Engineering and Infrastructure Assessment Report

272 and 278 Clevedon - Kawakawa Road, Clevedon

Countryside Living Subdivision

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1.0 Introduction

Lands and Survey (Auckland) Limited (LAS) has been engaged to complete an Engineering and Infrastructure Assessment in support of the countryside living subdivision and development proposed by Stratford Properties Limited at 278 Clevedon-Kawakawa Road, Clevedon.

The statutory approval process that is being adopted for this project involves a private plan change request to rezone part of the land at 272 and 278 Clevedon-Kawakawa Road and all the land at 274 Clevedon-Kawakawa Road from Rural – Rural Coastal to Rural – Countryside Living. The plan change request also seeks approval to extend the Clevedon Sub Precinct C over the subject land.

A subsequent resource consent application will be lodged for the subdivision of 278 Clevedon-Kawakawa Road to create 11 countryside living lots, a shared access, an amenity lot, a balance farm lot and a balance lot to be amalgamated with 272 Clevedon-Kawakawa Road. This resource consent application is being prepared on the basis that the plan change request will be approved prior to this application being considered. The resource consent application is therefore being made on the basis that the land area at 278 Clevedon Kawakawa Road to be used for countryside living activities is zoned Rural Countryside Living and the Clevedon Sub Precinct C applies to this land.

This statutory approval approach is being taken as the currently proposed plan change will only enable limited countryside living development opportunities on the property at 278 Clevedon-Kawakawa Road. This is because the extent of the flooding constraints that apply to this land and the nature of the clustered countryside living subdivision and any associated development that is provided for by the Rural – Countryside Living Zone and Clevedon Sub Precinct C provisions under the Auckland Unitary Plan. The proposal for which resource consent is being sought therefore defines the maximum extent of subdivision and development that will be enabled by the proposed plan change on the properties.

The engineering and infrastructure assessment, design and reporting is therefore based on the subsequent subdivision and development of the land that will be enabled through the approval of the plan change request, which is the proposal as detailed in the resource consent application. This is deemed to be the maximum possible development potential of the land that would reasonably be expected to occur as a result of the approval of the plan change request.

The assessment, design and reporting as detailed in this report is based on information from the following sources:

- Auckland Council GeoMaps
- Topographical Survey, Lands and Survey, Drawing Reference 117536-100 - 111, REV A
- Geotechnical Investigation Report, KGA Geotechnical, Reference K199051, 20 March 2019
- On-site Wastewater Treatment and Disposal (Draft), KGA Geotechnical, Reference K199051-1, 7 June 2019
- Landscape Plan Set (Draft), Greenwood Associates, Drawing Reference 9012/1 – 5, 12/06/2019
- Auckland Council Healthy Waters

2.0 Scope

The purpose of the Engineering and Infrastructure Assessment Report is to address the relevant engineering and infrastructure design matters associated with the proposed subdivision and subsequent development of the site, that will be enabled by the plan change request, and provide an assessment of the serviceability of the proposed subdivision and subsequent development of the site..

In general, the engineering and infrastructure matters considered include:

- Earthworks;
- Erosion and sediment control;
- Site access and shared access road;
- Stormwater management including:
    - Stormwater detention
    - Swale design

  - Culvert design
- On-site water supply
- On-site wastewater management
- Firefighting water supply
- Network utilities

3.0 Site Description

The site is situated at 278 Clevedon-Kawakawa Road, Clevedon, Auckland as shown on Figure 1 below. The site is located on the northern side of Clevedon-Kawakawa Road, approximately 2.5km east of the Clevedon Village. The site adjoins the Wairoa River to the north and is located approximately 5km upstream of Pauto Point where the Wairoa River meets the Hauraki Gulf.

The site is legally described as Lot 1 DP 146882 and has an overall area of some 52 hectares. The site currently accommodates a single-level detached dwelling and some outbuildings grouped together at the south-east corner of the site. Two small farm sheds are also located adjacent to the western boundary of the site.

The site accommodates an approximate 3 metre width vehicle crossing adjoining Clevedon-Kawakawa Road at the south-east corner. The site is also accessed via a driveway on the property at 272 Clevedon-Kawakawa Road (which is owned by the applicant) running adjacent to the western boundary. This driveway adjoins a separate vehicle crossing onto Clevedon-Kawakawa Road, south-west of the site.

The site is predominantly in pasture. There are some shelter trees dispersed intermittently around the property. The property is currently used for the grazing of relatively light animals (because of the high degree of risk of pugging of the pastures) and the production of supplements to be sold off the property (such as hay or silage).

The site contains several farm tracks formed in gravel that are located intermittently around the site. A gravel farm track accessed off the driveway at 272 Clevedon – Kawakawa Road extends up to the northern part of the site adjacent to the Wairoa River. At the centre of the site a farm drain runs perpendicular from the road frontage towards the Wairoa River end of the site for a length of approximately 670 metres. At this point the farm drain transitions into a stream which discharges into the wetland area adjoining the Wairoa River.

The site has varying topography with the majority of the site comprising moderate slopes up to a 10% gradient. There are some elevated areas where there are moderate to steep slopes of up to 35% gradient. The boundaries are all fenced with post and wire fencing. The paddocks within the site are delineated with post and wire fencing.

The majority of the site is within the 1 per cent annual exceedance floodplain, with the exception of two elevated areas located in the south-west corner of the site, and another elevated area at the south-east corner of the site. The coastal inundation 1 per cent annual exceedance probability (AEP) plus 1 metre sea level rise also extends over a similar area, but slightly reduced to the 1 per cent AEP floodplain.

The site is not serviced with any public reticulated wastewater or water supply infrastructure. The existing dwelling located at the south-east corner of the site is serviced via a private rainwater collection tank and an on-site wastewater treatment and disposal system. The existing dwelling is also connected to the public utility networks located within Clevedon – Kawakawa Road.

Figure 1: Council Geomaps Data (obtained June 2019)

4.0 Overview of the Proposal

As outlined above, the proposed plan change will only enable limited countryside living development opportunities on the properties given the extent of the flooding constraints that apply to this land and the nature of the clustered countryside living subdivision and development that is provided for by the Rural – Countryside Living Zone and Clevedon Sub Precinct C provisions under the Auckland Unitary Plan. The proposal for which resource consent is being sought therefore defines the maximum extent of subdivision and development that will be enabled by the proposed plan change on the properties.

The proposed subdivision and development of the property at 278 Clevedon – Kawakawa Road involves the creation of 11 lifestyle lots ranging in size from 3,661m² – 6,000m², a jointly owned lot containing the shared private access road, a wetland area and a planted native bush area, a balance farm lot and a lot to be amalgamated with the adjoining property at 272 Clevedon – Kawakawa Road.

The proposal will involve the following works:

- Construction of a new private shared access road with an overall width of 3.5metres with 3 passing bays provided on the western side of the access road. Part of the access way will be 5.5metres wide for a length of 15metres;
- Formation of a new swale drain along the eastern side of the shared access road;
- Construction of a new stormwater culvert under the shared access road to mitigate flood water disruption for the 1% AEP flood event.
- Extension of power and communication utility connections to the lifestyle lots;
- Construction of a new rural vehicle crossing with a width of 8.9 metres at the boundary; and
- Formation of a new bin collection area along the frontage with Clevedon – Kawakawa Road.

5.0 Earthworks

5.1 Earthworks

The earthworks will comprise cut to fill over a total area of some 5,500m^2 associated with the construction of the shared access road, passing bays, swale drain, vehicle crossing and bin collection area and the installation of culverts and network utility connections.

The estimated earthworks volumes associated with the proposal are as follows:

- Cut Volume = 140 m^3
- Fill Volume = 3,250 m^3
- Shortage of Fill = 3,110 m^3

This estimated earthwork volume are solid measure quantities measured from existing ground level to design ground level including topsoil stripping.

Part of the shared access road will be constructed over the 1% AEP flood plain area and so it is recommended that the stormwater culvert system be constructed to allow flood waters to flow through the culvert during the 1% AEP storm event.

As there is a net imbalance of cut / fill material of 3,110m3, imported fill will be brought to site from a suitably identified source at the time earthworks are to be undertaken.

5.2 Erosion and Sediment Control

Erosion and Sediment Control (E&SC) will be implemented during the earthworks operation in accordance with industry best practice and the Auckland Council Guideline Document 2016/05: Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (GD05).

The proposed erosion and sediment control approach will allow for the existing cleanwater surface run off from upstream of the site to be diverted and allow the dirty water runoff from within the site to be captured and treated. The detailed design of the E&SC proposals will be completed at the Engineering Plan Approval stage and may be subject to change depending on the Contractor's construction methodology, which will be discussed and agreed with the Contractor and the Council at the pre-start meeting.

The proposed E&SC approach will comprise of the following:

- Construction of a new site access as a stabilised entrance to allow truck to access the site.
- Construction of diversion bunds to divert clean water away from the construction site and retain runoff from exposed areas on the site as required.
- Use of decant earth bunds (DEBs) to treat runoff form exposed earthwork areas.

The erosion and sediment controls and the site stabilisation required for the project will be implemented and undertaken in accordance with the guidance provided in GD05 and will comprise of the following:

- **Stabilised Construction Entrance**

  The proposed location for the new vehicle crossing will be utilised as a stabilised construction access. The position of the construction site access will be confirmed on the site with the Contractor at the time of works. Facilities to enable the wash down of vehicles (water blaster as a minimum) will be used to ensure vehicles are cleaned down prior to exiting the site onto Clevedon – Kawakawa Road.

- **Retention of Existing Vegetation**

  Where possible the existing vegetation / grass cover will be maintained over the site to minimise the amount of bare earth exposed. The retention of the existing vegetation / grass cover will provide for a buffer / filtration strip to the area of works.

- **Cleanwater Diversion**

  Cleanwater diversion drains will be installed around the upslope perimeter of the proposed earthworks area to direct clean water from upslope away from working areas. Dirty water diversion drains will be installed around the downslope perimeter and within the site as required to direct sediment laden runoff within the site to a decant bund if required. These channels shall be trapezoidal and sized as per the cross sections shown in Figures 16 & 18 of GD05. Where diversion drains are greater than 2% they shall be lined to avoid erosion/scour of the channel.

- **Contour Drains**

  Temporary excavated channels or ridges, or a combination of both, shall be constructed as required along the contour within the earthworks area to break overland flow that is draining down disturbed slopes. This will reduce the erosive power of runoff and aid in the diversion of sediment laden water to the SRP. Contour drains shall be installed as required prior to inclement weather.

- **Decanting Earth Bund**

  A decanting earth bund (DEB) is an impoundment area formed by a temporary bund to provide an area where ponding can occur, and sediment can settle before runoff is discharged from site. DEBs can be used for areas up to 3,000m^2. DEBs will be utilised on site for areas from which it is not possible for runoff to be diverted to the sediment retention pond. DEBs will be sized for 1% of the contributing catchment area (i.e. 10m^3 per 1,000m^2 catchment) and will be installed on as per Figure 79 of GD05.

- **Site Stabilisation**

  Once the subgrade levels are achieved, progressive site stabilisation will be undertaken and shall comprise:

  - Re-top soiling in conjunction with grass seeding to establish grass cover over berms/reserve areas.
  - Where necessary, areas will be stabilised by applying straw mulch in conjunction with top soiling and grass seeding.
  - Pavement aggregates will be placed over driveway pavement areas as soon as practicable.

Site stabilisation will reduce the time bare earth is exposed to erosive forces and ability for generation of sediment laden runoff. Perimeter controls will remain in place until adequate stabilisation is achieved over the site.

Refer to Appendix A - Engineering Plans for detailed Erosion and Sediment Control details.

6.0 Site Access and Driveway

A new site access (vehicle crossing) is proposed to be constructed from Clevedon – Kawakawa Road to the site to provide access to the proposed development. A new stormwater pipe (BossPipe twin wall or similar) is proposed to be constructed underneath the new site access to convey the existing flows within the road-side drain.

A new shared driveway and swale have been designed in according with the AUP (OP) standards and the Council engineering standards. The driveway will be 3.5m wide with 5.5m wide passing bays provided every 100m as per Rule E27.6.4.3.1 (T147) of the AUP (OP).

The driveway has been designed to provide a minimum freeboard of 200mm at the lowest point above Auckland Council flood level RL = 4.4m during 1% AEP event. Rotten rock / brown rock or similar approved engineering fill will be used to build up the driveway within the floodplain area with a maximum batter slope of 1 in 3 (33% gradient). The driveway will be 25Mpa concrete, 150mm thick with 665 mesh centrally places. The driveway will be broomed finished with appropriate construction and expansion joints.

At chainage 160m of the driveway, it is crossing an existing overland flow path. It is therefore proposed to install 2 x 675mm diameter culverts at the crossing with headwall and riprap erosion protection. The culverts are sized to be 100 year at inlet control without overtopping the road level. Please refer to Appendix B for Culvert Sizing Calculations

Also refer to Appendix A for Engineering Plan for detailed driveway design.

7.0 Flood Risk Assessment and Stormwater Mitigation

7.1 Flood Risk Assessment

The proposed site is located downstream of the Wairoa River, close to the river outlet to the Hauraki Gulf. The site is known to be subject to frequent flood events in the winter, due to its location and the flooding of the Wairoa River. The majority of the site is identified within the Coastal Inundation 1 per cent AEP plus 1m Control – 1m sea level rise.

Consultation with Auckland Council Healthy Waters has been undertaken in order to understand and obtain information about the river flood level and its flood nature. Heathy Water has advised there has been flood modelling and flood assessment completed by Tokin and Taylor in 2014 for the Wairoa River catchment. The most recent 10-year and 100-year flood mapping is held by Healthy Waters. A 100-year ARI flood map has been supplied by Healthy Waters to explain the flood levels at various nominated cross sections along the Wairoa River. However, Healthy Water has advised that the 100-year ARI flood mapping in the model does not cover the site. The nearest upstream cross section available is 'XS2' on the flood map which is located at 202 Clevedon-Kawakawa Road. 'XS2' has a 100-year flood level RL 4.306m. Please refer to the flood map in Appendix B.

The site is located some 2 kilometres downstream of this cross section. As such, it has been assumed the water level next to the site will be slightly lower than this level. Based on the above information, further discussion was held with Healthy Waters to determine what flood level should be adopted for the development. Healthy Waters has advised that the Auckland Council GIS flood plain, in this instance, can be adopted as an acceptable and conservative flood level. It is therefore proposed to adopt RL 4.4m from Auckland Council GIS Map as the 100-year ARI flood level. This level was also adopted for the recent consented countryside living subdivision and development in 252 Clevedon-Kawakawa Road (refer to Figure 2 below).

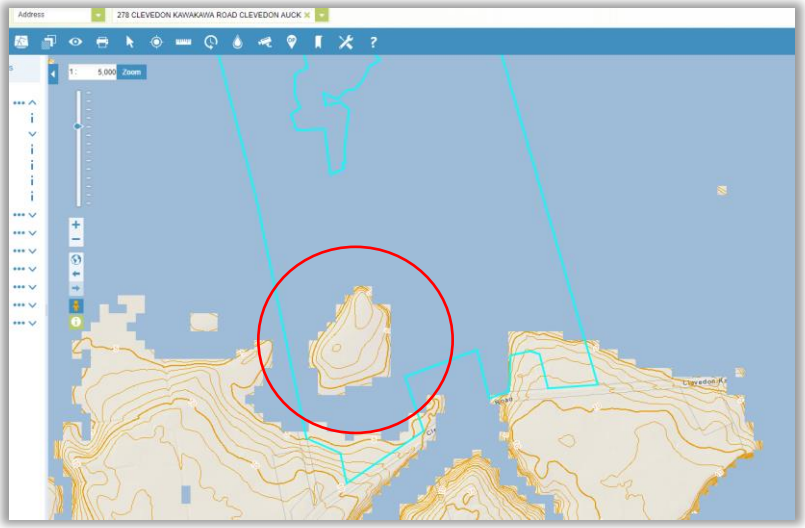

Figure 2: Council Geomaps Flood Plain Map (obtained June 2019)

Based on the adopted flood level from Auckland Council GIS the building platforms and wastewater disposal areas will be required to be above the RL 4.4m flood level. As can be seen on the scheme plan of subdivision all of the building platforms and wastewater disposal areas are to be located outside of the flood plain. The proposed building finished floor level (FFL) will be set at a minimum RL 4.9m for all the buildings, to provide 500mm freeboard above the 100-year flood level. Please refer to Appendix B for Council correspondence and the flood map.

7.2 Stormwater Mitigation

7.2.1 Stormwater Mitigation for Lots

There is no public reticulation provided for stormwater management in the vicinity of the site other than the existing roadside drains. It is therefore proposed to provide measures for the management of stormwater on site at the time of development. The stormwater management approach will provide for mitigation through the use of stormwater rain tanks for attenuation of roof water run-off for the 2 year and 10-year ARI. Stormwater run-off from all other paved surfaces on each of the lots will be discharged through level spreaders onto pasture and sheet flow into the nearby water course.

A roof area of 400m² for each lot and a private driveway area of 300m² for each lot has been assumed to ensure that the assessment is conservative. Hec HMS model was used to determine the pre-development and post development peak run off. The runoff is calculated using the Auckland Council recommended method, TP108 or NZSCS curve rainfall calculations. The curve number used for the impervious area is 98 and for the pervious area is 74. The time of concentration used is a minimum 10 minutes with 6.7 minutes lag time. The initial abstraction is 5mm as per TP108 standard. The rainfall depth is taken from TP108 rainfall maps, and an allowance for climate change of 9% for the 2-year ARI and 13.2% for the 10-year ARI was included. The results are shown in the table below.

HecHMS - Model Tabulated Results						
Roof	Paved	Mitigated Area	Flows (l/sec)			
			2 Year		10 Year	
(m^2)	(m^2)	(m^2)	predev	postdev	predev	postdev
400	300	700	5.87	5.10	16.1	11.55

Tank Storage - Bailey 30,000 L Detention Tanks						
Roof	Paved	Mitigated Area	Storage in tank (m^3)		Tank Elevation (m)	
			Storm Event		Storm Event	
(m^2)	(m^2)	(m^2)	2 Year	10 Year	2 Year	10 Year
400	300	700	9.4	18.6	0.835	1.64

The result has shown that the use of rainwater tanks on each of the lots can provide full extended detention volume for the 2 and 10 year ARI storm events and release the flow over 24 hours period. The peak discharge rate is mitigated to that of the pre-development rate and discharged through a level spreader to minimise the effect of the new impervious areas being established on the lots. Please refer to HecHMS outputs in Appendix C and Drawing 340 in Appendix A for orifice configuration.

7.2.2 Stormwater Mitigation for Driveway

A swale will be constructed along the eastern side of the driveway to convey water and provide water quality treatment for stormwater runoff in accordance to Auckland Council GD2017/001 Guidelines.

Auckland Council GD2017/001 Guidelines recommended that where a swale has a longitudinal gradient of less than 2%, particularly in areas where the soils have poor infiltration capacity, that the swale should be constructed with subsoil drainage and drainage material trench underneath the swale base to prevent stagnation and saturation of the swale bed. Where the proposed swale is to be formed within driveway fill area, subsoil drainage may not be required for any longitudinal slopes below 2% gradient, as the engineered fill material will have better filtration capacity than local soils.

Refer to Appendix C for Swale Calculation and Appendix A plans for the detail of subsoil drain location along the swale.

8.0 Wastewater On-site Management

A public reticulated wastewater system is not available to the site. The soils within the site are moderate to slow draining. As such, the use of on-site wastewater treatment and disposal systems is possible for the lots. It is proposed that each lot will be provided with an on-site wastewater treatment system at the time of development to discharge treated effluent to a suitable disposal field area.

KGA Geotechnical has completed an On-site Wastewater Treatment and Disposal Assessment for the proposed subdivision and subsequent development of the site. This has confirmed the wastewater treatment and dispersal requirements for the proposed lots. The Wastewater Assessment is included in Appendix D. The assessment has concluded that the proposed subdivision is suitable for on-site wastewater treatment and disposal.

Refer to Appendix A – Engineering Plan – Drawing 150-152 for the wastewater primary and secondary disposal areas that are proposed within the lots. The on-site disposal areas have been sized, designed and located as recommended by KGA Geotechnical and comply with setback requirements as per the Auckland Council Technical Publication 58 Guidelines.

9.0 Water Supply and Firefighting Supply Assessment

Potable water is not available from a reticulated source for the site. It is therefore proposed to capture and store water by means of rainwater harvesting using runoff from the roof areas discharging to rain tanks.

For the assessment of water demand for future development of the additional lots created by the development, it has been assumed the following for design purposes:

- roof area of the proposed dwelling = 400m^2
- occupancy of proposed dwelling = 6 people (based on TP58 Table 6.1 – Occupancy Allowances)

Based on the above, a typical water demand of 180 litres per person per day for the new dwellings (refer Auckland Council, "Technical Publication No. 58 – On-Site Wastewater Systems: Design and Management Manual", Third Edition 2004 Table 6.2 domestic Wastewater Flow Allowances – Per Capita) was adopted and equates to a maximum daily water supply demand of 1.08m^3/day for the new dwellings.

Tank sizing and capacity is determined on the basis that 100% of the water demand in the driest month (January or February) can be supplied at the design flow rate of 1.08m^3/day for the new dwellings, for the entire month.

Based on hydrological data from NIWA for the Auckland Region 1981-2010, the mean daily rainfall for January and February is 73.3mm/month and 66.1 mm/month respectively.

For the new dwellings based on an assumed roof area of 400m^2, the runoff per month generated will be 29.3m^3/month in January and 26.4m^3/month in February. This equates to 0.94m^3/day for both months (based on 31 days in January and 28 days in February).

For the proposed dwellings, a minimum storage volume of 29.3m^3 is required so providing two 35,000L tanks would mean that there would be adequate water supply storage for water generated from the roof runoff in January or February to meet the predicted demand assuming full occupancy.

It is noted that imported water may be required where there is higher demand or in extended dry weather periods.

It is proposed to use rainwater tanks to provide for stormwater mitigation and water re-use within the lots at the time of development. The tanks will provide storage for water usage for 30 days typically. The rainwater tank will be fitted with tap and pumps for re-use.

There are no fire hydrants available for firefighting water supplies within the site. The New Zealand Fire Service Firefighting Water Supplies Code of Practice guideline (SNZ PAS 4509:2008) sets out methods of achieving a minimum volume supply of water for firefighting. The proposed lots would be classified as an FW2 as per Table 1 below.

Table 1 – Method for determining required water supply classification

Sprinklered structures															
Category	**Water supply classification (see table 2)**														
Single family homes with a sprinkler system installed to an approved Standard	FW1														
All other structures (apart from single family homes) with a sprinkler system installed to an approved Standard	FW2														
Non-sprinklered structures															
Category	**Water supply classification (see table 2)**														
Housing; includes single family dwellings, multi-unit dwellings, but excludes multi-storey apartment blocks	FW2														
All other structures (characterised by fire hazard category[1]), examples of which are given below	**Water supply classification (see table 2)**														
	Floor area of largest firecell of the building (m^2)														
	0-199[10]	200-399	400-599	600-799	800-999	1000-1199	1200-1399	1400-1599	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599	2600-2799	> 2800
FHC 1[2]	FW3	FW3	FW3	FW4	FW4	FW4	FW5	FW5	FW5	FW5	FW5	FW5	FW5	FW5	FW6
FHC 2[3]	FW3	FW3	FW4	FW5	FW5	FW5	FW6	FW6	FW6	FW7	FW7	FW7	FW7	FW7	FW7
FHC 3[4]	FW3	FW4	FW5	FW5	FW6	FW6	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7
FHC 4[5]	FW4	FW6	FW6	FW6	FW6	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7	FW7
For special or isolated hazards not covered in above categories [9]	FW7														

NOTE –
(1) Fire hazard category as defined in the compliance documents for the New Zealand Building Code, Acceptable Solution C/AS1.
(2) FHC 1 is sleeping activities including care facilities, motels, hotels, hostels; crowd activities of <100 people including cinemas, art galleries, community halls, lecture halls, churches; working/business/storage activities processing non-combustible materials such as wineries, cattle yards, horticultural products; multistorey apartment blocks.
(3) FHC 2 is crowd activities of >100 people, libraries, book storage, night clubs, restaurants; working/business/storage activities with low fire load such as hairdressers, banks, medical consulting rooms, offices.
(4) FHC 3 is working/business/storage activities with medium fire load such as manufacturing, processing, bulk storage up to 3 metres.
(5) FHC 4 is working/business/storage activities with high fire load such as chemical manufacturing, feed mills, plastics manufacturing, supermarkets or other stores with bulk display over 3 metres.
(6) For special or isolated fire hazards in an area with a lower water supply classification, an assessment should be carried out to determine measures to mitigate the hazard or increase the water supply (see 4.4).
(7) The values in the table were determined by heat release rate modelling for fully developed fires.
(8) All non-sprinkler protected structures, except houses, have an entry level of FW3.
(9) Examples of special or isolated hazards may include bulk fuel installations, timber yards, tyre dumps, wood chip stock piles, recycle depots, and marinas.
(10) For non-sprinkler protected fire hazard category 1 structures less than 50 m^2 in floor area, the FW3 requirement may be reduced by up to 50% with the agreement of the Fire Region Manager. Examples of the sorts of structures intended to be covered by this comment are predominantly garages, sheds, and outbuildings.

SNZ PAS 4509:2008

Table 1: SNZ PAS 4509:2008 - Method for determining required water supply classification.

A FW2 classified building in a non-reticulated water supply area will require a minimum water storage of 45m^3 (45,000 litres) for 30 mins within 90m of the building. Based on the proposal for two 35,000L rainwater tanks for each lot, there would be enough water volume to meet this requirement. It is recommended that the water tanks on each lot to be installed at a location that allows for ease of access for the fire service in the event of a fire. A Fire-fighting coupling will be fitted at the bottom of the tanks.

Table 2 – Method for determining firefighting water supply

	Reticulated water supply			Non-reticulated water supply	
Fire water classification	**Required water flow within a distance of 135 m**	**Additional water flow within a distance of 270 m**	**Maximum number of fire hydrants to provide flow**	**Minimum water storage within a distance of 90 m (see Note 8)**	
				Time (firefighting) (min)	**Volume (m^3)**
FW1	450 L/min (7.5 L/s) (See Note 3)	–	1	15	7
FW2	750 L/min (12.5 L/s)	750 L/min (12.5 L/s)	2	30	45
FW3	1500 L/min (25 L/s)	1500 L/min (25 L/s)	3	60	180
FW4	3000 L/min	3000 L/min	4	90	540

Table 2: SNZ PAS 4509:2008 - Method for determining fighting water supply.

10.0 Utilities

There are network utility services available within Clevedon – Kawakawa Road. The existing power and telecommunications will be extended to service the development.

11.0 Conclusion

11.1 General

The proposal to subdivide the site at 272 and 278 Clevedon-Kawakawa Road and create 11 Countryside Living lots is considered feasible through the illustrated stormwater, wastewater, water supply and access in accordance with relevant Auckland Unitary Plan (Operative in part) requirements, engineering standards and construction good practice.

The site is located within a flood plain and coastal inundation however the proposed mitigation measures set out in this report are considered appropriate in mitigating any adverse effects associated with the flood plain and costal inundation.

It is considered that this site is able to be suitably services, based on the recommendations in this report and that resource consent conditions may be set to allow development in accordance with Council Development Standards.

11.2 Earthworks

Mitigation of effects of construction and subsequent use are able to be practically undertaken. Sediment controls will be installed to mitigate the potential adverse effects of sediment laden runoff from earthworks. Construction of infrastructure is feasible to serve the proposed development, with minimal adverse effects.

11.3 Stormwater

The proposed development will increase the area of impermeable surface. It is therefore necessary to provide on-site mitigation for this increase in impermeable area for the 2-year, 10-year and 100-year storm events.
The stormwater runoff from the proposed dwellings will flow to roof water reuse tanks to provide a water supply and the overflow will be piped for sheet flow discharge over pasture via level spreader devices to natural drainage.

The proposed mitigation has the effect of reducing peak flows and volumes from the proposed development compared to the pre-development situation.

11.4 Wastewater

The proposed development lots would discharge to new proprietary domestic wastewater treatment devices.
The treated effluent should be discharged to a suitably sized land disposal area and adequate reserve areas should also be provided.

The primary discharge area should be located based on the following parameters:

- 1.5m from a property boundary
- 3m from a dwelling
- 15m for a surface water feature
- 3m from a retaining wall
- 20m from a water bore

Sufficient area is available at the site to discharge treated effluent via compensating drip lines. The soils are expected to provide final treatment of effluent prior to entering groundwater, and adverse effects on the environment are expected to be no more than minor.

The proposed system is designed to produce a high quality environmentally benign effluent. The land discharge area is being loaded conservatively and the design is in accordance with TP58;

12.0 Limitations

This report has been prepared solely for the benefit of our client **Stratford Properties Ltd** with respect of the brief and it may not be relied upon in other contexts for any other purpose without the approval of Lands and Survey (Auckland) Ltd. Neither Lands and Survey (Auckland) Ltd nor any employee or sub-consultant accepts any responsibility with respect to its use, either in full or in part, by any other person or entity. This disclaimer

shall apply notwithstanding that the report may be made available to other persons including Council for an application for permission, approval or to fulfil a legal requirement.

Appendix A - Engineering and Infrastructure Plans

Appendix B – Flood Risk and Stormwater Assessment Report

Appendix C – Swale and Culvert Calculation and HecHMS Outputs

Appendix D – On-site Wastewater Treatment and Disposal Assessment Report

278 CLEVEDON-KAWAKAWA ROAD, CLEVEDON

RESOURCE CONSENT PLANS

117536-000	COVER SHEET
117536-010	GENERAL STANDARD NOTES
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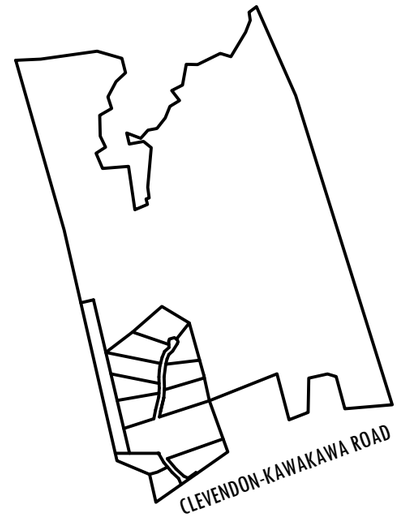
117536-300	STORMWATER LONG SECTION & TYPICAL INLET/OUTLET WINGWALL DETAILS
117536-340	STORMWATER TANK TYPICAL DETAILS



LOCALITY PLAN

SCALE (A3)NOT TO SCALE

SCALE BAR

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278 CLEVEDON-KAWAKAWA ROAD CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
1	ORIGINAL ISSUE	RW	18/06/19

SURVEYED	PG	12/18
DESIGNED	PL	12/06/19
DRAWN	RW	18/06/19
APPROVED	TG	/06/19

DRAWING REFERENCE: 117536- 000

REV: A

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PRE-CONSTRUCTION NOTES:

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE AND ACCURATELY CONFIRM INVERT AND LID LEVELS OF EXISTING STORMWATER MANHOLES AND CONNECTION POINTS PRIOR TO COMMENCING CONSTRUCTION. WHERE LEVELS DIFFER TO THOSE SHOWN THE CONTRACTOR SHALL ADVISE THE ENGINEER ACCORDINGLY.
2. THE DRAWINGS DO NOT NECESSARILY SHOW ALL EXISTING SERVICES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ACCURATELY LOCATE AND PROTECT ALL EXISTING SERVICES DURING THE CONSTRUCTION PERIOD USING "BEFORE U DIG" AND OR SUITABLE SERVICES AND PRE-START APPROVAL.

ROADING AND PAVEMENT NOTES:

1. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL CODE OF PRACTICE AND ANY AMENDMENTS INCLUDING LOCAL INTERPRETATIONS AND SPECIFICATIONS.
2. ALL EXTRUDED/INSITU CONCRETE TO BE MIN. 20 MPa STRENGTH AT 28 DAYS.
3. ALL UNDERCHANNEL DRAINS TO BE LAID IN TNZ F/2 OR SIMILAR APPROVED DRAINAGE MATERIAL AND HAVE FREE-FLOWING OUTLET TO NEAREST DOWNSTREAM CATCHPIT.
4. ALL FOOTPATHS TO COMPRISE 100mm THICK 20MPa BROOM FINISH CONCRETE ON MIN. 100mm COMPACTED DEPTH GAP40 BASECOURSE.
5. ALL REINFORCING SHALL BE PLACED ON APPROVED CHAIRS AND IS TO BE PLACED CENTRALLY OR AS PER DESIGN PLANS. FOR TWIN LAYERS OF REINFORCING THE PAIRS OF CHAIRS TO MEET HEIGHT REQUIREMENTS SHALL BE USED TO ENSURE REINFORCING IS AS PER SPECIFICATION.
6. ALL FOOTPATH SAWCUTS ARE TO COINCIDE WITH KERB SAWCUTS AT 3m CRS TYP. UNLESS NOTED OTHERWISE.
7. PAVEMENT DESIGN IS PROVISIONAL ONLY AND INSITU SUBGRADE STRENGTH SHALL BE CONFIRMED VIA SCALA PENETROMETER TESTING FOLLOWING TRIMMING AND PROOF ROLLING OF THE SUBGRADE TO CONFIRM FINAL PAVEMENT THICKNESS AND ANY SUBGRADE IMPROVEMENT WORKS i.e. UNDERCUTTING, MOISTURE CONTENT CORRECTION AND / OR STABILISATION. THE ENGINEER IS TO INSPECT, TEST AND APPROVE ALL SUBGRADES PRIOR TO AGGREGATE PLACEMENT, CLOTH AND / OR GEOGRID PLACEMENT.
8. ALL SUBGRADES SHALL BE TRIMMED WITHIN +/- 10mm TOLERANCE TO DESIGN LEVELS AND SHALL BE STRUNG AND APPROVED PRIOR TO METAL COURSE PLACEMENT.
9. REFER TO PAVEMENT DRAWING FOR SPECIFIC REQUIREMENT.

