

APPENDIX D NEARBY GROUNDWATER USERS



Table D1: Water Supply Bores Within One Kilometre of the Development

BORE ID	TYPE	STATUS	EASTING	NORTHING	EXTERNAL CASING DIAMETER (mm)	DRILLED DEPTH (m)
72_10731	Well/Bore	Existing	1794847	5816025	100	46.3
69_177	Well/Bore	Existing	1795455	5814963	65	7.54
69_178	Well/Bore	Existing	1795453	5816163	76	18.9
72_11240	Well/Bore	Existing	1795223	5814854	150	139.5
72_11140	Well/Bore	Unknown	1794982	5814834		
69_858	Well/Bore	Existing	1794955	5814862	100	23.7
72_3491	Well/Bore	Existing	1794956	5814662	75	
69_92	Well/Bore	Existing	1795956	5814564	100	11.6
72_1432	Well/Bore	Existing	1796056	5814664	100	23.0
62_3	Well/Bore	Existing	1796645	5814765	76	32.94
72_4901	Well/Bore	Existing	1796709	5814842	100	6
62_25	Well/Bore	Existing	1795954	5815764	65	8.16
62_26	Well/Bore	Existing	1796154	5815864	76	32.94
72_11239	Well/Bore	Existing	1795408	5816356	200	113
72_10731	Well/Bore	Existing	1794847	5816025	100	46.3
69_681	Well/Bore	Existing	1795053	5816563	100	7.2
69_193	Well/Bore	Existing	1795253	5816663	76	54.8
72_4635	Well/Bore	Existing	1795252	5816763	100	33
69_30	Well/Bore	Existing	1794852	5816663	76	11
69_477	Well/Bore	Existing	1794852	5816663		
69_768	Well/Bore	Existing	1794552	5816862	100	14.3
72_604	Well/Bore	Existing	1794683	5817036	100	5.1
72_12996	Well/Bore	Existing	1795126	5815602	40	6.0
72_12997	Well/Bore	Existing	1795589	5815421	40	4.5
72_12998	Well/Bore	Existing	1796009	5815506	40	4.6
72_12999	Well/Bore	Existing	1795218	5816292	40	9.0

Note:

⁽¹⁾ Source: WRC database obtained April 2026.

APPENDIX E

SOIL TRIAXIAL TESTS



Sample Locations

Soils have been sampled from seven locations:

- One sample from the low hills developed on Walton Group clays
- Three samples from low-lying peat of the flood plain
- Three samples from the marginal recent alluvium

Each of the samples are obtained as undisturbed as possible, collected using push tubes to 0.5 m bgl.

The locations of the sampling auger holes are identified in Figure F1.

Sample Processing and Analysis

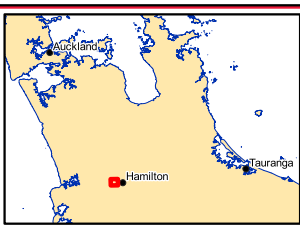
The samples were submitted to the Geotechnics Ltd geotechnical laboratory for triaxial testing.

Each sample provided for testing were as undisturbed as possible. For each sample:

- Place the undisturbed soil sample in the triaxial test apparatus.
- Measure and record the sample size.
- Apply an initial confining pressure (30 kPa, equivalent to 3 m H₂O)
 - Test the hydraulic conductivity of the sample using a pressure differential of 20 kPa (approximately 2 m H₂O).
- Compress the sample to meet CWM fill geotechnical specifications.
 - Required consolidation stress is (80 kPa, approximately equivalent to 8 m H₂O).
 - Record the change in sample size and water loss from sample (should be the same).
 - Test the hydraulic conductivity of the compacted sample using a pressure differential of 20 kPa (approximately 2 m H₂O).

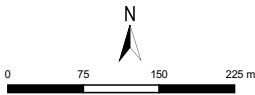
Test Results

The triaxial test results are summarised in Table E1.



LEGEND

-  Sampling Location
-  Site Boundary



Scale 1:7 500 @A4

Coordinate System: NZGD 2000 New Zealand Transverse Mercator

WGA

Figure E1
Brymer Farms Limited
Sampling Locations for Soil
Compaction Test Samples

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Any reliance placed on such information shall be at the risk of the user.
Note: The information shown on this map is copyright of WGA 2026

Table E1: Peat and Silt Soil Compaction Test Results Summary

LOCATION ID	UNITS	TL-1	TL-2	TL-3	TL-4	TL-5	TL-6	TL-7
Sample depth	m bgl	0.33 – 0.40	0.41 – 0.48	0.37 – 0.44	0.31 – 0.38	0.45 – 0.52	0.53 – 0.6	0.35 – 0.42
Lithology		PEAT	PEAT	PEAT	SILT	SILT	SILT	SILT
Stage 1 sample height	mm	68	73	65	73	67	65	65
Stage 1 sample diameter	mm	60	60	60	60	60	60	60
Stage 1 sample volume	mL	192	206	184	206	189	184	184
Initial bulk density	t/m3	0.96	1.05	1.18	1.26	1.90	1.79	1.83
Initial dry density	t/m3	0.16	0.25	0.50	0.61	1.53	1.29	1.47
Initial water content	%	507	330	135	107	24	39	24
Final dry density	t/m3	0.20	0.32	0.59	0.65	1.52	1.32	1.43
Final water content	%	411	243	121	102	28	38	31
Final bulk density	t/m3	1.02	1.10	1.30	1.31	1.94	1.82	1.87
Compaction ratio	%	125	128	118	107	99	102	97
Final volume	mL	153.73	161.17	155.67	193.60	190.59	179.52	188.83
Final volumetric strain	%	20	22	15	6.2	-0.7	2.3	-2.8
Water loss prior to Test 1	mL	8.54	12.31	11.44	2.21	0.62	0.29	NA
Sample volume prior to Test 1	mL	184	194	172	204	189	183	NA
Intermediate volumetric strain	%	4	6	6	1	0	0	NA
Initial hydraulic conductivity	m/s	5.0×10^{-8}	2.1×10^{-9}	4.6×10^{-9}	3.9×10^{-7}	4.6×10^{-9}	4.8×10^{-10}	NA
Final hydraulic conductivity	m/s	9.3×10^{-10}	6.6×10^{-10}	1.7×10^{-9}	7.1×10^{-8}	3.4×10^{-9}	2.5×10^{-10}	4.4×10^{-9}



9 July 2026

Our Ref: 1102489.0000.0.0/Rep1a

Customer Ref: HAM2025-0084

CMW Geosciences (NZ) Ltd
116 Cameron Road
Tauranga
Tauranga 3110

Attention: Mark McVinnie

Dear Mark

584 Whatawhata Road, Hamilton

Amended Laboratory Test Report

This report supersedes the original report certificate number 1102489.0000.0.0/Rep1, dated 22 May 2026, to include the initial and final water content and dry density values for the sample TL06, 0.53 - 0.6 (m). We apologise for any inconvenience it may have caused.

Customer's Instructions

Detailed testing instructions were provided by the customer via email dated 5 March 2026.

Sampling Procedure

Samples have been tested as received.

Sample Location Plan

Not applicable.

Samples

We received seven push tube samples labelled with the location ID and sample depth.

Date(s) of Sample Receipt

4 March 2026

Test Method(s)

ISO 17892:2019 Part 11 - Permeability Tests

NZS 4402: 1986 Test 2.1 - Water Content

Material Description

Descriptions are provided in the attached presentation pages.

Geotechnics Ltd

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+64 9 356 3510 | enquiry@geotechnics.co.nz | www.geotechnics.co.nz

Test Results

Test results are attached.

Test Remarks

Test remarks are detailed on the presentation page.

General Remarks

Samples not destroyed during testing, will be retained for one month from the date of this report before being discarded.

Descriptions are enclosed for your information but are not covered under the IANZ endorsement of this report.

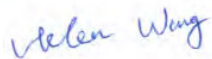
This report has been prepared for the benefit of CMW Geosciences (NZ) Ltd, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

Please reproduce this report in full when transmitting to others or including in internal reports.

If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of the letterhead page.

GEOTECHNICS LTD

Report approved by:



.....
Helen Wang
Triaxial Laboratory Manager
Key Technical Person

Authorised for Geotechnics by:

.....
Steven Anderson
Project Director



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

9-Jul-26

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hamilton.pihe.rep1a.docx



GEOTECHNICS

1 Hill Street
Onehunga
Auckland
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p. +64 9 356 3510

Geotechnics Project ID: 1102489.0000.0.0
Customer Project ID: HAM2025-0084
Test Schedule Reference: --

Site/Location: 584 Whatawhata Road, Hamilton

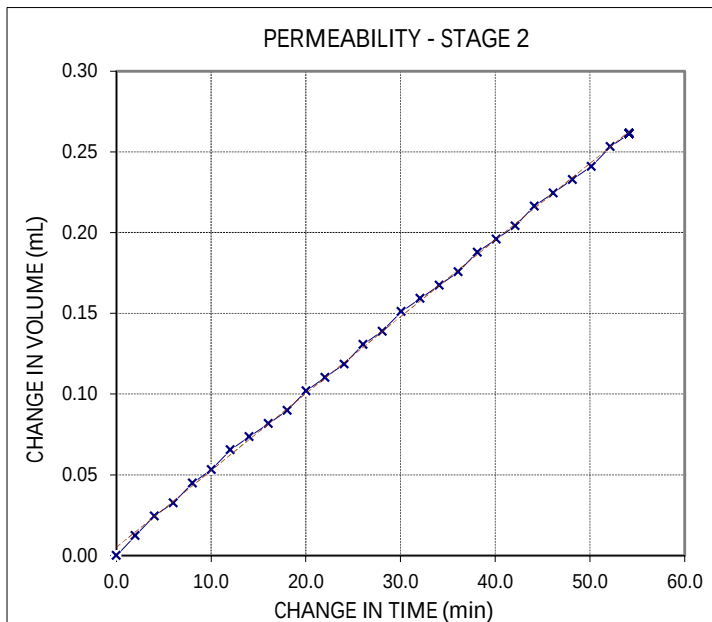
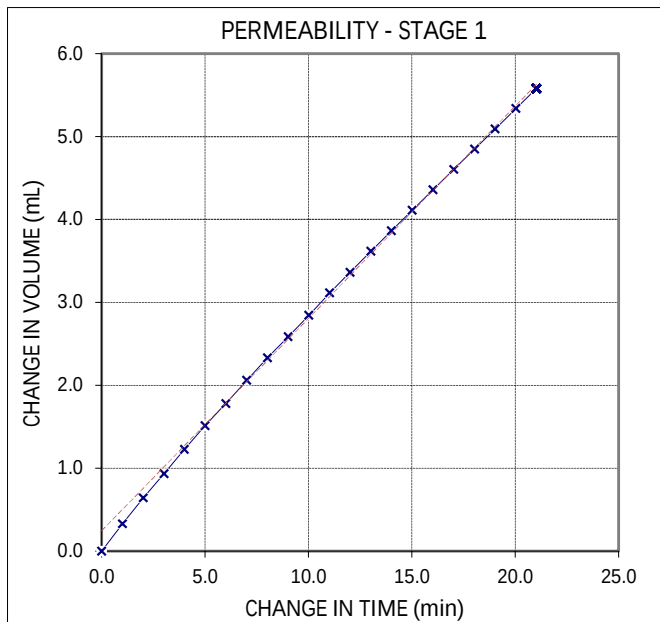
Location ID: TL1

Sample Ref.: --

Geotechnics ID: --

Depth (m): 0.33 - 0.40

Test Method Used: ISO 17892-11:2019 Part 11 Permeability Tests
NZS 4402:1986 Test 2.1 Determination of Water Content



Initial sample height	68	(mm)	Initial bulk density	0.96	(t/m ³)
Initial sample diameter	60	(mm)	Initial dry density	0.16	(t/m ³)
Saturation at test (B)	100	(%)	Initial water content	507	(%)
Final water content	411	(%)	Final dry density	0.20	(t/m ³)

	Stage 1	Stage 2	
Back pressure level (kPa)	310	310	
Consolidation stress level (kPa)	30	80	
Head difference (kPa)	20	20	
Hydraulic gradient	30	30	
Test Temperature (°C)	20.0	20.0	
Coefficient of Permeability (m/s)	5.03E-08	9.34E-10	

SAMPLE DESCRIPTION

PEAT with minor rootlets, spongy, fibrous; dark brown/black.

SAMPLE HISTORY

Undisturbed core trimmed at natural water content.

TEST REMARKS

Constant-head permeability test in a triaxial cell. De-aired tap water was used in the test.
The sample was saturated by increments of cell pressure and back pressure.

Tested by: PIHE/ PAVI Date: 20/03/2026 Approved by KTP:  Date: 20/05/2026



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Geotechnics Project ID: 1102489.0000.0.0
Customer Project ID: HAM2025-0084
Test Schedule Reference: --

Site/Location: 584 Whatawhata Road, Hamilton

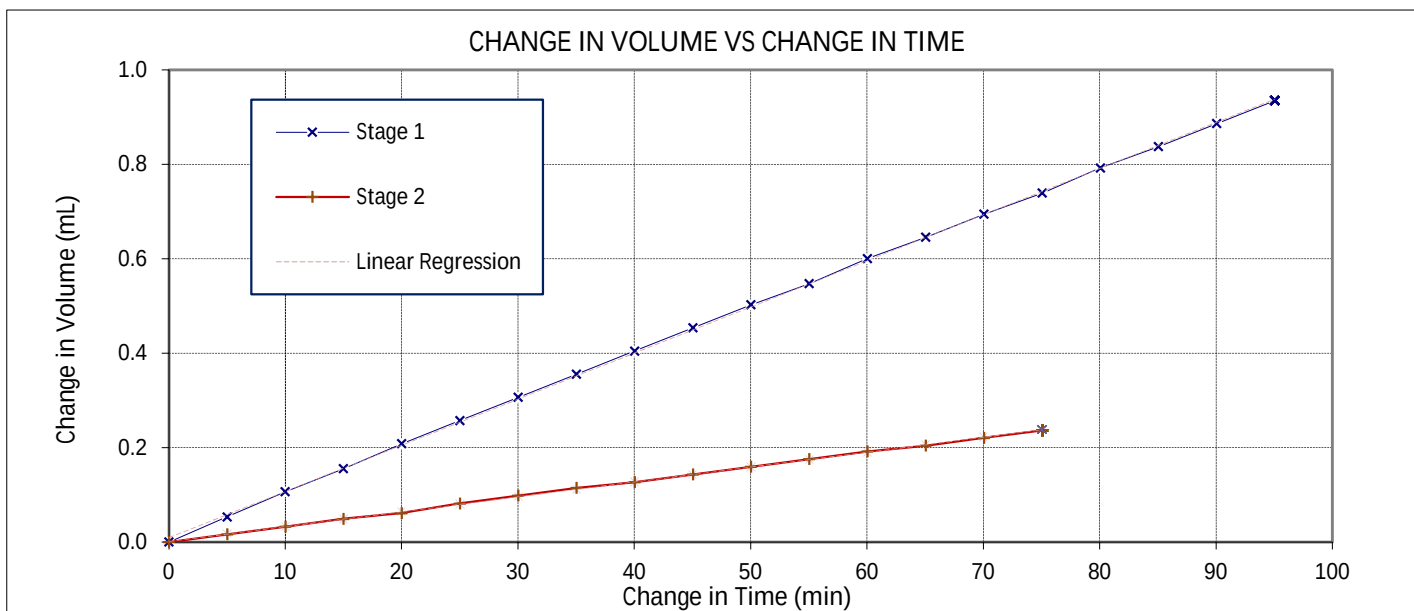
Location ID: TL2

Sample Ref.: --

Geotechnics ID: --

Depth (m): 0.41 - 0.48

Test Method Used: ISO 17892-11:2019 Part 11 Permeability Tests
NZS 4402:1986 Test 2.1 Determination of Water Content



Initial sample height	73	(mm)	Initial bulk density	1.05	(t/m ³)
Initial sample diameter	60	(mm)	Initial dry density	0.25	(t/m ³)
Saturation at test (B)	94	(%)	Initial water content	330	(%)
Final water content	243	(%)	Final dry density	0.32	(t/m ³)

	Stage 1	Stage 2	
Back pressure level (kPa)	310	310	
Consolidation stress level (kPa)	30	80	
Head difference (kPa)	20	20	
Hydraulic gradient	28	28	
Test Temperature (°C)	20.5	20.5	
Coefficient of Permeability (m/s)	2.05E-09	6.60E-10	

SAMPLE DESCRIPTION

PEAT (organic soil); black to dark brown. Firm, plastic, minor rootlets present. Upper ~1/3 of the sample contains woody material (trunk/wood fragment).

SAMPLE HISTORY

Undisturbed core trimmed at natural water content.

TEST REMARKS

Constant-head permeability test in a triaxial cell. De-aired tap water was used in the test.
The sample was saturated by increments of cell pressure and back pressure.

Tested by: PIHE/ PAVI Date: 20/04/2026 Approved by KTP: Date: 20/05/2026



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Geotechnics Project ID: 1102489.0000.0.0
Customer Project ID: HAM2025-0084
Test Schedule Reference: --

Site/Location: 584 Whatawhata Road, Hamilton

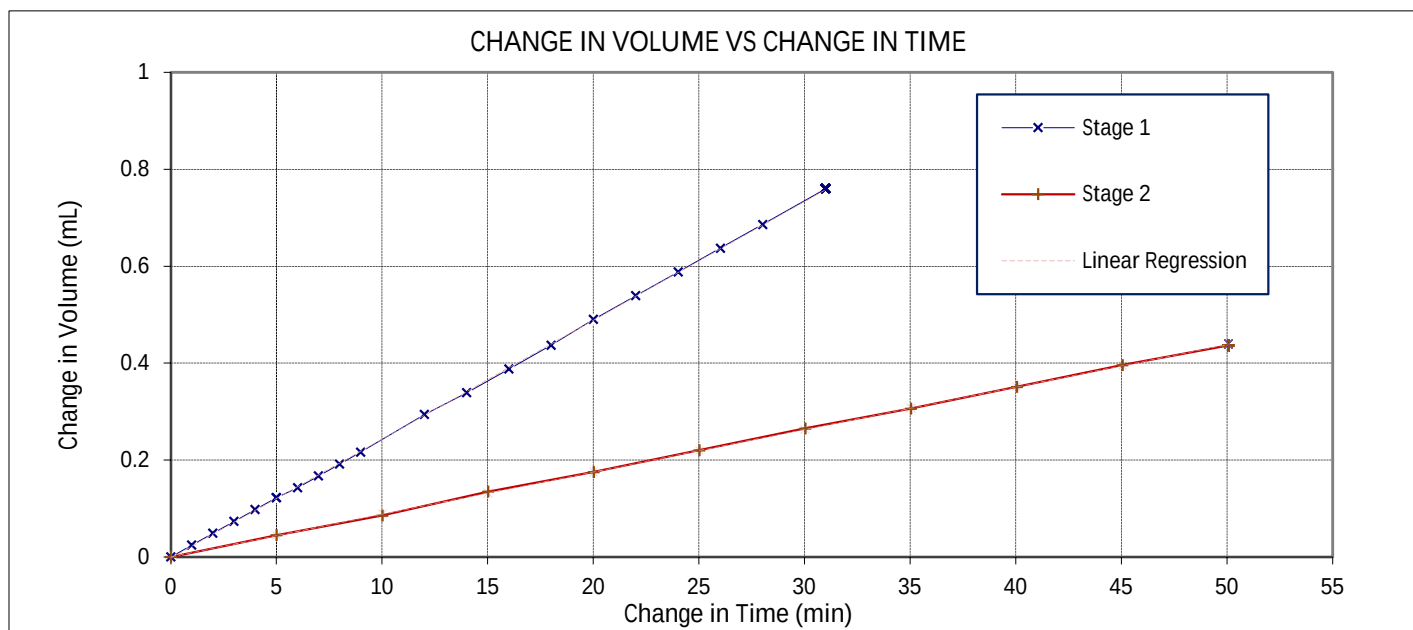
Location ID: TL03

Sample Ref.: --

Geotechnics ID: --

Depth (m): 0.37- 0.44

Test Method Used: ISO 17892-11:2019 Part 11 Permeability Tests
NZS 4402:1986 Test 2.1 Determination of Water Content



Initial sample height	65	(mm)	Initial bulk density	1.18	(t/m ³)
Initial sample diameter	60	(mm)	Initial dry density	0.50	(t/m ³)
Saturation at test (B)	92	(%)	Initial water content	135	(%)
Final water content	121	(%)	Final dry density	0.59	(t/m ³)

	Stage 1	Stage 2	
Back pressure level	310	310	
Consolidation stress level	30	80	
Head difference	20	20	
Hydraulic gradient	31	31	
Test Temperature	20.0	19.5	
Coefficient of Permeability	4.63E-09	1.65E-09	

SAMPLE DESCRIPTION

Peat, with minor rootlets; black. Firm, plastic.

SAMPLE HISTORY

Undisturbed core trimmed at natural water content.

TEST REMARKS

Constant-head permeability test in a triaxial cell. De-aired tap water was used in the test.
The sample was saturated by increments of cell pressure and back pressure.

Tested by: PIHE/ PAVI Date: 28/04/2026 Approved by KTP:  Date: 20/05/2026



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Geotechnics Project ID: 1102489.0000.0.0
Customer Project ID: HAM2025-0084
Test Schedule Reference: --

Site/Location: 584 Whatawhata Road, Hamilton

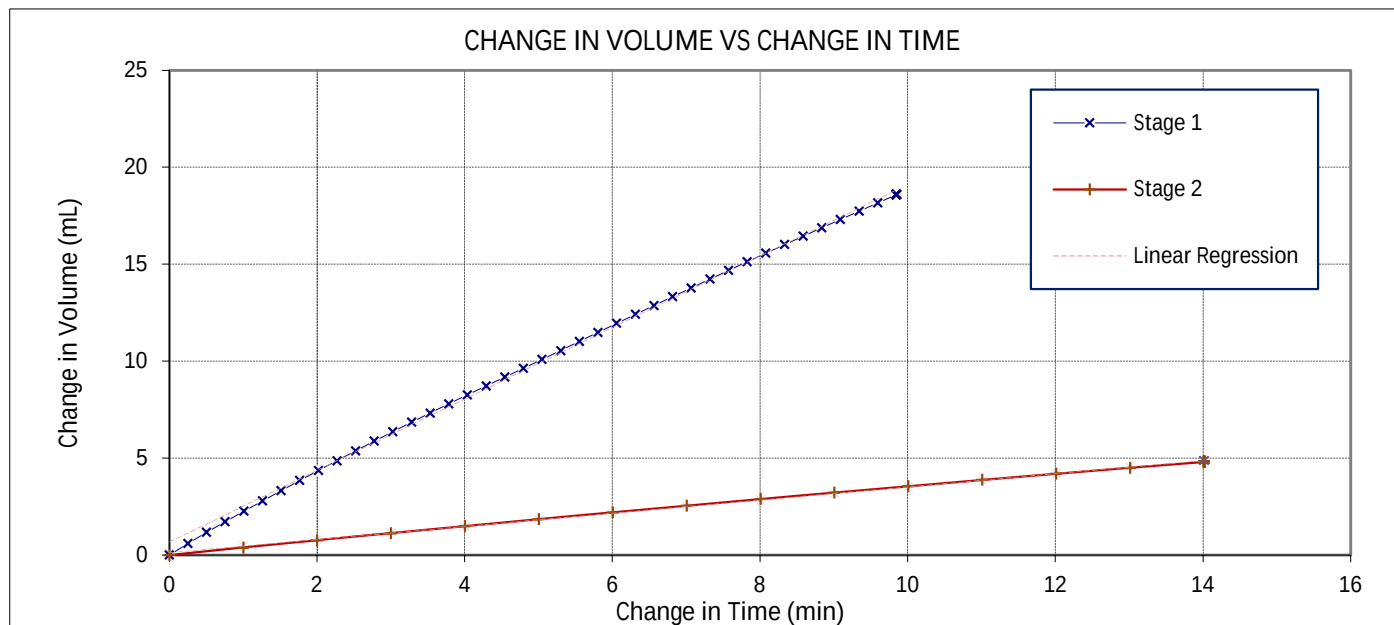
Location ID: TL4

Sample Ref.: --

Geotechnics ID: --

Depth (m): 0.31 - 0.38

Test Method Used: ISO 17892-11:2019 Part 11 Permeability Tests
NZS 4402:1986 Test 2.1 Determination of Water Content



Initial sample height	73	(mm)	Initial bulk density	1.26	(t/m ³)
Initial sample diameter	60	(mm)	Initial dry density	0.61	(t/m ³)
Saturation at test (B)	94	(%)	Initial water content	107	(%)
Final water content	102	(%)	Final dry density	0.65	(t/m ³)

	Stage 1	Stage 2	
Back pressure level (kPa)	310	310	
Consolidation stress level (kPa)	30	80	
Head difference (kPa)	20	20	
Hydraulic gradient	28	28	
Test Temperature (°C)	20.0	20.5	
Coefficient of Permeability (m/s)	3.85E-07	7.09E-08	

SAMPLE DESCRIPTION

SILT, with minor clay and sand; dark brown/black. Soft. Minor organic matter present.

SAMPLE HISTORY

Undisturbed core trimmed at natural water content.

TEST REMARKS

Constant-head permeability test in a triaxial cell. De-aired tap water was used in the test.
The sample was saturated by increments of cell pressure and back pressure.

Tested by: PIHE/ PAVI Date: 2/04/2026 Approved by KTP:  Date: 20/05/2026



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Geotechnics Project ID: 1102489.0000.0.0
Customer Project ID: HAM2025-0084
Test Schedule Reference: --

Site/Location: 584 Whatawhata Road, Hamilton

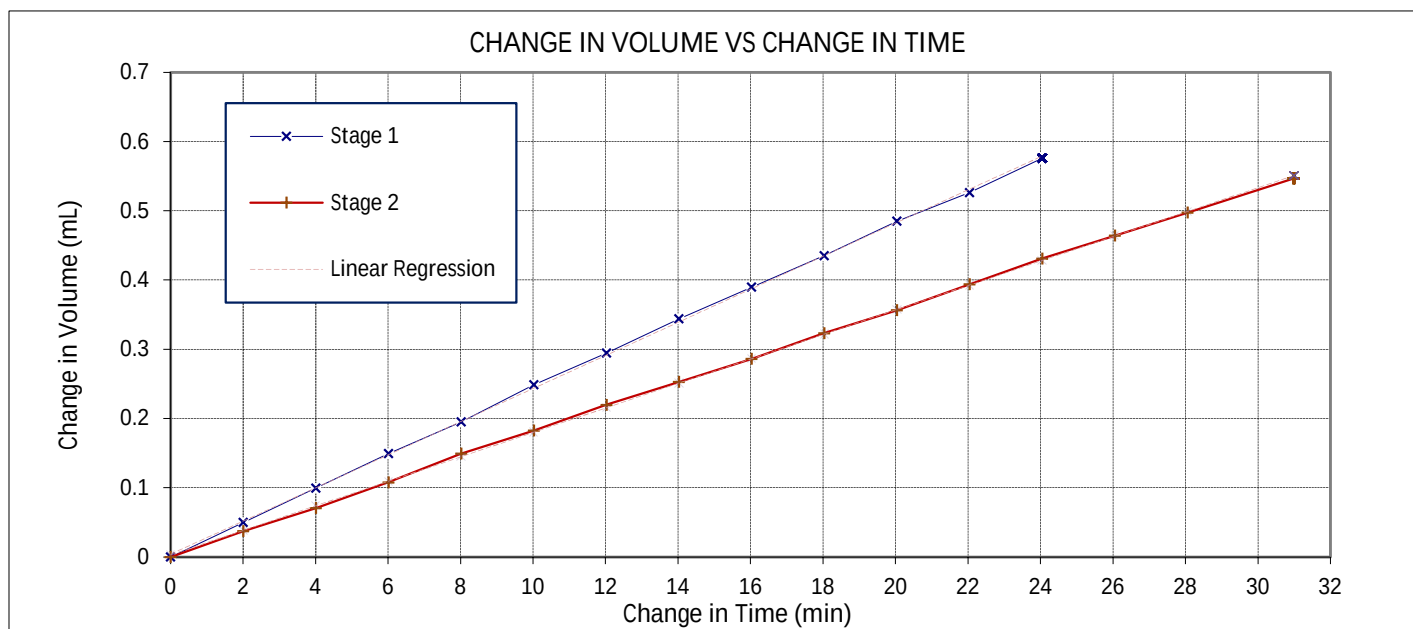
Location ID: TL5

Sample Ref.: --

Geotechnics ID: --

Depth (m): 0.45 - 0.52

Test Method Used: ISO 17892-11:2019 Part 11 Permeability Tests
NZS 4402:1986 Test 2.1 Determination of Water Content



Initial sample height	67	(mm)	Initial bulk density	1.90	(t/m ³)
Initial sample diameter	60	(mm)	Initial dry density	1.53	(t/m ³)
Saturation at test (B)	92	(%)	Initial water content	24.4	(%)
Final water content	27.9	(%)	Final dry density	1.52	(t/m ³)

	Stage 1	Stage 2	
Back pressure level (kPa)	310	310	
Consolidation stress level (kPa)	30	80	
Head difference (kPa)	20	20	
Hydraulic gradient	31	31	
Test Temperature (°C)	20.0	20.0	
Coefficient of Permeability (m/s)	4.58E-09	3.39E-09	

SAMPLE DESCRIPTION

SILT, with minor sand and a trace of clay; light yellowish brown. Stiff.

SAMPLE HISTORY

Undisturbed core trimmed at natural water content.

TEST REMARKS

Constant-head permeability test in a triaxial cell. De-aired tap water was used in the test.
The sample was saturated by increments of cell pressure and back pressure.

Tested by: PIHE/ PAVI Date: 15/04/2026 Approved by KTP:  Date: 20/05/2026



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Geotechnics Project ID: 1102489.0000.0.0
Customer Project ID: HAM2025-0084
Test Schedule Reference: --

Site/Location: 584 Whatawhata Road, Hamilton

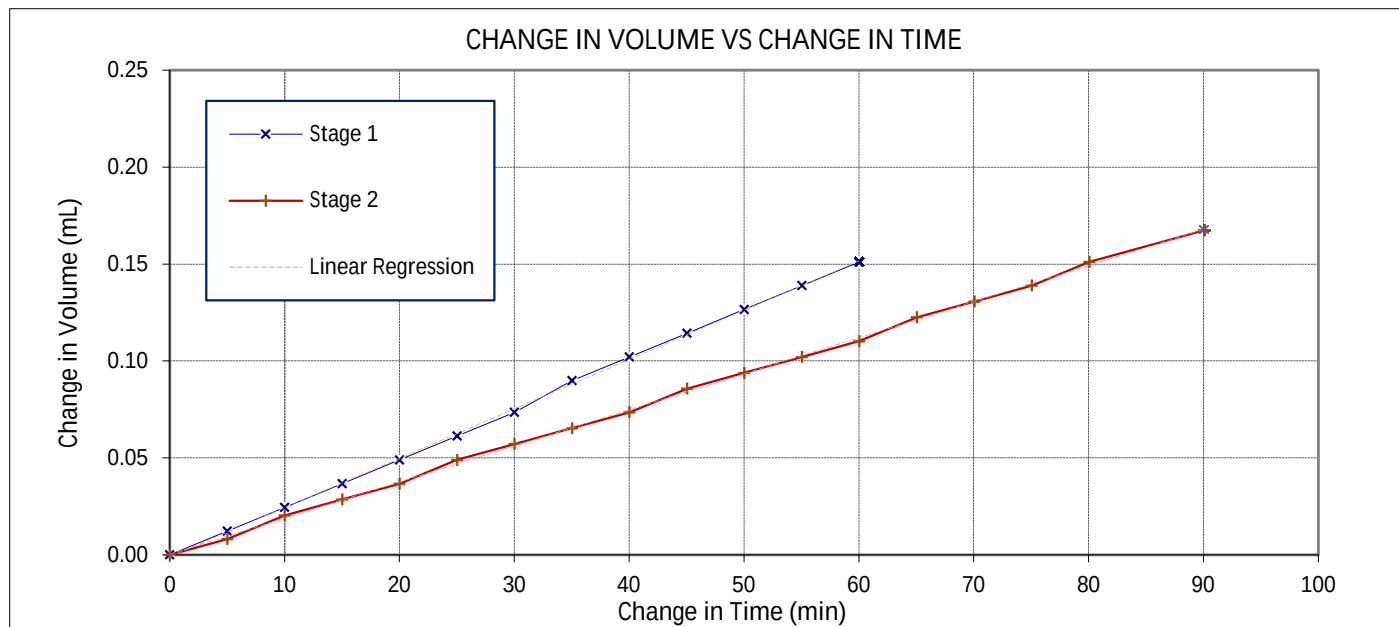
Location ID: TL06

Sample Ref.: --

Geotechnics ID: --

Depth (m): 0.53 - 0.6

Test Method Used: ISO 17892-11:2019 Part 11 Permeability Tests
NZS 4402:1986 Test 2.1 Determination of Water Content



Initial sample height	65	(mm)	Initial bulk density	1.79	(t/m ³)
Initial sample diameter	60	(mm)	Initial dry density	1.29	(t/m ³)
Saturation at test (B)	92	(%)	Initial water content	39.4	(%)
Final water content	37.8	(%)	Final dry density	1.32	(t/m ³)

	Stage 1	Stage 2	
Back pressure level (kPa)	360	360	
Consolidation stress level (kPa)	30	80	
Head difference (kPa)	20	20	
Hydraulic gradient	31	31	
Test Temperature (°C)	20.5	19.5	
Coefficient of Permeability (m/s)	4.75E-10	3.48E-10	

SAMPLE DESCRIPTION

Sandy SILT; yellowish brown/grey. Soft, moist.

SAMPLE HISTORY

Undisturbed core trimmed at natural water content.

TEST REMARKS

Constant-head permeability test in a triaxial cell. De-aired tap water was used in the test.
The sample was saturated by increments of cell pressure and back pressure.

Tested by: PIHE/ PAVI Date: 5/05/2026 Approved by KTP:  Date: 9/07/2026



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Geotechnics Project ID: 1102489.0000.0.0
 Customer Project ID: HAM2025-0084
 Test Schedule Reference: --

Site/Location: 584 Whatawhata Road, Hamilton

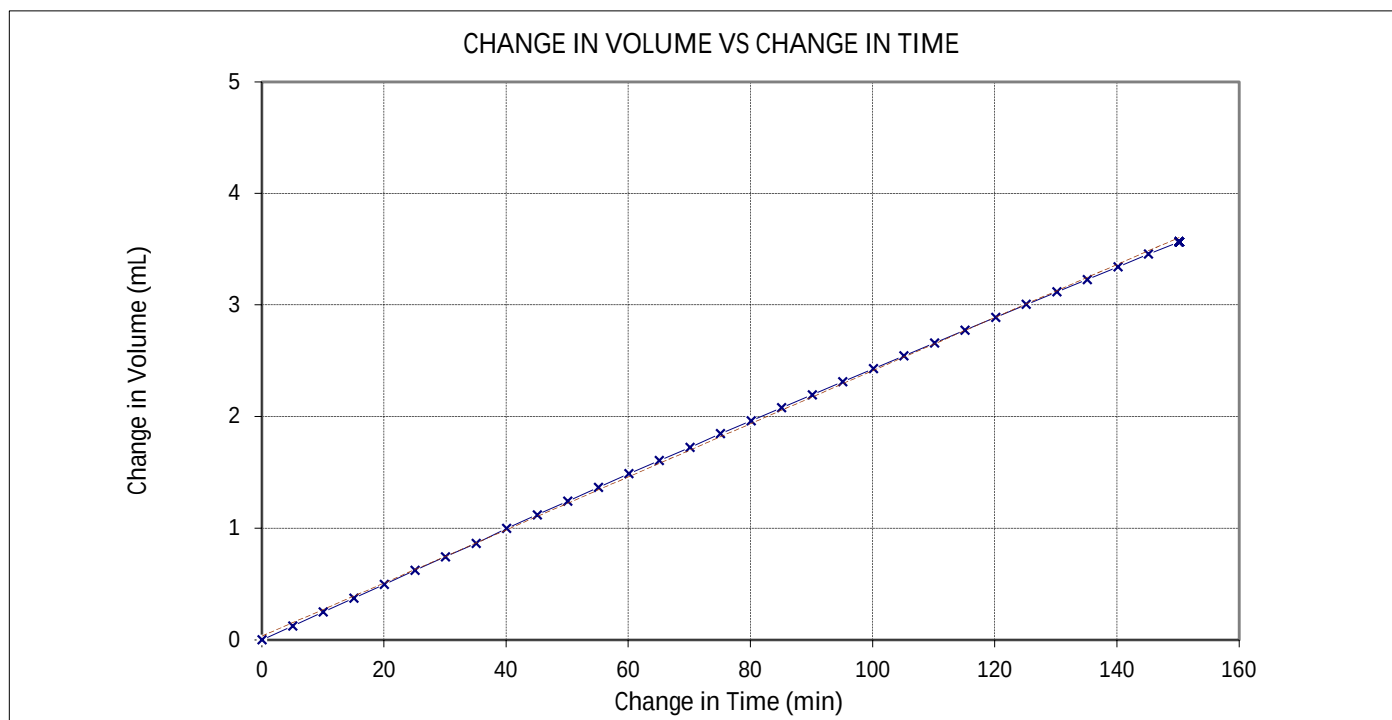
Location ID: TL7

Sample Ref.: --

Geotechnics ID: --

Depth (m): 0.35 - 0.42

Test Method Used: ISO 17892-11:2019 Part 11 Permeability Tests
 NZS 4402:1986 Test 2.1 Determination of Water Content



Coefficient of Permeability at 20 °C = $4.43\text{E-}09$ (m/s)

Initial sample height	65	(mm)	Initial bulk density	1.83	(t/m ³)
Initial sample diameter	60	(mm)	Initial dry density	1.47	(t/m ³)
Saturation at test (B)	90	(%)	Initial water content	24.4	(%)
Back pressure level	460	(kPa)	Final water content	30.9	(%)
Consolidation stress level	80	(kPa)	Final dry density	1.43	(t/m ³)
Head difference	20	(kPa)	Hydraulic gradient	32	

SAMPLE DESCRIPTION

Clayey SILT, with minor sand; brown. Stiff, moist.

SAMPLE HISTORY

Undisturbed core trimmed at natural water content.

TEST REMARKS

Constant-head permeability test in a triaxial cell. De-aired tap water was used in the test.
 The sample was saturated by increments of cell pressure and back pressure.

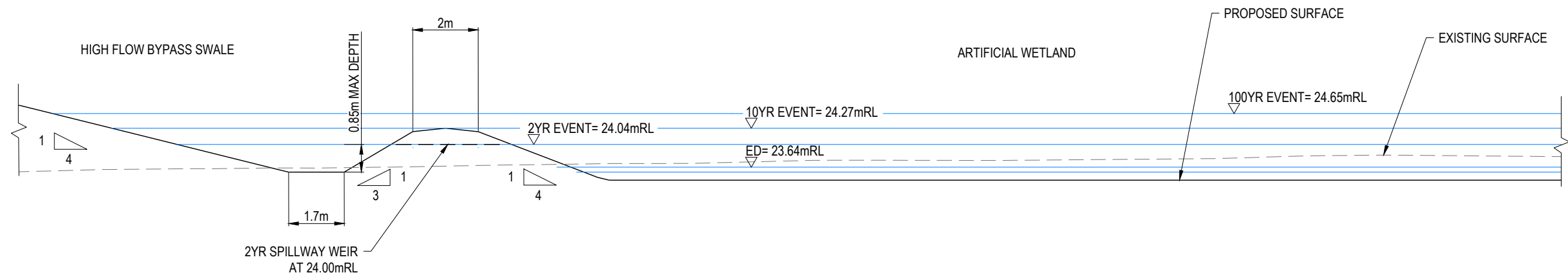
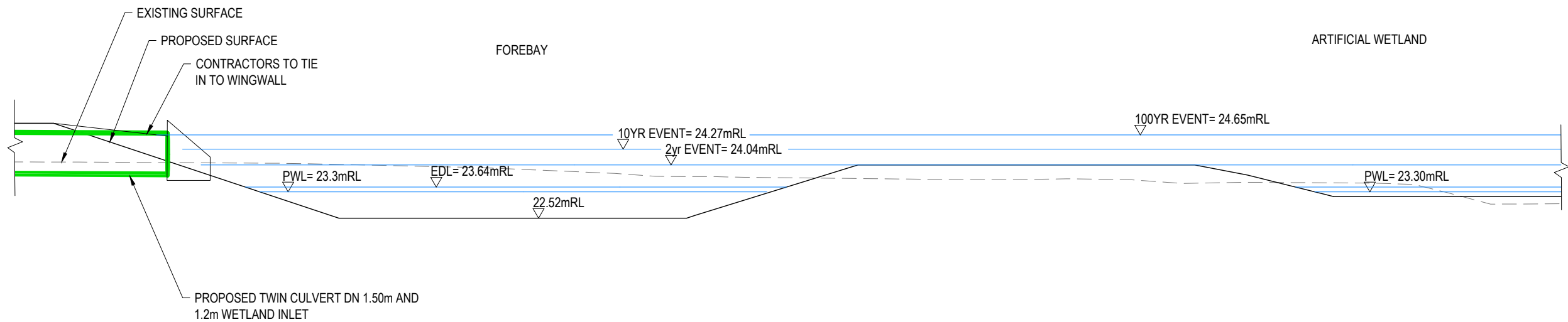
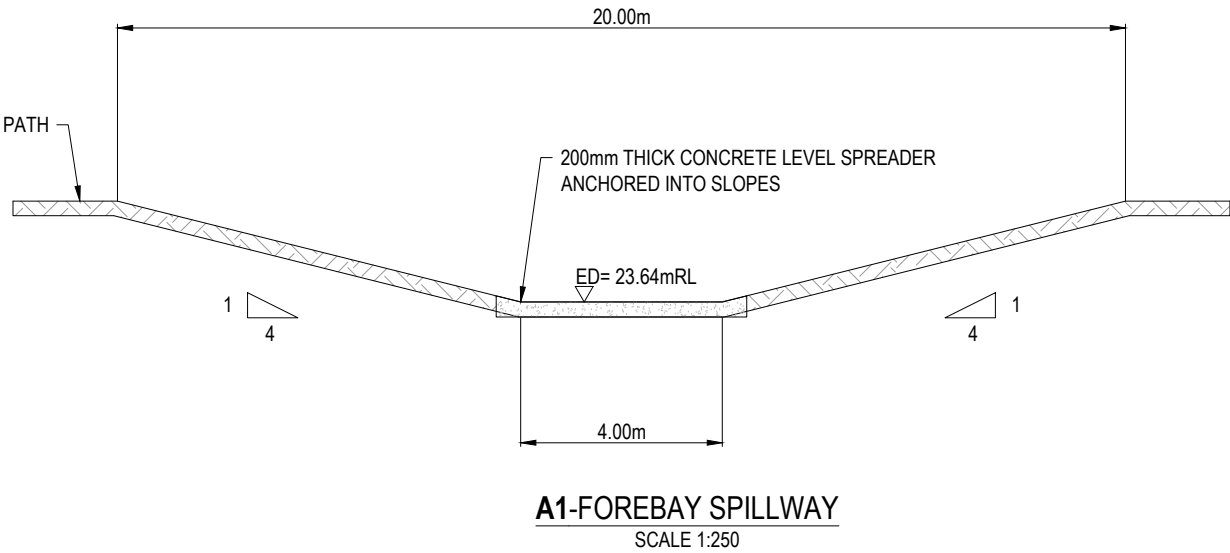
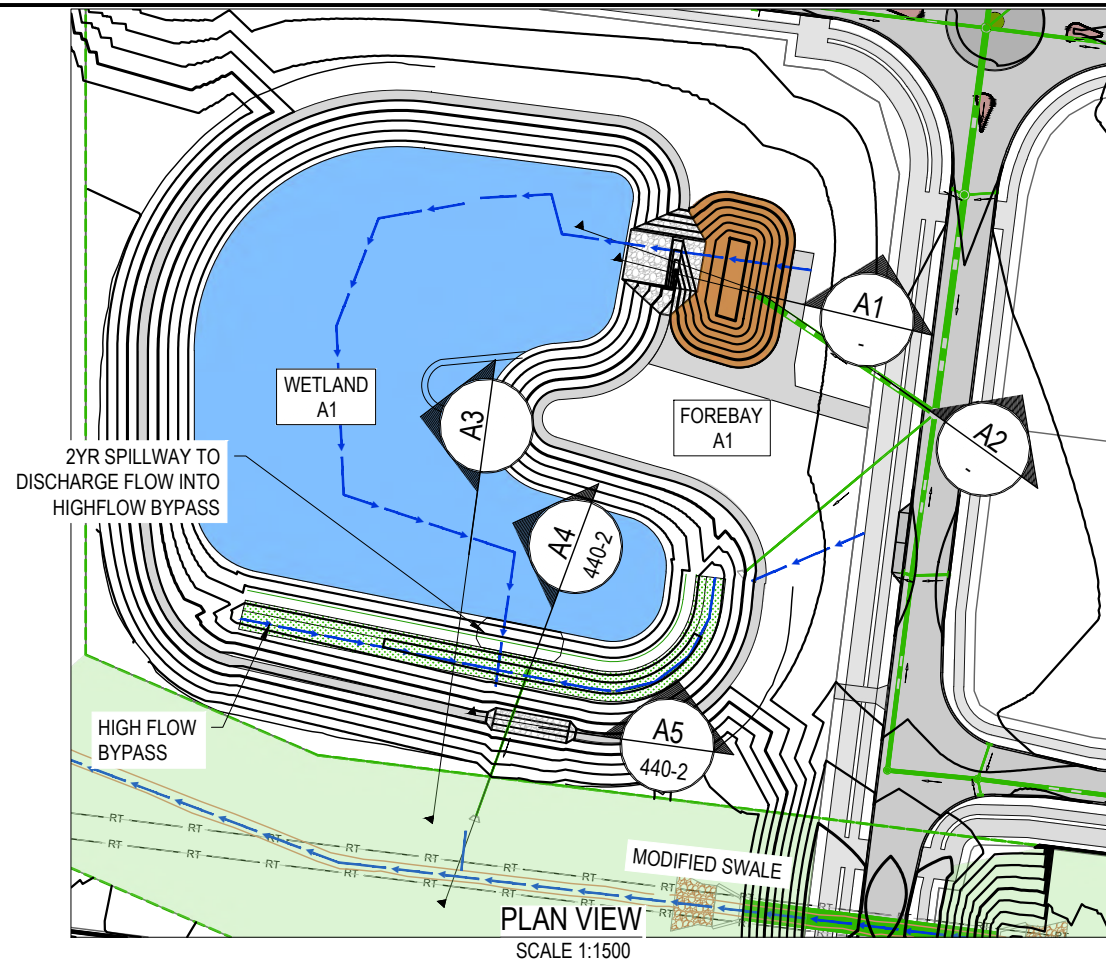
Tested by: ATSR/YHW Date: 18/05/2026 Approved by KTP:  Date: 20/05/2026

APPENDIX F

MAVEN DESIGNS



DATE: 8/4/25 FILEPATH: F:\MVEN\HAMITON6 PROJECTS\119014- BRYMER FARMS\7 DRAWING\119014-C440-SW WETLAND DETAILS.DWG



DRAFT FOR REVIEW

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 3. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY HIS OPERATIONS.
 4. ALL CONCRETE SW PIPE TO BE INSTALLED IN ACCORDANCE WITH AS/NZS 3725:2007 FOR BURIED CONCRETE PIPES AND AS/NZ 4058:2007 FOR PRECAST CONCRETE PIPES (PRESSURE AND NON-PRESSURE) AS STIPULATED IN THE RITS 2018
 5. APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL STORMWATER LINES WITHIN THE ROAD RESERVE.
 6. HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS.
 7. ALL CESSPIT LEADS SHALL HAVE MIN COVER 0.9M.
 8. ALL LINES ARE TO BE CLASS4 RCRRJ UNLESS SHOWN OTHERWISE.
 9. ALL LINES TO BE ABANDONED SHALL BE SEALED AT EACH END. TIMING OF ALL SEALING TO BE COORDINATED WITH COUNCIL STAFF.

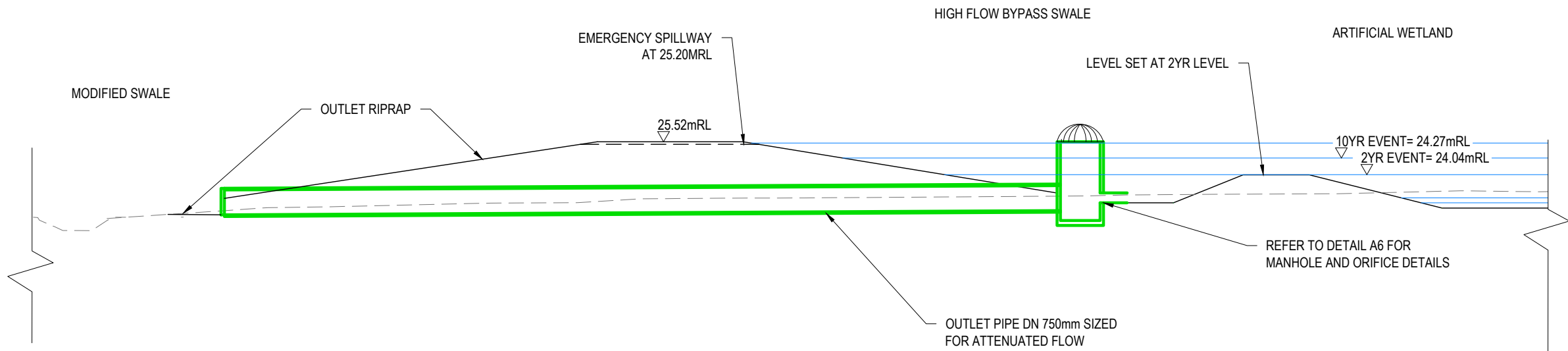
B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	NK		10/2025
Drawn	NK		10/2025
Checked			



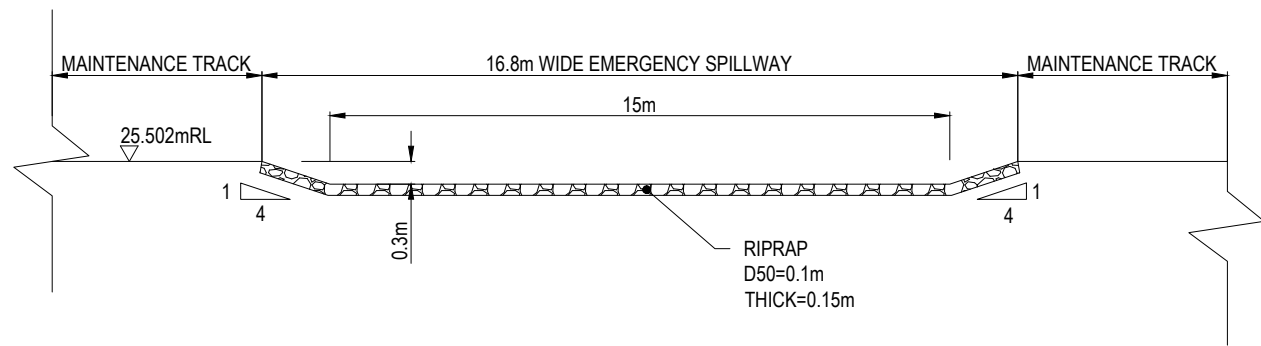
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
STAGE 1 WETLAND
DETAILS**

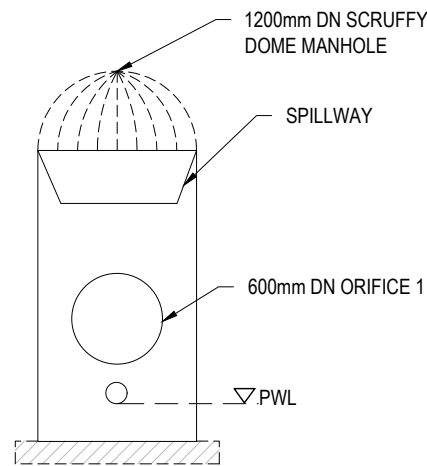
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Cad file	119014-C440-SW WETLAND DETAILS.DWG
Drawing no.	C440-1
Rev	B



A4-WETLAND OUTLET SECTION DETAILS
SCALE 1:150



A5- EMERGENCY SPILLWAY SECTION DETAILS
SCALE 1:100



A6-OUTLET MANHOLE TYPICAL DETAIL
SCALE 1:100

Wetland A	
Base of wetland	23.0mRL
PWL	23.3mRL
EDL	23.64mRL
2YR	24.04mRL
10YR	24.27mRL
100YR	24.65mRL

Wetland	ED Orifice (mm)	Orifice Invert (mRL)	Wetland Weir to Overflow Swale - Min Width (m)	Top of Weir (m)
1	140	25.30	9	24.50

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	NK	10/2025	
Drawn	NK	10/2025	
Checked	.	.	

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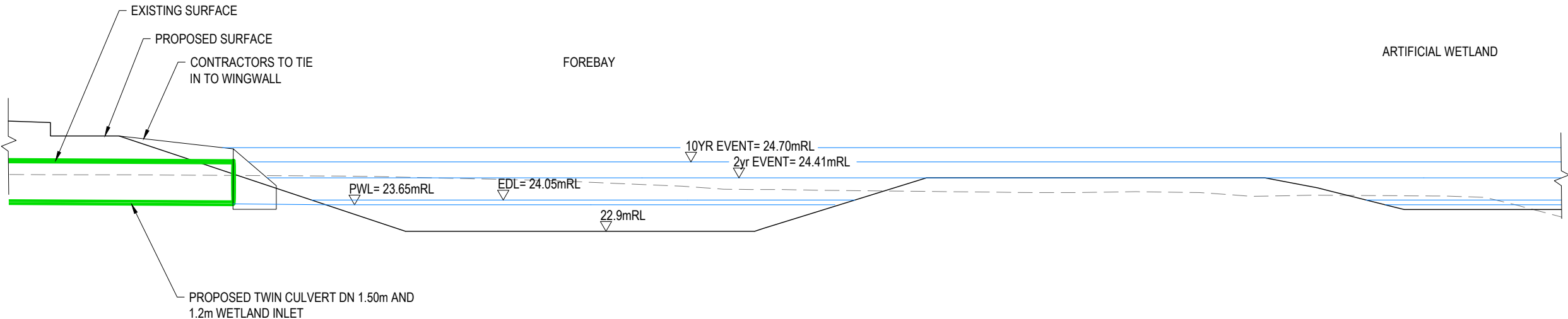
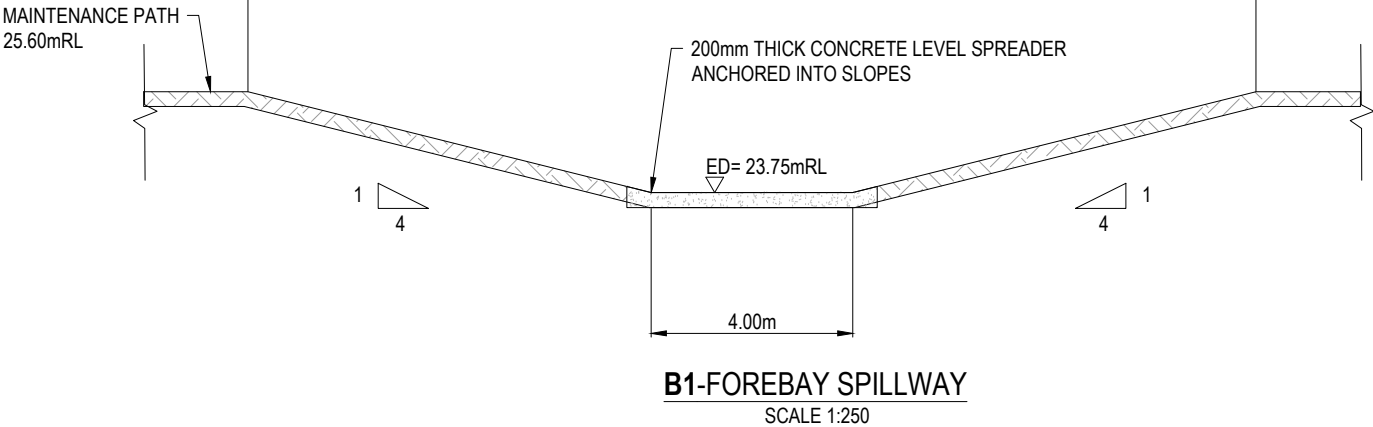
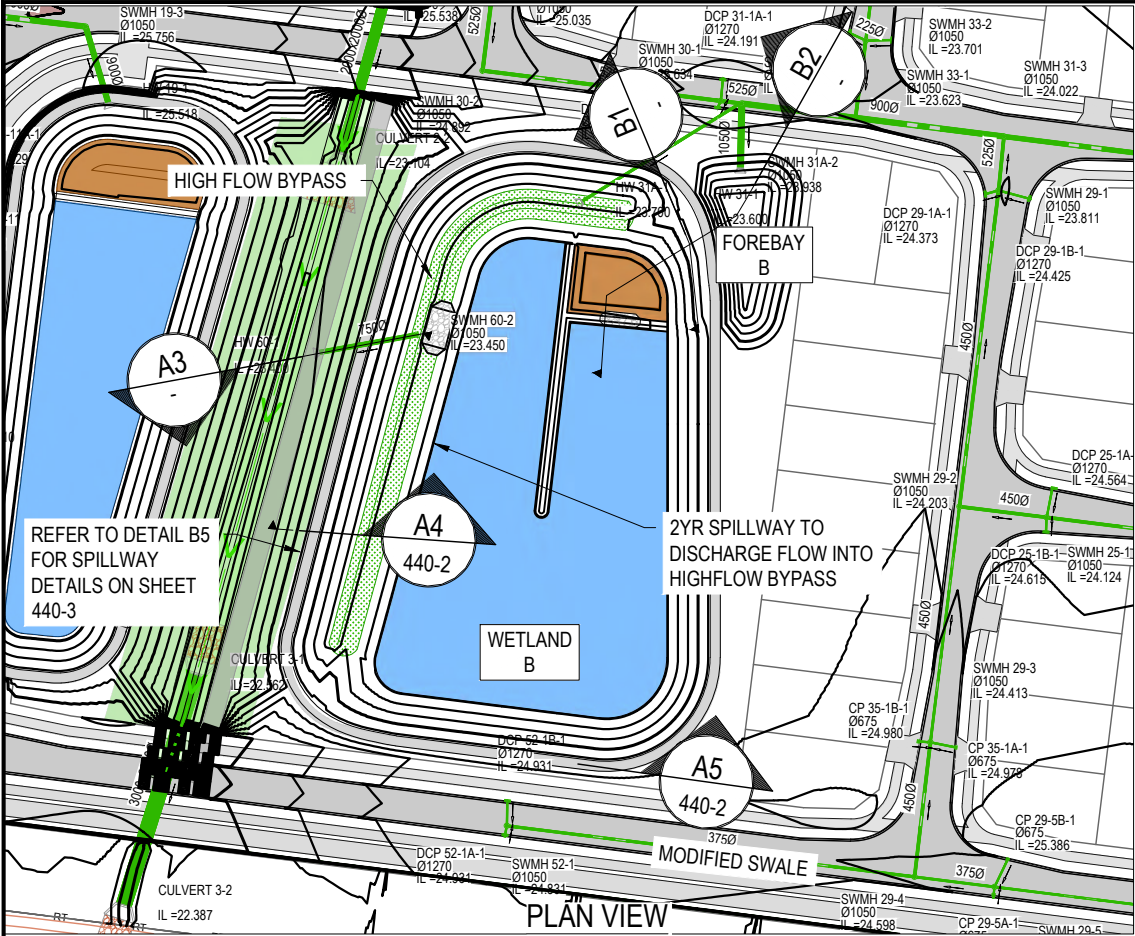
New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

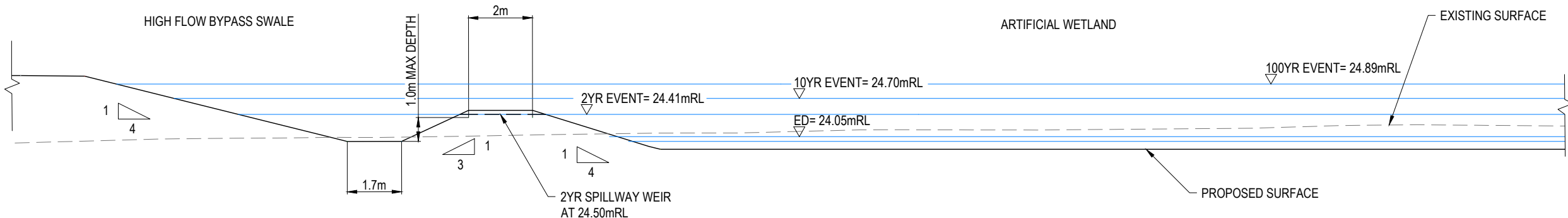
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**PROPOSED
STAGE 1 WETLAND
DETAILS**

Project no.	119014		
Scale	1:1000 @ A3		
Cad file	119014-C440-SW WETLAND DETAILS.DWG		
Drawing no.	C440-2	Rev	B

DRAFT FOR REVIEW



B2-FORBAY AND WETLAND INTERFACE TYPICAL DETAIL
SCALE 1:150



B3-HIGH FLOW BYPASS AND WETLAND TYPICAL DETAIL
SCALE 1:150

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B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	NK		10/2025
Drawn	NK		10/2025
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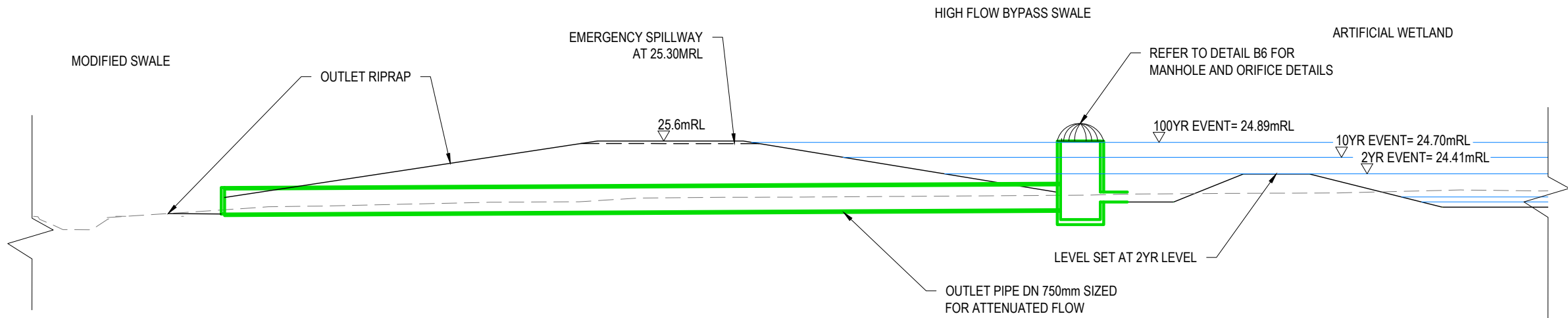
M **Maven Waikato**
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New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

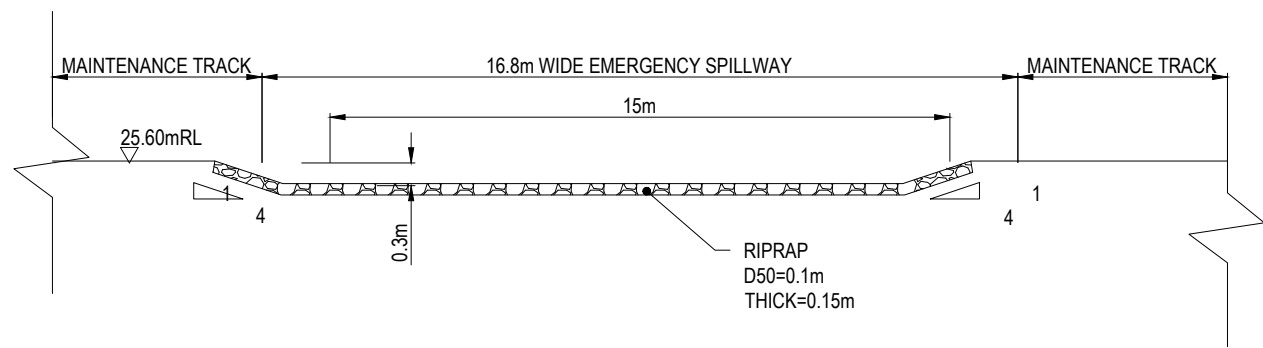
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**PROPOSED
STAGE 2 WETLAND
DETAILS**

