

1799a Great South Road, Bombay

Supplementary Geotechnical Assessment



Vernon Developments Ltd

GB27261

27/05/2025

TILSLEY ENGINEERING LTD

CONSULTING ENGINEERS AND ENVIRONMENTAL CONSULTANTS

1799a Great South Road, Bombay

Supplementary Geotechnical Assessment

Client: Vernon Developments Ltd

Prepared by:

TILSLEY ENGINEERING LTD, NEW ZEALAND

27 Roulston Street, Pukekohe 2340, PO Box 392, New Zealand

T +64 9 238 3245 www.tilsleyengineering.co.nz

Info@teng.co.nz

27/05/2025

Job No: GB27261

Quality Information

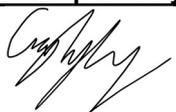
Rev	Revision Date	Details	Prepared by	Reviewed by	Authorised by
			 George Bigley Engineering Geologist (MEngGeol, MEngNZ)	 Dougal Tilsley (Snr. Engineering Tech.) Director	 Sig# P434 R Tilsley (CMEngNZ, CPEng) Director



Table of Contents

1. INTRODUCTION	3
2. SITE INFORMATION	3
3. SITE SUMMARY	4
4. DEVELOPMENT RECOMMENDATIONS	5
5. SAFETY IN CONSTRUCTION	8
6. RECOMMENDATIONS	9
7. LIMITATIONS	10
APPENDIX A - BACKGROUND INFORMATION	11

List of Figures

FIGURE 1 SITE LOCATION SHOWING CONTOURS, EXISTING STRUCTURES, AND PROPOSED DEVELOPMENT AREA.	11
FIGURE 2 LOCATION OF STORMWATER POND, LOOKING NORTH.	12
FIGURE 3 TYPICAL SOIL PROFILE (HA01 – SEE GB26032-3).	12

List of Tables

TABLE 1 TESTING CRITERIA FOR FILL.	6
------------------------------------	---



1. INTRODUCTION

1.1 Project Overview

Tilsley Engineering Ltd (TEL) has been engaged by the client to provide a supplementary geotechnical assessment for proposed earthworks at 1799a Great South Road, Bombay.

This report is in partial response to the s92 / request for information addressed to The Surveying Company (TSC) regarding a resource consent application; **BUN60444618 (DIS60444619** and **LUC60444660)** on behalf of Vernon Developments Ltd. This report specifically covers point **34**:

34. *Please request for an addendum to the Geotechnical Report to ensure all proposed developments/land modification, buildings/structures and operations are captured and assessed.*

This report may also be used in partial response to any further queries regarding 1799a Great South Road, Bombay, put forward by Auckland Transport, Healthy Waters, and any other involved parties and/or territorial authorities.

The scope of this report encompasses geotechnical suitability, earthworks recommendations, and general site development recommendations, in support of future resource and building consent applications to the Council and for interested parties such as the builder, structural engineer, earthworks, and civil contractors.

Additionally, the scope of this report encompasses an area designated for future New Zealand Transport Agency (NZTA) development for the Drury to Bombay motorway extension. As such, this report is of interest to NZTA.

This report includes a summary of the investigations undertaken and provides an assessment of:

- Ground conditions
- Groundwater conditions
- Liquefaction
- Ground stability
- Earthworks recommendations and limitations
- Other constraints and issues identified with the site

2. SITE INFORMATION

2.1 Site Location

The property is described legally as Lot 6 DP 156089 and is approximately 8.67ha in area. The site is located on the northeastern side of Great South Road, bordering the Southern Motorway to the east. The Lot is bounded by similar pastureland.

2.2 Proposed Site Development

The proposal is to create a stormwater treatment pond on the northeastern corner of the Lot. As per the plans supplied by The Surveying Company (TSC), ref: J2224-4, dated February 2025, proposed fills are up to 3.0m high, with site cuts up to 1.0m. Total Cut volume is 508m³ and total Fill volume is 8323m³. The earthworks cover 11,449m² in area.

The works will redirect and block a permanent stream/waterway as listed on Auckland Council GIS maps. As such, the northern earthbund of the stormwater pond falls under the definition of a '**minimal hazard dam**'. Proposed earthwork plans are attached in appendix A.

2.3 Background information and Previous Involvement

TEL have been previously involved in the site. Geotechnical assessment and stormwater management was provided for two new sheds by TEL on 02 February 2024, reference:JP21923-1. TEL were also engaged to provide earthworks and construction monitoring/inspections for the two sheds.

In JP21923-1, a total of 8 boreholes (HA01 to HA08) were drilled up to 2.0m – 3.0m depth. Underlying soils consisted of silty clay to clayey silt. Peak shear strengths were greater than 220 kPa. Soils were identified as expansivity class "M", with characteristic surface movements expected to be $22 < (\text{ys}) \leq 44\text{mm}$.

According to the New Zealand Geotechnical Database (NZGD), accessed December 2024, a 40m deep water bore was drilled on-site by DrillForce, dated 05/12/2012, ref: 29004. Here they encountered volcanic clays up to 4m depth, followed by broken, weathered basalt up to 11.8m depth, before hitting hard basalt rock. Groundwater was encountered at 4.6m depth.

Additionally, TEL have undertaken geotechnical, stormwater, and wastewater investigations and provided design recommendations for a large, 1400m² dwelling proposed to go onto the northwestern side of the Lot (ref: GB26032-3, dated 06/05/2025). Here, 4 bores were drilled up to 1.0m depth, finding similar conditions to those in JP21923-1.

This report is **supplementary** to the previous works done by TEL. Please refer to JP21923-1, GB25522, and GB26032-3 for background information (i.e., geology, topography, slope instability), walkover inspections, and geotechnical field investigations. Any development recommendations regarding buildings on the site are covered in those reports.

This report specifically covers earthworks for the stormwater pond. Any other proposed developments on the site are beyond the scope of this report.

3. SITE SUMMARY

3.1 Ground and Groundwater Model

We (TEL) consider that the ground conditions have not changed since our previous investigations. As such, we believe that our ground and groundwater model is still applicable to this site. A summary of which is provided below.

3.1.1 Site subsurface conditions

Topsoil

Topsoil over the site generally is to depths of 0.1m below existing ground level. It is described as dark and friable, rich in organic content.

Soil deposits

The soils consist of Orange-brown Clayey SILT w/ traces of fine gravel (scoria); these are stiff to very stiff and low to non-plastic. Some previous boreholes had fragments of charcoal and pumice. These soils extended to the end-depth of all previous boreholes drilled by TEL. These soils are typical of the Kerikeri Volcanic Group (QVS) in the Bombay area.

Shear strength of these soils generally ranged from 130kPa to 220+kPa (the upper limit of our shear vane) and reform strengths ranging from 46kPa to 139kPa. The soils are identified as moderately sensitive to sensitive.

The degree of accuracy on this ground assessment is high, as similar conditions were encountered within all 12 previous testing bores, seeing little to no variation over at least one year.

Groundwater.

Groundwater was not encountered in any previous borehole investigations up to 3.0m below the surface. Considering the spatial distribution and seasons in which these investigations were undertaken, the groundwater table is expected to be 2.5m below ground level during peak winter conditions. This table is expected to be consistent across the site, parallel to the existing natural topography.

The degree of accuracy on this groundwater assessment is moderate; the groundwater table was not encountered in any of our (TEL) previous investigations but was empirically identified by DrillForce at 4.6m below ground level during peak summer conditions. We cannot attest to the accuracy of DrillForce's investigation, especially so considering the age of the data (>10yr). As such, groundwater shall be considered during geotechnical inspection of the earthworks. As the bulk of proposed works consist of earth-fills, the effect of groundwater on the development is expected to be minimal, however, where cuts have been proposed, we stress that any evidence of groundwater seepage be taken into account as specified in section 4.1.4.

4. DEVELOPMENT RECOMMENDATIONS

We consider that the subject site is geotechnically suitable for the proposed development. This opinion is furnished on the condition that the following recommendations are implemented during design and construction.

The development recommendations presented here are to be strictly used for the development of the stormwater pond and are not relevant to other areas on the Lot.

4.1 Earthworks

The earthworks will need to be undertaken in accordance with all applicable Council guidelines, New Zealand Standards, and the following requirements.

The proposed earthworks consist of infilling a large area to create a large stormwater treatment pond to meet SMAF2 and stormwater attenuation requirements. The northern earthbund of the stormwater pond falls under the definition of a '**minimal hazard dam**' and the works are beholden Auckland Council TP109.

All earthworks shall be undertaken during the summer works period. Works may be undertaken during the winter period providing approval is granted by a Geo-professional with written approval from the territorial authority.

4.1.1 Borrow Site

As per the supplied plans, approximately 7,815m³ of material will need to be sourced from a borrow site to meet the outlined volumes of fill.

After discussion with the property owner/developer Vernon Developments, additional fill materials shall be sourced from McPherson Quarry, located at 47 McPherson Road, Pokeno. Borrowed fills will consist of manufactured structural clay fill, with maximum soil grain size no bigger than 0.02mm

and approximately 20% to 30% fines (passing 63µm sieve). This product meets the specification of a NZS4431:2022 Class F-A Soil and is suitable for the proposed earthworks.

If borrowed clay fills are stockpiled on site for periods exceeding 3 days, these shall be sufficiently protected using coir fibre or polythene sheet as to maintain optimum moisture content. Should soil moisture conditions vary during transportation, or stockpiled for extended periods with insufficient protection, NZS4431 soil classification may vary from F-D to F-W.

Soils shall be determined that they are at optimum moisture content by the certifier. If soils are too dry (F-D; where they are more than 2% below optimum moisture content), soils shall be spray-moisturised and remixed to evenly distribute moisture. If soils are too wet (F-W; where they are more than 4% above optimum moisture content) soils shall be aeration dried prior to being remixed. Suitable soil conditioning shall be confirmed by the certifier.

Should the borrow site change part-way through development, the new borrow site will be subject to supplementary geotechnical investigation to assess the suitability of soils encountered in the new borrow site. If fills are changed for an alternative manufactured product, a product specification shall be provided, and written approval will need to be sought from the certifier or a geo-professional familiar with the contents of this report.

4.1.2 General Fills

The following development recommendations apply to proposed fills for the stormwater pond.

Fill shall be clear of any unsuitable materials. We advise contamination prevention practices are carried out if transports have been previously used to transport unsuitable materials such as cleanfill, topsoil, or aggregate.

All earthworks and compaction testing shall be carried out in accordance with NZS4404 and NZS4431. Compaction shall be carried out in loose layers no greater than 200mm thickness. Compaction testing shall be carried out after each lift of 200mm. Once compacted, soils shall achieve the following criteria:

Table 1 Testing Criteria for Fill.

	Vane Shear Strength (kPa)	Maximum Air Voids %
Minimum	100	12
Ideal	120	10

Compaction testing shall be undertaken by a Geo-Professional familiar with the contents of this report during construction to ensure the correct level of compaction is being achieved.

All un-retained fill batters shall be no steeper than 1V:3H. Fill batter faces shall be overfilled and cut back.

