



Town Council Meeting
Council Chambers, conducted through Zoom and
streamed live to Facebook.

Wednesday, September 11, 2024

Immediately following Committee of the Whole

AGENDA

1. Call to Order – Welcome
2. Approval of Agenda
pages 1 - 2
3. Approval of Minutes – June 27, 2024 – Regular Council Meeting –
pages 3 - 15
 - July 17, 2024 - Special Council Meeting
pages 16 - 17
 - August 7, 2024 - Special Council Meeting
Pages 18 - 24
4. Business
 - 4.1 WaterCAD Study – presentation
Pages 25 - 65
 - 4.2 Request for Water and Services – Ann Okwese – update and discussions
 - 4.3 Request for Water Services – Bill O’Neil and Cindy Austin – update and discussions
 - 4.4 Request for Water and Sewer Services – Tim Ellis
 - 4.5 Request for Water Services – Kate Wood
 - 4.6 Temporary Borrowing Resolution – Fire Truck (Rescue Pumper and Town Garage)
 - 4.7 Town of Oxford recreation field – parking area – housekeeping item

5. Correspondence

Nil

6. In-Camera

6.1 acquisition, sale, lease, and security of municipal property

7. Adjournment



Minutes of the Regular Council Meeting

Place: Council Chambers, Zoom, streamed live to Facebook
Date: Wednesday, June 27, 2024
Presiding Officer: Mayor Greg Henley
Councillors Present: Carla Black, Paul Jones, Deputy Mayor Arnold
MacDonald, Brenton Colborne, Chrystal McNutt, and
Olivia Canning
Councillors Regrets: *Nil*

A quorum was present throughout the meeting.

Staff in attendance: Linda Cloney – CAO, Ruthann Brookins – Manager of Finance, and Stan McDougall - Admin Assistant (recording secretary).

Media in attendance: Mark Rushton, SixRivers News, Radio, and TV via Zoom.

Gallery in attendance: Community members: Josephine MacDonald, Kelly Milner, Steve McLellan, Mark Rushton, Marion Abbott, Giancarlo Piccin, Tom VanHoek, Marilyn Nolan and Greg Moore.

Prior to calling the meeting to order, Mayor Henley welcomed those in attendance from the public seated in the gallery.

1. Call to Order – Welcome

At 6:02 PM, Mayor Henley called the meeting to order.

2. Approval of Agenda, pages 1 – 2

Moved by Councillor Jones and seconded by Councillor McNutt that the agenda of the Regular Council Meeting for June 27, 2024, be approved, as presented.

Motion Carried

3. Approval of Minutes

- **May 22, 2024 – Regular Council Meeting, pages 3 - 10**
- **June 12, 2024 – Special Council Meeting, pages 11 – 15**
- **June 19, 2024 - Special Council Meeting, pages 16 – 21**

Approved by _____
Mayor Greg Henley, on June 27, 2024

4. Business

4.1 Public Hearing – Bylaw #05-2024-2 Road Trails Designation Bylaw

Mayor Henley called the Public Hearing for the matter of Bylaw #05-2024-2 Roads Trails Designation Bylaw to order at 6:03 PM.

Mayor Henley turned the floor over to Councillor Jones to present a review of the information leading up to this Public Hearing to all in attendance.

Councillor Jones welcomed everyone in attendance and introduced himself as the Chair of the Road Trails Act Review Committee with members present including Councillor McNutt, Councillor Colborne, and Councillor Canning.

Councillor Jones presented that the Road Trails Act Review Committee started meeting on May 30, 2023, shortly after the announcement of the Road Trails Act was enacted and which was given Royal Assent on April 12, 2023. The act's purpose is to enable the operation of off-highway vehicles on designated parts of highways to allow for trail and amenity connectivity.

The Committee met and considered many factors, spoke with experts in the field and held a public information session on April 3, 2024, at the Oxford Capitol Theatre. They had a panel of experts available and answered questions from the floor. 37 public members were in attendance, not including the panel, committee members, or staff.

Some items of concern were shared with the committee throughout the public hearing process including discussion on how it will be policed, concerns of

late-night travellers, and how ATV operators would find out about the routes as a few examples.

The RCMP is the current policing service for the Town of Oxford and will continue to be the primary policing body for the trails. If the bylaw, once passed, is abused and not respected, the Oxford Council may vote to rescind it. The act currently only allows riders to travel 30 minutes before sunrise until 30 minutes after sunset at a maximum of 25 km/hr. At the trailheads, signage will be posted and will include a QR code allowing the rider to display the rules on their cell phone and the trail route will be marked with additional signage.

If the bylaw passes a second reading, it does not become enacted until the proper signage is in place.

Benefits for the bylaw were discussed including attracting additional business to existing businesses and potentially new businesses to come to Oxford as it has for other communities who have passed similar bylaws. The establishment of the bylaw will help regulate the use allowing for the policing on illegal use in areas where the bylaw would not apply

It was discussed that the Committee did consider making all of the streets of Oxford ATV-friendly but decided that it would be best to adhere to the ACT which centres around the connection of amenities. Therefore, the streets in Oxford that would be affected are from the “Circle K” on Main Street to “Shelley’s Convenience” on Lower Main Street up to the trailhead on Water Street. No other streets would be considered for this bylaw at that time but could be reviewed again by the Council if this proves to be successful.

After all the meetings and listening to the public *for* and *against* the Road Trails Designation Bylaw, the Road Trails Act Committee made a motion to recommend to the Council to enact the Road Trails Designation Bylaw #05-2024-2.

Councillor Jones concluded his presentation and turned the floor back over to Mayor Henley.

Mayor Henley gave the floor to Linda Cloney, CAO for an update on correspondence related to the second reading.

Linda Cloney presented correspondence received *for* and *against* the second reading of the Road Trails Designation Bylaw #05-2024-2, stating the names of the individuals writing in either for or against. A petition was also received which included 330 signatures in support of the legislation granting OHV (Off Highway Vehicles) permission on Main and Water Street in Oxford.

It was further noted that the Council had received a copy of the correspondence and the petition. The remaining correspondence had been received by the Council before the meeting. Linda Cloney concluded the presentation of the correspondence and turned the floor back over to Mayor Henley.

Mayor Henley turned the floor over to Josephine MacDonald, a resident of the Town of Oxford to present to the Council to address concerns of accessibility in the Town of Oxford and the potential impact of the passing of the Road Trails Act Bylaw. Josephine MacDonald presented to the Council various concerns regarding accessibility in the Town of Oxford, reviewing lived examples and where accessibility may be improved in the Town. Josephine discussed the Town of Oxford Accessibility Plan and the work that needs to be done to comply with the Act for the deadline of 2030. A poll was presented to the Council of 82 signatures and 371 responses to the survey. Of the signatures collected, 91.5% were against the second reading and 8.5% were in favour of the second reading. Josephine concluded her presentation and thanked the Council for their time and careful consideration.

Mayor Henley thanked Josephine for her presentation.

Mayor Henley asked anyone in the gallery if they would like to speak to the second reading of the Road Trails Act Bylaw. Steven McLellan, a resident of the Town of Oxford requested to speak.

Mayor Henley turned the floor over to Steven McLellan. Steven McLellan introduced himself as a resident of the Town of Oxford and an avid OHV rider. Steven discussed his travels on snowmobiles in most provinces of Canada and

on ATV in most of Eastern Canada. Steven discussed that the second reading of the bylaw wasn't to make Main Street Oxford a trail. Rather, it is to make the designated route legally accessible for OHV riders to travel down and access local businesses and get from one end of Oxford to the other. Steven stated examples of various businesses that would benefit from the second reading. There are lots of opportunities for OHV riders to access local businesses in the Town of Oxford. The OHV Community look for and uses ATV-friendly towns and their businesses because they know they can feel safe using the routes legally. Steven discussed that most of the OHV riders travel legally and want to use the routes legally. Steven believed that the spirit for the second reading is for the legal rider and fully supported the second reading and the economic boost is needed for the Town of Oxford.

There being nothing further, Mayor Henley ended the Public Hearing at 6:24 PM.

4.2 Bylaw #05-2024-2 Road Trails Designation Bylaw – second reading, *pages 22 – 23 – Councillor McNutt*

Moved by Councillor McNutt and seconded by Councillor Jones that the Town Council proceed to second reading of the proposed bylaw under the Road Trails Act, which would make a portion of Main Street (from civic number 4602 to civic number 5228), a portion of Lower Main Street (from civic number 105 to civic number 460), and a portion of Water Street (from civic number 9 to civic number 237) all part of the designated Road Trail, in Oxford, Nova Scotia.

Also, that the Road Trails Designation Bylaw #05-2024-2 will be enforced and enacted when the Road Trails signage is installed, and the bylaw is advertised.

Councillor Black questioned how long it would take to have the signage in place. Mayor Henley answered that signage will be ordered once a second reading is passed. Linda Cloney, CAO estimated that the signage could be installed approximately by July or August, depending on funding process.

Councillor McNutt reviewed that accessibility is being worked on diligently by the Accessibility Committee and accessibility issues in the Town of Oxford are

being continually worked on. Councillor McNutt was in favour of the positive effects that the bylaw would have for the Town of Oxford.

Deputy Mayor MacDonald reviewed the “What it is” and “What it isn’t” pamphlet which was presented at the public hearing.

Hearing no further discussion, the motion was held to a vote.

Councillor Jones – Yes
Councillor Colborne – Yes
Deputy Mayor MacDonald – Yes
Councillor Canning – Yes
Councillor McNutt – Yes
Councillor Black – Yes
Mayor Henley – Yes

Motion Carried

4.3 RFD – Approve changes made to Procurement Policy, Pages 24 – 52

Linda Cloney, CAO, reviewed that the Procurement Policy proposed threshold amendments were reviewed at the last Committee of the Whole and the Committee of the Whole recommended these amendments to the Council and were included in the Council package.

Moved by Deputy Mayor MacDonald and seconded by Councillor Colborne the Council approves the amendments made to the thresholds in the Procurement Policy as presented.

Motion Carried

4.4 RFD – Permission to operate licensed cotton candy, Page 53

Linda Cloney reviewed with the Council that a request had been received from Mr. Leon Burke from the Town of Amherst to operate his licensed cotton candy stand on the town-owned property for business purposes during weekends and town events. Mr. Burke requested to set up in the parking lot in front of the skateboard park and at the baseball field during games.

Linda discussed a similar request that had been received before this one. The Town of Oxford does not have a bylaw currently for mobile vendors and it may be a requirement to discuss developing one soon. Linda discussed further that the Council should consider a similar approach to that of the Town of Amherst. The requirement for liability insurance by the vendor. A \$200.00 non-refundable application fee was discussed as part of the requirement of the Town of Amherst.

Moved by Councillor McNutt and seconded by Councillor Black that Council grants Mr. Burke permission to operate their licensed cotton candy stand on the town-owned property for business purposes during weekends and possibly for town events if invited by staff or the minor ball association. This is conditional. They must clean up their own garbage, avoid vending in front of other vendors that sell similar products and possess liability insurance. Also, they must pay a yearly fee of \$200.00 and fill out an application form provided by the town.

Deputy Mayor MacDonald discussed requiring an application for a license for commercial vendors to attend by special event rather than by the year.

Councillor Jones inquired if the permit to operate would stipulate that the vendor is only allowed to offer what was stated in the request to operate, not to operate or sell additional items.

Hearing no further discussion, the motion was held to a vote.

Councillor Jones – *No*

Councillor Colborne – *Yes*

Deputy Mayor MacDonald – *Yes*

Councillor Canning – *Yes*

Councillor McNutt – *Yes*

Councillor Black – *Yes*

Mayor Henley – *Yes*

Motion Carried

4.5 RFD – Municipal Election format – reconsideration – Request from Accessibility Committee – Deputy Mayor MacDonald, Page 54

Moved by Deputy Mayor MacDonald and seconded by Councillor McNutt that the motion, which was approved at the May 22, 2024, Council Meeting whereby the Council adopted the fully paper ballot voting method of the 2024 Council and School Board Election Year be rescinded.

Councillor Jones – *No*
Councillor Colborne – Yes
Deputy Mayor MacDonald – Yes
Councillor Canning – Yes
Councillor McNutt – Yes
Councillor Black – Yes
Mayor Henley – Yes

Motion Carried

Moved by Deputy Mayor MacDonald and seconded by Councillor McNutt that the motion, which was approved at the May 22, 2024, Council Meeting whereby the Council approved the schedule of fees for the 2024 Council and School Board Election for the fully paper ballot voting method in the estimated amount of \$6, 557.30 be rescinded.

Councillor Jones – *No*
Councillor Colborne – Yes
Deputy Mayor MacDonald – Yes
Councillor Canning – Yes
Councillor McNutt – Yes
Councillor Black – Yes
Mayor Henley – Yes

Motion Carried

Deputy Mayor MacDonald read a letter from the Accessibility Committee to the Council where the Accessibility Committee asked the Council to consider a hybrid model, allowing everyone an opportunity to vote by paper, phone or

Internet. Prices were reviewed that a fully paper model would cost an estimated amount of \$6,557.30. A fully electronic model would cost an estimated amount of \$10,694.85. A hybrid model consisting of paper and electronic would cost an estimated amount of \$11,332.50. A motion was made at the May 27, 2024, Accessibility Committee meeting for the Council to reconsider the format for the Municipal Election and consider a hybrid model at the estimated cost of \$11,332.50 to allow everyone the opportunity to vote.

Moved by Deputy Mayor MacDonald and seconded by Councillor Canning that Council adopt the hybrid voting method, which includes paper, phone and Internet and to approve the schedule of fees for the 2024 Council and School Board Election in the estimated amount of \$11,332.50.

Councillor McNutt asked why both methods would need to be considered. Councillor Canning reviewed that seniors, people without Internet and people with accessibility requirements may need to use the paper ballot method. It would make it unfair to not offer both methods and a hybrid would make it easy for anyone to take part in the vote.

Hearing no further discussion, the motion was held to a vote.

Councillor Jones – *No*
Councillor Colborne – Yes
Deputy Mayor MacDonald – Yes
Councillor Canning – Yes
Councillor McNutt – Yes
Councillor Black – Yes
Mayor Henley – Yes

Motion Carried

4.6 RFD – Amber lights on Water Street Crosswalk – request from Accessibility Committee – Councillor Canning, Page 55

Councillor Canning-Sweet reviewed with the Council that the Accessibility Advisory Committee discussed that after the crosswalk was installed due to one of the pedestrian sidewalks being closed for repair on the Water Street bridge,

there have been near misses and traffic not noticing the crosswalk due to the nature of the roadway. Knowing that the crosswalk was to be repainted, the Accessibility Advisory Committee discussed the recommendation to install amber lights at that crosswalk. A motion by the Accessibility Advisory Committee was moved by Deputy Mayor MacDonald and seconded by Amanda Purdy for the Council to consider purchasing amber lights at the Water Street bridge crossings.

Linda Cloney reviewed with the Council that research had been done by staff regarding the estimated costs for the installation of the amber flashing lights. The estimated cost for two flashing amber lights would be approximately \$7,230. The flashing lights would be installed at the ballfield crossing (one on each side of the road facing traffic) to alert motorists of the crosswalk.

Public Works had discussed extending the sidewalk on the ballfield side and then relocating the crosswalk down to the end of the extension. Relocating the crosswalk now may not be an option due to there being no sidewalk present with only a gravel pathway available.

Funding for the amber flashing lights, sidewalk extension and/or crosswalk relocation may involve moving some projects around within the health and safety GL to allow the project to fit within the 2024-25 budget.

