotechnical Practice in New Zealand. "Module 3: Identification, assessment and mitigation of liquefaction hazards" Rev. 0, Issue Date May 2016.

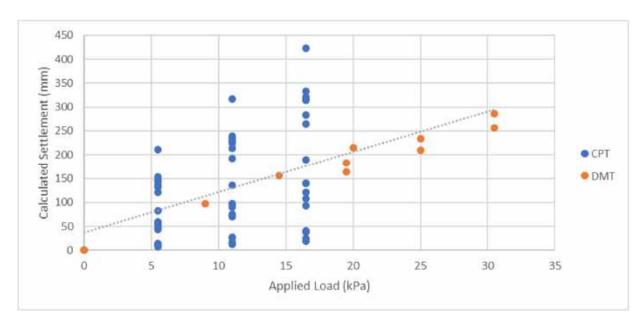


³ Takanini Stormwater Conveyance Channel – Geotechnical Investigation Report; Technical Report C. Reference 51/32174, dated December 2015.

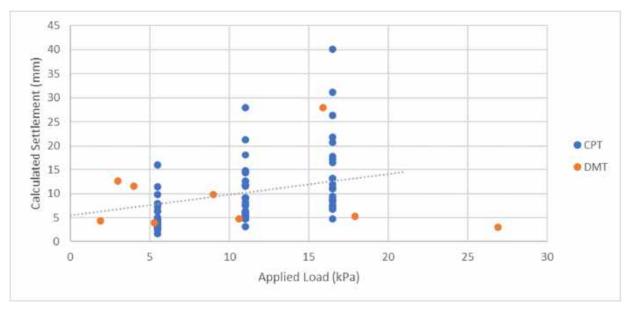
⁴ Takanini Stormwater Conveyance Channel – Geotechnical and Ground Settlements Effects Report; Technical Report E. Reference 51/32174, dated April 2016.

Up to 16mm, 28mm and 41mm (using the CPT data).

The insets below show a summary of the expected settlements calculated for both Zones. It should be noted that there is a reasonable disparity between CPT and DMT settlement estimations. DMT methods are widely regarded as a more accurate in-situ test for estimating settlements due to the direct measurement of the soil constraint modulus (M). Notwithstanding, trial preloading as alluded to later in this section will help assess actual response of the ground to surcharge application, as opposed to reliance on widely varying theoretical estimations.



Inset C: Applied Load vs Calculated Settlement for all Zone 1 assessments.



Inset D: Applied Load vs Calculated Settlement for all Zone 2 assessments.

Based on these preliminary analyses, the settlements are assessed to generally be acceptable for NZS3604-type buildings up to three-storeys constructed in Zone 2 areas, however, within Zone 1, all assessed tests were found to be in excess of this requirement as is expected in 'Peat'.



Precedence has been set to construction on similar ground conditions in nearby subdivisions and consolidation settlement is typically addressed by ground improvement (generally undercutting by around 500mm and replacing with compacted hardfill or sand beneath building platforms to act as a raft) and preloading to induce the settlements to be imposed by future building loads.

A preload design should be completed commensurate with EPA application, and this will need to consider the final earthworks proposal, building typologies and uniformly distributed loads (UDLs) as well as the preferred preload material type, and trial preloads are recommended in this regard.

LDE Limited has been retained by Sunfield Developments Limited to provide geotechnical services for several preload trials to get a head start and quantify anticipated consolidation settlements and timeframes that can be expected under a preloading regime for the various building typologies and densities anticipated. At the time of preparation of this report, the preload design has been completed (refer Section 3), however, preload trials have not yet commenced.

The assessment for settlement beneath buildings greater than three storeys in Zone 2 has not been completed as part of this assessment, however, it is foreseeable that such construction would likely require piled foundations to support dwellings due to wind or seismic loading requirements. Such assessments should be addressed in further investigations if required.

7.3.2 Drawdown Settlements

Drawdown induced settlements occur where the soils experience dewatering to a groundwater level lower than that of the average seasonal variability. Groundwater drawdown is calculated as the difference between the proposed earthworks cut level and the season low in the groundwater levels (i.e. if the cut level extends below the seasonal low in the groundwater level then groundwater drawdown will occur). In Zone 1 soils, drawdown will create an increase in effective stress and induce settlement.

Our groundwater monitoring indicates seasonal fluctuations in the order of 1-2m between summer and winter. Over this zone of fluctuation the soils would tend to be pre-consolidated due to the effective stresses imposed. Over most areas of the site, cuts of around 1m or less are proposed and there is only minor groundwater drawdown risk, however, the primary concern for any such drawdown settlements is in the area of the proposed stormwater channel excavations. This is a matter for detailed design and should be assessed at EPA application stage.

Based on the existing groundwater data and earthworks proposals the following preliminary assessments of groundwater drawdown have been made for the proposed stormwater channel using the data presented in Figure 2.2 and Table 3.2:



Table 2: Preliminary Groundwater Drawdown Assessment

Location	Cut Depth	Lowest Measured Groundwater Level (m)	Groundwater Drawdown (m)
Stormwater Channel	1m to 2.5m	1.57m to 3.37m*	Up to 0.43m*

^{*} We recommend further commentary be included during a future EPA application to address this risk, including the lateral extent affected by any drawdown. However, drawdown should only be assessed against the lowest recorded readings, which is generally the summer case.

7.4 Liquefaction and Lateral Spread Potential

7.4.1 Computer Liquefaction Analysis

Due to the variable nature of soils encountered across the study area (i.e. normally consolidated fibrous peat and clay deposits, pumiceous silty and sandy materials, over consolidated cohesive materials), a computer liquefaction assessment has been completed using the CPT data across the study area. A full description of our computer liquefaction analyses together with detailed summary tables and full output results are presented in Appendix 7.

No vertical settlements were calculated under SLS seismic conditions, however, under ULS seismic conditions, theoretical vertical settlements of up to 105mm (i.e. due to cyclic softening) were calculated, however, this does not take into account non-liquefiable crust thickness overlying the liquefiable layers, nor does it account for the Liquefaction Severity Number (LSN) for each analysis or the geological age of the soils. These criteria are outlined in Section 7.4.3 to 7.4.6 below and assessed vertical settlements following these assessments are presented in Section 7.4.7.

Lateral spreads are not considered to be a geotechnical concern as the site is generally flat and non-liquefiable crust layers across the site are generally thick enough to mitigate this as an issue (as there is no free face present for lateral spreading to develop). Additionally, lateral spread was not determined to be an issue in the proposed stormwater channel due to the Newmark Rigid-Block slope stability analysis (discussed in Section 7.2 and in Appendix 5).

In the following sections of this report we outline the relevant geotechnical criteria from relevant geotechnical publications for classifying soils as being prone to liquefaction and how they relate to the assessed results and the subsoils identified at the Cosgrave Road landholding.

7.4.2 Computer Lateral Spread Analysis

MBIE Module 3 indicates that lateral spread can develop where a factor of safety against liquefaction of less than 1.0 and a free face are present in combination (i.e. the proposed stormwater channel).

The Newmark Rigid-Block lateral spread assessment outlined in Appendix 5 indicate that no lateral spread occurs.



7.4.3 Geological Age

MBIE Module 3 advises aging of soils generally improves their resistance against liquefaction, and that liquefaction almost exclusively occurs in geologically young Holocene sediments, constructed fills and soils that have liquefied previously, and that in rare instances liquefaction of saturated sandy soils has been recorded in late Pleistocene soils (>11,000 years).

The soils within Zone 1 are of Holocene age and are therefore considered susceptible from a geological age perspective to the liquefaction calculated in our computer analyses.

The soils within Zone 2 are aged between Late Pliocene to Middle Pleistocene (11,000 years to 23 Ma). Soils of Late Pliocene age (Stratum S2a) comprise over consolidated cohesive materials and therefore considered to be less susceptible to liquefaction due to their age.

7.4.4 Soil Fabric

MBIE Module 3 states that 'sand-like' soils (sands, non-plastic silts and gravels) are most commonly susceptible to liquefaction and 'clay-like' soils (clays and clayey silts) are not susceptible to liquefaction, although the latter are soils of Holocene age may be susceptible to cyclic softening (as is the case at Cosgrave Road). The distinction between 'clay-like' and 'sand-like' soils are determined by the fine content of the soil, where 'clay-like' behaviour is defined as where greater than 30% of the dry mass can pass through a 0.075mm sieve (i.e. $D_{30} < 0.075mm$ (or $75\mu m$)).

Additionally, MBIE Module 3 presents the following classification system for classifying liquefaction susceptibility in terms of the plasticity index of the soil for soils having a $D_{30} < 0.075$ mm:

Table 3. Liquefaction Susceptibility Criteria.

Plasticity Index Value	Susceptibility
PI <7	Susceptible to liquefaction ('sand-like' soils)
7 ≤ PI ≥ 12	Potentially susceptible to liquefaction; (possibly 'sand-like' soils)
PI ≥ 12	Not susceptible to liquefaction; ('clay-like' soils)

Preliminary laboratory testing has been completed for various soil types across the site to characterise their characteristics and behaviour. Plasticity index and particle size distribution testing indicate that materials described as 'organic silty CLAY' or 'pumiceous silty CLAY' comprise D_{30} of 1.4µm or less and have a PI of 40% or more ('clay-like'), and materials described as 'silty SAND' or 'pumiceous SILT' comprise D_{30} of 19.7µm or less and have a were unable to be tested for PI (i.e. PI can be assumed to be 0 and therefore 'sand-like').

This indicates that the soils described as CLAY (generally in Zone 2 or lower Zone 1) are not susceptible to liquefaction, however, the Zone 1 soils described as SILT, pumiceous SILT and SAND are susceptible to liquefaction



based on cohesion and plasticity index classification. However, these near surface non-cohesive deposits are thinly bedded, and peat is more prevalent.

Although not tested (on account of the difficulty of obtaining a sample suitable for testing), the fibrous PEATs which make up the majority of the near surface subsoils within Zone 1 generally have high moisture contents and a porous-fibrous structure and inherently can be classified as susceptible to cyclic softening (i.e. they can be treated as SILT or SAND in this sense).

7.4.5 Liquefaction Severity Number

MBIE Module 3 Table 5.1 indicates expected performance levels for liquefied deposits based on the Liquefaction

Severity Number (LSN). The potential for ground surface damage as a result of the computer liquefaction settlements has therefore been evaluated using LSNs for each CPT assessed. As shown in Table 7.4 in Appendix 7, the CPT-based LSN values for ULS ground shaking are typically less than 10 with the remaining values in excess of 10 but still less than 15. This indicates insignificant to mild effects as a result of liquefaction as per MBIE Module 3 Table 5.1 (refer Inset E right).

Table 5.1: General performance levels for liquefied deposits EFFECTS FROM EXCESS PORE WATER PRESSURE AND LIQUEFACTION CHARACTERISTICS OF LIQUEFACTION AND ITS CONSEQUENCES CHARACTERISTIC F_L, LPI, L5N F_>1.4 LPI=0 No significant excess pore water pressures (no liquefaction). Lo Insignificant Limited excess pore water pressures; negligible deformation 1.2 LPI = 0 LT of the ground and small settlements. L5N = 5 - 15 Liquefaction occurs in layers of limited thickness F1 = 1.0 LPI < 5 (small proportion of the deposit, say to percent or less) Moderate L5N 10 - 25 small differential settlements. Liquefaction occurs in significant portion of the deposit F_L < 1.0 LPI = 5 - 15 (say 30 percent to 50 percent) resulting in transient lateral 13 High displacements, moderate-to-large differential movements, and LSN = 15 - 35 settlement of the ground in the order of 100 mm to 200 mm. Complete liquefaction develops in most of the deposit. F, << 1.0 resulting in large lateral displacements of the ground, excessive LPI > 15 differential settlements and total settlement of over 200 mm. L5N > 30 Liquefaction resulting in lateral spreading (flow), large permanent lateral ground displacements and/or significant LE Very severe ground distortion (lateral strains/stretch, vertical offsets and angular distortion).

Inset E: General performance levels for liquefied deposits.

The average LSN for the Zone 1 soils for the ULS case is approximately 2.4, while the average LSN for the Zone 2 soils is approximately 9.2. This indicates insignificant to mild liquefaction effects generally prevail under ULS shaking across both of these zones, resulting in limited excess pore water pressures, negligible deformation of the ground and small settlements only.

7.4.6 Surface Manifestation Criteria

MBIE Module 3 provides guidance around consideration of crust thickness. A non-liquefiable crust thickness of 3m is generally deemed thick enough to suppress surface manifestation of deep liquefaction occurrence for earthquakes with a PGA of 0.2g or less.

Research completed by Bowen & Jacka (2013)⁶ has compared this theory to the damage recorded during the 2010 and 2011 Canterbury earthquake sequence which also found that where the crust thickness of 3m or more is present (for a PGA of 0.2g), liquefaction was considered unlikely to occur as the crust thickness was considered too thick for the underlying liquefied soils to 'break through', for example in the case of sand boils. The research also suggests

⁶ Bowen, H. & Jacka, M. (2013) "Liquefaction induced ground damage in the Canterbury earthquakes: predictions vs reality" Proc. 19th NZGS Geotechnical Symposium.



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that the thickness of the underlying liquefied layer is a less important factor except in instances where a liquefied layer of between 0.5m and 2.0m were present within the upper 3m. The results of our computer liquefaction analysis have considered the thickness of non-liquefiable crust layers, and these demonstrate that the non-liquefiable crust thickness was between 1.3m and 6.3m under ULS seismic conditions, with the resulting ULS settlements up to 105mm (refer Table 7.4). A significant number of CPTs in Zone 1 (11 out of 19) have non-liquefiable crusts less than 3m thick, while out of the Zone 2 CPTs, only 7 out of 20 have non-liquefiable crusts less than 3m thick. Based on this, the Zone 1 soils could have more surface manifestation of liquefaction during a ULS earthquake, while the Zone 2 soils are generally not expected to show surface manifestation based on crust thickness criteria.

Based on our assessment of geological ages, soil cohesiveness, and surface manifestation criteria, the Zone 1 soils are possibly susceptible to liquefaction only under ULS shaking with calculated settlements of up to 105mm, while the Zone 2 soils are considered to be less susceptible to liquefaction.

7.4.7 Development on Liquefaction-Prone Soils (Zone 1)

The results of this liquefaction analysis (based on a post-construction earthworks scenario) indicate that soils which have been identified as susceptible to liquefaction / cyclic softening (i.e. Zone 1 soils with no sufficient non-liquefiable crust) and assessed to possibly undergo liquefaction-induced settlement under ULS conditions could be between approximately 5mm and 130mm. These figures are only preliminary and future assessments should be completed as part of an EPA application(s).

Due to the potential for liquefaction-induced settlements, the subdivision will need to be designed with this in mind, with a regard to overland flow path, floodplain levels and maintaining free-board for building platforms, etc.

Additionally, MBIE Module 5⁷ outlines several methods of ground improvement that can be used in soils which are assessed to be susceptible to liquefaction. Of the methods of ground improvement, the following methods are considered to be the most applicable to the proposed development based on precedence set in the area (see section 8.1.1 also) at nearby subdivisions and as these methods will also address the consolidation settlements as discussed in Section 7.3.1:

- Replacement: involves the undercutting of the upper liquefaction prone soils and reinstating with a non-liquefiable material. This is commonly a compacted GAP65 hardfill material which acts as an additional raft beneath the future building and also improves the available bearing capacity available for future buildings. In peat soils this may be problematic for construction due to the high groundwater table, and for consolidation settlements due net increases in stress (e.g. from hardfill reinstatement).
- <u>Densification</u>: involves the rearrangement of soil particles into a tighter / denser configuration. This can be achieved in part via preloading, which is also required to remove building induced settlement as discussed in Section 7.3.1.

⁷ New Zealand Geotechnical Society (NZGS) and Ministry of Business Innovation & Employment (MBIE) guidelines for Earthquake Geotechnical Practice in New Zealand. "Module 5: Ground improvement of soils prone to liquefaction" Issue Date June 2017.



7.5 Proximity to Faults

Based on a review of the GNS digital geological QMaps, it is apparent that there are several identified faults in proximity to the study area. The Drury Fault runs through the study area and is classified by GNS as inactive. The likely return period of the Drury Fault is considered to be in the order of several thousand years or more8. The nearest defined active fault is the Wairoa North Fault which is located approximately 10km to the east of the study area (refer Fig 2.12).

Due to the distance of the site to the nearest active fault being 10km and the existence of other Urban and Future Urban developments in similar or closer proximity to the Drury Fault (i.e. residential subdivisions along Cosgrave and Grove Roads and the Addison Development), we consider that the fault should not be considered a high impact geotechnical issue to this development.

7.6 Expansive Soils

A phenomenon common to the plastic soils found throughout this region is their expansive nature and tendency to shrink and swell, particularly with seasonal fluctuations of near surface water contents. Geotechnical engineering solutions to expansive soils are discussed in Section 8.2 below.

7.7 Flood

The Auckland Council Geomaps database indicates that flood plains within the study area are generally confined to the identified overland flow path areas and we understand these will be assessed by other specialist reports accompanying the application.

7.8 Regional Hazards

7.8.1 Earthquake

As stated above, the Cosgrave Road landholding is located 10km from the nearest active fault (the Wairoa North Fault). Notwithstanding, all future foundations for structures should be seismically designed in accordance with the relevant New Zealand Standards and guidelines.

7.8.2 Tsunami

The landholding is located approximately 2.5km from the nearest Tsunami shore exclusion zone and evacuation zones as per Auckland Councils Geomaps database, which are adjacent to the Pahurehure Inlet. Tsunami should be dismissed as a likely hazard.

⁸ Williams et al. 2006. "Active Faulting in the Auckland Region, Earthquake and Urban Development," New Zealand Geotechnical Society, IPENZ, Proceedings or Technical Groups Vol.31.



7.8.3 Volcanic

The landholding is located relatively close to the South Auckland Volcanic Field, which is considered to be extinct, and is around 9km from the nearest Auckland Volcanic Field Volcanoes (Matakarua, Manurewa and Ash Hill mountains in Wiri). Leonard and Roberts (2017)⁹ highlights the difficulty in forecasting future eruption timelines and locality in the Auckland Volcanic Field and argues that given the population and extent of economic and urban development in Auckland, avoidance of this hazard is not feasible, but rather risk should be mitigated through contingency and emergency planning at a regional level.

8 GEOTECHNICAL ENGINEERING CONSIDERATIONS

8.1 Foundations for Buildings

8.1.1 Zone 1

Based on the results of our field investigation and subsequent settlement analyses, soils in this area of the site comprise generally fibrous peats (Stratum S1b) with varying degrees of stiffer crustal thicknesses (Stratum S1a) generally through the central and western portions of the study area. Crust thicknesses of up to 2.2m are present, although are generally less than 1m thick. However, there is the potential for 'crust thicknesses' to increase by up to 1m in some areas due to the proposed bulk filling works.

Within S1a areas, one and two storey <u>light weight</u> standalone residential dwellings will generally require undercutting beneath the building footprints by 500mm and replacement with compacted hardfill or approved sand, in conjunction with a geotextile cloth to separate the backfill from underlying soft subgrades. Localised preloading may be required; however, this should be assessed during future site-specific investigations.

Within S1b areas, one and two storey light weight standalone dwellings will require ground improvement as required for S1a areas plus a wider preload. Preload details should be confirmed commensurate with specific building proposals at EPA stage.

For both S1a and S1b areas, <u>heavier</u> two storey, or <u>terraced</u> (i.e. conjoined residential dwellings), or <u>three</u> storey on natural ground will require the undercutting <u>plus</u> a higher degree of preloading. Preloads can be in place for anywhere between 6 and 18 months based on precedence. Preload trials are recommended to observe actual response of the soils to surcharges loadings (LDE Limited have been retained to provide geotechnical inputs into such trials, with preload design completed at the time of preparation of this report – refer Section 3).

Alternatively such buildings could be piled or some other deep ground improvement option implemented to mitigate settlement and bearing capacity concerns.

⁹ Leonard, G. A. & Roberts, R. C. Volcanic Hazard from the Auckland Volcanic Field. Proceedings 20th NZGS Geotechnical Symposium. 2017.



For commercial / industrial buildings within Zone 1, the foundation solution will be commensurate on end use and as such will require site specific investigations and foundation design. There is precedence of large buildings having commercial / industrial end-use in Takanini peats, and solutions such as piling, soft pile rafts, ground improvement and preloading etc. have been utilised.

All building types constructed on peat soils will require stiffened pod-raft type foundation solutions to spread building loads evenly in order to minimise the potential for differential settlements.

Other floor slab systems may be appropriate provided that they are the subject of specific site investigation and foundation design by an appropriately experienced Chartered Professional Engineer. Roofing systems should preferably be light weight and the exterior cladding should preferably be flexible or at least contain adequate control joints as specified by the Architect/ Engineer.

Private services entry points into houses with require flexible connections and driveways will need a transition slab into the floor slab to minimise cracking / distress between these elements.

A summary table of preloading and/or localised ground improvement requirements and specific foundation design criteria is presented in **Appendix 6.1.** A summary of specific buildings and ground improvement / foundations solutions adapted for commercial / industrial buildings is presented in Table 4 below.

Table 4. Commercial / Industrial Ground Improvement and Foundation Solution Case Studies (for Zone 1 areas).

Location / Building	Building Working Load	Ground Improvement	Foundation Solution
Sikh Temple, 70 Takanini School Road	20kPa	N/A	8m deep piled foundations (to relatively shallow ECBF bedrock)
Gymnasium and Multi- Sports Centre, Bruce Pulman Park, Walters Road	Unconfirmed, typically 'lightweight'	Stage 1 (single storey) - 1400mm high preloading, average settlement of 142mm recorded Stage 2 (two-storey) - 1700mm high preloading, average settlement of 500mm recorded	foundation pads and floor slab thickenings
Mitre 10 Centre, 238 Great South Road	10kPa	500mm thick hardfill raft	Timber driven piles (for column loads) Strip footings (for external tilt slab walls)



8.1.2 Zone 2

Where inorganic natural ground is present, bearing capacity is expected to be in accordance with the limitations imposed by NZS 3604 where 300kPa geotechnical ultimate bearing capacity should be adopted. However, as is evident from our borehole findings, some areas contain pockets of weaker ground and/or lenses of organics.

Softer ground or lenses of organics can pose constraints to NZS 3604 building foundations and residential end use, necessitating remediation during earthworks construction (e.g. undercutting and reinstatement with stronger soils), and/ or specifically designed foundation solutions (i.e. 'raft' foundations). LDE's experience in the delivery of hundreds of lots in the nearby area on Puketoka Formation soils (i.e. the Auranga Residential Subdivision in Drury) indicates that typically only a small number of lots are affected by soft ground or organic soils, but in due course more intensive physical site investigation associated with a subdivision scheme will substantiate this risk.

For commercial / industrial within Zone 2 more conventional shallow foundations solutions are possible dependent on end-use, however, these types of buildings will generally require site specific investigation and foundation design.

8.2 Expansive Soils

A phenomenon common to the plastic soils found throughout this region is their expansive nature and tendency to shrink and swell, particularly with seasonal fluctuations of near surface water contents. Expansive soils are outside the provisions of NZS 3604 (according to its definition of "good ground") and therefore foundations on such soils require specific design to establish appropriate embedment depths and/ or concrete reinforcement configurations.

Based on the preliminary laboratory testing undertaken and our knowledge of the soils encountered within this area of Auckland, the assessed expansive site class for this site is as follows when assessed in accordance with AS2870:2011 guidelines is as follows:

- Class M (moderate)* to Class H2 (high)*
- Characteristic ground movement of 40mm and 75mm, respectively*

*Note: This AS2870:2011 assessment is based on the scaling factor of the site being adjusted to a 1/500yr event to meet the recommendations of MBIE.

It is foreseeable that foundation design in Zone 2 may be carried out in accordance with AS2870:2011 provided they are designed to the recommendations above on expansive site class and characteristic ground movement or alternatively an engineer approved design solution may be adopted.

Within Zone 1 areas, consolidation settlement of the underlying peat soils and the need to charge groundwater will govern here, not expansivity.

This will be addressed in greater detail as part of an EPA approval report and will need to consider proposed earthworks.



8.3 Non-engineered Fills

As described in Section 6.2, some pre-existing filling is present within the landholding and is likely associated with an old rubbish pit.

Where deemed economic to do so, pre-existing filling will need to be undercut and reinstated with engineer certified filling to mitigate the risk of differential settlement and bearing capacity issues associated with non-engineered filling.

If there are any fill depths which are considered too deep for undercutting and reinstatement to be a viable option, specific foundation design will be required to mitigate the aforementioned risks, with a view to pile foundation solutions or ground improvement. This is a matter to be re-addressed as part of an EPA application report.

8.4 Earthworks and Civil Works

8.4.1 Zone 1

The risk of ground settlement in this area requires that careful mitigation measures be implemented to ensure that any settlements that do occur are within acceptable limits. Surficial soils within Zone 1 are relatively sensitive to disturbance and any earthworks and construction operations should be undertaken with care.

Based on the results of our settlement analyses, a large portion of Zone 1 could be subject to significant consolidation settlements which will be in excess of Building Code limits for differential settlements. It is our view that development in these areas should be subject to ground improvements comprising of the undercutting and replacement of weaker soils immediately beneath the foundations or the preloading of the building platforms following post-construction earthworks. Additionally, in some areas, a lag-period could be implemented where construction is able to commence without additional ground improvement following, say 1-year, to allow fills to settle under their own self-weight. Such assessments should be made at EPA application stage when further detail is available regarding the proposed development schemes.

Control of post-construction settlement is usually reduced through appropriate engineering design, such as preloading if required, identification and removal of buried tree stumps/ logs from beneath building platforms and service line corridors, and settlement monitoring of fills. Stump detection involves probing to 2m depth in a grid fashion (say 3m centres) using a special attachment on a digger, and excavation of any obstructions encountered and replacement with peat or black sand.

With regard to bulk filling, normal subdivisional compaction specifications do not apply to these organic materials if they are used as fill. The materials are best bladed out to a uniform thickness and screened using a root rake to remove as much large matter as possible. The materials are then track rolled and allowed to drain and harden over time. Light re-compaction once moisture contents have reduced during favourable site conditions is prudent. This methodology has been widely used in other nearby developments on peat soils over the past 10 years or so (e.g. Addison).



8.4.2 Zone 2

Based on our previous experience in the area we expect that the natural soils on site should generally be suitable as borrow materials. Moisture contents in laboratory samples tested were generally higher than the plastic limits, indicating that they will likely require conditioning prior to placement as engineer certified filling. However, these samples were collected in winter and more favourable conditions could possibly be observed during summer conditions.

Puketoka Formation soils, particularly pumiceous soils (which are common in Puketoka Formation), can be sensitive to disturbance during earthworks and trafficking with pumping and weaving occurring under heavy machinery trafficking (i.e. the subgrade may lose strength and become difficult for primary earthworks machinery to traverse). If sensitive and/ or pumiceous soils are uncovered near to proposed levels on site, appropriate earthworks methodologies and programming should be implemented to avoid disturbing these materials. This can include keeping machinery trafficking to designated haul roads and maintaining levels at 200mm-300mm above final level until topsoil or basecourse can be placed. Where these soils are disturbed, undercutting and reinstatement of the disturbed soil mass with engineered filling will likely be necessary.

Sensitivity to disturbance can also cause the degradation of roading subgrades once exposed. This can be avoided by careful construction sequencing or mitigated by subgrade improvement such as undercutting and replacement or lime stabilisation etc.

It is likely such areas will be determined in greater detail as part of further investigations commensurate with subsequent EPA application(s).

8.5 Pipes and Buried Services

The laying of deep pipelines in ground with a high groundwater table can be extremely difficult and is best undertaken by a Constructor with a proven track record in this regard (i.e. laying pipes in peat).

If flat grades are proposed then the risk of settlement dipping the lines increases, and redundancy should be incorporated into the design, such as oversizing pipeline internal diameters, careful consideration in selection of trench backfill materials, seepage cut off collars at regular intervals to prevent the pipe bedding media acting as a groundwater drawdown drain, etc.

Increased bedding thickness and undercut to provide a uniform support to the pipelines will also be necessary. It is important to note that despite design and construction best efforts, differential settlement on flat service lines always poses a risk and cannot be completely mitigated in this terrain. It will be important to ensure settlement in bulk fill areas has attenuated to acceptable level prior to the laying of minimal grade service lines and roading kerbs, etc. This is an important construction sequencing issue.

Deep trench fills (e.g. greater than 3m) if hard filled may induce settlements that dip lines, so lightweight fills (e.g. PolyRock) or Puni sand with 3% cement (i.e. to immobilise it) may be warranted.



It is also important that services pipes are designed to withstand long-term corrosion. We anticipate that specialist advice will need to be sought for assessments in accordance with AS4058:2007 Appendix E, Table E1 (or current standard) as to concrete pipe resistance to the corrosive nature of the soils (refer Appendix 8 for site specific pH results). Further chemical testing and analyses of the organic soils/groundwater may be required for this (e.g. pH, total alkalinity (mg/L), Baumann-Gully acidity (mL/kg), chloride and sulphate (mg/kg)).

8.6 Roading

Roading subgrades within Zone 1 peaty soils will be extremely soft but precedence has been set in the area. Subgrade improvement undercuts typically comprise of ranges from 500mm to 700mm. The undercuts are typically reinstated with black sand (e.g. sourced from Woodhill or Waiuku), with a geotextile cloth placed to separate the sand from the underlying subgrade. The roading materials themselves may involve settlement of the underlying subgrade and requirement for additional depths of roading aggregate may be experienced as a 'top up' to achieve design levels. Our experience with Benkelman Beam deflection testing in the local area (e.g. on 700mm thick sand improvements) indicates deflections of close to 1mm are normally achievable, which seems to improve in time as the pavement 'sets up'. The deflection target criteria are normally 1mm for main through roads and 1.5mm for lesser roads.

Within Zone 2 soils, likely minimum CBRs of between 2% and 4% will likely be available for pavement design purposes.

8.7 Stormwater Management

LDE Limited (previously Lander Geotechnical Consultants Limited) have performed falling head stormwater percolation testing in two locations shown on our site plan (Figure 2.1) in accordance with the method described in the Auckland Council stormwater design manual TR2013-040.

Minimum percolation rates ranged from 0.01 L/m²/min (within fibrous PEAT soils) to 0.0743 L/m²/min. Based on these results and comparison to Table 4 of TR2013-040 we consider that in-situ percolation at Cosgrave Road will be likely be poor within identified CLAY deposits (i.e. Stratum S2a and S3a).

Within Zone 1 it is vital that existing groundwater levels within the Zone 1 peaty soils are maintained through recharge of stormwater runoff via soakage pits and/ or swales to minimise the potential for widespread drawdown and associated consolidation settlements. Within Zone 2 stormwater should be disposed of via specifically designed soakage pits or alternatively into the stormwater reticulation network.

9 CONCLUSIONS

Overall, the landholding is considered suitable for urban intensification as has been done on other topographically large land holdings to the west in similar geologies, and we therefore support the development proposal.



Further site investigation, and/ or design analyses will be required as part of the EPA application process in due course, commensurate with earthworks plans.

10 LIMITATIONS

This report has been prepared solely for the use of our client, Sunfield Developments Limited, its professional advisers in relation to the specific development proposal brief described herein. No liability is accepted in respect of its use for any other purpose or by any other person or entity. All future owners of this property should seek professional geotechnical advice to satisfy themselves as to its ongoing suitability for their intended use.

The opinions, recommendations and comments given in this report result from the application of normal methods of site investigation. As factual evidence has been obtained solely from boreholes which by their nature only provide information about a relatively small volume of subsoils, there may be special conditions pertaining to this site which have not been disclosed by the investigation and which have not been considered in the report.



APPENDIX 1 CLIENT SUPPLIED DRAWINGS

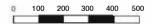


Sunfield Masterplanned Community

Masterplan - 25.11.2024







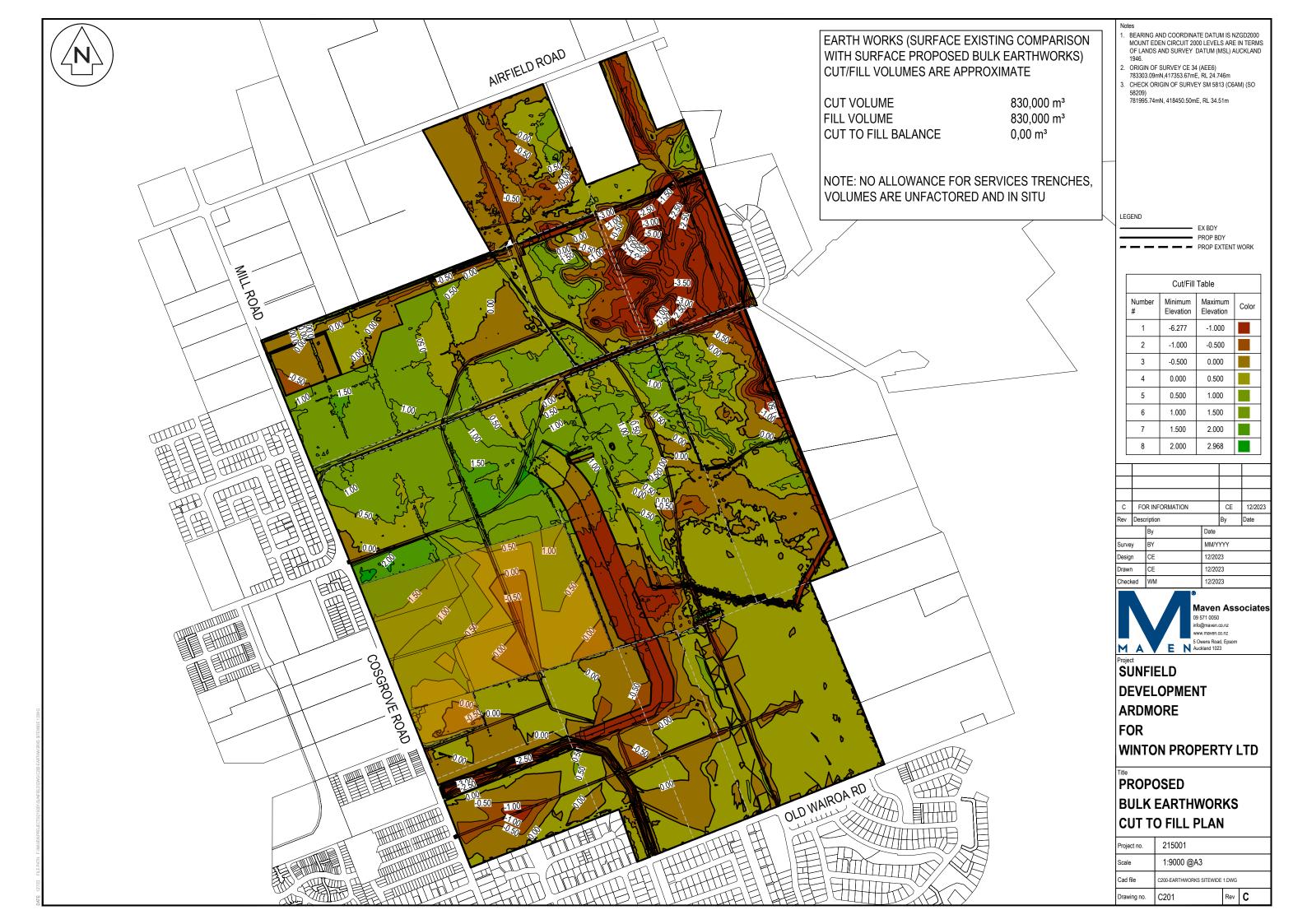


Sunfield Masterplanned Community

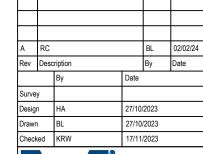
Masterplan - 25.11.24







PROPOSED2.5m WIDE SHARED PATH EXISTING GROUND LEVEL PROPOSED 2.5m WIDE SHARED PATH LOW FLOW CHANNEL PERMANENT WATER LEVEL TOP OF SLURRY WALL COVERED WITH 4% 150mm OF TOP SOIL WHERE EXPOSED EXISTING SLURRY WALL EXISTING SLURRY TRIAX 160 AND BIDIM A19 WALL SCOUR PROTECTION AT CRITICAL LOCATIONS REFER TO DRG 215009-S3-C4251 DETAIL 1 CHANNEL TYPICAL SECTION (WITH SLURRY WALL) SCALE 1:200 (A3)



. REFER TO DRG 215009-S3-C4000 FOR STANDARD CHANNEL NOTES.



AWAKERI WETLAND
STAGE 3
PAPAKURA
FOR
WINTON LAND LTD

PROPOSED CHANNEL
TYPICAL SECTIONS

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Cad file	215009-S3-C4250-CHANNEL DE	TAILS.D\	WG			
Drawing no.	215009-S3-C4250	Rev	Α			

CHANNEL TYPICAL SECTION (WITHOUT SLURRY WALL)

WETLAND GRASSES

REFER TO LANDSCAPE DESIGN

NATIVE SHRUBS AND GRASSES

REFER TO LANDSCAPE DESIGN

LOW FLOW CHANNEL PERMANENT WATER

WITH SOME NATIVE TREES

NATIVE SHRUBS AND GRASSES

REFER TO LANDSCAPE DESIGN

SCALE 1:200 (A3)

WITH SOME NATIVE TREES

RESOURCE CONSENT

PROPOSED 2.5m WIDE SHARED PATH

APPENDIX 2 LANDER GEOTECHNICAL CONSULTANTS LIMITED AND LDE LIMITED DRAWINGS



Drury Fault (approx. location) Approx. area of uncertified fill dentified in July 2021. Exact area, contents and depth currently being determined by Focus Environemntal S1b **S1b - Zone 1: Peat** (Undifferentiated Alluvium; Q1al)

Green circles and crosses

are various existing tests

from NZGS database

THICKNESS OF INORGANIC CRUST INDICATED IN [BRACKETS] IN METRES. ALL TESTS IN S1b MATERIALS HAVE 0m CRUST THICKNESS.

S3a - Zone 2: Residual Clays/Silts (East Coast Bays Formation; Mwe)

S1a - Zone 1: Crust material (Undifferentiated Alluvium; Q1al).

