Appendix F – Engineering Assessment

Engineering Assessment

Project Name:	Matakana Country Club
Client:	Sanderson Partners Ltd
CP Project No:	2804-01
CP Document No:	2804-01-ER01v1
Date of Issue:	06 October 2025
Originator:	Matt Richards – CBD Engineering Manager
Reviewer:	Alister Hood – Senior Engineer

1. Introduction

This engineering assessment supports a Referral Application under the Fast-track Approvals Act 2024 for the Matakana Country Club in Matakana. It outlines how the project's engineering components will be designed and managed to meet regulatory requirements and minimise adverse effects. The report addresses earthworks, erosion and sediment control, geotechnical, stormwater, wastewater, water supply, and utilities. It has been prepared in accordance with the Auckland Unitary Plan, Infrastructure Design Codes, and relevant technical guidance such as GD01 for stormwater and GD05 for erosion control.

Matakana Country Club is a proposed retirement village with approx. 208 villas, a clubhouse, care facility, café/restaurant, health spa, and other amenities. The site will be fully serviced with new infrastructure for stormwater, wastewater, water supply, and utilities. The following sections detail each engineering aspect of the project.

2. Site Description

The project site is located at 120 Tongue Farm Road, Matakana, which includes two parcels legally described as Part Lot 3 and 5 DP 13160 with a total area of approximately 73.9 hectares. The site is situated on a peninsula with the tidal Matakana River to the south and west, a minor estuary to the east, Tongue Farm Road to the northeast, and a small rural lot to the northwest. The site is currently an existing rural property.

The site is mostly flat, however there are slopes between 1:1 and 1:2 along the coastline.

The site is zoned Rural Coastal under the Auckland Unitary Plan. Coastal inundation controls and two Marine Significant Ecological Areas present, however, these do not impact engineering aspects.

As shown on Council GIS, there are small streams:

1. Running across the northeastern corner of the site from Tongue Farm Road to the estuary, and

2. Running south in the centre of the site to a low-lying reservoir which was created by damming the stream with a 90m long embankment in the early 1970s

EcoLogical Solutions have conducted an ecological assessment to determine the extent of ecological features present. The site contains a variety of ecological values, including terrestrial, wetland, freshwater, and coastal habitats. The detailed engineering design will look to protect these features by maintaining the necessary offsets from earthworks and preserving existing hydrological patterns through stormwater discharge methods consistent with current conditions. Additionally, the wetlands will be clearly delineated and safeguarded throughout the construction process.

The site has no public infrastructure services. However, there is an existing 180PE wastewater pressure main in Tongue Farm Road which does not service the property. This wastewater pressure main services Matakana township and discharges to a Wastewater Treatment Plant located on Watercare's land at 64 Jones Road, Tāwharanui Peninsula.

3. Proposed Development

The project involves the creation of a low-density retirement village and associated infrastructure contained within the northern portion of the site. A masterplan is provided in Appendix 1.

Key components of the development are:

- Approximately 208 villas located in clusters in the northern part of the site.
- A clubhouse, care facility, café/restaurant, health spa, and other amenities.
- Approximately 5km of new private roads, accessways, and a farm track will be built, with footpaths and streetlights to relevant standards.
- New privately owned stormwater and wastewater infrastructure will be installed.
- A privately owned reticulated potable water system with fire hydrants will service all lots.
- Provision for underground power, and telecoms is included.

The engineering infrastructure will undergo detailed assessment as part of the substantive application phase, ensuring that all works are compliant with relevant standards and requirements. In addition, building consents and engineering plan approvals will be obtained as necessary.

4. Earthworks

Bulk earthworks are required to form road corridors, building platforms, and to install services. Approximately 32,000 m^3 of cut to fill will be undertaken across the site, as detailed in Table 1. Earthworks are designed to balance on site as much as possible, with minimal or no import or export required. The intention is to keep earthworks to a minimum and blend the proposed levels into the existing topography as much as possible. There will be a focus on ensuring that finished floor levels are set above the 1% AEP flood levels, with allowances for climate change and sea level rise, as discussed in Section 7 below. Preliminary earthworks quantities are:

Cut Volume (Compacted)	Fill Volume	Net Import/Export	Earthworks Area
32,000 m3	32,000 m3	-	25.0 ha

Table 1: Preliminary Earthworks Volumes (solid measure, before compaction)

Earthworks will be staged and undertaken during the permitted earthwork season (October to April). All slopes will be geotechnically stable, typically no steeper than 1 in 3. Retaining structures will be designed and consented where required.

5. Geotechnical

The site is underlain by two distinct geological units: the Puketoka Formation and the Tauranga Group. The Puketoka Formation covers most of the site and consists of Neogene rock-derived alluvial or colluvial sedimentary soils, while the Tauranga Group comprises organic-rich alluvial and colluvial deposits. The site is generally suitable for NZS3604 type residential construction within Puketoka Formation areas, with a geotechnical ultimate bearing capacity of 300 kPa for shallow strip and pad or pod-raft foundations. However, areas of organic or soft ground may limit the bearing capacity. These areas will be improved if required for roads or building platforms. Natural hazards identified include slope instability, liquefaction risk, settlement, tsunami evacuation zones, flood hazards, active faults, and coastal erosion. Further site-specific investigations are recommended and will be undertaken (as part of the substantive application or engineering approval process) to address these hazards and ensure safe development. The full geotechnical due diligence report prepared by LDE is attached in Appendix 2.

6. Sediment and Erosion Control

Prior to any earthworks, a comprehensive ESCP will be implemented in accordance with Auckland Council Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region Guideline Document 2016/005 (GD05). The proposed measures may include:

- Stabilised construction entrances to remain in place for the duration of the works.
- Clean water diversion bunds will intercept and direct clean water away from the proposed works area (sized in accordance with GD05).
- Silt fences, runoff diversion channels and topsoil diversion bunds will control sediment runoff.
- Sediment retention ponds with rainfall driven chemical treatment to reduce the suspended sediments, these will treat runoff from the majority of the earth-worked area. The treated water will discharge into existing drainage features on the site that will remain undisturbed.

- If required, chemically treated decanting earth bunds will be used to treat any earth-worked areas that cannot be directed to the main silt pond. The decanting earth bunds will be sized in accordance with GD05, being 3% volume with 10% forebays and a cloth lined forebay spreader bar, with floc treatment.
- All measures will continue to treat water and remain in place for the duration of the works until the catchment is fully stabilised.
- Clean water diversions and silt fences will be constructed around stockpiled materials.

All erosion and sediment controls will be constructed prior to any bulk earthworks commencing. Sediment and Erosion Control monitoring will be undertaken by the contractor's project supervisor, the site Engineer and Council representative. Sediment and Erosion Control monitoring will be undertaken on a weekly basis with increased monitoring during times of heavy rainfall. Visual checks will be conducted to ensure the quality of water in the receiving environment(s) is not compromised.

Wind Erosion and Dust Monitoring

If earthworks are undertaken during dry periods there may be the potential for dust generation and erosion by wind from un-stabilised site areas. Accordingly, it is proposed to implement measures to control wind erosion and to minimise the spread of airborne dust, and any nuisance created by it consent conditions and/or Construction Management Plan.

7. Flood Assessment

As the site is generally elevated above the floodplain, design can largely be completed based on Council's flood model, however additional analysis may be required for the floodplain shown on Council GIS in Tongue Farm Road and the stream flowing from Tongue Farm Road to the estuary.

Development will occur outside of and above the flood plains identified on Council GIS, and floor levels for all buildings will be set to provide freeboard above the flood levels as per Council and Building Code requirements. Dwelling finished floor levels will be at least 500mm above the floodplain as shown on Council GIS. Council's flood modelling includes climate change and also includes 1m sea level rise.

For most villas near the coastal boundary, minimum floor levels are required to be around RL 3–3.5. The existing landform along the coastal boundary is generally above 3–3.5m RL, ensuring that villas in this area will meet the required minimum floor levels without significant modification. Similarly, villas located at the northern end of the site will be situated on or near the existing landform at approximately 9.5m RL, providing at least 500mm of freeboard above the floodplain on Tongue Farm Road.

At least 150mm freeboard will also be required above local overland flow paths within the site, such as along roading and driveways.

A complete flood assessment will be prepared with the detailed design as part of the Substantive Application.

8. Stormwater

Stormwater runoff from the site drains via overland flow either directly to the coast, or via the two streams and the existing dam. The receiving environment is generally low energy mudflats, with mangroves along much of the foreshore.

Stormwater management requirements will include:

- Quality treatment to be provided for runoff from paved areas.
- Inert building materials to be used (i.e. no unpainted metal roofing or guttering).
- Hydrological mitigation to be provided for runoff from all impervious areas where discharge is to the streams – this comprises retention (capture for reuse, or discharge to ground via rain gardens or soakage devices) of the first 5mm of runoff, and extended detention (capture and discharge over 24 hours of the difference between the predevelopment and postdevelopment runoff volumes from the 95th percentile storm, which is 44mm, minus the retention volume).
- Pipe networks to be designed for the 10% AEP (1 in 10-year storm) including climate change, which is 197mm.
- Overland flow paths to be sized for the 1% AEP (1 in 100-year storm) including 2.1 degrees climate change, which is 307mm. Checks will be made for the increased 3.8 degrees climate change scenario. Flow will be located primarily within road carriageways or dedicated overland flow paths. The design will include safety checks for vehicles and pedestrians.
- Peak flow attenuation is not required as the purpose of this is to protect downstream properties from increased flooding, and there are no downstream properties.
- Hydrology mitigation is not required where stormwater is discharged directly to the coast or to the existing reservoir.

Primary discharge to ground is not viable due to the clay soils at the site. Runoff will be discharged to the overland flow paths, streams, or reservoir, or directly to the coast, at a number of locations throughout the development. Discharge points will be selected taking into account the location of any wetlands, and the need to maintain flows to the wetlands. Erosion protection will be provided at outlets and where applicable in flow paths and will be designed in accordance with Council standards.

The required stormwater management can be provided by a number of common stormwater management devices which may include:

- Approved proprietary treatment devices, such as SW360 StormFilter cartridge filters.
- Tanks capturing roof runoff for retention (reuse) and extended detention.
- Swales, rain gardens or wetlands
- Gross pollutant traps (GPTs)

Stormwater management is anticipated to generally be provided by proprietary treatment devices, along with tanks designed to collect roof runoff for both retention (reuse) and extended detention purposes. A comprehensive Stormwater Management Plan will be developed in conjunction with the detailed design as part of the Substantive Application.

Stormwater discharge will be covered by a private stormwater discharge consent which will also form part of the Substantive Application.

All infrastructure will be privately owned and operated. An operation and maintenance plan will be required as a condition of consent.

Appendix 3 includes indicative stormwater layout.

All stormwater infrastructure will comply with applicable Auckland Council standards and guidelines including the Stormwater Code of Practice, GD01 for stormwater management, TP108 for runoff modelling, and TR2013/018 or GD08 (currently in draft form) for inlet and outlet design.

9. Wastewater

There is currently no publicly reticulated wastewater connection to the site. However, there is an existing 180PE wastewater pressure main in Tongue Farm Road which services Matakana township and discharges to a Wastewater Treatment Plant on Watercare's land at 64 Jones Road, Tāwharanui Peninsula.

The wastewater will be managed via either of the following options:

Option 1: Private low-pressure sewer system, discharging to the existing 180PE pressure wastewater main on Tongue Farm Road. It is anticipated that the current main, pumps, and treatment plant are likely not adequately sized to cater for the proposed development and therefore this may not be the optimal solution. However, this option could be discussed further with Watercare to review the extent of upgrades required, should it be pursued.

Option 2: Use of Innoflow's Prelos Community System (or similar), a privately owned, low-pressure wastewater treatment solution designed for community-scale developments. The system incorporates primary treatment (via on-site STEP tanks and grease traps), secondary treatment (using pre-anoxic tanks, recirculation tanks, and AdvanTex® textile packed bed reactors in two stages), and tertiary treatment (UV disinfection), with final effluent disposal through subsurface drip irrigation fields. The land treatment area spans 29,433 m², based on a soil loading rate of 3 mm/day. The Innoflow product is capable of treating and discharging average daily flows of 66,200 litres and peak daily flows of 88,300 litres. For more detail, please refer to Innoflow's specifications and drawings for this on-site wastewater solution in Appendix 4.

Option 3: Use of a containerised Membrane Bioreactor (MBR) system, designed as a privately owned, decentralised wastewater treatment solution for community-scale developments. The system integrates primary treatment (screening and grit removal), secondary biological treatment (activated sludge process), and membrane filtration (microfiltration or ultrafiltration), producing high-quality effluent suitable for reuse or discharge through dispersal fields or surface water systems. The MBR will be sized to be capable of treating and discharging the flows as detailed below.

Appendix 3 includes indicative wastewater layout for Option 2, being the preferred option.

Based on the conceptual design, the development anticipates an average daily wastewater demand of 92.7 m³, resulting in an annual demand of 33,828 m³, as detailed in Table 2 below.

Typology	No. Units or Size	Population Multiplier	Population	Daily Use Per Person (L)	Daily Demand (m^3)	Annual Demand (m^3)
Villas	208	1.8	374.4	200	74.9	27,331
Care	30	1	30	220	6.6	2,409
Staff	50	1	50	50	2.5	913
Visitors	30	1	30	15	0.45	164
Clubhouse	750m2	-	50	30	1.5	548
Restaurant	150m2	-	100	30	3	1,095
Café	225m2	-	100	25	2.5	913
Health Spa	450m2	-	50	25	1.25	456
				TOTAL	92.7	33,828

Table 2: Preliminary Wastewater Demand (based on TP58 flows).

All wastewater infrastructure will comply with Wastewater CoP Chapter 5 and Watercare standards.

10. Water

There is currently no publicly reticulated water connection to the site. According to Watercare's GIS, the nearest Watercare water network is situated in Warkworth, approximately 10 km from the proposed development. Warkworth currently falls within Watercare's areas that have no available additional capacity. While upgrades are expected to be completed before development commences on our site, the network will not have sufficient capacity to supply our location.

The water supply will be provided via the following:

All Potable and Non-potable Supply: All water usage (e.g. drinking water, toilet, garden watering) will be supplied using privately owned on-site reuse tanks connected to the villa roofs constructed from inert materials. We anticipate 1x 100-150m^3 reuse tanks (with additional volume for stormwater detention, if required) to service clusters of 13 villas and individually sized tanks for each communal building (approx. total of 21 reuse tanks over the whole site). Tank size will be confirmed during the Substantive Application. Each tank will have its own pump and treatment equipment to provide water supply its relevant cluster of villas or building.

Fire Supply: Fire supply is intended to come from the existing on-site lake, which has an estimated storage of approx. 30,000m^3. An intake with a basket strainer or similar will be placed within the lake, and a water booster pump station on the shore. The booster pump will pressurise a privately owned 150mm fire main that will extend through the development, intended to supply FW2/FW3 fire supply to all buildings. The proposal will be designed in accordance with SNZ PAS 4509:2008 and detailed design will be subject to FENZ approval.

Backup Supply: Backup water supply (if required) could potentially utilise or expand upon an existing bore on site. A feasibility assessment by Williamson Water and Land Advisory (WWLA) reveals the property is underlain by three aquifer systems: Quaternary sediments (poor potential), Matakana Waitemata Group sandstone/siltstone (primary viable option), and Tawharanui Greywacke rock (secondary option). The property is outside high-use management areas, with confirmed groundwater availability of 460,403 m^3/year (Waitemata) and 1,079,067 m^3/year (Greywacke). A hypothetical 200 m deep bore in the Waitemata aquifer could yield up to 1,050 m^3/day, exceeding the development's m^3/day requirement. Water quality is generally suitable for potable, commercial, and horticultural use, with saline intrusion a potential concern to assess during exploration. A centralised water treatment plant would be situated near the bore hole, with associated pumping

equipment which will pressurise privately owned water reticulation that extends to all villas and amenity buildings. A Water Take consent will be applied for if this option is pursued.

Note that all potable water supplied will comply with the Drinking Water Standards for New Zealand, as required by the Water Services Act 2021.

Appendix 3 includes indicative water layout, and Appendix 5 includes the Groundwater Take Feasibility Assessment by WWLA.

Based on the conceptual design, the development anticipates an average daily water demand of 100.2 m^3, resulting in an annual demand of 36,561 m^3, as detailed in Table 3 below. The calculations for population multipliers and per person daily usage are based on existing data provided by Sanderson Partners from comparable developments.

Typology	No. Units or Size	Population Multiplier	Population	Daily Use Per Person (L)	Daily Demand (m^3)	Annual Demand (m^3)
Villas	208	1.8	374.4	220	82.4	30,064
Care	30	1	30	220	6.6	2,409
Staff	50	1	50	50	2.5	913
Visitors	30	1	30	15	0.45	164
Clubhouse	750m2	-	50	30	1.5	548
Restaurant	150m2	-	100	30	3	1,095
Café	225m2	-	100	25	2.5	913
Health Spa	450m2	-	50	25	1.25	456
				TOTAL	100.2	36,561

Table 3: Preliminary Water Demand

Water infrastructure will comply with Water CoP Chapter 6 and Watercare standards.

11. Utilities

Electricity and telecommunications will be provided via underground reticulation. Coordination with:

- Vector (electricity)
- Chorus (telecom)

For confirmation regarding the capacity and servicing of the proposed development, please refer to Appendix 6.

12. Conclusion

Based on the assessment provided in this report and the accompanying supporting documentation, we conclude that the Matakana Country Club is a feasible development opportunity, from an infrastructure perspective, supported by the following key findings:

- Geotechnical investigations confirm that the site conditions are suitable for the proposed development. Any potential ground challenges identified have been addressed with appropriate, engineering solutions.
- Earthworks will incorporate robust sediment and erosion control measures in accordance with regulatory requirements, ensuring protection of the surrounding environment during construction.
- All proposed buildings will have finished floor levels set at least 500mm above the Auckland Council's flood modelling projections, which account for the impacts of climate change and a 1m sea level rise.
- The concept engineering plans illustrate that the infrastructure proposals including stormwater, wastewater, and water supply can be designed to meet all relevant standards.
- Electricity and telecommunications services will be delivered via underground reticulation, with implementation coordinated with Vector (electricity) and Chorus (telecommunications).

APPENDIX 1

Masterplan

KEY		
	Wetland	
	Coastal Forest / Bush	
	Parkland Tree	
	Pasture / Lawn	
	Lake	
	Housing Cluster (16×13)	16 × 13 home clusters
	Road	Dwelling Size:
	Farm Track	~120-240 sqm
	Walking Track	
1.	Club House & Croquet	~ 750 sqm
2.	Care Facility	~ 1500 sqm
3.	Restaurant / Cafe & Carpark	~ 350 sqm
4.	Pool	~ 250 sqm
5.	Health Spa	~ 200 sqm
6.	Art Centre	~ 200 sqm
7.	Workshop	~ 200 sqm
8.	Yacht Club	(existing)
9.	Tennis Court / Pickleball	
10.	Orangery / Pavillion	~ 100 sqm
11.	Sea Lodge & Sports Hub	~ 750 sqm (existing)
12.	Jetty & Boat Ramp	
13.	Orchard	
14.	Potager	

Note:
To be read in conjunction with Landscape masterplan

FIRST LIGHT NZ

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PROJECT	**2515**	**Proposed Masterplan**	REV
Matakana Country Club	SCALE @A1	1:3000	
120 Tongue Farm Road	STAGE	Masterplan for FR	
Matakana	REVISION	REV	
Auckland	DATE		SHEET **SK-03d**

APPENDIX 2

Geotechnical Report

Project Reference: 29017

3/07/2025

Nathan Sanderson

Dear Nathan

PRE-PURCHASE DUE DILIGENCE

120 Tongue Farm Road, Matakana

1 BRIEF AND SCOPE

LDE have been asked to provide a desktop due diligence geotechnical appraisal of 120 Tongue Farm Road, Matakana (comprises of two parcels legally described as Pt Lot 3 DP 13160 and Pt Lot 5 DP 13160), comprising of the following:

- Review historic aerial photographs / surveyed topographic contours.
- Review of geological maps and existing geotechnical data from the NZ Geotechnical Database (NZGD).
- Outline the perceived geotechnical constraints and key geotechnical considerations.
- Outline a scope of additional investigations recommended to assess ground conditions for further due diligence assessments and/or Resource Consent purposes.

We understand that following a purchase of this property, a rural-residential subdivision is intended which you intend to seek via the Fast-track Approvals Act 2024. However, we are unaware of any earthworks or detailed scheme proposals associated with a potential subdivisional development at the time of preparing this report. We assume development of standalone units / dwellings is proposed, and it is unclear if stormwater and effluent disposal will be via on-site systems or a reticulated network.

This memorandum is not intended to support a Fast Track Approval application (or a Resource or Building Consent application), however, the data presented herein may be used to support a further application if you choose to progress the project to development stage.

2 SITE DESCRIPTION AND TOPOGRAPHY REVIEW

The site is situated on a peninsula between Matakana River to the west, a minor inlet and estuary to the east and Tongue Farm Road to the north. A reservoir is located in the central portion of the side and borders Matakana River. The northeastern portion of the site is separated by a stream that runs southeast from Tongue Farm Road. A driveway generally bisects the site north to south with several buildings located along or near the driveway. The rest of the site generally comprises of pasture.

Slope gradients across the site are generally flat to gently sloping, however, there are frequent steeper slopes along the coastline up to 9m high with gradients between approximately 1(v) in 2(h) and 1(v) in 1(h).

3 HISTORIC AERIAL IMAGERY REVIEW

A review of available historic aerial photographs from Google Earth and Retrolens covering the period between October 1966 and April 2023 has been completed. No obvious signs of slope instability were noted, however coastlines are expected to be prone to instability due to steep slopes, extreme groundwater events and coastal erosion. Brief commentary of our relevant observations is presented below.

Figure 1: October 1966 (centre of site)

Sometime between 14 October 1966 and December 1973, a set of sheds was constructed near the north edge of the figure above.

Figure 2: December 1973 (centre of site)

The area shown in the figure above appears to have been a stream or wetland that extends through the central portion of the site. Sometime between 4 December 1973 and 16 December 1976, a dam or embankment appears to have been constructed across this stream's outlet to Matakana River which has caused the area to flood and form a reservoir.

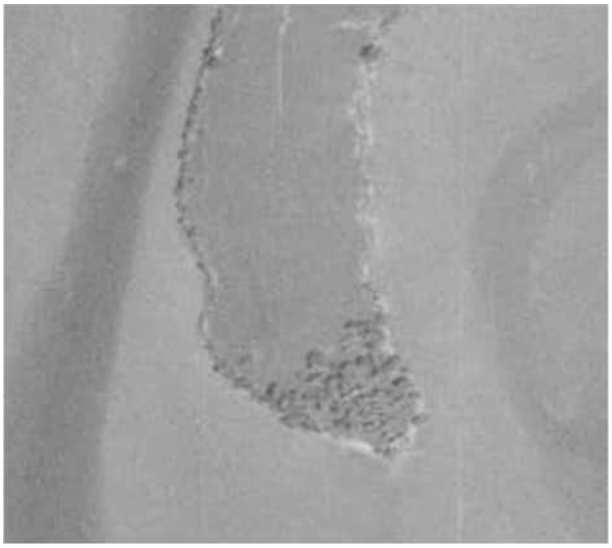

Figure 3: December 1973 (south end of site)

Figure 4: 1999 (entire site)

Additionally, sometime between the same time period a dwelling was constructed at the southern end of the site. Following this, no further significant changes to the site were noted.

4 GEOLOGICAL SITE SETTING

4.1 Published Geology

The site is mapped as being underlain by two distinct geological units as illustrated by the figure below.

Figure 5: Published Geology (sourced from GNS database)

4.1.1 Puketoka Formation

This is pale yellow shaded in the figure above and covers most of the site. These materials generally consist of Neogene rock derived alluvial or colluvial sedimentary soils (Late Miocene to Middle Pleistocene epoch 11.2-0.071 Mya). Composition generally includes inorganic silts and clay soils, although these soils can be highly variable and the lenses of organic soils, peats and pumiceous soils occasionally occur.

4.1.2 Tauranga Group

This is white shaded area located in the northeastern corner of the site. These deposits form the younger sequence of the Tauranga Group beds (Late Holocene epoch up to 14,000 years). These materials generally consist of organic rich alluvial and colluvial deposits, typically sand, silt and clay with local gravel and peat. Soils within this geology are more susceptible to liquefaction, bearing capacity and settlement issues. This area has been highlighted with red crosses in drawing G01.

4.2 Nearby Investigations

The NZGD shows three driller log records in close proximity to the site within the Puketoka Formation geology. One record is 220m to the west (NZGD ID:79870) and the other two are 70m (NZGD ID:79688) and 480m (NZGD ID:82377) to the northwest. These identified clay soils to depths between 16m and 30m depth with sandstone underlying (although it should be appreciated that well drill logs are not described to the same detail and engineering borehole records.

Figure 6: Well Borehole Locations

Figure 7: Hand Auger Locations

Three hand auger boreholes were undertaken approximately 1km to the northwest (NZGD IDs:191453, 198547 and 198548) within the Puketoka Formation geology. These identified alluvial soils to the full depth of the boreholes (3m-5m). These soils generally comprised of grey, orange and brown clays and silts with variable lenses of organic clay and and peat found at 191453. Measured undrained shear strengths ranged from 51kPa to 194kPa. Scala penetrometer testing undertaken at the base of the boreholes returned blow counts between 1 to 6 blows per 50mm.

5 NATURAL HAZARDS

5.1 Slope Instability

The site topography is mostly flat to gentle; however, slope gradients of between 1(v) in 2(h) and 1(v) in 1(h) are present along the coastlines along the western, southern and eastern sides of the site. Further site-specific investigation supplemented with slope stability analyses will be a key consideration for any development for any development in the general proximity of steep slopes. Areas where this is a considered to be a potential risk is outlined in drawings G01-G03. A less conservative 8m setback from the top of the slope has been shaded with squares and a more conservative 24m setback has been shaded with red diagonal lines. These correspond to an approximate 1(v) in 3(h) and 1(v) in 4(h) regression line extrapolated from toe of slope respectively.

There is a 1(v) in 3(h) slope along the northern boundary bordering Tongue Farm Road in the northeastern section of the site. Slope instability may be an issue here given that weaker Tauranga Group soils are likely present.

Our preliminary view is that consideration will need to be made to adequate setbacks from steep slopes. This is a matter that will need to be addressed at Resource Consent or Fast Track application phase commensurate with

final proposed ground contours / earthworks proposals. If development within potentially unstable land is proposed, geotechnical engineering intervention such as keys, pile walls or retaining walls, geotechnical drainage etc may be required to support the land above watercourses.

5.2 Liquefaction Risk

MBIE guideline requires Level B (Calibrated Assessment) to accompany a plan change or land use / subdivision consent. Auckland Council Geomaps Liquefaction Vulnerability Layer shows that for Level B most of the site the category is undetermined and liquefaction damage is likely for the northeastern corner of the site.