Considering the nature of the works, earth-fills are not expected to carry building loads. Should future development see structures proposed on areas of fill covered in this report, they will be subject to site specific investigation, with a suitability assessment undertaken by a Geo-professional or their representative.

4.1.3 Fills for the Dam

The following development recommendations apply to the dam. Fills shall be compacted and tested in the same manner as outlined in section 4.1.2. Following TP109 and NZS4431, Earthworks for the

dam shall be undertaken by a purpose-made compactor. As the dam exceeds 2.5m height, a tracked compactor cannot be used.

4.1.4 Cuts

All new un-retained cut batters for the sides of the stormwater pond shall be graded at a maximum slope of 1V: 3H and shall not be higher than 1.0m. All cuts over 1.0m shall be assessed, supervised, and approved by a Chartered Professional Engineer experienced in Civil Earthworks, or their representative.

As per TP109, a cutoff trench or 'key' shall be excavated beneath the base of the dam profile, approximately 1.0m deep, at least 3.0m wide, and with side walls no steeper than 1V:1H. This shall span of the width of the dam and extend up the sides of the dam to 1.0m below the design water level. Subsequent fills shall be done in accordance with Section 4.1.2 and 4.1.3 of this report.

As per the supplied plans, proposed cuts will not extend beneath the groundwater table. If permanent or temporary cuts extend below the known groundwater table, or groundwater seepage is observed by the certifier, a site-specific groundwater drawdown assessment shall be required. This shall be done by a Geo-Professional or their representative.

4.1.5 Temporary Earthworks

Site development works will likely require excavation and temporary batters prior to reaching final ground level. As such, there is potential for batter collapse during construction, particularly so if left exposed during extended periods of inclement weather. As such, we recommend the following:

- Excavations adjacent to or situated upon the property boundary should have further precautions to minimise risk to neighbouring properties. This may consist of temporary buttressing. These works shall be assessed and approved by a suitably qualified professional.
- Where cut faces are expected to be exposed for extended periods of time longer than three days, additional erosion protection shall be implemented. This may consist of coir fibre or polythene sheeting.
- The contractor is expected to employ appropriate plant and machinery to undertake excavations and retaining wall construction.
- Appropriate silt and stormwater control measures shall be employed. This is particularly important due to the works proximity to stormwater infrastructure and natural waterways.

4.1.6 Earthworks limitation

The nature and continuity of the soil conditions identified within our ground and groundwater model are specific to 1799a Great South Road, Bombay. Accounting for any and all inaccuracies or discrepancies, we stress the importance of inspections made during development.

All earthworks' procedures and compaction testing be carried out in accordance with NZS4404 and NZS4431. Any cut/fill steeper than the recommended slope may require the construction of a retaining wall specifically designed according to site conditions by a suitably qualified Structural Engineer. No cut or fill depths greater than mentioned in the above sections shall be undertaken without the approval in writing of a Chartered Professional Engineer who is experienced in geo-mechanics and is familiar with the contents of this report. This is because such works may disturb existing equilibrium conditions.



4.2 Construction observation

A Geo-Professional familiar with the findings of this report shall be engaged to carry out inspections during earthworks, to confirm soil conditions are consistent with those summarized within this report, and to ensure that earthworks are undertaken in accordance with this report.

It is in the interests of all parties that Tilsley Engineering are retained to inspect earthworks during construction, so that ground conditions can be compared with those assumed in formulating this report. In any event, we shall be notified of any variations in ground conditions from those described or assumed to exist.

4.3 Settlement

We recommend that earthworks are done to 10% higher than required (proposed final ground level) to accommodate for settlement of earth-fills. This is especially important where larger quantities of fill have been laid such as the embankments and dam.

4.4 Topsoil and Vegetation

Prior to commencement of earthworks, all topsoil shall be stripped from the site and suitably stockpiled. Once earthworks have ceased, the surface shall be scarified. This may be achieved using dozer cleats (if safe to do so) or purpose-built machinery. Once scarified, topsoil shall be returned to the walls and line the stormwater pond, including both sides of the dam.

The sides of the stormwater pond shall be planted with suitable vegetation as per TP10 as to enhance both the treatment characteristics and natural look of the site.

The dam and embankments shall not be planted with any woody vegetation or trees. The dam and embankments shall be regularly cleared of any woody vegetation as to prevent them from taking root.

5. SAFETY IN CONSTRUCTION

We stress that any and all works shall be undertaken in a careful and safe manner so that Health & Safety is not compromised, and that suitable Erosion & Sediment control measures should be put in place. Any stockpiles placed shall be done so in an appropriate manner so that land stability and/or adjacent structures are not compromised. Furthermore:

- All works must be undertaken in accordance with the Health and Safety at Work Act 2015.
- Any open excavations should be fenced off or covered, and/or access restricted as appropriate.
- The location of all services shall be verified at the site prior to the commencement of construction.
- The Contractor is responsible at all times for ensuring that all necessary precautions are taken to protect all aspects of the works, as well as adjacent properties, buildings and services.

Should the client or contractor have any site-specific concerns with regards to safe construction methodologies of any Tilsley Engineering Limited designs and recommendations, please contact us before any work is undertaken.



6. RECOMMENDATIONS

- Borrowed fill shall be sourced from McPherson Quarry. Alternative sources of fill will need to be assessed and approved by a geo-professional.
- All earthworks shall be carried out in accordance with Section 4 of this report.
- All fills are to be laid and compacted in loose 200mm layers, with compaction testing undertaken after each lift of 200mm. Fills shall meet the strength criteria outlined in Table 2.
- If any temporary or permanent cuts extend beneath the groundwater table, a groundwater drawdown assessment shall be required.
- Earth-fills for the dam shall be keyed in as per section 4.1.4.
- We recommend final fill levels be 10% higher than proposed to accommodate settlement.
- Where any future structures are to be placed on areas of fill outlined in this report, they will be subject to geotechnical assessment.
- The walls of the stormwater pond shall be scarified and covered in topsoil. The pond may be planted with suitable vegetation. The pond shall not be planted with any woody vegetation or trees.



7. LIMITATIONS

This report has been prepared solely for the benefit of our client with respect to a particular brief given to us, and data or opinions in it may not be used in other contexts, by any other party or for any other purposes. To the maximum extent permitted by law, Tilsley Engineering Ltd disclaims all liability and responsibility (in contract or tort, including negligence, or otherwise) for any loss or damage whatsoever which may be suffered as a result of any reliance by any third party on this report, whether that loss is caused by any fault or negligence on the part of Tilsley Engineering Ltd or otherwise.

Council is able to rely on this report for processing the resource or building consent only for the site mentioned within this report. It may not be used for any other use or purpose without permission from Tilsley Engineering Ltd.

Hard copies and electronic copies of this document are available from Tilsley Engineering Ltd. Any copies/reproductions of this document must be in the original format and in colour. Any copies must be reproduced in its entirety.

Notice to Reader/ User of this document

Should you be in any doubt as to the applicability of this report and/or its recommendations for the proposed development as described herein, and/or encounter materials on site that differ from those described herein, it is essential that you discuss these issues with the authors before proceeding with any work based on this document.

The recommendations and opinions contained in this report are based upon site observations of the investigation area. Inferences about ground conditions over the site are made using geological principles and engineering judgment, however, it is possible that conditions over the site may vary and therefore it is not possible to guarantee the continuity of ground conditions away from investigation locations and visible areas.

Furthermore, the logs are provided presenting descriptions of the soils and geology based on field observations of the samples recovered in the fieldwork and may not be truly representative of the actual underlying conditions.

Recommendations and opinions in this report are based on data obtained from the investigations and site observations as detailed in this report. The nature and continuity of subsoil conditions at locations other than the investigation bores and tests are inferred and it shall be appreciated that actual conditions could vary from the assumed model.

It is recommended that construction activity shall be undertaken in the dry season. If construction activities are undertaken in wet seasons there is a potential risk of reduction of soil strength. Tilsley Engineering Ltd is not responsible for the reduction in soil strength due to construction activities.

Ground conditions can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions that existed at the time of subsurface exploration, decisions shall not be based on a report whose adequacy may have been affected by time. Tilsley Engineering Ltd to be advised how time may have impacted on the project.

This report is based on the assumption that the site conditions as revealed through investigation stages are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore this report recommendations can only be regarded as preliminary. Only Tilsley Engineering Ltd, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes shall be considered as the project develops. If another party undertakes the implementation of the recommendations of this report, there is a risk that the report will be misinterpreted and Tilsley Engineering Ltd cannot be held responsible for such misinterpretation.

APPENDIX A - BACKGROUND INFORMATION

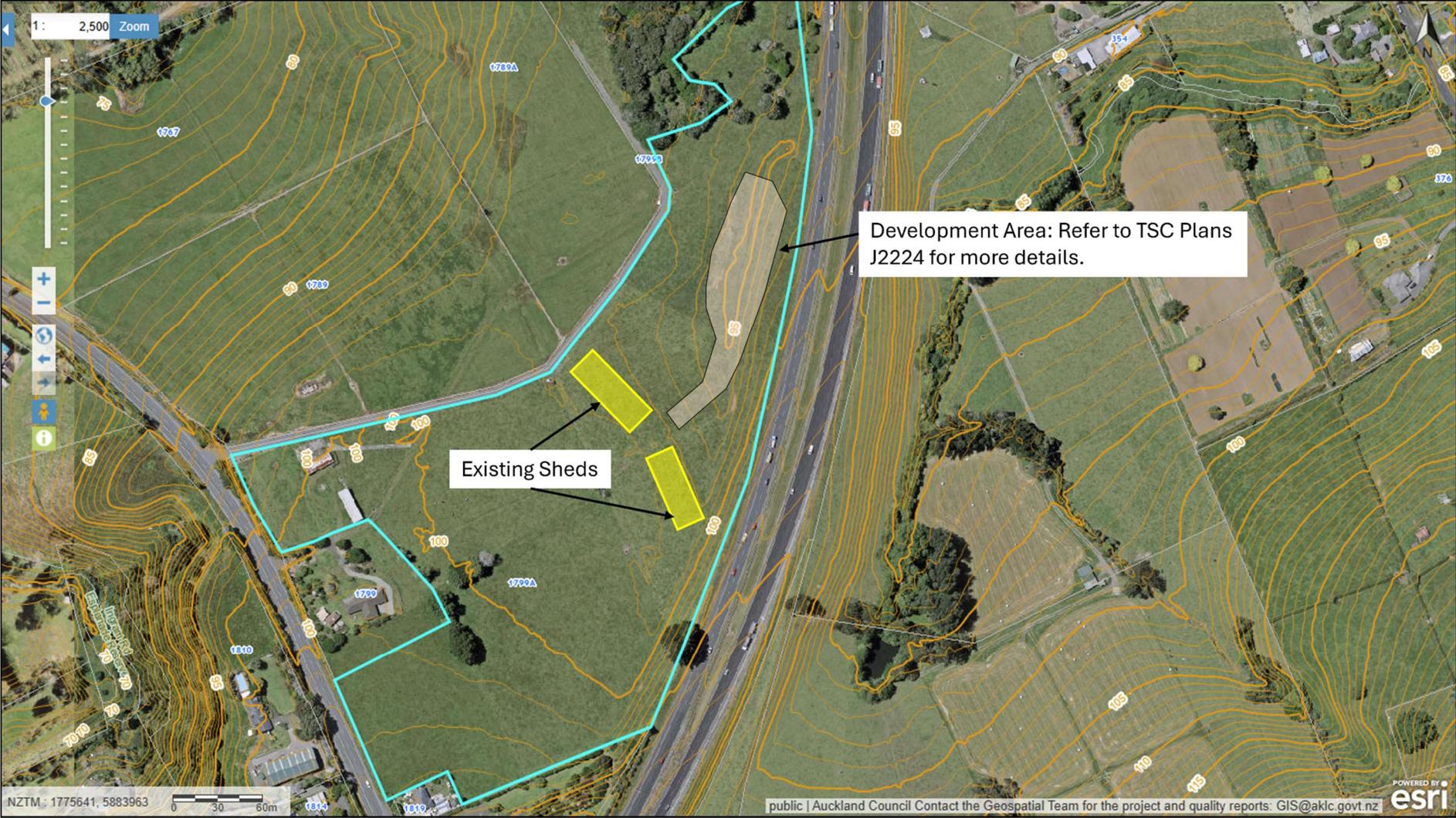


Figure 1 Site location showing contours, existing structures, and proposed development area.



