Professional Services Corporation, PC

Memorandum

Date	April 15, 2021
To	Sherborn Zoning Board of Appeals
From	Thomas C. Houston, PE
Project	The Pines Residences and Apple Hill Estates Comprehensive Permit Projects
Subject	Evaluation of Responses to Stormwater Peer Review Comments

Professional Services Corporation, PC (PSC) reviewed the Stormwater Management Systems and Stormwater Reports for The Pines Residences and Apple Hill Estates Comprehensive Permit Projects (Proposed Projects) on behalf of the Sherborn Zoning Board of Appeals. We issued our Stormwater Peer Review memorandum on the First Submission on March 20, 2021 and a revised copy on March 22, 2021. We are in receipt of memoranda dated April 9, 2021 responding to our peer review comments as well as revised site plans and updated stormwater reports submitted by Allen & Major Associates, Inc. (A&M).

This memorandum includes peer review comments from our March 20th memorandum, responses from the A&M memoranda dated April 9, 2021, and our evaluation of the adequacy of the responses.

As of April 15, 2021, Comments 3, 7, 8, 14, 21, 22, 23, 24, 28, 32, 37A through 37G, 38, 44, 52, and 55 are not fully resolved.

BASIS – UPDATED AS OF APRIL 15, 2021

A. Allen & Major Associates, Inc. memorandum to Mr. Richard S. Novak, Chair, Zoning Board of Appeals re Response to Peer Review of Stormwater Management System & Stormwater Report The Pines – 41 N Main St (Route 27), Sherborn, Massachusetts dated April 9, 2021.

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B. Allen & Major Associates, Inc. memorandum to Mr. Richard S. Novak, Chair, Zoning Board of Appeals re Response to Peer Review of Stormwater Management System & Stormwater Report Apple Hill Estates – Hunting Lane, Sherborn, Massachusetts dated April 9, 2021.

C. "The Pines Residences, 41 North Main Street, Sherborn, MA, Grading and Drainage Plan," Sheet C-103, prepared by Allen & Major Associates, Inc. dated October 23, 2020, signed and sealed November 23, 2020, one sheet.

D. "The Pines Residences, 41 North Main Street, Sherborn, MA, Drainage Report," date prepared November 18, 2020, revised April 9, 2021.

E. "Site Development Plans for The Pines Residences, 41 North Main Street, Sherborn, MA, 01770," prepared by Allen & Major Associates, Inc. issued for ZBA Application October 1, 2020, issued for Stormwater Review April 9, 2021 (Survey Sheet dated September 1, 2020), consisting of 13 sheets.

F. "Site Development Plans for Apple Hill Estates, 31 Hunting Lane, Sherborn, MA, 01770," prepared by Allen & Major Associates, Inc. issued for ZBA Application October 1, 2020, Updated ZBA Application March 1, 2021, Updated ZBA Application April 9, 2021 consisting of 13 sheets.

G. "Apple Hill Estates, 31 Hunting Lane, Sherborn, Massachusetts, Drainage Report" prepared by Allen & Major Associates, Inc. date prepared November 18, 2020, revised March 1, 2021, and revised April 9, 2021.

H. PowerPoint presentation "Town of Sherborn Zoning Board of Appeals Water Supply and Wastewater Treatment Presentation Apple Hill Estates and Pine Residences Sherborn " prepared by Onsite Engineering, Inc.

REFERENCE

I. The Stormwater Management Standards (310 CMR 10.05(6)(k))

J. The Water Quality Certification Regulations (314 CMR 9.06(6)(a)).

K. Stormwater Handbook, Massachusetts Department of Environmental Protection. (SWHB).

L. MA MS4 General Permit, United States Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (as modified) signed December 7, 2020, effective January 6, 2021 (MA MS4).

M. Chapter 25 Comprehensive Stormwater Management By-Law, Added 2011, Amended 2019.

N. Stormwater Management Program, Sherborn, Massachusetts, revised November 2020 (SWMP).

O. Rules and Regulations of the Sherborn Planning Board including amendments approved through February 9, 2011 (RRPB).

P. Town of Sherborn, Board of Health Regulations, January 10, 2020 (BHR).

Q. Sherborn Wetlands Administration Bylaw Regulations, revised September 25, 2017 (SWABR).

PART I – THE PINES STORMWATER

THE PINES – STORMWATER COLLECTION SYSTEM

1. Provide full information on the existing drainage structure at SP-1.
   A&M: The existing drainage structure is a 12" RCP drainline under Hunting Lane.
   PSC: Resolved.

