



K190051-2a

7 October 2019

**ON-SITE WASTEWATER TREATMENT AND DISPOSAL
RESIDENTIAL SUBDIVISION
278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON**

Prepared For:

Stratford Properties Limited
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Greenlane
Auckland 1546

KGA Geotechnical Group Limited
Supporting the Construction Industry since 1990

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REPORT ISSUE AUTHORISATION

On-Site Wastewater Treatment And Disposal
Residential Subdivision
278 Clevedon-Kawakawa Road
Clevedon

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EXECUTIVE SUMMARY

On-Site Wastewater Treatment And Disposal

Residential Subdivision

278 Clevedon-Kawakawa Road

Clevedon

<p>SITE CONDITIONS</p>	<ul style="list-style-type: none"> • The near surface ground conditions (up to approximately 2.5m in depth) comprised between 0.2m and 0.3m of topsoil, underlain by natural clays, silts and some fine sand. • Groundwater was identified at a depth generally greater than 2m below the ground surface. • The soils are considered to be moderately to slowly draining and therefore should be classified as Category 5-6 in accordance with Auckland Council TP58; Table 5.1. • A dispersal rate of 2.5mm per day is recommended for the soils at the site.
<p>WASTEWATER TREATMENT RECOMMENDATIONS</p>	<ul style="list-style-type: none"> • We have assumed that the dwellings will comprise standard water fixtures. • It is recommended that the wastewater produced from the dwellings is treated to minimum advanced secondary level. • Disposal should be undertaken using pressure compensating dripper irrigation. • Specific design should be undertaken for each Lot once individual house layout plans are provided.
<p>DISPOSAL CONSIDERATIONS</p>	<ul style="list-style-type: none"> • The wastewater disposal areas (primary and reserve) should be compliant with the setbacks provided in Auckland Council Technical Publication 58 (TP58). • No heavy machinery should track through the disposal fields, both pre and post development. • The disposal field should be setback a minimum distance of 3m from slopes greater than 1 Vertical on 4 Horizontal. • The disposal field must be setback a minimum 15m from overland flowpaths and open stormwater drains. • The disposal field is recommended to be mulched and planted on completion.
<p>FUTURE WORK</p>	<ul style="list-style-type: none"> • We recommend that a site specific wastewater design is undertaken for each Lot once development layouts are known and floor plans have been prepared.
<p>REPORT DISTRIBUTION</p>	<p>A full copy of this report must be provided to all relevant parties involved in the project. This should include, but not be limited to, owner, architectural designers, engineers (civil and structural) and the earthworks/building contractor.</p>

CONTENTS

EXECUTIVE SUMMARY	ii
1. INTRODUCTION	1
2. SITE DESCRIPTION	1
3. PROPOSED DEVELOPMENT	3
4. BACKGROUND INFORMATION	4
4.1 Historical Site Development.....	4
4.2 Geotechnical Report	4
5. SUBSOIL CONDITIONS AND CLASSIFICATION	5
6. WASTEWATER DESIGN REQUIREMENTS.....	6
6.1 Domestic Facilities	6
6.2 Design Flows	7
6.3 Wastewater Treatment and Disposal.....	8
6.4 Additional Recommendations	9
7. COMPLIANCE WITH AUCKLAND UNITARY PLAN	9
8. CONCLUSIONS AND FUTURE WORK	10
9. LIMITATIONS	10

Attachments:-

Sheet 1	Wastewater Irrigation Field Site Plan
Sheet 2A – 2H	Boreholes AH1 to AH8

1. INTRODUCTION

At the instruction of Stratford Properties Limited, we provide details for on-site wastewater treatment and dispersal requirements for the proposed residential development at 278 Clevedon-Kawakawa Road, Clevedon.

The scope of our investigation was to undertake a detailed site walkover inspection, explore the subsurface ground and groundwater conditions and provide an assessment for on-site wastewater treatment and disposal for the proposed development. We have prepared this letter on the basis that each Lot will be serviced by its own individual treatment and disposal system.

This letter presents our findings and recommendations for on-site wastewater treatment and disposal and has been prepared in support of a Subdivision Consent application.

2. SITE DESCRIPTION

The property at 278 Clevedon-Kawakawa Road, Clevedon is legally described as Lot 1, DP 146882, with an approximate area of 51.7ha. The property is located on the northern side of Clevedon - Kawakawa Road and is bounded by Wairoa River to the north and large residential properties to the east and west.

For the most part, the property comprises low-lying farmland, which is predominately mapped as floodplain areas, with the exception of an elevated knoll towards the south western corner and an elevated strip of land located adjacent to the road. A number of overland flowpaths are located in the property and flow in a generally northwards direction towards Wairoa River. The majority of the property comprises gentle slopes, with a maximum gradient of approximately 1 Vertical on 10 Horizontal (1V:10H). Locally, the northern, western and eastern slopes of the elevated knoll would be described as moderately to steeply sloping, with grades up to 1V:3H.

An aerial photograph of the subject site, showing the overland flowpaths is presented on Figure 1 below.