WASTEWATER NOTES:

1. ALL WORKS AND MATERIALS TO COMPLY WITH COUNCIL CODE OF PRACTICE AND ANY AMENDMENTS INCLUDING LOCAL INTERPRETATIONS AND SPECIFICATIONS.
2. ALL PRIVATE DRAINAGE WORKS TO COMPLY WITH THE NEW ZEALAND BUILDING CODE.
3. ALL DRAINAGE WORKS SHALL BE CARRIED OUT UNDER THE SUPERVISION OF A REGISTERED DRAIN LAYER AND IN ACCORDANCE WITH CURRENT HEALTH AND SAFETY PRACTICES. WHERE REQUIRED, DRAINAGE WORKS ARE TO BE UNDERTAKEN BY AN APPROVED LICENSED CONTRACTOR (A.L.C.)
4. ALL WASTEWATER MAIN PIPELINES ARE TO BE MIN. DN 150 SN16 uPVC OR 180OD HDPE100 PIPE UNLESS SHOWN OTHERWISE.
5. ALL MANHOLES ARE TO BE MIN. DN 1050 FITTED WITH HEAVY DUTY D.I. HINGED LID AND FRAME, INCLUDING STAINLESS STEEL SAFETY GRILLE AS PER STANDARDS.
6. MANHOLES OVER 3.5m DEPTH TO BE DN 1200. INCL. MANHOLES WITH INTERNAL DROP CONNECTIONS AS PER CODE OF PRACTICE.
7. ALL ORDINARY TRENCH BACKFILL SHALL COMPRISE SUITABLE EARTHFILL FREE OF TOPSOIL/ORGANICS AND SHALL BE WELL COMPACTED IN LAYERS NOT EXCEEDING 200mm TO ACHIEVE MINIMUM SHEAR STRENGTHS OF 140 KPA/MAX. 10% AIR VOIDS OR AS PER THE EARTHWORKS SPECIFICATION.
8. ALL WASTEWATER PIPES TO BE INSPECTED BY CCTV WITH THE VIDEO AND INSPECTION LOG PROVIDED FOR INSPECTION AND THEREAFTER SUBMISSION TO COUNCIL.
9. ALL PIPE CROSSINGS UNDER CARRIAGEWAYS/TRAFFIC AREAS TO BE HARDFILL BACKFILLED WITH APPROVED GAP65 IN MAX. 150mm LAYERS TO 1.0m BEYOND EXTENT CARRIAGEWAY. TRENCH HARDFILL BACKFILL TO BE WELL COMPACTED TO ACHIEVE MIN. CLEGG HAMMER CIV=20.
10. ALL PIPE CROSS OVERS ARE TO BE HARDFILL BACKFILLED 1.0m EITHER SIDE OF CROSSOVER.
11. WHERE CLEARANCE BETWEEN PIPELINE CROSSOVERS IS LESS THAN 500mm THE GAP IS TO BE POLYSTYRENE PACKED IN ADDITION TO HARDFILLING OF CROSSOVERS.

STORMWATER NOTES:

1. ALL WORKS AND MATERIALS TO COMPLY WITH COUNCIL CODE OF PRACTICE AND ANY AMENDMENTS INCLUDING LOCAL INTERPRETATIONS AND SPECIFICATIONS.
2. ALL PRIVATE DRAINAGE WORKS TO COMPLY WITH THE NEW ZEALAND BUILDING CODE.
3. ALL DRAINAGE WORKS SHALL BE CARRIED OUT UNDER THE SUPERVISION OF A REGISTERED DRAIN LAYER AND IN ACCORDANCE WITH CURRENT HEALTH AND SAFETY PRACTICES. WHERE REQUIRED, DRAINAGE WORKS ARE TO BE UNDERTAKEN BY AN APPROVED LICENSED CONTRACTOR (A.L.C.)
4. ALL PIPE CROSSINGS UNDER CARRIAGEWAYS/TRAFFIC AREAS TO BE HARDFILL BACKFILLED WITH APPROVED GAP65 IN MAX. 150mm LAYERS TO 1.0m BEYOND EXTENT CARRIAGEWAY. TRENCH HARDFILL BACKFILL TO BE WELL COMPACTED TO ACHIEVE MIN. CLEGG HAMMER CIV=20.
5. WHERE CLEARANCE BETWEEN PIPELINE CROSSOVERS IS LESS THAN 300mm THE GAP IS TO BE POLYSTYRENE PACKED IN ADDITION TO HARDFILLING OF CROSSOVERS.
6. ALL CONNECTIONS ARE TO BE DN 100 UNLESS SHOWN OTHERWISE AND DIMENSIONED FROM THE DOWNSTREAM MANHOLE.
7. ALL EXISTING BERMS, CARRIAGEWAYS AND CROSSINGS TO BE RE-INSTATED AS PER COUNCIL/CONTROLLING AUTHORITY REQUIREMENTS.
8. ALL WASTEWATER PIPES TO BE INSPECTED BY CCTV WITH THE VIDEO AND INSPECTION LOG PROVIDED FOR INSPECTION AND THEREAFTER SUBMISSION TO COUNCIL.

WATER SUPPLY NOTES:

1. ALL WORKS AND MATERIALS TO COMPLY WITH COUNCIL CODE OF PRACTICE AND ANY AMENDMENTS INCLUDING LOCAL INTERPRETATIONS AND SPECIFICATIONS.
2. ALL WATERMAINS ARE TO BE POSITIONED IN ACCORDANCE WITH COMMON SERVICES TRENCH DETAILS UNLESS SHOWN OTHERWISE.
3. ALL WATERMAIN SHALL HAVE MIN. 600mm COVER IN BERMS AND MIN. 900mm COVER IN CARRIAGEWAYS.
4. ALL WORKS ON THE EXISTING WATER NETWORK IS TO BE UNDERTAKEN BY AN APPROVED LICENSED CONTRACTOR (A.L.C.).
5. ALL SERVICE CONNECTIONS TO BE DN 20 UNLESS SHOWN OTHERWISE.
6. ALL RIDERMAINS/WATERMAINS DN 50-300 TO COMPRISE MDPE PE80AS/NZS 4130/2003 PN12 SDR11 COLOURED BLUE AND INCLUDE TRACER WIRE.
7. THE CONTRACTOR IS TO FIX BY SURVEY ALL CHANGES IN DIRECTION AND/OR DEPTH OF THE PROPOSED WATERMAIN.
8. ALL TRENCHES UNDER THE CARRIAGEWAY ARE TO BE BACKFILLED WITH HARDFILL GAP65 IN MAX. 150mm LAYERS. ALL ROAD CROSSINGS SHALL HAVE MINIMUM OF 900mm COVER.
9. WHERE CLEARANCE BETWEEN PIPELINE CROSSOVERS IS LESS THAN 300mm THE GAP IS TO BE POLYSTYRENE PACKED IN ADDITION TO HARDFILLING CROSSOVERS.
10. ALL TEES, BENDS AND REDUCERS SHALL BE FLANGED DI AND PROVIDED WITH ANCHOR BLOCK.
11. ALL VALVES ARE TO BE LAID IN GRASS BERMS, WHERE VALVE/HYDRANT BOXES ARE REQUIRED LIDS TO BE FLUSH WITH CONCRETE FINISHED LEVEL.
12. THE DRAWINGS DO NOT NECESSARILY SHOW ALL EXISTING SERVICES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ACCURATELY LOCATE AND PROTECT ALL EXISTING SERVICES DURING THE CONSTRUCTION PERIOD.

EROSION AND SEDIMENT CONTROL

1. IT IS THE CONTRACTORS RESPONSIBILITY TO BE FAMILAR WITH AUCKLAND COUNCIL STANDARD AND AC TECHNICAL GUIDELINE GD05

SCALE (A3)NOT TO SCALE

SCALE BAR

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DRAWING TITLE:

GENERAL STANDARD NOTES

CLIENT ADDRESS:

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RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	18/06/19

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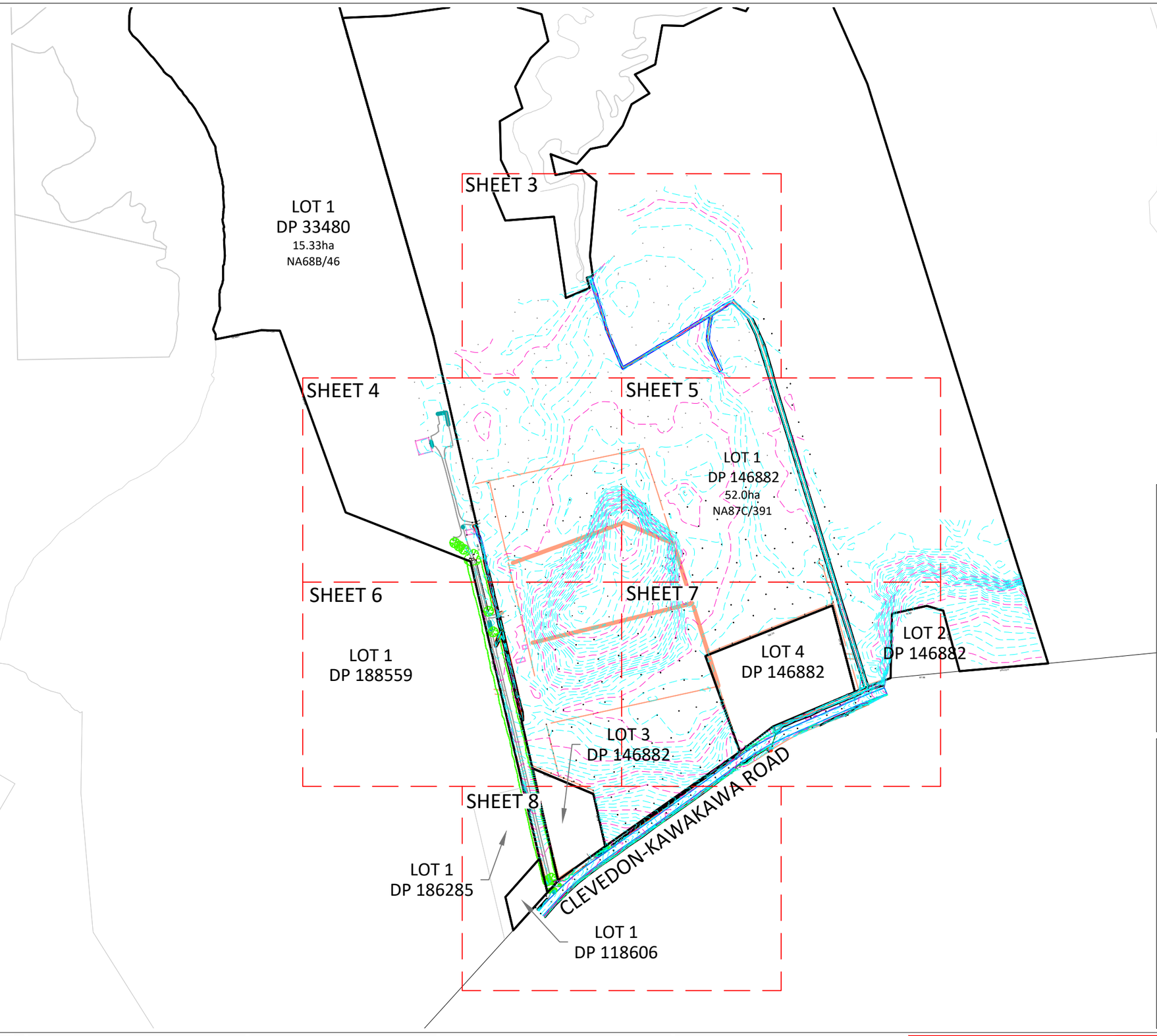
APPROVED	TG	06/19

DRAWING REFERENCE: 117536- 010

REV: A



NOTES:

1. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT, GEODETIC 2000.
   ORIGIN: CE43 AE2M
   mN 788335.92
   mE 425775.36
2. LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946 (Source: April 2016)
   ORIGIN OF LEVELS:
   CE43 AE2M
   RL:17.27m
3. CONTOUR INTERVAL
   - MAJOR 1.00m
   - MINOR 0.5m
4. ALL SERVICES SHOWN ADOPTED FROM AUCKLAND COUNCIL GIS UNLESS STATED OTHERWISE

LEGEND:

- Boundary
- Abutting boundaries
- Road
- Contour minor
- Contour major
- Edge of concrete
- Fence
- SS — Wastewater pipe
- SW — Stormwater pipe
- Electrical pole
- MP — Telephone infrastructure post

SCALE (A3) 1:5000

SCALE BAR 0 50 100 150 200 250m

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A	ORIGINAL ISSUE	MV	23/11/18

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APPROVED	KH	23/11/18

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REV: A

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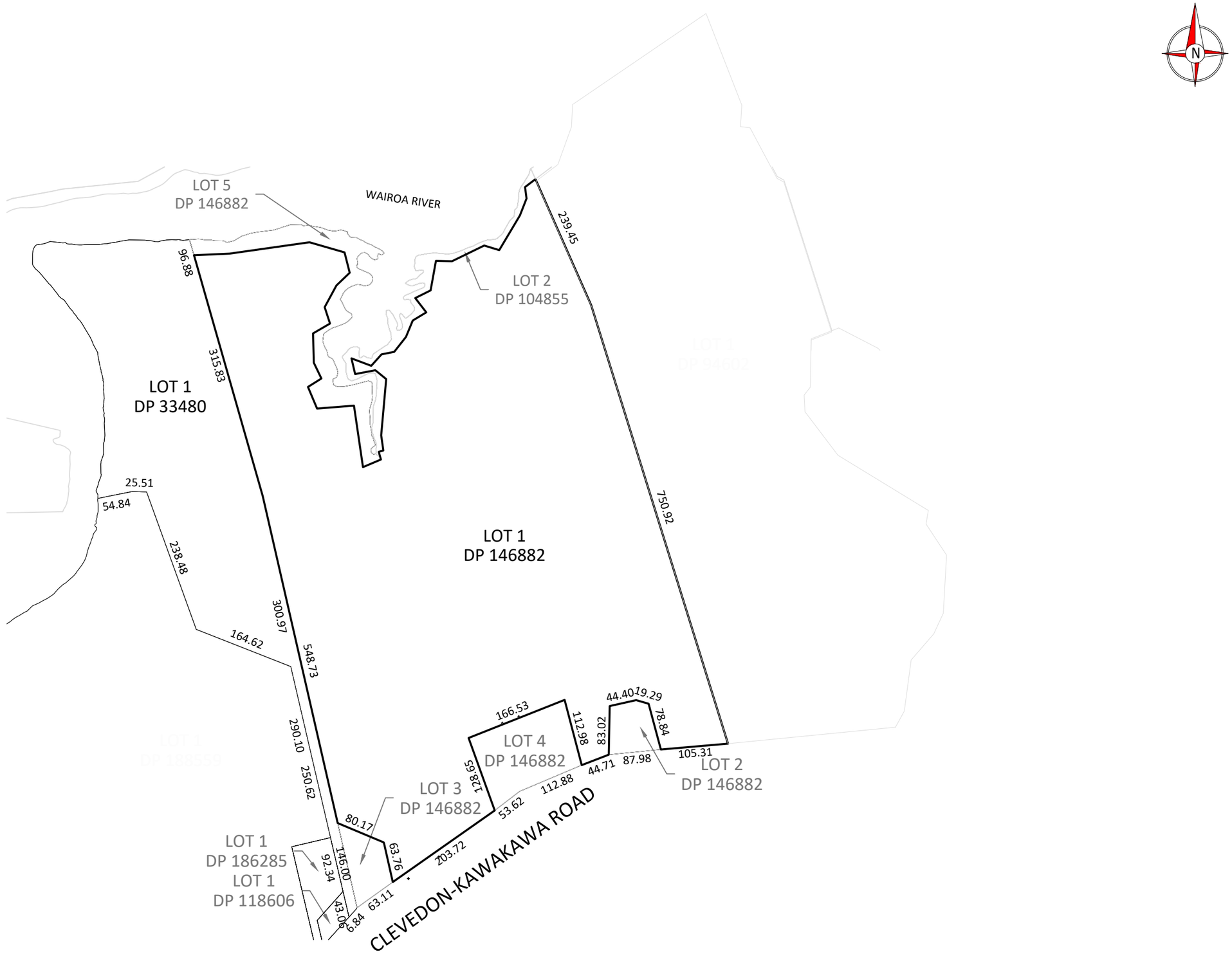

SCALE (A3) 1:1000

SCALE BAR
0 10 20 30 40 50m

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REV: A

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LOT 1
DP 146882
52.0ha
NA87C/391

PADDOCK

PADDOCK

DRAIN

DRAIN

DRAIN

DRAIN

DRAIN

SCALE (A3) 1:1000

SCALE BAR
0 10 20 30 40 50m

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DRAWING REFERENCE
117536-102

REV
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LOT 1
DP 33480
15.33ha
NA68B/46

LOT 1
DP 146882
52.0ha
NA87C/391

PADDOCK

BARN
FL:2.77

GARAGE

METAL TRACK

DRAIN

DRAIN

POST & WIRE FENCE

POST & WIRE FENCE

POST & WIRE FENCE

POST & WIRE FENCE

LINE OF TREES

PIPE INVERT: 1.57
PIPE TOP:1.63

300.97

164.62

548.73

PADDOCK

N

SCALE (A3) 1:1000

SCALE BAR
0 10 20 30 40 50m

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117536-103

REV
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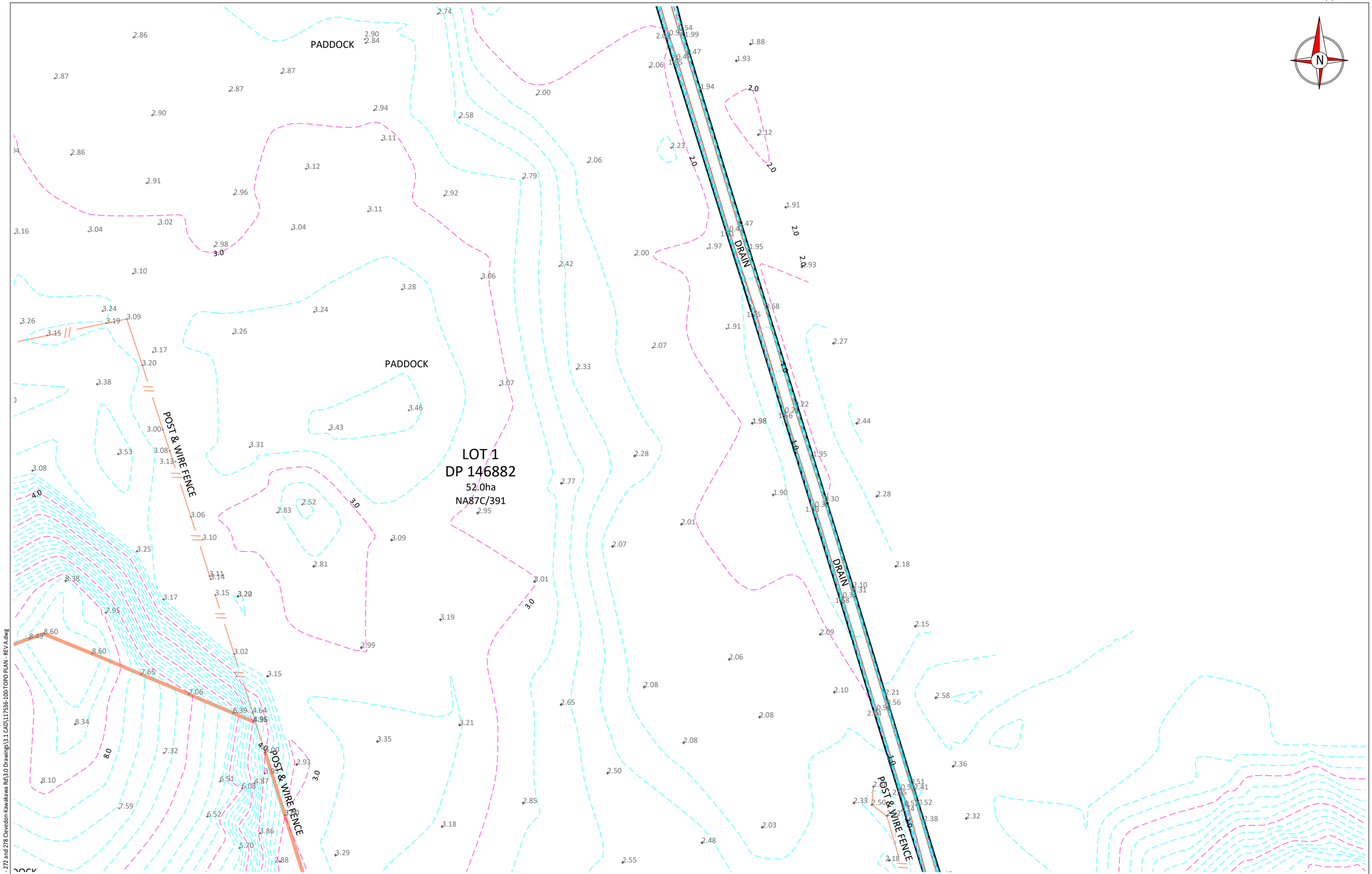

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SCALE (A3) 1:1000

SCALE BAR 0 10 20 30 40 50m

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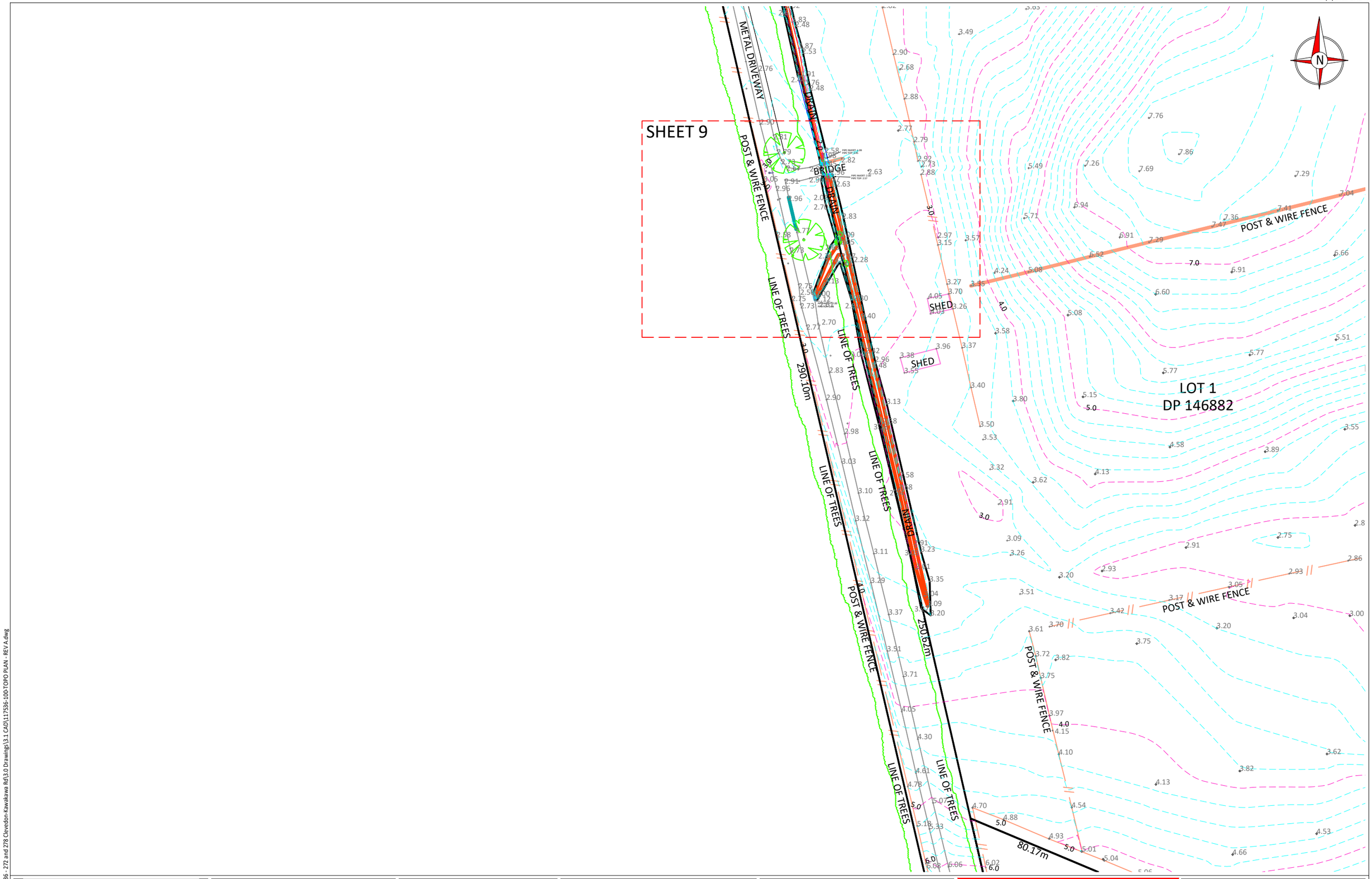

SCALE (A3) 1:1000

SCALE BAR 0 10 20 30 40 50m

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DOCK

PADDOCK

PADDOCK

PADDOCK

LOT 1
DP 146882

LOT 4
DP 146882

LOT 2
DP 146882

SHEET 10

POST & WIRE FENCE

166.53

112.98

83.02

44.40

87.98

128.65

DRAIN

BRIDGE

METAL DRIVEWAY

ROCK HEAD WALL

EDGE OF ROAD

EP

CLEVEDON-KAWAKAWA ROAD

N

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SCALE (A3) 1:1000

SCALE BAR
0 10 20 30 40 50m

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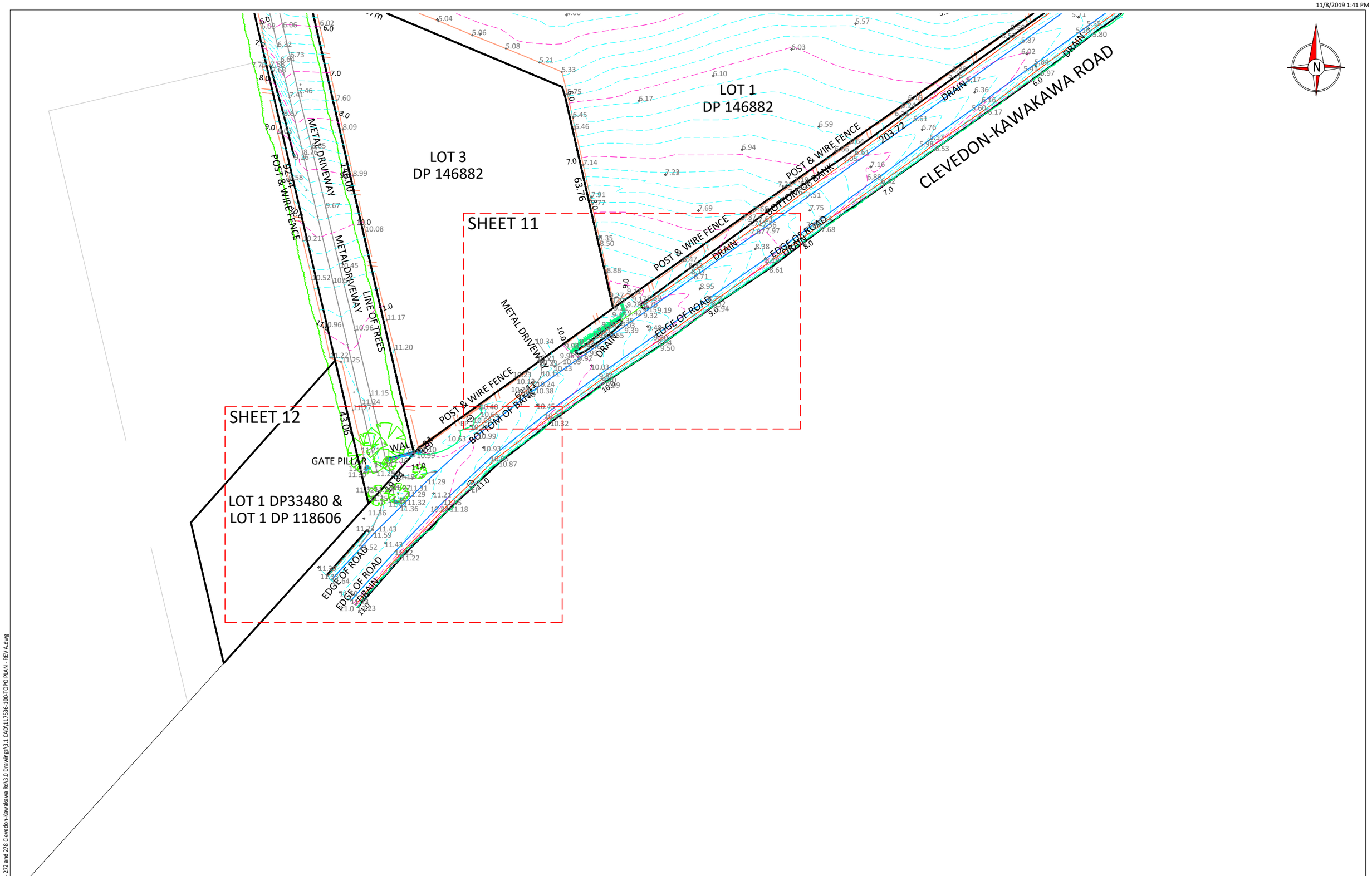

SCALE (A3) 1:1000

SCALE BAR 0 10 20 30 40 50m

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TOPOGRAPHICAL SURVEY
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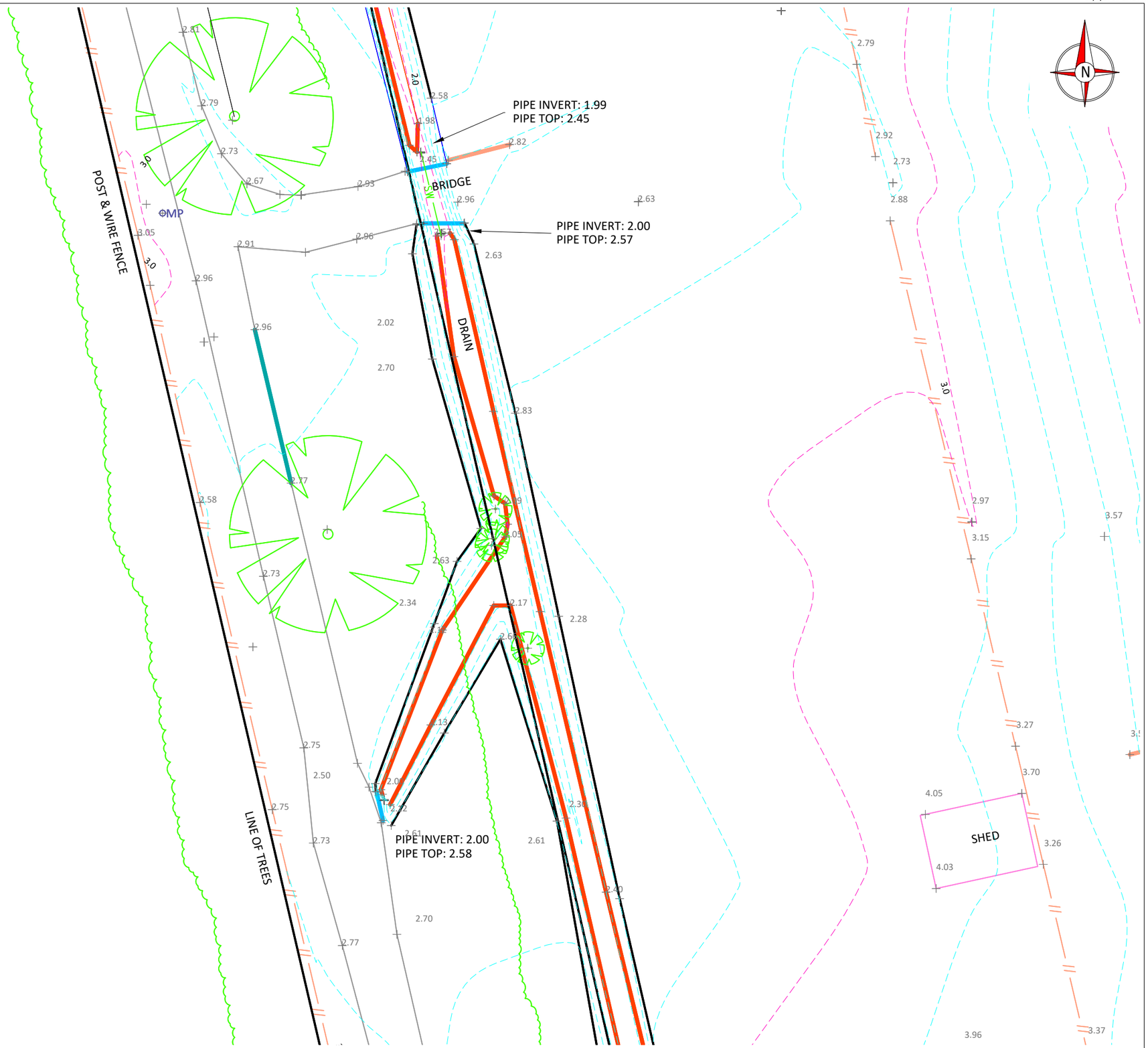

