

SEPTEMBER 30, 2026

PROJECT NO: 721-3464-2

SENT VIA: EMAIL

Town of The Blue Mountains
32 Mill Street, P.O. Box 310
Thornbury, ON N0H 2P0

Attention: Evan Hancock
Development Engineering Reviewer

RE: WATER DISTRIBUTION SYSTEM
HOME FARM RENTAL DEVELOPMENT
TOWN OF THE BLUE MOUNTAINS

Dear Evan,

C.F. Crozier & Associates Inc. was retained by MacPherson Builders Ltd. to prepare a water model using Bentley WaterCAD to confirm the proposed Home Farm Rental Development can be supported by the existing municipal water distribution system and proposed watermain network within the Home Farm Residential Development. The proposed watermain system has been designed to provide minimum mandated domestic pressures, domestic flows, and fire flows in accordance with the Ministry of Environment, Conservation and Parks (MECP) Design Guidelines for Drinking-Water Systems (2008) and the Town of The Blue Mountains (TOBM) Engineering Standards (Revised November 2024).

1.0 Background

The proposed development is located within the Village of Craigeleith. The site is bound by Town owned lands and a proposed Long-Term Care Facility development to the west, the Craigeleith Ridge Residential Development to the north, the Trailhead Residential Development and undeveloped lands to the east, and the proposed Home Farm Residential development to the south. The Site Plan proposes 112 residential units that will have two units per townhouse, with one unit occupying the basement and one unit occupying the main and second floor.

This water model has been prepared as an extension to the water model for the Home Farm Residential Development. The Rental Development will be serviced through the Home Farm Residential Development. Phases 1 and 2 of the Home Farm development will be serviced prior to construction of the Rental Development. Refer to the Home Farm Water Distribution Model Memo prepared by Crozier dated December 2022 under a separate cover for more information.

It should be noted that the Long-Term Care Facility design is being undertaken by a separate consultant (WalterFedy) and will rely on the Rental Development to provide water servicing. Therefore, the Long-Term Care Facility has been accounted for in the water model to confirm serviceability and capacity.

Refer to **Figure 1** for the Site Location Plan.

2.0 Proposed Water Distribution System

The proposed development is located within Pressure Zone 4. The distribution watermain for the development is located along internal roadways and will connect to the proposed water distribution system within the Home Farm Residential Development. Connections to the existing TOBM water distribution network will be provided by the existing 350 mm diameter watermain on Grey Road 19. The water distribution system within the Home Farm Residential Development will be constructed prior to construction of the Rental Development.

Internal 200 mm diameter watermain will be installed at sufficient depth to achieve frost protection (minimum 1.7 m cover typical). Fire hydrants and valves have been proposed at spacing that meets the requirements of the TOBM standards. As per TOBM standards, the watermain will be PVC DR18 with all associated appurtenances required.

3.0 WaterCAD Model

A WaterCAD model was set up to confirm that the proposed development can be supported by the existing municipal system and proposed watermain network within the Home Farm Residential Development.

3.1 Design Parameters

The following design parameters were used in the WaterCAD model:

- Water system elevations were based on centreline of roadway elevations taken from the Grading Plans prepared by Crozier dated September 30, 2026.
- Population of the development is based on a unit density of 2.15 persons/unit per TOBM Standards.
- The residential average daily demand for the proposed development is based on 350 L/cap/day per TOBM Standards.
- The average daily demand for the Long-Term Care Facility has been provided by WalterFedy.
- A maximum daily demand and peak hour demand factor of 4.08 and 6.13, respectively, were used in accordance with MECP guidelines for the residential units.
- A maximum daily demand and peak hour demand factor of 4.54 and 6.84, respectively, were used in accordance with MECP guidelines for the Long-Term Care Facility.
- Friction factors for piping are based on MECP Guidelines using C=110 for 200 mm PVC watermain.
- Minor loss coefficients for pipe appurtenances were calculated and used as per Bentley Engineering Libraries in WaterCAD.
- Maximum allowable velocity for a pipe was set to 5.0 m/s per the TOBM standards.

- Required pressure for average day and peak hour is 350 kPa to 550 kPa and 275 kPa to 700 kPa, respectively, as per TOBM standards.
- The required minimum pressure for maximum day plus fire flow is 140 kPa to 700 kPa per TOBM standards.

3.2 Water Demands and Boundary Conditions

The domestic demands required for the proposed 112 units for the Rental Development have been calculated based on the criteria listed above. The calculated demands for the Rental Development are summarized in **Table 1** along with the demands provided by WalterFedy for the Long-Term Care Facility. Refer to the Home Farm Rental Servicing & Stormwater Management Implementation Report dated June 26, 2026, for more information. The water modelling was completed using the demands summarized in the table below.

Table 1: Water Demands

TOBM	Average Day (L/s)	Maximum Day (L/s)	Peak Hour (L/s)	Fire Flow (L/s)
Rental Development	0.98	3.98	5.98	133
Long-Term Care Facility ¹	1.00	4.54	6.84	150
Total	1.98	8.52	12.82	-

¹ Domestic demands and fire flow for the future Long-Term Care facility have been provided by WalterFedy.

Updated boundary conditions for the Rental Development water model were provided by J.L. Richards on September 21, 2026, and are included in **Appendix A**. The boundary conditions account for multiple scenarios, which were all modelled in WaterCAD.

