

10 March 2026

Proposed Residential and Agricultural Development

1073, 1171 and 1185 Tauwhare Road, Tauwhare

PRELIMINARY GEOTECHNICAL DESKTOP STUDY

Maven Associates Limited

Job No. HAM2025-0122AB | Version 0



Hamilton

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CONTENTS

1.0	INTRODUCTION	4
2.0	SITE DESCRIPTION	4
2.1	Site Location.....	4
2.2	Landform	5
2.3	Proposed Development	5
3.0	CONCEPTUAL GROUND MODEL.....	5
3.1	Geology	5
3.2	Nearby Geotechnical Data	6
3.3	Groundwater.....	7
4.0	DESKTOP FINDINGS	7
4.1	LINZ	7
4.2	Historical Air Photos.....	7
4.3	Regional Hazards.....	7
4.4	Fault Rupture	8
4.5	Liquefaction and Lateral Spread	8
4.6	Cyclic Softening	8
4.7	Slope Stability.....	9
4.8	Load Induced Settlement	9
4.9	Earthworks	9
4.10	Preliminary Foundation Options.....	9
5.0	FURTHER WORK	9
6.0	CLOSURE	10

Appendices

APPENDIX A	NZGD and Bore Logs
APPENDIX B	Historical Photographs
APPENDIX C	Waikato Regional Council Hazard Maps

1.0 INTRODUCTION

CMW Geosciences (CMW) was engaged by Maven Associates Limited to carry out a geotechnical desktop assessment for 1073, 1171 and 1185 Tauwhare Road, Tauwhare, to support a fast-track referral application for a proposed development comprising a mixture of rural residential lots, a retirement village and an Agrihub.

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal letter referenced HAM2025-0122AA, Rev 0 dated 4 November 2025.

This report has been prepared to summarise expected ground conditions and to provide preliminary recommendations to mitigate possible geohazards, including foundation recommendations, and site-specific geotechnical testing required for future consent applications.

2.0 SITE DESCRIPTION

2.1 Site Location

The proposed development is located on Tauwhare Road, Tauwhare, as shown in Figure 1. The site is currently used for pastoral purposes and comprises a total area of approximately 69ha, with three individual Lot titles:

- Lot 1 DP 407508
- Lot 1 DP 82115
- Lot 2 DP 548121

The site is bound by Tauwhare Road and rural residential lifestyle blocks to the east, pastoral land to the north and west, and pastoral land, rural residential lifestyle blocks, and Tauwhare Road to the south.



Figure 1: Site Location Plan (Source: Google Earth Pro).

2.2 Landform

The landform can generally be described as near level, with existing ground levels ranging between RL48m to 52m, with a small hill on the western boundary of the central lot. This hill extends to a maximum height of RL58m and a gradient of approximately 1V:6H. An additional hill is noted beyond the northwestern corner of the site, with a maximum gradient of approximately 1V:2H and a height of RL73.

An unnamed tributary which connects to Mangaonua Stream approximately 3km to the southwest of the site is noted to intersect the site. This tributary flows in a general north to south direction intersecting the site centrally through the northern two lots and along the southern lots eastern boundary. Farm drains are anticipated across the site.

2.3 Proposed Development

At the time of writing this report the project was in the early stages of planning. We understand that this development will consist of a retirement village, rural residential lots and an Agrihub to teach farming.

No architectural or engineering design drawings have been supplied to date, and we have prepared this report on the basis that a future development will broadly comprise minor cuts and fills to form a near level site.

3.0 CONCEPTUAL GROUND MODEL

3.1 Geology

Tauwhare is located at the eastern edge of the Hamilton Basin adjacent to the Maungakawa Hills. The Hamilton Basin consists of the older sediments of the Walton Subgroup and the younger alluvial outwash sediments of the Hinuera Formation.

Published geological maps¹ for the area depict the majority of the site being covered by Hinuera Formation with a narrow channel in the north possibly having younger river deposits. Walton Subgroup might be encountered in the western part of the site. This is illustrated in Figure 2 below.

¹ GNS Geological Map 1:250,000 scale Geological Map No 4 'Waikato'. SW Edbrooke et al.

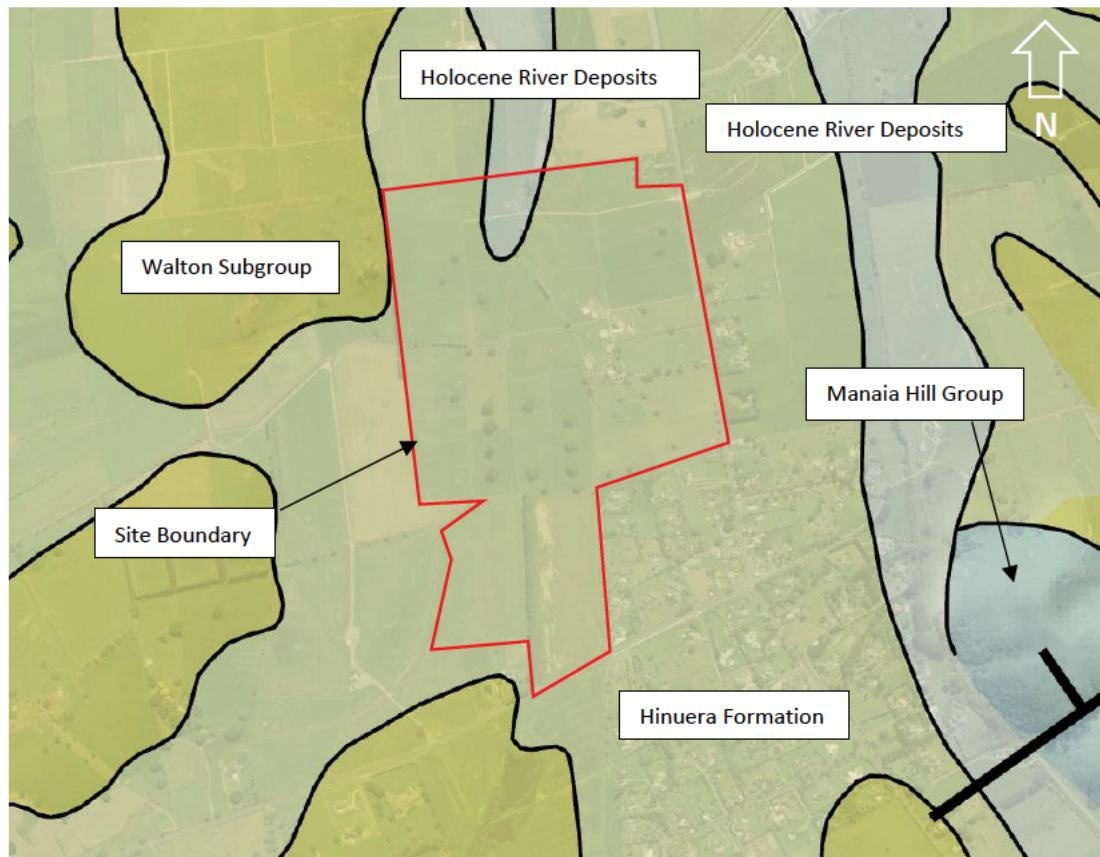


Figure 2: Published Geology (Source: GNS Geology Map)¹

3.2 Nearby Geotechnical Data

A review of geotechnical logs from the New Zealand Geotechnical Database (NZGD) in the vicinity of the site confirms the geology present in the published geological maps. Relevant plans and engineering logs are presented in **Appendix A**.

The ground conditions presented in the geotechnical data logged by others, can be generalised according to the following units in Table 1.

Table 1: Summary of Strata Encountered in Publicly Available Logs.

Unit	Depth to Base of unit (m)		Assessed Thickness (m)
	Min	Max	
Hinuera Formation Plains			
Topsoil	0.2	0.3	0.2
Organic SILT (Pakihi Supergroup)*	-	0.7	0.3
Stiff Sandy SILT (Hinuera Formation)	0.5	>1.4	0.6
Loose to Dense SAND (Hinuera Formation)**	1.2	>1.7	-
Walton Subgroup Hills			
Topsoil	0.1	0.2	0.2
Very Stiff Silty CLAY (Hamilton Ash)	0.9	1.2	0.8

Unit	Depth to Base of unit (m)		Assessed Thickness (m)
	Min	Max	
Very Stiff to Hard CLAY (Hamilton Ash)**	>3		-
Notes: *Encountered in localised areas.			
**Base of unit not encountered in limited available investigation logs.			

3.3 Groundwater

NZGD data in the vicinity shows logged groundwater between 0.1m and 1.2m below ground level (bgl). A site drive past conducted on 27 February 2026 indicated water within the drain along the eastern boundary of Tauwhare Road.

4.0 DESKTOP FINDINGS

4.1 LINZ

A hill shade from LINZ² shows that throughout the area there is a network of open drains. There is also evidence of a ancient braided channel which would have deposited sediment which has since been reworked by more recent streams. This is shown in Figure 3 below.

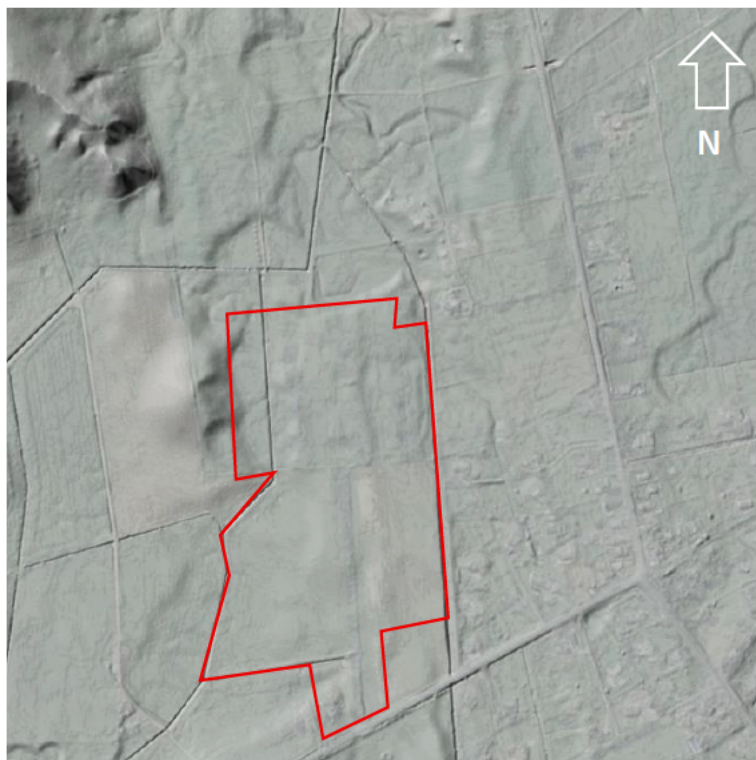


Figure 3: Hill shade (Source: LINZ)²

4.2 Historical Air Photos

Historical photos dating back to 1939 have been reviewed and are attached in **Appendix B**. The historical photos show that the site has primarily been used for agriculture. In 1939, a stream can be seen running through site

² Land Information New Zealand. NZ Terrain Relief (Topo50). <https://data.linz.govt.nz/layer/50765-nz-terrain-relief-topo50/>

and by 1971 water had been rediverted to the council drains as part of the Waikato drainage scheme. In 2008, houses were being developed in the area southeast of the site. The old stream could also still be seen in the north of the site. In 2017, ponding is observed in the southern paddock of the site.

