

LEGEND

- SITE BOUNDARY
- EARTHWORKS EXTENT
- 50.0 PROPOSED CONTOURS
- 50.0 EXISTING CONTOURS
- PROPOSED RETAINING WALL
- EXISTING NATURAL WETLAND
- EXISTING MANMADE WETLAND

CONSENT ISSUE

D	INFORMAL S92 RESPONSE	ZY	21/07/23
C	ROAD 3 RE-ALIGN	VC	20/12/21
B	ARCHAEOLOGICAL SITE	VC	09/11/21
A	ORIGINAL ISSUE	VC	21/09/21
REVISION	CHANGES	CHECKED	DATE

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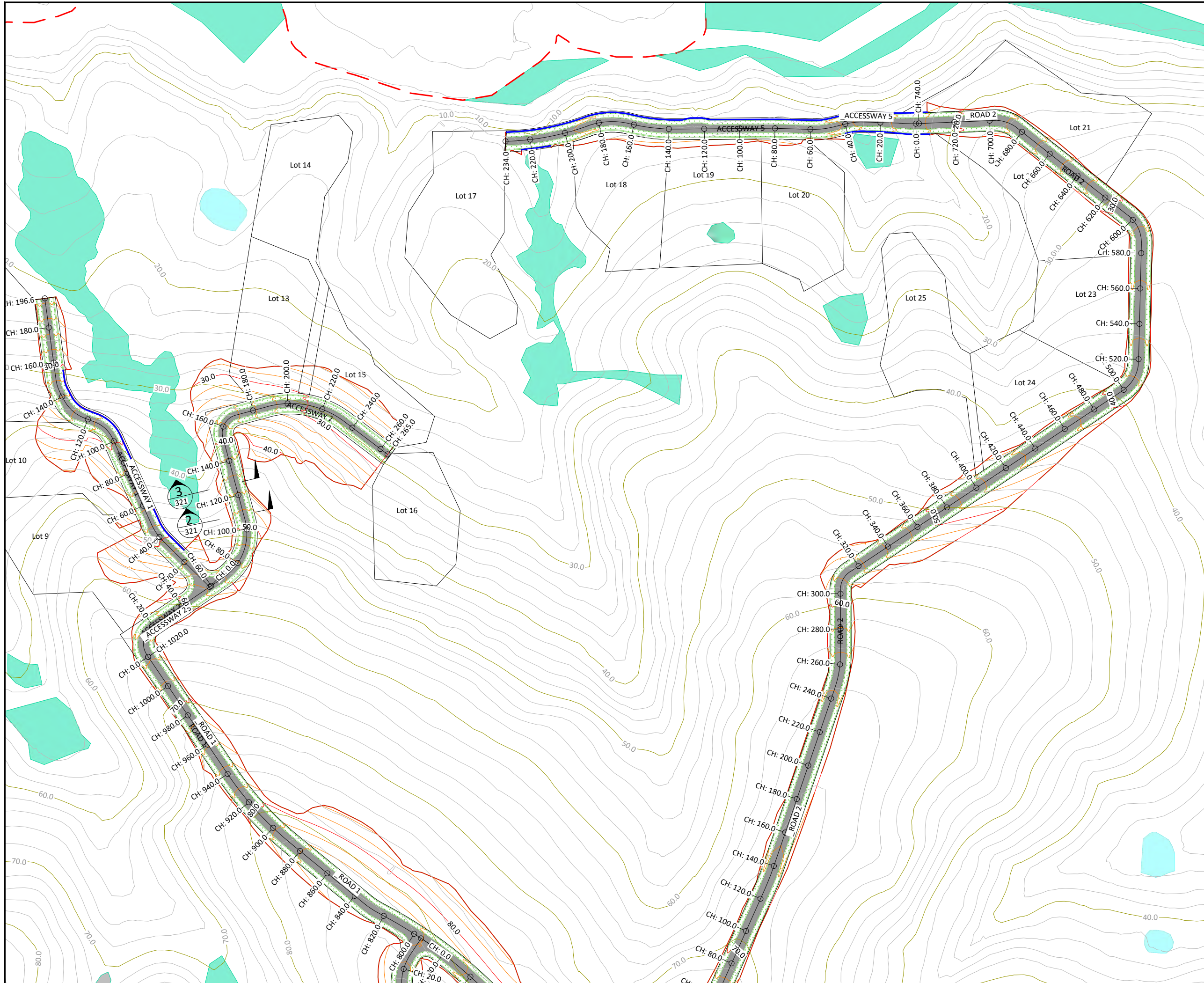
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ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING LAYOUT PLAN SHEET 1

DRAWN	MD	SCALE	A1 1:1000
DESIGNED	VC		A3 1:2000
PROJECT No	DRAWING No	REVISION	
1366	C301	D	



LEGEND

- SITE BOUNDARY
- EARTHWORKS EXTENT
- 50.0 PROPOSED CONTOURS
- 52.0 PROPOSED CONTOURS
- 50.0 EXISTING CONTOURS
- 52.0 EXISTING CONTOURS
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CONSENT ISSUE

C	INFORMAL S92 RESPONSE	ZY	21/07/23
B	ARCHAEOLOGICAL SITE	VC	09/11/21
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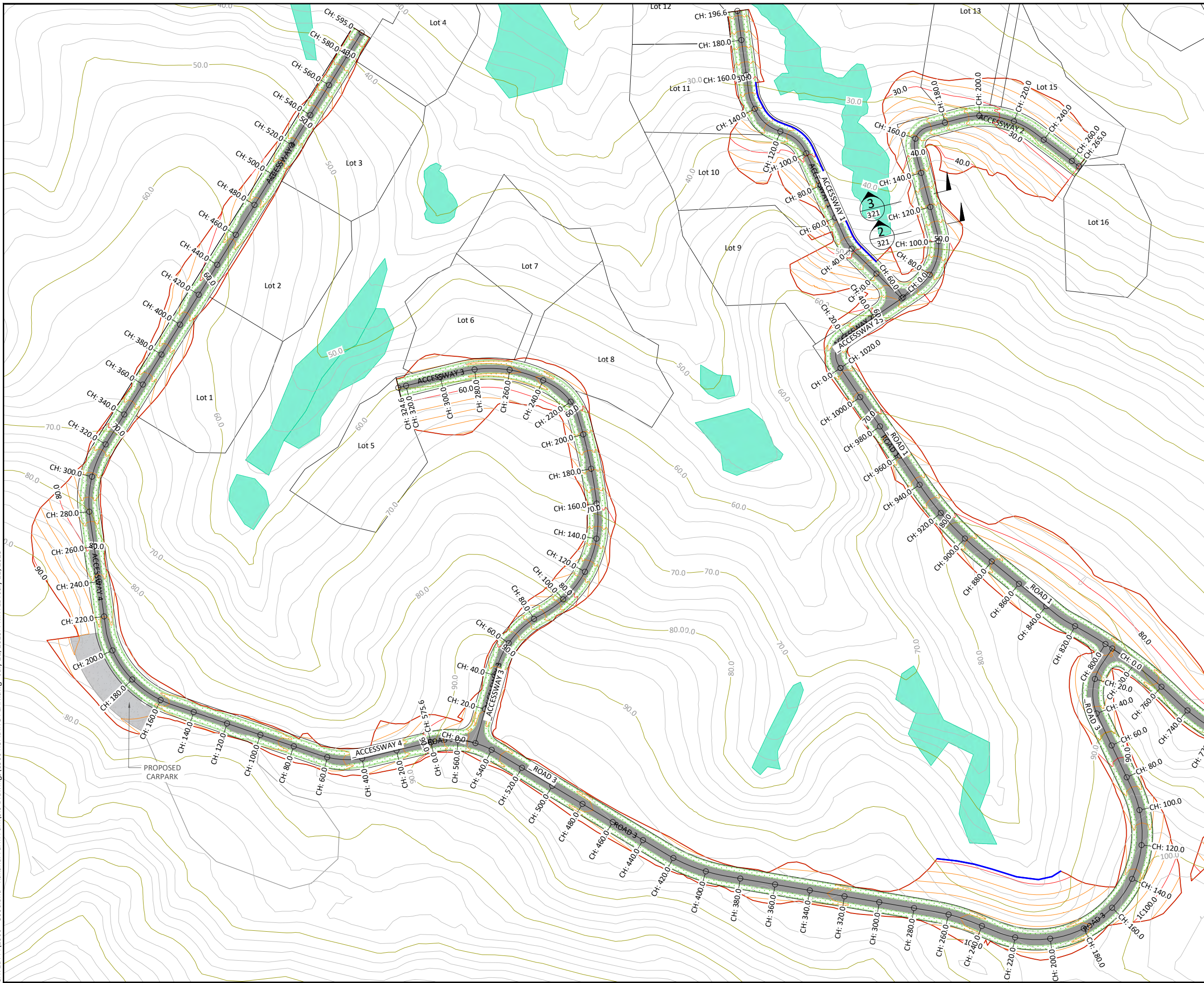
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PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING LAYOUT PLAN SHEET 2

DRAWN	MD	SCALE
DESIGNED	VC	A1 1:1000
PROJECT No	DRAWING No	A3 1:2000
1366	C302	REVISION
		C

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C300 ROADING PLAN.dwg - July 21, 2023. PRINTED: July 21, 2023



LEGEND

- SITE BOUNDARY
- EARTHWORKS EXTENT
- 50.0 PROPOSED CONTOURS
- 50.0 EXISTING CONTOURS
- 52.0 EXISTING CONTOURS
- PROPOSED RETAINING WALL
- EXISTING NATURAL WETLAND
- EXISTING MANMADE WETLAND

CONSENT ISSUE

D	INFORMAL S92 RESPONSE	ZY	21/07/23
C	ROAD 3 RE-ALIGN	VC	20/12/21
B	ARCHAEOLOGICAL SITE	VC	09/11/21
A	ORIGINAL ISSUE	VC	21/09/21
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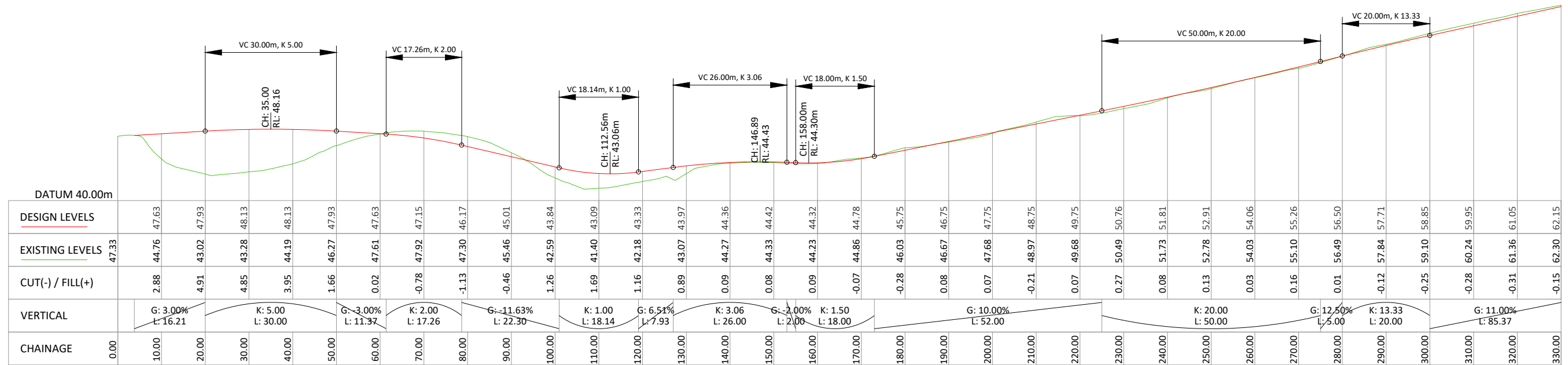
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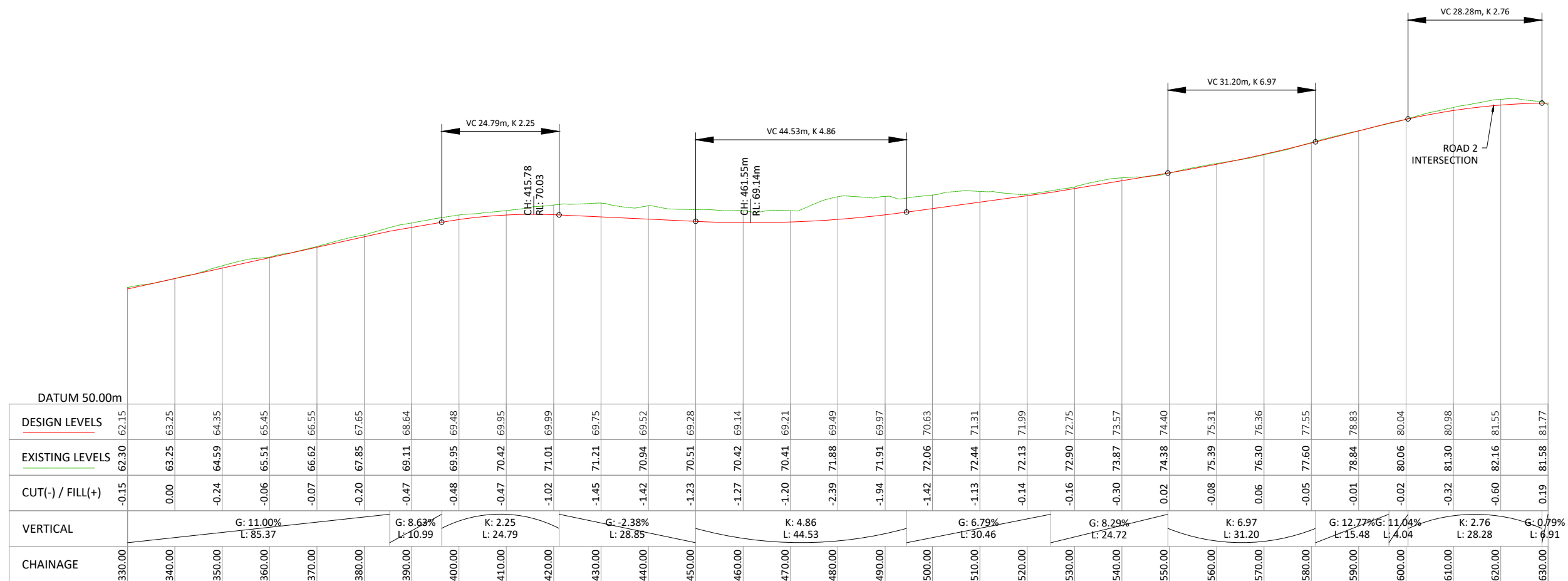
PROJECT
GOODLAND COASTAL FARM

TITLE
**ROADING LAYOUT PLAN
SHEET 3**

DRAWN	MD	SCALE	A1 1:1000
DESIGNED	VC		A3 1:2000
PROJECT No	DRAWING No	REVISION	
1366	C303	D	



ROAD 1
SCALE 1H:2V



ROAD 2
SCALE 1H:2V

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL	VC	24/11/21

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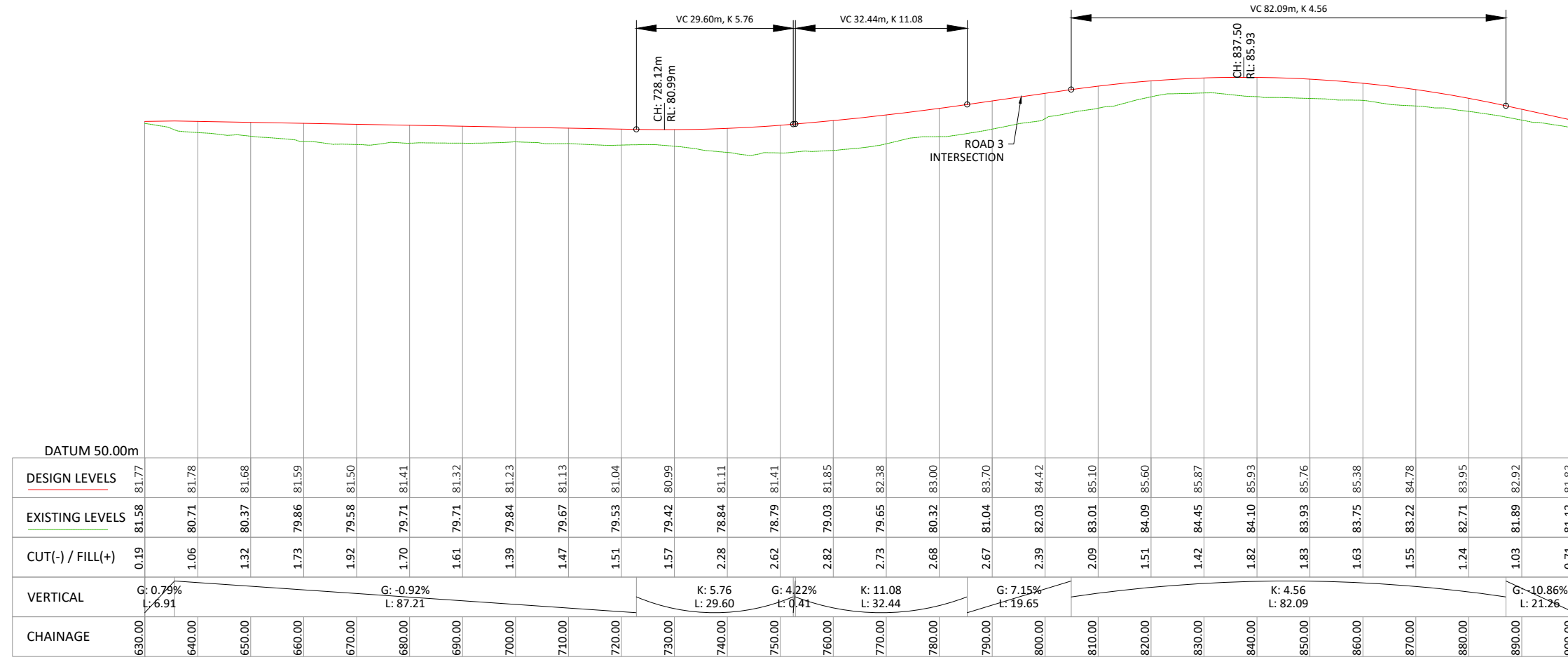
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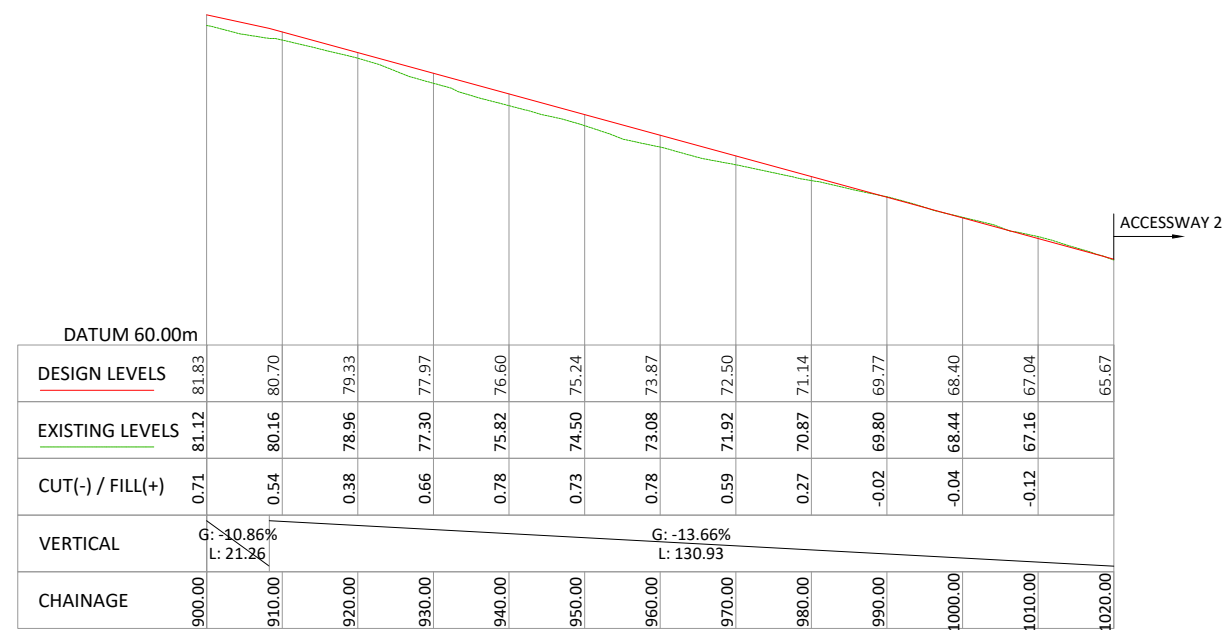
PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING LONGSECTIONS SHEET 1

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC		A3 1:1000
PROJECT No	1366	DRAWING No	C310
REVISION			B



ROAD 1
SCALE 1H:2V



ROAD 1
SCALE 1H:2V

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL	VC	24/11/21

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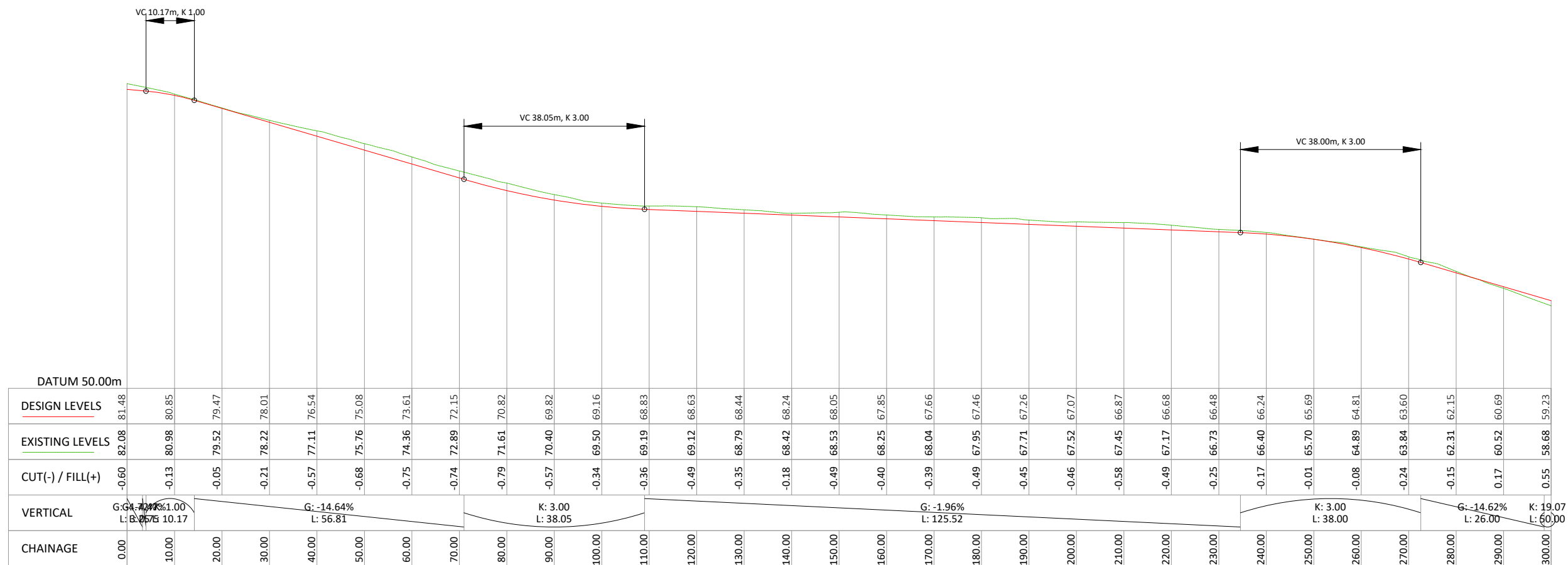
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PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING LONGSECTIONS SHEET 2

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC		A3 1:1000
PROJECT No	1366	DRAWING No	C311
		REVISION	B



ROAD 2
SCALE 1H:2V

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL	VC	24/11/21

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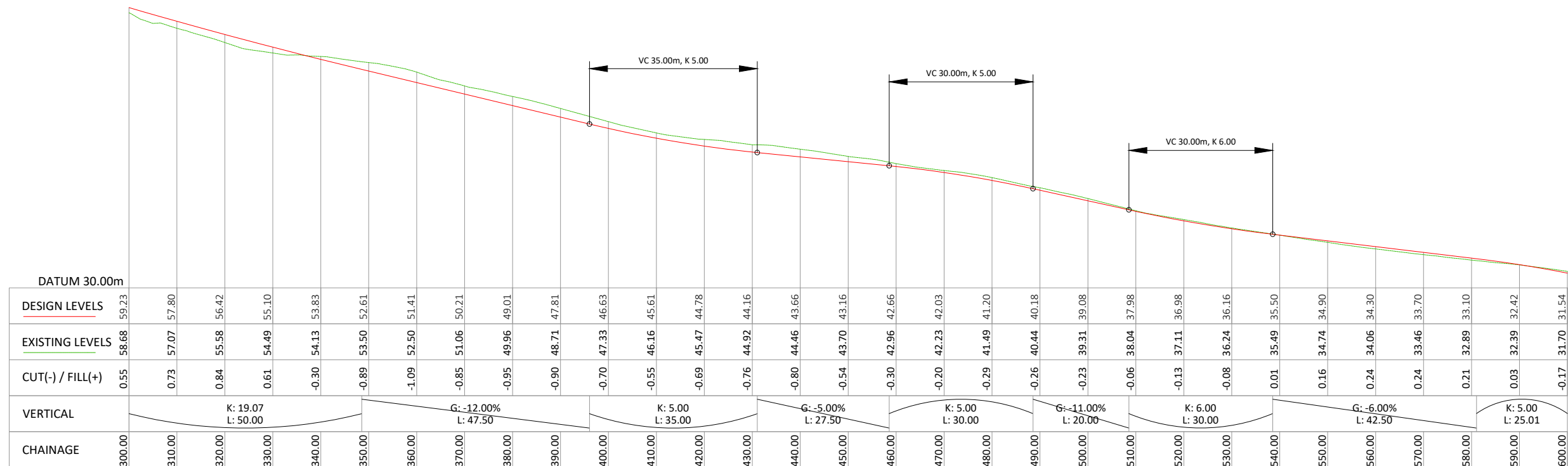
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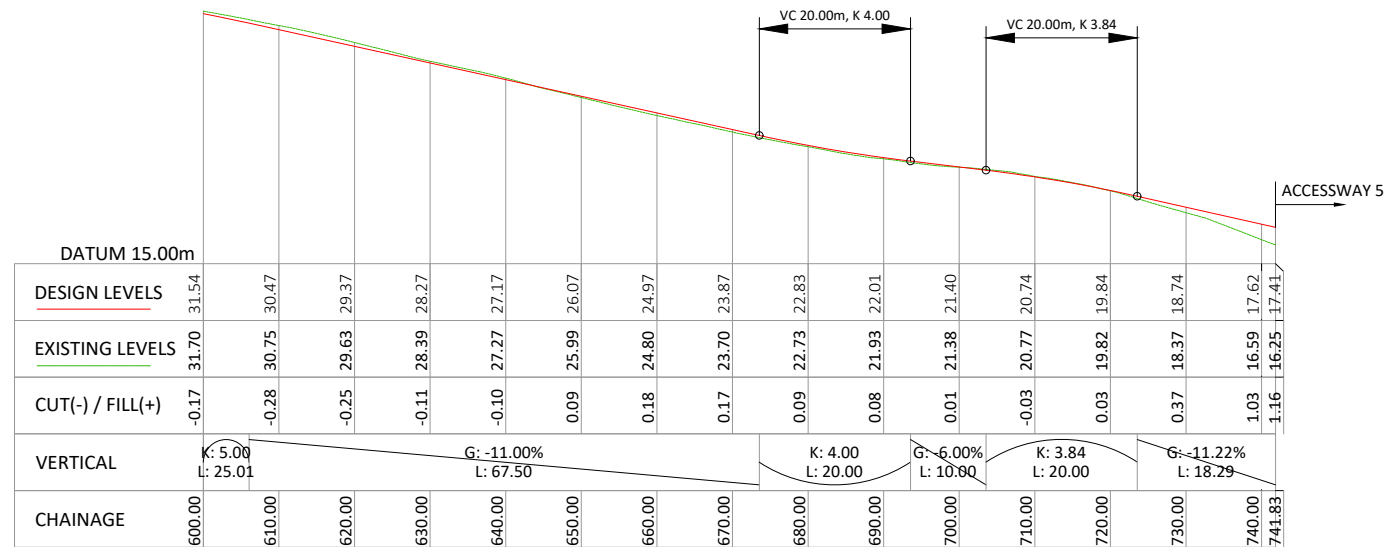
PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING LONGSECTIONS SHEET 3

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC	A3	1:1000
PROJECT No	1366	DRAWING No	C312
REVISION	B		



ROAD 2
SCALE 1H:2V



ROAD 2
SCALE 1H:2V

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
C	INFORMAL S92 RESPONSE	ZY	21/07/23
B	ROAD 3 RE-ALIGN	VC	20/12/21
A	ORIGINAL	VC	24/11/21

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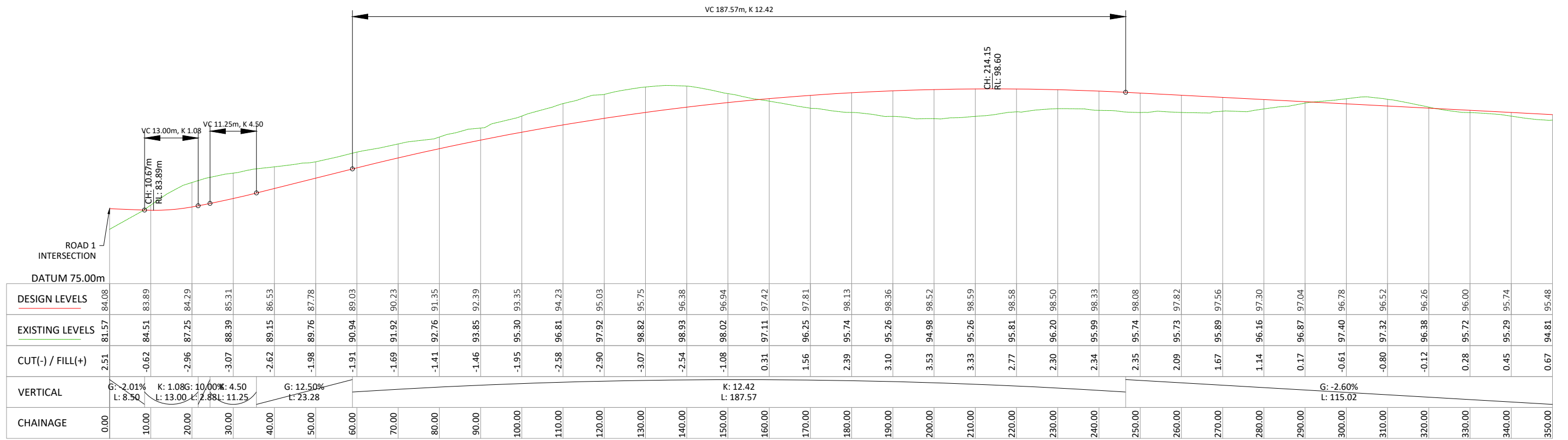
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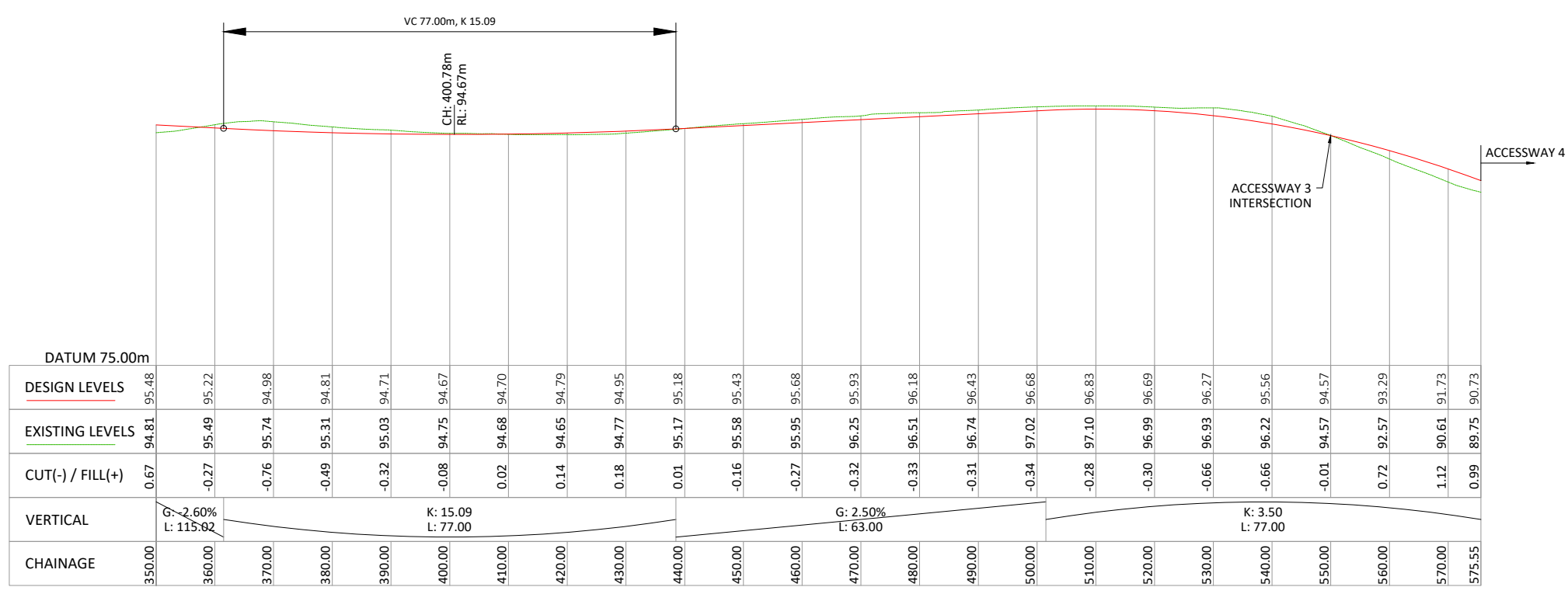
PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING LONGSECTIONS SHEET 4

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC	SCALE	A3 1:1000
PROJECT No	1366	DRAWING No	C313
REVISION	C		



ROAD 3
SCALE 1H:2V



ROAD 3
SCALE 1H:2V

CONSENT ISSUE

C	INFORMAL S92 RESPONSE	ZY	21/07/23
B	ROAD 3 RE-ALIGN	VC	20/12/21
A	ORIGINAL	VC	24/11/21
REVISION	CHANGES	CHECKED	DATE

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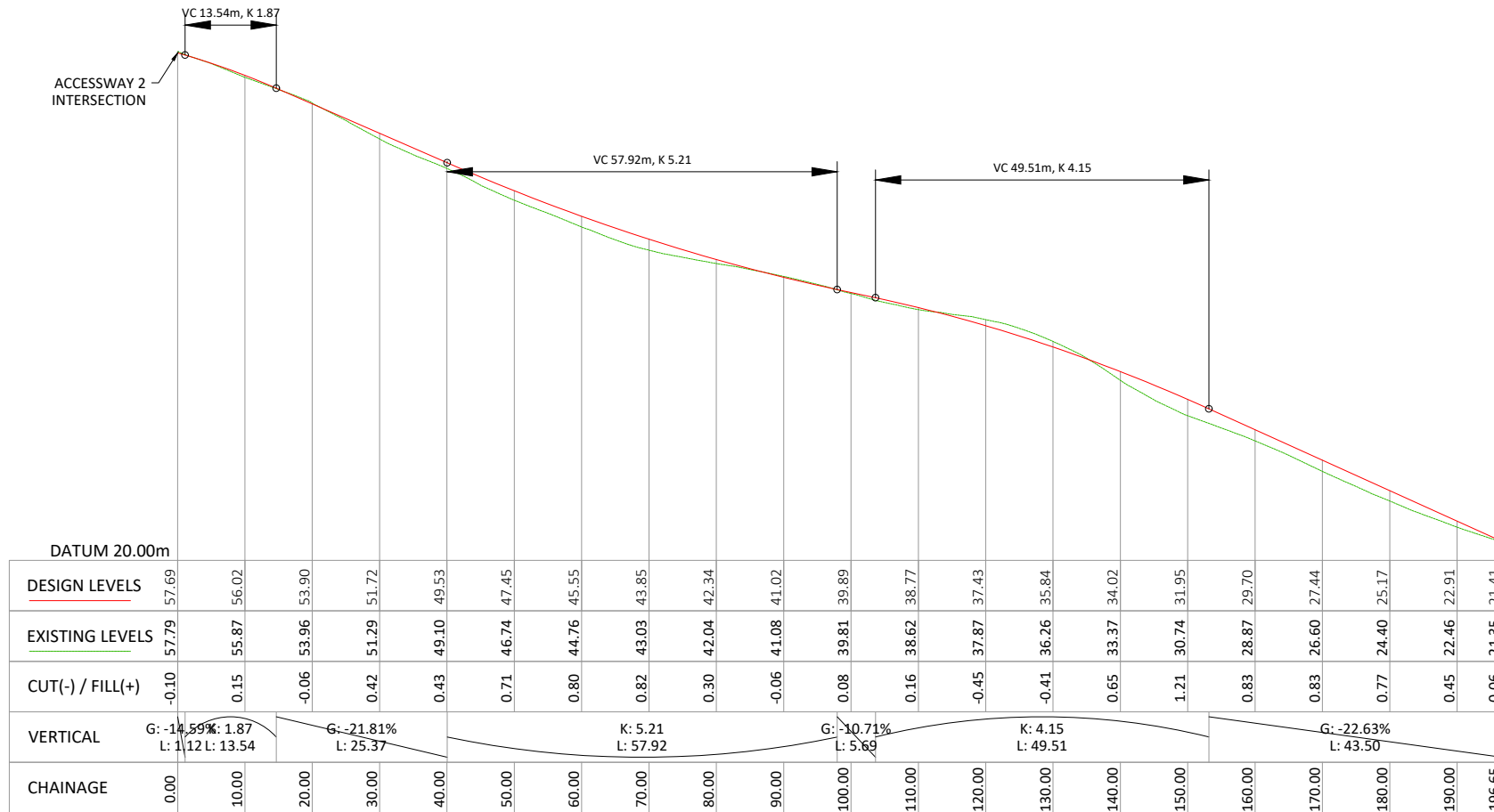
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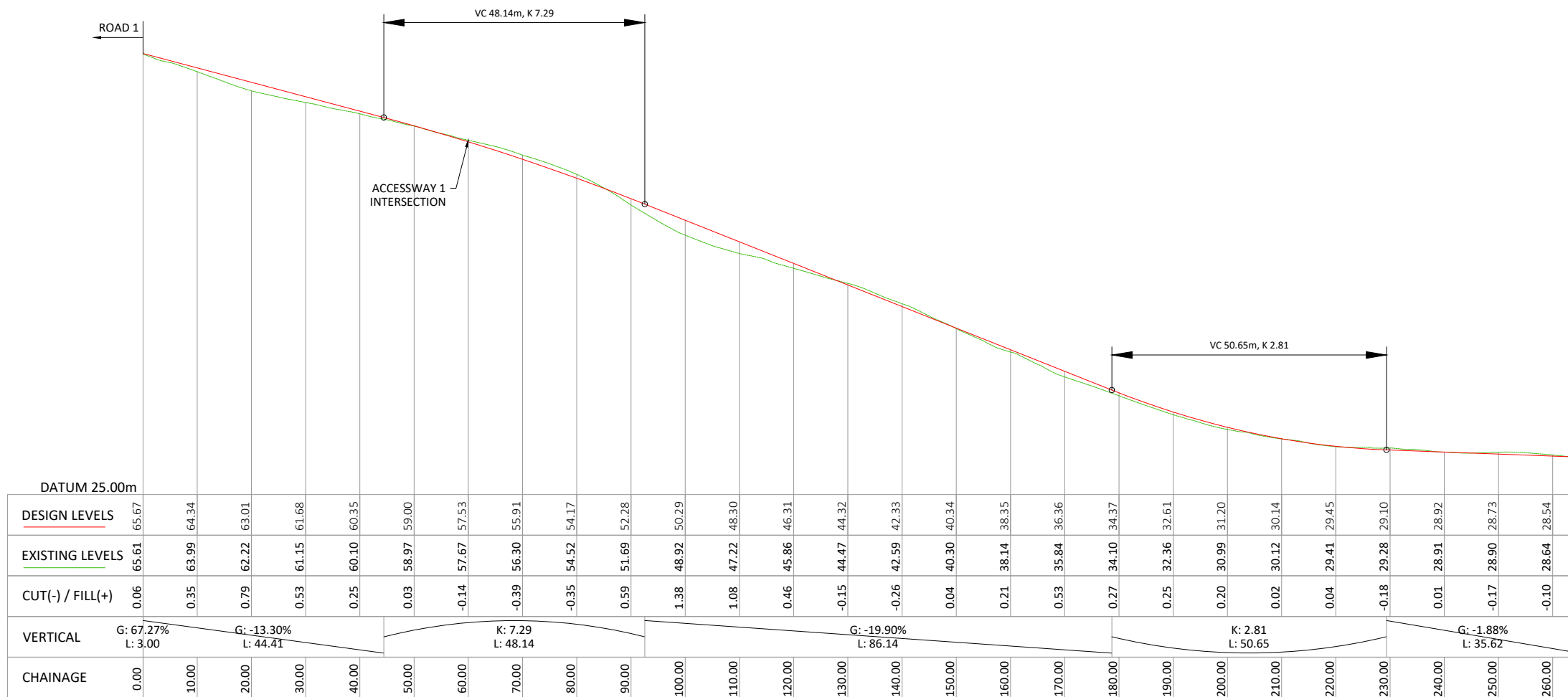
PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING LONGSECTIONS SHEET 5

DRAWN MD	SCALE A1 1:500
DESIGNED VC	A3 1:1000
PROJECT No 1366	DRAWING No C314
	REVISION C



ACCESSWAY 1
SCALE 1H:2V



ACCESSWAY 2
SCALE 1H:2V

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL	VC	24/11/21

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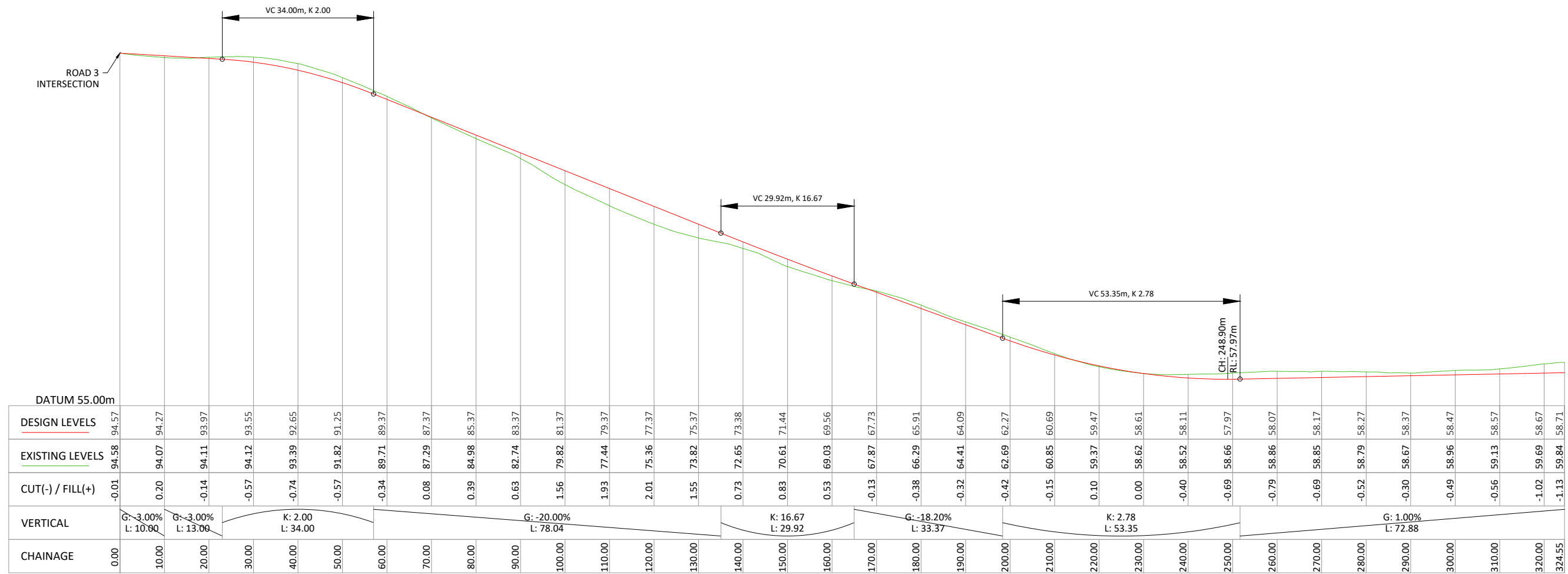
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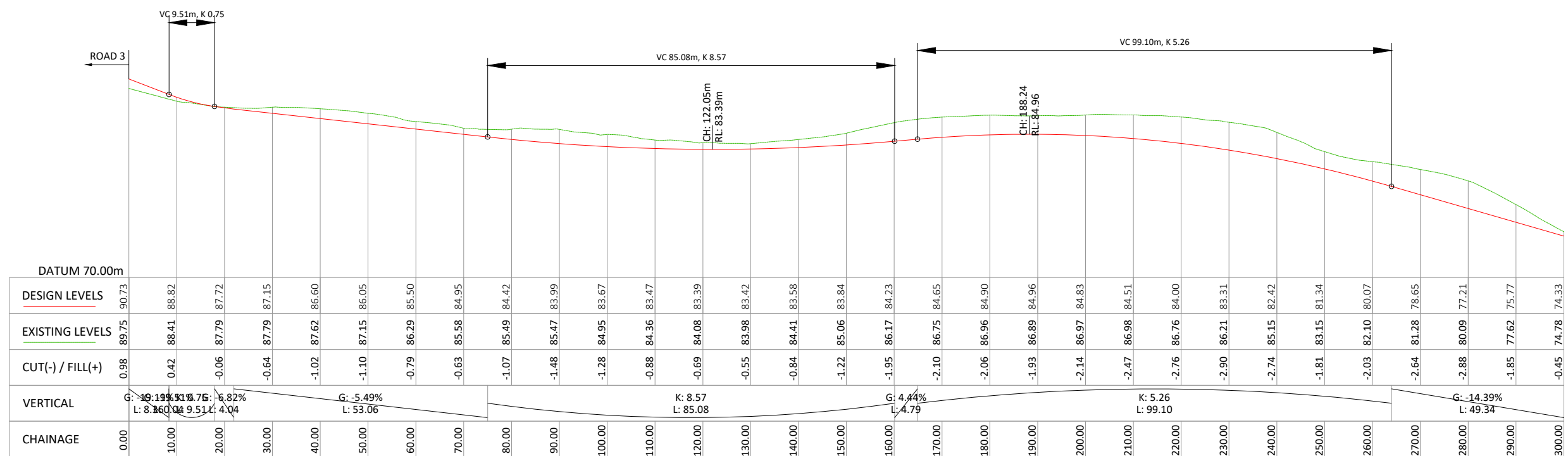
PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING LONGSECTIONS SHEET 6

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC		A3 1:1000
PROJECT No	DRAWING No	REVISION	
1366	C315	B	



ACCESSWAY 3
SCALE 1H:2V



ACCESSWAY 4
SCALE 1H:2V

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL	VC	24/11/21

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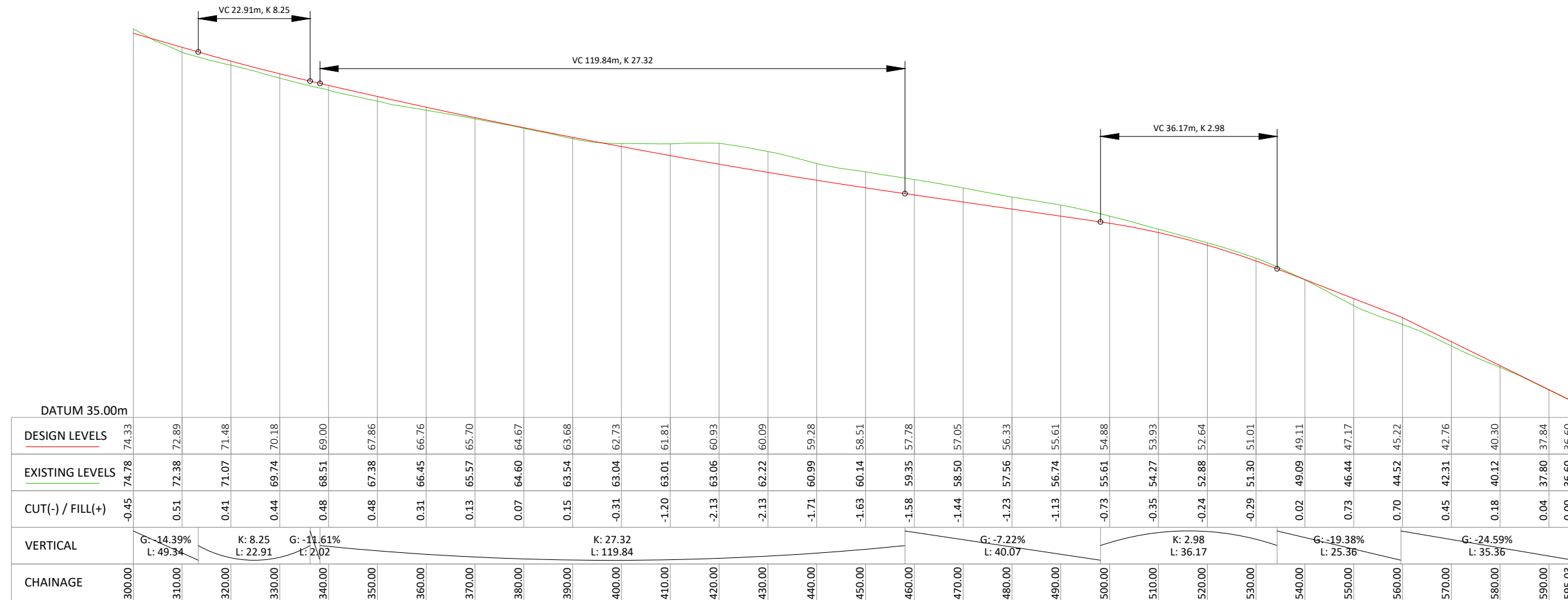
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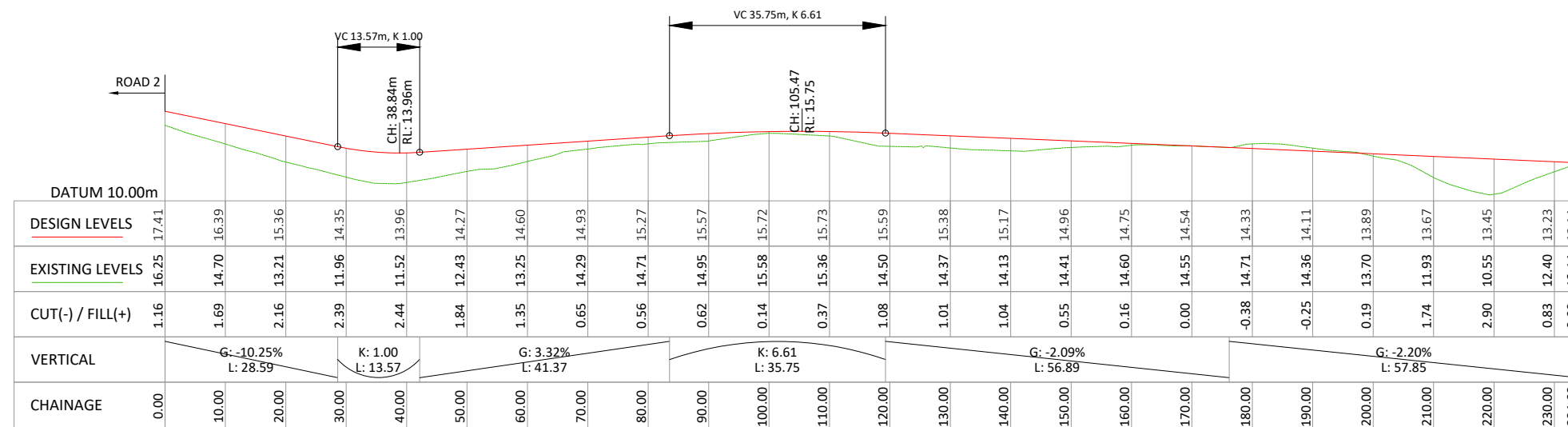
PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING LONGSECTIONS SHEET 7

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC		A3 1:1000
PROJECT No	1366	DRAWING No	C316
		REVISION	B



ACCESSWAY 4
SCALE 1H:2V



ACCESSWAY 5
SCALE 1H:2V

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL	VC	24/11/21

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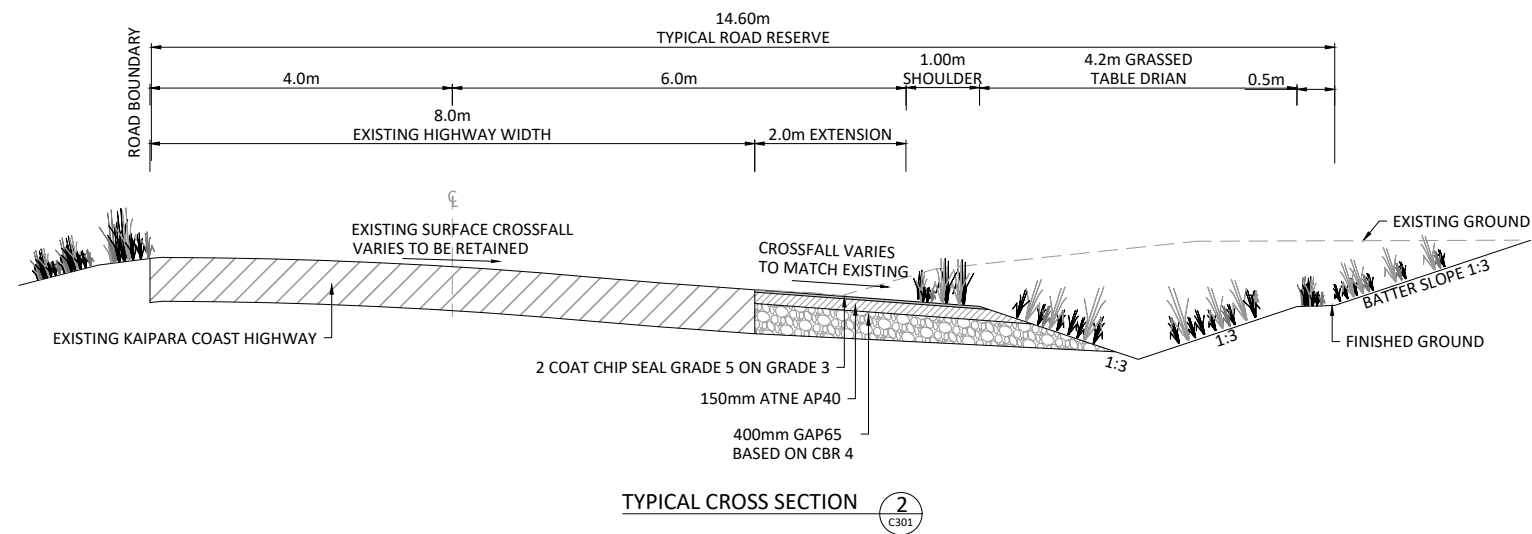
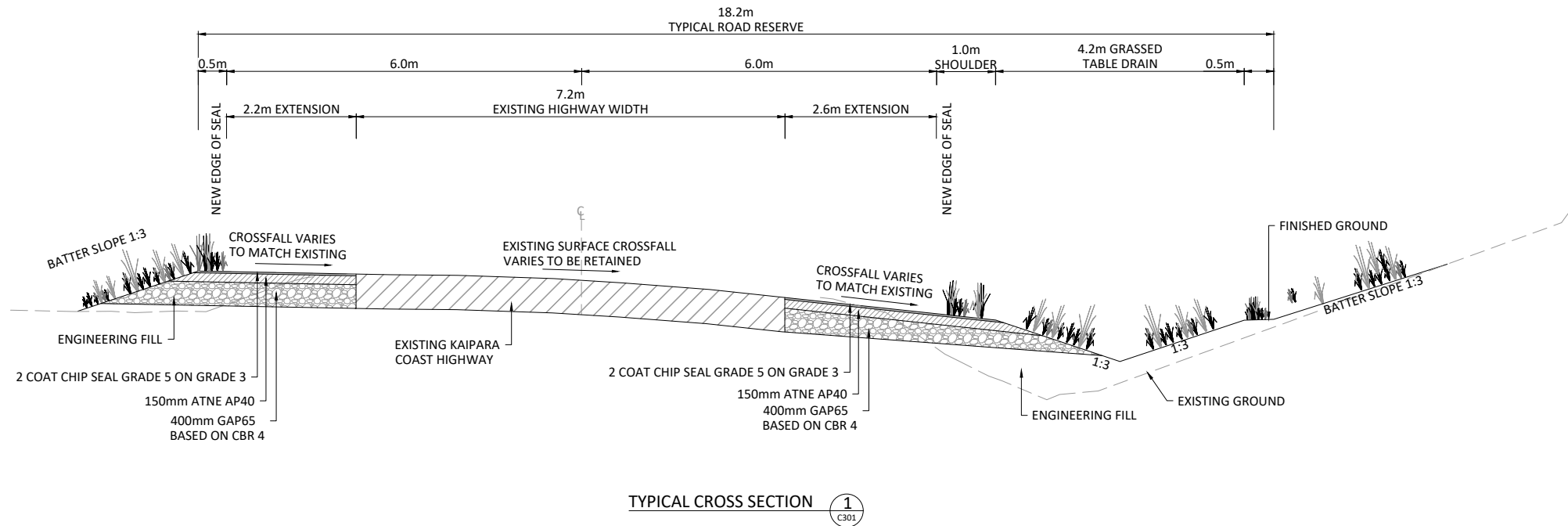
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PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING LONGSECTIONS SHEET 8

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC	SCALE	A3 1:1000
PROJECT No	1366	DRAWING No	C317
REVISION		REVISION	B

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CONSENT ISSUE

A	INFORMAL S92 RESPONSE	ZY	21/07/23
3	ROAD WIDTH	VC	22/12/21
2	CURVED W-BEAM	VC	13/12/21
1	SAFETY BARRIER ADDED	VC	03/11/21
REVISION	CHANGES	CHECKED	DATE

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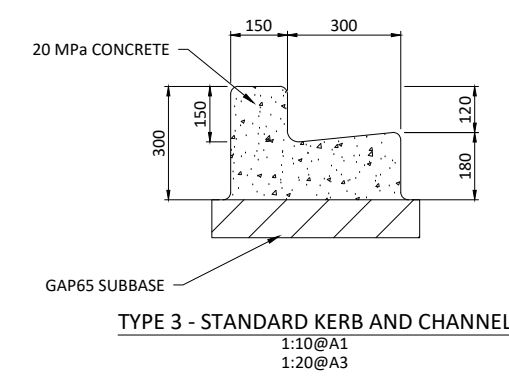
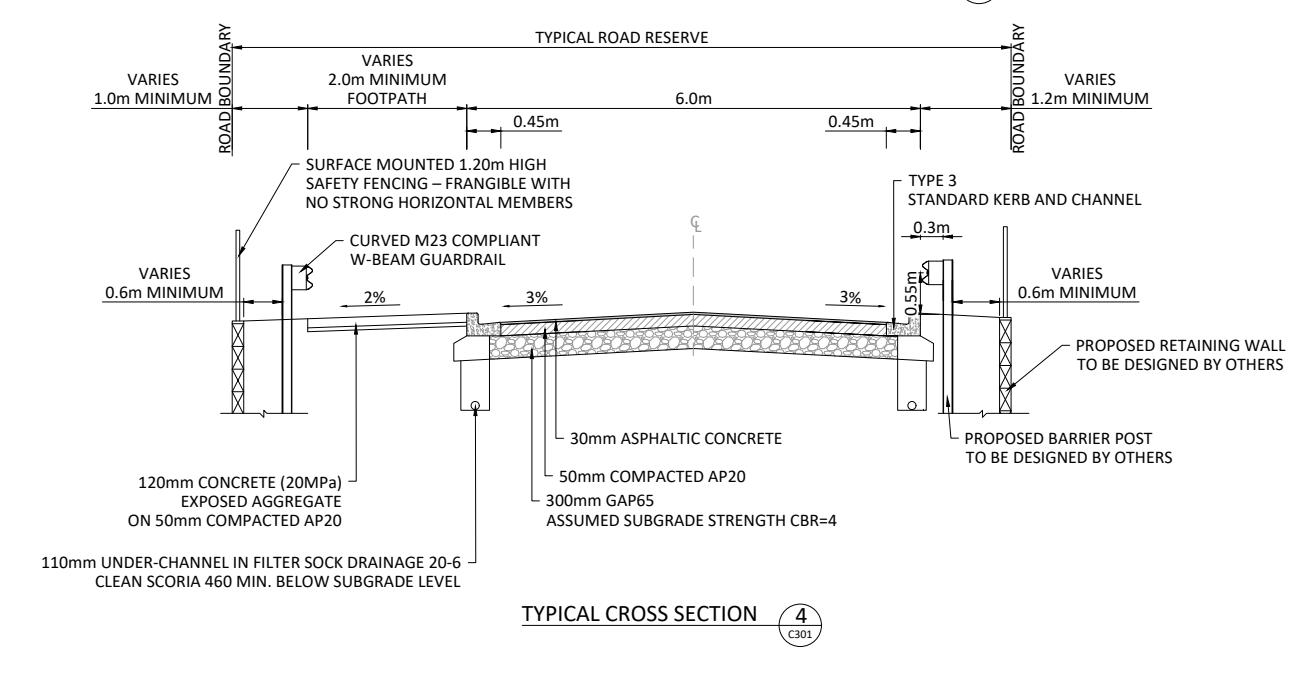
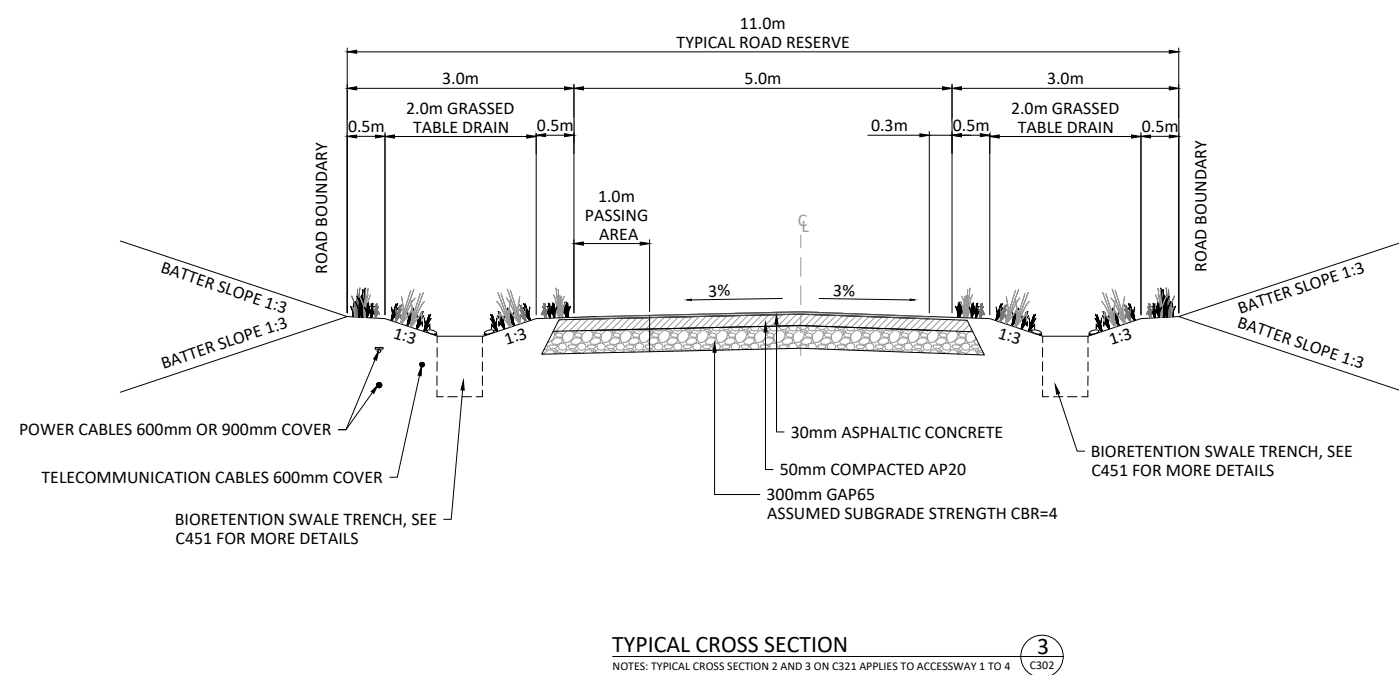
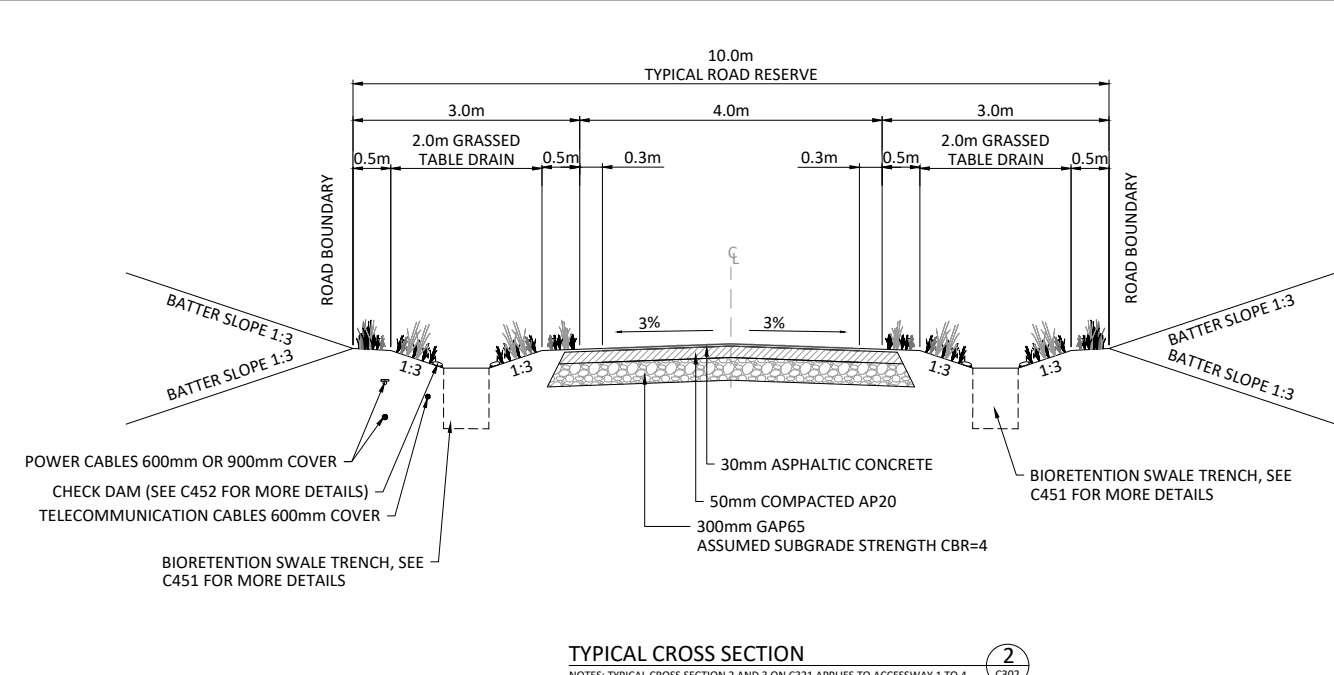
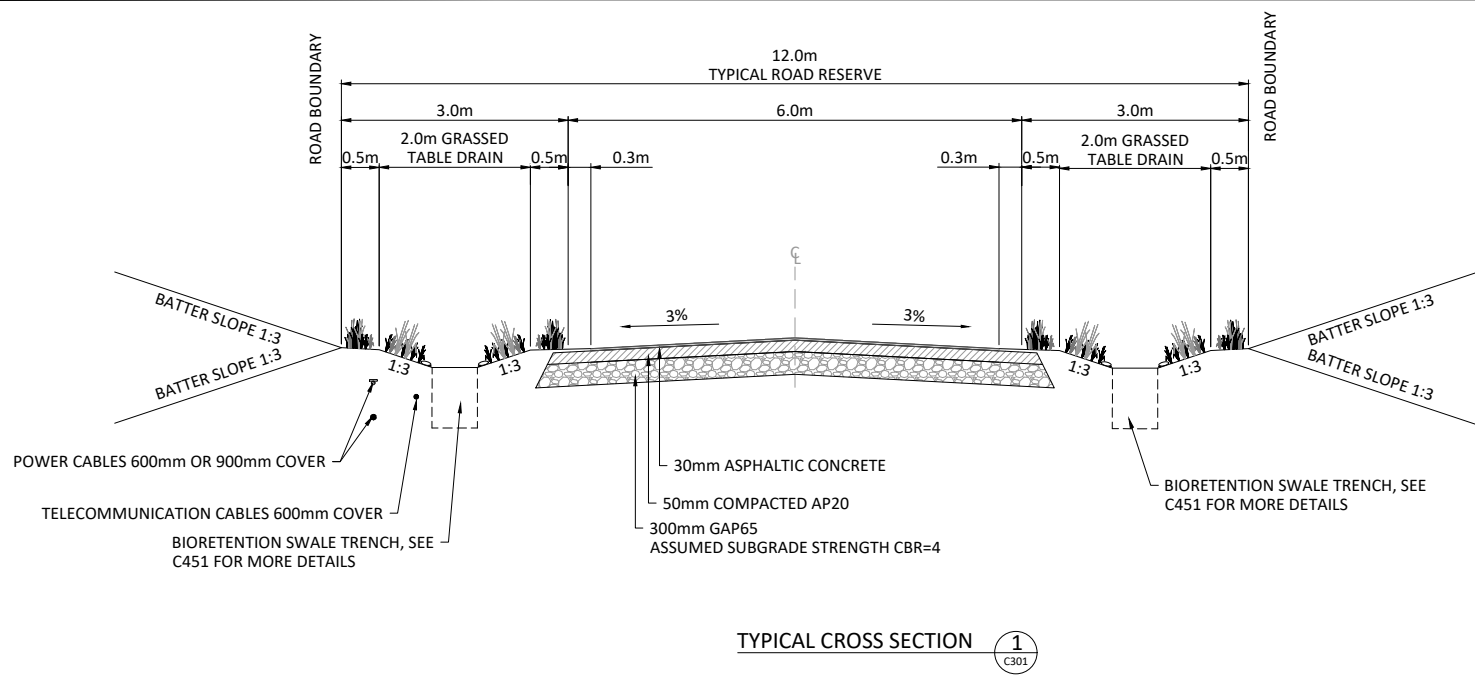
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PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING TYPICAL CROSS SECTIONS SHEET 1

DRAWN	MD	SCALE	A1 1:50
DESIGNED	VC	A3	1:100
PROJECT No	DRAWING No	REVISION	
1366	C320	A	

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NOTES
TYPICAL CROSS SECTION 2 AND 3 ON C321 ALSO APPLIES TO ACCESSWAY 1 TO 4.

