GWE
CONSULTING ENGINEERS

ONSITE WASTEWATER TREATMENT AND DISPOSAL SUBDIVISION REPORT

787 Kaipara Coast Highway
Kaukapakapa

RIVERVIEW PROPERTIES LTD
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1 INTRODUCTION

This assessment report was prepared by GWE Consulting Ltd (GWE) for Riverview Properties Ltd as our client in accordance with our letter of engagement dated 14 May 2021.

This is Stage 2 of the Riverview Development to subdivide the property at 787 Kaipara Coast Highway into 16 residential Lots. This report provides a general assessment of each residential lot to determine the suitability for onsite wastewater treatment and disposal. This assessment provides support to the application for subdivision consent.

The recommendations in this report are based on the information received from the client and the assessment is in accordance with Auckland Regional Council Technical Publication No. 58: On-site Wastewater Systems: Design and Management Manual (TP58) 2004.

2 PROPERTY/SITE DETAILS

The subject site is located at 787 Kaipara Coast Highway and is legally described as

- Lot 1 DP 523159 with a gross lot area of 13,417 m^2.
- Lot 2 DP 523159 with a gross lot area of 30,287 m^2.

The large rural property is irregular in shape. Access to the site is provided directly from State Highway 16. The properties directly to the north are large residential lots developed as part of Stage 1 of the Riverview development, while to the east of the development there are existing residential houses. State Highway 16 borders the southern boundary and there is predominantly farmland south of this.

The property contains an existing dwelling located on Lot 6. Wastewater from the dwelling is treated to a secondary standard and discharged to land using. Lot 3 contains a number of farm buildings. There is no wastewater discharge from this lot.

Figure 1: Site Location Plan – 787 Kaipara Coast Highway, Kaukapakapa

3 PROPOSAL

GWE has been provided with a scheme plan prepared by C & R Surveyors Ltd titled '*Lots 1 to 18 Being Proposed Subdivision of Lots 1 and 2 DP 523159*' dated 11 May 2021. The draft plan indicates that Lot 6 is an existing dwelling, Lot 3 contains farm buildings and Lots 17 and 18 are the right of way providing common access. The proposed lot sizes are summarised in Table 1 below.

Table 1: Summary of Gross Lot Sizes

RESIDENTIAL LOT	GROSS AREA
Lot 1	2,505 m^2
Lot 2	2,670 m^2
Lot 3 (existing farm buildings)	2,824 m^2
Lot 4	2,500 m^2
Lot 5	2,586 m^2
Lot 6 (existing dwelling)	2,501 m^2
Lot 7	2,500 m^2
Lot 8	2,500 m^2
Lot 9	2,558 m^2
Lot 10	2,500 m^2
Lot 11	2,696 m^2

RESIDENTIAL LOT	GROSS AREA
Lot 12	2,505 m^2
Lot 13	2,504 m^2
Lot 14	2,515 m^2
Lot 15	2,502 m^2
Lot 16	2,504 m^2
Lot 17 (common access lot)	2,504 m^2
Lot 18 (common access lot)	332 m^2

GWE has not been provided with indicative architectural plans indicating the location and construction nature of future residential dwellings to be constructed on the proposed lots following subdivision.

The property is located outside of the Auckland area serviced by the Watercare Services Ltd. wastewater collection network. As such the wastewater from each lot will need to be treated and disposed of appropriately on site. Water supply to each lot will be provided by roof water supply.

For the purpose of the wastewater design, we have allowed for a 5-bedroom dwelling on each of the bare residential lots. Based on Table 6.1 and 6.2 of TP58 a total occupancy allowance of 8 people and a flow allowance of 180 litres/person/day (based on roof water supply and standard water fixtures) is proposed. Wastewater generated per Lot is anticipated to be a peak flow of up to 1,440 litres/day.

For Lot 6 the existing dwelling will be maintained in place and the treatment system on Lot 6 will be retained. This will be assessed as a 3-bedroom dwelling with a per capita flow allowance of 180 litres/day for a total daily discharge of 900 litres/day. We have assumed that for Lot 3 the farm buildings can be removed and a dwelling placed on the lot.

It is important to note that specific investigation and design of onsite wastewater for any future development on each Lot will be required at Building Consent stage, once final development (architectural) plans are available for each dwelling.

4 SITE ASSESSMENT

A site investigation was undertaken at the site on 02 June 2021 and 11 June by a GWE Engineer. The site inspection and recorded site evaluation information was prepared in accordance with the Site Evaluation Investigation Checklist (Appendix E, TP58).

The site is largely flat, with the western third sloping west at approximately 3 to 4 degrees. It is covered in pasture, with only proposed Lots 3 and 6 containing any buildings.

Council GIS shows indicative overland flowpaths across the site. Following the site visit it was clear that these were not there. However, an overland flowpath had been formed along the western boundary and this is shown on the site plan in Appendix B. The nearest other overland flowpaths are roadside drains.

4.1 Subsoil Investigation

A detailed subsoil assessment was undertaken to determine soils underlying the proposed/potential land disposal areas for proposed Lots 1-5 and 7 to 16. Hand augered boreholes (AH1–AH25) were completed to 1.2 mbgl.

A summary description of soils encountered in the boreholes (AH1–AH25), including relevant soil structure, textural features and horizontal depths are summarised below with borelogs appended in APPENDIX A. No percolation testing was undertaken.

Table 2: Soil Descriptions

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
AH-1			
0-0.15 m	Dark Brown TOPSOIL with minor grey clay, moist. Inferred fill	Medium slow drainage	5/6
0.15-0.5 m	Medium dark brown silty CLAY, mottled red and grey, moist, high stiffness, medium plasticity. Inferred fill.	Slow drainage	6
0.5–1.2 m	Medium brown/tan/grey CLAY, moist, high stiffness, medium/high plasticity. Increasing grey colour with depth, becoming tan/orange/grey at 800mmm depth	Slow drainage	6
1.2 m	Target depth. No groundwater encountered		
AH-2			
0-0.15 m	Dark brown moist TOPSOIL, minor gravels and clay, rootlets	Medium drainage	5
0.15-0.4 m	Medium brown/orang/tan moist-wet silty CLAY, high stiffness, medium/high plasticity. Inferred fill.	Slow drainage	6
0.4-1.2m	Orange-tan/grey CLAY, moist, high stiffness, high plasticity. Increasing grey with depth	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-3			
0-0.1m	TOPSOIL, dark brown, moist/wet mixed with clay. Inferred fill	Medium slow drainage	5/6
0.1-0.3 m	Medium brown silty CLAY with topsoil, moist, medium stiffness, high plasticity.	Slow drainage	6
0.3-1.2m	Orange-tan/grey CLAY, high stiffness, medium/high plasticity, moist. Increasing grey with depth, moist wet at 1,100mm.	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-4			
0-0.05 m	Dark brown moist/wet TOPSOIL with clay. Inferred fill.	Medium slow drainage	6
0.5-1.2 m	Orange-tan/grey CLAY, high stiffness, high plasticity, moist. Red/orange mottling at 500mm onwards. Moist/wet at 1,000mm	Slow drainage	6
1.2 m	Target depth. No groundwater encountered		

