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March 29, 2018

Martha Morrison, Chair
Topsfield Planning Board
Town of Topsfield
461 Boston Street, Unit E-6
Topsfield, MA 01983

Reference: Perkins Row Open Space Development Definitive Subdivision
293 Boston Street, Topsfield, MA
Peer Review Report #2

Via: Email

Dear Chair Morrison and Members of the Board:

Our office has been working with the applicant's engineer, Marchionda & Associates, L.P. (M&A"), over the past several weeks to resolve the comments that were issued as part of our January 31, 2018 Peer Review Report for the overall project. During this time, the applicant's engineer has provided interim sets of materials to our office for review. We discussed many of these items directly in order to reach a quick resolution on as many issues a possible without the need for formal written responses.

For our specific comments, we have repeated the comment, the response from M&A in *italics*, and our follow up comment in **bold** below.

Topsfield Planning Board Rules and Regulations Governing the Subdivision of Land in the Town of Topsfield

Comment 1 - Section 4.3.2.j – The applicant shall submit an Environmental Impact State which shall provide the information shown in Appendix to these Rules and Regulations and clearly show the relation of the proposed project to the total environment of the Town and its inhabitants. The applicant has requested a waiver to this requirement. Since the application is for the creation of a single buildable lot, our office has no objection to this waiver request.

M&A Response: No response required.

BAI Final Comment: We recommend the waiver be granted.

Comment 2 - Section 5.1.2 – The cross-section standard on plate 2 includes 13 feet of pavement to the front face of the curbing and 14 feet of pavement total width on both sides of the centerline. The

applicant has proposed 10 feet of pavement to the front face of the curbing, and has not shown the pavement to extend below the curbing. The cross-section should be revised to show the pavement extending one foot underneath the curb as shown on plate 2.

M&A Response: For the record Plate 2 is not applicable to this project. Plate 2 is for a Collector Street and clearly Martina Way is classified as a Minor Street. Therefore, the proper plate applicable to this project is Plate 1. The cross-section has been revised to increase the width of the traveled way to 24 feet which we understand requires a waiver. The "Bituminous Concrete Cape Cod Berm Detail" (located just to the left of the cross section) clearly shows the pavement extending below the curbing consistent with plate 1. Although it is clearly shown on the berm detail, we have revised the cross-section detail as requested.

BAI Final Comment: The applicant's engineer is correct that we inadvertently referenced Plate 2 instead of Plate 1; however, the comment generally still applies. M&A has updated the roadway width to a consistent 24 feet through the entire length. This issue is resolved.

Comment 3 - Section 5.1.2 – The cross-section standard on plate 2 includes 1.5" surface course, 2.5" binder course, 12" crushed stone, and 12" gravel base course. The applicant has not shown any buildup depth layers. The buildup layer depths should be added to the plans. In addition, the applicant should add the following notes:

- Crushed stone shall contain no stones larger than 1.5" diameter
- Gravel base course shall:
    - Be reasonably free of fines.
    - Contain no stones over 4" diameter.
    - Be compacted to 95% optimum density
- Subbase to be acceptable to superintendent of highways.

M&A Response: The buildup layers were shown on the "Typical Pavement Section -Streets" detail on sheet 11 of 12. Also, the 9 notes directly under that detail contains specifications equal to and superior to the notes as suggested with the exception of the required compaction of the gravel base course and acceptability of the subgrade, which have now been added to the notes.

BAI Final Comment: This issue is resolved.

Comment 4 - Section 5.1.2 – The applicant has not identified the treatment of the shoulder on the left side of the cross section.

M&A Response: The treatment of the shoulders, which includes the shoulder on the left side of the cross section, is specified in note number 9 under the "Typical Pavement Section -

Streets" detail on sheet 11 of 12. Although not necessary, we have also repeated the note from the right-side shoulder of the cross section to the left side shoulder.

BAI Final Comment: This issue is resolved.

Comment 5 - Section 5.1.2 – The cross-section standard on plate 2 includes a slope of ¼" per foot slope for the shoulder on both sides of the roadway. The applicant has not provided a slope for the two shoulders. This should be noted on the plans and details.

M&A Response: As stated earlier plate 2 is not applicable to this project. A ¼" per foot slope has been added to the typical roadway section as shown on plate 1.

BAI Final Comment: The applicant's engineer is correct that we inadvertently referenced Plate 2 instead of Plate 1; however, the comment generally still applies. M&A has updated the shoulder cross-slope to be ¼" per foot on both sides. This issue is resolved.

Comment 6 - Section 5.1.3 Table 1 – The required right of way width for a minor street is 50 feet. The applicant is proposing a 40 foot wide right of way. The applicant has requested a waiver. Since this the creation of a single buildable lot, our office supports this waiver request.

M&A Response: No response required.

BAI Final Comment: We recommend the waiver be granted.

Comment 7 - Section 5.1.3 Table 1 – The required pavement width for a minor street is 26 feet. The applicant has requested a waiver to allow for a pavement width of 20 feet. The applicant should justify their request of this waiver. As shown on the plans at approximately station 1+60, the right lane narrows from approximately 13.5 feet to approximately 10 feet as scaled from the plans. Dimensions should be added to the plans to confirm roadway widths along Martina Way.

M&A Response: The Typical Roadway Section has been revised for a roadway width of 24 feet and dimensions have been added to the plan view. A waiver has been requested to allow the width to be reduced from 26 to 24 feet Justification for all waivers was submitted in writing to the board with the definitive plan submission. Furthermore, we have discussed the roadway width with the Board, the DPW director and the fire chief and a width of 24 feet appears to be acceptable.