Figure 2 Location of stormwater pond, looking north.



Figure 3 Typical soil profile (HA01 – See GB26032-3).



APPENDIX B – SUPPLIED PLANS

**DEVELOPMENT AT 1799A GREAT SOUTH ROAD, BOMABY
FOR VERNON DEVELOPMENTS LIMITED**

ENGINEERING

**SHEET 1, DRAWING No. J2224-1
PRE-DEVELOPMENT CONTOUR PLAN**

**SHEET 2, DRAWING No. J2224-2
EXISTING CONTOUR PLAN**

**SHEET 3, DRAWING No. J2224-3
POST DEVELOPMENT CONTOUR PLAN**

**SHEET 4, DRAWING No. J2224-4
ISOPACH PLAN**

**SHEET 5, DRAWING No. J2224-5
EROSION & SEDIMENT CONTROL PLAN**

**SHEET 6, DRAWING No. J2224-6
OVERALL STORMWATER PLAN**

**SHEET 7, DRAWING No. J2224-7
DEVELOPMENT PLAN 1**

**SHEET 8, DRAWING No. J2224-8
DEVELOPMENT PLAN 2**

**SHEET 9, DRAWING No. J2224-9
STORMWATER DETAILS 1**

**SHEET 10, DRAWING No. J2224-10
STORMWATER DETAILS 2**

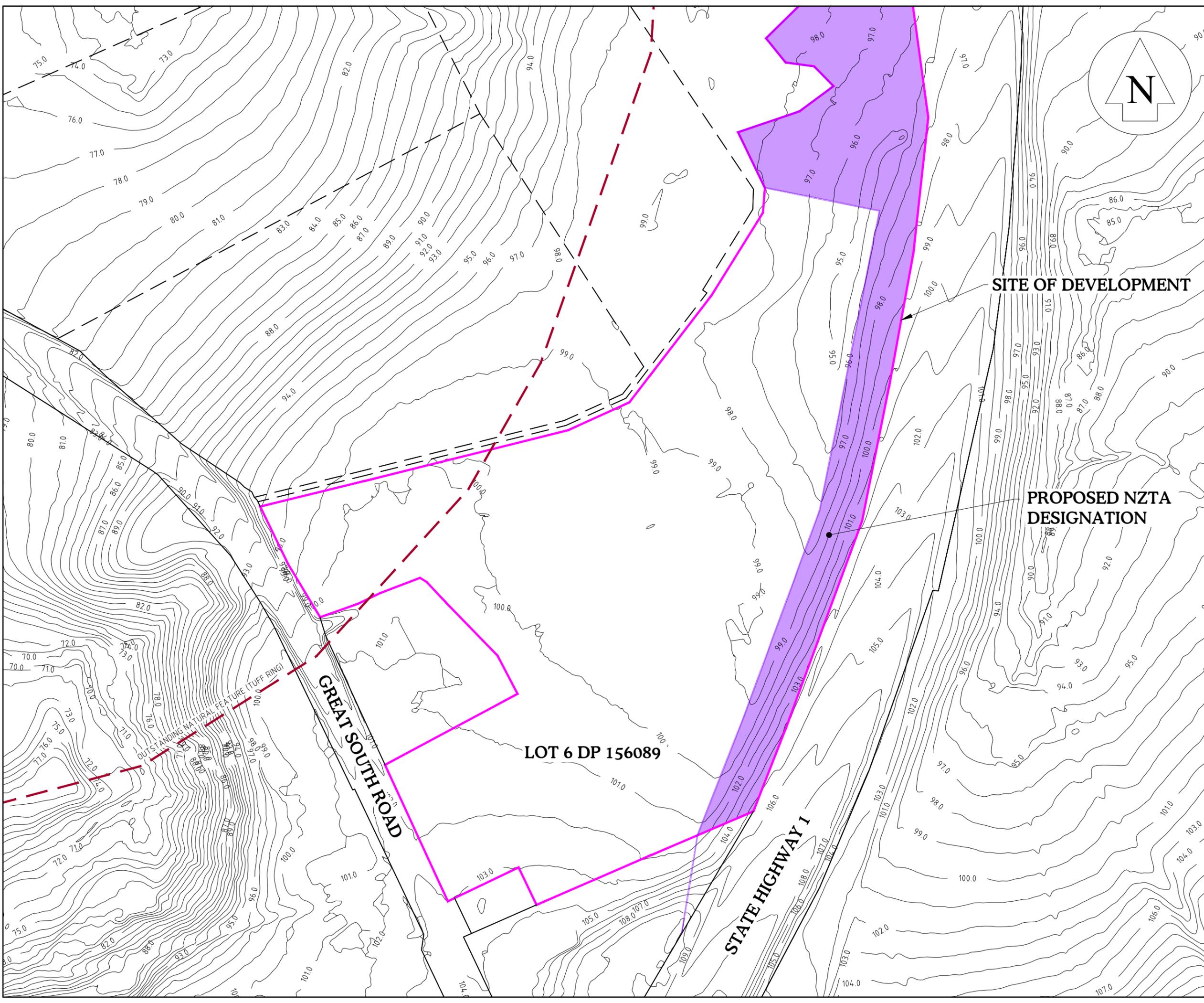
**SHEET 11, DRAWING No. J2224-11
STORMWATER DETAILS 3**

PREPARED BY:



0800 TO SURVEY (0800 86 78 78)
e-mail: info@subdivision.co.nz
LEVEL1, 17 HALL STREET, PUKEKOHE, NEW ZEALAND
PH:09 238 9991

**FEBRUARY 2025
PROJECT NO: J2224
FOR A RETROSPECTIVE CONSENT
CONTROLLING AUTHORITY:
AUCKLAND COUNCIL**



- GENERAL NOTES**
1. LEVELS ARE IN TERMS OF NZ VERTICAL DATUM 2016.
 2. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT 2000.
 3. PRE-DEVELOPMENT CONTOURS SOURCED FROM AUCKLAND COUNCIL GEOMAPS.

LEGEND

PRE-DEVELOPMENT CONTOURS (GIS)		(1.0m INTERVALS)
OUTSTANDING NATURAL FEATURE (TUFF RING)		
PROPOSED NZTA DESIGNATION		

Amendments	Name	Date

This document and the copyright in this document remain the property of TSC Ltd. The contents of this document may not be reproduced either in whole or in part by any means whatsoever without the prior written consent of TSC Ltd.
 Contractor to:
 Verify all dimensions on site before commencing any work. Refer to all figured dimensions. Refer all discrepancies to TSC Ltd.

	Name	Date
Surveyed	Auckland Council Geomaps	N/A
Designed	Sam Furniss	02/25
Drawn	Sam Furniss	02/25
Checked	Avneet Kumar	02/25
Approved	Craig Forrester	02/25

TSC
 THE SURVEYING COMPANY
 Planners, Surveyors & Engineers

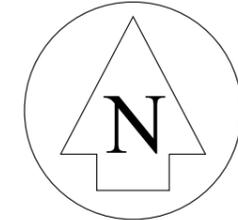
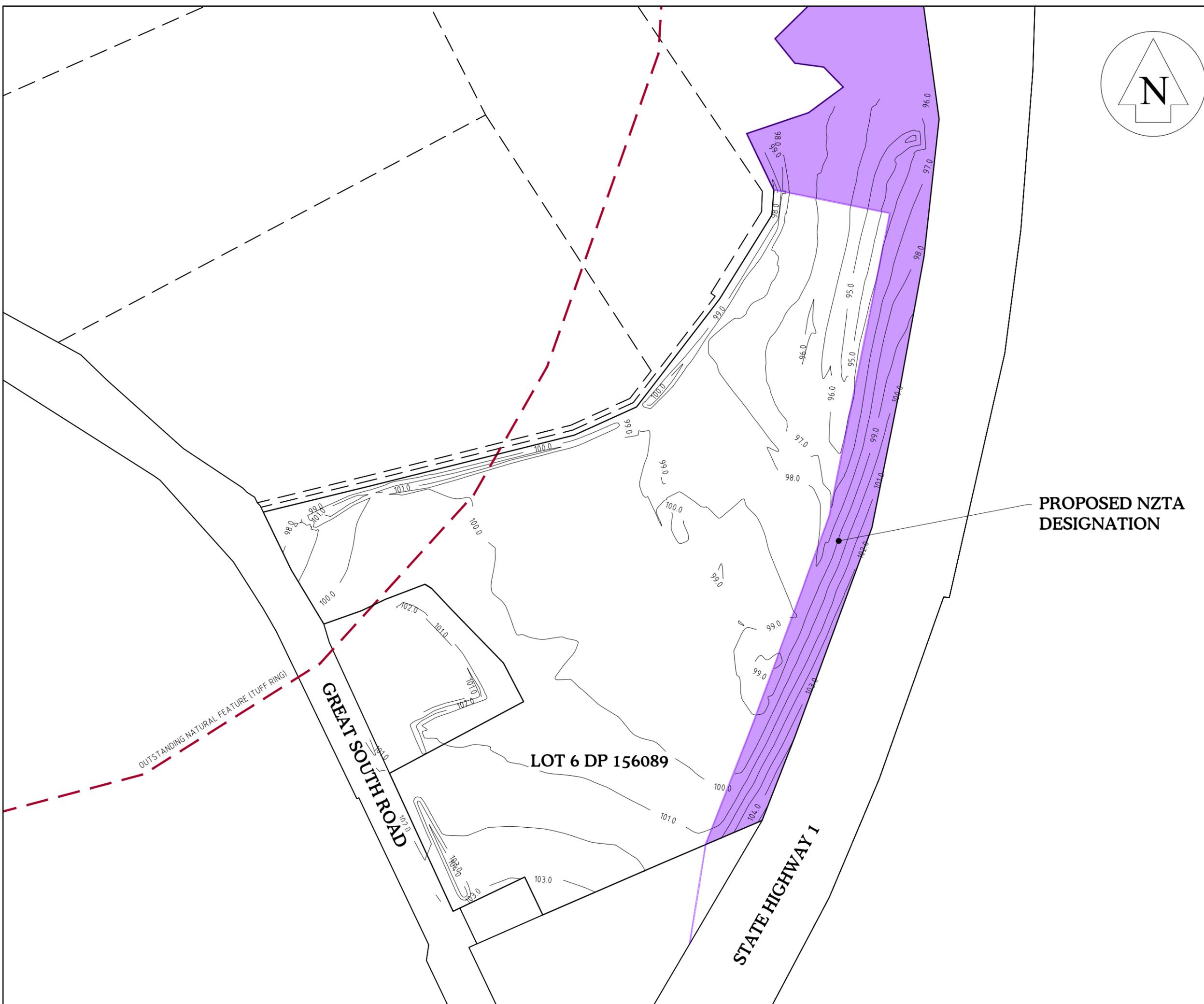
0800 TO SURVEY (0800 86 78 78)
 e-mail: info@subdivision.co.nz
 LEVEL 1,17 HALL STREET, PUKEKOHE, NEW ZEALAND
 PH:09 238 9991, FAX: 09 238 9307