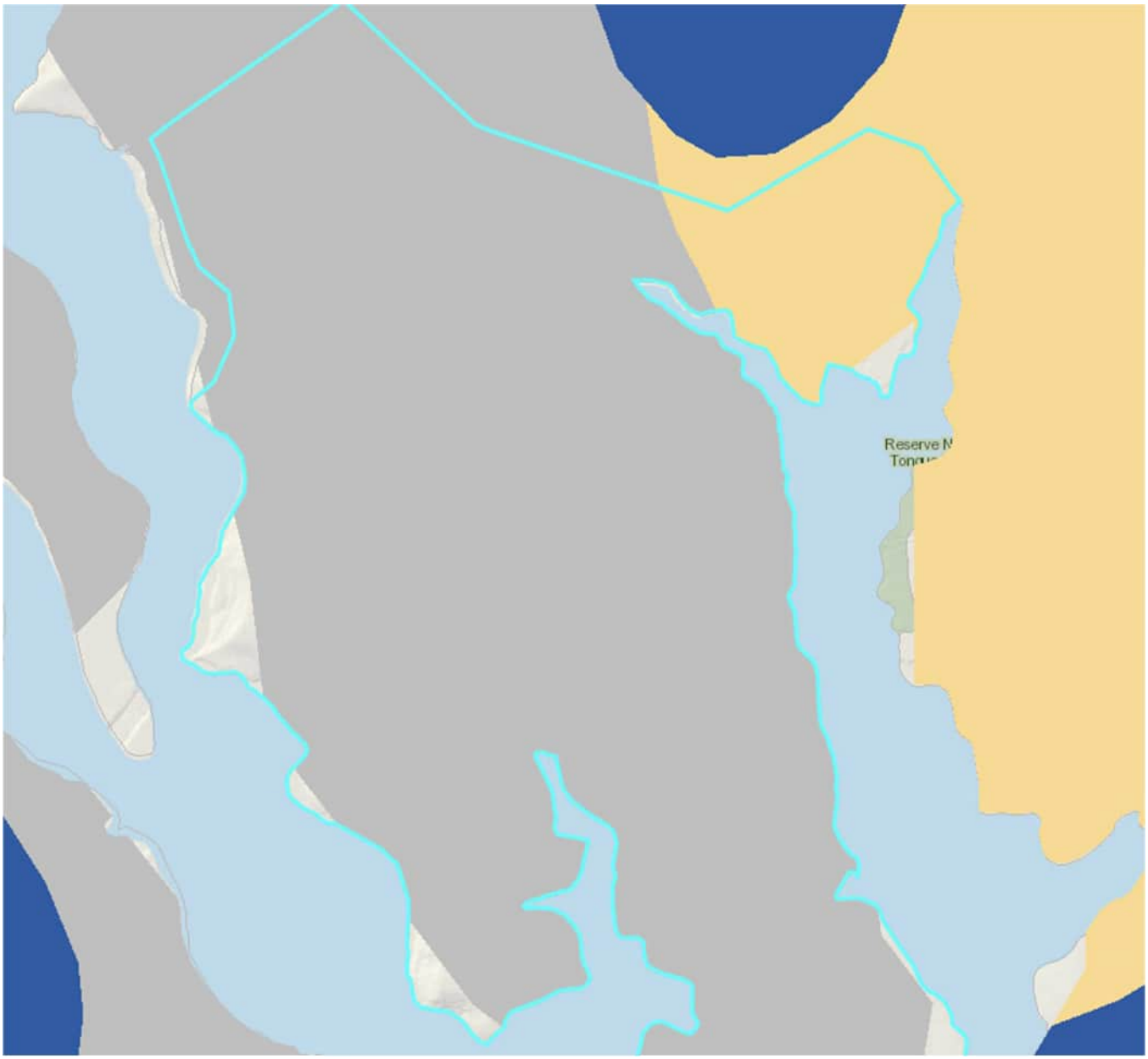

Figure 8: Liquefaction Level B Calibrated Desktop Assessment

The grey shaded area corresponds to areas assumed to be a part of the Puketoka Formation while the areas shaded yellow corresponds to areas assumed to be a part of the Tauranga Group. The soils in nearby boreholes indicate that Puketoka Formation likely comprises stiff, clayey soils which generally have low liquefaction

vulnerability on account of their undrained shear strengths, high plasticity and lower sand contents (in general). No borehole data is available within nearby Tauranga Group areas; however, our preliminary view is that these areas may contain soils which are more susceptible to liquefaction (in general). A more detailed Level B assessment will need to be undertaken at Fast Track / resource consent stage to confirm these preliminary assumptions.

5.3 Settlement

The Puketoka Formation soils are considered to be over-consolidated with regard to likely residential, earthworks and normal vehicle loading. However, the Puketoka Formation is known to contain lenses of organic, sensitive and/or soft materials which can result in settlement and earthworks trafficking concerns where present. The presence of such materials should not be discounted at this site given that no site-specific testing has been completed to date. These are commonly addressed via localised undercutting or specific foundation designs.

Tauranga Group soils within the northeastern corner of the site are generally considered susceptible to settlement, often comprising low strength and/or organic deposits. If further investigation confirms the presence of such materials, remediation of this area may be required and could include localised undercuts, pre-loading and/ or specifically designed foundations.

5.4 Tsunami Evacuation Zones

Figure 9: Tsunami Hazard Map (source Auckland Council Geomaps, 2025).

Auckland Council GIS maps indicate that there are tsunami evacuation zones along the coastline as indicated in Figure 9. There are currently no prescriptive methods or specific code designs that need to be considered in terms of building designs, and it should be appreciated that to date some form of tsunami risk is accepted by the wider population and society of New Zealand for any low-lying land adjacent to the coast.

5.5 Flood Hazard

The Auckland Council Geomaps shows that some areas near the reservoir in the middle of the site and most of the northeastern corner is prone to flooding hazards on this site, although advice should be sought from a flood modelling specialist should this be a concern.

5.6 Active Faults

According to the GNS active fault map, the nearest active fault is Waikopua Fault located approximately 70km to the south, and it is sensible to conclude that there are no foreseeable hazards to this site on account of this fault line, although any future buildings will need to adhere to seismic design requirements as per the building code.

5.7 Coastal Erosion

Figure 10: Area Susceptible to Coastal Instability and Erosion (source Auckland Council Geomaps, 2025).

Chapter J1 (AUP) generally defines land within inner harbours and 40m of the mean high water spring levels as a coastal erosion hazard area. The coastline of the site area shown on Auckland Council GeoMaps to be prone to long term coastal erosion / inundation due to sea level rise and future development on the site may need to accommodate this. Generally Council ASCIE lines are conservative and do not account for many site-specific factors. Here, mangroves were observed indicating that the location is more likely to be accretionary than erosional in nature, however, we recommend that a site-specific study is undertaken between LDE geotechnical professionals and a qualified coastal scientist to refine the ASCIE lines should they be limiting to development during Resource Consent phase.

5.8 Fill Material

No obvious signs of land scale land modification base on our review of the available aerial photographs. However, it should be noted that in farm environments the presence of localised filling (e.g. rubbish or offal pits) should not be dismissed. It is also reasonable to assume localised filling may be present around existing buildings associated with landscape filling, driveways and building foundations. Further site-specific investigation is recommended near existing buildings to help identify if such deposits are likely present at this site.

6 PRELIMINARY FOUNDATION RECOMMENDATIONS

Based on the nearby borehole findings and our experience in similar geology nearby, it is our preliminary professional opinion that the site should generally be geotechnically suitable to safely support NZS3604 type residential construction within Puketoka Formation areas, with a geotechnical ultimate bearing capacity of 300 kPa being available for shallow strip and pad or pod-raft foundations. This also assumes development takes place on land flatter than 1(v) in 4(h) following subdivisional earthworks and above any imposed slope stability safe set back lines (if / where required), and that any pre-existing fills are remediated. However, if areas of organic or soft ground are encountered this may limit the bearing capacity unless appropriately remediated (refer Section 5.3).

The soils are likely to fall outside the NZS3604 definition of ‘good ground’ in terms of expansive soils. Based on the site geology and our experience nearby, a preliminary AS2870:2011 expansive site Class H1 / H2 should be assumed for now, until such time as appropriate laboratory testing can be carried out to refine this during Fast Track

or Resource Consent phase with the site class ultimately to be confirmed post-earthworks construction at Completion Reporting stage and subject to classification testing.

Based on local knowledge, and subject to detailed site investigations at a later stage (e.g. during Resource Consent), a preliminary NZS1170.5 seismic site Class C (shallow soil site) can be assumed.

7 PRELIMIANRY EARTHOWRKS AND INFRASTRUCTURE RECOMMENDATIONS

The natural deposits encountered across the majority of the site are expected to typically have relatively high strength and good engineering characteristics for earthworks handling. However, the following points should be considered in the earthworks proposals (if proposed):

- If any deep topsoil, uncertified fills or localised gully mullock are encountered, these will need to be undercut and replaced during bulk earthworks if any fills are proposed in these areas or otherwise will need to be removed by end users at building stage if earthworks are not proposed in these areas, and/or tags imposed on lots (refer Section 6). These materials will need to be assessed for suitability to be re-used in engineered filling.

- Where sensitive soils are encountered, (i.e. if exposed in site cuts), subgrade issues may arise due to the performance of these materials under heavy plant (i.e. wheel rutting / groundwater pumping). In these scenarios, selection of plant (i.e. lightweight, tracked plant) is often required. If subgrade disturbance occurs during earthworks, ground improvement via undercutting and backfilling with engineered fill is often required, refer Section 5.3.

- Based on nearby borehole findings, road design CBRs of between 2% and 4% can be expected within the natural ground across the majority of the site, however, if soft or compressible soils are identified (e.g. within Tauranga Group areas), CBRs as low as <1% can be expected. CBRs of 6% to 7% may be assumed for areas having at least 1m of engineered certified fill. It is recommended that a programme of penetration resistance testing is carried out when the roads / pavement areas are being formed to their final levels to inform actual CBR values.

- Deep service trenches / pump stations and cuts may encounter groundwater seepage (to be determined during future site investigations), and allowance should be made for subsoil drainage and pumping in case of this.

8 FUTHER WORK

In order prepare a geotechnical assessment report to accompany a Fast Track or Resource Consent application, intrusive site investigation work should comprise of the following:

- Site walkover / Geomorphic mapping walkover
- Approximately 40x hand auger borehole up to 5m depth
- 6x CPT sounding up to 20m depth
- 3x Atterberg Suite tests (for expansive soils assessment, including sampling costs)
- 3x Shrink-Swell tests (for expansive soils assessment, including sampling costs)
- Up to 10x computer slope stability analyses of measured cross-sections
- Computer liquefaction and settlement analyses.
- Preparation of a Geotechnical Assessment Report (or similar) presenting the findings of our investigations including preliminary foundation design recommendations, earthworks recommendations, presentation of slope stability results and recommendations.

Preliminary test types and locations are outlined on the appended investigation plans, Drawing No.'s G01, G02 and G03. We anticipate fees for the next phase of the project is likely to be in the order of $35,000 to $40,000 excluding GST, however, this should be reviewed once proposed subdivision and earthworks plans are available to ensure further investigations align with the final development proposal(s).

9 LIMITATIONS

This report should be read and reproduced in its entirety including the limitations to understand the context of the opinions and recommendations given.

This report has been prepared exclusively for Nathan Sanderson in accordance with the brief given to us or the agreed scope and they will be deemed the exclusive owner on full and final payment of the invoice. Information, opinions, and recommendations contained within this report can only be used for the purposes with which it was intended. LDE accepts no liability or responsibility whatsoever for any use or reliance on the report by any party other than the owner or parties working for or on behalf of the owner, such as local authorities, and for purposes beyond those for which it was intended.

This report was prepared in general accordance with current standards, codes and best practice at the time of this report. These may be subject to change.

For and on Behalf of LDE Ltd

Prepared by	Reviewed by:	Authorised by:
		
Richard Zhang	Kyle Meffan	Tobias Francis
Geotechnical Engineer	**Associate Engineering Geologist**	**National Engineering Manager - Geotechnical**
BE (Hons) Civil	*CMEngNZ (PEngGeol)*	*MSc (Hons), CPEng, CMEngNZ*

Attachments: Geotechnical Hazards and Site Investigation Plan (Drawings G01 to G03)
NZGD Borehole Records

Legend

- Proposed cone penetrometer test
- Proposed hand auger borehole
- Less conservative slope setback
- More conservative slope setback
- Liquefaction and settlement prone

north

0 25 50 75 100 125

Scale 1:2500 (m)

Original Size = A3

CLIENT
Nathan Sanderson

PROJECT
120 Tongue Farm Road
Matakana

DRAWING TITLE
Geotechncial Hazards and
Site Investigation Plan

LDE engineers • scientists

No.	REVISION	BY	DATE
A	First Issue	RZ	02.07.25

DESIGN:	--
DRAWN:	RZ
DATE:	02.07.25
CHECKED:	KM
SCALE A3:	1:2500

PROJECT STATUS: Information
PROJECT: 29017
SHEET: 1 of 3
DRAWING No: G01
REV: A

www.lde.co.nz • Auckland 09 280 6645 • Gisborne 06 867 3035 • Napier 06 929 0720 • Tauranga 07 975 0029 • Warkworth 09 425 0137 • Whanganui 06 867 3036 • Whangarei 09 974 8799 • email: info@lde.co.nz

Legend

- Proposed cone penetrometer test
- Proposed hand auger borehole
- Less conservative slope setback
- More conservative slope setback
- Liquefaction and settlement prone

north

0 25 50 75 100 125

Scale 1:2500 (m)

Original Size = A3

CLIENT	Nathan Sanderson
PROJECT	120 Tongue Farm Road Matakana
DRAWING TITLE	Geotechncial Hazards and Site Investigation Plan

No.	REVISION	BY	DATE
A	First Issue	RZ	02.07.25

DESIGN:	--
DRAWN:	RZ
DATE:	02.07.25
CHECKED:	KM
SCALE A3:	1:2500

PROJECT STATUS: Information

PROJECT: 29017 SHEET: 2 of 3

DRAWING No: G02 REV: A

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Legend

- Proposed cone penetrometer test
- Proposed hand auger borehole
- Less conservative slope setback
- More conservative slope setback
- Liquefaction and settlement prone

north

0 25 50 75 100 125

Scale 1:2500 (m) Original Size = A3

CLIENT
Nathan Sanderson

PROJECT
120 Tongue Farm Road
Matakana

DRAWING TITLE
Geotechncial Hazards and
Site Investigation Plan

LDE engineers • scientists

No.	REVISION	BY	DATE
A	First Issue	RZ	02.07.25

DESIGN:	--
DRAWN:	RZ
DATE:	02.07.25
CHECKED:	KM
SCALE A3:	1:2500

PROJECT STATUS: Information
PROJECT: 29017
SHEET: 3 of 3
DRAWING No: G03
REV: A

WAIKATO VALLEY AUTHORITY

KIWI WELLDRILLERS LTD
P.O. BOX 191
WARKWORTH PH, 47289

WELL No 1

185-10357

Job No. 119

DRILLERS' LOG FORM

Well Owner Morris + James
Address Tongue Farm Road Mata Ikana
Location of Bore
Map Sheet No R09
Grid Reference 650-374
Reduced Level of Bore Site (m) —

Drilling Firm Kiwi Welldrillers
Driller K. Allfrey
Drilling Method Rotary Mud.
Date of Starting 22-4-88.
Date of Finishing 24-4-88.
Purpose of Bore Domestic

Bore Log

Depth from Surface Top	Bottom	Description of Ground Passed Through
0	1.80	orange Clays
1.80	4.50	Light Grey clay.
4.50	13.00	Silty clay. Firm.
13.00	24.00	Grey Sands. Loose.
24.00	30.00	Grey Clays. Sticky.
30.00	42.00	Grey Siltstone Soft to firm.
42.00	145.00	Sandstone. Firm, 5% circulation loss from 120m

BIP 119
GROUNDWATER A.R.W.B.
W.R. No. 8810 copy on pink 9
NAME MORRIS & JAMES
TECHNICAL FILES
6/7/88 9
ACTIONED
BORE LOG ✓
PUMP TEST
COMPUTER
WATER QUAL

WELL CONSTRUCTION

Depth of bore (m): 145.00
Depth of casing (m): 52.00
Diameter of casing (mm): 100
Screens: — diameter(s): Not Required
— interval(s) from:
to:
from:
to:
— slot size and type:

PUMP TEST

Static water level before pumping in metres: 9.60
Test discharge (m^3/hr): 6.800
Drawdown level at that discharge (m): 22
Pump set 30.00 m
Duration of pumping at that discharge in hours: 4

WATER QUALITY

Observation on site: Good to drink
Sample taken:
Analysed by:

Remarks: Casing - Full Grout casing
16 Bags of Cement
5% Circulation loss at End of Drilling

The Manager,
Auckland Regional Water Board,
Auckland Regional Authority,
Private Bag,
AUCKLAND 1.
(Telephone No. 794-420)

Ground Water

Bc 2026

DRILLERS' LOG FORM

Grid ref field checked on 21-1-88 by PK &

2 R09 653367

WELL OWNER Anthony Morris

LOCALITY Matakana

ADDRESS Tongue Farm Rd

MAP SHEET No. R09

DRILLING FIRM Kiwi Welldrillers

GRID REFERENCE ~~3670553~~ ~~6553369~~

DRILLER K. Allfrey

WELL No. 1 JOB No. –

Date of Starting 27-11-86

Date of Finishing 27-11-86

STRATA

Depth From Surface Top	Depth From Surface Bottom	Description of Ground Passed Through
0	3 m	Yellow Clay.
3 m	7.5 m	Green Clay.
7.5 m	19.5 m	Gray sandy Clay.
19.5 m	30.5 m	Sandstone Med Grain

Reduced Level of Well Site (m) –

Max. Drawdown (m) 6.5

At 37.8 (Litres/Min.)

Casing Diameter (cm) 10

Length (m) 22.8

Screen

Pump Depth (m) Surface

Static Water Level* (m) 2 m

Yield 37.8 (Litres/Min.)

Water Quality

Small Iron.

Hour Meter Reading

3 Test.

*or Artesian Head

Remarks Tested at 15 m to get 75 Litres/Min

NZGD ID: 79688

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

NEW ZEALAND GEOLOGICAL SURVEY

21

Ground Water

BC 2026

DRILLERS' LOG FORM

Locality of Drillhole or Well: SNELLS BEACH Grid Reference N 34/241/139

Job for: SNELLS BEACH MOTOR CAMP

of (Address): SNELLS BEACH. R09 653309

Date of Starting: ..... Date of Finishing: .....

Drilling Firm: GLAVISH, HELENSVILLE Driller: .....

LOG

STRATA			WATER			
Depth from Surface		Description of Ground Passed Through	Static Level*	Yield When Pumped	Drawdown when Pumped	Casing and Screen: Diameter, Depth, and Size of Slots
Top	Bottom					
0	80	LIMESTONE		300gph		CASING 60'
						NO SCREEN

*or Artesian Head

Additional Information and Remarks (e.g. Casing, Screen Type and Lengths)

HIGH IRON CONTENT
60' a.s.l.
PUMP DOWN 60'

COLLECTED BY A.R.A 8/70

16

Please send a copy of this form to:—

100 Pads/7/67—37346 X 21 SIR (G.S.) 11

NZGD ID: 79688

KIWI WELLDRILLERS N.Z.

ISO 9002 CERTIFIED

KEVIN BROWN LTD.
PH. 0800 822 822

MEMBER: NZ. DRILLERS FED

BRANCHES:
BAY OF ISLANDS
WARKWORTH
GLENBROOK

PO BOX 400, OREWA
FAX 09 425 0228
E-Mail: s 9(2)(a)

BORE LOG FORM

Client JUSTIN WYBORN
Address s 9(2)(a)
s 9(2)(a)

Grid Reference No.. 1754928 5973693
Consent No REG-61294 Bore I.D. 29138

Driller JORDAN BROWN
Drilling Method ROT.- MUD
Date of Finishing 31.1.2014
Purpose of Bore STOCK - DOMESTIC

BORE LOG

Depth from Surface Top	Bottom	Description of Ground Passed Through
0.0	4.0	FILL
4.0	16.0	MARINE CLAYS
16.0	25.0	SANDSTONE/MUDSTONE 80/20
25.0	54.0	COARSE SANDSTONE
54.0	66.0	DRILLED BLIND
66.0	86.0	COARSE SANDSTONE
86.0	100.0	SANDSTONE MUDSTONE 80/20
100.0	158.0	COARSE SANDSTONE
158.0	165.0	SANDSTONE MUDSTONE 50/50
165.0	170.0	COARSE FRACTURED SANDSTONE

WELL CONSTRUCTION

All measurements from the top of the casing

Depth of bore (M) 170.00 m
Depth of casing (M) 66.00 m
Diameter of Casing PVC 104 (mm)
Screens:
From m to m
Slot size and type
Grouting 13 Bags

Pump Tests:

Method of development AIR INDUCTION
Static water level 3.50 m
Duration of test 3 HOURS
Max 16500 ltrs p/hr
Test discharge (m^3/hr) 16.5
Drawdown level 25.00 m
PUMP DEPTH 35.00 m
PUMP VOLUME up to 5000 ltrs p/hr

Type pump to suit construction of bore for client

80mm SUBMERSIBLE PUMP SET **SQE 5-50**
AT 35.00 m. FOR 5000 lph

Water Quality Basic on site taste test

REMARKS

20% CIRCULATION LOSS @ 145.00 m
50% CIRCULATION LOSS @ 167.00 m
100% CIRCULATION LOSS @ 54.00 m TO 66.00 m
WATER TESTS 16500 AT 60.00 m
6900 LPH AT 20.00 m

KIWI 11013

This well has been drilled in accordance with **New Zealand Standard 4411:2001** Environmental Standard for Drilling of Soil and Rock.

NZGD ID: 79870

geologix consulting engineers

INVESTIGATION LOG

HOLE NO.: BH01

CLIENT: Zarah Grant-Jones

PROJECT: 938 Matakana Road, Matakana

JOB NO.: C0214

SITE LOCATION: South of Matakana Road

START DATE: 01/12/2022

CO-ORDINATES:

ELEVATION: Ground

END DATE: 01/12/2022

CONTRACTOR: Internal

RIG: Hand Auger

DRILLER: GC

LOGGED BY: GC

MATERIAL DESCRIPTION (See Classification & Symbology sheet for details)	SAMPLES	DEPTH (m)	LEGEND	SCALA PENETROMETER (Blows / 0mm)	VANE SHEAR STRENGTH (kPa) Vane: 3467	Values	WATER
Grassed TOPSOIL comprising organic sandy SILT, dark blackish brown, moist, low plasticity.		0.0	TS				
Silty CLAY, very stiff, brownish grey, moist, low plasticity. (Alluvium)		0.2				147 42	
Silty CLAY, very stiff, grey mottled yellowish brown, moist, high plasticity. (Tauranga Group)		0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2				152 58 152 55 172 83 152 83 128 67 114 58	
Organic CLAY, stiff to very stiff, brownish dark brown, moist, high plasticity, contains occasional rootlets. (Tauranga Group) 2.4m: contains peat and becoming black.		2.4 2.6 2.8 3.0 3.2 3.4				111 25 97 47 67 30	01/12/2022
End Of Hole: 3.50m		3.6				180 28	

PHOTO(S)

REMARKS

1. Borehole completed at target depth.
2. Groundwater encountered at 2.8 m.

WATER

- Standing Water Level
- Out flow
- In flow

INVESTIGATION TYPE

- [x] Hand Auger
- [ ] Test Pit

NZGD ID: 191453

HAND AUGER LOG

Client:	Matakana School Board of Trustees	**Job No.:**	K220155
Project:	Geotechnical Investigation	**Hole No.:**	AH1
Location:	Matakana School, Matakana	**Date:**	18/03/2022
		Logged By:	JD
Coordinates:	**Ground Level:** -	**Sheet:**	1 of 1

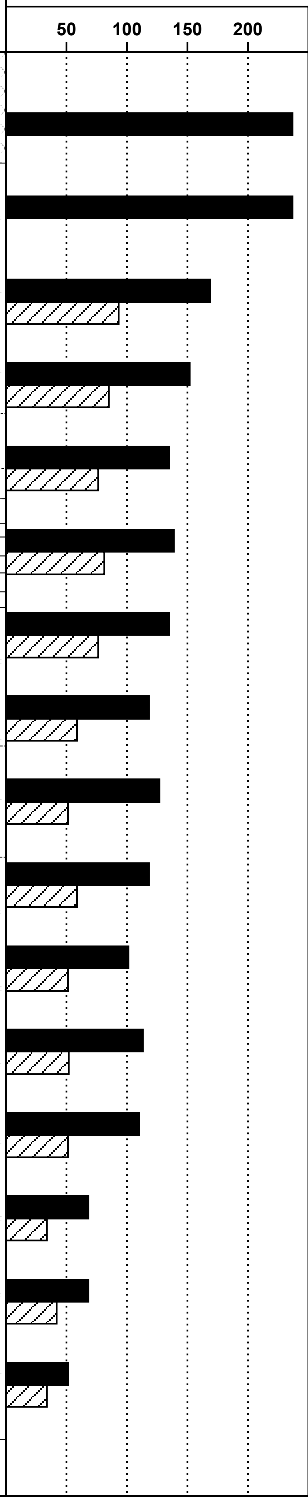
Depth (m) | **RL** | **Subsurface Conditions** | **Groundwater** | **Geological Unit** | **Graphic Log**

Subsurface Conditions	Geological Unit
TOPSOIL and SILT some clay; dark brown. Very stiff, moist, low plasticity. [FILL/TOPSOIL]	Fill/Topsoil
SILT, trace clay and fine sand; light grey with mottled orange. Very stiff, moist, low plasticity. [ALLUVIUM]	ALLUVIUM
SILT, some clay; light grey with mottled orange. Very stiff, moist, moderate plasticity. [ALLUVIUM]	ALLUVIUM
Clayey SILT; light grey with mottled orange. Very stiff, moist, high plasticity. [ALLUVIUM]	ALLUVIUM
Silty CLAY; light grey with mottled orange. Very stiff, moist, high plasticity. [ALLUVIUM]	ALLUVIUM
SILT, some clay, trace fine sand; light grey and orange. Very stiff, moist, moderate plasticity. [ALLUVIUM]	ALLUVIUM
SILT, some to minor clay; blue grey. Very stiff, moist, moderate plasticity. [ALLUVIUM]	ALLUVIUM
SILT, some clay; blue grey. Stiff, moist to wet, moderate plasticity. [ALLUVIUM]	ALLUVIUM
5.0m: End of hole (target depth reached).	