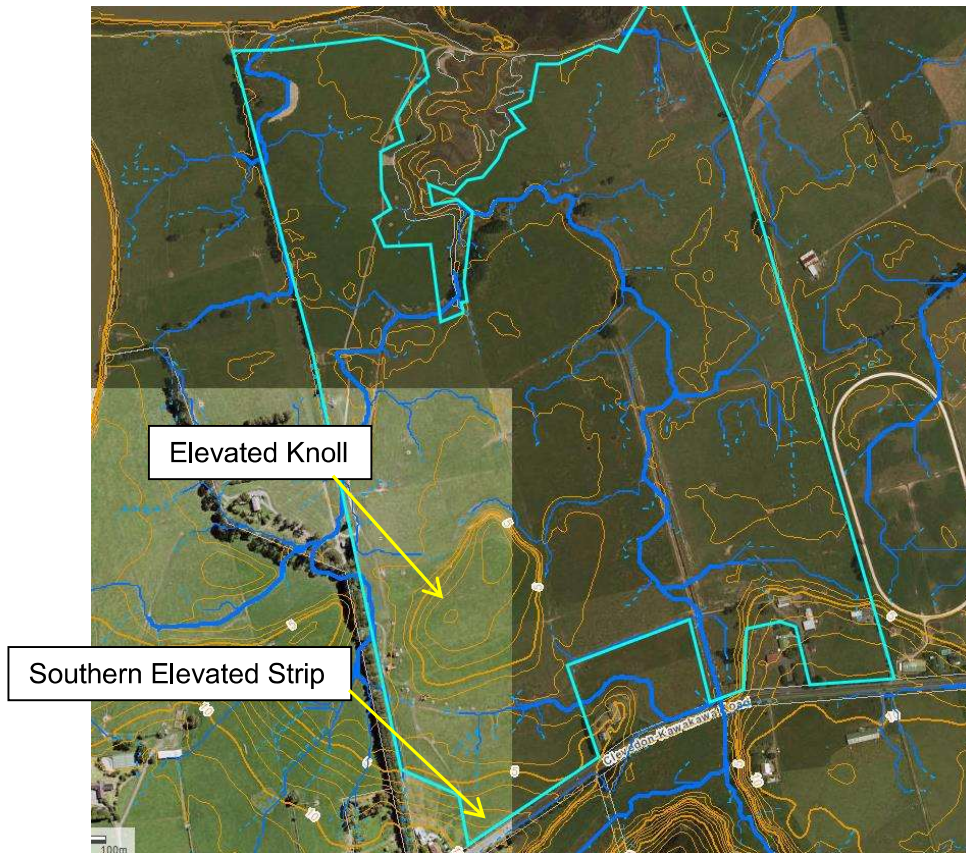


Figure 1: Aerial view of 278 Clevedon-Kawakawa Road, sourced from Auckland Council Geomaps website (<https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html>)

3. PROPOSED DEVELOPMENT

The latest proposed development plans provided by Lands & Survey, Ref No. 117536-100, 101 and 102 (Rev C), dated 04/06/2019, detail 11 individual Lots located on the elevated land in the southern part of the property as described in the previous section. The plans include details of potential Lot boundaries and a 500m² building platform area for each Lot is also provided on these plans. We have adapted these plans for our use, as shown on the attached Site Plan, Sheet 1.

We understand that a flood level assessment has been undertaken and that a “building zone” has been designated on ground that is at an elevation higher than RL4.4m. The properties will be accessed via a shared driveway which we understand will have kerb/channel drainage.

We understand that water supply for each of the Lots will be from rain water collection.

4. BACKGROUND INFORMATION

4.1 Historical Site Development

An assessment of aerial photographs between 1940 and 2017 indicate the site has undergone very little to no modification or development since 1940, with the site primarily used as grazing for livestock.

4.2 Geotechnical Report

KGA Geotechnical Group Limited (KGA) have recently prepared a geotechnical investigation report for the currently proposed residential subdivision. The report is titled 'Geotechnical Investigation Report, Proposed New Subdivision, 278 Clevedon-Kawakawa Road, Clevedon', dated 20 March 2019.

The investigation comprised the drilling of 8 hand auger boreholes and the advancement of 2 static cone penetrometer test (CPT) probes within the proposed development areas. The ground information obtained from the subsurface investigation has been used to assess wastewater requirements as indicated later in this report.

As part of the investigation, a slope stability assessment was carried out for the moderately to steeply sloping ground descending northward from the elevated knoll. Stability checks confirmed that slope stability is not considered a concern at this site, provided that stormwater is addressed appropriately and that adequate setbacks of the structure from the sloping ground is maintained.

5. SUBSOIL CONDITIONS AND CLASSIFICATION

As indicated previously, a total number of 8 hand auger boreholes were drilled across the proposed subdivision. In addition, 2 CPT probes were advanced at the site. The near surface ground conditions (up to approximately 2.5m in depth) comprised between 0.2m and 0.3m of topsoil, underlain by natural clays, silts and some fine sand. No fill was identified at the investigation locations.

