



October 05, 2017

Michael Kulesza – Chairman
Town of Norfolk – Zoning Board of Appeals (ZBA)
One Liberty Lane
Norfolk, MA 02056

Re: Norfolk, MA – The Preserve at Abbyville/Abbyville Commons
Comprehensive Plan – Peer Review Comment Responses

Dear Mr. Kulesza:

BETA Group, Inc. (BETA) has completed its review of the comment responses from United Consultants, Inc. (UCI) and from Green International Affiliates, Inc. (GIAI) for the preliminary design for the referenced project, based on the following materials:

- Response to comments letter prepared by UCI, dated August 29, 2017
- Response to comments letter prepared by GIAI, dated August 28, 2017
- 'The Preserve at Abbyville' and 'Abbyville Commons', Norfolk, Massachusetts Grading and Utility Plans (15 Sheets). Profiles (4 Sheets) and watershed Maps (3 Sheets), prepared by United Consultants, Inc. revision date August, 2017
- Additional/ revised drainage information in report entitled 'Technical Supplemental Drainage Calculations for The Preserve at Abbyville and Abbyville Commons, Located in Norfolk, Massachusetts' dated August 30, 2017 and Post Development Watershed Maps, revision date August 2017.

The following are our comments on the UCI Responses to BETA's initial comments on the civil/site & stormwater elements of the preliminary design. It is understood that some elements of the development design referenced in this review are still being developed, and will be provided by the applicant when they are complete. Therefore, further review and comments shall be provided as those materials are received.

Where referenced, the term "applicant" refers to either the applicant itself or its design consultants.

General

- The Traffic Impact Studies has been reviewed by BETA, and comments on them have been provided separately.
- The site includes an AUL associated with the former Buckley and Mann mill site. The AUL was reviewed by BETA for any potential impacts from the development on it, see findings and recommended conditions provided in a separate document dated August 7, 2017.
- The existing bridge on Lawrence Street has been acknowledged to be structurally and operationally deficient. It is our understanding that the applicant is working cooperatively with the Town to prepare and submit a grant application for State funds that would be used to reconstruct the bridge. Further, the applicant has acknowledged that regardless of the outcome of the grant application, the bridge improvements will be necessary to support the development.

- There is the potential for the development of a Town well on a parcel immediately adjacent to the site. It is our understanding that the applicant is coordinating with the Town to provide adequate access to and through the site to support the well, and has designed the water system to support the prospective future development of the Town well.
- The applicant is requesting numerous waivers from local zoning and subdivision regulations, as well as other Town by-laws. These waiver requests will be evaluated as the peer review process advances.

Civil/Site

- 1) *The roadway typical sections shown on sheet 88 and sheet 89 depict a 24-foot wide roadway and an 18-foot wide roadway. Traffic volumes for the development are anticipated to exceed an ADT of 1,500 vehicles for the Preserve and over 1,900 including the Commons. This would indicate that the main roads (Buckley Road, Eliot Boulevard, Annie's Loop and Mann's Loop) should be considered Primary Roadways.*

Recommendation: *Given the volume of traffic anticipated, further discussion of waivers from the Subdivision standards for primary roadways is warranted.*

UCI Response: We anticipate the Zoning Board will discuss the primary roadway waivers at the traffic public hearing in August of 2017.

BETA1: Refer to BETA's response to Item 2 below.

UCI: See response to Item 2 below.

- 2) *Designated rights of way are shown for the roadways within the Preserve. This indicates the possibility that the Town could be asked to accept the streets in the future. This should be a consideration in evaluating requested waivers for roadway geometry.*

Recommendation: *Further discussion of waivers from the Subdivision standards for primary roadways is warranted.*

UCI Response: We anticipate the Zoning Board will discuss the primary roadway waivers at the traffic public hearing in August of 2017.

BETA1: The applicant has confirmed its intention to request that the Town accept the development right-of-ways and roadways at a future date, and has prepared & submitted a right-of-way/roadway summary table and development sketch that depicts the required and proposed right-of-way and roadway widths, as well as which roadways will be designated as one-way. The applicant has distributed these materials to the Zoning and Planning Boards, as well as multiple Town departments for their review and comment. The applicant also attended the Norfolk Planning Board at their July 19th hearing to present and discuss the proposed development roadway layout, and to solicit comments from that board on same; the comments will be prepared by the Planning Board and provided to the Zoning Board for its consideration in the review process.