S2a - Zone 2: Overconsolidated Clays/Silts (Upper) (Puketoka

Legend and/or Notes:

Trial Pit (TP) [Lander 2021]

Machine Borehole (MH)

Cone Penetration Test (CPT) [Lander 2021] Dilatometer Test (DMT)

Hand Auger Borehole (HA) [Lander 2021]

Falling Head Percolation

Cone Penetration Test (CPT) [Initia 2022]

Geotechnical Cross Section

Test [Lander 2021]

[Lander 2021]

[Lander 2021]

Study Area

Alignment

SOURCE: NZGS Database, existing tests as green circles or crosses

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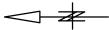
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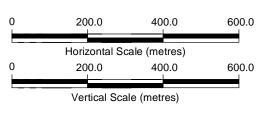
Formation; Pup)





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from NZGS database

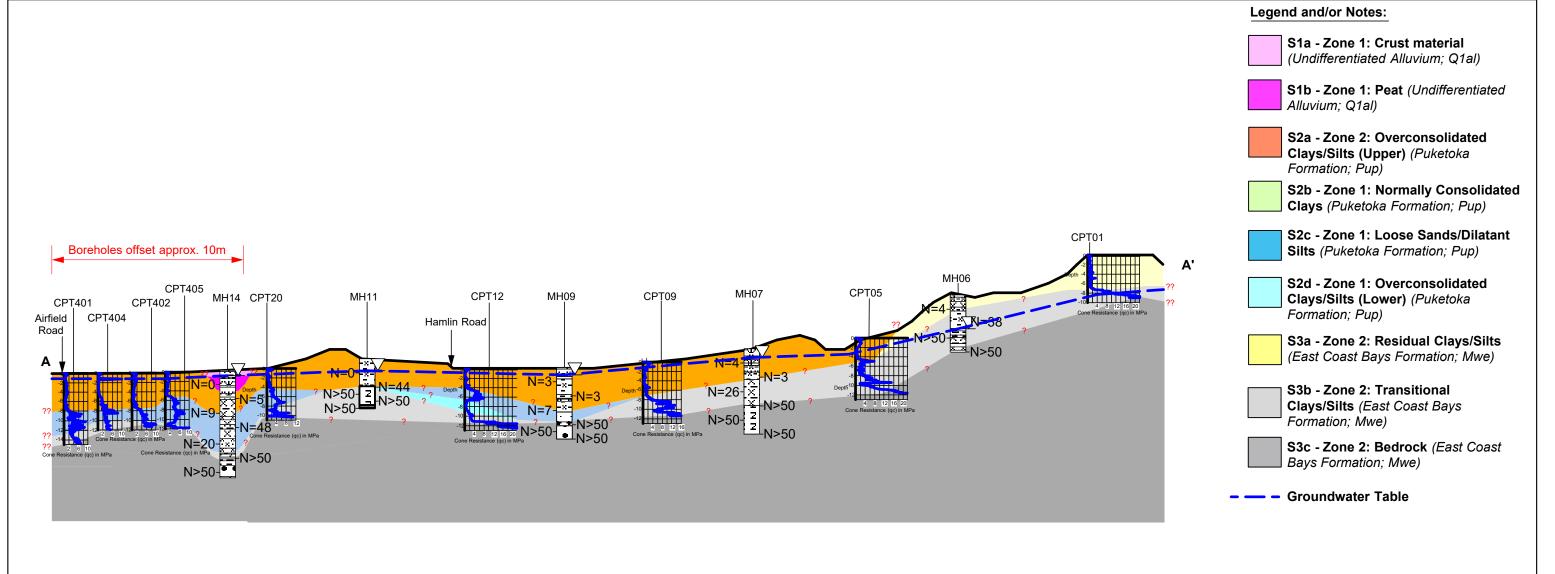
MEASURED GROUNDWATER LEVELS WITHIN STANDPIPES ON MONITORING DATES INDICATED IN [BRACKETS]

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project: SUNFIELDS, ARDMORE

project no: J01627 figure no: 2.2

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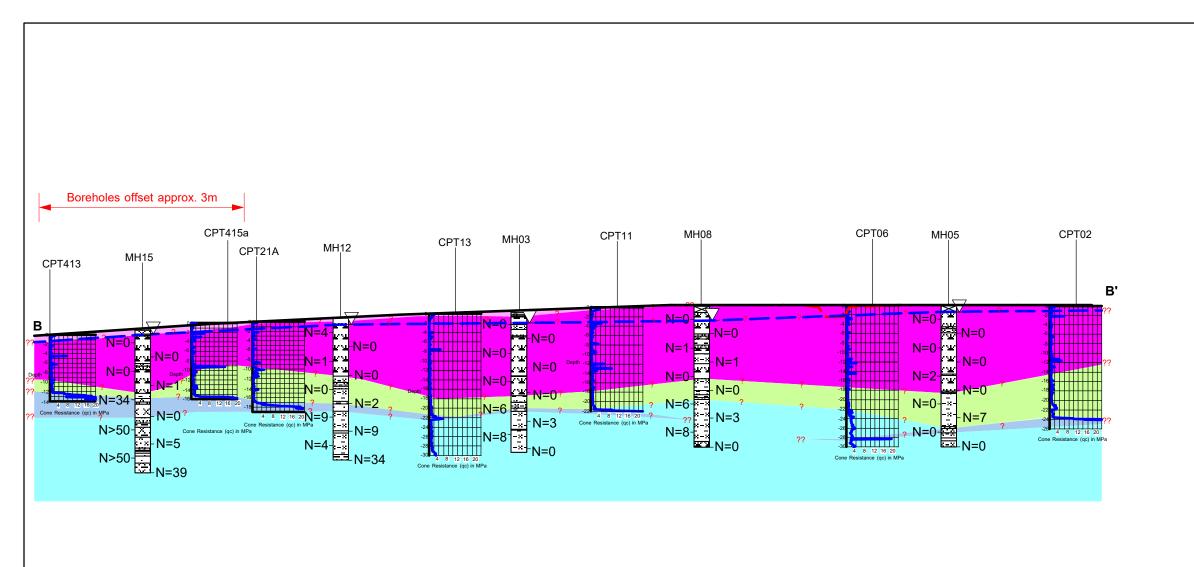
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Legend and/or Notes: S1a - Zone 1: Crust material (Undifferentiated Alluvium; Q1al) S1b - Zone 1: Peat (Undifferentiated Alluvium; Q1al) S2a - Zone 2: Overconsolidated Clays/Silts (Upper) (Puketoka Formation; Pup) S2b - Zone 1: Normally Consolidated Clays (Puketoka Formation; Pup) S2c - Zone 1: Loose Sands/Dilatant Silts (Puketoka Formation; Pup) S2d - Zone 1: Overconsolidated Clays/Silts (Lower) (Puketoka Formation; Pup) S3a - Zone 2: Residual Clays/Silts (East Coast Bays Formation; Mwe) S3b - Zone 2: Transitional Clays/Silts (East Coast Bays Formation; Mwe) S3c - Zone 2: Bedrock (East Coast Bays Formation; Mwe) Groundwater Table

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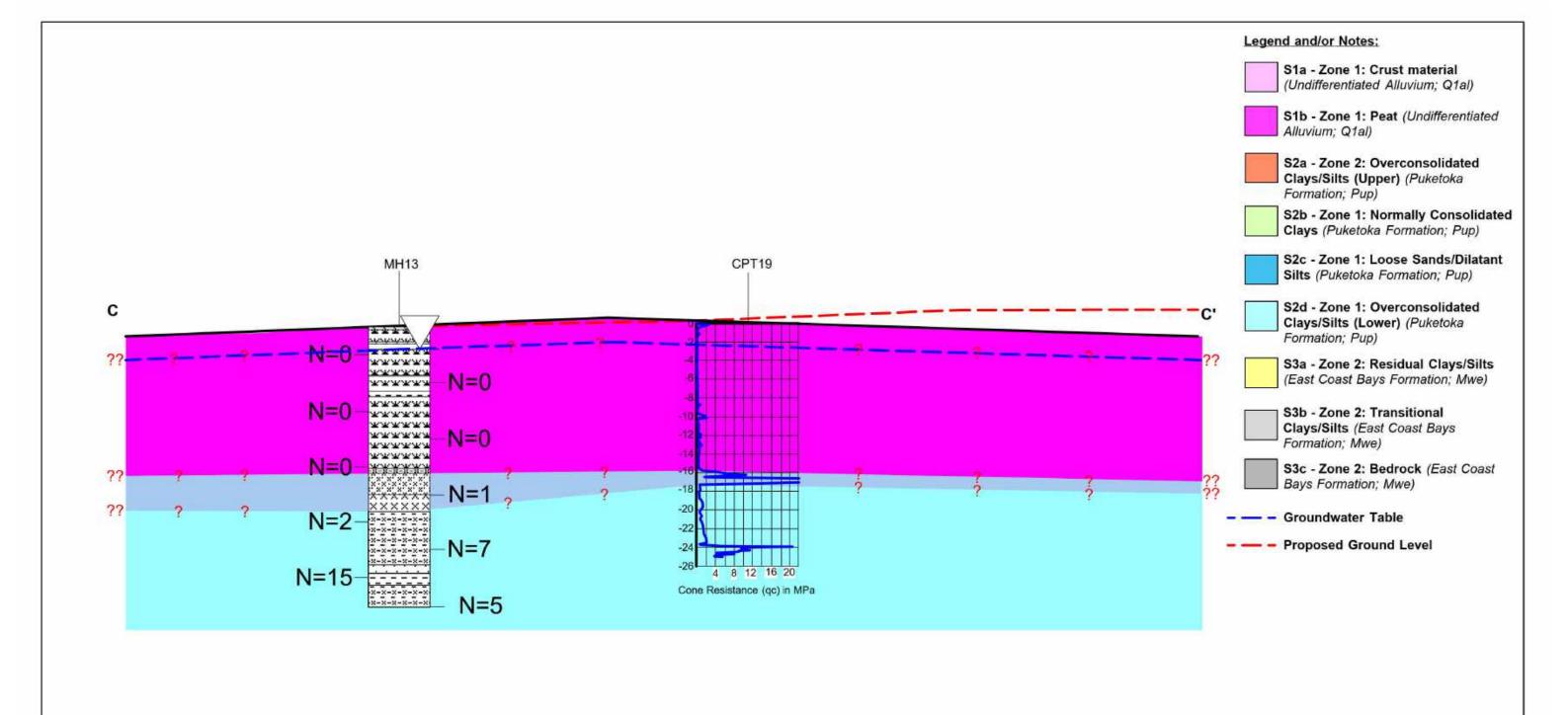
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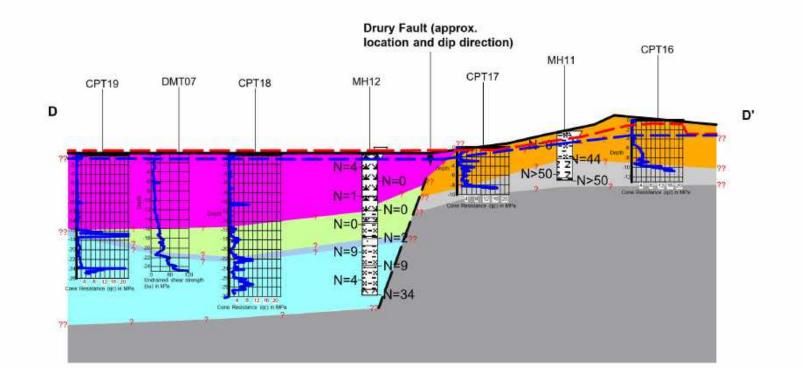


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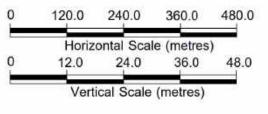
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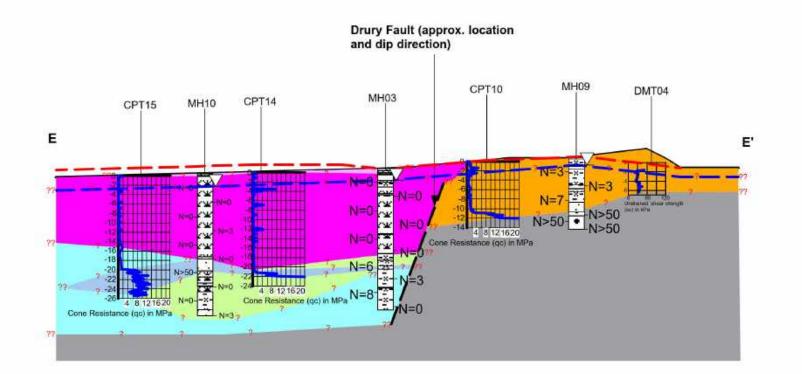


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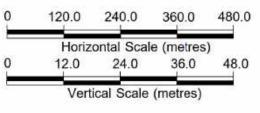
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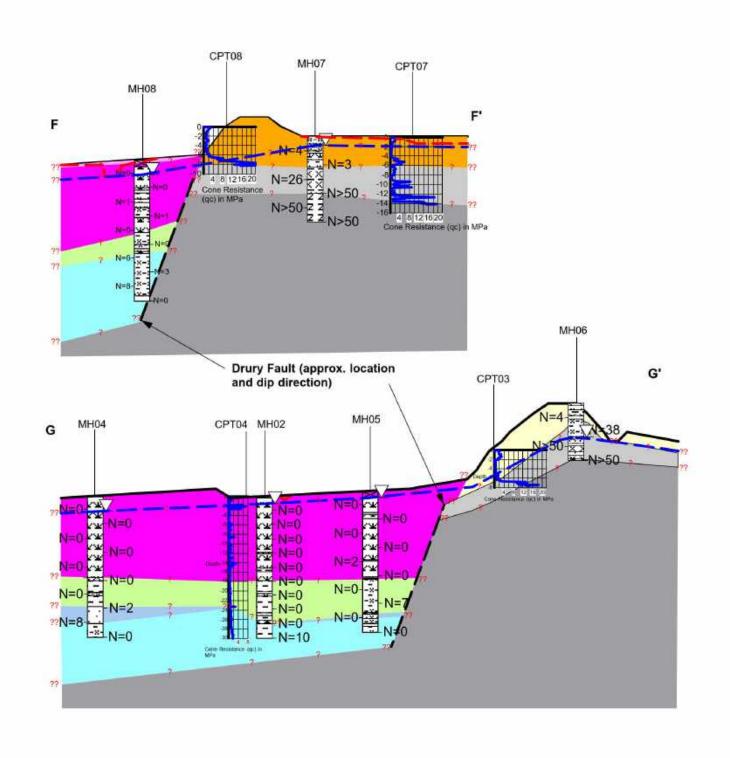
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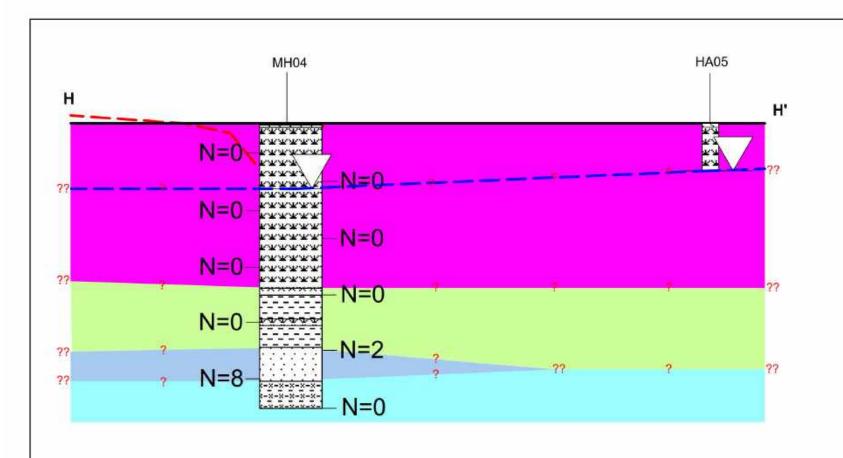
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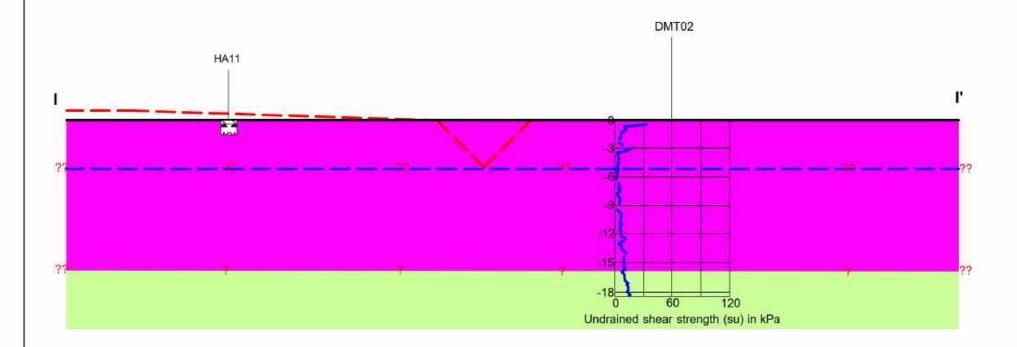
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- - Groundwater Table

Bays Formation; Mwe)

- - Proposed Ground Level

S1a - Zone 1: Crust material

(Undifferentiated Alluvium; Q1al)

S2a - Zone 2: Overconsolidated Clays/Silts (Upper) (Puketoka

Clays (Puketoka Formation; Pup)

Silts (Puketoka Formation; Pup)

S2d - Zone 1: Overconsolidated Clays/Silts (Lower) (Puketoka

S3a - Zone 2: Residual Clays/Silts (East Coast Bays Formation; Mwe)

S3c - Zone 2: Bedrock (East Coast

S3b - Zone 2: Transitional Clays/Silts (East Coast Bays

S1b - Zone 1: Peat (Undifferentiated

S2b - Zone 1: Normally Consolidated

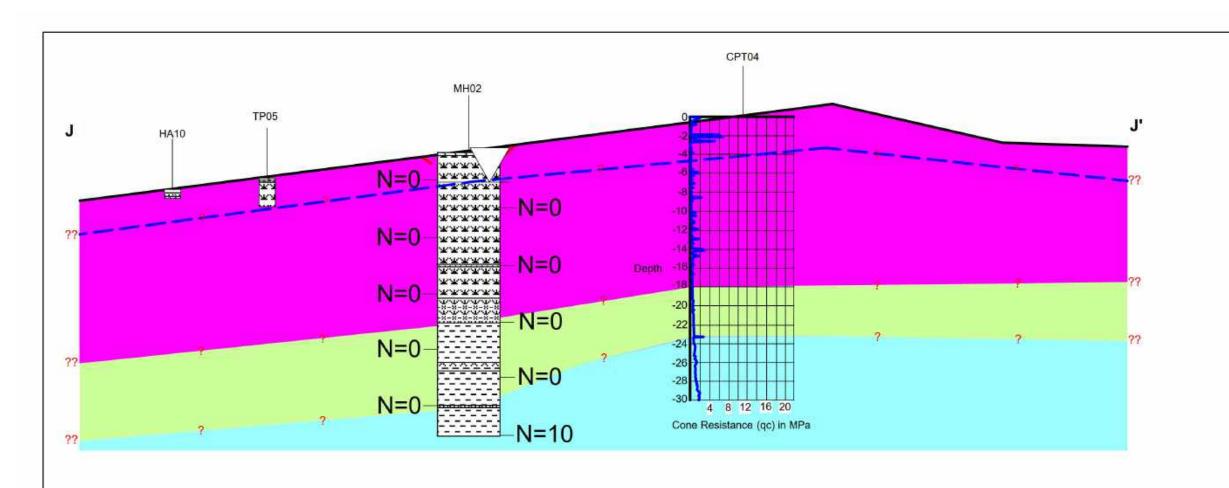
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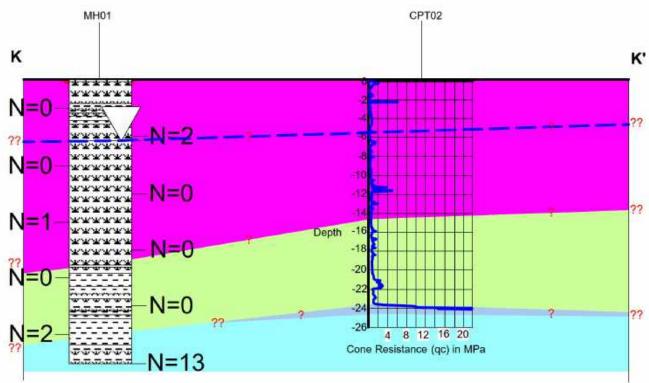
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- - Groundwater Table

- - Proposed Ground Level

Bays Formation; Mwe)

S1a - Zone 1: Crust material

(Undifferentiated Alluvium; Q1al)

S2a - Zone 2: Overconsolidated

Clays (Puketoka Formation; Pup)

Silts (Puketoka Formation; Pup)

S2d - Zone 1: Overconsolidated Clays/Silts (Lower) (Puketoka

S3a - Zone 2: Residual Clays/Silts (East Coast Bays Formation; Mwe)

S3c - Zone 2: Bedrock (East Coast

S3b - Zone 2: Transitional

Clays/Silts (East Coast Bays

Clays/Silts (Upper) (Puketoka

S1b - Zone 1: Peat (Undifferentiated

S2b - Zone 1: Normally Consolidated

S2c - Zone 1: Loose Sands/Dilatant

description

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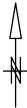
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simple_nam: Neogene sedimentary rocks

key, name: East Coast Bays Formation of Warkworth Subgroup (Wailemata Group)

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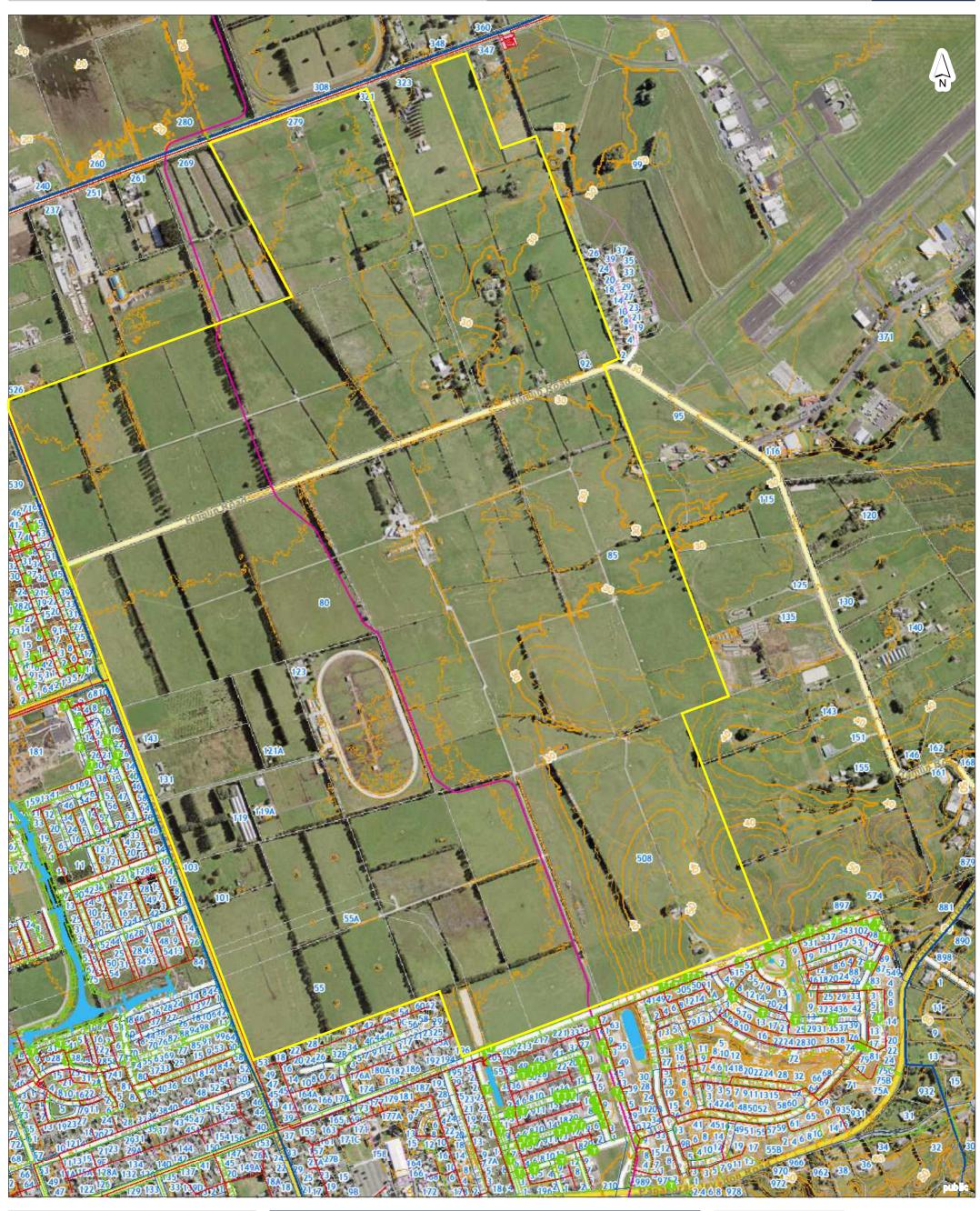
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Auckland Council Map



DISCLAIMER:

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Sunfields Study Area





Wastewater Stormwater Pipe Water Structure (Transmission) Fibre Optic Cable - ARTA Public - Rising Main Secondary Arterial Road Under Construction Water Reservoir (Transmission) Local Network Public - Gravity Mains Fibre Optic Cable - ARTA Public - Subsoil Drain Primary Arterial Road Wastewater Pipe GIS ID Label (Local) Water Reservoir (Transmission) Address Private - Gravity Mains Stormwater Abandoned Connection Primary Arterial Road Under Construction Wastewater Pipe GIS ID Label (Local) Water Source (Transmission) Address KiwiRail, Gravity Mains Public Wastewater Pipe (Local) Collector Road Water Source (Transmission) Contours 2016 Septic Tank Public - Culvert/Tunnel Operational Collector Road Under Construction Other Watercare Assets Contours 0m Œ Public - Hi-Tech Private - Culvert/Tunnel Other Watercare Linear Assets Operational Not Vested - Contours 0m Local Road Private - Hi-Tech Other Watercare Linear Assets KiwiRail, Culvert/Tunnel; KiwiRail, In Service, Culvert Contours 2m Intervals Abandoned / Not Operational Local Road Under Construction Public - Other Other Watercare Structures and Areas Contours 100m Wastewater Structure (Local) Public - Rising Main Property Other Watercare Structures and Areas Contours 100m (3) Wastewater Other Structure (Local) Private - Other Private - Rising Main Property Other Non Watercare Contours 50m Stormwater GPS Wastewater Other Structure (Local) Rate Assessment Public - Subsoil Drain Non Watercare Pipe **GPS Location (NorthShore)** Contours 50m Wastewater Pump Station (Local) Rate Assessment Private - Subsoil Drain Non Watercare Pine GPS Location (NorthShore) Contours 10m Wastewater Pump Station (Local) Parcels **Stormwater Connection** Asbuilt Area Contours 10m **GPS Survey (North Shore) Transmission Network** Parcels Public Asbuilt Area Wastewater Pipe (Transmission) GPS Survey (North Shore) Contours 2m Coastline Transpower Water Contours 2m Operational Aerial 2019 2020 Rural **Transpower Pylons Local Network** Stormwater Channel Place Names Operational Not Vested **Image** Water Pipe (Local) Transpower Pylons Place Name (25,000) Public lined Red: Band_1 Abandoned/ Not Operational Operational (Non-Potable) **Transpower Sites** Place Name (25,000) Public Watercourse Wastewater Structure (Transmission) Green: Band_2 Transpower Sites Operational (Potable) Public Open Space Names (8,000) Stormwater Private Watercourse Blue: Band_3 **Electricity Transmission Lines** Public Open Space Names (8,000) Operational Not Vested **Stormwater Treatment Device** Stormwater Pump Station Aerial 2022 Rural 110 kv **Place Name Search** Public Abandoned / Not Operational Public **Image** Place Name Search 220 kv 0 Private Water Structure (Local) Red: Band 1 Private **Rail Stations** Stormwater Pond or Wetland Components Stormwater Planting Water Other Structure (Local) 400 kv Green: Band 2 Rail Stations (8,000) Water Other Structure (Local) Stormwater Forebay **LGP Pipeline** Public Rail Stations (8,000) Blue: Band_3 Public Water Pump Station (Local) LGP Pipeline Aerial 2017 Urban Railway Lines Private Water Pump Station (Local) Aviation JetA1 Fuel Pipeline Private lmage Railway (25,000) Stormwater Erosion And Flood Control Aviation JetA1 Fuel Pipeline Water Reservoir (Local) Stormwater Treatment Facility -- Railway (25,000) Red: Band_1 Public - Wall Structure Water Reservoir (Local) **Gas Transmission Lines** Public **Auckland Council Boundary** Green: Band_2 Private - Wall Structure **Transmission Network** Gas Transmission Lines Private Auckland Council Boundary Blue: Band 3 Water Fitting (Transmission) Public - Other Structure High Pressure Gas Pipelines **Stormwater Watercourse** Roads Water Pipe (Transmission) Aerial 2010 2011 Rural High Pressure Gas Pipelines Private - Other Structure Public Roads (8,000) Operational (Non-Potable) **Image** Medium-Pressure Gas Pipeline Stormwater Abandoned Assets Motorway Red: Band_1 Operational (Potable) Stormwater Abandoned Pipe Medium-Pressure Gas Pipeline Stormwater Pipe SAP ID label Motorway Under Construction Green: Band_2 Public - Gravity Mains Not Operational RNZ Liquid Fuels Pipeline Marsden to Wiri Stormwater Pipe SAP ID label Secondary Arterial Road RNZ Liquid Fuels Pipeline Marsden to Wiri Blue: Band_3 Public - Culvert/Tunnel Proposed

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APPENDIX 3 FIELD INVESTIGATION RECORDS



APPENDIX 3.1 GEOTECHNICAL MODEL SUMMARY



Table 3.1. Geotechnical Model Summary.

Stratum ID / Geology	Soil Material Type	In-Situ Test	Parameters -	- typical rar	nge & [average]
S1: Undifferentiated Alluvium S2: Puketoka Formation S3: East Coast Bays Formation					
		Su	N-value	q_c	m _v
S1a: Crust material	Inorganic and organic stained silty CLAY/clayey SILT.	40-217 [76]	-	0.5-4.0 [1.3]	
S1b: Peat	Fibrous PEAT. Some beds of amorphous PEAT, CLAY, dilatant pumiceous SILT.	1-147 [30]	0-4	0-1.1 [0.35]	1.1x10 ⁻² - 4.0 [1.2]
S2a: Over-consolidated Clays/Silts	Inorganic or organic stained silty CLAY/clayey	49 - 270+	0-4	0.1-3.0	2.1x10 ⁻² - 0.5
(Upper)	SILT. Some beds of organic silty CLAY/clayey SILT.	[67]	[3]	[1.3]	[0.2]
S2b: Normally-consolidated Clays	Inorganic and organic CLAY. Some beds of dilatant pumiceous SILT, fibrous and amorphous PEAT.	8-77 [38]	0-7 [0]	0.3-1.7 [1.3]	7.0x10 ⁻² - 0.5 [2.7x10 ⁻²]
S2c: Loose Sands/Dilatant Silts	Dilatant pumiceous SILT, clayey SAND, silty SAND.	17-32 [25]*	1-50 [2]	3.0-35 [7.8]	3.2x10 ⁻³ - 0.3 [2.6x10 ⁻²]
S2d: Over-consolidated Clays/Silts (Lower)	Inorganic and organic stained CLAY/silty CLAY. Some beds of fibrous PEAT, SAND	37-200 [83]	0-34 [7]	0.8-2.8 [2.1]	(#)
S3a: Residual Soils	Inorganic silty CLAY/clayey SILT.	101-270+ [178]	4	0.6-1.9 [1.3]	7.4x10 ⁻³ - 3.5x10 ⁻² [3.0x10 ⁻²]
S3b: Transitional Soils	Inorganic silty CLAY/clayey SILT, fine SAND. Some beds of highly to completely weathered interbedded SILTSTONE and SANDSTONE.	162-270+ [230]	26-50+ [45]	3.1-30.3 [7.1]	6.1x10 ⁻³ - 8.3x10 ⁻³ [6.9x10 ⁻³]
S3c: Bedrock	Slightly to completely weathered SANDSTONE		50+	(4)	

^{*:} peak undrained shear strengths only related to clayey SAND layers.

J01627 - Sunfields Development, Ardmore

Standing Groundwater Level

Technician: JM

Table 3.2. Groundwater monitoring summary

Borehole No.	GW encountered (m below existing ground level)	Standing GWL (m below existing ground level)	Piezometer screen (m below existing ground level)	Date measured
HA01	-	-	-	12.04.21
HA02	-	-	-	12.04.21
HA03	-	-	-	12.04.21
HA04	1.2	2.8	-	12.04.21
HA05	2.8	4.5	-	12.04.21
HA06	-	-	-	12.04.21
HA07	-	-	-	12.04.21
HA08	-	н	-	12.04.21
HA09	-	-	-	12.04.21
HA10	-	-	-	12.04.21
HA11	-	-	-	12.04.21
HA12	3.3	3.8	-	12.04.21
HA13	-	-	-	12.04.21
HA14	2.0	2.2	-	12.04.21
HA15	-	-	-	12.04.21
HA16	2.2	4.0	-	13.04.21
HA17	1.4	1.8	-	13.04.21
HA18	1.5	1.5	-	14.04.21
HA19	-	-	-	14.04.21
HA20	-	-	-	14.04.21
HA21	3.1	3.7	-	15.04.21
HA22	3.1	3.5	-	12.04.21
HA23	1.9	1.9	-	14.04.21
HA24	-	-	-	14.04.21
HA25	2.3	1.5	-	12.04.21
HA26	1.9	1.8	-	12.04.21

Borehole No.	GW encountered (m below existing ground level)	Standing GWL (m below existing ground level)	Piezometer screen (m below existing ground level)	Date measured
HA27	2.0	1.9	-	14.04.21
HA28	-	-	-	20.04.21
HA29	-	-	-	12.04.21
HA30	1.4	1.5	-	14.04.21
HA31	2.0	1.9	-	12.04.21
HA32	0.6	1.8	-	12.04.21
HA33	-	-	-	12.04.21
HA34	-	-	-	12.04.21
HA35	-	-	-	15.12.23
HA36	3.5	4.2	-	15.12.23
HA37	1.4	2.0	-	15.12.23
HA38	1.5	4.2	-	15.12.23
HA39	1.4	1.0	-	15.12.23
HA40	1.0	0.7	-	15.12.23
HA41	1.0	1.2	-	15.12.23
MH01	N/A	1.66, 1.05, 1.61, 1.73	1.0 - 30.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH02	N/A	1.57, 0.50, 0.92	1.0 - 30.0	30.04.21, 30.07.21, 17.01.22
MH03	N/A	2.63, 2.10, 2.09, 1.98	1.0 - 30.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH04	N/A	3.37, 0.60, 2.92, 3.30	1.0 - 30.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH05	N/A	1.46, 0.50, 0.52, 1.00	1.0 - 30.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH06	N/A	7.17, 3.50, 4.26, 5.68	1.0 - 12.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH07	N/A	1.87, 0.60, 0.56, 0.72	1.0 - 18.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH08	N/A	3.23, 3.45, 3.39, 3.37	1.0 - 30.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH09	N/A	1.55, 0.40, 0.39, 0.91	1.0 - 15.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH10	N/A	2.69, 1.00, 0.97, 2.43	1.0 - 30.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH11	N/A	2.54, 0.20, 0.32, 1.28	1.0 - 10.5	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH12	N/A	1.30, 1.20, 1.17, 1.44	1.0 - 30.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH13	N/A	1.26, 0.60, 0.63, 1.03	1.0 - 30.0	30.04.21, 30.07.21, 27.10.21, 17.01.22
MH14	N/A	1.15	1.0 - 23.0	09.02.23
MH15	N/A	1.16	1.0 - 30.5	09.02.23

Borehole No.	GW encountered (m below existing ground level)	Standing GWL (m below existing ground level)	Piezometer screen (m below existing ground level)	Date measured
TP01	1.2	N/A		13.04.21
TP02	2.7	N/A	-	13.04.21
TP03	2.4	N/A	-	13.04.21
TP04	2.7	N/A	-	13.04.21
TP05	2.3	N/A	-	13.04.21
TP06	2.0	N/A	-	13.04.21
TP07	1.6	N/A	-	13.04.21
TP08	-	N/A	-	13.04.21

APPENDIX 3.2 MACHINE BOREHOLE RECORDS



Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH01 Project Location: SUNFIELDS ARDMORE Sheet 1 of 4 Vane Head: Logged By: Processor Start Date: 07.04.21 Job Number: J01627 2153 JM Finish Date: 07.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Borehole Stratigraphy Piezometer Vane Dial / Sensitivity & SPT RQD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) DEFECTS CORE DESCRIPTION TOPSOIL Tube Lockable toby fibrous PEAT, dark brown/black. Firm, moist, low to medium Triple 1 Bentonite seal 65 1.0 - becoming high plasticity, moderately sensitive 27/8 - 3.4 1.5 Groundwater level measured 30.04.21: 1.66m 2.0 Sample 1 Disturbed 1.9-2.4m 84 organic stained CLAY, brown. Soft, moist, high plasticity 3.0 SPTat Undifferentiated Alluvium 3.0-3.45m SPT CLAY, light grey/green. Soft, moist, high plasticity, with trace 0/0/0 Gravel backfill _ organic inclusions N=0 3.5 organic stained CLAY, brown. Soft, moist, high plasticity Piezometer with moderately thin bed of fibrous PEAT screened from 1.0m to 30.0m CLAY, light grey/green. Soft, moist, high plasticity, with trace Sample 2 _rootlets 89 4.0 Disturbed 3.8-4.25m organic stained CLAY, dark brown. Soft, moist, high plasticity, sensitive, with trace rootlets 17/3 - 5.7 4.5 fibrous PEAT, dark brown/black. Soft, moist, medium plasticity 5.0 54 with coarse gravel sized tree gum inclusion 5.5 6.0 SPTat SPT 6.0-6.45m 0/1/1 N=2 6.5 -becoming low plasticity 65 7.0 becoming moderately sensitive 14/5 - 2.8 7.5 95 Sandstone Drilling Fluid: Comments: Topsoil Plutonic water Fill Siltstone No Core LANDER Checked: Clay RG Driller: Rig: Silt Drillforce Pumice Truck Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH01 Project Location: SUNFIELDS ARDMORE Sheet 2 of 4 Vane Head: Logged By: Processor Start Date: 07.04.21 Job Number: J01627 2153 JM JM Finish Date: 07.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Borehole Vane Dial / Sensitivity & SPT Stratigraphy Piezometer 8 Recovery (Location: Description: Refer to site plan Orientation: vertical ROD Depth E **DEFECTS** CORE DESCRIPTION Triple Tube Sample 3 pumiceous SILT, light brown/white. Loose, moist, no plasticity, Disturbed dilatant 8.2-8.4m fibrous PEAT, dark brown/black. Soft, moist, low plasticity 8.5 95 becoming medium plasticity 12/5 - 2.4 SPT at 9.0-9.45m becoming moderately sensitive 9.0 SPT with thin bed of light brown/white dilatant purisceous SILT 0/0/0 N=0 9.5 with thin bed of light brown/white dilatant pumiceous SILT with thin bed of light brown/white dilatant pumiceous SILT 53 10.0 -becoming sensitive 10.5 17/3 - 5.7 11.0 Undifferentiated Alluvium 51 Gravel backfill Screened from 1.0m to 30.0m becoming moderately sensitive 12.0 17/5 - 3.4 SPTat SP 12.0-12.45m 0/0/0 with thin bed of light brown fine SAND N=0 12.5 0 13.0 57 14/2 - 7.0 becoming sensitive 15.0 SPTat 15.0-15.45m SP 0/1/0 N=1 15.5 73 Sandstone Drilling Fluid: Plutonio Comments: Topsoil Sand water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH01 Project Location: SUNFIELDS ARDMORE Sheet 3 of 4 Vane Head: Logged By: Processor Start Date: 07.04.21 Job Number: J01627 2153 JM JM Finish Date: 07.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Borehole Stratigraphy Piezometer Vane Dial / Sensitivity & SPT ROD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) DEFECTS CORE DESCRIPTION Triple Tube 73 Undifferentiated Alluvium 00 becoming firm, moderately sensitive 31/9 - 3.4 SPTat SPT 18.0-18.45m 0/0/0 N=0 001 19.0 Gravel backfill becoming very soft 6/2 - 3.0Screened from CLAY, brown mottled light grey. Soft, moist, high plasticity, 1.0m to 30.0m with minor organic staining organic CLAY, dark grey/brown. Soft, moist, high plasticity 20.0 95 CLAY, light grey. Firm, moist, high plasticity, sensitive 20.5 with moderately thin bed of brown CLAY with minor organic 36/8 - 4.5 SPTat with moderately thin bed of brown CLAY with minor organic staining Formation SP 21.0-21.45m 0/0/0 becoming lightgrey/green N=0 "silty CLAY with trace fine sand, grey/green. Hard, moist, high 00 22.0 becoming medium plasticity, with minor fine to medium sand - 22.5 UTP pumiceous SILT, white. Loose, moist, no plasticity, dilatant 23.0 organic CLAY, dark grey/brown. Firm, moist, high plasticity 11 23.5 - organic stained CLAY, brown. Firm, moist, high plasticity Drilling Fluid: Sandstone Comments: Topsoil Sand Plutonio water Siltstone No Core Fill LANDER Checked: Clay Limestone RG Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH01 Project Location: SUNFIELDS ARDMORE Sheet 4 of 4 Vane Head: Logged By: Processor Start Date: 07.04.21 Job Number: J01627 2153 JM JM Finish Date: 07.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Borehole Stratigraphy Piezometer Vane Dial / Sensitivity & SPT 8 Recovery (Location Description: Refer to site plan Orientation: vertical ROD (E) **DEFECTS** CORE DESCRIPTION SPTat Triple Tube 24.0-24.45m SPT organic CLAY, dark grey/brown. Firm, moist, medium to high 0/0/0 plasticity, with minor woody inclusions N=0 organic stained CLAY, brown. Firm, moist, high plasticity, with trace organic inclusions CLAY, light grey. Firm, moist, high plasticity, with trace organic inclusions at 24.55m, becoming grey/brown, with minor organic staining 8 organic CLAY, dark grey/brown. Firm, moist, medium to high 25.0 plasticity, with trace woody inclusions CLAY, light grey/green. Soft, moist, high plasticity, moderately 21/8 - 2.6 25.5 26.0 100 Formation 26.5 Sample 4 Disturbed Puketoka 26.6-27.0n 101/21 - 4.8 becoming very stiff, sensitive SPT at 27.0-27.45m SPT 0/0/2 Gravel backfill N=2 - 27.5 Screened from 1.0m to 30.0m 00 28.0 organic stained CLAY, grey/brown. Stiff, moist, high plasticity 28.5 29.0 8 29.5 at 29.8m, becoming brown, with minor woody inclusions CLAY, light grey/green. Stiff, moist, high plasticity, moderately sensitive 83/22 - 3.8 EOB at 30.0m. Target Depth. **SPT at** SPT 30.0-30.45m 2/6/7 N=13 - 30.5 31.0 31.5 Sandstone Drilling Fluid: Comments: Topsoil Sand Plutonio water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Driller: Rig: Silt Drillforce Pumice Truck Volcanic