4.3 Regional Hazards

A review of the Waikato Regional Council Natural Hazards Portal³ was undertaken.

The hazard portal addresses potential flooding, volcanic and seismic hazards.

The site is a part of the Waikato Drainage Scheme, and a network drains run through the site to remove water after a rainfall event. This demonstrates that the site is potentially prone to flooding after a heavy rainfall event.

The nearest active volcanoes are Rotorua and Mayor Island, both of which are approximately 100km away and are currently at alert level 0. Hazard maps are presented in **Appendix C**.

4.4 Fault Rupture

This site is not considered to be at risk of fault rupture on the basis that there is no mapped active faulting in the area. The GNS Active Fault Database⁴ indicates the nearest active fault is the Kerepehi Fault which is approximately 50km to the east of the site and has a recurrence interval of 2,000 to 3,500 years.

4.5 Liquefaction and Lateral Spread

Liquefaction occurs in loose saturated cohesionless soils that are subject to cyclic shear loading during an earthquake. This process leads to pore pressure build-up, soil grains moving into suspension and temporary loss of strength causing vertical and lateral ground deformation. A liquefaction hazard map from the Waikato Regional Council is presented in **Appendix C**. Much of the site is classed at possible risk of liquefaction, while the hills are classed as unlikely.

Based on our local knowledge, the Hinuera Formation soils are susceptible to liquefaction when they are below the ground water table. Free-field liquefaction induced settlement may be significant during a ULS seismic event. The magnitude of liquefaction induced settlement is likely to vary across the site and differential settlement should be anticipated, should there be a large seismic event.

Following the onset of liquefaction, liquefied soils will behave as a very weak undrained material, which can give rise to lateral spreading where a free face is present (e.g. existing drains or proposed cut or fill batters or stormwater basins or swales).

Liquefaction and lateral spreading risk will need to be assessed once site investigation has taken place.

4.6 Cyclic Softening

While not liquefiable due to their high plasticity, the fine-grained soils of the Hinuera Formation and Walton Subgroup may be susceptible to some strength loss, during a seismic event. On account of the typically high shear strengths of these soils, this is often not a significant geotechnical issue for land development projects.

³ Waikato Regional Council. Waikato Regional Hazards Portal. <https://experience.arcgis.com/experience/0eced30c44eb43a2b6fcb1ce8727c9db/>

⁴ GNS NZ Active Fault Database. <https://data.gns.cri.nz/af/>

4.7 Slope Stability

Based on the site topography, it is considered that the site is not generally considered to be at risk of slope instability. A site walkover by experienced engineering geologist will be required to confirm slope stability conditions.

The inclusion of high or steep slopes for stormwater basins or swales or cuts will need an assessment of slope stability as part of the design process.

4.8 Load Induced Settlement

Given the site geology is predominantly alluvial deposits, there may be localised zones of soft and compressible soils. Significant primary consolidation and long-term secondary creep settlements may occur as a response to the placement of fill and building loads. Site specific geotechnical investigations will need to be carried out to better characterise the soils across the site.

Future reporting will provide advice to ensure soft areas are appropriately managed, which might include surcharging, cutting and replacement etc.

4.9 Earthworks

Hamilton Ash clays are generally suitable for reuse as engineered fill with moisture conditioning during normal summer conditions. Hinuera Formation silts can be sensitive and may lose strength with they are disturbed and allowed to get wet. This will have to be accounted for during earthworks/ construction.

Soft or organic soils near the ground surface may be encountered during excavation.

Groundwater may be encountered at shallow depths.

4.10 Preliminary Foundation Options

Depending on the magnitude of liquefaction induced settlements, engineered foundation solutions may be required. This may include shallow foundation options such as TC2 type raft foundations with or without shallow geogrid-reinforced gravel rafts. Deep pile foundations or ground improvements in the form of rigid inclusions (e.g. rammed aggregate piers) may also be required for commercial/ heavy structures.

Static settlement magnitudes can be estimated once geotechnical investigations have been performed and the earthworks design and building loads are known. Depending on the nature of the proposed development and the finished ground levels, surcharging or cutting and replacement may be required to manage static load induced settlement.

5.0 FURTHER WORK

Based on the assessment presented in this report, there are no unusual features or geotechnical constraints observed for this site that would prevent a mixed development from proceeding. We have identified the following additional scope of work that is considered necessary to further assess the risk profile for the scheme and to support consent applications. This additional scope of work is typical for a mixed development of this scale, and includes the following:

- Geotechnical investigations to inform ground model development, detailed geohazard assessment, selection of geotechnical design parameters.

- Geotechnical analysis and reporting, suitable to support future project stages including resource consent application, detailed design, and building consent applications (if any). This includes recommendations for construction and earthworks.
- Design of ground improvements, if necessary, to mitigate load or liquefaction induced settlements, and/or lateral spread.
- Inspections during construction and earthworks followed by geotechnical completion reporting.

6.0 CLOSURE

This report has been prepared for use by Maven Associates Limited in relation to the proposed rural residential lots, a retirement village and an Agrihub, 1073, 1171 and 1185 Tauwhare Road, Tauwhare project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Maven Associates Limited seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site.

A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

Environmental matters are not covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

APPENDIX A

NZGD and Bore Logs



 CMW Geosciences Great People Practical Solutions	CLIENT:	DRAWN:	PROJECT:
	PROJECT:	CHECKED:	DRAWING:
	REVISION:	SCALE:	
	DATE:	SHEET:	
TITLE:			

HA2

Address: 1036 Tauwhare Road

Date: 24/11/2021

Testers: MohammedA, AlexF

Project No: 13093

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):		
					5	10	15	Undrained:	Remoulded:	Sensitivity:
Not Found	100	Undefined		Topsoil				116	32	3.6
	200			SILT, brownish orange, low plasticity, moist, stiff						
	300									
	400									
	500									
	600			Clayey SILT, brown, low plasticity, moist, stiff				130	43	3
	700									
	800									
	900			Silty fine to medium SAND, greyish brown, well graded, moist, loose to medium dense						
	1000									
	1100									
	1200			End of Borehole @1100mm						
	1300									
	1400									
	1500									
	1600									
	1700									
	1800									
	1900									
	2000									
	2100									

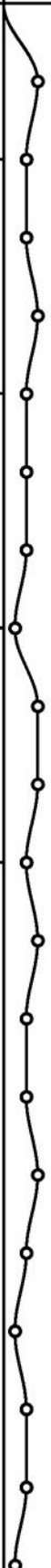
HA2

Address: 1036 Tauwhare Road

Date: 24/11/2021

Testers: MohammedA, AlexF

Project No: 13093

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):				
					5	10	15	Undrained:	Remoulded:	Sensitivity:		
Not Found	100	Undefined		Topsoil				116	32	3.6		
	200											
	300			SILT, brownish orange, low plasticity, moist, stiff								
	400											
	500											
	600			Clayey SILT, brown, low plasticity, moist, stiff				130	43	3		
	700											
	800											
	900			Silty fine to medium SAND, greyish brown, well graded, moist, loose to medium dense								
	1000											
	1100											
	1200			End of Borehole @1100mm								
	1300											
	1400											
	1500											
	1600											
	1700											
	1800											
	1900											
	2000											
	2100											

NZGD ID: 201497

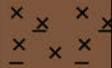
HA3

Address: 1036 Tauwhare Road

Date: 24/11/2021

Testers: MohammedA, AlexF

Project No: 13093

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):		
					5	10	15	Undrained:	Remoulded:	Sensitivity:
Not Found	100	Undefined		Topsoil						
	200									
	300			SILT, brownish orange, low plasticity, moist, stiff				123	35	3.5
	400									
	500									
	600			Clayey SILT, greyish brown, low plasticity, moist, stiff to very stiff						
	700									
	800							109	43	2.5
	900									
	1000									
	1100									
	1200							203	46	4.4
	1300									
	1400									
	1500									
	1600							101	43	2.3
	1700									
	1800									
	1900			SILT, dark greyish brown, low plasticity, dry, very stiff						
	2000							203	41	5
	2100			End of Borehole @2000mm						

HA5

Address: 1036 Tauwhare Road

Date: 24/11/2021

Testers: MohammedA, AlexF

Project No: 13093

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):		
					5	10	15	Undrained:	Remoulded:	Sensitivity:
	100	Undefined		Topsoil						
	200									
	300									
	400			Black, organics						
	500									
	600									
	700									
	800			Silty medium SAND, greyish pinkish white, well graded, moist, 1300 to 2000 no retrieval but auger reached bottom						
	900									
	1000									
	1100									
	1200									
	1300									
	1400									
	1500									
	1600									
	1700									
	1800									
	1900									
	2000									
	2100			End of Borehole @2000mm						

