Drainage, Earthworks and Overland Flowpath Report

22 and 22a SUMMIT DRIVE, MOUNT ALBERT, AUCKLAND

For

A&Y CONTRACTOR LIMITED
MAY 2025-Rev A

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1.0 Introduction

Anchor Consulting Ltd has been engaged by A&Y Contractor Limited to prepare a Drainage and Overland Flowpath Report to assess proposed earthworks and to inform the design of excavations and retaining systems. It also assesses the suitability of proposed utility services and the impact of an overland flow path that is shown as running through the site on construction of two new dwellings at 22 and 22a Summit Drive, Mount Albert.

This report has been prepared in support of a land use consent application to Auckland Council to construct two new houses on two recently created freehold allotments. The assessment is based on a site inspection, topographical survey data as well as publicly available information from Auckland Council. The information provided herein is also informed by a geotechnical site investigation prepared by Geostudio and Architectural Design Plans prepared by 10x10 Architecture.

2.0 Site Description

2.1 Site Location and Legal Description

The ‘site’ that is the subject of the resource consent application for construction of two houses, which this Drainage, Earthworks and Overland Flowpath Report has been prepared to support is Lot 1 DP 603808 (22 Summit Drive) and Lot 2 DP 603808 (22a Summit Drive). The location of the site (22 & 22a Summit Drive, Mt Albert, Auckland) is identified on the map below.

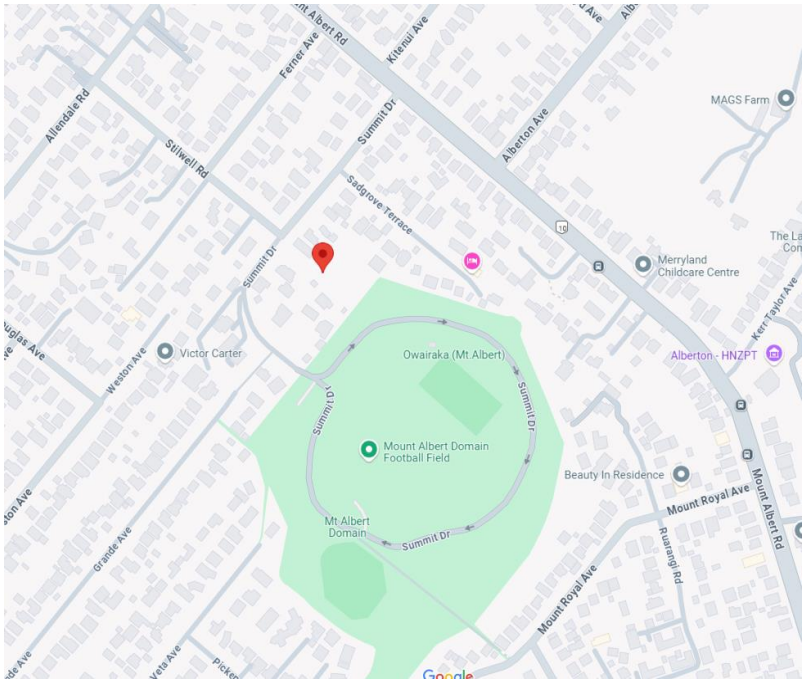


Figure 1.0 – Locality Plan.

The site area is 932m^2 (gross), being 597m^2 (net) within 22 Summit Drive and 616m^2 (Net/Gross) within 22a Summit Drive, more or less. DP 603808 has deposited and Records of Title for 22 and 22a Summit Drive have been issued.

2.2 Site Description

The site is shown on the aerial image below. Neighbouring buildings and properties are also shown on the below image. Our site visit established that the site is currently vacant.

Figure 2.0 – Nearmaps March 2025 Aerial

2.3 Topography

The land within the site is slopes downward from its south-western boundary towards the north-eastern boundary.

Refer to Appendix B, which contains a topographical survey plan prepared by Anchor Consulting Ltd. The plan shows ground levels and contours within the site.

3.0 Development Proposal

This report is prepared to support a land use consent application to construct the proposed residential buildings, as noted above. The proposed development comprises construction of two new houses as well as underground services and access.

The resource consent application is for consent to construct two houses on two recently created properties/titles. While this report addresses earthworks as they will occur across the two properties, for consistency with the resource consent application, 22 and 22a Summit Drive fall within the AUP definition of separate sites, as each is contained in a single lot on an approved survey plan and has a separate Record of Title. Therefore, reference to the site as being/comprising both allotments is an application of the interpretation of ‘site’ that is being applied for consistency only. Furthermore, any consent that is required for earthworks across two sites is limited to a consent for technical non-compliance only.

Earthworks

It is proposed to undertake and complete the necessary earthworks in one stage. The work undertaken would include cut/fill, topsoil spreading as well as the sowing/germination of grass. The completion date will depend on weather conditions.

A suitably qualified and experienced Geotechnical Engineer will be engaged by the client to check and monitor the earthworks. A Structural Engineer will be engaged by the client to monitor construction of the retaining walls and building foundations.

The earthworks will be managed and mitigated as per GD-05 erosion and sediment control design guidelines.

Below is a summary of the proposed earthworks.

The proposed Lot 1 earthworks will affect approximately 405m^2 of the site. The approximate earthworks volumes are provided below:

Bulk Cut (solid measure)	150m^3
Bulk Fill (solid measure)	40m^3
Net Cut – to be exported (solid measure)	110m^3

The proposed Lot 2 earthworks will affect approximately 405m^2 of the site. The approximate earthworks volumes are provided below:

Bulk Cut (solid measure)	100m^3
Bulk Fill (solid measure)	20m^3
Net Cut – to be exported (solid measure)	80m^3

Below is the combined earthworks area and volumes.

Earthworks Area = 810m^2

Bulk Cut (solid measure)	250m^3
Bulk Fill (solid measure)	60m^3
Net Cut – to be exported (solid measure)	190m^3

Access and Utilities

Vehicular access to the proposed buildings will be provided via the existing shared driveway.

Individual electricity, telecommunication, and water lines have already been installed beneath the shared driveway to service the development.

Sewage Drainage

Auckland Council's GIS (Geomaps) indicates the presence of an existing public sewer line which runs beneath the access leg into the site (22 Summit Dr) and adjacent to the north-west boundary, within the developable part of the site. Individual sewer stub connections were installed during the recently completed subdivision (DP 603808).

The proposal is to utilise the existing individual sewer connections. Separate private laterals will be installed from these stub connections to serve the two dwellings within the proposed development.

The position of the existing public sewer manhole and line and individual private connections/laterals is shown on Anchor Consulting Drainage Plan RC-107 (see Appendix A).

Stormwater Drainage

The site has been investigated to determine the feasibility of stormwater disposal via deep bore soakage. Two borehole tests - one within each lot - have been carried out. The results indicate that the site is underlain by suitable soil conditions, confirming that it is well-suited for this type of stormwater management system.

Individual deep bore soakage systems will be constructed to serve each lot.

Roof-water runoff from the dwellings will be directed into proposed settling chambers before discharging into the soakage chambers. Surface-water runoff from the driveway will be collected and treated as required before being conveyed to the same soakage system, ensuring compliance with stormwater management guidelines.

The proposed stormwater drainage layout is shown on Anchor Consulting Drainage Plans (See Appendix A).

Other Aspects of Proposal

The enabling works required to facilitate the development include site clearing and earthworks for the construction of the proposed buildings, private driveway, retaining walls, and sealed surfaces.

The proposal includes introduction of an additional ROW easement, which will be created under s348 of the LGA and will be over Lot 1 in favour of Lot 2. The proposed easement will be created to support and protect access rights over the driveway to Lot 2 for the owners/occupants of that property.

The proposed right of way easement, as shown on Anchor proposed right of way plan RC-101 will be registered on the property titles prior to occupation of the proposed dwellings.

4.0 Earthworks Management

4.1 Stability

The client engaged GeoStudio Ltd to conduct a preliminary geotechnical investigation. the geotechnical report prepared by Geostudio Ltd concludes that the land is generally suitable for the proposed development. The report includes recommendations for the design of building foundations, which will be complied with.

Refer to geotechnical report by GeoStudio Ltd for further detail.

4.2 Erosion and Sediment Control

As per GD-05, any sediment laden runoff that is generated from the works area will be controlled. In order to control sediment/silt runoff, silt fences, and an entrance stabiliser are proposed to control sediment that is generated during construction.

Further to the control measures discussed above, it is proposed that:-

The installed sediment control measures will be inspected by an appropriately qualified and experienced engineer to certify that all proposed methods/structures have been constructed and are operating in accordance with the erosion and sediment control plan.

An appropriately qualified and experienced engineer will be engaged to monitor the sediment control measures on a regular basis (fortnightly) and after every significant rainfall event to ensure that the measures are maintained to the correct standard and are in accordance with the erosion and sediment control plan.

Contact details for the site manager will be displayed on site. The site manager will be contactable in the event of an emergency.

Please refer to Appendix A, which contains the proposed earthworks and erosion and sediment control plans (Anchor Erosion and Sediment Control Plans RC-102 and RC-103).

5.0 Stormwater Management

5.1 Stormwater Discharge

It is proposed to install soakage chambers (Deep Bore Soakage) within each lot to service the proposed development. Two deep bore soakage tests have been undertaken, both of which produced favourable results, indicating that the underlying soil conditions are suitable for a soakage-based stormwater solution. For the location of the soakage holes, refer to Anchor Consulting Plan RC-107 (Appendix B).

Intorock Drilling was engaged to carry out site investigations and perform the soakage testing. A summary of the borehole flow rates recorded during the initial test is provided below.

Borehole Number (BH)	Flows (l/s)
1 (Lot 1-22 Summit Drive)	8.0
3 (Lot 2-22a Summit Drive)	8.7

GD-07 has been used to calculate the borehole capacity.

Below is a tabulated summary of the peak discharge and the borehole capacity (with factor of safety).

Lot Number	BH Capacity w/ Factor of Safety Applied (l/s)	Site Peak Discharge 10 ARI (l/s)	Additional Storage Min (l/s)
1	6.7	11.75	1.26m^3
2	7.25	12.75	1.71m^3

Based on the information provided above, the two soak holes tested do not have sufficient capacity to service the development on their own. As a result, additional detention storage is proposed to supplement the system. With this added storage, the two proposed soakage manholes will have adequate capacity to contain and dispose of stormwater runoff from the proposed development.

Please refer to Appendix B for soakage test results and calculations.

Please refer to Appendix C for tank calculations.

5.2 Overland Flowpath

A site walk-over was conducted to verify the location of the Overland Flow Path (OLFP) as shown on Auckland Council's GIS (Geomaps). The inspection confirmed that the OLFP is minor flow and that the actual alignment of the flow path is consistent with what is shown on the Council GIS.

The proposed development will maintain the existing ground level along the south-eastern boundary to preserve the OLFP entry point. A V-shaped channel is proposed to divert flows toward the OLFP exit point, ensuring that overland flow is appropriately managed.

The contributing catchment area used in our assessment to determine the 100-year storm water level was derived from Council's GIS records. A summary of our assessment is provided below.

The design parameters used to calculate water depths within the proposed channel are as follows:

Q100 = 0.1 m^3/s (Based From GIS)

V Channel = 1.5mWx0.25mD

The Flowmaster program was used to determine water depths along the OLFP channel. Below is a summary table of the 100-year flood levels within the overland flow path.

The below tables also present the OLFP details as identified in Anchor OLFP RC-115 (Section A-A), along with the projected water depths within the flow path during a 100-year storm event.

A summary of the calculated flows and water levels within the OLFP channel is provided within the tables.

Section	Width (m)	Top of Overland Flowpath Channel (Assume)	Bottom of Overland Flowpath Channel (Assume)
A-A	1.5m	10.0m	9.75m

Section	100yr Water Level (R.L)	Depth of 100yr Water Level (mm)
A-A	9.86m	110

Based on the above analysis, the 100-year flood level will be fully contained within the proposed V-shaped channel and will not impact the proposed building.

Please refer to Appendix D for OLFP calculations.

6.0 AUP Considerations

6.1 Earthworks

Rule E12.4.1 (A48) provides for earthworks affecting greater than 500m^2 but less than 1,000m^2 of land in a residential zone as a restricted discretionary activity and E12.4.1(A8) provides for earthworks in the residential zone which result in the disturbance of greater than 250m^3 and less than 1000m^3 of material as a restricted discretionary activity.
Separately the earthworks within 22 and 22a Summit Drive do not exceed the permitted limits, but combined the maximum limits are exceeded.

Activity Table E12.4.2 sets out earthworks rules for sites in an overlay area, except sites in an Outstanding Natural Features Overlay. This site is subject to several overlays, including the Outstanding Natural Features Overlay and these rules appear not to apply to this proposal. However, the site is also affected by a number of other overlays. If it is Councils view that the proposal must be assessed against rules in Activity Table E12.4.2 then consent should be granted under those rules.

The site is in the Special Character Areas Overlay Residential and Business - Mt Albert, Residential Isthmus C. Rule E12.4.2 (32) and (33) both require that

earthworks in this overlay area that either exceed $5m^3$ and are up to $250m^2$ or are in excess of $250m^3$ require consent as a discretionary activity. The earthworks as measured within both separately within each lot or in the combined overall site exceed $5m^3$ so consent would be required as a discretionary activity under these rules.

Activity Table E12.4.3 sets out rules for earthworks in an Outstanding Natural Features Overlay area. Rule E12.4.3 (A41) requires that earthworks exceeding $50m^3$ require consent as a restricted discretionary activity.

If the proposal is assessed as a discretionary activity, we understand that Council is not limited in the matters that it can consider in its assessment of the proposal. The limitation on assessment matters notwithstanding, we believe the assessment matters in rule E12.8.2 for restricted discretionary activities should be considered, as they cover effects that are relevant to this proposal.

For an assessment of the full range of effects that will be created by this proposal please refer to the assessment of environmental effects provided within the associated resource consent application.

(a) Whether applicable standards are complied with;

All earthworks will comply with standard council construction requirements, i.e., the period of the day in which the works can be undertaken and maximum permissible noise levels for construction machinery.

(b) The extent to which the earthworks will generate adverse noise, vibration, odour, dust, lighting and traffic effects on the surrounding environment and the effectiveness of proposed mitigation measures;

All earthworks will comply with standard council construction noise, vibration etc. requirements.

The site is located in a good soakage area. The maximum proposed cut at this site is 1.4m (Lot 1 building). Log reports by Intorock Drilling indicate that the depth of basalt rock is 2.5m below the ground surface; as the deepest excavation proposed is 1.4m there is no requirement for rock breaking.

Vibration and noise for general earthworks activities will therefore be able to be managed so as to be within AUP required limits. Noise will be monitored as per best practice.

(c) Whether the earthworks and any associated retaining structures are designed and located to avoid adverse effects on the stability and safety of surrounding land, buildings, and structures.

The civil contractor will work with the Geotech engineer during the earthworks phase. The combined approach to the management of the construction works will

ensure that the works are completed in accordance with the recommendations of the geotechnical report. The Geotech Engineer will monitor the work and will provide additional recommendations if any soil stability or other issues are identified during the construction stage.

(d) Whether the earthworks and final ground levels will adversely affect overland flow paths or increase potential volume or frequency of flooding within the site or surrounding sites.

An overland flow path (2,000m^2 to 4,000m^2 flow path catchment) is shown as entering the site via the south-east boundary and exiting toward the north. The entry and exit points of the flow path will not change and the earthworks will not otherwise adversely impact on the OLFP, as assessed below and shown on Anchor OLFP Plan RC-115.

(e) Whether the protocol for the accidental discovery of koiwi, archaeology and artefacts of Māori origin has been provided and the effectiveness of the protocol in managing the impact on Mana Whenua cultural heritage if discovery is made.

An accidental discovery condition is nominated to support the application for consent for the proposed earthworks. An archaeological report supporting the application identifies no specific pre-colonial features within the subject land and consultation with Mana Whenua has been undertaken as part of the overall application.

(f) Whether the extents or impacts of adverse effects from the land disturbance can be mitigated by managing the duration, season or staging of such works;

Sediment control devices are proposed to control sediment within the site during construction (see Erosion and Sediment Control Plans RC-102 and RC-103 in Appendix A). The silt and sediment control system has been designed taking account of the nature and scale of the proposed earthworks and will be effective in controlling sediment within the site.

It is expected that the earthworks will be completed in one stage. In the event that the works extend into the winter season, the mitigation measures being utilised will be upgraded, and monitoring frequencies will be increased where necessary.

(g) The extent to which the area of the land disturbance is minimised, consistent with the scale of development being undertaken;

The proposed earthworks have been designed as part of the development and are therefore consistent with the scale of the development.

(h) The extent to which the land disturbance is necessary to provide for the functional or operational requirements of the network utility installation, repair or maintenance.

The utility ducts/cables required for the operational requirements of the houses within the proposed lots will be located within a single trench, where possible. Other earthworks for the installation of services will be limited to just that which is required to meet servicing requirements. The extent of land disturbance has, therefore, been kept to a minimum.

(i) The extent or risk associated with natural hazards and whether the risks can be reduced or not increased;

No potential hazards were identified during our site visit. Construction of the proposed buildings is not, therefore, likely to increase the risk associated with natural or manmade hazards.

(j) Whether the land disturbance and final ground levels will adversely affect the existing utility services.

The civil contractor will undertake an appropriate investigation (potholing) in consultation with the utility company(s) to identify the exact location of the utility services located beneath the road berm. All necessary safety precautions and protections will be implemented during construction to avoid damage to public utility services.

