

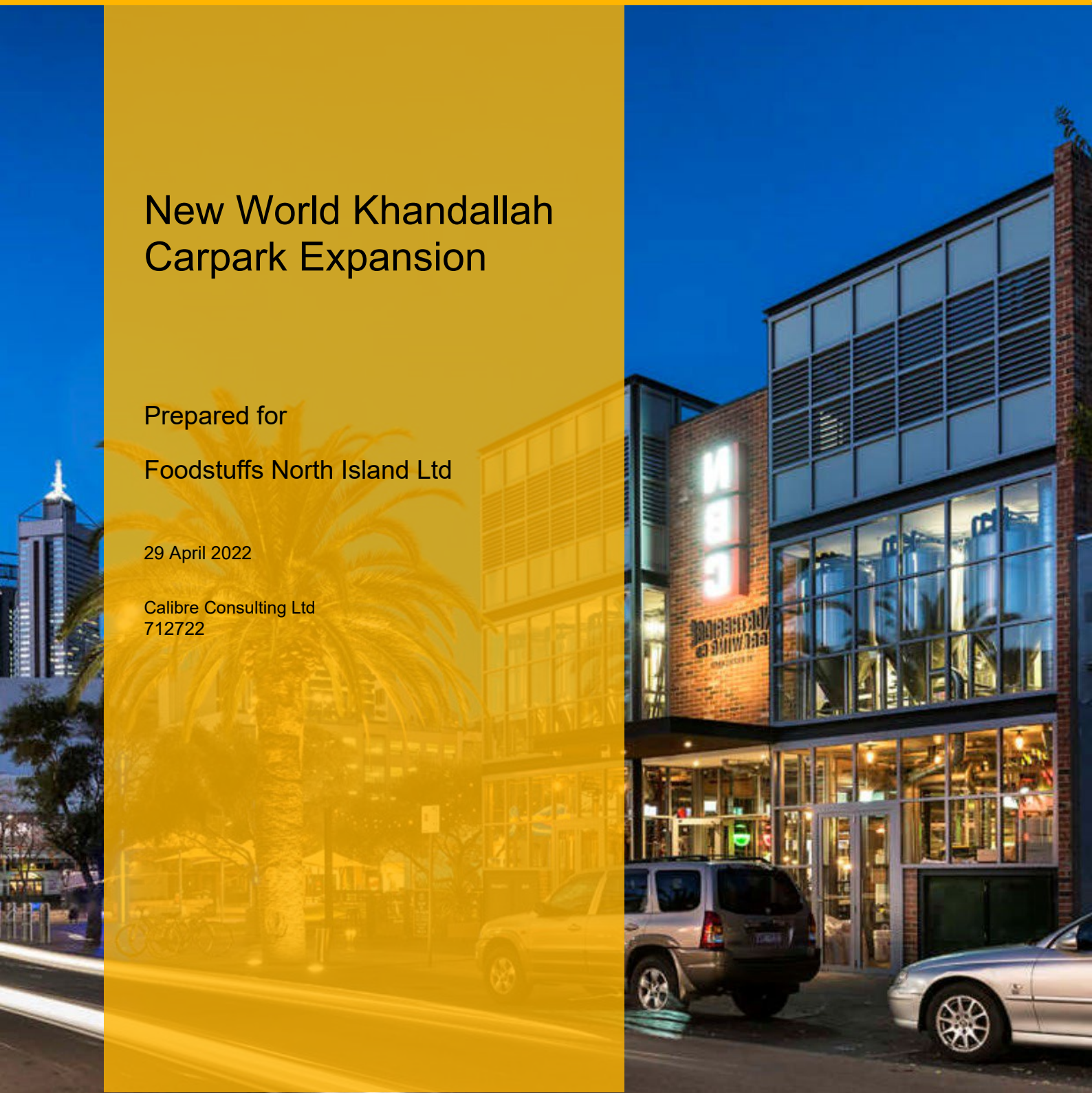
# Infrastructure Report

## New World Khandallah Carpark Expansion

Prepared for  
Foodstuffs North Island Ltd

29 April 2022

Calibre Consulting Ltd  
712722



## QUALITY ASSURANCE STATEMENT

TASK	NAME	SIGNATURE
Project Manager	Rob Truter	
Prepared by	David Bevan-Smith	
Reviewed by	Sumin Wang	
Approved for Issue by	Rob Truter	

## DOCUMENT CONTROL

ISSUE	DATE	ISSUE DETAILS	AUTHOR	CHECKED	APPROVED
00	21/04/2022	For Resource Consent	DBS	SW	RT
01	29/04/2022	Retaining wall appendix added	TA	KS	TA

712722 Re 20220429 Nw Khandallah Car Park Foodstuffs

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# Appendices

- Appendix A Engineering Drawings
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- Appendix C Retaining Wall Notes

# 1. Introduction

This report is prepared to support the concept design for the development of the Khandallah New World carpark extension. The report covers the earthworks, roading and stormwater associated with the project.

# 2. Existing Site

The site has been used historically for residential purposes and typically falls to the southwest. The site features retaining walls and trees/vegetation associated with residential areas, these will be either removed or maintained during the construction phase of the project.

The site has the typical 3 waters and utility connections associated with residential dwellings. These will need to be capped at the mains connection point or at the property boundary and the sections of pipe removed or abandoned.

# 3. Earthworks and Sediment Control

## 3.1 Earthworks

The earthworks associated with the project involve cutting and filling of the site over 2,800m<sup>2</sup> to achieve the proposed carpark levels. Construction of retaining walls is required to support the cut and fill batters.

Table 1: Earthworks Volume Table

Total Cut (m <sup>3</sup> )	Total Fill (m <sup>3</sup> )	Balance (m <sup>3</sup> )
2540	90	2450

The retaining walls vary in height up to 3.4m high, predominantly supporting the pedestrian right of way (1m wide) which is significantly higher than the finished floor level of the adjoining New World shopping centre. Appropriate pedestrian barriers/fence will be installed along this section. Vehicle barriers are required where there is a retained height equal or higher than 0.6m for protection from falling.

Refer to Appendix A for the engineering drawings.

## 3.2 Erosion and Sediment Control

The erosion and sediment control (ESCP) measures incorporate silt fences and earth bund and channels to collect the dirty water runoff from inside the site and divert it to two earth bund decants for discharge from site. A clean water diversion channel diverts water from entering the site.

Stabilised site access are to be constructed at the existing entrances. Soil Loss calculation is in Appendix B

Refer to Appendix A for the engineering drawings.

# 4. Roading

The road environments have all been specifically designed to suit the vehicle movement, parking, pedestrian, utilities, and access requirements of their circumstances. That includes the choice of kerb types (standard kerb and channel and edge kerb).

Construction of accessway 1 from Nicholson Road will require the existing wastewater manhole lid to be raised to match the new entrance levels. The existing vehicle crossing on Nicholson Road is to be upgraded and the kerb reinstated.

Construction of accessway 2 from the existing carpark to the proposed carpark will require the existing manholes etc. to be taken into consideration in the design.

Acoustic walls, designed by others, will be installed in the location shown on drawing C300.

Refer to Appendix A for the engineering drawings.

## 5. Stormwater

The existing private pipe network and kerb discharge points along Dekka Street will be removed and the kerb is to be reinstated.

The carpark is design to create the crest near the intersection of Accessway 1 and 2, which separately drains the surface stormwater towards lowed placed sumps.

The northerly stormwater runoff from the proposed carpark is collected via sumps inside the carpark area and is treated (stormwater filter) prior to being discharged to kerb along Dekka Street.

The southerly stormwater runoff from the proposed carpark is collected via sumps inside the carpark area and is treated (stormwater filter) prior to being piped to a detention tank at the Nicholson Road carpark entrance. This is then discharged to Council public drainage system.

Stormwater from the retaining walls is to be collected by subsoil drain behind the retaining walls and connected to the proposed stormwater system via a silt trap sump.

Refer to Appendix A for the engineering drawings

The detention tank has been designed to mitigate stormwater run-off flows equal or less than pre-development levels for 10 year and 100-year storm events. The detention tank volume is designed as 3m<sup>3</sup> to meet the required mitigation scenario.

Refer to Appendix B for the stormwater calculations.

## 6. Conclusion

Based on the above, the proposed development will have less than minor effects on the existing infrastructure,

## Appendix A      Engineering Drawings

## Document List No. TR1

Project name: NEW WORLD KHANDALLAH CARPARK EXPANSION  
 Project Number: 712722  
 Client: FOODSTUFFS NORTH ISLAND LTD  
 Subject: FOR RESOURCE CONSENT  
 Comment: FOR RESOURCE CONSENT  
 Date: 21-Apr-22  
 Issued by: KD Authorised: SW

### Media and Status Details

Print Size	Digital	Media	Purpose	Phase
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<input type="checkbox"/> Other <input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> LAN/WAN	<input type="checkbox"/> Construction	<input type="checkbox"/> As Built

### Distribution Details

1  
1

### Document Details

Document Number	Rev	Document Title
712722-C000	0	COVER SHEET
712722-C100	0	EXISTING SITE PLAN
712722-C170	0	EROSION AND SEDIMENT CONTROL PLAN
712722-C171	0	EROSION AND SEDIMENT CONTROL DETAILS
712722-C200	0	PROPOSED CONTOUR PLAN
712722-C201	0	CUT AND FILL PLAN
712722-C205	0	SITE SECTIONS
712722-C210	0	RETAINING WALL PLAN
712722-C211	0	RETAINING WALL SECTIONS
712722-C300	0	ACCESSWAY PLAN
712722-C301	0	ACCESSWAY LONG SECTIONS
712722-C302	0	TYPICAL ROAD CROSS SECTIONS
712722-C303	0	ROADING CONSTRUCTION DETAILS
712722-C305	0	ROAD MARKING AND SIGN PLAN
712722-C400	0	DRAINAGE PLAN
712722-C401	0	STORMWATER CATCHMENT PLAN
712722-C405	0	STORMWATER LONG SECTION
712722-C800	0	STANDARD DETAILS SHEET 1

# FOODSTUFFS NORTH ISLAND LTD

# NEW WORLD KHANDALLAH CAR PARK EXPANSION



## 712722 DRAWING SCHEDULE



C000 COVER SHEET

### **EROSION & SEDIMENT CONTROL**

C100 EXISTING SITE PLAN  
C170 EROSION AND SEDIMENT CONTROL PLAN  
C171 EROSION AND SEDIMENT CONTROL DETAILS

### **EARTHWORKS**

C200 PROPOSED CONTOUR PLAN  
C201 CUT AND FILL PLAN  
C205 SITE SECTIONS  
C210 EARTHWORKS SITE SECTION LOCATION PLAN  
C211 EARTHWORKS SITE CROSS SECTIONS

### **SITE**

C300 ACCESSWAY PLAN  
C301 ACCESSWAY LONG SECTIONS  
C302 TYPICAL CARPARK CROSS SECTIONS  
C303 ROADING CONSTRUCTION DETAILS

### **DRAINAGE, WATER & UTILITY**

C400 STORMWATER RETICULATION PLAN  
C401 STORMWATER CATCHMENT PLAN  
C405 STORMWATER LONG SECTIONS  
C800 STANDARD DETAILS SHEET1

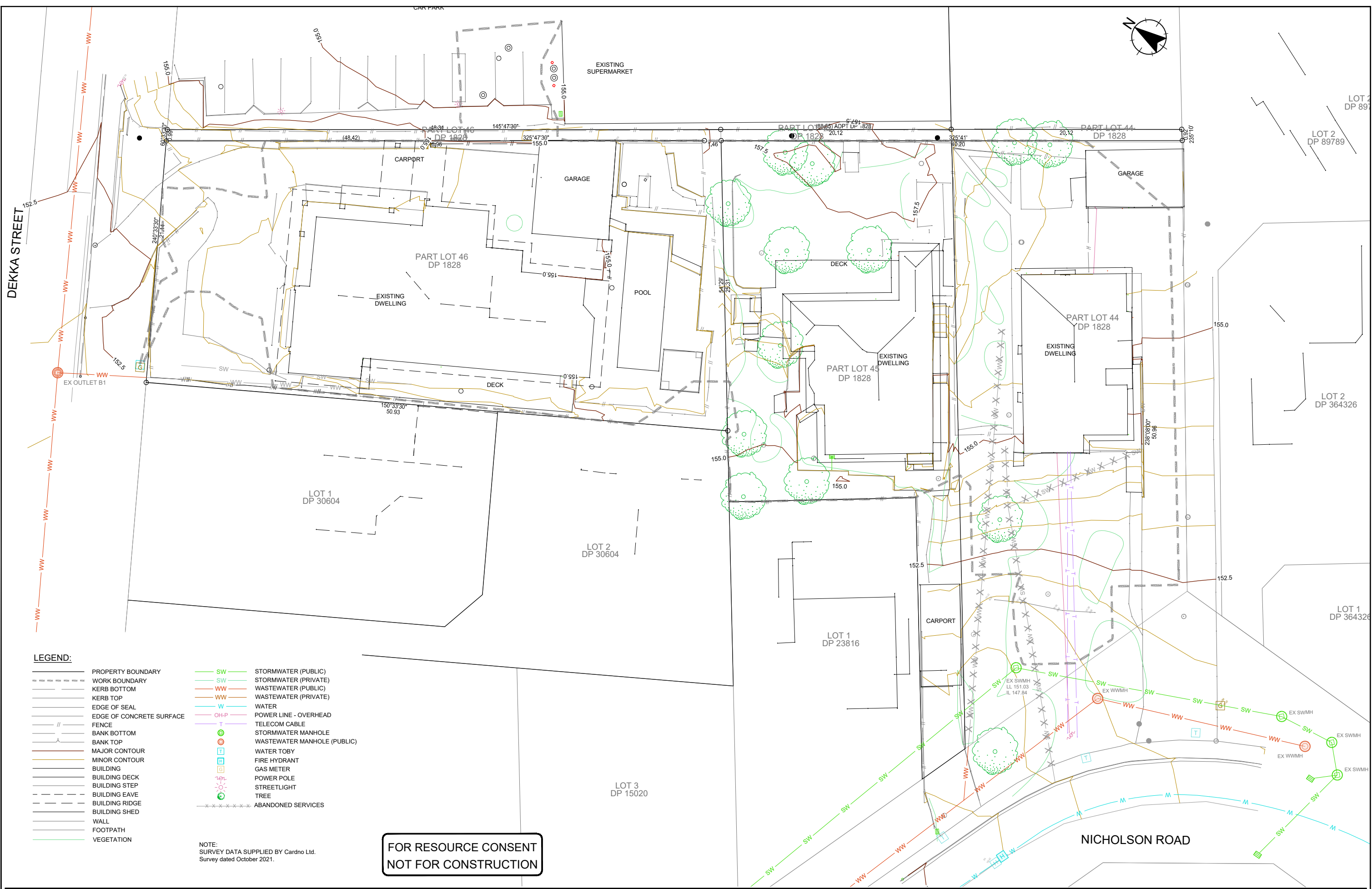
**NOTE:**

Due to COVID restrictions, Concept Design has been undertaken using latest information sourced from Wellington City Council GIS Viewer or supplied by others which has not been ground truthed/verified on site. Existing site levels and peripheral boundary heights are subject to field survey. Other Services are subject to verification by underground location/detection providers.