SCALE (A3) 1:250

SCALE BAR 0 2.5 5 7.5 10 12.5m

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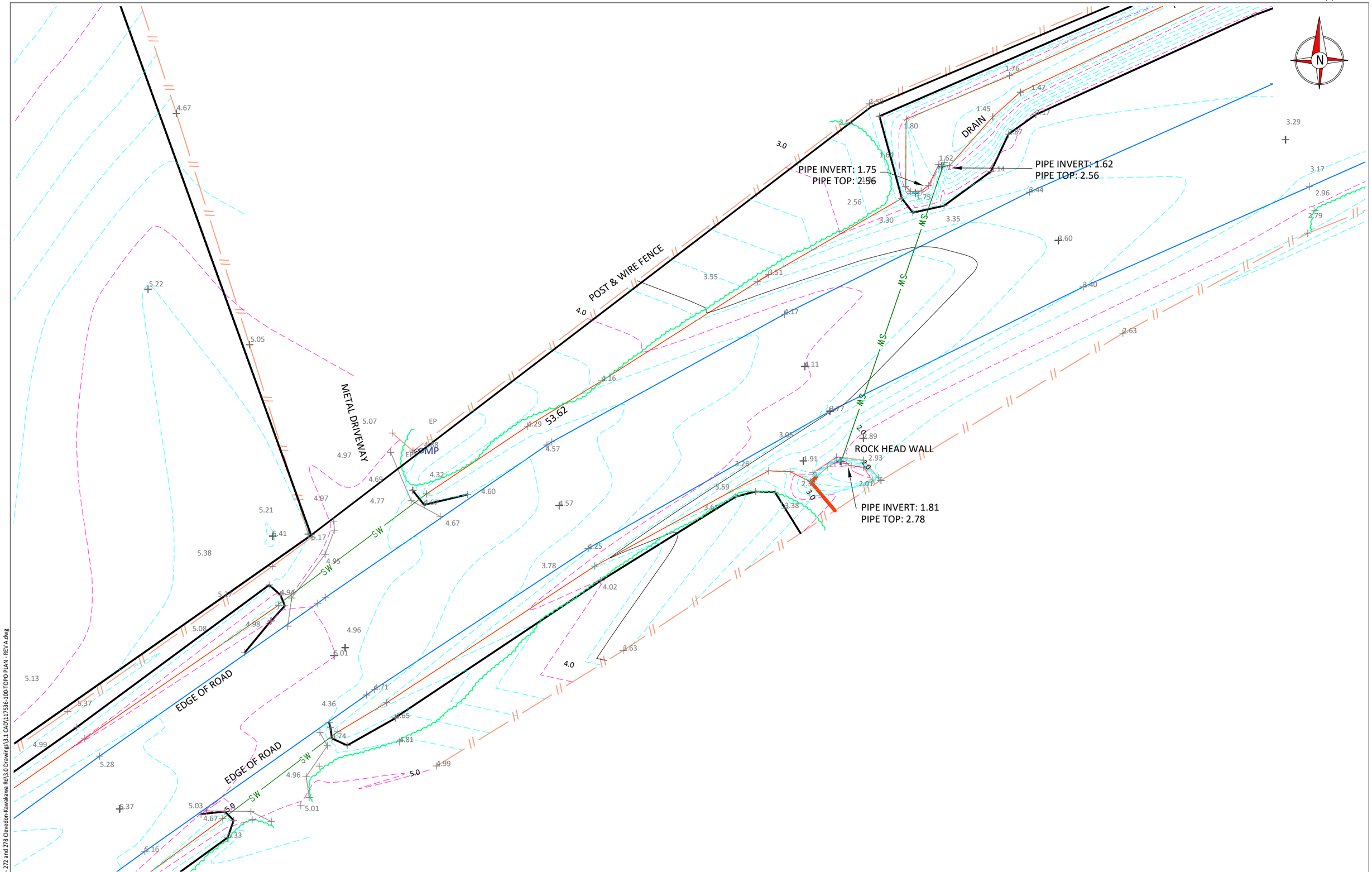

SCALE (A3) 1:250

SCALE BAR 0 2.5 5 7.5 10 12.5m

CAD AND PRODUCTION BY:

LANDS & SURVEY
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www.landsandsurvey.co.nz

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

DRAWING TITLE:

TOPOGRAPHICAL SURVEY SHEET 10/12

CLIENT ADDRESS:

LOT 1 DP 33480
276&278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	MV	23/11/18

SURVEYED	PG	15/11/18
DESIGNED		
DRAWN	MV	23/11/18
APPROVED	KH	23/11/18

DRAWING REFERENCE: 117536-109

REV: A

T:\Projects\117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-100-TOPO PLAN - REV A.dwg

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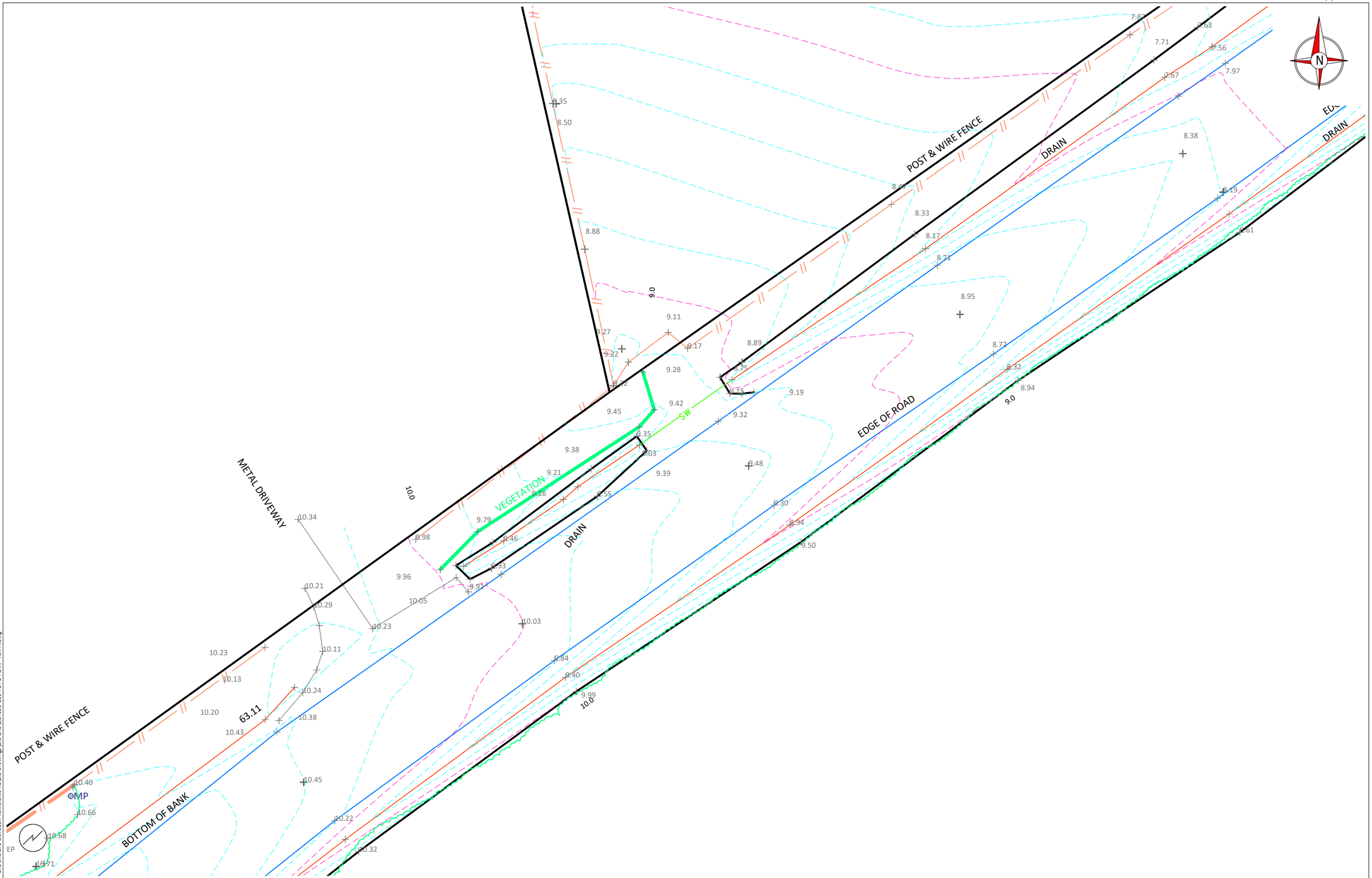

T:\Projects\117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-100-TOPO PLAN - REV A.dwg

SCALE (A3) 1:250

SCALE BAR
0 2.5 5 7.5 10 12.5m

CAD AND PRODUCTION BY:

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CLIENT NAME:

STRATFORD PROPERTIES LIMITED

DRAWING TITLE:

TOPOGRAPHICAL SURVEY
SHEET 11/12

CLIENT ADDRESS:

LOT 1 DP 33480
276&278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

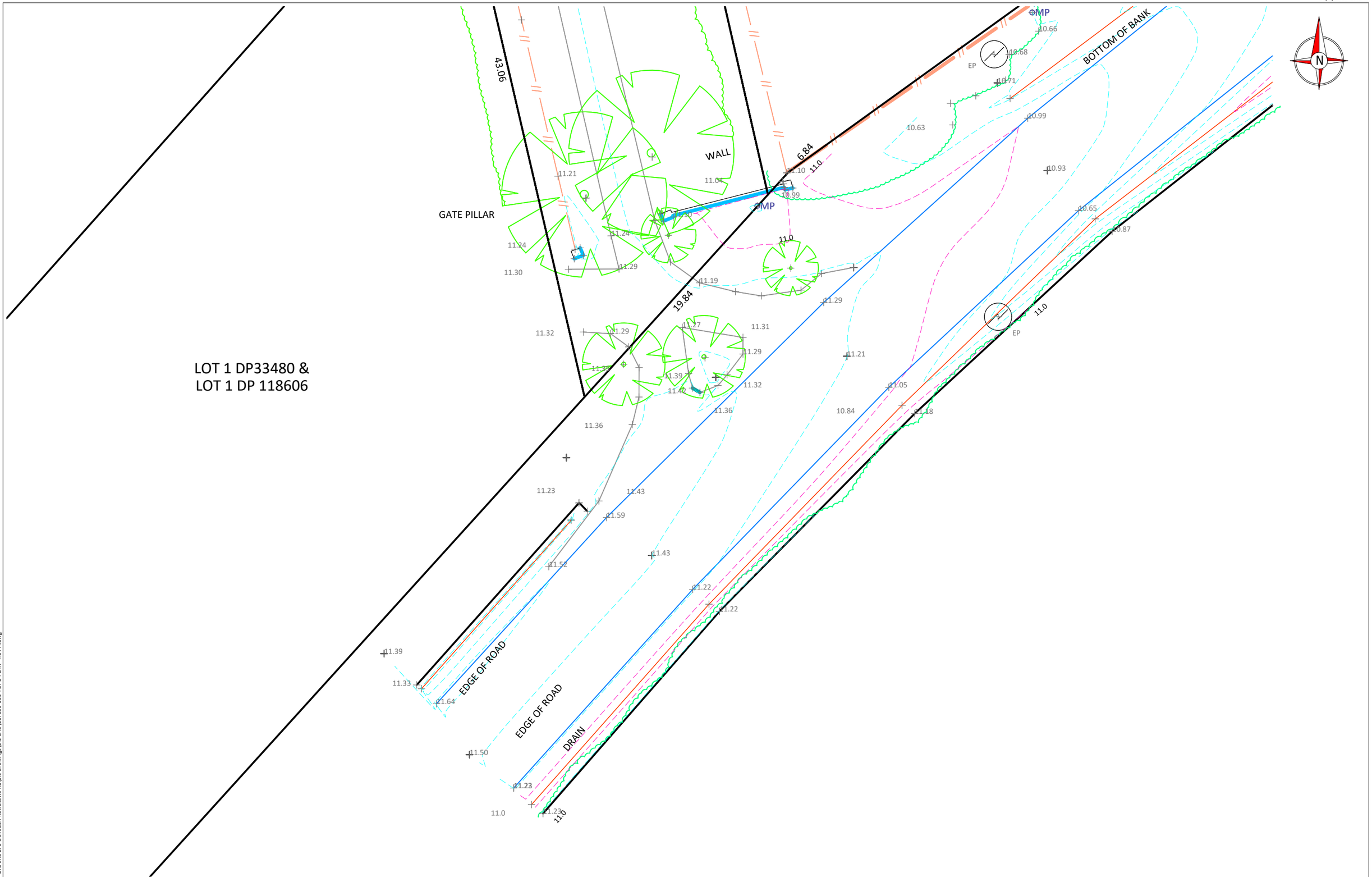
REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	MV	23/11/18

SURVEYED	PG	15/11/18
DESIGNED		
DRAWN	MV	23/11/18
APPROVED	KH	23/11/18

DRAWING REFERENCE: 117536-110

REV: A

11/8/2019 1:41 PM



SCALE (A3) 1:250

SCALE BAR
0 2.5 5 7.5 10 12.5m

CAD AND PRODUCTION BY:

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CLIENT NAME:

STRATFORD PROPERTIES LIMITED

DRAWING TITLE:

TOPOGRAPHICAL SURVEY
SHEET 12/12

CLIENT ADDRESS:

LOT 1 DP 33480
276&278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	MV	23/11/18

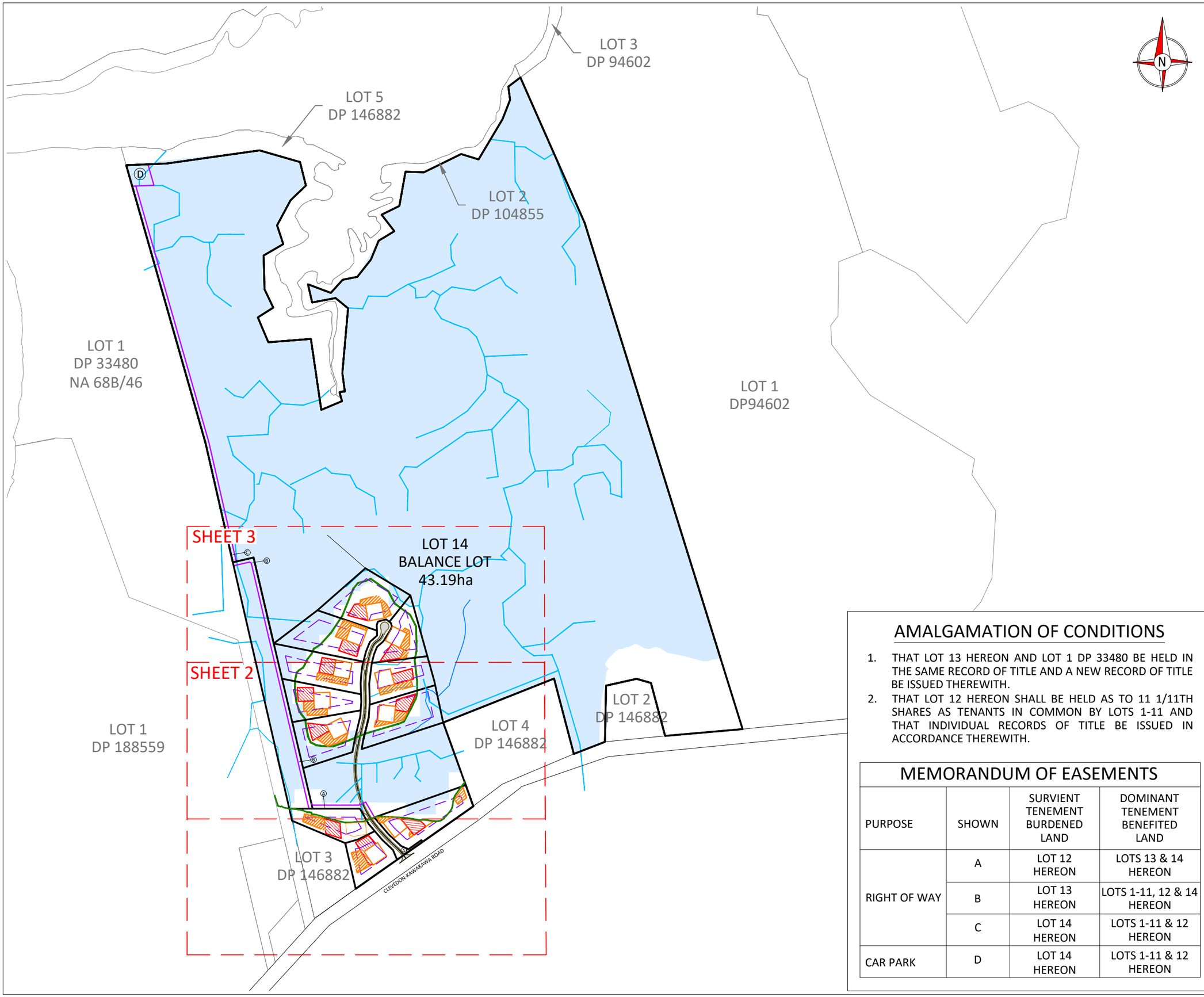
SURVEYED	PG	15/11/18
DESIGNED		
DRAWN	MV	23/11/18
APPROVED	KH	23/11/18

DRAWING REFERENCE: 117536-111

REV: A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-100-TOPO PLAN - REV A.dwg

Drawing Plotted: 11/8/2019 1:41 PM



NOTES:

1. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT, GEODETIC 2000.
   ORIGIN: CE43 AE2M
   mN 788335.92
   mE 425775.36
2. LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946.
   ORIGIN OF LEVELS:
   CE43 (GEOCODE AE2M)
   RL: 17.27m
3. CONTOUR INTERVAL
   - MAJOR 1.00m
   - MINOR 0.50m
4. FOR RESOURSE CONSENT PURPOSES ONLY.
5. AREAS AND MEASUREMENTS ARE SUBJECT TO SURVEY.

LEGEND:

- WW PRIMARY DISPOSAL AREA
- WW RESERVE DISPOSAL AREA
- BUILDING PLATFORM
- EASEMENT
- 12.0m SETBACK
- OVERLAND FLOW PATH
- GIS FLOOD PLAIN
- 4.4m FLOOD LEVEL

AMALGAMATION OF CONDITIONS

1. THAT LOT 13 HEREON AND LOT 1 DP 33480 BE HELD IN THE SAME RECORD OF TITLE AND A NEW RECORD OF TITLE BE ISSUED THEREWITH.
2. THAT LOT 12 HEREON SHALL BE HELD AS TO 11 1/11TH SHARES AS TENANTS IN COMMON BY LOTS 1-11 AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SURVIENT TENEMENT BURDENED LAND	DOMINANT TENEMENT BENEFITED LAND
RIGHT OF WAY	A	LOT 12 HEREON	LOTS 13 & 14 HEREON
	B	LOT 13 HEREON	LOTS 1-11, 12 & 14 HEREON
	C	LOT 14 HEREON	LOTS 1-11 & 12 HEREON
CAR PARK	D	LOT 14 HEREON	LOTS 1-11 & 12 HEREON

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED SUBDIVISION OF LOT 1 DP 146882 SCHEME PLAN - SHEET 1/3

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

276&278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RC	15/05/19
B	BDRYS ADJUSTED AND NEW AREAS	RW	29/05/19
C	BDRYS ADJUSTED AND NEW AREAS	RW	04/06/19
D	PRIMARY DISPOSAL AMENDED	RW	02/10/19
E	LOT 2 AREAS AMENDED	RW	09/10/19
SURVEYED		PG	19/12/18
DESIGNED			
DRAWN		RW	15/05/19
APPROVED		PL	15/05/19

SCALE (A3) 1:5000

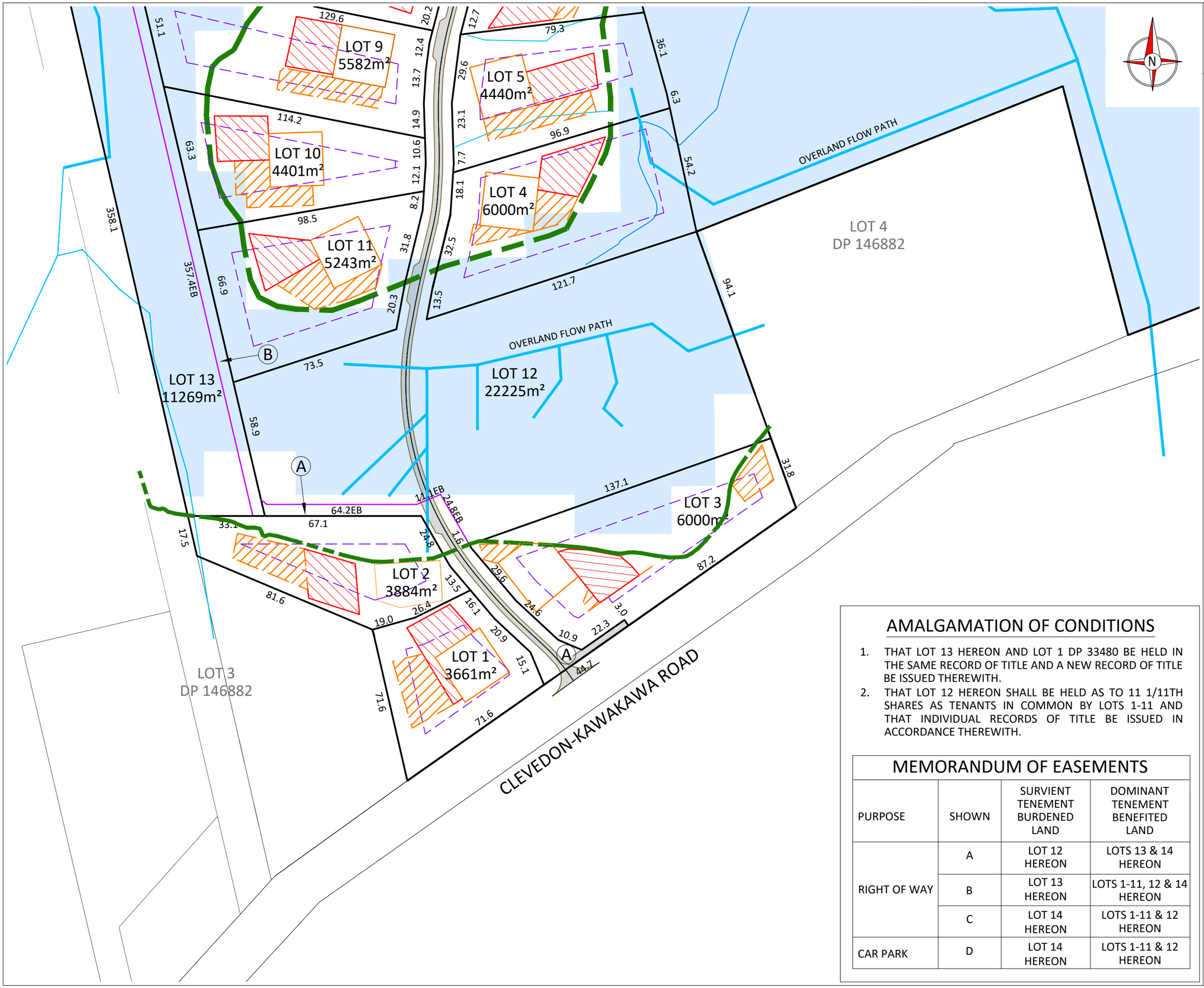
SCALE BAR
0 50 100 150 200 250m

DRAWING REFERENCE 117536- 150

REV E

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-150-152-SCHEME PLAN - REV E.dwg

Drawing Plotted: 11/8/2019 1:41 PM



AMALGAMATION OF CONDITIONS

1. THAT LOT 13 HEREON AND LOT 1 DP 33480 BE HELD IN THE SAME RECORD OF TITLE AND A NEW RECORD OF TITLE BE ISSUED THEREWITH.
2. THAT LOT 12 HEREON SHALL BE HELD AS TO 11 1/11TH SHARES AS TENANTS IN COMMON BY LOTS 1-11 AND THAT INDIVIDUAL RECORDS OF TITLE BE ISSUED IN ACCORDANCE THEREWITH.

MEMORANDUM OF EASEMENTS

PURPOSE	SHOWN	SURVIENT TENEMENT BURDENED LAND	DOMINANT TENEMENT BENEFITED LAND
RIGHT OF WAY	A	LOT 12 HEREON	LOTS 13 & 14 HEREON
	B	LOT 13 HEREON	LOTS 1-11, 12 & 14 HEREON
	C	LOT 14 HEREON	LOTS 1-11 & 12 HEREON
CAR PARK	D	LOT 14 HEREON	LOTS 1-11 & 12 HEREON

NOTES:

1. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT, GEODETIC 2000.
   ORIGIN: CE43 AE2M
   mN 788335.92
   mE 425775.36
2. LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946.
   ORIGIN OF LEVELS:
   CE43 (GEOCODE AE2M)
   RL: 17.27m
3. CONTOUR INTERVAL
   - MAJOR 1.00m
   - MINOR 0.50m
4. FOR RESOURSE CONSENT PURPOSES ONLY.
5. AREAS AND MEASUREMENTS ARE SUBJECT TO SURVEY.

LEGEND:

- WW PRIMARY DISPOSAL AREA
- WW RESERVE DISPOSAL AREA
- BUILDING PLATFORM
- EASEMENT
- 12.0m SETBACK
- OVERLAND FLOW PATH
- GIS FLOOD PLAIN
- 4.4m FLOOD LEVEL

CAD AND PRODUCTION BY:

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DRAWING TITLE:
PROPOSED SUBDIVISION OF LOT 1 DP 146882
SCHEME PLAN - SHEET 2/3

CLIENT NAME:
STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:
276&278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

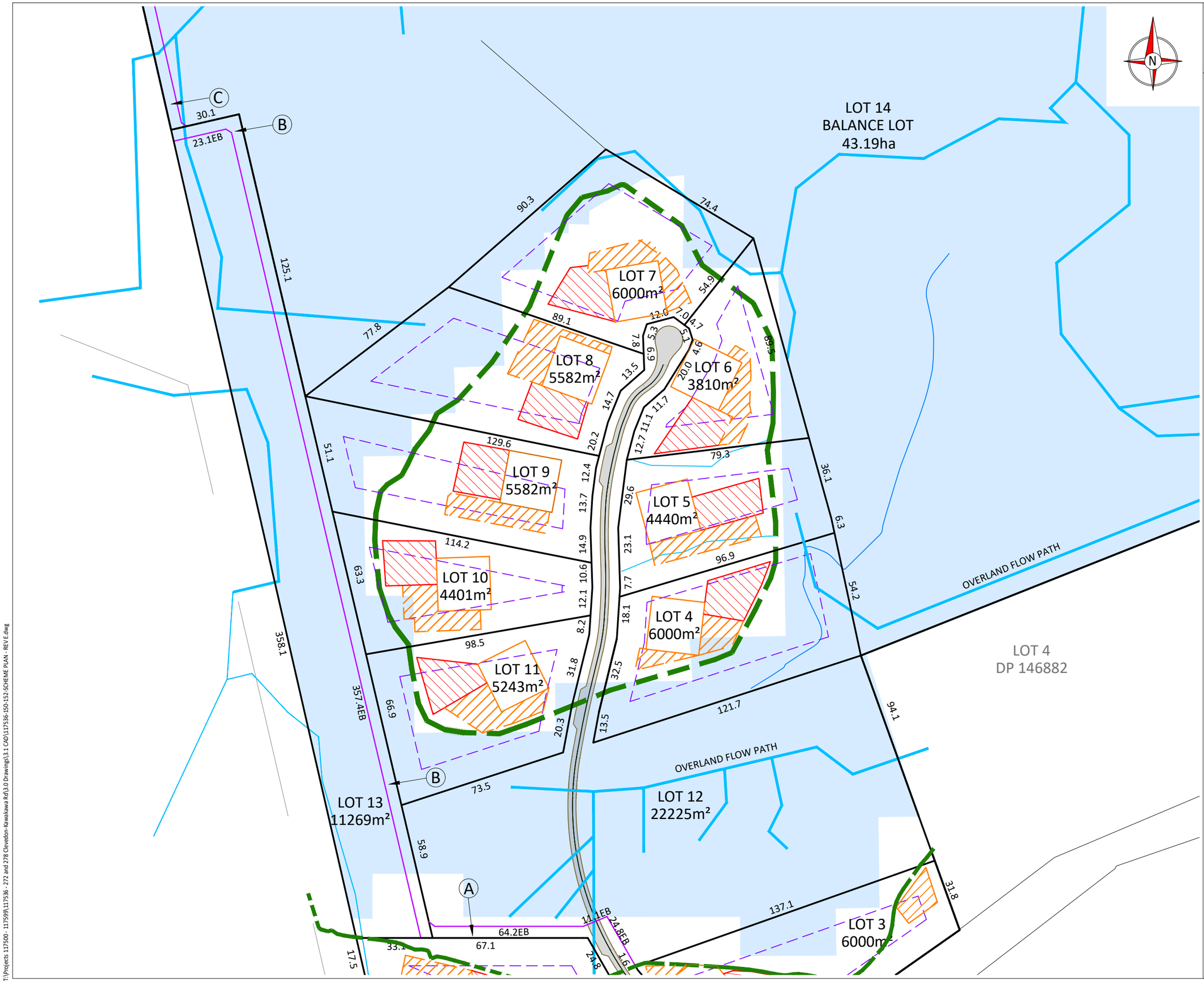
REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RC	15.05.19
B	BDRYS ADUSTED AND NEW AREAS	RW	29/05/19
C	BDRY AND AREAS AMENDED	RW	04/06/19
D	PRIMARY DISPOSAL AMENDED	RW	02/10/19
E	LOT 2 AREA AMENDED	RW	09/10/19
SURVEYED		PG	19/12/18
DESIGNED			
DRAWN		RW	15/05/19
APPROVED		TG	15/05/19

SCALE (A3) 1:1500
SCALE BAR 0 15 30 45 60 75m

DRAWING REFERENCE 117536-151
REV E

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-150-152-SCHEME PLAN - REV E.dwg

Drawing Plotted: 11/8/2019 1:41 PM



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NOTES:

1. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT, GEODETIC 2000.
   ORIGIN: CE43 AE2M
   mN 788335.92
   mE 425775.36
2. LEVELS ARE IN TERMS OF AUCKLAND VERTICAL DATUM 1946.
   ORIGIN OF LEVELS:
   CE43 (GEOCODE AE2M)
   RL: 17.27m
3. CONTOUR INTERVAL
   - MAJOR 1.00m
   - MINOR 0.50m
4. FOR RESOURSE CONSENT PURPOSES ONLY.
5. AREAS AND MEASUREMENTS ARE SUBJECT TO SURVEY.