(k) The extent to which the land disturbance is necessary to accommodate development otherwise provided for by the Plan … including development proposed in a relevant operative reserve management plan or parks management plan;

The extent of land disturbance is contained within the site. The land disturbance is necessary to accommodate the proposed development. The residential use of the land is an activity that is provided for by the AUP in this zone.

(l) For land disturbance near Transpower New Zealand Limited Transmission towers:

(i) The outcome of any consultation with Transpower … and

(ii) The risk to the structural integrity of transmission lines.

The proposed development is not close to transmission lines.

(m) The extent to which the earthworks avoid, minimise, or mitigate adverse effects on any archaeological sites that have been identified in the assessment of effects.

The site is not known to have special natural or historic heritage values.

6.2 Flooding

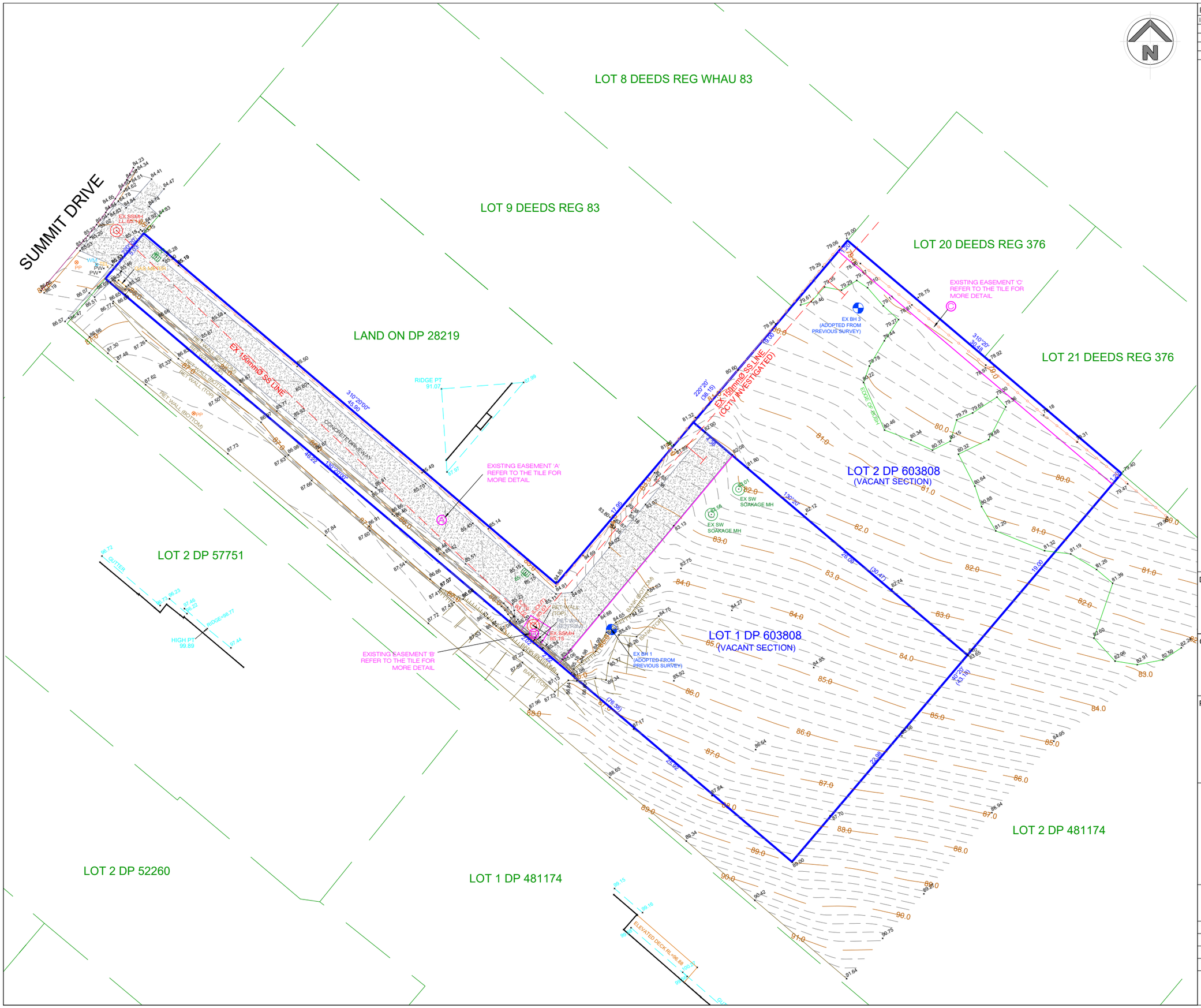
The proposed activity will not divert the entry or exit points of the flow paths or reduce their capacity. The proposed activity is therefore a Permitted Activity, as provided in activity table E36.4.1 (A39 & A40) - Development of new or redevelopment of existing impervious areas.

7.0 Conclusion

This report assesses the capacity of the public wastewater and stormwater networks to service the proposed development. It also evaluates the design of the proposed stormwater management system for compliance with the Council's Code of Practice. The OLFP (Overland Flow Path) entry and exit points will remain unchanged. The 100-year flood level will be safely contained within the proposed V-shaped channel, which is designed to divert the OLFP away from the proposed buildings.

It is noted that building consents will be required for the soakage device, storage tanks, private wastewater and stormwater lines, and individual lot driveway access. All necessary approvals will be obtained prior to the commencement of construction.

APPENDIX A - Anchor Consulting Ltd – Engineering Plans



NOTE:
DATUM: GEODETIC 2000, MT EDEN
ORIGIN: RM 6563 SO 53238 798952.044mN
395863.772mE

LEVELS ARE IN TERMS OF NEW ZEALAND VERTICAL DATUM

ORIGIN OF LEVELS: RM 6563 SO 53238
@ RL=93.52

CONTOURS SHOWN ARE AT 0.20 m INTERVALS.

ALL EASEMENTS, COVENANTS AND OTHER LEGAL INSTRUMENTS REGISTERED ON THIS SITE MAY NOT BE SHOWN ON THIS PLAN. INVESTIGATION IS REQUIRED TO BE UNDERTAKEN PRIOR TO DESIGN AND CONSTRUCTION.

SERVICES (EITHER OVERHEAD OR UNDERGROUND) SHOWN ON THIS PLAN MAY HAVE BEEN OBTAINED FROM THIRD PARTY RECORDS AND SHOULD BE VERIFIED ON SITE.

REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	CL

DRAWING TITLE

A & Y CONTRACTOR LIMITED

CLIENT

A & Y CONTRACTOR LIMITED

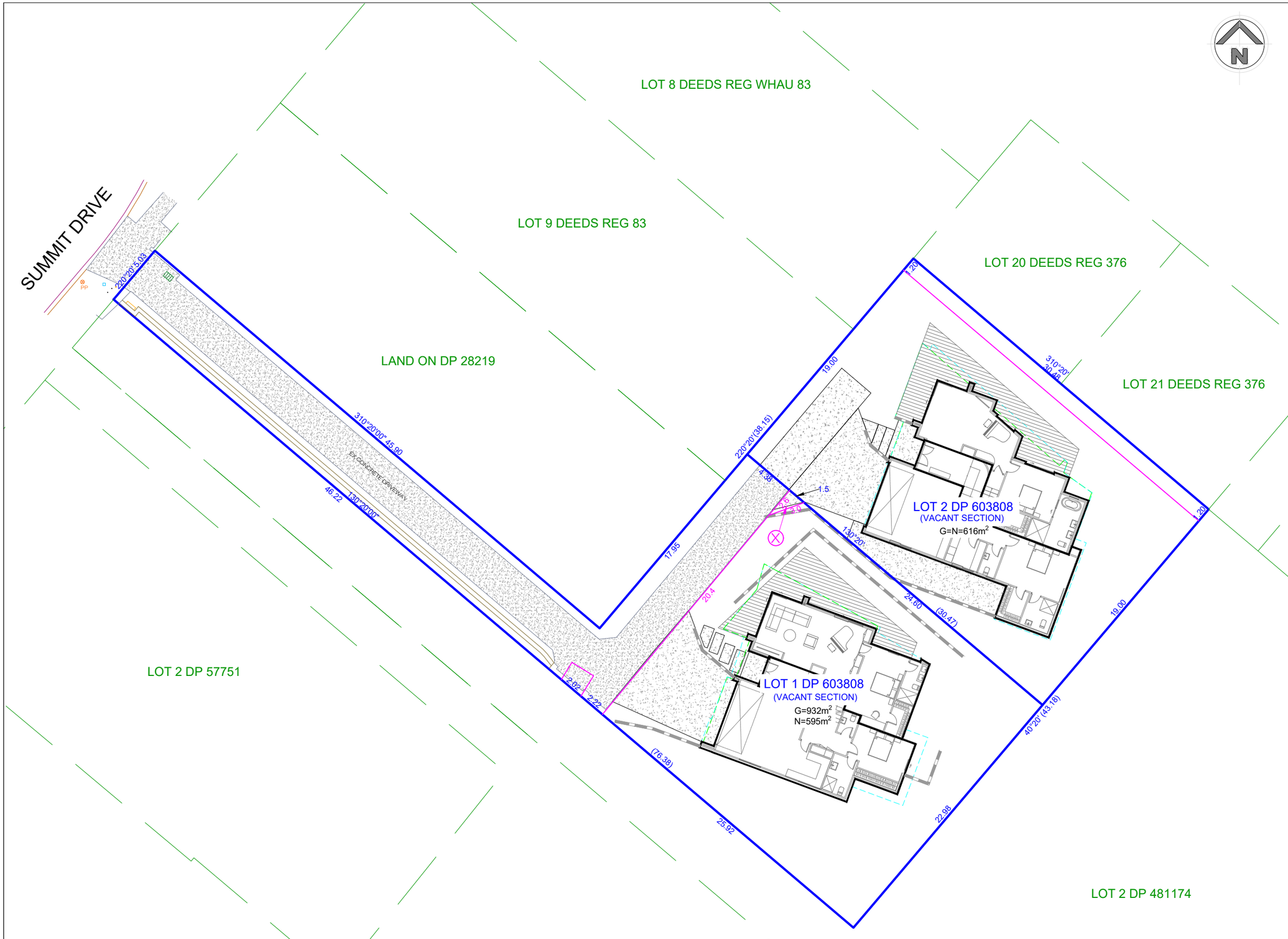
PROJECT

22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
DATE:	SEPTEMBER 2024		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	CL	CHECKED BY	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-100	A



PROPOSED EASEMENTS

PURPOSE	SHOWN	SERVIENT TEN (BURDENED LAND)	DOMINANT TEN BENEFITED LAND
RIGHT OF WAY	X	LOT 1 DP 603808	LOT 2 DP 603808

REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

NOTES:

1. ALL DIMENSIONS & AREAS ARE APPROXIMATE AND MAY VARY UPON COMPLETION OF FINAL SURVEY.

2. EASEMENTS TO BE CREATED WHERE NECESSARY

3. EASEMENTS SUCH AS RIGHT TO OVERHANG, RIGHT FOR MAINTENANCE AND RIGHT TO CONVEY SW WILL BE CREATED WHEN NECESSARY ON ANY PARTS OF BUILDING / FOOT STRUCTURE THAT CROSS OVER FROM ONE LOT TO THE OTHER.

DRAWING TITLE

PROPOSED ROW PLAN TO BE GRANTED UNDER S348 OF THE LOCAL GOVERNMENT ACT 1974

CLIENT

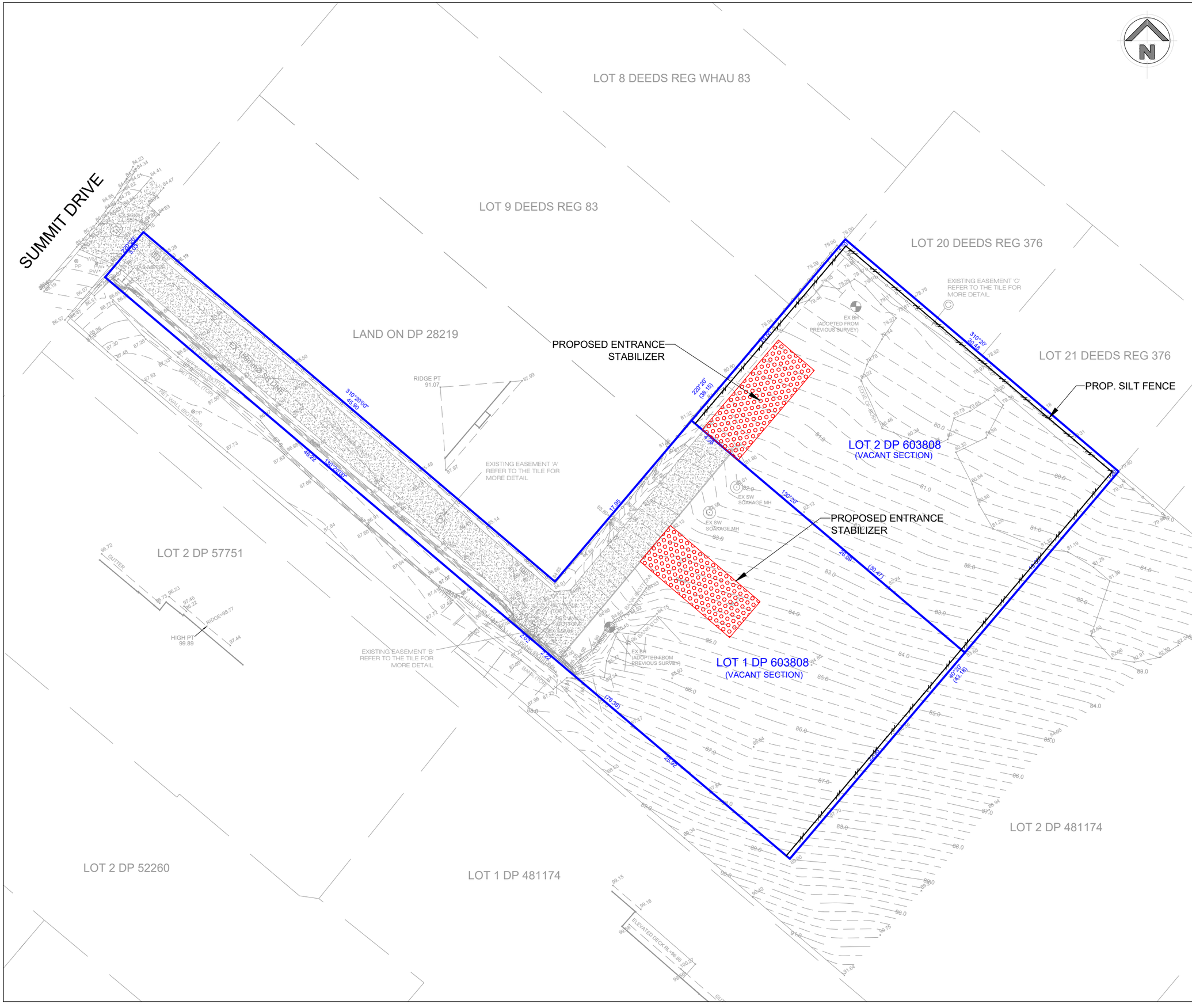
A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY	CK
PROJECT No. A15-0082		DWG No. RC-101	REV. A



REVISION				
ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

NOTE:

1. ALL TREES WITHIN THE SITE TO BE CUT & REMOVED OFFSITE

LEGEND

ENTRANCE STABILIZER (INDICATIVE LOCATION)

PROP SILT FENCE

DRAWING TITLE

EROSION AND SEDIMENT CONTROL PLAN

CLIENT

A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE, MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 150 @ A1 1 :300 @ A3		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
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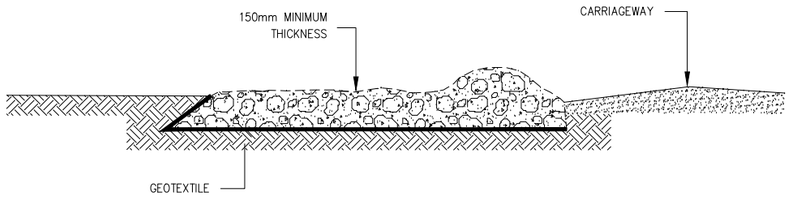
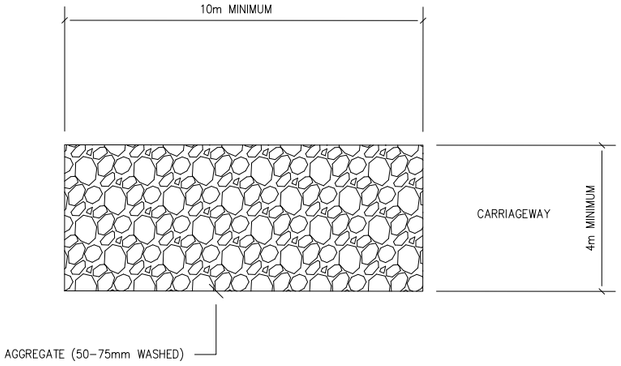


SIDE ELEVATION

STABILISED CONSTRUCTION ENTRANCE – SPECIFICATIONS:

APPLICATION

USE A STABILISED CONSTRUCTION ENTRANCE AT ALL POINTS OF CONSTRUCTION SITE INGRESS AND EGRESS WITH A CONSTRUCTION PLAN LIMITING TRAFFIC TO THESE ENTRANCES ONLY. THEY ARE PARTICULARLY USEFUL ON SMALL CONSTRUCTION SITES BUT CAN BE UTILISED FOR ALL PROJECTS.



