

Appendix E – Infrastructure Report prepared by Kotare Consultants





DEVELOPMENT
INFRASTRUCTURE
REPORT

TAMAHERE COUNTRY CLUB

STAGE 3 Extension

82 & 92 Tamahere Drive
TAMAHERE 3283

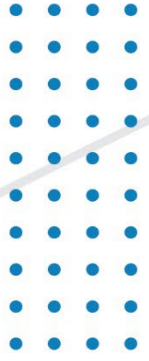
MAY 2023

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kotareconsultants.nz



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Council Reference: TBC

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Tamahere Country Club Extension Infrastructure Report:
56, 82 & 92 Tamahere Drive, Tamahere 3283

THREE WATERS, ROADING, EARTHWORKS, AND UTILITY SERVICING CONCEPTS

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- Appendix A Kotare Consultants Development Consent Plan Set Issue Two**
- Appendix B Te Miro Water Stormwater Report and Revision Memorandum**
- Appendix C Previous Stage Reference Plans**



1.0 Introduction:

Tamahere Country Club Limited is seeking resource consent for an expansion of their existing retirement village in Tamahere. That development is known as the Tamahere Country Club (TCC). The site to which this extension applies is the majority of 56, 82 & 92 Tamahere Drive, Tamahere.

This report provides an overview at a conceptual level of anticipated infrastructure within the development. The purpose is to outline key infrastructure concepts regarding supply and design, and to demonstrate feasibility.

Our report will cover the following matters:

- Wastewater Management;
- Stormwater Management;
- Water Supply;
- Roding;
- Earthworks;
- Utility Services.

The proposed infrastructure has been developed alongside collaboration with various consultants and the report gives reference to enclosed supporting documentation. Reference plans from previous staging are included in **Appendix C** for illustration related infrastructure described.

2.0 Wastewater Management:

The overall wastewater strategy for the extension is a gravity reticulation network that leads to a low point central to the overall development and adjacent to the existing wastewater treatment plant. The wastewater treatment plant has contingency and additional capacity and performance is being actively monitored to confirm capacity is appropriate. Appropriate gravity connection points have been provided as part of previous future-proofed civil works in earlier staging.

The wastewater treatment plant is modular in design and will be upgraded (additional capacity added) as part of the extension works if required. Following treatment, the wastewater is dispersed to primary wastewater disposal beds to the South-West of site. A reserve Wastewater Field has been located at the North-East end of the extension area as per previous reporting by Ormiston & Associates and as constructed. There is contingency in the wastewater treatment and discharge system as consented with Waikato Regional Council to accommodate additional wastewater and should additional capacity be required; revision can be sought from the Regional Council separate to the District Council consenting process.

We have undertaken a capacity check on wastewater treatment as shown in Table 1 and note that the treatment system is modular with the ability to ultimately increase capacity should this be required however these initial calculations indicate that the system should be able to cater for the overall development. This is partly due to a future-proofed design and further confidence in that treatment requirements are generally lower than initial calculation. With reference to Figure 1 below it is noted that the current wastewater primary treatment system in Green and the Reserve Area in Orange. We note the space in red as possible extension if required and that there are additional vacant areas shown blue should as suitable locations demonstrating surplus capacity to requirement.



Table 1: Wastewater Treatment Capacity Check.

Wastewater Calculations	
243 Units @ 1.7 Occupancy (165l / day)	68161.5 l/day
76 Care Units @ 1.0 occupancy (220l / day)	13420 l/day
40 Staff at 50l / day	2000 l/day
60 Guests at 15l / day	900 l/day
I & I at factor of 1.6	50688.9 l/day
	135170.4 l/day

Initial calculation was for 130,000 l /day with consideration towards possible future expansion and hence why this calculation is not proportionally larger.

It is noted that current Wastewater Flow is at approx. 30,000l / day on average with 1 third of development complete and occupied.

The expectation at this stage closer to 40,000 l / day and as such the system is performing better than initial calculation designed to.

It is noted that there is approx. 100m³ of storage in manholes in lines as a matter of additional contingency / risk reduction.

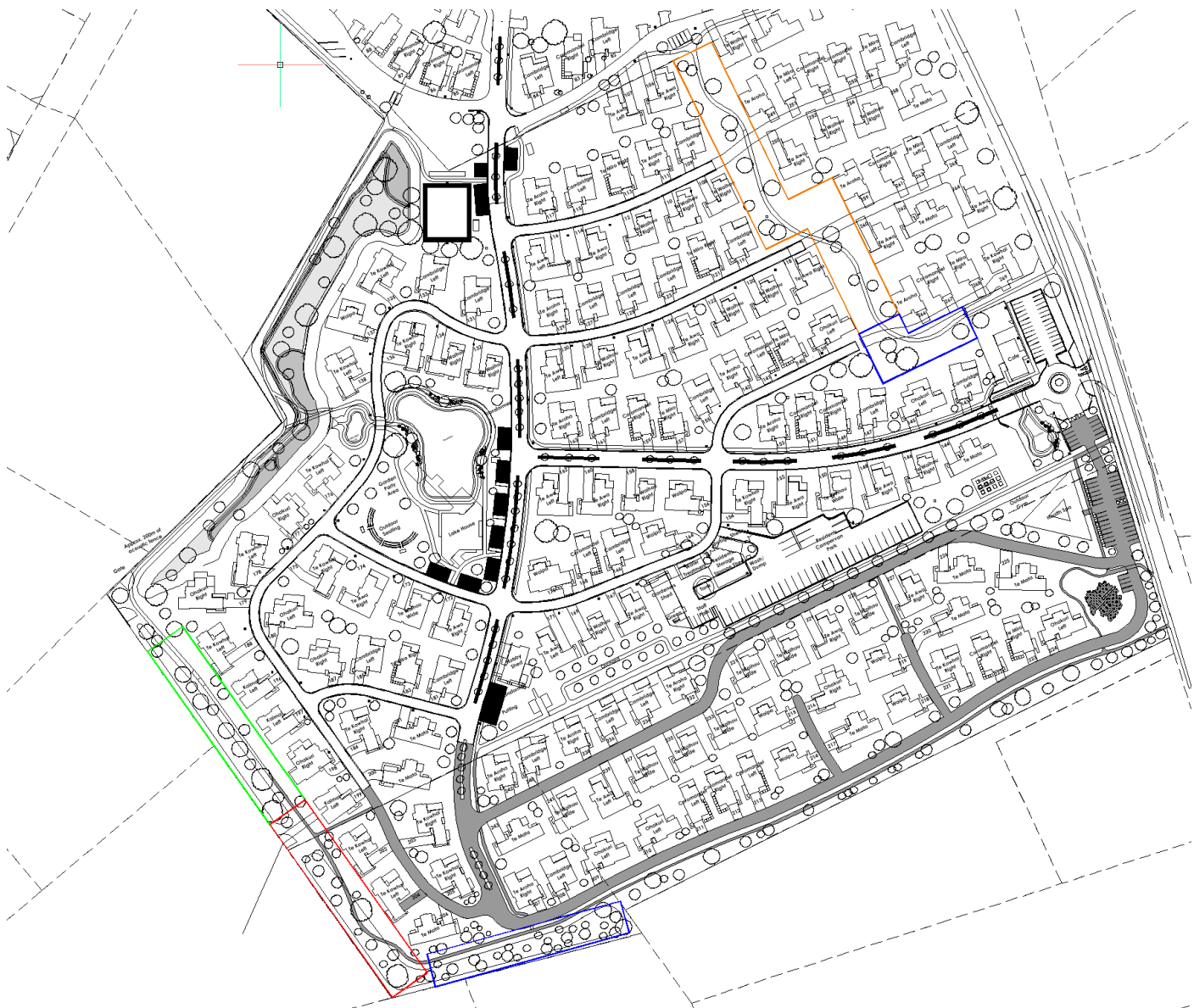


Figure 2: Indicative spacing for wastewater disposal and reserve space allocations.



3.0 Stormwater Management:

The overall stormwater strategy for the extension is for the development of a reticulated infrastructure network that will channel stormwater from the road, access network, buildings, and hardstand areas to the existing attenuation system for treatment and soakage. See Kotare Consultants stormwater plans in **Appendix A** for Stormwater Concept. Appropriate gravity connection points have been provided as part of previous future-proofed civil works in earlier staging. Roading and swales have been designed to convey secondary overland storm flows to reticulation networks as appropriate.

The attenuation system is designed to attenuate stormwater events to at least the 100-year event and, at a certain level greater than the 2-year event, on overflow will facilitate some stormwater discharge to the existing receiving swale downstream to the West of the wider site. Further localised attenuation and soakage will be implemented in localised locations within the extension as required either for individual units or larger catchment areas inclusive of roading where required to increase capacity. Specific soakage testing will be undertaken as part detailed design inclusive of respective soakage tanks where required.

The combination of the attenuation basin and the overflow are designed to keep any flows discharged to the immediate downstream environment to be in line with existing pre-development rates. Any existing inflows to site have been considered and allowed for within the proposed stormwater system model. See **Appendix B** for Te Miro Water Stormwater Reporting and further detail related to the site's stormwater philosophy and design.

4.0 Water Supply:

The overall development has a water reticulation network in place that incorporates a series of bores and a water treatment plant in close proximity to facilitate appropriate water supply to the extension. A separate irrigation & firefighting network draws from a lake feature within the development that captures stormwater and has a backup supply from the bore where required and forms an appropriately sized reservoir.

The design concept layout for the extension water reticulation network is shown on plans within **Appendix A** with sizing for the dual network to ensure appropriate capacity. The concept utilises interconnected networks of water, principal, and rider mains to ensure suitable supply, pressure, and resilience, and valves will be located to ensure convenience of isolation and maintenance. Fire hydrant location has been considered as appropriate and in line with standards and requirements. Engineering design, construction, and quality assurance will ensure that appropriate pressure and water quality are provided for, and all relevant standards met.

There is contingency in the water treatment plan and water take as consented with Waikato Regional Council to accommodate additional water supply and should additional capacity be required; revision can be sought from the Regional Council separate to the District Council consenting process.

It is noted that there is are a 100m³ and a 200m³ reservoir tank on site for potable water resilience and the irrigation pond has approximately 4000m³ of capacity and incorporates the ability for stormwater retention for irrigation purposes.

We provide a check confirming adequate capacity in water take consented for development as follows:



Table 3: Water Take Capacity Check

<u>Water Take Calculations</u>							
<u>People</u>							
243 Units @ 1.7 Occupancy (230l / day)	95013 litres						
76 Care Units @ 1.0 occupancy (280l / day)	21280 litres						
40 Staff and 60 Guests at 50 l / day)	5000						
<u>Total</u>	<u>121293 litres</u>						
<u>Cubic Meters</u>							
	<u>121 m3 / day</u>						
Consented - APP143736	355 m3 / day						
<i>Balance</i>	<i>234 m3 / day spare capacity</i>						
	<i>34% Usage for Potable</i>						
<i>Capacity for Potable water is the critical measure and it is noted it only requires 1/3rd of daily allowable take.</i>							
<u>Daily Use People</u>							
	<u>44272 m3 / year</u>						
Irrigation Over Dry Season - 200 days @ 200m3 a day	40000 m3 /year						
<u>Total Usage</u>	<u>84272</u>						
Consented	94075 m3 / year						
<i>Balance</i>	<i>9803 m3 / year spare capacity</i>						
	<i>10% Contingency</i>						
Please note there are green stormwater retention mechanisms on site allowing stormwater to be utilised for irrigation from integrated lake reservoir.							
Irrigation will be monitored and can be adjusted as required to ensure compliance with consent.							

5.0 Roading:

Roading infrastructure has been modelled from existing roading design established within TCC, and Stantec has provided input as per their transport report. See Kotare Consultants plan set within **Appendix A** for roading layout and section concepts as they relate to the extension. The concept ensures appropriate interfaces and connectivity with the wider Tamahere Country Club development to the north.

6.0 Earthworks:

Earthworks plans are included within the Kotare Consultants plan set enclosed as **Appendix A**. A topographical site plan is enclosed similarly, and the Geotechnical Investigation Report is incorporated within the master land use consent application report by BBO.

The earthworks concept has been developed on a relatively flat site to ensure sufficient road grades and consistent overland flow to common low points; the initial concept proposes approximately 50,000m³ of Fill (Solid). The concept respects existing levels with respect existing farm drains, swales, the existing TCC development and Tamahere Drive, and ensures secondary stormwater flow is consistent and safe. Preliminary design has sought to minimise filling requirements and further rationalisation of the design will be undertaken to reduce fill volumes where possible in course.

The duration of earthworks is anticipated to be 6 – 8 months. It is proposed to have a singular entry and exit point from site off the existing 70 Tamahere Drive entranceway, inclusive of truck washing infrastructure. A singular point of entry reduces access points to site and mitigating traffic effects. Designated parking areas on site will mitigate parking on the existing abutting carriageways. For works in proximity the entranceway and roading, applicable temporary traffic management plans and CARS approvals will be implemented to suit works where required.



A bund along the western boundary will be continued as is consistent with the existing development at a height of approximately 3 meters. There is a protected tree on site and a perimeter constructure fence will be established outside the dripline to ensure this is protected during works.

The overall Sediment & Erosion Control Strategy is to contain the site with perimeter bunding and for the maintenance of sediment retention infrastructure at the low points of site in general accordance with Waikato Regional Council guidelines. Clean and Dirty water diversion bunds will be developed and maintained actively as appropriate.

Ponding Volume and Sediment Infrastructure will be monitored and maintained to ensure it operates effectively in line with requirements. Any works around the perimeter will require appropriate bunding / trenching and sediment fencing to contain sediment runoff and exposed surfaces may require mulch spreading where appropriate.

7.0 Utility Services:

Waipa Networks, Tuatahi First Fibre, and First Gas can service the development extension via existing networks in respect electricity, telecommunications, and gas. Waipa Networks Ltd, Tuatahi First Fibre Ltd, and First Gas Ltd will undertake their infrastructure design for the development in course. Relevant existing services in abutting roads or crossing site would be located at time of works and maintained or redirected where applicable as part any construction works.

8.0 Summary:

This report, in conjunction with the enclosed development concept plan set, stormwater reporting, and geotechnical and transportation reporting (in the master document), outlines key infrastructure concepts regarding supply and design and demonstrates availability of service, feasibility of infrastructure, and emphasis on environmental sustainability. The concepts will be developed further, and a full development engineering set would be made available for Council Development Engineering review in due course on matters applicable and as part construction.

Should you have any queries, please do not hesitate to contact the undersigned.

Yours faithfully,



Ciaran P. Murphy
MNZIS, BSurv.
Director
Kotare Consultants Ltd



APPENDIX A

KOTARE CONSULTANTS SUBDIVISION CONSENT PLAN SET Issue Two



TAMAHERE COUNTRY CLUB SANDERSON GROUP



FOR CONSENT PLAN SET SOUTH PRECINCT TAMAHERE DRIVE, TAMAHERE

OCTOBER 2023

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NOTES:

1. HEIGHTS ARE IN TERMS OF MOTURIKI VERTICAL DATUM 1953.
ORIGIN: AP 3 DP 565970 **RL=47.27**
2. COORDINATES ARE IN TERMS OF NZGD 2000, MOUNT EDEN CIRCUIT.
3. CONTOURS ARE SHOWN AT 0.25M INTERVALS.



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Mount Eden 2000 - Hz DATUM
Moturiki '53 - Vt DATUM
- :N - :E - :Z - :O - :RIGIN MARK
- :N - :E - :Z - :O - :RIGIN MARK
- :N - :E - :Z - :O - :RIGIN MARK

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CONSULTANTS

CLIENT
**TAMAHERE COUNTRY CLUB
SOUTH PRECINCT**

PROJECT TITLE
**EARTHWORKS
EXISTING LAYOUT**

BY: -	CHK: -	APR: -	SCALE: 1:1500	DATE: 01.06.2023
STATUS: FOR CONSENT			PLAN	REV
CHANGELOG: REFER TO DRAWING REGISTER			1011.03.10.EA.101	-



LEGEND

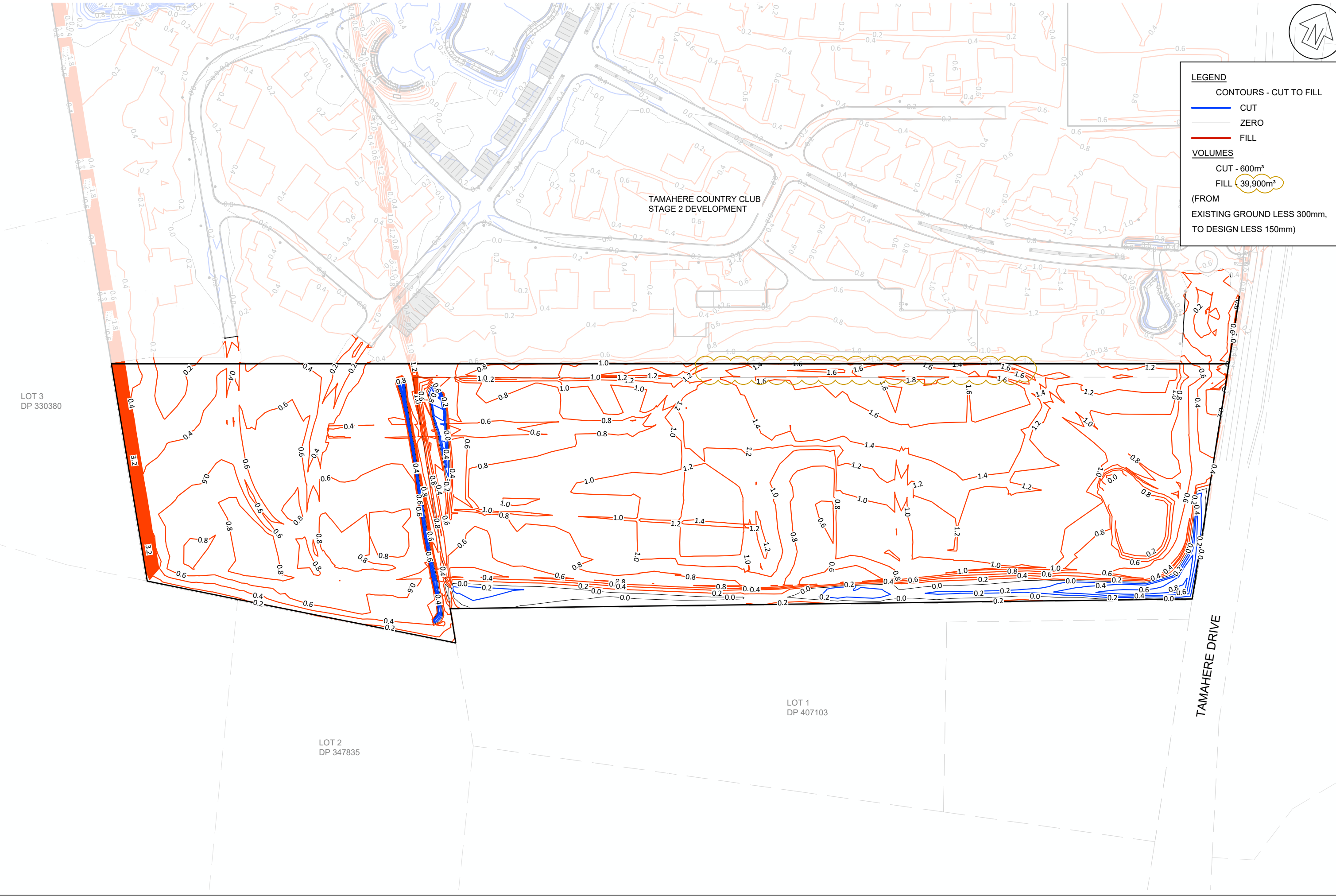
CONTOURS - CUT TO FILL

- CUT
- ZERO
- FILL

VOLUMES

- CUT - 600m³
- FILL - 39,900m³

(FROM EXISTING GROUND LESS 300mm, TO DESIGN LESS 150mm)



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Mount Eden 2000 Hz DATUM
Moturiki '53 -VI DATUM

- :GEODETTIC CODE - :E - :Z :COORDINATE NOTES

DESIGN IN REFERENCE TO B.L.S. / N.Z.S. UNLESS DETAILED.

Document Set ID: 4350583

Version: 1, Version Date: 22/11/2023

CLIENT
**TAMAHERE COUNTRY CLUB
SOUTH PRECINCT**

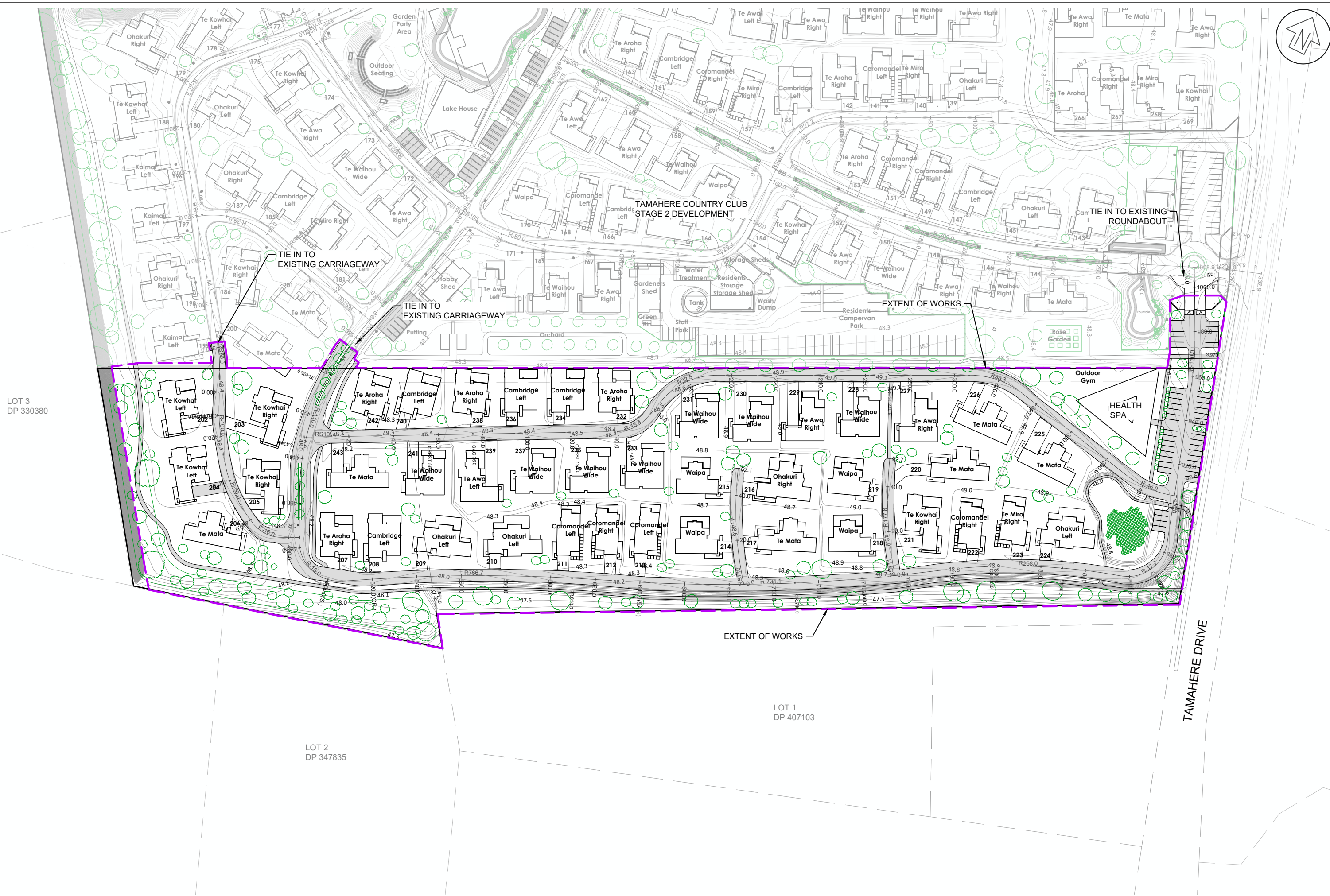
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**EARTHWORKS
CUT FILL CONTOURS**

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Moturiki '53 - NZ DATUM
- :N - ORIGIN MARK
- :E - COORDINATE
NOTES

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Version: 1, Version Date: 22/11/2023

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TAMAHERE COUNTRY CLUB
SOUTH PRECINCT