2. Show the swale on adjacent property more clearly on the drawings and calculate the open channel flow capacity of the swale vs the peak discharge to the swale.
   A&M: The existing area adjacent to the property line (between subject parcel & railroad) would be more classified as a shallow detention basin verse a swale. This methodology has been incorporated into both the existing and proposed hydraulic calculations.
   PSC: Resolved.

3. Provide downgradient easements to the benefit of the Applicant over the adjacent property at FES1 and FES2 or eliminate the discharge for the 25-year frequency storm event (Town's design storm).
   A&M: Based on MADEP Stormwater Standards, "Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates." Since the project has been designed to reduce the peak rate of discharge at the abutting property, therefore an easement is not warranted.
   PSC: Regardless of whether the peak rate increases, the proposed stormdrain system creates new point sources directing new concentrated flow across the property line impacting the property rights of the downgradient abutter Conrail Corporation.

4. Raise the inverts of Catchbasins 4, 15, and 16 above elevation 171.64.

A&M: Although not required per MADEP requirements, the inverts have been adjusted to the maximum extent practical to an elevation of 171.36. This will still provide proper clearance between the top of the pipe and the rim of the structure.
PSC: Resolved.

5. If practicable, raise the inverts of all catchbasins connected to Infiltration #2 above 172.02.
A&M: Although not required per MADEP requirements, the inverts have been adjusted to the maximum extent practical.
PSC: Resolved.

THE PINES – LOW IMPACT DEVELOPMENT

6. Include a detailed evaluation of Low Impact Development measures considered and specific reasons why they could not be implemented.
A&M: Bioretention areas are considered a form of Low Impact Development (LID) and have been incorporated into the design, in one location adjacent to the existing railroad. Other forms of LID, such as vegetated rooftops or large open constructed wetlands are impractical for a development such as this. Due the architecture of the building, green roofs are not practical and constructed wetlands would utilize valuable real estate which would require additional impacts to the site.
PSC: Resolved.

THE PINES – BMPs

Subsurface Structure

7. Provided a minimum of 4 test pits for Infiltration Structure 1 and a minimum of 6 test pits for Infiltration Structure 2 having a minimum 10 ft. length and in compliance with the requirements of Volume 3 of the Stormwater Handbook that are logged by a Massachusetts Soil Evaluator.
A&M: Per (SWHB V. 2: C. 2: P. 88-89) One soil sample for every 5000 ft. of basin area is recommended and a minimum of three test pits are required for a site. A total of three test pits were performed on site in the area of IS-1, with a minimum of 2 were within the footprint of the infiltration system, the locations of which are shown on the Grading & Drainage Plan. Based on the footprint of the system (6176 sf), the 2 pits within the footprint meet the requirement. As the footprint extends into an area of the existing structure, test pits are impractical at that location. In the area of Infiltration #2, test pits were not conducted as the system will be constructed within the partial limits of an existing structure and in a fill condition, making test pits impractical. As the system will be constructed above the existing

grade, the fill material can be closely monitored and an evaluated for permeability during the construction process. Specific notes regarding the placement of fill under the infiltration system have been added to the plans. Test pit logs are provided in the Appendix of the revised Drainage Report and illustrate that the separation to the estimated seasonal high ground water is achieved.
PSC: The response incorrectly cites the section of the Stormwater Handbook for infiltration basins. Subsurface structures are proposed not infiltration basins. For subsurface structures using chambers or perforated pipes "Take the same number of borings or observation pits as for infiltration trenches" (SWHB V. 2: C. 2: P. 104). Based upon requirements for infiltration trenches, take 4 test pits for Infiltration Structure 1 and a minimum of 6 test pits for Infiltration Structure 2. Taking no test pits at subsurface structure 2 is unacceptable. Placing a system in fill does not alleviate the requirement for test pits. The feasibility of infiltration at this location is solely dependent upon the infiltration rate at the interface between fill and in situ soils. For all test pits as provided and to be provided, show the elevation in feet of ESHGW at each test pit on the Grading and Drainage Plan.

8. Provide monitoring ports for each pipe and specify HS-20 loading.
   A&M: Monitoring ports have been shown to be installed and a detail has been added to the plan.
   PSC: We could not locate the referenced detail.