Job Title
RETROSPECTIVE WORKS AT 1799A GREAT SOUTH ROAD, BOMBAY

Client
VERNON DEVELOPMENTS LTD

Sheet Title
PRE-DEVELOPMENT CONTOUR PLAN

Project	J2224	Drawing	J2224-1
CAD Ref. File	C-502-01	Council Ref.	ABC21680658
Scale (A3 Original)	1:2000	Amendment	----



- GENERAL NOTES**
1. LEVELS ARE IN TERMS OF NZ VERTICAL DATUM 2016.
 2. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT 2000.

LEGEND

EXISTING CONTOURS	(1.0m INTERVALS)
OUTSTANDING NATURAL FEATURE (TUFF RING)	
PROPOSED NZTA DESIGNATION	

Amendments	Name	Date

This document and the copyright in this document remain the property of TSC Ltd. The contents of this document may not be reproduced either in whole or in part by any means whatsoever without the prior written consent of TSC Ltd.
 Contractor to:
 Verify all dimensions on site before commencing any work. Refer to all figured dimensions. Refer al discrepancies to TSC Ltd.

	Name	Date
Surveyed	Lewis Jones	07/24
Designed	Sam Furniss	02/25
Drawn	Sam Furniss	02/25
Checked	Avneet Kumar	02/25
Approved	Craig Forrester	02/25



0800 TO SURVEY (0800 86 78 78)
 e-mail: info@subdivision.co.nz
 LEVEL 1,17 HALL STREET, PUKEKOHE, NEW ZEALAND
 PH:09 238 9991, FAX: 09 238 9307

Job Title
**RETROSPECTIVE WORKS
 AT 1799A GREAT SOUTH
 ROAD, BOMBAY**

Client
**VERNON
 DEVELOPMENTS LTD**

Sheet Title
EXISTING CONTOUR PLAN

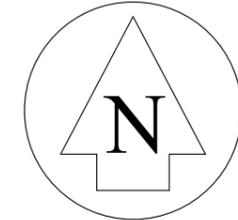
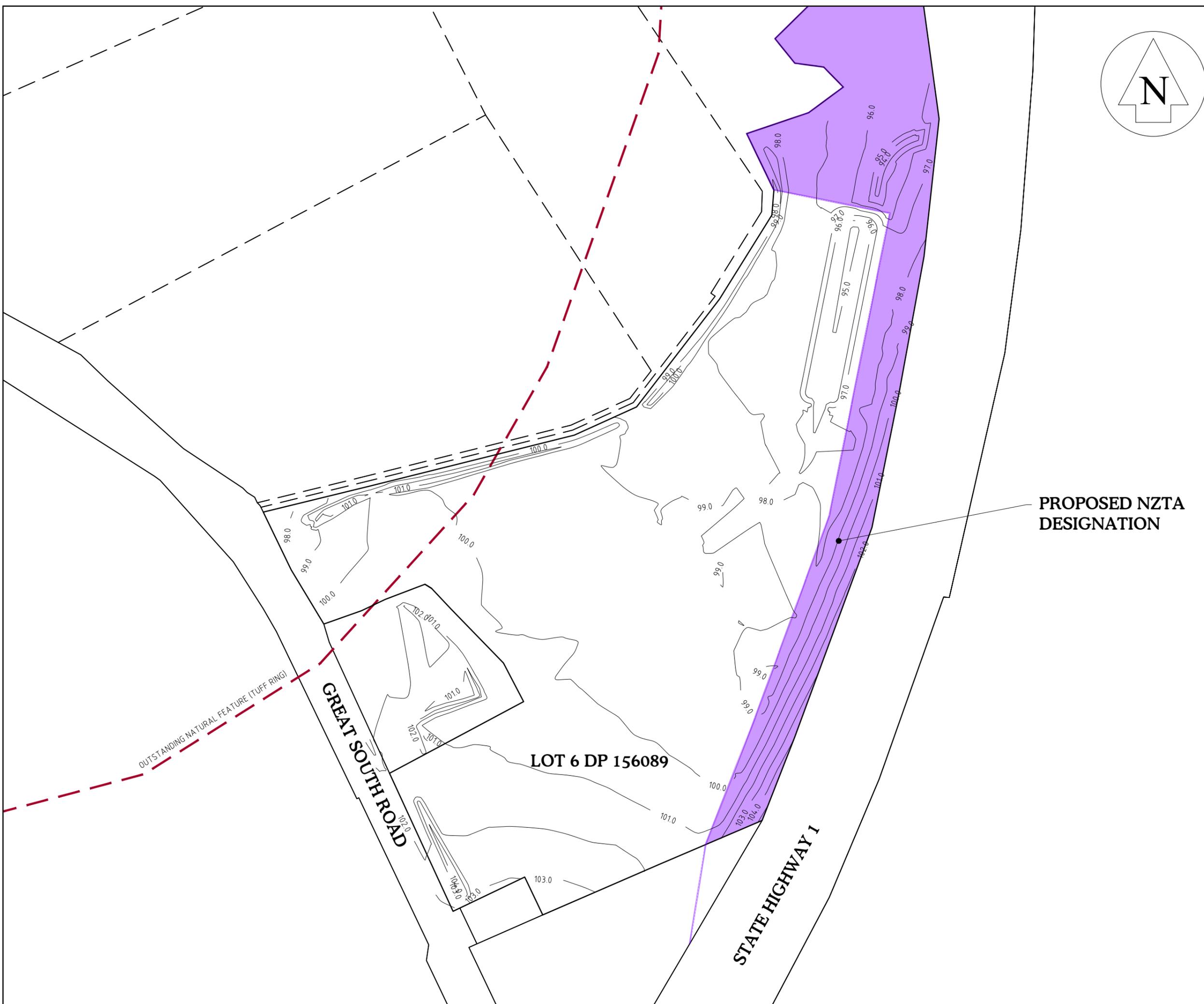
Project		Drawing	
J2224	J2224	J2224-2	J2224-2
CAD Ref. File		Council Ref.	
C-502-01	C-502-01	ABC21680658	ABC21680658
Scale (A3 Original)		Amendment	
1:2000	1:2000	----	----

**PROPOSED NZTA
 DESIGNATION**

LOT 6 DP 156089

GREAT SOUTH ROAD

STATE HIGHWAY 1



- GENERAL NOTES**
1. LEVELS ARE IN TERMS OF NZ VERTICAL DATUM 2016.
 2. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT 2000.

LEGEND

PROPOSED CONTOURS	(1.0m INTERVALS)
OUTSTANDING NATURAL FEATURE (TUFF RING)	
PROPOSED NZTA DESIGNATION	

Amendments	Name	Date

This document and the copyright in this document remain the property of TSC Ltd. The contents of this document may not be reproduced either in whole or in part by any means whatsoever without the prior written consent of TSC Ltd.
 Contractor to:
 Verify all dimensions on site before commencing any work. Refer to all figured dimensions. Refer al discrepancies to TSC Ltd.

	Name	Date
Surveyed	Lewis Jones	07/24
Designed	Sam Furniss	02/25
Drawn	Sam Furniss	02/25
Checked	Avneet Kumar	02/25
Approved	Craig Forrester	02/25



0800 TO SURVEY (0800 86 78 78)
 e-mail: info@subdivision.co.nz
 LEVEL 1,17 HALL STREET, PUKEKOHE, NEW ZEALAND
 PH:09 238 9991, FAX: 09 238 9307

Job Title
**RETROSPECTIVE WORKS
 AT 1799A GREAT SOUTH
 ROAD, BOMBAY**

Client
**VERNON
 DEVELOPMENTS LTD**

Sheet Title
**POST DEVELOPMENT
 CONTOUR PLAN**

Project	J2224	Drawing	J2224-3
CAD Ref. File	C-502-01	Council Ref.	ABC21680658
Scale (A3 Original)	1:2000	Amendment	----

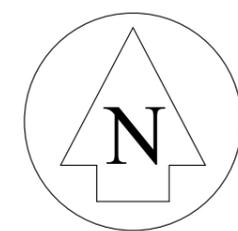
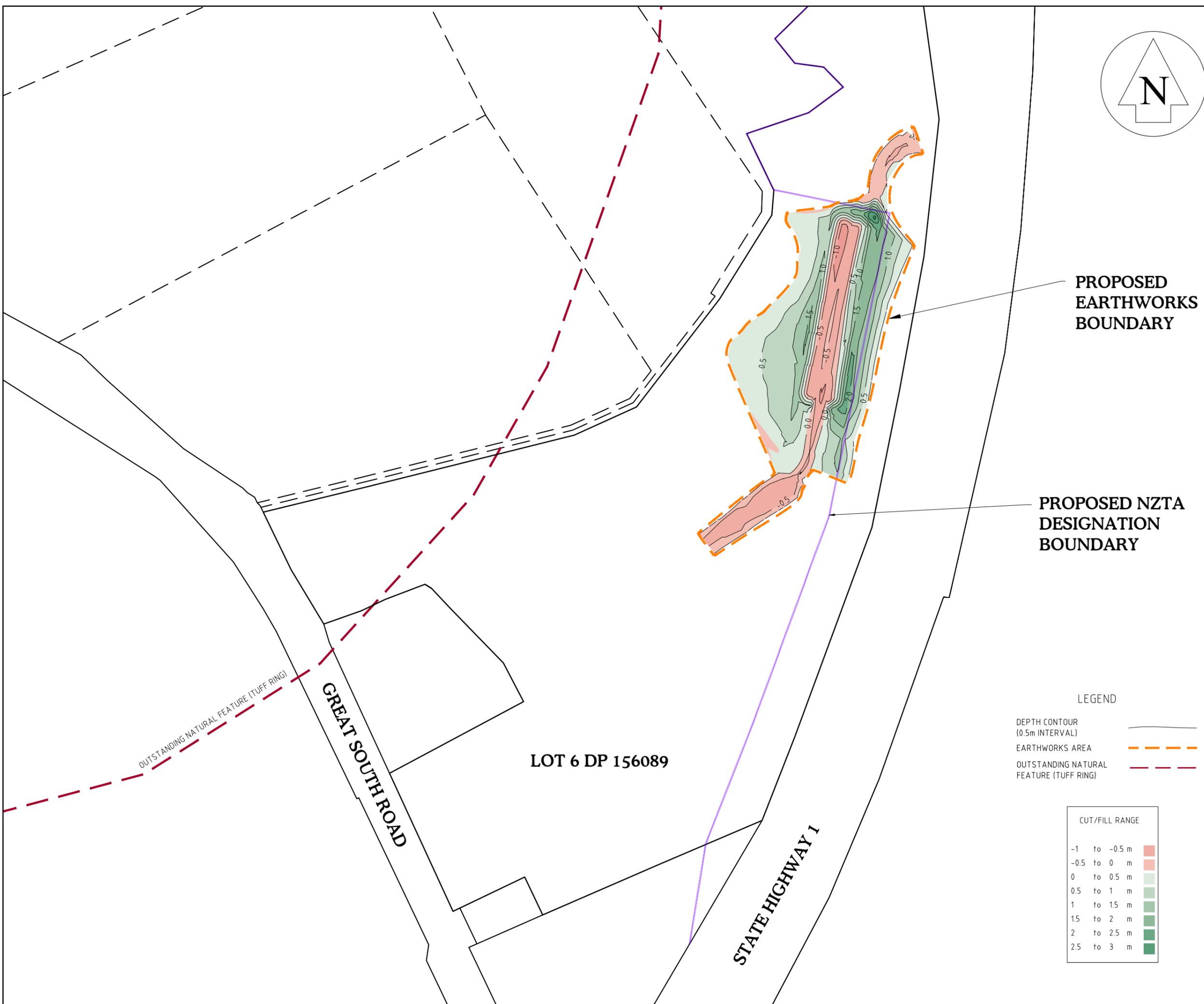
**PROPOSED NZTA
 DESIGNATION**