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Advisory  
Surveying  
Urban Development  
Infrastructure Buildings  
Structural Engineering  
Civil Engineering





**LEGEND:**

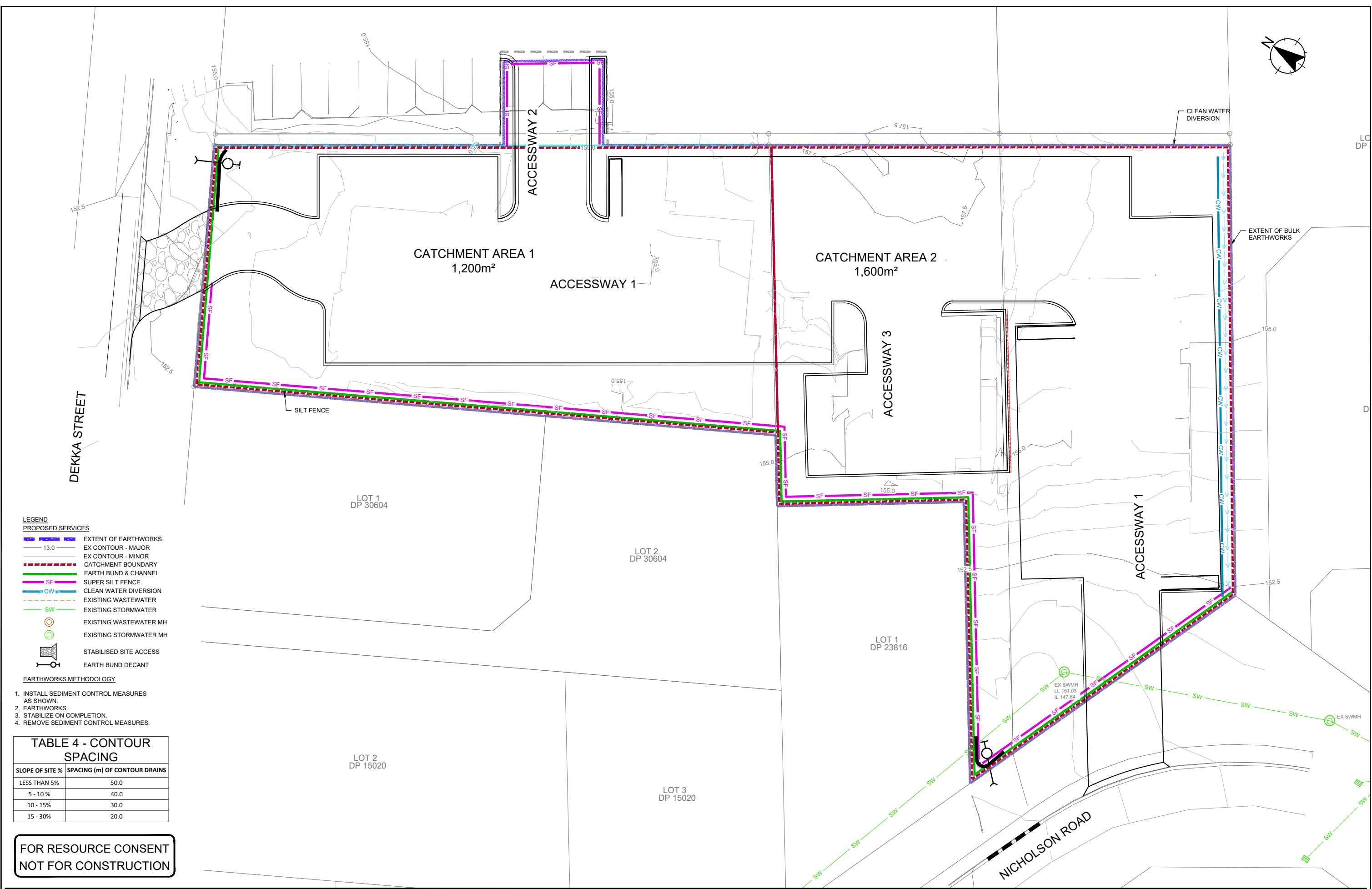
---	PROPERTY BOUNDARY	---	STORMWATER (PUBLIC)
- - - -	WORK BOUNDARY	---	STORMWATER (PRIVATE)
---	KERB BOTTOM	---	WASTEWATER (PUBLIC)
---	KERB TOP	---	WASTEWATER (PRIVATE)
---	EDGE OF SEAL	---	WATER
---	EDGE OF CONCRETE SURFACE	---	POWER LINE - OVERHEAD
---	FENCE	---	TELECOM CABLE
---	BANK BOTTOM	---	STORMWATER MANHOLE
---	BANK TOP	---	WASTEWATER MANHOLE (PUBLIC)
---	MAJOR CONTOUR	---	WATER TOBY
---	MINOR CONTOUR	---	FIRE HYDRANT
---	BUILDING	---	GAS METER
---	BUILDING DECK	---	POWER POLE
---	BUILDING STEP	---	STREETLIGHT
---	BUILDING EAVE	---	TREE
---	BUILDING RIDGE	---	ABANDONED SERVICES
---	BUILDING SHED		
---	WALL		
---	FOOTPATH		
---	VEGETATION		

NOTE:  
SURVEY DATA SUPPLIED BY Cardno Ltd.  
Survey dated October 2021.

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NOT FOR CONSTRUCTION**

0 FOR RESOURCE CONSENT Revision	RT 21.04.22 App Date	Dec-21 Dec-21 Dec-21 Dec-21	Client <b>FOODSTUFFS NORTH ISLAND LTD</b>	Project Title <b>NEW WORLD KHANDALLAH CAR PARK EXPANSION</b>	Sheet Title <b>EXISTING SITE PLAN</b>	Level 5, Building 3 666 Great South Road Eilerslie Auckland 1051 +64 9 525 9770 calibregroup.com		Scale (A1 Original) 1:150 (A3) 1:300 
	Surveyed SW Designed SW Drawn YW Reviewed RD Approved RT	Project No <b>712722</b>	Sheet <b>C100</b>	Revision <b>0</b>				

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- LEGEND**
- PROPOSED SERVICES**
- EXTENT OF EARTHWORKS
  - EX CONTOUR - MAJOR
  - EX CONTOUR - MINOR
  - CATCHMENT BOUNDARY
  - EARTH BUND & CHANNEL
  - SUPER SILT FENCE
  - CLEAN WATER DIVERSION
  - EXISTING WASTEWATER
  - EXISTING STORMWATER
  - EXISTING WASTEWATER MH
  - EXISTING STORMWATER MH
  - STABILISED SITE ACCESS
  - EARTH BUND DECANT
- EARTHWORKS METHODOLOGY**
1. INSTALL SEDIMENT CONTROL MEASURES AS SHOWN.
  2. EARTHWORKS.
  3. STABILIZE ON COMPLETION.
  4. REMOVE SEDIMENT CONTROL MEASURES.

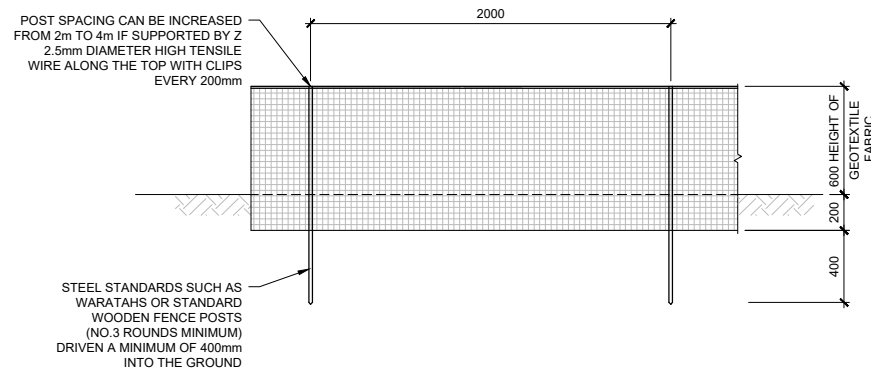
**TABLE 4 - CONTOUR SPACING**

SLOPE OF SITE %	SPACING (m) OF CONTOUR DRAINS
LESS THAN 5%	50.0
5 - 10 %	40.0
10 - 15%	30.0
15 - 30%	20.0

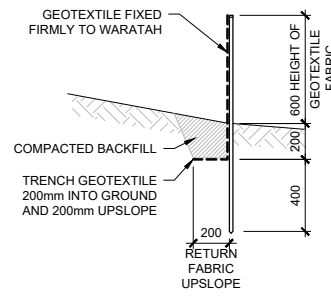
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<p>0 FOR RESOURCE CONSENT</p> <p>Revision</p>	<p>RT 21.04.22</p> <p>App Date</p>	<p>Surveyed SW Dec-21</p> <p>Designed YW Dec-21</p> <p>Drawn YW Dec-21</p> <p>Reviewed RD Dec-21</p> <p>Approved RT Dec-21</p>	<p>Client</p> <p><b>FOODSTUFFS NORTH ISLAND LTD</b></p>	<p>Project Title</p> <p><b>NEW WORLD KHANDALLAH CAR PARK EXPANSION</b></p>	<p>Sheet Title</p> <p><b>EROSION AND SEDIMENT CONTROL PLAN</b></p>	<p>Level 5, Building 3 666 Great South Road Eilerslie Auckland 1051 +64 9 525 9770 calibregroup.com</p>		<p>Scale (A1 Original) 1:150 (A3) 1:300</p> <p>Project No 712722 Sheet C170 Revision 0</p>
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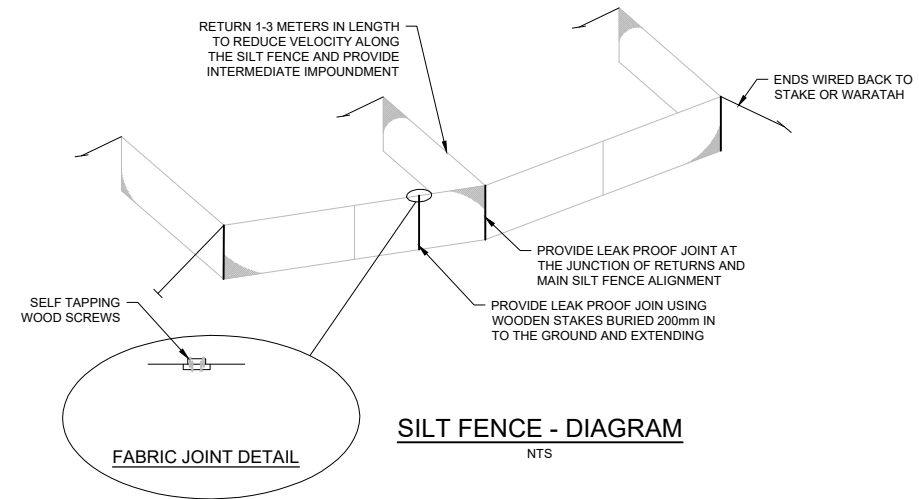
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SECTION

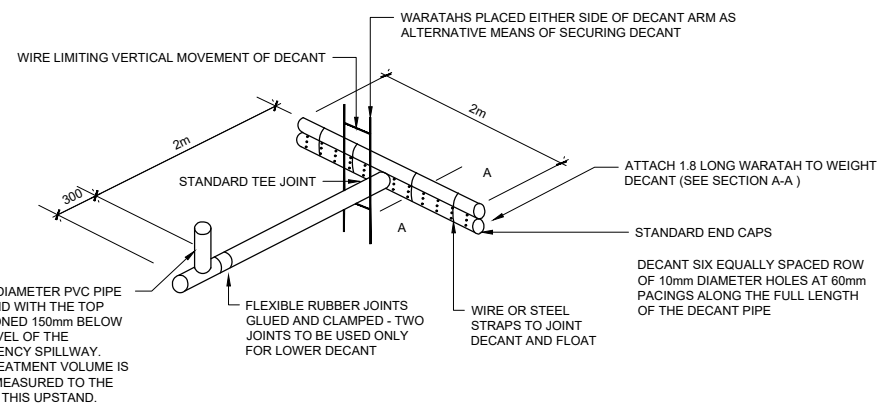
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1:20 @ A1



**SILT FENCE - DIAGRAM**

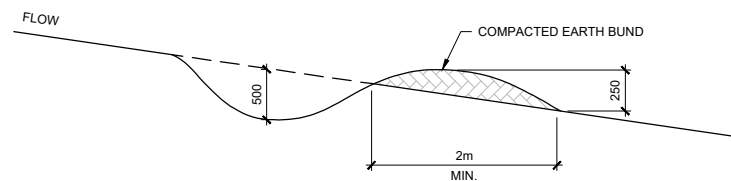
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SECTION A-A

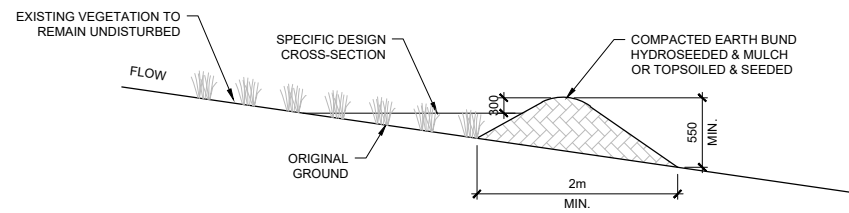
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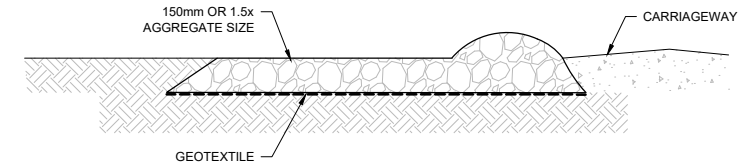
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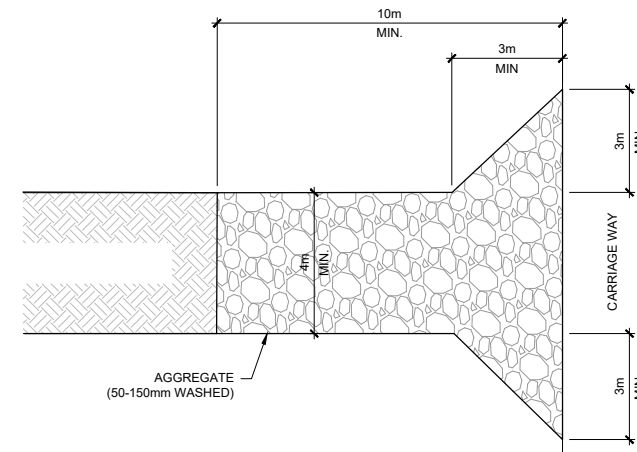
**CLEAN WATER RUN OFF DIVERSION BUND**