TSS Removal

TSS removal calculations are provided for the drainlines connected to the subsurface structures. However, TSS removal is not calculated for the off-property swale extending from the proposed shallow infiltration basin to SP-1.

9. Provide a TSS removal spreadsheet for the pavement runoff directed to the reconstructed swale though the curb break northwest of the Common Building to SP-1.
   A&M: The TSS removal spreadsheets for each treatment train have been provided as requested in the revised Drainage Report.
   PSC: Resolved.

THE PINES – PHOSPHOROUS

The Final 2016 Massachusetts Small MS4 General Permit including 2020 Modifications (effective January 6, 2021) sets the baseline phosphorous load for Sherborn at 846 kg./yr. and sets the stormwater percent reduction in phosphorous load as 18%. The reduction is measured relative to

the baseline phosphorous load. The baseline phosphorous load for the site is 1.62 lbs./yr. This must be reduced to 1.33 lbs./yr. Therefore, the Proposed Condition Phosphorous Loading of 6.22 lbs./yr. must be reduced by 4.89 lbs./yr.

10. Reduce the Proposed Condition Phosphorous Loading by 4.89 lbs./yr.
    A&M: The phosphorus loading has been recalculated as requested.
    PSC: Resolved.

THE PINES – WELLHEAD PROTECTION

There is an existing Zone I and Interim Wellhead Protection Area (IWPA) which overlies the south portion of the site. Buildings are not allowed within an IWPA so we anticipate that the Proposed "Common Building" must be relocated outside the Zone 1 (310 CMR 22.21) (1) (b) 5) and (BRP Policy # BRPP-2011-01).

11. Relocate the Proposed Common Building outside the Zone I and modify the site plan to accommodate this change.
    A&M: Although not required as the existing aforementioned Zone 1 is non-compliant because the area around the well is not owned or controlled by the property owner for which it serves and because inappropriate existing land uses currently exist within the Zone 1 area (including buildings at 33 North Main Street, 5 Powderhouse Lane and 31 North Main Street, as well as existing parking, driveways and Powderhouse Lane itself), the Common has been relocated outside of the non-compliant Zone 1 area.
    PSC: Resolved.

12. Eliminate the shallow infiltration basin within the Interim Wellhead Protection Area.
    A&M: The shallow infiltration basin is an existing area which under pre-development conditions received stormwater flows from the existing residence and allowed to infiltration. In the post development scenario, this area will continue to receive only flows from the existing residence and not the new parking area, therefore the basin has been kept in the design.
    PSC: Resolved.

13. Replace the unlined swale with a lined swale or provide a sealed drainline extending to beyond the IWPA.
    A&M: The treatment of the stormwater from this specific area along the project's access drive, including the Common House now incorporates a lined bio-retention filtration area included pre-treatment structures. As this area is currently a combination of pavement, compacted gravel and material stockpiles associated with the adjacent

landscaping business, with no means of stormwater treatment, the proposed system is a vast improvement. The swale now only receives flows from the undeveloped portions of the property.
PSC: Resolved.

14. If the lined swale option is selected, provide test pits to establish the elevation of seasonal high groundwater.
A&M: As the swale is intended for conveyance purposes only, separation requirements are not applicable.
PSC: The lined swale was not provided. A bioretention area is provided which is lined. The limits of the bioretention area are not shown on the plans. Separation to groundwater is not at issue. The concern is that shallow groundwater could create buoyant uplift damaging the lining of the bioretention area. Therefore, a test pit is required.

15. Provide a treatment train for pavement runoff in the swale or swale/pipe system providing TSS removal.
A&M: The TSS removal spreadsheets for each treatment train have been provided as requested in the revised Drainage Report.
PSC: Resolved.

16. Include a "no salt' (sodium chloride) prohibition in the Operation & Maintenance Plan.
A&M: The Operation & Maintenance Plan has been revised to indicate that sodium chloride should not be used, as requested.
PSC: Resolved.

17. Include a restriction limiting fertilizer to slow-release organic fertilizer in the Operation & Maintenance Plan.
A&M: The Operation & Maintenance Plan includes instruction only use slow-release fertilizer.
PSC: Resolved.

18. Include a requirement to develop and implement an Integrated Pest Management Program in the Operation and Maintenance Plan.
A&M: The Operation & Maintenance Plan includes instruction to implement an Integrated Pest Management program.
PSC: Resolved.