Groundwater was measured at the investigation locations at the time of drilling, and in the boreholes the week following, to allow for the effects of drilling to dissipate. The depth to groundwater was encountered at between 1.3m and 3.8m below the existing ground surface. We note that the readings of 1.3m (AH6) and 1.65m (AH3) below the ground surface were from boreholes drilled below RL4.4m and within the floodplain, and these readings represent groundwater conditions below the floodplain level. Outside from these boreholes, the depths to groundwater were greater than 2m below the existing ground surface and which is considered to be more representative of levels over the proposed development areas.

Based on our observation of the subsoils, we consider the soils to be moderately to slowly draining and therefore should be classified as Category 5 to 6 in accordance with Auckland Council TP58; Table 5.1. A dispersal rate of 2.5mm per day is therefore recommended for the soils at the site.

Copies of the hand auger boreholes are attached to this letter as Sheet 2A to 2H.

6. WASTEWATER DESIGN REQUIREMENTS

We understand that it is proposed for each Lot to be serviced by an individual on-site wastewater treatment system, and to have their own individual wastewater disposal field. We provide a summary regarding the number of bedrooms that may be serviced on each Lot. Following discussions with Greenwood Associates we have considered that the dwellings will have standard water fixtures.

It should be noted that the design flows provided in Section 6.2 below are preliminary only and a Lot specific assessment should be undertaken once plans have been developed. As such, a potential purchaser may install additional bedrooms or use higher water use fixtures provided that the design complies with the current design documents and regulations.

6.1 Domestic Facilities

As discussed with Greenwood Associates, we have assumed for this report that the dwellings will comprise standard water fixtures. These include, but are not limited to the following:

- 6/3 Litre Flush Cisterns
- Automatic Washing Machine
- Low Water Use Dishwasher
- No Garbage Grinder

Provided the above are incorporated into the design of the dwelling, a wastewater flow allowance/person/day is 180L, in accordance with Table 6.2, TP58.

6.2 Design Flow Volumes

Although we have not received confirmation of proposed Lot boundaries we provide a summary of wastewater flow volumes for a three, four and five bedroom dwelling in Table 1 below. It must be noted that where additional rooms are proposed that may be closed off and be utilised as a bedroom in the future, they are to be considered as a bedroom for wastewater design purposes. These include, but are not limited to; family, study, sewing room and office.

The total wastewater flow volumes have been calculated based on Table 6.1 of TP58 for a wastewater daily flow allowance of 180L/person/day, for standard water fixtures.

Table1: Wastewater Design Volumes

	Number of Bedrooms		
	Three	Four	Five
Design Occupancy (persons/day)	5	6	8
Total design Volume (Litres/day)	900L/day	1,080L/day	1,440L/day

6.3 Wastewater Treatment and Disposal

We recommend that the wastewater is treated to a minimum advanced secondary level. The advanced secondary treatment will provide a high treatment standard by reducing total suspended solids, organic matter and total nitrogen.

A number of treatment packages are available on the market however; the chosen package must have gone through the Onsite Effluent Treatment National Testing Programme (OSET NTP) to certify the treatment standard of the system. The chosen system must have a minimum 24 hours' emergency storage in the event of breakdown or power failure.

Advanced secondary treated effluent should be dispersed via pressure compensated dripper irrigation lines covered in mulch and planted. We provide the wastewater disposal field sizing requirements in Table 2 below based on the design flow, and loading rate of 2.5mm/day as indicated in Section 5.

Table 2: Wastewater Disposal Field Areas

Number of Bedrooms	Three	Four	Five
Total design Volume (Litres/day)	900L/day	1,080L/day	1,440L/day
Primary Disposal Area (m ²)	360m ²	432m ²	576m ²
Reserve Disposal Area (m ²) (100% for Subdivision Consent)	360m ²	432m ²	576m ²

The wastewater disposal field for each Lot must comply with the setback requirements detailed in Auckland Council TP58, Table 5.2. In addition, the wastewater disposal field (secondary and reserve) must be kept outside of proposed fill areas, 1.5m setback from driveways, 3m setback from slopes steeper than 1V:4H and above RL4.4m (floodplain). The disposal fields will be located on the elevated ground, outside of the floodplain areas (RL4.4m).

The separation distance between the disposal field and groundwater table exceeds 600mm as required in TP58 for advanced secondary treated effluent.

For subdivision consent purposes, we indicate that based on the current scheme plans provided to us, each individual Lot is considered to have available space for wastewater dispersal for a four (4) bedroom dwelling (subject to Lot specific design). It must be noted that for the purposes of the subdivision consent application, 100% reserve dispersal area must be allocated on each Lot.

At specific design stage for each Lot, a reserve wastewater disposal field of 50% may comply as a permitted activity under Rule 5.6.2.1 of the Auckland Council Unitary Plan.

We attach a potential wastewater disposal plan that demonstrates that each of the 11 Lots has sufficient area for primary wastewater disposal and 100% area allocated for reserve. This is attached as Sheet 1.

6.4 Additional Recommendations

The dispersal field is to be mulched and fully planted with appropriate vegetation in accordance with TP58, Appendix G, Plant List.

