APPENDIX D

Water and Sewer Infrastructure Report prepared by DPM Water

344/346 & 350 ROSS RIVER RD, CRANBROOK UNIT DEVELOPMENT

WATER SUPPLY & SEWERAGE PLANNING REPORT

Date: 10 October 2025
(Revision A)

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APPENDICES

REPORT AUTHORISATION				
Revision	**Revision Date**	**Details**	**Prepared by**	**Signature**
A	10/10/2025	Original Report	Desmond Moseley (RPEQ 7565)	

1 INTRODUCTION

A residential unit development is proposed at 344/346 & 350 Ross River Rd, Cranbrook. This site is located on the south-west corner of the Nathan St and Ross River Rd intersection. The proposed development will have a total of 81 residential units. The site is illustrated on the extract from the Townsville Council GIS below.

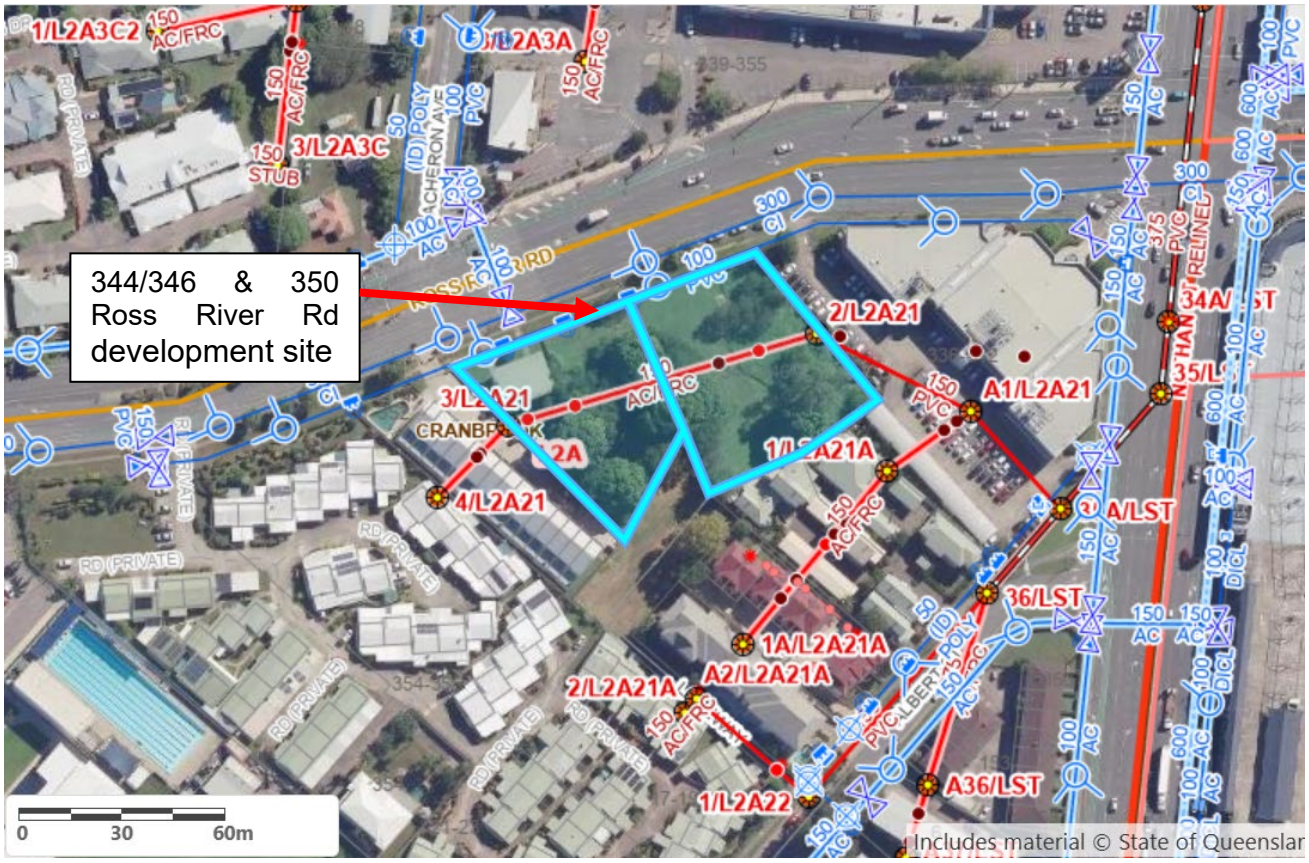

Figure 1.1 – Development Site Location

The residential unit development is proposed to have two building, both of which are to be 5 levels. The ground level is to be car parking with levels 1 to 4 being a combination of 1, 2 & 3 bedroom units. There is expected to be a total of 81 units. Figure 1.2 below illustrates the proposed layout of Level 1 to 3 of the development. The development plans are provided in Appendix A.

To ensure the residential unit 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 water network modelling shows the existing DN100 PVC water main along the southern side of Ross River Rd and the frontage of the development site is adequately sized to service the development. This water main is connected to the existing DN300 CI trunk water main on Ross River Rd and an existing DN150 AC water main on Nathan St.
- There is an existing DN150 gravity sewer that traverses the development site. The sewer is located under the proposed residential units. The developer has proposed to replace and divert the existing DN150 sewer with a DN225 sewer. The sewer replacement/diversion plan is provided in Appendix C.
- The SewerGEMS network modelling illustrates that the proposed diversion sewer has sufficient capacity to service the development.

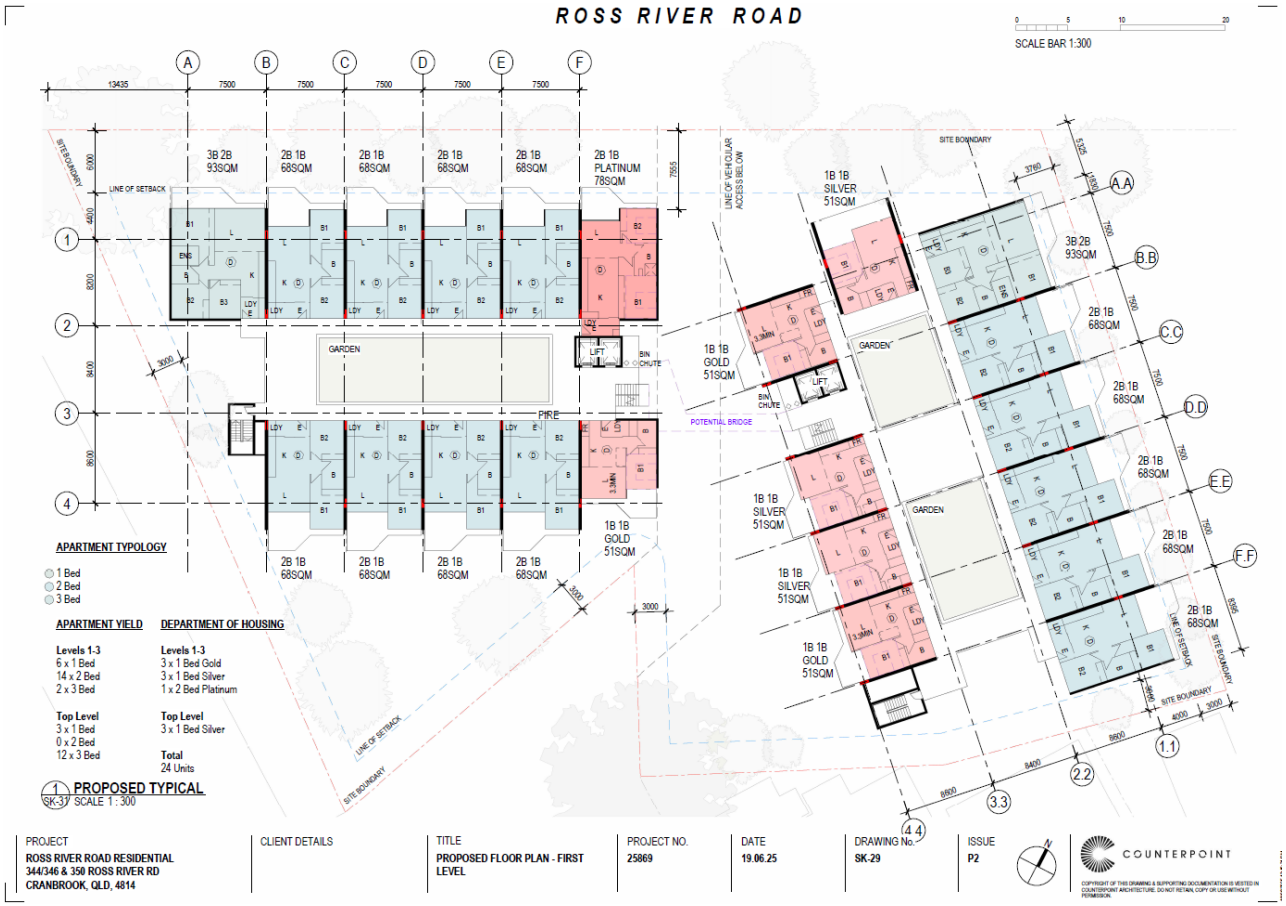

Figure 1.2 – Development Layout Plan (Level 1 to 3)

The water network modelling and sewer system capacity assessment undertaken for the proposed residential unit development is summarised in the following report sections.

2 POPULATION ASSESSMENT

The following section provides the equivalent population assessment for the proposed units development on 344/346 & 350 Ross River Rd. Two methods have been undertaken to determine the equivalent population for the proposed development. These methods are summarised in Table 2.1 and Table 2.2.

The equivalent population in Table 2.1 is based on applying a loading rate of 1.8 EP for the single bedroom units and a loading rate of 2.8 EP for the two & three bedroom units. This is an upper/conservative estimate of the equivalent population.

Table 2.1 – Water & Sewer Equivalent Population Assessment

Unit Type	Number	Rate	EP
1 Bed Unit	21	1.8	37.8 EP
2 Bed Unit	42	2.8	117.6 EP
3 Bed Unit	18	2.8	50.4 EP
Total			205.8 EP

The equivalent population in Table 2.2 below is based on applying 1.0 EP per room.

Table 2.2 – Water & Sewer Equivalent Population Assessment

Unit Type	Number	Rate	EP
1 Bed Unit	21	1.0	21 EP
2 Bed Unit	42	2.0	84 EP
3 Bed Unit	18	3.0	54 EP
Total			159 EP

The above assessment shows that a higher equivalent population is produced by applying the 1.8 EP for the single bedroom units and a loading rate of 2.8 EP for the two & three bedroom units. This higher equivalent population has been used for the water & sewer capacity assessment to ensure the existing network is able to service the proposed development.

3 WATER SUPPLY PLANNING

3.1 Water Demand

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

Table 3.1 - 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)	0.033 L/s/EP	2.56 PD

The peak hour residential water demands have been applied to the proposed unit development, giving a peak water demand of 205.8 EP x 0.033 l/s/EP = 6.9 l/s.

In addition to the above, as the development is multi-story residential, a 30 l/s “Commercial” fire flow is considered 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 2 x multi-story residential unit development buildings is on the south-west corner of the Nathan St and Ross River Rd intersection in Cranbrook. The existing water infrastructure that services the site includes:

- A 100 PVC water main along the southern footpath of Ross River Rd. This is along the frontage of the proposed development. The existing DN100 PVC water main extends to the intersection of Nathan St where it connects to a DN150 AC water main that runs along Nathan St.
- The other end of the DN100 PVC on Ross River Rd connects to the DN300 CI trunk water main that runs along the southern side of Ross River Rd.

- The existing DN300 CI and DN150 AC water mains connect to the existing DN600 AC trunk water main that is located on the eastern side of Nathan St. This DN600 AC trunk water main continues to the south along Nathan St.
- The DN600 AC trunk water main is supplied water from the 2 x 40 ML Douglas 1A/1B reservoirs.

The following extract from the Council GIS illustrates the existing water infrastructure that services the Ross River Rd and Nathan St area of 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 WaterGEMS network modelling results with the inclusion of the water demands from the proposed development shows:

- The existing DN100 PVC water main along Ross River Rd frontage of the development site 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 403 kPa. This meets the minimum pressure requirement of 220 kPa.
- The velocity along the DN100 PVC water main for peak hour demands is up to 0.79 m/s. This achieves the CTM Code standard of being less than 2.5 m/s. The headloss gradient along the existing DN100 PVC water main is up to 0.009 m/m. This exceeds the recommended headloss gradient of 0.005 m/m but since this is an existing water main that only services a couple of properties and has low velocities this is considered acceptable.