NTS



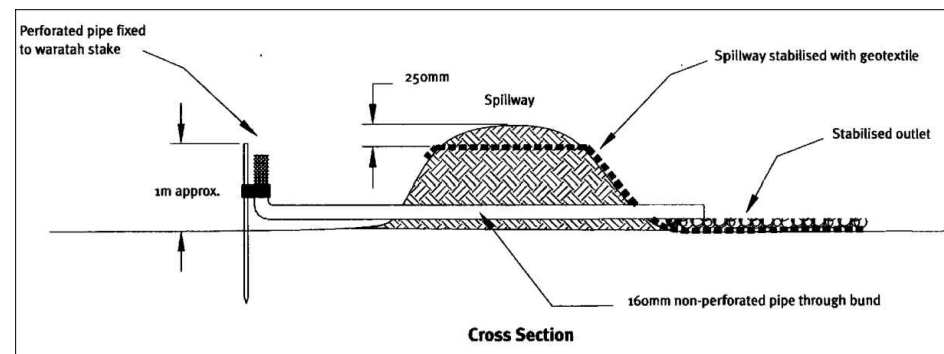
**ELEVATION STABILISED SITE ACCESS ENTRANCE**

NTS



**TYPICAL PLAN STABILISED SITE ACCESS ENTRANCE**

NTS



Cross Section

**EARTH BUND**

N.T.S

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0 FOR RESOURCE CONSENT Revision	RT	21.04.22	App	Date	Approved	RT	Dec-21
	Designed	SW					Dec-21
	Drawn	YW					Dec-21
	Reviewed	RD					Dec-21
	Approved	RT					Dec-21

Client  
**FOODSTUFFS  
NORTH ISLAND LTD**

Project Title  
**NEW WORLD  
KHANDALLAH  
CAR PARK EXPANSION**

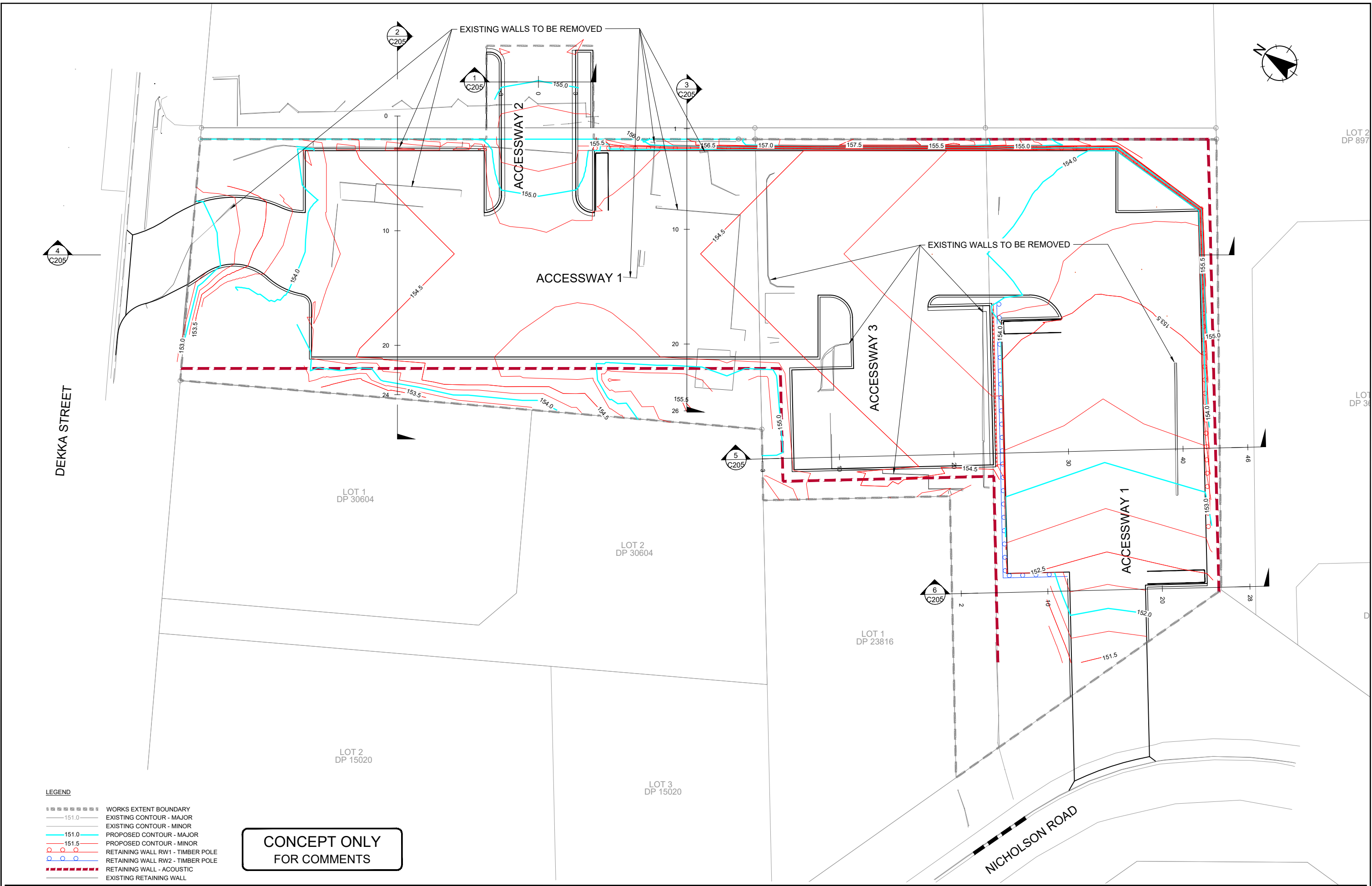
Sheet Title  
**EROSION AND  
SEDIMENT CONTROL  
DETAILS**

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Scale (A1 Original) 1:	(A3) 1:	
Project No	Sheet	Revision
712722	C171	0

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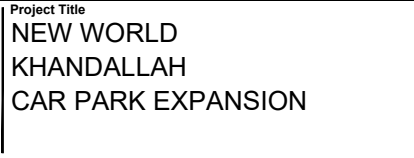
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-----	WORKS EXTENT BOUNDARY
151.0	EXISTING CONTOUR - MAJOR
151.0	EXISTING CONTOUR - MINOR
151.0	PROPOSED CONTOUR - MAJOR
151.5	PROPOSED CONTOUR - MINOR
○	RETAINING WALL RW1 - TIMBER POLE
○	RETAINING WALL RW2 - TIMBER POLE
○	RETAINING WALL - ACOUSTIC
---	EXISTING RETAINING WALL

**CONCEPT ONLY  
FOR COMMENTS**

0 FOR RESOURCE CONSENT Revision	RT	21.04.22	App	Date	Approved	RT	Dec-21
	Designed	SW	Dec-21	Client	FOODSTUFFS NORTH ISLAND LTD		
	Drawn	YW	Dec-21	Project Title	NEW WORLD KHANDALLAH CAR PARK EXPANSION		
	Reviewed	RD	Dec-21	Sheet Title	PROPOSED CONTOUR PLAN		

Level 5, Building 3  
666 Great South Road  
Eilerslie  
Auckland 1051  
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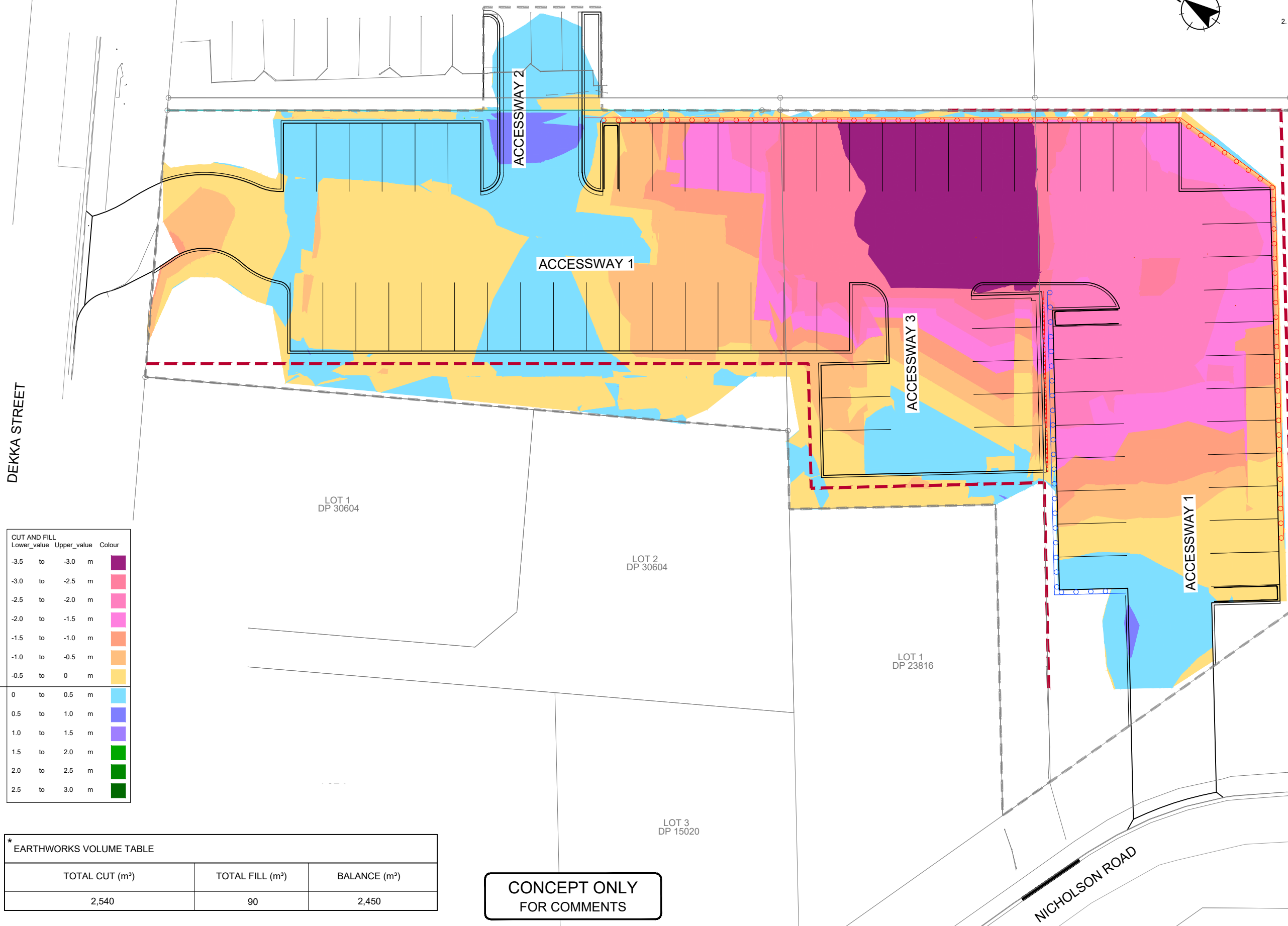
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Project No	712722	Sheet
		C200
Revision		0

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calibre.network\NZ\Projects\WLG\712722 New World Khandallah Car Park expansion\320 Drawings\3 Drawings\712722-C200.dwg, Plotted By Stella Miao at 21/04/2022 3:15:10 pm



- NOTES**
1. DEPTHS OF CUT/FILL ARE COMPUTER GENERATED AND ARE APPROXIMATE ONLY.
  2. EXISTING SURFACE TO DESIGNED FINISHED LEVELS/SURFACE (UNADJUSTED VOLUME).



CUT AND FILL			
Lower_value	Upper_value	Colour	
-3.5	to -3.0	m	Dark Purple
-3.0	to -2.5	m	Red-Orange
-2.5	to -2.0	m	Pink
-2.0	to -1.5	m	Light Pink
-1.5	to -1.0	m	Orange
-1.0	to -0.5	m	Light Orange
-0.5	to 0	m	Yellow
0	to 0.5	m	Light Blue
0.5	to 1.0	m	Blue
1.0	to 1.5	m	Light Blue
1.5	to 2.0	m	Green
2.0	to 2.5	m	Dark Green
2.5	to 3.0	m	Very Dark Green

* EARTHWORKS VOLUME TABLE		
TOTAL CUT (m³)	TOTAL FILL (m³)	BALANCE (m³)
2,540	90	2,450

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0 FOR RESOURCE CONSENT	RT	21.04.22	App	Date	Approved	RT	Dec-21
Surveyed		SW	Dec-21	Client			
Designed		SW	Dec-21	FOODSTUFFS NORTH ISLAND LTD			
Drawn		YW	Dec-21	Project Title			
Reviewed		RD	Dec-21	NEW WORLD KHANDALLAH CAR PARK EXPANSION			
Revision		RT	Dec-21	Sheet Title			
				CUT AND FILL PLAN			

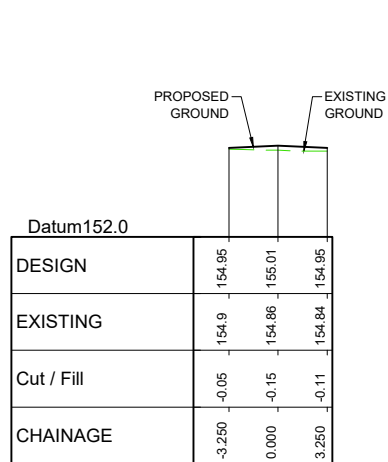
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Project No	Sheet	Revision
712722	C201	0

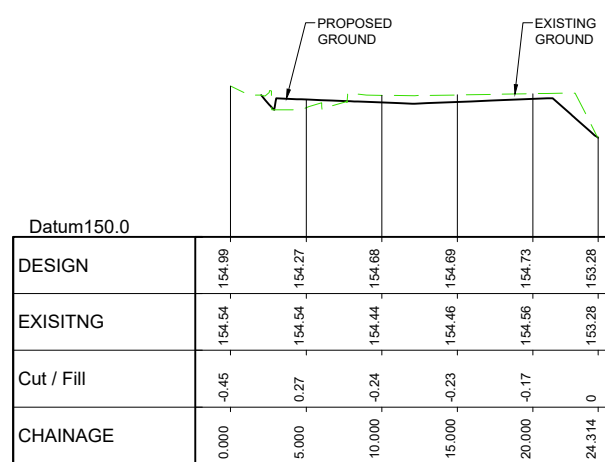
NICHOLSON ROAD

LOT 2  
DP 8974

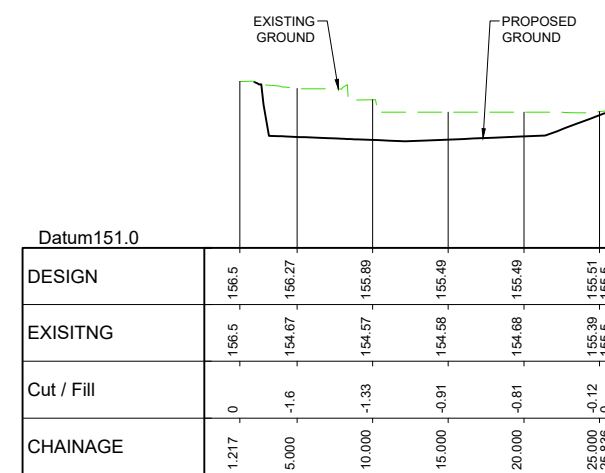
LOT  
DP 36



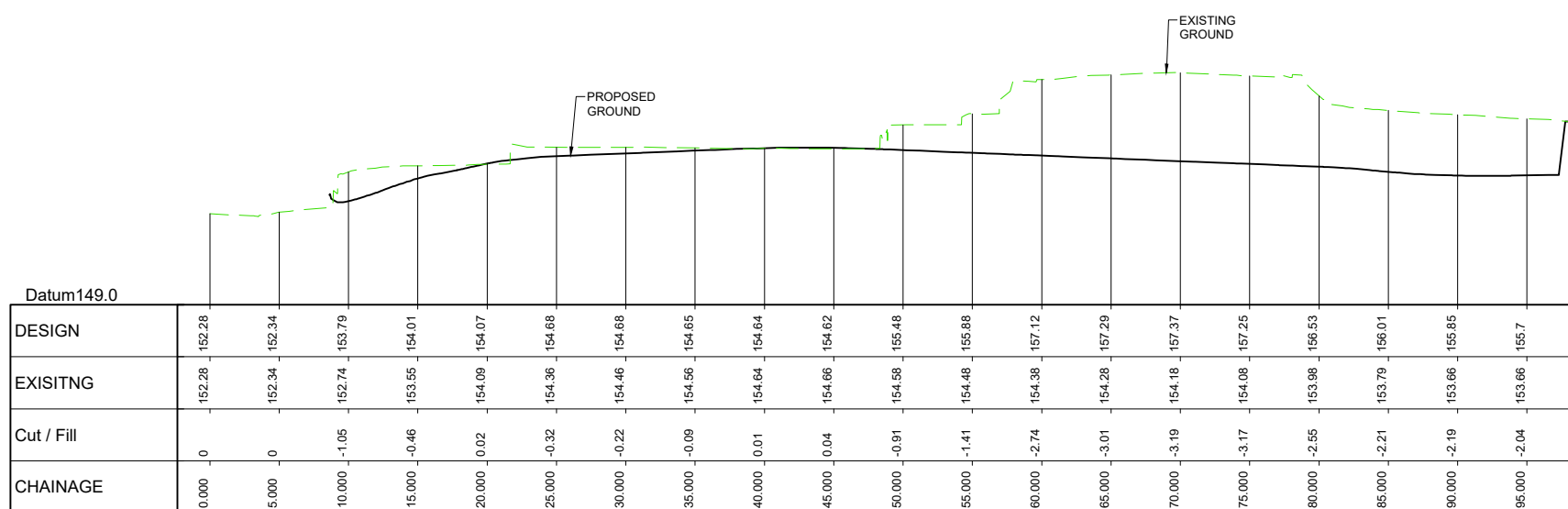
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Vertical scale 1:125



