

INFRASTRUCTURE COMMITTEE MEETING

Monday, August 27, 2018

6:00 P.M.

HAMPDEN TOWN OFFICE

AGENDA

1. MINUTES
 - a. July 23, 2018 Meeting
2. UNFINISHED BUSINESS
3. NEW BUSINESS
 - a. Discussion regarding the need for improved water supply capacity to Hampden Business Park and Ammo Industrial Park. See the attached Draft Analysis provided to the Water District from Woodard & Curran for background information – *request of Town and Water District staff*
4. STAFF UPDATES
 - a. Status – Mayo Road Code Complaint
 - b. Status – Mold Remediation Project at Municipal Building
 - c. Status – Schoolhouse Lane
5. PUBLIC COMMENTS
6. COMMITTEE MEMBER COMMENTS
7. ADJOURN

INFRASTRUCTURE COMMITTEE MEETING

Monday, July 23, 2018

MINUTES – DRAFT

Attending:

<i>Councilor Mark Cormier, Chairman</i>	<i>Town Manager Jim Chandler</i>
<i>Mayor Ivan McPike</i>	<i>PW Director Sean Carrier</i>
<i>Councilor Dennis Marble</i>	<i>Members of the Public</i>
<i>Councilor Terry McAvoy</i>	
<i>Councilor David Ryder</i>	
<i>Councilor Stephen Wilde</i>	
<i>Councilor Shelby Wright</i>	

Chairman Cormier called the meeting to order at 6 PM.

1. MINUTES

- a. **June 25, 2018 Meeting** – *Motion by Chairman Cormier seconded by Mayor McPike to approve the minutes as written. Motion carried seven in favor and none against.*

2. OLD BUSINESS

- a. **Mayo Road Code Complaint – request of Councilor Marble**
 - i. **Note, the Code Officer was not available for this item when originally place on the June agenda.**

Councilor Marble explained this item had been tabled from last month's meeting for a couple of reasons. One being there had been a death in the family at the residence in question, and two the Code Enforcement Officer was not available at last month's meeting.

Councilor Marble stated there are un-registered vehicles on the property. These un-registered vehicles have been there for a very long time. A vote was taken in 2002 by the Council not to go to court over this issue.

Manager Chandler visited the site and noted the piles of debris two un-registered abandon vehicles and a big RV type vehicle not registered on the property. Three letters from different Code Enforcement Officers over the years and one letter written by the Town Attorney were sent to the homeowner, with no response. No action was taken.

Myles Block the current Code Enforcement Officer stated there are junk vehicles on the property and a pick-up truck in the back close to the property line, and the property is in a Residential B Zone.

Chairman Cormier asked whether the Town removes them if the homeowner doesn't and if so who pays that cost. CEO Block explained that the ordinance does not give the Town the authority to remove the junk vehicle but does give the Town the authority to take the violators to court for a land use violation under Title 30-A. The fine is a minimum of \$100.00 per day and up to \$500.00 for each day the violation exist.

Councilor McAvoy asked the Code Officer if he had the authority to take violators to court.

CEO Block replied he does not have the authorization to spend the funds to take them to court. He has the authorization to take them to court.

Councilor McAvoy stated there are two decision points to be made, does code enforcement have authority to initiate court action but first must come to Council to pay for it. CEO Block stated that it would be done through the Town's attorney.

Manager Chandler asked CEO Block if he had 80K certification. Myles stated he does not. Manager Chandler explained that 80K is basically giving the Code Enforcement Officers ability to present matters before a judge.

Councilor Wilde asked if this is one of those items where we go through all the motions, then drop it. Councilor Wilde was making a reference to an unsafe building on Main Road North where the Council determined it was an unsafe building. Enforcement action was required, but the building still exists.

At the end of the discussion, Council consensus was to proceed with CEO Block sending out a letter giving 30 days to comply with ordinance prior to taking further action with the attorney.

b. Update on Mold Remediation at Municipal Building

Director Currier stated that the first phase of the mold remediation is complete, and the second phase is starting. This phase should take a week and a half to two weeks. Flooring will be 3 to 4 days. Basically, another month the project should be complete.

c. Update – Cemetery Vehicle Purchase

Director Currier explained to the Committee about the purchase of a cemetery vehicle. This vehicle was being sold by Maine Savings as a repo. The vehicle was purchased for \$21,000.00. Councilor Marble made a motion to refer this item to Council. The motion was seconded by Councilor Wilde. The vote was unanimous.

d. Update on FY 2019 Paving Pre-Con Meeting

Director Currier updated the Committee on the paving project. Paving starts on Friday July 27.

e. Schoolhouse Lane Status

Director Currier explained that the survey is complete, he believes it will be a four weeks schedule to start the bid process and hoping for fall construction. He plans to go through the winter with a binder coat on, then coming back in the spring and put the top coat of pavement on the road.

