94 BERGIN ROAD, CRANBROOK
ROOMING ACCOMMODATION DEVELOPMENT

WATER SUPPLY & SEWERAGE
PLANNING REPORT

Date: 22 April 2025
(Revision A)

TABLE OF CONTENTS

APPENDICES

REPORT AUTHORISATION				
Revision	**Revision Date**	**Details**	**Prepared by**	**Signature**
A	22/04/2025	Original Report	Desmond Moseley (RPEQ 7565)	

1 INTRODUCTION

A rooming accommodation development is proposed at 94 Bergin Road, Cranbrook. This site is located on the north-west corner on Isabella Crt and Bergin Rd. An existing single dwelling is location on the site. The dwelling is an existing rooming accommodation with 5 rooms. The site is illustrated on the Townsville Council GIS image below.

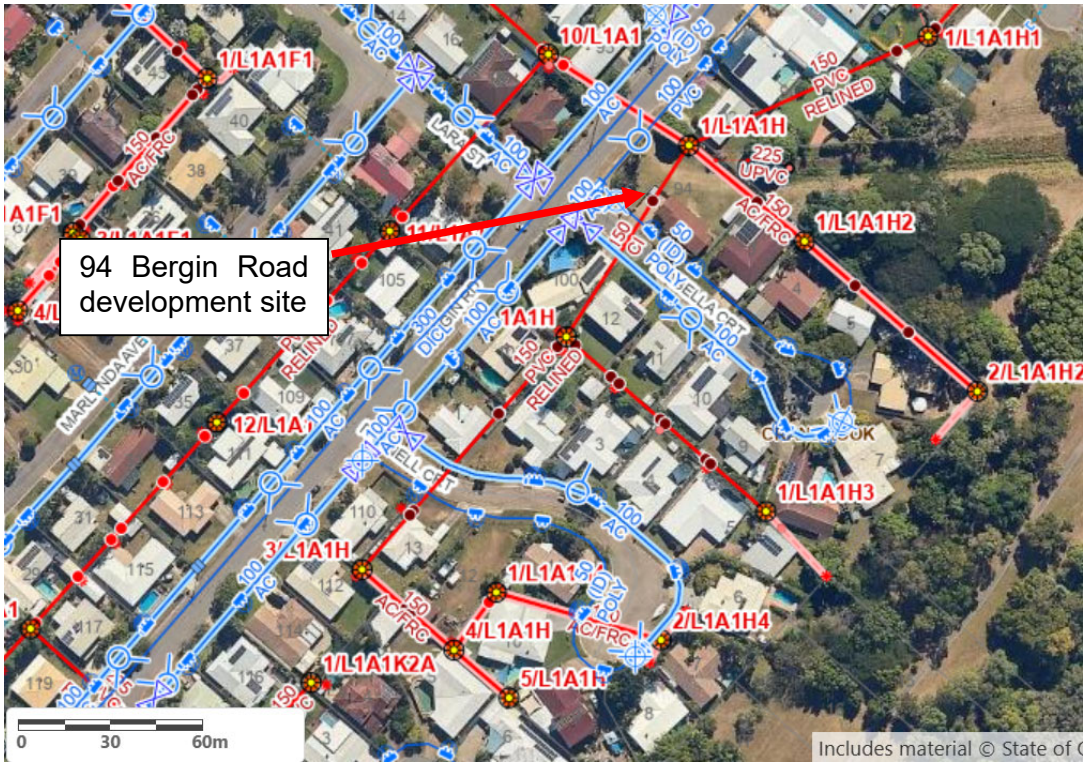


Figure 1 – Development Site Location

It has been advised from the client that the intent is to construct an additional two buildings on the site. These two buildings will be additional rooming accommodation. The proposed development plans are provided in Appendix A. The development plans illustrate a total of 16 rooms in the three buildings (ie 11 additional rooms and 5 existing rooms). The client has advised that there is the potential for the building layouts to be adjusted to have up to 18 rooms. The water & sewer assessment has therefore been undertaken based on the upper development yield of 18 rooms.

To ensure the rooming accommodation development can be adequately serviced with a potable water supply and sewage system in accordance with Council standards, an assessment of the system capacities have been undertaken. This report summarises the assessment of the existing water and sewerage network with this illustrating:

- The theoretical modelling shows the existing water network, including the DN100 AC water main along the southern side of Bergin Rd is adequately sized to service the development.
- The existing DN150, DN225 and DN300 gravity sewer system from the development site to PS L1A (Barellan St) has sufficient capacity to service the development.
- No water or sewer system upgrades are required to service the development.

The water network modelling and sewer system capacity assessment undertaken for this rooming accommodation development is summarised in the following report sections.

2 POPULATION ASSESSMENT

The following section provides the equivalent population assessment for the proposed rooming accommodation development on 94 Bergin Rd. The equivalent population assessment has been developed based on the proposed use on the site, being rooming accommodation. The rooming accommodation will allow for one (1) person per room only. The following table provides the water and sewer equivalent population for the development.

Table 2.1 – Water & Sewer Equivalent Population Assessment

	Number	Rate	EP
Rooms	18	1.0	18 EP

The above equivalent population assessment has been used in the water supply and sewer system capacity assessment for the proposed development.

3 WATER SUPPLY PLANNING

3.1 Water Demand

Water demands have been calculated in accordance with Townsville City Council planning scheme and its latest amendments. The following table provides the “residential” water demand parameters for the Townsville Planning Scheme for each equivalent person (EP).

Table SC6.4.3.21.2 Water supply unit demand parameters

Parameter	Unit Demand	Peaking Factor
Average Day (AD)	600 L/day/EP	
Mean Day Max Month (MDMM)	900 L/day/EP	1.5 AD
Peak Day (PD)	1125 L/day/EP	1.25 MDMM
Peak Hour (PH)	0.0333 L/s/EP	2.56 PD

The peak hour residential water demands have been applied to the proposed rooming development, giving a peak water demand of 18 EP x 0.033 l/s/EP = 0.594 l/s.

In addition to the above, as the development is residential, a 15 l/s fire flow is applicable in accordance with Council’s planning and design guidelines. This fire flow has been used to assess the theoretical performance of the water network.

3.2 Water Supply Assessment & Network Modelling

The existing site for the proposed rooming accommodation development is on the north-west corner on Isabella Crt and Bergin Rd in Cranbrook. The existing water infrastructure that services the site includes:

- A DN100 AC water main along the south-eastern side of Bergin Rd. This is along the frontage of the proposed development. There is also a DN63 PE water main along the Isabella Crt frontage of the development site.
- The existing DN100 AC water main extends to the intersection north east along Bergin Rd to the intersection with Alice St where it connects to an existing DN300 AC/DICL water main. The DN300 trunk water main runs along the full length of Bergin Rd.

- The DN300 AC/DICL water main connects to an existing DN600 AC trunk water main at the intersection of Bergin Rd and Nathan St.
- The DN600 AC trunk water main extends to the south along Nathan St (across Ross River as 4 x DN300 MSCL pipes attached to the Bridge) and then through to the intersection of Angus Smith Drv. The DN600 main connects to a DN825 MSCL main at Angus Smith Drv. The DN825 MSCL main is the trunk outlet main from the Douglas 1A/1B reservoir.

The following extract from the Council GIS illustrates the existing water infrastructure that services the development site in Cranbrook.

Figure 3.1 – Council GIS Plot

Theoretical water network modelling has been performed to assess the capacity of the existing reticulation network. The modelling was undertaken using the Council's WaterGEMS network model for both the peak hour demands and fire flows.

The theoretical WaterGEMS network modelling results with the inclusion of the water demands from the proposed development shows:

- The existing DN100 AC water main along Bergin Rd frontage is shown to be adequately sized to service the development with peak hour and fire flows.
- The peak hour pressures at 6:30 pm (ie the peak residential demand period) are reduced to 413 kPa at the development site. The water pressures in the adjacent residential area are reduced to around 400 kPa. This meets the minimum pressure requirement of 220 kPa.
- The headloss gradient along the existing DN100 AC water main along Bergin Rd is up to 0.010 m/m with the pipe velocities up to 0.68 m/s. The headloss gradient in above the recommenced 0.005 m/m value however the pipe velocity is well within the

maximum recommenced value of 2.5 m/s. As this is an existing water main, having a higher headloss gradient does not adversely impact on the water network performance and peak hour water pressures in this area. It is also noted that the headloss gradient on the existing DN100 AC water main was higher than the 0.005 m/m value prior to the additional demands from the rooming accommodation development.

- With the inclusion of the 15 l/s fire flow the water pressures are reduced to 337 kPa within the water main. This is the pressure at 6:30pm and is concurrent with the peak residential demand period and meets the minimum pressure requirement of 120 kPa.
- The fire flow velocity along the DN100 reticulation main on Bergin Rd is 1.52 m/s and meets the Council design standards of being less than 5.0 m/s.
- The WaterGEMS figure and results table are provided in Appendix B.

The above theoretical water network modelling shows that the proposed development is able to be serviced with a reticulated water supply that meets Council's standards with no upgrades required.

The following figure illustrates the peak hour demands and residual water pressure at the proposed rooming development site.

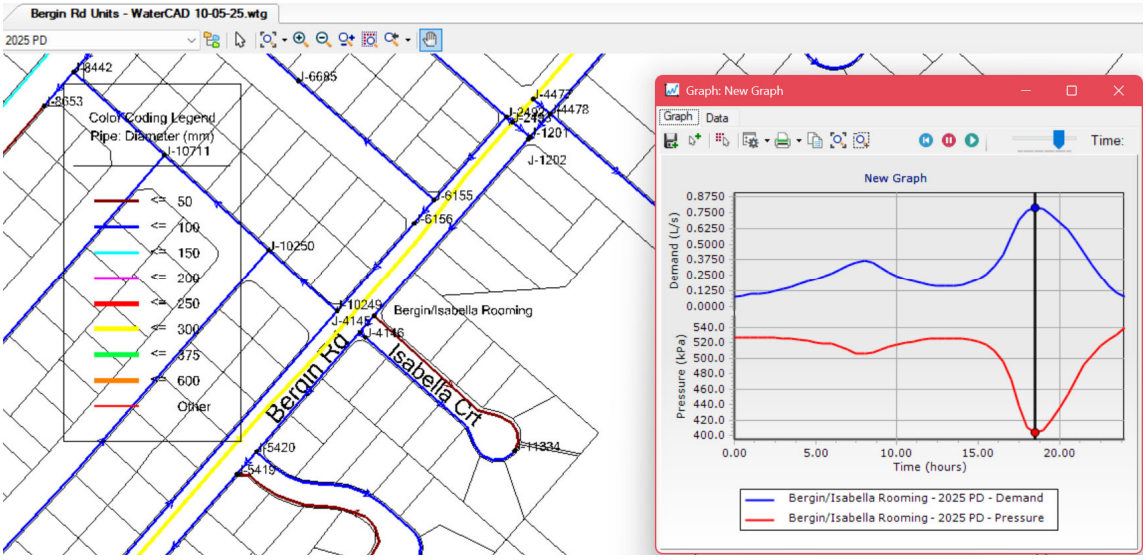


Figure 3.2 – Peak Hour Water Demand & Pressures

The following figure illustrates the water pressure at the development site with the inclusion of the 15 l/s fire flows.