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EARTHWORKS
DESIGN CONTOURS

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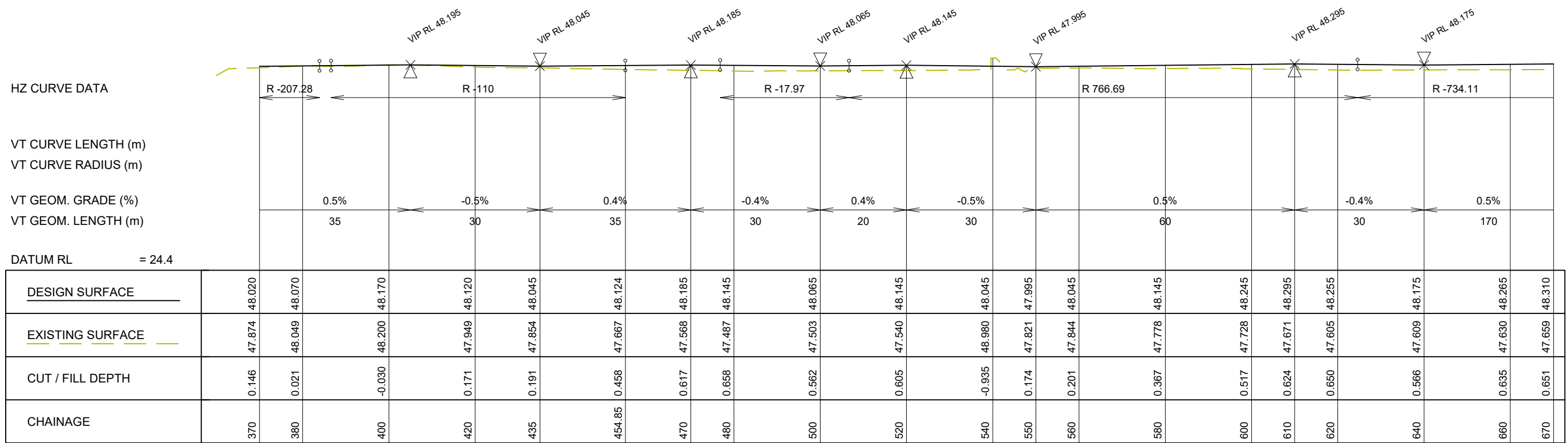
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DATE 03.10.2023
REV A

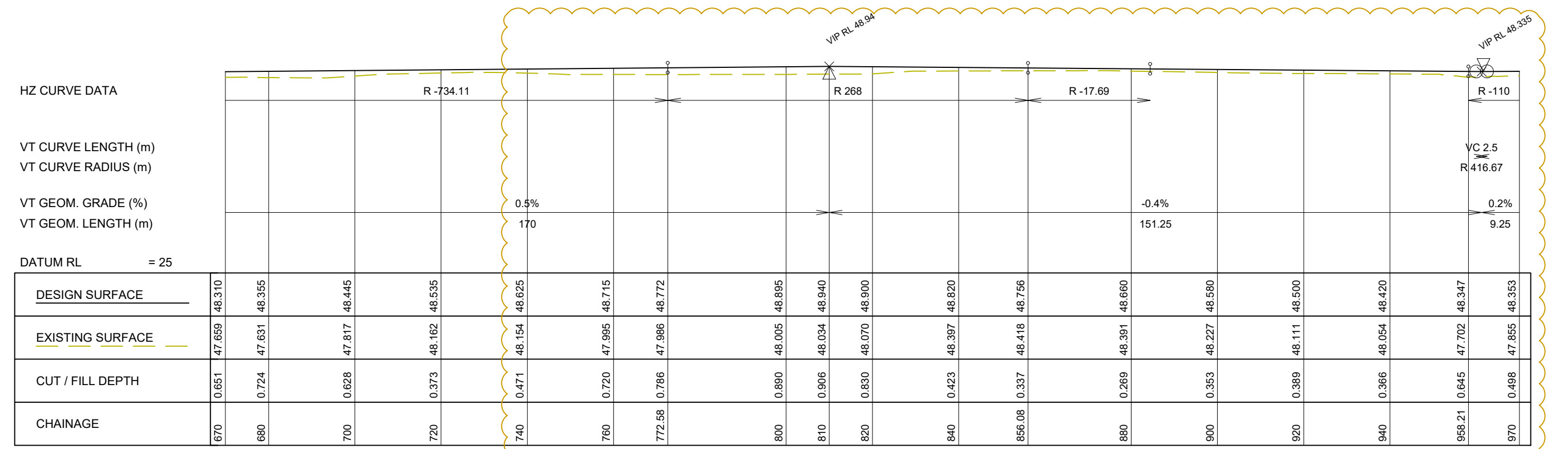
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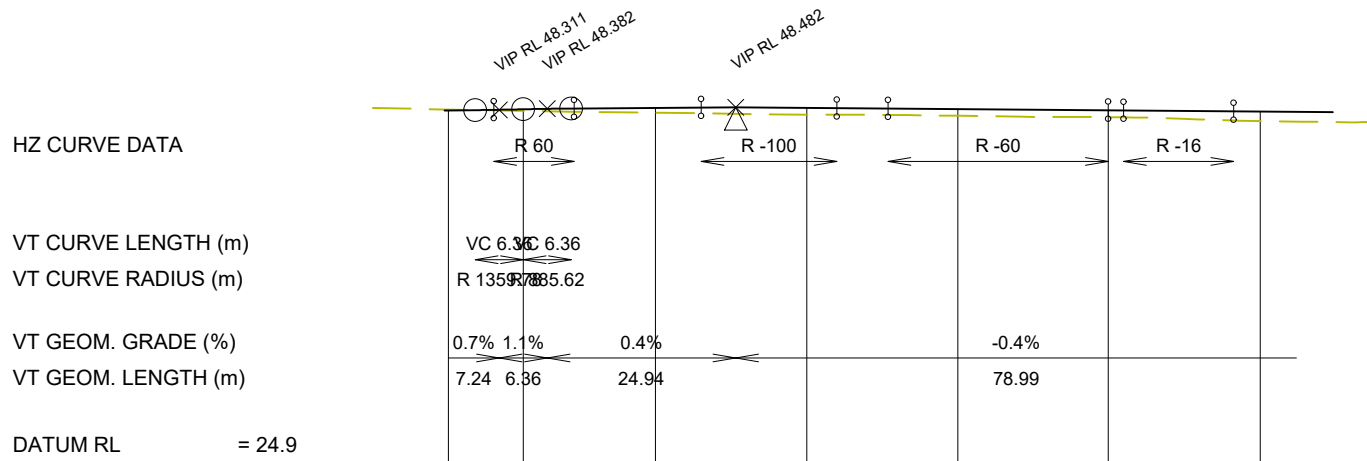
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LONGITUDINAL SECTION RS100EXTN

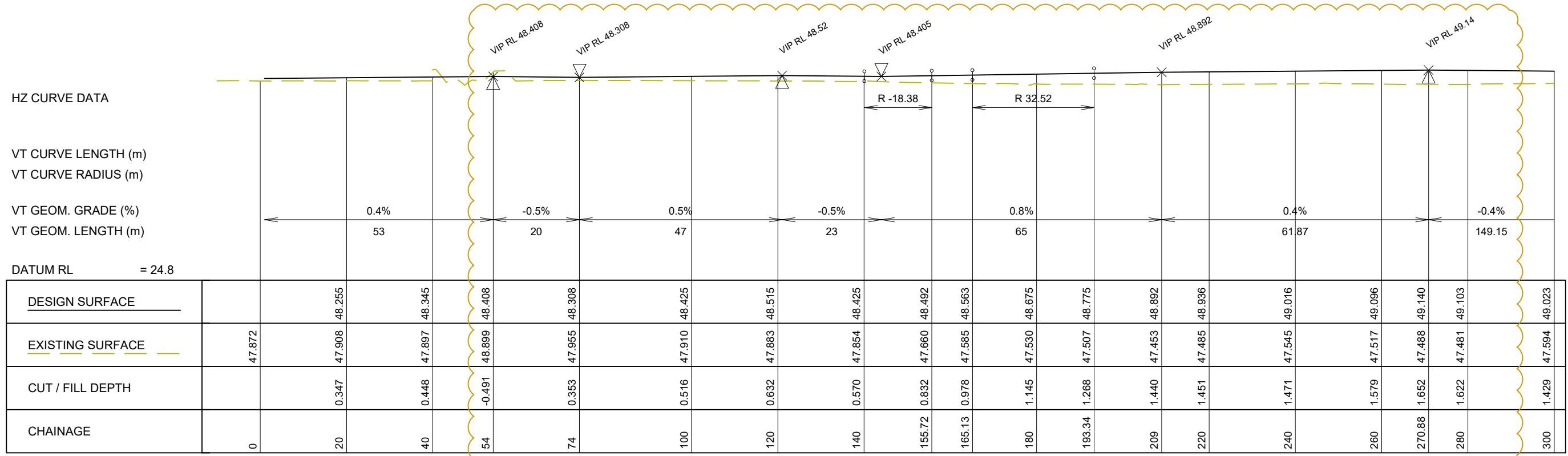
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	372.61	382.51	400	420	440	459.89	480
DESIGN SURFACE	48.268	48.347	48.440	48.445	48.365	48.285	48.205
EXISTING SURFACE	48.331	48.247	48.125	48.000	47.920	47.826	47.575
CUT / FILL DEPTH	-0.063	0.100	0.315	0.445	0.445	0.459	0.630
CHAINAGE							

LONGITUDINAL SECTION RS102EXT



LONGITUDINAL SECTION RS109

HZ CURVE DATA
 VT CURVE LENGTH (m)
 VT CURVE RADIUS (m)
 VT GEOM. GRADE (%)
 VT GEOM. LENGTH (m)
 DATUM RL = 24.8

	0	20	40	54	74	100	120	140	155.72	165.13	180	193.34	209	220	240	260	270.88	280	300
DESIGN SURFACE		48.255	48.345	48.408	48.308	48.425	48.515	48.425	48.492	48.563	48.675	48.775	48.892	48.936	49.016	49.096	49.140	49.103	49.023
EXISTING SURFACE	47.872	47.908	47.897	48.899	47.955	47.910	47.883	47.854	47.660	47.585	47.530	47.507	47.453	47.485	47.545	47.517	47.488	47.481	47.594
CUT / FILL DEPTH		0.347	0.448	-0.491	0.353	0.516	0.632	0.570	0.832	0.978	1.145	1.268	1.440	1.451	1.471	1.579	1.652	1.622	1.429
CHAINAGE																			



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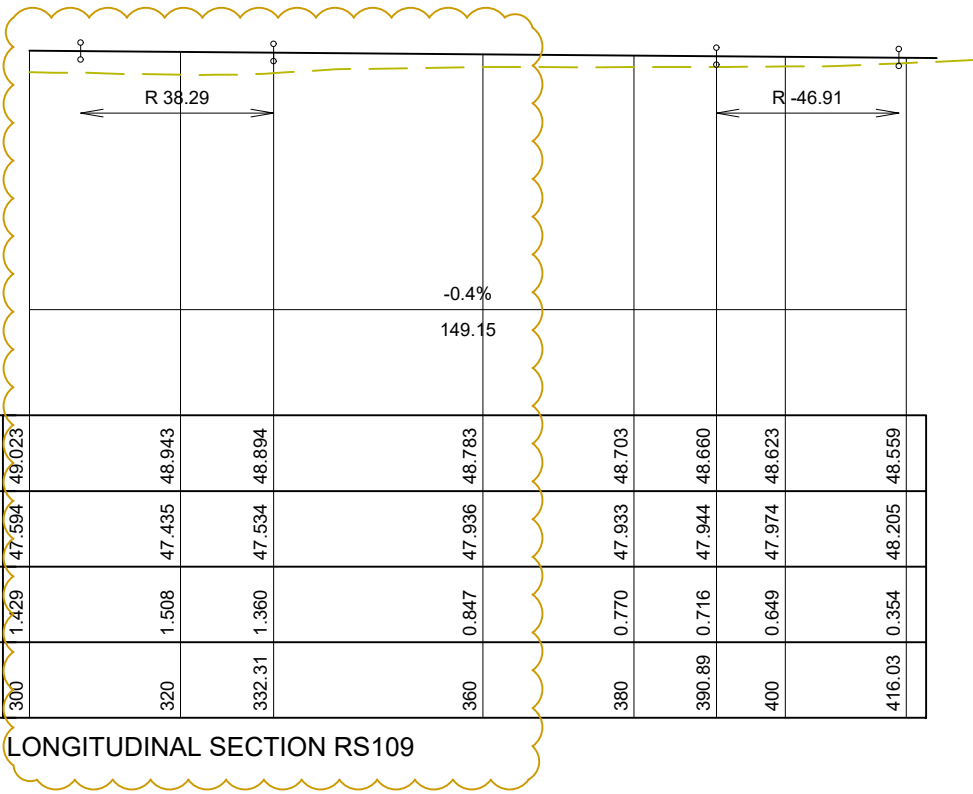
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HZ CURVE DATA

VT CURVE LENGTH (m)
 VT CURVE RADIUS (m)
 VT GEOM. GRADE (%)
 VT GEOM. LENGTH (m)

DATUM RL = 24.9

DESIGN SURFACE	48.023	48.943	48.894	48.783	48.703	48.660	48.623	48.559
EXISTING SURFACE	47.594	47.435	47.534	47.936	47.933	47.944	47.974	48.205
CUT / FILL DEPTH	1.429	1.508	1.360	0.847	0.770	0.716	0.649	0.354
CHAINAGE	300	320	332.31	360	380	390.89	400	416.03



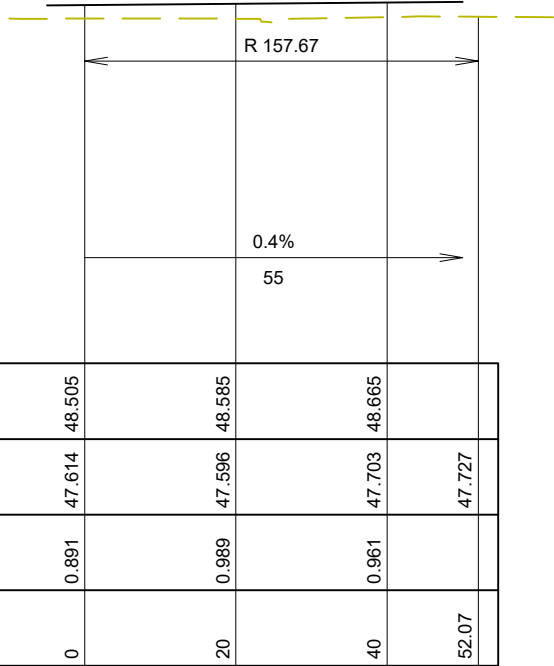
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HZ CURVE DATA

VT CURVE LENGTH (m)
 VT CURVE RADIUS (m)
 VT GEOM. GRADE (%)
 VT GEOM. LENGTH (m)

DATUM RL = 24.8

DESIGN SURFACE	48.505	48.585	48.665	
EXISTING SURFACE	47.614	47.596	47.703	47.727
CUT / FILL DEPTH	0.891	0.989	0.961	
CHAINAGE	0	20	40	52.07



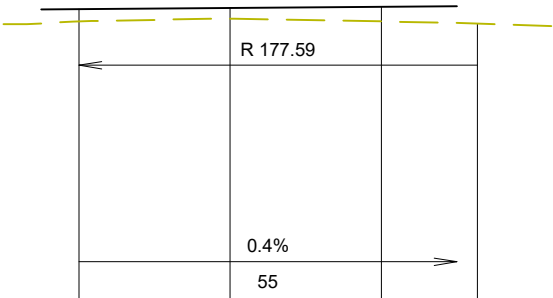
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HZ CURVE DATA

VT CURVE LENGTH (m)
 VT CURVE RADIUS (m)
 VT GEOM. GRADE (%)
 VT GEOM. LENGTH (m)

DATUM RL = 25.1

DESIGN SURFACE	48.810	48.890	48.970	
EXISTING SURFACE	48.000	48.187	47.999	47.852
CUT / FILL DEPTH	0.809	0.703	0.970	
CHAINAGE	0	20	40	52.72

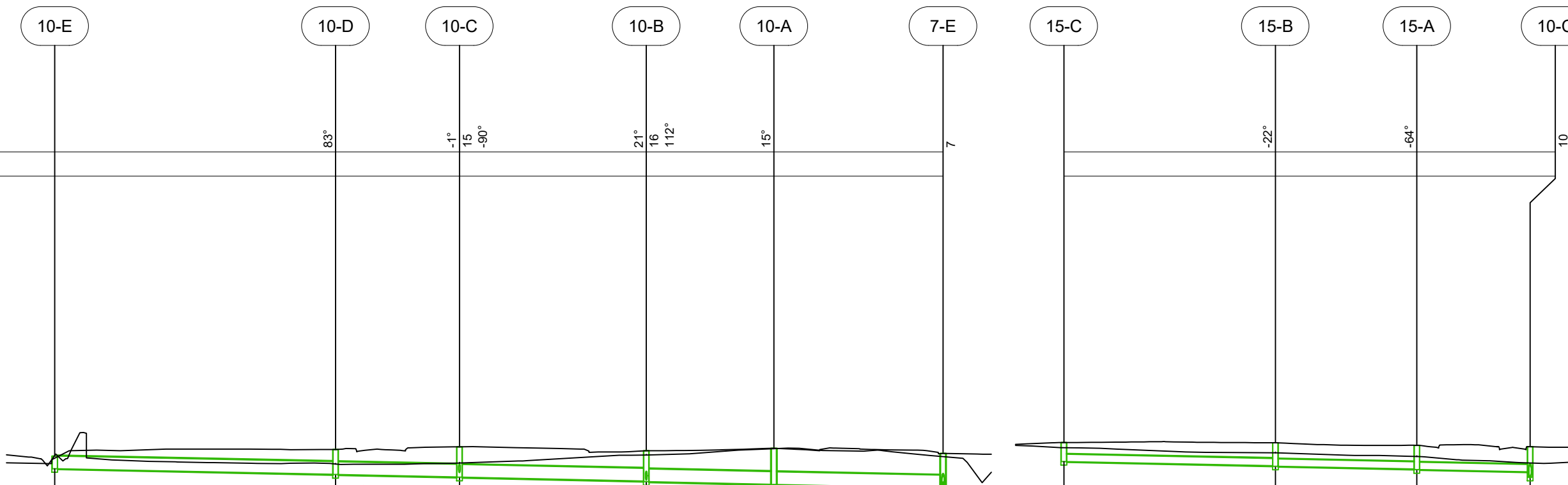


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LINE DEFLECTION & BRANCHES
PROPERTY CONNECTION TYPE



DATUM RL	39.000				
PIPE SIZE (mm), CLASS	525, RCRRJ Class 4				
GRADE (%)	0.4%				
LENGTH	58.11	25.64	38.67	26.41	35.01
FINISHED (& EXISTING) SURFACE LEVEL	47.74 (47.85)	48.10 (47.49)	48.21 (47.54)	48.04 (47.87)	48.15 (48.13)
DEPTH OF INVERT BELOW FSL	0.43	1.03 1.04	1.25 1.26	1.25 1.28	1.49 1.50
INVERT LEVEL	47.30	47.07 47.06 47.04	46.96 46.95	46.79 46.76 46.75	46.66 46.65
CHAINAGE	0.00	58.11 63.95 A 150mm IL 46.43	83.74	122.42 125.15 L 150mm IL 46.08	148.83 183.84

Scale Hz 1:1000 / Vt 1:200

DATUM RL	39.000		
PIPE SIZE (mm), CLASS	300, RCRRJ Class 4		
GRADE (%)	0.4%		
LENGTH	43.78	29.29	23.43
FINISHED (& EXISTING) SURFACE LEVEL	48.38 (48.17)	48.38 (47.96)	48.26 (47.81)
DEPTH OF INVERT BELOW FSL	0.78	0.95 0.97	0.98 1.00
INVERT LEVEL	47.60	47.42 47.40	47.29 47.27
CHAINAGE	0.00	43.78 93.72 A 150mm IL 46.24	96.50 47.17 46.95

Scale Hz 1:1000 / Vt 1:200

Mount Eden 2000 Hz DATUM
Motunui '53 -VI DATUM
- :N -ORIGIN MARK
- :E - :Z -COORDINATE
NOTES



CLIENT
TAMAHERE COUNTRY CLUB
SOUTH PRECINCT

PROJECT TITLE
STORMWATER
LONGSECTION SHEET 1

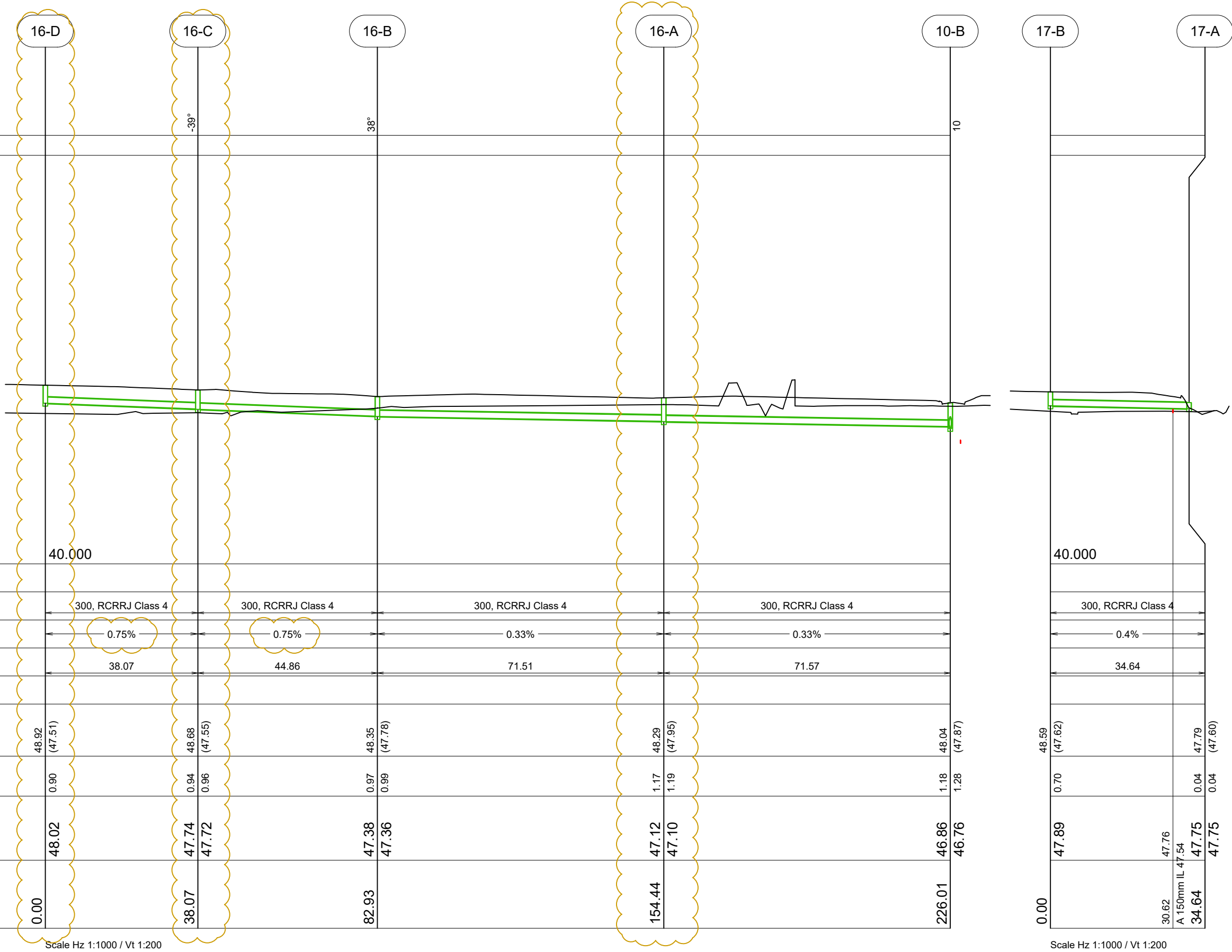
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CHK: -
STATUS: **FOR CONSENT**
CHANGELOG:
REFER TO DRAWING REGISTER

APR: -
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(A3)
PLAN
1011.03.40.SW.421
DATE 18.05.2023
REV -

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LINE DEFLECTION & BRANCHES
PROPERTY CONNECTION TYPE



Scale Hz 1:1000 / Vt 1:200

Scale Hz 1:1000 / Vt 1:200

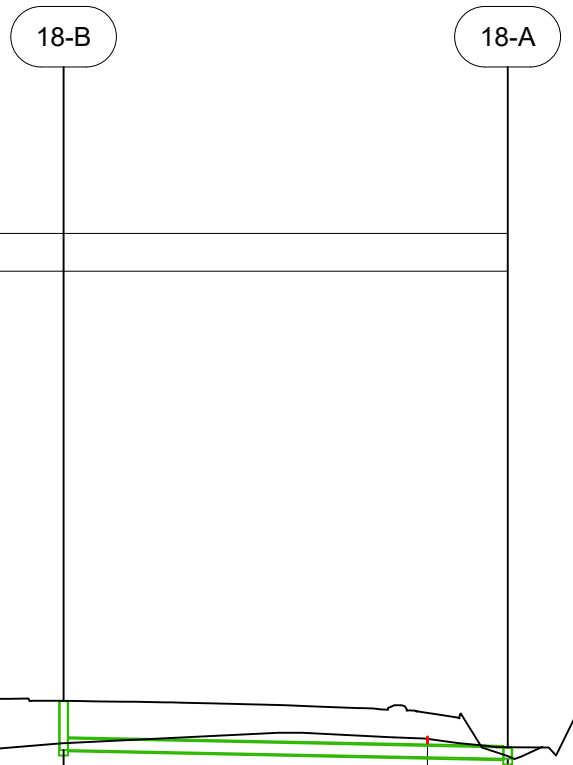


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LINE DEFLECTION & BRANCHES
PROPERTY CONNECTION TYPE



DATUM RL	40.000	
PIPE SIZE (mm), CLASS	300, RCRRJ Class 4	
GRADE (%)	0.4%	
LENGTH	58.73	
FINISHED (& EXISTING) SURFACE LEVEL	49.03 (47.91)	47.57 (47.80)
DEPTH OF INVERT BELOW FSL	1.30	0.07 0.07
INVERT LEVEL	47.73	47.54 A 150mm IL 47.91 47.50 47.50
CHAINAGE	0.00	48.14 58.73