There was some discussion on where the money for Schoolhouse Lane re-construction was coming from.

Director Currier read from his notes stating that streets and roads highway operating budget \$303,000.00 for re-construction (10-01-30-75), partial offset from by \$150,000 from Environmental Trust. Paving is coming out of paving budget.

Director Currier stated that there were other projects we did not put money in for such as the Sucker Brook culvert. \$50,000 was put in the budget last year for Sucker Brook. We were going to propose TIF funds.

Manager Chandler asked if \$100,000 would cover Sucker Brook project.

3. NEW BUSINESS

a. Discussion and motion to refer Proposed November 2018 Roads and Bridges Bond Referendum to Council.

Manager Chandler explained when last discussed, he was headed to a BACTS meeting to gain their support for the Route 1A reconstruction project, and a sixth year of funding at \$621,000.

There is a \$370,000 gap or deficit based on the latest DOT estimates. This is a 20% increase in two years. Bottom line the Town is looking to get the funding needed for this project to stay on track. Time frame of 2019.

Councilor McAvoy stated this this would have to go to the finance committee for referral to Council.

Manager Chandler stated his recommendation would be prepared for the August 6th meeting.

Councilor Marble stated that over the last year or two there are holes that need attention. The Sucker Brook culvert has been discussed for at least the last four years. Councilor Marble cautioned about how much the Town takes on.

Director Currier explained about the replacement of the signal lights at the intersection at Western Avenue and 1A. Director Currier stated this is his #2 priority. Replacing all pole and signals, wires supports, and pedestrian signals. Director Currier stated this project would be around \$325,000 rather than \$400,000. These numbers were projected from Old Town project.

Director Currier stated his #3 priority would be Manning Mill. Sawyer Road is #4, the State is telling us both Manning Mill and Sawyer Road bridges are deficient.

Manager Chandler stated he did look at both bridges. There is no visible damage. The water is undercutting and eroding away under the bridges. Manager Chandler asked if Sucker Brook was something we need to add to the list.

TIF funding was discussed for Sucker Brook.

Councilor Marble stated about maybe holding off on 3 and 4, but what about liability.

Manager Chandler stated we would not go to Bond unless we had firm numbers.

Councilor Marble made a motion to refer to finance for authorization on November 2018 Roads and Bridges Bond in the rough amount of \$1.4 million, seconded by Councilor McAvoy.

4. STAFF UPDATES

Director Currier stated regarding the truck for the cemetery, that it was not a typical way to purchase a vehicle; however, he saw an opportunity and took it to save the Town some money.

Mayor McPike stated Director Currier did a great job purchasing a used truck at a lower cost for the cemetery.

5. PUBLIC COMMENTS

Douglas Annis, 618 Main Rd North. He sent some photos of the site. Mr. Annis stated he has an autistic son, who needs help with learning to living independently. He got a building permit for a shed. The shed is now going to be a place for his son to live in. He wants to put a Y in his sewer pipe to have sewer hooked up in this building. Due to the town sewer ordinance he would have to dig up 1A which is not only very costly, but he cannot wait years to do so. The sewer pipe is on the opposite site of the road. He is asking for a waiver from the committee, so he could hook up the building to his sewer pipe.

Chairman Cormier asked if he was in the right meeting.

Manager Chandler stated that there is no permit or way for him to violate the ordinance with a variance.

Director Currier stated that the original permit was for a shed.

Director Currier stated that Travis Roberts (a town employee) did not give a yea or nay on what could be done on site.

Director Currier stated that the sewer ordinance does not allow for shared sewer. Director Currier read from the sewer ordinance the part that explains that separate sewer is needed for every dwelling unit. The Town Council may issue a waiver due to hardship.

Councilor Marble asked about attached units, accessory apartments. Living area and a workshop combined attached to his house would he be able to do that.