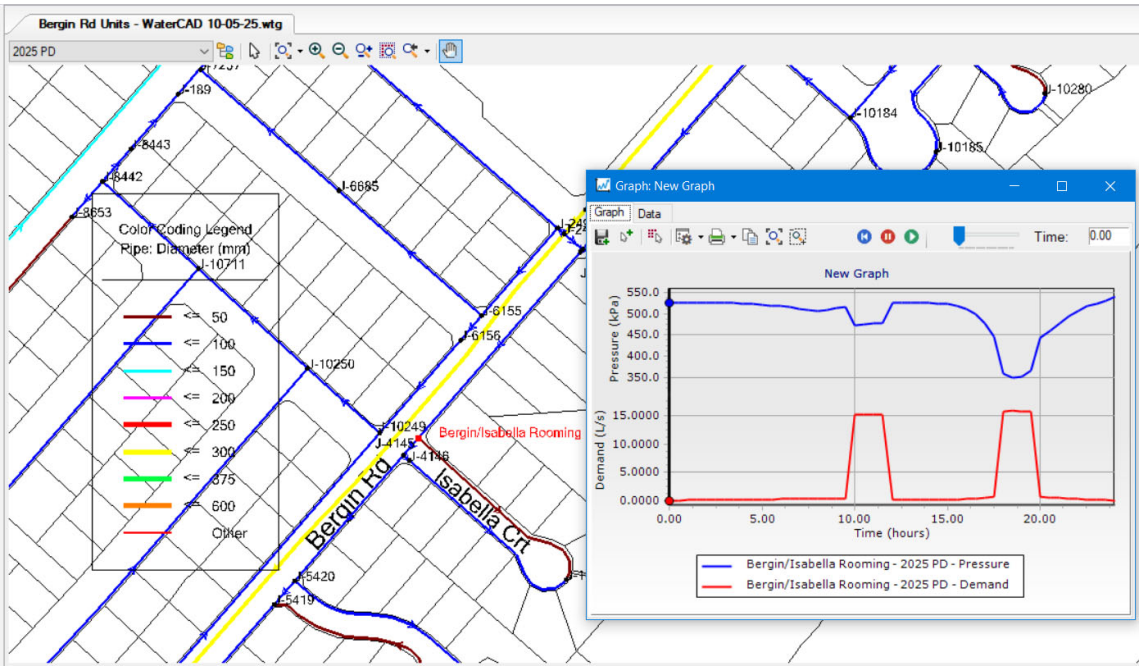


Figure 3.3 – 15 l/s Fire Flow Water Demand & Pressures

Additional hydrant testing could be undertaken if required on Bergin Rd to confirm the actual performance of the network, with this subject to the building code requirements for the site.

4 SEWAGE SYSTEM PLANNING

The existing site for the proposed rooming accommodation development is currently serviced with a reticulated gravity sewer system. The existing gravity sewer system consists of:

- A DN150 AC sewer is located along the north eastern boundary of the development site. Existing MH 1/L1A1H is located on the DN150 AC sewer and within the site. The DN150 sewer extends to the north west and under Bergin Rd to MH 10/L1A1.
- The sewer increases to a DN225 sewer at MH 10/L1A1 and extends to the north west through to MH 5/L1A1 that is located between Jannila Ave and Ross River Rd. The sewer increases in size to a DN300 AC pipe at MH 5/L1A1.
- The DN300 sewer extends to the north east (parallel to Ross River Rd) through to PS L1A (Barellan) that is located opposite the intersection of Jandera St and Barellan St. PS L1A pumps sewage to the east to discharge into a trunk sewer in the catchment of major PS L14A.

Figure 4.1 below is a plot from the Council GIS that illustrates the existing DN150, DN225 & Dn300 sewer system that services the development site. The capacity of the existing sewer system is provided in the following report sections.

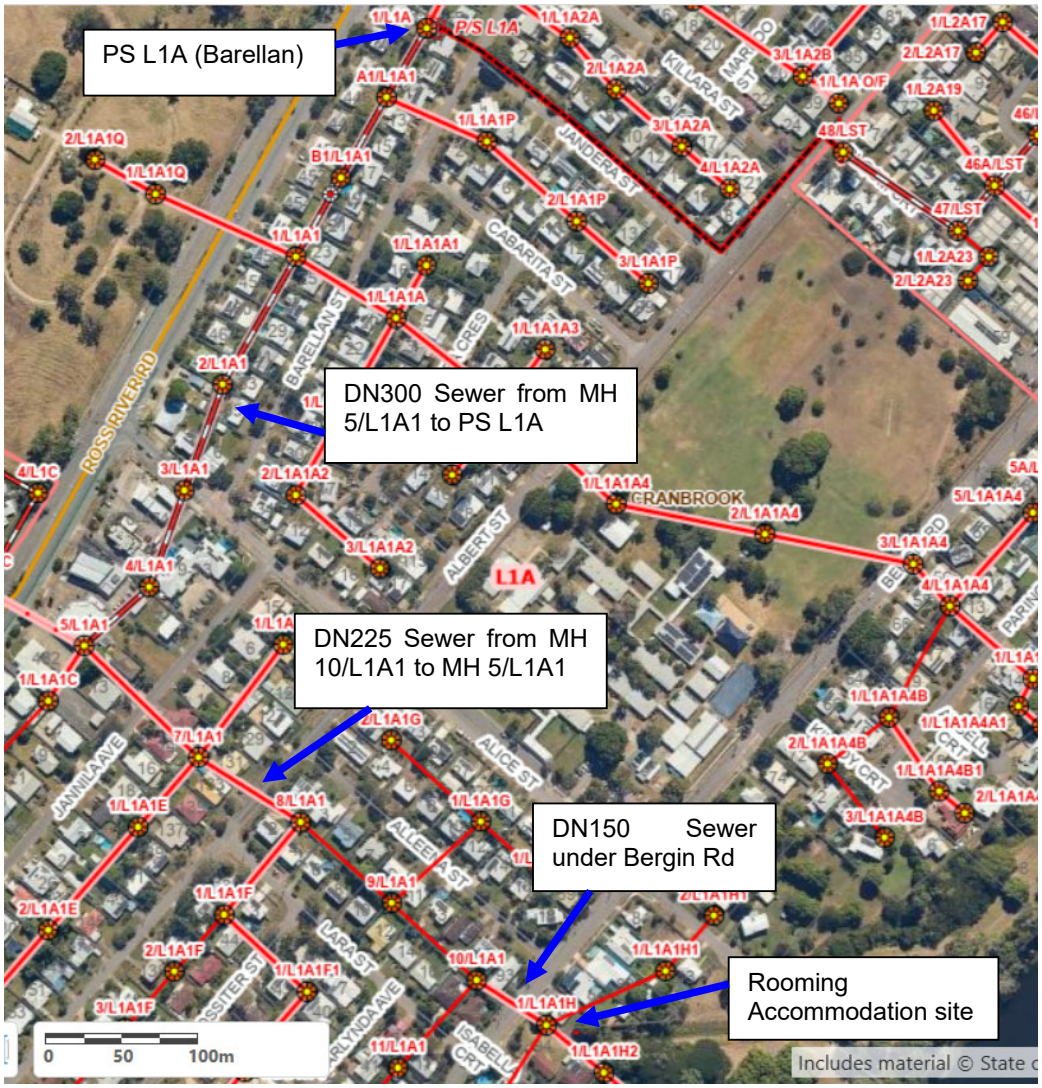


Figure 4.1 – GIS Plot of Existing Sewer System

4.1 Sewage Infrastructure Capacity

The capacity of the existing gravity sewer system to cater for the proposed rooming accommodation development was assessed using the SewerGEMS model developed for the Louisa suburbs of Townsville.

The SewerGEMS model includes the existing reticulation and trunk gravity sewer system from the development site through to existing PS L1A (Barellan St). The additional residential equivalent population has been added to MH 1/L1A1H which is located within the proposed development site.

The additional residential equivalent population loading on MH 1/L1A1H is illustrated in the extract from the SewerGEMS model on Figure 4.2 below.

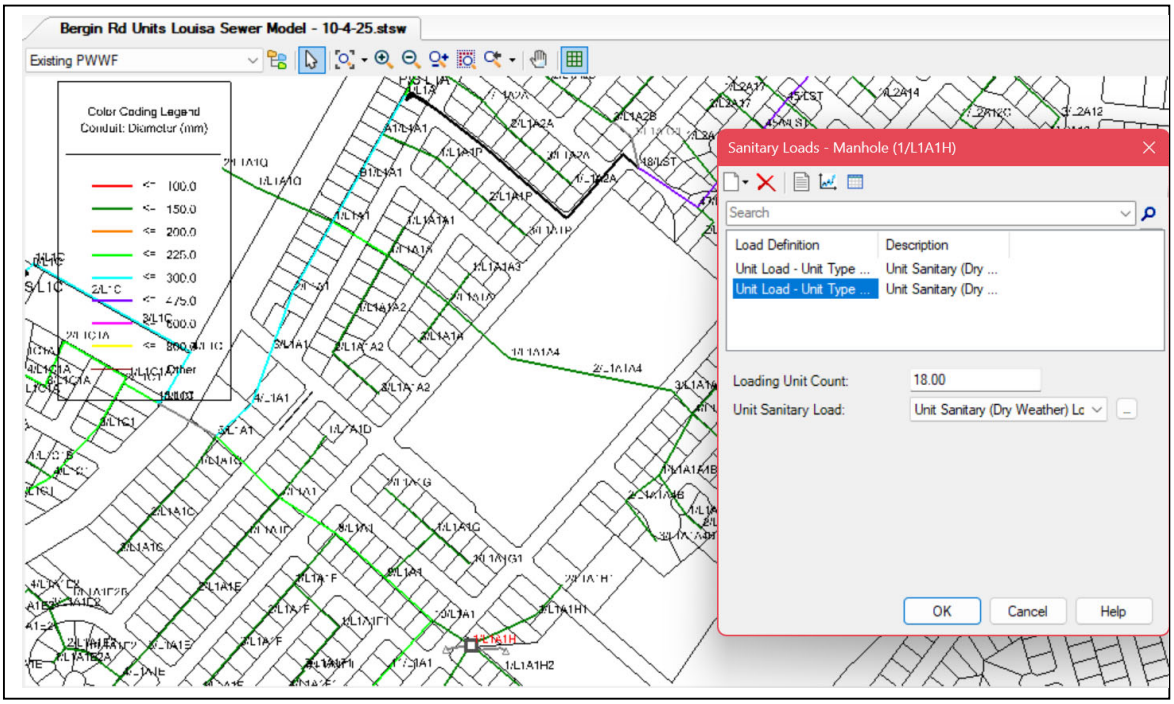
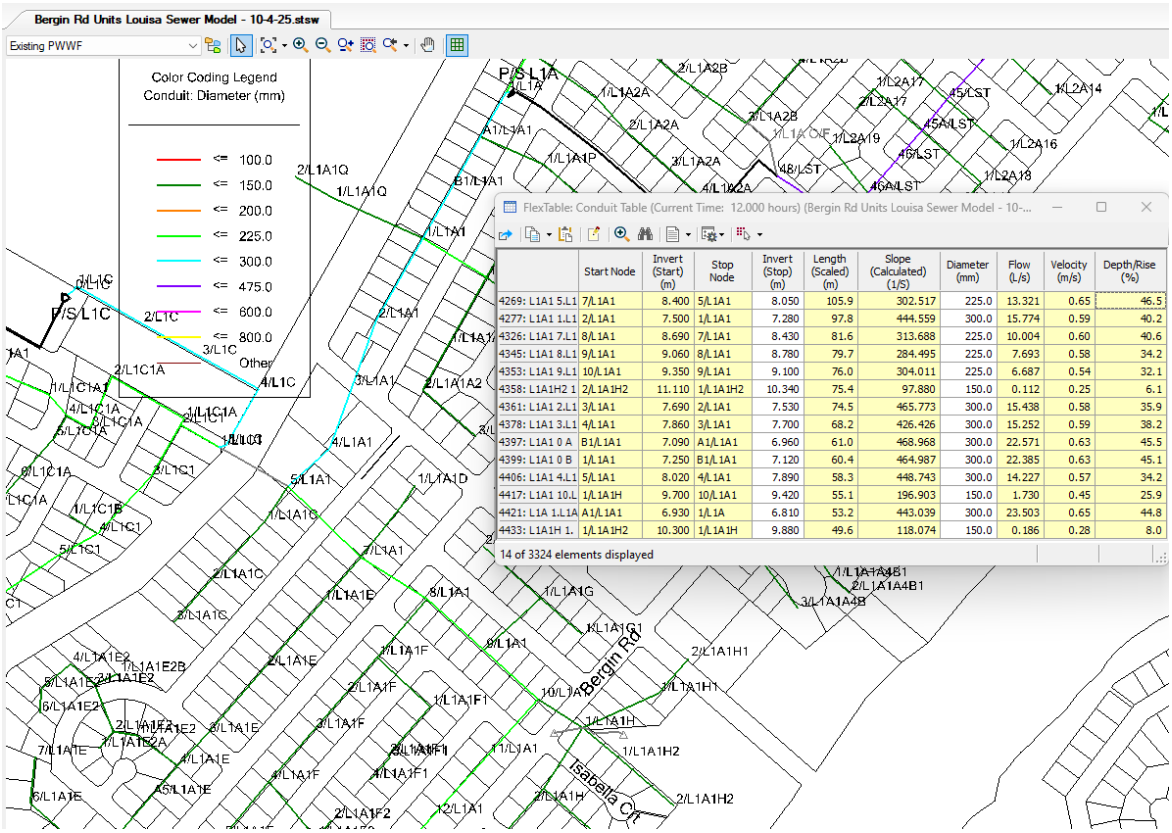