The source of water supply for the Proposed Project will be a water system on a separate lot in separate ownership…However, as part of that process, DEP may designate a Zone 1, interim

wellhead protection area or other protection zone at the wellhead and such designated regulatory zones could extend onto this site.

COA: The Board reserves the right to reexamine the design of the stormwater management system should wellhead protection zones be designated by DEP or should other restrictions be placed on the public water supply impacting on-site stormwater management.

A&M: Based on the current proximity of the existing bedrock wells (approximately 500 ft) to be utilized for domestic water for the project as compared to the stormwater systems, it is unlikely that a Zone 1 wellhead protective radius of that size would be possible. Therefore, the aforementioned condition is not relevant.

PSC: No longer applicable. The PowerPoint presentation to the ZBA on "Town of Sherborn Zoning Board of Appeals Water Supply and Wastewater Treatment Presentation Apple Hill Estates and Pine Residences Sherborn " by Onsite Engineering, Inc. provided preliminary delineation of the limits of the Zone I which does not extend onto the site and the interim wellhead protection area (IWPA) which encompasses the entire multifamily development portion of the site.

THE PINES – MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS

Standard 1: No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. There is no new direct discharge to resource areas.

Standard 2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04. As submitted post development peak rates of discharge do not exceed predevelopment peak rates of discharge. However, test pits must be submitted to verify design of the subsurface structure. **As of April 15, additional test pits are required.**

Standard 3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook. As

submitted, the required recharge volume is accommodated. However, test pits must be submitted to verify design of the subsurface structures. **As of April 15, additional test pits are required.**

Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained.
b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

The site generally complies; however, a treatment train must be developed for pavement runoff entering the modified swale (Comment 15). **Resolved.**

Standard 5: Land Use with Higher Potential Pollutant Loads (LUHPPL). The project site is not characterized as a Land Use with Higher Potential Pollutant Loads.

Standard 6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. There is an existing Zone 1 and an Interim Wellhead Protection Area (IWPA) overlying the south portion of the site. Revisions for compliance with requirements for discharge to a critical area are provided (Comments 12 through 18). A future IWPA or other regulatory mechanism may be imposed on this site in conjunction with development of a new public water supply for the project on the lot to the west (Assessor's Map 11, Lot 3B) which may extend onto the Project Site. To address these potential restrictions, a draft Condition of Approval is provided in the "Wellhead Protection" section in "Part I" of this memorandum. **As of April 15, the Onsite Engineering data indicates that the preliminary Zone 1 does not extend onto the site. However, the preliminary IWPA encompasses the entire area proposed for development.**

Standard 7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater

Management Standards and improve existing conditions. The Proposed Project is not a redevelopment project.

Standard 8: A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented. Construction phase sediment and erosion controls are provided, and a construction phase plan is provided in the stormwater report.

Standard 9: A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed. A long-term operation and maintenance plan is in the stormwater report.

Standard 10: All illicit discharges to the stormwater management system are prohibited. Compliance pending – a duly executed copy of the illicit discharge statement signed by the Owner or responsible property manager should be provided prior to construction.

THE PINES – MS4

Stormwater management systems shall be designed to meet an average annual pollutant removal equivalent to 90% of the average annual load of Total Suspended Solids (TSS) related to the total post-construction impervious area on the site (MA MS4 2.3.6). An average annual pollutant removal equivalent to 60% of the average annual load of Total Phosphorus (TP) related to the total postconstruction impervious surface area on the site is required (MA MS4 2.3.6). As-built drawings are required no later than two (2) years after completion of construction projects.

19. Verify 90% TSS removal and 60% TP removal.
    A&M: 90% TSS removal and 60% TP removal have been provided. Calculations for each can be found in the Appendix of the Drainage Report.
    PSC: Resolved.

20. Add the requirement to submit an as-bult plan to the drawings.
    A&M: A note has been added to the Grading & Drainage Plan, as requested.
    PSC: Resolved.

THE PINES – STORMWATER MANAGEMENT PROGRAM

The Stormwater Management Program incorporates as a post-construction ordinance the Rules and Regulations off the Planning Board Part 2.3.6.a.ii, §3.4.2.16 and §4.4 and §12 of the Board of Health

Regulations. The Planning Board Regulations require that all runoff be held on-site unless otherwise approved (RRPB §3.4.2.19).

A&M: Pre vs post reduction achieved, which concludes that the net difference of the runoff is held on-site.