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
AH-5			
0-0.05m	Dark brown moist wet TOPSOIL mixed with grey/white clay. Inferred fill.	Medium slow drainage	5/6
0.05-0.3 m	Medium brown moist-wet silty CLAY, medium stiffness, high plasticity. Inferred fill.	Slow drainage	6
0.3-1.2m	Grey/orange-tan CLAY with rusty mottling, high stiffness, high plasticity, moist-wet.	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-6			
0-0.1 m	Dark brown moist/wet TOPSOIL with orange/brown silty clay	Medium slow drainage	5/6
0.1-0.4 m	Tan/grey silty CLAY with red mottling, minor topsoil, moist/wet, medium stiffness, medium plasticity.	Slow drainage	6
0.4-0.8 m	Medium brown/tan silty CLAY with minor gravels, minor white streaks, high stiffness, medium plasticity, moist.	Slow drainage	6
0.8-1.2 m	Medium brown/tan/grey with red/orange mottling, silty CLAY, moist, high stiffness, medium plasticity, increasingly brown with depth.	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-7			
0-0.2 m	Dark brown TOPSOIL, mottled orange, moist/wet. Inferred fill	Medium slow drainage	5/6
0.2-0.8 m	Tan/orange/medium brown silty CLAY mixed with topsoil, low-medium stiffness, medium plasticity, moist/wet. Inferred fill.	Slow drainage	5/6
0.8-1.2 m	Orange/tan-grey CLAY, high stiffness, moderate plasticity, minor red mottling, moist.	Slow drainage	6
1.2 m	Terminated. Groundwater encountered		
AH-8			
0-0.2 m	Dark brown wet TOPSOIL with bark, mottled orange clay. Inferred fill.	Medium slow drainage	5/6
0.2-0.6 m	Dark brown clayey SILT, friable, medium plasticity, low-medium stiffness, minor white patches, moist. Inferred fill	Medium slow drainage	5/6
0.6-1.2 m	Orange brown clayey SILT, moist, medium plasticity, friable, low-medium stiffness.	Medium slow drainage	5/6
1.20 m	Target depth. No groundwater encountered		
AH-9			
0-0.2 m	Dark brown moist TOPSOIL	Medium good drainage	4/5
0.2-0.7 m	Light-m to medium brown/orange silty CLAY, medium plasticity, moist	Moderate to slow drainage	5/6

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
0.7-1.2 m	Light brown./grey silty CLAY, trace sand, high stiffness, medium high plasticity, moist.	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-10			
0-1.0 m	TOPSOIL, top 50mm moist, mixed with clayey silt, friable, tan/light brown, getting drier. Bark till 200mm with rootlets till 400mm and angular gravels (5-10mm) 700mm onwards	Medium slow drainage	5/6
1.0 m	Terminated. No groundwater encountered		
AH-11			
0-0.3 m	Dark brown TOPSOIL, moist	Medium drainage	4/5
0.3-0.8 m	Light – medium brown silty CLAY, orange mottling at 600mm, low/medium stiffness, medium plasticity	Moderate to slow drainage	5/6
0.8-1.2 m	Orange/brown clayey SILT, friable, low-medium stiffness, low plasticity	Moderate to slow drainage	5/6
1.20 m	Target depth. No groundwater encountered		
AH-12			
0-0.2 m	Medium-dark brown TOPSOIL, moist	Medium drainage	4/5
0.2-0.6 m	Light brown/tan silty CLAY, moist, low-medium plasticity, medium stiffness.	Moderate to slow drainage	5/6
0.6-1.2 m	Tan silty CLAY, moist, medium stiffness, ow-medium plasticity.	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-13			
0-0.2 m	Dark brown moist TOPSOIL	Medium drainage	4/5
0.2-0.7 m	Medium brown with orange streaks, silty CLAY, medium-high stiffness, medium plasticity, moist	Moderate to slow drainage	5/6
0.7-1.2 m	Tan/orange/grey silty CLAY, medium-high stiffness, medium-high plasticity, moist. Increasingly grey with depth	Slow drainage	6
1.2 m	Terminated. Groundwater encountered		
AH-14			
0-1.2 m	Topsoil and silty clay, friable, dry – moist, very inconsistent, rootlets till 300mm, intermittent bark, patches of silt, minor aggregate throughout. Fill.	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-15			
0-1.2 m	Silty clay, dry, mottled orange, minor topsoil, medium-dark brown, friable, rootlets till 300-	Slow drainage	6

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
	400mm. Minor aggregate from 500mm, inconsistent throughout. Fill.		
1.20 m	Target depth. No groundwater encountered		
AH-16			
0-0.7 m	Clayey SILT, light brown, mottled orange/blue, minor topsoil, friable, some angular aggregate, dry, rootlets till 200mm. Fill.	Medium drainage	5
0.7-1.2 m	Dark blue/black and yellow/tan/brown silty clay, medium stiffness, some topsoil, mottled grey/orange, minor angular aggregates, medium-high stiffness, low-medium moist. Fill.	Moderate to slow drainage	5/6
1.2 m	Target depth. No groundwater encountered		
AH-17			
0-0.6 m	Silty clay, mottled orange/grey, medium-dark brown, dry, friable, minor angular aggregates. Fill.	Slow drainage	6
0.6-1.2 m	Silty clay, orange brown mixed with medium brown, mottles orange, minor aggregates, medium-high stiffness, medium-high plasticity, becoming wet at 1,200mm. Fill.	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-18			
0-0.5 m	Silty clay, dark brown with orange mottling, moist, friable, minor topsoil, minor aggregates.	Slow drainage	6
0.5-1.20 m	Silty clay, yellow/tan mixed with orange brown, mottled, medium-high stiffness, white patches, moist, minor aggregates, low-medium plasticity.	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-19			
0-0.7 m	Silty clay, orange/tan and light brown, dry, friable, minor topsoil and aggregates, mottled orange and grey. Some white/dark blue clay (medium stiffness and plasticity). Fill	Slow drainage	6
0.7-1.2 m	Silty clay, tan/light brown/orange, moist, plastic, medium stiffness, mottled orange, minor topsoil. Fill.	Slow drainage	6
1.2 m	Target depth. No groundwater encountered		
AH-20			
0-0.2 m	Dark brown TOPSOIL, moist	Medium drainage	4/5
0.2-0.6 m	Silty CLAY with minor angular aggregates (<5mm) mixed with topsoil, mottled orange, trace sand, moist	Moderate to slow drainage	5/6