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Version: 1, Version Date: 28/10/2025

- With the inclusion of the 30 l/s “Commercial” fire flow the water pressures are reduced to 337 kPa within the water main. This is the pressure at 6:30 pm and is concurrent with the peak residential demand period and meets the minimum pressure requirement of 120 kPa.
- The velocity along the DN100 PVC reticulation main on the Ross River Rd frontage of the development site with the including of the 30 l/s commercial fire flow is up to 2.4 m/s. This velocity is well within the CTM Code standard of a maximum of 4.0 m/s for fire flows.
- 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 residential unit development site.

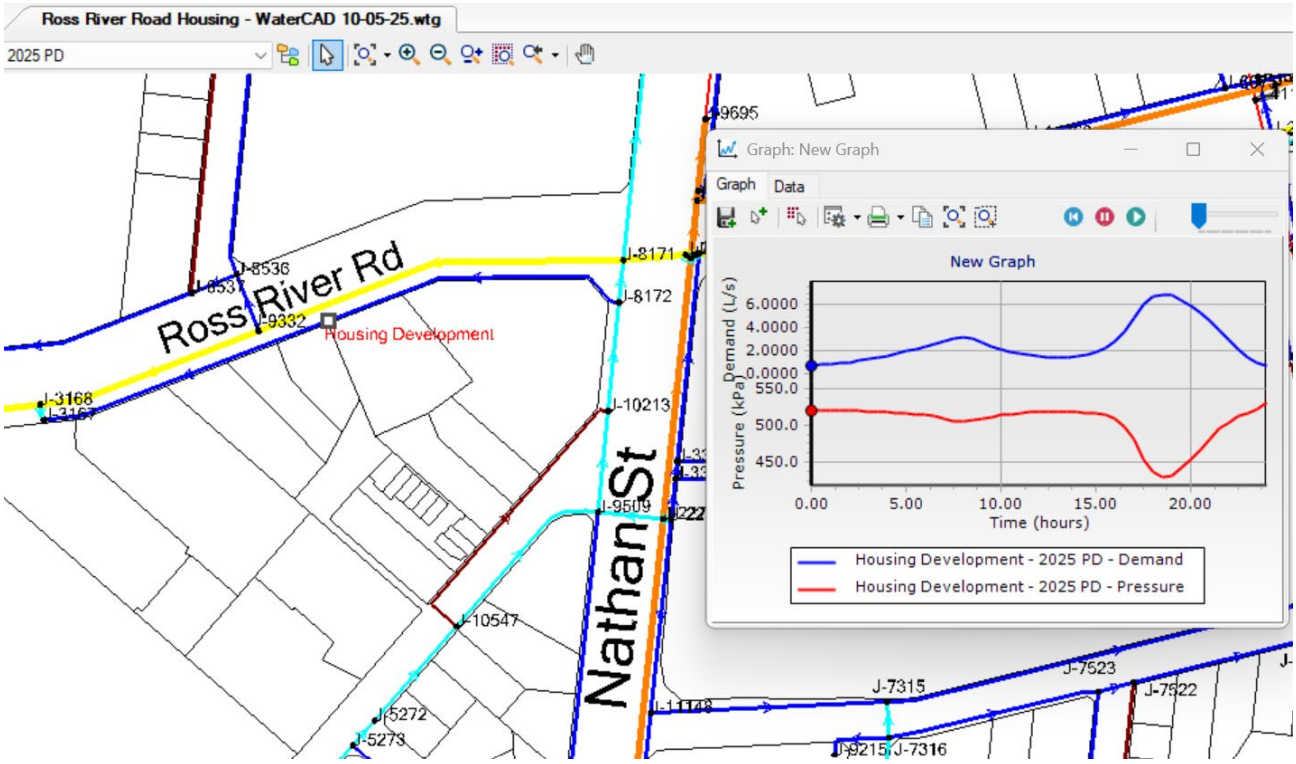


Figure 3.2 – Peak Hour Water Demand & Pressures

The following figure illustrates the water pressure at the development site with the inclusion of the 30 l/s “Commercial” fire flows.

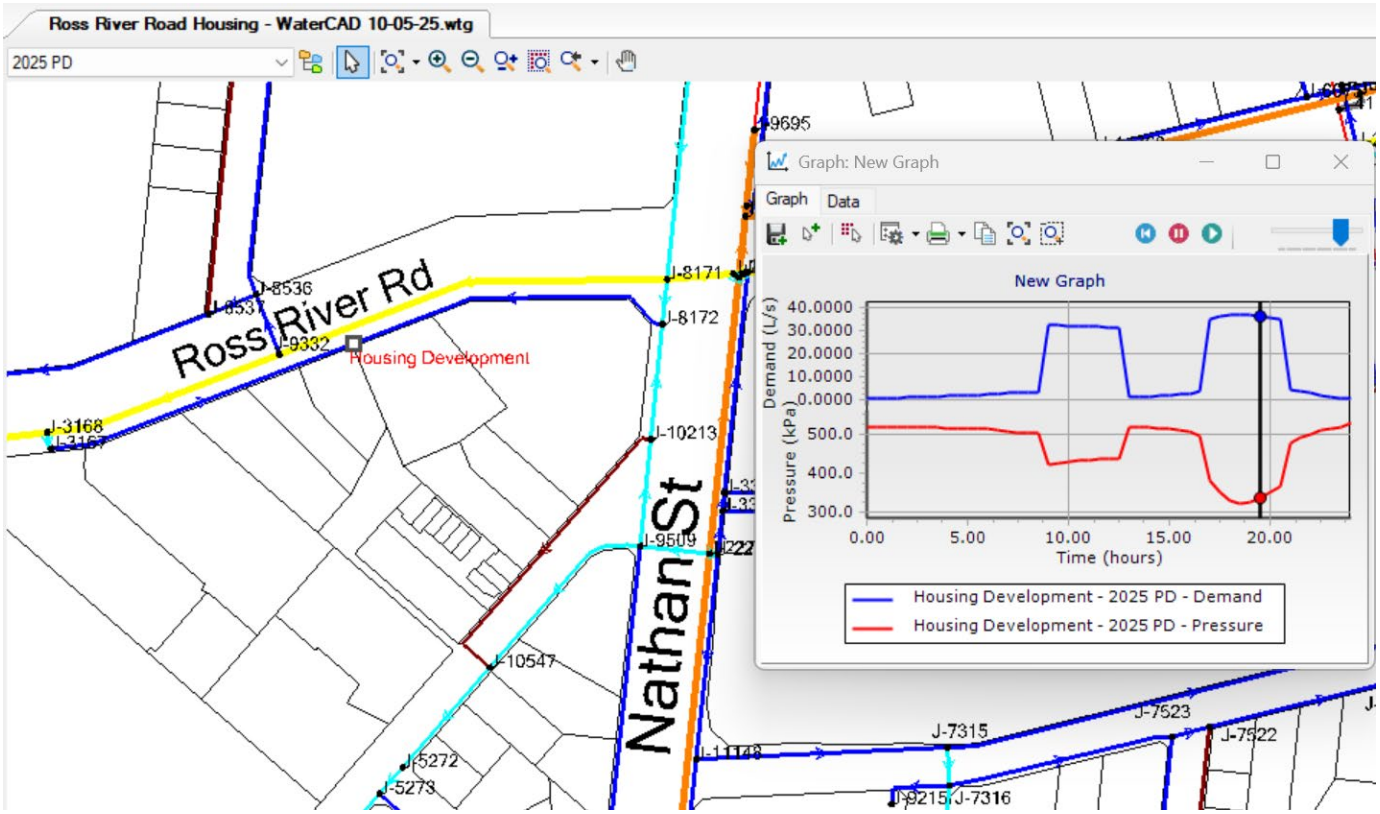


Figure 3.3 – 30 l/s Commercial Fire Flow Water Demand & Pressures

It is understood that due to the size of the proposed residential unit development a fire tank and booster pump system may be required to meet the requirements of the Building Code. The building code and fire assessment for the development is being undertaken separately and will detail the specific fire system requirements for the development.

4 SEWAGE SYSTEM PLANNING

The existing site for the proposed residential unit development currently has a DN150 gravity sewer running underneath the location for the proposed buildings. Works are proposed to build a replacement and diverted gravity sewer through the development site.

The following is the existing sewer infrastructure that services the developments area:

- An existing DN150 sewer runs from MH 4/L2A21 to the east and south to connect to existing MH 35A/LST. This existing gravity sewer traverses the development site between MH 3/L2A21 and MH 2/L2A21.
- The existing DN375 sewer from MH 35A/LST is located near the intersection of Albert St and Nathan St. The DN375 trunk sewer continues to the north along Nathan St with it increasing in size to become a DN750 sewer before discharging into PS L14A (Mather St).

Figure 4.1 below is a plot from the Council GIS that illustrates the existing DN150 reticulation sewer and DN375 trunk sewer system that services the development site.

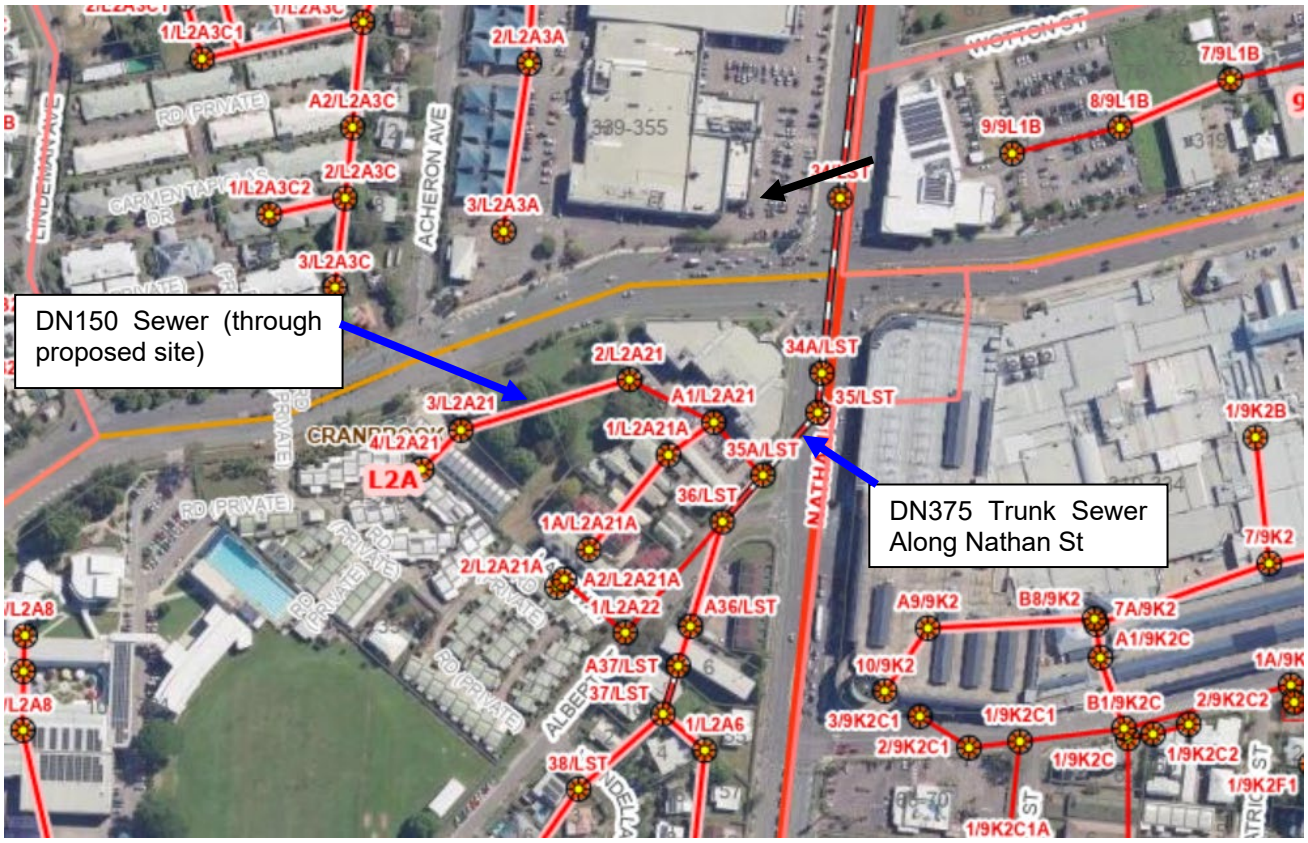


Figure 4.1 – GIS Plot of Existing Sewer System

The existing DN150 AC gravity sewer that is located through the development site is from MH 3/L2A21 and MH 2/L2A21. This is an old DN150 AC sewer so TCC will not allow a high rise building to be constructed over it. The developer is proposing the following sewer upgrade/diversion works:

- A new DN225 PVC sewer to be constructed on the same alignment as the existing DN150 sewer from MH 3/L2A21 to the east. This section of proposed replacement sewer will be around 50m long. This section of replacement sewer will be located under one of the proposed buildings.
- A new maintenance hole will be constructed on the DN225 sewer line. This MH will be located between the two proposed residential unit buildings.
- The DN225 diversion sewer will then extend to the north east and onto the eastern boundary of the development site to a new MH. The final section of diversion DN225 sewer will then extend to the south (along the eastern boundary of the development site) to existing MH 2/L2A21.
- This proposed DN225 replacement and diverted sewer line will be graded at around 1 in 250. This grade meets the CTM Code standards for DN225 sewers (minimum grade of 1 in 290) and is required to allow for the longer length of the replacement and diverted sewer to be constructed from MH 3/L2A21 and MH 2/L2A21.