3.3 Methodology

The WaterCAD model includes two connections to the proposed water distributions system in Street C within the Home Farm Residential Development. The Home Farm development will include two connections to the existing 350 mm watermain on Grey Road 19 within Pressure Zone 4. A schematic of the model is shown in **Appendix A**. Refer to the Site Servicing Plan prepared by Crozier dated September 30, 2026, for further details regarding the watermain layout. The water model for the Rental Development has been prepared under the assumption that all phases of the Home Farm Residential Development will be constructed prior to construction of the Rental Development.

Minor losses for the pipes were calculated based on the proposed watermain design, which includes minor losses due to bends, tees, and valves. A Hazen-Williams (C) value has been applied to each pipe length based on TOBM standards. Minor losses calculated for each pipe length are included in **Appendix A**.

Junctions were placed at major grade changes (i.e. low and high points), watermain intersections and dead ends. Demands for each junction were assigned based on the dwellings closest to the specified junction. Junction demands for each scenario were calculated using TOBM standards. Refer to **Appendix A** for detailed model inputs.

Multiple scenarios were setup and run using the model. The scenario runs were based on the boundary condition information provided by J.L. Richards. For each scenario that was run, the boundary conditions within the model were adjusted accordingly. Boundary conditions were represented by a fixed reservoir, in which the Hydraulic Grade Line (HGL) was set to represent the specific demand scenario.

3.4 Modelling Results

Average Day

Model results for average day demand conditions show that pressures within the system range from 621 kPa to 644 kPa. Since the pressures exceed the Town's pressure requirements of 350 kPa to 550 kPa, individual pressure reducing valves will be required for the water services within the Rental Development and the Long-Term Care Facility. Alternatively, installing one or two pressure reducing valves near the connections can be investigated as the results show the entire site exceeds the maximum allowable pressure. Velocities within the proposed system do not exceed the maximum allowable of 5.0 m/s. Refer to **Appendix A** for model output summaries.

Peak Hour

The pressures within the system during peak hour conditions range from 603 kPa to 627 kPa, meeting the Town's pressure requirements of 275 kPa to 700 kPa. Velocities within the proposed system do not exceed the maximum allowable of 5.0 m/s. Refer to **Appendix A** for model output summaries.

Maximum Day + Fire Flow

Boundary conditions were provided for 133 L/s based on the maximum residential fire flow. The fire flow for the residential units (133 L/s) is based on fire walls being installed for townhouse blocks exceeding 5 units, which was confirmed with the architect. The fire flow for the Long-Term Care Facility (150 L/s) was provided by WalterFedy. All junctions achieve the minimum allowable pressure of 140 kPa while providing the required fire flows for maximum day plus fire flow scenarios. Velocities within the proposed system do not exceed the maximum allowable of 5.0 m/s, meeting the Town's requirements. Refer to **Appendix A** for model output tables.

4.0 Conclusion

Based on the foregoing analysis we conclude:

- 1) The proposed development can be supported by the existing and proposed municipal water distribution system as part of the Home Farm Residential development.
- 2) The proposed water distribution system will consist of 200 mm diameter watermain internal to the site to provide adequate demands and pressures.
- 3) Individual pressure reducing valves are required to achieve the Town's criteria for all scenarios.

We trust that the above modelling results are satisfactory and address the Town's requirements specifically related to the water distribution design. Should you have any questions or require any further information, please do not hesitate to contact the undersigned.

Sincerely,

C.F. CROZIER & ASSOCIATES INC.