HORIZON	DESCRIPTION	DRAINAGE	CATEGORY
0.6-1.2 m	Silty CLAY, brown/orange-tan, medium-high stiffness, medium plasticity, moist	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-21			
0-0.25 m	Dark Brown moist TOPSOIL	Medium drainage	4/5
0.25-0.7 m	Light brown/grey moist silty CLAY, friable, low-medium stiffness, low-medium plasticity, minor orange streaks.	Moderate to slow drainage	5/6
0.7-1.2 m	Light brown/tan/orange silty CLAY, medium-high stiffness, mottled orange at 900mm onwards, becoming grey/orange/tan at 1,100 mm.	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-22			
0-0.1 m	TOPSOIL, medium brown, moist	Medium drainage	4/5
0.1-1.2 m	Orange, medium plastic silty CLAY, not moist, getting yellow/grey at 1,000 mm.	Slow drainage	6
1.2 m	Target depth. No groundwater encountered.		
AH-23			
0-0.1 m	TOPSOIL, medium brown, moist.	Medium drainage	4/5
0.1-1.2 m	Orange, medium plastic silty CLAY, not moist, getting yellow/grey at 1,000 mm.	Slow drainage	6
1.2 m	Target depth. No groundwater encountered		
AH-24			
0-0.1 m	TOPSOIL, brown, silty	Medium drainage	4/5
0.2-0.6 m	Clayey SILT, orange, friable, not sticky, crumbly, low plasticity and stiffness	Moderate to slow drainage	5
0.6-1.2 m	Orange, medium plastic silty CLAY, not moist, getting yellow/grey at 1,000 mm	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		
AH-25			
0-0.1 m	TOPSOIL, medium brown, moist	Medium drainage	4/5
0.1-1.2 m	Orange, medium plastic silty CLAY, not moist, getting yellow/grey at 1,000 mm.	Slow drainage	6
1.20 m	Target depth. No groundwater encountered		

The results of the site investigation can therefore be summarised as follows:

- Soils at the site are predominantly comprised of clay with some minor silts, with a corresponding ARC Soil Category of 6.
- Boreholes 14 – 19 were drilled on the bund along the southern boundary adjacent to State Highway 16. The bund was comprised of fill like material comprising a mixture of clays with some topsoil and gravel (as well as other material), but was not heavily compacted and has been given a rating of Soil Category 6.
- Loading rates for the wastewater disposal system design shall be based upon an ARC Category 6 soil.
- The water table was not encountered at the maximum exploratory depth of 1.2 metres below ground level (mbgl).

5 DISCHARGE DETAILS FOR LOTS 1-5 AND 7-16

5.1 Proposed Buildings/Dwelling

For the purpose of estimating wastewater generated onsite, we have allowed for a 5-bedroom dwelling on each of the lots. It should be noted that any study, office, gym or similar maybe considered to be a 'potential bedroom' by the Council.

5.2 Design Wastewater Volumes

The water supply for the 16-Lot subdivision will be sourced from roof water. We have proposed a flow allowance of 180 Litres/person/day (as per Table 6.2 of TP58) on the assumption that standard water saving fixtures will be installed. However, to promote the water conservation on each lot, we recommend full water reduction fixtures. Table 3 outlines the design considerations for the wastewater flows.

Table 3: Design Flows for Proposed Subdivision

DEVELOPMENT	16 Lot Subdivision
NO. OF PERSONS	5-bedroom dwelling: 8 persons **Total occupancy: 8 people (per lot)**
DAILY FLOW ALLOWANCE (TABLE 6.1 OF TP58)	**180 Litres/person/day**
WATER FIXTURES (TABLE 6.2 OF TP58)	Standard Fixtures include combined use of: • 11 litre flush water cisterns • Automatic washing machine and dishwasher • No garbage grinder unless other water saving devices (e.g. low flush 6/3litre toilet cisterns) are used.
DESIGN FLOW RATE	**1,440 Litres/day (per Lot)**
WATER METER	A water meter is not required.
OTHER NOTES	No grey-water reuse recycling proposed

6 DISCHARGE DETAILS FOR LOT 6

The existing dwelling on the proposed Lot 6 has been assessed as a 3-bedroom dwelling suitable for occupancy of up to 5 people. This was legally established under a building consent in 1955 and was moved to the current location in 1992. Alterations to the dwelling were made in 1994, and it retained 3 bedrooms.

The design flow volume is summarised in Table 4 below. Treatment is currently undertaken using a secondary system (Hynds Lifestyle Advanced) with pressure compensating drip irrigation (PCDI) to an area around the southern and western boundary. During the GWE Engineer's site visit it was observed that some of the disposal line had been cut and it is recommended it be re-laid.

Table 4: Design Flows for Existing Dwelling on Proposed Lot 6

DEVELOPMENT	Existing 3-bedroom dwelling
NO. OF PERSONS	3-bedroom dwelling: 5 persons **Total occupancy: 5 people (per lot)**
DAILY FLOW ALLOWANCE (TABLE 6.1 OF TP58)	**180 Litres/person/day**
WATER FIXTURES (TABLE 6.2 OF TP58)	Standard Fixtures include combined use of: • Dual flush 6/3 litre flush water cisterns • Automatic washing machine and dishwasher • No garbage grinder unless other water saving devices are used.
DESIGN FLOW RATE	**900 Litres/day**
WATER METER	A water meter is not required given the proposed flow allowance is over 145litres/day/person.
OTHER NOTES	No grey-water reuse recycling proposed

The existing dwelling will be maintained in place as will the existing wastewater treatment and disposal system.

7 WASTEWATER TREATMENT FOR LOTS 1-5 AND 7-16

Several proprietary systems are available that are considered suitable for the site conditions and will provide the necessary quality of wastewater effluent.

In Table 4, we have presented several manufacturers of on-site wastewater treatment systems that are able to treat raw wastewater to secondary quality effluent. If the disposal fields are less than 15m to any overland flowpaths, tertiary treatment will be required. All of these suppliers are based or have approved agents in the Auckland Region.

Table 5: Wastewater Treatment System Suppliers

WASTEWATER TREATMENT TECHNOLOGIES	• Innoflow Technologies Ltd • Reflections Treatment Systems • Oasis Clearwater Ltd • Hynds Lifestyle • Jet Water and Waste Ltd
TERTIARY TREATMENT	Site specific and will depend on a full site evaluation. *UV disinfection may be required to meet separation distances requirements to surface water including roadside drains.*
ESTIMATED COST	$25-30 k +GST fully installed (does not include design report costs, building consent application fees, etc.)
ALARM SYSTEM	Minimum requirement - visual and audible alarm located at plant

The type and capacity of treatment plant for each site shall be based on the level of treatment required and peak flows it can handle.

At this stage, it can be demonstrated that, at a minimum, a treatment plant providing secondary level treatment can be installed based on the proposed effluent disposal locations, given compliance to minimum separation from groundwater (minimum 0.6m) and surface water (minimum 10m). The type and capacity of the treatment plant shall be determined at the detailed design stage once architectural drawings have confirmed potential occupancy.