27.8-30.45m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH01-B
	Ardmore	compiled:	date:
title:	MH01 Photo Summary - 24.8-30.45m	JM	07.04.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH02** Project Location: SUNFIELDS ARDMORE Sheet 1 of 4 Vane Head: Logged By: Processor Start Date: 08.04.21 Job Number: J01627 2153 JM JM Finish Date: 09.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Borehole Stratigraphy Piezometer Vane Dial / Sensitivity & SPT RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth **DEFECTS** CORE DESCRIPTION TOPSOIL **Triple Tube** Lockable toby 52 - fibrous PEAT, black. Firm, moist, medium to high plasticity Bentonite seal 0.5 2 with thin bed of light grey/brown, loose, dilatant puriceous SILT 1.0 Sample 1 Disturbed 8 0.9-1.5m Groundwater level 1.5 measured 30.04.21: becoming dark brown 2.0 with moderately thin buried log 45 2.5 3.0 SPT at 3.0-3.45m SPT Undifferentiated Alluvium 0/0/0 Gravel backfill N=0 3.5 Screened from 1.0m to 30.0m 4.0 0 4.5 5.0 0 5.5 6.0 SPTat SPT 6.0-6.45m 0/0/0 N=0 6.5 with very thin bed of light grey/brown, loose, dilatant pumiceous SILT 50 7.0 75 at 7.9m, with moderately thin bed of light grey/brown, loose, dilatant pumiceous SILT Sandstone Drilling Fluid: Comments: Topsoil Plutonic water Fill Siltstone No Core LANDER Checked: Organic Clay Limeston Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH02** Project Location: SUNFIELDS ARDMORE Sheet 2 of 4 Vane Head: Logged By: Processor Start Date: 08.04.21 Job Number: J01627 2153 JM JM Finish Date: 09.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Borehole Vane Dial / Sensitivity & SPT Stratigraphy Piezometer RQD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION Triple Tube with thin buried log 8.5 75 becoming very soft, moderately sensitive 9.0 8/3 - 2.7 SPTat SPT 9.0-9.45m 0/0/0 N=0 9.5 47 10.0 10.5 11.0 83 Undifferentiated Alluvium Gravel backfill with thin buried log Screened from 1.0m to 30.0m Sample 2 Disturbed pumiceous SILT, light grey/brown. Loose, moist, no plasticity, extra sensitive, dilatant 11.75-27/2 - 13.5 SPT at 12.05m fibrous PEAT, dark brown/black. Firm, moist, medium 12.0-12.45m SPT 0/0/0 N=0 12.5 62 13.0 62 15.0 SPTat 15.0-15.45m SP organic CLAY, grey/brown. Firm, moist, high plasticity, with 0/0/0 trace woody inclusions, with thin buried log N=0 0 fibrous PEAT, dark brown/black. Firm, moist, low to medium plasticity, with thin buried log Sandstone Drilling Fluid: Plutonia Comments: Topsoil water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH02** Project Location: SUNFIELDS ARDMORE Sheet 3 of 4 Vane Head: Logged By: Processor Start Date: 08.04.21 Job Number: J01627 2153 JM JM Finish Date: 09.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Borehole Stratigraphy Piezometer Vane Dial / Sensitivity & SPT ROD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION Triple Tube 0 ferentiated Alluvium 17 CLAY, light grey/green. Firm, moist, high plasticity SPTat 8.0-18.45m SPT 0/0/0 N=0 18.5 001 19.0 Sample 3 Disturbed Gravel backfill 19.1-19.5m 19.5 Screened from 1.0m to 30.0m with trace brown organic staining 20.0 100 pumiceous SILT, light brown. Loose, moist, no plasticity,
 dilatant
 with moderately thin bed of light yellow/white pumiceous clayey SILT 20.5 fine sandy SILT, light yellow/green. Loose, moist, no plasticity 22/3 - 7.3 pumiceous fine sandy SILT, white. Loose, moist, no plasticity, 21.0 sensitive, dilatant, with minor black organic inclusions to SPTat SP 21.0-21.45m CLAY, light grey/green. Firm, moist, high plasticity 0/0/0 N=0 8 22.0 with thin bed of brown organic stained CLAY, with trace -22.5 49/24 - 2.0 organic inclusions - at 22.5m, becoming moderately sensitive with thin bed of brown organic stained CLAY at 23.1m, with thin buried log 23.0 45 23.5 Sandstone Drilling Fluid: Comments: Topsoil Plutonio water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Rig: Driller: Silt Drillforce Pumice Truck Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH02** Project Location: SUNFIELDS ARDMORE Sheet 4 of 4 Vane Head: Logged By: Processor Start Date: 08.04.21 Job Number: J01627 2153 JM JM Finish Date: 09.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Borehole Vane Dial / Sensitivity & SPT Stratigraphy Piezometer ROD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth (E) DEFECTS CORE DESCRIPTION SPTat Triple Tube 24.0-24.45m SPT 0/0/0 N=0 organic CLAY, brown. Firm, moist, high plasticity, with trace organic inclusions 8 25.0 CLAY, light grey/green. Firm, moist, high plasticity 25.5 26.0 with moderately thin bed of brown organic stained CLAY 90 fibrous PEAT, dark brown/black. Stiff, moist, low plasticity Puketoka Formation - 26.5 96/27 - 3.6 CLAY, light grey/green. Stiff, moist, high plasticity, moderately sensitive, with minor fibrous organic inclusions SPTat 27.0-27.45m SPT 0/0/0 with trace organic inclusions Gravel backfill N=0 27.5 Screened from 1.0m to 30.0m 100 28.0 28.5 - with trace fine sand Sample 4 Disturbed 29.0 28.8-29.2n 00 becoming medium to high plasticity, with minor fine sand becoming medium plasticity, with some fine sand 1/30 - 2.4 EOB at 30.0m. Target Depth. SPTat 30.0-30.45m SPT 4/4/6 N=10 - 30.5 31.0 31.5 Sandstone Drilling Fluid: Comments: Topsoil Sand Plutonio water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone Driller: Rig: Silt Drillforce Truck Pumice Volcanic





29.4-30.0m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH02-B
	Ardmore	compiled:	date:
title:	MH02 Photo Summary - 29.4-30.0m	JM	08,04,21-09,04,21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **МН03** Project Location: SUNFIELDS ARDMORE Sheet 1 of 4 Vane Head: Logged By: Processor Start Date: 13.04.21 Job Number: J01627 1900 RG JM Finish Date: 14.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Stratigraphy Borehole Piezometer Vane Dial / Sensitivity & SPT 8 Recovery (Location Description: Refer to site plan Orientation: vertical ROD **DEFECTS** CORE DESCRIPTION TOPSOIL **Friple Tube** Lockable toby Bentonite seal 0.5 clayey SILT, orange speckled brown. Stiff, moist, low plasticity, with trace rootlets 8 Sample 1 silty CLAY, orange mottled light brown/grey. Stiff, moist, high -1.0 Disturbed plasticity, with trace limonite 0.9-1.2m organic silty CLAY, dark brown. Stiff, moist, high plasticity fibrous PEAT, dark brown/black. Firm, moist to wet, low to 1.5 medium plasticity 2.0 93 2.5 Groundwater level measured 30.04.21: 2.63m 3.0 pumiceous SILT, black speckled light grey. Very loose, moist, low plasticity, with minor organic inclusions SPTat SPT 3.0-3,45m Undifferentiated Alluvium 0/0/0 Gravel backfill becoming grey N=0 3.5 Screened from 1.0m to 30.0m becoming light brown/grey Sample 2 Disturbed 90 4.0 3.8-4.0m fibrous PEAT, dark brown. Firm, moist to wet, low plasticity 4.5 5.0 59 clayey SILT, grey. Soft, wet, low plasticity 5.5 fibrous PEAT, dark brown. Firm, moist to wet, low plasticity 6.0 SPTat SPT 6.0-6.45m 1/0/0 N=0 6.5 86 7.0 7.5 100 8 Sandstone Drilling Fluid: Comments: Topsoil Plutonic water Fill Siltstone No Core LANDER Checked: Clay Limeston RG Rig: Driller: Silt Drillforce Pumice Truck Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **МН03** Project Location: SUNFIELDS ARDMORE Sheet 2 of 4 Vane Head: Logged By: Processor Start Date: 13.04.21 Job Number: J01627 1900 RG JM Finish Date: 14.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Borehole Vane Dial / Sensitivity & SPT Stratigraphy Piezometer 8 Recovery (Location: Description: Refer to site plan Orientation: vertical ROD **DEFECTS** CORE DESCRIPTION Triple Tube 100 8.5 Sample 3 Disturbed 8.7-9.0m 9.0 SPTat SPT 9,0-9,45m 0/0/0 N=0 9.5 8 10.0 10.5 00 Gravel backfill **Undifferentiated Alluvium** 100 Screened from 1.0m to 30.0m 12.0 SPTat 12.0-12.45m SPT 0/0/0 N-0 12.5 8 13.0 00 slightly clayey SILT with minor fine sand, orange/brown. Stiff, moist, low plasticity, with minor pyrite flecks - fibrous PEAT, dark brown. Firm, moist, low to medium plasticity, with minor woody inclusions up to 100mm in length 8 15.0 SPTat 15.0-15.45m SP 0/0/0 N=0 100 Sandstone Drilling Fluid: Plutonio Comments: Topsoil water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **МН03** Project Location: SUNFIELDS ARDMORE Sheet 3 of 4 Vane Head: Logged By: Processor Start Date: 13.04.21 Job Number: J01627 1900 RG JM Finish Date: 14.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer ROD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth **DEFECTS** CORE DESCRIPTION Triple Tube 8 Jndifferentiated Alluvium 00 17.5 silty CLAY, black streaked grey. Firm, moist, high plasticity, SPTat with trace organic streaks 18.0-18.45m SPT 0/0/0 N=0 18.5 8 Gravel backfill organic silty CLAY, dark brown. Firm, moist, high plasticity Screened from 1.0m to 30.0m Formation 20.0 00 20.5 pumiceous SILT with some clay, light grey/white. Very dense, moist, low plasticity Sample 4 Disturbed SPTat 20.8-21.3m 21.0-21.11m SPT 50 for 35mm N>50 sity CLAY, brown/grey. Stiff, moist, high plasticity, with trace black organic staining 8 22.0 - 22.5 without organic staining 23.0 100 23.5 with trace fine sand Sandstone Drilling Fluid: Comments: Topsoil Plutonio water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Rig: Driller: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **МН03** Project Location: SUNFIELDS ARDMORE Sheet 4 of 4 Vane Head: Logged By: Processor Start Date: 13.04.21 Job Number: J01627 1900 RG JM Finish Date: 14.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical E **DEFECTS** CORE DESCRIPTION SPTat Triple Tube 24.0-24.45m SPT 0/1/3 00 25.0 clayey SILT with minor fine sand, dark grey. Stiff, moist, low plasticity, with trace organic inclusions, with trace coarse sand to fine gravel sized green silt clast inclusions silty CLAY, light blue/grey. Very stiff, moist, high plasticity, 25.5 with trace coarse sand sized white clast inclusions with trace fine sand, without coarse sand sized white clast - 26.0 100 26.5 SPTat 27.0-27.45m SPT 0/2/5 Gravel backfill N=7 - 27.5 Screened from 1.0m to 30.0m 001 28.0 28.5 without fine sand 29.0 8 29.5 EOB at 30.0m. Target Depth. - 30.5 31.0 31.5 Sandstone Drilling Fluid: Plutonio Comments: Topsoil Sand water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Rig: Driller: Silt Drillforce Truck Pumice Volcanic







0.0-3.45m 3.45-7.8m 7.8-11.1m







11.1-14.2m 14.2-17.1m 17.1-20.2m



client:	Ardmore Developments Limited		project no:	figure no:
project:	Sunfields		J01627	Figure MH03-A
3	Ardmore		compiled:	date:
title:	MH03 Photo Summary - 0.0-20.2m	7	JM	13.04.21-14.04.21



20.2-23.1m



25.8-28.8m



23.1-25.8m



28.8-30.0m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH03-B
	Ardmore	compiled:	date:
title:	MH03 Photo Summary - 23.1-30.0m	JM	13.04.21-14.04.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH04** Project Location: SUNFIELDS ARDMORE Sheet 1 of 4 Vane Head: Logged By: Processor Start Date: 09.04.21 Job Number: J01627 2153 JM JM Finish Date: 12.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Borehole Vane Dial / Sensitivity & SPT Stratigraphy Piezometer RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth **DEFECTS** CORE DESCRIPTION TOPSOIL **Triple Tube** Lockable toby 54 fibrous PEAT, dark brown/black. Firm, moist, medium Bentonite seal ■plasticity ■ at 0.5m, with moderately thick buried log 0.5 57 1.0 œ 1.5 27 Gravel backfill Screened from 2.0 1.0m to 30.0m 83 3.0 SPT at 3.0-3.45m SPT **Undifferentiated Alluvium** Groundwater level 0/0/0 measured 30.04.21: 3.37m N=0 3.5 56 4.0 4.5 5.0 82 5.5 6.0 SPTat SPT 6.0-6.45m 2/0/0 N=0 6.5 with thin bed of light brown/white, dilatant pumiceous fine sandy SILT 100 7.0 - with thin buried log with thin bed of white speckled brown, dilatant fine SAND with 8/5 - 1.6 trace pumiceous inclusions at 7.5m, becoming very soft, insensitive 43 Sandstone Drilling Fluid: Plutonic Comments: Topsoil Sand water Fill Siltstone No Core LANDER Checked: Clay Organic Limeston RG Rig: Driller: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH04** Project Location: SUNFIELDS ARDMORE Sheet 2 of 4 Vane Head: Logged By: Processor Start Date: 09.04.21 Job Number: J01627 2153 JM JM Finish Date: 12.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth **DEFECTS** CORE DESCRIPTION Triple Tube 43 8.5 12/5 - 2.4 SPT at becoming soft, moderately sensitive -9.0 9.0-9.45m 0/0/0 SPT N=0 9.5 92 10.0 10.5 19/6 - 3.2 11.0 **Undifferentiated Alluvium** 68 Gravel backfill Screened from 1.0m to 30.0m becoming very soft, insensitive 12.0 6/5-1.2 SPTat 12.0-12.45m SPT 0/0/0 N-0 12.5 00 13.0 UTP - wood 4 15.0 organic CLAY, dark grey/brown. Firm, moist, high plasticity SPTat 15.0-15.45m SP 0/0/0 N=0 Jibrous PEAT, dark brown/black. Firm, moist, low to medium 15.5 plasticity Sample 1 100 Disturbed 15.95 16,35m Sandstone Drilling Fluid: Plutonia Comments: Topsoil water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH04** Project Location: SUNFIELDS ARDMORE Sheet 3 of 4 Vane Head: Logged By: Processor Start Date: 09.04.21 Job Number: J01627 2153 JM JM Finish Date: 12.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater/ 8 Stratigraphy Borehole Piezometer Vane Dial / Sensitivity & SPT 8 Recovery Location Description: Refer to site plan Orientation: vertical ROD Œ **DEFECTS** CORE DESCRIPTION with moderately thin bed of dark grey/brown, high plasticity Sample 1 Undifferentiated Alluvium Tube organic CLAY Disturbed 8 15.95 Triple 7 16.35m fine to medium sandy SILT, light brown. Loose, moist, no plasticity, dilatant 14/2 - 7.0 amorphous to fibrous PEAT, dark brown/black. Soft, moist, low to medium plasticity, sensitive 7 pumiceous SILT, white. Loose, moist, no plasticity, dilatant, with minor brown organic staining, with trace organic 17.5 inclusions at 17.55m, without organic staining, without organic inclusions Sample 2 Disturbed 17.6-18.0m 18.0 CLAY, light grey/green. Firm, moist, high plasticity, with trace SPTat organic inclusions 18.0-18.45m SPT 0/0/0 N=0 18.5 00 19.0 Gravel backfill becoming stiff, sensitive Formation 62/15 - 4.1 19.5 Screened from 1.0m to 30.0m 20.0 with trace fine sand, without organic inclusions Sample 3 73 Disturbed 20.2-20.5 20.55m organic stained CLAY with trace fine sand, brown, Soft, moist, medium to high plasticity, sensitive, with trace organic at 20.7m, with thin bed of grey/green CLAY with some fine 24/5 - 4.8 21.0 sand SPTat 21.0-21.45m SP CLAY with some fine sand, grey/green. Firm, moist, medium 0/0/0 _ plasticity N=0 at 21.4m, with very thin woody inclusion organic stained CLAY with some fine sand, brown. Firm, 8 22.0 moist, medium plasticity CLAY with some fine sand, grey/green, Firm, moist, medium plasticity, moderately sensitive at 22.2m, with minor grey/brown organic staining 27/9 - 3.0 22.5 - becoming medium to high plasticity, with minor fine sand, without organic staining 23.0 8 with some fine sand 23.5 clayey fine to medium SAND, light grey/green. Firm, moist, low plasticity Drilling Fluid: Sandstone Comments: Topsoil Plutonio water Siltstone No Core Fill LANDER Checked: Organio Clay Limestone Driller: Silt Rig: Pumice Drillforce Truck Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH04** Project Location: SUNFIELDS ARDMORE Sheet 4 of 4 Vane Head: Logged By: Processor Start Date: 09.04.21 Job Number: J01627 2153 JM JM Finish Date: 12.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer ROD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION SPTat Triple Tube 24.0-24.45m SPT 0/1/1 N=2 00 25.0 Sample 4 Disturbed 25.1-25.5n 17/3 - 5.7 becoming soft, sensitive 25.5 26.0 Formation 100 clayey fine to coarse SAND with minor fine gravel, grey/green *Stiff, moist, low to medium plasticity, sensitive 26.5 Puketoka 96/21 - 4.6 SPT at 27.0-27.45m silty CLAY, dark green streaked grey/green. Stiff, moist, high SPT plasticity 1/2/6 Gravel backfill N=8 becoming grey/green - 27.5 Screened from 1.0m to 30.0m 100 28.0 silty CLAY with trace fine to medium sand, grey, Stiff, moist, 28.5 76/6 - 12.7 high plasticity, extra sensitive 29.0 8 29.5 EOB at 30.0m. Target Depth. SPTat SPT 30.0-30.45m 0/0/0 N=0 - 30.5 31.0 31.5 Sandstone Drilling Fluid: Comments: Topsoil Sand Plutonio water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Driller: Rig: Silt Drillforce Truck Pumice Volcanic









29.0-30.0m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH04-B
	Ardmore	compiled;	date:
title:	MH04 Photo Summary - 22.5-30.0m	JM	09.04.21-12.04.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH05 Project Location: SUNFIELDS ARDMORE Sheet 1 of 4 Vane Head: Logged By: Processor Start Date: 14.04.21 Job Number: J01627 1750 PL JM Finish Date: 15.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater/ 8 Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer RQD (%) Recovery (Location Description: Refer to site plan Orientation: vertical **DEFECTS** CORE DESCRIPTION TOPSOIL **Triple Tube** core loss Lockable toby Bentonite seal 0.5 1 1.0 Groundwater level measured 30.04.21: 1.5 fibrous PEAT, black. Soft, moist, medium plasticity 1.46m 2.0 23 2.5 19/4 - 4.8 becoming sensitive 3.0 SPT at 3.0-3.45m SPT Undifferentiated Alluvium 1/0/0 Gravel backfill N=0 -becoming dark grey/brown 3.5 Screened from 1.0m to 30.0m 8 4.0 with moderately thin buried log 4.5 sitty CLAY, blue/grey. Very stiff, moist, high plasticity 5.0 organic silty CLAY, black mottled dark grey/brown. Very stiff, moist, high plasticity, with trace black carbonaceous inclusions 93 5.5 6,0 fibrous PEAT, dark grey/brown. Very stiff, moist, medium SPTat plasticity SPT 6.0-6.45m 0/0/0 N=0 6.5 86 7.0 Sample 1 100 Disturbed 7.6-8.0m Sandstone Drilling Fluid: Comments: Topsoil Plutonic water Fill Siltstone No Core LANDER Checked: Organic Clay Limeston RG Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH05 Project Location: SUNFIELDS ARDMORE Sheet 2 of 4 Vane Head: Logged By: Processor Start Date: 14.04.21 Job Number: J01627 2153 PL JM Finish Date: 15.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater/ (%) Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth **DEFECTS** CORE DESCRIPTION Triple Tube becoming black 100 8.5 9.0 SPT at 9.0-9,45m SPT 1/0/0 N-0 9.5 100 10.0 - with thin bed of brown/white pumiceous SILT 10.5 11.0 53 Undifferentiated Alluvium Gravel backfill Screened from 1.0m to 30.0m 12.0 SPT at 12.0-12.45m SPT 0/0/0 N=0 12.5 57 13.0 100 clayey SAND with trace silt, dark brown. Stiff, moist, low Sample 2 Disturbed plasticity 14.7-15.0m 15.0 fibrous PEAT, black. Very stiff, moist, medium plasticity SPTat 15.0-15.45 SP 0/0/2 N-2 15.5 100 Sandstone Drilling Fluid: Plutonio Comments: Topsoil Sand water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH05 Project Location: SUNFIELDS ARDMORE Sheet 3 of 4 Vane Head: Logged By: Processor Start Date: 14.04.21 Job Number: J01627 1750 PL JM Finish Date: 15.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer ROD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION Triple Tube 8 Undifferentiated Alluvium 93 SPTat 18.0-18.45m SPT 0/0/0 silty CLAY, blue/grey. Stiff, moist, high plasticity N=0 fibrous PEAT, black. Stiff, moist, medium plasticity, with trace blue silty CLAY intermixed silty CLAY, blue/grey. Very stiff, moist, high plasticity 100 19.0 Gravel backfill 19.5 Screened from with trace fine sand 1.0m to 30.0m Sample 3 Disturbed 20.0 19.7-20.1m 100 becoming dark grey/blue Formation 20.5 Puketoka becoming blue 21.0 SPTat 21.0-21.45m SPT 0/0/0 N=0 00 22.0 with moderately thin buried log becoming dark grey/blue, with trace fine sand - 22.5 becoming blue, without fine sand 23.0 becoming grey and white streaked blue 80 23.5 Sandstone Drilling Fluid: Comments: Topsoil Plutonio water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH05 Project Location: SUNFIELDS ARDMORE Sheet 4 of 4 Vane Head: Logged By: Processor Start Date: 14.04.21 Job Number: J01627 1750 PL JM Finish Date: 15.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Borehole Stratigraphy Piezometer Vane Dial / Sensitivity & SPT ROD (%) Recovery (Location Description: Refer to site plan Orientation: vertical (E) **DEFECTS** CORE DESCRIPTION SPTat Triple Tube 24.0-24.45m SPT 0/3/4 8 25.0 25.5 clayey SILT with trace fine sand, white and dark grey streaked _ight brown. Very stiff, moist, low plasticity Formation 26.0 silty SAND with trace clay, light brown streaked white. Loose, 93 - moist, low to no plasticity, with minor pumiceous inclusions Puketoka 26.5 Sample 4 Disturbed 26.4-27.0m SPT at 27.0-27.45m silty CLAY, black streaked brown/grey. Very stiff, moist, high SPT plasticity, with trace black carbonaceous inclusions, with thin 5/0/0 Gravel backfill bed of amorphous PEAT at top of layer N=0 becoming blue/grey 27.5 Screened from 1.0m to 30.0m 100 28.0 amorphous PEAT, brown/black, Stiff, moist, medium plasticity with trace black carbonaceous inclusions 28.5 silty CLAY, blue/grey. Very stiff, moist, medium plasticity 29.0 becoming black streaked brown/grey, with thin bed of 93 amorphous PEAT 29.5 with trace woody inclusions EOB at 30.0m. Target Depth. SPTet 30.0-30.45m SPT 0/0/0 N=0 - 30.5 31.0 Sandstone Drilling Fluid: Comments: Topsoil Sand Plutonio water Siltstone No Core Fill LANDER Checked: Organic Clay Limestone RG Rig: Driller: Silt Drillforce Pumice Truck Volcanic



0.0-6.9m





10.1-14.5m

6.9-10.1m







14.5-17.6m

17.6-21.0m

21.0-24.8m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH05-A
31/2	Ardmore	compiled;	date:
title:	MH05 Photo Summary - 0.0-24.8m	JM	14.04.21-15.04.21





24.8-27.8m 27.8-30.0m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH05-B
	Ardmore	compiled:	date:
title:	MH05 Photo Summary - 24.8-30.0m	JM	14.04.21-15.04.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH06** Project Location: SUNFIELDS ARDMORE Sheet 1 of 2 Vane Head: Logged By: Processor Start Date: 14.04.21 Job Number: J01627 1900 RG JM Finish Date: 15.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Stratigraphy Borehole Piezometer Vane Dial / Sensitivity & SPT 8 Recovery Location Description: Refer to site plan Orientation: vertical ROD (E) **DEFECTS** CORE DESCRIPTION TOPSOIL **Friple Tube** PT 1 Lockable toby 占 Push Tube 0.0-0.5m Bentonite seal 0.5 silty CLAY, orange. Very stiff, moist, medium to high plasticity Sample 1 becoming orange streaked light grey Formation Disturbed 20 1.0 0.8-1.1m clayey SILT, orange streaked light grey. Very stiff, moist, low Sample 2 1.5 to medium plasticity, with very closely spaced to extremely Disturbed closely spaced thinly laminated beds of dark orange limonite East Coast 1.4-1.8m 2.0 Residual 87 2.5 silty CLAY, orange mottled light grey. Very stiff, moist, high plasticity, with trace limonite 3.0 SPTat 3.0-3.45m SP 1/2/2 Gravel backfill N=4 silty CLAY, dark grey. Very stiff, moist, high plasticity 3.5 Sample 3 Screened from Disturbed 1.0m to 12.0m 3.5-3.8m 100 4.0 4.5 PT 2 Push Tube П 4.5-5.0m Formation 5.0 East Coast Bays 90 5.5 6.0 SPTat ransitional SPT 6.0-6.45m 10/17/21 N=38 6.5 001 7.0 Groundwater level Sample 4 slightly clayey fine SAND, dark grey/green. Very stiff, moist, measured 30.04.21: Disturbed low plasticity, with laminated bed of orange limonite, with very 7.17m 7.1-7.4m closely spaced to extremely closely spaced irregular Jaminated beds of green/grey, medium plasticity silty CLAY clayey SILT, dark grey. Hard, moist, low to medium plasticity 00 Sandstone Drilling Fluid: Comments: Topsoil Plutonic water Siltstone No Core Fill LANDER Checked: Organio Clay Limeston RG Driller: Rig: Silt Pumice Drillforce Truck Volcanic

Client: ARDMORE DEVELOPMENTS LIMITED Machine Borehole No. **MH06** Project Location: SUNFIELDS ARDMORE Sheet 2 of 2 Vane Head: Logged By: Processor Start Date: 14.04.21 Job Number: J01627 1900 RG JM Finish Date: 15.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater 8 Borehole Vane Dial / Sensitivity & SPT Stratigraphy Piezometer RQD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION Triple Tube 100 Formation at 8.50m, CF highly weathered, dark grey SILTSTONE; Very weak to extremely weak at 8.60m, 1JN PL R3 0-10° 24 at 8.90m, 1JN PL R3 90° SPTat Bays 9.0-9.3m clayey SILT, dark grey. Hard, moist, low plasticity SPT 35/50 Coast for 150mm N>50 with trace fine sand East 9.5 ransitional Gravel backfill 100 10.0 Screened from 1.0m to 12.0m slightly clayey fine SAND, dark green/grey. Very stiff, moist, low plasticity 10.5 Bedrock clayey SILT, dark grey. Hard, moist, low to medium plasticity 00 - with trace fine sand aitemata at 11.70m, CF highly weathered, dark grey SANDSTONE; Very weak to extremely weak, fine grained 0 SPTat at 11.9m, with extremely closely spaced thinly laminated 12.0-12.45m 12.0 black carbonaceous beds to 11.95m SPT 50 SPI for 125mm EOB at 12.0m. Target Depth. N>50 12.5 13.0 15.0 15.5 Sandstone Drilling Fluid: Comments: Topsoil Plutonio water Siltstone No Core Fill LANDER Checked: Organic Clay Limestone RG Driller: Rig: Silt Drillforce Pumice Truck Volcanic



0.0-4.5m



8.2-11.2m



4.5-8.2m



11.2-12.0m



client:	Ardmore Developments Lim	ited project no:	figure no:
project:	Sunfields	J01627	7 Figure MH06-A
	Ardmore	compiled:	date:
title:	MH06 Photo Summary - 0.0	-12.0m JM	14.04.21-15.04.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH₀7 Project Location: SUNFIELDS ARDMORE Sheet 1 of 3 Vane Head: Logged By: Processor Start Date: 15.04.21 Job Number: J01627 1900/307 RG/RZ JM Finish Date: 16.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Strationaphy Borehole Piezometer Vane Dial / Sensitivity & SPT 8 Recovery Location Description: Refer to site plan Orientation: vertical ROD Depth Œ **DEFECTS** CORE DESCRIPTION TOPSOIL Tube Lockable toby 64 Triple 7 Bentonite seal organic clayey SILT, dark brown. Stiff, moist, low to medium 0.5 plasticity, with trace rootlets PT 1 Push Tube Б 0.5-1.0m 1.0 PT 2 Push Tube Ы 1.0-1.5m 1.5 silty CLAY, light brown. Very stiff, moist, high plasticity, with trace woody inclusions Groundwater level at 1.6m, with moderately thin bed of brown/purple organic measured 30.04.21: stained silty CLAY 1.87m 2.0 clayey SILT with trace fine sand, orange mottled light grey/blue. Very stiff, moist, low to medium plasticity, with trace 100 organic silty CLAY, purple/brown. Stiff, moist, high plasticity, Sample 1 with trace organic inclusions 2.5 Disturbed 2.3-2.8m Formation 3.0 silty CLAY, light blue/grey. Stiff, moist, high plasticity SPTat SPT 3 0-3 45m 1/2/2 Gravel backfill Puketoka N=4 3.5 organic clayey SILT, black mottled dark brown. Stiff, moist, Screened from PT 3 medium plasticity, with trace woody inclusions 1.0m to 18.0m Push Tube 2 3.5-4.0m 4.0 8 clayey SILT, light brown, Firm, moist, low plasticity, with minor 4.5 Sample 2 woody inclusions Disturbed silty CLAY, light blue/grey. Stiff, moist, high plasticity, with 4.5-4.8m trace organic inclusions at 4.7m, without organic inclusions becoming green mottled light blue/grey 5.0 clayey SILT, green/grey. Stiff, moist, low to medium plasticity 8 becoming lightgreen/grey 5.5 silty CLAY, light green/grey. Stiff, moist, high plasticity 6.0 SPTat mation 6.0-6.45m SPT 0/1/2 N=3 clayey SILT, dark grey. Very stiff, moist, medium plasticity Bays Coast 001 7.0 Sample 3 East Disturbed 7.1-7.5m tional 7.5 with irregular closely spaced to very closely spaced thin beds
 of clavev fine SAND. 00 ransit of clayey fine SAND Sandstone Drilling Fluid: Comments: Topsoil Plutonic water Siltstone No Core Fill LANDER Checked: Clay Limeston RG Driller: Silt Rig: Pumice Drillforce Truck Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH₀7 Project Location: SUNFIELDS ARDMORE Sheet 2 of 3 Vane Head: Logged By: Processor Start Date: 15.04.21 Job Number: J01627 1900/307 RG/RZ JM Finish Date: 16.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Stratigraphy Borehole Piezometer Vane Dial / Sensitivity & SPT 8 Recovery (Location Description: Refer to site plan Orientation: vertical ROD **DEFECTS** CORE DESCRIPTION Tube with thin bed of carbonaceous staining Formation Triple 7 100 8.5 Bays 9.0 Coast SPTat 9.0-9.45m SPT 13/11/15 East N-26 9.5 completely to highly weathered, dark grey SILTSTONE; Very at 9.60m, 1JN PL R4 0-10° weak to extremely weak 0 at 9.80m, CF at 9.90m, CF silty fine SAND with minor clay, dark grey. Medium dense, 8 10.0 moist, low plasticity at 10.1m, with moderately thin bed of dark grey, medium to high plasticity silty CLAY at 10.60-11.90m, 15DI PL R3 completely to highly weathered, dark grey SILTSTONE; Very weak to extremely weak, with closely spaced to very closely 80-90" spaced irregularly interbedded thin to very thin beds of dark grey, hard, moist, low plasticity silty fine SAND with minor clay 80 0 Gravel backfill Screened from 1.0m to 18.0m **SPT** at without beds of silty fine SAND 12.0-12.3m SPT SPT 20/50 for 150mm N>50 Bedrock 12.5 at 12.76m, 1JN UN R5 85-90° 8 at 12.90m, CF 38 with moderately thin bed of silty CLAY with trace hard silt clast at 13.00m, CF Coast inclusions at 13.10-13.35m, 2JN PL R5 85-90" East with moderately thin bed of clayey SILT at 13.50-13.70m, 6JN PL R5 45-90° Sample 4 at 13.70-13.80m, CF at 13.80-14.00m, 3JN PL R3 Disturbed 3.5-4.0m 45-609 at 14.10-14.30m, CF 100 43 at 14:50-14.70m, CF SPTat at 14.90m, 1JN PL R4 40-90° 15.0-15.13m 15.0 50 SPT SPI for 125mm at 15.30m, CF N>50 at 15.50m, CF at 15.60m, 1JN PL R3 40-90° 90 37 at 15.85m, CF at 16.00m, 1JN PL Drilling Fluid: Sandstone Comments: Topsoil Plutonio water Siltstone No Core Fill LANDER Checked: Clay Limestone RG Driller: Silt Rig: Pumice Drillforce Truck Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH07** Project Location: SUNFIELDS ARDMORE Sheet 3 of 3 Vane Head: Logged By: Processor Start Date: 15.04.21 Job Number: J01627 1900 / 307 RG/RZ JM Finish Date: 16.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater Stratigraphy Borehole Piezometer Vane Dial / Sensitivity & SPT RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth (m) **DEFECTS** CORE DESCRIPTION at 16.10-16.42m, CF Triple Tube Bedrock 8 37 becoming highly weathered, very weak Coast Bays Formation at 16.60m, 1DI PL R3 80-90° at 16.70m, 1JN PL R3 70° at 16.70-16.90m, CF 100 91 at 17.35m, 1JN PL R4 70-90° 17.5 Gravel backfill East Screened from 1.0m to 18.0m **SPT** at 18.0-18.12m EOB at 18.0m. Target Depth. SPT SPT 50 for 115mm N>50 18.5 19.0 19.5 20.0 20.5 21.0 21.5 - 22.0 - 22.5 23.0 23.5 Drilling Fluid: Sandstone Plutonio Comments: Topsoil Sand water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG. Driller: Rig: Silt Drillforce Truck Pumice Volcanic







0.0-4.9m 4.9-7.8m 7.8-10.8m







10.8-13.5m 13.5-16.5m 16.5-18.0m

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client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH07
	Ardmore	compiled;	date:
title:	MH07 Photo Summary - 0.0-18.0m	JM	15,04.21-16.04.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH08** Project Location: SUNFIELDS ARDMORE Sheet 1 of 4 Vane Head: Logged By: Processor Start Date: 13.04.21 Job Number: J01627 1750 PL JM Finish Date: 14.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater 8 Borehole Vane Dial / Sensitivity & SPT Stratigraphy Piezometer RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical **DEFECTS** CORE DESCRIPTION TOPSOIL **Triple Tube** Lockable toby core loss Bentonite seal 0.5 1.0 1.5 silty CLAY, grey/brown. Stiff, moist, high plasticity fibrous PEAT, black. Firm, moist, medium plasticity 2.0 53 2.5 3.0 SPT at 3.0-3.45m Groundwater level measured 30.04,21: 3.23m SPT 0/0/0 Undifferentiated Alluvium N=0 3.5 16 4.0 Gravel backfill Screened from 1.0m to 30.0m 4.5 Sample 1 Disturbed 4.1-4.4m 5.0 67 5.5 6.0 organic silty CLAY, grey/brown. Firm, moist, medium to high SPTat plasticity SPT 6.0-6.45m 0/0/0 N=0 Tibrous PEAT, black. Firm, moist, medium plasticity 6.5 86 7.0 silty CLAY, grey/blue. Firm, moist, high plasticity 7.5 Sample 2 100 Disturbed 7.1-7.4m Sandstone Drilling Fluid: Comments: Topsoil Plutonic water Fill Siltstone No Core LANDER Checked: Organic Clay Limeston RG Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH08** Project Location: SUNFIELDS ARDMORE Sheet 2 of 4 Vane Head: Logged By: Processor Start Date: 13.04.21 Job Number: J01627 1750 PL JM Finish Date: 14.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater/ (%) Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer RQD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION Triple Tube organic silty CLAY, black/brown. Firm, moist, high plasticity, 100 8.5 sensitive with trace woody inclusions 35/8 - 4.4 SPT at 9.0-9.45m 9.0 fibrous PEAT, black. Very stiff, moist, medium plasticity SPT 0/0/1 N=1 9.5 with moderately thin buried log 8 10.0 Undifferentiated Alluvium silty CLAY, grey/blue. Firm, moist, medium plasticity 10.5 47 Gravel backfill Screened from 1.0m to 30.0m 12.0 SPTat 12.0-12.45m SP 0/0/1 fibrous PEAT, black. Very stiff, moist, medium plasticity, with N=1 trace woody inclusions 12.5 00 13.0 9 15.0 SPTat 12.0-12.45m SP 0/0/0 N=0 silty CLAY, grey/blue. Very stiff, moist, high plasticity Puketoka 100 Sandstone Drilling Fluid: Plutonio Comments: Topsoil Sand water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH08** Project Location: SUNFIELDS ARDMORE Sheet 3 of 4 Vane Head: Logged By: Processor Start Date: 13.04.21 Job Number: J01627 1750 PL JM Finish Date: 14.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Groundwater/ Ground R.L 8 Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer ROD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical (E) **DEFECTS** CORE DESCRIPTION Triple Tube 8 - becoming dark grey/blue 100 - becoming grey/blue 17.5 organic silty CLAY, dark brown/black. Very stiff, moist, SPTat medium plasticity SPT 18.0-18.45m at 18.2, with trace woody inclusions 0/0/0 N=0 with minor woody inclusions 18.5 - with trace woody inclusions silty CLAY, dark grey. Stiff, moist, medium plasticity, 100 19.0 moderately sensitive Sample 3 Disturbed 19.0-19.4n Gravel backfill 54/15 - 3.6 - 19.5 fibrous PEAT, black. Firm, moist, medium plasticity Screened from 1.0m to 30.0m silty CLAY, grey/blue. Very stiff, moist, medium plasticity 20.0 100 20.5 21.0 SPTat 21.0-21.45 SPT 0/2/4 00 22.0 -becoming stiff, sensitive - 22.5 81/12 - 6.8 23.0 100 23.5 Sample 4 with trace fine sand Disturbed 23.7-24.0m 62/12 - 5.2 at 24.0m, without fine san Sandstone Drilling Fluid: Comments: Topsoil Sand Plutonic water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH08** Project Location: SUNFIELDS ARDMORE Sheet 4 of 4 Vane Head: Logged By: Processor Start Date: 13.04.21 Job Number: J01627 1750 PL JM Finish Date: 14.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater/ (%) Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical **DEFECTS** CORE DESCRIPTION SPT at 24.0-24.45m Triple Tube 0/0/3 N=3 100 25.0 becoming firm, moderately sensitive 46/19 - 2.4 25.5 26.0 100 26.5 Formation becoming very stiff Puketoka SPTat 27.0-27.45m SPT 0/0/8 Gravel backfill N=B - 27.5 Screened from 1.0m to 30.0m 100 - 28.0 28.5 fibrous PEAT, black. Stiff, moist, medium to high plasticity 29.0 47 29.5 EOB at 30.0m. Target Depth. SPTat SPT 30.0-30.45m 0/0/0 N=0 - 30.5 31.0 -31.5 Sandstone Drilling Fluid: Plutonio Comments: Topsoil Sand water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone RG Driller: Rig: Silt Drillforce Truck Pumice Volcanic







9.7-12.45m

0.0-6.0m 6.0-9.7m







18.2-21.3m

12.45-15.45m

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 client:
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 Sunfields
 J01627
 Figure MH08-A

 Ardmore
 compiled:
 date:

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 MH08 Photo Summary - 0.0-21.3m
 JM
 13.04.21-14.04.21





