110 and 120 Carrs Drive
Yamba NSW 2464

Potable Water Supply Service Assessment

FINAL Report V1 - 8 November, 2023

H2One Pty Ltd

Water, Sewer and Stormwater Engineering Specialists

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Reviewed by RPEQ	Reg. No.	Signed	Date
Joshua May	18064		8 November, 2023

Version	Date	Author	Reviewer
DRAFT - V1	17 October, 2023	D Colledge	J May
FINAL - V1	8 November, 2023	D Colledge	J May

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1 INTRODUCTION

1.1 Background

A manufactured housing development at 110 and 120 Carrs Drive, Yamba NSW 2464, Lot 2 on DP733507 and 10 on DP1280863, is currently in the DA Assessment phase (DA has been submitted and RFI issued by CVC). This hydraulic analysis is being completed to respond to the RFI). The development's proposed land-use type and density is 216 x 2 bedroom units.

MDE Pty Ltd developed the potable water service strategy and concept pipe layout plan for the development (refer to Appendix 1 for further details). To support the DA, Clarence Valley Council (CVC) requested a hydraulic modelling assessment of the proposed servicing strategy, to ensure adequate service will be achieved throughout the development.

H2One Pty Ltd was engaged to complete the hydraulic modelling analysis, in accordance with CVC's Design Standards; *New South Wales Development Design Specification, D11, Water Supply* (2009), to confirm the proposed strategy and size relevant infrastructure. As per the Applicant's request, this assessment was based on CVC's design standards, and not the relevant design requirements for private plumbing infrastructure, e.g. Plumbing Code of Australia (PCA) and Australian Standard 2419.1.

The results of the assessment and confirmed reticulation layout plans are presented in this report.

1.2 Objectives

The key objectives of the project were as follows:

1. Estimate potable water demands for the subject site, at ultimate development.
2. Develop a hydraulic model for the proposed water supply reticulation network, utilising CVC's flow and pressure boundary conditions at the relevant connection point.
3. Complete a standard flow and fire flow hydraulic analysis to confirm infrastructure sizing/layout, in accordance with CVC's Design Standards.
4. Issue an RPEQ certified hydraulic assessment report and associated concept pipe layout plans.

1.3 Potable Water Supply Service Strategy

The water supply service strategy for the subject site consists of an extension of the existing DN150 main, located at the intersection of Carrs Drive and Miles Street, to the eastern property boundary of the subject site. The development will be serviced by two (2) connection points along Carrs Drive, adjacent to the eastern property boundary of the subject site.

Refer to Appendix 2 for CVC's "Mains Pressure Test" boundary conditions and Appendix 3 for an overview of the proposed water supply service strategy.

2 METHODOLOGY

2.1 Desired Standards of Service

The Design Standards of CVC's *New South Wales Development Design Specification, D11, Water Supply* (2009) were adopted for the project. Where assessment criteria was not available within CVC's Design Standards, the Water Services Association of Australia (WSAA) *Water Supply Code of Australia, WSA 03* (2011) was assumed. A summary of the relevant provisions is presented in Table 1 below.

Table 1. Design specifications adopted for the analysis

Provision	Specification
Residential peak instantaneous potable demand	0.15 L/s/ET
Minimum standard flow network pressure	20 m
Maximum standard flow network pressure	78 m
Maximum pipe velocity	3.0 m/s
Maximum head loss	5 m head/km for <=DN150 3 m head/km >=DN200
Minimum fire flow network pressure	12 m at peak demand
Fire flow at hydrant	11 L/s
Hazen Williams pipe friction co-efficient	<= 150 diameter, 100 >150 <300 diameter, 110

2.2 Demand Assessment

A demand assessment of the development was undertaken to estimate the peak flow rate attributed to the proposed land-use type and density. This was calculated using CVC's peak instantaneous unit rates for potable water (0.15 L/s/ET), in conjunction with demand rates adopted from Water Directorate's Section *64, Determinations of Equivalent Tenements Guidelines* (2009). Refer to the table below for a summary of the demand estimation for the subject site, at ultimate development.