8 LAND DISPOSAL METHOD

It is proposed that effluent dispersal be undertaken via pressure compensating dripper (PCDI) system. Whilst there are no major design constraints with regards to the type of wastewater plant that can be installed (based on the list of system suppliers in Table 4), the location and extent of disposal area requires consideration of the following:

i. **Loading Rate:**

Based on the site investigations undertaken, the underlying soils (up to 1.2 m) are inferred to be Category 6 with poor drainage capabilities. A loading rate of 3 mm/day is proposed (Table 9.2 of TP58). Where the disposal field is proposed to be on steep slopes, a conservative loading rate (<3 mm/day) is recommended. Disposal areas for the concept site plan (Drawing No.500) is based on a conservative 3 mm/day loading rate.

ii. **Overland Flow Paths:**

Several overland flow paths are indicated to traverse the property according to the ARC geomaps. For the proposal to be considered a Permitted Activity, a minimum separation distance of 15 m (disposal field from the overland flow path/surface water) is required if the treatment plant is of secondary level and 10 m if tertiary level is installed. Separation distances less than this (minimum of 5 m) will require a discharge consent. Drawing No. 500 shows separation distance of 10m.

iii. **Disposal System:**

The PCDI driplines are proposed to be surface laid on the steep slopes (pinned to the ground with ample planting where vegetation is thin or absent) and/or laid subsurface (100-150 m below ground) on flat or gentle slopes.

iv. **Disposal Field Location:**

The disposal field is required to be setback no closer than 3.0m from the habitable dwellings, 1.5 m from property boundaries, 3.0 m from retaining walls and 15 m (minimum secondary level effluent quality) or 10m (if tertiary treatment is provided) from any overland flow paths (including roadside drains) and outside a 1 in 100 or 1 in 20 year flood plain (depending on the level of treatment). The aforementioned separation distances can be reduced, however a discharge consent will be required and likewise for disposal fields on steep slopes (greater than 20°) and areas of fill. Effluent disposal fields should not be placed on areas of fill and where possible, the entire primary disposal field for each site shall be located on undisturbed ground.

v. **Groundwater:**

A minimum separation of 0.6-1.2 m is to be maintained from groundwater (depending on the level of treatment).

vi. **Scarps:**

During the site walkover, no scarps were identified within the proposed disposal field areas.

8.1 Land Application Area for Proposed Lot 6

The land application aria is located around the western and northern boundaries, as shown drawing No. 500. There is more than 50% reserve area available in the garden and lawn at Lot 6.

Table 6: Proposed Land Disposal Design for Lot 6

TYPE LAND DISPOSAL SYSTEM	PCDI
DRIPPER LINES	Surface laid PCDI: dripper lines to be at 1.0m spacing
SOIL CATEGORY	6
LOADING RATE	3.0 mm/day
LOADING METHOD	Pump
PUMP	High water level alarm shall be installed in pump chamber with audible/visual alarm Pump Chamber Volume – system specific Emergency Storage volume – min. 24 hours storage
PRIMARY DISPOSAL AREAS	300 m^2
RESERVE DISPOSAL AREA	50% or 150 m^2
LOCATION	Refer to Drawing No.500 (Appendix B)
STORMWATER CONTROLS	All surface water/ stormwater drains shall be diverted away from the disposal fields. Discharge location of stormwater management devices shall be located downslope of all wastewater disposal fields.

SEPARATION DISTANCE	Site boundaries: >1.5m Buildings: >1.5m Groundwater: >1.2m Retaining walls:: >3.0m Bores: >20m

8.2 Land Application Area for Proposed Lots 1-5 and 7 to 16

The proposed land application areas for Lots 1-5 and 7-16 is a 3.0 mm/day loading rate based on category 6 soils. The design flow volume is 1,440 L/day based on a 5-bedroom dwelling. The indicative primary disposal field is therefore 480 m^2 with a further 240 m^2 (50%) allocated for reserve. Indicative areas available for wastewater disposal are given on Drawing No. 500. Building platforms of 400 m^2 are also indicated.

A summary of the proposed land disposal considerations is as per Table 7 below.

Table 7: Proposed Land Disposal Design for Lot 1-2, 4-5 and 7 to 16

TYPE LAND DISPOSAL SYSTEM	PCDI
DRIPPER LINES	Surface laid PCDI: dripper lines to be at 1.0m spacing Subsurface PCDI: dripper lines to be at 0.5m spacing
SOIL CATEGORY	6
LOADING RATE	3 mm/day
LOADING METHOD	Pump
PUMP	High water level alarm shall be installed in pump chamber with audible/visual alarm Pump Chamber Volume – system specific Emergency Storage volume – min. 24 hours storage
PRIMARY DISPOSAL AREAS	Lot 1-5 and 7-16: 480 m^2
RESERVE DISPOSAL AREA	240m^2 - 50%
LOCATION	Refer to Drawing No.500 (APPENDIX B)
STORMWATER CONTROLS	All surface water/ stormwater drains shall be diverted away from the disposal fields. Discharge location of stormwater management devices shall be located downslope of all wastewater disposal fields.

9 LOT SPECIFIC DESIGN

Based on the aforementioned design parameters and conservative design assumptions (reiterated below) a lot specific design can be summarised as per Table 5.

Table 8: Proposed Lot Specific Design

LOT	GROSS AREA	PEAK DESIGN FLOW LITRES/ DAY	SOIL CATEGORY	LOADING RATE	MIN. PRIMARY DISPOSAL AREA	MIN. RESERVE DISPOSAL AREA	MIN. LEVEL OF TREATMENT
1	2,505 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
2	2,670 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
3	2,824 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
4	2,500 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
5	2,586 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
6	2,501 m^2	900	6	3 mm/day	300 m^2	50%	Secondary
7	2,500 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
8	2,500 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
9	2,558 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
10	2,500 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
11	2,696 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
12	2,505 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
13	2,504 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
14	2,515 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
15	2,502 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary
16	2,504 m^2	1,440	6	3 mm/day	480 m^2	50%	Secondary

We note that development of Lot 10 is restricted due to the presence of the overland flowpath inside the western boundary. Where Drawing No. 500 shows that each of the lots have sufficient area to dispose of treated wastewater from a 5 bedroom dwelling, it is unlikely that this will be possible on Lot 10 without a resource consent and/or reducing the number of bedrooms to 3-4.

At the building consent stage (once final architectural plans are available), a specific design is required to reflect and confirm the wastewater volumes anticipated, level of treatment, the extent of the disposal fields and how the minimum separation distances can be complied with.

10 STATUTORY ASSESSMENT

In accordance with Rules E5.4 (Activity Table), E5.6.1 (General Standards for Activities) and E5.6.2.1 (Permitted Activity Standards) of the Auckland Unitary Plan Operative in Part, the following proposal to discharge domestic wastewater on each proposed residential Lot via a land disposal system, is considered a **Permitted Activity** given that the lot area (m^2) to wastewater volume (L/d) ratio (A:V) and the requirements of TP58 (2004) can be met. The concept site plan (Drawing No. 500) demonstrates how the requirements pertaining to separation distances (from surface water, boundaries and indicative building platform) are met. All the lots comply with the A:V (greater than 1.5) as outlined in Table 6.