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
D	FORMAL S92 RESPONSE	ZY	31/01/24
C	INFORMAL S92 RESPONSE	ZY	21/07/23
B	UPDATED TABLE DRAIN	ZY	20/04/23
A	ORIGINAL ISSUE	VC	24/11/21

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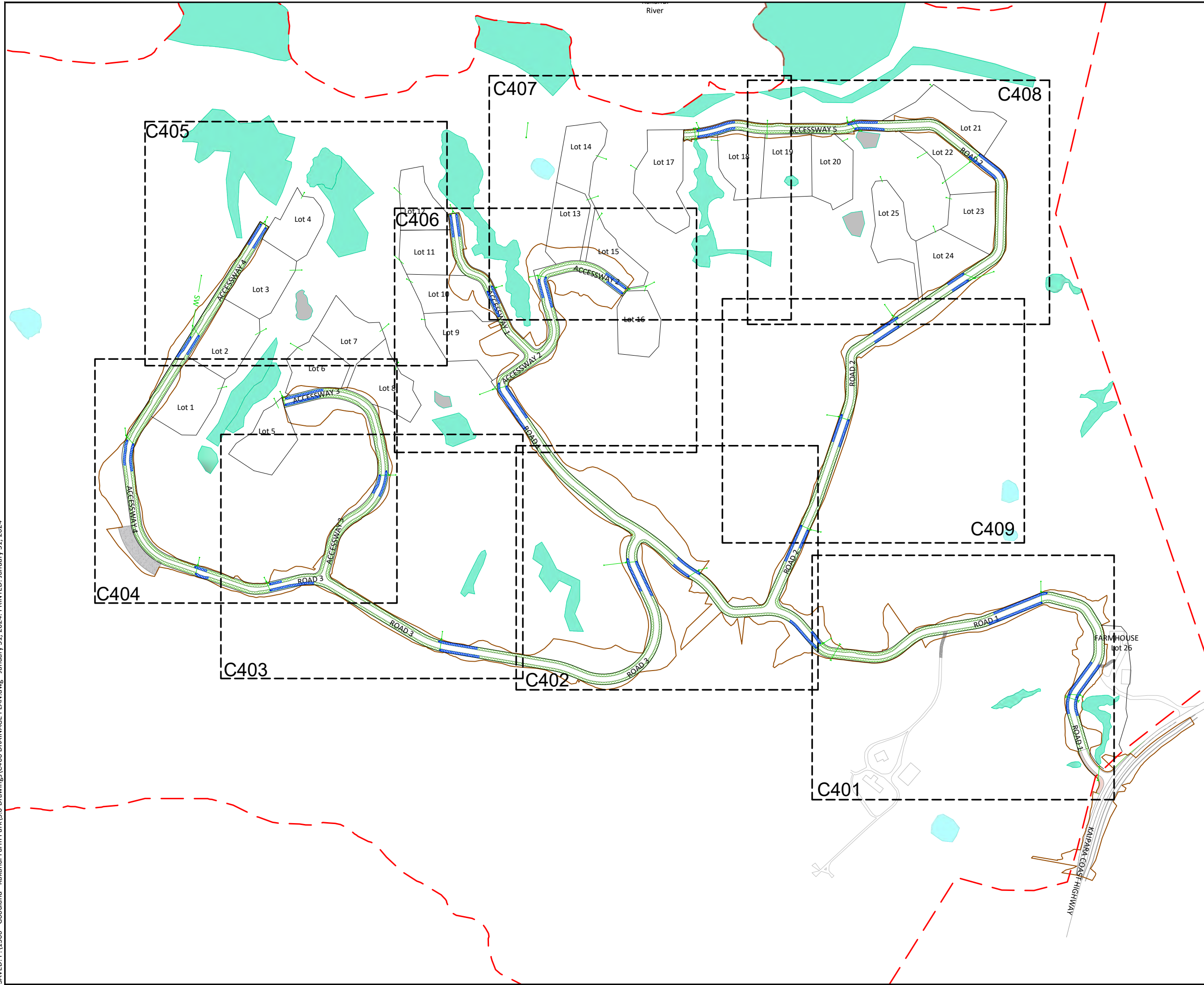
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PROJECT
GOODLAND COASTAL FARM

TITLE
ROADING TYPICAL CROSS SECTIONS SHEET 2

DRAWN	MD	SCALE	A1 1:50
DESIGNED	VC	A3	1:100
PROJECT No	1366	DRAWING No	C321
REVISION			D



LEGEND

- SITE BOUNDARY
- 50.0 PROPOSED CONTOURS
- 52.0 EXISTING CONTOURS
- EARTHWORKS EXTENT
- █ EXISTING NATURAL WETLAND
- █ EXISTING ARTIFICIAL WETLAND
- PROPOSED STORMWATER PIPE NETWORK
- PROPOSED SCRUFFY DOME
- ▢ SW PROPOSED CULVERT
- ▢ BIORETENTION SWALE
- ▢ GRASSED TABLE DRAIN

NOTES:

1. APPROVED HARDFILL SHALL BE USED WHEN BACKFILLING ALL ROAD CROSSINGS.
2. ALL MANHOLES SHALL BE 1050Ømm MINIMUM UNLESS SHOWN OTHERWISE ON LONG-SECTION DRAWINGS.
3. 7MPa SCORIA CONCRETE BEDDING TO BE USED WHERE GRADIENTS EXCEED 10%.
4. ANCHOR BLOCKS TO BE USED WHERE LONGITUDINAL GRADIENT EXCEEDS 20% (TO BE CONSTRUCTED TO SW CoP SPECIFICATIONS).

CONSENT ISSUE

D	FORMAL S92 RESPONSE	ZY	31/01/24
C	INFORMAL S92 RESPONSE	ZY	21/07/23
B	ROAD 3 RE-ALIGN	VC	20/12/21
REVISION	CHANGES	CHECKED	DATE

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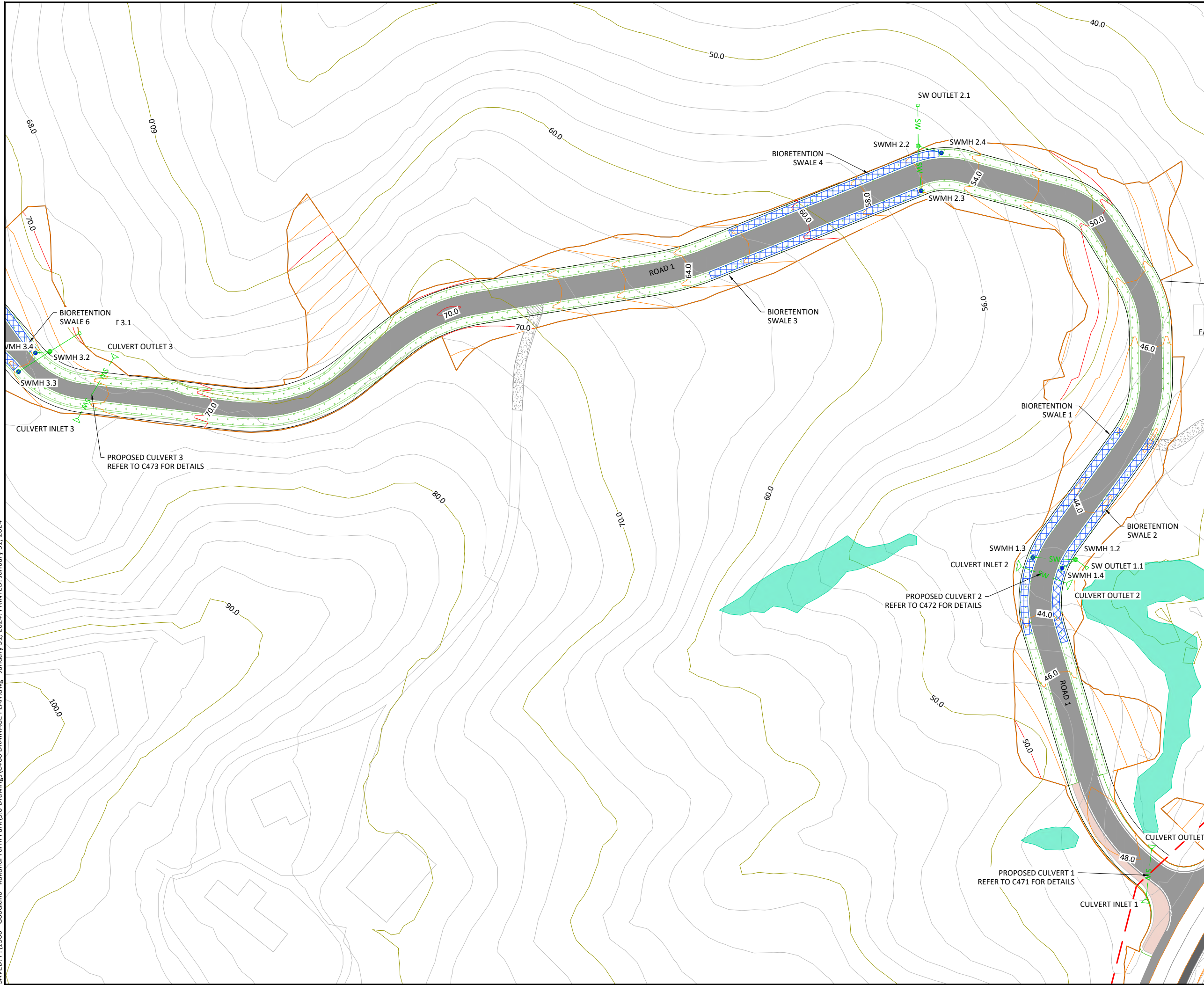
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ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
DRAINAGE OVERALL PLAN

DRAWN	MD	SCALE	A1 1:2000
DESIGNED	VC	A3	1:4000
PROJECT No	DRAWING No	REVISION	
1366	C400	D	

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LEGEND

- SITE BOUNDARY
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- PROPOSED STORMWATER PIPE NETWORK
- PROPOSED SCRUFFY DOME
- SW PROPOSED CULVERT
- ▨ BIORETENTION SWALE
- ▨ GRASSED TABLE DRAIN

- ### NOTES:
1. APPROVED HARDFILL SHALL BE USED WHEN BACKFILLING ALL ROAD CROSSINGS.
 2. ALL MANHOLES SHALL BE 1050Ømm MINIMUM UNLESS SHOWN OTHERWISE ON LONG-SECTION DRAWINGS.
 3. 7MPa SCORIA CONCRETE BEDDING TO BE USED WHERE GRADIENTS EXCEED 10%.
 4. ANCHOR BLOCKS TO BE USED WHERE LONGITUDINAL GRADIENT EXCEEDS 20% (TO BE CONSTRUCTED TO SW CoP SPECIFICATIONS).

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REVISION	CHANGES	CHECKED	DATE
D	FORMAL S92 RESPONSE	ZY	31/01/24
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL ISSUE	VC	24/11/21

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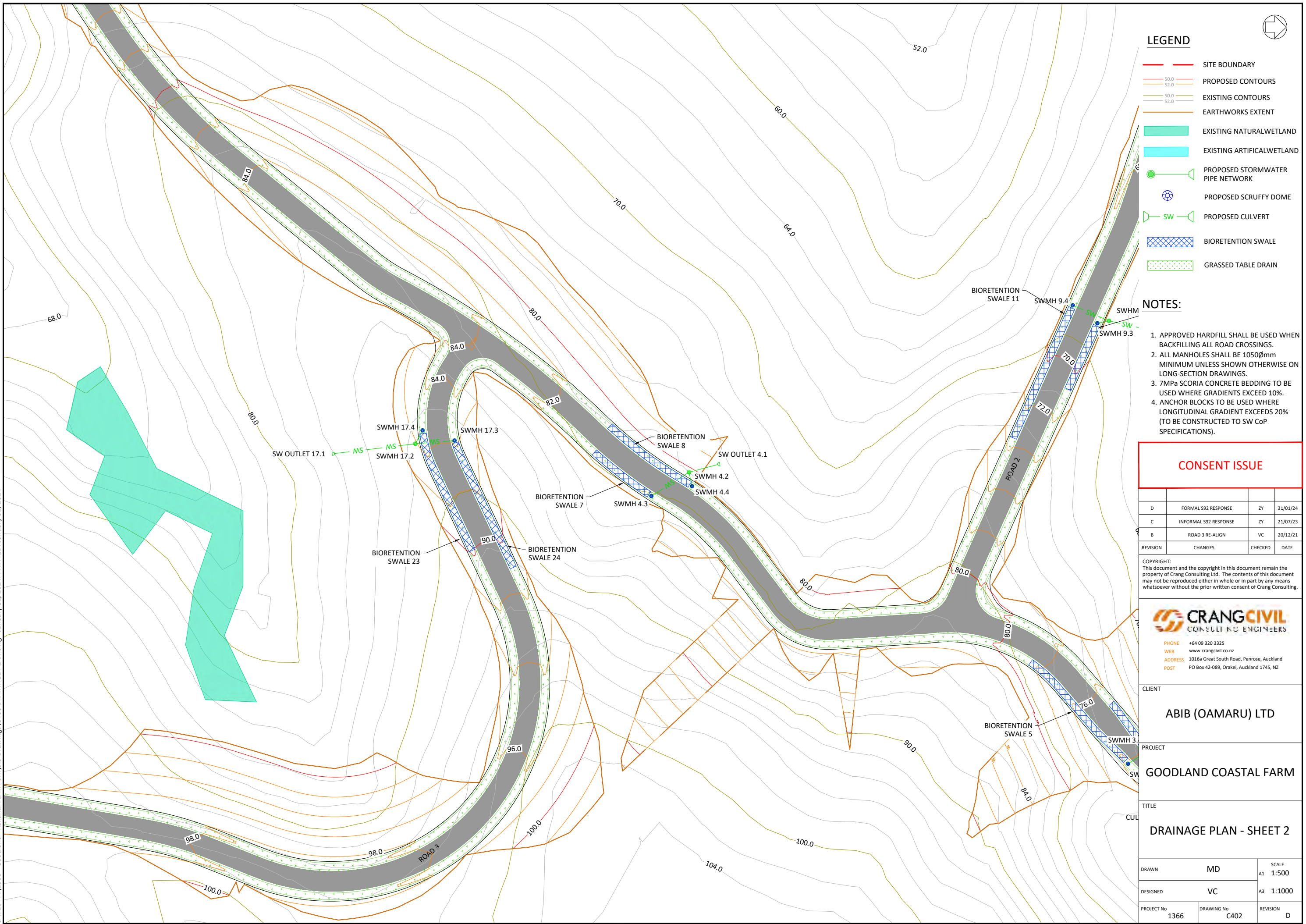
CLIENT
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PROJECT
GOODLAND COASTAL FARM

TITLE
DRAINAGE PLAN - SHEET 1

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC	A3	1:1000
PROJECT No	1366	DRAWING No	C401
REVISION	D		

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- █ EXISTING ARTIFICIAL WETLAND
- PROPOSED STORMWATER PIPE NETWORK
- PROPOSED SCRUFFY DOME
- SW PROPOSED CULVERT
- ▨ BIORETENTION SWALE
- ▨ GRASSED TABLE DRAIN

NOTES:

1. APPROVED HARDFILL SHALL BE USED WHEN BACKFILLING ALL ROAD CROSSINGS.
2. ALL MANHOLES SHALL BE 1050Ømm MINIMUM UNLESS SHOWN OTHERWISE ON LONG-SECTION DRAWINGS.
3. 7MPa SCORIA CONCRETE BEDDING TO BE USED WHERE GRADIENTS EXCEED 10%.
4. ANCHOR BLOCKS TO BE USED WHERE LONGITUDINAL GRADIENT EXCEEDS 20% (TO BE CONSTRUCTED TO SW CoP SPECIFICATIONS).

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
D	FORMAL S92 RESPONSE	ZY	31/01/24
C	INFORMAL S92 RESPONSE	ZY	21/07/23
B	ROAD 3 RE-ALIGN	VC	20/12/21

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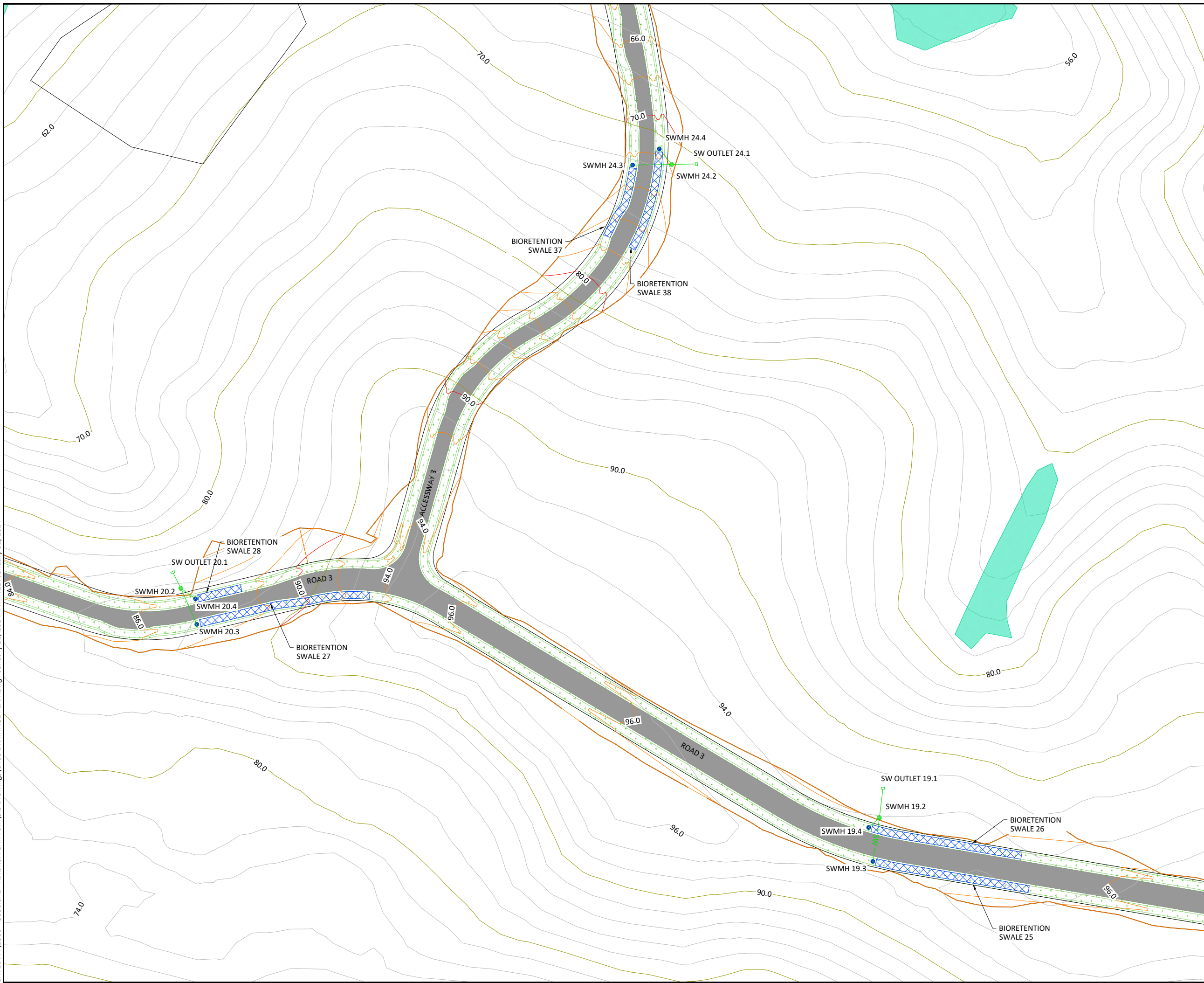
CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
DRAINAGE PLAN - SHEET 2

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC	A3	1:1000
PROJECT No	DRAWING No	REVISION	
1366	C402	D	

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LEGEND

- SITE BOUNDARY
- 50.0 PROPOSED CONTOURS
- 52.0 EXISTING CONTOURS
- 50.0 EXISTING CONTOURS
- 52.0 EXISTING CONTOURS
- EARTHWORKS EXTENT
- EXISTING NATURAL WETLAND
- EXISTING ARTIFICIAL WETLAND
- PROPOSED STORMWATER PIPE NETWORK
- PROPOSED SCRUFFY DOME
- SW PROPOSED CULVERT
- BIURETENTION SWALE
- GRASSED TABLE DRAIN

NOTES:

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2. ALL MANHOLES SHALL BE 1050Ømm MINIMUM UNLESS SHOWN OTHERWISE ON LONG-SECTION DRAWINGS.
3. 7MPa SCORIA CONCRETE BEDDING TO BE USED WHERE GRADIENTS EXCEED 10%.
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CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
D	FORMAL S92 RESPONSE	ZY	31/01/24
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL ISSUE	VC	24/11/21

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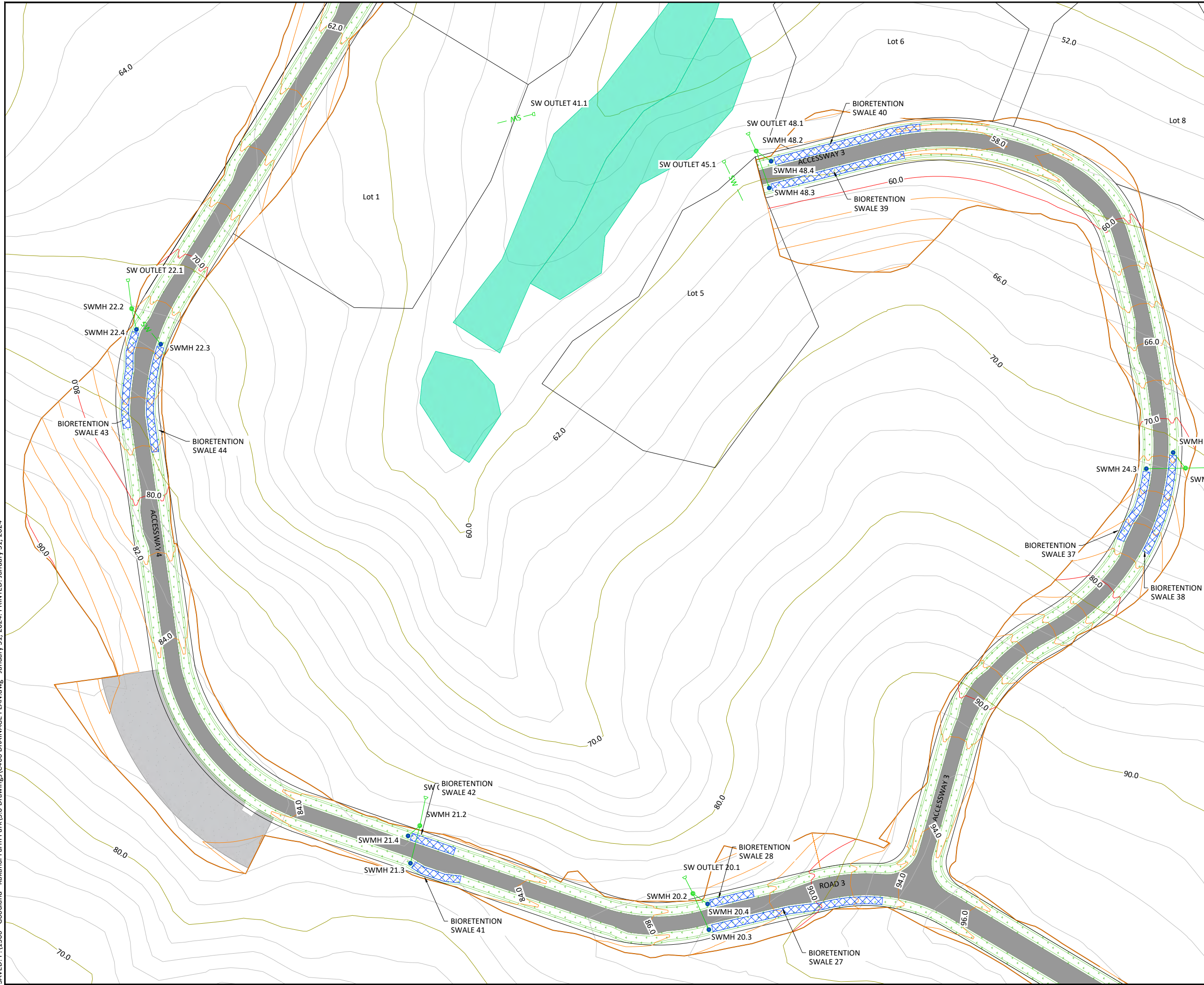
CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
DRAINAGE PLAN - SHEET 3

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC	SCALE	A3 1:1000
PROJECT No	1366	DRAWING No	C403
		REVISION	D

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LEGEND

- SITE BOUNDARY
- 50.0 PROPOSED CONTOURS
- 52.0 PROPOSED CONTOURS
- 50.0 EXISTING CONTOURS
- 52.0 EXISTING CONTOURS
- EARTHWORKS EXTENT
- EXISTING NATURAL WETLAND
- EXISTING ARTIFICIAL WETLAND
- PROPOSED STORMWATER PIPE NETWORK
- PROPOSED SCRUFFY DOME
- SW PROPOSED CULVERT
- BIORETENTION SWALE
- GRASSED TABLE DRAIN

NOTES:

1. APPROVED HARDFILL SHALL BE USED WHEN BACKFILLING ALL ROAD CROSSINGS.
2. ALL MANHOLES SHALL BE 1050mm MINIMUM UNLESS SHOWN OTHERWISE ON LONG-SECTION DRAWINGS.
3. 7MPa SCORIA CONCRETE BEDDING TO BE USED WHERE GRADIENTS EXCEED 10%.
4. ANCHOR BLOCKS TO BE USED WHERE LONGITUDINAL GRADIENT EXCEEDS 20% (TO BE CONSTRUCTED TO SW CoP SPECIFICATIONS).

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
D	FORMAL S92 RESPONSE	ZY	31/01/24
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL ISSUE	VC	24/11/21

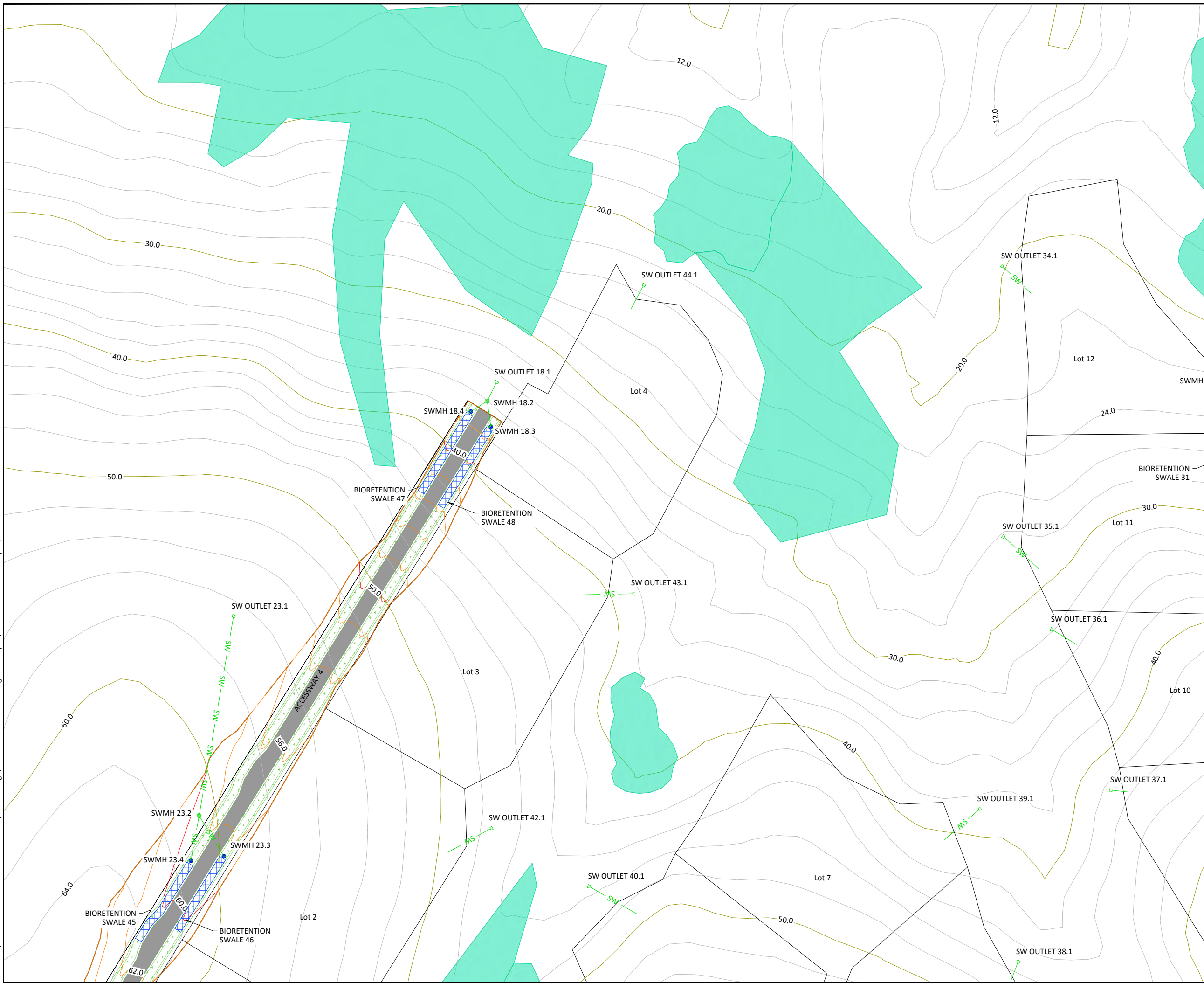
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CLIENT		
ABIB (OAMARU) LTD		
PROJECT		
GOODLAND COASTAL FARM		
TITLE		
DRAINAGE PLAN - SHEET 4		
DRAWN	MD	SCALE A1 1:500
DESIGNED	VC	A3 1:1000
PROJECT No	DRAWING No	REVISION
1366	C404	D

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LEGEND

- SITE BOUNDARY
- 50.0 PROPOSED CONTOURS
- 52.0 EXISTING CONTOURS
- 50.0 EXISTING CONTOURS
- 52.0 EXISTING CONTOURS
- EARTHWORKS EXTENT
- █ EXISTING NATURAL WETLAND
- █ EXISTING ARTIFICIAL WETLAND
- PROPOSED STORMWATER PIPE NETWORK
- PROPOSED SCRUFFY DOME
- SW — PROPOSED CULVERT
- █ BIORETENTION SWALE
- █ GRASSED TABLE DRAIN

- ### NOTES:
1. APPROVED HARDFILL SHALL BE USED WHEN BACKFILLING ALL ROAD CROSSINGS.
 2. ALL MANHOLES SHALL BE 1050Ømm MINIMUM UNLESS SHOWN OTHERWISE ON LONG-SECTION DRAWINGS.
 3. 7MPa SCORIA CONCRETE BEDDING TO BE USED WHERE GRADIENTS EXCEED 10%.
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CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
D	FORMAL S92 RESPONSE	ZY	31/01/24
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL ISSUE	VC	24/11/21

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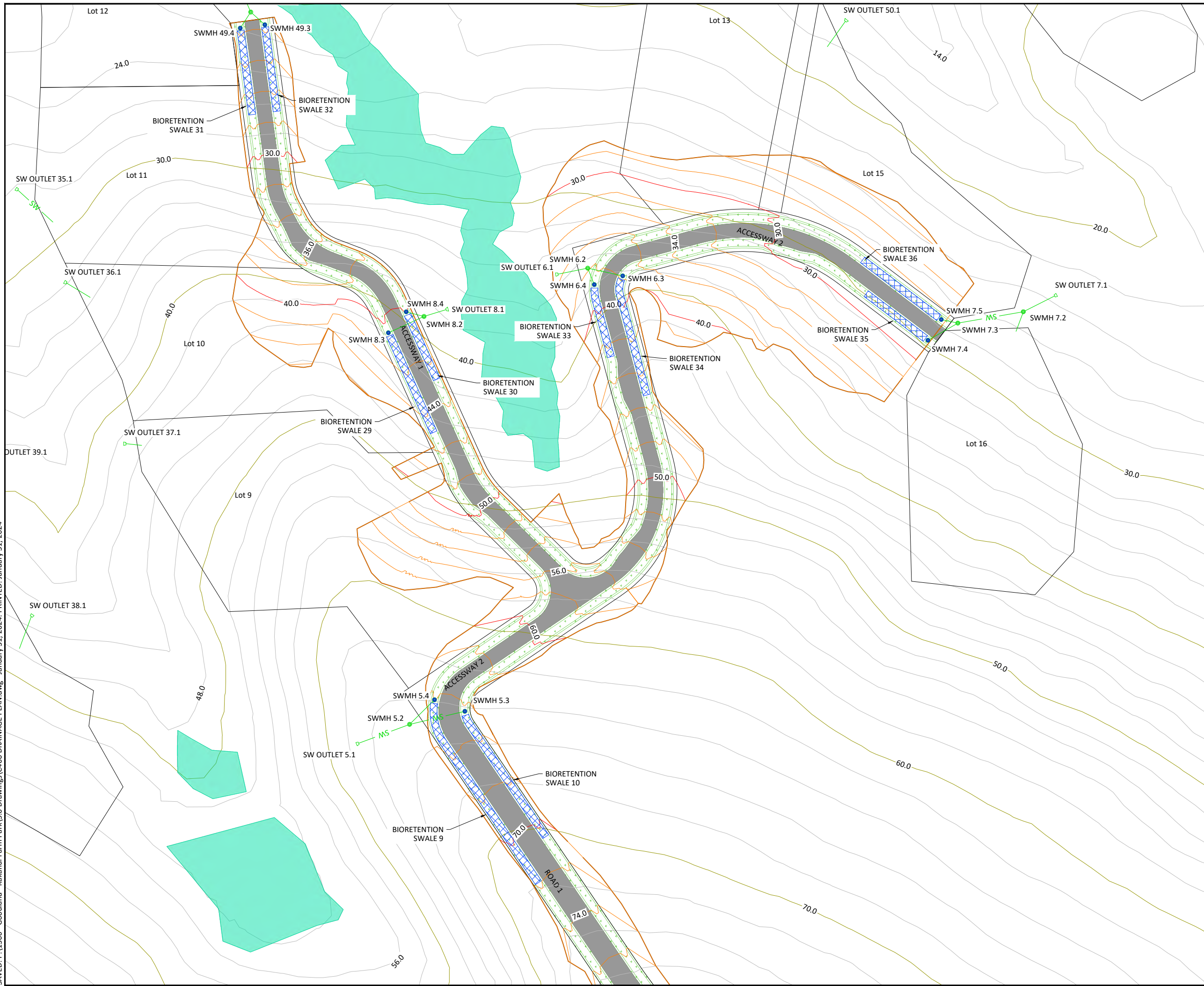
CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
DRAINAGE PLAN - SHEET 5

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC	A3	1:1000
PROJECT No	DRAWING No	REVISION	
1366	C405	D	

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LEGEND

- SITE BOUNDARY
- 50.0 PROPOSED CONTOURS
- 52.0 EXISTING CONTOURS
- EARTHWORKS EXTENT
- █ EXISTING NATURAL WETLAND
- █ EXISTING ARTIFICIAL WETLAND
- PROPOSED STORMWATER PIPE NETWORK
- PROPOSED SCRUFFY DOME
- SW PROPOSED CULVERT
- ▨ BIORETENTION SWALE
- ▨ GRASSED TABLE DRAIN

NOTES:

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CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
D	FORMAL S92 RESPONSE	ZY	31/01/24
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL ISSUE	VC	24/11/21

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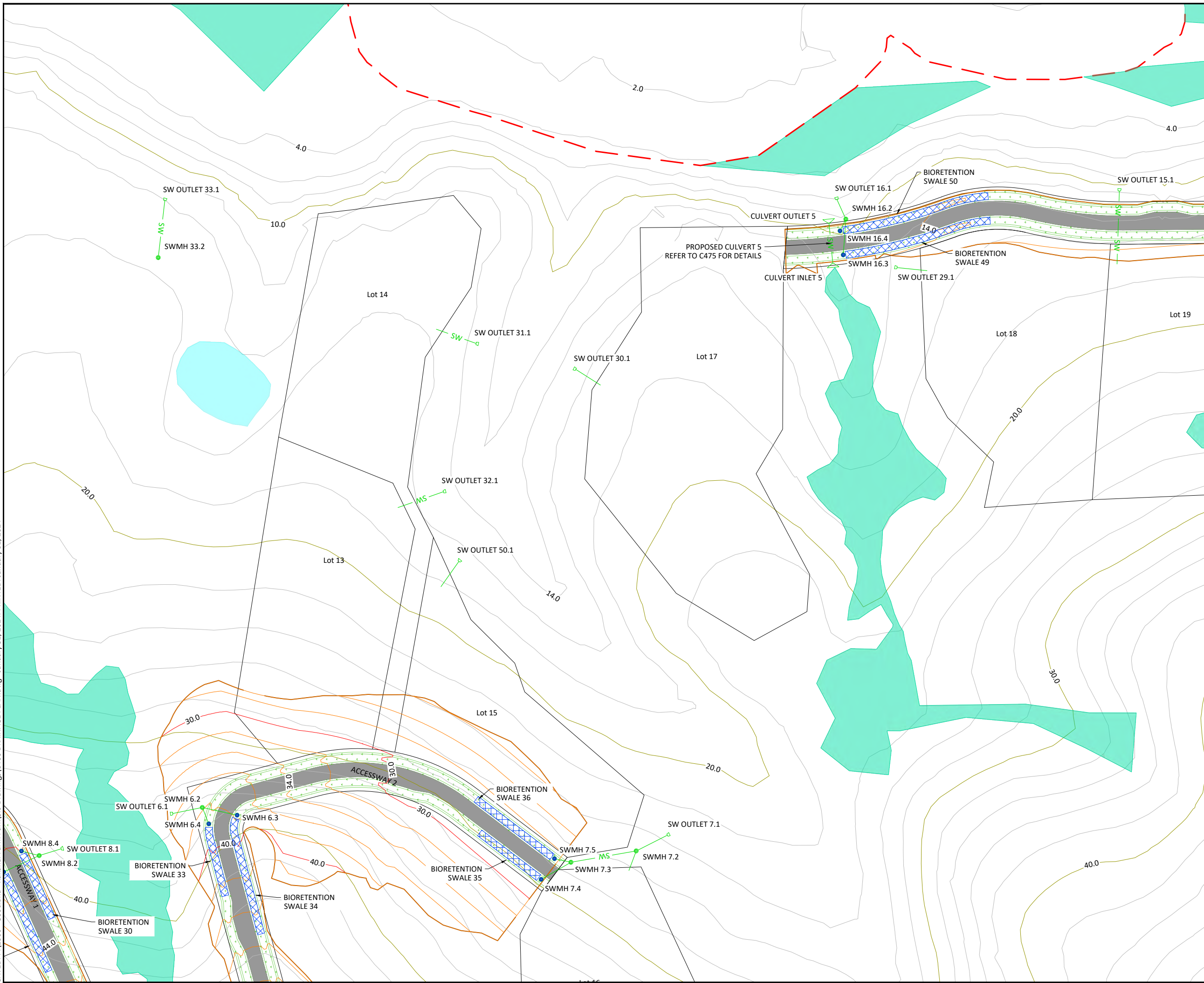
CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
DRAINAGE PLAN - SHEET 6

DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC	SCALE	A3 1:1000
PROJECT No	1366	DRAWING No	C406
REVISION	D		

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LEGEND

- SITE BOUNDARY
- 50.0 PROPOSED CONTOURS
- 52.0 PROPOSED CONTOURS
- 50.0 EXISTING CONTOURS
- 52.0 EXISTING CONTOURS
- EARTHWORKS EXTENT
- █ EXISTING NATURAL WETLAND
- █ EXISTING ARTIFICIAL WETLAND
- PROPOSED STORMWATER PIPE NETWORK
- PROPOSED SCRUFFY DOME
- SW PROPOSED CULVERT
- ▨ BIORETENTION SWALE
- ▨ GRASSED TABLE DRAIN

NOTES:

1. APPROVED HARDFILL SHALL BE USED WHEN BACKFILLING ALL ROAD CROSSINGS.
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CONSENT ISSUE

D	FORMAL S92 RESPONSE	ZY	31/01/24
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL ISSUE	VC	24/11/21
REVISION	CHANGES	CHECKED	DATE

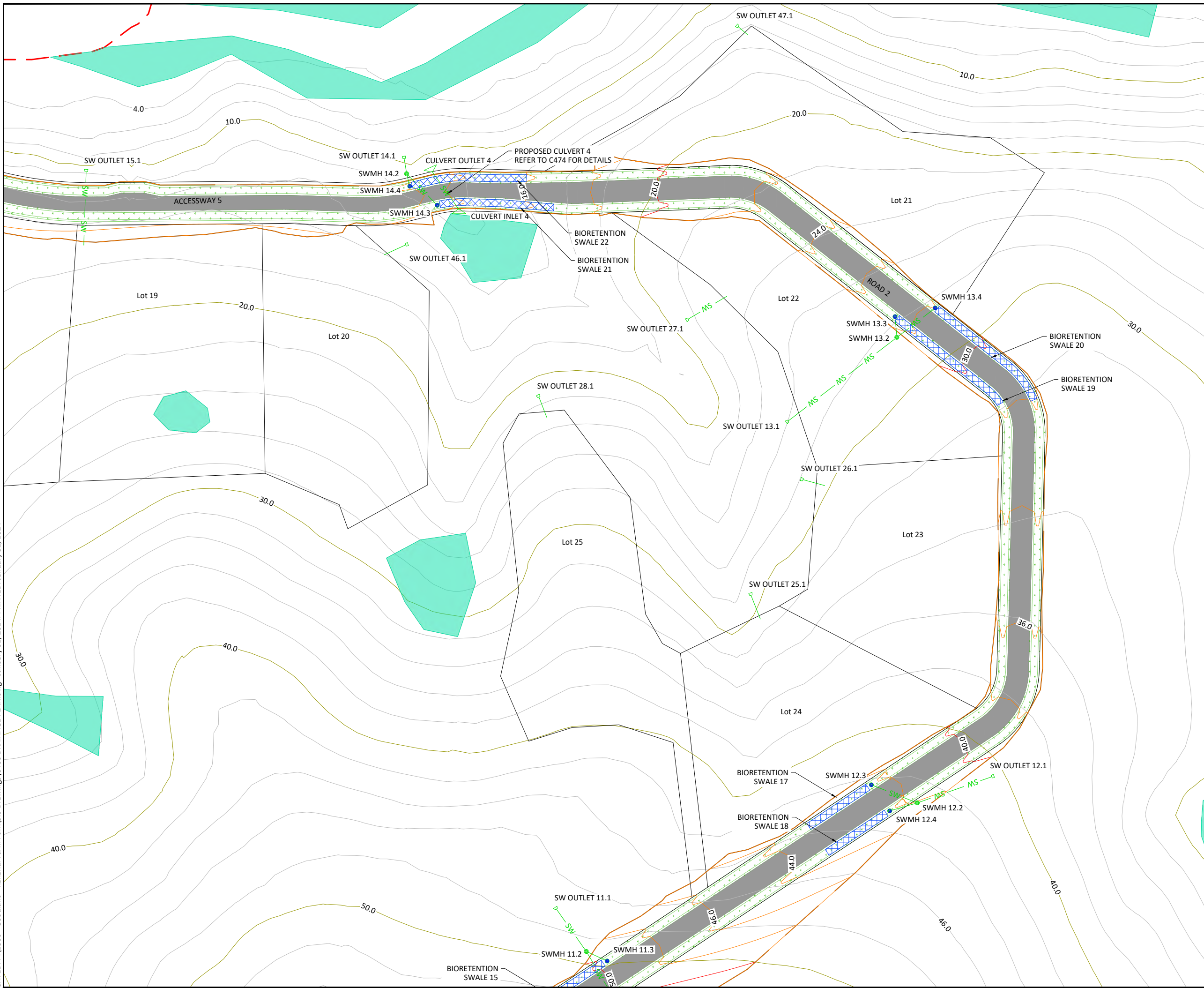
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CLIENT		
ABIB (OAMARU) LTD		
PROJECT		
GOODLAND COASTAL FARM		
TITLE		
DRAINAGE PLAN - SHEET 7		
DRAWN	MD	SCALE A1 1:500
DESIGNED	VC	A3 1:1000
PROJECT No	DRAWING No	REVISION
1366	C407	D

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LEGEND

- SITE BOUNDARY
- 50.0 PROPOSED CONTOURS
- 52.0 PROPOSED CONTOURS
- 50.0 EXISTING CONTOURS
- 52.0 EXISTING CONTOURS
- EARTHWORKS EXTENT
- EXISTING NATURAL WETLAND
- EXISTING ARTIFICIAL WETLAND
- PROPOSED STORMWATER PIPE NETWORK
- PROPOSED SCRUFFY DOME
- SW PROPOSED CULVERT
- ▨ BIORETENTION SWALE
- ▨ GRASSED TABLE DRAIN

NOTES:

1. APPROVED HARDFILL SHALL BE USED WHEN BACKFILLING ALL ROAD CROSSINGS.
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3. 7MPa SCORIA CONCRETE BEDDING TO BE USED WHERE GRADIENTS EXCEED 10%.
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CONSENT ISSUE

D	FORMAL S92 RESPONSE	ZY	31/01/24
B	INFORMAL S92 RESPONSE	ZY	21/07/23
A	ORIGINAL ISSUE	VC	24/11/21
REVISION	CHANGES	CHECKED	DATE

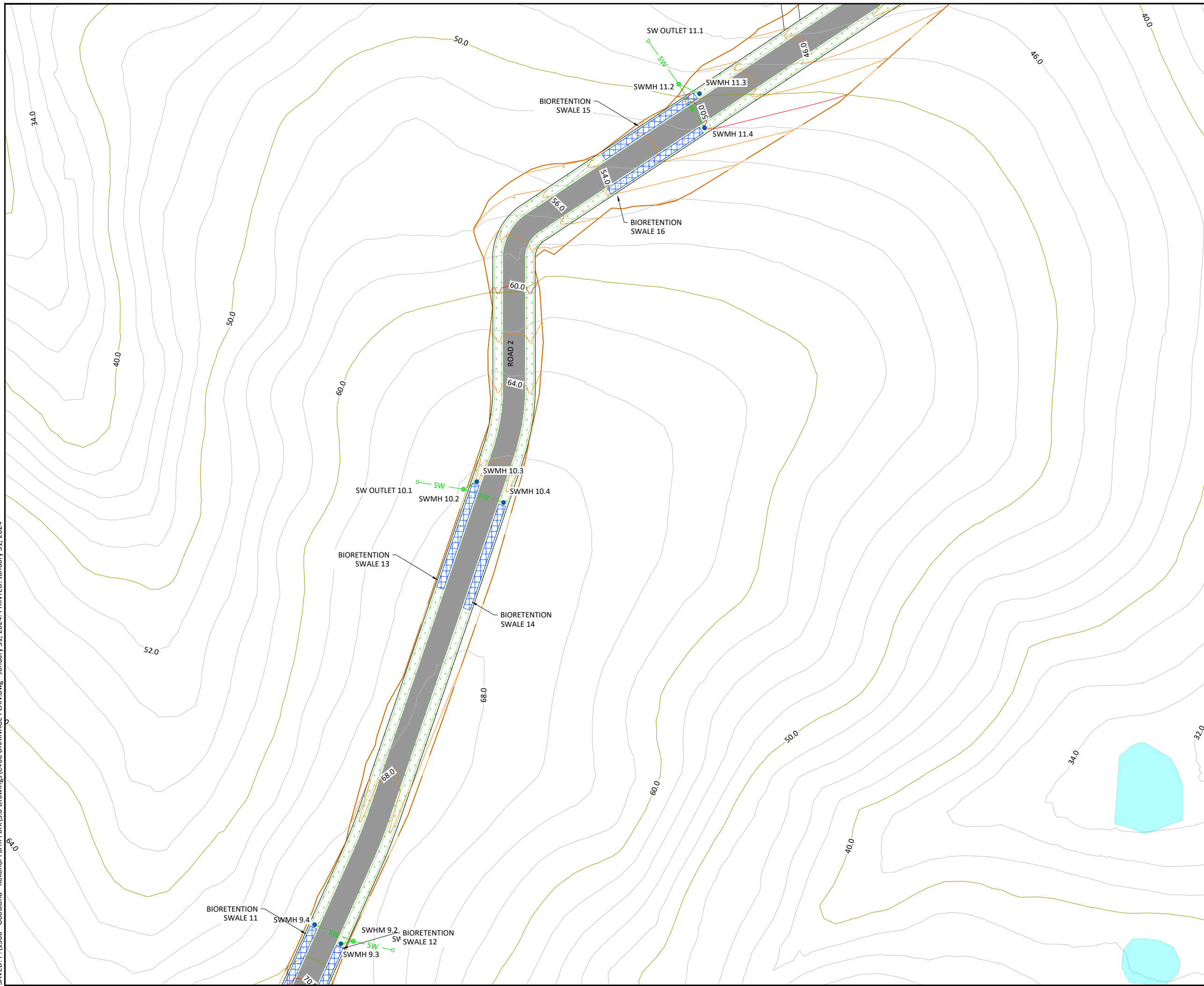
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CLIENT	ABIB (OAMARU) LTD		
PROJECT	GOODLAND COASTAL FARM		
TITLE	DRAINAGE PLAN - SHEET 8		
DRAWN	MD	SCALE	A1 1:500
DESIGNED	VC	SCALE	A3 1:1000
PROJECT No	1366	DRAWING No	C408
		REVISION	D

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LEGEND

- SITE BOUNDARY
- 50.0 PROPOSED CONTOURS
- 52.0 PROPOSED CONTOURS
- 50.0 EXISTING CONTOURS
- 52.0 EXISTING CONTOURS
- EARTHWORKS EXTENT
- EXISTING NATURAL WETLAND
- EXISTING ARTIFICIAL WETLAND
- ○ — PROPOSED STORMWATER PIPE NETWORK
- ○ — PROPOSED SCRUFFY DOME
- SW — PROPOSED CULVERT
- BIORETENTION SWALE
- GRASSED TABLE DRAIN

NOTES:

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3. 7MPa SCORIA CONCRETE BEDDING TO BE USED WHERE GRADIENTS EXCEED 10%.
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CONSENT ISSUE

D	FORMAL S92 RESPONSE	ZY	31/01/24
B	INFORMAL S92 RESPONSE	ZY	22/07/23
A	ORIGINAL ISSUE	VC	25/11/21
REVISION	CHANGES	CHECKED	DATE

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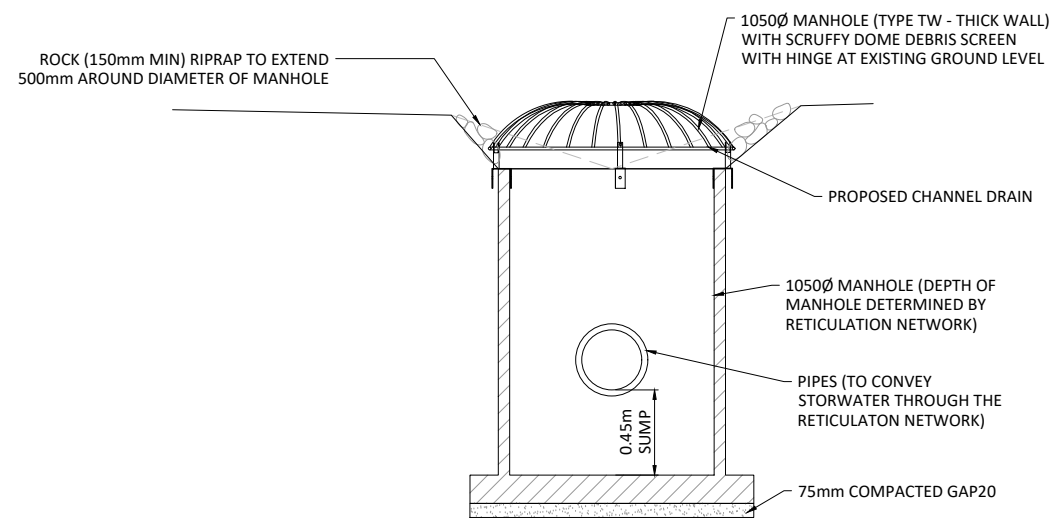
CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

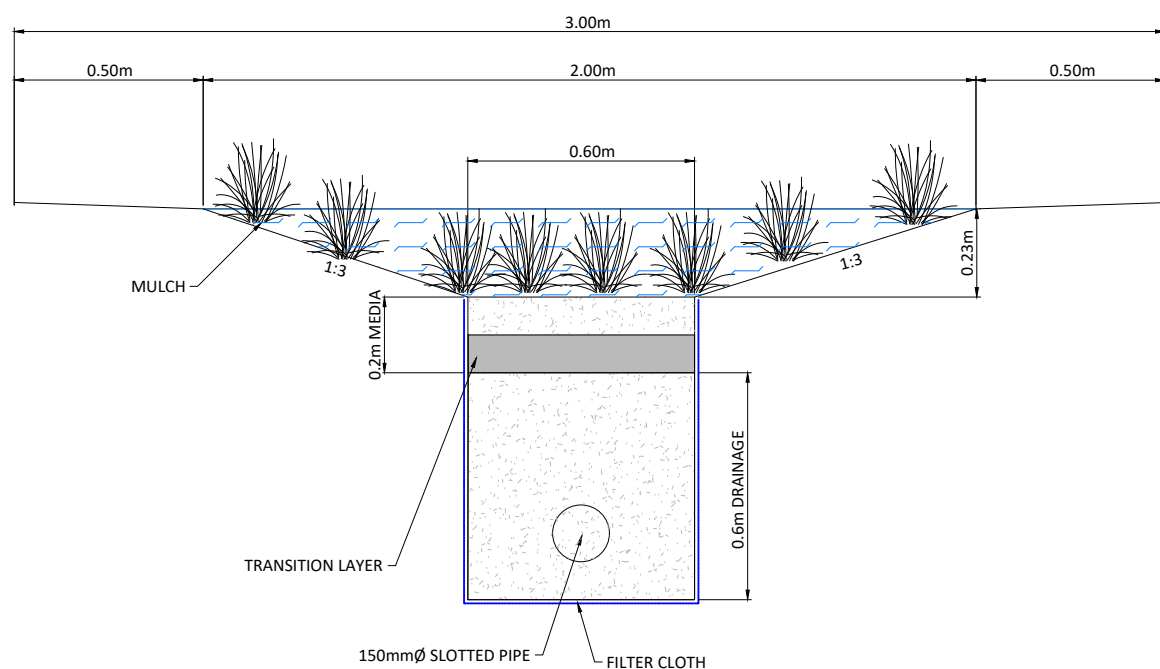
TITLE
DRAINAGE PLAN - SHEET 9

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DESIGNED	VC	A3	1:1000
PROJECT No	DRAWING No	REVISION	
1366	C409	D	

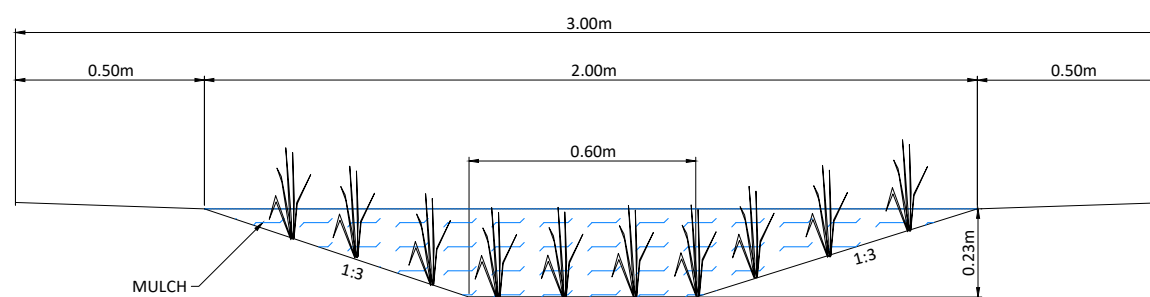
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SCRUFFY DOME CROSS SECTION
SCALE 1:20 (A1), 1:40 (A3)



BIORETENTION SWALE
SCALE 1:10 (A1), 1:20 (A3)



GRASSED TABLE DRAIN
SCALE 1:10 (A1), 1:20 (A3)

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
B	FORMAL S92 RESPONSE	ZY	31/01/24
A	ORIGINAL ISSUE	ZY	21/07/23

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CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
SCRUFFY DOME & TABLE DRAIN DETAILS

DRAWN	TG	SCALE A1 1:20
DESIGNED	TG	A3 1:40
PROJECT No	DRAWING No	REVISION
1366	C450	A

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C451 TABLE DRAIN CROSS SECTION DETAILS.dwg - February 1, 2024. PRINTED: February 1, 2024

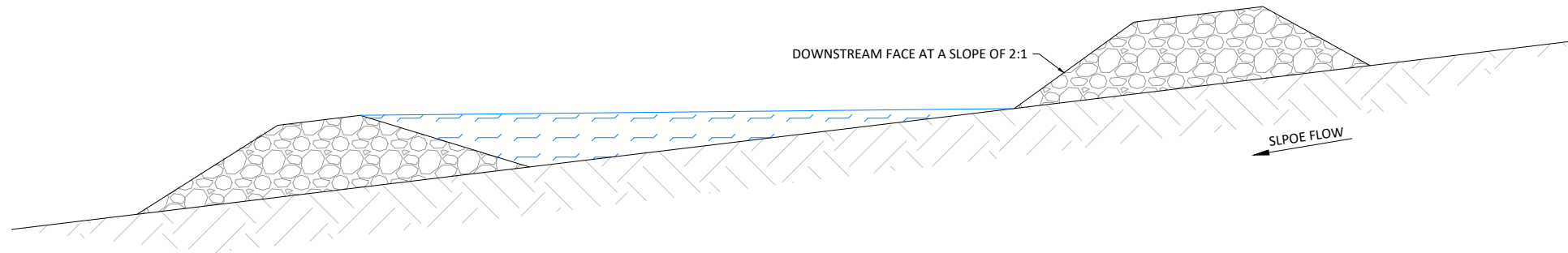
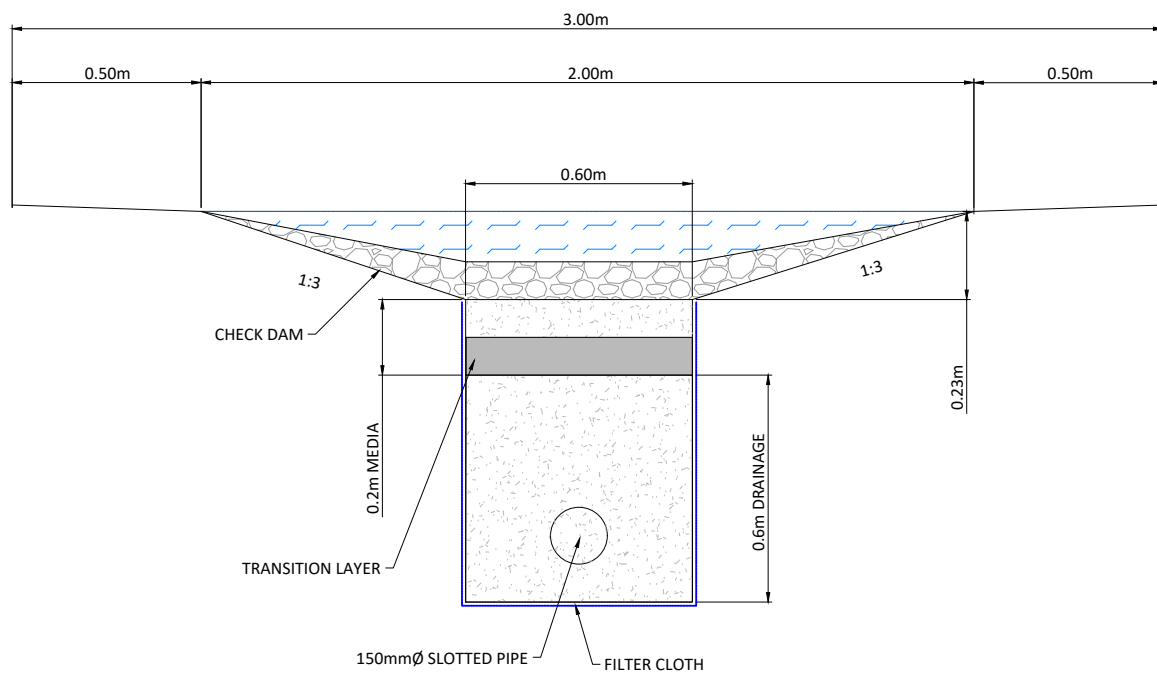