In addition to any comments from the Planning Board and other town departments, BETA recommends that the applicant provide a truck turning analysis of the proposed roadways that demonstrates that all anticipated Town vehicles, including emergency and maintenance vehicles, will be capable of accessing and negotiating all of the roadways with no departures from the paved roadway areas and minimal encroachments into oncoming lanes.

GIAI2 Response: Comment noted; no response necessary at this time.

BETA2: *The proposed roundabouts and cul-de-sacs have been revised based on truck turning analyses prepared by Green International. The revisions provide adequate turning radii for emergency vehicles within the roundabouts and cul-de-sacs. However, it appears that the rights of way need to be revised to reflect the revised roadway pavements. Additional geometric information including curve data, lane widths, inscribed circle diameter and truck apron layout should be included in the final design plans.*

- 3) *It appears that roundabouts are proposed at the Buckley Road/Annie Loop intersection and at the Eliot Boulevard/Mann Loop intersection. However, it does not appear that the roadway layout reflects the appropriate geometry for roundabouts. Given the volume of traffic anticipated on the main roadways, appropriate geometry should be incorporated for safety.*

Recommendation: *Incorporate appropriate approach and departure angles and splitter islands into the roundabout design. This may affect the proposed right of way.*

UCI Response: The applicant's traffic engineer Green International will discuss the roundabouts at the public hearing in August of 2017.

BETA1: *We will reserve additional comment until such time as we have had the opportunity to hear Green International's presentation at the August ZBA hearing, and will coordinate any resultant comments with the applicant/Green International.*

GIAI2 Response: Since the traffic reports and plans were first submitted and based on seeing the Beta comment, Green has conducted an analysis of internal turning movements of fire ladder trucks using AutoTurn software. As a result of our analysis, we have determined that the two circular intersections included in the initial plan submission could be modified to standard roundabout design without too much difficulty. We have provided to the site designer our recommended changes to these locations that would include splitter islands and center island apron. Fire apparatus has been tested with this design and is accommodated. Graphic depictions are attached while the site engineer will be submitting the revised plans under separate cover.

BETA2: *The proposed roundabouts and cul-de-sacs have been revised based on truck turning analyses prepared by Green International. The proposed roundabouts are designed with splitter islands on the approaches, modified departure radii and a center island with truck apron. The roundabouts as presented provided adequate turning radii for emergency apparatus. It appears that the proposed Right of Way needs to be updated to reflect the new roadway geometry. Since it is anticipated that the Town will be requested to accept the project roadways, it is recommended that the Fire Department, as it relates to access, and DPW, as it relates to snow storage and maintenance, review and indicate acceptability of the design. Also see response to Comment 2.*

- 4) *With the exception of Green Circle, the various dead-end roads, while depicting circular right-of-way geometry at their termini, do not propose roadway cul-de-sacs; rather, the roads simply terminate, with adjacent head-in parking spaces that could theoretically serve as a T-turnaround.*

Recommendation: *The proposed dead end roads should adhere to the geometric requirements for cul-de-sacs, and the proposed parking spaces thereby displaced should be relocated elsewhere in the development. It is noted that the Fire Chief's letter of June 16, 2017 indicates that the Applicant has agreed to:*

1. *Connect Thomas Drive to Albert Circle*

2. *Create a cul-de-sac at the end of Waite Circle*
3. *Connect Wick Road to Morse Road*
4. *Create a cu-de-sac at the end of Thayer Circle*
5. *Create a cul-de-sac at the end of Daniel Drive*

UCI Response: The roadways were revised by making Albert Drive and Wick Road through one way streets. The parking spaces were eliminated at all the cul-de-sac areas. The cul-de-sac pavement was expanded to a 47' diameter as required in the sub-division rules and regulations. The proposed ROW diameter is 48' and a waiver will be requested.

BETA1: The modifications to the roadways within the dead-end right of-ways conform to our recommendation, provided that the truck turning analysis verifies that the proposed roadways/cul-de-sacs can be accessed and negotiated by the applicable vehicle types and sizes. BETA suggests that various Town entities provide comment regarding the waiver requests for the right-of-way widths, with the observation that any such waivers should account for the realistic land area outside of the paved roadways that will be needed by the Town for regular access and maintenance, if the roads are ultimately to be accepted by the Town.