LEGEND:

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- WW RESERVE DISPOSAL AREA
- BUILDING PLATFORM
- EASEMENT
- 12.0m SETBACK
- OVERLAND FLOW PATH
- GIS FLOOD PLAIN
- 4.4m FLOOD LEVEL

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED SUBDIVISION OF LOT 1 DP 146882 SCHEME PLAN - SHEET 3/3

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

276&278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RC	15/05/19
B	BDRYS ADJUSTED AND NEW AREAS	RW	29/05/19
C	BDRY AND AREAS ADJUSTED	RW	04/06/19
D	PRIMARY DISPOSAL AMENDED	RW	02/10/19
E	LOT 2 AREAS AMENDED	RW	09/10/19
SURVEYED		PG	19/12/18
DESIGNED			
DRAWN		RW	15/05/19
APPROVED		PL	15/05/19

SCALE (A3) 1:1500

SCALE BAR
0 15 30 45 60 75m

DRAWING REFERENCE 117536-152

REV E

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-150-152-SCHEME PLAN - REV E.dwg

Drawing Plotted: 11/8/2019 1:42 PM

SHEET 4

LOT 8

LOT 6

LOT 9

LOT 5

LOT 10

LOT 4

LOT 11

OVERLAND FLOW PATH

LOT 13

LOT 12

SHEET 3

LOT 2

LOT 3

LOT 1

SHEET 2

CLEVEDON-KAWAKAWA ROAD

N

NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES.
2. REFER TO KGA ON-SITE WASTEWATER TREATMENT AND DISPOSAL FOR RESIDENTIAL BUILDING REPORT FOR DETAILED DESIGN OF WASTEWATER DISPOSAL AREA FOR PROPOSED LOT.

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EXTENT OF EARTHWORKS
- GRASS BERM
- SWALE
- CONCRETE DRIVE
- WW PRIMARY DISPOSAL AREA
- WW RESERVE DISPOSAL AREA
- BUILDING PLATFORM

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED CONTOUR & WASTEWATER LAYOUT PLAN SHEET 1 OF 4

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
B	WASTEWATER FIELDS AMENDED	RW	08/11/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	08/11/19

SCALE (A3) 1:1500

SCALE BAR
0 15 30 45 60 75m

DRAWING REFERENCE: 117536- 200

REV: B

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-200-PROP. CONT & WASTEWATER PLAN.dwg

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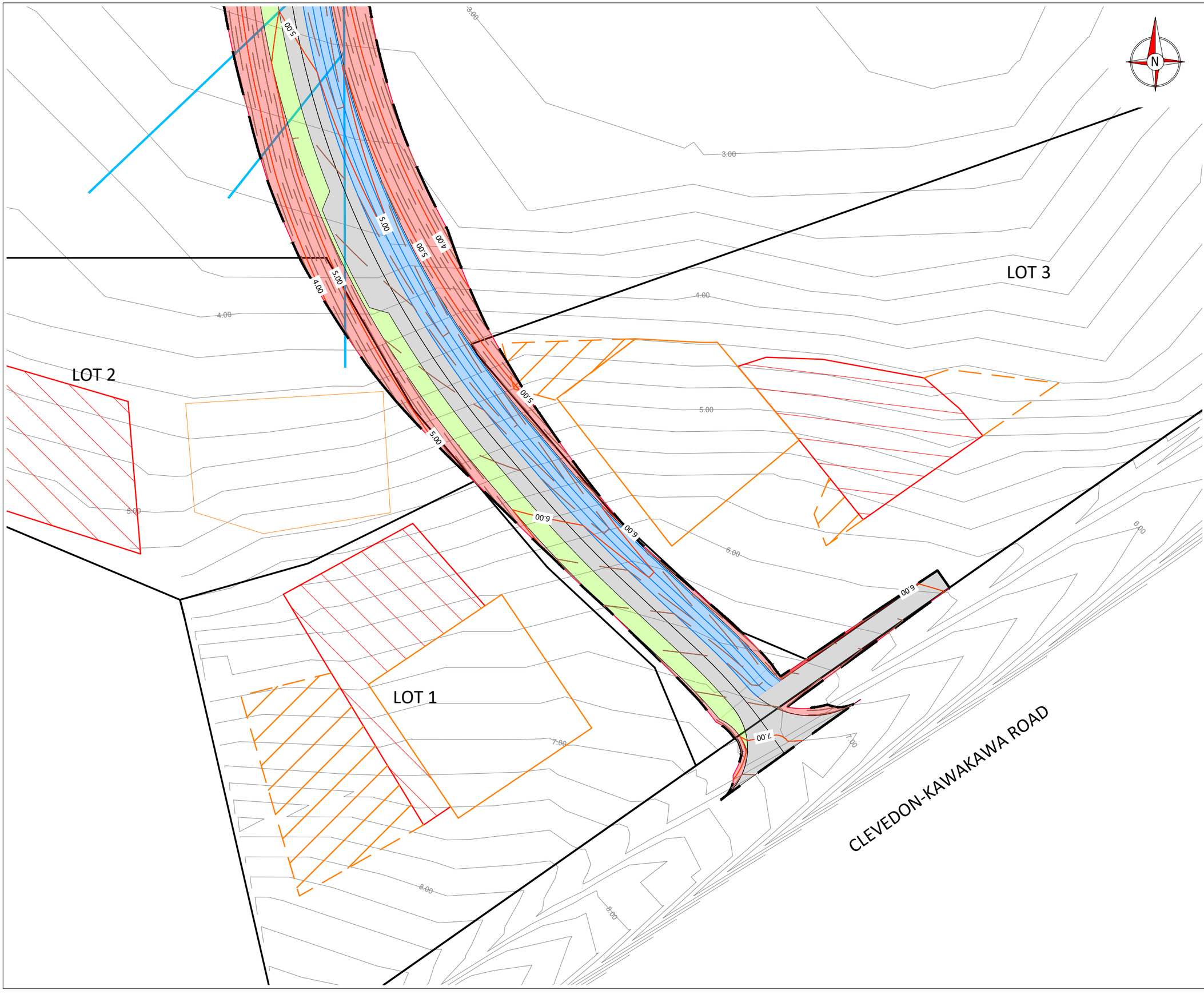

NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES.
2. REFER TO KGA ON-SITE WASTEWATER TREATMENT AND DISPOSAL FOR RESIDENTIAL BUILDING REPORT FOR DETAILED DESIGN OF WASTEWATER DISPOSAL AREA FOR PROPOSED LOT.

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EXTENT OF EARTHWORKS
- GRASS BERM
- SWALE
- CONCRETE DRIVE
- WW PRIMARY DISPOSAL AREA
- WW RESERVE DISPOSAL AREA
- BUILDING PLATFORM

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED CONTOUR & WASTEWATER LAYOUT PLAN SHEET 2 OF 4

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
B	WASTEWATER FIELDS AMENDED	RW	08/11/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	08/11/19

SCALE (A3) 1:500

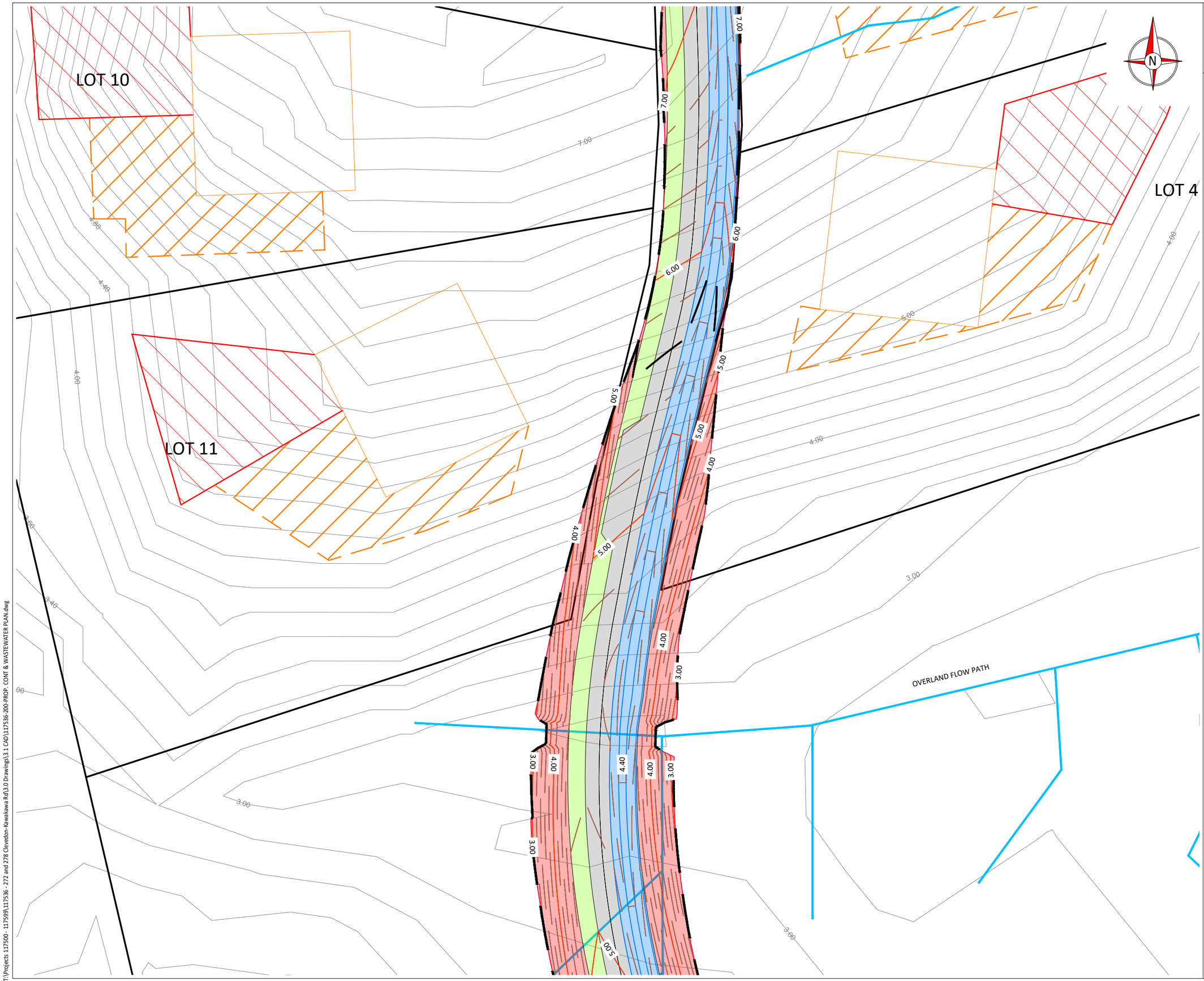
SCALE BAR
0 5 10 15 20 25m

DRAWING REFERENCE 117536- 201

REV B

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-200-PROP. CONT & WASTEWATER PLAN.dwg

Drawing Plotted: 11/8/2019 1:42 PM



NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES.
2. REFER TO KGA ON-SITE WASTEWATER TREATMENT AND DISPOSAL FOR RESIDENTIAL BUILDING REPORT FOR DETAILED DESIGN OF WASTEWATER DISPOSAL AREA FOR PROPOSED LOT.

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EXTENT OF EARTHWORKS
- GRASS BERM
- SWALE
- CONCRETE DRIVE
- WW PRIMARY DISPOSAL AREA
- WW RESERVE DISPOSAL AREA
- BUILDING PLATFORM

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED CONTOUR & WASTEWATER LAYOUT PLAN SHEET 3 OF 4

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:
278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
B	WASTEWATER FIELDS AMENDED	RW	08/11/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	08/11/19

SCALE (A3) 1:500

SCALE BAR
0 5 10 15 20 25m

DRAWING REFERENCE
117536- 202

REV
B

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-200-PROP. CONT & WASTEWATER PLAN.dwg

Drawing Plotted: 11/8/2019 1:42 PM

NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES.
2. REFER TO KGA ON-SITE WASTEWATER TREATMENT AND DISPOSAL FOR RESIDENTIAL BUILDING REPORT FOR DETAILED DESIGN OF WASTEWATER DISPOSAL AREA FOR PROPOSED LOT.

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EXTENT OF EARTHWORKS
- GRASS BERM
- SWALE
- CONCRETE DRIVE
- WW PRIMARY DISPOSAL AREA
- WW RESERVE DISPOSAL AREA
- BUILDING PLATFORM

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED CONTOUR & WASTEWATER LAYOUT PLAN SHEET 4 OF 4

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:
278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
B	WASTEWATER FIELDS AMENDED	RW	08/11/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	08/11/19

SCALE (A3) 1:500

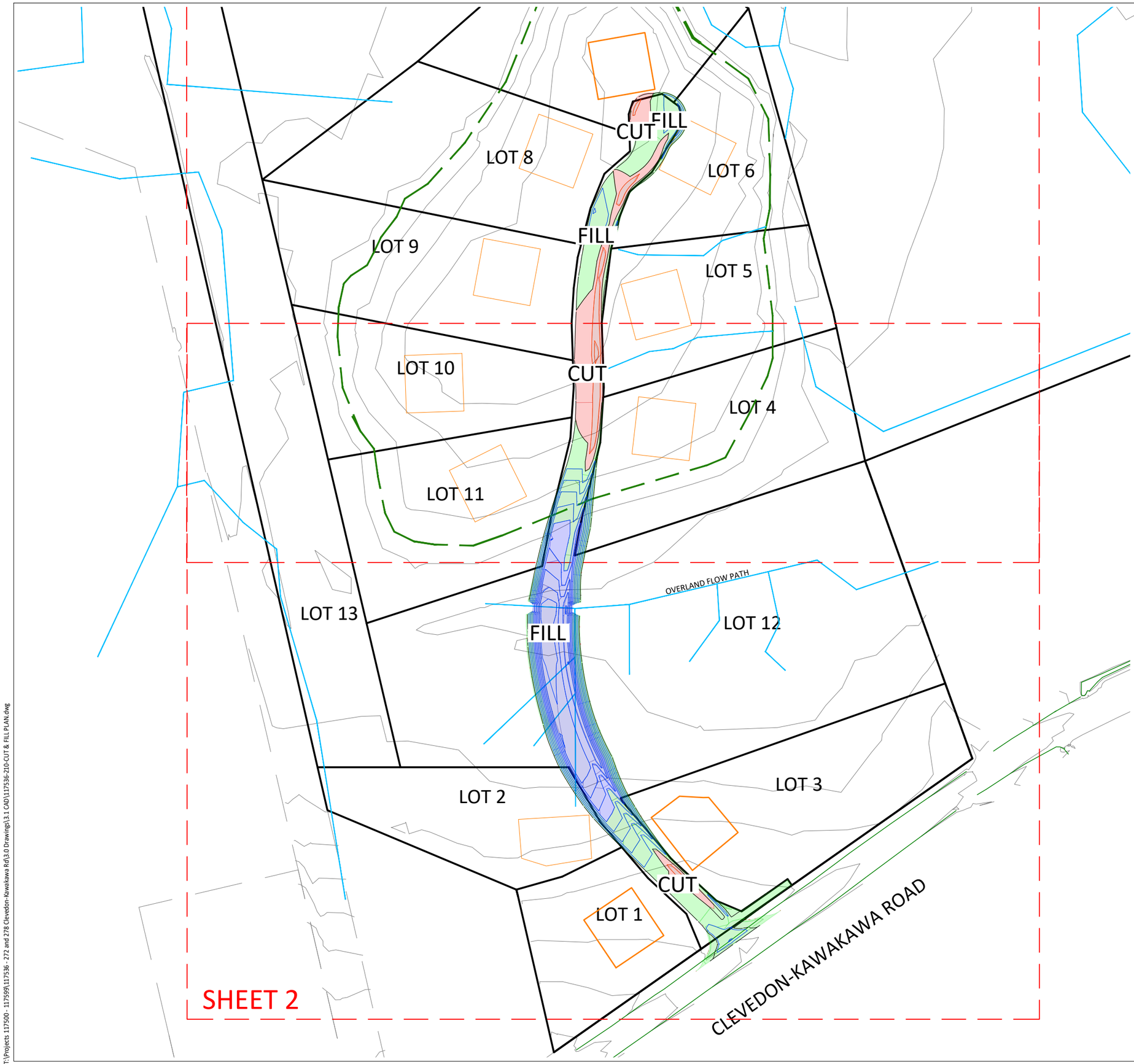
SCALE BAR
0 5 10 15 20 25m

DRAWING REFERENCE
117536- 203

REV
B

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-200-PROP. CONT & WASTEWATER PLAN.dwg

Drawing Plotted: 11/8/2019 1:42 PM



ISOPACH CUT FILL TABLE FROM		TO		COLOUR
-5.0	to	-3.0	m	
-3.0	to	-2.8	m	
-2.8	to	-2.6	m	
-2.6	to	-2.4	m	
-2.4	to	-2.2	m	
-2.2	to	-2.0	m	
-2.0	to	-1.8	m	
-1.8	to	-1.6	m	
-1.6	to	-1.4	m	
-1.4	to	-1.2	m	
-1.2	to	-1.0	m	
-1.0	to	-0.8	m	
-0.8	to	-0.6	m	
-0.6	to	-0.4	m	
-0.4	to	-0.2	m	
-0.2	to	0.0	m	
0.0	to	0.2	m	
0.2	to	0.4	m	
0.4	to	0.6	m	
0.6	to	0.8	m	
0.8	to	1.0	m	
1.0	to	1.2	m	
1.2	to	1.4	m	
1.4	to	1.6	m	
1.6	to	1.8	m	
1.8	to	2.0	m	
2.0	to	2.2	m	
2.2	to	2.4	m	
2.4	to	2.6	m	
2.6	to	2.8	m	
2.8	to	3.0	m	
3.0	to	5.0	m	

NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES.
2. ESTIMATED VOLUMES BELOW ARE SOLID MEASURE QUANTITIES, TAKEN FROM EXISTING GROUND SURFACE TO DESIGN GROUND SURFACE INCLUDING TOPSOIL STRIPPING VOLUME.

EARTHWORKS VOLUME:

- TOTAL AREA = 5,500m2
- CUT VOLUME = 140m3
- FILL VOLUME = 3,250m3

SHORTAGE OF FILL REQUIRED = 3,110m3

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- CUT CONTOUR
- FILL CONTOUR

CAD AND PRODUCTION BY:

LANDS & SURVEY
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Auckland | Whangarei | Christchurch | Wanaka
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www.landsandsurvey.co.nz

DRAWING TITLE:
PROPOSED ISOPACH CUT AND FILL PLAN SHEET 1 OF 3

CLIENT NAME:
STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:
278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

SCALE (A3) 1:1500

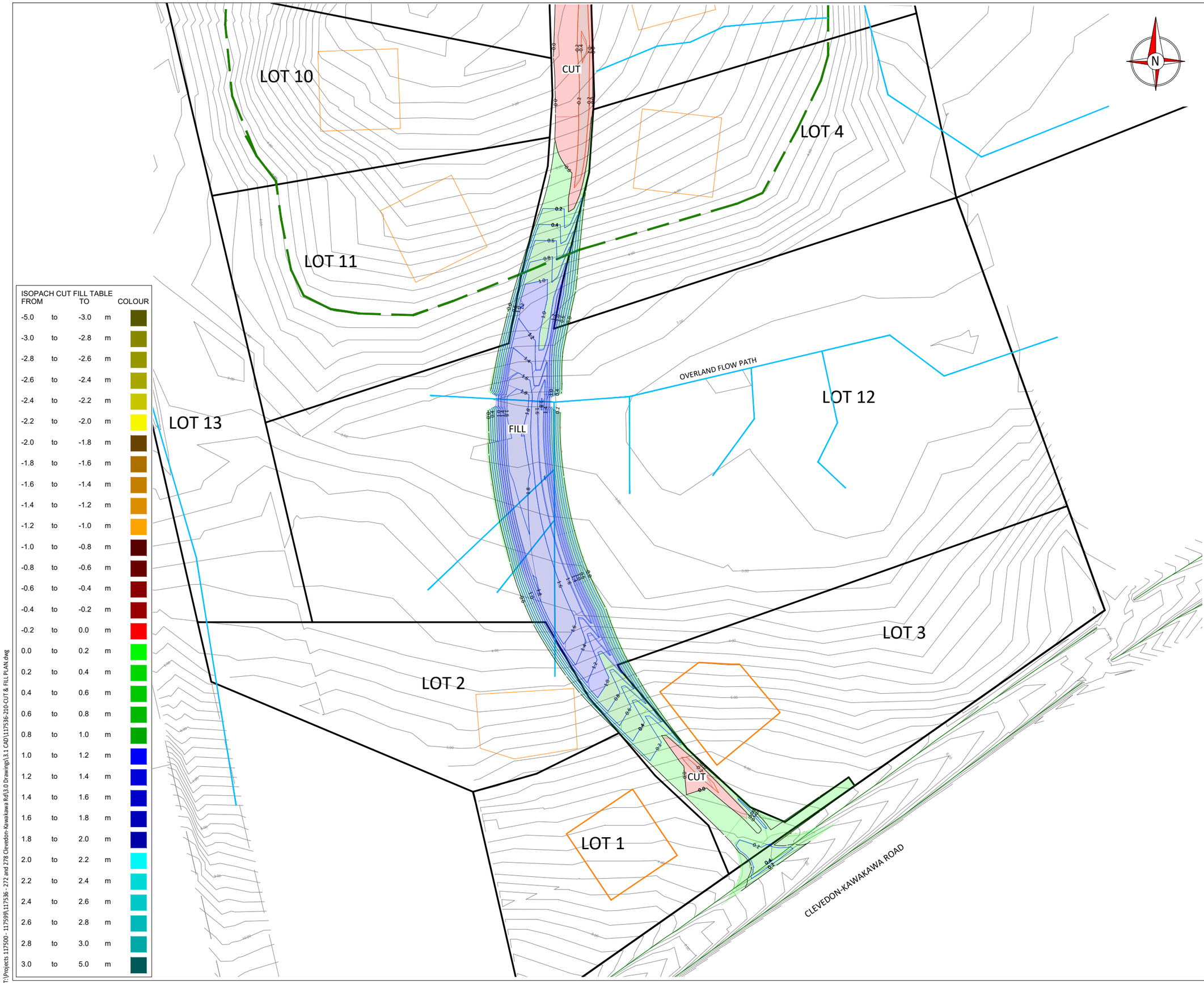
SCALE BAR
0 15 30 45 60 75m

DRAWING REFERENCE 117536- 210

REV A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-210-CUT & FILL PLAN.dwg

Drawing Plotted: 11/8/2019 1:42 PM



ISOPACH CUT FILL TABLE

FROM		TO		COLOUR
-5.0	to	-3.0	m	
-3.0	to	-2.8	m	
-2.8	to	-2.6	m	
-2.6	to	-2.4	m	
-2.4	to	-2.2	m	
-2.2	to	-2.0	m	
-2.0	to	-1.8	m	
-1.8	to	-1.6	m	
-1.6	to	-1.4	m	
-1.4	to	-1.2	m	
-1.2	to	-1.0	m	
-1.0	to	-0.8	m	
-0.8	to	-0.6	m	
-0.6	to	-0.4	m	
-0.4	to	-0.2	m	
-0.2	to	0.0	m	
0.0	to	0.2	m	
0.2	to	0.4	m	
0.4	to	0.6	m	
0.6	to	0.8	m	
0.8	to	1.0	m	
1.0	to	1.2	m	
1.2	to	1.4	m	
1.4	to	1.6	m	
1.6	to	1.8	m	
1.8	to	2.0	m	
2.0	to	2.2	m	
2.2	to	2.4	m	
2.4	to	2.6	m	
2.6	to	2.8	m	
2.8	to	3.0	m	
3.0	to	5.0	m	

NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES.
2. ESTIMATED VOLUMES BELOW ARE SOLID MEASURE QUANTITIES, TAKEN FROM EXISTING GROUND SURFACE TO DESIGN GROUND SURFACE INCLUDING TOPSOIL STRIPPING VOLUME.

EARTHWORKS VOLUME:

- TOTAL AREA = 5,500m2
- CUT VOLUME = 140m3
- FILL VOLUME = 3,250m3

SHORTAGE OF FILL REQUIRED = 3,110m3

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- CUT CONTOUR
- FILL CONTOUR

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED ISOPACH CUT AND FILL PLAN SHEET 2 OF 3

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

SCALE (A3) 1:500

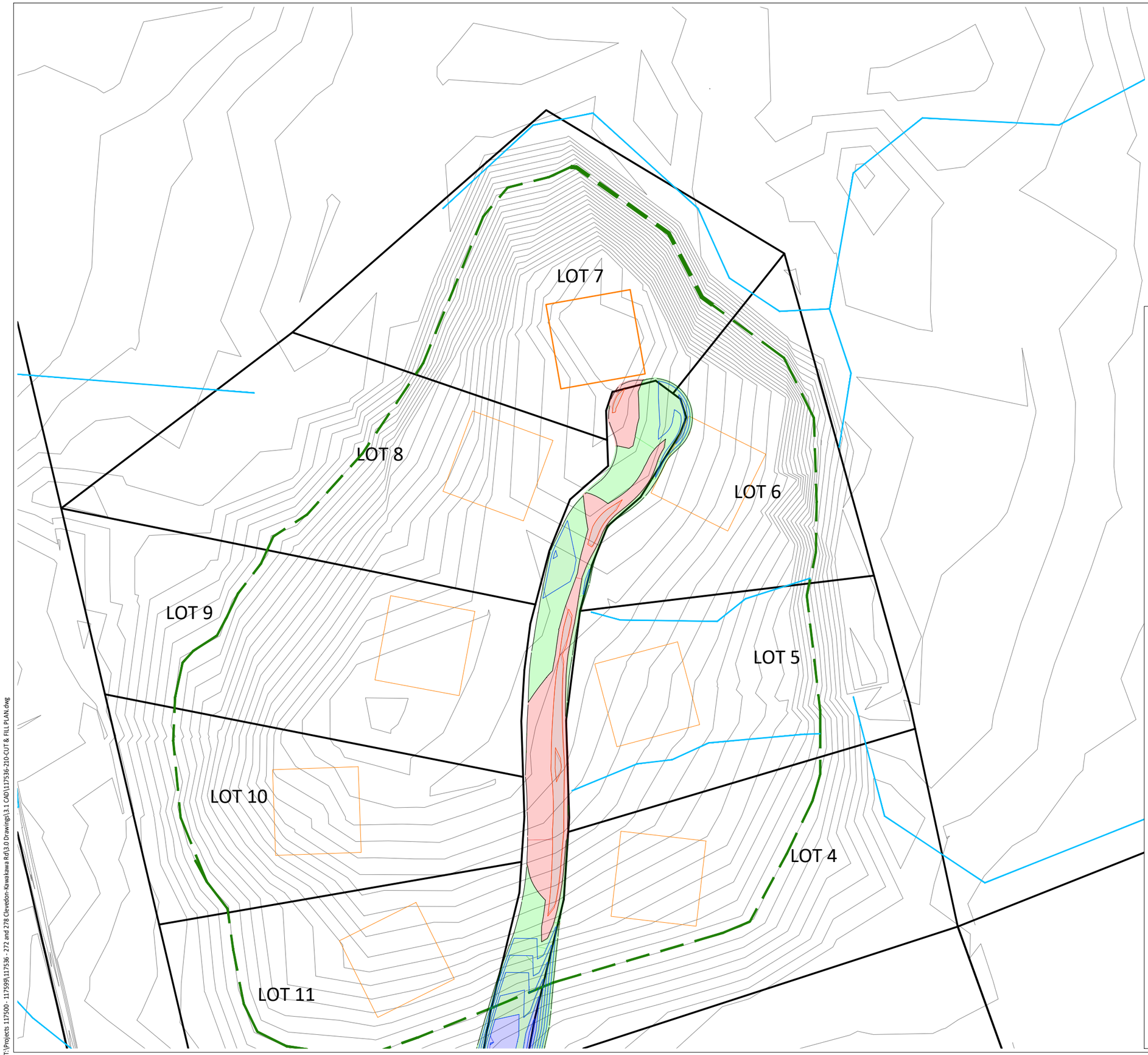
SCALE BAR
0 5 10 15 20 25m

DRAWING REFERENCE: 117536- 211

REV: A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-210-CUT & FILL PLAN.dwg

Drawing Plotted: 11/8/2019 1:42 PM



NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES.
2. ESTIMATED VOLUMES BELOW ARE SOLID MEASURE QUANTITIES, TAKEN FROM EXISTING GROUND SURFACE TO DESIGN GROUND SURFACE INCLUDING TOPSOIL STRIPPING VOLUME.

EARTHWORKS VOLUME:

- TOTAL AREA = 5,500m2
- CUT VOLUME = 140m3
- FILL VOLUME = 3,250m3

SHORTAGE OF FILL REQUIRED = 3,110m3

ISOPACH CUT FILL TABLE

FROM		TO		COLOUR
-5.0	to	-3.0	m	
-3.0	to	-2.8	m	
-2.8	to	-2.6	m	
-2.6	to	-2.4	m	
-2.4	to	-2.2	m	
-2.2	to	-2.0	m	
-2.0	to	-1.8	m	
-1.8	to	-1.6	m	
-1.6	to	-1.4	m	
-1.4	to	-1.2	m	
-1.2	to	-1.0	m	
-1.0	to	-0.8	m	
-0.8	to	-0.6	m	
-0.6	to	-0.4	m	
-0.4	to	-0.2	m	
-0.2	to	0.0	m	
0.0	to	0.2	m	
0.2	to	0.4	m	
0.4	to	0.6	m	
0.6	to	0.8	m	
0.8	to	1.0	m	
1.0	to	1.2	m	
1.2	to	1.4	m	
1.4	to	1.6	m	
1.6	to	1.8	m	
1.8	to	2.0	m	
2.0	to	2.2	m	
2.2	to	2.4	m	
2.4	to	2.6	m	
2.6	to	2.8	m	
2.8	to	3.0	m	
3.0	to	5.0	m	

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- CUT CONTOUR
- FILL CONTOUR

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED ISOPACH CUT AND FILL PLAN SHEET 3 OF 3

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

SCALE (A3) 1:500

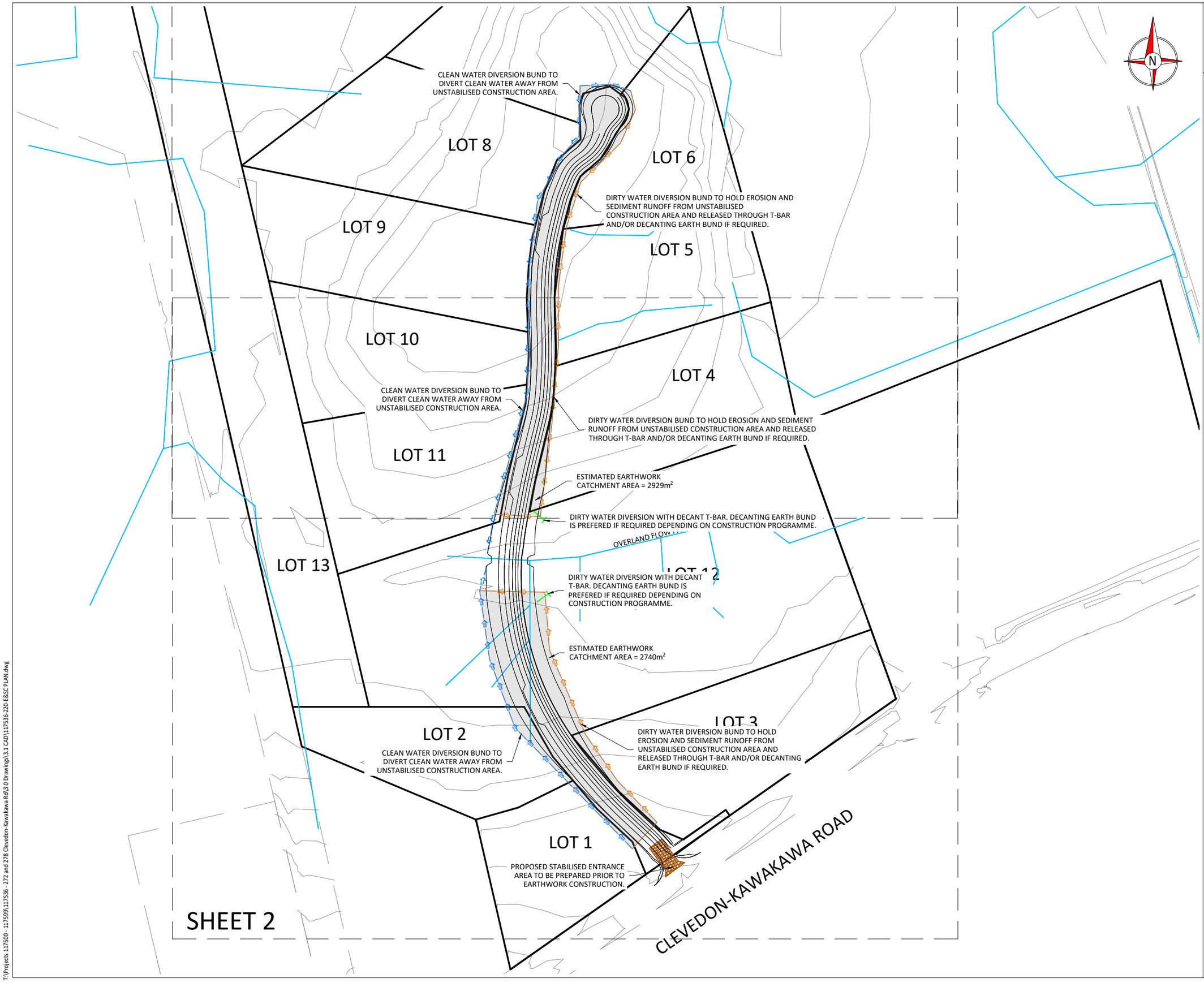
SCALE BAR
0 5 10 15 20 25m

DRAWING REFERENCE 117536- 212

REV A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-210-CUT & FILL PLAN.dwg

