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December 18, 2013

Mr. Peter Wolfe, Chair
Durham Planning Board
15 Newmarket Road
Durham, NH 03824

RECEIVED
Town of Durham

DEC 18 2013

Planning, Assessing
and Zoning

Re: Application for Site Plan and Conditional Use permits for 15 Madbury Road & 8 Mathes Terrace Tax Map 2 Lots 12-5 & 12-6

Dear Chair Wolfe and Planning Board members:

BAA Realty Acquisitions, LLC & EZT Holdings, LLC (BAA & EZT) have filed applications with the Planning Board seeking site plan review approval and conditional use permit approval. BAA is the applicant and owner of 8 Mathes Terrace (Map 2, Lot 12-6), and EZT is filing as applicant on behalf of Theodore Finnegan (owner) of 15 Madbury Road (Map 2, Lot 12-5). The purpose of this letter is to provide the Planning Board with supporting documentation and background information regarding these applications.

The Subject Property

The subject property consists of two lots located at 15 Madbury Road and 8 Mathes Terrace. The 15 Madbury Road parcel is located at the corner of Madbury Road and Mathes Terrace. This parcel consists of 0.154 Acres with 63.19' of frontage on Madbury Road and 100' of frontage on Mathes Terrace. The 8 Mathes Terrace parcel is located directly adjacent to and shares the westerly boundary of the 15 Madbury Road parcel. This parcel consists of 0.127 acres with 76.39' of frontage on Mathes Terrace. The parcels are located on the westerly side of Madbury Road and northerly side of Mathes Terrace in the center of Town within the Central Business District (ref. Existing Conditions Plan). The parcels are shown on Durham Tax Map 2 Lots 12-5 and 12-6 respectively and are located in the Central Business District (Exhibit # 1).

Both parcels are currently developed with two story buildings. The 15 Madbury Road property contains a single family home, which is currently unoccupied and the 8 Mathes Terrace property contains a single structure currently used as student housing. Both lots are improved with paved accesses and parking, municipal utilities including sewer and water, and other utilities from local utility providers. The sewer service currently cuts across private property to tie into the municipal sewer. The property has several mature trees along the northerly boundary and a few other trees along the frontage on 15 Madbury Road. The property has a short quick grade drop along the northerly boundary dropping from north to south approximately 3' to 4' and slopes downward from north to south and southwest from 4 to 8 percent (ref. Existing Conditions Plan).

The Mathes Terrace Proposal

The proposal is to combine the two lots together and redevelop the new lot with a single mixed use building. This project will remove two older buildings, one which needs significant repair, and one which is currently used for student housing rental. This project will improve access by providing one access to parking, provide screened trash and recycling onsite, provide safe pedestrian access via a newly proposed sidewalk, slightly widen Mathes Terrace and replace the existing older buildings with a newly constructed, architecturally attractive and very energy efficient building that will be well managed and provide about 4150 square feet of commercial space. The upper floors will have 16 residential apartments, 8 per floor and approximately 64 beds.

The project has been in front of the board for several months under the design review process beginning in June 2013. During the six month process leading to this submission, we have been through several meetings with the planning board, two subcommittee meetings, two TRG meetings, meetings with the neighbors, a site walk and 8 design concepts. During each of the conceptual designs, we have tried to incorporate all of the suggestions while trying to maintain a financially viable project. The changes that were made throughout the process included reducing impervious surface coverage to 77%, decreasing residential density by 15 -20%, reduced floors from 4 to 3 stories, maintained 4 square architecture style, added parking, removed units from the first floor and basement, and will provide utilities for neighborhood connection. Most importantly, with this submission, we have reduced the building height by an additional 2.5' and removed the basement. These two modifications are important for two reasons. The first reason is that the eve height of the proposed building is 21' which is the same as the other adjacent buildings on Mathes Terrace and similar to the building heights across Madbury Road and the second reason is that by removing the basement it significantly reduces the construction traffic by minimizing the need for excavation of surplus material from the site. There are some additional architectural changes that have been made to the roof, eaves and porch to change the building aesthetics.