BAI Final Comment: Both the DPW Director and the Fire Chief have provided email responses to the applicant's engineer stating that the design of the cul-de-sac looks fine to them. We recommend the waiver be granted.

Comment 8 - Section 5.1.3 Table 1 Grade a. – The maximum grade is 8.00 percent. The applicant has requested a waiver for the existing paved portion of Martina Way that according to the plans has a grade of 10.1 percent. This should be reviewed by the Highway and Fire Department, and comments should be provided to the Planning Board.

> *M&A Response: The highway and fire departments have no objection to this waiver. Please see email from Dave Bond copied to fire chief Jen Collins Brown dated January 8, 2018 and the email from Chief Jen Brown dated February 14, attached. This was also discussed with the Board at their February 6th hearing and appeared to be acceptable to the Board.*

BAI Final Comment: We recommend the waiver be granted.

Comment 9 - Section 5.1.3 Table 1 Intersection a. - The minimum angle in degrees permitted is 90. The intersection between Martina Way and Perkins Row is not 90 degrees. A waiver should be requested for this requirement.

> *M&A Response: We do not agree that this waiver is required. The Martina Way pavement intersects the variable Perkins Row pavement at 90 degrees. The math of the bearings of Martina Way layout and the Perkins Row layout are not exactly 90 degrees due to the variability of the Perkins Row layout. However, that does not rise to the level or requiring a waiver.*

BAI Final Comment: Our office agrees with the reasoning behind the math not showing a 90-degree intersection angle in this location; however, that does not diminish the fact that the angle is not 90 degrees. We understand that on many road layouts in Topsfield, and throughout New England, the ability to have a perfect 90-degree angle does not exist. This simple fact would seem to justify the granting of a waiver.

Comment 10 - Section 5.1.3 Table 1 Intersection c. - The minimum radius at roadway edge is 25 feet. The applicant should confirm what the existing radii are at the intersection of Perkins Row and Martina Way. If the radii are not 25 feet, a waiver should be requested.

> *M&A Response: Within reasonable construction tolerances the existing roadway edge of Martina Way is 25 feet. However, the existing berm at the radius is in need of repair so the*

plan has been revised to require replacing the berm at the intersection with Perkins Row at a radius of 25 feet.

BAI Final Comment: This issue is resolved.

Comment 11 - Section 5.1.3 Table 1 Intersection d. – The minimum sight distance required is 200 feet. No documentation has been provided verifying the sight distance at the intersection is in excess of 200 feet. Sight distances should be shown on the plans.

M&A Response: The sight distance in the northwesterly direction is greater than 250 feet and the sight distance in the southeasterly direction is greater than 400 feet. We have added note #10 to sheet 9 of 12 of our revised plan set which provides these sight distances.

BAI Final Comment: This issue is resolved.

Comment 12 - Section 5.1.3 Table 1 Dead-End Streets e.1. - The minimum required pavement radius, outer edge is 110 feet. The applicant has proposed a minimum required pavement radius, outer edge of 45 feet. The applicant is requesting a waiver to reduce the outside diameter edge of the cul-de-sac from 110 feet to 90 feet. The applicant should provide a turning analysis that a fire truck will safely be able to navigate the reduced outside diameter edge. Our office has no objections to this waiver once this turning analysis has been performed and confirms the ability to navigate the reduced outside diameter edge.

M&A Response: Note #6 on sheet 9 of 12 contains the various turning radii obtained from the fire apparatus turning report which demonstrate that the fire apparatus will be able to safely navigate this cul-de-sac. Furthermore, in our revised plan set, we have reduced the inside radius of the pavement at the cul-de-sac from 25' to 21' (to increase the pavement width to 24') which will provide the fire apparatus with even more room to navigate the cul-de-sac. For your reference, attached please find the turning radius report for the new fire apparatus that the town of Topsfield will be purchasing that we obtained from the manufacturer.

BAI Final Comment: Our office has prepared an AutoTurn analysis of this cul-de-sac using the dimensions indicated in the note and have found there to be adequate room for the fire truck to navigate the roadway. This issue is resolved.

Comment 13 - Section 5.1.3 Table 1 Dead-End Streets e.3. - The minimum height of island above surrounding pavement is 16 inches. The applicant is requesting a waiver of the minimum height of the island surrounded by pavement to allow the island to be depressed in order to provide for stormwater treatment. Our office has no objections to this waiver request.

M&A Response: No response required.

BAI Final Comment: We recommend the waiver be granted.

Comment 14 - Section 5.1.3 Table 1 Dead-End Streets e.5. – The minimum right-of-way radius is 120 feet. The applicant has not provided a continuous radii along the entire cul-de-sac as the right-of-way terminates into the property line at 146 Perkins Row. In addition, the cul-de-sac has a radius of 65 feet and does not meet the requirement.

M&A Response: We have requested a waiver to allow a ROW radius of 65 feet and a pavement radius of 45 feet, approved by highway and fire, to avoid alteration of the wetland buffer and possibly the wetlands.

Section 5.1.3 Table 1 Dead-End Streets e.5 does not require a continuous radii along the entire cul-de-sac. The right-of-way terminates at the property line of #146 Perkins Row due to the existing configuration of the property lines at #'s 146 & 142 Perkins Row

BAI Final Comment: We recommend the waiver be granted.