LOT 6 DP 156089

GREAT SOUTH ROAD

STATE HIGHWAY 1

OUTSTANDING NATURAL FEATURE (TUFF RING)



**PROPOSED
EARTHWORKS
BOUNDARY**

**PROPOSED NZTA
DESIGNATION
BOUNDARY**

LEGEND

DEPTH CONTOUR
(0.5m INTERVAL)

EARTHWORKS AREA

OUTSTANDING NATURAL
FEATURE (TUFF RING)

CUT/FILL RANGE	
-1 to -0.5 m	
-0.5 to 0 m	
0 to 0.5 m	
0.5 to 1 m	
1 to 1.5 m	
1.5 to 2 m	
2 to 2.5 m	
2.5 to 3 m	

- GENERAL NOTES**
- LEVELS ARE IN TERMS OF NZ VERTICAL DATUM 2016.
 - COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT 2000.
 - EARTHWORKS ARE NOT TO BE EXTENDED INTO ADJOINING SITES UNLESS THE ENGINEER HAS ISSUED SPECIFIC INSTRUCTIONS.
 - ALL EROSION AND SEDIMENT CONTROL DEVICES TO BE INSTALLED, AS-BUILT AND INSPECTED BY THE ENGINEER / COUNCIL PRIOR TO COMMENCING BULK EARTHWORKS ON SITE.
 - ALL EARTHWORKS TO BE INSPECTED BY CLIENT'S GEOTECHNICAL ENGINEER.
 - SUBSOIL DRAINS, IF REQUIRED, ARE TO BE CONFIRMED ON SITE DURING CONSTRUCTION BY ENGINEER.
 - CUT TO FILL OPERATIONS, THE MATERIAL WILL BE LIFTED, TRANSPORTED, PLACED IN 200-300mm LAYERS AND THEN COMPACTED WITH A SHEEPSFOOT ROLLER TO ENSURE THE REQUIRED COMPACTION IS OBTAINED.
 - TOPSOIL WILL BE CULTIVATED AND REVEGETATED.
 - EARTHWORKS VOLUMES ARE FROM EXISTING SURFACE LESS TOPSOIL STRIPPED (200mm) AND FINISHED SUBGRADE LEVELS AND ARE:
 - TOPSOIL VOLUME 2,290m³
 - TOTAL CUT 508m³
 - TOTAL FILL 8,323m³
 - MAX CUT DEPTH 1.0m
 - MAX FILL DEPTH 3.0m
 - EARTHWORKS AREA IS 11,449m².

Amendments	Name	Date

This document and the copyright in this document remain the property of TSC Ltd. The contents of this document may not be reproduced either in whole or in part by any means whatsoever without the prior written consent of TSC Ltd.
 Contractor to:
 Verify all dimensions on site before commencing any work. Refer to all figured dimensions. Refer al discrepancies to TSC Ltd.

	Name	Date
Surveyed	Lewis Jones	07/24
Designed	Sam Furniss	02/25
Drawn	Sam Furniss	02/25
Checked	Avneet Kumar	02/25
Approved	Craig Forrester	02/25

TSC
THE SURVEYING COMPANY
 Planners, Surveyors & Engineers

0800 TO SURVEY (0800 86 78 78)
 e-mail: info@subdivision.co.nz
 LEVEL 1,17 HALL STREET, PUKEKOHE, NEW ZEALAND
 PH:09 238 9991, FAX: 09 238 9307

Job Title
**RETROSPECTIVE WORKS
 AT 1799A GREAT SOUTH
 ROAD, BOMBAY**

Client
**VERNON
 DEVELOPMENTS LTD**

Sheet Title
ISOPACH PLAN

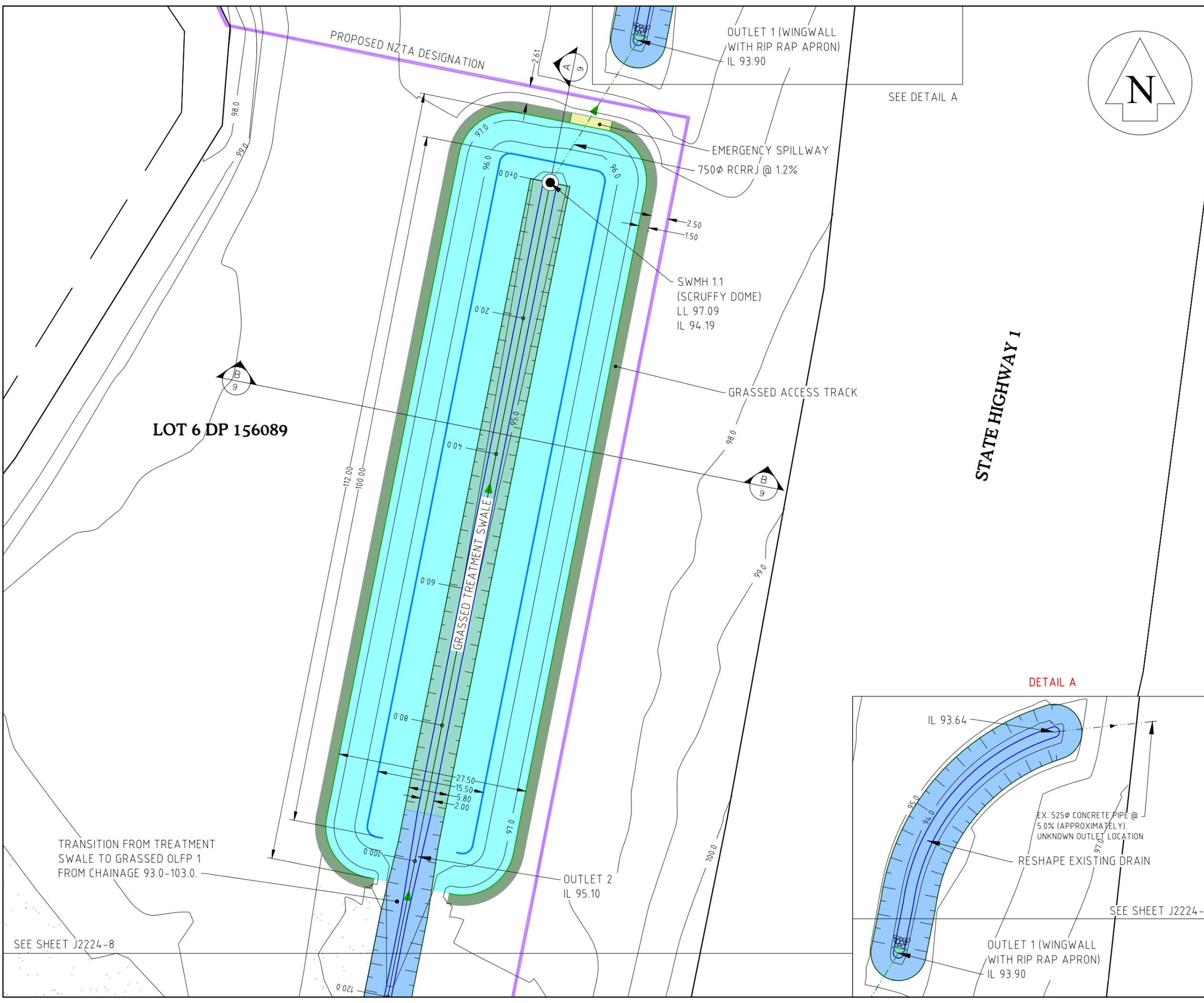
Project	J2224	Drawing	J2224-4
CAD Ref. File	C-502-01	Council Ref.	ABC21680658
Scale (A3 Original)	1:2000	Amendment	----

LOT 6 DP 156089

GREAT SOUTH ROAD

STATE HIGHWAY 1

OUTSTANDING NATURAL FEATURE (TUFF RING)



- GENERAL NOTES**
1. LEVELS ARE IN TERMS OF NZ VERTICAL DATUM 2016.
 2. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT 2000.
 3. CONTRACTOR TO VERIFY POSITION OF EXISTING SERVICE CONNECTION PRIOR TO EXCAVATION.
 4. CONTRACTOR TO CONTACT TSC LIMITED PRIOR TO COMMENCEMENT OF ANY WORK ON THE SITE.

LEGEND

PROPOSED CONTOURS	
PROPOSED NZTA DESIGNATION	
PROPOSED STORMWATER	
PROPOSED STORMWATER MANHOLE	
TREATMENT SWALE	
OVERLAND FLOWPATH	

Amendments	Name	Date

This document and the copyright in this document remain the property of TSC Ltd. The contents of this document may not be reproduced either in whole or in part by any means whatsoever without the prior written consent of TSC Ltd.
 Contractor to: Verify all dimensions on site before commencing any work. Refer to all figured dimensions. Refer all discrepancies to TSC Ltd.