Approvals Being Requested from the Planning Board

This proposal does not require any variances. Refer to the email from the Planner Michael Behrendt per our meeting with the code enforcement officer (Exhibit #2). The Site Plan Review Regulations (S.P.R.R.) will require the following approvals based on the current redevelopment scope of work.

1. Planning Board Approvals:
 - a. Site Plan Approval per Site Plan Review Regulations pursuant to Article V, Section 175-16.F and RSA 674:43, with intent of requesting consideration of the following:
 - i. Parking Requirements, Z.O. Section 175-112.A. relative to parking within the Central Business District: Request specific Planning Board approval to allow a partial exemption of the parking standards for the one-time payment of a parking fee. The redevelopment proposal offers 8 parking spaces, the 9th is just for maintenance purposes where 81+/- spaces are required by ordinance.

ii. Full Waiver of Public School Impact Fees for this Development: This is supported by the following:

1. The redevelopment project is driven due to its location within the UNH Campus and the units will be marketed to the UNH student population.
 - b. Conditional Use Permit, pursuant to Article XIII, Section 175-61.A.1 and A.4, of the Wetland Conservation Overlay District for construction of streets, roads access ways, bridge crossings and utilities including pipelines, power lines and transmission lines; and the construction of Accessory structures and buildings other than those allowed as permitted uses. This permit is necessary to allow the redevelopment of the property as proposed and includes the transformer, dumpster, fence, pervious access area and parking space proposed on the west side of the parcel.
2. Department Approvals
- a. Public Works relative to water and sewer connections, drainage, and other design considerations.
 - b. Fire & Police Departments relative to safety, fire protection, and other design considerations.
 - c. Building department relative to building codes and ADA requirements.

A. Request for Site Plan Approval

In accordance with the site plan review regulations, this submission package includes the Site Plan Review Checklist, CUP Checklist, Stormwater Management Checklist and the Energy Considerations Checklist. Also, the following plans are included:

1. Existing Conditions Plan
2. Site Plan
3. Demolition Plan
4. Utility, Grading, Drainage & Erosion Control Plan
5. Detail Sheets
6. Site Landscape Plan
7. Building Elevations
8. Stormwater Management Plan (report)
9. Operations and Maintenance Plan (report)

B. Conditional Use Permit for conditional uses in the WCO District

The following outlines how this project complies with the provisions of the general conditions for a Conditional Use Permit contained within Section 175-23.C and specific conditions for a CUP contained within Section 175-61.B for the Wetlands Conservation Overlay (WCO) District of the Town of Durham Zoning Ordinance. The numbering below

coincides with the applicable sections. We anticipate that this application will be presented to the Conservation Commission at the January meeting in order to obtain their advice for the Planning Board relative to approval of the CUP.

As previously stated, the project requires a CUP for the transformer, dumpster, fence, pervious access area and parking space all of which is proposed on the west side of the parcel partially in the WCO District. The statements below demonstrate how this redevelopment project complies with the CUP criterion. The plans incorporate best management practices for the reconstruction and thereby satisfy the CUP criterion.

175-23.C

1. Site Suitability:

The property is suitable for the proposed mixed use building because it is an allowed use in this zone. The intended use of the buildings and site includes covered parking on the first floor of a portion of the building, 16 residential units and 4100 square feet of commercial space. The redevelopment will enhance this parcel in the middle of the downtown and provide a pedestrian connection between the downtown and Madbury Road, while expanding the commercial opportunities to this area of town. The residential units are primarily for student occupancy because of the proximity to the UNH campus area and downtown Durham. The property has historically been used for single family residential occupancy and student housing. The commercial space provides additional opportunities for more businesses and common uses on the first floor to enhance the business use on Mathes Terrace and expands the tax base.

(a) This site provides adequate vehicle and pedestrian access because of its location in the downtown business district, the road frontage along Madbury Road and Mathes Terrace and the existing sidewalk along Madbury Road and the proposed extension of the sidewalk along Mathes Terrace. The site design also proposes to maintain the setback and enhance the pedestrian space along the frontage to match adjacent sites.