In discussion with the vendor of the amber flashing lights, they are movable later if the crosswalk is moved out further.

Councillor Canning inquired about the extension of the sidewalk to possibly eliminate the need for the amber flashing lights given the cost. The Council discussed that the amber flashing lights would be a requirement either way.

Moved by Councillor Canning and seconded by Councillor Jones that the Council consider purchasing amber flashing lights at the Water Street crossing.

Motion Carried

5. Correspondence

5.1 **12-Month Notice Letter to NSFM – Letter from Municipal Affairs and Housing** – Ruthann Brookins – Manager of Finance, *pages 56-59 – for Council information purposes.*

Ruthann Brookins, Manager of Finance, reviewed with the Council the 12-month notice released from the Nova Scotia Federation of Municipalities for the 2025-26 Budget year of potential changes in upcoming provincial changes to legislation in various departments which may affect costs and fees for various municipal programs and employment legislation.

5.2 **Cumberland Public Libraries – Brief Report**, *pages 60-61, for information purposes.*

6. In-Camera

6.1 acquisition, sale, lease, and security of municipal property

At 7:05 PM it was moved by Councillor Jones and seconded by Councillor McNutt to go in-camera to discuss the acquisition, sale, lease, and security of municipal property.

Motion Carried

At 7:37 PM it was moved by Deputy Mayor MacDonald and seconded by Councillor Jones to come out of in-camera and resume the Regular Council Meeting.

Motion Carried

Linda Cloney, CAO, reviewed that the Town of Oxford had been approached by Oxford Frozen Foods with their interest in the purchase of land. The land had been identified as no longer required for Municipal purposes. The PID referred to is 25208695 and the purpose of the sale of land is for residential housing. This was determined by the Council that this would be a value to the town.

Moved by Councillor McNutt and Seconded by Councillor Jones that WHEREAS the Town of Oxford (the "Town") owns certain real property located at Meadow Lane, Oxford, being PID 25208695 (the "Meadow Lane Lands");

AND WHEREAS Oxford Frozen Foods Limited ("OFF") has expressed an interest in purchasing a 150-foot by 85-foot building lot out of the Meadow Lane Lands for the purpose of residential housing, which purpose is ultimately beneficial to the financial interest of the Town; AND WHEREAS section 50(5)(b) of the Nova Scotia Municipal Government Act permits the Town to sell real property at fair market value when the property is no longer required for municipal purposes;

AND WHEREAS Town Council, having reviewed the issue with its Public Works Department, has determined that all or substantially all of the Meadow Lane Lands are no longer required for municipal purposes;

AND WHEREAS the Town has retained the services of a certified real property appraiser who has valued the proposed Building Lot at \$39,500 (the "Appraisal");

AND WHEREAS OFF has offered to purchase the Building Lot for an amount in excess of the appraised value (\$40,000 + HST);

NOW THEREFOR BE IT RESOLVED as follows:

1. The Town hereby declares the proposed Building Lot to be lands which are no longer required for municipal purposes.
2. The Town accepts the Appraisal as an accurate assessment of the fair market value of the Building Lot;
3. The Town hereby agrees to sell the Building Lot to OFF for the Offered Price, provided however that OFF bear any and all transaction costs, including without limitation, all legal, surveying and administrative costs, in relation to the migration of the Meadow Lane Lands (PID 25208695), the subdivision of the Building Lot out of the Meadow Lane Lands, and the conveyance of the Building Lot from the Town of Oxford to OFF.
4. The Town's Mayor and Chief Administrative Officer are hereby authorized, acting together, for and on behalf of the Town, to take any action, make any decision, or sign any and all documents necessary to facilitate the transaction contemplated by the foregoing resolution, and without limiting the generality of the foregoing, to retain any required professional service providers or to consent to same being retained by OFF.

This motion was not carried officially.

7. Adjournment

Before the adjournment of the meeting, Mayor Henley announced that this meeting was scheduled to be the last meeting for the Council for the summer with the Council returning in early September.

The meeting adjourned at 7:42 PM

Greg Henley, Mayor, Chair

Stan McDougall, Admin Assistant

Date Approved



Minutes of the Special Council Meeting

Place: Council Chambers, Zoom, streamed live to Facebook
Date: Wednesday, July 17, 2024
Presiding Officer: Mayor Greg Henley
Councillors Present: Carla Black, Paul Jones, Deputy Mayor Arnold
MacDonald, Olivia Canning-Sweet, and Chrystal McNutt
Councillors Regrets: *Brenton Colborne*

A quorum was present throughout the meeting.

Staff in attendance: Linda Cloney – CAO (recording secretary)

Media in attendance: *Nil*

Gallery in attendance: *Nil*

1. **Call to Order**

At 6:00 PM, Mayor Henley called the meeting to order.

2. **Approval of Agenda**

Moved by Councillor Canning-Sweet and seconded by Councillor Black that the agenda of the Special Council Meeting for July 17, 2024, be approved, as presented.

Motion Carried

3. **In Camera**

3.1 acquisition, sale, lease, and security of municipal property

At 6:02 PM it was moved by Deputy Mayor MacDonald and seconded by Councillor Black to go in-camera to discuss the acquisition, sale, lease and security of municipal property.

Motion Carried

At 6:17 PM it was moved by Councillor Black and seconded by Councillor Canning-Sweet to come out of in-camera and resume the Special Council Meeting.

Motion Carried

Moved by Deputy Mayor MacDonald and seconded by Councillor Black to start the proceedings to sell the municipal property (PID #25500943) to the Oxford Community Centre.

Motion Carried

4. **Adjournment**

The meeting adjourned at 6:19 PM

Greg Henley, Mayor, Chair

Stan McDougall, Admin Assistant

Date Approved



Minutes of the Special Council Meeting

Place: Council Chambers, Zoom, streamed live to Facebook
Date: Wednesday, August 7, 2024
Presiding Officer: Mayor Greg Henley
Councillors Present: Carla Black, Paul Jones, Brenton Colborne, Deputy Mayor Arnold MacDonald, Olivia Canning-Sweet, and Chrystal McNutt (*via Zoom*)
Councillors Regrets: *Brenton Colborne*

A quorum was present throughout the meeting.

Staff in attendance: Linda Cloney – CAO, and Stan McDougall (recording secretary)

Media in attendance: *Nil*

Gallery in attendance: *Nil*

Announcements before call to order:

Mayor Henley announced that the municipal elections would be this coming fall. If anyone is considering to run for Council, nominations started on August 29, 2024.

Nominations could also be filed on August 30, September 3, 4, 5, 6, 9 and 10th and an appointment can be made with the Returning Officer for further details. Nominations require 5 signatures, a candidate must be a resident of Oxford since March 9, 2024 (six months preceding Nomination Day), must be on the voter's list, and must be a resident of Canada. Candidates must have all taxes and water paid up to date not including the final tax bill coming out in late August.

The deposit for running as a candidate in the 2024 Municipal Election is \$50.00.

September 10, 2024, is nomination day.

October 10 and October 15, 2024, are Advanced Polling days at the Oxford Fire Hall. October 19, 2024, is Election Day and will take place at the Oxford Fire Hall.

1. **Call to Order**

At 6:02 PM, Mayor Henley called the meeting to order.

2. **Approval of Agenda**

Moved by Councillor Black and seconded by Councillor Canning-Sweet that the agenda of the Special Council Meeting for August 7, 2024, be approved, as presented.

Motion Carried

3. **In Camera**

3.1 acquisition, sale, lease, and security of municipal property

At 6:03 PM it was moved by Deputy Mayor MacDonald and seconded by Councillor Jones to go in-camera to discuss the acquisition, sale, lease and security of municipal property.

Motion Carried

At 6:17 PM it was moved by Deputy Mayor MacDonald and seconded by Councillor Jones to come out of in-camera and resume the Special Council Meeting.

Motion Carried

Linda Cloney presented that there were three items Council wishes to address coming out of in-camera. The first item is in response to a letter received from Oxford Frozen Foods and Kent Thompson regarding a feasibility study for a preliminary design for water and sewer services across the Trans Canada Highway. The letter describes both parties fronting 50% of the preliminary design feasibility study in a joint agreement.

Councillor Jones added that the agreement also involves a grant in lieu of taxes, for future development should the project proceed wherein the credit would be granted on their taxes based on a Council decision at that time.

Moved by Councillor Jones and seconded by Deputy Mayor MacDonald to approve the request as presented in the letter from Oxford Frozen Foods and Kent Thompson for 50% towards the preliminary design feasibility study for the extension of water and sewer services across the Trans Canada highway.

Motion Carried

Secondly, a letter was received from the Oxford Seniors Club, located at 31 Ellis Street. The letter asked the Council to consider granting annual tax-exemption to the property.

Moved by Deputy Mayor MacDonald and seconded by Councillor Jones that the property located at 31 Ellis Street, for the Oxford Seniors Club, be property tax exempt annually.

Motion Carried

Lastly, at the last Special Council Meeting in June, a motion was made regarding sale of lands on Meadow Lane that needed to be clarified. The motion was not formally approved, however, the motion needed to include wording concerning land development costs incurred by Oxford Frozen Foods that the Town of Oxford would need to reimburse.

Moved by Councillor Black and Seconded by Councillor Jones that WHEREAS the Town of Oxford (the "Town") owns certain real property located at Meadow Lane, Oxford, being PID 25208695 (the "Meadow Lane Lands");

AND WHEREAS Oxford Frozen Foods Limited ("OFF") has expressed an interest in purchasing a 150-foot by 85-foot building lot (the "Building Lot"; as graphically depicted in the sketch attached hereto) out of the Meadow Lane Lands for the purpose of residential housing, which purpose is ultimately beneficial to the financial interests of the Town;

AND WHEREAS section 50(5)(b) of the Nova Scotia *Municipal Government Act* permits the Town to sell real property at fair market value when the property is no longer required for municipal purposes.

AND WHEREAS Town Council, having reviewed the issue with its Public Works Department, has determined that all or substantially all of the Meadow Lane Lands are no longer required for municipal purposes;

AND WHEREAS the Town has retained the services of a certified real property appraiser who has valued the proposed Building Lot at \$39,500 (the "Appraisal");

AND WHEREAS OFF has offered to purchase the Building Lot for an amount of \$40,000 + HST which is in excess of the appraised value (the "Offered Price");

AND WHEREAS it is acknowledged that OFF has provided land development costs in the amount of \$14,232.50 + HST and that the Town of Oxford will set off that amount from the offered price.

NOW THEREFOR BE IT RESOLVED as follows:

1. The Town hereby declares the proposed Building Lot to be lands which are no longer required for municipal purposes.
2. The Town accepts the Appraisal as an accurate assessment of the fair market value of the Building Lot;
3. The Town hereby agrees to sell the Building Lot to OFF for the Offered Price, provided however that OFF bear any and all transaction costs, including without limitation, all legal, surveying and administrative costs, in relation to the migration of the Meadow Lane Lands (PID 25208695), the subdivision of the Building Lot out of the Meadow Lane Lands, and the conveyance of the Building Lot from the Town of Oxford to OFF.

4. The Town's Mayor and Chief Administrative Officer are hereby authorized, acting together, for and on behalf of the Town, to take any action, make any decision, or sign any and all documents necessary to facilitate the transaction contemplated by the foregoing resolution, and without limiting the generality of the foregoing, to retain any required professional service providers or to consent to same being retained by OFF.

Councillor Jones – Yes

Councillor Colborne – Yes

Deputy Mayor MacDonald – Yes

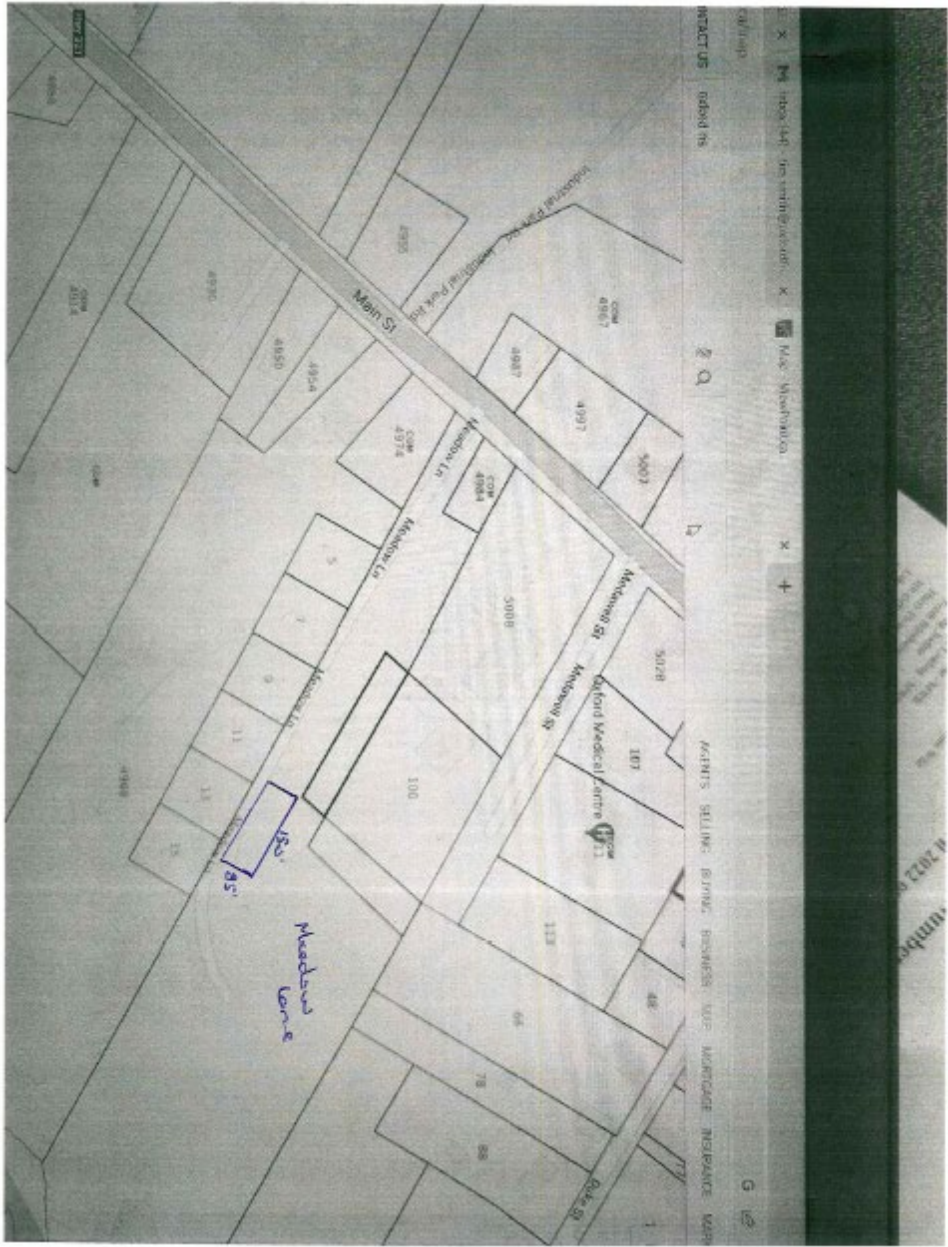
Councillor Canning-Sweet – Yes

Councillor McNutt – Yes

Councillor Black – Yes

Mayor Henley – Yes

Motion Carried



4. **Adjournment**

The meeting adjourned at 6:25 PM

Greg Henley, Mayor, Chair

Stan McDougall, Admin Assistant

Date Approved

DRAFT

July 17, 2024

Town of Oxford
168 Water Street
P.O. Box 670
Oxford, Nova Scotia
B0T 1W0

Attention: CAO - Linda Cloney

Development of WaterCAD Model – Town of Oxford – Report

Dillon Consulting Limited (Dillon) was retained by the Town of Oxford (Town) to develop a WaterCAD model to represent the Town's existing water distribution system. The objectives of this project included confirming existing conditions through on-site investigations, the creation of a Steady-State WaterCAD model, and scenario analysis to identify opportunities for system improvements and optimization.

