

JUNE 12, 2023

PROJECT NO: 1046-4031

SENT VIA: EMAIL
BWORSLEY@THEBLUEMOUNTAINS.CA

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

Attention: Mr. Brian Worsley, P.Eng.
Manager, Development Engineering

RE: WATER DISTRIBUTION SYSTEM – MODELLING AND SIZING REVIEW
PARKBRIDGE CRAIGLEITH RIDGE RESIDENTIAL DEVELOPMENT
TOWN OF THE BLUE MOUNTAINS

Dear Brian,

C.F. Crozier & Associates Inc. (Crozier) has been retained by Parkbridge Lifestyle Communities Inc. to prepare a water model using Bentley WaterCAD to confirm the watermain system for the proposed Parkbridge Craigleith Ridge Residential Development is sized adequately to service the ultimate buildout of the Site. 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 April 2009).

1.0 Background

The proposed development is located south of Highway 26 within the Village of Craigleith and is bound by Lakeshore Road to the north, privately owned lands to the south and east, and Grey Road 19 to the west.

The Site Plan proposes a total of 211 residential units, a clubhouse, storage facility, a series of private roads, environmental spaces, archaeological areas, open space, and stormwater management facility areas. Access to the Site will be provided from Grey Road 19 with an additional entrance for emergency access from Lakeshore Road. The Nipissing Ridge runs through the Site.

2.0 Proposed Water Distribution System

The proposed development is located between two existing pressure zones – PZ 4 / PZ 4aEast and PZ 4e. The development proposes one connection along Grey Road 19 and one connection along Lakeshore Road and will maintain the two pressure zones within the Site. There is also a future connection proposed to the Eden Oak development adjacent to the Craigleith Ridge Development lands which has been included to accurately model ultimate conditions.

The distribution watermain for the proposed Craigleith Ridge Development is located along all internal roadways. Connections to the existing TOBM water distribution network will be to the existing 350 mm diameter watermain on Grey Road 19 at the southwest limits of the proposed main Site access (Hawthorn Way) and one connection to the 200 mm diameter watermain on Lakeshore Road off Daylily Crescent. Note, the connection at Grey Road 19 is in PZ 4 and the connection to Lakeshore Road is in PZ 4e. For the purposes of this memo, the portion of the Site within PZ 4 will be referred to as the upper zone and the portion of the Site in PZ 4e will be the lower zone.

Internal watermain of 300 mm and 200 mm diameter piping will be installed within the paved shoulder of the roadway 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 the watermain system for the proposed development is sized adequately to service the ultimate buildout of the Site.

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.
- Population of the development is based on a unit density of 2.3 persons/unit per TOBM Standards.
- The average daily demand for the proposed development is based on 450 L/cap/day per TOBM Standards.
- A maximum daily demand and peak hour demand factor of 2.75 and 4.50, respectively, were used in accordance with MECP guidelines and TOBM standards.
- Friction factors for piping are based on TOBM standards using C=130 for 250 mm, C=120 for 200 mm and C=110 for 150 mm watermain.
- Minor loss coefficients for pipe appurtenances were used as per Bentley Engineering Libraries in WaterCAD.
- Maximum allowable velocity for a pipe was set at 5.0 m/s per the TOBM standards.
- Required pressure for average day and peak hour is 350-550 kPa and 275-700 kPa, respectively, as per TOBM standards.
- The required pressure for maximum day plus fire flow is 140 kPa – 700 kPa as per TOBM standards.

3.2 Water Demand & Boundary Conditions

Total domestic flows required by the watermain network for the proposed development (211 units, community club house and storage facility total) have been calculated based on the criteria listed above. The water modelling was completed using the demands listed in the tables below. Calculations demonstrating these demands are included in Appendix A.

Table 1: Domestic Water Demands

Scenario	Upper Demand (L/s)	Lower Demand (L/s)
Average Day	0.89	1.73
Maximum Day	1.73	3.45
Peak Hour	3.88	7.76

The TOBM requested that J.L. Richards model the water demands using the Town's current hydraulic water model to determine boundary conditions. The boundary conditions provided by J.L. Richards for the PZ 4 connection are included in Appendix A. The boundary conditions account for many different scenarios, each of which was modelled in WaterCAD.

3.3 Modelling Results

The WaterCAD model setup begins with the connection to the existing 350 mm watermain on Grey Road 19. This connection follows along Hawthorn Way to supply Periwinkle Crescent, Coltsfoot Lane and Squill Crescent until reaching the end of PZ 4. The water model then continues into PZ 4e along Hawthorn Way where it branches off to supply Thistle Trail, Daylily Crescent, and Butternut Court. The connection to the existing 200 mm watermain on Lakeshore Road connects to the proposed watermain along Daylily Crescent. There is also a 200 mm watermain connection to the proposed Eden Oak development. These neighbouring developments will have a connected water distribution system, so they have both been included in the model with associated demands and boundary conditions. A schematic of the model is shown in Appendix A. Drawings C101A-D show the detailed watermain layout.

Minor losses in pipes were calculated based on the proposed watermain design, which includes minor losses due to bends, tees, and valves. 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. Required fire flow was calculated using both the Fire Underwriter's Survey (FUS) and the Ontario Building Code (OBC). Refer to Appendix A for the calculated demands and fire flows.

Multiple scenarios were computed using the model. The scenario runs were dedicated by the boundary condition information provided by J.L. Richards. For each scenario that was run, the boundary conditions within the model were altered to suit. Boundary conditions were represented by a fixed reservoir, in which the Hydraulic Grade Line (HGL) was set to represent the scenario.

The model also includes a Pressure Reducing Valve (PRV) located at the ridge in order to meet the Town's criteria while maintaining the two pressure zones throughout the Site. This PRV was set to "closed" during average day and peak hour demand scenarios and set to "active" during max day demand plus fire flow.

As previously stated, to maintain the pressure zones, a Pressure Reducing Valve (PRV) is required at the location of the ridge, between the upper and lower zones on the Site. The PRV was set to have an initial HGL of 240 m, as dictated in the boundary condition information provided by J.L. Richards. The following table outlines the results from the model for the upper zone in the Site.

Table 2: Internal System Pressures – Upper Zone

Scenario	Min. Available Flow (L/s)	Pressure (kPa)	Meets TOBM Standard (Y/N)
Average Day	-	max = 784	N
Peak Hour	-	max = 780	N
Fire Flow (FUS) – 133 L/s	263	min = 376	Y

As shown in the table above, the Town's criteria are achieved during the fire flow scenario. The pressures in the system during average day and peak hour exceed the maximum allowable based on the Town's criteria; therefore, individual pressure reducing valves are required in the upper zone. The following table outlines the results from the model for the lower zone in the Site.

Table 3: Internal System Pressures – Lower Zone

Scenario	Min. Available Flow (L/s)	Pressure (kPa)	Meets TOBM Standard (Y/N)
Average Day	-	max = 586	N
Peak Hour	-	max = 526	Y
Fire Flow (FUS) – 133 L/s	157	min = 161	Y

As shown in Table 3, the Town's criteria are achieved during all scenarios in the lower zone, except for average day. The pressures during average day exceed the allowable based on the Town's criteria, by a maximum of 36 kPa. This is a marginal overage; therefore, we don't expect individual pressure reducing valves are required.