21.3-24.5m

24.5-30.0m



client:	Ardmore Developments Limited			figure no:
project:	Sunfields	j	J01627	Figure MH08-B
	Ardmore	compiled:		date:
title:	MH08 Photo Summary - 21.3-30	.0m	JM	13.04.21-14.04.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH09** Project Location: SUNFIELDS ARDMORE Sheet 1 of 2 Vane Head: Logged By: Processor Start Date: 16.04.21 Job Number: J01627 1750 PL JM Finish Date: 16.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Borehole Stratigraphy Piezometer Vane Dial / Sensitivity & SPT ROD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION TOPSOIL **Friple Tube** Lockable toby 8 sitty CLAY, grey. Stiff, moist, medium plasticity Bentonite seal 0.5 PT₁ Б Push Tube 0.5-1.0m 1.0 becoming orange streaked grey, with trace organic staining 80 Groundwater level 1.5 measured 30.04.21: -1.55m fibrous PEAT, black. Firm, moist, medium plasticity 2.0 93 sitty CLAY, blue/grey. Stiff, moist, high plasticity 2.5 3.0 SPT at 3.0-3.45m SPT Puketoka Formation 0/1/2 Gravel backfill N=3 ith trace fine sand 3.5 Screened from 1.0m to 15.0m 48 4.0 4.5 5.0 8 5.5 sandy CLAY with trace silt, blue/grey. Very stiff, moist, medium plasticity 6.0 SPTat SPT 6.0-6.45m 1/1/2 N=3 6.5 clayey SAND, brown/grey. Very stiff, moist, low plasticity organic stained silty CLAY, dark brown. Very stiff, moist, Sample 1 medium plasticity, with trace black carbonaceous inclusions Disturbed 001 7.0 6.7-7.2m silty CLAY with trace fine sand, blue. Very stiff, moist, medium plasticity, moderately sensitive 173/58 - 3.0 7.5 100 Drilling Fluid: Sandstone Comments: Topsoil Plutonic water Fill Siltstone No Core LANDER Checked: Organio Clay Limeston PL Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED **MH09** Project Location: SUNFIELDS ARDMORE Sheet 2 of 2 Vane Head: Logged By: Processor Start Date: 16.04.21 Job Number: J01627 1750 PL JM Finish Date: 16.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater 8 Borehole Vane Dial / Sensitivity & SPT Stratigraphy Piezometer RQD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION Triple Tube 100 8.5 9.0 SPT at 9.0-9,45m SPT 0/3/4 clayey SAND, brown/grey, Hard, moist, low plasticity 9.5 Gravel backfill with trace woody inclusions Puketoka Screened from 1.0m to 15.0m 86 10.0 10.5 11.0 73 completely weathered, dark grey, fine grained SANDSTONE; Extremely weak 90 at 11.80m, 1DI IR R4 60° SPTat at 12.00m, CF 12.0-12.38m SPT SP 16/30/20 for 75mm slightly weathered, dark grey, fine grained SANDSTONE; Very East Coast Bays Formation Bedrock N>50 at 12.45-13.30m, 6DI IR R4 45° 8 7 13.0 at 13.30-13.50m, CF SPTat 13.5-13.64m at 13.50-13.80m, 3DI IR R4 80° 50 SPT SPT for 135mm N>50 at 13.90-14.20m, CF at 14.30-14.35m, 2DI IR R4 85° 001 62 SPTat at 15.00m, 1JN PL R4 45° 15.0 15.0-15.24m EOB at 15.0m. Target Depth. SPT SPT 32/50 for 90mm N>50 Sandstone Drilling Fluid: Comments: Topsoil Sand Plutonio water Siltstone No Core Fill LANDER Checked: Organic Clay Limestone PL Driller: Rig: Silt Drillforce Truck Pumice Volcanic







0-4.5m

4.5-7.6m

7.6-10.8m



10.8-13.9m

13.9-15m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH09
	Ardmore	compiled:	date:
title:	MH09 Photo Summary - 0.0-15.0m	PL	16.04.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH10 Project Location: SUNFIELDS ARDMORE Sheet 1 of 4 Vane Head: Logged By: Processor Start Date: 16.04.21 Job Number: J01627 307 / 2153 RZ/JM JM Finish Date: 19.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Piezometer Stratigraphy Borehole Vane Dial / Sensitivity & SPT RQD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION TOPSOIL **Triple Tube** Lockable toby 001 - organic silty CLAY, dark red/brown. Stiff, moist, low plasticity Bentonite seal 0.5 fibrous PEAT, dark brown. Firm, moist, medium plasticity PT 1 Push Tube 4 0.5-1.0m 1.0 PT 2 Push Tube Ы 1.0-1.5m 1.5 Sample 1 Disturbed 1.5-2.0m 2.0 20 2.5 Groundwater level measured 30.04.21: 2.69m with thin hard tree gum inclusion 3.0 SPT at 3.0-3.45m SPT Undifferentiated Alluvium 2/0/0 Gravel backfill N=0 3.5 Screened from with thin tree gum inclusion 1.0m to 30.0m 8 4.0 4.5 Sample 2 Disturbed 4.5-5.0m 5.0 8 5.5 6.0 SPTat SPT 6.0-6.45m 0/0/0 N=0 6.5 -with some grey clay intermixed 90 7.0 7.5 PT 3 Push Tube F 7.5-8.0m at 8.0m, without grey clay Sandstone Drilling Fluid: Comments: Topsoil Sand Plutonic water Fill Siltstone No Core LANDER Checked: Clay Organic Limeston PL Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH10 Project Location: SUNFIELDS ARDMORE Sheet 2 of 4 Vane Head: Logged By: Processor Start Date: 16.04.21 Job Number: J01627 307 / 2153 RZ/JM JM Finish Date: 19.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater (%) Stratigraphy Borehole Piezometer Vane Dial / Sensitivity & SPT RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth E **DEFECTS** CORE DESCRIPTION Triple Tube 20 8.5 becoming dark brown/black 9.0 SPT at 9.0-9.45m SPT 0/0/0 N=0 9.5 90 10.0 becoming very soft, moderately sensitive 10.5 6/2 - 3.0Undifferentiated Alluvium 2 Gravel backfill Screened from 1.0m to 30.0m 5/2 - 2.5 SPT at 12.0 12.0-12.45m SPT with moderately thick buried log 0/1/2 N=3 12.5 00 13.0 becoming low plasticity 100 15.0 SPTat 15.0-15.45m SP 0/0/0 N=0 15.5 47 at 16.0m, becoming medium plasticity Sandstone Drilling Fluid: Plutonio Comments: Topsoil Sand SPT at 9.0m slipped out. water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone PL Driller: Drillforce Rig: Silt Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH10 Project Location: SUNFIELDS ARDMORE Sheet 3 of 4 Vane Head: Logged By: Processor Start Date: 16.04.21 Job Number: J01627 307 / 2153 RZ/JM JM Finish Date: 19.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Stratigraphy Vane Dial / Sensitivity & SPT Borehole Piezometer RQD (%) Recovery (Location Description: Refer to site plan Orientation: vertical DEFECTS CORE DESCRIPTION Triple Tube Undifferentiated Alluvium 47 becoming soft 19/8 - 2.4 00 CLAY, light grey/green. Soft, moist, high plasticity, moderately with minor fine to medium sand 21/8 - 2.6 slightly clayey fine to medium SAND, grey/blue. Soft, moist, SPTat low to no plasticity SPT 18.0-18.45m 0/0/0 N=0 18.5 becoming low plasticity 00 Sample 3 Disturbed 19.0-19.5n Gravel backfill becoming clayey fine to medium SAND, low to medium plasticity Screened from 1.0m to 30.0m 20.0 Formation 80 20.5 pumiceous SILT, white. Loose, moist, no plasticity, sensitive, Puketoka _ dilatant Sample 4 Disturbed 20.6-21.0n becoming very dense SPTat SPT 21.0-21,33m 28/43/7 for 25mm N>50 organic CLAY, grey/brown mottled black. Firm, moist, high plasticity 61 22.0 fibrous PEAT, dark brown/black. Very soft, moist, medium plasticity, insensitive 8/5 - 1.6 - 22.5 23.0 90 23.5 silty CLAY, light grey. Firm, moist, high plasticity, moderately Sandstone Drilling Fluid: Comments: Topsoil Plutonio water Siltstone No Core Fill LANDER Checked: Organio Clay Limestone PL Driller: Rig: Silt Drillforce Pumice Truck Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH10 Project Location: SUNFIELDS ARDMORE Sheet 4 of 4 Vane Head: Logged By: Processor Start Date: 16.04.21 Job Number: J01627 307 / 2153 RZ/JM JM Finish Date: 19.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Stratigraphy Borehole Piezometer Vane Dial / Sensitivity & SPT ROD (%) Recovery (Location Description: Refer to site plan Orientation: vertical (E) DEFECTS CORE DESCRIPTION SPTat Triple Tube organic stained silty CLAY, brown. Stiff, moist, high plasticity 24.0-24.45m SPT 0/0/0 - fibrous PEAT, dark brown/black. Firm, moist, low plasticity N=0 8 - 25.0 silty CLAY, light grey. Firm, moist, high plasticity, moderately 37/18 - 2.1 25.5 Sample 5 Disturbed 25.5-26.0n 26.0 100 26.5 with trace fine sand 48/24 - 2.0 Puketoka SPT at 27.0-27.45m SPT 0/0/0 Gravel backfill becoming lightgrey/green, with minor fine sand N=0 - 27.5 Screened from 1.0m to 30.0m 100 28.0 becoming stiff 77/27 - 2.9 28.5 becoming grey, with trace fine sand 29.0 slightly clayey fine to medium SAND with minor silt, grey. 8 Firm, moist, low to no plasticity, moderately sensitive 29.5 at 30.0m, becoming firm 27/12 - 2.3 EOB at 30.0m. Target Depth. SPTat SPT 30-30.45m 0/1/2 N=3- 30.5 31.0 31.5 Sandstone Drilling Fluid: Comments: Topsoil Sand Plutonio water Fill Gravel Siltstone No Core LANDER Checked: Organic Clay Limestone PL Driller: Rig: Silt Drillforce Truck Pumice Volcanic









20.2-23.3m

23.3-26.8m

26.8-30.0m



client:	Ardmore Developments Limited	project no:	figure no:	,
project:	Sunfields	J016		MH10-B
	Ardmore	compiled:	date:	7
title:	MH10 Photo Summary - 20.1-30m	PI	L 19.0	4.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH11 Project Location: SUNFIELDS ARDMORE Sheet 1 of 2 Vane Head: Logged By: Processor Start Date: 21.04.21 Job Number: J01627 2153 JM JM Finish Date: 21.04.21 Sample and Laboratory Test Details Drilling Method & Casing mΕ Ground R.L Groundwater 8 Stratigraphy Borehole Piezometer Vane Dial / Sensitivity & SPT 8 Recovery (Location Description: Refer to site plan Orientation: vertical ROD (E) DEFECTS CORE DESCRIPTION TOPSOIL Tube Lockable toby Triple 1 Bentonite seal 0.5 silty CLAY, orange mottled light yellow/grey. Stiff, moist, high - plasticity 59 pumiceous silty CLAY, orange mottled light grey/white. Firm, 1.0 moist, high plasticity becoming stiff, moderately sensitive 55/24 - 2.3 1.5 2.0 80 Groundwater level Sample 1 2.5 measured 30.04.21: Disturbed 2.35-2.8m Puketoka silty CLAY, dark grey. Stiff, moist, high plasticity 3.0 Sample 2 Disturbed SPT at 3.0-3.45m SP 2.9-3.45n 0/0/0 Gravel backfill N=0 3.5 Screened from 1.0m to 10.5m 100 4.0 4.5 5.0 75 5.5 at 5.84m, CF slightly weathered, dark grey SILTSTONE; Very weak at 5.94m, 1DI PL R3 90° 0 Formation SPTat 6.0-6.45m SP SP 14/21/23 N=44 at 6.48m, CF Bays at 6.66-7.46m, 10JN PL R3-4 80-90° with verythin fine sand Coast infill at 6.94-7.14m, CF 10 97 East Sample 3 Disturbed with closely spaced to very closely spaced thin to very thin **Transitional** 7.05-7.5m - beds of fine grained SANDSTONE **SPT** at 7.5-7.28m SPT SPT 22/50 at 7.81-8.92m, 12JN PL R3-4 for 125mm 8 N>50 80-90° 26 at 7.96-8.15m, 1JN PL R4 15° Sandstone Drilling Fluid: Comments: Topsoil Plutonic water Siltstone No Core Fill LANDER Checked: Organio Clay Limestone PL Driller: Rig: Silt Drillforce Pumice Truck Volcanic

Client: ARDMORE DEVELOPMENTS LIMITED Machine Borehole No. MH11 Project Location: SUNFIELDS ARDMORE Sheet 2 of 2 Vane Head: Logged By: Processor Start Date: 21.04.21 Job Number: J01627 2153 JM JM Finish Date: 21.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater 8 Stratigraphy Vane Dial / Sensitivity & SPT Borehole Piezometer 8 Recovery (Location: Description: Refer to site plan Orientation: vertical ROD **DEFECTS** CORE DESCRIPTION Gravel backfill Triple Tube with moderately thin bed of hard dark grey CLAY Screened from with thin bed of hard dark grey CLAY at 8.4m, with thin bed of hard dark grey CLAY 1.0m to 10.5m 100 26 at 8.55m, CF Bays Fransitional East Coast SPTat 9.0 9.0-9.23m SPT SPT 43/50 for 75mm at 9.22-10.30m, 6JN PL R3-4 Sample 4 N>50 75-90 Disturbed at 9.45m, CF 9.5 9,23-9,65n at 9.56-9.69m, 2JN PL R3-4 90° 85 with very thin fine sand infill 100 _CLAY, dark grey. Hard, moist, high plasticity 10.0 slightly weathered, dark grey SILTSTONE; Very weak, with 83 SPT at 10.5-10.28m enosely spaced to very closely spaced thin to very thin beds of fine grained SANDSTONE at 10.4m, with moderately thin bed of fine sand 2221 10.5 SPT SP 22/50 for 125mm EOB at 10.5m. Target Depth. N>50 11.0 12.0 12.5 13.0 15.0 15.5 Sandstone Drilling Fluid: Comments: Topsoil Plutonio water Siltstone No Core Fill LANDER Checked: Organic Clay Limestone PL Rig: Driller: Silt Pumice Drillforce Truck Volcanic







0-3.9m

3.9-7.5m 7.5-10.5m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH11
20/2	Ardmore	compiled:	date:
title:	MH11 Photo Summary - 0.0-10.5m	PL	21.04.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH12 Project Location: SUNFIELDS ARDMORE Sheet 1 of 4 Vane Head: Logged By: Processor Start Date: 19.04.21 Job Number: J01627 1750 PL RZ Finish Date: 19.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater (%) Piezometer Stratigraphy Borehole Vane Dial / Sensitivity & SPT RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth **DEFECTS** CORE DESCRIPTION TOPSOIL **Friple Tube** Lockable toby - fibrous PEAT, black. Soft, moist, medium plasticity Bentonite seal 0.5 20 1.0 Groundwater level measured 30.04.21: 1,30m 1.5 2.0 47 Undifferentiated Alluvium -becoming wet 3.0 SPT at SPT 3.0-3.45m 0/0/4 Gravel backfill N=4 3.5 Screened from 1.0m to 30.0m 48 4.0 4.5 Sample 1 5.0 Disturbed 4.8-5.3m 47 5.5 6.0 SPTat SPT 6.0-6.45m 0/0/0 N=0 6.5 24 7.0 87 Sandstone Drilling Fluid: Plutonic Comments: Topsoil water No Core Fill Siltstone LANDER Checked: Clay Limeston PL Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: ARDMORE DEVELOPMENTS LIMITED Machine Borehole No. MH12 Project Location: SUNFIELDS ARDMORE Sheet 2 of 4 Vane Head: Logged By: Processor Start Date: 14.04.21 Job Number: J01627 1750 PL RZ Finish Date: 14.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Ground R.L Groundwater 8 Borehole Stratigraphy Piezometer Vane Dial / Sensitivity & SPT RQD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) DEFECTS CORE DESCRIPTION Triple Tube 8.5 87 Undifferentiated Alluvium 9.0 SPT at 9-9.45m silty CLAY with minor fine sand, SP black. Soft, wet, medium plasticity 0/1/0 N=1 amorphous PEAT, black. Soft, wet, medium plasticity 9.5 48 10.0 fibrous PEAT, black. Soft, wet, medium plasticity 10.5 11.0 0 Gravel backfill Screened from 1.0m to 30.0m 12.0 **SPT at** SPT 12-12.45m silty CLAY with trace fine sand, grey/blue. Firm, moist, 0/0/0 - medium to high plasticity N=0 12.5 at 12.45, becoming brown/grey, without sand 100 becoming blue/grey 13.0 with trace woody inclusions Puketoka Formation with trace fine sand - organic stained silty CLAY, black/dark grey. Firm, - moist, medium plasticity 100 fibrous PEAT, black. Soft, moist, medium plasticity silty CLAY with minor fine sand, blue. Soft, moist, 15.0 medium plasticity SPTat SP 15-15.45m 0/0/0 N=0 15.5 without sand 100 Drilling Fluid: Sandstone Comments: Topsoil Plutonio water Fill Siltstone No Core LANDER Checked: Clay Limestone PL Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH12 Project Location: SUNFIELDS ARDMORE Sheet 3 of 4 Vane Head: Logged By: Processor Start Date: 19.04.21 Job Number: J01627 1750 PL RZ Finish Date: 19.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Stratigraphy Borehole Piezometer Vane Dial / Sensitivity & SPT ROD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) DEFECTS CORE DESCRIPTION silty CLAY with minor fine sand, blue. Soft, moist, Triple Tube medium plasticity, with minor fine sand 8 100 17.5 sandy CLAY with minor fine silt, blue/grey. Soft, moist, medium plasticity SPTat slightly clayey SAND, dark grey. Stiff, moist, no SPT 18-18.45m plasticity 2/2/0 N-2 18.5 becoming clayey SAND Formation 19.0 86 Gravel backfill - becoming white, low plasticity, dilatant becoming dark grey Screened from silty CLAY, with trace fine sand, grey/blue. Very 1.0m to 30.0m stiff, moist, medium plasticity 20.0 100 - with minor fine sand, white streaked black 20.5 21.0 SPTat 21-21,45m 4/4/5 N=9 8 becoming grey 22.0 with trace woody inclusions - 22.5 23.0 86 silty CLAY, blue. Very stiff, moist, medium plasticity 23.5 clayey SAND, grey/blue. Very stiff, moist, low plasticity Drilling Fluid: Sandstone Plutonic Comments: Topsoil Sand water Fill Siltstone No Core LANDER Checked: Organio Clay Limestone PL Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH12 Project Location: SUNFIELDS ARDMORE Sheet 4 of 4 Vane Head: Logged By: Processor Start Date: 19.04.21 Job Number: J01627 1750 PL JM Finish Date: 19.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater/ 8 Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION Triple Tube SPTat 24.0-24.45m SPT 4/4/5 silty CLAY with trace fine sand, dark blue streaked blue. Very N=9 stiff, moist, medium plasticity 8 25.0 25.5 26.0 8 Formation with minor fine sand 26.5 with trace fine sand Puketoka SPT at 27.0-27.45m SPT becoming brown/grey, without fine sand 1/2/2 Gravel backfill N=4 vith trace fine sand - 27.5 Screened from 1.0m to 30.0m with some fine sand 100 -becoming blue, without fine sand 28.0 28.5 slightly clayey SILT, blue/grey. Hard, moist, lowto no plasticity 29.0 93 with alternating beds of slightly clayey SILT and silty CLAY 29.5 EOB at 30.0m. Target Depth. SPTat SPT 30.0-30.45m 7/13/21 N=34 - 30.5 31.0 31.5 Sandstone Drilling Fluid: Plutonio Comments: Topsoil Sand water Fill Gravel Siltstone No Core LANDER Checked: Organic Clay Limestone PL Driller: Rig: Silt Drillforce Truck Pumice Volcanic







0-6.8m

6.8-12.45m

12.45-15.2m







15.2-18.0m

18.0-21.2m

21.2-24.2m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH12-A
	Ardmore	compiled:	date:
title:	MH12 Photo Summary - 0.0-24.4m	PL	19.04.21





24.2-27.1m 27.1-30.0m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH12-B
	Ardmore	compiled;	date:
title:	MH12 Photo Summary - 24.4-30.0m	JM	19.04.21

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH13 Project Location: SUNFIELDS ARDMORE Sheet 1 of 4 Vane Head: Logged By: Processor Start Date: 20.04.21 Job Number: J01627 1750 PL RZ Finish Date: 20.04.21 Drilling Method & Casing Sample and Laboratory Test Details mE Groundwater/ Ground R.L 8 Borehole Stratigraphy Piezometer Vane Dial / Sensitivity & SPT RQD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth **DEFECTS** CORE DESCRIPTION TOPSOIL **Friple Tube** Lockable toby fibrous PEAT, black. Soft, moist, medium plasticity Bentonite seal 0.5 30 1.0 Groundwater level measured 30.04.21: PT1 Ы Push Tube 1.0-1.5m 1.5 clayey SAND with trace silt, brown, Soft, moist, no to low plasticity fibrous PEAT, black. Soft, moist, low plasticity 2.0 99 2.5 Undifferentiated Alluvium becoming wet, medium plasticity 3.0 SPTat SPT 3.0-3,45m 0/0/0 Gravel backfill N=0 3.5 Screened from 1.0m to 30.0m 48 4.0 4.5 becoming brown/black 5.0 with moderately thin bed of clayey SAND, brown. Soft, moist, 100 low plasticity 5.5 with moderately thin layer of wood 6.0 SPTat SPT 6.0-6.45m 0/0/0 N=0 6.5 sandy CLAY, white mottled dark brown. Soft, moist, no to low 86 7.0 - plasticity 7.5 fibrous PEAT, black. Soft, wet, medium plasticity 96 Sandstone Drilling Fluid: Comments: Topsoil Sand Plutonic water Fill Siltstone No Core LANDER Checked: Clay Organio PL Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH13 Project Location: SUNFIELDS ARDMORE Sheet 2 of 4 Vane Head: Logged By: Processor Start Date: 20.04.21 Job Number: J01627 1750 PL RZ Finish Date: 20.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater 8 Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer RQD (%) Recovery (Location: Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION Triple Tube 96 8.5 9.0 SPT at 9.0-9.45m SP 0/0/0 N=0 9.5 93 10.0 10.5 Undifferentiated Alluvium amorphous PEAT, black. Soft, wet, medium plasticity 11.0 93 Gravel backfill Screened from 1.0m to 30.0m fibrous PEAT, black. Soft, wet, medium plasticity 12.0 SPTat SPT 12.0-12.45m 0/0/0 N=0 12.5 8 13.0 PT2 Push Tube Ы 13.5-14.0 0 15.0 SPTat SP 15.0-15.45m organic stained silty CLAY, black streaked brown. Very stiff, 0/0/0 moist, high plasticity N=0 15.5 slightly pumiceous silty SAND, brown, Loose, moist, no 48 _ plasticity, dilatant Sandstone Drilling Fluid: Comments: Topsoil Plutonio water Fill Siltstone No Core LANDER Checked: Clay Limestone PL Rig: Driller: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH13 Project Location: SUNFIELDS ARDMORE Sheet 3 of 4 Vane Head: Logged By: Processor Start Date: 20.04.21 Job Number: J01627 1750 PL RZ Finish Date: 20.04.21 Drilling Method & Casing Sample and Laboratory Test Details mΕ Ground R.L Groundwater 8 Stratigraphy Borehole Vane Dial / Sensitivity & SPT Piezometer ROD (%) Recovery (Location Description: Refer to site plan Orientation: vertical Depth (E) **DEFECTS** CORE DESCRIPTION Triple Tube 48 with minor pumiceous inclusions, with minor organic 9 17.5 32/2 - 16.0 pumiceous SILT with minor sand, white. Very loose, SPTat moist, no plasticity, quick SPT 8.0-18.45m 14/1/0 N=1 19.0 0 Gravel backfill 19.5 Screened from 1.0m to 30.0m silty CLAY, blue/grey. Stiff, moist, high plasticity, with trace organic inclusions 20.0 47 20.5 21.0 SPT at 21-21.45m SPT becoming blue streaked brown/grey 0/0/2 becoming blue 100 22.0 becoming brown mottled grey/blue, with minor organic -22.5 -staining 23.0 8 becoming light blue/grey 23.5 Sandstone Drilling Fluid: Plutonic Comments: Topsoil Sand water Fill Siltstone No Core LANDER Checked: Organic Clay Limestone PL Driller: Rig: Silt Drillforce Truck Pumice Volcanic

Client: Machine Borehole No. ARDMORE DEVELOPMENTS LIMITED MH13 Project Location: SUNFIELDS ARDMORE Sheet 4 of 4 Vane Head: Logged By: Processor Start Date: 20.04.21 Job Number: J01627 2153 JM RZ Finish Date: 20.04.21 Sample and Laboratory Test Details Drilling Method & Casing mE Ground R.L Groundwater 8 Borehole Stratigraphy Piezometer Vane Dial / Sensitivity & SPT 8 Recovery Location: Description: Refer to site plan Orientation: vertical ROD (E) **DEFECTS** CORE DESCRIPTION silty CLAY, light blue/grey. Very stiff, moist, high Triple Tube SPTat plasticity, with trace carbonaceous inclusions, minor SPT 24-24.45m 0/3/4 organic staining N=7 Sample 4 Disturbed 24.55-25.05m 00 25.0 becoming grey, with thin bed of organic staining 25.5 fine to medium SAND, grey. Loose, moist, no 26.0 Formation 75 CLAY with trace fine to medium sand, grey. Stiff, 26.5 moist, high plasticity, moderately sensitive at 26.5m, with very closely to closely spaced thin to moderately thin beds of fine to medium sand 52/14 3.8 SPTat SP 27-27.45m 5/5/10 Gravel backfill N=15 - 27.5 Screened from 1.0m to 30.0m silty CLAY, grey. Hard, moist, medium to high plasticity, with occasional very thin beds of fine to 100 UTP ─coarse sand ─at 27.9m, with thin bed of fine of white silty clay 28.0 with thin bed of white silty clay 28.5 29.0 9 silty CLAY, grey. Firm, moist, medium plasticity, moderately sensitive 29.5 37/8 4.8 EOB at 30.0m. Target Depth. SPTat SPT 30-30.45m 1/2/3 - 30.5 N-5 31.0 31.5 Sandstone Drilling Fluid: Comments: Topsoil Sand Plutonio water Fill Gravel Siltstone No Core LANDER Checked: Organic Clay Limestone Rig: Driller: PL Silt Drillforce Pumice Truck Volcanic







25.1-28.7m

28.7-30.0m



client:	Ardmore Developments Limited	project no:	figure no:
project:	Sunfields	J01627	Figure MH13-B
	Ardmore	compiled:	date:
title:	MH13 Photo Summary - 25.2-30.	n PL	20.04.21

r	ent ojec e Le	•				Rig		ctor	: Pro-Drill SLG Willie			Sta	rt Da	ID: ate:	15/	627 12/202 12/202
Te:	st L	ocation: See plan ed By: Site plan/map				Co		nate	S: Not set			Grid	d:	NZ	ZTM	1
(III)	Geology	Material Description	Depth (m)	Graphic Log	In Situ Testing SPT blows/75mm Shear vane peak/residual	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method		RQD (%)	E 1	Progress Fluid Lvi. Had	Backfill/
	TS	Clayey SILT, with trace sand and gravel; brown. Firm; moist; low plasticity; sand, fine, gravel, fine;		18 4 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	44 / 22 kPa					-	Open Barrel	100				Bentonite
		moderately sensitive; with trace rootlets. 0.80m: becoming dark brown/grey, without rootlets			72 / 22 kDa						Open Barrel	70				Bentonite
		1.00m: becoming stiff 1.20m: with trace rootlets	- 1 - 		73 / 23 kPa					1-	Open Barrel	56				1.0
		Organic silty CLAY; dark brown/grey. Firm; wet; high plasticity. Fibrous PEAT; dark brown/grey. Soft; wet; low		W	0/0//0/0/0/0 N = 0						SPT	100				0000
'- - - -	Undifferentiated Alluvium	plasticity to no plasticity; insensitive. 2.10m: with thin buried log 2.25m: with thin buried log	_2_							- 2 -	Open Barrel	100				
-	Undiffer	2.80m: with trace fine to medium gravel for 100mm Organic stained silty CLAY; brown mottled light grey. Stiff; wet; high plasticity; with woody	_3_		17 / 13 kPa 0/0//0/0/0/0 N = 0					_ 3 .	SPT	95				17 Sec. 07 17 Sec. 0
		Amorphous PEAT; dark grey/brown. Soft; wet; low plasticity; insensitive. 4.00m: with thin buried log	4 -							- - - - - - - -	Open Barrel	100				Gravel
-					20 / 15 kPa 0/0//0/0/0/0 N = 0						SPT	90				
-	Puketoka Formation	Organic clayey SILT; brown/grey. Stiff; wet; low plasticity; with carbonaceous inclusions 5.60m: with thin bed of light pumiceous silt	5	× × ×						_ 5 .	Open Barrel	90				
e		Clayey SILT, with trace sand; green/grey. Stiff; moist; low plasticity; sand, fine; moderately sensitive. rks: Lockable toby installed.		* * * * * * * * * * * * * * * * * * *	73 / 20 kPa		DATE 02/20		LEVEL REMARK	Ho		epth:	:	In	ıclir	ation
			IZG							Lo	gge	d By: DS		С	hec	ked B

(DE DEVELOPMENT ENGINEERING		E	BORE	10)L	.E	LOG			Hole	e N(114
ro	ent:	t: Geotechnical Investigation				Rig	j:	ctor	SLG			Sta	rt Da	ate: 1	01627 5/12/20:
es	st L	ocation: Sunfields Landholding, Ardmore ocation: See plan				Co		nate				Grid	d:	NZ	
		ed By: Site plan/map	(c)	Log	In Situ Testing		vati	Defect Spacing	Not set	ē	Drilling Method	Dat		Time	oth E
,	Geology	Material Description	Depth (m)	Graphic Log	SPT blows/75mm Shear vane peak/residual 0/0//1/1/1/2	Strength	Weathering	Defect S	Defects and Drilling Remarks	Depth (m)	Drilling	TCR (%)	RQD (%)	Sampling	Backfill/
		Clayey SILT, with some sand; light grey/blue. Very stiff; moist; sand, fine; low plasticity to non-plastic. 6.45m; becoming hard, with some fine to medium			N = 5						SPI	100			0.03
		SAND 7.00m: with thin laminations of dark blue/grey coarse / sand	7-							7	Open Barrel	100			
		7.40m: with some fine to coarse SAND; with trace / carbonaceous inclusions			UTP 2/1//3/3/3/5 N = 14					-	SPT	100			
	tion		_8_							- 8	Open Barrel	100			
	Puketoka Formation		9 -		UTP 1/1/1/2/2/3 N = 9					9	TAS	100			Gravel
		Silty SAND, with some gravel; blue/grey. Medium dense; moist; non-plastic; sand, fine to coarse; gravel, fine.								_10	Open Barrel	100			
-		SILT, with some sand and gravel; grey/blue. Medium dense; moist; non-plastic; sand, fine to medium, gravel, fine.			UTP 1/2//3/3/4/4 N = 14					-	Tds	100			50
		Clayey SILT, with some gravel; grey/blue. Hard; moist; low plasticity; gravel, fine.	_111_	スペススを選集						-	Open Barrel	81			
eı	mar	rks: Lockable toby installed.			PIEZO 1		DATE 02/20		LEVEL REMARK 1.15	Ho		epth : 3.00	:	Inc	lination 90.00
										10	aae	d By:		Ch	ecked B

((DE		E	BORE	10)L	Ε	LOG			Ho	e No		H1	1
112	ent	Sunfield Developments Limited						ctor	,			Pro	ioot			
	ent ojec	•				Rig		ctor	SLG					ID:		627 12/2022
		ocation: Sunfields Landholding, Ardmore ocation: See plan				1	ller:	nate	Willie			End Gri			<u>16/</u> ZTM	12/2022
		ed By: Site plan/map				1	vati		Not set			1	u. um:	: G	roun	
					In Situ Testing			gu			D D				Fluid Lvi.	
RL (III)	Geology	Material Description	Depth (m)	Graphic Log	SPT blows/75mm Shear vane peak/residual 6/11//11/11/13/13	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)		Progress Flu	Backfill/ Installation/
					N = 48						SPT	0				
		Clayey SILT; blue/grey. Hard; moist; low plasticity.									Triple Tube	82				
			_13.							_13.						
											Triple Tube	95				
			_14.	X X X X X X X X X X X X X X X X X X X	7/11//13/8/5/8 N = 34					_14.	SPT	0				
		Silty SAND; blue/grey. Medium dense; moist;									35					
-	a Formation	non-plastic.	_15_							15.	Triple Tube	29				Gravel
	Puketoka										F					
					3/4//5/4/4/7 N = 20						SPT	100				
:			_16_							_16.						
		Silty SAND, with some clay; blue/grey. Hard; moist; low plasticity. 16.80m: with trace clay									Triple Tube	100				
-		is south that dade sky	_17_		7/8//11/13/13/13 N = 50					_17.	SPT	100				
		17.60m: with moderately thin bed of moderately / strong; slightly weathered; grey; SANDSTONE Silty CLAY; brown/grey. Hard; moist; high									Triple Tube	94	22			
-		plasticity.			DIEZO		DATE		LEVEL REMARK					Щ		ŝ
е	ma	rks: Lockable toby installed.			PIEZO 1		DATE 02/20		LEVEL REMARK 1.15	Ho		epth 3.00		Ir		ation: 90.00
	_		_	_						Lo	gge	d By		c		ked By
1a	teri	als are described in general accordance with leption of Soil and Rock' (2005).	NZG	S 'Fi	eld							DS INAL		\perp		JM eet 3 o

li	ent:	Sunfield Developments Limited			BORE		ノL ntra					Pro	iect	M :ID:	H1	
ro	ojec	t: Geotechnical Investigation				Rig	j:		SLG			Sta	rt D	ate:	15/	12/202
		ocation: Sunfields Landholding, Ardmore ocation: See plan				1	ller: ordi		Willie s:			End			<u>16/</u> ZTM	12/202 I
		ed By: Site plan/map				1	vati		Not set			_	u. um:	Gı	roun	
ווון)	Geology	Material Description	Depth (m)	Graphic Log	In Situ Testing SPT blows/75mm Shear vane peak/residual	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)	F	Progress Fluid Lvi. https://dice.com/	Backfill/
-	Transitional East Coast Bays Formation	Moderately weathered; grey/brown; SILTSTONE moderately strong.			5/12//26/20 for		MW		18.20m: 2 Joint , 80-90°, Undulating-/ planar, smooth.		Triple Tube	94	22			
1	ast Coast E	Silty SAND; grey/blue. Dense; moist; non-plastic.	<u> </u>		5mm N = 50+					- · - ·	SPT	0				
8-	Transitional E	Clayey SILT, with trace sand; grey/blue. Hard; moist; low plasticity; sand, fine. Slightly weathered; grey; SILTSTONE; strong; sand, fine.	19_			200				19	Triple Tube	83	54			
02-			20_		12/15//16/13/14/7 for 35mm N = 50+	vw				20_	SPT	0				o c
17-	East Coast Bays Formation Bedrock	Slightly weathered; grey; fine fabric; SANDSTONE; strong.					sw		20.60m: 1 Joint, 20°-60°, irregular, smooth. 20.70m: 1 Joint, 80°-90°, planar to irregular, smooth. 20.78m: 1 Drilling induced fracture, 90°, planar, polished 21.00m: 1 Drilling induced fracture, 90°, planar, polished 21.05m: chaotic fracture 21.33m: 1 Drilling induced fracture, 90°, planar, polished	21 -	Triple Tube	100	41			Gravel
	East Coas				18/32 for 60mm N = 50+	MS			21.40m: 1 Joint, 80°- 90°, planar to / irregular, smooth.		SPT	0				
77-			22_						21.85m: -21.95m: 2 Joints, 80°-90°, planar, smooth. 22.30m: -22.55m: Chaotic fracture	_22_	Triple Tube	86	46			
57-		Slightly weathered; grey; fine fabric; SILTSTONE; strong. EOH: 23.00m	23_		17/33 for 60mm N = 50+				planar, smooth.	_23_	SPT	0				8.0 BOOK
Re	mar	'ks: Lockable toby installed.	ļ :		PIEZO 1		DATE 02/20		LEVEL REMARK 1.15	Но		epth 3.00		In		ation:
										Lo	gge	d By		С		ked B
_		als are described in general accordance with	NZC	C IE	ald					I		DS		- 1		JM



Hole No.: MH14 Project ID: J01627

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0.00m - 3.00m



3.00m - 6.00m

Section of the sectio



Hole No.: MH14 Project ID: J01627

Page 2 of 4



6.00m - 9.00m



9.00m - 12.00m

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Hole No.: MH14 Project ID: J01627

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12.00m - 17.00m



17.00m - 21.00m

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Hole No.: MH14 Project ID: J01627

Page 4 of 4



21.00m - 23.00m

Pro Sit	e L	t: Sunfield Developments Limited ct: Geotechnical Investigation cocation: Sunfields Landholding, Ardmore Location: See plan			Rig Dri	j: Iler:	ctor:	: Pro-Drill SLG Willie s:			Sta	rt Da Dat		01627 6/12/202 6/12/202
RL (III)	Geology		Depth (m) Graphic Log	In Situ Testing SPT blows/75mm Shear vane peak/residual		Weathering	Defect Spacing	Not set Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)		Sampling Progress Time O	Backfill/
	TS	TOPSOIL. Clayey SILT, with trace sand; dark grey streaked dark brown. Stiff; moist; low plasticity; sand, fine;	15 45 15 15 15 15 15 15 15 15 15 15 15 15 15	73 / 20 kPa					- - -	Open Barrel	92			Bentonite
]		moderately sensitive; with some rootlets. 0.50m - 1.00m: Core loss							-	Open Barrel	0			Bentonite
-		Amorphous to fibrous PEAT; dark grey/brown. Firm; moist; insensitive; non-plastic.		22 / 15 kPa					- ' -	Open Barrel	52			1.0
-		Clayey SILT; brown/orange. Soft; moist; high plasticity; insensitive; with some carbonaceous inclusions. Amorphous to fibrous PEAT; dark grey/ brown. Soft; moist; insensitive; non-plastic. 1.95m: with moderately thin buried log	2	0/0//0/0/0/0 N = 0						SPT	100			050.050
	E			v V					-	Open Barrel	76			50 00 00 00 00 00 00 00 00 00 00 00 00 0
-	Undifferentiated Alluvium		- 3	15 / 10 kPa 0/0//0/0/0/0 N = 0					_ 3 .	SPT	100			vel
	ņ	4.00m: becoming amorphous PEAT	4						_ 4 _	Open Barrel	82			Gravel
-		4.40m: with some woody inclusions to 4.5m		15 / 12 kPa 0/0//0/0/0/0 N = 0					5.	SPT	100			
		5.40m: with some woody inclusions to 5.5m		22 / 15 kPa						Open Barrel	67			
e	ma	arks: Lockable toby installed.	i i i	PIEZO 1		DATE 02/20		LEVEL REMARK		3	epth: 0.50			ination 90.00
	iter	ials are described in general accordance with N ription of Soil and Rock' (2005).	IZGS 'I	Field					Lo		d By: S/ML		Che	cked B JM

-	1	AND DEVELOPMENT			BORE				,					MH	
r	ient ojed	ct: Geotechnical Investigation				Rig	j:		: Pro-Drill SLG			Star	t Dat		5/12/202
		ocation: Sunfields Landholding, Ardmore Location: See plan					ller: ordi	nate	Willie			End Grid		e: 19 NZT	9/12/202 M
.0	cat	ed By: Site plan/map				Ele	vati	on:	Not set	\perp		Datu	ım:	Grou	th
וער (וווו)	Geology	Material Description	Depth (m)	Graphic Log	In Situ Testing SPT blows/75mm Shear vane peak/residual 0/0//0/0/0/0 N = 0	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)	Sampling Time	
		6.40m: becoming amorphous to fibrous PEAT									- SPI	100			0
		6.90m: with moderately thin bed of pumiceous sand	7.							7.	Open Barrel	100			
		Pumiceous silty SAND; light brown/grey. Loose; moist; non-plastic; sand, fine to coarse; insensitive.		-	29 / 15 kPa 0/0//2/3/3/2 N = 10						SPT	100			200
8-	T.	Organic stained clayey SILT; grey/green. Stiff; moist; low plasticity; with trace rootlets.	8.	**************************************						- 8 .	Open Barrel	100			
6-	Undifferentiated Alluvium	Amorphous PEAT; dark grey/brown. Stiff; moist; insensitive; non-plastic.	9.		73 / 29 kPa 0/0//0/0/0/0 N = 0					9.	SPT	100			Gravel
-10			_10_							_10.	Open Barrel	0			
				1,34,4,34,	0/0//0/0/0/0 N = 0					-	SPT	100			0 08 0
-11		11.30m: becoming fibrous PEAT — 11.50m: with moderately thin buried log —	-11		UTP					-111.	Open Barrel	0			
Re	ma	rks: Lockable toby installed.			PIEZO 1		DATE '02/20		LEVEL REMARK		3	epth: 0.50 d By:		_	ination: 90.00
Мa		als are described in general accordance with Niption of Soil and Rock' (2005).	NZG	S 'Fi	eld					L	D	S/ML INAL			JM heet 2