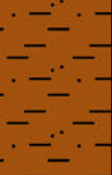
HA1

Address: 1036 Tauwhare Road

Date: 24/11/2021

Testers: MohammedA, AlexF

Project No: 13093

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):		
					5	10	15	Undrained:	Remoulded:	Sensitivity:
Not Found	100	Undefined		Topsoil			0	99	58	1.7
	200						0			
	300			SILT, brownish orange, low plasticity, moist, stiff			0	130	29	4.5
	400						3			
	500						3			
	600			Silty medium SAND, brownish orange, well graded, moist, loose			3			
	700						3			
	800						3			
	900			Silty fine SAND, greyish brown, well graded, moist, loose			2			
	1000						2			
	1100			Medium SAND with some gravel, brownish orange, well graded, moist, loose			2			
	1200						2			
	1300			Sandy CLAY, brownish orange, high plasticity, moist, stiff			3	104	67	1.6
	1400						2			
	1500						1			
	1600						1			
	1700						1			
	1800									
	1900									
	2000									
	2100			End of Borehole @2000mm						

Address: 9 Scotsman Valley Road
Date: 23/06/2023
Testers: JacobV

HA1

Project №: 14692

Water Table:	Depth (mm):	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):		
				5	10	15	Undrained:	Remoulded:	Sensitivity:
Not Found	100		Topsoil			0	95	30	3.2
	200					0			
	300					0			
	400		SILT, brownish orange, low plasticity, moist, firm to stiff			2	65	22	2.9
	500					1			
	600					1			
	700					1			
	800					1			
	900					1			
	1000		Gravelly medium SAND, yellowish brownish orange, well graded, moist, loose to dense			3			
	1100					6			
	1200					7			
	1300		End of Borehole @1200mm			5			
	1400					8			
	1500					8			
	1600					5			
	1700					5			
	1800					7			
	1900					6			
	2000								
	2100								

Address:9 Scotsman Valley Road

Date:23/06/2023

Testers:JacobV

HA2

Project №:14692

Water Table:	Depth (mm):	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):									
				5	10	15	Undrained:	Remoulded:	Sensitivity:							
Not Found	100		Topsoil					93	27	3.5						
							0									
	200						0									
	300		SILT, brownish orange, low plasticity, moist, stiff				0				74	34	2.2			
	400						2									
	500						2									
	600						2									
	700						1									
	800						2							43	42	1
	900						1									
	1000						1									
	1100	1														
	1200		Gravelly medium SAND, greyish brown, well graded, moist, medium dense to dense				5									
	1300						8									
	1400						10									
	1500						8									
	1600						8									
	1700						7									
	1800						8									
	1900						7									
	2000															
2100																

NZGD ID: 205940

Address: 984c Tauwhare Road

Date: 11/03/2021

Testers: LiamV

Project No: 12006

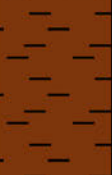
Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):		
					5	10	15	Undrained:	Remoulded:	Sensitivity:
Not Found	100	Walton Subgroup		Topsoil						
	200									
	300									
	400			Sandy SILT, brownish orange, low plasticity, moist, very stiff				152	34	4.5
	500									
	600									
	700									
	800			CLAY, brown, high plasticity, moist, very stiff				213	49	4.4
	900									
	1000			SILT with minor sand, brownish grey and orange, low plasticity, moist, stiff				134	30	4.4
	1100									
	1200			End of Borehole @1100mm						
	1300									
	1400									
	1500									
	1600									
	1700									
	1800									
	1900									
	2000									
	2100									

Address: 984c Tauwhare Road

Date: 11/03/2021

Testers: LiamV

Project No: 12006

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):		
					5	10	15	Undrained:	Remoulded:	Sensitivity:
Not Found	100	Walton Subgroup		Topsoil						
	200									
	300			SILT with minor sand, brownish grey and orange, low plasticity, moist, stiff to very stiff				125	40	3.2
	400									
	500									
	600							152	23	6.7
	700									
	800									
	900									
	1000			Silty CLAY, brown, high plasticity, moist, very stiff				198	34	5.9
	1100									
	1200									
	1300									
	1400									
	1500			CLAY, brown, high plasticity, moist, very stiff				213	61	3.5
	1600									
	1700									
	1800									
	1900									
	2000							213	55	3.9
	2100									
	2200									
				End of Borehole @2000mm						

Address: 984c Tauwhare Road

Date: 11/03/2021

Testers: LiamV

Project No: 12006

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):		
					5	10	15	Undrained:	Remoulded:	Sensitivity:
Not Found	100	Walton Subgroup		Topsoil						
	200									
	300			SILT with some sand, brownish grey and orange, low plasticity, dry, stiff				91	30	3
	400									
	500									
	600									
	700			Silty CLAY, brownish orange and grey, high plasticity, very stiff				152	43	3.6
	800									
	900									
	1000									
	1100			CLAY with some silt, brown, high plasticity, moist, very stiff				213	61	3.5
	1200									
	1300									
	1400									
	1500							213	88	2.4
	1600									
	1700									
	1800									
	1900									
	2000							189	67	2.8
	2100			End of Borehole @2000mm						

Address: 984c Tauwhare Road

Date: 11/03/2021

Testers: LiamV

Project No: 12006

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):		
					5	10	15	Undrained:	Remoulded:	Sensitivity:
Not Found	100	Walton Subgroup		Topsoil						
	200			Sandy SILT, brownish grey and orange, low plasticity, dry to moist, stiff				128	34	3.8
	300									
	400									
	500									
	600			Silty CLAY, brownish grey, high plasticity, moist, very stiff				175	46	3.8
	700									
	800									
	900									
	1000			CLAY with some silt, brown, high plasticity, moist, stiff to very stiff				137	46	3
	1100									
	1200									
	1300									
	1400									
	1500							213	107	2
	1600									
	1700									
	1800									
	1900									
	2000							213	88	2.4
	2100			End of Borehole @2000mm						

Address: 984c Tauwhare Road

Date: 11/03/2021

Testers: LiamV

Project No: 12006

Water Table:	Depth (mm):	Geology:	Graphic Log:	Material Description:	Blows /100mm:			Shear Strength (kPa):		
					5	10	15	Undrained:	Remoulded:	Sensitivity:
Not Found	100	Walton Subgroup		Topsoil						
	200									
	300			SILT with minor sand, brownish orange, low plasticity, moist, very stiff				152	30	5
	400									
	500									
	600							213	52	4.1
	700									
	800									
	900									
	1000			CLAY with minor silt, brownish, high plasticity, moist, very stiff				183	53	3.4
	1100									
	1200									
	1300									
	1400									
	1500			CLAY with some silt, light brownish, high plasticity, moist, very stiff				213	122	1.8
	1600									
	1700									
	1800									
	1900									
	2000							213	107	2
	2100			End of Borehole @2000mm						

		INVESTIGATION LOG											Job No.: HD1512						
		Client: Bowrock Properties Limited											No.: HA02						
		Project: Lot 3 & 32 Tauwhare Road, Tauwhare											Date: 27.07.20						
		Location: South of pond.											Logged By: BK						
		Co-ordinates: 1815697mE, 5816149mN											Checked By: SH						
		Elevation: Ground																	
Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)										Vane Shear Strength (kPa) Vane: 534					Water
				2	4	6	8	10	12	14	16	18	50	100	150	200	250		
Topsoil	TOPSOIL (OL); dark brownish black. Moist; rootlets.	0.2	TS																
			TS																
Hamilton Ash Formation	Silty CLAY (CL); dark brown. Stiff to hard; moist; moderate plasticity, moderately sensitive.	0.4																	
		0.6																	
		0.8																	
		1.0																	
	CLAY (CL); dark brown. Hard; moist; low plasticity.	1.2																	
		1.4																	
		1.6																	
		1.8																	
		2.0																	
	Silty CLAY (CL); dark yellowish brown. Very stiff; moist; low plasticity, moderately sensitive.	2.2																	
		2.4																	
		2.6																	
		2.8																	
	EOH: 3.00 m	3.0																	
Photo		Remarks																	
		End of log at 3.0 m. Target depth achieved. Groundwater not encountered.																	
		Shear Vanes				Water				Investigation Type									
		Peak Remoulded				Standing Water Level Out flow In flow				☒ Hand Auger ☐ Investigation Pit ☐ Machine Borehole									

INVESTIGATION LOG

Client: Bowrock Properties Limited

Project: Lot 3 & 32 Tauwhare Road, Tauwhare

Location: West of open-drain.

Co-ordinates: 1815815mE, 5816128mN

Elevation: Ground

Job No.: HD1512

No.: HA03

Date: 23.07.20

Logged By: RR

Checked By: SH

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane: 534	Water
				2 4 6 8 10 12 14 16 18	50 100 150 200 250	
Topsail	TOPSOIL (OL); brownish black. Moist; Rootlets.			1 2		
Hinuera Formation	SILT (ML); light brown, mottled orange. Very stiff; moist; low dilatancy, sensitive; moderate iron staining.	0.2	1		154	
		0.4	1		34	
		0.6	2		161	
		0.8	2		34	
		1.0	4			
		1.2	7			
		1.4	8			
		1.6	14			
		1.8	11			
		2.0	14			
	No recovery, becomes saturated. 1.1 m: becomes dense. EOH: 1.20 m	2.2	9			
		2.4	9			
		2.6	11			
		2.8	12			
		3.0	11			
			10			
			11			
			13			
			11			
			13			
			8			
			4			
			4			
			5			
			6			

Photo

Remarks

End of log at 1.2 m.

Target depth of 3.0 m not achieved due to no recovery and hole collapse.

Groundwater encountered at 1.1 m.