Manager Chandler stated Mr. Annis did not want it attached to his house.

Myles Block, Code Enforcement stated he can apply his building permit to a dwelling unit, under conditional use he would be allowed to do that. The Town Planner can help Mr. Annis with that.

The Waiver for this would be this committee, for recommendation to Council.

Councilor Marble stated he would like to see a proper permit for the dwelling unit.

Mayor McPike stated that if the proper channels were followed he is in favor of the waiver.

Councilor McAvoy asked about the waiver to Y into the sewer.

Manager Chandler asked Mr. Annis to come in and get the proper permit for the dwelling unit.

Mr. Annis asked if it is Danielle who he see at the Town Office?

This is Mr. Annis next step to get a permit for the new dwelling unit.

Yes, it is.

6. COMMITTEE MEMBER COMMENTS

7. ADJOURN

There being no further business, the meeting was adjourned at 7:20 p.m.

*Respectfully Submitted,
Rosemary Bezanson, Public Works*

MEMORANDUM



TO: Jamie Holyoke, Hampden Water District
CC: Nathan McLaughlin, P.E., Woodard & Curran
FROM: Kyle Corbeil, P.E., Woodard & Curran
DATE: June 13, 2018
RE: Evaluation of Hampden Business Park Available Fire Flow Capacity

The purpose of this memorandum is to review the existing water service to the Hampden Business Park and the associated developments regarding fire protection capacity. This portion of the system is currently separate from the main Hampden Water District (HWD) service area and previous analysis has shown limitations in available fire flow (AFF) relative to the anticipated needed fire flow (NFF) for proposed developments. This review of available improvement options includes recommendations for system modifications to improve AFF.

Background

HWD provides service to customers located within the Hampden Business Park (located on Carey Circle, East Carey Circle, and Commerce Court) and the Ammo Industrial Park. Service is provided via a meter station located at the entrance to the Business Park adjacent to Route 202. The meter station serves as an interconnection with the Bangor Water District (BWD) distribution system.

BWD owns a 12-inch water main that extends from their Perry Road Pump Station, located about 0.6 miles to the north of Business Park, south along Route 202 to the HWD Route 202 Pump Station and then east, crossing the Penobscot River and serving BWD customers in Orrington. HWD connects to the BWD 12-inch main at the Business Park and at the Route 202 Pump Station. There are no other known active service connections to this main south of Mecaw Road. This portion of the BWD distribution system operates as a separate pressure zone, with the Perry Road Pump Station providing system pressure via variable speed pumps. No water storage is provided in this pressure zone at the hydraulic grade provided by the Perry Road Pump Station. Limited system pressure is available if the Perry Road pumps are offline through a bypass connection, but it is insufficient to maintain the normal hydraulic grade that the HWD interconnections require at design water flow.

The existing Business Park meter station is a partially buried structure with metering and backflow prevention equipment. The existing system includes a pair of 6-inch reduced pressure zone (RPZ) backflow preventers and 4-inch Metron water meters arranged in parallel trains. Both trains are normally active.

The existing arrangement appears to be adequate for normal daily water use in the Business Park. However, this arrangement can become limiting at high water flows necessary for fire protection due to headloss through the service equipment.

By modeling the hydraulic conditions, we estimate that a maximum available fire flow (AFF) of 600 to 650 gpm can be expected from the existing hydrants in the Business Park, further detailed in the Baseline Scenario section that follows in this memorandum. While this range of flow is typically adequate for low-density residential development, this is generally too low to meet fire protection requirements for some



commercial, industrial, and dense residential developments. A recent prospective Business Park developer used an initial fire flow requirement of 2,000 gpm based on their development plans.

Hydraulic Model Conditions

The HWD hydraulic model was used to evaluate existing conditions and improvement scenarios. As this is a planning level study focused on fire protection, the hydraulic model uses projected Maximum Day Demand (MDD) per AWWA guidelines for distribution system evaluation.