The WaterCAD modelling results confirm that with one PRV at the ridge, individual PRVs in the upper zone, and a combination of 300 mm and 200 mm internal watermain will provide acceptable flows and pressures to all units. Detailed WaterCAD model output results are included in Appendix A.

4.0 Conclusion

Based on the foregoing analysis we conclude:

- 1) The subdivision water distribution system will consist of 300 mm and 200 mm diameter watermains to provide adequate demands and pressures for the calculated demands and fire flows.

- 2) One PRV is proposed to maintain the existing pressures within the two pressure zones that the Site spans and individual PRVs are proposed within the upper zone.

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.

C.F. CROZIER & ASSOCIATES INC.

Margaret Jasek, EIT
Engineering Intern

Julie Scott, P.Eng.
Project Manager

JS/mj

I:\Crozier-Files\Projects\1000\1046-Parkbridge Lifestyle\4031-Craigleith Fogal Land Acq\Reports\Water Model\2023.06.12 Craigleith Water Model Memo.docx

APPENDIX A



Project: Parkbridge Craigleith
 Project No.: 1046-4031
 File: Junction Demand
 Design by: JE
 Date: 07-Sep-18
 Updated by: JS
 Updated: 09-Apr-21

Junction (ID)	Elevation (m)	Units (#)	Population (persons)	ADD (l/s)	MDD (l/s)	PF (l/s)
J1	211.14	15	35	0.180	0.359	0.809
J2	212.96	4	9	0.048	0.096	0.216
J3	209.14	7	16	0.084	0.168	0.377
J4	210.95	6	14	0.072	0.144	0.323
J5	206.75	4	9	0.048	0.096	0.216
J6	207.47	5	12	0.060	0.120	0.270
J7	204.72	6	14	0.072	0.144	0.323
J8	206.87	15	35	0.180	0.359	0.809
J9	201.87	10	23	0.120	0.240	0.539
J10	186.80	46	106	0.551	1.102	2.480
J11	183.93	14	32	0.168	0.335	0.755
J13	187.61	16	37	0.192	0.383	0.863
J14	188.95	4	9	0.048	0.096	0.216
J15	185.70	15	35	0.180	0.359	0.809
J16	187.56	5	12	0.060	0.120	0.270
J17	183.46	24	55	0.288	0.575	1.294
J18	185.01	20	46	0.240	0.479	1.078
Total		216	497	2.59	5.18	11.64

Julie Scott

From: Austin Spencer
Sent: March 11, 2021 8:17 AM
To: Jessie Elder; Julie Scott
Cc: Jon Proctor
Subject: FW: Hydraulic Boundary Conditions for Parkbridge Craigleith (Feb 2021)
Attachments: TOBM Parkbridge Feb2021_Rev1.pdf; Parkbridge Craigleith - water modelling update

Jessie,

Wondering if you have time this week (or early next) to discuss water modelling for Craigleith/Eden Oak sites. I believe that you may have Julie completing water model for Craigleith (correct me if I'm wrong).

Maybe we can have a chat regarding Eden Oak and water modelling associated with same. Let me know what time/date works for you.

Thanks,

Austin

Austin Spencer P.Eng. | Construction Services
DID: 705.719.3434

From: Annie Williams <awilliams@jlrichards.ca>
Sent: February 24, 2021 2:53 PM
To: Mason Bellamy <mbellamy@thebluemountains.ca>
Cc: Deanna Vickery <dvickery@thebluemountains.ca>; Mark Buchanan <mbuchanan@jlrichards.ca>; Sarah O'Neill <soneill@cfcrozier.ca>; Jon Proctor <jproctor@cfcrozier.ca>; Austin Spencer <aspencer@cfcrozier.ca>
Subject: Hydraulic Boundary Conditions for Parkbridge Craigleith (Feb 2021)

Hello Mason,

The proposed Development ("Parkbridge Craigleith"), located east of Grey Road 19 and south of Lakeshore Road in the Town of the Blue Mountains (Town), was simulated using the Town's updated hydraulic water model (2020) to determine hydraulic boundary conditions based on theoretical water demands and fire flows provided by the Developer's Engineer (refer to attached). The proposed site is located between two existing pressure zones – PZ 4 / PZ 4aEast and PZ 4e. One (1) watermain connection is proposed on Grey Road 19 and one (1) other watermain connection is proposed on Lakeshore Road, with a pressure reducing valve (PRV) proposed in the middle of the site to maintain two separate pressure zones. Two proposed connection locations were modelled on Grey Road 19 – one on the south side of the existing PRV at Craigleith Road (within PZ 4) and the other on the north side of the existing PRV at Craigleith Road (within PZ 4aEast). Hydraulic boundary conditions were previously provided for this development on April 18, 2019. The

information provided below was requested as an update to the 2019 boundary conditions in order to eliminate a second eastern watermain connection to Lakeshore Road, and to increase the FUS fire flow to 133 L/s.

Table 1 summarizes the theoretical water demands that were included in the model at junction nodes PB-02 and PB-03. Table 2 summarizes the required fire flows as calculated by the Developer's Engineer.

Table 1: Theoretical Water Demands

Scenario	PB-02 Upper Elevation Side – Demand (L/s)	PB-03 Lower Elevation Side – Demand (L/s)
Average Day	0.89	1.71
Maximum Day	1.78	3.43
Peak Hour*	5.00	8.54

*Note the peak hour demand is greater than specified in the request email, based on the demands provided in the attachment.

Table 2: Fire Flow Calculations

FUS (L/s)	OBC (L/s)
133	45

The Town also confirmed the operational settings for the PRVs at Lakeshore Road and Monterra Road in a previous email dated September 2020, as shown in Table 3.

Table 3: PRV Settings

Scenario	PRV at Lakeshore	PRV at Monterra
Average Day	Closed	317 kPa (46 psi)
Max Day + Fire Flow	538 kPa (78 psi)	269 kPa (39 psi)
Peak Hour	Closed	317 kPa (46 psi)

The hydraulic boundary conditions have been generated at the requested connection locations labelled as junction nodes CR-449, J-783 and PB-05 in the model and are summarized in Table 4 and Table 5 (refer to attached WaterCAD model outputs). The average day and peak hour demand scenarios assume that the proposed PRV is closed. The maximum day plus fire flow scenarios are modelled with a PRV hydraulic grade setting of 240.00 m, which was found to maintain similar pressures along Lakeshore Road under average day conditions.

It should be noted that there are three (3) junction nodes near the Happy Valley Reservoir that were removed from pressure zone (PZ 4): CR-205, CR-206 and CR-450. This was similarly done in the 2017 water model for the Town-wide Water Master Plan and was approved by the Town. In the model, these junction nodes continually experience low pressure based on the corresponding water level of the Happy Valley Reservoir. The resulting low pressure severely limits the simulated fire flow availability throughout the Craighleith area. In practice, the Town advised that the model be adjusted to reflect that this area does not actually limit the available fire flow throughout Craighleith as the Happy Valley Reservoir is sized in support of municipal fire water supply.