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Drawing no.	C440-3
Rev	B

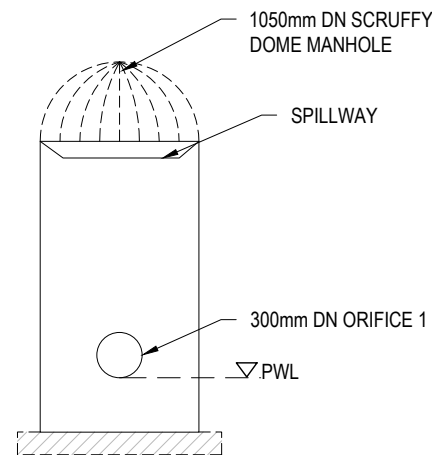
DRAFT FOR REVIEW



B4-WETLAND OUTLET SECTION DETAILS
SCALE 1:150



B5- EMERGENCY SPILLWAY SECTION DETAILS
SCALE 1:100



B6-OUTLET MANHOLE TYPICAL DETAIL
SCALE 1:100

Wetland B	
Base of wetland	23.90mRL
PWL	23.65mRL
EDL	24.05mRL
2YR	24.41mRL
10YR	24.70mRL
100YR	24.89mRL

Wetland	ED Orifice (mm)	Orifice Invert (mRL)	Wetland Weir to Overflow Swale - Min Width (m)	Top of Weir (m)
1	300	23.60	9	25.30

- NOTES
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B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	NK		10/2025
Drawn	NK		10/2025
Checked			

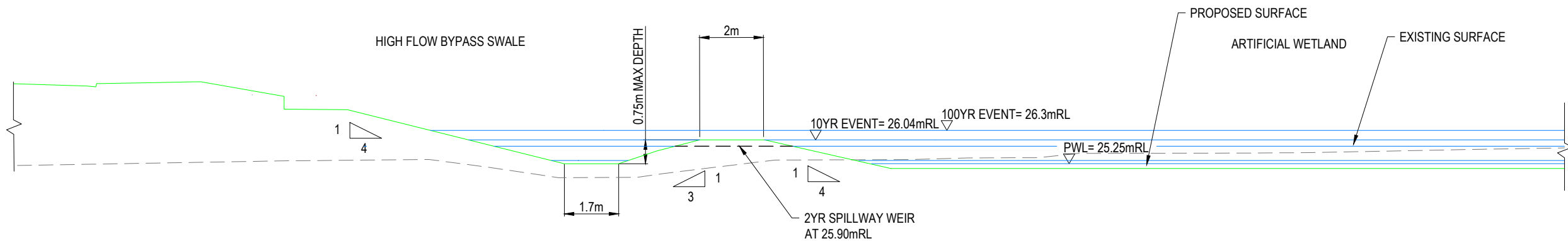
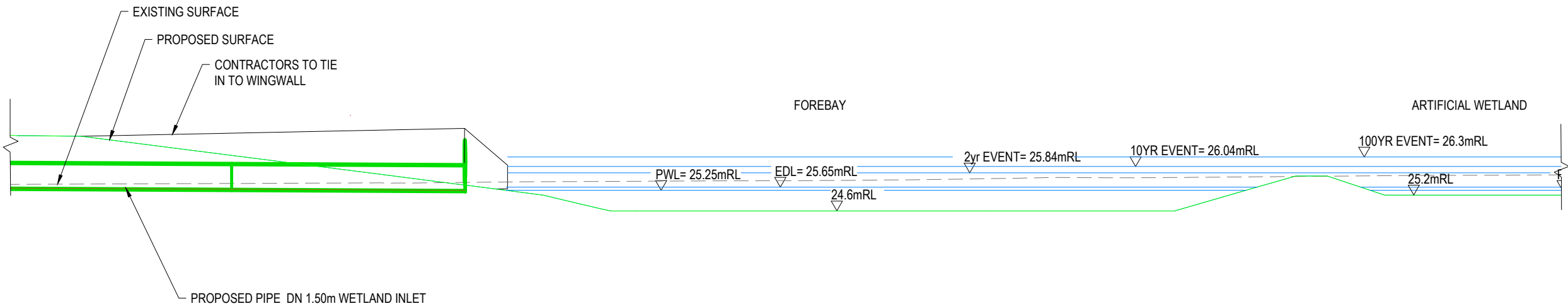
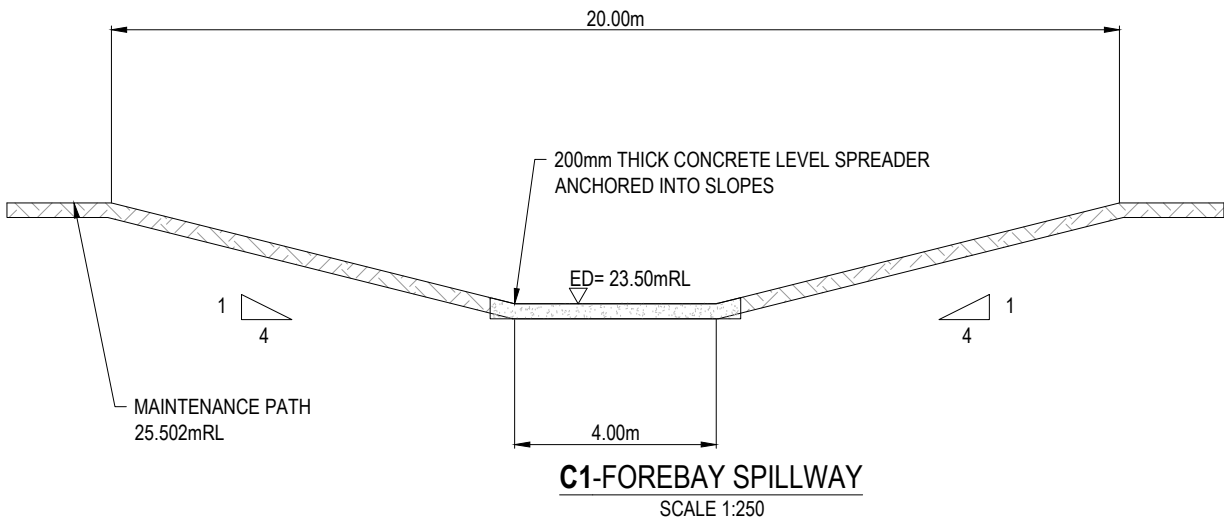
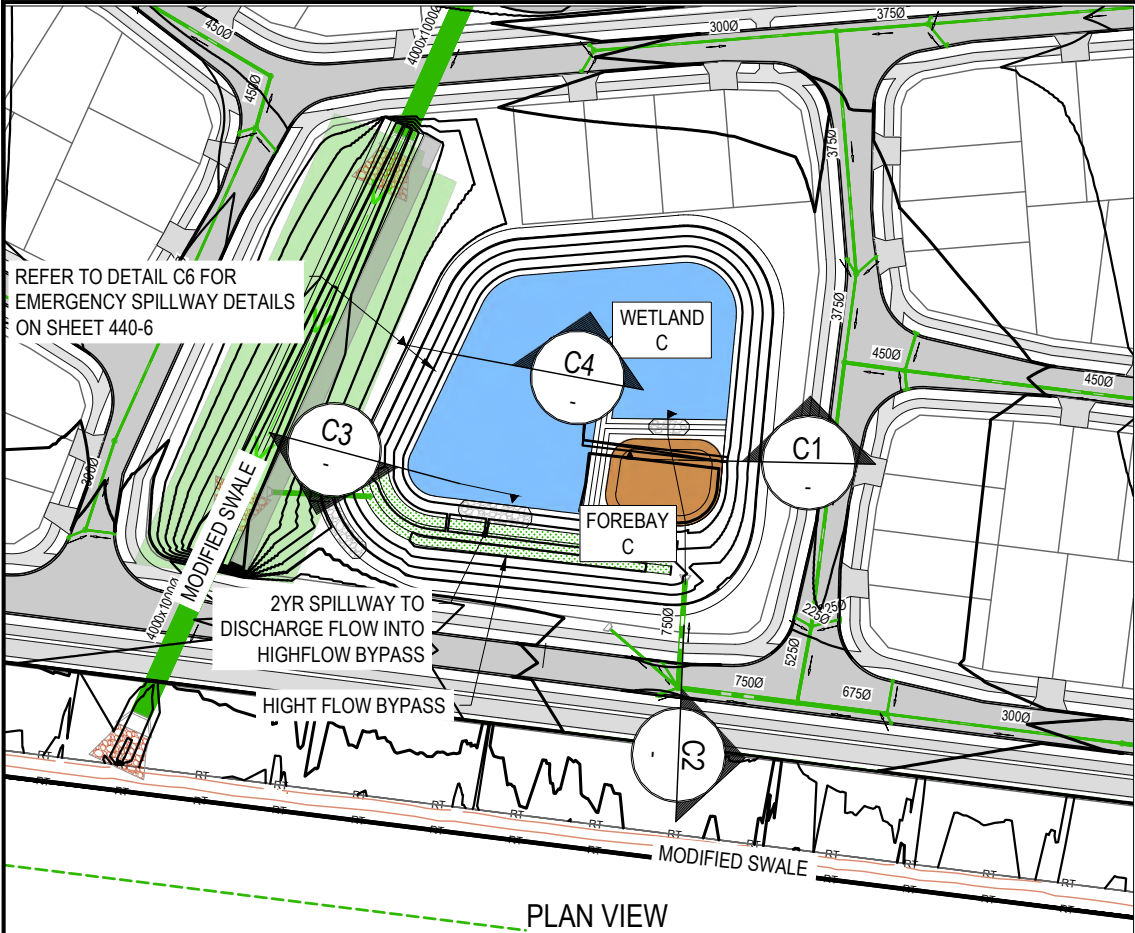
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New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
STAGE 2 WETLAND
DETAILS**

Project no.	119014		
Scale	1:1000 @ A3		
Cad file	119014-C440-SW WETLAND DETAILS.DWG		
Drawing no.	C440-4	Rev	B

DRAFT FOR REVIEW



- NOTES
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B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	NK		10/2025
Drawn	NK		10/2025
Checked			

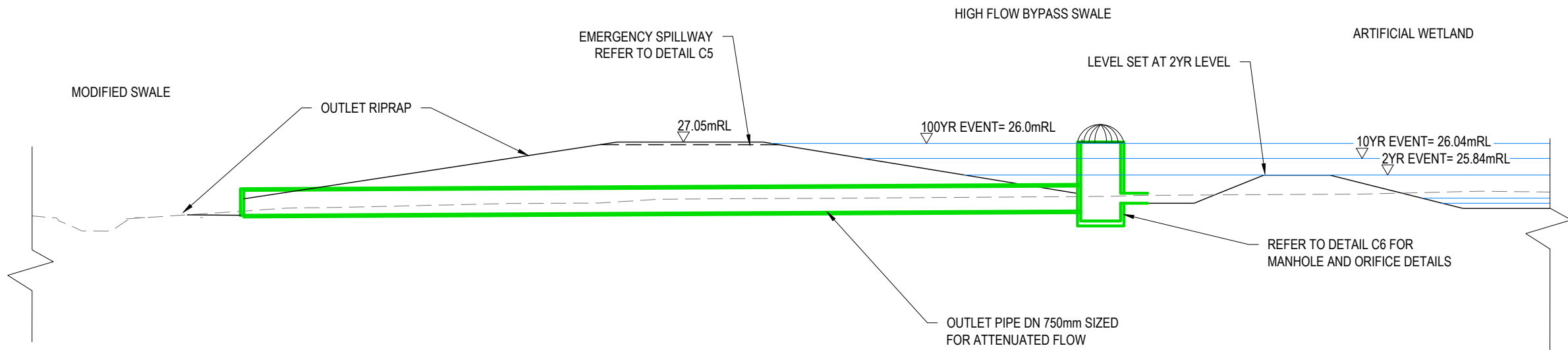


Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

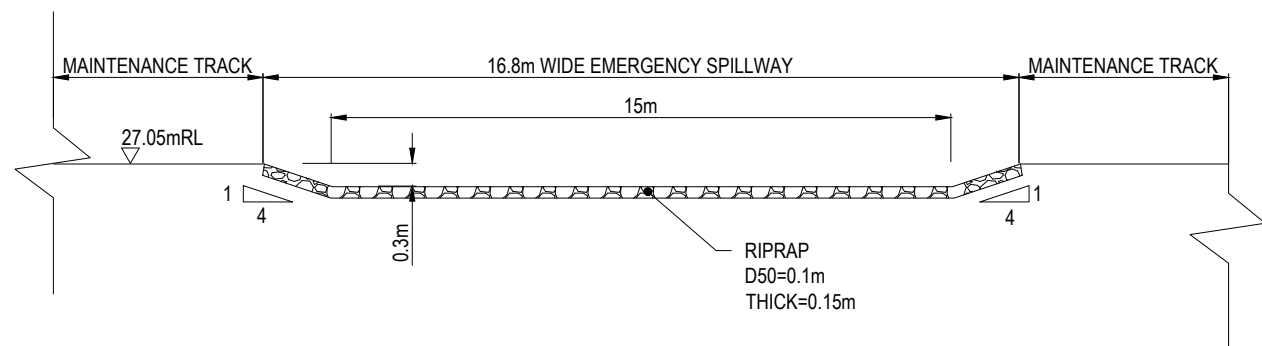
Title
**PROPOSED
STAGE 3 WETLAND
DETAILS**

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Cad file	119014-C440-SW WETLAND DETAILS.DWG
Drawing no.	C440-5
Rev	B

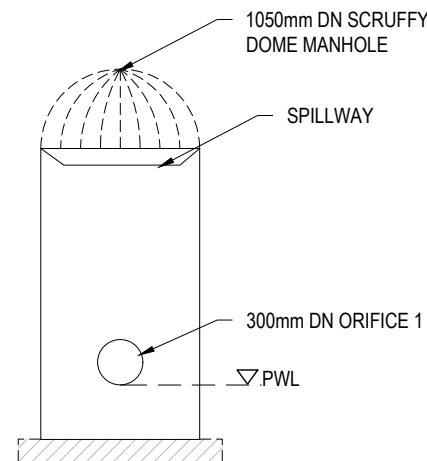
DRAFT FOR REVIEW



C4-WETLAND OUTLET SECTION DETAILS
SCALE 1:150



C5- EMERGENCY SPILLWAY SECTION DETAILS
SCALE 1:100



C6-OUTLET MANHOLE TYPICAL DETAIL
SCALE 1:100

Wetland C	
Base of wetland	25.20mRL
PWL	25.25mRL
EDL	25.65mRL
2YR	25.84mRL
10YR	26.04mRL
100YR	26.30mRL

Wetland	ED Orifice (mm)	Orifice Invert (mRL)	Wetland Weir to Overflow Swale - Min Width (m)	Top of Weir (m)
1	300	25.35	9	26.00

- NOTES
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B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	NK	10/2025	
Drawn	NK	10/2025	
Checked	.	.	

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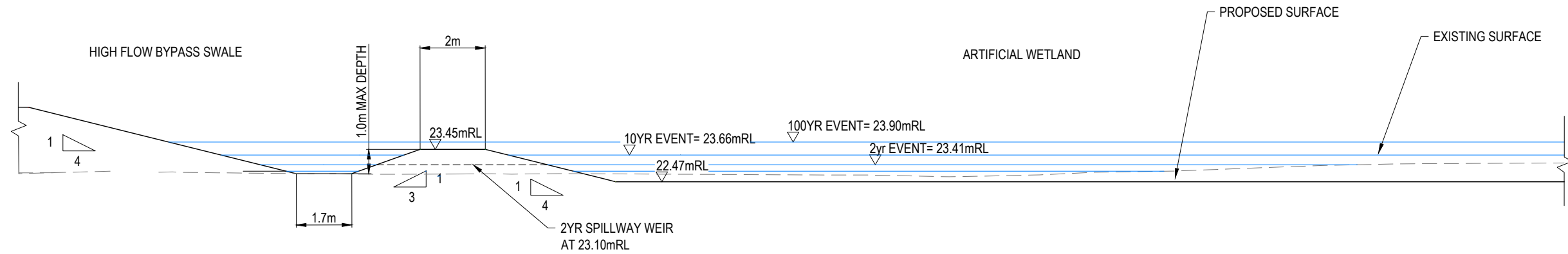
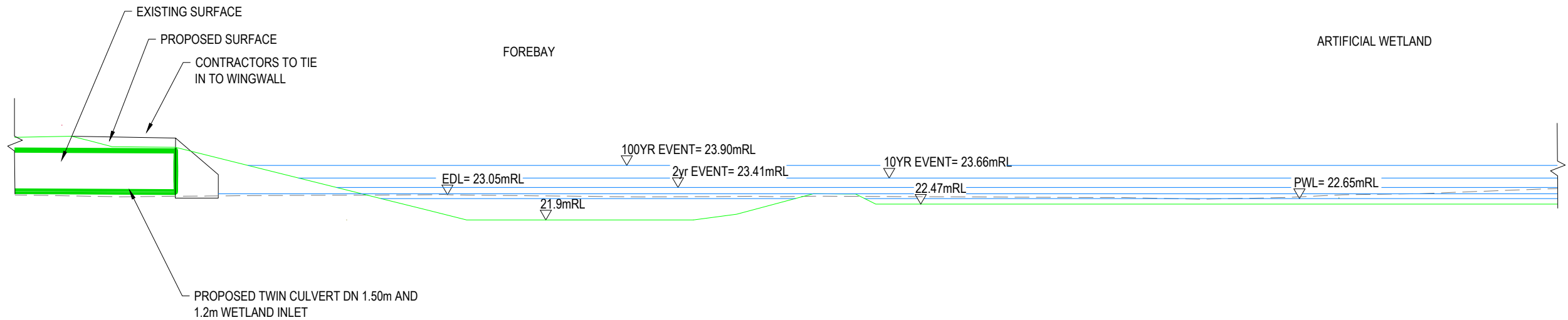
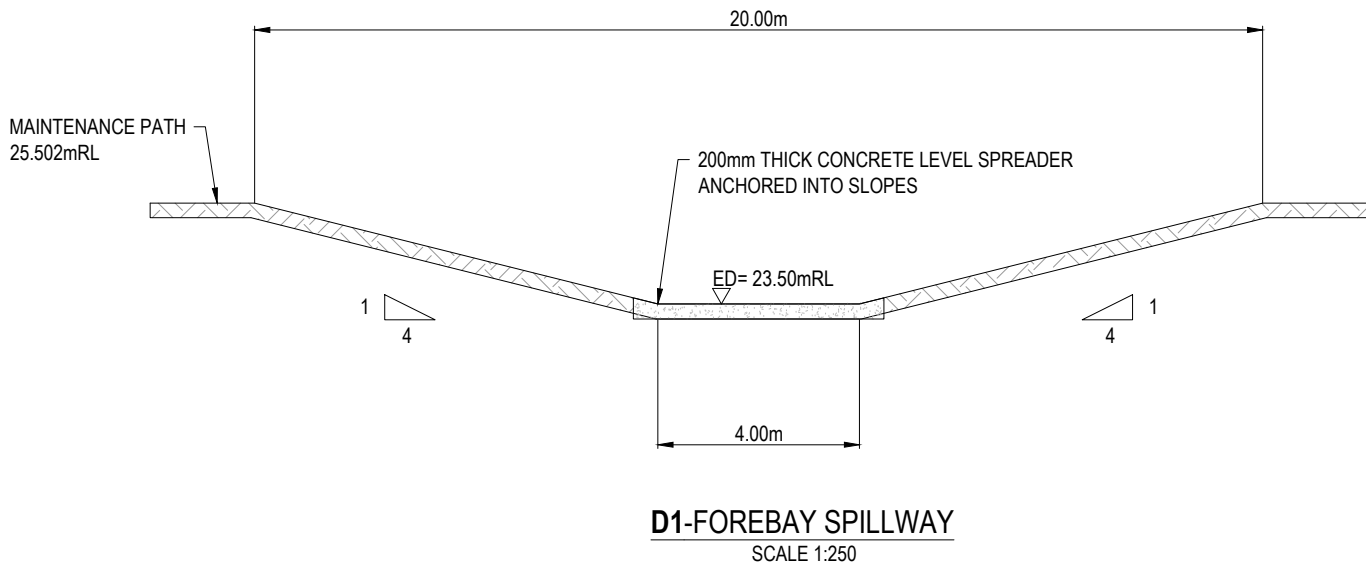
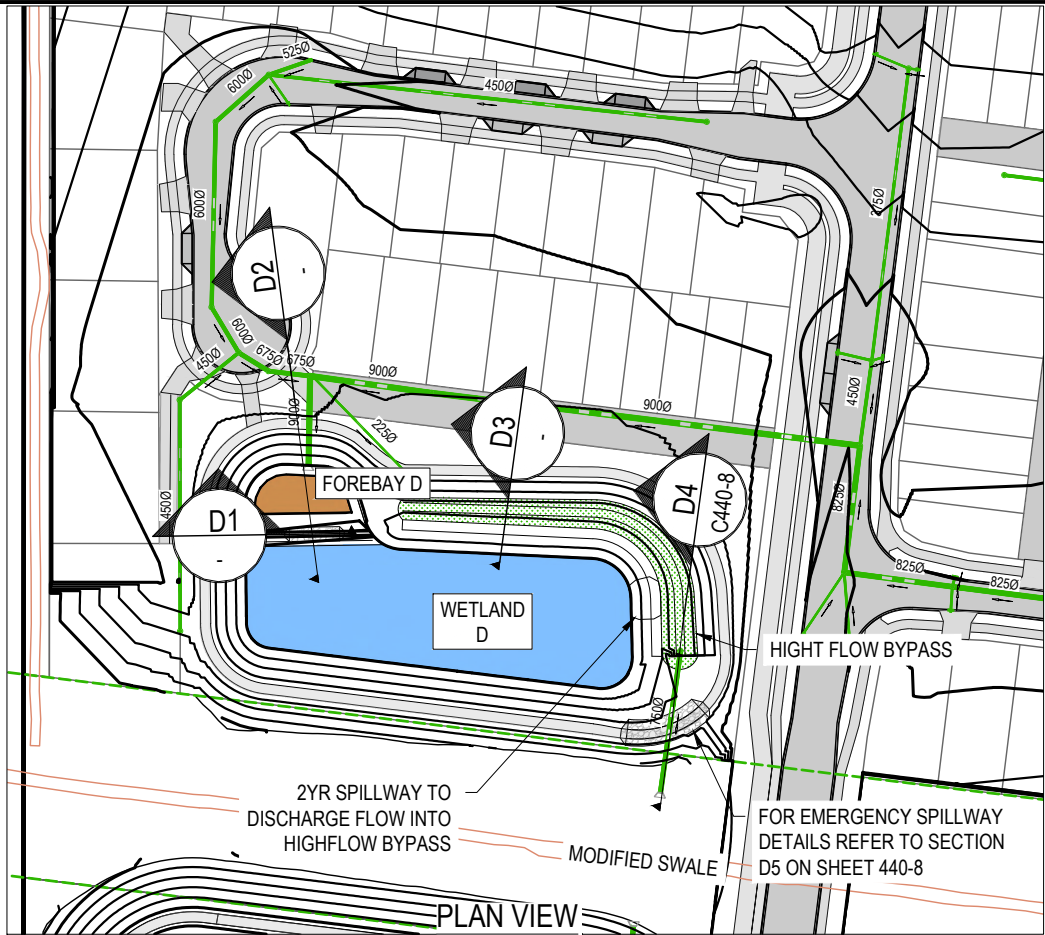
New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
STAGE 3 WETLAND
DETAILS**

Project no.	119014		
Scale	1:1000 @ A3		
Cad file	119014-C440-SW WETLAND DETAILS.DWG		
Drawing no.	C440-6	Rev	B

DRAFT FOR REVIEW



- NOTES
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A	DRAFT	NK	10/2025
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	NK		10/2025
Drawn	NK		10/2025
Checked			

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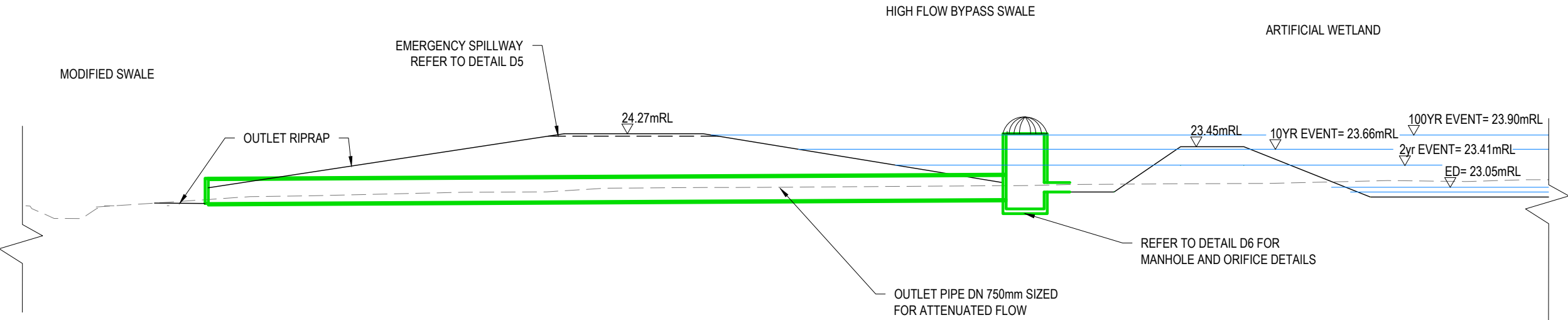
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
STAGE 4 WETLAND
DETAILS**

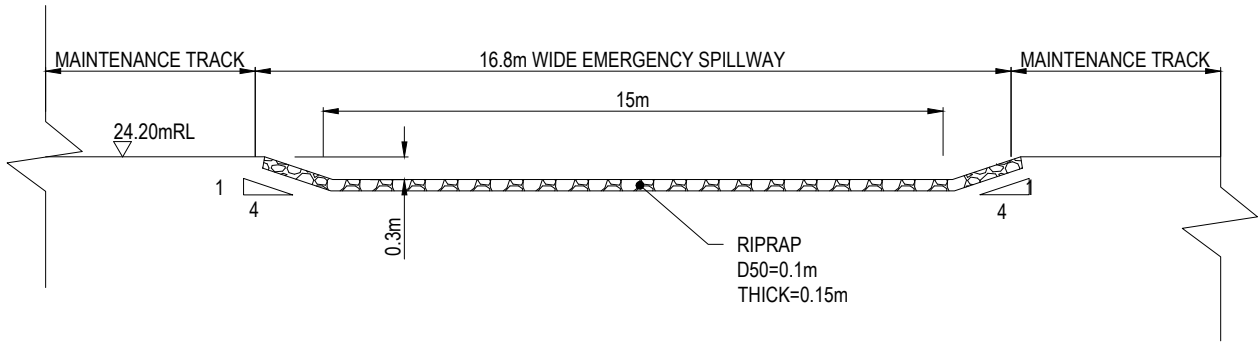
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Drawing no.	C440-7
Rev	B

DRAFT FOR REVIEW

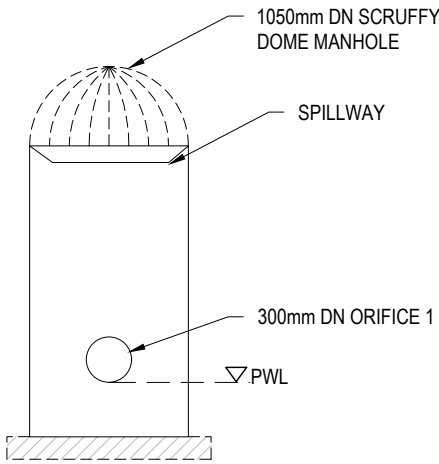
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D4-WETLAND OUTLET SECTION DETAILS
SCALE 1:150



D5- EMERGENCY SPILLWAY SECTION DETAILS
SCALE 1:100



D6-OUTLET MANHOLE TYPICAL DETAIL
SCALE 1:100

Wetland D	
Base of wetland	22.47mRL
PWL	22.65mRL
EDL	23.05mRL
2YR	23.41mRL
10YR	23.66mRL
100YR	23.90mRL

Wetland	ED Orifice (mm)	Orifice Invert (mRL)	Wetland Weir to Overflow Swale - Min Width (m)	Top of Weir (m)
1	300	22.65	9	23.30

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B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	NK		10/2025
Drawn	NK		10/2025
Checked	.	.	.

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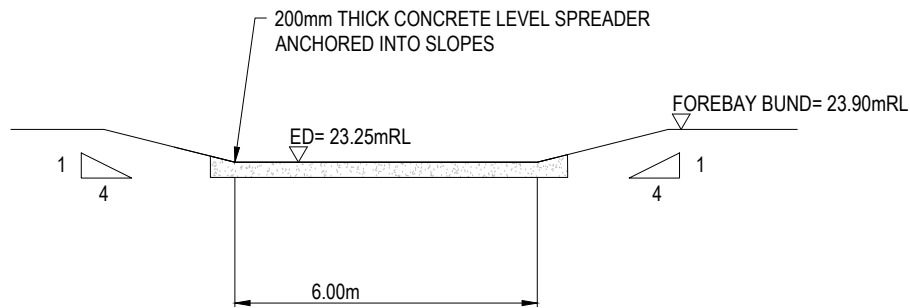
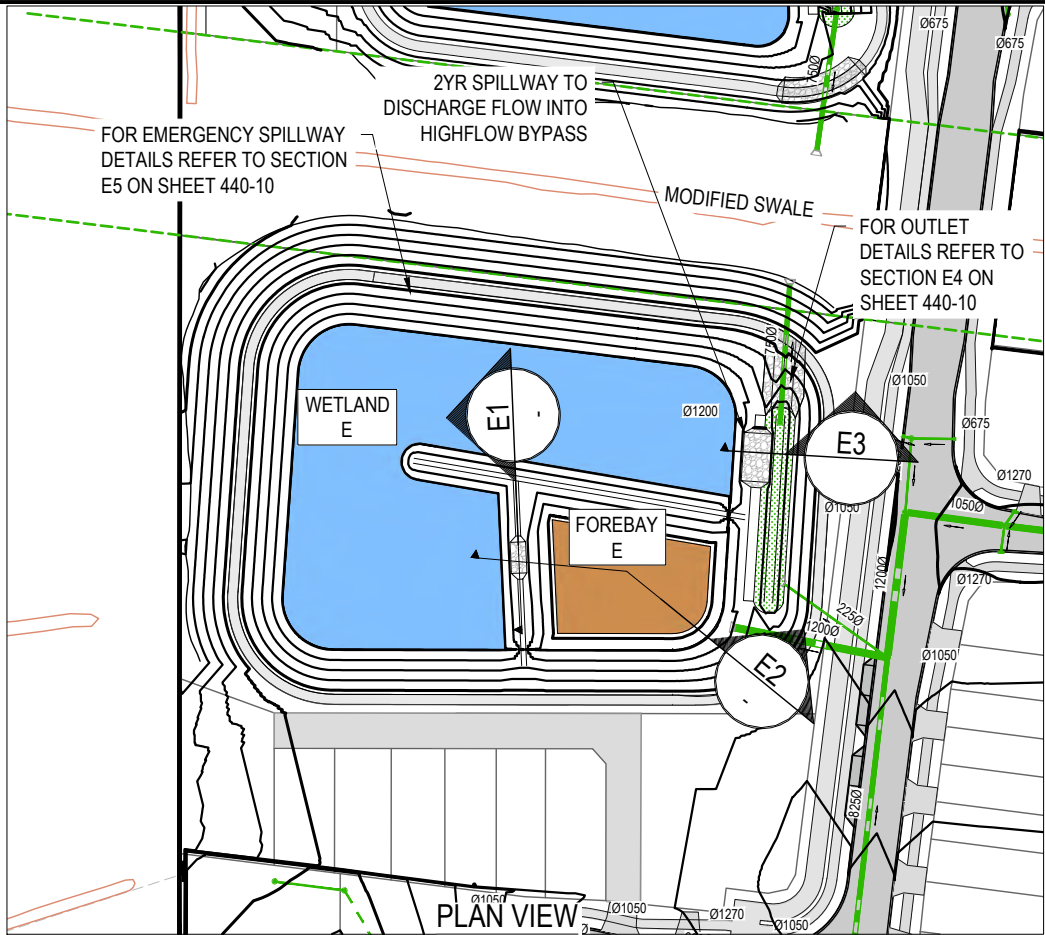
New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

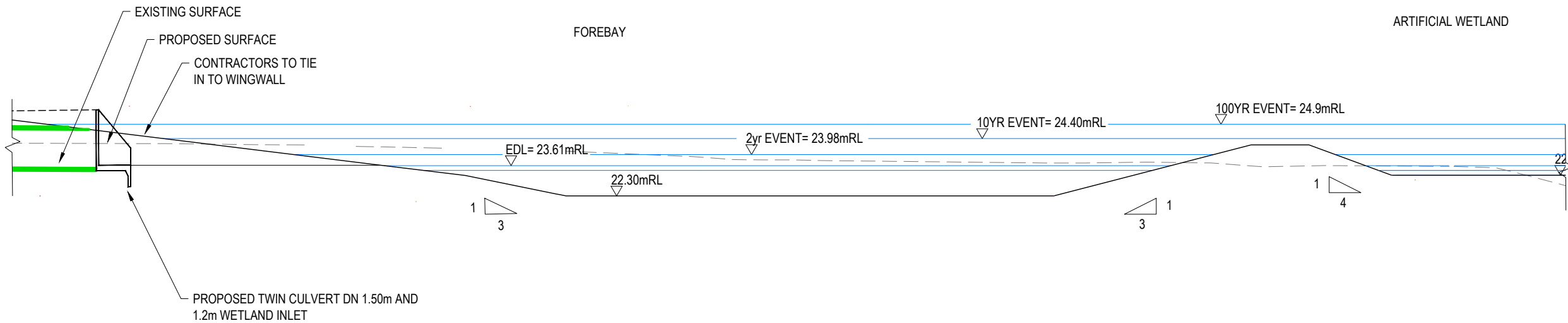
Title
**PROPOSED
STAGE 4 WETLAND
DETAILS**

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Drawing no.	C440-8	Rev	B

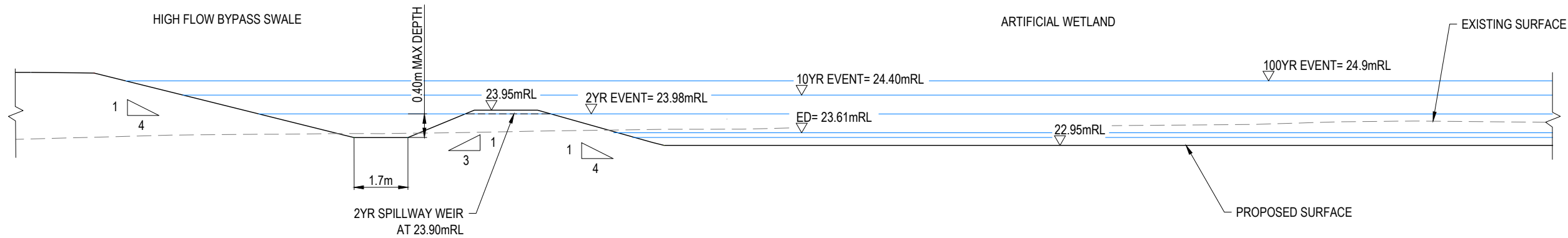
DRAFT FOR REVIEW



E1-FOREBAY SPILLWAY
SCALE 1:250



E2-FORBAY AND WETLAND INTERFACE TYPICAL DETAIL
SCALE 1:150



E3-HIGH FLOW BYPASS AND WETLAND TYPICAL DETAIL
SCALE 1:150

- NOTES
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Design	NK	10/2025	
Drawn	NK	10/2025	
Checked			

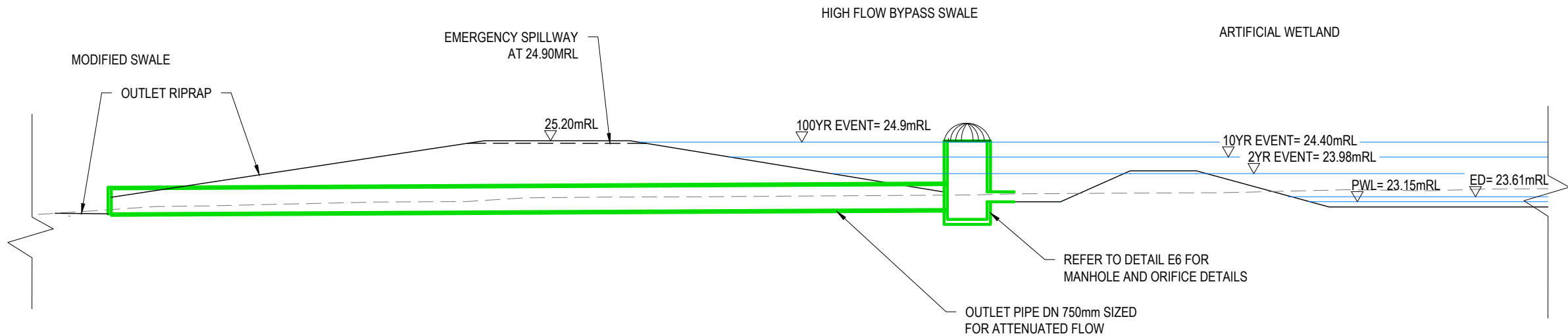


Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

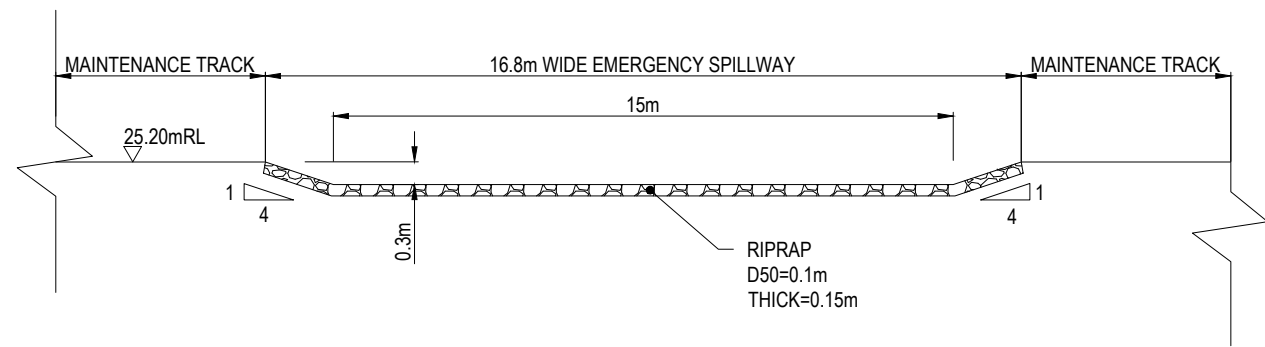
Title
**PROPOSED
STAGE 5 WETLAND
DETAILS**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C440-SW WETLAND DETAILS.DWG
Drawing no.	C440-9
Rev	B

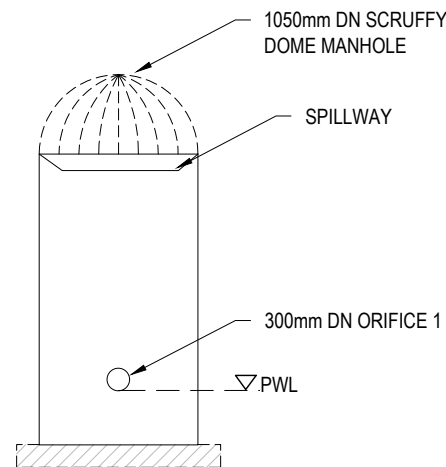
DRAFT FOR REVIEW



E4-WETLAND OUTLET SECTION DETAILS
SCALE 1:150



E5- EMERGENCY SPILLWAY SECTION DETAILS
SCALE 1:100



E6-OUTLET MANHOLE TYPICAL DETAIL
SCALE 1:100

Wetland E	
Base of wetland	22.95mRL
PWL	23.15mRL
EDL	23.61mRL
2YR	23.98mRL
10YR	24.40mRL
100YR	24.90mRL

Wetland	ED Orifice (mm)	Orifice Invert (mRL)	Wetland Weir to Overflow Swale - Min Width (m)	Top of Weir (m)
1	300	23.10	9	24.90

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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 6. HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS.
 7. ALL CESSPIT LEADS SHALL HAVE MIN COVER 0.9M.
 8. ALL LINES ARE TO BE CLASS4 RCRRJ UNLESS SHOWN OTHERWISE.
 9. ALL LINES TO BE ABANDONED SHALL BE SEALED AT EACH END. TIMING OF ALL SEALING TO BE COORDINATED WITH COUNCIL STAFF.

B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
		MAVEN	10/2025
Survey	MAVEN		10/2025
Design	NK		10/2025
Drawn	NK		10/2025
Checked			



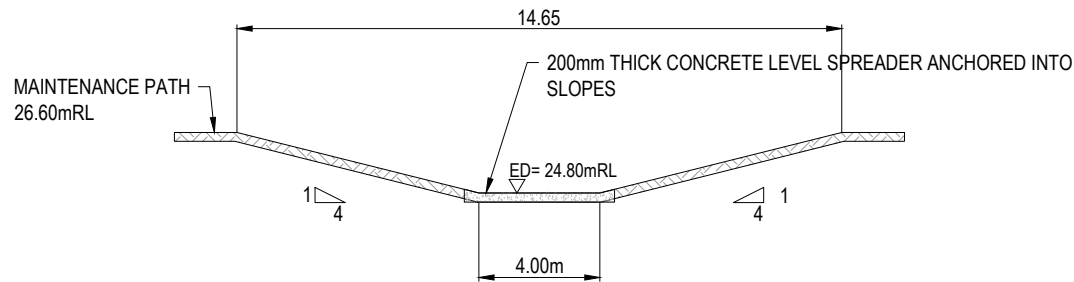
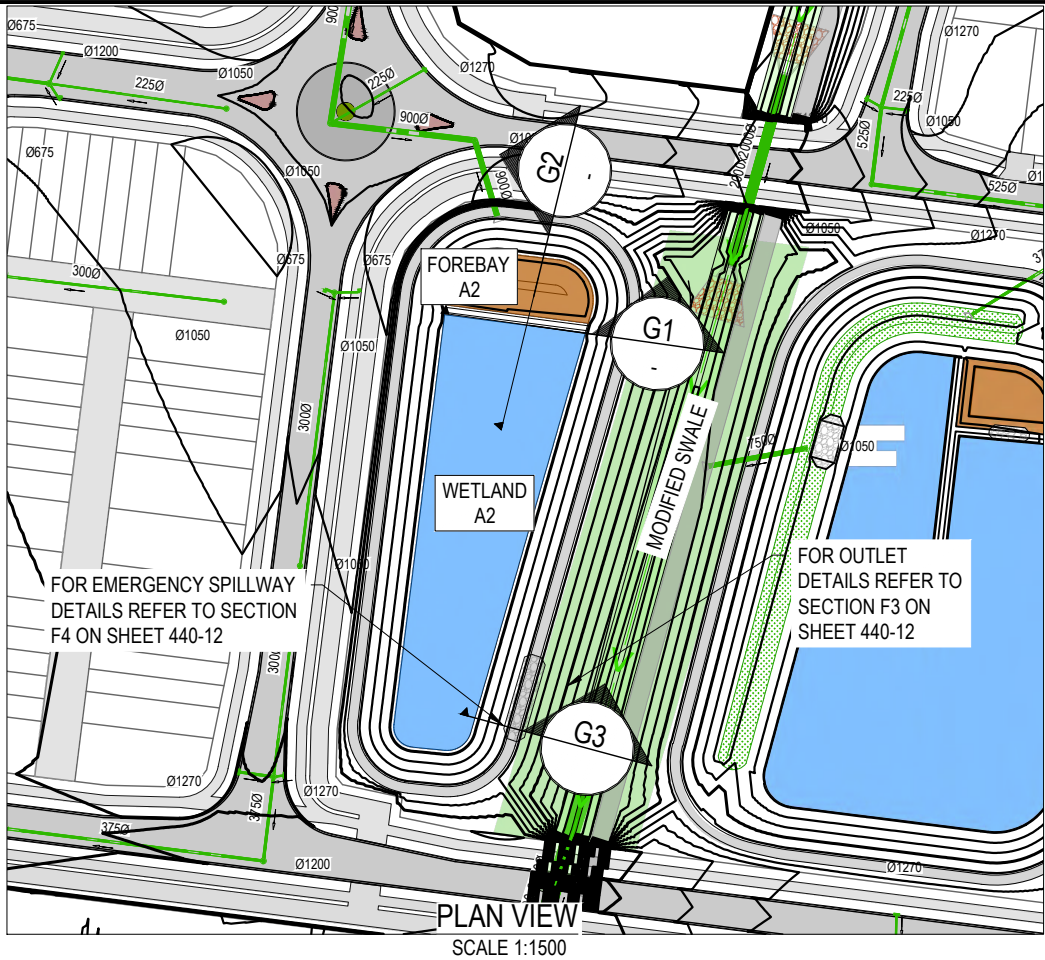
Maven Waikato
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Level 1 286 Victoria Street, Hamilton
New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

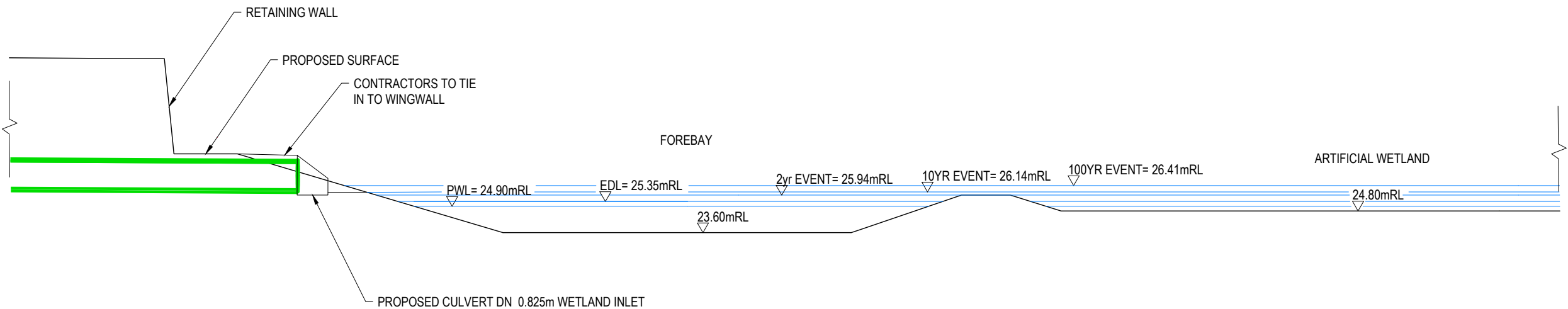
Title
**PROPOSED
STAGE 1 WETLAND
DETAILS**

Project no.	119014		
Scale	1:1000 @ A3		
Cad file	119014-C440-SW WETLAND DETAILS.DWG		
Drawing no.	C440-10	Rev	B

DRAFT FOR REVIEW



**G1-FOREBAY
SPILLWAY**
SCALE 1:250



**G2-FORBAY AND WETLAND INTERFACE TYPICAL
DETAIL**

SCALE 1:150

- NOTES
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B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	NK		10/2025
Drawn	NK		10/2025
Checked			

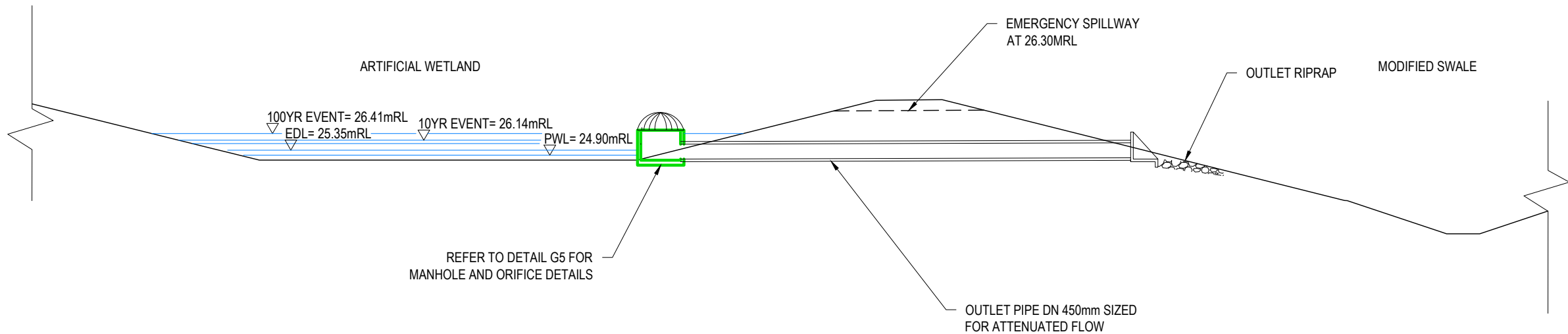


Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

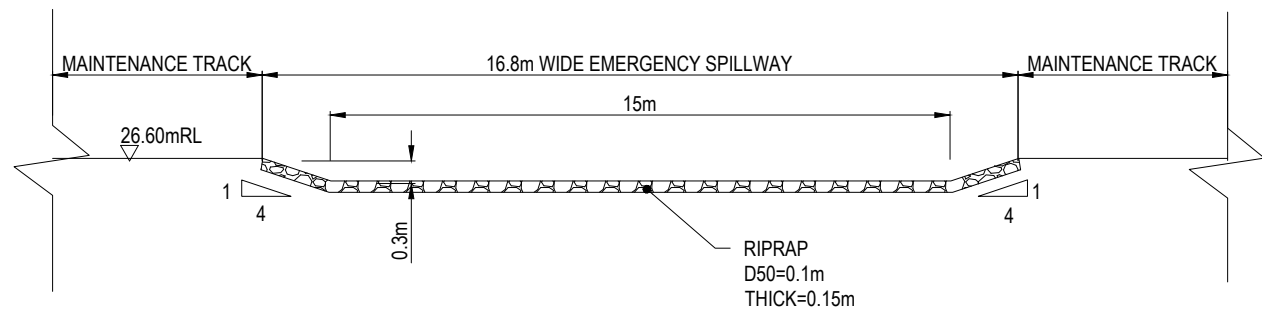
Title
**PROPOSED
STAGE 1 WETLAND
DETAILS**

Project no.	119014		
Scale	1:1000 @ A3		
Cad file	119014-C440-SW WETLAND DETAILS.DWG		
Drawing no.	C440-11	Rev	B

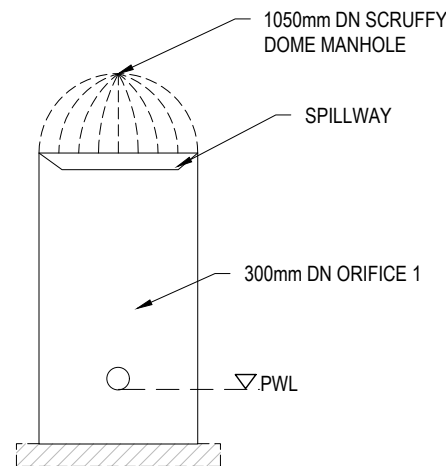
DRAFT FOR REVIEW



G3-WETLAND OUTLET SECTION DETAILS
SCALE 1:150



G4- EMERGENCY SPILLWAY SECTION DETAILS
SCALE 1:100



G5-OUTLET MANHOLE TYPICAL DETAIL
SCALE 1:100

Wetland A2	
Base of wetland	24.80mRL
PWL	24.90mRL
EDL	25.35mRL
2YR	25.94mRL
10YR	26.14mRL
100YR	26.41mRL

Wetland	ED Orifice (mm)	Orifice Invert (mRL)	Wetland Weir to Overflow Swale - Min Width (m)	Top of Weir (m)
1A	300	24.95	9	25.60

- NOTES
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A	DRAFT	NK	10/2025
Rev	Description	By	Date
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		NK	10/2025
		NK	10/2025
Checked			

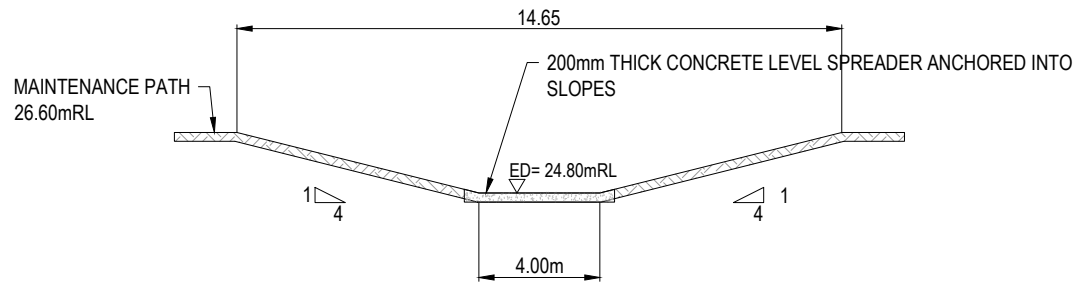
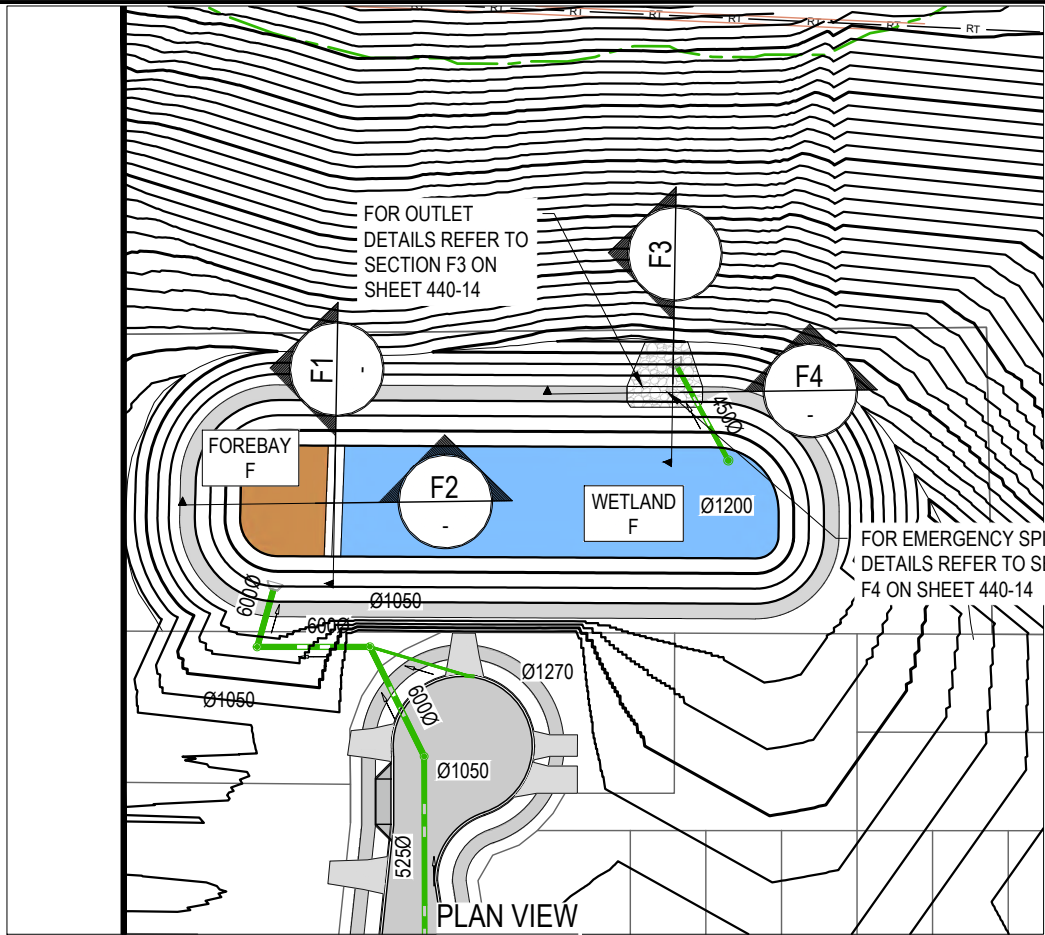
M **Maven Waikato**
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Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

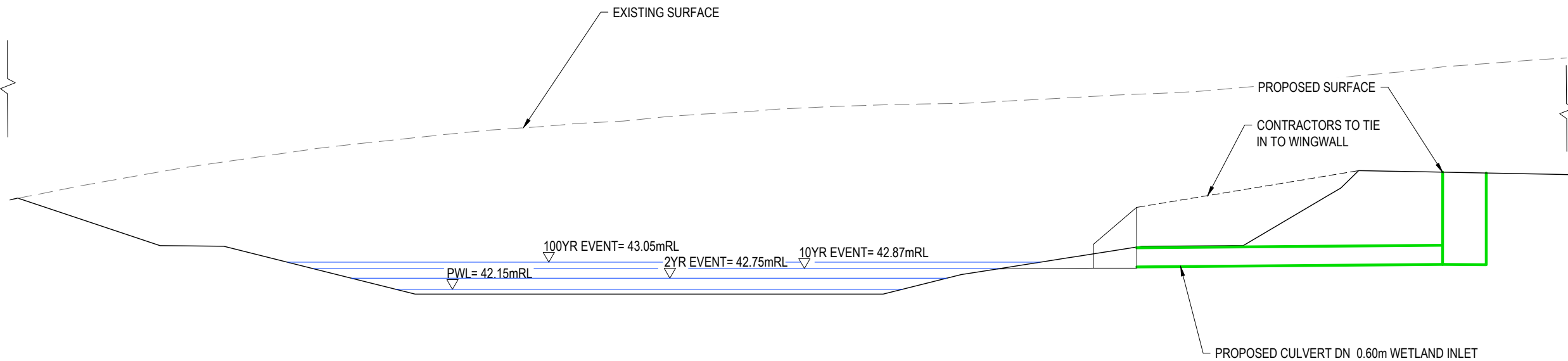
Title
**PROPOSED
STAGE 1 WETLAND
DETAILS**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C440-SW WETLAND DETAILS.DWG
Drawing no.	C440-12
Rev	B

DRAFT FOR REVIEW



F1-FOREBAY SPILLWAY
SCALE 1:250



F2-FORBAY AND WETLAND INTERFACE TYPICAL DETAIL
SCALE 1:150

- NOTES
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A	DRAFT	NK	10/2025
Rev	Description	By	Date
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Survey	MAVEN		10/2025
Design	NK		10/2025
Drawn	NK		10/2025
Checked			

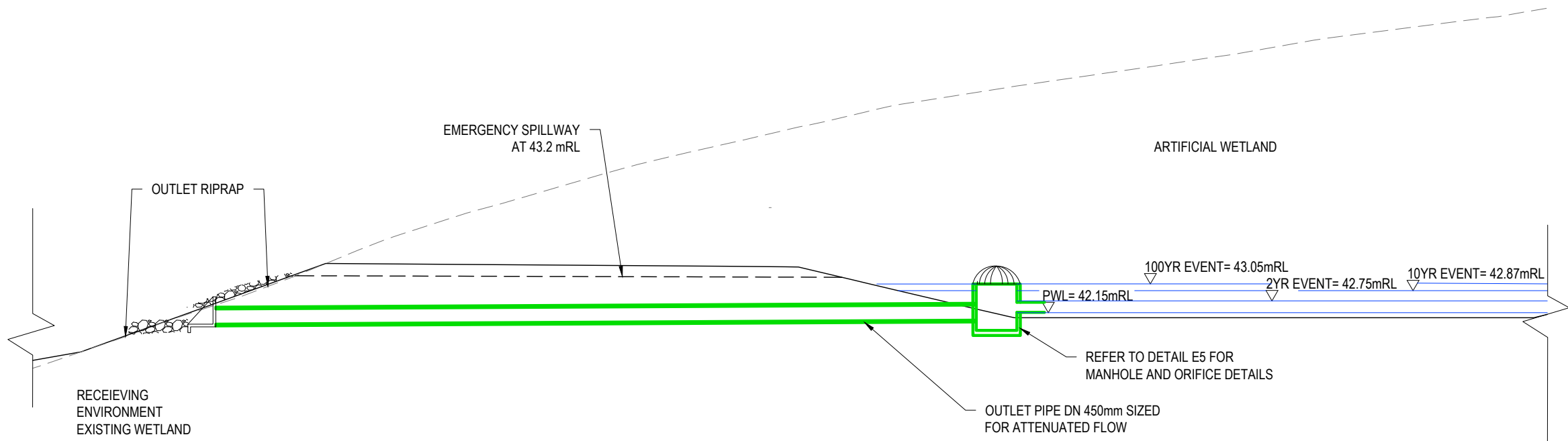


Project
**BRYMER FARMS
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BRYMER FARMS
LIMITED**

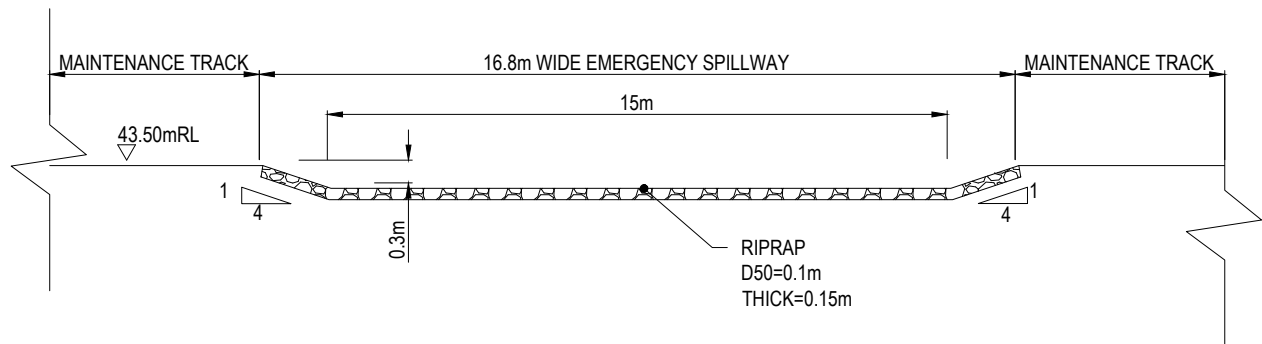
Title
**PROPOSED
STAGE 6 WETLAND
DETAILS**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C440-SW WETLAND DETAILS.DWG
Drawing no.	C440-13
Rev	B

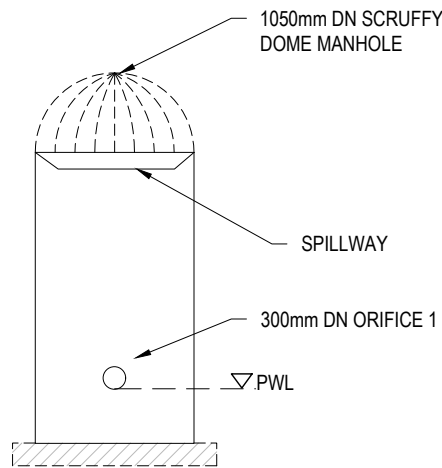
DRAFT FOR REVIEW



F3-WETLAND OUTLET SECTION DETAILS
SCALE 1:150



F4- EMERGENCY SPILLWAY SECTION DETAILS
SCALE 1:100



F5-OUTLET MANHOLE TYPICAL DETAIL
SCALE 1:100

Wetland F	
Base of wetland	42.00mRL
PWL	42.15mRL
EDL	42.45mRL
2YR	42.75mRL
10YR	42.87mRL
100YR	43.05mRL

Wetland	ED Orifice (mm)	Orifice Invert (mRL)	Wetland Weir to Overflow Swale - Min Width (m)	Top of Weir (m)
1	300	42.15	9	42.80

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B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
	Survey	MAVEN	10/2025
	Design	NK	10/2025
	Drawn	NK	10/2025
	Checked		