Scale Hz 1:1000 / Vt 1:200

Mount Eden 2000 Hz DATUM
Motunui '53 Vi DATUM
- :N - :E - :Z :COORDINATE
ORIGIN MARK
NOTES

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Version: 1, Version Date: 22/11/2023

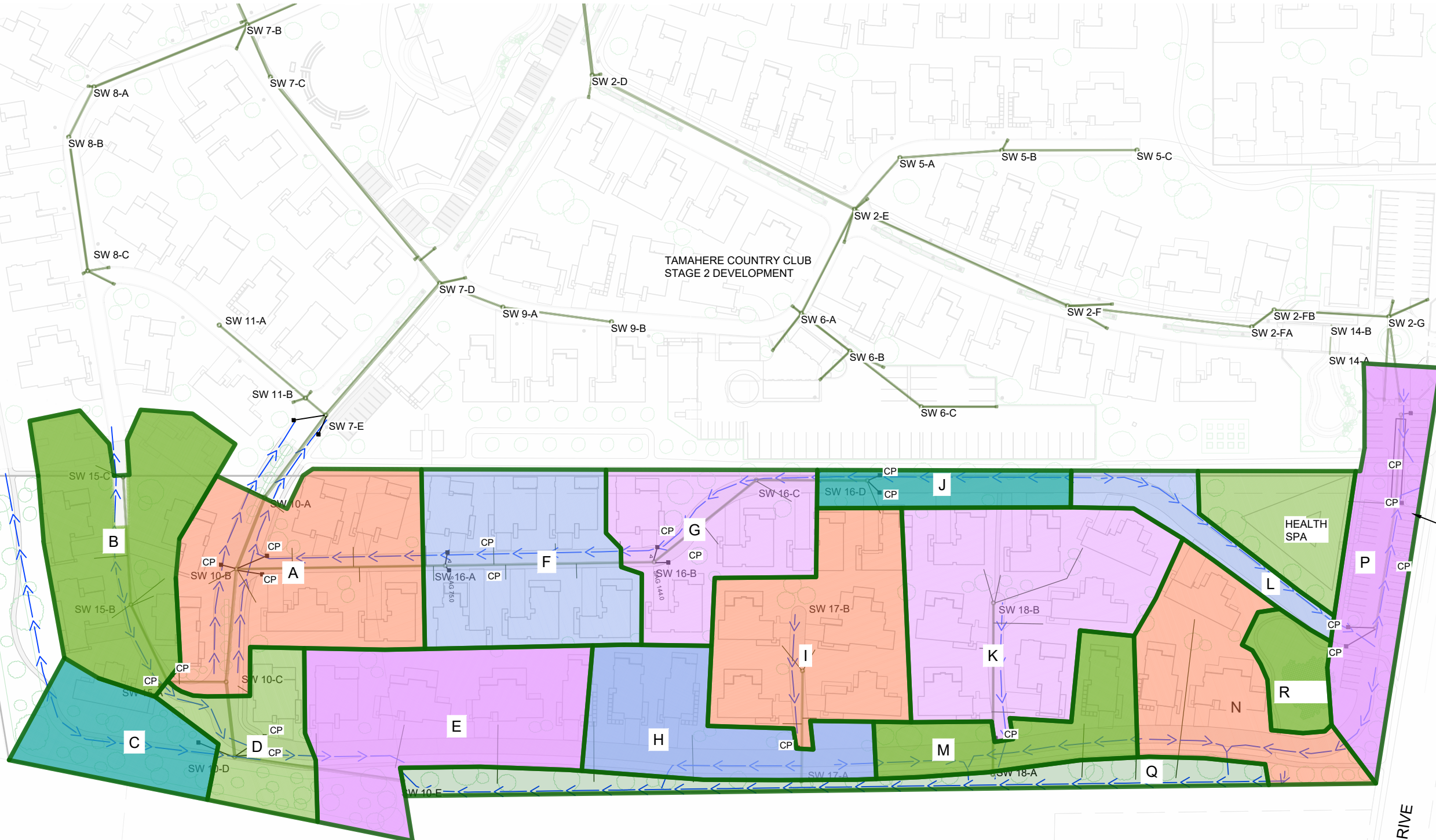
CLIENT
TAMAHERE COUNTRY CLUB
SOUTH PRECINCT

PROJECT TITLE
STORMWATER
LONGSECTION SHEET 3

BY: _____	APR: _____	SCALE: 1:AS	DATE 18.05.2023
CHK: _____		(A3)	
STATUS: FOR CONSENT		PLAN	REV
CHANGELOG: REFER TO DRAWING REGISTER		1011.03.40.SW.423	-



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CATCHMENT AREAS		
ID	AREA	DESCRIPTION
A	5,168m ²	RS100 EXTN
B	4,269m ²	RS102 EXTN
C	1,953m ²	WEST BACKYARD AREAS
D	1,819m ²	SOUTH AREA END OF RS100 EXTN
E	4,608m ²	RS100 SECTION ALONGSIDE SWALE
F	4,172m ²	RS109 SECTION
G	3,147m ²	RS109 SECTION
H	2,894m ²	RS100 SECTION ALONGSIDE SWALE
I	4,140m ²	RS110 (ACCESS WAY)
J	1,115m ²	RS109 SECTION
K	5,520m ²	RS111 (ACCESS WAY)
L	1,231m ²	RS109 SECTION
M	2,038m ²	RS100 SECTION ALONGSIDE SWALE
N	3,299m ²	RS100 SECTION ALONGSIDE SWALE
O	1,682m ²	HEALTH CENTRE
P	3,007m ²	CARPARKING AREA (TO SOAKAGE)
Q	2,038m ²	SWALE
R	886m ²	POND

Mount Eden 2000 - NZ DATUM
 Moturiki '53 - NZ DATUM
 - :GEODETTIC CODE - :E - :ORIGIN MARK - :Z - :COORDINATE NOTES

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CLIENT
TAMAHERE COUNTRY CLUB SOUTH PRECINCT

PROJECT TITLE
STORMWATER CATCHMENT PLAN

BY: -
 CHK: -
 STATUS: **FOR CONSENT**

APR: -
 SCALE: 1:1500
 PLAN
 1011.03.40.SW.491

DATE: 21.05.2023
 REV: -

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LOT 3
DP 330380

LOT 2
DP 347835

LOT 1
DP 407103

TAMAHERE DRIVE

TAMAHERE COUNTRY CLUB
STAGE 2 DEVELOPMENT

HEALTH SPA

Mount Eden 2000 - NZ DATUM
Motunui '53 - DATUM
- :N - :E - :Z - :COORDINATE
NOTES
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Document Set ID: 4350583
Version: 1, Version Date: 22/11/2023



CLIENT
TAMAHERE COUNTRY CLUB
SOUTH PRECINCT

PROJECT TITLE
WASTEWATER
PLAN LAYOUT

BY: -
CHK: -
STATUS: **FOR CONSENT**
CHANGELOG:
REFER TO DRAWING REGISTER

APR: -
SCALE: 1:1500
(A3)
PLAN
1011.03.50.WW-501

DATE 18.05.2023
REV -


100mm
1:1
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MAINTENANCE HOLE / SHAFT NAME	A-6	A-7	A-8	A-9	A-10	A-11	A-12
MH / MS COVER TYPE							
MH / MS TYPE	MH1050	MH1050	MH1050	MH1050	MH1050	MH1050	MH1050
DS MH / MS DROP TYPE							
LINE DEFLECTION & BRANCHES	4° G -88° H 79°	-7° I 89°	-14°	-19° L -111°	M 90°	-88°	
PROPERTY CONNECTION TYPE							
DATUM RL	39.000						
PROPERTY DESCRIPTION							
PIPE SIZE (mm), CLASS		150, uPVC SN16	150, uPVC SN16	150, uPVC SN16	150, uPVC SN16	150, uPVC SN16	150, uPVC SN16
GRADE (1 IN X)		1%	0.55%	0.55%	0.55%	0.56%	0.55%
LENGTH		69.69	34.48	24.92	43.76	17.08	96.40
EMBEDMENT TYPE							
FINISHED (& EXISTING) SURFACE LEVEL	47.56 (48.00)	47.99 (47.93)	48.12 (48.18)	48.01 (47.89)	48.15 (47.54)	48.14 (47.45)	48.13 (47.76)
DEPTH OF INVERT BELOW FSL	2.67 2.65	2.38 2.36	2.30 2.28	2.02 2.00	1.90 1.88	1.78 1.72	1.17
INVERT LEVEL	44.89 44.91 44.98 7 525mm IL 46.12	45.59 11 225mm IL 46.52 319.81 45.61 45.63	45.82 45.84	45.98 46.01	46.24 15 300mm IL 47.18 422.97 46.25 46.27	46.36 46.42 46.43 10 525mm IL 47.04	46.95
CHAINAGE	250.12	317.71	354.29	379.21	420.35	440.05	536.45

Scale Hz 1:1000 / Vt 1:200

Mount Eden 2000 - NZ DATUM
Motunui '53 - NZ DATUM
- :N - :E - :Z - :COORDINATE
NOTES
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CLIENT
TAMAHERE COUNTRY CLUB
SOUTH PRECINCT

PROJECT TITLE
WASTEWATER
LONGSECTION SHEET 1

BY: _____
CHK: _____
STATUS: **FOR CONSENT**

APR: _____
SCALE: 1:AS
PLAN
1011.03.50.WW-521

DATE 18.05.2023
REV _____

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MAINTENANCE HOLE / SHAFT NAME	A-12	A-13	A-14	A-15
MH / MS COVER TYPE				
MH / MS TYPE	MH1050	MH1050	MH1050	MH1050
DS MH / MS DROP TYPE				
LINE DEFLECTION & BRANCHES		-7° N -92°	-85°	
PROPERTY CONNECTION TYPE				
DATUM RL	40.000			
PROPERTY DESCRIPTION				
PIPE SIZE (mm), CLASS	150, uPVC SN16		150, uPVC SN16	150, uPVC SN16
GRADE (1 IN X)	-0.55%		-0.56%	-1%
LENGTH	97.70		71.03	40.46
EMBEDMENT TYPE				
FINISHED (& EXISTING) SURFACE LEVEL	48.13 (47.76)	48.33 (47.63)	48.73 (48.02)	48.98 (47.97)
DEPTH OF INVERT BELOW FSL	1.17 1.15	0.82 0.80	0.80 0.74	0.59
INVERT LEVEL	46.95 46.97	47.51 47.53 47.54 17 300mm IL 47.78	47.91 18 300mm IL 47.54 47.92 47.98	48.39
CHAINAGE	536.45	634.14	702.64 705.18	745.64

Scale Hz 1:1000 / Vt 1:200

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MAINTENANCE HOLE / SHAFT NAME	A-10	M-1	M-2	M-3
MH / MS COVER TYPE				
MH / MS TYPE	MH1050	MH1050	MH1050	MH1050
DS MH / MS DROP TYPE				
LINE DEFLECTION & BRANCHES	A	64°	22°	
PROPERTY CONNECTION TYPE				

DATUM RL	39.000			
PROPERTY DESCRIPTION				
PIPE SIZE (mm), CLASS	150, uPVC SN16		150, uPVC SN16	
GRADE (1 IN X)	0.85%		1%	
LENGTH	21.71		31.45	
EMBEDMENT TYPE				
FINISHED (& EXISTING) SURFACE LEVEL	48.15 (47.54)	48.17 (47.81)	48.33 (47.97)	48.35 (48.19)
DEPTH OF INVERT BELOW FSL	1.90 1.84	1.67 1.62	1.52 1.49	1.07
INVERT LEVEL	46.25 46.31	46.50 46.55	46.81 46.84	47.29
CHAINAGE	0.00	21.71	53.16	97.47

Scale Hz 1:1000 / Vt 1:200

MAINTENANCE HOLE / SHAFT NAME	A-13	N-1
MH / MS COVER TYPE		
MH / MS TYPE	MH1050	MH1050
DS MH / MS DROP TYPE		
LINE DEFLECTION & BRANCHES	A	
PROPERTY CONNECTION TYPE		

DATUM RL	40.000	
PROPERTY DESCRIPTION		
PIPE SIZE (mm), CLASS	150, uPVC SN16	
GRADE (1 IN X)	1%	
LENGTH	51.48	
EMBEDMENT TYPE		
FINISHED (& EXISTING) SURFACE LEVEL	48.33 (47.63)	48.68 (47.73)
DEPTH OF INVERT BELOW FSL	0.82 0.76	0.59
INVERT LEVEL	47.51 47.57	48.09
CHAINAGE	0.00	51.48

Scale Hz 1:1000 / Vt 1:200

MAINTENANCE HOLE / SHAFT NAME	A-14	O-1
MH / MS COVER TYPE		
MH / MS TYPE	MH1050	MH1050
DS MH / MS DROP TYPE		
LINE DEFLECTION & BRANCHES	A	
PROPERTY CONNECTION TYPE		







DATUM RL	41.000	
PROPERTY DESCRIPTION		
PIPE SIZE (mm), CLASS	150, uPVC SN16	
GRADE (1 IN X)	1%	
LENGTH	40.46	
EMBEDMENT TYPE		
FINISHED (& EXISTING) SURFACE LEVEL	48.73 (48.02)	48.98 (47.97)
DEPTH OF INVERT BELOW FSL	0.80 0.74	0.59
INVERT LEVEL	47.92 47.98	48.39
CHAINAGE	0.00	40.46

Scale Hz 1:1000 / Vt 1:200

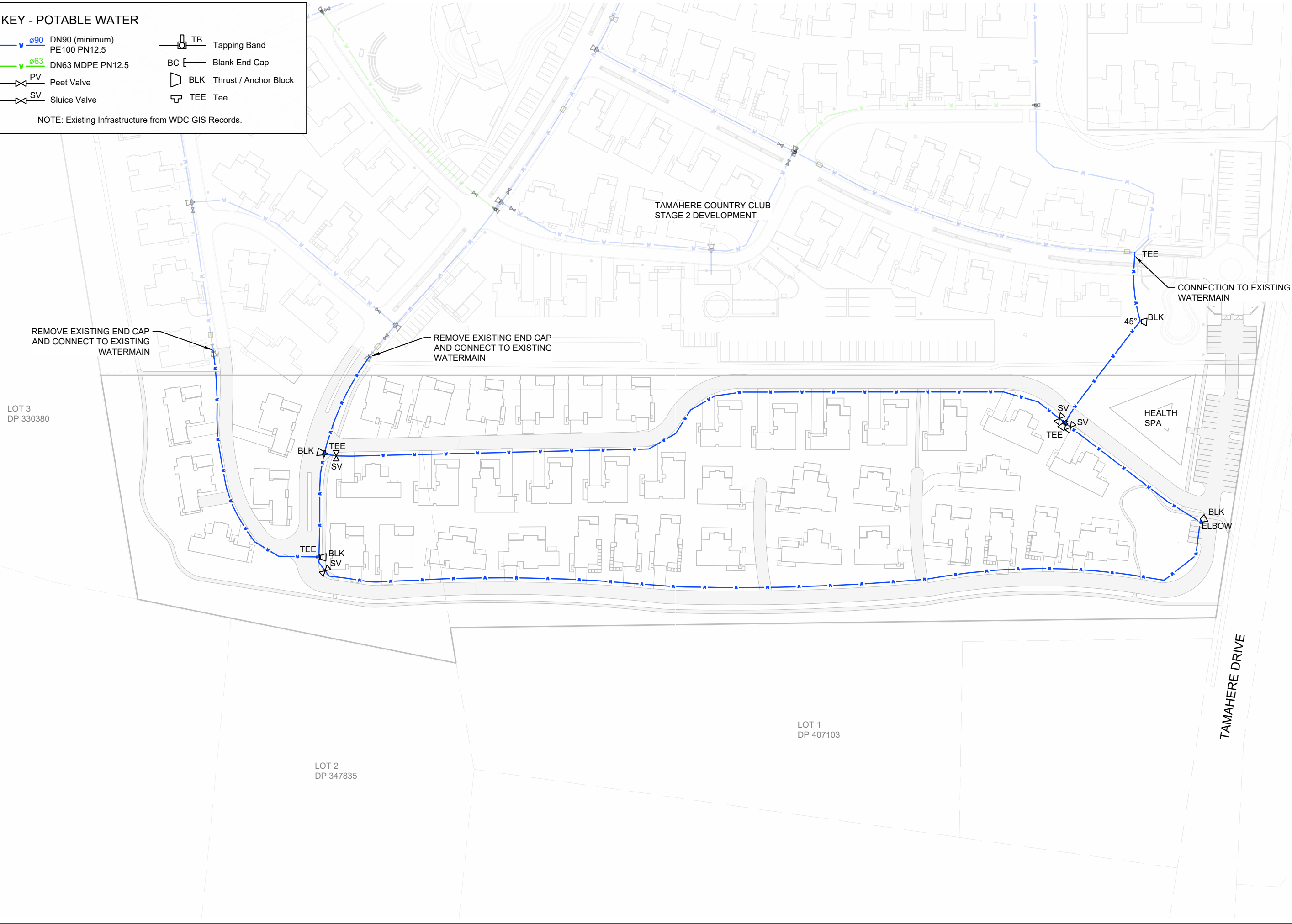
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KEY - POTABLE WATER

- $\varnothing 90$ DN90 (minimum)
PE100 PN12.5
- $\varnothing 63$ DN63 MDPE PN12.5
-  PV Peet Valve
-  SV Sluice Valve
-  TB Tapping Band
-  BC Blank End Cap
-  BLK Thrust / Anchor Block
-  TEE Tee

NOTE: Existing Infrastructure from WDC GIS Records.



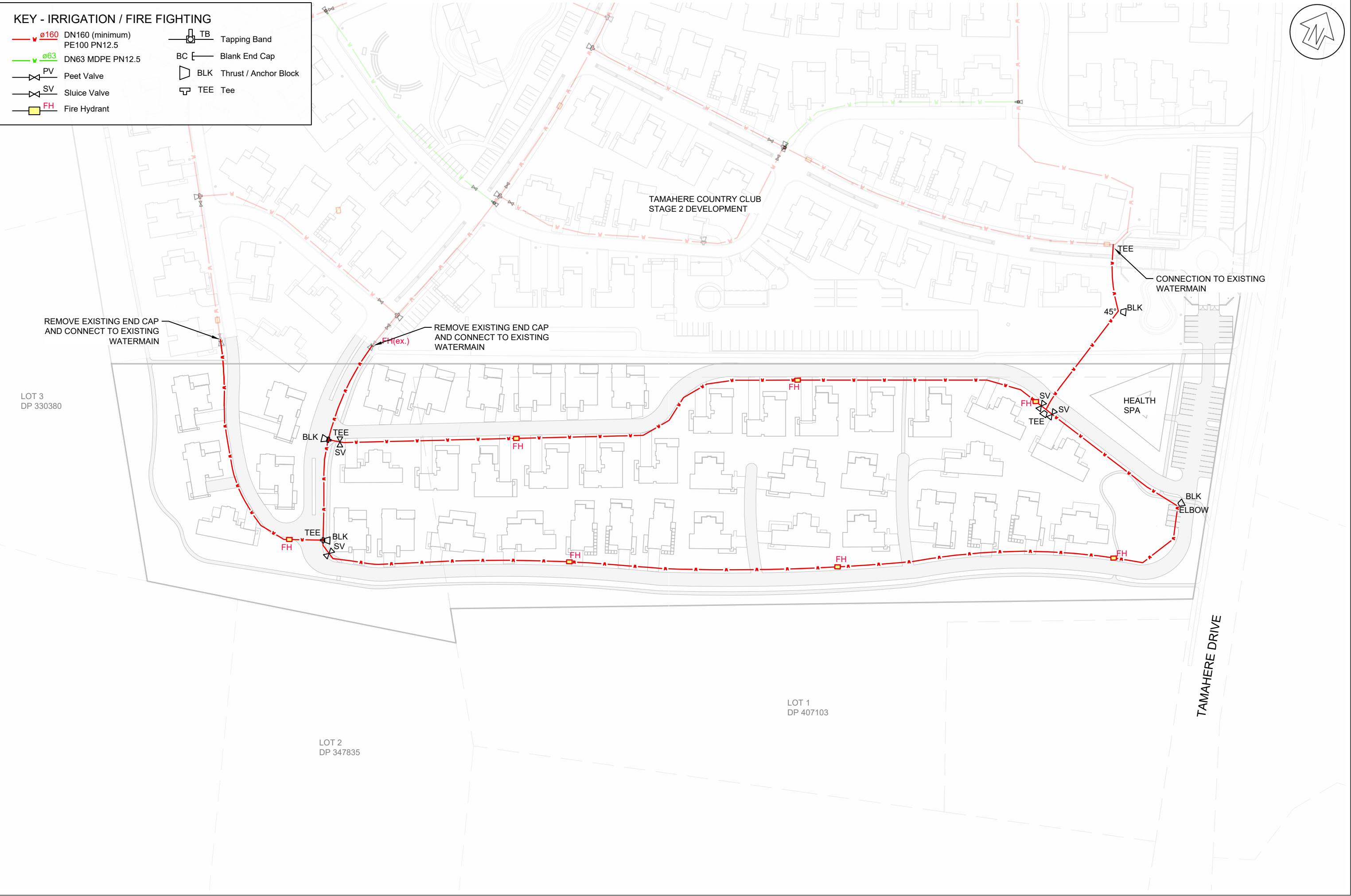
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KEY - IRRIGATION / FIRE FIGHTING

$\phi 160$ DN160 (minimum) PE100 PN12.5	TB Tapping Band
$\phi 63$ DN63 MDPE PN12.5	BC Blank End Cap
PV Peet Valve	BLK Thrust / Anchor Block
SV Sluice Valve	TEE Tee
FH Fire Hydrant	



Mount Eden 2000 - NZ DATUM
Motunui '53 - NZ DATUM

GEODETIC CODE: -N
ORIGIN MARK: -E
COORDINATE NOTES: -Z

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CONSULTANTS

CLIENT
**TAMAHERE COUNTRY CLUB
SOUTH PRECINCT**

PROJECT TITLE
**WATER
FIREFIGHTING AND IRRIGATION LAYOUT**

BY: -	APR: -	SCALE: 1:1500	DATE: 18.05.2023
CHK: -		(A3)	
STATUS: FOR CONSENT		PLAN	REV -
CHANGELOG: REFER TO DRAWING REGISTER		1011.03.60.PW.602	

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TAMAHERE COUNTRY CLUB SANDERSON GROUP



FOR CONSENT PLAN SET EAST PRECINCT TAMAHERE DRIVE, TAMAHERE

JUNE 2023

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Kotare

CONSULTANTS

Unit D Victoria Arcade
75D Victoria Street
Cambridge 3434 NZ

Tel: 07 827 5340
www.kotareconsultants.nz
ciaran@kotareconsultants.nz

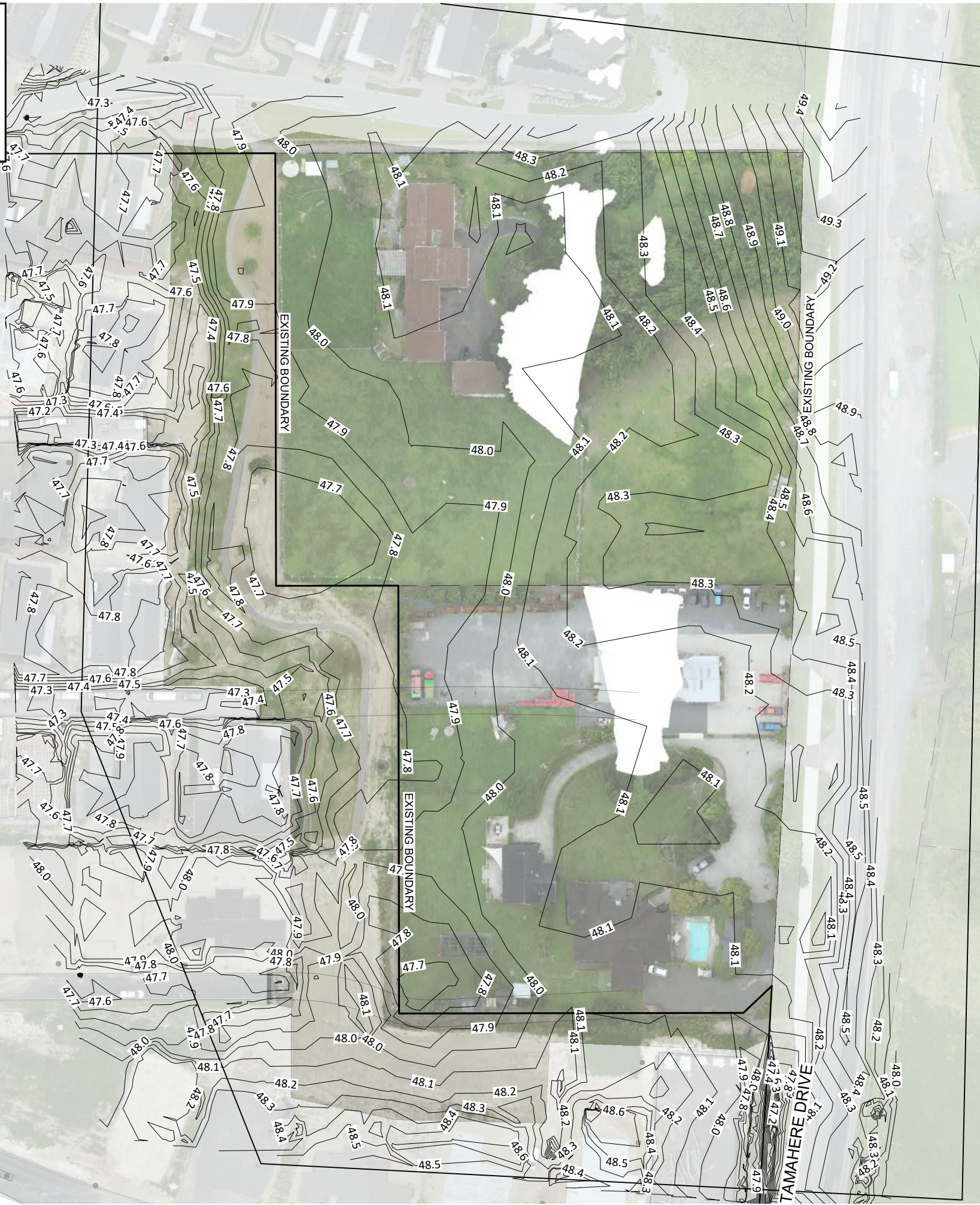
NOTES:

- 1. HEIGHTS ARE IN TERMS OF MOTURIKI VERTICAL DATUM 1953.
ORIGIN: AP 3 DP 565970 RL=47.27
- 2. COORDINATES ARE IN TERMS OF NZGD 2000, MOUNT EDEN CIRCUIT.
- 3. CONTOURS ARE SHOWN AT 0.25M INTERVALS.