PLAN VIEW

STABILISED CONSTRUCTION ENTRANCE

DESIGN:

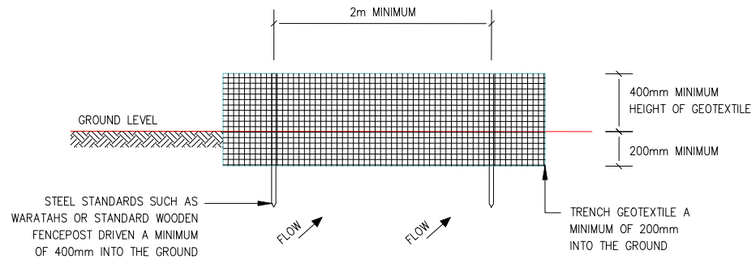
1. CLEAR THE ENTRANCE AND EXIT AREA OF ALL VEGETATION, ROOTS AND OTHER UNSUITABLE MATERIAL AND PROPERLY GRADE IT.
2. PROVIDE DRAINAGE TO CARRY RUNOFF FROM THE STABILISED CONSTRUCTION ENTRANCE TO A SEDIMENT CONTROL MEASURE.
3. PLACE AGGREGATE TO THE SPECIFICATIONS BELOW AND SMOOTH IT.

STABILISED CONSTRUCTION ENTRANCE AGGREGATE SPECIFICATIONS:

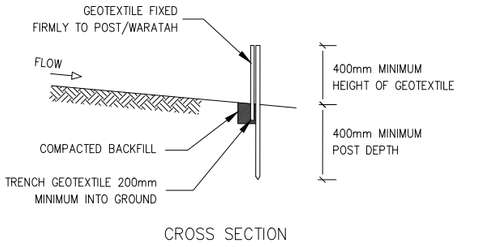
AGGREGATE SIZE	50–75mm WASHED AGGREGATE
THICKNESS	150mm MINIMUM
LENGTH	10m MINIMUM
WIDTH	4m MINIMUM

MAINTENANCE

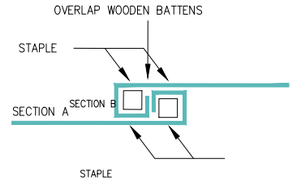
1. MAINTAIN THE STABILISED CONSTRUCTION ENTRANCE IN A CONDITION TO PREVENT SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. AFTER EACH RAINFALL INSPECT ANY STRUCTURE USED TO TRAP SEDIMENT FROM THE STABILISED CONSTRUCTION ENTRANCE AND CLEAN OUT AS NECESSARY.



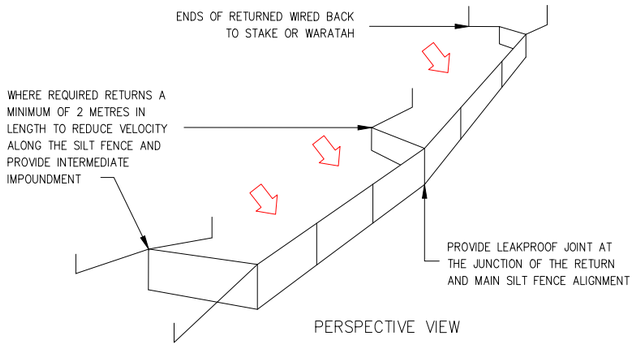
ELEVATION



CROSS SECTION



STANDARD FABRIC JOINT



PERSPECTIVE VIEW

SILT FENCE CONSTRUCTION

NOTES:

1. ALL EROSION AND SEDIMENT CONTROL MEASURES MUST BE OPERATIONAL PRIOR TO ANY OTHER WORKS COMMENCING ON SITE. THE CONTRACTOR SHALL ARRANGE FOR AND ATTEND A PRELIMINARY SEDIMENT CONTROL MEETING ON–SITE WITH THE ENGINEER AND THE COUNCIL REPRESENTATIVE.
2. A COPY OF THE EROSION MANAGEMENT PLAN SHALL BE AVAILABLE ON THE SITE DURING WORK HOURS AND ALL PERSONNEL INVOLVED IN EARTHWORK ACTIVITIES ON THE SITE (INCLUSIVE OF SUB–CONTRACTORS) SHALL BE FAMILIAR WITH THE CONSENT AND PLAN REQUIREMENTS AS THEY RELATE TO EROSION AND SEDIMENT CONTROL.
3. THAT ALL "CLEANWATER" RUNOFF FROM STABILISED SURFACES INCLUDING CATCHMENT AREAS ABOVE THE SITE SHALL BE DIVERTED AWAY FROM EARTHWORK AREAS VIA STABILISED SYSTEM, SO AS TO PREVENT SURFACE EROSION.
4. ALL EROSION AND SEDIMENT CONTROL SHALL COMPLY WITH THE "EROSION AND SEDIMENT CONTROL GUIDELINES FOR LAND DISTURBING ACTIVITIES" GD05
5. FURTHER SEDIMENT CONTROL WORKS MAY BE REQUIRED BY THE ENGINEER AS THE PROJECT ADVANCES. THESE WILL BE INSTALLED AS AND WHERE DIRECTED BY THE ENGINEER.

REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

DRAWING TITLE

EROSION AND SEDIMENT CONTROL STANDARD DETAILS

CLIENT

A & Y CONTRACTOR LIMITED

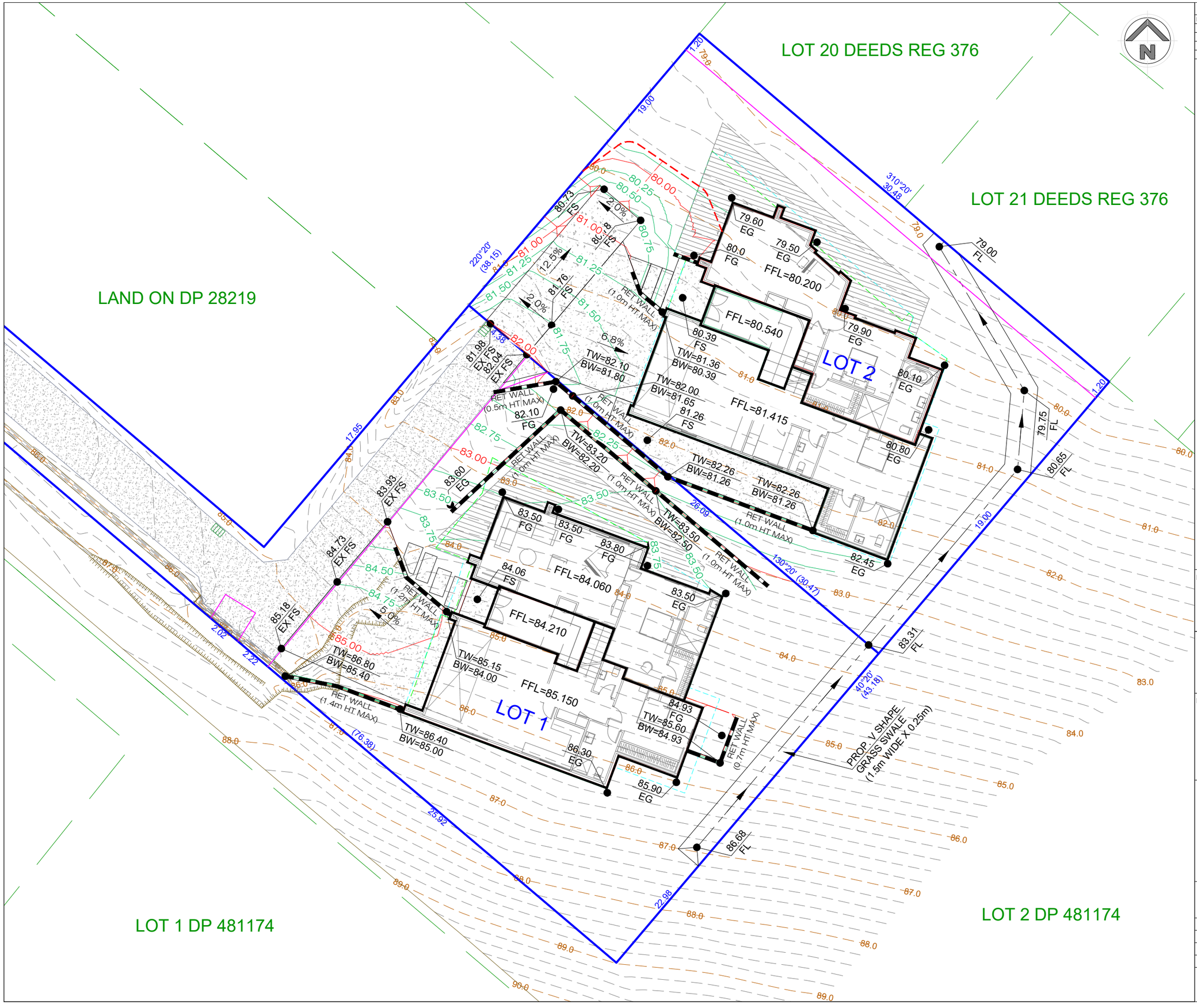
PROJECT

22&22A SUMMIT DRIVE, MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY	CK
PROJECT No.	A15-0082	DWG No.	RC-103
		REV.	A



REVISION				
ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

LEGEND

80.00	EXIST. MAJOR CONTOUR
	EXIST. MINOR CONTOUR (0.20m INTERVAL)
80.00	FINISHED MAJOR CONTOUR
80.25	FINISHED MINOR CONTOUR
	PROP. RETAINING WALL

NOTE:
CONTRACTOR TO LOCATE AND IDENTIFY THE EXISTING SERVICES PRIOR TO EXCAVATION.

FS-PROP FINISH SURFACE (PAVED)
FG-PROP FINISH GROUND LEVEL
EX FS- EXISTING FINISH SURFACE (PAVED)
EG-EXISTING GROUND LEVEL
GFL- GARAGE FLOOR LEVEL
FFL - FINISH FLOOR LEVEL
TW - TOP OF WALL
BW - BOTTOM OF WALL
FL-FLOW LINE

DRAWING TITLE

OVERALL EARTHWORKS PLAN

CLIENT

A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

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PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
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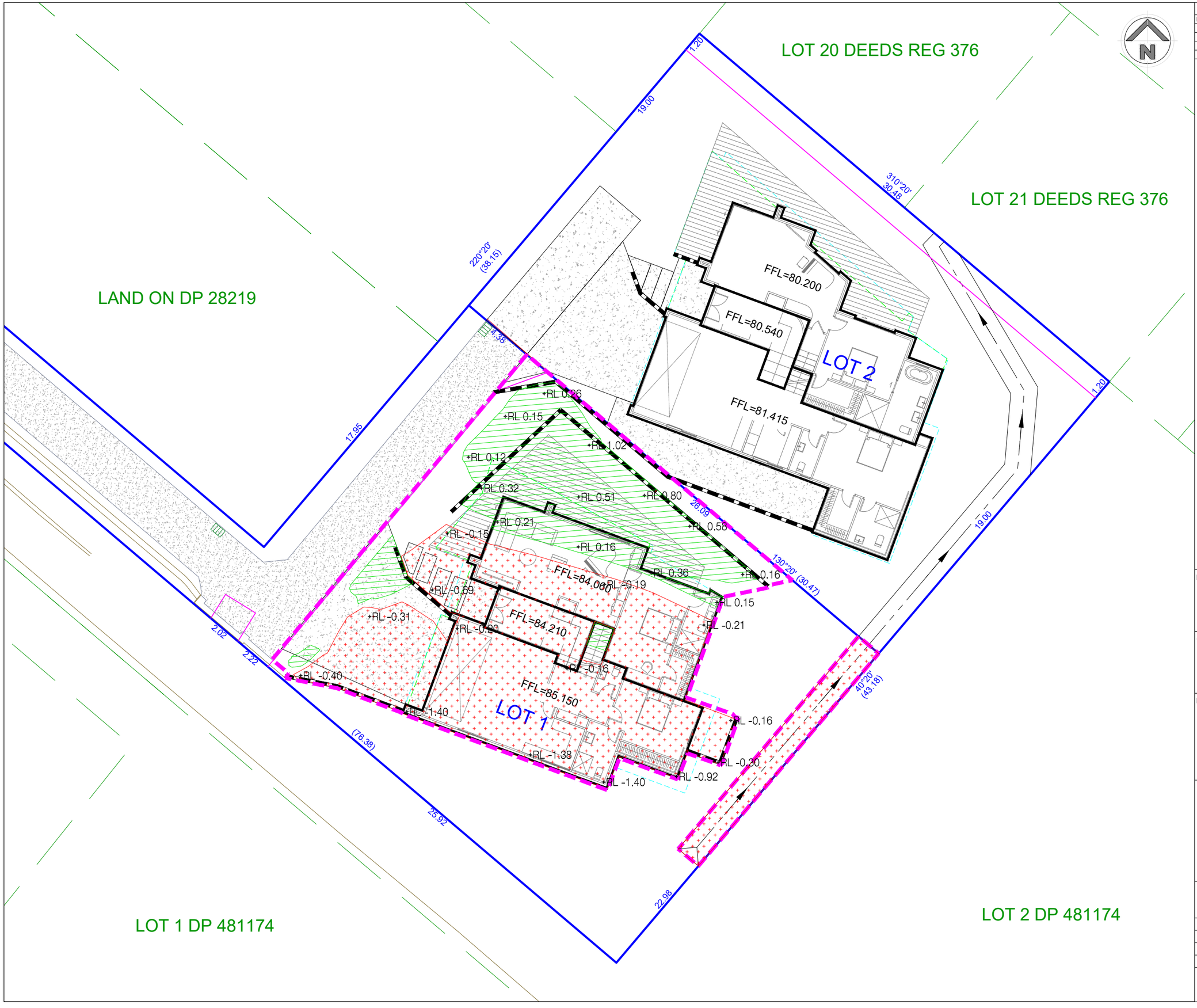
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-104	A



REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

LEGEND

FILL AREA

CUT AREA

EARTHWORKS AREA

+RL -1.40 CUT DEPTH

+RL 1.00 FILL DEPTH

EARTHWORKS VOLUME

BULK CUT (SOLID MEASURE)	150 m3
BULK FILL (SOLID MEASURE)	40 m3
NET CUT (SOLID MEASURE)	110 m3

EARTHWORKS AREA = 405m2

DRAWING TITLE

CUT & FILL (LOT 1)

CLIENT

A & Y CONTRACTOR LIMITED

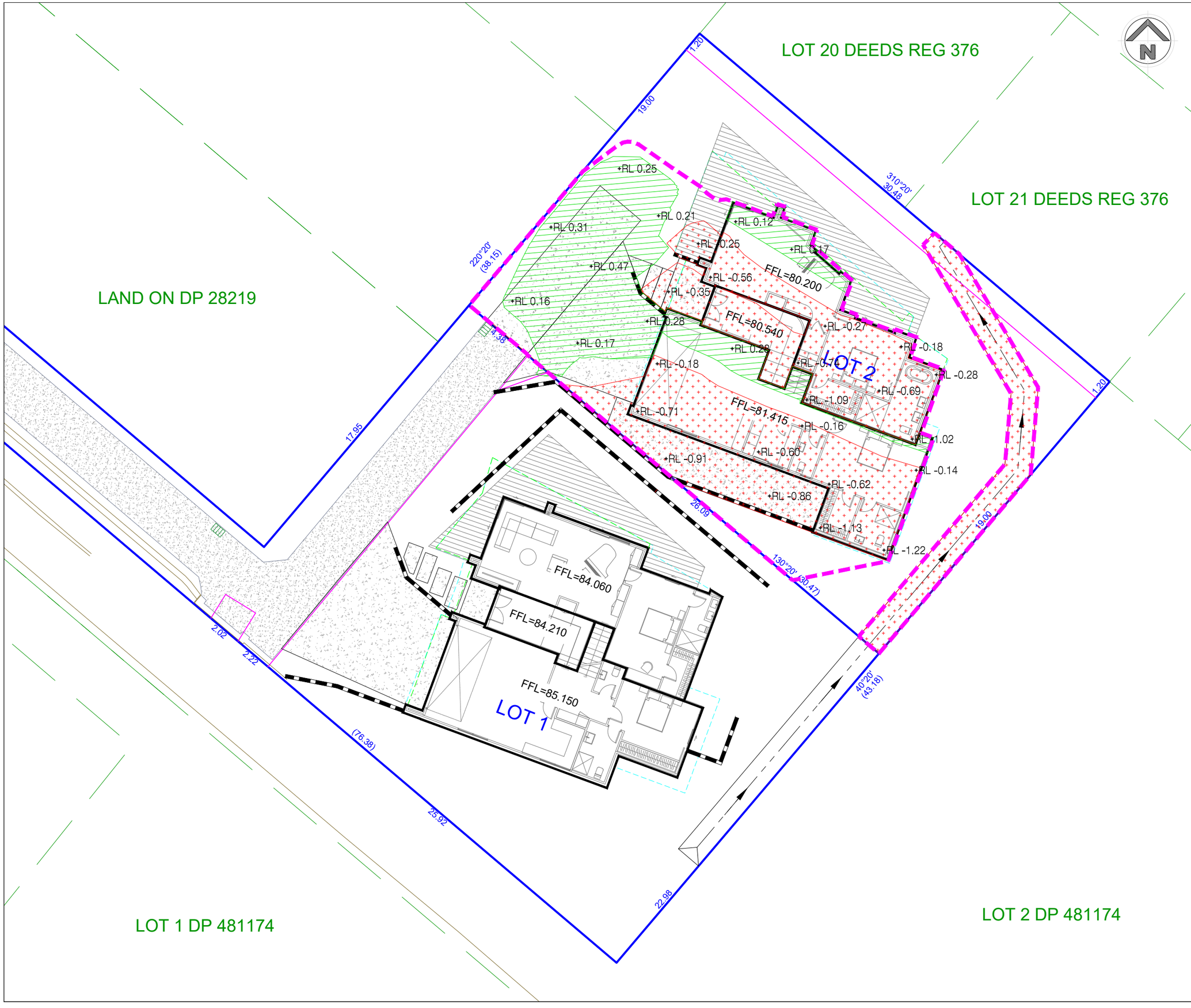
PROJECT

22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-105	A



REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

LEGEND

FILL AREA

CUT AREA

EARTHWORKS AREA

+RL -1.40 CUT DEPTH

+RL 1.00 FILL DEPTH

EARTHWORKS VOLUME

BULK CUT (SOLID MEASURE)	100 m3
BULK FILL (SOLID MEASURE)	20 m3
NET CUT (SOLID MEASURE)	80 m3

EARTHWORKS AREA = 405m2

DRAWING TITLE

CUT & FILL (LOT 2)