Heavy equipment must not track across proposed wastewater disposal fields, both prior to and following construction.

Stormwater from the proposed developments and impermeable areas must be disposed of appropriately so that it does not interfere with the irrigation areas. The irrigation field must be setback a minimum of 15m from flowpaths and stormwater outlets, including roadside and private driveway open drains.

7. COMPLIANCE WITH AUCKLAND UNITARY PLAN

In order to comply as a Permitted Activity, in accordance with the Auckland Unitary Plan (AUP), the developer must consider the total Lot area and potential flow volume. Where the ratio of site area to wastewater discharge volume is less than 1.5m² per litre per day, or less than 3m² where the flow volume exceeds 2,000L, the development does not comply as a permitted activity under Rules E5.6.2.1 and E5.6.2.4 of the AUP and the proposal will be considered Restricted Discretionary. A discharge consent will need to be applied for in this instance.

8. CONCLUSIONS AND FUTURE WORK

Based on the above, it is our professional opinion that the proposed subdivision is suitable for on-site wastewater treatment and disposal. Provided that the recommendations contained within this report are followed and incorporated into individual Lot detailed design for wastewater, the effects on the environment are considered less than minor. A modern home effluent treatment system that is installed and maintained in accordance with the instructions of the manufacturer, dispersing to the recommended field at the specified loading rate, will produce no significant smell, noise or hazard to the locale.

The recommendations enclosed are for subdivision consent use only. We recommend that a site specific wastewater design is undertaken for each Lot once development layouts are known and floor plans have been prepared.

9. LIMITATIONS

The report was prepared in the context defined in Section 1 above and must not be relied upon by any other party other than that for whom it was prepared and the relevant Territorial Authority. It has been compiled with respect to the brief given to us, and must not be relied upon in any other context or recreated for any other purpose.



POTENTIAL BUILDING PLATFORM
AREA AND LOT BOUNDARIES AS
INDICATED ON PLANS PROVIDED BY
LANDS & SURVEY

OVERLAND FLOWPATH

VEDON-KAWAKAWA ROAD

RL4.4m LINE FROM
GREENWOOD ASSOCIATES PLAN

AH8

AH7

AH5

AH3

AH4

AH1

GPT12

HAND AUGER LOG

Job No.: 190051

Client: KGA Geotechnical Group Ltd
Project: 272-278 Clevedon-Kawakawa Road, Clevedon
Location: See Site Plan
Coordinates: ,

Hole No.: AH1
Date: 15/02/2019
Logged By: SR
Sheet: 1 of 1

Ground Level: -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa)		Scala Penetrometer (blows / 50mm)			
						(refer notes for details)	Values	Depth (m)	Blows		
		Topsoil. [TOPSOIL]		TOP SOIL				5.05	1		
0.5		SILT with some clay. Orange mottled light grey, very stiff to hard, dry, low plasticity. [ALLUVIUM] Clayey SILT. Orange mottled light grey, very stiff to hard, dry, moderately plastic. [ALLUVIUM]		TAURANGA GROUP ALLUVIUM (Pleistocene deposits)			198+	5.10	1		
										5.15	1
										5.20	1
										5.25	1
										5.30	1
										5.35	1
										5.40	1
1.0		Silty CLAY. Orange mottled light grey, very stiff to hard, dry to moist, highly plastic. At 1m; Becomes very stiff, moist and light grey mottled orange. [ALLUVIUM]							139	5.45	1
									57	5.50	2
										5.55	1
										5.60	2
										5.65	1
1.5		1.6m: Moist to wet.							124	5.70	2
									59	5.75	2
										5.80	2
										5.85	1
										5.90	2
2.0		1.9m: Becomes orange and light grey.							141	5.95	2
		CLAY with some Silt. Orange mottled light grey, very stiff, moist to wet, highly plastic. [ALLUVIUM]							74	6.00	2
								6.05	2		
								6.10	3		
2.5		Silty CLAY. Light grey mottled orange, stiff, moist to wet, highly plastic. [ALLUVIUM]					99	6.15	2		
							48	6.20	3		
								6.25	2		
								6.30	2		
								6.35	2		
3.0		3m: Becomes wet, very stiff with occasional organics (<2mm).					127	6.40	3		
							48	6.45	2		
								6.50	2		
								6.55	2		
								6.60	2		
3.5		Clayey SILT with minor fine sand. Orange mottled light grey and dark orange, stiff, wet, moderately plastic. [ALLUVIUM]					99	6.65	2.5		
							42	6.70	2.5		
								6.75	2.5		
								6.80	2.5		
4.0		Silty CLAY with some fine to medium sand. Orange mottled light grey and dark orange, very stiff, wet, highly plastic. [ALLUVIUM]					116	6.85	2.5		
							57	6.90	2.5		
4.5							127				
							45				
5.0		5m: End of Borehole					62				
							20				

Notes & Abbreviations

Soils logged in accordance with 'The guidelines for the classification and description of soil and rock for engineering purposes' December 2005, NZGS

SOIL DYNE LTD
AUCKLAND



Water	Shear Vane	Other Comments
▼ Standing Water Level ▽ Water Level At Time Of Drilling	Corrected as per NZGS Guidelines Vane No.:GEO1596 is 1,414 UTP = Unable To Penetrate + = Peak Exceeded - = No Result	Flat, Field. Hole data is for a set location only.