Table 2. Demand estimation for the proposed development

Site Land Use and Density	Demand Rate	ET	Potable Peak Flow (L/s)
216 x 2 bedroom unit	0.6 ET/Unit	129.6	19.5

2.3 Hydraulic Model Assessment

The methodology adopted for the hydraulic assessment is as follows.

1. An InfoWater hydraulic model was developed for the proposed development, based on the service strategies developed in consultation with CVC, refer to Appendix 3 for further details. The pipe layouts were introduced to a base model as a background layer, and model node/hydrant elements drawn manually.
2. All pipes were initially allocated sizing of DN100, as per MDE's pipe layout plan, and assigned the relevant Hazen Williams Roughness co-efficient, i.e. DN100/150 = 100 and DN200 = 110.
3. The water supply boundary conditions (issued by CVC) were introduced into the hydraulic model at the relevant connection point/s, in addition to finished surface levels and relevant peak hour water demands.

Note CVC's hydraulic model was not available for the provision of flow and pressure boundary conditions at the time of the assessment. CVC advised MDE and H2One that a field test was sufficient for the sizing of the proposed pipework. To estimate systems pressures at peak hour standard flow and peak hour fire flow event, the respective field test results at 20 L/s @ 490 kPa and 31.5 L/s @ 450 kPa flow rates were adopted for the hydraulic model. No consideration was made for friction losses through the riser, spring hydrant and stand-pipe, which resulted in a conservative hydraulic assessment. Refer to Appendix 2 for details of the relevant field test

4. A standard flow and fire flow hydraulic analysis was undertaken on the potable water reticulation layout, where pipe sizes were systematically increased and/or connections adjusted to achieve relevant Design Standards. An unrelated development to the east of Carrs Drive (52 to 54 Miles Street, Yamba) was also considered in the assessment, in the event this site is serviced by the proposed DN150 pipe extension.
5. Modelling results were verified and deliverables prepared.

3 RESULTS

As per the methodology described in Section 2.3 of this report, a standard flow and fire flow hydraulic analysis was undertaken on the proposed internal water network layout. The analysis identified that the infrastructure presented in Table 3 and Appendix 3 achieved CVC's Design Standards.

Table 3. Summary of potable water infrastructure

Description	Location	Diameter (DN)	Length (m)
Potable water retic. pipe	Throughout the develop. site	100 mm	2,370
	Carrs Drive and entrance of development site	150 mm	510

A summary of the hydraulic modelling results is as follows.

- The proposed reticulation layout presented a standard flow minimum pressure of 38.4 m, at node J404, located at the north-west property boundary.
- The proposed reticulation layout presented a peak hour fire flow minimum pressure of 14.8 m, at node J404.
- The proposed reticulation layout presented a standard flow maximum pressure of 43.6 m, at node J398, located at the northern connection point along Carrs Drive.

In summary, the proposed potable water pipe layout complied with CVC's Design Standards, across all development stages, with an average network pressure of 40.2 m. Refer to Appendix 4 for detailed modelling results.

Note the neighbouring development on the eastern side of Carrs Drive (52 to 54 Miles Street, Yamba) was also considered for the hydraulic assessment. The following demands were estimated utilising the following land-use type and density.

- 277 x residential freehold lots
- 1,000 m2 of commercial/retail area
- 35 x 3 bedroom units

This resulted in an estimated 47.3 L/s instantaneous peak flow, for the proposed development. As the flow and pressure boundary conditions provided by CVC show the existing DN150 with a max flow of 31.5 L/s @ 450 kPa, the DN150 main extension would be insufficient to service the additional demand. However, MDE has advised a DN250 trunk main will be constructed in the future, from the existing DN250 trunk main located at the intersection of Carrs Drive and Miles Street, heading east along Miles Street, to the existing DN375 trunk main along Yamba Road. It's likely the proposed development at 52 to 54 Miles Street would make connection to the proposed DN250 trunk main along the northern property boundary, to service the proposed internal pipework. Based on this service strategy, the proposed DN150 pipe extension should have sufficient capacity to service the subject site.

4 CONCLUSION

A manufactured housing development at 110 and 120 Carrs Drive, Yamba NSW 2464, Lot 2 on DP733507 and 10 on DP1280863, is currently in the DA Assessment phase (DA has been submitted and RFI issued by CVC). This hydraulic analysis is being completed to respond to the RFI). The development's proposed land-use type and density is 216 x 2 bedroom units.