1	16	s ENGINEERING												MH	
rc	ent: ojec	ct: Geotechnical Investigation				Co		ctor	: Pro-Drill SLG						01627 6/12/202
		ocation: Sunfields Landholding, Ardmore ocation: See plan				 	ller: ordi	nate	Willie Willie			End Grid		e: 19 NZT	9/12/202 гм
		ed By: Site plan/map			1	t	vati		Not set			Datu		Gro	und
,	Geology	Material Description	Depth (m)	Graphic Log	In Situ Testing SPT blows/75mm Shear vane peak/residual 0/0//1/0/0/0 N = 1	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)	Sampling Progress Time	Fluid LVI.
-	/inm	12.40m: with some woody inclusions to 12.45m 12.45m: becoming amorphous to fibrous PEAT								-	SPT	100			
	Undifferentiated Alluvium	13.00m: with some woody inclusions	_13_	1,3,31,4,4,44,14 1,3,4,41,4,41,41						_13_	Open Barrel	90			
		13.50m: becoming firm; moderately sensitive Silty CLAY; light grey. Firm; moist; high plasticity.		10 to	44 / 12 kPa 0/0//0/0/0/0 N = 0						SPT	100			
			14							_14_					
		14.20m: becoming grey		*							Open Barrel	100			
		14.70m: with moderately thin bed of black amorphous PEAT Pumiceous SILT; light grey/white. Dense; moist; non-plastic; with trace organic staining.	15_		UTP										avel
			13		3/4//6/7/10/11 N = 34						SPT	100			Grav
	Puketoka Formation	15.45m - 15.95m: Core loss	16_							16_	Open Barrel	52			
		16.50m: becoming medium dense			0/0//2/4/6/6 N = 18						SPT	100			
										17	Open Barrel	100			
					PIEZO		DATE		LEVEL REMARK	-	Triple Tube	100			
e	maı	rks: Lockable toby installed.			1		02/20		1.16	\dashv	3	epth: 0.50			lination: 90.00
			IZG							Lo		d By: S/ML		Che	ecked B

Cli	ient	t: Sunfield Developments Limited			BORE							Proi	ect		H15		
r	oje	ct: Geotechnical Investigation		Contractor: Pro-Drill Rig: SLG							Project ID: J01627 Start Date: 16/12/2022						
		ocation: Sunfields Landholding, Ardmore Location: See plan		_	ller: ordi	nate	Willie			End			: 19/12/2022 NZTM				
		ed By: Site plan/map				1	vati		Not set			Date		Gro	ound		
NE (III)	Geology	Material Description	Depth (m)	Graphic Log	In Situ Testing SPT blows/75mm Shear vane peak/residual	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)	Sampling Time ©	Fluid Lvl.		
)					0,			J i i i	-	Triple Tube	100	<u></u>	<u> </u>	30000000		
		18.50m: becoming very loose			0/0//0/0/0 N = 0					- - -	SPT	100			0.00		
		Organic stained clayey SILT, with trace sand; grey. Stiff; moist; medium plasticity; sand, fine; with thin bed of brown organic silty clay.	_19_							_19.	-				8000		
		Organic silty CLAY; brown. Stiff; moist; high plasticity.		**************************************						- - - -	Triple Tube	100			3.00		
-		Organic stained clayey SILT, with trace sand; grey. Stiff, moist; medium plasticity; sand, fine. Clayey SILT; grey. Very stiff; moist; medium plasticity; with organic inclusions.	20_	10 A	0/0//0/1/1/2 N = 4					_20.	SPT	100					
	Puketoka Formation	Clayey SILT, with some sand; green/grey. Hard; moist; sand, fine to medium; low plasticity to non-plastic; with trace pumiceous inclusions.	21_							21.	Triple Tube	92			Gravel		
					4/5//15/24/11 for 30mm N = 50+					-	SPT	73					
		21.90m: becoming green; without sand	22								Triple Tube	92					
		Sandy SILT; green. Loose; moist; non-plastic; sand, fine to medium; with trace pumiceous inclusions.	23_		4/3//2/1/2/1 N = 6					_23.	SPT	0			US 23:0 US 23:0 U		
		23.60m: with trace coarse sand								-	Triple Tube	100					
е	ma	rks: Lockable toby installed.			PIEZO 1		DATE 02/20		LEVEL REMARK 1.16	Ho		epth: 0.50		Inc	lination 90.00		
										Lo		0.50 d By :		Ch	ecked E		
lo	teri	ials are described in general accordance with N	NZG	S 'Fi	eld							S/ML			JM		

(DEVELOPMENT ENGINEERING		E	BORE							Hol		M	H1	
Client: Sunfield Developments Limited Project: Geotechnical Investigation Site Location: Sunfields Landholding, Ardmore Test Location: See plan						Contractor: Pro-Drill Rig: SLG Driller: Willie Coordinates:						Project ID: J01627 Start Date: 16/12/20 End Date: 19/12/20 Grid: NZTM				2/2022 2/2022
RL (III)	Geology Geologia	ed By: Site plan/map Material Description	Depth (m)	Graphic Log	In Situ Testing SPT blows/75mm Shear vane	Strength El	Weathering	Defect Spacing	Not set Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)	Time D	Progress Fluid Lvi. Hade	Backfill/ Installation/
-	<u>o</u>	material Description		9	peak/residual	Š	8	Δ.	Dillillig Reliains	-	Triple Tube D	100	<u>«</u>	Ö		B
			25		0/1//0/1/2/2 N = 5						SPT	100				
97-		Clayey SILT, with some sand; green/grey. Stiff; moist; low plasticity to non-plastic. Organic stained clayey SILT; dark grey. Tiff;									Triple Tube	100				
		moist; low to no plasticity. Pumiceous SAND; grey. Medium dense; moist; non-plastic; sand, coarse.	26	*	4/5//7/6/8/7 N = 26					_26	SPT	100				
	Formation	Clayey SAND; grey. Very stiff; moist; low plasticity; sand, coarse.									Triple Tube	100				
-	Puketoka Fc	Pumiceous SAND; grey. Very dense; wet; non-plastic; sand, coarse.	27							_27.	Triple Tube	100				Gravel
			28	28	3/5//11/12/17/10 for 35mm N = 50+						SPT	91				
		Clayey SILT; grey. Hard; moist; low to non-plastic; with trace pumiceous coarse sand.								-	Triple Tube	100				
			29_		6/8//7/7/7/8 N = 29					- _29. -	SPT	0				
		29.45m: becoming green/grey; without coarse / pumiceous sand	1 .							-	Triple Tube	100				
		rks: Lockable toby installed.			PIEZO 1		DATE 02/20		LEVEL REMARK 1.16	╙	3 gge	epth 0.50	:			ation: 90.00 ced By
		als are described in general accordance with the ption of Soil and Rock' (2005).	ΝZG	SS 'Fi	eld							S/ML INAL			She	JM eet 5 of

1	D		OREHOLE LOG									Hole No.:						
	NO DEVELOPMENT	BORE										MH15						
Client:	Sunfield Developments Limited				1		ctor	: Pro-Drill SLG							627			
Project: Geotechnical Investigation Site Location: Sunfields Landholding, Ardmore Test Location: See plan Located By: Site plan/map					Rig Dri	ller:		Willie			Start Date : 16/12/2022 End Date : 19/12/2022							
					Coordinates:						Grid: NZTM Datum: Ground							
Located	д Бу. Эне ріаніппар			In Situ	Lie	Vali		Not set		_	Dai	um		Depth	iu			
RL (m) Geology	Material Description	Depth (m)	Graphic Log	Testing SPT blows/75mm Shear vane	Strength	Weathering	Defect Spacing	Defects and Drilling Remarks	Depth (m)	Drilling Method	TCR (%)	RQD (%)	Sampling	Progress Fluid Lvi. ga	Backfill/ Installation/ Groundwater			
RL (m) ketoka Formati Geology	material Description		9	peak/residual	S	S	0	Dinning Remarks		Triple Tube D	100	R	S	Ь	Gravel B			
	EOH: 30.50m		FAS.	5/5//7/8/12/12 N = 39					-									
7-		31_							_31_	SPT	0							
ξ _γ -		_32_							_32_									
			-															
-33		_33_	-						_33_									
			-						-	-								
									-									
- 34		34_	-						_34_	1								
										1								
-32		35							35_									
			-															
			-						-	-								
Remark	ss: Lockable toby installed.	1	<u> </u>	PIEZO 1		DATE 02/20		LEVEL REMARK 1.16	Но	le D	epth 0.50		I	nclir	nation: 90.00			
		.,							Lo	gge	d By S/MI		C	Chec	ked By: JM			
Material: Descript	s are described in general accordance with tion of Soil and Rock' (2005).	NZG	SS 'Fi	eld							INAL		+	Sh	eet 6 of 6			



Hole No.: MH15 Project ID: J01627

Page 1 of 5



0.00m - 4.00m



4.00m - 7.30m

20 Habit 20 2000/00/00 0 00 Habit 20 00 Habit 20 10 Habit 20 Ha



Hole No.: MH15 Project ID: J01627

Page 2 of 5



7.30m - 11.45m



11.45m - 14.70m

70,573,000,000,000,000,000,000,000,000



CORE PHOTOS

Hole No.: MH15 Project ID: J01627

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14.70m - 17.40m



17.40m - 20.45m

MBH 30 2000/2000 40:E7:95



CORE PHOTOS

Hole No.: MH15 Project ID: J01627

Page 4 of 5



20.45m - 24.65m



24.65m - 27.00m



CORE PHOTOS

Hole No.: MH15 Project ID: J01627

Page 5 of 5

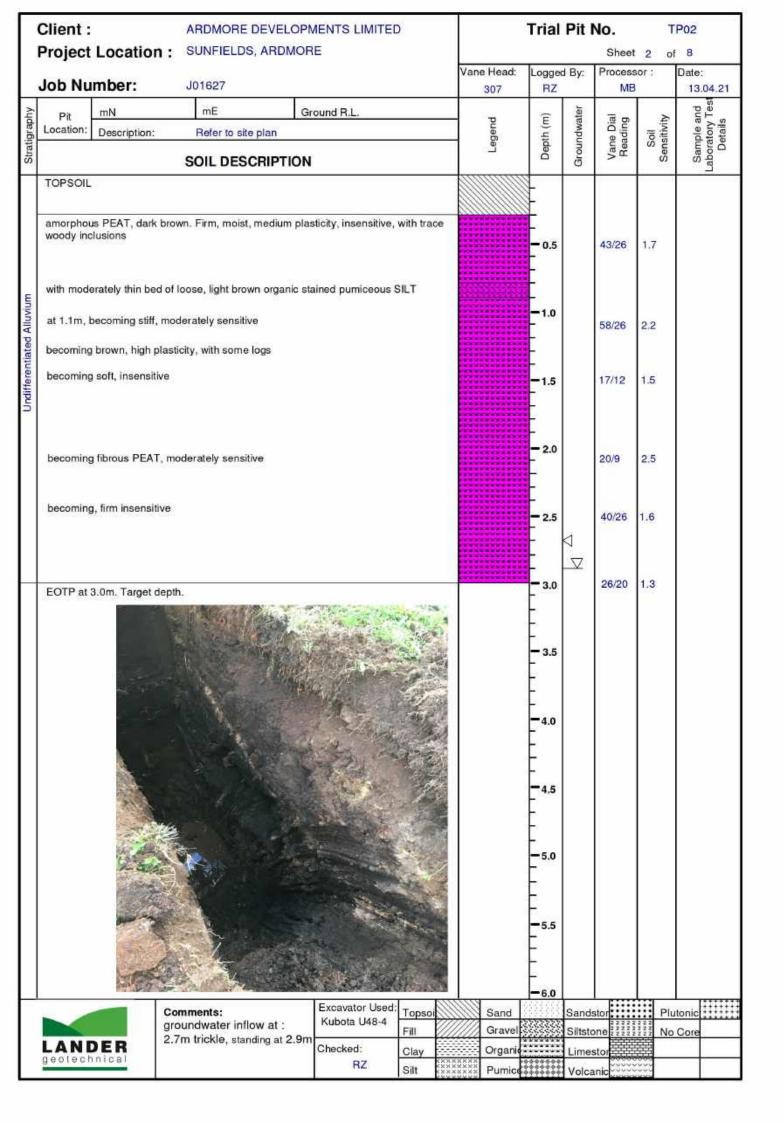


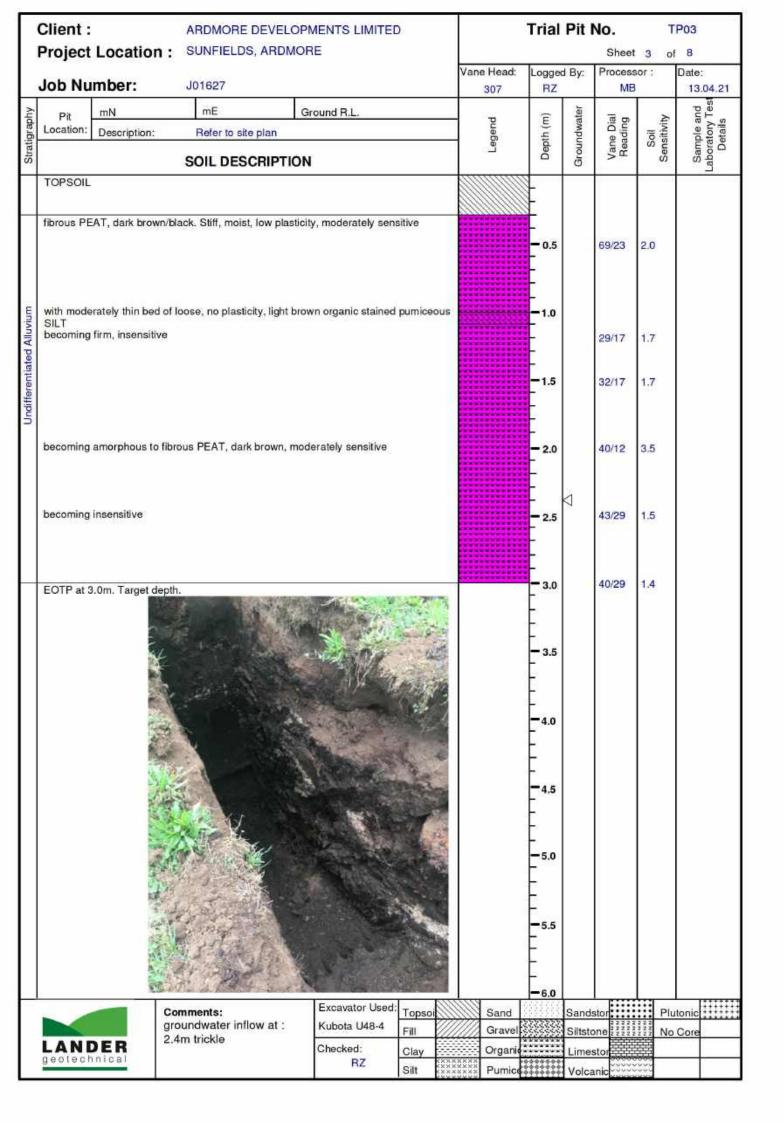
27.00m - 30.50m

APPENDIX 3.3 TRIAL PIT RECORDS



	Client :		ARDMORE DEV	ELOP	MENTS LIMITED)			Trial	Pit N	No.	Т	P01
	Project	Locatio	n: SUNFIELDS, AF	RDMOR	E						Sheet	1 of	8
	Job Nu		101007					Head:	Logged	Ву:	Process		Date:
	JOD NU	mber:	J01627				_	307	RZ		MB		13.04.21
sphy.	Pit	mN	mE		ound R.L.			P	Ê	vater	ial og	jį	and y Te Is
Stratigraphy	Location:	Description:	Refer to site plan	n			-	Legend	Depth (m)	Groundwater	Vane Dial Reading	Soil	mple rator Jetai
Stre			SOIL DESCRI	PTION					Pa	G.	× c	Se	Sample and Laboratory Test Details
	TOPSOIL	ĵi											19
	clayey SIL	T, brown/red	. Stiff, dry to moist, low pl	asticity			100		t l				
	_		k brown. Firm, moist, med		eticity inconcitivo				-				
	organio si	ny ozniny dan	K Stown: 1 mm, moray mes	aidiii pid	story, moonorave				- 0.5		46/20	1.8	
Undifferentiated Alluvium									t l				
Allu	amorphou	s to fibrous F	PEAT, black. Firm, wet, m	edium p	lasticity, insensitiv	e			F				
iated									- 1.0				
erent									-	◁	46/20	1.8	
ndiff	organic st	ained numice	ous fine sandy SILT, ligh	t brown	Very lonse wet r	10	100		F				
_	plasticity,	insensitive	ous line sandy OLET, ngm	i Diowii.	very loose, well, i				- 1.5		40/26	1.6	
	amorphou sensitive.	is to fibrous f with moderal	PEAT, black, Soft, wet, motely thin buried log	edium pl	asticity, moderate	ly			- 1	◁			
									- 2.0	◁	20/6	3,5	
									-			131,000	
	becoming	amorphous l	PEAT						F	∇			
Ц	ē.						-		- 2.5		70/40	1.9	
	EOTP at	2.6m. Too ha	ard to excavate further du	e to tree	remains.				-				
		70	N MAR S	No. of	A CINETON		8		ΓI				
		1		.	264	712			3.0				
			A STATE OF THE STA			China China			-				
			The second second				9		Ē				
			No.						- 3.5				
				4	Was In		1		-				
			B. C.			1	3		F				
		=	- *				4		-4.0				
			24	1	新	Te let			-				
		1			1 3 77	4	A STATE OF THE STA		F				
					1000	40	1		4.5				
					100				-				
		3 6	a.				2		Γ.				
			1/2/				e e		-5.0				
			7 A.		E C	Section 2	8		- 1				
									F				
		1/3		1		1	•		-5.5				
			N. A.	1		TO STATE OF	-		Εl				
						X	8		-				
		224		6	Excavator Used:		IIIIIIIA		-6.0			:::	[:::::::
			Comments: groundwater inflow a	t:	Kubota U48-4	Tupsuit		Sand Gravel	222322	Sands	22222	222	tonic
	LAND	ER	1.2m trickle, 1.7m tri	ckle,	Checked:	Fill Clay		Organic		Siltsto	2555	ZZZ No	Core
	geotech	nical	2.0m medium flow, s at 2.4m and rising	tanding	RZ	Silt	XXXXXXX XXXXXXXX	Pumice		Volca	22222	555	





	Client :		ARDMORE DEVE	LOPMENTS LIMITE	D			Trial	Pit I	No.	Т	P04
	Project Lo	ocatio	n: SUNFIELDS, ARD	MORE						Sheet	4 of	8
	lab Num	hav.	101007			Va	ne Head:	Logge	d By:	Process		Date:
_	Job Num	ber:	J01627	_		-	307	RZ		MB		13.04.21
phy	Pit m		mE	Ground R.L.			P	Ê	Groundwater	lial 99	ı́£	Sample and Laboratory Test Details
Stratigraphy	Location: De	escription:	Refer to site plan				Legend	Depth (m)	nd w	Vane Dial Reading	Soil Sensitivity	ator ator etail
Stra			SOIL DESCRIPT	TION			1	De	Gro	Na Va	Ser	San
	TOPSOIL											
	clavov SILT by	rown/rod	Firm, dry to moist, low plast	icitu moderatelu sensiti	ivo		accesses to					
	ciayey SIL1, bi	iowijied.	i am, dry to moist, low plast	icity, moderatery serisit	ive			E				
								- 0.5		40/14	2.8	
	organic silty Cl	AY, dark	brown. Firm, wet, medium ;	plasticity, moderately						10.000/s10.00	i de la constantina	
	sensitive, with	some woo	ody inclusions	PO-36 NOO #18 NOO A 16 OO OO #0.0				F				
								-				
rium	at 1.2m, with th	nin bed of	very loose, no plasticity, lig	ht brown organic staine	d			- 1.0				
Alluv	pumiceous fine			clasticite sendencial		200		t		46/20	2.3	
Undifferentiated Alluvium	sensitive		AT, black. Firm, wet, medic	an plasticity, moderatel	У			-				
entie	at 1.45m, with	some burie	ed logs					- 1.5		43/14	3.0	
diffe	becoming fibro	us PEAT						-				
5						111						
								- 2.0				
								Ė		29/14	2.0	
								-			1.00001	
								– 2.5		o se de Salvanes d	er(1.00	
	becoming inse becoming satu								1	26/17	1.5	
	occoming said	a diod						-	7			
			deten					L.,				
H	at 3.1m, become EOTP at 3.1m					a de la		3.0		49/9	5.7	
	LOTT GIO. III	. raigot a	THE SALES DAVIS	MARION /				Ė				
			3					F				
					,			3.5				
					Marie .			F				
								F				
					最高	0		4.0				
								-				
						3		Ė				
								-4.5				
			25	To the				ļ.				
								-				
						8		-5.0				
			100									
			4		2			F				
			The state of the s		533			- -5.5				
						3		F 5.5				
				2000	THE WAY			F				
				A No.	1			-				
_			- Contraction	Excavator Used		anni	1 !	-6.0			 	[::::::
			Comments: groundwater inflow at :		Topsoi Fill		Sand Gravel	2555555	Sands	22222	222	Core
	LANDE	R	2.7m	Checked:	Clay	4444	Organic		Limes	2250	ZZZ NO	Core
	geotechni	cal		RZ	Silt	**************************************	Pumice		Volca	00000	/000	*
	100		la contraction of the contractio	in the second	Appendix.	*******		ALLEY T		- III	-	

1	Client :		ARDMORE DEVE	LOPMENTS LIMITED)		Trial	Pit I	No.	Т	P05
	Project	Locatio	n: SUNFIELDS, ARD	MORE					Sheet	5 of	8
ű	Job Nu	mber:	J01627			Vane Head: 307	Logge	d By:	Process MB		Date: 13.04.21
hy	Pit	mN	mE	Ground R.L.		12	0	ter	-		Test
Stratigraphy	Location:	Description:	: Refer to site plan			Legend	Depth (m)	Groundwater	Vane Dial Reading	Soil Sensitivity	Sample and Laboratory Test Details
Strat			SOIL DESCRIPT	TION		9	Dep	Groun	Van	Sen	Sam abore D
	TOPSOIL		0012 02001111								
	organic eil	ty CLAV dar	k brown. Stiff, moist, mediu	m placticity with trace w	nady		1				
	inclusions				Joury		ŧ				
-			eous SILT, light brown. Loos PEAT, black. Soft, wet, med				- 0.5		14/14	1.0	
	000 177 NA # 100 pare						F				
Ε											
lluviu	becoming	stiff, modera	tely sensitive				-1.0		83/29	2.9	
ed A							F				
Undifferentiated Alluvium	becoming	soft, insensit	ive						17/12	1.5	
iffere							- 1.5			11.0	
Pun							F				
							- 2.0		17/12	1.5	
	becoming	fibrous PEAT	Γ, brown				-	2			
							F	N			
	becoming	firm					– 2.5		32/20	1.6	
							-				
	becoming	sensitive					F				
\dashv		.0m. Target	depth.				3.0		26/6	4.5	
			2000 A THE	All bo	网络		-				
							F				
				12-49			3.5				
				All Sales			F				
				No.	A SERVICE		F				
				1 11			4.0				
					4		Ł				
							-				
				ALC: NOT			4.5				
							Ė				
							-				
				*	1		-5.0				
							Ė				
							F				
			H. Y. H.				-5.5				
			第一个	a sub	CAL		F				
				The Bank			ie Teway		Classe.		
			Comments:	Excavator Used:	Topsoi	Sand	-6.0	Sand	UTP	DI.	tonic
			groundwater inflow at :	[1000] The State of the Control of t	Fill	Gravel		Siltsto	22222	222	Core
	LAND geotech	DER	2.3m dripping	Checked:	Clay	Organio		Lime	2250	噩	
	90000	in oai		RZ	Silt Silt	Pumice		Volce	nic	200	

- 9	Client :		ARDMORE DE	VELOP	MENTS LIMITED)			Trial	Pit I	No.	Т	P06
7	Project	Location	1: SUNFIELDS, AI	RDMOR	RE						Sheet	6 of	8
ŭ	Job Nu	mber:	J01627				Van	e Head: 307	Logged	Ву:	Process MB		Date: 13.04.21
		mN	mE	C.	ound R.L.		\top			T			
Stratigraphy	Pit Location:	Description:			ound H.L.			Legend	Depth (m)	Groundwater	Vane Dial Reading	Soil Sensitivity	Sample and Laboratory Test Details
tratig							7	Leg	Dept	roun	/ane Rea	Sc	amp porat Del
S	TOPSOIL		SOIL DESCRI	PTION			1			Ō		0)	E co
			AY, orange mottled light	brown. \	Very stiff, moist, m	edium to		HIHH	1				-
J-1-10	high plast	icity, sensitive							_ _ 0.5 _		115/29	4.0	
Undifferentiated Alluvium	amorphou trace root	us PEAT, dark lets	s brown/grey. Stiff, moist	, medium	n plasticity, insensi	tive, with			- 1.0 - -		55/29	1.9	
Undifferen	becoming	g firm, modera	itely sensitive						- - 1.5 - - -		40/14	2.8	
	with mode SILT	erately thin be	d of loose, no plasticity,	light brov	wn organic stained	pumiceou	s		- - 2.0 - - -		29/12	2.5	
	becoming	soft, insensit	ive						- - 2.5 - -	∇	17/12	1.5	
\dashv	EOTP at	3.0m. Target	depth.				-	******	3.0		37/26	1.4	
	EOIPat	3.Um. Target			Excavator Used:				- 3.5 - 3.5 - 4.0 - 4.5 - 5.0 			n.	
	LAND		Comments: groundwater inflow a - 2.1m gushing, stan 2.7m and rising		Kubota U48-4 Checked: RZ	Topsoi Fill Clay	N N N N N N H M M M M M H M M M M M	Sand Gravel Organic Pumice		Sands Siltsto Limes Volca	stor	222	Core

1	Client :		ARDMORE DE	EVELOP	MENTS LIMITED)		Trial	Pit I	No.	Т	P07
	Project	Location	1: SUNFIELDS,	ARDMOF	RE					Sheet	7 of	8
ŭ	Job Nu	mber:	J01627				Vane Head: 307	Logge	d By:	Process MB		Date: 13.04.21
ýL	Pit	mN	mE	G	round R.L.		175-0)	ter			nd Test
Stratigraphy	Location:	Description:	Refer to site pi				Legend	Depth (m)	Groundwater	Vane Dial Reading	Soil Sensitivity	Sample and Laboratory Test Details
Strat			SOIL DESCR	RIPTION			ت ا	Dep	Grou	Var	Sen	Sarr aborr D
\exists	TOPSOIL	ë.						-				
	woody inc	lusions	AY, brown. Very stiff, n		300 ST 100 S			0.5		167/32	5.3	
Undifferentiated Alluvium	with trace	woody inclusion		high plas	licity, moderately s	ensitive,		- 1.0 - -		55/20	2.7	
Undiffere	becoming	ı soft, insensiti	ve					- 1.5 - - -	◁	17/12	1.5	
								- 2.0 - - - -		17/12	1.5	
	becoming	g moderately s	ensitive					- 2.5 - -		12/6	2.0	
	silty CLA	√, grey. Soft, s	aturated, high plasticit	y, modera	tely sensitive			3.0	V	12/6	2.0	
	EOTP at	3.2m. Target o	depth		WHEN SE	11 to 11 16 16 16 16 16 16 16 16 16 16 16 16		Ē		120	2.0	
						1.7		- 3.5 -				
						Far -		4.0				
								-				
					1			- - 4.5				
								-				
								-5.0				
				- 4				E				
								- -5.5				
			1		The second			- - -6.0				
			Comments:	DOLUMNUS .	Excavator Used:		Sand	999999	Sand	stor	Plu	tonic
	LAND	DER	groundwater inflow 1.6m heavy flow, st at 3.0m and rising		Kubota U48-4 Checked:	Fill Clay	Gravel Organic		Siltsto Limes	75777	iii No	Core
	geotech	nical	at 5.011 and fishig		MI.	Silt (XXX	Pumice		Volca	22222	555	

- 9	Client :		ARDMORE DEVE	LOPMENTS LIMITE	D			Trial	Pit I	No.	Т	P08
200000	Project	Locatio	n: SUNFIELDS, ARD	MORE						Sheet	8 of	8
	1-5-51		Vertical and a			Van	e Head:	Logged	d By:	Process		Date:
	Job Nu	mber:	J01627	T.		_	307	RZ		MB		13.04.21
yhy	Pit	mN	mE	Ground R.L.			TO	Ê	ater	[B]		Sample and Laboratory Test Details
igra	Location:	Description	: Refer to site plan				Legend	Depth (m)	wpu	Vane Dial Reading	sitivi	atory etail
Stratigraphy			SOIL DESCRIPT	TION			9	Dep	Groundwater	Var	Soil Sensitivity	Sam
007000	TOPSOIL	-	JOIL DESCRIPT	1014		1111	,,,,,,,,,,		0			
	(0,000							1				
Undifferentiated Alluvium	becoming	wet soft, insensi	ck. Firm, moist, medium plas itive no plasticity, brown organic		itive, with			- 0.5 - 0.5 - 1.0 - 1.5 - 1.5 - 2.0 - 2.5		37/17 40/20 23/14 29/1.7	2.2 2.0 1.6	
					¥1000 c	7.7		-		30000		
Н		becoming firn 2.9m. Target	n, moderately sensitive, with depth.	some buried log inclus	ions		********	-		37/17	2.2	
								- 3.0 				
			Comments: No groundwater inflow	Excavator Used	Topsoil		Sand	*****	Sands	22222	222	tonic
	LANI	EB	No groundwater milow	The second second	Fill		Gravel		Siltsto	2000	ZZZ No	Core
	LANI geotech	nical		Checked:	Clay	KKSKKKK	Organic		Limes	00000	 	7 39
	7			RZ	Silt	XXXXXXX	Pumice	*****	Volca	nic	~~~	

APPENDIX 3.4 HAND AUGER BOREHOLE RECORDS



Client: ARDMORE DEVELOPMENTS LIMITED Project Location: SUNFIELDS ARDMORE					Aug	er Bo	oreho	le No.		HA01
Project Location	n : SUNFIELDS								Sheet 1	of 34
lab Manakan				Vane H		Logge	7.57	Process		**************************************
Job Number:	J01627			30	7		RZ	RZ	12	.04.21
Borehole mN		ound R.L.			Œ	Standing Water Level	Vane Shear(kPa) peak / residual	lity.	Sample	and
Location: Description	: Refer to site plan			Legend	Depth (m)	andi ter L	Vane sar(k k/res	Soil Sensitivity	Laborator	// Other
	SOIL DESCRIPTION			2	۵	Wa	Spea	Sel	Deta	
_ TOPSOIL					-					
silty CLAY, red mottled of [RESIDUAL EAST COAS	orange. Very stiff, moist, medium pi ST BAYS FORMATION]	lasticity, moderate	ely sensitive	1-1-1-1-1-1 1-1-1-1-1-1 1-1-1-1-1-1 1-1-1-1-1-1 1-1-1-1-1-1-1	- - - - 0.5		173/69	2.5		
becoming light grey mott	led orange				- 0.5 - - -		173/69	2,3		
					- 1.0 -		178/83	2.1		
becoming insensitive					- - - 1.5		118/78	1.5		
-					- - - 2.0		109/60	1.8		
					-					
					- 2.5 - - -		101/60	1.7		
_ clayey SILT, light grey m - -	ottled orange. Hard, moist, low pla	sticity			- 3.0		201+			
- - - - becoming grey					- - 3.5 -		201+			
<u>-</u>					- -4.0 -		201+			
					- 4.5 -		201+			
EOB at 5.0m. Target dep	oth				_ 5.0		201+			
					- - - - 5.5					
					- - - - -6.0					
	Comments:	Borehole Diameter:	Topsoil	Si	and		Sandstone		Plutonic	
	Groundwater not encountered.	50mm	Fill	//// G	ravel		Siltstone	222222	No Core	
LANDER geotechnical	UTP = unable to penetrate. EOB = end of borehole.	Checked: RG	Clay	XXXXX	ganic -	*****	Limestone		ğ	3
			Sin 222	XXXXX PU	annua P	*****	Volcanic	200000	Y)	

Client :		ARDMORE DEVELOPM	IENTS LIMITE	D		Aug	er B	oreho	le No.	E.	HA02
Project	Locatio	n: SUNFIELDS							3	Sheet 2	of 34
lab No		ARDMORE			Vane F		Logge	7.87	Process	7.0	
Job Nu	mber:	J01627			17	50		,r	RZ	12	2.04.21
Borehole	mN		ound R.L.			Œ	Standing Water Level	Vane Shear(kPa) peak / residual	vity	Sample	e and
Location:	Description	: Refer to site plan			Legend	Depth (m)	tandi ter L	Vand ear(k k / res	Soil Sensitivity	Laborator Te	y / Other
		SOIL DESCRIPTION				Δ	s w	SPea	Se	Deta	
TOPSOIL						-					
 silty CLAY, o sensitive, wi 	orange streak th trace tops	ked light grey. Hard, moist, mediun oil leaching [RESIDUAL EAST CO	n plasticity, mode AST BAYS FORI	rately MATION]		Ė					
					1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	- - 0.5		220/85	2.6		
 without tops 	oil leaching				2-2-0-2-0-2-0 2-2-0-0-0-0-2-1 2-0-0-0-0-0-0-0 2-0-0-0-0-0-0-0	- 0.5		220/03	2.0		
5 5						_					
 becoming hi 	gh plasticity				0 - 2 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -	١.,		235/119	2.0		
<u>-</u>						- 1.0		233/113	2.0		
						Ε.					
					3-2-8-3-3-8-1 3-3-8-3-3-8-1 3-2-8-3-2-2-1	٠					
						- 1.5		270+			
becoming or	ange streake	ed grey, medium plasticity			0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-	Ė					
- becoming hi	것님 이렇게 되었는데 뭐요.	***				-		CECUEUSAS	SME V		
becoming ve	ery stiff, inser	nsitive			3-3-6-0-2-1- 3-3-6-0-2-1- 3-3-6-0-2-1-	- 2.0		169/96	1.8		
-					(1-2-1-0-1-2-2-1 (1-2-1-0-1-2-2-1 (1-2-1-0-1-2-2-1	_					
-					11-2-10-2-11-2-1 11-2-10-2-11-2-1 11-2-10-2-11-2-1	-					
-					(3 - 5 - 8 - 5 - 7 - 8 - 8 - 1 (3 - 5 - 6 - 6 - 6 - 8 - 1 (3 - 5 - 6 - 6 - 6 - 5 - 2 - 1	- 2.5		169/104	1.6		
-					3 -3 -0 -0 -0 -3 -5 - 3 -3 -5 -0 -5 -5 -5 -	Ė					
-						-		10000000			
 becoming lig 	ht grey and o	orange streaked orange/brown			1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	- 3.0		181/96	1.9		
					3-3-0-0-3-2-1 3-3-0-0-3-2-1	_					
					1-1-1-0-1-1-1 1-1-1-0-1-1-1 1-1-1-0-1-1-1	-					
-					3+3+4+0+4+3+1 1+3+3+0+3+3+1 1+3+3+0+3+3+1 2+3+3+0+3+3+1	- 3.5		181/96	1.9		
silty CLAY, o	dark grey. Ha	rd, moist, medium to high plasticity	, insensitive [TR	ANSITIONA	VL 555555						
EAST COAS	ST BAYS FO	RMATION]				F					
-						- 4.0		227/127	1.8		
					2-2-2-2-2-2-1 2-2-2-2-2-2-1 2-2-2-2-2-2-	Ŀ					
en Edge					0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-	-					
becoming ve	ery stiff				1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	4.5		196/135	1.5		
						-					
at 5.0m, bec	omina hard					F					
EOB at 5.0m	The state of the s	th			Sependentel	-5.0		239/154	1.6		
-						-					
-											
						- 5.5					
<u> </u>						-					
-											
-		4	-			-6.0				.,	
		Comments:	Borehole Diameter:	Topsoil	}}}}}	and	555555	Sandstone		Plutonic	
LAND	ED	Groundwater not encountered. UTP = unable to penetrate.	50mm Checked:	Fill Clay	2222	ravel		Sittstone	777777	No Core	
geotech		EOB = end of borehole.	RG RG	Clay Sint SX	XXXXXX	ganic :		Limestone	55555	<u> </u>	
				- 28 28	XXXXXX	e	*****	Volcanic	200000	95	

Client :	ARDMORE DEVELOPM	IENTS LIMITE	D	(8	Aug	er Bo	oreho	le No	. +	1A03
Project Location	1: SUNFIELDS							8	Sheet 3	of 34
Job Number:	ARDMORE J01627			Vane H		Logge	d By: PL	Process RZ	1 22	: 2.04.21
Borehole mN	mE Gro	ound R.L.			6	je j	a)	,	Westersta	50500Y
Location: Description:	Refer to site plan			Legend	Depth (m)	nding r Lev	ane rr(kP	oil	Sampl Laborator	y / Other
	SOIL DESCRIPTION			Leg	Deb	Standing Water Level	Vane Shear(kPa) peak / residual	Soil Sensitivity	Te Det	st
TOPSOIL					-					
	ked light brown. Hard, moist, low t SIDUAL EAST COAST BAYS FOR		city,		- - - - 0.5		204/58	3.5		
silty CLAY, orange and br insensitive becoming orange streaked	own streaked light grey. Very stiff, d light grey, high plasticity	, moist, medium į	plasticity,		- - - -1.0		177/104	1.7		
					- - - 1.5 -		169/96	1.8		
- - - - becoming orange streaker	d light brown				- - - 2.0 -		169/96	1.8		
becoming drange streaker becoming light grey streaker					- - - 2.5 - -		154/96	1.6		
becoming light grey stream	led of ange				- -3.0 -		104/65	1.6		
 silty CLAY, dark grey. Har COAST BAYS FORMATION 	d, moist, medium plasticity, insend DN]	sitive [TRANSITI	ONAL EAST		- - 3,5 - -		212/162	1.3		
- becoming very stiff, moder - -	rately sensitive				- - 4.0 - -		162/62	2.6		
becoming hard					- -4.5 -	,	227/104	2.2		
EOB at 5.0m, Target dept	n.			1-1-000-0-1-1	- 5.0 -		270+			
					- - - - - - - - - - -					
	Comments: Groundwater not encountered.	Borehole Diameter: 50mm	Topsoil Fill	Sa Gr			Sandstone Sittstone	227222	Plutonic No Core	
	UTP = unable to penetrate. EOB = end of borehole.	Checked: RG	Clay	CKKKKK	ganic mice		Limestone Volcanic			

Client: ARDMORE DEVE	ELOPMENTS LIMITE	D		Aug	er Bo	oreho	le No.		HA04
Project Location : SUNFIELDS ARDMORE								Sheet 4	of 34
Job Number: J01627			Vane I		Logge	7.57	Process		
	1		19	900		RG	RZ	1	2.04.21
Borehole Location: Description: Refer to site plan	Ground R.L.			Ê	Standing Water Level	Vane Shear(kPa) peak / residual	vity	Samp	le and
Location: Description: Refer to site plan			Legend	Depth (m)	stand ater I	Van near(ak / re	Soil Sensitivity	Te	ry / Other est
SOIL DESCRIPT	ION			_ <u>_</u>	8 8	P S	Se	Det	ails
- TOPSOIL				-					
** - *				#					
fibrous PEAT, dark brown/black. Firm, moist, low pla	asticity, moderately sens	sitive	-	+					
[UNDIFFERENTIATED ALLUVIUM]				- 0.5		49/25	2.0		
5(- 1				-					
*				-		0445			
				-1.0		34/15	2.3		
 becoming saturated with moderately thin bed of brown/grey pumiceous S 	SILT, loose, wet, low plas	sticity		ţ					
	n de la controllà est esta esta de està da este esta e la come esta esta esta esta en esta esta esta esta esta	woode t	122000	-					
becoming insensitive				- 1.5		37/28	1.3		
2) 2)				ţ					
eri - North Company March of State				ŀ		-0400000	DOMINIC.		
becoming soft				2.0		22/12	1.8		
≟: -:				t					
				-			********		
becoming stiff -				- 2.5		61/49	1.2		
•) •:				t	V				
EOB at 2.9m. Too hard to auger further. Inferred tre	e root/stump.			-	,	UTP			
	6			-3.0					
				Ė					
•				Ł					
5				- 3.5					
2) 				t					
- 0				ļ.					
= ::				-4.0					
•(=:				Ė					
S.A.				-					
- -				- 4.5					
				Ė					
				-					
<u> </u>				- 5.0					
<u>+.</u> <u>2</u> 0				Ė					
# 6									
				- 5.5					
-				Ė					
•									
Comments:	Borehole Diameter:	Topsoil	111111111111111111111111111111111111111	-6.0		Sandstone		Plutonic	
Groundwater encountered		Fill	}}}}}	aravel 2		Sandstone	222222	No Core	
LANDER 1.2m.	Observation		HHHH		CANCEL AND A		22777	#	*
geotechnical OTF = unable to penetrate	e Checked:	Clay	0	rganic	e se remente se se	Limestone	1	쳒	

Client :	ARDMORE DEVE	LOPMENTS LIMITE	D		Aug	er Bo	oreho	le No.		HA05
Project Locatio	n: SUNFIELDS ARDMORE									5 of 34
Job Number:	J01627			Vane F		Logge	7.57	Process)ate:
T	1	The same and the		19	00		RG .	RZ		12.04.21
Borehole mN Location: Description:	l mE	Ground R.L.		9	(E)	ling	he KPa) sidual	_ vity	Sa	mple and
Location: Description:		E 100 //		Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak / residual	Soil Sensitivity		atory / Other Test
	SOIL DESCRIPTI	ON		_	L.	∞ ≥	Ø €	Š	-	Details
_ TOPSOIL					-					
=: =:					-					
fibrous PEAT, dark brown	n/black. Firm, moist, low plas	sticity, moderately sens	itive		L.,		27/45	0.5		
[UNDIFFERENTIATED A	LLUVIUM]			22220	- 0.5		37/15	2.5		
5					_					
-					-1		0.100			
					- 1.0		31/9	3.4		
 with moderately thin bed becoming wet 	of stiff, light brown/grey pum	iceous SILT			Ė					
					-					
 becoming soft, insensitive 	Э				- 1.5		18/12	1.5		
<u> </u>										
=					F					
 becoming firm, moderate 	ly sensitive				- 2.0		31/12	2.6		
-					-					
 becoming stiff, insensitive)				- 2.5		52/31	1.7		
T: R: T:W wi No 1879 (0 8:00)					-					
 becoming saturated, with 	limited sample recovery									
 becoming firm 					-3.0		31/18	1.7		
					-					
 becoming stiff 					- 3.5		65/43	1.5		
					Ė					
- becoming firm, moderate	ly sensitive				- 4.0		31/12	2.6		
-					_					
-										
		NOTE: 1402-1403			- 4.5		UTP			
 EOB at 4.5m. Too hard to 	auger further. Inferred tree	root/stump.			-					
					- -5.0					
					2					
					- -5.5					
					-					
-					-					
-					- -6.0					
	Comments:	Borehole Diameter:	Topsoil	s //////	and		Sandstone		Pluto	nio :::::::
	Groundwater encountered	at 50mm	Fill	////// G	ravel		Siltstone	222222	No C	*******
LANDER	2.8m. UTP = unable to penetrate	Checked:	Clay		ganic	******	Limestone		Ė	
gootechinoa	EOB = end of borehole.	RG	Siit	XXXXXXXX PL	umice H		Volcanic	555555	ÿ)	

Client :	ARDMORE DEVELOR	MENTS LIMITE	D		Aug	er Bo	oreho	le No	•	HA06
Project Locatio	n: SUNFIELDS ARDMORE			-				8	Sheet	6 of 34
Job Number:	J01627				Head: 07	Logge	7.5	Process		te: 12.04.21
3347	1			3	1		RZ	RZ		12.04.21
Borehole Location: Description		Ground R.L.		- P	(m)	ding	ne (kPa)	il ivity	Sam	ple and
Description		1		Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peek residual	Soil Sensitivity	1	ory / Other est
	SOIL DESCRIPTION						Se	S	D	etails
_ TOPSOIL					1					
 silty CLAY, orange mottle FORMATION] 	ed light grey. Hard, moist, mediur	n plasticity [PUKE]	TOKA	11111						
					- 0.5		201+			
-				14-1-15-1-15 14-1-15-1-15 15-16-15-16-16	ŧ					
5) 					L					
becoming very stiff, mode	erately sensitive			4 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 -	-1.0		176/63	2.8		
				23333	Į.					
_ clayey SILT, light brown. -	Very stiff, moist, low plasticity, m	oderately sensitive	9		t					
					- 1.5		196/92	2.1		
 becoming brown, mediun 	Commence of the Commence of th				F			1-555		
 becoming wet, with trace 	Imonite				ţ					
organic silty CLAV dark	brown. Stiff, wet, high plasticity, r	noderately sensitiv	/e		- 2.0		86/26	3.3		
	otomic out, not, night places, , ,	noderatory contents								
-					_					
 becoming insensitive 					- 2.5		60/32	1.9		
•										
= - = -										
 becoming moderately ser 	nsitive				- 3.0		52/26	2.0		
2										
EOB at 3.3m. Too sticky	to auger further.				F					
					- 3.5					
-: -:					ţ					
- 0					=					
-					-4.0					
=0 ₹1					Ė					
- A					Ł.,					
5					-4.5					
					F					
= ¹					-5.0					
2)					-					
					F					
					- -5.5					
					£ 3.3					
-					-					
	Z	25			-6.0			11224-13-0 137		-, -
	Comments:	Borehole Diameter:	Topsoil		Sand		Sandstone	e	Plutonic	
LANDES	Groundwater not encountered. UTP = unable to penetrate.	50mm	Fill	444444	Gravel		Siltstone	222222	No Con)
LANDER geotechnical	EOB = end of borehole.	Checked: RG	Clay	XXXXXXXX	Organic		Limeston	· 5555	ğ	+
-		(1,000)	Siit	XXXXXXXX E	Pumice M		Volcanic	330000	Ų.	