TAMAHERE COUNTRY CLUB
STAGE 2 DEVELOPMENT

EXISTING HERITAGE TREE
TO REMAIN



Mount Eden 2000 - Hz DATUM
Moturiki '53 - VI DATUM
- : GEODETIC CODE - : E - : ORIGIN MARK
- : N - : Z - : COORDINATE
NOTES



CLIENT
TAMAHERE COUNTRY CLUB
EAST PRECINCT

PROJECT TITLE
EARTHWORKS
EXISTING LAYOUT

BY: -
CHK: -
STATUS: **FOR CONSENT**

APR: -
SCALE: 1:1000
DATE: 02.06.2023
PLAN
1011.04.10.EA.101
REV -



LEGEND

CONTOURS - CUT TO FILL

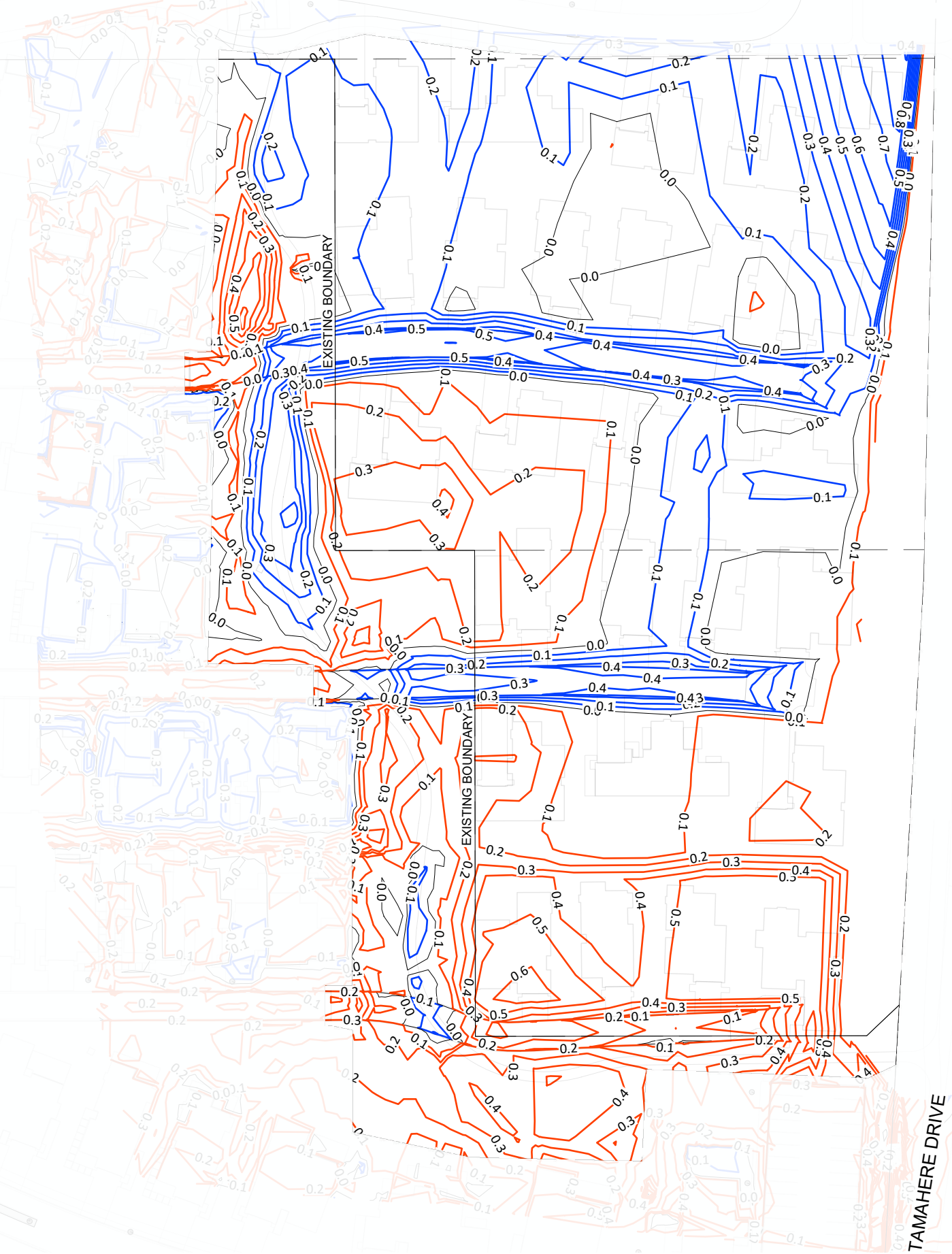
- 0.1m CUT
- ZERO
- +0.1m FILL

VOLUMES

- CUT - 3,000m³
- FILL - 10,000m³

(FROM EXISTING GROUND LESS 300mm, TO DESIGN LESS 150mm)

TAMAHERE COUNTRY CLUB
STAGE 2 DEVELOPMENT



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Mount Eden 2000 - NZ DATUM
Moturiki '53 - NZ DATUM
- :GEODEIC CODE - :E
- :N - :Z :COORDINATE
NOTES
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CLIENT
**TAMAHERE COUNTRY CLUB
EAST PRECINCT**

PROJECT TITLE
**EARTHWORKS
CUT FILL CONTOURS**

BY: _____
CHK: _____
STATUS: **FOR CONSENT**
CHANGELOG:
REFER TO DRAWING REGISTER

APR: _____
SCALE: 1:1000 (A3)
DATE: 02.06.2023
PLAN
1011.04.10.EA.111
REV: _____



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Mount Eden 2000
Moturiki '53
:GEODEIC CODE
-N
:E
:Z
:COORDINATE
NOTES
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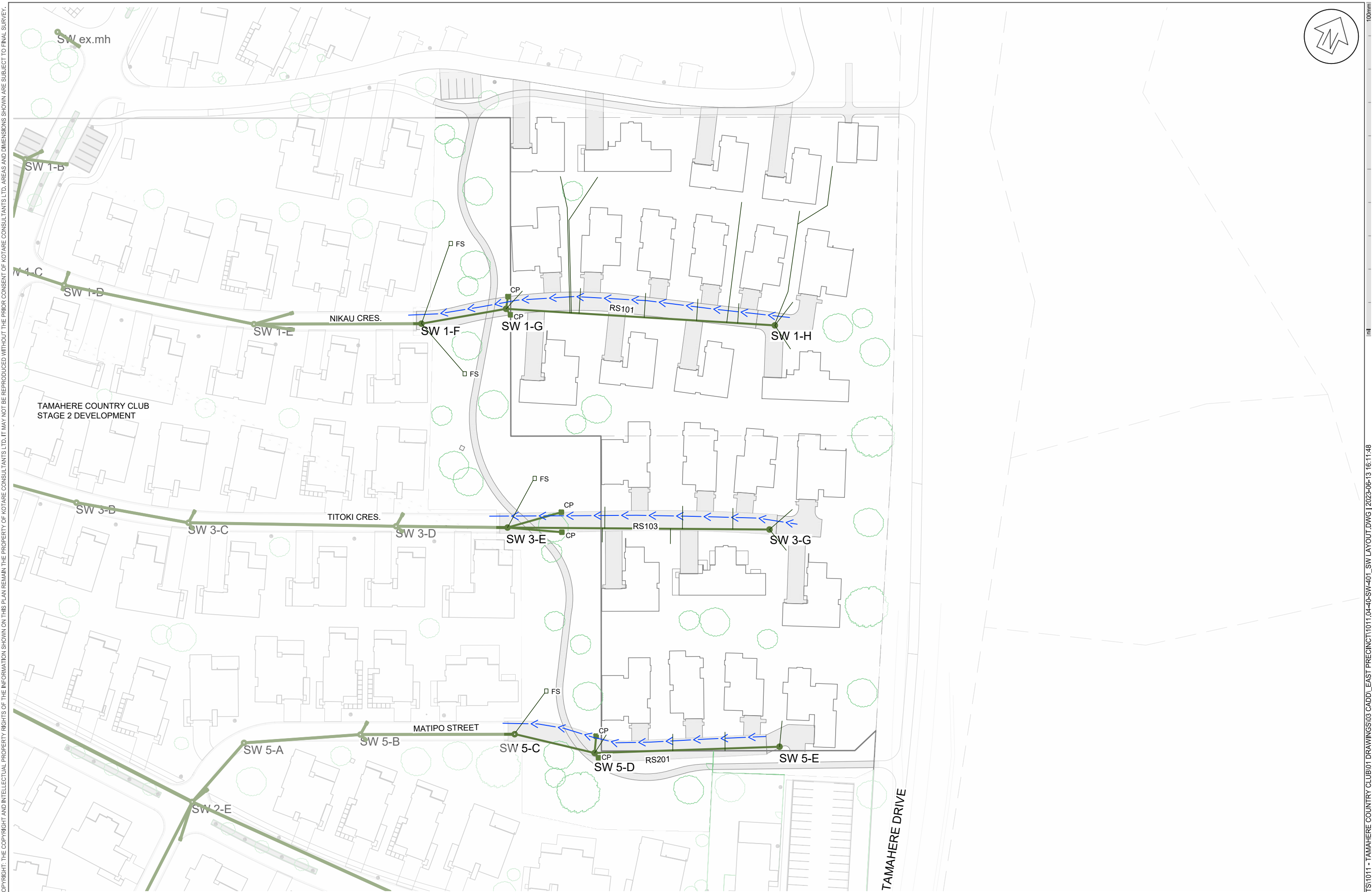
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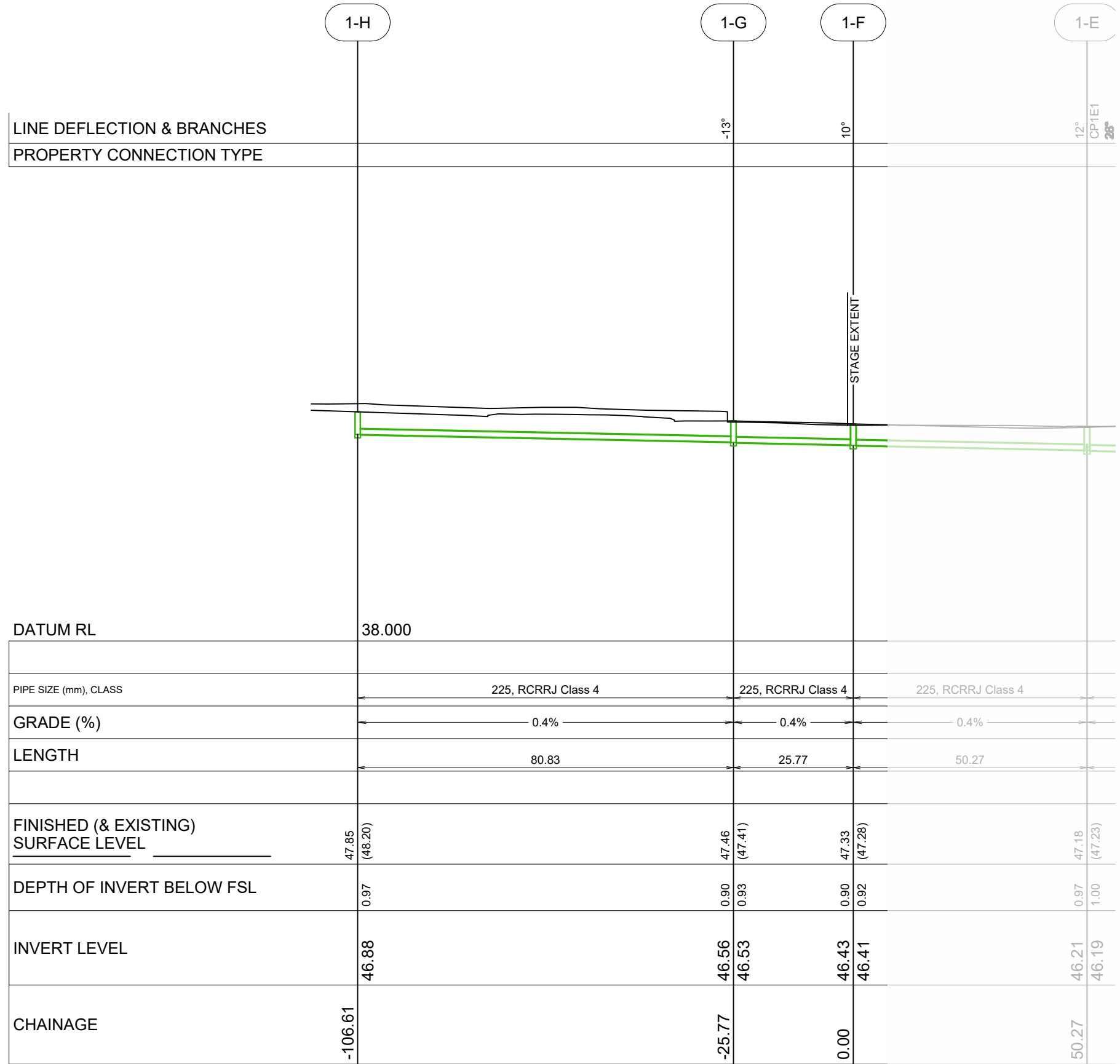


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PROJECT TITLE
**STORMWATER
 PLAN LAYOUT**

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CHK: _____		(A3)	
STATUS: FOR CONSENT		PLAN	REV _____
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LINE DEFLECTION & BRANCHES
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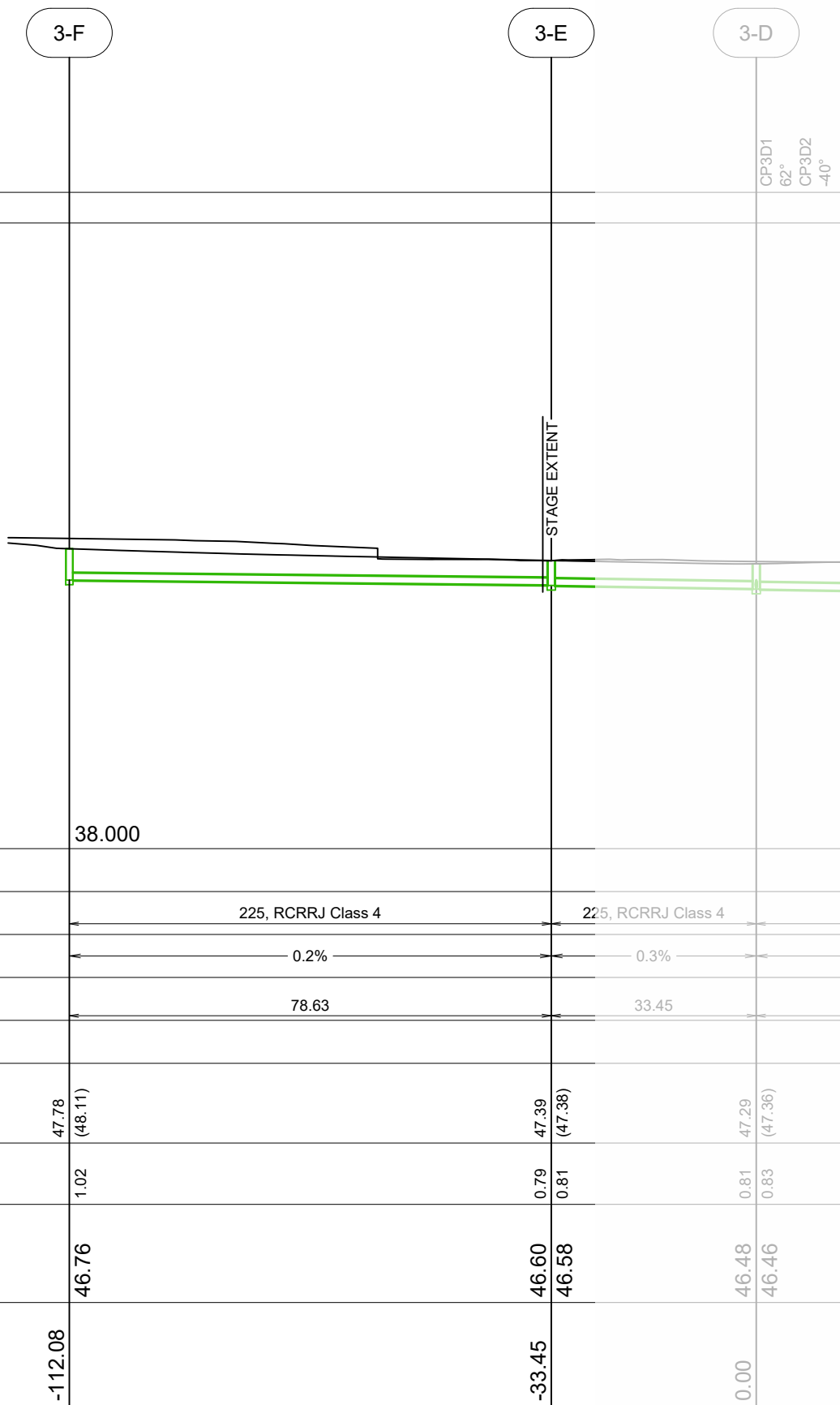
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PIPE SIZE (mm), CLASS	225, RCRRJ Class 4	225, RCRRJ Class 4	225, RCRRJ Class 4
GRADE (%)	0.4%	0.4%	0.4%
LENGTH	80.83	25.77	50.27
FINISHED (& EXISTING) SURFACE LEVEL	47.85 (48.20)	47.46 (47.41)	47.33 (47.28)
DEPTH OF INVERT BELOW FSL	0.97	0.90 (0.93)	0.90 (0.92)
INVERT LEVEL	46.88	46.56 (46.53)	46.43 (46.41)
CHAINAGE	-106.61	-25.77	0.00



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LINE DEFLECTION & BRANCHES
PROPERTY CONNECTION TYPE



DATUM RL	38.000		
PIPE SIZE (mm), CLASS	225, RCRRJ Class 4	225, RCRRJ Class 4	
GRADE (%)	0.2%	0.3%	
LENGTH	78.63	33.45	
FINISHED (& EXISTING) SURFACE LEVEL	47.78 (48.11)	47.39 (47.38)	47.29 (47.36)
DEPTH OF INVERT BELOW FSL	1.02	0.79 0.81	0.81 0.83
INVERT LEVEL	46.76	46.60 46.58	46.48 46.46
CHAINAGE	-112.08	-33.45	0.00

Scale Hz 1:1000 / Vt 1:200

Mount Eden 2000 - NZ DATUM
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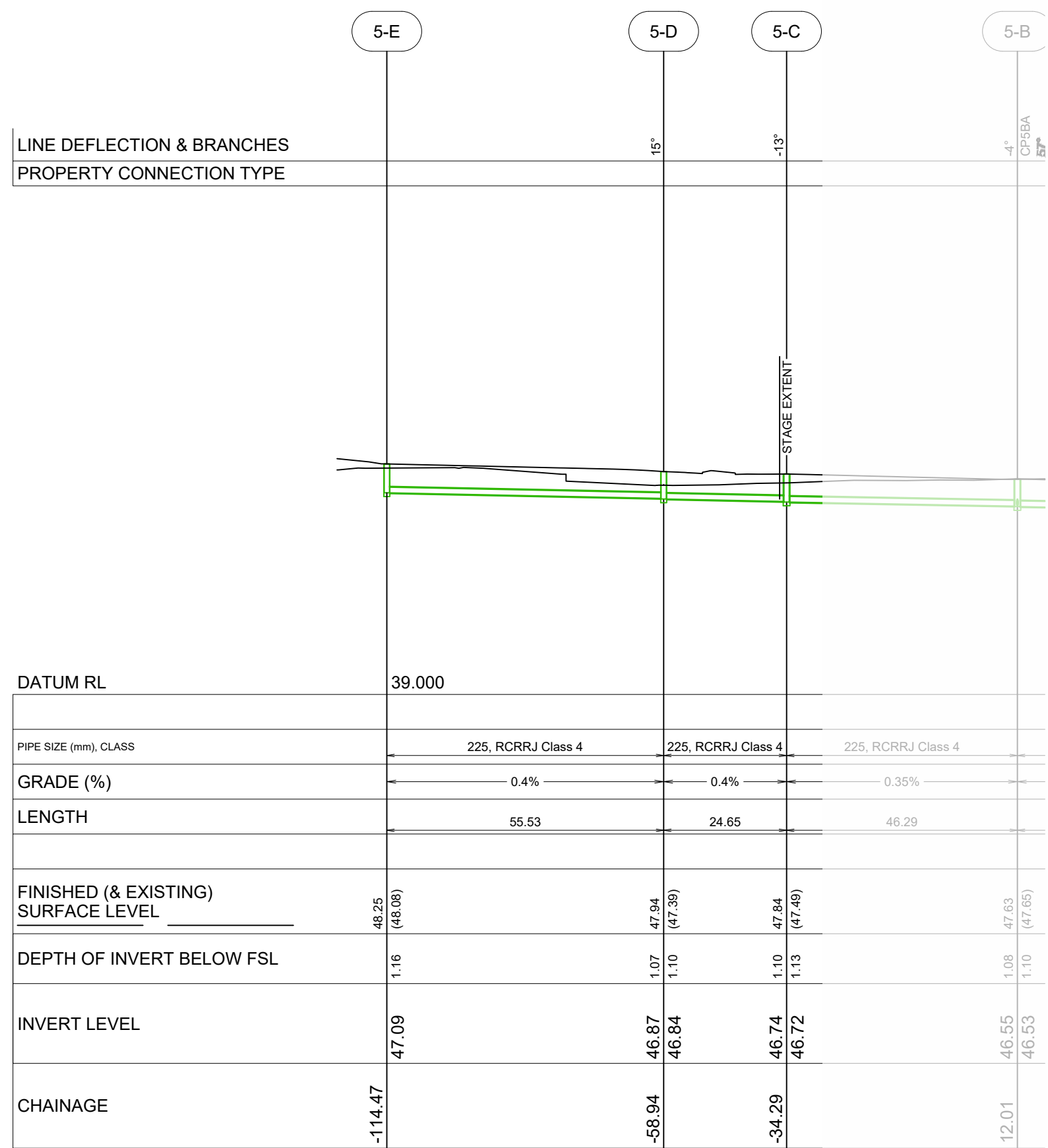
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LONGSECTION SHEET 2