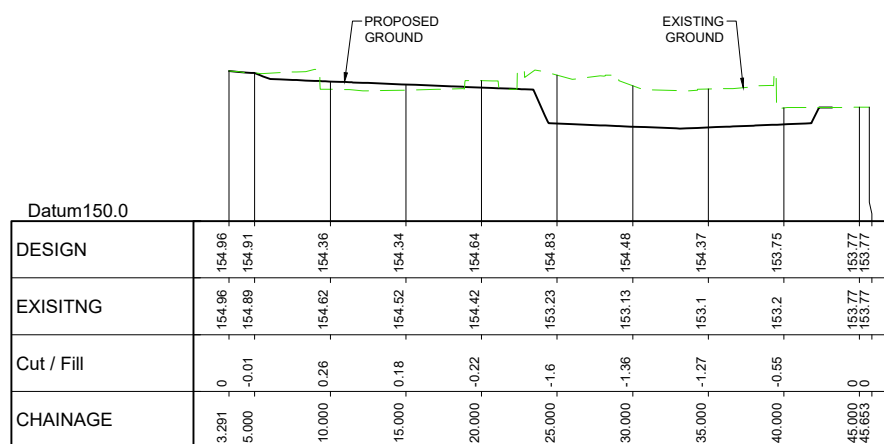
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Vertical scale 1:125



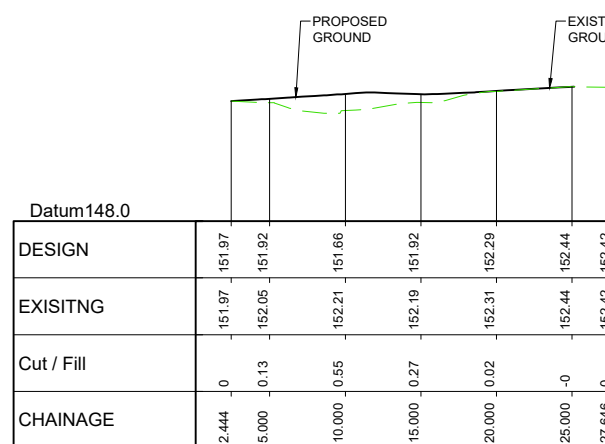
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Horizontal scale 1:250  
Vertical scale 1:125



EARTHWORK CROSS SECTION 4  
Horizontal scale 1:250  
Vertical scale 1:125



EARTHWORK CROSS SECTION 5  
Horizontal scale 1:250  
Vertical scale 1:125



EARTHWORK CROSS SECTION 6  
Horizontal scale 1:250  
Vertical scale 1:125

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FOR COMMENTS

FOR RESOURCE CONSENT		RT	21.04.22
Revision	App	Date	Approved
	RT	21.04.22	

Client  
**FOODSTUFFS  
NORTH ISLAND LTD**

Project Title  
**NEW WORLD  
KHANDALLAH  
CAR PARK EXPANSION**

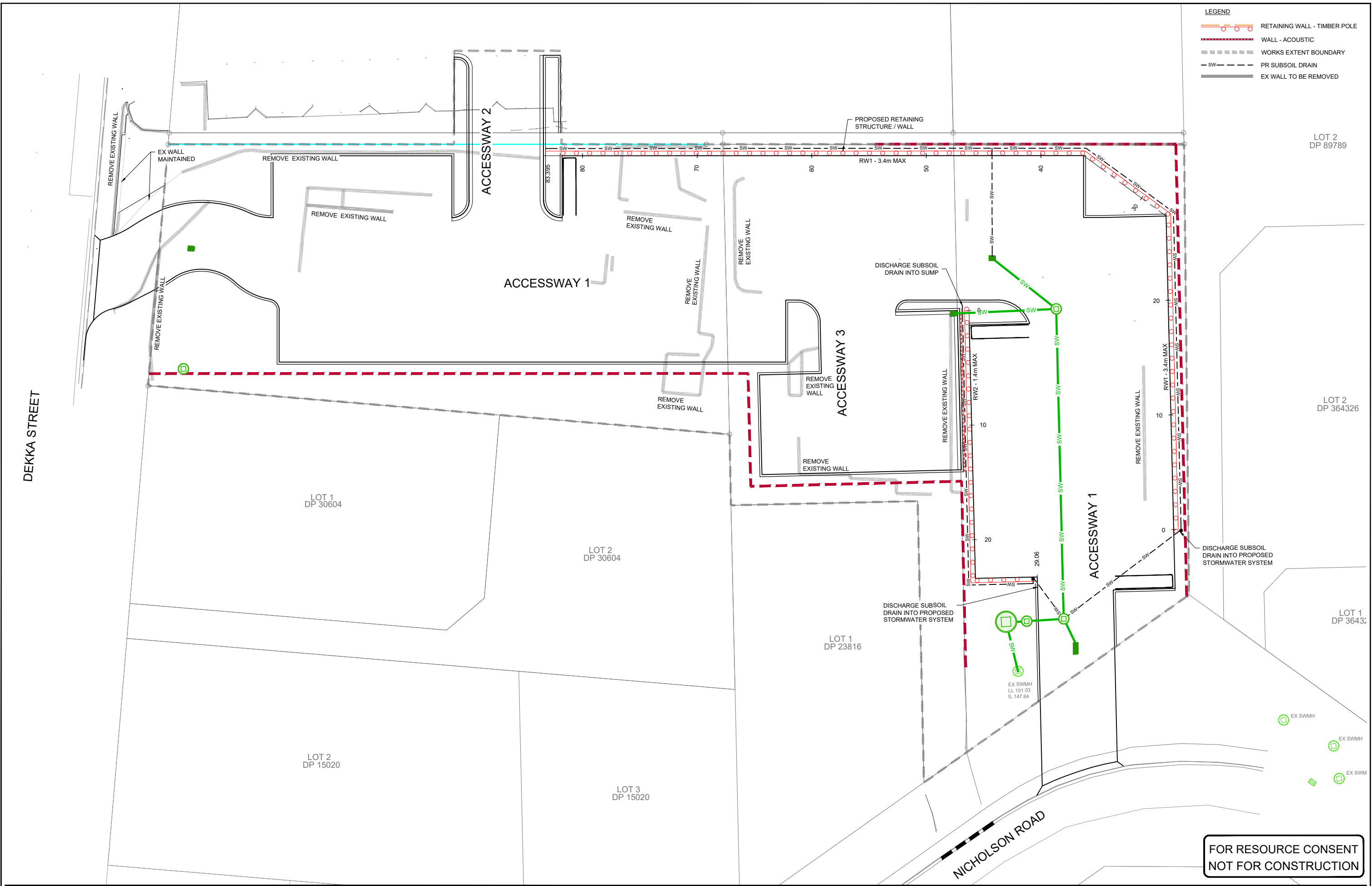
Sheet Title  
**SITE SECTIONS**

Level 5, Building 3  
666 Great South Road  
Epsom  
Auckland 1051  
+64 9 525 9770  
calibreproject.com



Scale (A1 Original) 1:1000 (A3) 1:2000		
20 10 0 20 40 60 m		
Project No	Sheet	Revision
712722	C205	0

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**LEGEND**

- RETAINING WALL - TIMBER POLE
- WALL - ACOUSTIC
- WORKS EXTENT BOUNDARY
- PR SUBSOIL DRAIN
- EX WALL TO BE REMOVED

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NOT FOR CONSTRUCTION**

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Designed	YW	Dec-21																		
Drawn	RD	Dec-21																		
Reviewed	RT	Dec-21																		
App	Date	Approved																		
RT	21.04.22	RT																		

Project Title  
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KHANDALLAH  
CAR PARK EXPANSION**

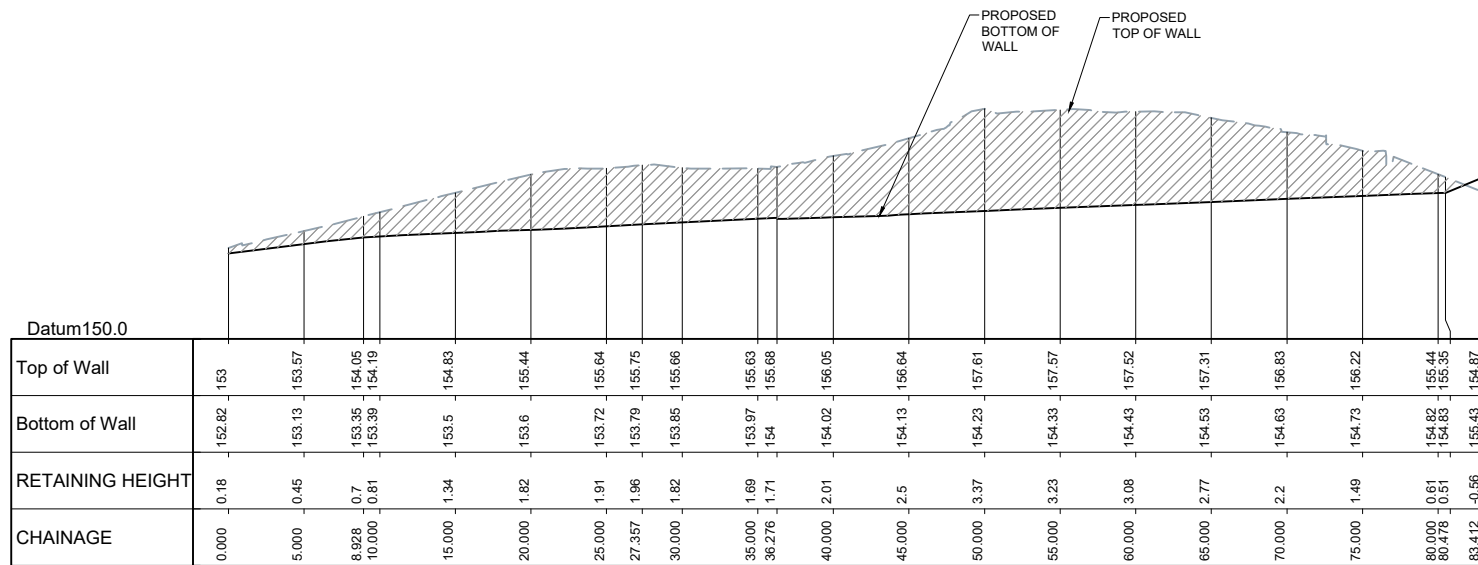
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666 Great South Road  
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Auckland 1051  
+64 9 525 9770  
calibregroup.com

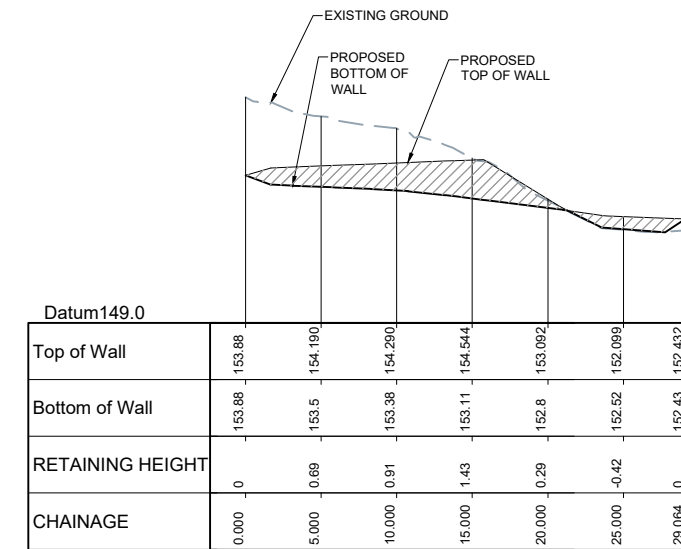


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Project No	Sheet
712722	C210
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RETAINING WALL RW1 LONGSECTION  
Horizontal scale 1:250  
Vertical scale 1:125



RETAINING WALL RW2 LONGSECTION  
Horizontal scale 1:250  
Vertical scale 1:125

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Revision	App	Date	Approved	RT	21.04.22
0	FOR RESOURCE CONSENT	RT	21.04.22	App	Date

Client	Surveyed	Dec-21
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	YV	Dec-21
	RD	Dec-21
	RT	Dec-21

Project Title	Sheet Title
NEW WORLD KHANDALLAH CAR PARK EXPANSION	RETAINING WALL SECTIONS