TABLE DRAIN WITH CHECK DAM LONG SECTION
SCALE N.T.S



BIORETENTION SWALE WITH CHECK DAM
SCALE N.T.S

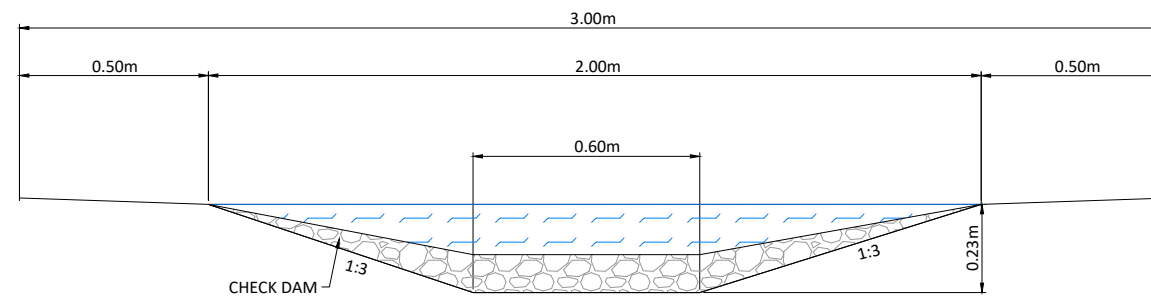


TABLE DRAIN WITH CHECK DAM
SCALE N.T.S

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
B	FORMAL S92 RESPONSE	ZY	31/01/24
A	ORIGINAL ISSUE	ZY	21/07/23

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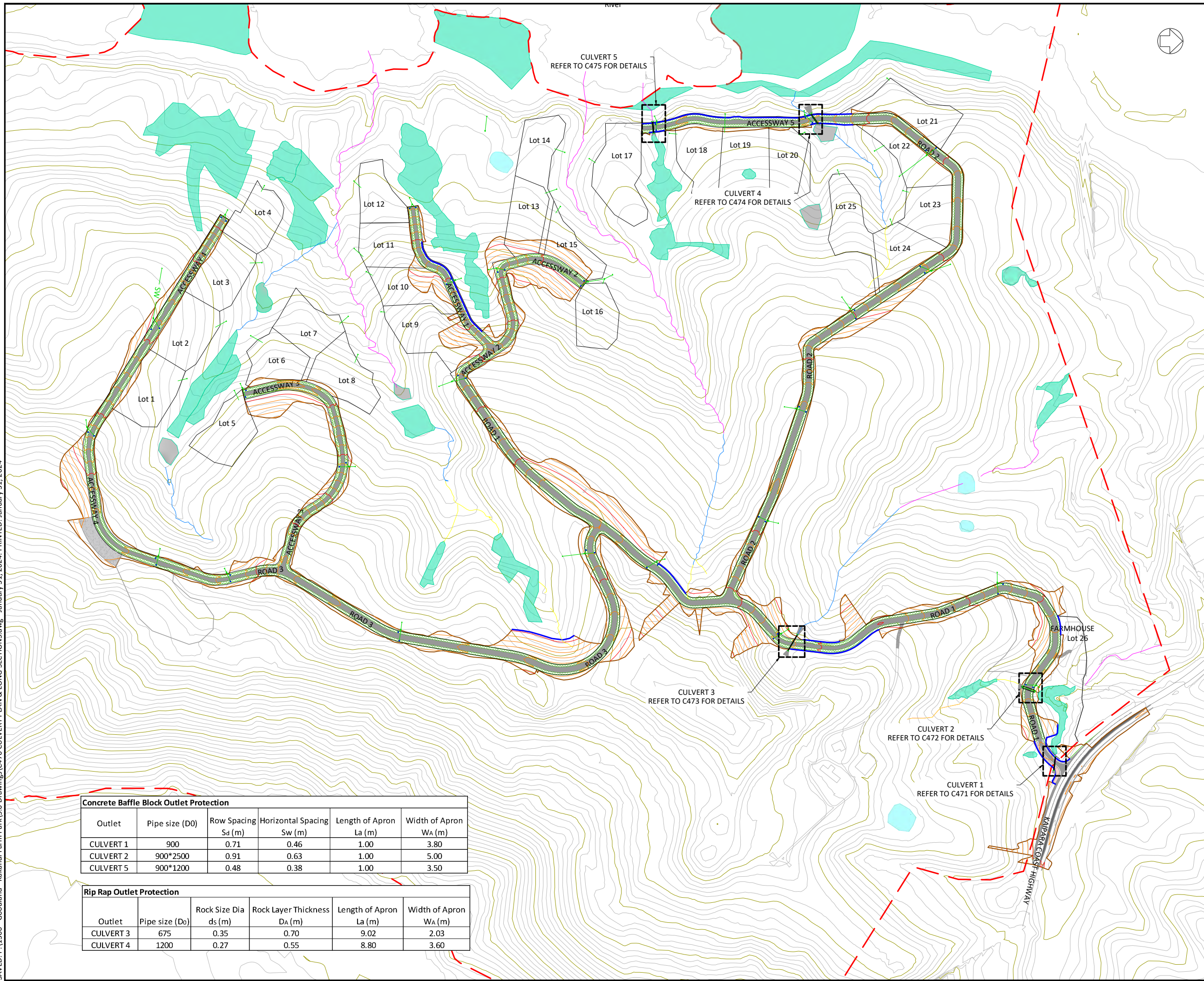
CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
TABLE DRAIN SECTIONS

DRAWN	TG	SCALE A1 NTS
DESIGNED	TG	A3 NTS
PROJECT No 1366	DRAWING No C451	REVISION A

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C470 CULVERT PLAN & LONG SECTIONS.dwg - January 31, 2024. PRINTED: January 31, 2024



LEGEND	
	SITE BOUNDARY
	PROPOSED CONTOURS
	EXISTING CONTOURS
	EARTHWORKS EXTENT
	EXISTING NATURAL WETLAND
	EXISTING ARTIFICIAL WETLAND
	PROPOSED STORMWATER PIPE NETWORK
	PROPOSED SCRUFFY DOME
	PROPOSED CULVERT

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
B	FORMAL S92 RESPONSE	ZY	31/01/24
A	ORIGINAL ISSUE	ZY	21/07/23

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CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

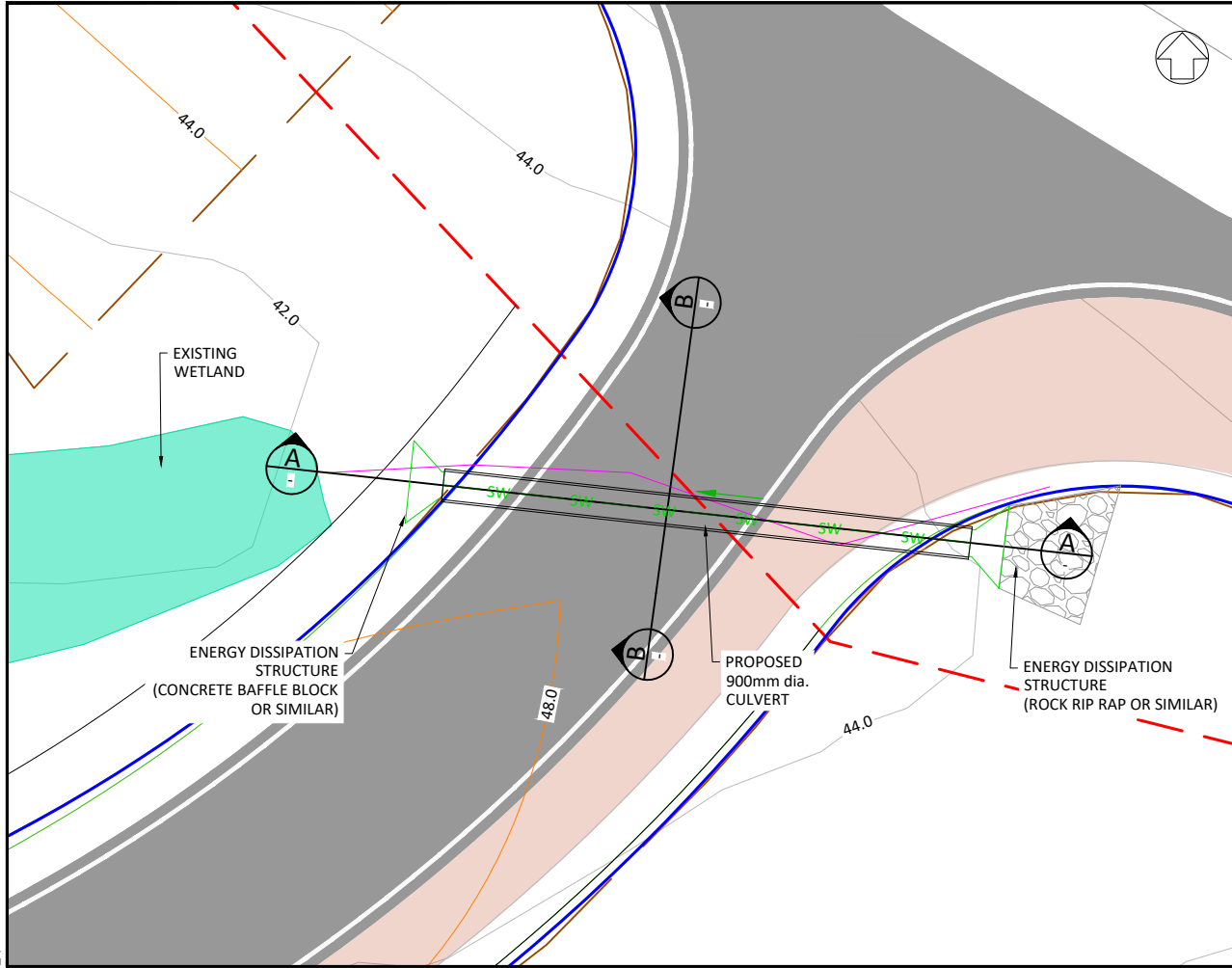
TITLE
CULVERT OVERALL PLAN

DRAWN	MA	SCALE	A1 1:2000
DESIGNED	MA	SCALE	A3 1:4000
PROJECT No	1366	DRAWING No	C470
REVISION	A		

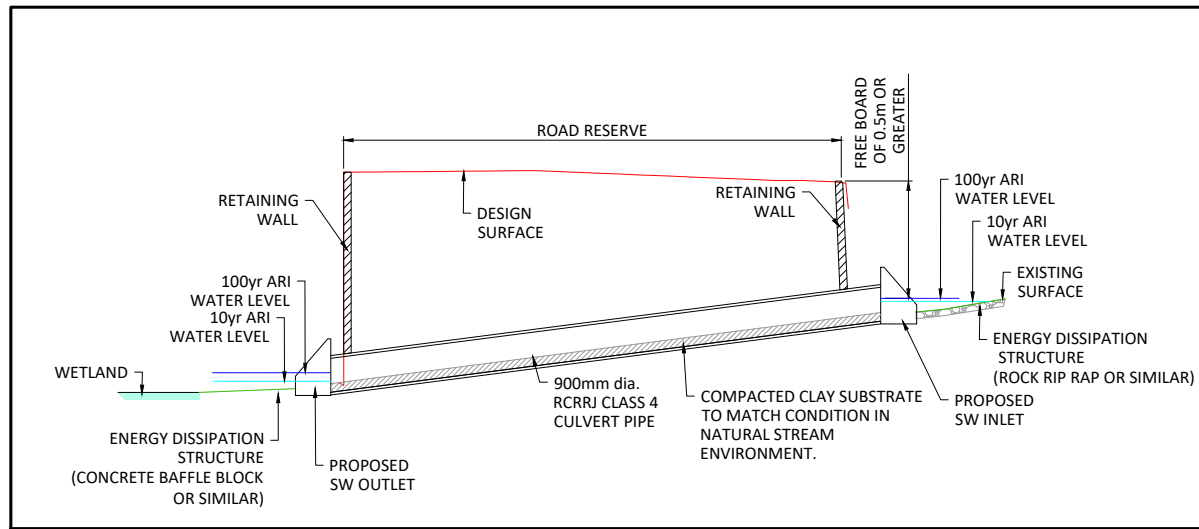
Concrete Baffle Block Outlet Protection					
Outlet	Pipe size (D0)	Row Spacing Sa (m)	Horizontal Spacing Sw (m)	Length of Apron La (m)	Width of Apron Wa (m)
CULVERT 1	900	0.71	0.46	1.00	3.80
CULVERT 2	900*2500	0.91	0.63	1.00	5.00
CULVERT 5	900*1200	0.48	0.38	1.00	3.50

Rip Rap Outlet Protection					
Outlet	Pipe size (Do)	Rock Size Dia ds (m)	Rock Layer Thickness Da (m)	Length of Apron La (m)	Width of Apron Wa (m)
CULVERT 3	675	0.35	0.70	9.02	2.03
CULVERT 4	1200	0.27	0.55	8.80	3.60

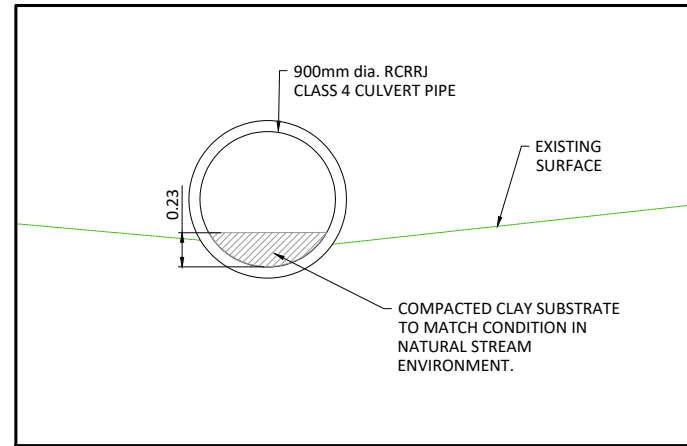
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CULVERT DETAIL PLAN (A1)
SCALE 1:100 (A1)



CULVERT 1 SECTION (A)
SCALE 1:100 (A1)



CULVERT 1 SECTION (B)
SCALE 1:50 (A1)

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
B	FORMAL S92 RESPONSE	ZY	31/01/24
A	ORIGINAL ISSUE	ZY	21/07/23

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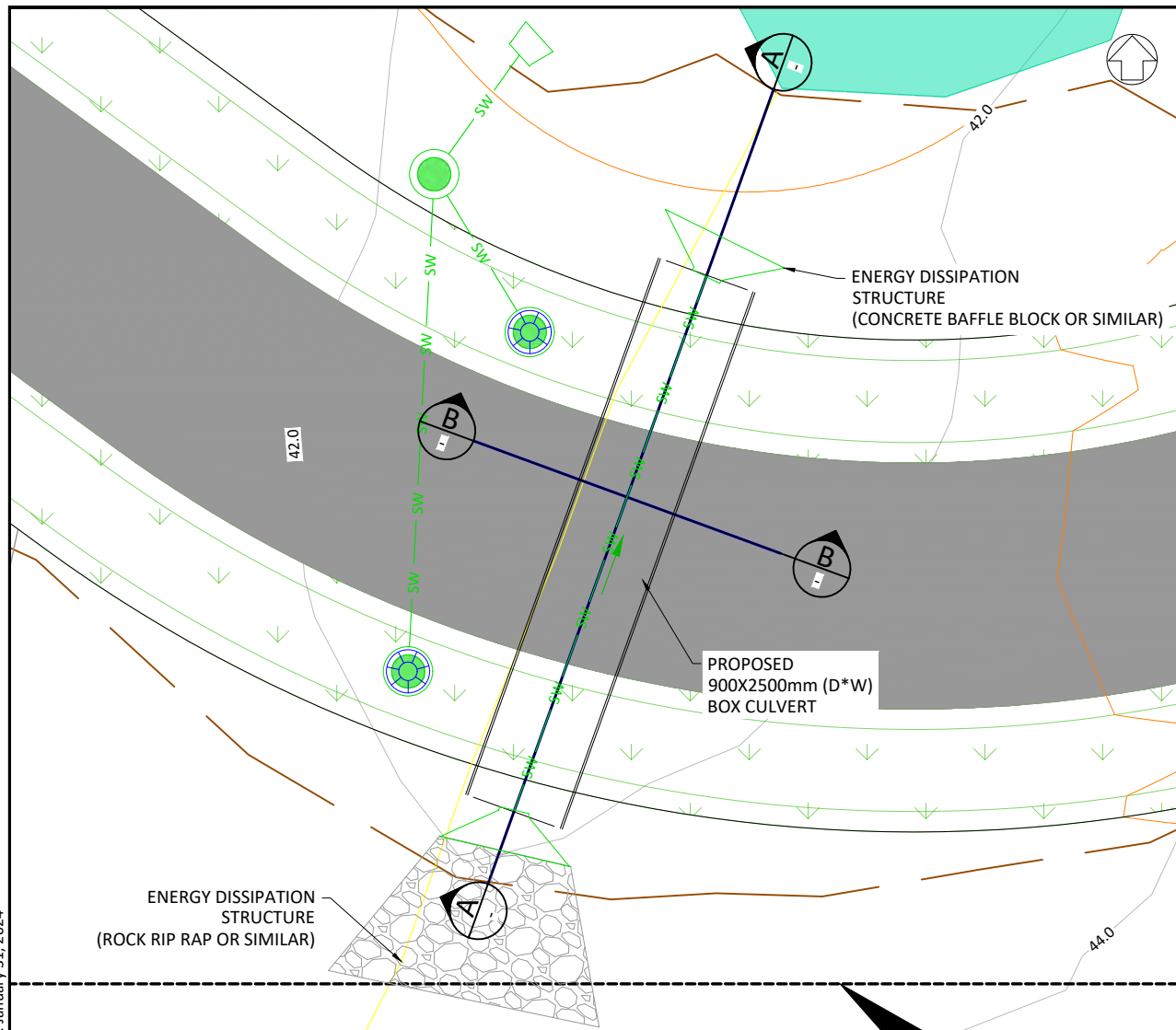
CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

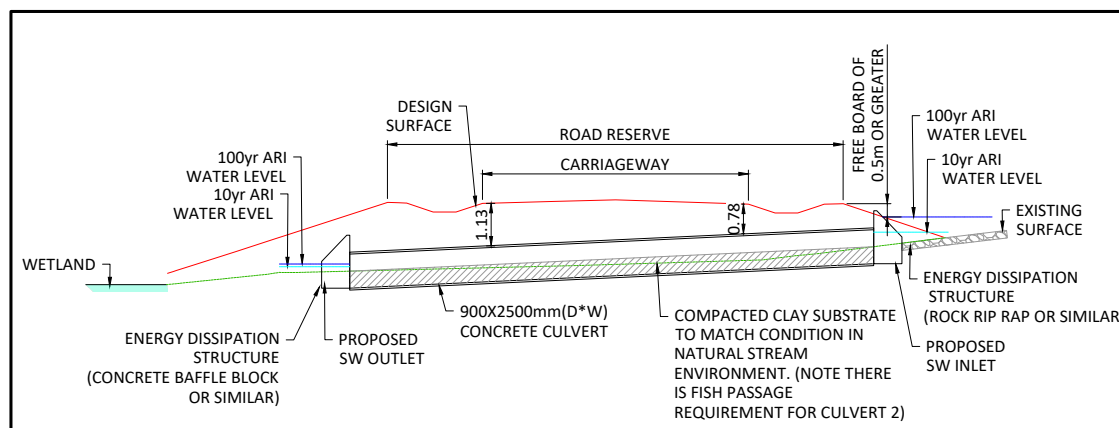
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CULVERT DETAIL PLAN AND LONG SECTION SHEET 1

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DESIGNED	MA	A3	1:200
PROJECT No	DRAWING No	REVISION	
1366	C471	A	

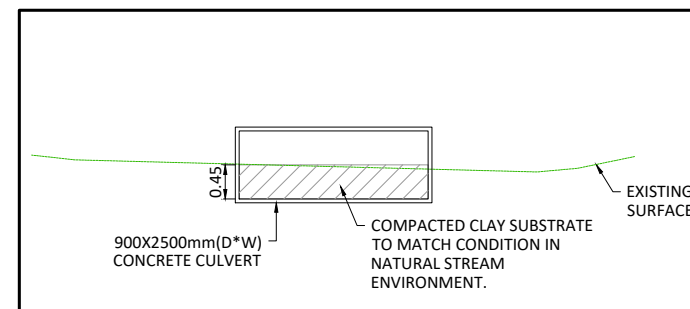
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CULVERT DETAIL PLAN (2)
SCALE 1:100 (A1)



CULVERT 2 SECTION (A)
SCALE 1:100 (A1)



CULVERT 2 SECTION (B)
SCALE 1:50 (A1)

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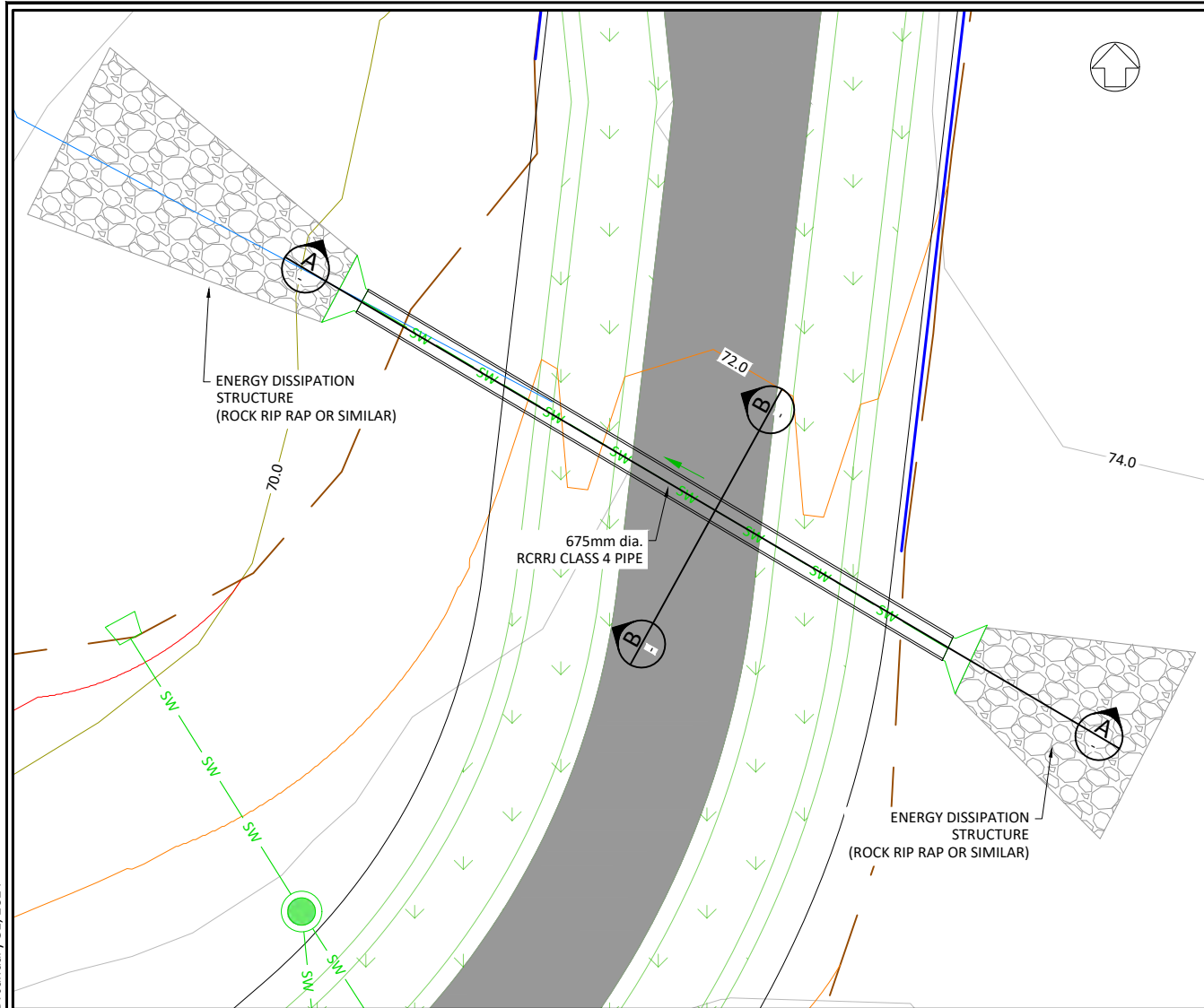
CLIENT
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PROJECT
GOODLAND COASTAL FARM

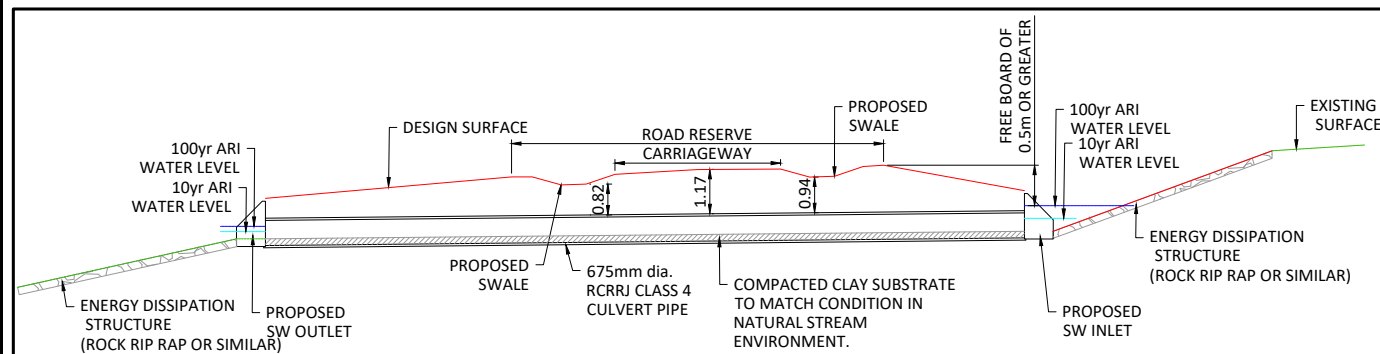
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CULVERT DETAIL PLAN AND LONG SECTION SHEET 2

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DESIGNED	MA		A3 #####
PROJECT No	DRAWING No	REVISION	
1366	C472	A	

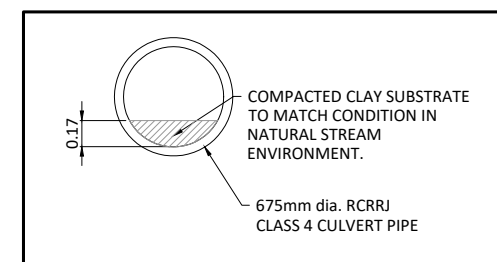
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CULVERT DETAIL PLAN 3
SCALE 1:100 (A1)



CULVERT 3 SECTION A
SCALE 1:100 (A1)



CULVERT 3 SECTION B
SCALE 1:25 (A1)

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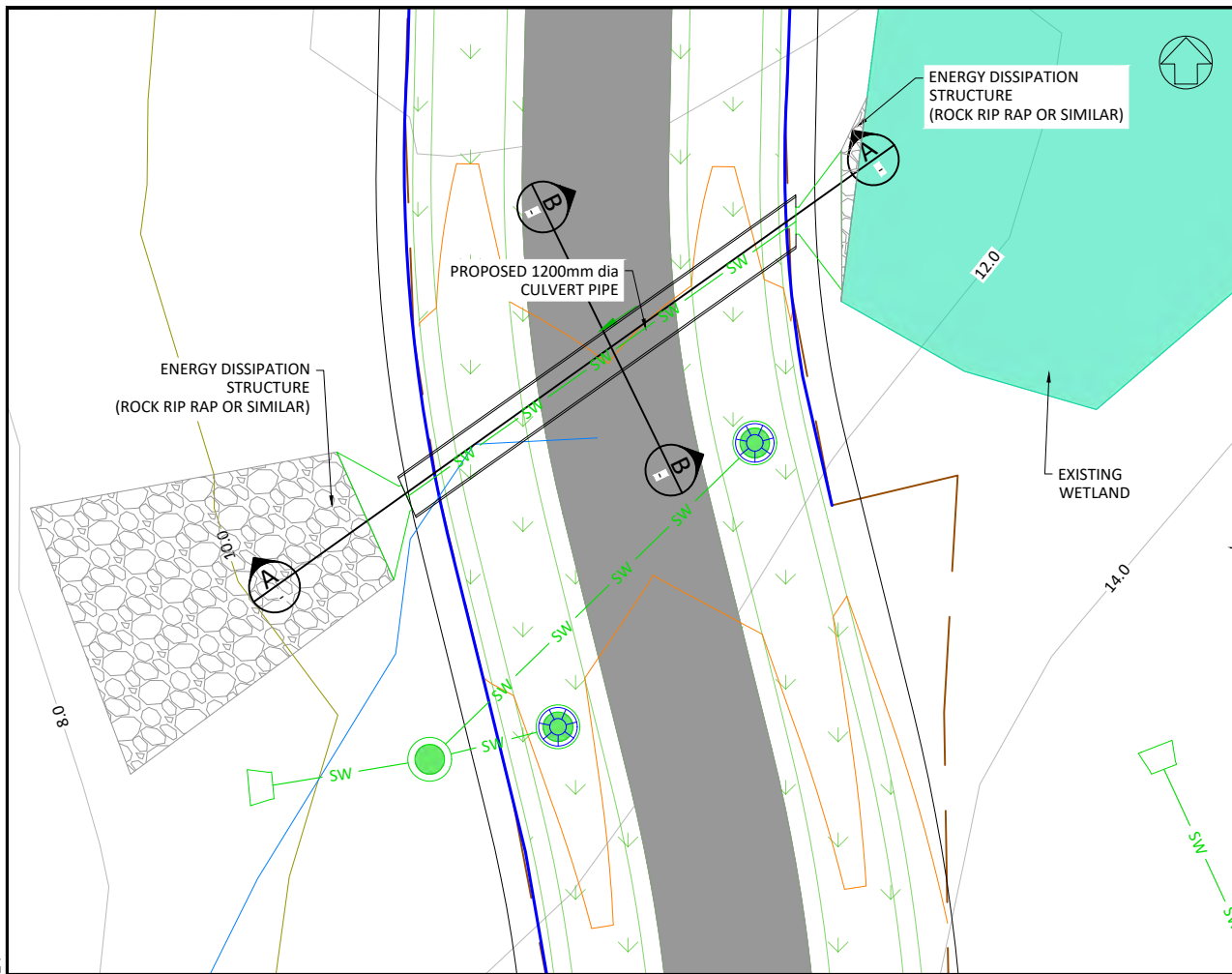
CLIENT
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PROJECT
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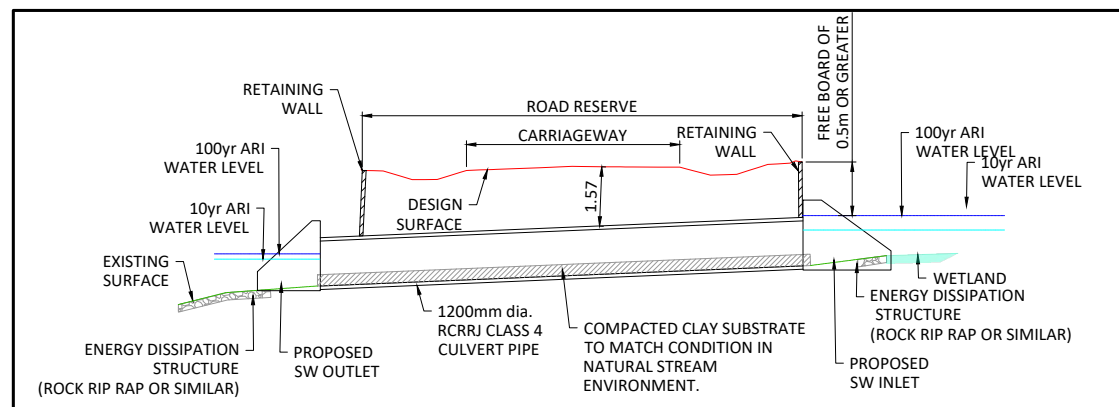
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DESIGNED	MA	A3	1:200
PROJECT No	DRAWING No	REVISION	
1366	C473	A	

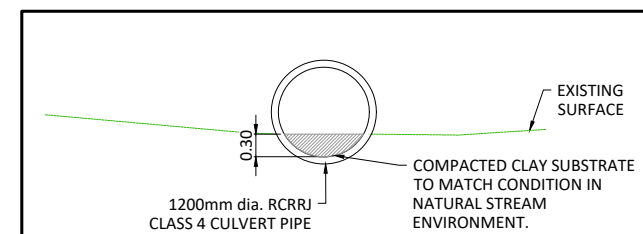
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CULVERT DETAIL PLAN 4
SCALE 1:100 (A1)



CULVERT 4 SECTION A
SCALE 1:100 (A1)



CULVERT 4 SECTION B
SCALE 1:50 (A1)

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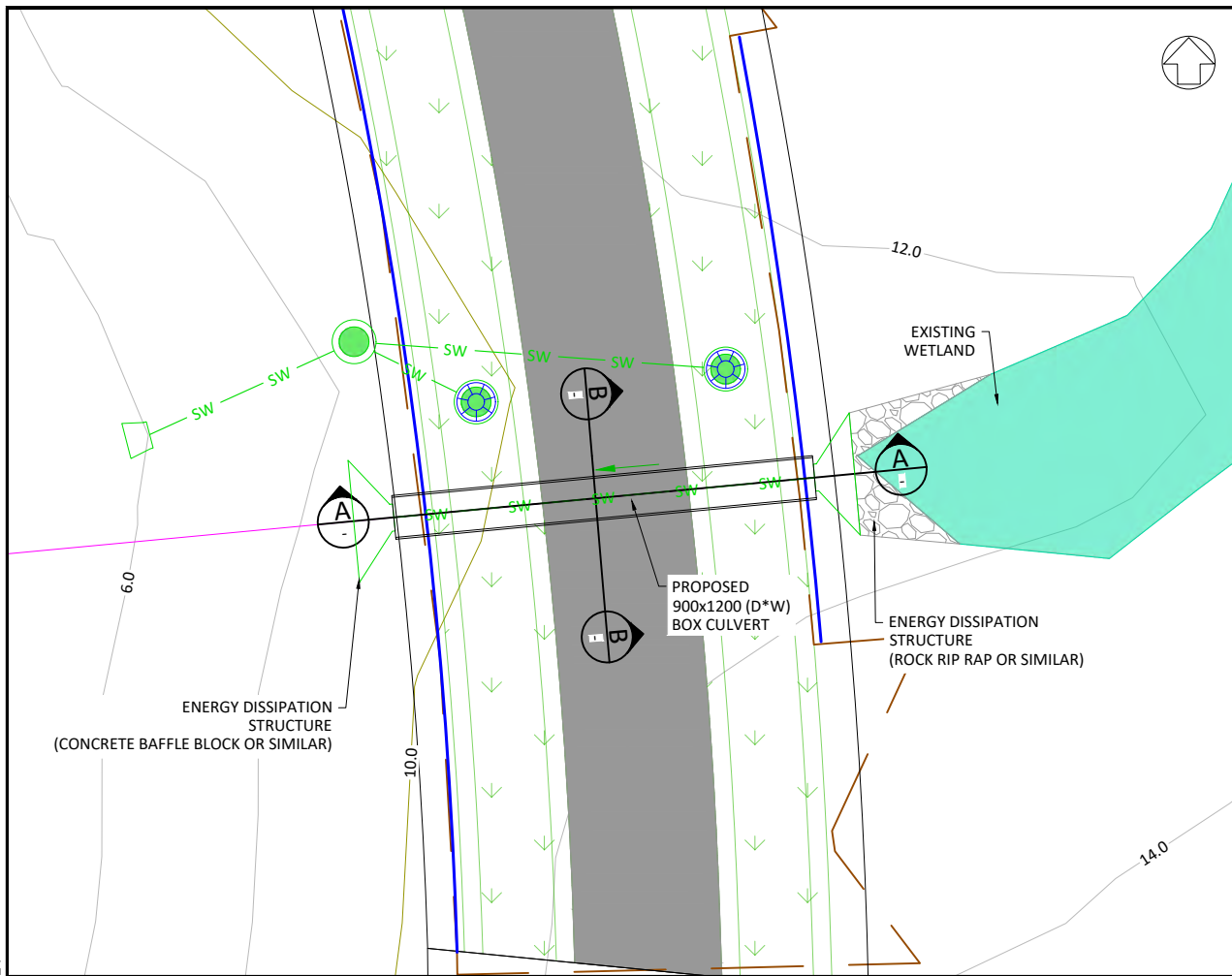
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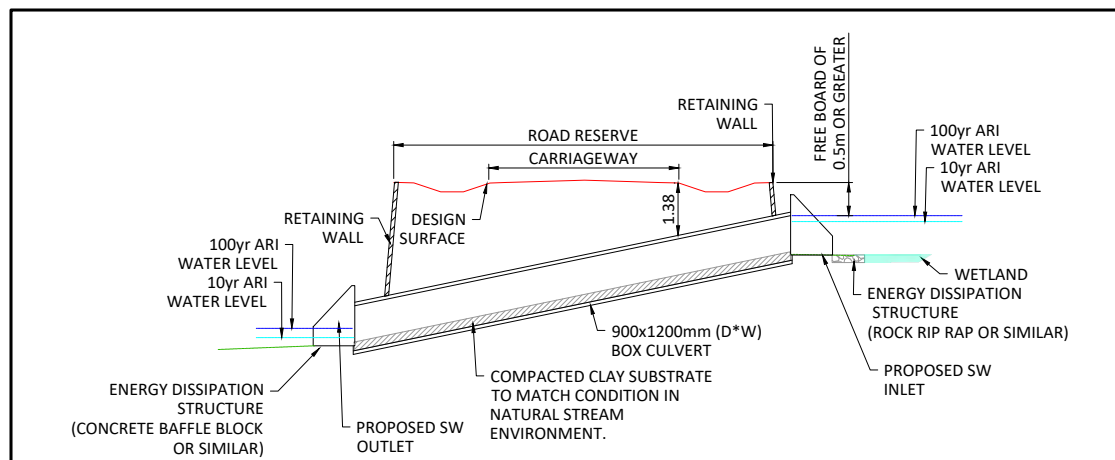
TITLE
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DESIGNED	MA	A1 1:100
PROJECT No	DRAWING No	REVISION
1366	C474	A

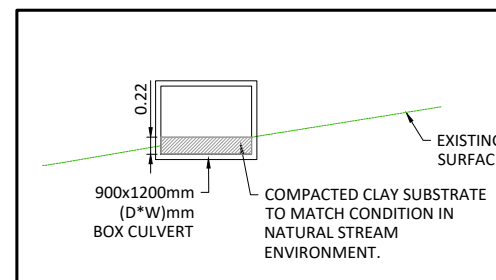
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CULVERT DETAIL PLAN 5
SCALE 1:100 (A1)



CULVERT 5 SECTION A
SCALE 1:100 (A1)



CULVERT 5 SECTION B
SCALE 1:50 (A1)

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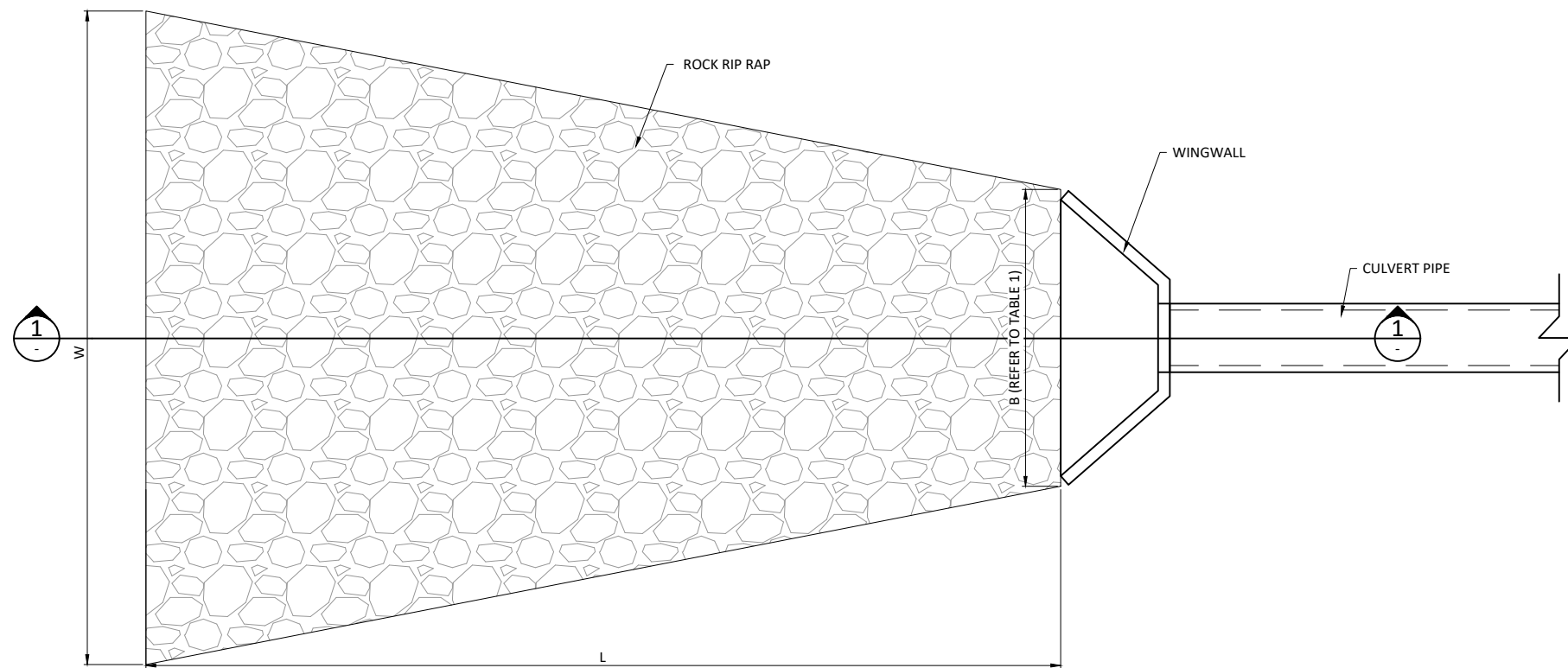
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PROJECT
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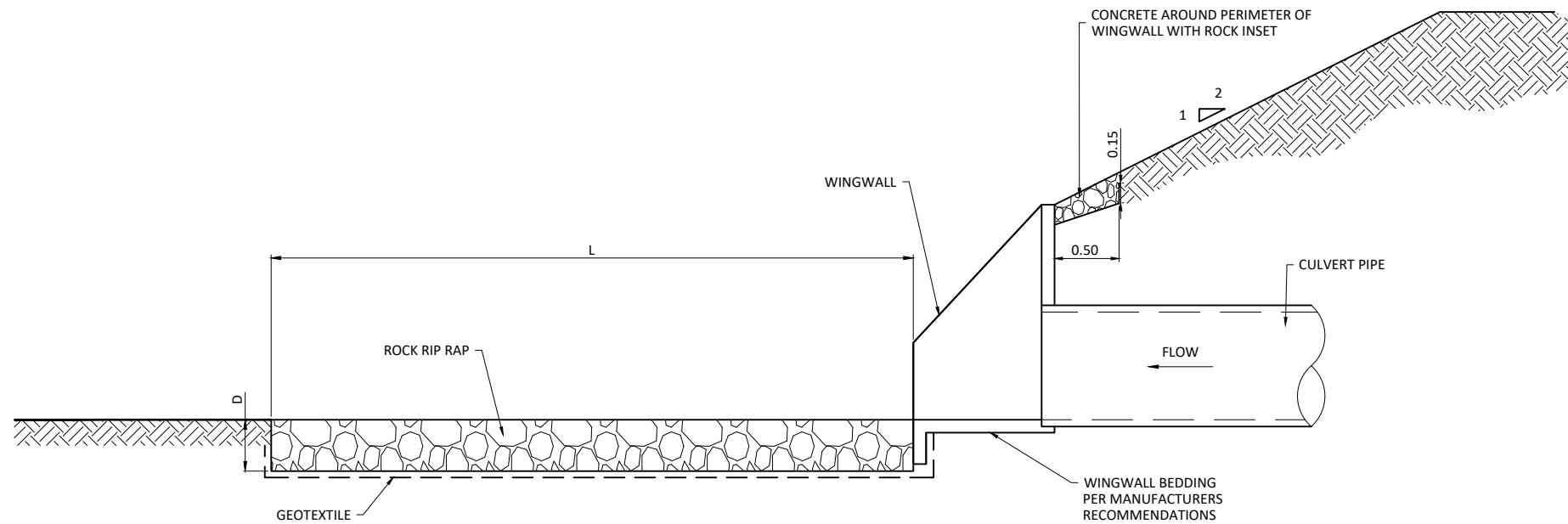
TITLE
CULVERT DETAIL PLAN AND LONG SECTION SHEET 5

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DESIGNED	MA		A3 1:200
PROJECT No	DRAWING No	REVISION	
1366	C475	A	

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C476 ROCK RIP RAP OUTLET DETAILS.dwg - January 31, 2024 - PRINTED: January 31, 2024



CULVERT OUTLET PLAN
SCALE: NTS



CULVERT OUTLET SECTION
SCALE: NTS

2127 Kaipara Coast Highway						
Outlet	Pipe size (D0)	Min. WA (m)	ds (m)	DA (m)	La (m)	
SW OUTLET 1.1	300	0.90	0.13	0.26	3.60	
SW OUTLET 2.1	300	0.90	0.19	0.37	4.40	
SW OUTLET 3.1	300	0.90	0.26	0.52	5.16	
SW OUTLET 4.1	300	0.90	0.27	0.54	5.25	
SW OUTLET 5.1	300	0.90	0.07	0.14	2.29	
SW OUTLET 6.1	300	0.90	0.28	0.56	5.32	
SW OUTLET 7.1	300	0.90	0.21	0.42	4.67	
SW OUTLET 8.1	300	0.90	0.14	0.27	3.73	
SW OUTLET 9.1	300	0.90	0.16	0.31	4.03	
SW OUTLET 10.1	300	0.90	0.07	0.15	2.40	
SW OUTLET 11.1	300	0.90	0.22	0.43	4.73	
SW OUTLET 12.1	300	0.90	0.09	0.17	2.72	
SW OUTLET 13.1	300	0.90	0.07	0.14	2.29	
SW OUTLET 14.1	300	0.90	0.30	0.60	5.47	
SW OUTLET 16.1	300	0.90	0.25	0.50	5.07	
SW OUTLET 17.1	300	0.90	0.15	0.31	4.00	
SW OUTLET 18.1	300	0.90	0.23	0.46	4.87	
SW OUTLET 19.1	300	0.90	0.07	0.15	2.35	
SW OUTLET 20.1	300	0.90	0.08	0.16	2.52	
SW OUTLET 21.1	300	0.90	0.18	0.36	4.34	
SW OUTLET 22.1	300	0.90	0.24	0.49	5.00	
SW OUTLET 23.1	300	0.90	0.05	0.09	1.29	
SW OUTLET 24.1	300	0.90	0.23	0.47	4.91	
SW OUTLET 48.1	300	0.90	0.09	0.18	2.74	
SW OUTLET 49.1	300	0.90	0.07	0.15	2.33	

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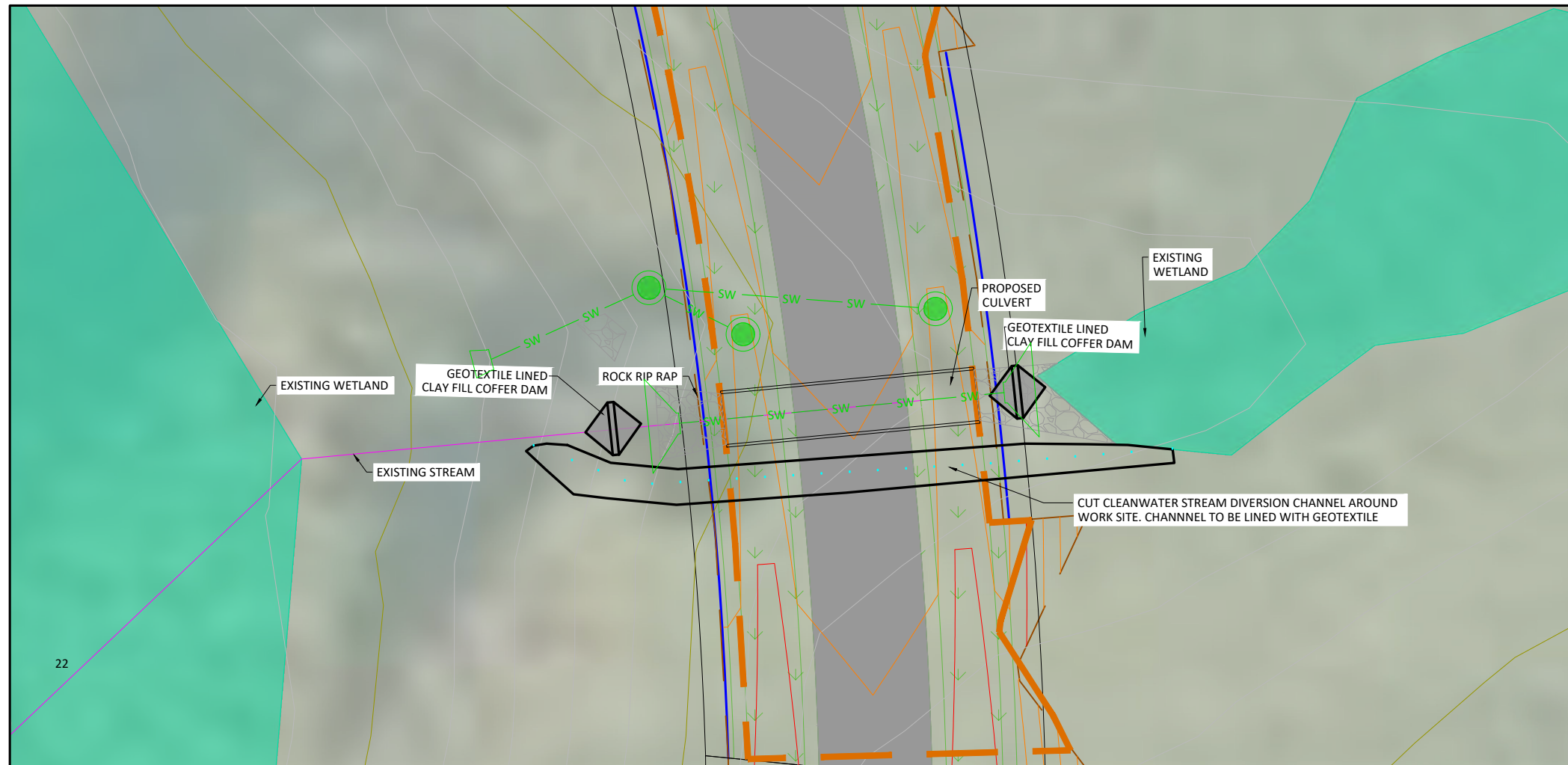
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PROJECT
GOODLAND COASTAL FARM

TITLE
ROCK RIP RAP AND OUTLET DETAILS

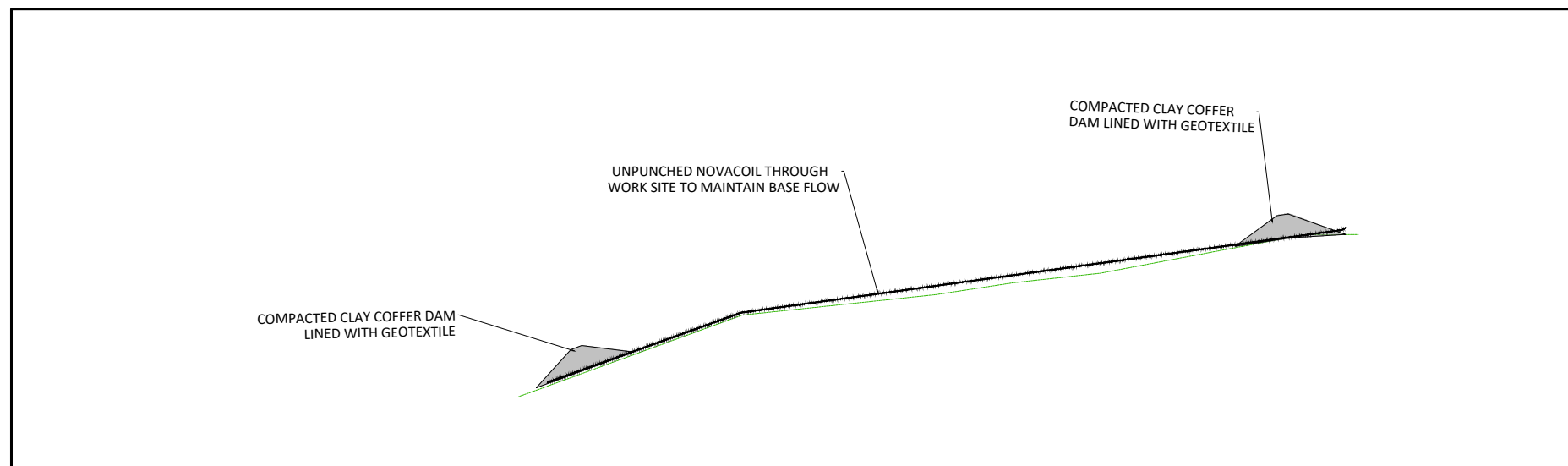
DRAWN	TG	SCALE A1 1:25
DESIGNED	TG	A3 1:50
PROJECT No 1366	DRAWING No C476	REVISION A

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C477 TEMPORARY STREAM DIVERSION WORKS.dwg - January 30, 2024. PRINTED: February 1, 2024



PROPOSED TEMPORARY STREAM DIVERSION

SCALE : A1 @ 1:100 & A3 @ 1:200



PROPOSED COFFER DAM INSTALLATION

SCALE : A1 @ 1:50 & A3 @ 1:100

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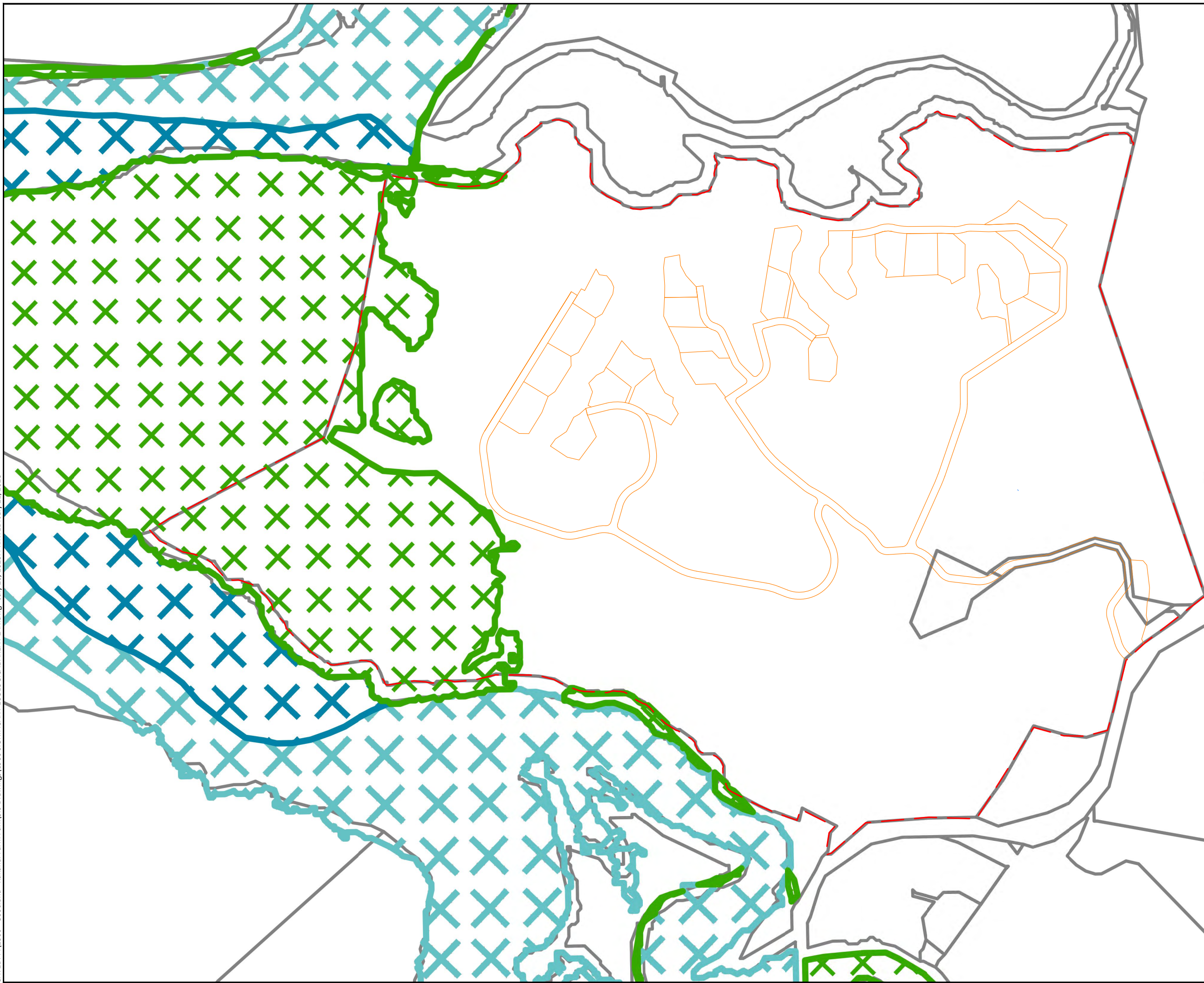
CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
TEMPORARY STREAM DIVERSION WORKS

DRAWN	TG	SCALE A1 1:100
DESIGNED	TG	A3 1:200
PROJECT No 1366	DRAWING No C477	REVISION A

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C900 SIGNIFICANT ECOLOGICAL AREA PLAN.dwg - July 20, 2023. PRINTED: July 21, 2023



LEGEND

- - - - SITE BOUNDARY
- EXISTING BOUNDARIES
- PROPOSED LOT AND ROAD BOUNDARIES
- + + + + TERRESTRIAL [RP/DP]
- + + + + MARINE 1 [RCP]
- + + + + MARINE 2 [RCP]

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PROJECT

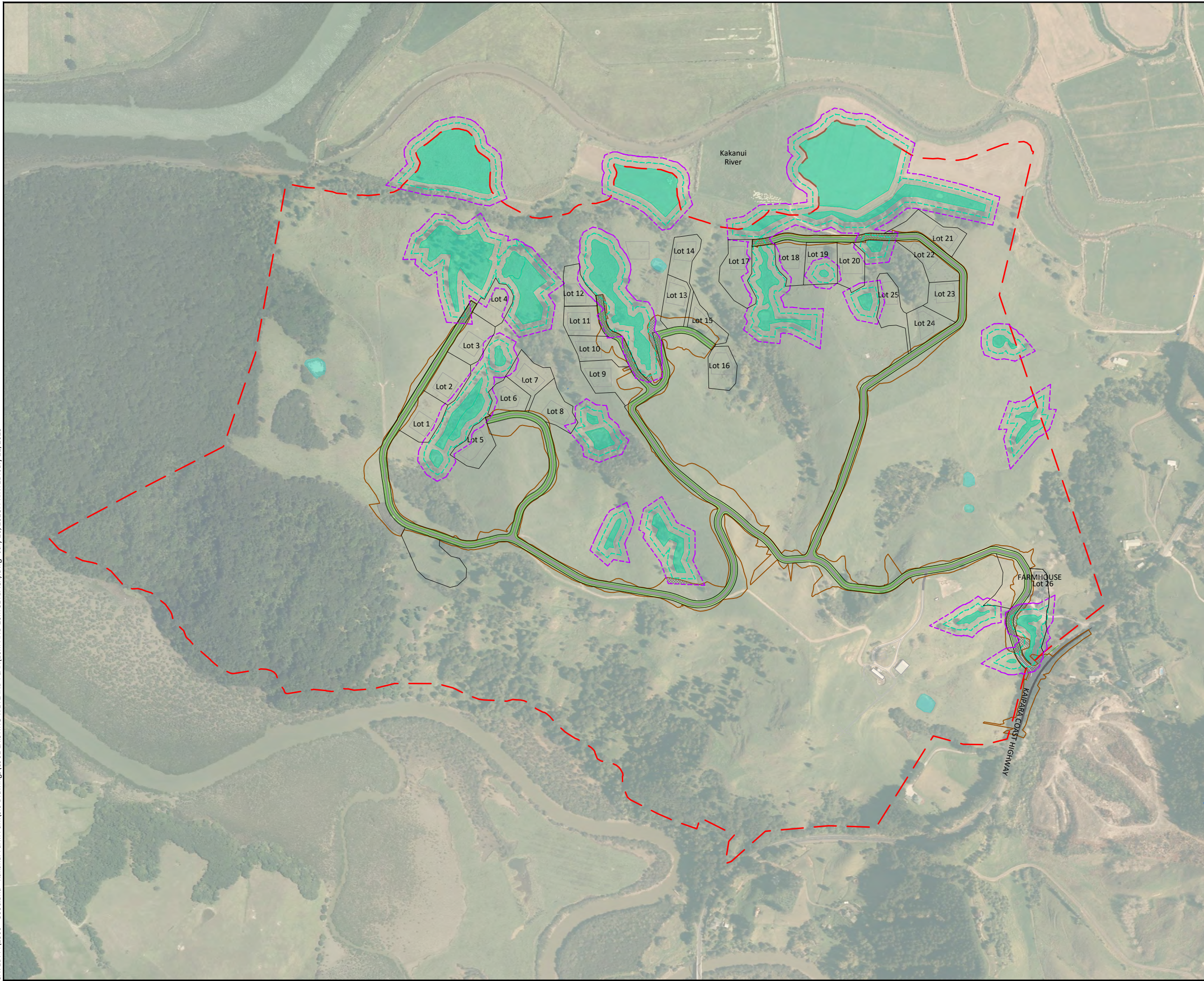
GOODLAND COASTAL FARM

TITLE

SIGNIFICANT ECOLOGICAL
AREA PLAN

DRAWN	TG	SCALE	A1 1:3000
DESIGNED	TG		A3 1:6000
PROJECT No	DRAWING No	REVISION	
1366	C900	A	

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C901 EXISTING WETLAND PLAN(10m AND 20m SETBACK).dwg - July 20, 2023 - PRINTED: July 21, 2023



LEGEND

- SITE BOUNDARY
- PROPOSED LOT AND ROAD BOUNDARIES
- PROPOSED BUILDING PLATFORM
- EARTHWORK EXTENT
- NATURAL WETLAND
- MANMADE WETLAND
- 10m SETBACK FROM NATURAL WETLAND
- 20m SETBACK FROM NATURAL WETLAND
- OVERLAY BETWEEN 10m SETBACK FROM NATURAL WETLAND AND EARTHWORKS EXTENT AREA: 1629m²
- OVERLAY BETWEEN 10-20m SETBACK FROM NATURAL WETLAND AND EARTHWORKS EXTENT AREA: 5278m²

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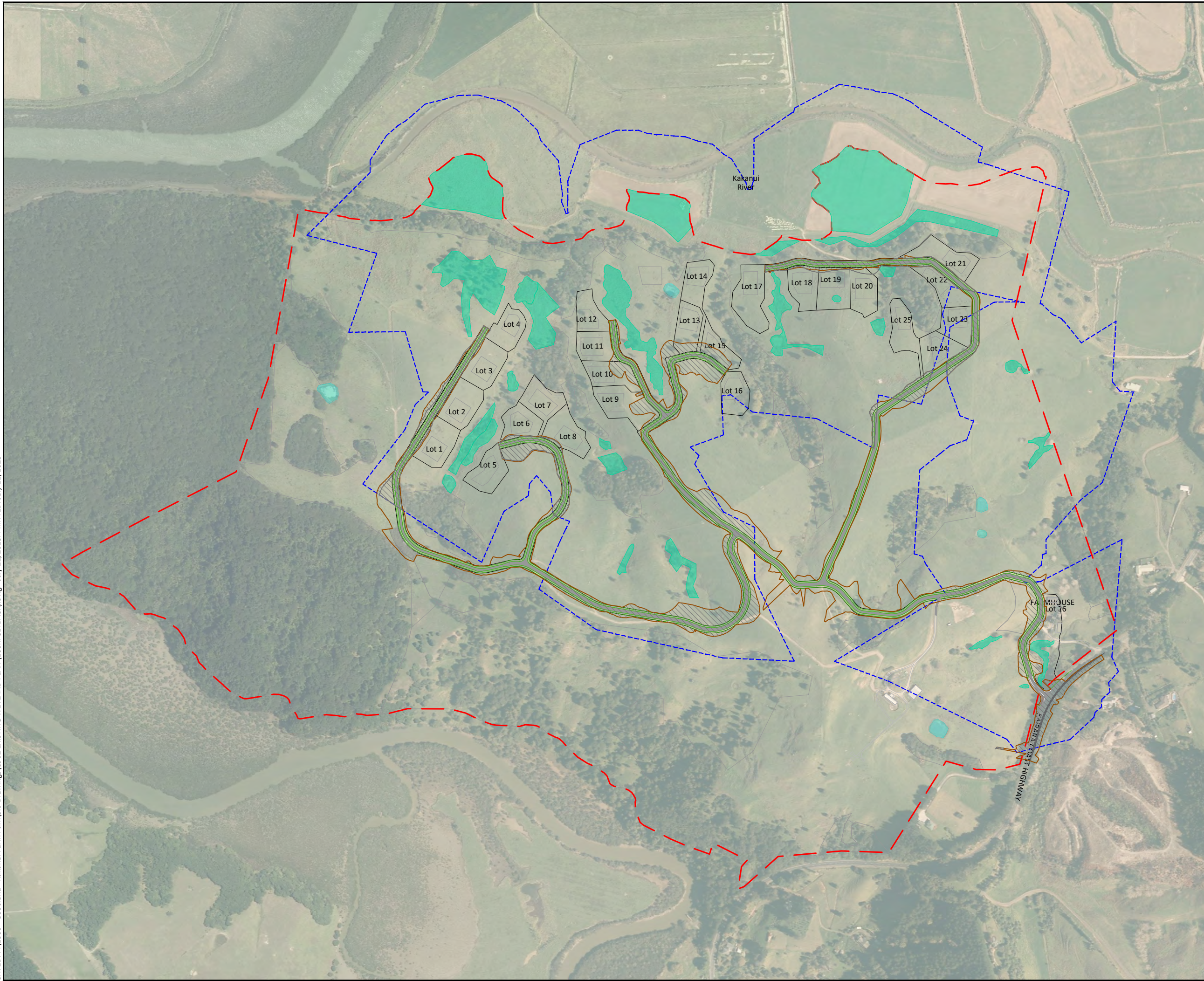
CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
EXISTING WETLAND PLAN(10m AND 20m SETBACK)

DRAWN	TG	SCALE	A1 1:3000
DESIGNED	TG	A3	1:6000
PROJECT No	DRAWING No	REVISION	
1366	C901	A	

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C902 EXISTING WETLAND PLAN (100m SETBACK).dwg - July 21, 2023. PRINTED: July 21, 2023



LEGEND

- - - SITE BOUNDARY
- PROPOSED LOT AND ROAD BOUNDARIES
- PROPOSED BUILDING PLATFORM
- EARTHWORK EXTENT
- NATURAL WETLAND
- MANMADE WETLAND
- 100m SETBACK FROM NATURAL WETLAND
- OVERLAY BETWEEN 100m SETBACK AND EARTHWORKS EXTENT AREA: 63487m²

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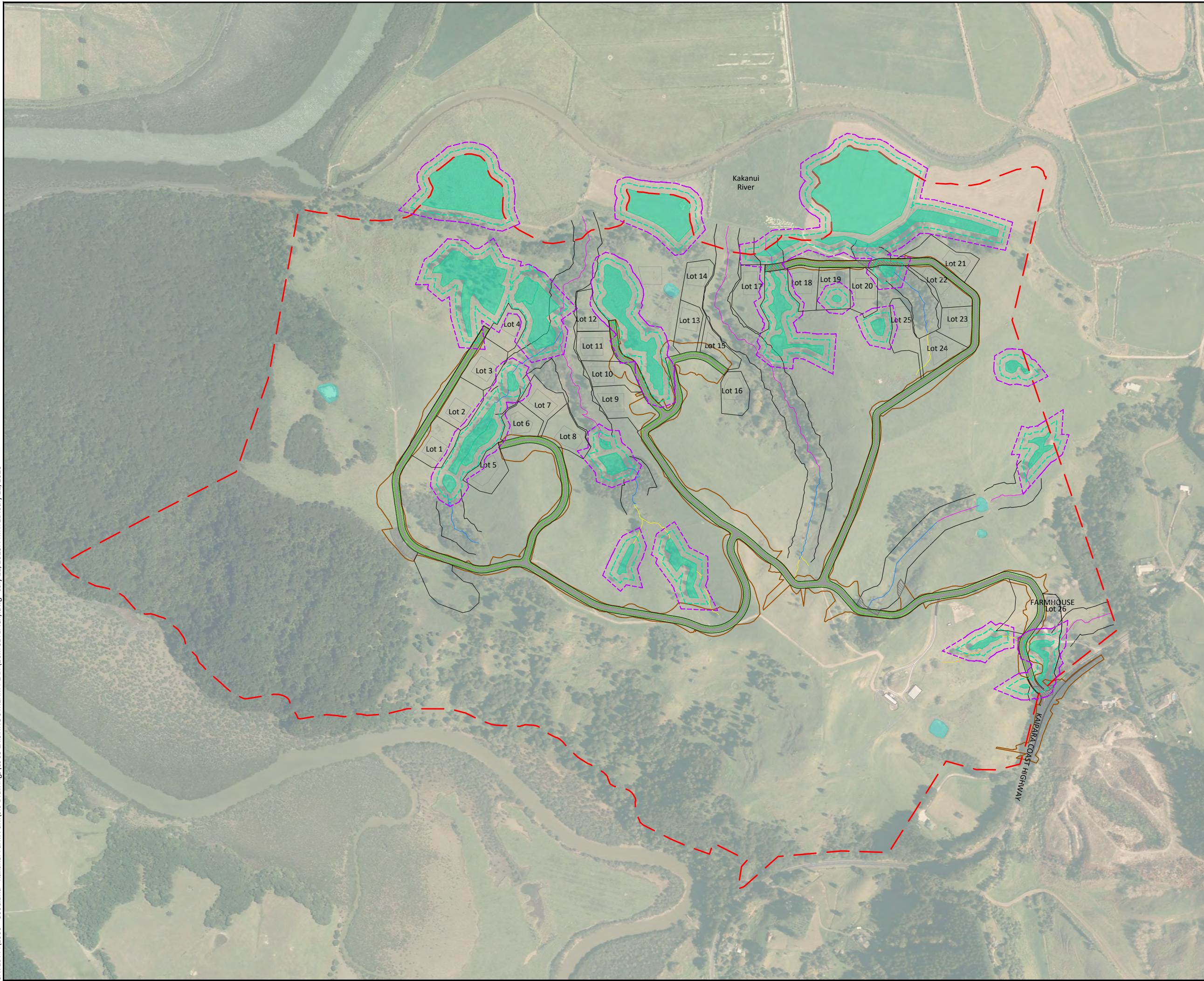
CLIENT
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PROJECT
GOODLAND COASTAL FARM

TITLE
**EXISTING WETLAND PLAN
(100m SETBACK)**

DRAWN	TG	SCALE	A1 1:3000
DESIGNED	TG	A3	1:6000
PROJECT No	DRAWING No	REVISION	
1366	C902	A	

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C903 EXISTING STREAM PLAN (20m SETBACK).dwg - July 21, 2023. PRINTED: July 21, 2023



LEGEND

- - - SITE BOUNDARY
- PROPOSED LOT AND ROAD BOUNDARIES
- PROPOSED BUILDING PLATFORM
- EARTHWORK EXTENT
- NATURAL WETLAND
- MANMADE WETLAND
- 20m OFFSETS STREAM
- EPHEMERAL STREAM
- INTERMITTENT STREAM
- PERMANENT STREAM
- OVERLAY BETWEEN 20m STREAM SETBACK ANDSTREAM AREA: 1810m²

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PROJECT

GOODLAND COASTAL FARM

TITLE

EXISTING STREAM PLAN (20m SETBACK)

DRAWN	TG	SCALE	A1 1:3000
DESIGNED	TG	A3	1:6000
PROJECT No	DRAWING No	REVISION	
1366	C903	A	

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C904 100-YEAR FLOOD EXTENT PLAN.dwg - July 21, 2023. PRINTED: July 21, 2023



LEGEND

- - - - SITE BOUNDARY
- PROPOSED LOT AND ROAD BOUNDARIES
- PROPOSED BUILDING PLATFORM
- EARTHWORK EXTENT
- 100-YEAR FLOOD EXTENT (AUCKLAND GIS)

NOTES:
 EXTENT OF THE 100-YEAR FLOOD PLAINS IS ONLY PARTIALLY SHOWN OUTSIDE OF THE DEVELOPMENT SITE ON THE PLAN. PLEASE REFER TO AUCKLAND GEOMAPS FOR MORE DETAILS.