A screenshot of the DN225 sewer replacement and diversion works is shown on Figure 4.2 below. The preliminary diversion sewer drawing is provided in Appendix C.

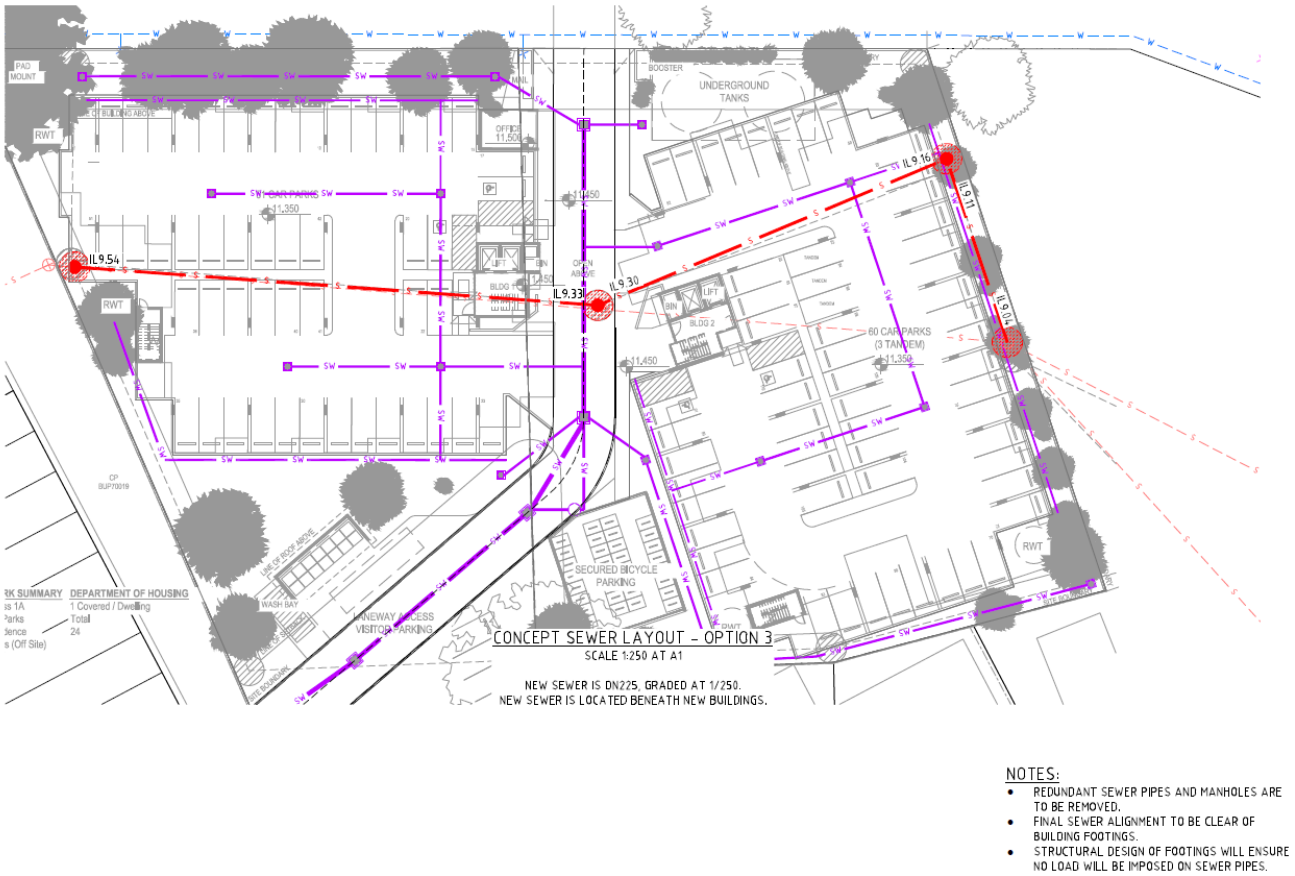


Figure 4.2 – Proposed DN225 Diversion Sewer

The capacity and performance of the existing gravity sewer system and the proposed replacement and diverted DN225 sewer is provided in the following section.

4.1 Sewage Infrastructure Capacity

The capacity of the existing gravity sewer system and the proposed DN225 sewer diversion/replacement works to cater for the proposed residential unit 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 PS L14A (Woolcock St). The additional residential equivalent population has been added to the future proposed sewer MH (being MH 5/L2A21 in the SewerGEMS model) that will be located along the proposed DN225 diversion sewer through the development site.

Figure 4.3 below illustrates the additional equivalent population loading onto the proposed DN225 diversion sewer through the development site.

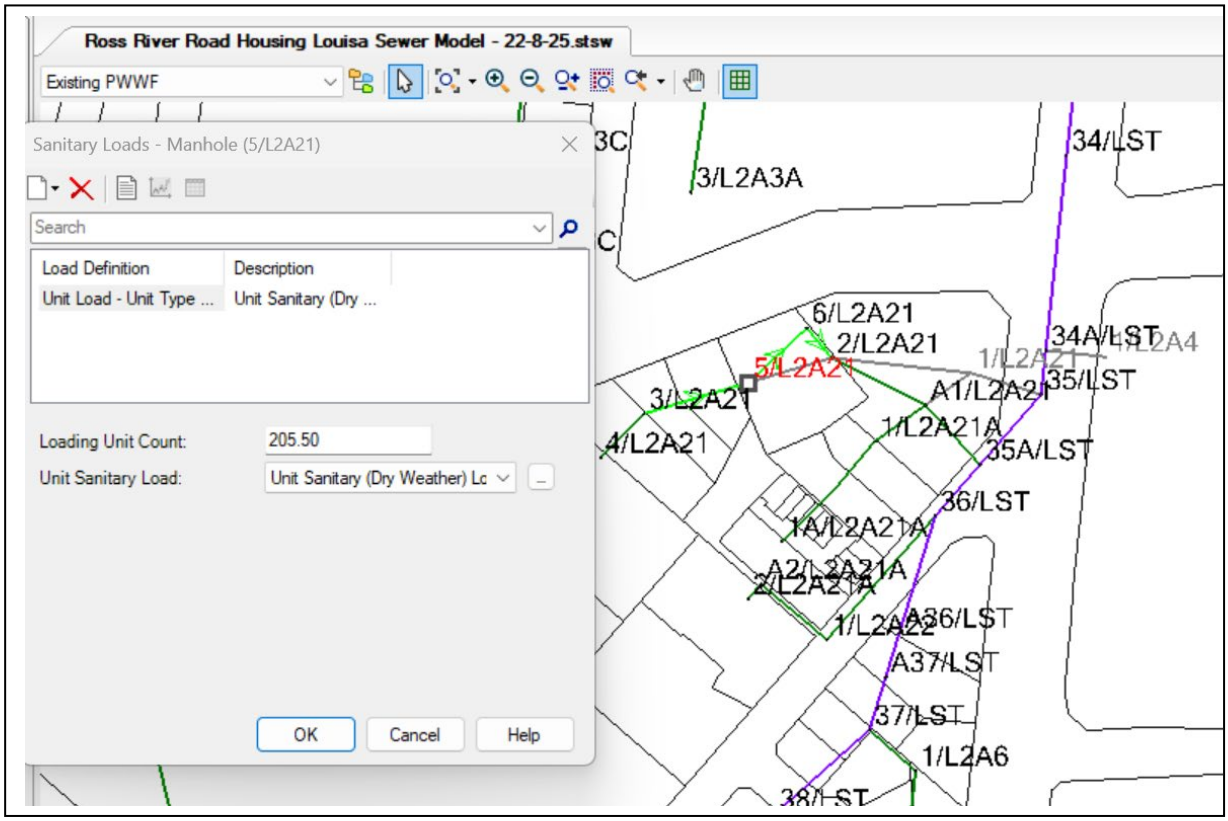
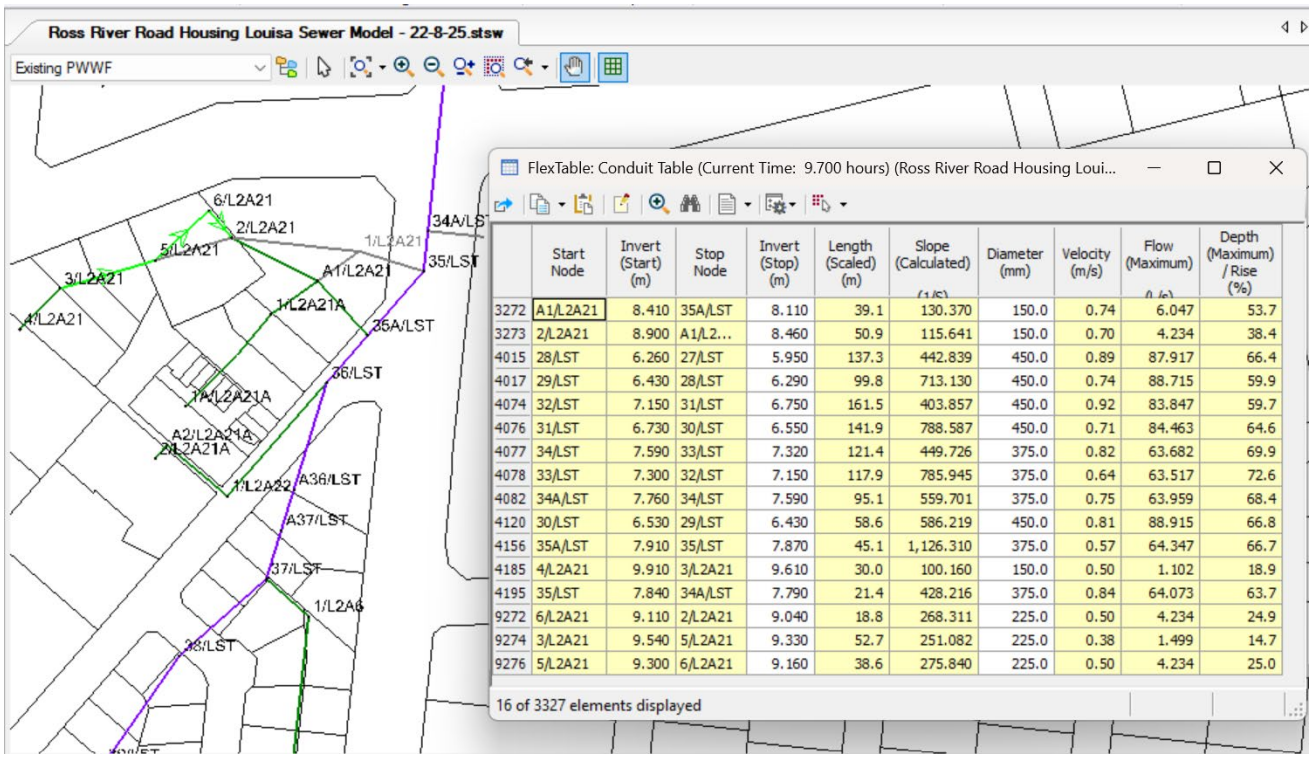


Figure 4.3 – Additional Residential Loading on Proposed MH 5/L2A21

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

- The existing sections of DN150 AC sewer from MH 2/L2A21 to MH 35A/LST flows up to 54% full for the peak wet weather flows with the inclusion of the additional residential unit development EP.
- The proposed DN225 replacement and diversion gravity sewer through the development site (from MH 3/L2A21 to MH 2/L2A21) flows up to 25% full for the peak wet weather flows.
- The existing and proposed replacement/diversion DN150 and DN225 reticulation gravity sewers therefore flow less than the CTM Code requirement of 75% full for peak wet weather flows.
- The existing DN375 AC and DN450 AC sewer from MH 35A/LST to the north along Nathan St flows up to 73% full for the 5 x ADWF flows. It is noted that during large wet weather events this trunk gravity sewer has some capacity issues which is understood to be due to excessive infiltration and inflow into the sewer system in excess of 5 x ADWF. It is understood that TCC is investigating the source of the I/I and has future trunk sewer infrastructure strategies to improve the capacity and performance of the existing trunk gravity sewer system. The SewerGEMS network modelling however shows that the existing trunk gravity sewer system has sufficient capacity for the 5 x ADWF flows.
- All the existing sewers flow less than 75% full for the 5 x ADWF flows so meets the requirements of the CTM code.