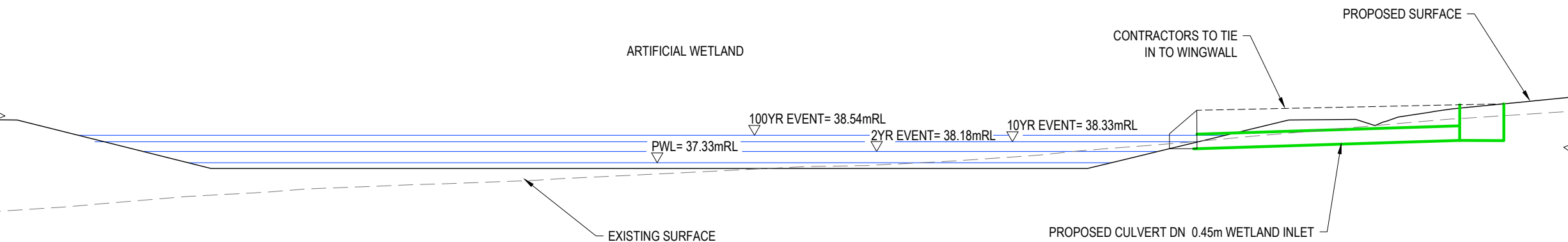
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Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
STAGE 6 WETLAND
DETAILS**

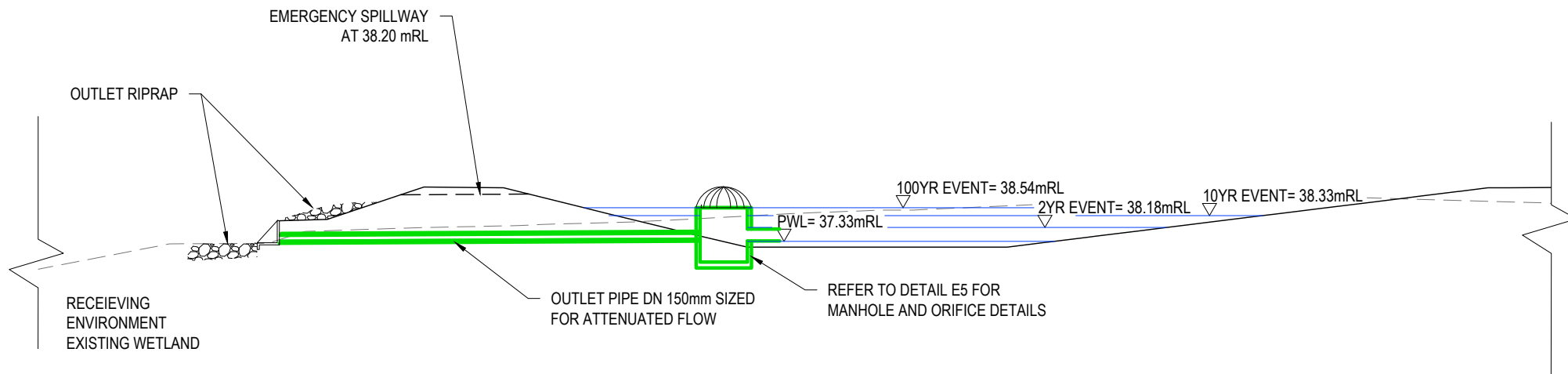
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Cad file	119014-C440-SW WETLAND DETAILS.DWG		
Drawing no.	C440-14	Rev	B

DRAFT FOR REVIEW

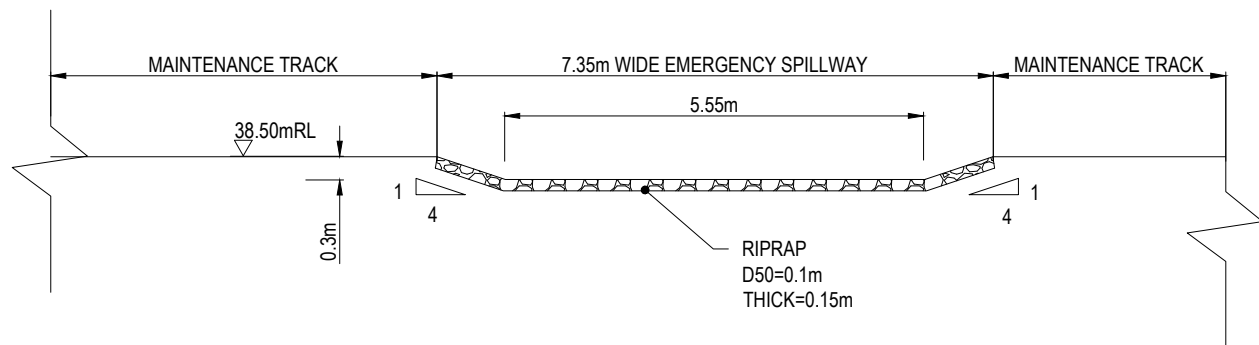


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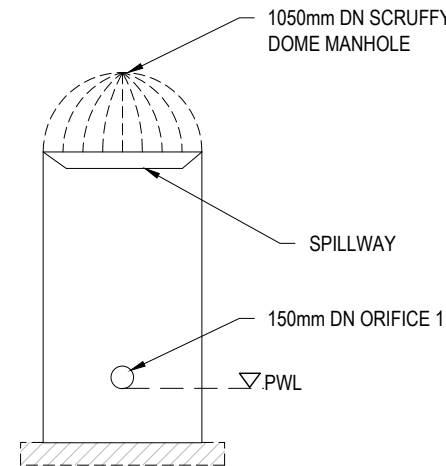
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Cad file	119014-C440-SW WETLAND DETAILS.DWG		
Drawing no.	C440-15	Rev	B



G3-WETLAND OUTLET SECTION DETAILS
SCALE 1:150



G2- EMERGENCY SPILLWAY SECTION DETAILS
SCALE 1:100



G4-OUTLET MANHOLE TYPICAL DETAIL
SCALE 1:100

Wetland G	
Base of wetland	37.00mRL
PWL	37.33mRL
EDL	37.85mRL
2YR	38.18mRL
10YR	38.33mRL
100YR	38.54mRL

Wetland	ED Orifice (mm)	Orifice Invert (mRL)	Wetland Weir to Overflow Swale - Min Width (m)	Top of Weir (m)
1	150	42.15	5.55	42.80

- NOTES
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B	DRAFT	NK	06/2026
A	DRAFT	NK	10/2025
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	NK	10/2025	
Drawn	NK	10/2025	
Checked			

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Project
**BRYMER FARMS
FOR
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LIMITED**

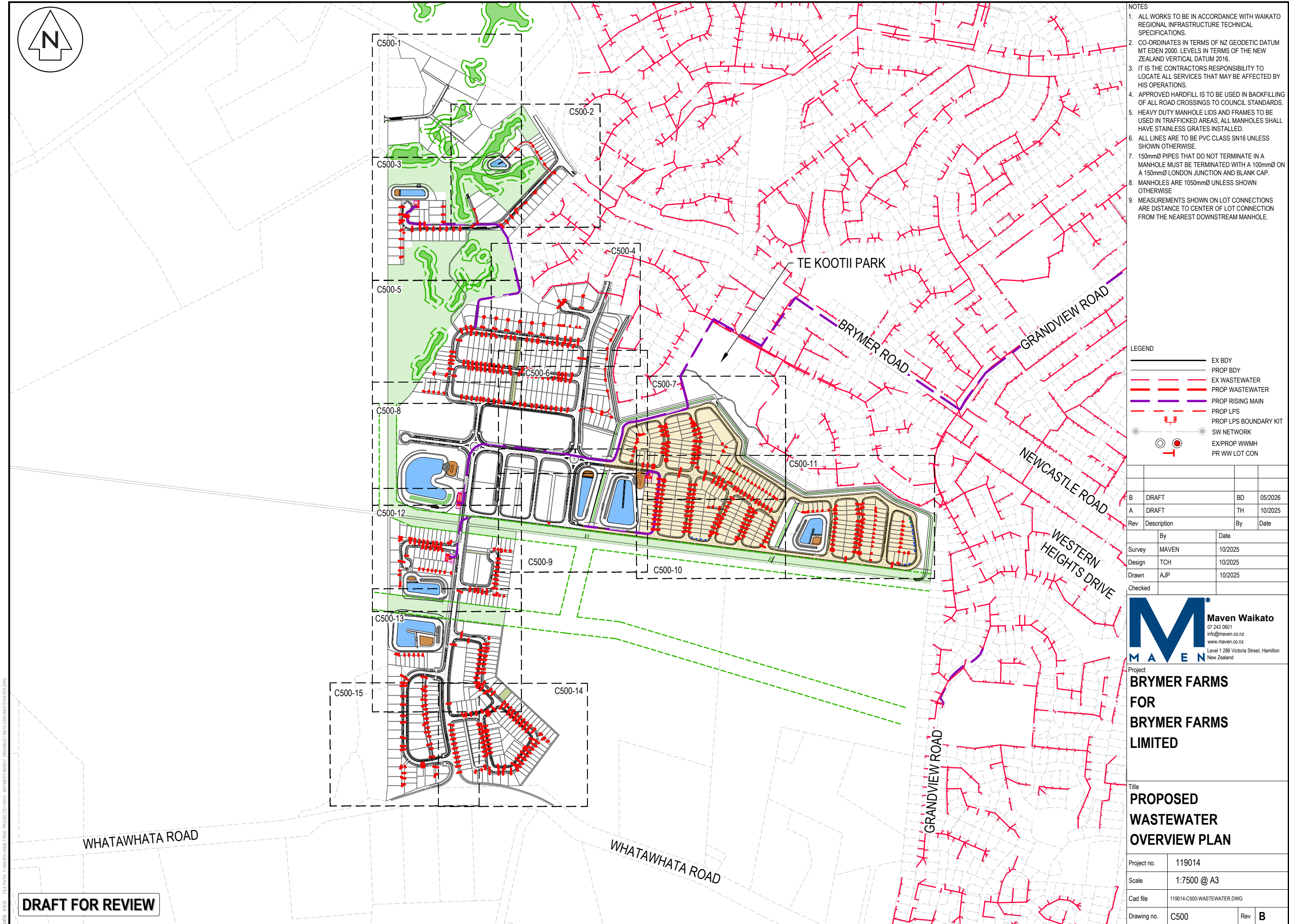
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Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C440-SW WETLAND DETAILS.DWG
Drawing no.	C440-16
Rev	B

DRAFT FOR REVIEW



DATE: 6/2/25 FILE PATH: F:\MVEN\HAMTON6 PROJECTS\119014- BRYMER FARMS\7 DRAWING\119014-C500-WASTEWATER.DWG

DRAFT FOR REVIEW



- NOTES
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 6. ALL LINES ARE TO BE PVC CLASS SN16 UNLESS SHOWN OTHERWISE.
 7. 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
 8. MANHOLES ARE 1050mmØ UNLESS SHOWN OTHERWISE
 9. MEASUREMENTS SHOWN ON LOT CONNECTIONS ARE DISTANCE TO CENTER OF LOT CONNECTION FROM THE NEAREST DOWNSTREAM MANHOLE.

LEGEND

—	EX BDY
—	PROP BDY
---	EX WASTEWATER
---	PROP WASTEWATER
---	PROP RISING MAIN
---	PROP LPS
---	PROP LPS BOUNDARY KIT
●	SW NETWORK
○	EX/PROP WWMH
+	PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
Drawn	AJP		10/2025
Checked			



Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
OVERVIEW PLAN**

Project no.	119014		
Scale	1:7500 @ A3		
Cad file	119014-C500-WASTEWATER.DWG		
Drawing no.	C500	Rev	B



Lot 3
DPS 16893

Lot 1
DPS 6936

726

PAPER ROAD

Lot 3
DP 464194

Lot 1
DP 385271

727

728

725

Lot 2
DP 385271

729

Lot 4
DP 385271

NOTE:
ALL RURAL RESIDENTIAL LOTS TO
HAVE ONSITE WASTEWATER
TREATMENT

735

731

736

732

734

733

724

723

OBRIEN ROAD

DRAFT FOR REVIEW

- NOTES
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LEGEND			
	EX BDY		EX WASTEWATER
	PROP BDY		PROP WASTEWATER
	EX WASTEWATER		PROP RISING MAIN
	PROP RISING MAIN		PROP LPS
	PROP LPS BOUNDARY KIT		SW NETWORK
	EX/PROP WWMH		PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
Drawn	AJP		10/2025
Checked			

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Project
**BRYMER FARMS
FOR
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Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	119014		
Scale	1:1000 @ A3		
Cad file	119014-C500-WASTEWATER.DWG		
Drawing no.	C500-1	Rev	B



NOTES

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LEGEND

—	EX BDY
—	PROP BDY
- - -	EX WASTEWATER
- - -	PROP WASTEWATER
- - -	PROP RISING MAIN
- - -	PROP LPS
- - -	PROP LPS BOUNDARY KIT
●	SW NETWORK
○	EX/PROP WWMH
+	PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
Drawn	AJP		10/2025
Checked			

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Project

**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title

**PROPOSED
WASTEWATER
PLAN**

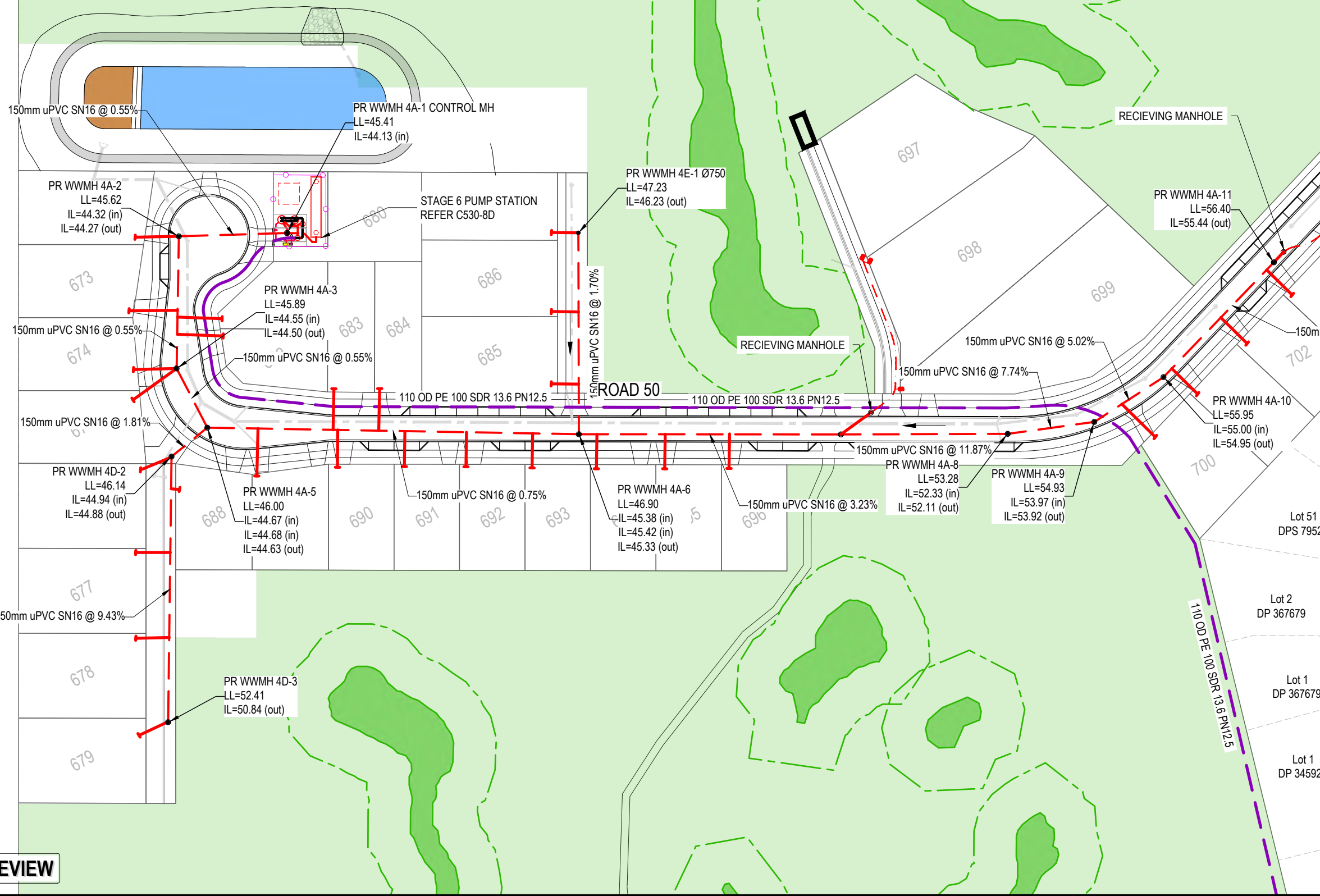
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Cad file	119014-C500-WASTEWATER.DWG		
Drawing no.	C500-2	Rev	B

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMTON\6. PROJECTS\119014 - BRYMER FARMS\7. DRAWINGS\119014-C500-WASTEWATER.DWG



NOTE:
ALL RURAL RESIDENTIAL LOTS TO
HAVE ONSITE WASTEWATER
TREATMENT

WETLAND F



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
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LEGEND

	EX BDY
	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	PROP LPS
	PROP LPS BOUNDARY KIT
	SW NETWORK
	EX/PROP WWMH
	PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
Drawn	AJP		10/2025
Checked			

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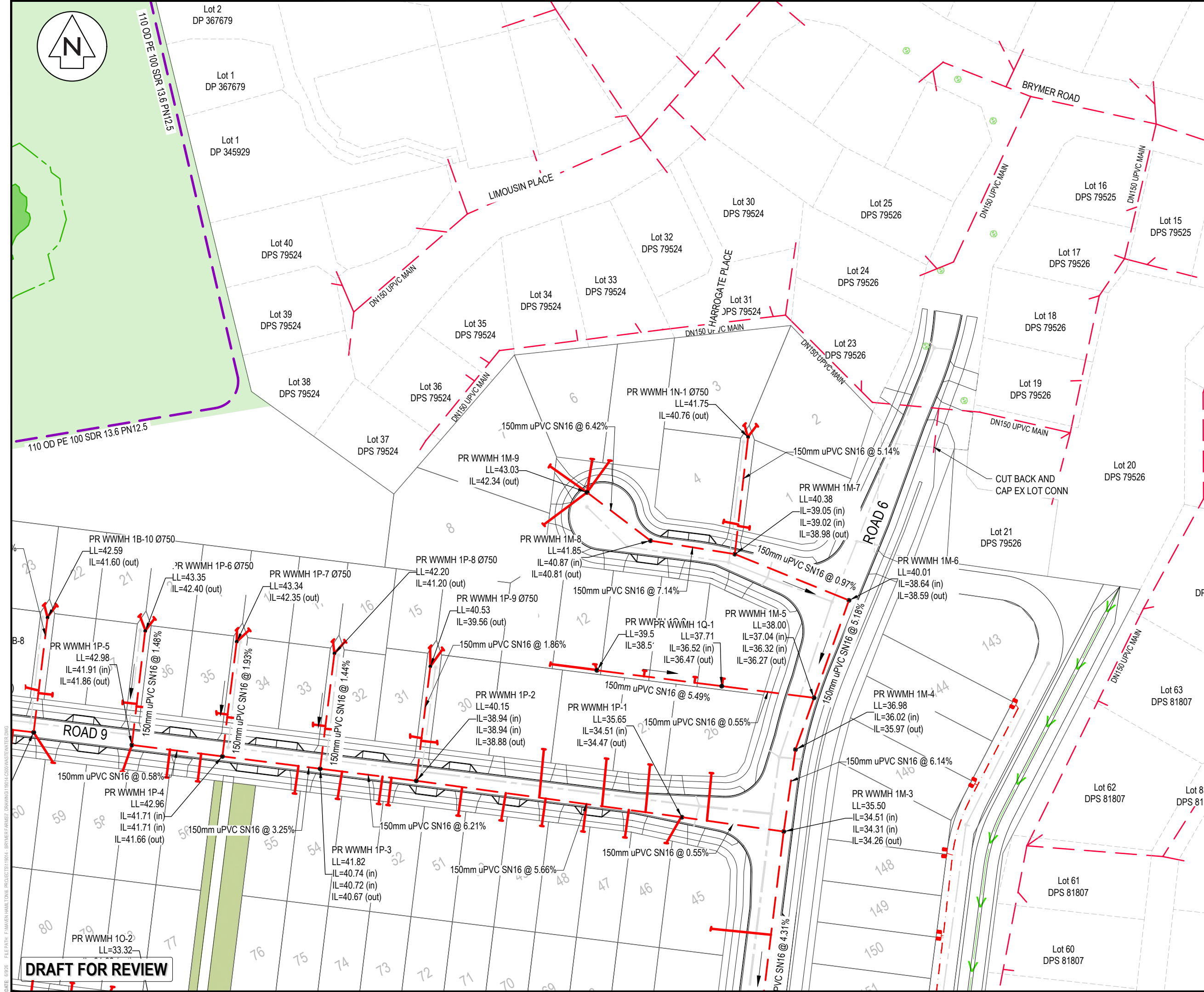
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C500-WASTEWATER.DWG
Drawing no.	C500-3
Rev	B

DRAFT FOR REVIEW

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMITON\6. PROJECTS\119014 - BRYMER FARMS\7. DRAWING\119014-C500-WASTEWATER.DWG



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LEGEND

—	EX BDY
—	PROP BDY
- - -	EX WASTEWATER
- - -	PROP WASTEWATER
- - -	PROP RISING MAIN
- - -	PROP LPS
- - -	PROP LPS BOUNDARY KIT
○	SW NETWORK
●	EX/PROP WWMH
+	PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
L	Survey	MAVEN	10/2025
DPS	Design	TCH	10/2025
	Drawn	AJP	10/2025
	Checked		

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Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	119014		
Scale	1:1000 @ A3		
Cad file	119014-C500-WASTEWATER.DWG		
Drawing no.	C500-4	Rev	B

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMILTON\6. PROJECTS\119014 - BRYMER FARMS\7. DRAWING\119014-C500-WASTEWATER.DWG



Part Lot 2
DP 23773

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMTON6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C500-WASTEWATER.DWG

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NOTES

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LEGEND

EX BDY	EX WASTEWATER	EX/PROP WWMH
PROP BDY	PROP WASTEWATER	PR WW LOT CON
EX RISING MAIN	PROP RISING MAIN	
PROP LPS	PROP LPS BOUNDARY KIT	
SW NETWORK		

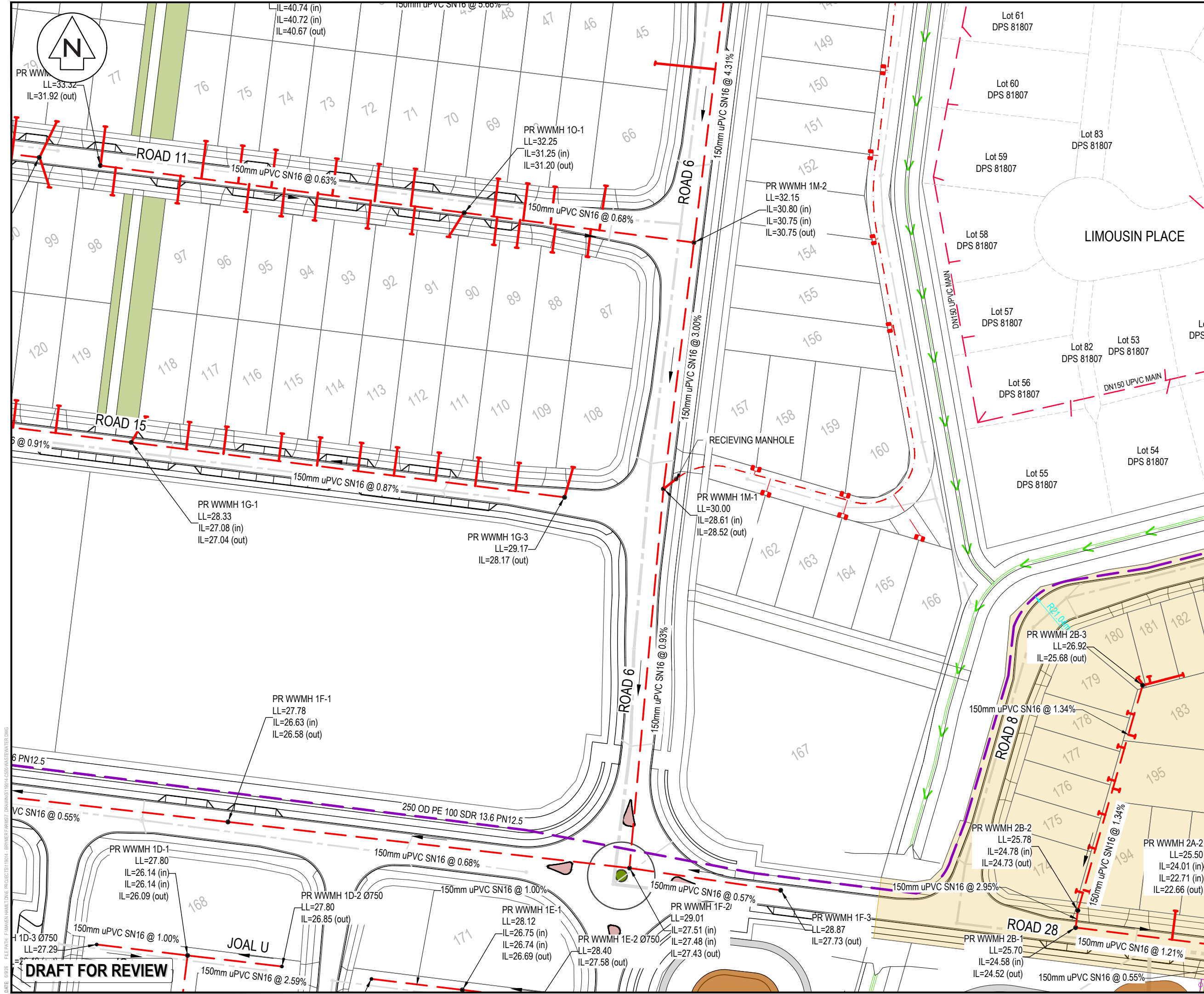
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A	DRAFT	TH	10/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
Drawn	AJP		10/2025
Checked			

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Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C500-WASTEWATER.DWG
Drawing no.	C500-5
Rev	B



NOTES

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LEGEND

	EX BDY
	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	PROP LPS
	PROP LPS BOUNDARY KIT
	SW NETWORK
	EX/PROP WWMH
	PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
Drawn	AJP		10/2025
Checked			

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Project

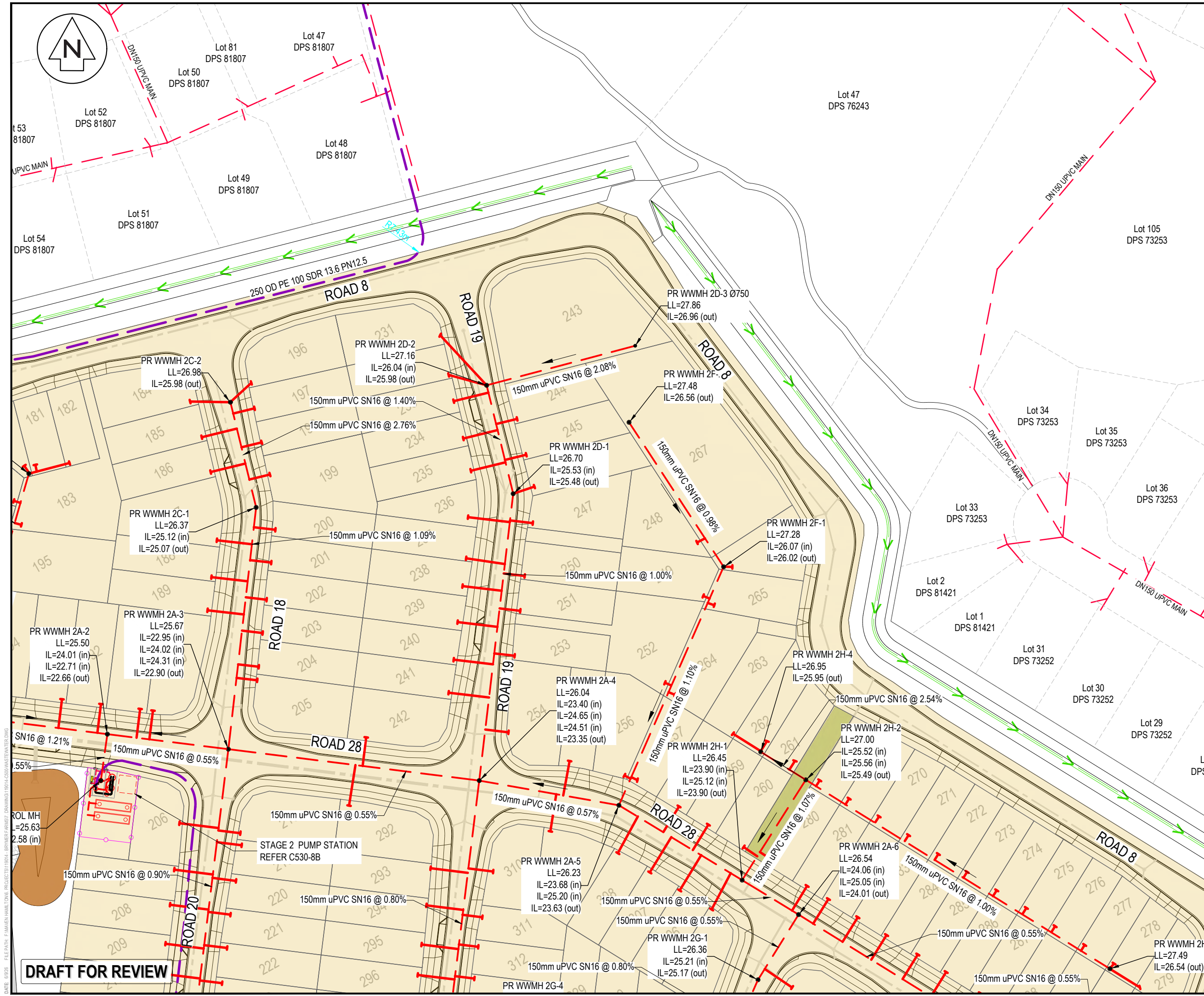
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title

**PROPOSED
WASTEWATER
PLAN**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C500-WASTEWATER.DWG
Drawing no.	C500-6
Rev	B

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMTON6 PROJECTS\119014 - BRYMER FARMS\DRAWING\119014-C500-WASTEWATER.DWG



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—	PROP BDY
---	EX WASTEWATER
---	PROP WASTEWATER
---	PROP RISING MAIN
---	PROP LPS
---	PROP LPS BOUNDARY KIT
○	SW NETWORK
●	EX/PROP WWMH
+	PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
	Survey	MAVEN	10/2025
	Design	TCH	10/2025
	Drawn	AJP	10/2025
Checked			

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Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C500-WASTEWATER.DWG
Drawing no.	C500-7
Rev	B

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMTON6 PROJECTS\119014 - BRYMER FARMS\DRAWING\119014-C500-WASTEWATER.DWG

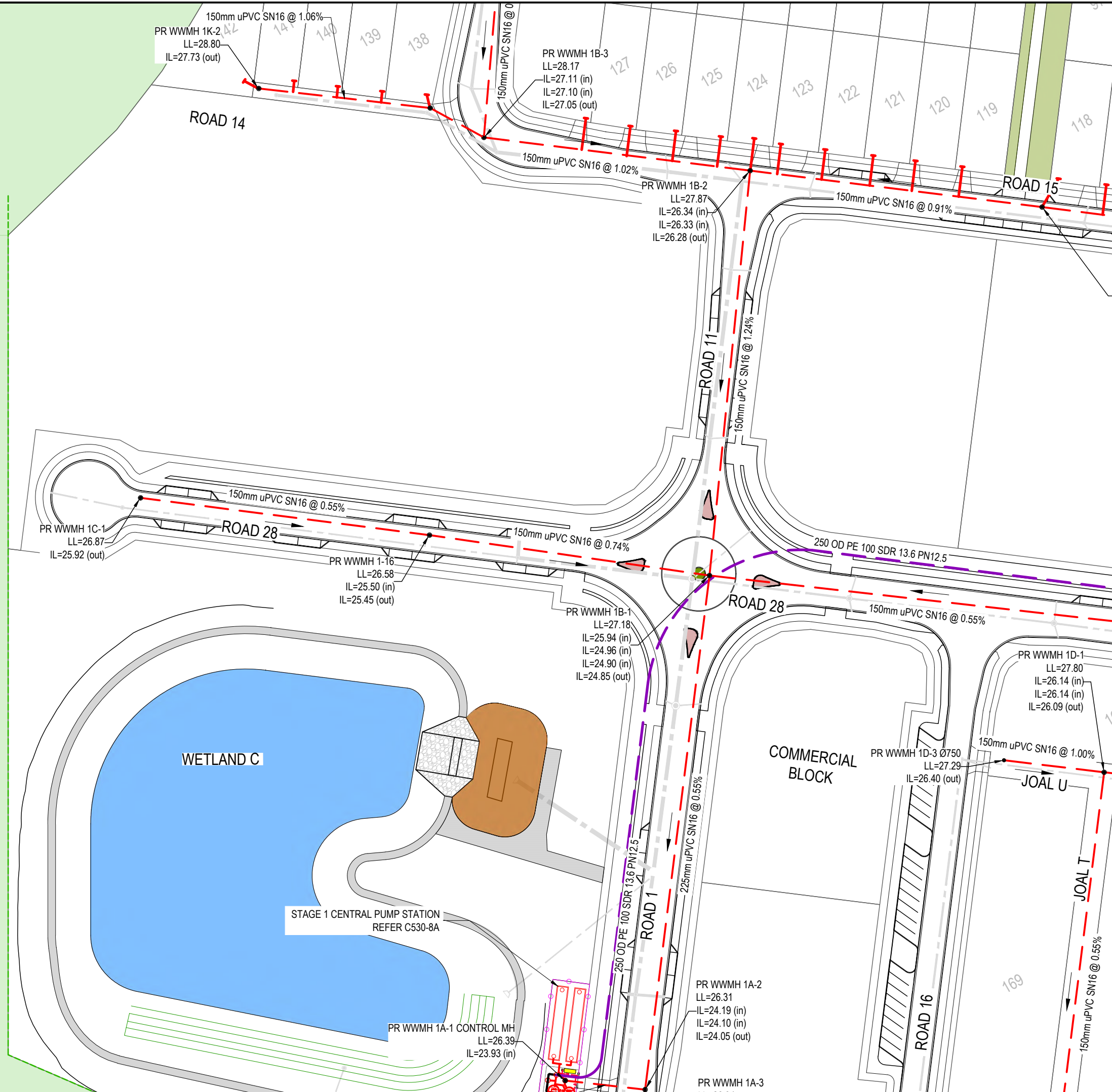
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Part Lot 2
DP 23773

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMTON6 PROJECTS\119014- BRYMER FARMS\7 DRAWING\119014-C500-WASTEWATER.DWG

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—	PROP BDY
---	EX WASTEWATER
---	PROP WASTEWATER
---	PROP RISING MAIN
---	PROP LPS
---	PROP LPS BOUNDARY KIT
○	SW NETWORK
●	EX/PROP WWMH
+	PR WW LOT CON

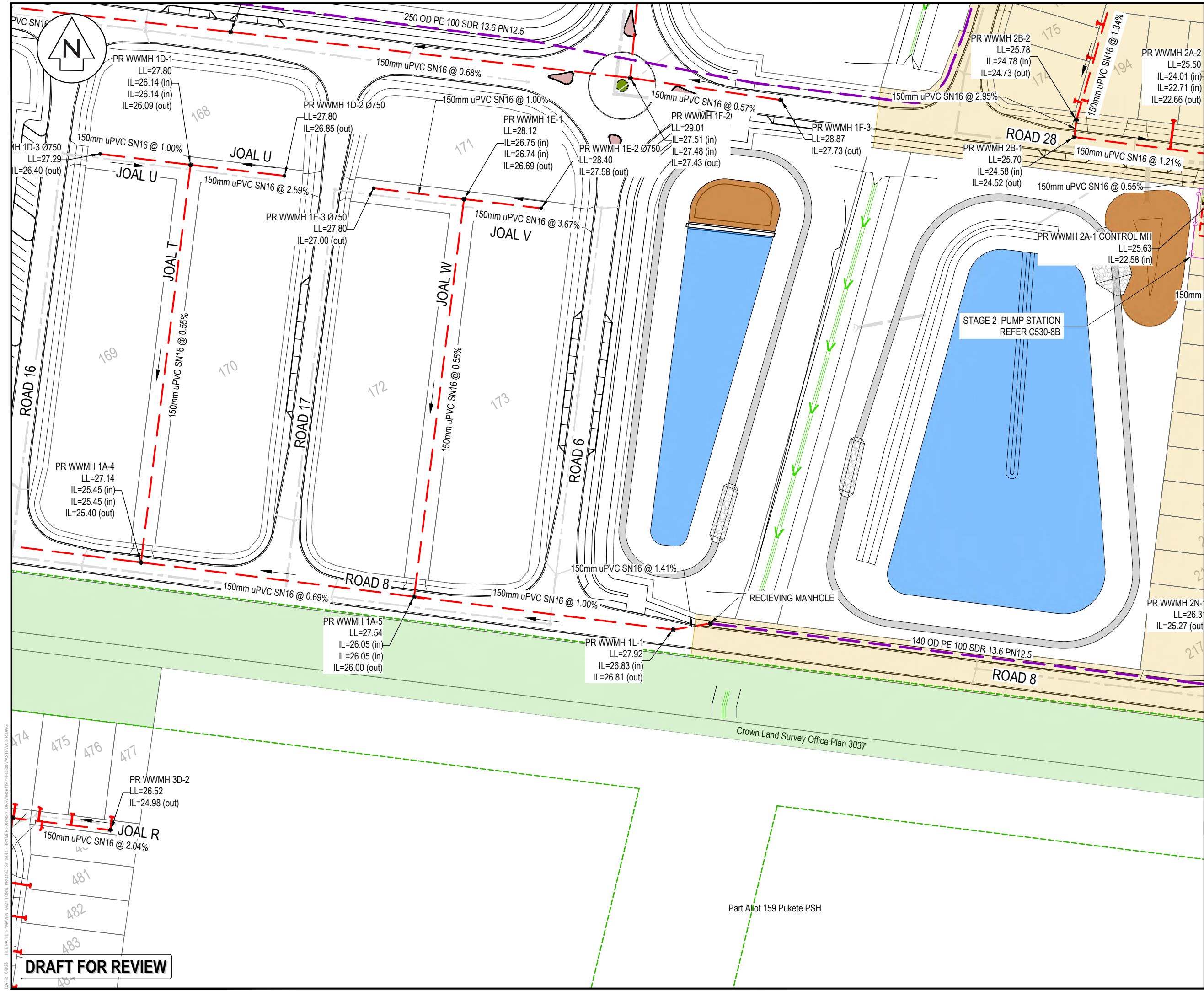
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A	DRAFT	TH	10/2025
Rev	Description	By	Date
	Survey	MAVEN	10/2025
	Design	TCH	10/2025
	Drawn	AJP	10/2025
	Checked		

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Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	119014		
Scale	1:1000 @ A3		
Cad file	119014-C500-WASTEWATER.DWG		
Drawing no.	C500-8	Rev	B



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LEGEND

	EX BDY
	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	PROP LPS
	PROP LPS BOUNDARY KIT
	SW NETWORK
	EX/PROP WWMH
	PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
	Survey	MAVEN	10/2025
	Design	TCH	10/2025
	Drawn	AJP	10/2025
	Checked		

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Project

**BRYMER FARMS
FOR
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LIMITED**

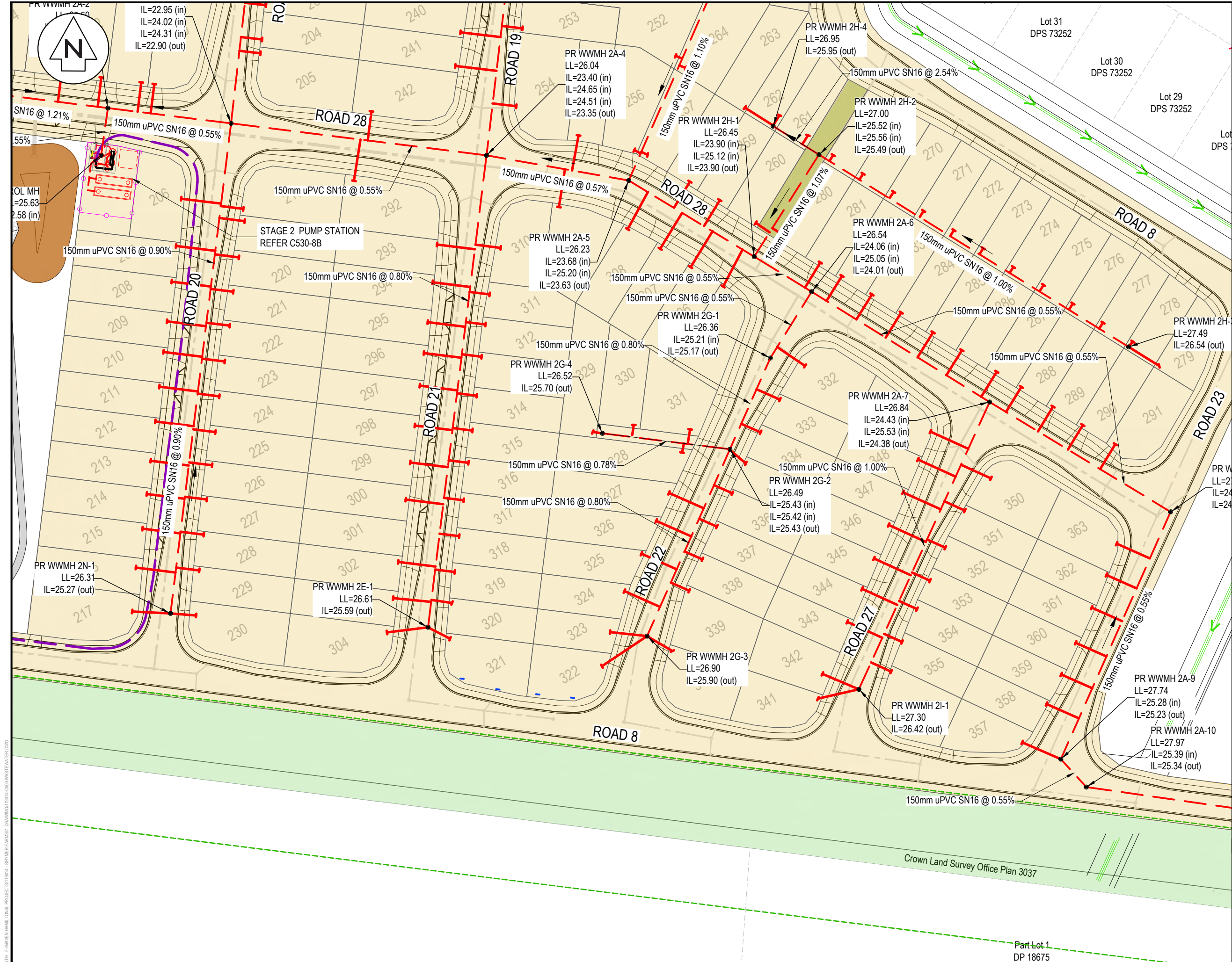
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**PROPOSED
WASTEWATER
PLAN**

Project no.	119014		
Scale	1:1000 @ A3		
Cad file	119014-C500-WASTEWATER.DWG		
Drawing no.	C500-9	Rev	B

DATE: 6/2/25 FILEPATH: F:\MVEN\HAMTON6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C500-WASTEWATER.DWG

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- NOTES
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	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	PROP LPS
	PROP LPS BOUNDARY KIT
	SW NETWORK
	EX/PROP WWMH
	PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
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Project
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FOR
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LIMITED**

Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C500-WASTEWATER.DWG
Drawing no.	C500-10
Rev	B

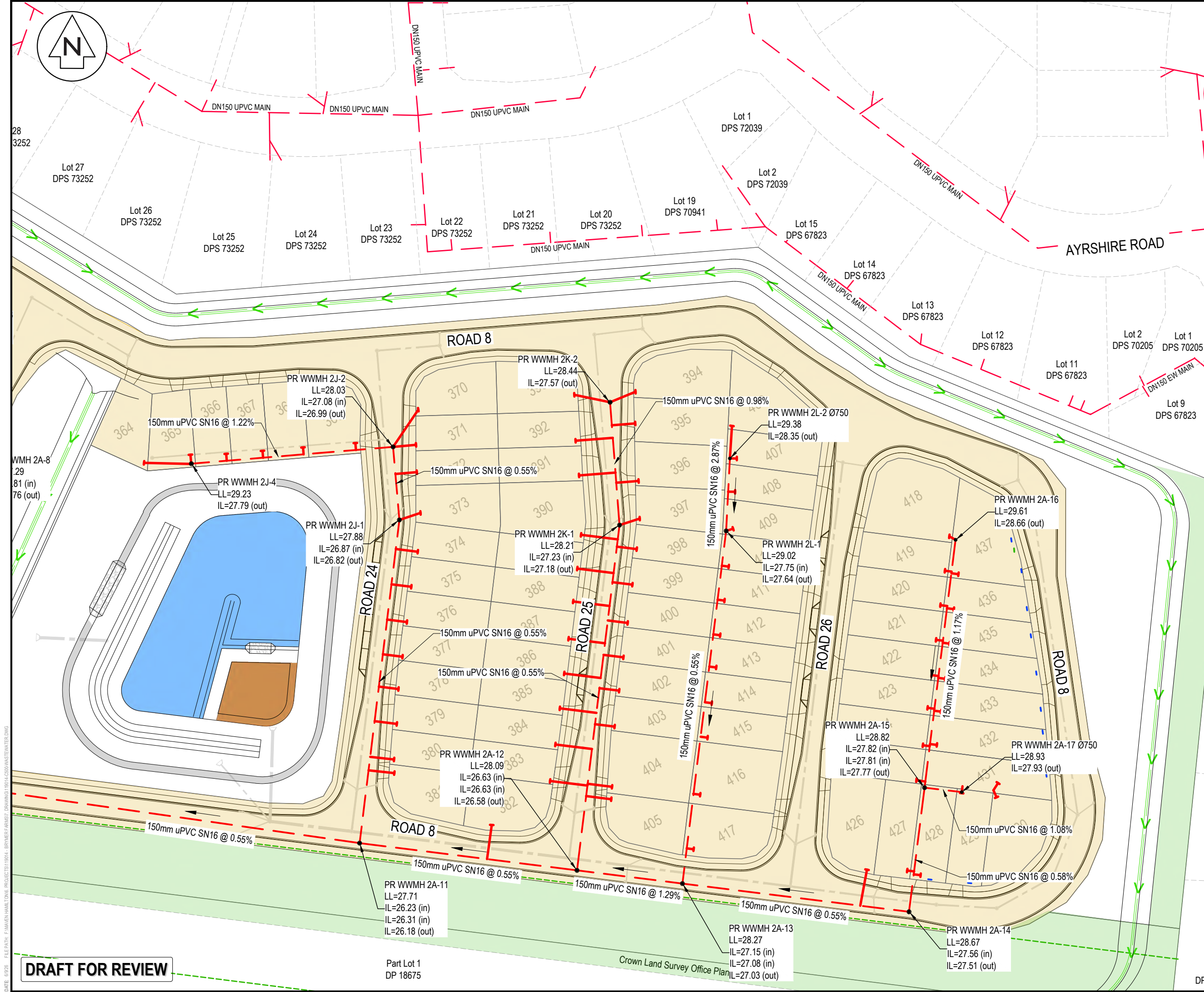
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Part Allot 159 Pukete PSH

Part Lot 1
DP 18675

Crown Land Survey Office Plan 3037

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMTON6 PROJECTS\119014 - BRYMER FARMS\DRAWING\119014-C500-WASTEWATER.DWG



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LEGEND

- EX BDY
- PROP BDY
- EX WASTEWATER
- PROP WASTEWATER
- PROP RISING MAIN
- PROP LPS
- PROP LPS BOUNDARY KIT
- SW NETWORK
- EX/PROP WWMH
- PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
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Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C500-WASTEWATER.DWG
DPS Drawing no.	C500-11
Rev	B

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Part Lot 1
DP 18675

Crown Land Survey Office Plan

DATE: 6/9/25 FILE PATH: F:\MVEN\HAMILTON\6. PROJECTS\119014 - BRYMER FARMS\7. DRAWING\119014-C500-WASTEWATER.DWG



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	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	PROP LPS
	PROP LPS BOUNDARY KIT
	SW NETWORK
	EX/PROP WWMH
	PR WW LOT CON

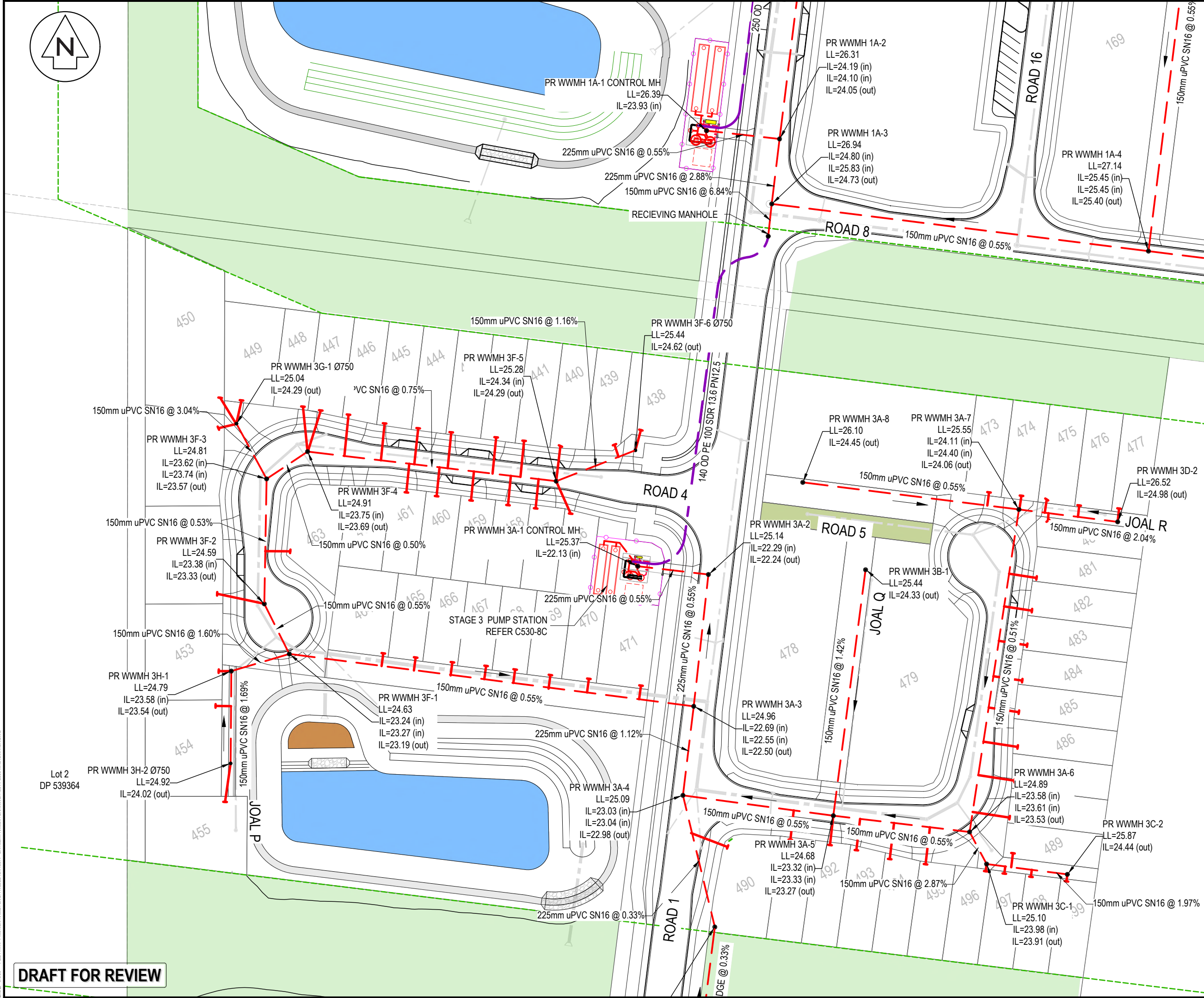
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Project
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FOR
BRYMER FARMS
LIMITED**

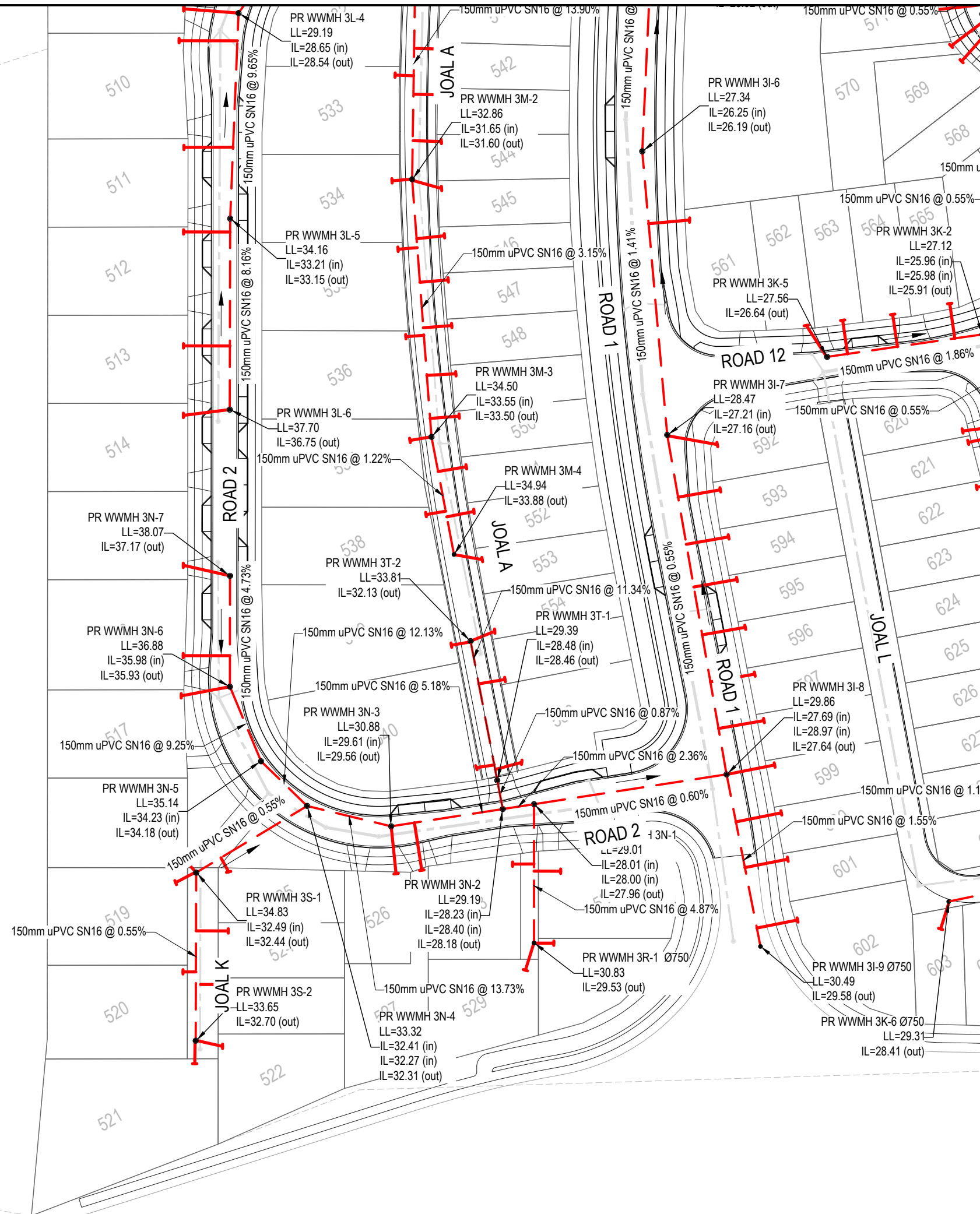
Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C500-WASTEWATER.DWG
Drawing no.	C500-12
Rev	B





DRAFT FOR REVIEW



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	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	PROP RISING MAIN
	PROP LPS
	PROP LPS BOUNDARY KIT
	SW NETWORK
	EX/PROP WWHMH
	PR WW LOT CON

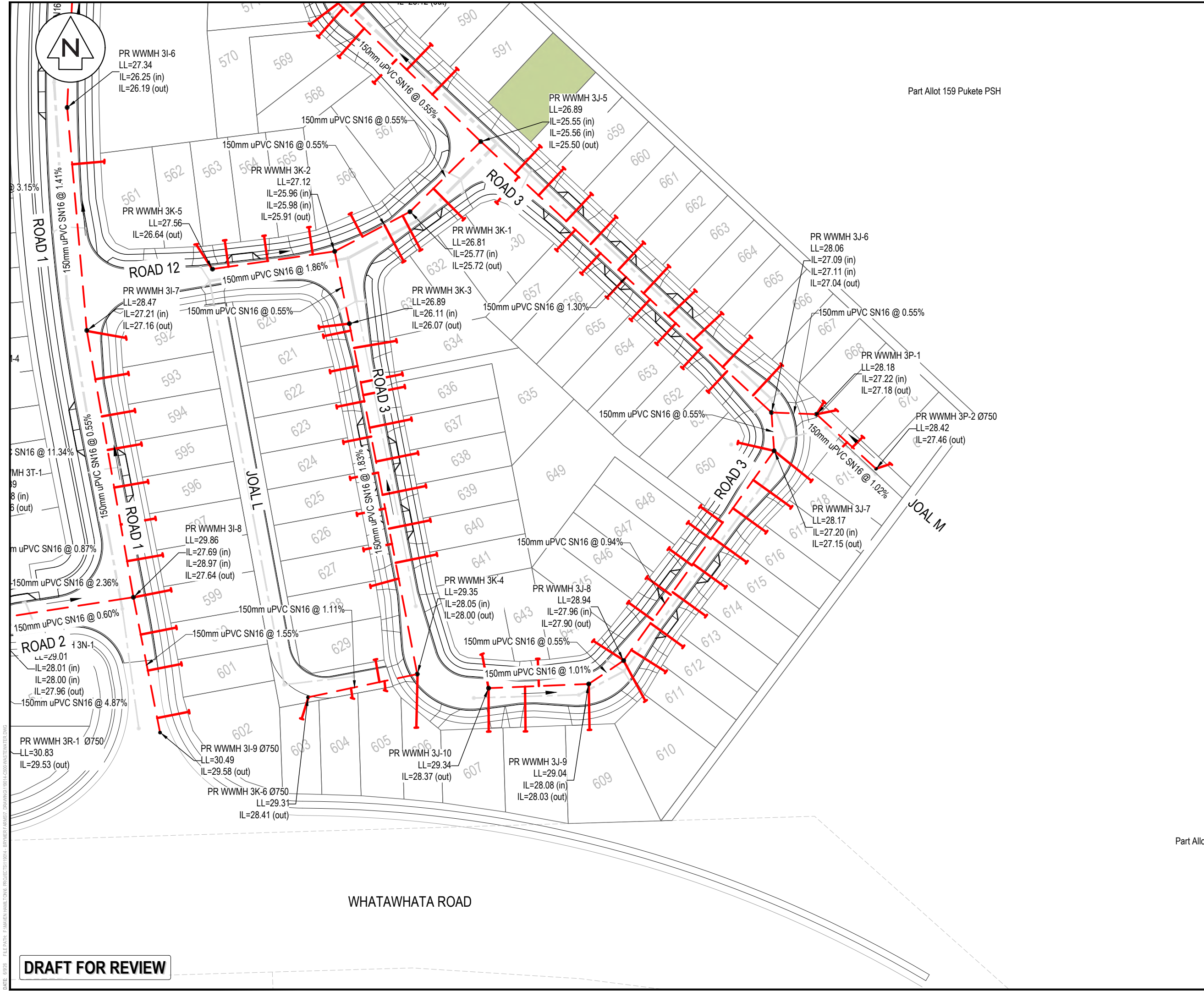
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A	DRAFT	TH	10/2025
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	TCH	10/2025	
Drawn	AJP	10/2025	
Checked			



Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
PLAN**

Project no.	119014		
Scale	1:1000 @ A3		
Cad file	119014-C500-WASTEWATER.DWG		
Drawing no.	C500-14	Rev	B



NOTES

- ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
- CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
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- APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL ROAD CROSSINGS TO COUNCIL STANDARDS.
- HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS. ALL MANHOLES SHALL HAVE STAINLESS GRATES INSTALLED.
- ALL LINES ARE TO BE PVC CLASS SN16 UNLESS SHOWN OTHERWISE.
- 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
- MANHOLES ARE 1050mmØ UNLESS SHOWN OTHERWISE
- MEASUREMENTS SHOWN ON LOT CONNECTIONS ARE DISTANCE TO CENTER OF LOT CONNECTION FROM THE NEAREST DOWNSTREAM MANHOLE.