The model conditions are summarized as follows:

- Water Use: Projected 2030 MDD of 0.890 MGD
 - Includes the Town-approved MRC/Fiberight development MDD of 100 gpm and estimates of associated development along Coldbrook Road, MRC/Fiberight Access Road, and other Industrial Park areas.
- Route 202 Pump Station: Assumes increased capacity of 800-900 gpm based on previous upgrade recommendations and ongoing design. Each improvement scenario assumes that the Route 202 Pump Station is operating, and the Main Road Pump Station is offline to reflect limiting conditions on the BWD system, specifically the Perry Road Pump Station and 12-inch water main along Route 202.
- Perry Road Pump Station: Assumes that the existing pump configuration and controls are utilized and that no BWD upstream limitations exist.
- Business Park Expansion: The additional water main and hydrants installed as part of the Business Park expansion were incorporated into the model network.
- No other significant HWD or BWD improvements are considered unless specifically noted in the scenario description.

Available Fire Flow estimates are based on the hydraulic model predictions of capacity at each hydrant location while maintaining a minimum pressure of 20 psi within the affected pressure zone. Reported flow rates are hydraulic model predictions and may not be reflective of actual flow test measurements, which are dependent on the testing procedure and system conditions.

Baseline Scenario

A baseline scenario was developed to evaluate existing distribution system conditions of the HWD and BWD systems with assumptions as previously noted.

Predicted AFF for hydrants located within the Hampden Business Park ranged from 607 gpm to 647 gpm and are listed in Table 1. This can be considered adequate based on a minimum standard of 500 gpm for low-density residential development but is generally considered to be low for other types of development, particularly for building types without sprinkler systems or those with other specific fire protection requirements.

Limitations in AFF appear to be primarily due to headloss through the Business Park meter station, limiting the available pressure in the service area during fire flow conditions.



Predicted AFF elsewhere in the HWD distribution system varies widely, but generally ranges between 1,500 gpm and 2,000 gpm in service areas adjacent to the Business Park and exceeds 2,500 gpm in areas served by mains 8-inch and larger, are lower in elevation than the Business Park, and have good system connection with at least one of the existing HWD storage tanks.

Table 1: Existing Conditions estimated AFF

Hydrant	Location	Estimated Available Fire Flow (AFF) GPM
CCR-01	Carey Circle	646
CCR-02	Carey Circle	638
CCR-03	Carey Circle	630
CCR-04	Carey Circle	620
CCR-05	Carey Circle	614
CCR-06	Carey Circle	607
CCR-07	Carey Circle	603
COM-01	Commerce Court	647
ECR-01	East Carey Circle	638
ECR-02	East Carey Circle	638
ECR-03	East Carey Circle	638

Carey Circle Improvement Options

We prepared a series of options aimed at improving available fire flow (AFF) in the Business Park, listed as follows:

1. Modify HWD Business Park Meter Station
2. Extend HWD Distribution System to Carey Circle
3. Install a Storage Tank
4. Install a New Interconnection with BWD
5. Do Nothing

Each option is discussed in more detail in the following sections.

Option 1: Modify the HWD Business Park Meter Station

Upgrading the existing Business Park meter station equipment may increase the AFF by modifying the existing equipment or supplementing its capacity.

Several options for upgrading the existing meter are available, including replacing the existing metering and backflow prevention equipment with larger models, utilizing an alternative meter and backflow protection system, or installing a fire pump system. Each is discussed below.

Any modifications to the meter station will require coordination and acceptance from the Bangor Water District and are subject to their service requirements. For example, they may not accept the use of anything but an RPZ-type backflow preventer for the maximum protection from backflow or may have other limits on supply capacity beyond the hydraulic limitation we are evaluating.



1A: Replace existing metering and backflow prevention equipment with larger models

Replacing the existing metering and backflow equipment with larger models can reduce the headloss and increase the available pressure at higher flow rates. However, meters and check valve devices tend to be more accurate and last longer when properly matched with typical flows.

Compound meters substituted for the existing meters could increase the range of accurate flow measurement, although they are not always suited for the high flows typical with fire protection applications.

The RPZ-type backflow preventers have a high inherent headloss, approximately 10 to 12 psi throughout their flow range. A larger RPZ can increase the maximum capacity but may also result in inconsistent operation at low flows due to oversized check valves. Large RPZs operated only at low flows typically require extra attention to maintenance to ensure that they operate properly across their range. A two-stage system with a system sized for typical low flows and a system sized for fire protection flows may provide more consistent operation while maintaining redundancy.

It may be possible to replace the existing RPZ-type backflow preventers with double-check valve assembly (DCVA) backflow preventers. DCVAs are generally used for premise fire protection services and offer less than half the headloss of a similarly sized RPZ. They are intended for lower hazard applications, such as preventing backflow from fire protection systems that do not add corrosion control chemicals. A substitution would require acceptance from the Bangor Water District, which to date has required RPZ devices.