The following Figure 4.4 provides the flows and performance of the existing gravity sewer system with the inclusion of the additional loading from the proposed 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)	Diameter (mm)	Velocity (m/s)	Flow (Maximum)	Depth (Maximum) / Rise (%)
3272	A1/L2A21	8.410	35A/LST	8.110	39.1	130.370	150.0	0.74	6.047	53.7
3273	2/L2A21	8.900	A1/L2...	8.460	50.9	115.641	150.0	0.70	4.234	38.4
4015	28/LST	6.260	27/LST	5.950	137.3	442.839	450.0	0.89	87.917	66.4
4017	29/LST	6.430	28/LST	6.290	99.8	713.130	450.0	0.74	88.715	59.9
4074	32/LST	7.150	31/LST	6.750	161.5	403.857	450.0	0.92	83.847	59.7
4076	31/LST	6.730	30/LST	6.550	141.9	788.587	450.0	0.71	84.463	64.6
4077	34/LST	7.590	33/LST	7.320	121.4	449.726	375.0	0.82	63.682	69.9
4078	33/LST	7.300	32/LST	7.150	117.9	785.945	375.0	0.64	63.517	72.6
4082	34A/LST	7.760	34/LST	7.590	95.1	559.701	375.0	0.75	63.959	68.4
4120	30/LST	6.530	29/LST	6.430	58.6	586.219	450.0	0.81	88.915	66.8
4156	35A/LST	7.910	35/LST	7.870	45.1	1,126.310	375.0	0.57	64.347	66.7
4185	4/L2A21	9.910	3/L2A21	9.610	30.0	100.160	150.0	0.50	1.102	18.9
4195	35/LST	7.840	34A/LST	7.790	21.4	428.216	375.0	0.84	64.073	63.7
9272	6/L2A21	9.110	2/L2A21	9.040	18.8	268.311	225.0	0.50	4.234	24.9
9274	3/L2A21	9.540	5/L2A21	9.330	52.7	251.082	225.0	0.38	1.499	14.7
9276	5/L2A21	9.300	6/L2A21	9.160	38.6	275.840	225.0	0.50	4.234	25.0

Figure 4.4 – SewerGEMS Modelling Results

The above assessment illustrates the existing gravity sewer system, including the proposed DN225 replacement/diversion sewer has sufficient capacity to cater for the proposed residential unit development at 344/346 & 350 Ross River Rd, Cranbrook.

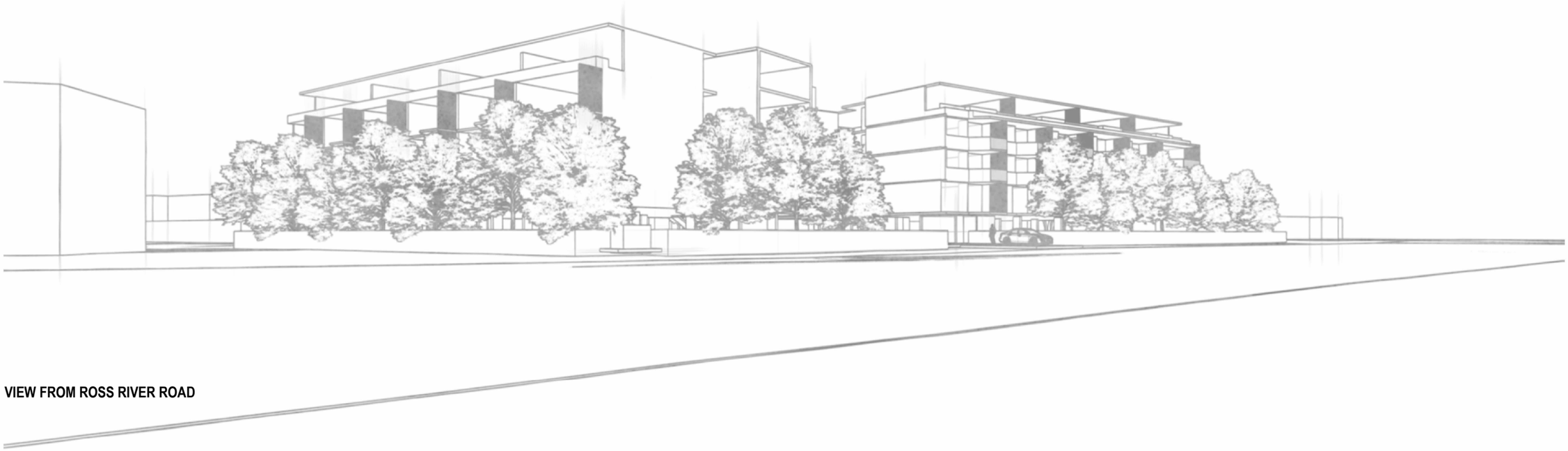
APPENDIX A
RESIDENTIAL ROOMING DEVELOPMENT PLANS

COUNTERPOINT

ROSS RIVER ROAD RESIDENTIAL

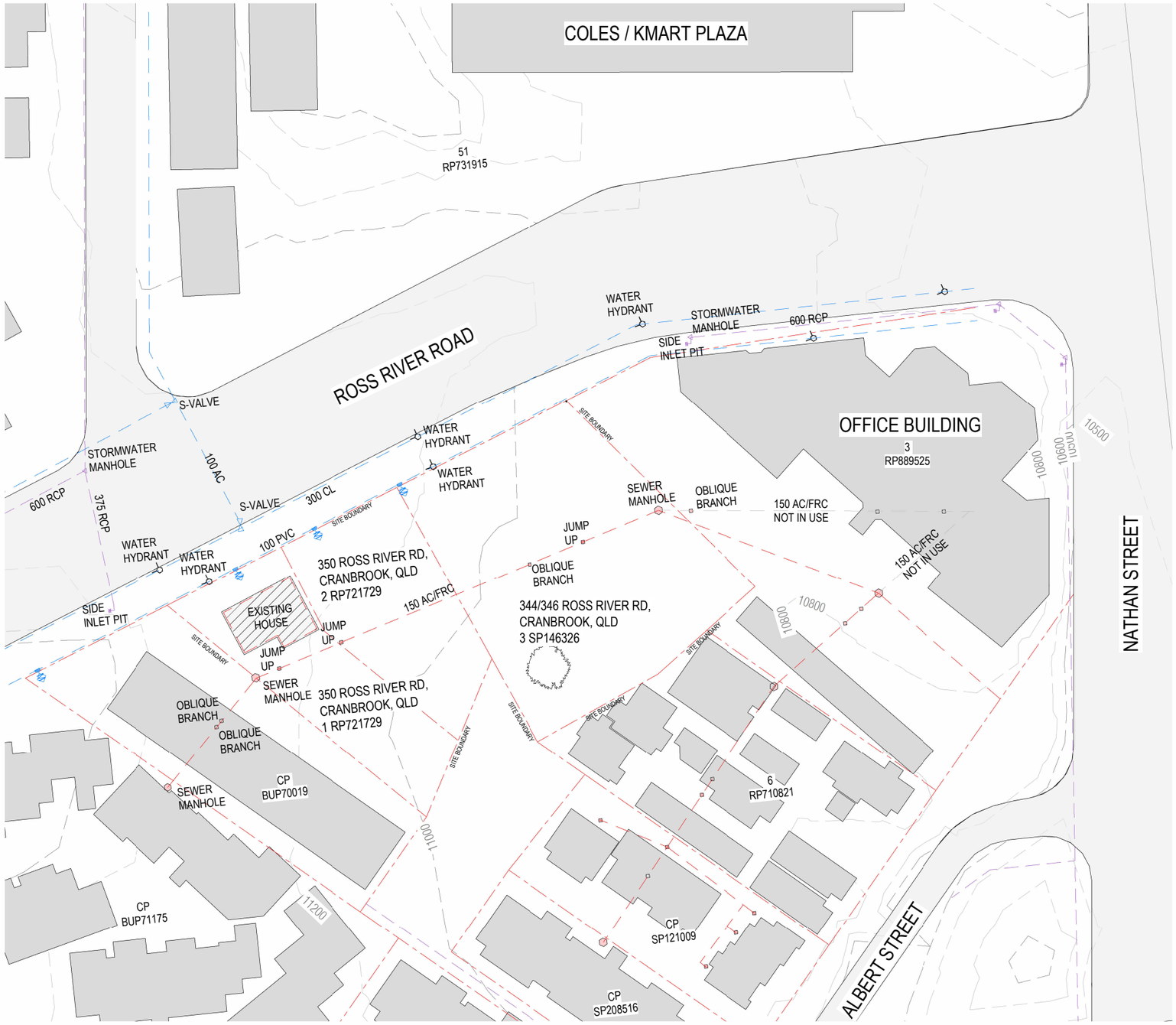
344/346 & 350 ROSS RIVER RD
CRANBROOK, QLD, 4814

	REV	
SK-00	P2	COVER SHEET
SK-10	P2	EXISTING SITE PLAN
SK-12	P2	EXISTING - DIAGRAM - FLOODING & VEGETATION
SK-20	P2	PROPOSED SITE PLAN
SK-21	P2	PROPOSED FLOOR PLAN - GROUND
SK-29	P2	PROPOSED FLOOR PLAN - FIRST LEVEL
SK-30	P2	PROPOSED FLOOR PLAN - LEVEL 4



VIEW FROM ROSS RIVER ROAD

COUNTERPOINT ARCHITECTURE 487 FLINDERS STREET, TOWNSVILLE PO BOX 1604 Townsville QLD 4810 P: (07) 4724 0990 E: ADMIN@CPOINT.COM.AU



1 **EXISTING SITE PLAN**
SK-31 SCALE 1 : 1000

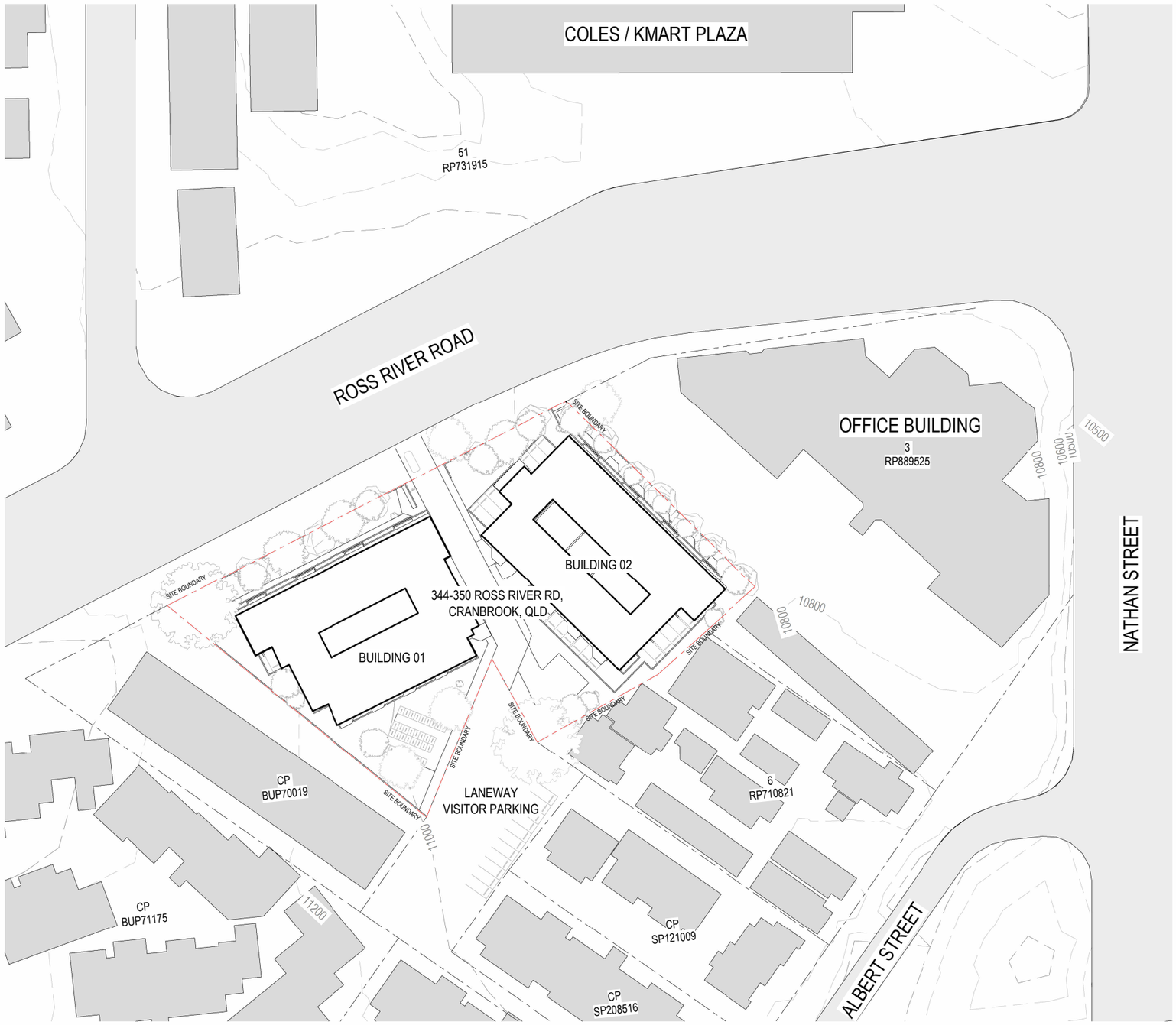
NOTE:
LOCATION OF LEVELS, BOUNDARIES, SERVICES TO BE CONFIRMED BY SURVEYOR

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL **344/346 & 350 ROSS RIVER RD** **CRANBROOK, QLD, 4814**		**EXISTING SITE PLAN**	**25869**	**19.06.25**	**SK-10**	**P2**