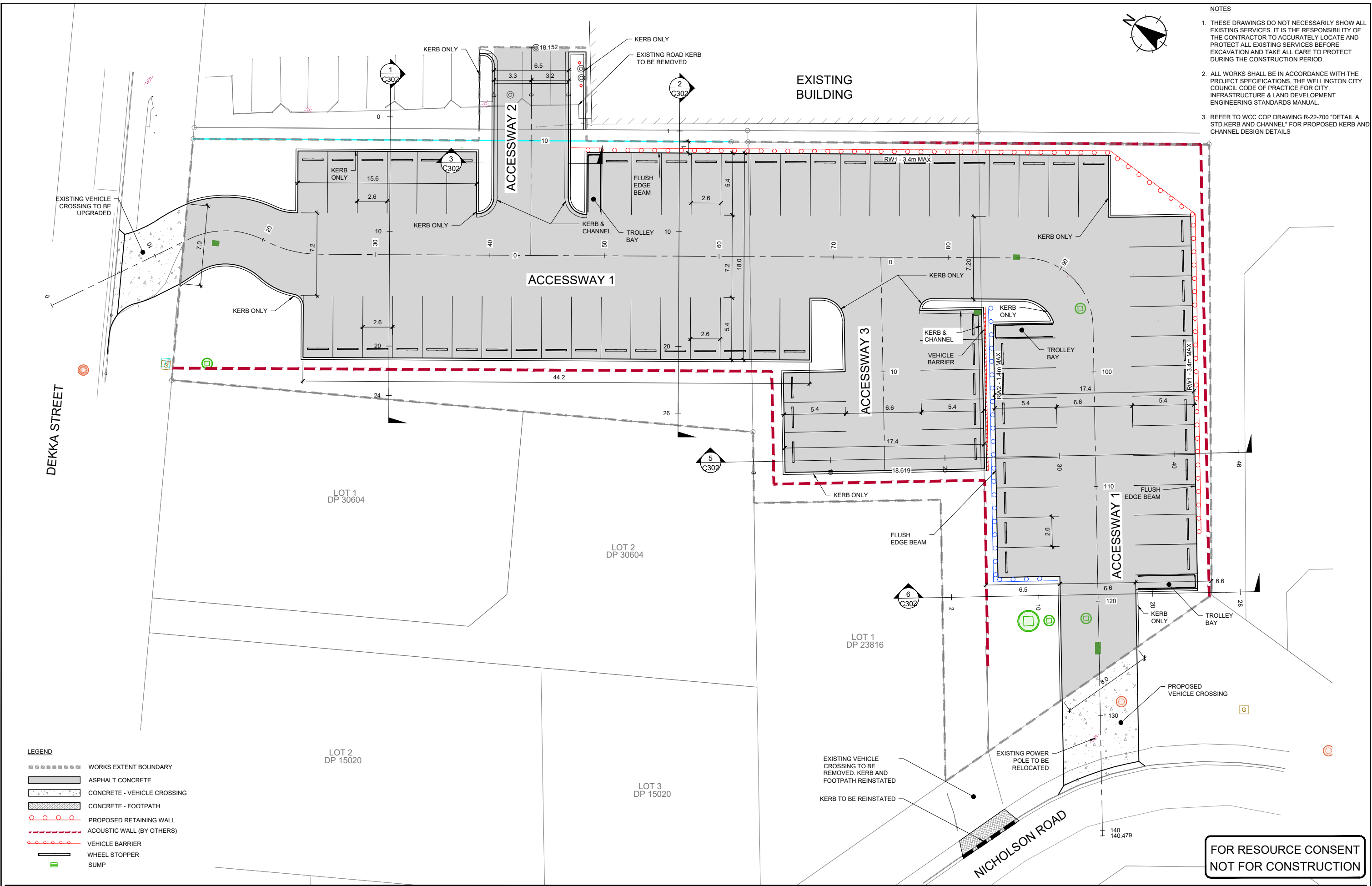
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- NOTES**
1. THESE DRAWINGS DO NOT NECESSARILY SHOW ALL EXISTING SERVICES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ACCURATELY LOCATE AND PROTECT ALL EXISTING SERVICES BEFORE EXCAVATION AND TAKE ALL CARE TO PROTECT DURING THE CONSTRUCTION PERIOD.
  2. ALL WORKS SHALL BE IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS, THE WELLINGTON CITY COUNCIL CODE OF PRACTICE FOR CITY INFRASTRUCTURE & LAND DEVELOPMENT ENGINEERING STANDARDS MANUAL.
  3. REFER TO WCC COP DRAWING R-22-700 "DETAIL A STD KERB AND CHANNEL" FOR PROPOSED KERB AND CHANNEL DESIGN DETAILS

- LEGEND**
- WORKS EXTENT BOUNDARY
  - ASPHALT CONCRETE
  - CONCRETE - VEHICLE CROSSING
  - CONCRETE - FOOTPATH
  - PROPOSED RETAINING WALL
  - ACOUSTIC WALL (BY OTHERS)
  - VEHICLE BARRIER
  - WHEEL STOPPER
  - SUMP

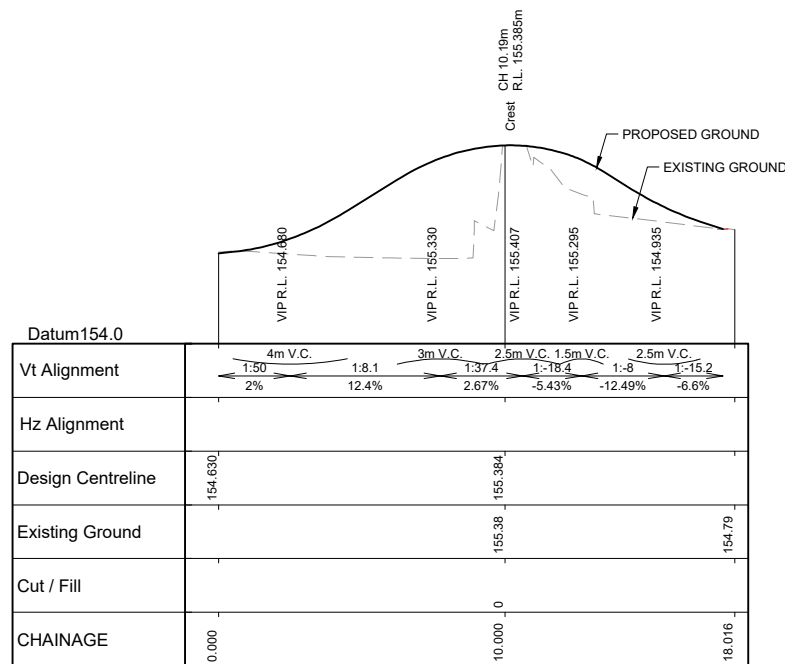
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	RT 21.04.22 App Date	Dec-21 Dec-21 Dec-21	Client <b>FOODSTUFFS NORTH ISLAND LTD</b>	Project Title <b>NEW WORLD KHANDALLAH CAR PARK EXPANSION</b>	Sheet Title <b>ACCESSWAY PLAN</b>	Level 5, Building 3 666 Great South Road Eilerslie Auckland 1051 +64 9 525 9770 calibregroup.com		
Project No: 712722			Sheet: C300			Revision: 0		

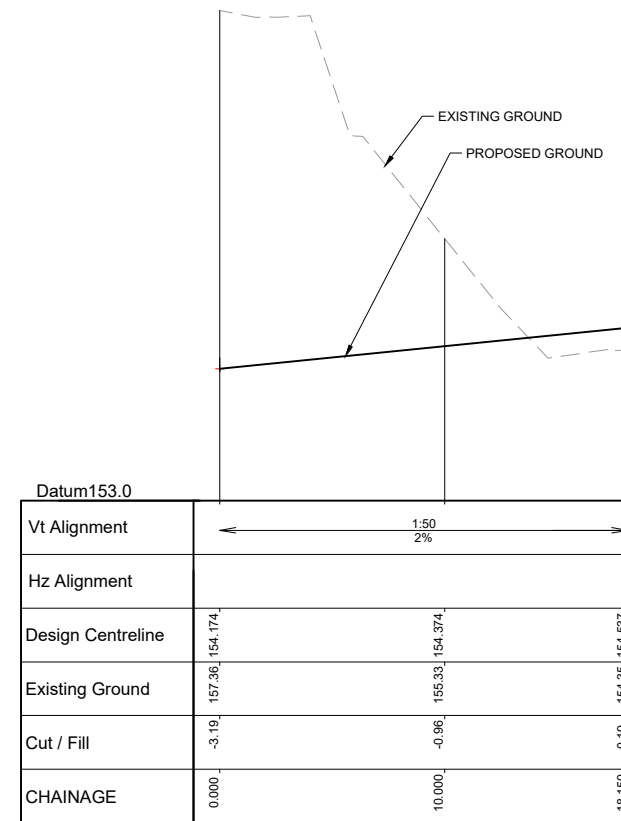
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LEGEND

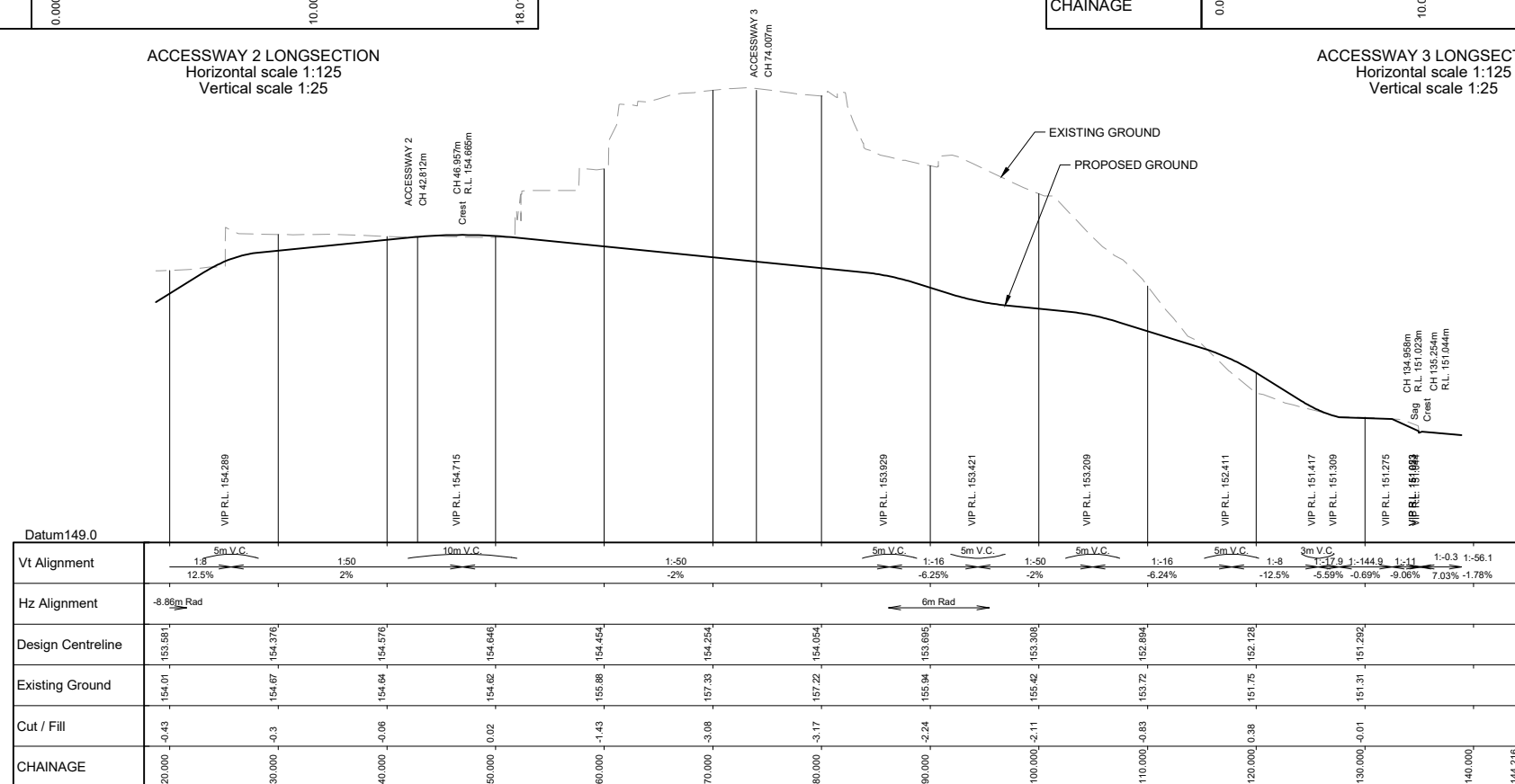
— EXISTING GROUND LEVEL  
 — FINISHED GROUND LEVEL



ACCESSWAY 2 LONGSECTION  
 Horizontal scale 1:125  
 Vertical scale 1:25



ACCESSWAY 3 LONGSECTION  
 Horizontal scale 1:125  
 Vertical scale 1:25



ACCESSWAY 1 LONGSECTION  
 Horizontal scale 1:250  
 Vertical scale 1:50

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	Reviewed	RD					Dec-21
	Approved	RT					Dec-21

Client  
**FOODSTUFFS  
 NORTH ISLAND LTD**

Project Title  
**NEW WORLD  
 KHANDALLAH  
 CAR PARK EXPANSION**

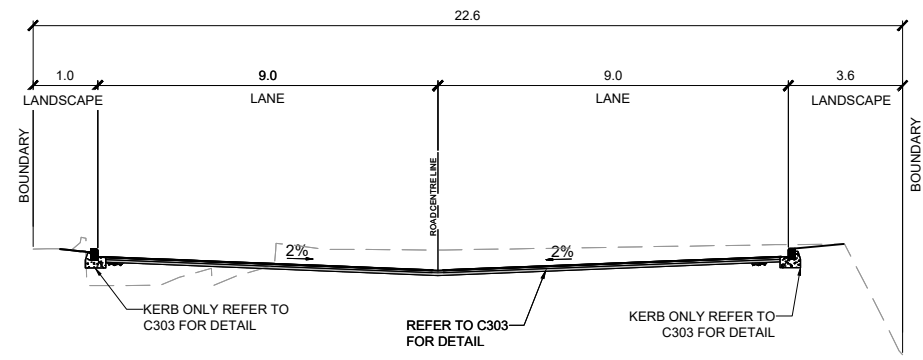
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**ACCESSWAY  
 LONG SECTIONS**

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 +64 9 525 9770  
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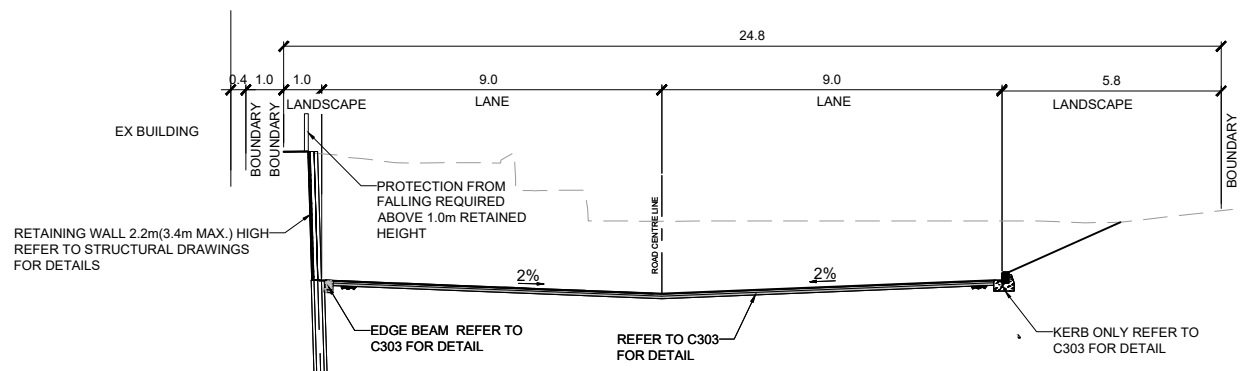


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Project No	712722	Sheet C301
Revision		0