Client :	ARDMORE DEVELOPM	MENTS LIMITE	D		Aug	er Bo	oreho	le No		HA07
Project Location	n: SUNFIELDS ARDMORE							88	Sheet 7	of 34
Job Number:	J01627			Vane H		Logge	7.87	Process		e: 2.04.21
1	T	LANGUA RANGLIO DE L		17	50		L	RZ		2.04.21
Borehole mN Location: Description	- Annon-	ound R.L.		_ ₂	Œ	Standing Water Level	Vane Shear(kPa) peak / residual	- vity		ole and
Location: Description				Legend	Depth (m)	Standater	Var near sak / re	Soil Sensitivity	Т	ory / Other est
50000000000000000000000000000000000000	SOIL DESCRIPTION				н	″≥	20 g	Š	De	tails
TOPSOIL										
slightly clayey SILT, orange [PUKETOKA FORMATION PUKETOKA FORMATION PUKETOKA FORMATION PUKETOKA PUKETO	ige streaked light grey. Hard, moist DN]	t, no to low plastic	city		- - - 0.5		270+			
silty CLAY, orange and w	rhite streaked grey. Hard, moist, m	edium plasticity			-					
becoming medium to hig	h plasticity				- 1.0 -		270+			
 becoming orange streake becoming insensitive 	ed grey, high plasticity				- - 1.5 -		208/169	1.2		
insensitive, with trace roo	Y, orange streaked purple/grey. Ve otlets e black carbonaceous streaks	ery stiff, moist, lov	w plasticity,		- - - 2.0 -		135/77	1.8		
warder rooteds, was the	e black carbonaceous streaks				- - - 2.5 -		100/77	1.3		
silty CLAY, grey/blue. Ve	ry stiff, moist, high plasticity, insen	sitive			- - -3.0		112/73	1.5		
becoming stiff					- - - 3.5 -		92/73	1.3		
6 - -					- - - 4.0		77/58	1.3		
becoming very stiff					- - - 4.5 -		100/65	1.5		
EOB at 5,0m, Target dep	oth				- - -5.0		108/77	1.4		
					- - - - - - - - - - -					
	Comments:	Borehole Diameter:	Topsoil	Si	ind		Sandstone		Plutonic	::::::
	Groundwater not encountered.	50mm	Fill	///// Gr	avel		Siltstone	222222	No Core	
LANDER geotechnical	UTP = unable to penetrate. EOB = end of borehole.	Checked: RG	Clay ××	XXXXXX	ganic	*****	Limestone		E C	
-		nu	Sift XX	XXXXXX Pu	mice e	*****	Volcanic	00000	Š)	

Client :	ARDMORE DEVELOPM	IENTS LIMITE	D		Aug	er Bo	oreho	le No.		HA08
Project Locatio	n: SUNFIELDS ARDMORE							33	Sheet 8	of 34
Job Number:	J01627			Vane F		Logge	7.57	Process		
T T	1 1	ALCON CURSO		17	50		,r	RZ	12	.04.21
Borehole MN Location: Description		ound R.L.		_ ₂	Œ	ling	le kPa) sidual	vity	Sample	and
Location: Description				Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak / residual	Soil Sensitivity	Laboratory Tes	t
	SOIL DESCRIPTION				L	"≥	20.5	ű	Deta	ils
_ TOPSOIL					-					
silty CLAY, light grey stre [PUKETOKA FORMATION	aked orange, Hard, moist, mediun	n plasticity, sensit	tive	1-1-1-2-2-1-1	_					
_				1-1-1-0-0-1-1-1 1-1-1-0-1-1-1-1 1-1-1-0-0-1-1-1-1	- - 0.5		208/39	5.3		
-							200,00	0.0		
 becoming orange streake 	d light grey				-					
-				8-8-8-0-0-6-8-8 8-8-8-0-6-8-8-8 8-8-8-0-6-8-8-8	- -1.0		208/39	5.3		
5.) -:				2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-						
 becoming high plasticity 										
 becoming insensitive 				1-1-1-1-1-1-1-1 1-1-1-1-1-1-1-1 1-1-1-1-1-1-1-1-1	- 1.5		208/119	1.7		
-				2-1-1-0-0-1-1-1 1-2-1-0-0-1-1-1			Section Colors	SATE:		
-										
 becoming very stiff, 				8 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 -	- 2.0		177/119	1.5		
<u>-</u> :				1-2-2-7-0-2-7-1 1-2-2-7-7-2-7-7						
-				22.000 22.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.0000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.000 24.00	_					
_				1 - 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	- 2.5		131/100	1.3		
.				-1-0-0-0-1	-					
=- =-				4.0-5.0-5.	20) 323					
1				1-1-1-1-1-1-1	- 3.0		131/85	1.5		
	-Margia Particulation			2-2-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1				2000		
 becoming orange streaker 	ed blue/grey				- 3.5		135/100	1.4		
					_					
	0.5844.00.0			-1-1-1-1-1	- Mariana			12121		
 becoming moderately ser 	nsitive				- 4.0		131/65	2.0		
					_					
_silty CLAY, dark grey. Har _FORMATION]	d, moist, high plasticity [TRANSITI	ONAL EAST CO	AST BAYS		<u>-</u>		270+			
5				2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-	- 4.5		210+			
-				2-2-1-2-1-1-1	E					
-	(O.,			2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-	- -5.0		270+			
EOB at 5.0m. Target dep	th									
<u>B</u>)					2					
<u>-</u>					- -5.5					
±7 ₹1					-					
-										
	(-	25	1 14		-6.0			112-2017		
	Comments:	Borehole Diameter:	Topsoil	}}}}}	and	cacce	Sandstone		Plutonic	
LANDED	Groundwater not encountered. UTP = unable to penetrate.	50mm	Fill	44444	ravel	******	Sittstone	111211	No Core	-
LANDER geotechnical	EOB = end of borehole.	Checked: RG	Clay S	KKKKKKK	ganic :	*****	Limestone	BEE	g	-
			Oin C	EXXXXX PL	ATTITUDE PO	*****	Volcanic	000000	Y .	

Client :	ARDMORE DEVELO	PMENTS LIMITE	D		Aug	er B	oreho	le No.	i.	HA09
Project Location			are to the second				Sheet	9 of 34		
Joh Number	ARDMORE Job Number: J01627 Borehole MN ME Ground R.L.							Process	or: D	ate:
1	1 1	7 42 0 549 500 445 445 445 0		- 1	900		RG	PL	- 1	12.04.21
Dotellois		Ground R.L.			(E)	ding	ne (kPa)	wity _	Sai	mple and
Location: Description		. 1		Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak / residual	Soil Sensitivity		atory / Other Test
	SOIL DESCRIPTION	N .					ശമ	Ø	- 1	Details
TOPSOIL					1					
					1					
fibrous PEAT, dark brow [UNDIFFERENTIATED	vn/black. Firm, moist, low plastic	city, moderately sens	sitive		0.5		37/12	3.1		
- becoming wet	ALLOVIOM				t		SPORTS CO.	17551)		
-					-					
 becoming insensitive 					-1.0		43/25	1.7		
=					Ė					
7					-					
					1.5		UTP			
_ COD at 1.5m, 100 hard*	to auger further. Inferred tree ro	oustump.			E		5.00			
_					t					
_					- 2.0					
-					Ļ					
-					Ł					
-					- 2.5					
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					E					
					-3.0					
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-					-4.0					
7. 51					F					
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-					-4.5					
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-					Ė					
25;					-5.0					
-					-					
_					F					
					- 5.5					
					F					
=: =:					ļ.					
-		-			-6.0			ļ		b + + + + + + + +
	Comments:	Borehole Diameter: 5. 50mm	Topsoil	>>>>>	Sand	555555	Sandston	9	Pluto	******
LANDER	Groundwater not encountered UTP = unable to penetrate.	Checked:	Fill	-		****	Sittstone	22222	No Co	ore
geotechnical	EOB = end of borehole.	RG	Sift	XXXXXXXX	rganic		Limestoni Volcanic	* 55555	<u> </u>	
-			227	******		****	Anicialic	NAME OF TAXABLE PARTY.	-	

Client :	ARDMORE DEVELO	OPMENTS LIMITE	D	Αι	ger B	oreho	le No.		HA10
Project Location	n: SUNFIELDS			5	5 ™ ##5 €20				10 of 34
Job Number:	ARDMORE J01627			Vane Head			Process	or: [Date:
	1			1900	_	RG	PL		12.04.21
Borehole Location: Description	mE Refer to site plan	Ground R.L.		Legend	Standing Water Level	Vane Shear(kPa)	Soil Sensitivity		mple and
Description				Legend	Stan	Vai hear eak/n	So		atory / Other Test
TORGOU	SOIL DESCRIPTIO	N			5	00 a	U)		Details
	n/black. Stiff, moist, low to me	dium plasticity, mode	rately						
_ sensitive [UNDIFFEREN	BN 1500 10명 역사 1600 1600 1600 1600 1600 1600 1600 160								
 with very thin bed of low with mottles of black PE 	plasticity, light orange/brown p AT intermixed	ourniceous SILT with r	minor clay,	- o	.5	61/28	2.2		
-:									
	nor clay, light brown/grey. Hard	d, moist, low plasticity	, with black						
PEAT intermixed EOB at 1.0m, Too hard to	to auger further, Inferred tree r	oot/stump.		_1	.о	UTP			
	· · · · · · · · · · · · · · · · · · ·	real control of the		-					
				l F					
				-1	.5				
_				lt					
- 9				<u> </u>	-22				
-				-2	.0				
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	Comments: Groundwater not encountered	Borehole Diameter:	Topsoil	Sand Gravel	(2)22222	Sandston	e	Pluto	
LANDER	UTP = unable to penetrate.	Checked:	Fill Clay	Organic	*******	Limestone	, 122227	Z (NO C	
geotechnical	EOB = end of borehole.	RG	Sitt XXXX	CXXXX Pumice		Volcanic	355555	Ų.	3 8

Client :	ARDMORE DEVELO	PMENTS LIMITE	D		Aug	er B	oreho	le No.		HA11
Project Locatio			3			N	Sheet	11 of 34		
Joh Number:	Job Number: J01627 Borehole MN mE Ground R.L.					Logge	7.57	Process	or: D	ate:
7	1 1	7 42 0.5 6 9 0.0 4 0 4 0 4 0 0 0 0 0		- 15	900		RG	PL		12.04.21
Doteriole		Ground R.L.		_ ₂	Œ	Standing Water Level	Vane Shear(kPa) peak / residual	vity –	Sar	nple and
Location: Description:				Legend	Depth (m)	Standater	Var near(sak / re	Soil Sensitivity		tory / Other Test
	SOIL DESCRIPTION	1			ь	∞,≥	20 g	ű	C	etails
_ TOPSOIL					}					
-					<u> </u>					
fibrous PEAT, dark brow	n/black. Firm, moist, low to med	dium plasticity, inser	sitive		0.5		46/25	1.8		
[UNDIFFERENTIATED A	ALLUVIUM]				- 0.5		40/23	1.0		
7) 5)					-					
<u> </u>					<u> </u>		28/15	1.9		
<u> </u>					-1.0		20/13	1.9		
- Company of the Comp					ļ.					
_ pumiceous SILT with mir	nor clay, light brown/grey. Stiff,	moist, low plasticity			L					
EOB at 1.5m. Too hard t	o auger further. Inferred tree ro	ot/stump.			- 1.5		UTP			
					ļ.					
<u>=</u> 7					-					
					- 2.0					
-					ļ.					
					-					
-					- 2.5					
					t					
					F					
					-3.0					
					F					
					F					
					- 3.5					
<u>21</u>					F					
=					F					
-					-4.0					
-21 -21					-					
= 1 5.1:					F					
-					-4.5					
					-					
					Ē					
9)					-5.0					
					F					
<u>-</u>					Ė					
-					-5.5					
-					F					
					Ė					
<u> </u>	6	25	St		-6.0			11554 - Ded S.W		
	Comments:	Borehole Diameter:	Topsoil	. [[[[]]]	Sand		Sandstone		Plutor	ic :::::::
	Groundwater not encountered		Fill	//////	Gravel 3		Siltstone	222222 222222 222222	No Co	re
LANDER geotechnical	UTP = unable to penetrate. EOB = end of borehole.	Checked: RG	Clay	XXXXXXXX	Organic :		Limeston	· 1000	품	
B		nG	Silt	2222222 2222222	umice	****	Volcanic	350000	*	

Client :	ARDMORE DEVELO	DPMENTS LIMITE	D		Aug	er Bo	oreho	le No		HA12
Project Locatio	n: SUNFIELDS ARDMORE							88	Sheet	12 of 34
Job Number:	J01627			Vane H		Logge	7.57	Process		te: 12.04.21
1	Ť	0 151		30	2 442		RZ	PL		12.04.21
Borehole Location: Description:	mE Pefer to alto plan	Ground R.L.		- p	Depth (m)	Standing Water Level	Vane Shear(kPa) peak / residual	Soil Sensitivity	Sam	ple and
Description				Legend	Depti	Stand	Var hear sak / re	Soi	i.	ory / Other Test
	SOIL DESCRIPTIO	N				" ≥	o g	Ö	D	etails
_ TOPSOIL					-					
 silty CLAY, orange mottle sensitive [PUKETOKA Fe 	ed light grey. Very stiff, moist,	medium plasticity, mo	oderately		_					
_ sensitive [FORE FORA F	ONWATION			1-1-1-0-0-0-1 1-1-0-0-0-0-0-0 1-1-0-0-0-0	- - 0.5		148/43	3.4		
-:				1-1-1-1-1-1	- 0.5					
organic stained silty CLA	Y, light brown. Very stiff, mois	t medium placticity	moderately	1.1.1.1.1.1.1.1						
sensitive	ir, iigin brown. Very atiir, mora	t, medium plasticity, i	moderately		- -1.0		176/55	3.2		
E .1					- 1.0		17.0.00	0.2		
 becoming dark brown, st 	iff, high plasticity				_,,		5047			
					- 1.5		58/17	3.3		
 becoming wet becoming firm, insensitive 					- - 2.0		49/29	1.7		
- becoming firm, magnistry	•				- 2.0		49/29)IaC		
-										
- 	4				- - 2.5		86/55	4.0		
 becoming light brown, str 	Ш				- 2.5		86/33	1.6		
₹ #3										
_					-		115/58	0.0		
 becoming very stiff, mode clavey SILT light grange 	erately sensitive /light grey, Stiff, wet, medium	plasticity moderately	sensitive		- 3.0		115/58	2.0		
becoming saturated	agin groy. July, Wol, Modali j	siadicity, moderatory	SCHOLLYC							
- - haaamina linht eesetubita					- - 3.5		58/23	2.5		
becoming light grey/white	•				- 3.5		36/23	2,5		
-						∇				
becoming hard							201			
- becoming haid					- 4.0		201+			
51 ₹1										
becoming stiff					<u> </u>		60/29	2.1		
- becoming still					- 4.5		00/23	2.1		
<u>-</u>					- -5.0		55/26	2.1		
EOB at 5.0m. Target Dep	oth				- 5.0		30/20	E.1		
					-					
					- 5.5 -					
				9	- 					
	Comments:	Borehole Diameter:	Topsoil	Si VIIII	-6.0	1931113	Sandstone		Plutoni	
	Groundwater encountered at	50mm	Fill	///// G	ravel		Siltstone	222222 222222 222222	No Cor	*******
LANDER geotechnical	3.3m. UTP = unable to penetrate.	Checked:	Clay		ganic		Limestone		ž .	
gootechnical	EOB = end of borehole.	RG	Sitt XX	×××××× Pu	mice H		Volcanic	000000	Ü	

Client: ARDMORE DEVELOPM	IENTS LIMITE	0	9	Aug	er Bo	oreho	le No.		HA13
Project Location : SUNFIELDS								Sheet 13	of 34
ARDMORE			Vane H		Logge	7.5	Process		
Job Number: J01627			278	34		IM	PL	12	.04.21
Bololiolo	ound R.L.		ا ہ ا	(E	Standing Water Level	Vane Shear(kPa) peak / residual	. <u>\$</u>	Sample	and
Location: Description: Refer to site plan			Legend	Depth (m)	tandi ter L	Vane Bar(k k/res	Soil Sensitivity	Laborator	// Other
SOIL DESCRIPTION			ا د ا	Δ	Wa	Sh	Se	Deta	
TOPSOIL				_					
 clayey SILT, light grey streaked orange. Hard, moist, low pl FORMATION] 	lasticity [PUKETO	OKA		-					
				- - 0.5		205+			
- haraning Baki arrang atrada di Baki arra				- 0.0		2001			
 becoming light orange streaked light grey 									
*:				-		205+			
<u>.</u>				- 1.0		2034			
100 100 100 100 100 100 100 100 100 100									
 becoming very stiff, insensitive becoming wet 				- 1.5		159/83	1.9		
-									
silty CLAY, light orange streaked light grey. Very stiff, wet, r	medium plasticity	insensitive	9 1999999	- 2.0		155/91	1.7		
	noutern placement	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	7-7-10-2-7-7-7 2-1-10-2-3-7-7						
- -									
_			5-3-3-3-3-3-3	- 2.5		155/88	1.8		
-: -:			0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -	-		PARTON TO 16	1.454.60		
-				-					
<u>-</u>				- -3.0		159/97	1.6		
8			5-5-6-0-6-9-6 5-5-6-0-6-6-6-6 5-5-6-0-6-5-6	- 3.0		100/07	1.0		
			0-2-0-0-0-0-0 0-2-0-0-0-0-0-0 0-2-0-0-0-0						
							100 Aug		
5				- 3.5 -		159/109	1.5		
			1-2-2-2-2-2-2-2 2-2-2-2-2-2-2 2-2-2-2-2-						
± ₩			5-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	-					
becoming moderately sensitive, with trace fine sand				- 4.0		155/77	2.0		
5 1									
=====================================									
 becoming hard, insensitive 			0.00.00.00.00.00	- 4.5		202/106	1.9		
7			0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 +	7					
			0-0-0-0-0-0-0-0 0-0-0-0-0-0-0-0 0-0-0-0-0-0-0-0 0-0-0-0-0-0-0-0			_			
at 5.0m, becoming very stiff, moderately sensitive EOB at 5.0m. Target Depth.			0-2-K-0-2-2-2 2-2-K-0-2-2-2	-5.0		186/71	2.6		
at some ranget soprific									
				2					
_				- -5.5					
_									
-				-					
_				- -6.0					
Comments:	Borehole Diameter:	Topsoil	Sa	nd	1333113	Sandstone		Plutonic	
Groundwater not encountered.	50mm	Fill	}}}}}	avel	\$\$\$\$\$\$\$	Sittstone	222222	No Core	
UTP = unable to penetrate. EOB = end of borehole.	Checked:	Clay	On	ganic	*****	Limestone		華	
geotechnical EOB = end of borehole.	RG	Sift XX	XXXXXX Pu	mice -6	*****	Volcanic	22222	V1	· ·

Client :	ARDMORE DEVELO	PMENTS LIMITE	D	9	Aug	er B	oreho	le No		HA14
Project Locatio	oject Location : SUNFIELDS ARDMORE b Number: J01627							8	Shee	t 14 of 34
Joh Number				Vane H		Logge	1.5	Process	or:	Date: 12.04.21
T		7.400-669-670-440-60		27			1M	PL		12.04.21
Borehole mN Location: Description	mE	Ground R.L.		_ ₂	Depth (m)	Standing Water Level	Vane Shear(kPa) peak/residual	vity	8	ample and
Location: Description				Legend	Depth	Standater	Var near	Soil Sensitivity	Lab	oratory / Other Test
	SOIL DESCRIPTION	N .				"≥	ഗമ	Ø		Details
_ TOPSOIL					- 1					
organic stained silty CLA	AY, light orange streaked grey/t	prown. Hard, wet, me	edium		- - 0.5		205+			
plasticity [UNDIFFEREN]	TIATED ALLUVIUM]				- 0.5		2007			
D) 5)										
 becoming very stiff, insen 	eitivo				- 1.0		189/106	18		
- beconsing very star, assert	ionave				- 1.0		100/100	1.0		
 becoming moderately ser 	nsitive				- -1.5		199/100	2.0		
-	TOMP O				- 1.0		199/100	2.0		
21										
 becoming grey, high plast becoming stiff, saturated, 					- 2.0		80/44	1.8		
					- 2.0	∇	00/44	11.00		
_ amorphous PEAT, light of plasticity	grey streaked dark brown/black	. Very soft, saturated	d medium							
at 2.4m, push probed to	5.0m				- - 2.5		sunk un	der		
					_		own we	ght		
#4 #4										
 becoming stiff, insensitive 	e, with limited sample recovery				- -3.0		59/32	1.8		
_	7									
 becoming very soft 					- 3.5		sunk ur			
							own we	ight		
-					-					
_					- -4.0		sunk ur			
-							own we	igni		
21 1					-					
					- 4.5		sunk ur			
7-) -)							own we	ight		
-										
	-11-				- 5.0		sunk un			
EOB at 5.0m. Target Dep	pin.							3		
					2					
-					- -5.5					
-										
-				8	- (
-	4	25	10 10		- 6.0					
	Comments:	Borehole Diameter:	Topsoil	Se	and .	SSECTE	Sandston	e	**	ıtonic
LANDED	Groundwater encountered at 2.0m.	50mm	Fill			*****	Sittstone	222222	No.	Core
LANDER geotechnical	UTP = unable to penetrate.	Checked: RG	Clay	XXXXXXX	ganic :		Limeston	· 100000	<u> </u>	
	EOB = end of borehole.	575-FIG.	Sitt ×	XXXXXXX Pu	mice P	*****	Volcanic	20000	Y)	

Client :	ARDMORE DEVELOPM	MENTS LIMITE	D		Aug	er Bo	oreho	le No.		HA15
Project Locatio	Project Location : SUNFIELDS ARDMORE Job Number: J01627							3	Sheet 1	5 of 34
lah Numbas				Vane H		Logge	7.27	Process		
Job Number:	1 1			30	7		RZ	PL	1	2.04.21
Borehole mN	mE Gr	ound R.L.		- o	Œ	Standing Water Level	Vane Shear(kPa) peak / residual	ijέ	Samp	le and
Location: Description	: Refer to site plan			Legend	Depth (m)	tandi ter L	Vane ear(k k / res	Soil Sensitivity	Laborato	ry / Other est
	SOIL DESCRIPTION			د	۵	Wa	SP	Se		ails
TOPSOIL					_					
	Y, orange mottled light brown. Ver		dium							
plasticity, moderately ser	nsitive [PUKETOKA FORMATION]				-		- 0.754.70.702-10.5	STATE OF THE PARTY		
-					- 0.5		164/43	3.8		
-: -:										
es Estas es es aces					-		estable of			
 becoming insensitive 					-1.0		138/101	1.4		
					- 1.5		115/60	1.7		
-										
<u></u>				Debeleschieb Scholeschieb Scholeschieb	- 2.0		176/127	1.4		
-	A SWALL BOOK CONTRACTOR OF THE SWALL STANDS			24140-2-241-2 241-2-241-2 241-2-241-2						
 silty CLAY, orange streak 	ed light grey. Very stiff, moist, high	plasticity, insens	sitive							
_					- 2.5		141/109	1.3		
+: -:							A SHEW CHOOSE A			
=: =::					-					
<u>.</u>					- -3.0		150/115	19		
					- 3.0		130/113	1.5		
becoming light grey/light	brown									
<u>=</u>							400/00	200		
5					- 3,5		132/83	1.6		
-										
	oro a ramon				-			311-1		
 becoming moderately se 	nsitive				- 4.0		155/75	2.1		
 becoming medium plastic 	city				_					
51) 					7.			1555		
 becoming insensitive 					- 4.5		184/109	1.7		
					7					
E3 E3				3-3-3-3-3-3-3 3-3-3-3-3-3-3-3-3-3-3-3-3				-		
_ EOB at 5.0m. Target Dep	oth.			(Ministerna)	-5.0		196/115	1.7		
				50	- 5.5					
-0.					-					
-: -:										
	4	25	11 12		-6.0			1000000000		2, 6
	Comments:	Borehole Diameter:	Topsoil	Se	and		Sandstone		Plutonic	
	Groundwater not encountered.	50mm	Fill	Gr	ravel		Sittstone	222222 222222 222222	No Core	
LANDER geotechnical	UTP = unable to penetrate. EOB = end of borehole.	Checked:	Clay	Or	ganic		Limestone	000000	器	
3 - 2 - 2 - 2 - 1 - 1 - 2 - 2 - 2 - 2 - 2		RG	Siit	Pu	mice :		Volcanic	000000	33	

Client :	ARDMORE DEVELOPM	MENTS LIMITE	D C	9	Aug	er Bo	orehol	le No.	E.	HA16
Project Location	1: SUNFIELDS							3	Sheet 1	6 of 34
	AHDMORE			Vane H	ead:	Logge	7.57	Process		
Job Number:	J01627			278	34		IM	PL	1:	3.04.21
Borehole mN	mE Gr	ound R.L.		ا ہا	Ê	grei	Pa)	.≥	Sampl	le and
Location: Description:	Refer to site plan			Legend	Depth (m)	andir er Le	Vane Shear(kPa) peak / residual	Soil Sensitivity	Laborato	ry / Other
	SOIL DESCRIPTION			ا د	De	Standing Water Level	She	Se	Te Det	
TOPSOIL					0			2 - 1		2
_ clayey SILT, orange strea FORMATION]	ked light grey. Very stiff, moist, lo	w plasticity [PUK	ETOKA							
_ PONWATION										
aity CLAV propagatrock	ed light grey. Very stiff, moist, me	dium plantinitu m	odorotok	5333333	- 0.5		155/74	2.1		
sensitive	ed light grey. Very still, moist, me	dium plasticity, ii	loderately		-1					
53				1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	7.2					
 becoming insensitive 				5-5-5-5-5-5-5 5-5-5-5-5-5-5-5 5-5-5-5-5	- -1.0		144/106	1.4		
					1115					
-										
Ĕ							4774 14 27	40.00		
					- 1.5 -		171/127	1.3		
				8 -2 -2 00000 - 2 - 2 8 -2 -2 -2 -4 -2 -2						
= 7					-		or 2000-00-00-00-00	NITS-CONT		
 becoming wet 				6-5-3-3-3-4-1 6-5-3-3-3-3-4-1	2 .0		137/71	1.9		
 becoming saturated 					-					
F.										
_					2.5		106/62	1.7		
					-1					
= 1										
<u> </u>					-3.0		109/77	1.4		
링 -										
 becoming moderately sen 	sitive				3.5		133/62	2.1		
_										
<u> </u>					4					
 becoming insensitive 					4.0	∇	127/74	1.7		
					- 7.0		18 MAN	1000		
=- =-										
Sá				1-2-1-3-2-2-1 1-2-1-3-2-2-1			121/77	1.6		
- -					- 4.5		121/11	1.0		
at 5.0m, becoming modera	ately sensitive				tigate		Waterstein	22033		
EOB at 5.0m. Target Dept					- 5.0		140/68	2.1		
<u>-</u>					-					
7					- 5.5					
= 4					=					
					=:					
- ,			100		-6.0		لط		••	
	Comments:	Borehole Diameter:	Topsoil	Sa	- 8	Seces	Sandstone		Plutonic	
	Groundwater encountered at 2.2m.	50mm	Fill	111111		*****	Sittstone	112221	No Core	
	UTP = unable to penetrate.	Checked: RG	Clay 55	XXXXXX	anic		Limestone	最適	<u> </u>	
	EOB = end of borehole.	6,4,950	Sift XX	XXXXXX Put	mice M	*****	Volcanic	22000	93	

Client :	ARDMORE DEVELO	PMENTS LIMITE	D	(8	Aug	er Bo	oreho	le No		1	HA17
Project Location	n: SUNFIELDS ARDMORE							9	Shee	t 17	of 34
Job Number:	J01627			Vane H		Logge	(3)	Process		Date:	
1	1			278	34		IM	PL		13.0	14.21
Borehole mN Location: Description:	mE	Ground R.L.			Ē	Standing Water Level	Vane Shear(kPa) peak residual	vity	٤	Sample	and
Location: Description:	Refer to site plan			Legend	Depth (m)	stand ater I	Van lear(ak/re	Soil Sensitivity	Lab	oratory /	Other
	SOIL DESCRIPTION	N			Δ	8	S 8	Se		Details	S
TOPSOIL					4						
			n on Marketon		_						
organic stained clayey Sli [UNDIFFERENTIATED A	LT, orange mottled grey/brown LLUVIUM]	n. Hard, moist, low pi	lasticity		-0		1425-2012/0				
- 12-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2					- 0.5 -		205+				
becoming dark brown											
- *					-		Wester	52.27			
becoming very stiff, mode	HERVOR MORE STATE OF THE CONTRACT OF THE CONTR		-1		- 1.0		140/65	2.2			
amorphous PEAT, dark b sensitive, with trace rootle	rown. Very stiff, moist to wet, ets	medium plasticity, m	oderately								
 becoming saturated 											
					- 1.5		136/62	2.2			
<u> </u>						∇					
=1											
 becoming firm, push prob 	ed to 5.0m				- 2.0		32/13	2.5			
= :											
								000000			
 becoming very soft 					- 2.5		sunk un own wei				
								The state of			
=3 =3											
becoming firm, insensitive	Э				-3.0		47/26	1.8			
의 라											
 becoming very soft 					- 3.5		sunk un own we				
2					-						
-											
-					-4.0		sunk un	Maria de la companya della companya			
- -								grit			
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-					- 4.5		sunk un	COLU			
₹) ₹)							own wei	gnt			
EOP at 5 On Town 10	+b				- -5.0		sunk un own wei				
_ EOB at 5.0m. Target Dep	ин.						SWII WE	9111			
<u></u>					<u>19</u>						
_					- - 5.5						
-:					-						
_					- - 6.0						,.
	Comments:	Borehole Diameter:	Topsoil	Sa			Sandstone	e	Pic	utonic	
	Groundwater encountered at	50mm	Fill	///// Gr	avel		Siltstone	222222	**	Core	
LANDER geotechnical	1.4m. UTP = unable to penetrate.	Checked:	Clay		ganic	*****	Limeston	0	薯		
gootoommoa	EOB = end of borehole.	RG	Silit XX	exxxxxx Pu	mice H		Volcanic	000000	ž)		

fibrous PEAT, dark brown/black. Stiff, moist, medium plasticity, insensitive [UNDIFFERENTIATED ALLUVIUM] -0.5 becoming wet -1.0 47/29 1.6 becoming saturated	Client :	ARDMORE DEV	/ELOPI	MENTS LIMITE	D			Aug	er Bo	oreho	le No			HA18
South Comments Sout	Project Location	n : SUNFIELDS									88	Shee	t 18	of 34
Borehold Coation: Refer to site plan SOIL DESCRIPTION SOIL D	Joh Number	MRDMORE J01627 mN mE Ground R.L.						7.27		or:				
TOPSOIL fibrous PEAT, dark brown/black, Sliff, moist, medium plasticity, insensitive	T	1	1			- 1	27	84					143	04.21
TOPSOIL fibrous PEAT, dark brown/black, Sliff, moist, medium plasticity, insensitive	Dorentole			ound R.L.			2	Œ	ing	e kPa) sidual	vity	٤	Sample	and
TOPSOIL fibrous PEAT, dark brown/black, Sliff, moist, medium plasticity, insensitive	Location: Description	n: Refer to site plan	n				eger	epth	tand ater 1	Van lear(l ak / rei	Soil	Lab	oratory Test	/ Other
fibrous PEAT, dark browniblack. Stiff, moist, medium plasticity, insensitive [UNDIFFERENTIATED ALLUVILM] becoming wet becoming saturated -1.0 4729 1.6 -1.5 -2.5 sunk under own weight -2.5 sunk under own weight -3.0 sunk under own weight -3.5 -3		SOIL DESCRIP	TION					Δ	N N	S ad	S		Detai	ls
becoming wet becoming saturated -1.5	_ TOPSOIL													
becoming wet becoming saturated -1.5	¥: 													
becoming wet - becoming saturated - 1,5	fibrous PEAT, dark brov [UNDIFFERENTIATED	vn/black. Stiff, moist, medi ALLUVIUM]	um plast	icity, insensitive						of Arraheavan	Contract to			
becoming saturated becoming very soft -1.5								- 0.5		68/59	1.2			
becoming saturated becoming very soft -1.5	- becoming wet													
becoming saturated -1.5	•							-		Section 1	54/445			
becoming very soft -2.0 sunk under own weight -2.5 sunk under own weight -3.0 sunk under own weight -3.5 sunk under own weight -3.5 sunk under own weight -3.5 under own weight -3.5 sunk under own weight -3.5 sunk under own weight -3.5 sunk under own weight -3.6 sunk under own weight -3.7 sunk under own weight -3.8 sunk under own weight -3.9 sunk under own weight -3.5 sunk under own weight -3.6 sunk under own weight -3.7 sunk under own weight -3.8 sunk under own weight -3.9 sunk under own weight -3.0 sunk under own weight -3.0 sunk under own weight -3.5 sunk under own weight -3.6 sunk under own weight -3.7 sunk under own weight -3.8 sunk under own weight -3.8 sunk under own weight -3.9 sunk under own weight -3.0 sunk under	becoming firm							- 1.0		47/29	1.6			
becoming very soft -2.0 sunk under own weight -2.5 sunk under own weight -3.0 sunk under own weight -3.5 sunk under own weight -3.5 sunk under own weight -3.5 under own weight -3.5 sunk under own weight -3.5 sunk under own weight -3.5 sunk under own weight -3.6 sunk under own weight -3.7 sunk under own weight -3.8 sunk under own weight -3.9 sunk under own weight -3.5 sunk under own weight -3.6 sunk under own weight -3.7 sunk under own weight -3.8 sunk under own weight -3.9 sunk under own weight -3.0 sunk under own weight -3.0 sunk under own weight -3.5 sunk under own weight -3.6 sunk under own weight -3.7 sunk under own weight -3.8 sunk under own weight -3.8 sunk under own weight -3.9 sunk under own weight -3.0 sunk under	-1 74													
becoming very soft -2.0 sunk under own weight -2.5 sunk under own weight -3.0 sunk under own weight -3.5 sunk under own weight -3.5 sunk under own weight -3.5 under own weight -3.5 sunk under own weight -3.5 sunk under own weight -3.5 sunk under own weight -3.6 sunk under own weight -3.7 sunk under own weight -3.8 sunk under own weight -3.9 sunk under own weight -3.5 sunk under own weight -3.6 sunk under own weight -3.7 sunk under own weight -3.8 sunk under own weight -3.9 sunk under own weight -3.0 sunk under own weight -3.0 sunk under own weight -3.5 sunk under own weight -3.6 sunk under own weight -3.7 sunk under own weight -3.8 sunk under own weight -3.8 sunk under own weight -3.9 sunk under own weight -3.0 sunk under									\Box					
- 2.5 sunk under own weight - 3.0 sunk under own weight - 3.5 sunk under own weight - 3.5 sunk under own weight - 3.5 sunk under own weight - 4.5 sunk under own weight - 5.0 sunk under own weight - 5.0 sunk under own weight - 5.0 sunk under own weight - 6.0 sunk under	 becoming saturated 							- 1.5		32/17	1.9			
- 2.5 sunk under own weight - 3.0 sunk under own weight - 3.5 sunk under own weight - 3.5 sunk under own weight - 3.5 sunk under own weight - 4.5 sunk under own weight - 5.0 sunk under own weight - 5.0 sunk under own weight - 5.0 sunk under own weight - 6.0 sunk under	<u>왕</u> 36													
- 2.5 sunk under own weight - 3.0 sunk under own weight - 3.5 sunk under own weight - 3.5 sunk under own weight - 3.5 sunk under own weight - 4.5 sunk under own weight - 5.0 sunk under own weight - 5.0 sunk under own weight - 5.0 sunk under own weight - 6.0 sunk under	- v - 27									,VI	₂			
and the product of the control of th	becoming very soft					3		- 2.0						
and the product of the control of th	<u>4</u> €							-						
and the product of the control of th	-: -:													
= 3.0 sunk under own weight = 3.5 sunk under own weight = 3.5 unk under own weight UTP = 4.5 = 5.0 = 5.0 = 5.0 = 5.5 = 6.0 Sand Sandstone Flutenic Somm Fill Groundwater encountered at 1.5m. Checked: Clay Ogaric Unrestone Sunk under own weight own wei	<u>-</u>							- 2.5						
EOB at 3.9m. Too hard to auger further. Inferred tree root/stump. -3.5 Sunk under own weight -4.5 -5.0 -5.0 -5.5 -5.5 -5.5 -5.5 -6.0 Sand Sandstone Plutonic Sitstone Sitstone Sitstone Sitstone Somm Pill Gravel J. Fill Gravel J. Fill Gravel J. Type Unrestone Checked: UTP — unable to penetrate.	5: ₹							Ε.		and the second				
EOB at 3.9m. Too hard to auger further. Inferred tree root/stump. -3.5 Sunk under own weight -4.5 -5.0 -5.0 -5.5 -5.5 -5.5 -5.5 -6.0 Sand Sandstone Plutonic Sitstone Sitstone Sitstone Sitstone Somm Pill Gravel J. Fill Gravel J. Fill Gravel J. Type Unrestone Checked: UTP — unable to penetrate.	-													
EOB at 3.9m. Too hard to auger further. Inferred tree root/stump. -4.5 -5.0 -5.5 -6.0 Comments: Groundwater encountered at 1.5m. Groundwater encountered at 1.5m. UTP = unable to penetrate. Checked: Clay Organic Limestone	<u>.</u> 5							-3.0		sunk und	der			
EOB at 3.9m. Too hard to auger further, Inferred tree root/stump. -4.0 -4.5 -5.0 -5.5 -5.5 -6.0 Comments: Groundwater encountered at 1.5m. UTP unable to penetrate. Borehole Diameter: Topsol Sand Sandatione Plutonic Fill Gravel Sittatone Checked: Clay Organic Limestone	5) 7)										200			
EOB at 3.9m. Too hard to auger further, Inferred tree root/stump. -4.0 -4.5 -5.0 -5.5 -5.5 -6.0 Comments: Groundwater encountered at 1.5m. UTP unable to penetrate. Borehole Diameter: Topsol Sand Sandatione Plutonic Fill Gravel Sittatone Checked: Clay Organic Limestone														
EOB at 3.9m. Too hard to auger further, Inferred tree root/stump. -4.0 -4.5 -5.0 -5.5 -5.5 -6.0 Comments: Groundwater encountered at 1.5m. UTP = Dameter: Topsol Sand Sandstone Pliutonic Somm Fill Gravel Sitistone Sitistone Sitistone Checked: Checked: Clay Cogaric Limestone Checked: Checked: Clay Cogaric Limestone Checked: Checked:								- 3.5						
Comments: Groundwater encountered at 1.5m. UTP = unable to penetrate. UTP = unable to penetrate. Groundwater encountered to the penetrate. UTP = unable to penetrate. Groundwater encountered to the penetrate. UTP = unable to penetrate. Groundwater encountered to the penetrate. UTP = unable to penetrate. Groundwater encountered to the penetrate. UTP = unable to penetrate. Groundwater encountered to the penetrate. UTP = unable to penetrate. Groundwater encountered to the penetrate. UTP = unable to penetrate. Groundwater encountered to the penetrate. UTP = unable to penetrate. Groundwater encountered to the penetrate. UTP = unable to penetrate.	-									Own wes	9			
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Comments: Groundwater encountered at 1,5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Somm Fill Gravel Sittstone No Core Checked: Clay Organic Limestone Limestone	EOB at 3.9m. Too hard	to auger further, Inferred to	ree root/	stump.			3	-4.0		UIP				
Comments: Groundwater encountered at 1,5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Somm Fill Gravel Sittstone No Core Checked: Clay Organic Limestone Limestone	*: -:													
Comments: Groundwater encountered at 1,5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Somm Fill Gravel Sittstone No Core Checked: Clay Organic Limestone Limestone	-							=						
Comments: Groundwater encountered at 1,5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Somm Fill Gravel Sittstone No Core Checked: Clay Organic Limestone Limestone	56 							-4.5						
Comments: Groundwater encountered at 1.5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitistone No Core Checked: Clay Organic Limestone Limestone	₹ -							_						
Comments: Groundwater encountered at 1.5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitistone No Core Checked: Clay Organic Limestone Limestone	=							-						
Comments: Groundwater encountered at 1.5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitistone No Core Checked: Clay Organic Limestone Limestone	<u>-</u>							- -5.0						
Comments: Groundwater encountered at 1.5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitstone No Core Checked: Clay Organic Limestone Limestone	2) 													
Comments: Groundwater encountered at 1.5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitstone No Core Checked: Clay Organic Limestone Limestone	9							2						
Comments: Groundwater encountered at 1.5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitstone No Core Checked: Clay Organic Limestone Limestone	# 5													
Comments: Groundwater encountered at 1.5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitstone No Core Checked: Clay Organic Limestone Limestone								- 5.5						
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Comments: Groundwater encountered at 1.5m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitstone No Core Checked: Clay Organic Limestone Limestone								-						
Groundwater encountered at 1.5m. UTP = unable to penetrate. Groundwater encountered at 1.5m. UTP = unable to penetrate. Checked: Clay Organic Unimestone		Comments:		Borehole Diameter	Tonsol		.e.		33333	Sandston		Pir	atonio I	
LANDER 1.5m. UTP = unable to penetrate. Checked: Clay Organic Umestons		Groundwater encounter	ed at				}}}	- 10	33333	1	222222	**		1111111
		6.00000000	ate.	24 C (C (C (C (C (C (C (C (C (C			Or		*****	Limestone	,	Ħ		
	geotechnical		27 (\$16) (RG	Sit	XXXX XXXX XXXX	XXXX Pu	mice H		Volcanic	000000	33		0