(b) The availability of public services to serve the intended use including emergency services, which will be provided by the police and fire department, in addition to the developer providing onsite management services to coordinate with the authorities; pedestrian facilities will be enhanced with expanded access along Mathes Terrace to provide a safer pedestrian use and connect the public to the site and existing business from Madbury Road; other municipal services are adequate as they already exist on Madbury Road and are extended to the site allowing the existing structures to connect into the municipal sewer removing the sewer from crossing private property; the schools will not be impacted by this development; Solid waste will be handled onsite with disposal by a private waste company or the owners personnel staff;

(c) The only environmental constraint on the property is the wetland conservation overlay district associated with wetlands adjacent to Pettee Brook. The redevelopment proposal incorporates a balanced environmental design approach by changing the impervious surface area from pavement to roof area, landscape area, pervious surfaces within the 75' buffer and constructing a stormwater collection/treatment system and rain garden classified by the NHDES as best management practices incorporating some filtration and detention. Unfortunately, due to the clay soils, significant infiltration will not be feasible at the site. However, this system will greatly improve on the existing stormwater runoff by improving the quality and reducing the peak flow discharged from the site and significantly reducing the surface runoff from the site onto other properties. The landscape plan will also be extensive and enhance the site;

(d) The site is suitable because of the availability of appropriate utilities to serve the intended use including water, sewage disposal, storm water disposal, electricity, and similar utilities. The site is currently serviced by municipal water within Madbury Road from a 12" water main, sewer service is located on Madbury Road and will be extended up to the intersection of Mathes Terrace to provide municipal sewer service to the site

and Mathes Terrace properties; the stormwater system will be a vast improvement from the existing conditions including collection, filtration and detention. The system includes building gutters, closed drainage collection pipes, an underground stormwater pond using Stormtech© chambers, pervious pavement and a rain garden; the site is appropriate for the proposed use because of the vast improvements and minimal environmental constraints.

2. *External Impacts:*

The external impacts of the proposed mixed use building on the abutting properties and the neighborhood will be no greater than the impacts of adjacent existing uses or other uses permitted in the zone because:

- The traffic generated by the uses will not cause a negative impact to the surrounding properties or public ways because there are adequate roads and parking lots within close proximity to the parcel. In addition the proposal will be maintaining 9 parking spaces on the site matching or exceeding the existing conditions and these spaces will be for commercial tenants. Loading/unloading will be via Mathes Terrace to gain access to the rear of the parcel where there is a pervious access area designed to provide temporary loading for the commercial uses. Trash and recycling will be picked up on site using the same pervious access area and not on the public way; the sidewalks are being improved to match the town wide theme and will be extended into Mathes Terrace providing safer pedestrian access without narrowing the roadway.
- The residential and retail/office uses will have no measurable impact on noise, odors, vibrations, dust or fumes. A full time management staff will enforce responsible use of the buildings and site and provide security coordination with the local authorities. In addition, the residential units will be on the upper floors and will have a separate entrance on Madbury Road.
- Exterior lighting will be via ceiling mounted lights on the entrance porch, the overhang of the center entrance at the court yard and surface mounted lighting within the covered parking area.

The location, nature, design, and height of the structure and its appurtenances, its scale with reference to its surroundings, and the nature and intensity of the use will have no adverse effect on the surrounding environment and will not discourage the appropriate and orderly development and use of the land and buildings in the neighborhood because:

- The proposed development complies with or is less than the allowable residential density of the underlying zone, has greater setbacks than required or than its neighbors, and is below the maximum height of the underlying zone.
- The neighborhood is a mixture of residential and office uses.
- The building architecture conforms to downtown style buildings and the surrounding neighborhood and fits into the neighborhood after several design considerations were taken into account from several meetings with the Town and design team.
- The architectural design of the building incorporates a blend of exterior finishes that establish a typical downtown appearance to the building yet mimics the 4 square style of the immediate neighborhood. Different types of exterior finishes, windows, overhangs, eaves etc, are still being discussed to adjust the building design to be even more conforming with the architectural regulations.