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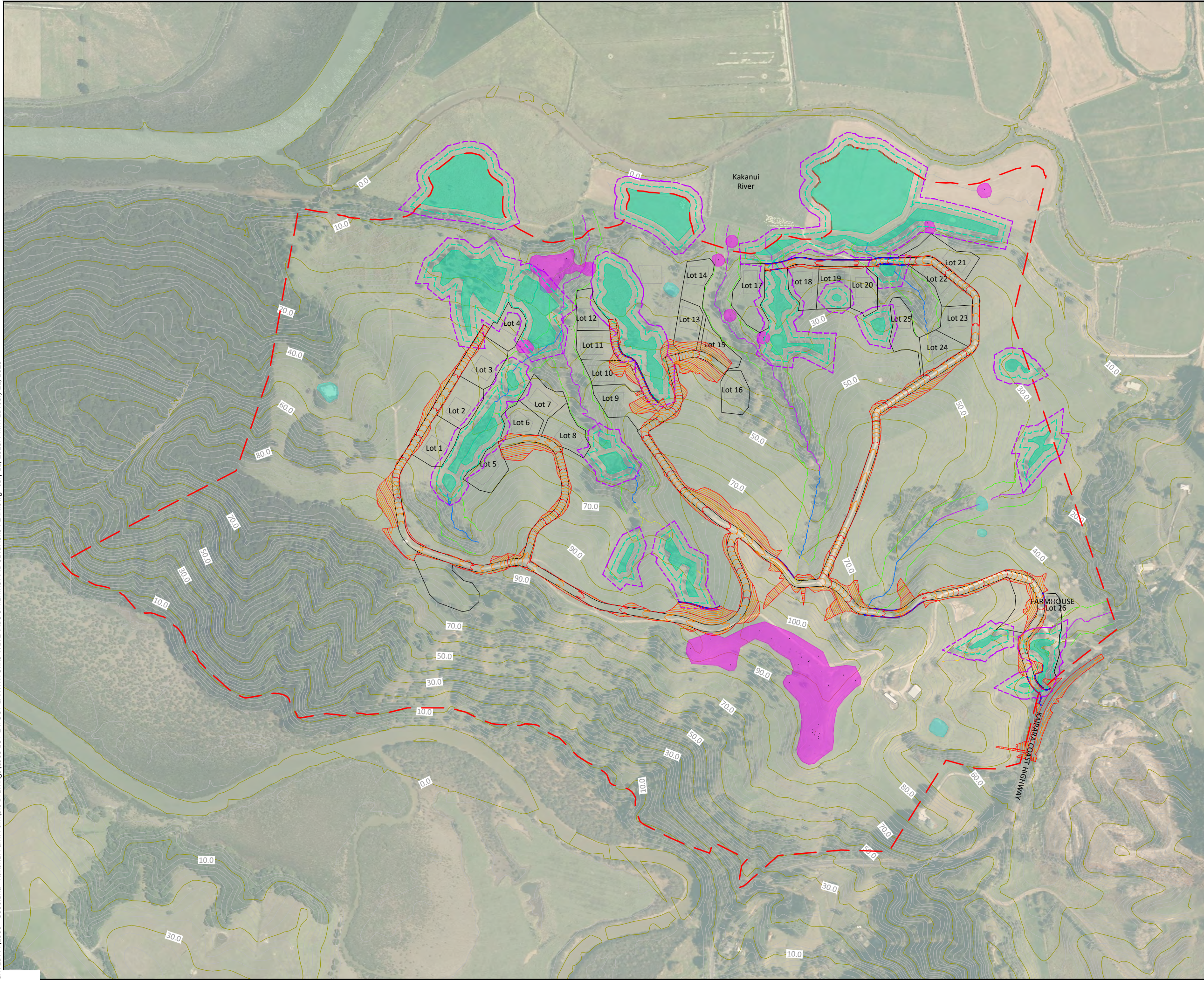
CLIENT
 ABIB (OAMARU) LTD

PROJECT
 GOODLAND COASTAL FARM

TITLE
 100-YEAR FLOOD EXTENT PLAN

DRAWN	TG	SCALE	A1 1:3000
DESIGNED	TG	A3	1:6000
PROJECT No	DRAWING No	REVISION	
1366	C904	A	

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C905 LOT LAYOUT EARTHWORKS WETLANDS STREAMS AND SETBACKS PLAN.dwg - July 21, 2023. PRINTED: July 21, 2023



- LEGEND**
- 90.0 PROPOSED CONTOURS
 - 52.0 EXISTING CONTOURS
 - - - SITE BOUNDARY
 - PROPOSED LOT AND ROAD BOUNDARIES
 - PROPOSED BUILDING PLATFORM
 - EARTHWORK EXTENT
 - 20m OFFSETS STREAM
 - EPHEMERAL STREAM
 - INTERMITTENT STREAM
 - PERMANENT STREAM
 - ARCHAEOLOGY EXTENT
 - NATURAL WETLAND
 - - - 10m SETBACK FROM NATURAL WETLAND
 - - - 20m SETBACK FROM NATURAL WETLAND
 - MANMADE WETLAND

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PROJECT
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TITLE
**LOT LAYOUT EARTHWORKS
WETLANDS STREAMS AND
SETBACKS PLAN**

DRAWN	TG	SCALE
DESIGNED	TG	A1 1:3000
PROJECT No	DRAWING No	A3 1:6000
1366	C905	REVISION
		A

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C906 EXISTING OVERLAND FLOW PATH PLAN.dwg - January 9, 2024 - PRINTED: January 9, 2024



LEGEND

- - - SITE BOUNDARY
- PROPOSED LOT AND ROAD BOUNDARIES
- PROPOSED BUILDING PLATFORM
- EARTHWORK EXTENT
- NATURAL WETLAND
- MANMADE WETLAND
- GIS OVERLAND FLOW PATH
- EPHEMERAL STREAM
- INTERMITTENT STREAM
- PERMANENT STREAM

NOTES

1. EPHEMERAL STREAM, INTERMITTENT STREAM AND PERMANENT STREAM SHOWN ON THE PLAN BASED ON GPS SURVEY.

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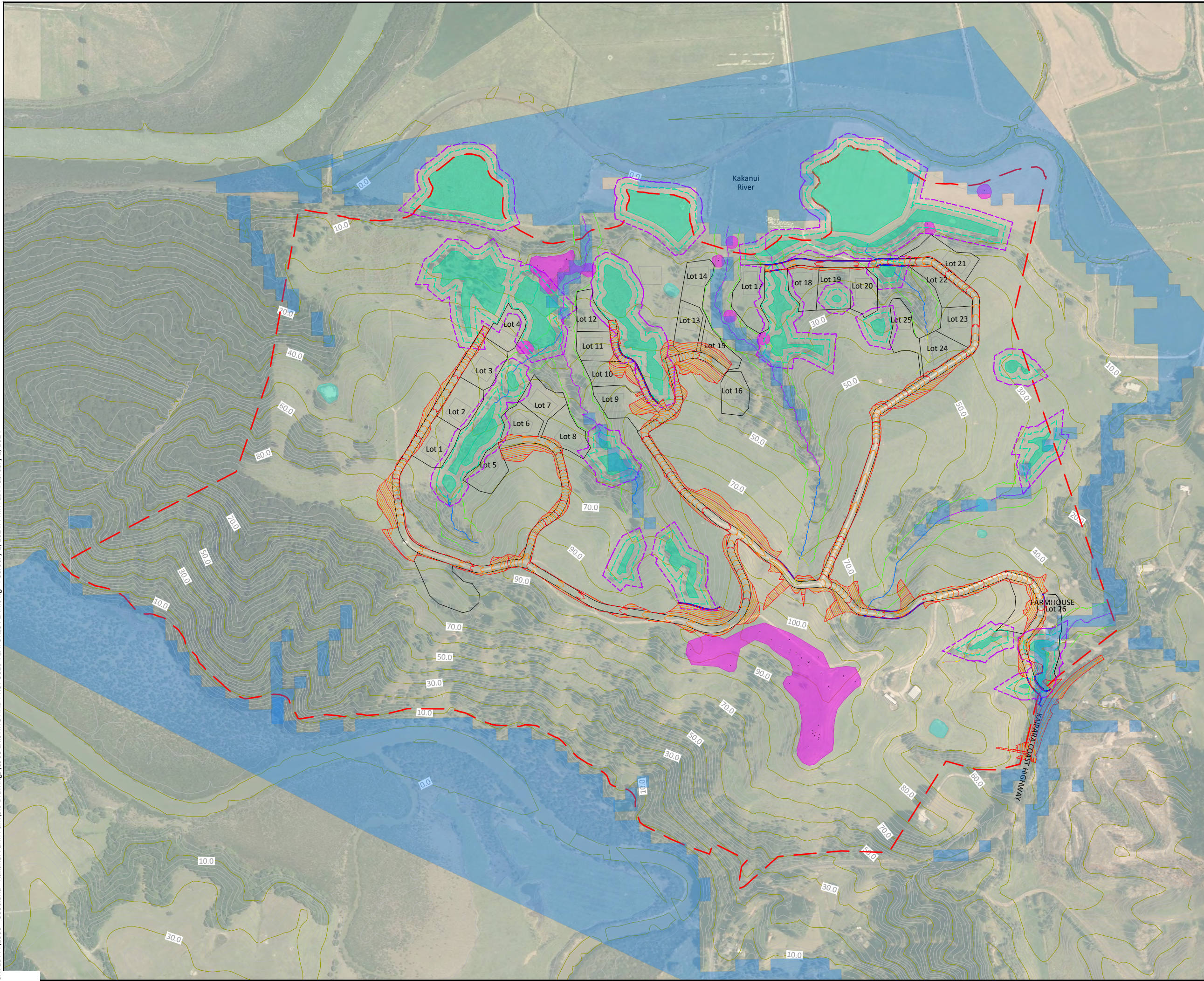
CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
EXISTING OVERLAND FLOW PATH PLAN

DRAWN	TG	SCALE
DESIGNED	TG	A1 1:3000
PROJECT No	DRAWING No	REVISION
1366	C906	A

SAVED: P:\1366 - Goodland - Kakanui Farm Park\5.0 Drawings\C908 EXISTING AND PROPOSED FEATURES PLAN.dwg - February 1, 2024. PRINTED: February 1, 2024



LEGEND

- 50.0 PROPOSED CONTOURS
- 52.0 EXISTING CONTOURS
- - - SITE BOUNDARY
- PROPOSED LOT AND ROAD BOUNDARIES
- PROPOSED BUILDING PLATFORM
- EARTHWORK EXTENT
- 20m OFFSETS STREAM
- EPHEMERAL STREAM
- INTERMITTENT STREAM
- PERMANENT STREAM
- ARCHAEOLOGY EXTENT
- NATURAL WETLAND
- MANMADE WETLAND
- - - 10m SETBACK FROM NATURAL WETLAND
- - - 20m SETBACK FROM NATURAL WETLAND
- 100-YEAR FLOOD EXTENT (AUCKLAND GIS)



NOTES:

1. THE EXTENT OF 100-YEAR FLOOD PLAINS ONLY SHOWN WITHIN OR ADJACENT TO THE SITE.

CONSENT ISSUE

REVISION	CHANGES	CHECKED	DATE
A	ORIGINAL ISSUE	ZY	31/01/24

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CRANG CIVIL
CONSULTING ENGINEERS

PHONE +64 09 320 3325
WEB www.crangcivil.co.nz
ADDRESS 1016a Great South Road, Penrose, Auckland
POST PO Box 42-089, Orakei, Auckland 1745, NZ

CLIENT
ABIB (OAMARU) LTD

PROJECT
GOODLAND COASTAL FARM

TITLE
EXISTING AND PROPOSED FEATURES PLAN

DRAWN	TG	SCALE
DESIGNED	TG	A1 1:3000
PROJECT No	DRAWING No	A3 1:6000
1366	C908	REVISION
		A

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**Geological investigation of aggregate resources on the
Goodland Group property, Makarau**

GOODLAND GROUP			
			By:
10 February 2005			
	Action	Info	Copy

Report prepared for Goodland Group

By KR Miller & Associates

November 2004

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1 Introduction

Goodland Group have recently purchased a rural property at 2127 Kaipara Coast Highway (State Highway 16), Makarau which included, under a separate title, a small, non-operating quarry. KR Miller & Associates were engaged to investigate the aggregate deposits on the property and determine the technical feasibility of developing a new quarry. A staged investigation was recommended with the Stage 1 aims, as outlined in the KR Miller & Associates Work Order, defined as follows:

1. Investigation and evaluation of aggregate resources at the Goodland Group property, Makarau.
2. Preparation of data for drilling companies and request for prices. Preparation of drilling contract.
3. Supervision of drilling operations and collection and logging of drill samples.
4. Geological mapping of site
5. GPS topographic survey.
6. Geological modelling of resources using Microlynx mine planning software.
7. Preparation of report.

The GPS topographic survey was subsequently replaced with a photogrammetric survey when initial investigations showed widespread evidence of andesite rocks on the property. The photogrammetric survey was a more efficient way of covering a larger, partly bush clad area. In fact it was possible to topographically map the entire property for about the same cost as a GPS survey of the area surrounding the quarry.

2 Existing Information

The area has been mapped at 1:50,000 scale by the New Zealand Geological Survey (Schofield, 1989). The property was mapped mainly as Helensville Conglomerate, with a circular outcrop of a lava flow shown around the quarry. The text accompanying the map describes rare lava flows within the Helensville Conglomerate. The slopes between the trig and the Makarau River, including the area around State Highway 16 are mapped as Paremoremo Formation.

The small quarry on the property is shown on the Geological Resource Map of New Zealand (Kermode et al. 1992), where it is called Makarau Bridge Quarry (Ref. Q10/e18). The material quarried is described as an andesite breccia, but no production figures or other details are given. Anecdotal evidence suggests that the quarry may have operated in the 1930's.

Some water bore logs are available in the area and provided useful data on the extent of the andesite flow. A water bore (ARC reference 4720) drilled near the farm house and implement shed intersected 40 metres of andesite before finishing in andesite at 75 metres depth. Another bore (ARC reference 4690) has co-ordinates that place it on the property, but further investigations revealed it was drilled on the neighbouring property to the north. It also intersected andesite at depth. Both water bore logs are included in Appendix 1.

3 Investigation Programme

3.1 Topographic Mapping

NZ Aerial Mapping was engaged to prepare a topographic map of the entire property (Figure 1). Existing photography, taken on December 31st 1984, was used as it had established photo control. The photography was suitable to produce contours at a 5m interval with an accuracy of around $\pm 2.5\text{m}$. Other features such as roads, streams and buildings were also picked up.

The photogrammetric data was supplied as a .dxf file, which was input into AutoCad. Features were updated by KR Miller & Associates by digitising farm tracks, buildings and vegetation areas from much more recent photography taken on March 4th 2004. Property boundaries were digitised from a cadastral map.

Contours, spot heights and other 3D data were transferred to the MicroLynx survey module to produce a digital terrain model suitable for cross section construction and volume calculations.

3.2 Drilling and logging

The drilling contract was awarded to Kiwi Welldrillers (Kevin Brown Ltd). Drilling was carried out using a truck mounted Mayhew rig with a support water truck. Drilling was generally carried using blade or tricone bits to penetrate mudstone and weathered volcanic material. In hard conglomerate or andesite an air-driven down-hole hammer was used.

Chip samples were taken from the hole over 1m intervals for logging. Hard bands were noted by the driller to provide more accurate depths for potential aggregates. Following logging, representative samples were kept in plastic bags for future reference if required. Drill logs are given in Appendix 1.

Drillhole locations are shown in Table 1 and on Figure 1. Locations were determined using a handheld GPS and should be accurate to within $\pm 3\text{m}$. All drillholes have been back-filled as required by the Auckland Regional Council.

Table 1 Drillhole Locations

Hole	East	North	Level	Depth
1	2641066	6516371	87.0	34.0
2	2640760	6516339	69.2	30.4
3	2640843	6516062	85.9	52.6
4	2641048	6516069	95.8	25.0
5	2641077	6516196	108.8	32.0
6	2641018	6516305	71.2	29.5
7	2641032	6516392	77.0	43.0

3.3 Geological Mapping

Geological mapping was carried out by inspecting rock exposures in conjunction with a photo interpretation study using a stereo pair of March 2004 colour images. Mapping was hindered by the scarcity of outcrops in the area, which is typical of the moderately weathered terrain in the region. The drill hole data was found to be essential in providing information where there were no outcrops.

All data was transferred to a base map produced using the topographic data. The geology map is attached as Figure 2.

4 Geological Interpretation

The stratigraphic sequence in the area is shown in Table 2. All are part of the Miocene Waitemata Group.

Table 2. Stratigraphic sequence at Makarau (based on Schofield, 1989)

Unit	Description
Swanson Mudstone	Soft mudstone and siltstone, finely interbedded, locally massive with rare pebble bands. Interbedded sandstone occurs near base.
Helensville Conglomerate	Well rounded mainly andesitic conglomerate with boulders up to 2m in diameter and rare lava flows.
Paremoremo Formation	Alternating graded sandstone and grey mudstone, locally carbonaceous. Includes interbeds of roundstone Albany Conglomerate.

Andesite thickness of in excess of 35 metres was indicated from the log of the water bore near the farmhouse. The drilling did not locate solid andesite of this thickness, with the best intersection being 20.5 metres in MAK5. Hole MAK7 intersected a 23.7m thick sequence, but this included an approximately 6 metre thick low grade, clay contaminated band. It is possible that the andesite is thicker and has fewer mudstone interbeds to the north as shown in the water bore log. However, it is more likely that the mudstone beds were present but not logged.

The relationship between the conglomerate and the andesite deposit was uncertain prior to the drilling and mapping programme. It is significant that none of the holes intersected both andesite and conglomerate, despite some holes going through apparently complete sequences of each type of material. It is now apparent that the andesite flows were emplaced first and were far more extensive than the few remaining remnants indicate. These flows were severely eroded after deposition, resulting in the deposition of conglomerate in river valleys around resistant ridges of andesite. This relationship is shown in sections B-B' and C-C' in Figure 3.

4.1 Structure

Faults in this area are generally north-easterly or north-westerly trending. Based on the drilling results a north-westerly trending fault is indicated northeast of the quarry. Drillhole MAK1 is on the downthrown side of the fault, which is why no andesite was intersected despite the proximity to the quarry. The fault has a throw of approximately

40 metres, making the andesite on the downthrown side too deep to be of economic interest. The andesite intersected in the water bore is also on the downthrown side of the fault.

5 Economic Geology

5.1 Andesite Flow

5.1.1 Quality

The andesite exposed in the old quarry and nearby outcrops is in the form of a breccia, i.e. it contains angular pieces of andesite of all sizes (up to several metres in diameter) that have been fragmented in an eruption and mixed with fresh andesitic lava. In the quarry area the matrix is slightly weaker than the pieces of andesite, so that this upper material would not be suitable for a premium aggregate. This is typical of most aggregate deposits as the upper level is invariably weathered and has a lower value. The expectation at Makarau was that the underlying rock would be of increasing strength and could be used to produce high or premium grade aggregates. This proved not to be the case as the lower part of the andesite below the old quarry floor was found to be of similar strength and also contains layers of mudstone.

5.1.2 Resources

An andesite volume was calculated for the thick, upper section of the flow. Material separated from the main flow by mudstone layers, such as that found below the old quarry floor was not included. The bulk of the resource lies between the quarry and the ridge to the south, although the old quarry could also be advanced for a small distance towards the north.

The quarry footprint is shown in Figure 3. The Microlynx survey module was used to calculate volumes using the surface subtraction method. The pit walls were given a nominal slope of 45° for this initial estimate.

The volume of andesite breccia was found to be 355,000 m³, which was covered with 170,000 m³ of overburden.

An average overburden thickness of 5 metres was assumed, but this was based on few drill intersections. Most of the resource area is too steep to drill without extensive track development.

5.2 Conglomerate

Schofield (1989) noted that

"minor quarrying for road metal has also taken place within the Helensville Conglomerate, but its relative thinness means that it is generally weathered throughout leaving only a few large andesite boulders".

This may not be the case at Makarau where some of the thickest known deposits occur. The thickest drillhole intersection was 27m in MAK3, but geological mapping suggested the thickness increased towards the west.

Winstone Aggregates have investigated production of aggregates from the Albany Conglomerate, but appear to have not fully solved processing problems. The process apparently results in excessive fines from the conglomerate matrix. Kermodé et al (1992) stated:

"The conglomerates contain assorted pebbles and boulders of mainly andesite material in poorly sorted sandy matrix. The natural size grading requires minimal crushing and screening. Although specific deposits have been significant producers, the conglomerate is not generally considered a source of high quality material. Difficulties in removing the deleterious matrix material during processing has hindered widespread use for concrete aggregate and sealing chip. However, if this problem is resolved, these deposits will have a greater economic potential. To date, more than 4.5 Mt have been extracted for use, mainly as road aggregate."

A relatively thin (5-10m) conglomerate layer is extracted from the Wharehine Contractors quarry at Whangaripo, where it occurs at the top of the greywacke which is their primary product. The conglomerate is crushed and sold as a relatively low value sub-grade aggregate.

At present it appears the conglomerates are not an attractive prospect for a new quarry, but this could change in the future as other materials are worked out.

5.3 Boulders

Andesite boulders have weathered out of both the andesite breccia and the conglomerate and are widespread on the property. They are particularly concentrated in some areas as shown on the geology plan. There are likely to be buried deposits in the alluvial material at the base of the hill.

The boulders all appear to contain very hard andesite which could be crushed to produce a high grade aggregate. However, there are insufficient for a commercial operation. Boulders are also valued for landscaping purposes, and rounded boulders are rare in the Auckland region. Further investigations are needed to determine if it would be worthwhile to extract the boulders. Removal of the boulders would also increase the pasture area of the farm.

5.4 Groundwater

Most of the holes were not deep enough to reach an aquifer. Water bores in the area have shown that the andesite flow provides a good source of water, and this is the source of the water at the farmhouse bore. The alluvial sediments to the east of the hill may be suitable, although saltwater intrusion would be a concern.

Drillhole MAK2, located west of the quarry, intersected a flow of water estimated to be about 1.5 cubic metres per hour coming from conglomerate. The following day the standing water level had risen to 7.9m below ground level, indicating good pressure and the possibility of a reasonable supply of water at shallow depth.

6 Conclusions and Recommendations

The resource is best suited to the production of aggregate suitable for sub-base¹ for public roads, or as a surface for farm tracks and unsealed roads. The hard pieces of andesite that occur in the breccia, conglomerate and as loose boulders would be suitable for higher grade basecourse and possibly sealing chip. However, separation of these high grade products would appear to be a problem.

Development of a small quarry taking perhaps 50,000 m³ per year for about 7 years is a possibility as it appears there is local demand. Initial development and testing should take place on the northern wall of the quarry to avoid destruction of the farm track on the southern side.

The farm contains a number of gullies that could be used for overburden disposal. Development of the quarry and overburden disposal could be done to make the site safer and more useful. The existing quarry contains dangerous faces and it would be an advantage to the future residential development if face profiles were improved.

6.1 Permits required

A resource consent is required if more than 200 m³ of material per year is to be extracted. Quarrying is classified as a discretionary activity, and the expense required to gain a consent will depend on the scale of operation envisaged. It appears a relatively small operation that would provide aggregate for the proposed subdivision and other properties in the area could be achieved with few obstacles.

Most of the andesite resource lies within the parcel of land where the minerals are state owned. A mining licence will therefore be required before any quarrying starts. A mining licence costs approximately \$1600 to lodge the application and there is a small ongoing annual fee. Royalties must be paid and, depending on the calculation method used, are likely to be around 1% of the sales price received. No royalty is payable if net sales revenues are less \$100,000 per annum.

¹ The term sub-base refers to material in the pavement between the sub-grade (beneath) and the basecourse (above).

6.2 Development Constraints

Five archaeological sites have been recorded in the area, all of which are south of the Makarau River. The bush covered land on the end of the peninsular and to the south of the farm is Maori Land containing a Maori Burial Reserve. It appears the land that would be quarried is free of cultural or historical sites, but consultation would be required.

The Rodney District Plan shows the area surrounding the old quarry is not included in any special coastal or landscape zones, but it is identified as a view corridor. The Department of Conservation Management Strategy document identifies the area as a significant landscape area (qual. 5 category), and the ARC denotes it a sensitive landscape. The proposed quarry would reduce the height of the southern ridge, and require relocation of the survey trig.

6.3 Recommendations

There is potential to operate a small quarry on the property. The feasibility depends on the level of local demand and the likely cost of obtaining a resource consent. These factors need to be investigated.

This investigation focussed on the andesite flow and little time was able to be spent on the large conglomerate deposit. No outcrops of conglomerate were identified, but there may be some on parts of the farm not inspected. Conglomerate deposits appear to be a more long term prospect, but any exposures would be worth investigating. Similarly, it is recommended that extraction of the surficial boulders be investigated.

Input from a planner concerning the feasibility of operating a quarry at this site is strongly recommended.

References

Kermode, L.O., Meshesha, M.Y., Christie, A.B., Braithwaite, R.L. and Brown, L.J. 1992. Sheet QM281 Manukau Geological Resource Map of New Zealand 1:250,000. IGNS Science Report 92/15.

Schofield, J.C., 1989. Sheet Q10 Helensville. 1:50,000 Geological Map of New Zealand. DSIR Publishing.

Appendix 1

Drill Logs

Log of Drillhole No. MAK1 Sheet 1 of 2

Project: MAKARAU Feature: Quarry
 Datum: NZMG Date Completed: Nov 1 2004
 Coordinates: 2641066 mE 6516371 mN
 RL collar: 87.0 m Orientation: Vertical

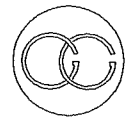


DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE SIZE	CORE LOSS (%)	SAMPLES
			Soil, brown.		Blade		5 20 50	
2		86	Soil, yl-brown, clayey.					
4		84	Mudstone, mottled red-brown and l.grey-brown, highly weathered, v. weak.	Swanson Mudstone				
6		82	Mudstone, l.grey-brown, v.weathered, weak, with minor red-brown bands.					
8		80						
		78						
10		76						
12		74	Mudstone, grey to green-grey, mod. strong, with harder fine sandstone bands at 9.7, 17.5, 21 and 22.2m.					
14		72						
16		70						
18		68						
20		66						
22		62						
24		60						
26		58						
28			Sandstone, grey to brown, fine - coarse grained, hard, interbedded with mudstone, grey.					
30		56	Mudstone, grey, mod. weak.					

Static water level:
 Date measured:

KR Miller and Associates
 Natural Resource Consultants
 Auckland, New Zealand
 Phone: 09 625 4301
 Facsimile: 09 625 4165
 e-mail: kmiller@geosci.co.nz

Log of Drillhole No. MAK1 Sheet 2 of 2



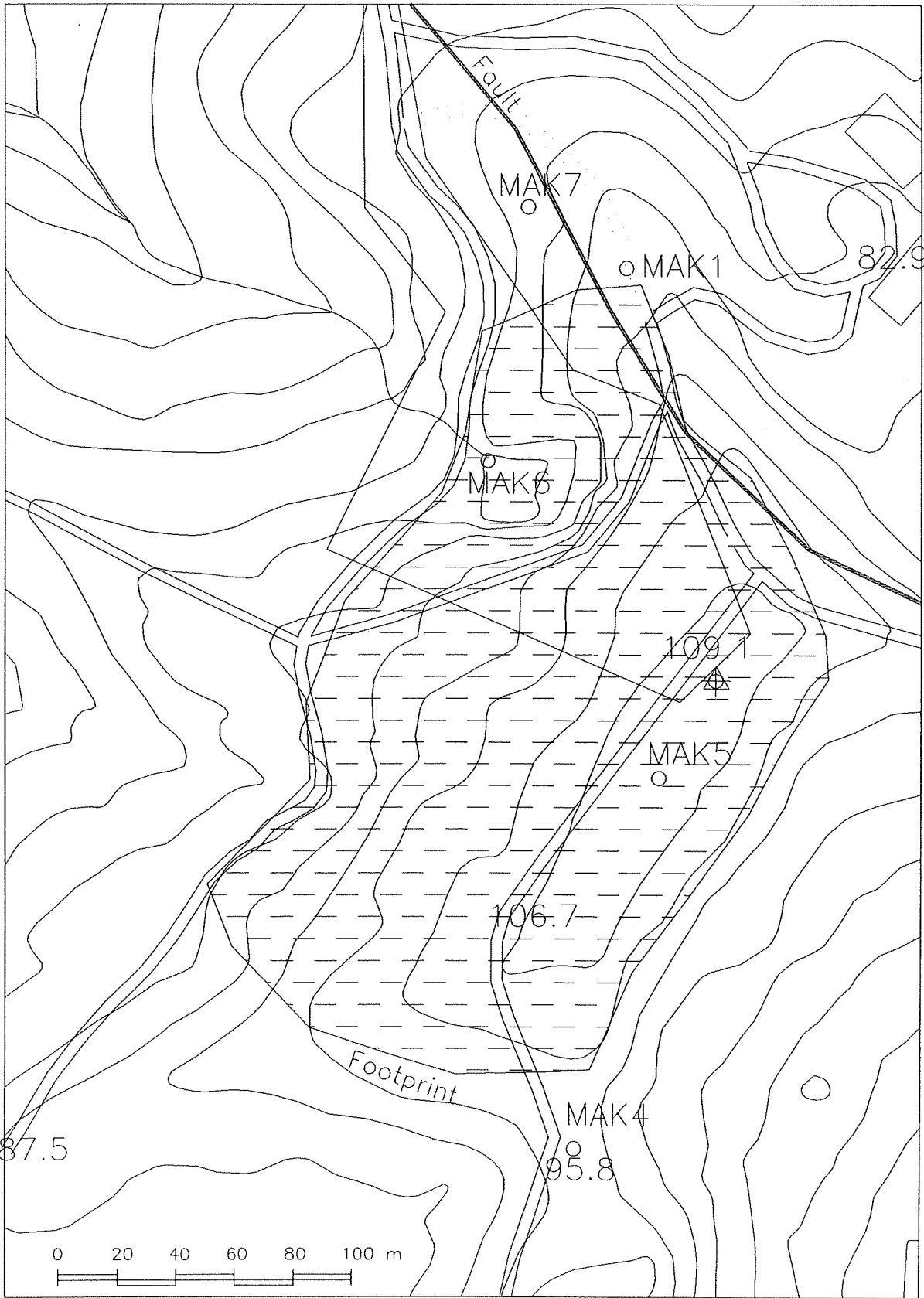
GOODLAND GROUP

Project: MAKARAU	Feature: Quarry
Datum: NZMG	Date Completed: Nov 1 2004
Coordinates: 2641066 mE	6516371 mN
RL collar: 87.0 m	Orientation: Vertical

DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE LOSS (%)			SAMPLES
						5	20	50	
2	[Graphic Log: Dotted pattern]	54	Mudstone, grey, mod. weak.						
	[Graphic Log: Dotted pattern]	52	Sandstone, green-grey, fine grained, muddy.						
4	[Graphic Log: Dotted pattern]		Mudstone, grey, mod. weak.						
6		50	TD 34.0m						
8									
10									
12									
14									
16									
18									
20									
22									
24									
26									
28									
30									

Static water level:
Date measured:

KR Miller and Associates
 Natural Resource Consultants
 Auckland, New Zealand
 Phone: 09 625 4301
 Facsimile: 09 625 4165
 e-mail: kmiller@geasci.co.nz



KR MILLER & ASSOCIATES
 43 OLSEN AVENUE
 HILLSBOROUGH
 AUCKLAND
 TEL (09) 6254301
 FAX (09) 6254061

ORIGINAL ISSUE DATE

NOV 2004

SCALE

1:2000 at A4

Makarau
 Quarry Footprint

4

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Log of Drillhole No. MAK2 Sheet 1 of 1



**GOODLAND
GROUP**

Project: MAKARAU	Feature: Quarry
Datum: NZMG	Date Completed: Nov 2 2004
Coordinates: 2640760 mE	6516339 mN
RL collar: 69.2 m	Orientation: Vertical

DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE SIZE	CORE LOSS (%)	SAMPLES
			Soil, brown.		Blade		5 20 50	
2		-68	Soil, yl-brown, clayey.					
		-66	Mudstone, l.brown to yl-brown, v.weak, highly weathered.	Swanson Mudstone				
4		-64	Mudstone, grey, weak.					
6								
8		-62						
10		-60						
12		-58						
14		-56	Mudstone, (50%), grey, weak, interbedded with siltstone (50%), grey, mod. strong, with minor green-grey hard silicified bands and rare fine pebble bands.					
16		-54						
18		-52						
20		-50						
22		-48						
24		-46						
26		-44						
28		-42	Conglomerate, grey, pebble & cobble sized clasts, mixed andesite, silic. mudstone and siltstone clasts. Water inflow approx. 1.5cu.m/hr	Helensville Conglomerate	hammer			
30			Mudstone, grey, hard.					

Static water level: RL 78.0m
Date measured: Nov 4th 2004

TD 30.4m

KR Miller and Associates
 Natural Resource Consultants
 Auckland, New Zealand
 Phone: 09 625 4301
 Facsimile: 09 625 4165
 e-mail: kmiller@geasci.co.nz

Log of Drillhole No. MAK3 Sheet 1 of 2

Project: MAKARAU Feature: Quarry
 Datum: NZMG Date Completed: Nov 3 2004
 Coordinates: 2640843 mE 6516062 mN
 RL collar: 85.9 m Orientation: Vertical

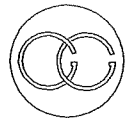


DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE LOSS (%)			SAMPLES
						5	20	50	
			Soil, brown.		Blade				
2		84	Soil, yl-brown, clayey.						
4		82	Mudstone, grey, weak.	Swanson Mudstone					
6		80							
8		78							
10		76							
			Conglomerate, grey, pebble & cobble sized clasts, mixed andesite, silic. mudstone and siltstone clasts.	Helensville Conglomerate					
12		74	Mudstone, yl-brown, weak.		Hammer				
14		72	Conglomerate, grey, pebble & cobble sized clasts, mixed andesite, silic. mudstone and siltstone clasts.						
16		70							
18		68							
20		66							
22		64							
24		62							
26		60	Conglomerate, as above but iron stained.						
28		58							
30		56							

Static water level:
 Date measured:

KR Miller and Associates
 Natural Resource Consultants
 Auckland, New Zealand
 Phone: 09 625 4301
 Facsimile: 09 625 4165
 e-mail: kmiller@geosci.ca.nz

Log of Drillhole No. MAK3 Sheet 2 of 2



Project: MAKARAU Feature: Quarry
 Datum: NZMG Date Completed: Nov 3 2004
 Coordinates: 2640843 mE 6516062 mN
 RL collar: 85.9 m Orientation: Vertical

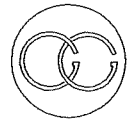
GOODLAND GROUP

DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE SIZE	CORE LOSS (%)			SAMPLES
							5	20	50	
2		54	Conglomerate, grey, pebble & cobble sized clasts, mixed andesite, silic. mudstone and siltstone clasts.							
4		52								
6		50								
8		48								
10		46	Mudstone, grey, mod hard, shell fragments 45-47m.	Paremoremo Formation	Blode					
12		44								
14		42								
16		40								
18		38								
20		36								
22		34								
24										
26										
28										
30										
			TD 52.6m							

Static water level:
 Date measured:

KR Miller and Associates
 Natural Resource Consultants
 Auckland, New Zealand
 Phone: 09 625 4301
 Facsimile: 09 625 4165
 e-mail: kmiller@geosci.co.nz

Log of Drillhole No. MAK4 Sheet 1 of 1



GOODLAND GROUP

Project: MAKARAU Feature: Quarry
 Datum: NZMG Date Completed: Nov 4 2004
 Coordinates: 2641048 mE 6516069 mN
 RL collar: 95.8 m Orientation: Vertical

DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE SIZE	CORE LOSS (%)			SAMPLES
							5	20	50	
			Soil, brown.		Blade					
2		94	Soil, yl-brown, clayey.							
4		92	Mudstone, mottled yl-brown and l.grey, mod. wthd, weak.	Helensville Conglomerate Mudstone member						
6		90	Mudstone, grey, with granules of weathered rd-brown and grey andesite near base.							
8		88								
10		86	Andesite, d.grey, with red-brown bands, v. hard.	Andesite member	Hammer					
12		84	Mudstone, grey, weak.	Paremoremo Formation	Blade					
14		82								
16		80								
18		78								
20		76								
22		74								
24		72	Mudstone (50%) grey, interbedded with l.brown mudstone (50%) and minor carbonaceous mudstone layers.							
26		70	TD 25m							
28										
30										

Static water level:
 Date measured:

KR Miller and Associates
 Natural Resource Consultants
 Auckland, New Zealand
 Phone: 09 625 4301
 Facsimile: 09 625 4165
 e-mail: kmiller@geosci.co.nz

Log of Drillhole No. MAK5 Sheet 1 of 2

Project: MAKARAU Feature: Quarry
 Datum: NZMG Date Completed: Nov 4 2004
 Coordinates: 2641077 mE 6516196 mN
 RL collar: 108.8 m Orientation: Vertical



GOODLAND GROUP

DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE LOSS (%)			SAMPLES
						CORE SIZE	5	20	
			Soil, brown.		Blade				
2		108	Soil, yl-brown, clayey.						
4		106	Mudstone, mottled l,yl-brown to red brown, mod. weatherd, mod. weak.	Helensville Conglomerate Mudstone member					
6		104	Andesite breccia, mixed red brown and d.grey, mod. weathered rims around fresh rock.	Helensville Conglomerate Andesite member	Hammer				
8		102	Andesite breccia, as above, with clay bonds.						
10		100							
12		98	Andesite breccia, d.grey, some enclosed andesite boulders v. hard.						
14		96							
16		94							
18		92							
20		90	Andesite, d.gy, v. hard, ? flow or v. large boulder.						
22		88							
24		86	Andesite breccia, d.gy, clasts include some hard, fine grained sandstone blocks.						
26		84							
28		82	Mudstone, brown to gy.brown, hard, ? baked.						
30		80	Mudstone, grey, mod. hard.	Paremoremo Formation					

Static water level:
 Date measured:

KR Miller and Associates
 Natural Resource Consultants
 Auckland, New Zealand
 Phone: 09 625 4301
 Facsimile: 09 625 4165
 e-mail: kmiller@geosci.co.nz

Log of Drillhole No. MAK5 Sheet 2 of 2



Project: MAKARAU Feature: Quarry
 Datum: NZMG Date Completed: Nov 4 2004
 Coordinates: 2641077 mE 6516196 mN
 RL collar: 108.8 m Orientation: Vertical

GOODLAND GROUP

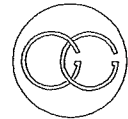
DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE LOSS (%)			SAMPLES
						5	20	50	
32		78	Mudstone, grey, mod. hard.						
34		76	TD 32.0m						

Static water level:
 Date measured:

KR Miller and Associates
 Natural Resource Consultants
 Auckland, New Zealand
 Phone: 09 625 4301
 Facsimile: 09 625 4165
 e-mail: kmiller@geosci.co.nz

Log of Drillhole No. MAK6 Sheet 1 of 1

Project: MAKARAU Feature: Quarry
 Datum: NZMG Date Completed: Nov 4 2004
 Coordinates: 2641018 mE 6516305 mN
 RL collar: 71.2 m Orientation: Vertical



GOODLAND GROUP

DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE SIZE	CORE LOSS (%)	SAMPLES
							5 20 50	
			Soil and clay, disturbed, on floor of old quarry.		Blade			
2		70	Mudstone, gy, mod. weak, minor harder bands.	Helensville Conglomerate Mudstone member				
4		68						
6		66						
8		64	Andesite breccia, gy to d.gy, mixed hard and softer bands.	Helensville Conglomerate Andesite member				
10		62						
12		60	Andesite, d.gy, v. hard.		Tricone			
			Andesite, red-bn, v. hard.					
14		58	Mudstone (80%), grey, mod. weak, with hard pieces of andesite (20%).	Helensville Conglomerate Mudstone member				
16		56						
18		54						
20		52	Andesite, intermixed d.gy and red-bn, v.hard.	Helensville Conglomerate Andesite member				
22		50						
24		48	Mudstone, grey and gn-grey.	Paremoremo Formation				
26		46						
28		44						
30		42						
30			TD 29.5m					

Static water level: _____
 Date measured: _____

KR Miller and Associates
 Natural Resource Consultants
 Auckland, New Zealand
 Phone: 09 625 4301
 Facsimile: 09 625 4165
 e-mail: kmiller@geosci.co.nz

Log of Drillhole No. MAK7

Sheet 1 of 2

Project: MAKARAU

Feature: Quarry

Datum: NZMG

Date Completed: Nov 5 2004

Coordinates: 2641032 mE

6516392 mN

RL collar: 77.0 m

Orientation: Vertical



GOODLAND GROUP

DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE LOSS (%)			SAMPLES
						CORE SIZE	5	20	
		76	Soil, yl-bn, clayey.	Helensville Conglomerate Andesite member	Blade				
2			Andesite boulder, h. weathered, mod. weak, red-bn to grey.						
4		74	Clay, yl-bn at top, grading to l.bn-gy. Soft, with occasional hard pieces of andesite.	Helensville Conglomerate Mudstone member					
		72							
6		70							
8		68							
10		66	Andesite, v. hard, d.gy, with zones of weaker weathered rock.	Helensville Conglomerate Andesite member	Tricone				
12		64	Mudstone, gy and blue-gy, mod. hard with harder silicified bands.	Helensville Conglomerate Mudstone member					
14		62							
16		60	Andesite, d.gy, very hard, with bands of red-bn andesite at 16.5-17.2m and 20.9-21.5m	Helensville Conglomerate Andesite member					
18		58							
20		56							
22		54	Mudstone (70%), gy, mod. hard, with bands of Andesite (30%), d.gy, hard.	Helensville Conglomerate Mudstone member					
24		52							
26		50							
28		48							
30			Andesite, d.gy, very hard, with bands of red-bn andesite.	Helensville Conglomerate Andesite member	Hammer				

Static water level:
Date measured:

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Natural Resource Consultants
Auckland, New Zealand
Phone: 09 625 4301
Facsimile: 09 625 4165
e-mail: kmiller@geosci.co.nz

Log of Drillhole No. MAK7 Sheet 2 of 2

Project: MAKARAU Feature: Quarry
 Datum: NZMG Date Completed: Nov 5 2004
 Coordinates: 2641032 mE 6516392 mN
 RL collar: 77.0 m Orientation: Vertical



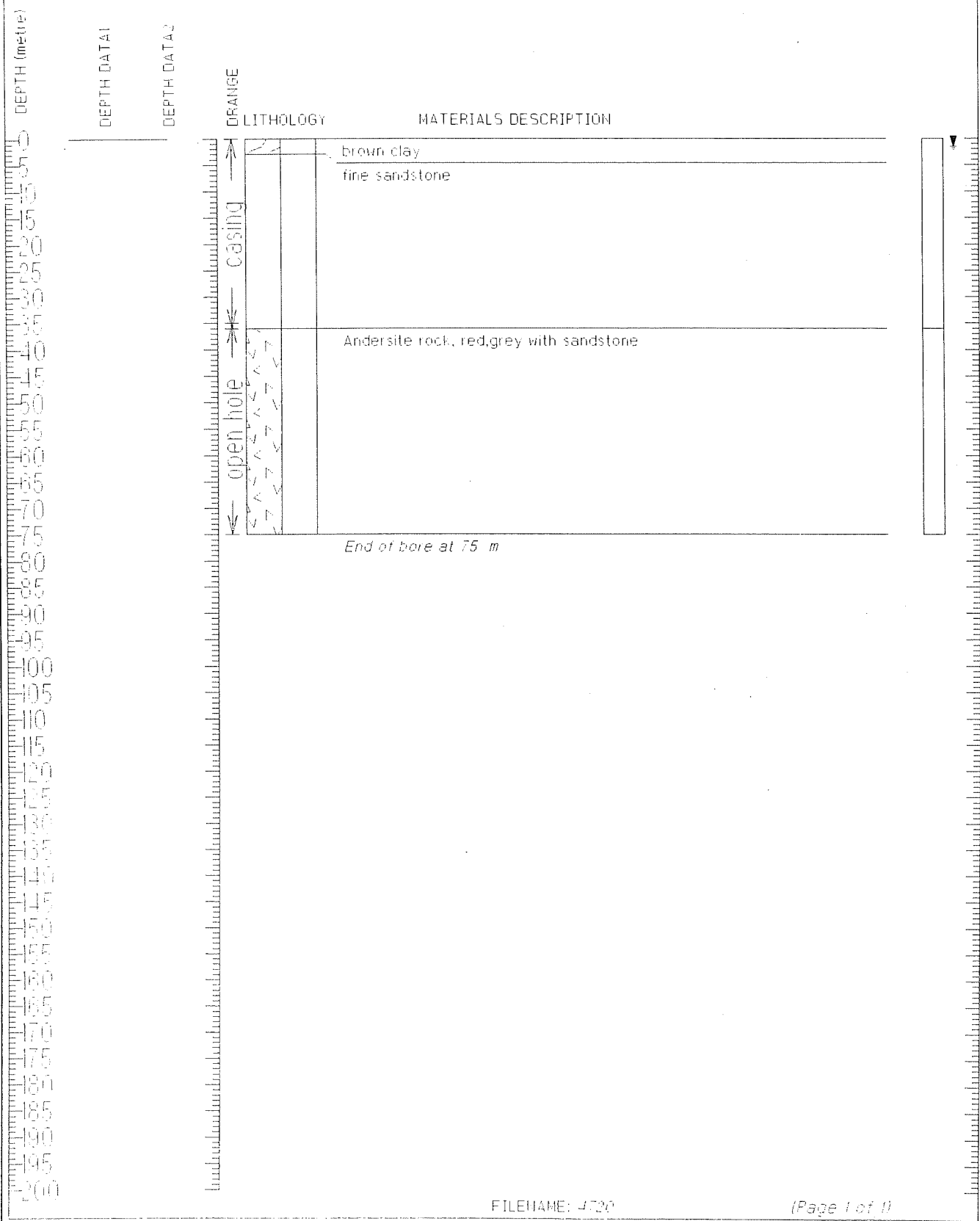
DEPTH (m)	GRAPHIC LOG	R.L.	DESCRIPTION OF CUTTINGS/CORE	CORRELATION	DRILL METHOD	CORE LOSS (%)			SAMPLES
						5	20	50	
32		46	Andesite, d.gy, very hard, with bands of red-bn andesite.						
		44							
34		42							
36		40							
38		38							
40			Mudstone, blue-gy, hard, ?baked.	Paremoremo Formation					
42		36	Mudstone, grey.						
44		34	TD 43.0m						

Static water level:
 Date measured:

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 Natural Resource Consultants
 Auckland, New Zealand
 Phone: 09 625 4301
 Facsimile: 09 625 4165
 e-mail: kmiller@geosci.co.nz

BORE: Makarau River Partnership

ADDRESS Highway 19, Haukapapa PERMIT NO. C512-12-1504
 MAP REFERENCE 010:4114/65 TIDEDA NO. _____
 USE Stock & Domestic DRILLER Liwi Well-drillers DATE 14/02/95
 LOGGED BY Driller ELEVATION 20 m. a.s.l DIAMETER 100 mm BORE CONS. Y INTERPOLATED _____
 WATER DEPTH 1.5 m. b.t.c TOTAL DEPTH 75 m. PUMP TEST _____ WATER CHEM. _____ GEOPHYSICS _____



BORE: Ivan Alach

ADDRESS Highway 16, Kawhāpakāpa PERMIT NO. C512-12-1487
 MAP REFERENCE 010:410167 TIEDA NO. _____
 USE Stock & Domestic DRILLER Liwi Well-drillers DATE 11/02/95
 LOGGED BY Driller ELEVATION m.rsl DIAMETER 100 mm BORE CONS. Y INTERPOLATED _____
 WATER DEPTH 20 m.btc TOTAL DEPTH 75 m. PUMP TEST _____ WATER CHEM. _____ GEOPHYSICS _____

DEPTH DATA
 DEPTH DATA
 0
5
10
15
20
25
30
35
40
45
50
55
60
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115
120
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130
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DEPTH DATA
 DEPTH DATA

ORANGE

LITHOLOGY

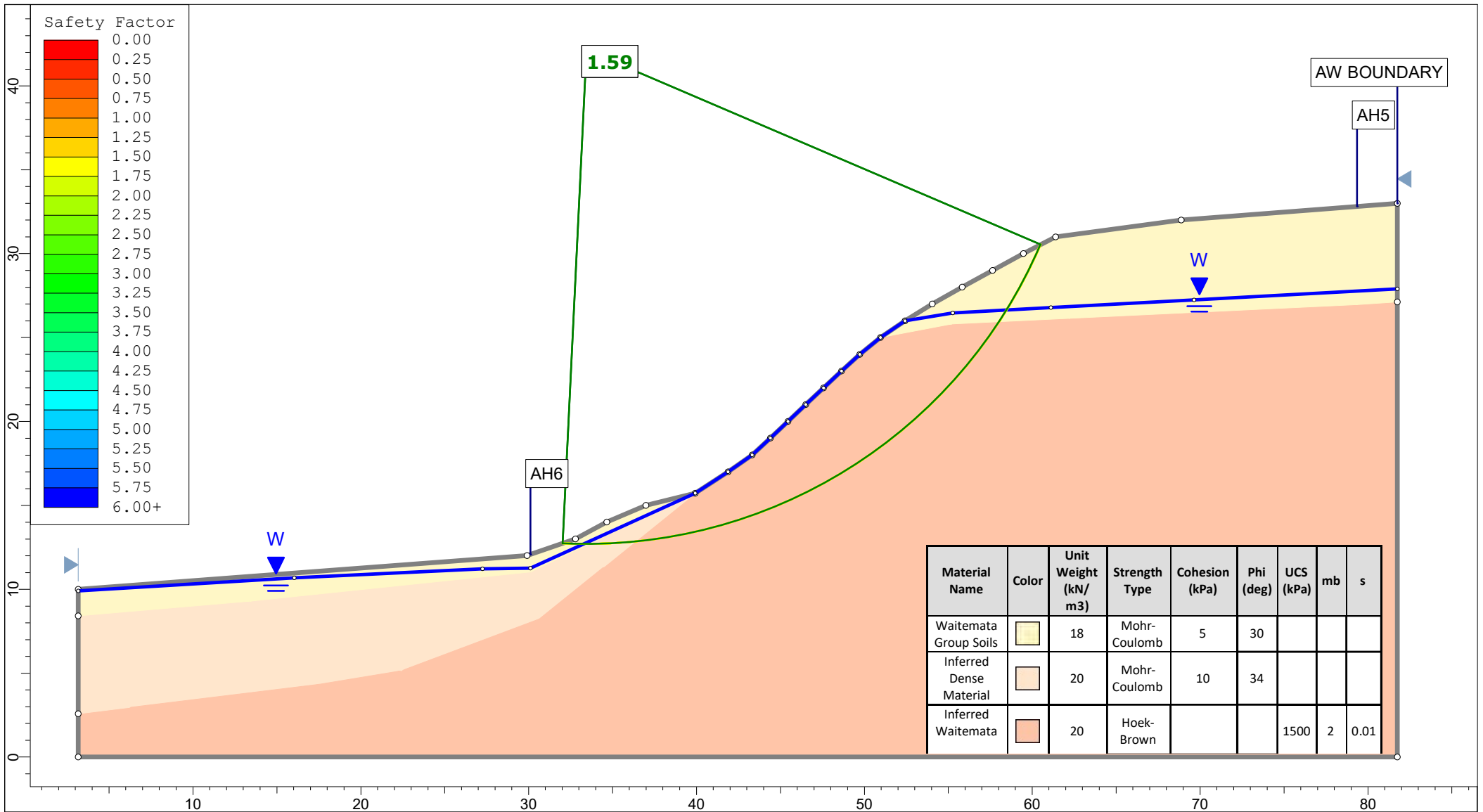
MATERIALS DESCRIPTION

Casing	0-5		brown clay
	5-10	◆	brown decayed rock with boulders
	10-15		
	15-20	◆	grey rock with boulders
	20-25		
	25-30		fine sandstone
	30-35		
	35-40		
	40-45		
	45-50		
Open hole	50-55		
	55-60	◆	grey rock with boulders
	60-65		
	65-70	◆	
	70-75		Red rock (? andesite)
	75-80		grey rock (? andesite)
	80-85		End of bore at 75 m

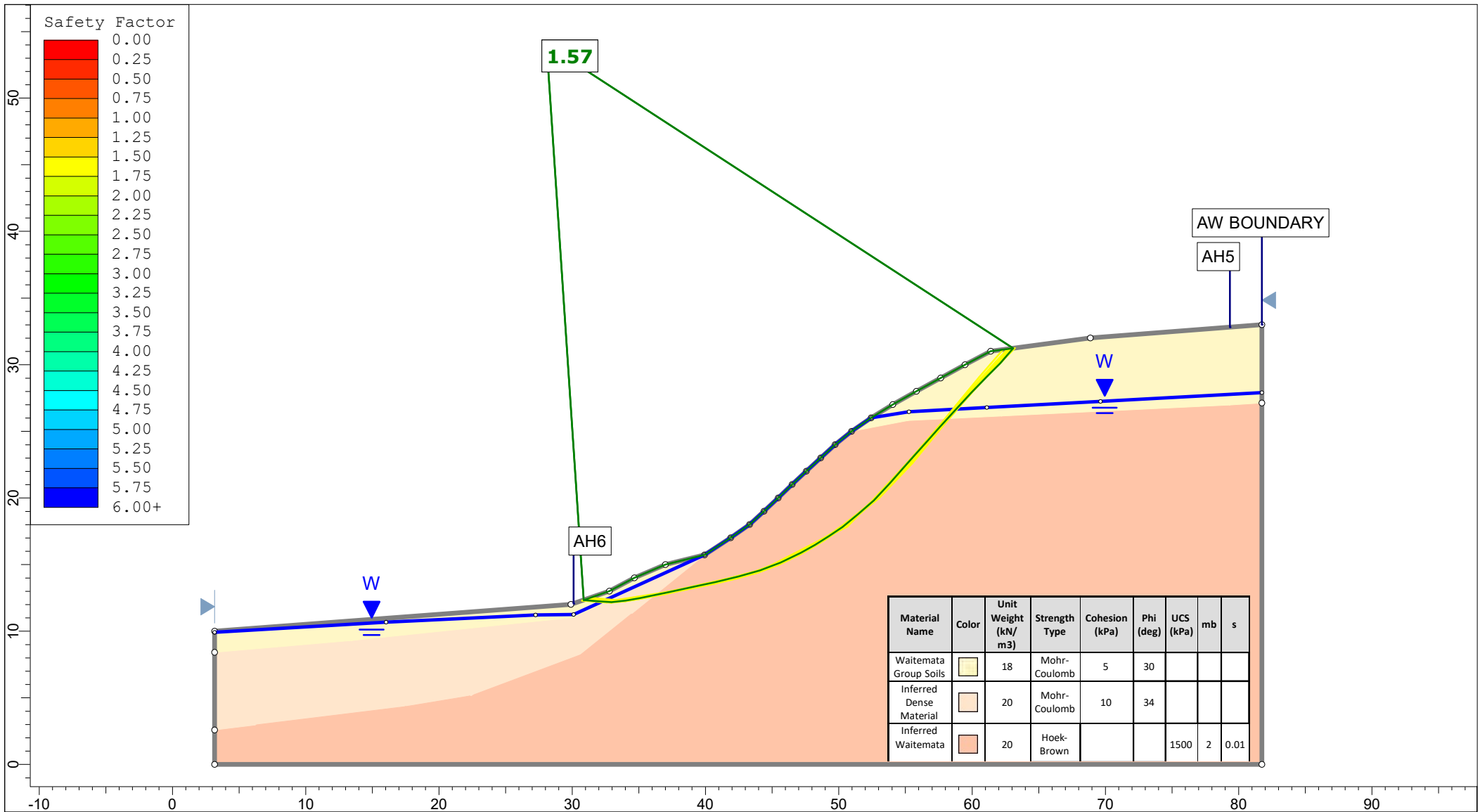



APPENDIX C

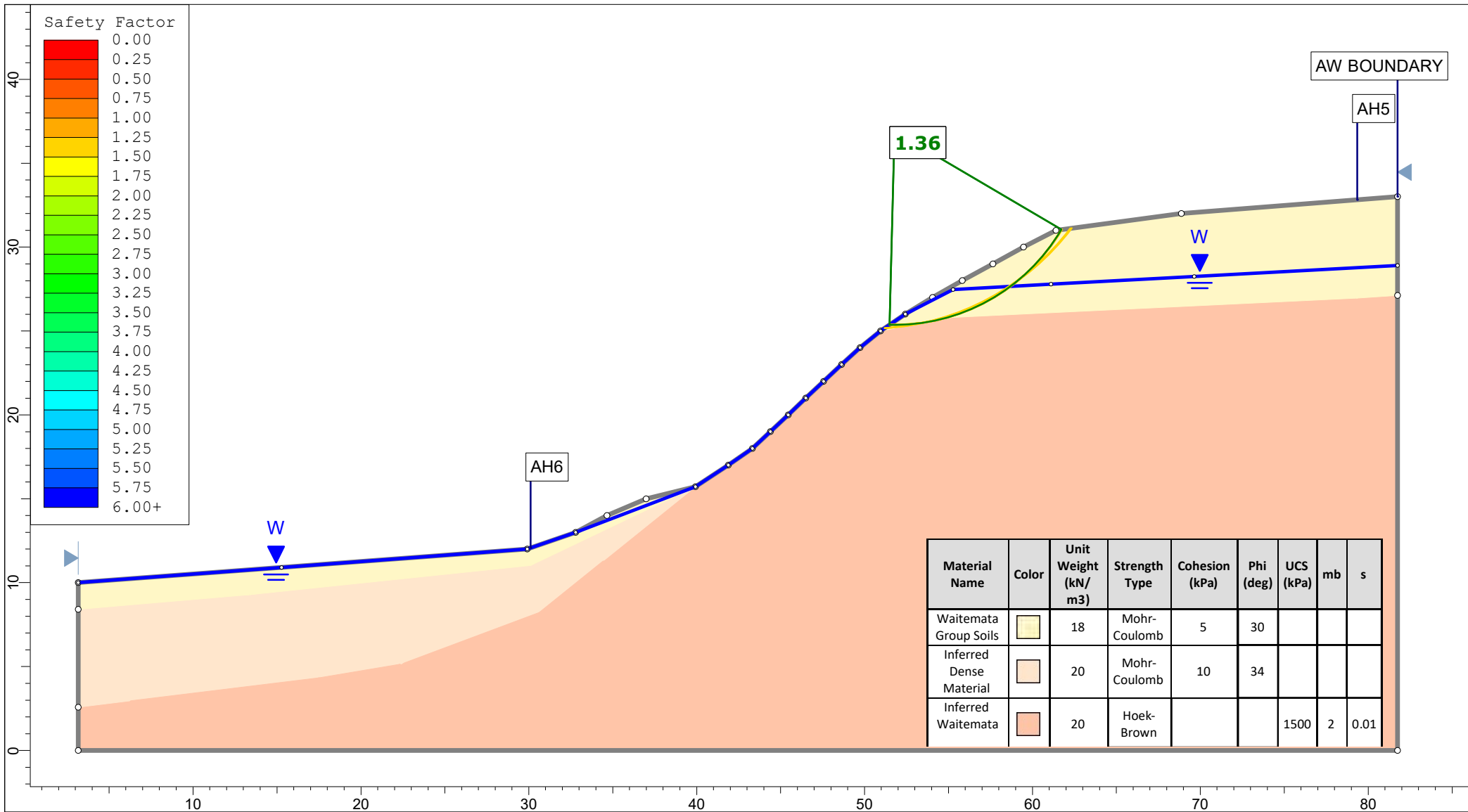
Slope Stability Calculations




<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section A-A'		
	Drawn By		TR		
	Date		26 February 2024		
		Scenario		Run 1 - Measured Groundwater - Circular	
		Company		KGA Geotechnical Group Limited	
		File Name		2024 Master.slmd	