The model was used to identify areas of concern within the existing water distribution system so that recommendations could be made to enhance the system's performance. It is intended that this model will also be used in the future to analyze the impact of future developments to the existing system and to make recommendations on the design characteristics of these developments. As part of this project, the Town requested that Dillon use the WaterCAD model to analyze the impact and make recommendations for a potential new development of an additional nine (9) single detached homes off of Horton Street, located on the east end of the Town.

This report presents a review of the steady-state computational hydraulic model, using WaterCAD software, that has been developed by Dillon and validated using hydrant testing provided by Aqua Data Atlantic. Also included in this report are recommendations to mitigate several reported issues within the existing system and the findings and recommendations from the future development scenario analysis that was conducted for the addition of nine (9) homes on Horton Street.

Background

When attempting to add an additional watermain connection to the 50 mm galvanized steel watermain on Horton, the Town determined that the existing steel line was almost completely closed off by tuberculation (a build up of iron oxide precipitation) and would not be able to provide enough water to the planned new housing development of currently four (4) homes. The Town eventually planned on adding a total of nine new homes to this area, and reached out to Dillon expressing concern that the existing water distribution system can not meet residential pressure requirements in this area under existing conditions.



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The Town also received complaints about low water pressure on the neighbouring Handel Street. During discussions, it was also noted that adequate fire flows may not be able to be obtained throughout the Town due to inadequate transmission mains. Dillon determined that in order to properly make recommendations to address these concerns, a WaterCAD model of the existing water distribution system would be required.

Data Collection

To create the model, Dillon collected available existing information and data on the system. This included a site visit on April 3, 2024 where a topographic survey was conducted and the locations and elevations of the existing tanks, valve chambers and select fire hydrants that were used by Aqua Data Atlantic to validate the model were collected.

The following is a list of resources that were used during the creation of the model that were received from the Town:

- 23-6115_2021-2023 Master Datasheet: Main Tank (Route 204) Flow Data (Date, GPM Flow) provided Average Day Demand (ADD) and Max Day Demand (MDD).
- Oxford Water Utility – Water Consumption Report: Provided 2019, 2020, 2021, 2022, and 2023 metered water consumption within the Town.
- Tank level Max and Min Datasheets: Provided Route 204 Tank Water Level elevations (Date, Time, Water Level Elevation).
- Valve and Tank details: Provided water storage tank details (Route 204 Tank & Pugwash Road Tank) and pressure reducing valve (PRV) chamber details.

The following resources were collected from the Dillon archives of past projects completed for the Town:

- “Town of Oxford Water System Assessment – Dillon Consulting Final Report (2023)”: System assessment report for the Town provided the existing Distribution System Schematic used to create the layout of the existing water distribution system.
- “Town of Oxford Operation and Maintenance Manual Water Treatment System – Dillon Consulting (2021)”: Provided information on the two tanks supplying the town (Route 204 Tank & Pugwash Road Tank).

Water CAD Model Development

The WaterCAD model of the existing water distribution system was created with the following design parameters, water demands, assumptions, and model validation



process. Also presented are the final modelled system pressure and fire flow analysis results.

Design Parameters

The key water system design parameters used in the development of the model are summarized in **Table 1**.

Table 1: Water System Design Parameters

Parameter	Value
¹ Population (2021 Census)	1100
Average # of People/House	2.2 (2016 Stats Canada)
² Average Daily Demands (2021-2023) (Large Consumer + Residential)	2,137,577 L/day
Existing Residential Demand	180 L/cap/day
Proposed Development Residential Demand	350 L/cap/day (ACWWA Guidelines)
³ Peaking Factors	2.65 (Max Day Demand) 3.75 (Peak Hour Demand)
⁴ Fire Flow	3785 L/min (1000 GPM)
Minimum System Pressure	275 kPa (40 PSI) (ACWWA Guidelines)
Maximum System Pressure	700 kPa (100 PSI) (ACWWA Guidelines)

Note:

1. The 2021 Census in the Town of Oxford had a total population of 1170 people. In the Oxford Water Utility – Water Consumption Report, apartment buildings and senior housing was included under consumer demand. In order to model the per capita residential demand more accurately, a total population of 1100 people was used in the residential demand calculations to account for the metered flow for apartment buildings and senior housing that is already included in the total consumer demands.
2. Average Daily Demand was calculated using the annual metered consumption data in the Oxford Water Utility – Water Consumption Report provided by the Town.
3. The Peak Hour Demand Peaking Factor was selected based on ACWWA Water Supply Guidelines since no hourly flow data was available. The Max Day Demand peaking factor was determined using the Main Tank Flow Data (2021-2023) for the Tank on Route 204.
4. The required fire flow for one- and two-family Dwellings not exceeding 5000 ft² shall be 3785 L/min for 1 hour. This required fire flow is cited from the 2015 National Fire Protection Association (NFPA) 1 Fire Code.

Water Demands

Most of the Town’s water supply comes from the Main Supply Tank (926 m³) located on Route 204; and a concrete Balancing Tank located off Pugwash Road (910 m³) provides the rest when needed, generally during periods of Oxford Frozen Food high demand.

The Average Day Demand (ADD) was calculated using the annual metered consumption data found in the Oxford Water Utility – Water Consumption Report



(2019-2023). The Max Day Demand (MDD) and MDD peaking factor was determined using the Main Tank Flow Data (2021-2023) for the Tank on Route 204. Both the Oxford Water Utility – Water Consumption Report (2019-2023) and the Main Tank Flow Data (2021-2023) were provided by the Town. The peak hour factor was selected based on the ACWWA Water Supply Guidelines since no hourly flow data was available.

Water demands were allocated to different junctions within the model. Water demands for large consumers were allocated to junctions closest to their respective location and residential demands were allocated to junctions that best represented the portion of residential consumers in that area.

Table 2 summarizes the residential demand and **Table 3** summarizes the consumer demand within the Town.

Table 2: Residential Demands

Junction	# of Houses	# of People	Average Day Demand (ADD) (L/day)	Average Day Demand (ADD) (L/s)	¹ Peak Hour Demand (PHD) (L/s)	¹ Max Day Demand (MDD) (L/s)
J-38 (6267 Route 204)	18	40	7144	0.08	0.31	0.22
J-159 (6361 Route 204)	22	48	8731	0.10	0.38	0.27
J-47 (471 Sunset Ave)	46	101	18256	0.21	0.79	0.56
J-51 (661 Lower Main St)	40	88	15875	0.18	0.69	0.49
J-61 (1720 Black River Rd)	20	44	7938	0.09	0.34	0.24
J-63 (4484 Main St)	3	7	1191	0.01	0.05	0.04
J-62 (Black River Rd – Main St Intersection)	28	62	11113	0.13	0.48	0.34
J-154 (14 Duke St)	12	26	4763	0.06	0.21	0.15
J-155 (390 Pugwash Rd)	28	62	11113	0.13	0.48	0.34
J-66 (Town Hall)	6	13	2381	0.03	0.10	0.07
J-102 (145 Thompson Rd)	29	64	11509	0.13	0.50	0.35
J-106 (7800 Birchwood Rd)	25	55	9922	0.11	0.43	0.30



Junction	# of Houses	# of People	Average Day Demand (ADD) (L/day)	Average Day Demand (ADD) (L/s)	¹ Peak Hour Demand (PHD) (L/s)	¹ Max Day Demand (MDD) (L/s)
J-105 (136 Foundry St)	27	59	10716	0.12	0.47	0.33
J-86 (154 Handel St)	20	44	7938	0.09	0.34	0.24
J-92 (433 Water St)	14	31	5556	0.06	0.24	0.17
J-94 (91 New Hansford Rd)	19	42	7541	0.09	0.33	0.23
J-71 (61 River Ave)	51	112	20241	0.23	0.88	0.62
J-67 (129 Smith St)	92	202	36513	0.42	1.58	1.12
Total	500	1100	198439	2.30	8.61	6.09

Note:

- The MDD and PHDs are calculated by multiplying the ADD by the PHD (3.75) and MDD (2.65) peaking factors.

Table 3: Large Consumer Demands

Junction	Average Day Demand (ADD) (L/day)	Average Day Demand (ADD) (L/s)	¹ Peak Hour Demand (PHD) (L/s)	¹ Max Day Demand (MDD) (L/s)
J-149 (School)	2655	0.03	0.12	0.08
J-150 (Senior Housing)	2655	0.03	0.12	0.08
J-66 (Town Hall)	2655	0.03	0.12	0.08
J-151 (Canada Post)	4	0.000042	0.00016	0.00011
J-57 (Arena)	2655	0.03	0.12	0.08
J-65 (Oxford Frozen Foods (OFF))	1918731	22.21	83.28	58.85
J-148 (Police Station)	2655	0.03	0.12	0.08
J-153 (Parkview Restaurant and Motel)	504	0.0058	0.02	0.02
J-152 (Tim Hortons)	6622	0.08	0.29	0.20
Total	1939138	22.44	84.16	59.48

Note:

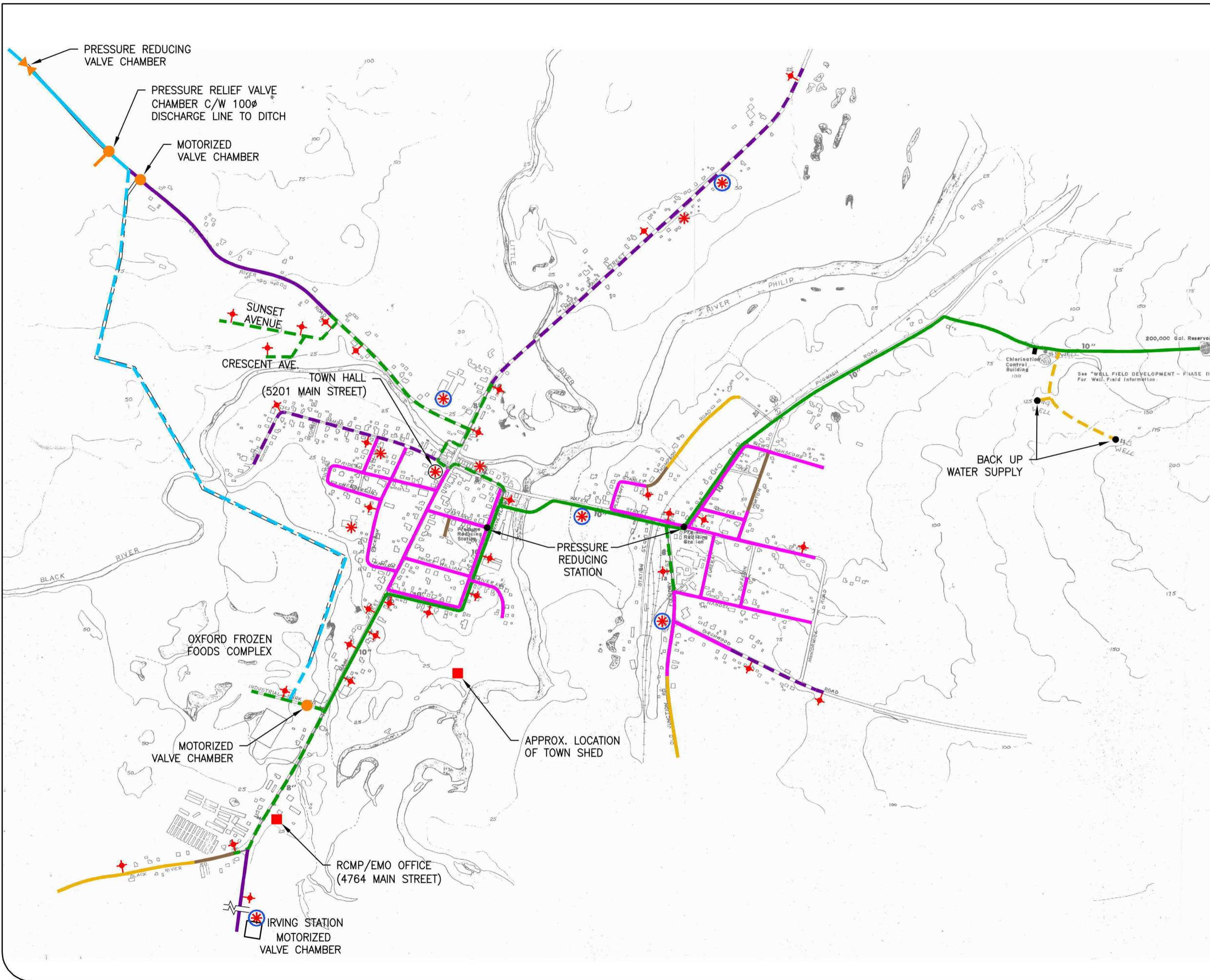
- The MDD and PHDs are calculated by multiplying the ADD by the PHD (3.75) and MDD (2.65) peaking factors.



Assumptions

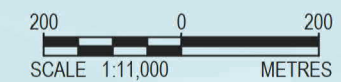
There was very limited up to date information available for the actual layout and characteristics of the existing water distribution system resulting in several unknowns when creating the model. Below is a list of the assumptions that were made throughout the model creation process.

- **Figure 1** is the Distribution System Schematic collected from the “Town of Oxford Water System Assessment – Dillon Consulting Final Report”. The information presented in this figure is from a 2004/2005 system map that was provided by the Town. Being the most recent map available, this figure was used to create the model of the existing water distribution system. This figure was used to identify pipe location, size and material, tank locations, valve chamber locations and hydrant locations. When this schematic was created the Town was aware that there was inconsistency with the figure and the actual water distribution system, however field investigations were not practical at the time. This figure was used as a starting point and then the model was updated based on Fire Flow testing results and further discussions with the Town.



DISTRIBUTION SYSTEM SCHEMATIC
 FIGURE 1

- 50mm GALVANIZED STEEL
- 50mm PLASTIC
- 100mm HDPE
- 100mm CAST IRON
- 100mm PVC
- 150mm PVC
- 200mm HDPE
- 250mm HDPE
- 300mm PVC
- 350mm PVC
- FIRE HYDRANTS
- EXISTING SAMPLE LOCATIONS
- RECOMMENDED SAMPLE LOCATIONS



MAP/DRAWING INFORMATION
 W. N. Horner and Associates, Water System Layout (Sept. 1977)
 and Dillon Consulting Limited.

CREATED BY: TLR
 CHECKED BY: KRM
 DESIGNED BY: KAM/SRH

File Location:
 c:\pw working directory\projects 2020\dillon_54tp\dms21188\202649-05-03-fig3.dwg
 July, 16, 2024 12:42 PM





- After a site visit and discussions with the Town, the location, type and status of the valve chambers within the Town were determined. **Table 4** is a breakdown of the valve chambers within the Town and how they were modelled.