Shear Vanes

Peak

Remoulded

Water

Standing Water Level

Out flow

In flow

Investigation Type

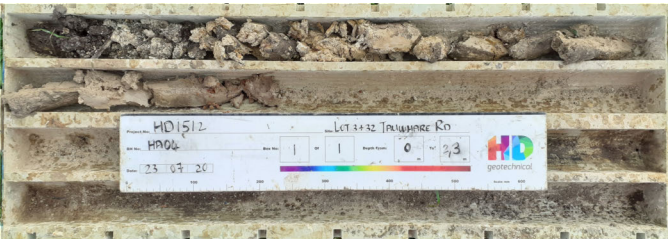
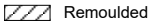
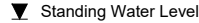
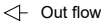
☒ Hand Auger

☐ Investigation Pit

☐ Machine Borehole

NZGD ID: 221318

Page 1 of 1

		INVESTIGATION LOG				Job No.: HD1512	
		Client: Bowrock Properties Limited Project: Lot 3 & 32 Tauwhare Road, Tauwhare Location: Near southern corner. Co-ordinates: 1815668mE, 5815964mN Elevation: Ground				No.: HA04 Date: 23.07.20 Logged By: RR Checked By: SH	
Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane: 534		Water
				2 4 6 8 10 12 14 16 18	50 100 150 200 250		
Topsoil	TOPSOIL (OL); brownish black. Moist; Rootlets.	0.2	1	1			
Hinuera Formation	SILT (ML), with trace sand; light brownish grey. Very stiff; moist; low plasticity, moderately sensitive; sand, fine; moderate iron staining. 1.2 m: becomes saturated, medium dense. EOH: 1.40 m	0.4	3	3			
		0.6	3	3		133	
		0.8	3	3		127	
		1.0	4	4		136	
		1.2	4	4		120	
		1.4	4	4		93	
		1.6	5	5		62	
		1.8	7	7			
		2.0	7	7			
		2.2	8	8			
		2.4	10	10			
		2.6	7	7			
		2.8	6	6			
		3.0	6	6			
Photo		Remarks					
		End of log at 1.4 m. Target depth of 3.0 m not achieved due to no recovery and hole collapse. Groundwater encountered at 1.2 m.					
		Shear Vanes  Peak  Remoulded Water  Standing Water Level  Out flow  In flow Investigation Type ☒ Hand Auger ☐ Investigation Pit ☐ Machine Borehole					



INVESTIGATION LOG

Client: Bowrock Properties Limited

Project: Lot 3 & 32 Tauwhare Road, Tauwhare

Location: North-west of pond.

Co-ordinates: 1815515mE, 5816373mN

Elevation: Ground

Job No.: HD1512

No.: HA05

Date: 27.07.20

Logged By: BK

Checked By: SH

Geology	Geological Interpretation (refer to separate Geotechnical and Geological Information sheet for further information)	Depth (m)	Legend	Scala Penetrometer (Blows / 100 mm)	Vane Shear Strength (kPa) Vane: 534	Water
				2 4 6 8 10 12 14 16 18	50 100 150 200 250	
Topsoil	TOPSOIL (OL); dark brown. Moist; rootlets.	0.2				
Hamilton Ash Formation	Silty CLAY (CL); brown. Very stiff to hard; moist to wet; low plasticity, moderately sensitive.	0.4				
		0.6				
		0.8				
		1.0				
		1.2				
	CLAY (CL), with some silt; dark brown. Hard; moist; low plasticity.	1.4				
		1.6				
		1.8				
		2.0				
		2.2				
	Silty CLAY (CL); brown. Hard; moist; low plasticity, moderately sensitive.	2.4				
		2.6				
		2.8				
		3.0				
	EOH: 3.00 m					
Photo		Remarks				
		End of log at 3.0 m. Target depth achieved. Groundwater not encountered.				
		Shear Vanes Peak Remoulded Water Standing Water Level Out flow In flow Investigation Type ☒ Hand Auger ☐ Investigation Pit ☐ Machine Borehole				

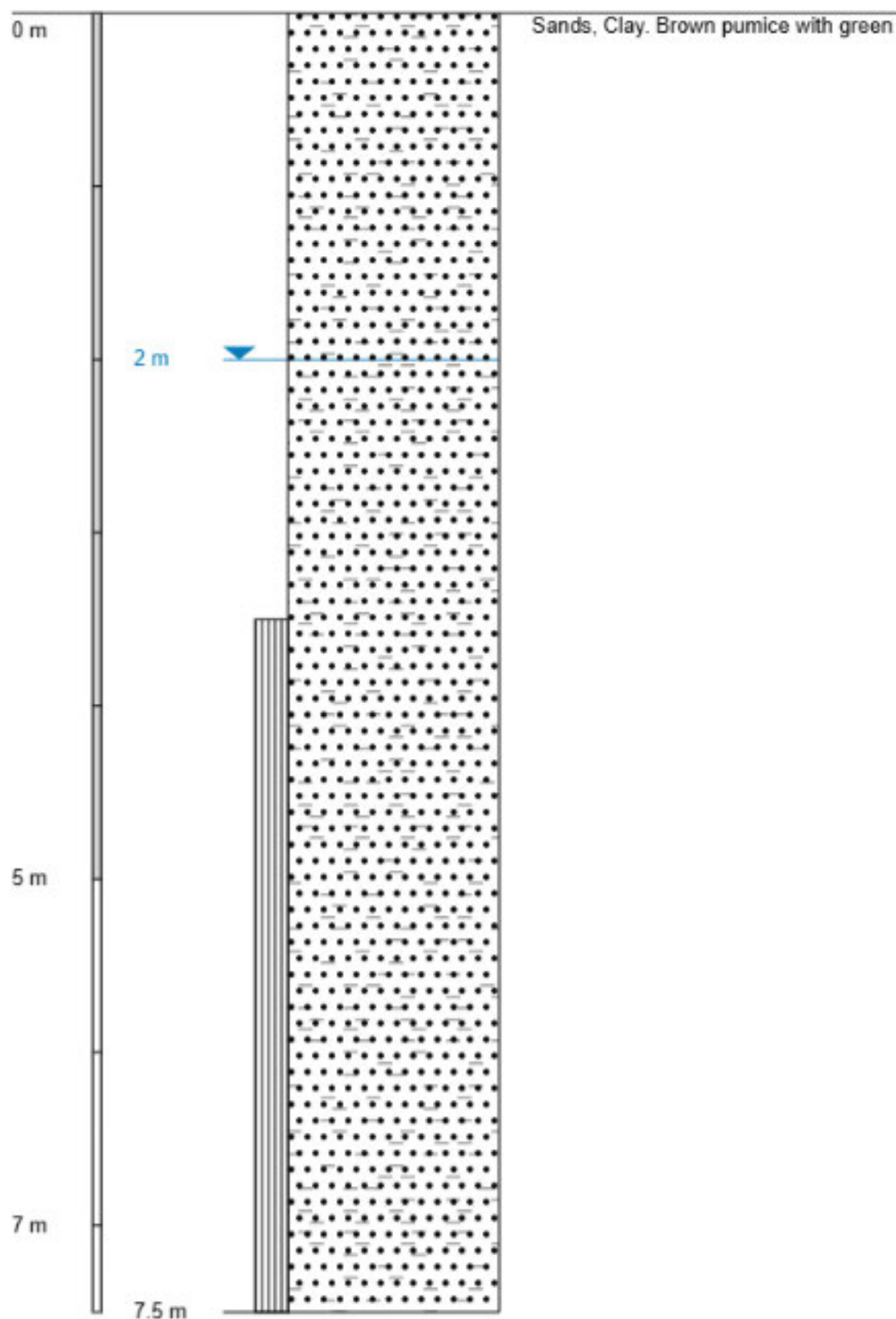
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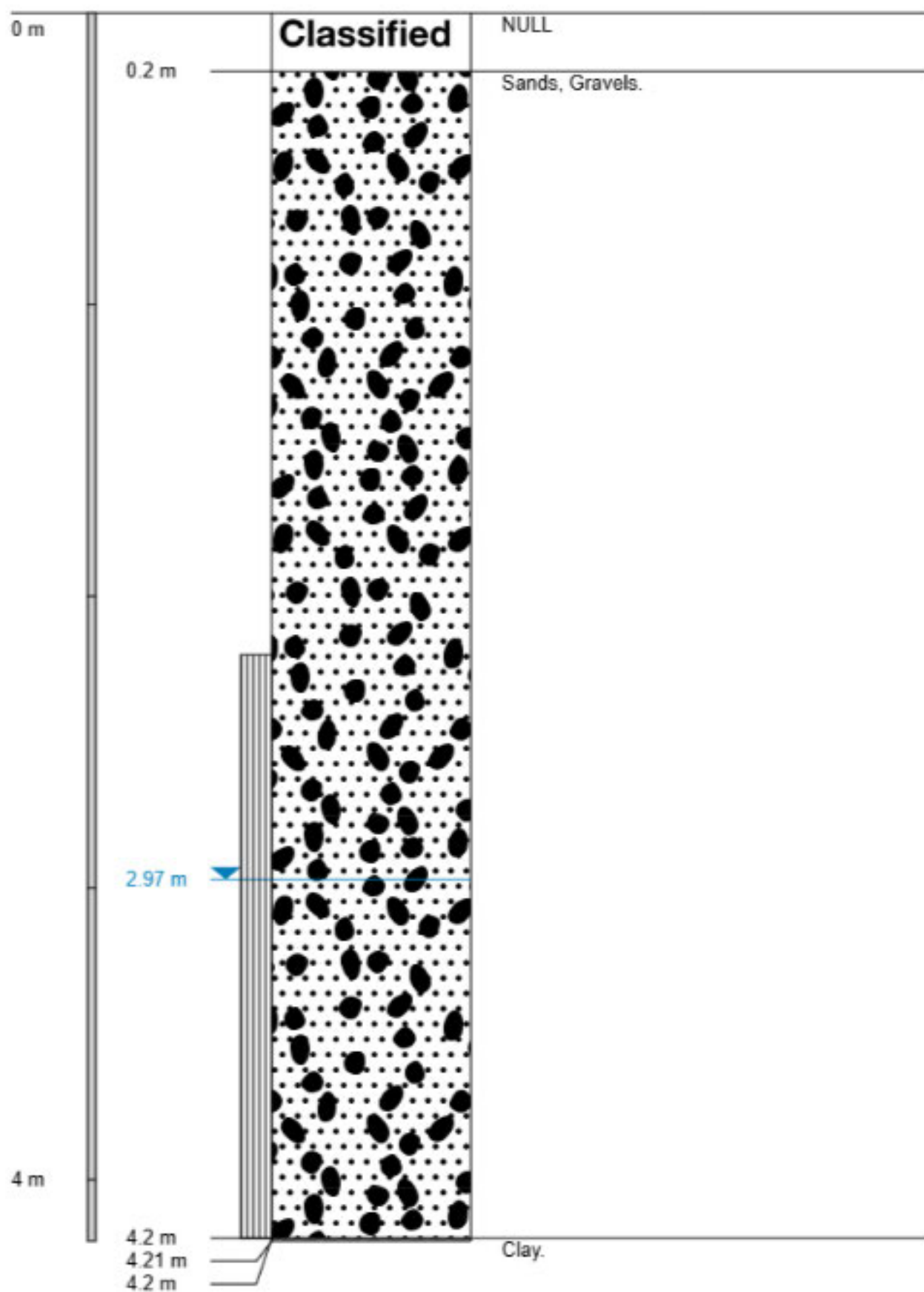
Page 1 of 1