This option was not reviewed further due to the expected marginal gains in available fire flow, i.e. predicted AFF less than 1,000 gpm.

1B: Utilize an Alternative Meter and Backflow Protection System

Using an alternative meter and backflow prevention device could increase the available fire flow capacity by substituting the high-headloss existing components with systems optimized for fire protection.

Alternative metering and backflow prevention systems include the Mueller Systems Hersey Meters FM3 fire service meter or Badger Meter Recordall Fire Series Assembly. These systems may be a more appropriate choice for this application due to their fire protection design features, such as lower headloss and higher flow capacity than DCVA or RPZ devices. They utilize a large strainer, independent flow meters (one large meter and one smaller bypass meter), and a check valve to provide all typical service entrance functions. The systems are UL Listed for fire service use, FM approved, and meet AWWA requirements.

This option was reviewed using the hydraulic model to predict available fire flows using lower headloss equipment.

The hydraulic model results show a range of estimated AFF from 906 to 1,071 gpm using this option. At the higher flow rate, pressure is expected to be reduced to 65 psi at the Perry Road Pump Station (typically maintained at approximately 75 psi) and to 26 psi at the inlet to Route 202 Pump Station (typically maintained at approximately 38 psi).



1C: Fire Pump System

Another method of increasing available pressure and flow for fire protection involves the installation of a fire pump system. The design of this system would be subject to National Fire Protection Association (NFPA) requirements for private buildings relying on a pump system for fire protection supply and other design practices that are intended to allow the pump station to meet critical demands.

The fire pump system would require coordination with the BWD Perry Road Pump Station due to the lack of water storage in the BWD pressure zone. A second fire pump system at the Perry Road Pump Station, or modifications to the existing Perry Road Pump Station to meet NFPA requirements, may be necessary with this option.

Based on the results of hydraulic modeling, using fire pumps to increase the AFF above 1,400 gpm at Carey Circle without modifications to the Perry Road Pump Station is likely to reduce system pressure in the BWD system below 20 psi and impact the HWD Route 202 Pump Station operation.

As this option requires a significant amount of modifications to both the HWD and BWD systems and could exacerbate the lack of water storage in the connected portion of the BWD system, we did not further review this option.

Option 2: Extend HWD Distribution System to Carey Circle

Increasing AFF may also be possible by extending the HWD distribution system to the Business Park, integrating it into the main pressure zone of the HWD system and eliminating the hydraulic restrictions of the existing Business Park meter station.

Extending the HWD distribution system to Carey Circle would consist of replacing the current BWD interconnection with a connection by water main to a nearby portion of the HWD distribution system. The existing HWD hydraulic grade is higher than the existing BWD hydraulic grade, increasing the available pressure. By extending the existing distribution system, the two existing HWD water storage tanks would be available as emergency storage where there currently is not any available.

We reviewed two variations of this option for connecting the HWD to Carey Circle, one with a main extending from Old County Road to Carey Circle via a cross-country route and one with a main extending along Route 202 and connecting to existing water main near the Route 202 Pump Station.

The cross-country route option would require a minimum of 2,000 feet of new main for the most direct route and up to 3,800 feet if the route is not direct. HWD would also need to acquire an easement or property rights for the water main alignment outside of established Town and State corridors. Hydraulic model results for the cross-country option were a predicted AFF of 1,113 gpm to 1,191 gpm for an 8-inch water main and 1,604 gpm to 1,849 gpm for a 12-inch water main.

The Route 202 route option requires approximately 4,300 to 4,700 feet of new main and could parallel the existing Route 202 right-of-way. Hydraulic model results for the Route 202 option were a predicted AFF of 933 gpm to 978 gpm for an 8-inch main and 2,002 to 2,492 gpm for a 12-inch main.

Assuming an 8-inch water main size, the cross-country route option appears to result in a higher AFF due to its shorter length than the Route 202 route option, although neither option with this pipe size provides particularly high AFF.

Assuming a 12-inch water main size, the Route 202 route option appears to result in a higher AFF due to a connection to an existing 12-inch main on Route 202 in lieu of the 8-inch main located on Old County



Road. It is also a more direct connection to the Ballfield Tank and Route 202 Pump Station than the connection to Old County Road main.