Comment 15 - Section 5.1.3 Table 1 – The actual cul-de-sac shall be centered on the right-of-way. The applicant has not provided any dimensions along the centerline of the proposed roadway, and it cannot be verified if the cul-de-sac has been centered on the right-of-way.

M&A Response: We have shifted the alignment slightly to ensure it is completely centered. Furthermore, we have added dimensions between the cul-de-sac and the ROW to the plan (Sheet 9 of 12) that demonstrate the cul-de-sac is centered on the right-of way.

BAI Final Comment: This issue is resolved.

Comment 16 - Section 5.1.5.b – Natural features such as large trees, stone walls and other features to be preserved should be shown on the plans. It appears that large trees have been mapped on a portion of the site, and should be mapped on the remainder of the site subject to the development. The tree line shown on the plans should clearly depict the entire tree line and not terminate in lot 1.

M&A Response: We have located all of the major features on the site from retaining walls to existing structures. We have also located all of the large trees near the proposed right of way as well as a few other significant trees on the site. We have also located significant lengths

of treeline as shown on our plans. We feel this adequately addresses the intent of Section 5.1.5.b.

BAI Final Comment: This issue is resolved.

Comment 17 - Section 5.1.5.d through 5.1.5.h – Please add notes relative to these items to the General Notes sheet or the appropriate details.

M&A Response: These notes have been added to the general notes on sheet 2 of 12.

BAI Final Comment: This issue is resolved.

Comment 18 - Section 5.1.6.b through 5.1.6.e – Please add the material specifications noted in these sections to the typical roadway section detail in the plan set.

*M&A Response: Please be advised that the typical pavement section detail included these notes. Specifically note 4 is worded **identically** to the wording of 5.1.6.b (in addition on the revised plans we have added the specified compaction per plate 1); the wording of note 5 is **identical** to the wording of 5.1.6.c; the wording of note 6 is the **identical** material specification portion to the wording of 5.1.6.d (in addition, although not necessary in our opinion, we have added the remaining wording of 5.1.6.d to that note); lastly the wording of note 7 is **identical** to the wording of 5.1.6.e.*

BAI Final Comment: During our initial review of the project, we missed these notes. This issue is resolved.

Comment 19 - Section 5.3 – The full arc length of curves at intersections shall consist of granite curbing. No granite curbing is proposed at the intersection of Perkins Row and Martina Way. Additionally, No transition details for the change from bituminous berm curbing to granite curbing are shown in the planset, and should be added accordingly.

M&A Response: The highway superintendent does not want granite curbing at the intersection of Martina Way and Perkins Row. See email dated February 12, 2018 attached.
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BAI Final Comment: We agree with this response. This issue is resolved.

Comment 20 - Section 5.4 – Sidewalks may be constructed only on one side of the roadway at the property line on Minor Streets. The applicant has requested a waiver to this requirement. Our office has no objections to this waiver request.

M&A Response: No response required.

BAI Final Comment: We recommend the waiver be granted.

Comment 21 - Section 5.7 – The location and details of the street name signs should be included on the plans.

M&A Response: The location and detail of the street signs has been added to the plan and see e mail from Dave Bond dated 3/6/18 attached.

BAI Final Comment: This issue has been resolved.

Comment 22 - Section 5.9 – A proposed TEC line is shown on the plans, however it is not clear what this is being connected to. A label should be added to the plans to describe where the connection to existing utilities is being made. It appears the connection may being made to a utility pole, however this utility pole appears to be located outside the right of way and located on 146 Perkins Row. The applicant should confirm that they have permission to make this connection if this is the intention.

M&A Response: The proposed TEC line shown on the plans is intended to make a connection to the utility pole (#1717/1) as you believed. We have added a label to the plan. However, this is shown conceptually as the utility provider(s) always makes the determination to where the actual connection will be made but will not do so until after they receive an endorsed plan. The specifics of the connection location(s) and type(s) will be made at a later date by the respective providers.

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BAI Final Comment: This issue has been resolved.

Comment 23 - Section 5.11 – The need for Fire Alarm and Police Call Boxes should be discussed between the applicant and the Board.

M&A Response: Fire alarm and police boxes are not used in Topsfield. Please see email from Chief Brown dated February 14th attached.

BAI Final Comment: This issue has been resolved.

Comment 24 - Section 5.12.1.b – The applicant has proposed that the water service be installed 7 feet minimum to the right of the centerline of the roadway. Plate 1 requires that the water line be installed a minimum of 10 feet to the right of the centerline. Additionally, the applicant does not provide a dimension from the edge of the roadway to the proposed telecomm, electric, and cable as shown on plate 1, and should be added accordingly. The horizontal location of the utility lines should match the location in Plate 1 of the Subdivision Regulations. If this is not practical, a waiver should be requested.

M&A Response: The dimensions to the water service and telecom, electric and cable have been added to the Typical Roadway Section. The water service is still shown to be 7 feet from the centerline to avoid conflicting with existing utilities in Martina Way. We will request a waiver if the Board deems it to be necessary.

BAI Final Comment: We do not think a waiver should be necessary for this item. This issue is resolved.

Comment 25 - Section 5.12.1.d – No trench detail has been provided. Trench details should be provided for each utility.

M&A Response: Trench details for each utility have been added to the detail sheets.

BAI Final Comment: This issue is resolved.

Comment 26 - Section 5.12.2.c. – The water pipe diameter shall not be less than 8 inches. The applicant has shown a water pipe that is a 1" type "k" copper water service. The applicant should request a waiver from this item.