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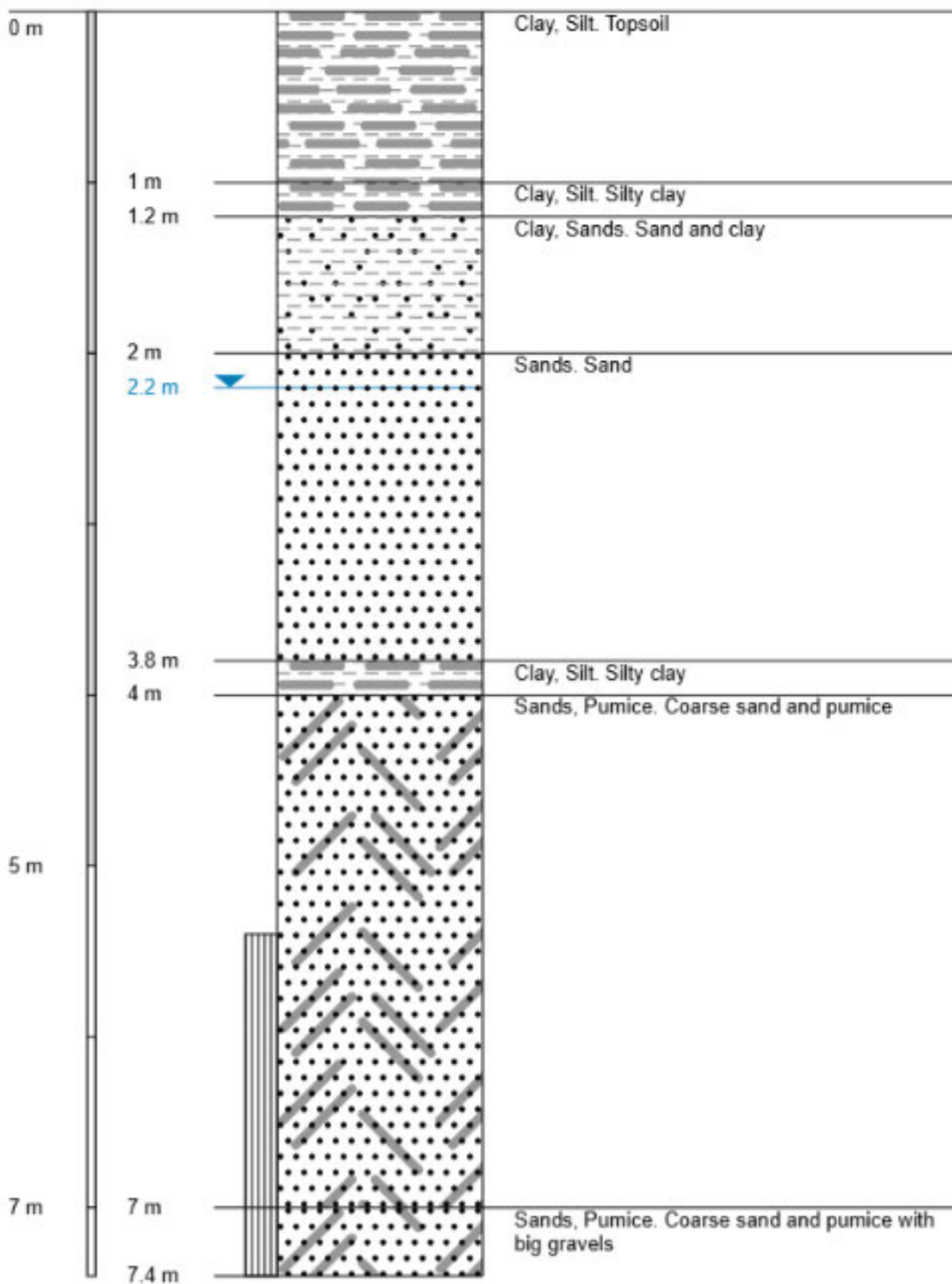
Council well number : 69_1520
Well name : Bore 69 - Station 1520
Drilling company : J Jones Limited
Drilling date : 01/11/1993
Drilling method : -
Locality : -
Total depth drilled : 7.5m
NZTM : 1816058 : 5816795



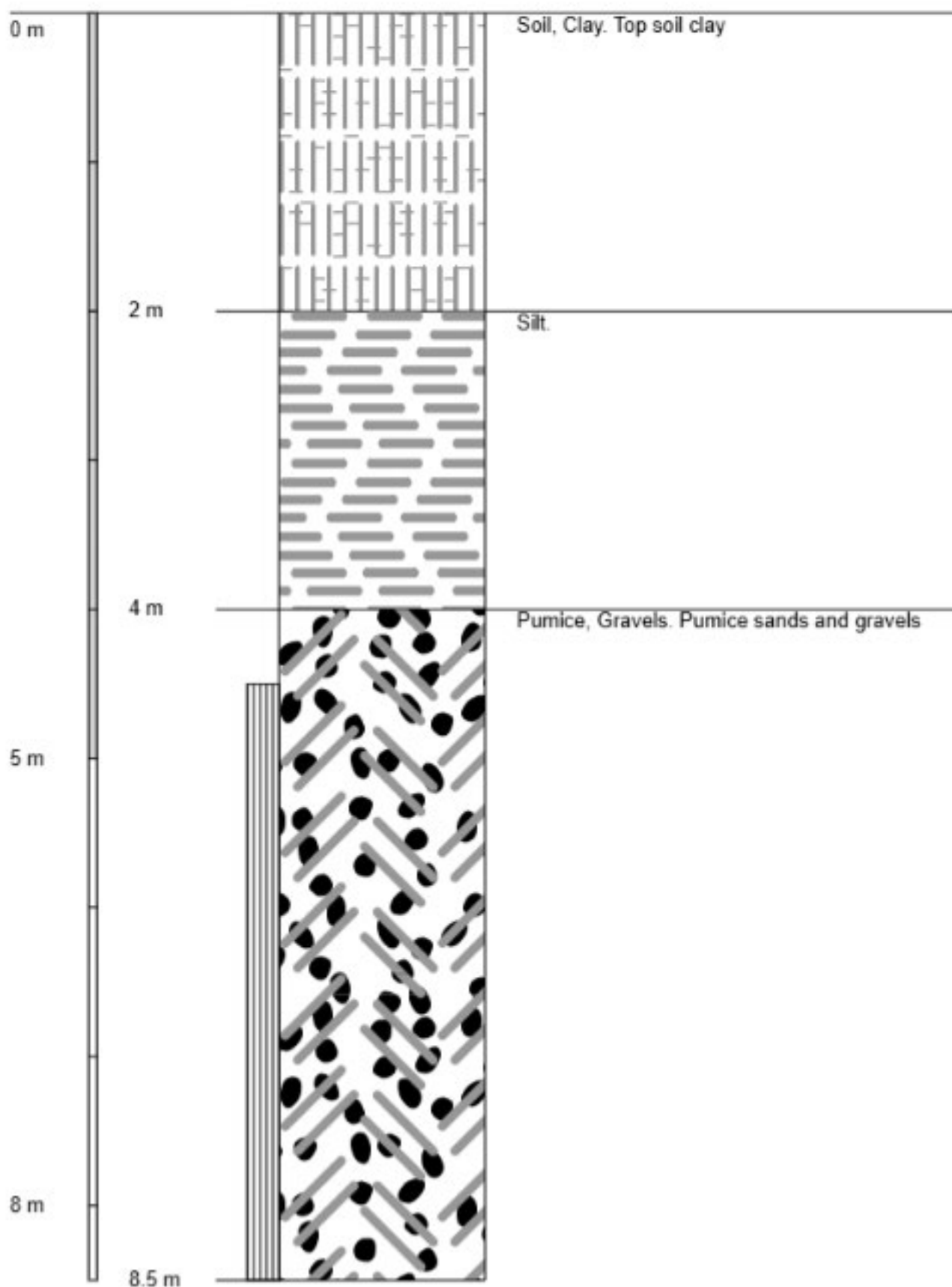
Council well number : 69_1809
 Well name : Bore 69 - Station 1809
 Drilling company : King Drilling Company Limited
 Drilling date : 15/04/1996
 Drilling method : -
 Locality : -
 Total depth drilled : 4.2m
 NZTM : 1816142 : 5816539