MDE Pty Ltd developed the potable water service strategy and concept pipe layout plan for the development (refer to Appendix 1 for further details). To support the DA, Clarence Valley Council (CVC) requested a hydraulic modelling assessment of the proposed servicing strategy, to ensure adequate service will be achieved throughout the development.

H2One Pty Ltd was engaged to complete the hydraulic modelling analysis, in accordance with CVC's Design Standards; *New South Wales Development Design Specification, D11, Water Supply* (2009), to confirm the proposed strategy and size relevant infrastructure. As per the Applicant's request, this assessment was based on CVC's design standards, and not the relevant design requirements for private plumbing infrastructure, e.g. Plumbing Code of Australia (PCA) and Australian Standard 2419.1.

The hydraulic analysis determined that the reticulation network layout presented in Appendix 3 satisfied the minimum Design Standards, and is therefore recommended for CVC approval, pending a review of hydraulic performance based on any requirements relevant to private plumbing infrastructure, e.g. AS2419.1.

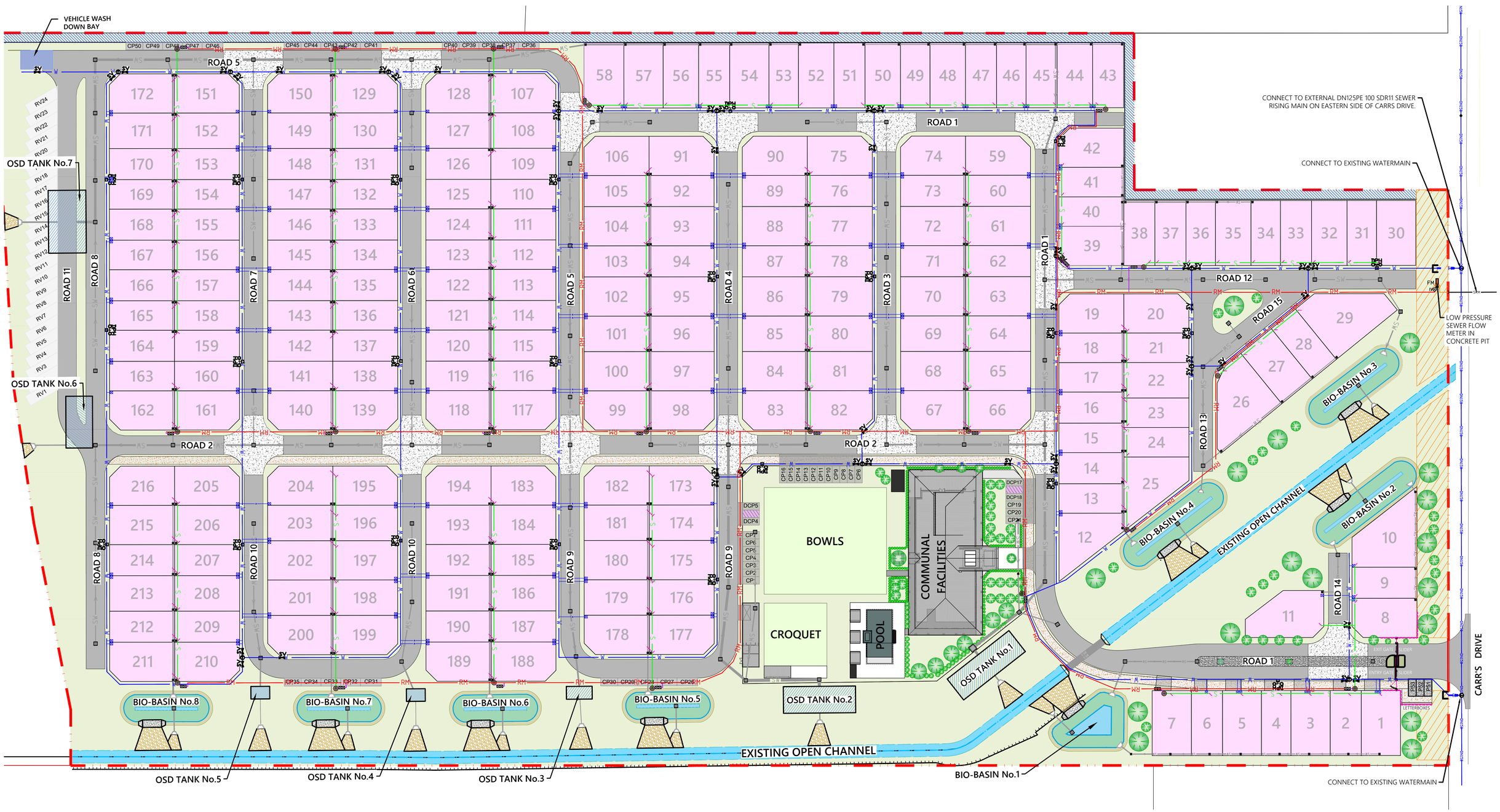
5 REFERENCES

Water Directorate (2009) "*Section 64, Determinations of Equivalent Tenements Guidelines*"

Clarence Valley Council (2009) "*New South Wales Development Design Specification, D11, Water Supply*"

6 APPENDICES