Groundwater Not Encountered

Depth scale (m): 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0

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



Values (peak)	Values (residual)
237+	-
237+	-
169	93
152	85
135	76
139	81
135	76
118	59
127	51
118	59
101	51
113	52
110	51
68	34
68	42
51	34

Scala Penetrometer (blows / 50mm)

Depth (m)	Blows
5.00	0.0
5.05	0.0
5.10	0.0
5.15	0.0
5.20	1.0
5.25	1.0
5.30	1.0
5.35	2.0
5.40	1.0
5.45	2.0
5.50	1.0
5.55	2.0
5.60	2.0
5.65	3.0
5.70	2.0
5.75	2.0
5.80	3.0
5.85	1.0
5.90	2.0
5.95	3.0
6.00	3.0
6.05	3.0
6.10	3.0
6.15	3.0
6.20	4.0
6.25	4.0
6.30	4.0
6.35	4.0
6.40	4.0
6.45	4.0
6.50	4.0
6.55	4.0
6.60	5.0
6.65	5.0
6.70	5.0
6.75	6.0
6.80	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
- Out Flow / In Flow

Shear Vane

Corrected as per NZGS Guidelines
Vane No.:1428
UTP = Unable To Penetrate
+ = Peak Exceeded
- = No Result

Other Comments

7A William Pickering Dr
Albany | Auckland
PO Box 302 361 NHMC
09 478 6655
www.kga.co.nz
KGA GEOTECHNICAL

HAND AUGER LOG

Job No.:	**K220155**
Hole No.:	**AH2**
Date:	18/03/2022
Logged By:	JD
Sheet:	1 of 1

Client: Matakana School Board of Trustees

Project: Geotechnical Investigation

Location: Matakana School, Matakana

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 and SILT some clay; dark brown. Very stiff, moist, low plasticity. [FILL/TOPSOIL]	Groundwater Not Encountered	Fill/Topsoil		50 100 150 200	194 85	3.00 3.05 3.10 3.15 3.20 3.25 3.30 3.35 3.40 3.45 3.50 3.55 3.60 3.65 3.70 3.75 3.80 3.85 3.90 3.95 4.00 4.05 4.10 4.15	1.0 1.0 1.0 2.0 1.0 2.0 2.0 2.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 4.0 4.0 3.0 4.0 5.0 4.0 4.0 4.0
0.5		SILT, minor to trace clay; light grey with mottled orange. Very stiff, moist, low plasticity. [ALLUVIUM]		ALL.			186 110		
1.0		SILT, some clay; light grey with mottled orange. Very stiff, moist, moderate plasticity. [ALLUVIUM]					169 93		
1.5		Clayey SILT/silty CLAY; light grey with mottled orange. Very stiff, moist, high plasticity. [ALLUVIUM]					169 85		
2.0		SILT, some clay; orange with mottled light grey. Very stiff, moist, moderate plasticity. [ALLUVIUM]					152 85		
2.5							144 78		
3.0		3.0m: End of hole (target depth reached).					135 79		
3.5							147 76		
4.0							110 51		
4.5							122 51		
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
- Out Flow / In Flow

Shear Vane

Corrected as per NZGS Guidelines
Vane No.:1428
UTP = Unable To Penetrate
+ = Peak Exceeded
- = No Result

Other Comments

7A William Pickering Dr
Albany | Auckland
PO Box 302 361 NHMC
09 478 6655
www.kga.co.nz
KGA GEOTECHNICAL

NZGD ID: 198548

APPENDIX 3

Concept Engineering Plans

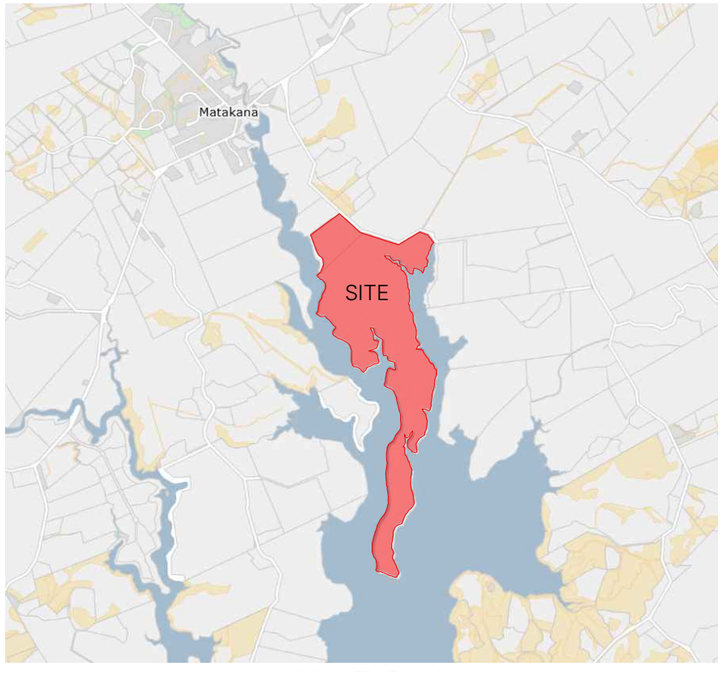
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

PROJECT NUMBER: 2804-01

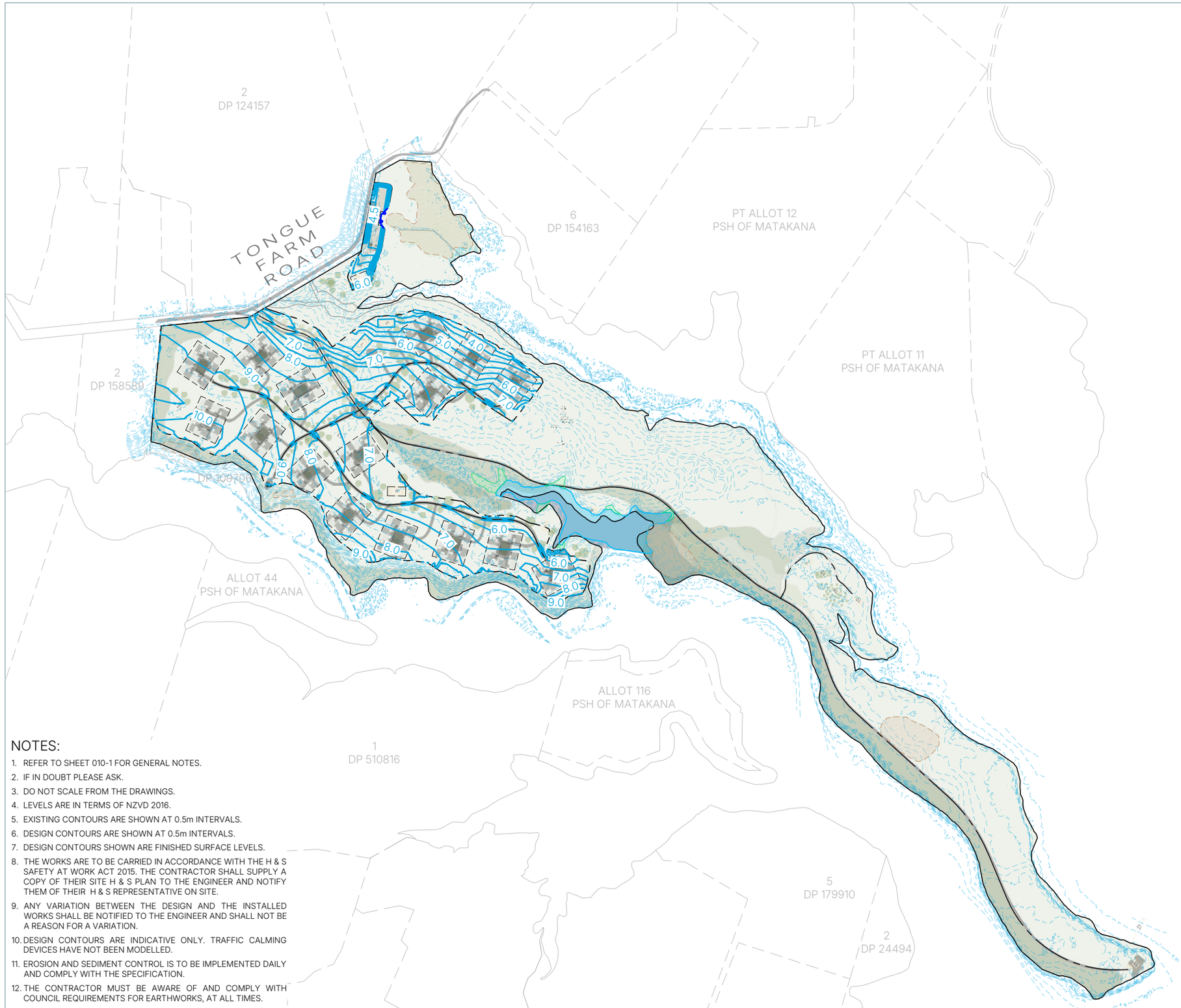
FAST TRACK REFERRAL ISSUE
OCTOBER 2025

CIVILPLAN CONSULTANTS

Sheet List Table	
Sheet Number	Sheet Title
000 and 100 Plan Series-General Subdivision	
000-1	COVER SHEET
200 Plan Series-Earthworks	
200-1	DESIGN CONTOURS PLAN
200-2	DESIGN CONTOURS PLAN DETAIL SHEET 1
220-1	DEPTH CONTOURS PLAN
220-2	DEPTH CONTOURS PLAN DETAIL SHEET 1
400 Plan Series-Drainage	
400-1	DRAINAGE RETICULATION PLAN OVERALL LAYOUT
400-2	DRAINAGE RETICULATION PLAN DETAIL SHEET 1
400-3	DRAINAGE RETICULATION PLAN DETAIL SHEET 2
420-1	OVERLAND FLOWPATH PLAN
500 Plan Series-Water	
500-1	WATER RETICULATION PLAN OVERALL LAYOUT
500-2	WATER RETICULATION PLAN DETAIL SHEET 1
500-3	WATER RETICULATION PLAN DETAIL SHEET 2



LOCALITY PLAN
NOT TO SCALE



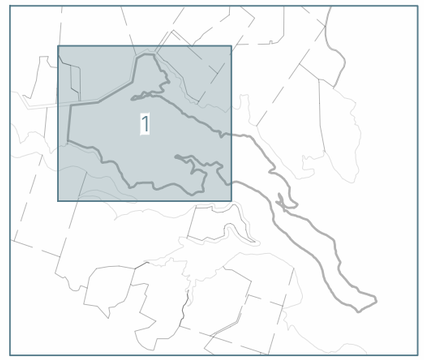
NOTES:

1. REFER TO SHEET 010-1 FOR GENERAL NOTES.
2. IF IN DOUBT PLEASE ASK.
3. DO NOT SCALE FROM THE DRAWINGS.
4. LEVELS ARE IN TERMS OF NZVD 2016.
5. EXISTING CONTOURS ARE SHOWN AT 0.5m INTERVALS.
6. DESIGN CONTOURS ARE SHOWN AT 0.5m INTERVALS.
7. DESIGN CONTOURS SHOWN ARE FINISHED SURFACE LEVELS.
8. THE WORKS ARE TO BE CARRIED IN ACCORDANCE WITH THE H & S SAFETY AT WORK ACT 2015. THE CONTRACTOR SHALL SUPPLY A COPY OF THEIR SITE H & S PLAN TO THE ENGINEER AND NOTIFY THEM OF THEIR H & S REPRESENTATIVE ON SITE.
9. ANY VARIATION BETWEEN THE DESIGN AND THE INSTALLED WORKS SHALL BE NOTIFIED TO THE ENGINEER AND SHALL NOT BE A REASON FOR A VARIATION.
10. DESIGN CONTOURS ARE INDICATIVE ONLY. TRAFFIC CALMING DEVICES HAVE NOT BEEN MODELLED.
11. EROSION AND SEDIMENT CONTROL IS TO BE IMPLEMENTED DAILY AND COMPLY WITH THE SPECIFICATION.
12. THE CONTRACTOR MUST BE AWARE OF AND COMPLY WITH COUNCIL REQUIREMENTS FOR EARTHWORKS, AT ALL TIMES.
13. IT IS INTENDED THAT THE CONTRACTOR SHALL GRADE THE EARTHWORKS TO THE FINISHED CONTOURS SHOWN. HOWEVER, THE FINAL MARRYING AND SHAPING OF THE EARTHWORKS AREAS IS SUBJECT TO THE ENGINEERS APPROVAL.
14. ROAD LONGSECTION SUBGRADE LEVELS, TYPICAL CROSS-SECTION LEVELS AND BOUNDARY LEVELS TAKE PRECEDENCE OVER PLAN CONTOUR LEVELS.
15. 3D TIN AND STRING DATA IS TO BE USED FOR SETTING OUT LINE AND LEVEL OF CENTRELINES AND KERBS. IT SHOULD NOT BE USED FOR PLAN POSITIONS OF BOUNDARIES AND FOOTPATHS. PLAN POSITIONS OF BOUNDARIES, FOOTPATHS, DRAINAGE AND UTILITIES ARE TO BE SETOUT FROM THE 2D DRAWING DATA.

N

LEGEND

- EXISTING CONTOUR (10.0)
- PROPOSED CONTOUR
- EARTHWORK EXTENT
- PROPOSED RETAINING WALL
- EXISTING POND
- EXISTING NATURAL INLAND WETLAND
- EXISTING POTENTIAL NATURAL INLAND WETLAND



KEYPLAN

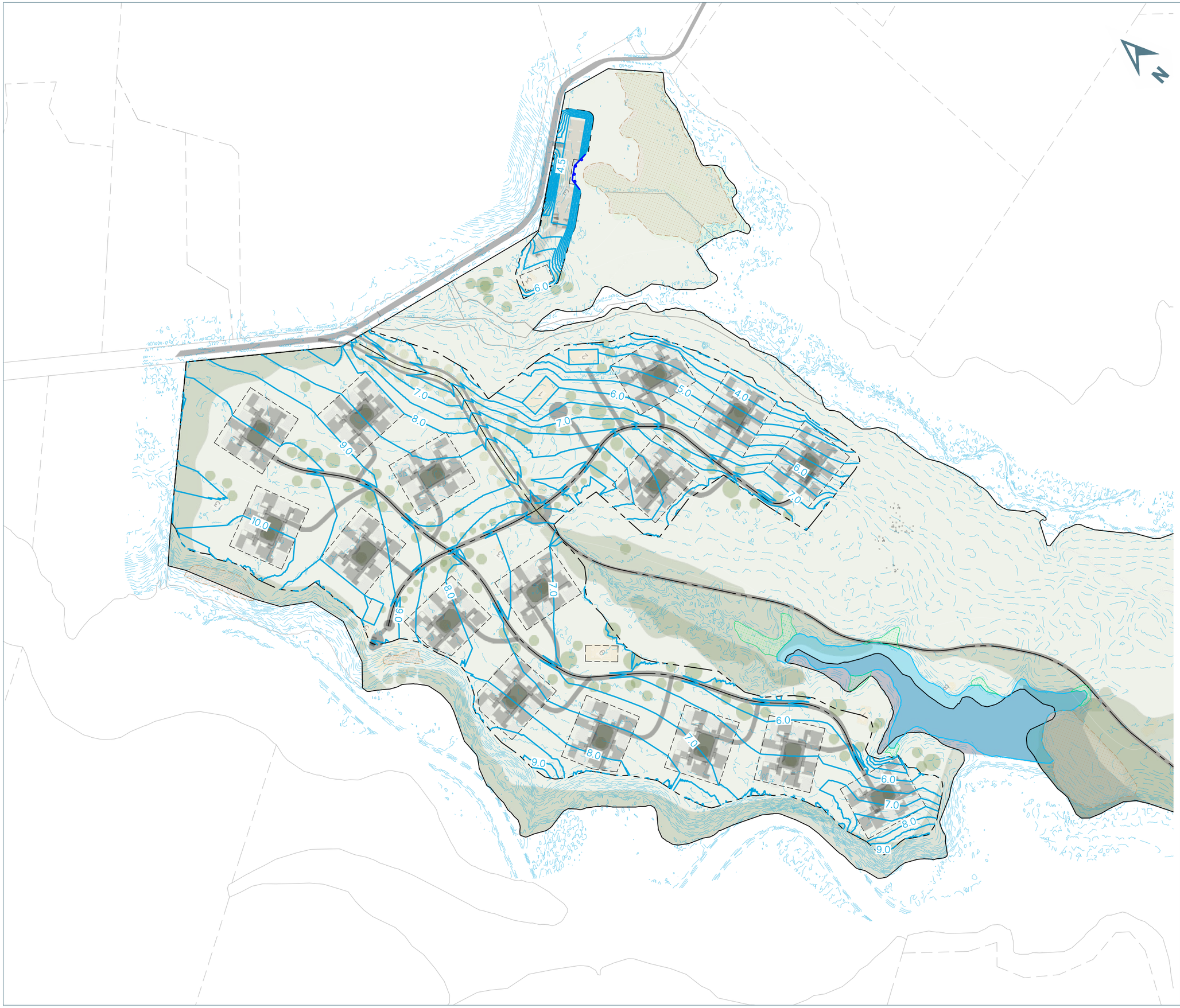
CIVILPLAN CONSULTANTS
Level 1, Van Den Brink House, 652 Gt Sth Rd, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
DESIGN CONTOURS PLAN
OVERALL LAYOUT

SCALE: (A1/A3)	1:4000 / 1:8000
SCALE BAR 1:8000@A3	0 30 160 240 320 400m
ISSUE STATUS:	CONSENT ISSUE
PROJECT NUMBER:	2804-01
DRAWING NUMBER:	200-1
REV:	C1
REVISION DETAILS:	ISSUED FOR CONSENT
REVISION DATE:	06.10.2025
DRAWN:	GDS
CHECKED:	MRR
APPROVED:	MRR

Printed by: GLEN@06.10.25 // Filepath: S:\JOBS\2804 - TONGUE FARM ROAD MATAKANA\CAD\01 - FAST TRACK REFERRAL\2804-01-200-1-DESIGN CONTOURS PLAN.DWG

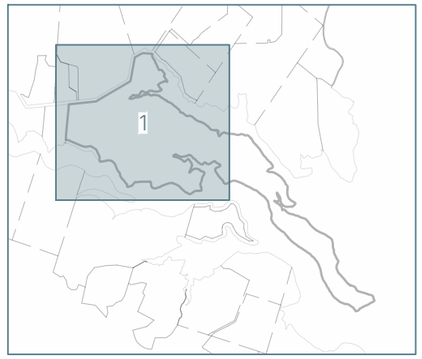


LEGEND

- EXISTING CONTOUR (10.0)
- PROPOSED CONTOUR
- EARTHWORK EXTENT
- PROPOSED RETAINING WALL
- EXISTING POND
- EXISTING NATURAL INLAND WETLAND
- EXISTING POTENTIAL NATURAL INLAND WETLAND

NOTES:

1. REFER SHEET 200-1 FOR OVERALL PLAN AND NOTES.



KEYPLAN

CIVILPLAN CONSULTANTS
Level 1, Van Den Brink House, 652 Gt Sth Rd, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
DESIGN CONTOURS PLAN
DETAIL SHEET 1

SCALE: (A1/A3)	1:2000 / 1:4000
SCALE BAR 1:4000@A3	0 40 80 120 160 200m
ISSUE STATUS:	CONSENT ISSUE
PROJECT NUMBER:	2804-01
DRAWING NUMBER:	200-2
REV:	C1
REVISION DETAILS:	ISSUED FOR CONSENT
REVISION DATE:	06.10.2025
DRAWN:	GDS
CHECKED:	MRR
APPROVED:	MRR

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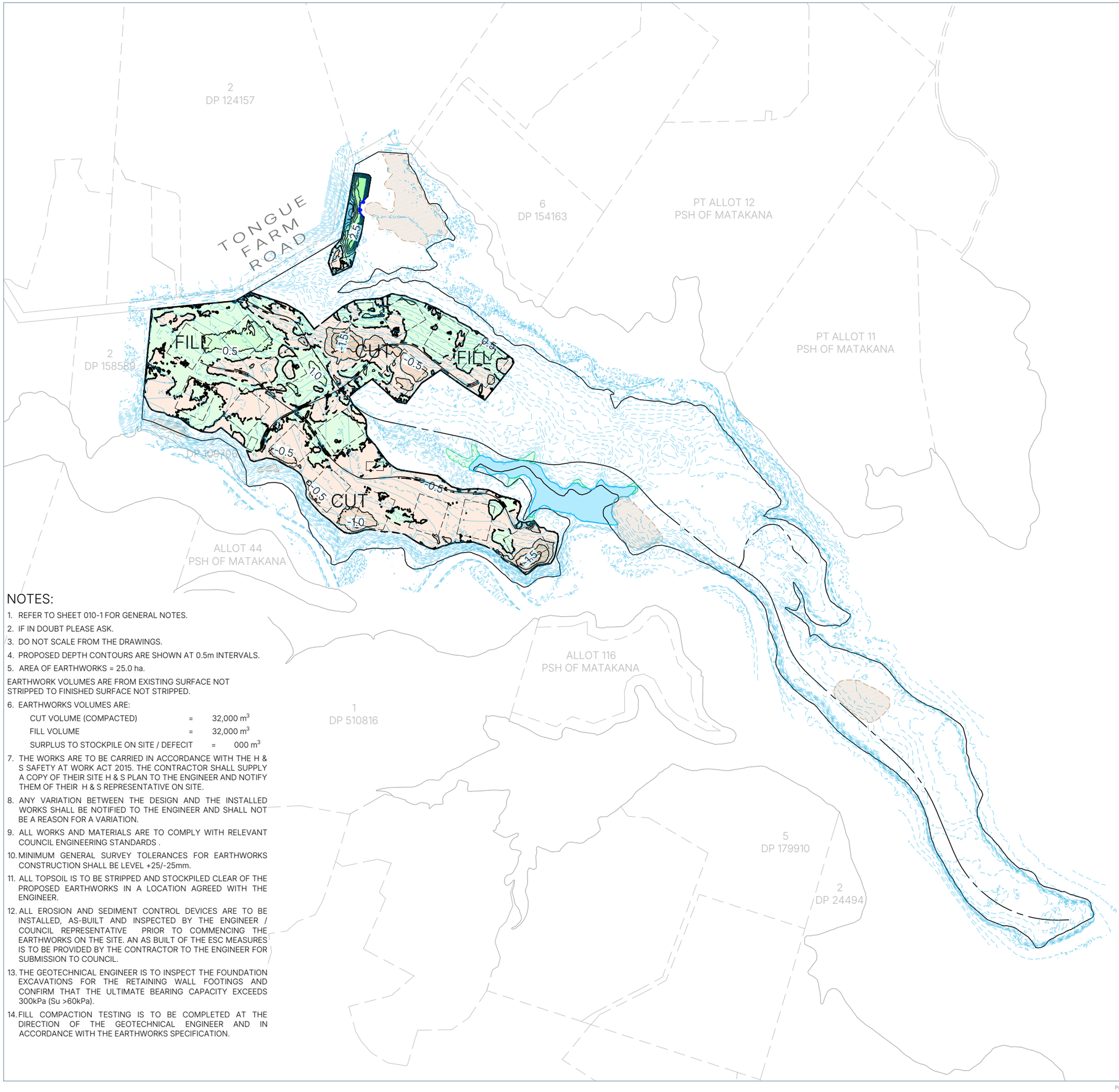


N

LEGEND

-1.0 PROPOSED CUT ISOPACH

1.0 PROPOSED FILL ISOPACH

10.0 EARTHWORKS ZERO CUT/FILL LINE

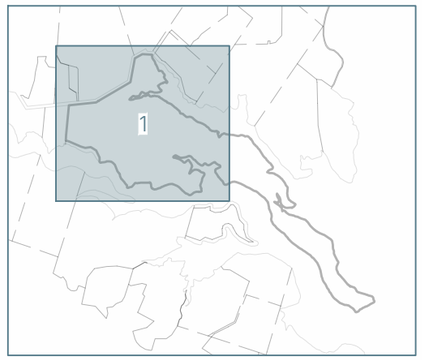
EARTHWORK EXTENT

CUT | FILL PROPOSED CUT/FILL AREAS

EXISTING POND

EXISTING NATURAL INLAND WETLAND

EXISTING POTENTIAL
NATURAL INLAND WETLAND



KEYPLAN

NOTES:

1. REFER TO SHEET 010-1 FOR GENERAL NOTES.
2. IF IN DOUBT PLEASE ASK.
3. DO NOT SCALE FROM THE DRAWINGS.
4. PROPOSED DEPTH CONTOURS ARE SHOWN AT 0.5m INTERVALS.
5. AREA OF EARTHWORKS = 25.0 ha.

EARTHWORK VOLUMES ARE FROM EXISTING SURFACE NOT STRIPPED TO FINISHED SURFACE NOT STRIPPED.

6. EARTHWORKS VOLUMES ARE:

CUT VOLUME (COMPACTED)	=	32,000 m^3
FILL VOLUME	=	32,000 m^3
SURPLUS TO STOCKPILE ON SITE / DEFECIT	=	000 m^3

7. THE WORKS ARE TO BE CARRIED IN ACCORDANCE WITH THE H & S SAFETY AT WORK ACT 2015. THE CONTRACTOR SHALL SUPPLY A COPY OF THEIR SITE H & S PLAN TO THE ENGINEER AND NOTIFY THEM OF THEIR H & S REPRESENTATIVE ON SITE.
8. ANY VARIATION BETWEEN THE DESIGN AND THE INSTALLED WORKS SHALL BE NOTIFIED TO THE ENGINEER AND SHALL NOT BE A REASON FOR A VARIATION.
9. ALL WORKS AND MATERIALS ARE TO COMPLY WITH RELEVANT COUNCIL ENGINEERING STANDARDS .
10. MINIMUM GENERAL SURVEY TOLERANCES FOR EARTHWORKS CONSTRUCTION SHALL BE LEVEL +25/-25mm.
11. ALL TOPSOIL IS TO BE STRIPPED AND STOCKPILED CLEAR OF THE PROPOSED EARTHWORKS IN A LOCATION AGREED WITH THE ENGINEER.
12. ALL EROSION AND SEDIMENT CONTROL DEVICES ARE TO BE INSTALLED, AS-BUILT AND INSPECTED BY THE ENGINEER / COUNCIL REPRESENTATIVE PRIOR TO COMMENCING THE EARTHWORKS ON THE SITE. AN AS BUILT OF THE ESC MEASURES IS TO BE PROVIDED BY THE CONTRACTOR TO THE ENGINEER FOR SUBMISSION TO COUNCIL.
13. THE GEOTECHNICAL ENGINEER IS TO INSPECT THE FOUNDATION EXCAVATIONS FOR THE RETAINING WALL FOOTINGS AND CONFIRM THAT THE ULTIMATE BEARING CAPACITY EXCEEDS 300kPa (Su >60kPa).
14. FILL COMPACTION TESTING IS TO BE COMPLETED AT THE DIRECTION OF THE GEOTECHNICAL ENGINEER AND IN ACCORDANCE WITH THE EARTHWORKS SPECIFICATION.

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Level 1, Van Den Brink House, 652 Gt Sth Rd, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
DEPTH CONTOURS PLAN
OVERALL LAYOUT

SCALE: (A1/A3) 1:4000 / 1:8000

SCALE BAR 1:8000@A3 0 30 160 240 320 400m

ISSUE STATUS: CONSENT ISSUE

PROJECT NUMBER: 2804-01 DRAWING NUMBER: 220-1 REV: C1

REVISION DETAILS: ISSUED FOR CONSENT REVISION DATE: 06.10.2025

DRAWN: GDS CHECKED: MRR APPROVED: MRR

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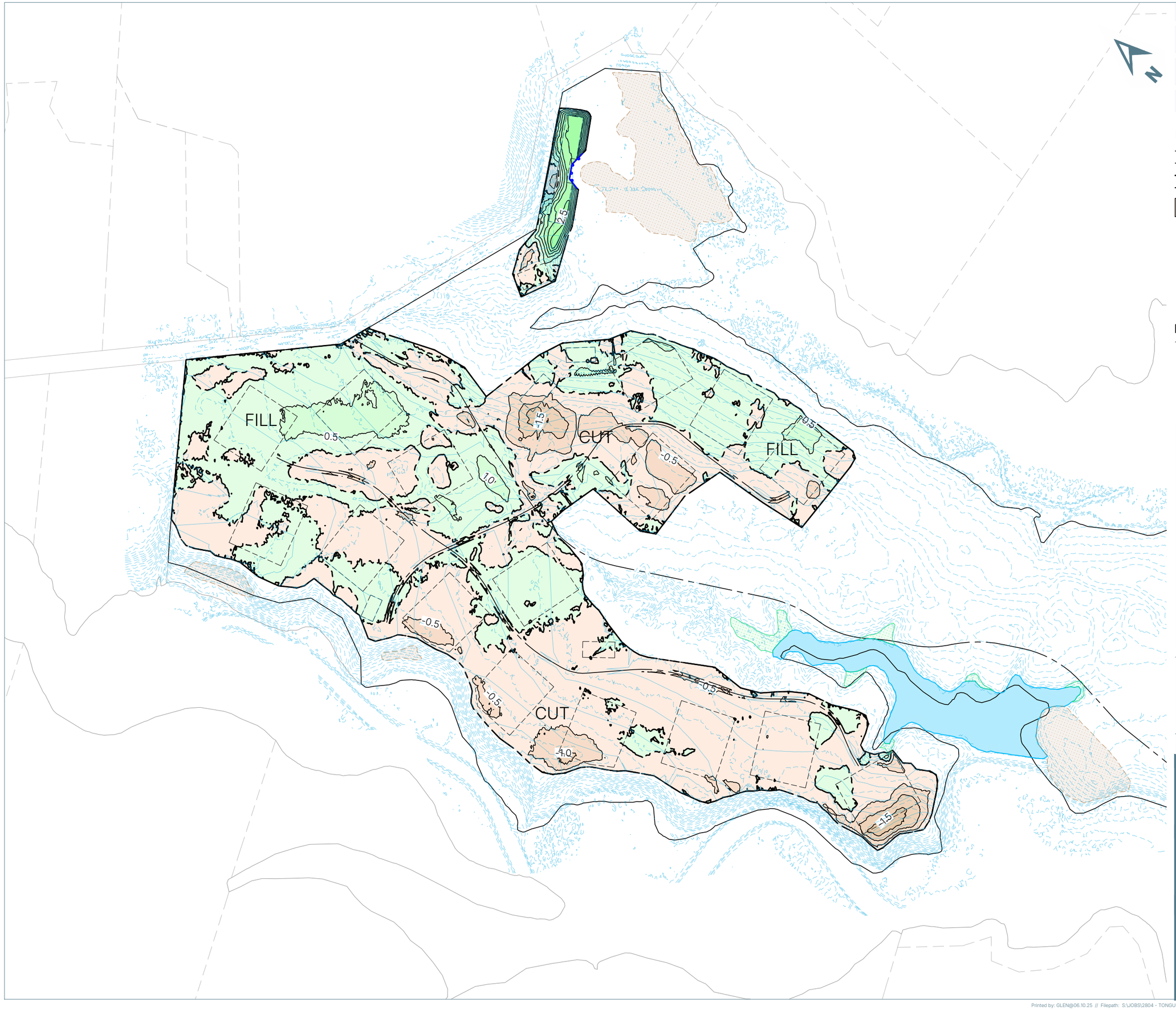


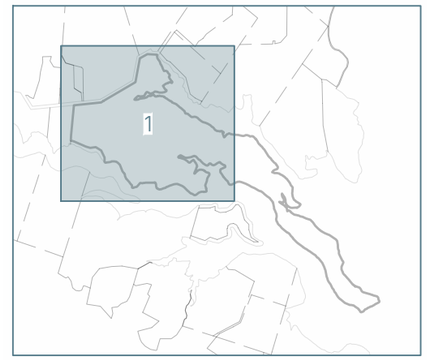
N

LEGEND

- -1.0 — PROPOSED CUT ISOPACH
- 1.0 — PROPOSED FILL ISOPACH
- EARTHWORKS ZERO CUT/FILL LINE
- EARTHWORK EXTENT
- CUT | FILL — PROPOSED CUT/FILL AREAS
- EXISTING POND
- EXISTING NATURAL INLAND WETLAND
- EXISTING POTENTIAL NATURAL INLAND WETLAND

NOTES:

1. REFER SHEET 220-1 FOR OVERALL LAYOUT AND NOTES.



KEYPLAN

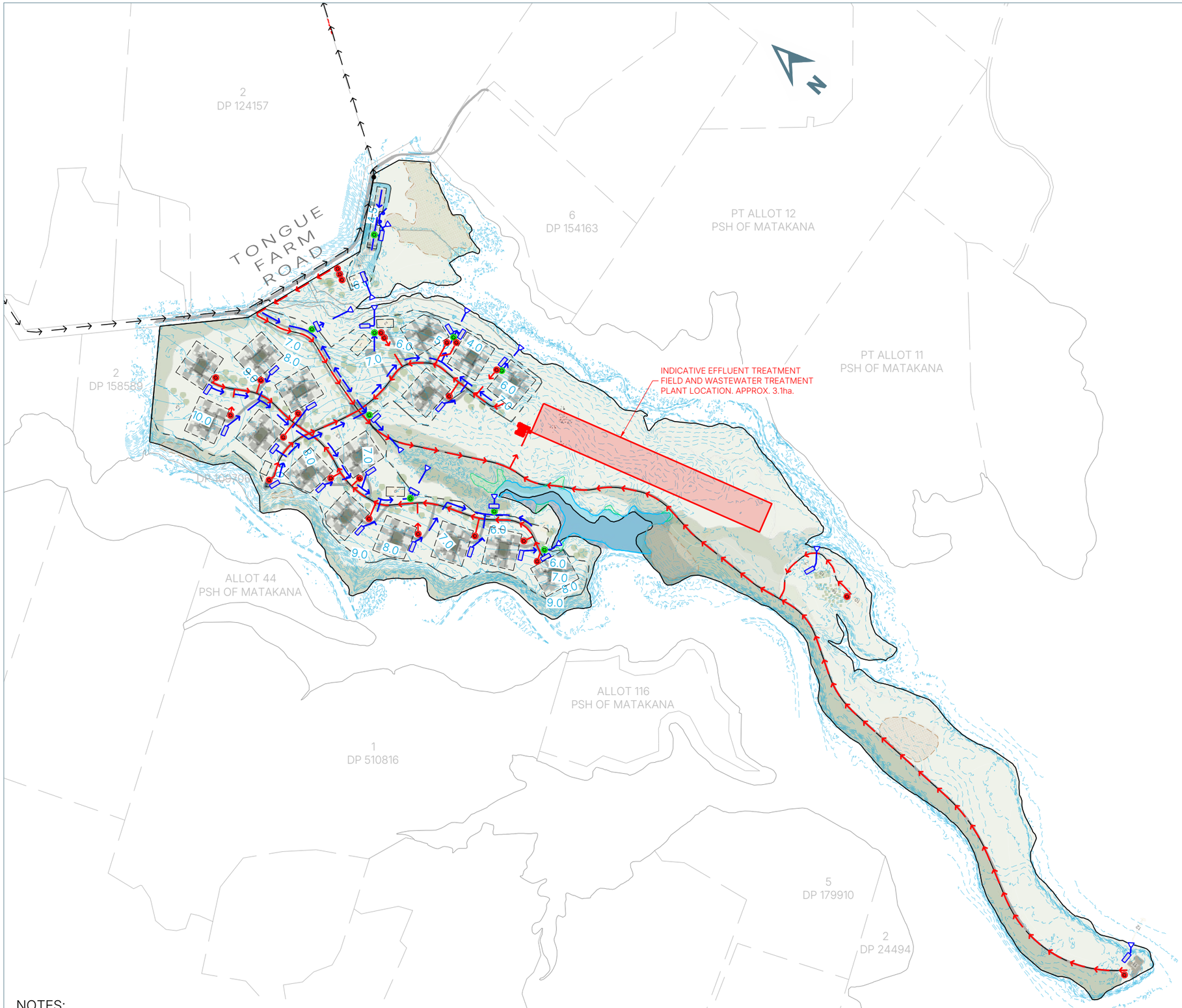
CIVILPLAN CONSULTANTS
Level 1, Van Den Brink House, 652 Gt Sth Rd, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
DEPTH CONTOURS PLAN
DETAIL SHEET 1

SCALE: (A1/A3)	1:2000 / 1:4000
SCALE BAR 1:4000@A3	0 40 80 120 160 200m
ISSUE STATUS:	CONSENT ISSUE
PROJECT NUMBER:	2804-01
DRAWING NUMBER:	220-2
REV:	C1
REVISION DETAILS:	ISSUED FOR CONSENT
REVISION DATE:	06.10.2025
DRAWN:	GDS
CHECKED:	MRR
APPROVED:	MRR

Printed by: GLEN@06.10.25 // Filepath: S:\JOBS\2804 - TONGUE FARM ROAD MATAKANA\CAD\01 - FAST TRACK REFERRAL\2804-01-220-1-DEPTH CONTOURS PLAN.DWG



NOTES:

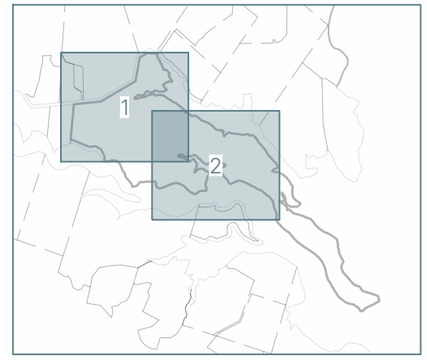
GENERAL:

1. ALL PUBLIC DRAINAGE WORKS AND MATERIALS ARE TO COMPLY WITH THE AUCKLAND COUNCIL CODE OF PRACTICE - CHAPTER 4 STORMWATER AND CHAPTER 5 WASTEWATER.
2. ALL PRIVATE DRAINAGE WORKS AND MATERIALS ARE TO COMPLY WITH THE NZ BUILDING CODE - CHAPTER E1 SURFACE WATER AND CHAPTER G13 FOUL WATER.
3. THE CONTRACTOR IS TO FIX BY SURVEY, ALL CHANGES IN DIRECTION AND THE AS-BUILT DEPTH OF ALL DRAINAGE LINES, LOT CONNECTIONS AND MANHOLES.
4. ANY WORK DEEMED BY THE ENGINEER OR FUTURE ASSET OWNERS AS BEING SUBSTANDARD WORK SHALL BE RECTIFIED AT THE CONTRACTORS EXPENSE.

LEGEND

PROPOSED

- GRAVITY STORMWATER LINE
- PRESSURISED SEWER LINE
- SW TREATMENT MANHOLE WITH BYPASS
- STORMWATER OUTLET
- STEP TANK OR GREASE TRAP
- STORMWATER DETENTION AND/OR REUSE TANK



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CIVILPLAN
CONSULTANTS
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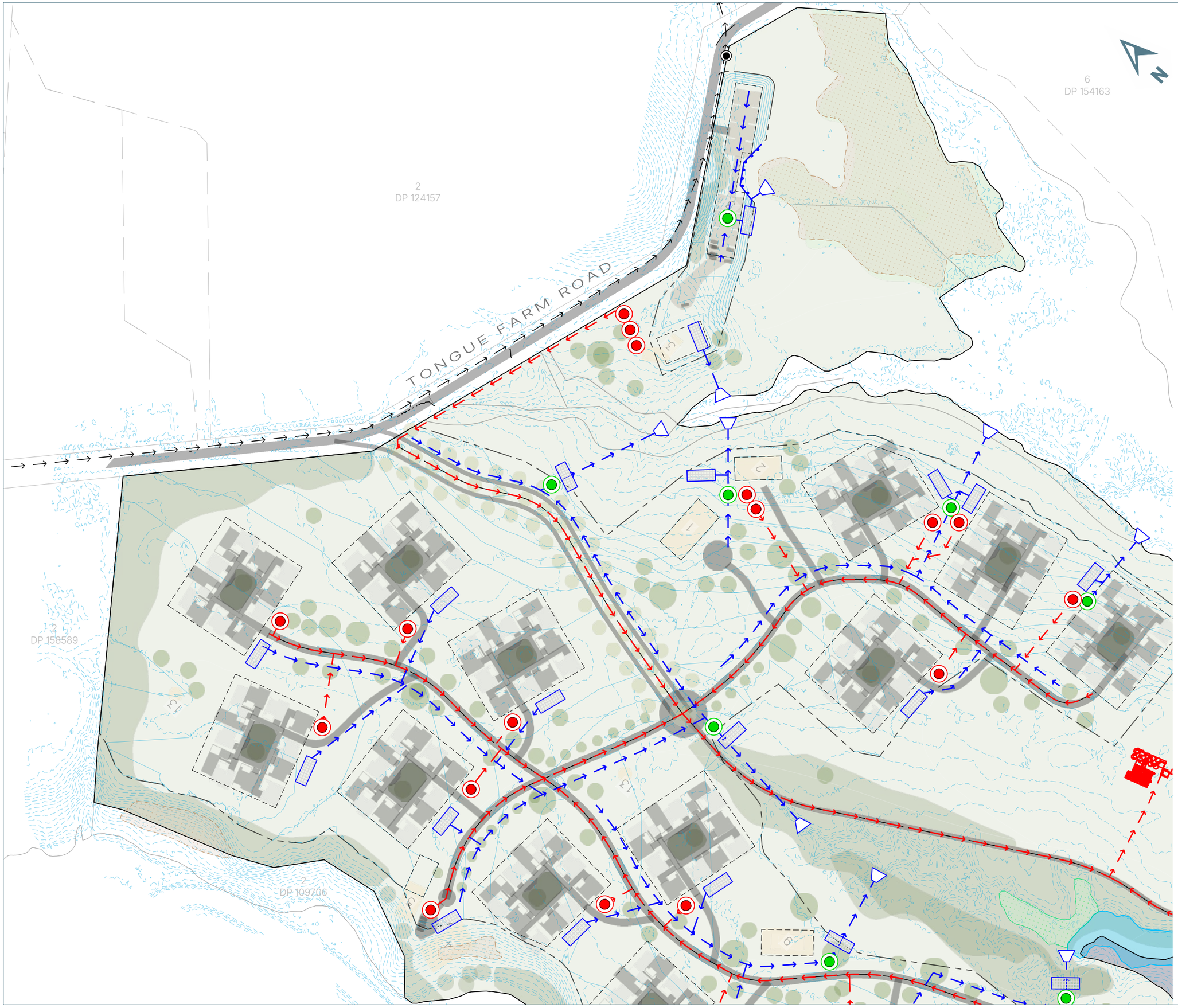
PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
DRAINAGE RETICULATION PLAN
OVERALL LAYOUT

SCALE: (A1/A3)	1:4000 / 1:8000
SCALE BAR 1:8000@A3	0 30 160 240 320 400m
ISSUE STATUS:	CONSENT ISSUE
PROJECT NUMBER:	2804-01
DRAWING NUMBER:	400-1
REV:	C1
REVISION DETAILS:	ISSUED FOR CONSENT
REVISION DATE:	06.10.2025
DRAWN:	GDS
CHECKED:	MRR
APPROVED:	MRR

Printed by: MATT@08.10.25 // Filepath: S:\JOBS\2804 - TONGUE FARM ROAD MATAKANA\CAD\01 - FAST TRACK REFERRAL\2804-01-400-1-DRAINAGE RETICULATION PLAN.DWG



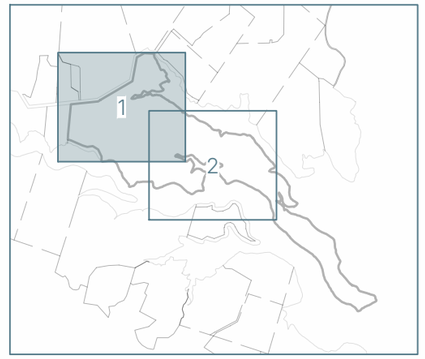
LEGEND

PROPOSED

- GRAVITY STORMWATER LINE
- PRESSURISED SEWER LINE
- SW TREATMENT MANHOLE WITH BYPASS
- STORMWATER OUTLET
- STEP TANK OR GREASE TRAP
- STORMWATER DETENTION AND/OR REUSE TANK

NOTES:

1. REFER TO SHEET 400-1 FOR OVERALL PLAN AND NOTES.



KEYPLAN

CIVILPLAN CONSULTANTS
Level 1, Van Den Brink House, 652 Gt Sth Rd, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
DRAINAGE RETICULATION PLAN
DETAIL SHEET 1

SCALE: (A1/A3)	1:1250 / 1:2500
SCALE BAR 1:2500@A3	0 25 50 75 100 125m
ISSUE STATUS:	CONSENT ISSUE
PROJECT NUMBER:	2804-01
DRAWING NUMBER:	400-2
REV:	C1
REVISION DETAILS:	ISSUED FOR CONSENT
REVISION DATE:	06.10.2025
DRAWN:	GDS
CHECKED:	MRR
APPROVED:	MRR

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INDICATIVE EFFLUENT TREATMENT FIELD AND WASTEWATER TREATMENT PLANT LOCATION. APPROX. 3.1ha.

N

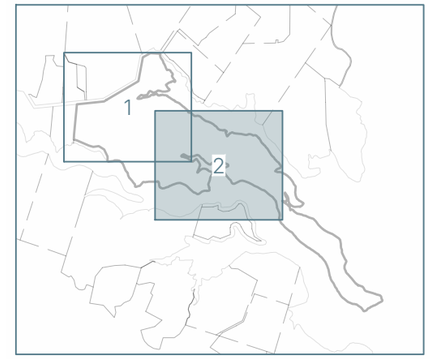
LEGEND

PROPOSED

- GRAVITY STORMWATER LINE
- PRESSURISED SEWER LINE
- SW TREATMENT MANHOLE WITH BYPASS
- STORMWATER OUTLET
- STEP TANK OR GREASE TRAP
- STORMWATER DETENTION AND/OR REUSE TANK

NOTES:

1. REFER TO SHEET 400-1 FOR OVERALL PLAN AND NOTES.



KEYPLAN

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PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
DRAINAGE RETICULATION PLAN
DETAIL SHEET 2

SCALE: (A1/A3)	1:1250 / 1:2500
SCALE BAR 1:2500@A3	0 25 50 75 100 125m
ISSUE STATUS:	CONSENT ISSUE
PROJECT NUMBER:	2804-01
DRAWING NUMBER:	400-3
REV:	C1
REVISION DETAILS:	ISSUED FOR CONSENT
REVISION DATE:	06.10.2025
DRAWN:	GDS
CHECKED:	MRR
APPROVED:	MRR

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N

LEGEND

1%AEP+CC OVERLAND FLOWPATH

NOTES:

1. CONTOURS ARE 0.5m INTERVAL.
2. ALL FLOW DEPTH IS TO BE HELD WITHIN THE ROAD CORRIDOR OR DEFINED OVERLAND FLOW PATHS.

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PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
OVERLAND FLOWPATH PLAN

SCALE: (A1/A3) 1:4000 / 1:8000

SCALE BAR 1:8000@A3 0 30 160 240 320 400m

ISSUE STATUS: CONSENT ISSUE

PROJECT NUMBER: 2804-01 DRAWING NUMBER: 420-1 REV: C1

REVISION DETAILS: ISSUED FOR CONSENT REVISION DATE: 06.10.2025

DRAWN:	CHECKED:	APPROVED:
GDS	MRR	MRR

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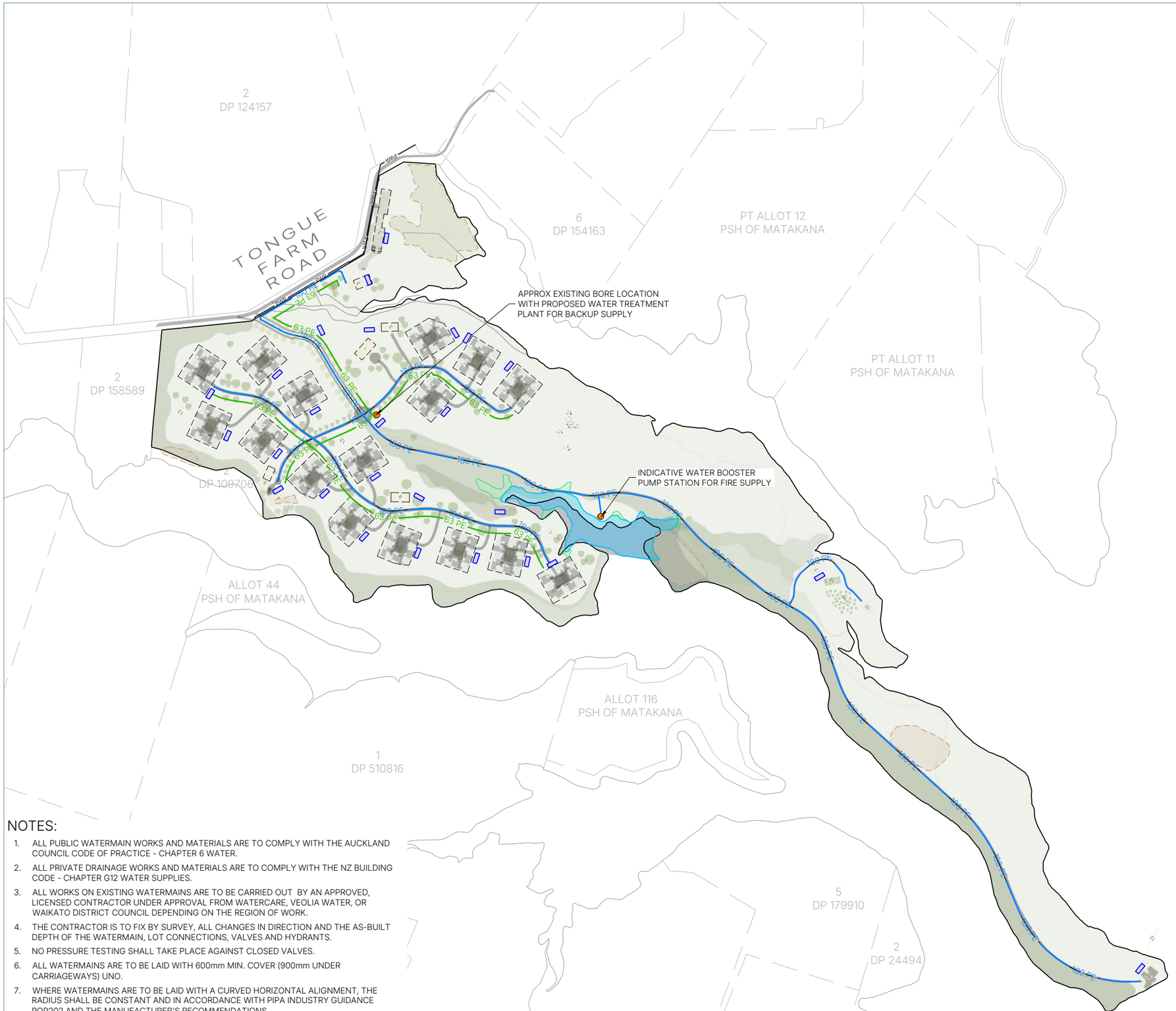
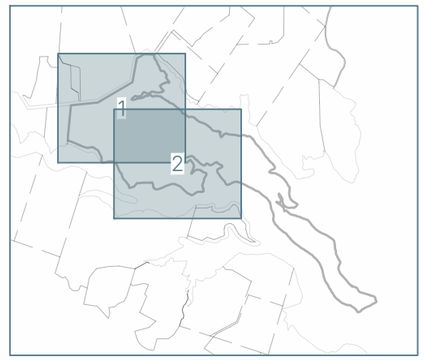


N

LEGEND

PROPOSED

- 63 PE — OD63 PE LINE - BACKUP BORE SUPPLY
- 180 PE — OD180 PE LINE - FIRE SUPPLY
- STORMWATER REUSE TANK WITH TREATMENT, PUMP, AND CONNECTION TO BUILDINGS



KEYPLAN

NOTES:

1. ALL PUBLIC WATERMAIN WORKS AND MATERIALS ARE TO COMPLY WITH THE AUCKLAND COUNCIL CODE OF PRACTICE - CHAPTER 6 WATER.
2. ALL PRIVATE DRAINAGE WORKS AND MATERIALS ARE TO COMPLY WITH THE NZ BUILDING CODE - CHAPTER G12 WATER SUPPLIES.
3. ALL WORKS ON EXISTING WATERMAINS ARE TO BE CARRIED OUT BY AN APPROVED, LICENSED CONTRACTOR UNDER APPROVAL FROM WATERCARE, VEOLIA WATER, OR WAIKATO DISTRICT COUNCIL DEPENDING ON THE REGION OF WORK.
4. THE CONTRACTOR IS TO FIX BY SURVEY, ALL CHANGES IN DIRECTION AND THE AS-BUILT DEPTH OF THE WATERMAIN, LOT CONNECTIONS, VALVES AND HYDRANTS.
5. NO PRESSURE TESTING SHALL TAKE PLACE AGAINST CLOSED VALVES.
6. ALL WATERMAINS ARE TO BE LAID WITH 600mm MIN. COVER (900mm UNDER CARRIAGEWAYS) UNO.
7. WHERE WATERMAINS ARE TO BE LAID WITH A CURVED HORIZONTAL ALIGNMENT, THE RADIUS SHALL BE CONSTANT AND IN ACCORDANCE WITH PIPA INDUSTRY GUIDANCE POP202 AND THE MANUFACTURER'S RECOMMENDATIONS.
8. ALL LOT CONNECTIONS TO BE OD25 PE TO FIT A 20mm METER IN ACCORDANCE WITH COUNCIL STANDARDS. ALL LOT CONNECTIONS TO TERMINATE IN AN APPROVED LOCKABLE METER BOX.
9. WATERMAIN MATERIAL SHALL BE UNO:

PE		
OD63 AND BELOW	MDPE PE80B PN12.5 (SDR11)	TO AS/NZS 4130/4131
OD125 AND GREATER	PE PE100PN12.5 (SDR13)	TO AS/NZS 4130/4131
FITTINGS		
MANUFACTURER: GILLIES METALTECH	DUCTILE IRON K9 OR PN35	TO AS/NZS 2280

CIVILPLAN CONSULTANTS

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PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
WATER RETICULATION PLAN
OVERALL LAYOUT

SCALE: (A1/A3) 1:4000 / 1:8000

SCALE BAR 1:8000@A3 0 30 160 240 320 400m

ISSUE STATUS: CONSENT ISSUE

PROJECT NUMBER: 2804-01 DRAWING NUMBER: 500-1 REV: C1

REVISION DETAILS: ISSUED FOR CONSENT REVISION DATE: 06.10.2025

DRAWN: GDS CHECKED: MRR APPROVED: MRR

Printed by: GLEN@06.10.25 // Filepath: S:\JOBS\2804 - TONGUE FARM ROAD MATAKANA\CAD\01 - FAST TRACK REFERRAL\2804-01-500-1-WATER RETICULATION PLAN.DWG

TONGUE FARM ROAD

2
DP 124157

6
DP 154163

2
DP 158589

2
DP 109706

APPROX EXISTING BORE LOCATION WITH PROPOSED WATER TREATMENT PLANT FOR BACKUP SUPPLY

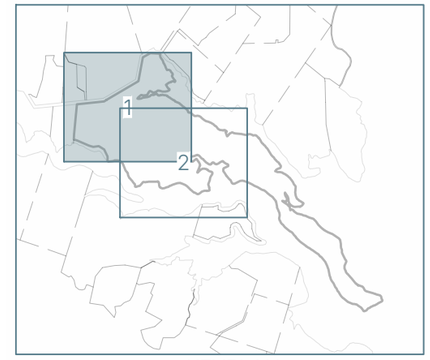
LEGEND

PROPOSED

- 63 PE — OD63 PE LINE - BACKUP BORE SUPPLY
- 180 PE — OD180 PE LINE - FIRE SUPPLY
- STORMWATER REUSE TANK WITH TREATMENT, PUMP, AND CONNECTION TO BUILDINGS

NOTES:

1. REFER TO SHEET 500-1 FOR OVERALL PLAN AND NOTES.



KEYPLAN

CIVILPLAN CONSULTANTS
Level 1, Van Den Brink House, 652 Gt Sth Rd, Manukau, Auckland. Phone: 09 222 2445

PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
WATER RETICULATION PLAN
DETAIL SHEET 1

SCALE: (A1/A3)	1:1250 / 1:2500
SCALE BAR 1:2500@A3	0 25 50 75 100 125m
ISSUE STATUS:	CONSENT ISSUE
PROJECT NUMBER:	2804-01
DRAWING NUMBER:	500-2
REV:	C1
REVISION DETAILS:	ISSUED FOR CONSENT
REVISION DATE:	06.10.2025
DRAWN:	GDS
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Printed by: GLEN@06.10.25 // Filepath: S:\JOBS\2804 - TONGUE FARM ROAD MATAKANA\CAD\01 - FAST TRACK REFERRAL\2804-01-500-1-WATER RETICULATION PLAN.DWG

APPROX EXISTING BORE LOCATION
WITH PROPOSED WATER TREATMENT
PLANT FOR BACKUP SUPPLY

INDICATIVE WATER BOOSTER
PUMP STATION FOR FIRE SUPPLY

ALLOT 44
PSH OF MATAKANA

1
DP 510816

ALLOT 116
PSH OF MATAKANA

LEGEND

PROPOSED

- 63 PE — OD63 PE LINE - BACKUP BORE SUPPLY
- 180 PE — OD180 PE LINE - FIRE SUPPLY
- STORMWATER REUSE TANK WITH TREATMENT, PUMP, AND CONNECTION TO BUILDINGS

NOTES:

1. REFER TO SHEET 500-1 FOR OVERALL PLAN AND NOTES.

KEYPLAN

CIVILPLAN CONSULTANTS
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PROJECT TITLE:
SANDERSON PARTNERS LTD
120 TONGUE FARM ROAD
MATAKANA

SHEET TITLE:
WATER RETICULATION PLAN
DETAIL SHEET 2

SCALE: (A1/A3)	1:1250 / 1:2500
SCALE BAR 1:2500@A3	0 25 50 75 100 125m
ISSUE STATUS:	CONSENT ISSUE
PROJECT NUMBER:	2804-01
DRAWING NUMBER:	500-3
REV:	C1
REVISION DETAILS:	ISSUED FOR CONSENT
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APPENDIX 4

Innoflow's On-site Wastewater Treatment Solution

MATAKANA COUNTRY CLUB

DECENTRALISED WASTEWATER SCHEME SPECIFICATION REPORT

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Date:	**8th October 2025**

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1.0 INTRODUCTION

Innoflow Technologies NZ Ltd (Innoflow) present this report which outlines the specification details for the proposed wastewater scheme to service Matakana Country Club, located at 120 Tongue Farm Road, Matakana. This design includes 20 on-lot STEP tanks and 2 Grease Traps, liquid only pressure sewer, a communal wastewater treatment plant and a land treatment system. A set of drawings have been provided to visualise the proposed system.

2.0 WASTEWATER MANAGEMENT OVERVIEW

2.1 Wastewater Management Concept

The wastewater management scheme proposed for this country club incorporates a decentralised collection, central treatment, and land treatment for further renovation of effluent. The scheme incorporates the following key components and is illustrated in Figure 1.

1. On-lot pumped septic tanks at each facility to provide primary treatment of wastewater (STEP Tanks)
2. Dual Chamber Grease Traps to remove FOG (Fat, Oil & Grease) from Café and Restaurant Kitchen.
3. A wastewater collection system comprising a pressurised liquid only sewer.
4. A communal wastewater treatment plant (AdvanTex® recirculating textile packed bed reactors) to provide secondary and tertiary treatment, as well as remove nutrients.
5. An effluent dispersal system comprising of a pressure compensating drip irrigation field.

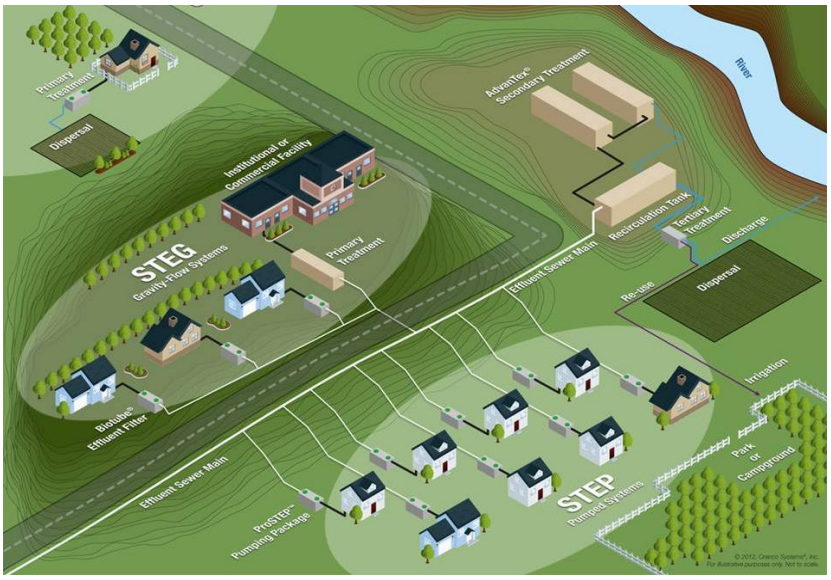


Figure 1- Example Schematic of Decentralised Treatment

2.2 Wastewater System Design Summary

Peak Flow, Influent Wastewater Characteristics and Target Effluent Quality

- Average daily flow: 69.5 m^3/day
- Peak daily flow: 92.7 m^3/day

- Influent BOD_5: <423 mg/L
- Influent TSS: <473 mg/L
- Influent TKN: <66 mg/L

- Effluent BOD_5: <15 mg/L
- Effluent TSS: <15 mg/L
- Effluent E.Coli: <200 cfu/100mL

- Land application method: Pressure Compensating Dripline Irrigation
- Soil loading rate: 3 mm/day

On-Lot Treatment

- 19 x 25 m^3 Pumped Septic Tanks (STEP) with an MVP Panel
- 1 x 4.5 m^3 Pumped Septic Tank (STEP) with an MVP Panel
- 2 x 4.5 m^3 Dual Chamber Grease Trap Tanks

Reticulation

- Low-pressure liquid only sewer (PE SDR11 63-90mm OD) to transfer primary treated effluent from on-lot pumped septic tank to secondary wastewater treatment plant.