Figure 4.2 – Additional Residential Loading on MH 1/L1A1H

With the inclusion of the additional equivalent population loading on the existing gravity sewer system, the SewerGEMS model has illustrated:

- The existing DN150 sewer from MH 1/L1A1H2 to MH 10/L1A1 (being the reticulation gravity sewer that will service the development site) flows up to 26% full for the peak wet weather flows.
- The existing DN225 sewer from MH 10/L1A1 to MH 5/L1A1 (being the reticulation sewer that runs to the north-west to near Ross River Rd) flows up to 47% full for the peak wet weather flows.
- The final section is an existing DN300 trunk sewer that runs from from MH 5/L1A1 into PS L1A (being the trunk sewer that runs the north-east at the back of the lots between Ross River Rd and Barellan St) flows up to 45% full for the peak wet weather flows.
- All the existing sewers easily flow less than 75% full which is the maximum value allowable in the CTM code.

The following Figure 4.3 provides the flows and performance of the existing gravity sewer system with the inclusion of the additional loading from the proposed rooming accommodation development. A larger version of the modelling results is provided in Appendix C.

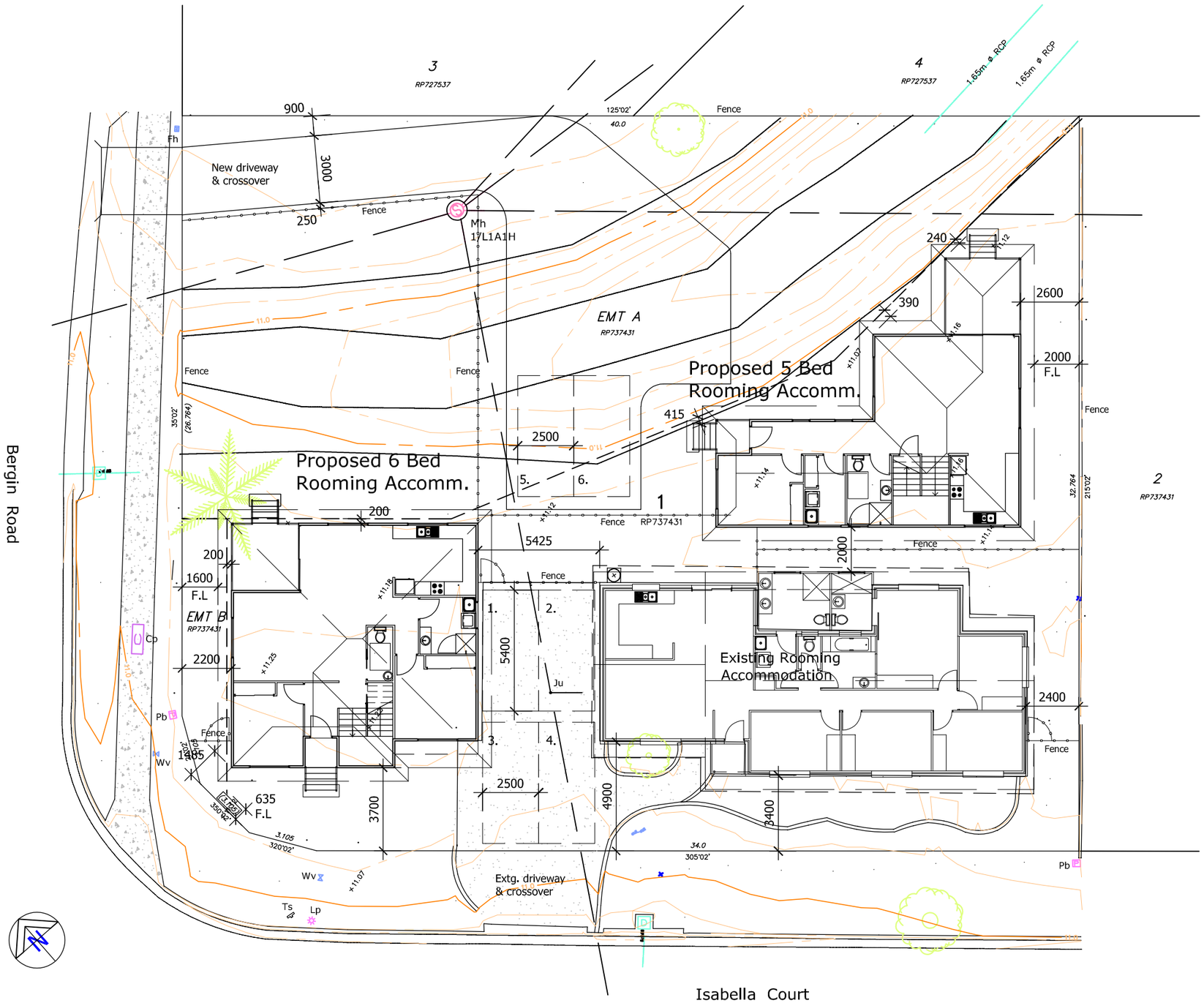


	Start Node	Invert (Start) (m)	Stop Node	Invert (Stop) (m)	Length (Scaled) (m)	Slope (Calculated) (1/S)	Diameter (mm)	Flow (L/s)	Velocity (m/s)	Depth/Rise (%)
4269: L1A1 5.L1	7/L1A1	8.400	5/L1A1	8.050	105.9	302.517	225.0	13.321	0.65	46.5
4277: L1A1 1.L1	2/L1A1	7.500	1/L1A1	7.280	97.8	444.559	300.0	15.774	0.59	40.2
4326: L1A1 7.L1	8/L1A1	8.690	7/L1A1	8.430	81.6	313.688	225.0	10.004	0.60	40.6
4345: L1A1 8.L1	9/L1A1	9.060	8/L1A1	8.780	79.7	284.495	225.0	7.693	0.58	34.2
4353: L1A1 9.L1	10/L1A1	9.350	9/L1A1	9.100	76.0	304.011	225.0	6.687	0.54	32.1
4358: L1A1H2 1	2/L1A1H2	11.110	1/L1A1H2	10.340	75.4	97.880	150.0	0.112	0.25	6.1
4361: L1A1 2.L1	3/L1A1	7.690	2/L1A1	7.530	74.5	465.773	300.0	15.438	0.58	35.9
4378: L1A1 3.L1	4/L1A1	7.860	3/L1A1	7.700	68.2	426.426	300.0	15.252	0.59	38.2
4397: L1A1 0 A	B1/L1A1	7.090	A1/L1A1	6.960	61.0	468.968	300.0	22.571	0.63	45.5
4399: L1A1 0 B	1/L1A1	7.250	B1/L1A1	7.120	60.4	464.987	300.0	22.385	0.63	45.1
4406: L1A1 4.L1	5/L1A1	8.020	4/L1A1	7.890	58.3	448.743	300.0	14.227	0.57	34.2
4417: L1A1 10.L	1/L1A1H	9.700	10/L1A1	9.420	55.1	196.903	150.0	1.730	0.45	25.9
4421: L1A 1.L1A	A1/L1A1	6.930	1/L1A	6.810	53.2	443.039	300.0	23.503	0.65	44.8
4433: L1A1H 1.	1/L1A1H2	10.300	1/L1A1H	9.880	49.6	118.074	150.0	0.186	0.28	8.0

Figure 4.3 – SewerGEMS Modelling Results

The above assessment illustrates the existing gravity sewer system has sufficient capacity to cater for the proposed rooming development at 94 Bergin Rd, Cranbrook.

APPENDIX A
RESIDENTIAL ROOMING DEVELOPMENT PLANS



Site Plan
Scale 1:200

Real Property Description
Lot 1 on RP 737431
Site Area : 1302 m²
Wind Classification : C1

General Notes

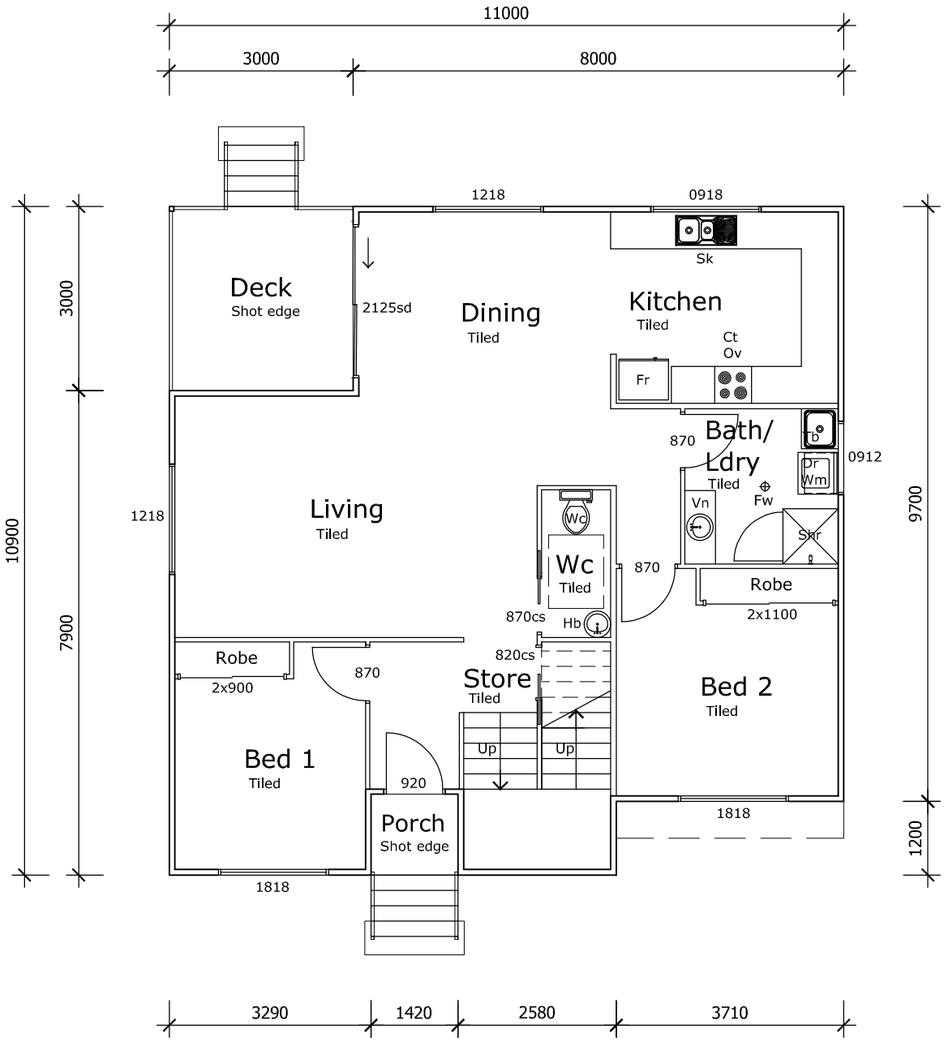
1. Do not scale off drawing check all dimensions & levels on site before commencing work, including location of all services.
2. Comply with all Local Authority & Building Code of Australia 2022 regulations & all relevant Australian Standard Codes.
3. Installation of all materials to comply with Manufacturer's Specifications.
4. Notwithstanding Inspection by an Engineer or Building Certifier, it is the Builder's responsibility to ensure that all works are constructed in accordance with the Building Approval Drawings.
5. Substitution of any structural member, & variation to any of the design, will void any responsibilities to Benson Building Designs for the performance of the building.