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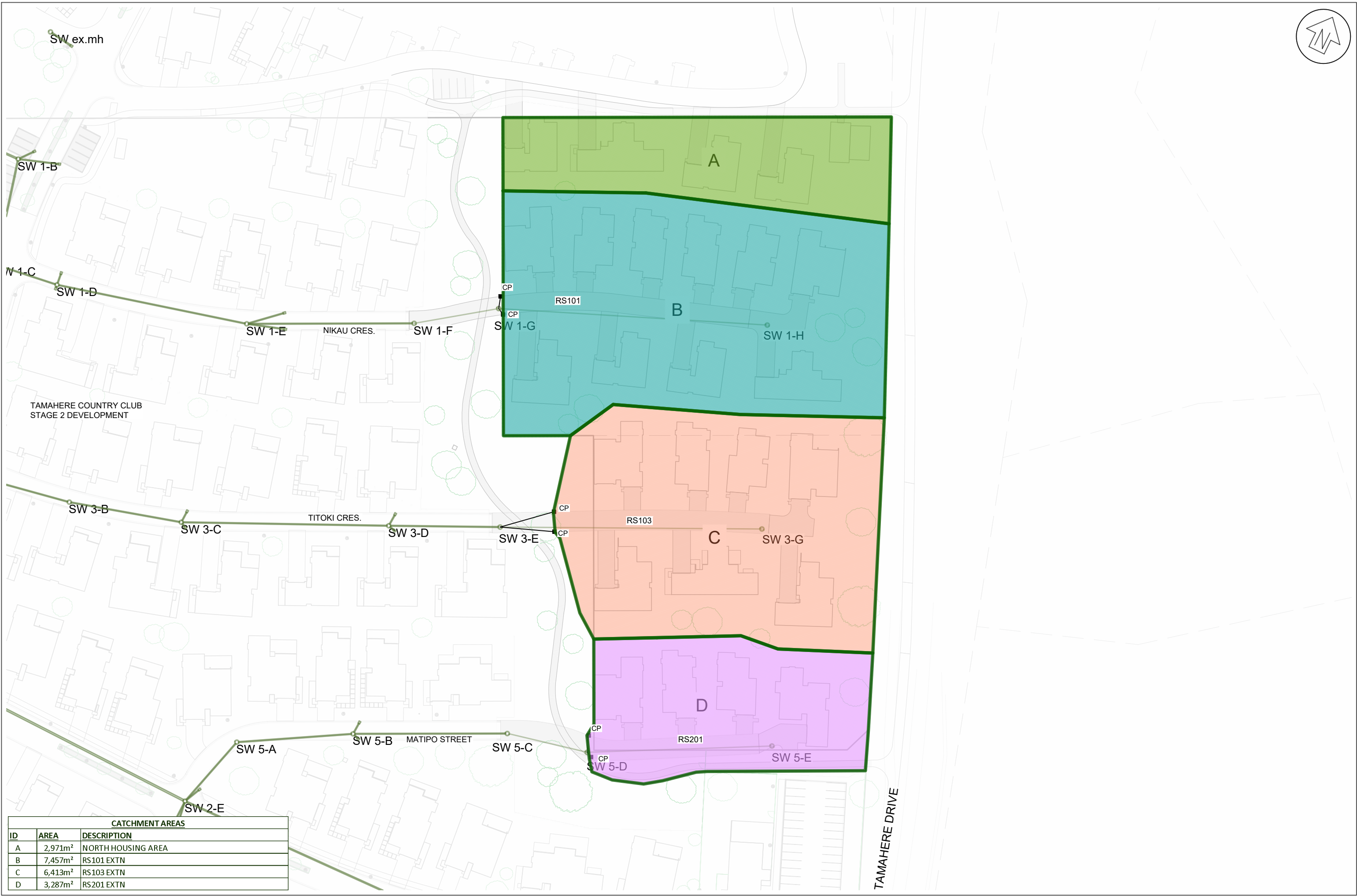
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CATCHMENT AREAS		
ID	AREA	DESCRIPTION
A	2,971m ²	NORTH HOUSING AREA
B	7,457m ²	RS101 EXTN
C	6,413m ²	RS103 EXTN
D	3,287m ²	RS201 EXTN

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 CATCHMENT PLAN**

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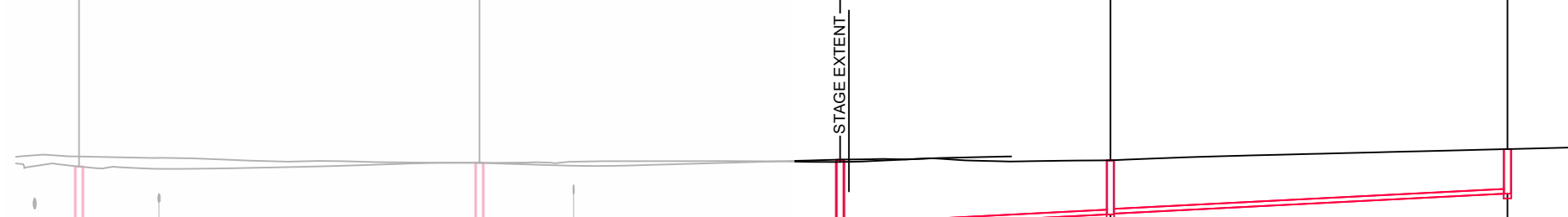
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PROJECT TITLE
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 PLAN LAYOUT

BY: _____	APR: _____	SCALE: 1:1000	DATE 02.06.2023
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MAINTENANCE HOLE / SHAFT NAME	A-3	B-1	B-2	B-3	B-4
MH / MS COVER TYPE					
MH / MS TYPE	MH	MH	MH	MH1050	MH1050
DS MH / MS DROP TYPE					
LINE DEFLECTION & BRANCHES	A	-12°	-10°	16°	
PROPERTY CONNECTION TYPE					



DATUM RL	37.000				
PROPERTY DESCRIPTION					
PIPE SIZE (mm), CLASS	150, PVC		150, PVC		150, PVC
GRADE (1 IN X)	2.04%		1%		1%
LENGTH	63.34		57.05		62.82
EMBEDMENT TYPE					
FINISHED (& EXISTING) SURFACE LEVEL	47.11 (47.43)	47.23 (47.23)	47.33 (47.26)	47.31 (47.31)	47.66 (47.66)
DEPTH OF INVERT BELOW FSL	3.91 3.85	2.68 2.65	2.18 2.16	1.71 1.68	1.41
INVERT LEVEL	43.20 43.26 43.51	44.55 44.58	45.15 45.17	45.60 45.63	46.26
CHAINAGE	0.00 12.63	63.34	120.40	163.15	225.96

Scale Hz 1:1000 / Vt 1:200

Mount Eden 2000 - NZ DATUM
Moturiki '53 - NZ DATUM

- :GEODETTIC CODE
 - :N
 - :E
 - :Z :COORDINATE
 - :ORIGIN MARK
 - :Z :COORDINATE
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Kotare
 CONSULTANTS

CLIENT: TAMAHERE COUNTRY CLUB
 EAST PRECINCT

PROJECT TITLE: WASTEWATER
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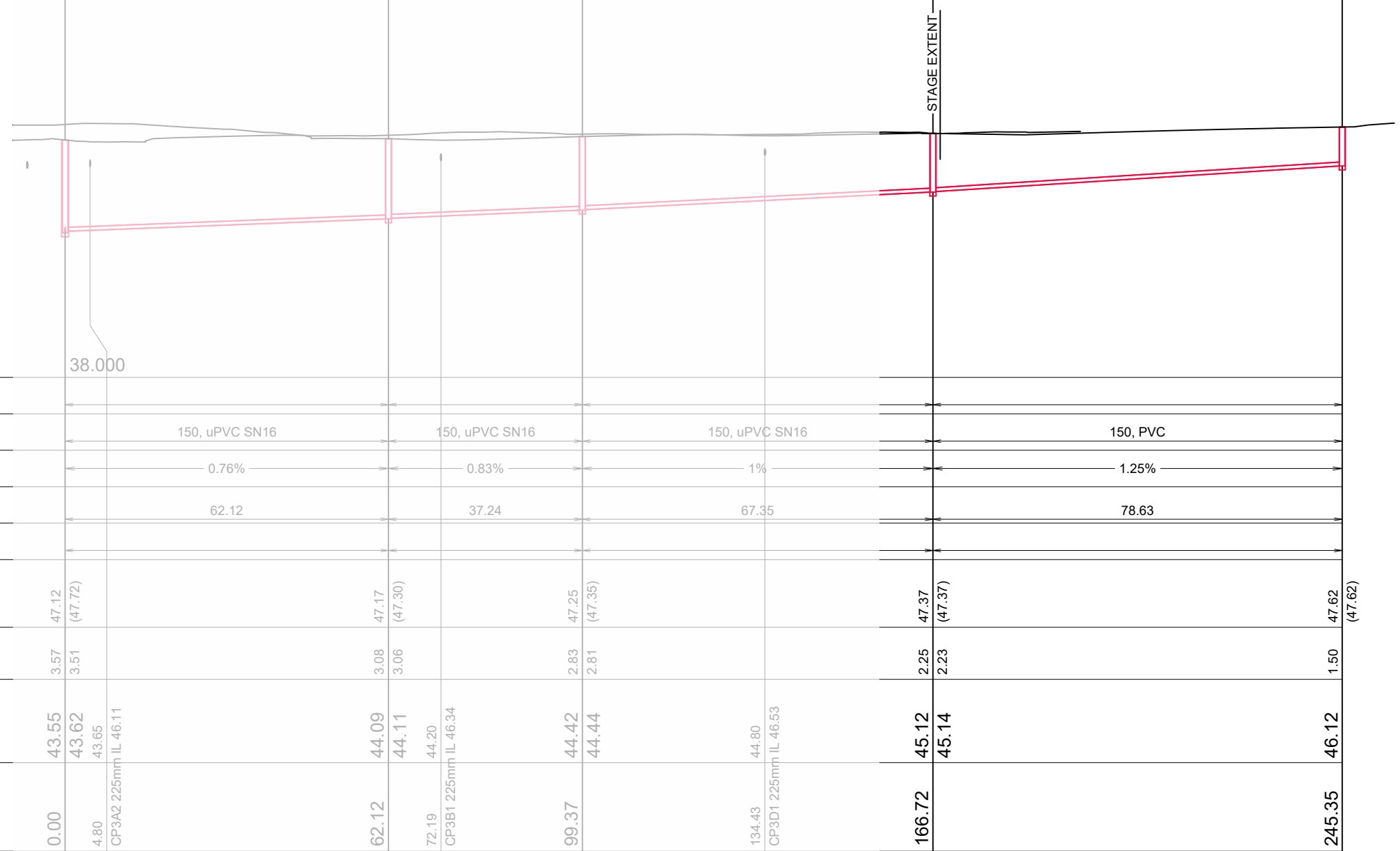
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MAINTENANCE HOLE / SHAFT NAME	A-4	C-1	C-2	C-3	C-4
MH / MS COVER TYPE					
MH / MS TYPE	MH	MH1050	MH1050	MH1050	MH1050
DS MH / MS DROP TYPE					
LINE DEFLECTION & BRANCHES	A	-14°	-3°		
PROPERTY CONNECTION TYPE					



DATUM RL	38.000				
PROPERTY DESCRIPTION					
PIPE SIZE (mm), CLASS	150, uPVC SN16		150, uPVC SN16		150, PVC
GRADE (1 IN X)	-0.76%		-0.83%		1.25%
LENGTH	62.12		37.24		78.63
EMBEDMENT TYPE					
FINISHED (& EXISTING) SURFACE LEVEL	47.12 (47.72)	47.17 (47.30)	47.25 (47.35)	47.37 (47.37)	47.62 (47.62)
DEPTH OF INVERT BELOW FSL	3.57 3.51	3.08 3.06	2.83 2.81	2.25 2.23	1.50
INVERT LEVEL	43.55 43.62 43.65 CP3A2 225mm IL 46.11	44.09 44.11 44.20 CP3B1 225mm IL 46.34	44.42 44.44	45.12 45.14 CP3D1 225mm IL 46.53	46.12
CHAINAGE	0.00 4.80	62.12 72.19	99.37	166.72	245.35

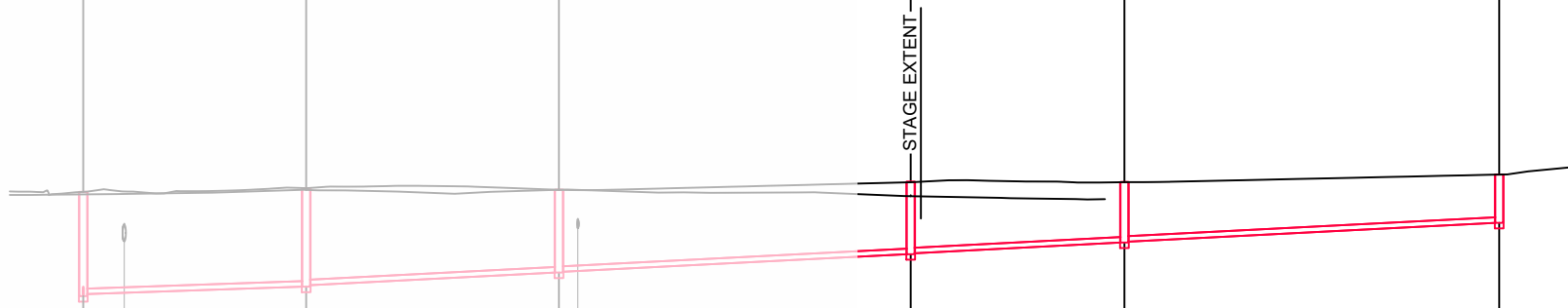
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MAINTENANCE HOLE / SHAFT NAME	E-1	F-1	F-2	F-3	F-4	F-5
MH / MS COVER TYPE						
MH / MS TYPE	MH1050	MH1050	MH1050	MH1050	MH1050	MH1050
DS MH / MS DROP TYPE						
LINE DEFLECTION & BRANCHES	E	44°	4°	11°	-13°	
PROPERTY CONNECTION TYPE						



DATUM RL	38.000					
PROPERTY DESCRIPTION						
PIPE SIZE (mm), CLASS	150, uPVC SN16		150, uPVC SN16		150, PVC	150, PVC
GRADE (1 IN X)	0.67%		1%		1%	1%
LENGTH	30.30		34.35		47.81	29.05
EMBEDMENT TYPE						
FINISHED (& EXISTING) SURFACE LEVEL	47.58 (47.51)	47.68 (47.63)	47.64 (47.64)	47.84 (47.46)	47.85 (47.85)	48.05 (48.05)
DEPTH OF INVERT BELOW FSL	2.83 2.77	2.67 2.63	2.25 2.23	1.95 1.93	1.64 1.62	1.31
INVERT LEVEL	44.75 44.81 44.84 2.450mm IL 46.24	45.01 45.05	45.39 45.41 45.43 CP5BA 225mm IL 46.60	45.89 45.92	46.21 46.23	46.74
CHAINAGE	0.00	30.30	64.65	112.46	141.51	192.46

Scale Hz 1:1000 / Vt 1:200



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KEY - IRRIGATION / FIRE FIGHTING

$\phi 160$ DN160 (minimum) PE100 PN12.5	TB Tapping Band
$\phi 63$ DN63 MDPE PN12.5	BC Blank End Cap
PV Peet Valve	BLK Thrust / Anchor Block
SV Sluice Valve	TEE Tee
FH Fire Hydrant	



Mount Eden 2000
Moturiki '53

Geodetic Code: -N
Datum: -E
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Coordinate Notes

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EAST PRECINCT**

PROJECT TITLE
**WATER
FIREFIGHTING AND IRRIGATION LAYOUT**

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APPENDIX B

TE MIRO WATER Stormwater Report and Revision Memorandum



TO: Emily Patterson – BBO and Ciaran Murphy – Kotare Consultants

FROM: Mike Chapman and Arun Gopi – Te Miro Water

SUBJECT: Stormwater Management South and East Extensions – Tamahere Drive, Tamahere.

INTRODUCTION

In May 2023, Te Miro Water were engaged by Kotare Properties to undertake a re-design to accommodate additional stormwater runoff from the proposed TCC Stage 3 extension. Note Stage 3 is now referred to as the south extension (Figure 1). The drawing set relating to stormwater is provided in the Appendix.

In June 2023 Te Miro were subsequently engaged by Kotare Consultants to provide further assessment for the eastern extension (in addition to the earlier southern extension) also shown in Figure 1. The key stormwater objectives when looking at both extension areas are:

1. Provide a stormwater solution for south and east TCC extension areas. The runoff from both areas ultimately reaches the communal soakage basin (as part of Stage 2). This basin discharges to existing drain (at existing 100yr peak flow) which runs north under Airport Road into the Tamahere rural residential area.
2. Each extension will need to provide additional attenuation within the site because the communal soakage basin and existing pipe network does not have capacity to accommodate peak flows and runoff.
3. TRITON chamber systems are proposed to provide additional attenuation with controlled outlet to the existing 10- year primary pipe system to the soakage basin (already constructed within Stage 2).
4. The TRITON system in the south and east areas are designed to accommodate runoff from both lot and accessway impervious areas. TRITON systems are currently provided within the TCC Stage 1 development.
5. HEC HMS model is revised to check spill > 10 year up to the 100 year continues to be safely contained within the soakage basin with peak flow to existing drain at no more than existing peak flow.
6. This memo retains the earlier assessment for the south (previous referred to as Stage 3) but now includes the east area.

RESULTS- SOUTH PRECINCT

The HEC HMS results show runoff from the southern extension can be accommodated within the current basin (design as part of Stage 2). However, TRITON systems are now recommended due to the additional runoff from the east extension and need to restrict flows to the existing pipe capacity now installed within Stage 2.

The consented stormwater design solution for Stage 2 includes a communal stormwater soakage basin along the northern boundary which is designed to soak up to the 10yr event. A weir control is provided to the existing drain to manage flows above the 10yr up to the 100yr. Flows are attenuated to the existing 100-year peak flow entering the drain.

A re-use system is also provided with initial flows from the 10yr primary network entering the soakage basin being initially directed to HYNDS defender units prior to being pumped to a sperate feature pond for irrigation and firefighting. The re-use volumes are not considered in the soakage design or water quality treatment forebay so in this sense they provide additional benefits to the overall stormwater solution. Stage 3 will also drain to this basin with first flush also directed initially to the HYNDS units and then to the feature pond.

For the south precinct two previous stormwater management options were assessed with Option 1 being the preferred option.

1. Accommodate south extension (all pervious and impervious areas) within the existing Soakage basin (located in Stage 2) while maintaining existing peak flows offsite to the existing drain in accordance with the WRC discharge consent. It is noted the basin has been enlarged compared to the basin submitted in the SMP for Stage 2 Resource Consent.
2. Undertake on lot soakage up to the 10yr (roof areas) with only road and pervious areas going to the basin. Spill to the basin from lots will however above 10yr. This option would reduce pressure on the basin if existing storage capacity was insufficient.



Figure 1: South and East Extension in relation to Existing Stage 1 and 2 (SW plans for south and east areas are provided in the appendix)

ORIGINAL HEC HMS MODEL TO SUPPORT SOUTH EXTENSION ONLY

A HEC HMS model was built (for Stage 2) to assess the current soakage basin capacity and control peak flows to the receiving environment (farm drain) to existing peak flows (determined separately by from TUFLOW 2D modelling). This model was then updated to include runoff from the south area – importantly a revised depth-elevation table was included in the model (provided by Kotare consultants).

To re-cap, the existing soakage basin results (based on runoff from Stage 2 only) are:

The pond base elevation: 46mRL
 Maximum 100yr level: 46.9mRL
 Freeboard: 47.4mRL
 Peak flow to drain: 0.6m³/s

The new design inputs for the south extension are as follows:

South area catchment was divided into 3 land use sub catchments (Table 1). 1. pervious (greenspace including road berms, gardens reserve etc), 2. Roof and 3. road/driveways/pond.

TABLE 1

Type	Lots (roofs)	Roads	Small Pond (lake)	Pervious	Impervious (Road+small pond)	Total area
Area (ha)	0.94	1.3051	0.051	3.47	1.36	5.77

Scenario 1: Test the current basin with base elevation = 46mRL (see depth elevation table below) and spillway to rural drain at 46.9mRL. As above this scenario includes Stage 3 as well as the original Stage 2 runoff.

Elevation (M)	Area (1000 M2)
46.0	5.7020
46.9	7.4120
47.4	8.3639

The peak discharge was within consent limit = 0.75m³/s (limit is 0.8m³/s), however peak 100yr level is 47.27mRL which is ~400mm above currently proposed 100yr peak level in the basin (from just Stage 2) resulting in freeboard to FFL now needing to be set higher at minimum 47.8mRL. Weir length (alongside drain) = 2.25m

Scenario 2: Use depth elevation table starting at 45mRL to provide greater storage (Figure 3 shows current basin under construction). The revised – larger- basin is under construction. Resulting in keeping peak discharge rates to the drain to consent limits. The spillway level (broad crested wooden weir to drain) remains at 46.9mRL (as per current design) providing 300mm height difference to prevent backflow from the drain into the basin (drain invert ~46.6mRL).

Peak discharge is within consent limit = 0.5m³/s (limit is 0.8m³/s). Peak 100yr level is now lower at 47.00mRL which complies with required freeboard to FFL set at minimum 47.5mRL. Weir spillway is set at 46.9mRL and weir length is now increased to 5m (parallel to drain bank) to keep peak 100yr level to 47mRL. Essentially a shallow 100mm spill depth along this 5 m length. Peak storage Depth = 11,000m³.

Paired Data Table Graph	
Elevation (M)	Area (1000 M2)
45.00	0.0000
45.10	3.4710
45.20	3.9970
45.30	4.2540
45.40	4.5120
45.50	4.7750
45.60	4.9590
45.70	5.1440
45.80	5.3290
45.90	5.5150
46.00	5.7020
46.10	5.8900
46.20	6.0780
46.30	6.2660
46.40	6.4560
46.50	6.6460
46.60	6.8360
46.70	7.0280
46.80	7.2200
46.90	7.4120
47.00	7.6050
47.40	8.3639

Figure 2: Revised Soakage Basin Depth-Elevation Table provided by Kotare Consultants.



Figure 3: Soakage basin under construction (6 April 2023) – showing scruffy inlets to HYNDS unit prior to pumping first flush to feature ponds.

TRITON SIZING – SOUTH AND EAST EXTENSIONS

The assessment above (from previous memo) highlights runoff from the south extension could be contained within the communal soakage basin especially given the revised as built depth-elevation table (enlarged basin during construction resulting in no need for on-site attenuation). However, a TRITON system is also required as outlined in the introduction, given we now have the south and east extension areas and a stormwater network installed in stage 2 which was not designed to take primary flows from upper areas.

The TRITON system calculations are provided in the appendix for both the south and east areas and summarised in Table 2. It should be noted that the systems are designed conceptually at this stage assuming a conservative 50mm/hr soakage rate (as was used for the soakage basin) and a 70% impervious area for the lots and roads. Also, the final configuration (length and width) is to be determined to best fit within the built form for each area.

At detailed design we recommend further soakage testing at each location to confirm final rates for design. The preliminary TRITON dimensions are shown in Table 2

TABLE 2

10-year rain	Storage volume	Length	Width
South Extension	2,000m ³	200m	13m
East Extension	800m ³	80m	13m

HEC HMS MODEL UPDATES

The HEC HMS model (originally developed for Stage 2 basin sizing) was updated for the south area and then again with the south and east areas (Figure 4). The results show the soakage basin has capacity to accommodate the 100 Year minus 10 Year flows (10 year is now contained within the TRITON system) from the southern and eastern precincts. The peak flow from the basin to the existing drain is well within the consented existing peak flow of 0.8m³/s. For reference the earlier peak outflow was 0.5m³/s when we assumed the whole of southern precinct was discharging to the basin ie. No TRITONS and no east precinct included.

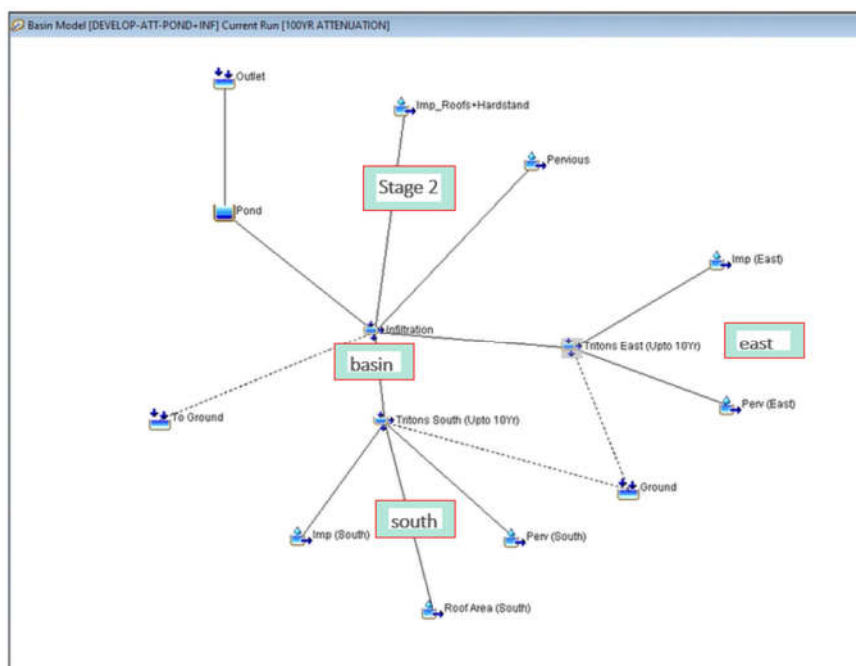


Figure 4: HEC HMS schematic with inclusion of both south and east precinct as well as original Stage 2

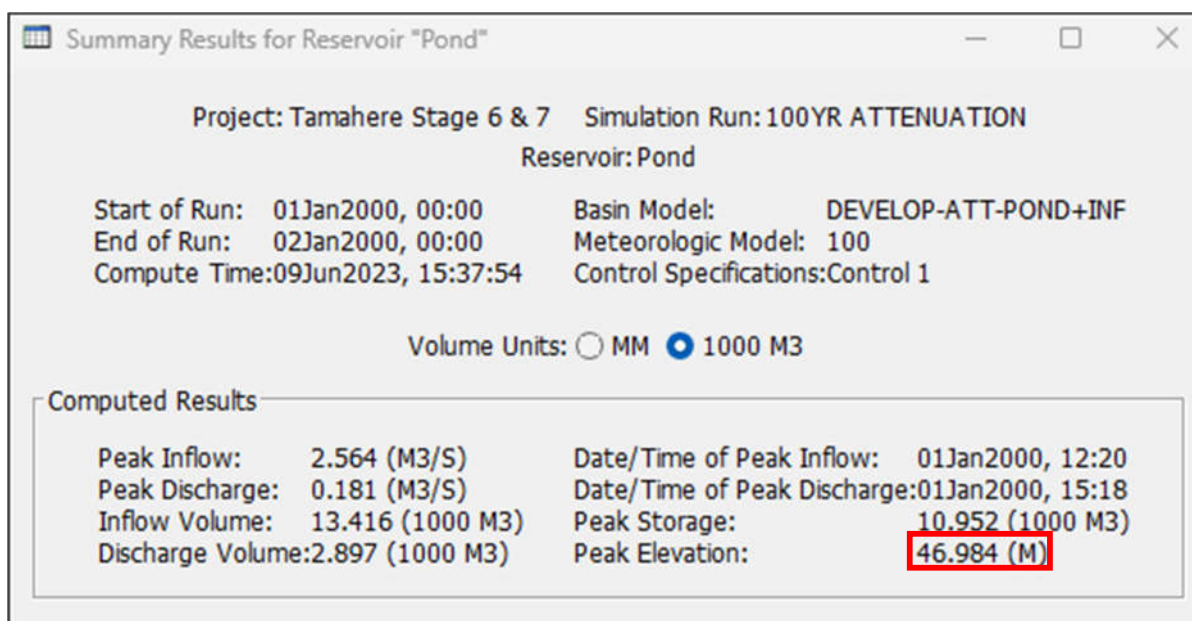


Figure 5 output from HEC HMS showing peak elevation and discharge from the basin.