GIAI2 Response: It is our understanding that the proposed design of the cul-de-sacs meet the town's subdivision design regulations. However, Green has evaluated the internal turning movements using an SU-30 AASHTO standard vehicle and a 40-foot-long fire ladder truck using the AutoTURN 10 simulation software for the cul-de-sacs and "horseshoe" type drives serving several or more homes. Based upon this analysis, Green has recommended relatively minor modifications noted below to the internal roadway geometry and provided these to the site designer. Graphic depictions are also attached.

Green Circle: A fire ladder truck's wheel path just fits in this cul-de-sac as is currently drawn. There is some body overhang over the curb or driveways.

Thayer Circle: At the corner of Lot #73, increase the cul-de-sac radius to 48', shift the center of the cul-de-sac to one foot closer to the southwest corner of the house at Lot #73, and use a fillet radius of 30' between the cul-de-sac and the tangent portion of roadway.

Daniel Drive: At the corner of Lot #114, use a fillet radius of 35' between the cul-de-sac and the tangent portion of roadway. At Lot #113 there is a 2.5' vehicle body overhang at the driveway; the wheel path remains within the roadway.

Waite Circle: At the corner of Lot #104, use a fillet radius of 35' between the cul-de-sac and the tangent portion of roadway.

Horseshoes at Lots #52-55, Lots #56-58: The outer corner path radius of the fire ladder truck's tightest turn is about 44' (for an 88.1' diameter). Hence, the radius of the horseshoes need to be at least 44.1' wide unless they are reconfigured to significantly flatten out the curves.

As indicated above, the revised plans will be submitted under separate cover from the site engineer.

BETA2: *See response to Comments 2 and 3.*

- 5) *The proposed site grading indicates that there will be significant cuts and fills throughout the site, and based on a conversation with the applicant's designer, it is anticipated that the project will generate a significant volume of excess material.*

Recommendation: *The applicant should perform a site-wide cut and fill analysis and assess the potential impacts of removing significant volumes of material from the site via adjacent local roadways. Evaluation should at include at a minimum:*

- *Effect on ground water table*
- *Number of construction trucks per day anticipated and the duration of the earthwork operation*
- *Blasting requirements/ledge removal, if any*
- *Construction routes and impact to the existing bridge over Bush Pond.*

UCI Response: Refer to the project phasing and proposed phasing schedule for construction and site work in Appendix H.

BETA1: The following are our responses to the individual sub-items above, followed by a summarization of our overall observations pertaining to this item:

- *Ground Water (Sub-item 1): Observations from the significant number of deep soil borings performed throughout the site (typically to depths well below the proposed finish grading) indicate that groundwater will not be encountered at or near the proposed finish grades in most locations.*

UCI Response: No comment.

- *Construction Trucks (Sub-item 2): The referenced materials provided by the applicant include a color-coded sketch of the proposed phasing of the overall development, as well as a summary table listing the total number of phases (7), the estimated duration for each (either 12-18 or 18-24 months), the number of units and length of roadway per phase, the total cut and fill volumes (in cubic yards) per phase (net total ≈ 1,330,000 CY), and the estimated range of daily truck trips. Those ranges indicate that the anticipated truck traffic from the site will be between 2-3 trucks per hour for the least intensive phase (V) and 4-7 trucks per hour for the most intensive phase (III). It is noted that the initial list of waiver requests includes a requested waiver from The Town's Earth Removal Bylaw.*

UCI Response: No comment.

- *Ledge Removal (Sub-item 3): Based again on observations from the site-wide deep soil borings, the applicant has stated that the grading plan has been developed to avoid the need for excessive ledge removal to the extent possible.*

UCI Response: No comment.

- *Construction Routes (Sub-item 4): The applicant has stated that the majority of construction traffic will travel to and from the site along Lawrence Road easterly to Park Street. In addition, as stated previously in the general comments, the applicant is aware of the deficiencies in the existing Lawrence Street bridge over Bush Pond, and understands that significant structural improvements will need to be made to it before the trucking associated with the site development can take place. The Board should consider having a designated truck route to the nearest major highway to control construction traffic to and from the site.*

UCI Response: No comment.