No.	Revision/Issue	Date
B	Floor Level Raised to 900mm	17/02/25
A	Preliminary Design	24/09/24

benson building designs
commercial / units / new homes / extensions
renovations / decks / patios
Gery Benson
BSc. Dip Arch Draft.
Call : 0416 936 452
QBCC Lic. No. 1256424 ABN 68 537 687 613
Email : plans@bensonbuildingdesigns.com.au
www.bensonbuildingdesigns.com.au

Project Name and Address
Proposed Rooming Accomm. Development
Abel Family Trust Pl
94 Bergin Road,
Cranbrook, Queensland

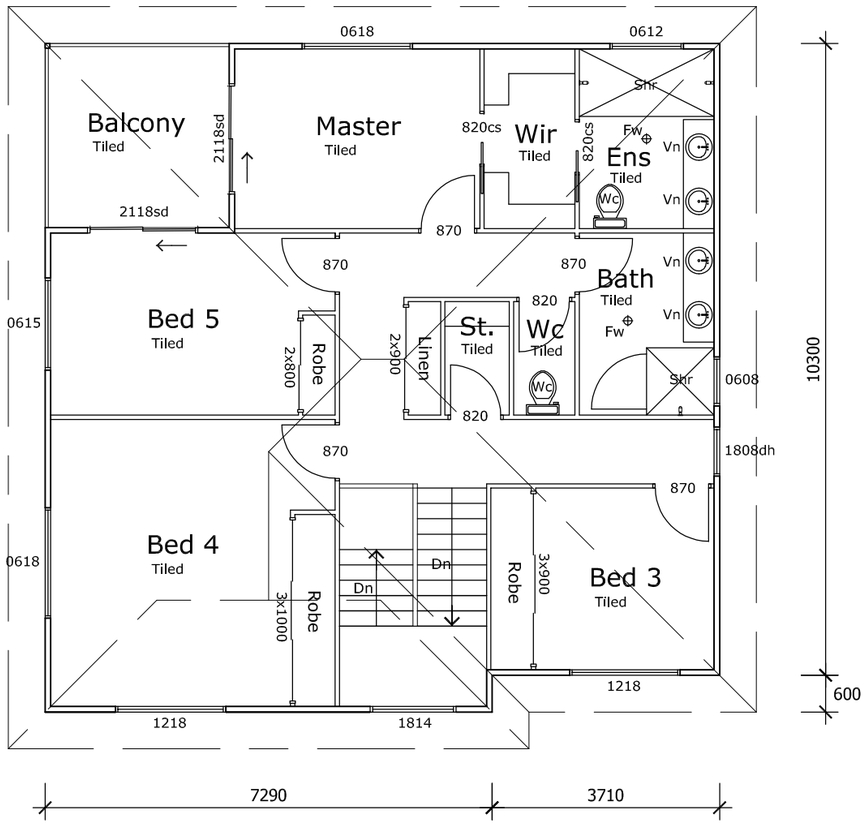
Project No.	Dwg No.	Issue
2024-12	DD01	B
Date: March, 2024	Designed: G.B	
Scale: 1:200 @ A3	Drawn: G.B	



Ground Floor Plan

Scale 1:100

Floor Areas
Living : 105.14 m²
Deck : 9.00 m²
Porch : 1.44m²
Overall : 115.58 m²



Upper Floor Plan

Scale 1:100

Floor Areas
Living : 108.74 m²
Balcony : 9.00m²
Overall : 117.74 m²

General Notes

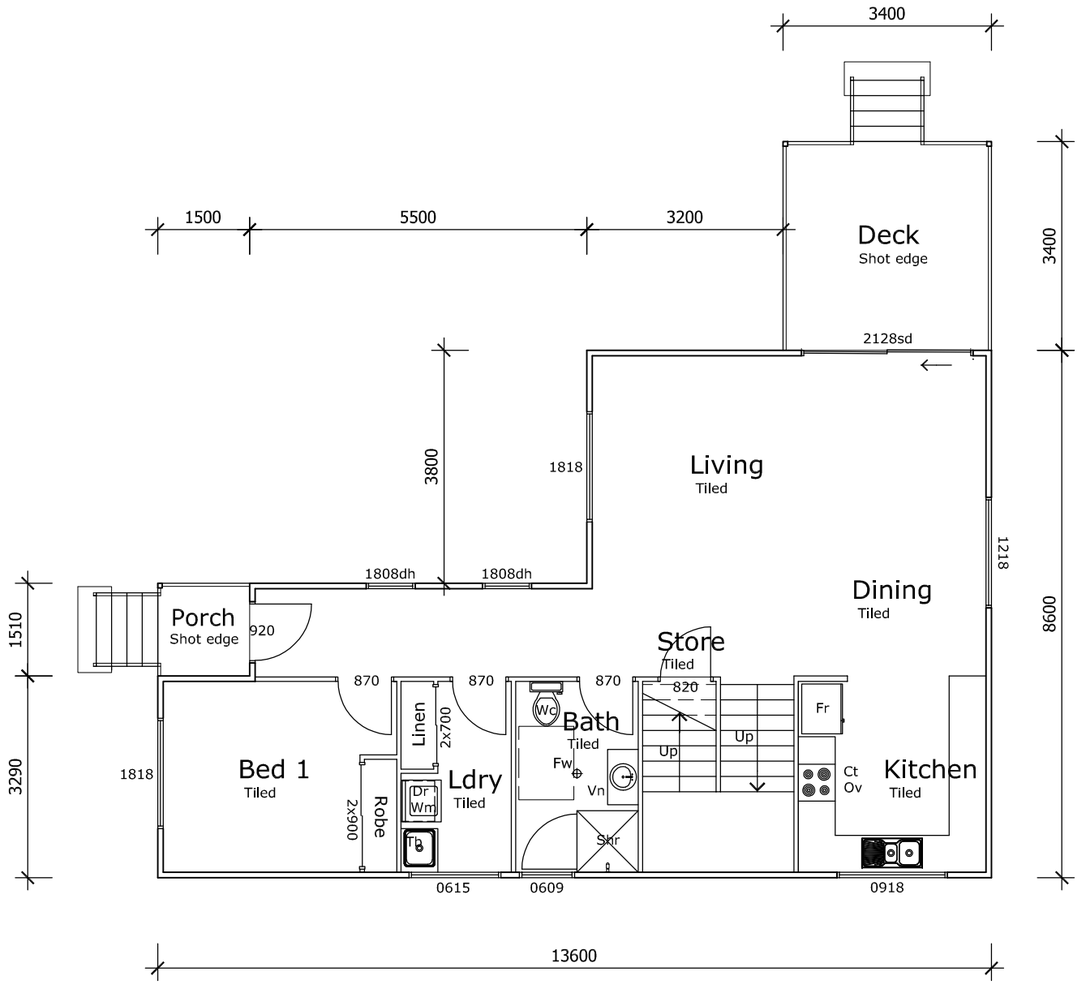
1. Do not scale off drawing check all dimensions & levels on site before commencing work, including location of all services.
2. Comply with all Local Authority & Building Code of Australia 2022 regulations & all relevant Australian Standard Codes.
3. Installation of all materials to comply with Manufacturer's Specifications.
4. Notwithstanding Inspection by an Engineer or Building Certifier, it is the Builder's responsibility to ensure that all works are constructed in accordance with the Building Approval Drawings.
5. Substitution of any structural member, & variation to any of the design, will void any responsibilities to Benson Building Designs for the performance of the building.

No.	Revision/Issue	Date
B	Floor Level Raised to 900mm	17/02/25
A	Preliminary Design	24/09/24

benson building designs
commercial / units / new homes / extensions
renovations / decks / patios
Gery Benson
BSc. Dip Arch Draft.
Call : 0416 936 452
QBCC Lic. No. 1256424 ABN 68 537 687 613
Email : plans@bensonbuildingdesigns.com.au
www.bensonbuildingdesigns.com.au

Project Name and Address
Proposed Rooming Accomm. Development
Abel Family Trust Pl
94 Bergin Road,
Cranbrook, Queensland

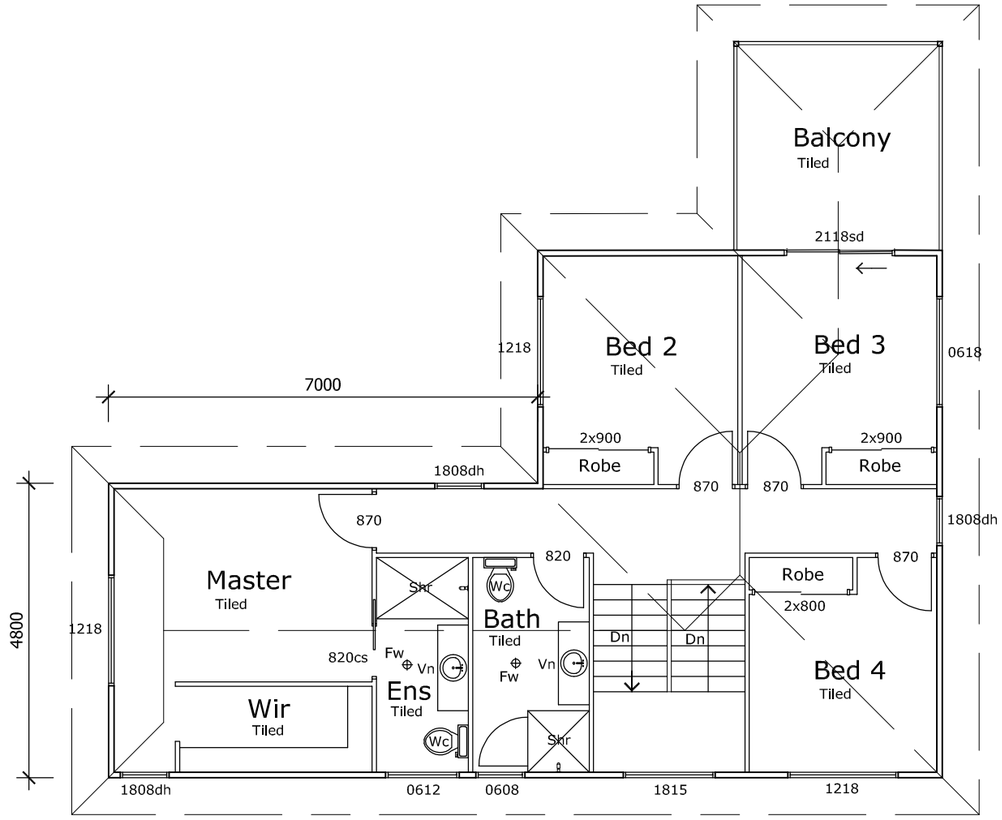
Project No.	Dwg No.	Issue
2024-12	DD02	B
Date: March, 2024	Designed: G.B	
Scale: 1:100 @ A3	Drawn: G.B	