Client: ARDMORE DEVELOPMENTS LIMITED					Auger Borehole No. HA19										
Project Location	n: SUNFIELDS			Sheet 19 of											
lah Numbau	ARDMORE			Vane		Logged By:		Process							
Job Number:	J01627			2	784		M	PL	14	.04.21					
Borehole MN Location: Description		ound R.L.		_ ₂	Ē	ing	e kPa) sidual	vity	Sample	and					
Location: Description				Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak / residual	Soil Sensitivity	Laborator Tes	st					
	SOIL DESCRIPTION				П	",≥	is a	Š	Deta	ills					
_ TOPSOIL					}										
amorphous PEAT dark	brown/black. Stiff, moist, medium p	lasticity insensit	ive		1										
[UNDIFFERENTIATED	ALLUVIUM]	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			- - 0.5		77/44	1.8							
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5) 5)					-										
 becoming firm 					- -1.0		32/23	1.4							
- Locottining in the					t '''										
56 5. Oktober superior september 1980					-										
 push probed to 4.2m becoming very soft 					- 1.5		sunk und								
					Ė		own wei	ght							
2 0					-										
_					- 2.0		sunk und								
- -					Ė.		own wei	gnt							
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-					-4.0		sunk und own wei								
EOB at 4.2m. Too hard	to auger further. Inferred tree root/s	stump.			_										
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_	Comments:	Borehole Diameter:	Topsoil		-6.0		Sandstone		Plutonic						
	Groundwater not encountered.	50mm	Fill	}}}}}	Gravel 3	20000	Sandstone	222222	No Core						
LANDER	UTP = unable to penetrate. EOB = end of borehole.	Checked:	Clay) rganic	*****	Limestone		Ž.						
geotechnical	LOD - one of potential.	RG	Siit	XXXXXXX P	umice		Volcanic	35555	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$						

Client :	Auger Borehole No. HA20										
Project Location	n: SUNFIELDS ARDMORE				Sheet 20	20 of 34					
Job Number:	J01627				Head:	Logged By: NM		Process			
T		Al-hood has to to to		2	784			PL	14	.04.21	
Borehole MN Location: Description		ound R.L.		_ ₂	Œ	ling	kPa) sidual	_ vity	Sample	and	
Location: Description				Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak / residual	Soil Sensitivity	Laborator Tes	st	
	SOIL DESCRIPTION				-	∞,≥	20 g	σ	Deta	ills	
_ TOPSOIL					3						
=: =:					F						
fibrous PEAT, dark brow	n/black. Very stiff, wet, medium pla	sticity, insensitiv	e		L		121/68	1.8			
[UNDIFFERENTIATED /	ALLUVIUM]				- 0.5		121/00	1.0			
 push probed to 2.9m 											
becoming stiff					- -1.0		68/35	1.9			
- becoming sur					-1.0		00.00				
					F						
becoming very soft					- -1.5		sunk und				
-					± "		own wei	ght			
					-						
_					2.0		sunk un				
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_					- 2.5		sunk un				
-: -:				****** *****	+		own wei	gnt			
-					-						
EOB at 2.9m. Too hard t	to auger further. Inferred tree root/s	tump.			-3.0						
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	Comments: Groundwater not encountered.	Borehole Diameter: 50mm	Topsoil	>>>>>	Sand Gravel	222222	Sandstone Sittstone	22222	Plutonic No Core		
LANDER	UTP = unable to penetrate.	Checked:	Fill	444444			Limestone	22222	23 140 Out		
geotechnical	EOB = end of borehole.	RG	Sitt	SEEKEEE	Pumice		Volcanic	200000	Š.	1	
		14.1			_			-			

Client :	Auger Borehole No. HA21												
Project Location	n: SUNFIELDS ARDMORE			Sheet 21 of									
Job Number:	J01627			Vane I		Logged By: NM		Process	200				
T				27	84			PL	15	.04.21			
Borehole mN Location: Description		ound R.L.			Œ	ling	le kPa) sidual	_ vity	Sample	and			
Location: Description				Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak / residual	Soil Sensitivity	Laborator Tes	st			
0.000 0.000 0.000 0.000	SOIL DESCRIPTION					>	ഗമ	Ø	Deta	iils			
TOPSOIL					1								
clayey SILT, orange/red sensitive [PUKETOKA F	mottled grey. Very stiff, moist, low ORMATIONI	plasticity, moder	ately		-								
	300000000000000				- 0.5		144/47	3.1					
					ţ		CACTORISM	ROCAL					
53					-								
becoming hard					-1.0		205+						
silty CLAY, orange mottl	ed grey. Very stiff, moist, medium	plasticity, insensit	tive	5-2-1-1-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-2-									
				1 - 1 - 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -									
-				111111	- 1.5		174/112	1.6					
					F		110000000000000000000000000000000000000	100707					
-					_								
=					- 2.0		144/85	1.7					
_													
H: H:					t								
_					– 2.5		155/106	1.5					
becoming wet				14-1-1-1-1									
=3 =3				1-1-1-1-1									
 becoming saturated, high 	n placticity				-3.0		109/65	1.7					
- becoming saturated, riigi	i plasticity			44144									
					L								
5				11.1.3.1.	- 3.5		136/91	1.5					
2 1					-	∇							
 with trace coarse sand si 	ized pumiceous inculsions				Ė								
					- 4.0		152/91	1.7					
 becoming hard 					L								
50 54													
-					- 4.5		205+						
					L								
=0 =1				1-1-1-0-0-0-0-1 1-1-1-1-1-1-1-1 1-1-1-1-			groowy						
EOB at 5.0m. Target De	pth.				- 5.0		205+						
					-								
					-								
					- 5.5 -								
-					F								
_					<u>L</u>								
	Comments:	Borehole Diameter:	Topsoil		-6.0	1833113	Sandstone	,	Plutonic				
	Groundwater encountered at	50mm	Fill		iravel		Sittstone	222222 222222 222222 222227	No Core				
LANDER geotechnical	3.1m. UTP = unable to penetrate.	Checked:	Clay	o	rganic C		Limestone	,	ž.				
georechnical	EOB = end of borehole.	RG	Silt	XXXXXXXX P	umice H		Volcanic	22222	÷				

Client: ARDMORE DEVELOPMENTS LIMITED				Auger Borehole No. HA22									
Project Location	n : SUNFIELDS			Sheet						22 of 34			
lah Numbari	ARDMORE				e Head: Log 2784		13		or:	Date:			
Job Number:	J01627	Ť		27	84		IM	PL	1	12.04.21			
Borehole mN	mE	Ground R.L.			Ê	Standing Water Level	Vane Shear(kPa) peak / residual	/ity	Sa	ample and			
Location: Description	Refer to site plan			Legend	Depth (m)	tand ter L	Van ear(F	Soil Sensitivity	Labo	ratory / Other Test			
	SOIL DESCRIPTION	N			Ω	× ×	R. S.	S		Details			
TOPSOIL					-								
UNDIFFERENTIATED	ttled light grey. Hard, moist, lo ALLUVIUM]	w plasticity, with trace	rootlets		-		resolute.						
	S = 10				- 0.5		217+						
 with trace black organic s 	streaks												
-					-		10000						
becoming very stiff, mod		Hlad light grove Vanco	tiff majet		- 1.0		189/90	2.1					
_ medium plasticity, mode	AY, black streaked orange mo rately sensitive	tiled light grey. Very s	uir, moist,										
					- 1.5		152/78	2.0					
27 28													
#8 cc							rr 1000 700 000 000 000 000 000 000 000 00	SWOOD					
<u> </u>					- 2.0		140/62	2.3					
-					_								
_ fibrous PEAT, dark brow	vn/black. Very stiff, wet, mediu	m plasticity, insensitiv	re		-								
					- 2.5		155/96	1.6					
 becoming dark brown/bla becoming dark brown/bla 	priggreen as the real means resemble.				-								
-	150							3-3					
 becoming saturated 					- 3.0		143/78	1.8					
_	MARKS.			*****		∇	10 To 10	120-151 F					
 becoming moderately se 	nsitive				- 3,5		143/68	2.1					
-													
-					-								
-					- 4.0		127/62	2.1					
51 -				111111									
The arms our					-		0000000	2.5					
 becoming insensitive 					- 4.5		109/93	1.2					
at 5.0m, becoming firm					Parameter (SESONAU!	220 - 823					
EOB at 5.0m. Target De	pth.				- 5.0		47/34	1.4					
<u>:</u> :					-								
Ī					- 5.5 -								
-				9	Ė								
-					40								
-		Davids to Fe			-6.0	197111			:1	ania			
	Comments: Groundwater encountered a	Borehole Diameter: 50mm	Topsoil Fill	}}}}}	and avel	222222	Sandstone Sittstone	222222	**	onic			
LANDER	3.1m. UTP = unable to penetrate.	Checked:	Clay		ganic		Limestone	22222	1	10 (\$F-5) [
geotechnical	EOB = end of borehole.	RG	Sitt	XXXXXXX	mice		Volcanic	22222	Ü.	3 2			
			-				8						

Client: ARDMORE DEVELOPMENTS LIMITED					Auger Borehole No. HA23										
Project Location	on: SUNFIELDS ARDMORE				Sheet 23 of										
Job Number:	J01627			Vane Head: 2784			Logge	7.57	Process						
7	1 1	Sales and the control		+	278	34		MM.	RZ	14	.04.21				
Borehole MN Location: Description		ound R.L.		\dashv	· E	Ξ	ling	le kPa) sidual	_ vity	Sampl	e and				
Location: Description				7	Legend	Depth (m)	Standing Water Level	Vane Shear(kPa) peak / residual	Soil Sensitivity	Laborator Te	st				
	SOIL DESCRIPTION					-	″ ≥	SS	ഗ്	Deta	ails				
TOPSOIL						-									
=0. :						_									
fibrous PEAT, dark brow	vn/black. Stiff, moist, medium plasti	city, insensitive						00/50	Tarrar .						
[UNDIFFERENTIATED	ALLUVIUM]	Andrew Marie and the second se				- 0.5 -		68/50	1.4						
=0. 53															
								19/16	1.2						
becoming soft						- 1.0		19/16	1.2						
±1 29 ■,1															
D N Bones of V	F 001 - 189														
 becoming firm, wet, mod 	derately sensitive					- 1.5 -		34/16	2.2						
2) 2)															
 becoming saturated 							∇	C20009400	25764940						
 becoming insensitive 						- 2.0		31/25	1.3						
= : =:															
-				Ě		-									
-						- 2.5		31/25	1.3						
-															
-								***							
						- 3.0		34/28	1.2						
					100			- PERCENTER	0.00						
						- 3,5		43/28	1.6						
2) 2)															
-															
- 		Laboration				- 4.0		37/25	1.5						
EOB at 4.1m, 100 hard	to auger further. Inferred tree root/s	tump.													
=1 -1 -10						-									
-					6	- 4.5									
					ł										
2007 ■ 1 0007															
8						- 5.0									
						- 5.5									
= 0						¥3									
7. 27						4									
_	¥	i i	1	11111	//4	-6.0	describe		L	.,	·····				
	Comments: Groundwater encountered at	Borehole Diameter: 50mm	Topsoil		Sa	- 10	222355	Sandston		Plutonic No Core					
LANDER	1.9m.	Checked:	Fill	////	444	avel		Sittstone Limestone	112227	No Core	-				
geotechnical	UTP = unable to penetrate. EOB = end of borehole.	RG	Sift	XXXXX	XXX	mice H		Volcanic	900000	g					
- 77			S2677	KEKKK	0.55	- 10	****	, Sielane	12001111100						

Client :	ARDMORE DEVELOPM	IENTS LIMITE	D		Aug	er Bo	oreho	le No.		HA24
Project Location	n : SUNFIELDS							3	Sheet 24	of 34
lah Numbau	ARDMORE			Vane I		Logge	7.57	Process	2.0	North Cart. Co.
Job Number:	J01627			27	784 T		IM	RZ	14	.04.21
Borehole mN		ound R.L.			Œ	Standing Water Level	Vane Shear(kPa) peak / residual	vity	Sample	and
Location: Description	Refer to site plan			Legend	Depth (m)	tandi	Vane ear(k	Soil Sensitivity	Laborator	/ Other
	SOIL DESCRIPTION			5	۵	s w	SPea	Se	Deta	
TOPSOIL					-					
¥					1					
fibrous PEAT, dark brow [UNDIFFERENTIATED A	n/black. Very stiff, moist to wet, me	dium plasticity, ir	sensitive		-					
-					- 0.5		124/68	1.8		
-					t					
=: =:					F		- CONTRACTOR			
 becoming stiff, moderate 	ly sensitive				-1.0		68/34	2.0		
					-					
- push probed to 2.9m					F).		
 becoming very soft 					- 1.5		sunk und own weig			
<u>-</u>					-			S		
2					F			427		
<u> </u>				10000	2.0		sunk und own weig			
<u>-</u> -					-					
- 9				*****	F			5500		
-					– 2.5		sunk und own weig			
<u>.</u>					F		300000000000000000000000000000000000000	5000		
					<u> </u>					
EOB at 2.9m. Too hard t	o auger further. Inferred tree root/s	tump.			-3.0					
140 					-					
					Ė					
-					- 3.5					
2					F					
					ļ.					
<u>-</u>					-4.0					
ਨ: ਲ					F					
-					Ė					
-					-4.5					
T)					F					
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₹? ₩:					Ė					
€ :					-					
	16.	25			-6.0			1024-0-0-199		
	Comments:	Borehole Diameter:	Topsoil		and		Sandstone		Plutonic	
	Groundwater not encountered.	50mm	Fill	//////	iravel		Siltstone	222222 222222 222222	No Core	
LANDER geotechnical	UTP = unable to penetrate. EOB = end of borehole.	Checked:	Clay	0	rganic		Limestone	展題	喜	
		RG	Sitt	XXXXXXX P	umice H		Volcanic	22222	× 1	

Client :	ARDMORE DEVELO	OPMENTS LIMITE	D		Aug	jer B	oreho	le No		HA2	5
Project Location	n: SUNFIELDS ARDMORE				3			8	Sheet	25 of 3	4
Job Number:	J01627				e Head:	Logge	7.57	Process		Date:	
1	1				2784	_	MM	RZ		12.04.21	-
Borehole MN Location: Description:	mE	Ground R.L.		- 7	(E)	Standing Water Level	Vane Shear(kPa) peak / residual	_ vity	s	ample and	292.13
Location: Description:				proper	Depth (m)	Stand	Var near(ak / re	Soil Sensitivity	Labo	ratory / Othe Test	ar
	SOIL DESCRIPTIO	N				″≥	SS	ŭ		Details	
_ TOPSOIL											1
(Server DEAT along brown	March 1988 marks marginary	to Pote to constitu									1
[UNDIFFERENTIATED AL	n/black. Stiff, moist, medium p LUVIUM]	diasticity, insensitive			- - 0.5		78/43	1.8			1
- :					- 0.5		70/45	1.0			1
D: D:					-						1
 becoming moderately sens 	sitive				- -1.0	0	84/22	3.9			1
-	Silve				- '		04/22	0.0			1
											1
 becoming very soft 					- -1.5	∇	sunk und				
-				1112	- 1.5		own wei				
											1
#1 <u></u>						6	sunk und				1
-					- 2.0		own wei	ght			١
 becoming saturated 											1
_					<u>.</u>		sunk und	der			1
-					– 2.5	5	own wei	ght			١
70 70				1111							١
<u>.</u>					-		sunk und	der			١
					- 3.0	É	own wei	ght			١
											١
<u>-</u>					<u> </u>	e l	sunk und				1
5					- 3,5	li l	own wei	ght			١
= 1 = 2											1
-							44000				1
 organic stained silty CLAY plasticity, moderately sens 	, black streaked light grey. Ve	ery stiff, saturated, m	edium		4.0		140/62	2.3			1
- plasticity, moderately sens	siuve										1
EOB at 4.4m. Too hard to	auger further. Inferred tree re	oot/stump.		9286							
5					-4.5						
					Ē						
E. 1											
					-5.0						
					Ė						
					-						
					- 5.5						
-					F						
-7					+						
	Comments:	Borehole Diameter:	Topsoil		-6.0 Sand	1333113	Sandstone	e	Pin	tonic :::::	
	Groundwater encountered at		Fill		Gravel	*****	Sittstone	222222		Core	200
LANDER	2.3m. UTP = unable to penetrate.	Checked:	Clay		Organic	*****	Limeston		蓋		- 2
1160160101001	EOB = end of borehole.	RG	Sitt	XXXXXXXX XXXXXXX XXXXXXX	Pumice		Volcanic	22222	3	1.5	-

Client :	ARDMORE DEVEL	OPMENTS LIMITE	D		Aug	er Bo	oreho	le No.		HA26
Project Locatio	n: SUNFIELDS ARDMORE							33	Sheet	26 of 34
Job Number:	J01627			Vane I		Logge		Process		Date:
1	1			30	17		RZ	RZ		12.04.21
Dotetiole		Ground R.L.			Depth (m)	Standing Water Level	Vane Shear(kPa) peak / residual	il ivity	S	ample and
Description				Legend	Depti	Stan /ater	Vai hear eak / n	Soil Sensitivity	Labo	ratory / Other Test
	PEAT, black. Soft, moist, high plasticity, insensitive aturated, push probed to 3.4m rm noderately sensitive The comments: Groundwater encountered at 1.9m. UTP = unable to penetrate. Borehole Diameter: 50mm Fill Checked: Clay	innana.	102773	5	ωa	Ø		Details		
sensitive [UNDIFFEREN]	Y, light brown, Stiff, dry to mo: FIATED ALLUVIUM]	ist, low plasticity, mod	erately		ţ					
12 23					-					
					- 0.5		77/23	3.1		
					ļ					
 becoming moist, high pla 	sticity				t					
-					-1.0		83/32	2.6		
amorphous PEAT, black.	Soft, moist, high plasticity, in	sensitive		23333	F					
					F					
					- 1.5		17/12	1.5		
-					t	∇				
 becoming saturated, pust 	h probed to 3.4m				-		Carren (e.e.	JATONIA S		
7					- 2.0		23/14	1.6		
-										
- hasamina firm					Ł.,		40/29	24/34/		
becoming firm					- 2.5		40/29	1.4		
50 50					F					
 becoming moderately ser 	nsitive				- -3.0		43/17	2.5		
-					<u> </u>					
=				*****	ŧ					
EOB at 3.4m. Too hard to	auger further. Inferred tree re	oot/stump.			- 3.5					
					E					
-					F					
-					-4.0					
e: -					-					
== 3 == 1 == 1.1					-					
-					- 4.5					
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<u> </u>					- 3.0					
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					- -5.5					
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					_					
-	4	25			-6.0					
			7000	}}}}}	and		Sandstone		•	tonic
LANDER	1.9m.	5 U 502-011-02-00					Sittstone	111111	33 No	Core
geotechnical		46/2/2/2/2/2/2020/01	PROFICE OF THE PROFIC	KKKKKKKK	rganic umice		Limestone Volcanic	* *******	Š.	-
			3502	- Common	P	****	7.5		-	

Client: ARD	DMORE DEVELOPM	MENTS LIMITE	Ö		Au	ger B	oreho	le No	6	HA27
Project Location : SUN	NFIELDS DMORE				3	ATTENDO TO		3	Sheet 2	27 of 34
Job Number: Joh				Va	ne Head:	1.5	7.27	Process		
		errettaalen :		+	307	_	RZ	RZ		14.04.21
Boleliole		ound R.L.		-	pu (iii	Standing Water Level	Vane Shear(kPa) peak / residual	il ivity		ole and
Description, Ne	efer to site plan			-	Legend Death (m)	Stand	Var hear sek / re	Soil Sensitivity	Т	ory / Other est
	DESCRIPTION	71 50 45 210					ശമ	Ø	De	tails
organic stained silty CLAY, light brov [UNDIFFERENTIATED ALLUVIUM]	vn. Stiff, moist, medium	plasticity, sensit	ive		E					
-					-					
-						5	92/23	4.0		
amorphous PEAT, black. Stiff, moist,	, medium plasticity, mo	derately sensitive					- WOARDOO.E			
5)										
					-1.	0	75/35	2.2		
= 5√										
 becoming very stiff 					-1.	5	112/32	3.5		
				222						
<u>.</u>						∇				
 becoming stiff, saturated 				di uru	— 2.	0	60/29	2.1		
()					-					
							_			
becoming very stiff		K TO BANKS			- 2.	5	147/55	2.7		
EOB at 2.6m, Too hard to auger furth	her. Inferred tree root/s	tump.			Ė					
-					1					
					- 3.	0				
					Ė					
					Ł.	_				
					- 3.	5				
-					F					
e: _					-4.					
e L					- "	•				
<u></u>					F					
5). -					-4.	5				
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					- 5.	5				
-					F					
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-		ř		min	<u>–6.</u>	0		L	:1	·····
Comment	ts: ater encountered at	Borehole Diameter: 50mm	Topsoil		Sand Gravel	(222222	Sandstone Sittstone	e	Plutonic No Core	
LANDED 2.0m.		Checked:	Fill		Organic	******		22222	E No Core	S
geotechnical Oir = una	able to penetrate. d of borehole.	RG	Sitt	**************************************	y Pumice		Volcanic	330000	Š.	

Client: ARDMORE DEVELOPMENTS LIMITED	Αι	iger B	oreho	le No.		HA28
Project Location : SUNFIELDS				33	Sheet 28	of 34
ARDMORE	Vane Head			Process		
Job Number: J01627	1750	_	PL	RZ	20	.04.21
Borehole mN mE Ground R.L.		Standing Water Level	Vane Shear(kPa)	.≩:	Sample	e and
Location: Description: Refer to site plan	Legend	Standing /ater Leve	Vane sar(k	Soil Sensitivity	Laborator	y / Other
SOIL DESCRIPTION	، ا د	Wates	She	Ser	Deta	
TOPSOIL	111111					
 slightly clayey SILT, orange. Hard, moist, no plasticity, moderately sensitive [PUKETOKA FORMATION] 						
- TOMMATION						
-		.5	220/69	3.2		
silty CLAY, orange/brown. Hard, moist, medium plasticity, moderately sensitive						
becoming orange streaked light grey/orange		.0	200/65	3.1		
# 1 52 N 74 N N N N N N N N N N N N N N N N N						
with trace organic staining		.5	270/131	2.1		
		-	2/0/131	2.1		
 becoming orange streaked white, very stiff, insensitive, with trace pumicious inclusions 	1-1-1-1-1-1-1 1-1-1-1-1-1-1-1 1-1-1-1-1			2.4		
becoming transfer streaked write, very still, insensitive, with trace pullicious inclusions	5-5-1-3-1-1-1 5-1-1-3-3-1-1 	2.0	173/123	1.4		
-						
5						
-		2.5	173/112	1.5		
	5-5-5-3-3-5-3 5-5-5-3-3-3-5 5-3-3-3-3-3-					
becoming yellow/orange streaked white, wet				222-2		
	-3 	.0	104/54	1.9		
- becoming white, with trace fine sand	0-1-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0					
becoming stiff	141144	.5	77/54	1.4		
	1.1.1.1.1.1.1.1 1.1.1.1.1.1.1.1 1.1.1.1.1.1.1.1					
- becoming green/blue streaked light blue						
becoming light blue	-4	.0	58/42	1.4		
- -:						
	1-1-1-0-0-0-1 1-1-1-1-1-1-1 1-1-1-1-1-1-					
 becoming very stiff 	-4	.5	104/73	1.4		
T)						
at 5.0m, becoming stiff	-5	.0	77/54	1.4		
EOB at 5.0m. Target Depth.						
		.5				
	E					
-	-					
_		.0				
Comments: Borehole Diameter: Topsoil	Sand		Sandston	e	Plutonic	
Groundwater not encountered. 50mm Fill	Gravel	222222	Siltstone	222222 222222 222222 222227	No Core	
LANDER UTP = unable to penetrate. Checked: Clay EOB = end of borehole.	Organic	*******	Limeston		H H	
geotechnical EOB = end of borenole. RG Six 8XX	XXXXX XXXXX Pumice	******	Volcanic	000000	Š.	

Client :	ARDMORE DEVELO	PMENTS LIMITE	D	3	Aug	er Bo	oreho	le No		HA29
Project Location	n: SUNFIELDS			,					Sheet	29 of 34
Job Number:	ARDMORE			Vane F		Logge		Process		Date:
T	J01627	The Committee		30	7	_	RZ	RZ		12.04.21
Borehole MN Location: Description	mE	Ground R.L.			(E)	Standing Water Level	Vane Shear(kPa) peak/residual	vity	Sa	mple and
Location: Description	Refer to site plan	: 1		Legend	Depth (m)	stand ater I	Van lear(Soil Sensitivity		atory / Other Test
	SOIL DESCRIPTION	N .			Δ	N N	S S	S		Details
_ TOPSOIL					-					
silty CLAY, orange/brown FORMATION]	n. Very stiff, moist, no plasticity,	sensitive [PUKETO	KA							
_ FORWATION							104/00	50		
becoming yellow/light gre	еу				- 0.5 -		164/32	5.2		
5) 5)										
becoming hard				5-5-5-5-5-6 			201+			
 becoming nard becoming orange and red 	d mottled white			1-2-1-3-2-3 2-2-1-3-2-3 2-2-1-3-3-3-3	- 1.0		201+			
 becoming very stiff, inser 	nsitiva			0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 - 0 -			40.442	.		
- Documing very still, itself	35 (F)			0-1-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0	- 1.5		184/121	1.5		
 				1-1-1-0-000 1-1-1-0-0-0-1 1-1-1-0-0-1	_					
<u>-</u>				5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5 -	- - 2.0		155/86	1.8		
-				5-5-5-5-5-4- 5-1-5-5-5-4-1	- 2.0		100/86	1,8		
=- ===================================				1-1-1-0-1-1-1 1-1-1-0-1-1-1-1 1-1-1-1-1-	-					
 becoming high plasticity becoming stiff 					- - 2.5		86/60	1.4		
-				5-5-5-5-5-5 5-5-5-5-5-5 1-5-5-5-5-5			80/00	567		
 becoming orange and wf 	nite mottled			1-1-1-2-2-2-1-1 1-1-1-2-2-2-1-1 1-1-1-2-2-1-1	- -3.0		60/43	1.4		
				6-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1			00/40	1.4		
EOB at 3.3m. Too sticky	to augor further			9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-9-						
EOB at 3.5m. Too sticky	to adger turner.				- - 3.5					
-										
3										
-					-4.0					
#: =0					-					
= ;				3	=					
36 -					- 4.5					
-					-					
-										
ea 7 20-				i i	- 5.0					
<u>u</u> u										
_					- 5.5					
					-					
-										
<u> </u>	<i>Y</i> .	25			-6.0					
	Comments:	Borehole Diameter:	Topsoil	s	and		Sandston	e	••	
LANDED	Groundwater not encountered UTP = unable to penetrate.		Fill	///////	ravel	*****	Sittstone	111111	No C	iore
LANDER geotechnical	EOB = end of borehole.	Checked: RG	Clay	XXXXXXXX	ganic		Limeston	0 55555	<u> </u>	
			Silt	XXXXXXXX P	umice	******	Volcanic	000000	93	

Client :	ARDMORE DEVELOPM	IENTS LIMITE	D	1	Aug	er Bo	oreho	le No		HA30
Project Location	n: SUNFIELDS								Sheet	30 of 34
Job Number:	J01627			Vane H		Logge	d By: RZ	Process RZ)ate: 14.04.21
Laster V	mE Gr	ound R I			5.445		/POS			
DOTOTION	- Acceptance	Julia III.E.		Legend	Depth (m)	ding,	r(kPg residu	oil trivity	Sa Labor	mple and atory / Other
				Leg	Dept	Standing Water Level	Vane Shear(kPa) peak / residual	Soil Sensitivity		Test Details
56 1 FORD 1 10 - 10 AND FREEDOM	Number: J01627 Number: J01627 MR	1000000	AMERICA.	>	0, 4	- 0,		Details		
 organic stained silty CLAY plasticity, moderately sen 	Y, orange mottled light brown. Ver sitive [UNDIFFERENTIATED ALL	y stiff, moist, med UVIUM]	lium		- - - - - 0.5		127/35	3.7		
		y, moderately ser	nsitive		_ _ _ 1.0		43/17	2.5		
becoming saturated push probed to 4.2m					- - - - -1.5	▽	46/20	2.3		
becoming very soft					- - - 2.0		sunk un own wei			
					- - - - 2.5		sunk und own wei			
becoming firm, insensitive	,				- - -3.0 -		29/17	1.7		
-					- - - 3,5 -		37/23	1.6		
FOR at 4.2m Too hard to	auger further. Inferred tree rest/e	tumo			-4.0 -		46/40	1.1		
-					- - -4.5 -					
				10	- - 5.0 - -					
					- -5.5 - - - - -			155-3013		
	Comments:	Borehole Diameter:	Topsoil	Si	and		Sandstone		Pluto	nio ::::::
		U 57850100000	Fill	//// G	avel		Sittstone	222222 222222 222222	No C	ore
LANDER geotechnical	UTP = unable to penetrate.	440 MARKETS AND 1	63	CHERRAN	ganic mice		Limestone Volcanic) BB	¥	

Client :	ARDMORE DEVELO	OPMENTS LIMITE	D	(Aug	er Bo	oreho	le No		HA31
Project Locatio	n: SUNFIELDS								Sheet	31 of 34
	ARDMORE			Vane H		Logge	d By:	Process	or: [ate:
Job Number:	J01627	<u> </u>		30	7		RZ	RZ		12.04.21
Borehole mN	mE	Ground R.L.			Ê	grei	Pa)	≥	Sa	mple and
Location: Description	: Refer to site plan			Legend	Depth (m)	andir er Le	/ane ar(kf /resi	Soil Sensitivity	Labora	atory / Other
	SOIL DESCRIPTIO	N		Le	ο	Standing Water Level	Vane Shear(kPa) peak / residual	Sen	1	Test Details
TOPSOIL	And the Colon countries with the Section Colon C			111111				2: =		
organic silty CLAY, light t ALLUVIUM]	brown. Stiff, moist, medium pla	asticity [UNDIFFEREN	TIATED		-					
amorphous PEAT, dark b	prown/black. Stiff, moist, medic	um plasticity, moderat	ely sensitive		- 0.5		52/17	3.0		
-(5)					-					
•: • •:					- 1.0		55/26	2.1		
becoming firm					- 1.5		31/14	2.2		
#1 #1 #1						∇				
 becoming very stiff, satur 	rated				- 2.0		130/46	2.8		
EOB at 2.2m. Too hard to	o auger further, Inferred tree ro	oot/stump			-					
<u> </u>				18	- 2.5 -					
현 현 					5 5					
라 - -					- 3.0					
-					- 3.5					
					_					
-				3	- 4.0					
•0 •0 •0					5 5 5					
-				6	- 4.5					
					- 5.0					
					- 5.5 -					
*: *: #:										
-	Comments:	Borehole Diameter:	Topsoil	Si Si	-6.0	333333	Sandstone	 -	Pluto	nio
	Groundwater encountered at		Fill	****	avel	222222	Sittstone	222222	No C	
LANDER	2.0m. UTP = unable to penetrate.	Checked:	Clay	On	ganic	*****	Limestone	,	Ħ	
geotechnical	EOB = end of borehole.	RG		XXXXX Pu	mice		Volcanic	22222	\$ \$ \$	