Nicholas Sproule, EIT
Engineering Intern

C.F. CROZIER & ASSOCIATES INC



Maggie Findlay, P.Eng.
Project Engineer, Land Development

JS/NS/MF

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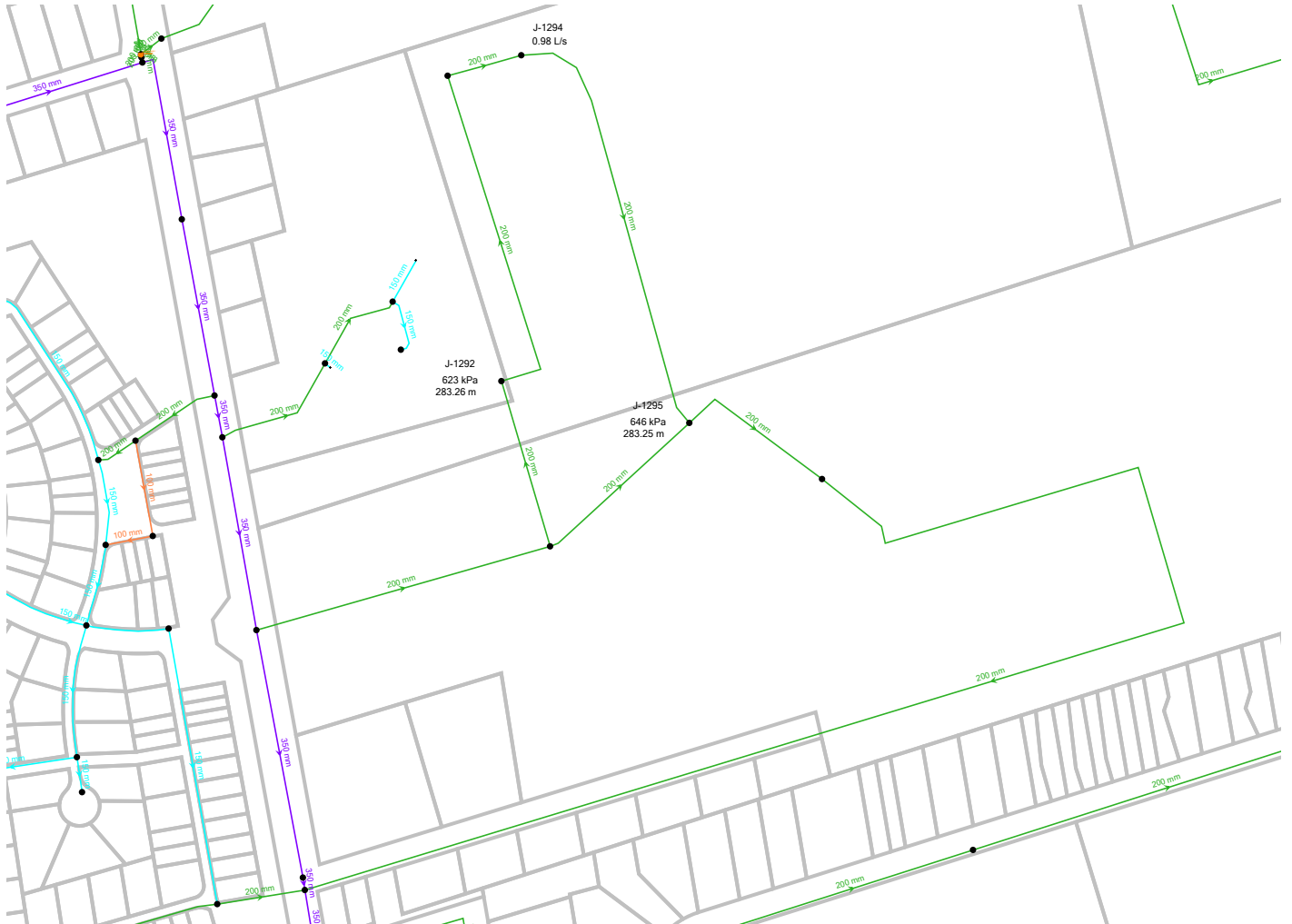
APPENDIX A