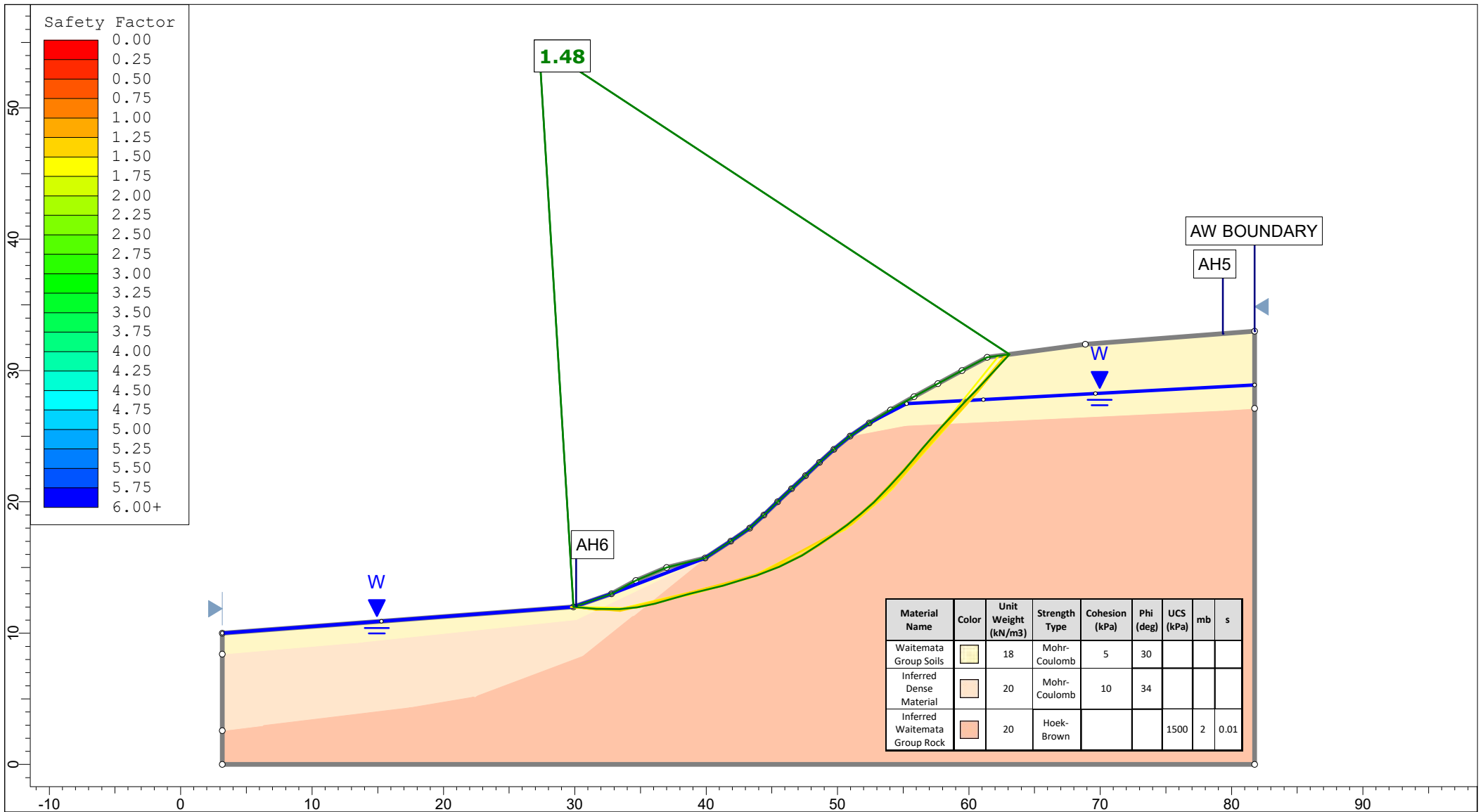


 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui				
	Group		Cross Section A-A'				
	Scenario		Run 2 - Measured Groundwater - Non-Cicular				
	Company		KGA Geotechnical Group Limited				
Drawn By		TR		File Name		2024 Master.slmd	
Date		26 February 2024					

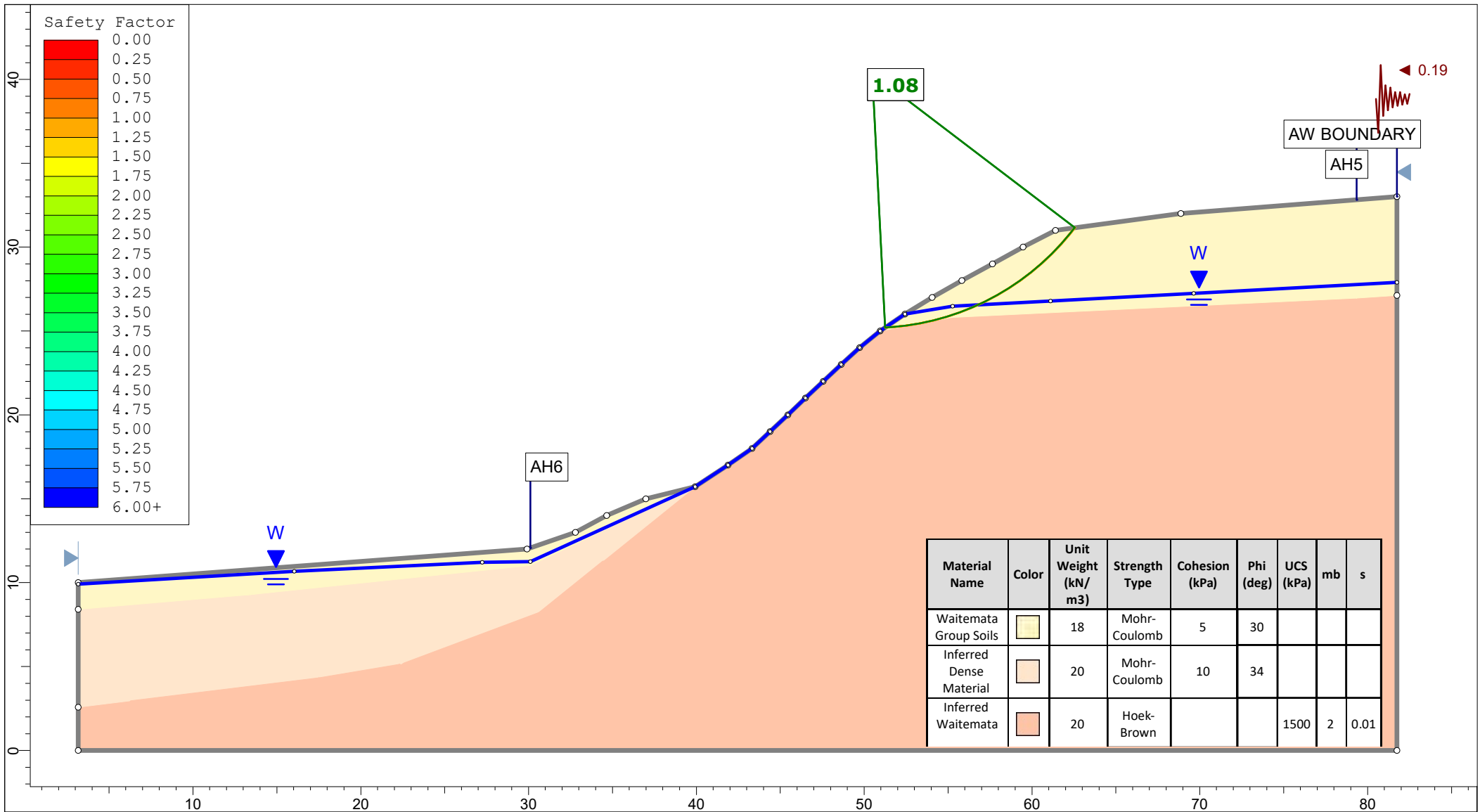



Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)	UCS (kPa)	mb	s
Waitemata Group Soils	Yellow	18	Mohr-Coulomb	5	30			
Inferred Dense Material	Light Orange	20	Mohr-Coulomb	10	34			
Inferred Waitemata	Dark Orange	20	Hoek-Brown			1500	2	0.01

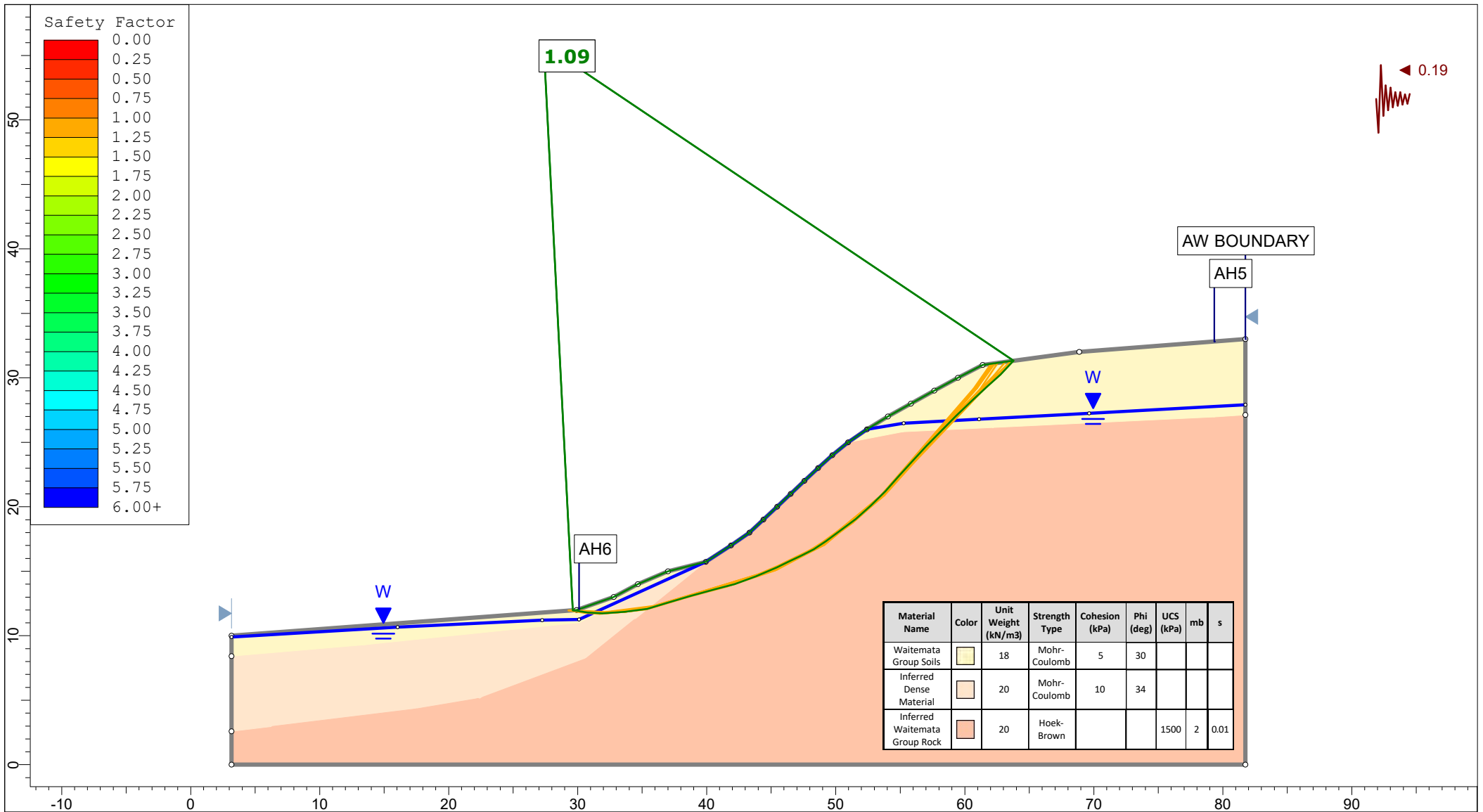
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p> 	Project	K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group	Cross Section A-A'	Scenario	Run 3 - Raised Groundwater - Cicular
	Drawn By	TR	Company	KGA Geotechnical Group Limited
	Date	26 February 2024	File Name	2024 Master.slmd




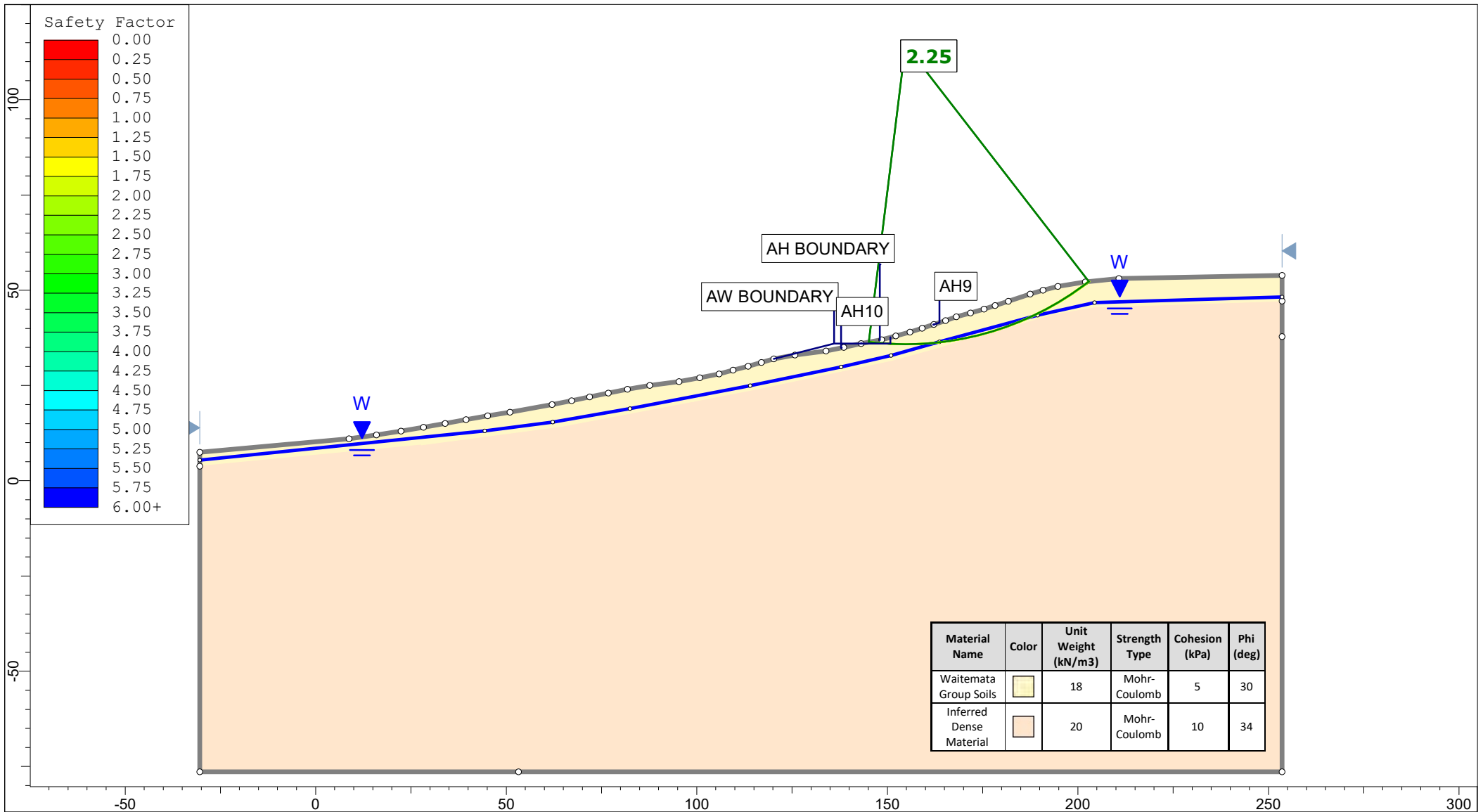
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section A-A'	
	Scenario		Run 4 - Raised Groundwater - Non-Cicular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.slmd		



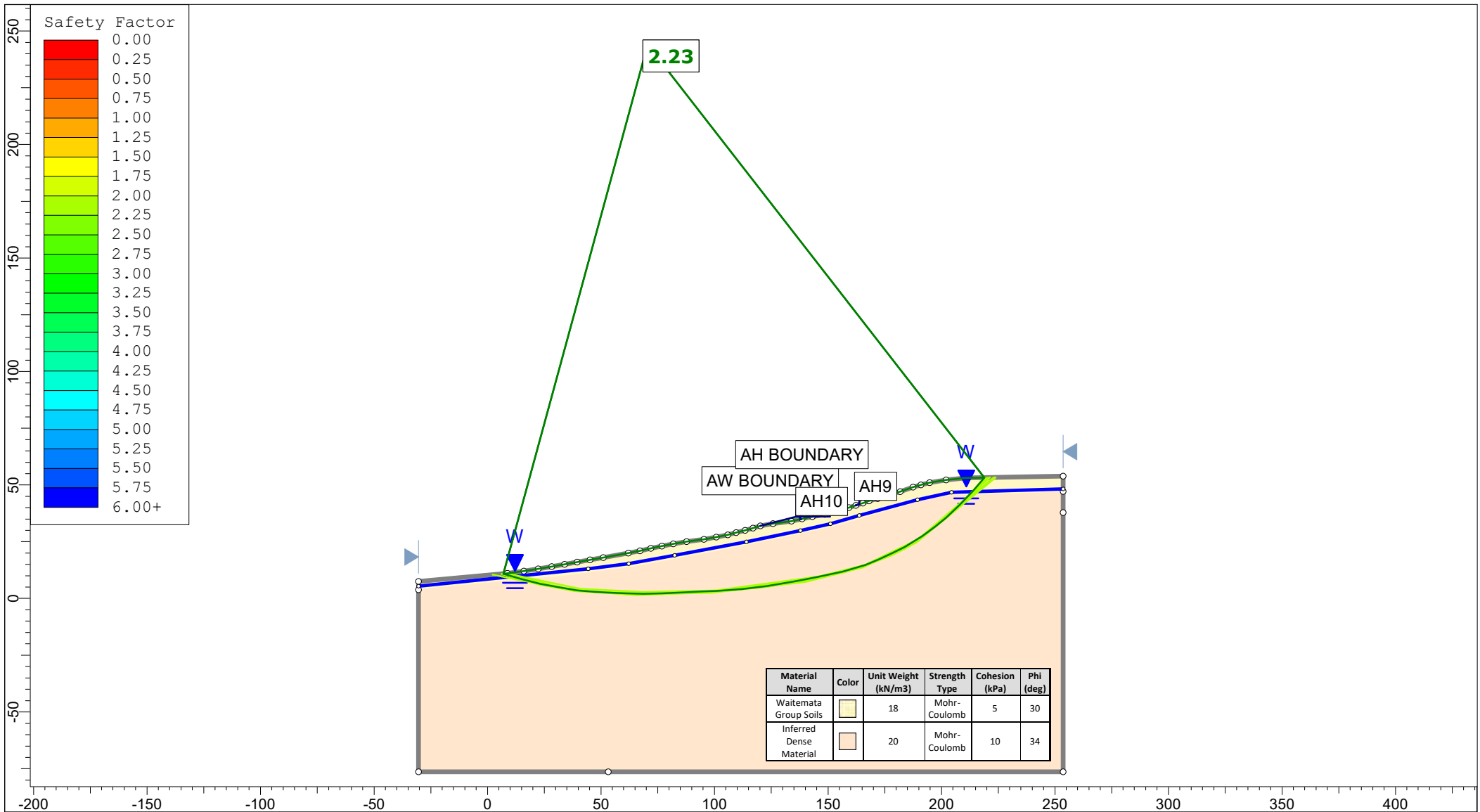
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section A-A'	
	Scenario		Run 5 - Seismic Loading - Circular	
	Company		KGA Geotechnical Group Limited	
Date		26 February 2024		
File Name		2024 Master.slmd		



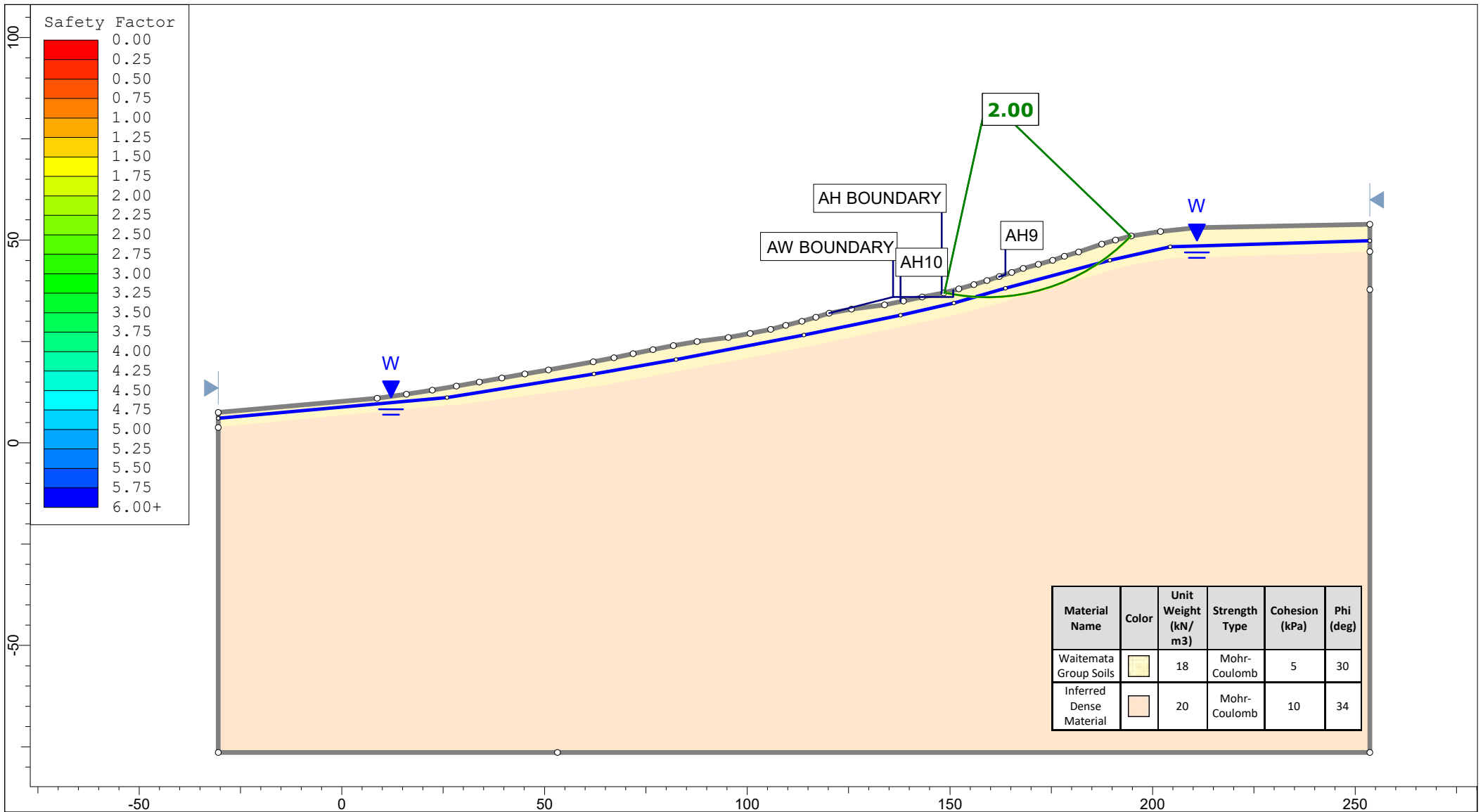
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p> 	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section A-A'	
	Drawn By		TR	
	Date		26 February 2024	
		Scenario		Run 6 - Seismic Loading - Non-Circular
		Company		KGA Geotechnical Group Limited
		File Name		2024 Master.slmd




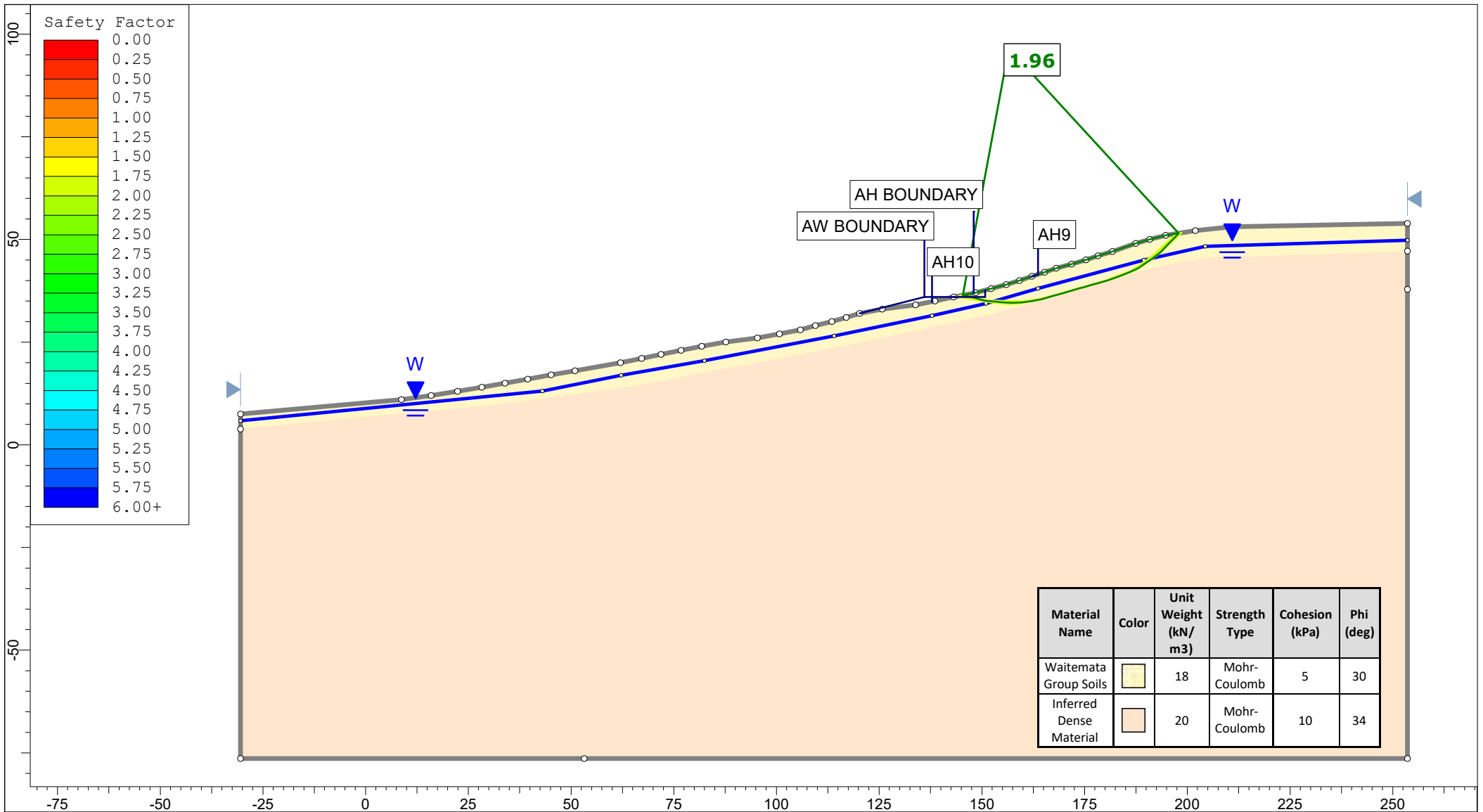
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section B-B' Measured Ground		
	Drawn By		TR		
	Date		26 February 2024		
		Scenario		Run 1 - Measured Groundwater - Circular	
		Company		KGA Geotechnical Group Limited	
		File Name		2024 Master.slm	




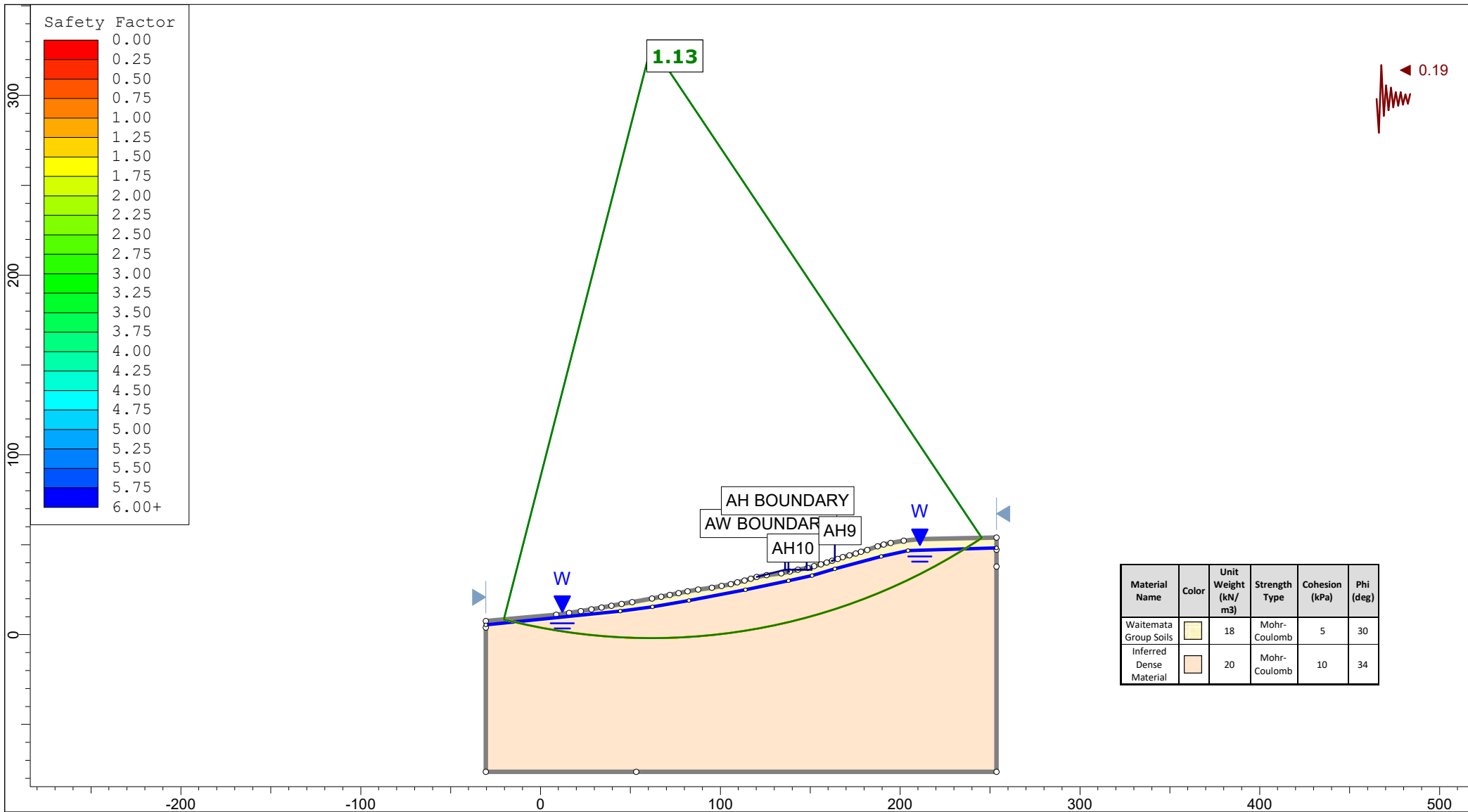
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section B-B' Measured Ground	Scenario	Run 2 - Measured Groundwater - Non-Cicular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm



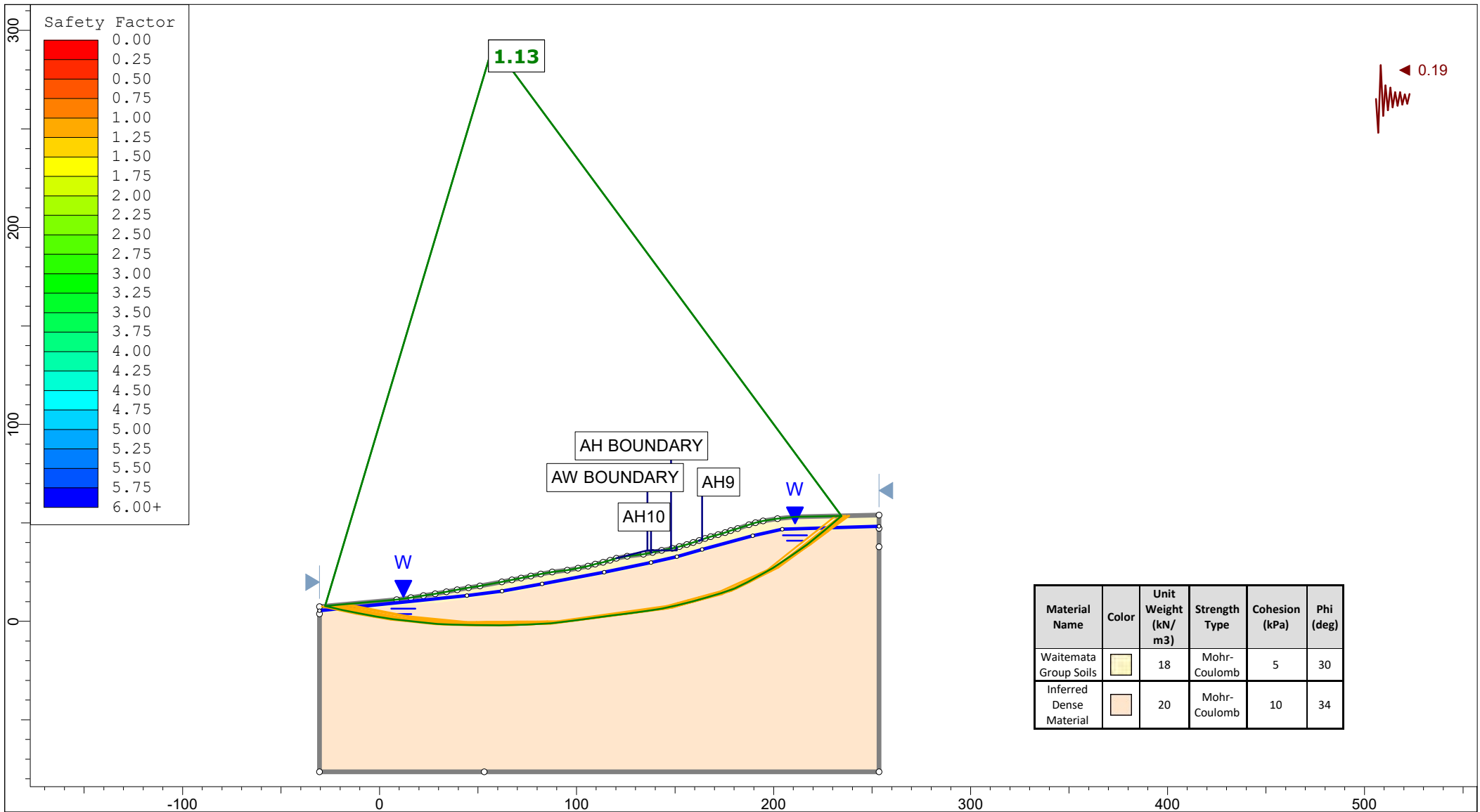
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section B-B' Measured Ground	
	Scenario		Run 3 - Raised Groundwater - Cicular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.sldm		




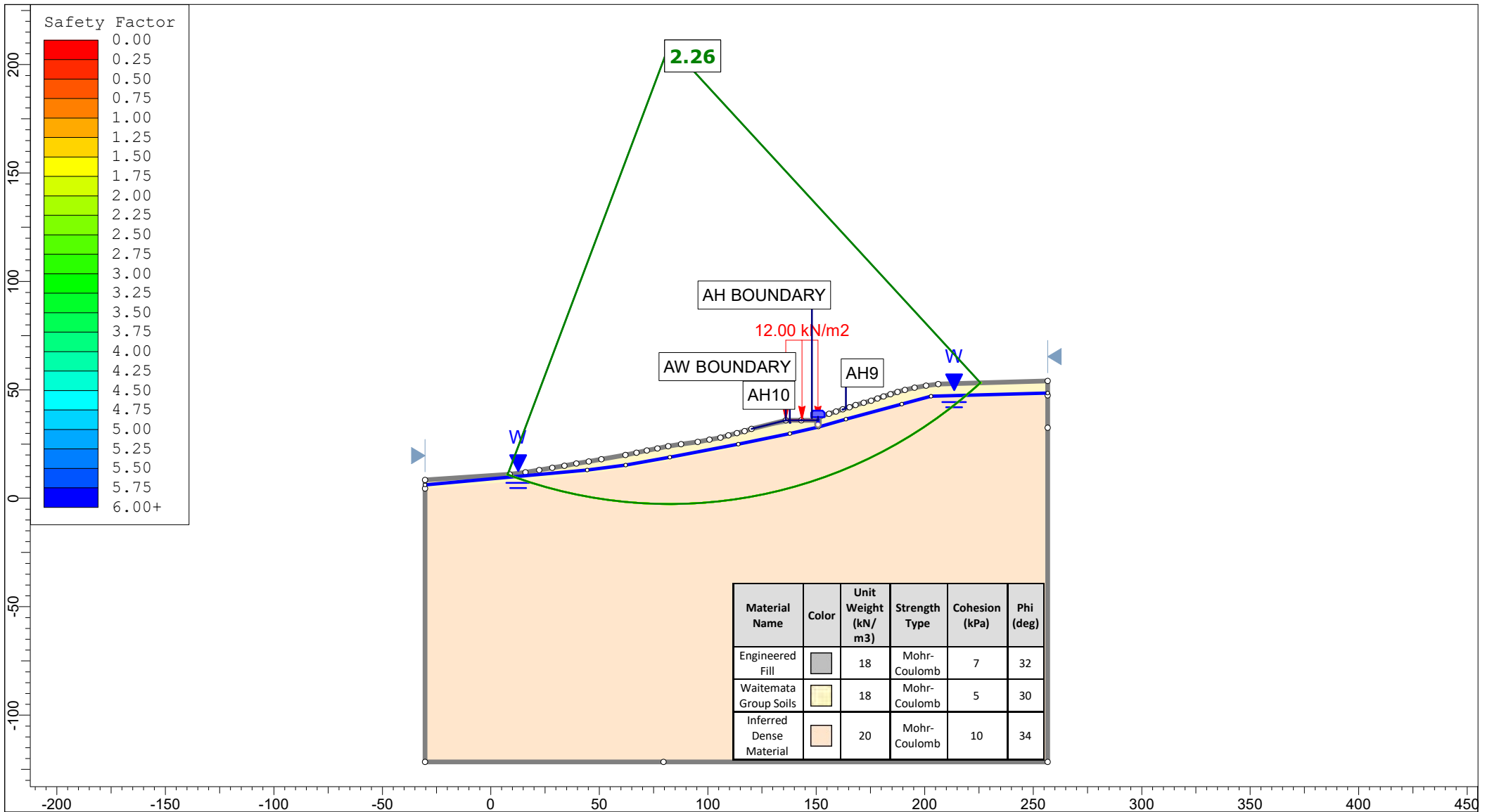
 Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section B-B' Measured Ground	
	Scenario		Run 4 - Raised Groundwater - Non-Cicular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.slmd		




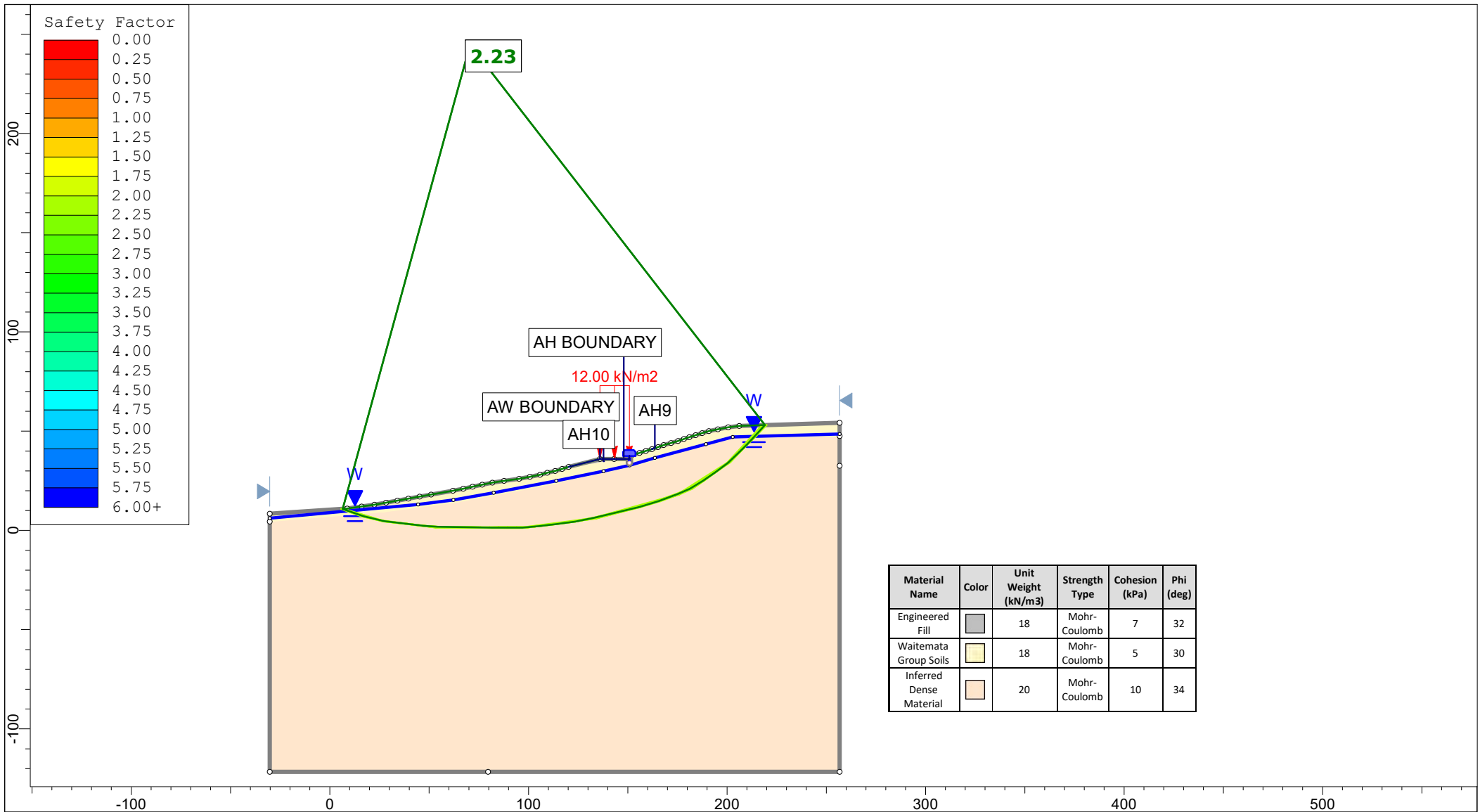
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section B-B' Measured Ground	Scenario	Run 5 - Seismic Loading - Cicular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.slmd




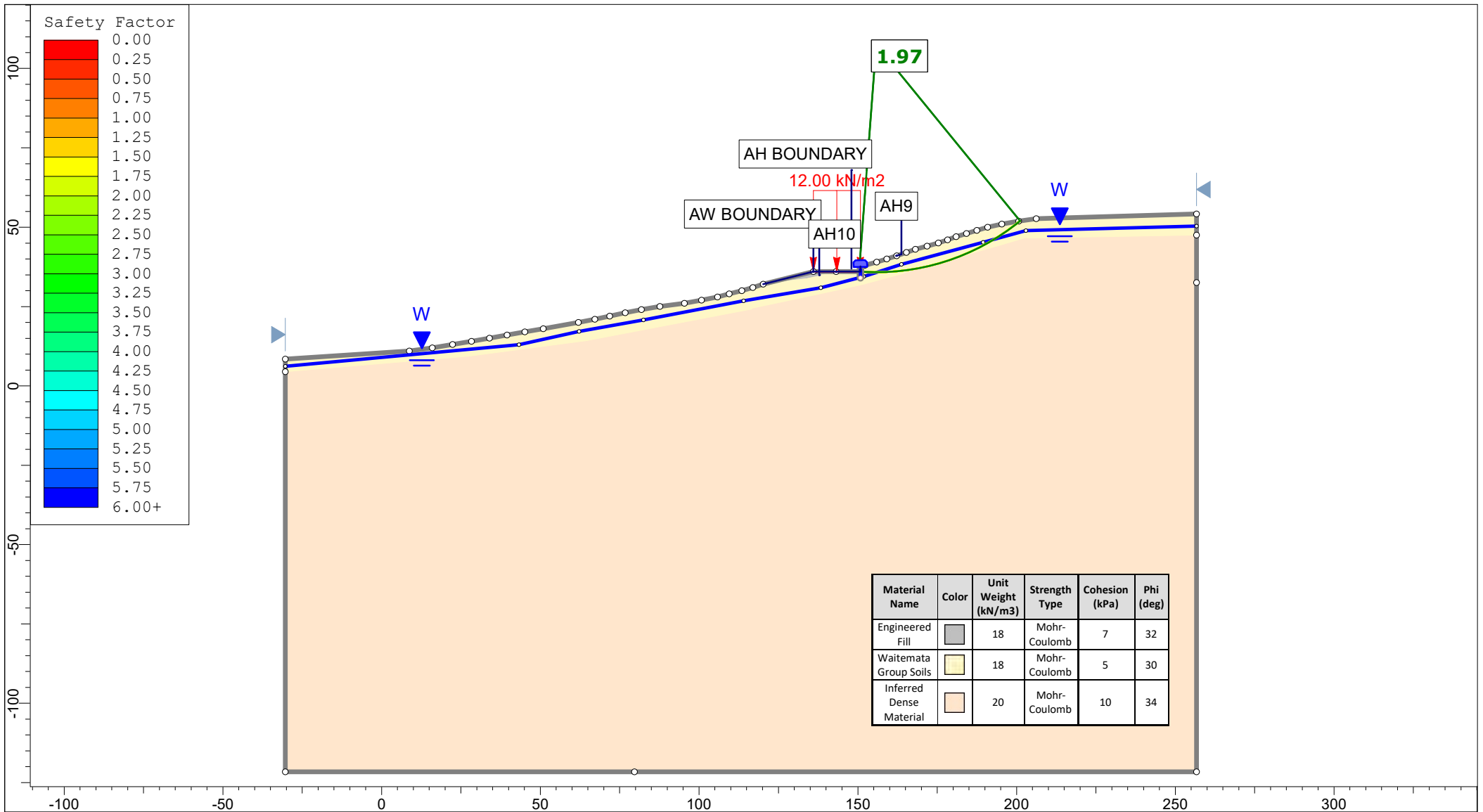
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	Group		Cross Section B-B' Measured Ground	Scenario	Run 6 - Seismic Loading - Non-Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm




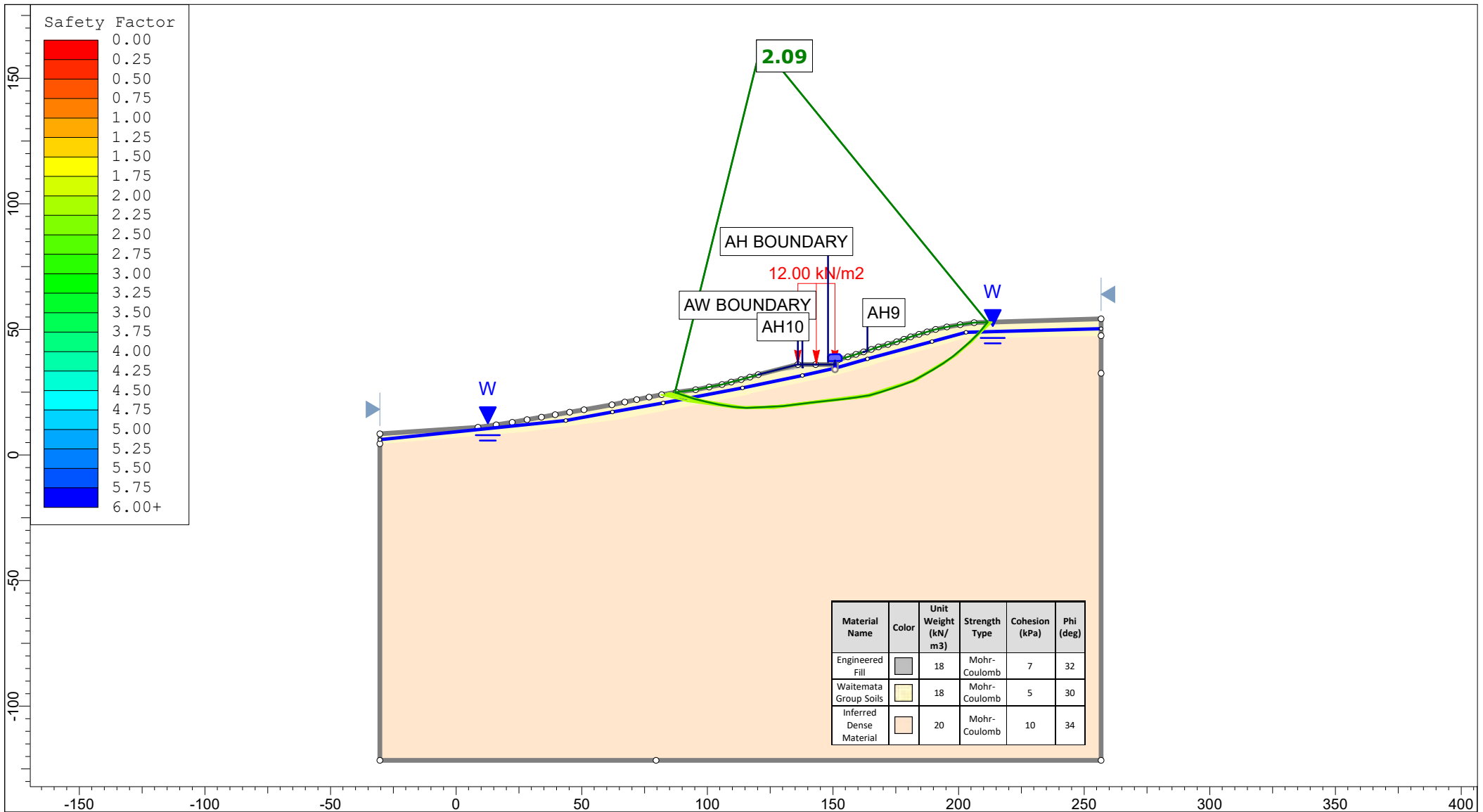
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p> 	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section B-B' Proposed Ground	Scenario	Run 1 - Measured Groundwater - Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm



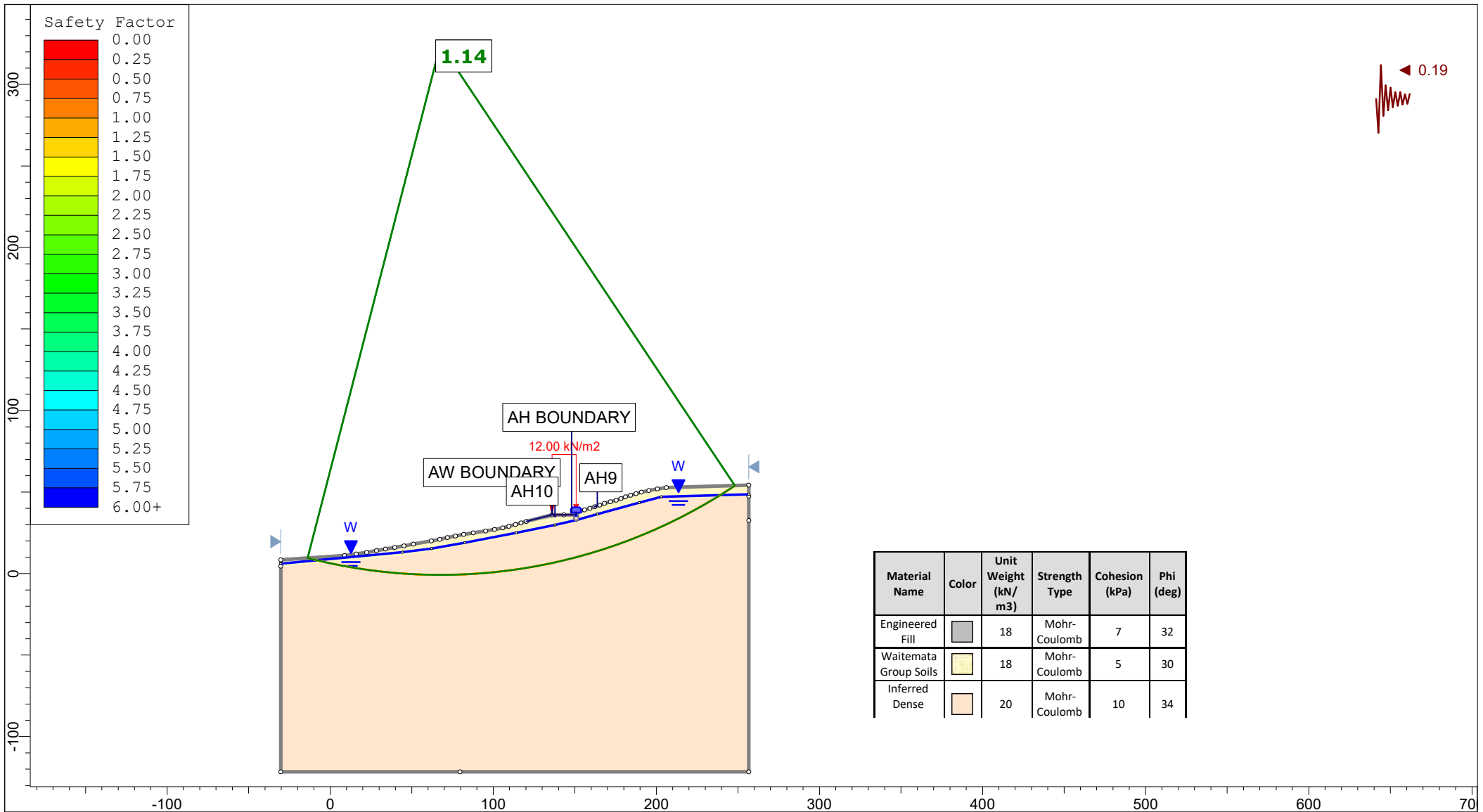
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui			
	Group		Cross Section B-B' Proposed Ground	Scenario	Run 2 - Measured Groundwater - Non-Cicular	
	Drawn By		TR	Company		KGA Geotechnical Group Limited
	Date		26 February 2024	File Name		2024 Master.slm



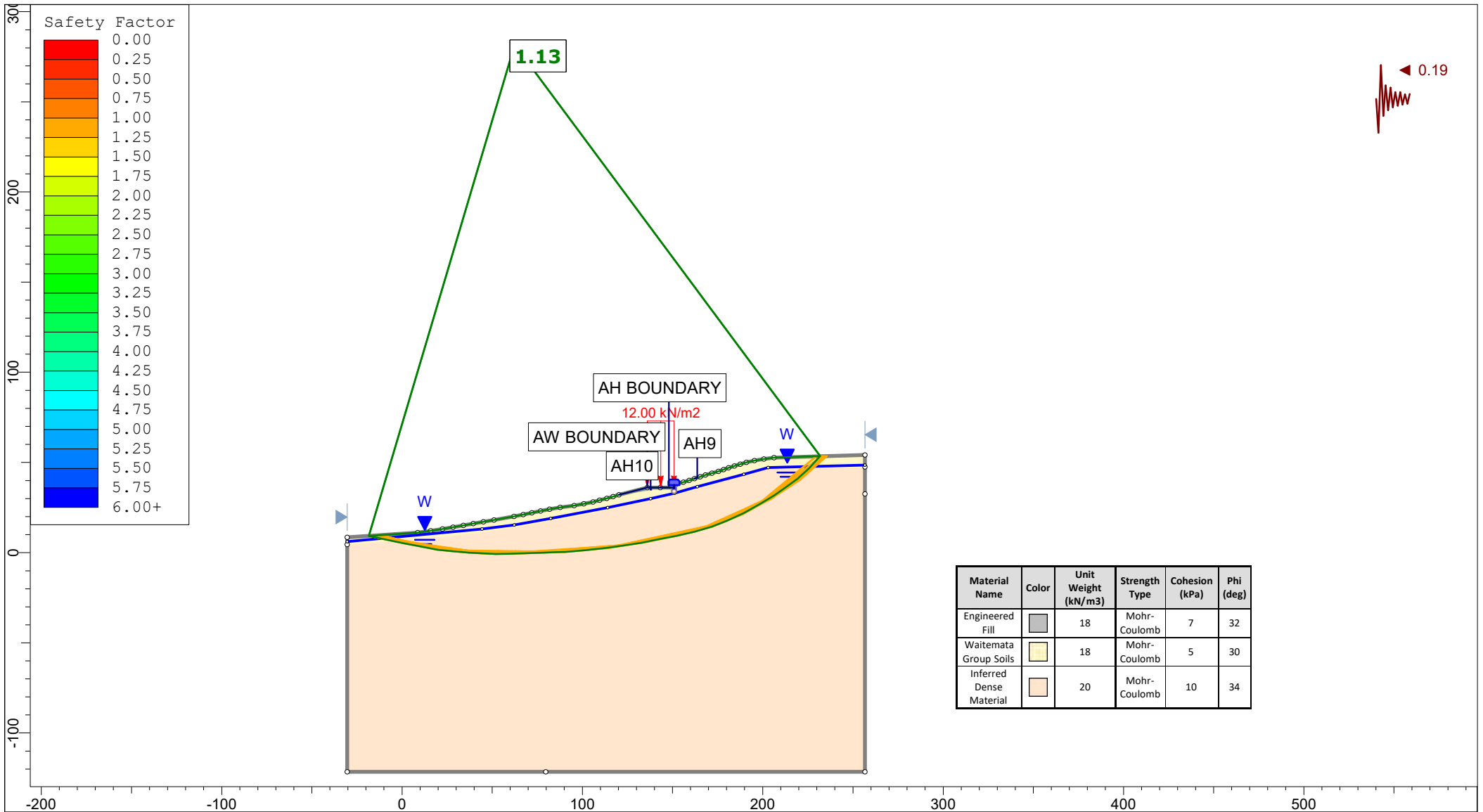
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui			
	Group		Cross Section B-B' Proposed Ground	Scenario	Run 3 - Raised Groundwater - Circular	
	Drawn By		TR	Company		KGA Geotechnical Group Limited
	Date		26 February 2024	File Name		2024 Master.slmd




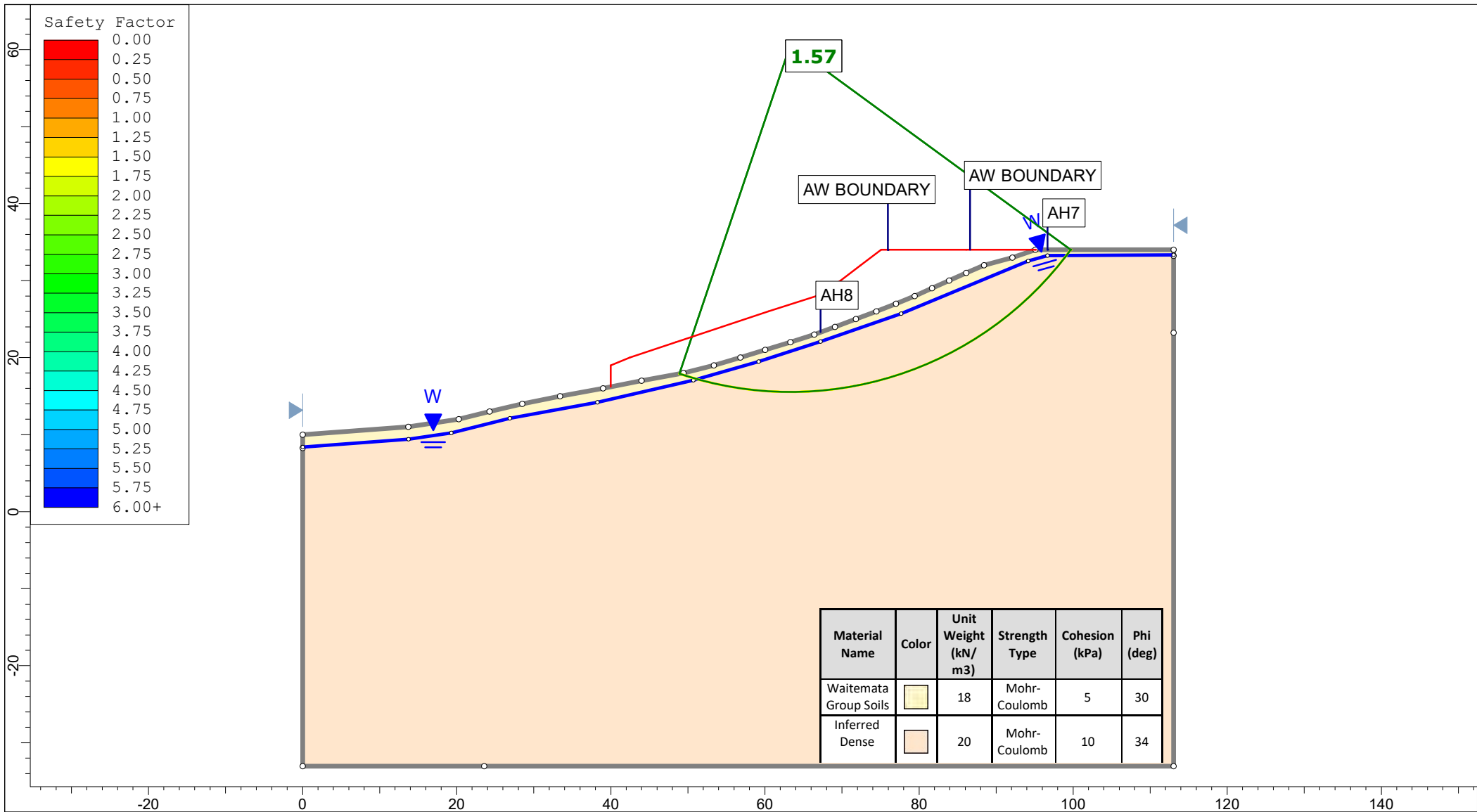
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section B-B' Proposed Ground		
	Drawn By		TR		
	Date		26 February 2024		
		Scenario		Run 4 - Raised Groundwater - Non-Cicular	
		Company		KGA Geotechnical Group Limited	
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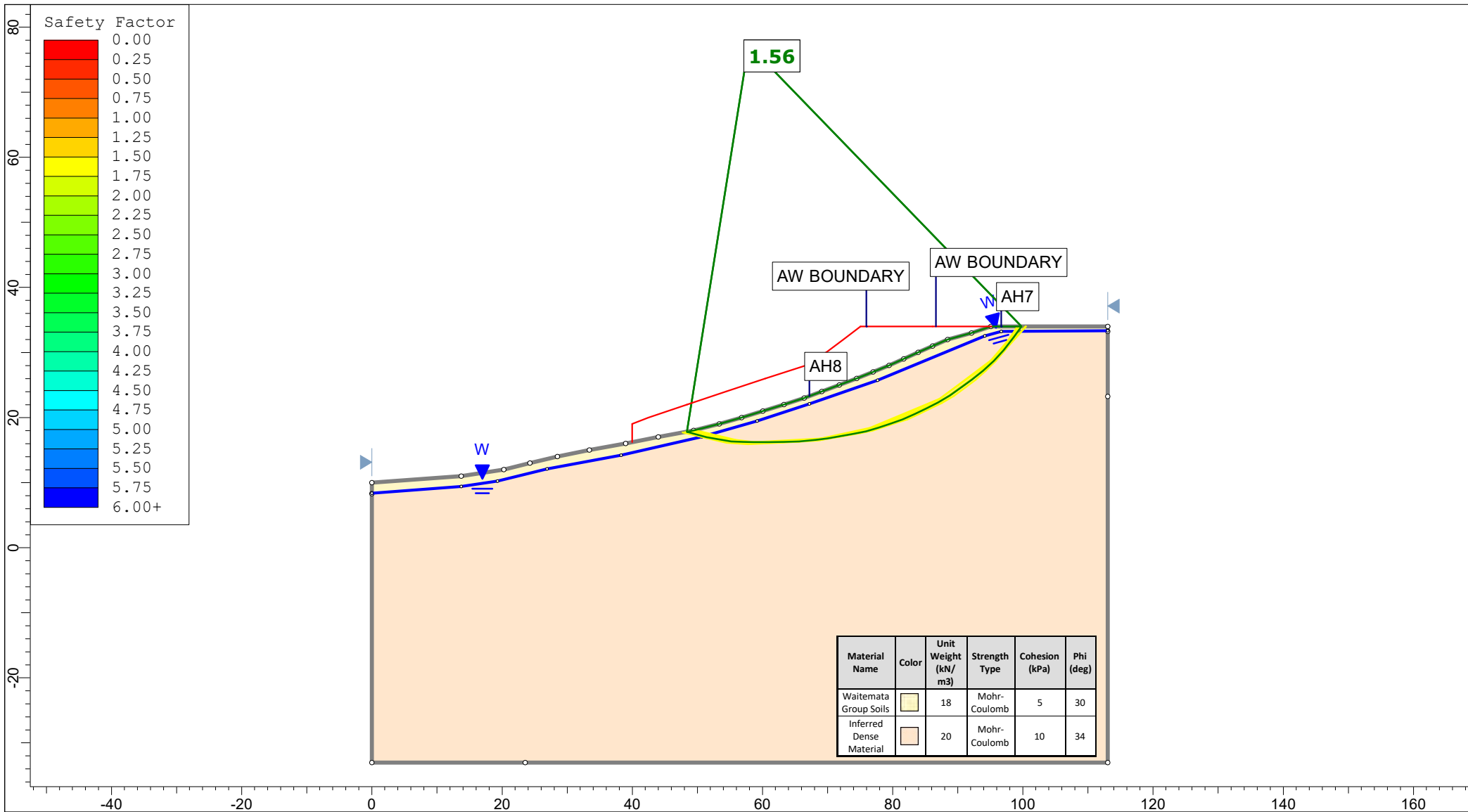
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	Group	Cross Section B-B' Proposed Ground	Scenario	Run 5 - Seismic Loading - Circular
	Drawn By	TR	Company	KGA Geotechnical Group Limited
	Date	26 February 2024	File Name	2024 Master.sldm