M&A Response: Pursuant to discussions with the water department and fire department, two options for water service are available. Please see email from Greg Krom attached. The applicant has elected to go with a 2 inch plastic water service and provide residential fire sprinklers for the house.

BAI Final Comment: This issue has been resolved.

Comment 27 - Section 5.12.3.b – The applicant has not provided documentation that the drainage system has been designed using a minimum of a 25-year design frequency storm event. Additionally, the drainage system has not been designed in accordance with the natural drainage boundaries of the total drainage area. According to the watershed maps, the boundaries of the total drainage area

have terminated at various property lines. The watershed boundaries are discussed further in the Stormwater and Erosion Control Regulations of this report.

M&A Response: Between the size of the watersheds to the piping network being so small and the rate that the inlets can catch water, it was our opinion that the time and expense to document pipe capacities was not necessary. However, to respond to the comment we have run an analysis on the piping network and have attached the results. The piping network accommodates the 25-year storm as expected. To the extent that watersheds beyond the property limits contribute to the proposed stormwater system we would agree that such watersheds should be included. However, that is not the case in this specific subdivision. The watersheds outside of the property boundaries do not contribute to the proposed stormwater systems. Therefore no purpose would be served by attempting to delineate off site watersheds in this particular instance.

BAI Final Comment: After discussing this with the applicant's engineer, we agree with this approach. This issue has been resolved.

Comment 28 - Section 5.12.3.e – Drainage pipe beneath the roadway shall be reinforced concrete and have a minimum diameter of 12 inches. The applicant has requested a waiver to allow 8 inch HDPE under the roadway in lieu of 12inch RCP from CB 3 to DMH 2 and to allow all other drain pipe to be HDPE in lieu of RCP. It is not clear why the applicant is requesting a waiver to allow for 8 inch HDPE from CB 3 to DMH 2, when no calculations have been provided for the sizing of the pipes as required by section 5.12.3.b. Also, it is not clear why the applicant is proposing to use HDPE pipe instead of RCP. At this time our office does not support this waiver request.

M&A Response: We have requested a waiver to allow the use of an 8" HDPE pipe between CB-3 and DMH-2 because the catchment area of CB-3 is very small. CB-3 only captures runoff from the cul-de-sac inside of the crown in the roadway. The runoff outside of the crown travels along the curbing to CB-1 & CB-2. HDPE in lieu of RCP has been requested as HDPE pipe is the common industry standard for the past 10 – 20 years. Please see email from the highway superintendent dated January 8, 2018 where he stated no objection to the HDPE pipe as long as rubber gaskets were used. We have added a note to the details sheet specifying that the rubber gaskets must be used.

BAI Final Comment: We recommend the waiver be granted.

Comment 29 - Section 5.12.3.k – No drainage pipe trench detail has been provided detailing that applicant will meet the requirements of the section. A drainage pipe trench detail should be provided detailing the requirements of this section.

M&A Response: A detail has been added.

BAI Final Comment: This issue is resolved.

Comment 30 - Section 5.12.3.f – Provide a detail per Plate 3 of the Subdivision Regulations. Provide a detail on transitioning from bituminous berm curb to the granite curb inlets.

M&A Response: This detail is not needed as the highway superintendent has determined that granite curb inlets are not to be provided. See email dated February 12, 2018 attached.

BAI Final Comment: This issue is resolved.

Comment 31 - Section 5.12.3.f – Provide a profile and cross section of the swale shown between the proposed driveway and 142 Perkins Row to insure flooding does not incur onto the abutting property.

M&A Response: Based on the proposed site grading and the inclusion of the yard drain (YD-1) very little stormwater will be travelling toward this swale. Flow arrows shown on the plan also indicate the driveway runoff will be directed away from 142 Perkins Row. We feel a profile and cross-section of this swale is unnecessary.

BAI Final Comment: Given the site conditions and the minimal drainage through this area, we agree with M&A's response. This issue is resolved.

Comment 32 - Section 5.12.4 – The applicant has not proposed whether there will be a connection to a public sewerage system or whether there will be a private on-lot sewerage system. We anticipate that there is a septic field in the southwest corner of lot 1, and if this is a septic field it should be labeled as such.

M&A Response: There is no public sewerage available to tie into. The plan does show a proposed septic field in the southwest corner of the lot. We have added a label to the plan.

BAI Final Comment: This issue is resolved.

Comment 33 - Section 5.13.1 – No drainage easements have been shown for the drain lines and infiltration systems. Drainage easements should be shown on the plans.

M&A Response: The intention is that Martina Way will become a town accepted street therefore no easements for any drainage facilities within Martina way are required.

Furthermore, the drain lines and infiltration facilities that are on lot 1 are intended to be maintained by the lot owner as such no easements are necessary. However, we have revised the plan of land to provide for a drainage easement along the pipe from the edge of the ROW to the outlet of the drainage pipe into the sedimentation basin.

BAI Final Comment: A 15' drainage easement has been added which covers the piped conveyance. If the basin and forebay are to maintained by the homeowner, a covenant or other legal means to ensure maintenance should be added to the deed to the property since this facility will accommodate the Town's drainage. This form of documentation should be reviewed and approved by the DPW Director.

Comment 34 - Section 5.13.1 – On sheet 2 of 12 Legend and Notes, General Note 13 states *"All required utilities exclusive of transformers shall be placed underground. The developer shall provide easements for transformers where necessary."* The plans however do not show transformer locations or any easements pursuant to this section of the regulations.