Ground Floor Plan

Scale 1:100

Floor Areas
Living : 88.25 m²
Patio : 11.56 m²
Porch : 2.10m²
Overall : 101.92 m²



Upper Floor Plan

Scale 1:100

Floor Areas
Living : 90.36 m²
Balcony : 11.56m²
Overall : 101.92 m²

General Notes

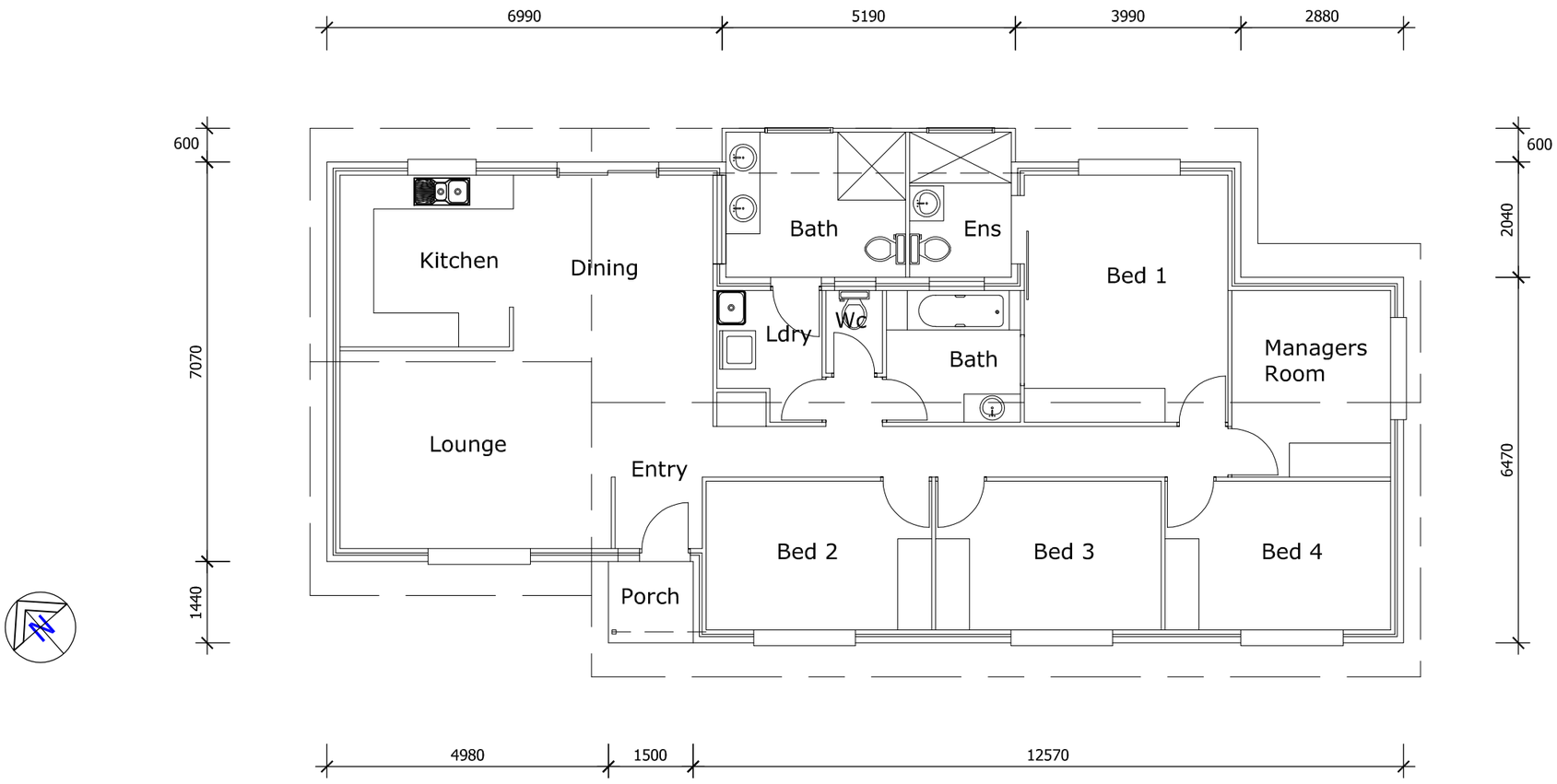
1. Do not scale off drawing check all dimensions & levels on site before commencing work, including location of all services.
2. Comply with all Local Authority & Building Code of Australia 2022 regulations & all relevant Australian Standard Codes.
3. Installation of all materials to comply with Manufacturer's Specifications.
4. Notwithstanding Inspection by an Engineer or Building Certifier, it is the Builder's responsibility to ensure that all works are constructed in accordance with the Building Approval Drawings.
5. Substitution of any structural member, & variation to any of the design, will void any responsibilities to Benson Building Designs for the performance of the building.

No.	Revision/Issue	Date
B	Floor Level Raised to 900mm	17/02/25
A	Preliminary Design	24/09/24

benson building designs
commercial / units / new homes / extensions
renovations / decks / patios
Gery Benson
BSc. Dip Arch Draft.
Call : 0416 936 452
QBCC Lic. No. 1256424 ABN 68 537 687 613
Email : plans@bensonbuildingdesigns.com.au
www.bensonbuildingdesigns.com.au

Project Name and Address
Proposed Rooming Accomm. Development
Abel Family Trust Pl
94 Bergin Road,
Cranbrook, Queensland

Project No.	Dwg No.	Issue
2024-12	DD05	B
Date: March, 2024	Designed: G.B	
Scale: 1:100 @ A3	Drawn: G.B	



Floor Areas
Living : 150.02 m²
Porch : 2.16m²
Overall : 152.18 m²

Existing Floor Plan

Scale 1:100

General Notes

1. Do not scale off drawing check all dimensions & levels on site before commencing work, including location of all services.
2. Comply with all Local Authority & Building Code of Australia 2022 regulations & all relevant Australian Standard Codes.
3. Installation of all materials to comply with Manufacturer's Specifications.
4. Notwithstanding Inspection by an Engineer or Building Certifier, it is the Builder's responsibility to ensure that all works are constructed in accordance with the Building Approval Drawings.
5. Substitution of any structural member, & variation to any of the design, will void any responsibilities to Benson Building Designs for the performance of the building.

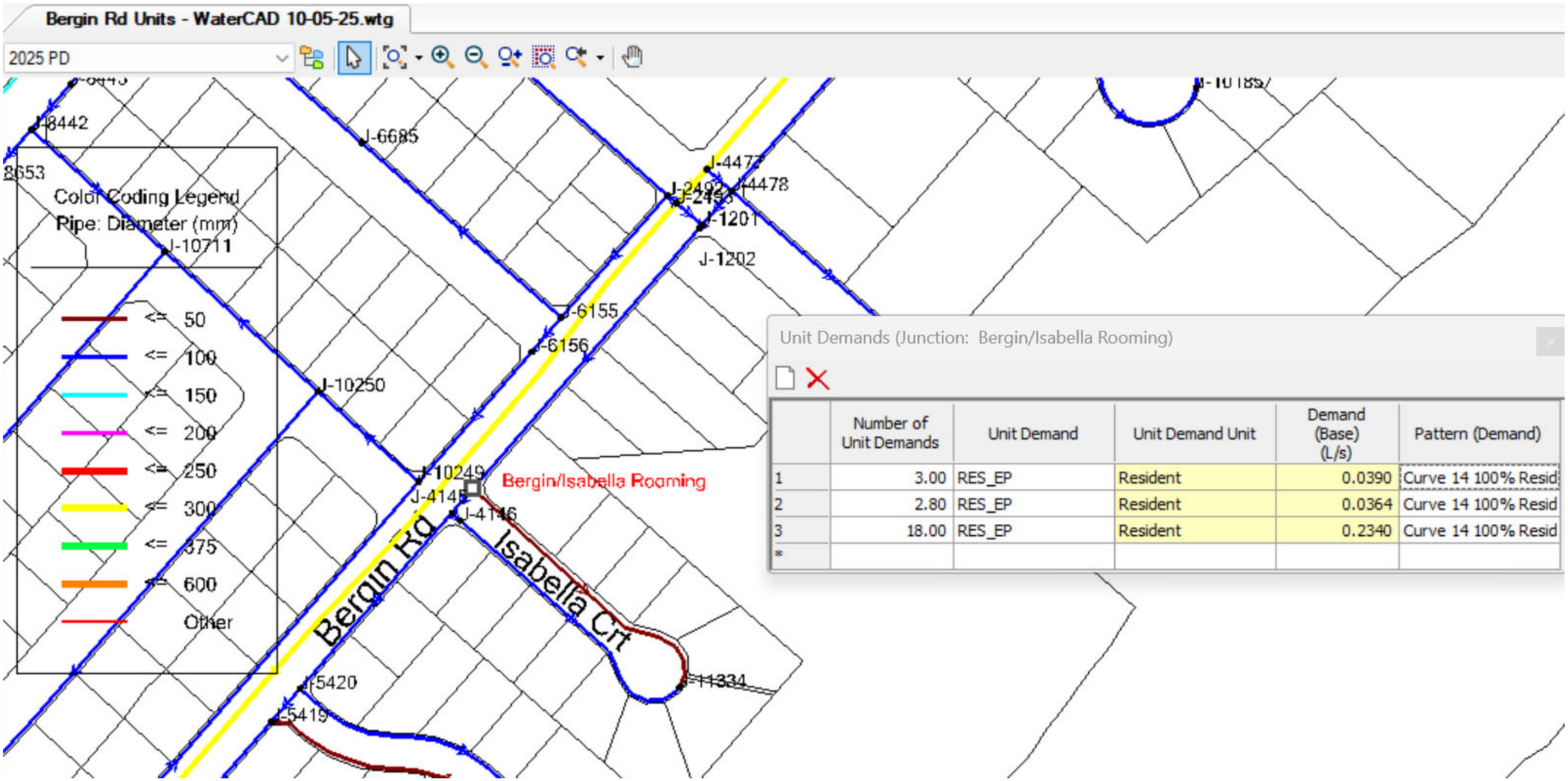
No.	Revision/Issue	Date
A	Preliminary Design	24/09/24

benson building designs
commercial / units / new homes / extensions
renovations / decks / patios
Gery Benson
BSc. Dip Arch Draft.
Call : 0416 936 452
QBCC Lic. No. 1256424 ABN 68 537 687 613
Email : plans@bensonbuildingdesigns.com.au
www.bensonbuildingdesigns.com.au

Project Name and Address
Proposed Rooming Accomm. Development
Abel Family Trust Pl
94 Bergin Road,
Cranbrook, Queensland