LEGEND

- EX BDY
- PROP BDY
- EX WASTEWATER
- PROP WASTEWATER
- PROP RISING MAIN
- PROP LPS
- PROP LPS BOUNDARY KIT
- SW NETWORK
- EX/PROP WWMH
- PR WW LOT CON

B	DRAFT	BD	05/2026
A	DRAFT	TH	10/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
Drawn	AJP		10/2025
Checked			

Maven Waikato
 07 242 0601
 info@maven.co.nz
 www.maven.co.nz
 Level 1 286 Victoria Street, Hamilton
 New Zealand

Project
**BRYMER FARMS
 FOR
 BRYMER FARMS
 LIMITED**

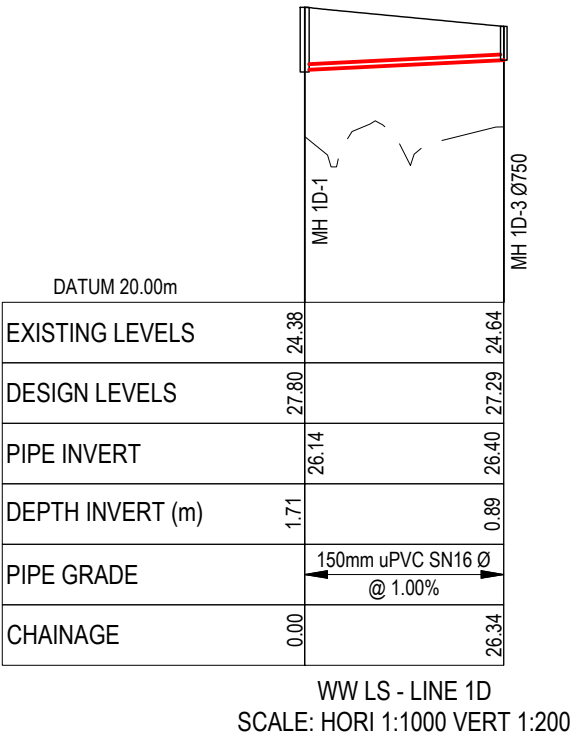
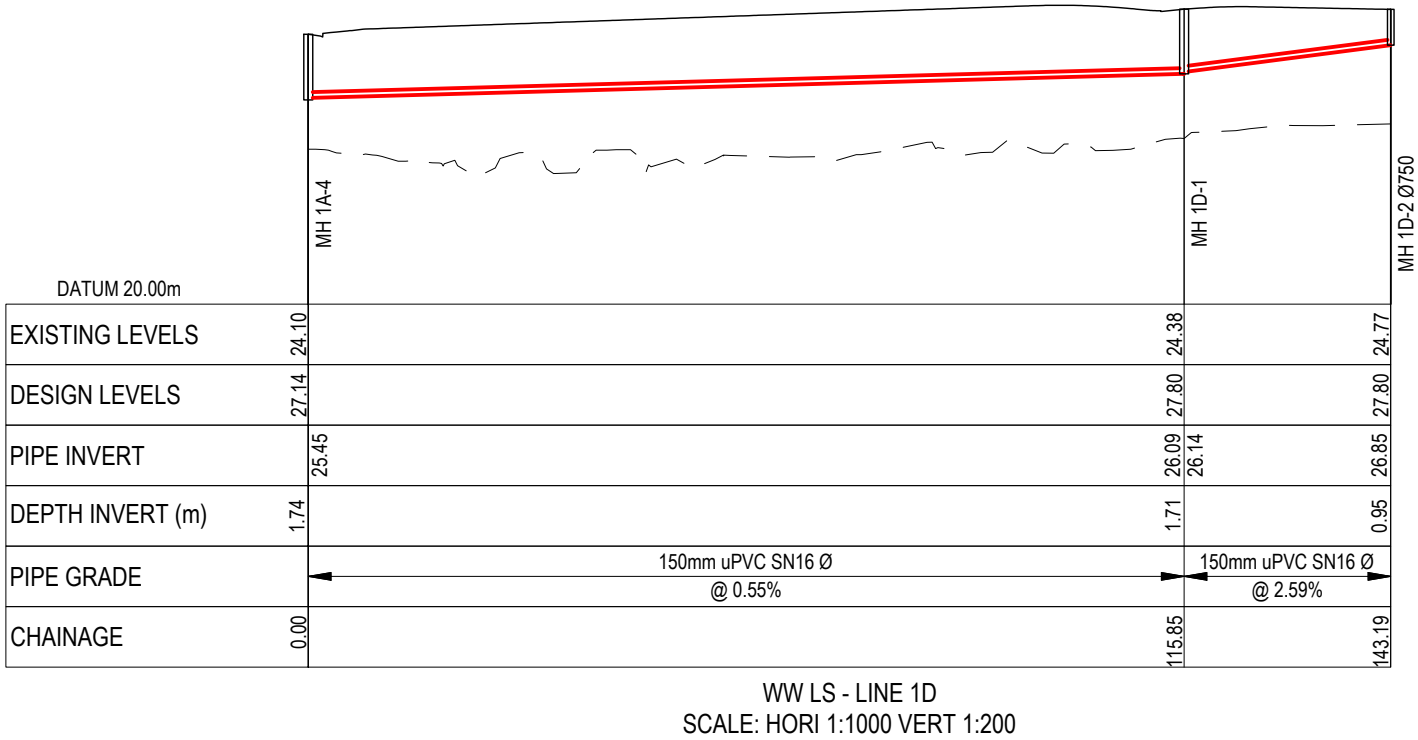
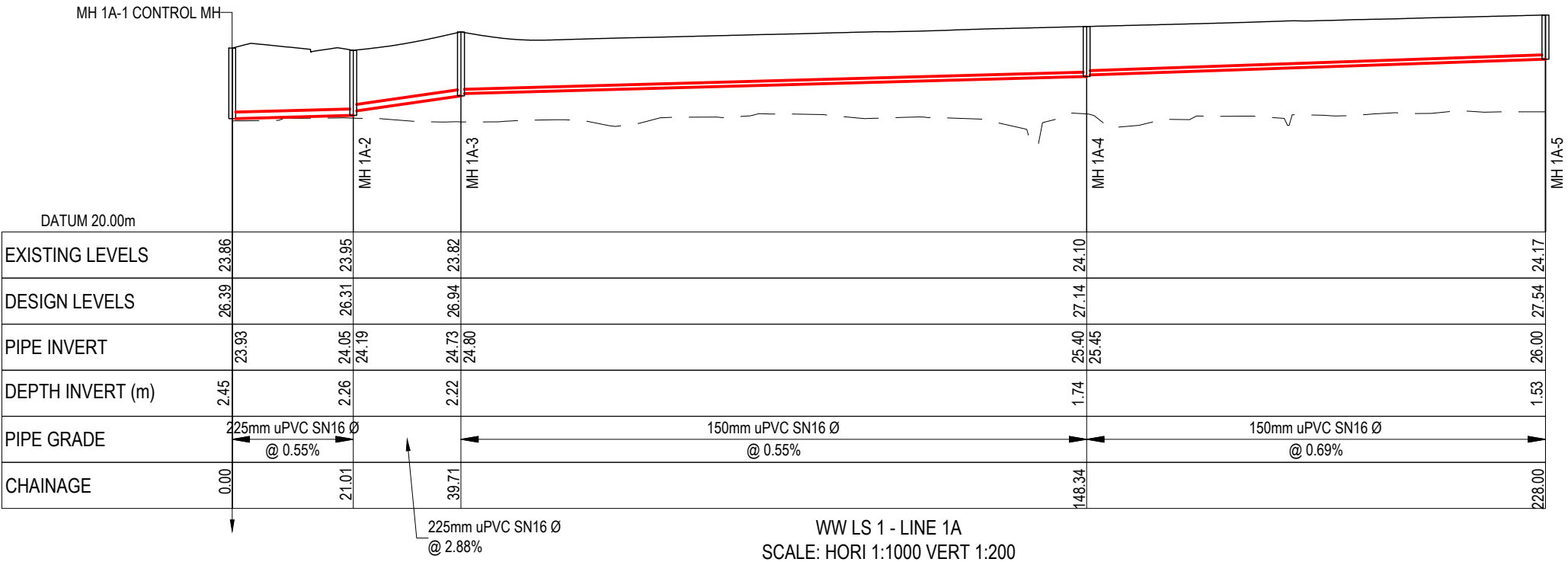
Part Allot Title
**PROPOSED
 WASTEWATER
 PLAN**

Project no.	119014
Scale	1:1000 @ A3
Cad file	119014-C500-WASTEWATER.DWG
Drawing no.	C500-15
Rev	B

DATE: 6/9/25 FILEPATH: F:\MVEN\HAMTON6 PROJECTS\119014 - BRYMER FARMS\119014-C500-WASTEWATER.DWG

DRAFT FOR REVIEW

DATE: 5/25/26 FILE PATH: F:\MVEN\HAM1046 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520-WW LONG SECTION.DWG



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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 6. ALL LINES ARE TO BE 150mmØ PVC CLASS SN16 UNLESS SHOWN OTHERWISE.
 7. 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
 8. MANHOLE DIAMETERS SHOWN ON STRUCTURE LABEL ARE INTERNAL DIAMETER.
 9. MEASUREMENTS SHOWN ON LOT CONNECTIONS ARE DISTANCE TO CENTER OF LOT CONNECTION FROM THE NEAREST DOWNSTREAM MANHOLE.

LEGEND

— — — — — EX GROUND LEVEL

— — — — — PR GROUND LEVEL

0 0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026



Project

**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

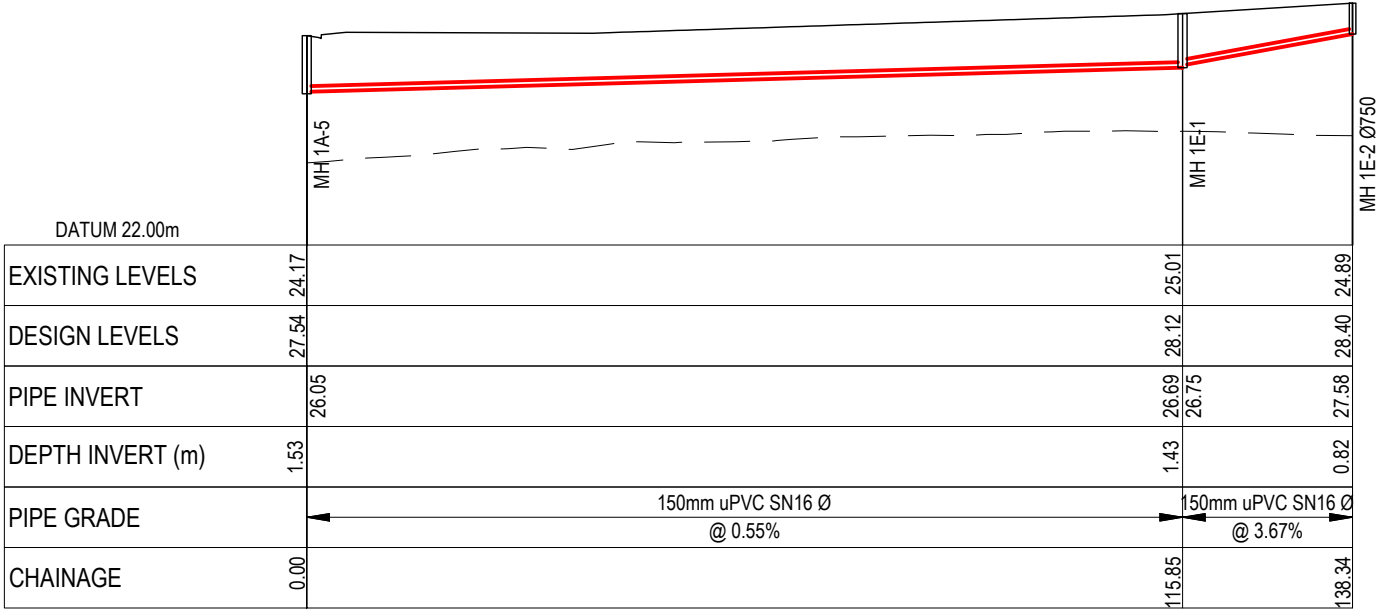
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**PROPOSED
WASTEWATER
LONGSECTION**

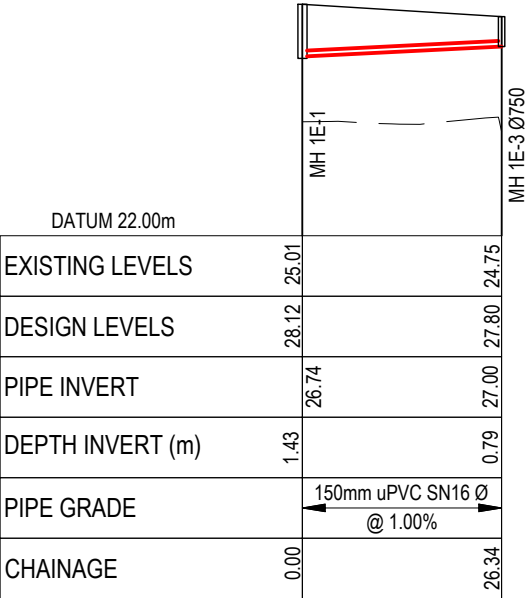
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Drawing no.	C520-0	Rev	A

DRAFT FOR REVIEW

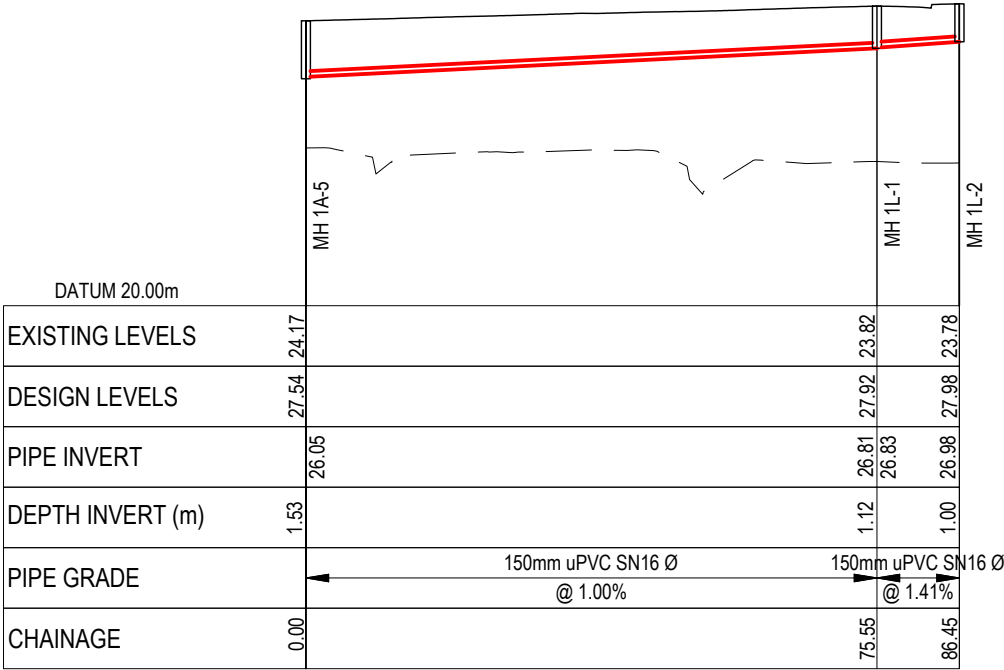
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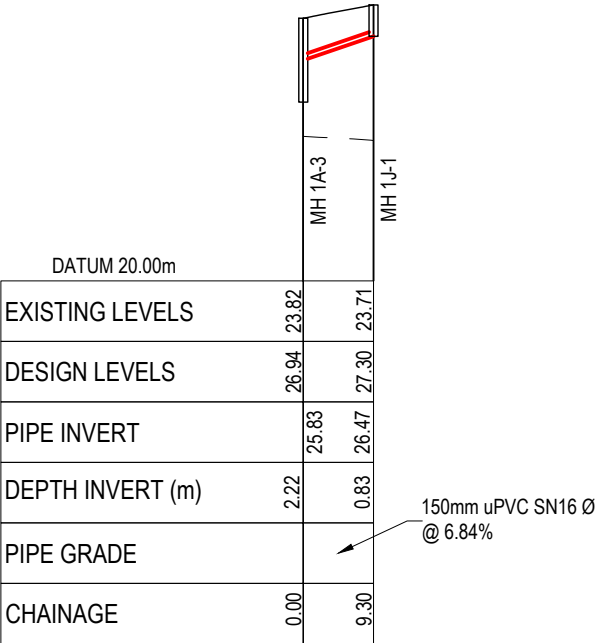
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SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 1F
SCALE: HORI 1:1000 VERT 1:200



PV - (11)
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 1J
SCALE: HORI 1:1000 VERT 1:200

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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 7. 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 1 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	Survey	MAVEN	10/2025
	Design	BD	03/2026
	Drawn	BD	03/2026
	Checked	TH	03/2026

M

A

E

N

Maven Waikato

07 242 0601

info@maven.co.nz

www.maven.co.nz

Level 1 286 Victoria Street, Hamilton

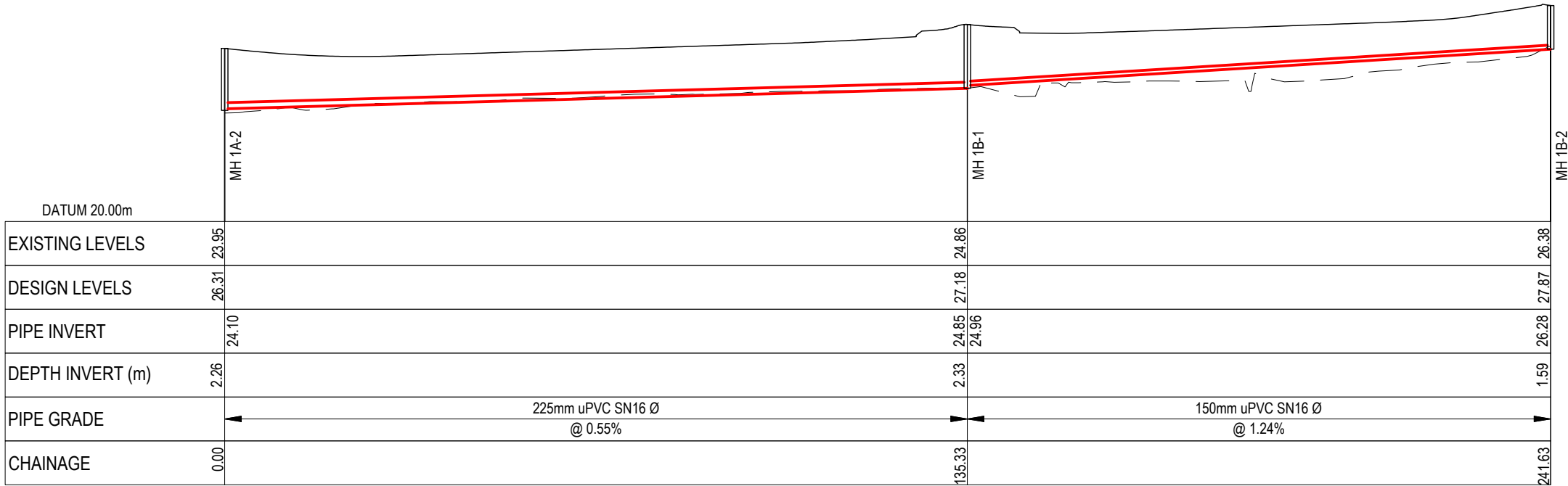
New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

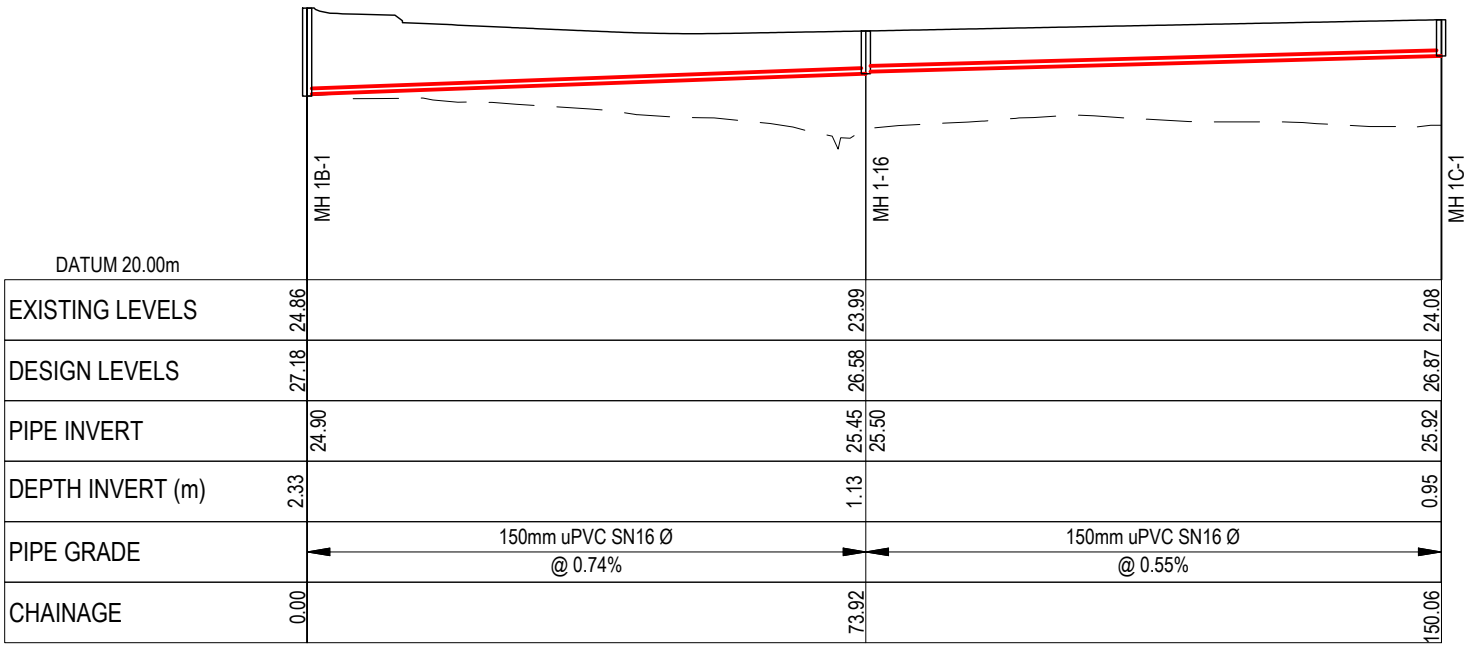
Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014
Scale	AS SHOWN
Cad file	119014-C520-WW LONG SECTION.DWG
Drawing no.	C520-1
Rev	A

DRAFT FOR REVIEW



WW LS - LINE 1B
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 1C
SCALE: HORI 1:1000 VERT 1:200

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

— — — — — EX GROUND LEVEL
— — — — — PR GROUND LEVEL
0 0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026



Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

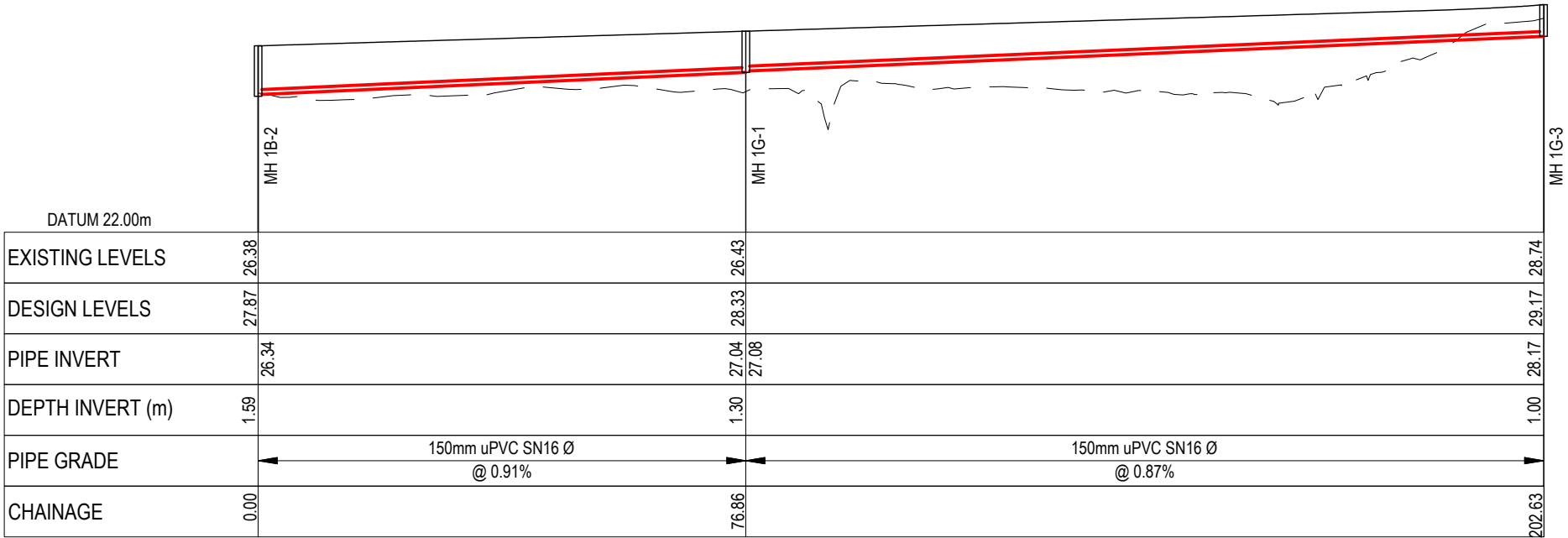
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**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
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Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-2	Rev	A

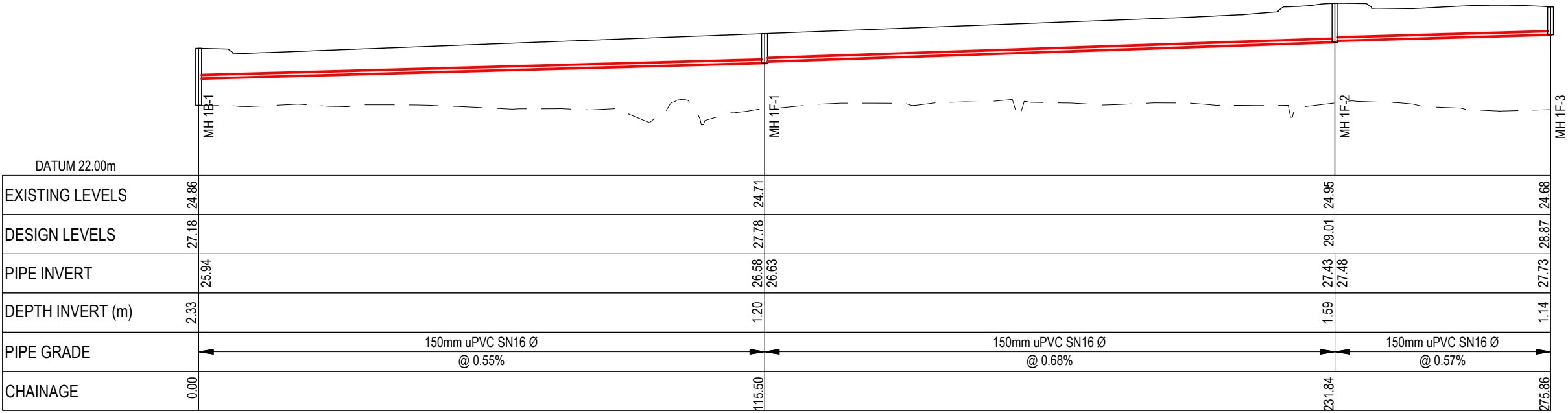
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DATE: 5/25/26 FILEPATH: F:\MVEN\HAMTON\6 PROJECTS\119014-BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG

DRAFT FOR REVIEW



WW LS - LINE 1G
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 1F
SCALE: HORI 1:1000 VERT 1:200

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
--- CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026

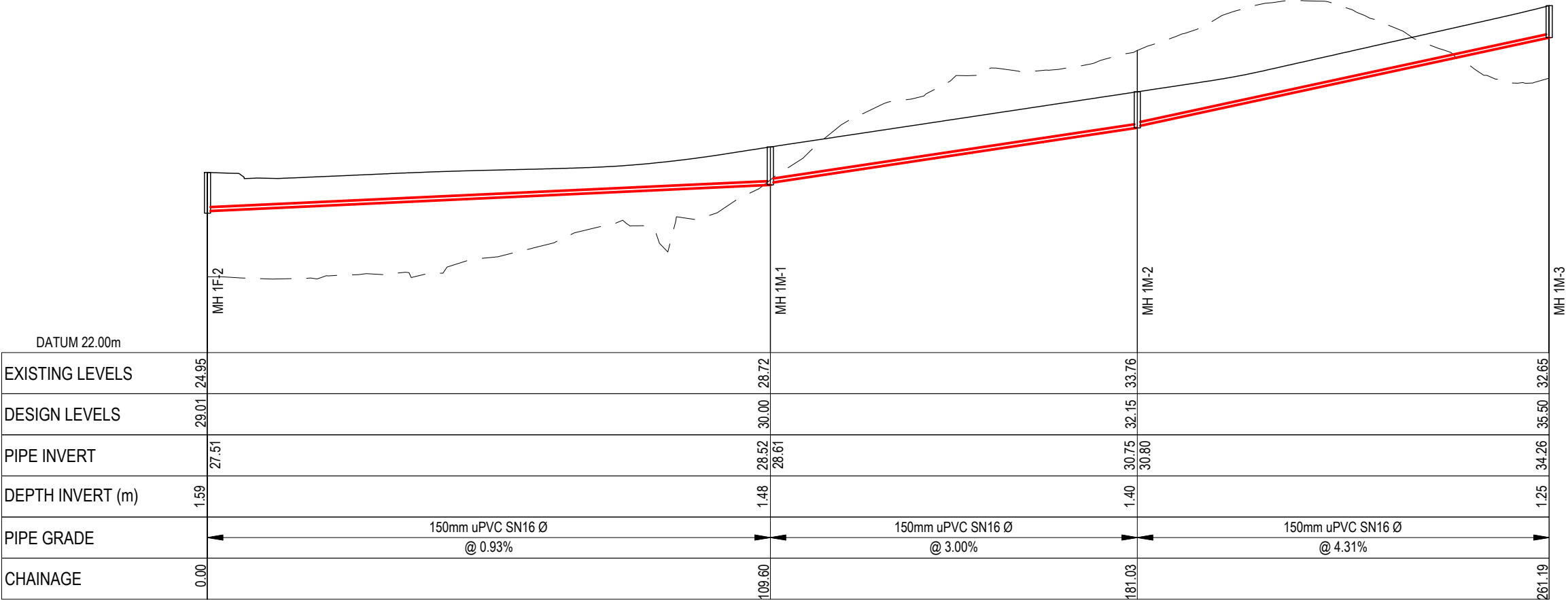


Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

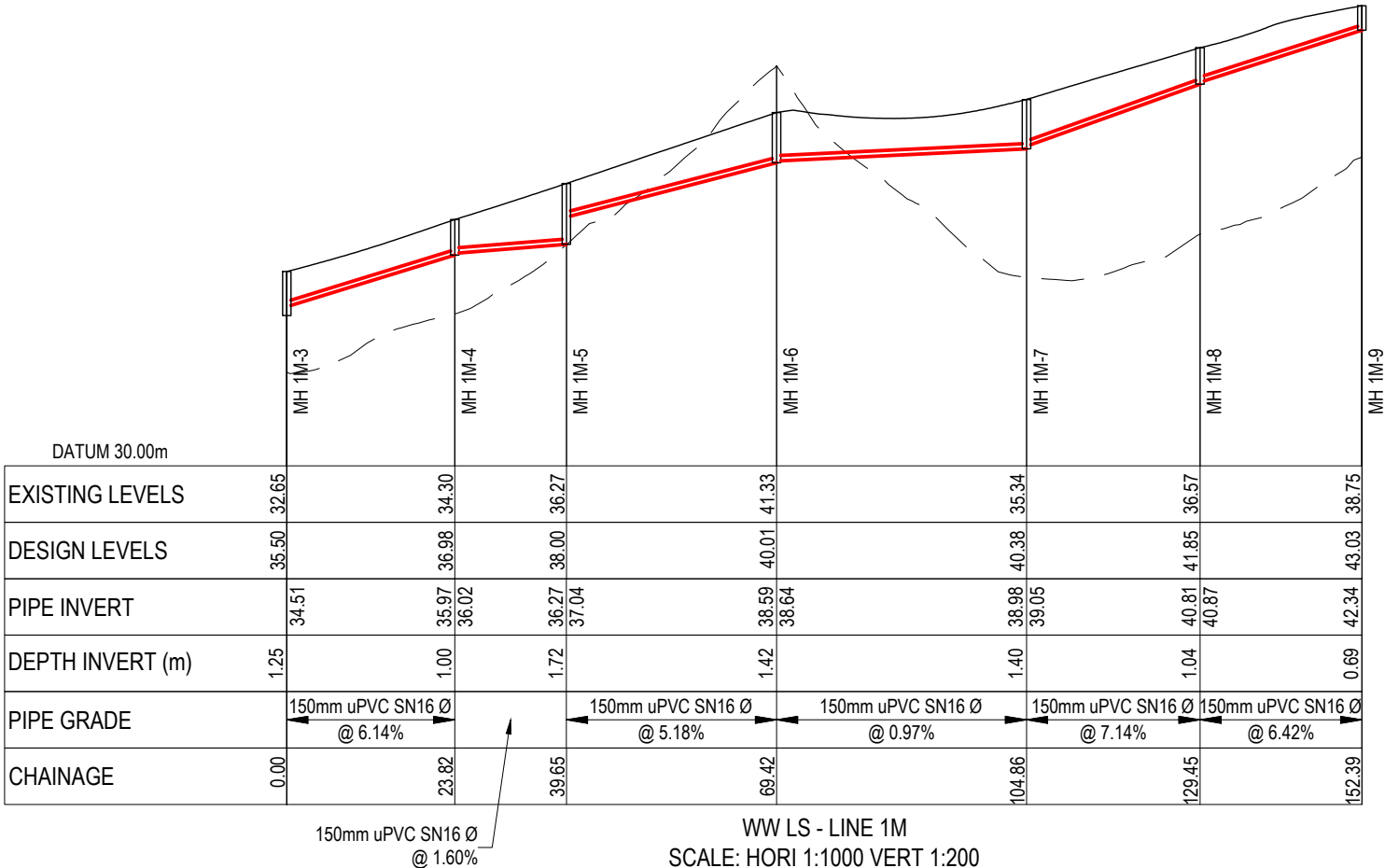
Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
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Drawing no.	C520-3	Rev	A

DATE: 5/25/26 FILEPATH: F:\MAVEN\HAMILTON6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG



WW LS - LINE 1M
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 1M
SCALE: HORI 1:1000 VERT 1:200

DRAFT FOR REVIEW

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
--- CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026



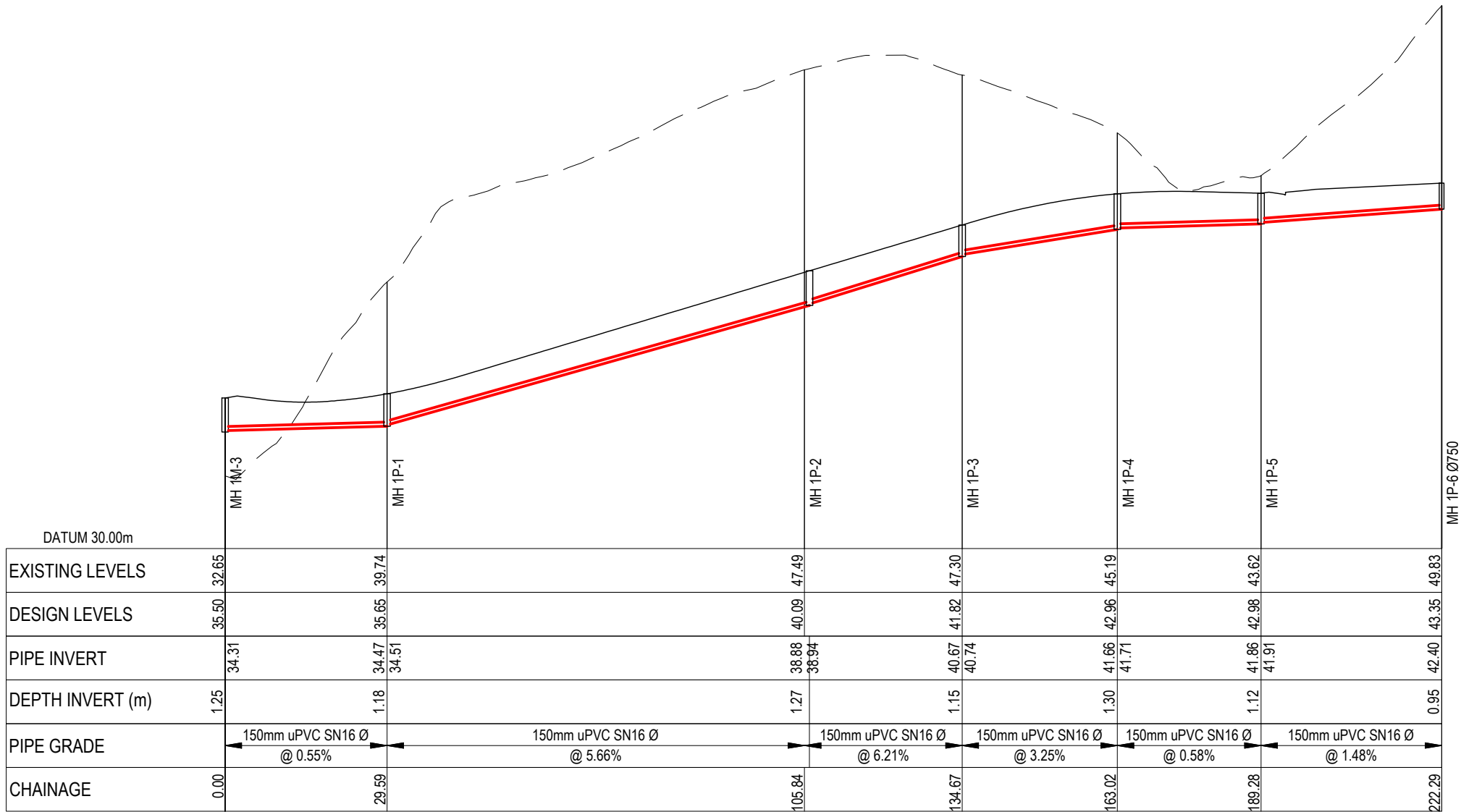
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014
Scale	AS SHOWN
Cad file	119014-C520-WW LONG SECTION.DWG
Drawing no.	C520-4
Rev	A

DATE: 5/25/26 FILE PATH: F:\MVEN\HAMILTON\6. PROJECTS\119014 - BRYMER FARMS\7. DRAWING\119014-C520\WW LONG SECTION.DWG

DRAFT FOR REVIEW



WW LS - LINE 1P
SCALE: HORI 1:1000 VERT 1:200

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
Survey	MAVEN	10/2025	
Design	BD	03/2026	
Drawn	BD	03/2026	
Checked	TH	03/2026	

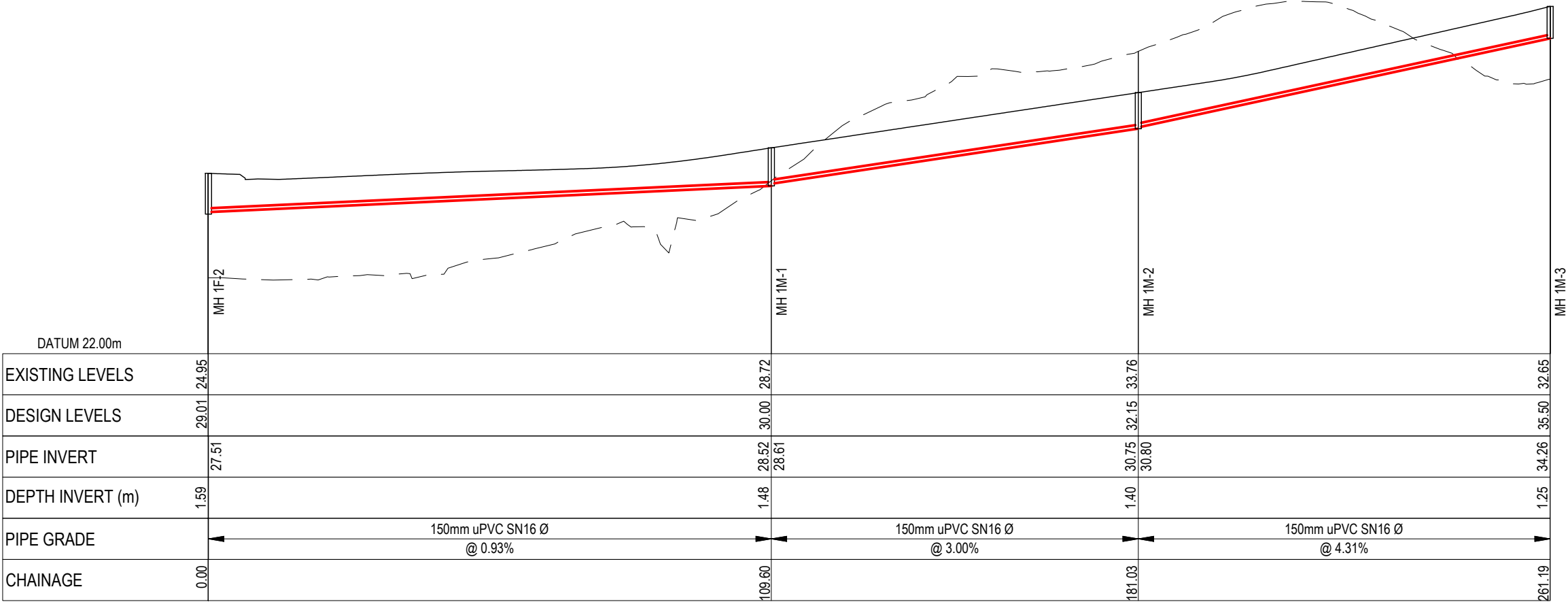


Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

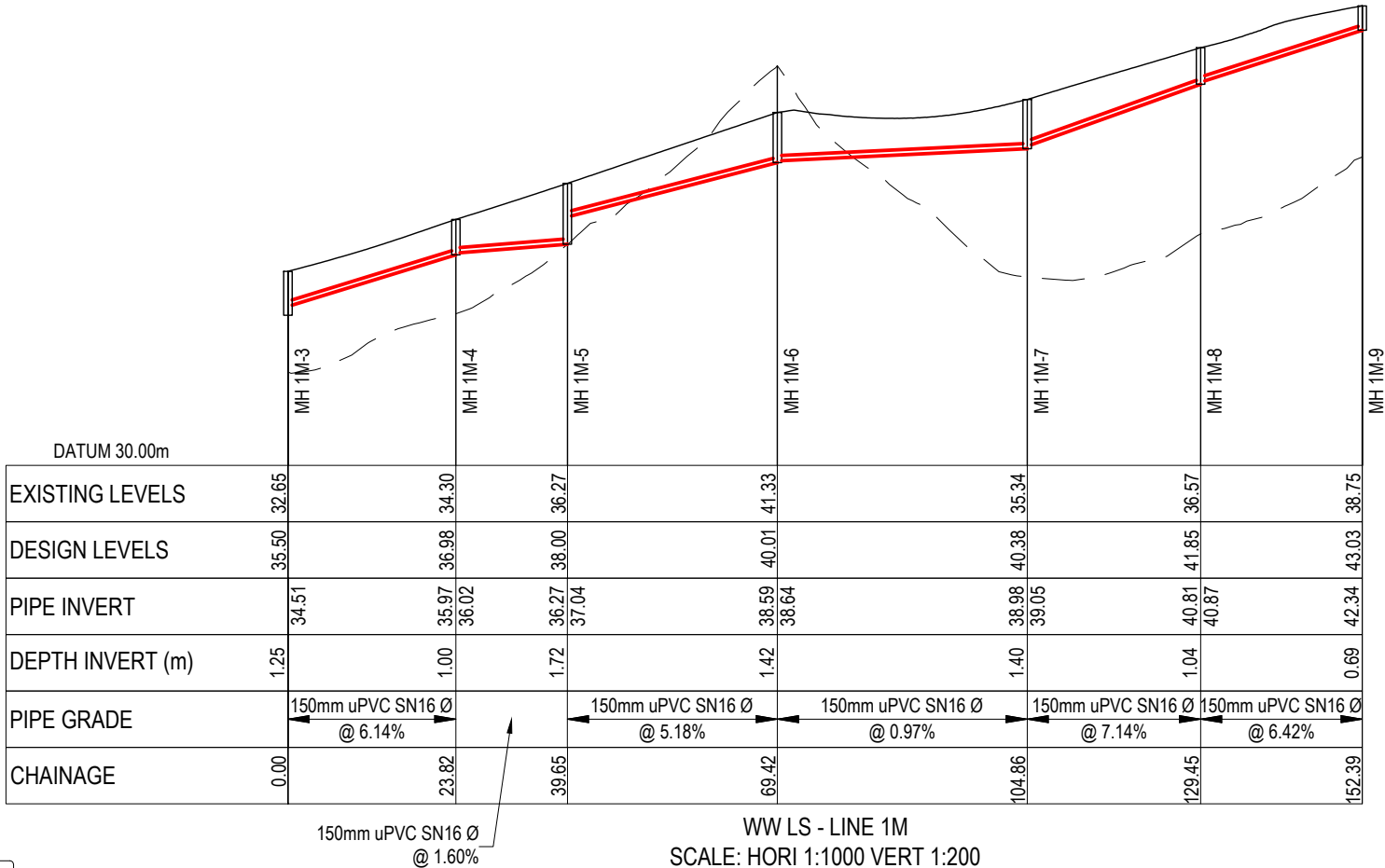
Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
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Drawing no.	C520-5	Rev	A

DATE: 5/25/26 FILEPATH: F:\MAVEN\HAMILTON6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG



WW LS - LINE 1M
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 1M
SCALE: HORI 1:1000 VERT 1:200

DRAFT FOR REVIEW

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026



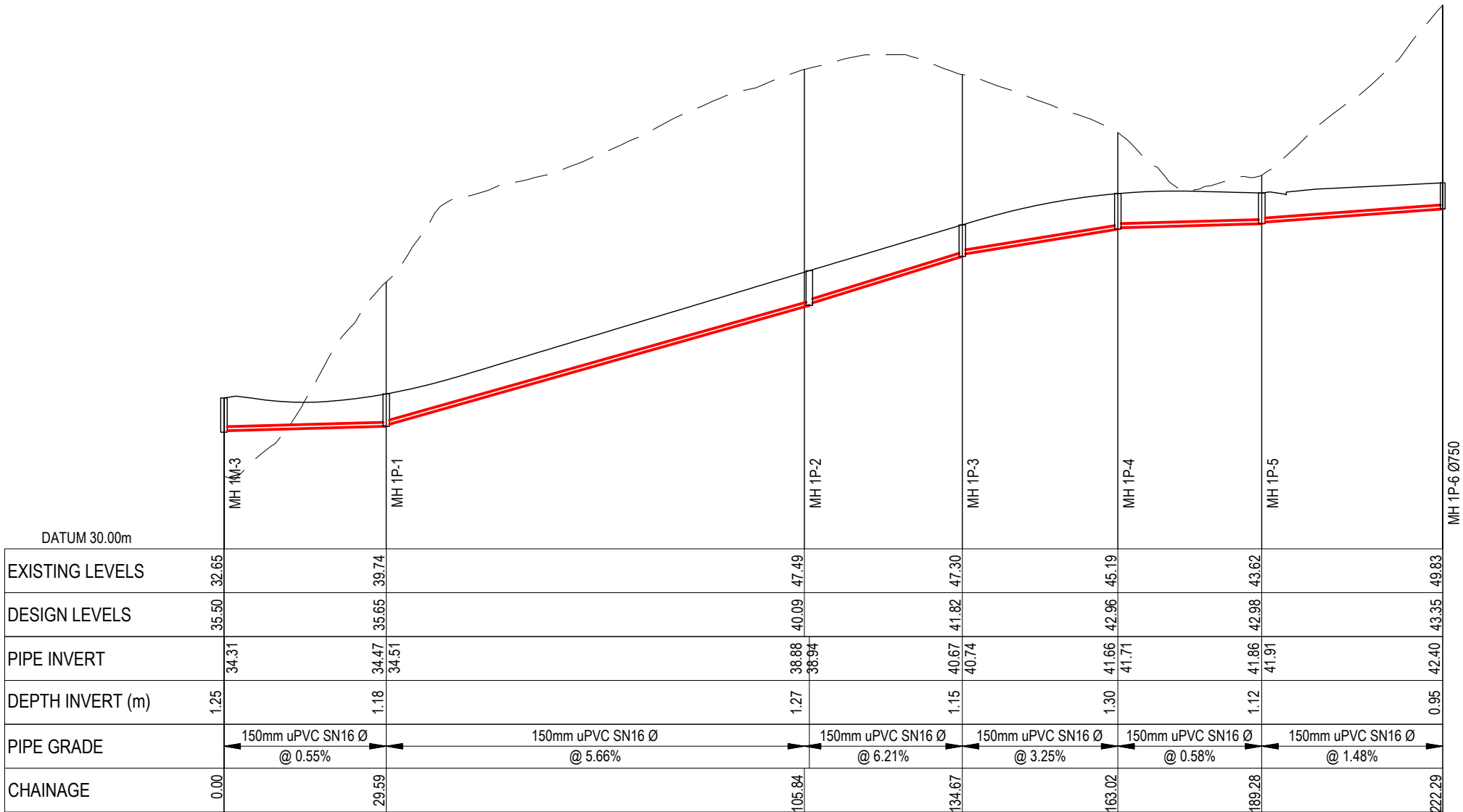
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014
Scale	AS SHOWN
Cad file	119014-C520-WW LONG SECTION.DWG
Drawing no.	C520-6
Rev	A

DATE: 5/25/26 FILE PATH: F:\MVEN\HAM1046 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG

DRAFT FOR REVIEW



WW LS - LINE 1P
SCALE: HORI 1:1000 VERT 1:200

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 0 CROSSING PIPE

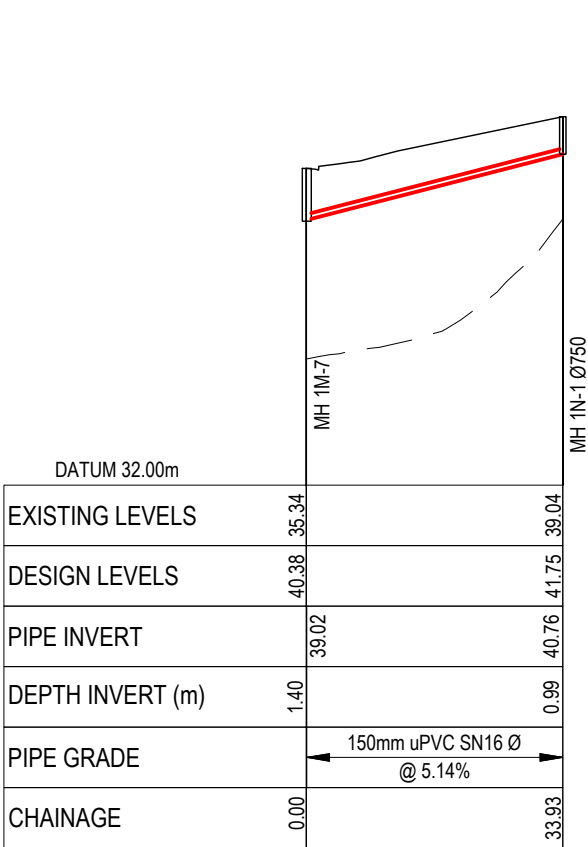
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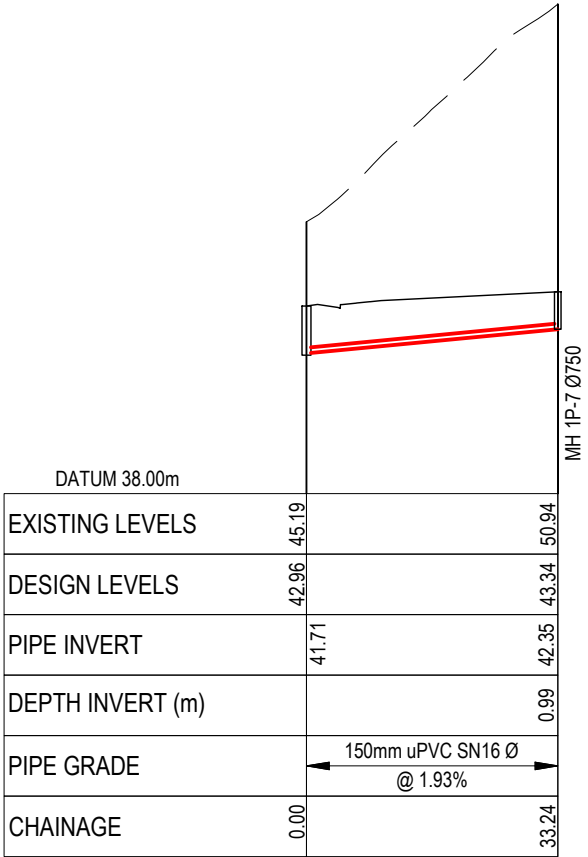
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

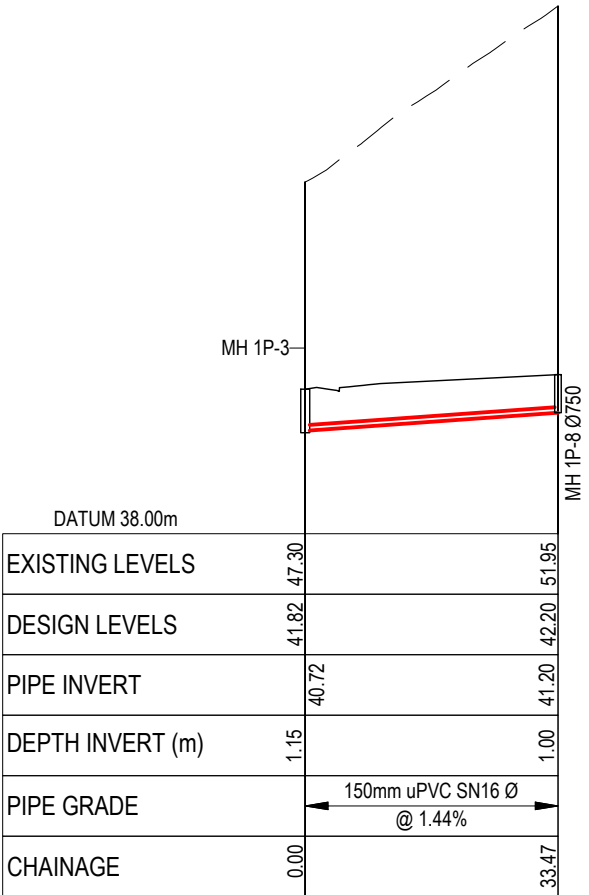
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Drawing no.	C520-7	Rev	A



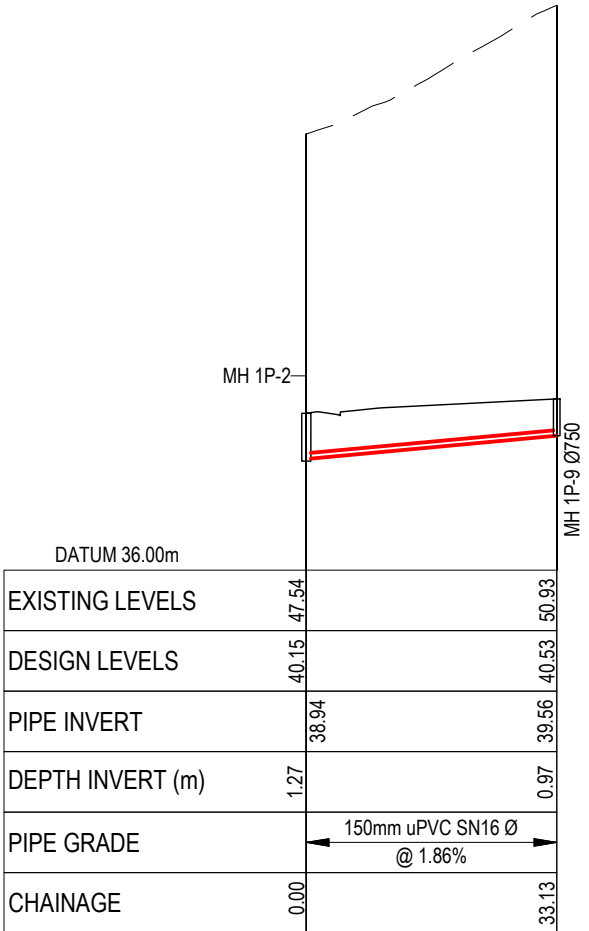
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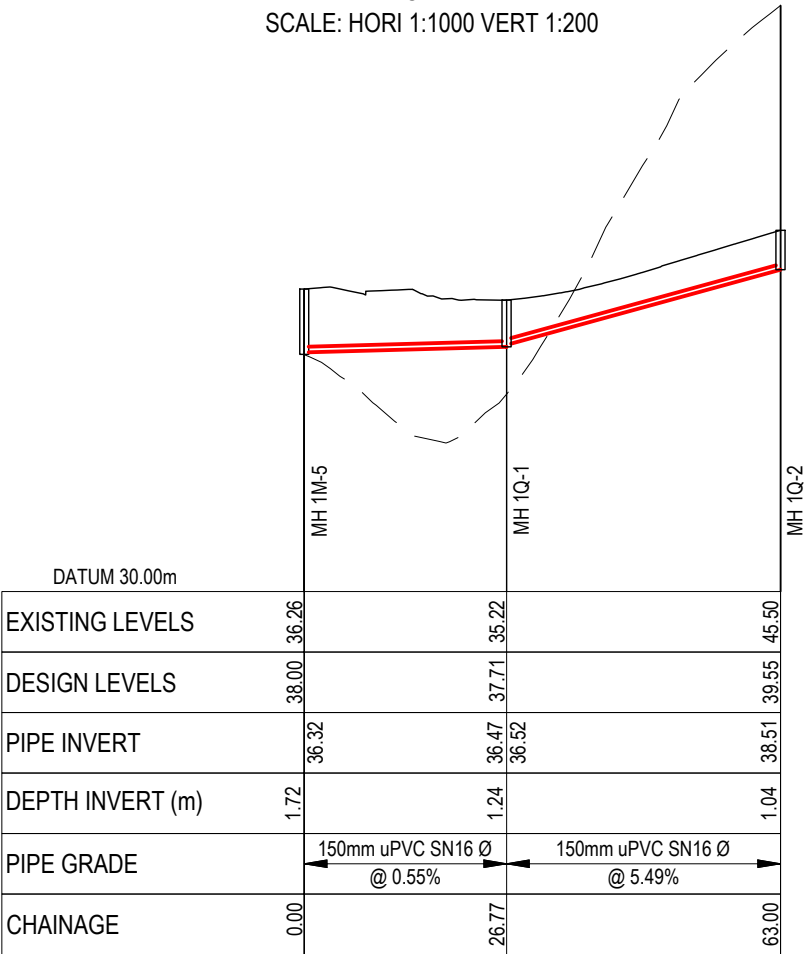
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WW LS - LINE 1P
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 1P
SCALE: HORI 1:1000 VERT 1:200



WWLS - LINE 1Q
SCALE: HORI 1:1000 VERT 1:200

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 1 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	BD	03/2026	
Drawn	BD	03/2026	
Checked	TH	03/2026	



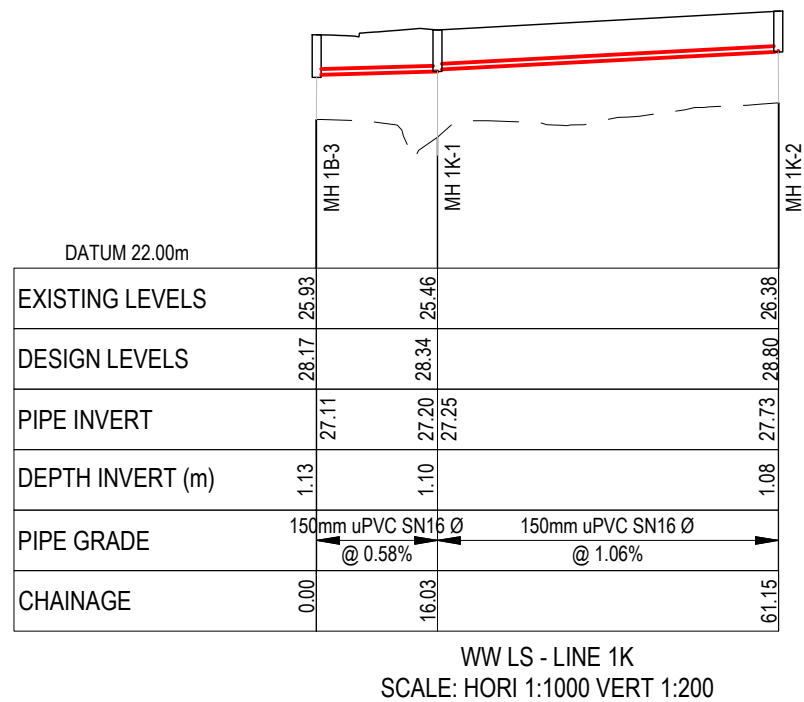
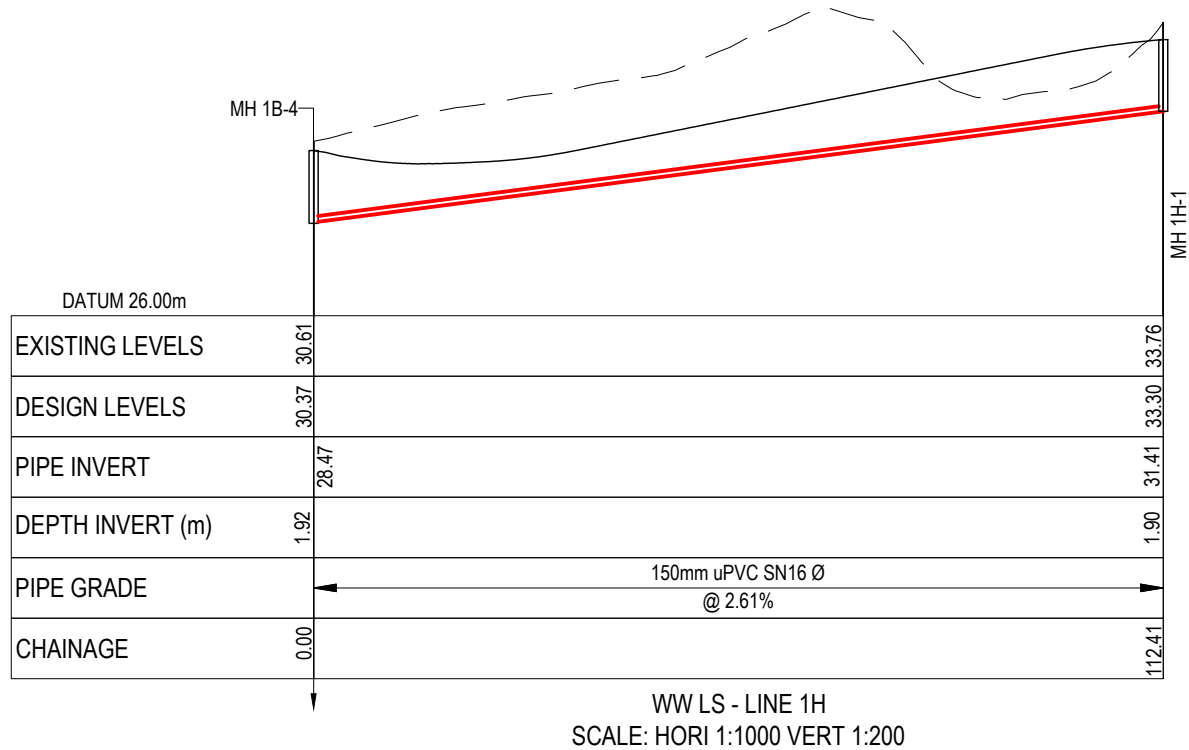
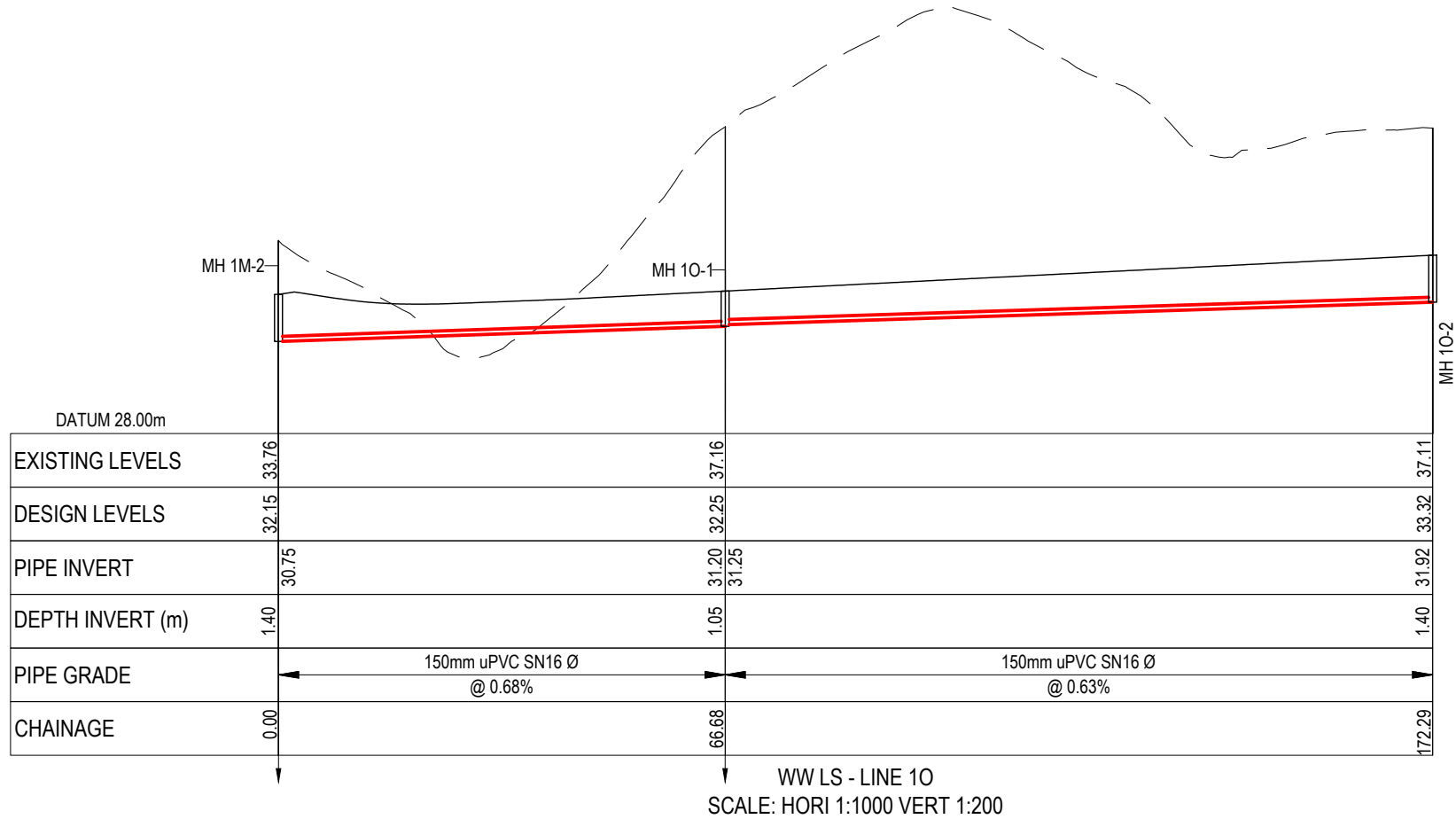
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-8	Rev	A