	Name	Date
Surveyed	Lewis Jones	07/24
Designed	Sam Furniss	02/25
Drawn	Sam Furniss	02/25
Checked	Avneet Kumar	02/25
Approved	Craig Forrester	02/25

TSC
 THE SURVEYING COMPANY
 Planners, Surveyors & Engineers

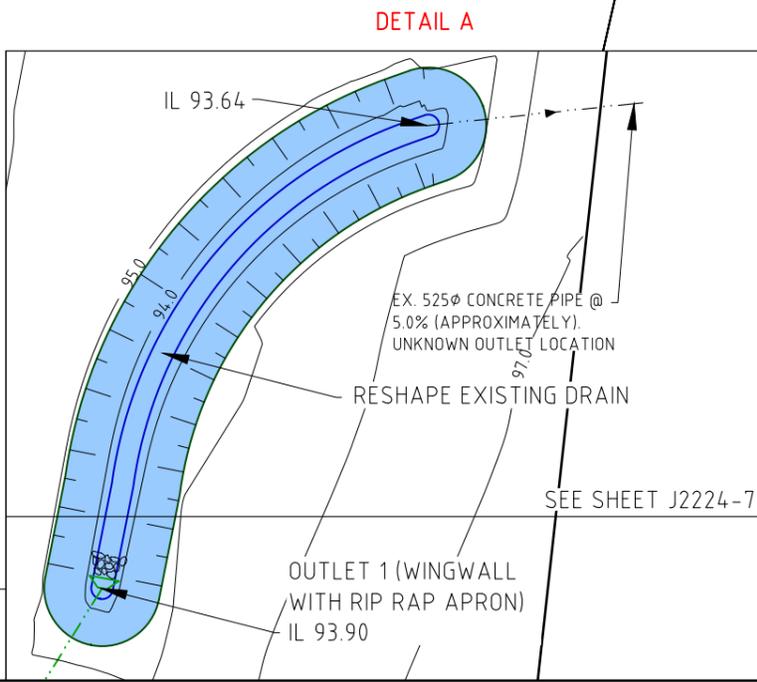
0800 TO SURVEY (0800 86 78 78)
 e-mail: info@subdivision.co.nz
 LEVEL 1,17 HALL STREET, PUKEKOHE, NEW ZEALAND
 PH:09 238 9991, FAX: 09 238 9307

Job Title
RETROSPECTIVE WORKS AT 1799A GREAT SOUTH ROAD, BOMBAY

Client
VERNON DEVELOPMENTS LTD

Sheet Title
DEVELOPMENT PLAN 1

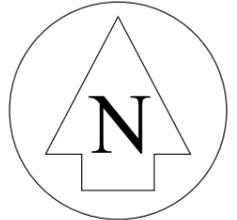
Project	J2224	Drawing	J2224-7
CAD Ref. File	C-502-01	Council Ref.	ABC21680658
Scale (A3 Original)	1:500	Amendment	----



SEE SHEET J2224-8

LOT 6 DP 156089

STATE HIGHWAY 1



DETAIL A

SEE SHEET J2224-7

SEE DETAIL A

TRANSITION FROM TREATMENT SWALE TO GRASSED OLFP 1 FROM CHAINAGE 93.0-103.0.

OUTLET 2
IL 95.10

OUTLET 1 (WINGWALL WITH RIP RAP APRON)
IL 93.90

OUTLET 1 (WINGWALL WITH RIP RAP APRON)
IL 93.90

EMERGENCY SPILLWAY
750Ø RCRRJ @ 1.2%

SWMH 1.1 (SCRUFFY DOME)
LL 97.09
IL 94.19

GRASSED ACCESS TRACK

GRASSED TREATMENT SWALE

PROPOSED NZTA DESIGNATION

112.00
100.00

120.0

100.0

100.0

100.0

100.0

97.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

0.07

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

20.0

2.50

1.50

2.50

1.50

2.50

1.50

2.50

1.50

2.50

1.50

2.50

1.50

2.50

1.50

2.50

1.50

2.50

1.50

2.50

1.50

2.50

1.50

2.50

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

2.61

97.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

97.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

97.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

97.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

97.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

96.0

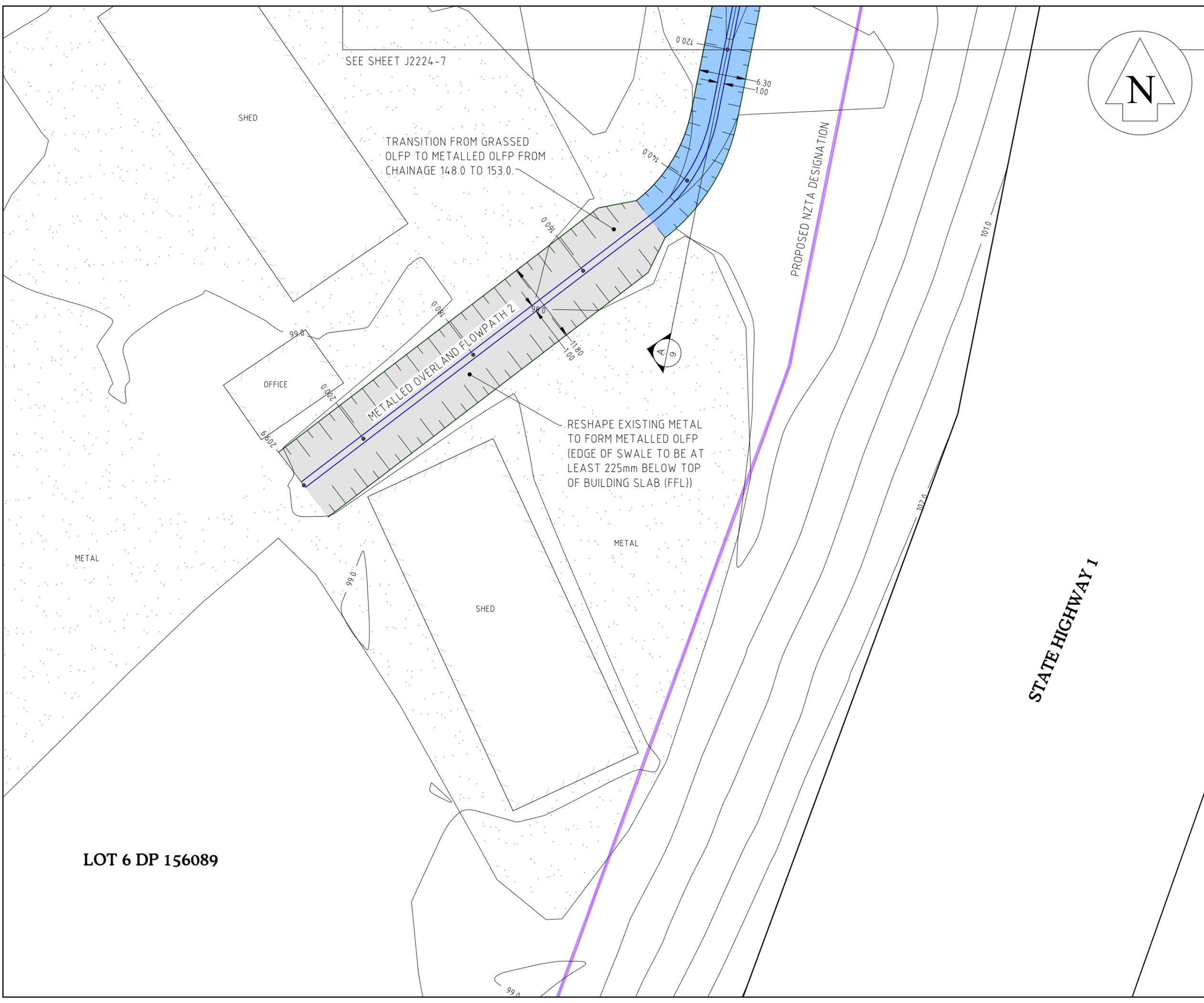
96.0

96.0

96.0

96.0

96.0



- GENERAL NOTES**
1. LEVELS ARE IN TERMS OF NZ VERTICAL DATUM 2016.
 2. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT 2000.
 3. CONTRACTOR TO VERIFY POSITION OF EXISTING SERVICE CONNECTION PRIOR TO EXCAVATION.
 4. CONTRACTOR TO CONTACT TSC LIMITED PRIOR TO COMMENCEMENT OF ANY WORK ON THE SITE.

LEGEND

PROPOSED CONTOURS	
PROPOSED NZTA DESIGNATION	
PROPOSED STORMWATER MANHOLE	
METAL	
OVERLAND FLOWPATH (GRASSED)	
OVERLAND FLOWPATH (METALLED)	

Amendments	Name	Date

This document and the copyright in this document remain the property of TSC Ltd. The contents of this document may not be reproduced either in whole or in part by any means whatsoever without the prior written consent of TSC Ltd.
 Contractor to: Verify all dimensions on site before commencing any work. Refer to all figured dimensions. Refer all discrepancies to TSC Ltd.

	Name	Date
Surveyed	Lewis Jones	07/24
Designed	Sam Furniss	02/25
Drawn	Sam Furniss	02/25
Checked	Avneet Kumar	02/25
Approved	Craig Forrester	02/25

TSC
 THE SURVEYING COMPANY
 Planners, Surveyors & Engineers

0800 TO SURVEY (0800 86 78 78)
 e-mail: info@subdivision.co.nz
 LEVEL 1,17 HALL STREET, PUKEKOHE, NEW ZEALAND
 PH:09 238 9991, FAX: 09 238 9307

Job Title
RETROSPECTIVE WORKS AT 1799A GREAT SOUTH ROAD, BOMBAY

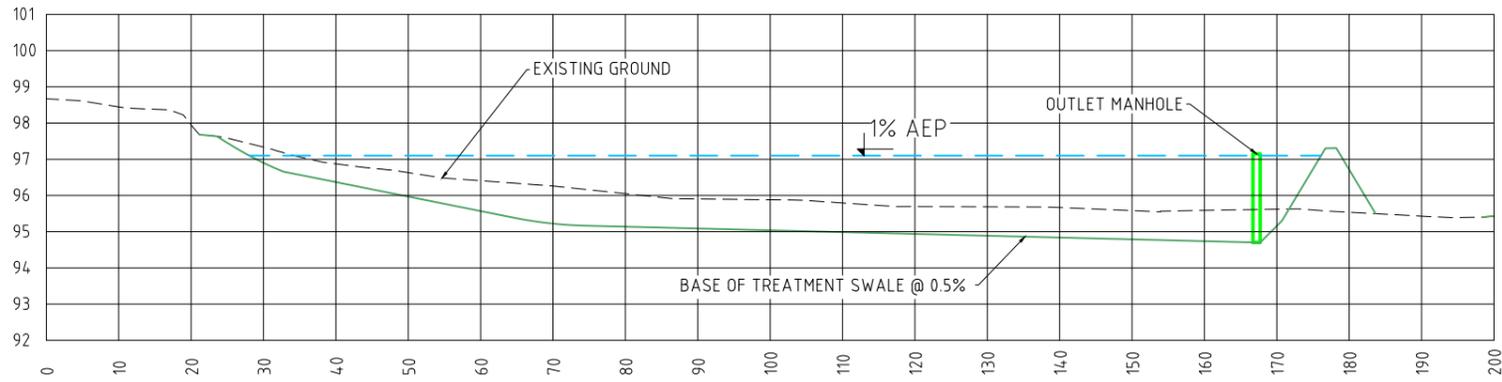
Client
VERNON DEVELOPMENTS LTD

Sheet Title
DEVELOPMENT PLAN 2

Project	J2224	Drawing	J2224-8
CAD Ref. File	C-502-01	Council Ref.	ABC21680658
Scale (A3 Original)	1:500	Amendment	----