Appendix 1. Development Site Layout and Servicing Strategy



10 5 0 10 20 30 40
Horizontal Scale 1:600 (A1)
1:1200 (A3)

SEWER AND WATER PLAN
SCALE 1:600

NOTE: DA CONCEPT DESIGN PHASE
SEWER AND WATERMAIN PIPE SIZES, PUMP & CHAMBER SIZES ARE PRELIMINARY ONLY AND SUBJECT TO DETAILED DESIGN

PLANS TO BE PRINTED IN COLOUR

PRELIMINARY PLANS FOR DA PURPOSES ONLY NOT FOR CONSTRUCTION

ARCHITECTURAL INFORMATION FOR CLUB HOUSE SUPPLIED BY MARK SHAPIRO ARCHITECTS DRAWING NUMBER DA1002WIP REV 2

LEGEND

- DEVELOPMENT BOUNDARY
- INTERNAL LOT BOUNDARY
- BIO - BASIN TOP
- CHANNEL TOP OF BANK
- CHANNEL CENTRE LINE
- DESIGN CONTOURS
- PROPOSED STORMWATER DRAINAGE
- WATERMAIN Ø100mm
- GRAVITY SEWER Ø150mm
- LOW PRESSURE SEWER
- SEWER HOUSE CONNECTION
- WATER MAIN TEE
- WATER METER
- STORMWATER DRAINAGE PIT
- HEADWALL
- DUAL PILLAR HYDRANT
- SLUICE VALVE
- LOW PRESSURE SEWER ISOLATION VALVE
- LOW PRESSURE SEWER FLOW METER
- LOW PRESSURE SEWER BOUNDARY KIT
- AQUATEC LOW PRESSURE SEWER CHAMBER
- PROPOSED MHE ALLOTMENT
- NEW INTERNAL CONCRETE ROAD PAVEMENT
- NEW INTERNAL CONCRETE INTERSECTION TREATMENTS & DRIVEWAYS
- NEW 2.5m WIDE SHARED PATH WITHIN SITE BOUNDARY
- MHE BOUNDARY SETBACK 3m WIDE 'NO BUILD ZONE'
- MHE BOUNDARY SETBACK 10m WIDE 'NO BUILD ZONE'
- VISITOR AND RECREATIONAL VEHICLE PARKING
- SCOUR PROTECTION
- BIO-BASIN BREM
- BIO-BASIN GRASSED AREA
- BIO-BASIN WEIR
- BIO-BASIN FLOOR
- GRASSED AREA