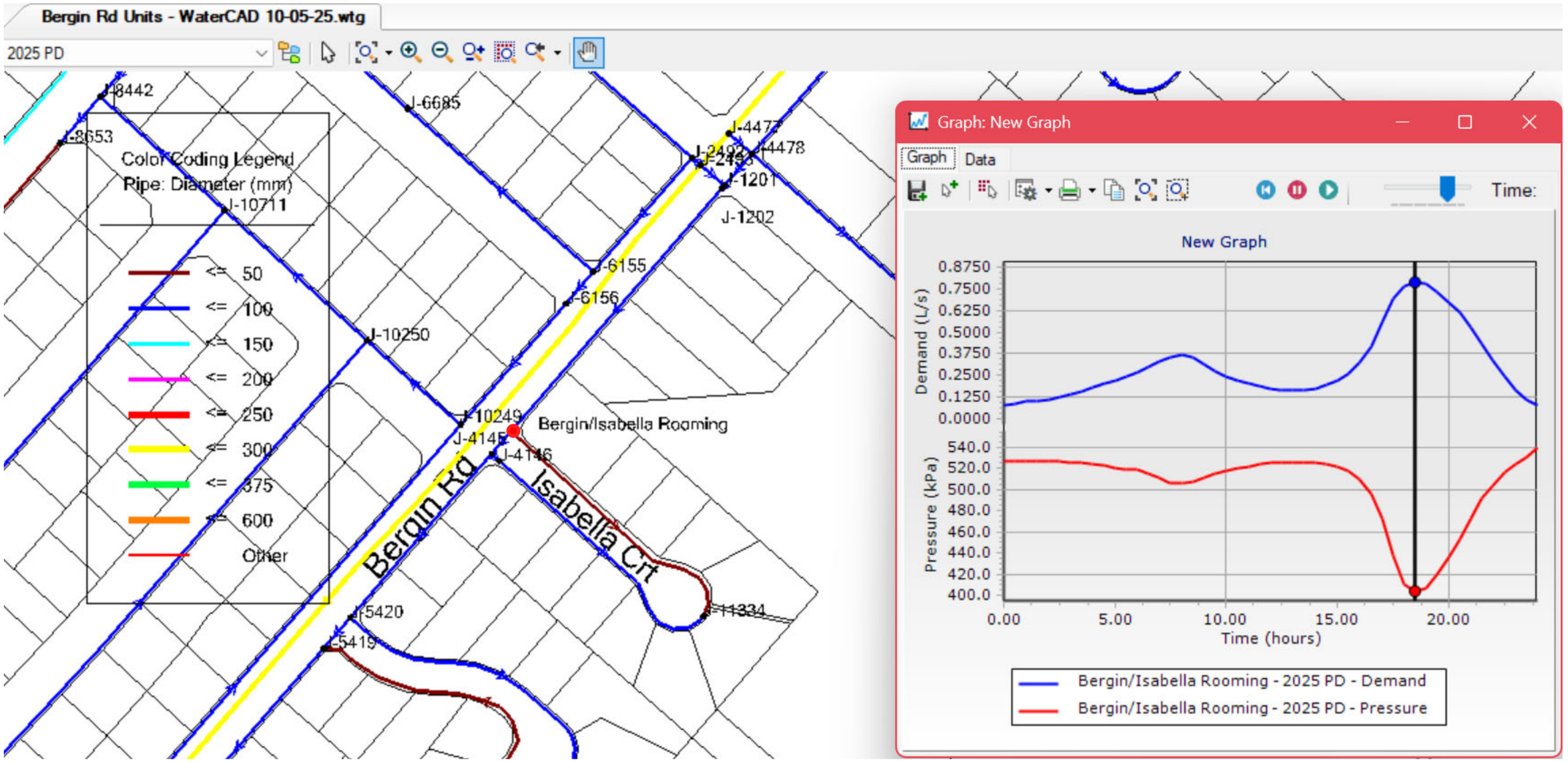
Project No.	Dwg No.	Issue
2024-12	DD08	A
Date: March, 2024	Designed: G.B	
Scale: 1:100 @ A3	Drawn: G.B	

APPENDIX B
WATERGEMS MODELLING RESULTS

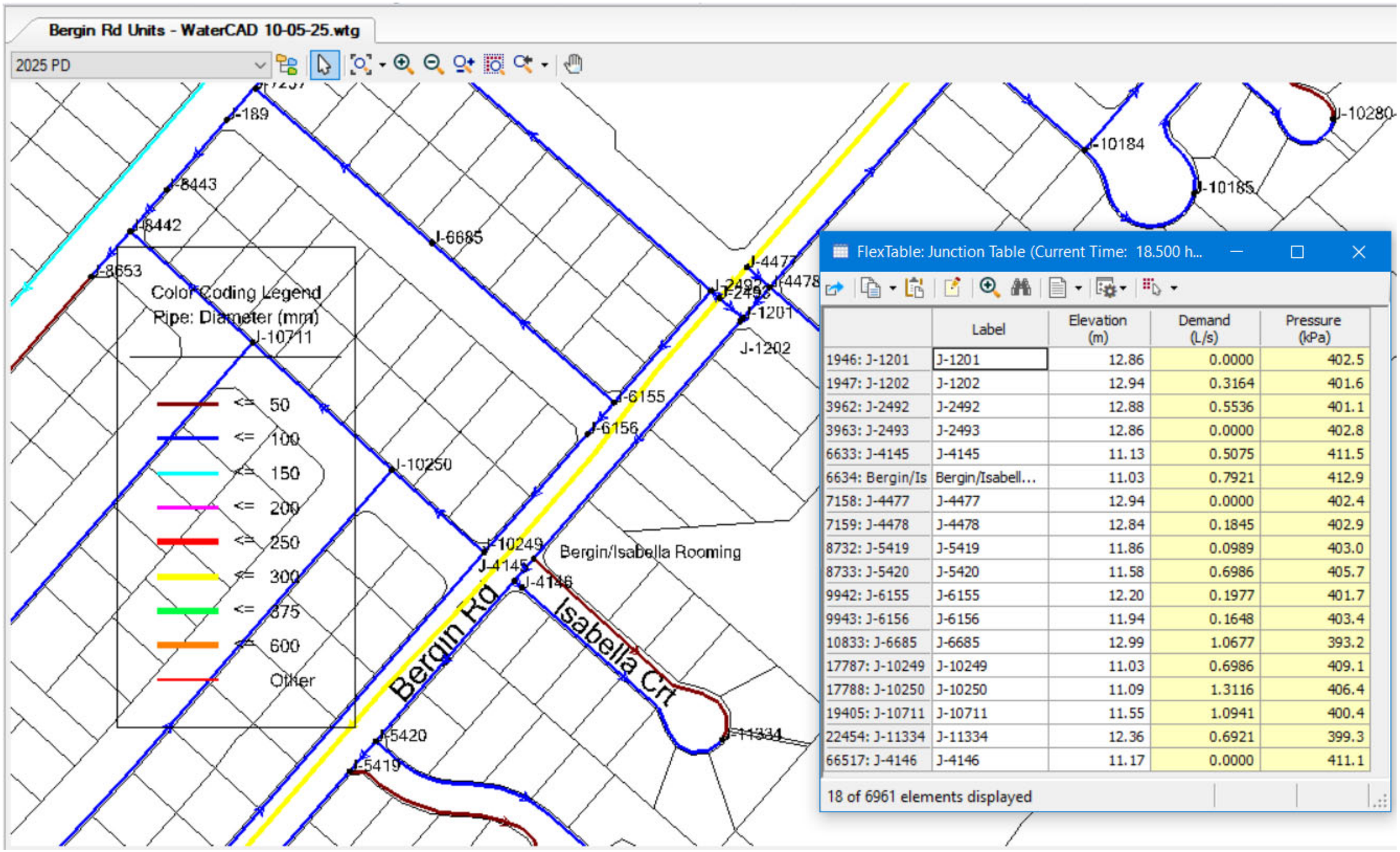


	Number of Unit Demands	Unit Demand	Unit Demand Unit	Demand (Base) (L/s)	Pattern (Demand)
1	3.00	RES_EP	Resident	0.0390	Curve 14 100% Resid
2	2.80	RES_EP	Resident	0.0364	Curve 14 100% Resid
3	18.00	RES_EP	Resident	0.2340	Curve 14 100% Resid
*					