N

COUNTERPOINT

19/06/2025 12:46:08 PM



1 **PROPOSED SITE PLAN**
SK-31 SCALE 1 : 1000

NOTE:
LOCATION OF LEVELS, BOUNDARIES, SERVICES TO BE CONFIRMED BY SURVEYOR

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL **344/346 & 350 ROSS RIVER RD** **CRANBROOK, QLD, 4814**		**PROPOSED SITE PLAN**	**25869**	**19.06.25**	**SK-20**	**P2**

N

COUNTERPOINT

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ROSS RIVER ROAD

SCALE BAR 1:300

CAR PARK SUMMARY	DEPARTMENT OF HOUSING
User Class 1A	1 Covered / Dwelling
126 Car Parks	Total
111 Residence	24
16 Visitors (Off Site)	

1 PROPOSED GROUND PLAN

SK-31 SCALE 1 : 300

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL **344/346 & 350 ROSS RIVER RD** **CRANBROOK, QLD, 4814**		**PROPOSED FLOOR PLAN - GROUND**	**25869**	**19.06.25**	**SK-21**	**P2**

COUNTERPOINT

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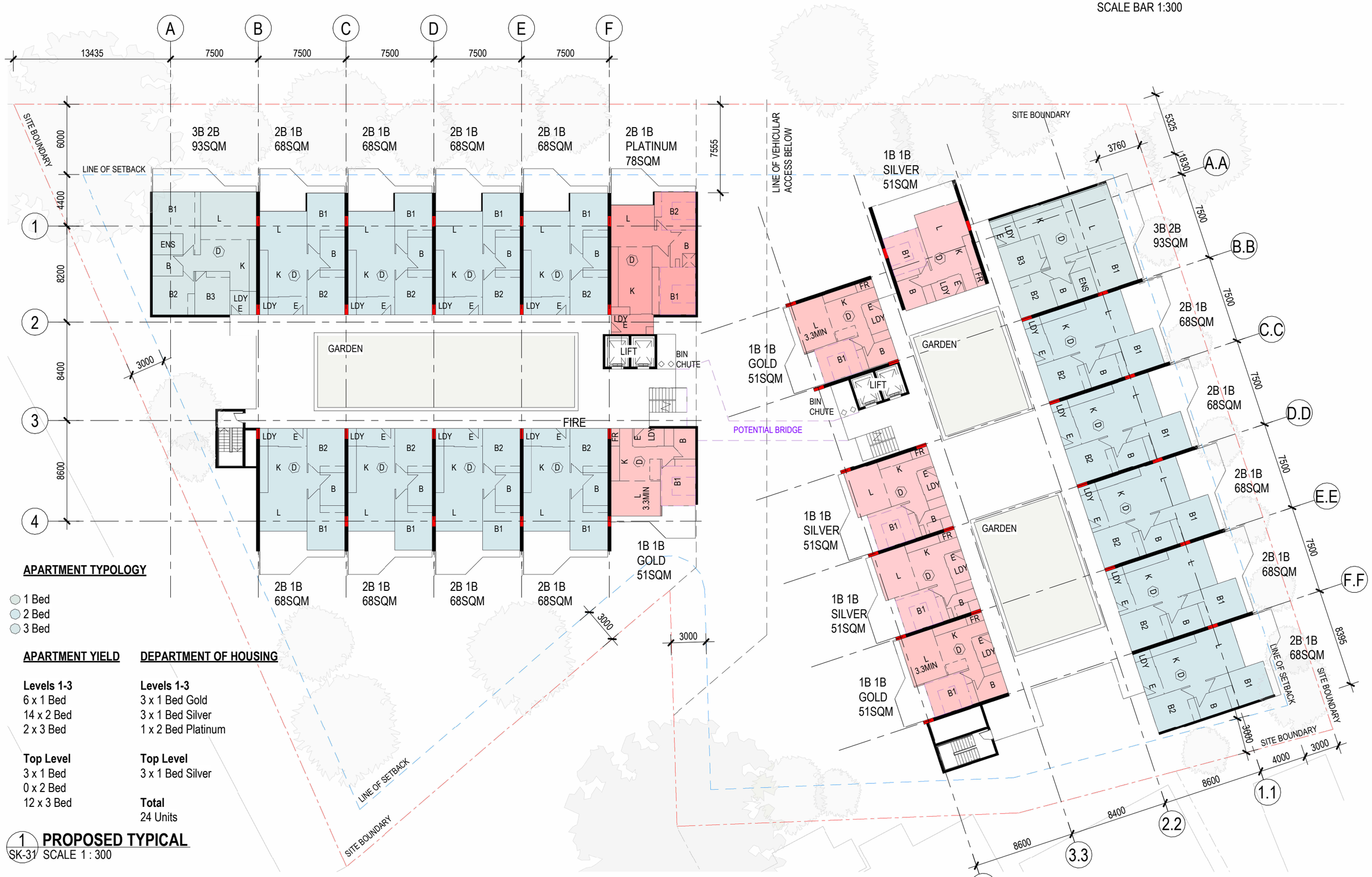
ROSS RIVER ROAD

SCALE BAR 1:300



APARTMENT TYPOLOGY

- 1 Bed
- 2 Bed
- 3 Bed

APARTMENT YIELD

Levels 1-3
6 x 1 Bed
14 x 2 Bed
2 x 3 Bed

Top Level
3 x 1 Bed
0 x 2 Bed
12 x 3 Bed

DEPARTMENT OF HOUSING

Levels 1-3
3 x 1 Bed Gold
3 x 1 Bed Silver
1 x 2 Bed Platinum

Top Level
3 x 1 Bed Silver

Total
24 Units

1 PROPOSED TYPICAL

SK-31 SCALE 1 : 300

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL **344/346 & 350 ROSS RIVER RD** **CRANBROOK, QLD, 4814**		**PROPOSED FLOOR PLAN - FIRST LEVEL**	**25869**	**19.06.25**	**SK-29**	**P2**

COUNTERPOINT

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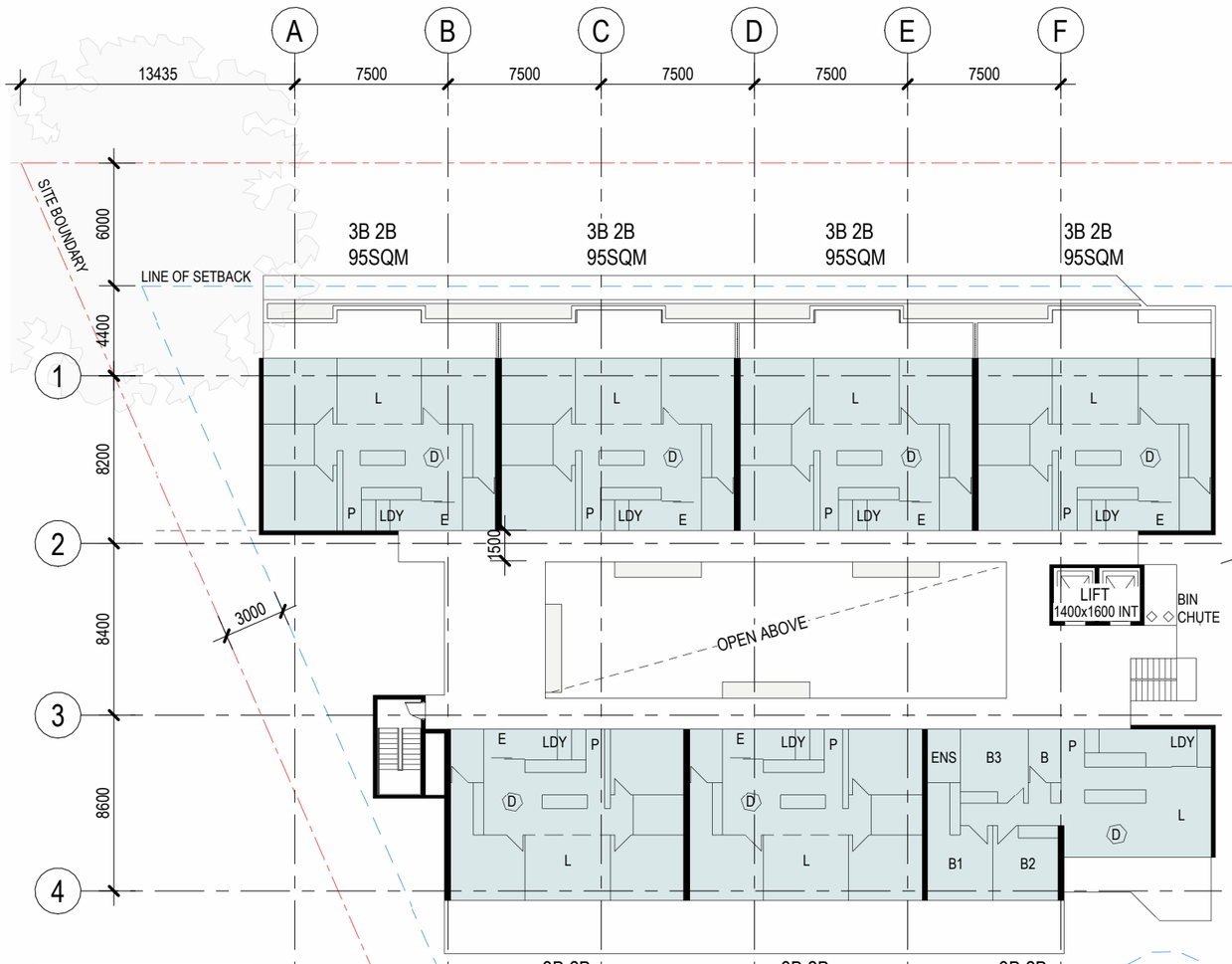
ROSS RIVER ROAD

SCALE BAR 1:300



APARTMENT TYPOLOGY

- 1 Bed
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APARTMENT YIELD

Levels 1-3
6 x 1 Bed
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Top Level
3 x 1 Bed
0 x 2 Bed
12 x 3 Bed