ISSUE	DESCRIPTION	DATE
0	ISSUED FOR DEVELOPMENT APPLICATION	08.09.2022

DESIGNED: T.RYDEN | DATE: SEPT 2022
DRAWN: A.SCHMID | SCALE: AS SHOWN
SURVEYING: | SHEET SIZE: A1

NOT FOR CONSTRUCTION

MDE Manage Design Engineer

CLIENT: CLIFTON YAMBA LAND PTY LTD

TITLE: 110 & 120 CARRS DRIVE, YAMBA
DEVELOPMENT APPLICATION CIVIL WORKS PLANS

CLIFTON YAMBA

PROJECT: PROPOSED MHE DEVELOPMENT
110 & 120 CARRS DRIVE
YAMBA, NSW 2464
LOT 2 DP733507 & LOT 32 DP128863

DA CIVIL DRAWING

DRAWING TITLE: SEWER AND WATER RETICULATION PLAN

DWG No: D42 | SHEET: 42 OF 45 | REV: 0

Appendix 2. CVC Water Mains Test Certificate

clarence
VALLEY COUNCIL

04 October 2023

Reference: Mains Pressure Test
Contact: Phllip A. Moore

Owner: Richard Volpe - Clifton Yamba Land Pty Ltd
Applicant: Andrew Smith (Manage Design Engineer Pty Ltd)
Email: andrew@mde.au

Re: Application for Pressure Test Certificate
For 90 Carrs Drive Yamba

For your information, results of the requested watermain flow/pressure testing are noted below:

DATE OF TEST: 22/09/23 ***TIME OF TEST:*** 9:30AM

LOCATION: Carrs Drive (Miles Street 150mm)

WATERMAIN SIZE & TYPE: 150mm

	FLOW L/SEC	***PRESSURE (kPa)***
	No flow	568
	5	558
	10	529
	15	509
	20	490
	25	450
Maximum Flow	**31.5**	450

You are advised that the above flow and pressure information applies only to the flow and pressure available at the time of the test and is not representative of conditions at all times of the day or season. Conditions could be affected by system alterations, variations in demands or changes in the hydraulic operation of the water network.

Should you require any further information, please do not hesitate to contact Council's Water Cycle Section on (02) 6645 0253 or (02) 6645 0273.