M: 027 368 8832

E: soil.dyne@yahoo.com



Produced with Core-GS

HAND AUGER LOG

Job No.: 190051

Client: KGA Geotechnical Group Ltd
Project: 272-278 Clevedon-Kawakawa Road, Clevedon
Location: See Site Plan
Coordinates: ,

Hole No.: AH2
Date: 15/02/2019
Logged By: SR
Sheet: 1 of 1

Ground Level: -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa)		Scala Penetrometer (blows / 50mm)						
						50	100	150	200	Values	Depth (m)	Blows		
		Topsoil. [TOPSOIL]		TOP SOI						3.05	1			
0.5		Clayey SILT. Orange, very stiff, dry, low to moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]		TAURANGA GROUP ALLUVIUM (Pleistocene deposits)						3.10	1			
		Silty CLAY. Orange mottled light grey, very stiff, dry to moist, moderate to highly plastic. [WAIPAPA GROUP / COLLUVIUM ?]										3.15	1	
		0.9m: Becomes moist.										3.20	1	
											141	3.25	1	
											28	3.30	1	
												3.35	0.5	
												3.40	0.5	
												3.45	1	
											184	3.50	2	
											62	3.55	1	
												3.60	2	
		Clayey SILT. Orange mottled light grey, very stiff, moist, moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]										3.65	2	
		SILT with minor to trace of clay. Light brown, mottled orange and light grey, very stiff, dry to moist, very low plasticity.										UTP	3.70	2
		At 1.5m; With a trace of clay, hard and orange mottled light brown, dark orange and light grey. At 1.6m; With Clasts (<4mm<30%). At 1.7m; With some clay. [WAIPAPA GROUP / COLLUVIUM ?]										-	3.75	2
													3.80	3
											3.85	2		
											3.90	3		
											3.95	2		
											4.00	3		
											4.05	1.5		
											4.10	1.5		
											4.15	1.5		
											4.20	1.5		
											4.25	2		
											4.30	2		
											4.35	2		
											4.40	3		
									Scaled		4.45	6		
											4.50	6		
											4.55	7		
											4.60	6		
											4.65	4		
											4.70	4		
											4.75	4		
											4.80	4		
											4.85	5		
											4.90	5		
											4.95	5		
											5.00	5		
											5.05	5		
											5.10	6		
											5.15	5		
											5.20	6		
											5.25	5		
											5.30	6		
											5.35	6		
											5.40	7		
											5.45	7		

Notes & Abbreviations

Soils logged in accordance with 'The guidelines for the classification and description of soil and rock for engineering purposes' December 2005, NZGS

Water
 ▼ Standing Water Level
 ▽ Water Level At Time Of Drilling

Shear Vane
 Corrected as per NZGS Guidelines
 Vane No.:GEO1596 is 1,414
 UTP = Unable To Penetrate
 + = Peak Exceeded
 - = No Result

Other Comments
 Near Level, Field. Hole data is for a set location only.

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HAND AUGER LOG

Job No.: 190051

Client: KGA Geotechnical Group Ltd
 Project: 272-278 Clevedon-Kawakawa Road, Clevedon
 Location: See Site Plan
 Coordinates: ,

Hole No.: AH3
 Date: 14/02/2019
 Logged By: SR
 Sheet: 1 of 1

Ground Level: -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa)					Scala Penetrometer (blows / 50mm)			
						50	100	150	200	Values	Depth (m)	Blows		
		Topsoil. [TOPSOIL]		TOPSOIL							3.55	0.5		
0.5		Clayey SILT. Grey mottled orange with brown staining, very stiff, dry, moderately plastic. [ALLUVIUM]		TAURANGA GROUP ALLUVIUM (Holocene deposits)						141	3.60	0.5		
		Silty CLAY. Orange and light grey, very stiff, dry to moist, highly plastic. At 0.6m; Moist. [ALLUVIUM]									34	3.65	0.5	
1.0		1m: Becomes stiff with occasional plant fibers.										99	3.70	0.5
		1.2m: Moist to wet.										45	3.75	0.5
1.5		1.5m: Wet.											3.80	0.5
		1.7m: Becomes grey.											3.85	0.5
2.0		Organic Silty CLAY. Dark brown, stiff, wet, moderate to highly plastic. At 2m; Firm. [ALLUVIUM]											3.90	0.5
		Clayey SILT. Grey, firm, wet to saturated, moderately plastic. [ALLUVIUM]											3.95	0.5
2.5		2.5m: Becomes stiff with poor recovery and some contamination from above.											4.00	0.5
		3m: Fully saturated.											4.05	0.5
3.0		3.5m: End of Borehole, high suction											4.10	0.5
													4.15	1
													4.20	1
													4.25	1
													4.30	2
													4.35	1
													4.40	1
													4.45	1
													4.50	1
											4.55	1		
											4.60	2		
											4.65	1		
											4.70	2		
											4.75	1		
											4.80	1		
											4.85	1		
											4.90	1		
											4.95	1		
											5.00	2		
											5.05	1		
											5.10	2		
											5.15	2		
											5.20	2		
											5.25	2		
											5.30	2		
											5.35	2		
											5.40	2		
											5.45	1		
											5.50	2		
											5.55	2		
											5.60	2		
											5.65	2		
											5.70	2		
											5.75	1		
											5.80	2		
											5.85	2		
											5.90	2		
											5.95	2		