Table 4: Parkbridge Craighleith Boundary Conditions – Connection to PZ 4

Demand Scenario	Connection 1A		Connection 2	
	Junction Node CR-449 (Elev 220.00 m)		Junction Node PB-05 (Elev 181.55 m)	
	Pressure (kPa)	HGL (m)	Pressure (kPa)	HGL (m)
Average Day (0.89 + 1.71 L/s)	606	281.95	609	243.75
Lower Elevation Side - Max Day (1.78 + 3.43 L/s) + FUS Fire Flow (133 L/s)	534	274.58	504	233.06
Lower Elevation Side - Max Day (1.78 + 3.43 L/s) + OBC Fire Flow (45 L/s)	591	280.37	562	238.94
Upper Elevation Side - Max Day (1.78 + 3.43 L/s) + FUS Fire Flow (133 L/s)	500	271.06	575	240.34

Upper Elevation Side - Max Day (1.78 + 3.43 L/s) + OBC Fire Flow (45 L/s)	587	279.96	575	240.34
Peak Hour (5.00 + 8.54 L/s)	602	281.56	583	241.14

Table 5: Parkbridge Craigleith Boundary Conditions – Connection to PZ 4aEast

Demand Scenario	Connection 1B		Connection 2	
	Junction Node J-783 (Elev 219.96 m)		Junction Node PB-05 (Elev 181.55 m)	
	Pressure (kPa)	HGL (m)	Pressure (kPa)	HGL (m)
Average Day (0.89 + 1.71 L/s)	387	259.46	609	243.75
Lower Elevation Side - Max Day (1.78 + 3.43 L/s) + FUS Fire Flow (133 L/s)	285	249.12	435	225.97
Lower Elevation Side - Max Day (1.78 + 3.43 L/s) + OBC Fire Flow (45 L/s)	373	258.06	562	238.94
Upper Elevation Side - Max Day (1.78 + 3.43 L/s) + FUS Fire Flow (133 L/s)	98*	229.95	575	240.34
Upper Elevation Side - Max Day (1.78 + 3.43 L/s) + OBC Fire Flow (45 L/s)	373	258.06	575	240.34
Peak Hour (5.00 + 8.54 L/s)	387	259.46	583	241.14

on Grey Road 19.

The model pressures internal to the development have also been provided within the model schematic attachments (as previously requested by the Town) and do not represent a complete detailed design of the proposed watermain network, which remains the responsibility of the design engineer. The hydraulic boundary conditions provided in Table 4 and Table 5 above remain available to assist in the completion of the detailed watermain design.

It was noticed that the pressures on the high elevation side of the development are anticipated to be significantly higher than 550 kPa or even 700 kPa under certain scenarios, which are the maximum operating pressures under average/maximum day and minimum/peak hour demand, respectively, as recommended by *The Blue Mountains Engineering Standards (April 2009)*. The detailed design should confirm the proposed PRV location and setting, and any units expected to experience high pressures may require individual pressure reduction measures.

Note that the foregoing model results are for current conditions and are based on computer model simulation. We have not reviewed the adequacy of the domestic demand nor the fire flow requirements for the proposed development, which remains the responsibility of the Developer's Engineer.

Disclaimer: The model results are based on current simulated operation of the Town's water distribution system. The computer model simulation is based on the best information available at this time. The operation of the water distribution system can change on a regular basis, resulting in a variation in the boundary conditions. It is further noted that the operational characteristics of the water supply system and physical properties of the watermains can change and/or deteriorate over time. These changes may affect the supply characteristics of the system and the assumptions made in developing the model, which in turn could lead to variations in the simulation results. This should be considered by any third party undertaking simulation of system upgrades.

Please do not hesitate to contact me should you have any questions regarding the foregoing.

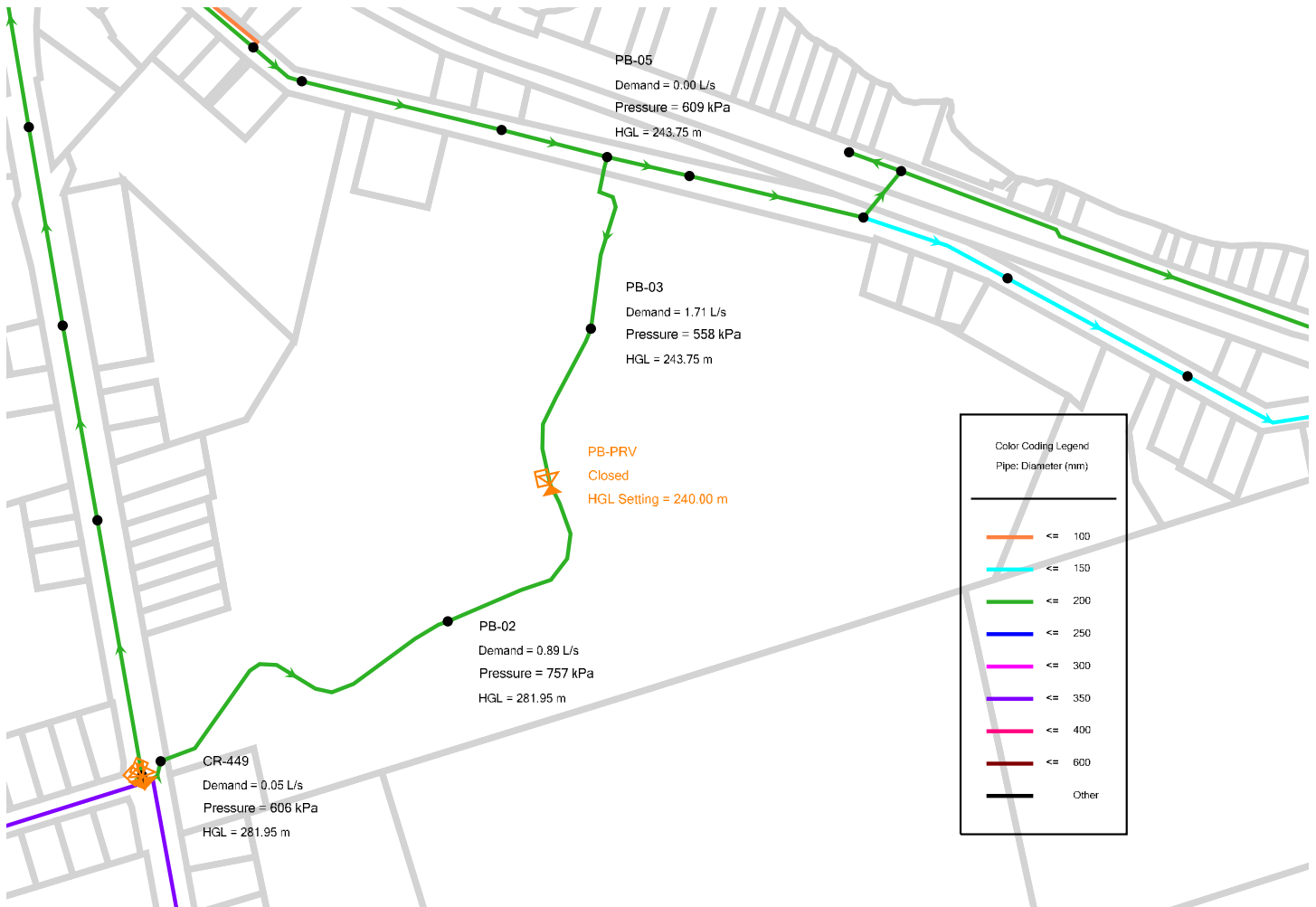
Sincerely,
Annie

Annie Williams, P.Eng.
Civil Engineer

J.L. Richards & Associates Limited
700 - 1565 Carling Avenue, Ottawa, ON K1Z 8R1
Direct: 343-803-4523