3. *Character of the site development:*

The proposed layout and design of the site is compatible with the established character and the intended redevelopment of the neighborhood and mitigates any external impacts of the use on the neighborhood because:

- The building orientation on the lot complies with the development standards of the underlying zoning district, the building height has been dropped to match the eave heights, total roof heights of the adjacent buildings, and the setbacks from the property lines are similar to the other buildings in the neighborhood; the layout

also provides a pedestrian friendly access including ADA compliance from all frontages without encroachment into public ways.

- Adequate vehicular access to the property is provided from Madbury Road and Mathes Terrace. Additional parking is available at the Town owned parking lot just to the west of the lot. The trash and recycling pick up area is provided on site to eliminate conflict with traffic on the public and private roadways. Reconstruction of the existing sidewalk along Madbury Road and new sidewalk along Mathes Terrace provides better pedestrian connection to the site.
- The redevelopment incorporates a landscape plan, retaining a significant existing tree within the WCO district, planting additional trees to screen the parking entrance and increases the landscape area within the WCO district from the existing condition.

4. *Character of the buildings and structures:*

The design of the new building is compatible with the established character of the neighborhood because:

- The scale, height, and massing of the building conforms to the development standards of the Central Business District, the neighborhood and the architectural regulations with the incorporation of the 4 square style design. The eave height, overall roof height and roof lines have been reduced to match the surrounding buildings within the neighborhood.
- The treatment of the building façade is established at the main street entrance with a porch and separate entrances to the units. The façade facing Mathes Terrace has been broken up to minimize the overall size of the building, provide pedestrian access and match the 4 square building styles.

5. *Preservation of natural, cultural, historic, and scenic resources:*

The proposed use of the site, including all related development activities, preserves identified natural, cultural, historic, and scenic resources on the site and does not degrade such identified resources on abutting properties because:

- There are minimal resources on the site. The largest mature tree on the site will be preserved and any additional trees along the common property line that can be saved will be, but given this and the adjacent development most of the trees will be removed.
- Site grading and fill activities will be minimized to mitigate construction impact and keep the natural grade as close as possible to the existing conditions.
- The existing property affords no significant wildlife habitat, cemeteries, graveyards, designated historic buildings, scenic views or view sheds. The existing buildings were once part of a small 4 square neighborhood, but given the removal of one of the existing buildings for the development at 9 Madbury Road without any concern for historical significance of that building which had also been significantly modified with additions and the modification of the other existing buildings with several additions, these buildings are not designated historical buildings and therefore this development is not degrading a historical resource.

6. *Impact on property values:*

- The proposed redevelopment will increase the tax base and adjacent property values would remain unchanged or may improve with the construction of this new building.

7. *Availability of Public Services and Facilities:*

- The site plan design will incorporate a new water connection service for the proposed building. The new service will tie into the 12" water main in Madbury Road which is adequate to service the development. Refer to results of a water flow test model for two adjacent developments on Madbury Road. (Exhibit #3) The proposed sewer connection will tie into the sewer main in Madbury Road which will be extended up to the intersection with Mathes Terrace. The proposed

design will require a permit application submission to be filed directly with the Durham Department of Public Works and NHDES for approval.

- Solid Waste will be stored within the enclosed dumpster pad to the west of the building and accessed via Mathes Terrace and the proposed onsite loading area.
- Drainage will be controlled on site and released at a lower rate than the pre-development condition as documented in the Drainage Analysis. The quality of the stormwater leaving the site will be greatly improved by the collection and treatment systems design into this development. The use of best management practices and LID technology is incorporated into the design.
- Electric, telephone, and data utilities will connect to the existing public lines from Madbury Road.
- Police and Fire Department review and comment is conducted as part of the application. They have already been involved in several meetings and have given valuable input that has been incorporated into the design. The overall project will have a positive effect on the single family neighborhoods by providing additional student housing in the downtown area.
- The intended use of the new building as student housing will have negligible to no impact on the Durham Public School System.

8. Fiscal impacts:

- The residential units will be marketed to the UNH student population and have no impact on the Durham School system.
- Solid Waste/Recycling will be handled by a private contractor and paid for directly by the property owner.
- The proposed mixed use buildings will generate a greater tax base for the community compared to the existing use.
- The provision of a full time property management staff will minimize the emergency calls generated by this property.