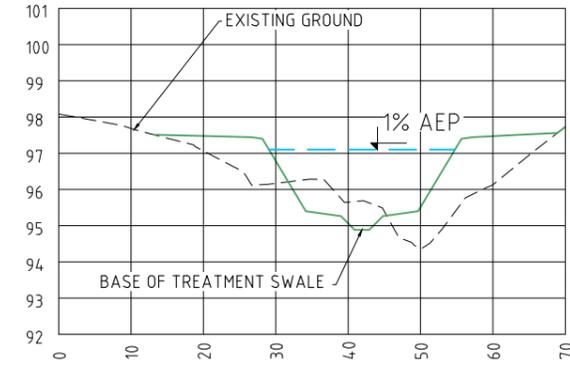
LOT 6 DP 156089

STATE HIGHWAY 1



CROSS SECTION A

HOR. SCALE 1:1000
VERT. SCALE 1:200



CROSS SECTION B

HOR. SCALE 1:1000
VERT. SCALE 1:200

- GENERAL NOTES**
1. LEVELS ARE IN TERMS OF NZ VERTICAL DATUM 2016.
 2. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT 2000.
 3. CONTRACTOR TO VERIFY POSITION OF EXISTING SERVICE CONNECTION PRIOR TO EXCAVATION.
 4. CONTRACTOR TO CONTACT TSC LIMITED PRIOR TO COMMENCEMENT OF ANY WORK ON THE SITE.

LEGEND

EXISTING SURFACE	
DESIGN SURFACE	

Amendments	Name	Date

This document and the copyright in this document remain the property of TSC Ltd. The contents of this document may not be reproduced either in whole or in part by any means whatsoever without the prior written consent of TSC Ltd.
Contractor to: Verify all dimensions on site before commencing any work. Refer to all figured dimensions. Refer all discrepancies to TSC Ltd.

	Name	Date
Surveyed	Lewis Jones	07/24
Designed	Sam Furniss	02/25
Drawn	Sam Furniss	02/25
Checked	Avneet Kumar	02/25
Approved	Craig Forrester	02/25

TSC
THE SURVEYING COMPANY
Planners, Surveyors & Engineers

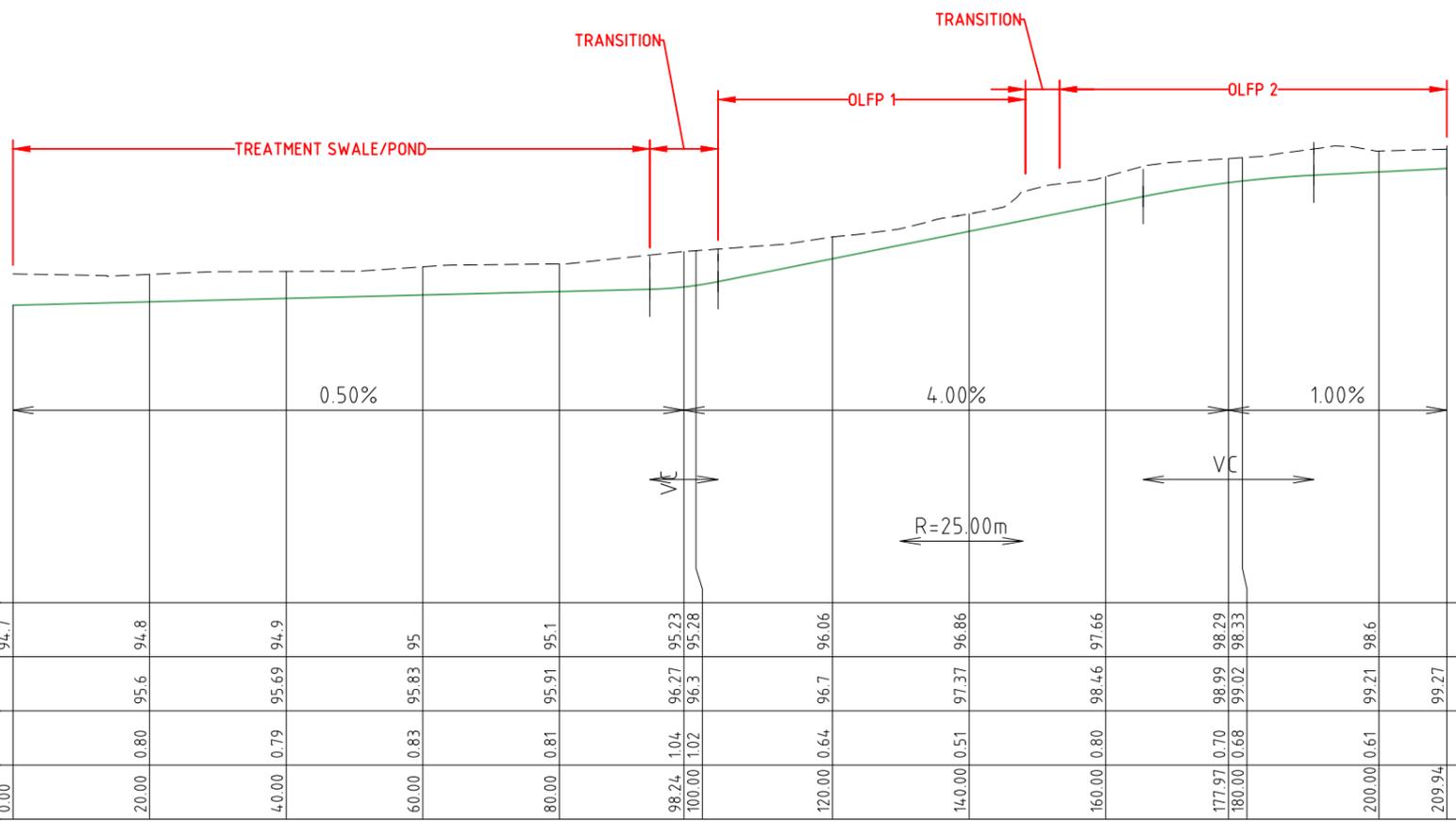
0800 TO SURVEY (0800 86 78 78)
e-mail: info@subdivision.co.nz
LEVEL 1,17 HALL STREET, PUKEKOHE, NEW ZEALAND
PH:09 238 9991, FAX: 09 238 9307

Job Title
RETROSPECTIVE WORKS AT 1799A GREAT SOUTH ROAD, BOMBAY

Client
VERNON DEVELOPMENTS LTD

Sheet Title
STORMWATER DETAILS 1

Project	J2224	Drawing	J2224-9
CAD Ref. File	C-502-01	Council Ref.	ABC21680658
Scale (A3 Original)	AS SHOWN	Amendment	----

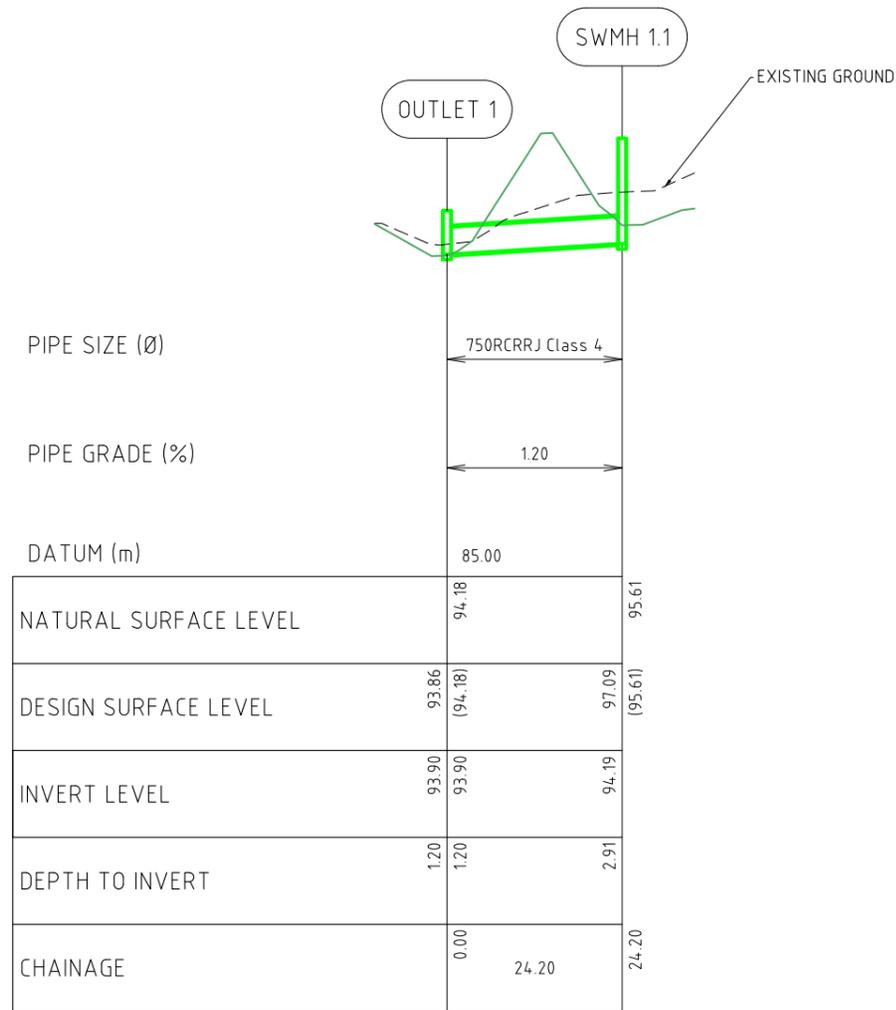


DESIGN GRADELINE
VERTICAL GEOMETRY
HORIZONTAL GEOMETRY
DATUM RL 86.00

DESIGN LEVELS	94.7	94.8	94.9	95	95.1	95.23 95.28	96.06	96.86	97.66	98.29 98.33	98.6	99.27
EXISTING SURFACE		95.6	95.69	95.83	95.91	96.27 96.3	96.7	97.37	98.46	98.99 99.02	99.21	99.27
DEPTHS		0.80	0.79	0.83	0.81	1.04 1.02	0.64	0.51	0.80	0.70 0.68	0.61	
CHAINAGES	0.00	20.00	40.00	60.00	80.00	98.24 100.00	120.00	140.00	160.00	177.97 180.00	200.00	209.94