*J.L. Richards & Associates Limited is proactively doing our part to protect the wellbeing of our staff and communities while improving our communication technology. **We are pleased to announce that we have implemented direct phone lines for all of our staff, allowing you to connect with us regardless of whether we are working remotely or in the office.** We are dedicated to delivering quality services to you through value and commitment, as always. Please reach out to us if you have any questions about your project.*

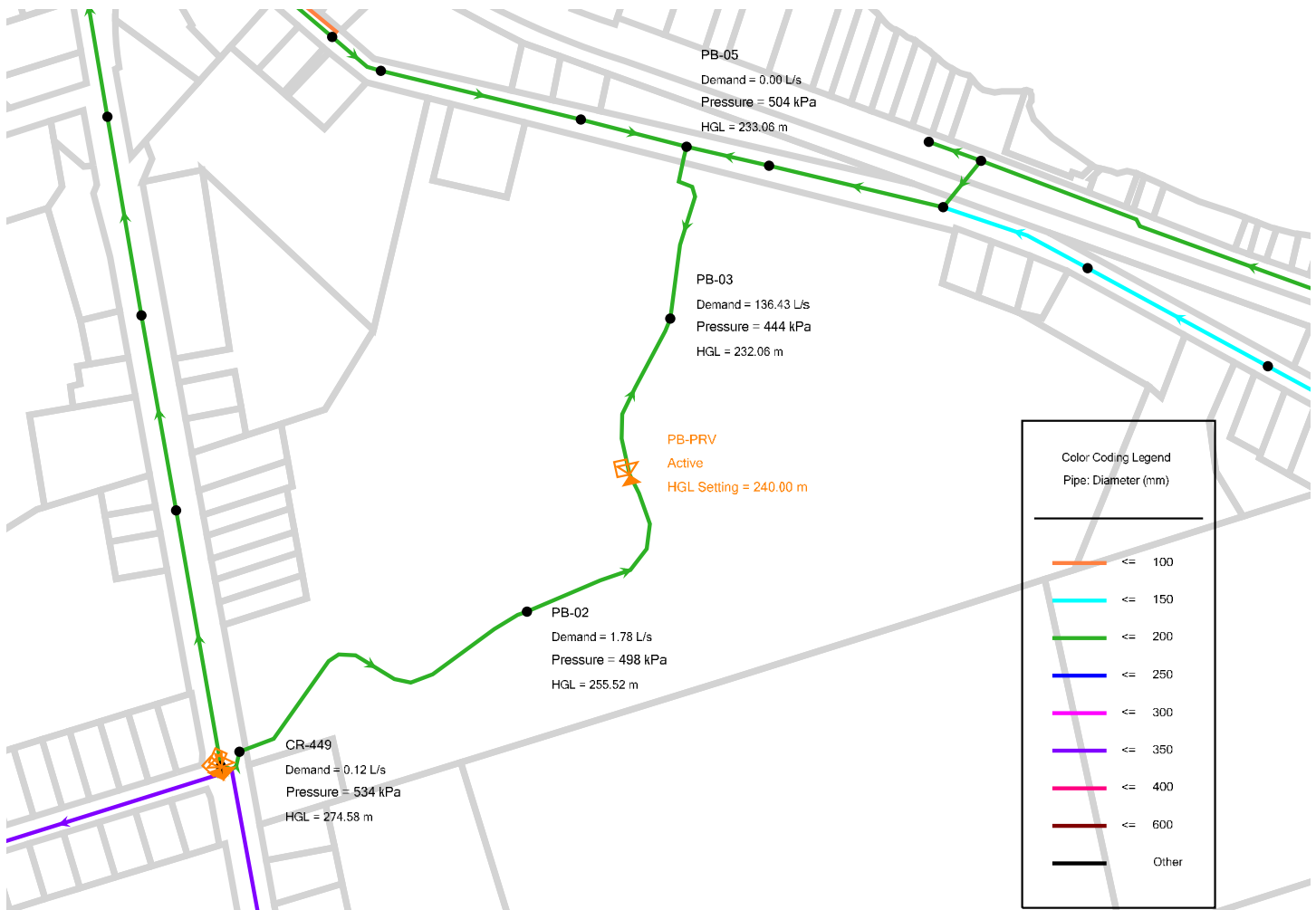
Parkbridge Craigleith Average Day Demand Connection to PZ 4



Parkbridge Craigleith

Maximum Day Demand + Fire Flow (FUS 133 L/s - Lower Side)