CLIENT

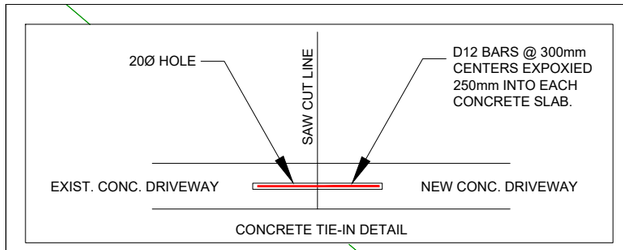
A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-106	A



CONCRETE TIE-IN DETAIL

LOT 20 DEEDS REG 376

LOT 21 DEEDS REG 376

LAND ON DP 28219

EXISTING SS STUB CONNECTION TO BE REUSED TO SERVICE LOT 2 IL=78.39

PROP. 1200mmØ PRE CAST MH RISER 2 RATE=8.7l/s

BH 3

PROP.150mm REINFORCED 25Mpa CONCRETE W/665 MESH. WITH 50mm AP20 BASECOURSE. WITH 150mm GAP65 SUBASE. CBR>5

EXISTING SS STUB CONNECTION TO BE REUSED TO SERVICE LOT 1 IL=80.71

CONCRETE TIE-IN DETAILS

EXISTING CONCRETE DRIVEWAY TO REMAIN TO SERVICE THE NEW DEVELOPMENT

EX SW SOAKAGE MH LL=82.01

EX SW SOAKAGE MH LL=82.56

EX.150mmØ SS LINE (CCTV INVESTIGATED)

IL(IN)=83.12

IL(OUT)=83.07

EX SSMH LL=85.15

PROP. 1200mmØ PRE CAST MH RISER 1 RATE=8.0l/s

BH 1

FFL=80.200

FFL=80.540

FFL=81.415

LOT 2

FFL=84.060

FFL=84.210

LOT 1 FFL=85.150

PROP.150mm REINFORCED 25Mpa CONCRETE W/665 MESH. WITH 50mm AP20 BASECOURSE. WITH 150mm GAP65 SUBASE. CBR>5

LOT 1 DP 481174

LOT 2 DP 481174

REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

LEGEND

- EXISTING SEWER MANHOLE AND LINE
- PROP. 1200mmØ PRE CAST MANHOLE RISER (SOAKAGE CHAMBER)
- PROP. SETTLING CHAMBER 675Øx900mm DEEP (INDICATIVE LOCATION)
- PROP 100mmØ uPVC SW LINE
- PROP PRIVATE 150mmØ uPVC SW PIPE
- EX. 100mmØ uPVC SS LOT CONNECTION
- PROP 100mmØ uPVC SW LOT CONNECTION
- EX. FIELD CESSPIT
- PROP. FIELD CESSPIT
- PROP GRATED CHANNEL
- UNDERGROUND DETENTION TANK (AQUACOMB PODS) INDICATIVE LOCATION

DRAWING TITLE

DRAINAGE & DRIVEWAY PLAN

CLIENT

A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE, MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-107	A

LOT 20 DEEDS REG 376

LOT 21 DEEDS REG 376

LAND ON DP 28219

LOT 1 DP 481174

LOT 2 DP 481174

1.20

19.00

310°20'
30.48

220°20' (38.15)

17.95

2.02

2.23

C1

C1 AREA =267m²

130°20' (30.47)

19.00

40°20'
(43.18)

(76.38)

25.92

22.98

N

REVISION				
ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

DRAWING TITLE

SOAKAGE CATCHMENT PLAN
(LOT 1)

CLIENT

A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR
CONSULTING LTD

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-108	A

REVISION				
ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

Intorock Drilling Ltd

BORE LOG SHEET

DATE: 24.11.15

CLIENT:	Anchor Consulting
DESCRIPTION OF WORK:	Drill bore for soakage & test
LOCATION:	22 Summit Drive, Mt Albert
METHOD OF BORING:	Percussion DTH
BOREHOLE NO:	One
BOREHOLE DIA:	100mm
BOREHOLE I.D:	
BOREHOLE LOC:	6m x 5m from front right corner

STRATA		FLOW TEST			
Depth	Description	Meter Start	Meter Finish	Duration	Lts / sec
1m	Ash				
2m					
2.5m	Boulders & Ash				
3m					
3.4m					
4m					
5m					
6m					
7m					
8m					
9m					
10m	Scoria				
11m					
12m					
13m					
14m		Pre	Soak	10mins	
15m		N/A	N/A	10mins	
15.5m	E.O.B	=	4,800L	/600sec	8.0L/sec
16m					
17m					
18m			Full	Hydrant	Flow
19m					
20m					

Flow test result is only relevant to the actual time of testing.

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www.intorockdrilling.co.nz PO Box 79 DRURY 2247

BH1

Worksheet 3: Rockbore Constant Head Percolation Test (page 2 of 2)

Borehole number: One Test number: 1 of total no. 1

1. Capacity of test borehole (use minimum value recorded in test interval)

Unfactored bore capacity[2]	$= \bar{P} = Min\ Flowrate$	=	8.0 L/s
FoS for consequences of failure[3]	$= F_{(C)}$	=	1.0
FoS for testing uncertainty[4]	$= F_{(U)}$	=	1.2
Total Factor of Safety	$F_{(total)} = F_{(C)} \times F_{(U)}$	=	1.2
Factored percolation rate	$P_{(Factored)} = \frac{\bar{P}}{F_{(total)}}$	=	6.7 L/s

General comments (indications of waterlogging, rock structure, etc.):

Name of test operator: Intorock Drilling Ltd Date: 15/11/24

Qualification: Signature:

Notes:
[1] mBGL = metres below ground level
[2] Use lowest tested flowrate (usually last interval). Repeat the test at least twice until the end of test flow rate is consistent to ±10%.
[3] See Section B.4.0 Table 5 for factors of safety.
[4] See Section B.4.0 Table 6 for factors of safety.

BH1

Appendix B1.4 Worksheet 4: Rockbore design summary

Site Address: 22 Summit Drive
Designer: Shehan Attanayaka Date: 01/05/2025
Qualification: BE (civil) Signed: C/L
Reviewer: Chang Jin Khow Date:
Qualification: Licensed Cadastral Surveyor Signed:

Step 1. Site assessment
Number of boreholes (Manhole 1): 1
Manhole 1 diameter: 100 mm
Number of boreholes (Manhole 2) – where required:
Manhole 2 diameter – where required: mm

Step 2. Hydrological requirement
Peak discharge rate (Use TP108 Method), Q_{PS}[1] 11.8 L/s

Step 3. Soakage rate (after factor of safety is applied)
Borehole Factored Soakage Rate Details[2]

Manhole 1			Manhole 2	
Bore 1, p_1	6.7 L/s		Bore 5, p_5	L/s
Bore 2, p_2	L/s		Bore 6, p_6	L/s
Bore 3, p_3	L/s		Bore 7, p_7	L/s
Bore 4, p_4[3]	L/s		Bore 8, p_8[3]	L/s
Total soakage rate with factor of safety applied $P_{(factored)}$	6.7 L/s			

$P_{(factored)} \geq Q_{PS}$[1] ☐ YES ☑ NO

If yes, design is complete. If no, consider drilling more bores or using multiple devices.

* provide 1.4 m³ under ground tank for stormwater mitigation

[1] Attach TP108 worksheet while submitting this worksheet for approval
[2] The soakage rate of every borehole shall be determined in L/s
[3] The designer may choose to have an extra borehole drilled for future development. The bore should be tested, but the soakage rate that it contributes should not be included in the Total Factored Soakage Rate for rockbore sizing.

BH1

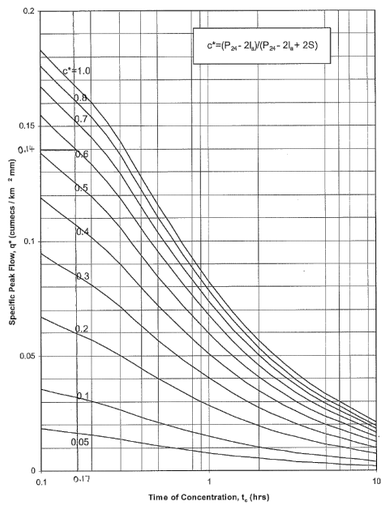


Figure 5.1 - Specific Peak Flow Rate

Worksheet 1: Graphical Peak Flow Rate

Project:	A15-0082		By:	SA	Date: 2025May01
Location:	22 Summit Drive		Checked:	ME	Date: 2025May01
Circle one:		Pre-development		Post-development	

Data:		Percentage	Km^2
Lot Area (m2)=	595.48		0.00059548
Imperv Area (m2)=	265.88	0.45	
Perv Area (m2)=	329.6	0.55	

ARI (Yr) =	10yr
P_{24} (mm) =	141
TC (Hr) =	0.17
CN =	74

TP 108 Include Climate Change

1. Weighted Average Curve Number =	(74 x Pervious %) + (98 x Impervious%) = 84.7
2. Initial Abstraction I_a (mm)	(5 x Pervious %) + (0 x Impervious%) = 2.8
3. Soil Storage S (mm)	((1000/CN)-10) x 25.4 = 45.8
4. Runoff Index C*	$= \frac{(P_{24} - 2I_{a)}}{(P_{24}-2I_a+2s)}$ = 0.60
5. Specific Flow Rate q*	Using TP108 Figure 5.1 = 0.140
6. Peak Runoff q_p	= q* x A x P_{24} (A=km2) = 0.011754775 m3/s = 11.7547752 l/s

DRAWING TITLE
SOAKAGE CALCULATION
(LOT 1)

CLIENT
A & Y CONTRACTOR LIMITED

PROJECT
22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	NTS		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No.	A15-0082	DWG No.	RC-109
REV.	A		

Detention Tank Calculation Summary

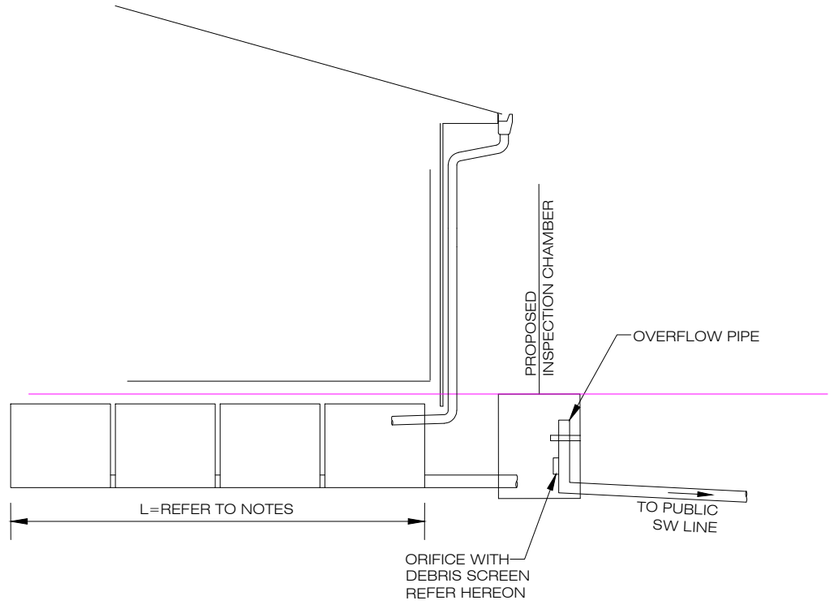
22 Summit Drive

1 Detention Purpose 4x350l Aquacomb (4x1.1mLx1.1mWx0.3mD)

Pre Dev Imperv Area=	0	m^2		
Imperv Area=	266	m^2	Additional Impervious Area only	
Impervious Area to be use for 22 Summit Drive tank calculations=	270	m^2	Tank to be upsized to compensate the driveway area.	

2 Temporary Storage for 10 ARI Storm — I=141mm/day — TP 108 Includes Climate Change Factor

Orifice diameter	=	0.085	m	(input in HEC-HMS)
Cross sectional area (A)	=	0.005674502	m^2	
Orifice centre elevation	=	0.143	m	(bottom+100mm+half orifice diameter)
Post development peak flow	=	0.00553	m^3/s	(from HEC-HMS)- Soakage Rate with factor of safety applied = 6.7 l/s
Soakage Flowrate	<	0.00670	m^3/s	Q_{post} is less than soakgae flowrate therefore O.K.
10 year peak storage = min tank size	=	**1.26**	m^3	(from HEC-HMS)
Peak elevation	=	0.269	m	(from HEC-HMS)



UNDERGROUND DETENTION TANK DETAILS

NTS

REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

DRAWING TITLE

DETENTION TANK DETAILS
(LOT 1)

CLIENT

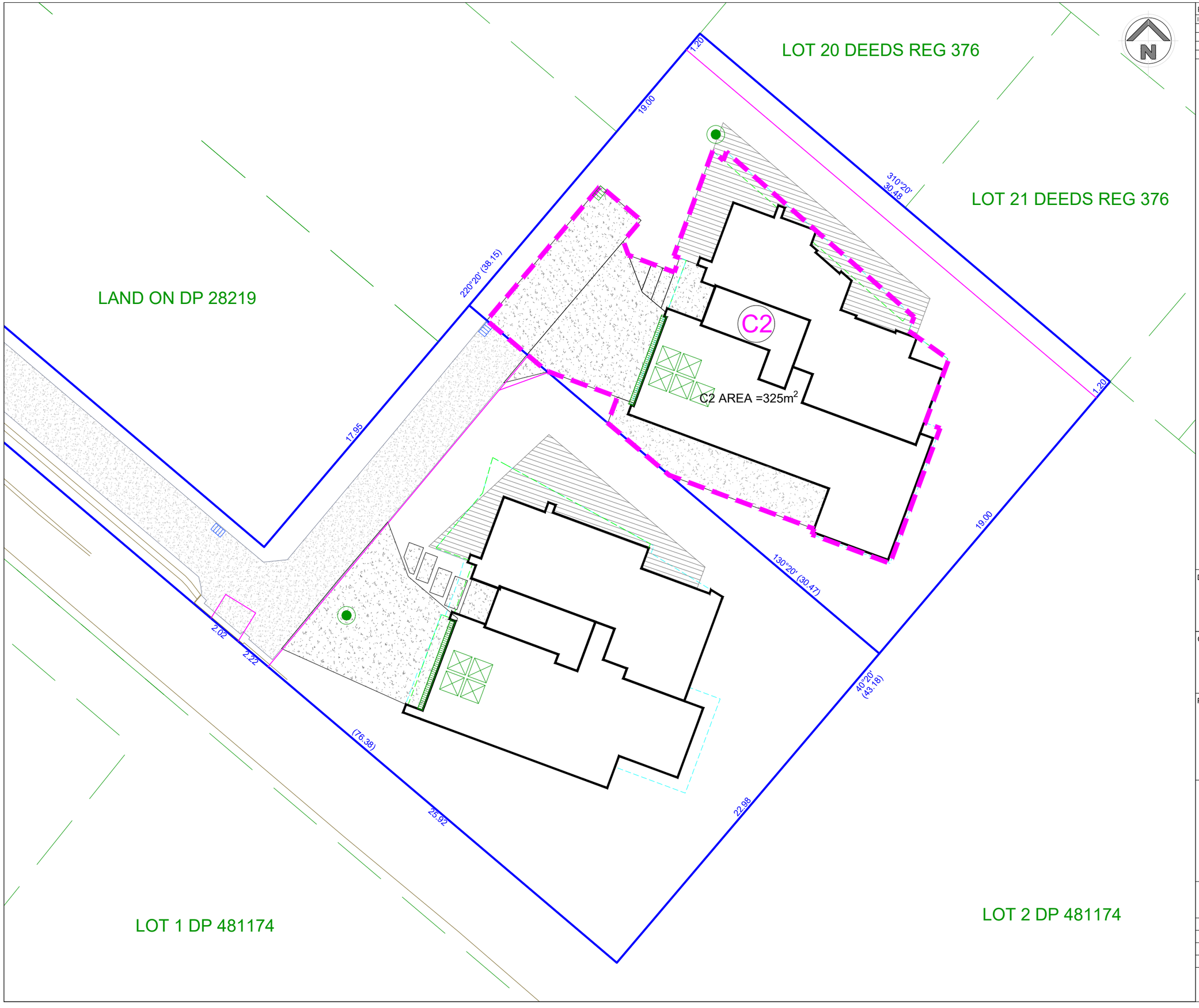
A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	NTS		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-110	A



REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

DRAWING TITLE

SOAKAGE CATCHMENT PLAN
(LOT 2)

CLIENT

A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-111	A

REVISION				
ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

Intorock Drilling Ltd

BORE LOG SHEET

DATE: 24.11.15

CLIENT: Anchor Consulting
DESCRIPTION OF WORK: Drill bore for soakage & test
LOCATION: 22aSummit Drive, Mt Albert
METHOD OF BORING: Percussion DTH
BOREHOLE NO: Three BOREHOLE DIA: 100mm
BOREHOLE I.D:
BOREHOLE LOC: 5m x 3m from front left corner

STRATA		FLOW TEST			
Depth	Description	Meter Start	Meter Finish	Duration	Lts / sec
1m					
2m	Stiff Ash				
2.5m					
3m	Basalt Rock				
3.4m	Broken Rock				
4m					
4.0m	→ 4.7m Basalt Rock	Pre	Soak	10mins	
5m	Broken Rock	N/A	N/A	10mins	
6m					
6.5m	E.O.B	=	5,220L	/600sec	8.7L/sec
7m					
8m			Full	Hydrant	Flow
9m					
10m					
11m					
12m					
13m					
14m					
15m					
16m					
17m					
18m					
19m					
20m					

Flow test result is only relevant to the actual time of testing.