Table 4: Valve Chambers – Town of Oxford

Valve Chamber	Location	Pressure Setting	^{1,2} Notes
Pressure Reducing Valve (PRV)	Route 204 (PRV-10)	140 kPa (20 PSI)	Main PRV in Town
Gate Valve	Water Street - Pugwash Road Intersection	NA	Isolation valve. Not included in model (minor head losses can be ignored)
Motorized Gate Valve	Route 204 towards OFF	NA	Modelled as open at all times
Gate Valve	OFF (From Main Street)	NA	³ Modelled as partially open at all times
Air Release Valve	Route 204	NA	Not included in model (minor head losses can be ignored)
Gate Valve	Waverly Street	NA	Isolation valve. Not included in model (minor head losses can be ignored)

Note:

1. Individual street shut off valves were not included in the model and were assumed to be open.
 2. Gate valves and air release valves were not included in the model
 3. The motorized gate valve to OFF from Main Street is currently not operational so it now functions as a regular gate valve and the Town manually opens and closes the Gate Valve when they see fit. The town described the gate valve as “partially open” meaning the gate valve is closed to a certain degree but it is unknown as to how much.
- Hydrant leads were assumed to be, on average, 5 m long, 150 mm in diameter and to be the same material as the transmission main the lead is connected to.
 - **Table 5** presents the pipes that were inserted into the model as a different material than what was shown on the Distribution System Schematic due to these materials not being available within the software.



Table 5: Pipe Material in Model

Distribution System Schematic	Pipe Material in Model	Hazen-Williams Pipe Roughness Coefficient (New Pipe)
Galvanized Steel	Steel	140
Plastic	PVC	150
HDPE	PVC	150
Cast Iron	Cast Iron	130
PVC	PVC	150

- Junction elevations were assumed to be 1.8 m below ground surface elevation. Ground surface elevations were determined using Google Earth since no LiDAR data was available. Google Earth imagery typically has an accuracy of +/- 1-2 metres, however, is generally reliable for exercises of this nature.
- Hydrant nozzle elevations were assumed to be 0.47 m above ground surface elevation. During the site visit, ground elevation shots were collected for select hydrants. This data was used to determine the nozzle elevation for these select hydrants. For hydrants that did not have ground elevation shots, the ground surface elevations were determined using Google Earth since no LiDAR data was available.
- The elevation of the PRV was assumed to be 1.5 m below ground surface. The ground surface elevation was collected during the site visit for this PRV location.
- The Town informed Dillon that the OFF gate valve (located off of the main line from Main Street towards OFF) is completely open during the fresh blueberry season (August – December) and then “partially open” the rest of the time. In the model, the pipe to OFF (P-204) was set as a 20 mm pipe to represent the head loss and flow restrictions of a partially open valve at this location.

Model Validation

Updated and accurate information on the Town’s existing water distribution system was limited. Dillon engaged Aqua Data Tech to perform hydrant flow testing in select areas to validate the water distribution system. Model validation includes comparing observed values (from field tests) to the modelled values. Parameters such as tank water levels, pipe roughness coefficients, and pipe diameters are adjusted within the model until the modelled values closely match the observed values. Information gathered during discussion with the Town, such as the observed low water pressure on Horton Street and Handel Street was also used to validate the model. Changes within the model were made so that it represented these known issues.



All of the adjustments and changes made to the model were based on hydrant testing and information from the Town for low pressure zones. It was not feasible to test every hydrant in the system, so a representative sample were selected for testing.

Dillon reviewed six hydrant flow tests, provided by Aqua Data Tech, that were performed on December 28, 2023, to validate the model constraints. These hydrants were selected for model validation based on their location within the Town. With a limited number of tests available, Dillon selected the hydrants at locations that best represented a large section of the system. The results from the hydrant flow tests are shown in **Table 6**.

Table 6: Fire Flow Test Results

Fire Flow Test	Flow Hydrant	Normal Pressure at Flow Hydrant (kPa (PSI))	Residual Hydrant	Flow (GPM)	Flow (L/s)	Residual Pressure at Residual Hydrant (kPa (PSI))
1	F1 (H-20)	510.21 (74)	R1 (H-16)	1531	96.6	358.53 (52)
2	F2 (H-30)	393 (57)	R2 (H-29)	NO FLOW	NO FLOW	13.79 (2)
3	F3 (H-26)	455.05 (66)	R3 (H-24)	1158	73.05	330.95 (48)
4	F4 (H-8)	510.21 (74)	R4 (H-7)	1227	77.41	289.58 (42)
5	F5 (H-31)	482.63 (70)	R5 (H-1)	1227	77.41	262 (38)
6	F6 (H-12)	503.32 (73)	R6 (H-11)	1295	81.70	372.32 (54)

The model constraints were determined by the validation as follows:

- High water reservoir elevations set to validate for static pressures in the system:
 - Tank Route 204 = 18 m
 - Tank Pugwash Road = 4.8 m
- Pipes 5 and 7 roughness coefficients reduced to 100.
- Pipes 47, 49, 57, 125 and 126 roughness coefficients reduced to 50 to represent the tuberculation of the existing pipes.
- Roughness coefficients in all remaining cast-iron pipes and steel pipes in the northern area were reduced to 50. This area includes the cast iron pipes on Water Street, Pugwash Road, Powell Street, Peel Street, and New Hansford Road.



- The roughness coefficients from the PVC pipes coming from the Pugwash Road Balancing Tank were reduced to 120 to account for the age of these pipes.
- Reduced the roughness coefficients in pipes 143(1) and 143(2) (Horton Street) to 50 to represent tuberculation of the existing pipes due to age and reduced the diameter of these pipes to 10 mm due to the confirmed build up of rust found in these pipes when the Town cut into the line and did not receive any flow.
- Reduced the diameter of pipes 45 and 48 (Handel Street) to 50 mm due to the Town receiving complaints of low-pressure issues being experienced in this area.

Figure 2 displays the pipes described above with labels shown and **Figure 3** is a visual representation of the alignment and pipe diameter sizes in the existing water distribution system model after model validation changes

Figure 2: Existing Water Distribution System - Modified Pipes

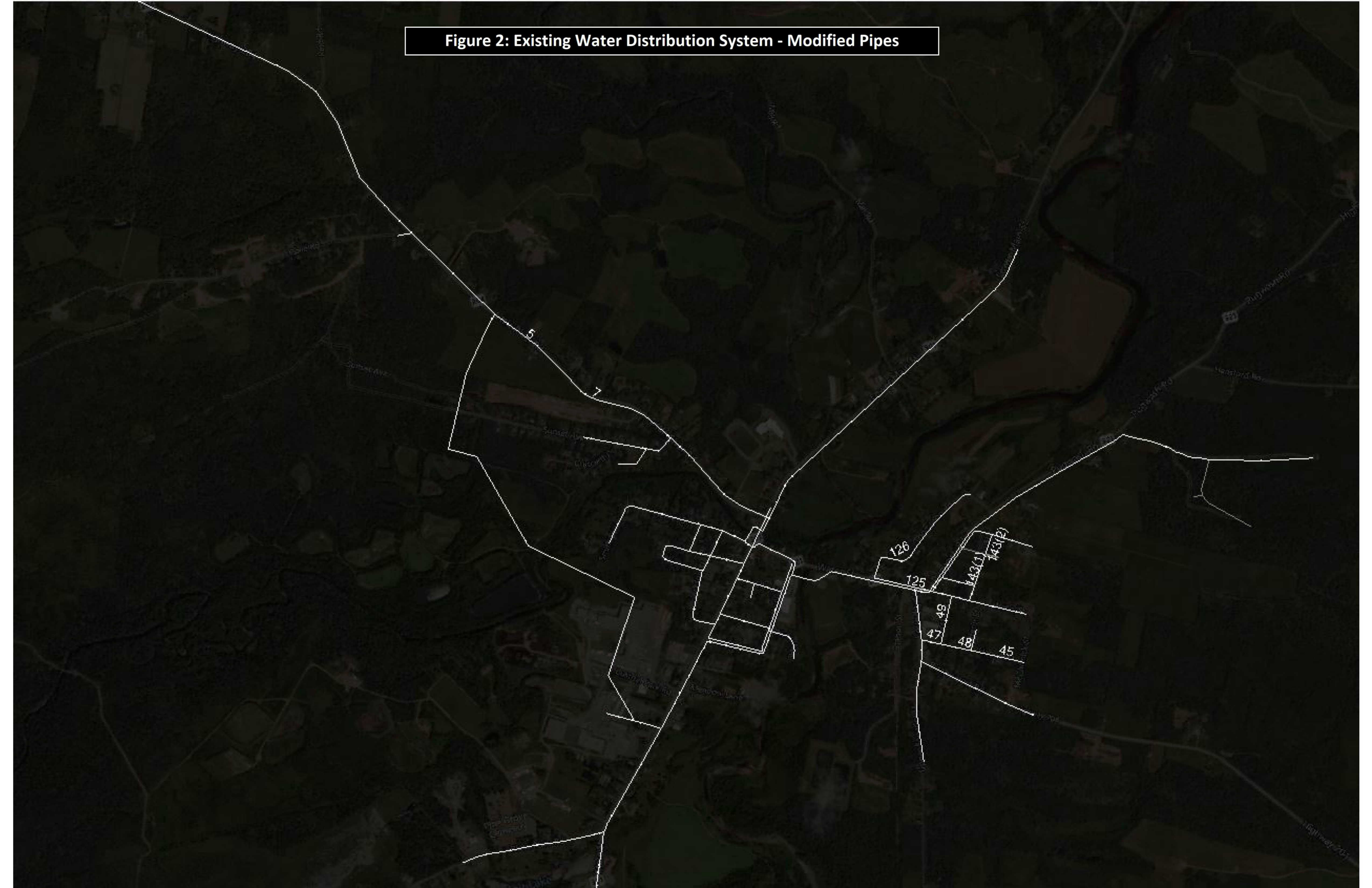
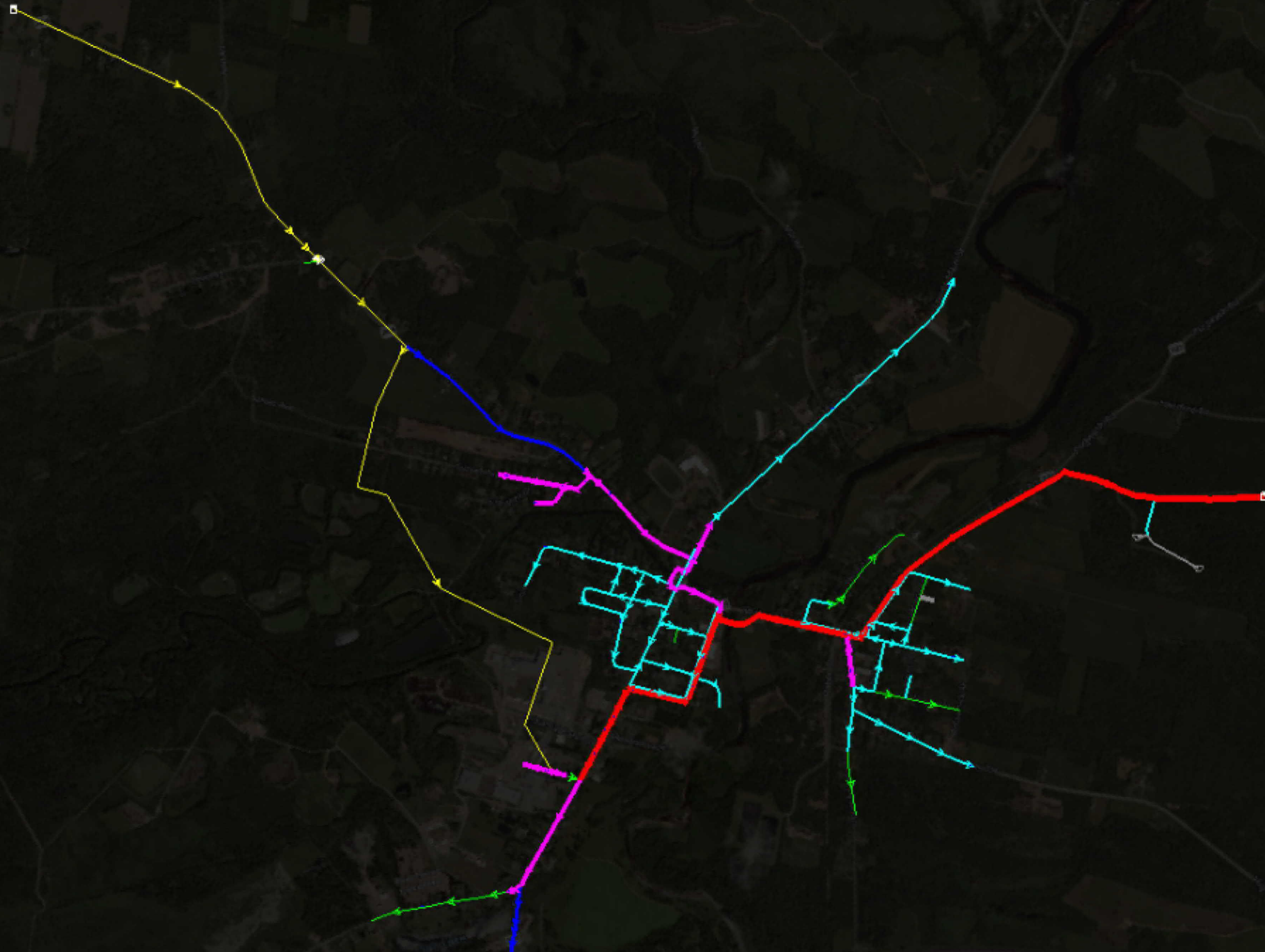


Figure 3: Existing Water Distribution System - Pipe Diameter



Color Coding Legend
Pipe: Diameter (mm)

- | | |
|---|--------------|
|  | \leq 50.0 |
|  | \leq 100.0 |
|  | \leq 150.0 |
|  | \leq 200.0 |
|  | \leq 250.0 |
|  | \leq 350.0 |
|  | Other |



The hydraulic model validation – based on the available data – is assessed against the error between model results and physical measurements. The threshold of model acceptance following validation is based on $\pm 10\%$. A threshold between 6-10% is considered as good and a threshold between 0-5% is considered as very good. The model validation results meet the threshold for hydrant tests 3, 4, 5, and 6.

Table 7 presents a visual legend for the results and **Tables 8 - 13** present a breakdown of the measure data vs the modelled data.

Table 7: Legend – Measured Data vs Modelled Data

Status	Threshold	
Very Good	0 – 5%	
Good	6 – 10%	
Caution	> 10%	

Table 8: Fire Flow Test 1

Flow Hydrant: H-20 Main Street

Flow = 96.6 L/s

Residual Hydrant: H-16 Duke Street

	Measured Data	Modelled Data	Comparison Results	
Static Pressure (PSI)	74	76	3%	
Residual Pressure (PSI)	52	34	35%	

Table 9: Fire Flow Test 2

Flow Hydrant: H-30 Highway 204

Flow = No Flow

Residual Hydrant: H-29 Birchwood Road

	Measured Data	Modelled Data	Comparison Results	
Static Pressure (PSI)	57	55	4%	
Residual Pressure (PSI)	Hydrant not operational, no measured data available.			