175-61.B

1. *There is no alternative location on the parcel that is outside of the WCO District that is feasible for the proposed use.*

The WCO district buffer encumbers only a small portion of the parcel on the western corner. The total area of the WCO district on the lot is 852 SF. The proposed development will improve the current conditions by removing the pavement, increasing the vegetation and maintaining existing vegetation including a significantly large tree, and constructing pervious pavers. All of these improvements will decrease the pervious area within the WCO to 164 SF which includes the dumpster pad and transformer pad. This will significantly reduce the runoff and allow runoff to be collected in the pervious paver area and treated. No alternative location on the parcel that is outside the WCO District is available that would allow the proposed use or improve the existing conditions to the extent proposed without a large negative impact to the proposed development.

2. *The amount of soil disturbance will be the minimum necessary for the construction and operation of the facilities as determined by the Planning Board.*

The proposed site layout and associated grading and drainage design has been prepared with the primary intent of minimizing soil disturbance by minimizing the disturbance of the soils on site or by reducing the slope to minimize erosion. In addition, due to the clay soils the fills on the site have been minimized. The largest soil disturbance will be for the building excavation, however, this construction is outside of the WCO district but has been minimized to reduce construction disturbance. The impact will ultimately be an improvement as it enhances the area within the WCO by keeping existing vegetation, adding lawn area which is currently pavement, and changing the remainder of the pavement within the WCO and directly adjacent to it to a pervious surface to reduce runoff and collect and treatment stormwater prior to discharge offsite.

3. *The location, design, construction, and maintenance of the facilities will minimize any detrimental impact on the wetland and on the adjacent shoreland and water body as well as downstream water bodies, and mitigation activities will be undertaken to counterbalance any adverse impacts.*

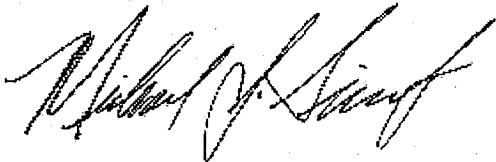
Every feasible effort has been made in the design of the site layout and grading to minimize any detrimental impacts described above and mitigation activities incorporated as well. These include:

- o Use of temporary erosion control measures like silt soxx along the property line; temporary and permanent stormwater control systems; and regular sweeping of public roadway to minimize tracking of dirt onto paved areas. Temporary construction fence is proposed around the site to provide better assurance that construction equipment will not stray offsite.
 - o Construction of a stormwater collection/treatment/detention system within the parking area will collect and treat runoff from all storm events prior to discharge to Pettee Brook.
 - o A change in the majority of the impervious area on the site from pavement to building roofs and pervious pavement. This change and the incorporation of the stormwater system will be a vast improvement to the stormwater runoff from the site.
 - o Temporary disturbances to the wetland buffer to allow construction of the above will be fully reclaimed with either topsoil/seed/mulch/planting or pervious pavers.
4. *Restoration activities will leave the site, as nearly as possible, in its pre-existing condition and grade at the time of application for the Conditional Use Permit.*

The proposed development actually reduces the impervious area within the WCO district, replaces pavement with pervious pavers in the non landscaped area and reduces the slope of the land within the WCO slightly to reduce runoff.

If you have any questions or need additional information, please do not hesitate to contact me.

Sincerely;



Michael J. Sievert PE
MJS Engineering



Michael Sievert <mjsenq88@gmail.com>

RECEIVED

Town of Durham

Mathes Terrace - Wetland Buffer

DEC 18 2013

Michael Behrendt <mbehrendt@ci.durham.nh.us>

Tue, Nov 12, 2013 at 2:30 PM

Planning, Assessing
and Zoning

To the PB (and DCC et. al.,)

The question arose as part of the Planning Board's review of Mathes Terrace what approvals might be needed for the pavement, driveway, parking, dumpster, and dumpster fence enclosure that would be located within the 75 foot buffer in the Wetland Conservation Overlay District (WCO District). Mike Sievert and I met today with Tom Johnson. As Zoning Administrator, Tom determined that:

- none of these uses would be grandfathered under the current site because the site is being significantly redeveloped

- all of the above uses would be allowed by conditional use. See the excerpt below: the pavement and driveway is covered under A. 1., the dumpster is covered under A. 1. As a utility, the fence would be an accessory structure under A. 4., and the parking would be an accessory structure under A. 4. See the definition for "Structure," below.