Drawing Plotted: 11/8/2019 1:42 PM



NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EDGE OF CONCRETE
- CUT CONTOUR
- FILL CONTOUR

CAD AND PRODUCTION BY:

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DRAWING TITLE:

EROSION AND SEDIMENT CONTROL PLAN SHEET 1 OF 3

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

SCALE (A3) 1:1500

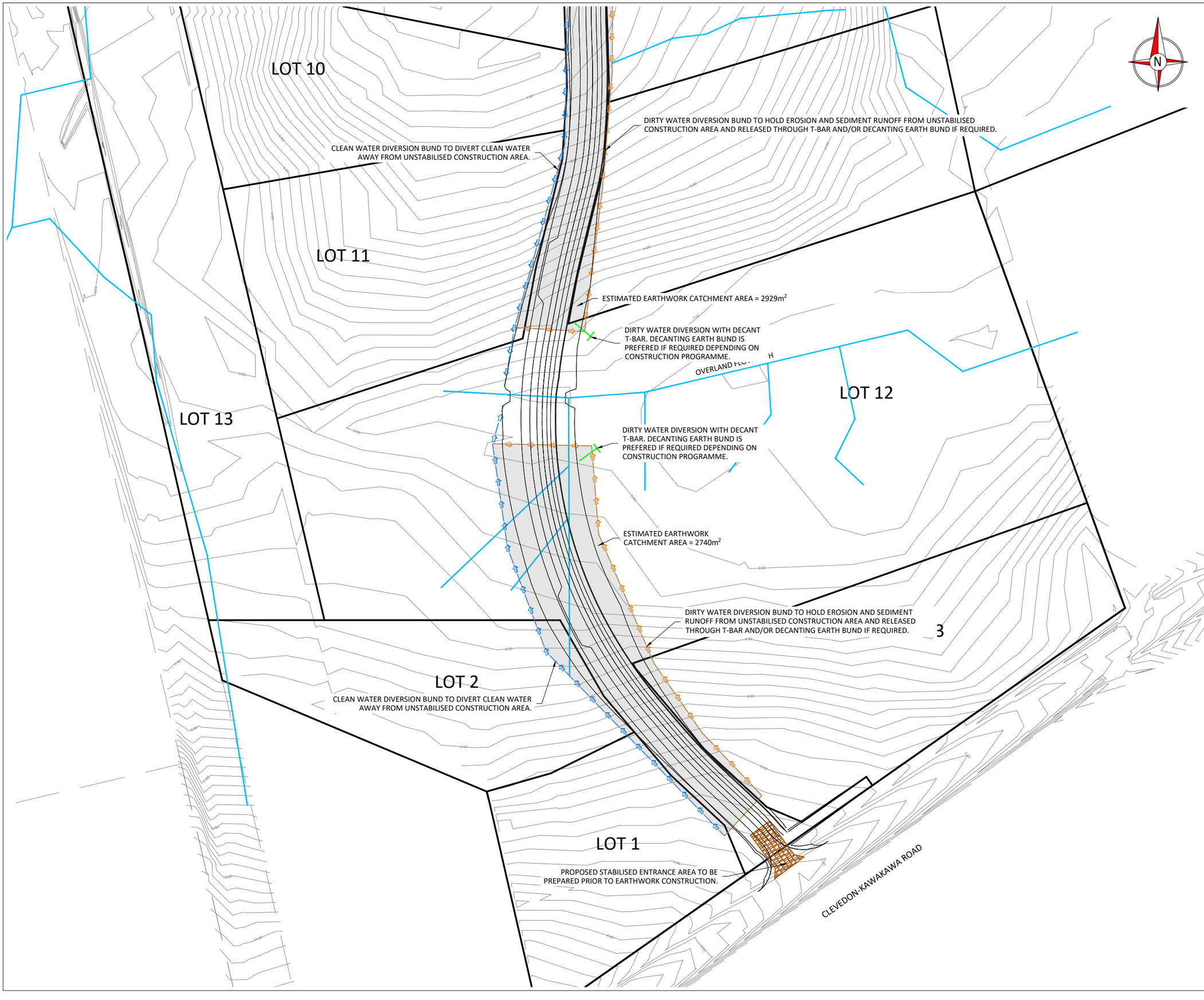
SCALE BAR
0 15 30 45 60 75m

DRAWING REFERENCE 117536- 220

REV A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-220-E&SC PLAN.dwg

Drawing Plotted: 11/8/2019 1:42 PM



NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EDGE OF CONCRETE
- CUT CONTOUR
- FILL CONTOUR

CAD AND PRODUCTION BY:

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DRAWING TITLE:

EROSION AND SEDIMENT CONTROL PLAN SHEET 2 OF 3

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

SCALE (A3) 1:500

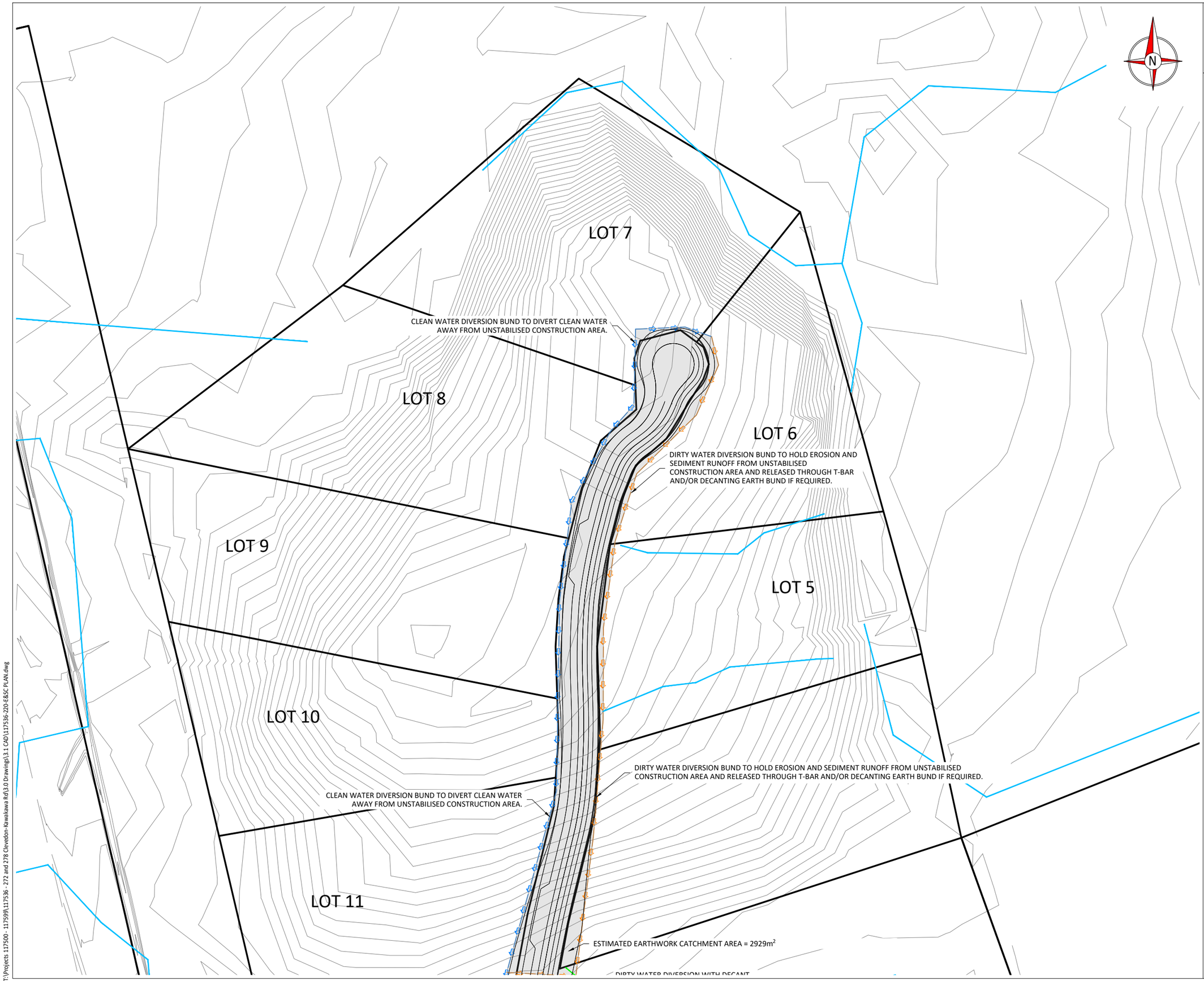
SCALE BAR
0 5 10 15 20 25m

DRAWING REFERENCE 117536- 221

REV A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-220-E&SC PLAN.dwg

Drawing Plotted: 11/8/2019 1:42 PM



NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EDGE OF CONCRETE
- CUT CONTOUR
- FILL CONTOUR

CAD AND PRODUCTION BY:

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DRAWING TITLE:

EROSION AND SEDIMENT CONTROL PLAN SHEET 3 OF 3

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

SCALE (A3) 1:500

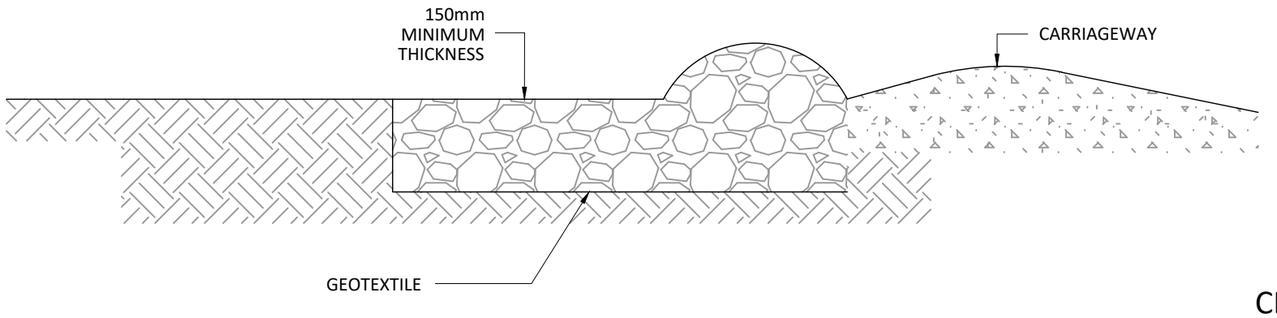
SCALE BAR
0 5 10 15 20 25m

DRAWING REFERENCE: 117536- 222

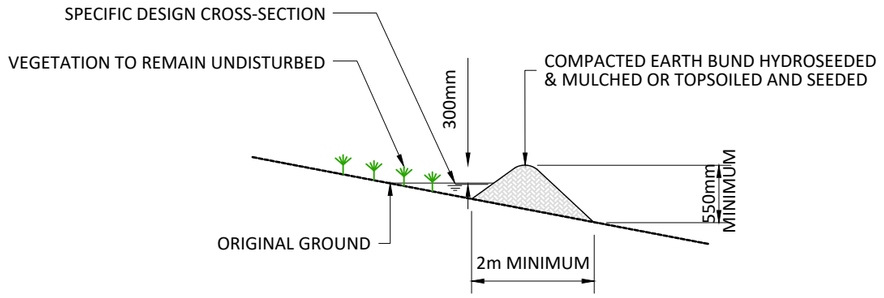
REV: A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-220-E&SC PLAN.dwg

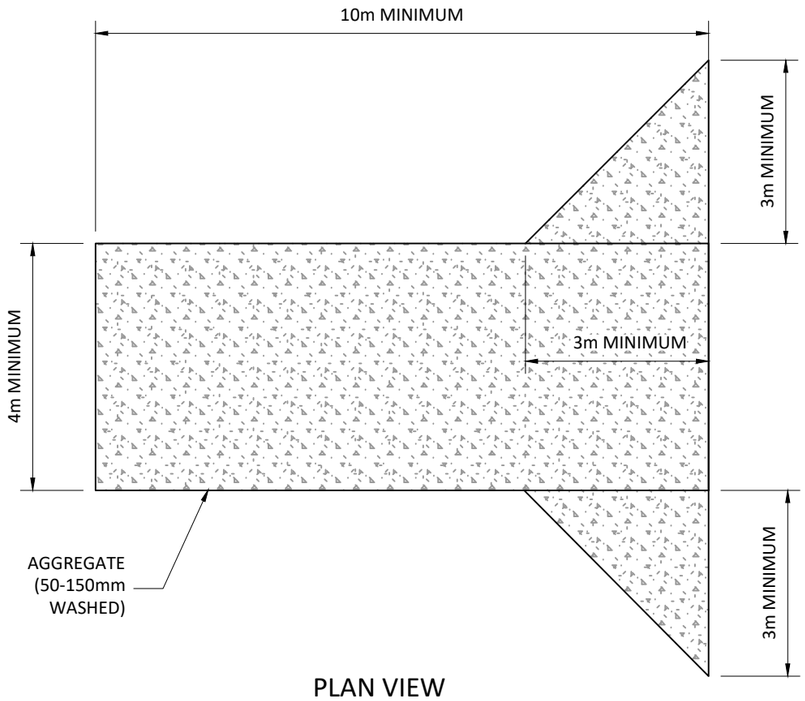
STABILISED ENTRANCE



CLEARWATER DIVERSION BUND/CHANNEL

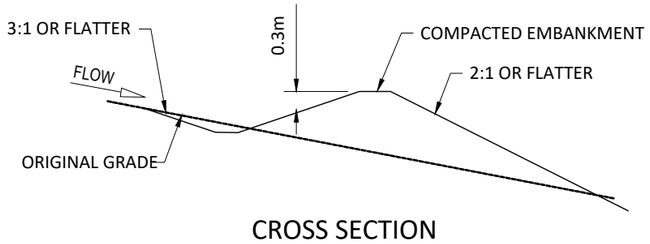


CROSS SECTION



PLAN VIEW

DIRTY WATER DIVERSION BUND/CHANNEL



CROSS SECTION

NOTES:

1. REFER TO DRAWING 010 FOR GENERAL NOTES

CAD AND PRODUCTION BY:

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DRAWING TITLE:
EROSION AND SEDIMENT CONTROL TYPICAL DETAILS

CLIENT NAME:
STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:
278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	13/06/19
SURVEYED			
DESIGNED			
DRAWN		RW	12/06/19
APPROVED			

SCALE (A3) NOT TO SCALE

SCALE BAR

DRAWING REFERENCE
117536- 223

REV
A

Drawing Plotted: 11/8/2019 1:42 PM

SHEET 4

LOT 8

LOT 6

LOT 9

LOT 5

SHEET 3

LOT 4

LOT 11

OVERLAND FLOW PATH

LOT 13

LOT 12

LOT 2

LOT 3

LOT 1

SHEET 2

CLEVEDON-KAWAKAWA ROAD

NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EDGE OF CONCRETE
- GRASS BERM
- SWALE
- CONCRETE DRIVE

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED DRIVEWAY AND STORMWATER LAYOUT PLAN SHEET 1 OF 4

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

SCALE (A3) 1:1500

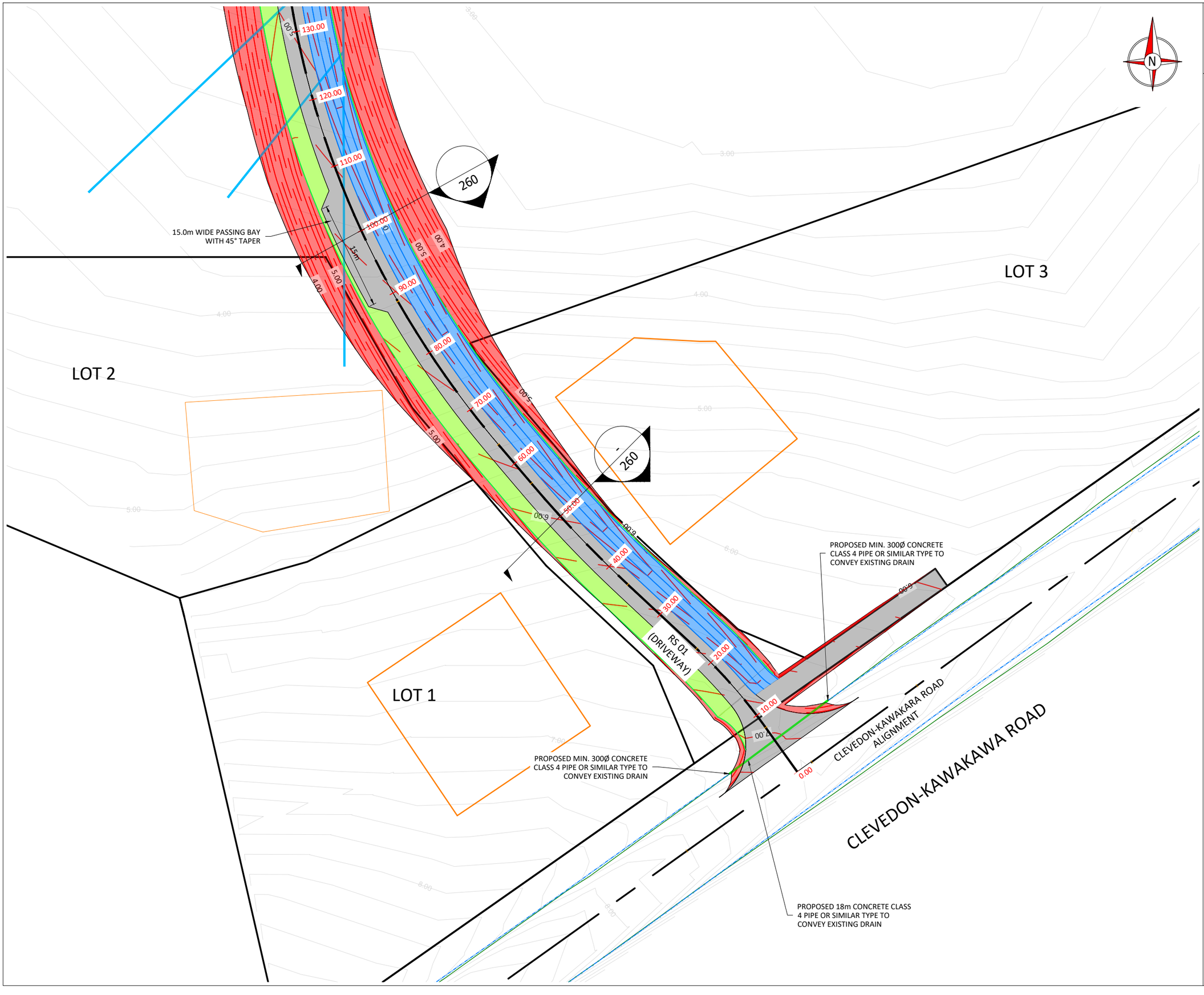
SCALE BAR
0 15 30 45 60 75m

DRAWING REFERENCE 117536- 250

REV A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-250-PROP. DRIVEWAY & SW PLAN.dwg

Drawing Plotted: 11/8/2019 1:43 PM



NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EDGE OF CONCRETE
- GRASS BERM
- SWALE
- CONCRETE DRIVE

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED DRIVEWAY AND STORMWATER LAYOUT PLAN SHEET 2 OF 4

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		PL	21/06/19

SCALE (A3) 1:500

SCALE BAR
0 5 10 15 20 25m

DRAWING REFERENCE 117536- 251

REV A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-250-PROP. DRIVEWAY & SW PLAN.dwg

Drawing Plotted: 11/8/2019 1:43 PM

LOT 10

LOT 11

LOT 4

260.00
250.00
240.00
230.00
220.00
210.00
200.00
190.00
180.00
170.00
160.00
150.00
140.00
130.00

7.00
6.00
5.00
4.00
3.00

15.0m WIDE PASSING BAY
WITH 45° TAPER

15m

261

SWALE SUBSOIL DRAIN TO BE
CONNECTED TO DOULBE CATCHPIT

DOUBLE CATCHPIT INLET

DOUBLE 675Ø CULVERT INLET

300Ø RCRRJ CLASS 4 OUTLET FROM DOUBLE CATCHPIT

OVERLAND FLOW PATH

5.0m x 5.0m x 0.3m D150Ø
RIPRAP ROCK AREA

5.0m x 5.0m x 0.3m D150Ø
RIPRAP ROCK AREA

DOUBLE 675Ø CULVERT OUTLET

NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EDGE OF CONCRETE
- GRASS BERM
- SWALE
- CONCRETE DRIVE

CAD AND PRODUCTION BY:

LANDS & SURVEY
SURVEYING | PLANNING | ENGINEERING

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DRAWING TITLE:

PROPOSED DRIVEWAY AND STORMWATER LAYOUT PLAN SHEET 3 OF 4

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:
278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

SCALE (A3) 1:500

SCALE BAR
0 5 10 15 20 25m

DRAWING REFERENCE 117536- 252

REV A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-250-PROP. DRIVEWAY & SW PLAN.dwg

Drawing Plotted: 11/8/2019 1:43 PM

NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES

LEGEND

- EX CONTOUR (0.2m INTERVAL)
- PROPOSED BUILDING PLATFORM
- EX SW DRAIN
- PROPOSED WW DISPOSAL AREA
- ROAD CENTRELINE
- PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- OVERLAND FLOW PATH
- EX WW AREA 4.4m
- SWALE
- EDGE OF CONCRETE
- GRASS BERM
- SWALE
- CONCRETE DRIVE

CAD AND PRODUCTION BY:

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DRAWING TITLE:

PROPOSED DRIVEWAY AND STORMWATER LAYOUT PLAN SHEET 4 OF 4

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

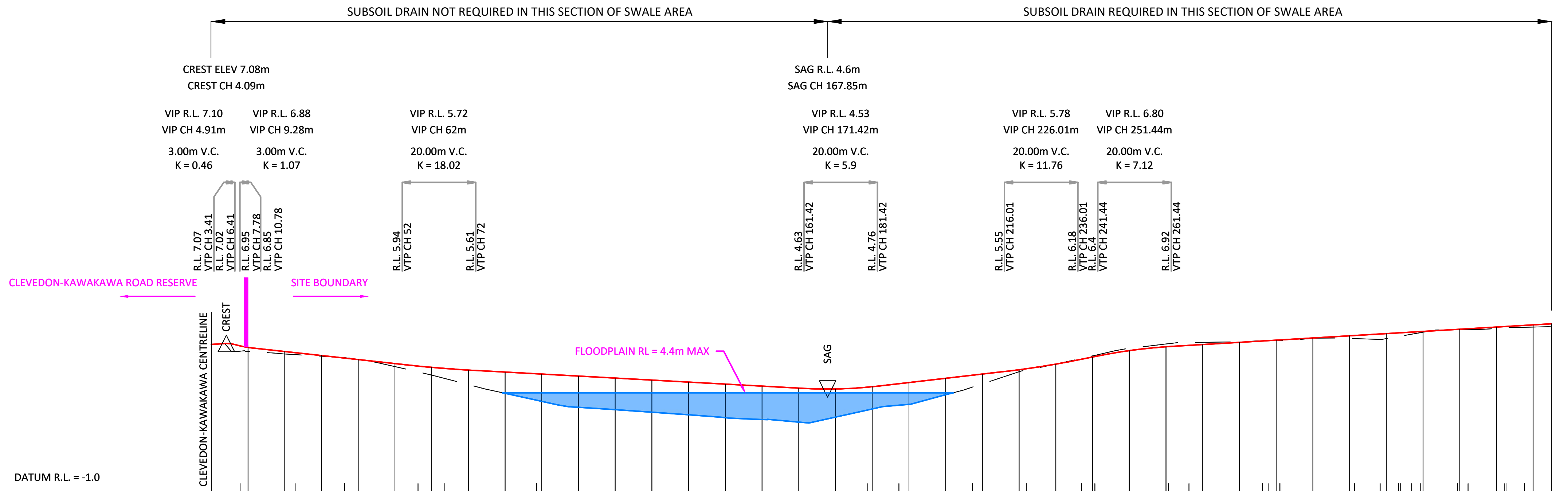
SCALE (A3) 1:500

SCALE BAR
0 5 10 15 20 25m

DRAWING REFERENCE: 117536- 253

REV: A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-250-PROP. DRIVEWAY & SW PLAN.dwg



DESIGN GRADE: 1.47% -5.00% -2.20% -1.09% 2.30% 4.00% 1.19%

CHAINAGE (m)	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL	CUT/FILL DEPTH
0	7.02	7.02	0
10	6.86	6.64	0.23
20	6.64	6.51	0.14
30	6.42	6.38	0.04
40	6.2	6.21	-0.01
50	5.98	5.82	0.16
60	5.78	5.36	0.42
70	5.63	4.84	0.79
80	5.52	4.37	1.15
90	5.41	3.93	1.48
100	5.3	3.6	1.7
110	5.19	3.48	1.72
120	5.09	3.34	1.75
130	4.98	3.2	1.78
140	4.87	3.04	1.83
150	4.76	2.94	1.82
160	4.65	2.8	1.85
170	4.6	3.07	1.53
180	4.72	3.51	1.21
190	4.95	3.77	1.19
200	5.18	4.29	0.89
210	5.41	4.88	0.53
220	5.65	5.54	0.11
230	5.96	5.96	-0
240	6.34	6.4	-0.06
250	6.69	6.81	-0.12
260	6.9	7.05	-0.15
270	7.02	7.14	-0.12
280	7.14	7.19	-0.05
290	7.26	7.24	0.01
300	7.38	7.36	0.02
310	7.5	7.35	0.14
320	7.61	7.34	0.27
330	7.73	7.69	0.04
340	7.85	7.84	0.01
350	7.97	7.89	0.08
360	8.09	7.97	0.12
364.97	8.15	7.99	0.16

LONGITUDINAL SECTION RS 01

HORIZONTAL SCALE 1:1500
VERTICAL SCALE 1:300

NOTES:

1. REFER TO DRAWING 010 FOR GENERAL NOTES.
2. REFER TO DRAWING 260 & 261 FOR PROPOSED DRIVEWAY CROSS SECTION, SWALE & SERVICE TRENCH DETAILS.

CAD AND PRODUCTION BY:

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DRAWING TITLE:
PROPOSED DRIVEWAY LONGITUDINAL SECTION

CLIENT NAME:
STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:
278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19

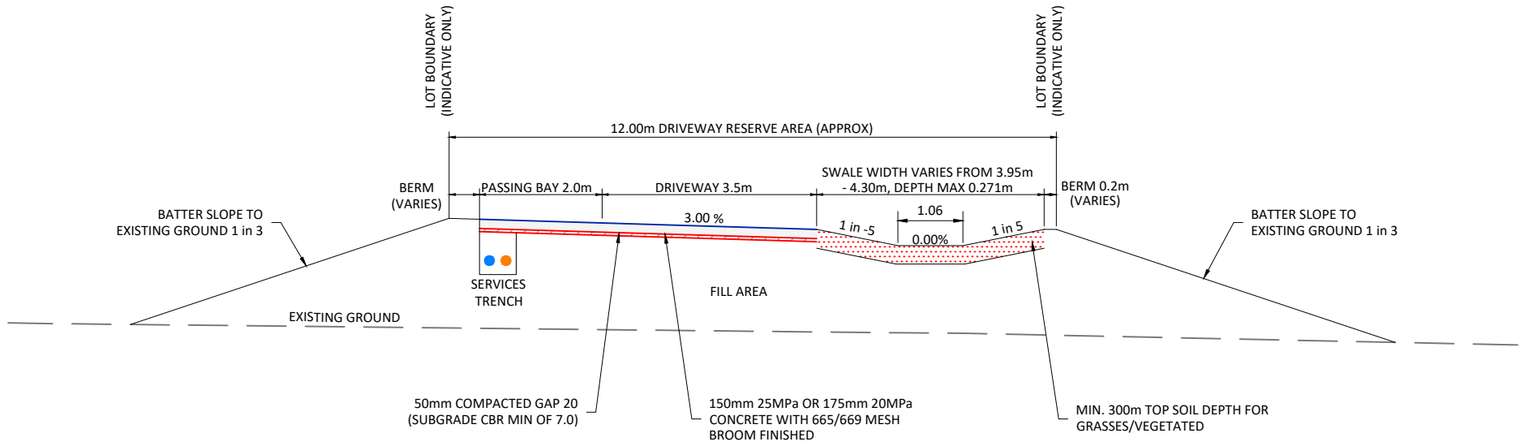
SURVEYED	PG	19/12/18
DESIGNED	PL	15/06/19
DRAWN	RW	11/06/19
APPROVED	TG	21/06/19

SCALE (A3) AS SHOWN

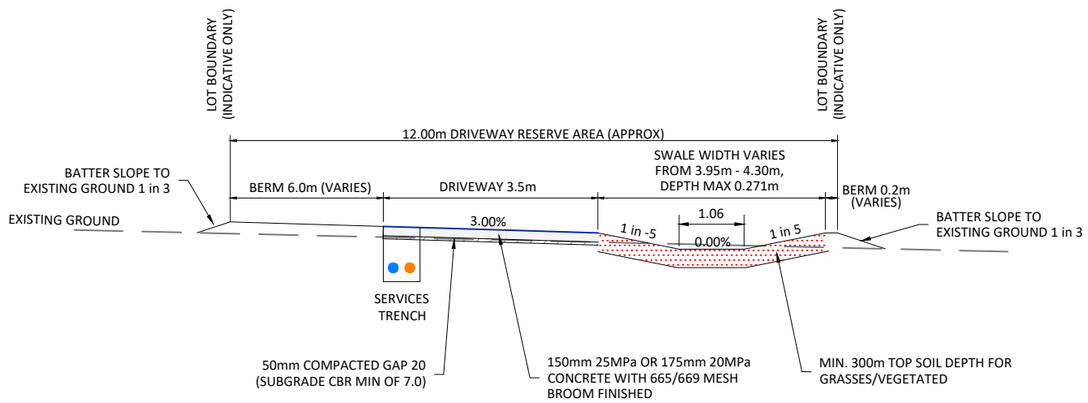
SCALE BAR

DRAWING REFERENCE 117536- 254 REV A

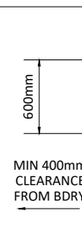
T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-254-PROP. DRIVEWAY LONG SECTION.dwg



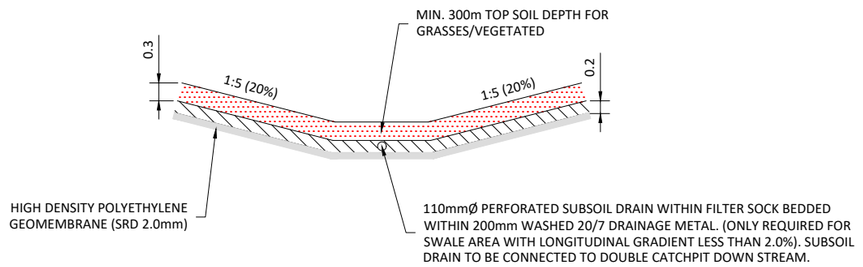
PROPOSED DRIVEWAY
CROSS SECTION - CHAINAGE 100



PROPOSED DRIVEWAY
CROSS SECTION - CHAINAGE 50



TYPICAL SERVICE TRENCH DETAILS
SCALE 1:50



TYPICAL SWALE DETAILS

NOTES:

1. REFER TO DRAWING 010 FOR GENERAL NOTES.

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DRAWING TITLE:
PROPOSED DRIVEWAY CROSS SECTION CH50 & CH100 SWALE & TRENCH DETAILS

CLIENT NAME:
STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:
278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

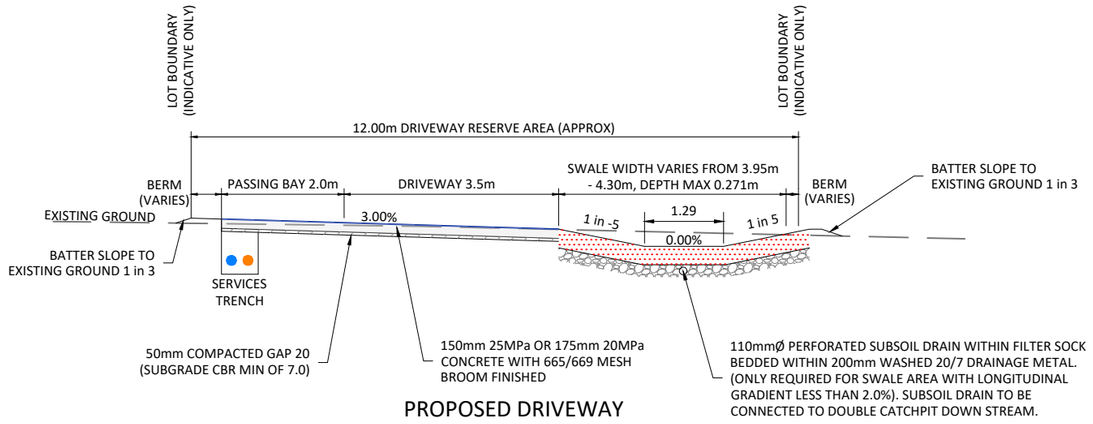
RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