WATERGEMS Model With 18 Rooms Development - Water Demand Added

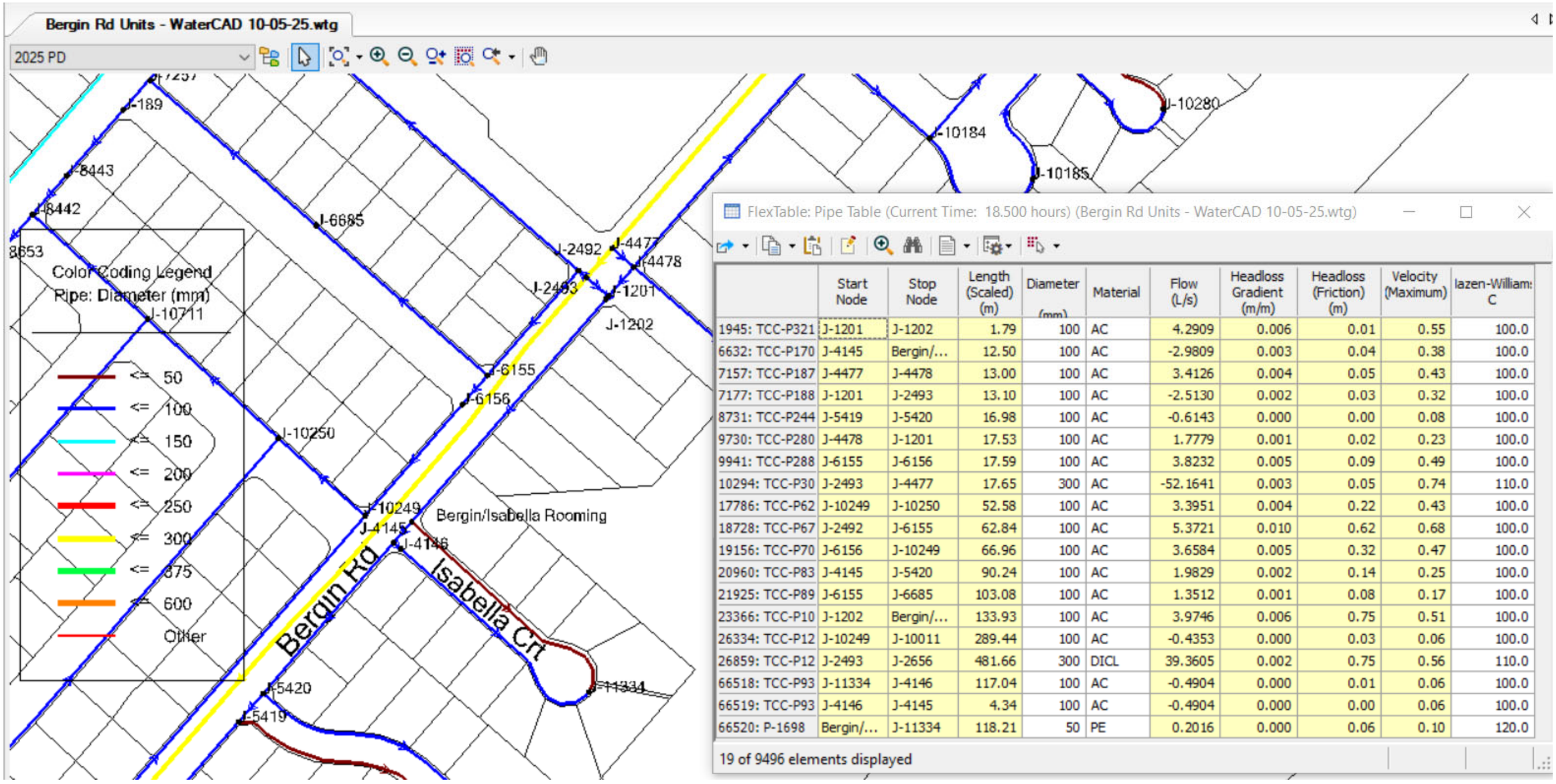


Peak Hour Pressure at Unit Development Node



	Label	Elevation (m)	Demand (L/s)	Pressure (kPa)
1946: J-1201	J-1201	12.86	0.0000	402.5
1947: J-1202	J-1202	12.94	0.3164	401.6
3962: J-2492	J-2492	12.88	0.5536	401.1
3963: J-2493	J-2493	12.86	0.0000	402.8
6633: J-4145	J-4145	11.13	0.5075	411.5
6634: Bergin/Is	Bergin/Isabell...	11.03	0.7921	412.9
7158: J-4477	J-4477	12.94	0.0000	402.4
7159: J-4478	J-4478	12.84	0.1845	402.9
8732: J-5419	J-5419	11.86	0.0989	403.0
8733: J-5420	J-5420	11.58	0.6986	405.7
9942: J-6155	J-6155	12.20	0.1977	401.7
9943: J-6156	J-6156	11.94	0.1648	403.4
10833: J-6685	J-6685	12.99	1.0677	393.2
17787: J-10249	J-10249	11.03	0.6986	409.1
17788: J-10250	J-10250	11.09	1.3116	406.4
19405: J-10711	J-10711	11.55	1.0941	400.4
22454: J-11334	J-11334	12.36	0.6921	399.3
66517: J-4146	J-4146	11.17	0.0000	411.1

Peak Hour Node Modelling Results – 6:30 pm



FlexTable: Pipe Table (Current Time: 18.500 hours) (Bergin Rd Units - WaterCAD 10-05-25.wtg)

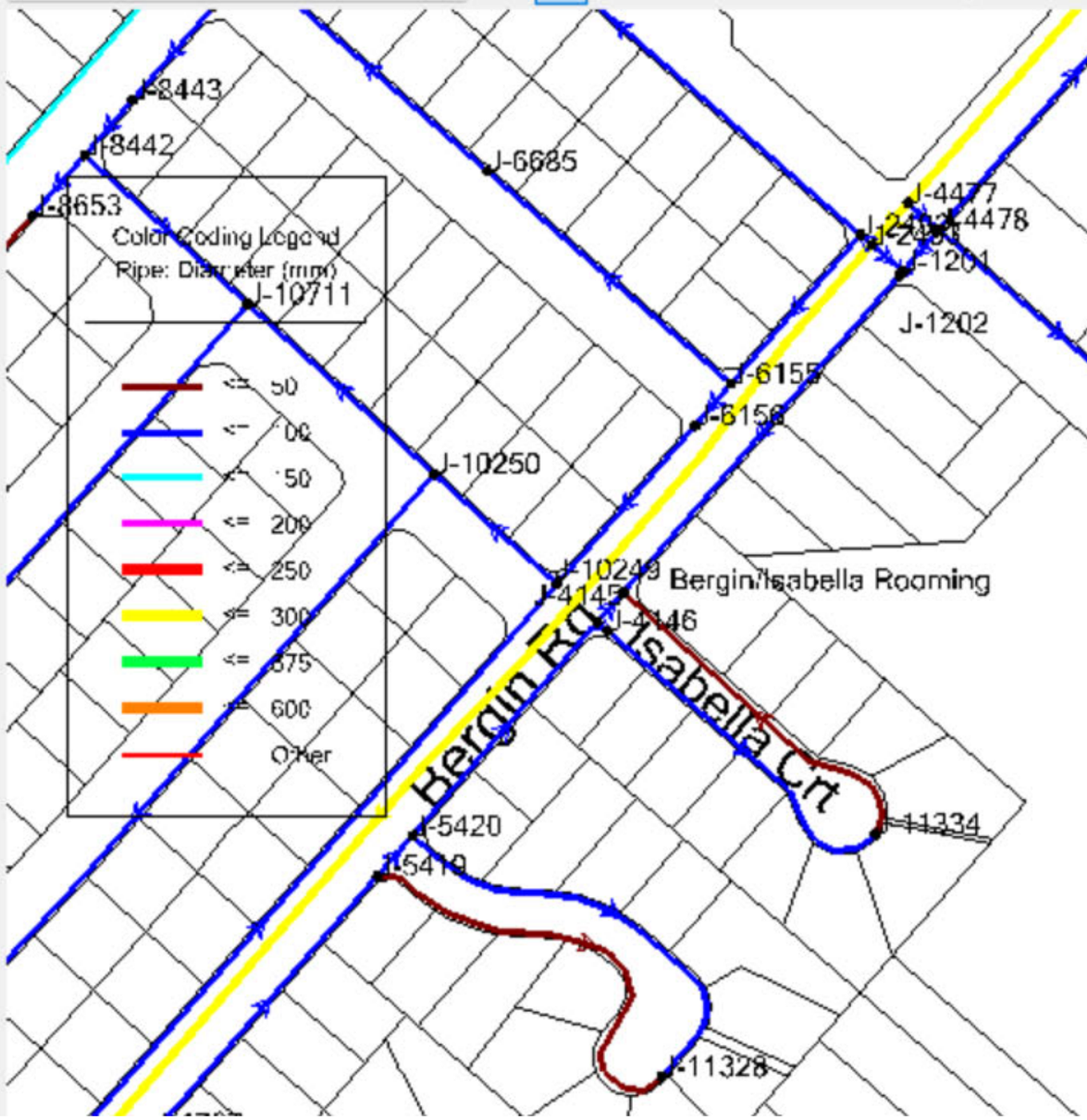
	Start Node	Stop Node	Length (Scaled) (m)	Diameter (mm)	Material	Flow (L/s)	Headloss Gradient (m/m)	Headloss (Friction) (m)	Velocity (Maximum)	Hazen-William C
1945: TCC-P321	J-1201	J-1202	1.79	100	AC	4.2909	0.006	0.01	0.55	100.0
6632: TCC-P170	J-4145	Bergin/...	12.50	100	AC	-2.9809	0.003	0.04	0.38	100.0
7157: TCC-P187	J-4477	J-4478	13.00	100	AC	3.4126	0.004	0.05	0.43	100.0
7177: TCC-P188	J-1201	J-2493	13.10	100	AC	-2.5130	0.002	0.03	0.32	100.0
8731: TCC-P244	J-5419	J-5420	16.98	100	AC	-0.6143	0.000	0.00	0.08	100.0
9730: TCC-P280	J-4478	J-1201	17.53	100	AC	1.7779	0.001	0.02	0.23	100.0
9941: TCC-P288	J-6155	J-6156	17.59	100	AC	3.8232	0.005	0.09	0.49	100.0
10294: TCC-P30	J-2493	J-4477	17.65	300	AC	-52.1641	0.003	0.05	0.74	110.0
17786: TCC-P62	J-10249	J-10250	52.58	100	AC	3.3951	0.004	0.22	0.43	100.0
18728: TCC-P67	J-2492	J-6155	62.84	100	AC	5.3721	0.010	0.62	0.68	100.0
19156: TCC-P70	J-6156	J-10249	66.96	100	AC	3.6584	0.005	0.32	0.47	100.0
20960: TCC-P83	J-4145	J-5420	90.24	100	AC	1.9829	0.002	0.14	0.25	100.0
21925: TCC-P89	J-6155	J-6685	103.08	100	AC	1.3512	0.001	0.08	0.17	100.0
23366: TCC-P10	J-1202	Bergin/...	133.93	100	AC	3.9746	0.006	0.75	0.51	100.0
26334: TCC-P12	J-10249	J-10011	289.44	100	AC	-0.4353	0.000	0.03	0.06	100.0
26859: TCC-P12	J-2493	J-2656	481.66	300	DICL	39.3605	0.002	0.75	0.56	110.0
66518: TCC-P93	J-11334	J-4146	117.04	100	AC	-0.4904	0.000	0.01	0.06	100.0
66519: TCC-P93	J-4146	J-4145	4.34	100	AC	-0.4904	0.000	0.00	0.06	100.0
66520: P-1698	Bergin/...	J-11334	118.21	50	PE	0.2016	0.000	0.06	0.10	120.0

19 of 9496 elements displayed

Peak Hour Pipes Modelling Results – 6:30 pm

Bergin Rd Units - WaterCAD 10-05-25.wtg

2025 PD

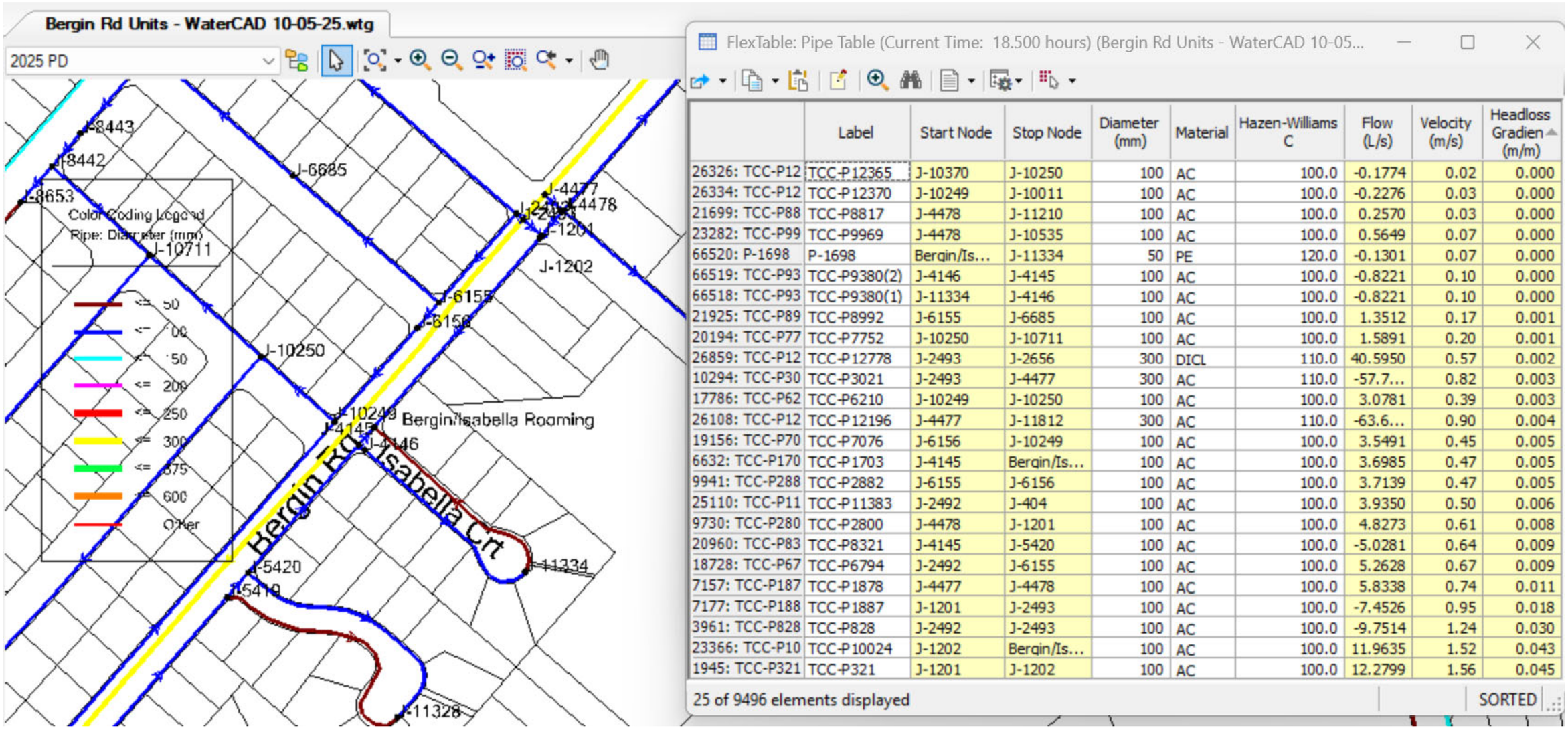


FlexTable: Junction Table (Current Time: 18.50...