Table 10: Fire Flow Test 3

Flow Hydrant: H-26 Pugwash Road

Flow = 77.41 L/s

Residual Hydrant: H-24 Stanley Street

	Measured Data	Modelled Data	Comparison Results	
Static Pressure (PSI)	76	71	7%	
Residual Pressure (PSI)	48	51	6%	



Table 11: Fire Flow Test 4

Flow Hydrant: H-8 Lower Main Street
 Flow = 77.41 L/s

Residual Hydrant: H-7 Lower Main Street

	Measured Data	Modelled Data	Comparison Results	
Static Pressure (PSI)	74	79	6%	
Residual Pressure (PSI)	42	44	5%	

Table 12: Fire Flow Test 5

Flow Hydrant: H-31 Little River Road
 Flow = 77.41 L/s

Residual Hydrant: H-1 Sunset Avenue

	Measured Data	Modelled Data	Comparison Results	
Static Pressure (PSI)	70	75	7%	
Residual Pressure (PSI)	38	40	5%	

Table 13: Fire Flow Test 6

Flow Hydrant: H-12 Waverly Street
 Flow = 81.7 L/s

Residual Hydrant: H-11 Jackson Street

	Measured Data	Modelled Data	Comparison Results	
Static Pressure (PSI)	73	76	4%	
Residual Pressure (PSI)	54	53	2%	

The residual pressure comparison results for Fire Flow Test 1 showed a difference of 35% between the measured data and the modelled data. These measured results show a greater difference in residual pressures in the measured results vs the modelled results. The actual measured residual pressure is significantly greater than the modelled result, indicating that the modelled results in this area are conservative. Dillon suspects that the difference is mainly due to the test being located near the OFF-gate valve coming from Main Street. Due to the status of the gate valve being “partially opened” with no confirmation as to how open the gate valve is, there is uncertainty present within these results. Other factors that could contribute to the difference could be related to unknown connections within the system that are not present in the model. Due to this, Fire Flow Test 1 was ignored during the model validation process.

The Results for Fire Flow test 2 were ignored during the model validation process due to the fact that at the time of the testing the residual hydrant selected was not



operational and there was no flow present. No flow testing was completed for this hydrant.

Model Results

The existing water distribution system was modelled in Average Day Demand (ADD), Peak Hour Demand (PHD), Max Day Demand (MDD), and MDD + Fire Flow scenarios. **Table 13** represents the pressure within the system during the ADD, PHD and MDD scenarios and **Figure 4** is a visual representation of the pressure at each node within the system during the ADD scenario.

Table 13: Existing Water Distribution System - Pressure

Junction	ADD Pressure (kPa (PSI))	PHD Pressure (kPa (PSI))	MDD Pressure (kPa (PSI))
J-38	510.6 (74)	483 (70)	496.8 (72)
J-39	372.6 (54)	372.6 (54)	372.6 (54)
J-42	579.6 (84)	503.7 (73)	545.1 (79)
J-45	531.3 (77)	524.4 (76)	524.4 (76)
J-46	531.3 (77)	524.4 (76)	524.4 (76)
J-47	462.3 (67)	455.4 (66)	455.4 (66)
J-48	483 (70)	476.1 (69)	476.1 (69)
J-49	489.9 (71)	483 (70)	489.9 (71)
J-50	545.1 (79)	545.1 (79)	545.1 (79)
J-51	524.4 (76)	524.4 (76)	524.4 (76)
J-52	565.8 (82)	558.9 (81)	565.8 (82)
J-54	324.3 (47)	324.3 (47)	324.3 (47)
J-57	545.1 (79)	538.2 (78)	545.1 (79)
J-59	524.4 (76)	524.4 (76)	524.4 (76)
J-60	503.7 (73)	503.7 (73)	503.7 (73)
J-61	483 (70)	476.1 (69)	483 (70)
J-62	531.3 (77)	531.3 (77)	531.3 (77)
J-63	552 (80)	552 (80)	552 (80)
J-64	545.1 (79)	538.2 (78)	545.1 (79)
J-65	572.7 (83)	476.1 (69)	524.4 (76)
J-66	545.1 (79)	545.1 (79)	545.1 (79)
J-67	503.7 (73)	496.8 (72)	503.7 (73)
J-68	538.2 (78)	531.3 (77)	531.3 (77)
J-69	545.1 (79)	538.2 (78)	545.1 (79)



Junction	ADD Pressure (kPa (PSI))	PHD Pressure (kPa (PSI))	MDD Pressure (kPa (PSI))
J-70	545.1 (79)	538.2 (78)	545.1 (79)
J-71	565.8 (82)	558.9 (81)	558.9 (81)
J-72	565.8 (82)	558.9 (81)	558.9 (81)
J-73	565.8 (82)	558.9 (81)	558.9 (81)
J-74	545.1 (79)	538.2 (78)	545.1 (79)
J-75	552 (80)	552 (80)	552 (80)
J-76	565.8 (82)	558.9 (81)	558.9 (81)
J-77	545.1 (79)	545.1 (79)	545.1 (79)
J-78	565.8 (82)	558.9 (81)	558.9 (81)
J-79	565.8 (82)	558.9 (81)	558.9 (81)
J-80	565.8 (82)	558.9 (81)	558.9 (81)
J-81	545.1 (79)	538.2 (78)	545.1 (79)
J-82	538.2 (78)	531.3 (77)	531.3 (77)
J-83	545.1 (79)	538.2 (78)	545.1 (79)
J-84	496.8 (72)	489.9 (71)	489.9 (71)
J-85	462.3 (67)	462.3 (67)	462.3 (67)
J-86	393.3 (57)	372.6 (54)	379.5 (55)
J-87	427.8 (62)	414 (60)	420.9 (61)
J-88	455.4 (66)	441.6 (64)	448.5 (65)
J-89	455.4 (66)	448.5 (65)	455.4 (66)
J-90	476.1 (69)	469.2 (68)	469.2 (68)
J-91	455.4 (66)	448.5 (65)	448.5 (65)
J-92	393.3 (57)	386.4 (56)	393.3 (57)
J-93	462.3 (67)	455.4 (66)	462.3 (67)
J-94	393.3 (57)	386.4 (56)	393.3 (57)
J-95	503.7 (73)	496.8 (72)	496.8 (72)
J-97	455.4 (66)	448.5 (65)	448.5 (65)
J-99	483 (70)	476.1 (69)	483 (70)
J-100	503.7 (73)	496.8 (72)	496.8 (72)
J-101	510.6 (74)	503.7 (73)	510.6 (74)
J-102	483 (70)	469.2 (68)	476.1 (69)
J-103	455.4 (66)	455.4 (66)	455.4 (66)
J-104	448.5 (65)	441.6 (64)	441.6 (64)

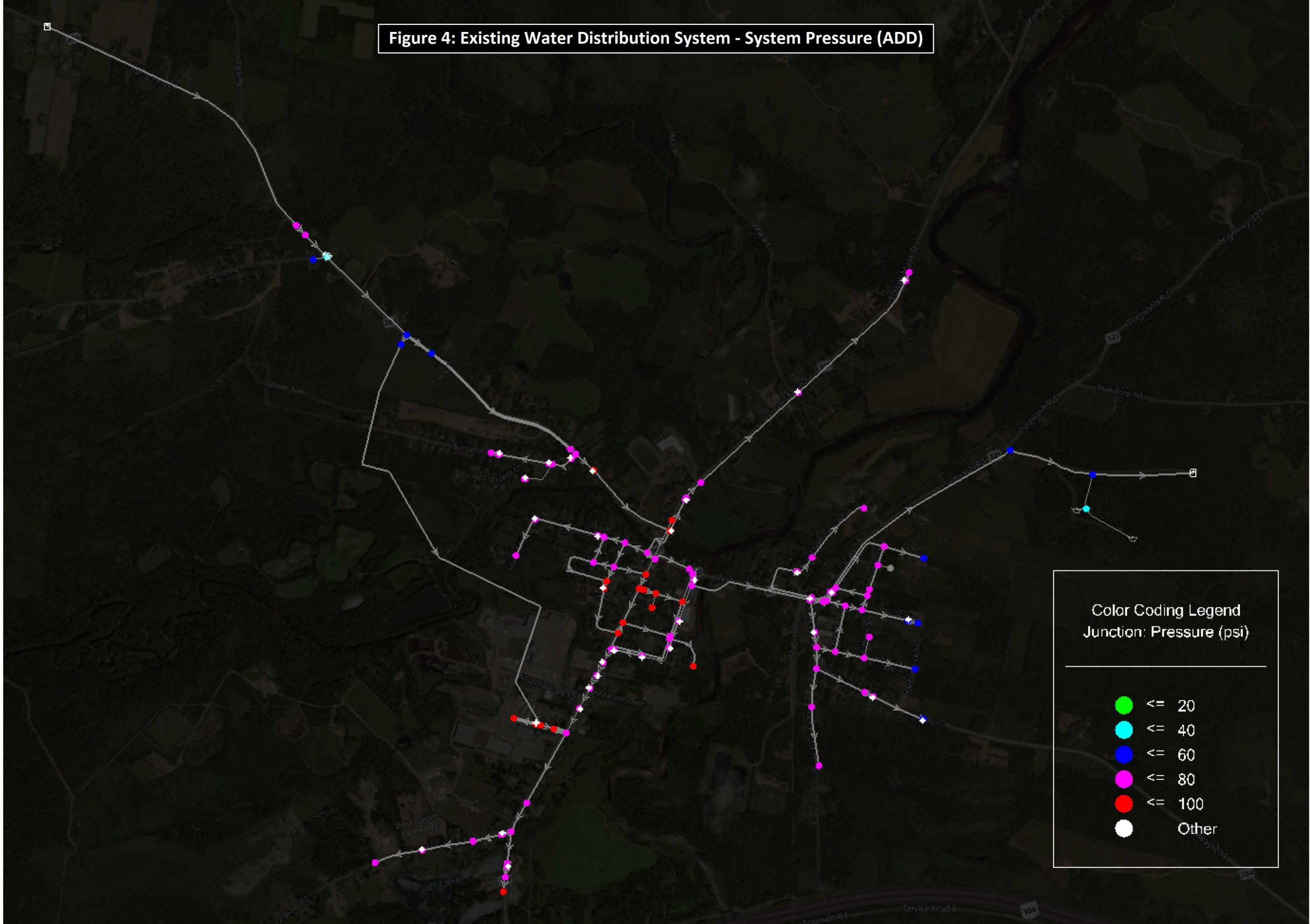


Junction	ADD Pressure (kPa (PSI))	PHD Pressure (kPa (PSI))	MDD Pressure (kPa (PSI))
J-105	462.3 (67)	462.3 (67)	462.3 (67)
J-106	358.8 (52)	351.9 (51)	358.8 (52)
J-107	538.2 (78)	531.3 (77)	538.2 (78)
J-108	483 (70)	476.1 (69)	476.1 (69)
J-109	489.9 (71)	483 (70)	489.9 (71)
J-110	462.3 (67)	455.4 (66)	455.4 (66)
J-111	517.5 (75)	510.6 (74)	510.6 (74)
J-112	469.2 (68)	462.3 (67)	462.3 (67)
J-113	545.1 (79)	545.1 (79)	545.1 (79)
J-114	565.8 (82)	558.9 (81)	565.8 (82)
J-115	538.2 (78)	531.3 (77)	531.3 (77)
J-116	503.7 (73)	496.8 (72)	503.7 (73)
J-117	565.8 (82)	558.9 (81)	558.9 (81)
J-118	545.1 (79)	538.2 (78)	545.1 (79)
J-119	545.1 (79)	538.2 (78)	545.1 (79)
J-120	545.1 (79)	538.2 (78)	545.1 (79)
J-121	545.1 (79)	538.2 (78)	545.1 (79)
J-122	545.1 (79)	538.2 (78)	545.1 (79)
J-123	552 (80)	545.1 (79)	552 (80)
J-124	538.2 (78)	538.2 (78)	538.2 (78)
J-125	552 (80)	545.1 (79)	552 (80)
J-126	552 (80)	545.1 (79)	552 (80)
J-127	579.6 (84)	496.8 (72)	538.2 (78)
J-129	524.4 (76)	524.4 (76)	524.4 (76)
J-130	483 (70)	483 (70)	483 (70)
J-131	545.1 (79)	538.2 (78)	545.1 (79)
J-132	503.7 (73)	496.8 (72)	496.8 (72)
J-133	496.8 (72)	483 (70)	489.9 (71)
J-134	496.8 (72)	483 (70)	489.9 (71)
J-135	393.3 (57)	386.4 (56)	393.3 (57)
J-136	496.8 (72)	489.9 (71)	489.9 (71)
J-137	427.8 (62)	420.9 (61)	420.9 (61)
J-138	358.8 (52)	351.9 (51)	358.8 (52)



Junction	ADD Pressure (kPa (PSI))	PHD Pressure (kPa (PSI))	MDD Pressure (kPa (PSI))
J-140	427.8 (62)	420.9 (61)	420.9 (61)
J-141	455.4 (66)	448.5 (65)	448.5 (65)
J-142	565.8 (82)	565.8 (82)	565.8 (82)
J-147	496.8 (72)	489.9 (71)	489.9 (71)
J-148	538.2 (78)	531.3 (77)	538.2 (78)
J-149	538.2 (78)	531.3 (77)	531.3 (77)
J-150	545.1 (79)	538.2 (78)	545.1 (79)
J-151	558.9 (81)	552 (80)	552 (80)
J-152	545.1 (79)	545.1 (79)	545.1 (79)
J-153	545.1 (79)	538.2 (78)	538.2 (78)
J-154	552 (80)	545.1 (79)	552 (80)
J-155	372.6 (54)	372.6 (54)	372.6 (54)
J-159	324.3 (47)	317.4 (46)	324.3 (47)
J-160	324.3 (47)	317.4 (46)	317.4 (46)
J-162	510.6 (74)	483 (70)	496.8 (72)
J-163	565.8 (82)	496.8 (72)	531.3 (77)
J-164	462.3 (67)	455.4 (66)	455.4 (66)
J-166	324.3 (47)	317.4 (46)	324.3 (47)
J-167	565.8 (82)	558.9 (81)	558.9 (81)
J-168	552 (80)	545.1 (79)	545.1 (79)
J-169	503.7 (73)	496.8 (72)	496.8 (72)
J-170	138 (20)	138 (20)	138 (20)
J-171	503.7 (73)	503.7 (73)	503.7 (73)
J-173	496.8 (72)	489.9 (71)	489.9 (71)
J-178	483 (70)	483 (70)	483 (70)

Figure 4: Existing Water Distribution System - System Pressure (ADD)





The demand scenario determined to govern design is the Max Day Demand (MDD) plus fire flows. The available fire flow is evaluated in the hydraulic model using set model boundary conditions and each junction is evaluated under the required fire flow demands in addition to the max day demand. The model analysis demonstrated that residential fire flows can be satisfied under the described boundary conditions within all pipes with a diameter greater than 150 mm. The pipes within the system with a diameter smaller than 150 mm are unable to provide adequate fire flow. The fire flow analysis results are summarized in **Table 14**