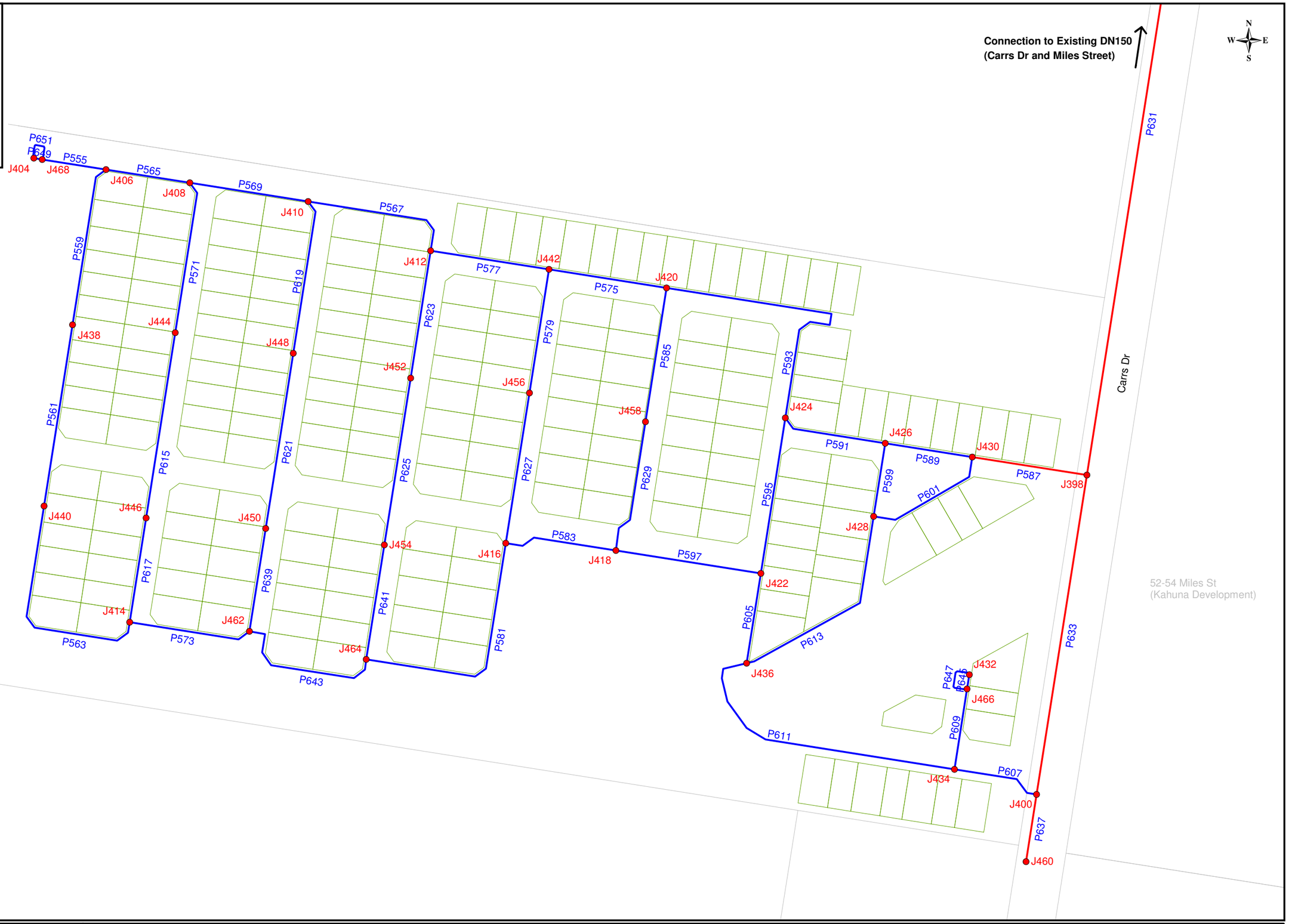
Yours faithfully

for Phillip A. Moore
Supervisor (Water & Sewer East)

Appendix 3. Potable Water Supply Pipe Layout Plan

LEGEND

- Proposed DN150
- Proposed DN100
- Model node
- Proposed boundary
- Existing boundary



H2ONE

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DESIGNED:	D Colledge
DRAWN:	D Colledge
CHECKED:	J May
APPROVED:	J May
CLIENT PM:	
H2ONE PM:	J May

NOTE: DESIGN NOT TO BE AMENDED WITHOUT H2ONE PTY LTD ACCEPTANCE

No.	REVISION	APPROVED
A	ORIGINAL ISSUE - 17 OCT 2023	

DATUM:
HORIZ: MGA94 (ZONE 56)
HEIGHT: AHD

SCALE:
0 300 600
Metres

SURVEYED BY / DATE:
SURVEY CHECKED:

H2ONE REFERENCES

PROJECT NO:
2308583

FILE REFERENCE:

CAD FILE:

clarence VALLEY COUNCIL

Clarence Valley Council
Locked Bag 23
Grafton NSW 2460

110 & 120 Carrs Dr Yamba NSW 2464 Potable Water Supply Service Assessment

Appendix 3. Potable water supply pipe layout plan

ORIGINAL ISSUE DATE: OCT, 2023

DATE SCANNED:

DRG No:

REV:

Appendix 4. Raw Hydraulic Modelling Results

Pipes - Potable Water

Develop. Stage	ID	Diameter (DN)	HW Co-efficient	Length (m)	SF PH Flow Rate (L/s)	SF PH Velocity (m/s)	SF PH Head Loss (m)
Ultimate	P555	100	100	27.2	1.2	0.2	0.0
	P559	100	100	68.3	0.1	0.0	0.0
	P561	100	100	77.2	0.5	0.1	0.0
	P563	100	100	98.2	1.1	0.1	0.1
	P565	100	100	35.7	1.9	0.2	0.1
	P567	100	100	64.4	4.1	0.5	0.4
	P569	100	100	50.4	2.9	0.4	0.2
	P571	100	100	64.8	0.4	0.0	0.0
	P573	100	100	52.0	2.6	0.3	0.1
	P575	100	100	50.1	6.0	0.8	0.6
	P577	100	100	50.4	6.0	0.8	0.6
	P579	100	100	52.7	0.6	0.1	0.0
	P581	100	100	105.5	4.3	0.6	0.7
	P583	100	100	48.0	6.2	0.8	0.6
	P585	100	100	57.0	0.8	0.1	0.0
	P587	150	100	48.8	13.6	0.8	0.4
	P589	100	100	37.1	7.2	0.9	0.6
	P591	100	100	44.8	8.1	1.0	0.9
	P593	100	100	126.6	5.8	0.7	1.4
	P595	100	100	66.2	1.7	0.2	0.1
	P597	100	100	61.8	8.1	1.0	1.3
	P599	100	100	31.2	1.5	0.2	0.0
	P601	100	100	53.7	5.8	0.7	0.6
	P605	100	100	38.3	7.1	0.9	0.6
	P607	100	100	37.9	5.9	0.7	0.4
	P609	100	100	34.2	1.2	0.2	0.0
	P611	100	100	127.8	4.0	0.5	0.7
	P613	100	100	91.0	3.6	0.5	0.4
	P615	100	100	78.9	0.3	0.0	0.0
	P617	100	100	44.4	0.9	0.1	0.0
	P619	100	100	65.7	0.6	0.1	0.0
	P621	100	100	74.6	0.0	0.0	0.0
	P623	100	100	54.3	1.3	0.2	0.0
	P625	100	100	71.1	0.6	0.1	0.0
	P627	100	100	64.0	1.2	0.2	0.0
	P629	100	100	57.2	1.4	0.2	0.0
	P631	150	100	300.4	19.4	1.1	4.4
	P633	150	100	136.1	5.9	0.3	0.2
	P637	150	100	28.7	0.0	0.0	0.0
	P639	100	100	43.9	0.6	0.1	0.0
	P641	100	100	48.8	0.0	0.0	0.0
	P643	100	100	66.5	3.8	0.5	0.3
	P645	100	100	6.1	0.6	0.1	0.0
	P647	100	100	18.6	0.0	0.0	0.0
	P649	100	100	3.6	0.7	0.1	0.0
	P651	100	100	15.2	0.1	0.0	0.0

Note: “SF” is “standard flow”, “PH” is “peak hour” and “HW” is “Hazen-Williams”

Nodes - Potable Water

Develop. Stage	ID	Demand (ET)	RL AHD (m)	SF PH Demand (L/s)	SF PH Pressure (m)	Fire Flow (L/s)	FF PH Pressure (m)
Ultimate	J398	0.0	2.0	0.0	43.6	11	33.8
	J400	0.0	2.0	0.0	43.4	11	32.5
	J404	4.1	2.0	0.61	38.4	11	14.7
	J406	4.1	2.0	0.61	38.4	11	16.0
	J408	4.1	2.0	0.61	38.5	11	16.9
	J410	4.1	2.0	0.61	38.6	11	18.1
	J412	4.1	2.0	0.61	39.0	11	20.0
	J414	4.1	2.0	0.61	38.5	11	17.0
	J416	4.1	2.0	0.61	39.6	11	22.5
	J418	4.1	2.0	0.61	40.3	11	24.6
	J420	4.1	2.0	0.61	40.2	11	24.1
	J422	4.1	2.0	0.61	41.6	11	28.3
	J424	4.1	2.0	0.61	41.6	11	28.6
	J426	4.1	2.0	0.61	42.6	11	31.0
	J428	4.1	2.0	0.61	42.6	11	31.1
	J430	4.1	2.0	0.61	43.2	11	32.7
	J432	4.1	2.0	0.61	42.9	11	29.3
	J434	4.1	2.0	0.61	42.9	11	31.0
	J436	4.1	2.0	0.61	42.2	11	29.7
	J438	4.1	2.0	0.61	38.4	11	15.5
	J440	4.1	2.0	0.61	38.4	11	15.6
	J442	4.1	2.0	0.61	39.6	11	22.2
	J444	4.1	2.0	0.61	38.5	11	16.2
	J446	4.1	2.0	0.61	38.5	11	16.3
	J448	4.1	2.0	0.61	38.6	11	17.3
	J450	4.1	2.0	0.61	38.6	11	17.4
	J452	4.1	2.0	0.61	39.0	11	19.3
	J454	4.1	2.0	0.61	38.9	11	19.1
	J456	4.1	2.0	0.61	39.6	11	22.0
	J458	4.1	2.0	0.61	40.2	11	24.0
	J460	0.0	2.0	0.0	43.4	11	32.3
	J462	4.1	2.0	0.61	38.6	11	18.0
	J464	4.1	2.0	0.61	38.9	11	19.6
	J466	4.1	2.0	0.61	42.9	11	29.4
	J468	4.1	2.0	0.61	38.4	11	14.8