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BH3

Worksheet 3: Rockbore Constant Head Percolation Test (page 2 of 2)

Borehole number: Three Test number: 1 of total no. 1

1. Capacity of test borehole (use minimum value recorded in test interval)

Unfactored bore capacity[3]	$= P =$ Min Flowrate	= 8.7	L/s
FoS for consequences of failure[3]	$= F_{(c)}$	= 1.0	
FoS for testing uncertainty[4]	$= F_{(u)}$	= 1.2	
Total Factor of Safety	$F_{(total)} = F_{(c)} \times F_{(u)}$	= 1.2	
Factored percolation rate	$P_{(factored)} = \frac{P}{F_{(total)}}$	= 7.25	L/s

General comments (indications of waterlogging, rock structure, etc.):

Name of test operator: Intorock Drilling Ltd Date: 15/11/2024
Qualification: Signature:

Notes:
[1] mBGL = metres below ground level
[2] Use lowest tested flowrate (usually last interval). Repeat the test at least twice until the end of test flow rate is consistent to ±10%.
[3] See Section B.4.0 Table 5 for factors of safety.
[4] See Section B.4.0 Table 6 for factors of safety.

BH3

Appendix B1.4 Worksheet 4: Rockbore design summary

Site Address: 22A Summit Drive
Designer: Shehan Attanayaka Date: 01/05/2025
Qualification: BE (Civil) Signed:
Reviewer: Chong Jin Khaw Date:
Qualification: Licensed Cadastral Surveyor Signed:

Step 1. Site assessment
Number of boreholes (Manhole 1): 1
Manhole 1 diameter: 100 mm
Number of boreholes (Manhole 2) – where required:
Manhole 2 diameter – where required: mm

Step 2. Hydrological requirement
Peak discharge rate (Use TP108 Method), Q_m[1] 12.75 L/s

Step 3. Soakage rate (after factor of safety is applied)
Borehole Factored Soakage Rate Details[2]

Manhole 1		Manhole 2	
Bore 1, p_1 7.25	L/s	Bore 5, p_5	L/s
Bore 2, p_2	L/s	Bore 6, p_6	L/s
Bore 3, p_3	L/s	Bore 7, p_7	L/s
Bore 4, p_4[3]	L/s	Bore 8, p_8[3]	L/s
Total soakage rate with factor of safety applied $p_{(factored)}$ 7.25			L/s

$p_{(factored)} \geq Q_m$?[4] ☐ YES ☑ NO

If yes, design is complete. If no, consider drilling more bores or using multiple devices.

* provide 1.4 m³ under ground tank for stormwater mitigation.

[1] Attach TP108 worksheet while submitting this worksheet for approval
[2] The soakage rate of every borehole shall be determined in L/s.
[3] The designer may choose to have an extra borehole drilled for future development. The bore should be tested, but the soakage rate that it contributes should not be included in the Total Factored Soakage Rate for rockbore sizing.

BH3

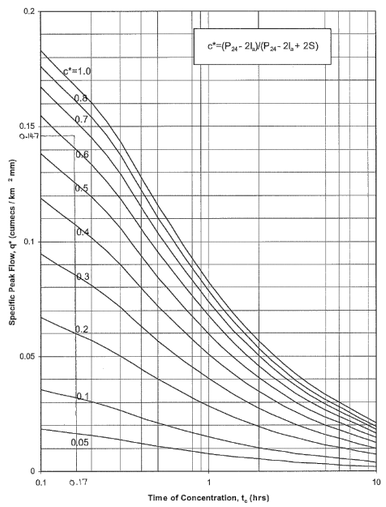


Figure 5.1 - Specific Peak Flow Rate

Worksheet 1: Graphical Peak Flow Rate

Project: A15-0082 By: SA Date: 2025May01
Location: 22A Summit Drive Checked: ME Date: 2025May01
Circle one: Pre-development Post-development

Data:		Percentage	Km^2
Lot Area (m2)=	615		0.000615
Imperv Area (m2)=	325	0.53	
Perv Area (m2)=	290	0.47	

ARI (Yr) =	10yr
P_{24} (mm) =	141
TC (Hr) =	0.17
CN =	74

TP 108 Include Climate Change

1. Weighted Average Curve Number =	(74 x Pervious %) + (98 x Impervious%) = 86.7
2. Initial Abstraction I_a (mm)	(5 x Pervious %) + (0 x Impervious%) = 2.4
3. Soil Storage S (mm)	((1000/CN)-10) x 25.4 = 39.0
4. Runoff Index C*	$= \frac{(P_{24} - 2I_{a)}}{(P_{24}-2I_a+2s)}$ = 0.64
5. Specific Flow Rate q*	Using TP108 Figure 5.1 = 0.147
6. Peak Runoff q_p	= q* x A x P_{24} (A=km2) = 0.012747105 m3/s = 12.747105 l/s

DRAWING TITLE
SOAKAGE CALCULATION
(LOT 2)

CLIENT
A & Y CONTRACTOR LIMITED

PROJECT
22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	NTS		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No. A15-0082		DWG No. RC-112	REV. A

Detention Tank Calculation Summary

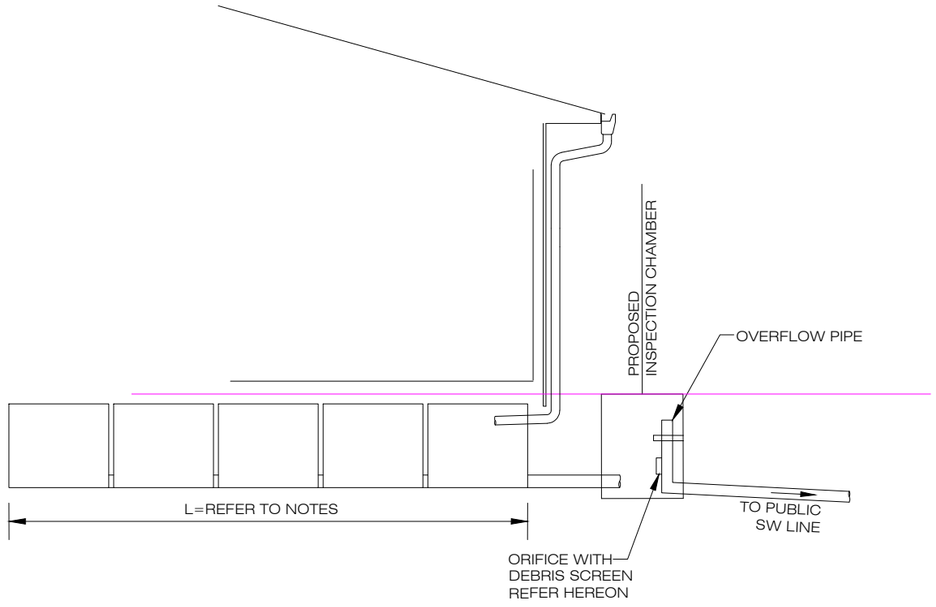
22A Summit Drive

1 Detention Purpose 5x350l Aquacomb (5x1.1mLx1.1mWx0.3mD)

Pre Dev Imperv Area=	0	m^2		
Imperv Area=	325	m^2	Additional Impervious Area only	
Impervious Area to be use for 22 Summit Drive tank calculations=	330	m^2	Tank to be upsized to compensate the driveway area.	

2 Temporary Storage for 10 ARI Storm — I=141mm/day — TP 108 Includes Climate Change Factor

Orifice diameter	=	0.090	m	(input in HEC-HMS)
Cross sectional area (A)	=	0.006361725	m^2	
Orifice centre elevation	=	0.145	m	(bottom+100mm+half orifice diameter)
Post development peak flow	=	0.00674	m^3/s	(from HEC-HMS)- Soakage Rate with factor of safety applied = 7.3 l/s
Soakage Flowrate	<	0.00730	m^3/s	Q_{post} is less than soakgae flowrate therefore O.K.
10 year peak storage = min tank size	=	**1.71**	m^3	(from HEC-HMS)
Peak elevation	=	0.29	m	(from HEC-HMS)



UNDERGROUND DETENTION TANK DETAILS

NTS

REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

DRAWING TITLE

DETENTION TANK DETAILS
(LOT 2)

CLIENT

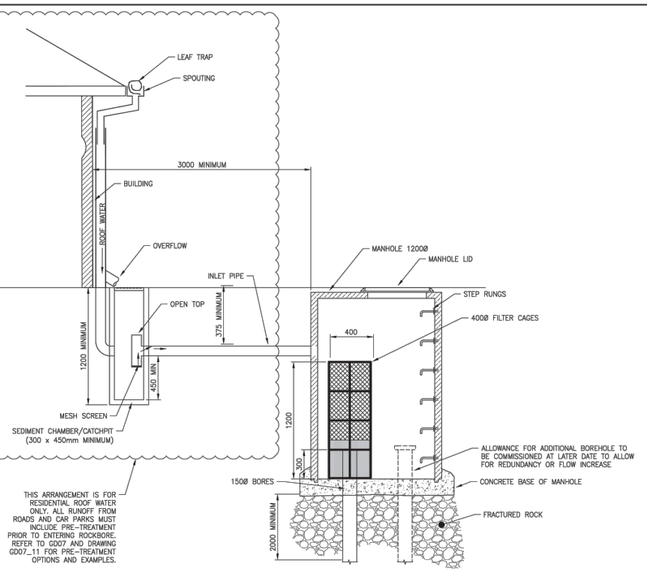
A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	NTS		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No. A15-0082		DWG No. RC-113	REV. A



ROCKBORE WITH 1 BORE

NOTES:

1. MINIMUM MANHOLE DIAMETER SIZED TO ACCOMODATE AN ADDITIONAL BOREHOLE TO BE COMMISSIONED AT A LATER DATE.

No. OF BORES	ALLOWANCE FOR ADDITIONAL BORES	MIN. MANHOLE DIAMETER FOR ROCKBORE
1	1	1200
2	1	1500
3	1	1800

2. FLOW TESTING OF ROCKBORES TO BE CARRIED OUT BEFORE AND AFTER CAGE INSTALLATION.
3. NEW ROCKBORE MINIMUM DEPTH OF MANHOLE 1.5m. MANHOLES DEEPER THAN 2.5m WILL NEED DISCUSSION AS ACCESSIBILITY FOR MAINTENANCE BECOMES AN ISSUE.
4. MINIMUM DEPTH OF BOREHOLE FROM CONCRETE BASE OF MANHOLE IS 2.0m.
5. ACCESS RUNGS SHALL BE PROVIDED FOR MANHOLE ACCESS. REFER TO DRAWING IN STORMWATER CODE OF PRACTICE FOR DETAILS.
6. BOREHOLE POSITIONS RELATIVE TO MANHOLE LID NOT SHOWN TO ACCURATELY TO AID CLARITY. POSITION SHOULD BE AS PER DRAWING GD07_02.
7. SETBACK REQUIREMENTS

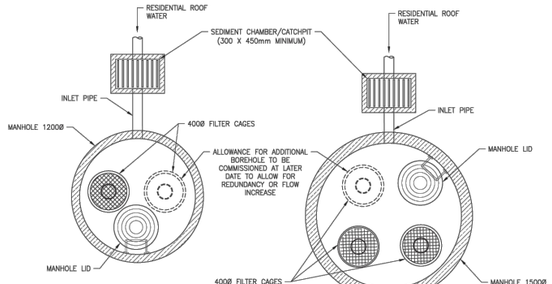
   BUILDINGS AND PROPERTY BOUNDARIES:
   - A SETBACK DISTANCE OF 3m IS RECOMMENDED FOR BUILDINGS AND PROPERTY BOUNDARIES. SPECIFIC GEOTECHNICAL DESIGN WILL BE REQUIRED WHERE THE DEVICE MAY AFFECT ADJACENT STRUCTURES (SUBJECT TO COUNCIL APPROVAL).
   - WHERE THIS IS NOT PRACTICALLY POSSIBLE A SITE-SPECIFIC GEOTECHNICAL DESIGN MUST BE COMPLETED TAKING INTO ACCOUNT THE EFFECTS OF THE SOAKAGE DEVICE ON BUILDING FOUNDATIONS AND POTENTIAL FOR FLOODING OF NEIGHBOURING PROPERTIES. THIS MUST BE DONE BY A CHARTERED GEOTECHNICAL ENGINEER OR A PROFESSIONAL ENGINEERING GEOLOGIST.
   - DEVICES SHALL NOT BE PLACED BELOW BUILDINGS AND BUILDINGS SHALL NOT BE BUILT OVER SOAKAGE DEVICES.

   RETAINING WALLS:
   - FOR WALLS < 2m HIGH, THE SETBACK MUST NOT BE LESS THAN THE HEIGHT OF THE RETAINING WALL + 1.5m AND WHERE THE SOAKAGE DEVICE IS UP SLOPE OF THE WALL, THEN THE WALL MUST HAVE BEEN DESIGNED TO TAKE FULL WATER LOADING.
   - THE ROCK BORE MUST BE DESIGNED TO DISCHARGE IN A ZONE THAT IS BELOW THE TOE OF ANY WALL WITHIN 10 M.
   - FOR WALLS > 2m HIGH, A SITE-SPECIFIC DESIGN MUST BE CARRIED OUT BY A GEOTECHNICAL ENGINEER, CONSIDERING RELEVANT GEOTECHNICAL ISSUES AND CUT-OFF DRAINAGE OF THE RETAINING WALL.

   UNDERGROUND INFRASTRUCTURE:
   - A SETBACK DISTANCE OF 2m IS REQUIRED FROM ANY EXISTING WATER AND WASTEWATER PIPES.
8. DEVICES THAT WILL BE VESTED TO AUCKLAND TRANSPORT SHALL BE DESIGNED IN ACCORDANCE WITH THE AUCKLAND TRANSPORT CODE OF PRACTICE.
9. PIPE EMBEDMENT DETAILS FOR PRIVATE DRAINAGE SHALL COMPLY WITH BUILDING CODE AS PER NZS 7643.
10. PIPE EMBEDMENT DETAILS FOR THE PUBLIC DRAINAGE SHALL COMPLY WITH STORMWATER CODE OF PRACTICE (SWCOP) DRAWINGS.

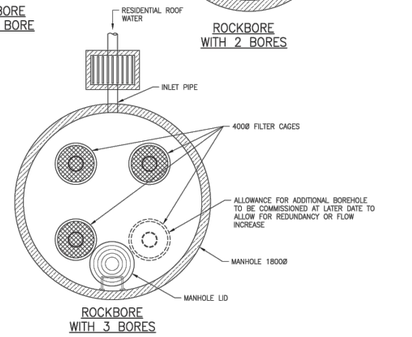
PLOT DATE: 23/6/2021 11:05 am U:\2020\JER\2573.3_SPD\3_Solutions docs\GD07 - Soakage\Drawings\CAD\GD07_01.dwg

SOAKAGE GUIDELINE DOCUMENT	AUCKLAND COUNCIL
STANDARD DETAILS	TYPICAL ROCKBORE
REVISION: 0	FOR FRACTURED ROCK (SECTION)
REV DATE: 21/06/2021	ENVIRONMENTAL-SW
CAD FILENAME: GD07_01.DWG	ORIGINAL SCALE: N.T.S. A3
	DRAWING SET: GD07 SHEET: 1 OF 1
	DRAWING No.: GD07_01 REV: 0



ROCKBORE WITH 1 BORE

ROCKBORE WITH 2 BORES



ROCKBORE WITH 3 BORES

NOTES:

1. REFER TO DRAWING GD07_01 NOTES 1.
2. ALLOWANCE SHALL BE MADE FOR 1 ADDITIONAL BORE TO BE DRILLED FOR REDUNDANCY DUE TO BLOCKAGE OR INCREASED FLOW.
3. ALL RESIDENTIAL ROOF WATER SHALL DISCHARGE TO SEDIMENT CHAMBER / CATCHPIT AND NOT DIRECTLY INTO THE DEVICE.
4. ALL RUNOFF FROM ROADS, CAR PARKS OR OTHER CONTAMINANT SOURCES MUST INCLUDE PRE-TREATMENT OF RUNOFF PRIOR TO ENTERING ROCKBORE. REFER TO GD07 AND DRAWING GD07_11 FOR PRE-TREATMENT OPTIONS AND EXAMPLES.
5. LEAF TRAP TO BE INSTALLED IN ROOF GUTTERS.