Notes & Abbreviations

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Water	Shear Vane	Other Comments
▼ Standing Water Level ▽ Water Level At Time Of Drilling	Corrected as per NZGS Guidelines Vane No.:GEO1596 is 1,414 UTP = Unable To Penetrate + = Peak Exceeded - = No Result	Flat, Field. Hole data is for a set location only.

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 AUCKLAND

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HAND AUGER LOG

Job No.: 190051

Client: KGA Geotechnical Group Ltd
Project: 272-278 Clevedon-Kawakawa Road, Clevedon
Location: See Site Plan
Coordinates: ,

Hole No.: AH4
Date: 18/02/2019
Logged By: SR
Sheet: 1 of 1

Ground Level: -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa)		Scala Penetrometer (blows / 50mm)		
						(refer notes for details)	Values	Depth (m)	Blows	
		Topsoil. [TOPSOIL]		TOP SOIL				3.90	1	
		SILT with minor clay. Orange, very stiff to hard, low plasticity. [WAIPAPA GROUP / COLLUVIUM ?]		TAURANGA GROUP ALLUVIUM (Pleistocene deposits)				3.95	1	
		Clayey SILT. Orange mottled light grey, very stiff to hard, dry, low to moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]							4.00	1
0.5		Silty CLAY. Orange mottled light grey, very stiff, dry to moist, moderate to highly plastic. [WAIPAPA GROUP / COLLUVIUM ?] 0.9m: Becomes moist and highly plastic.						198+	4.05	1
		1.2m: Moderate to highly plastic.							4.10	1
		Clayey SILT. Light grey mottled orange, very stiff, moist, moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]							4.15	1
		Silty CLAY. Orange mottled light grey, very stiff, moist, highly plastic. At 1.8m: Moist to wet. [WAIPAPA GROUP / COLLUVIUM ?]							4.20	1
1.0								170	4.25	1
								71	4.30	1
									4.35	1
									4.40	1
									4.45	1
									4.50	1
								116	4.55	1
1.5								57	4.60	1
									4.65	2
									4.70	1
									4.75	1
									4.80	1
2.0								102	4.85	1
								45	4.90	2
							4.95	2		
							5.00	2		
							5.05	3		
2.5						158	5.10	2		
						71	5.15	2		
							5.20	2		
							5.25	2		
							5.30	2		
3.0						156	5.35	3		
						28	5.40	2		
							5.45	3		
							5.50	2		
							5.55	3		
3.5						99	5.60	2.5		
						42	5.65	2.5		
							5.70	2.5		
							5.75	2.5		
4.0						54	5.80	2.5		
							5.85	2.5		
							5.90	3		
							5.95	3		
							6.00	3		
							6.05	3		
4.5							6.10	3		
							6.15	3		
							6.20	3		
							6.25	3		
							6.30	3		
5.0		3.85m: End of Borehole, high suction								

Notes & Abbreviations

Soils logged in accordance with 'The guidelines for the classification and description of soil and rock for engineering purposes' December 2005, NZGS

Water	Shear Vane	Other Comments
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HAND AUGER LOG

Job No.: 190051

Client: KGA Geotechnical Group Ltd
Project: 272-278 Clevedon-Kawakawa Road, Clevedon
Location: See Site Plan
Coordinates: ,

Hole No.: AH5
Date: 14/02/2019
Logged By: SR
Sheet: 1 of 1

Ground Level: -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa)				Scala Penetrometer (blows / 50mm)				
						50	100	150	200	Values	Depth (m)	Blows		
0.0		Topsoil. [TOPSOIL]		TOPSOIL							3.60	5		
0.5		Clayey SILT. Orange mottled light grey, hard, dry, low to moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]		TAURANGA GROUP ALLUVIUM (Pleistocene deposits)						UTP	3.65	4		
		Silty CLAY. Orange mottled light grey, hard, moist, highly plastic. [WAIPAPA GROUP / COLLUVIUM ?]										-	3.70	4
		1m: Very stiff.											3.75	4
		1.2m: Moist to wet.											3.80	5
		1.5m: Stiff.											3.85	6
		Clayey SILT with minor fine sand. Light grey mottled orange, stiff, moist to wet, moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]											3.90	4
		SILT with Clasts (<3mm<25%), some fine sand and minor clay. Orange, light grey and dark orange, stiff, moist to wet, low plasticity. At 2m; Hard. At 2.2m; With some clasts (<4mm). [WAIPAPA GROUP / COLLUVIUM ?]											3.95	5
		2.4m: With some clay and wet.											4.00	3
		Fine to medium, medium dense to dense Sandy SILT with clasts (<4mm) and minor clay. Orange mottled light grey and dark orange, wet, low plasticity. [WAIPAPA GROUP / COLLUVIUM ?]											141	4
		Silty (Fine to medium, medium dense to dense) SAND with Clasts (<5mm<30%) and minor to trace of clay. Orangey brown, wet, very low plasticity. [WAIPAPA GROUP / COLLUVIUM ?]											57	3
		3.55m: End of Borehole, unable to penetrate									4.10	3		
											4.15	4		
											4.20	4		
											99	5		
											31	7		
											4.30	7		
											4.35	6		
											4.40	8		
											4.45	9		
											4.50	4		
											UTP	4.55	4	
											-	4.60	5	
											-	4.65	4	
											-	4.70	7	
											-	4.75	10	
											-	4.80	11	
											-	4.85	11	
											-	4.90	11	
											-	4.95	14	
											-	5.00	14	