Table 14: Fire Flow Analysis Results

Junction	Fire Flow Needed (L/s (GPM))	Fire Flow Available (L/s (GPM))	Pressure (Residual Lower Limit) (kPa (PSI))	Pressure (Residual Calculated) (kPa (PSI))
J-38	63.1 (1000)	220.878 (3506)	138 (20)	289.8 (42)
J-39	63.1 (1000)	9.639 (153)	138 (20)	138 (20)
J-42	63.1 (1000)	105.462 (1674)	138 (20)	303.6 (44)
J-45	63.1 (1000)	84.672 (1344)	138 (20)	227.7 (33)
J-46	63.1 (1000)	84.42 (1340)	138 (20)	227.7 (33)
J-47	63.1 (1000)	70.371 (1117)	138 (20)	151.8 (22)
J-48	63.1 (1000)	78.687 (1249)	138 (20)	179.4 (26)
J-49	63.1 (1000)	76.986 (1222)	138 (20)	158.7 (23)
J-50	63.1 (1000)	83.538 (1326)	138 (20)	241.5 (35)
J-51	63.1 (1000)	13.482 (214)	138 (20)	158.7 (23)
J-52	63.1 (1000)	93.681 (1487)	138 (20)	255.3 (37)
J-54	63.1 (1000)	162.729 (2583)	138 (20)	172.5 (25)
J-57	63.1 (1000)	100.737 (1599)	138 (20)	282.9 (41)
J-59	63.1 (1000)	74.277 (1179)	138 (20)	200.1 (29)
J-60	63.1 (1000)	5.67 (90)	138 (20)	282.9 (41)
J-61	63.1 (1000)	3.276 (52)	138 (20)	144.9 (21)
J-62	63.1 (1000)	75.411 (1197)	138 (20)	213.9 (31)
J-63	63.1 (1000)	52.668 (836)	138 (20)	276 (40)
J-64	63.1 (1000)	82.53 (1310)	138 (20)	282.9 (41)
J-65	63.1 (1000)	35.343 (561)	138 (20)	448.5 (65)
J-66	63.1 (1000)	99.792 (1584)	138 (20)	227.7 (33)
J-67	63.1 (1000)	19.782 (314)	138 (20)	138 (20)
J-68	63.1 (1000)	21.798 (346)	138 (20)	414 (60)
J-69	63.1 (1000)	21.798 (346)	138 (20)	213.9 (31)
J-70	63.1 (1000)	21.798 (346)	138 (20)	324.3 (47)



Junction	Fire Flow Needed (L/s (GPM))	Fire Flow Available (L/s (GPM))	Pressure (Residual Lower Limit) (kPa (PSI))	Pressure (Residual Calculated) (kPa (PSI))
J-71	63.1 (1000)	21.798 (346)	138 (20)	193.2 (28)
J-72	63.1 (1000)	21.798 (346)	138 (20)	365.7 (53)
J-73	63.1 (1000)	21.798 (346)	138 (20)	365.7 (53)
J-74	63.1 (1000)	21.798 (346)	138 (20)	324.3 (47)
J-75	63.1 (1000)	21.798 (346)	138 (20)	365.7 (53)
J-76	63.1 (1000)	21.798 (346)	138 (20)	386.4 (56)
J-77	63.1 (1000)	101.745 (1615)	138 (20)	227.7 (33)
J-78	63.1 (1000)	21.798 (346)	138 (20)	345 (50)
J-79	63.1 (1000)	5.859 (93)	138 (20)	427.8 (62)
J-80	63.1 (1000)	21.798 (346)	138 (20)	420.9 (61)
J-81	63.1 (1000)	21.798 (346)	138 (20)	414 (60)
J-82	63.1 (1000)	21.798 (346)	138 (20)	441.6 (64)
J-83	63.1 (1000)	21.798 (346)	138 (20)	414 (60)
J-84	63.1 (1000)	100.233 (1591)	138 (20)	276 (40)
J-85	63.1 (1000)	85.554 (1358)	138 (20)	248.4 (36)
J-86	63.1 (1000)	1.071 (17)	138 (20)	144.9 (21)
J-87	63.1 (1000)	1.953 (31)	138 (20)	179.4 (26)
J-88	63.1 (1000)	1.953 (31)	138 (20)	200.1 (29)
J-89	63.1 (1000)	15.561 (247)	138 (20)	220.8 (32)
J-90	63.1 (1000)	7.812 (124)	138 (20)	241.5 (35)
J-91	63.1 (1000)	7.308 (116)	138 (20)	220.8 (32)
J-92	63.1 (1000)	5.67 (90)	138 (20)	144.9 (21)
J-93	63.1 (1000)	5.355 (85)	138 (20)	207 (30)
J-94	63.1 (1000)	4.662 (74)	138 (20)	138 (20)
J-95	63.1 (1000)	7.497 (119)	138 (20)	248.4 (36)
J-97	63.1 (1000)	7.434 (118)	138 (20)	200.1 (29)
J-99	63.1 (1000)	7.686 (122)	138 (20)	227.7 (33)
J-100	63.1 (1000)	5.733 (91)	138 (20)	165.6 (24)
J-101	63.1 (1000)	4.536 (72)	138 (20)	172.5 (25)
J-102	63.1 (1000)	3.024 (48)	138 (20)	138 (20)
J-103	63.1 (1000)	22.932 (364)	138 (20)	351.9 (51)
J-104	63.1 (1000)	22.932 (364)	138 (20)	200.1 (29)
J-105	63.1 (1000)	4.851 (77)	138 (20)	144.9 (21)
J-106	63.1 (1000)	14.742 (234)	138 (20)	138 (20)



Junction	Fire Flow Needed (L/s (GPM))	Fire Flow Available (L/s (GPM))	Pressure (Residual Lower Limit) (kPa (PSI))	Pressure (Residual Calculated) (kPa (PSI))
J-107	63.1 (1000)	83.034 (1318)	138 (20)	241.5 (35)
J-108	63.1 (1000)	78.057 (1239)	138 (20)	179.4 (26)
J-109	63.1 (1000)	76.986 (1222)	138 (20)	158.7 (23)
J-110	63.1 (1000)	70.434 (1118)	138 (20)	158.7 (23)
J-111	63.1 (1000)	13.419 (213)	138 (20)	158.7 (23)
J-112	63.1 (1000)	17.955 (285)	138 (20)	158.7 (23)
J-113	63.1 (1000)	83.853 (1331)	138 (20)	241.5 (35)
J-114	63.1 (1000)	93.555 (1485)	138 (20)	255.3 (37)
J-115	63.1 (1000)	21.798 (346)	138 (20)	393.3 (57)
J-116	63.1 (1000)	21.798 (346)	138 (20)	186.3 (27)
J-117	63.1 (1000)	21.798 (346)	138 (20)	407.1 (59)
J-118	63.1 (1000)	100.926 (1602)	138 (20)	276 (40)
J-119	63.1 (1000)	96.957 (1539)	138 (20)	282.9 (41)
J-120	63.1 (1000)	94.311 (1497)	138 (20)	282.9 (41)
J-121	63.1 (1000)	91.287 (1449)	138 (20)	282.9 (41)
J-122	63.1 (1000)	89.082 (1414)	138 (20)	282.9 (41)
J-123	63.1 (1000)	87.696 (1392)	138 (20)	289.8 (42)
J-124	63.1 (1000)	86.688 (1376)	138 (20)	276 (40)
J-125	63.1 (1000)	85.68 (1360)	138 (20)	289.8 (42)
J-126	63.1 (1000)	84.231 (1337)	138 (20)	289.8 (42)
J-127	63.1 (1000)	105.462 (1674)	138 (20)	282.9 (41)
J-129	63.1 (1000)	74.466 (1182)	138 (20)	200.1 (29)
J-130	63.1 (1000)	4.095 (65)	138 (20)	165.6 (24)
J-131	63.1 (1000)	52.668 (836)	138 (20)	310.5 (45)
J-132	63.1 (1000)	5.733 (91)	138 (20)	165.6 (24)
J-133	63.1 (1000)	7.686 (122)	138 (20)	186.3 (27)
J-134	63.1 (1000)	7.56 (120)	138 (20)	234.6 (34)
J-135	63.1 (1000)	5.67 (90)	138 (20)	158.7 (23)
J-136	63.1 (1000)	89.586 (1422)	138 (20)	276 (40)
J-137	63.1 (1000)	18.333 (291)	138 (20)	207 (30)
J-138	63.1 (1000)	14.805 (235)	138 (20)	138 (20)
J-140	63.1 (1000)	19.215 (305)	138 (20)	207 (30)
J-141	63.1 (1000)	7.434 (118)	138 (20)	186.3 (27)
J-142	63.1 (1000)	86.499 (1373)	138 (20)	262.2 (38)



Junction	Fire Flow Needed (L/s (GPM))	Fire Flow Available (L/s (GPM))	Pressure (Residual Lower Limit) (kPa (PSI))	Pressure (Residual Calculated) (kPa (PSI))
J-147	63.1 (1000)	101.745 (1615)	138 (20)	276 (40)
J-148	63.1 (1000)	79.443 (1261)	138 (20)	213.9 (31)
J-149	63.1 (1000)	22.995 (365)	138 (20)	441.6 (64)
J-150	63.1 (1000)	102.06 (1620)	138 (20)	262.2 (38)
J-151	63.1 (1000)	21.798 (346)	138 (20)	358.8 (52)
J-152	63.1 (1000)	52.668 (836)	138 (20)	296.7 (43)
J-153	63.1 (1000)	52.668 (836)	138 (20)	317.4 (46)
J-154	63.1 (1000)	88.83 (1410)	138 (20)	289.8 (42)
J-155	63.1 (1000)	150.696 (2392)	138 (20)	144.9 (21)
J-159	63.1 (1000)	237.636 (3772)	138 (20)	255.3 (37)
J-160	63.1 (1000)	67.536 (1072)	138 (20)	193.2 (28)
J-162	63.1 (1000)	220.878 (3506)	138 (20)	276 (40)
J-163	63.1 (1000)	95.004 (1508)	138 (20)	310.5 (45)
J-164	63.1 (1000)	0.063 (1)	138 (20)	282.9 (41)
J-166	63.1 (1000)	153.405 (2435)	138 (20)	276 (40)
J-167	63.1 (1000)	21.798 (346)	138 (20)	186.3 (27)
J-168	63.1 (1000)	21.798 (346)	138 (20)	317.4 (46)
J-169	63.1 (1000)	101.556 (1612)	138 (20)	282.9 (41)
J-171	63.1 (1000)	102.942 (1634)	138 (20)	282.9 (41)
J-173	63.1 (1000)	100.233 (1591)	138 (20)	276 (40)
J-178	63.1 (1000)	107.856 (1712)	138 (20)	262.2 (38)

Scenario Analysis

Dillon used the model of the existing water distribution system to perform an analysis on the following scenarios.

Scenario 1 – Both Tanks Full

The model was tested with both the Route 204 Tank and Pugwash Road Tank full for ADD, PHD, and MDD scenarios. The model presented no demand or pressure concerns in this scenario.



Scenario 2 – Both Tanks at Minimum Levels

The model was tested with both of the Route 204 Tank and Pugwash Road Tank at minimum water levels for ADD, PHD, and MDD scenarios. The model presented no demand or pressure concerns in this scenario. Both tanks are still able to provide adequate demand to the system even when close to empty. These results are based on a steady state analysis.

Scenario 3 – Route 204 Tank Offline vs Pugwash Road Tank Offline

The model was tested with the Route 204 Tank offline. The model showed that if the Route 204 Tank was to go offline, the tank on Pugwash Road would not be able to supply adequate demand to the water distribution system.

The model was also tested with the Pugwash Road Tank offline. The model showed that if the Pugwash Road Tank was to go off line, the tank on Route 204 would be able to continue to provide adequate ADD, PHD, and MDD flows to the entire system even at minimum water levels. However, the Route 204 tank alone would not be able to provide enough supply in an MDD + Fire Flow scenario even when the tank is full.

Scenario 4 – OFF Demand Limit

The model was used to test how much demand could be satisfied at OFF before other issues presented themselves within the system. Under the ADD scenario OFF uses an average of 22.21 L/s. The model was tested with OFF taking 5 times its ADD (111.05 L/s) with both tanks at a minimum level. When running this scenario, there were no supply or pressure issues present showing that the system has the capacity under the ADD scenario to provide 5 times the ADD of OFF without causing any concern within the system. Demands above 5 times the ADD of OFF were not tested.

Under the PHD (83.28 L/s) scenario, with both tanks at minimum level, the model showed no issues within the system at 2.5 times the PHD (208.2 L/s) of OFF but at 3 times the PHD (249.84 L/s) of OFF pressure issues within the distribution network were present. This showed that the demand limit of OFF from the existing system falls somewhere between 2.5 to 3 times the PHD of OFF.

It should be noted that the scenarios tested only provide results for a snapshot in time during ADD and PHD scenarios. These scenarios did not consider the supply capacity of the wells to provide these demands.

Opportunities for Improvement and Optimization

After performing the scenario analysis described above, Dillon recommends the following for system improvement and optimization.



Low Pressure Zones – Horton Street and Handel Street

Due to the current conditions of the pipes on Horton Street and Handel Street, in order to address the low-pressure zones, it is recommended that the cast iron and steel pipes within this area be upsized and replaced. The existing pipes are currently showing signs of tuberculation and, with time, will only worsen. It is also noted that with these undersized pipes there is also no fire protection within these areas. The Atlantic Canada Water Supply Guidelines require a minimum of 150 mm for service mains providing fire protection and a minimum of 100 mm for service mains not providing fire protection. Dillon recommends that the pipes be replaced with 150 mm PVC pipes so that fire hydrants can be added to the system in these areas. If additional development beyond the nine homes is planned, this may need to be increased even further.

It is also recommended that the diameter of the pipes located in the middle of Town (Main Street, Duke Street, Waverly Street, Prince William Street, Ellis Street, Hanlon Street, Rideau Street, Henderson Street, Jackson Street, Fulton Street, Elm Street, James Street, Smith Street) also be increased since these are currently also undersized for fire flow. The risk associated with unsupported fire flow within the Town could be detrimental to residents within these areas and present an insurance risk. These upgrades could be completed piecemeal as the infrastructure in general is needing to be replaced due to its current age.

Scenario 3 – Route 204 Tank Offline vs Pugwash Road Tank Offline

If the Route 204 Tank was to go offline the remaining tank on Pugwash Road would not be able to provide adequate demand to the entire system. To address this concern, another water supply would need to be added to the system or the tank on Pugwash Road would need to be upgraded/replaced in order to add more supply to the system. Overall, these upgrades would require developing a reliable secondary water supply. These system upgrades are costly and would require further investigation and design work. A secondary water supply would provide redundancy to the system and increase the systems capability of supplying increased demands in emergency and future growth scenarios.

Although the Route 204 tank can provide adequate supply under ADD, PHD, and MDD scenarios, it cannot meet MDD + Fire Flow demand requirements. The existing model is set up with the gate valve to OFF from Main Street “partially open”. To try and mitigate this issue, the model was tested under the MDD + Fire Flow scenario with the Pugwash Road tank offline and the gate valve to OFF completely open. In this scenario, the Town experienced an increased supply of fire flow. With the gate valve completely open, the system pulled more water through the 300 mm PVC main line which feeds OFF from Route 204. It is recommended that if the tank on Pugwash Road is ever to go offline, the gate valve to OFF from Main Street be completely opened to increase the supply within the Town. Although with the gate valve



completely open there are improvements to fire flow, it should be noted that this will not address the concerns surrounding the undersized pipes within the system.

Scenario 4 – OFF Demand Limit

Regarding the concern of OFF pulling too much demand from the system, the steady state analysis conducted showed no requirements for system improvements to satisfy increased demands of OFF but the steady state analysis has its limitations when analyzing tank capacities.

Route 204 Pressure Reducing Valve

Since the PRV on Route 204 is the only PRV in the entire system, if this PRV was to fail the community would experience very high pressures and this could cause the fittings and pipes downstream to break apart and cause major leaks in the system. It is very common for PRVs in a water distribution system to have issues given all the different mechanisms at play. It is recommended that regular maintenance be performed on these valves as per manufacturer's recommendations.

If the Town is interested in exploring these concerns, Dillon can be engaged to provide further observations and recommendations.

Required Fire Flow

Many pipes within the system have a diameter less than 150 mm and are undersized for Fire flow. This provides limited fire protection and a risk to the residents located in these areas. If fire flow requirements are required, a minimum pipe size of 150 mm is required.