M&A Response: Note 13 is a general note, however, the utility company will not layout any transformers (if they are needed) until after that are presented with an endorsed approved plan. Also, if a transformer is needed there is sufficient room within the Martina Way layout to accommodate a transformer without an easement.

BAI Final Comment: This issue is resolved.

Comment 35 - Section 5.14.3 – Iron pipe markers set in concrete shall be installed at the intersection of all lot lines with street lines. An iron pipe marker should be proposed along the lot 1 property line intersecting with the right of way. Details and notes for the iron pipe markers should be added to the plans.

M&A Response: The location of iron pipe markers and a detail has been added to the plans.

BAI Final Comment: This issue is resolved.

Comment 36 - Section 5.19 – Notes regarding the preservation of trees and other features should be added to the plans.

M&A Response: A note has been added to the general notes on sheet 2.

BAI Final Comment: This issue is resolved.

Comment 37 - Section 5.20.1 – Shade trees of species approved by the Tree Warden shall be planted on each side of each street (at least two (2) per lot) in a subdivision, except where the Definitive plan show trees to be retained which are healthy and adequate. If the applicant is not proposing to provide shade trees, the applicant should submit a waiver request.

M&A Response: We have added two proposed trees within the Martina Way cul-de-sac ROW in front of the proposed building lot and specified the size, caliper and species as recommended by the tree warden.

BAI Final Comment: In an email to the applicant's engineer, the Tree Warden confirmed that he will specify the species of the trees. He has requested that the caliper be 4" minimum. This should be specified.

Stormwater and Erosion Control Regulations, Town of Topsfield Planning Board

Comment 38 - Section 5.0.C.1 – A note should be added to the Site Plan or General Notes sheet that reads "Any stormwater and erosion control permit issued in conjunction with a Definitive Plan for the Subdivision of Land shall apply to the alteration of the land approved in said plan, i.e. alteration associated with the construction of the infrastructure of the project and any grading or filling for the creation of lots indicated on the plan. Subsequent or additional alteration to individual lots in the subdivision will require stormwater and erosion control permits unless there are no changes from those approved in the Definitive Plan or the lots are exempt under the bylaw."

M&A Response: This note has been added as general note #22 on sheet 2 of 12.

BAI Final Comment: This issue is resolved.

Comment 39 - Section 6.0.L.2.e – On sheet 2 of 12 general note 13 indicates there will be transformer easements. The locations of all existing and proposed property lines and easements should be shown on the plans. Also, no easements have been shown for the stormwater management facilities.

M&A Response: See response to comments 33 and 34.

BAI Final Comment: This issue is resolved.

Comment 40 - Section 6.0.L.2.g - There appears to be an 86 contour to the west of the flower bed, and the next contour to the north is a 90 contour. It appears an 88 contour is missing separating the

86 contour from the 90 contour. Additionally, existing contours should be provided extending beyond the watershed boundaries so that the watershed boundaries may be verified.

M&A Response: The existing wall between the 86 and 90 contours accommodates a grade change. The spot elevation at the southern face of the wall in this area is 87.0 and the next contour to the north of the wall is elevation 90. An elevation of 88 takes place in the wall and therefore an 88 contour would not be shown here. We have added some additional contour labels and clarified the grading in this area.

See response to comment 27 regarding additional topography.

BAI Final Comment: This issue is resolved.

Comment 41 - Section 6.0.L.2.h - The watershed boundaries appear to follow the property lines along Martina Way, as well as the eastern and southern property lines. These boundaries should be reevaluated to determine the correct actual watershed boundary based on topography and natural features and not on boundaries established by deeds. In addition, existing subcatchment E-1 has been delineated with a study point within Perkins Row. It is not clear how stormwater in the southeastern corner of this subcatchment will flow to the analysis point. Additionally, there appears to have been watersheds delineated without surrounding contours. Contours surrounding the watersheds should be shown to verify that the watersheds have been correctly delineated.

M&A Response: The depiction of the watershed for the pre and post development conditions accurately delineate the pre and post developed watersheds for the purposes of analyzing the impacts of the proposed development. Study point A should not be interpreted to intend to measure the pre and post flows to that specific point in Perkins ROW. The purpose of Study point A is to measure the pre and post development flows to Perkins ROW. The southeast portion of E1 flows towards Perkins ROW overland via the property at 140 Perkins Row.

BAI Final Comment: This issue is resolved.

Comment 42 - Section 6.0.L.2.k - Estimated high ground water elevation should be shown on the plans in areas to be used for stormwater retention, detention, or infiltration.

M&A Response: The test pits were performed in areas planned for stormwater management and the soil logs, which include groundwater information, were shown on sheet 5 of 12.

BAI Final Comment: This issue is resolved.

Comment 43 - Section 6.0.L.2.l - All existing vegetation, including trees over 12 inches in diameter at 4 feet above ground level should be shown on the plans. The plans appear to show only a certain portion of the site's existing vegetation, and should be shown throughout the development area of lot 1.

M&A Response: Please see our response to comment #16.

BAI Final Comment: This issue is resolved.

Comment 44 - Section 6.0.L.2.o.i - The location, cross sections and profiles of all drainage swales and their methods of stabilization should be shown. This includes but is not limited to the swale located between the proposed dwelling and the eastern property line and the swale created on the northern side of the cul-de-sac.

M&A Response: In our opinion the tiny amount of water being carried by the swales does not rise to the level to require cross sections and details of stabilization. The swales will be vegetated with native grass.