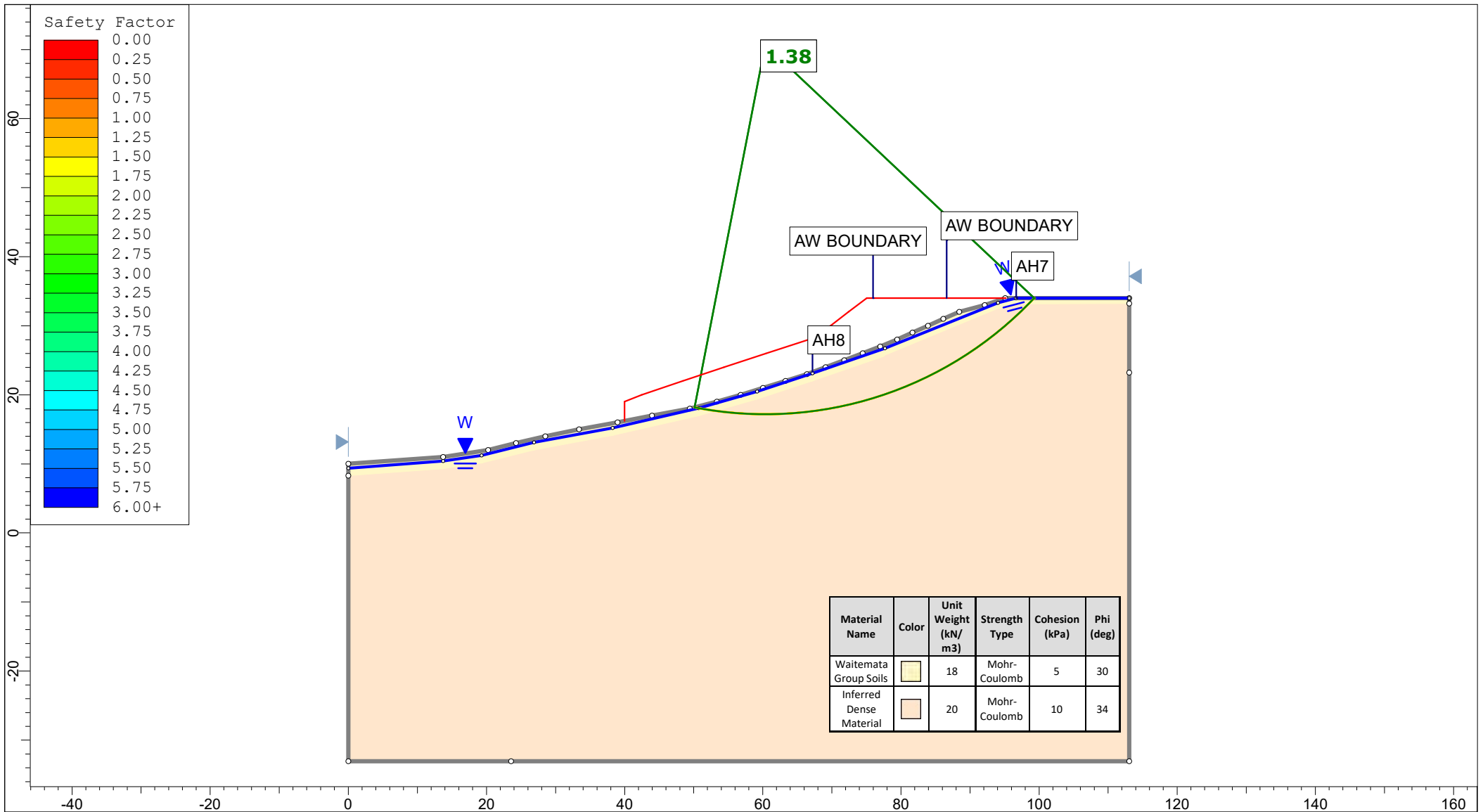
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui			
	Group		Cross Section B-B' Proposed Ground	Scenario	Run 6 - Seismic Loading - Non-Circular	
	Drawn By		TR	Company		KGA Geotechnical Group Limited
	Date		26 February 2024	File Name		2024 Master.slmd



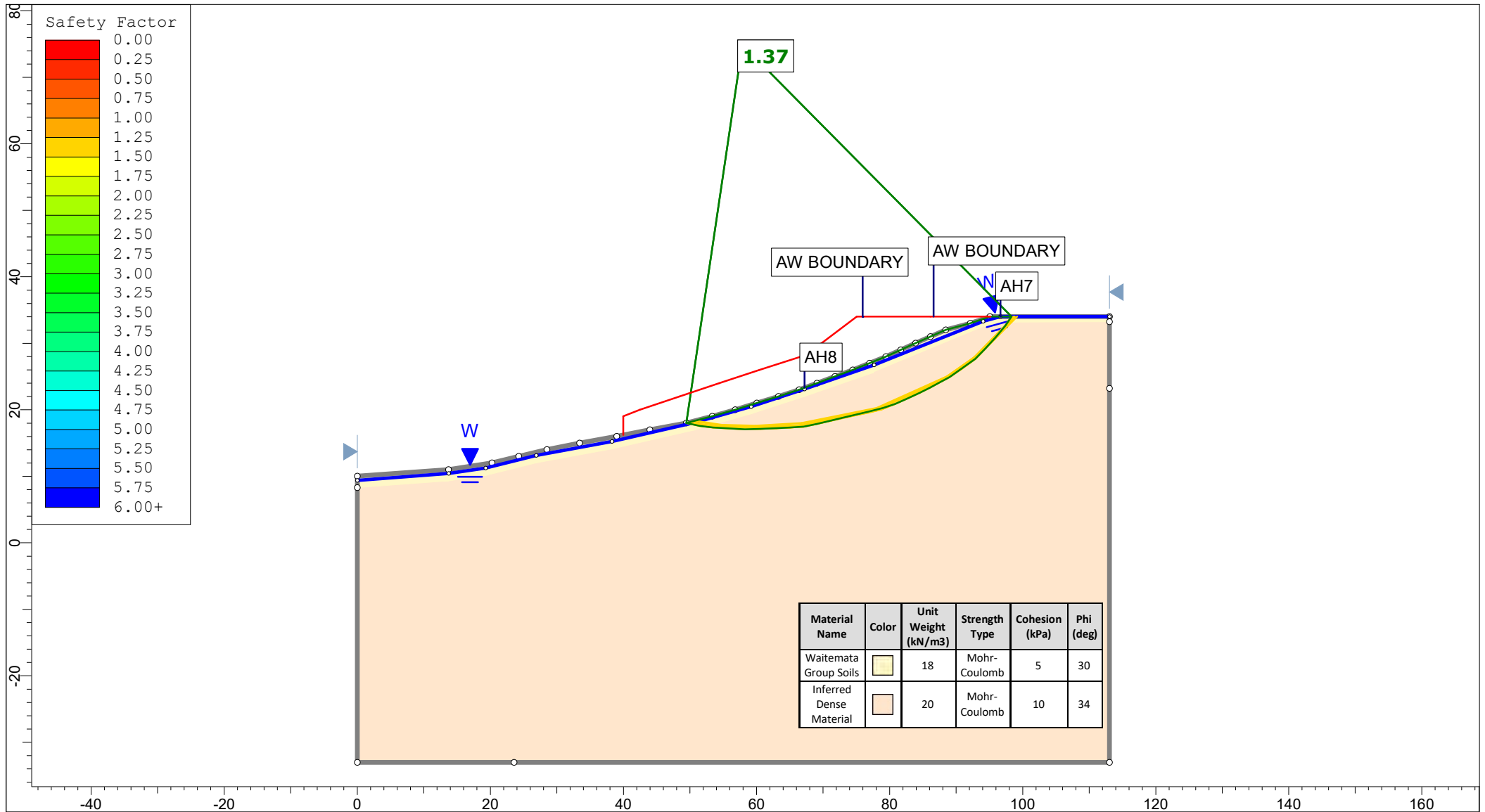
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	Group		Cross Section C-C' Measured Ground	Scenario	Run 1 - Measured Groundwater - Circular	
	Drawn By		TR	Company		KGA Geotechnical Group Limited
	Date		26 February 2024	File Name		2024 Master.sldm




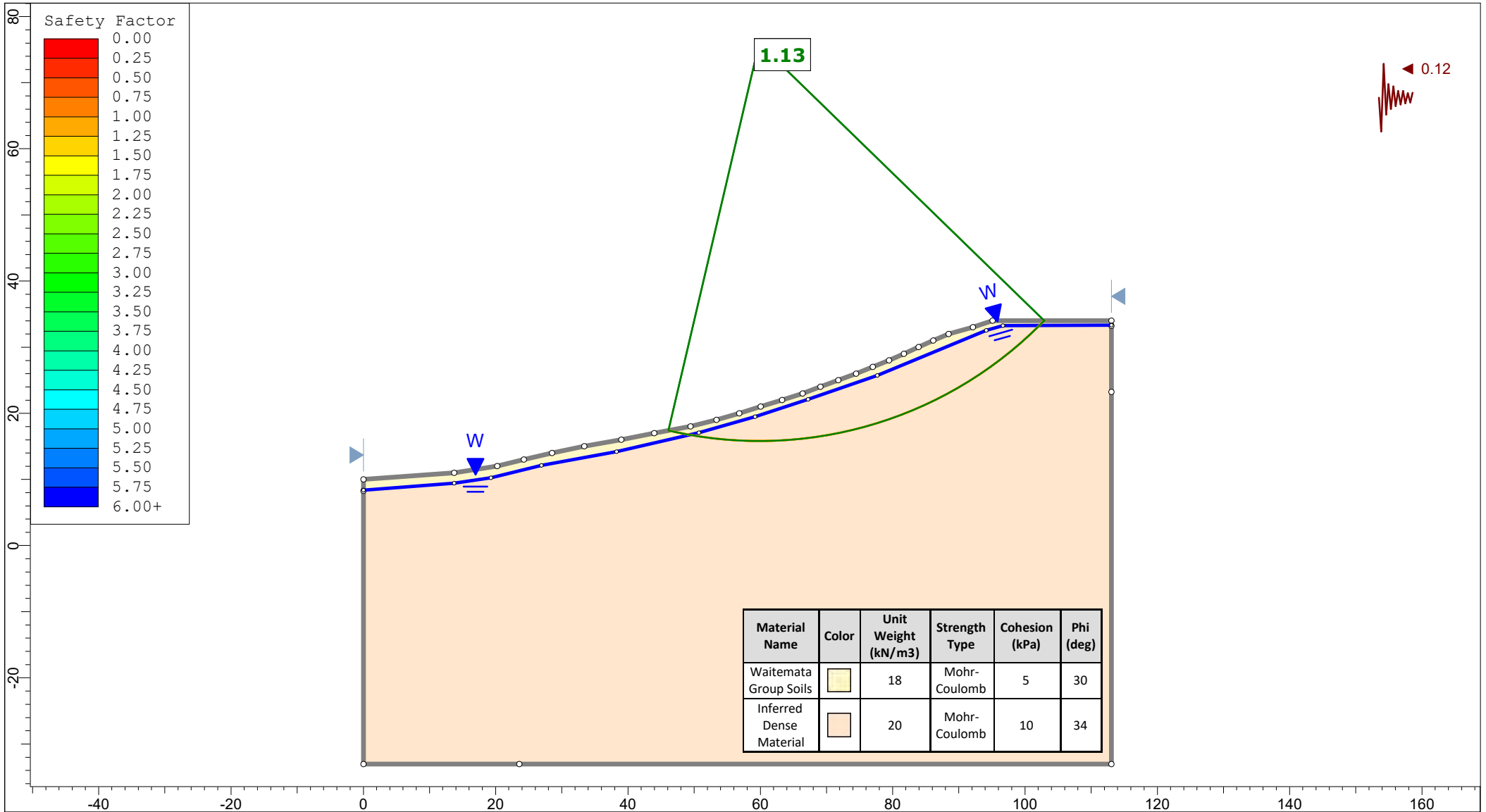
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	Group		Cross Section C-C' Measured Ground	Scenario	Run 2 - Measured Groundwater - Non-Cicular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.slm



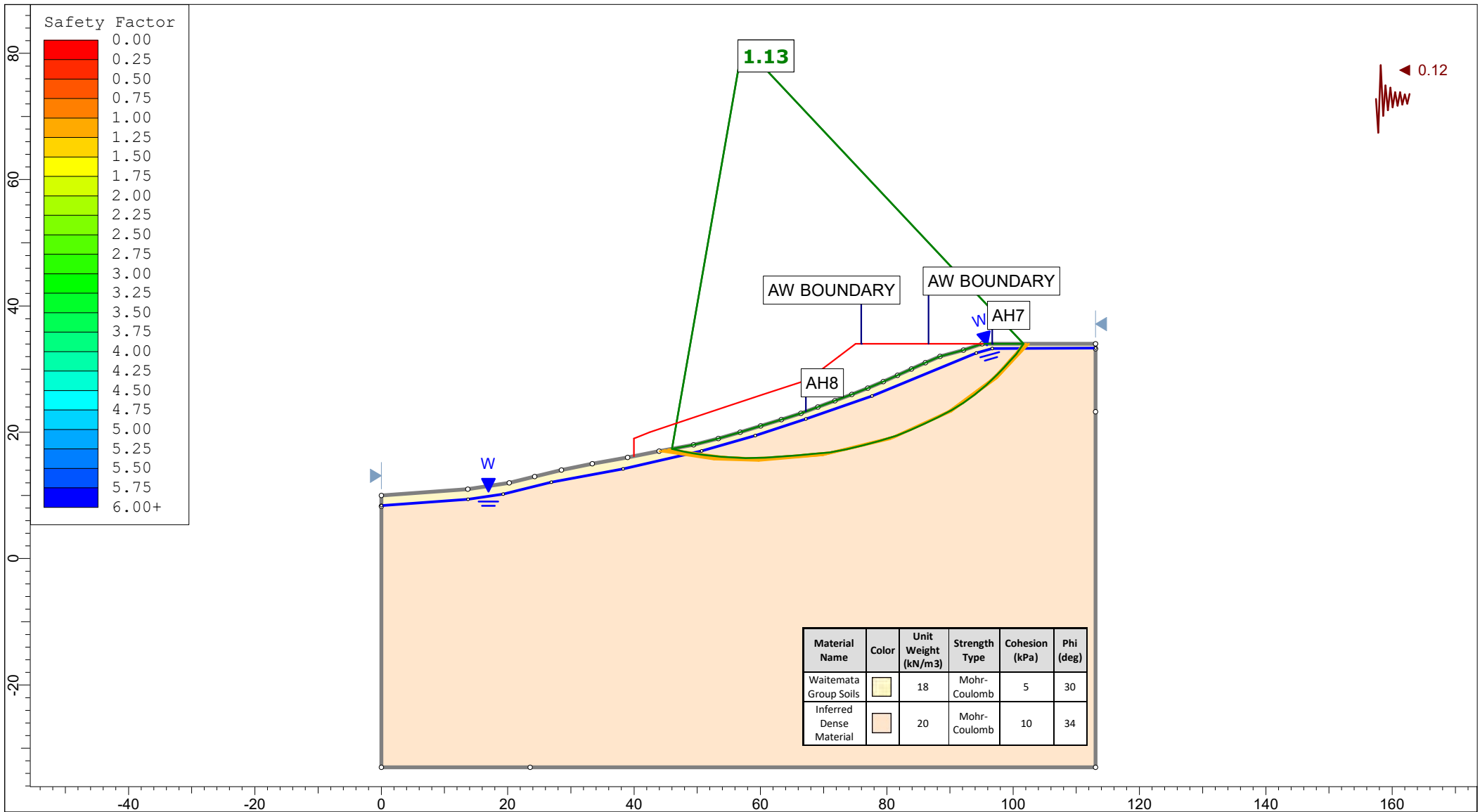
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section C-C' Measured Ground	Scenario	Run 3 - Raised Groundwater - Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm



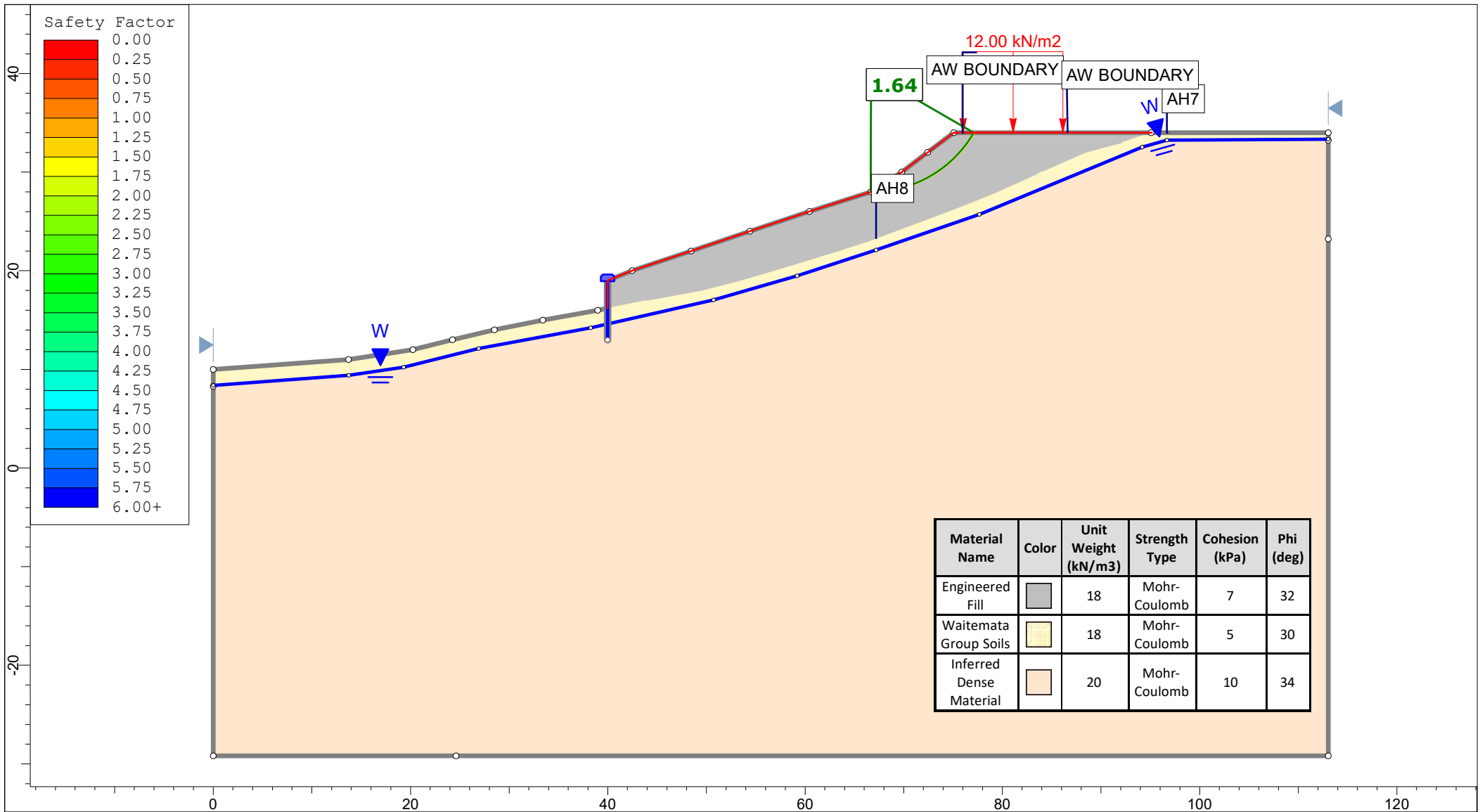
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui			
	Group		Cross Section C-C' Measured Ground	Scenario	Run 4 - Raised Groundwater - Non-Cicular	
	Drawn By		TR	Company		KGA Geotechnical Group Limited
	Date		26 February 2024	File Name		2024 Master.sldm



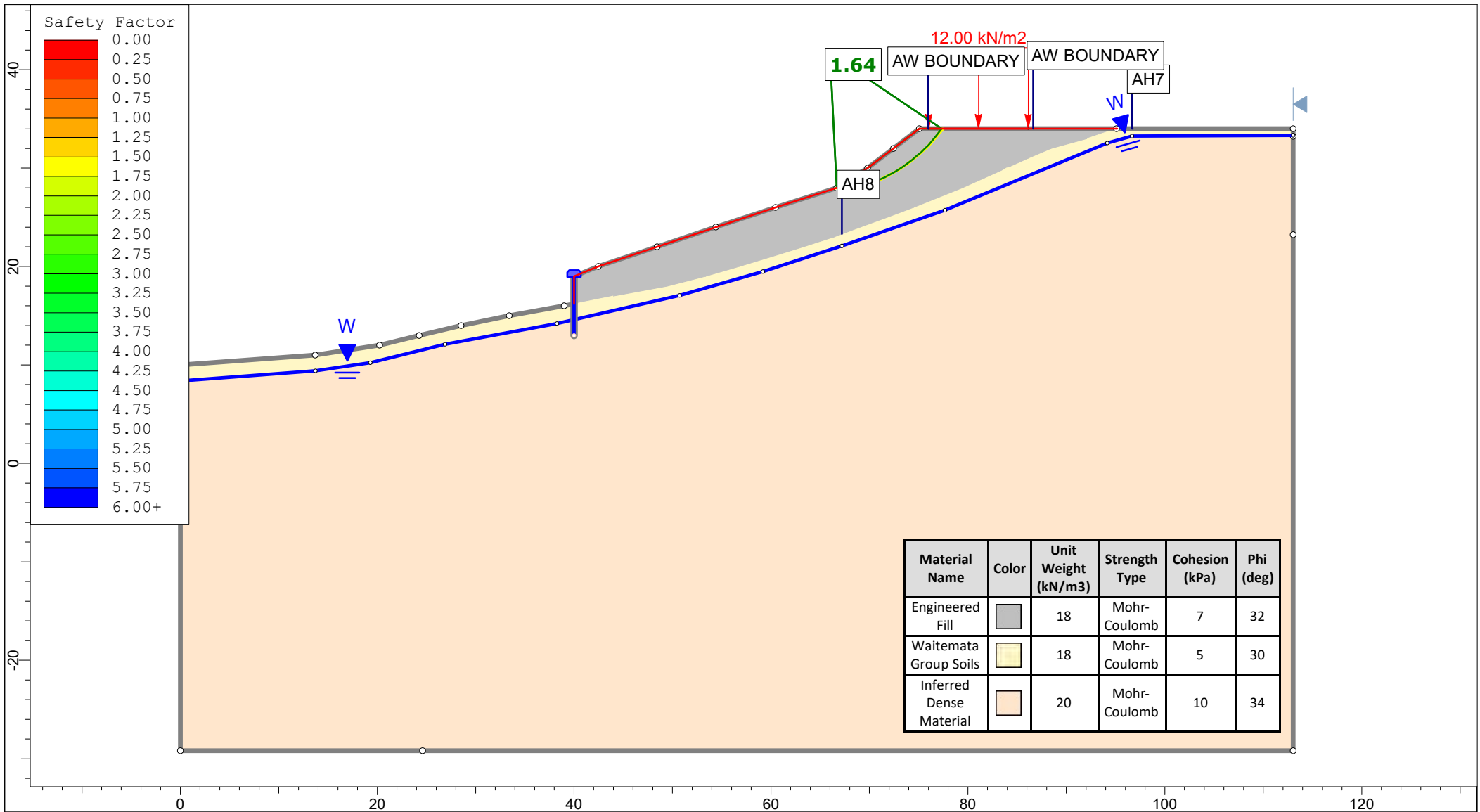
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
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	Date		26 February 2024	File Name	2024 Master.sldm



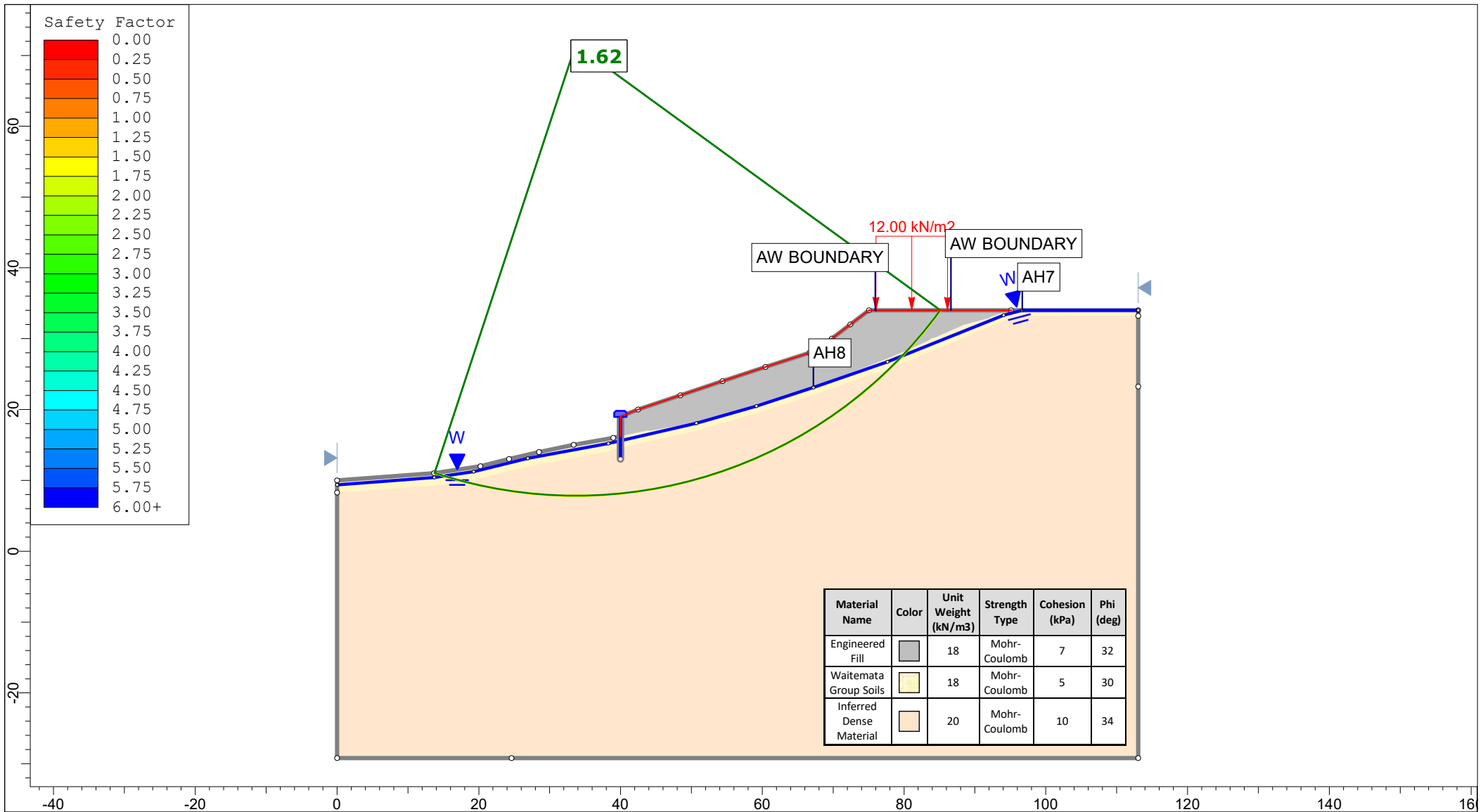
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section C-C' Measured Ground	Scenario	Run 6 - Seismic Loading - Non-Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm



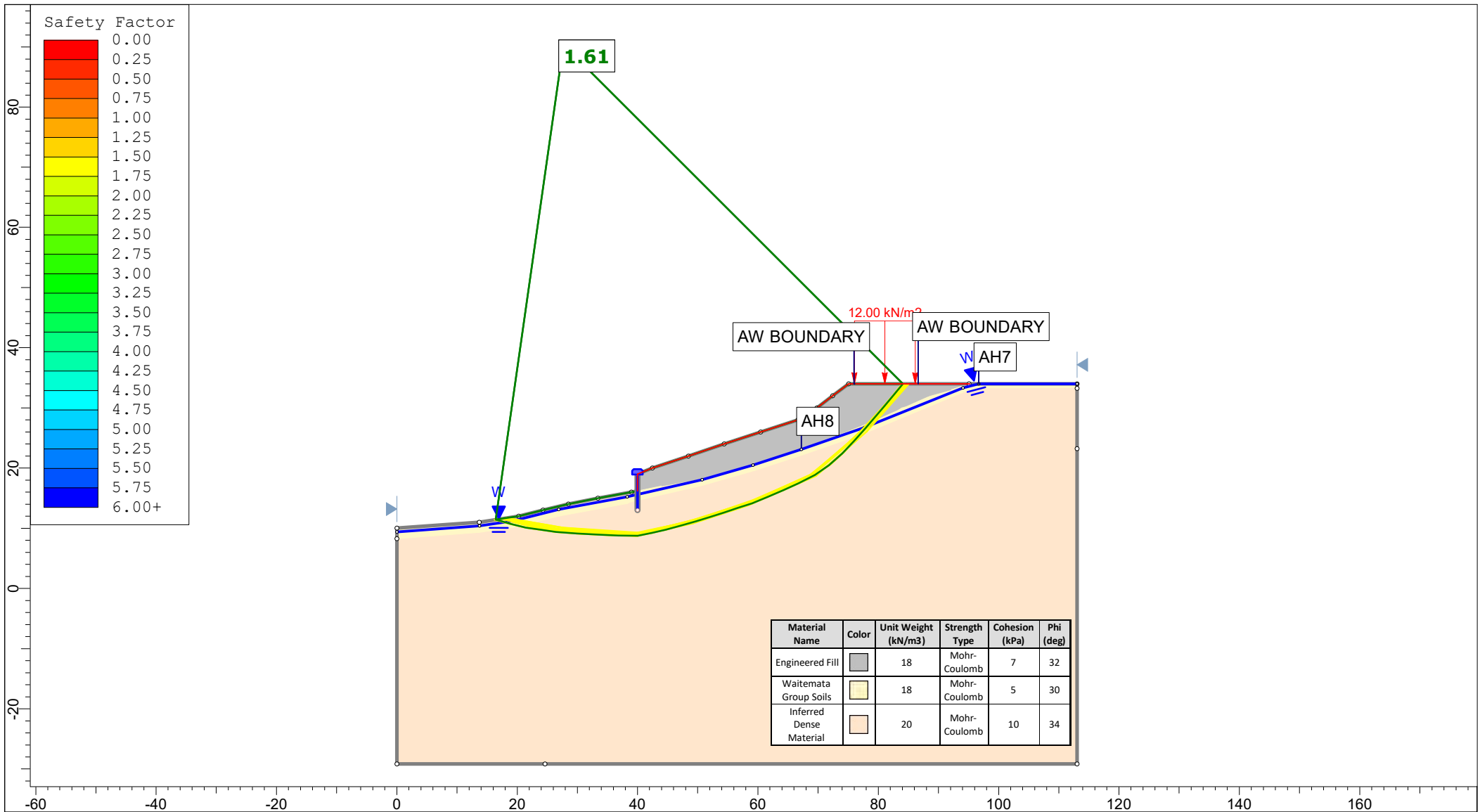
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section C-C' Proposed Ground	
	Scenario		Run 1 - Measured Groundwater - Circular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.slmd		



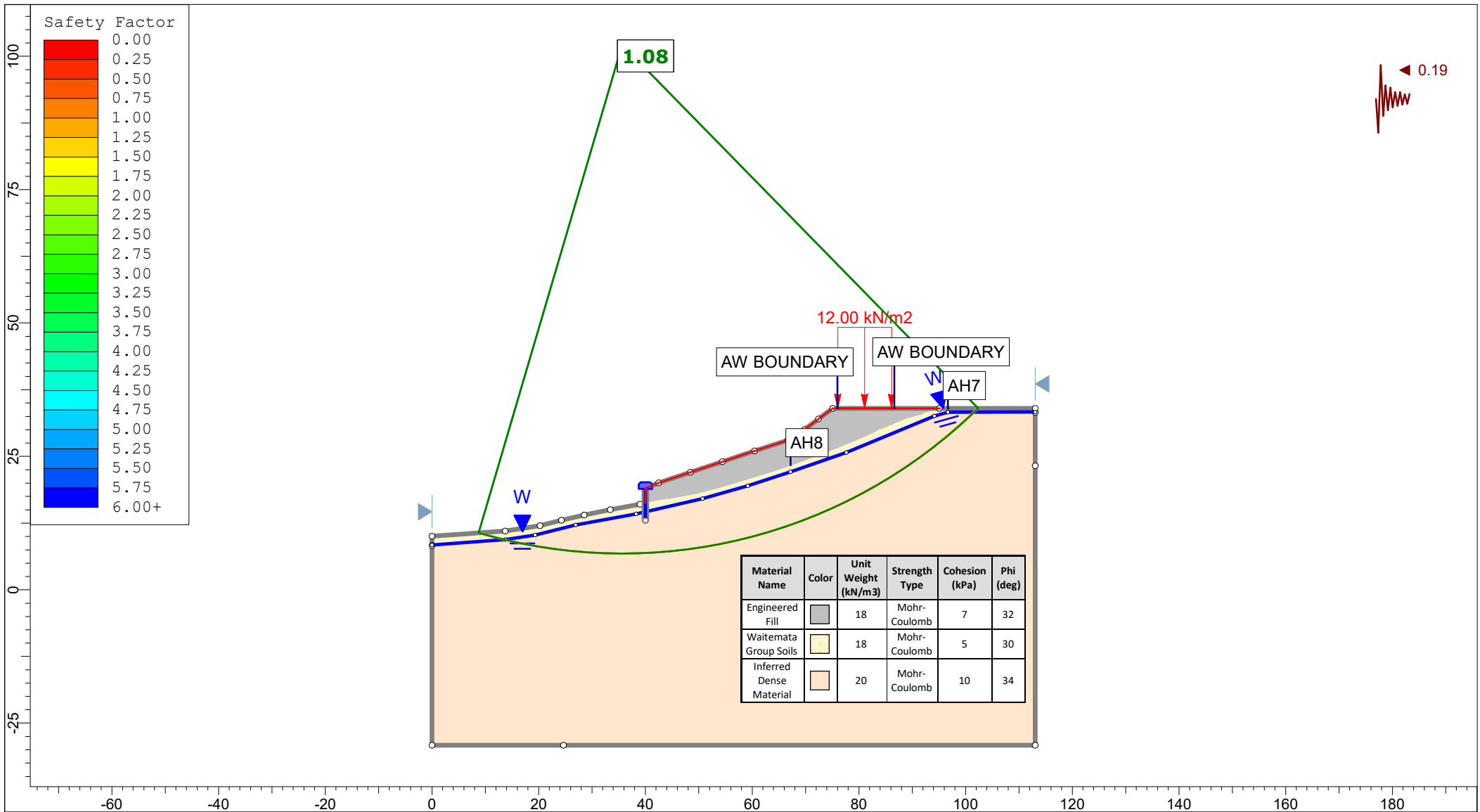
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui			
	Group		Cross Section C-C' Proposed Ground	Scenario	Run 2 - Measured Groundwater - Non-Cicular	
	Drawn By		TR	Company		KGA Geotechnical Group Limited
	Date		26 February 2024	File Name		2024 Master.slmd




<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section C-C' Proposed Ground	
	Scenario		Run 3 - Raised Groundwater - Circular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.sldm		

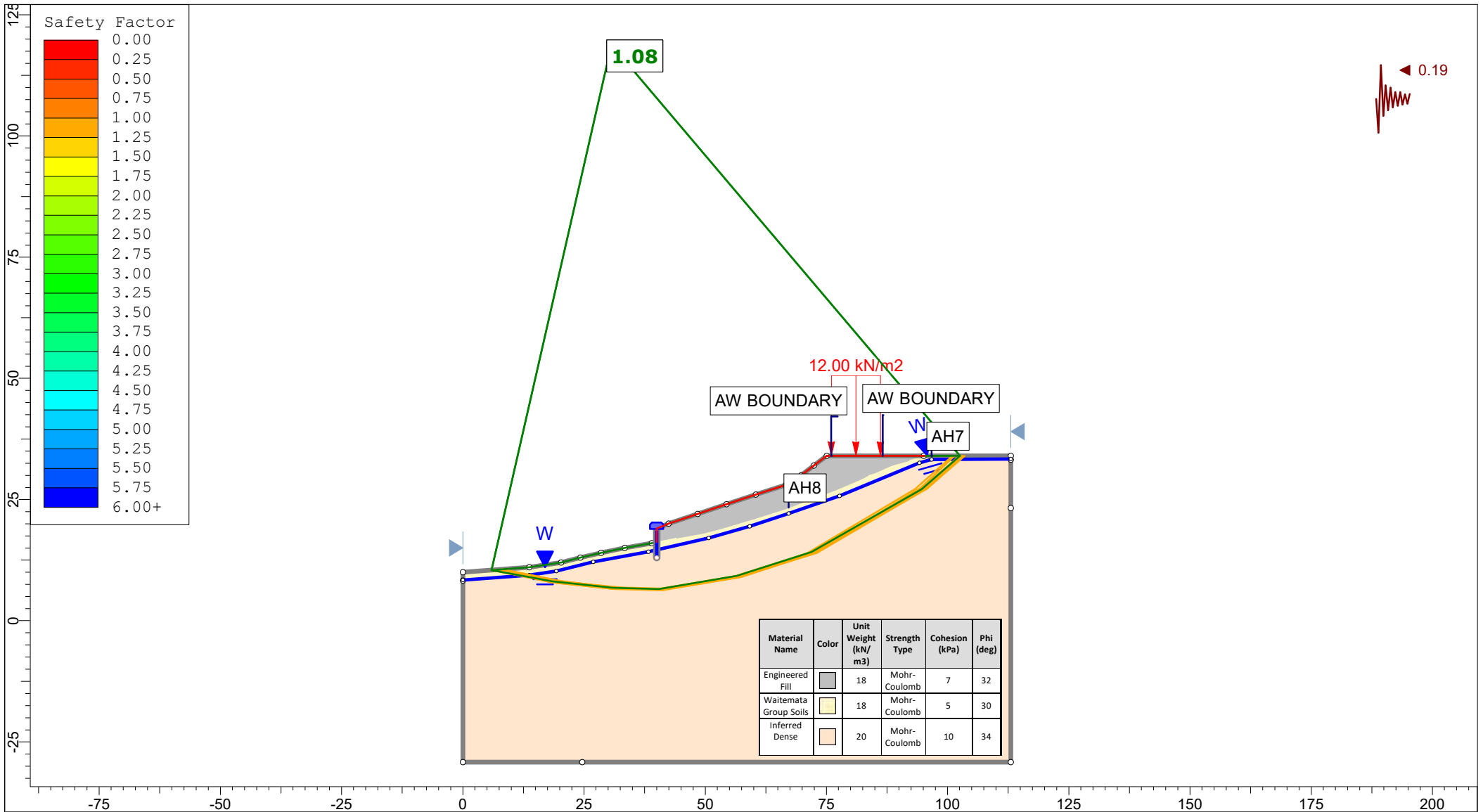


<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section C-C' Proposed Ground	
	Scenario		Run 4 - Raised Groundwater - Non-Cicular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.slmd		

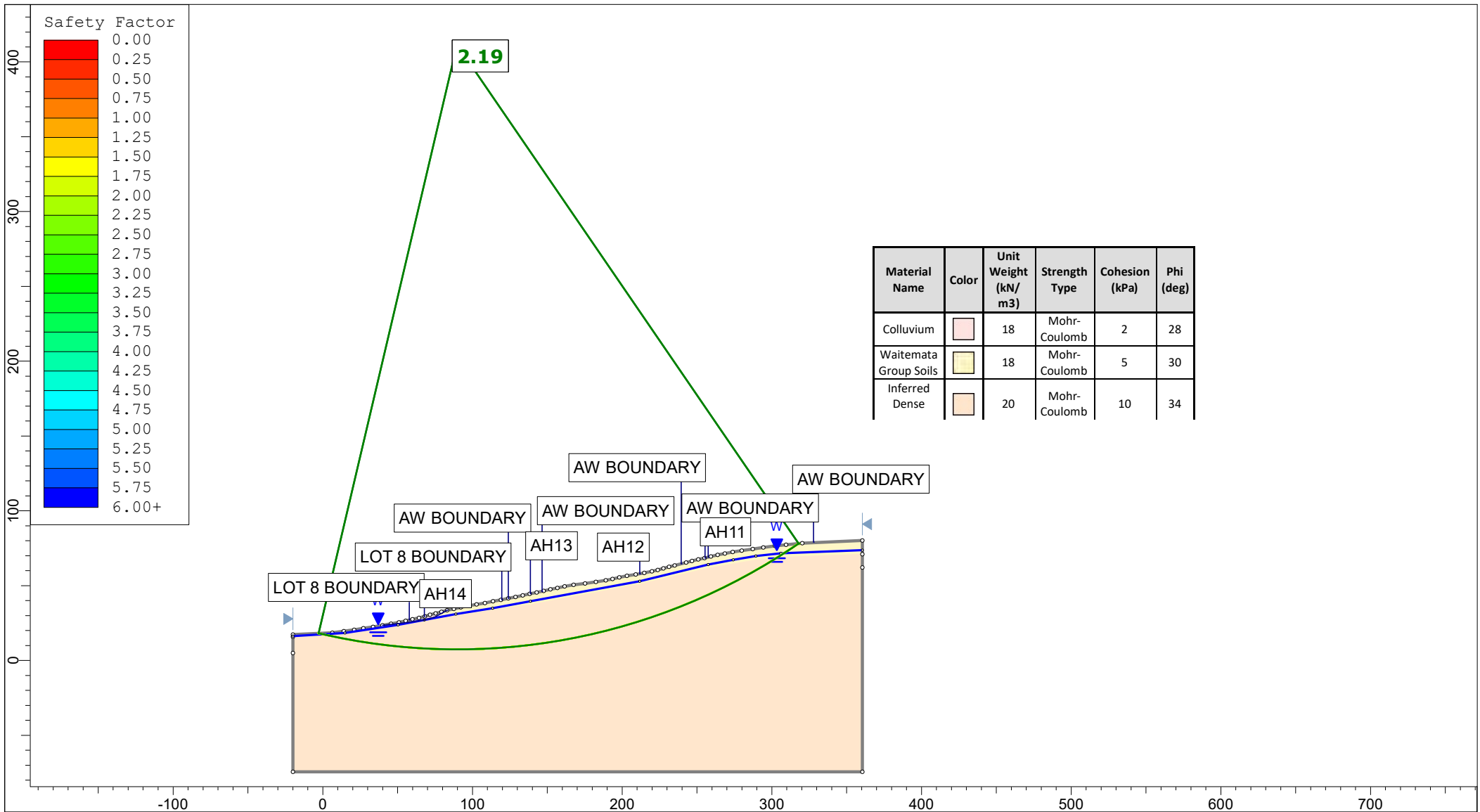



Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)
Engineered Fill	Grey	18	Mohr-Coulomb	7	32
Waitemata Group Soils	Yellow	18	Mohr-Coulomb	5	30
Inferred Dense Material	Orange	20	Mohr-Coulomb	10	34

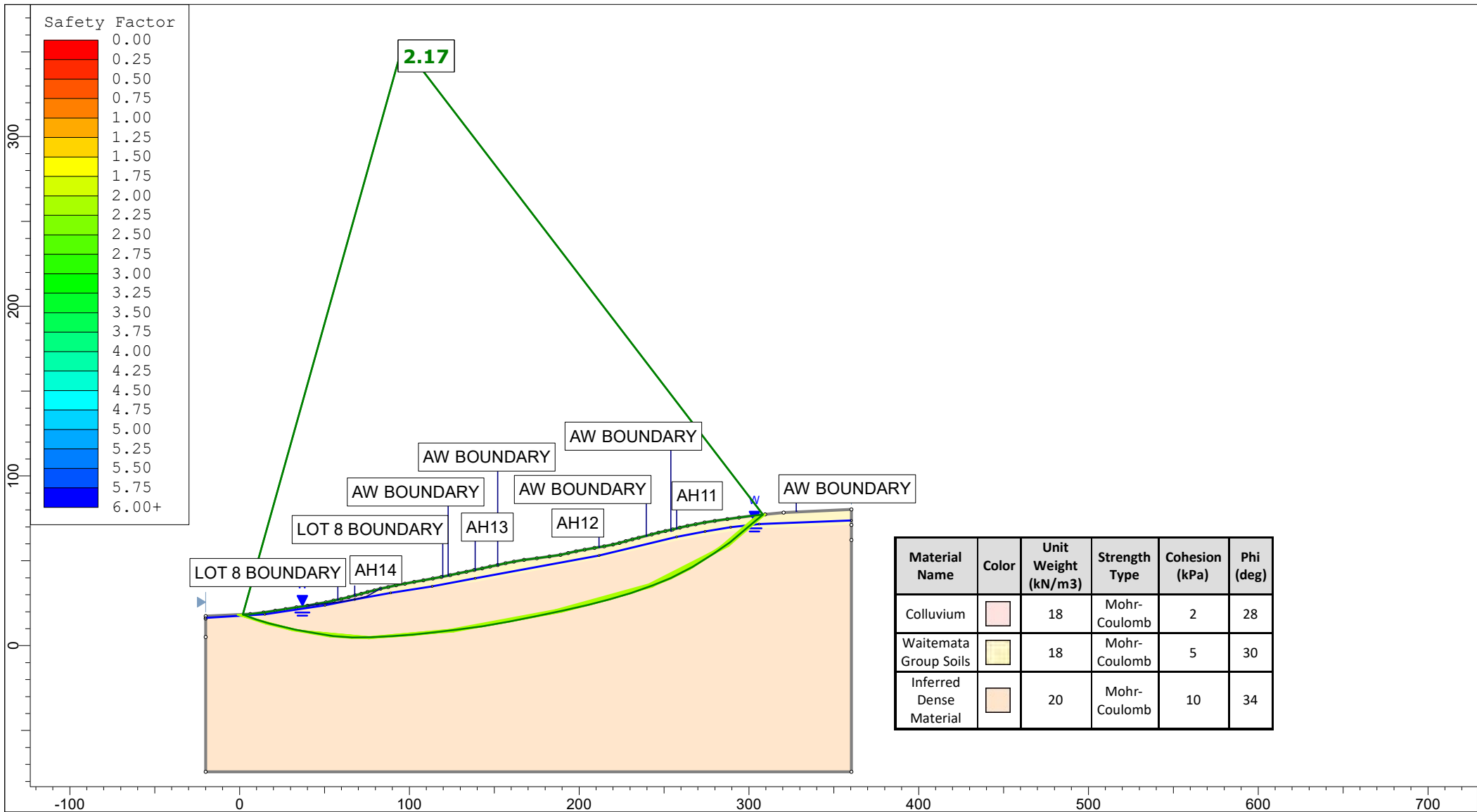
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section C-C' Proposed Ground	
	Scenario		Run 5 - Seismic Loading - Circular	
	Drawn By		TR	
Date		26 February 2024		
Company		KGA Geotechnical Group Limited		
File Name		2024 Master.slmd		



<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section C-C' Proposed Ground	Scenario	Run 6 - Seismic Loading - Non-Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.slmd

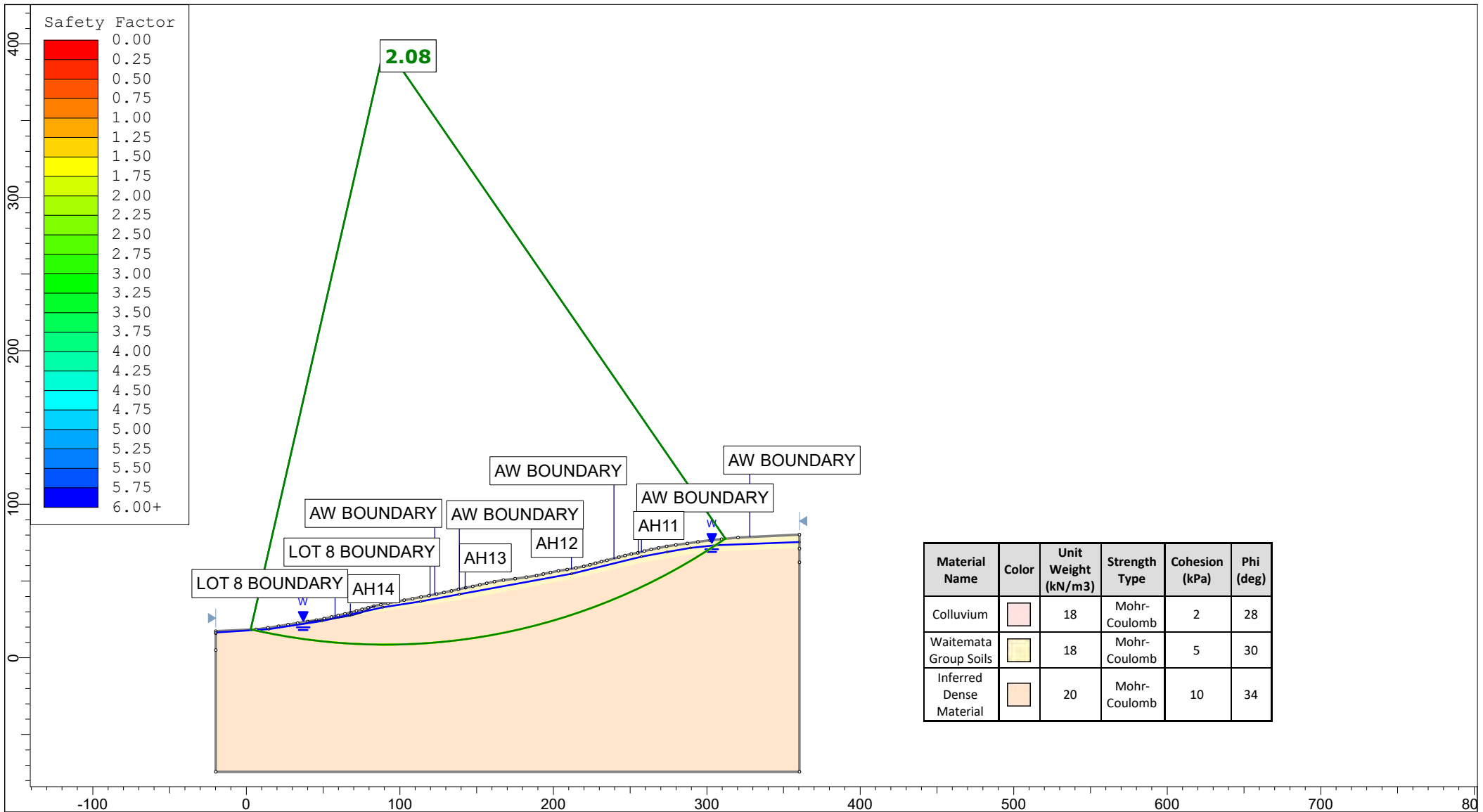



 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section D-D' Measured Ground		
	Scenario		Run 1 - Measured Groundwater - Circular		
	Company		KGA Geotechnical Group Limited		
Drawn By		TR		Date	
Date		26 February 2024		File Name	
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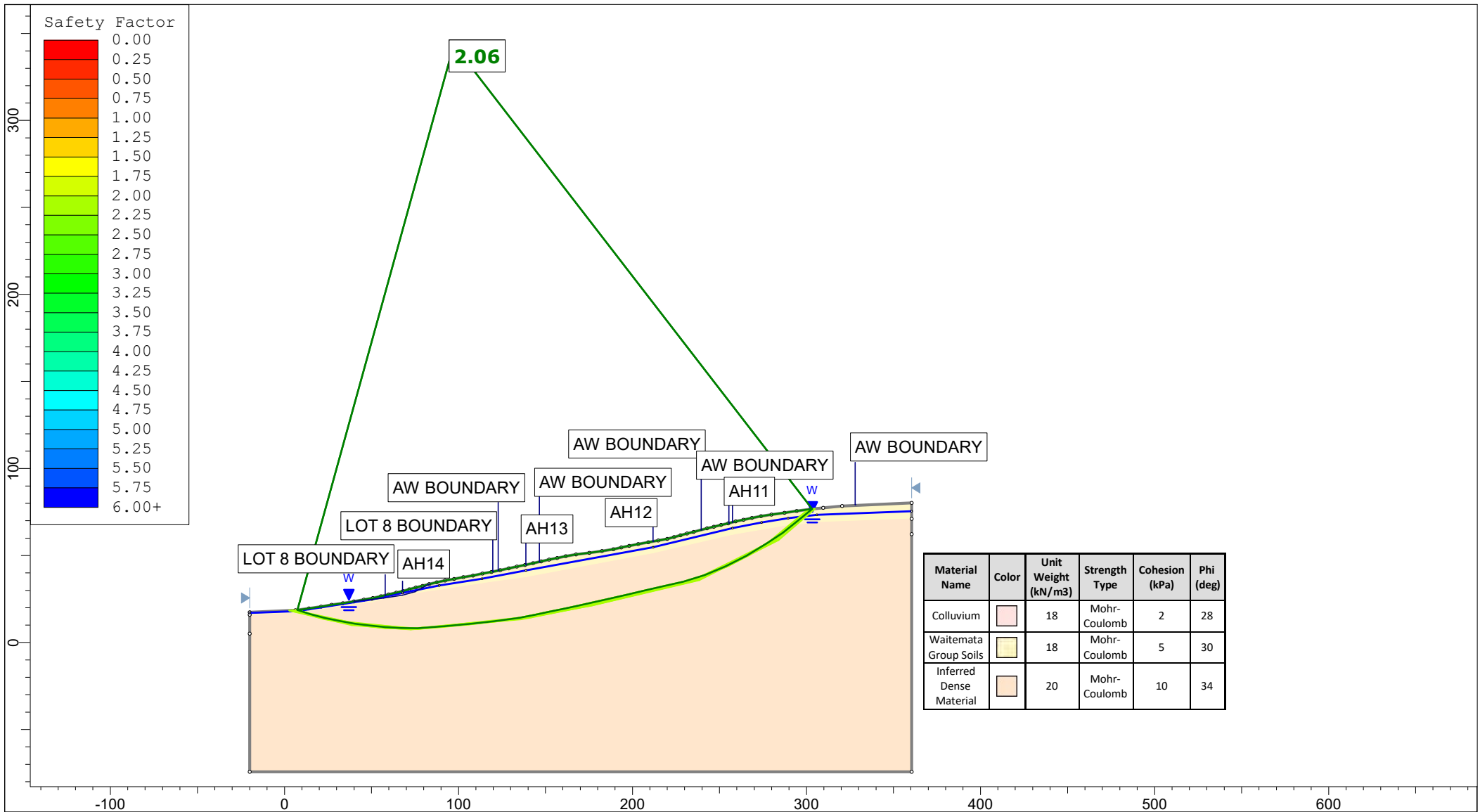


Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)
Colluvium		18	Mohr-Coulomb	2	28
Waitemata Group Soils		18	Mohr-Coulomb	5	30
Inferred Dense Material		20	Mohr-Coulomb	10	34

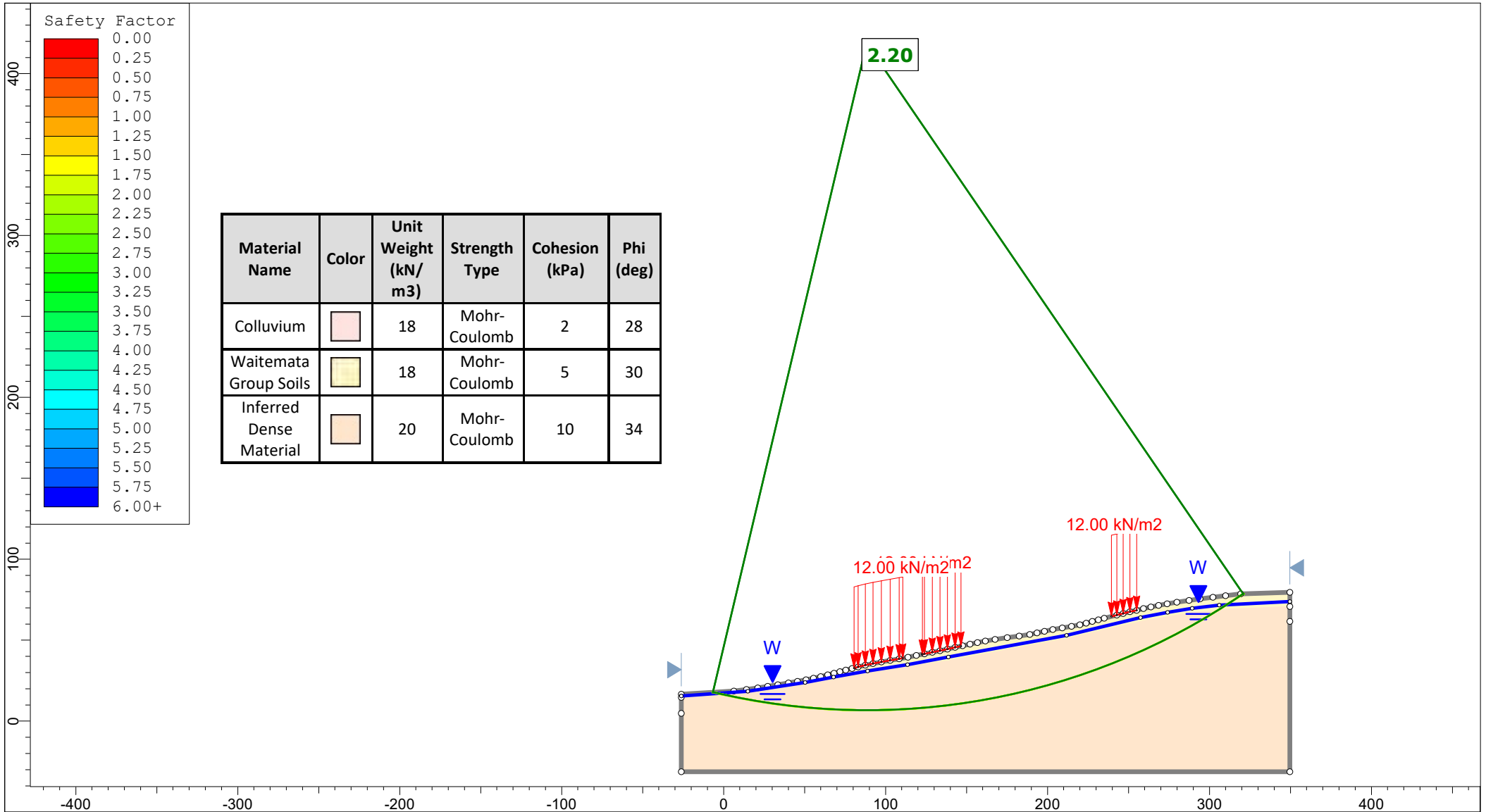
 Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section D-D' Measured Ground	
	Drawn By		TR	
	Date		26 February 2024	
		Scenario		Run 2 - Measured Groundwater - Non-Cicular
		Company		KGA Geotechnical Group Limited
		File Name		2024 Master.slmd



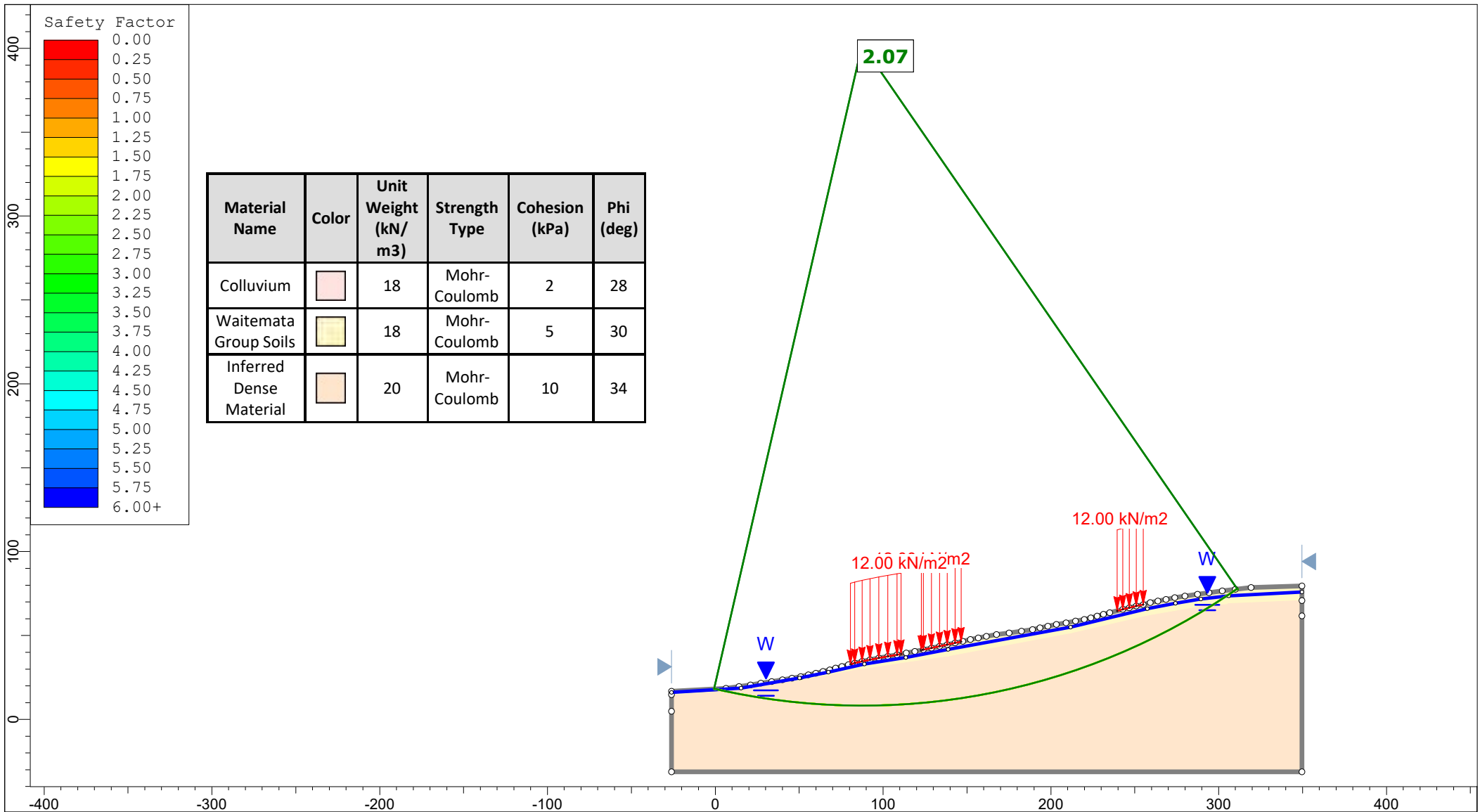
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section D-D' Measured Ground	
	Drawn By		TR	
	Date		26 February 2024	
		Scenario		Run 3 - Raised Groundwater - Circular
		Company		KGA Geotechnical Group Limited
		File Name		2024 Master.slmd