DRAFT FOR REVIEW

DATE: 5/25/26 FILEPATH: F:\MVEN\HAM10\6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG



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LEGEND

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--- PR GROUND LEVEL
0 1 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	BD	03/2026	
Drawn	BD	03/2026	
Checked	TH	03/2026	



Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

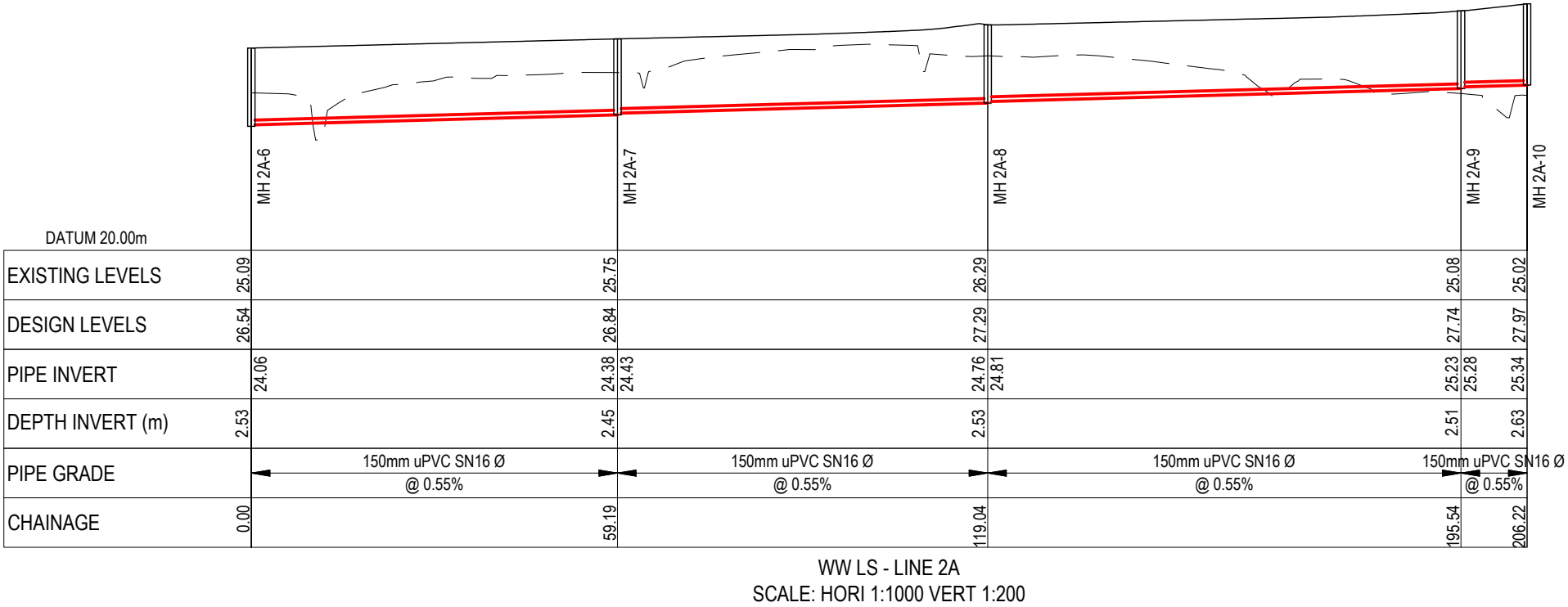
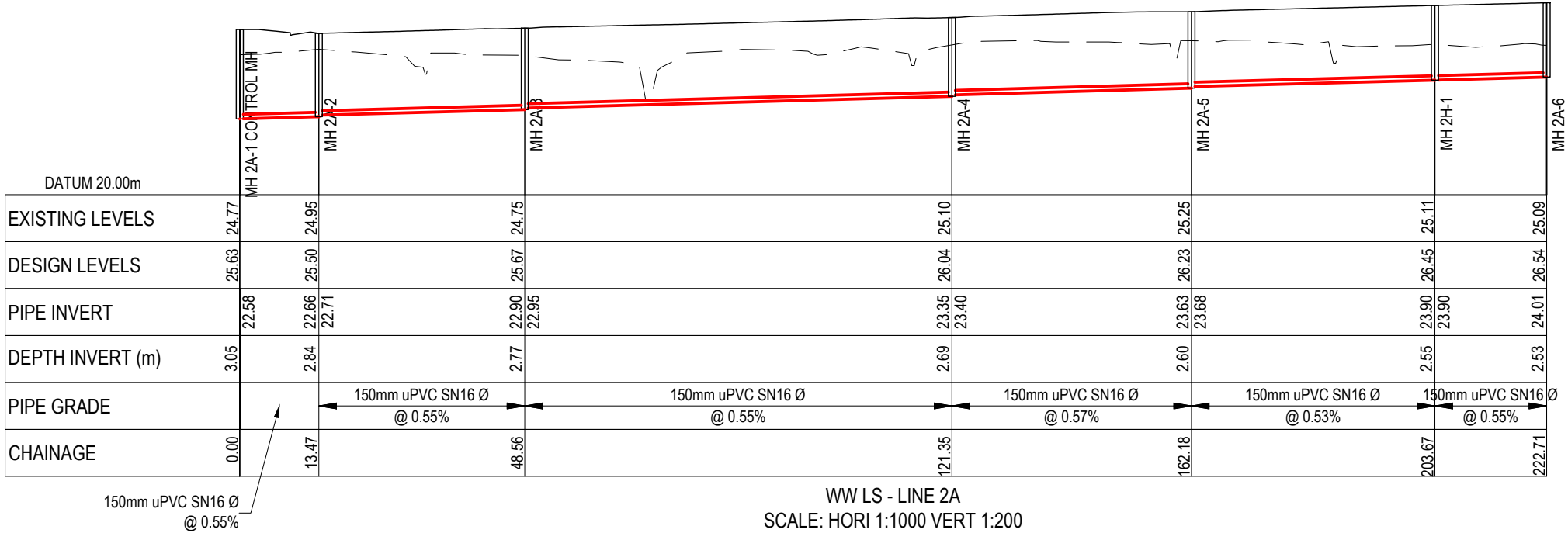
Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-9	Rev	A

DRAFT FOR REVIEW

DATE: 5/25/26 FILE PATH: F:\Maven\Hamilton6 - PROJECTS\119014 - BRYMER FARMS\7 - DRAWING\119014-C520-WW LONG SECTION.DWG

DRAFT FOR REVIEW



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LEGEND

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--- PR GROUND LEVEL
0 1 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	Survey	MAVEN	10/2025
	Design	BD	03/2026
	Drawn	BD	03/2026
	Checked	TH	03/2026



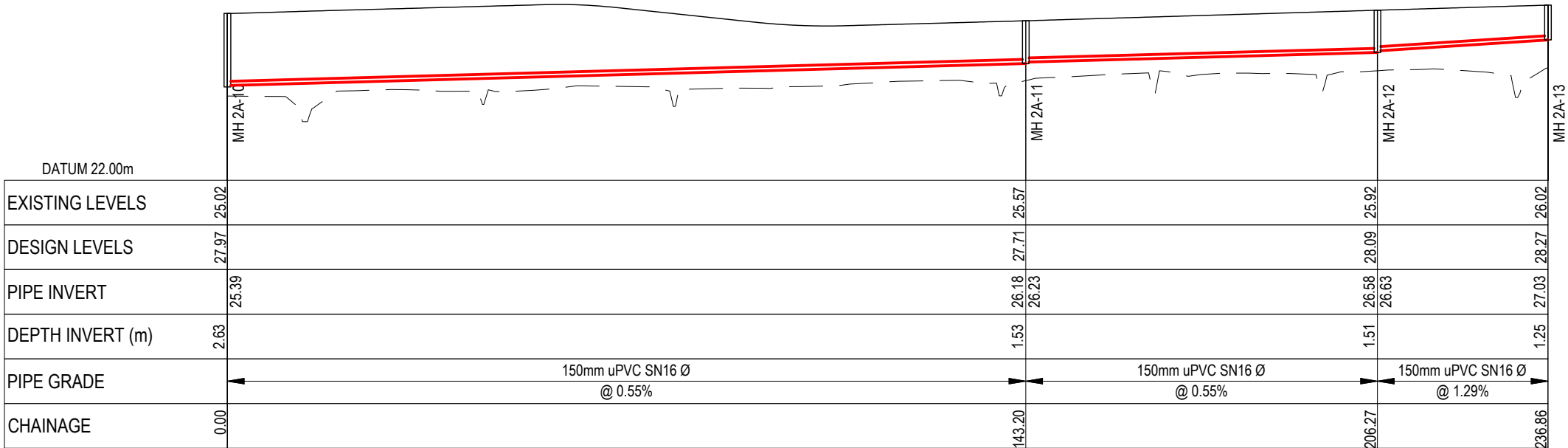
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

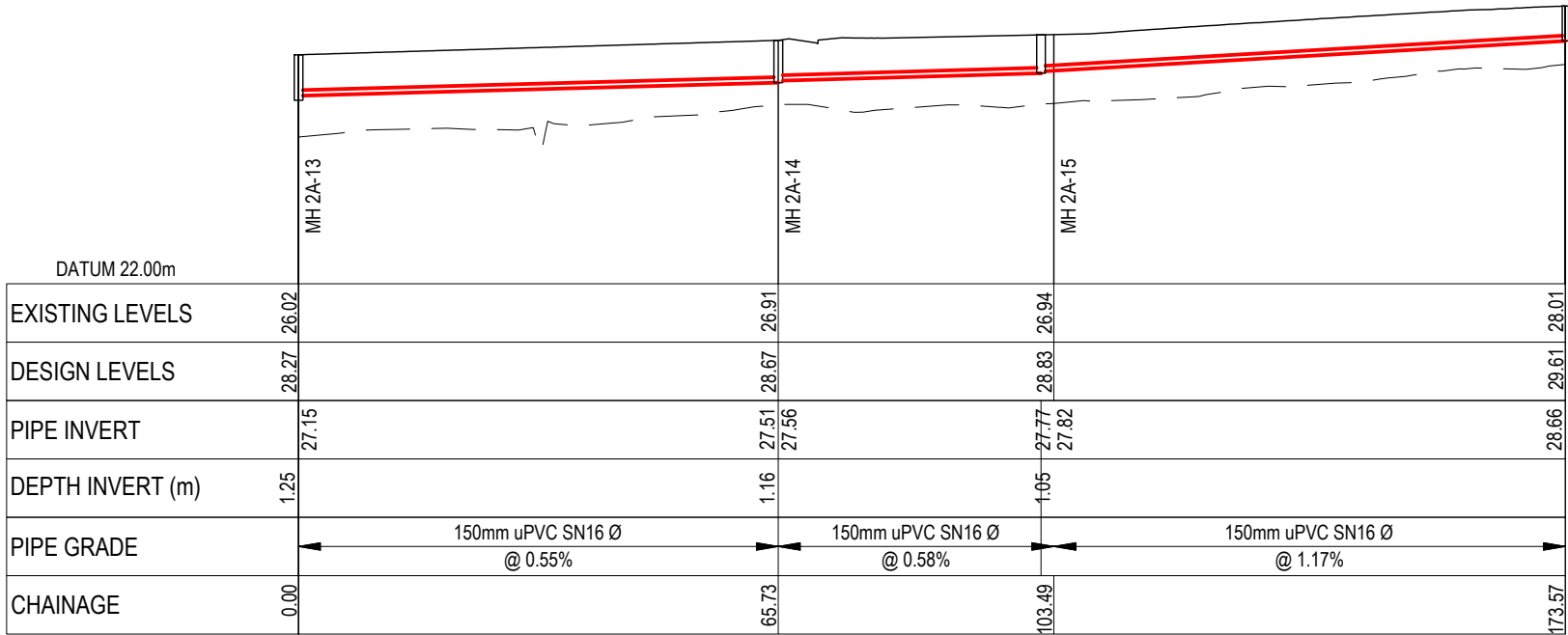
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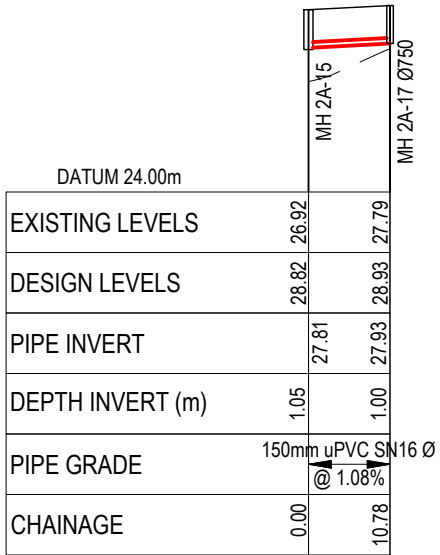
DRAFT FOR REVIEW



WW LS - LINE 2A
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 2A
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 2A
SCALE: HORI 1:1000 VERT 1:200

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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	BD	03/2026	
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Checked	TH	03/2026	

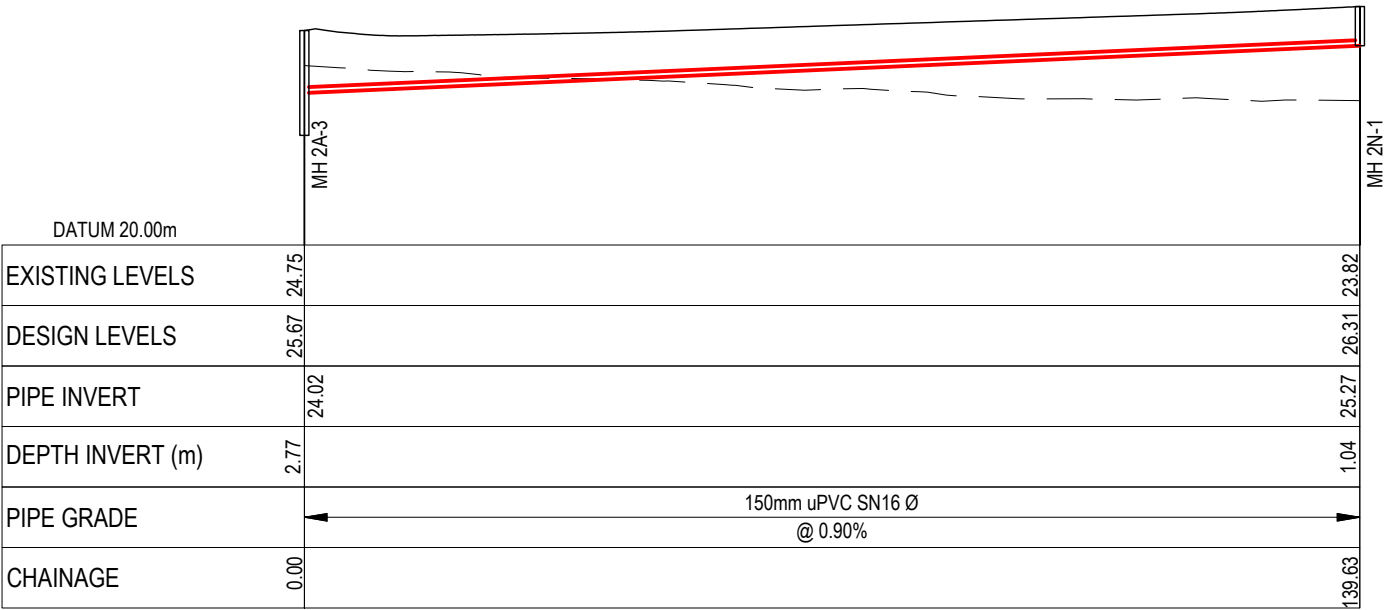


Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

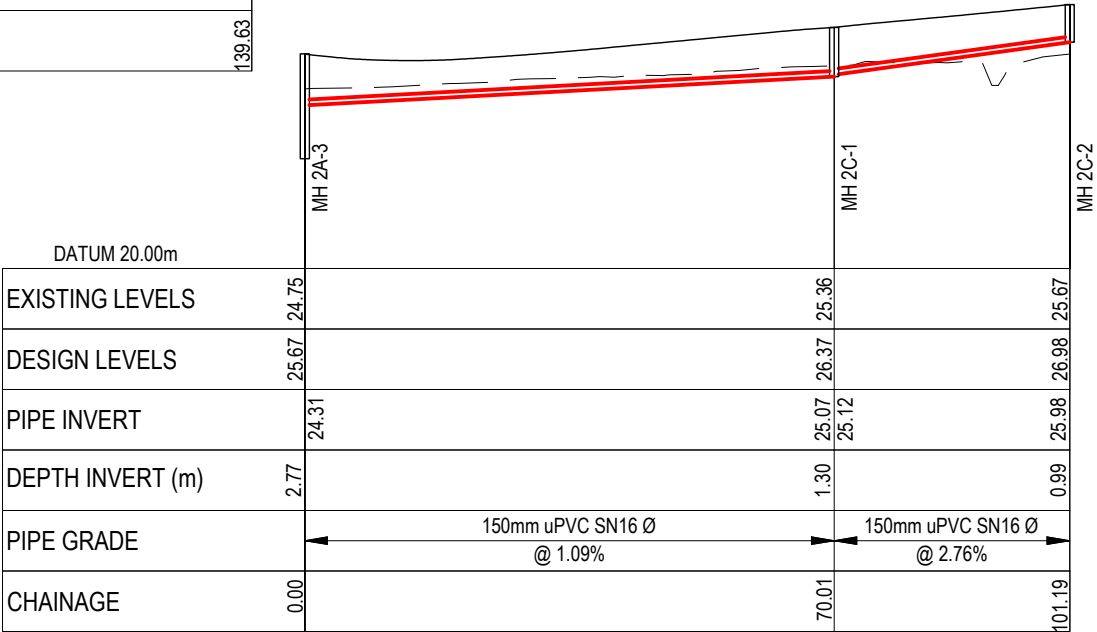
Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-11	Rev	A

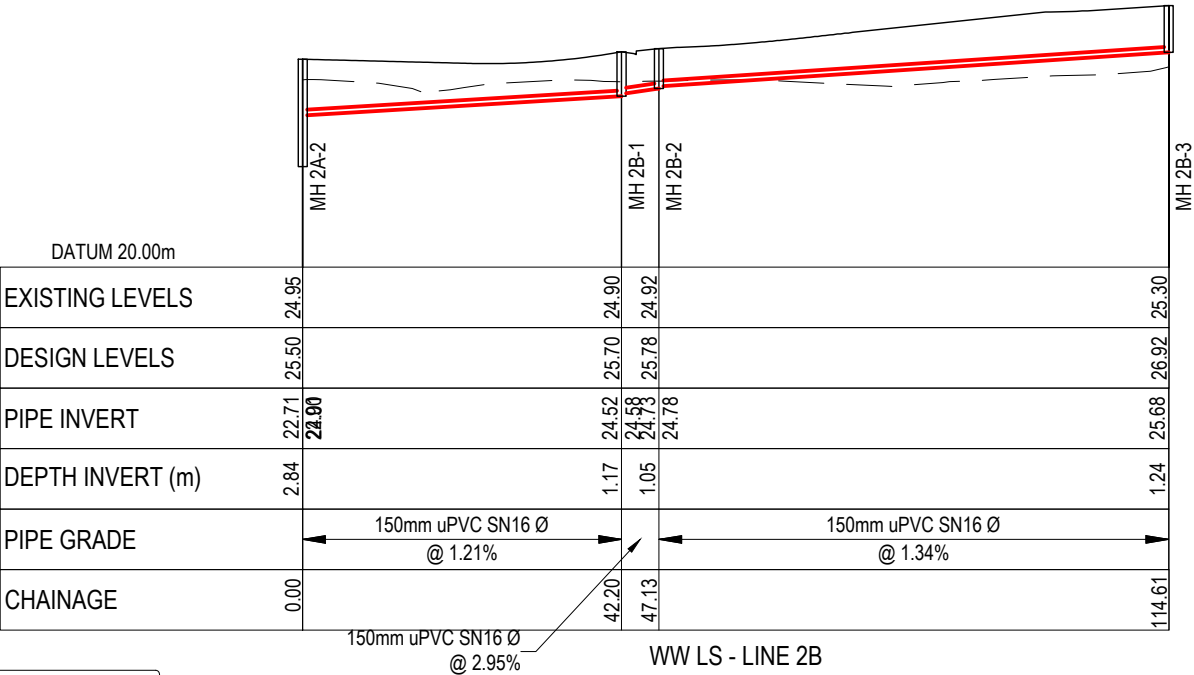
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WW LS - LINE 2N
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 2C
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 2B
SCALE: HORI 1:1000 VERT 1:200

DRAFT FOR REVIEW

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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	BD	03/2026	
Drawn	BD	03/2026	
Checked	TH	03/2026	



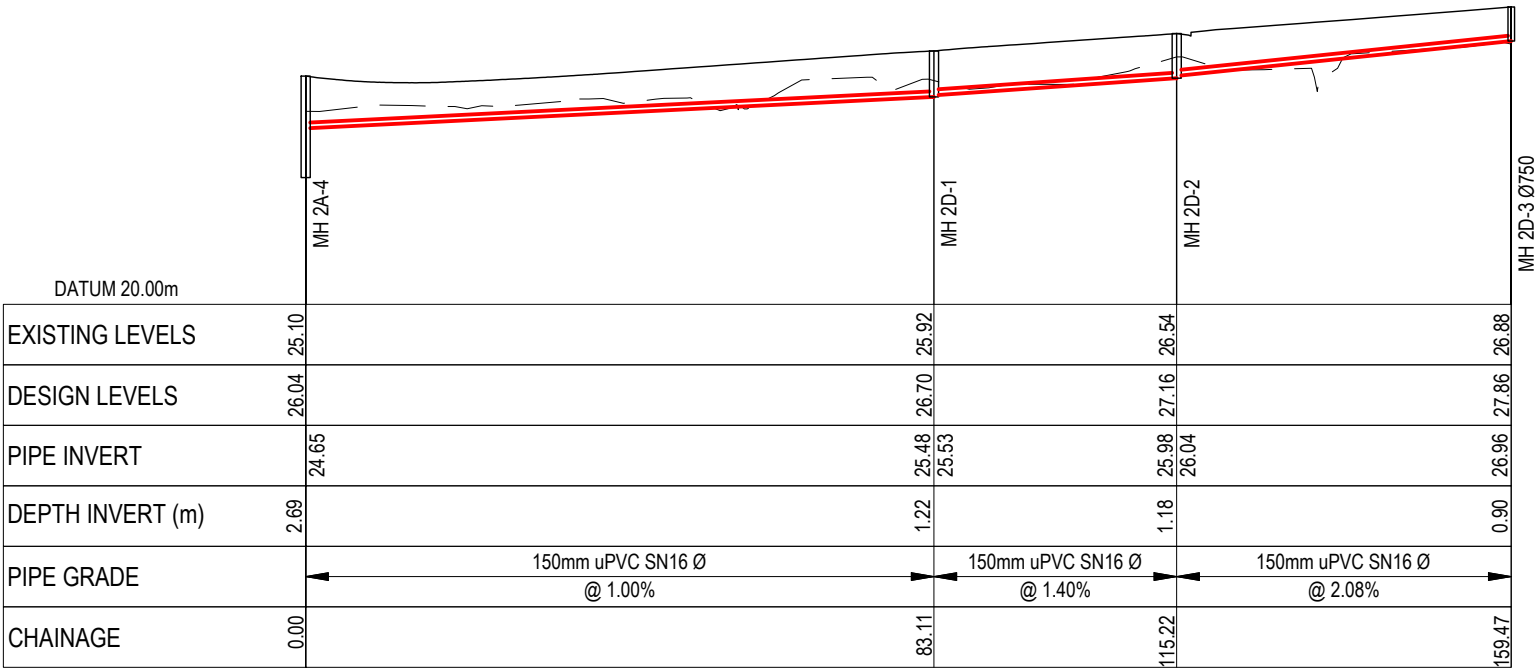
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

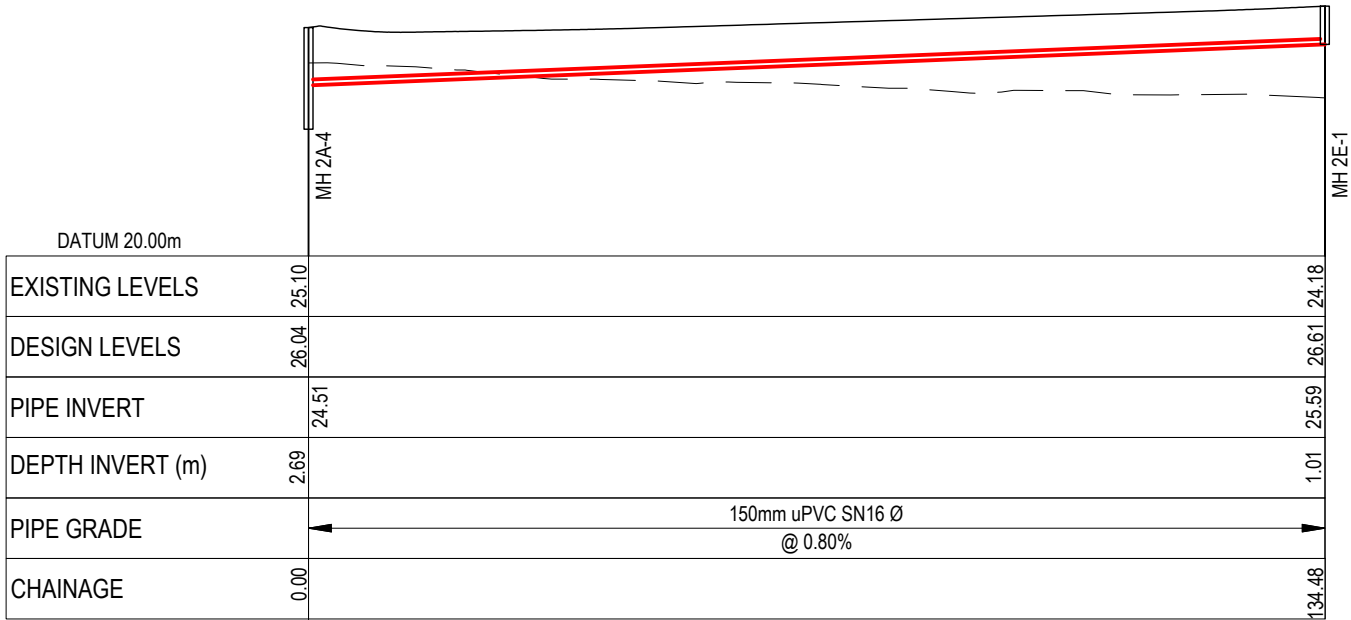
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Drawing no.	C520-12
Rev	A

DATE: 5/25/26 FILE PATH: F:\MAVEN\HAMITON\6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG

DRAFT FOR REVIEW



WW LS - LINE 2D
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 2E
SCALE: HORI 1:1000 VERT 1:200

- NOTES
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LEGEND

— — — — — EX GROUND LEVEL
— — — — — PR GROUND LEVEL
0 0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026

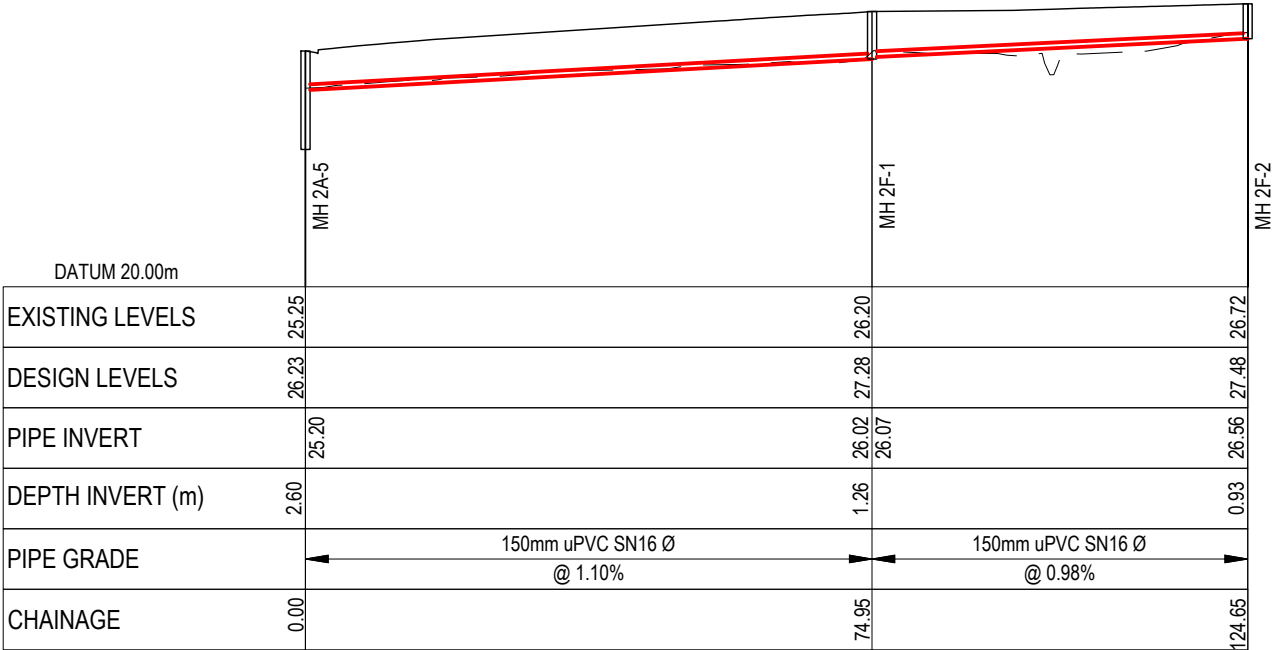


Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

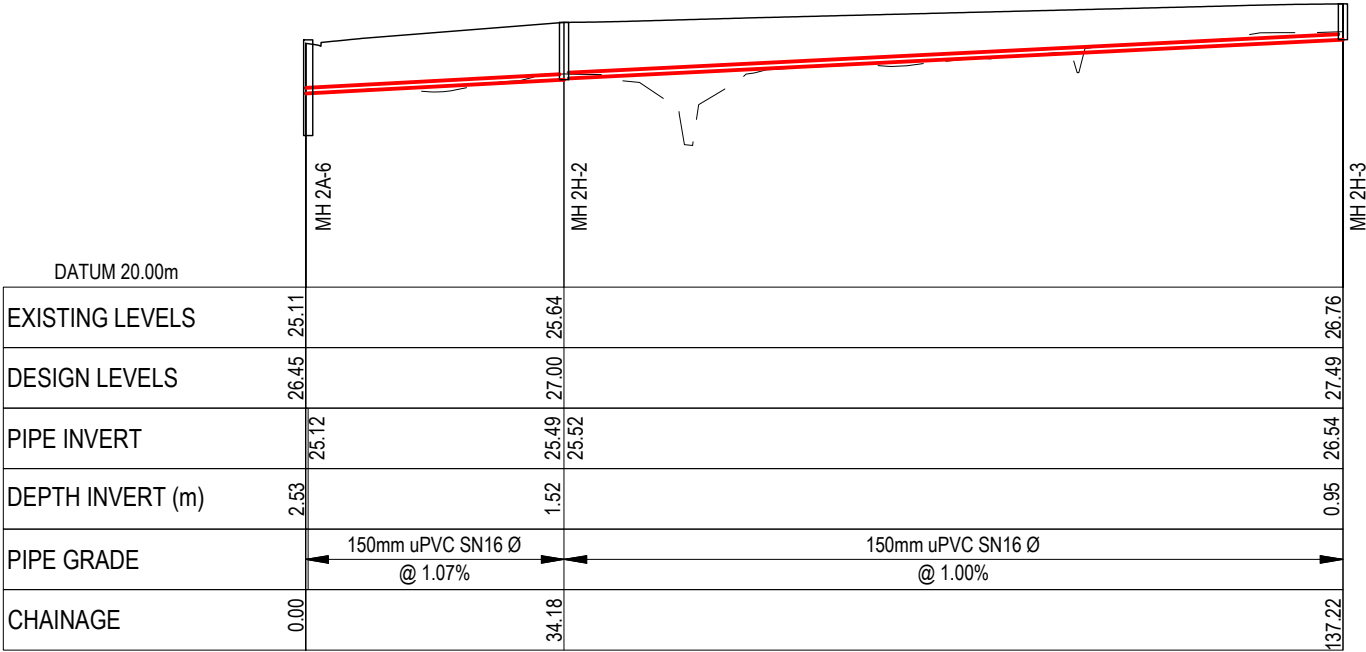
Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-13	Rev	A

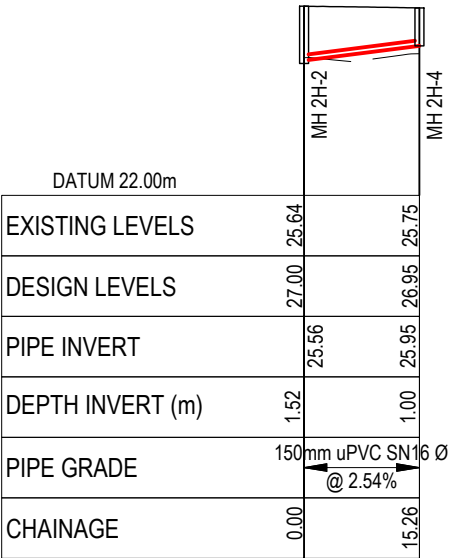
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WW LS - LINE 2F
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 2H
SCALE: HORI 1:1000 VERT 1:200



WW LS - LINE 2H
SCALE: HORI 1:1000 VERT 1:200

- NOTES
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LEGEND

— — — — — EX GROUND LEVEL
— — — — — PR GROUND LEVEL
0 0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	BD	03/2026	
Drawn	BD	03/2026	
Checked	TH	03/2026	

M

MAVEN

Maven Waikato
07 242 0601
info@maven.co.nz
www.maven.co.nz
Level 1 286 Victoria Street, Hamilton
New Zealand

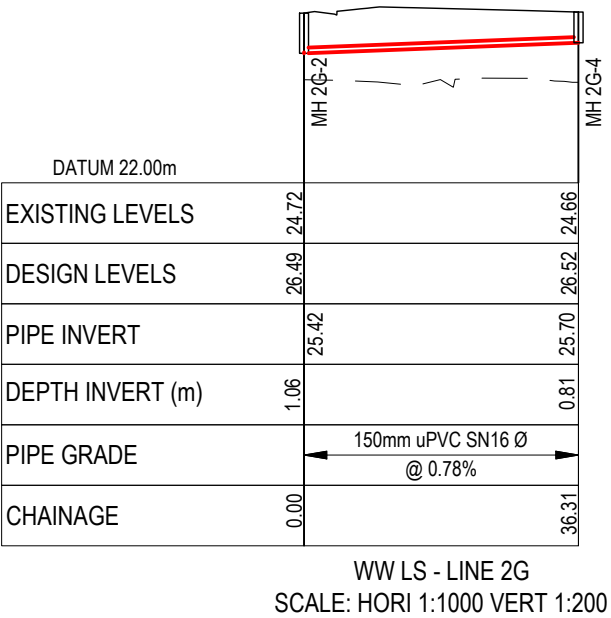
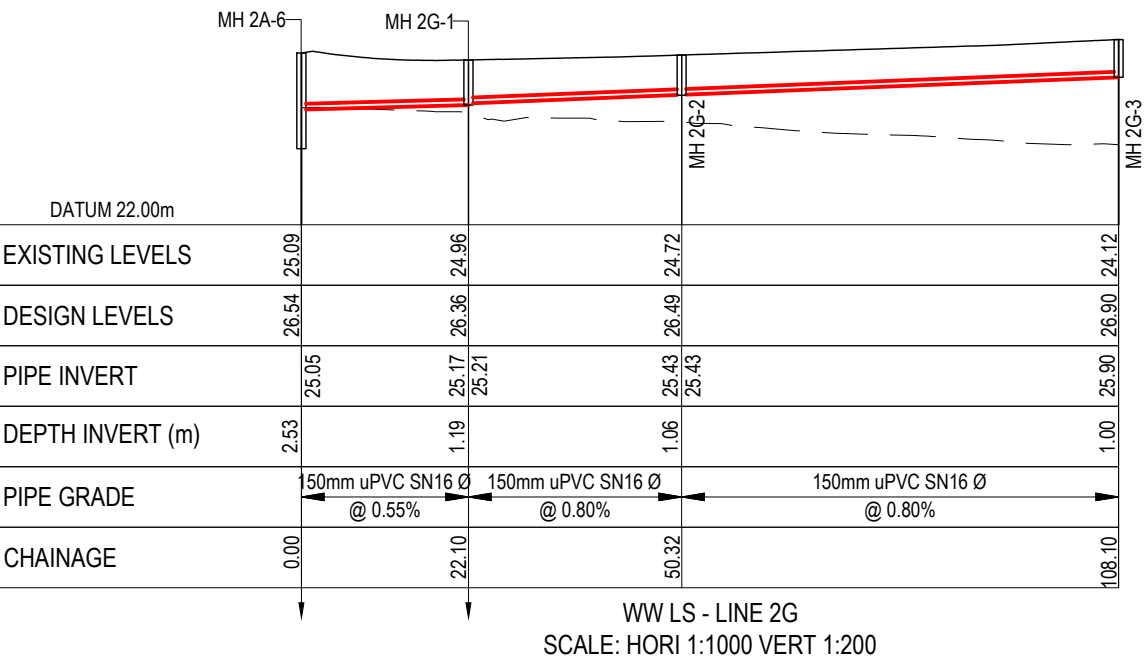
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-14	Rev	A

DRAFT FOR REVIEW

DATE: 5/25/26 FILEPATH: F:\MAVEN\HAMITON6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG



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LEGEND

— — — — — EX GROUND LEVEL
— — — — — PR GROUND LEVEL
0 0 CROSSING PIPE

A	DRAFT	BD	03/2026
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	By	Date	
Survey	MAVEN	10/2025	
Design	BD	03/2026	
Drawn	BD	03/2026	
Checked	TH	03/2026	

M

MAVEN

Maven Waikato
07 242 0601
info@maven.co.nz
www.maven.co.nz
Level 1 286 Victoria Street, Hamilton
New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

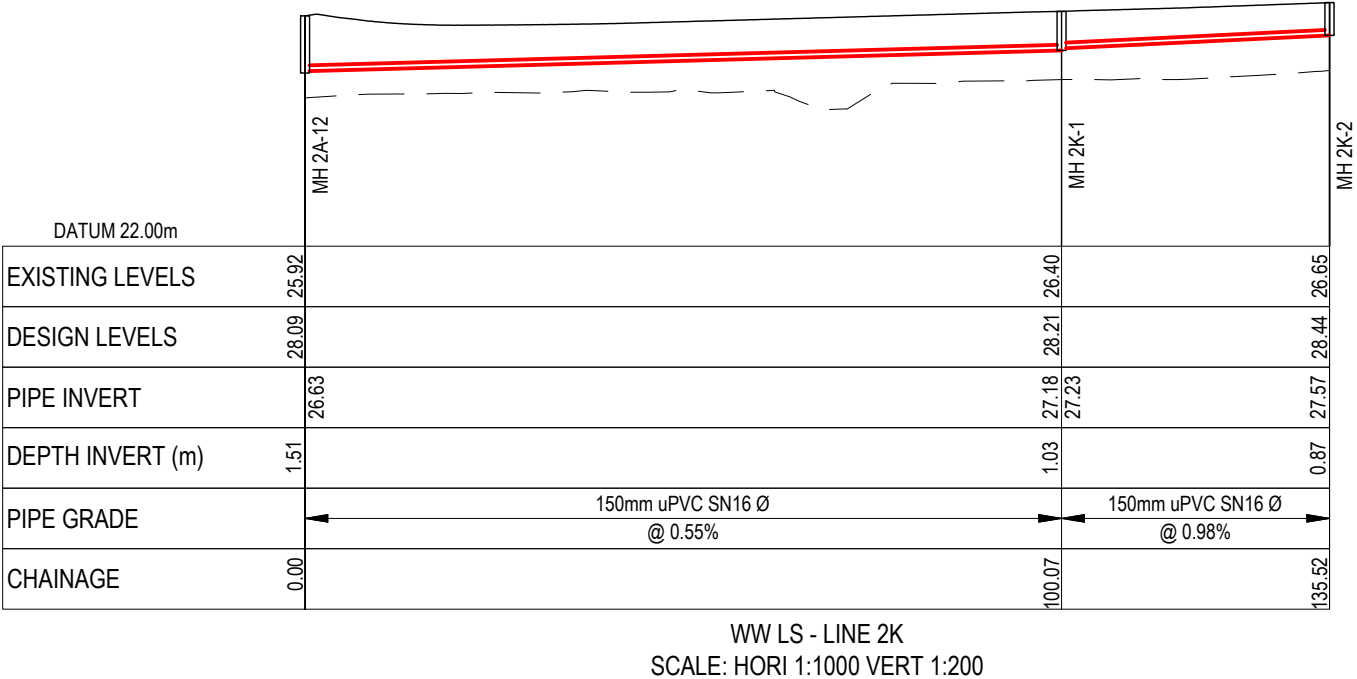
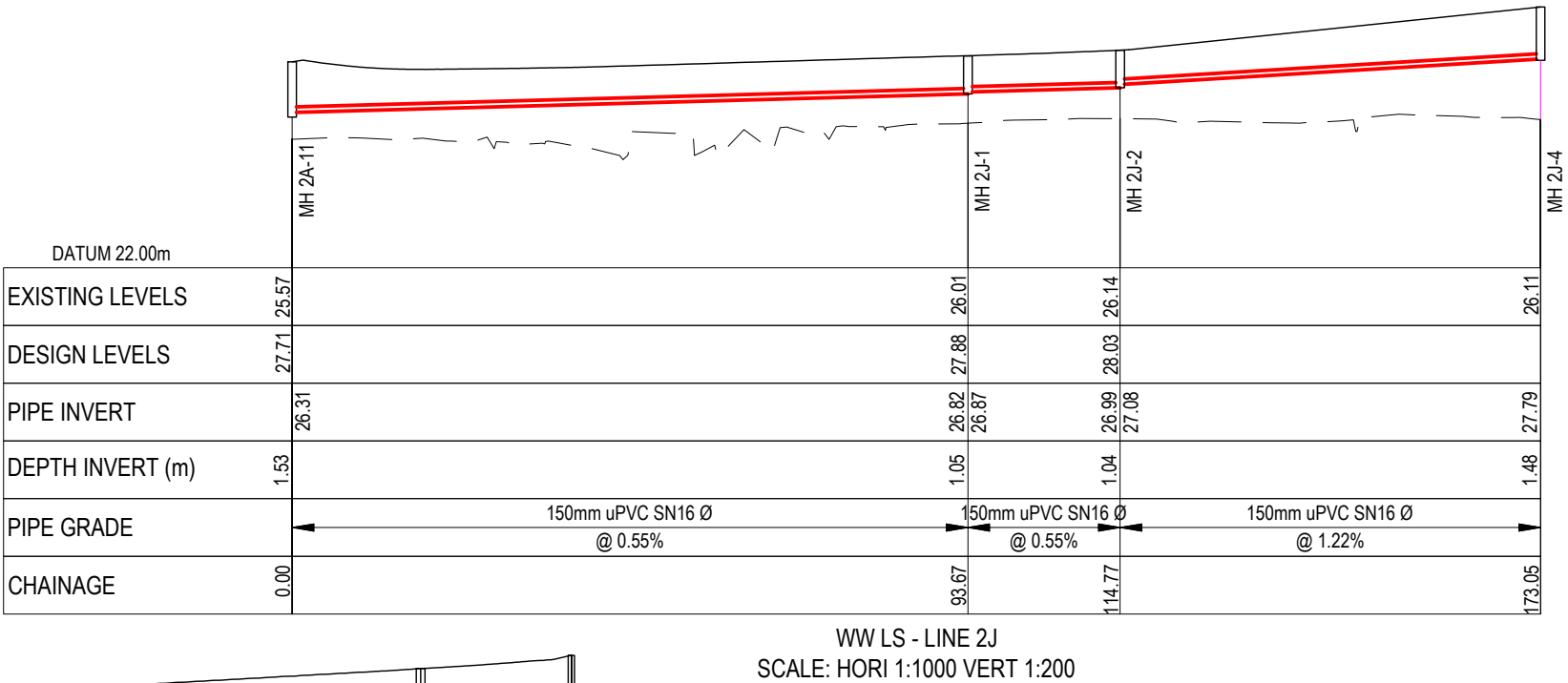
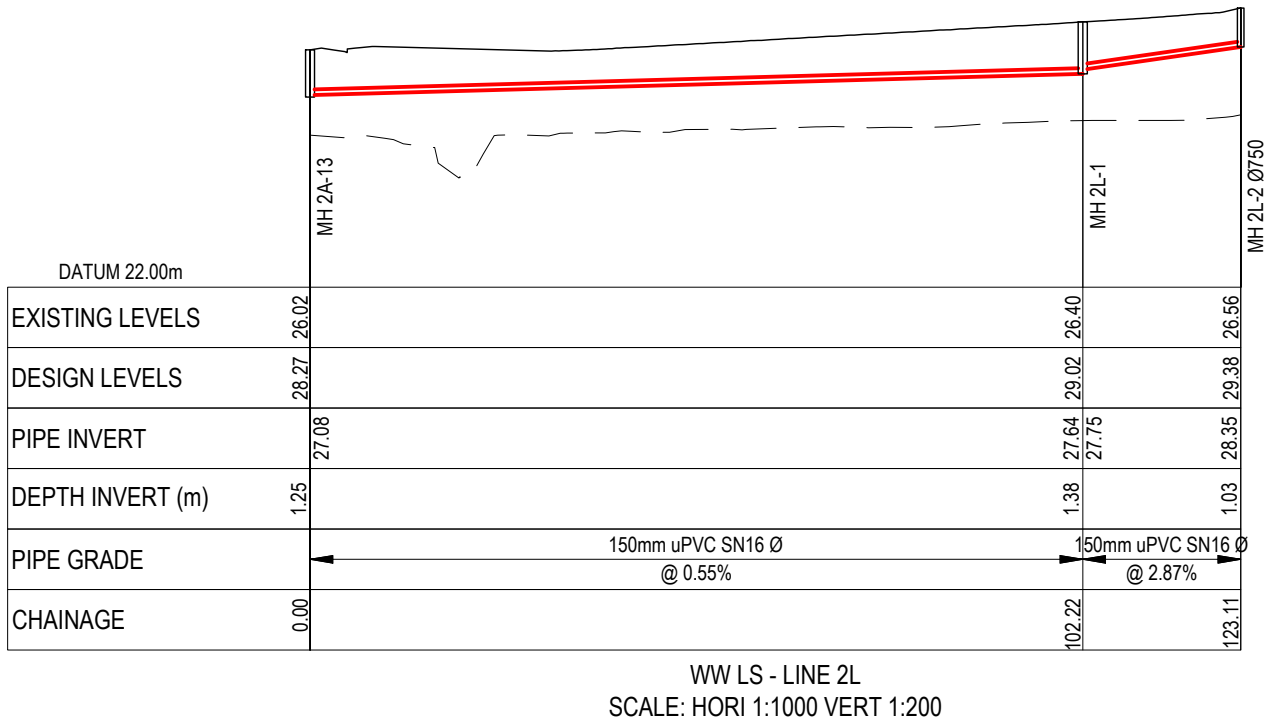
Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-15	Rev	A

DRAFT FOR REVIEW

DATE: 5/25/26 FILEPATH: F:\MVEN\HAMILTON6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG

DRAFT FOR REVIEW



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LEGEND

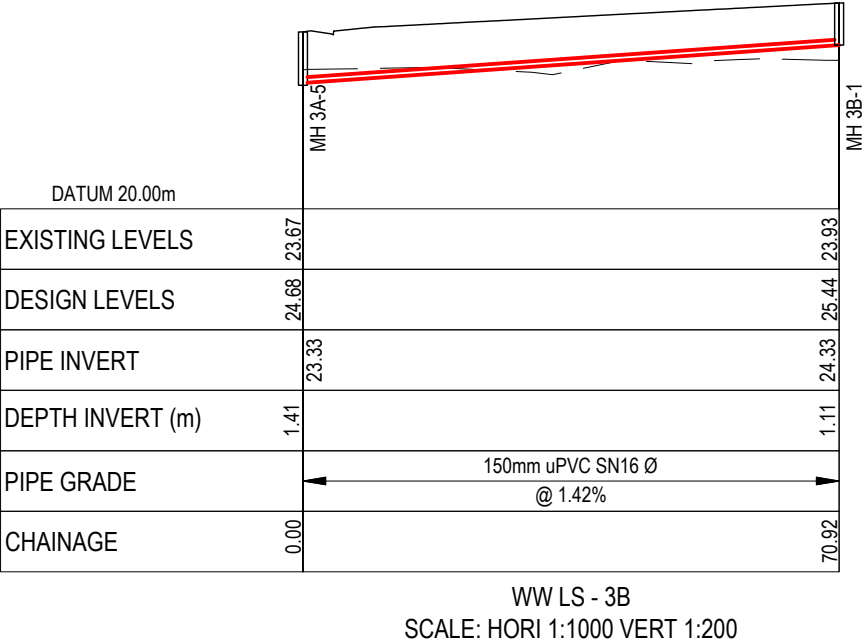
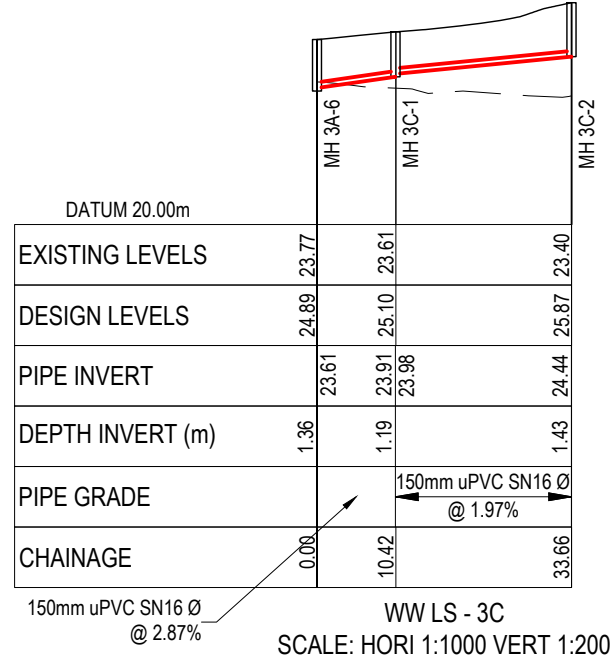
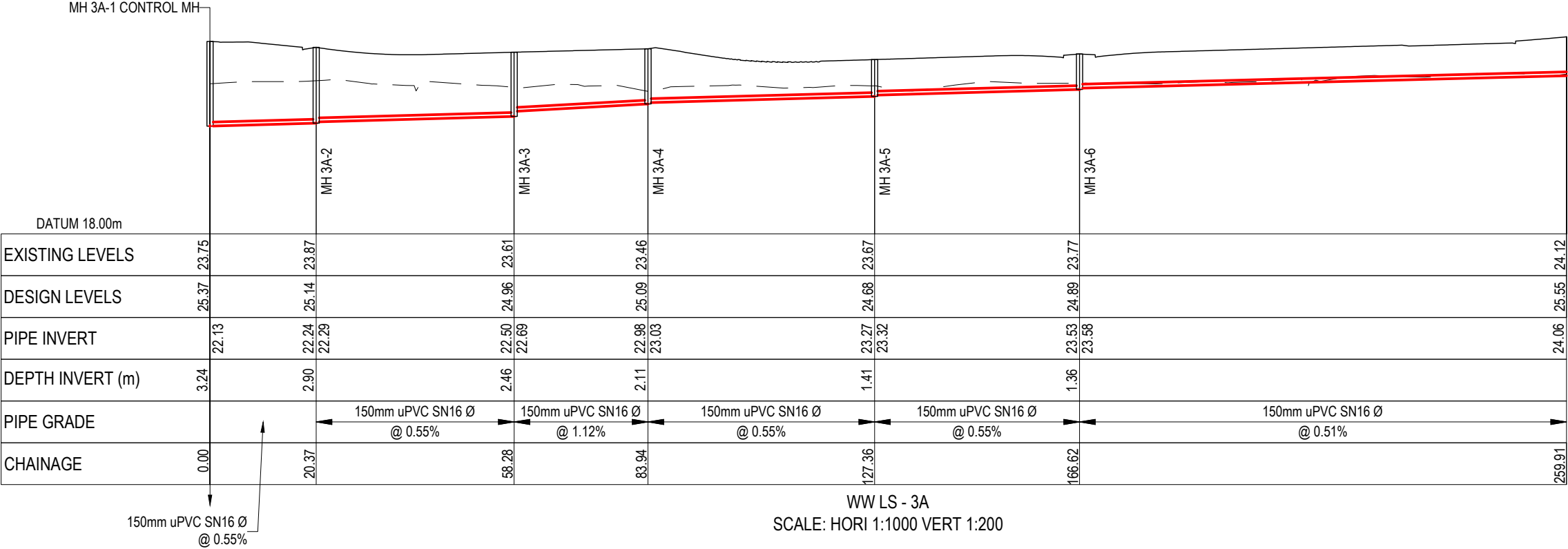
--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 1 CROSSING PIPE

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Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026



Project			
BRYMER FARMS FOR BRYMER FARMS LIMITED			
Title			
PROPOSED WASTEWATER LONGSECTION			
Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-16	Rev	A

DATE: 5/25/26 FILE PATH: F:\MVEN\HAMITON6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG



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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 1 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026



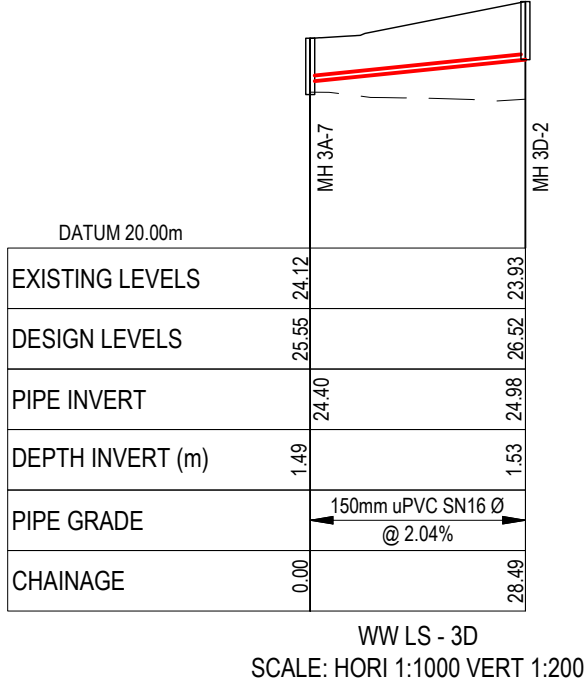
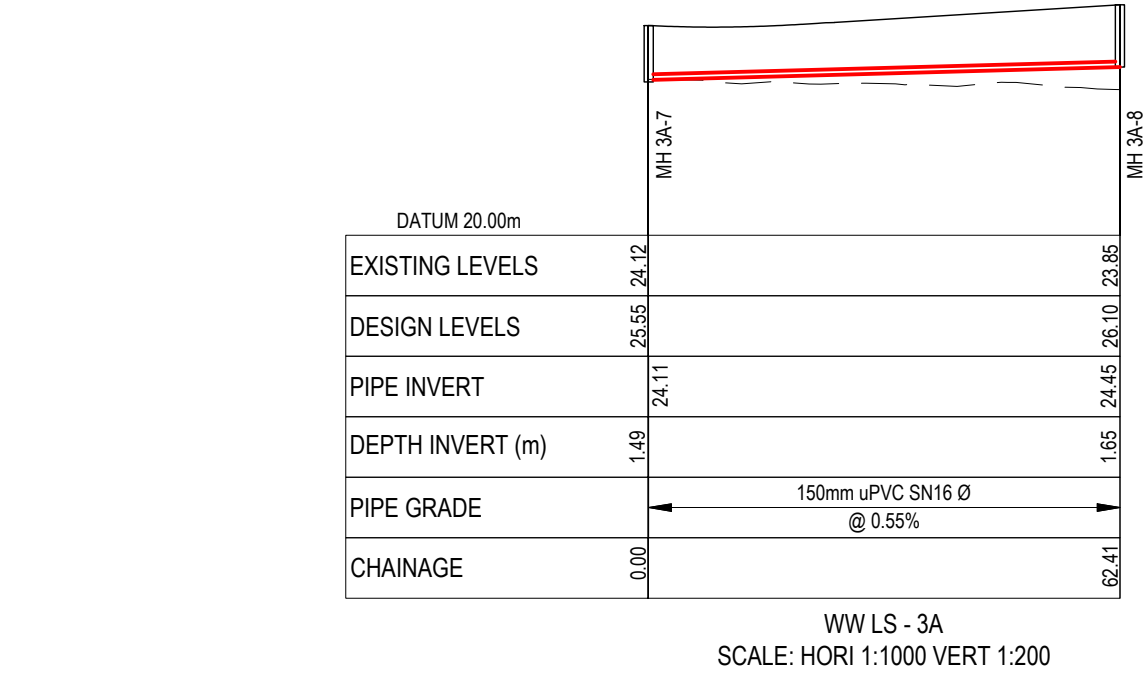
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014
Scale	AS SHOWN
Cad file	119014-C520-WW LONG SECTION.DWG
Drawing no.	C520-20
Rev	A

DRAFT FOR REVIEW

DATE: 5/25/26 FILE PATH: F:\MAVEN\HAMTON6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 1 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	BD	03/2026	
Drawn	BD	03/2026	
Checked	TH	03/2026	

M

MAVEN

Maven Waikato
07 242 0601
info@maven.co.nz
www.maven.co.nz
Level 1 286 Victoria Street, Hamilton
New Zealand

Project

**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

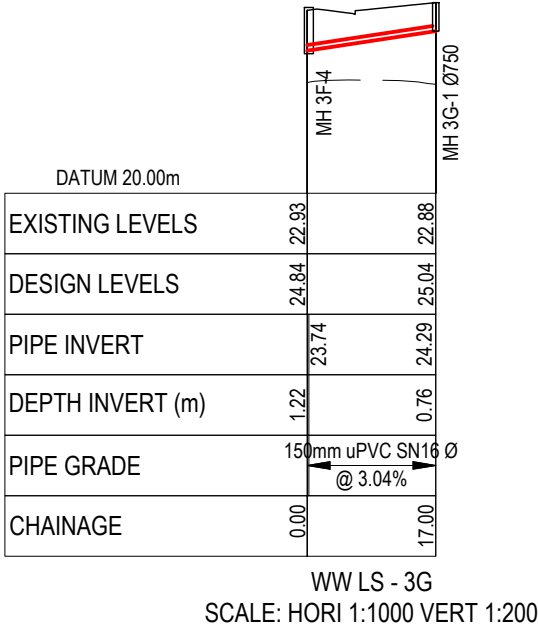
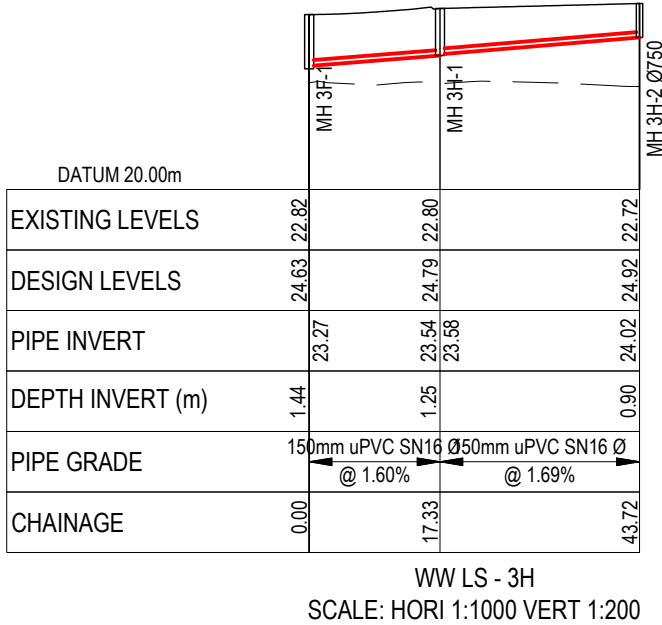
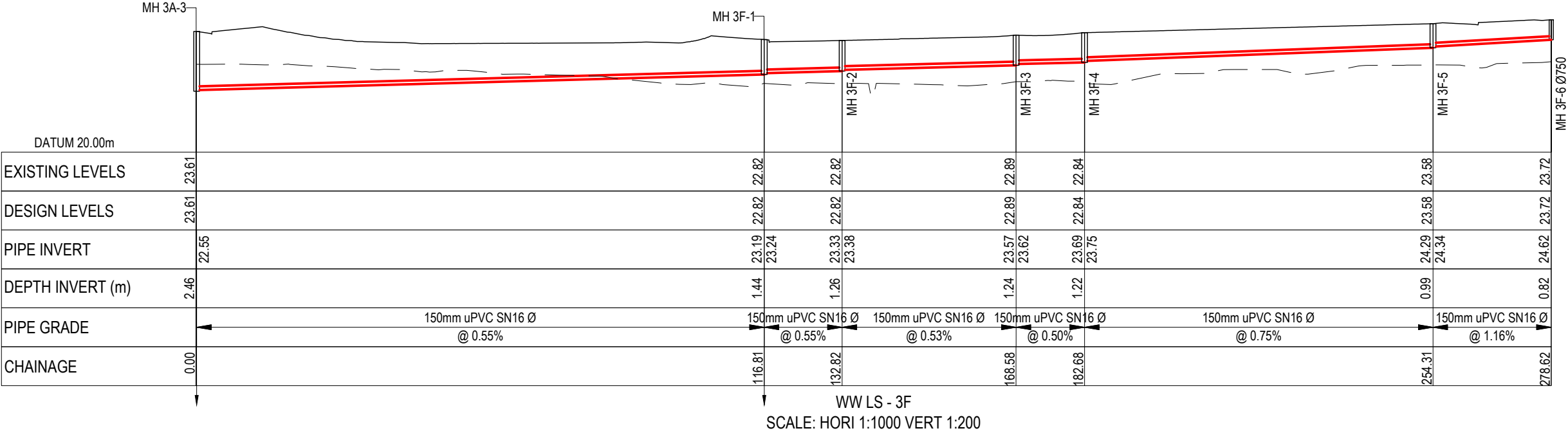
Title

**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-21	Rev	A

DRAFT FOR REVIEW

DATE: 5/25/26 FILEPATH: F:\MAVEN\HAM1046 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG



- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 1 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026