Table 9: Area to Volume Ratio

RESIDENTIAL LOT	GROSS AREA	WASTEWATER VOLUME	A:V RATION ($L/m^2/d$)
Lot 1	2,505 m^2	1,440 L/d	1.74
Lot 2	2,670 m^2	1,440 L/d	1.85
Lot 3 (existing farm buildings)	2,824 m^2	1,440 L/d	1.96
Lot 4	2,500 m^2	1,440 L/d	1.74
Lot 5	2,586 m^2	1,440 L/d	1.80
Lot 6 (existing dwelling)	2,501 m^2	900 L/d	2.78
Lot 7	2,500 m^2	1,440 L/d	1.74
Lot 8	2,500 m^2	1,440 L/d	1.74
Lot 9	2,558 m^2	1,440 L/d	1.78
Lot 10	2,500 m^2	1,440 L/d	1.74
Lot 11	2,696 m^2	1,440 L/d	1.87
Lot 12	2,505 m^2	1,440 L/d	1.74
Lot 13	2,504 m^2	1,440 L/d	1.74
Lot 14	2,515 m^2	1,440 L/d	1.75
Lot 15	2,502 m^2	1,440 L/d	1.74
Lot 16	2,504 m^2	1,440 L/d	1.74
Lot 17 (common access lot)	2,462 m^2	-	-
Lot 18 (common access lot)	332 m^2	-	-

11 ASSESSMENT OF ENVIRONMENTAL EFFECTS

It is anticipated that the recommendations proposed will have a less than minor effect on the environment. The following general assessment applies across the 16 proposed residential lots, based on the information inferred from the site walkover, subsoil assessment and proposed design.

A review of the assessment (environmental effects) is required at the building consent stage relative to the final location of the disposal field and proposed treatment plant.

11.1 Impact on Surface Water

With reference to the site plan (Drawing No. 500), the areas proposed for primary disposal and reserve demonstrates that a minimum separation of 10 m can be achieved to any overland flowpaths, provided a tertiary level of treatment is provided. Furthermore, as a high level of treatment is proposed and disposal will be predominantly to flat land or gentle sloped covered in high evapotranspiration species, the effects on surface water is expected to be less than minor. The highly treated effluent disposed on gentle slopes within vegetated areas, will assist with the retention, breakdown and uptake of effluent and prevent effluent being washed off-site.

No natural wetlands were observed by GWE within 100 m of the development.

11.2 Impact on Groundwater

The groundwater table is a minimum of 1.2 m below ground level. Secondary effluent quality and subsequent percolation through topsoil and clay soils will ensure groundwater is not contaminated as a result of the discharge of treated effluent to the surface soil. It is also accepted that pathogen removal and significant nitrogen and phosphorus removal takes place within the topsoil.

11.3 Impact on Soils

The soils are conservatively categorised as soil category 6 with slow draining characteristics. A conservative loading rate of 3 mm/day has been proposed for the subdivision and PCDI disposal has been specified to ensure an even loading of treated effluent over the whole disposal area. The vegetated areas on the disposal field site will promote the uptake of nitrogen and phosphorus and mitigate the accumulation of these compounds in the topsoil zone.

The treated wastewater will have very low total suspended solids and BOD concentration reducing the impact on the receiving soils by reducing the level of biological breakdown of organic compounds which soils would normally expect to complete. The aerobic nature of the wastewater minimises any impact on receiving soils and can enhance the long-term acceptance rate (LTAR). Reduction in soakage capacity as a result of application of the high-level treated wastewater into the soil would not be expected to occur.

11.4 Impact on Amenity Values

Given the high level of wastewater treatment proposed, odours are not anticipated at the plant or the disposal field. Moreover, the volume of treated effluent produced is proposed to be dispersed over a large area. The treatment plants will be located a minimum of 1.5 m from all habitable buildings and the disposal fields at a minimum of 1.5 m from the lot boundaries. As such, indiscernible adverse odour effects are not anticipated. The treatment plant is not expected to result in any discernible adverse noise effects to the owners or neighbours.

11.5 Summary

Wastewater treatment and disposal for the proposed subdivision has been designed in accordance with relevant guidelines and is consistent with the Resource Management Act and the Auckland Unitary Plan Operative in Part.

For the reasons outlined above, and throughout the application, insignificant adverse environmental effects are anticipated. Groundwater, surface water, public health, and amenity are all adequately protected. Overall, the proposal to discharge domestic wastewater from the proposed lots via a land disposal system, is considered to have less than minor adverse effects that can be contained within the boundaries of the site. Ongoing maintenance and management of the proposed treatment system in accordance with the supplier's specifications will be required to ensure that no minor adverse effects arise.

12 CONCLUSIONS AND RECOMMENDATIONS

GWE consider the proposal to subdivide the existing property at 787 Kaipara Coast Highway, Kaukapakapa into 16 separate lots to be feasible based on the requirements for onsite wastewater treatment and disposal on each lot.

For the purposes of this report we have used conservative estimates for per capita flow rate from each dwelling of 180 litres/day and the land disposal rate of 3 mm/day to demonstrate that the subdivision of the section is feasible. The per capita flow rate from each dwelling may vary depending on the final design of the dwellings and the fixtures installed in the properties.

Using these conservative parameters, the disposal of effluent from a 5-bedroom main dwelling has been shown to be feasible as a **permitted activity,** compliant with E5.6.1 and E5.6.2.1 of the Auckland Unitary Plan. Detailed design will take place at the building consent phase for each of the lots.

Wastewater from the existing dwelling on Lot 6 is treated and disposed of in line with the standards set out in the Auckland Unitary Plan and TP58. It is recommended the disposal lines be replaced due to damage.

13 LIMITATIONS

This report has been prepared for the sole benefit of **Riverview Properties Ltd** as our client, and their appointed representatives, according to their instructions, for the specific objectives described herein. It is not to be relied upon or used out of context by any other party for any other objective without reference to GWE Consulting Ltd. The reliance by other parties on the information or opinions contained in the report shall, without prior review and agreement in writing, be at such parties' sole risk.

APPENDIX A
BORELOGS

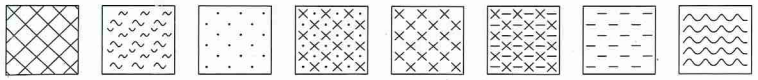
CLIENT:	
PROJECT:	
LOCATION:	
Surface Conditions:	

Borehole/Test Pit 787 Kaiwaka

AH1 - adjacent fill site - LOT 1

Sheet 1 of

Lithologic Key



Fill 0.50 Dark br brown with minor grey Clay - Fill, moist

Med - dark brown silty CLAY, mottled red and grey, moist, high stiffness, mod plasticity

Fill 0.90 red brown / tan - grey silty CLAY, moist, high stiffness mod. high plasticity

increasing grey colour w/ depth

~~Occas. Shells at 500 onwards~~ brownish tan/orange at 500 mm onwards

1.20 NO GW EOB 1200

Geological Unit	Depth (metres)	Depth (metres)	Groundwater	Shear Vane	Scala Penetrometer
	0	0			Start Depth (m)
	1	1			50
	2	2			100
	3	3			150
	4	4			200
	5	5			250
					300
					350
					400
					450
					500
					550
					600
					650
					700
					750
					800
					850
					900
					950
					1000
					1050
					1100
					1150
					1200
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					1300
					1350
					1400
					1450
					1500
					1550
					1600
					1650
					1700
					1750
					1800
					1850
					1900
					1950
					2000
					End Depth (m)