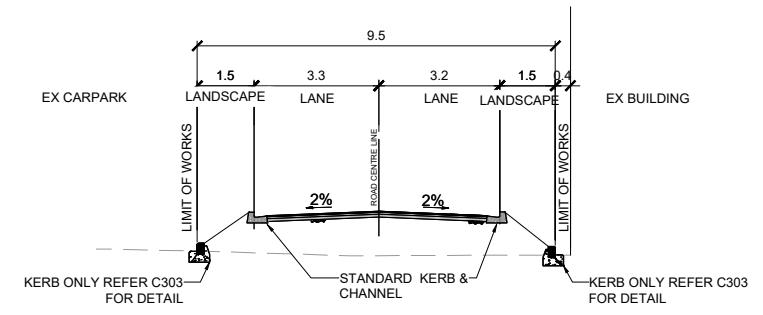
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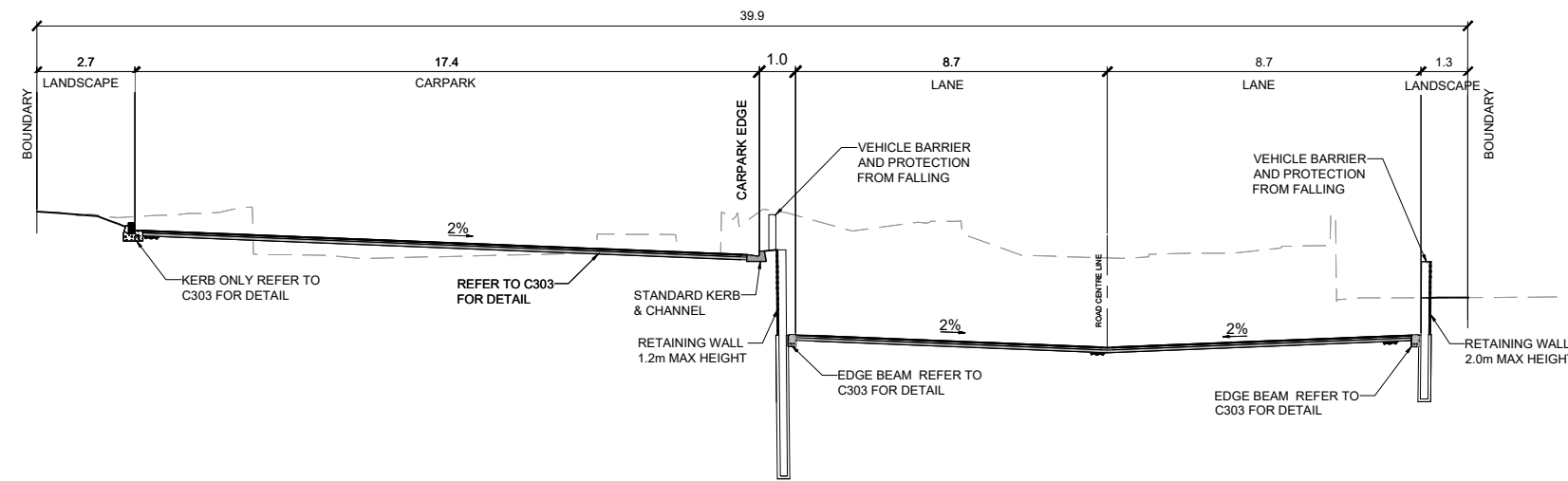
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 1:100 @ A1  
 1:200 @ A3  
 C300



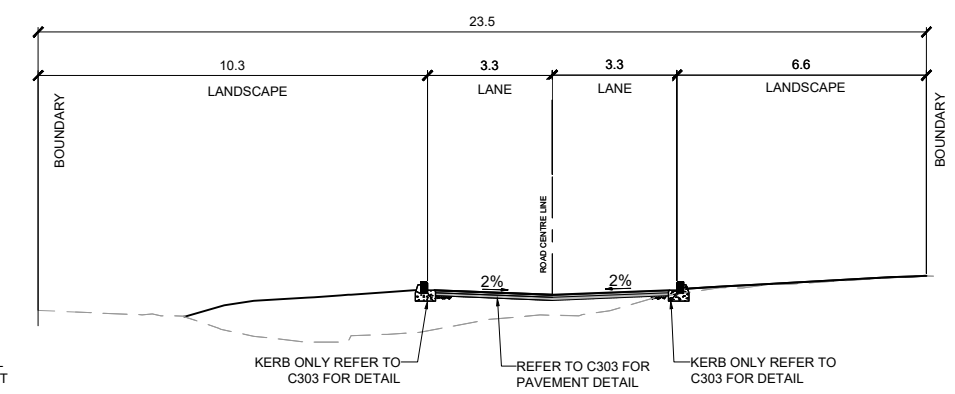
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 1:100 @ A1  
 1:200 @ A3  
 C300



**ACCESSWAY 2 CH12 CROSS SECTION 3**  
 1:100 @ A1  
 1:200 @ A3  
 C300



**SECTION 5**  
 1:100 @ A1  
 1:200 @ A3  
 C300



**ACCESSWAY 1 CH119 CROSS SECTION 6**  
 1:100 @ A1  
 1:200 @ A3  
 C300

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0	FOR RESOURCE CONSENT	RT	21.04.22				

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**Project Title**  
 NEW WORLD  
 KHANDALLAH  
 CAR PARK EXPANSION

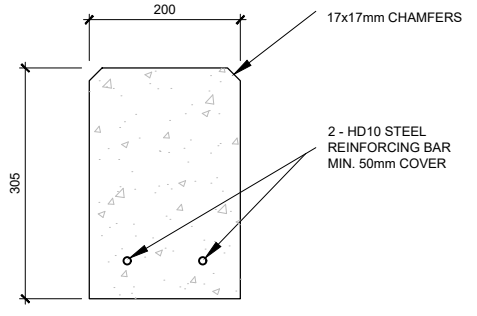
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 TYPICAL ROAD  
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Level 5, Building 3  
 666 Great South Road  
 Eilerslie  
 Auckland 1051  
 +64 9 525 9770  
 calibregroup.com

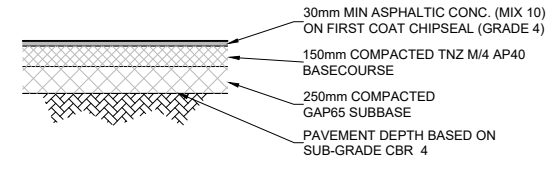


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Project No	Sheet	Revision
712722	C302	0

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①  
**EDGE BEAM & KEBR ONLY**  
 1:10 @ A1



**TYPICAL CARRIAGEWAY  
 PAVEMENT DETAIL**  
 1:10 @ A1

**CONCEPT ONLY  
 FOR COMMENTS**

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	RT	21.04.22	App	Date	Approved	RT	Dec-21
	RT	21.04.22	App	Date	Approved	RT	Dec-21
	RT	21.04.22	App	Date	Approved	RT	Dec-21

**Client**  
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 NORTH ISLAND LTD

**Project Title**  
 NEW WORLD  
 KHANDALLAH  
 CAR PARK EXPANSION

**Sheet Title**  
 ROADING  
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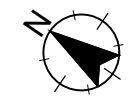
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LOT 2  
DP 89789

LOT 2  
DP 89789

LOT 2  
DP 364326

LOT 1  
DP 364326

LOT 1  
DP 30604

LOT 2  
DP 30604

LOT 1  
DP 23816

LOT 2  
DP 15020

LOT 3  
DP 15020

ACCESSWAY 2

ACCESSWAY 1

ACCESSWAY 3

ACCESSWAY 1

NICHOLSON ROAD

ADJUST EXISTING  
MANHOLE LID LEVELS  
AS REQUIRED

CP3

PR CP2

KERB OUTLET

UPGRADE TO SW Ø150

PR SWMH B2  
STORMFILTER

CUT OFF EXISTING  
WASTEWATER PIPE AT THE  
BOUNDARY AND CAP OFF

PR CP4

PR SWMH A3

PR SWMH A1  
STORMFILTER

TANK SIZE  
Ø2000 x 1m  
VOLUME 3m<sup>3</sup>

CUT OFF EXISTING  
WASTEWATER PIPE AT THE  
BOUNDARY AND CAP OFF

EXISTING PRIVATE SERVICE  
CONNECTIONS TO BE  
CAPPED AND ABANDONED

PR SWMH A2

PR DCP1

EX SWMH  
LL 151.03  
IL 147.84

EX Ø225  
SW

HEAVY DUTY LID

EX SWMH

EX WMMH

EX SWMH

EX SWMH

- LEGEND**
- EXISTING SERVICES**
- SW — STORMWATER
  - SW — STORMWATER TO BE REMOVED
  - WW — WASTEWATER
  - WW — WASTEWATER TO BE REMOVED
  - WASTEWATER MANHOLE
  - WASTEWATER MANHOLE SUMP
- PROPOSED SERVICES**
- SW — WORKS EXTENT BOUNDARY
  - SW — STORMWATER - PRIVATE
  - WASTEWATER MH - PRIVATE
  - CESSPIT

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Drawn	YW							Dec-21
Reviewed	RD							Dec-21
Revision								Dec-21

Client  
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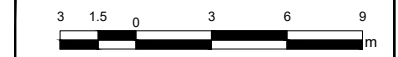
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**NEW WORLD  
KHANDALLAH  
CAR PARK EXPANSION**

Sheet Title  
**DRAINAGE PLAN**

Level 5, Building 3  
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Auckland 1051  
+64 9 525 9770  
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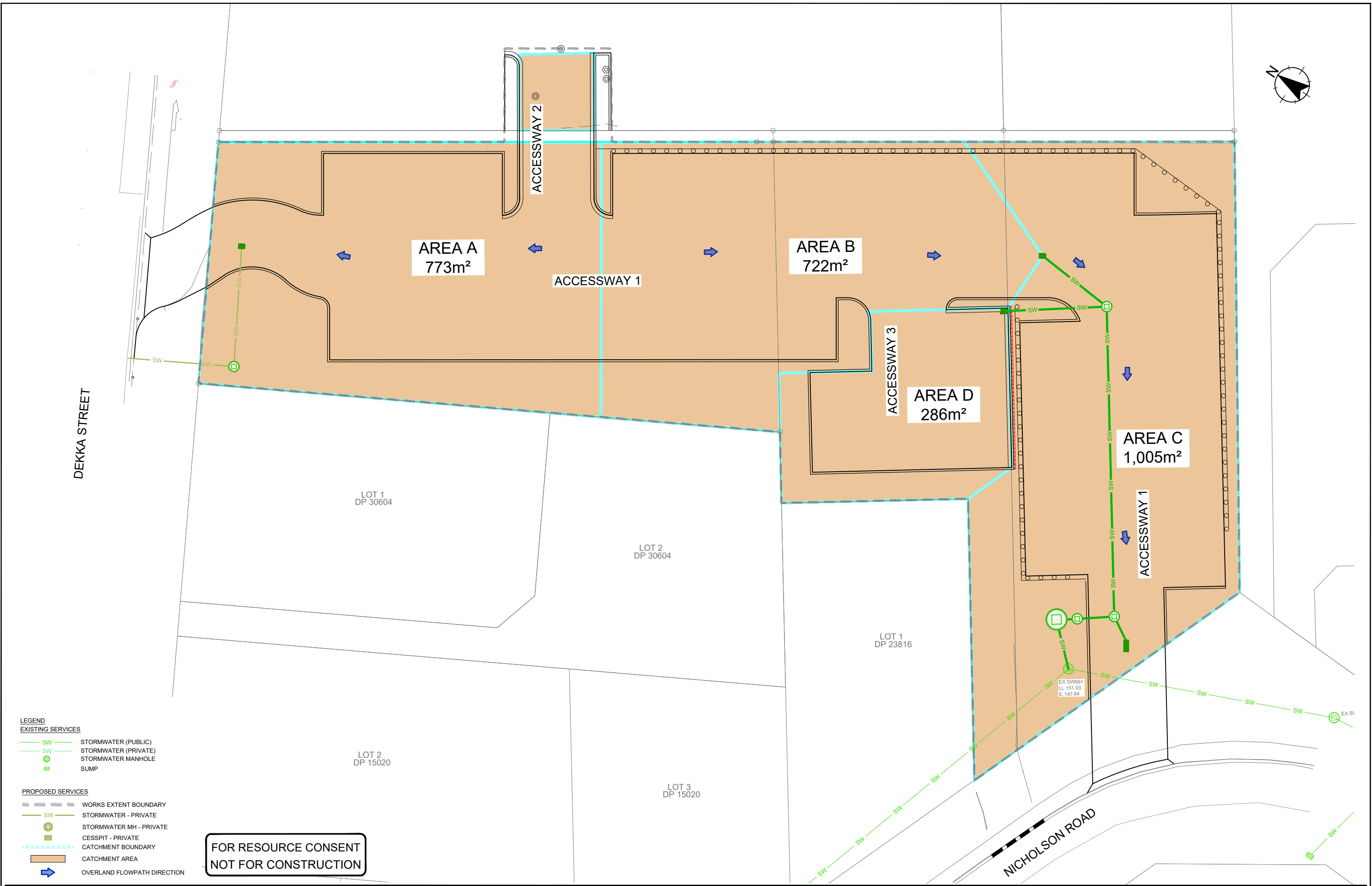


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- LEGEND**
- EXISTING SERVICES**
- SW — STORMWATER (PUBLIC)
  - SW — STORMWATER (PRIVATE)
  - ⊕ STORMWATER MANHOLE
  - SUMP
- PROPOSED SERVICES**
- WORKS EXTENT BOUNDARY
  - SW — STORMWATER - PRIVATE
  - ⊕ STORMWATER MH - PRIVATE
  - CESSPIT - PRIVATE
  - CATCHMENT BOUNDARY
  - CATCHMENT AREA
  - ➡ OVERLAND FLOWPATH DIRECTION

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	App						Dec-21

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**Project Title**  
NEW WORLD  
KHANDALLAH  
CAR PARK EXPANSION