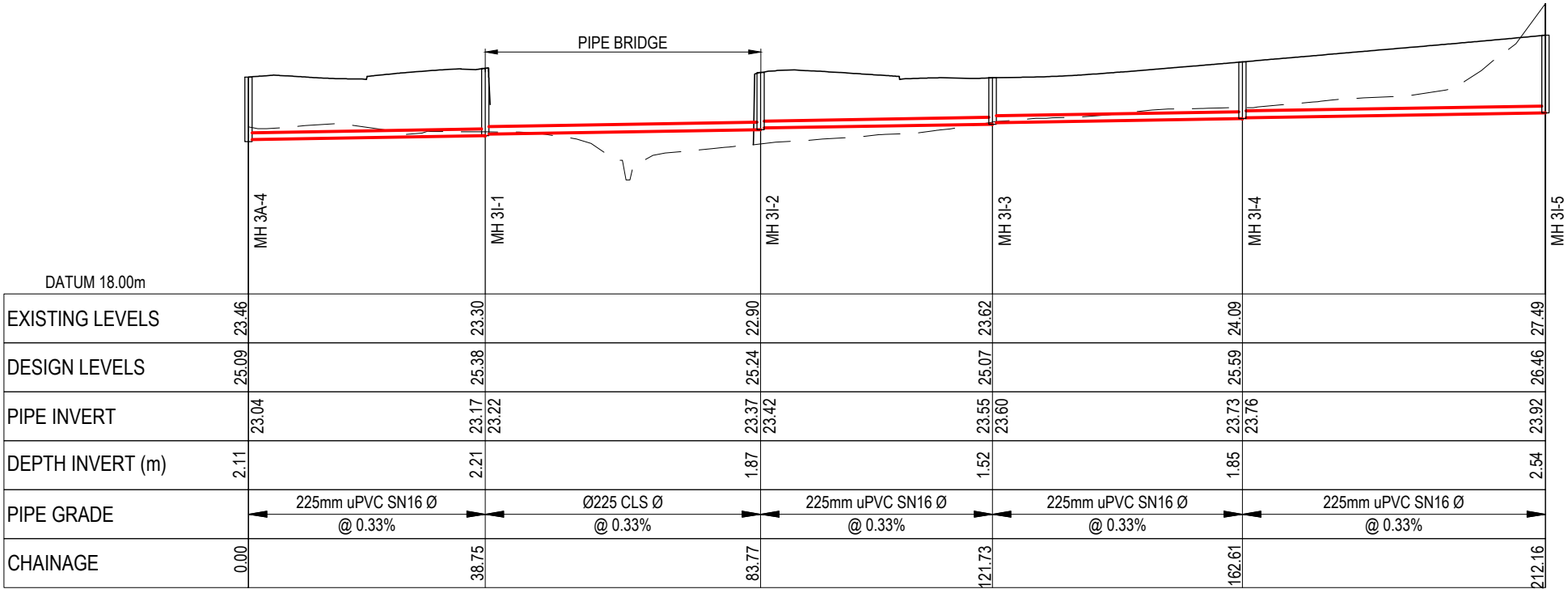
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

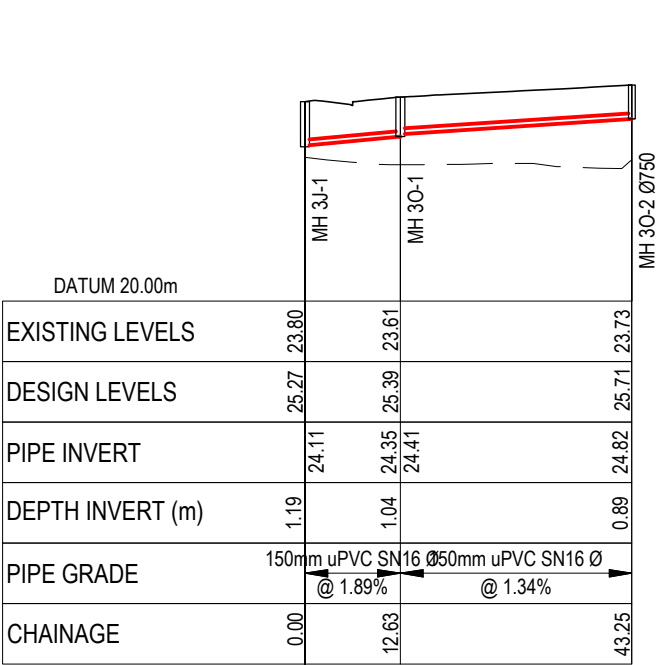
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Cad file	119014-C520-WW LONG SECTION.DWG
Drawing no.	C520-22
Rev	A

DRAFT FOR REVIEW

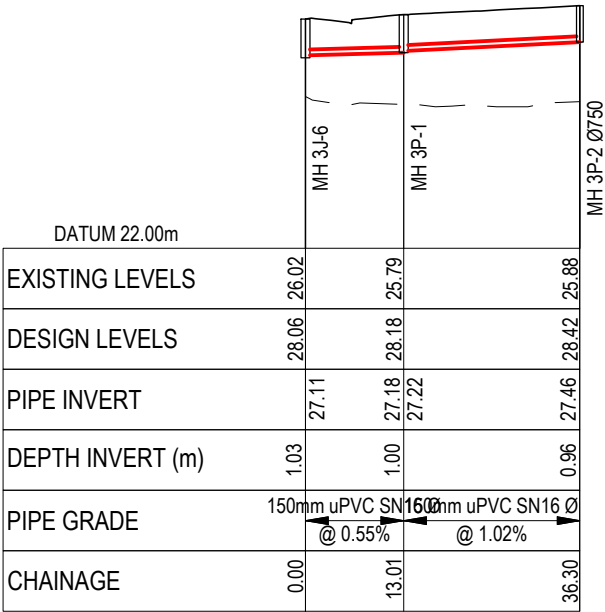
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WW LS - 3I
SCALE: HORI 1:1000 VERT 1:200



WW LS - 3O
SCALE: HORI 1:1000 VERT 1:200



WW LS - 3P
SCALE: HORI 1:1000 VERT 1:200

- NOTES
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LEGEND

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--- PR GROUND LEVEL
0 1 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	BD	03/2026	
Drawn	BD	03/2026	
Checked	TH	03/2026	



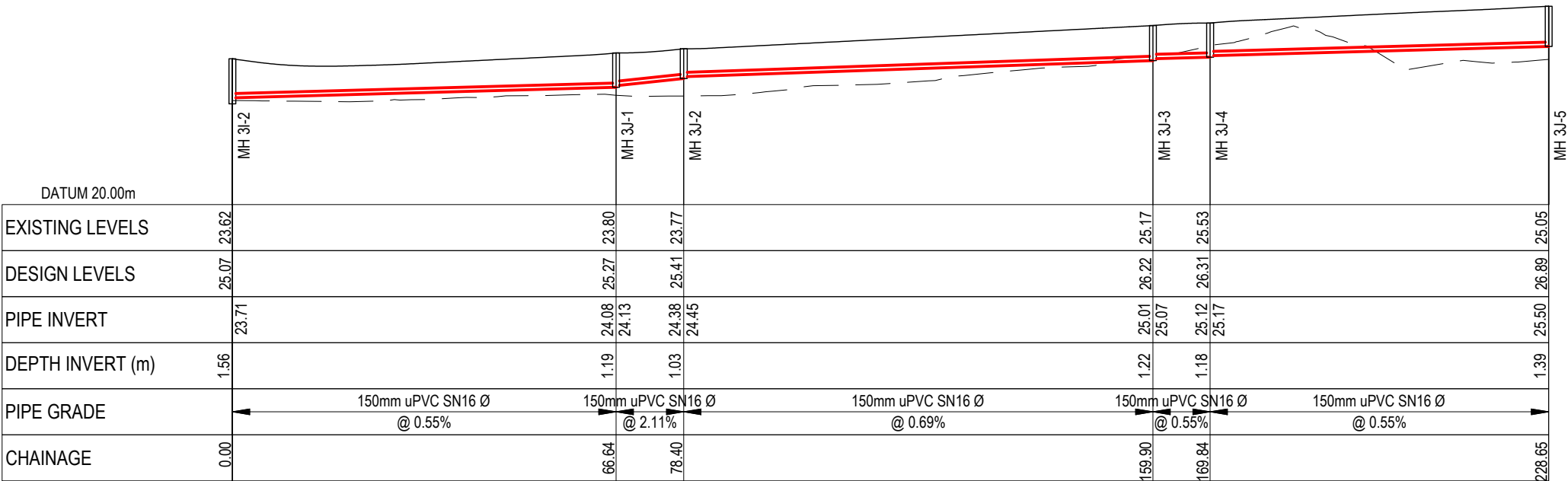
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-23	Rev	A

DRAFT FOR REVIEW

DATE: 5/25/26 FILEPATH: F:\MVEN\HAMTON6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG



WW LS - 3J
SCALE: HORI 1:1000 VERT 1:200

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— — — — — EX GROUND LEVEL
— — — — — PR GROUND LEVEL
0 0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026

M **A** **E** **N** **W** **A** **I** **K** **A** **T** **O**

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07 242 0601
info@maven.co.nz
www.maven.co.nz
Level 1 286 Victoria Street, Hamilton
New Zealand

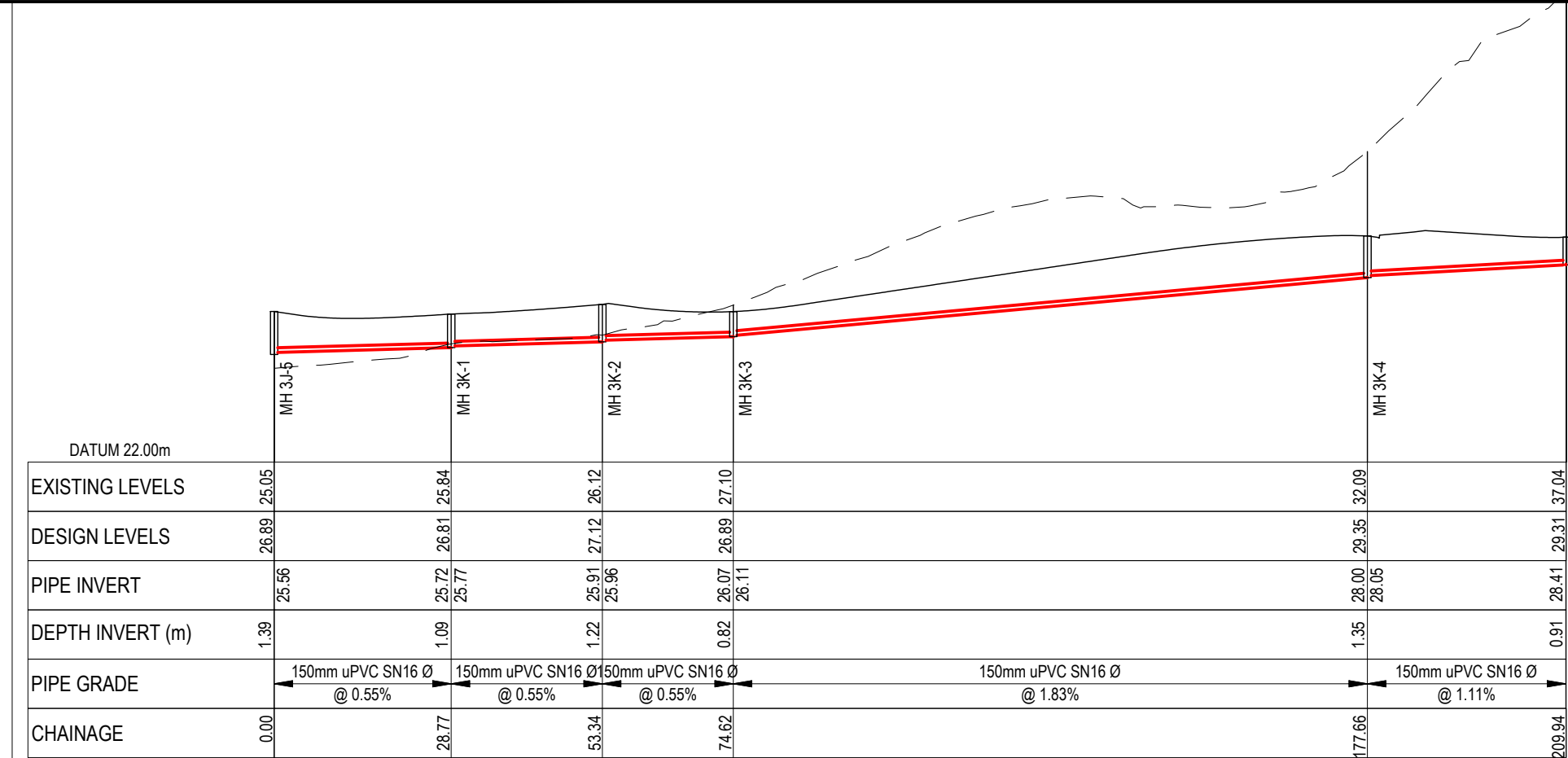
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

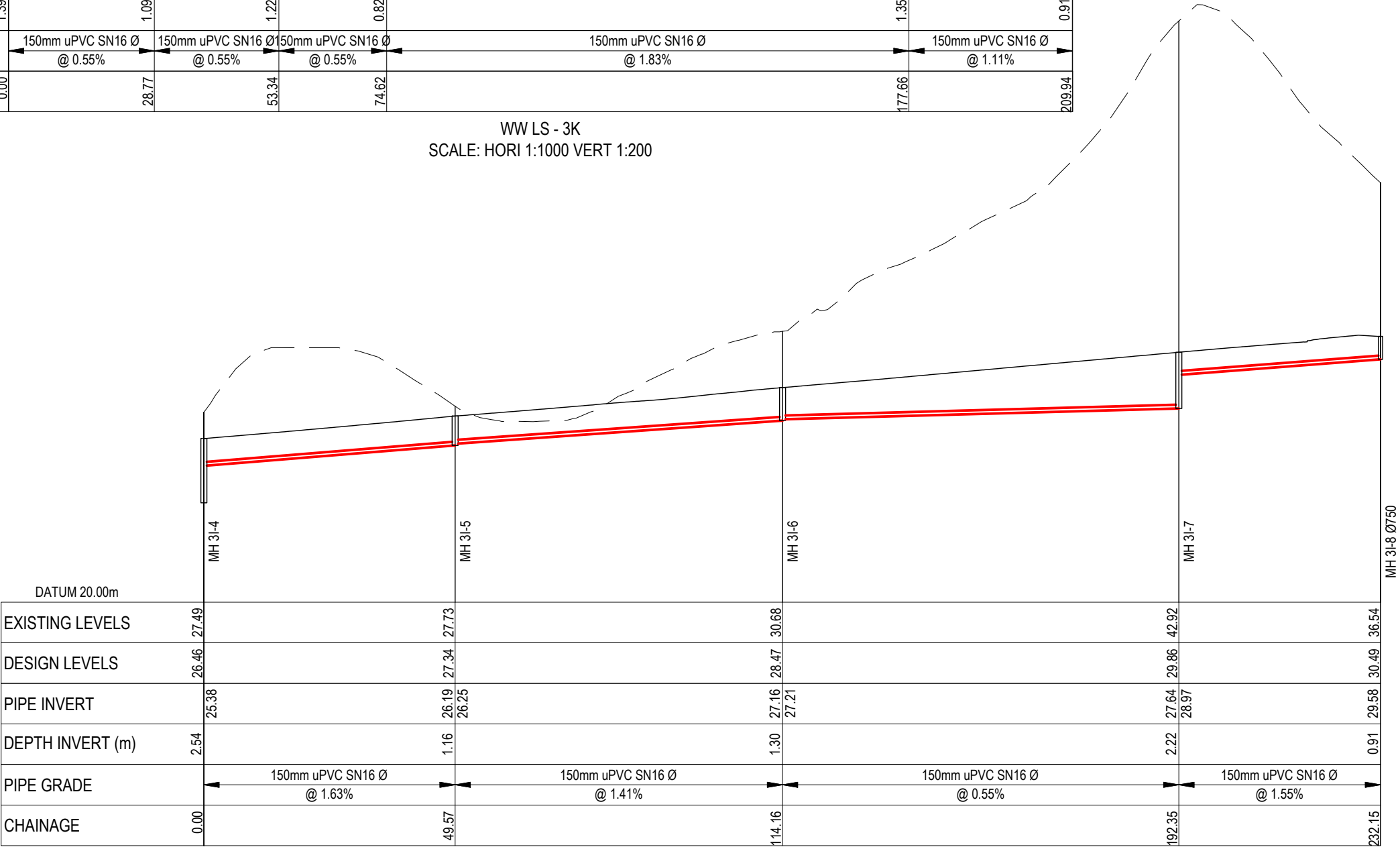
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Drawing no.	C520-24
Rev	A

DRAFT FOR REVIEW

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WW LS - 3K
SCALE: HORI 1:1000 VERT 1:200



WW LS - 3I
SCALE: HORI 1:1000 VERT 1:200

DRAFT FOR REVIEW

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LEGEND

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--- PR GROUND LEVEL
0 0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	BD	03/2026	
Drawn	BD	03/2026	
Checked	TH	03/2026	

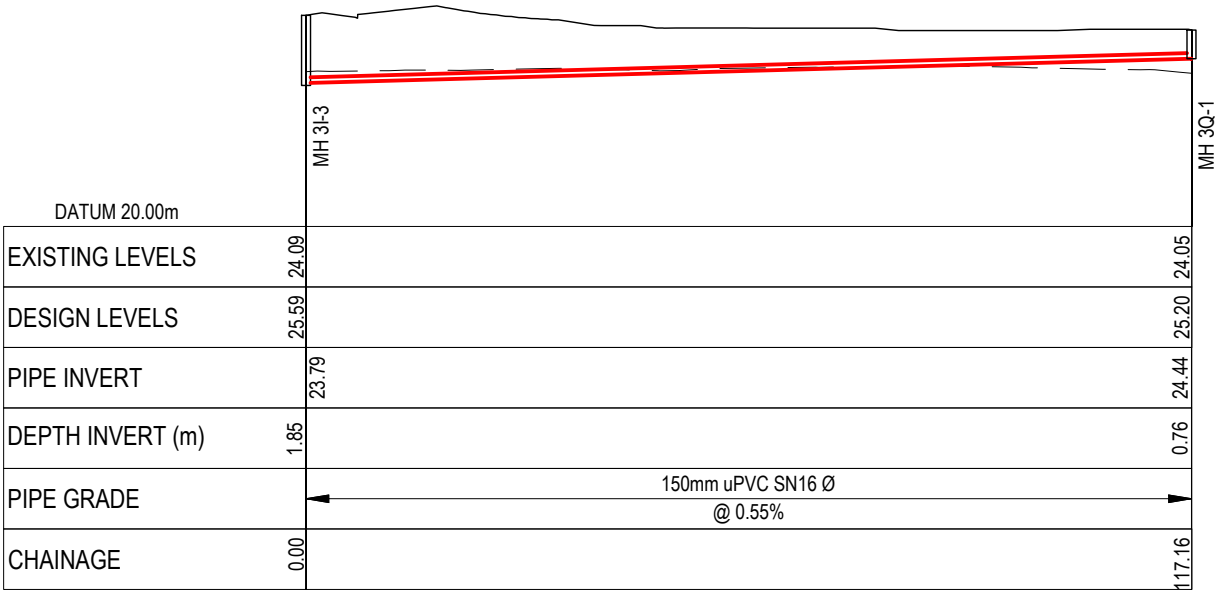
M **MAVEN** **Waikato**
07 242 0601
info@maven.co.nz
www.maven.co.nz
Level 1 286 Victoria Street, Hamilton
New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

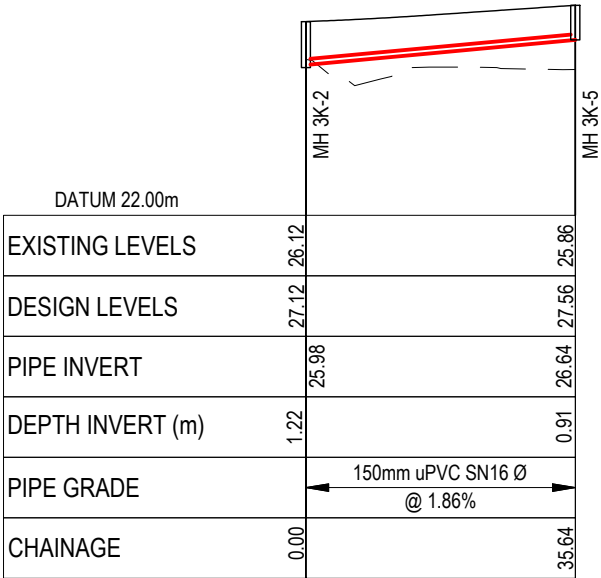
Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014
Scale	AS SHOWN
Cad file	119014-C520-WW LONG SECTION.DWG
Drawing no.	C520-25
Rev	A

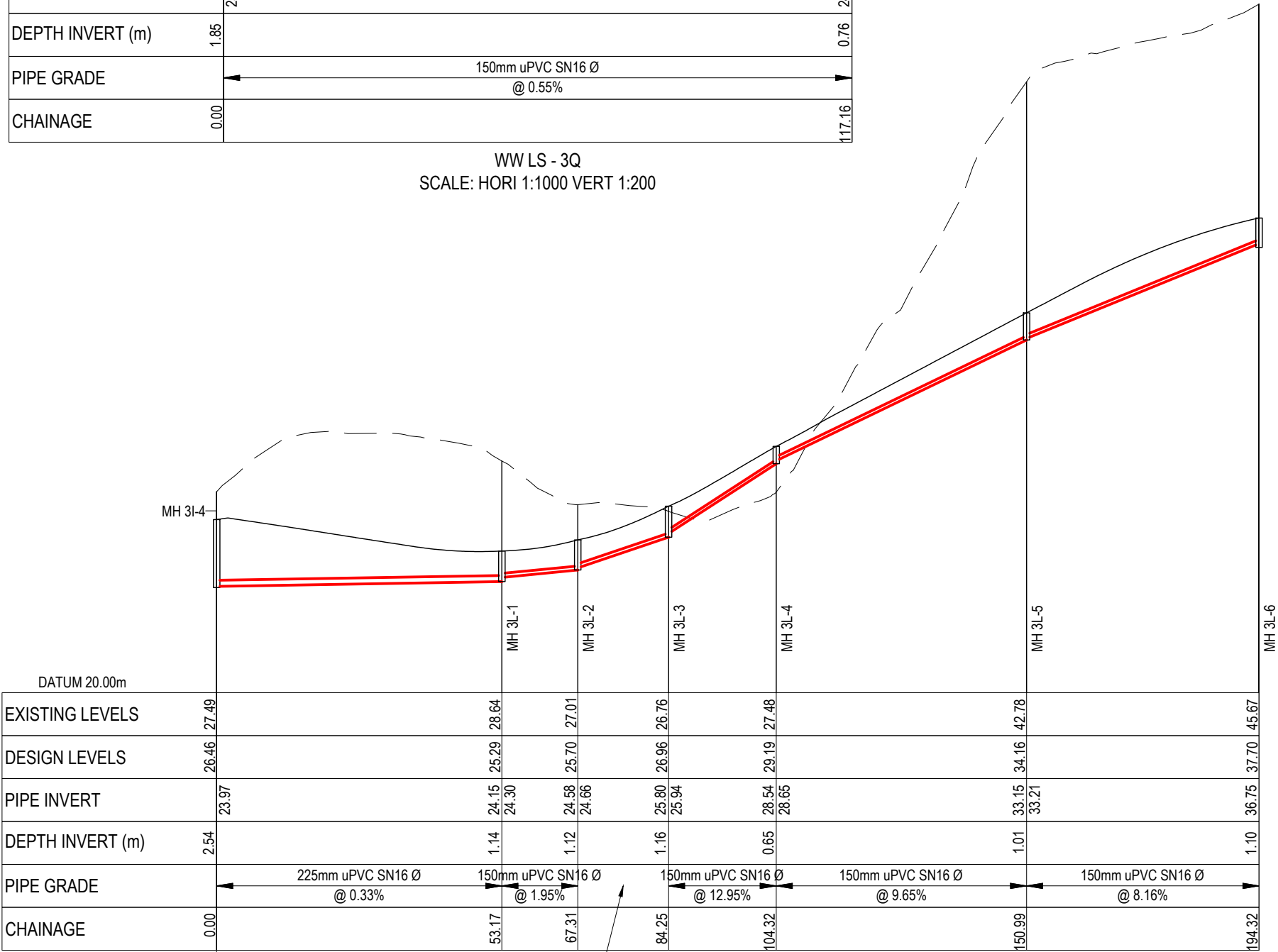
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WW LS - 3Q
SCALE: HORI 1:1000 VERT 1:200



WW LS - 3I
SCALE: HORI 1:1000 VERT 1:200



WW LS - 3L
SCALE: HORI 1:1000 VERT 1:200

DRAFT FOR REVIEW

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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
0 1 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026

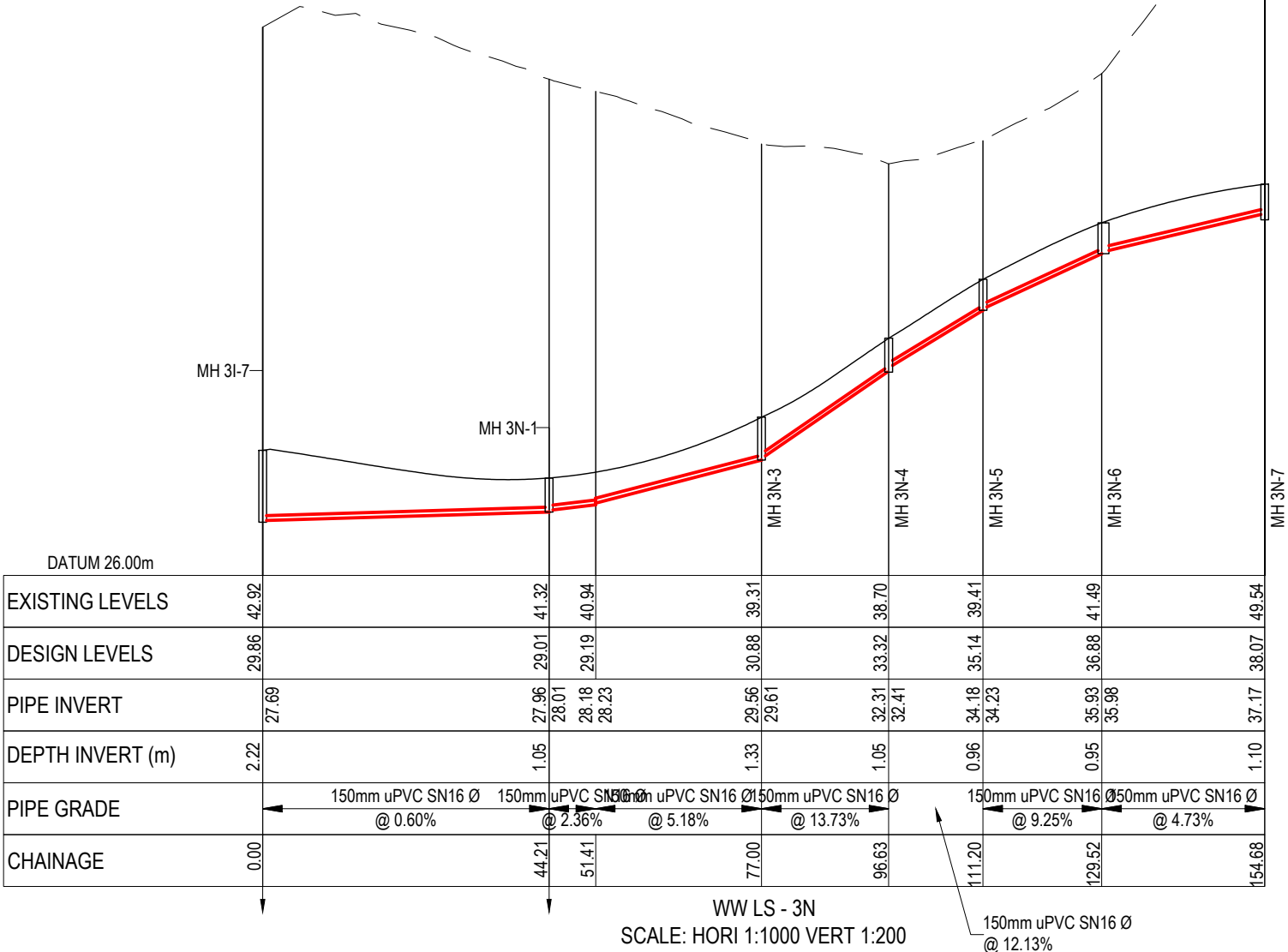
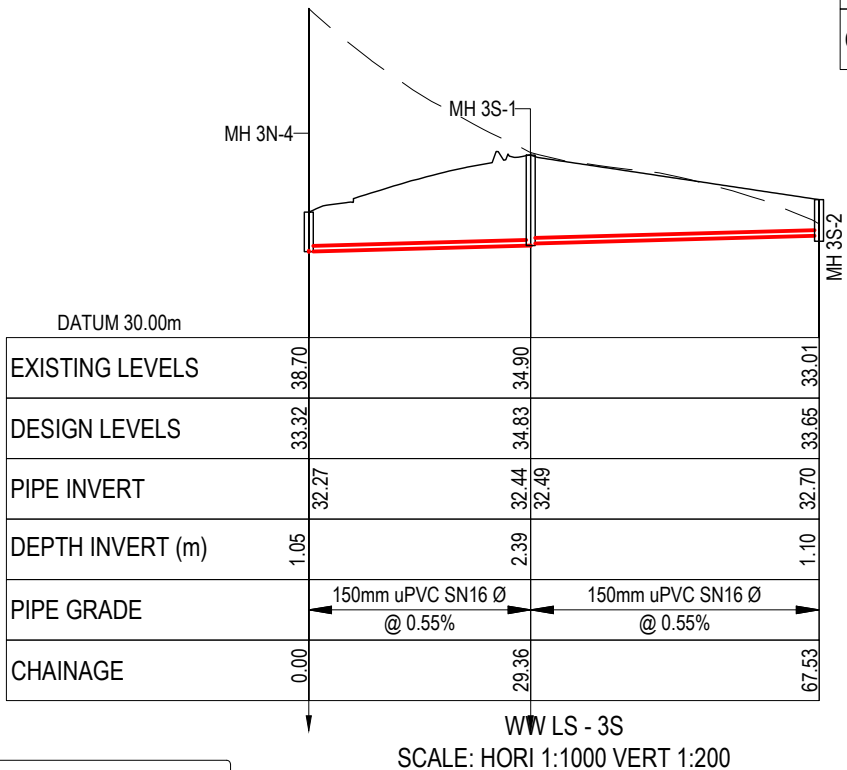
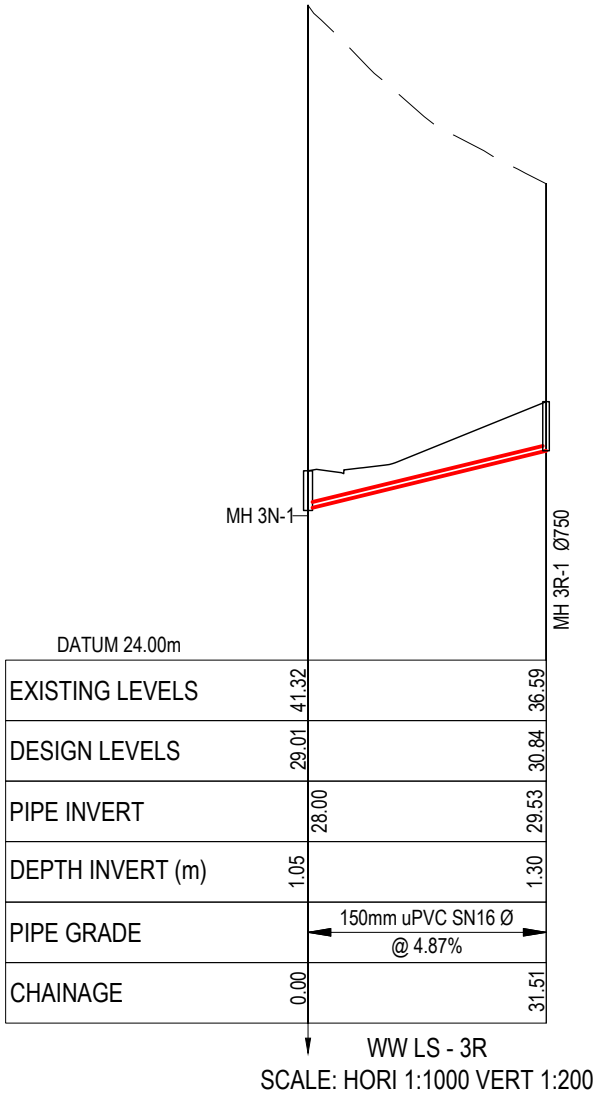


Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014
Scale	AS SHOWN
Cad file	119014-C520-WW LONG SECTION.DWG
Drawing no.	C520-26
Rev	A

DATE: 5/25/26 FILE PATH: F:\MVEN\HAMILTON6 PROJECTS\119014- BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG



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LEGEND

--- EX GROUND LEVEL
--- PR GROUND LEVEL
--- CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	BD		03/2026
Drawn	BD		03/2026
Checked	TH		03/2026



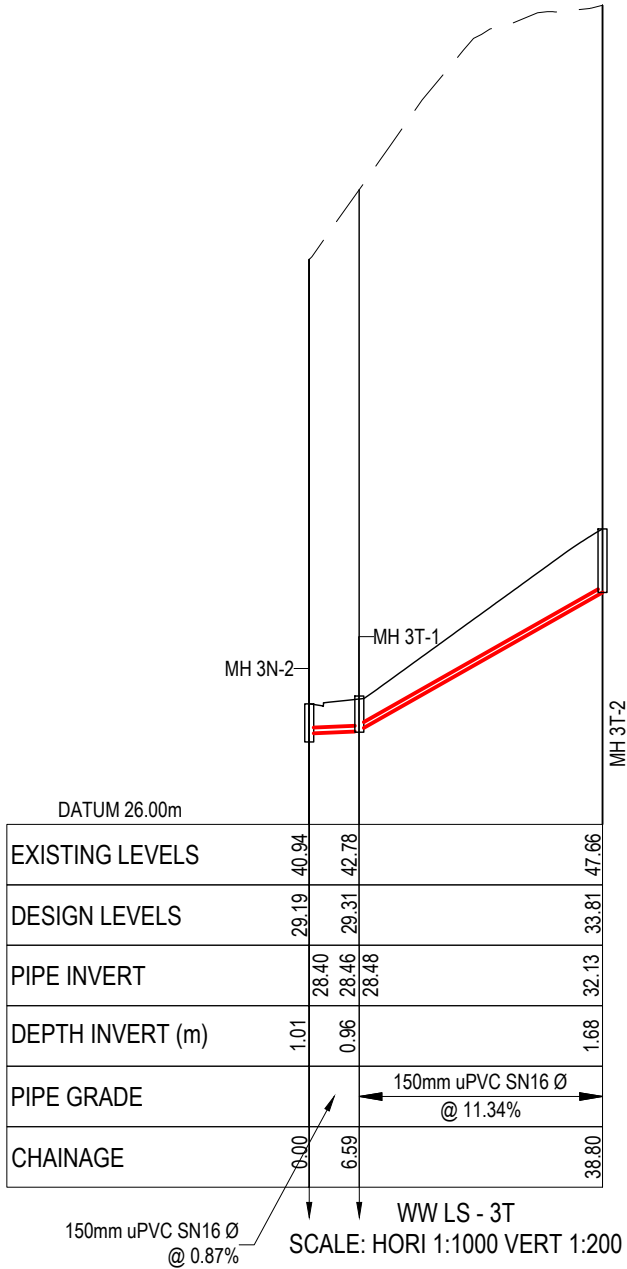
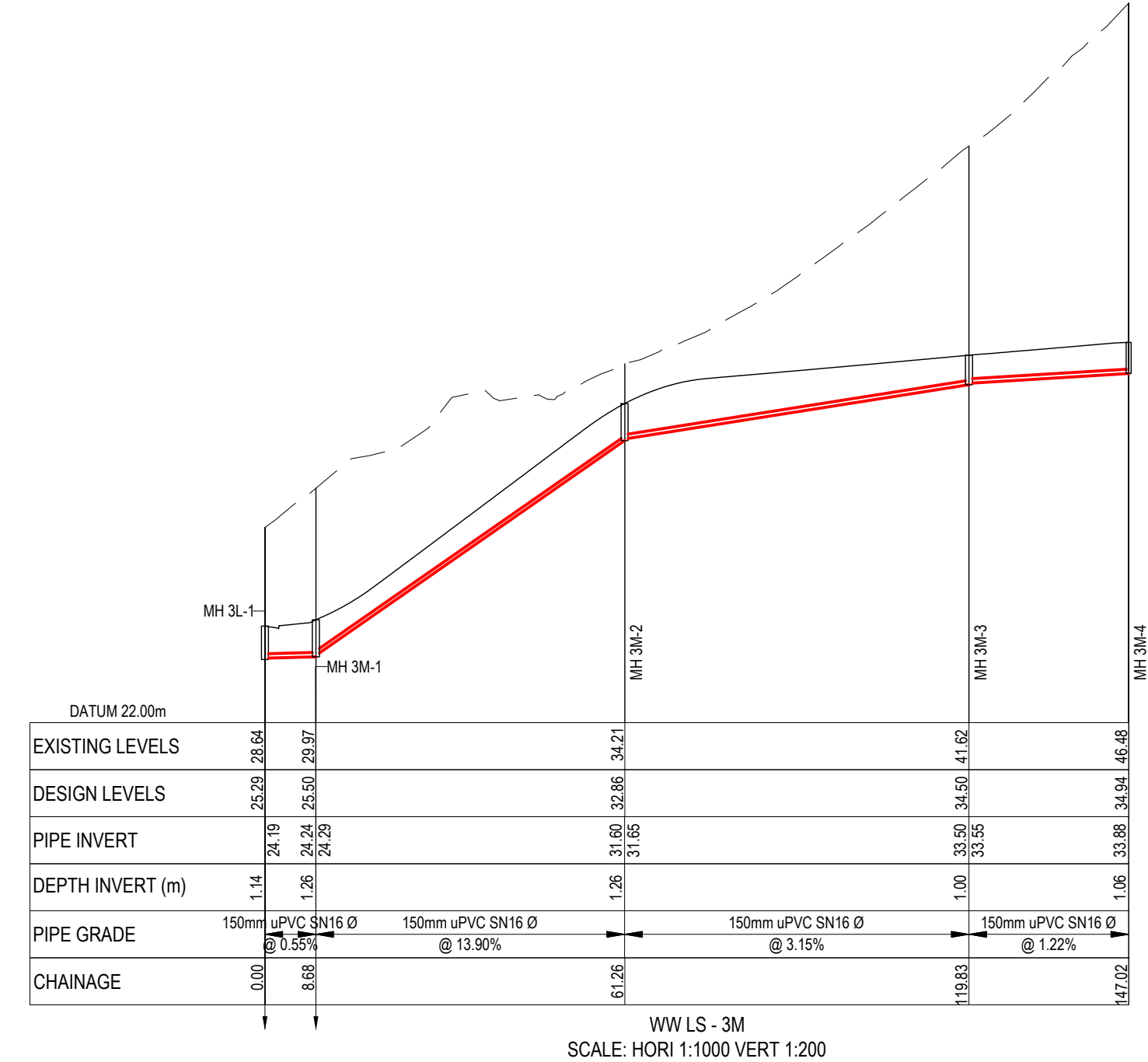
Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014
Scale	AS SHOWN
Cad file	119014-C520-WW LONG SECTION.DWG
Drawing no.	C520-27
Rev	A

DRAFT FOR REVIEW

DATE: 5/25/28 FILEPATH: F:\MVEN\HAMTON6 PROJECTS\119014 - BRYMER FARMS\7 DRAWING\119014-C520\WW LONG SECTION.DWG



- NOTES
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--- PR GROUND LEVEL
0 0 CROSSING PIPE

A	DRAFT	BD	03/2026
Rev	Description	By	Date
	By	Date	
Survey	MAVEN	10/2025	
Design	BD	03/2026	
Drawn	BD	03/2026	
Checked	TH	03/2026	



Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER
LONGSECTION**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C520-WW LONG SECTION.DWG		
Drawing no.	C520-28	Rev	A

DRAFT FOR REVIEW



PUMP STATION D
REFER C530-3

PUMP STATION A
REFER C530-1

PUMP STATION B
REFER C530-2

15m3 ADDITIONAL
PUMPSTATION
STORAGE ADDED TO
EXISTING PUMP
STATION #SPS098

- NOTES
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 10. RISING MAIN LEVELS WILL BE DETERMINED AT DETAILED DESIGN STAGE

LEGEND

	EX BDY
	PROP BDY
	EX WASTEWATER
	PROP WASTEWATER
	EX/PROP WWMH
	PR WW LOT CON

B	FOR INFORMATION	BD	08/2026
A	DRAFT	TCH	10/2025
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
Drawn	BY		10/2025
Checked			

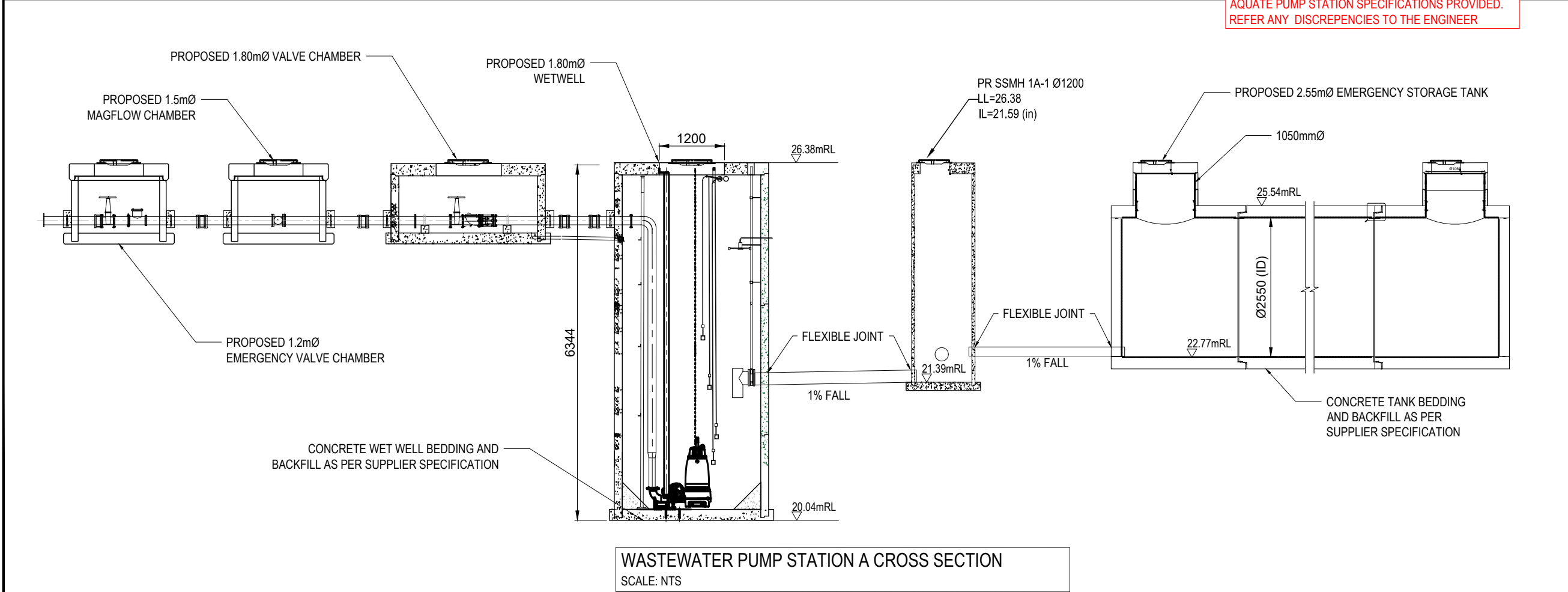
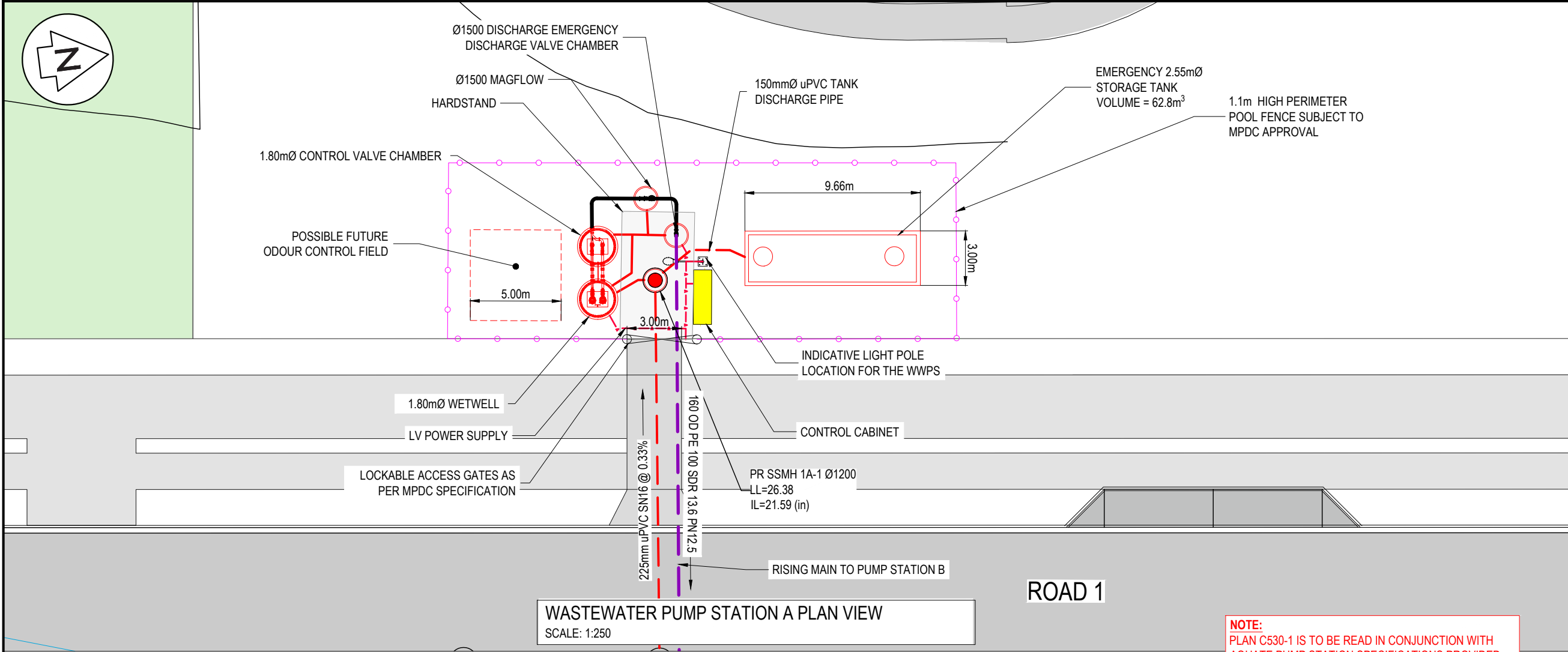
Maven Waikato
07 242 0601
info@maven.co.nz
www.maven.co.nz
Level 1 286 Victoria Street, Hamilton
New Zealand

Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER PUMP
STATION OVERVIEW**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C530-WW PUMPSTATION.DWG		
Drawing no.	C530	Rev	B

FOR INFORMATION



NOTES

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- 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
- MANHOLE DIAMETERS SHOWN ON STRUCTURE LABEL ARE INTERNAL DIAMETER.
- MEASUREMENTS SHOWN ON LOT CONNECTIONS ARE DISTANCE TO CENTER OF LOT CONNECTION FROM THE NEAREST DOWNSTREAM MANHOLE.
- RIISING MAIN LEVELS WILL BE DETERMINED AT DETAILED DESIGN STAGE

LEGEND

—	EX BDY
—	PROP BDY
---	EX WASTEWATER
---	PROP WASTEWATER
○	EX/PROP WWMH
→	PR WW LOT CON

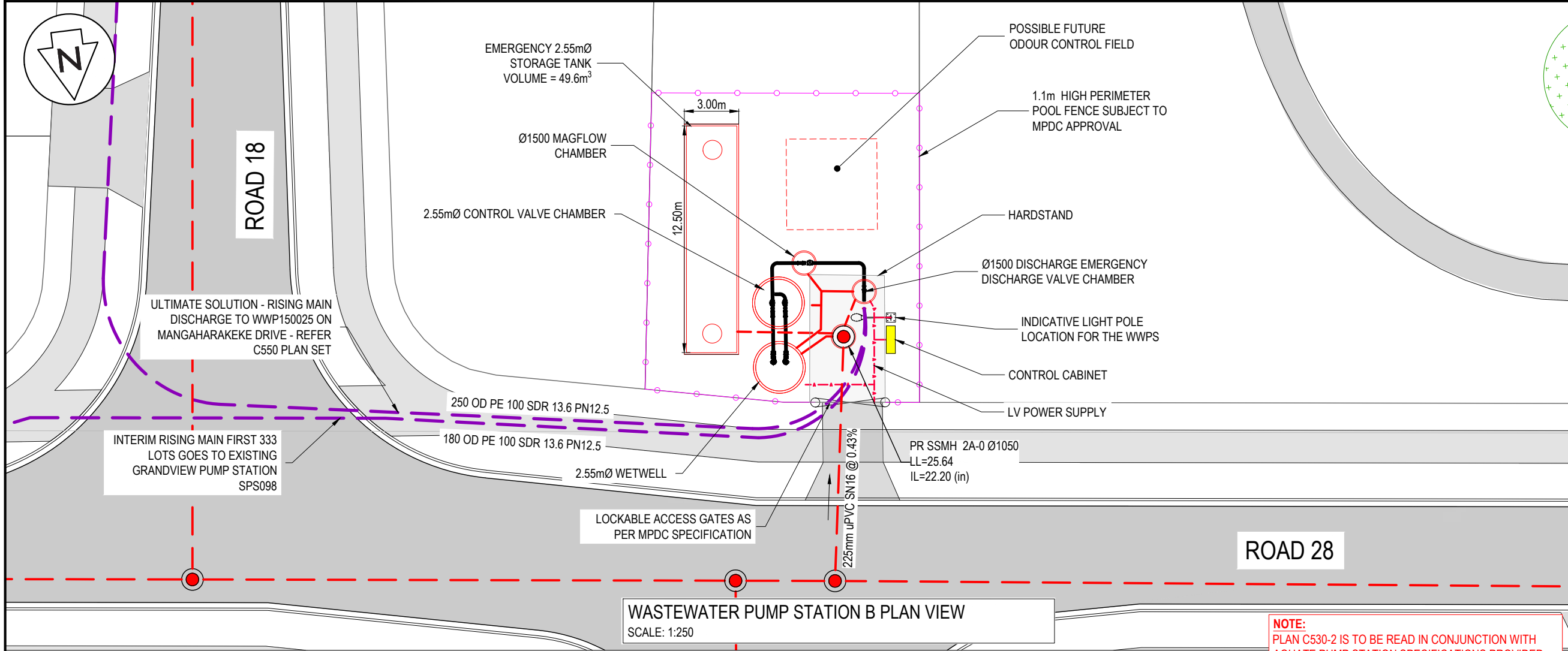
B	FOR INFORMATION	BD	08/2026
A	DRAFT	TCH	10/2025
Rev	Description	By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
Drawn	BY		10/2025
Checked			

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Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER PUMP
STATION A**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C530-WW PUMPSTATION.DWG		
Drawing no.	C530-1	Rev	B



WASTEWATER PUMP STATION B PLAN VIEW
SCALE: 1:250

NOTE:
PLAN C530-2 IS TO BE READ IN CONJUNCTION WITH
AQUATE PUMP STATION SPECIFICATIONS PROVIDED.
REFER ANY DISCREPANCIES TO THE ENGINEER

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 3. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY HIS OPERATIONS.
 4. APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL ROAD CROSSINGS TO COUNCIL STANDARDS.
 5. HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS. ALL MANHOLES SHALL HAVE STAINLESS GRATES INSTALLED.
 6. ALL LINES ARE TO BE 150mmØ PVC CLASS SN16 UNLESS SHOWN OTHERWISE.
 7. 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
 8. MANHOLE DIAMETERS SHOWN ON STRUCTURE LABEL ARE INTERNAL DIAMETER.
 9. MEASUREMENTS SHOWN ON LOT CONNECTIONS ARE DISTANCE TO CENTER OF LOT CONNECTION FROM THE NEAREST DOWNSTREAM MANHOLE.
 10. RISING MAIN LEVELS WILL BE DETERMINED AT DETAILED DESIGN STAGE

LEGEND

—	EX BDY
- - -	PROP BDY
- - -	EX WASTEWATER
- - -	PROP WASTEWATER
○	EX/PROP WWMH
+	PR WW LOT CON

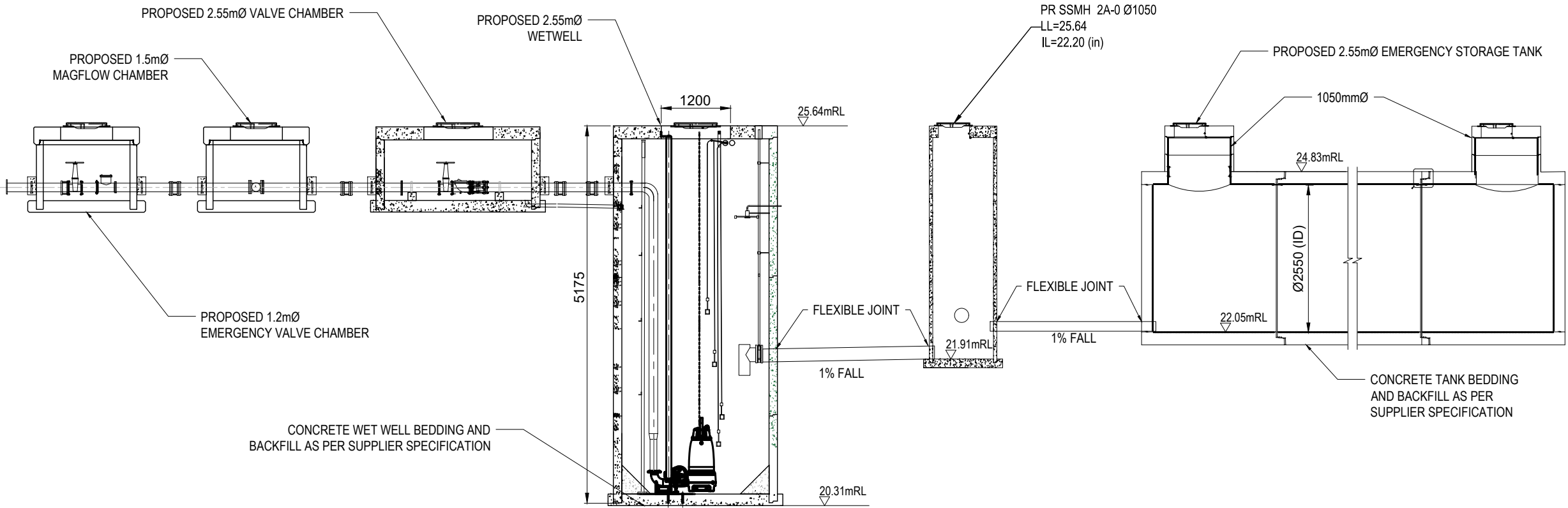
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A	DRAFT	TCH	10/2025
Rev	Description	By	Date
		By	Date
Survey	MAVEN		10/2025
Design	TCH		10/2025
Drawn	BY		10/2025
Checked			



Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

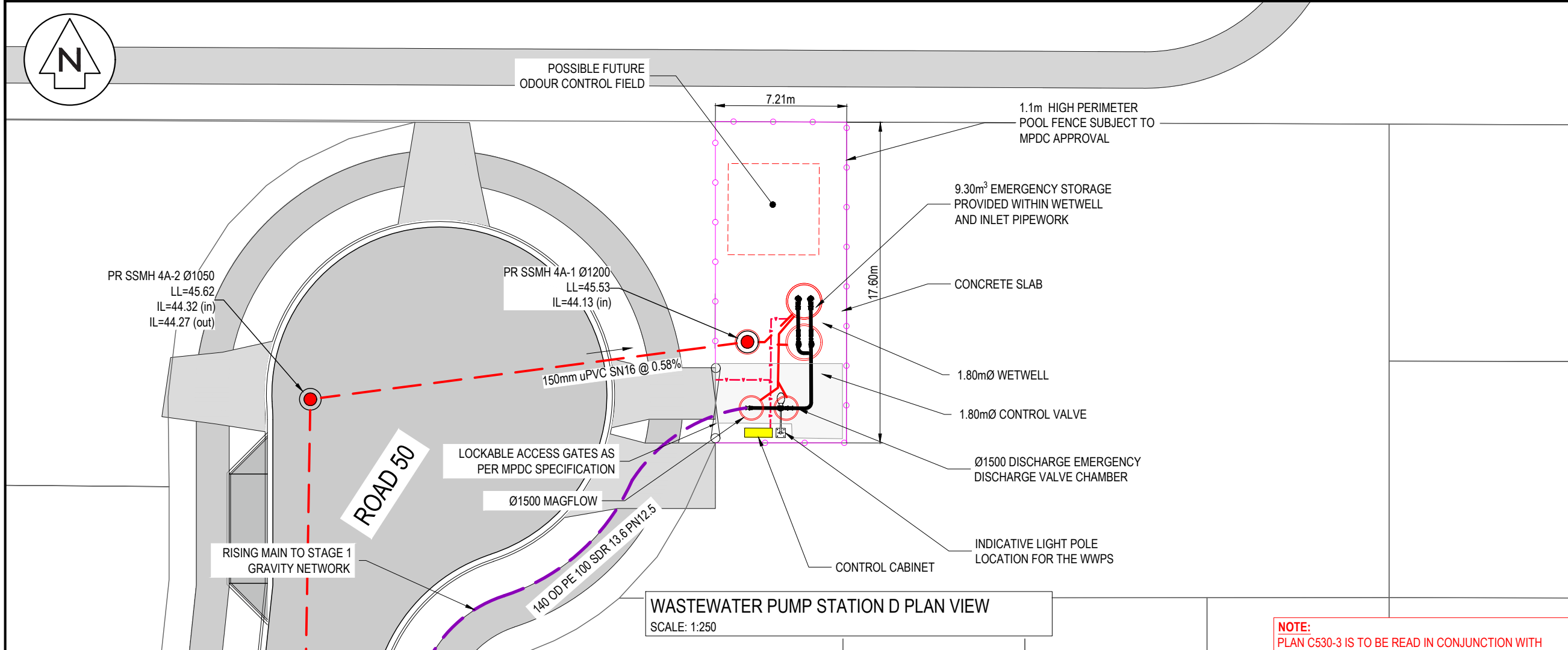
Title
**PROPOSED
WASTEWATER PUMP
STATION B**

Project no.	119014		
Scale	AS SHOWN		
Cad file	119014-C530-WW PUMPSTATION.DWG		
Drawing no.	C530-2	Rev	B



WASTEWATER PUMP STATION B CROSS SECTION
SCALE: NTS

FOR INFORMATION



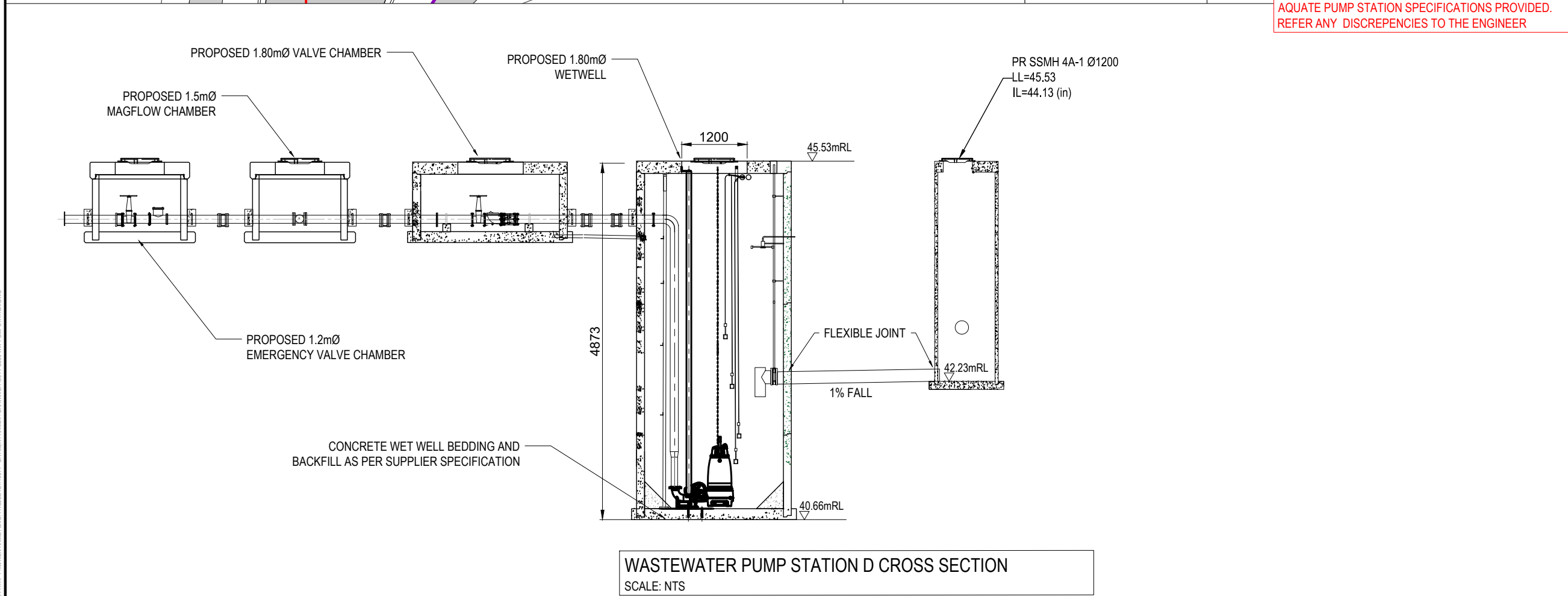
WASTEWATER PUMP STATION D PLAN VIEW
SCALE: 1:250

NOTE:
PLAN C530-3 IS TO BE READ IN CONJUNCTION WITH
AQUATE PUMP STATION SPECIFICATIONS PROVIDED.
REFER ANY DISCREPENCIES TO THE ENGINEER

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016.
 3. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY HIS OPERATIONS.
 4. APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL ROAD CROSSINGS TO COUNCIL STANDARDS.
 5. HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS. ALL MANHOLES SHALL HAVE STAINLESS GRATES INSTALLED.
 6. ALL LINES ARE TO BE 150mmØ PVC CLASS SN16 UNLESS SHOWN OTHERWISE.
 7. 150mmØ PIPES THAT DO NOT TERMINATE IN A MANHOLE MUST BE TERMINATED WITH A 100mmØ ON A 150mmØ LONDON JUNCTION AND BLANK CAP.
 8. MANHOLE DIAMETERS SHOWN ON STRUCTURE LABEL ARE INTERNAL DIAMETER.
 9. MEASUREMENTS SHOWN ON LOT CONNECTIONS ARE DISTANCE TO CENTER OF LOT CONNECTION FROM THE NEAREST DOWNSTREAM MANHOLE.
 10. RISING MAIN LEVELS WILL BE DETERMINED AT DETAILED DESIGN STAGE

LEGEND

—	EX BDY
---	PROP BDY
---	EX WASTEWATER
---	PROP WASTEWATER
○	EX/PROP WWMH
+	PR WW LOT CON



WASTEWATER PUMP STATION D CROSS SECTION
SCALE: NTS

FOR INFORMATION

B	FOR INFORMATION	BD	08/2026
A	DRAFT	TCH	10/2025
Rev	Description	By	Date
		MAVEN	10/2025
Survey		TCH	10/2025
Design		BY	10/2025
Drawn			
Checked			

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Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
WASTEWATER PUMP
STATION D**

Project no.	119014
Scale	AS SHOWN
Cad file	119014-C530-WW PUMPSTATION.DWG
Drawing no.	C530-3
Rev	B



5. SEDIMENT CONTROL SHALL BE INSTALLED AND OPERATIONAL BEFORE EARTHWORKS START ONSITE IN ACCORDANCE WITH COUNCIL STANDARDS.
6. CONTRACTOR SHALL PROVIDE ASBUILT OF WORKING SEDIMENT CONTROL DEVICES AND CONFIRMATION OF POND/DECENT VOLUMES TO ENGINEER.

- NOTES
1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
 2. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY THEIR OPERATIONS.
 3. THE CONTRACTOR SHALL COMPLY WITH ALL RELEVANT HEALTH AND SAFETY REQUIREMENTS.
 4. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY APPROVAL FROM UTILITY OPERATORS BEFORE COMMENCING WORK UNDER OR NEAR THEIR SERVICES.