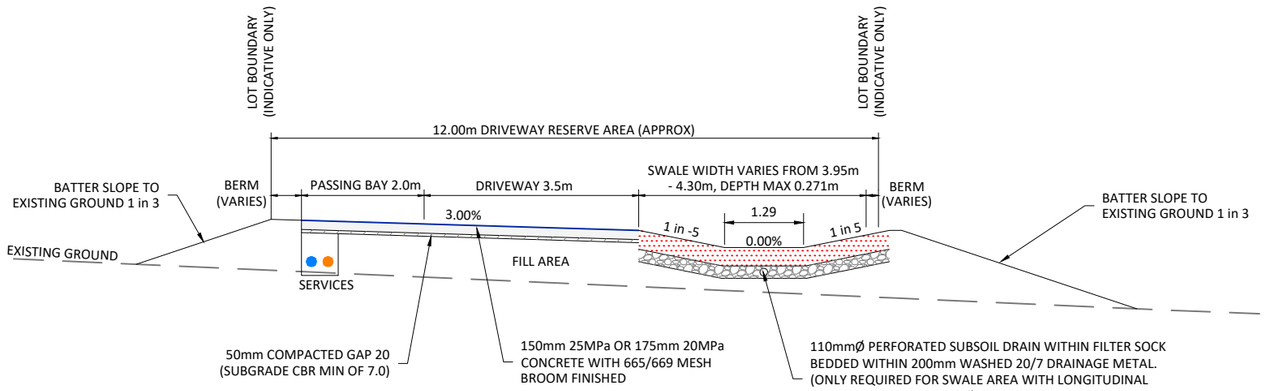
SCALE (A3) 1:100
SCALE BAR 0 1 2 3 4 5m

DRAWING REFERENCE 117536- 260
REV A

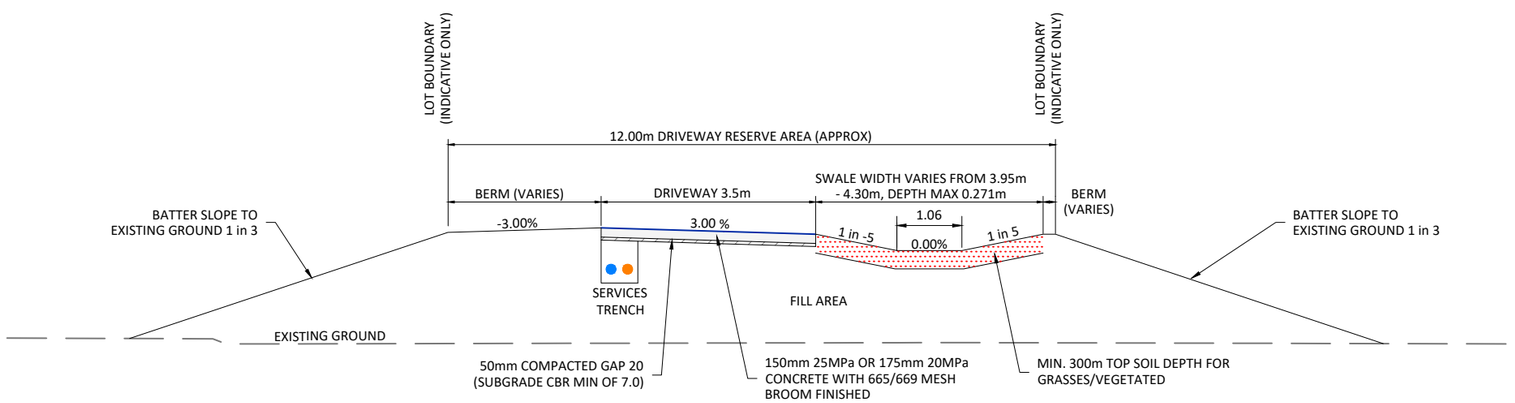
T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-260-PROP. DRIVEWAY CROSS SECTION & DETAILS.dwg



PROPOSED DRIVEWAY CROSS SECTION - CHAINAGE 300



PROPOSED DRIVEWAY CROSS SECTION - CHAINAGE 200



PROPOSED DRIVEWAY CROSS SECTION - CHAINAGE 150

NOTES:

1. REFER TO DRAWING 010 FOR GENERAL NOTES.

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DRAWING TITLE:

PROPOSED DRIVEWAY CROSS SECTIONS CH150, 200 & 300

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:

278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

SCALE (A3) 1:100

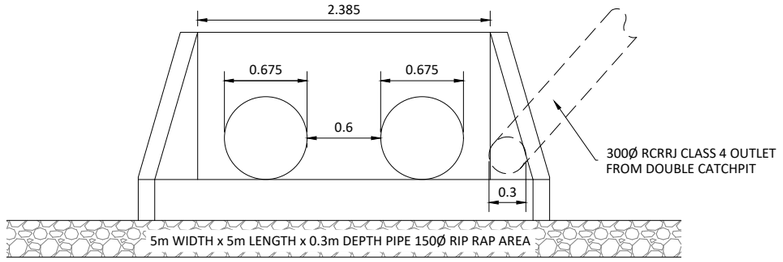
SCALE BAR
0 1 2 3 4 5m

DRAWING REFERENCE 117536- 261

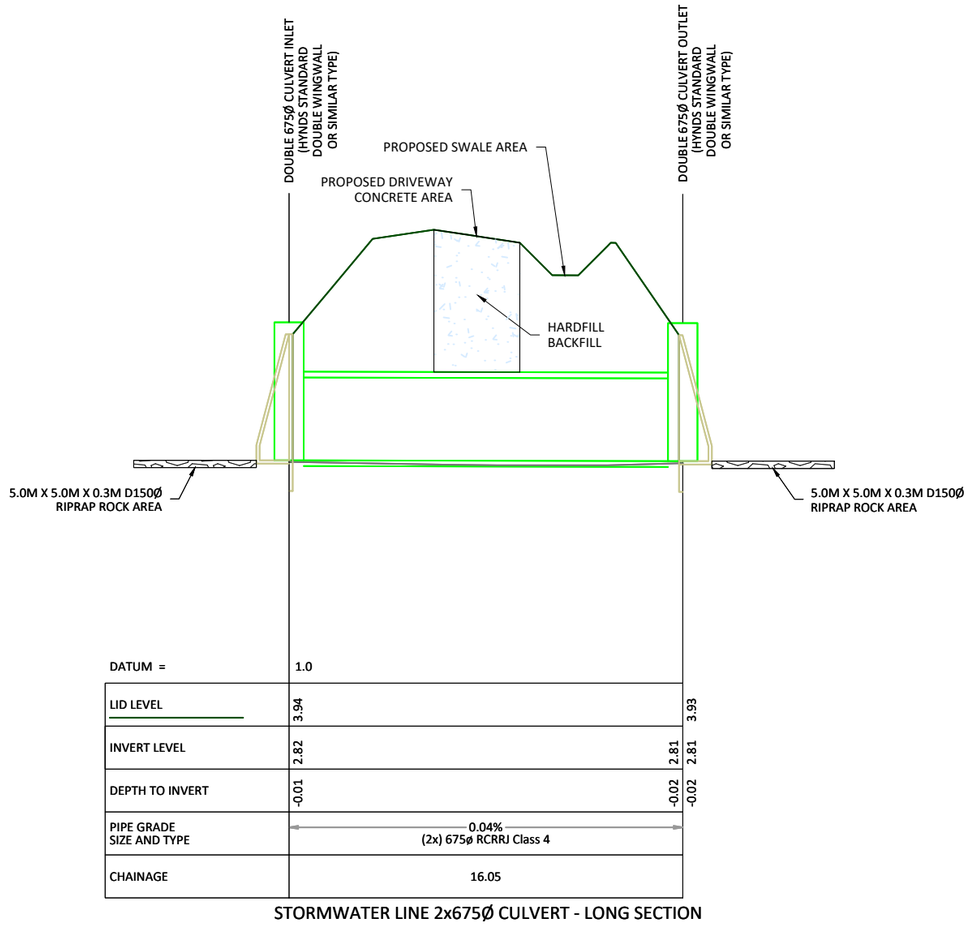
REV A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-260-PROP. DRIVEWAY CROSS SECTION & DETAILS.dwg

Drawing Plotted: 11/8/2019 1:43 PM

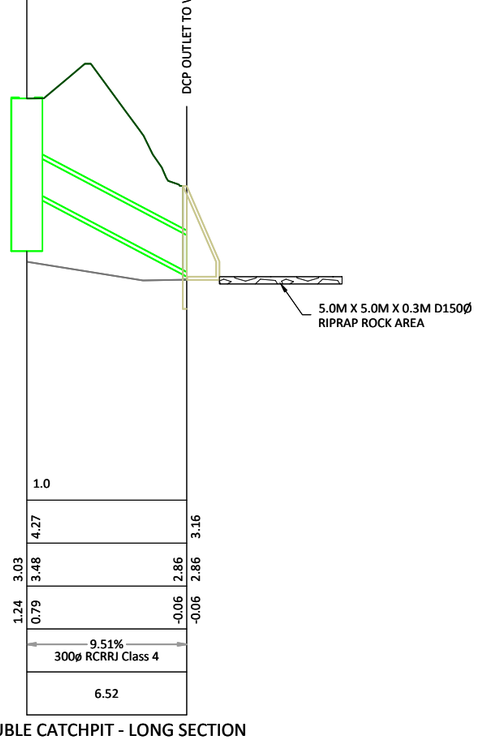


TYPICAL STORMWATER INLET/OUTLET STRUCTURE
SCALE 1:50



DATUM =	1.0	
LID LEVEL	3.94	3.93
INVERT LEVEL	2.82	2.81 2.81
DEPTH TO INVERT	-0.01	-0.02 -0.02
PIPE GRADE SIZE AND TYPE	0.04% (2x) 675ø RCRRJ Class 4	
CHAINAGE	16.05	

STORMWATER LINE 2x675Ø CULVERT - LONG SECTION
HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50



1.0		
4.27		3.16
3.03 3.48		2.86 2.86
1.24 0.79		-0.06 -0.06
9.51% 300ø RCRRJ Class 4		
6.52		

DOUBLE CATCHPIT - LONG SECTION
HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:50

NOTES:

1. REFER TO DRAWING 010 FOR GENERAL NOTES

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DRAWING TITLE:
STORMWATER LONG SECTION & TYPICAL INLET/OUTLET WINGWALL DETAILS

CLIENT NAME:
STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:
278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		PG	19/12/18
DESIGNED		PL	12/06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

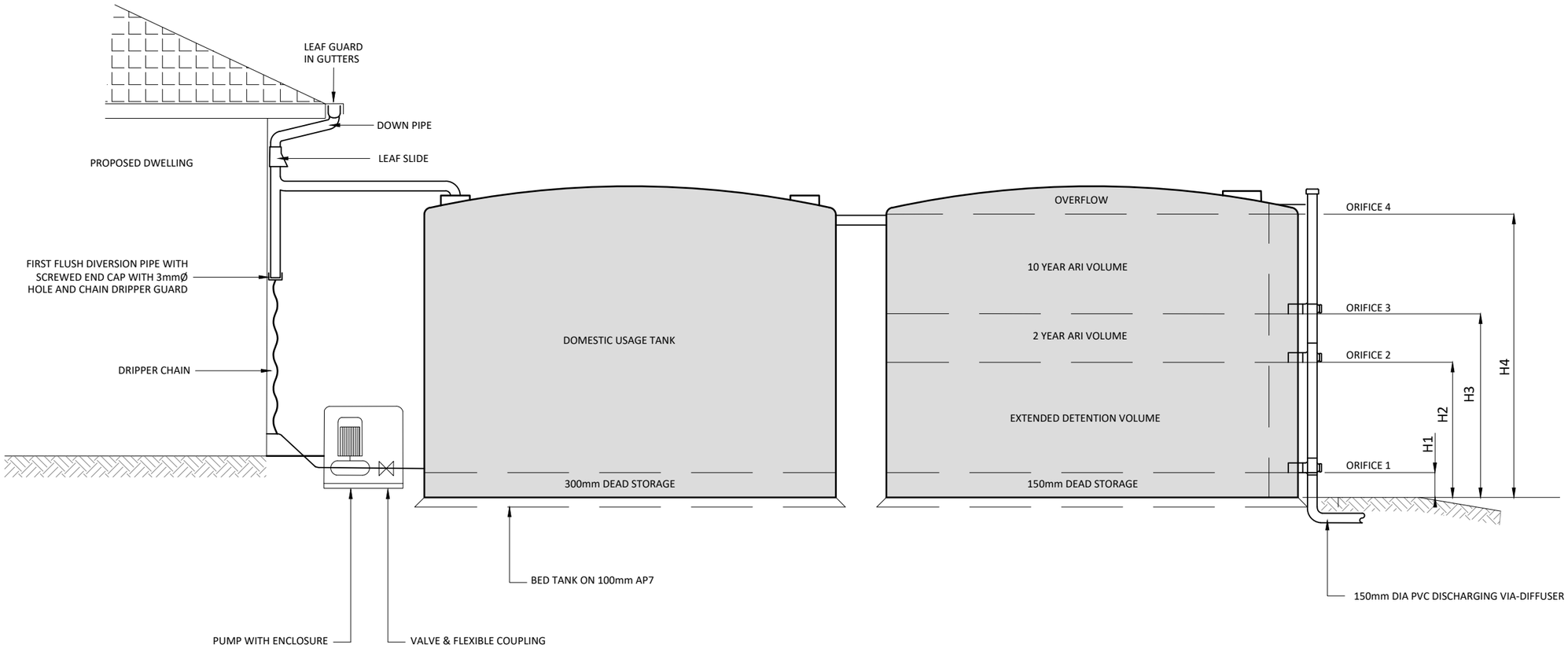
SCALE (A3) AS SHOWN
SCALE BAR

DRAWING REFERENCE
117536- 300

REV
A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-300-SW LONG SECTION & INLET-OUTLET DETAILS.dwg

Drawing Plotted: 11/8/2019 1:43 PM



NOTES

1. REFER TO DRAWING 010 FOR GENERAL NOTES.
2. REFER TO LANDS AND SURVEY FLOOD RISK & STORMWATER ASSESSMENT REPORT FOR SPECIFIC SIZING OF WATER TANK.
3. WATER TANKS TO BE INSTALLED IN ACCORDANCE WITH AUCKLAND COUNCIL & MANUFACTURER'S SPECIFICATIONS.
4. RAIN TANK WILL REQUIRE SPECIFIC DESIGN TO ENSURE PROPOSED AREA OF DEVELOPMENT ON EACH LOT SATISFIES THE LAND USE CONSENT REQUIREMENTS.
5. ALL ELECTRICAL WORK SHALL BE CARRIED OUT BY A REGISTERED ELECTRICIAN TO REQUIRED SAFETY STANDARDS.
6. ONLY PERSONNEL TRAINED ON CONFINED SPACE ENTRY SHALL ENTER THE TANK.
7. ALL PLUMBING AND DRAINAGE WORK TO BUILDING ACT 1991 AND NZ BUILDING CODE.
8. ORIFICE SIZE AND LEVELS PRESENTED HAVE BEEN OPTIMISED TO MINIMISE STORAGE REQUIREMENTS.

CAD AND PRODUCTION BY:

LANDS & SURVEY
SURVEYING | PLANNING | ENGINEERING

Auckland | Whangarei | Christchurch | Wanaka
Ph 0800 SURVEY
www.landsandsurvey.co.nz

DRAWING TITLE:

STORMWATER TANK TYPICAL DETAILS

CLIENT NAME:

STRATFORD PROPERTIES LIMITED

CLIENT DETAILS:
278 CLEVEDON-KAWAKAWA ROAD
CLEVEDON

RESOURCE CONSENT

REV.	DESCRIPTION	BY	DATE
A	ORIGINAL ISSUE	RW	21/06/19
SURVEYED		TG	19/12/18
DESIGNED		TG	06/19
DRAWN		RW	12/06/19
APPROVED		TG	21/06/19

SCALE (A3) NOT TO SCALE

SCALE BAR

DRAWING REFERENCE
117536- 340

REV
A

T:\Projects 117500 - 117599\117536 - 272 and 278 Clevedon-Kawakawa Rd\3.0 Drawings\3.1 CAD\117536-340-SW TANK TYPICAL DETAILS.dwg

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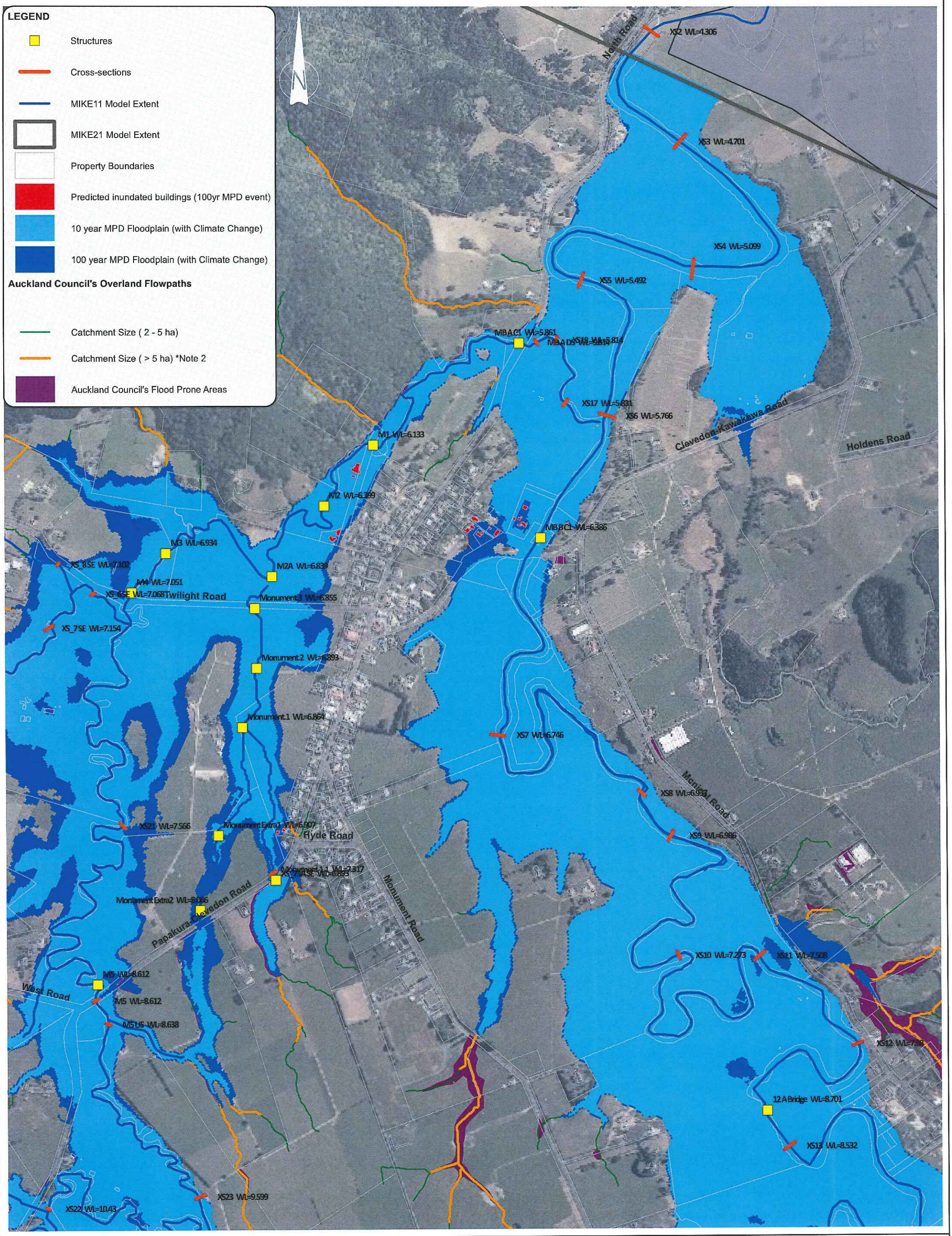


Notes:
1. Aerial map sourced from Terralink International (Copyright 2002-2005-Terralink International Limited and its licensors).
2. Probable floodplain, outside of main channels, not assessed as part of this study

A3 SCALE 1:10,000

0 0.1 0.2 0.3 0.4 0.5 (km)

Tonkin & Taylor
Environmental and Engineering Consultants
www.tonkin.co.nz

DRAWN	EHF	Jan.14
CHECKED	JRCR	Apr 14
APPROVED	TSRF	4/14
ARCFILE	FJ01.mxd	
SCALE (AT A3 SIZE)	1:10,000	
PROJECT No.	27067.700	

AUCKLAND COUNCIL
CLEVEDON FLOOD HAZARD MAPPING
Floodplain Maps
Page 2 of 7

FIGURE No. Figure J02

Rev. 0

Jiang Li

From: Zheng Qian <Zheng.Qian@aucklandcouncil.govt.nz>
Sent: Thursday, 20 December 2018 2:49 PM
To: Jiang Li
Cc: HWcustomerandcommunity
Subject: RE: Request for Flood report by Auckland Council

Hello Lee,

The plan we provided is the only information that is available from the Clevedon flood hazard modelling study for your site at 202 Clevedon Kawakawa Road. The report of the study a is a model build report and is mainly about the data, methodologies and assumptions of the modelling study.

If you have further questions pls feel free to contact me directly.

Kind regards.

Zheng Qian | Senior Healthy Waters Specialist
Catchment Planning | Healthy Waters
DD 09 890 4114 | Extn (46)4114 | Mob 021 605890
Auckland Council, Level 3 South, Bledisloe House, 24 Wellesley Street, Auckland Central 1010
Visit our website: www.aucklandcouncil.govt.nz

From: Donna Carter **On Behalf Of** HWcustomerandcommunity
Sent: Thursday, 20 December 2018 1:32 p.m.
To: Zheng Qian
Subject: FW: Request for Flood report by Auckland Council

Good afternoon Zheng

I have opened an RFI and assigned to you under 8700927709, if you could liaise directly with the customer regarding their request thanks heaps

Kind regards

Donna Carter
Healthy Waters Senior Customer Specialist
021 195 8945 (09) 262 5141
Customer and Community Team
Auckland Council I Bledisloe House I Level 3 North 24 Wellesley Street Auckland
Visit our website www.aucklandcouncil.govt.nz

From: Jiang Li
Sent: Monday, 17 December 2018 4:46 PM
To: HWcustomerandcommunity <HWcustomerandcommunity@aucklandcouncil.govt.nz>
Subject: RE: Request for Flood report by Auckland Council

Hi Donna

Thank you for this! Could we perhaps have the full report, as I only have the map? We'd like to know the flood levels in terms of figures etc

Many thanks

Regards,

Lee (Jiang Li) | Civil Engineer | 022 573 1273 | lee@landsandsurvey.co.nz |

From: Donna Carter <donna.carter@aucklandcouncil.govt.nz> **On Behalf Of** HWcustomerandcommunity
Sent: Wednesday, 28 November 2018 1:56 PM
To: Jiang Li <lee@landsandsurvey.co.nz>
Subject: FW: Request for Flood report by Auckland Council

Dear Jiang

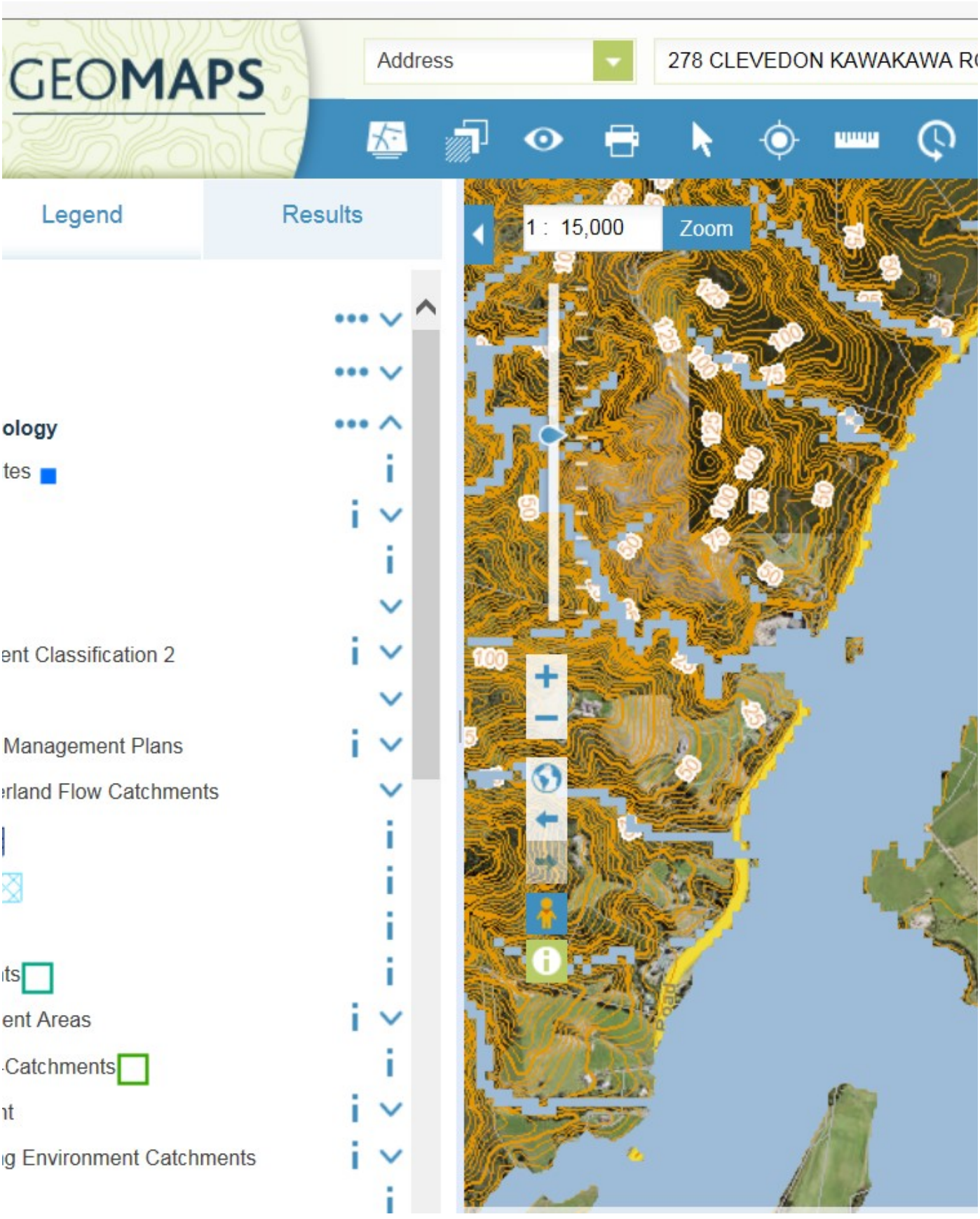
Please find attached the modelled 10 year and 100 year flood plain for the area in MPD and climate change scenario.

Only part of 202 Clevedon Kawakawa Road is within the extent of the modelled area, meaning that the flood plain is only available for the area that is within the model. In the study, we do not have the flood plain for the rest of 202 Clevedon Kawakawa Road and 278 Clevedon Kawakawa Road.

Since our model is based on 2006 LiDAR information, please note we have spotted some accuracy issues, it is important that you view and use the information with care. The information provided is not a substitute for a detailed site assessment.

For the rest of 202 Clevedon Kawakawa Road and 278 Clevedon Kawakawa Road, we only have rapid flood assessment results for the area which is published in Council's GeoMaps, of which there is a screen shot provided below, the blue line shows the address of 278.

Rapid flood assessment is only a rough indication of low lying areas that may flood during rainfall events.



Please note that whilst due care has been taken in producing the flood information given above, Auckland Council gives no guarantee as to the accuracy and completeness of any information given here and accepts no liability for any error, omission or use of the information.

Kind regards.

Donna Carter
Healthy Waters Senior Customer Specialist
Customer and Community Team
Auckland Council I Bledisloe House I Level 3 North 24 Wellesley Street Auckland
Visit our website www.aucklandcouncil.govt.nz

Your request details

Hi there

We are looking at a development in 202 and 278 Clevedon KawaKawa Road, Clevedon. We understand Council has done a flood report. Could we please have a copy of the report for the area?

Many thanks

Your contact details

Your full name: Jiang Li

Your contact phone number: 0225731273

Your email address: lee@landsandsurvey.co.nz

Your address:
405 Hobsonville Road
Hobsonville
Auckland
0618

Preferred contact method: Email

LANDS & SURVEY
SURVEYING | PLANNING | ENGINEERING

Client	278 Clevedon Kawakawa Raod	Job No:	117536
Job Address	278 Clevedon Kawakawa Raod		
	Clevedon, Auckland	Date:	6-Jun-19

Stormwater Runoff Calculation Worksheet - Based on ARC TP 108, April 1999.