Home Farm Rental Boundary Condition

Looped Congifuration

Average Day Demand

Map View

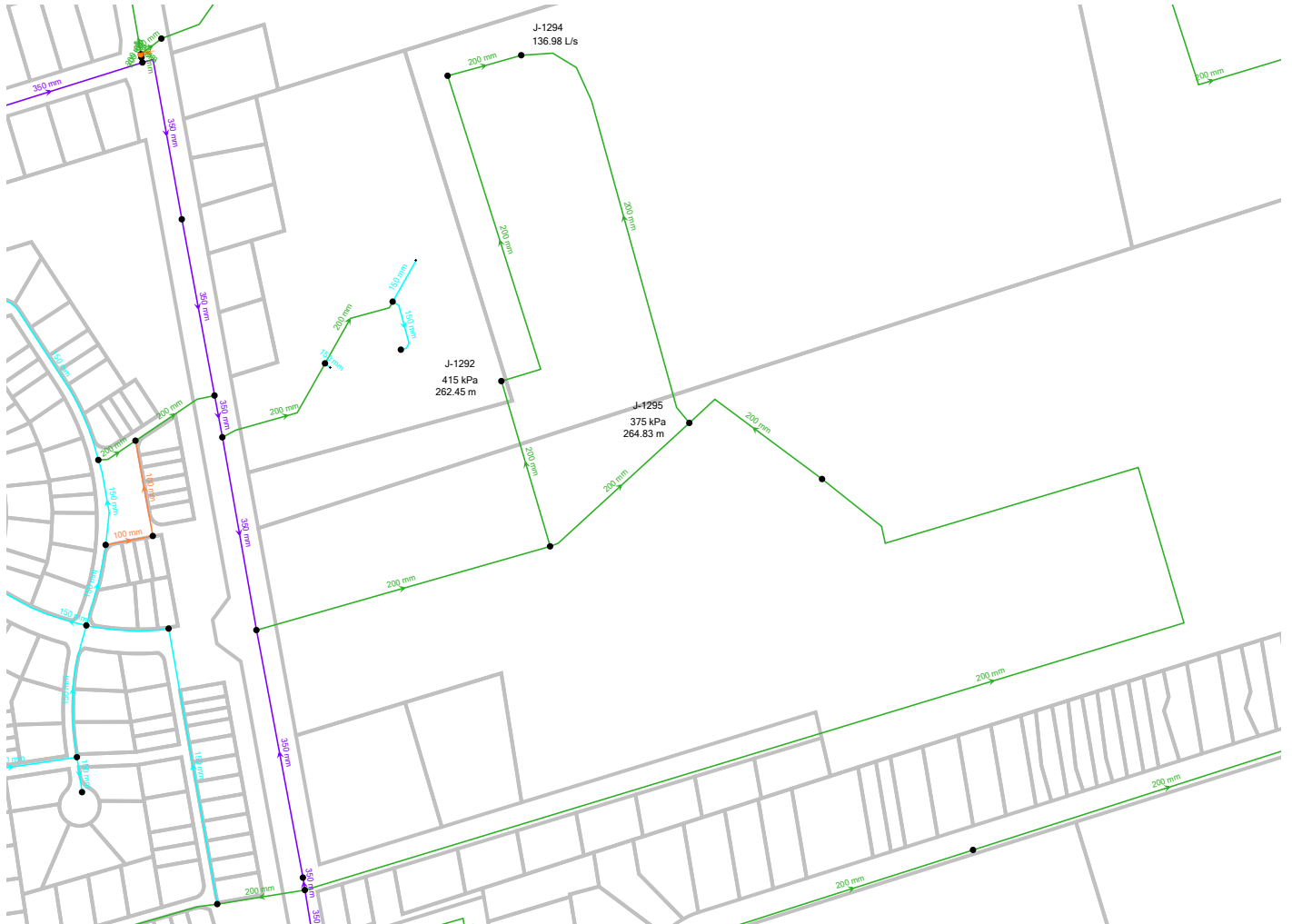


Home Farm Rental Boundary Condition

Looped Configuration

Maximum Day + 133L/s Fire Flow

Map View



The diagram illustrates a hydraulic network with the following components:

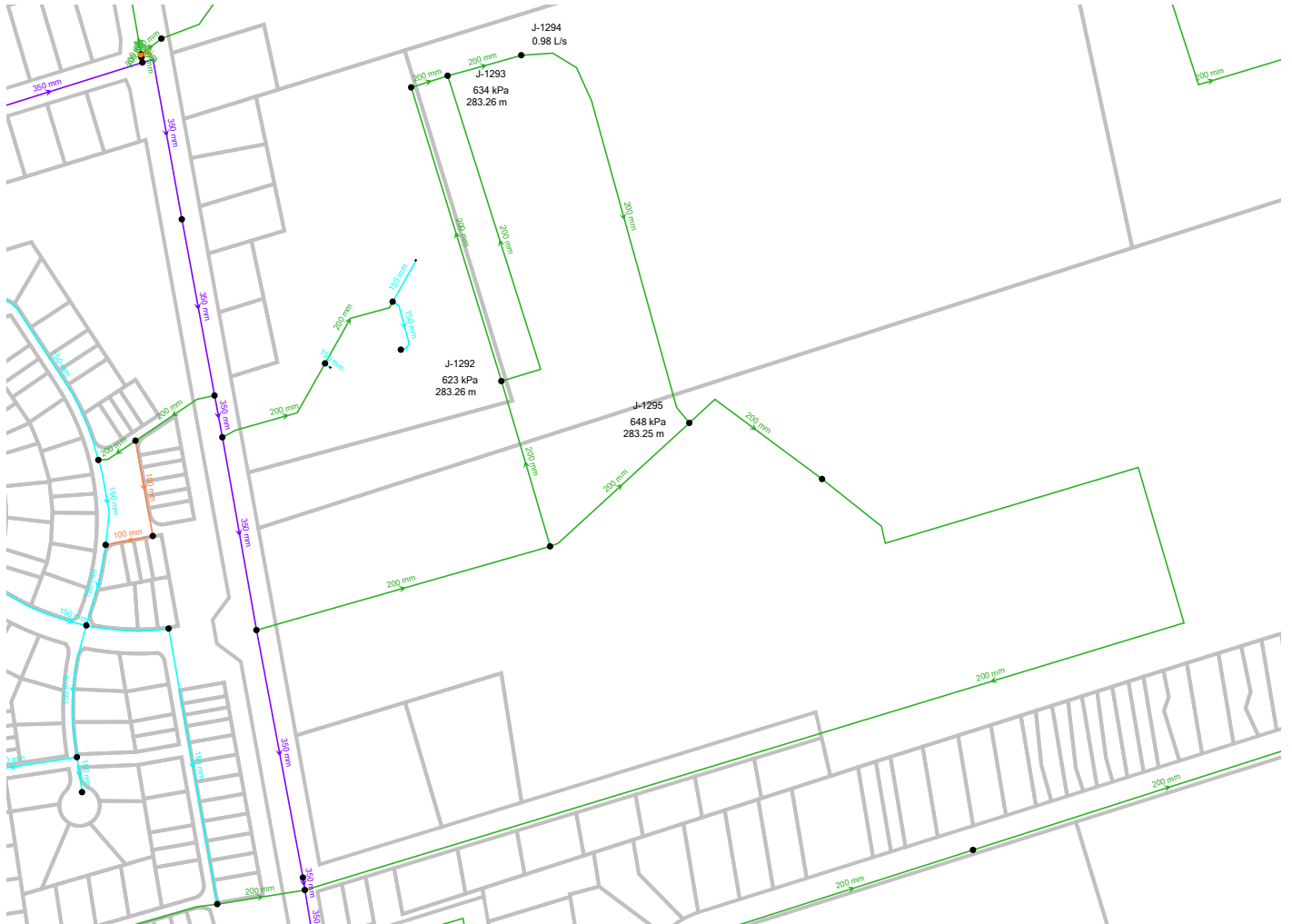
- Main Line:** A purple line running vertically, labeled with pipe diameters of 350 mm and 300 mm.
- Branches:**
 - A cyan line (150 mm) branches off to the left, with a red rectangular area highlighting a section of it.
 - Green lines (200 mm, 250 mm, 300 mm) branch off to the right, connecting to various nodes.
- Nodes:**
 - J-1292:** Located at the intersection of the main line and a green branch, with a pressure of 605 kPa and an elevation of 281.84 m.
 - J-1294:** Located at the top right, with a flow rate of 5.98 L/s.
 - J-1295:** Located in the center right, with a pressure of 542 kPa and an elevation of 281.89 m.
- Other Features:**
 - A street layout is shown in the background.
 - A building footprint is visible in the bottom right corner.
 - Various pipe diameters (200 mm, 250 mm, 300 mm) are labeled along the green lines.