CONCLUSIONS

1. The original memo (for the south area only) has been further updated to reflect inclusion of the east extension. Updates include revised HEC HMS model and requirement for TRITON systems to augment attenuation previously provided by only the basin.
2. The HEC HMS model previously reflected runoff from just Stage 2 for the earlier consent.
3. The current soakage basin and installed pipe network for Stage 2 cannot accommodate runoff and peak flows from the south and east extension areas, which when combined amount to a similar area to Stage 2.
4. Therefore, TRITON systems are proposed in the south and east precincts to store, soak and attenuate runoff. Spill from each TRITON system for flows above the 10 year will be conveyed to the communal basin within the pipe network (given flows from Stage 2 will have passed already through) as well as within the road network.
5. The final configuration of the TRITON systems (length and width) will be confirmed at detailed following on site soakage testing.
6. Input hydrology parameters for south and east pervious and impervious areas remain as per the Stage 2 scenario – 70% impervious.
7. A revised depth-elevation table was provided by Kotare Consultants. The soakage basin has been deepened by 1m compared to the original design for Stage 2 consent. Providing approximately 5,500m³ more storage volume. The top area is also increased compared to the original consent. Original depth of 46mRL lowered to 45mRL.
8. The HEC HMS model results show the basin can accommodate additional runoff from south area while limiting 100yr peak flows offsite to less than existing peak flows. Peak 100-year elevation in the basin = 47.00mRL. Freeboard to FFL should be set minimum 47.5mRL.
9. Peak elevation is maintained at 47mRL using TRITON system to manage 10-year runoff from south and east areas.
10. The weir spillway to the existing drain should be lengthened from 2.25m to 5m to keep elevation to 47.00mRL (~100mm spill depth over weir) to provide sufficient freeboard.
11. Peak discharge is within consent limit = 0.5m³/s (limit is 0.8m³/s).

LIMITATIONS

This report is for the use by Kotare Consultants Ltd and Sanderson Ltd. The report should not be used or relied upon by any other person or entity or for any other project. No responsibility is accepted by Te Miro Water Limited or its directors for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.

APPENDIX

Tamahere Country Club

TRITON sizing for south and east precincts

Objectives:

1. Size TRITON system to manage runoff from impervious areas up to the 10-year storm event.
2. To alleviate pressure on the soakage basin and existing downstream primary stormwater network.
3. Use HEC HMS to check spill from TRITON system is accommodated within the communal soakage for events > 10 year up to the 100 year.

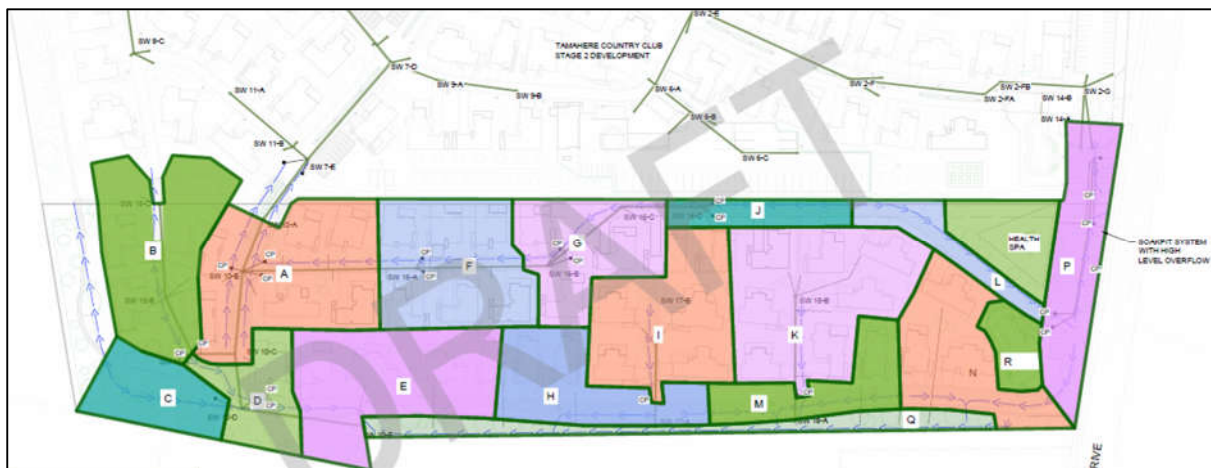
Southern Precinct

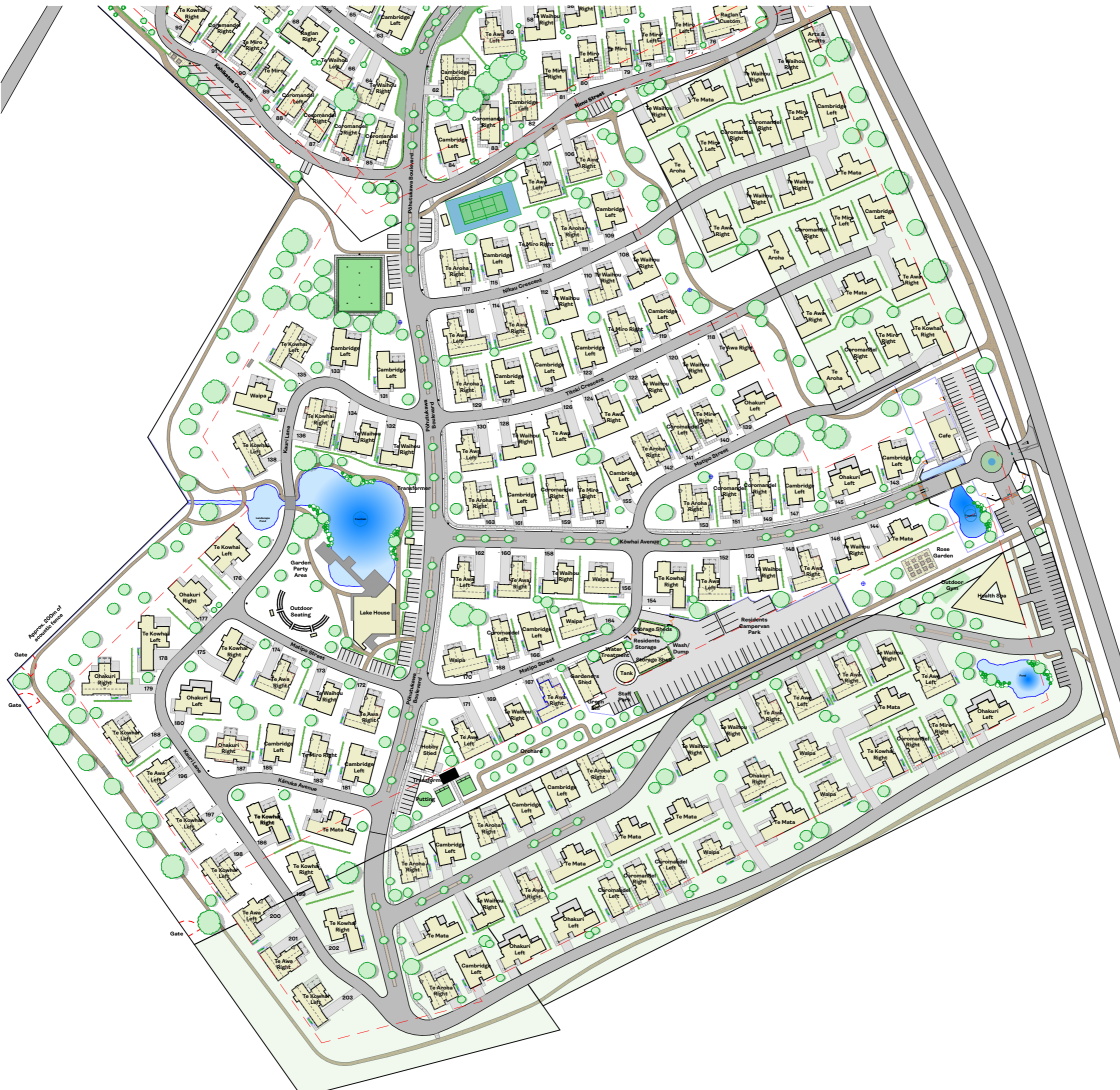
Contributing Catchments: A to R

A = 5,168m² B = 4,269m² C = 1,953m² D = 1,819m² E = 4,608m² F = 4,172m² G = 3,147m² H = 2,894m² I = 4,140m² J = 1,115m² K = 5,520m² L = 1,231m² M = 2,038m² N = 3,299m² O = 1,682m² P = 3,007m² Q = 2,038m² R = 886m²

Runoff Coefficients used: Impervious - 0.9 and Pervious - 0.3

Triton accommodates the 10-Yr runoffs from Catchments A to R





Rev ID	Ch ID	Change Name	Date
21	36	Caravan Park Changes	16/11/22



46 Tamahere Drive
Tamahere

Tamahere Master Site Plan

DRAWN BY: Studio H Design

1:2000 @ A3

DATE: 3/04/23

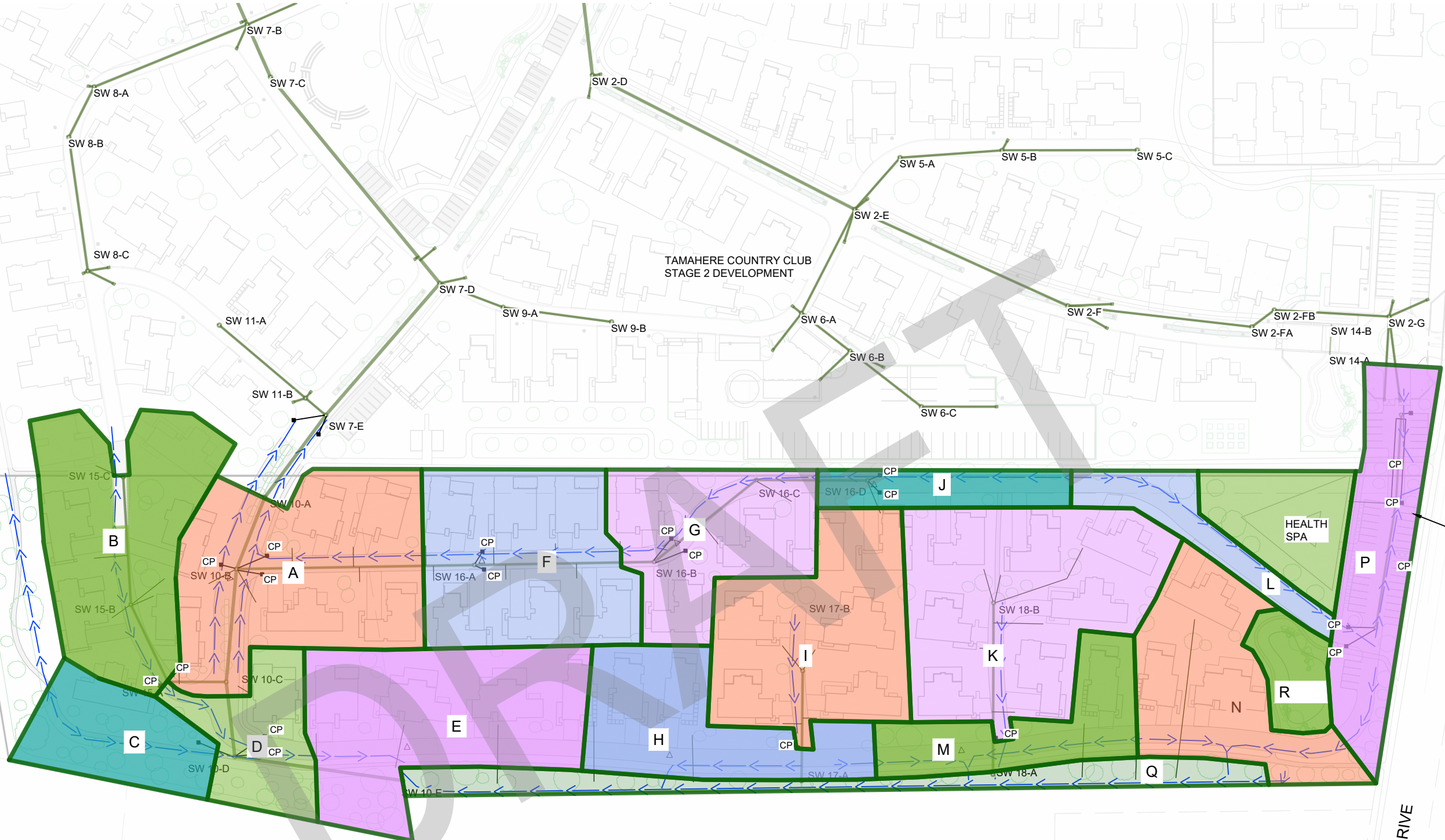
PHONE: #Contact Phone Number

REVISION NUMBER:

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CATCHMENT AREAS		
ID	AREA	DESCRIPTION
A	5,168m ²	RS100 EXTN
B	4,269m ²	RS102 EXTN
C	1,953m ²	WEST BACKYARD AREAS
D	1,819m ²	SOUTH AREA END OF RS100 EXTN
E	4,608m ²	RS100 SECTION ALONGSIDE SWALE
F	4,172m ²	RS109 SECTION
G	3,147m ²	RS109 SECTION
H	2,894m ²	RS100 SECTION ALONGSIDE SWALE
I	4,140m ²	RS110 (ACCESS WAY)
J	1,115m ²	RS109 SECTION
K	5,520m ²	RS111 (ACCESS WAY)
L	1,231m ²	RS109 SECTION
M	2,038m ²	RS100 SECTION ALONGSIDE SWALE
N	3,299m ²	RS100 SECTION ALONGSIDE SWALE
O	1,682m ²	HEALTH CENTRE
P	3,007m ²	CARPARKING AREA (TO SOAKAGE)
Q	2,038m ²	SWALE
R	886m ²	POND

Mount Eden 2000 - NZ DATUM
 Moturiki '53 - NZ DATUM
 - :GEODETTIC CODE - :E - :ORIGIN MARK - :Z - :COORDINATE NOTES
 DOCUMENT CONTROL TO BE RESPONSIBILITY OF PLAN HOLDER.
 DESIGN IN REFERENCE TO R.I.T.S. / N.Z.S. UNLESS DETAILED.
Kotare CONSULTANTS
 Version: 1, Version Date: 22/11/2023

CLIENT
TAMAHERE COUNTRY CLUB

PROJECT TITLE
STORMWATER CATCHMENT PLAN

BY: :
 CHK: :
 STATUS: **PRELIMINARY**
 CHANGELOG: REFER TO DRAWING REGISTER

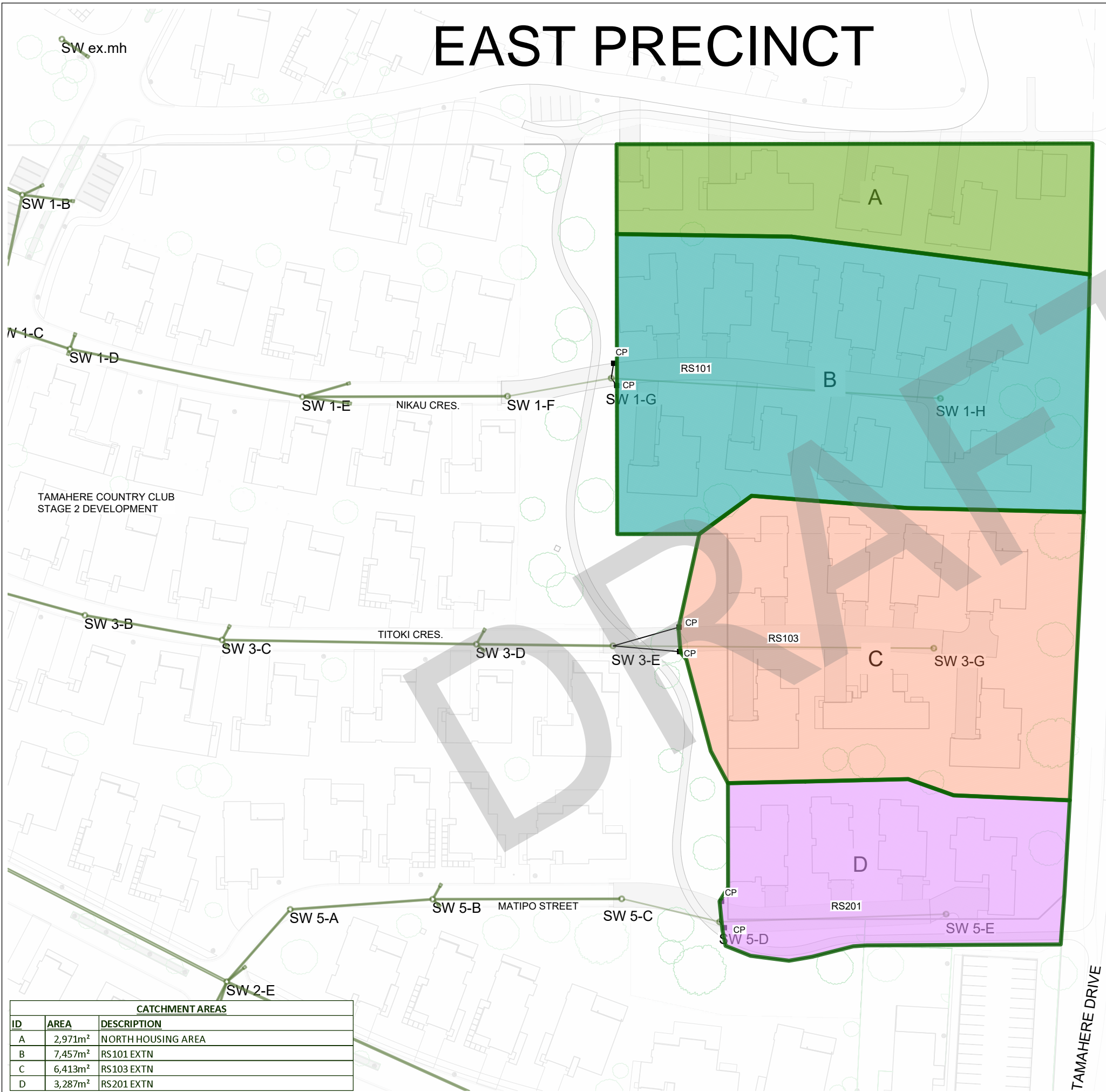
APR: :
 SCALE: 1:1500 (A3)
 PLAN
 1011.03.40.SW.491

DATE: **21.05.2023**
 REV: -

DRAFT

K:\KC - DOCUMENTS\1011 - TAMAHERE COUNTRY CLUB\01 DRAWINGS\03 CADD - SOUTH PRECINCT\1011.03.40-SW-491_SW_CATCHMENTS.DWG | 2023-05-21 04:30:11

EAST PRECINCT



TAMAHERE COUNTRY CLUB
STAGE 2 DEVELOPMENT

CATCHMENT AREAS		
ID	AREA	DESCRIPTION
A	2,971m ²	NORTH HOUSING AREA
B	7,457m ²	RS101 EXTN
C	6,413m ²	RS103 EXTN
D	3,287m ²	RS201 EXTN

DRAFT

Mount Eden 2000 - NZ DATUM
Moturiki '53 - NZ DATUM

:- GEODETIC CODE - :E - :Z - :COORDINATE NOTES

DOCUMENT CONTROL TO BE RESPONSIBILITY OF PLAN HOLDER.
DESIGN IN REFERENCE TO R.I.T.S. / N.Z.S. UNLESS DETAILED.

CLIENT
**TAMAHERE COUNTRY CLUB
STAGE 7**

PROJECT TITLE
**STORMWATER
CATCHMENT PLAN**

BY: _____ APR: _____ SCALE: 1:1000 | DATE 02.06.2023
 CHK: _____ STATUS: **PRELIMINARY**
 CHANGELOG: REFER TO DRAWING REGISTER
 PLAN 1011.04.40.SW.491 | REV _____

Parameters

Units:

Storage Volume: Cu m

Chamber Selection:

Header Row Position:

Fill Over Embedment Stone: mm
Min 300 mm fill over embedment stone

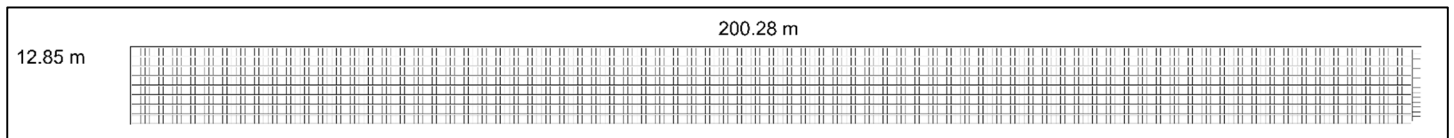
Controlled By: m

Embedment Stone: (mm)

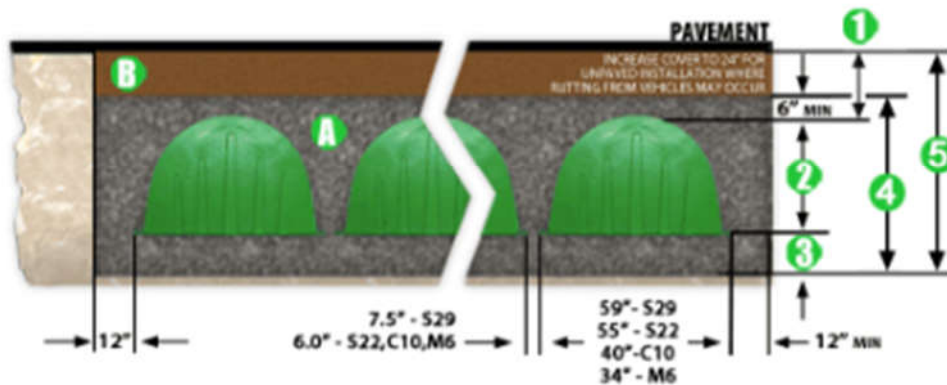
Over: Under: Porosity:

Min 150mm over and under

Indicative dimensions – can be split into shorter and wider lengths. To be confirmed at detailed combined with on-site soakage testing to confirm final dimensions.