To summarize, the applicant has provided the requested supplemental information called for by our original recommendation. That information confirms that the project as designed will include a very significant earthwork/earth removal component, and there will likely be corresponding ancillary considerations/impacts associated with that magnitude of earthwork, including:

- *Bush Pond bridge deficiencies & Lawrence Street road condition*

UCI. Masswork grant applied for. Discussion ongoing.

➤ *Lawrence Street traffic capacity during construction*

UCI: Addressed by Green International.

➤ *Noise/dust from truck traffic during construction*

UCI: Offsite trucking will be limited to 7-5 Monday through Friday. Noise levels will be in compliance with state regulations. Lawrence Street will be swept weekly or more frequently if necessary. Water will be applied as necessary to control site dust during construction.

As noted in previous items, the applicant has indicated that they are currently working cooperatively with the Town to address the first item, and in any case, both the bridge and the affected portion of Lawrence Street will be reconstructed as part of the development. For the second and third items, a phasing plan has been developed for the project. Constructing the project in phases will moderate to some extent, the concentration of the truck traffic and the associated ancillary impacts on Lawrence Street and the nearby properties and neighborhoods. Given the magnitude of the potential earth removal from the site, we suggest that the applicant prepare a construction traffic management plan for review by the Board to include, as a minimum, proposed phasing, anticipated volume of construction traffic, days/hours of operation, dust/noise control methods.

UCI2 Response: The applicant is working cooperatively with the Town to secure a grant for the Lawrence Street work. The applicant is also working cooperatively with the Town to address off site mitigation of Lawrence Street. Green International has addressed the construction traffic volumes. See response to above items for noise, dust days and hours of operation.

BETA2:

- *BETA is providing a separate review of the anticipated construction truck traffic related to removal of the estimated 1,330,000 CY of excavation as well as the phasing and timeline provided by the Applicant. BETA is also reviewing the information provided by Michael Guidice. A separate response letter will be prepared regarding this issue.*
 - *While the Applicant notes that the design avoids excessive ledge removal, we suggest that the Applicant provide an actual estimate of the volume of ledge to be removed. This will allow the Board to assess any potential impacts related to blasting.*
 - *The Applicant notes that construction truck traffic will be limited to 7:00 AM to 5:00 PM Monday through Friday. The Board may wish to consider further limiting truck traffic on Lawrence Street during hours when school buses are picking up or dropping off children.*
 - *The Applicant notes that noise will be comply with State regulations and that dust will be controlled by street sweeping and application of water. These are standard and appropriate dust control measures. The Board may wish to consider conditions that require the Applicant/Contractor to implement a formal system to allow the Town and abutters to notify the Applicant/Contractor of conditions that are creating excessive noise and/or dust.*
 - *It is suggested that as a condition of any approvals the Applicant provide a formal Construction Management Plan outlining all agreed to requirements for construction.*
- 6) *The proposed roadway profiles do not appear to take advantage of the maximum grades allowed in the Subdivision Regulations. This contributes to the significant earthwork required for the roadway construction, as well as the lot construction. This also affects the grading of abutting lots.*

Recommendation: Evaluate the proposed profiles, particularly along Elliott Boulevard, Mann's Loop and Annie's Loop, and the proposed lot grading to better utilize the existing topography and reduce earthwork quantities.

UCI Response: The roadway profiles were created based on the perimeter development extent existing grades. The primary roadways have been proposed to have slopes in the vicinity of 3 percent to allow for the roadway and driveway connections to occur with leveling areas as required by the subdivision regulations.

BETA1: We recognize that there are geometric requirements and constraints that affect, and in some cases dictate, the roadway profile grading. We also recognize that the approach of holding ~3% roadway slopes may facilitate grading of the adjacent parcels. Our recommendation was intended to point out that in areas where geometric requirements/lot grading considerations allow, it would be possible for the applicant to increase the roadway slopes, keeping them in conformance with the Subdivision Regulations, to potentially reduce the volume of material that will need to be removed from the site.

We therefore suggest that the applicant, without actually redesigning the roadways/site grading, could perform an earthwork estimation to approximate the reduction in cut volume that could be achieved by using greater roadway slopes. The exercise would consist of identifying any roadway areas where 6% roadway slopes could be achieved without conflicting with other roadway geometric requirements, then calculating the earthwork volumes if the roadway slopes in those areas were to be modified. This would allow the Board to evaluate the magnitude of potential benefit (in the form of reducing in the net volume to be removed from the site) that could be achieved by modifying the roadway profiles.