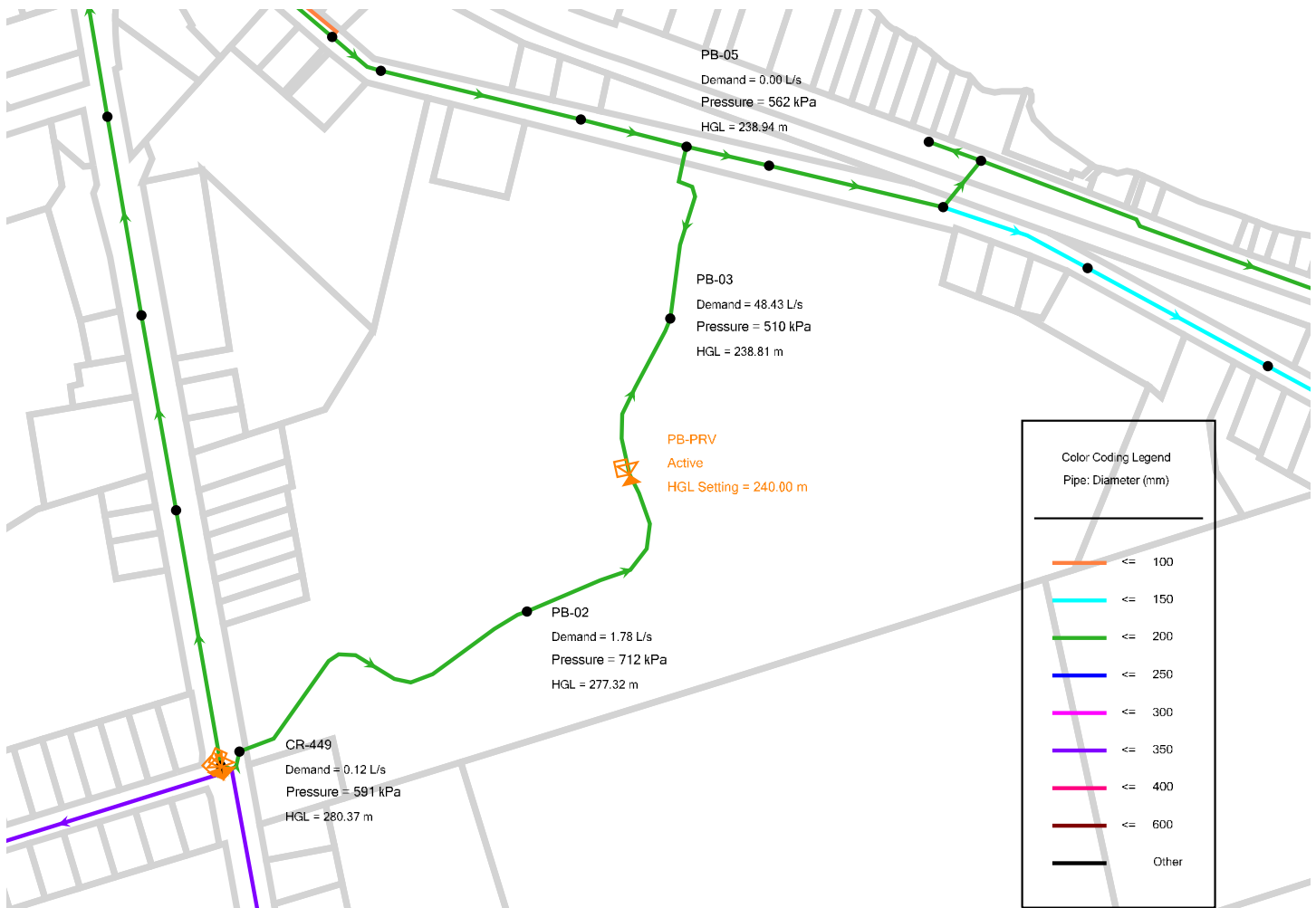
Connection to PZ 4



Parkbridge Craigleith

Maximum Day Demand + Fire Flow (OBC 45 L/s - Lower Side)

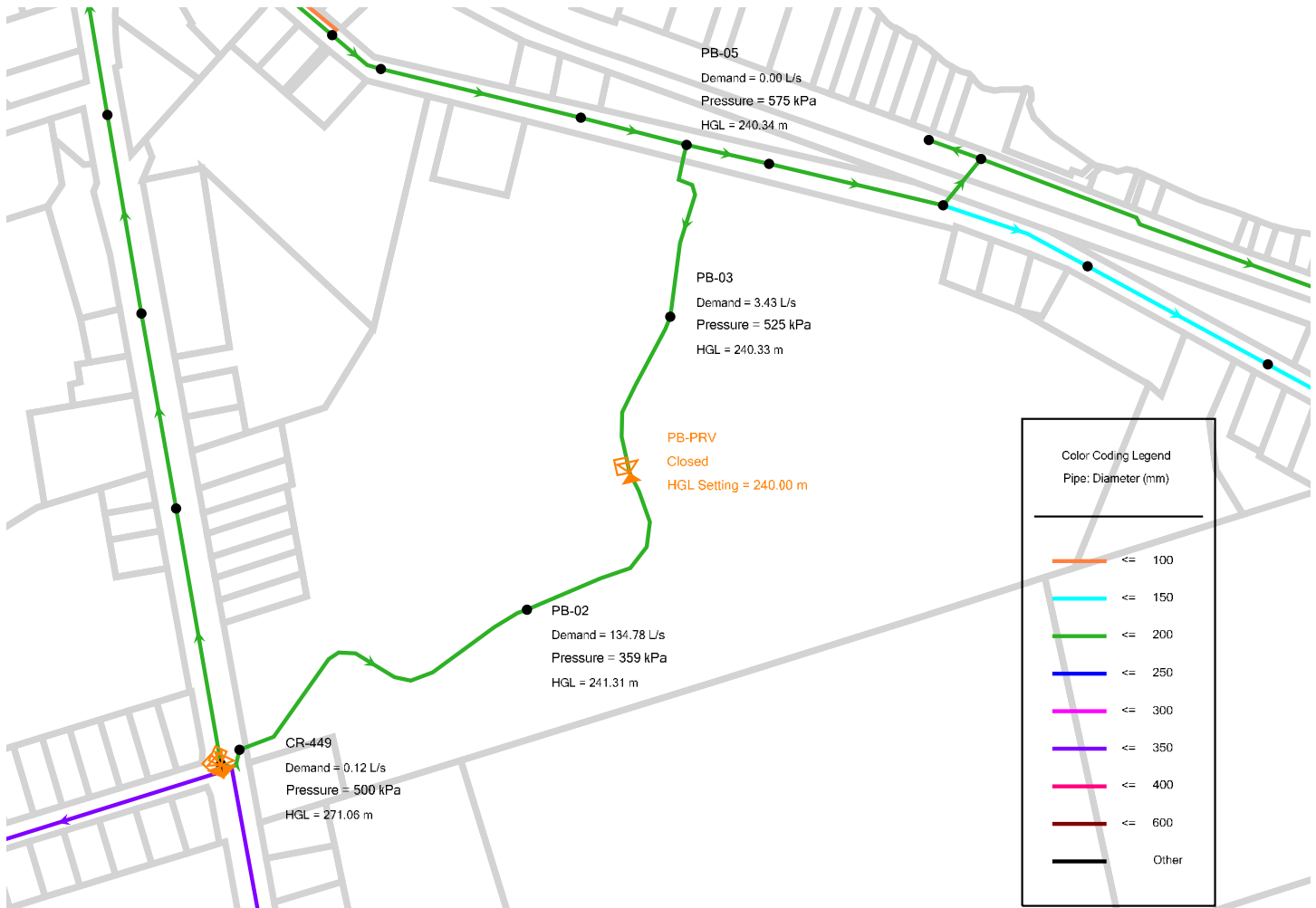
Connection to PZ 4



Parkbridge Craigleith

Maximum Day Demand + Fire Flow (FUS 133 L/s - Upper Side)