Home Farm Rental Boundary Condition

Looped with LTC Congifuration

Average Day Demand

Map View

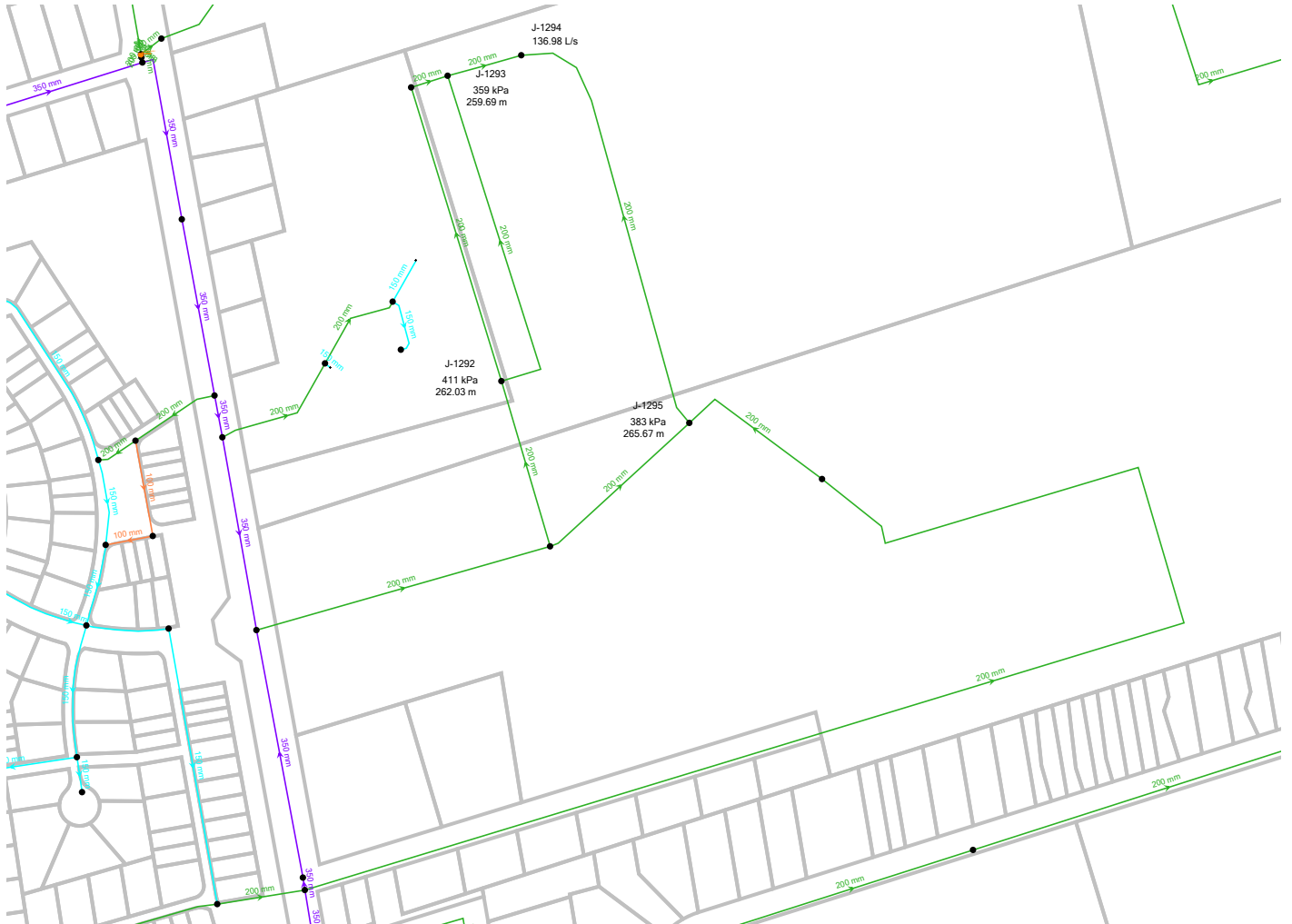


Home Farm Rental Boundary Condition

Looped with LTC Congifuration

Maximum Day + 133L/s Fire Flow

Map View

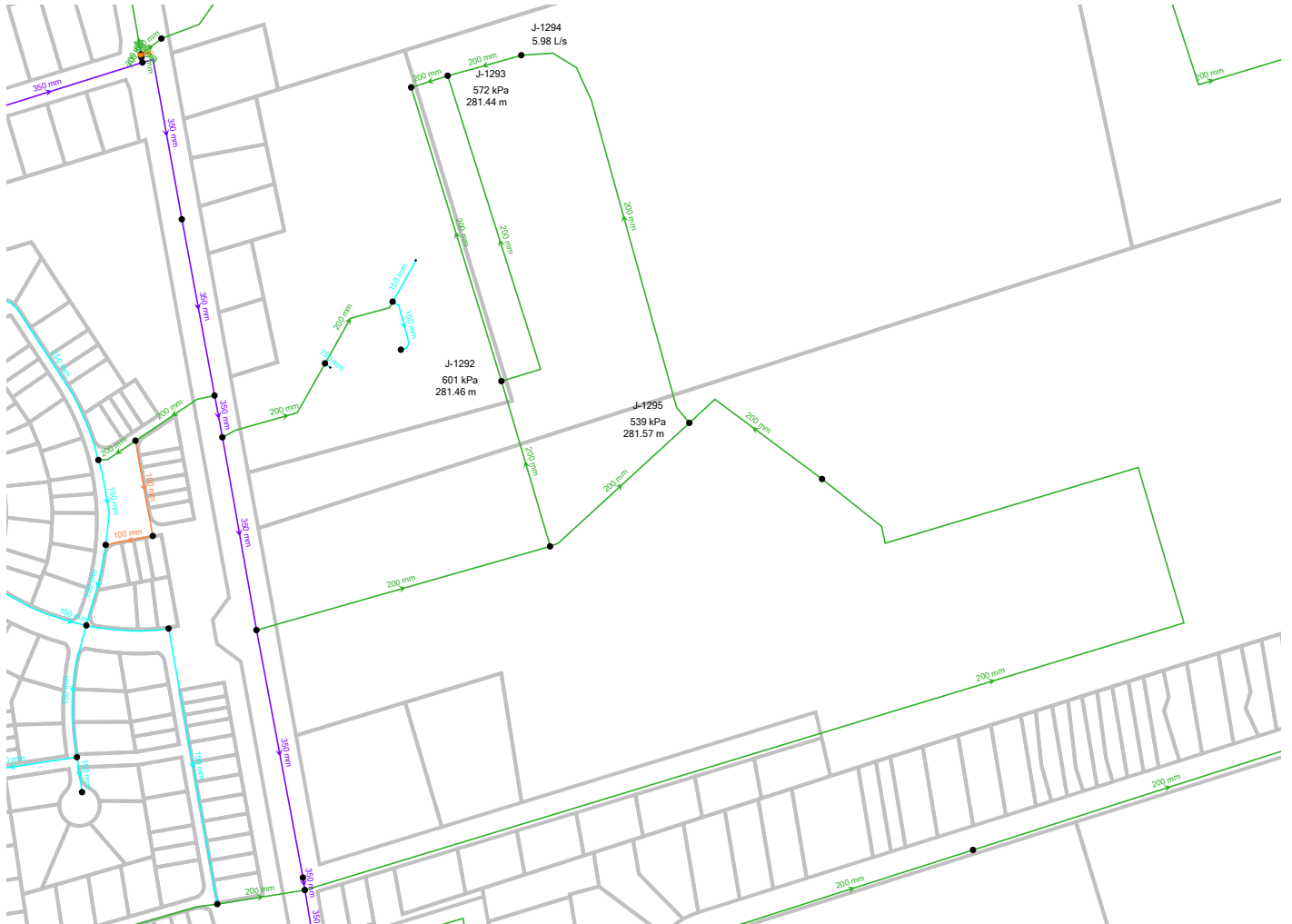


Home Farm Rental Boundary Condition

Looped with LTC Congifuration

Peak Hour

Map View





Project: Home Farm Rental
Project No.: 721-3464-2
Design by: M.F./N.S.
Date: 21-Sep-26

Junction Demands

Junction (ID)	Land Use -	Unit #	Elevation (m)	Population (persons)	ADD (L/s)	MDD (L/s)	PH (L/s)
Rental Development							
J-R1	Residential	0	219.85	0	0.00	0.00	0.00
J-R2	Residential	58	218.63	124.7	0.51	2.06	3.10
J-R3	Residential	14	218.49	30.1	0.12	0.50	0.75
J-R4	Long-Term Care Facility*	-	218.59	192	1.00	4.54	6.84
J-R5	Residential	40	217.78	86	0.35	1.42	2.14
J-R6	Residential	0	217.48	0	0.00	0.00	0.00
Total	-	112	-	433	1.98	8.52	12.82

*Domestic demands and fire flow for the Long-Term Care Facility have been provided by WalterFedy.

Pipe Minor Losses Summary

Pipe ID P-R1

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1 - Vertical)	0	0.37	0.00