Option 3: Install a Storage Tank

Installation of a storage tank serving the Business Park and connected properties may increase the AFF by incorporating emergency water storage and reducing the reliance on the pumping systems.

Water storage tank size is dependent on the type of tank used, existing water use, water supply capacity, and standards for the volume of emergency storage.

Typical design factors for municipal systems are based on the AWWA M31 Distribution System Requirements for Fire Protection manual of practice based on the required fire flow (RFF) and duration of event. RFF values are calculated using Insurance Services Office (ISO) methods. Table 2 details the typical RFF, event duration, and resulting emergency storage volume for municipalities.

Table 2: Storage Tank Emergency Storage

Required Fire Flow (GPM)	Event Duration (Hours)	Emergency Storage Volume* (Gallons)
2,500 or less	2	Up to 300,000
3,000	3	540,000
3,500	3	630,000
* Excludes other reliable sources of supply		

An RFF of 3,500 gpm is typically the highest value considered by municipal water systems unless other agreements are in place due to practical limitations. The emergency volume must also be stored above an elevation maintaining 20 psi in the distribution system based on Maine Drinking Water Program rules.

The emergency storage volume can be reduced by the reliable capacity of other systems, such as a fire pump system or water supply connection that is automatic and incorporates redundant equipment. As the existing available supply rate is relatively small relative to the RFF and volume considered in Table 2, we did not consider other variations.

The resulting emergency water storage volume relative to the number of customers and size of the Business Park and connected properties does not generally warrant a dedicated tank, especially when considering potential water quality issues due to low average water use and the life-cycle costs associated with tank ownership. In addition, the elevation of the Business Park and surrounding properties is like adjacent areas of the HWD system and does not warrant a separate pressure zone that might require an additional tank.

For these reasons, we did not further evaluate this option.

Option 4: Install a New Interconnection with BWD

Increasing the AFF in the Business Park may be possible by incorporate a new BWD interconnection. This option includes a new connection point to the BWD system and additional water main necessary to connect to the Business Park.

As the existing BWD water main extending along Route 202 is by far the closet connection point for the HWD, the next closest point of connection would be Odlin Road to the north and across I-95. The connection would be expected to pass through Ammo Industrial Park and connect to the existing HWD



water main serving that development. Approximately 3,500 to 4,000 feet of new water main and a bridge crossing (across I-95) would be necessary.

Due to the cost, complexity, and uncertain capacity available in the BWD system at Odlin Road with this option, we do not expect this to be feasible and have not further evaluated it.

Other potential interconnections have been investigated in the past and were found unfeasible due to similar issues.

Option 5: Do Nothing

The “Do Nothing” option consists of making no modifications to the existing HWD water service to the Business Park and connected properties.

The primary impact of this option relative to fire protection appears to be increasing the responsibility of the developer to meet their respective fire protection requirements through a combination of connection to the HWD system with its limited existing capacity and the use of dedicated onsite fire protection systems to meet code requirements.

Private fire protection code requirements can be met by using fire-resistant construction materials and systems such as sprinklers, onsite water storage, and alternate fire retardants based on the specific requirements of the proposed development.

The potential impacts of these requirements and any potential limitations on the type of development within the Business Park from this option has not been considered as part of this evaluation.

Summary of Findings

The following summarizes the findings from our review of the hydraulic model and potential improvements:

1. The existing Business Park meter station at Carey Circle is predicted to be a significant limiting factor in increasing AFF due to its inherent headloss through metering and backflow prevention equipment. This cannot be fully eliminated due to interconnection requirements for these functions.
2. Upgrading the HWD Business Park meter station at Carey Circle (Option 1) appears to increase AFF, though is predicted to provide an AFF of up to 1,000 gpm with evaluated alternatives, which may not be adequate for some developments.
3. Extending the HWD distribution to the Business Park (Option 2) appears to significantly improve AFF, depending on water main size and alignment.
 - a. The only variation predicted to provide an AFF in excess of 2,000 gpm utilized a 12-inch water main extended along Route 202. The connection to Old County Road resulted in a slightly lower AFF, but still may meet development needs.
4. Options 3 and 4 were not evaluated with the hydraulic model due to significant feasibility concerns.
5. The Do-Nothing Option (Option 5) maintains adequate existing water service but may limit the feasibility of future development types requiring substantial fire protection systems or increased water use (i.e. “wet industry”).