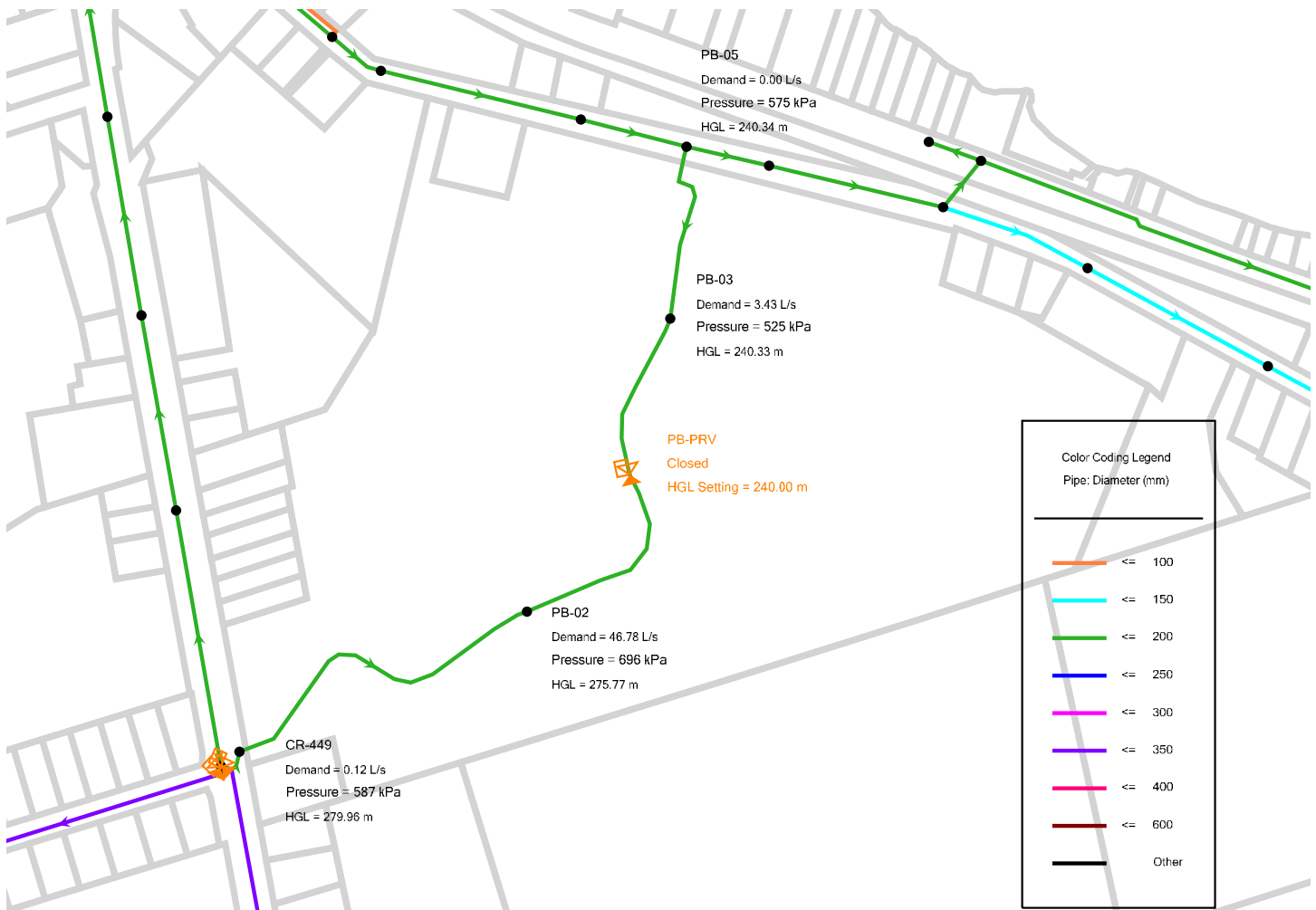
Connection to PZ 4



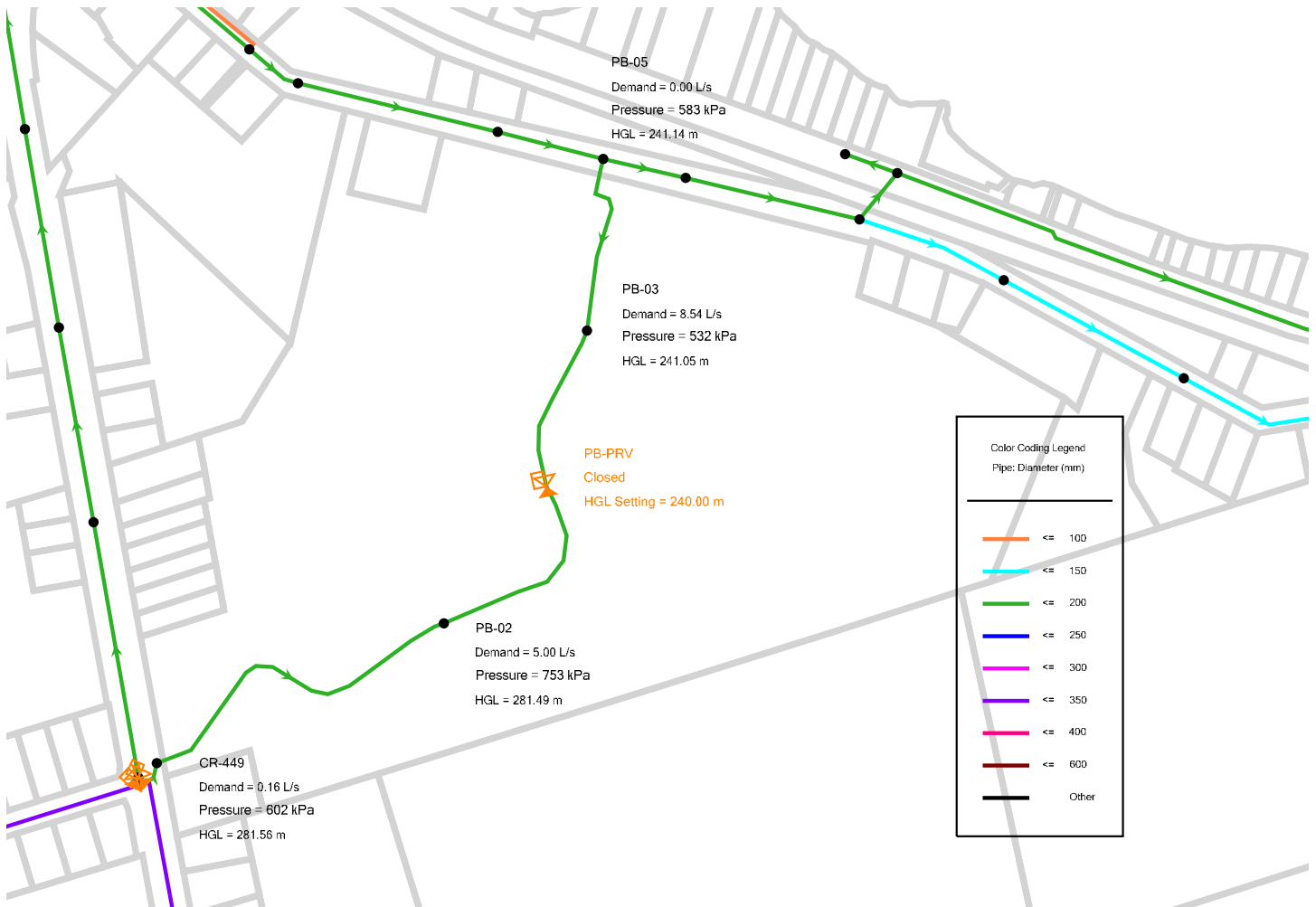
Parkbridge Craigleith

Maximum Day Demand + Fire Flow (OBC 45 L/s - Upper Side)