Project Results



① Cover Over System:	300 mm
② Height Of Chamber:	888 mm
③ Embedment Stone Under Chambers:	150 mm
④ Section Height:	1189 mm
⑤ System Depth:	1489 mm
Ⓐ Volume of Embedment Stone Required:	1676 Cu. m
Ⓑ Volume of Fill Material Required:	772 Cu. m

Total Storage Provided:	2054 Cu. m
Type Of Chambers:	S-22
# Of Spacers Required:	7
# Of Chambers Required:	2263
# Of End Caps Required:	18
Required Bed Size:	2575 Sq. m
Volume of Excavation:	3061 Cu. m
* Area of Filter Fabric:	3081 Sq. m
# of Chambers long:	281
# of rows:	8
Actual Trench Length:	200.28 m
Actual Trench Width:	12.85 m

* Filter Fabric quantity for Fabric on Top and Sides of System Only, does not include overlap

Triton System Dimensions								
L	200.28	m	Area	2573.6	m ²	ΣCA	36,862	m ²
W	12.85	m	Vol (net)	2050.00	m ³	Infiltration Rate	1.39E-05	m/sec
D	0.89	m				Constant Outflow		l/s

Duration	i	Q	V _{runoff}	V _{infiltration}	V _{outflow}	V _{storage}	Balance
	mm/hr	l/sec	m ³	m ³	m ³	m ³	m ³
10 min	111.0	1137	681.9	21.4	0.0	660.5	1389.5
20 min	76.7	785	942.4	42.9	0.0	899.5	1150.5
30 min	61.2	627	1128.0	64.3	0.0	1063.6	986.4
1 hr	41.0	420	1511.3	128.7	0.0	1382.7	667.3
2 hrs	26.7	273	1968.4	257.4	0.0	1711.1	338.9
6 hrs	12.7	130	2808.9	772.1	0.0	2036.8	13.2
12 hrs	7.7	79	3414.9	1544.2	0.0	1870.7	179.3
24 hrs	4.6	47	4051.9	3088.3	0.0	963.5	1086.5
48 hrs	2.7	27	4724.2	6176.6	0.0	0.0	2050.0

Red Cells: user entry

Green Cells: indicate excess system capacity (values are positive)

Yellow Cells: indicate storage shortfall (values are negative)

[Length, Width and Volume of the Triton System are an output of the Triton Calculator at www.tritonsws.com/calculator](http://www.tritonsws.com/calculator)

Refer to Cirtex[®] Stormwater Calculator Terms & Condition of use

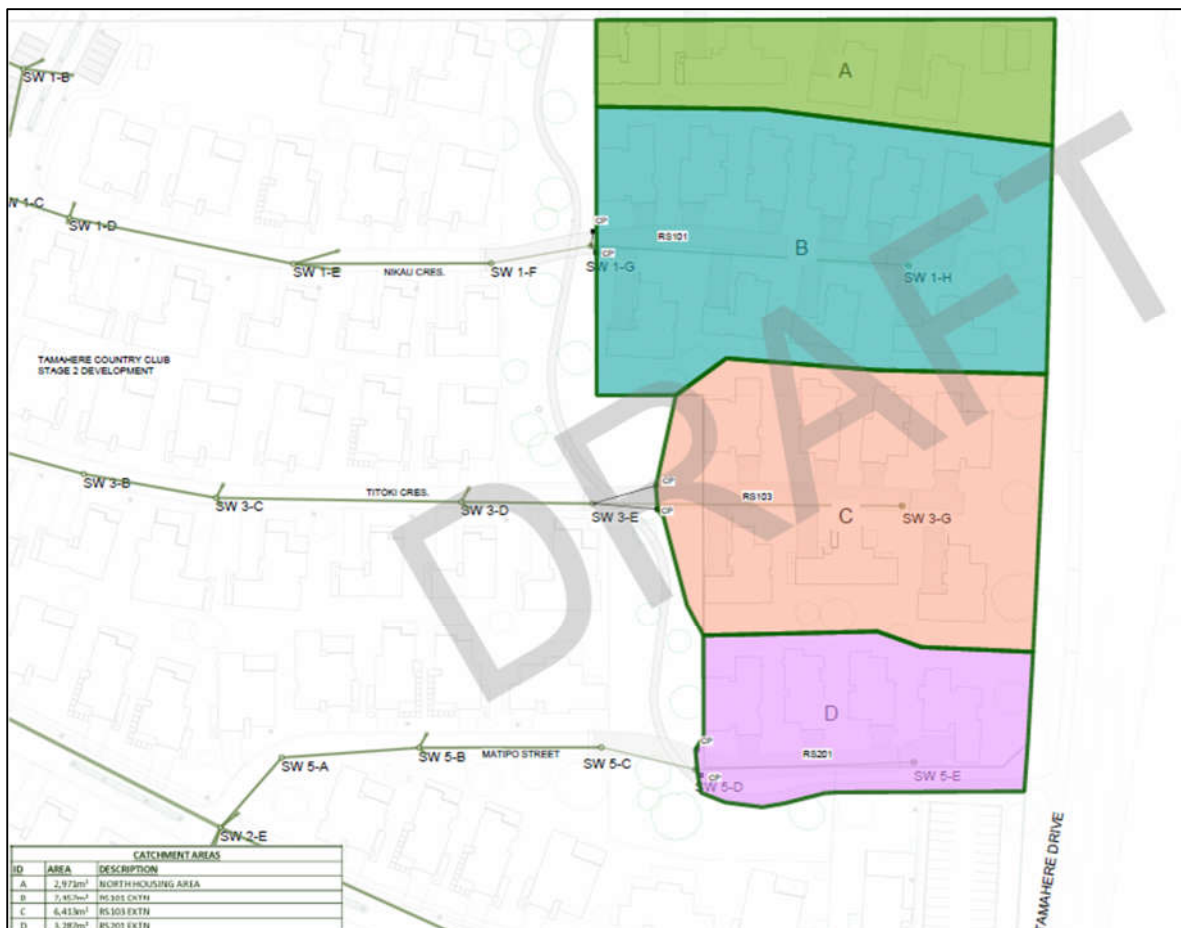
Eastern Precinct

Contributing Catchments: A, B, C and D

A = 2,971m² B = 7,457m² C = 6,413m² D = 3,287m²

Runoff Coefficients used: Impervious - 0.9 and Pervious - 0.3

Triton accommodates the 10-Yr runoffs from Catchments A, B, C and D



Parameters

Units:

Storage Volume: Cu m

Chamber Selection:

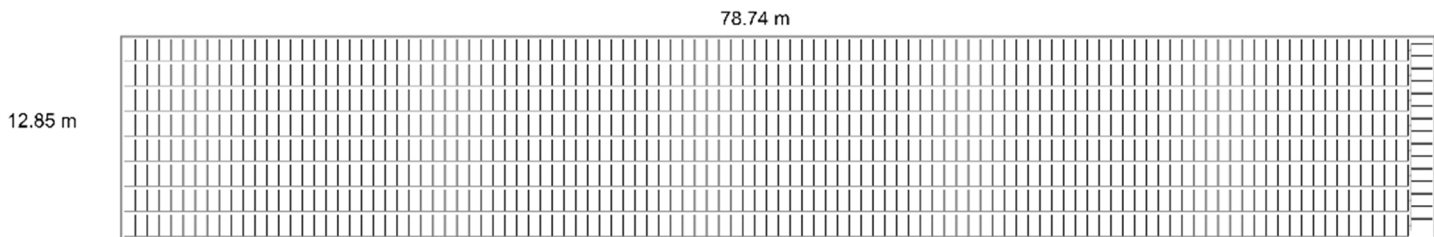
Header Row Position:

Fill Over Embedment Stone: mm
Min 300 mm fill over embedment stone

Controlled By: m

Embedment Stone: (mm)
Over: Under: Porosity:

Min 150mm over and under



Triton System Dimensions

L	78.74 m	Area	1011.81 m ²	ΣCA	14,090 m ²
W	12.85 m	Vol (net)	800.00 m ³	Infiltration Rate	1.39E-05 m/sec
D	0.89 m			Constant Outflow	 l/s

Duration	i	Q	V _{runoff}	V _{infiltration}	V _{outflow}	V _{storage}	Balance
	mm/hr	l/sec	m ³	m ³	m ³	m ³	m ³
10 min	111.0	434	260.7	8.4	0.0	252.2	547.8
20 min	76.7	300	360.2	16.9	0.0	343.4	456.6
30 min	61.2	240	431.2	25.3	0.0	405.9	394.1
1 hr	41.0	160	577.7	50.6	0.0	527.1	272.9
2 hrs	26.7	105	752.4	101.2	0.0	651.2	148.8
6 hrs	12.7	50	1073.7	303.5	0.0	770.1	29.9
12 hrs	7.7	30	1305.3	607.1	0.0	698.2	101.8
24 hrs	4.6	18	1548.8	1214.2	0.0	334.6	465.4
48 hrs	2.7	10	1805.8	2428.3	0.0	0.0	800.0

Red Cells: user entry

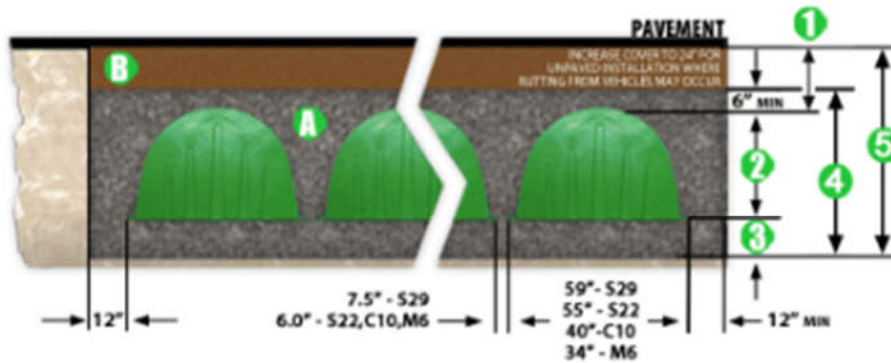
Green Cells: indicate excess system capacity (values are positive)

Yellow Cells: indicate storage shortfall (values are negative)

Length, Width and Volume of the Triton System are an output of the Triton Calculator at www.tritonsws.com/calculator

Refer to Cirtex[®] Stormwater Calculator Terms & Condition of use

Project Results



1	Cover Over System:	300 mm
2	Height Of Chamber:	888 mm
3	Embedment Stone Under Chambers:	150 mm
4	Section Height:	1189 mm
5	System Depth:	1489 mm
A	Volume of Embedment Stone Required:	664 Cu. m
B	Volume of Fill Material Required:	303 Cu. m

Total Storage Provided:	804 Cu. m
Type Of Chambers:	S-22
# Of Spacers Required:	7
# Of Chambers Required:	879
# Of End Caps Required:	18
Required Bed Size:	1012 Sq. m
Volume of Excavation:	1204 Cu. m
* Area of Filter Fabric:	1230 Sq. m
# of Chambers long:	108
# of rows:	8
Actual Trench Length:	78.74 m
Actual Trench Width:	12.85 m

* Filter Fabric quantity for Fabric on Top and Sides of System Only, does not include overlap



TAMAHERE COUNTRY CLUB STAGE 6+7

DATE 12/10/2023

TO: James Templeton, WDC
Cc to Kathryn Drew BBO and Ciaran Murphy, Kotare Consultants

FROM: TE MIRO WATER CONSULANTS LIMITED (MIKE CHAPMAN & ARUN GOPI)

SUBJECT: S92: LUC0060/24-LDE response- 3 Waters matters Tamahere Country Club (TCC)-Stormwater South and East Stage (Stage 6 + 7).

Dear James,

Thank you for review comments. This memo addresses your s92 query dated 13 September 2023 as per italics below and snip from the relevant section in the Waikato RITS.

It is not clear within the Kotare report if the pipe grades (0.33% and 0.4% instances) proposed within the drawing detail have been assessed by Te Miro to meet suitable self-cleaning velocities as per RITS minimum grade.

RITS spec:

4.2.4.8 Minimum Gradients and Flow Velocities in Pipes

Pipe gradients should be at a grade that prevents silt deposition. The minimum velocity should be at least 0.6m/s at a flow of half the 2 year ARI design flow. For velocities greater than 3.0m/s specific design to mitigate erosion is required.

As requested, we have now completed an assessment of the stormwater reticulation for the self-cleansing criteria in accordance with the RITS guidelines. The minimum gradients and flow velocities in pipe network required to prevent silt deposition has been assessed and the results/solutions are provided below for both the south and east extensions.

To summarise we have:

1. Provided the pipe sizing spreadsheet for both the south and east precincts with the design velocities listed for each pipeline.
2. The lines with the minimum design velocities have been assessed for a flow of half the 2 Year design storm in Hydraulic Toolbox.
3. The results from Hydraulic Toolbox show that all the lines except for the line from Catchment J in the south precinct can achieve the minimum velocity of 0.6m/s specified in RITS. The low velocity for Catchment J is due to the small size of the catchment and hence the low flow and corresponding velocity.
4. The minimum velocity required to achieve the self-cleaning criteria has also been calculated for the line from Catchment J and recommended.
5. The pipe assessment for the eastern precinct is shown in Figure 1-4 and for the southern in Figures 4-8.

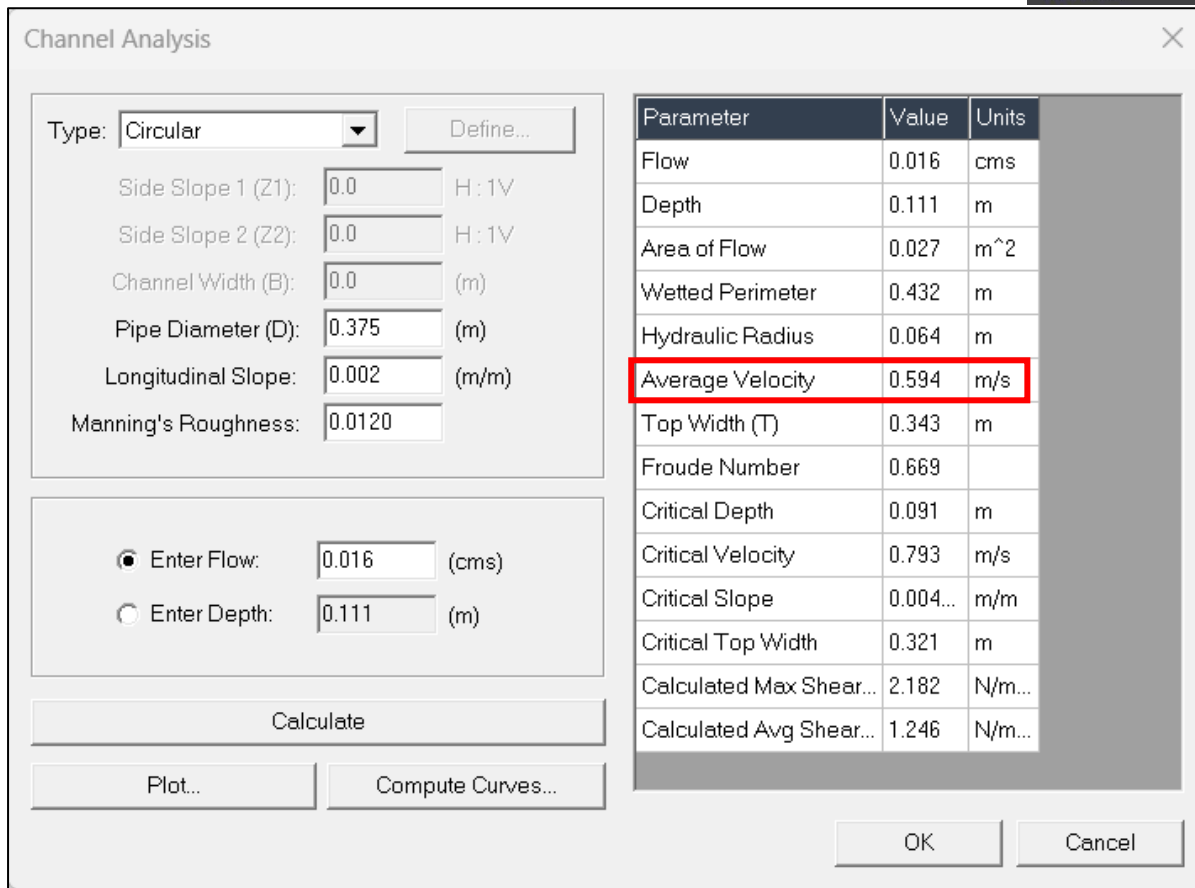


Figure 2: Hydraulic Toolbox result for the line to MH3-E

The pipeline to MH3-E is having the lowest velocity in the east precinct. Figure 2 shows the average velocity for a flow of half the 2 Year design storm is 0.6m/s (1dp), this meets the RITS minimum values as per RITS.

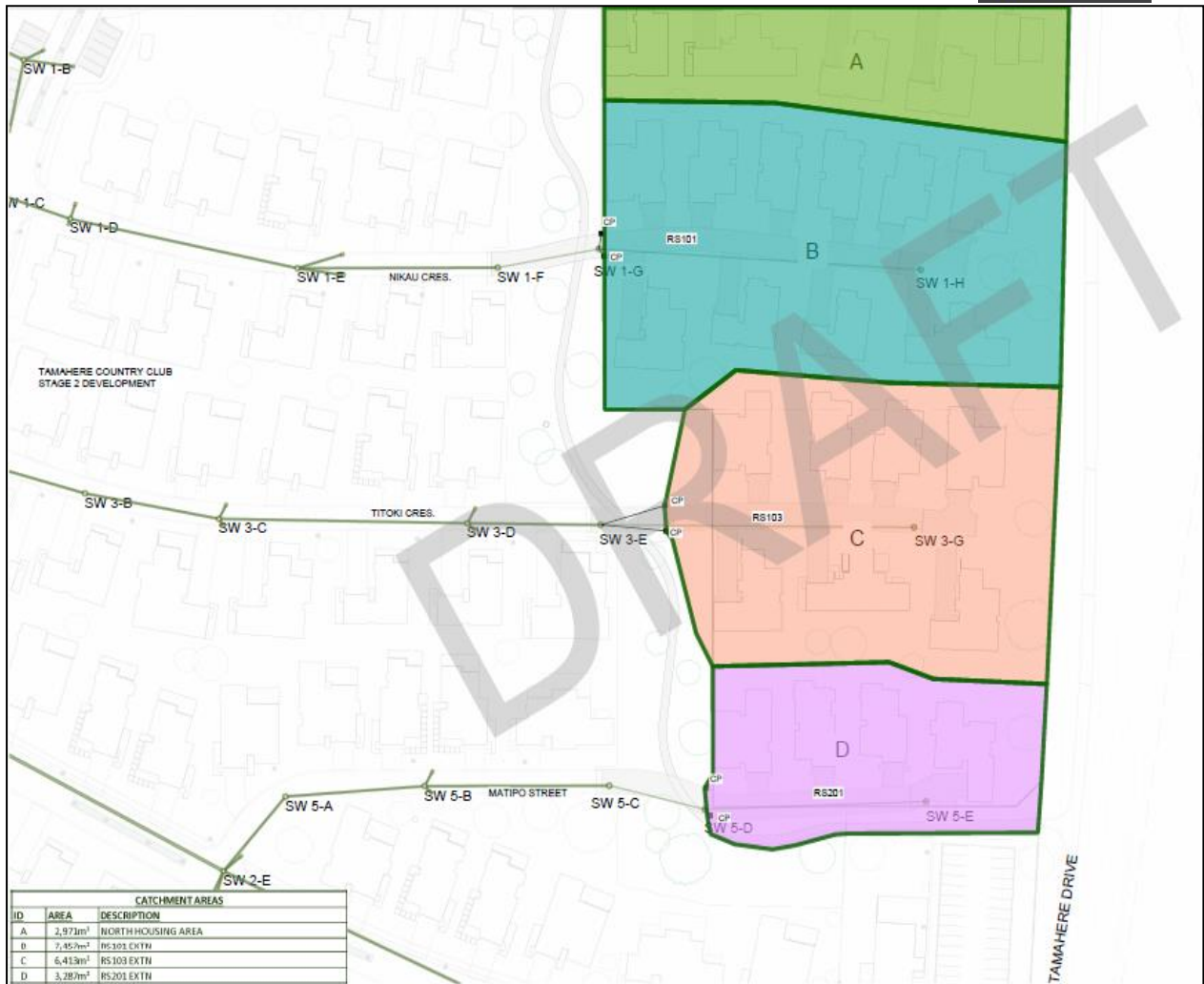


Figure 3: Catchment Plan for Eastern Precinct



Figure 4: SW Reticulation for Eastern Precinct

Southern Precinct

Stormwater Catchment
Tamahere Stage 6 & 7



FACTORS

Tc mins	10	Runoff Coefficients	
f years	10	Rd Cats - 85% Impervious & 15% Pe	0.8
i mm/hr	13.05	RCP 6.0 - 2 year *0.8	Super Lots, Lots
Pipe Coeff. (mm)	1.5	Concrete pipe	Houses
			0.9

PIPE LINE	INCREMENT	AREA (ha)	COEFF.	INTENSITY (mm/hr)	EQUIVALENT Increment	AREA Sum	FLOW (l/s)	DIA (mm)	GRADE (%)	CAPACITY (l/s)	VELOCITY (m/s)	CAPACITY Check
Main Lines to SWMH 17-A												
SWMH17-B to SWMH17-A	Catchment I	0.4140	0.70	13	0.2898	0.2898	10.5	300	0.40	65	0.9	yes
Main Line to SWMH 18-A												
SWMH18-B to SWMH18-A	Catchment K	0.5520	0.70	13	0.3864	0.3864	14.0	300	0.40	65	0.9	yes
Main Lines to SWMH 10-A												
SWMH10-E to SWMH10-D	Catchment P	0.3007	0.85	13	0.2556	0.9318						
	Catchment O	0.1682	0.70	13	0.1177	1.0495						
	Catchment L	0.1231	0.80	13	0.0985	1.1480						
	Catchment R	0.0886	0.80	13	0.0709	1.2189						
	Catchment N	0.3299	0.70	13	0.2309	1.4498						
	Catchment M	0.2038	0.70	13	0.1427	1.5925						
	Catchment H	0.2894	0.70	13	0.2026	1.7951						
	Catchment E	0.4608	0.70	13	0.3226	2.1176						
	Catchment Q	0.2038	0.40	13	0.0815	2.1991	79.7	525	0.40	285	1.3	yes
SWMH10-D to SWMH10-C	Catchment D	0.1819	0.70	13	0.1273	2.3265						
	Catchment C	0.1953	0.50	13	0.0977	2.4241	87.9	600	0.40	405	1.4	yes
SWMH15-C to SWMH15-B	Catchment B	0.4269	0.70	13	0.2988	0.2988	10.8	300	0.40	65	0.9	yes
SWMH15-B to SWMH15-A		-	0.70	13	0.0000	0.2988	10.8	300	0.40	65	0.9	yes
SWMH15-A to SWMH10-C		-	0.70	13	0.0000	0.2988	10.8	300	0.40	65	0.9	yes



SWMH10-C to SWMH10-B		-	0.70	13	0.0000	2.7230	98.7	600	0.40	405	1.4	yes
SWMH16-D to SWMH16-C	Catchment J	0.1116	0.80	13	0.0892	0.0892	3.2	300	0.33	59	0.8	yes
SWMH16-C to SWMH16-B		-	0.70	13	0.0000	0.0892	3.2	300	0.33	59	0.8	yes
SWMH16-B to SWMH16-A	Catchment G	0.3147	0.70	13	0.2203	0.3095	11.2	300	0.33	59	0.8	yes
SWMH16-A to SWMH10-B	Catchment F	0.4172	0.70	13	0.2920	0.6015	21.8	375	0.33	106	0.9	yes
SWMH10-B to SWMH10-A	Catchment A	0.5168	0.70	13	0.3618	3.6862	133.6	675	0.40	552	1.5	yes
SWMH10-A to SWMH7-E		-	0.70	13	0.0000	3.6862	133.6	675	0.40	552	1.5	yes

Figure 5: Pipe Sizing spreadsheet for Southern Precinct

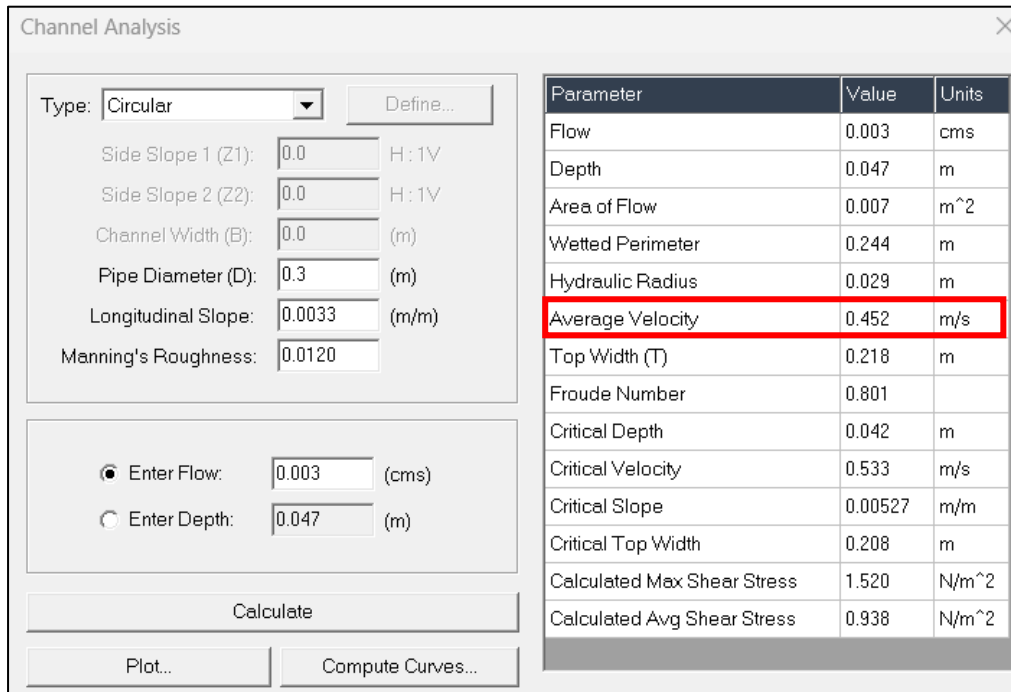


Figure 6: Hydraulic Toolbox result for the line from MH16-D to MH16-C and MH16-C to MH16-B at 0.33% grade

The pipeline from MH16-D to MH16-C is having the Lowest velocity and the average velocity (sub catchment J in Figure 9) for a flow of half the 2 Year design storm is 0.45m/s (Figure 6), however this is a small catchment with low flow. To achieve the minimum velocity of 0.6m/s, we would have to increase the grade to at least 0.75% for this line as shown in Figure 7.