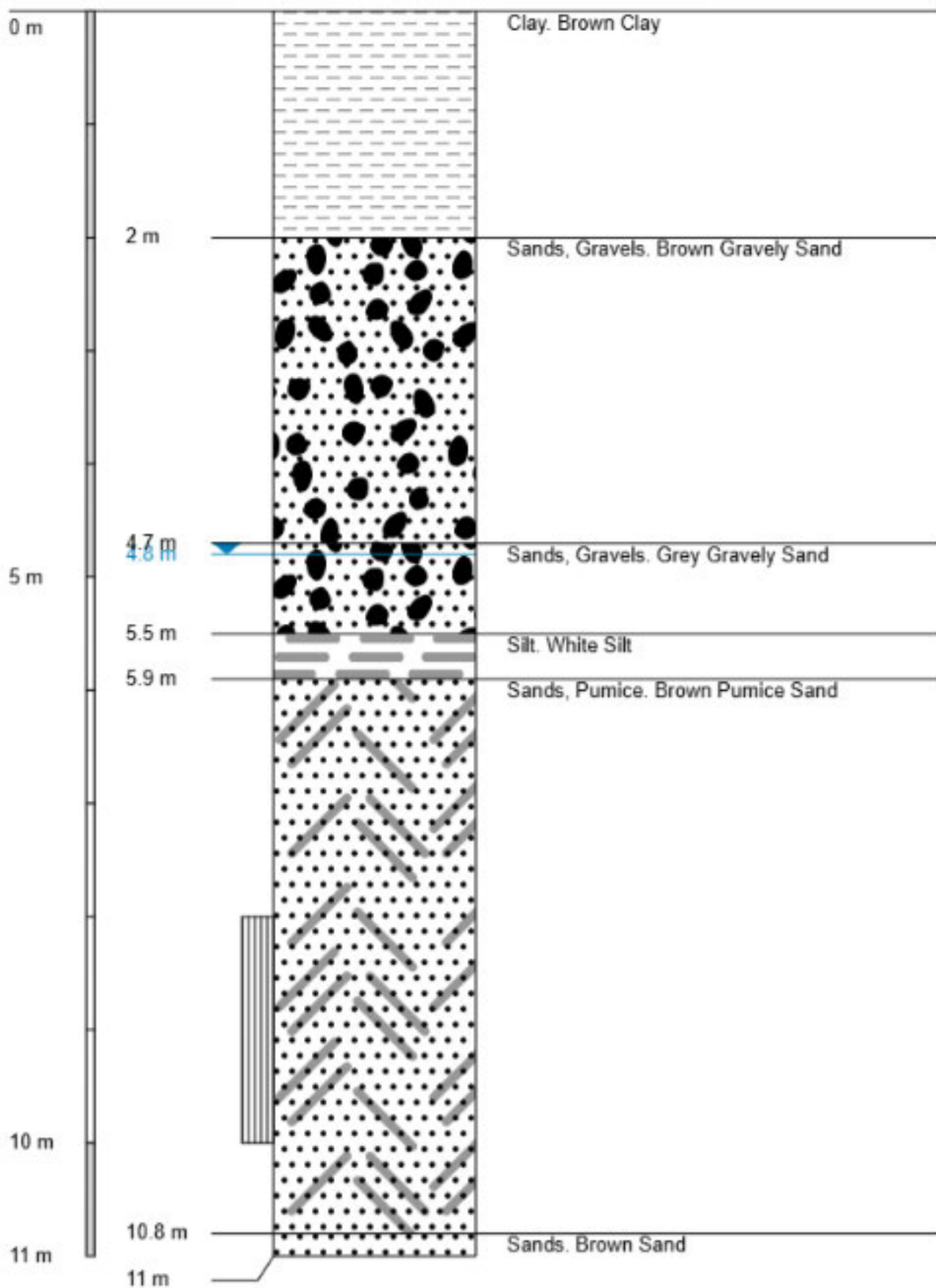
Council well number : 69_2182
Well name : Bore 69 - Station 2182
Drilling company : King Drilling Company Limited
Drilling date : 03/11/1999
Drilling method : -
Locality : -
Total depth drilled : 7.4m
NZTM : 1816258 : 5816996



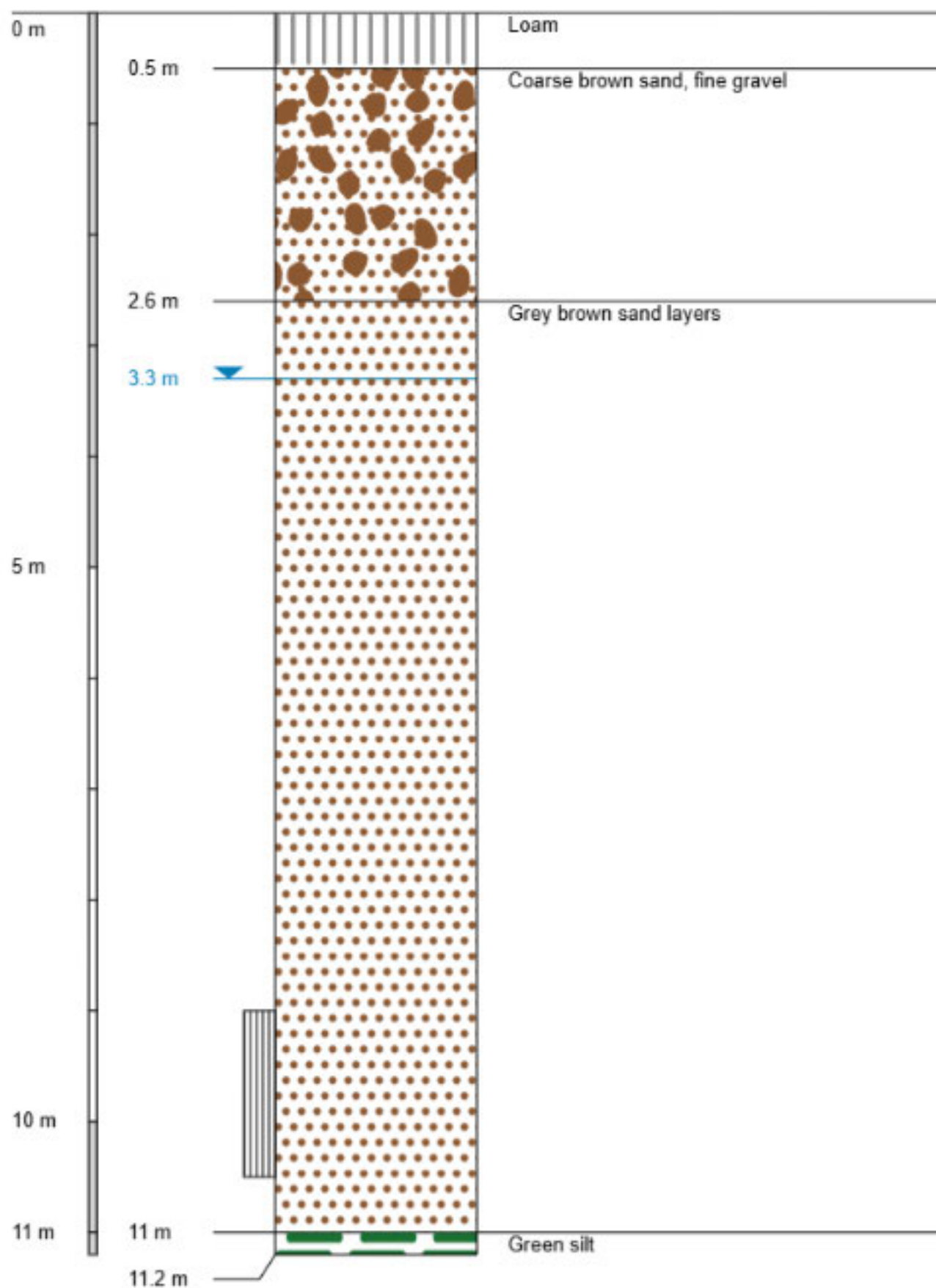
Council well number : 72_10433
Well name : Bore 72 - Station 10433
Drilling company : Barham United Welldrillers Limited
Drilling date : -
Drilling method : -
Locality : -
Total depth drilled : 8.5m
NZTM : 1816140 : 5817047



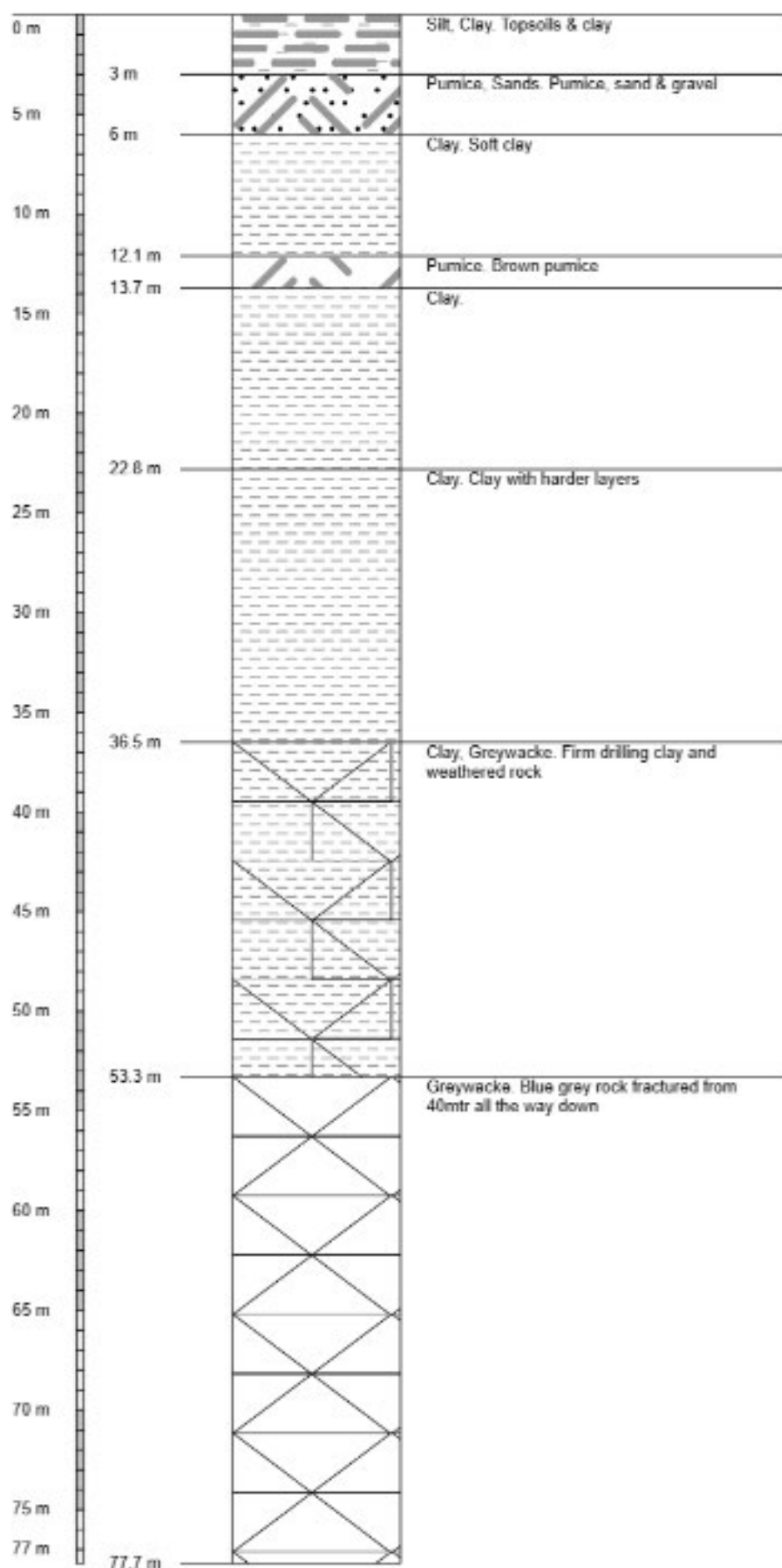
Council well number : 72_10497
Well name : Bore 72 - Station 10497
Drilling company : Benton & Son Limited
Drilling date : 10/09/2020
Drilling method : -
Locality : -
Total depth drilled : 11m
NZTM : 1816340 : 5816803