UCI2 Response: We have completed this analysis and the plan and memo are attached.

BETA2: The Applicant has provided an analysis of potential profile changes to reduce excavation quantities. The analysis indicates that a reduction of 18,000 cy of excavation can be realized through profile adjustments. BETA has reviewed the analysis and finds that it is generally appropriate for the current site layout. Some additional reduction could be achieved by re-grading the Elliott Boulevard and Buckley Boulevard approaches to Lawrence Street. The Board should consider potential earthwork changes based on the site layout review conducted by others.

- 7) *The plans depict a connection of Elliott Boulevard to land owned by the Town.*

Recommendation: The Board should determine whether this connection provides a future benefit to the Town.

UCI Response: No comment.

BETA1: It is BETA's understanding that the roadway was depicted specifically to facilitate the potential future development of the parcel by the Town, and that applicant will coordinate the need for the access road with the Town.

- 8) *The project includes 148 single-family units and 48 rental units. All the units will utilize subsurface disposal systems for sanitary disposal. Given the density of the development and the relatively small lot size, there is concern regarding the overall potential impact of the subsurface disposal systems on groundwater, adjacent private wells and Bush Pond.*

Recommendation: The project needs to be in conformance with the guidelines in Title V for Aggregation of Flows and Nutrient Loading as outlined in 310 CMR 15.216. The applicant should provide a hydrogeological analysis of the site development to evaluate groundwater flow, water table depth, the

potential nutrient loading and any associated impacts to abutting private wells (within 400 feet of the site), wetlands or Bush Pond.

UCI Response: A hydrogeological analysis is forthcoming.

BETA1: We shall review and evaluate the hydrogeological analysis when it is submitted.

UCI Response: No comment.

- 9) *A previously noted, the ownership units are proposed to have septic systems on individual lots. It is not clear how the size of the systems shown on the plans was determined. Percolation tests will be required to determine the necessary size of the systems. However, given the potentially significant change in grade these tests may not be able to be conducted until the general grading is complete. Given the proposed lot areas/layout, there is limited area on the lots for the systems. An increase in the size of the system may affect the constructability of certain lots. Also, a number of systems are located close to proposed or existing slopes. Breakout distance will be a consideration in the design of these areas and may affect the constructability of these lots if significant changes to the layout of the septic systems are required.*

UCI Response: Upon approval of the project septic system testing and designs will be completed for each of the lots and will be done in conformance with Title V.

BETA1: We recognize and acknowledge that the septic system testing and design process can only take place at a later date, once the site grading has been completed, but we reiterate the observation that that process may result in alterations to the depicted systems that could affect the layout and potentially the viability of some lots.

UCI2 Response: The applicant is proposing to construct a sewerage treatment plant. Individual septic systems are no longer proposed.

BETA2: Design revised; sewer treatment plant will require review and approval by MassDEP.

- 10) *There are a two water main junction locations (Wick Road between lots 76 & 77 and overland between the ends of Daniel Drive and Morse Road) where it appears that isolation gate valves would be appropriate, but no valves are proposed.*

Recommendation: *The applicant should add isolation gate valves at both locations.*

UCI Response: Gate valves were added at both suggested locations.

BETA1: Revisions adequate; comment addressed.

- 11) *There are multiple locations where proposed water mains and appurtenances will cross and/or occupy portions of proposed private lots. The Plan of Land sheets, which depict the proposed right-of-way and lot geometry in detail, do not indicate any proposed utility easements for the water system.*

Recommendation: *The applicant should depict adequately sized (i.e. sufficient for the utility owner to perform its operation and maintenance of the water system) utility easements in any locations where common infrastructure will be located on private lots.*

UCI Response: Easements were added at the water main locations that are located on private lots.

BETA1: The revised plans submitted do not include the Plan of Land Sheets, and the revised Grading & Utility Plans that were provided do not appear to depict the proposed easements. However, assuming

that the easements are depicted on the Plan of Land Sheets, they should be provided along with sample easement language to the Norfolk Water Department for review and approval. We will reserve further comment until such time as the materials are provided to and coordinated with the Water Department.

UCI2 Response: The easements were provided on lots 128 - 131 and the label can be found in Lot 130 and an easement is also located on Lots 91, 92 and 95 with the label being located in Thayer Circle. We will provide updated plans of land depicting the easement locations once the Water Department has commented.