PLOT DATE: 23/6/2021 11:05 am U:\2020\JER\2573.3_SPD\3_Solutions docs\GD07 - Soakage\Drawings\CAD\GD07_02.dwg

SOAKAGE GUIDELINE DOCUMENT	AUCKLAND COUNCIL
STANDARD DETAILS	TYPICAL ROCKBORE
REVISION: 0	FOR FRACTURED ROCK (PLAN)
REV DATE: 21/06/2021	ENVIRONMENTAL-SW
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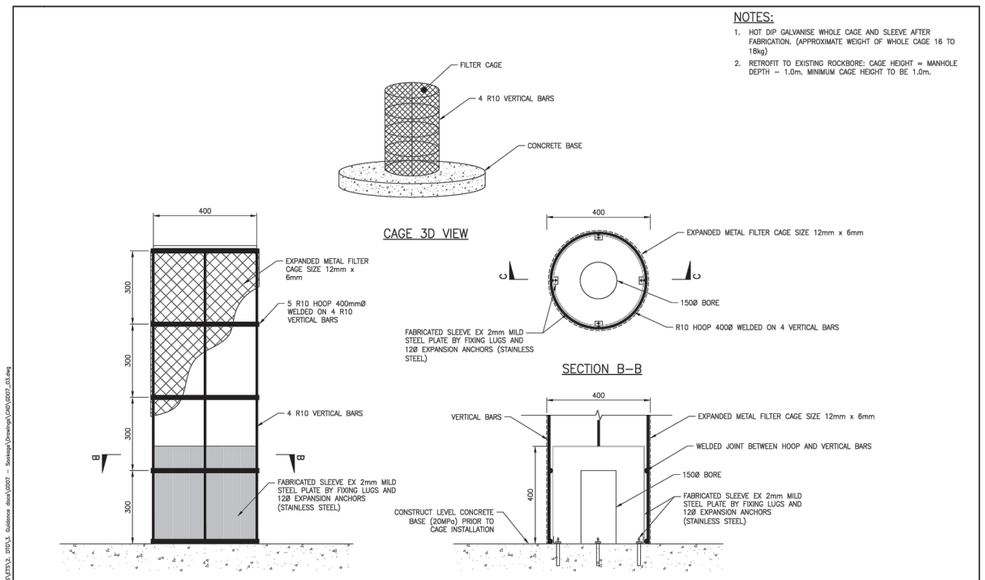
	DRAWING SET: GD07 SHEET: 1 OF 1
	DRAWING No.: GD07_02 REV: 0



PLOT DATE: 23/6/2021 11:05 am U:\2020\JER\2573.3_SPD\3_Solutions docs\GD07 - Soakage\Drawings\CAD\GD07_03.dwg

SOAKAGE GUIDELINE DOCUMENT	AUCKLAND COUNCIL
STANDARD DETAILS	TYPICAL ROCKBORE FILTER CAGE (DETAILS)
REVISION: 0	FOR FRACTURED ROCK
REV DATE: 21/06/2021	ENVIRONMENTAL-SW
CAD FILENAME: GD07_03.DWG	ORIGINAL SCALE: N.T.S. A3
	DRAWING SET: GD07 SHEET: 1 OF 1
	DRAWING No.: GD07_03 REV: 0

REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

DRAWING TITLE

SOAKAGE STANDARD DETAILS

CLIENT

A & Y CONTRACTOR LIMITED

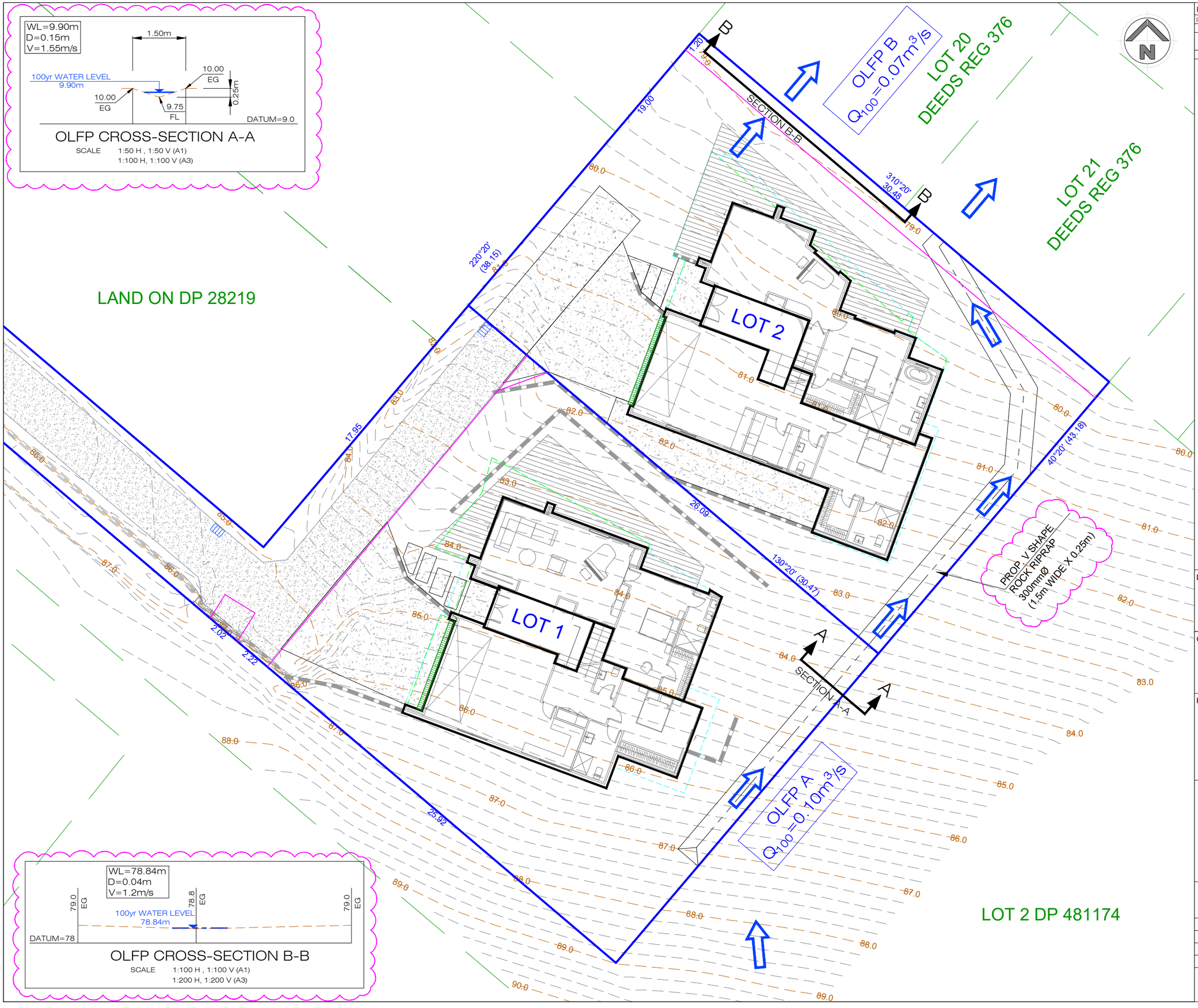
PROJECT

22&22A SUMMIT DRIVE, MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	NTS		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-114	A



REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA
B	09/12/25	SWALE SPECS CHANGED TO ROCK RIP RAP	CK	ME

LEGEND:

OLPF DIRECTION.

DRAWING TITLE

POST DEVELOPMENT
OLFP PLAN

CLIENT

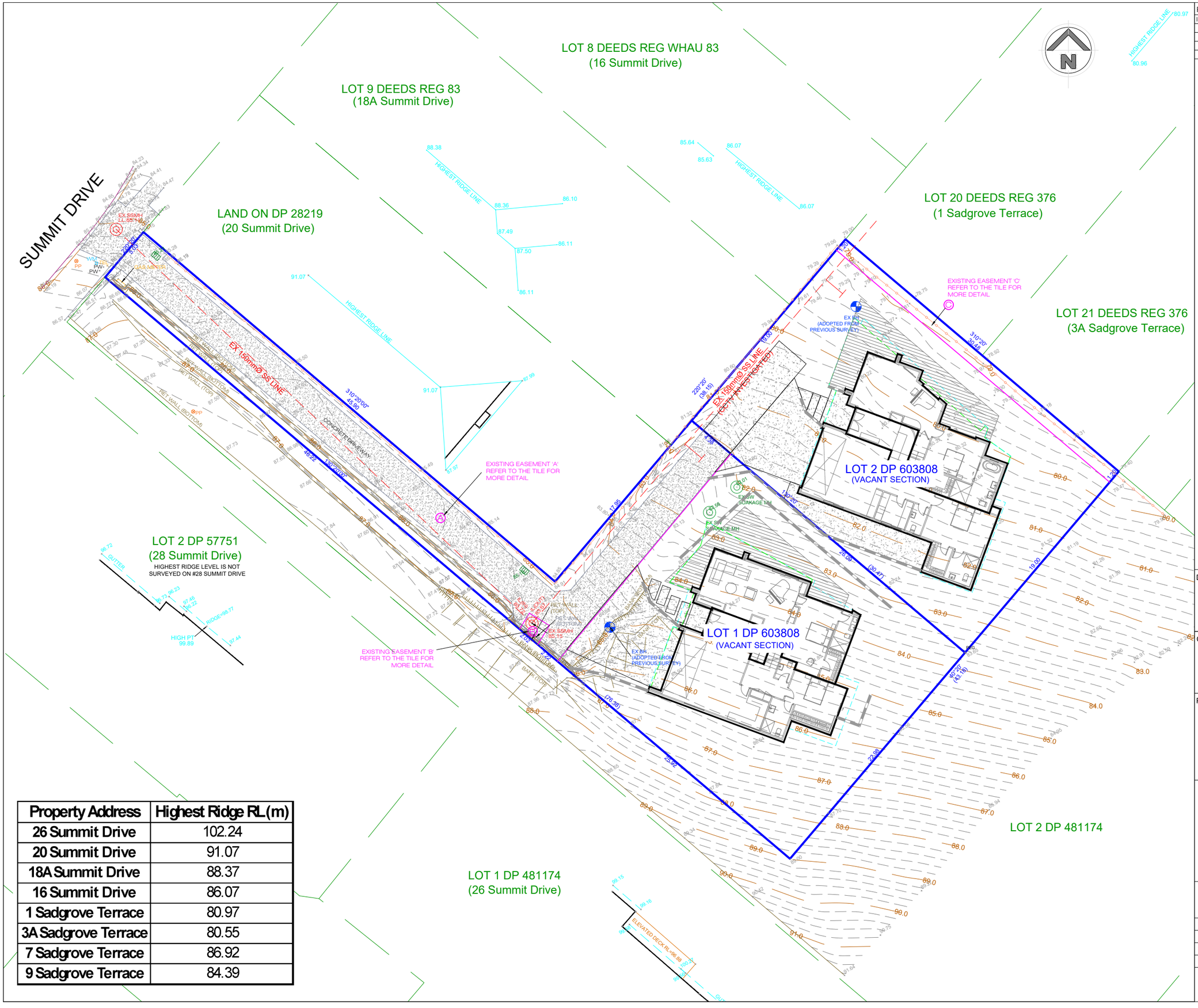
A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE,
MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
DATE:	APRIL 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY :	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-115	B



Property Address	Highest Ridge RL(m)
26 Summit Drive	102.24
20 Summit Drive	91.07
18A Summit Drive	88.37
16 Summit Drive	86.07
1 Sadgrove Terrace	80.97
3A Sadgrove Terrace	80.55
7 Sadgrove Terrace	86.92
9 Sadgrove Terrace	84.39

REVISION

ISSUE	DATE	DETAILS	CHKD	DWN
A	09/05/25	RC APPLICATION	CK	SA

DRAWING TITLE

CLOSEST BUILDING ROOF HEIGHTS PLAN

CLIENT

A & Y CONTRACTOR LIMITED

PROJECT

22&22A SUMMIT DRIVE, MOUNT ALBERT, AUCKLAND

ANCHOR CONSULTING LTD
Tel: 021 66 99 46
PO Box 34810, Birkenhead 0746, Auckland

SCALE :	1 : 100 @ A1 1 :200 @ A3		
DATE:	MAY 2025		
SURVEYED BY :	CL&AV	DESIGNED BY:	N/A
DRAWN BY:	SA	CHECKED BY	CK
PROJECT No.		DWG No.	REV.
A15-0082		RC-200	A

APPENDIX C - Detention Tank Calculations

Intorock Drilling Ltd

BORE LOG SHEET

DATE: 24.11.15

CLIENT:	Anchor Consulting		
DESCRIPTION OF WORK:	Drill bore for soakage & test		
LOCATION:	22 Summit Drive, Mt Albert		
METHOD OF BORING:	Percussion DTH		
BOREHOLE NO:	One	**BOREHOLE DIA:**	100mm
BOREHOLE I.D:			
BOREHOLE LOC:	6m x 5m from front right corner		

STRATA		FLOW TEST			
Depth	Description	Meter Start	Meter Finish	Duration	Lts / sec
1m	Ash				
2m					
2.5m	Boulders & Ash				
3m					
3.4m					
4m					
5m					
6m					
7m					
8m					
9m					
10m	Scoria				
11m					
12m					
13m					
14m		Pre	Soak	10mins	
15m		N/A	N/A	10mins	
15.5m	E.O.B	=	4,800L	/600sec	8.0L/sec
16m					
17m					
18m			Full	Hydrant	Flow
19m					
20m					

Flow test result is only relevant to the actual time of testing.

Phone: 09 294 6181 Fax: 09 294 6182 Email: info@intorockdrilling.co.nz
www.intorockdrilling.co.nz PO Box 79 DRURY 2247

BH1

Worksheet 3: Rockbore Constant Head Percolation Test (page 2 of 2)

Borehole number: one Test number: 1 of total no. 1

1. Capacity of test borehole (use minimum value recorded in test interval)

Unfactored bore capacity[2]	$= P = Min\ Flowrate$	= 8.0	L/s
FoS for consequences of failure[3]	$= F_{(c)}$	= 1.0	
FoS for testing uncertainty[4]	$= F_{(u)}$	= 1.2	
Total Factor of Safety	$F_{(total)} = F_{(c)} \times F_{(u)}$	= 1.2	
Factored percolation rate	$P_{(factored)} = \frac{P}{F_{(total)}}$	= 6.7	L/s

General comments (indications of waterlogging, rock structure, etc.):

Name of test operator: Intorock Drilling Ltd Date: 15/11/24

Qualification: Signature:

Notes:

[1] mBGL = metres below ground level

[2] Use lowest tested flowrate (usually last interval). Repeat the test at least twice until the end of test flow rate is consistent to ±10%.

[3] See Section B.4.0 Table 5 for factors of safety.

[4] See Section B.4.0 Table 6 for factors of safety.

BH1

Appendix B1.4 Worksheet 4: Rockbore design summary

Site Address: 22 Summit Drive

Designer: Shehan Attanayaka Date: 01/05/2025

Qualification: BE (civil) Signed: [signature]

Reviewer: Chong Jin Khow Date:

Qualification: Licensed Cadastral Surveyor Signed:

Step 1. Site assessment	
Number of boreholes (Manhole 1): 1	
Manhole 1 diameter: 100	mm
Number of boreholes (Manhole 2) – where required:	
Manhole 2 diameter – where required:	mm

Step 2. Hydrological requirement	
Peak discharge rate (Use TP108 Method), $Q_{(S)}$[1] 11.8	L/s

Step 3. Soakage rate (after factor of safety is applied)

Borehole Factored Soakage Rate Details[2]

Manhole 1		Manhole 2	
Bore 1, p_1 6.7	L/s	Bore 5, p_5	L/s
Bore 2, p_2	L/s	Bore 6, p_6	L/s
Bore 3, p_3	L/s	Bore 7, p_7	L/s
Bore 4, p_4[3]	L/s	Bore 8, p_8[3]	L/s
Total soakage rate with factor of safety applied $p_{(factored)}$ 6.7			L/s

$p_{(factored)} \geq Q_{(S)}$?[3]	☐	YES	☑	NO
If yes, design is complete. If no, consider drilling more bores or using multiple devices.				

* provide 1.4 m³ under ground tank for stormwater mitigation.

[1]Attach TP108 worksheet while submitting this worksheet for approval

[2]The soakage rate of every borehole shall be determined in L/s

[3]The designer may choose to have an extra borehole drilled for future development. The bore should be tested, but the soakage rate that it contributes should not be included in the Total Factored Soakage Rate for rockbore sizing.