Post Development Catchment for Culvert

Section 1 Runoff Curve Number (CN) and Initial Abstraction (Ia)

Soil name and classification	Cover type, treatment, and hydrologic condition	Curve No. (CN)	Area (Ha)	Product of CN x Area
			Pervious	
Grp C Mudston	Grass (good)	74	2.34	173.16
	Wetland	98		0
	Forest	70		0
	Orchard	72		0
		Total pervious	2.34	
			Impervious	
	Paved areas	98	0.00474	0.46452
	Roofed area	98	0.01152	1.12896
	Open water	98		0
				0
		Total impervious	0.01626	
		Totals	2.35626	174.75348

CN (weighted) = total product/total area = 74.17

Ia (weighted) = 5 x pervious area/total area = 4.97

2) Time of Concentration

Channelisation factor - from table 4.2 C= 1

Catchment length (km) L= 0.259

Catchment slope Sc= 0.032
Equal area method

Runoff factor CN/(200-CN) 0.589

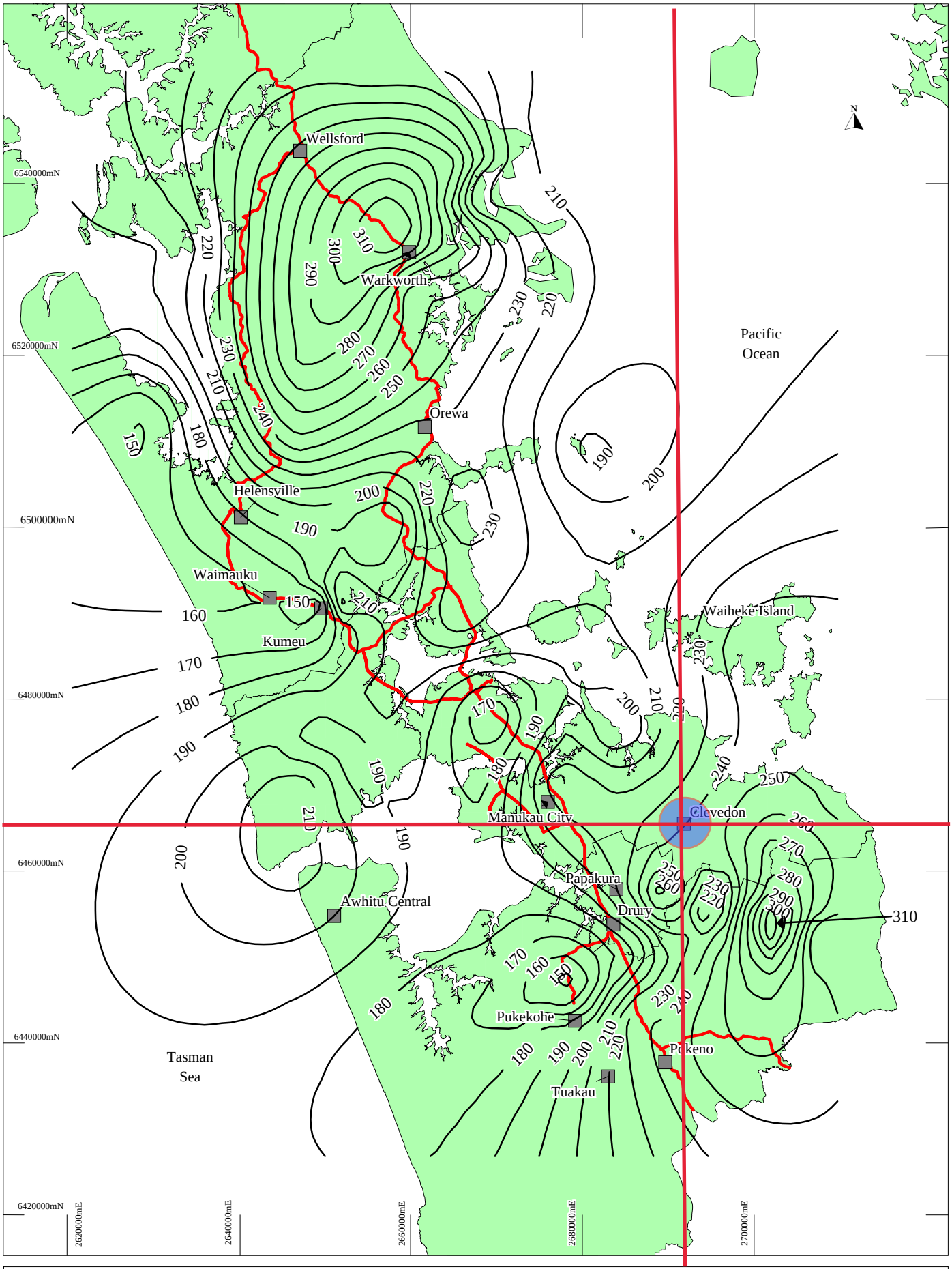
Time of Concentration Tc 0.216 Hrs
$Tc = 0.14 \times C \times L^{0.66} \times (CN/200-CN)^{-0.55} \times Sc^{-0.3}$

Section 2 Graphical Peak Flow Rate
1) Data

Catchment Area (km2)	A=	0.0236
Runoff curve number	CN=	74.166
Initial abstraction	Ia=	4.965
Time of concentration	Tc=	0.22

2) Calculation of Storage
S=((1000/CN)-10)x25.4 S= 88.48

	Storm 1	Storm 2	Storm 3		
3) Average recurrence interval (ARI) (yrs)	2	10	100		
4) 24hr rainfall depth, P_{24}(mm) (from TP 108)	87.2	186.8	280.3		
5) Compute $c^* = P_{24}-(2 \times Ia)/(P_{24} - 2 \times Ia) +2 \times S$	0.30	0.50	0.60		
6) Specific peak flow rate q* (from figure 6.1)	0.079	0.280	0.310		
7) Peak flow rate, $q_p = q^* \times A \times P_{24}$ (m^3/s)	0.1623	1.2324	2.0474		
8) Runoff Depth, $Q_{24} = (P_{24} - Ia)^2/((P_{24}-Ia) + S)$	40	122	208		
9) Runoff volume, $V_{24} = 1000 \times Q_{24} \times A$ (m^3)	933	2882	4910		



A

Legend: 90 Rainfall Contour (mm)

State Highways

Auckland *Regional* Council

Figure A.6
100 Year ARI
Daily Rainfall Depth

Scale: 1:600,000 (at A4)

(Revised 25/08/1999)

Workspace: N:(civil)\25\2507757\gis\mapinfo\wor\100yrari.wor Date: 25/08/1999

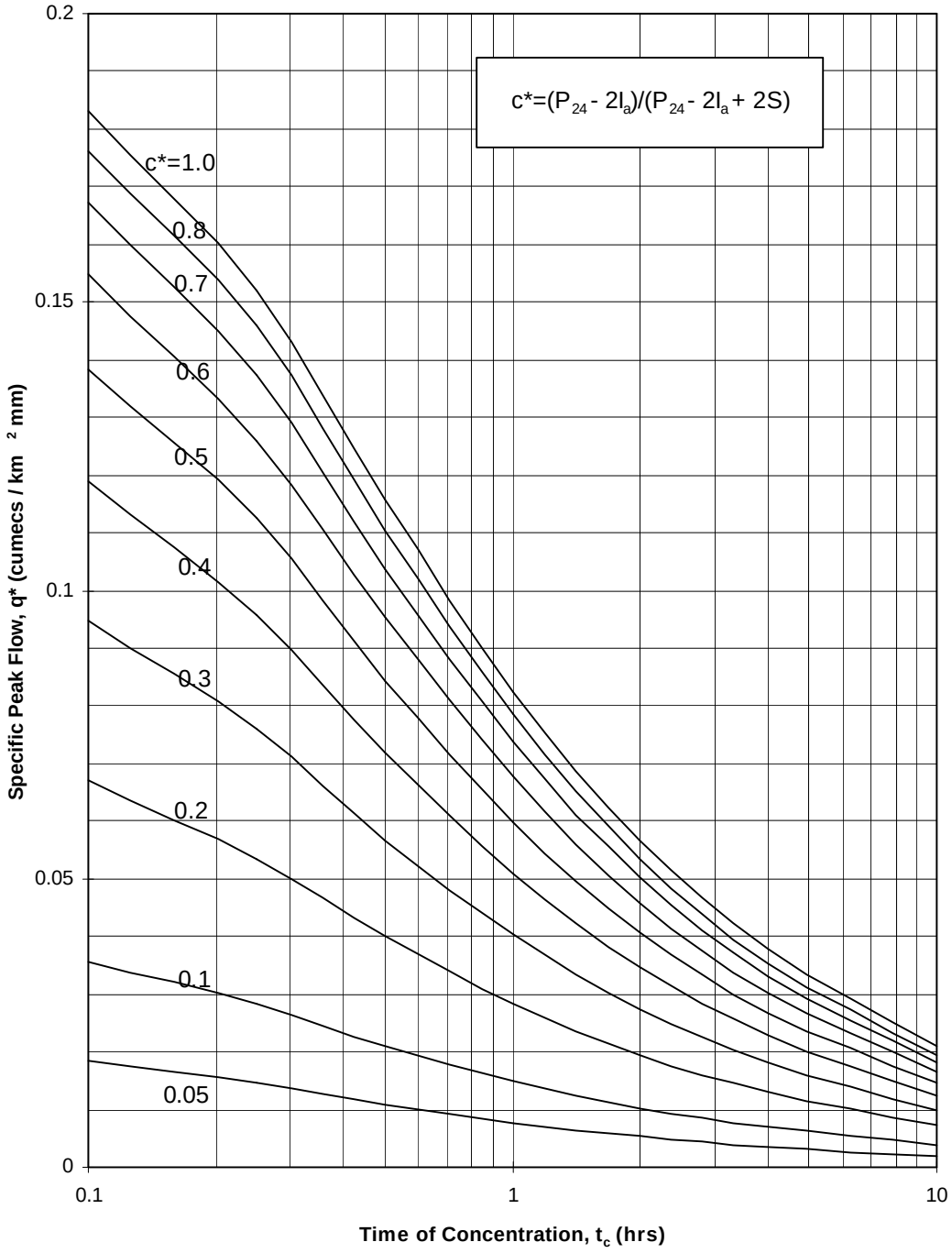
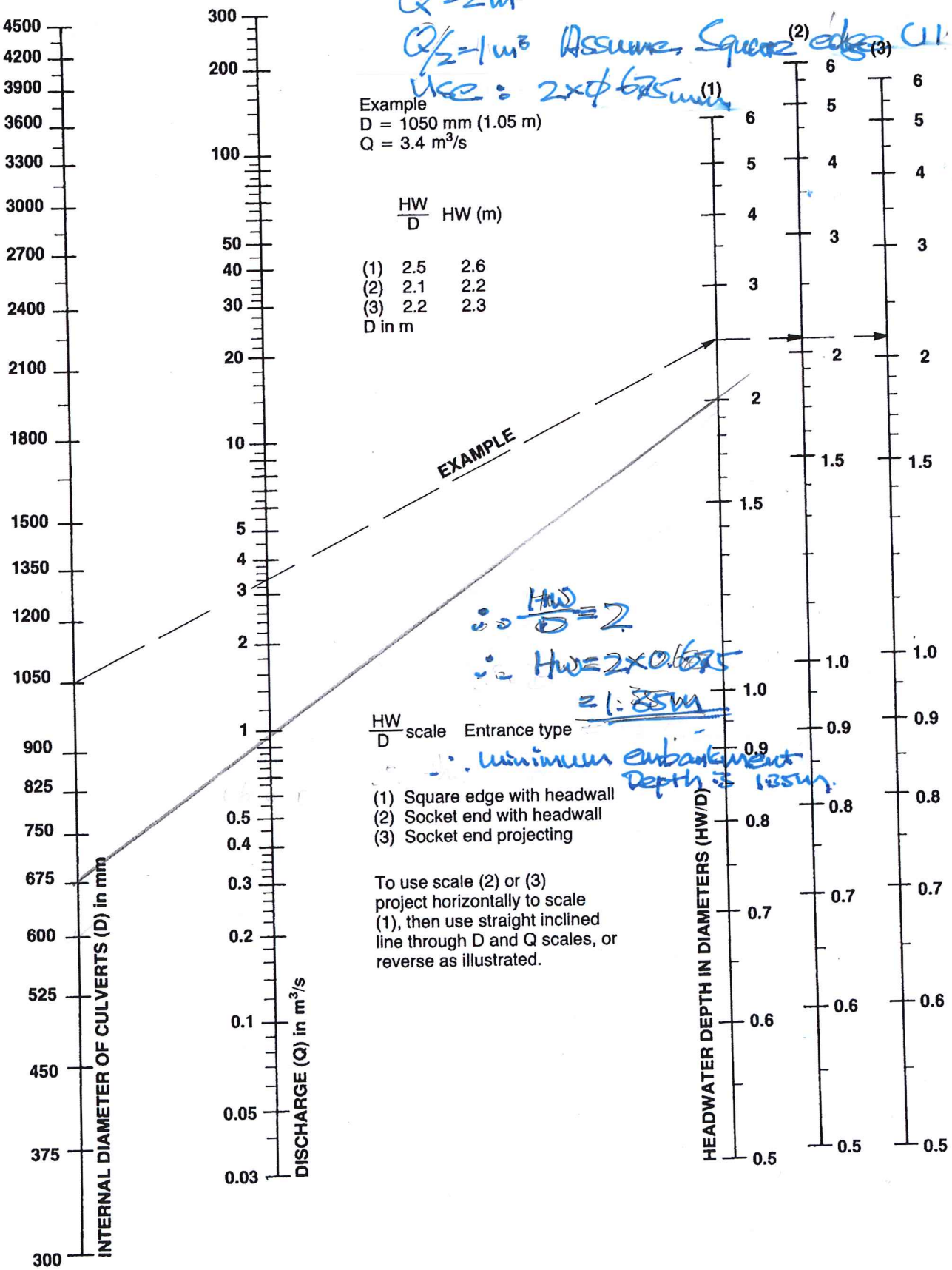
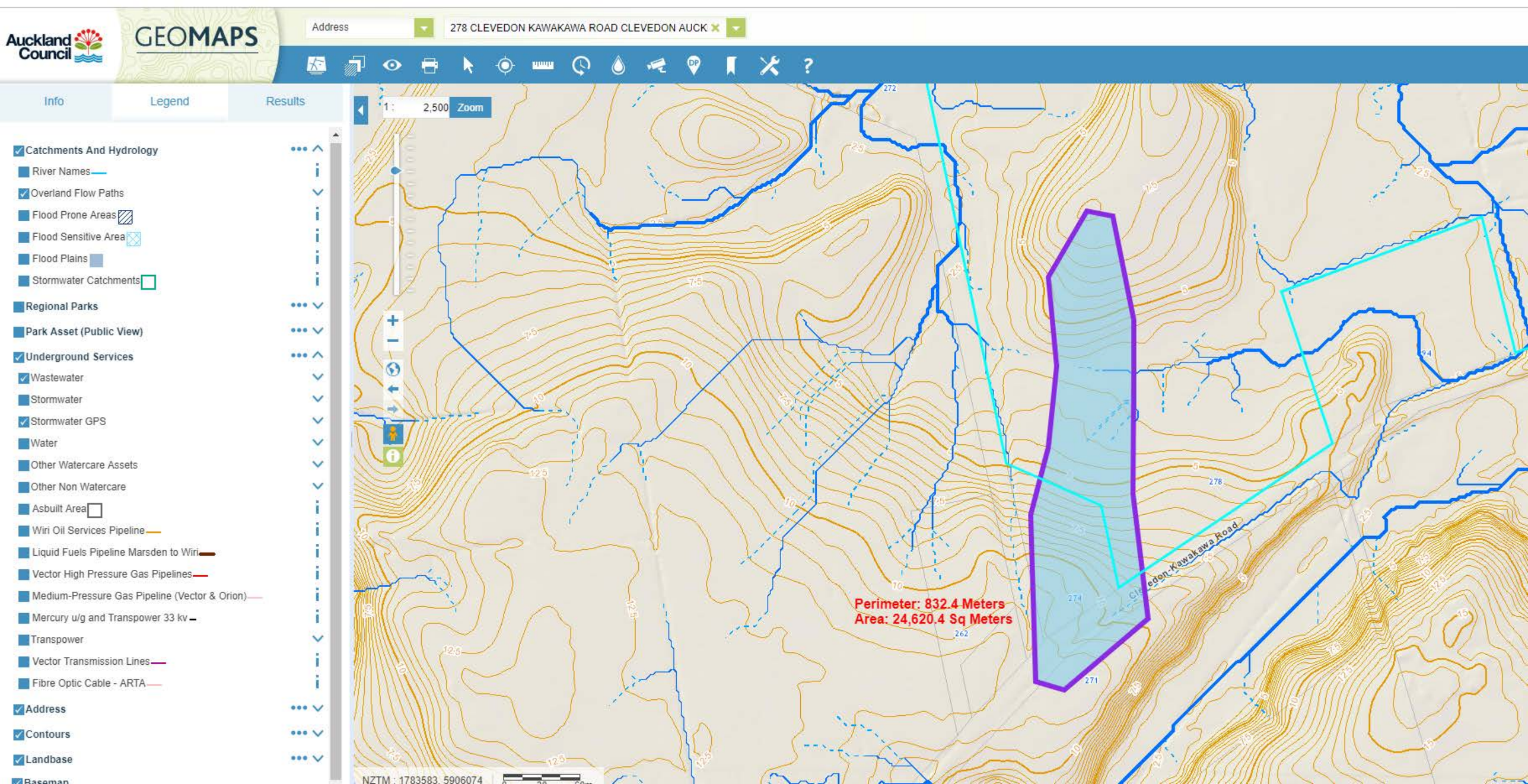


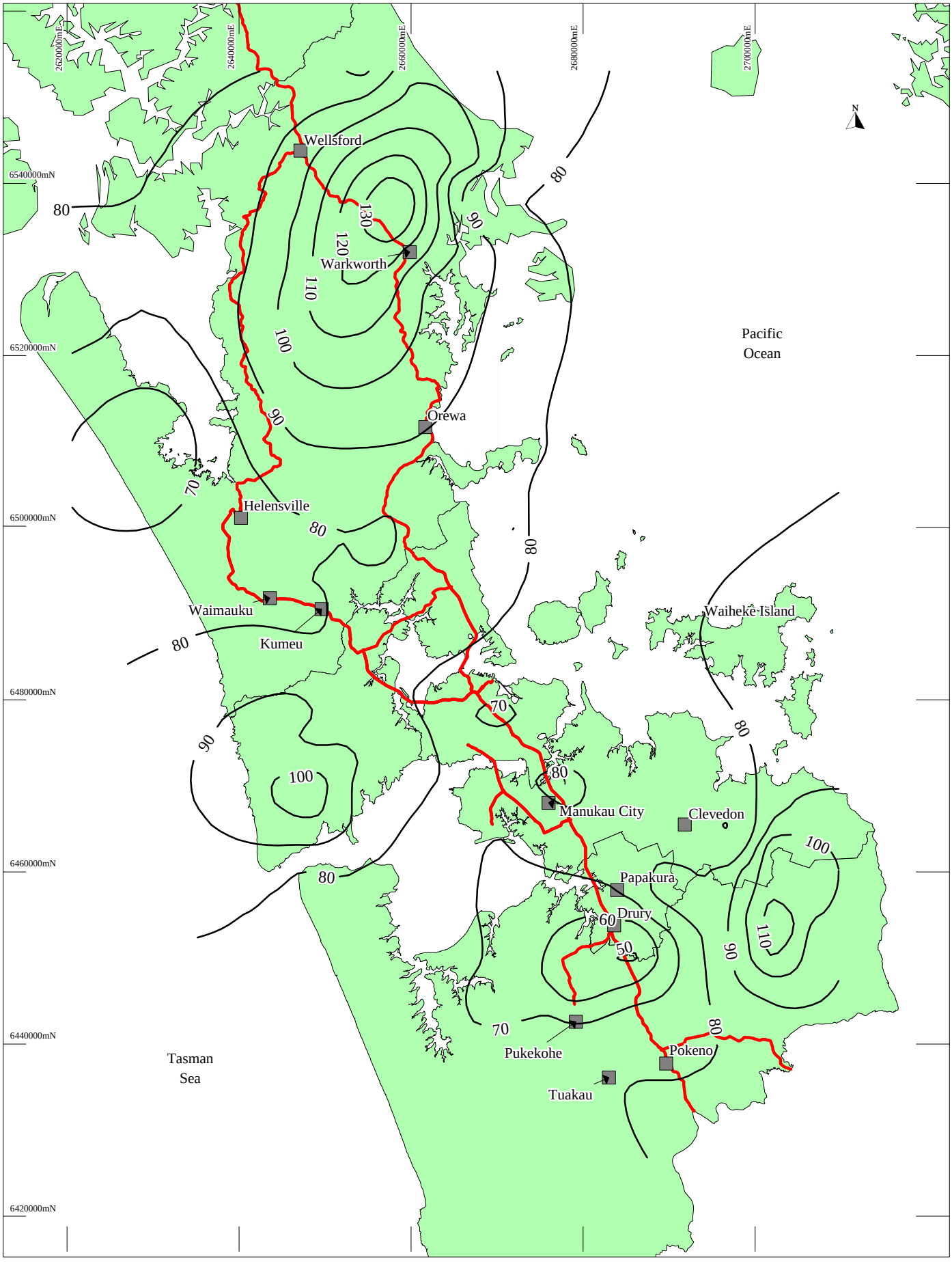
Figure 5.1 - Specific Peak Flow Rate



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

Figure 3.3
Adapted from [3.4]


Auckland Council
GEOMAPS
Address
278 CLEVEDON KAWAKAWA ROAD CLEVEDON AUCK
Info
Legend
Results
1 : 2,500
Zoom
Catchments And Hydrology
River Names
Overland Flow Paths
Flood Prone Areas
Flood Sensitive Area
Flood Plains
Stormwater Catchments
Regional Parks
Park Asset (Public View)
Underground Services
Wastewater
Stormwater
Stormwater GPS
Water
Other Watercare Assets
Other Non Watercare
Asbuilt Area
Wiri Oil Services Pipeline
Liquid Fuels Pipeline Marsden to Wiri
Vector High Pressure Gas Pipelines
Medium-Pressure Gas Pipeline (Vector & Orion)
Mercury u/g and Transpower 33 kv
Transpower
Vector Transmission Lines
Fibre Optic Cable - ARTA
Address
Contours
Landbase
Baseman
Perimeter: 832.4 Meters
Area: 24,620.4 Sq Meters
Clevedon-Kawakawa Road
NZTM : 1783583, 5906074



A

Legend: — 70 — Rainfall Contour (mm)

State Highways

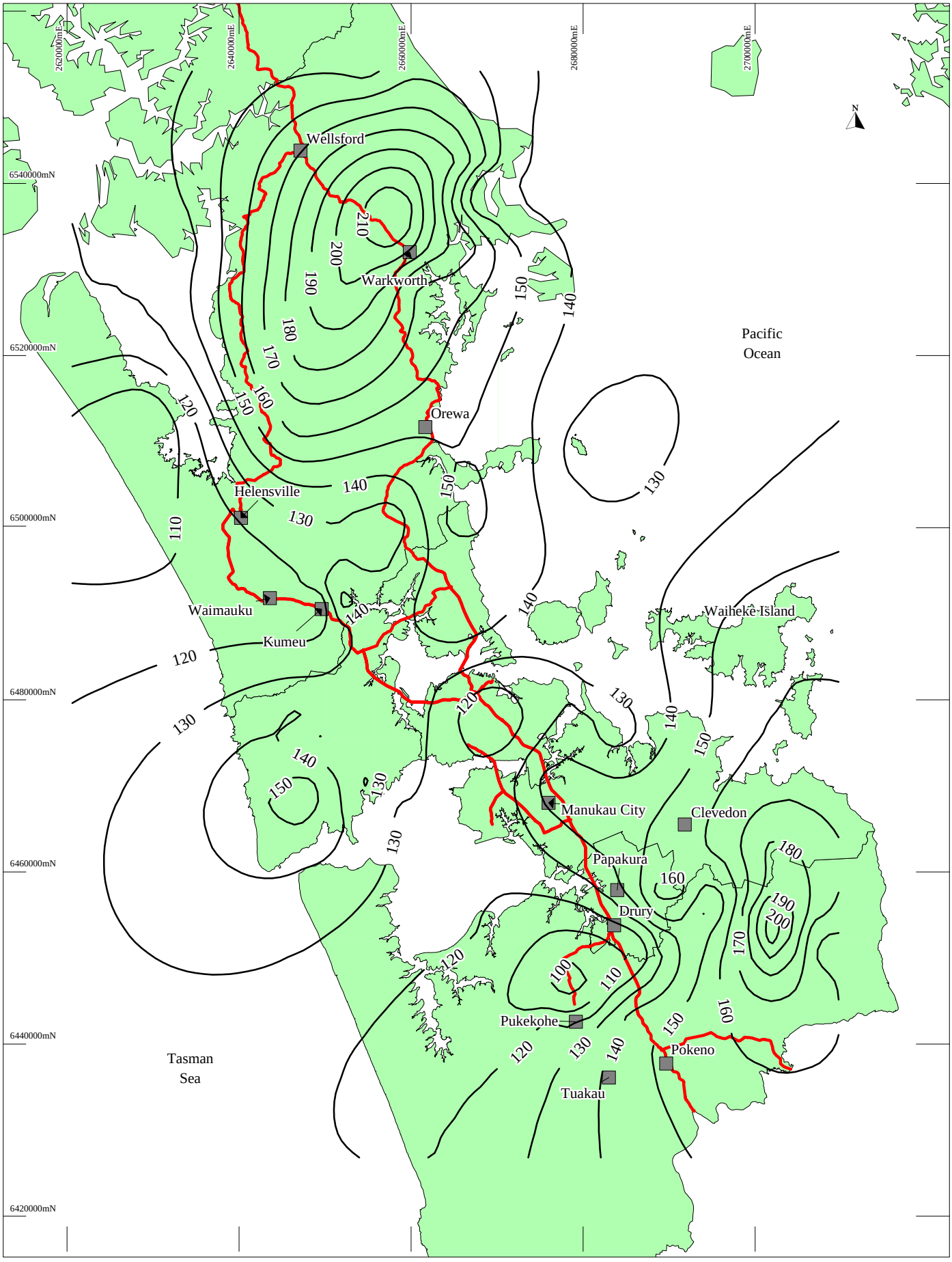
Auckland *Regional* Council

Figure A.1
2 Year ARI
Daily Rainfall Depth

Scale: 1:600,000 (at A4)

(Revised 25/08/1999)

Workspace: N:(civil)\25\2507757\gis\mapinfo\wor\2yrari.wor Date: 25/08/1999



A

Legend: — 90 — Rainfall Contour (mm)

State Highways

Auckland **Regional** Council

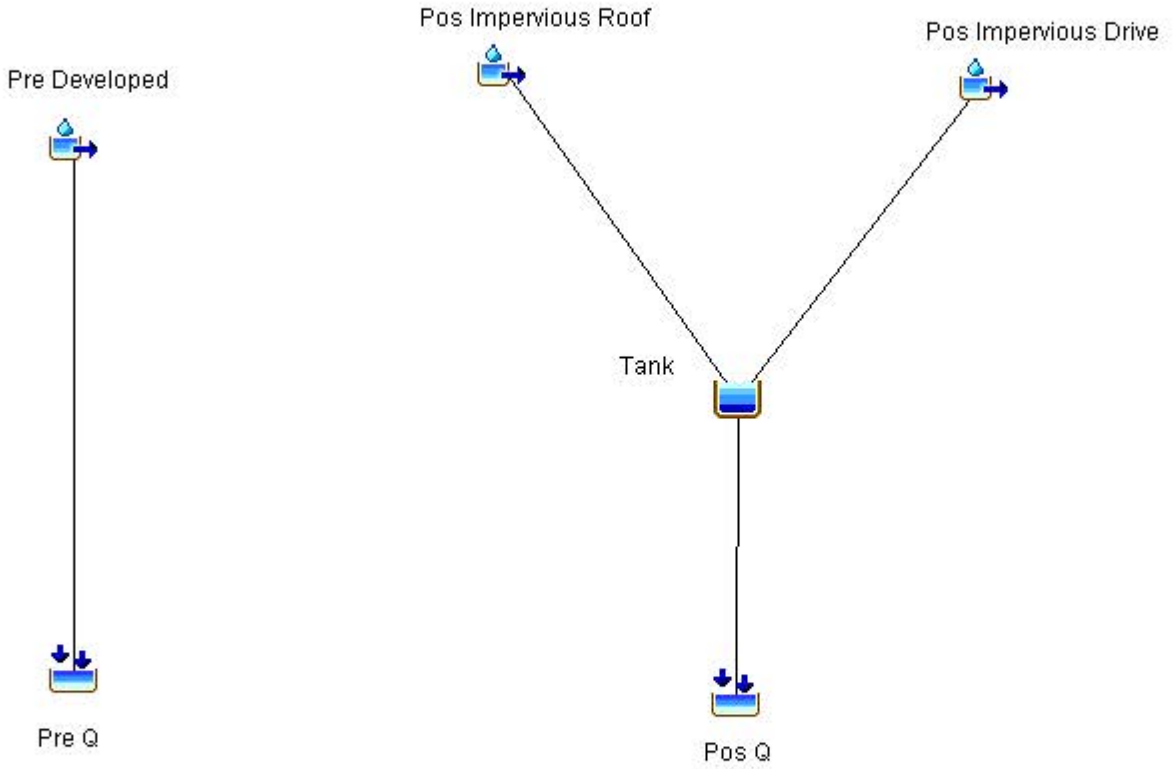
Figure A.3
10 Year ARI
Daily Rainfall Depth

Scale: 1:600,000 (at A4)

(Revised 25/08/1999)

Workspace: N:(civil)\25\2507757\gis\mapinfo\wor\10yrari.wor Date: 25/08/1999

Basin Model [Basin 1] Current Run [10 yr]



Project: 117536 Clevedon Kawakawa Simulation Run: 10 yr

Start of Run: 01Jan2000, 00:00 Basin Model: Basin 1
End of Run: 02Jan2000, 00:00 Meteorologic Model: 10 year
Compute Time: 25Jun2019, 21:56:10 Control Specifications: Control 1

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (1000 M3)
Pre Developed	0.000700	0.01607	01Jan2000, 12:13	0.08217
Pre Q	0.000700	0.01607	01Jan2000, 12:13	0.08217
Pos Impervious Roof	0.000400	0.01245	01Jan2000, 12:12	0.07066
Pos Impervious Drive	0.000300	0.00933	01Jan2000, 12:12	0.05299
Tank	0.000700	0.01155	01Jan2000, 12:22	0.12307
Pos Q	0.000700	0.01155	01Jan2000, 12:22	0.12307

Project: 117536 Clevedon Kawakawa Simulation Run: 10 yr

Reservoir: Tank

Start of Run:	01Jan2000, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2000, 00:00	Meteorologic Model:	10 year
Compute Time:	25Jun2019, 21:56:10	Control Specifications:	Control 1

Volume Units: 1000 M3

Computed Results

Peak Inflow:	0.02178 (M3/S)	Date/Time of Peak Inflow:	01Jan2000, 12:12
Peak Discharge:	0.01155 (M3/S)	Date/Time of Peak Discharge	01Jan2000, 12:22
Inflow Volume:	0.12365 (1000 M3)	Peak Storage:	0.01858 (1000 M3)
Discharge Volume	0.12307 (1000 M3)	Peak Elevation:	1.643 (M)

Project: 117536 Clevedon Kawakawa Simulation Run: 10 yr

Reservoir: Tank

Start of Run:	01Jan2000, 00:00	Basin Model:	Basin 1
End of Run:	02Jan2000, 00:00	Meteorologic Model:	10 year
Compute Time:	25Jun2019, 21:56:10	Control Specifications:	Control 1

Volume Units: 1000 M3

Computed Results

Peak Inflow:	0.02178 (M3/S)	Date/Time of Peak Inflow:	01Jan2000, 12:12
Peak Discharge:	0.01155 (M3/S)	Date/Time of Peak Discharge	01Jan2000, 12:22
Inflow Volume:	0.12365 (1000 M3)	Peak Storage:	0.01858 (1000 M3)
Discharge Volume	0.12307 (1000 M3)	Peak Elevation:	1.643 (M)

Client: **Stratford Properties** **By:** **PL**
Ref: **117536**
Date: **10/06/2019**

Sheet 1: **Swale Contributing Area & Water Quality Storm Flow Rate Calculation**

	Part 1	From Low Point CH 160 to End Point (Culdesac)		Part 2	From Start to Low Point CH 160
	Road Length =	205	m	160	m
	Road Width =	3	m	3	m
	No. Parking Bay =	2		1	
	Parking Length =	15	m	15	m
	Parking Width =	2.5	m	2.5	m
	Road Reserve =	7	m	7	m
GD2017/001 Table 68	Peak rainfall rate =	10	mm/hr		
Grass Area	A(pervious) =	510	m2	355	m2
Concrete including Parking Bay	A(impervious) =	899	m2	548	m2
Not including Swale Area	Total road area =	1409	m2	903	m2
	c pervious =	0.5			
	Q(per) =	0.0007	m3/s	0.0005	m3/s
	c impervious =	0.95			
	Q(imp) =	0.0024	m3/s	0.0014	m3/s
	Total Q =	0.0031	m3/s	0.0019	m3/s

Client: Stratford Properties **By:** PL
Ref: 117536
Date: 10/06/2019

LANDS & SURVEY
SURVEYING | PLANNING | ENGINEERING

Sheet 2: Swale Sizing Calculation - Part 1

D =	0.130	m	
b =	1.29	m	base width of channel
T =	1.64	m	swale width
z =	5.00		side slope
d =	0.035	m	water depth
n =	0.25		Manning for 10% AEP
i =	1.2%		channel slope

Low Flow (10mm/hr)

A(per) =	510	m2	
A(imper) =	899	m2	
Q(wq)=	0.002	m3/s	
road length =	205.00	m	
l(eff) =	102.50	m	
b=	1.293	m	
T=	1.643	m	
A(cross) =	0.051	m2	
R(hy) =	0.031	m	
v =	0.043	m/s	OK less than 0.8m/s
Q(wq) =	0.002	m3/s	
HRT	40	mins	OK greater than 9mins
l(req) =	23.05	m	

10% AEP Event Runoff

i(24) =	111	mm	From NIWA
i convert =	75.26	mm/hr	
Q(per) =	0.005	m3/s	
Q(imper) =	0.018	m3/s	
Q(10) =	0.023	m3/s	
new depth D =	0.130	m	
b=	1.293	m	
T=	2.593	m	
A(cross) =	0.253	m2	
R(hy) =	0.096	m	
v =	0.091	m/s	OK less than 0.8m/s
Q(10) =	0.023	m3/s	

Total Depth D =	0.28	m	with 150mm freeboard
Swale Base b =	1.29	m	
Total Swale Width T =	4.09	m	

Client: **Stratford Properties** **By:** **PL**
Ref: **117536**
Date: **10/06/2019**

LANDS & SURVEY
SURVEYING | PLANNING | ENGINEERING

Sheet 3: **Swale Sizing Calculation - Part 2**

D =	0.115	m	
b =	1.06	m	base width of channel
T =	1.36	m	swale width
z =	5.00		side slope
d =	0.030	m	water depth
n =	0.25		Manning for 10% AEP
i =	1.1%		channel slope

Low Flow (10mm/hr)

A(per) =	355	m2	
A(imper) =	548	m2	
Q(wq)=	0.001	m3/s	
road length =	160.00	m	
l(eff) =	80.00	m	
b=	1.060	m	
T=	1.360	m	
A(cross) =	0.036	m2	
R(hy) =	0.027	m	
v =	0.037	m/s	OK less than 0.8m/s
Q(wq) =	0.001	m3/s	
HRT	36	mins	OK greater than 9mins
l(req) =	19.84	m	

10% AEP Event Runoff

i(24) =	111	mm	From NIWA
i convert =	75.26	mm/hr	
Q(per) =	0.004	m3/s	
Q(imper) =	0.011	m3/s	
Q(10) =	0.015	m3/s	
new depth D =	0.115	m	
b=	1.060	m	
T=	2.210	m	
A(cross) =	0.188	m2	
R(hy) =	0.084	m	
v =	0.080	m/s	OK less than 0.8m/s
Q(10) =	0.015	m3/s	

Total Depth D =	0.27	m	with 150mm freeboard
Swale Base b =	1.06	m	
Total Swale Width T =	3.71	m	

K190051-1

7 June 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

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P O Box 7630 | Sydenham | Christchurch 8240
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REPORT ISSUE AUTHORISATION

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

Prepared by:

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Engineering Geologist

Reviewed by:

Tom Palastanga
BSc (Hons), MEngSt (Hons), MEngNZ
Senior Geotechnical Engineer

Authorised by:

R. J. Hutchison
BE, MSc, DIC, MICE, CEng(UK), FIPENZ, CPEng
Principal Geotechnical Engineer

EXECUTIVE SUMMARY

On-Site Wastewater Treatment And Disposal

Residential Subdivision

278 Clevedon-Kawakawa Road

Clevedon

SITE CONDITIONS	• 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.
WASTEWATER TREATMENT RECOMMENDATIONS	• 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.
DISPOSAL CONSIDERATIONS	• 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.
FUTURE WORK	• We recommend that a site specific wastewater design is undertaken for each Lot once development layouts are known and floor plans have been prepared.
REPORT DISTRIBUTION	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.