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

Observations

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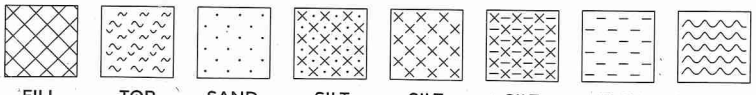
CLIENT:	
PROJECT:	
LOCATION:	
Surface Conditions:	

Borehole/Test Pit 787 KY

AH2 - cor 1

Sheet 1 of

Lithologic Key



Geological Unit | Depth (metres) | Depth (metres) | Groundwater | Shear Vane | Scala Penetrometer

Fill 150 Dark br moist topsoil mix sands and clay, roots

Fill 400 Med br/orange/tan moist-wet silty CLAY high stiffness, mod-high plasticity

Orange-tan/grey CLAY, moist, high stiffness high plasticity

increasing grey w/ depth

1200

EOB 1200 NO GW

0 1 2 3 4 5

Start Depth (m)

50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000

End Depth (m)

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

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CLIENT:		Borehole/Test Pit 787 KH 4
PROJECT:		AH3 LOT 2
LOCATION:		
Surface Conditions:		Sheet 1 of

Lithologic Key

FILL · TOP SOIL · SAND · SILT SANDY · SILT · SILT CLAYEY · CLAY · ORGANIC SOILS

Geological Unit	Depth (metres)	Description
Fill	100	TOPSOIL DARK Br, moist / wet mixed with med br CLAY
	300	Mod br silty CLAY with topsoil, moist, mod stiffness, high plasticity
		Orange - tan / grey CLAY, high stiffness, mod - high plassity, moist
	1	increasingly grey / w depth, moist - wet 1100
	1200	
		EOB 1200 NO GW

NOTE: SE CORNER OF LOT 2
Area with overgrown grass very wet / soggy
→ ~~HAR~~ HARDFILL / concrete in area

Depth (metres)	Groundwater	Shear Vane	Scala Penetrometer Start Depth (m)		
			50		
			100		
			150		
			200		
			250		
			300		
			350		
			400		
			450		
			500		
			550		
			600		
			650		
			700		
			750		
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			1650		
			1700		
			1750		
			1800		
			1850		
			1900		
			1950		
			2000		
			End Depth (m)		

Drill Method		**Observations**
Date Drilled		
Drilled By		
Shear Vane No.		

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CLIENT:	
PROJECT:	
LOCATION:	
Surface Conditions:	Sheet 1 of

Borehole/Test Pit: AH 4 787 KH
LOT 2

Lithologic Key: FILL | TOP SOIL | SAND | SILT SANDY | SILT | SILT CLAYEY | CLAY | ORGANIC SOILS

Geological Unit	Depth (metres)	Log	Depth (metres)	Groundwater	Shear Vane

50 — Dark br moist topsoil with CLAY (Fill?)
Orange/tan/grey CLAY, high stiffness, high plasticity
moist
red/orange mottling at 500 onwards
moist - wet at 1000

1200 EOB NO GW

AH5 LOT 2
50 Dark br moist-wet topsoil mixed with grey/white CLAY Fill
300 Med br moist-wet silty clay, mod stiff, high plasticity Fill?
Grey/orange-tan CLAY with rust mottling
high stiffness, ~~mod~~-high plasticity
moist - wet

1200 EOB 1200 NO GW

AH6 LOT 2
100 Dark br moist-wet topsoil with orange/br silty clay (topsoil)
TAN/grey with red mottling silty CLAY minor topsoil
400 moist - wet, mod stiffness, mod plasticity
Med br/tan silty CLAY with minor gravel
minor white streaks, high stiffness, mod plasticity, moist
800 Med br/tan/grey with red/orange mottling silty CLAY
moist, high stiffness, mod plasticity, increasing brown w/ depth
1200
EOB 1200 NO GW

Scala Penetrometer

Start Depth (m)		
50		
100		
150		
200		
250		
300		
350		
400		
450		
500		
550		
600		
650		
700		
750		
800		
850		
900		
950		
1000		
1050		
1100		
1150		
1200		
1250		
1300		
1350		
1400		
1450		
1500		
1550		
1600		
1650		
1700		
1750		
1800		
1850		
1900		
1950		
2000		
End Depth (m)		

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

Observations

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CLIENT:	
PROJECT:	
LOCATION:	
Surface Conditions:	Sheet 1 of

Borehole/Test Pit: 757 KH
LOT 5
AH7

Lithologic Key: FILL | TOP SOIL | SAND | SILT SANDY | SILT | SILT CLAYEY | CLAY | ORGANIC SOILS

Geological Unit | Depth (metres) | Depth (metres) | Groundwater | Shear Vane | Scala Penetrometer

Start Depth (m)

50 100 150 200 250 300 400 450 500 550 600 650 700 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000

End Depth (m)

200 Dark br topsoil mottled orange, moist-wet
tan/orange/red br silty CLAY mixed with topsoil
600 low-mod stiffness, mod plasticity, moist-wet
Orange/tan-grey CLAY, high stiffness
mod plasticity, minor red mottling
moist
1 1200

EOB 1200 ND GW

AH8 LOT 5

2 200 DARK br wet TOPSOIL with some
rotted orange-clay inclusions
220 Dark br Clayey SILT, friable, mod plasticity
600 low-mod stiffness, minor white patches, moist
Orange brown Clayey SILT, moist
homogenous, mod plasticity, friable, low-mod stiffness
3 1200

EOB 1200 ND GW

AH9 LOT 5

4 DARK br moist topsoil
250 light-mod br/orange Clayey silty CLAY, mod stiffness,
mod plasticity, moist
700 light br/grey silty clay, trace sand
high stiffness, mod-high plasticity, moist
5 1200

EOB 1200 ND GW

Fill?

Fill

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

Observations

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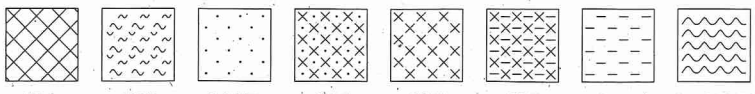
CLIENT:	
PROJECT:	
LOCATION:	
Surface Conditions:	

Borehole/Test Pit 787 Ik H
AH10 LOT 4

Sheet 1 of

Lithologic Key



Geological Unit | Depth (metres) | Depth (metres) | Groundwater | Shear Vane | Scala Penetrometer

TOP 50mm MOIST CLAYEY SILT
TOPSOIL (dark br, dry) mixed with ~~SILTY CLAY~~
friable, tan / lt br, friable, dry
Bark fill 200 mm
Rootlets fill 400 mm
Angular gravels 700 mm onwards (5 >10 mm)

(orgn) 1

EOB 1000 NO GW

AH 77 - LOT 4

300 BARK DF dry - moist topsoil moisture on ?
light - red br clayey CLAY, orange mottling
at 600, low - med plast, moderate planarity
600
ORANGE BROWN Clayey SILT, friable, low
- med plast, low planarity
1 low
EOB 1200 NO GW

mixed in topsoil fill 400 ?
topsoil return !? at depth

Start Depth (m)

50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000

End Depth (m)