Wastewater Treatment Plant

- 1 x Influent Magflow meter
- 2 x 25 m^3 Pre-Anoxic tanks with filtrate return line
- 3 x (Stage 1) 25 m^3 Recirculation tanks with dosing pumps
- 8 x (Stage 1) AX100 packed bed reactor pods
- 1 x (Stage 2) 25 m^3 Recirculation tank with dosing pumps
- 3 x (Stage 2) AX100 packed bed reactor pods
- 4 x 25 m^3 Treated Effluent tanks with irrigation pumps.
- 1 x UV disinfection unit
- 1 x TCOM control panel

Land Application

- Treated effluent rising main.
- 12 x 2575 m^2 sectors comprising of 30,900 lineal meters of pressure compensating dripline irrigation laid at 1m centres.
- 2 x 6-Sector Sequencing Valve

3.0 DESIGN PARAMETERS

3.1 Peak Wastewater Flow Calculations

The wastewater treatment plant system has been designed based on influent strength and daily flow stipulated below.

Table 1- Design Peak Daily Flows

Input Design Parameters		
$Q_{average}$	m^3	**69.5**
Q_{peak}	m^3	**92.7**
Villas		
Occupancy	People	374.4
Flow Allowance	L/Person/Day	200
Number of Dwellings		208
Café		
Occupancy	People	100
Flow Allowance	L/Person/Day	25
Restaurant		
Occupancy	People	100
Flow Allowance	L/Person/Day	30
Clubhouse		
Occupancy	People	50
Flow Allowance	L/Person/Day	30
Spa Patrons		
Occupancy	People	50
Flow Allowance	L/Person/Day	25
Care Rooms		
Occupancy	People	30
Flow Allowance	L/Person/Day	220
Staff		
Occupancy	People	50
Flow Allowance	L/Person/Day	50
Visitors		
Occupancy	People	30

Flow Allowance	L/Person/Day	15

Note 1 - Occupancy totals from Engineer

3.2 Design Influent Parameters

Influent wastewater generated from the site shall be domestic strength in nature, with the following combined maximum influent strengths.

Table 2- Design Equivalent Mass Loads

Equivalent Mass Loads per Person per Day		
BOD_5	grams	85
TSS	grams	95
TKN as N	grams	13.3
NH_3	mg/L	7.8
Total P as P	grams	3.3

Note 2 - From Crites & Tchobanoglous 1998, Table 4-12

Table 3- Design Mass Load Conversion

Equivalent Mass Load Conversion Factor (Residential)		
BOD_5	grams	100%
TSS	grams	100%
TKN as N	grams	100%
NH_3	grams	100%
Total P as P	grams	100%

Table 4-Design Influent Strength (Maximum)

Raw Influent Strength		
BOD_5	mg/L	**423**
TSS	mg/L	**473**
TKN	mg/L	**66**
NH_3	mg/L	**39**
TP	mg/L	**16**
Alkalinity as $CaCO_3$	mg/L	-

3.3 Design Effluent Quality

The following tables describe the design effluent quality from the treatment plant.

Table 5- Target Effluent Quality Limits

Final Effluent Quality		
	(less than)	
$cBOD_5$	mg/L	15
TSS	mg/L	15
TN	kgN/Ha/Yr	-
NH_3	mg/L	-
TP	mg/L	-
FC	cfu/100 mL	200

3.4 Toxicity

The assumption has been made that the influent strength detailed in the table above is domestic in nature, with no commercial and industrial waste. The influent stream shall not contain concentrations of toxic substances that may adversely affect the performance of the biological processes required for the system to operate. Below is a list of toxic compounds that are known to negatively impact the system and are not to discharge into the treatment plant. Note: This is not a complete list, other harmful compounds are likely to exist that will adversely affect the performance of the plant.

Table 6- List of chemicals not to be discharged into wastewater system.

Toxic Compound(s)	Example	Result
Heavy Metals	Copper, Nickel, Zinc, Cadmium, Chromium	Stop ammonia oxidation (reversible)
Metal-binding compounds[1]	Sodium Sulfide	Stop ammonia oxidation (reversible)
Bind heme and proteins[1]	Ethyl xanthate (mining industry)	Stop ammonia oxidation; cell death
Hydrazine (H_2N_2)[1]	Rocket fuel	Stop ammonia oxidation
Chlorination		Cell death
Uncouplers of oxidative phosphorylation and inhibitors of electron transport[1]	DNP (2, 4-Dinitrophenol) MCCP (m-Chlorocarbonyl-cyanize phenylhydrazone)	Cell death
Short-chain alcohols and amines[1]	Methanol, Ethanol, n-butanol	Cell death
Phenol[2]		Stop ammonia oxidation; cell death
Nitrous oxide (N_2O)[1]	Aerosol propellants	Stop ammonia oxidation
High levels of nitrite (NO_{2-})		Stop ammonia oxidation
Quaternary amines	Disinfectant, surfactant, fabric softeners, shampoo	Cell death
UV light[3]		Stop ammonia oxidation

Toxic Compound(s)		Concentration resulting in 50% inhibition (mg/L)
L-Histidine		0.5
Thiosemicarbazide		0.9
Nitrourea	***	1
Allylthiourea		1.2
8-Quinolinol		1.5
L-Arginine		1.7
L-Valine		1.8
Diethyldithiocarbamate		2
L-Threonine		3.6
L-Lysine		4
Quinacrine	***	5
Diphenylthiocarbazone		7.5
L-Methionine		9
o-Phenanthroline		9
Phenazine methosulfate		10
Dicyclohexylcarb-diimide		10
2-Chloro-6-trichloromethyl-pyridine		11
Ethyl xanthate		12
Dipryidyl		16
2,4-Dinitrophenol	**	37
3-Aminotriazole		70
Aminoguanidine	**	74
Methanol	*	160
Dichlorophenolinde-phenol		250
Hydrazide		300
Methylamine		310
Trimethylamine		590
Tetremethylammonium Chloride		2200
Ethanol		4100
Acetone	*	8100
N-Butanol	*	8200
Aminoehtanol		12000
Ethyl Acetate	*	18000
N-Propanol	*	20000
* Included in the list of significant chemicals		
** Inhibitors of both NH_3 and NO_2 oxidation		
*** Inhibitors of NO_2 oxidation		
All others inhibit NH_3 oxidation		

4.0 PRESSURISED LIQUID ONLY SEWERS

4.1 Drainage from Buildings

Raw wastewater from each lot shall enter the effluent sewer via conventional 100 mm DWV gravity sewer pipes (or as determined suitable onsite). We have assumed that all pipework can be laid at a shallow depth, with all tanks buried at a depth of less than 900mm (soil cover to tank roof).

Figure 2- Gravity pipework between the building and the installed primary tanks.

4.2 Grease Trap Tanks

Wastewater from the kitchen facilities in the Café and the Restaurant will be collected in two 4.5 m3 Dual Chamber Grease Trap tanks. These tanks trap FOG (Fat, Oil & Grease) preventing it from damaging the WWTP. The effluent is then gravity fed to the STEP tank.

Table 7 - Grease Trap Tanks Specification

Tank Manufacturer	Duracrete
Tank Model	DC4500DC
Number of Tanks	2
Tank Volume	4.5 m³
Construction	Pre-Cast Concrete
Dimensions	Length: 2320 Width: 1500 mm Height: 1860 mm + 450 mm Risers
Access Risers (on each tank)	2 x 610 mm Dia x 450 mm high Fibreglass access risers
Access Lids (on each tank)	2 x 610 mm Dia fiberglass lid and bolts (model FL24g)

4.3 Primary Wastewater Treatment (STEP Tanks)

Wastewater from each facility will be collected in on-lot 25 m³ and 4.5 m³ pumped septic tanks, which is also referred to as a STEP tanks. This essentially is an onsite septic tank fitted with a specialist pumping assembly which shall pump liquid waste only to the communal treatment system via the liquid only effluent sewer network. The STEP tanks are allocated as per the table below.

Table 8 - STEP Tank allocation

Typology	Daily Demand (m^3)	STEP Tank Volume (m^3)	Number of Tanks
Villas	74.9	25	16 (1 tank per Cluster)
Staff + Visitors + Care + Clubhouse	11.05	25	2
Restaurant + Cafe	5.5	25	1
Health Spa	1.25	4.5	1

Each STEP tank will be fitted with the following Orenco components.

- 1 x Biotube Pump Vault
- 1 x Biotube Effluent Filter
- 1 x Discharge Hose & Valve Assembly,
- 1 x Float Tree
- 1 x PF (50Hz)300512 Orenco PF Series Pump,
- 1 x external Splice Box (SBEX)
- 1 x MVP Control Panel

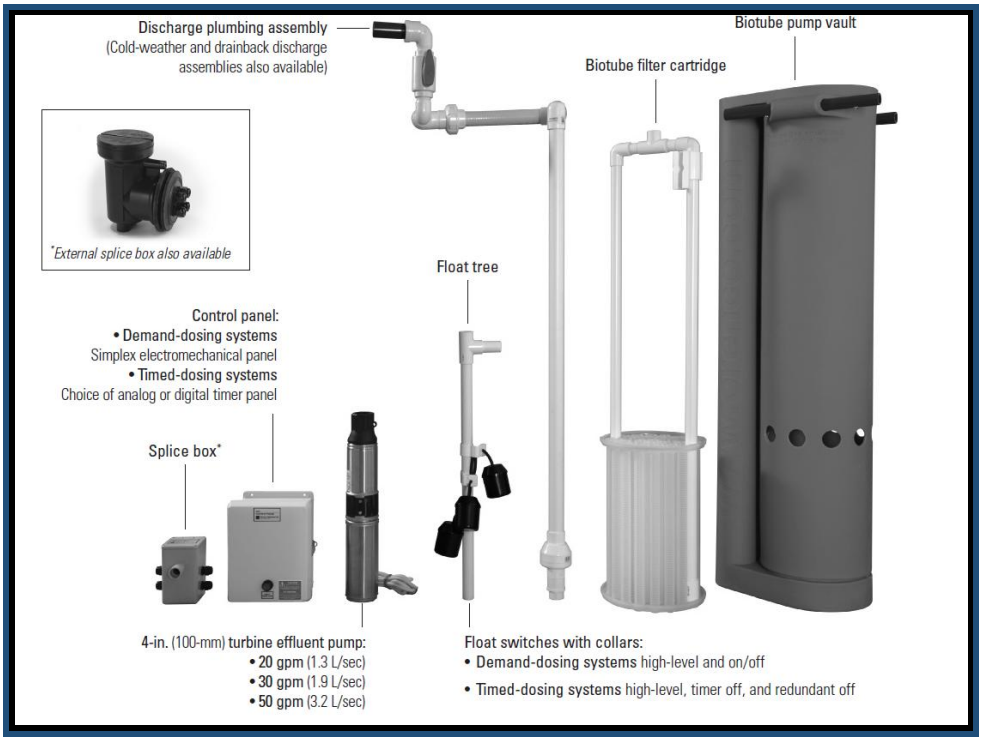


Figure 3 - Example of Septic Tank Pumping Kit

Table 9 - 25 m^3 STEP Tank Specification

Tank Manufacturer	Duracrete
Tank Model	DC25000SC
Number of Tanks	19
Tank Volume	25 m^3
Construction	Pre-Cast Concrete
Dimensions	Overall Diameter: 3730 mm Height: 2659 mm + 900mm Risers
Number of pumps per tank	1
Pump Model	PF (50Hz)300512
kW	0.37 kW
Voltage	230 V
Amperage	4.1 A
Hz	50 Hz
Operating Range	1.2-1.9 L/s
Flow Rate at TDH	approximately 1.2 L/sec @ 20 m
Outlet Diameter	32 mm
Motor Protection	IP68
Float Arrangement	High Level, Pump on/off, Low level/redundant off
Access Risers (on each tank)	2 x 610 mm Dia x 900 mm high Fibreglass access risers
Access Lids (on each tank)	2 x 610 mm Dia fiberglass lid and bolts (model FL24g)

Table 10 - 4.5 m^3 STEP Tank Specification

Tank Manufacturer	Duracrete
Tank Model	DC4500SC
Number of Tanks	1
Tank Volume	4.5 m^3
Construction	Pre-Cast Concrete
Dimensions	Length: 2320 mm Width: 1500 mm Height: 1860 mm + 900mm Risers
Number of pumps per tank	1
Pump Model	PF (50Hz)300512
kW	0.37 kW
Voltage	230 V
Amperage	4.1 A
Hz	50 Hz
Operating Range	1.2-1.9 L/s
Flow Rate at TDH	approximately 1.2 L/sec @ 20 m
Outlet Diameter	32 mm
Motor Protection	IP68
Float Arrangement	High Level, Pump on/off, Low level/redundant off
Access Risers (on each tank)	2 x 610 mm Dia x 900 mm high Fibreglass access risers
Access Lids (on each tank)	2 x 610 mm Dia fiberglass lid and bolts (model FL24g)

4.4 STEP Tank Pump-Out Intervals

The tanks have been designed to provide >3 days hydraulic retention time, which provides adequate retention for solid settlement and anaerobic digestion. The tanks will need to be pumped out periodically as sludge builds up in the tank.

All proposed STEP tanks will contain 24 hours emergency storage above the high-level alarm trigger level. In the event of pump or power failure emergency storage is provided to allow adequate time to rectify any fault. The pump and discharge assembly can be disconnected, and a new pump fitted within a few minutes by simply unscrewing a socket union and rewiring.

The STEP tanks and equipment are designed to be low maintenance. The pumps utilised are reliable, long-life, multi-stage turbine pumps. A control panel and float switches control the pump and automatically deal with high or low-level situations. The effluent filters are very low maintenance, having a large surface area.

Orenco outlet Biotube effluent filters have been specifically designed for its ability to remove total suspended solids to no greater than 30 mg/L. This also protects the downstream components of the wastewater treatment system in a consistent and predictable way.

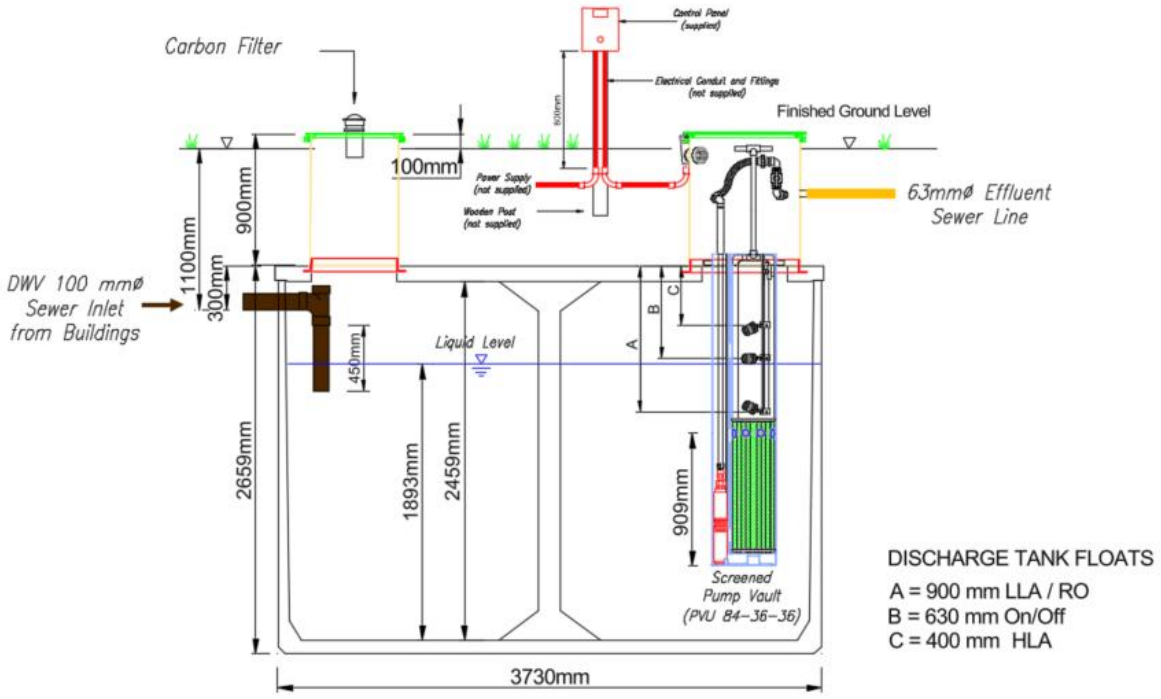


Figure 4 - Snapshot of Sectional View of 25 m3 STEP Tank

5.0 SECONDARY WASTEWATER TREATMENT

It is proposed to install an AdvanTex® recirculating textile packed bed reactor (rtPBR) wastewater treatment plant to provide advanced secondary treatment, shown in the schematic below. Recirculating packed bed reactors recognised as one of the most stable treatment processes available, able to produce a consistently high-quality effluent, even under fluctuating loads and wastewater strengths.

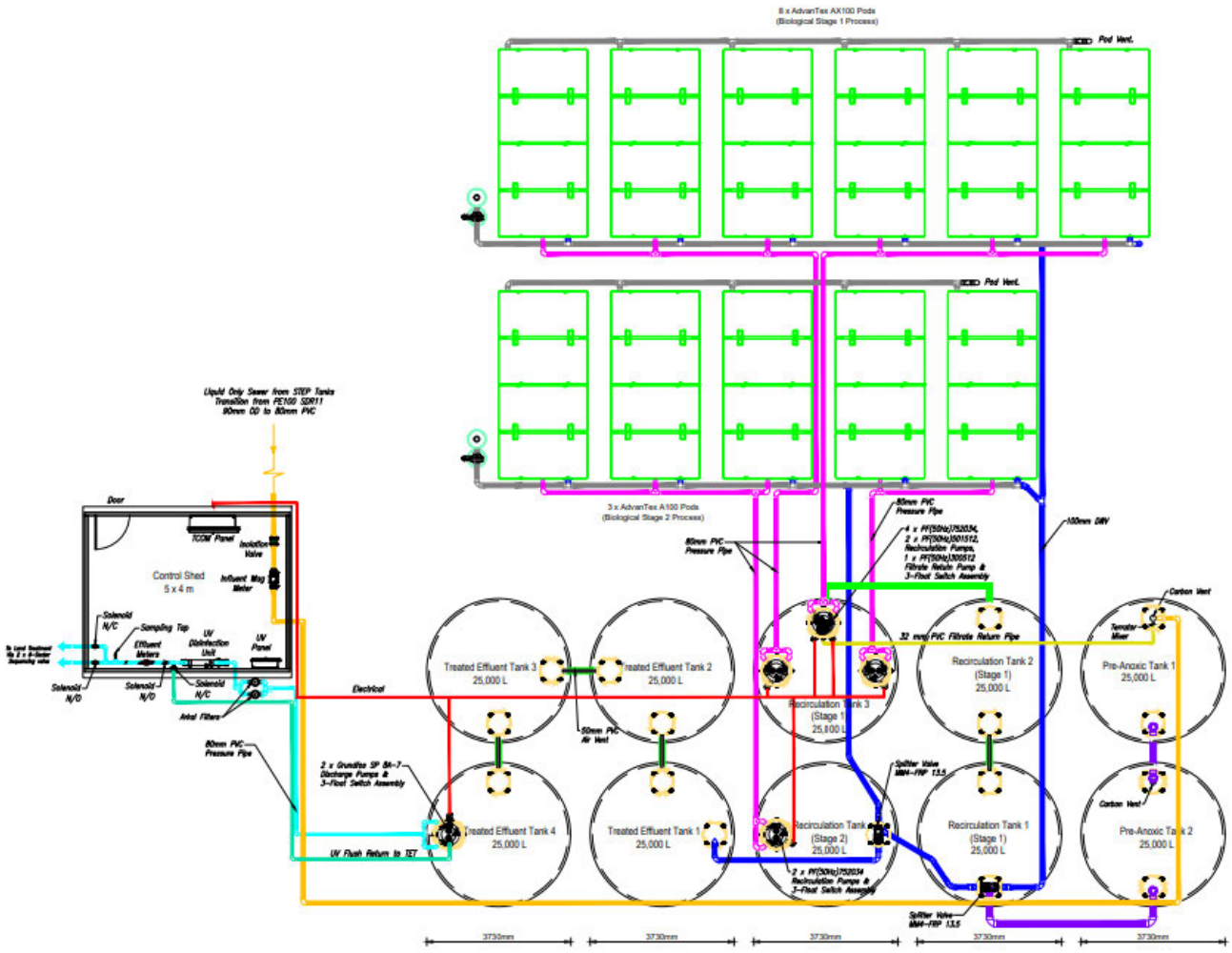


Figure 5- Snapshot of Proposed Wastewater Treatment Plant

5.1 Pre-Anoxic Tank

The proposed 2 x 25m³ pre-anoxic tanks receive both effluent from the STEP tanks as well as a portion of returned nitrified effluent that has passed through the packed bed reactor. The anoxic conditions within this tank provide a suitable environment for denitrification as well as diluting the influent stream.

Table 11- Pre- Anoxic Tank Specification Table

Tank Manufacturer	Duracrete
Number of Tanks	1
Tank Volume	25m³
Dimensions	Height: 2659 mm Diameter: 3730 mm
Hydraulic Retention Time @ Peak	>0.5 Day
Access Risers	4 x 610 mm Dia x 450 mm high Fibreglass access risers (Model: RF2418)
Access Lids	4 x 610 mm Dia fiberglass lids and bolts (model FL24g)

5.2 Recirculation Tank – Stage 1 and 2

4 x 25m³ recirculation tanks (3 for stage 1 and 1 for stage 2) are provided to dose the stage one and two AX100 packed bed reactors. These tanks are fitted with timer dosed pumps that pump a blend of effluent over the textile filters in the packed bed reactor in a timer controlled and flow equalised fashion. A recirculation splitter float valve assembly is also installed in these tanks to ensures that the optimal recycle ratio is always maintained, maximising treatment efficiency for a consistently high-quality effluent.

In this way, the recirculation tank ensures that the packed bed reactor receives a continuous source of oxygen and food during periods of little or no flow, ensuring that the micro-organisms are maintained at peak condition, ready to receive shock or varying that provide the necessary flow rates to dose the textile with effluent.

Table 12 - Recirculation Tanks (Stage 1 and 2) Specification Table

Tank Manufacturer	Duracrete
Number of Tanks	4 (3 for Stege 1, 1 for Stage 2)
Tank Volume	25 m³
Dimensions	Height: 2659 mm Diameter: 3730mm
Hydraulic Retention Time @ Peak	>1 day
Pump Manufacturer	Orenco
Number of Pumps (Stage 1)	4
Recirc Pump Model (Stage 1)	PF (50Hz)752034
kW	1.49kW
Voltage	380 V
Amperage	4.0 A
Hz	50 Hz
Operating Range	3.2-6 L/s
Flow Rate at TDH	approximately 4.6 L/sec @ 16 m
Outlet Diameter	50 mm
Motor Protection	IP68
Float Arrangement	High Level, Timer Override, Low level/redundant off
Number of Pumps (Stage 1)	2
Recirc Pump Model (Stage 1)	PF (50Hz)501512
kW	1.12kW
Voltage	230 V

Amperage	7.1 A
Hz	50 Hz
Operating Range	1.0-4.0 L/s
Flow Rate at TDH	approximately 3.0 L/sec @ 15 m
Outlet Diameter	50 mm
Motor Protection	IP68
Float Arrangement	High Level, Timer Override, Low level/redundant off
Number of Pumps (Stage 2)	2
Recirc Pump Model (Stage 2)	PF (50Hz)752034
kW	1.49kW
Voltage	380 V
Amperage	4.0 A
Hz	50 Hz
Operating Range	3.2-6 L/s
Flow Rate at TDH	approximately 4.6 L/sec @ 16 m
Outlet Diameter	50 mm
Motor Protection	IP68
Float Arrangement	High Level, Timer Override, Low level/redundant off
Number of Pumps	1
Filtrate Return Pump Model	PF (50Hz)300512
kW	0.37 kW
Voltage	230 V
Amperage	4.1 A
Hz	50 Hz
Operating Range	0.3-0.7 L/s
Flow Rate at TDH	approximately 1.9 L/sec @ 20 m
Outlet Diameter	25 mm
Motor Protection	IP68
Access Risers	Stage 1 Tanks: 4 x 610mm Dia x 450mm high fiberglass access risers (Model: RF2418) 3 x 760mm Dia x 450mm high fiberglass access risers (Model: RF3018) Stage 2 Tank: 1 x 610mm Dia x 450mm high fiberglass access riser (Model: RF2418) 1 x 760mm Dia x 450mm high fiberglass access riser (Model: RF3018)
Access Lids	Stage 1 Tanks: 4 x 610 mm Dia fiberglass lid and bolts (model FL24g) 3 x 760 mm Dia fiberglass lid and bolts (model FL30g) Stage 2 Tank: 1 x 610 mm Dia fiberglass lid and bolts (model FL24g) 1 x 760 mm Dia fiberglass lid and bolts (model FL30g)

5.3 AdvanTex® Recirculation Textile Packed Bed Reactor – Stage 1 and 2

11 x AdvanTex AX100 packed bed reactor pods (8 for the first stage and 3 for the second stage) are proposed to provide aerated biological treatment of wastewater. In total, these pods provide approximately 110 m² or 1100 sqft of textile. The textile is loaded in the following manner. The first stage process provides treatment to a standard secondary level (effluent $cBOD_5$ <20 mg/L and TSS <30 mg/L). The second stage of the system

provides another layer of treatment and is expected to treat effluent to an advanced secondary level (that is <15mg/L of both parameters respectively).

The AdvanTex rtPBR is essentially a bed of highly specialised textile nestled in a pre-made pod to which the effluent is uniformly dosed through a pressure distribution system using a timer-controlled dosing regimen. These small precise doses at multiple point sources across the reactor bed ensure thin film application of the effluent maximising retention times within the reactor for renovation.

This unique complex fibre structure of the textile media has an immense surface area for biomass colonization, (up to 5 times greater than sand) and a much greater void space (~3 times higher than sand) to ensure free flow of oxygen through the media interstices. Its high field moisture capacity ensures long, intimate, contact times of the wastewater with the biomass for almost complete renovation.

Figure 6 - Example of AX100 installation

Table 13- AX100 Pod (Stage 1 and 2) Specification Table

Manufacturer	Orenco Systems Inc.
Model	AdvanTex AX100
Textile Surface Area per Pod	9.6 m²
Number of Pods	11 (8 for stage 1 and 3 for stage 2)
Number of Spray Nozzles per Pod	8
Ventilation Fan Model	CF1818
Number of Fans	2
Phase	Single
Voltage	230V
Amperage	1.8A
Hz	50Hz
Operation	Continuous
Air Flowrate	5.8 m³/min
RPM	2900/min

Maximum Power Consumption	0.06 kW
Activated Carbon	Granular cracked carbon

5.4 Fresh Air Ventilation

Each unit contains a fresh air inlet point, designed to allow air ventilation throughout the hanging textile. Venting each pod involves drawing fresh air through the inlet at the end of each pod, through the textile sheets, and out through an activated carbon filter/fan. The fan used to circulate the fresh air is a small 110 watt "ducting type" fans, designed for continuous operation.

To maintain a steady state in each pod, the fan will operate continuously. It should be noted that the fan is not designed to provide an artificially high population of microbes inside the AdvanTex® pods. Since the fan is small, the airflow is only slight and simply required to prevent stagnant conditions. The carbon filter, ventilation fan and heater will be housed inside a green fibreglass enclosure installed at the same height as the AdvanTex® pods.

Odours do not generally permeate from an rtPBR unless there is a serious issue. To help control and scrub any air that is forced out of the plant, carbon filters are included on access lids to allow the balancing and diffusion of air as water levels rise and fall within the tanks.

5.5 Treated Effluent Storage Tank

Treated effluent from the wastewater treatment plant will be collected and stored in 4 x 25m³ treated effluent storage tanks. Two pumps will be fitted in this tank which is suitably sized for the land application field (specifications below). A pulse effluent flow water meter, two Arkal filters and a UV unit will be installed in the pumped outlet of the tank.