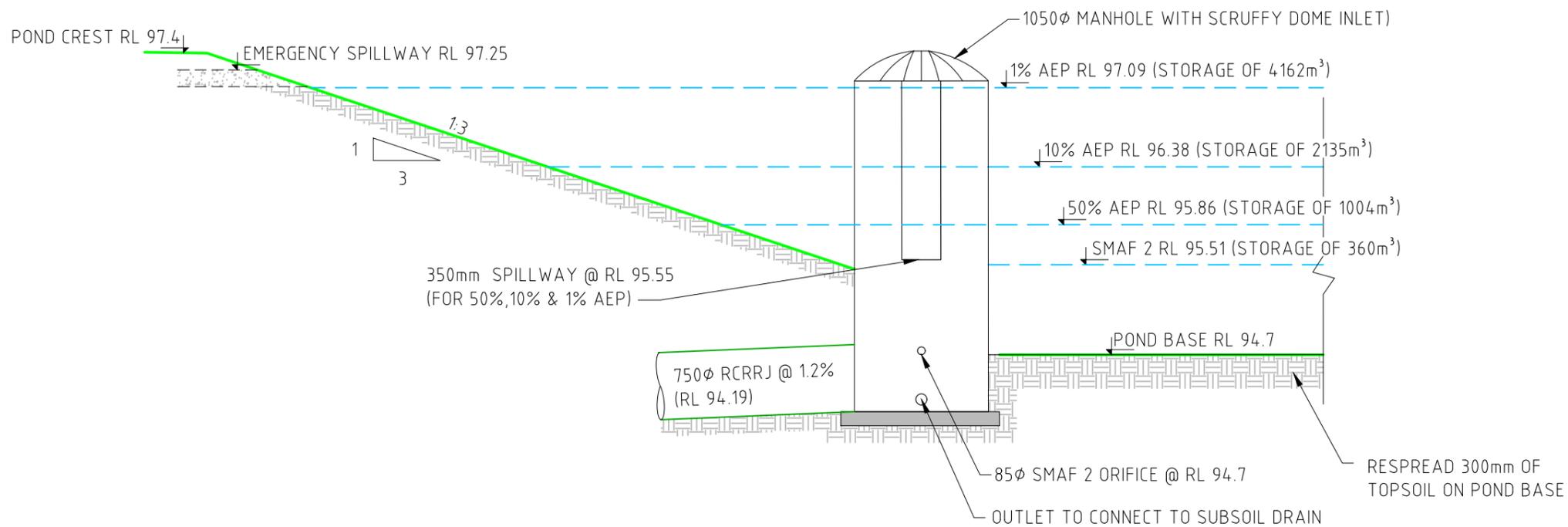
SWALE/OVERLAND FLOWPATH LONG SECTION

HOR. SCALE 1:1000
VERT. SCALE 1:200



STORWATER LINE 1

HOR. SCALE 1:1000
VERT. SCALE 1:200



TYPICAL POND OUTLET CROSS SECTION

SCALE 1:50

GENERAL NOTES

- LEVELS ARE IN TERMS OF NZ VERTICAL DATUM 2016.
- COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT 2000.
- CONTRACTOR TO VERIFY POSITION OF EXISTING SERVICE CONNECTION PRIOR TO EXCAVATION.
- CONTRACTOR TO CONTACT TSC LIMITED PRIOR TO COMMENCEMENT OF ANY WORK ON THE SITE.

LEGEND

EXISTING SURFACE

DESIGN SURFACE

Amendments	Name	Date

This document and the copyright in this document remain the property of TSC Ltd. The contents of this document may not be reproduced either in whole or in part by any means whatsoever without the prior written consent of TSC Ltd.
 Contractor to:
 Verify all dimensions on site before commencing any work. Refer to all figured dimensions. Refer all discrepancies to TSC Ltd.

	Name	Date
Surveyed	Lewis Jones	07/24
Designed	Sam Furniss	02/25
Drawn	Sam Furniss	02/25
Checked	Avneet Kumar	02/25
Approved	Craig Forrester	02/25



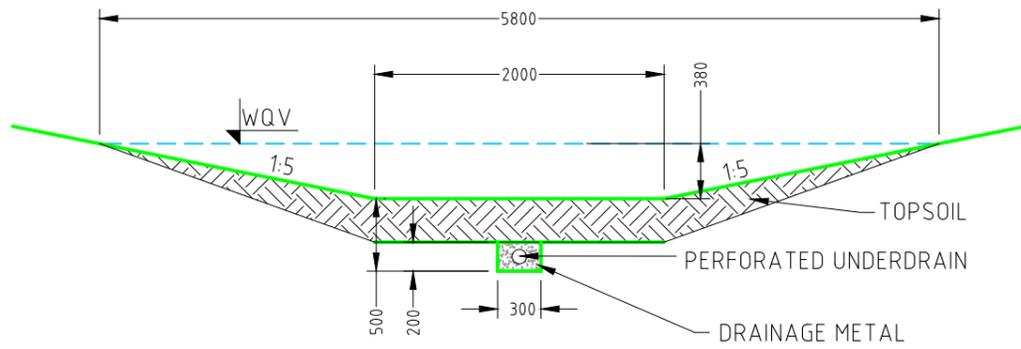
0800 TO SURVEY (0800 86 78 78)
 e-mail: info@subdivision.co.nz
 LEVEL 1,17 HALL STREET, PUKEKOHE, NEW ZEALAND
 PH:09 238 9991, FAX: 09 238 9307

Job Title
**RETROSPECTIVE WORKS
 AT 1799A GREAT SOUTH
 ROAD, BOMBAY**

Client
**VERNON
 DEVELOPMENTS LTD**

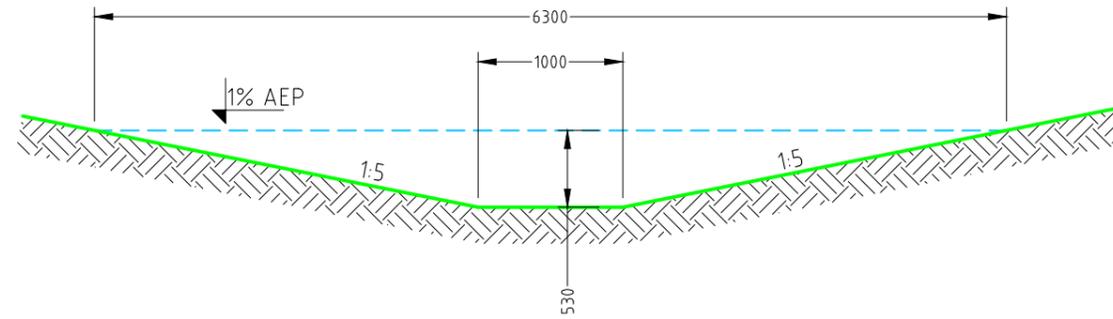
Sheet Title
STORMWATER DETAILS 2

Project	J2224	Drawing	J2224-10
CAD Ref. File	C-502-01	Council Ref.	ABC21680658
Scale (A3 Original)	AS SHOWN	Amendment	----



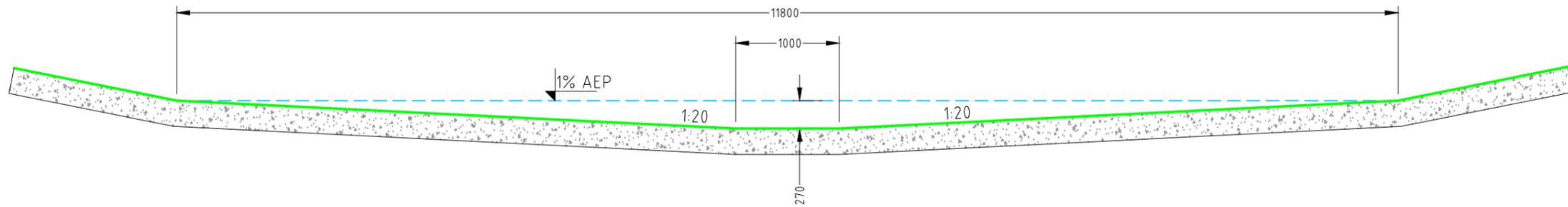
TYPICAL TREATMENT SWALE CROSS SECTION - GRASED
(CHAINAGE 0.0 - 93.0)

SCALE 1:50



TYPICAL OLFP 1 CROSS SECTION - GRASED
(CHAINAGE 103.0 - 148.0)

SCALE 1:50

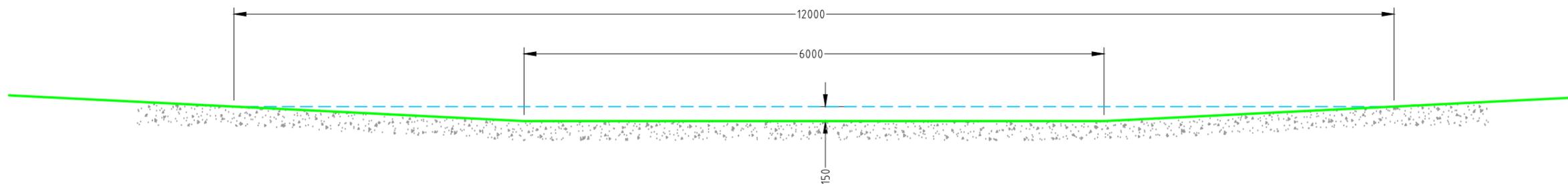


TYPICAL OLFP 2 CROSS SECTION - METALLED
(CHAINAGE 153.0 - 209.9)

SCALE 1:50

NOTE:

1. UNDERCUT PROVIDED LEVELS TO ALLOW FOR MINIMUM 100mm OF TOPSOIL FOR OLFP AND MINIMUM 300mm OF TOPSOIL FOR TREATMENT SWALE
2. SWALE TO BE LINED COCONUT MATTING OR SIMILAR APPROVED MATERIAL
3. SUBSOIL TO BE PLACED UNDER TREATMENT SWALE



EMERGENCY SPILLWAY

SCALE 1:50

GENERAL NOTES

1. LEVELS ARE IN TERMS OF NZ VERTICAL DATUM 2016.
2. COORDINATES ARE IN TERMS OF MOUNT EDEN CIRCUIT 2000.
3. CONTRACTOR TO VERIFY POSITION OF EXISTING SERVICE CONNECTION PRIOR TO EXCAVATION.
4. CONTRACTOR TO CONTACT TSC LIMITED PRIOR TO COMMENCEMENT OF ANY WORK ON THE SITE.

Amendments	Name	Date

This document and the copyright in this document remain the property of TSC Ltd. The contents of this document may not be reproduced either in whole or in part by any means whatsoever without the prior written consent of TSC Ltd.
Contractor to: Verify all dimensions on site before commencing any work. Refer to all figured dimensions. Refer al discrepancies to TSC Ltd.

	Name	Date
Surveyed	Lewis Jones	07/24
Designed	Sam Furniss	02/25
Drawn	Sam Furniss	02/25
Checked	Avneet Kumar	02/25
Approved	Craig Forrester	02/25



0800 TO SURVEY (0800 86 78 78)
e-mail: info@subdivision.co.nz
LEVEL 1,17 HALL STREET, PUKEKOHE, NEW ZEALAND
PH:09 238 9991, FAX: 09 238 9307

Job Title
**RETROSPECTIVE WORKS
AT 1799A GREAT SOUTH
ROAD, BOMBAY**

Client
**VERNON
DEVELOPMENTS LTD**

Sheet Title
STORMWATER DETAILS 3

Project	J2224	Drawing	J2224-11
CAD Ref. File	C-502-01	Council Ref.	ABC21680658
Scale (A3 Original)	AS SHOWN	Amendment	----