- LEGEND
- EX BDY
 - PROP BDY
 - PROP EXTENT WORK
 - EX WATERCOURSES
 - EX WETLAND WITH 10m BUFFER

Cut/Fill Table			
Number #	Minimum Elevation	Maximum Elevation	Color
1	-999	-2.500	
2	-2.500	-2.000	
3	-2.000	-1.500	
4	-1.500	-1.000	
5	-1.000	-0.500	
6	-0.500	0	
7	0	0.500	
8	0.500	1.000	
9	1.000	1.500	
10	1.500	2.000	
11	2.000	2.500	
12	2.500	999	

C	DRAFT	TCH	05/2026
B	DRAFT	TCH	12/2025
A	DRAFT	TCH	10/2025
Rev	Description	By	Date
Survey	MAVEN	10/2025	
Design	TCH	10/2025	
Drawn	TCH	10/2025	
Checked			



Project
**BRYMER FARMS
FOR
BRYMER FARMS
LIMITED**

Title
**PROPOSED
CUT/FILL
OVERVIEW PLAN**

Project no.	119014		
Scale	1:7500 @ A3		
Cad file	119014-C220-EW CUT & FILL.DWG		
Drawing no.	C220	Rev	C

EARTH WORKS (EXISTING FINISHED GROUND VS PROPOSED FINISHED GROUND)

CUT VOLUME 653,423 m³
FILL VOLUME 804,180 m³
NET FILL 150,757 m³

TOPSOIL STRIPPED (300mm) = 219,608 m³
EARTHWORKS AREA = 732,026 m²

NOTE: NO ALLOWANCE FOR SERVICES TRENCHES, VOLUMES ARE UNFACTORED AND IN SITU

DRAFT FOR REVIEW

APPENDIX G

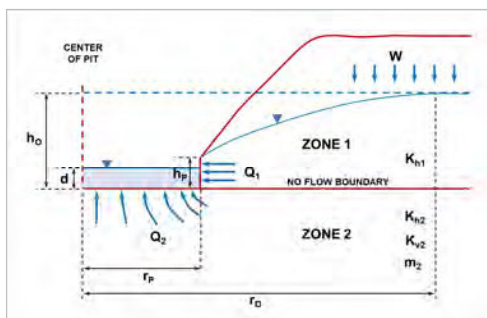
DRAWDOWN CALCULATIONS FOR STORMWATER WETLANDS



INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Natural Wetland
 Date: Tuesday, 4 August 2026
 Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.00E-08	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	3.5	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	61	m	effective pit radius
d	0.1	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 104 m

Known h_o 3.5 m

h_o calculated using Equation A 3.5 m

Q₁ 2.3E-04 m³/s
 19.65 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 4.9E-04 m³/s
 42.73 m³/day

Total Pit Inflow

Q_{TOT} 7.2E-04 m³/s
 62.37 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

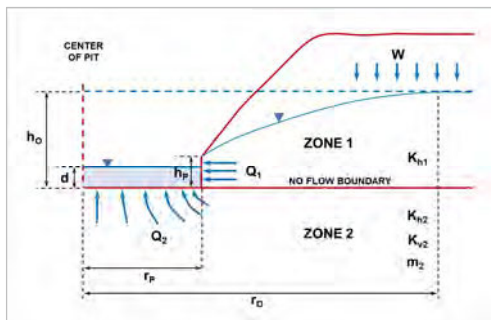
Analysed by: JFM
 Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Natural Wetland
 Date: Tuesday, 4 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

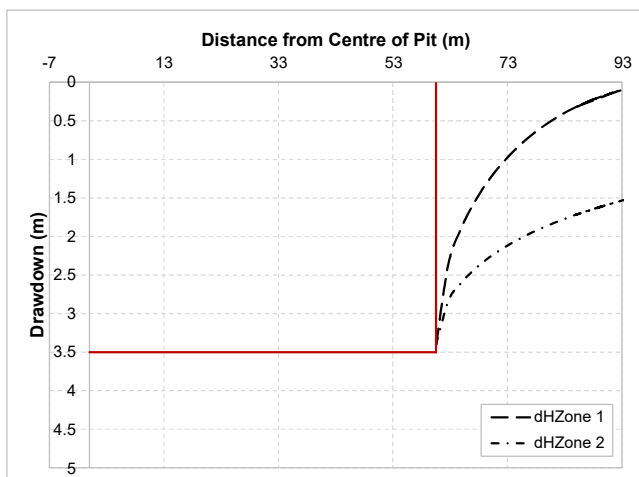
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.00E-08	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	3.5	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	61	m	effective pit radius
d	0.1	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

104 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
60.51793	3.4	3.4
62.7	2.3	2.8
64.9	1.9	2.6
67.1	1.6	2.4
69.3	1.3	2.3
71.5	1.1	2.2
73.7	0.9	2.1
75.9	0.8	2.0
78.1	0.6	1.9
80.3	0.5	1.8
82.5	0.4	1.8
84.7	0.3	1.7
86.9	0.3	1.7
89.0	0.19	1.6
91.2	0.14	1.6
93.8	0.09	1.5
104.4	0.00	1.3

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

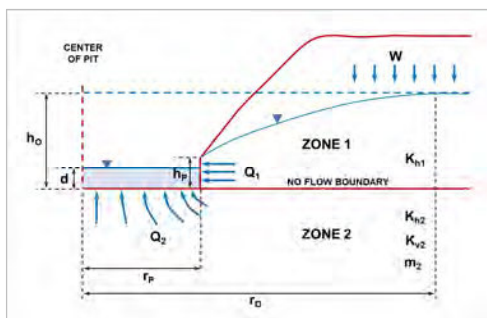
Analysed by: JFM
Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
PROJECT: Brymer Development
Project #: WGA211193
Location: Wetland A1
Date: Friday, 7 August 2026
Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	8.00E-09	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	1.48	m	initial saturated thickness above the base of Zone 1
h _p	0.78	m	saturated thickness at the pit wall
r _p	62.9	m	effective pit radius
d	0.78	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 81 m

Known h_o 1.48 m

h_o calculated using Equation A 1.5 m

Q₁ 6.7E-05 m³/s
5.82 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 1.1E-04 m³/s
9.14 m³/day

Total Pit Inflow

Q_{TOT} 1.7E-04 m³/s
14.96 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

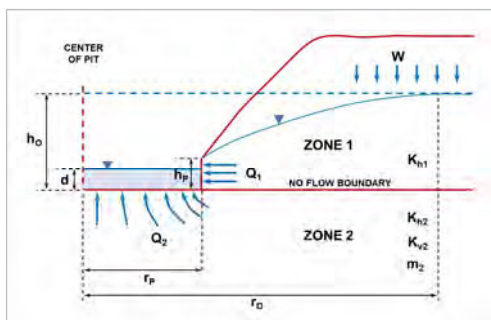
Analysed by: JFM
Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland A1
 Date: Friday, 7 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

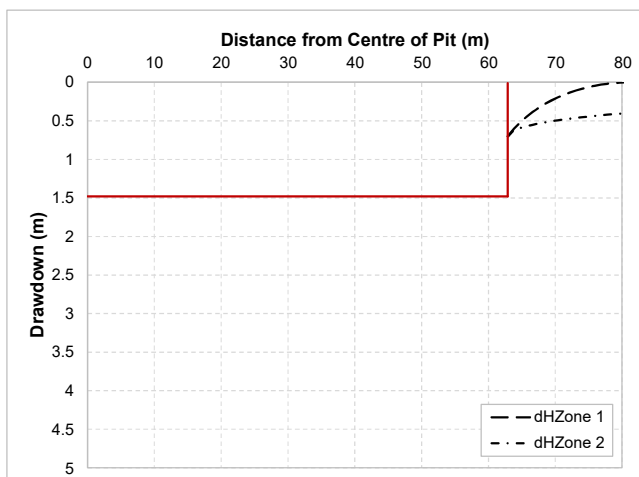
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	8E-09	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	1.48	m	initial saturated thickness above the base of Zone 1
h _p	0.78	m	saturated thickness at the pit wall
r _p	62.9	m	effective pit radius
d	0.78	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

81 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
62.9	0.7	0.7
63.8	0.6	0.6
64.8	0.5	0.6
65.7	0.4	0.6
66.6	0.4	0.6
67.5	0.3	0.5
68.5	0.3	0.5
69.4	0.2	0.5
70.3	0.2	0.5
71.3	0.2	0.5
72.2	0.1	0.5
73.1	0.1	0.5
74.0	0.1	0.5
75.0	0.06	0.4
75.9	0.05	0.4
76.8	0.03	0.4
77.8	0.02	0.4
78.7	0.01	0.4
79.6	0.00	0.4
80.5	0.00	0.4
81.5	0.00	0.4

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

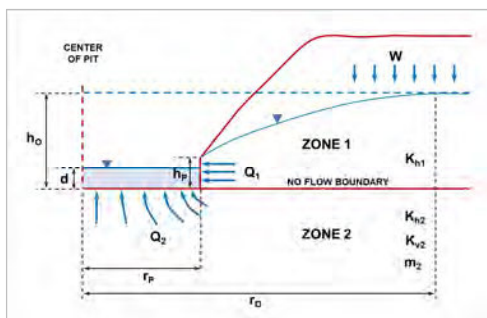
Analysed by: JFM
Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
PROJECT: Brymer Development
Project #: WGA211193
Location: Wetland A1
Date: Friday, 7 August 2026
Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.00E-08	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	2.48	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	62.9	m	effective pit radius
d	0.1	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 94.74 m

Known h_o 2.48 m

h_o calculated using Equation A 2.48 m

Q₁ 1.6E-04 m³/s
13.62 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 3.6E-04 m³/s
31.09 m³/day

Total Pit Inflow

Q_{TOT} 5.2E-04 m³/s
44.71 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
Simple analytical equations for estimating ground water inflow
to a mine pit. Ground Water 38, no. 2: 311-314.

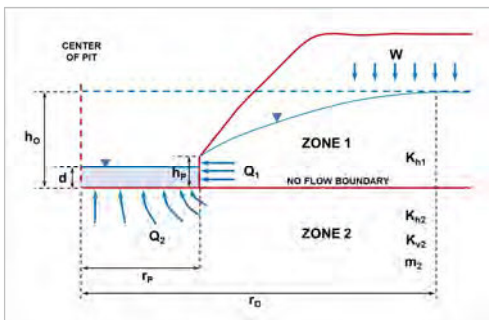
Analysed by: JFM
Checked by:

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland A1
 Date: Friday, 7 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln \left(\frac{r}{r_p} \right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1} \left(\frac{r_p}{r} \right)$$

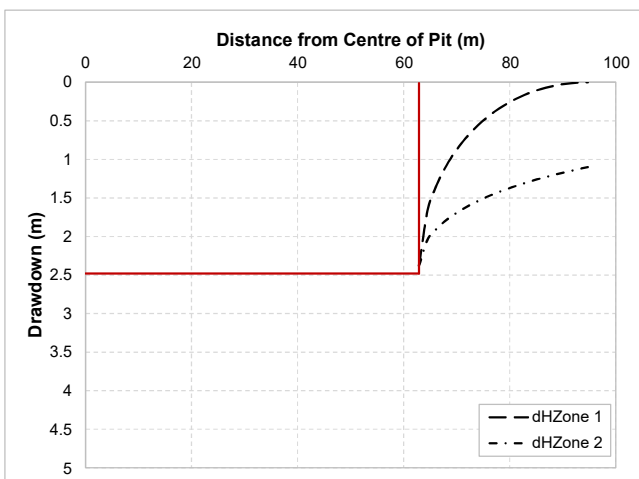
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1E-08	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	2.48	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	62.9	m	effective pit radius
d	0.1	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

95 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
62.9	2.38	2.4
64.5	1.7	2.0
66.1	1.4	1.9
67.7	1.1	1.8
69.3	0.9	1.7
70.9	0.8	1.7
72.5	0.7	1.6
74.0	0.6	1.5
75.6	0.5	1.5
77.2	0.4	1.4
78.8	0.3	1.4
80.4	0.2	1.4
82.0	0.2	1.3
83.6	0.14	1.3
85.2	0.10	1.3
86.8	0.07	1.2
88.4	0.04	1.2
90.0	0.02	1.2
91.6	0.01	1.1
93.1	0.00	1.1
94.7	0.00	1.1

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

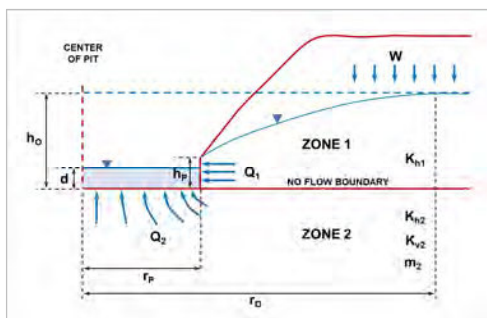
Analysed by: JFM
 Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland A2 and B
 Date: Friday, 7 August 2026
 Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	8.00E-09	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	1.1	m	initial saturated thickness above the base of Zone 1
h _p	0.75	m	saturated thickness at the pit wall
r _p	75	m	effective pit radius
d	0.75	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r _o calculated by iterating equation A	87	m
Known h _o	1.1	m
h _o calculated using Equation A	1.1	m
Q ₁	4.9E-05	m ³ /s
	4.26	m ³ /day

Inflow from Zone 2

Anisotropy parameter calculated using equation D	3.162278	
Q ₂	6.3E-05	m ³ /s
	5.45	m ³ /day

Total Pit Inflow

Q _{TOT}	1.1E-04	m ³ /s
	9.71	m ³ /day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

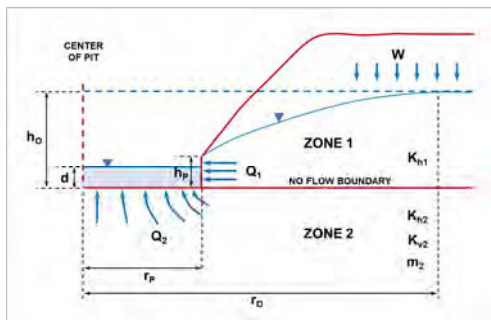
Analysed by: JFM
 Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland A2 and B
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$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

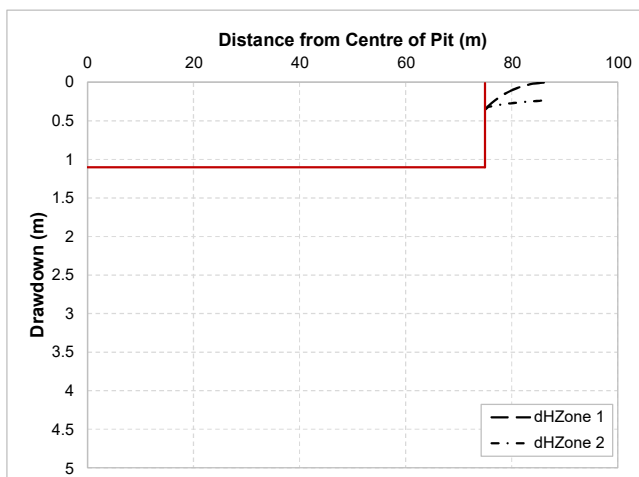
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	8E-09	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	1.1	m	initial saturated thickness above the base of Zone 1
h _p	0.75	m	saturated thickness at the pit wall
r _p	75	m	effective pit radius
d	0.75	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

87 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
75	0.35	0.4
75.6	0.31	0.3
76.2	0.27	0.3
76.8	0.24	0.3
77.4	0.21	0.3
78.0	0.18	0.3
78.6	0.15	0.3
79.2	0.13	0.3
79.8	0.11	0.3
80.4	0.09	0.3
81.0	0.07	0.3
81.7	0.1	0.3
82.3	0.0	0.3
82.9	0.04	0.3
83.5	0.03	0.2
84.1	0.02	0.2
84.7	0.01	0.2
85.3	0.01	0.2
85.9	0.00	0.2
86.5	0.00	0.2
87.1	0.00	0.2

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

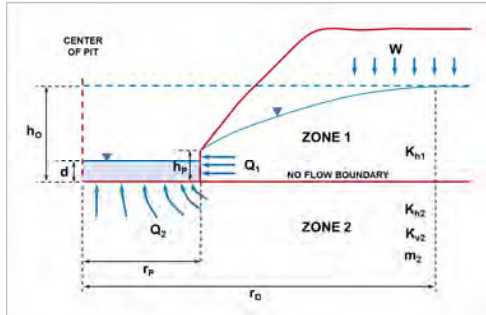
Analysed by: JFM
Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
PROJECT: Brymer Development
Project #: WGA211193
Location: Wetland A2 and B
Date: Friday, 7 August 2026
Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.00E-08	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	2.1	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	75	m	effective pit radius
d	0.1	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 102 m

Known h_o 2.1 m

h_o calculated using Equation A 2.1 m

Q₁ 1.5E-04 m³/s
13.20 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 3.6E-04 m³/s
31.15 m³/day

Total Pit Inflow

Q_{TOT} 5.1E-04 m³/s
44.35 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

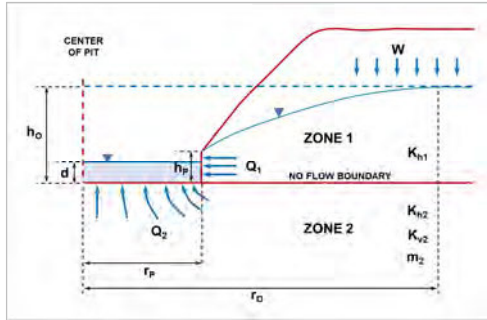
Analysed by: JFM
Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland A2 and B
 Date: Friday, 7 August 2026
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$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

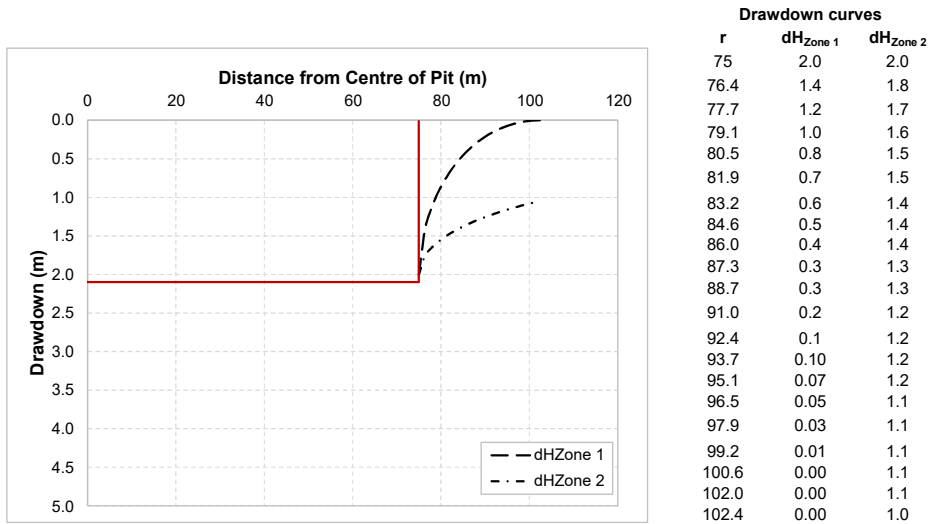
$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1E-08	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	2.1	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	75	m	effective pit radius
d	0.1	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1 102 m



Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

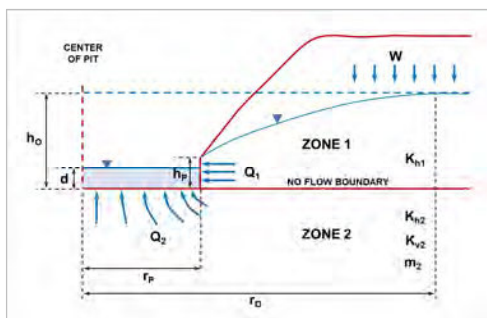
Analysed by: JFM
Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland C
 Date: Monday, 7 August 2026
 Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	8.00E-09	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	1.4	m	initial saturated thickness above the base of Zone 1
h _p	0.65	m	saturated thickness at the pit wall
r _p	42.4	m	effective pit radius
d	0.65	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 60 m

Known h_o 1.4 m

h_o calculated using Equation A 1.4 m

Q₁ 4.6E-05 m³/s
 4.02 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 7.6E-05 m³/s
 6.60 m³/day

Total Pit Inflow

Q_{TOT} 1.2E-04 m³/s
 10.62 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

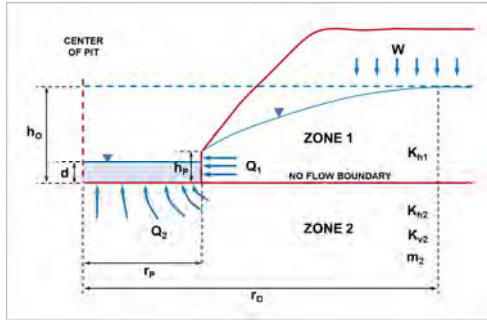
Analysed by: EC
 Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland C
 Date: Monday, 7 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln \left(\frac{r}{r_p} \right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1} \left(\frac{r_p}{r} \right)$$

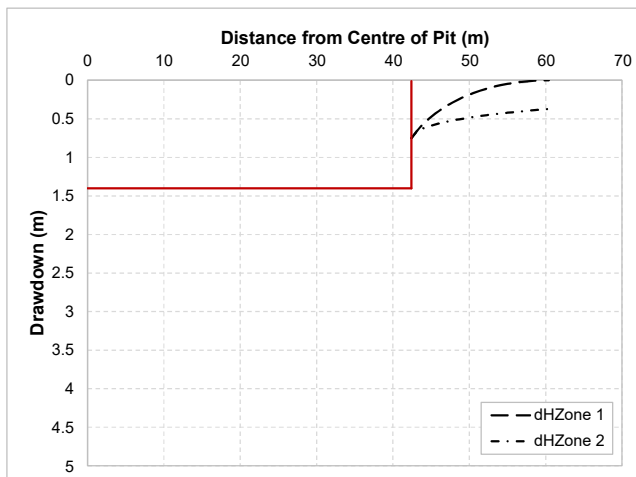
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	8E-09	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	1.4	m	initial saturated thickness above the base of Zone 1
h _p	0.65	m	saturated thickness at the pit wall
r _p	42.4	m	effective pit radius
d	0.65	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

60 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
42.4	0.75	0.8
43.3	0.6	0.7
44.2	0.5	0.6
45.1	0.5	0.6
46.0	0.4	0.6
46.9	0.3	0.5
47.8	0.3	0.5
48.7	0.2	0.5
49.6	0.2	0.5
50.5	0.2	0.5
51.4	0.1	0.5
52.3	0.1	0.5
53.2	0.1	0.4
54.1	0.06	0.4
55.0	0.05	0.4
55.9	0.03	0.4
56.8	0.02	0.4
57.7	0.01	0.4
58.6	0.00	0.4
59.5	0.00	0.4
60.4	0.00	0.4

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

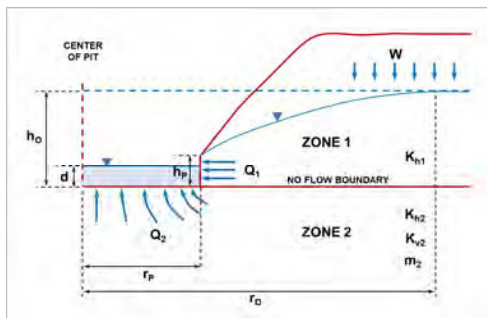
Analysed by: EC
 Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland C
 Date: Friday, 7 August 2026
 Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.00E-08	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	2.4	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	42.4	m	effective pit radius
d	0.1	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 73 m

Known h_o 2.4 m

h_o calculated using Equation A 2.4 m

Q₁ 1.1E-04 m³/s
9.40 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 2.3E-04 m³/s
20.25 m³/day

Total Pit Inflow

Q_{TOT} 3.4E-04 m³/s
29.65 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

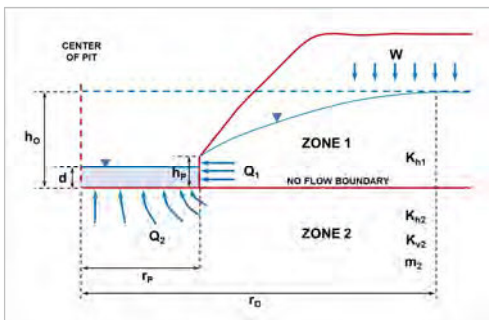
Analysed by: JFM
 Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland C
 Date: Friday, 7 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln \left(\frac{r}{r_p} \right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1} \left(\frac{r_p}{r} \right)$$

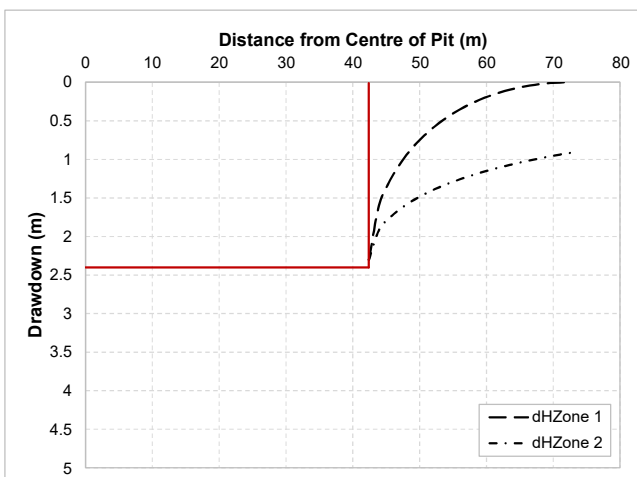
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1E-08	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	2.4	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	42.4	m	effective pit radius
d	0.1	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

73 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
42.4	2.3	2.3
43.9	1.6	1.9
45.4	1.3	1.8
46.9	1.1	1.7
48.4	0.9	1.6
49.9	0.8	1.5
51.4	0.6	1.4
52.9	0.5	1.4
54.5	0.4	1.3
56.0	0.4	1.3
57.5	0.3	1.2
59.0	0.2	1.2
60.5	0.2	1.1
62.0	0.13	1.1
63.5	0.10	1.1
65.0	0.07	1.0
66.5	0.04	1.0
68.0	0.02	1.0
69.5	0.01	1.0
71.0	0.00	0.9
72.5	0.00	0.9

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
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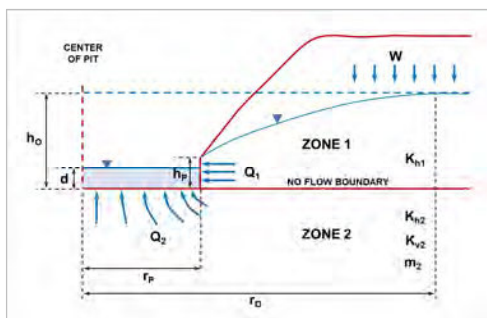
Analysed by: JFM
 Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
PROJECT: Brymer Development
Project #: WGA211193
Location: Wetland D
Date: Monday, 7 August 2026
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$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	8.00E-09	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	1.1	m	initial saturated thickness above the base of Zone 1
h _p	0.75	m	saturated thickness at the pit wall
r _p	40.8	m	effective pit radius
d	0.75	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 53 m

Known h_o 1.1 m

h_o calculated using Equation A 1.1 m

Q₁ 2.8E-05 m³/s
2.41 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 3.4E-05 m³/s
2.97 m³/day

Total Pit Inflow

Q_{TOT} 6.2E-05 m³/s
5.38 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

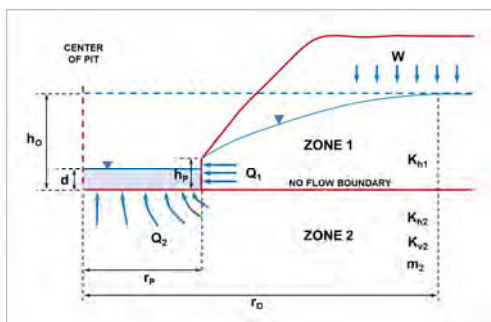
Analysed by: JFM
Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland D
 Date: Monday, 7 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln \left(\frac{r}{r_p} \right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1} \left(\frac{r_p}{r} \right)$$

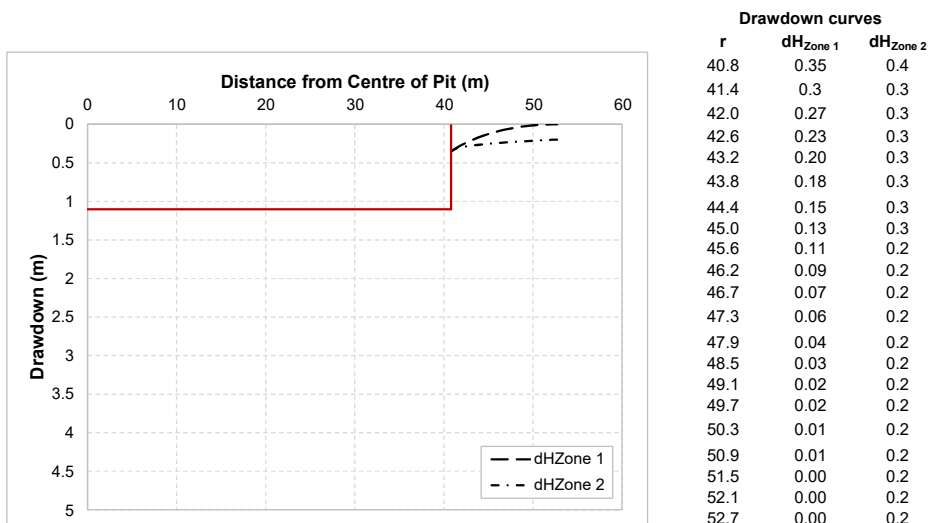
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	8E-09	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	1.1	m	initial saturated thickness above the base of Zone 1
h _p	0.75	m	saturated thickness at the pit wall
r _p	40.8	m	effective pit radius
d	0.75	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

53 m



Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

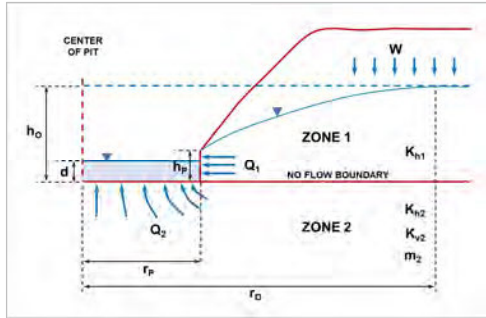
Analysed by: JFM
Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
PROJECT: Brymer Development
Project #: WGA211193
Location: Wetland D
Date: Wednesday, 7 August 2026
Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.00E-08	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	2.1	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	40.8	m	effective pit radius
d	0.1	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 67 m

Known h_o 2.1 m

h_o calculated using Equation A 2.1 m

Q₁ 9.0E-05 m³/s
7.79 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 2.0E-04 m³/s
16.94 m³/day

Total Pit Inflow

Q_{TOT} 2.9E-04 m³/s
24.73 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
Simple analytical equations for estimating ground water inflow
to a mine pit. Ground Water 38, no. 2: 311-314.

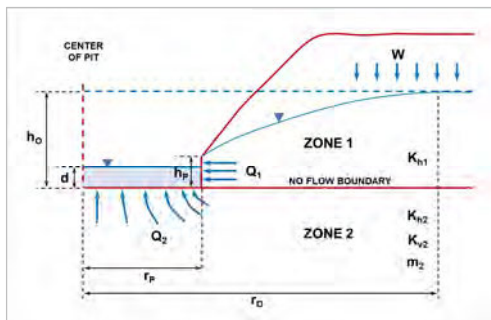
Analysed by: JFM
Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland D
 Date: Wednesday, 7 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

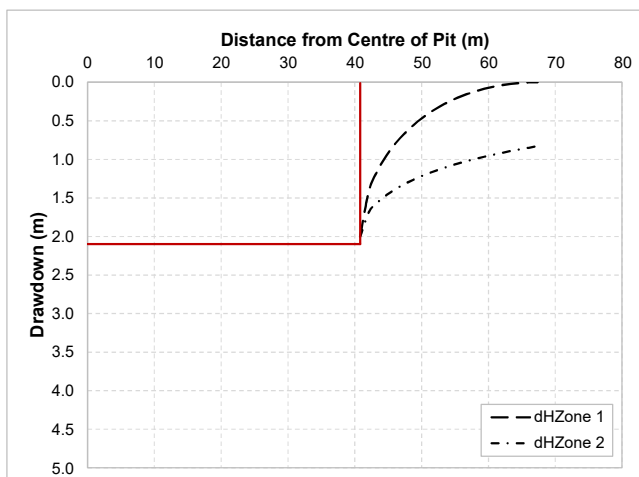
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1E-08	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	2.1	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	40.8	m	effective pit radius
d	0.1	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

67 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
40.8	2.0	2.0
42.1	1.4	1.7
43.5	1.1	1.6
44.8	0.9	1.5
46.1	0.8	1.4
47.4	0.7	1.3
48.8	0.6	1.3
50.1	0.5	1.2
51.4	0.4	1.2
52.7	0.3	1.1
54.1	0.3	1.1
55.4	0.2	1.1
56.7	0.2	1.0
58.0	0.1	1.0
59.4	0.1	1.0
60.7	0.1	0.9
62.0	0.04	0.9
63.4	0.02	0.9
64.7	0.01	0.9
66.0	0.00	0.8
67.3	0.00	0.8

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

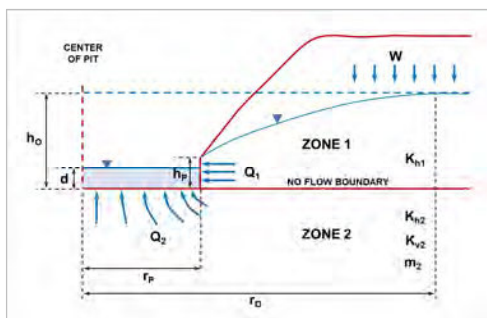
Analysed by: JFM
 Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland E
 Date: Tuesday, 11 August 2026
 Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	8.00E-09	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	1.2	m	initial saturated thickness above the base of Zone 1
h _p	0.85	m	saturated thickness at the pit wall
r _p	54.3	m	effective pit radius
d	0.85	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r _o calculated by iterating equation A	67	m
Known h _o	1.2	m
h _o calculated using Equation A	1.2	m
Q ₁	3.8E-05	m ³ /s
	3.32	m ³ /day

Inflow from Zone 2

Anisotropy parameter calculated using equation D	3.162278	
Q ₂	4.6E-05	m ³ /s
	3.95	m ³ /day

Total Pit Inflow

Q _{TOT}	8.4E-05	m ³ /s
	7.27	m ³ /day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

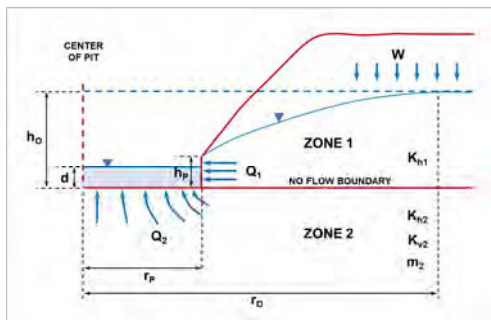
Analysed by: JFM
 Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland E
 Date: Tuesday, 11 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln \left(\frac{r}{r_p} \right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1} \left(\frac{r_p}{r} \right)$$

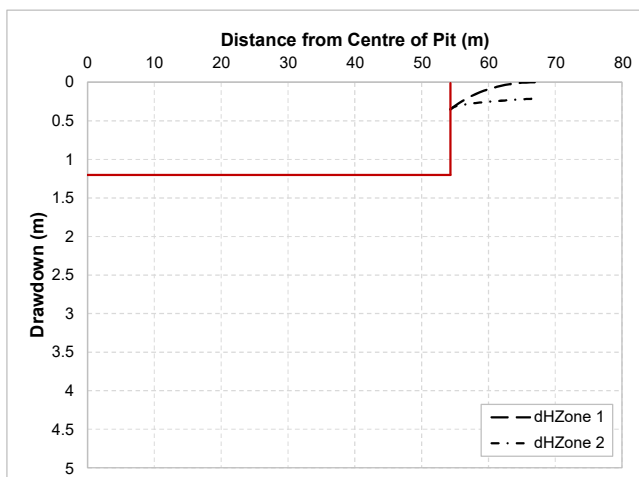
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	8E-09	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	1.2	m	initial saturated thickness above the base of Zone 1
h _p	0.85	m	saturated thickness at the pit wall
r _p	54.3	m	effective pit radius
d	0.85	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

67 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
54.3	0.35	0.4
54.9	0.3	0.3
55.6	0.3	0.3
56.2	0.2	0.3
56.8	0.2	0.3
57.5	0.2	0.3
58.1	0.2	0.3
58.7	0.1	0.3
59.3	0.1	0.3
60.0	0.1	0.3
60.6	0.1	0.2
61.2	0.1	0.2
61.9	0.0	0.2
62.5	0.03	0.2
63.1	0.03	0.2
63.8	0.02	0.2
64.4	0.01	0.2
65.0	0.01	0.2
65.7	0.00	0.2
66.3	0.00	0.2
66.9	0.00	0.2

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

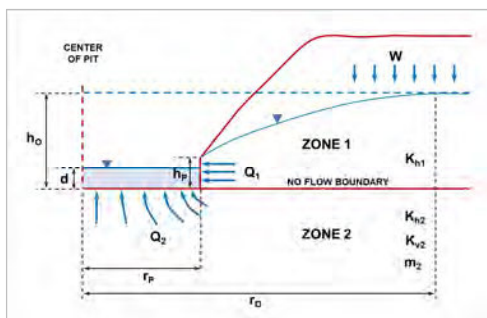
Analysed by: JFM
 Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland E
 Date: Tuesday, 11 August 2026
 Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.00E-08	m/s	recharge flux
K _{h1}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.90E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.90E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	2.2	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	54.3	m	effective pit radius
d	0.1	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 82 m

Known h_o 2.2 m

h_o calculated using Equation A 2.2 m

Q₁ 1.2E-04 m³/s
10.47 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 2.7E-04 m³/s
23.68 m³/day

Total Pit Inflow

Q_{TOT} 4.0E-04 m³/s
34.15 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

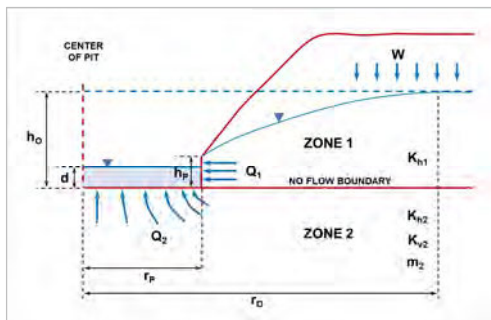
Analysed by: JFM
 Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland E
 Date: Tuesday, 11 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

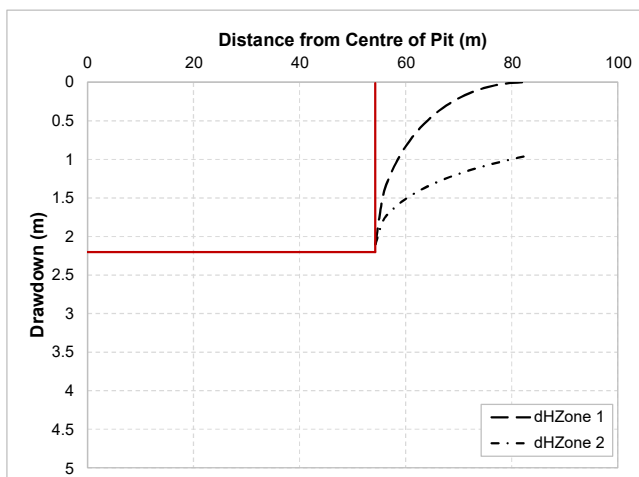
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1E-08	m/s	recharge flux
K _{h1}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.9E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.9E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	2.2	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	54.3	m	effective pit radius
d	0.1	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

82 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
54.3	2.1	2.1
55.7	1.5	1.8
57.1	1.2	1.7
58.5	1.0	1.6
59.9	0.8	1.5
61.3	0.7	1.5
62.8	0.6	1.4
64.2	0.5	1.3
65.6	0.4	1.3
67.0	0.3	1.3
68.4	0.3	1.2
69.8	0.2	1.2
71.2	0.2	1.2
72.6	0.1	1.1
74.0	0.1	1.1
75.4	0.06	1.1
76.9	0.04	1.0
78.3	0.02	1.0
79.7	0.01	1.0
81.1	0.00	1.0
82.5	0.00	1.0

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

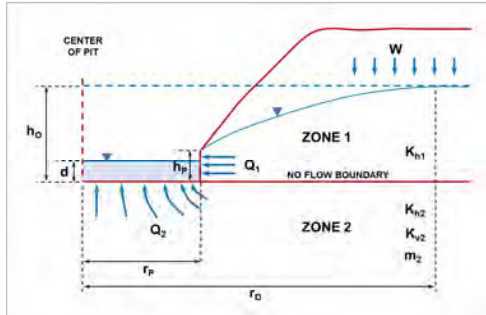
Analysed by: JFM
 Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
PROJECT: Brymer Development
Project #: WGA211193
Location: Wetland E
Date: Tuesday, 11 August 2026
Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.00E-08	m/s	recharge flux
K _{h1}	1.00E-06	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.00E-06	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.00E-07	m/s	vertical hydraulic conductivity in Zone 2
h _o	2.7	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	28.3	m	effective pit radius
d	0.1	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 53 m

Known h_o 2.7 m

h_o calculated using Equation A 2.7 m

Q₁ 6.2E-05 m³/s
5.32 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 9.3E-05 m³/s
8.04 m³/day

Total Pit Inflow

Q_{TOT} 1.5E-04 m³/s
13.36 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

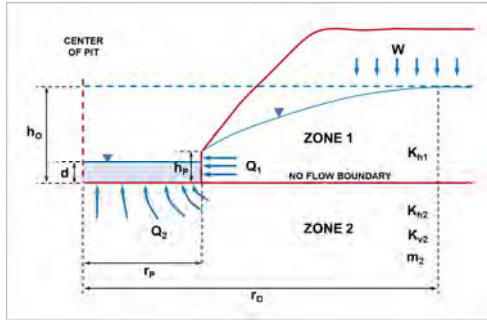
Analysed by: JFM
Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland E
 Date: Tuesday, 11 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln\left(\frac{r}{r_p}\right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1}\left(\frac{r_p}{r}\right)$$

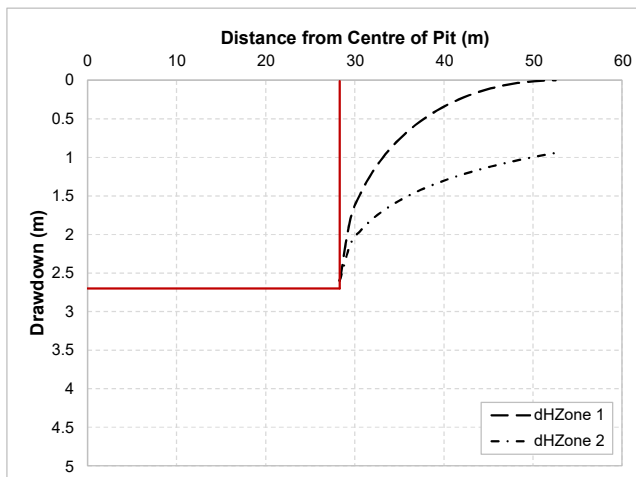
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1E-08	m/s	recharge flux
K _{h1}	0.000001	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	0.000001	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1E-07	m/s	vertical hydraulic conductivity in Zone 2
h ₀	2.7	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	28.3	m	effective pit radius
d	0.1	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

53 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
28.3	2.6	2.6
29.5	1.8	2.1
30.7	1.4	1.9
31.9	1.2	1.8
33.1	1.0	1.7
34.4	0.8	1.6
35.6	0.7	1.5
36.8	0.6	1.5
38.0	0.5	1.4
39.2	0.4	1.3
40.4	0.3	1.3
41.6	0.2	1.2
42.8	0.2	1.2
44.1	0.15	1.2
45.3	0.10	1.1
46.5	0.07	1.1
47.7	0.05	1.1
48.9	0.03	1.0
50.1	0.01	1.0
51.3	0.00	1.0
52.5	0.00	0.9

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

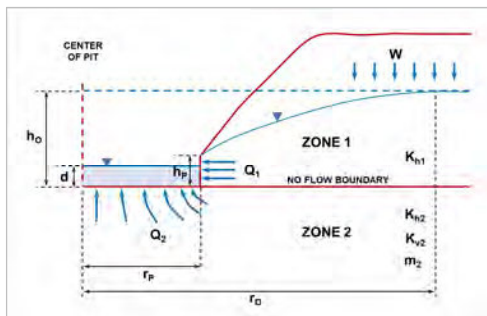
Analysed by: JFM
Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
PROJECT: Brymer Development
Project #: WGA211193
Location: Wetland F
Date: Tuesday, 11 August 2026
Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.00E-08	m/s	recharge flux
K _{h1}	1.00E-05	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	1.00E-05	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	1.00E-06	m/s	vertical hydraulic conductivity in Zone 2
h _o	2.7	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	28.3	m	effective pit radius
d	0.1	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 97 m

Known h_o 2.7 m

h_o calculated using Equation A 2.7 m

Q₁ 2.7E-04 m³/s
23.35 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 9.3E-04 m³/s
80.41 m³/day

Total Pit Inflow

Q_{TOT} 1.2E-03 m³/s
103.76 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

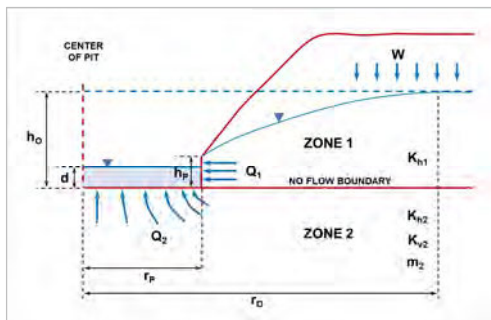
Analysed by: JFM
Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland F
 Date: Tuesday, 11 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln \left(\frac{r}{r_p} \right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1} \left(\frac{r_p}{r} \right)$$

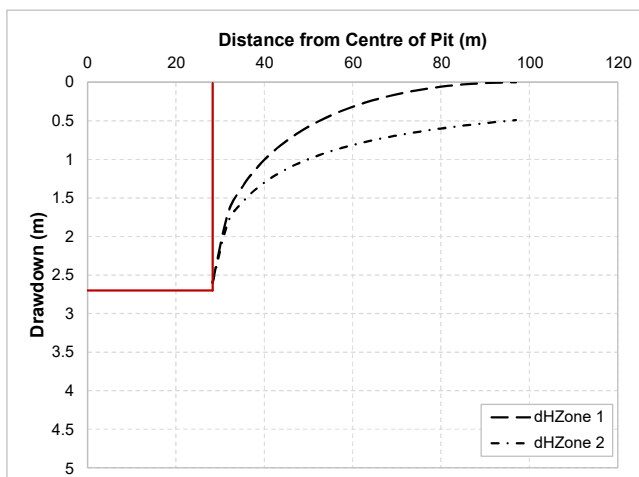
$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1E-08	m/s	recharge flux
K _{h1}	0.00001	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	0.00001	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	0.000001	m/s	vertical hydraulic conductivity in Zone 2
h ₀	2.7	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	28.3	m	effective pit radius
d	0.1	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1

97 m



Drawdown curves

r	dH _{Zone 1}	dH _{Zone 2}
28.3	2.6	2.6
31.7	1.7	1.8
35.2	1.3	1.5
38.6	1.1	1.4
42.0	0.9	1.2
45.5	0.7	1.1
48.9	0.6	1.0
52.3	0.5	0.9
55.8	0.4	0.9
59.2	0.3	0.8
62.6	0.3	0.8
66.1	0.2	0.7
69.5	0.2	0.7
72.9	0.12	0.7
76.4	0.09	0.6
79.8	0.06	0.6
83.2	0.04	0.6
86.7	0.02	0.6
90.1	0.01	0.5
93.5	0.00	0.5
97.0	0.00	0.5

Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

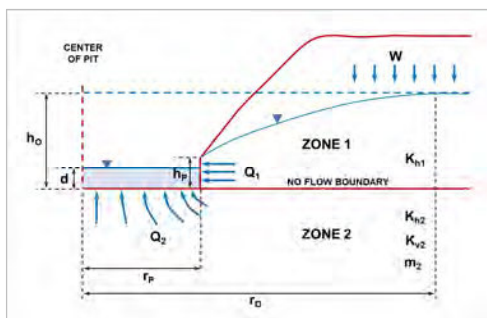
Analysed by: JFM
 Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

INFLOW TO OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
PROJECT: Brymer Development
Project #: WGA211193
Location: Wetland G
Date: Tuesday, 11 August 2026
Document #: WGA211193-RP-HG-0010



$$A \quad h_o = \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_o^2 \ln \left(\frac{r_o}{r_p} \right) - \frac{(r_o^2 - r_p^2)}{2} \right]}$$

$$B \quad Q_1 = W \pi (r_o^2 - r_p^2)$$

$$C \quad Q_2 = 4 r_p \left(\frac{K_{h2}}{m_2} \right) (h_o - d)$$

$$D \quad m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1.00E-08	m/s	recharge flux
K _{h1}	6.30E-07	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	6.30E-07	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	6.30E-08	m/s	vertical hydraulic conductivity in Zone 2
h _o	2	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	21	m	effective pit radius
d	0.1	m	depth of the pit lake

r_o is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Inflow from Zone 1

Radius of influence r_o calculated by iterating equation A 35 m

Known h_o 2 m

h_o calculated using Equation A 2.0 m

Q₁ 2.6E-05 m³/s
2.22 m³/day

Inflow from Zone 2

Anisotropy parameter calculated using equation D 3.162278

Q₂ 3.2E-05 m³/s
2.75 m³/day

Total Pit Inflow

Q_{TOT} 5.8E-05 m³/s
4.97 m³/day

Reference: Marinelli, F. & Niccoli W. L. 2000.
Simple analytical equations for estimating ground water inflow
to a mine pit. Ground Water 38, no. 2: 311-314.

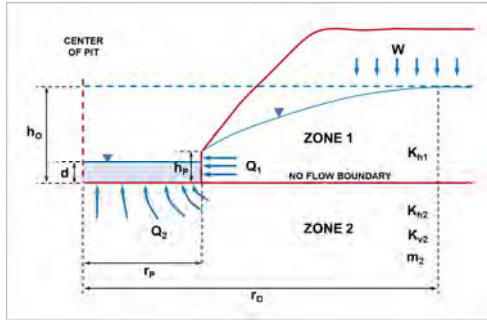
Analysed by: JFM
Checked by: CMH

Notes:

GROUNDWATER DRAWDOWN AROUND OPEN PIT - APPROXIMATION

WGA

CLIENT: Brymer Farms Ltd
 PROJECT: Brymer Development
 Project #: WGA211193
 Location: Wetland G
 Date: Tuesday, 11 August 2026
 Document #: WGA211193-RP-HG-0010



$$dH_{Zone1} = h_0 - \sqrt{h_p^2 + \frac{W}{K_{h1}} \left[r_0^2 \ln \left(\frac{r}{r_p} \right) - \frac{(r^2 - r_p^2)}{2} \right]}$$

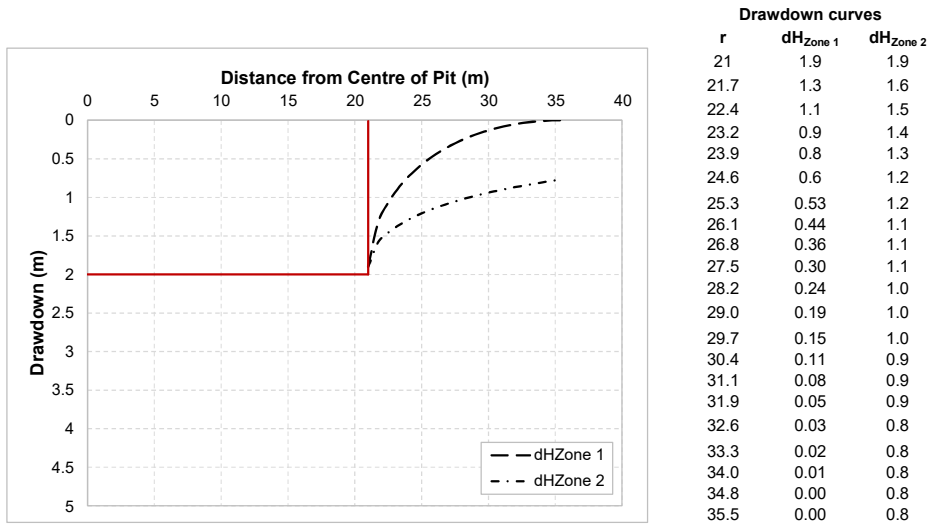
$$dH_{Zone2} = \frac{2(h_0 - d)}{\pi} \sin^{-1} \left(\frac{r_p}{r} \right)$$

$$m_2 = \sqrt{\frac{K_{h2}}{K_{v2}}}$$

W	1E-08	m/s	recharge flux
K _{h1}	6.3E-07	m/s	horizontal hydraulic conductivity in Zone 1
K _{h2}	6.3E-07	m/s	horizontal hydraulic conductivity in Zone 2
K _{v2}	6.3E-08	m/s	vertical hydraulic conductivity in Zone 2
h ₀	2	m	initial saturated thickness above the base of Zone 1
h _p	0.1	m	saturated thickness at the pit wall
r _p	21	m	effective pit radius
d	0.1	m	depth of the pit lake

r₀ is the radius of influence measured from the center of the pit beyond which groundwater drawdown is nil.

Radius of influence r₀ calculated by iterating equation A in analysis sheet 1 35 m



Reference: Marinelli, F. & Niccoli W. L. 2000.
 Simple analytical equations for estimating ground water inflow
 to a mine pit. Ground Water 38, no. 2: 311-314.

Analysed by: JFM
Checked by: CMH

Notes: The drawdown curves apply along the no-flow boundary line at an elevation equivalent to the base of the pit.
 The dH_{Zone2} line does not take into account recharge from above.
 Drawdown projections are initial approximations only.

APPENDIX H

DRAWDOWN CALCULATIONS FOR WASTEWATER PUMP STATIONS

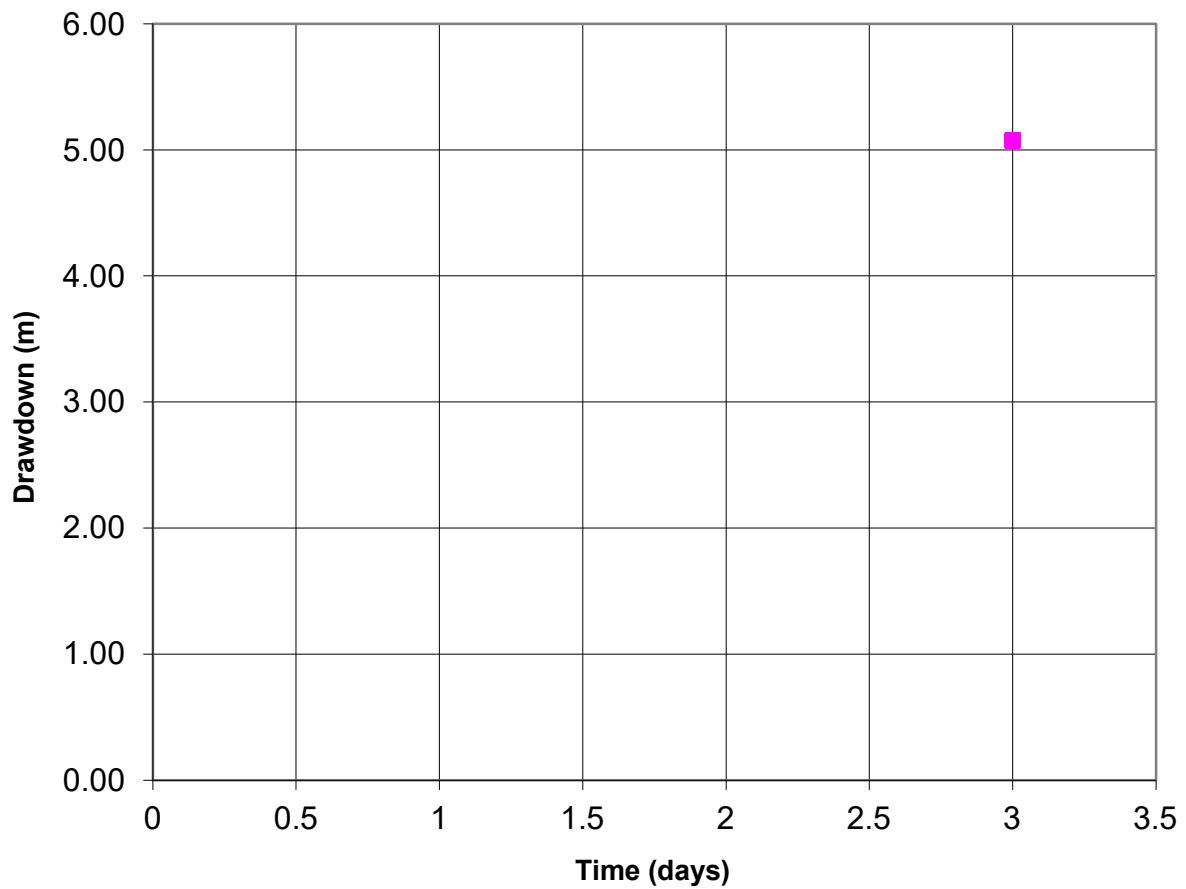


Time-drawdown calculations using Theis equation

Aquifer parameters		
T	5	m2/d
S	0.1	
L		
Pumping rate		
Q	8.8	l/s

Radius (m)	19.6	19.6	19.6
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075
3	5.075	5.075	5.075

Drawdown vs time

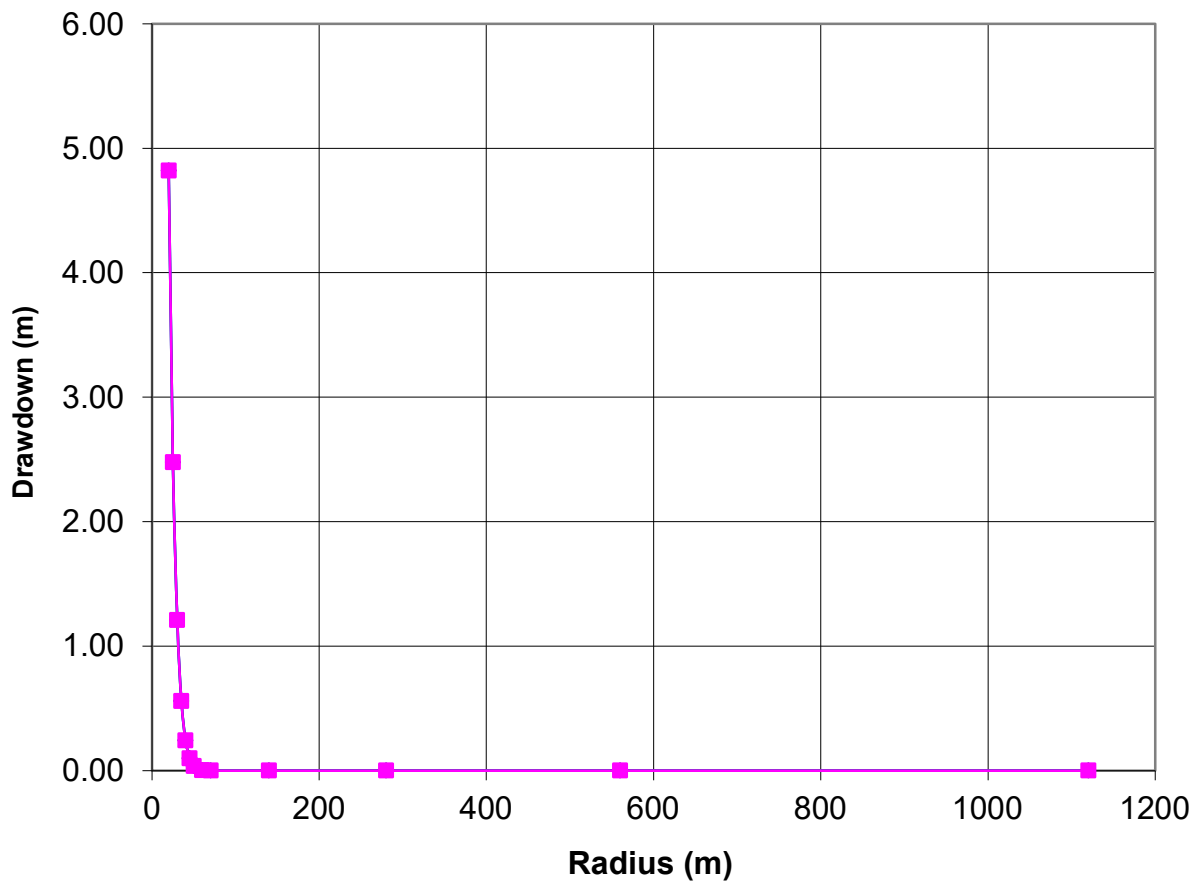


Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	5	m ² /d
S	0.1	
L		
Pumping rate		
Q	8.8	l/s

Time (days)	3	3	3
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
20	4.821	4.821	4.821
25	2.477	2.477	2.477
30	1.210	1.210	1.210
35	0.559	0.559	0.559
40	0.242	0.242	0.242
45	0.099	0.099	0.099
50	0.037	0.037	0.037
60	0.004	0.004	0.004
70	0.000	0.000	0.000
140	-	-	-
280	-	-	-
560	-	-	-
1120	-	-	-

Drawdown vs distance

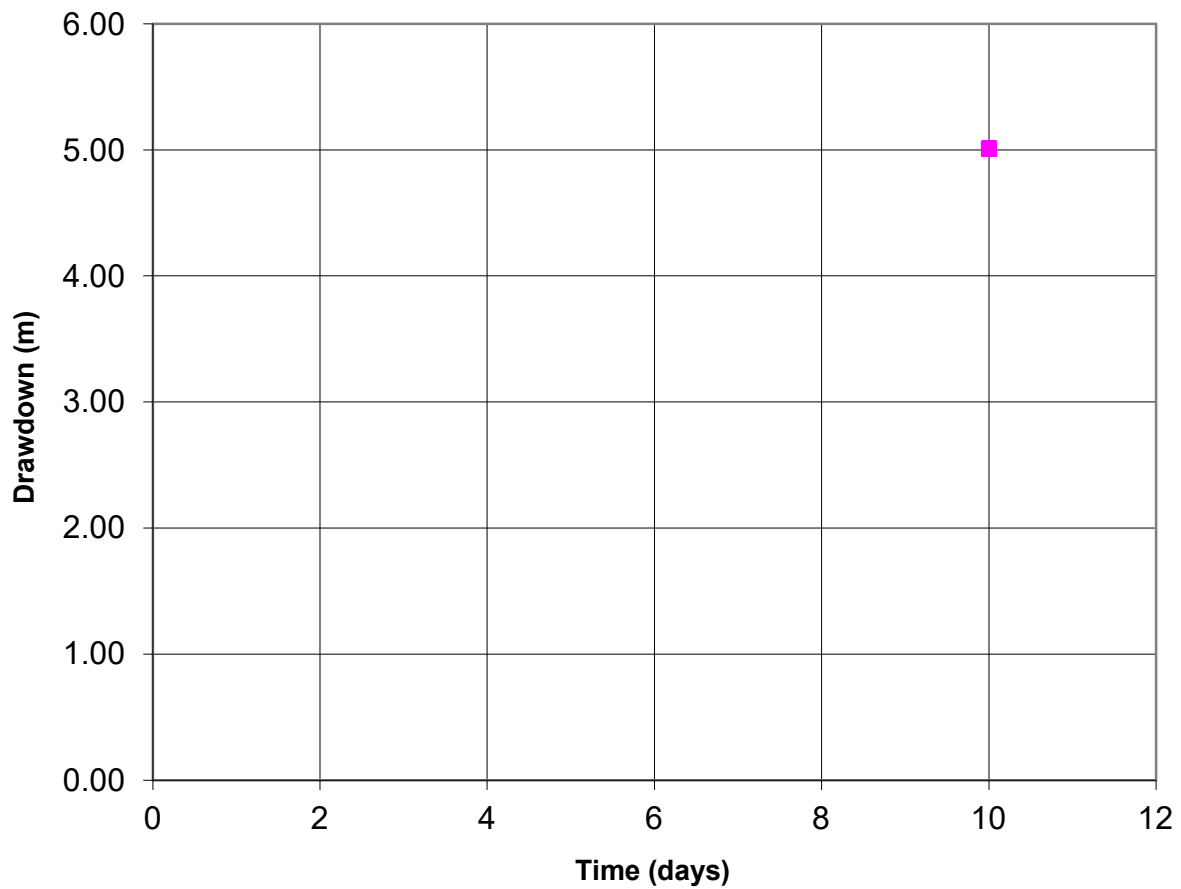


Time-drawdown calculations using Theis equation

Aquifer parameters		
T	5	m2/d
S	0.1	
L		
Pumping rate		
Q	2.9	l/s

Radius (m)	19.6	19.6	19.6
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008
10	5.008	5.008	5.008