DEPARTMENT OF HOUSING

Levels 1-3
3 x 1 Bed Gold
3 x 1 Bed Silver
1 x 2 Bed Platinum

Top Level
3 x 1 Bed Silver

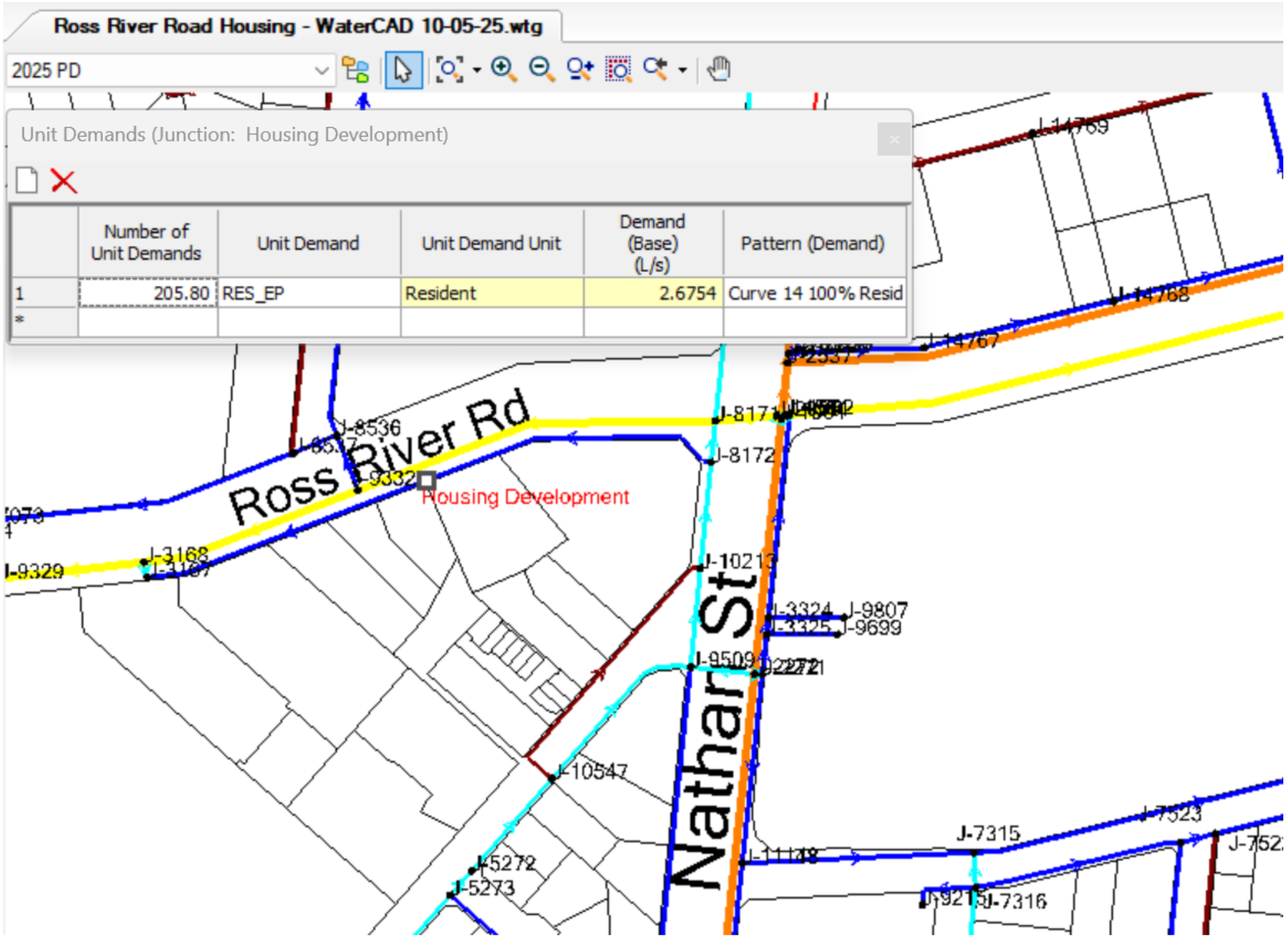
Total
24 Units

PROJECT	CLIENT DETAILS	TITLE	PROJECT NO.	DATE	DRAWING No.	ISSUE
ROSS RIVER ROAD RESIDENTIAL **344/346 & 350 ROSS RIVER RD** **CRANBROOK, QLD, 4814**		**PROPOSED FLOOR PLAN - LEVEL 4**	**25869**	**19.06.25**	**SK-30**	**P2**

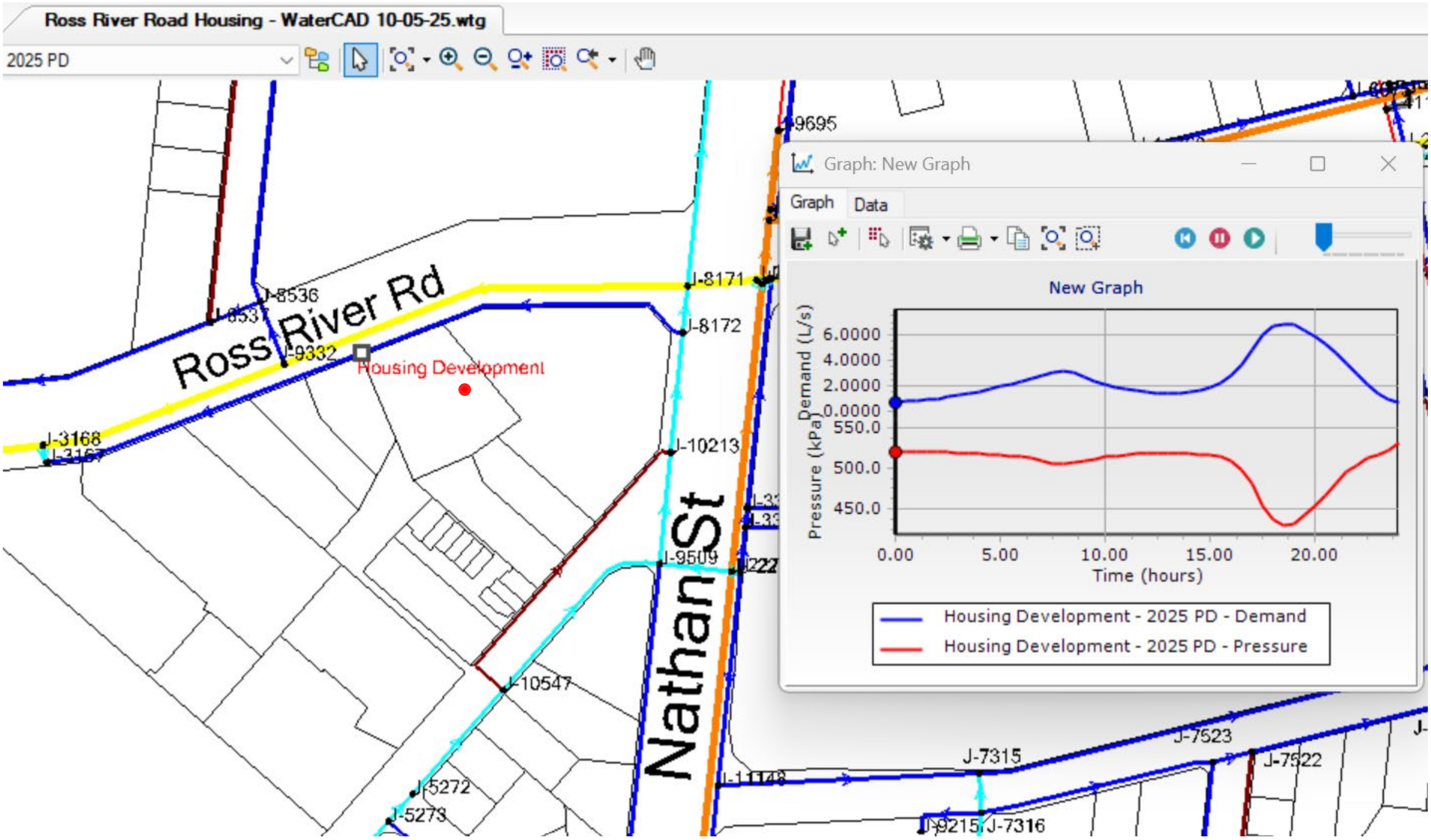
COUNTERPOINT

19/06/2025 12:46:36 PM

APPENDIX B
WATERGEMS MODELLING RESULTS



WATERGEMS Model With 81 Residential Units - Water Demand Added



Peak Hour Pressure at Unit Development Node

Ross River Road Housing - WaterCAD 10-05-25.wtg

2025 PD

Ross River Rd

Housing Development

Nathan St

J-8536

J-8537

J-9332

J-3168

J-3167

J-8171

J-8172

J-10213

J-9509

J-10547

J-5272

J-5273

J-9695

J-14768

J-14767

J-3324

J-3325

J-7315

J-7523

J-7522

J-9215

J-7316

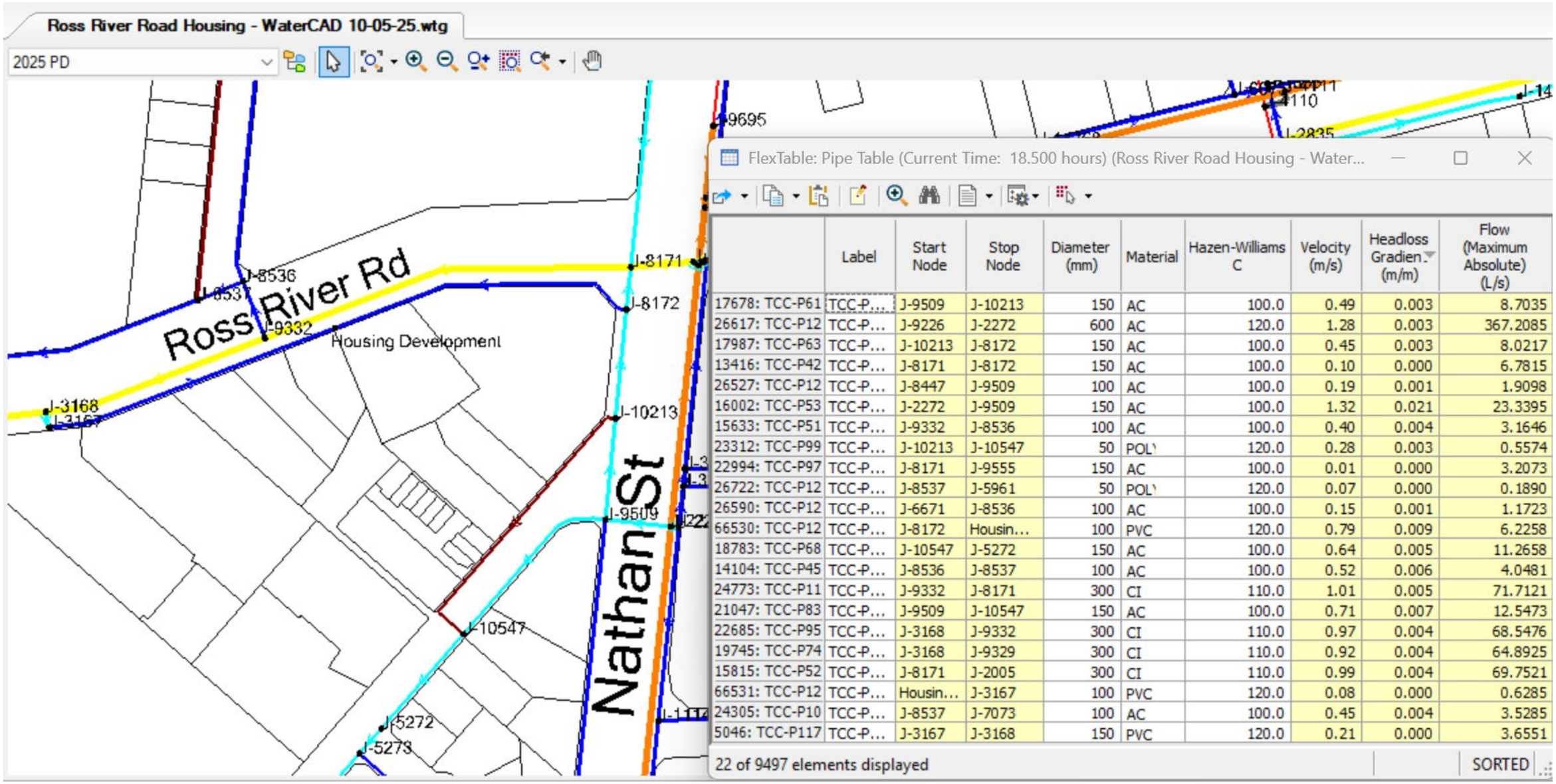
FlexTable: Junction Table (Current Time: 1...