**Sheet Title**  
STORMWATER  
CATCHMENT PLAN

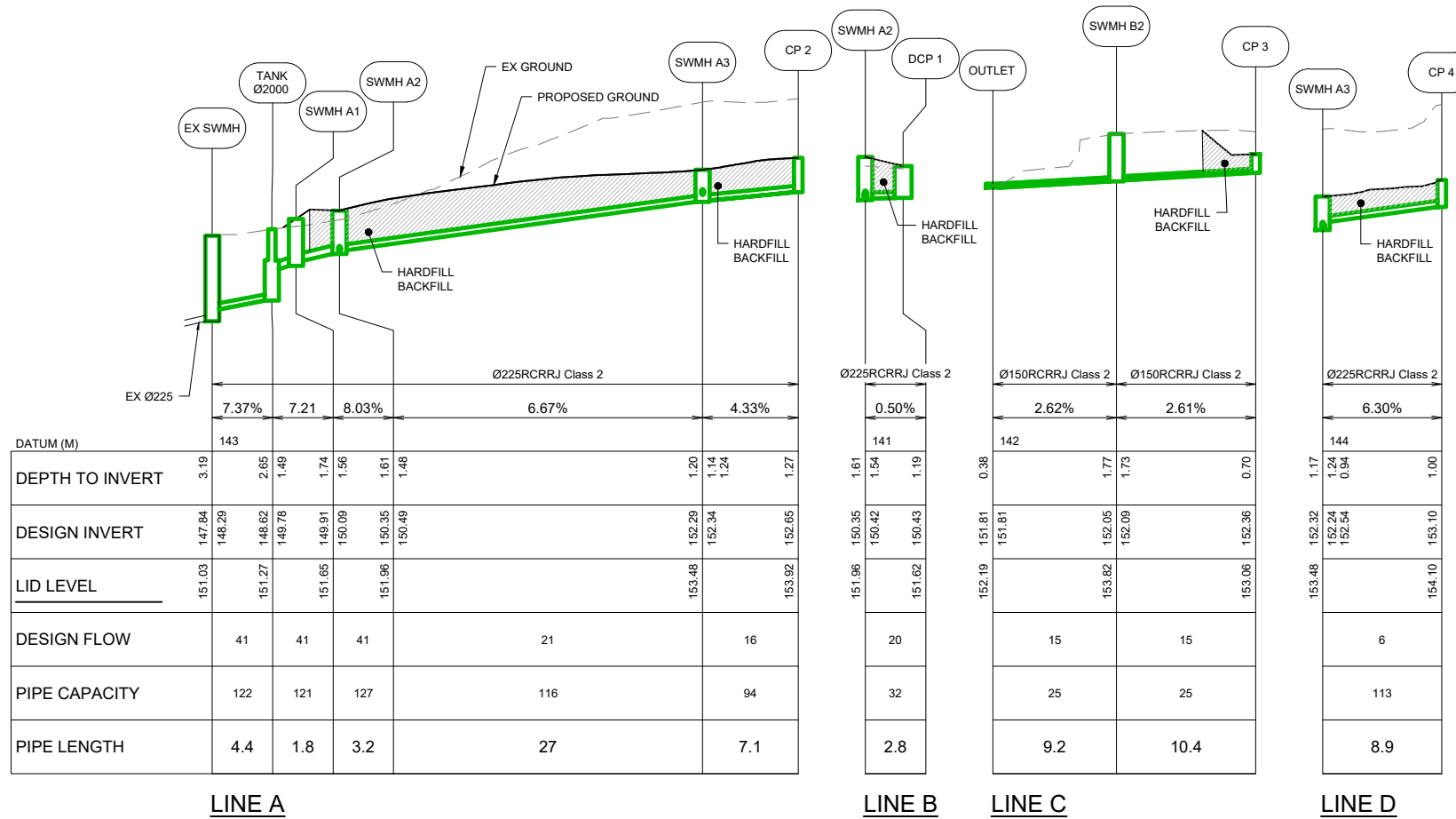
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Project Title  
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KHANDALLAH  
CAR PARK EXPANSION**

Sheet Title  
**STORMWATER  
LONG SECTION**

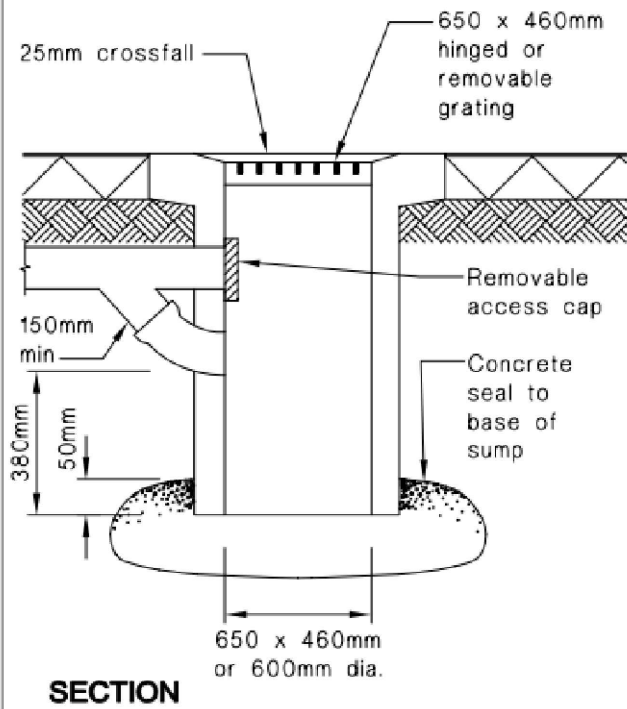
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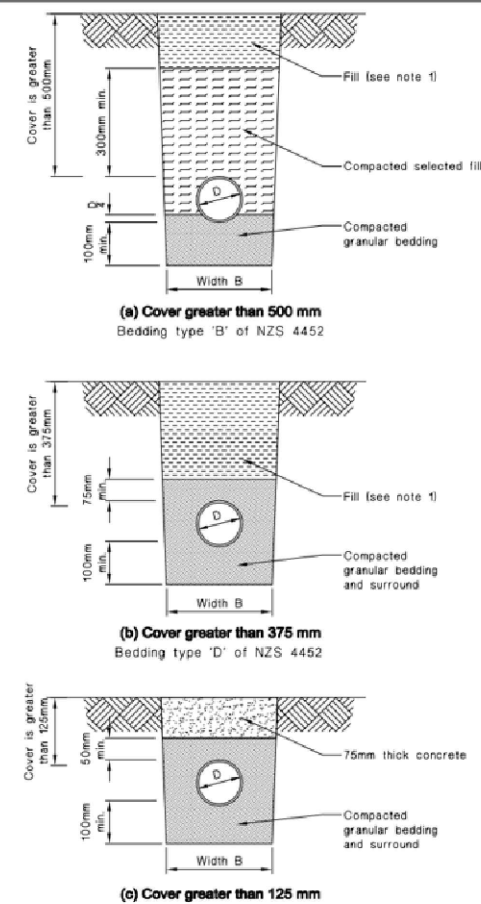
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**Figure 9: Type-two Surface Water Sump**  
Paragraph 3.6.2

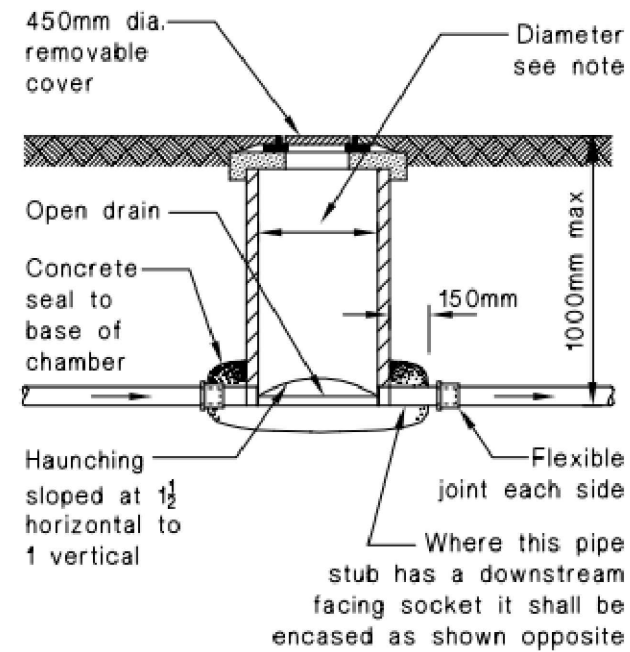


**Figure 13: Bedding and Backfilling**  
Paragraphs 3.9.2, 3.9.4 and 3.9.5



NOTE:  
1. Fill shall be:  
-Ordinary fill where drains are located below gardens and open country.  
-Compacted selected fill where the drains are located below residential driveways and similar areas subjected to light traffic.

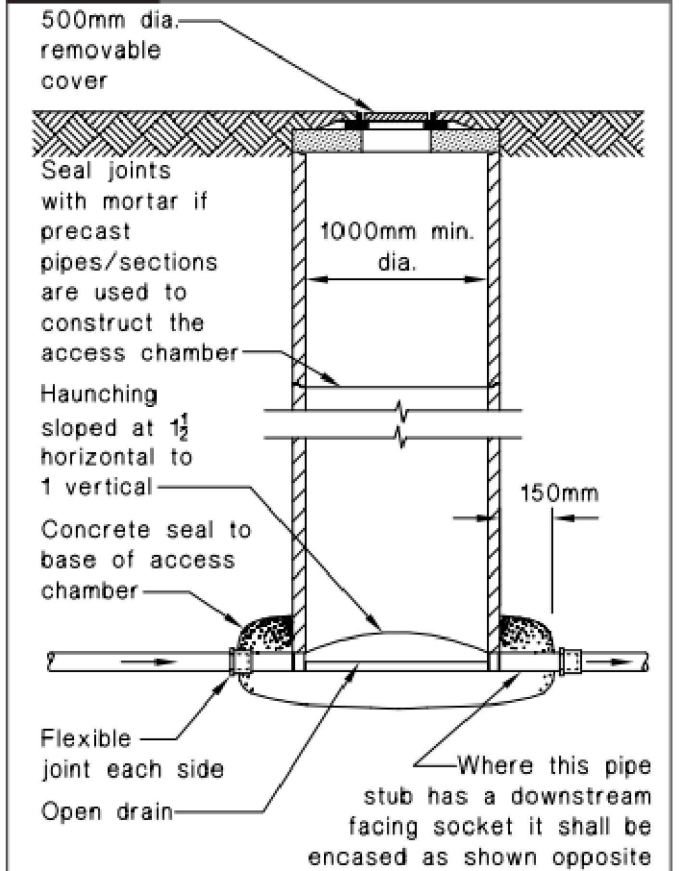
**Figure 11: Typical Inspection Chamber**  
Paragraphs 3.5.3, 3.7.1 and 3.7.4



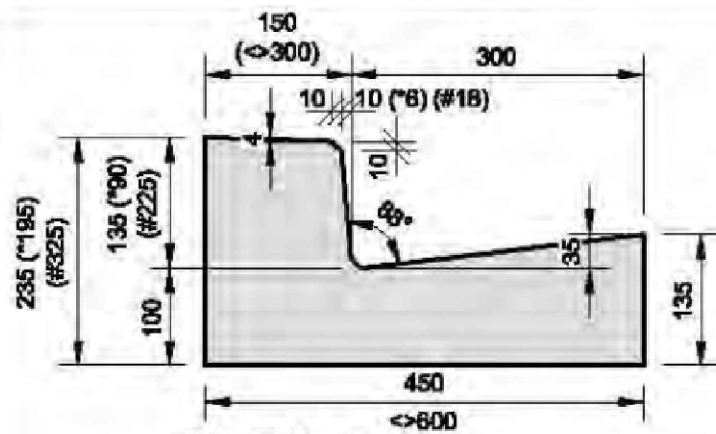
**SECTION**

NOTE:  
Inspection chamber diameter to be:  
-450 mm for drains 100 mm dia or less.  
-600 mm for drains greater than 100 mm dia.

**Figure 12: Typical Access Chamber**  
Paragraphs 3.5.3, 3.7.1 and 3.7.4



**SECTION**



**DETAIL A**  
**STD. KERB AND CHANNEL**  
(\* LOW PROFILE KERB)  
(# BUS STOP KERB)  
(<> WIDE TOP KERB)

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Surveyed		Dec-21					Dec-21

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Project Title  
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KHANDALLAH  
CAR PARK EXPANSION**

Sheet Title  
**STANDARD  
DETAILS  
SHEET 1**

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## Appendix B      Calculations

**Stormwater Attenuation Design (10-Year)**  
Wellington Water 12-hour nested rainfall distribution

Project:	New World Khandallah Car Park expansion	Revision:	B
Job Number:	712722	By:	DBS
		Date:	12.04.22
		Checked:	SW
		Date:	

**Pre-development Catchments**

Surface:	Catchment Areas:	Runoff Coefficients:	Effective Areas:
Landscape	A1= 1354m <sup>2</sup>	C1= 0.35	474m <sup>2</sup>
Paved Areas	A2= 753m <sup>2</sup>	C2= 0.85	640m <sup>2</sup>
Roof	A3= 721m <sup>2</sup>	C2= 0.90	649m <sup>2</sup>
<b>Total</b>	<b>2828m<sup>2</sup></b>	<b>Total Effective Area:</b>	<b>1763m<sup>2</sup></b>

**Post-development Catchments**

Surface:	Catchment Areas:	Runoff Coefficients:	Effective Areas:
Landscape	A1= 854m <sup>2</sup>	C1= 0.35	299m <sup>2</sup>
Paved Area NW	A2= 487m <sup>2</sup>	C2= 0.95	463m <sup>2</sup>
Paved Area SE	A3= 1445m <sup>2</sup>	C2= 0.95	1373m <sup>2</sup>
<b>Total</b>	<b>2786m<sup>2</sup></b>	<b>Total Effective Area:</b>	<b>2134m<sup>2</sup></b>

**Rainfall**

Source = Wellington City HIRDS V4 Historical Data + 20%  
Storm Return Period = 10 Years

**Rainfall Intensity Data:**

Source : Wellington City HIRDS V4 Historical Data + 20%

Duration	Depth (mm)
10	14.52
20	21
30	25.92
60	36.72
120	50.88
360	81.6
720	81.1

**Storage**

	Invert R.L.	Max Depth	Volume	Net void ratio	Effective Volume	Low Level Aperture	Low Level Invert	Mid Level Aperture	Mid Level Invert	Maximum fill %
Paved Area NW	0.0m	0.800m	2.94m <sup>3</sup>	1.00	2.9m <sup>3</sup>	156mm	0.00m	75m	0.500m	57%

**Outlets**

**Pre vs Post-development Peak Runoff**

Rainfall intensity = 105mm/hr

Scenario	Effective Catchment Area:	Peak Runoff Flow:	Delta:
Pre-development	A1= 1875m <sup>2</sup>	Q1= 54.4L/s	
Post-development unattenuated	A2= 762m <sup>2</sup>	Q2= 22.1L/s	-32.3L/s
Post-development attenuated	A3= 1373m <sup>2</sup>	Q3= 32.3L/s	-0.0L/s

Orifice outlet flow governed by Equation 12 of TR2013/018:  $Q = 0.62A(2gh)^{0.5}$

A = area of orifice  
g = gravitational acceleration  
h = elevation head acting on the orifice centreline



**Stormwater Attenuation Design (10-Year)**

Wellington Water 12-hour nested rainfall distribution

Project:	New World Khandallah Car Park expansion	Revision:	B
Job Number:	712722	By:	DBS
		Date:	12.04.22
		Checked:	SW
		Date:	