CONTENTS

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 report 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.

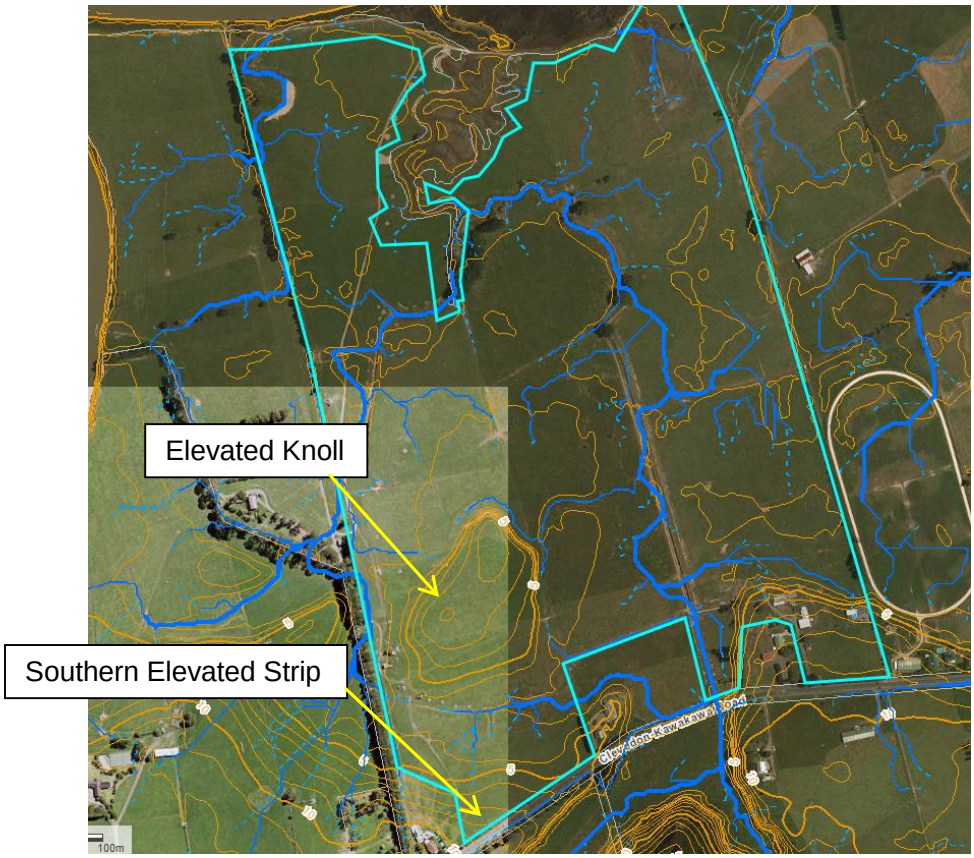


Figure 1: Aerial view of 278 Clevedon-Kawakawa Road, sourced from Auckland Council Geomaps website (https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html)

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.

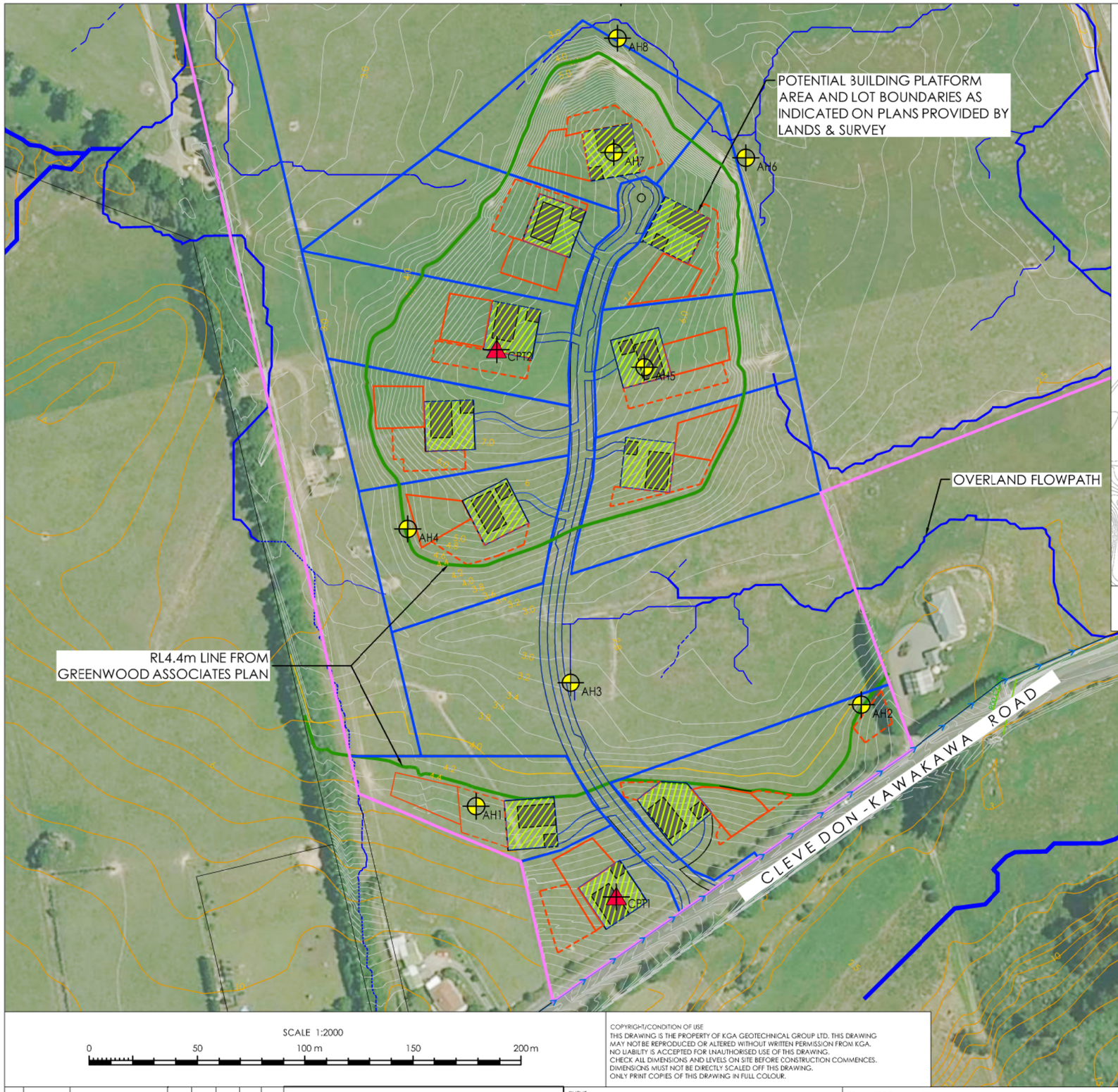
8. CONCLUSIONS AND FUTURE WORK

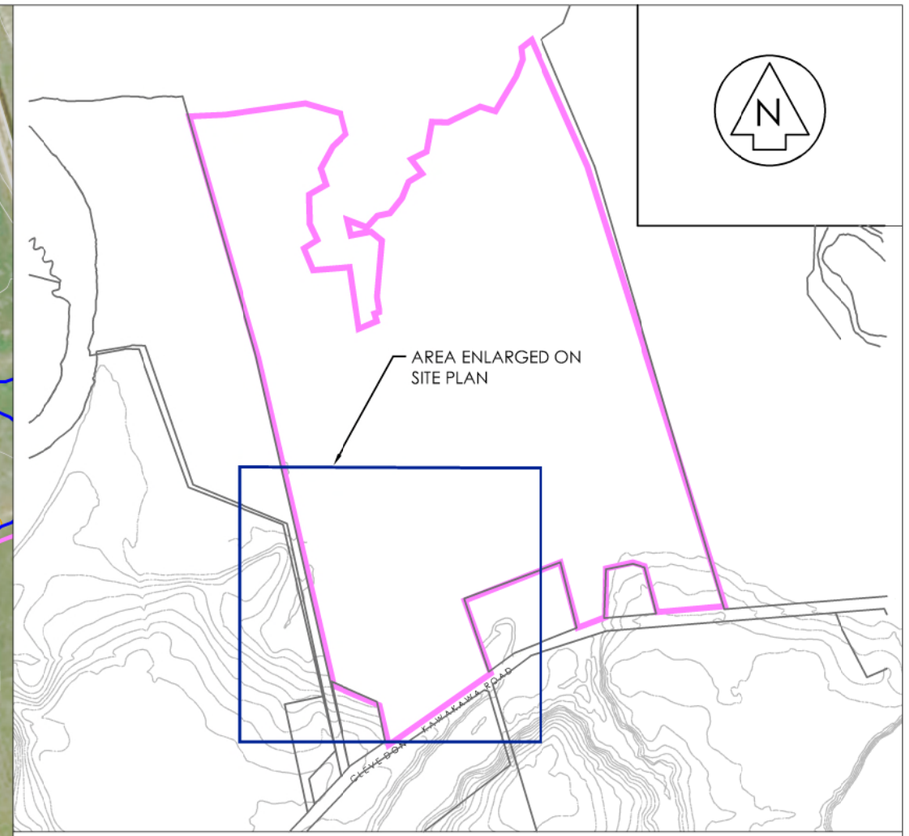
Based on the above, it is our professional opinion that the proposed subdivision is suitable for on-site wastewater treatment and disposal. Provided that the recommendations contained within this report are followed and incorporated into individual Lot detailed design for wastewater, the effects on the 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.





LOCATION PLAN
SCALE 1:10000

LEGEND

- AH1 — HAND AUGER BOREHOLE LOCATIONS
- CPT1 — CONE PENETRATION TEST (CPT) LOCATIONS
- POTENTIAL PRIMARY DISPOSAL AREA(432m²)
- POTENTIAL RESERVE DISPOSAL AREA(432m²)
- POTENTIAL BUILDING PLATFORM (AS INDICATED BY GREENWOOD ASSOCIATES)
- SITE BOUNDARY
- 5.0 — EXISTING TOPOGRAPHIC CONTOURS (COUNCIL GEOMAPS, INTERVAL 1m)
- 4.4 — EXISTING TOPOGRAPHIC CONTOURS (GREENWOCD ASSOCATES, INTERVAL 0.2m)
- EXISTING ROAD DRAIN
- OVERLAND FLOWPATH

NOTES

1. LOCATIONS OF FEATURES AND GROUND INVESTIGATION POINTS ARE APPROXIMATE ONLY.
2. AERIAL IMAGE SOURCED FROM AUCKLAND COUNCIL GEOMAPS WEBSITE.
3. CONTOURS SOURCED FROM GREENWOOD ASSOCIATES PLAN, 9012/1 PROPOSED LAYOUT, 12/04/2019 AND AUCKLAND COUNCIL GEPMAPS.
4. BOUNDARIES SOURCED FROM LANDS & SURVEY PLAN, 117536-100 REV C 104/06/2019.

SCALE 1:2000

0 50 100 m 150 200m

REV	DATE	REVISION DESCRIPTION	BY	CHK	SIGN	APP	SIGN
A	07/06/2019	REPORT ISSUE					

Auckland | Christchurch
09 478 6655 | 03 343 5302
www.kga.co.nz
KGA GEOTECHNICAL

CLIENT: SRATFORD PROPERTIES LTD.

PROJECT TITLE: PROPOSED RESIDENTIAL SUBDIVISION
278 CLEVEDON KAWAKAWA ROAD, CLEVEDON

DRAWING TITLE: POTENTIAL WASTEWATER DISPERSAL FIELD LAYOUT PLAN

DESIGNED	AF	SIGN		DATE	
DRAWN	MM	SIGN		DATE	
CHECKED	TP	SIGN		DATE	
APPROVED	RH	SIGN		DATE	

STATUS: SUBDIVISION CONSENT

SCALE: 1:2000 | SIZE: A3
COORDINATION SYSTEM: NZTM | HEIGHT DATUM: AUCKLAND VERTICAL DATUM 1946(MSL)
PROJECT NUMBER: K190051-1 | DRAWING NUMBER: SHEET 01 | REVISION: A

HAND AUGER LOG

Job No.:	**190051**
Hole No.:	**AH1**
Date:	15/02/2019
Logged By:	SR
Sheet:	1 of 1

Client: KGA Geotechnical Group Ltd

Project: 272-278 Clevedon-Kawakawa Road, Clevedon

Location: See Site Plan

Coordinates: , **Ground Level:** -

Depth (m)	Subsurface Conditions	Groundwater	Geological Unit	Vane Shear Strength (kPa) (refer notes for details)	Values	Scala Penetrometer (blows / 50mm) Depth (m)	Blows
0.0	Topsoil. [TOPSOIL]		TOP SOIL			5.05	1
	SILT with some clay. Orange mottled light grey, very stiff to hard, dry, low plasticity. [ALLUVIUM]					5.10	1
0.5	Clayey SILT. Orange mottled light grey, very stiff to hard, dry, moderately plastic. [ALLUVIUM]				198+	5.15	1
					-	5.20	1
	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]					5.25	1
1.0					139	5.30	1
					57	5.35	1
						5.40	1
						5.45	1
						5.50	2
1.5	1.6m: Moist to wet.				124	5.55	1
					59	5.60	2
						5.65	1
						5.70	2
	1.9m: Becomes orange and light grey.					5.75	2
2.0	CLAY with some Silt. Orange mottled light grey, very stiff, moist to wet, highly plastic. [ALLUVIUM]				141	5.80	2
		15/02/2019			74	5.85	1
						5.90	2
						5.95	2
						6.00	2
2.5	Silty CLAY. Light grey mottled orange, stiff, moist to wet, highly plastic. [ALLUVIUM]				99	6.05	2
					48	6.10	3
						6.15	2
		19/02/2019				6.20	3
						6.25	2
3.0	3m: Becomes wet, very stiff with occasional organics (<2mm).				127	6.30	2
					48	6.35	2
						6.40	3
						6.45	2
						6.50	2
3.5	Clayey SILT with minor fine sand. Orange mottled light grey and dark orange, stiff, wet, moderately plastic. [ALLUVIUM]				99	6.55	2
					42	6.60	2
						6.65	2.5
						6.70	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	6.75	2.5
					57	6.80	2.5
						6.85	2.5
						6.90	2.5
4.5					127		
					45		
5.0	5m: End of Borehole				62		
					20		

TAURANGA GROUP ALLUVIUM (Pleistocene deposits)

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

Flat, Field. Hole data is for a set location only.

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HAND AUGER LOG

Job No.:	**190051**
Hole No.:	**AH2**
Date:	15/02/2019
Logged By:	SR
Sheet:	1 of 1

Client: KGA Geotechnical Group Ltd

Project: 272-278 Clevedon-Kawakawa Road, Clevedon

Location: See Site Plan

Coordinates: , **Ground Level:** -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa) (refer notes for details)	Values	Scala Penetrometer (blows / 50mm) Depth (m)	Blows
0.0		Topsoil. [TOPSOIL]		TOPSOIL		50 100 150 200		3.05	1
		Clayey SILT. Orange, very stiff, dry, low to moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]						3.10	1
								3.15	1
								3.20	1
0.5		Silty CLAY. Orange mottled light grey, very stiff, dry to moist, moderate to highly plastic. [WAIPAPA GROUP / COLLUVIUM ?]					141	3.25	1
							28	3.30	1
								3.35	0.5
		0.9m: Becomes moist.						3.40	0.5
1.0							184	3.45	1
							62	3.50	2
								3.55	1
		Clayey SILT. Orange mottled light grey, very stiff, moist, moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]						3.60	2
								3.65	2
1.5		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
2.0		SILT with fine to medium, medium dense to dense Gravels, Clasts (<4mm) and fine to coarse Sand. Orange mottled orangey brown, moist to wet, no plasticity. [WAIPAPA GROUP / COLLUVIUM ?]	15/02/2019				UTP	3.95	2
							-	4.00	3
								4.05	1.5
								4.10	1.5
2.5			19/02/2019				UTP	4.15	1.5
		Fine to coarse, medium dense to dense SAND with SILT, Fine to medium Gravels and Clasts (<5mm). Orangey brown and dark orange, saturated, no plasticity. At 2.4m; Becomes wet.					-	4.20	1.5
								4.25	2
		At 2.6m; Becomes orange mottled light grey. [WAIPAPA GROUP / COLLUVIUM ?]						4.30	2
								4.35	2
3.0							Scaled	4.40	3
		Fine to coarse, loose Sandy SILT with Clasts (<4mm) and minor clay. Orange mottled light grey, wet, low plasticity. Scaled from 3m then re drilled.					-	4.45	6
								4.50	6
								4.55	7
								4.60	6
3.5		At 3.3m; Becomes light grey mottled orange and saturated. [WAIPAPA GROUP / COLLUVIUM ?]						4.65	4
								4.70	4
		3.7m: With Clasts (<5mm<30%).						4.75	4
								4.80	4
4.0		Silty (Fine to coarse, loose) SAND with Clasts (<5mm) and minor clay. Light grey mottled orange, saturated, low plasticity. At 4m; Medium dense. [WAIPAPA GROUP / COLLUVIUM ?]						4.85	5
								4.90	5
								4.95	5
								5.00	5
								5.05	5
4.5		Fine to coarse, medium dense Sandy SILT with Clasts (<5mm) and minor clay. Orange mottled light grey, wet to saturated, low plasticity [WAIPAPA GROUP / COLLUVIUM ?]						5.10	6
								5.15	5
								5.20	6
								5.25	5
								5.30	6
5.0		4.5m: End of Borehole, unable to penetrate. Additional scala values. Start 5.5m; 6,7,5,6,4,5,4,4,5. Scaled 1m first re drilled, then scaled out 2m. Then re drilled to 4.5m.						5.35	6
								5.40	7
								5.45	7

TAURANGA GROUP ALLUVIUM (Pleistocene deposits)

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

Client: KGA Geotechnical Group Ltd

Project: 272-278 Clevedon-Kawakawa Road, Clevedon

Location: See Site Plan

Coordinates: , **Ground Level:** -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa) (refer notes for details) 50 100 150 200	Values	Scala Penetrometer (blows / 50mm) Depth (m)	Blows
0		Topsoil. [TOPSOIL]		TOPSOIL	TS TS			3.55	0.5
								3.60	0.5
								3.65	0.5
		Clayey SILT. Grey mottled orange with brown staining, very stiff, dry, moderately plastic. [ALLUVIUM]		TAURANGA GROUP ALLUVIUM (Holecene deposits)				3.70	0.5
0.5							141	3.75	0.5
		Silty CLAY. Orange and light grey, very stiff, dry to moist, highly plastic. At 0.6m; Moist. [ALLUVIUM]					34	3.80	0.5
								3.85	0.5
								3.90	0.5
								3.95	0.5
1.0		1m: Becomes stiff with occasional plant fibers.					99	4.00	0.5
							45	4.05	0.5
		1.2m: Moist to wet.						4.10	0.5
								4.15	1
1.5		1.5m: Wet.	14/02/2019				59	4.20	1
			19/02/2019				34	4.25	1
		1.7m: Becomes grey.						4.30	2
								4.35	1
		Organic Silty CLAY. Dark brown, stiff, wet, moderate to highly plastic. At 2m; Firm. [ALLUVIUM]						4.40	1
2.0							28	4.45	1
							14	4.50	1
								4.55	1
		Clayey SILT. Grey, firm, wet to saturated, moderately plastic. [ALLUVIUM]						4.60	2
								4.65	1
2.5		2.5m: Becomes stiff with poor recovery and some contamination from above.					62	4.70	2
							28	4.75	1
								4.80	1
								4.85	1
								4.90	1
3.0		3m: Fully saturated.					57	4.95	1
							28	5.00	2
								5.05	1
								5.10	2
3.5		3.5m: End of Borehole, high suction					51	5.15	2
							28	5.20	2
								5.25	2
								5.30	2
								5.35	2
4.0								5.40	2
								5.45	1
								5.50	2
								5.55	2
								5.60	2
4.5								5.65	2
								5.70	2
								5.75	1
								5.80	2
								5.85	2
5.0								5.90	2
								5.95	2

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

Flat, Field. Hole data is for a set location only.

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HAND AUGER LOG

Job No.:	**190051**
Hole No.:	**AH4**
Date:	18/02/2019
Logged By:	SR
Sheet:	1 of 1

Client: KGA Geotechnical Group Ltd

Project: 272-278 Clevedon-Kawakawa Road, Clevedon

Location: See Site Plan

Coordinates: , **Ground Level:** -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa) (refer notes for details)	Values	Scala Penetrometer (blows / 50mm) Depth (m)	Blows
0.0		Topsoil. [TOPSOIL]		TOP SOIL		50 100 150 200	198+	3.90	1
		SILT with minor clay. Orange, very stiff to hard, low plasticity. [WAIPAPA GROUP / COLLUVIUM ?]					-	3.95	1
0.5		Clayey SILT. Orange mottled light grey, very stiff to hard, dry, low to moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]						4.00	1
		Silty CLAY. Orange mottled light grey, very stiff, dry to moist, moderate to highly plastic. [WAIPAPA GROUP / COLLUVIUM ?]						4.05	1
1.0		0.9m: Becomes moist and highly plastic.					170	4.10	1
		1.2m: Moderate to highly plastic.					71	4.15	1
		Clayey SILT. Light grey mottled orange, very stiff, moist, moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]						4.20	1
1.5		Silty CLAY. Orange mottled light grey, very stiff, moist, highly plastic. At 1.8m; Moist to wet. [WAIPAPA GROUP / COLLUVIUM ?]						4.25	1
								4.30	1
								4.35	1
								4.40	1
								4.45	1
								4.50	1
								4.55	1
							116	4.60	1
							57	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
		2.3m: Becomes light grey mottled orange and moist.	▽ 18/02/2019					5.05	3
2.5		Clayey SILT with minor fine sand. Light grey mottled orange, very stiff, wet, moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]	▼ 19/02/2019				158	5.10	2
							71	5.15	2
								5.20	2
								5.25	2
								5.30	2
3.0		SILT with CLASTS (<3mm), some fine sand and minor to trace of clay. Light brown mottled orangey brown and light grey, very stiff, wet, low plasticity. At 3m; With Clasts (<5mm), wet to saturated and orange and light grey. [WAIPAPA GROUP / COLLUVIUM ?]					156	5.35	3
							28	5.40	2
								5.45	3
								5.50	2
								5.55	3
3.5		Fine to medium, loose Sandy SILT with Clasts (<5mm) and minor clay. Orange, wet to saturated, low plasticity. [WAIPAPA GROUP / COLLUVIUM ?]					99	5.60	2.5
							42	5.65	2.5
								5.70	2.5
		Silty CLAY. Orange mottled light grey and dark orange, stiff, wet, highly plastic. [WAIPAPA GROUP / COLLUVIUM ?]					54	5.75	2.5
							31	5.80	2.5
4.0		Silty (Fine to coarse, loose) SAND with Clasts (<7mm) and minor clay. Light grey mottled orange, wet to saturated, low plasticity. [WAIPAPA GROUP / COLLUVIUM ?]						5.85	2.5
								5.90	3
		Silty CLAY. Light grey and orange, stiff, wet, moderate to highly plastic. [WAIPAPA GROUP / COLLUVIUM ?]						5.95	3
								6.00	3
4.5								6.05	3
		3.85m: End of Borehole, high suction						6.10	3
								6.15	3
								6.20	3
								6.25	3
5.0								6.30	3

TAURANGA GROUP ALLUVIUM (Pleistocene deposits)

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

Client: KGA Geotechnical Group Ltd

Project: 272-278 Clevedon-Kawakawa Road, Clevedon

Location: See Site Plan

Coordinates: , **Ground Level:** -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa) (refer notes for details) 50 100 150 200	Values	Scala Penetrometer (blows / 50mm) Depth (m)	Blows
0.0		Topsoil. [TOPSOIL]		TOPSOIL				3.60	5
								3.65	4
								3.70	4
								3.75	4
0.5		Clayey SILT. Orange mottled light grey, hard, dry, low to moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]		TAURANGA GROUP ALLUVIUM (Pleistocene deposits)			UTP	3.80	5
							-	3.85	6
		Silty CLAY. Orange mottled light grey, hard, moist, highly plastic. [WAIPAPA GROUP / COLLUVIUM ?]						3.90	4
								3.95	5
								4.00	3
1.0		1m: Very stiff.					141	4.05	4
							57	4.10	3
		1.2m: Moist to wet.						4.15	4
								4.20	4
								4.25	5
1.5		1.5m: Stiff.					99	4.30	7
							31	4.35	6
		Clayey SILT with minor fine sand. Light grey mottled orange, stiff, moist to wet, moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]						4.40	8
								4.45	9
								4.50	4
2.0		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 ?]					UTP	4.55	4
							-	4.60	5
								4.65	4
		2.4m: With some clay and wet.						4.70	7
2.5							UTP	4.75	10
								4.80	11
							-	4.85	11
		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 ?]	14/02/2019					4.90	11
			19/02/2019					4.95	14
3.0							UTP	5.00	14
							-		
		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 ?]							
3.5							UTP		
							-		
		3.55m: End of Borehole, unable to penetrate							
4.0									
4.5									
5.0									

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

Flat, Field. Hole data is for a set location only.

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HAND AUGER LOG

Job No.:	**190051**
Hole No.:	**AH6**
Date:	14/02/2019
Logged By:	SR
Sheet:	1 of 1

Client: KGA Geotechnical Group Ltd

Project: 272-278 Clevedon-Kawakawa Road, Clevedon

Location: See Site Plan

Coordinates: , **Ground Level:** -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa) (refer notes for details) 50 100 150 200	Values	Scala Penetrometer (blows / 50mm) Depth (m)	Blows
0.0		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)			144	2.10	2
0.5							31	2.15	2
		Silty CLAY. Orange and grey with brown staining, very stiff, moist, highly plastic. [ALLUVIUM]						2.20	2
		0.9m: With some clasts (<3mm), moist to wet with occasional organics (<3mm). At 1m; Extra sensitive.						2.25	2
1.0			▽ 14/02/2019				113	2.30	3
		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]	▼ 19/02/2019				14	2.35	3
								2.40	4
								2.45	4
								2.50	5
								2.55	6
								2.60	7
								2.65	7
								2.70	7
1.5							UTP	2.75	7
							-	2.80	8
		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]						2.85	9
								2.90	9
								2.95	10
2.0		Silty CLAY. Bluish grey, hard, moist to wet, highly plastic. [ALLUVIUM]					141	3.00	10
							57	3.05	11
		2m: End of Borehole, high suction / granular material from above prevents extraction						3.10	11
								3.15	12
								3.20	11
2.5									
3.0									
3.5									
4.0									
4.5									
5.0									

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

Client: KGA Geotechnical Group Ltd

Project: 272-278 Clevedon-Kawakawa Road, Clevedon

Location: See Site Plan

Coordinates: , **Ground Level:** -

Depth (m)	RL	Subsurface Conditions	Groundwater	Geological Unit	Graphic Log	Vane Shear Strength (kPa) (refer notes for details) 50 100 150 200	Values	Scala Penetrometer (blows / 50mm) Depth (m)	Blows
0.0		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
								2.75	4
								2.80	4
0.5		Clayey SILT. Orange mottled light grey, very stiff to hard, dry, low to moderately plastic. [WAIPAPA GROUP / COLLUVIUM ?]					198+	2.85	4
		0.7m: Moderately plastic.					-	2.90	4
								2.95	5
		0.9m: Becomes moist.						3.00	6
								3.05	4
1.0		1m: Becomes hard.					UTP	3.10	5
		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.					-	3.15	4
								3.20	4
								3.25	2
								3.30	2
1.5		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 ?]					UTP	3.35	3
							-	3.40	4
								3.45	6
								3.50	6
								3.55	7
2.0		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 ?]	▽ 14/02/2019				UTP	3.60	8
							-	3.65	7
								3.70	8
								3.75	7
								3.80	8
2.5		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. At 2.4m; With Clasts (<5mm). [WAIPAPA GROUP / COLLUVIUM ?]					UTP	3.85	4
							UTP	3.90	4
							-	3.95	6
		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 ?]						4.00	7
								4.05	6
3.0		2.6m: End of Borehole, unable to penetrate						4.10	7
								4.15	4
								4.20	4
								4.25	4
								4.30	5
3.5								4.35	5
								4.40	6
								4.45	7
								4.50	8
								4.55	6
4.0								4.60	7
4.5									
5.0									

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

Flat, Field. Hole data is for a set location only.

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HAND AUGER LOG

Job No.:	**190051**
Hole No.:	**AH8**
Date:	14/02/2019
Logged By:	SR
Sheet:	1 of 1

Client: KGA Geotechnical Group Ltd

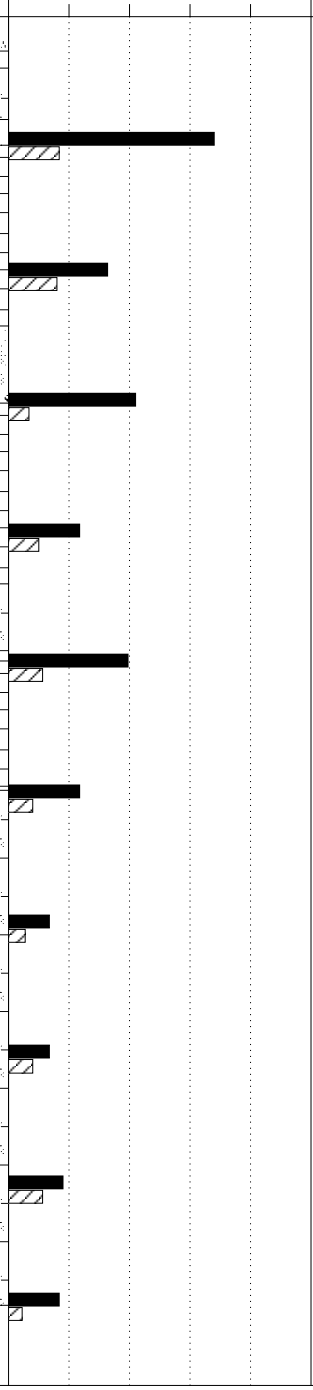
Project: 272-278 Clevedon-Kawakawa Road, Clevedon

Location: See Site Plan

Coordinates: , **Ground Level:** -

Depth (m)	Subsurface Conditions	Groundwater	Geological Unit
0	Topsoil. [TOPSOIL]		TOP SOIL
	SILT some clay. Orange mottled grey, very stiff, dry, low plasticity. [ALLUVIUM]		TAURANGA GROUP ALLUVIUM (Holocene deposits)
0.5	Clayey SILT. Light grey mottled orange, very stiff, dry to moist, moderately plastic. [ALLUVIUM]		
	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.		
1.0	At 1m; Becomes stiff and light grey mottled orange. [ALLUVIUM]		
	SILT with loose CLASTS (<4mm) and some fine sand and minor clay. Light grey mottled orange, wet, low plasticity. [ALLUVIUM]	▽ 14/02/2019	
1.5	Silty CLAY with minor clasts (<3mm). Orange and light grey, very stiff, moist to wet, highly plastic. At 1.8m; With some clasts (<4mm) and orange mottled light grey and dark grey plus wet.		
2.0	At 2m; Stiff. [ALLUVIUM]		
	Clayey SILT. Orange mottled light grey, stiff, wet, moderately plastic. [ALLUVIUM]	▼ 19/02/2019	
2.5	Silty CLAY. Light grey mottled orange, stiff, wet, highly plastic. [ALLUVIUM]		
3.0	Clayey SILT. Light grey and orange, stiff, saturated, moderately plastic. Poor recovery. [ALLUVIUM]		
3.5	3.5m: Very poor recovery, difficult ld, firm and pushing down.		
4.0			
4.5	4.4m: No recovery with no ld.		
5.0	5m: End of Borehole		

Vane Shear Strength (kPa) (refer notes for details)



Values
170
42
82
40
105
17
59
25
99
28
59
20
34
14
34
20
45
28
42
11

Scala Penetrometer (blows / 50mm)

Depth (m)	Blows
5.05	1
5.10	1
5.15	0.5
5.20	0.5
5.25	0.5
5.30	0.5
5.35	1
5.40	2
5.45	2
5.50	2
5.55	1
5.60	2
5.65	2
5.70	2
5.75	3
5.80	4
5.85	4
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

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