BETA2: *We will review the updated plans once they are completed.*

Preliminary Drainage Report & Stormwater Management Design

12) Background, Page 1 – *This section states the following:*

'A portion of the overall site was previously used for textile manufacturing, which has been abandoned and the building demolished.'

BETA understands that there is an AUL (Activity & Use Limitation, RTN #2-3000173) over a portion of the site, associated with the prior manufacturing activity thereon. Further, based on information gathered from the site walk, the area of the AUL appears to be relatively close to and downgradient of proposed Infiltration Basin 1. The AUL is not directly referenced or discussed in the drainage report, nor is it depicted on the post-development watershed map.

Recommendation: *The applicant should provide any relevant excerpts from the AUL that could have bearing on the stormwater management for the development, and should assess any potential impacts that the use of infiltration close to the AUL could have on the contaminated materials within the AUL.*

UCI Response: The AUL documentation was forwarded by the applicant to the ZBA as well as BETA. Please refer to the Infiltration Basin plan and profile referenced in Appendix L.

BETA1: *The review of the AUL documentation is ongoing, and will be coordinated with the hydrogeological report to be prepared and provided by the applicant. We will reserve further comment until such time as those reviews are complete.*

UCI2 Response: It is our understanding that BETA had a review of the AUL completed in house and that they prepared a report that was submitted to the Zoning Board of Appeals. The hydrogeological report is forthcoming.

BETA2: *See BETA's AUL Review for recommended conditions.*

13) System Performance, Page 2 – *This section states that the stormwater management system is projected to 'Exceed the minimum pollutant (TSS) removal rate of 80%.' The drainage report does not contain a TSS Removal Worksheet, which lists the various elements of the stormwater management system, their respective TSS removal rates, and the cumulative anticipated TSS removal rate of the "treatment train" (all stormwater elements operating in series).*

Recommendation: *The applicant should provide a TSS removal worksheet for each of the three (3) proposed stormwater management basins.*

UCI Response: TSS removal calculations were completed. Please refer to Appendix F.

BETA1: *Calculations sufficient; comment addressed.*

- 14) DEP Stormwater Standards, Standard Number 4, Page 3 – This section states that the design complies with the standard, though the report does not contain a TSS Removal Worksheet.

Recommendation: See previous comment.

UCI Response: TSS removal calculations were completed. Please refer to Appendix F.

BETA1: Calculations sufficient; comment addressed.

- 15) HydroCAD Printouts – 100-Year Storm – The drainage report presents the results from the HydroCAD analysis for just the 100-year storm, which all of the basins have been sized to handle without overflows. However, Table 2 – Discharge Analysis in the System Performance section lists the peak elevations in each of the proposed basins for the 2, 10, 25, 50 and 100-year storms. The report does not contain the HydroCAD report printouts to support the results in Table 2.

Recommendation: The applicant should provide HydroCAD summary printouts for each of the other analyzed storms (2, 10, 25 and 50) for just the sediment forebays and infiltration basins.

UCI Response: The 2-yr, 10-yr, 25-yr and 50-yr Sediment Forebay and Pond reports have been included in Appendices A through D.

BETA1: The requested materials have been provided; however, the analysis and output for all analyzed storms reflect modifications to the stormwater design since the initial review, and the values no longer correspond to the summarized values listed in the narrative report. Therefore, we suggest that the applicant also update and submit Table 2 – Discharge Analysis.

UCI2 Response: We have revised the drainage calculations to reflect the changes to the unit count, roundabout and cul-de-sac revisions as well as the elimination of Sediment Fore-bay A. The revised calculations, including an updated Table 2 are being provided.

BETA2: Revise supplemental design and calculations to include the following.

- a. Add bottom elevation (supplemental contour) of forebays 1, 2 and 3
- b. Add elevation of weir overflow for forebay 1 and 2
- c. Revise infiltration basin 1 to provide a minimum 1 foot of freeboard.

- 16) HydroCAD Analysis – Storm Duration – The storm duration used in the analysis was from hour five (5) to hour 20 (20) of a twenty-four (24) hour storm. A number of the reaches in the model indicated earlier inflow than the five hour mark, and it is typical when modeling a twenty-four hour event for the exfiltration of the full runoff volume from the infiltration basins to take longer than twenty hours.