Drawdown vs time

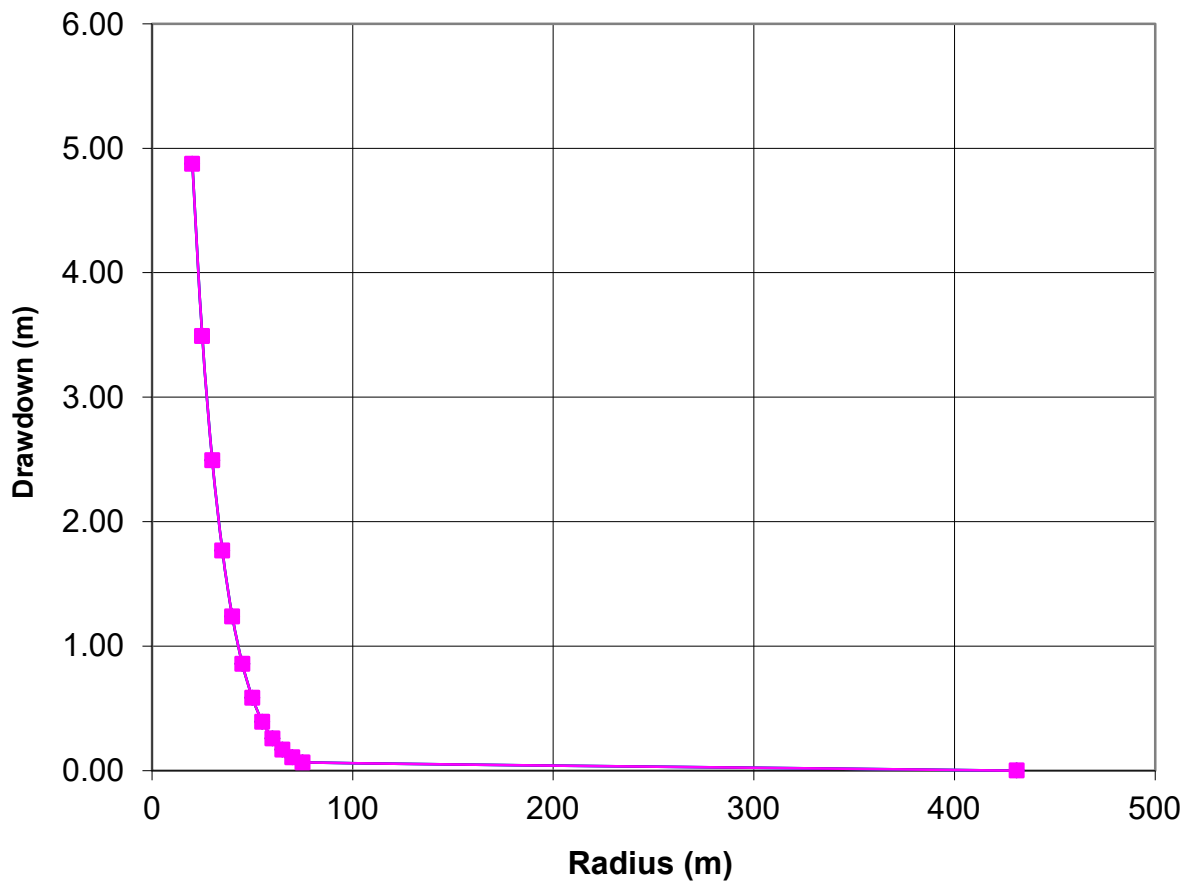


Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	5	m ² /d
S	0.1	
L		
Pumping rate		
Q	2.9	l/s

Time (days)	10	10	10
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
20	4.876	4.876	4.876
25	3.492	3.492	3.492
30	2.494	2.494	2.494
35	1.767	1.767	1.767
40	1.239	1.239	1.239
45	0.857	0.857	0.857
50	0.584	0.584	0.584
55	0.392	0.392	0.392
60	0.258	0.258	0.258
65	0.167	0.167	0.167
70	0.106	0.106	0.106
75	0.066	0.066	0.066
431	-	-	-

Drawdown vs distance

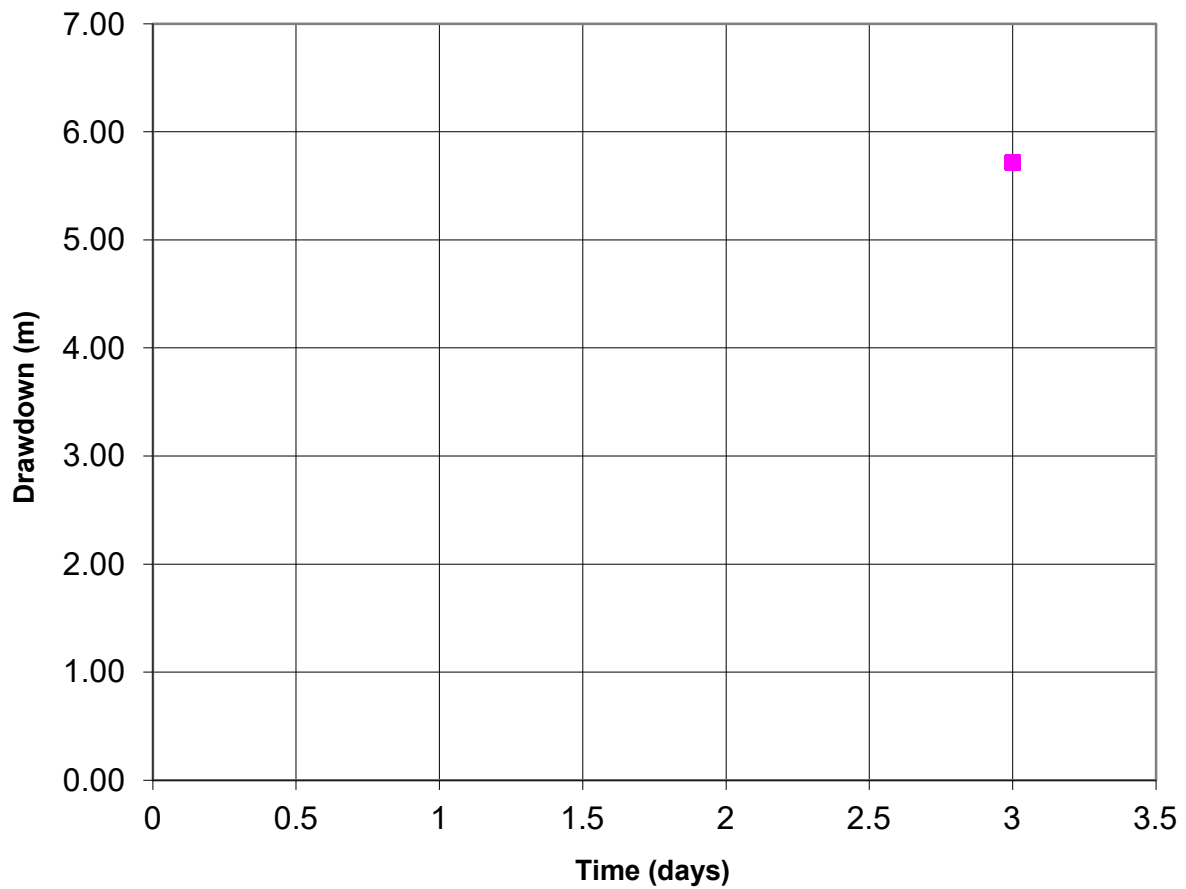


Time-drawdown calculations using Theis equation

Aquifer parameters		
T	5	m2/d
S	0.1	
L		
Pumping rate		
Q	10.3	l/s

Radius (m)	19.9	19.9	19.9
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716
3	5.716	5.716	5.716

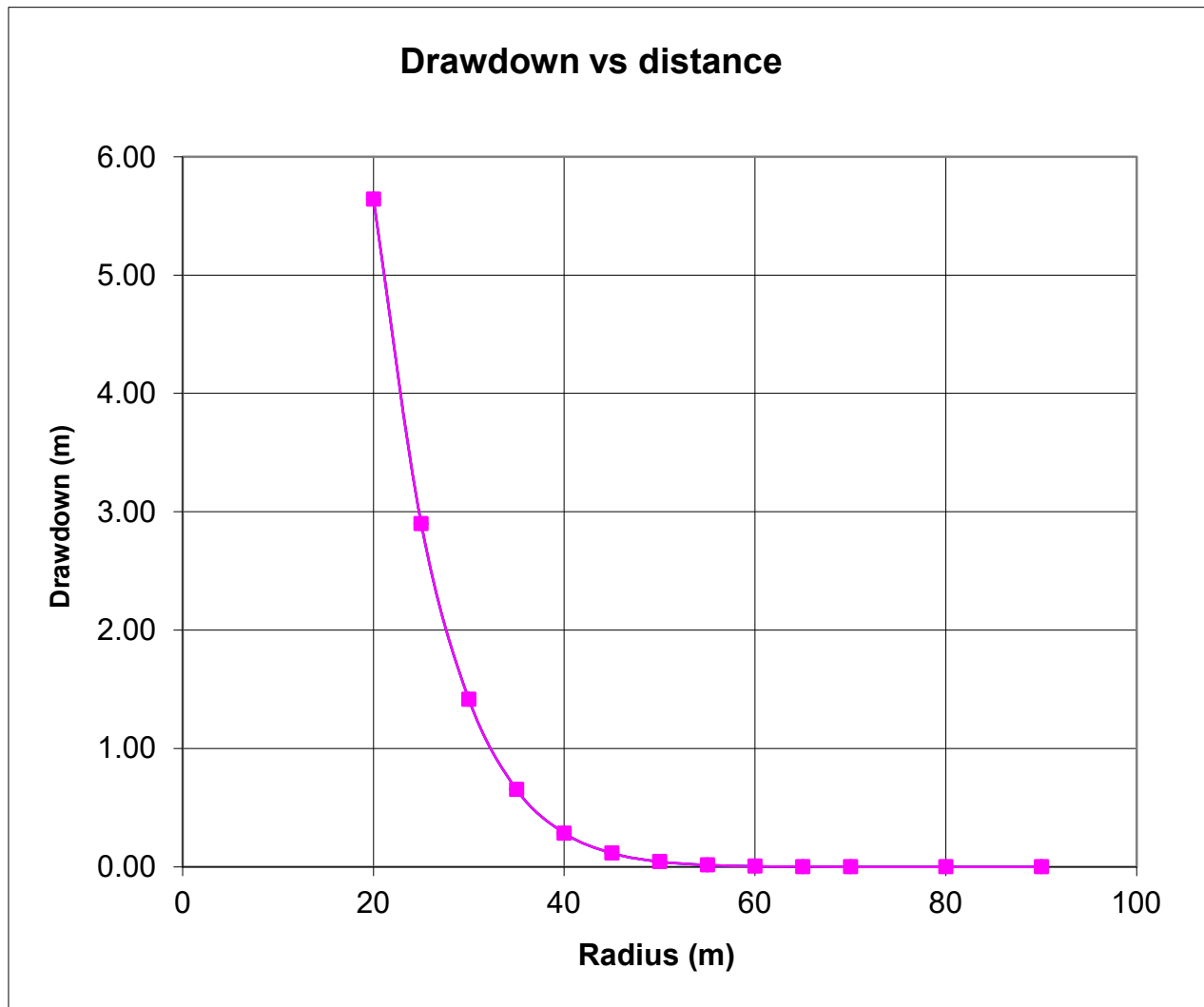
Drawdown vs time



Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	5	m ² /d
S	0.1	
L		
Pumping rate		
Q	10.3	l/s

Time (days)	3	3	3
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
20	5.643	5.643	5.643
25	2.899	2.899	2.899
30	1.417	1.417	1.417
35	0.654	0.654	0.654
40	0.284	0.284	0.284
45	0.115	0.115	0.115
50	0.044	0.044	0.044
55	0.015	0.015	0.015
60	0.005	0.005	0.005
65	0.002	0.002	0.002
70	0.000	0.000	0.000
80	0.000	0.000	0.000
90	0.000	0.000	0.000

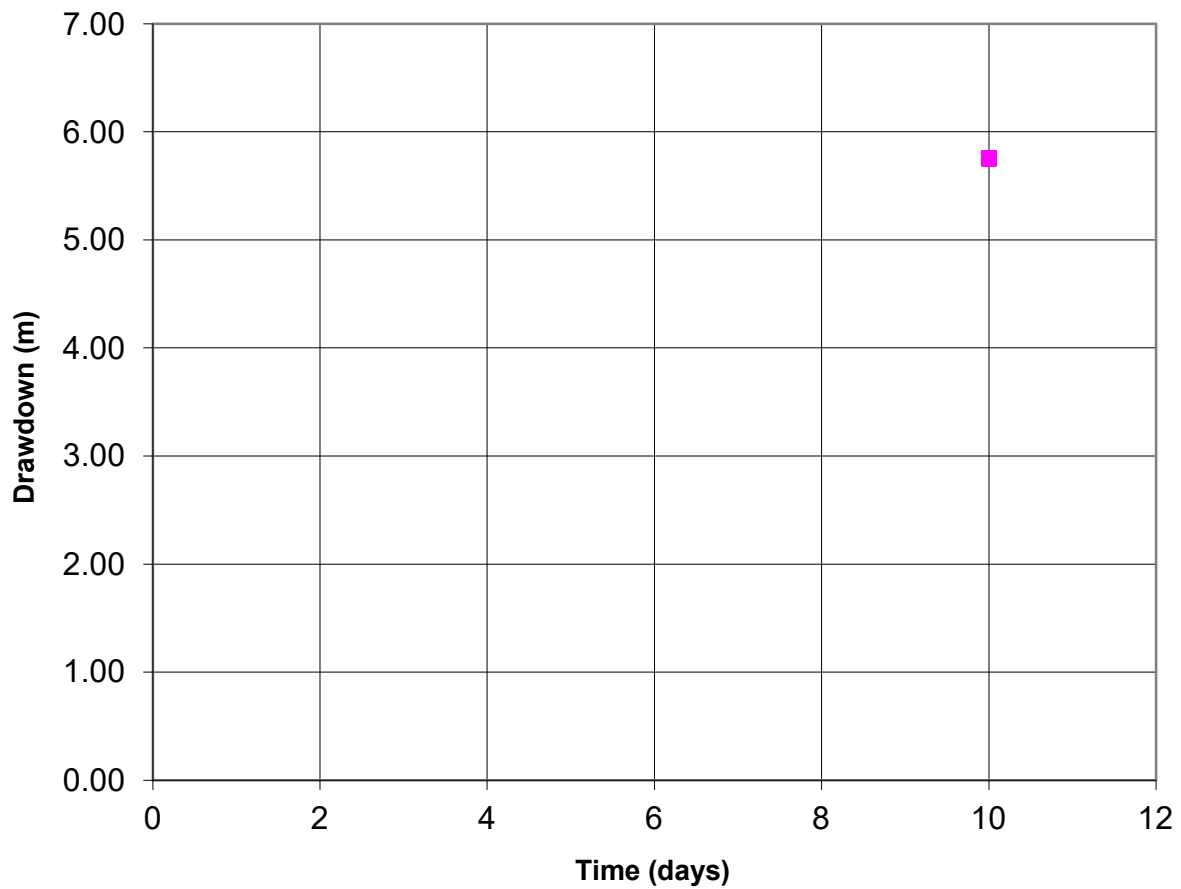


Time-drawdown calculations using Theis equation

Aquifer parameters		
T	5	m2/d
S	0.1	
L		
Pumping rate		
Q	3.4	l/s

Radius (m)	19.9	19.9	19.9
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755
10	5.755	5.755	5.755

Drawdown vs time

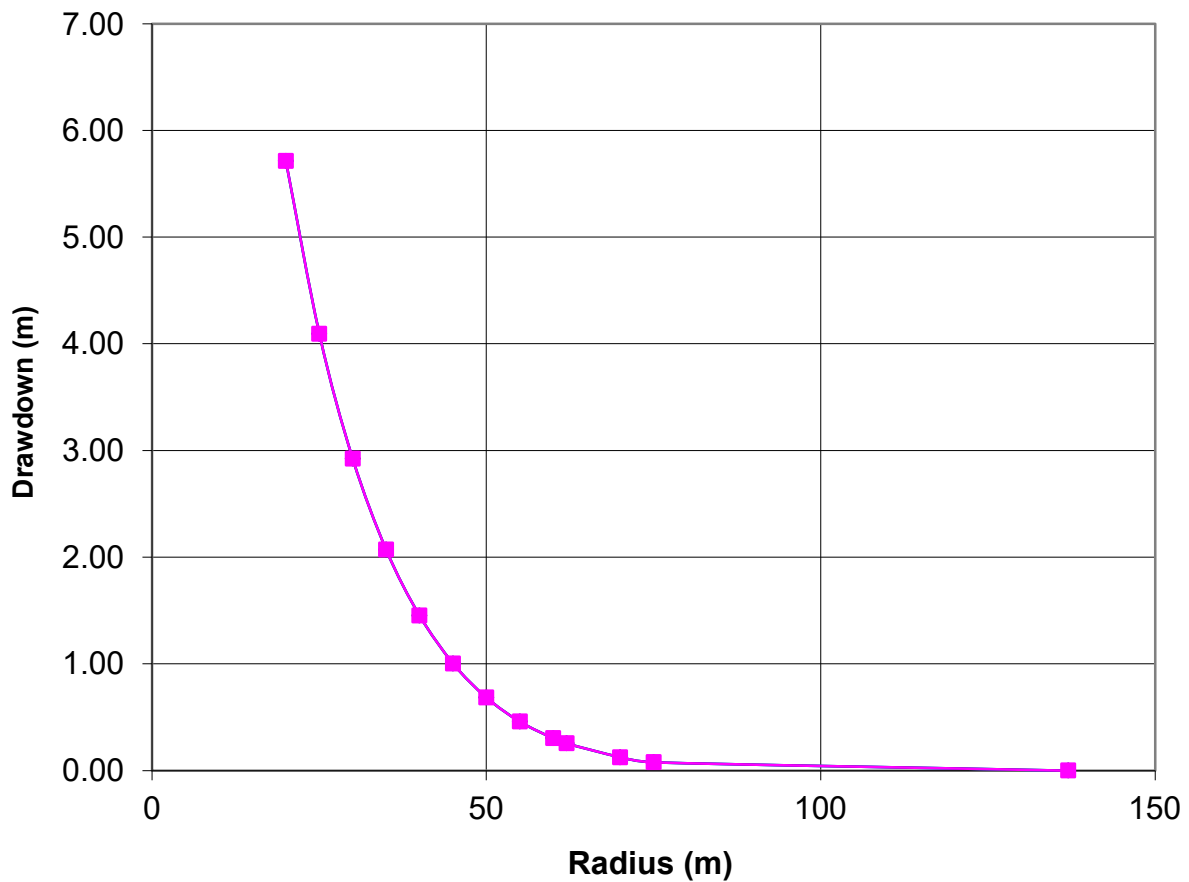


Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	5	m ² /d
S	0.1	
L		
Pumping rate		
Q	3.4	l/s

Time (days)	10	10	10
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
20	5.716	5.716	5.716
25	4.094	4.094	4.094
30	2.924	2.924	2.924
35	2.072	2.072	2.072
40	1.452	1.452	1.452
45	1.004	1.004	1.004
50	0.685	0.685	0.685
55	0.459	0.459	0.459
60	0.303	0.303	0.303
62	0.255	0.255	0.255
70	0.124	0.124	0.124
75	0.078	0.078	0.078
137	0.000	0.000	0.000

Drawdown vs distance

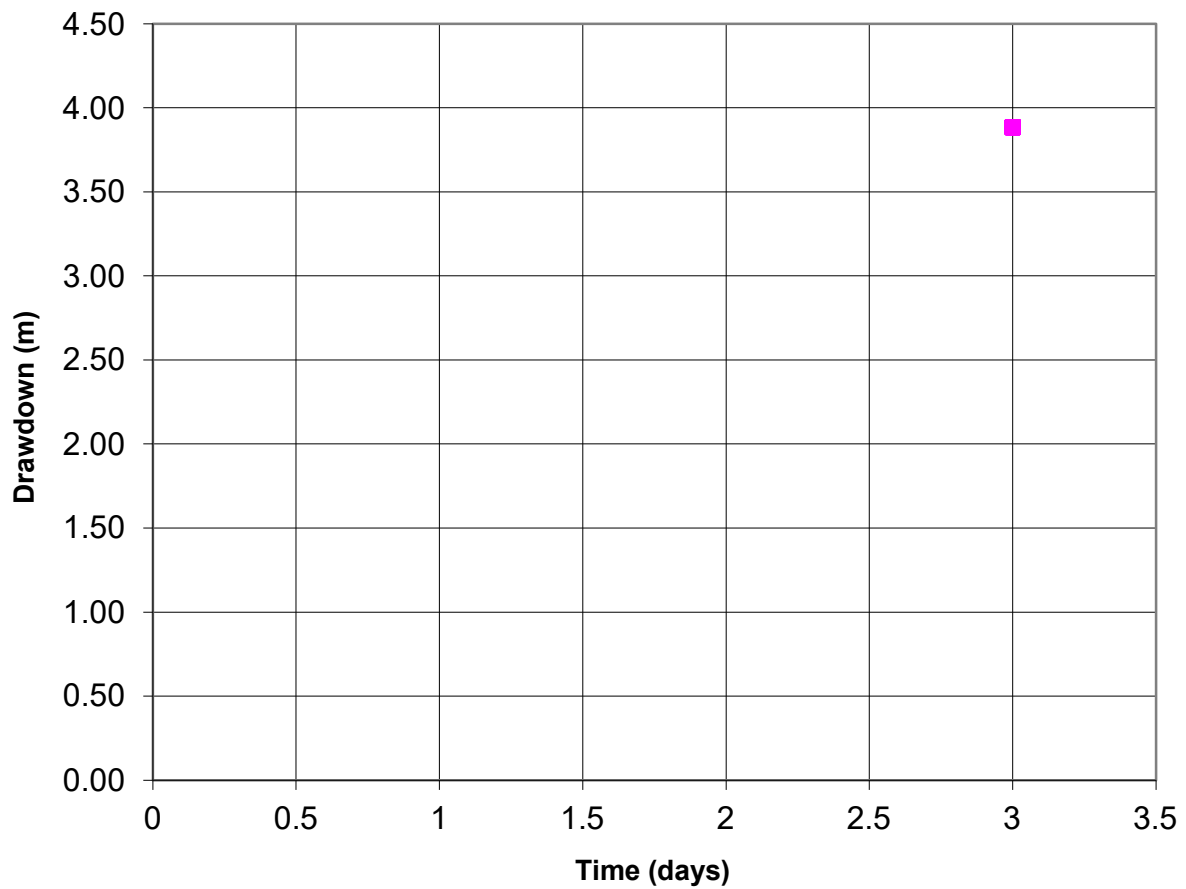


Time-drawdown calculations using Theis equation

Aquifer parameters		
T	8.6	m2/d
S	0.1	
L		
Pumping rate		
Q	4.8	l/s

Radius (m)	16.4	16.4	16.4
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884
3	3.884	3.884	3.884

Drawdown vs time

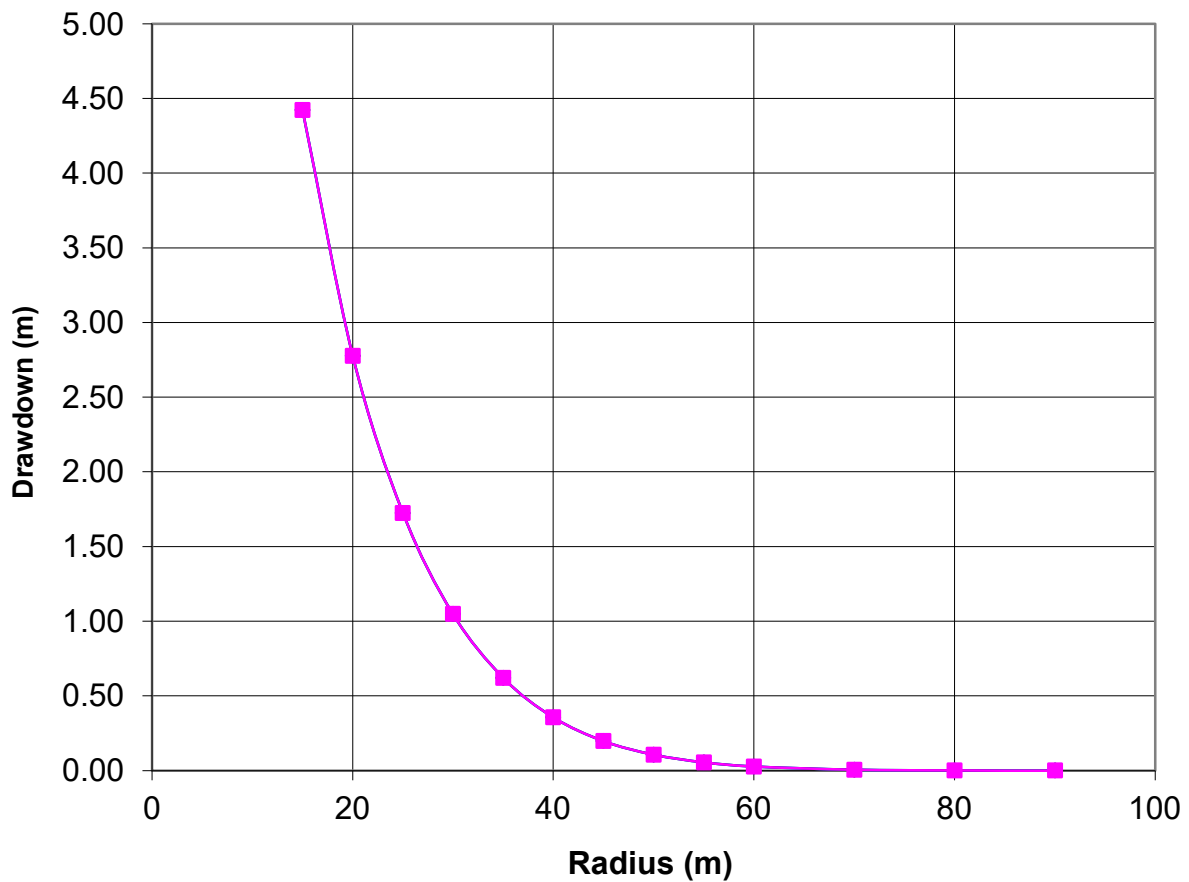


Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	8.6	m ² /d
S	0.1	
L		
Pumping rate		
Q	4.8	l/s

Time (days)	3	3	3
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
15	4.423	4.423	4.423
20	2.777	2.777	2.777
25	1.724	1.724	1.724
30	1.048	1.048	1.048
35	0.621	0.621	0.621
40	0.356	0.356	0.356
45	0.198	0.198	0.198
50	0.106	0.106	0.106
55	0.055	0.055	0.055
60	0.027	0.027	0.027
70	0.006	0.006	0.006
80	0.001	0.001	0.001
90	0.000	0.000	0.000

Drawdown vs distance

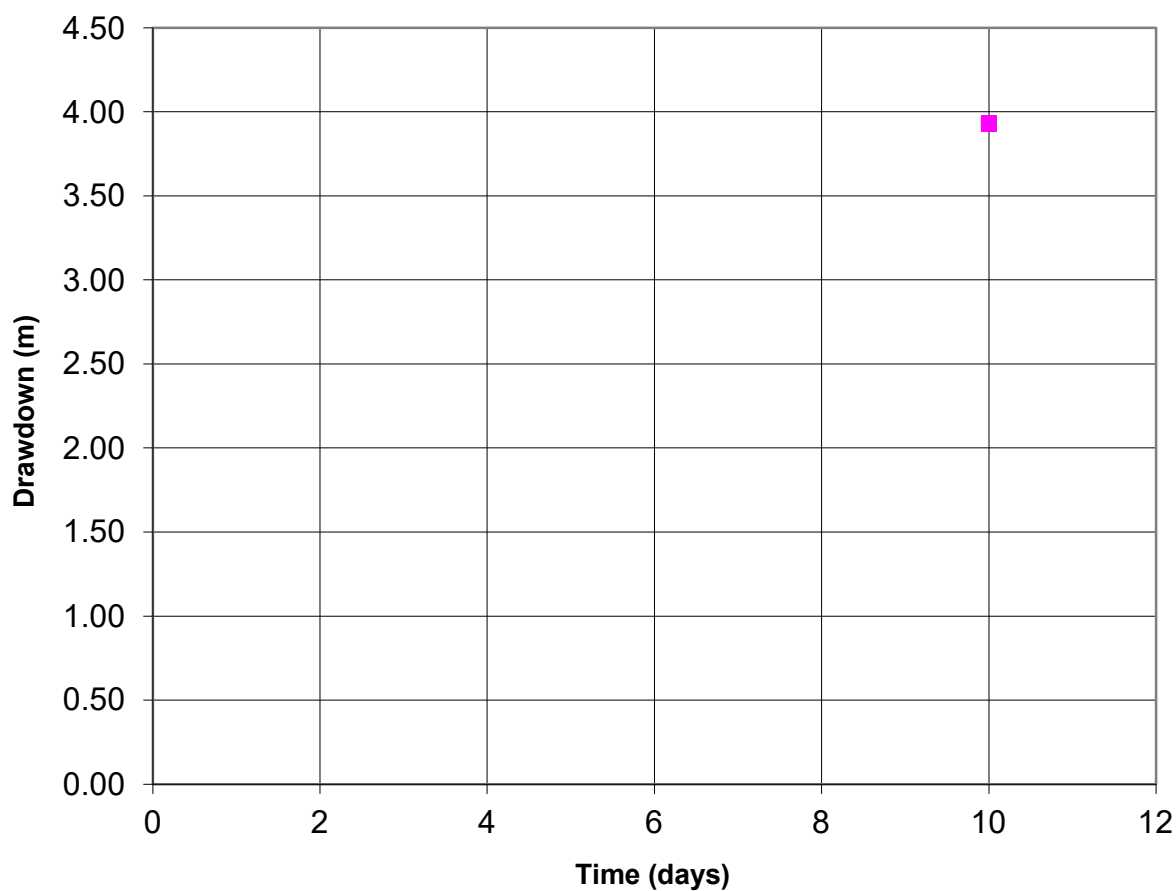


Time-drawdown calculations using Theis equation

Aquifer parameters		
T	8.6	m2/d
S	0.1	
L		
Pumping rate		
Q	2.4	l/s

Radius (m)	16.4	16.4	16.4
Time (days)	Drawdown (m)	Drawdown (m)	Drawdown (m)
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930
10	3.930	3.930	3.930

Drawdown vs time

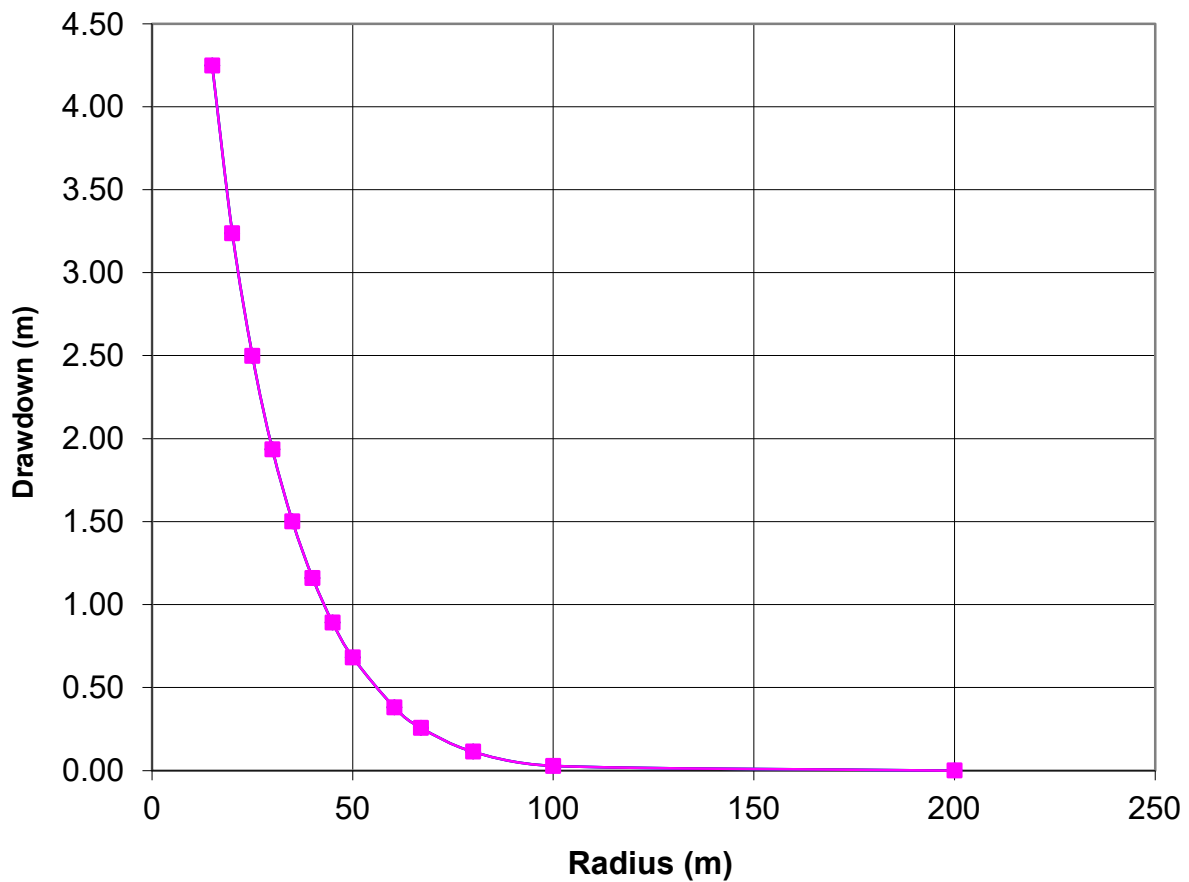


Distance-drawdown calculations using Theis equation

Aquifer parameters		
T	8.6	m ² /d
S	0.1	
L		
Pumping rate		
Q	2.4	l/s

Time (days)	10	10	10
Radius (m)	Drawdown (m)	Drawdown (m)	Drawdown (m)
15	4.249	4.249	4.249
20	3.238	3.238	3.238
25	2.498	2.498	2.498
30	1.936	1.936	1.936
35	1.501	1.501	1.501
40	1.160	1.160	1.160
45	0.892	0.892	0.892
50	0.682	0.682	0.682
60.4	0.381	0.381	0.381
67	0.258	0.258	0.258
80	0.114	0.114	0.114
100	0.028	0.028	0.028
200	0.000	0.000	0.000

Drawdown vs distance



APPENDIX I

CURRICULUM VITAE



Brett Sinclair

SENIOR PRINCIPAL HYDROGEOLOGIST

Brett is a Senior Principal Hydrogeologist with more than 30 years' experience in hydrogeology, geology, water management, water quality assessment and environmental effects mitigation.

Brett specialises in the evaluation, utilisation, management and protection of groundwater and groundwater-dependent surface water systems. He also specialises in the assessment of dewatering and groundwater management issues associated with large scale civil engineering and mining operations, including embankments and dams, cut and fill structures, deep excavations and underground structures.

He has worked internationally as a consultant and independent contractor, based in New Zealand, Australia and Germany. In addition, he has undertaken field hydrogeology investigations in Indonesia, Fiji and China.

Since 2000, Brett has constructed and acted as technical advisor for the development of numerous groundwater flow and contaminant transport models based on 2D and 3D modelling platforms. These models have been used for groundwater resource assessments, flow assessments for excavations and tunnels, slope stability analyses, seepage analyses through embankments and earth dams, and the assessment of effects on water quality arising from waste storage and wastewater irrigation.

WGA



QUALIFICATIONS & AFFILIATIONS

Postgraduate Certificate in Hydrogeology and Engineering Geology of Tropical and Subtropical Regions

MSc (Hons) Geology

BSc. Geology

Hydrological Society of New Zealand

Project Experience

Water Supply Systems

- **Groundwater Supply Systems, Numerous Clients, 1990 – 2024**

Project Manager, Technical Lead and/or Principal Hydrogeologist. Planned and supervised investigation drilling, well installation, and hydraulic test programs for clients requiring water for municipal, domestic, horticultural, agricultural and industrial purposes. Analysed the test data to determine production well efficiency and yield, and aquifer hydrogeological characteristics. Evaluated effects of planned abstraction on existing users and the surrounding environment to support consent applications for groundwater takes.

- **Saline Water Intrusion Risk Assessments, Various Clients, 2005 – 2023**

Principal Hydrogeologist and/or Technical Lead. Undertook or supervised desk top studies and field investigations including aquifer testing programs and groundwater system modelling of catchment groundwater systems subject to saline water intrusion risk arising from groundwater pumping. Presented evidence at Regional Council hearings.

- **Beachlands South Development, Beachlands South Limited Partnership, 2023**

Principal Hydrogeologist responsible for providing advice on testing of production bores for a municipal water supply. Supervised 3D geological and groundwater modelling to evaluate groundwater resources. Presented evidence regarding water supplies in support of a successful Private Plan Change application to Auckland Council for a change in land use.

Groundwater Management for Civil Developments

- **Construction Site Dewatering Reviews, Auckland Council, 2014 – 2023.**

Independent Peer Reviewer of applications for numerous construction site dewatering plans, with a focus on minimising potential effects on neighbouring landowners. Projects reviewed include wastewater tunnel and access shaft developments, stormwater pipeline developments and numerous deep basements in urban areas.

- **Civil Development Project Peer Reviewer, Various clients, 2009 – 2012**

Independent Peer Reviewer of technical assessments undertaken in support of major civil infrastructure projects, including:

- Waterview Tunnel, Auckland
- SH16 Causeway Raise, Auckland
- SH20 Excavation Dewatering, Auckland
- Waitaki River North Branch Tunnel, Canterbury

- **North-South Corridor Tunnel, Adelaide, Confidential client 2022 – 2023.**

Technical Lead for groundwater flow evaluation. Responsible for the evaluation of the effects of a twin road tunnel on groundwater pressures and flows in a layered multi-aquifer system. Developed methodologies for analytical assessment of inflows to lined tunnels through the construction period. Supervised modelling of focused site dewatering to enable construction of four dive structures, groundwater flow impedance by the final tunnel and dive structures and diversion of contaminant plumes during and following construction of the tunnels.

Groundwater Modelling

- **Groundwater Models, Various Clients, 2000 – 2024.**

Developed, supervised and technically reviewed numerous groundwater modelling projects simulating water flows and contaminant transport on site-specific to sub-regional scales. Projects included major civil infrastructure developments, mine sites, waste storage facilities, wastewater disposal facilities, groundwater resource quantification and abstraction assessments. Projects included 2D simulations supporting stability analysis of earth dams, flood protection embankments, earth-fill port facilities and opencast mine cuts.

- **NAIS ASR Project, 2018 – 2020.**

Technical Advisor and Reviewer for modelling of effects from existing and planned injection bores on water storage in a confined aquifer under the North Adelaide Plain. Appropriate model conceptualization and parameterization significantly improved the calibration in comparison to previous models. The model incorporated an innovative approach to the offshore flow boundary. Platform: Visual MODFLOW Classic.

- **Poverty Bay Flats, 2022 – 2023**

Technical Lead for the development of a regional scale 3D geological model on which a 3D groundwater model was based. Developed the conceptual groundwater model. Technical Advisor for development of a 3D groundwater model incorporating climate change effects through to 2080. The model was used to simulate a range of groundwater management options to evaluate their potential to offset projected climate change effects on environmental, cultural, social, and economic parameters. Platforms: GeoModeller, FEFLOW.

- **Rotokauri Greenway, 2023**

Technical Lead for the development of detailed 2D groundwater models to evaluate groundwater drawdown around a substantial drainage channel and to support the slope stability assessment for the cut slopes. Platform: SLIDE2

- **West Coast Stopbank Groundwater Seepage Modelling, 2024 – ongoing.**

Technical Lead for the development of detailed 2D groundwater models to evaluate groundwater pressure and seepage responses to storm flow events in and underneath planned river stopbanks to support stopbank geotechnical stability and ground heave risk assessments. Platform: SLIDE2. Projects include:

- Hokitika
- McKenna Stopbank, Westport

Managed Aquifer Recharge

- **Managed Aquifer Recharge (MAR) Projects, Various Clients, 2013 – Ongoing**

Principal Hydrogeologist responsible for groundwater pre-feasibility, feasibility and pilot trial assessments for MAR and Aquifer Storage and Recovery (ASR) projects at the sub-regional scale. Assessments include project planning, design, construction, testing, commissioning, monitoring, and documentation of multi-year outcomes.

- Makauri Aquifer MAR trial, 2013-2017
- Hinds Plains trial, 2014 – 2019
- Oreti Basin trial, 2018 – 2020
- NAIS ASR Project, 2018 – 2020
- Aldinga ASR Project, 2019 – 2020
- Nambeelup ASR concept, 2018

- **Central Hawkes Bay Project, 2018 – ongoing.**

Principal Hydrogeologist for the pre-feasibility assessment of MAR as an enhanced water storage option for agricultural supply. Project included area and site suitability assessments, site prioritization and final site identification. Responsible for conceptual infiltration basin and site water control system designs. Undertook field infiltration testing and supervised groundwater mounding assessments.

Mine Water Management

- **Hard Rock Opencast and Underground Mine Projects, International Clients, 2000-2024**

Supervised field mapping and rock mass hydraulic testing programs to depths of 600 m, evaluated effects of mine construction, operation and closure on surrounding groundwater systems. Assessed mine inflows for site water management purposes. Evaluated potential tailings water seepage and pore water pressures through and beneath tailings and water storage reservoir embankments. Evaluated options for seepage mitigation and contaminant management.

- **Opencast & Underground Coal and Soft Rock Mine Projects, Various Clients, 2000 – 2015.**

Supervised field mapping and hydraulic testing and sampling programs to depths of 400 m. Evaluated effects of mine construction, operation, and closure on surrounding groundwater systems. Assessed inflows for site water management purposes. Assessed contaminant transport in groundwater, discharge zones and receiving water concentrations for ecological effects and health risk assessments. Projects included mine sites in New Zealand, Australia, Indonesia, and Mongolia.

- **West Coast Mineral Sands, Project Reviewer**

Acted as independent peer reviewer on behalf of regulatory authorities for several proposed mineral sand mines located close to protected wetlands. Projects: Barrytown & Okari.

- **Reefton Gold Project, Oceana Gold, 2005-2024, Technical expert.**

Evaluate groundwater flows to multiple opencast pits. Supervise construction of FEFLOW models to simulate seepage and contaminant losses from tailings and waste rock storage areas for several phases of mine development. Supervise construction of SEEP/W models to evaluate tailings seepage losses through a constructed sealing layer. Evaluate seepage management options and mitigation measures.

Clare Houlbrooke

PRINCIPAL HYDROGEOLOGIST

Clare is a Principal Hydrogeologist with over 25 years' experience in hydrogeological resource investigations. Clare's main focus is sustainable management of groundwater resources and connected surface water systems.

Clare has a strong interest in managed aquifer recharge and broad experience in groundwater numerical modelling for resource management purposes and in mining environments. She has led groundwater investigations and modelling projects recommending resource allocation policies. As part of these projects she has gained skills in communicating technical recommendations and groundwater policies to the general public and technical groups through reports and public meetings. Clare develops strong on-going relationships with clients and focus on finding appropriate and innovative solutions for client needs.

WGA



QUALIFICATIONS & AFFILIATIONS

MSc (Hons, Tech) Earth Sciences

BSc Earth Sciences

Project Experience

Water

Integrated Catchment Management

- **Makauri Aquifer Managed Aquifer Recharge (MAR) expansion to scheme, MAR Ltd, 2017 – 2025**

Clare has been working with key local groundwater users who have formed a company to establish a Groundwater Replenishment Scheme for the Makauri Aquifer. Assessing potential locations for installing recharge bores and providing technical support for a resource consent application.

- **Makauri Aquifer MAR Pilot Trial, Gisborne District Council, 2013 - 2017**

Clare was the hydrogeologist and project manager supporting the development of a MAR trial near Gisborne. Tasks included preparation of

technical assessment of effects documents, coordinating data collection, presentations at public meetings, council meetings and a consent hearing, drilling management, design and conducting pumping tests and coordinating monitoring and reporting.

- **Wanaka MAR Pre-feasibility Assessment, 2015, Otago Regional Council**

Clare assessed the suitability of the Cardrona Gravel Aquifer for MAR, including a detailed review of the hydrogeological setting.

- **Central Hawkes Bay MAR Feasibility Study 2018-2025, Hawke's Bay Regional Council**

Clare was involved in assessing the suitability of the hydrogeological setting for a groundwater replenishment scheme. Included a thorough review of hydrogeology in relation to the applicability of MAR.

- **Oreti Basin MAR Trial, 2019 – 2020, Oreti MAR Trust**

Clare was the Senior Hydrogeologist assessing suitability of the Oreti Basin for a groundwater replenishment scheme. Included a detailed review of hydrogeological setting and assessment of effects for the trial. Prepared an assessment of environmental effects report for resource consent application and coordinated design of the bore and headworks.

- **Hinds Plains MAR Project, 2017-2018, Environment Canterbury**

Hydrogeologist and project manager assessing new site locations for expansion of the MAR scheme. Analysed response of the groundwater system to MAR in the Year 2 MAR trial report.

Water Resource Investigation

- **Hydrograph Analysis, Department of Agriculture, Western Australia, 1999 - 2000**

Clare was the Hydrogeologist and contributed to developing an analysis method for interpreting groundwater hydrographs. The method separated groundwater fluctuations associated with rainfall recharge from the underlying long-term trends. Involved in running workshops, writing user manuals and assisting in writing a scientific paper published in Australian Journal Soil Research.

- **Bendigo and Tarras Groundwater Allocation Study, 2010, Otago Regional Council**

Clare carried out a water allocation project using geophysical data and modelling using Visual Modflow to determine an allocation limit for the alluvial glacial outwash aquifer system.

- **Regional Water Management, various councils**

Clare managed the regional bore and groundwater quality databases for two regional councils. Carried out a review of Otago's state of environment groundwater monitoring network and made changes to address quality control issues.

- **Hautapu and Lichfield Groundwater Monitoring, Fonterra Limited, 2013 – 2017**

Clare was the Senior Hydrogeologist responsible for designing and conducting groundwater level monitoring at the dairy factory sites for resource consent compliance.

- **Fonterra Hautapu, 2017, Fonterra Limited**

Provided advice on local aquifer capacity through modelling and potential locations for new bores 2017.

- **South Dunedin, Otago Regional Council 2017**

Clare was involved in preparing a report on an international literature search covering the effects and potential controls for rising groundwater levels in urban areas.

- **Groundwater Models, Various Clients, 2011-2019**

She developed and technically reviewed numerous groundwater models to simulate water flows, pressures and contaminant transport on site specific to sub-regional scales. Projects include mine sites, waste water disposal assessments, groundwater resource and abstraction assessments.

Assessment of Environmental Effects

- **Rotokauri Greenway Fast-track Application for Resource Consent**

Principal Hydrogeologist leading a project to assess the groundwater effects of a 4 m deep, 4.7 km long swale drain on the northwestern side of Hamilton. Various modelling and assessment techniques were used to assess the effects.

- **RS Sand Cambridge Sand Quarry 2022-2025**

Clare carried out onsite investigations and led modelling to assess the effects of a proposed new sand quarry near Cambridge, Waikato. She presented technical evidence at the consent hearing.

- **Bay of Plenty and Waikato Kiwifruit Applications for Resource Consent to Take Water 2011 to present.**

Clare has carried out many technical assessments of effects for proposed groundwater pumping for the purpose of irrigation and frost fighting.

- **Tauhei Quarry Hydrogeological Assessment, 2022 to 2024.**

Clare carried out a water balance analysis for the quarry and modelled the drawdown effect of long-term dewatering. She engaged in meaningful dialogue and consultation with local iwi regarding the effects of dewatering.

- **Lindis Catchment Minimum Flow Court Case, Otago Regional Council 2018**

Presented evidence as expert witness on the hydrological effects of proposed changes to water abstraction and minimum flow regimes for the Lindis River.

- **Technical Review Groundwater Assessments, Waikato, Otago and Horizons Regional Councils 2001 until 2010**

During her time in regional councils Clare provided technical advice to consent planners for review of groundwater resource consent applications. Including assessment of affected parties, environmental effects, and recommending conditions.

- **Fonterra Edgecumbe Wastewater Irrigation, Fonterra Limited 2017**

Clare provided technical advice and attended the resource consent hearing as a technical expert on the effects on groundwater of the expansion of the irrigation of wastewater to land.

Catherine Howell

SENIOR HYDROGEOLOGIST

Catherine is a Hydrogeologist with a Masters in Groundwater Studies and over 20 years of experience in the United Kingdom, Australia and New Zealand.

Catherine has gained experience in hydrogeological investigations through roles in both regulatory bodies and consultancy. Her rounded hydrogeological assessment experience includes pump test analysis, regional scale water assessments, MAR, water quality monitoring, and project management. Catherine has managed a variety of projects ranging in value and complexity. Through these roles she has developed strong communication skills and professional relationships within a variety of teams.

WGA



QUALIFICATIONS & AFFILIATIONS

MSc Tech Groundwater Studies

BSc (Hons) Geology with Physical Geography

NZQA Level 4 Project Management

International Association of Hydrogeologists

Hydrological Society of New Zealand

Project Experience

Water

Hydrogeological Support for Infrastructure and Land Development

- **Ashbourne Development Fastrack Consent Application, Matamata, NZ**
Project management and hydrogeological support for the AEE for a fast-track consent to develop land for housing and solar farm. Assessment of effects included mounding from the proposed stormwater network, fate and transport of contaminants from wastewater irrigation field and earthworks dewatering. Assessment of potential use of groundwater as a water supply option for the subdivision.
- **Rotokauri Greenway Fast-track Consent Application, Hamilton, New Zealand**
Hydrogeological support for the fast-track resource consent process for the Rotokauri Greenway, a multi-functioning ecological corridor that will provide for stormwater management, ecological restoration, water runoff treatment and cultural re-instatement. Extensive testing and modelling of the groundwater components of the

project, working closely within a multi-consultancy team including ecologists, geotechnical specialists, planners, stormwater modellers and civil engineers. Development of Groundwater Monitoring and Contingency Plan for construction phase of development. Assist ecologists in assessment of potential areas for wetland offsetting and mudfish relocation based on site hydrology.

- **Te Wetini Development**
Assessment of consent conditions, development of Water Management Plan and implementation of compliance monitoring. Reporting for Compliance.
- **Te Awamutu Waste to Energy Plant, Te Awamutu, New Zealand**
Review of hydrogeological data to assess storage capacity of flood mitigation basins and effects on groundwater inflows and discharge. Preparation of evidence for a Board of Inquiry including participation in expert conferencing.

- **Various Sites, New Zealand**

Preparation of specialist groundwater memorandums to support various fast-track referral applications under the fast-track Approvals Act 2024.

Groundwater Resource Assessment and Development

- **Central Hawke's Bay Water Security Assessments, Hawke's Bay NZ**

Technical assessments for infiltration basins and ASR bore including in flow calculations, mounding assessments and evaluation of impress head for MAR solution in Central Hawke's Bay.

- **Oreti MAR Project, Oreti MAR Trust, Otago, Southland NZ**

A feasibility assessment into the application of Managed Aquifer Recharge (MAR) to enhance groundwater storage in the Oreti Basin. The main purpose of the project is to utilise and seasonally replenish stored groundwater to ensure secure and reliable water supplies for a range of land uses whilst maintaining ecological and cultural values. Catherine was responsible for data analysis to enable preparation of hydrogeological assessment for feasibility study.

- **Hinds Managed Aquifer Recharge (MAR) Pilot Project, Canterbury NZ**

Management and background assessments to enable the set up of MAR pilot project. Assessment of groundwater and surface water interactions. Percolation testing on site and analysis of infiltration rates, water quality sampling and assessment to support an AEE for consent to inject water for MAR purposes.

- **Silvergrass Reinjection Project, Rio Tinto Group Perth, WA Australia**

Responsible for data analysis following groundwater injection trials to assess MAR options for recycled water following mine dewatering.

- **Technical Review Groundwater Assessments, Waikato and Bay of Plenty Regional Councils NZ**

Provided technical advice to consent planners for groundwater resource consent applications. Determined affected parties, assessing environmental effects, and recommending conditions

- **Wheatstone Liquefied Natural Gas Plant Construction, Pilbara Ports Authority, WA**

Catherine was involved in Project Management and Technical Analysis responsible for management of an Esdat database to ensure the efficient handling and statistical analyses of large data sets.

- **Solomon Iron Ore Mine Site, WA**

Dewatering assessment including a grout curtain trial to mitigate the risks of dewatering to environmentally and culturally significant permanent groundwater pools and springs. Catherine was the Assistant Project Manager and Technical Assessments.

- **Hose and Lynton Borefields, Garnet Mine, WA**

Project Management and Key Client Contact. Projects include annual Groundwater Monitoring Summaries, triennial Groundwater Monitoring Reviews and H2 study for compliance with Department of Water license conditions.

- **Golden Grove Mine Site, WA**

Project Management and Key Client Contact. Studies include dewatering assessments for a new pit, TSF assessments and annual Groundwater Monitoring summaries.

- **Various sites, New Zealand, Western Australia, UK, Various Clients**

This work included production and monitoring bore construction, airlift testing, liaising between client and contractors and the geological logging of samples from a range of drilling methods; sonic, mud rotary, air hammer, dual rotary and percussion. Catherine was responsible for supervision of drilling contractors at various sites.

Water Quality, Environmental Regulation and Contaminated Land Assessment

- **Rakaunui Landfill, Taupo NZ**

Assessment of leachate fate and transport from landfill to downgradient receptors.

- **Tirohia Landfill, Waikato NZ**

Assessment of leachate fate and transport from landfill to downgradient receptors.

- **Tailings Storage Facility, Centennial Mining Ltd, Porcupine Flat VIC**

Assessment of potential causes of cyanide contamination in groundwater

- **Hamilton Pacific Aerospace, Waikato NZ**

Review of consent for wastewater treatment plant including fate and transport assessment of E.coli.

- **BBC Review Technologies, Waikato NZ**

Review of consent for wastewater treatment plant including fate and transport assessment of E.coli and viruses.

- **Ruahorehore Stream, NZ**

Evaluation of water, sediment and biological monitoring data to assess effects of direct discharges from mining tailing storage facilities to stream.

- **Greater Paraburdoo Iron Ore Mine site, WA Australia**

Field supervision of an EM34 geophysical survey to assess seepage issues relating to a mine tailings storage facility. Technical reporting and liaison with regulatory bodies on outcomes of survey.

- **Eling Wharf Industrial Site, Hampshire, UK**

Responsible for Supervision of the investigation and remediation of historic arsenic pollution in groundwater and surface water in a sensitive ecosystem.

- **River Alver Landfill Site, Hampshire, UK**

Investigation of pollution from historical landfill impacting both groundwater and surface water used for recreational purposes.

- **Woolston Ship Builders Yard, Hampshire**

Assessment of the risk to groundwater and human health from hydrocarbons (LNAPL and DNAPL) and supervised the risk assessments and subsequent removal and containment of asbestos on site.

James Manning

HYDROGEOLOGIST

WGA

James is a Hydrogeologist with a master's degree in water resource management and is enthusiastic about groundwater management for stream and wetland restoration.

James has a strong foundation in groundwater modelling, aquifer testing, and drilling supervision. He has led field programs in remote communities across Australia, overseeing bore construction, geological logging, and aquifer tests. He has applied analytical and numerical modelling tools such as AQTESOLV and Slide2 to assess dewatering impacts, groundwater seepage, and stream depletion effects. He has analysed numerous pumping tests using AQTESOLV to determine aquifer properties to support groundwater abstraction assessments.



QUALIFICATIONS & AFFILIATIONS

MWaterRM Water Resource Management (Distinction)

BSc (Environmental Science & Geography)

Project Experience

Water

Drilling Supervision and Geological Logging

- **Gapuwiyak Water Supply Drilling Supervision, Power and Water Corporation, NT**

Graduate Hydrogeologist. James served as the supervising hydrogeologist for a five week exploratory water supply drilling program in the remote Indigenous community of Gapuwiyak. He acted as the onsite liaison between the client and contractors, overseeing drilling operations and ensuring all safety and environmental requirements were met. Working collaboratively with contractors, senior scientists, and the client (via remote input), James helped design and successfully construct one production bore and two monitoring bores. He logged drill cuttings, collected water samples, and managed and analysed pumping tests for each bore. James also prepared the final drilling supervision report.

- **Christchurch Grammar School Brockway Playing Fields Slab Design, WA**

Hydrogeologist. James worked alongside a senior geotechnical engineer to supervise a geotechnical drilling investigation for a proposed water tank location in Perth. Three 15m bore holes were drilled with geology logged.

- **Menzies Solar Farm Geotechnical Investigation, Menzies, WA**

Hydrogeologist. James supervised a geotechnical investigation at a proposed solar farm. James oversaw the drilling of 17 machine auger holes and logged the geology. James was also responsible for coordinating and managing the collection of representative bulk samples of the underlying geology. Furthermore, James also oversaw three electrical resistivity tests and 17 Dynamic Cone Penetrometer tests.

- **Victoria Park Hydrology Review, Taranaki, New Zealand**

Graduate Hydrogeologist. James worked alongside a senior hydrogeologist to undertake a drainage investigation for a sports field in

Taranaki. Eight auger holes were drilled, with geology logged and infiltration tests conducted at five locations. James analysed the infiltration test data and prepared a technical memorandum summarising the investigation findings.

Groundwater Management for Civil Developments

- **Stopbank Groundwater Seepage Modelling, West Coast, New Zealand**

Graduate Hydrogeologist. Under the supervision of senior scientists and geotechnical engineers, James was responsible for the development of numerous transient finite element groundwater models to evaluate detailed groundwater pressure and seepage responses to storm flow events in and underneath planned river stopbanks along the Hokitika, Buller and Orowaiti Rivers. The detailed 2D modelling supported geotechnical stability evaluation and assessments of erosive seepages, drainage requirements, and ground heave risk for stopbank design.

- **Lockerbie Construction Dewatering Effects, Lockerbie Estate Limited, Waikato, New Zealand**

Graduate Hydrogeologist. James modelled the effects of construction dewatering for a housing development under the supervision of senior scientists. James modelled the expected inflows into dewatering trenches and stormwater basins using analogue models. Additionally, James was also responsible for modelling drawdown effects as a result of the construction dewatering on nearby streams.

- **Rotokauri Stormwater Basin Dewatering Effects, Hounsell Holdings, Waikato, New Zealand**

Graduate Hydrogeologist. James was responsible for modelling the effects of construction dewatering for a constructed wetland stormwater basin. James modelled the expected inflows into the stormwater basins using AQTESOLV under the supervision of senior scientists. Additionally, James also modelled drawdown effects as a result of the construction dewatering on nearby streams and sensitive wetlands.

- **Rotokauri Greenway, Hamilton City Council, Waikato, New Zealand**

Graduate Hydrogeologist. James modelled the effects of construction dewatering for a constructed wetland stormwater basin. James modelled the expected inflows into the basin using Slide2 2D finite element groundwater modelling software under the supervision of senior scientists.

Groundwater Modelling

- **Groundwater Time Series Analysis, Rio Tinto WA**

Graduate Hydrogeologist. James used the python package PASTAS to analyse extensive

hydrological time series data to assess the performance of a Managed Aquifer Recharge (MAR) program at a Pilbara mine site. The PASTAS code was applied to quantify the influence of key hydrological stressors such as rainfall recharge, injection, and dewatering on groundwater level responses over time. James was responsible for developing the python code and running the analyses before interpreting the results with a senior hydrogeologist.

- **Quarry Operation Modelling, Waikato, New Zealand**

Graduate Hydrogeologist. James worked alongside senior hydrogeologists and geotechnical engineers to develop a 2D finite element model in Slide2. The model was used to assess the associated dewatering effects from operating a quarry on nearby infrastructure and groundwater fed waterways.

- **Rotokauri Greenway, Hamilton City Council, Waikato, New Zealand**

Graduate Hydrogeologist. James contributed to the development of 2D finite element groundwater models for a 4km swale complex in the Waikato region using the groundwater module in Slide2. His responsibilities included setting up the mesh, extending the models, and refining the geological inputs to ensure numerical stability. The work involved building and refining 13 separate cross-sections to support ongoing geotechnical assessments for excavation design. James collaborated closely with geotechnical engineers and senior hydrogeologists to ensure the models were both geotechnically and hydrologically robust. He also used the models to calculate groundwater inflows to the swale complex and assess potential drawdown impacts from dewatering on nearby streams and sensitive wetlands.

Groundwater Quality

- **Effluent Discharge Assessment, Canterbury and Bay of Plenty, New Zealand**

Graduate Hydrogeologist and Hydrogeologist. James has worked on several hydrogeological investigations that assess potential groundwater quality effects as a result of discharging effluent to land. This involved modelling microorganism transport from the site and developing mass balance mixing models to assess changes in nitrate concentrations.

Groundwater Abstraction Consents

- **Numerous Groundwater Abstraction Assessments, Waikato, Auckland, Otago and Bay of Plenty, New Zealand**

Graduate Hydrogeologist. James has carried out numerous groundwater abstraction effects assessments all around New Zealand. For these projects, James was responsible for the analytical analysis of pumping test data using AQTESOLV software to determine the underlying aquifer

properties and evaluating the efficiency of the production bore. Additionally, James was responsible for modelling potential stream depletion effects, saline intrusion and drawdown effects on nearby bores. Lastly for these assessments, James was responsible for producing draft Technical Groundwater Assessment reports to be used in applying for a resource consent.

Construction Management

- **Intergrain New Facility Construction
Monitoring Earthworks, Kwinana, WA**

Hydrogeologist. James has provided on site construction supervision under the guidance of a senior geotechnical engineer to oversee bulk earthworks and verify compaction testing using a Perth Sand Penetrometer. James was also responsible for preparing daily progress reports.

Toby is a Graduate Hydrogeologist with a passion about the natural environment and the informed management of natural resources.

Toby joined WGA after completing his Master of Environmental Sciences at the University of Waikato. For his thesis research project, Toby investigated the vertical distribution of sediment fluxes within an intertidal mudflat. Using acoustic velocimeters and optical backscatter sensors he was able to measure sediment fluxes across the water column and calculate the potential error given under various commonly used experimental designs.

Toby has experience modelling mounding from soakage basins and assessing its effects using the MOUNDSOLV software. He also has experience modelling trench dewatering and contaminant spread through groundwater systems.



QUALIFICATIONS & AFFILIATIONS

MSc (Research), Environmental Sciences

BSc (Tech), Environmental Sciences and Geology

Project Experience

Hydrogeology

- **Ashbourne Development, Matamata Development Limited, 2025**

Graduate Hydrogeologist, under the supervision of senior scientists, Toby was responsible for modelling various groundwater related aspects of the site to support an Assessment of Environmental Effects (AEE) for the client. Toby Modelled and analysed drawdown effects in a greenway, groundwater mounding in 3 infiltration basins and contaminant propagation from the developments dripline irrigation wastewater system.

- **Rotokauri GMCP, Hounsell Holdings Limited, 2025**

Graduate Hydrogeologist, Toby, assisted senior scientists with putting together a Groundwater Management and Contingency Plan (GMCP). Toby helped manage data and pull relevant information together to create the GMCP.

- **Waingaro Quarry, Stevenson Aggregates, 2025**

Graduate Hydrogeologist, Toby, undertook a field survey of nearby bores along with senior scientists. Toby collected data and analysed the

properties, locations and underlying geology of relevant bores. From this data he was able to advise Stevenson Aggregates on the effects of drawdown from their proposed quarry extension on nearby bores.

- **Gordonton Sand Quarry, Online Sand Limited, 2025**

Graduate Hydrogeology, Toby, assisted senior scientists with a survey of wetlands and potential wetlands within the groundwater drawdown zone from the proposed quarry. Toby collected and analysed data from hand auger tests and previously undertaken drawdown modelling to determine the degree of drawdown within wetlands of interest.



FOR FURTHER INFORMATION CONTACT:

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Senior Hydrogeologist

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