Project Location: SUNFIELDS Job Number: Joi 827 Somethies Mark Medical Control RL Logad By. Processor: Date 12.04.21 Somethies Description: Refer to size plan SOLD ESCRIPTION Toping Supplies Suppli	Client :	ARDMORE DEVELOPM	MENTS LIMITE	D	33	Aug	er Bo	oreho	le No.	E.	HA32
Solution	Project Location	on : SUNFIELDS								Sheet 32	2 of 34
Borehold Location: Refer to site plan SOIL DESCRIPTION TOPSOIL organic stained sity CLAY, brown. Stiff, wet, high plasticity, sensitive, with trace woody becoming saturated becoming firm, moderately sensitive becoming soft, insensitive -1,0 becoming soft, insensitive -1,5 becoming soft, insensitive -2,5 101/12 8.8 -3,0 48:35 1.3 -3,0 48:35 1.3 -4,0 -5,5 -	lah Numbari						1000	7.57			
TOPSOIL organic stained sity CLAY, brown. Stiff, wet, high plasticity (UNDIFFERENTIATED ALLUVIUM) amorphous PEAT, dark brown. Stiff, wet, high plasticity, sensitive, with trace woody inclusions becoming stirm, moderately sensitive -1.0	Job Number:				307	7				1:	2.04.21
TOPSOIL organic stained sity CLAY, brown. Stiff, wet, high plasticity (UNDIFFERENTIATED ALLUVIUM) amorphous PEAT, dark brown. Stiff, wet, high plasticity, sensitive, with trace woody inclusions becoming stirm, moderately sensitive -1.0	Dotetiole	- Marian	ound R.L.			(E)	ng evel	Pa)	ξį	Sampl	e and
TOPSOIL organic stained sity CLAY, brown. Stiff, wet, high plasticity (UNDIFFERENTIATED ALLUVIUM) amorphous PEAT, dark brown. Stiff, wet, high plasticity, sensitive, with trace woody inclusions becoming stirm, moderately sensitive -1.0	Location: Description	n: Refer to site plan			- Ge	epth	tandi ter L	Vange ear(k k/res	Soil	Laborator	y / Other
organic stained sity CLAY, brown. Stiff, wet, high plasticity (UNDIFFERENTIATED ALLUVIUM) amorphous PEAT, dark brown. Stiff, wet, high plasticity, sensitive, with trace woody inclusions. becoming safur alled becoming safur alled becoming safur alled becoming safur alled becoming soft, insensitive —1.0 35/14 2.4 —1.5 17/12 1.5 —1.5 —1.5 —1.5 —1.5 —1.5 —1.5 —1.5		SOIL DESCRIPTION			ت	ă	Wa	Sh	Sel		
ALLUVIUS PEAT, dark brown. Siff, wet, high plasticity, sensitive, with trace woody inclusions becoming start abed becoming start abed becoming soft, insensitive -1.0	TOPSOIL					-					
amorphous PEAT, dark, brown. Self, wet, high plasticity, sensitive, with trace woody includions becoming saturated becoming saturated becoming saturated becoming saturated becoming saturated becoming soft, insensitive	organic stained silty CL	AY, brown. Stiff, wet, high plasticity	[UNDIFFERENTI	ATED		-					
becoming saturated becoming firm, moderately sensitive -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 35/14 2.4 -1,0 -1,0 35/14 2.4 -1,0 -1,0 35/14 2.4 -1,0 -1,	amorphous PEAT, dark	brown. Stiff, wet, high plasticity, se	nsitive, with trace	woody		-		00/44	4.0		
becoming very stiff, sensitive	inclusions					- 0.5 -		60/14	4.2		
becoming very stiff, sensitive	53										
becoming very stiff, sensitive		1 2.				-		PERMITS I	-2 W		
becoming very stiff, sensitive -2.0 181/37 4.8 101/12 8.8 -2.5 101/12 8.8 -2.6 -3.0 48/35 1.3 EOB at 3.3m. Too hard to auger further. Inferred tree root/stump. -3.5 -4.0 -4.5 -5.0 -5.0 -6.0 Comments: Groundwater encountered at 0.6m. Groundwater encountered at 0.6m. Groundwater encountered at 0.6m. Comments: Comme	 becoming firm, moderat 	ely sensitive				- 1.0		35/14	2.4		
becoming very stiff, sensitive -2.0 181/37 4.8 101/12 8.8 -2.5 101/12 8.8 -2.6 -3.0 48/35 1.3 EOB at 3.3m. Too hard to auger further. Inferred tree root/stump. -3.5 -4.0 -4.5 -5.0 -5.0 -6.0 Comments: Groundwater encountered at 0.6m. Groundwater encountered at 0.6m. Groundwater encountered at 0.6m. Comments: Comme	■ 1										
becoming very stiff, sensitive -2.0 181/37 4.8 101/12 8.8 -2.5 101/12 8.8 -2.6 -3.0 48/35 1.3 EOB at 3.3m. Too hard to auger further. Inferred tree root/stump. -3.5 -4.0 -4.5 -5.0 -5.0 -6.0 Comments: Groundwater encountered at 0.6m. Groundwater encountered at 0.6m. Groundwater encountered at 0.6m. Comments: Comme											
becoming very stiff, sensitive -2.0	 becoming soft, insensiting 	ve				- 1.5		17/12	1.5		
becoming very stiff, sensitive -2.0	201 201										
becoming extra sensitive -2.5	43 27										
becoming firm, insensitive -3.0 48/35 1.3 EOB at 3.3m. Too hard to auger further. Inferred tree root/stump. -3.5 -4.0 -4.5 -5.0 -5.5 -5.0 -6.0 Sand Sandstone Platonic Statute Statute Clay Corporate Statute Corporate Corporat	 becoming very stiff, sen 	sitive				- 2.0		181/37	4.8		
becoming firm, insensitive -3.0 48/35 1.3 EOB at 3.3m. Too hard to auger further. Inferred tree root/stump. -3.5 -4.0 -4.5 -5.0 -5.5 -5.0 -6.0 Sand Sandstone Platonic Statute Statute Clay Corporate Statute Corporate Corporat	• · • ·										
becoming firm, insensitive -3.0 48/35 1.3 EOB at 3.3m. Too hard to auger further. Inferred tree root/stump. -3.5 -4.0 -4.5 -5.0 -5.5 -5.0 -6.0 Sand Sandstone Platonic Statute Statute Clay Corporate Statute Corporate Corporat	K(
EOB at 3.3m. Too hard to auger further. Inferred tree root/stump. -3.5 -4.0 -4.5 -5.5 -5.5 -6.0 Sand Sandstone Plutonic Statutore Clay Statutore Clay Statutore Clay Statutore Clay Corporate Clay Clay Corporate Clay Clay Clay Corporate Clay Clay Clay Clay Clay Clay Clay Clay	becoming extra sensitive	e				- 2.5		101/12	8.8		
EOB at 3.3m. Too hard to auger further. Inferred tree root/stump. -3.5 -4.0 -4.5 -5.0 -5.5 -5.5 -6.0 Sand Sandstone Plutonic Groundwater encountered at 0.6m. O.6m. Checked: Clay Organic Umestone Checked: Clay Organic Umestone	€: :					- (100 miles)		18000000	ARRESTA		
EOB at 3.3m. Too hard to auger further. Inferred tree root/stump. -3.5 -4.0 -4.5 -5.0 -5.5 -5.5 -6.0 Sand Sandstone Plutonic Groundwater encountered at 0.6m. O.6m. Checked: Clay Organic Umestone Checked: Clay Organic Umestone	s: •3:										
EOB at 3.3m. Too hard to auger further. Inferred tree root/stump. -3.5 -4.0 -4.5 -5.0 -5.5 -5.5 -6.0 Sand Sandstone Plutonic Groundwater encountered at 0.6m. O.6m. Checked: Clay Organic Umestone Checked: Clay Organic Umestone	- - becoming firm, insensiti	We .						ACIDE	1.0		
- 3.5 - 4.0 - 4.5 - 5.0 - 5.5 - 5.5 - 5.5 - 6.0 Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Checked: C	- becoming tirm, inserialit	VO				-3.0		46/35	1.3		
- 3.5 - 4.0 - 4.5 - 5.0 - 5.5 - 5.5 - 5.5 - 6.0 Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Checked: C											
-4.5 -4.5 -5.0 -5.5 -5.5 -6.0 Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Checked: Clay Crganic Limestone Plutonic Fill Gravel Sintatore Sintatore No Core Limestone Limestone	EOB at 3.3m. Too hard	to auger further. Inferred tree root/s	tump.								
- 4.5 - 5.0 - 5.0 - 5.5 - 6.0 Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Checked: Clay Organic Limestone	- 3					- 3.5					
- 4.5 - 5.0 - 5.0 - 5.5 - 6.0 Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Checked: Clay Organic Limestone	2) 2:										
- 4.5 - 5.0 - 5.0 - 5.5 - 6.0 Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Checked: Clay Organic Limestone						25					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Somm Fill Gravel Sitstone No Core Checked: Clay Organic Limestone	<u>-</u> -:					- 4.0					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Somm Fill Gravel Sitstone No Core Checked: Clay Organic Limestone	-X					-					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Somm Fill Gravel Sitstone No Core Checked: Clay Organic Limestone	7.1 7.1					== ==================================					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitistone Sitistone Sitistone Checked: Clay Organic Limestone Limestone	-					- 4.5					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitistone Sitistone Sitistone Checked: Clay Organic Limestone Limestone	-					5). 5).					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitistone Sitistone Sitistone Checked: Clay Organic Limestone Limestone	3.										
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitistone Sitistone Sitistone Checked: Clay Organic Limestone Limestone	e.:					-5.0					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitistone No Core Checked: Clay Organic Limestone Limestone	27 23					_					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitistone No Core Checked: Clay Organic Limestone Limestone						2					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Sitistone No Core Checked: Clay Organic Limestone Limestone	-					- -55					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Siltstone No Core Checked: Clay Organic Limestone Limestone						- 5.5					
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Siltstone No Core Checked: Clay Organic Limestone Limestone	•:										
Comments: Groundwater encountered at 0.6m. UTP = unable to penetrate. Borehole Diameter: Topsoil Sand Sandstone Plutonic Siltstone No Core Checked: Clay Organic Limestone Limestone						- 					
Groundwater encountered at 0.6m. UTP = unable to penetrate. Groundwater encountered at 0.6m. UTP = unable to penetrate. Checked: Clay Organic Limestone Limestone		Comments:	Borehole Diameter:	Topsoil	Sa	- 13	1831118	Sandstone	,	Plutonic	
LANDER O.6m. UTP = unable to penetrate. Checked: Clay Organic Umestone		Groundwater encountered at			}}}}}	- 15	20000			•	CHILLE
		\$ 44 CONTRACTOR	Checked:		On	anic	*****	Limestone		E C	
	geotechnical		RG	Siit s	XXXXXXX Pu	mice •		Volcanic	000000	555	3 3

Sheek 33 of 34 ADMONE Job Number: Jot 27 Brombie	Client :	ARDMORE DEVELOPM	MENTS LIMITE	D	1	Auge	er Bo	oreho	le No.		НАЗЗ
Solidary State S	Project Locatio	n : SUNFIELDS							38	Sheet 33	of 34
Borehole Location: Main Mis	lah Numbari						100	(3)		20.00	100 C 100 C 100 C
TOPSCIL Signify claps (SLT. orange-brown. Very stiff, moist, no to low plasticity, sensitive -0.5 161/40 4.0	Job Number:				23	96			RZ	12	.04.21
TOPSCIL Signify claps (SLT. orange-brown. Very stiff, moist, no to low plasticity, sensitive -0.5 161/40 4.0	DOTOTOR	mE Gr	ound R.L.			Œ	ng evel	Pa)	lity.	Sample	and
TOPSCIL Signify claps (SLT. orange-brown. Very stiff, moist, no to low plasticity, sensitive -0.5 161/40 4.0	Location: Description	: Refer to site plan			- Gen	epth	tandi ter L	Vane ear(k k/res	Soil	Laborator	// Other
slightly clayey SILT, orange-brown. Very stiff, moist, no to low plasticity, sensitive PUKETOKA FORMATION -0.5		SOIL DESCRIPTION			2	Δ	Wa	SPea	Se		
Clayery SiLT, orange-brown streaked light grey. Hard, moist, medium plasticity					111111						
clayery SILT, orange-brown streaked light grey. Hard, moist, medium plasticity 1.0 253+ 1.0 253+ 1.0 253+ 1.0 253+ 1.0 253+ 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.	slightly clayey StLT, oran IPUKETOKA FORMATIC	ge/brown. Very stiff, moist, no to k	ow plasticity, sens	sitive		-					
clayey SILT, orange-brown streaked light grey. Hard, moist, medium plasticity becoming moderately sensitive -1.5		50 M									
becoming moderately sensitive sity CLAY, light grey. Very stiff, moist, medium plasticity, insensitive -1.5 23278 2.8 -1.5 23278 2.8 -1.5 23278 2.8 -1.5 23278 2.8 -1.6 2.0 13674 1.8 -1.7 2.0 13674 1.8 -1.8 2.6 2.6 -1.9 2.0 13674 1.8 -1.9 2.0 13674 1.8 -1.0 107/43 2.5	-					- 0.5		161/40	4.0		
becoming moderately sensitive sity CLAY, light grey. Very stiff, moist, medium plasticity, insensitive -1.5 23278 2.8 -1.5 23278 2.8 -1.5 23278 2.8 -1.5 23278 2.8 -1.6 2.0 13674 1.8 -1.7 2.0 13674 1.8 -1.8 2.6 2.6 -1.9 2.0 13674 1.8 -1.9 2.0 13674 1.8 -1.0 107/43 2.5	-										
becoming moderately sensitive sity CLAY, light grey. Very stiff, moist, medium plasticity, insensitive -1.5 23278 2.8 -1.5 23278 2.8 -1.5 23278 2.8 -1.5 23278 2.8 -1.6 2.0 13674 1.8 -1.7 2.0 13674 1.8 -1.8 2.6 2.6 -1.9 2.0 13674 1.8 -1.9 2.0 13674 1.8 -1.0 107/43 2.5	5.										
becoming moderately sensitive sity CLAY, light grey. Very stiff, moist, medium plasticity, insensitive -2.0	olavav SILT oranga hrav	us stronked light grov. Hard majet	madium plantinit			-1.0		253+			
alt S.Om. becoming stiff at S.Om. becoming very stiff, moderately sensitive 2.0	- clayey SILT, Grange/blow	vii streaked light gley. Hald, moist.	, medium piasiicii	у							
alt S.Om. becoming stiff at S.Om. becoming very stiff, moderately sensitive 2.0											
alt S.Om. becoming stiff at S.Om. becoming very stiff, moderately sensitive 2.0	becoming moderately ser	nsitive				-1.5		232/78	28		
-2.0 136/74 1.8	-							202/10	2.0		
clayery SILT, light grey. Stiff, moist, low to medium plasticity, moderately sensitive -2.5	silty CLAY, light grey. Ver	ry stiff, moist, medium plasticity, in	sensitive								
clayery SILT, light grey. Stiff, moist, low to medium plasticity, moderately sensitive -2.5	<u></u>					- 20		10074	4.0		
-2.5					14-1-3-3-4-1 14-1-3-3-4-1 1-1-1-1-1	- 2.0		130//4	1.6		
Decoming wet	clayey SILT, light grey. S	tiff, moist, low to medium plasticity	, moderately sen	sitive							
Decoming wet	-					-		***************************************	ata terapak		
becoming stiff -3.5 128/35 3.7 -4.0 89/42 2.1 -5.0 -4.5 56/38 1.5 -6.0 -5.5 -6.0 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. EGB = end of borehole. RG -6.0 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. EGB = end of borehole. RG -6.0 -6.0 Comments: Somm -6.0 -6.0 Sand Sandstone Plutonic Statore -6.0 Checked: RG -6.0	-					- 2.5		146/56	2.6		
becoming stiff -3.5 128/35 3.7 -4.0 89/42 2.1 -5.0 -4.5 56/38 1.5 -6.0 -5.5 -6.0 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. EGB = end of borehole. RG -6.0 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. EGB = end of borehole. RG -6.0 -6.0 Comments: Somm -6.0 -6.0 Sand Sandstone Plutonic Statore -6.0 Checked: RG -6.0	₹0 - 1										
becoming stiff -3.5 128/35 3.7 -4.0 89/42 2.1 -5.0 -4.5 56/38 1.5 -6.0 -5.5 -6.0 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. EGB = end of borehole. RG -6.0 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. EGB = end of borehole. RG -6.0 -6.0 Comments: Somm -6.0 -6.0 Sand Sandstone Plutonic Statore -6.0 Checked: RG -6.0	======================================					643 236					
becoming stiff -4.0 89/42 2.1 -4.5 56/38 1.5 at 5.0m, becoming very stiff, moderately sensitive EOB at 5.0m. Target depth. -5.5 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. GROUNDER geotechnical Checked: Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Checked: Clay Organic Umestore Checked: Clay Organic Umestore Corporation Corpo	-					-3.0		107/43	2.5		
becoming stiff -4.0 89/42 2.1 -4.5 56/38 1.5 at 5.0m, becoming very stiff, moderately sensitive EOB at 5.0m. Target depth. -5.5 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. GROUNDER geotechnical Checked: Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Checked: Clay Organic Umestore Checked: Clay Organic Umestore Corporation Corpo											
becoming stiff -4.0 89/42 2.1 -4.5 56/38 1.5 -4.5 56/38 1.5 -4.5 56/38 1.5 -5.0 184/71 2.6 -6.0 184/71 2.6 -7.5 56/38 1.5 -7.5 56/38 1	- becoming wet										
becoming insensitive, push probed to 5.0m 4.5 56/38 1.5 at 5.0m, becoming very stiff, moderately sensitive EOB at 5.0m. Target depth. 5.0 184/71 2.6 Comments: Groundwater not encountered. UTP = unable to penetrate. GOB = end of borehole. Checked: EOB = end of borehole.	-					- 3.5		128/35	3.7		
becoming insensitive, push probed to 5.0m 4.5 56/38 1.5 at 5.0m, becoming very stiff, moderately sensitive EOB at 5.0m. Target depth. 5.0 184/71 2.6 Comments: Groundwater not encountered. UTP = unable to penetrate. GOB = end of borehole. Checked: EOB = end of borehole.	<u> </u>										
becoming insensitive, push probed to 5.0m 4.5 56/38 1.5 at 5.0m, becoming very stiff, moderately sensitive EOB at 5.0m. Target depth. 5.0 184/71 2.6 Comments: Groundwater not encountered. UTP = unable to penetrate. GOB = end of borehole. Checked: EOB = end of borehole.	-										
at 5.0m, becoming very stiff, moderately sensitive EOB at 5.0m. Target depth. 5.0 184/71 2.6 Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Checked: RG ANNERS Comments: Gravel Checked: C	 becoming stiff 					-4.0		89/42	2.1		
at 5.0m, becoming very stiff, moderately sensitive EOB at 5.0m. Target depth. 5.0 184/71 2.6 Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Checked: RG ANNERS Comments: Gravel Checked: C	n. Bi										
at 5.0m, becoming very stiff, moderately sensitive EOB at 5.0m. Target depth. 5.0 184/71 2.6 Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Checked: RG ANNERS Comments: Gravel Checked: C	- -1										
EOB at 5.0m. Target depth. -5.5 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. UTP = unable to penetrate. EOB = end of borehole. EOB = end of borehole. Borehole Diameter: 50mm Fill Gravel Siltstone Siltstone No Core Checked: Clay Organic RG ***XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	 becoming insensitive, pus 	sh probed to 5.0m				-4.5		56/38	1.5		
EOB at 5.0m. Target depth. -5.5 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. UTP = unable to penetrate. EOB = end of borehole. EOB = end of borehole. Borehole Diameter: 50mm Fill Gravel Siltstone Siltstone No Core Checked: Clay Organic RG ***XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	3										
EOB at 5.0m. Target depth. -5.5 -6.0 Comments: Groundwater not encountered. UTP = unable to penetrate. UTP = unable to penetrate. EOB = end of borehole. EOB = end of borehole. Borehole Diameter: 50mm Fill Gravel Siltstone Siltstone No Core Checked: Clay Organic RG ***XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX											
Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Borehole Diameter: 50mm Fill Gravel Siltstone Siltstone No Core Checked: Clay Organic RG KANDERS RG KANDER						-5.0		184/71	2.6		
Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Borehole Diameter: Topsoil Sand Sandstone Plutonic Fill Gravel Clay Organic Sitstone Checked: Clay Organic RG XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	L EOB at 5.0m. Target dep	in.									
Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Borehole Diameter: Topsoil Sand Sandstone Plutonic Fill Gravel Clay Organic Sitstone Checked: Clay Organic RG XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	<u>ii</u>)					2					
Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Borehole Diameter: Topsoil Sand Sandstone Plutonic Fill Gravel Clay Organic Sitstone Checked: Clay Organic RG XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX						- -55					
Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Borehole Diameter: Topsoil Sand Sandstone Plutonic Fill Gravel Clay Organic Sitistone Checked: Clay Organic Sitistone Checked: RG	E)					_ 5.5					
Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Borehole Diameter: Topsoil Sand Sandstone Plutonic Fill Gravel Clay Organic Sitistone Checked: Clay Organic Sitistone Checked: RG	-										
Comments: Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Borehole Diameter: Topsoil Sand Sandstone Plutonic Fill Gravel Clay Organic Sitistone Checked: Clay Organic RG	_										
LANDER geotechnical Groundwater not encountered. UTP = unable to penetrate. EOB = end of borehole. Sitstore No Core Checked: Clay Organic Sitstore No Core No Core		Comments:	Borehole Diameter	Tonsoil	Se VIIII	1.5	133333	Sandstone		Plutonia	
LANDER geotechnical UTP = unable to penetrate. EOB = end of borehole. Checked: Clay Organic Limestone RG XXXXXXXX				1000	}}}}}	- 5	255555	2080 (1202)	222222	•	
Section 1 Sectio			000000000000000000000000000000000000000		Or		*****	Limestone		Ħ	
Announced to some and the second of the seco	geotechnical	EVD = end of borenole.	RG	Siit	CXXXXXXX Pu	mice 50		Volcanic	22222	555	2

Client :		ARDMORE DEV	ELOPA	MENTS LIMITE	D			Aug	er Bo	oreho	le No.		HA34
Project	Locatio	n: SUNFIELDS						3C-3/5/ T i					34 of 34
		ARDMORE					Vane l		Logge	d By:	Process		
Job Nu	mber:	J01627	-			-	2	153		M	RZ		2.04.21
Borehole	mN	mE	Gr	ound R.L.			75	Ê	Standing Water Level	Vane Shear(kPa) peak / residual	it	Same	ole and
Location:	Description	: Refer to site plan					Legend	Depth (m)	andi ler L	Vane sar(k	Soil Sensitivity	Laborate	ory / Other est
		SOIL DESCRIPT	ION				ä	۵	St	She	Ser		tails
TOPSOIL							11111						- 1
<u>-</u>								-					
organic stair sensitive [UI	ned silty CLA NDIFFERENT	Y, black mottled grey/brow FIATED ALLUVIUM]	n. Stiff,	moist, medium pl	asticity,			Ē.,			Tare.		
becoming bl inclusions, p	ack mottled b	orown, firm, wet, medium to o 2.9m	o high p	lasticity, with trac	e organic			- 0.5 -		77/17	4.5		
5:								-		augre	2010		
=======================================								- 1.0		45/11	4.1		
_ amorphous	PEAT, dark b	orown. Stiff, wet, medium to	o high p	lasticity, sensitive	6			ŧ					
								- 1.5		76/19	4.1		
								Ē					
- becoming m	oderately ser	nsitive						- 2.0		52/17	3.1		
-								F					
 becoming fir 	m, insensitive	e						- 2.5		43/28	1.6		
								‡		ARK NOT SELECT	11/40/4/2		
- with modera	tely thin log									UTP			
_ EOB at 2.9n	n. Too hard to	o auger futher. Inferred tree	e root/st	ump.				-3.0		0.11			
) [1]								F					
								Ė					
_								- 3.5					
_								Ė					
≅								-					
								L.,					
y :								-4.0					
-								Ē					
5 6								-					
-								-4.5					
2								-					
70 -								[
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_								-5.5					
								- 5.5					
-								ļ.					
-7								-					
		1				1111	1110	-6.0	322777			:1_	::::::::
		Comments: Groundwater not encoun	tered	Borehole Diameter: 50mm	Topsoil		}}}	Sand	222335	Sandstone		Plutonic	
LAND	EP	UTP = unable to penetrat		52291.000	Fill		444			Siltstone	222222	No Core	
geotech		EOB = end of borehole.		Checked: RG	Clay	8888	XXXX	rganic :		Limestone	BBB	X	-
	-			110	Sitt	XXXX	XXXX P	umice		Volcanic	350000	¥1	

Client Project Locat	ct: tion:	Sunfiel Geoted Sunfiel Refer t	d Developments Limited chnical Investigation ds Landholding, Ardmore o site plan	Coordinates: System: Elevation: Located By:		efined	d	g			Shed Test Logg Prep	ect ID:	: MK	 22
Depth (m)	Geology	Graphic Log	Metarial Pagariation		Water		2 Vane ι	ındraine	enetron 4 Led shea	n-situ neter (blo 6 r strengtl	ows / 50 8 h, s _u (kF	Pa)	Values Vane ID: 3476 peak / residual	
	TS- Tops oil		Material Description TOPSOIL.		>		50	1	00	150	200)	(sensitivity)	_
1.0	Puketoka Formation TT	**************************************	Sandy SILT, with trace clay; brown mottled grey. Fin plasticity; moderately sensitive. Silty CLAY; orange streaked grey. Firm; moist; high moderately sensitive; with trace limonite.		Groundwater not encountered			0	•				43 / 21 (2.0) 29 / 14 (2.1) 114 / 86 (1.3) 143 / 114 (1.3)	
2.5 _ 3.0 _ 3.5 _ 4.0 _ 4.5 _ 5.5 _ 5.5 _ 4.5 _ 4.5 _ 6			2.50m: becoming hard					***************************************					200+	
		h: 2.70r Scala p	m Termination : Too hard to auger further enetrometer testing commenced and found effective re	efusal at 3.40m.						ane peal			anding water lev	
 ∕lateri	ials a	re descr	ibed in general accordance with NZGS 'Field Descripti plied between shear vane and DCP values.	on of Soil and Ro	ock' (20	05).		\dashv	_	ane UTP	•		roundwater outfl	

Clien Proje Local	ct: tion:	e: Refer to site plan Located By: Site plan/map									HA36 J01627 1 of 1 15/12/202 : MK sy: MK y: JM	
Depth (m)	Geology	Graphic Log	Material Description		Water	2		enetrome d shear s	esitu Tes ter (blows / 6 strength, sul	50mm) 8	Values Vane ID: 3476 peak / residual (sensitivity)	
_ 0.5 _	TS	15 W W	TOPSOIL. Sandy SILT, with trace clay; brown mottled grey. V low plasticity; moderately sensitive.	/ery stiff; moist;		0			•		143 / 57 (2.5)	
. 1.0 _		× 5 × × × × × × × × × × × × × × × × × ×	Silty CLAY; grey. Very stiff; moist; high plasticity; in Pumiceous silty CLAY; light grey/white. Very stiff; plasticity; insensitive.				0-	•			121 / 71 (1.7)	
1.5 _		* * * * * * * * * * * * * * * * * * *	Silty CLAY; orange streaked light grey. Hard; mois	st; high			0	(143 / 86 (1.7)	
2.0 _	tion	* * * * * * * *	plasticity. 2.00m: becoming hard							•	200+	
2.5	Puketoka Formation	***	2.50m: becoming very stiff					0 •			129 / 107 (1.2))
3.0		* * * * * * * * * * * * * * * * * * *	3.00m: with trace limonite 3.20m: becoming orange streaked light blue; with trace fi	ne sand			0	•			121 / 86 (1.4)	
3.5 _		* * * * * * * * * * * * * * * * * * * *	3.50m: becoming stiff, saturated		\triangleleft	0					57 / 36 (1.6)	
4.0 _		× × ×	4.00m: becoming firm; with trace fine to medium sand		▼.						39 / 29 (1.3)	
4.5 _		× × × × × × × × × × × × × × × × × × ×	4.50m: becoming very stiff; moderately sensitive			0					143 / 50 (2.9)	
5.5		XXX	∑5.00m: becoming sensitive			0					171 / 43 (4.0)	
	Dept arks:	h: 5.00r	m Termination : Reached target depth					● Van	·		Standing water lev	
Mater	ials a	re descr	ibed in general accordance with NZGS 'Field Descripplied between shear vane and DCP values.	ption of Soil and Ro	ock' (20	05).	,		e residual e UTP UTP :		Groundwater inflo Groundwater outfl Penetrate	

Client: Projec Location	t: ion:	Refer to site plan Located By: Site plan/map								Pr Sh Te Lo	est ID: oject ID: neet: est Date: ogged By epared I	1 of 1 15/12/202 y: MK By: MK	22
Depth (m)	Geology	Graphic Log	Material Description		Water	Dyna Va	amic co 2	4	etromet shear s	situ Tester (blows /	50mm)	Values Vane ID: 3476 peak / residual (sensitivity)	- 1
.1.5	Undifferentiated Alluvium TS	Column C	Sandy SILT, with trace clay; brown mottled grey low plasticity; moderately sensitive. Silty CLAY; brown streaked light brown/grey. Signasticity; moderately sensitive; with trace limon 1.40m: becoming saturated Amorphous PEAT; black; Stiff; saturated; medicinsensitive; with traced decayed wood inclusion 2.00m: becoming very stiff; moderately sensitive 2.50m: becoming stiff	tiff; moist; high lite.	<							100 / 34 (2.9) 63 / 26 (2.4) 57 / 40 (1.4) 114 / 57 (2.0) 71 / 36 (2.0) 63 / 29 (2.2) 200+	
.4.5			4.80m: with minor clay								•	200+	
5.0			,									200+	
Remar	rks:	n: 5.00r	m Termination: Reached target depth	perintion of Call and D	2014 (20	06)				e peak e residual e UTP	\triangleleft	Standing water lev Groundwater inflor	w

Client Proje Locat	ct: tion:	: Refer to site plan Located By: Site plan/map									HA38 J01627 1 of 1 15/12/202 : MK sy: MK y: JM	22
Depth (m)	Geology	Graphic Log	Material Description		Water	Dynamic cone 2 1 Vane undra 50	4	romete	ength, s _u (50mm) 8	Values Vane ID: 3476 peak / residual (sensitivity)	
.0.5	TS	18 W W	TOPSOIL. Sandy SILT, with trace clay; brown mottled grey. Volow plasticity; moderately sensitive. Silty CLAY; brown motted light brown. Firm; moist;			0	•)			114 / 29 (3.9)	
1.5 _		***	insensitive; with trace peat. 1.50m: becoming stiff, saturated	ingii piastony,	<	0 •					43 / 29 (1.5) 57 / 31 (1.8)	
2.0 _	Puketoka Formation		Amorphous PEAT, black; Firm; saturated; medium moderately sensitive 2.50m: becoming stiff; insensitive	plasticity;		0 •					46 / 21 (2.2) 71 / 43 (1.7)	
3.0	Puk		3.00m: becoming firm 3.50m: becoming very stiff					0	•		31 / 26 (1.2) 171 / 129 (1.3))
4.0 _		* * * *	Silty CLAY; light blue. Hard; saturated; high plastici	ty.	▼						200+	
4.5		***									200+	
5.5											200+	
Rema	ırks:	h: 5.00r	m Termination: Reached target depth ibed in general accordance with NZGS 'Field Descrip	tion of Soil and Po	ock' (20	05)	0	Vane Vane Vane	residual	< •	Standing water lev Groundwater inflov Groundwater outflo	w

Clien Proje Locat	ct: tion:	Refer to site plan Located By: Site plan/map									F S T L	Test ID: Project II Sheet: Test Date Logged E Prepared Checked		t ID: J01627 1 of 1 late: 15/12/202 d By: BS red By: BS ed By: JM	
Depth (m)	Geology	Graphic Log	Material Description		Water		2	e und	4	etrome	eter (blows 6 strength, s 150	8 / 50mm)	Values Vane ID: 307 peak / residual (sensitivity)	
0.5	TS	TS W W TS	TOPSOIL. Silty CLAY, with trace sand; orange mottled brown/g stiff; moist; high plasticity; sand, fine; sensitive.	rey. Very	▼	0			•					111 / 18 (6.2) 131 / 87 (1.5)	
1.5 _			Amorphous PEAT; dark grey/black. Very stiff; moist; 1.40m: becoming saturated 1.50m: becoming stiff; moderately sensitive; with rootlets		\triangleleft		0		•					86 / 35 (2.5)	
2.0 _	Puketoka Formation	* * * * * * * * * * * * * * * * * * *	Silty CLAY, with trace sand; black streaked brown wire rootlets. Stiff; saturated; sand, fine; medium to high purchased brown with sand streaked brown wire suction 2.50m: becoming insensitive; with limited to no sample recovater suction 2.70m: becoming low to medium plasticity	lasticity;			0	•						69 / 21 (3.3) 63 / 36 (1.8)	
3.0	Puke	× × × × × × × × × × × × × × × × × × ×					0	•						63 / 33 (1.9) 56 / 47 (1.2)	
4.0 _ - - - -		* * * * * * * * * * * * * * * * * * *	4.00m: becoming moderately sensitive)		•					81 / 27 (3.0)	
4.5		* x x x x x x x x x x x x x x x x x x x	4.50m: becoming blue/grey; very stiff; insensitive						C)	•			153 / 104 (1.5)	
5.0														135 / 104 (1.3)	
Rema	ırks:	h: 5.00r	Termination: Reached target depth	on of Soil and Da	nck! (20	05)) Var	ne peak ne residua		<⊢ Gr	anding water levoundwater inflow	w

Client Proje Locat	ct: tion:	e: Refer to site plan Located By: Site plan/map									st ID: oject ID: neet: st Date: gged By epared B necked B	y: BS	 22
Depth (m)	Geology	Graphic Log	Material Description		Water		2	4	shear s	ter (blows / 6 1 trength, sult 150	50mm) 8	Values Vane ID: 307 peak / residual (sensitivity)	
- 0.5	<u> </u>	TSur 4 w	TOPSOIL. Clayey SILT, with some sand; brown. Very stiff; mois plasticity; sand, fine; sensitive. 0.30m: becoming orange streaked brown	t; low		0		•	•			108 / 26 (4.2)	
1.0 _			PEAT (AMORPHOUS); dark grey. Very stiff; saturate plasticity to non-plastic; insensitive. Clayey SILT, with some sand; orange. Very stiff; satuplasticity; sand, fine. PEAT (AMORPHOUS); dark grey. Very stiff; saturate plasticity to medium plasticity. 1.40m: with limited to no sample recovery due to groundwate.	d; low	\Diamond		C) '	•			162 / 87 (1.9) 111 / 72 (1.5)	
2.0 _	Undifferentiated Alluvium		2.50m: becoming stiff				0					102 / 56 (1.8) 72 / 63 (1.1)	
3.0	Undiffere		↑3.20m: with some rootlets			0						51 / 36 (1.4)	
3.5			3.50m: becoming moderately sensitive			0						72 / 35 (2.1)	
4.0 _			4.00m: becoming insensitive									75 / 63 (1.2)	
4.5			4.50m: becoming very stiff >5.00m: becoming stiff					0	•			111 / 93 (1.2)	
5.5												95 / 81 (1.2)	
Rema	ırks:	h: 5.00r	m Termination: Reached target depth ibed in general accordance with NZGS 'Field Description'							e peak e residual e UTP	< 0	Standing water lev Groundwater inflo Groundwater outfl)W

		t: Geotechnical Investigation System: NZTM Sunfields Landholding, Ardmore ite: Refer to site plan System: NZTM Elevation: Ground Located By: Site plan/map									F S T L	est ID: Project Sheet: Sest Dat Ogged Prepare Checked	e: By: d By:		22
Depth (m)	Geology	Graphic Log			ter		2		4	tromet	situ Te	esting 5 / 50mm) 8		Values Vane ID: 307	
<u>B</u>	8 - 8	S. B.	Material Description		Water		50		100		150	200		peak / residual (sensitivity)	
		* * * * * * * * * * * * * * * * * * *	TOPSOIL. Clayey SILT, with trace sand; brown. Stiff; moist; med plasticity; sand, fine.	ium											
. 0.5		× ×	Silty CLAY, with trace sand; orange streaked brown. Sand, fine; medium to high plasticity.	Stiff; moist;			0	•						63 / 36 (1.8)	
			Clayey SILT, with trace sand; dark grey mottled brown low plasticity; sand, fine; insensitive.	n. Stiff; wet;											
. 1.0 _			Amorphous PEAT; dark grey; low to medium plasticity saturated	r; stiff;	< <u></u> ✓-	0		•						57 / 11 (5.2)	
1.5			1.20m: with limited to no sample recovery				_								
1.5			1.50m: becoming insensitive; with some rootlet inclusion				0	•						63 / 45 (1.4)	
2.0							-0	•						59 / 41 (1.4)	
1	lluvium														
2.5	Undifferentiated Alluvium		2.50m: becoming hard									•	•	UTP	
1	ndiffer	NUK BUK BUK BUK	Silty CLAY, with trace sand; brown. Hard; saturated; so low to medium plasticity.	sand, fine;											
3.0	Ď	NAME OF THE PARTY	With no sample recovery due to water suction 3.00m: becoming very stiff; moderately sensitive							•				135 / 48 (2.8)	
		NAME TO SERVE													
3.5 _		NUT NUT NUT NUT NUT NUT	3.50m: becoming hard									•	•	UTP	
4.0		NOT NOT NOT NOT NOT NOT NOT NOT	A 00m; becoming you stiff inconsitive										1	88 / 123 (1.5))
		MATERIAL REPORTS	↑4.00m: becoming very stiff; insensitive												
4.5 _ -		NE NE NE NE	4.50m: becoming stiff					0	•					90 / 63 (1.4)	
		N F N F													
5.0		NA NA						—						78 / 50 (1.6)	
5.5															
_ 1															
	Dept	h: 5.00r	m Termination: Reached target depth			*			•	Vane	peak		Sta	nding water lev	/6
			ibed in general accordance with NZGS 'Field Descriptio	n of Call and D	ok! (00	.O.E.\			•	Vane	e residua e UTP			undwater inflow undwater outflo	

APPENDIX 3.5 FALLING HEAD PERCOLATION TEST RESULTS



	STORM	IWATER	PERCOLAT	ION T	EST	
Client:	Ardmore Develop	ments Limited			Job No:	J01627
Location:	Sunfields				Date:	20.04.21
	Ardmore				Page	1 of 2
Hole No:	P01			Diamete	0.1	(m)
Location:	Refer to site plan			Depth:	2	(m)
Weather co	onditions preceding	test:	Wet			710000
Details of p	resoaking:		7 Days	V		
620	-23	725 . 34	253400		8	
Time	Time	Depth	Water		Cum	
of Test	Interval	Reading	Depth		Time	
(hr.min)	(min)	(m)	(m)		(min)	
12:01	1.2	0.30	1.70		0	
12:02	1	0.39	1.61		1	
12:04	2	0.56	1.44		3	
12:08	4	0.62	1.38		7	
12:12	4	0.66	1.34		11	
12:22	10	0.72	1.28		21	
12:22	0	0.36	1.64		21	
12:23	1	0.45	1.55		22	
12:25	2	0.53	1.47		24	
12:30	5	0.61	1.39		29	
12:40	10	0.66	1.34		39	
12:50	10	0.68	1.32		49	
13:00	10	0.72	1.28		59	
13:00	0	0.20	1.80		59	
13:02	2	0.29	1.71		61	
13:04	2	0.38	1.62		63	
13:10	6	0.62	1.38		69	
13:20	10	0.68	1.32		79	
13:30	10	0.70	1.30		89	
13:31	1	0.32	1.68		90	
13:33	2	0.4	1.60		92	
13:35	2	0.55	1.45		94	
13:40	5	0.61	1.39		99	
13:50	10	0.68	1.32		109	
14:00	10	0.74	1.26		119	
14:30	30	0.83	1.17		149	
15:00	30	0.89	1.11		179	
15:30	30	0.96	1.04		209	
16:00	30	1.05	0.95		239	
	555"		5353			
			Test	P01		
			Gradient	0.0030	m/min	
			Percolation	0.0754	L/m²/min	
	_	Lander Geotec	hnical Consultants L	imited		



P O Box 97 385, Manukau, Auckland 2241

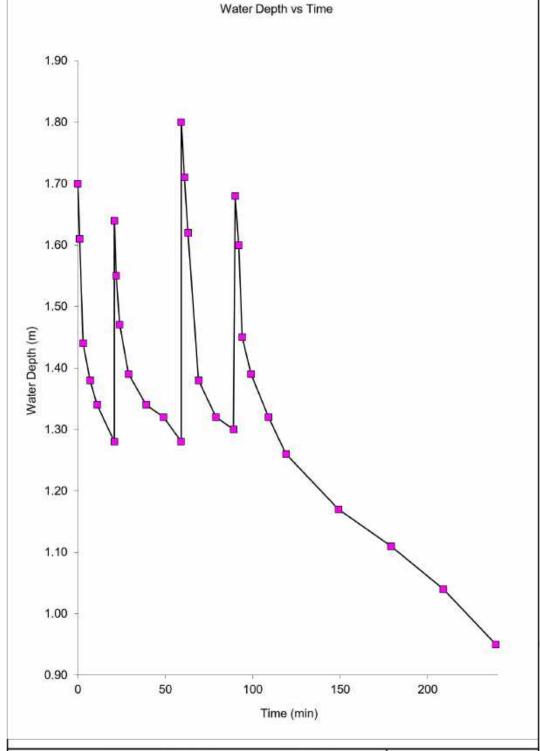
Phone: 027 488 6882

Email: shane@landergeotechnical.co.nz

Operator: RZ

Checked: JM

	STORMWA	TER PERC	OLATIO	N TEST	
Client:	Ardmore Development	s Limited	Job No:	J01627	
Location:	Sunfields		Date:	20.04.21	
	Ardmore		Page	2 of 2	
Hole No:	P01	Diameter:	0.1	(m)	
Location:	Refer to site plan	Depth:	2.0	(m)	





Lander Geotechnical Consultants Limited

P O Box 97 385, Manukau, Auckland 2241

Phone: 027 488 6882

Email: shane@landergeotechnical.co.nz Checked:

Operator: RZ

hecked: JM

	STORM	WATER P	ERCOLAT	ION TE	ST	
Client:	Ardmore Developm	ents Limited			Job No:	J01627
Location:	Sunfields			1	Date:	14.04.21
	Ardmore			ı	Page	1 of 2
Hole No:	P02			Diamete	0.1	(m)
Location:	Refer to site plan			Depth:	2	(m)
Weather c	onditions preceding to	est:	Wet			Nocese
Details of p	oresoaking:		48 Hours		_	
Time	Time	Depth	Water		Cum	
of Test	Interval	Reading	Depth		Time	
(hr.min)	(min)	(m)	(m)		(min)	

Time of Test	Time Interval	Depth Reading	Water Depth	Cum Time
(hr.min)	(min)	(m)	(m)	(min)
11:21	1.40	0.30	1.70	0
11:22	1	0.33	1.67	1
11:24	2	0.38	1.62	3
11:27	3	0.44	1.56	6
11:32	5	0.48	1.52	11
11:42	10	0.54	1.46	21
11:57	15	0.62	1.38	36
12:27	30	0.73	1.27	66
12:57	30	0.78	1.22	96
13:27	30	0.84	1.16	126
13:57	30	0.86	1.14	156
14:27	30	0.94	1.06	186
14:57	30	0.99	1.01	216
			Test	P02
			Gradient	0.0007 m/min

Gradient 0.0007 m/min Percolation 0.01 L/m²/min



Lander Geotechnical Consultants Limited

P O Box 97 385, Manukau, Auckland 2241

Phone: 027 488 6882

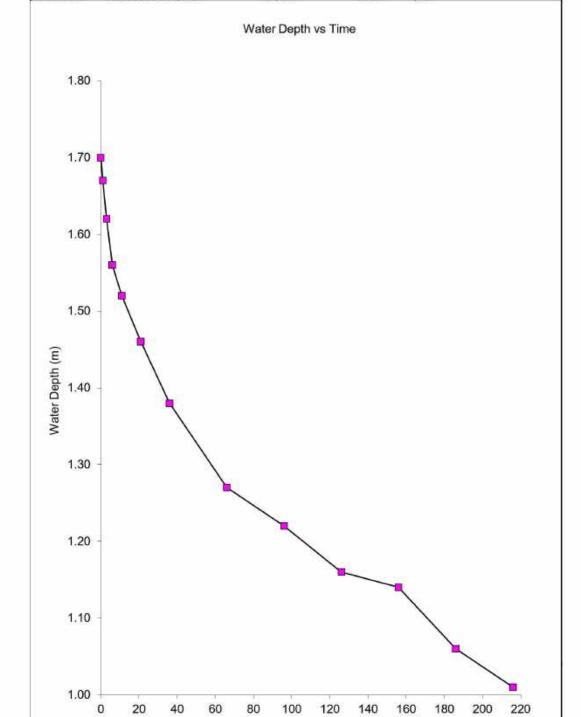
Email: shane@landergeotechnical.co.nz

Operator: JM

Checked: JM

LOCL_parisitation_21971

	STORMWA	TER PERC	OLATIO	N TEST	
Client:	Ardmore Development	s Limited	Job No:	J01627	
Location:	Sunfields		Date:	14.04.21	
	Ardmore		Page	2 of 2	
Hole No:	P02	Diameter:	0.1	(m)	
Location:	Refer to site plan	Depth:	2.0	(m)	





Lander Geotechnical Consultants Limited

Time (min)

P O Box 97 385, Manukau, Auckland 2241

Phone: 027 488 6882

Email: shane@landergeotechnical.co.nz Checked:

Operator: JM

JM

APPENDIX 3.6 CONE PENETRATION TEST RESULTS