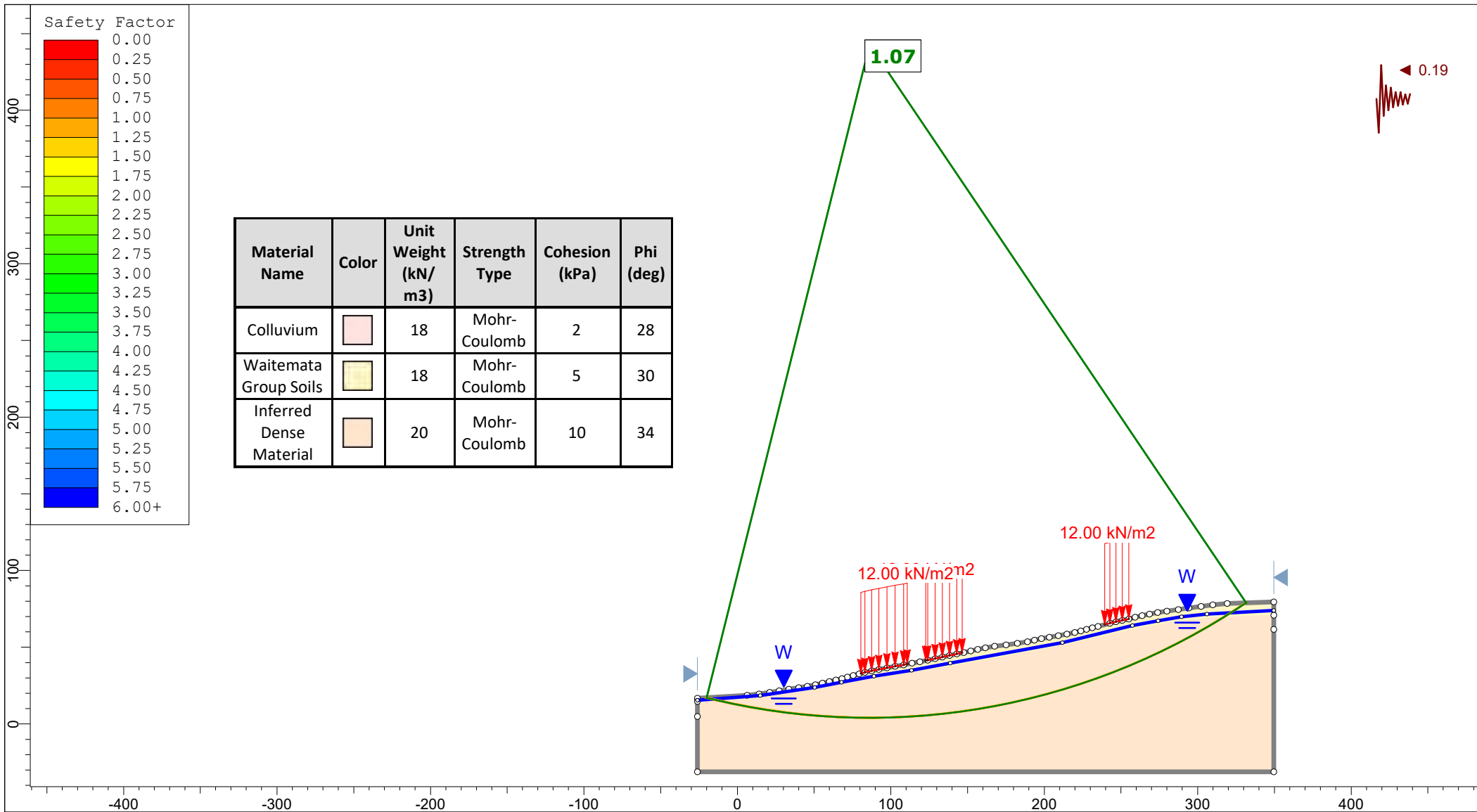
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section D-D' Measured Ground	
	Drawn By		TR	
	Date		26 February 2024	
		Scenario		Run 4 - Raised Groundwater - Non-Cicular
		Company		KGA Geotechnical Group Limited
		File Name		2024 Master.slmd



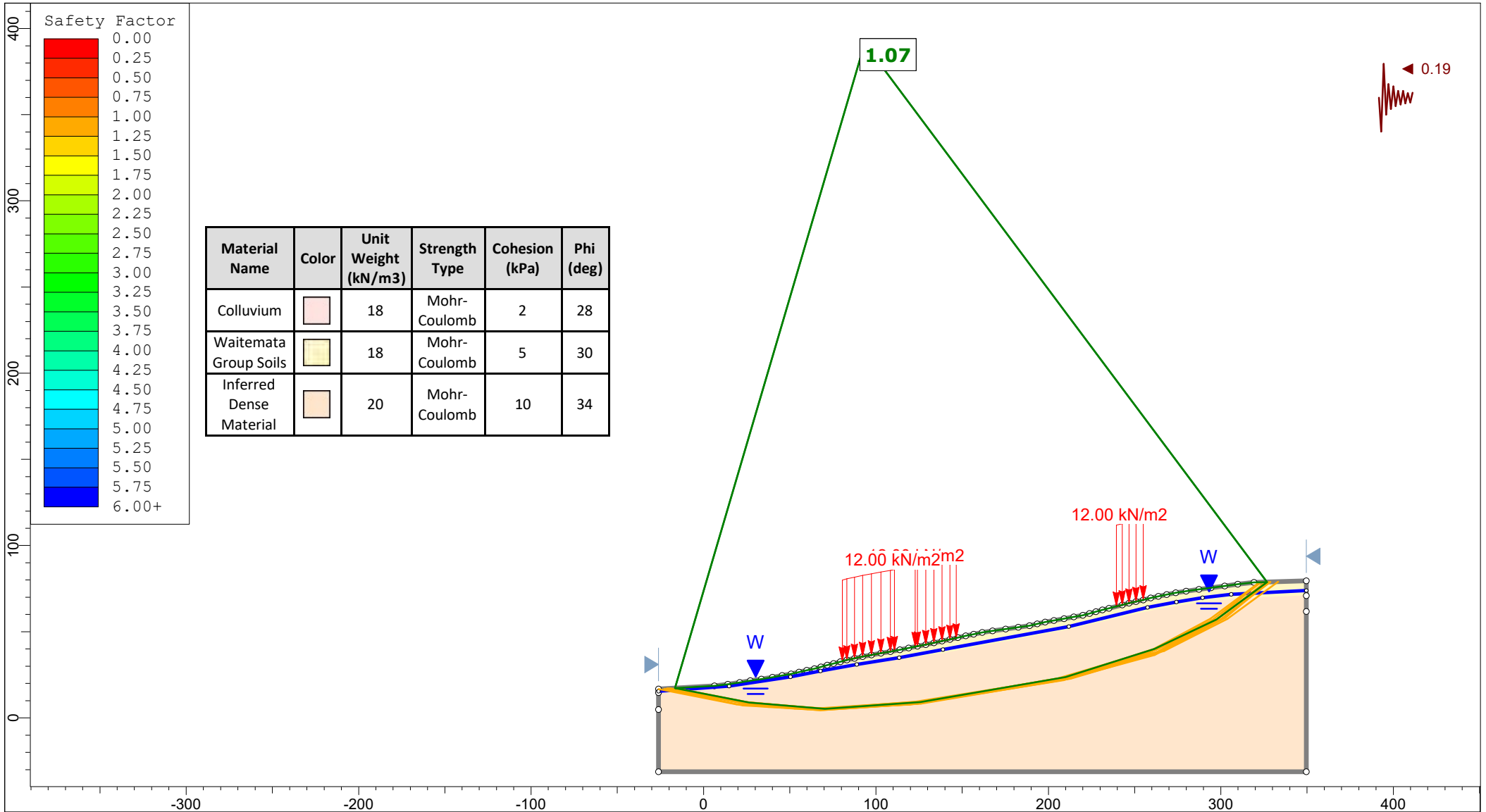
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section D-D' Proposed Ground		
	Scenario		Run 1 - Measured Groundwater - Circular		
	Company		KGA Geotechnical Group Limited		
Drawn By		TR		Date	
Date		26 February 2024		File Name	
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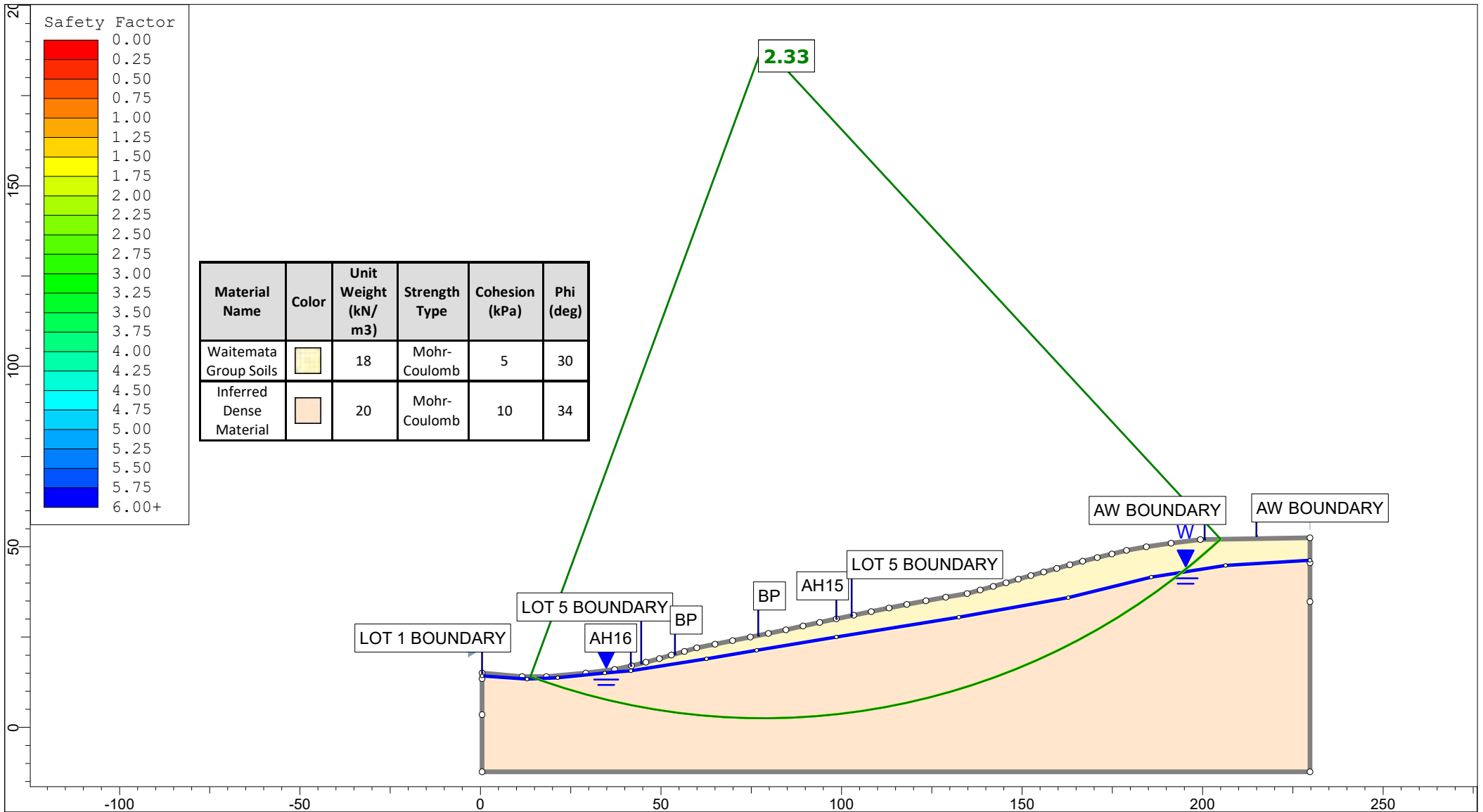
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section D-D' Proposed Ground		
	Scenario		Run 3 - Raised Groundwater - Circular		
	Company		KGA Geotechnical Group Limited		
Drawn By		TR		Date	
Date		26 February 2024		File Name	
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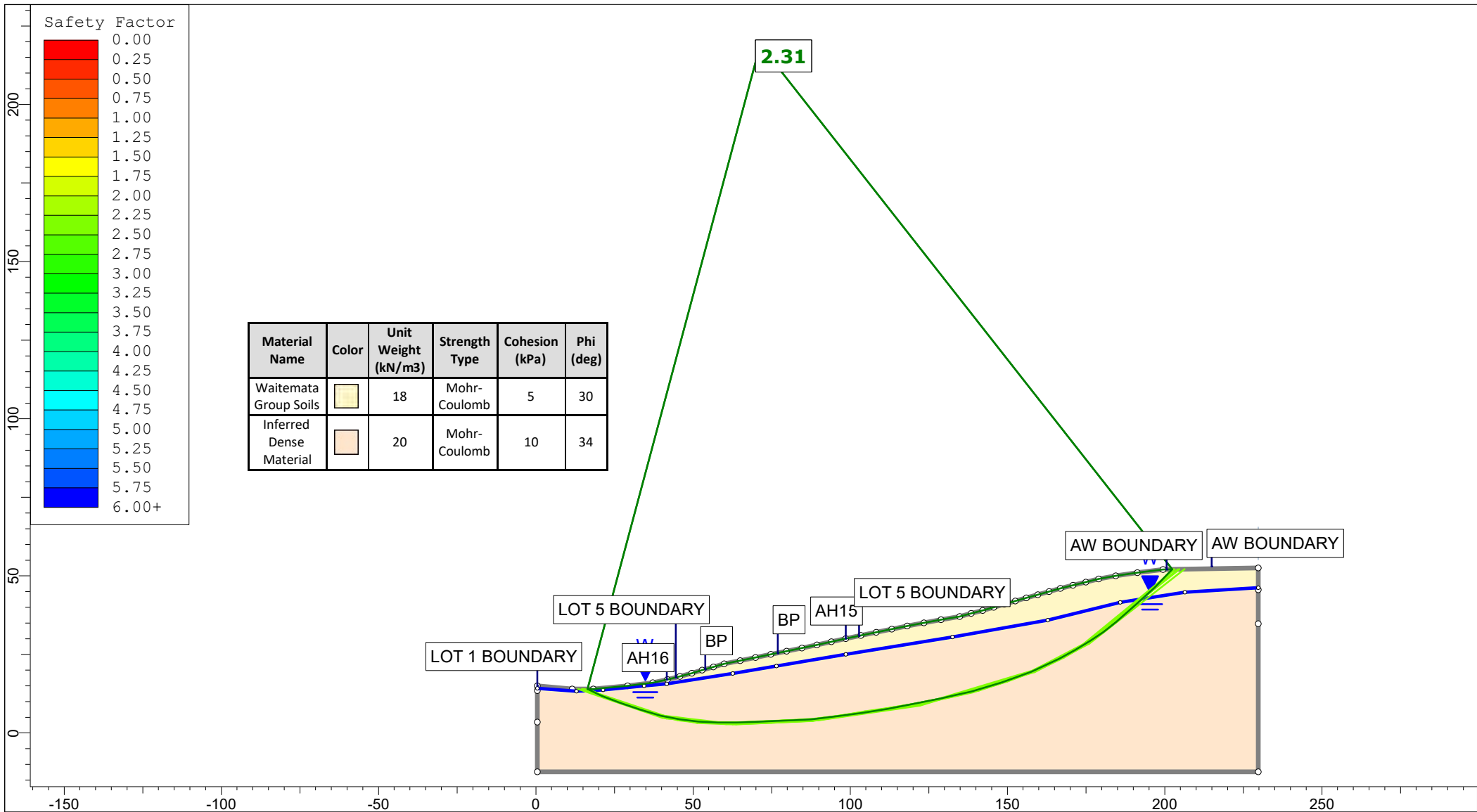
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section D-D' Proposed Ground	
	Drawn By		TR	
	Date		26 February 2024	
		Scenario		Run 5 - Seismic Loading - Circular
		Company		KGA Geotechnical Group Limited
		File Name		2024 Master.slmd



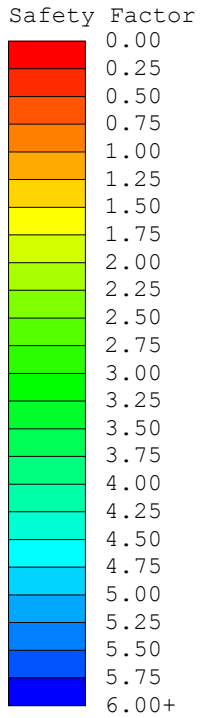
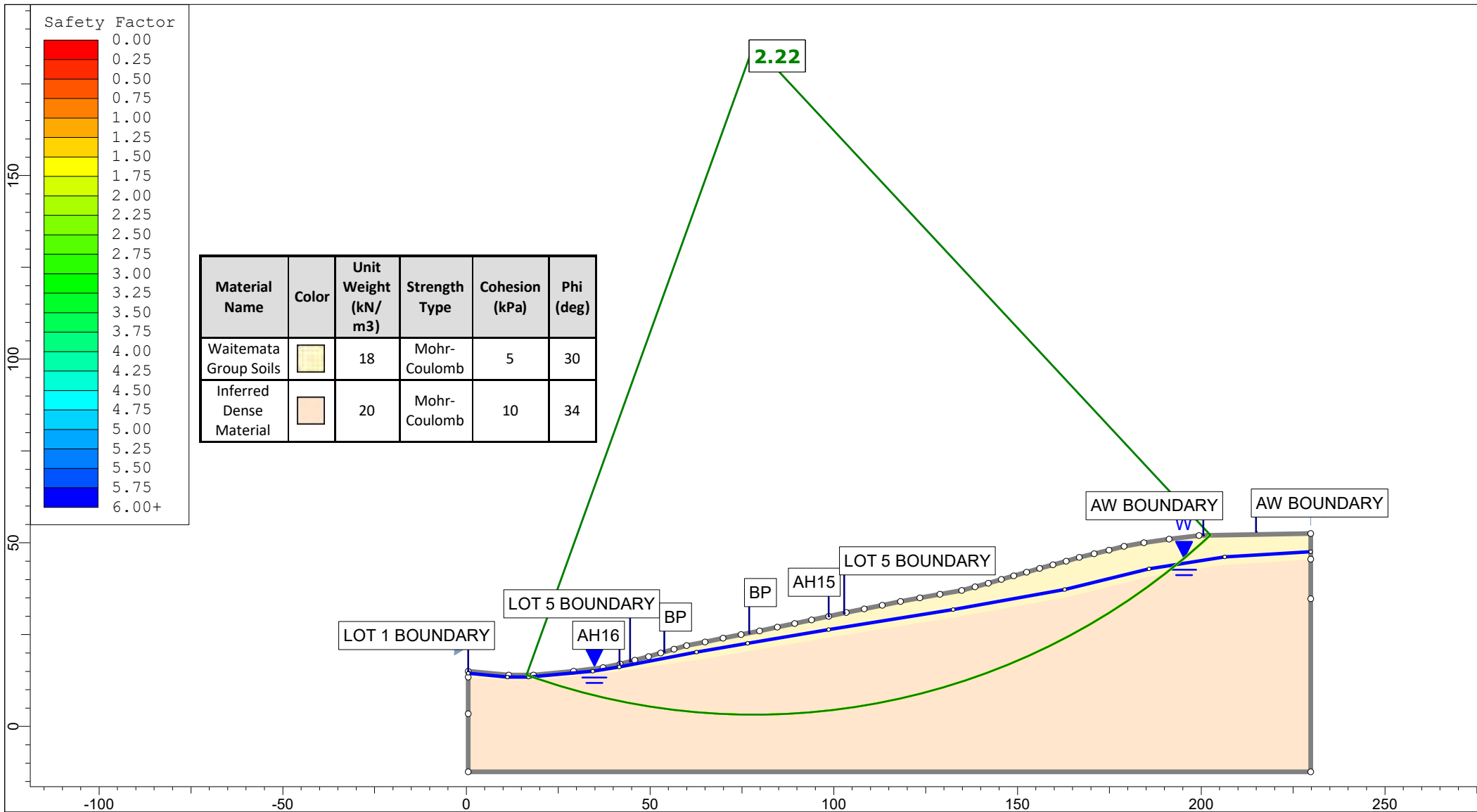
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section D-D' Proposed Ground	Scenario	Run 6 - Seismic Loading - Non-Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm



 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group Cross Section E-E' Measured Ground	Scenario Run 1 - Measured Groundwater - Circular
	Drawn By TR	Company KGA Geotechnical Group Limited
	Date 26 February 2024	File Name 2024 Master.slmd

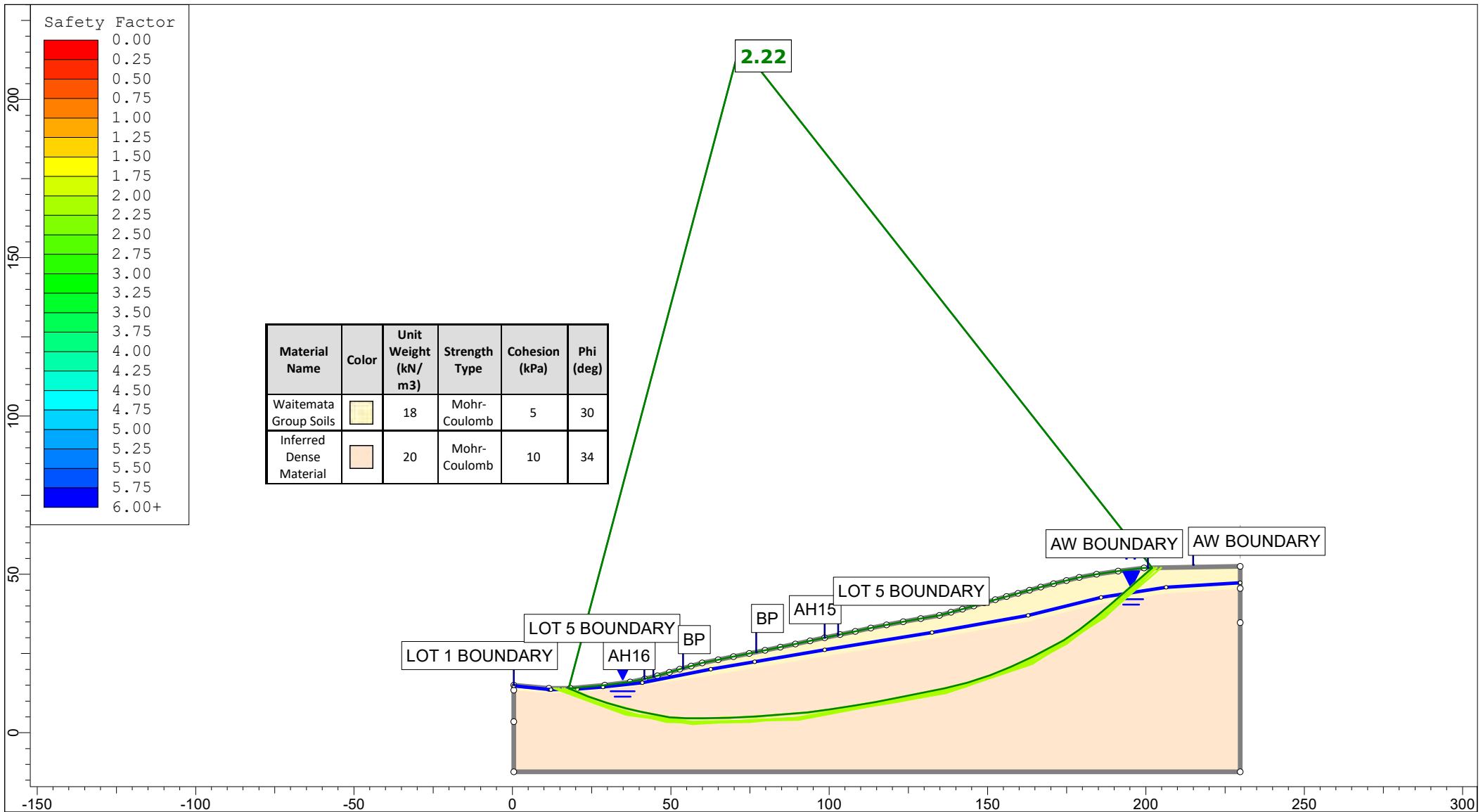


<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section E-E' Measured Ground	Scenario	Run 2 - Measured Groundwater - Non-Cicular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.slmd

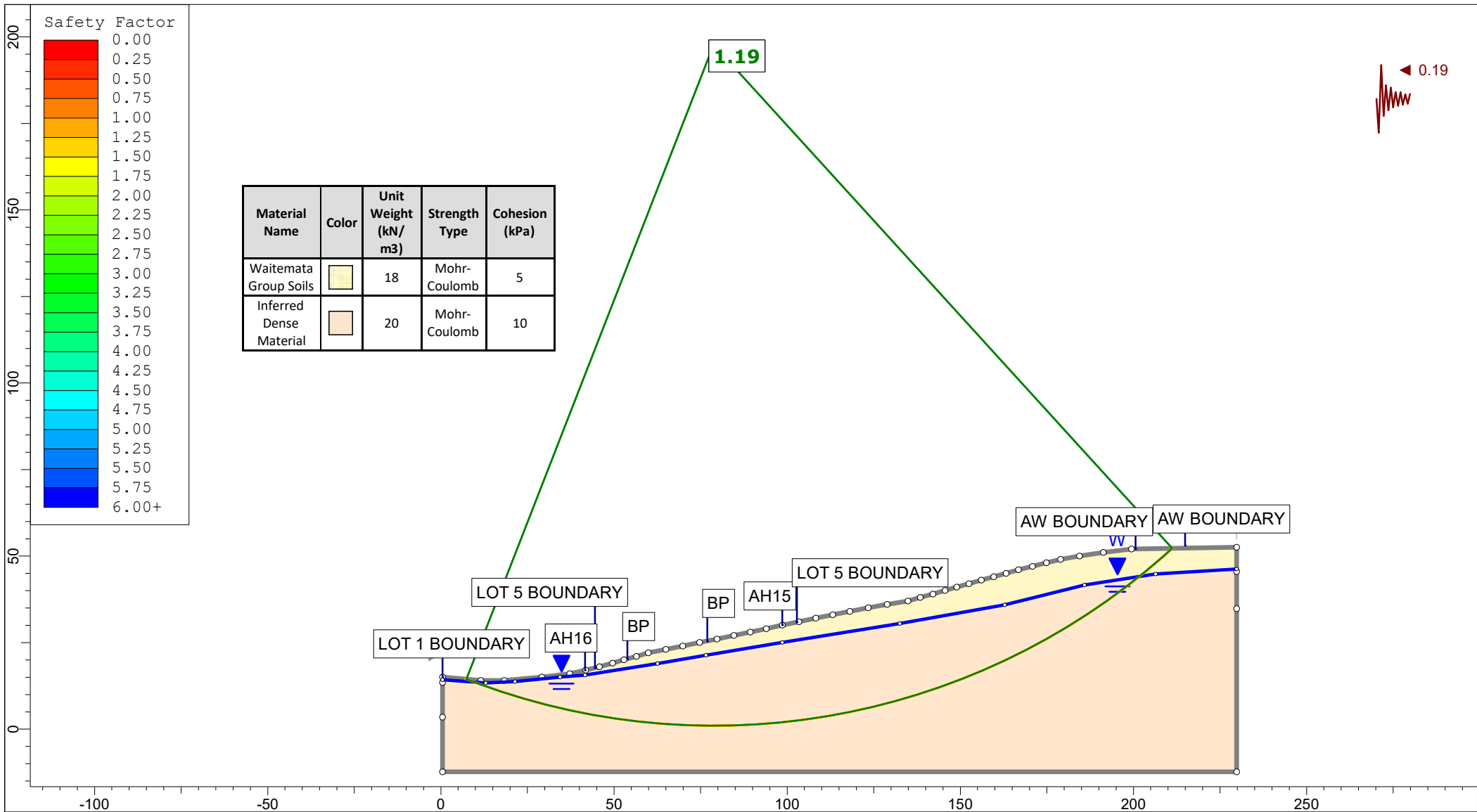


Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)
Waitemata Group Soils		18	Mohr-Coulomb	5	30
Inferred Dense Material		20	Mohr-Coulomb	10	34

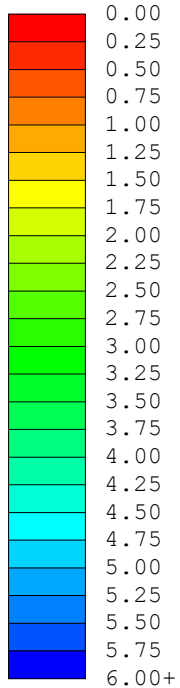
 Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz	Project	K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group	Cross Section E-E' Measured Ground	Scenario	Run 3 - Raised Groundwater - Circular
	Drawn By	TR	Company	KGA Geotechnical Group Limited
	Date	26 February 2024	File Name	2024 Master.slmd



<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section E-E' Measured Ground		
	Scenario		Run 4 - Raised Groundwater - Non-Cicular		
	Company		KGA Geotechnical Group Limited		
Drawn By		TR		Date	
Date		26 February 2024		File Name	
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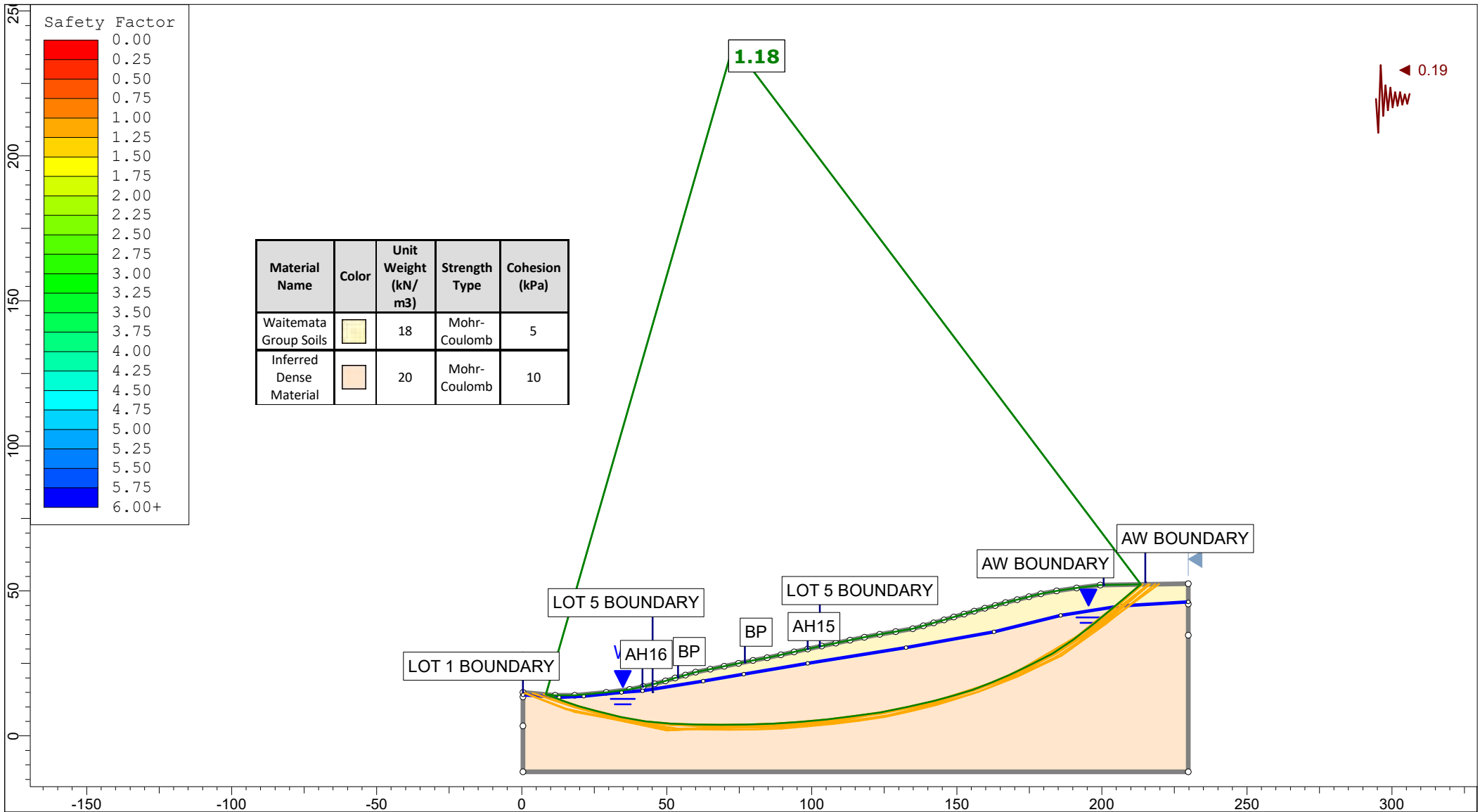



Safety Factor

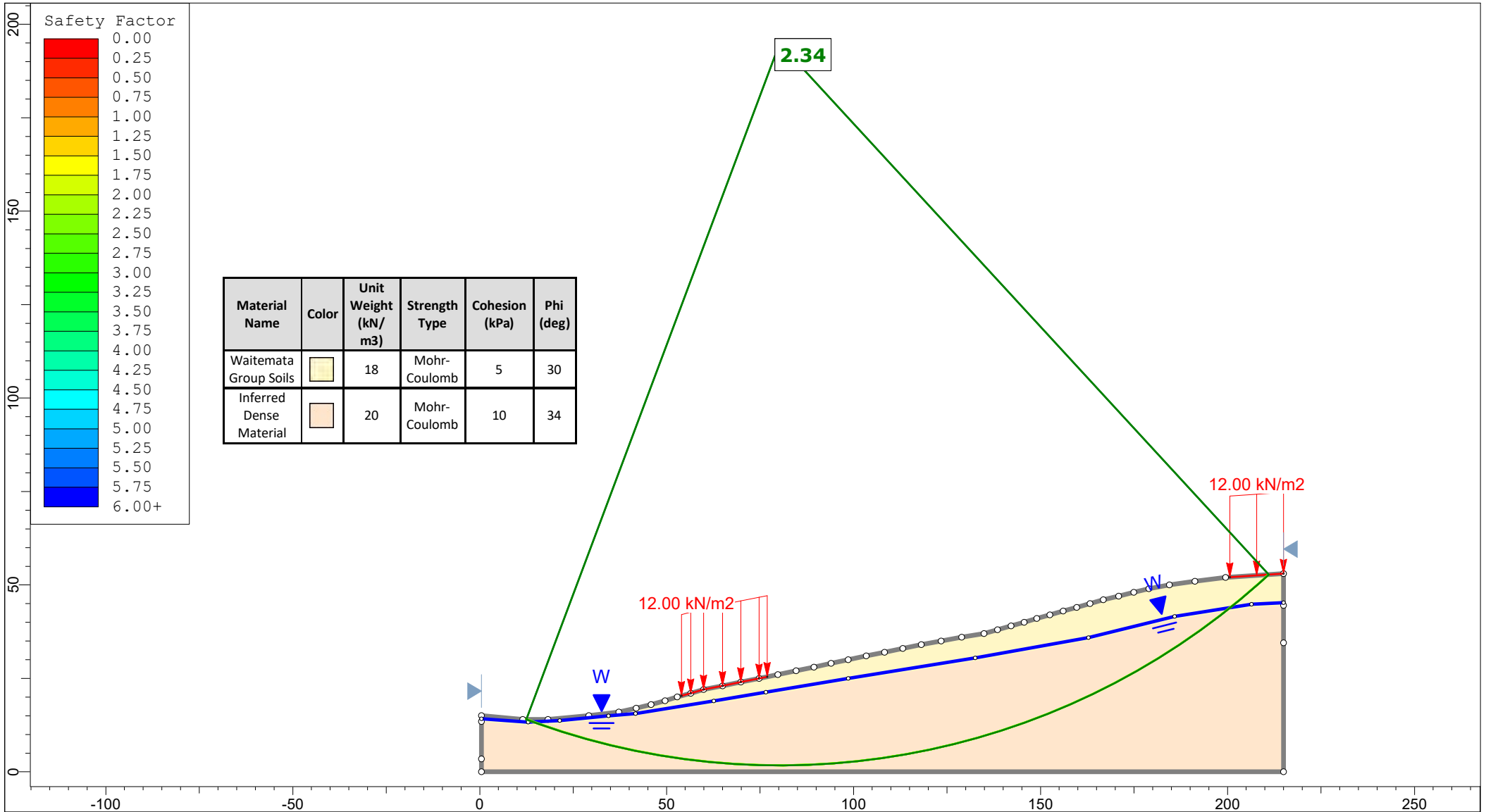


Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)
Waitemata Group Soils		18	Mohr-Coulomb	5
Inferred Dense Material		20	Mohr-Coulomb	10

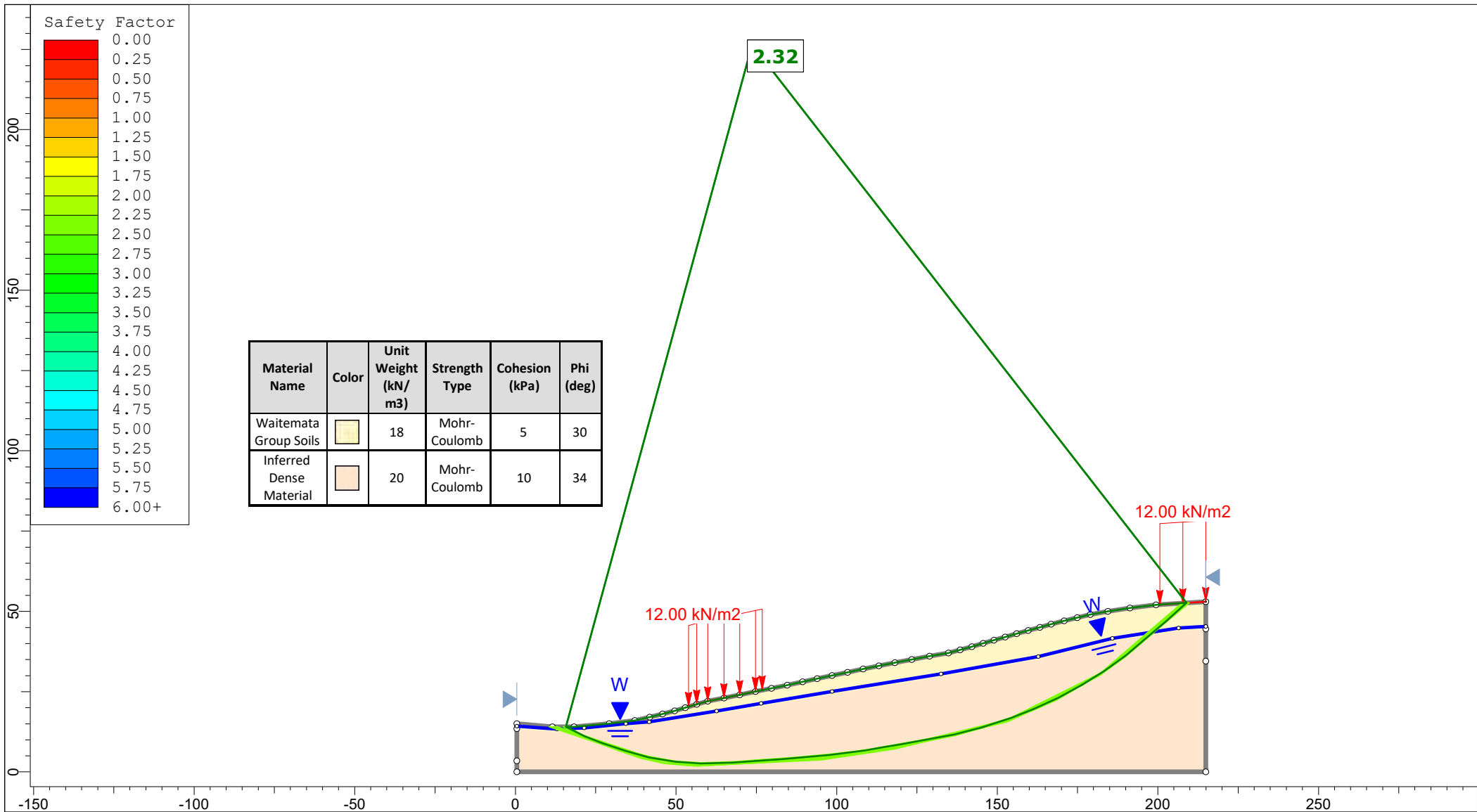
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section E-E' Measured Ground	Scenario	Run 5 - Seismic Loading - Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm



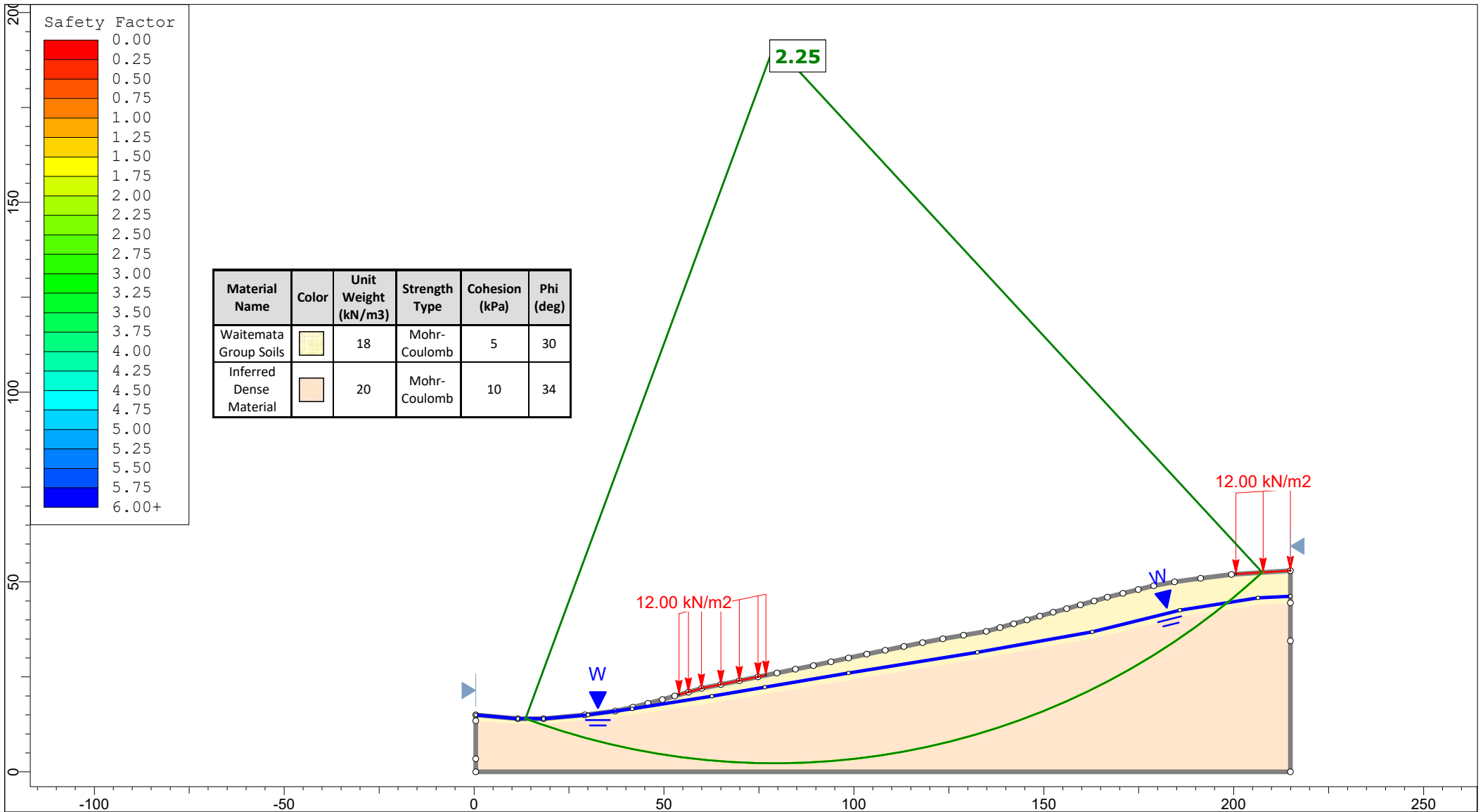
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group Cross Section E-E' Measured Ground	Scenario Run 6 - Seismic Loading - Non-Circular
	Drawn By TR	Company KGA Geotechnical Group Limited
	Date 26 February 2024	File Name 2024 Master.slmd



<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui				
	Group		Cross Section E-E' Proposed Ground				
	Scenario		Run 1 - Measured Groundwater - Circular				
	Company		KGA Geotechnical Group Limited				
Drawn By		TR		File Name		2024 Master.sldm	
Date		26 February 2024		Date		26 February 2024	

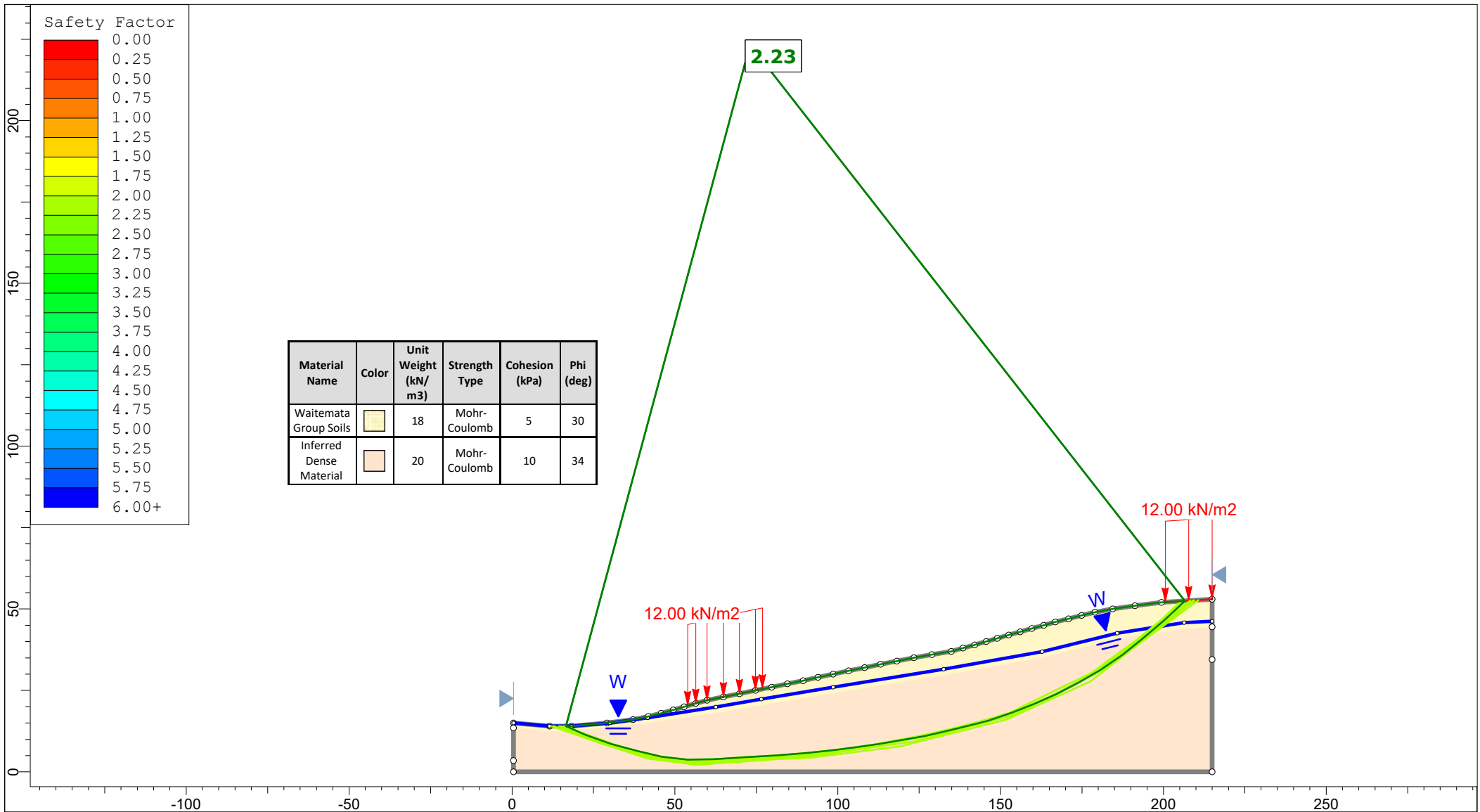


<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section E-E' Proposed Ground	Scenario	Run 2 - Measured Groundwater - Non-Cicular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.slmd

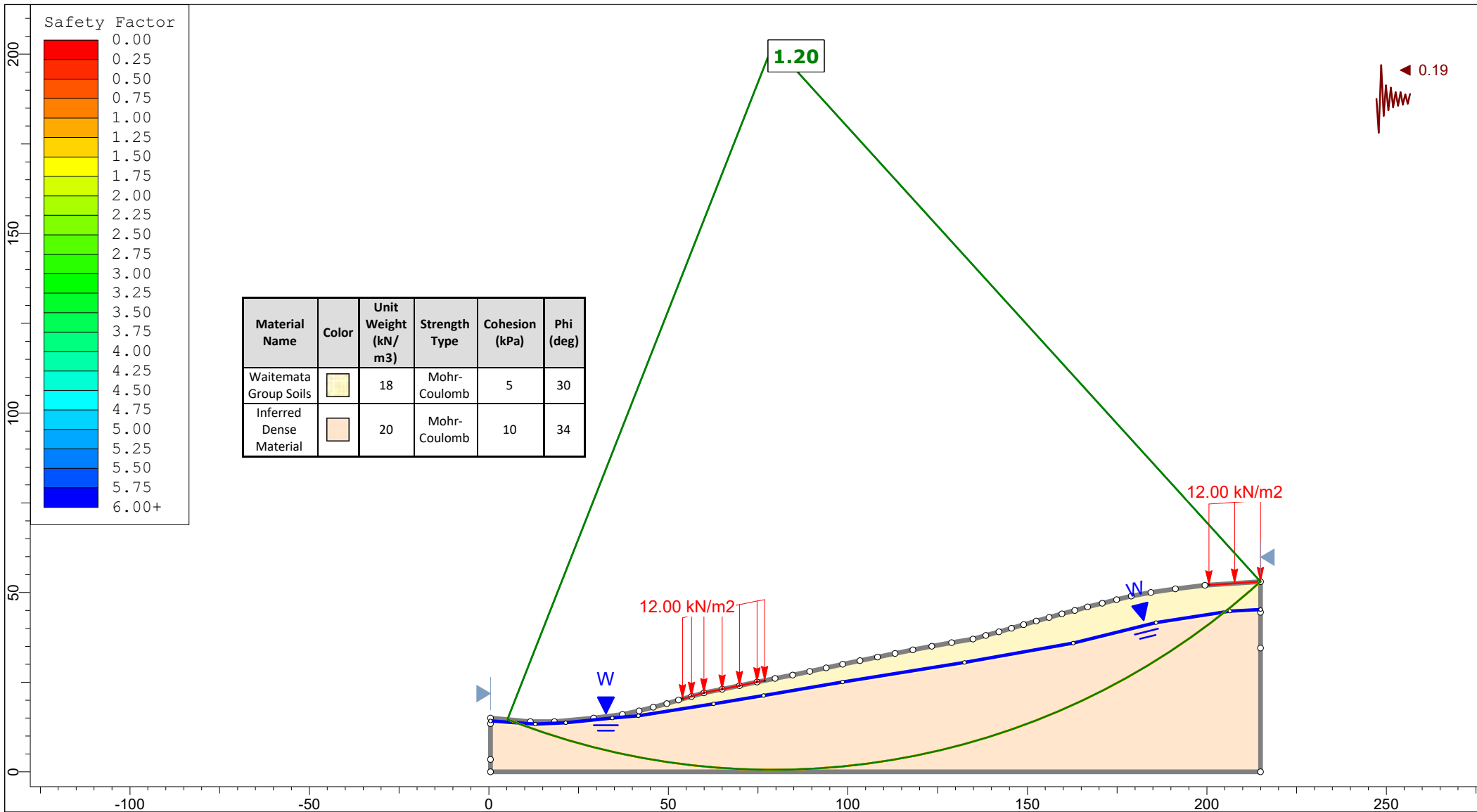


Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)
Waitemata Group Soils		18	Mohr-Coulomb	5	30
Inferred Dense Material		20	Mohr-Coulomb	10	34

 Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section E-E' Proposed Ground	
	Scenario		Run 3 - Raised Groundwater - Circular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.sldm		

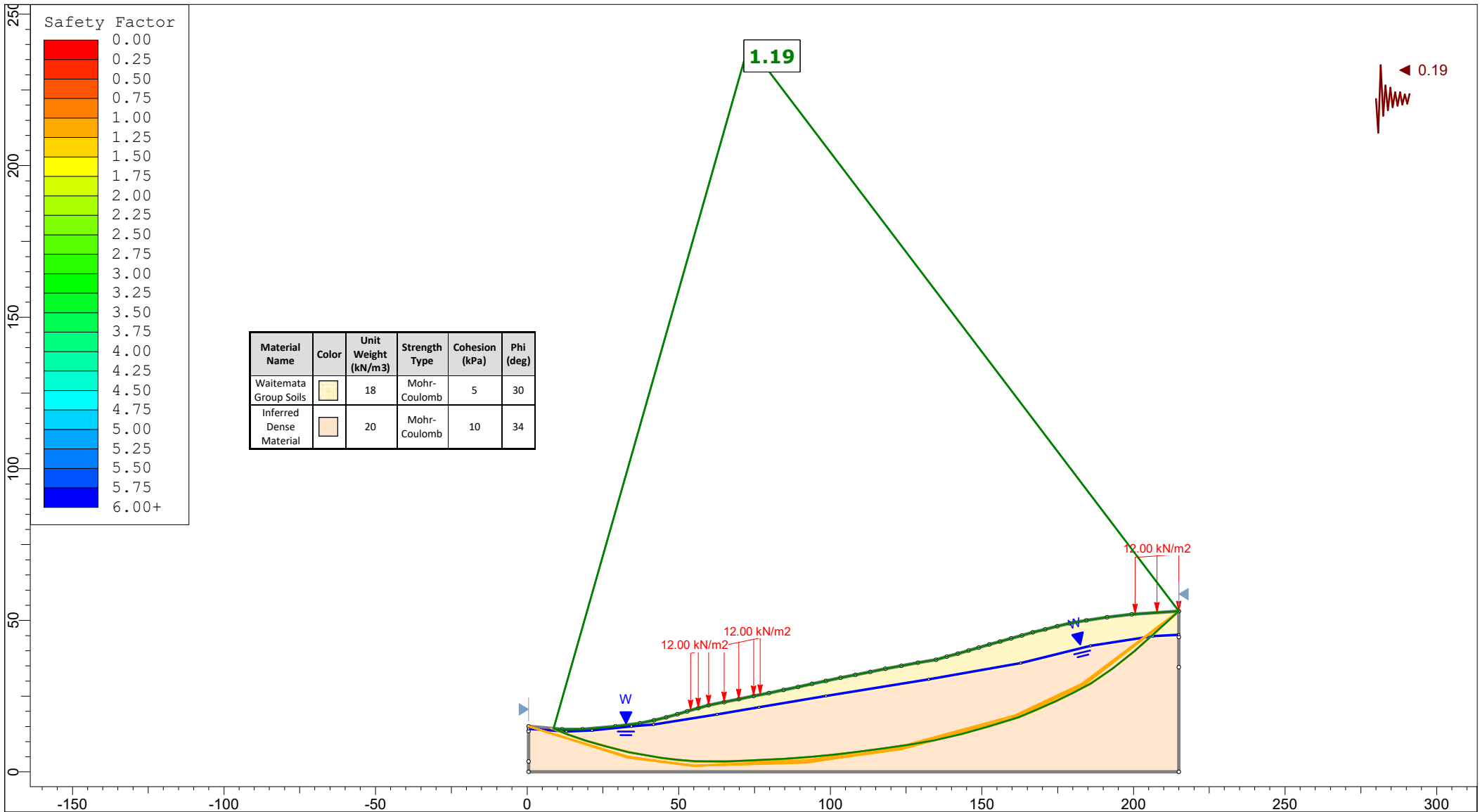


 Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz	Project K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group Cross Section E-E' Proposed Ground	Scenario Run 4 - Raised Groundwater - Non-Cicular
	Drawn By TR	Company KGA Geotechnical Group Limited
	Date 26 February 2024	File Name 2024 Master.slmd




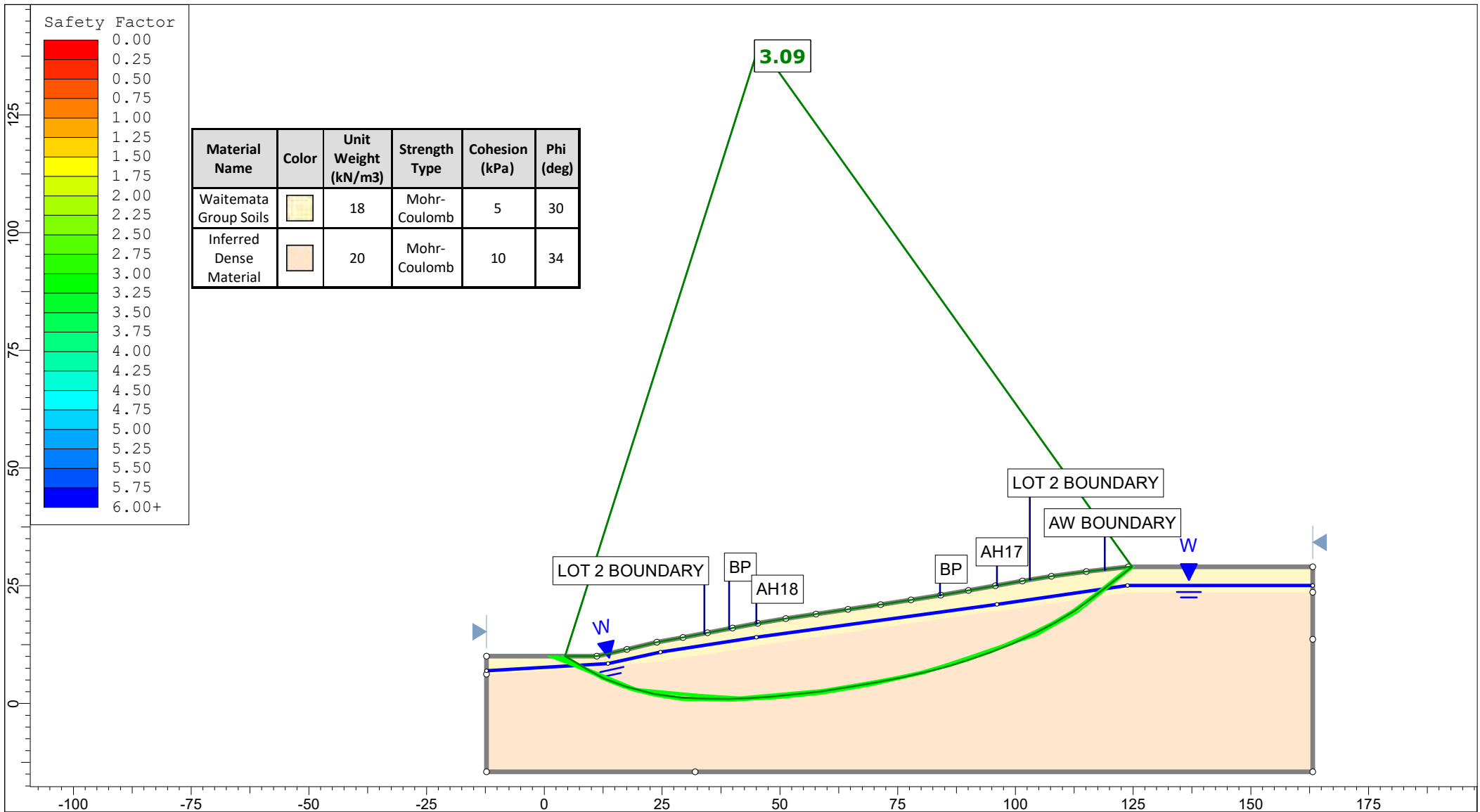
Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)
Waitemata Group Soils		18	Mohr-Coulomb	5	30
Inferred Dense Material		20	Mohr-Coulomb	10	34



 Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section E-E' Proposed Ground	Scenario	Run 5 - Seismic Loading - Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.slmd




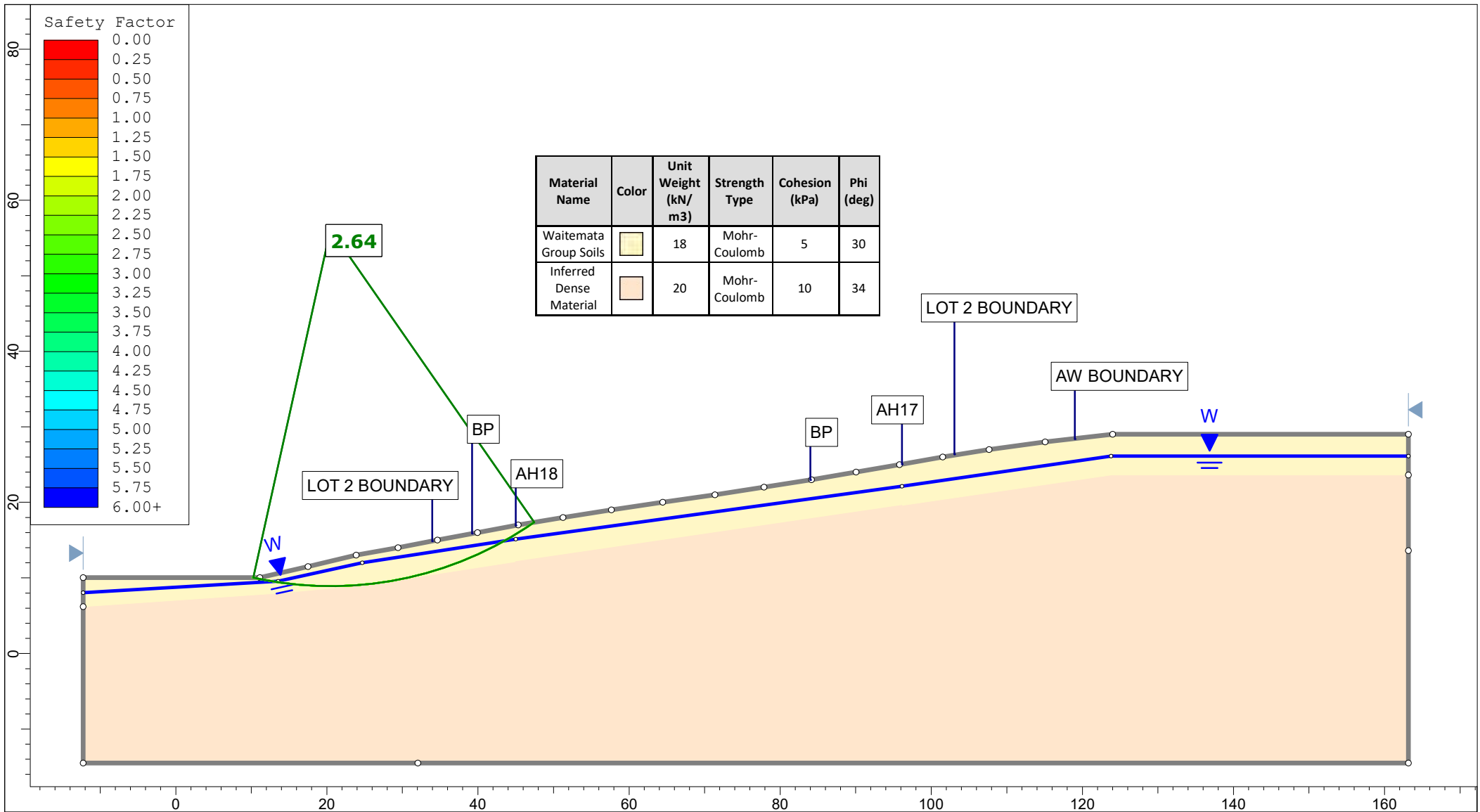
Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)
Waitemata Group Soils	Yellow	18	Mohr-Coulomb	5	30
Inferred Dense Material	Orange	20	Mohr-Coulomb	10	34

 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section E-E' Proposed Ground	Scenario	Run 6 - Seismic Loading - Non-Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm

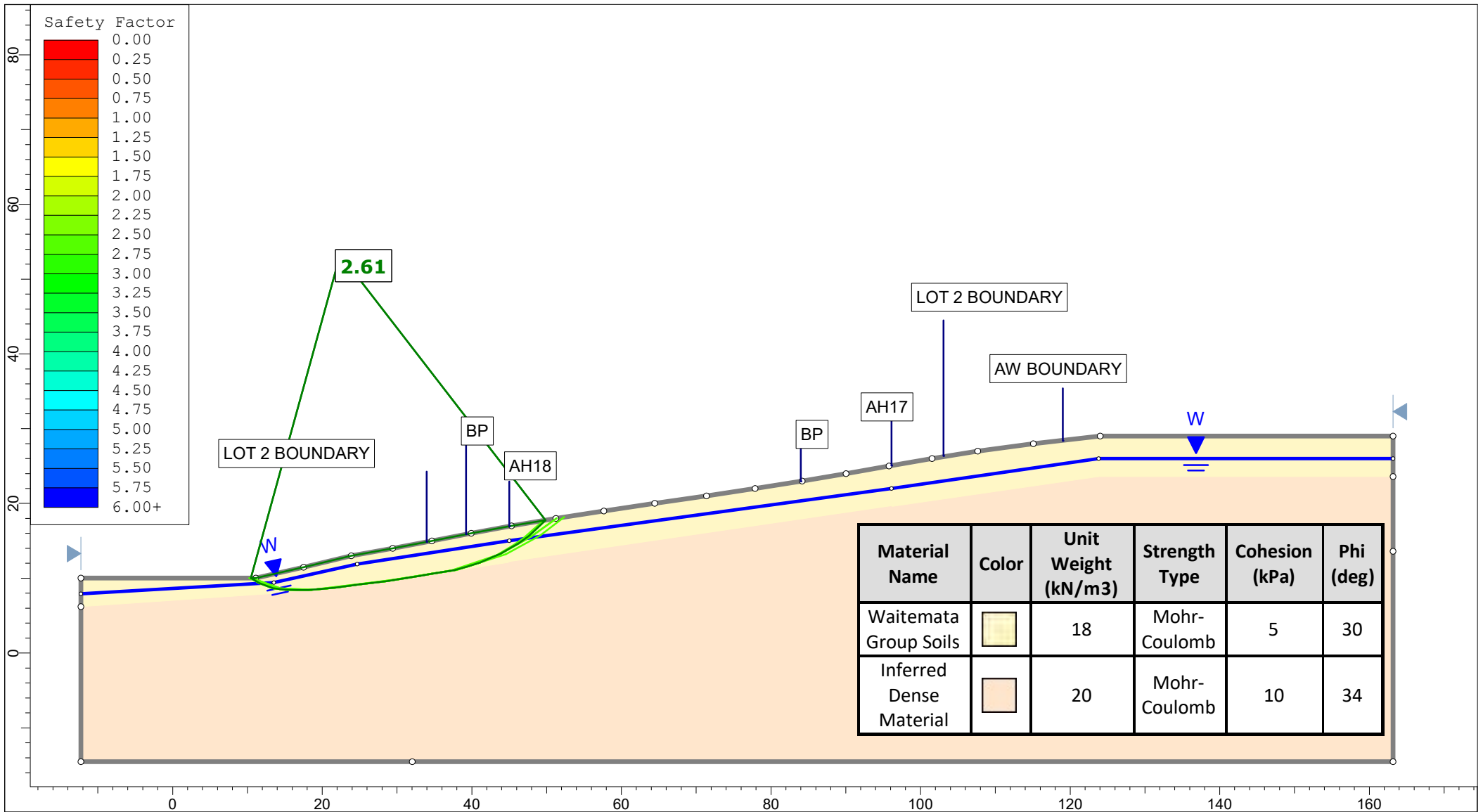


Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)
Waitemata Group Soils		18	Mohr-Coulomb	5	30
Inferred Dense Material		20	Mohr-Coulomb	10	34