Notes & Abbreviations

Soils logged in accordance with 'The guidelines for the classification and description of soil and rock for engineering purposes' December 2005, NZGS

Water	Shear Vane	Other Comments
▼ Standing Water Level ▽ Water Level At Time Of Drilling	Corrected as per NZGS Guidelines Vane No.:GEO1596 is 1,414 UTP = Unable To Penetrate + = Peak Exceeded - = No Result	Flat, Field. Hole data is for a set location only.

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HAND AUGER LOG

Job No.: 190051

Client: KGA Geotechnical Group Ltd
Project: 272-278 Clevedon-Kawakawa Road, Clevedon
Location: See Site Plan
Coordinates: ,

Hole No.: AH6
Date: 14/02/2019
Logged By: SR
Sheet: 1 of 1

Ground Level: -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa)		Scala Penetrometer (blows / 50mm)			
						50	100	150	200	Values	Depth (m)
		Topsoil. [TOPSOIL]		TOP SOIL						2.05	1
		Clayey SILT. Grey mottled orange and brown, very stiff, dry, low to moderately plastic. At 0.4m; Becomes moderately plastic, dry to moist and light grey mottled orange. [ALLUVIUM]		TAURANGA GROUP ALLUVIUM (Holocene deposits)						2.10	2
0.5											144
		Silty CLAY. Orange and grey with brown staining, very stiff, moist, highly plastic. [ALLUVIUM] 0.9m: With some clasts (<3mm), moist to wet with occasional organics (<3mm). At 1m; Extra sensitive.		TAURANGA GROUP ALLUVIUM (Holocene deposits)						2.20	2
											31
		Fine to medium, loose Sandy SILT with Clasts (<5mm), Gravels (<20mm) and some clay. Grey mottled orange and brown, wet, low plasticity. At 1.5m; With GRAVELS (30-40%) and light grey mottled orange. [ALLUVIUM]		TAURANGA GROUP ALLUVIUM (Holocene deposits)						2.30	3
											113
		Medium dense to dense CLASTS (<5mm), GRAVELS (<20mm), Silt, fine to medium Sand and a trace of clay. Light grey and orange, wet to saturated, no plasticity. [ALLUVIUM]		TAURANGA GROUP ALLUVIUM (Holocene deposits)						2.40	4
											14
		Silty CLAY. Bluish grey, hard, moist to wet, highly plastic. [ALLUVIUM]		TAURANGA GROUP ALLUVIUM (Holocene deposits)						2.50	5
											14
		2m: End of Borehole, high suction / granular material from above prevents extraction		TAURANGA GROUP ALLUVIUM (Holocene deposits)						2.60	7
											UTP
										2.70	7
										2.75	7
										2.80	8
										2.85	9
										2.90	9
										2.95	10
										3.00	10
										3.05	11
										3.10	11
										3.15	12
										3.20	11

Notes & Abbreviations

Soils logged in accordance with 'The guidelines for the classification and description of soil and rock for engineering purposes' December 2005, NZGS

Water
 ▼ Standing Water Level
 ▽ Water Level At Time Of Drilling

Shear Vane
 Corrected as per NZGS Guidelines
 Vane No.: GEO1596 is 1,414
 UTP = Unable To Penetrate
 + = Peak Exceeded
 - = No Result

Other Comments
 Near Level, Field. Hole data is for a set location only.

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HAND AUGER LOG

Job No.: 190051

Client: KGA Geotechnical Group Ltd
Project: 272-278 Clevedon-Kawakawa Road, Clevedon
Location: See Site Plan
Coordinates: ,