6. The BWD Perry Road Pump Station capacity may be a significant limiting condition to increasing available fire flow in the Business Park. Limitations are based on:
 - a. Limits on the hydraulic capacity of the Pump Station when subjected to combined MDD demands of existing connections, future Route 202 upgrades, and increased HWD water use.
 - b. The configuration of the existing Pump Station that may not fully address NFPA requirements for certain types of development.
 - c. We have not fully evaluated the capacity of the BWD system serving the Perry Road Pump Station and have assumed that the pumping capacity can be adequately served.

Table 3 provides a summary of predicted AFF values for each evaluated option.

Table 3: Predicted AFF for Evaluated Options

Hydrant	Location	Predicted Available Fire Flow (AFF) (GPM)					
		Existing Conditions (Baseline)	Option 1	Option 2			
			Upgrade Business Park Meter Station	Extend HWD Distribution System to Carey Circle			
				New Cross-Country Main (12")	New Cross-Country Main (8")	New Route 202 Main (12")	New Route 202 Main (8")
CCR-01	Carey Circle	646	1,071	1,849	1,191	2,492	978
CCR-02	Carey Circle	638	1,037	1,799	1,176	2,383	969
CCR-03	Carey Circle	630	1,008	1,755	1,163	2,291	962
CCR-04	Carey Circle	620	1,008	1,700	1,146	2,181	952
CCR-05	Carey Circle	614	970	1,663	1,133	2,110	945
CCR-06	Carey Circle	607	945	1,626	1,121	2,042	937
CCR-07	Carey Circle	603	921	1,604	1,113	2,002	933
COM-01	Commerce Court	647	906	1,719	1,163	1,972	962
ECR-01	East Carey Circle	638	1,037	1,799	1,176	2,383	969
ECR-02	East Carey Circle	638	1,037	1,799	1,176	2,383	969
ECR-03	East Carey Circle	638	1,037	1,799	1,176	2,383	969

Improvement Recommendations

We have prepared recommendations regarding improvements to the HWD system that this hydraulic model evaluation predicts will result in increased Available Fire Flow (AFF) and enhanced fire protection for future development within the Hampden Business Park. Our understanding is that recent development proposals have requested Needed Fire Flow (NFF) capacity up to 2,000 gpm.



Based on the findings of this evaluation and the recent NFF capacity requests, it appears necessary that HWD extend their distribution system (Option 2) to obtain the necessary predicted AFF capacity. We recommend that the District pursue Option 2 and conduct preliminary engineering to further evaluate the actual NFF, preferred utility alignment, and other construction considerations.

As the details of this option depend primarily on the water main alignment, we presented a range of budgetary construction cost estimates for consideration by the District based on preliminary two water main alignments, one between Old County Road and Carey Circle and the other along Route 202.

The Old County Road to Carey Circle alignment appears to have a substantially lower estimated construction cost than the Route 202 alignment based on budgetary cost estimates. However, the construction costs presented do not include expenses related to land and/or rights acquisition, permitting, and other expenses necessary for the main installation outside of an established right-of-way. The Route 202 alignment would be subject to Maine Department of Transportation (MEDOT) utility location requirements.

Table 4: Water Main Extension Construction Costs

Category	Option 2: Extend HWD Distribution System	
	Old County Road to Carey Circle	Route 202
Construction Subtotal	\$362,800 - \$495,100	\$845,800
Engineering Design, Bidding, and Construction Administration (15%)	\$54,500 - \$74,300	\$126,900
Contingency (20%)	\$72,600 - \$99,100	\$169,200
Construction Project Total	\$489,900 - \$668,500*	\$1,141,900
Excludes costs associated with Preliminary Expenses, Legal and Administration, Land and Rights, and other costs not specifically included in construction estimate.		

* The lower project cost assumes a crossing from Old County Road to Carey Circle through the middle of the existing farm field. The higher end assumes the District utilize an alignment like the Town's sewer alignment near Sucker Brook, then parallel to Route 202 to reach Carey Circle.

Other Considerations

We understand that water use from existing customers located in Carey Circle is relatively low. To address concerns related to water quality impacts that can result from water stagnation within low-use water mains, we recommend the District incorporate plans to monitor water quality and provide regular flushing until water use increases.