175-61. Conditional Uses in the WCO District.

A. The following uses shall be permitted as conditional uses in the WCO District provided that the use is allowed in the underlying zoning district and a Conditional Use Permit is granted by the Planning Board in accordance with Article VII:

1. The construction of **streets, roads, access ways**, bridge crossings, and **utilities** including pipelines, power lines, and

transmission lines;

2. Commercial agriculture and plant nurseries within the upland buffer strip subject to the performance standards of 175-65.C;
3. The construction of a non-residential building within the upland buffer strip in a commercial or office-residential zoning district;
4. Accessory structures and buildings other than those allowed as permitted uses;
5. Outdoor recreational facilities that do not require the construction of buildings or structures.

STRUCTURE – That which is built or constructed with a fixed location on the ground or attached to something having a fixed location on the ground.

"Structures" include but are not limited to a building, swimming pool, mobile home, billboard, pier, wharf, septic system, parking space/parking lot and deck. It shall not include a minor installation such as a fence under six (6) feet high, a mailbox, a flagpole, or an accessory shed.

Michael Behrendt, AICP

Director of Planning and Community Development

Town of Durham

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1805.00
November 22, 2013

Michael Sievert, P.E.
MJS Engineering, PC
5 Railroad Street, P.O. Box 359
Newmarket, NH 03857

RECEIVED
Town of Durham

DEC 18 2013

Planning, Assessing
and Zoning

Re: ESR WM-15
*17/21 Madbury Road and 15 Madbury Road / 8 Mathes Terrace – Proposed
Developments*

Dear Mr. Sievert:

Per Engineering Services Request ESR WM-15 the following are our findings from our review of the proposed projects, 17/21 Madbury Road and 15 Madbury Road / 8 Mathes Terrace.

Proposed Developments

Development 1: 17/21 Madbury Road

We understand the proposed development will consist of three buildings, three to five stories tall, including seven commercial units totaling approximately 30,000 square feet and 126 residential units with a total of 500 bedrooms.

Development 2: 15 Madbury Road / 8 Mathes Terrace

We understand the proposed development will consist of one mixed-use building, up to four stories tall, including two or three commercial units totaling approximately 7,000 square feet and 16 residential units with a total of 72 bedrooms.

Water service for both developments is assumed to be off the 12-inch main on Madbury Road.

Estimated Water Demands

Estimated water demands – based on information provided by the client – are as follows:

Proposed Development 1: 17/21 Madbury Road

500 bedrooms x 40 gpd/bedroom* =	20,000 gpd
Commercial space: 30,000 square feet x 15 gpd/100 square feet** =	4,500 gpd
Total design demand	24,500 gpd
Design flow rate, average	17.0gpm
Design flow rate, peak (peaking factor of 7)***	119.1 gpm

**Per discussions with the Town, 40 gpd/bedroom is a realistic expected demand for a development of this type rather than 150 gpd/bedroom per NHDES Administrative Rules (Env-Wq 1008.03, Table 1008-1)*

***Per Env-Wq 1008.03, Table 1008-1 as referenced by Env-Ws 372-Design Standard for Small Public Water Systems.*

****Assumed using Env-Ws 372-Design Standard for Small Public Water Systems, Table 372-5, "Residential" chart at ~125 service connections.*

Proposed Development 2: 15 Madbury Road / 8 Mathes Terrace

72 bedrooms x 40 gpd/bedroom* =	2,880 gpd
Commercial space: 7,000 square feet x 15 gpd/100 square feet** =	<u>1,050 gpd</u>
Total design demand	3,930 gpd
Design flow rate, average	2.7gpm
Design flow rate, peak (peaking factor of 10)***	27.3 gpm

**Per discussions with the Town, 40 gpd/bedroom is a realistic expected demand for a development of this type rather than 150 gpd/bedroom per NHDES Administrative Rules (Env-Wq 1008.03, Table 1008-1).*