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

Observations

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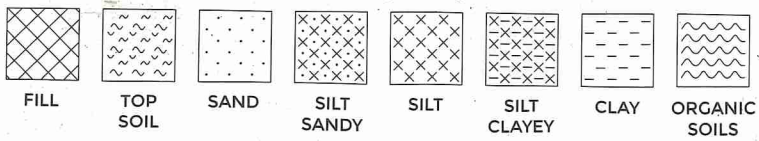
LOCATION. AHR LOT 10

Surface Conditions:

Sheet 1 of

Geological Unit | Depth (metres)

Lithologic Key



Depth (metres) | Groundwater | Shear Vane | Scala Penetrometer

0.00 Med – Dark br topsoil moist

0.60 light brown/tan silty CLAY, moist, low-med plasticity, mod stiffness

TAN silty CLAY, moist, mod - stiffness, low - mod plasticity

1.00 – EOB 100 NO GW

Start Depth (m)

50		
100		
150		
200		
250		
300		
350		
400		
450		
500		
550		
600		
650		
700		
750		
800		
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1850		
1900		
1950		
2000		

End Depth (m)

Drill Method	
ate Drilled	
d By	
ane No.	

Observations

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AH13 LOT 11

Surface Conditions:

Sheet 1 of

Geological Unit | Depth (metres) | Lithologic Key | Depth (metres) | Groundwater | Shear Vane | Scala Penetrometer

Lithologic Key: FILL; TOP SOIL; SAND; SILT SANDY; SILT; SILT CLAYEY; CLAY; ORGANIC SOILS

200 DARK Br moist topsoil

Med br ~~[illegible]~~ with orange streaks SILTY CLAY, mod - high plasticity, mod plasticity, moist

700

TAN [illegible] SILTY CLAY, mod - high plasticity mod - high plasticity, moist

increasingly stiff with depth

EOB 1200 NO G/W

AH 14 LOT 11 - Brad

Topsoil and silty clays, friable, dry - moist

Very inconsistent, rootlets till 300, intermittent brick, pockets of silt minor asbestos throughout

1200 EOH NO G/W

Start Depth (m)

50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000

End Depth (m)

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

Observations

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CLIENT:	
PROJECT:	
LOCATION:	
Surface Conditions:	Sheet 1 of

Borehole/Test Pit: LOT 14 AH 17

Lithologic Key: FILL | TOP SOIL | SAND | SILT SANDY | SILT | SILT CLAYEY | CLAY | ORGANIC SOILS

LOT 14 AH 17 - BUND

Silty CLAY mottled orange/grey, med. dense b- dry, friable, minor angular aggregate

60

Silty Clayey orange/brown mixed with red br mottled orange, Mike aggregate, moist, med- high plasticity

becoming wet at 1200

EOB 1700 no GW

FILL

mod planning

Depth (metres)	Start Depth (m)	End Depth (m)
1	50	2000
2	100	
3	150	
4	200	
5	250	
	300	
	350	
	400	
	450	
	500	
	550	
	600	
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	850	
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	1350	
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	1450	
	1500	
	1550	
	1600	
	1650	
	1700	
	1750	
	1800	
	1850	
	1900	
	1950	

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

Observations

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OT 1– 47775

Sheet 1 of

Geological Unit	Depth (metres)	Lithologic Key	Depth (metres)	Groundwater	Shear Vane	Scala Penetrometer

Lithologic Key: FILL · TOP SOIL · SAND · SILT SANDY · SILT · SILT CLAYEY · CLAY · ORGANIC SOILS

LOT 12 AH 5

SILTY CLAY, dry mottled orange, mottled-brown
med–dark brown, friable, rootlets
hill 300-400
Ass mikr modular aggregate from 700 onward
very montmorillonite

1200 — EOB 1200 no GW

Depth scale (metres): 1, 2, 3, 4, 5

Start Depth (m)		
50		
100		
150		
200		
250		
300		
350		
400		
450		
500		
550		
600		
650		
700		
750		
800		
850		
900		
950		
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1050		
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1200		
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1300		
1350		
1400		
1450		
1500		
1550		
1600		
1650		
1700		
1750		
1800		
1850		
1900		
1950		
2000		
End Depth (m)		

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

Observations

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CLIENT:		Borehole/Test Pit	LOT 10 [illegible]
PROJECT:			
LOCATION:			
Surface Conditions:		Sheet 1 of	

Lithologic Key

FILL | TOP SOIL | SAND | SILT SANDY | SILT | SILT CLAYEY | CLAY | ORGANIC SOILS

LOT 13 AHIL - BUND

Geological Unit	Depth (metres)	Description
Fill		Clayey SILT light brown ~~[illegible]~~, mottled orange/blue, minor topsoil, friable angular aggregate 300 mm crown, dry [illegible] 200
Fill [illegible]	700 – 1	Dark blue/black mixed with yellow/brown silty clay, moderate stiffness, minor topsoil mottled grey/orange angular aggregates, mod - high stiffness low - mod [illegible]
		EOB 1000 NO GW

Depth (metres): 1, 2, 3, 4, 5

Depth (metres)	Groundwater	Shear Vane	Scala Penetrometer
1, 2, 3, 4, 5			

Start Depth (m)		
50		
100		
150		
200		
250		
300		
350		
400		
450		
500		
550		
600		
650		
700		
750		
800		
850		
900		
950		
1000		
1050		
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1200		
1250		
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1400		
1450		
1500		
1550		
1600		
1650		
1700		
1750		
1800		
1850		
1900		
1950		
2000		
End Depth (m)		

Drill Method		Observations
Date Drilled		
Drilled By		
Shear Vane No.		

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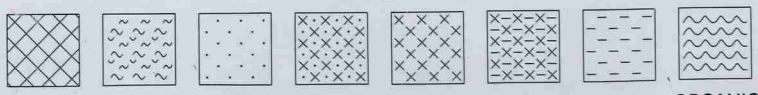
CLIENT:	
PROJECT:	
LOCATION:	
Surface Conditions:	

Borehole/Test Pit: LOT 15 AH 18 POND

Sheet 1 of

Lithologic Key



LOT 15 AH 18 POND

Geological Unit	Depth (metres)	Lithologic Key	Depth (metres)	Groundwater	Shear Vane	Scala Penetrometer

0.0 – SILTY CLAY; dark brown w/ orange mottling, moist, friable, minor to mod, minor aggregate

0.5 – SILTY CLAY, yellow/tan mixed with orange brown, mottled, mod stiff-high, minor pebbles, moist, minor aggregation, low-mod plasticity

1.20 – EOB REFUSAL ON

NOTE:
Next to irrigation line

FILL

Start Depth (m)

End Depth (m)	
50	
100	
150	
200	
250	
300	
350	
400	
450	
500	
550	
600	
650	
700	
750	
800	
850	
900	
950	
1000	
1050	
1100	
1150	
1200	
1250	
1300	
1350	
1400	
1450	
1500	
1550	
1600	
1650	
1700	
1750	
1800	
1850	
1900	
1950	
2000	

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

Observations

GWE CONSULTING ENGINEERS
Ground Floor, Oceanbridge House,
25 Anzac Street, Takapuna
Auckland 0622
09 445 8338
www.gwe.co.nz