Future Development: Nine Homes on Horton Street

When attempting to add an additional watermain connection to the 50 mm galvanized steel watermain on Horton, the Town determined that the existing 50 mm galvanized steel line was almost completely plugged off with tuberculation and would not be able to provide enough water supply to the planned new housing development of four homes.

After a discussion with the Town, it was noted that the Town would eventually like to add a total of nine homes to this area.

Model Results

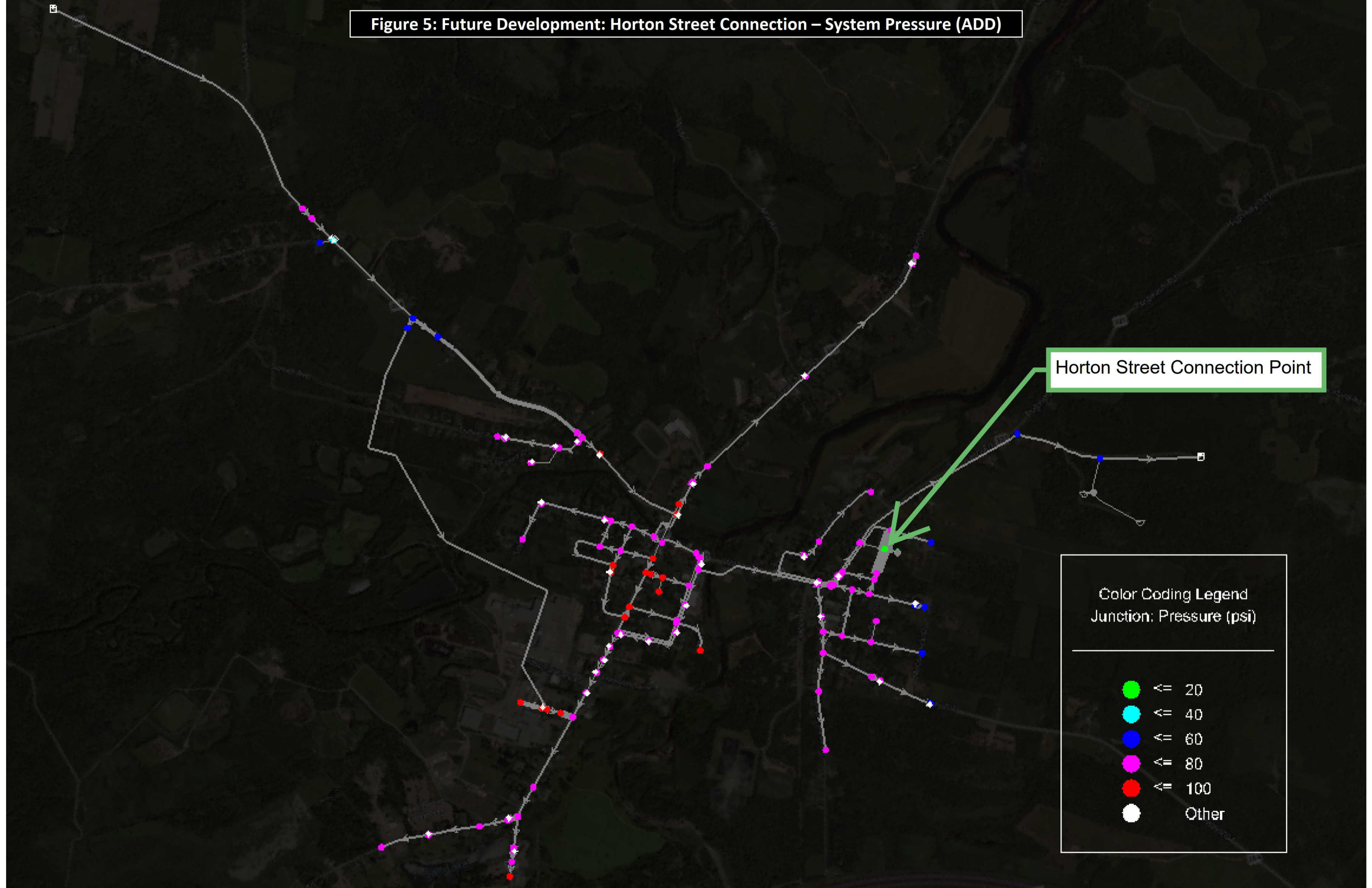
The addition of nine homes off of the 50 mm galvanized steel line on Horton Street was modelled and confirmed that the demand for the nine homes could not be satisfied though this connection point on Horton Street. **Figure 5** is a visual



representation of the pressure at each node within the system during the ADD scenario with the connection on Horton Street.



Figure 5: Future Development: Horton Street Connection – System Pressure (ADD)



Horton Street Connection Point

Color Coding Legend
Junction: Pressure (psi)

- Green ≤ 20
- Cyan ≤ 40
- Blue ≤ 60
- Magenta ≤ 80
- Red ≤ 100
- White Other



The model was then tested with the additional nine homes connected to the 250 mm PVC main line on Pugwash Road in Average Day Demand (ADD), Peak Hour Demand (PHD), Max Day Demand (MDD), and MDD + Fire Flow scenarios. The model determined that the system could meet the demand of the additional nine homes at this connection location in all scenarios. **Table 15** represents the pressure within the system during the ADD, PHD and MDD scenarios with the connection to the 250 mm PVC water main on Pugwash Road and **Figure 6** is a visual representation of the pressure at each node within the system during the ADD scenario with the connection on Pugwash Road.

Table 15: Future Development: Pugwash Road Connection - Pressure

Junction	ADD Pressure (kPa (PSI))	PHD Pressure (kPa (PSI))	MDD Pressure (kPa (PSI))
J-38	510.6 (74)	483 (70)	496.8 (72)
J-39	372.6 (54)	372.6 (54)	372.6 (54)
J-42	579.6 (84)	503.7 (73)	545.1 (79)
J-45	531.3 (77)	524.4 (76)	524.4 (76)
J-46	531.3 (77)	524.4 (76)	524.4 (76)
J-47	462.3 (67)	455.4 (66)	455.4 (66)
J-48	483 (70)	476.1 (69)	476.1 (69)
J-49	489.9 (71)	483 (70)	489.9 (71)
J-50	545.1 (79)	545.1 (79)	545.1 (79)
J-51	524.4 (76)	524.4 (76)	524.4 (76)
J-52	565.8 (82)	558.9 (81)	565.8 (82)
J-54	324.3 (47)	324.3 (47)	324.3 (47)
J-57	545.1 (79)	538.2 (78)	545.1 (79)
J-59	524.4 (76)	524.4 (76)	524.4 (76)
J-60	503.7 (73)	503.7 (73)	503.7 (73)
J-61	483 (70)	476.1 (69)	483 (70)
J-62	531.3 (77)	531.3 (77)	531.3 (77)
J-63	552 (80)	552 (80)	552 (80)
J-64	545.1 (79)	538.2 (78)	545.1 (79)
J-65	572.7 (83)	476.1 (69)	524.4 (76)
J-66	545.1 (79)	545.1 (79)	545.1 (79)
J-67	503.7 (73)	496.8 (72)	503.7 (73)
J-68	538.2 (78)	531.3 (77)	531.3 (77)
J-69	545.1 (79)	538.2 (78)	545.1 (79)



Junction	ADD Pressure (kPa (PSI))	PHD Pressure (kPa (PSI))	MDD Pressure (kPa (PSI))
J-70	545.1 (79)	538.2 (78)	545.1 (79)
J-71	565.8 (82)	558.9 (81)	558.9 (81)
J-72	565.8 (82)	558.9 (81)	558.9 (81)
J-73	565.8 (82)	558.9 (81)	558.9 (81)
J-74	545.1 (79)	538.2 (78)	545.1 (79)
J-75	552 (80)	552 (80)	552 (80)
J-76	565.8 (82)	558.9 (81)	558.9 (81)
J-77	545.1 (79)	545.1 (79)	545.1 (79)
J-78	565.8 (82)	558.9 (81)	558.9 (81)
J-79	565.8 (82)	558.9 (81)	558.9 (81)
J-80	565.8 (82)	558.9 (81)	558.9 (81)
J-81	545.1 (79)	538.2 (78)	545.1 (79)
J-82	538.2 (78)	531.3 (77)	531.3 (77)
J-83	545.1 (79)	538.2 (78)	545.1 (79)
J-84	496.8 (72)	489.9 (71)	489.9 (71)
J-85	462.3 (67)	462.3 (67)	462.3 (67)
J-86	393.3 (57)	372.6 (54)	379.5 (55)
J-87	427.8 (62)	414 (60)	420.9 (61)
J-88	455.4 (66)	441.6 (64)	448.5 (65)
J-89	455.4 (66)	448.5 (65)	455.4 (66)
J-90	476.1 (69)	469.2 (68)	469.2 (68)
J-91	455.4 (66)	448.5 (65)	448.5 (65)
J-92	393.3 (57)	386.4 (56)	393.3 (57)
J-93	462.3 (67)	455.4 (66)	462.3 (67)
J-94	393.3 (57)	386.4 (56)	393.3 (57)
J-95	503.7 (73)	496.8 (72)	496.8 (72)
J-97	455.4 (66)	448.5 (65)	448.5 (65)
J-99	483 (70)	476.1 (69)	483 (70)
J-100	503.7 (73)	496.8 (72)	496.8 (72)
J-101	510.6 (74)	503.7 (73)	510.6 (74)
J-102	483 (70)	469.2 (68)	476.1 (69)
J-103	455.4 (66)	455.4 (66)	455.4 (66)
J-104	448.5 (65)	441.6 (64)	441.6 (64)
J-105	462.3 (67)	462.3 (67)	462.3 (67)

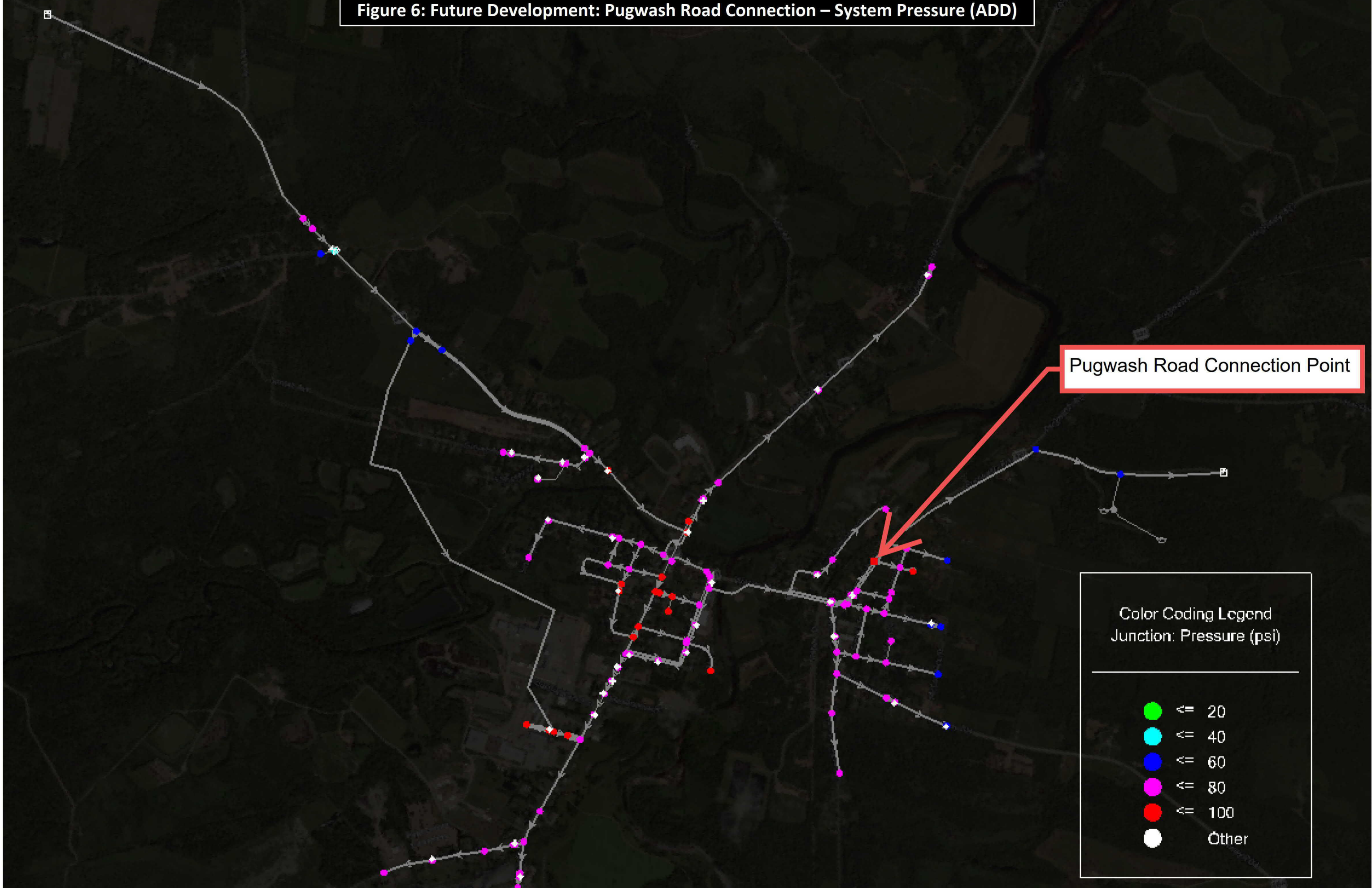


Junction	ADD Pressure (kPa (PSI))	PHD Pressure (kPa (PSI))	MDD Pressure (kPa (PSI))
J-106	358.8 (52)	351.9 (51)	358.8 (52)
J-107	538.2 (78)	531.3 (77)	538.2 (78)
J-108	483 (70)	476.1 (69)	476.1 (69)
J-109	489.9 (71)	483 (70)	489.9 (71)
J-110	462.3 (67)	455.4 (66)	455.4 (66)
J-111	517.5 (75)	510.6 (74)	510.6 (74)
J-112	469.2 (68)	462.3 (67)	462.3 (67)
J-113	545.1 (79)	545.1 (79)	545.1 (79)
J-114	565.8 (82)	558.9 (81)	565.8 (82)
J-115	538.2 (78)	531.3 (77)	531.3 (77)
J-116	503.7 (73)	496.8 (72)	503.7 (73)
J-117	565.8 (82)	558.9 (81)	558.9 (81)
J-118	545.1 (79)	538.2 (78)	545.1 (79)
J-119	545.1 (79)	538.2 (78)	545.1 (79)
J-120	545.1 (79)	538.2 (78)	545.1 (79)
J-121	545.1 (79)	538.2 (78)	545.1 (79)
J-122	545.1 (79)	538.2 (78)	545.1 (79)
J-123	552 (80)	545.1 (79)	552 (80)
J-124	538.2 (78)	538.2 (78)	538.2 (78)
J-125	552 (80)	545.1 (79)	552 (80)
J-126	552 (80)	545.1 (79)	552 (80)
J-127	579.6 (84)	496.8 (72)	538.2 (78)
J-129	524.4 (76)	524.4 (76)	524.4 (76)
J-130	483 (70)	483 (70)	483 (70)
J-131	545.1 (79)	538.2 (78)	545.1 (79)
J-132	503.7 (73)	496.8 (72)	496.8 (72)
J-133	496.8 (72)	483 (70)	489.9 (71)
J-134	496.8 (72)	483 (70)	489.9 (71)
J-135	393.3 (57)	386.4 (56)	393.3 (57)
J-136	496.8 (72)	489.9 (71)	489.9 (71)
J-137	427.8 (62)	420.9 (61)	420.9 (61)
J-138	358.8 (52)	351.9 (51)	358.8 (52)
J-140	427.8 (62)	420.9 (61)	420.9 (61)
J-141	455.4 (66)	448.5 (65)	448.5 (65)