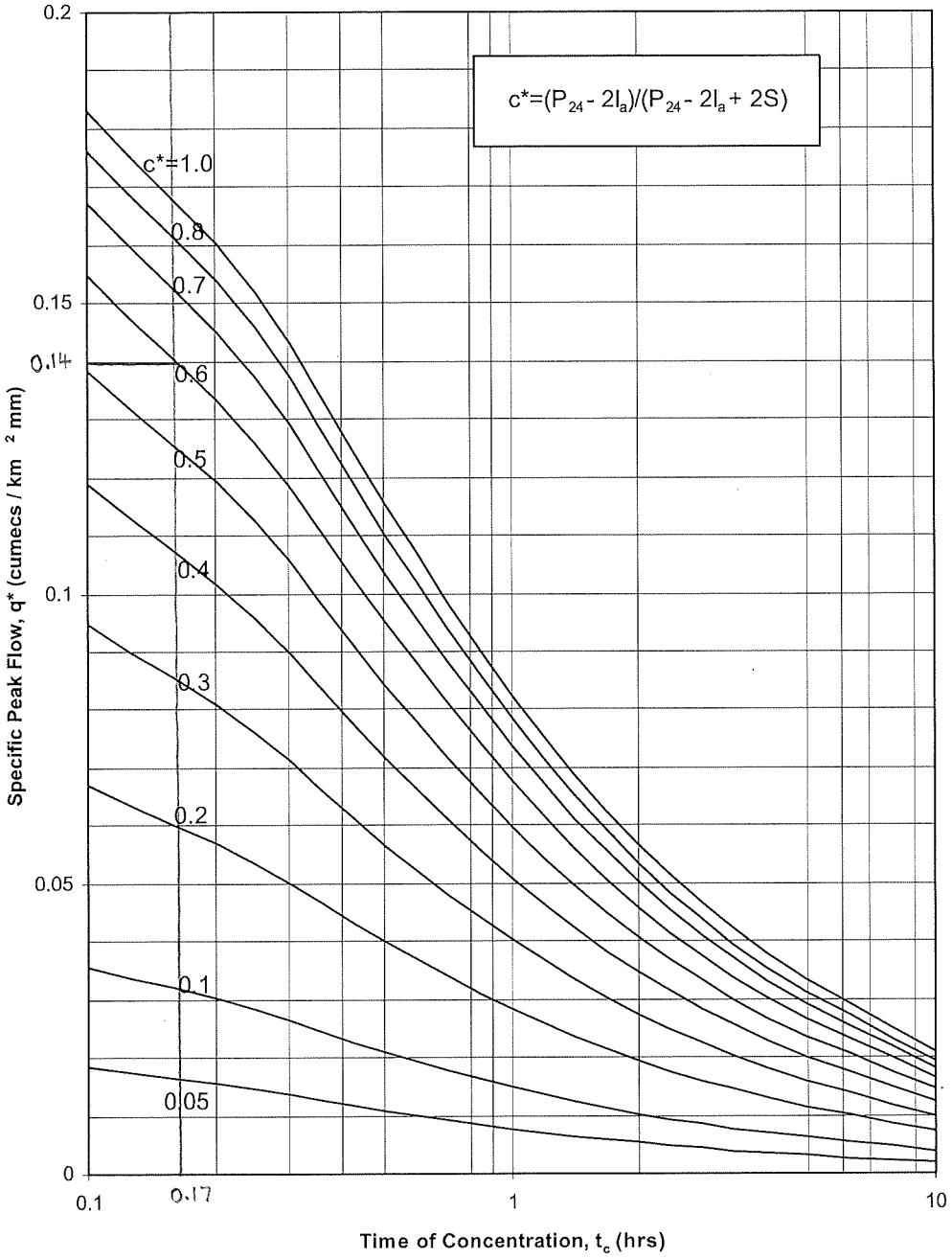


Figure 5.1 - Specific Peak Flow Rate

Worksheet 1: Graphical Peak Flow Rate

Project:	A15-0082	By:	SA	Date:	2025May01
Location:	22 Summit Drive	Checked:	ME	Date:	2025May01
Circle one:	Pre-development		Post-development		

Data:		Percentage	Km^2
Lot Area (m2)=	595.48		0.00059548
Imperv Area (m2)=	265.88	0.45	
Perv Area (m2)=	329.6	0.55	

ARI (Yr) =	10yr
P_{24} (mm) =	141
TC (Hr) =	0.17
CN =	74

TP 108 Include Climate Change

1. Weighted Average Curve Number =	(74 x Pervious %) + (98 x Impervious%)	
	= 84.7	
2. Initial Abstraction I_a (mm)	(5 x Pervious %) + (0 x Impervious%)	
	= 2.8	
3. Soil Storage S (mm)	((1000/CN)-10) x 25.4	
	= 45.8	
4. Runoff Index C*	$= \frac{(P_{24} - 2I_{a)}}{(P_{24}-2I_a+2s)}$	
	= 0.60	
5. Specific Flow Rate q*	Using TP108 Figure 5.1	
	= 0.140	
6. Peak Runoff q_p	= q* x A x P_{24}	(A=km2)
	= 0.011754775 m3/s	
	= 11.7547752 l/s	

Intorock Drilling Ltd

BORE LOG SHEET

DATE: 24.11.15

CLIENT:	Anchor Consulting		
DESCRIPTION OF WORK:	Drill bore for soakage & test		
LOCATION:	22a Summit Drive, Mt Albert		
METHOD OF BORING:	Percussion DTH		
BOREHOLE NO:	Three	**BOREHOLE DIA:**	100mm
BOREHOLE I.D:			
BOREHOLE LOC:	5m x 3m from front left corner		

STRATA			FLOW TEST			
Depth	**Description**		Meter Start	Meter Finish	Duration	Lts / sec
1m						
2m	Stiff Ash					
2.5m						
3m	Basalt Rock					
3.4m						
4m	Broken Rock					
4.0m						
5m	→ 4.7m Basalt Rock		Pre	Soak	10mins	
6m	Broken Rock		N/A	N/A	10mins	
6.5m		E.O.B	=	5,220L	/600sec	8.7L/sec
7m						
8m						
9m				Full	Hydrant	Flow
10m						
11m						
12m						
13m						
14m						
15m						
16m						
17m						
18m						
19m						
20m						

Flow test result is only relevant to the actual time of testing.

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www.intorockdrilling.co.nz PO Box 79 DRURY 2247

BH3

Worksheet 3: Rockbore Constant Head Percolation Test (page 2 of 2)

Borehole number: Three Test number: 1 of total no. 1

1. Capacity of test borehole (use minimum value recorded in test interval)

Unfactored bore capacity[2]	$= P = Min\ Flowrate$	=	8.7	L/s
FoS for consequences of failure[3]	$= F_{(c)}$	=	1.0	
FoS for testing uncertainty[4]	$= F_{(u)}$	=	1.2	
Total Factor of Safety	$F_{(total)} = F_{(c)} \times F_{(u)}$	=	1.2	
Factored percolation rate	$P_{(factored)} = \frac{P}{F_{(total)}}$	=	7.25	L/s

General comments (indications of waterlogging, rock structure, etc.):

Name of test operator: Intorock Drilling Ltd Date: 15/11/2024

Qualification: Signature:

Notes:

[1] mBGL = metres below ground level

[2] Use lowest tested flowrate (usually last interval). Repeat the test at least twice until the end of test flow rate is consistent to ±10%.

[3] See Section B.4.0 Table 5 for factors of safety.

[4] See Section B.4.0 Table 6 for factors of safety.

BH3

Appendix B1.4 Worksheet 4: Rockbore design summary

Site Address: 22A Summit Drive

Designer: Shehan Attanayaka Date: 01/05/2025

Qualification: BE (Civil) Signed:

Reviewer: Chong Jin Khaw Date:

Qualification: Licensed Cadastral Surveyor Signed:

Step 1. Site assessment		
Number of boreholes (Manhole 1):	1	
Manhole 1 diameter:	100	mm
Number of boreholes (Manhole 2) – where required:		
Manhole 2 diameter – where required:		mm

Step 2. Hydrological requirement		
Peak discharge rate (Use TP108 Method), $Q_{(S)}$[1]	12.75	L/s

Step 3. Soakage rate (after factor of safety is applied)

Borehole Factored Soakage Rate Details[2]

Manhole 1			Manhole 2	
Bore 1, p_1	7.25	L/s	Bore 5, p_5	L/s
Bore 2, p_2		L/s	Bore 6, p_6	L/s
Bore 3, p_3		L/s	Bore 7, p_7	L/s
Bore 4, p_4[3]		L/s	Bore 8, p_8[3]	L/s
Total soakage rate with factor of safety applied $p_{(factored)}$	7.25	L/s		
$p_{(factored)} \geqslant Q_{(S)}$?[3]	☐ YES		☑ NO	
If yes, design is complete. If no, consider drilling more bores or using multiple devices.				

* provide 1.4 m³ under ground tank for stormwater mitigation.

[1]Attach TP108 worksheet while submitting this worksheet for approval

[2]The soakage rate of every borehole shall be determined in L/s

[3]The designer may choose to have an extra borehole drilled for future development. The bore should be tested, but the soakage rate that it contributes should not be included in the Total Factored Soakage Rate for rockbore sizing.

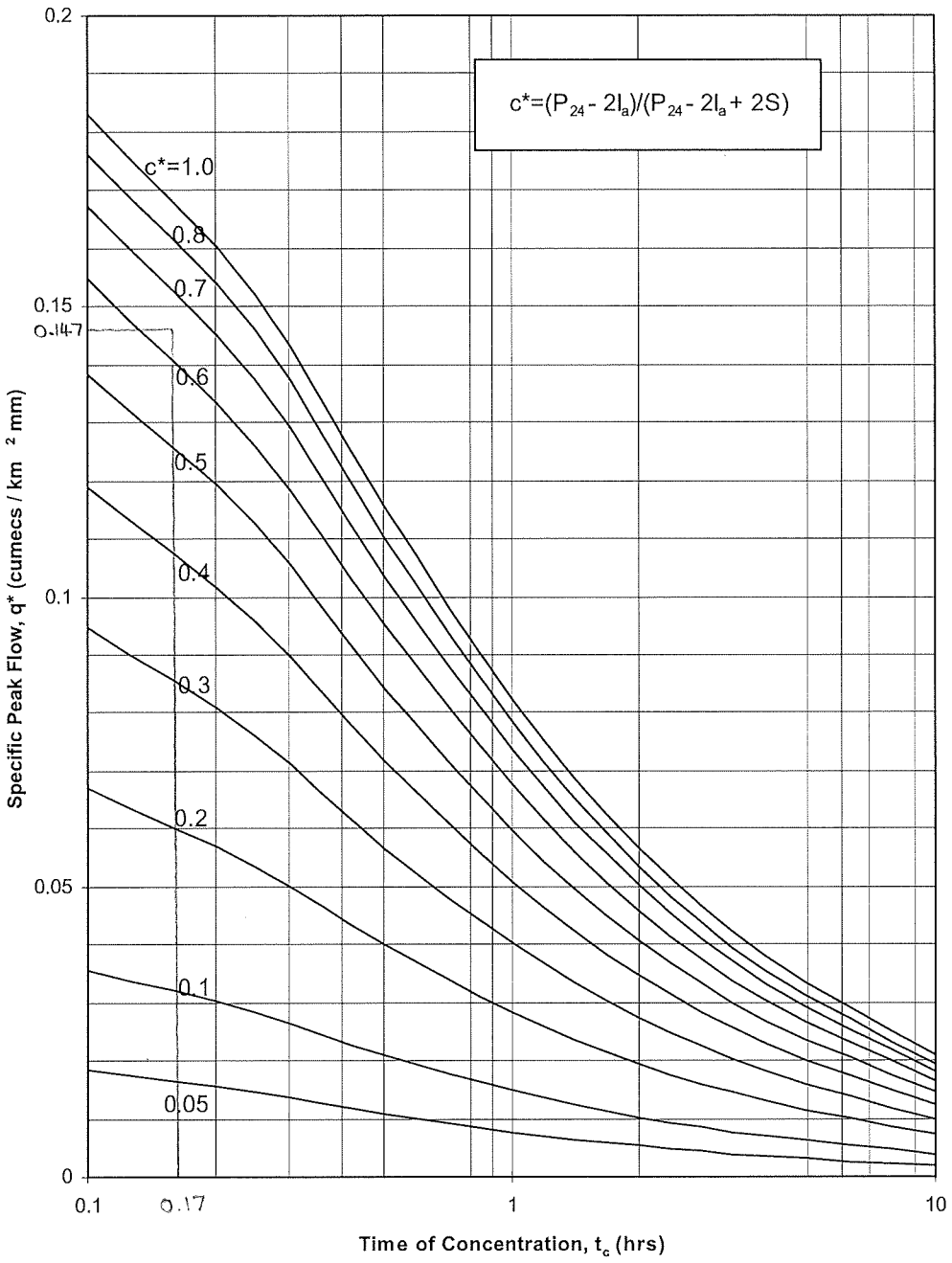

Figure 5.1 - Specific Peak Flow Rate

Worksheet 1: Graphical Peak Flow Rate

Project:	A15-0082	By:	SA	Date:	2025May01
Location:	22A Summit Drive	Checked:	ME	Date:	2025May01
Circle one:	Pre-development		Post-development		

Data:		Percentage	Km^2
Lot Area (m2)=	615		0.000615
Imperv Area (m2)=	325	0.53	
Perv Area (m2)=	290	0.47	

ARI (Yr) =	10yr
P_{24} (mm) =	141
TC (Hr) =	0.17
CN =	74

TP 108 Include Climate Change

1. Weighted Average Curve Number =	(74 x Pervious %) + (98 x Impervious%)	
	= 86.7	
2. Initial Abstraction I_a (mm)	(5 x Pervious %) + (0 x Impervious%)	
	= 2.4	
3. Soil Storage S (mm)	((1000/CN)-10) x 25.4	
	= 39.0	
4. Runoff Index C*	$= \frac{(P_{24} - 2I_{a)}}{(P_{24}-2I_a+2s)}$	
	= 0.64	
5. Specific Flow Rate q*	Using TP108 Figure 5.1	
	= 0.147	
6. Peak Runoff q_p	= q* x A x P_{24}	(A=km2)
	= 0.012747105 m3/s	
	= 12.747105 l/s	

APPENDIX C - Detention Tank Calculations

Detention Tank Calculation Summary

22 Summit Drive

1 Detention Purpose 4x350l Aquacomb (4x1.1mLx1.1mWx0.3mD)

Pre Dev Imperv Area=	0	m^2	
Imperv Area=	266	m^2	Additional Impervious Area only
Impervious Area to be use for 22 Summit Drive tank calculations=	270	m^2	Tank to be upsized to compensate the driveway area.

2 Temporary Storage for 10 ARI Storm I=141mm/day TP 108 Includes Climate Change Factor

Orifice diameter	=	0.085	m	(input in HEC-HMS)
Cross sectional area (A)	=	0.005674502	m^2	
Orifice centre elevation	=	0.143	m	(bottom+100mm+half orifice diameter)
Post development peak flow	=	0.00553	m^3/s	(from HEC-HMS)- Soakage Rate with factor of safety applied = 6.7 l/s
Soakage Flowrate	<	0.00670	m^3/s	Q_{post} is less than soakgae flowrate therefore O.K.
10 year peak storage = min tank size	=	**1.26**	m^3	(from HEC-HMS)
Peak elevation	=	0.269	m	(from HEC-HMS)

HEC-HMS

Project : 22 SUMMIT DRIVE

Basin Model : 10 year

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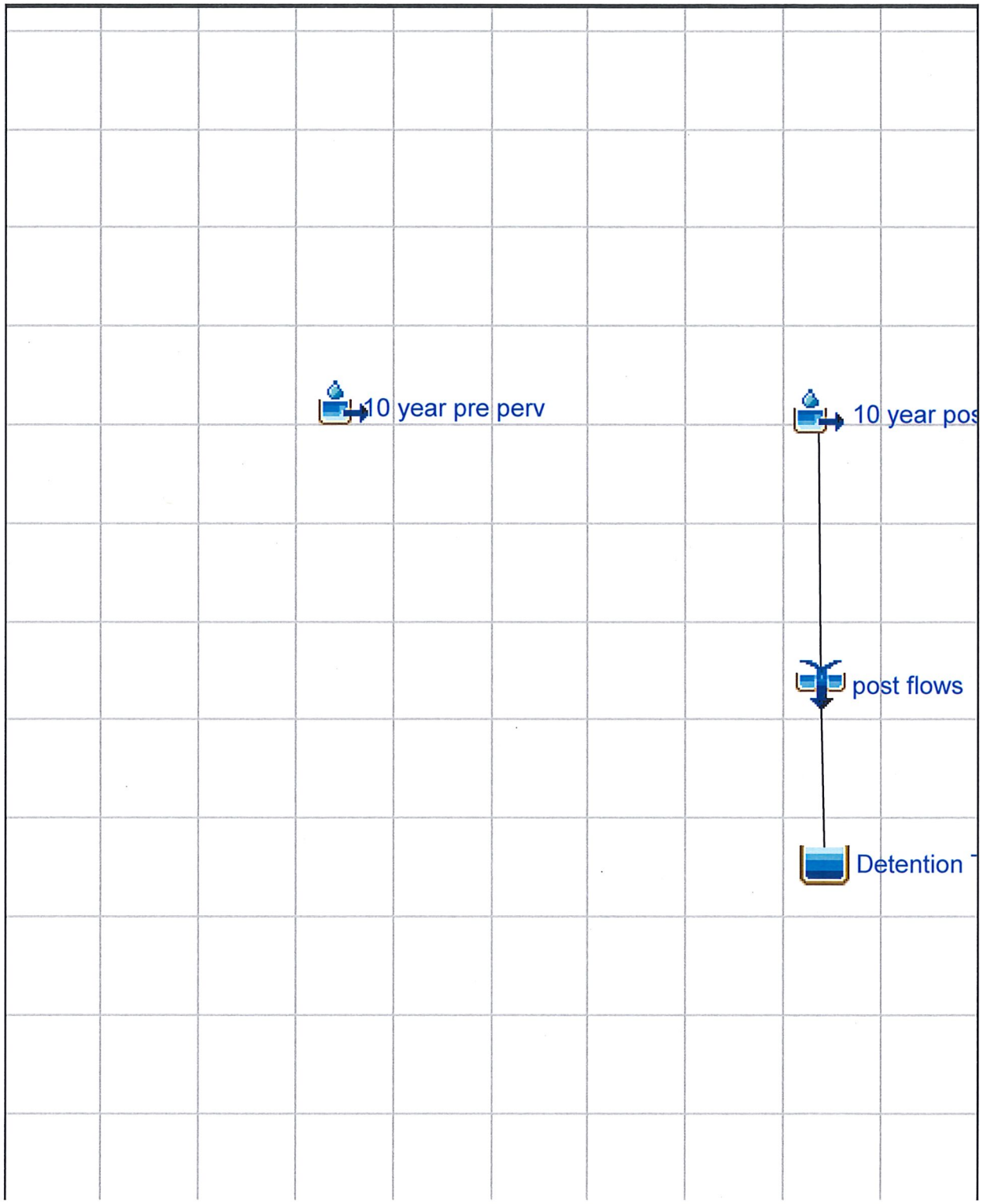