Recommendation: The applicant should revise the analysis duration in the HydroCAD model to at least the full twenty-four (24) hours of the modeled storms; in addition, if the model indicates that outflow is still occurring from any of the infiltration basins past hour twenty-four, the duration should be extended until such time as the full runoff volume has been exfiltrated from the basin.

UCI Response: The storm duration was revised to include 0 to 36 hours.

BETA1: Revisions acceptable; comment addressed.

- 17) HydroCAD Analysis – Reach Modeling with Storage-Indication & Translation Method – The HydroCAD model structure consists of runoff from the individual subwatersheds to each drainage inlet structure routed through individual pipe reaches, which represent the pipe runs throughout the drainage system. The pipe reaches are linked in sequence, and run to the respective forebays/infiltration basins for each system.

The results of the 100-year analysis indicate a significant number of exceedances by the water elevation in downstream pipes of either the outlet elevation, and in some cases the upstream inlet elevation, of incoming upstream pipes (tailwater conditions). In many cases, the tailwater depth is relatively small, but in a number of cases the tailwater is significant, and will likely delay the movement of runoff through the system. The Storage-Indication & Translation Method used for the analysis does not account for dynamic tailwater conditions, however, and therefore the model may not be closely representative of the true function of the drainage system.

Recommendation: The applicant should consider revising the model to use the Dynamic Storage-Indication (DSI) analysis method, which will account for the tailwater conditions that will occur in many of the pipes throughout the drainage systems and better represent the overall function of same.

UCI Response: The calculations were revised using the recommended method. We acknowledge there is some tailwater conditions which are occurring at pipe connections where the upstream pipes are not at or near capacity. Please note that the pipe out letting sediment forebay A is being utilized as a control and therefore will be submerged.

BETA1: The revisions to the modeling method are acceptable; we do not anticipate any issues with the small number of pipes that will experience tailwater conditions during the 100-year event. Comment addressed.

- 18) *HydroCAD Analysis – Infiltration Basin Exfiltration Rates – The preliminary stormwater analysis assumes an exfiltration rate of 8.27 in/hour for all three (3) of the proposed infiltration basins; this is the prescriptive Rawls rate for HSG A soils. However, the report presents field-determined permeability test results that all exceed the prescriptive Rawls rate by a significant amount, even after the standard 2:1 factor of safety is applied.*

Recommendation: The applicant may wish to consider using the field-determined soil permeabilities (at fifty (50) percent of the observed field rates) in the design of the infiltration basins. While using the Rawls rate could be considered conservative, it could also result in the infiltration basins being appreciably oversized.

UCI Response: We have utilized an infiltration rate of 20" per hour for all of the infiltration basin.

BETA1: Revisions acceptable, and it is noted that the applicant has correspondingly revised the infiltration basin designs to reduce the sizes of each; comment addressed.

BETA2: MassDEP Stormwater Standards do not allow exfiltration from sediment forebays, revise design and calculations accordingly.

- 19) *Pond 94P: Infiltration Trench – The 100-year analysis indicates a storage range exceedance of approximately 1,110 feet. This is typically the result of a pond with a relatively small footprint and capacity (in comparison to the flows it receives) and inadequate outflow devices (in this case only exfiltration); the model is forced to extend the storage exceedance vertically using only the footprint of the pond, resulting in artificially high peak elevations.*

Recommendation: The applicant should revise this pond to include a properly sized emergency overflow device (e.g. a weir). In addition, the value of 45% voids is higher than typically accepted void ratio (and corresponding porosity) values for crushed stone; a porosity value of 33% is typical.

UCI Response: The porosity value was revised and the trench has been revised to accommodate up to the 100 yr. storm.

BETA1: Revisions acceptable; comment addressed.

- 20) Pond 80P: Forebay 2 – The 100-year analysis indicates a storage range exceedance of approximately 0.4 feet.

Recommendation: The applicant should revise this pond to eliminate the storage range exceedance, either by increasing the capacity of the basin, increasing the size (and outflow capacity) of the overflow weir, or a combination of both.

UCI Response: Please refer to Forebay 2 in Appendix A.

BETA1: Revisions acceptable; comment addressed.

- 21) Pond 108P: Forebay 3 – The 100-year analysis indicates a storage range exceedance of approximately 1.39 feet.