	Label	Elevation (m)	Demand (L/s)	Pressure (kPa)
66529: Housing	Housing De...	11.27	6.8490	429.1
17679: J-10213	J-10213	10.43	0.1301	453.0
16003: J-9509	J-9509	10.72	0.5800	451.8
5047: J-3167	J-3167	11.92	3.0319	423.0
14105: J-8536	J-8536	11.26	0.2888	433.4
18784: J-10547	J-10547	10.72	1.8389	445.6
14106: J-8537	J-8537	11.30	0.6591	431.6
5048: J-3168	J-3168	11.52	0.0000	426.9
13417: J-8171	J-8171	10.78	0.0000	448.0
13418: J-8172	J-8172	10.60	0.0000	449.8
15634: J-9332	J-9332	11.20	0.0000	435.0

11 of 6962 elements displayed

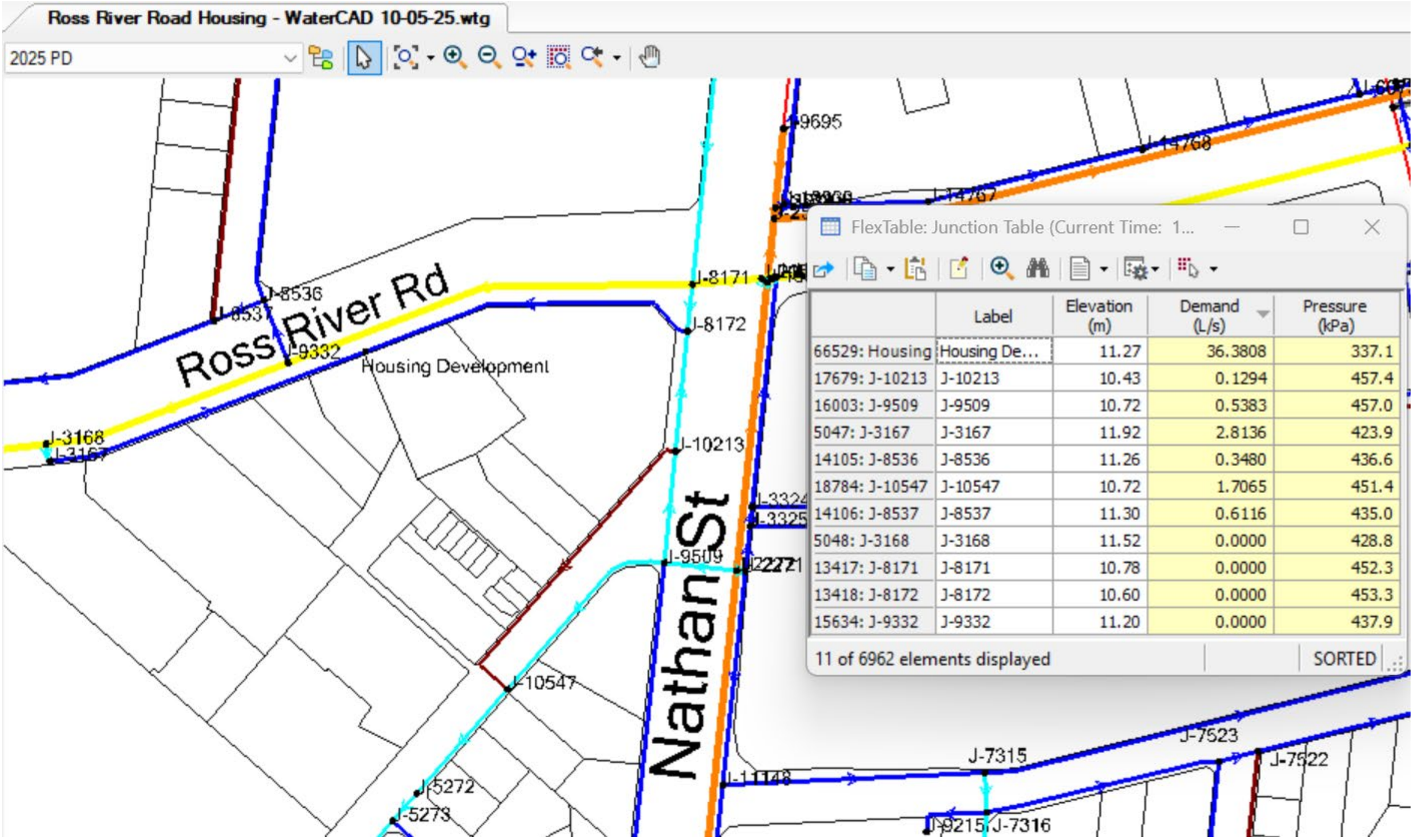
SORTED

Peak Hour Node Modelling Results – 6:30 pm

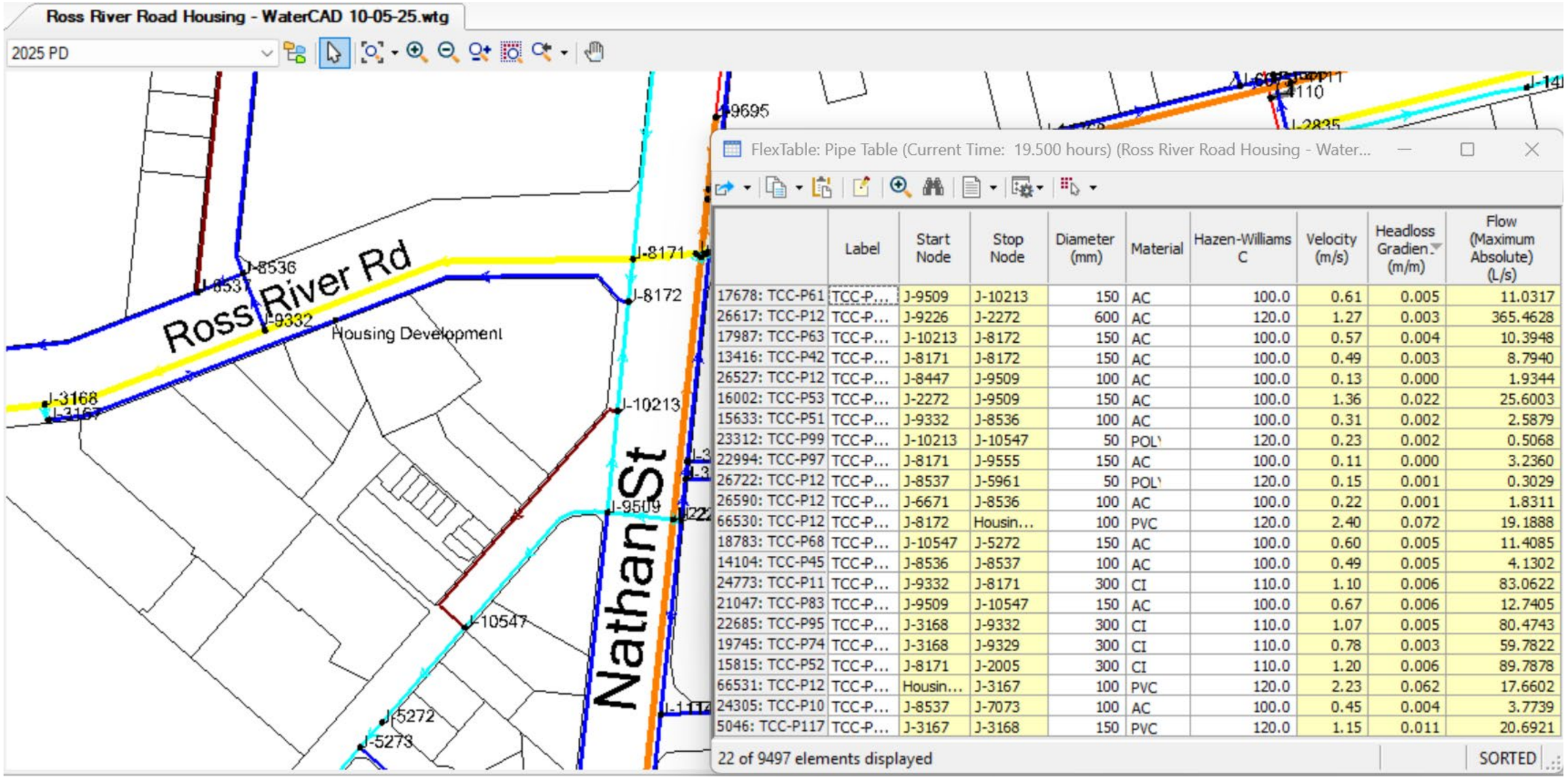


	Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Velocity (m/s)	Headloss Gradien... (m/m)	Flow (Maximum Absolute) (L/s)
17678: TCC-P61	TCC-P...	J-9509	J-10213	150	AC	100.0	0.49	0.003	8.7035
26617: TCC-P12	TCC-P...	J-9226	J-2272	600	AC	120.0	1.28	0.003	367.2085
17987: TCC-P63	TCC-P...	J-10213	J-8172	150	AC	100.0	0.45	0.003	8.0217
13416: TCC-P42	TCC-P...	J-8171	J-8172	150	AC	100.0	0.10	0.000	6.7815
26527: TCC-P12	TCC-P...	J-8447	J-9509	100	AC	100.0	0.19	0.001	1.9098
16002: TCC-P53	TCC-P...	J-2272	J-9509	150	AC	100.0	1.32	0.021	23.3395
15633: TCC-P51	TCC-P...	J-9332	J-8536	100	AC	100.0	0.40	0.004	3.1646
23312: TCC-P99	TCC-P...	J-10213	J-10547	50	POL'	120.0	0.28	0.003	0.5574
22994: TCC-P97	TCC-P...	J-8171	J-9555	150	AC	100.0	0.01	0.000	3.2073
26722: TCC-P12	TCC-P...	J-8537	J-5961	50	POL'	120.0	0.07	0.000	0.1890
26590: TCC-P12	TCC-P...	J-6671	J-8536	100	AC	100.0	0.15	0.001	1.1723
66530: TCC-P12	TCC-P...	J-8172	Housin...	100	PVC	120.0	0.79	0.009	6.2258
18783: TCC-P68	TCC-P...	J-10547	J-5272	150	AC	100.0	0.64	0.005	11.2658
14104: TCC-P45	TCC-P...	J-8536	J-8537	100	AC	100.0	0.52	0.006	4.0481
24773: TCC-P11	TCC-P...	J-9332	J-8171	300	CI	110.0	1.01	0.005	71.7121
21047: TCC-P83	TCC-P...	J-9509	J-10547	150	AC	100.0	0.71	0.007	12.5473
22685: TCC-P95	TCC-P...	J-3168	J-9332	300	CI	110.0	0.97	0.004	68.5476
19745: TCC-P74	TCC-P...	J-3168	J-9329	300	CI	110.0	0.92	0.004	64.8925
15815: TCC-P52	TCC-P...	J-8171	J-2005	300	CI	110.0	0.99	0.004	69.7521
66531: TCC-P12	TCC-P...	Housin...	J-3167	100	PVC	120.0	0.08	0.000	0.6285
24305: TCC-P10	TCC-P...	J-8537	J-7073	100	AC	100.0	0.45	0.004	3.5285
5046: TCC-P117	TCC-P...	J-3167	J-3168	150	PVC	120.0	0.21	0.000	3.6551

Peak Hour Pipes Modelling Results – 6:30 pm



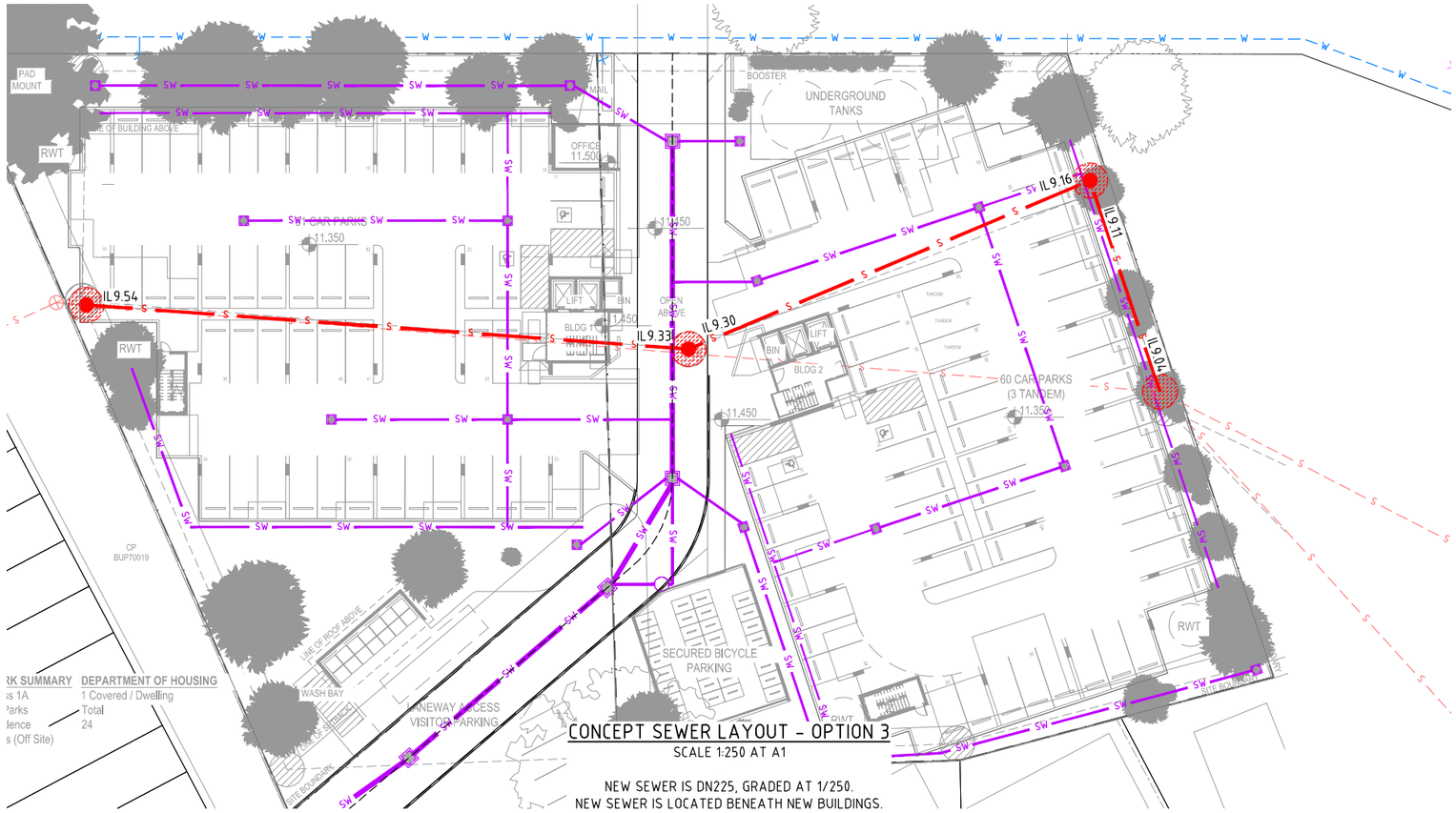
Peak Hour Node + 30 l/s Commercial Fire Flow Results – 6:30 pm