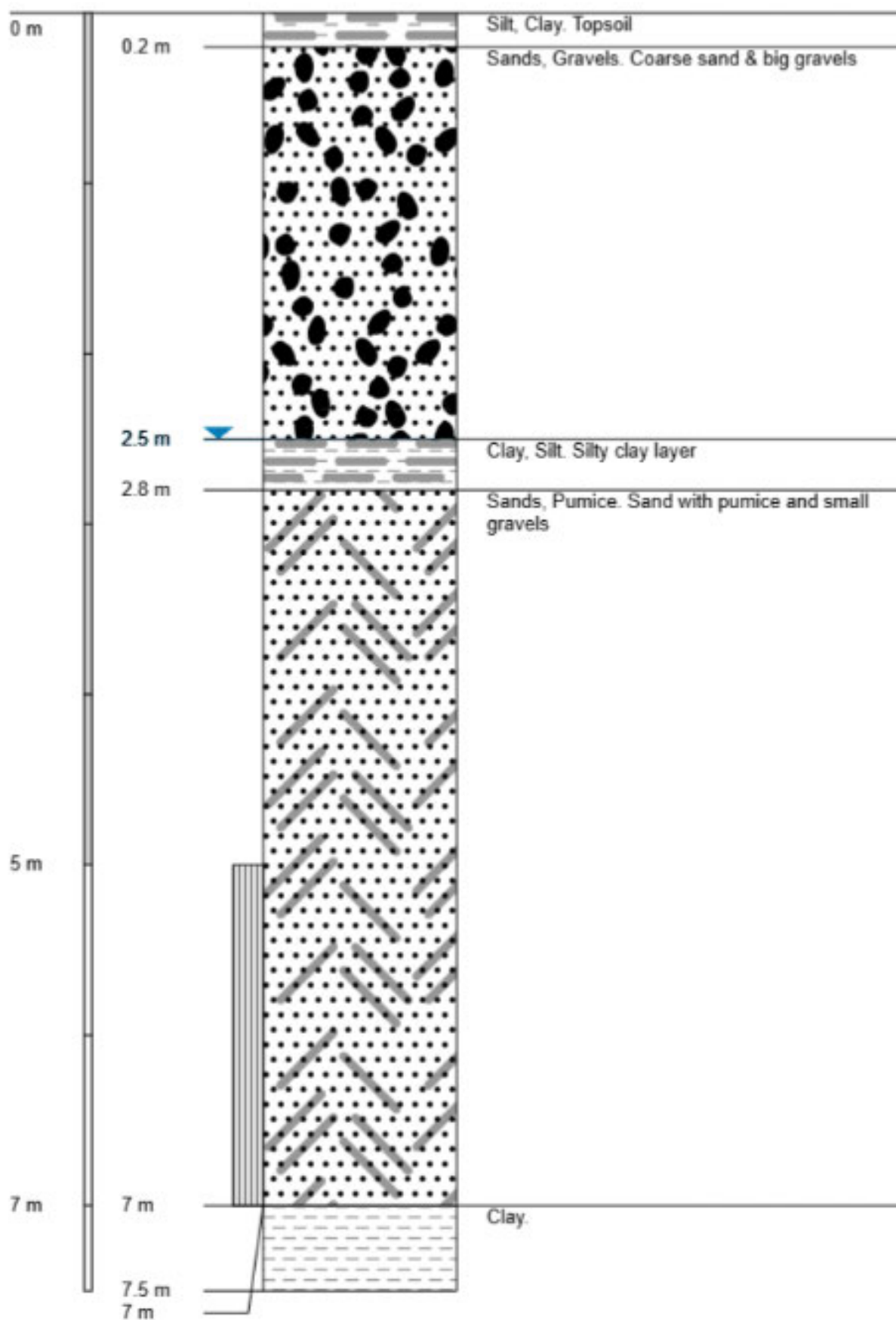
Council well number : 72_11314
Well name : Bore 72 - Station 11314
Drilling company : Benton & Son Limited
Drilling date : 23/10/2016
Drilling method : -
Locality : -
Total depth drilled : 11.2m
NZTM : 1816195 : 5816951



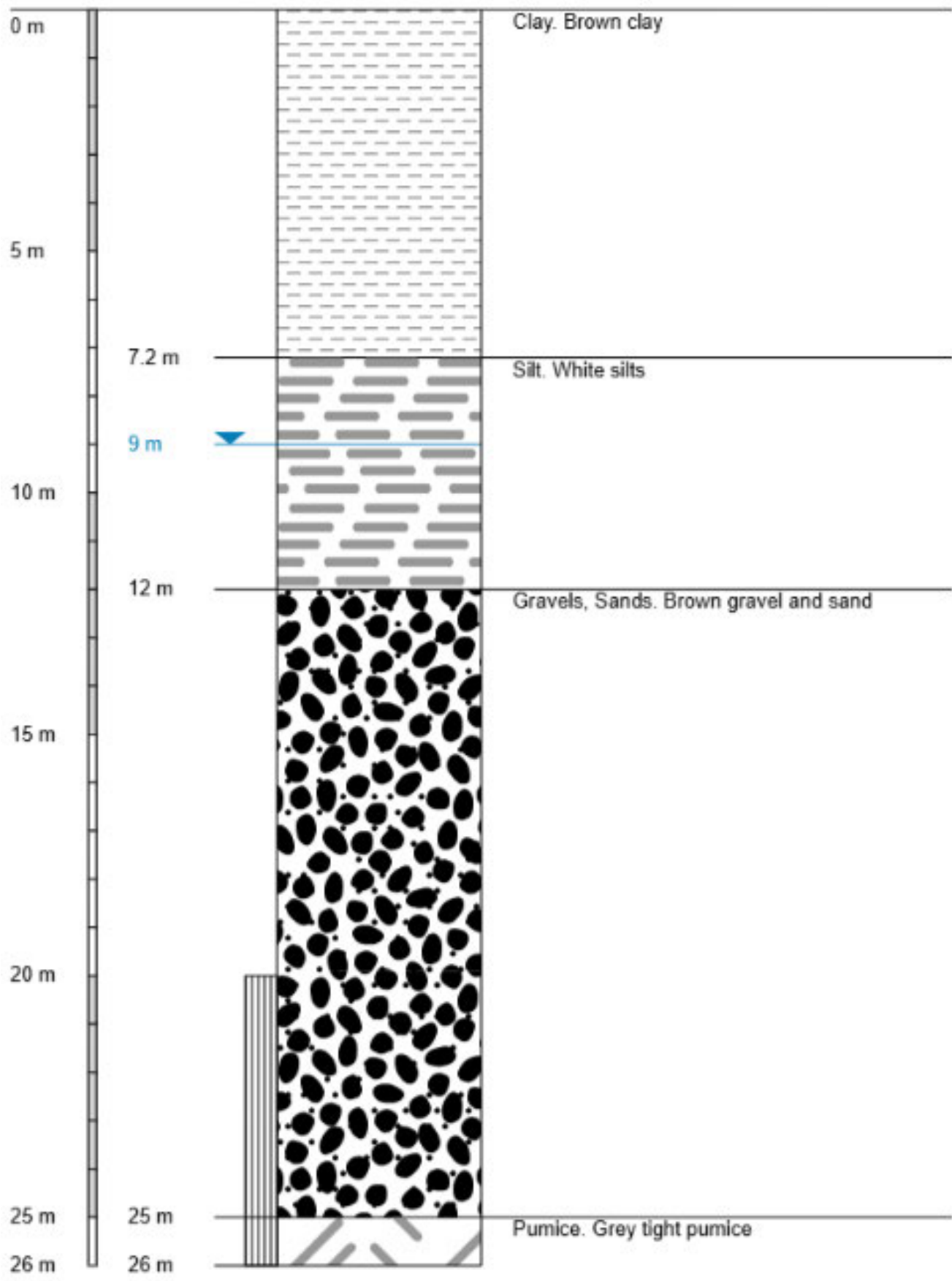
Council well number : 72_28
 Well name : Bore 72 - Station 28
 Drilling company : Geo Hutchinson (1984) Limited
 Drilling date : 29/03/2000
 Drilling method : -
 Locality : -
 Total depth drilled : 77.7m
 NZTM : 1816558 : 5816996



Council well number : 72_321
Well name : Bore 72 - Station 321
Drilling company : King Drilling Company Limited
Drilling date : 18/04/2000
Drilling method : -
Locality : -
Total depth drilled : 7m
NZTM : 1816458 : 5816896



Council well number : 72_5237
Well name : Bore 72 - Station 5237
Drilling company : Rex Brown Drilling (2012) Limited (Ceased Trading)
Drilling date : 01/12/2010
Drilling method : -
Locality : -
Total depth drilled : 26m
NZTM : 1814458 : 5816693