9:15	0.64	0.15	15.67	0.000	0.000	0.000	0.000	0.000	0.00	0%
9:20	0.64	0.15	15.82	0.040	0.000	0.000	0.000	0.000	0.15	5%
9:25	0.64	0.15	15.97	0.081	0.798	0.000	0.000	0.003	0.30	10%
9:30	0.64	0.15	16.11	0.000	0.000	0.000	0.000	0.000	0.00	0%
9:35	0.64	0.15	16.26	0.040	0.000	0.000	0.000	0.000	0.15	5%
9:40	0.64	0.15	16.41	0.081	0.798	0.000	0.000	0.003	0.30	10%
9:45	0.64	0.15	16.56	0.000	0.000	0.000	0.000	0.000	0.00	0%
9:50	0.64	0.15	16.71	0.040	0.000	0.000	0.000	0.000	0.15	5%
9:55	0.64	0.15	16.86	0.081	0.798	0.000	0.000	0.003	0.30	10%
10:00	0.64	0.15	17.00	0.000	0.000	0.000	0.000	0.000	0.00	0%
10:05	0.64	0.15	17.15	0.040	0.000	0.000	0.000	0.000	0.15	5%
10:10	0.64	0.15	17.30	0.081	0.798	0.000	0.000	0.003	0.30	10%
10:15	0.64	0.15	17.45	0.000	0.000	0.000	0.000	0.000	0.00	0%
10:20	0.64	0.15	17.60	0.040	0.000	0.000	0.000	0.000	0.15	5%
10:25	0.64	0.15	17.74	0.081	0.798	0.000	0.000	0.003	0.30	10%
10:30	0.64	0.15	17.89	0.000	0.000	0.000	0.000	0.000	0.00	0%
10:35	0.64	0.15	18.04	0.040	0.000	0.000	0.000	0.000	0.15	5%
10:40	0.64	0.15	18.19	0.081	0.798	0.000	0.000	0.003	0.30	10%
10:45	0.64	0.15	18.34	0.000	0.000	0.000	0.000	0.000	0.00	0%
10:50	0.64	0.15	18.48	0.040	0.000	0.000	0.000	0.000	0.15	5%
10:55	0.64	0.15	18.63	0.081	0.798	0.000	0.000	0.003	0.30	10%
11:00	0.64	0.15	18.78	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:05	-0.01	0.00	18.78	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:10	-0.01	0.00	18.78	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:15	-0.01	0.00	18.77	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:20	-0.01	0.00	18.77	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:25	-0.01	0.00	18.77	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:30	-0.01	0.00	18.77	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:35	-0.01	0.00	18.77	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:40	-0.01	0.00	18.77	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:45	-0.01	0.00	18.77	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:50	-0.01	0.00	18.76	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:55	-0.01	0.00	18.76	0.000	0.000	0.000	0.000	0.000	0.00	0%
12:00	-0.01	0.00	18.76	0.000	0.000	0.000	0.000	0.000	0.00	0%
12:05	0.00	0.00	18.76	0.000	0.000	0.000	0.000	0.000	0.00	0%

**Stormwater Attenuation Design (100-Year)**  
Wellington Water 12-hour nested rainfall distribution

Project:	New World Khandallah Car Park expansion	Revision:	B
Job Number:	712722	By:	DBS
		Date:	12.04.22
		Checked:	SW
		Date:	19.04.22

**Pre-development Catchments**

Surface:	Catchment Areas:	Runoff Coefficients:	Effective Areas:
Landscape	A1= 1354m <sup>2</sup>	C1= 0.35	474m <sup>2</sup>
Paved Areas	A2= 753m <sup>2</sup>	C2= 0.95	715m <sup>2</sup>
Roof	A3= 721m <sup>2</sup>	C2= 0.95	685m <sup>2</sup>
<b>Total:</b>	<b>2828m<sup>2</sup></b>	<b>Total Effective Area:</b>	<b>1875m<sup>2</sup></b>

**Post-development Catchments**

Surface:	Catchment Areas:	Runoff Coefficients:	Effective Areas:
Landscape	A1= 854m <sup>2</sup>	C1= 0.35	299m <sup>2</sup>
Paved Area NW	A2= 487m <sup>2</sup>	C2= 0.95	463m <sup>2</sup>
Paved Area SE	A3= 1445m <sup>2</sup>	C2= 0.95	1373m <sup>2</sup>
<b>Total:</b>	<b>2786m<sup>2</sup></b>	<b>Total Effective Area:</b>	<b>2134m<sup>2</sup></b>

- 1 L L free
- 2 L P sf
- 3 R L free
- 4 R P sump, tank

**Rainfall**

Source = Wellington City HIRDS V4 Historical Data + 20%  
Storm Return Period = 100 Years

**Rainfall Intensity Data:**  
Source : Wellington City HIRDS V4 Historical Data + 20%

Duration	Depth (mm)
10	22.8
20	32.88
30	40.44
60	56.76
120	78.24
360	123.6
720	160.8

**Storage** **Outlets**

	Invert R. L.	Max Depth	Volume	Net void ratio	Effective Volume	Low Level Aperture	Low Level Invert	Mid Level Aperture	Mid Level Invert	Maximum fill %
Paved Area NW	0.0m	0.800m	2.94m <sup>3</sup>	0.90	2.6m <sup>3</sup>	156mm	0.00m	75mm	0.500m	100%

**Pre vs Post-development Peak Runoff**

Rainfall intensity = 164mm/hr

Scenario	Effective Catchment Area:	Peak Runoff Flow:	Delta:
Pre-development	A1= 1875m <sup>2</sup>	Q1= 85.5L/s	
Post-development unattenuated	A2= 762m <sup>2</sup>	Q2= 34.7L/s	-50.8L/s
Post-development attenuated	A3= 1373m <sup>2</sup>	Q3= 50.8L/s	-0.0L/s

10 year  
-0.0L/s

Orifice outlet flow governed by Equation 12 of TR2013/018:  $Q = 0.62A(2gh)^{0.5}$

A = area of orifice  
g = gravitational acceleration  
h = elevation head acting on the orifice centreline



**Stormwater Attenuation Design (100-Year)**

Wellington Water 12-hour nested rainfall distribution

Project:	New World Khandallah Car Park expansion	Revision:	B
Job Number:	712722	By:	DBS
		Date:	12.04.22
		Checked:	SW
		Date:	19.04.22

9:20	0.95	0.22	31.39	0.066	0.000	0.000	0.000	0.000	0.22	8%
9:25	0.95	0.22	31.61	0.132	3.666	0.000	0.000	0.012	0.44	17%
9:30	0.95	0.22	31.83	0.000	0.000	0.000	0.000	0.000	0.00	0%
9:35	0.95	0.22	32.05	0.066	0.000	0.000	0.000	0.000	0.22	8%
9:40	0.95	0.22	32.27	0.132	3.666	0.000	0.000	0.012	0.44	17%
9:45	0.95	0.22	32.48	0.000	0.000	0.000	0.000	0.000	0.00	0%
9:50	0.95	0.22	32.70	0.066	0.000	0.000	0.000	0.000	0.22	8%
9:55	0.95	0.22	32.92	0.132	3.666	0.000	0.000	0.012	0.44	17%
10:00	0.95	0.22	33.14	0.000	0.000	0.000	0.000	0.000	0.00	0%
10:05	0.95	0.22	33.36	0.066	0.000	0.000	0.000	0.000	0.22	8%
10:10	0.95	0.22	33.58	0.132	3.666	0.000	0.000	0.012	0.44	17%
10:15	0.95	0.22	33.80	0.000	0.000	0.000	0.000	0.000	0.00	0%
10:20	0.95	0.22	34.01	0.066	0.000	0.000	0.000	0.000	0.22	8%
10:25	0.95	0.22	34.23	0.132	3.666	0.000	0.000	0.012	0.44	17%
10:30	0.95	0.22	34.45	0.000	0.000	0.000	0.000	0.000	0.00	0%
10:35	0.95	0.22	34.67	0.066	0.000	0.000	0.000	0.000	0.22	8%
10:40	0.95	0.22	34.89	0.132	3.666	0.000	0.000	0.012	0.44	17%
10:45	0.95	0.22	35.11	0.000	0.000	0.000	0.000	0.000	0.00	0%
10:50	0.95	0.22	35.33	0.066	0.000	0.000	0.000	0.000	0.22	8%
10:55	0.95	0.22	35.54	0.132	3.666	0.000	0.000	0.012	0.44	17%
11:00	0.95	0.22	35.76	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:05	0.52	0.12	35.88	0.036	0.000	0.000	0.000	0.000	0.12	5%
11:10	0.52	0.12	36.00	0.072	0.000	0.000	0.000	0.000	0.24	9%
11:15	0.52	0.12	36.12	0.108	2.746	0.000	0.000	0.009	0.36	14%
11:20	0.52	0.12	36.24	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:25	0.52	0.12	36.36	0.036	0.000	0.000	0.000	0.000	0.12	5%
11:30	0.52	0.12	36.48	0.072	0.000	0.000	0.000	0.000	0.24	9%
11:35	0.52	0.12	36.60	0.108	2.746	0.000	0.000	0.009	0.36	14%
11:40	0.52	0.12	36.72	0.000	0.000	0.000	0.000	0.000	0.00	0%
11:45	0.52	0.12	36.84	0.036	0.000	0.000	0.000	0.000	0.12	5%
11:50	0.52	0.12	36.96	0.072	0.000	0.000	0.000	0.000	0.24	9%
11:55	0.52	0.12	37.08	0.108	2.746	0.000	0.000	0.009	0.36	14%
12:00	0.52	0.12	37.20	0.000	0.000	0.000	0.000	0.000	0.00	0%
12:05	0.00	0.00	37.20	0.000	0.000	0.000	0.000	0.000	0.00	0%

**ESTIMATION OF SEDIMENT YIELD  
BY THE UNIVERSAL SOIL LOSS EQUATION**



**EXISTING SITE**

**PROJECT DATA**

PROJECT NO.: 712722      DATE: 19/04/2022      BY: YW      CHECKED: SW

SITE DESCRIPTION: New World Khandallah

**PRE-EARTHWORKS 4 MONTH PERIOD**

**CATCHMENT:**

WORKING DURATION (years):

WORKING AREA (ha):

	Area A				
	0.33				
	0.28				

**WORKING FORMULA (USLE)**

$A^* = R K L S C P$  ; Where A = soil loss (tonnes/ha/year)

Rainfall erosion index (R):

$R = 0.00828 * (P)^{2.2 * 1.70}$

; Where P = the rainfall figure from 6 hours duration 2 years storm event

2 yr ARI	(24hr)	78	mm	
	P =	48.98	mm	(P = 2yrARI * 0.628)
	R =	73.6		

Soil erodibility index (K):

(from triangular nomograph)  
(generally silty, some clay to clayey)      Assumed 20% Clay and 80% Silt

	Area A				
K=	0.37				
K <sub>metric</sub> =	0.49				

Slope length and steepness factor (LS):

Longest length high to low  
Mean grade/slope (all triang

	Upstream	Area A			
Length (m) =		50			
Slope (%) =		6.50			
m =		0.72			
LS =		1.145			

Vegetation cover factor and Erosion control practice factor (C & P):

temporary grass

	Upstream	Area A			
C =		0.1			
P =		1			

Sediment Delivery Ratio (SDR) & Sediment Control Efficiency (SCE):\*\*

SDR =	0.6	assume vegetation & depressions trap sediments
SCE =	0.9	Assume natural vegetation retains 90% of potential runoff

\*\* The USLE predicts the total yield of sediment generated but makes no allowance for that retained on site. A Sediment Delivery Ratio (SDR) must be selected. American sources state that SDR rates range mostly from 10% to 70% (N.Y. Guidelines for Urban Erosion and Sediment Control)



**ESTIMATION OF SEDIMENT YIELD  
BY THE UNIVERSAL SOIL LOSS EQUATION**



**EXISTING SITE**

ESTIMATION OF SEDIMENT

SECTION	TIME (YEAR)	AREA (ha)	USLE PARAMETERS					SDR	SCE
			R	K	LS	C	P		
AREA A	0.33	0.2800	73.55	0.4884	1.1448085	0.1	1	0.6	0.9

SECTION	EST.GROSS SEDIMENT YIELD (tonnes)	NET SEDIMENT LOSS (tonnes)
AREA A	0.38	0.02

SEDIMENT GENERATION POTENTIAL (tonnes)	0.38
ESTIMATED TOTAL NET SEDIMENT LOSS (tonnes)	0.02

**ESTIMATION OF SEDIMENT YIELD  
BY THE UNIVERSAL SOIL LOSS EQUATION**



**PROJECT DATA**

PROJECT NO.: 712722      DATE: Apr-22      BY: YW      CHECKED: SW

SITE DESCRIPTION: New World Khandallah

EARTHWORKS 4 MONTH PERIOD

**CATCHMENT:**

WORKING DURATION (years):

WORKING AREA (ha):

Upstream	Area A	Area B	Area C	Area D	Area E
	0.33				
	0.28				

**WORKING FORMULA (USLE)**

$A^* = R K L S C P$  ; Where A = soil loss (tonnes/ha/year)

Rainfall erosion index (R):

$R = 0.00828 * (P)^{2.2 * 1.70}$

; Where P = the rainfall figure from 6 hours duration 2 years storm event

2 yr ARI	(24hr)	78	mm	
	P =	48.98	mm	(P = 2yrARI * 0.628)
	R =	73.6		

Soil erodibility index (K):

(from triangular nomograph)  
(generally silty, some clay to clayey)      Assumed 20% Clay and 80% Silt

	Upstream	Area A	Area B	Area C	Area D	Area E
K=		0.37				
K <sub>metric</sub> =		0.49				

Slope length and steepness factor (LS):

Longest length high to low  
Assume no change in average

	Upstream	Area A	Area B	Area C	Area D	Area E
Length (m) =		50				
Slope (%) =		6.50				
m =		0.72				
LS =		1.145				

Vegetation cover factor and Erosion control practice factor (C & P):

	Upstream	Area A	Area B	Area C	Area D	Area E
Bare soil		1				
Compacted and smooth		1.32				

Sediment Delivery Ratio (SDR) & Sediment Control Efficiency (SCE):\*\*

SDR =	0.5	
SCE =	0.7	Decanting earthbunds

\*\* The USLE predicts the total yield of sediment generated but makes no allowance for that retained on site. A Sediment Delivery Ratio (SDR) must be selected. American sources state that SDR rates range mostly from 10% to 70% (N.Y. Guidelines for Urban Erosion and Sediment Control)

**ESTIMATION OF SEDIMENT YIELD  
BY THE UNIVERSAL SOIL LOSS EQUATION**



**ESTIMATION OF SEDIMENT**

Decanting Earthbunds

SECTION	TIME (YEAR)	AREA (ha)	USLE PARAMETERS					SDR	SCE <sub>(Floc)</sub>
			R	K	LS	C	P		
AREA A	0.33	0.2800	73.55	0.4884	1.145	1	1.32	0.5	0.7

SECTION	EST.GROSS SEDIMENT YIELD (tonnes)	NET SEDIMENT LOSS (tonnes)
AREA A	5.02	0.75

SEDIMENT GENERATION POTENTIAL (tonnes)	5.02
ESTIMATED TOTAL NET SEDIMENT LOSS (tonnes)	0.75

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## Appendix C      Retaining Wall Notes

## Retaining Walls

Timber retaining walls are proposed for the car park. The largest retaining wall is up to 3.4m tall for the footpath along the southwest face of the supermarket.

Below we have summarised the construction methodology for the retaining walls.

- Bore holes for timber piles from existing ground level after topsoil removal.
- Place timber poles and pour concrete.
- Once the concrete has cured, place timber rails and nova coil (with socks), and back fill with scoria.
- Back fill the ground behind the retaining walls up to the required level.
- Continuously monitor for movement of ground and retaining wall whilst earth filling

The design will also consider

- Proximity to site boundary and buildings
- Drainage
- Adequate Sediment control measures shall be adopted in accordance with an approved earth work and sediment control plan. Sediment Control Silt fences are kept reasonably inside from the boundary until the timber poles for retaining walls are installed. They shall be moved along the boundary when earth cutting or filling starts with Railing installation



## Contact Us

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