***Per Env-Wq 1008.03, Table 1008-1 as referenced by Env-Ws 372-Design Standard for Small Public Water Systems.*

****Assumed using Env-Ws 372-Design Standard for Small Public Water Systems, Table 372-5, "Residential" chart at ~16 service connections.*

Based on discussions with the Town, Underwood Engineers used a value of 40 gpd/bedroom rather than 150 gpd/bedroom per NHDES Administrative Rules Env-Wq 1008.03 Table 1008-1 to estimate design flows for the purpose of this letter report. This approach is less conservative, however more realistic for predicting actual impacts to the Town's water system. In our experience, actual average daily use is typically less than the design flows estimated using the NHDES method.

The water demands estimated above will replace existing demands from current uses at the project locations.

Estimated Fire Flow Requirements

A design fire flow has not been determined for the proposed developments. For the purposes of this study, we examined the impact on system pressures of a 500 gpm sprinkler flow at the proposed location. We also estimated the total available hydrant fire flow with a 20 psi residual pressure at hydrants on Madbury Road closest to the proposed developments (see "Findings" below).

Simulation using Water Model

The existing Durham/UNH water system model was used to simulate the impact of the proposed development on the existing water system. The hydraulic analysis was conducted using the WaterCAD model originally set up by Dufresne-Henry, Inc. (now Stantec) with minor modifications by Underwood Engineers, Inc. including updates for subsequent distribution system improvements. The following updates were made to the model for the purpose of this evaluation:



- Added a node to the model to represent the 17/21 Madbury Road development and set the elevation to 53 ft. AMSL, per information provided by the client (approximate first floor elevation).
- Added a node to the model to represent the 15 Madbury Road / 8 Mathes Terrace development and set the elevation to 53 ft. AMSL, per information provided by the client (approximate first floor elevation).

Other general conditions in the model included the following:

- Maximum day demands (1.2 MGD).
- Edgewood and Foss Farm Tanks at 207 ft. hydraulic gradeline (about 4.5 ft. drawdown).
- Beech Hill Tank at 305 ft. hydraulic gradeline (5 ft. drawdown).
- Water treatment plant and Lee Well pumps off.

The following model runs were performed:

- Monitor change in system pressure (if any) caused by addition of peak demand at proposed locations.
- Flow 500 gpm assumed sprinkler flow simultaneously with peak demands and monitor residual pressure at the proposed location.
- Flow the maximum amount available at the proposed location without dropping the pressure below 20 psi either at this location or any other point in the system.

Findings:

The modeling results are summarized in the table below:

	17/21 Madbury Road (First Floor Elev.)	15 Madbury Road / 8 Mathes Terrace (First Floor Elev.)
Normal operating pressure, existing conditions	66 psi	66 psi
Normal operating pressure, with peak demand at Proposed Development	66 psi	66 psi
Residual pressure with 500 gpm sprinkler flow and peak demand at Proposed Development	65 psi	65 psi
Available fire flow	>5,000 gpm*	>5,000 gpm*

* The upper limit to fire flow calculations in the model is 5,000 gpm. Greater flows are available at these locations at 20 psi residual.

Conclusions

Based on the above findings, we conclude the following. (Note: These conclusions are based on modeling results. Actual field results may vary.)

- The proposed developments will increase demand on the water system.
- The additional peak demand and assumed sprinkler flows of the proposed developments will likely have a negligible effect on existing system pressures.



- The existing distribution system can potentially provide greater than 5,000 gpm fire flow at a residual pressure of 20 psi at the closest hydrants on Madbury Road while maintaining the minimum allowable 20 psi residual pressure throughout the system.


Recommendations


- We recommend the client consult with his fire suppression system engineer to determine the required sprinkler flow, residual pressure design, and total required fire flow for the proposed development.
- Underwood Engineers will perform a field hydrant flow test to confirm model predictions if required by the Town of Durham or if requested by the client.

Please call if you have any questions.

Very truly yours,

UNDERWOOD ENGINEERS, INC.


Michael B. Metcalf, P.E.
Senior Project Manager


Michael C. Unger, P.E.
Senior Project Engineer

MBM/MCU/mcu

cc: David Cedarholm, P.E., Town of Durham