90° Bend (R/D=1 - Horizontal)	0	0.37	0.00
45° Bend (Mitered - Vertical)	0	0.20	0.00
45° Bend (Mitered - Horizontal)	2	0.20	0.40
30° Bend (Mitered - Vertical)	0	0.10	0.00
30° Bend (Mitered - Horizontal)	2	0.10	0.20
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	1	1.28	1.28
Reducer	0	0.64	0.00
Total			2.27

Pipe ID P-R2

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1 - Vertical)	0	0.37	0.00
90° Bend (R/D=1 - Horizontal)	0	0.37	0.00
45° Bend (Mitered - Vertical)	0	0.20	0.00
45° Bend (Mitered - Horizontal)	0	0.20	0.00
30° Bend (Mitered - Vertical)	0	0.10	0.00
30° Bend (Mitered - Horizontal)	3	0.10	0.30
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	1	1.28	1.28
Reducer	0	0.64	0.00
Total			2.32

Pipe ID P-R3

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1 - Vertical)	0	0.37	0.00
90° Bend (R/D=1 - Horizontal)	0	0.37	0.00
45° Bend (Mitered - Vertical)	0	0.20	0.00
45° Bend (Mitered - Horizontal)	0	0.20	0.00
30° Bend (Mitered - Vertical)	0	0.10	0.00
30° Bend (Mitered - Horizontal)	0	0.10	0.00
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	0	1.28	0.00
Reducer	0	0.64	0.00
Total			0.74