BAI Final Comment: Our office agrees with this approach. This issue is resolved.

Comment 45 - Section 6.0.L.2.o.ii - No detail has been provided for the flared end structure. Additionally, no erosion control devices have been provided on the downstream side of what appears to be the unidentified leach field in the southwestern corner of lot 1.

M&A Response: A detail of a flared end has been added to the plans. There is a proposed septic system, for which we have added a label. Additionally, we have changed the proposed construction fence to erosion controls in the area downstream of the proposed leach field.

BAI Final Comment: This issue is resolved.

Comment 46 - Section 6.0.L.2.o.iii – No construction sequence and installation timing as they relate to soil disturbance has been provided.

M&A Response: The very limited project scope does not warrant application of this section of the stormwater and erosion control regulations. A waiver this section has been added to our waiver request.

BAI Final Comment: We recommend approval of this waiver.

Comment 47 - Section 6.0.L.2.o.iv - Submit a plan showing areas of vegetation alteration, soil disturbance and areas of cut and fill.

M&A Response: The very limited project scope does not warrant application of this section of the stormwater and erosion control regulations. A waiver this section has been added to our waiver request. A waiver this section has been added to our waiver request.

BAI Final Comment: We recommend approval of this waiver.

Comment 48 - Section 6.0.L.2.o.v - Submit a phasing plan that indicates vegetation alteration, soil disturbance, cut and fill including designated soil stockpile locations with a tabulated sequence of construction and construction schedule, including earthworks.

M&A Response: The very limited project scope does not warrant application of this section of the stormwater and erosion control regulations. A waiver this section has been added to our waiver request.

BAI Final Comment: WE recommend approval of this waiver.

Comment 49 - Section 6.0.L.2.o.vi - Submit a proposed schedule for the maintenance of erosion control measures in tabular form should be included for the project throughout the construction period.

M&A Response: Notes have been added to the erosion control plan, sheet 10, specifying maintenance of the erosion control measures.

BAI Final Comment: This issue is resolved.

Comment 50 - Section 6.0.L.3.d - Total runoff volumes have not been provided for each watershed area.

M&A Response: Runoff volumes were provided in our stormwater report. The runoff volumes are clearly shown on each hydrograph labeled as "Hyd. Volume" and is part of Hydraflow's output.

BAI Final Comment: This issue is resolved.

Comment 51 - Section 6.0.L.3.e - Provide information on construction measures used to maintain the infiltration capacity of soil where any kind of infiltration is proposed.

M&A Response: We have added temporary construction fence around the stormwater management areas. Equipment tracking over these areas will be minimized. Notes have been added to the plans.

BAI Final Comment: This issue is resolved.

Comment 52 - Section 6.0.L.3.g - No documentation has been provided on culvert capacities.

M&A Response: Please see our response to comment #27.

BAI Final Comment: This issue is resolved.

Comment 53 - Section 6.0.L.3.h - No documentation has been provided on flow velocities.

M&A Response: Please see our response to comment #27.

BAI Final Comment: This issue is resolved.

Comment 54 - Section 6.0.L.6. – No landscaping plan has been provided describing the woody and herbaceous vegetative stabilization and management techniques to be used within and adjacent to the stormwater practice.

M&A Response: The proposed vegetation for treating stormwater is shown on the rain garden detail on sheet 12. The remainder of the site will have native grasses and typical residential landscaping.

BAI Final Comment: This issue is resolved.

Comment 55 - Section 6.0.M.2 – Provide a map showing the location of the systems and facilities including catch basins, manholes/access lids, main and stormwater devices.

M&A Response: Please see sheet 8 and the detail sheets.

BAI Final Comment: This issue is resolved.

Comment 56 - Section 6.0.M.3 – Maintenance agreements should be included that specify the following:

- The names and addresses of the person(s) responsible for operation and maintenance;

- The person(s) responsible for financing inspection, maintenance and emergency repairs;
- An Inspection and Maintenance Schedule for all stormwater management facilities including routine and non-routine maintenance tasks to be performed;
- A list of easements with the purpose and locations of each;
- The signature(s) of the owner(s).

M&A Response: The maintenance and operation of all stormwater management facilities that are located outside of the Martina Way layout will become the responsibility of the future home owner of lot 1 who is yet to be identified. As stated elsewhere the Town will not be maintaining the stormwater facilities on lot 1 and as such no easements are required. A maintenance schedule has been provided as Appendix 4 (Operation & Maintenance Plan) of our Stormwater Report. Please see Page 1 of the Stormwater Report for the maintenance schedule and responsibility.

BAI Final Comment: The Town will be maintaining the pipe that leads from Martina Way to the stormwater basin. An easement has been added to cover this area. In addition, since the homeowner will be responsible for the maintenance of a system that will accommodate the Town's drainage, covenants or other legal provisions for the ongoing maintenance should be added to the deed. This should be reviewed by the DPW Director.

Comment 57 - Section 6.0.M.4 – Draft easement language should be included for the stormwater easements.

M&A Response: See earlier responses regarding easements.

BAI Final Comment: We have not reviewed any draft language for the easements. This should also be reviewed by the DPW Director.

Comment 58 - Section 7.0.A - The applicant provides statements that the project meets or does not apply to the various DEP Stormwater Standards. In certain cases, the applicant has not provided calculations and documentation in accordance with the DEP Stormwater Handbook, Volume 3, Documenting Compliance.