	Label	Elevation (m)	Demand (L/s)	Pressure (kPa)
66517: J-4146	J-4146	11.17	0.0000	349.1
6633: J-4145	J-4145	11.13	0.5075	349.5
6634: Bergin/Is	Bergin/Isabel...	11.03	15.7921	349.9
1947: J-1202	J-1202	12.94	0.3164	387.8
1946: J-1201	J-1201	12.86	0.0000	389.5
3962: J-2492	J-2492	12.88	0.5536	390.3
7159: J-4478	J-4478	12.84	0.1845	391.1
9942: J-6155	J-6155	12.20	0.1977	391.1
7158: J-4477	J-4477	12.94	0.0000	391.5
3963: J-2493	J-2493	12.86	0.0000	391.8
9943: J-6156	J-6156	11.94	0.1648	392.8
17788: J-10250	J-10250	11.09	1.3116	396.3
17787: J-10249	J-10249	11.03	0.6986	398.7
21700: J-11210	J-11210	11.13	0.2570	407.8

14 of 6961 elements displayed | SORTED

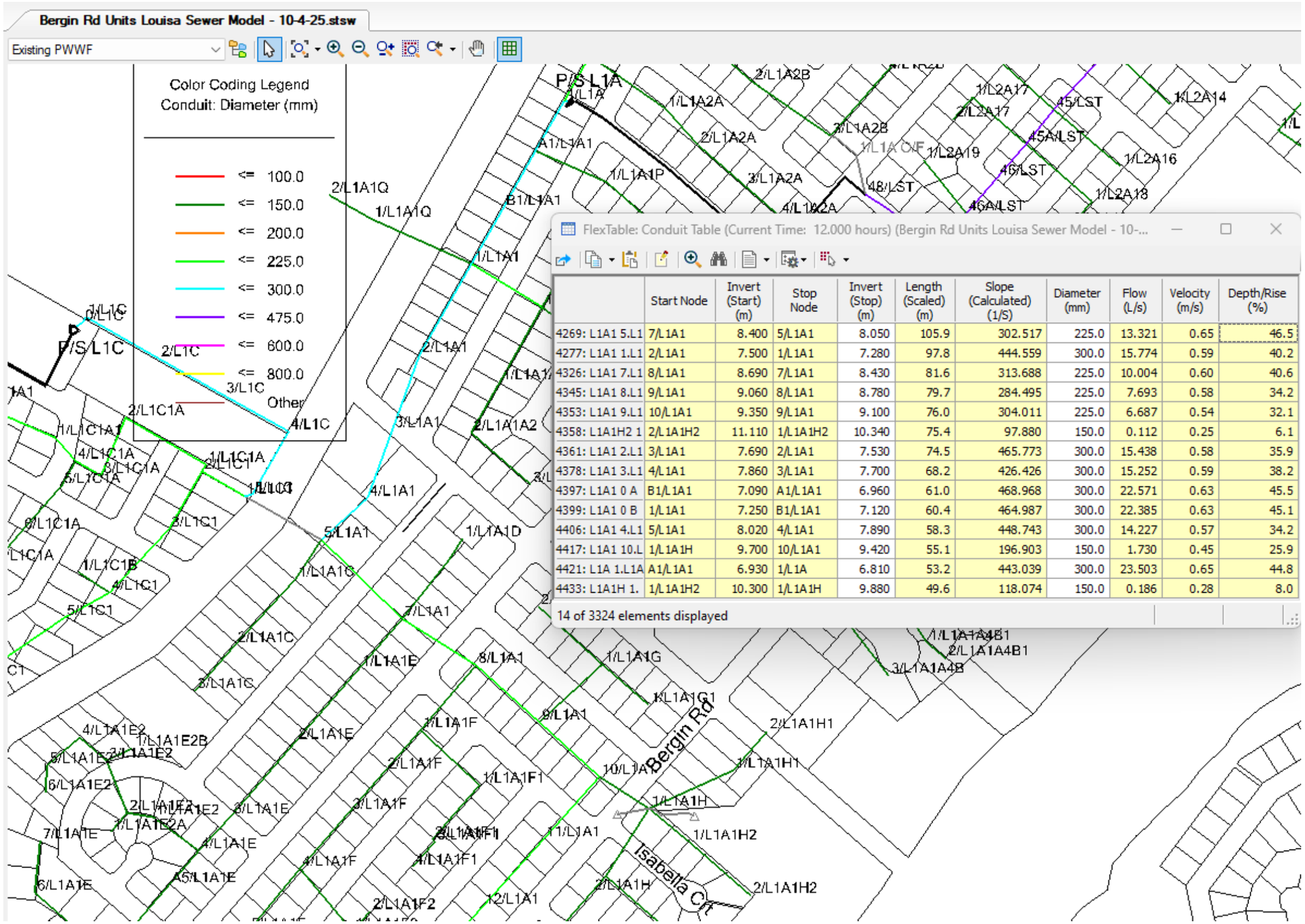
Peak Hour Node + 15 l/s Fire Flow Results – 6:30 pm



	Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Flow (L/s)	Velocity (m/s)	Headloss Gradien (m/m)
26326: TCC-P12	TCC-P12365	J-10370	J-10250	100	AC	100.0	-0.1774	0.02	0.000
26334: TCC-P12	TCC-P12370	J-10249	J-10011	100	AC	100.0	-0.2276	0.03	0.000
21699: TCC-P88	TCC-P8817	J-4478	J-11210	100	AC	100.0	0.2570	0.03	0.000
23282: TCC-P99	TCC-P9969	J-4478	J-10535	100	AC	100.0	0.5649	0.07	0.000
66520: P-1698	P-1698	Bergin/Is...	J-11334	50	PE	120.0	-0.1301	0.07	0.000
66519: TCC-P93	TCC-P9380(2)	J-4146	J-4145	100	AC	100.0	-0.8221	0.10	0.000
66518: TCC-P93	TCC-P9380(1)	J-11334	J-4146	100	AC	100.0	-0.8221	0.10	0.000
21925: TCC-P89	TCC-P8992	J-6155	J-6685	100	AC	100.0	1.3512	0.17	0.001
20194: TCC-P77	TCC-P7752	J-10250	J-10711	100	AC	100.0	1.5891	0.20	0.001
26859: TCC-P12	TCC-P12778	J-2493	J-2656	300	DICL	110.0	40.5950	0.57	0.002
10294: TCC-P30	TCC-P3021	J-2493	J-4477	300	AC	110.0	-57.7...	0.82	0.003
17786: TCC-P62	TCC-P6210	J-10249	J-10250	100	AC	100.0	3.0781	0.39	0.003
26108: TCC-P12	TCC-P12196	J-4477	J-11812	300	AC	110.0	-63.6...	0.90	0.004
19156: TCC-P70	TCC-P7076	J-6156	J-10249	100	AC	100.0	3.5491	0.45	0.005
6632: TCC-P170	TCC-P1703	J-4145	Bergin/Is...	100	AC	100.0	3.6985	0.47	0.005
9941: TCC-P288	TCC-P2882	J-6155	J-6156	100	AC	100.0	3.7139	0.47	0.005
25110: TCC-P11	TCC-P11383	J-2492	J-404	100	AC	100.0	3.9350	0.50	0.006
9730: TCC-P280	TCC-P2800	J-4478	J-1201	100	AC	100.0	4.8273	0.61	0.008
20960: TCC-P83	TCC-P8321	J-4145	J-5420	100	AC	100.0	-5.0281	0.64	0.009
18728: TCC-P67	TCC-P6794	J-2492	J-6155	100	AC	100.0	5.2628	0.67	0.009
7157: TCC-P187	TCC-P1878	J-4477	J-4478	100	AC	100.0	5.8338	0.74	0.011
7177: TCC-P188	TCC-P1887	J-1201	J-2493	100	AC	100.0	-7.4526	0.95	0.018
3961: TCC-P828	TCC-P828	J-2492	J-2493	100	AC	100.0	-9.7514	1.24	0.030
23366: TCC-P10	TCC-P10024	J-1202	Bergin/Is...	100	AC	100.0	11.9635	1.52	0.043
1945: TCC-P321	TCC-P321	J-1201	J-1202	100	AC	100.0	12.2799	1.56	0.045

Peak Hour Pipes + 15 l/s Fire Flow Modelling Results – 6:30 pm

APPENDIX C
SEWERGEMS MODELLING RESULTS & FIGURES



	Start Node	Invert (Start) (m)	Stop Node	Invert (Stop) (m)	Length (Scaled) (m)	Slope (Calculated) (1/S)	Diameter (mm)	Flow (L/s)	Velocity (m/s)	Depth/Rise (%)
4269: L1A1 5.L1	7/L1A1	8.400	5/L1A1	8.050	105.9	302.517	225.0	13.321	0.65	46.5
4277: L1A1 1.L1	2/L1A1	7.500	1/L1A1	7.280	97.8	444.559	300.0	15.774	0.59	40.2
4326: L1A1 7.L1	8/L1A1	8.690	7/L1A1	8.430	81.6	313.688	225.0	10.004	0.60	40.6
4345: L1A1 8.L1	9/L1A1	9.060	8/L1A1	8.780	79.7	284.495	225.0	7.693	0.58	34.2
4353: L1A1 9.L1	10/L1A1	9.350	9/L1A1	9.100	76.0	304.011	225.0	6.687	0.54	32.1
4358: L1A1H2 1	2/L1A1H2	11.110	1/L1A1H2	10.340	75.4	97.880	150.0	0.112	0.25	6.1
4361: L1A1 2.L1	3/L1A1	7.690	2/L1A1	7.530	74.5	465.773	300.0	15.438	0.58	35.9
4378: L1A1 3.L1	4/L1A1	7.860	3/L1A1	7.700	68.2	426.426	300.0	15.252	0.59	38.2
4397: L1A1 0 A	B1/L1A1	7.090	A1/L1A1	6.960	61.0	468.968	300.0	22.571	0.63	45.5
4399: L1A1 0 B	1/L1A1	7.250	B1/L1A1	7.120	60.4	464.987	300.0	22.385	0.63	45.1
4406: L1A1 4.L1	5/L1A1	8.020	4/L1A1	7.890	58.3	448.743	300.0	14.227	0.57	34.2
4417: L1A1 10.L	1/L1A1H	9.700	10/L1A1	9.420	55.1	196.903	150.0	1.730	0.45	25.9
4421: L1A 1.L1A	A1/L1A1	6.930	1/L1A	6.810	53.2	443.039	300.0	23.503	0.65	44.8
4433: L1A1H 1.	1/L1A1H2	10.300	1/L1A1H	9.880	49.6	118.074	150.0	0.186	0.28	8.0

PWWF Sewer Capacity Assessment Results