Hole No.: AH7
Date: 14/02/2019
Logged By: SR
Sheet: 1 of 1

Ground Level: -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa)		Scala Penetrometer (blows / 50mm)					
						50	100	150	200	Values	Depth (m)	Blows	
		Topsoil. [TOPSOIL]		TOP SOIL						2.65	5		
		SILT with some clay. Orange mottled brown, very stiff to hard, dry, low plasticity. [WAIPAPA GROUP / COLLUVIUM ?]		TAURANGA GROUP ALLUVIUM (Pleistocene deposits)						2.70	6		
0.5		Clayey SILT. Orange mottled light grey, very stiff to hard, dry, low to moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?] 0.7m: Moderately plastic.								198+		2.75	4
		0.9m: Becomes moist. 1m: Becomes hard.								-		2.80	4
		SILT with some clay, some clasts (<3mm) and some fine sand. Orange mottled light grey, hard, moist, low plasticity. At 1.3m; With minor clay.										2.85	4
		At 1.5m; With Clasts (<4mm<25%), minor to trace of clay and orange mottled brown, black, light grey and dark orange. [WAIPAPA GROUP / COLLUVIUM ?]										2.90	4
		Fine to medium, medium dense Sandy SILT with Clasts (<3mm) and minor to trace of clay. Dark orange mottled orange, moist to wet, very low plasticity. At 1.9m; Wet. [WAIPAPA GROUP / COLLUVIUM ?]										2.95	5
		Silty (Fine to medium, medium dense to dense) SAND with Clasts (<4mm) and a trace of clay. Light brown, orangey brown, orange and dark orange, wet, no plasticity.										3.00	6
		At 2.4m; With Clasts (<5mm). [WAIPAPA GROUP / COLLUVIUM ?]										3.05	4
		SILT with some fine sand, some clasts (<5mm) and a trace of clay. Orangey brown mottled orange and brown, hard, moist to wet, no plasticity. [WAIPAPA GROUP / COLLUVIUM ?]										3.10	5
		2.6m: End of Borehole, unable to penetrate										3.15	4
										3.20	4		
										3.25	2		
										3.30	2		
										3.35	3		
										3.40	4		
										3.45	6		
										3.50	6		
										3.55	7		
										3.60	8		
										3.65	7		
										3.70	8		
										3.75	7		
										3.80	8		
										3.85	4		
										3.90	4		
										3.95	6		
										4.00	7		
										4.05	6		
										4.10	7		
										4.15	4		
										4.20	4		
										4.25	4		
										4.30	5		
										4.35	5		
										4.40	6		
										4.45	7		
										4.50	8		
										4.55	6		
										4.60	7		

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HAND AUGER LOG

Job No.: 190051

Client: KGA Geotechnical Group Ltd
Project: 272-278 Clevedon-Kawakawa Road, Clevedon
Location: See Site Plan
Coordinates: ,

Hole No.: AH8
Date: 14/02/2019
Logged By: SR
Sheet: 1 of 1

Ground Level: -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa)				Scala Penetrometer (blows / 50mm)				
						50	100	150	200	Values	Depth (m)	Blows		
		Topsoil. [TOPSOIL]		TOP SOIL							5.05	1		
		SILT some clay. Orange mottled grey, very stiff, dry, low plasticity. [ALLUVIUM]		TAURANGA GROUP ALLUVIUM (Holocene deposits)							5.10	1		
		Clayey SILT. Light grey mottled orange, very stiff, dry to moist, moderately plastic. [ALLUVIUM]											5.15	0.5
0.5		Silty CLAY. Orange mottled light grey and dark orange, very stiff, moist, highly plastic. At 0.8m; Becomes grey mottled orange. At 0.9m; With a trace of fine sand and moist to wet.									170		5.20	0.5
		At 1m; Becomes stiff and light grey mottled orange. [ALLUVIUM]									42		5.25	0.5
		SILT with loose CLASTS (<4mm) and some fine sand and minor clay. Light grey mottled orange, wet, low plasticity. [ALLUVIUM]	14/02/2019										5.30	0.5
		At 2m; Stiff. [ALLUVIUM]											5.35	1
		Clayey SILT. Orange mottled light grey, stiff, wet, moderately plastic. [ALLUVIUM]											5.40	2
1.0		Silty CLAY. Light grey mottled orange, stiff, wet, highly plastic. [ALLUVIUM]									82		5.45	2
		At 1.8m; With some clasts (<4mm) and orange mottled light grey and dark grey plus wet.									40		5.50	2
		At 2m; Stiff. [ALLUVIUM]											5.55	1
		Clayey SILT. Orange mottled light grey, stiff, wet, moderately plastic. [ALLUVIUM]	19/02/2019										5.60	2
		Silty CLAY. Light grey mottled orange, stiff, wet, highly plastic. [ALLUVIUM]											5.65	2
		At 2m; Stiff. [ALLUVIUM]											5.70	2
		Clayey SILT. Light grey and orange, stiff, saturated, moderately plastic. Poor recovery. [ALLUVIUM]											5.75	3
		3.5m: Very poor recovery, difficult Id, firm and pushing down.											5.80	4
		4.4m: No recovery with no Id.											5.85	4
		5m: End of Borehole											5.90	5
											5.95	8		
											6.00	9		
											6.05	8		
											6.10	7		
											6.15	4		
											6.20	4		
											6.25	7		
											6.30	8		
											6.35	10		
											6.40	10		
											6.45	8		
											6.50	9		
											6.55	10		
											6.60	10		
											6.65	9		
											6.70	10		
											6.75	9		
											6.80	5		
											6.85	5		
											6.90	8		
											42	11		

Notes & Abbreviations

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Water
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