M&A Response: We have met the applicable stormwater standards for this project, particularly after addressing all of the peer reviewer comments.

BAI Final Comment: This issue is resolved.

Comment 59 - Section 7.0A – Massachusetts Stormwater Standard 3 requires a mounding analysis when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four feet and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher 24-hour storm. Mounding analyses should be provided for all infiltration systems within four feet of seasonal high groundwater.

M&A Response: A 4 foot vertical separation between the estimated seasonal high groundwater and the bottom of the system is provided. The test pit within the rain garden area (TP8-17) has an ESHWT of 84" below existing grade corresponding to an elevation of 82.0. The bottom of the rain garden is at elevation 86.8, which corresponds to a vertical separation of 4.8 feet. In our pond analysis of the rain garden (included in Appendix 1 of our stormwater report) the bottom contour area considered was at an elevation 87.0.

BAI Final Comment: We have discussed this situation with the applicant's engineer and have reached agreement on the proposed design and documentation. This issue is resolved.

Comment 60 - Section 7.0.A - Massachusetts Stormwater Standard 10 requires an Illicit Discharge Compliance Statement. The applicant has indicated that it shall be the project owner's responsibility to prepare in Illicit Discharge Statement in accordance with Standard 10 certifying that no discharges exist on the site. Since the Illicit Discharge Compliance Statement has not been filed, Mass DEP requires the Final Order of Conditions to require the submission of an Illicit Discharge Compliance Statement prior to the discharge of stormwater runoff to the post-construction best management practices.

M&A Response: An Illicit discharge compliance statement is attached

BAI Final Comment: This issue is resolved.

Comment 61 - Section 7.0.A - Test pit 7-17 on the plans indicates the ground elevation to be 91.0, and the estimated water table to be 65 inches. By calculation, the estimated water table is at elevation 85.6. In accordance to Standard 3 of the Massachusetts Stormwater Handbook Volume 1 Chapter 1, there must be at least a two foot separation between the bottom of the infiltration structure and the seasonal high groundwater table. According to the plans, the sediment forebay located next to test pit 7-17, the bottom contour of the sediment forebay of 87 is within 1.4 feet of the estimated seasonal high groundwater table.

M&A Response: The other test pits performed in the area of the sediment forebay (TP4-17 & TP8-17) have estimated seasonal high groundwater tables of 76" and 84" below existing grade corresponding to estimated high groundwater elevations of 82.0 and 82.7, respectively.

As such, we feel that the true estimated seasonal high groundwater in this area is between approximately elevations 82 and 83. Test pit TP9-17, also fairly close by, has an even deeper ESHWT. We believe we have more than adequate separation to groundwater and therefore are not required to perform a mounding analysis.

BAI Final Comment: BAI Final Comment: We have discussed this situation with the applicant's engineer and have reached agreement on the proposed design and documentation. This issue is resolved.

Comment 62 - Section 7.0.B.1 - The plans appear to indicate that the existing bituminous pavement ends approximately 170 feet from Perkins Row as scaled from the plans. The plans in the post-development condition appear to show 60 feet of proposed untreated pavement discharging to Perkins Row. Documentation should be providing detailing how this untreated pavement will achieve the required treatment prior to discharging to the municipal drainage system.

M&A Response: This small amount of untreated discharge is considered to be de minimus consistent with the Mass DEP Stormwater Handbook. Furthermore the existing Martina Way pavement width is being reduced from 26 to 24 feet. See attached email from the highway superintendent.

BAI Final Comment: This issue is resolved.

Comment 63 - Section 7.0.B.5 – Recharge calculations have been provided; however Massachusetts Stormwater Standard 3 requires an adjustment factor when recharge areas do not capture 100% of the impervious site area. This factor is known as the Capture Area Adjustment factor, and must be applied for the new proposed impervious area that are not being recharged. In appendix 2, on sheet one of two, the applicant states that there is 0.61 acres of proposed impervious cover, and on sheet two of two, the applicant states 0.31 acres of impervious surfaces are draining to the BMPs. This indicates that the adjustment factor must be applied.

M&A Response: The proposed design had 0.31 acres of impervious area being directed to BMPs, even though we only have an impervious area net increase of 0.23 acres. Nonetheless, we have revised Appendix 2 (sheet 2 of 2) to account for the capture area adjustment based on the total impervious area. The capture area adjustment factor is 1.97, which increases the required recharge volume to 418 cubic feet. We have provided 1,386 cubic feet of recharge volume so even with the adjustment factor applied we still meet this standard.

BAI Final Comment: This issue is resolved.

Comment 64 - Section 7.0.B.8.g – In preparing the hydrologic calculations, the standard for characterizing predevelopment land use for on-site areas shall be woods. The predevelopment calculations should be updated to accommodate this requirement.

M&A Response: That section is in direct contradiction to preceding section 7.0.B.g.a which states that "Impervious cover …includes…compacted dirt surface roads" which is exactly the present case in this subdivision. All characterization of the predevelopment land uses was computed as woods or open space with the exception of the existing very compacted dirt roadway.

BAI Final Comment: This issue is resolved.

Stormwater Management Report – Other Comments

Comment 65 - There appears to be a typo at the 12" HDPE pipe between FES-1 and DMH-2. FES-1 on the plans has an invert of 89.0 connected to a 12" HDPE pipe of 176 linear feet at a slope of 0.068 foot per foot. At this slope and length, the calculated invert at DMH-2 would be approximately 100.97. The invert on the plans at DMH-2 connected to FES-1 is 90.2.