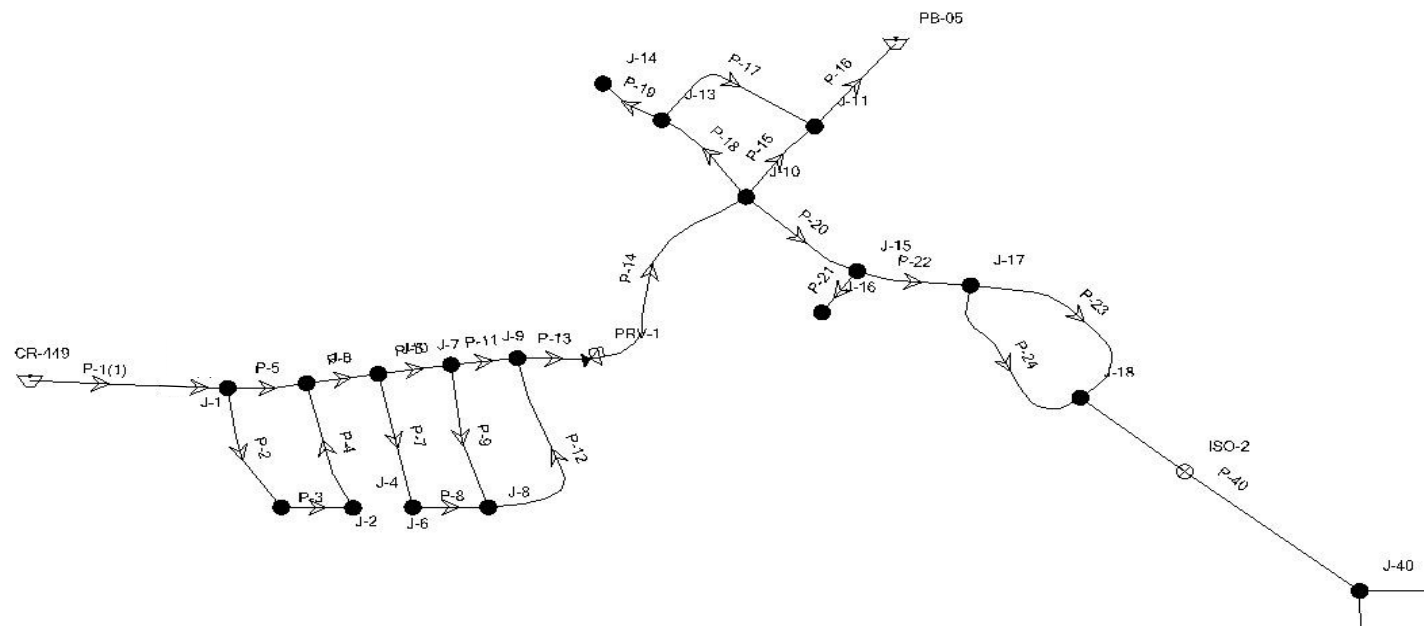
Connection to PZ 4



Parkbridge Craigleith Peak Hour Demand Connection to PZ 4



Water Model Schematic - Parkbridge Craigleith





Project: Parkbridge Craigleith
 Project No.: 1046-4031
 File: Pipe Loss Summary
 Design by: JE
 Date: 07-Sep-18
 Updated by: JS/MJ
 Updated: 16-Mar-22

PIPE LOSS SUMMARY

Pipe ID P1
Location Plater-Fleming Way
Size (mm) 300
Material PVC
Length (m) 197

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	3	0.20	0.60
30° Bend (Mitered)	4	0.10	0.40
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	1	1.28	1.28
Total			3.02

Pipe ID P2
Location Copper Crescent
Size (mm) 300
Material PVC
Length (m) 72

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	3	0.10	0.30
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	1	1.28	1.28
Total			1.97

Pipe ID P3
Location Copper Crescent
Size (mm) 200
Material PVC
Length (m) 54

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	4	0.20	0.80
30° Bend (Mitered)	0	0.10	0.00
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	0	1.28	0.00
Total			1.19

Pipe ID P4
Location Copper Crescent
Size (mm) 200
Material PVC
Length (m) 68

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	1	0.10	0.10
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	1	1.28	1.28
Total			1.77



Project: Parkbridge Craigleith
 Project No.: 1046-4031
 File: Pipe Loss Summary
 Design by: JE
 Date: 07-Sep-18
 Updated by: JS/MJ
 Updated: 16-Mar-22

Pipe ID P5
Location Plater-Fleming Way
Size (mm) 300
Material PVC
Length (m) 33

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	2	0.10	0.20
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	0	1.28	0.00
Total			0.94

Pipe ID P6
Location Plater-Fleming Way
Size (mm) 300
Material PVC
Length (m) 42

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	1	0.10	0.10
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	0	1.28	0.00
Total			0.84

Pipe ID P7
Location Coltsfoot Lane
Size (mm) 200
Material PVC
Length (m) 98

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	1	0.20	0.20
30° Bend (Mitered)	2	0.10	0.20
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	1	1.28	1.28
Total			2.07

Pipe ID P8
Location Coltsfoot Lane
Size (mm) 200
Material PVC
Length (m) 26

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	3	0.10	0.30
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	1	1.28	1.28
Total			1.97



Project: Parkbridge Craigeith
 Project No.: 1046-4031
 File: Pipe Loss Summary
 Design by: JE
 Date: 07-Sep-18
 Updated by: JS/MJ
 Updated: 16-Mar-22

Pipe ID P9
 Location Cottontail Crescent
 Size (mm) 200
 Material PVC
 Length (m) 110

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	1	0.20	0.20
30° Bend (Mitered)	2	0.10	0.20
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	1	1.28	1.28
Total			2.07

Pipe ID P10
 Location Plater-Fleming Way
 Size (mm) 300
 Material PVC
 Length (m) 34

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

Pipe ID P11
 Location Plater-Fleming Way
 Size (mm) 300
 Material PVC
 Length (m) 47

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	1	0.10	0.10
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	0	1.28	0.00
Total			0.84

Pipe ID P12
 Location Cottontail Crescent
 Size (mm) 200
 Material PVC
 Length (m) 175

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	2	0.39	0.78
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	4	0.20	0.80
30° Bend (Mitered)	3	0.10	0.30
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	1	1.28	1.28
Total			3.16



Project: Parkbridge Craigleith
 Project No.: 1046-4031
 File: Pipe Loss Summary
 Design by: JE
 Date: 07-Sep-18
 Updated by: JS/MJ
 Updated: 16-Mar-22

Pipe ID P13
 Location Plater-Fleming Way
 Size (mm) 300
 Material PVC
 Length (m) 127

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	6	0.10	0.60
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	0	1.28	0.00
Total			1.34

Pipe ID P14
 Location Plater-Fleming Way
 Size (mm) 200
 Material PVC
 Length (m) 143

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	5	0.10	0.50
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	0	1.28	0.00
Total			0.89

Pipe ID P15
 Location Festoon Crescent
 Size (mm) 200
 Material PVC
 Length (m) 111

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

Pipe ID P16
 Location Festoon Crescent
 Size (mm) 200
 Material PVC
 Length (m) 110

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	1	0.20	0.20
30° Bend (Mitered)	0	0.10	0.00
Tee (Line Flow)	2	0.35	0.70
Tee (Branch Flow)	0	1.28	0.00
Total			1.29



Project: Parkbridge Craigleith
 Project No.: 1046-4031
 File: Pipe Loss Summary
 Design by: JE
 Date: 07-Sep-18
 Updated by: JS/MJ
 Updated: 16-Mar-22

Pipe ID P17
 Location Festoon Crescent
 Size (mm) 200
 Material PVC
 Length (m) 199

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	2	0.39	0.78
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	3	0.20	0.60
30° Bend (Mitered)	2	0.10	0.20
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	1	1.28	1.28
Total			3.21

Pipe ID P18
 Location Nipissing Trail
 Size (mm) 200
 Material PVC
 Length (m) 137

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	4	0.10	0.40
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	1	1.28	1.28
Total			2.42

Pipe ID P19
 Location Nipissing Trail
 Size (mm) 200
 Material PVC
 Length (m) 69

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	1	0.10	0.10
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	0	1.28	0.00
Total			0.84

Pipe ID P20
 Location Nipissing Trail
 Size (mm) 200
 Material PVC
 Length (m) 134

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	1	0.10	0.10
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	0	1.28	0.00
Total			0.84



Project: Parkbridge Craigleith
 Project No.: 1046-4031
 File: Pipe Loss Summary
 Design by: JE
 Date: 07-Sep-18
 Updated by: JS/MJ
 Updated: 16-Mar-22

Pipe ID P21
 Location Butternut Court
 Size (mm) 200
 Material PVC
 Length (m) 49

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	0	0.10	0.00
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	1	1.28	1.28
Total			1.67

Pipe ID P22
 Location Nipissing Trail
 Size (mm) 200
 Material PVC
 Length (m) 103