Junction	ADD Pressure (kPa (PSI))	PHD Pressure (kPa (PSI))	MDD Pressure (kPa (PSI))
J-142	565.8 (82)	565.8 (82)	565.8 (82)
J-147	496.8 (72)	489.9 (71)	489.9 (71)
J-148	538.2 (78)	531.3 (77)	538.2 (78)
J-149	538.2 (78)	531.3 (77)	531.3 (77)
J-150	545.1 (79)	538.2 (78)	545.1 (79)
J-151	558.9 (81)	552 (80)	552 (80)
J-152	545.1 (79)	545.1 (79)	545.1 (79)
J-153	545.1 (79)	538.2 (78)	538.2 (78)
J-154	552 (80)	545.1 (79)	552 (80)
J-155	372.6 (54)	372.6 (54)	372.6 (54)
J-159	324.3 (47)	317.4 (46)	324.3 (47)
J-160	324.3 (47)	317.4 (46)	317.4 (46)
J-162	510.6 (74)	483 (70)	496.8 (72)
J-163	565.8 (82)	496.8 (72)	531.3 (77)
J-164	462.3 (67)	455.4 (66)	455.4 (66)
J-166	324.3 (47)	317.4 (46)	324.3 (47)
J-167	565.8 (82)	558.9 (81)	558.9 (81)
J-168	552 (80)	545.1 (79)	545.1 (79)
J-169	503.7 (73)	496.8 (72)	496.8 (72)
J-170	138 (20)	138 (20)	138 (20)
J-171	503.7 (73)	503.7 (73)	503.7 (73)
J-173	496.8 (72)	489.9 (71)	489.9 (71)
J-178	483 (70)	483 (70)	483 (70)
J-179	593.4 (86)	593.4 (86)	593.4 (86)

Figure 6: Future Development: Pugwash Road Connection – System Pressure (ADD)



Pugwash Road Connection Point

Color Coding Legend
Junction: Pressure (psi)

- ≤ 20
- ≤ 40
- ≤ 60
- ≤ 80
- ≤ 100
- Other



The model analysis of the future development demonstrated that residential fire flows can be satisfied under the described boundary conditions within all pipes with a diameter greater than 150 mm. The pipes within the system with a diameter smaller than 150 mm are unable to provide adequate fire flow. The fire flow analysis results are summarized in **Table 16**.

Table 16: Future Development: Pugwash Road Connection - Fire Flow Analysis Results

Junction	Fire Flow Needed (L/s (GPM))	Fire Flow Available (L/s (GPM))	Pressure (Residual Lower Limit) (kPa (PSI))	Pressure (Residual Calculated) (kPa (PSI))
J-38	63 (1000)	220.878 (3506)	138 (20)	289.8 (42)
J-39	63 (1000)	9.639 (153)	138 (20)	138 (20)
J-42	63 (1000)	105.462 (1674)	138 (20)	303.6 (44)
J-45	63 (1000)	84.546 (1342)	138 (20)	227.7 (33)
J-46	63 (1000)	84.357 (1339)	138 (20)	227.7 (33)
J-47	63 (1000)	70.308 (1116)	138 (20)	151.8 (22)
J-48	63 (1000)	78.624 (1248)	138 (20)	179.4 (26)
J-49	63 (1000)	76.923 (1221)	138 (20)	158.7 (23)
J-50	63 (1000)	83.475 (1325)	138 (20)	241.5 (35)
J-51	63 (1000)	13.419 (213)	138 (20)	158.7 (23)
J-52	63 (1000)	93.618 (1486)	138 (20)	255.3 (37)
J-54	63 (1000)	162.477 (2579)	138 (20)	172.5 (25)
J-57	63 (1000)	100.611 (1597)	138 (20)	282.9 (41)
J-59	63 (1000)	74.214 (1178)	138 (20)	200.1 (29)
J-60	63 (1000)	5.67 (90)	138 (20)	282.9 (41)
J-61	63 (1000)	3.276 (52)	138 (20)	144.9 (21)
J-62	63 (1000)	75.348 (1196)	138 (20)	213.9 (31)
J-63	63 (1000)	52.668 (836)	138 (20)	276 (40)
J-64	63 (1000)	82.404 (1308)	138 (20)	282.9 (41)
J-65	63 (1000)	35.343 (561)	138 (20)	448.5 (65)
J-66	63 (1000)	99.729 (1583)	138 (20)	227.7 (33)
J-67	63 (1000)	19.782 (314)	138 (20)	138 (20)
J-68	63 (1000)	21.798 (346)	138 (20)	414 (60)
J-69	63 (1000)	21.798 (346)	138 (20)	213.9 (31)
J-70	63 (1000)	21.798 (346)	138 (20)	324.3 (47)
J-71	63 (1000)	21.798 (346)	138 (20)	193.2 (28)



Junction	Fire Flow Needed (L/s (GPM))	Fire Flow Available (L/s (GPM))	Pressure (Residual Lower Limit) (kPa (PSI))	Pressure (Residual Calculated) (kPa (PSI))
J-72	63 (1000)	21.798 (346)	138 (20)	365.7 (53)
J-73	63 (1000)	21.798 (346)	138 (20)	365.7 (53)
J-74	63 (1000)	21.798 (346)	138 (20)	324.3 (47)
J-75	63 (1000)	21.798 (346)	138 (20)	365.7 (53)
J-76	63 (1000)	21.798 (346)	138 (20)	386.4 (56)
J-77	63 (1000)	101.682 (1614)	138 (20)	227.7 (33)
J-78	63 (1000)	21.798 (346)	138 (20)	345 (50)
J-79	63 (1000)	5.859 (93)	138 (20)	427.8 (62)
J-80	63 (1000)	21.798 (346)	138 (20)	420.9 (61)
J-81	63 (1000)	21.798 (346)	138 (20)	414 (60)
J-82	63 (1000)	21.798 (346)	138 (20)	441.6 (64)
J-83	63 (1000)	21.798 (346)	138 (20)	414 (60)
J-84	63 (1000)	100.044 (1588)	138 (20)	276 (40)
J-85	63 (1000)	85.428 (1356)	138 (20)	248.4 (36)
J-86	63 (1000)	1.071 (17)	138 (20)	144.9 (21)
J-87	63 (1000)	1.953 (31)	138 (20)	179.4 (26)
J-88	63 (1000)	1.953 (31)	138 (20)	200.1 (29)
J-89	63 (1000)	15.561 (247)	138 (20)	220.8 (32)
J-90	63 (1000)	7.812 (124)	138 (20)	241.5 (35)
J-91	63 (1000)	7.308 (116)	138 (20)	220.8 (32)
J-92	63 (1000)	5.67 (90)	138 (20)	144.9 (21)
J-93	63 (1000)	5.355 (85)	138 (20)	207 (30)
J-94	63 (1000)	4.662 (74)	138 (20)	138 (20)
J-95	63 (1000)	7.497 (119)	138 (20)	248.4 (36)
J-97	63 (1000)	7.434 (118)	138 (20)	200.1 (29)
J-99	63 (1000)	7.686 (122)	138 (20)	227.7 (33)
J-100	63 (1000)	5.733 (91)	138 (20)	165.6 (24)
J-101	63 (1000)	4.536 (72)	138 (20)	172.5 (25)
J-102	63 (1000)	3.024 (48)	138 (20)	138 (20)
J-103	63 (1000)	22.932 (364)	138 (20)	351.9 (51)
J-104	63 (1000)	22.932 (364)	138 (20)	200.1 (29)
J-105	63 (1000)	4.851 (77)	138 (20)	144.9 (21)
J-106	63 (1000)	14.742 (234)	138 (20)	138 (20)



Junction	Fire Flow Needed (L/s (GPM))	Fire Flow Available (L/s (GPM))	Pressure (Residual Lower Limit) (kPa (PSI))	Pressure (Residual Calculated) (kPa (PSI))
J-107	63 (1000)	82.971 (1317)	138 (20)	241.5 (35)
J-108	63 (1000)	77.994 (1238)	138 (20)	179.4 (26)
J-109	63 (1000)	76.923 (1221)	138 (20)	158.7 (23)
J-110	63 (1000)	70.371 (1117)	138 (20)	158.7 (23)
J-111	63 (1000)	13.419 (213)	138 (20)	158.7 (23)
J-112	63 (1000)	17.955 (285)	138 (20)	158.7 (23)
J-113	63 (1000)	83.727 (1329)	138 (20)	241.5 (35)
J-114	63 (1000)	93.492 (1484)	138 (20)	255.3 (37)
J-115	63 (1000)	21.798 (346)	138 (20)	393.3 (57)
J-116	63 (1000)	21.798 (346)	138 (20)	186.3 (27)
J-117	63 (1000)	21.798 (346)	138 (20)	407.1 (59)
J-118	63 (1000)	100.8 (1600)	138 (20)	276 (40)
J-119	63 (1000)	96.831 (1537)	138 (20)	282.9 (41)
J-120	63 (1000)	94.185 (1495)	138 (20)	282.9 (41)
J-121	63 (1000)	91.161 (1447)	138 (20)	282.9 (41)
J-122	63 (1000)	88.956 (1412)	138 (20)	282.9 (41)
J-123	63 (1000)	87.57 (1390)	138 (20)	289.8 (42)
J-124	63 (1000)	86.562 (1374)	138 (20)	276 (40)
J-125	63 (1000)	85.554 (1358)	138 (20)	289.8 (42)
J-126	63 (1000)	84.105 (1335)	138 (20)	289.8 (42)
J-127	63 (1000)	105.462 (1674)	138 (20)	282.9 (41)
J-129	63 (1000)	74.34 (1180)	138 (20)	200.1 (29)
J-130	63 (1000)	4.095 (65)	138 (20)	165.6 (24)
J-131	63 (1000)	52.668 (836)	138 (20)	310.5 (45)
J-132	63 (1000)	5.733 (91)	138 (20)	165.6 (24)
J-133	63 (1000)	7.686 (122)	138 (20)	186.3 (27)
J-134	63 (1000)	7.56 (120)	138 (20)	234.6 (34)
J-135	63 (1000)	5.67 (90)	138 (20)	158.7 (23)
J-136	63 (1000)	89.397 (1419)	138 (20)	276 (40)
J-137	63 (1000)	18.333 (291)	138 (20)	207 (30)
J-138	63 (1000)	14.805 (235)	138 (20)	138 (20)
J-140	63 (1000)	19.215 (305)	138 (20)	207 (30)
J-141	63 (1000)	7.434 (118)	138 (20)	186.3 (27)



Junction	Fire Flow Needed (L/s (GPM))	Fire Flow Available (L/s (GPM))	Pressure (Residual Lower Limit) (kPa (PSI))	Pressure (Residual Calculated) (kPa (PSI))
J-142	63 (1000)	86.373 (1371)	138 (20)	262.2 (38)
J-147	63 (1000)	101.556 (1612)	138 (20)	276 (40)
J-148	63 (1000)	79.38 (1260)	138 (20)	213.9 (31)
J-149	63 (1000)	22.995 (365)	138 (20)	441.6 (64)
J-150	63 (1000)	101.871 (1617)	138 (20)	262.2 (38)
J-151	63 (1000)	21.798 (346)	138 (20)	358.8 (52)
J-152	63 (1000)	52.668 (836)	138 (20)	296.7 (43)
J-153	63 (1000)	52.668 (836)	138 (20)	317.4 (46)
J-154	63 (1000)	88.704 (1408)	138 (20)	289.8 (42)
J-155	63 (1000)	150.444 (2388)	138 (20)	144.9 (21)
J-159	63 (1000)	237.636 (3772)	138 (20)	255.3 (37)
J-160	63 (1000)	67.536 (1072)	138 (20)	193.2 (28)
J-162	63 (1000)	220.878 (3506)	138 (20)	276 (40)
J-163	63 (1000)	95.004 (1508)	138 (20)	310.5 (45)
J-164	63 (1000)	0.063 (1)	138 (20)	282.9 (41)
J-166	63 (1000)	153.405 (2435)	138 (20)	276 (40)
J-167	63 (1000)	21.798 (346)	138 (20)	186.3 (27)
J-168	63 (1000)	21.798 (346)	138 (20)	317.4 (46)
J-169	63 (1000)	101.367 (1609)	138 (20)	282.9 (41)
J-171	63 (1000)	102.753 (1631)	138 (20)	282.9 (41)
J-173	63 (1000)	100.044 (1588)	138 (20)	276 (40)
J-178	63 (1000)	107.604 (1708)	138 (20)	262.2 (38)
J-179	63 (1000)	103.95 (1650)	138 (20)	138 (20)

Optimization Recommendations

Since the existing 50 mm galvanized steel watermain on Horton cannot satisfy the required additional demand of a new development, the two following options are recommended.

1. Upsize and replace all cast iron and steel pipes in the area with 150 mm PVC pipes to allow for fire flow protection within the area; or
2. Make the connection for these nine homes off of the 250 mm PVC main line on Pugwash Road. It is recommended that this connection be a 150 mm PVC pipe to allow for fire flow protection within the area.



Conclusion

Dillon has developed a Steady-State WaterCAD model of the existing water distribution system in the Town of Oxford. This model has been used to perform an analysis of several different scenarios and recommendations of opportunities for system improvements and optimization have been identified. This model can be used in the future to conduct tests of other scenarios including future growth and developments.

The results obtained by the WaterCAD model analysis are limited by the information available on the existing water distribution system. The elevation data is also based on ground elevation and will vary from the actual centerline pipe elevations. This analysis is based on an estimation of the existing Town supply as validated based on hydrant flow tests on the existing distribution system and discussion with the Town.

Overall, the existing water distribution system is experiencing supply and low-pressure issues within several areas of the Town due to the existing infrastructure being old and undersized. The undersized pipes also provide concerns surrounding adequate fire flow protection. Dillon recommends that the Town begin looking at potential infrastructure upgrades within the system such as replacing and upsizing the tuberculated and undersized pipes within the system.

When looking at the potential of adding nine homes to Horton Street, it is recommended that the Town either upsize and replace the existing infrastructure in this area so that it can provide adequate supply, or it is recommended that the Town make the connection for the nine homes to the 250 mm PVC water main on Pugwash Road. The Town can look at the two available options presented in this report and decide on how to proceed with this development.

The Town expressed concern regarding an increase of demand at OFF. An increased demand of five (5) times the ADD of OFF was tested and the model confirmed that an increased demand of this size could be met without causing any operational issues in the system at ADD. The model was also tested under the PHD scenario and the model showed no issues within the system at 2.5 times the PHD of OFF.

Regarding water supply, the tanks at full or minimum water levels are currently providing adequate supply to the system but if either tank was to become non-operational the entire system would experience supply and pressure issues. Dillon recommends that upgrades to a reliable secondary water supply or additional tankage be considered. A secondary water supply would provide redundancy to the system and increase the systems capability of supplying increased demands in emergency and future growth scenarios.



If the Town would like to conduct any further scenario analysis or simulations with the finalized WaterCAD model, Dillon can be engaged to perform these requests.

Sincerely,

DILLON CONSULTING LIMITED

Taylor Price, EIT

Kyle MacIntyre, P.Eng.

TP:jmt

Our file: 23-7219

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