Table 14 - Treated Effluent Tank Specification Table

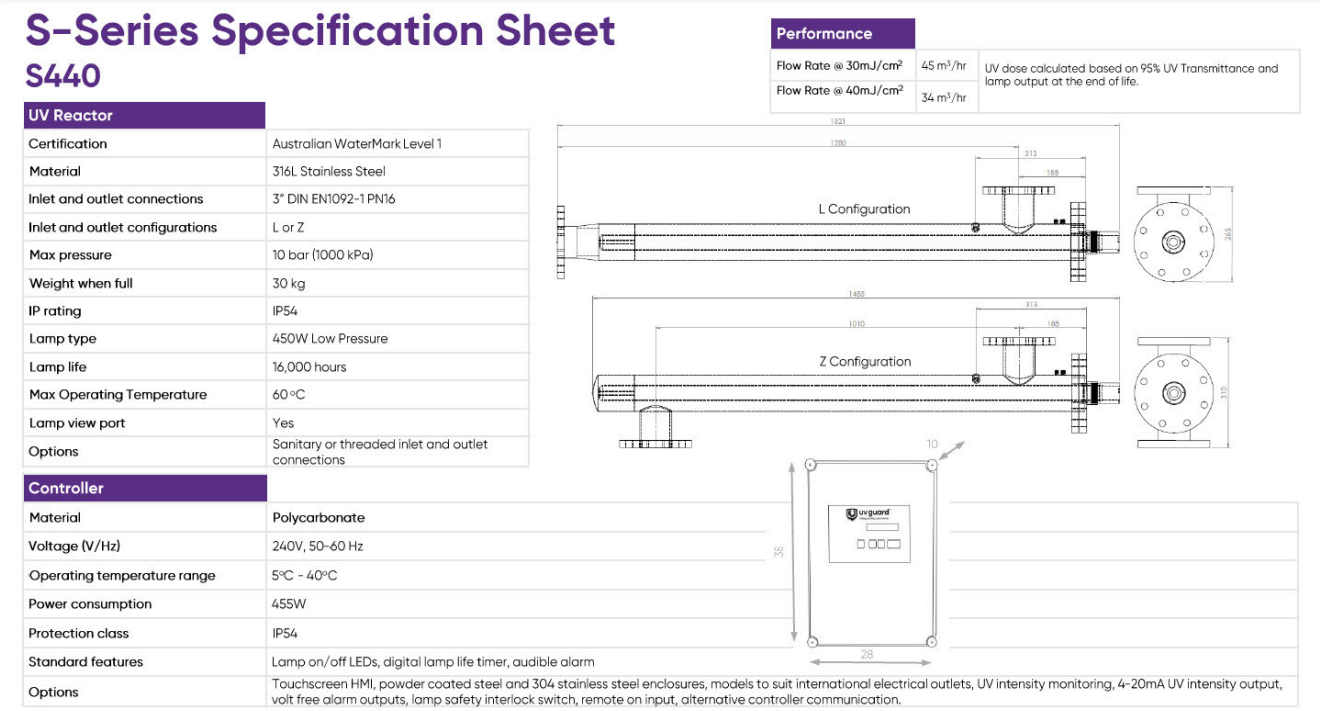
Tank Manufacturer	Duracrete
Number of Tanks	4
Tank Volume	25m³
Dimensions	Height: 2659 mm Diameter: 3730mm
Hydraulic Retention Time @ Peak	>1 day
Number of Pumps	2
Pump Model	Grundfos SP 8A-7
kW	1.1kW
Voltage	240 V
Amperage	7.1 A
Hz	50 Hz
Operating Range	0.36-3.17 L/s
Flow rate @ TDH	approximately 2.9 L/sec @ 20 m
Outlet Diameter	50 mm
Motor Protection	IP68

Access Risers	7 x 610 mm Dia x 450 mm high fiberglass access risers (Model: RF2418) 1 x 760 mm Dia x 450 mm high fiberglass access risers (Model: RF3018)
Access Lids	7 x 610 mm Dia fiberglass lid and bolts (model FL24g) 1 x 760 mm Dia fiberglass lid and bolts (model FL30g)

6.0 TERTIARY TREATMENT

6.1 UV Disinfection

A UV disinfection system has been proposed to provide an additional layer of treatment. We propose to supply and install a single UV Guard S440 disinfection unit. Details of this system is listed below.



S-Series Specification Sheet

S440

Performance		
Flow Rate @ 30mJ/cm²	45 m³/hr	UV dose calculated based on 95% UV Transmittance and lamp output at the end of life.
Flow Rate @ 40mJ/cm²	34 m³/hr	

UV Reactor	
Certification	Australian WaterMark Level 1
Material	316L Stainless Steel
Inlet and outlet connections	3" DIN EN1092-1 PN16
Inlet and outlet configurations	L or Z
Max pressure	10 bar (1000 kPa)
Weight when full	30 kg
IP rating	IP54
Lamp type	450W Low Pressure
Lamp life	16,000 hours
Max Operating Temperature	60 °C
Lamp view port	Yes
Options	Sanitary or threaded inlet and outlet connections

L Configuration

Z Configuration

Controller	
Material	Polycarbonate
Voltage (V/Hz)	240V, 50-60 Hz
Operating temperature range	5°C - 40°C
Power consumption	455W
Protection class	IP54
Standard features	Lamp on/off LEDs, digital lamp life timer, audible alarm
Options	Touchscreen HMI, powder coated steel and 304 stainless steel enclosures, models to suit international electrical outlets, UV intensity monitoring, 4-20mA UV intensity output, volt free alarm outputs, lamp safety interlock switch, remote on input, alternative controller communication.

Figure 7- Specification of proposed UV disinfection unit

UV energy, predominantly at 254 nm wavelength has the unique ability to destroy most micro-organisms that are exposed to this light. The ultraviolet rays penetrate the outer membrane of the bacteria, virus, yeast, mould, or algae and destroys the D.N.A that allow the organism to replicate. There is no possibility of receiving water contamination due to overdosing and it is not affected by pH changes.

7.0 CONTROLS AND TELEMETRY

7.1 TCOM Control Panel

A TCOM control panel will be supplied to control the wastewater treatment plant. The control panel attends the functions and requirements of the specific wastewater Treatment Plant.

Moreover, this panel controls general operations of the plant such as pump run times, fan run, water meter readings and monitoring of sensors. The panel also allows for automatic call-out to pagers, SMS via Cell phone and/or emails during alarm conditions or when the panel detects trends that could lead to system failure. It can maintain logs for system conditions and events, such as Pump Run Time, Pump Cycles, and Alarm Conditions and Downloadable logs into a *. dive or ASCII format for simple conversion to common spreadsheet or word processor programs. Please refer to attachments for samples of reports that can be generated through Hyper Terminal and downloaded to a spreadsheet program.

The Control panel can be set to run in three options- Manual, off or Automatic. In Automatic, the programmed settings control the on/off time of the nominated pump. Set to off, it will turn off the nominated pump, or set in manual, it will allow the nominated pump to run whilst the manual switch is engaged.

7.2 Networking Protocols

Ethernet (permits peer-to-peer communications, up to 16 peers)

- Modbus (permits our controller to serve as master or slave)
  a. When “master,” permits connection to off-the-shelf Non-proprietary devices that support Modbus protocols. Can control and monitor up to 32 slaves.
  b. When “slave,” permits connection to and communication with Modbus masters.

An IBM compatible interface is standard and Item™ or hyper terminal will interface with the panel enabling the backup for programming and data downloads.

7.3 Telemetry

Telemetry is a technology that allows the remote measurement and reporting of information. Innoflow Technologies NZ Limited provides its telemetry through Digital Telemetry, who are a company specialising in the provision of wireless telemetry services for your remote equipment. They connect to our remote, unattended equipment wirelessly using proven Siemens wireless controllers and modems connected to their network of management servers, through which customers can securely access their equipment using RS232/serial, digital I/O, analogue input or current loop (4-20mA) from any Internet connection in the world.

8.0 LAND TREATMENT AREA

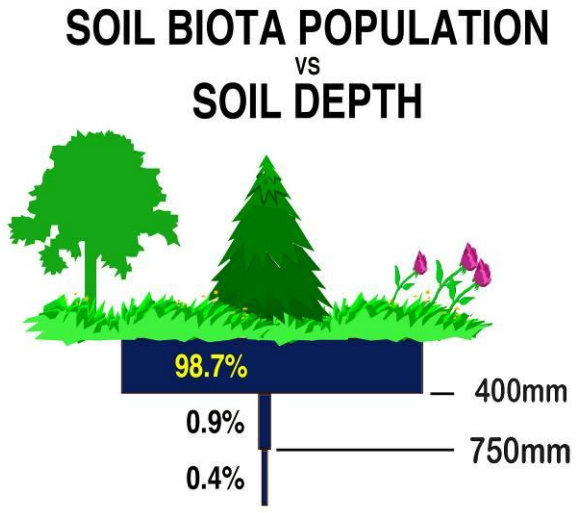
Soil assessments and categorisations have been conducted by others. Based on the provided information, it is proposed to irrigate highly treated effluent to 30,900 m² of pressure compensating drip irrigation lines, as summarised in the figure below.

The effluent from the AdvanTex® packed bed reactor system is treated to an enhanced secondary level and has quite different properties and environmental effects compared to wastewater which has received primary (STEP tank) treatment only. Specifically, whereas application of septic tank effluent to the ground will result in long-term clogging of the soil, application of the highly treated packed bed reactor effluent will produce no reduction in soakage capacity of the soil even in the long-term.

Design Parameters:

Qpeak	=	92,700 LPD
Soil Loading Rate	=	3 mm/day
Land Treatment Area	=	30,900 m²
Number of Zones	=	2 (6 sectors each)
Number of Sectors	=	12
Sector Sequencing	=	Sequencing Valves
Sector Size	=	2575 m²
Emitter flow rate	=	1.6 L/hr
Emitter spacing	=	0.5 m
Dripline spacing	=	1.0 m
Sector flow rate	=	8240 L/hr
Pump Duty	=	2.28 L/sec @ 20 m TDH

Figure 8 - Land Application Design Specification



This method of dispersal offers a unique flexibility allowing installation in areas of least value, such as median strips, road verges, landscaped areas, or steep hillside slopes.

The use of drip irrigation within the “A” soil horizon maximises the potential for Evapo-transpiration in addition to ground soakage. The growth of the plants in the area will be promoted with the application of water and nutrients. The application of the treated effluent directly into the biologically active topsoil layer ensures that complete treatment of the effluent occurs. The effluent from the treatment plant is collected and buffered in a treated effluent tank and then pumped to the dispersal area under timer control. The effluent is dispersed in a series of irrigation lines laid below the ground

throughout the dispersal area installed on a 1m x 0.5m grid. TNL valves and air release valves must be installed at appropriate points in the system.

A manual flushing valve is fitted to the end of each drip line. The end of each line should be marked with either stakes or valve boxes for easy location during maintenance. The disposal system will be sectored so that reliable, low-power turbine pumps can be utilised to pressurise the disposal network and utilisation of sector areas will be rotated.

Final polishing of the effluent and natural nutrient removal occurs as the effluent is utilised by plants or soaks in to the ground. It is proposed to discharge highly treated effluent to a multi-sector land application system comprising pressure compensating drip irrigation lines – laid on the surface, planted and spaced at approximately 1 metre centres with a soil loading rate of 3 mm/day.

The advantages of the irrigation system are:

- Low areal loading rates to minimise the potential for ground saturation.
- Sectored distribution and small frequent even distribution.
- Evapo-transpiration is maximised.
- Final renovation through the soil is maximised by use of large areas for better assimilation by soil, bacteria and vegetation.
- Ideally suited over uneven terrain.
- It is cost effective, reliable and very low maintenance.

8.1 Header Pipe

Treated effluent pumped from the treatment plant will convey to the land application system via a buried 63 mm OD MDPE pipe. The pipe proposed will be rated to a maximum operating pressure of 9.0 bar. The pipe will be laid in a chain trenched or excavated trench at a minimum depth of 600 mm. The pipe will be bedded with the material excavated from the trench.

8.2 Sequencing Valves

Distribution to the land application system will be achieved through one of Orenco's automatic sequencing valve assemblies. Two 6-Sector Sequencing valves are proposed here. These valves are useful for distributing effluent to multiple zones to simplify the design and installation of the distribution system and reduce ongoing operating costs.

The valve itself has only a few moving parts, requires no electricity, and alternates automatically with each cycle. The sequencing valves operate on a hydraulic cam system. As water pressure is applied to the cam it lifts and remains open, dosing only one sector, as the pressure drops once the pump stops, the cam rotates and closes ready to dose the next sector in the sequence.

The sequencing valve will be installed at the highest point of the land application system to avoid any back pressure disturbing the cam operation.

To minimise the visual impact and to protect the valve, the entire assembly will be enclosed within a PVC access riser and covered with a fibreglass lid.

8.3 Manifold Lines

It is proposed to install 50 mm MDPE manifold pipes to distribute the effluent from the sequencing valve to each treatment sector. The pipe proposed will be rated to a maximum operating pressure of 9.0 bar. The pipe will be laid in an excavated trench at a minimum depth of 300 mm. The pipe will be bedded with the material excavated from the trench.

Figure 9 - Example of Surface laid manifold pipe and drip lines. Tapping Barb (Upper insert) and Tube Non-Leakage Valve (Lower insert)

8.4 Tube Non-Leakage Valves

Tube Non-Leakage Valves (TNL) will be installed at the beginning of each drip line lateral. These in-line valves have a self-locking mechanism to prevent the upper drip lines and manifold pipes from draining into the lower lines when the pump stops, and pressure drops.

- Closing Pressure - 0.4 bar
- Operating Pressure - 1.0 bar
- Check Valve - 0.3 bar

8.5 Pressure Compensating Drip Line

Netafim pressure compensating drip irrigation lines will be used to evenly distribute effluent over the entire land application area. The drip line proposed is Netafim Bioline with a drip emitter every 500 mm designed to consistently discharge 1.6 litres per hour. These emitters are pressure compensating up to 35 m, which means the entire sector must be pressurised before any discharge and when discharge occurs, all emitters discharge together.

Figure 10 - Example of Installation of surface laid drip irrigation fields

8.6 Manual Flushing Valves and Boxes

Flushing taps will be fitted to the terminal ends of all laterals and marked with a durable valve box. The taps are used to manually flush any build-up inside the pipe on an annual basis in accordance with the manufacturer's instructions.

9.0 OPERATION AND MAINTENANCE

Maintenance of key components shall be carried out every three months. It is proposed to engage S3 Limited, a wholly owned subsidiary of Innoflow Technologies Limited, to carry out the required maintenance. Emergency call outs shall be carried out shall be handled by S3. Sample collection, packaging, and submission to the laboratory shall be carried out by the local environmental sampling agency, if required. It is expected that grounds maintenance shall be carried out by others. Below is a table showing the required checks at each service.

Table 15- Operations and Maintenance Tasks

Component	Maintenance Frequency
Grease Traps	
Inspect tank levels and integrity	1 x per 1.5-2 years
Measure and Log Biomass/Grease Level in Septic Tank	1 x per 1.5-2 years
Recommend Removal Accumulated Biomass/Grease	1 x per 1.5-2 years
STEP Tanks/Pre Anoxic Tanks	
Inspect tank levels and integrity	1 x per 1.5-2 years
Inspect and Clean Tank Biotube Vault & clean if required (Septic Tanks)	1 x per 1.5-2 years
Measure and Log Biomass/Grease Level in Septic Tank	1 x per 1.5-2 years
Recommend Removal Accumulated Biomass/Grease	1 x per 1.5-2 years
Visually inspect operation of odour control	1 x per 1.5-2 years
Complete sludge/scum testing of each tank	1 x per 3 months
Check operation & clean all pumps	1 x per 3 months
Clean & check operation of all control floats	1 x per 3 months
Check outlet pipe works to downstream components	1 x per 3 months
Recirculation Tank & AdvanTex recirculating textile packed bed reactor	
Inspect flow pattern of pod spray nozzles	1 x per 3 months
Inspect integrity of pod lids/lid hardware	1 x per 3 months
Flush pod distribution laterals	1 x per 3 months
Complete sludge/scum testing of each tank	1 x per 3 months
Check operation & clean all pumps	1 x per 3 months
Clean & check operation of all control floats	1 x per 3 months
Check operation of fan & ventilation systems (vents etc.)	1 x per 3 months
Check splitter valve operation	1 x per 3 months
Verify timer operation settings (advise from Innoflow engineer)	1 x per 3 months
Check outlet pipe works to downstream components	1 x per 3 months
Treated effluent tank & water meter	
Inspect tank levels and integrity including access risers etc.	1 x per 3 months

Inspect and clean treated effluent tank floats and alarms	1 x per 3 months
Inspect and clean treated effluent tank pump	1 x per 3 months
Measure and log biomass level in treated effluent tank	1 x per 3 months
Ensure water meter operation, ensure pulse signals to TCOM panel	1 x per 3 months
Ultraviolet Disinfection Unit	
Wipe down lamps with acidic solution (as per manufacturer requirement)	1 x per 3 months
Inspect and confirm operation of lamps and controls	1 x per 3 months
Replace bulbs	1 x per 1 year
Ensure water meter operation, ensure pulse signals to TCOM panel	1 x per 3 months
Check enclosure integrity & for any moisture	1 x per 3 months
Visually check all electrical components for signs of fatigue or failure (burning/melting etc)	1 x per 3 months
Ensure communications	1 x per 3 months
Land Application system	
Inspect, clean & assure operation of sequencing valves	1 x per 6 months
Flush distribution laterals	Annually
Assess wastewater irrigation fields for any obvious leaks	Annually
Reporting	
Forward maintenance inspection summary to client	1 x per 3 months

10.0 COMPONENT LIFE EXPECTANCY

Table 16- Component Life Expectancy

Recirculating packed bed reactor textile filters	>50 years
Recirculating packed bed reactor pod	>50 years
Concrete tanks	>50 years
Recirculating packed bed reactor pod lids	>35 years
Recirculation tank splitter valve	>25 years
Orenco systems inc. STEP Tank pumps	>25 years
Control panel mother board	>25 years
Biotube effluent filter	>25 years
Recirculating packed bed reactor pod lid struts	>20 years
Pvc and pe pipework and fittings	>20 years
Pump discharge assemblies	>20 years
Pulse water meters	>20 years
Control panel	>20 years
Orenco systems inc. Treated effluent pumps	>15 years
General electrical components	>15 years
Pvc access riser and fibreglass lids	>10 years
Orenco systems inc. Recirculation pumps	>10 years
Float switches	>10 years
Active carbon fan vents	> 5 years

Proposed Wastewater Treatment Scheme

Matakana Country Club

Reference No.5301

Drawing List

No.	Drawing Title
	Site Plan
00	Cover Page
01	Site Plan (TBC)
	Wastewater Treatment Plant
02	Grease Trap Detail
03	25,000L STEP Tank Detail
04	2 x 25,000L STEP Tank Detail
05	4,500L STEP Tank Detail
06	Reticulation Plan
10	WWTP Plan
11	WWTP Cross Section
12	Land Application Area - Typical Detail

Daily Design Flow :

Input Design Parameters		
Qaverage	m³	**69.5**
Qpeak	m³	**92.7**
Villas		
Occupancy	People	374.4
Flow Allowance	L/Person/Day	200
Number of Dwellings		208
Café		
Occupancy	People	100
Flow Allowance	L/Person/Day	25
Resturant		
Occupancy	People	100
Flow Allowance	L/Person/Day	30
Clubhouse		
Occupancy	People	50
Flow Allowance	L/Person/Day	30
Spa Patrons		
Occupancy	People	50
Flow Allowance	L/Person/Day	25
Care Rooms		
Occupancy	People	30
Flow Allowance	L/Person/Day	220
Staff		
Occupancy	People	50
Flow Allowance	L/Person/Day	50
Visitors		
Occupancy	People	30
Flow Allowance	L/Person/Day	15

Design Basis

Makatana Country Club is located is located at 120 Tongue Farm Road, Matakana. The wastewater system shall comprise concrete STEP Tanks and a Liquid Only Sewer to an AdvanTex WWTP. Treated effluent shall be irrigated to a subsurface dripline system. All wastewater shall be domestic in nature derived from the 16 clusters of Villas and other facilities.

System Description:

Reticulation & Primary Treatment

Collection System	= Liquid Only Sewer (63-90mm OD)
Grease Trap	= 2 x 4,500 L Dual Chamber
Primary Treatment	= 19 x 25,000 L STEP Tanks
	= 1 x 4,500L STEP Tank

Biological Stage 1

Pre-Anoxic Zone	= 2 x 25,000 L Pre-Anoxic Tanks
Secondary Treatment	= 3 x 25,000 L Recirculation Tank
AdvanTex	= AX800 Packed Bed Filters

Biological Stage 2

Secondary Treatment	= 1 x 25,000 L Recirculation Tank
AdvanTex	= AX300 Packed Bed Filters
Treated Effluent Tank	= 4 x 25,000 L Irrigation Tank
Tertiary Treatment	= UV Disinfection
Land Treatment	= Subsurface Dripline (30,900 m²)
Control Panel	= TCOM (Telemetry)

Maximum Influent Strength:

Raw Influent Strength		
BOD_5	mg/L	**423**
TSS	mg/L	**473**
TKN	mg/L	**66**
NH_3	mg/L	**39**
TP	mg/L	**16**
Alkalinity as $CaCO_3$	mg/L	-

Treatment Limits:

Final Effluent Quality		
	(less than)	
$cBOD_5$	mg/L	15
TSS	mg/L	15
TN	kgN/Ha/Yr	-
NH_3	mg/L	-
TP	mg/L	-
FC	cfu/100 mL	200

Mains Power Supply:

380 VAC
Three Phase
50 Hz
Note: Mains Power by others.

Project Notes

1. An Operation & Maintenance Manual is to be provided by Innoflow.
2. All property/user occupants are to follow the operation and Maintenence/Homeowner Manual recommendations
3. Innoflow assume incoming wastes will not contain high concentrations of toxic substances that may adversely affect the performance of the biological processes required for the system to operate, these typically include but are not limited to:
   - Chlorine (pool and spa pool overflow)
   - Waste Dairy Products
   - Quaternary Ammonium Compounds (disinfectants, cleaning products)
   - Formaldehyde (disinfectant, chemical toilet treatment)
   - Dichlorobenzene (urinal tablets, sanitisers)
   - Petrochemicals (waste oil, diesel, turpentine etc)
   - Pharmaceuticals (drugs and or medicines)
4. In addition to the above, Water softener brine discharge is strongly prohibited from being discharged into the AdvanTex advanced treatment system. Failure to adhere to this policy will void manufacturers warranty.
5. All installations are to follow manufacturer's instructions and recommendations for tank installation and/or watertight testing.
6. Once a facility is placed into operation, the flows and waste strengths to the facility should be monitored. If flow or any of the influent waste strengths exceed those listed in the design parameters, measures should be taken to reduce these parameters to those listed on the plan set. Otherwise additional treatment capacity and plant expansion will be necessary.

Recommended RecirculationTimer Settings:

Recirc ratio 4:1 Qave, 4:1 Qpeak (Stage 1)

PF(50Hz)752034 Pumps	*PF(50Hz)501512 Pumps*
R ON: 1.5 min	R ON: 1.5 min
R OFF: 9.04 min	R OFF: 9.04 min
R Ovr ON: 1.5 min	R Ovr ON: 1.5 min
R Ovr OFF: 6.40 min	R Ovr OFF: 6.40 min

Recirc ratio 2:1 Qave, 2:1 Qpeak (Stage 2)
R ON: 1.5 min
R OFF: 5.09 min
R Ovr ON: 1.5 min
R Ovr OFF: 3.44 min

Recommended Filtrate Return Timer Settings:

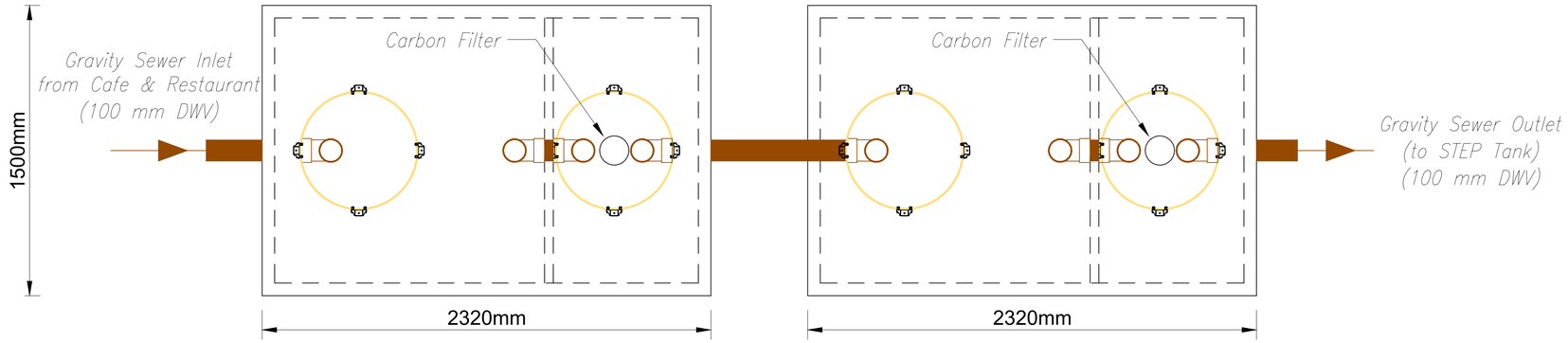
FR ON: 5.00 min
FR OFF: 6.76 min

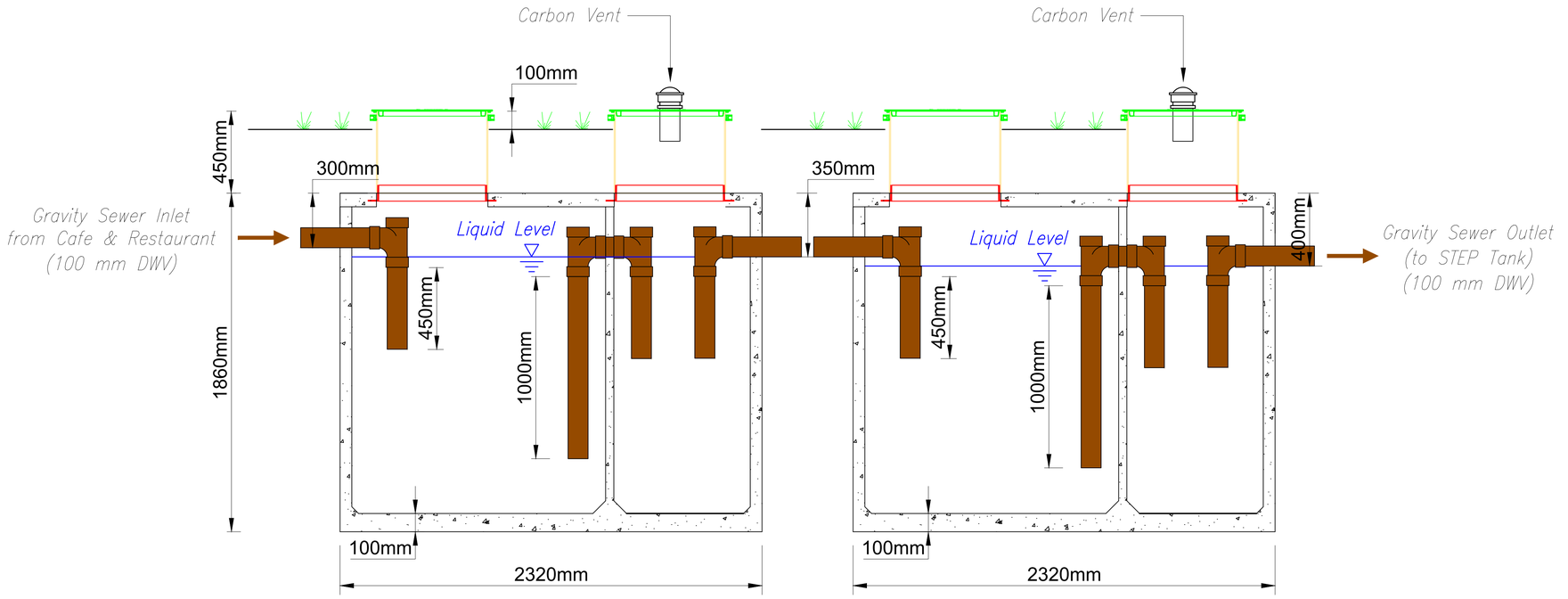
Recommended TET Timer Settings:

TET ON: 15 min
TET OFF: 30 min
TET Ovr ON: 20 min
TET Ovr OFF: 10min

8th October 2025

NOT FOR CONSTRUCTION





Dual Chamber Grease Trap
4,500 L

Dual Chamber Grease Trap
4,500 L

LEGEND:

- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (Low Level)
- Tank Inter-connection (High Level)
- UV Flush