22 SUMMIT DRIVE

Project: Road Detention Tank Simulation Run: 10 Year

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 02May2025, 12:05:54

Basin Model: 10 year
Meteorologic Model: 10 year RF
Control Specifications: Control 1

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (1000 M3)
10 year post imperv	0.000270	0.00654	01Jan2000, 12:10	0.03690
Detention Tank	0.000270	0.00553	01Jan2000, 12:20	0.03603
post flows	0.000270	0.00654	01Jan2000, 12:10	0.03690
10 year pre perv	0.000270	0.00427	01Jan2000, 12:10	0.02232

22 SUMMIT DRIVE

Project: Road Detention Tank

Simulation Run: 10 Year Reservoir: Detention Tank

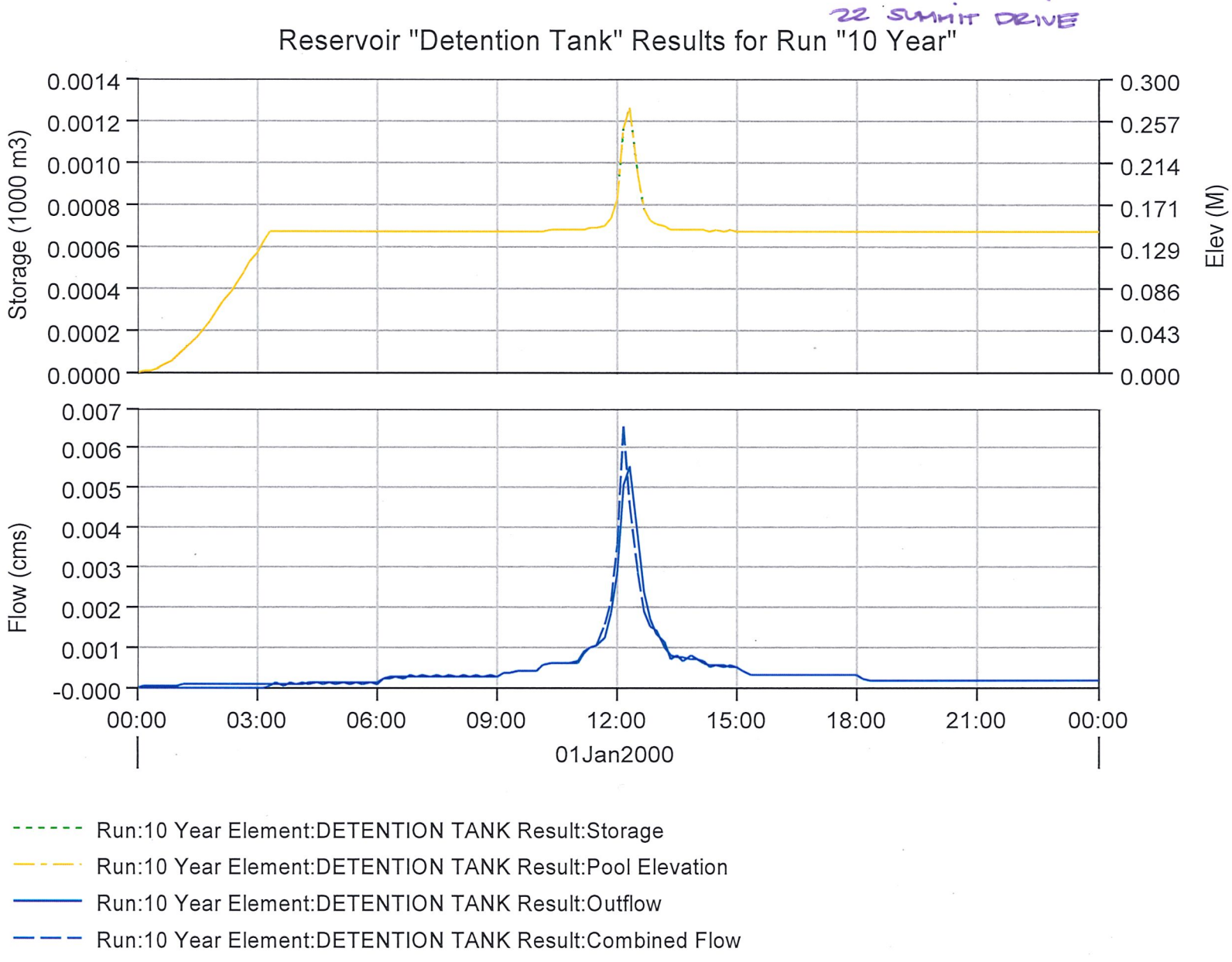
Start of Run:	01Jan2000, 00:00	Basin Model:	10 year
End of Run:	02Jan2000, 00:00	Meteorologic Model:	10 year RF
Compute Time:	02May2025, 12:05:54	Control Specifications:	Control 1

Volume Units: 1000 M3

Computed Results

Peak Inflow :	0.00654 (M3/S)	Date/Time of Peak Inflow :	01Jan2000, 12:10
Peak Outflow :	0.00553 (M3/S)	Date/Time of Peak Outflow :	01Jan2000, 12:20
Total Inflow :	0.03690 (1000 M3)	Peak Storage :	0.00126 (1000 M3)
Total Outflow :	0.03603 (1000 M3)	Peak Elevation :	0.269 (M)

22 SUMMIT DRIVE



Detention Tank Calculation Summary

22A Summit Drive

1 Detention Purpose 5x350l Aquacomb (5x1.1mLx1.1mWx0.3mD)

Pre Dev Imperv Area=	0	m^2	
Imperv Area=	325	m^2	Additional Impervious Area only
Impervious Area to be use for 22 Summit Drive tank calculations=	330	m^2	Tank to be upsized to compensate the driveway area.

2 Temporary Storage for 10 ARI Storm I=141mm/day TP 108 Includes Climate Change Factor

Orifice diameter	=	0.090	m	(input in HEC-HMS)
Cross sectional area (A)	=	0.006361725	m^2	
Orifice centre elevation	=	0.145	m	(bottom+100mm+half orifice diameter)
Post development peak flow	=	0.00674	m^3/s	(from HEC-HMS)- Soakage Rate with factor of safety applied = 7.3 l/s
Soakage Flowrate	<	0.00730	m^3/s	Q_{post} is less than soakgae flowrate therefore O.K.
10 year peak storage = min tank size	=	**1.71**	m^3	(from HEC-HMS)
Peak elevation	=	0.29	m	(from HEC-HMS)

HEC-HMS

Project : 22A SUMMIT DRIVE

Basin Model : 10 year

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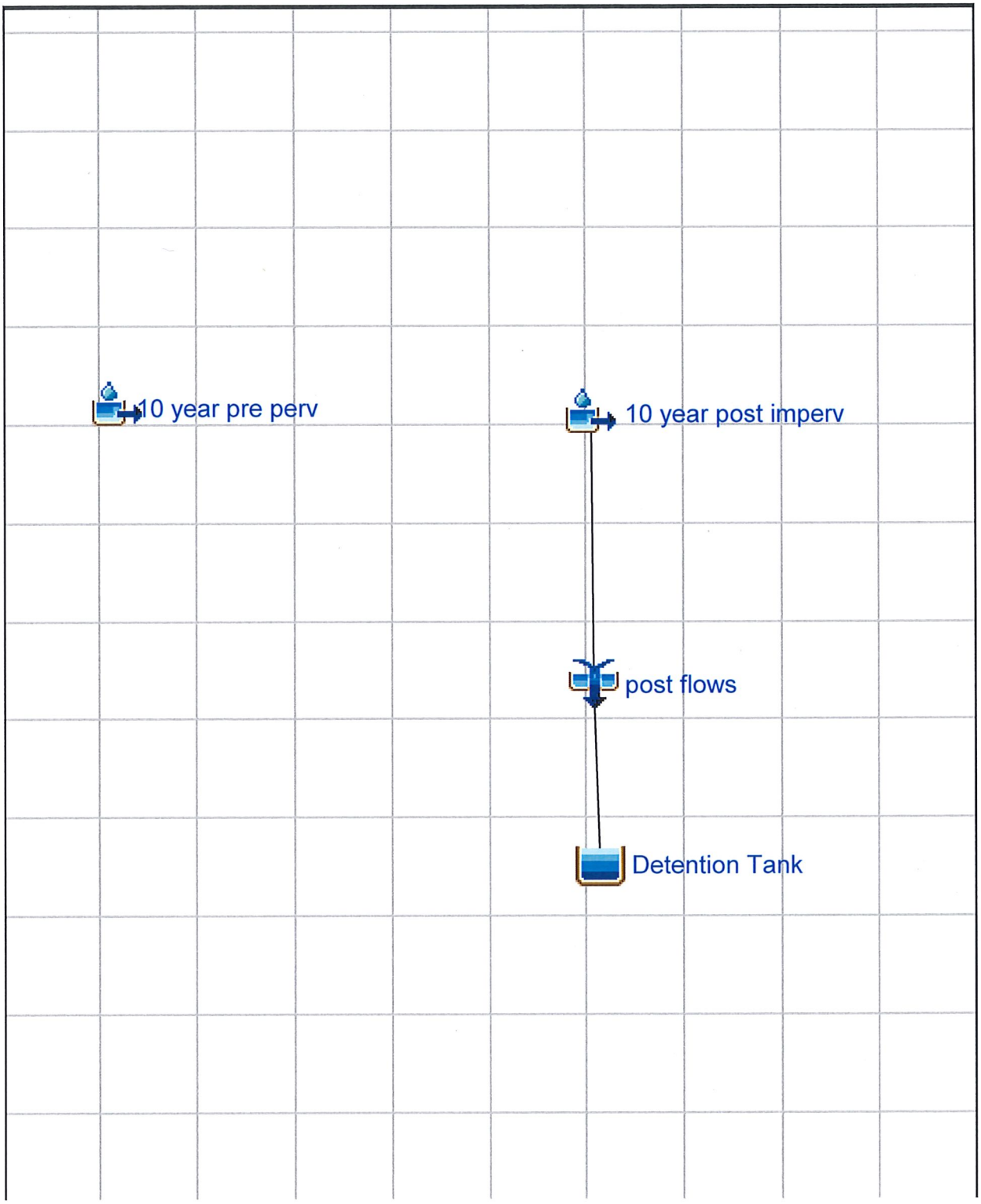


22A SUMMIT DRIVE

Project: Road Detention Tank Simulation Run: 10 Year

Start of Run: 01Jan2000, 00:00
End of Run: 02Jan2000, 00:00
Compute Time: 02May2025, 12:19:27

Basin Model: 10 year
Meteorologic Model: 10 year RF
Control Specifications: Control 1

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (1000 M3)
10 year post imperv	0.000330	0.00799	01Jan2000, 12:10	0.04510
Detention Tank	0.000330	0.00674	01Jan2000, 12:20	0.04430
post flows	0.000330	0.00799	01Jan2000, 12:10	0.04510
10 year pre perv	0.000330	0.00522	01Jan2000, 12:10	0.02728

22A SUMMIT DRIVE

Project: Road Detention Tank
Simulation Run: 10 Year Reservoir: Detention Tank

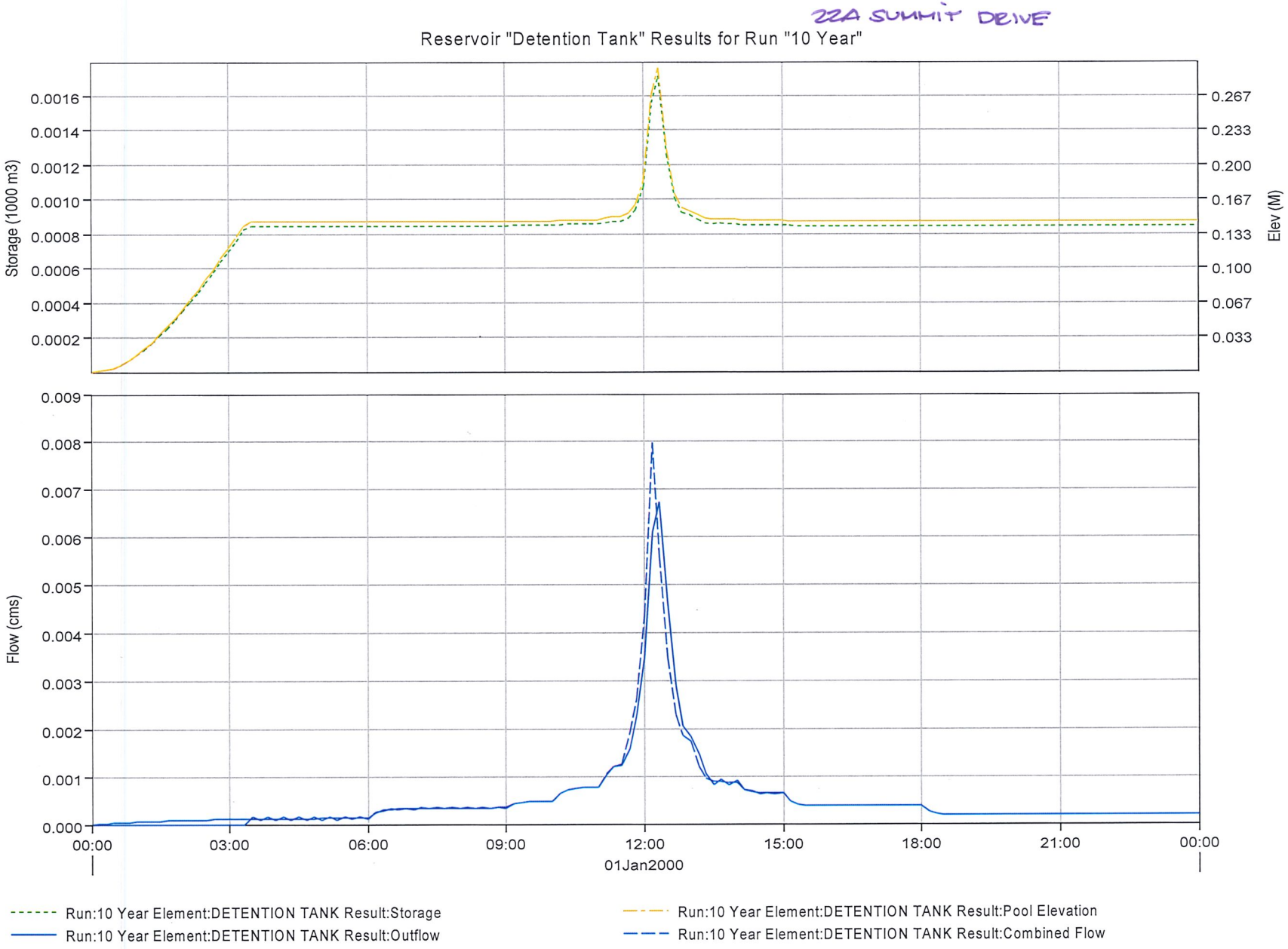
Start of Run:	01Jan2000, 00:00	Basin Model:	10 year
End of Run:	02Jan2000, 00:00	Meteorologic Model:	10 year RF
Compute Time:	02May2025, 12:19:27	Control Specifications:	Control 1

Volume Units: 1000 M3

Computed Results

Peak Inflow :	0.00799 (M3/S)	Date/Time of Peak Inflow :	01Jan2000, 12:10
Peak Outflow :	0.00674 (M3/S)	Date/Time of Peak Outflow :	01Jan2000, 12:20
Total Inflow :	0.04510 (1000 M3)	Peak Storage :	0.00171 (1000 M3)
Total Outflow :	0.04430 (1000 M3)	Peak Elevation :	0.294 (M)

22A SUMMIT DRIVE



APPENDIX D - OLFP Calculation

22 Summit Drive
OLFP Channel

Project Description	
Worksheet	Section A-A
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Slope	0.300000	m/m
Discharge	0.1000	m³/s

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results		
Mannings Coefficient	0.030	
Water Surface Elevation	9.86	m
Elevation Range	9.75 to 10.00	
Flow Area	3.8e-2	m²
Wetted Perimeter	0.72	m
Top Width	0.68	m
Actual Depth	0.11	m
Critical Elevation	9.94	m
Critical Slope	0.020873	m/m
Velocity	2.60	m/s
Velocity Head	0.34	m
Specific Energy	10.21	m
Froude Number	3.49	
Flow Type	Supercritical	

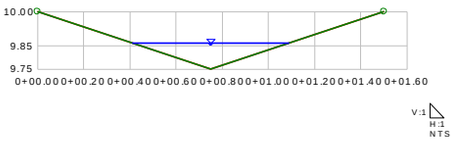
Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00.00	0+01.50	0.030

Natural Channel Points

Station (m)	Elevation (m)
0+00.00	10.00
0+00.75	9.75
0+01.50	10.00

22 Summit Drive
OLFP Channel

Project Description	
Worksheet	Section A-A
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data		
Mannings Coefficient	0.030	
Slope	0.300000	m/m
Water Surface Elevation	9.86	m
Elevation Range	9.75 to 10.00	
Discharge	0.1000	m³/s