Recommendation: The applicant should revise this pond to eliminate the storage range exceedance, either by increasing the capacity of the basin, increasing the size (and outflow capacity) of the overflow weir, or a combination of both.

UCI Response: Please refer to Forebay 3 in Appendix A.

BETA1: The maximum storage elevation for Forebay 3 (Pond 108P) in the HydroCAD model appears to be 168.0, with a peak 100-year water elevation in the forebay of 170.17. This would appear to indicate a storage range exceedance; however, it can be seen on the plans that the forebay and infiltration basin 3 are encompassed by a maximum elevation of 172. Therefore, it appears that the storage range for the overall forebay and basin will not be exceeded during the 100-year event, and the revision is acceptable; comment addressed.

BETA2: The peak elevation for forebays 1 and 3 needs further review/revision as it appears that the peak elevation exceeds the top elevation of the forebays for 100 year storm. Review/ revise to provide a minimum 1 foot of freeboard.

- 22) Infiltration Basin 2/Forebay 2 – This basin and its forebay occupy portions of lots 7, 8 and 9. The Town of Norfolk requires that off-road stormwater management measures be sited on independent undeveloped lots, rather than on portions of other developed lots.

Recommendation: The applicant should revise this pond and/or the lot layout to site it completely on its own dedicated parcel.

UCI Response: Infiltration Basin 2 was revised in size and shape. The lot line has also been revised.

BETA1: The revisions to the basin size and shape are acceptable. The lot line revisions do keep the entirety of the basin outside of any other proposed development parcels, and appear to make the basin part of the open space (basins 1 and 3 also appear to be within the open space area). We suggest the applicant coordinate with the Town to determine if it is desirable for the stormwater basins to be part of the open space, or if it would be preferable for them to occupy their own dedicated development parcels.

UCI2 Response: We have the option to provide individual parcels or easements as may be required by the Town. We anticipate the Zoning Board will make this decision and the plans will be updated accordingly.

BETA2: BETA defers to the Board on this issue.

23) Infiltration Basin/Forebay Equipment Access – The plans do not indicate access paths for vehicles and/or equipment to reach the basins, for routine maintenance and/or periodic repairs.

Recommendation: The applicant should add access paths to the plans that will allow maintenance vehicles and equipment to reach the basins (particularly the forebays) from nearby roadways.

UCI Response: Equipment access has been provided.

BETA1: Revisions acceptable; comment addressed.

24) Sediment Forebay "A" – This forebay, which discharges to Infiltration Basin 3, is located at the southeast corner of Elliot Boulevard and Annie Loop. It is relatively large and deep (8 feet relative to Elliot Blvd., 14 relative to Annie loop). It is unclear why an additional forebay is required for IB 3, as there is a forebay proposed immediately adjacent to that basin.

Recommendation: The applicant should evaluate the need for the forebay to provide pre-treatment for IB-3, and if it is required, consider alternative subsurface pre-treatment devices that would not require the creation of such a large and deep pond in such a central location within the proposed development.

UCI Response: Sediment Forebay A has been designed to allow for treatment of the roadway runoff prior to the discharge into Infiltration Basin 1. The depth of the sediment forebay was designed to allow the inlet drainage pipes for the catch basin system located at the low spot of Elliot Boulevard. The sediment fore bay located adjacent to the Infiltration Basin is for a small area of roadway runoff from the Richard Road area.

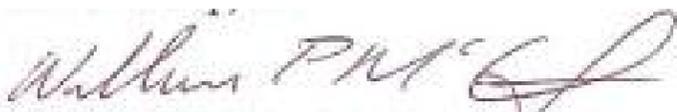
BETA1: Per coordination with the applicant subsequent to the development of the comment responses, the applicant will evaluate the possibility of installing an underground junction structure instead of the deep forebay. BETA will reserve additional comment until any revisions to the design are submitted.

UCI2 Response: The sediment fore-bay has been eliminated and the piping has been revised. We have provided the revised drainage calculations, roadway profiled and grading and utility sheets to reflect these revisions.

BETA2: The revised design and analysis has been reviewed. See additional comments 15, 18 and 21.

If you have questions about any of the preceding comments, please feel free to contact me at (401) 333-2382 or Phil Paradis at (781) 255-1982.

Very truly yours,
BETA Group, Inc.



William P. McGrath, P.E.
Associate

cc: Amy Brady – Norfolk Zoning Clerk