SCALE BAR 1:15

REV.	DESCRIPTION	DATE
A	Grease Trap Detail	19/09/2025

DATE: 19th Sep 2025
SCALE: 1 : 15 (A1)

APPROVED
CHECKED
DESIGNED
STATUS: Design

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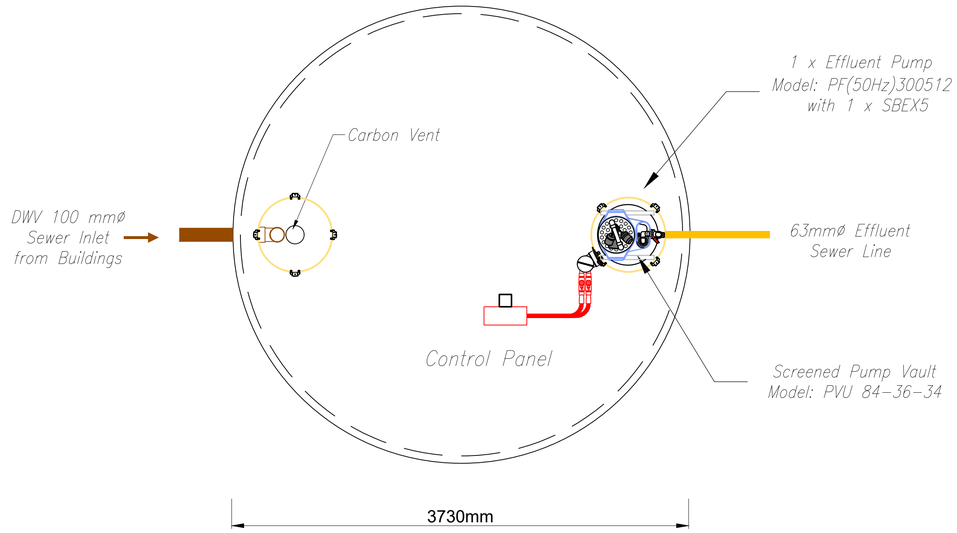
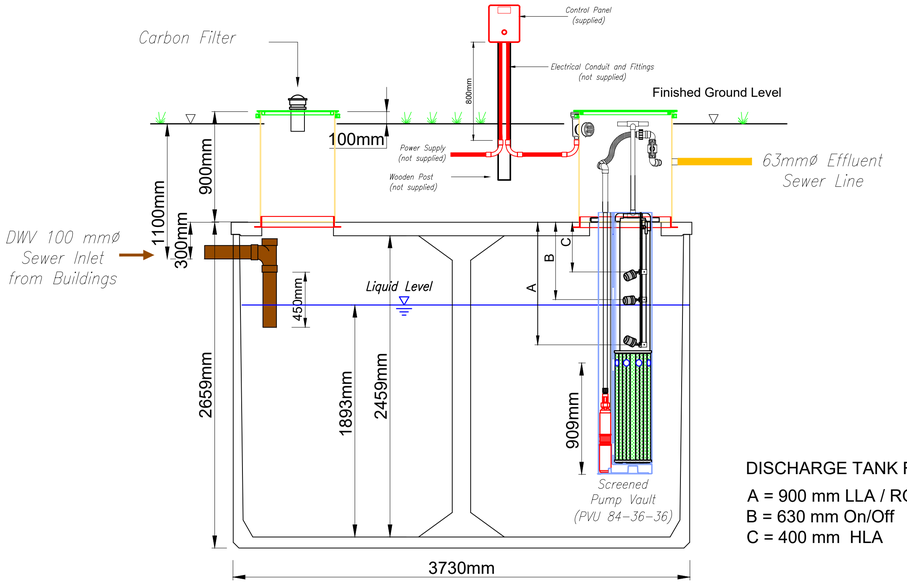
CLIENT: Sanderson Group

PROJECT: MATAKANA COUNTRY CLUB
DRAWING No.: 5301-02
TITLE: Grease Trap Detail (Restaurant + Cafe)
REVISION: A

NOT FOR CONSTRUCTION



STEP Tank 25,000 L
(1 of 17 Tanks)



STEP Tank (25,000 L)
(1 of 17 Tanks)

DISCHARGE TANK FLOATS

A = 900 mm LLA / RO
B = 630 mm On/Off
C = 400 mm HLA

LEGEND:

- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (Low Level)
- Tank Inter-connection (High Level)
- UV Flush

0 1 2 3 4 5

SCALE BAR 1:25

REV.	DESCRIPTION	DATE
B	Nbr of tanks increased to 19	08/10/2025

DATE: 8th October 2025
SCALE: 1 : 25 (A1)
STATUS: Design

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CHECKED
DESIGNED

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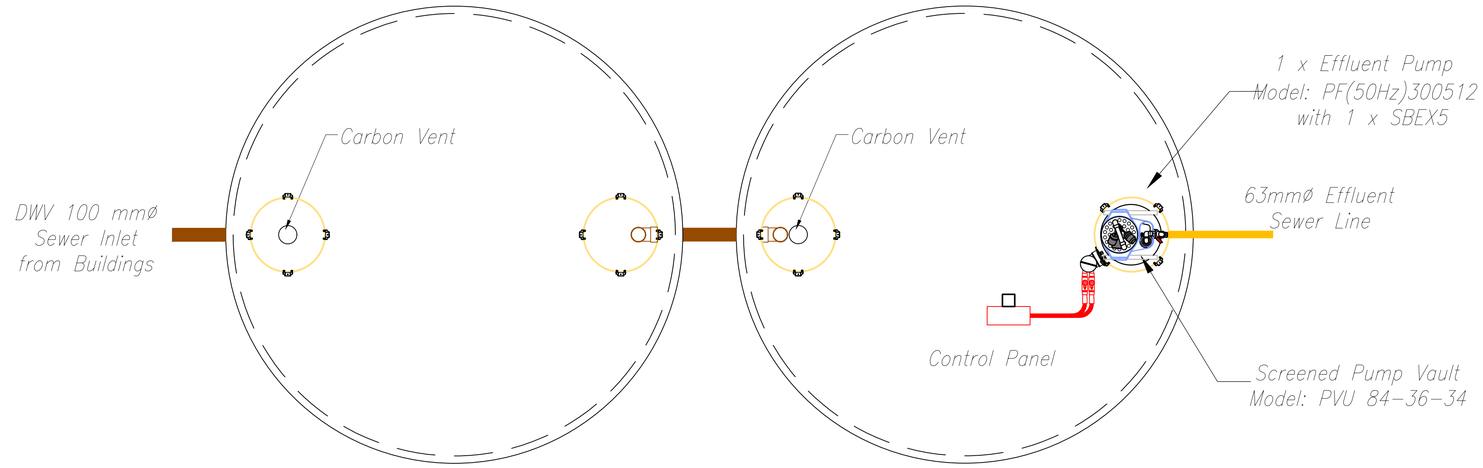
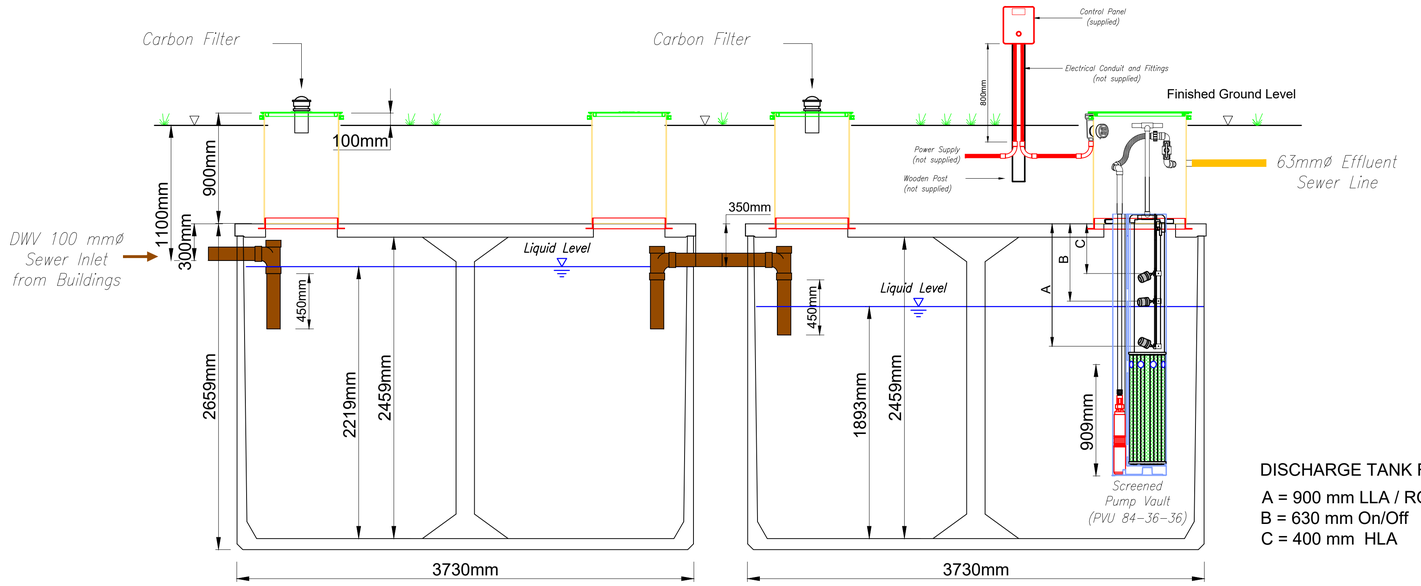
CLIENT: Sanderson Group

PROJECT: MATAKANA COUNTRY CLUB
TITLE: 25,000L STEP Tank Detail
DRAWING No.: 5301-03
REVISION: B

NOT FOR CONSTRUCTION



2 x 25,000L STEP Tanks



STEP Tanks (2 x 25,000 L)

DISCHARGE TANK FLOATS

A = 900 mm LLA / RO
B = 630 mm On/Off
C = 400 mm HLA

LEGEND:

- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (Low Level)
- Tank Inter-connection (High Level)
- UV Flush

0 1 2 3 4 5

SCALE BAR 1:25

REV.	DESCRIPTION	DATE
A	2 x 25,000L STEP Tanks	08/10/2025

DATE 8th October 2025

SCALE 1 : 25 (A1)

APPROVED		
CHECKED		
DESIGNED		

STATUS Design

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CLIENT Sanderson GROUP

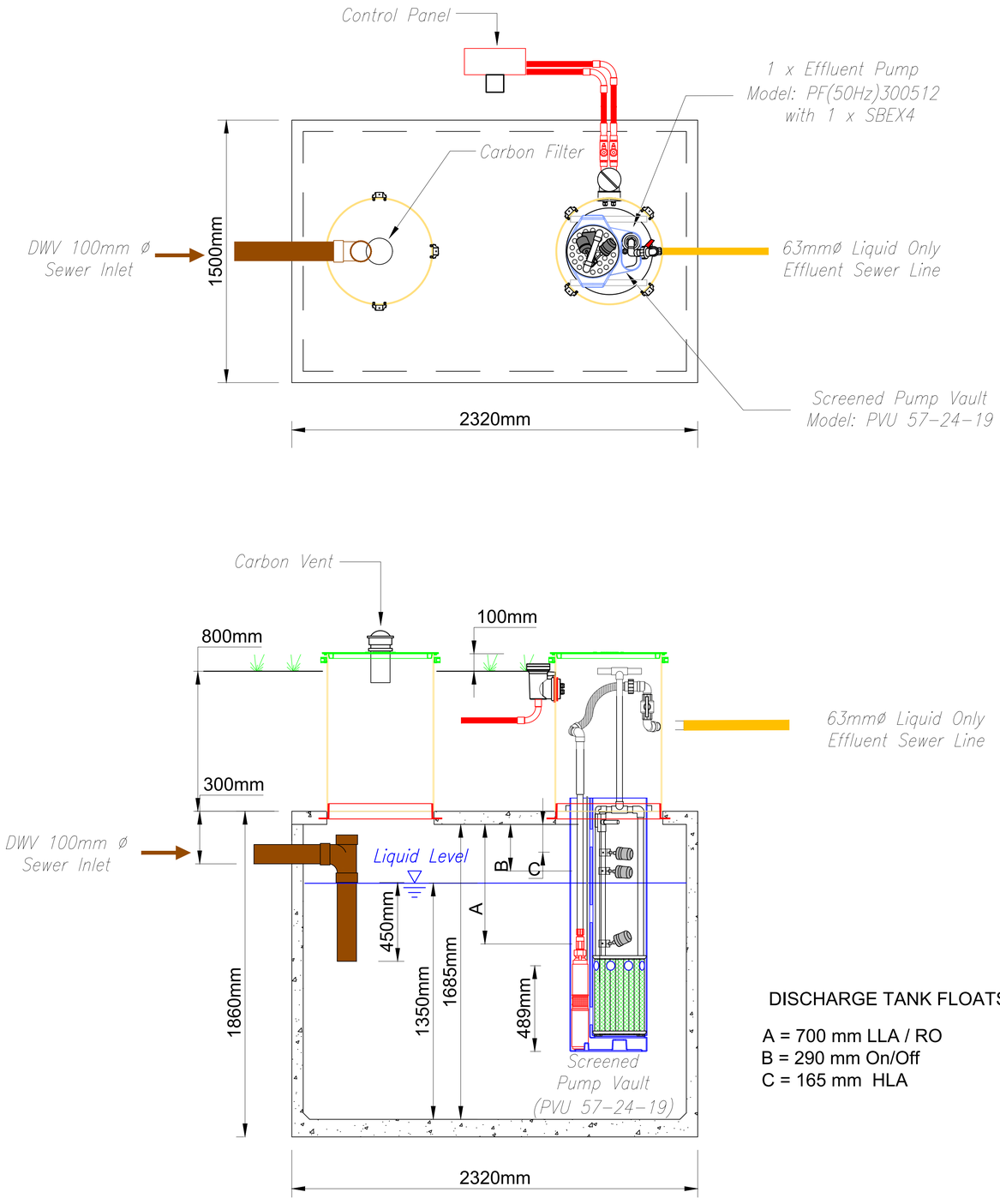
PROJECT MATAKANA COUNTRY CLUB

TITLE 2 x 25,000L STEP Tank Detail

DRAWING No. 5301-04

REVISION A

NOT FOR CONSTRUCTION



LEGEND:

- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (Low Level)
- Tank Inter-connection (High Level)
- UV Flush

DISCHARGE TANK FLOATS

A = 700 mm LLA / RO
B = 290 mm On/Off
C = 165 mm HLA

STEP Tank
4,500 L

0 1 2 3 4 5

SCALE BAR 1:15

REV.	DESCRIPTION	DATE
A	4,500L STEP Tank Detail	19/09/2025

DATE: 19th Sep 2025
SCALE: 1 : 15 (A1)
STATUS: Design

APPROVED		
CHECKED		
DESIGNED		

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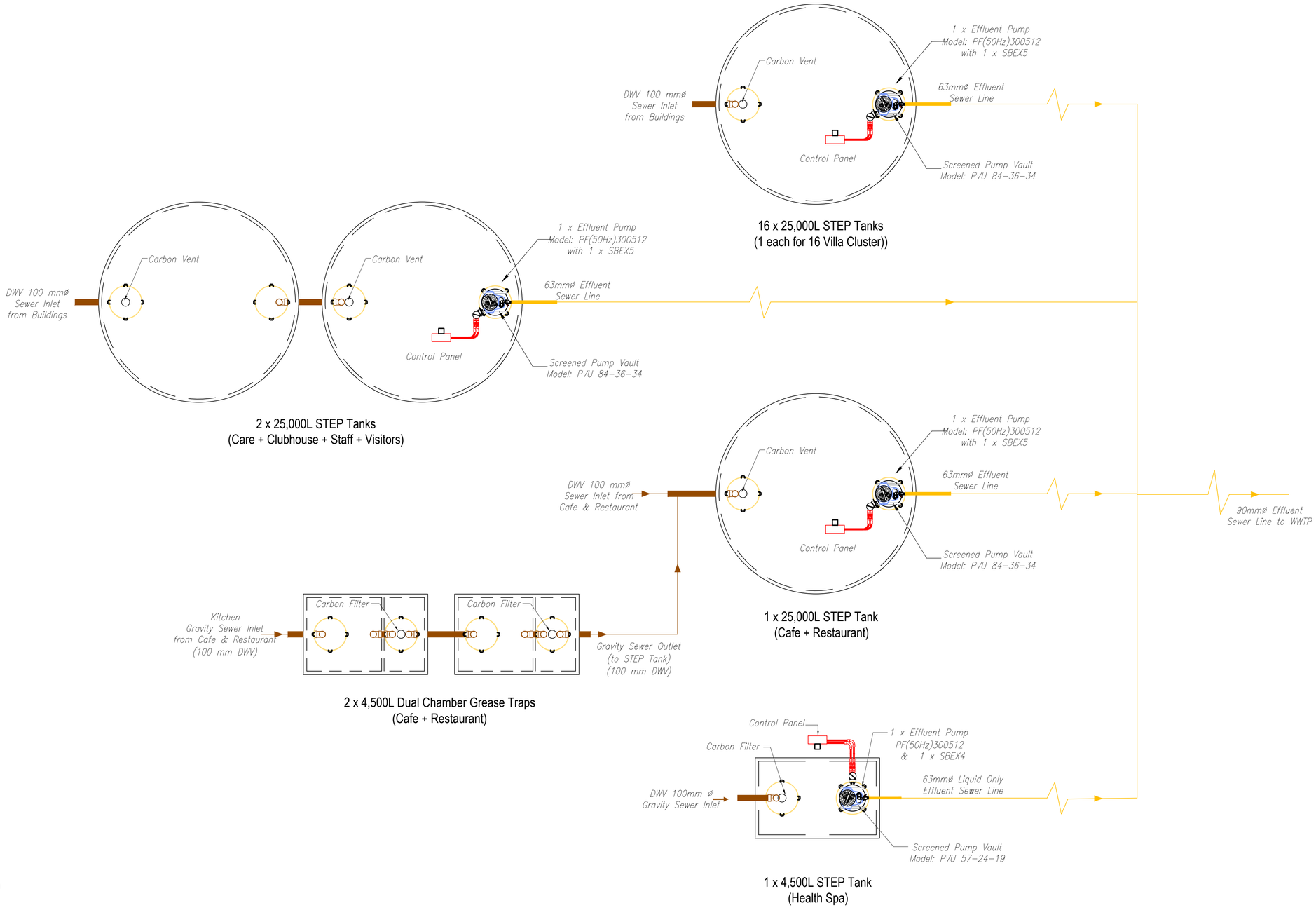
CLIENT: Sanderson Group

PROJECT: MATAKANA COUNTRY CLUB
DRAWING No.: 5301-05
TITLE: 4,500L STEP Tank Detail
REVISION: A

NOT FOR CONSTRUCTION



LEGEND:

- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (Low Level)
- Tank Inter-connection (High Level)
- UV Flush

0 1 2 3 4 5 10

SCALE BAR 1:40

REV.	DESCRIPTION	DATE
B	Nbr of STEP Tanks increased	08/10/2025

DATE: 8th October 2025

SCALE: 1 : 40 (A1)

APPROVED		
CHECKED		
DESIGNED		

STATUS: Design

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CLIENT: Sanderson Group

PROJECT: MATAKANA COUNTRY CLUB

TITLE: Reticulation Plan

DRAWING No.: 5301-06

REVISION: B

NOT FOR CONSTRUCTION

8 x AdvanTex AX100 Pods
(Biological Stage 1 Process)

Pod Vent.

Pod Vent.

3 x AdvanTex A100 Pods
(Biological Stage 2 Process)

80mm PVC
Pressure Pipe

4 x PF(50Hz)752034,
2 x PF(50Hz)501512,
Recirculation Pumps,
1 x PF(50Hz)300512
Filtrate Retutn Pump &
3-Float Switch Assembly

100mm DWV

80mm PVC
Pressure Pipe

Liquid Only Sewer from STEP Tanks
Transition from PE100 SDR11
90mm OD to 80mm PVC

Door

TCOM Panel

Isolation Valve

Control Shed
5 x 4 m

Influent Mag Meter

Solenoid N/C

Sampling Tap

Effluent Meters

UV Disinfection Unit

UV Panel

To Land Treatment Via 2 x 6-Sector Sequencing valve

Solenoid N/O

Solenoid N/O

Solenoid N/C

Arkal Filters

Electrical

80mm PVC
Pressure Pipe

2 x Grundfos SP 8A-7
Discharge Pumps &
3-Float Switch Assembly

UV Flush Return to TET

Treated Effluent Tank 3
25,000 L

Treated Effluent Tank 2
25,000 L

50mm PVC
Air Vent

Recirculation Tank 3
(Stage 1)
25,000 L

Recirculation Tank 2
(Stage 1)
25,000 L

Pre-Anoxic Tank 1
25,000 L

Carbon Vent

Terrator Mixer

32 mm PVC Filtrate Return Pipe

Treated Effluent Tank 4
25,000 L

Treated Effluent Tank 1
25,000 L

Recirculation Tank
(Stage 2)
25,000 L

Splitter Valve
MM4-FRP 13.5

Recirculation Tank 1
(Stage 1)
25,000 L

Pre-Anoxic Tank 2
25,000 L

Carbon Vent

2 x PF(50Hz)752034
Recirculation Pumps &
3-Float Switch Assembly

Splitter Valve
MM4-FRP 13.5

3730mm 3730mm 3730mm 3730mm 3730mm

LEGEND:

- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (Low Level)
- Tank Inter-connection (High Level)
- UV Flush

0 1 2 3 4 5 10

SCALE BAR 1:50

REV.	DESCRIPTION	DATE
A	WWTP Plan	23/09/2025

DATE 23rd Sep 2025

SCALE 1 : 50 (A1)

APPROVED

CHECKED

DESIGNED

STATUS Design

innoflow wastewater specialists
www.innoflowtechnologies.com

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CLIENT Sanderson GROUP

PROJECT MATAKANA COUNTRY CLUB

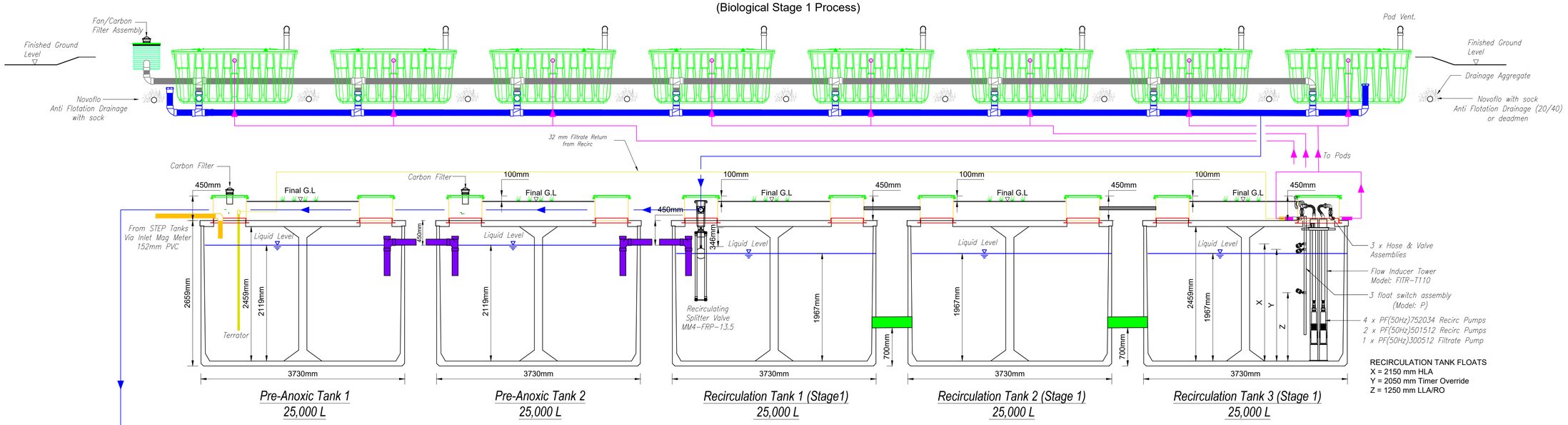
TITLE AdvanTex Wastewater Treatment Plant Plan

DRAWING No. 5301-10

REVISION A

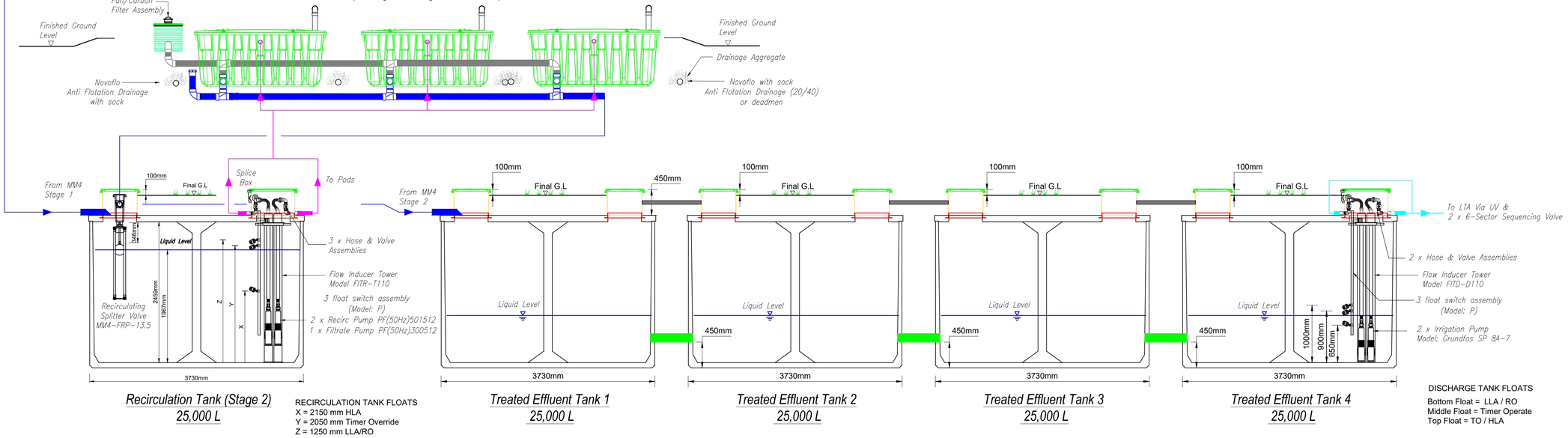
NOT FOR CONSTRUCTION

8 x AdvanTex AX100 Pods
(Biological Stage 1 Process)



RECIRCULATION TANK FLOATS
X = 2150 mm HLA
Y = 2050 mm Timer Override
Z = 1250 mm LLA/RO

3 x AdvanTex AX100 Pods
(Biological Stage 2 Process)



RECIRCULATION TANK FLOATS
X = 2150 mm HLA
Y = 2050 mm Timer Override
Z = 1250 mm LLA/RO

DISCHARGE TANK FLOATS
Bottom Float = LLA / RO
Middle Float = Timer Operate
Top Float = TO / HLA

LEGEND:

- Screened Effluent
- Underdrain Collection
- Pod Dosing
- Pod Ventilation
- Discharge
- Electrical
- Tank Inter-connection (Low Level)
- Tank Inter-connection (High Level)
- UV Flush