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	1	0.39	0.39
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	0	0.20	0.00
30° Bend (Mitered)	1	0.10	0.10
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	0	1.28	0.00
Total			0.84

Pipe ID P23
 Location Nipissing Trail
 Size (mm) 200
 Material PVC
 Length (m) 208

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	3	0.39	1.17
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	3	0.20	0.60
30° Bend (Mitered)	4	0.10	0.40
Tee (Line Flow)	1	0.35	0.35
Tee (Branch Flow)	0	1.28	0.00
Total			2.52

Pipe ID P24
 Location Nipissing Trail
 Size (mm) 200
 Material PVC
 Length (m) 207

Minor Loss	Number of Fittings	Loss Coef. (K)	SubTotal
Gate Valve (Open)	2	0.39	0.78
90° Bend (R/D=1)	0	0.37	0.00
45° Bend (Mitered)	4	0.20	0.80
30° Bend (Mitered)	4	0.10	0.40
Tee (Line Flow)	0	0.35	0.00
Tee (Branch Flow)	1	1.28	1.28
Total			3.26



PZ 4 Boundary Conditions
ISO-2: Open
PRV-1: Closed
PRV-2: Inactive

Project: Eden Oak & Craigleith
Project No.: 218-2659
Design By: MJ
Date: January 21, 2022
Revision Date: June 8, 2023
Revised By: MJ

Junction Table - Average Day Demand

Connection 1A HGL = 281.95m		Connection 2 HGL = 243.45m		Connection 3 HGL = 243.34m		Connection 4 HGL = 243.34m
Label	Demand (L/s)	Elevation (m)	Zone	Hydraulic Grade (m)	Pressure (kPa)	
J-1	0.18	211.14	UpperZone	281.95	693.0	
J-2	0.05	212.96	UpperZone	281.95	675.0	
J-3	0.08	209.14	UpperZone	281.95	713.0	
J-4	0.07	210.95	UpperZone	281.95	695.0	
J-5	0.05	206.75	UpperZone	281.95	736.0	
J-6	0.06	207.47	UpperZone	281.95	729.0	
J-7	0.07	204.72	UpperZone	281.95	756.0	
J-8	0.18	206.87	UpperZone	281.95	735.0	
J-9	0.12	201.87	UpperZone	281.95	784.0	
J-10	0.55	186.8	Lower Zone	243.41	554.0	
J-11	0.17	183.93	Lower Zone	243.42	582.0	
J-13	0.19	187.61	Lower Zone	243.41	546.0	
J-14	0.05	188.95	Lower Zone	243.41	533.0	
J-15	0.18	185.7	Lower Zone	243.39	565.0	
J-16	0.06	187.56	Lower Zone	243.39	546.0	
J-17	0.29	183.46	Lower Zone	243.37	586.0	
J-18	0.24	185.01	Lower Zone	243.37	571.0	
J-40	0.69	187.33	Lower Zone	243.34	548.00	
J-41	0.00	186.00	Lower Zone	243.34	561.00	
J-42	0.59	185.05	Lower Zone	243.34	570.00	
J-43	0.37	187.25	Lower Zone	243.34	549.00	
J-44	0.67	192.63	Lower Zone	243.34	496.00	
J-45	0.00	180.72	Lower Zone	243.34	613.00	



PZ 4 Boundary Conditions
ISO-2: Open
PRV-1: Closed
PRV-2: Inactive

Project: Eden Oak & Craigleith
Project No.: 218-2659
Design By: MJ
Date: January 21, 2022
Revision Date: June 8, 2023
Revised By: MJ

Junction Table - Peak Hour Demand

Connection 1A HGL = 281.54m		Connection 2 HGL = 237.45m		Connection 3 HGL - 237.18m	Connection 4 HGL - 237.34m
Label	Demand (L/s)	Elevation (m)	Zone	Hydraulic Grade (m)	Pressure (kPa)
J-1	0.81	211.14	UpperZone	281.54	689.0
J-2	0.22	212.96	UpperZone	281.54	671.0
J-3	0.38	209.14	UpperZone	281.54	709.0
J-4	0.32	210.95	UpperZone	281.54	691.0
J-5	0.22	206.75	UpperZone	281.54	732.0
J-6	0.27	207.47	UpperZone	281.54	725.0
J-7	0.32	204.72	UpperZone	281.54	752.0
J-8	0.81	206.87	UpperZone	281.54	731.0
J-9	0.54	201.87	UpperZone	281.54	780.0
J-10	2.48	186.8	Lower Zone	237.29	494.0
J-11	0.75	183.93	Lower Zone	237.33	523.0
J-13	0.86	187.61	Lower Zone	237.30	486.0
J-14	0.22	188.95	Lower Zone	237.30	473.0
J-15	0.81	185.7	Lower Zone	237.24	504.0
J-16	0.27	187.56	Lower Zone	237.24	486.0
J-17	1.29	183.46	Lower Zone	237.21	526.0
J-18	1.08	185.01	Lower Zone	237.20	511.0
J-40	3.13	187.33	Lower Zone	237.18	488.0
J-41	0.00	186.00	Lower Zone	237.18	501.0
J-42	2.64	185.05	Lower Zone	237.19	510.0
J-43	1.67	187.25	Lower Zone	237.18	489.0
J-44	3.02	192.63	Lower Zone	237.17	436.0
J-45	0.00	180.72	Lower Zone	237.23	553.0



PZ 4 Boundary Conditions
ISO-2: Open
PRV-1: Active
PRV-2: Inactive

Project: Eden Oak & Craigleith
Project No.: 218-2659
Design By: MJ
Date: January 21, 2022
Revision Date: June 8, 2023
Revised By: MJ

Junction Table - Max Day + Fire Demand (133 L/s)

Connection 1A HGL = 275.94m Connection 2 HGL = 233.22m Connection 3 HGL = 215.03m Connection 4 HGL = 215.84m

Label	Elevation (m)	Zone	Pressure (Calculated Lower Limit) (kPa)	Fire Flow Available (L/s)
J-1	211.14	UpperZone	444.0	263.26
J-2	212.96	UpperZone	399.0	263.26
J-3	209.14	UpperZone	435.0	263.26
J-4	210.95	UpperZone	382.0	263.26
J-5	206.75	UpperZone	434.0	263.26
J-6	207.47	UpperZone	384.0	263.26
J-7	204.72	UpperZone	421.0	263.26
J-8	206.87	UpperZone	376.0	263.26
J-9	201.87	UpperZone	418.0	263.26
J-10	186.8	Lower Zone	230.0	225.87
J-11	183.93	Lower Zone	230.0	271.90
J-13	187.61	Lower Zone	167.0	247.39
J-14	188.95	Lower Zone	237.0	156.98
J-15	185.7	Lower Zone	215.0	181.72
J-16	187.56	Lower Zone	219.0	156.96
J-17	183.46	Lower Zone	161.0	238.54
J-18	185.01	Lower Zone	174.0	228.92
J-40	187.33	Lower Zone	140.0	218.2
J-41	186.00	Lower Zone	146.0	312.7
J-42	185.05	Lower Zone	140.0	254.4
J-43	187.25	Lower Zone	165.0	175.4
J-44	192.63	Lower Zone	246.0	127.9
J-45	180.72	Lower Zone	165.0	274.3