Pipe ID P-R4

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	2	0.39	0.78
90° Bend (R/D=1 - Vertical)	0	0.37	0.00
90° Bend (R/D=1 - Horizontal)	0	0.37	0.00
45° Bend (Mitered - Vertical)	0	0.20	0.00
45° Bend (Mitered - Horizontal)	0	0.20	0.00
30° Bend (Mitered - Vertical)	0	0.10	0.00
30° Bend (Mitered - Horizontal)	0	0.10	0.00
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	1	1.28	1.28
Reducer	0	0.64	0.00
Total			2.06



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Date: 21-Sep-26

Pipe Minor Losses Summary

Pipe ID

P-R5

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1 - Vertical)	0	0.37	0.00
90° Bend (R/D=1 - Horizontal)	0	0.37	0.00
45° Bend (Mitered - Vertical)	0	0.20	0.00
45° Bend (Mitered - Horizontal)	0	0.20	0.00
30° Bend (Mitered - Vertical)	0	0.10	0.00
30° Bend (Mitered - Horizontal)	3	0.10	0.30
Tee (Line Flow)	2	0.35	0.70
Tee (Branch Flow)	1	1.28	1.28
Reducer	0	0.64	0.00
Total			2.67

Pipe ID

P-R6

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1 - Vertical)	0	0.37	0.00
90° Bend (R/D=1 - Horizontal)	0	0.37	0.00
45° Bend (Mitered - Vertical)	0	0.20	0.00
45° Bend (Mitered - Horizontal)	2	0.20	0.40
30° Bend (Mitered - Vertical)	0	0.10	0.00
30° Bend (Mitered - Horizontal)	0	0.10	0.00
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	1	1.28	1.28
Reducer	0	0.64	0.00
Total			2.42

Pipe ID

P-R7

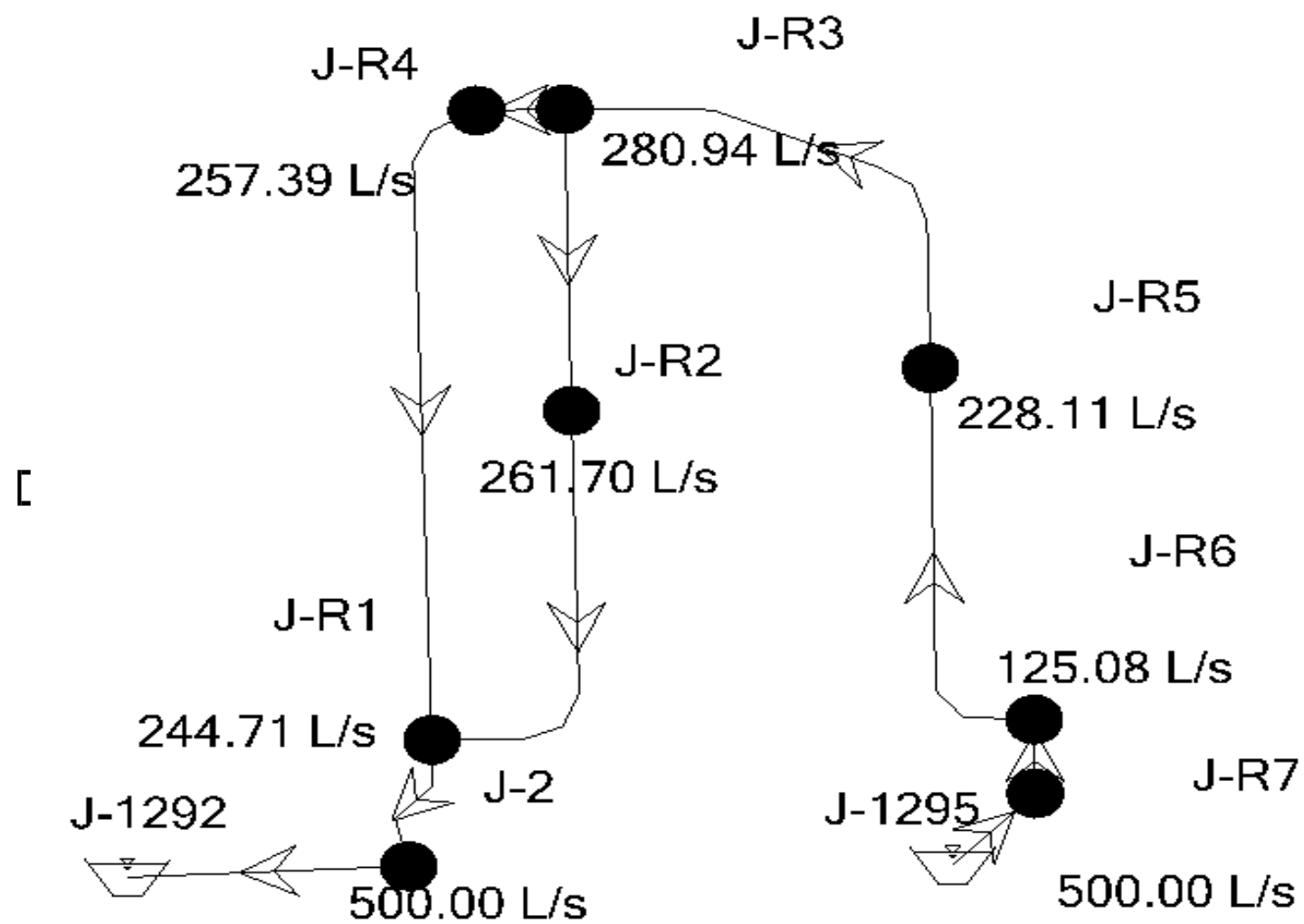
Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	2	0.39	0.78
90° Bend (R/D=1 - Vertical)	0	0.37	0.00
90° Bend (R/D=1 - Horizontal)	0	0.37	0.00
45° Bend (Mitered - Vertical)	0	0.20	0.00
45° Bend (Mitered - Horizontal)	2	0.20	0.40
30° Bend (Mitered - Vertical)	0	0.10	0.00
30° Bend (Mitered - Horizontal)	0	0.10	0.00
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	0	1.28	0.00
Reducer	0	0.64	0.00
Total			1.53