0 1 2 3 4 5 10

SCALE BAR 1:40

REV.	DESCRIPTION	DATE
A	WWTP Cross-Section	24/09/2025

DATE: 24th Sep 2025
SCALE: 1 : 40 (A1)
STATUS: Design

APPROVED
CHECKED
DESIGNED

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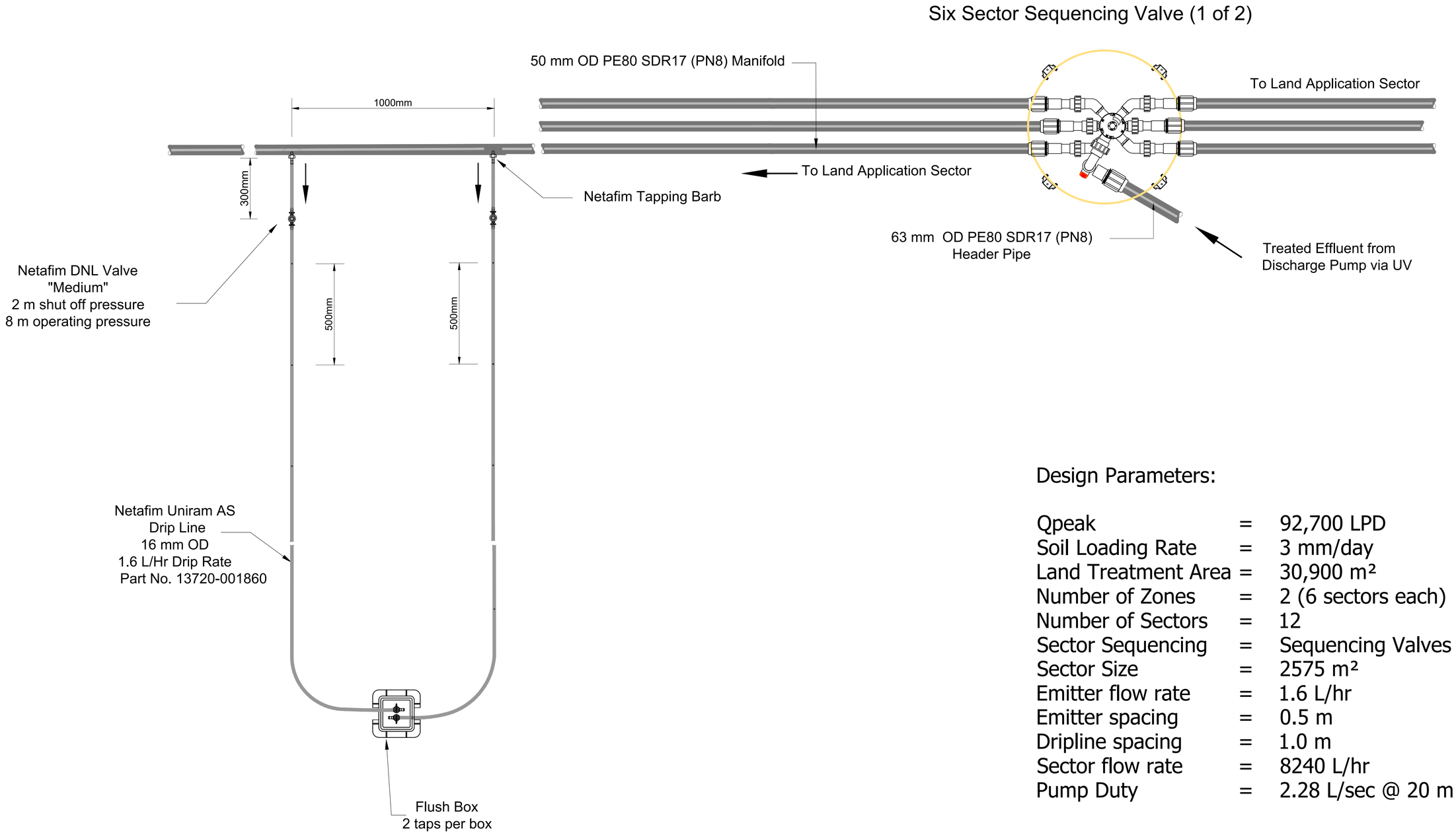
CLIENT: Sanderson Group

PROJECT: MATAKANA COUNTRY CLUB
TITLE: AdvanTex Wastewater Treatment Plant Cross-Section
DRAWING No.: 5301-11
REVISION: A

NOT FOR CONSTRUCTION

Legend:

DNL	-	Durable Non-Leakage Valve
AS	-	Anti Syphon Valve
XR	-	Xtra-Root Protection
CV	-	Anti Drain & Non Leakage Mechanism



Design Parameters:

Qpeak	=	92,700 LPD
Soil Loading Rate	=	3 mm/day
Land Treatment Area	=	30,900 m²
Number of Zones	=	2 (6 sectors each)
Number of Sectors	=	12
Sector Sequencing	=	Sequencing Valves
Sector Size	=	2575 m²
Emitter flow rate	=	1.6 L/hr
Emitter spacing	=	0.5 m
Dripline spacing	=	1.0 m
Sector flow rate	=	8240 L/hr
Pump Duty	=	2.28 L/sec @ 20 m TDH

REV.	DESCRIPTION	DATE
A	LTA Detail	23/09/2025

DATE: 23rd Sep 2025

SCALE: N.T.S

APPROVED | CHECKED | DESIGNED

STATUS: Design

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CLIENT: Sanderson Group

PROJECT: MATAKANA COUNTRY CLUB

TITLE: Land Application Area Detail

DRAWING No.: 5301-12

REVISION: A

APPENDIX 5

Groundwater Take Feasibility

WILLIAMSON
WATER & LAND ADVISORY

Unit 10 | 1 Putaki Drive | Kumeu
Auckland | New Zealand
s 9(2)(a)
W www.wwla.kiwi

Sanderson Group Limited
75 Elizabeth St
Tauranga 3110
New Zealand

Attention: Nathan Sanderson
s 9(2)(a)

6 October 2025 WWLA1545

120 Tongue Farm Road Groundwater Take Feasibility Assessment

1. Background

WWLA were commissioned by Sanderson Group Limited (SGL) to prepare an assessment of the feasibility of establishing a groundwater supply at 120 Tongue Farm Road, Matakana. The location of the property is shown below in **Figure 1**.

We understand SGL intend lodging a Fast Track Approval Applicable to the Environmental Protection Authority (EPA) for the necessary resource consents to develop the site as a retirement village named the Matakana Country Club.

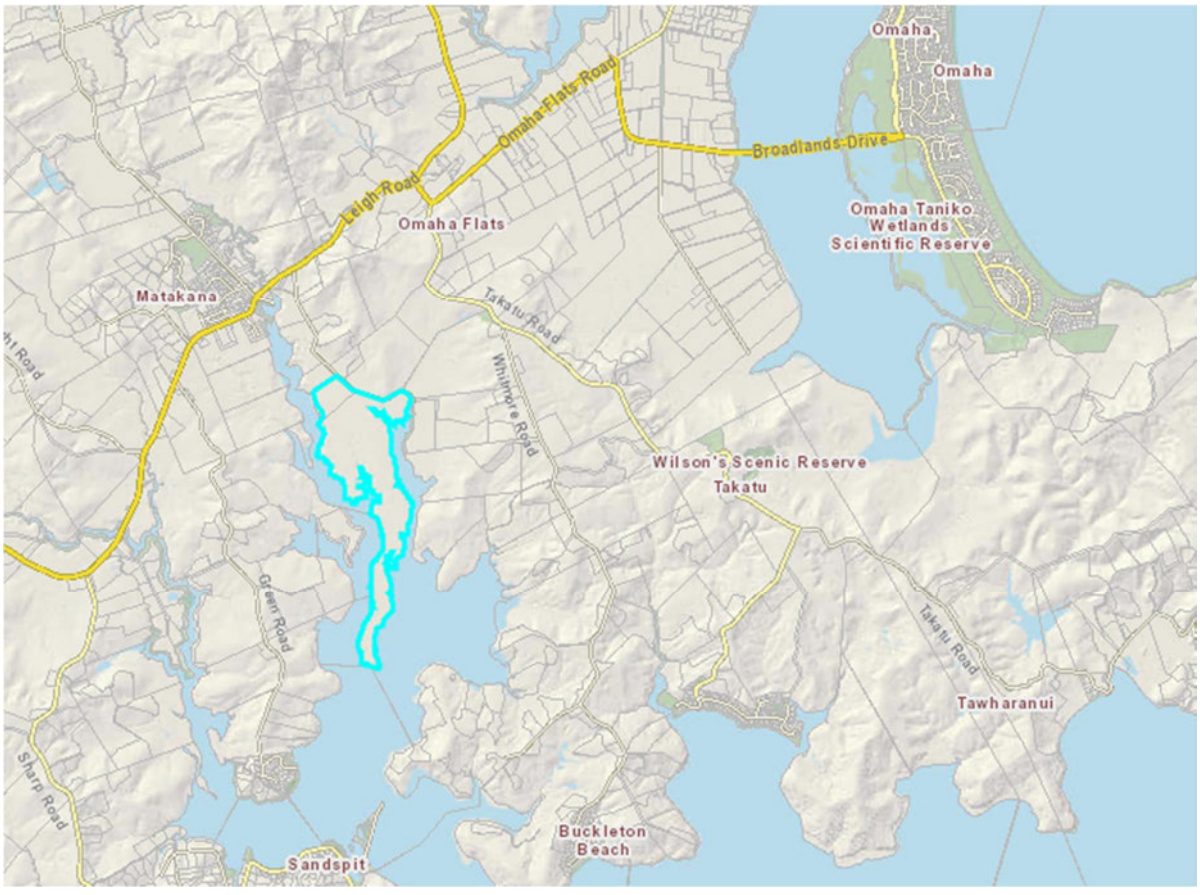

Figure 1. 120 Tongue Farm Property Location.

The masterplan for the Matakana Country Club is shown in **Figure 2**. The plan includes:

- 208 Homes;
- Care Facility;
- Clubhouse;
- Health Spa and Pool;
- Arts Centre;
- Yacht Club;
- Lodge; and
- Café.

We understand that the water requirement for the development is 100.2 m³/day and 36,561 m³/year.

Figure 2. Matakana Country Club Master Plan.

2. Environmental Setting

2.1 Geology

The geology beneath the site consists of quaternary sediments that overlie early Miocene Waitemata Group sediments (**Figure 3**). The quaternary sediments are up to 20 m thick (or greater locally) and is described as being pumiceous alluvium and colluvium with interbedded peat. The Waitemata Group subunit is the Pakiri Formation which consists of thick bedded, volcanic rich graded sandstone and siltstone. The Waitemata Group rocks form the basement rocks in the area.

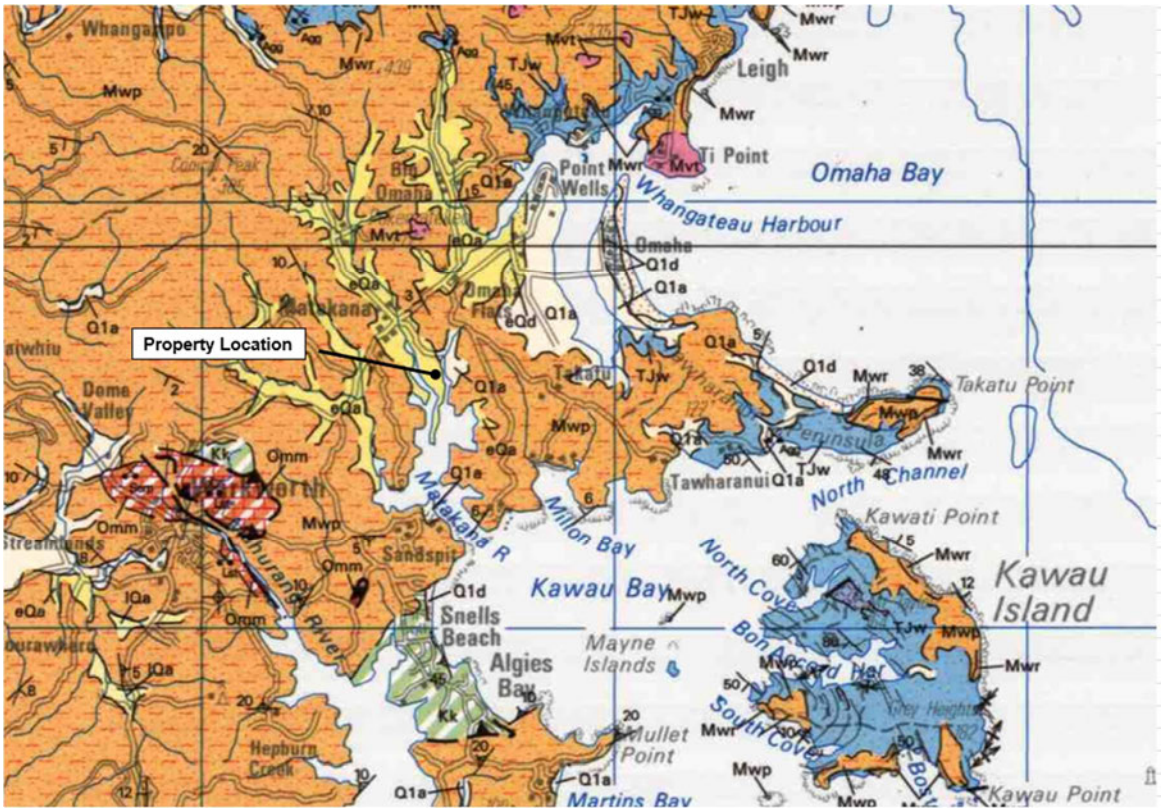

Figure 3. Surface Geology in the Matakana Area (Edbrooke, 2001)

2.2 Hydrogeology

There are essentially three aquifer systems beneath the property as shown on **Figure 4** and described below:

- Quaternary sediments; and
- Matakana Waitemata Group sandstone / siltstone (western property half).
- Tawharanui Greywacke rock (eastern property half).

While there are technically three aquifers beneath the property, the deep Waitemata Group aquifer is considered the most viable with respect to developing a groundwater supply. The limited depth and low permeability of the quaternary sediments mean the potential to develop a groundwater supply is poor. Greywacke rock also has a low permeability and requires fractures to obtain a reasonable yield and for that reason is the secondary option to develop a water supply.

2.3 Aquifer Properties

The Waitemata Group aquifer is confined (Storativity of $1x10^{-3}$ to $1x10^{-4}$) and has Transmissivity (T) values typically ranging from 5 to 35 m^2/d. In the Matakana area the Transmissivity of the aquifer is relatively high based on the air lift testing recorded on drillers logs during development following well drilling. One of the closest bores to the property (ID: 79870) at 411 Green Road was drilled in 2014 and the log shows the presence of hard coarse sandstone, which is fractured at depth. Analysis of the air lift test data indicates a Transmissivity of 20 m^2/d. The log for bore 79870 is included as an **Appendix A** and has been considered the prototype for a well that could be constructed at the subject property.

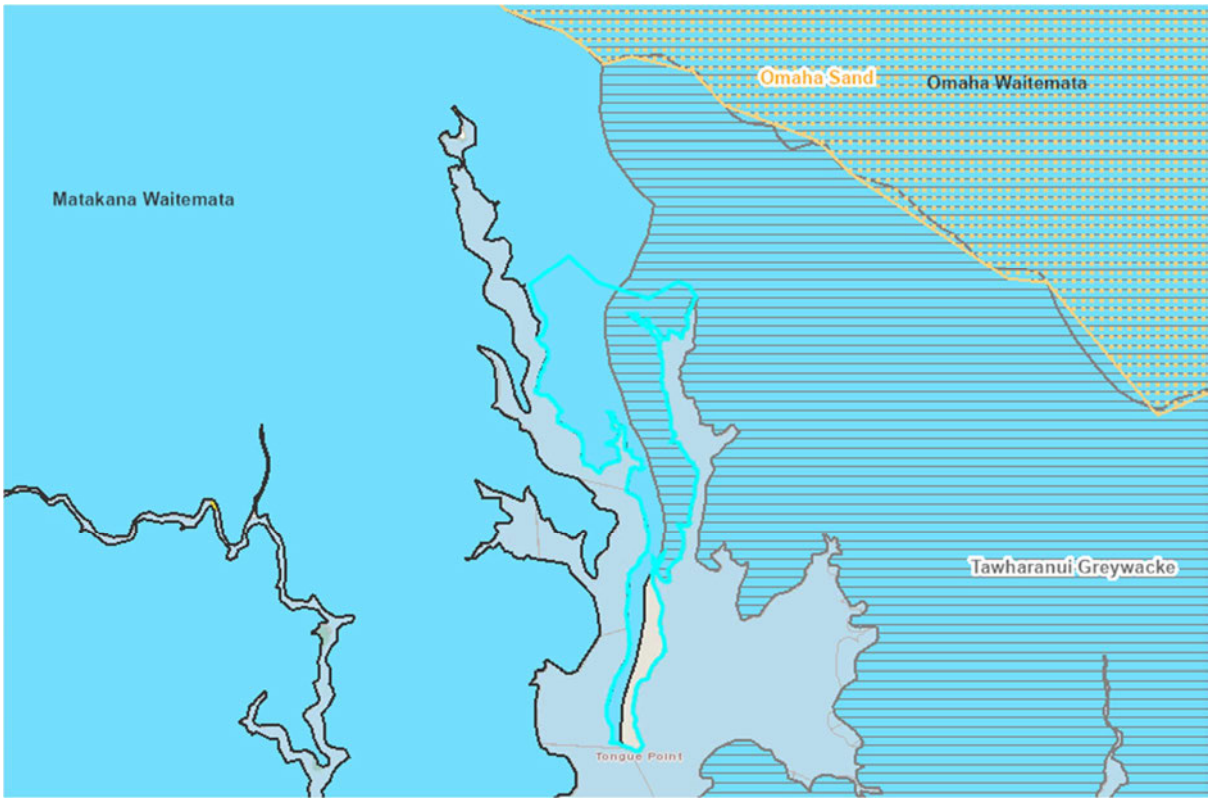

Figure 4. Waitemata Aquifer Management Areas

2.4 Groundwater Availability

The property is located approximately 1-2 km southwest of the Omaha Waitemata high use management area defined by the Auckland Council. The Matakana Waitemata management area boundary is 4-5 km to the west of the property. In summary, the property is not located within a high use management area. The Auckland Council have been consulted with respect to any potential issues associated with the availability of groundwater who have responded saying they are not aware of any issues nor are they processing consents in these aquifers at this time. The water availability has been provided as follows:

- Matakana Waitemata aquifer - 460,403 m^3/year
- Tawharanui Greywacke aquifer - 1,079,067 m^3/year

On that basis both aquifers would be viable targets for water development, however, the Waitemata aquifer would be the preferred option because there is more certainty that any bores drilled would provide the volume of water needed.

2.5 Potential Yield

We have adopted bore 79870 as a prototype for potential yield for a similar specification well that could be constructed on the property. **Table 1** shows the metrics for a hypothetical bore to determine it potential yield.

Table 1. Hypothetical Waitemata Aquifer Bore Yield.

Parameter	Value	Units
Depth	200.0	*m*
Static Water Level	3.5	*m*
Casing Depth	100.0	*m*
Pump Cut Out Depth	98.0	*m*
Pump Submergence	94.5	*m*
Max Drawdown (80% efficiency) [1]	80.0	*m*
Max Yield	1,050	m^3/d
Max Yield	12.0	*L/s*

[1] Theis assuming T= $20m^2/d$, S=$1x10^{-4}$ for 365 days pumping

The calculations assume continuous pumping for 365 days and produce a maximum potential yield of 1,050 m^3/d (or 12 L/s). In order to abstract that quantity of water from the bore it would need to be at least 150 mm diameter to house a suitably sized submersible pump. If more than that quantity of water was required, additional bores could be constructed with appropriate spacing between them.

2.6 Groundwater Quality

We note that the water quality of Waitemata Group aquifer is variable and tends to become enriched in sodium bicarbonate (gets harder) with greater depth but is typically suitable for potable, commercial and horticultural use.

A potential water quality issue given the site locality at the cost is saline intrusion induced through pumping. However, there are many potable supply bores at the coast in the Auckland region that we are aware of, which do not induce saline intrusion.

A recent groundwater quality test performed on a 30 m deep stock bore (ID: 79688, **Appendix A**) at the northern (Matakana) end of the property indicates the groundwater quality is general excellent, which minor softening and iron removal potential required (if any). The water quality results are shown in **Appendix B**.

3. Potential Consenting Issues

Aside from groundwater availability, any water take application will need to consider the effects of the on the environment and other groundwater users. Given the confined nature of the aquifer systems effects at the surface are expected to be limited. The drawdown effects of the take on other neighbouring bores and the risk of saline intrusion will need to be assessed as part of any consent application to take groundwater.

4. Discussion

The property at 120 Tongue Farm Road is located over a productive Matakana Waitemata Group aquifer that can potentially yield a considerable volume of groundwater and there is sufficient groundwater available to supply the volume needed.

Saline intrusion will require consideration during exploratory drilling and testing and is likely to be a concern of Auckland Council.

5. Closure

Should you have any further questions please contact the undersigned.

Yours sincerely,

Chris Simpson
Principal Hydrogeologist | s 9(2)(a)
s 9(2)(a) | www.wwla.kiwi

Jon Williamson
Managing Director | +s 9(2)(a)
s 9(2)(a) | www.wwla.kiwi

Appendix A. Borelogs for 79870 and 79688.

Location of Bore 79870 and 79688.

KIWI WELLDRILLERS N.Z.

ISO 9002 CERTIFIED

KEVIN BROWN LTD.
PH. 0800 822 822

MEMBER: NZ. DRILLERS FED

BRANCHES:
BAY OF ISLANDS
WARKWORTH
GLENBROOK

PO BOX 400, OREWA
FAX 09 425 0228
E-Mail: s 9(2)(a)

BORE LOG FORM

Client JUSTIN WYBORN
Address s 9(2)(a)
s 9(2)(a)

Grid Reference No.. 1754928 5973693
Consent No REG-61294 Bore I.D. 29138

Driller JORDAN BROWN
Drilling Method ROT.- MUD
Date of Finishing 31.1.2014
Purpose of Bore STOCK - DOMESTIC

BORE LOG

Depth from Surface Top	Bottom	Description of Ground Passed Through
0.0	4.0	FILL
4.0	16.0	MARINE CLAYS
16.0	25.0	SANDSTONE/MUDSTONE 80/20
25.0	54.0	COARSE SANDSTONE
54.0	66.0	DRILLED BLIND
66.0	86.0	COARSE SANDSTONE
86.0	100.0	SANDSTONE MUDSTONE 80/20
100.0	158.0	COARSE SANDSTONE
158.0	165.0	SANDSTONE MUDSTONE 50/50
165.0	170.0	COARSE FRACTURED SANDSTONE

WELL CONSTRUCTION

All measurements from the top of the casing

Depth of bore (M) 170.00 m
Depth of casing (M) 66.00 m
Diameter of Casing PVC 104 (mm)
Screens:
From m to m
Slot size and type
Grouting 13 Bags

Pump Tests:

Method of development AIR INDUCTION
Static water level 3.50 m
Duration of test 3 HOURS
Max 16500 ltrs p/hr
Test discharge (m^3/hr) 16.5
Drawdown level 25.00 m
PUMP DEPTH 35.00 m
PUMP VOLUME up to 5000 ltrs p/hr
Type pump to suit construction of bore for client
80mm SUBMERSIBLE PUMP SET **SQE 5-50**
AT 35.00 m. FOR 5000 lph
Water Quality Basic on site taste test

REMARKS

20% CIRCULATION LOSS @ 145.00 m
50% CIRCULATION LOSS @ 167.00 m
100% CIRCULATION LOSS @ 54.00 m TO 66.00 m
WATER TESTS 16500 AT 60.00 m
6900 LPH AT 20.00 m

KIWI 11013

This well has been drilled in accordance with **New Zealand Standard 4411:2001** Environmental Standard for Drilling of Soil and Rock.

NZGD ID: 79870

NZGD ID: 79870

The Manager,
Auckland Regional Water Board,
Auckland Regional Authority,
Private Bag,
AUCKLAND 1.
(Telephone No. 794-420)

Ground Water

Grid ref field checked on 21-1-88 by PK G

Bc 2026

DRILLERS' LOG FORM

2 R09 653367

WELL OWNER Anthony Morris LOCALITY Matakana

ADDRESS Tongue Farm Rd MAP SHEET No. R 09

DRILLING FIRM Kiwi Welldrillers GRID REFERENCE ~~2[illegible]~~ ~~65336~~9

DRILLER K. Allfrey WELL No. 1 JOB No. –

Date of Starting 27-11-86 Date of Finishing 27-11-86

STRATA

Depth From Surface Top	Depth From Surface Bottom	Description of Ground Passed Through
0	3 m	Yellow Clay
3 m	7.5 m	Green Clay
7.5 m	19.5 m	Gray sandy Clay
19.5 m	30.5 m	Sandstone Med Grain

Reduced Level of Well Site (m) –

Max. Drawdown (m) 6.5

At 37.8 (Litres/Min.)

Casing Diameter (cm) 10

Length (m) 22.8

Screen

Pump Depth (m) Surface

Static Water Level* (m) 2 m

Yield 37.8 (Litres/Min.)

Water Quality

Small Iron

Hour Meter Reading

3 Test

*or Artesian Head

Remarks Tested at 15 m to get 75 Litres/Min

NZGD ID: 79688

Appendix B. Water quality of Bore 79688

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

0508 HILL LAB (44 555 22)
+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Certificate of Analysis

Client:	FORSI Innovations Limited	**Lab No:**	3995487 DWAPv1
Contact:	Derrick Piper	**Date Received:**	29-Sep-2025
	C/- FORSI Innovations Limited	**Date Reported:**	03-Oct-2025
	PO Box 48	**Quote No:**	
	Matamata 3440	**Order No:**	3824
		Client Reference:	Stock Water, Bore Water
		Submitted By:	Emma Deed

Sample Type: Aqueous

		Sample Name:	Sample Gorsi Bottle 25-Sep-2025 1:00 pm	Aesthetic Values	Maximum Acceptable Values (MAV)
		Lab Number:	3995487.1		
Individual Tests					
Langelier Saturation Index			1.1	-	-
Sample Temperature*	°C		20.0	-	-
Dissolved Calcium	g/m^3		59	-	-
Reactive Silica	g/m^3 as SiO_2		78	-	-
Tannin	g/m^3		< 1.0 #1	-	-
Routine Water Profile					
Turbidity	NTU		4.0	≤ 5	-
pH	pH Units		8.3	7.0 - 8.5	-
Total Alkalinity	g/m^3 as $CaCO_3$		270	-	-
Free Carbon Dioxide	g/m^3 at 25°C		2.6	-	-
Total Hardness	g/m^3 as $CaCO_3$		210	≤ 200	-
Electrical Conductivity (EC)	mS/m		59.1	-	-
Electrical Conductivity (EC)	µS/cm		591	-	-
Approx Total Dissolved Salts	g/m^3		400	≤ 1000	-
Total Arsenic	g/m^3		< 0.0011	-	0.01
Total Boron	g/m^3		< 0.053	-	2.4
Total Calcium	g/m^3		65	-	-
Total Copper	g/m^3		< 0.00053	≤ 1	2
Total Iron	g/m^3		0.41	≤ 0.3	-
Total Lead	g/m^3		< 0.00011	-	0.01
Total Magnesium	g/m^3		12.5	-	-
Total Manganese	g/m^3		0.096	≤ 0.04 (Staining) ≤ 0.10 (Taste)	0.4
Total Potassium	g/m^3		0.79	-	-
Total Sodium	g/m^3		54	≤ 200	-
Total Zinc	g/m^3		0.0050	≤ 1.5	-
Chloride	g/m^3		38	≤ 250	-
Nitrate-N	g/m^3		< 0.05	-	11.3
Sulphate	g/m^3		< 0.5	≤ 250	-

APPENDIX 6

Utilities Confirmation

Chorus NZ Ltd
4 Graham Street
Auckland CBD
Auckland

Nathan Sanderson
Development Manager
Sanderson Group
Tauranga

29th August 2025

Hi Nathan,

Thank you for providing an indication of your development plans in this area.

I can confirm that we have UFB fibre infrastructure in the area that you are proposing to develop. Chorus will be able to extend our network to provide connection availability to "**120 Tongue Farm Road, Matakana".**

However, please note that this undertaking would of course be subject to Chorus understanding the final total property connections that we would be providing, roll-out of property releases/dates and what investment may or may not be required from yourselves and Chorus to deliver the infrastructure to and throughout the site in as seamless and practical way as possible.

The costs involved can only be finalised at the time that you are ready to proceed.

Chorus is happy to work with you on this project as the network infrastructure provider of choice. What this ultimately means is that the end customers (business and homeowners) will have their choice of any retail service providers to take their end use services from once we work with you to provide the physical infrastructure.
Please reapply with a detailed site plan when you are ready to proceed.

Thanks

Kind Regards,

Danny Masterson
Business Development Manager
s 9(2)(a)
Chorus NZ Ltd

Vector Limited
110 Carlton Gore Road
PO Box 99882
Newmarket
Auckland 1149
+64 9 978 7788 / vector.co.nz

23 September 2025

Nathan Sanderson
s 9(2)(a)

Vector ref. 1-6119960560

Dear Nathan,

1. **Supply Availability for 120 Tongue Farm Road, Matakana**
   Further to your recent correspondence regarding availability of supply of electricity for a 213 residential and 5 commercial lot development for Matakana Country Club.

   At the time of this enquiry Vector can confirm the following:

2. **Electrical Reticulation**
   - 1.1 Vector Limited is the Electrical Operator of the distribution system which will provide Line Function Services to provide supply to the site.
   - 1.2 Based on Vector's current forecasts, the Warkworth zone substation is expected to reach its capacity by 2027. To address this, we have bought forward the construction of a new Warkworth South zone substation planned for completion by December 2028.
   - 1.3 The ability to provide supply to your development will be dependent on the completion of the new Warkworth South zone substation.
   - 1.4 Vector has very limited capacity in the surrounding high voltage (HV) network.
   - 1.5 Installation of new HV and low voltage (LV) cables and equipment will be required to provide the site with points of supply for each of the residential and commercial lots, at the Customer's cost. The specific design scope and costs chargeable to Customer to support their intended capacity requirements will be worked through between Vector and Customer during Vector's project detailed design and cost stage.

Please do not hesitate to contact me on s 9(2)(a) if you have any further questions.

Kind regards,

Hanisha Vallabh
Senior Customer Contracts Advisor