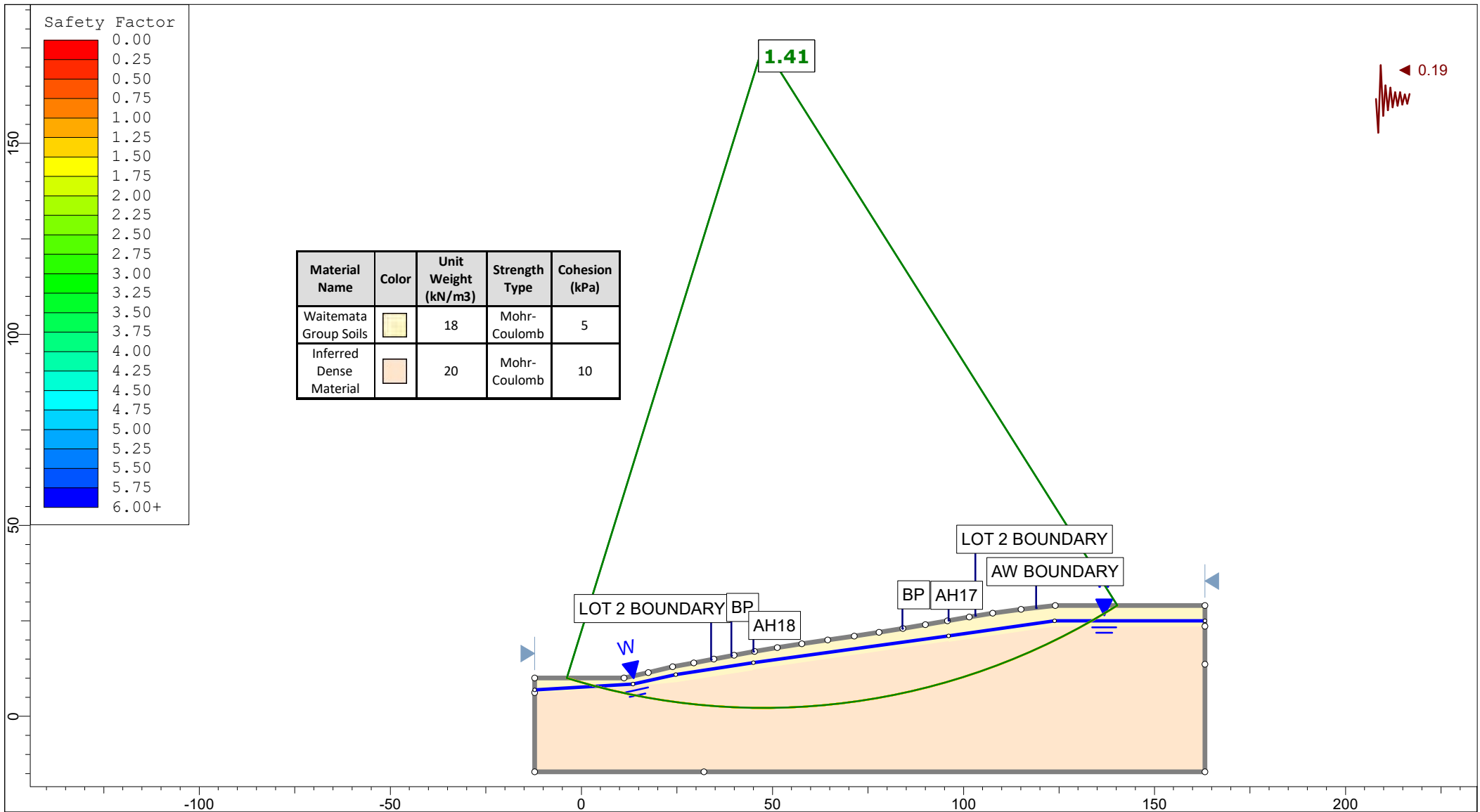
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section F-F' Measured Ground	Scenario	Run 2 - Measured Groundwater - Non-Cicular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm



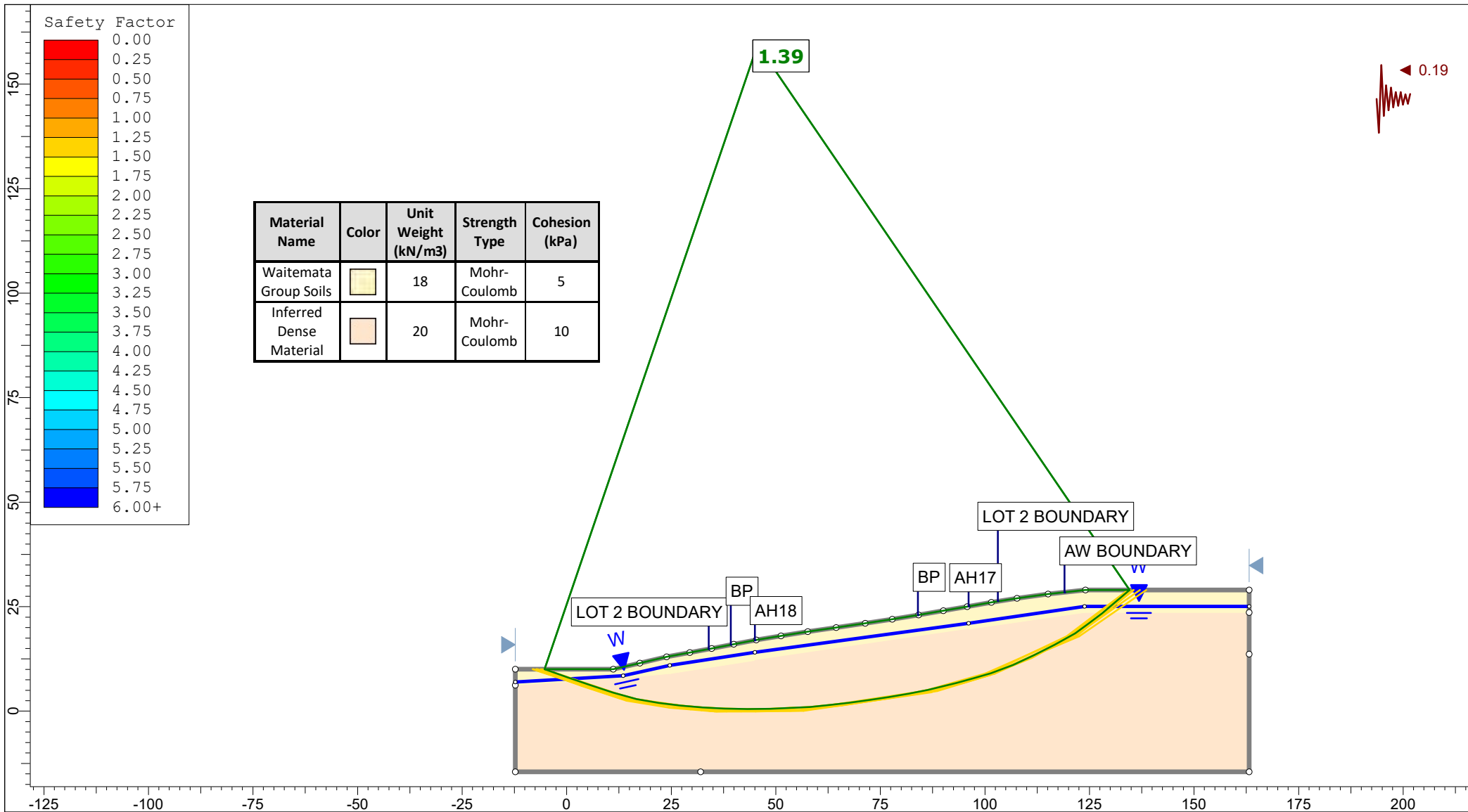
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui			
	Group		Cross Section F-F' Measured Ground	Scenario	Run 3 - Raised Groundwater - Circular	
	Drawn By		TR	Company		KGA Geotechnical Group Limited
	Date		26 February 2024	File Name		2024 Master.sldm



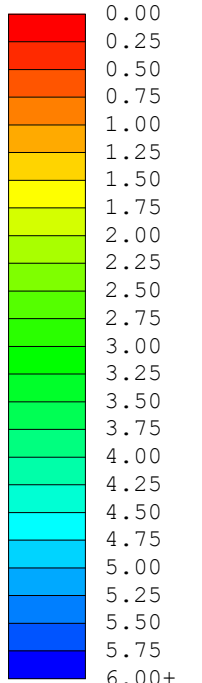
 Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section F-F' Measured Ground	
	Scenario		Run 4 - Raised Groundwater - Non-Cicular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.slmd		



<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section F-F' Measured Ground	Scenario	Run 5 - Seismic Loading - Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm

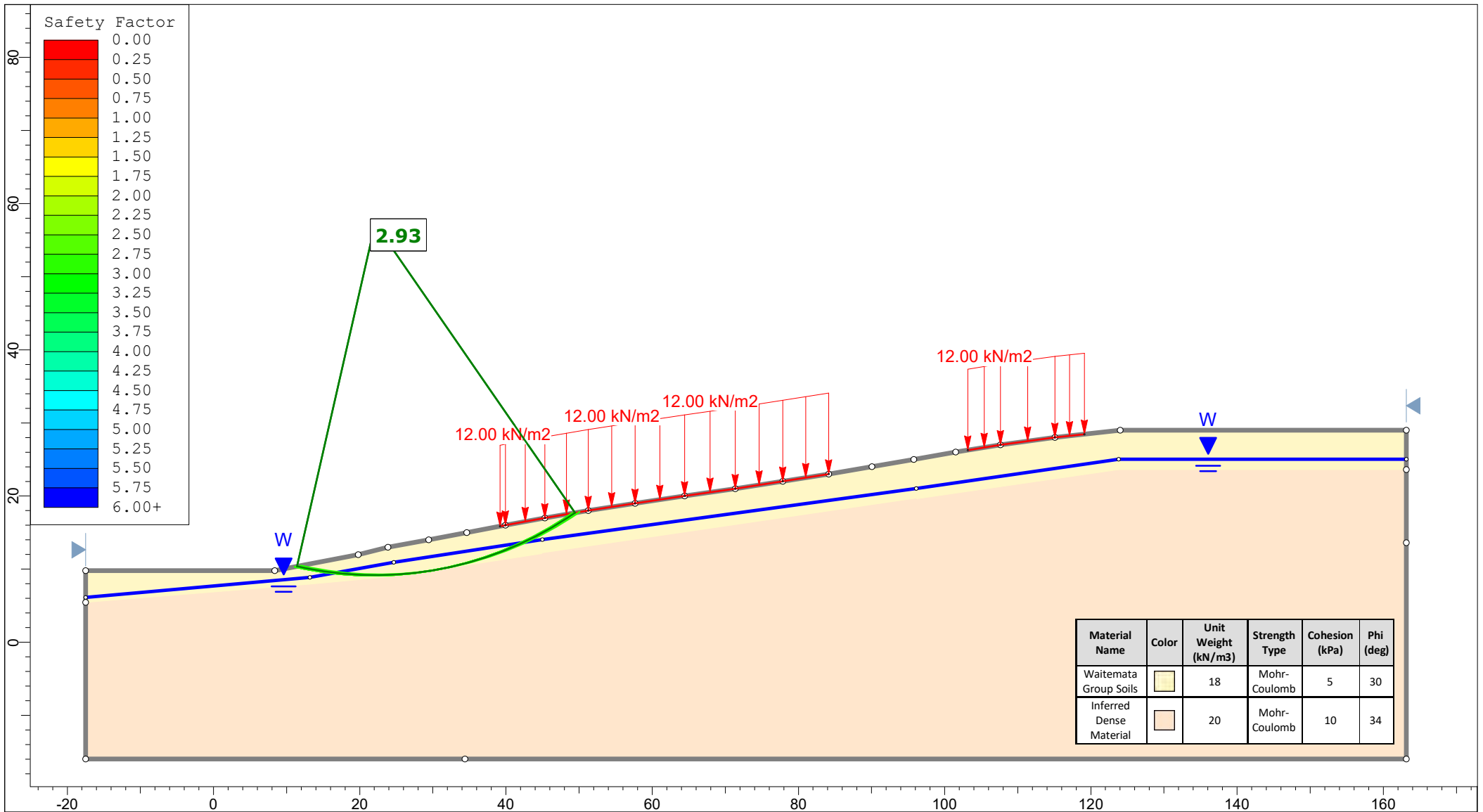


Safety Factor

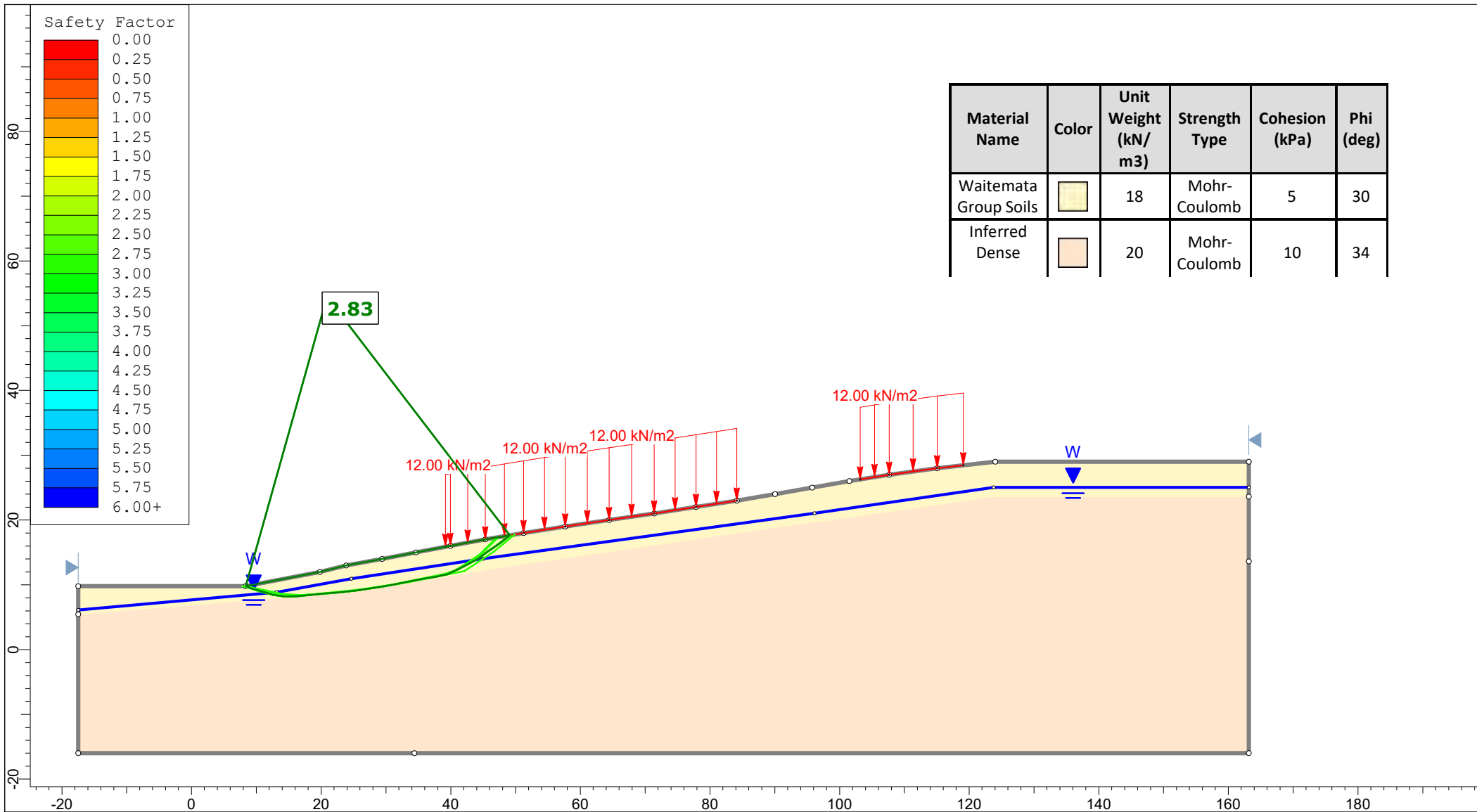



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)
Waitemata Group Soils		18	Mohr-Coulomb	5
Inferred Dense Material		20	Mohr-Coulomb	10

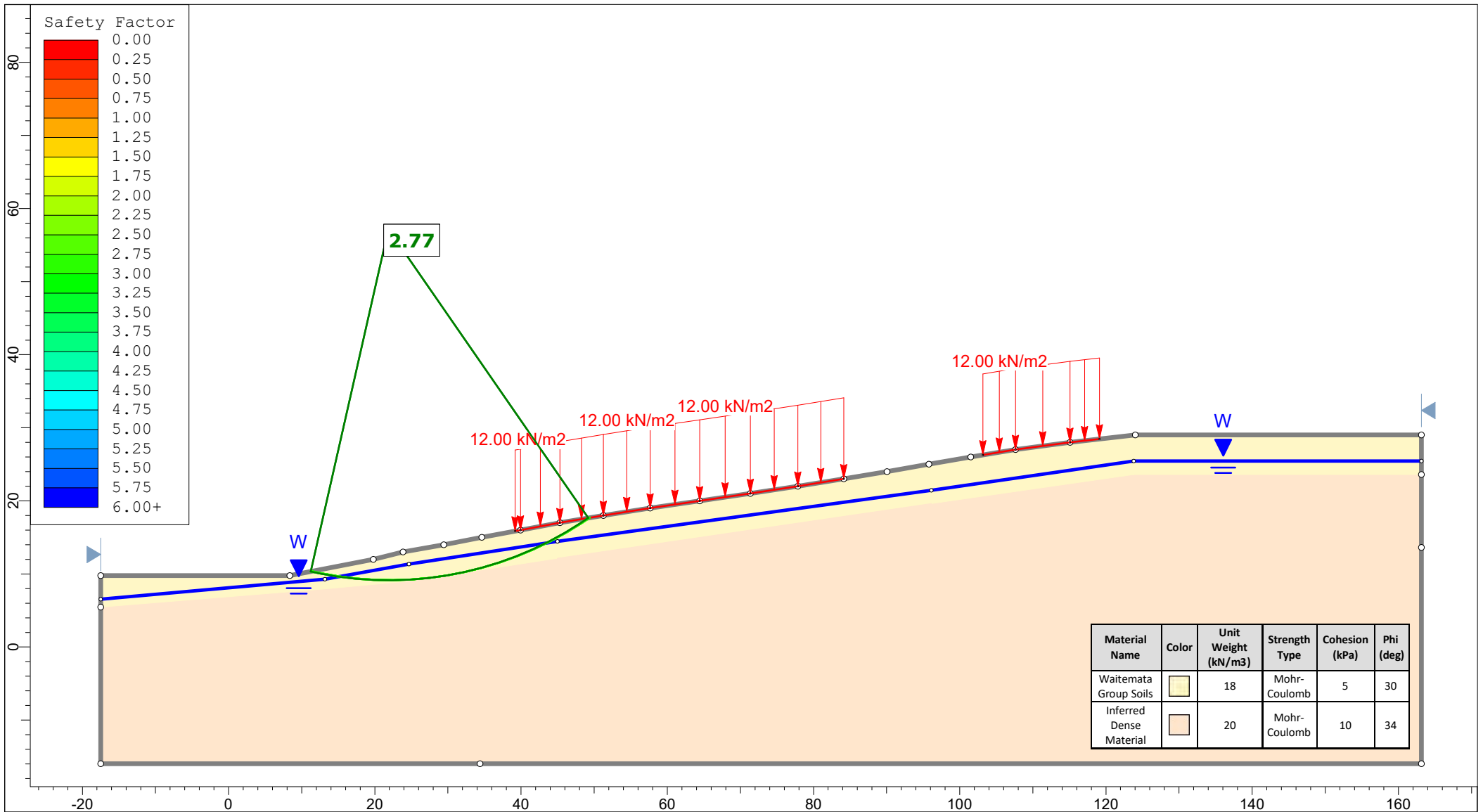
 Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz	Project	K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group	Cross Section F-F' Measured Ground	Scenario	Run 6 - Seismic Loading - Non-Circular
	Drawn By	TR	Company	KGA Geotechnical Group Limited
	Date	26 February 2024	File Name	2024 Master.slmd



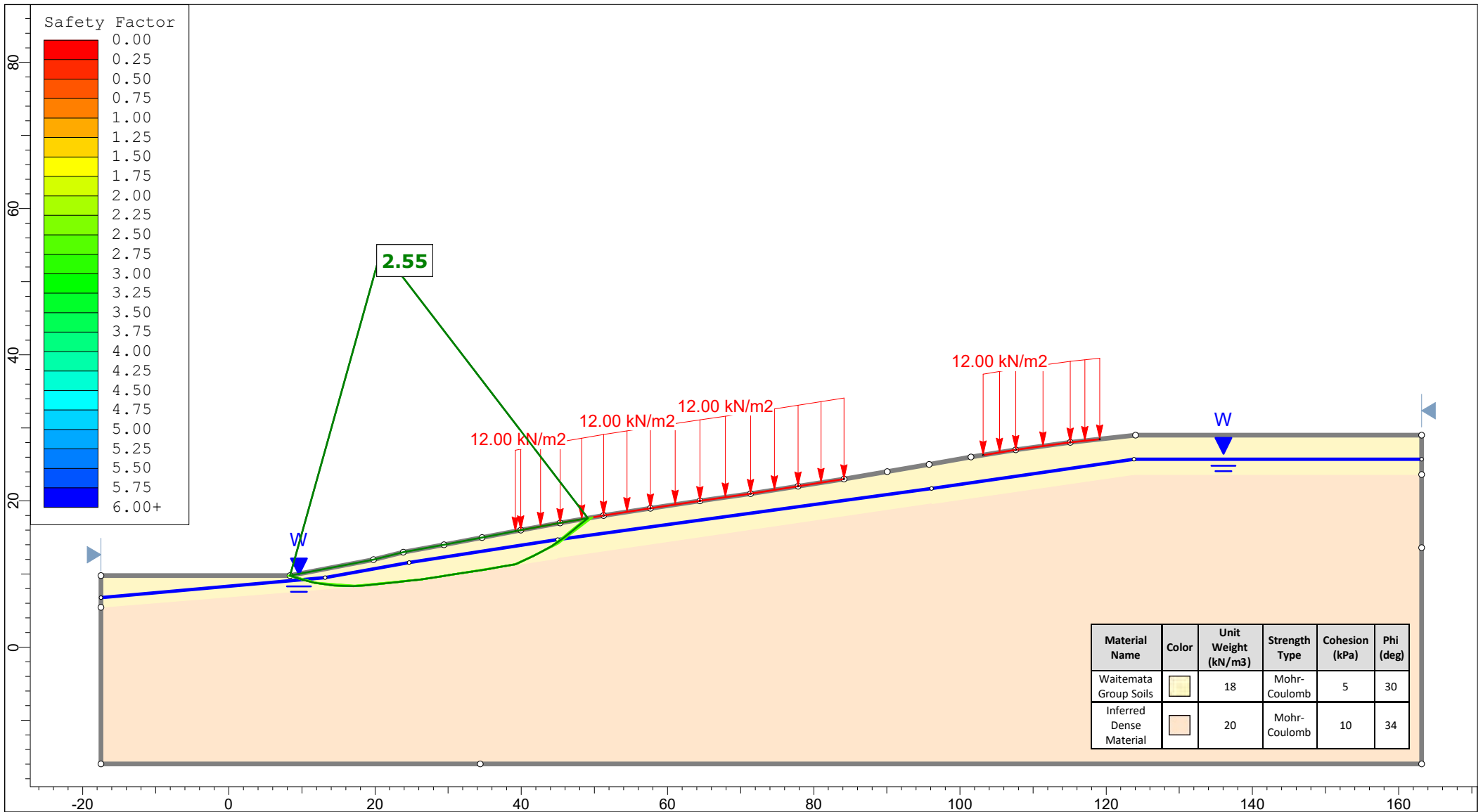
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	<p><i>Project</i> K200826 - 2127 Kaipara Coast Highway, Kakanui</p>	
	<p><i>Group</i> Cross Section F-F' Proposed Ground</p>	<p><i>Scenario</i> Run 1 - Measured Groundwater - Circular</p>
	<p><i>Drawn By</i> TR</p>	<p><i>Company</i> KGA Geotechnical Group Limited</p>
	<p><i>Date</i> 26 February 2024</p>	<p><i>File Name</i> 2024 Master.slm</p>



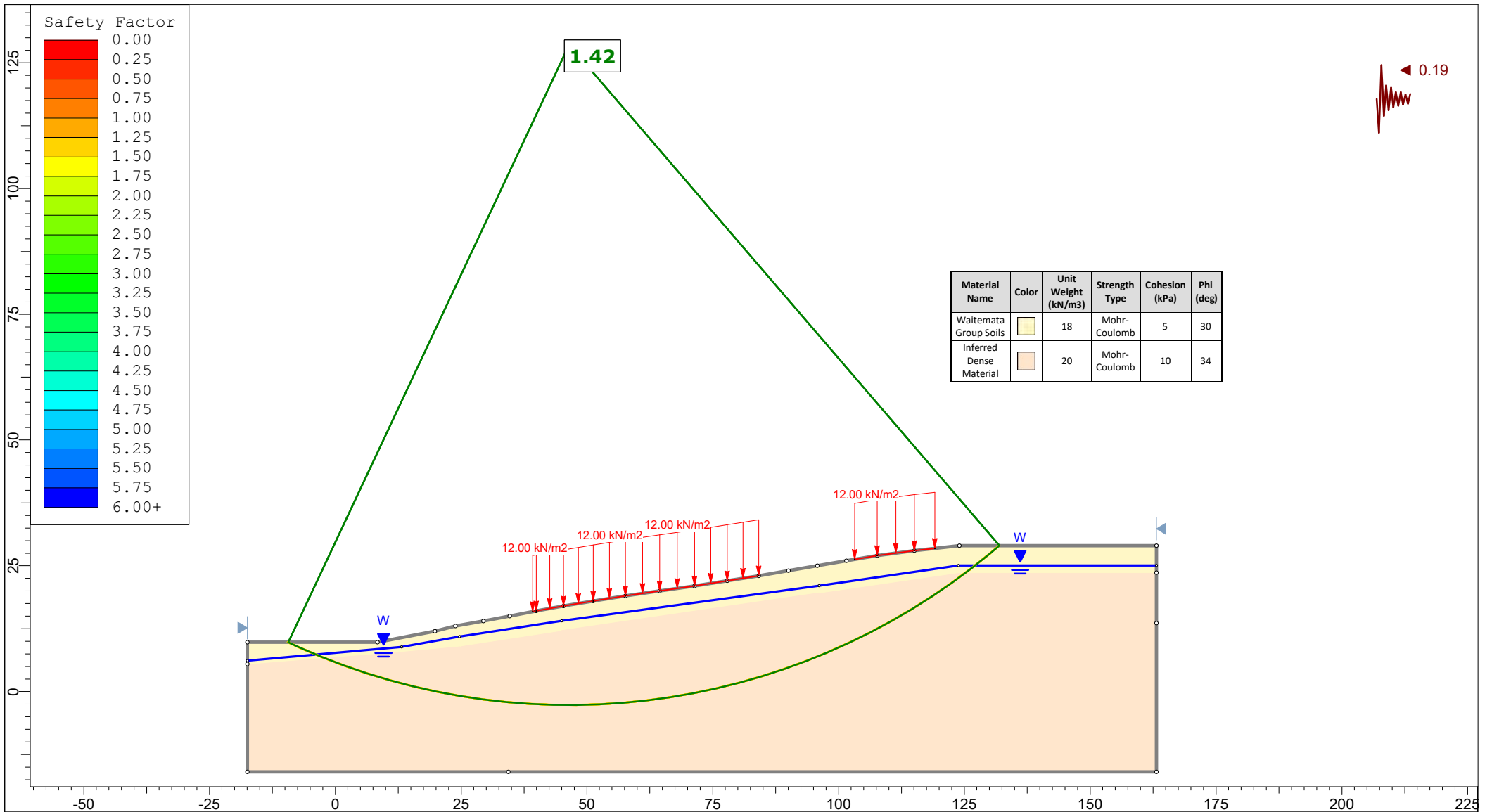
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section F-F' Proposed Ground	Scenario	Run 2 - Measured Groundwater - Non-Cicular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.slmd




<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section F-F' Proposed Ground	
	Scenario		Run 3 - Raised Groundwater - Circular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.slmd		

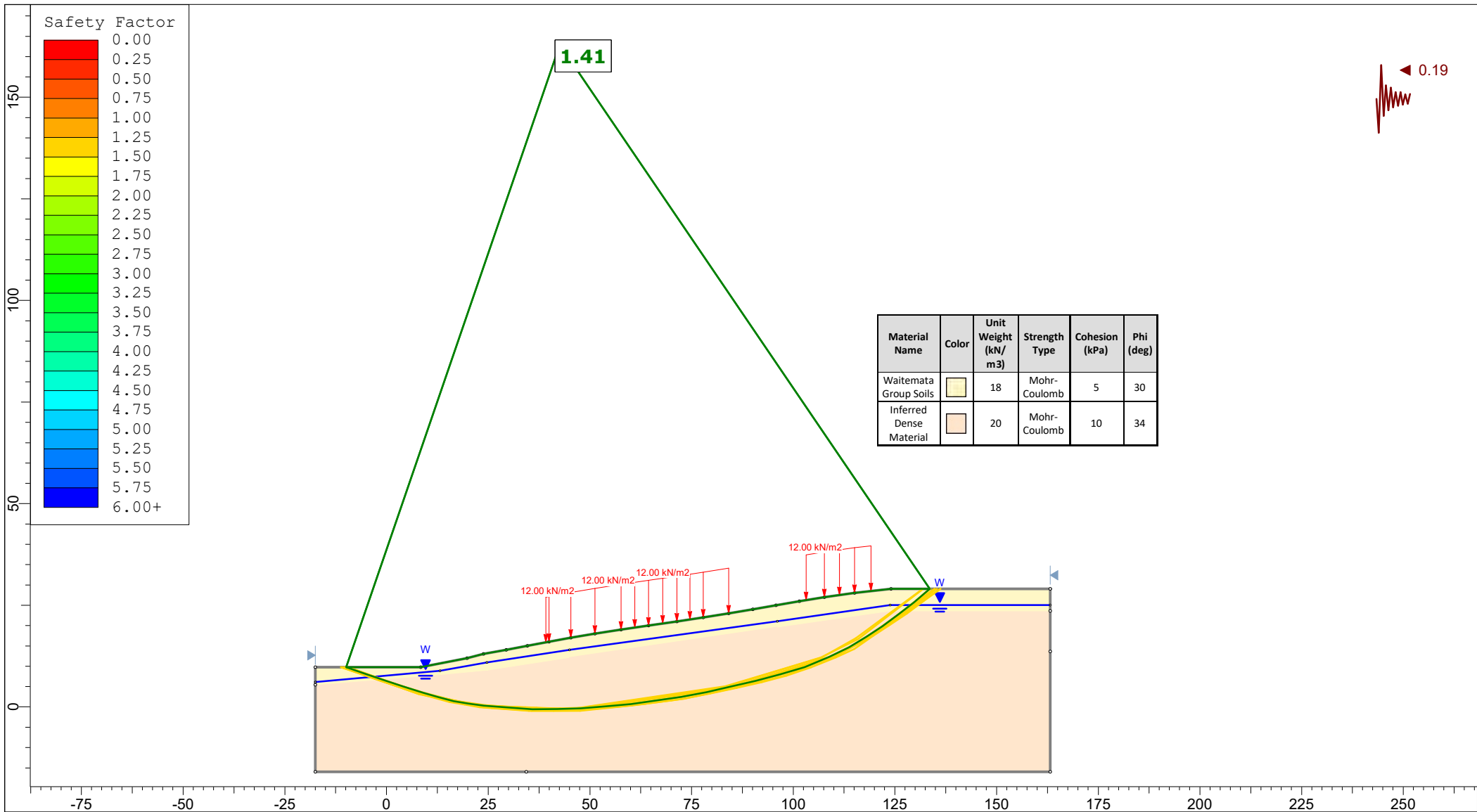


<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section F-F' Proposed Ground	
	Scenario		Run 4 - Raised Groundwater - Non-Cicular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.slmd		




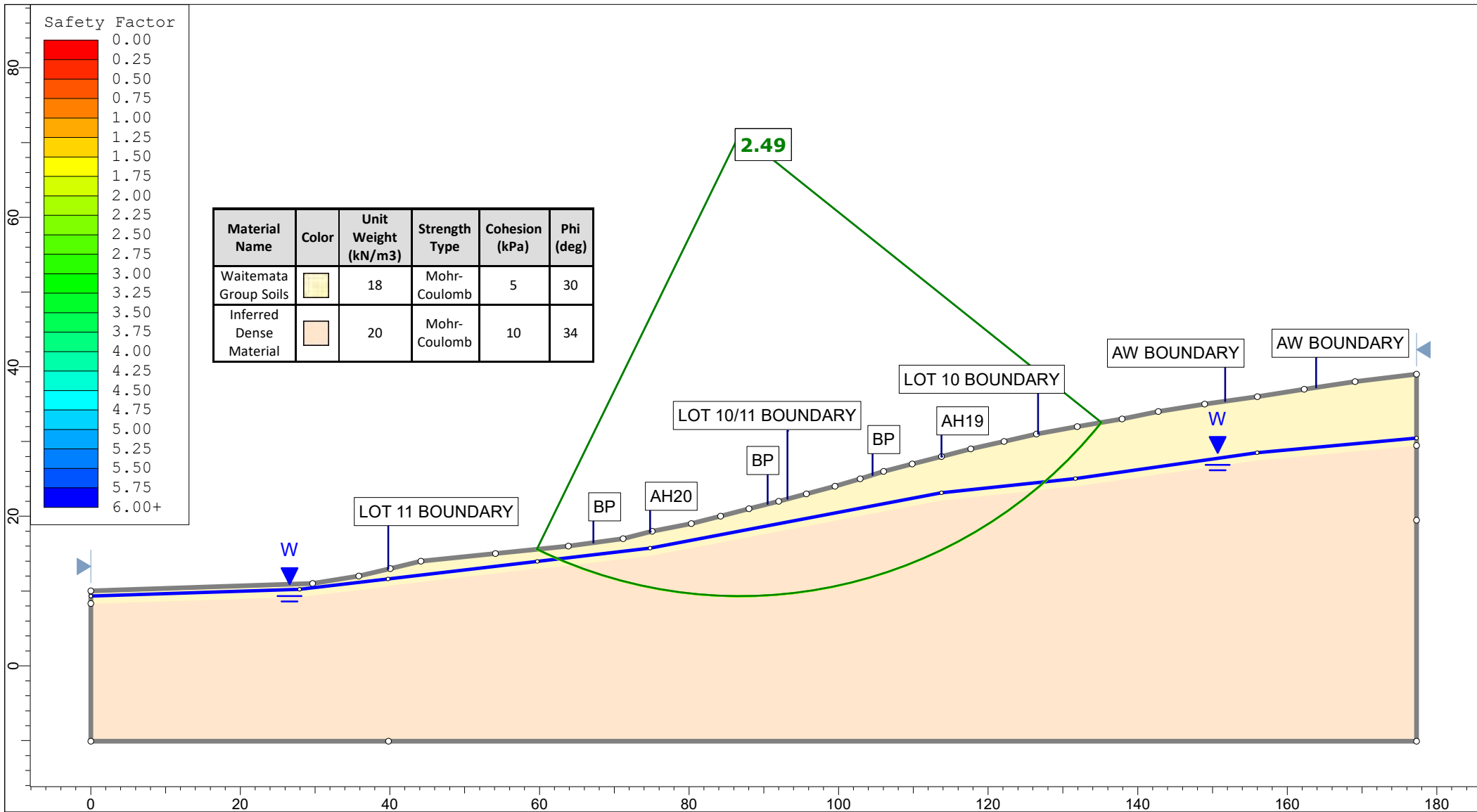
Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)
Waitemata Group Soils	Yellow	18	Mohr-Coulomb	5	30
Inferred Dense Material	Orange	20	Mohr-Coulomb	10	34

<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p> 	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section F-F' Proposed Ground	
	Drawn By		TR	
	Date		26 February 2024	
		Scenario		Run 5 - Seismic Loading - Circular
		Company		KGA Geotechnical Group Limited
		File Name		2024 Master.sldm

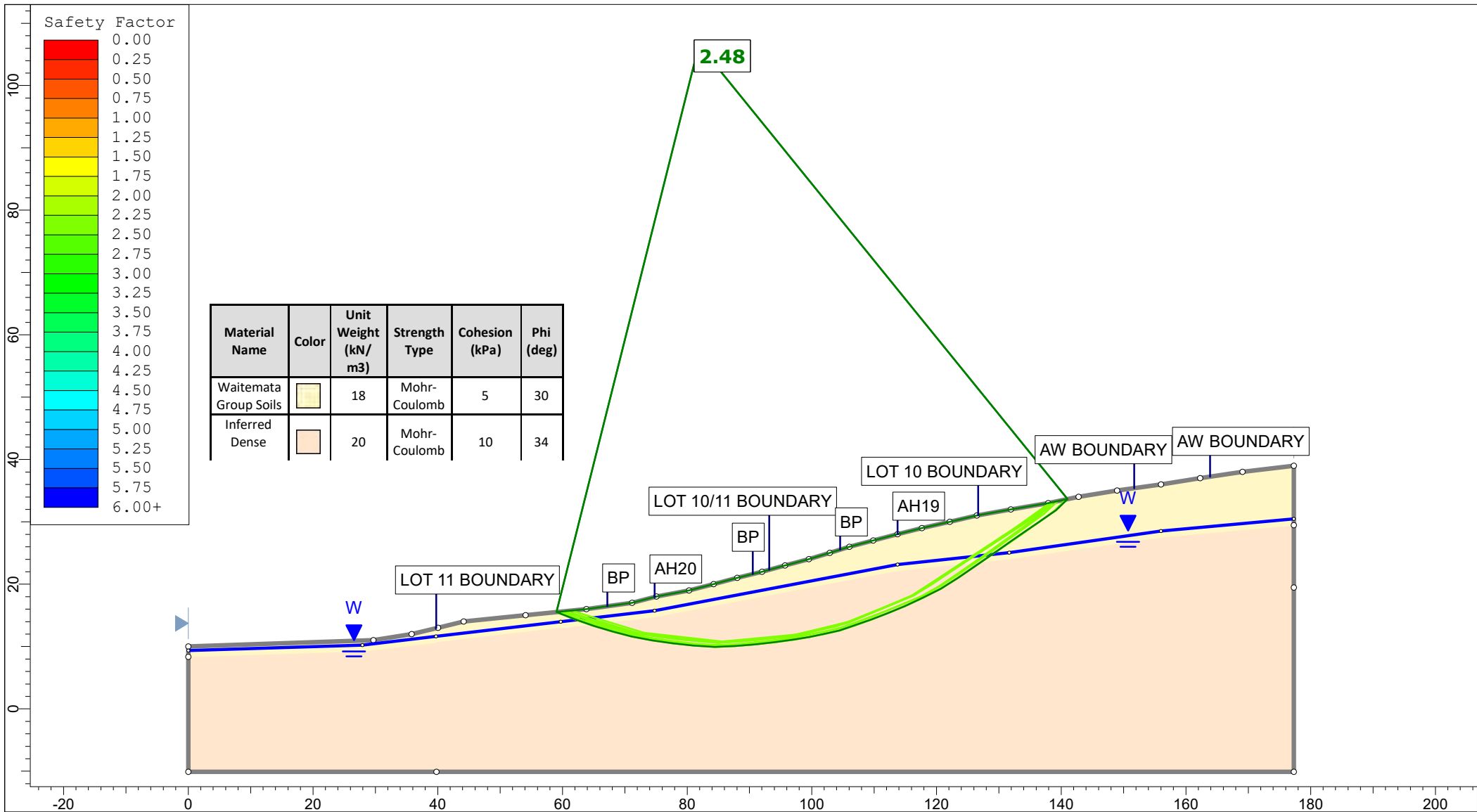



Material Name	Color	Unit Weight (kN/m ³)	Strength Type	Cohesion (kPa)	Phi (deg)
Waitemata Group Soils	Yellow	18	Mohr-Coulomb	5	30
Inferred Dense Material	Orange	20	Mohr-Coulomb	10	34

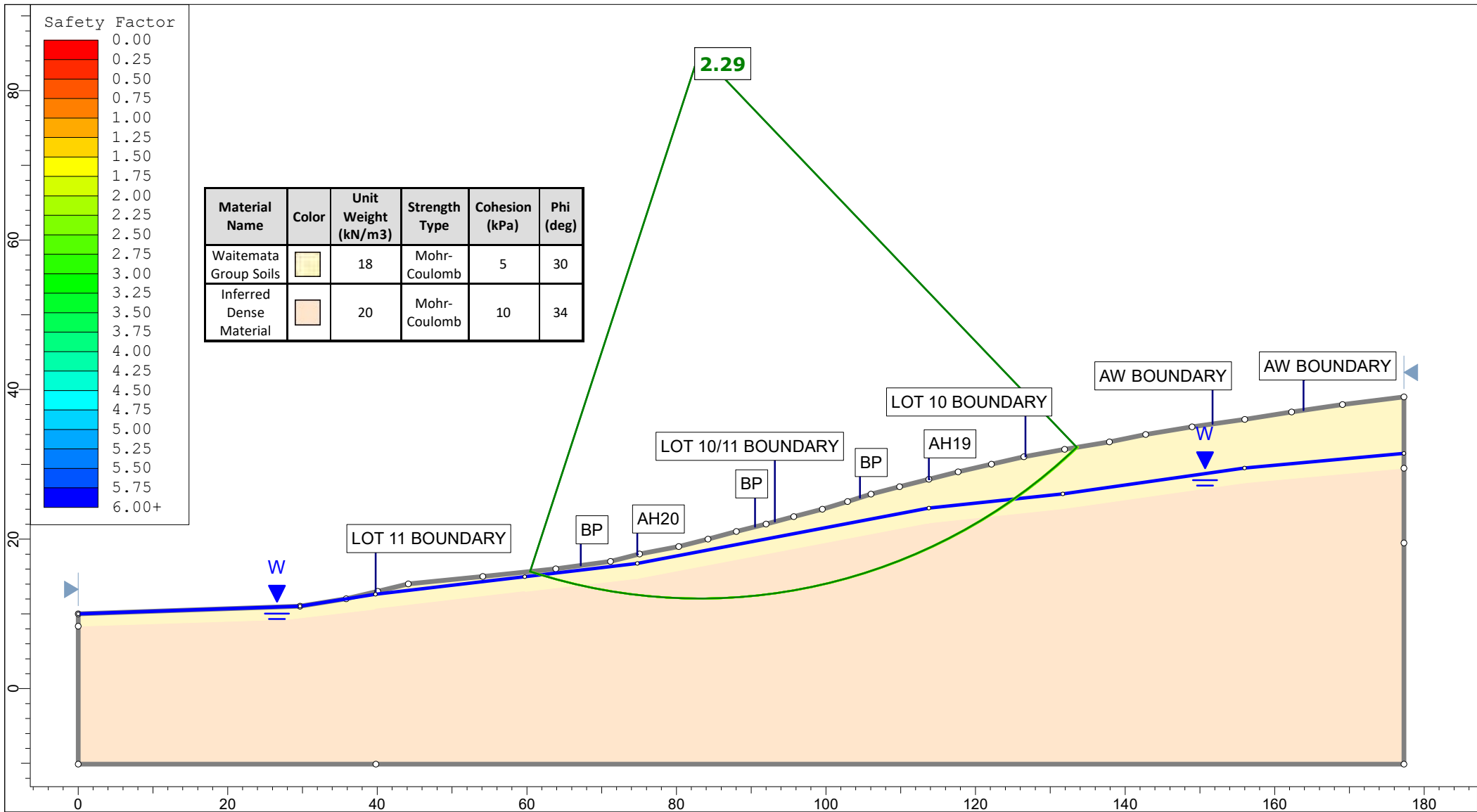
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p> 	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section F-F' Proposed Ground	
	Scenario		Run 6 - Seismic Loading - Non-Circular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.slmd		



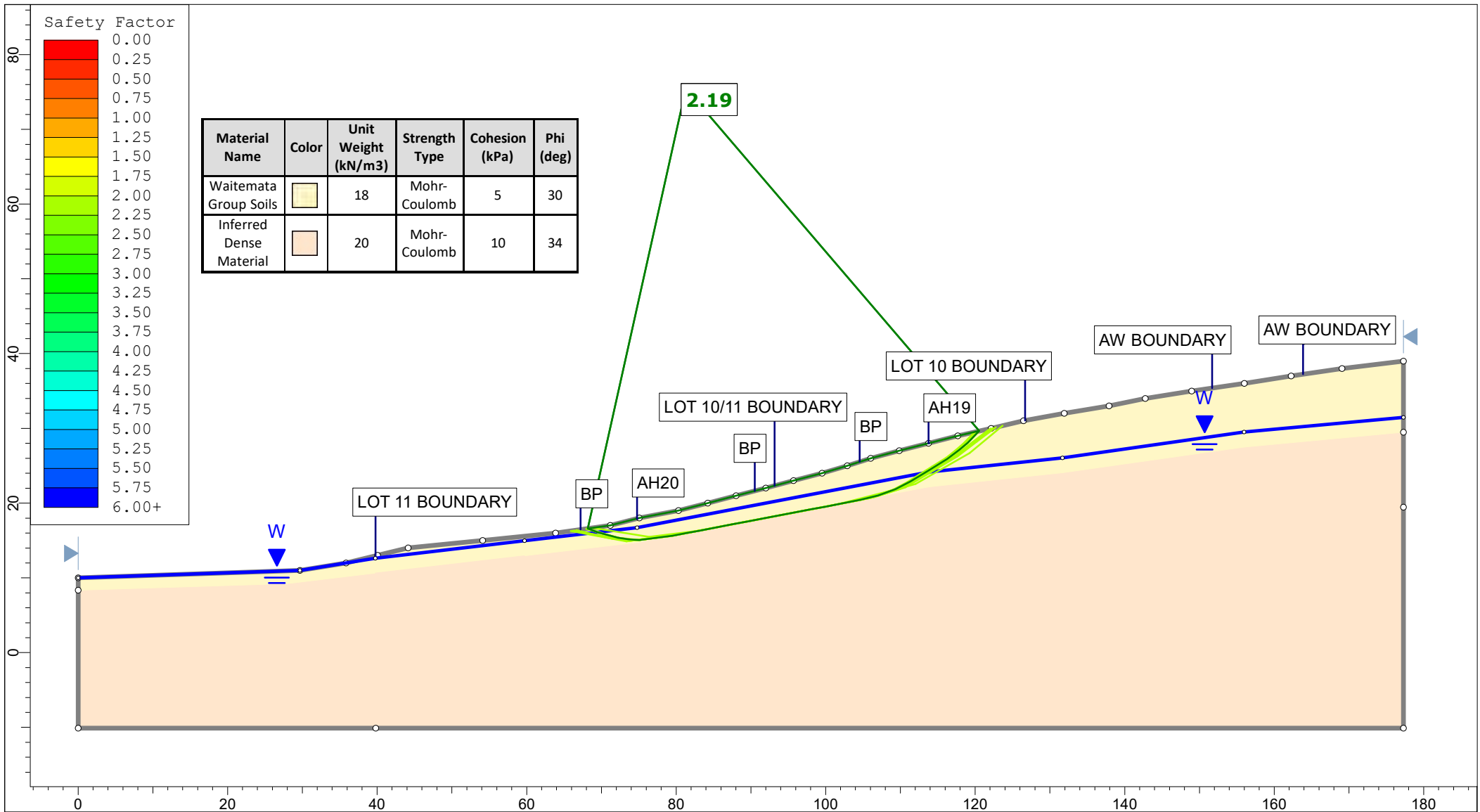
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	<p>Project K200826 - 2127 Kaipara Coast Highway, Kakanui</p>	
	<p>Group Cross Section G-G' Measured Ground</p>	<p>Scenario Run 1 - Measured Groundwater - Circular</p>
	<p>Drawn By TR</p>	<p>Company KGA Geotechnical Group Limited</p>
	<p>Date 26 February 2024</p>	<p>File Name 2024 Master.slmd</p>



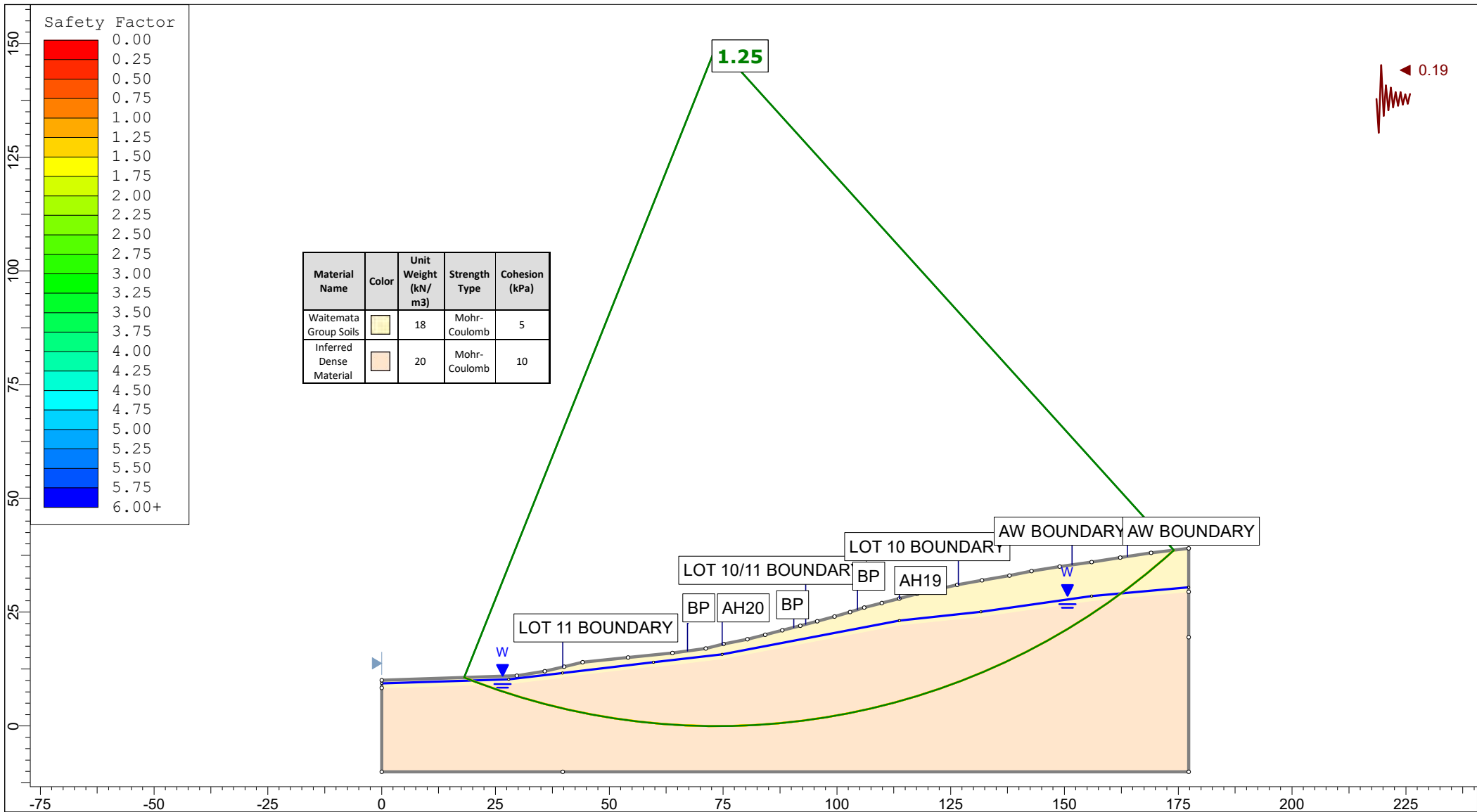
 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section G-G' Measured Ground	Scenario	Run 2 - Measured Groundwater - Non-Cicular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.slmd



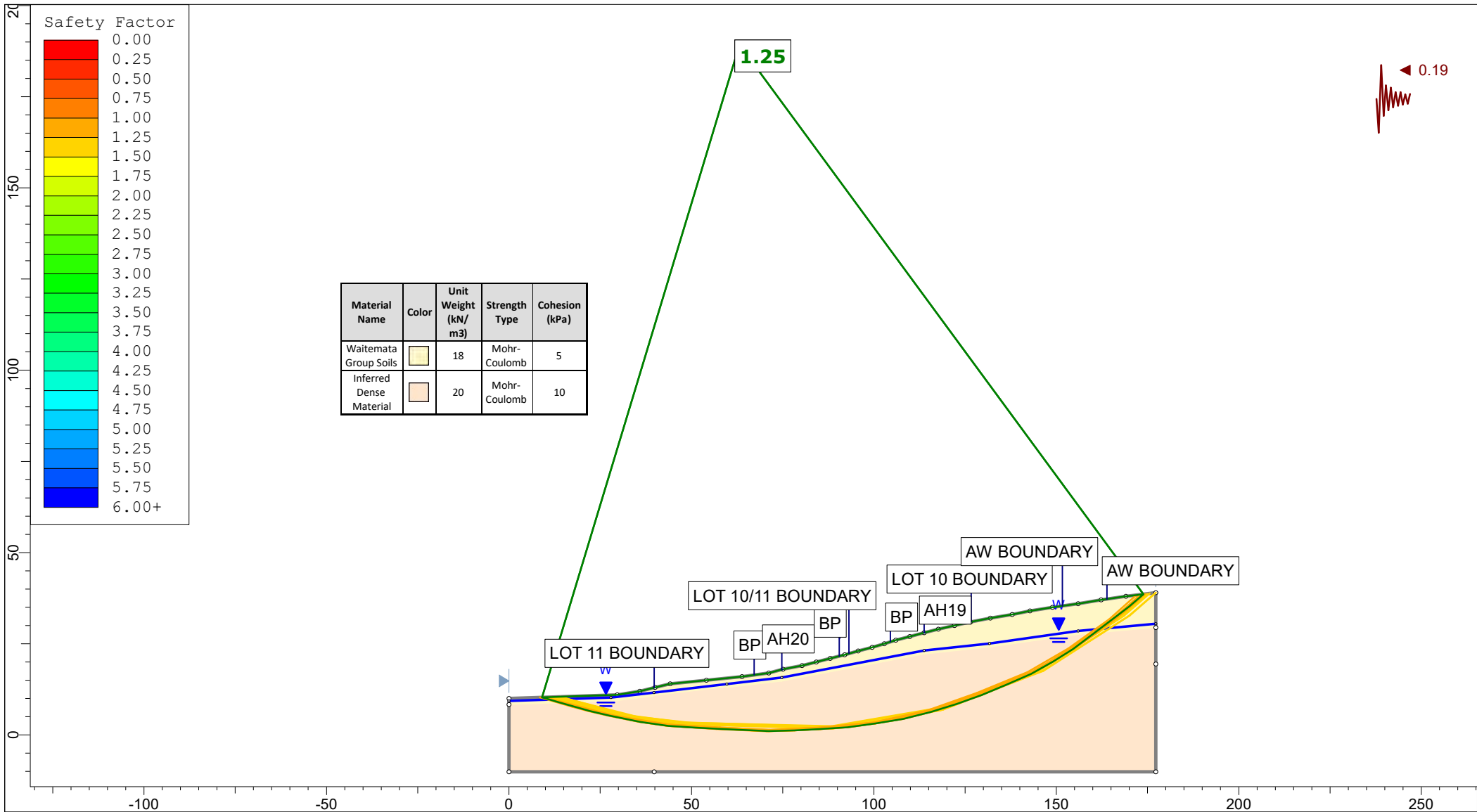
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section G-G' Measured Ground	Scenario	Run 3 - Raised Groundwater - Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.sldm




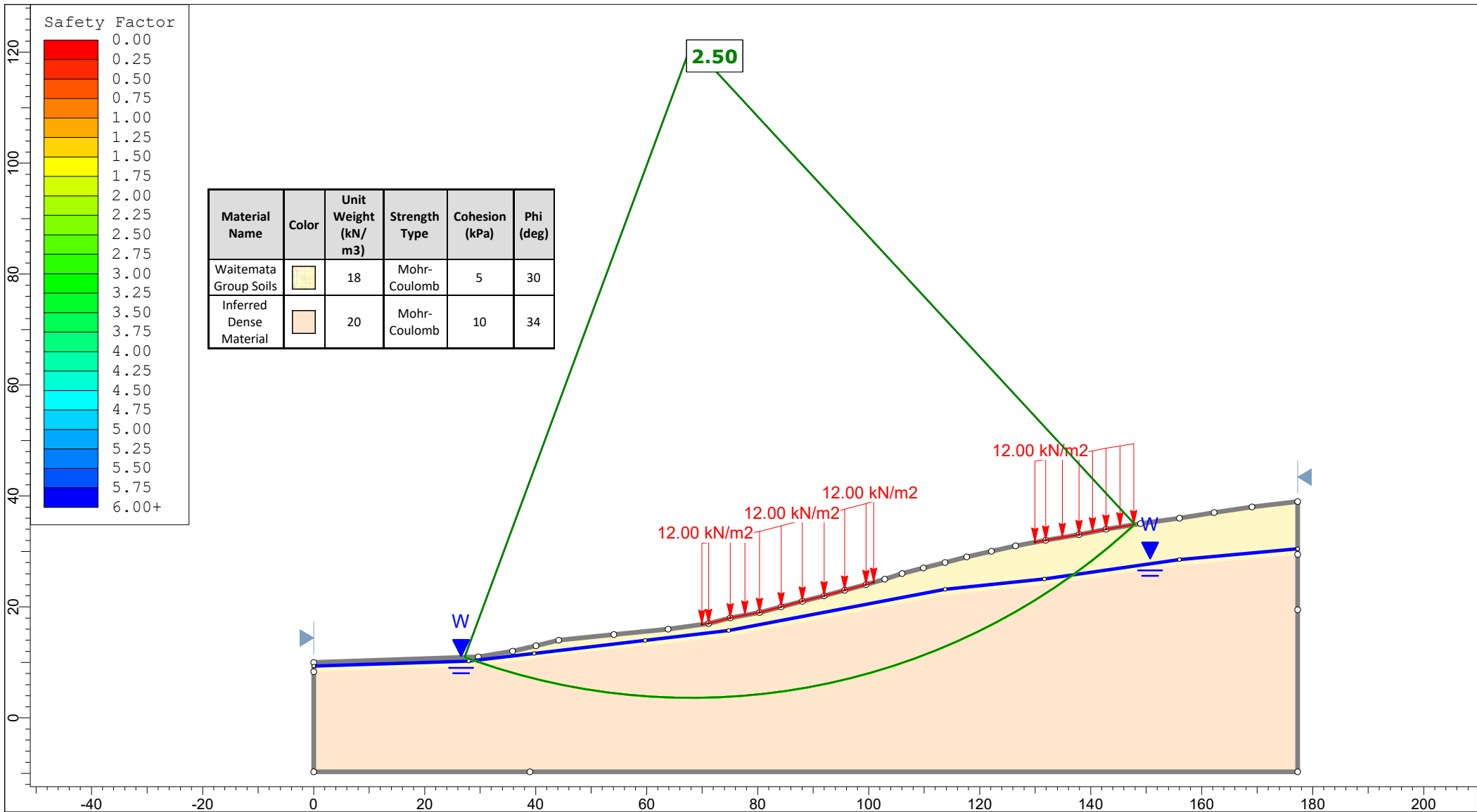
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section G-G' Measured Ground	
	Scenario		Run 4 - Raised Groundwater - Non-Cicular	
	Company		KGA Geotechnical Group Limited	
Drawn By		TR		
Date		26 February 2024		
File Name		2024 Master.slmd		




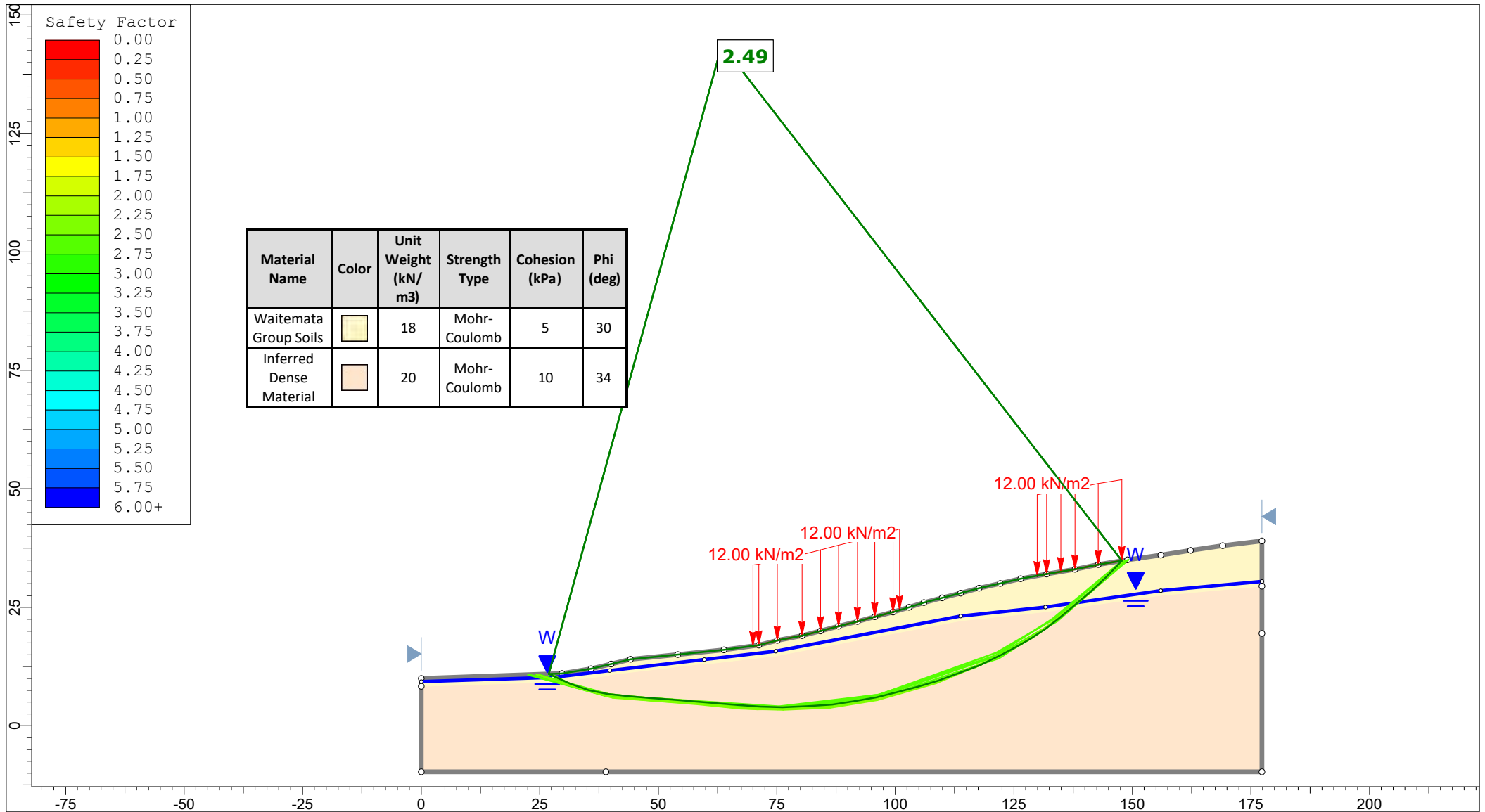
<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group		Cross Section G-G' Measured Ground	
	Drawn By		TR	
	Date		26 February 2024	
		Scenario		Run 5 - Seismic Loading - Circular
		Company		KGA Geotechnical Group Limited
		File Name		2024 Master.sldm




 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project		K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group		Cross Section G-G' Measured Ground	Scenario	Run 6 - Seismic Loading - Non-Circular
	Drawn By		TR	Company	KGA Geotechnical Group Limited
	Date		26 February 2024	File Name	2024 Master.slmd



 <p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p>	Project K200826 - 2127 Kaipara Coast Highway, Kakanui	
	Group Cross Section G-G' Proposed Ground	Scenario Run 1 - Measured Groundwater - Circular
	Drawn By TR	Company KGA Geotechnical Group Limited
	Date 26 February 2024	File Name 2024 Master.sldm



<p>Auckland Christchurch 09 478 6655 03 343 5302 www.kga.co.nz</p> 	Project	K200826 - 2127 Kaipara Coast Highway, Kakanui		
	Group	Cross Section G-G' Proposed Ground	Scenario	Run 2 - Measured Groundwater - Non-Cicular
	Drawn By	TR	Company	KGA Geotechnical Group Limited
	Date	26 February 2024	File Name	2024 Master.slm