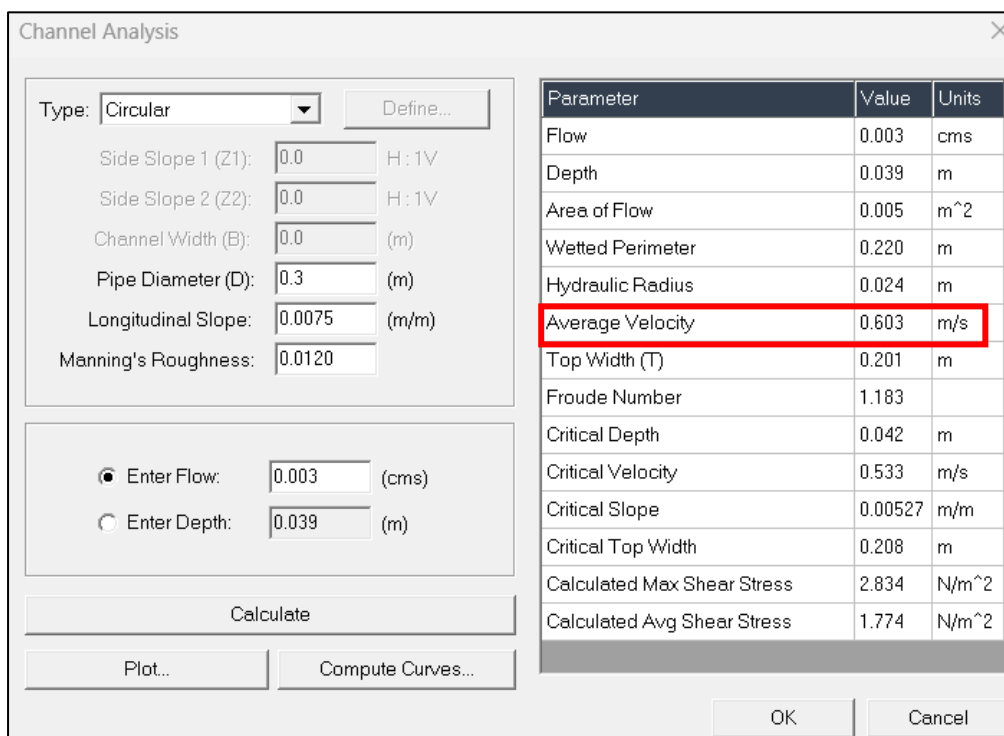


Figure 7: Hydraulic Toolbox result for the line from MH16-D to MH16-C and MH16-C to MH16-B at 0.75% grade

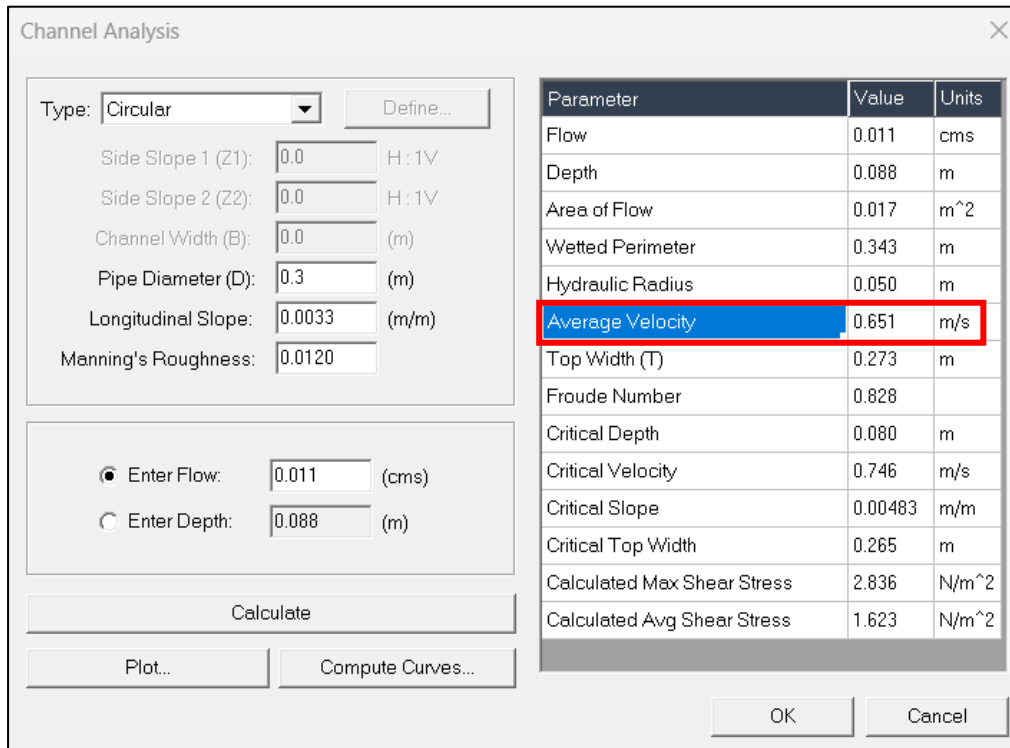


Figure 8: Hydraulic Toolbox result for the line from MH16-B to MH16-A showing velocity at 0.33% grade

The pipeline from MH16-B to MH16-A (sub catchment G and F) is having the next lowest velocity and the average velocity for a flow of half the 2 Year design storm is 0.65m/s as shown above in Figure 8, which meets the RITS minimum values as per specs.

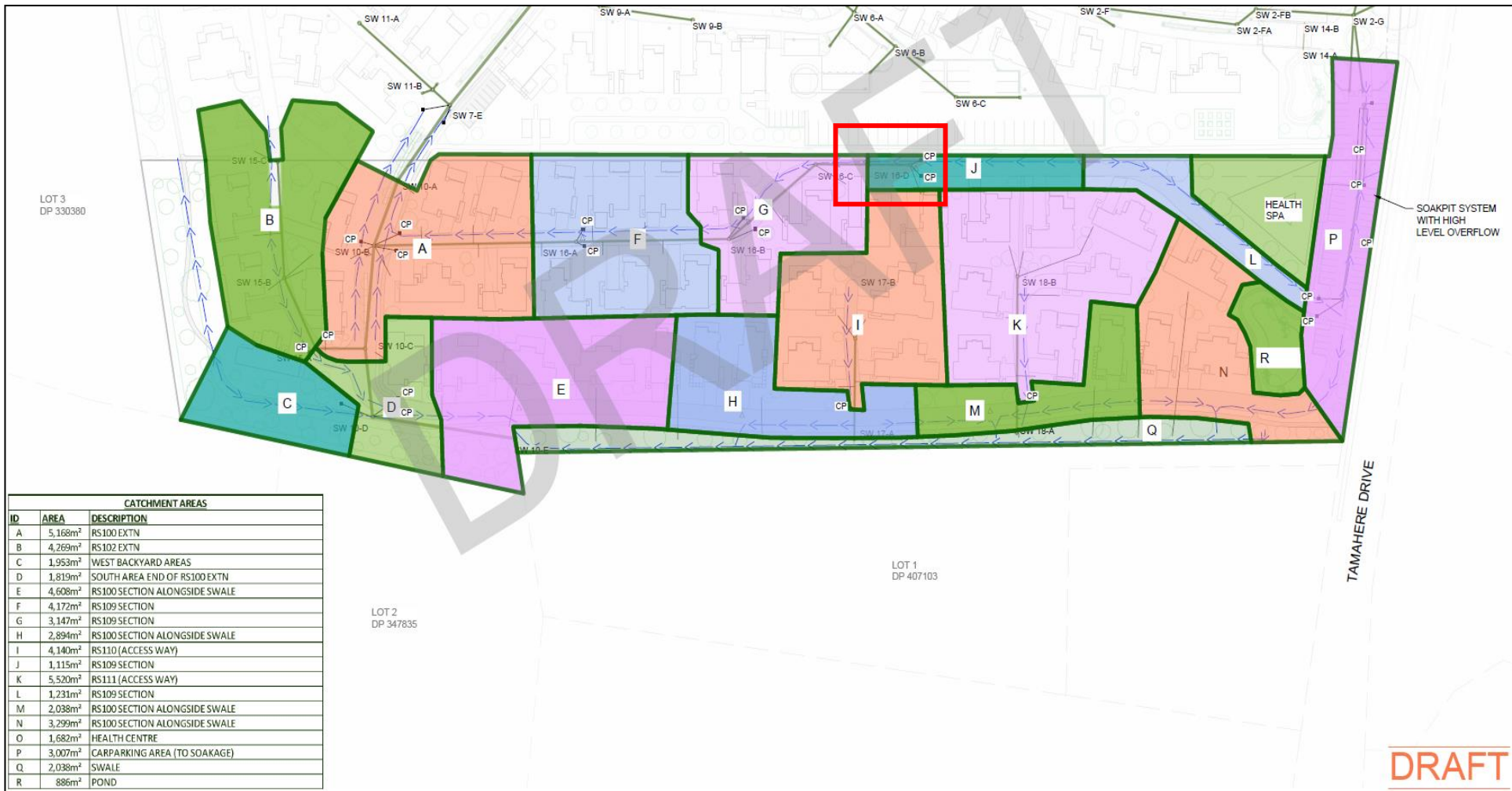


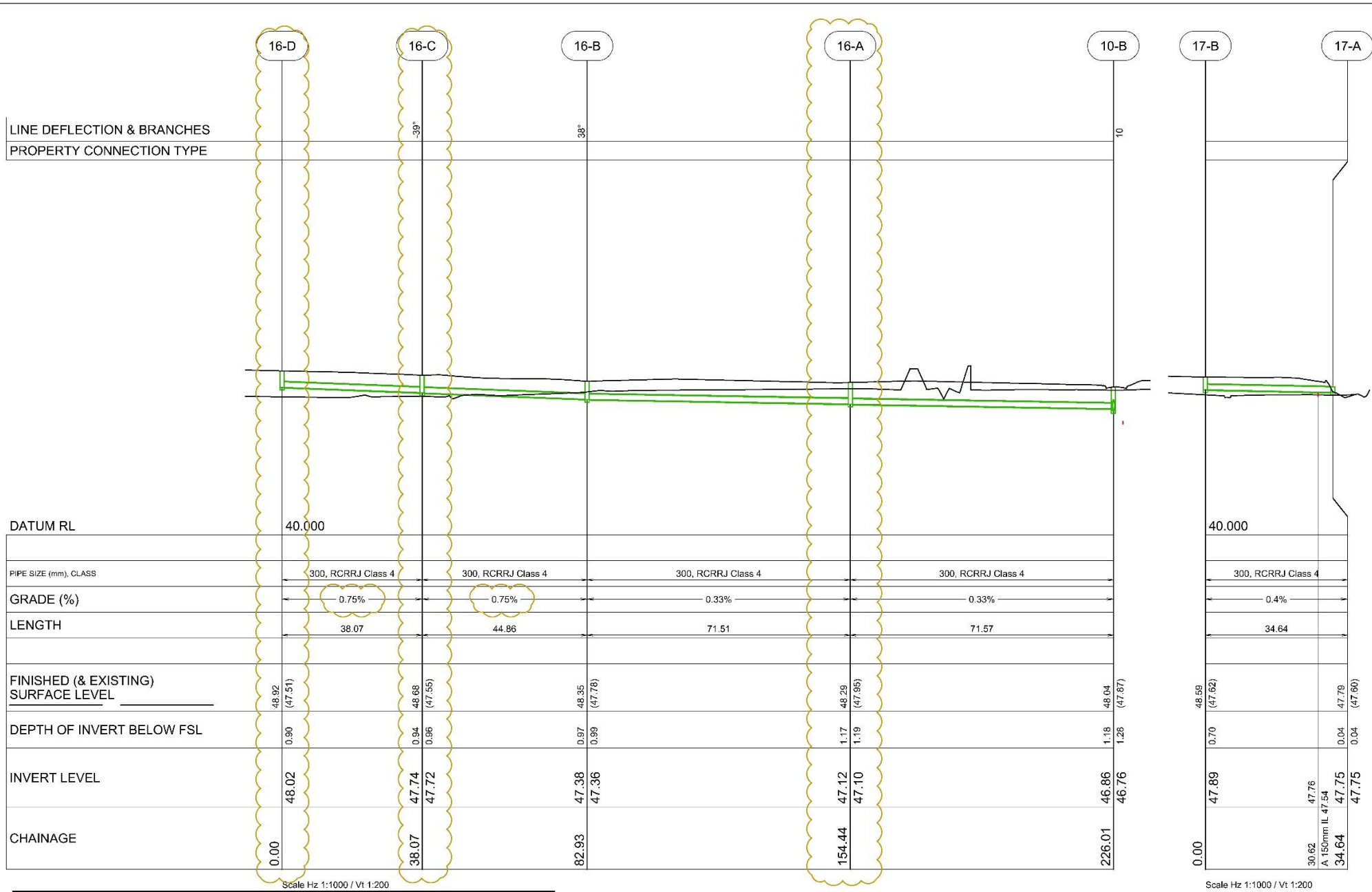
Figure 9: Catchment Plan for Southern Precinct – red box highlights the low velocity section of network from small sub catchment J below RITS 0.6m/s.

DRAFT



Figure 10: SW Reticulation for Southern Precinct

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Scale H: 1:1000 / Vt 1:200

Scale H: 1:1000 / Vt 1:200

Figure 11: Updated SW Long section drawing for Line 16 from Kotare

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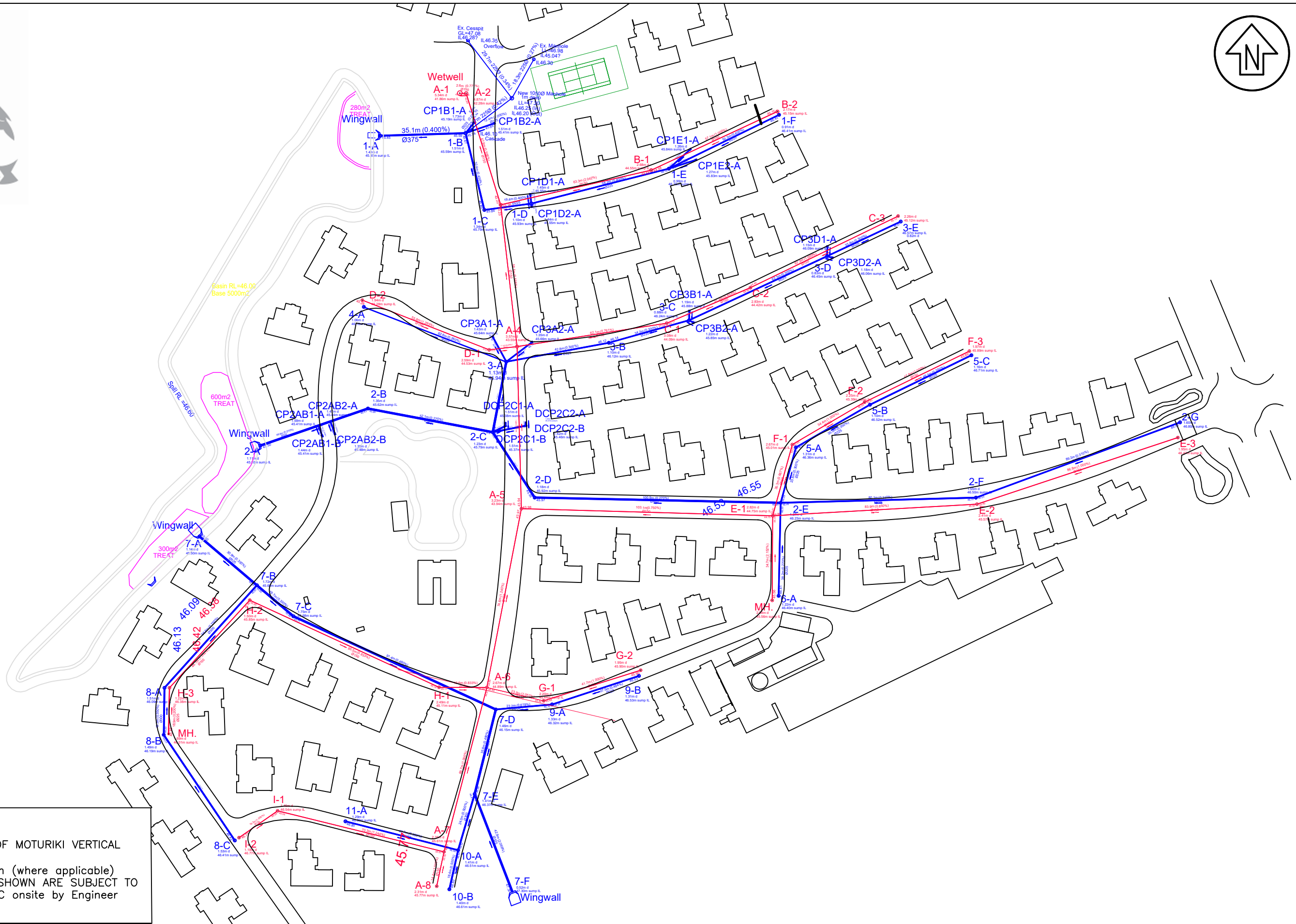
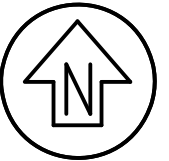
CONCLUSIONS AND RECOMMENDATIONS

1. The pipe sizing spreadsheets provided in this memo demonstrates that all the lines except for the lines from MH16-D to MH16-C and MH16-C to MH16-B achieve a minimum flow velocity of 0.6m/s to meet the self-cleaning criteria in the RITS.
2. This is due to the small size of the contributing catchment J, which has a low flow of 3.2l/s going through the pipes.
3. Based on the Hydraulic Toolbox result, a revised gradient of 0.75% (0.33% up to 0.75%) is needed for this short section of line to achieve the minimum flow velocity of 0.6m/s. Kotare Consultants Ltd has updated their drawing set with the recommended gradient of 0.75% for the lines from MH16-D to MH16-C and MH16-C to MH16-B as highlighted in Figure 11.
4. The pipe gradients for all the other lines are at a grade that prevents silt deposition. The minimum velocity of 0.6m/s at a flow of half the 2 Year ARI design flow is achieved.
5. No pipelines had a velocity greater than 3m/s.

APPENDIX C

Previous Stage Reference Plans





- NOTES:
1. HEIGHTS ARE IN TERMS OF MOTURIKI VERTICAL DATUM 1953
 2. CONTOUR INTERVAL 0.25m (where applicable)
 3. AREAS AND DIMENSIONS SHOWN ARE SUBJECT TO FINAL SURVEY. Design TBC onsite by Engineer



PLAN TITLE

**COMBINED SERVICES STAGE 1 SETOUT
TAMAHERE COUNTRY CLUB
SOUTH EXTENSION
AT 70 TAMAHERE DRIVE, TAMAHERE
SANDERSON GROUP**

REVISION	Rev0 Original	25 MAR 2021	JOB	1011	SHEET	16A0
DATE	8 Dec 2021		ORIGINAL SCALE AT A3	1:1500	REV	01
CAD	CPM					

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Existing Development:
Primary Wastewater
Disposal Field

Location of
Wastewater Treatment Plant

Reserve Wastewater
Disposal Area

Expansion Area:
Primary Wastewater
Disposal Field

Overall Site Plan:
On-site Wastewater
4816-2

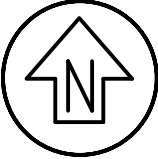


Tamahere
Country Club



Tamahere Country Club

FINE RETIREMENT LIVING



KEY - IRRIGATION / FIRE FIGHTING

- $\phi 160$ DN160 (minimum) PE100 PN12.5
- $\phi 63$ DN63 MDPE PN12.5
- PV Peet Valve
- SV Sluice Valve
- FH Fire Hydrant
- TB Tapping Band
- BC Blank End Cap
- BLK Thrust / Anchor Block
- TEE Tee

PROPERTY DETAILS:
 LEGAL DESCRIPTION:
 LOT 1 DPS 83644
 - AREA: 14.2909 Ha
 - COMPRISED IN SA64C/251
 - WAIKATO DISTRICT COUNCIL
 - ZONING: RURAL

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PLAN TITLE **WATER - FIREFIGHTING LAYOUT OVERVIEW**
TAMAHERE COUNTRY CLUB
STAGE 4 (SOUTH)
AT 70 TAMAHERE DRIVE, TAMAHERE
SANDERSON GROUP

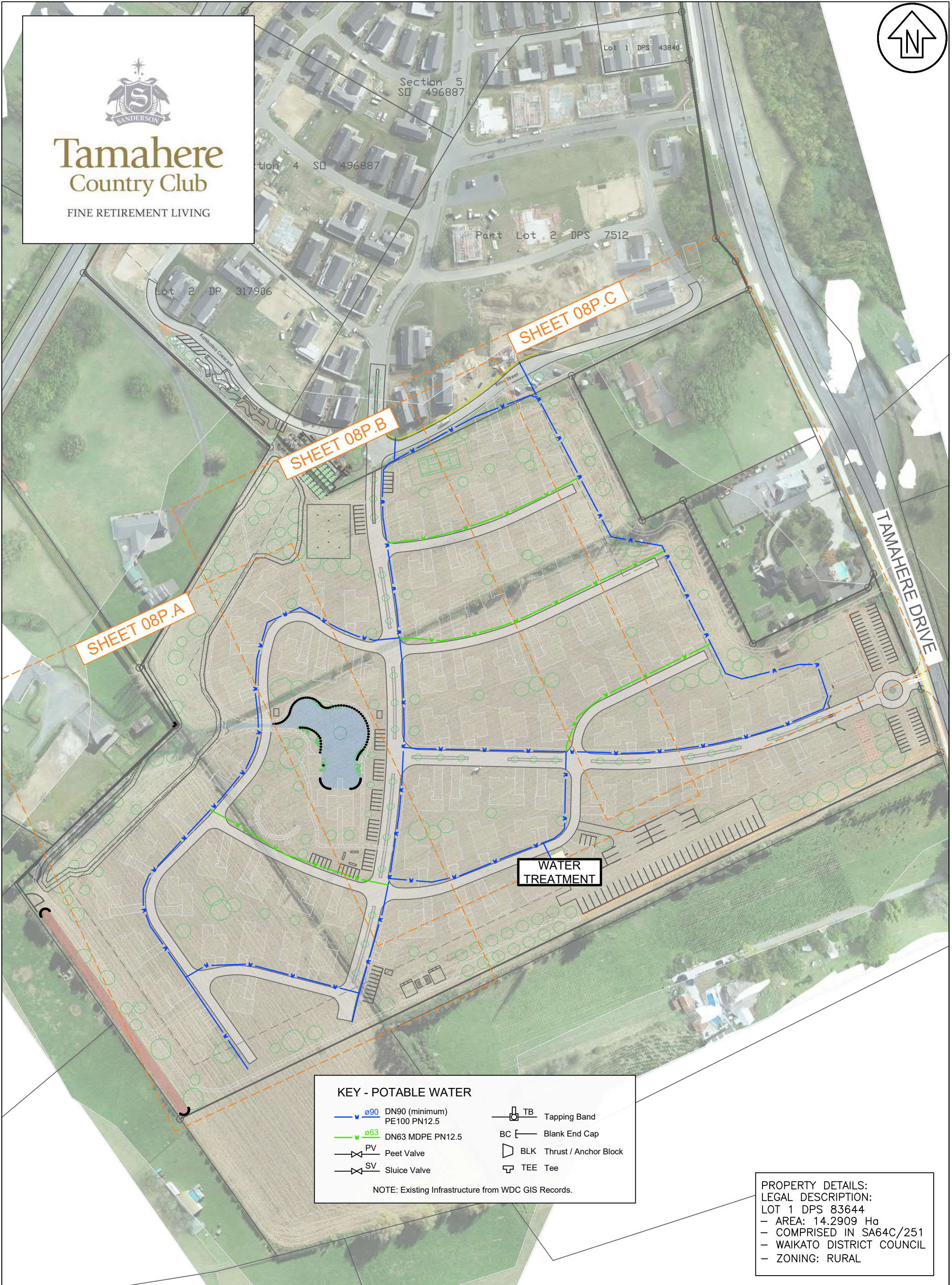
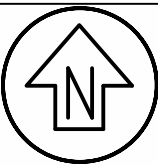
REVISION	Rev0 Original	APRIL 2021	JOB	1011	SHEET	08-01
DATE	MAY 2022		SCALE AT A3	REV 01		
CAD	CPM		1:2000			

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Tamahere Country Club

FINE RETIREMENT LIVING



SHEET 08P.A

SHEET 08P.B

SHEET 08P.C

WATER TREATMENT

TAMAHERE DRIVE

KEY - POTABLE WATER

$\varnothing 90$ DN90 (minimum) PE100 PN12.5	TB Tapping Band
$\varnothing 63$ DN63 MDPE PN12.5	BC Blank End Cap
PV Peet Valve	BLK Thrust / Anchor Block
SV Sluice Valve	TEE Tee

NOTE: Existing Infrastructure from WDC GIS Records.

PROPERTY DETAILS:
LEGAL DESCRIPTION:
LOT 1 DPS 83644
- AREA: 14.2909 Ha
- COMPRISED IN SA64C/251
- WAIKATO DISTRICT COUNCIL
- ZONING: RURAL



PLAN TITLE
**WATER RETICULATION CONCEPT PLAN
TAMAHERE COUNTRY CLUB
STAGE 4 (SOUTH)
AT 70 TAMAHERE DRIVE, TAMAHERE
SANDERSON GROUP**

REVISION	Rev0 Original	APRIL 2021	JOB	1011	SHEET	08-05
DATE	MAY 2022		SCALE AT A3		REV	01
CAD	CPM		1:2000			