M&A Response: This was a simple typo. The pipe slope is 0.0068 feet per foot which has been corrected on the plans and shown as 0.007 feet per foot. The inverts are correct.

BAI Final Comment: This issue is resolved.

Comment 66 - A discrepancy has been identified at the 8" HDPE pipe between DMH-2 and CB-3. DMH-2 on the plans has an invert of 90.3 connected to an 8" HDPE pipe of 44 linear feet at a slope of 0.03 foot per foot. At this slope and length, the calculated invert at CB-3 would be approximately 91.62. The invert on the plans at CB-3 is 91.5.

M&A Response: The pipe slope calculates at 0.027 feet per feet. The slope on the plan set was rounded to 0.03 feet per feet which is within normal construction tolerance. However, we have revised the plan to report a slope of 0.027 feet per foot.

BAI Final Comment: This issue is resolved.

Comment 67 - The rim elevation of YD-1 is 93.5 and a 93 contour is shown around the yard drain. It is not clear if the intent is to make this an infiltration area, or if the rim elevation should be around elevation 92.5.

M&A Response: We did not take any credit for any infiltration in this area. This is simply a yard drain. We have removed the 93 contour to clarify the intention of this yard drain. The rim and invert elevations remain unchanged.

BAI Final Comment: This issue is resolved.

Comment 68 - The Time of Concentration calculation for subcatchment E-1 has been calculated to have a total travel time of 15.90 minutes. When all of the components of travel time are added individually, the sum is 15.95 minutes. While this may be a rounding error, we would like to confirm what the value should be.

M&A Response: The difference between 15.90 minutes and 15.95 minutes is 3 seconds and is completely insignificant.

BAI Final Comment: This issue is resolved.

Comment 69 - The Time of Concentration calculation for subcatchment E-2 has been calculated to have a total travel time of 10.90 minutes. When all of the components of travel time are added individually, the sum is 10.93 minutes. While this may be a rounding error, we would like to confirm what the value should be.

M&A Response: The difference between 10.90 minutes and 10.93 minutes is 1.8 seconds and is completely insignificant.

BAI Final Comment: This issue is resolved.

Comment 70 - According to Pond No. 1 – Cul-de-sac found in Appendix 1 Hydrographs section, the contour area for elevation 93.00 is 200 square feet, however scaled from the plans is approximately 175 feet. The contour area for elevation for 94.00 in the report is 400 square feet, however scaled from the plans is approximately 350 square feet. While we do not think this discrepancy will be problematic, the applicant should confirm the correct value.

M&A Response: The values in Appendix 1 are correct and based on CAD, not scaled. Furthermore, any differences of the magnitude suggested are not problematic or worthy of

addressing. We have re-graded this area slightly so that the contour areas are even larger than those used in the analyses, which we hope alleviates your concern.

BAI Final Comment: This issue is resolved.

Comment 71 - According to Pond No. 1 – Cul-de-sac found in Appendix 1 Hydrographs section the Manning's coefficient for the culvert structure is listed as 0.013 which is commonly used for concrete pipes. According to the plans, the pipes are shown as HDPE which are not found with a Manning's coefficient equal to this value.

M&A Response: The Manning's coefficient has been updated to 0.010. We have re-run the analysis on this hydrograph and the results are attached. The peak discharge very slightly increased between zero and 0.012 cfs for the various storm events.

BAI Final Comment: This issue is resolved.

Comment 72 - The cul-de-sac found in Appendix 1 Hydrographs section, Pond No. 1, which indicates the slope of the culvert is 1.00 percent. According to the plans, the slope is 3.00 percent.

M&A Response: The slope of the pipe in Appendix 1 has been updated to 2.7% to match the slope shown on the plan. Please see our response to comment #72.

BAI Final Comment: This issue is resolved.

Comment 73 - Pond No. 1 – cul-de-sac found in Appendix 1 Hydrographs section the span in inches of the culvert is 12.00, and on the plans the culvert is an eight (8) inch HDPE pipe.

M&A Response: The size of the pipe in Appendix 1 has been updated to 8 inches to match the size shown on the plan. Please see our response to comment #72.

BAI Final Comment: This issue is resolved.

Comment 74 - Pond No. 1 – Cul-de-sac found in Appendix 1 Hydrographs section indicates the length of culvert is 50 feet, however according to the plans, the pipe is 44 linear feet.

M&A Response: The length of this pipe in Appendix 1 has been updated to 44 feet to match the length shown on the plan. Please see our response to comment #72.

BAI Final Comment: This issue is resolved.

As the project moves through the various stages of permitting, we encourage the Board and the applicant to endeavor to submit one final set of plans at the conclusion of permitting with a final revision date and description labeled Control Documents. This final set should contain and any and all revisions requested by the Board, peer reviews and other regulatory authorities. The Control Documents will provide a basis for all Town Departments to understand exactly what was approved for construction without the confusion that can come from multiple sets of plans tied to the same project. We also encourage the applicant to develop a comprehensive stormwater management plan for the entire project as required by the Town of Topsfield Stormwater Management regulations.

Our office looks forward to answering any questions you may have on this review and we look forward to discussing our findings with the Board on the evening of April 3, 2018 at the Planning Board's regular meeting. If you have any questions prior to that meeting, please do not hesitate to contact me directly.

Sincerely,
Beals Associates, Inc.

Todd P. Morey, P.E.
Vice President

C: C-979.01 File