Project: Home Farm Rental
Project No.: 721-3464-2
Design by: M.F./N.S.
Date: 21-Sep-26

Pipe Losses Summary

Pipe ID	Length (m)	Diameter (mm)	Material	Hazen-Williams C	Total Minor Loss Coefficient
Rental Development					
P-R1	65	200	PVC	110	2.27
P-R2	107	200	PVC	110	2.32
P-R3	71	200	PVC	110	0.74
P-R4	35	200	PVC	110	2.06
P-R5	112	200	PVC	110	2.67
P-R6	64	200	PVC	110	2.42
P-R7	143	200	PVC	110	1.53





Project: Home Farm Rental
Project No.: 721-3464
Design By: M.J./N.S.
Date: 21-Sep-26

Junction Table - Average Day Demand

Label	Demand (L/s)	Elevation (m)	Hydraulic Grade (m)	Pressure (kPa)
Rental Development				
J-R1	0.00	219.85	283.25	621
J-R2	0.51	218.63	283.25	632
J-R3	0.12	218.49	283.25	634
J-R4	1.00	218.59	283.25	633
J-R5	0.35	217.78	283.25	641
J-R6	0.00	217.48	283.25	644



Project: Home Farm Rental
Project No.: 721-3464
Design By: M.J./N.S.
Date: 29-Sep-26

Pipe Table - Average Day Demand

Label	Start Node	Stop Node	Flow (L/s)	Velocity (m/s)
Rental Development				
P-R1	J-2	J-R1	2.56	0.08
P-R2	J-R1	J-R2	1.29	0.04
P-R3	J-R2	J-R3	0.78	0.02
P-R4	J-R3	J-R4	-0.26	0.01
P-R5	J-R3	J-R5	0.93	0.03
P-R6	J-R5	J-R6	0.58	0.02
P-R7	J-R1	J-R4	1.26	0.04



Project: Home Farm Rental
Project No.: 721-3464
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Date: 21-Sep-26

Junction Table - Peak Hour Demand

Label	Demand (L/s)	Elevation (m)	Hydraulic Grade (m)	Pressure (kPa)
Rental Development				
J-R1	0.00	219.85	281.45	603
J-R2	3.10	218.63	281.45	615
J-R3	0.75	218.49	281.45	616
J-R4	6.84	218.59	281.44	615
J-R5	2.14	217.78	281.51	624
J-R6	0.00	217.48	281.56	627



Project: Home Farm Rental
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Design By: M.J./N.S.
Date: 29-Sep-26

Pipe Table - Peak Hour Demand

Label	Start Node	Stop Node	Flow (L/s)	Velocity (m/s)
Rental Development				
P-R1	J-2	J-R1	3.73	0.12
P-R2	J-R1	J-R2	1.37	0.04
P-R3	J-R2	J-R3	-1.73	0.06
P-R4	J-R3	J-R4	4.48	0.14
P-R5	J-R3	J-R5	-6.96	0.22
P-R6	J-R5	J-R6	-9.10	0.29
P-R7	J-R1	J-R4	2.36	0.08



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Date: 21-Sep-26

Junction Table - Max Day + Fire Demand (150 L/s)

Label	Demand (L/s)	Pressure (Calculated Lower Limit) (kPa)	Fire Flow Available (L/s)	Required Fire Flow Residential (L/s)
Rental Development				
J-R1	0.00	321	244.71	133
J-R2	2.06	287	261.70	133
J-R3	0.50	243	280.94	133
J-R4	4.54	284	257.39	150
J-R5	1.42	371	228.11	133
J-R6	0.00	401	125.08	N/A



Project: Home Farm Rental
Project No.: 721-3464
Design By: M.J./N.S.
Date: 29-Sep-26

Pipe Table - Maximum Day Demand + Fire Flow

Label	Start Node	Stop Node	Flow (L/s)	Velocity (m/s)
Rental Development				
P-R1	J-2	J-R1	-32.18	1.02
P-R2	J-R1	J-R2	-16.36	0.52
P-R3	J-R2	J-R3	-18.42	0.59
P-R4	J-R3	J-R4	20.36	0.65
P-R5	J-R3	J-R5	-39.28	1.25
P-R6	J-R5	J-R6	-40.70	1.30
P-R7	J-R1	J-R4	-15.82	0.50