	Label	Start Node	Stop Node	Diameter (mm)	Material	Hazen-Williams C	Velocity (m/s)	Headloss Gradien... (m/m)	Flow (Maximum Absolute) (L/s)
17678: TCC-P61	TCC-P...	J-9509	J-10213	150	AC	100.0	0.61	0.005	11.0317
26617: TCC-P12	TCC-P...	J-9226	J-2272	600	AC	120.0	1.27	0.003	365.4628
17987: TCC-P63	TCC-P...	J-10213	J-8172	150	AC	100.0	0.57	0.004	10.3948
13416: TCC-P42	TCC-P...	J-8171	J-8172	150	AC	100.0	0.49	0.003	8.7940
26527: TCC-P12	TCC-P...	J-8447	J-9509	100	AC	100.0	0.13	0.000	1.9344
16002: TCC-P53	TCC-P...	J-2272	J-9509	150	AC	100.0	1.36	0.022	25.6003
15633: TCC-P51	TCC-P...	J-9332	J-8536	100	AC	100.0	0.31	0.002	2.5879
23312: TCC-P99	TCC-P...	J-10213	J-10547	50	POL'	120.0	0.23	0.002	0.5068
22994: TCC-P97	TCC-P...	J-8171	J-9555	150	AC	100.0	0.11	0.000	3.2360
26722: TCC-P12	TCC-P...	J-8537	J-5961	50	POL'	120.0	0.15	0.001	0.3029
26590: TCC-P12	TCC-P...	J-6671	J-8536	100	AC	100.0	0.22	0.001	1.8311
66530: TCC-P12	TCC-P...	J-8172	Housin...	100	PVC	120.0	2.40	0.072	19.1888
18783: TCC-P68	TCC-P...	J-10547	J-5272	150	AC	100.0	0.60	0.005	11.4085
14104: TCC-P45	TCC-P...	J-8536	J-8537	100	AC	100.0	0.49	0.005	4.1302
24773: TCC-P11	TCC-P...	J-9332	J-8171	300	CI	110.0	1.10	0.006	83.0622
21047: TCC-P83	TCC-P...	J-9509	J-10547	150	AC	100.0	0.67	0.006	12.7405
22685: TCC-P95	TCC-P...	J-3168	J-9332	300	CI	110.0	1.07	0.005	80.4743
19745: TCC-P74	TCC-P...	J-3168	J-9329	300	CI	110.0	0.78	0.003	59.7822
15815: TCC-P52	TCC-P...	J-8171	J-2005	300	CI	110.0	1.20	0.006	89.7878
66531: TCC-P12	TCC-P...	Housin...	J-3167	100	PVC	120.0	2.23	0.062	17.6602
24305: TCC-P10	TCC-P...	J-8537	J-7073	100	AC	100.0	0.45	0.004	3.7739
5046: TCC-P117	TCC-P...	J-3167	J-3168	150	PVC	120.0	1.15	0.011	20.6921

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

APPENDIX C
SEWERGEMS MODELLING RESULTS & FIGURES



CONCEPT SEWER LAYOUT - OPTION 3

SCALE 1:250 AT A1

NEW SEWER IS DN225, GRADED AT 1/250.
NEW SEWER IS LOCATED BENEATH NEW BUILDINGS.

NOTES:

- REDUNDANT SEWER PIPES AND MANHOLES ARE TO BE REMOVED.
- FINAL SEWER ALIGNMENT TO BE CLEAR OF BUILDING FOOTINGS.
- STRUCTURAL DESIGN OF FOOTINGS WILL ENSURE NO LOAD WILL BE IMPOSED ON SEWER PIPES.

LEGEND

- EXISTING STORMWATER
- EXISTING SEWER MAIN
- EXISTING WATER MAIN
- NEW STORMWATER
- NEW SEWER
- 3m DIAMETER CLEARANCE

-5 0 5 10

SCALE OF METRES 1:250 AT A1 & 1:500 AT A3

B	CONCEPT	AC	2/10/25
A	CONCEPT	AC	9/9/25
REVISION		APP'D	DATE

CONCEPT

JAS-ANZ

WWW.JAS-ANZ.ORG/REGISTER

LCJ ENGINEERS

LCJ Engineers Pty Ltd
ABN 54 131 516 446
601 Flinders Street, Townsville QLD 4810
PO Box 1498, Aitkenvale QLD 4814
Tel: (07) 4721 5800
townsville@lcjengineers.com.au
www.lcjengineers.com.au

DRAWN	DESIGNED
AC	
APPROVED	DATE
RPEQ:	

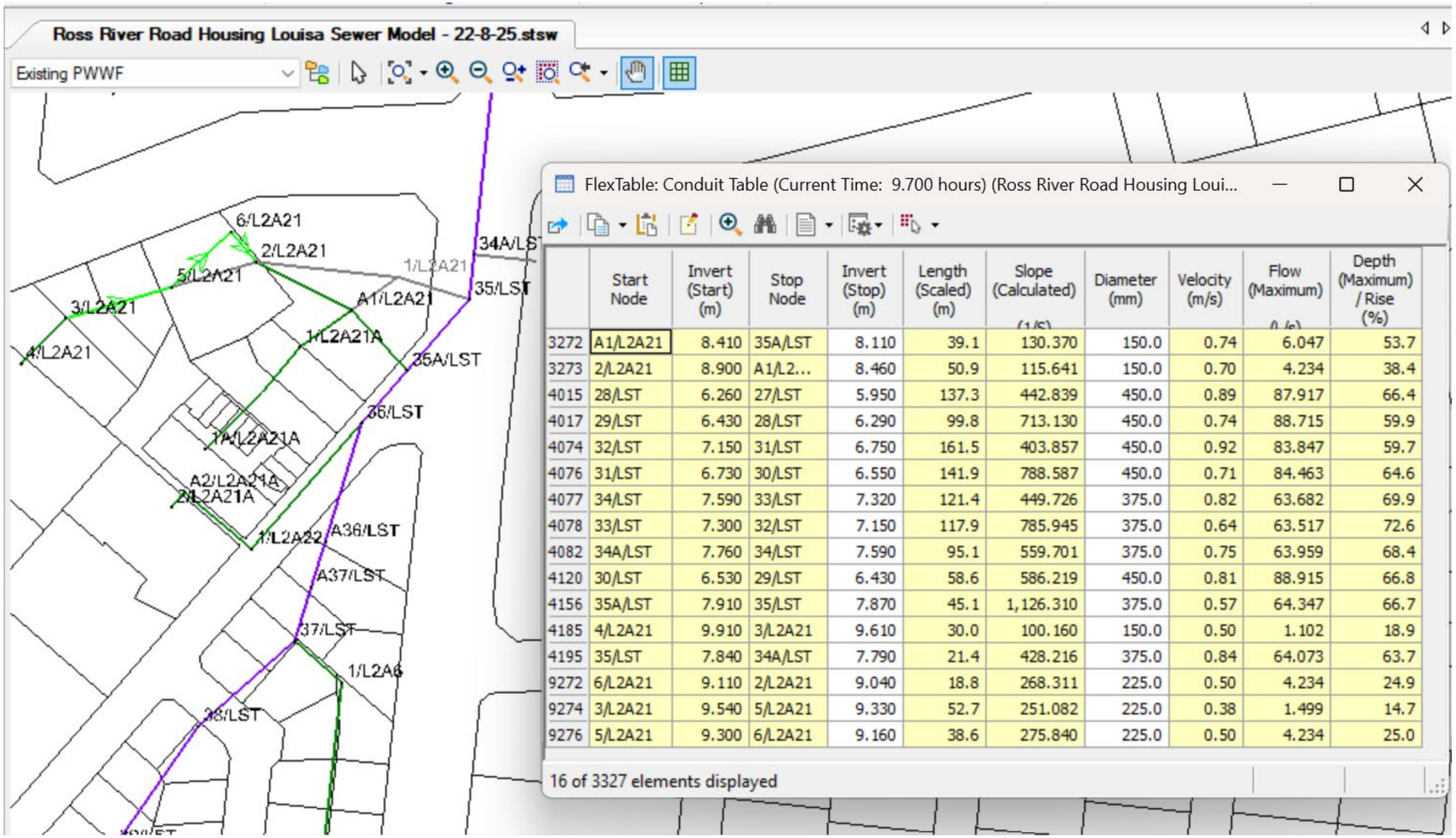
CLIENT
HURST CONSTRUCTIONS

PROJECT
ROSS RIVER RESIDENTIAL

344-350 ROSS RIVER RD
AITKENVALE

DRAWING
CONCEPT SEWER - OPT 3

NUMBER	SHEET NO.	REVISION
HURA018	SK05	B



	Start Node	Invert (Start) (m)	Stop Node	Invert (Stop) (m)	Length (Scaled) (m)	Slope (Calculated) (1/s)	Diameter (mm)	Velocity (m/s)	Flow (Maximum) (L/s)	Depth (Maximum) / Rise (%)
3272	A1/L2A21	8.410	35A/LST	8.110	39.1	130.370	150.0	0.74	6.047	53.7
3273	2/L2A21	8.900	A1/L2...	8.460	50.9	115.641	150.0	0.70	4.234	38.4
4015	28/LST	6.260	27/LST	5.950	137.3	442.839	450.0	0.89	87.917	66.4
4017	29/LST	6.430	28/LST	6.290	99.8	713.130	450.0	0.74	88.715	59.9
4074	32/LST	7.150	31/LST	6.750	161.5	403.857	450.0	0.92	83.847	59.7
4076	31/LST	6.730	30/LST	6.550	141.9	788.587	450.0	0.71	84.463	64.6
4077	34/LST	7.590	33/LST	7.320	121.4	449.726	375.0	0.82	63.682	69.9
4078	33/LST	7.300	32/LST	7.150	117.9	785.945	375.0	0.64	63.517	72.6
4082	34A/LST	7.760	34/LST	7.590	95.1	559.701	375.0	0.75	63.959	68.4
4120	30/LST	6.530	29/LST	6.430	58.6	586.219	450.0	0.81	88.915	66.8
4156	35A/LST	7.910	35/LST	7.870	45.1	1,126.310	375.0	0.57	64.347	66.7
4185	4/L2A21	9.910	3/L2A21	9.610	30.0	100.160	150.0	0.50	1.102	18.9
4195	35/LST	7.840	34A/LST	7.790	21.4	428.216	375.0	0.84	64.073	63.7
9272	6/L2A21	9.110	2/L2A21	9.040	18.8	268.311	225.0	0.50	4.234	24.9
9274	3/L2A21	9.540	5/L2A21	9.330	52.7	251.082	225.0	0.38	1.499	14.7
9276	5/L2A21	9.300	6/L2A21	9.160	38.6	275.840	225.0	0.50	4.234	25.0

PWWF Sewer Capacity Assessment Results