APPENDIX B

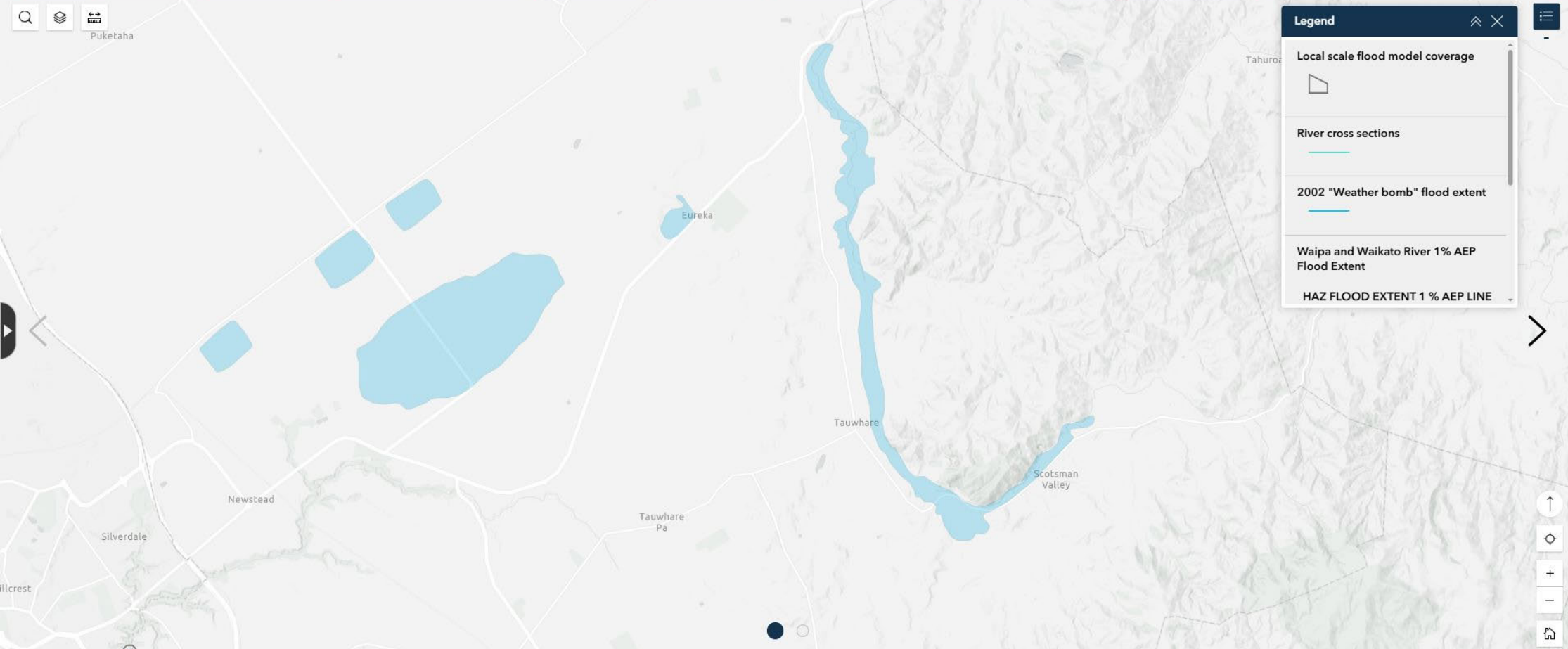
Historical Photographs

Date and source	Key Features
1939 Retrolens	 Stream observed running through the site (site boundary outlined in red).
1971 Retrolens	 Stream no longer visible and additional paddocks have been created.

Date and source	Key Features
2008 Google Earth	 • Housing being built in the south-eastern corner below the site. • Features from the old stream can be seen in the northern part of site (circled in blue).
2017 Google Earth	 • Ponding identified in southern paddock (circled in blue).

APPENDIX C

Waikato Regional Council Hazard Maps



Waikato Regional Hazards Portal

Visit our regional hazards and emergency management page



Overview

River flooding

Flood Management

Waikato District Defended areas

Coastal Hazards:

Coastal Inundation

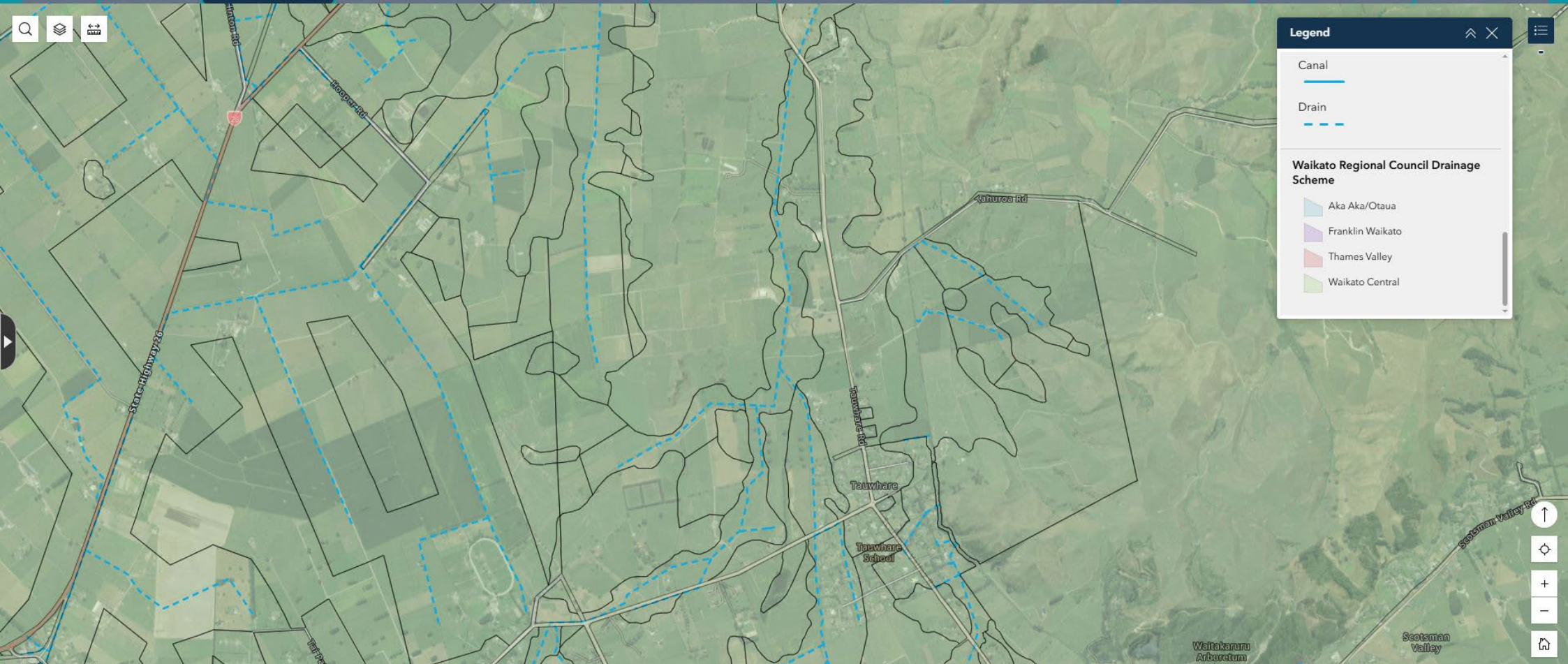
Earthquakes and landslides

Volcanoes and Geothermal

Karāpiro Dam Break

Emergency Management

Waikato Regional Cour



Leger

Car

Dra

Waikato Regional Council Drainage Scheme

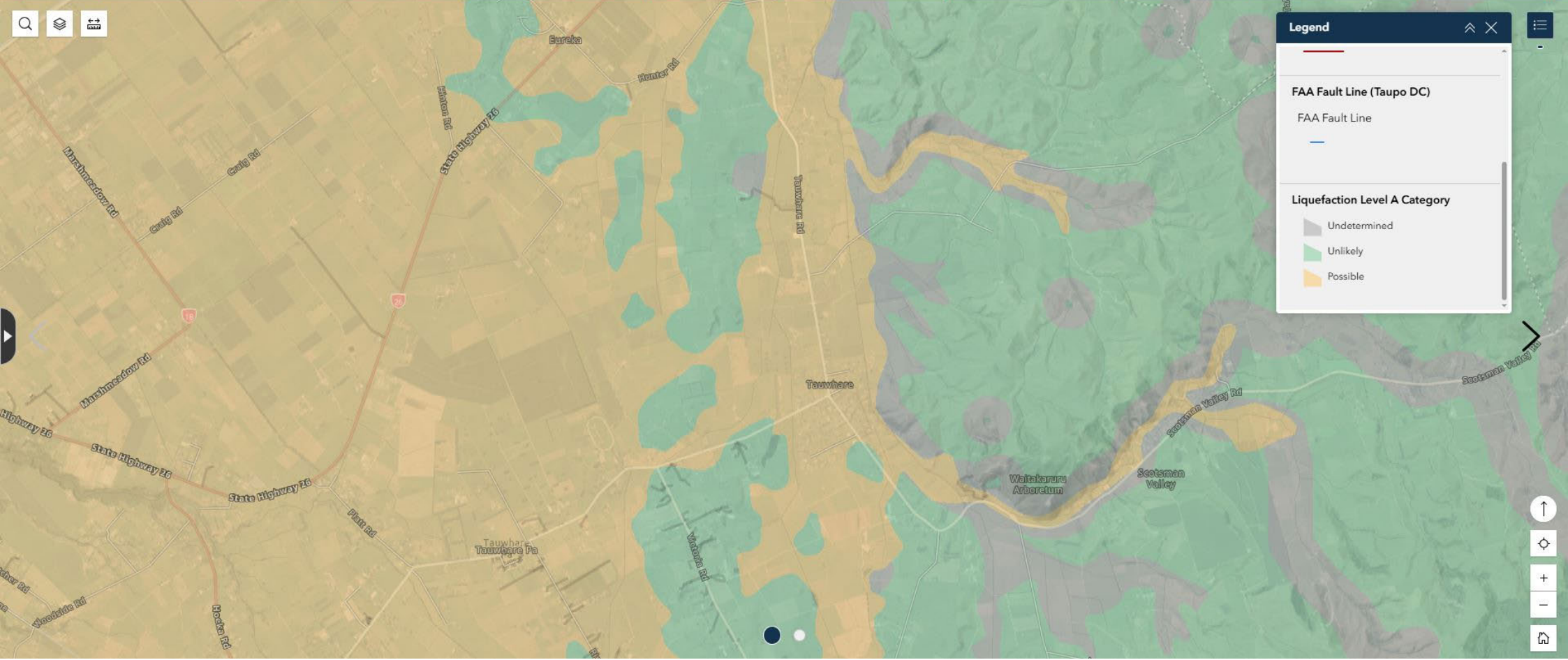
Aka Aka/Otau

Franklin Waikat

Thames Valley

Waikato Central







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