CLIENT:

PROJECT:

LOCATION:

Surface Conditions:

Borehole/Test Pit 737 KH

LOT 16 AT 19 - BUND

Sheet 1 of

Lithologic Key

FILL | TOP SOIL | SAND | SILT SANDY | SILT | SILT CLAYEY | CLAY | ORGANIC SOILS

Geological Unit | Depth (metres) | Depth (metres) | Groundwater | Shear Vane | Scala Penetrometer

LOT 16 AT 19 - BUND

Silty CLAY orange/tan and light br, dry, firm/stiff mbr known as aggressive, mottled orange and grey veins of white/dark blue clay (mod stiffness/plasticity) FILL

700 –

Silty CLAY, tan/light br/orange, moist, mod plasticity, mod stiffness, mottled orange, minor topsoil

1200 –

FOB 1100 NO GW

Start Depth (m)

50 | 100 | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 | 1050 | 1100 | 1150 | 1200 | 1250 | 1300 | 1350 | 1400 | 1450 | 1500 | 1550 | 1600 | 1650 | 1700 | 1750 | 1800 | 1850 | 1900 | 1950 | 2000

End Depth (m)

Drill Method

Date Drilled

Drilled By

Shear Vane No.

Observations

GWE CONSULTING ENGINEERS
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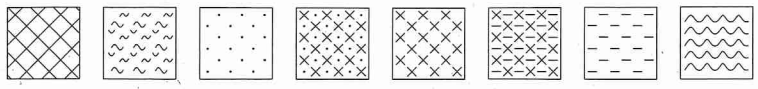
CLIENT:	
PROJECT:	
LOCATION:	
Surface Conditions:	

Borehole/Test Pit

LOT 4 AM20 - OLD DRIVEWAY

Sheet 1 of

Lithologic Key



LOT 4 AM 20 - Driveway (unsealed)

Geological Unit | Depth (metres) | Depth (metres) | Groundwater | Shear Vane | Scala Penetrometer

Start Depth (m)

600 work b. topsoil/ wet

SILTY CLAY with minor angular aggregate (fill) mixed with topsoil, mottled orange, trace sand, moist

600 SILTY CLAY brown/orange-tan, mod-high plasticity, moist

1200

EOB 1200 NO GW

Fill

50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000

End Depth (m)

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

Observations

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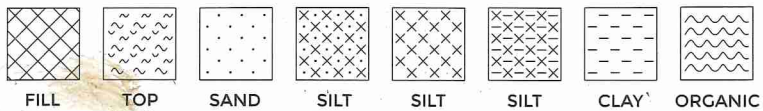
CLIENT:	
PROJECT:	
LOCATION:	
Surface Conditions:	Sheet 1 of

Borehole/Test Pit

AH21 LOT 16

Lithologic Key



Geological Unit | Depth (metres) | Depth (metres) | Groundwater | Shear Vane | Scala Penetrometer

250

PARK Br. Moist topsoil

light brown/grey moist silty CLAY, moist firm/stiff, low-mod stiffness, low-mod plasticity minor organic fibres

700

light brown/tan/orange silty CLAY, mod-high stiffness, mottled orange at 900 onwards becoming grey/orange/tan at 1100

1200

GOD ROD NO GW

1 2 3 4 5

1 2 3 4 5

Start Depth (m)

50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600 1650 1700 1750 1800 1850 1900 1950 2000

End Depth (m)

Drill Method	
Date Drilled	
Drilled By	
Shear Vane No.	

Observations

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25 Anzac Street, Takapuna
Auckland 0622
09 445 8338
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787 Karapoa Coast Hwy, 11 June

AH22 0-700 - TS, brown
100-1,200 - orange sticky clay, some silt, not moist a bit plastic, getting lighter (yellow/grey) at 1,200mm

AH23 Same as AH22

AH24 0-150 - TS, brown, silty
150-600 - clayey silt, orange, friable, not sticky, not moist, crumbly
600-1200 - orange sticky clay, some silty, not moist, a bit plastic, getting lighter (yellow/grey) at 1,000mm

AH25 Same as AH22.

APPENDIX B
CONCEPT WASTEWATER SITE PLAN

Plot Date : 11:18 am, 05 Jul 2021

LOCATION OF HYNDS LIFESTYLE ADVANCED SYSTEM

LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7
LOT 8
LOT 9
LOT 10
LOT 11
LOT 12
LOT 13
LOT 14
LOT 15
LOT 16
LOT 17
LOT 18

AH1
AH2
AH3
AH4
AH5
AH6
AH7
AH8
AH9
AH10
AH11
AH12
AH13
AH14
AH15
AH16
AH17
AH18
AH19
AH20
AH21
AH22
AH23
AH24
AH25

EXISTING NO BUILD COVENANT

375 CONC
450 CONC
300 CONC
225 CONC

787
799

NOTES:

1. DRAWING IS BASED ON SITE PLAN PREPARED BY C&R SURVEYORS LIMITED (JOB NO. 5177-SP STAGE 2, DATED 11/05/2021)
2. ADDITIONAL DATA FROM AUCKLAND COUNCIL GEOMAPS (CAPTURED 21/06/2020).
3. FINAL LOCATION OF WASTEWATER TREATMENT PLANT AND IRRIGATION AREA TO BE CONFIRMED ON-SITE.
4. PROPOSED IRRIGATION AREA = 720m² (INCLUDES 50% RESERVE AREA).
5. LOT 10 DISPOSAL AREA MAY BE REDUCED DUE TO OVERLAND FLOWPATH
6. MINIMUM SEPARATION DISTANCES
   1.5m FROM PROPERTY BOUNDARIES
   3.0m FROM DWELLINGS
   10m FROM WATERCOURSES
7. DO NOT SCALE FROM THIS DRAWING

LEGEND

PROPOSED BUILDING PLATFORM (400m²)

OVERLAND FLOW PATH

TOTAL INDICATIVE WASTEWATER FIELD AREA (720m²)

EXISTING WASTEWATER FIELD ON LOT 6 (300m²) 100% RESERVE AVAILABLE

LOCATION OF AUGER HOLES — AH1

0m 10m 50m 75m 100m

A3 SCALE = 1 : 1500

PLOT STATUS: FOR CONSENT

REV	AMENDMENT	CAD	ENG	APPD	DATE
0	FIRST ISSUE	AY	DW	GW	05/07/21

GWE CONSULTING ENGINEERS
GRD FLOOR OCEANBRIDGE HOUSE
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AUCKLAND 0622
P:+64 9 445 8338
www.gwe.co.nz

PROJECT:
787 KAIPARA COAST HIGHWAY
KAUKAPAKAPA
LOT 1 DP 523159, LOT 2 DP 52315

TITLE:
WASTEWATER SITE PLAN

CLIENT NAME:
RIVERVIEW PROPERTIES LIMITED

SCALE: 1:1500		A3
PROJECT No: J3086	DRAWING No: 500	REV 0

Filename : W:\Active Projects\LD\787 Kaipara Coast HW Kaukapakapa-J3086\08-Drawings\01-CAD\01-DWG\500 Wastewater Siteplan.dwg