PSC: Peak rate of runoff is limited by on-site controls. The volume of runoff increases and is not held on-site.

Soil percolation and/or permeability tests are required to document the capacity of the soil to accommodate the discharge design (RRPB §3.4.2.19) (Comment 7).

A&M: Published rates used.

PSC: Resolved.

21. Evaluate the option of holding all runoff on-site.

A&M: As exists today, stormwater runoff exits the subject parcel and it is unrealistic to presume that this runoff would be required to held solely within the parcel limits ahead of any development. The intent of RRPB 3.4.2.16 is for the protection of adjacent properties or natural resources. Through the use of currently accepted methods (TR-55 Urban Hydrology for Small Watersheds, developed by the U.S. Department of Commerce, Engineering Division and the HydroCAD 10.00)an estimation of the peak rate of runoff from various rainfall events has been provided for both existing and proposed conditions. Through the implementation of a stormwater management system, the analysis indicates that the proposed site development reduces the rate of runoff during all storm events at the identified points of analysis. In our professional opinion, the spirit and intent of RRPB 3.4.2.16 is met as the difference in runoff (pre vs post) from the site is illustrated to be held on-site.

PSC: Attenuation of peak rates is not functionally equivalent to retention of all runoff. The failure to comply is of concern given the discharge to a catchbasin-to-catchbasin drainage system.

<u>THE PINES – SHERBORN WETLANDS ADMINISTRATION BYLAW REGULATIONS</u>

The Proposed Project is subject to the Sherborn Wetlands Administration Bylaw Regulations as work includes work within the buffer and work within the inner and outer Riparian Zone Resource Area. The Sherborn Wetlands Administration Bylaw Regulations incorporates the Sherborn Stormwater Management Bylaw by reference.

The Regulations incorporate by reference the Sherborn Stormwater Management Bylaw's primary goal of incorporating Limited Impact Development (LID) principles in the project design (Comment 6). Also, the Regulations expand water quality impacts to include chemical and nutrient

contamination. These pollutants also critical with respect to Wellhead Protection and Phosphorous abatement (Comments 10, 16, 17, and 18).

A&M: Although the project was issued a negative Determination of Applicability by the Sherborn Conservation Commission on 9-20-2018, the above mentioned requirements have been met with the current stormwater management system.
PSC: Resolved.

THE PINES – STORMWATER MANAGEMENT BYLAW REGULATIONS

The Stormwater Management Bylaw Regulations apply as disturbance exceeds 40,000 sq.-ft. The Regulations require compliance with the stormwater management standards. Neither the rate or volume of stormwater runoff leaving the site shall increase nor shall nor shall runoff be discharged to any adjoining properties, public ways, or any wetland resource areas, unless otherwise permitted based on improvement over existing conditions (Comment 21). Runoff volumes discharged off-site increase and runoff is discharged to adjacent property without benefit of an easement (Comment 3). The Regulations require application of fertilizers and pesticides sparingly and encourage use of slow release nitrogen and low phosphorus fertilizers (Comments 16, 17, and 18).

A&M: The project reduces the rate of runoff for all design storm events, for all Study Points, which is an improvement over existing conditions. As mentioned above, the Operation & Maintenance Plan includes limitations on fertilizers and pesticides.
PSC: Runoff volumes discharged off-site increase and runoff is discharged to adjacent property without benefit of an easement. the Operation & Maintenance Plan includes limitations on fertilizers and pesticides.

PART II – APPLE HILL STORMWATER

APPLE HILL – STORMWATER COLLECTION SYSTEM

22. Analyze and map the municipal stormdrain system in Hunting Lane and determine if it is a catchbasin-to-catchbasin system.
A&M: The municipal storm drain system in Hunting Lane is catch basin-to-catch basin and is shown on the site plans.
PSC: The municipal drain system in Hunting Lane is a catchbasin-to-catchbasin system which inherently contributes to water pollution.

23. If the municipal stormdrain system in Hunting Lane is a catchbasin-to-catchbasin system, revise the design of the on-site stormwater management system to eliminate or severely restrict any additional discharge.

A&M: As mentioned above, the municipal storm drain system in Hunting Lane is catch basin-to-catch basin. As is acknowledged in the letter provided by PSC, the Project drainage system has been designed such that additional discharge is already restricted, since peak discharges are slightly reduced for each of the design storm events. In order to alleviate concerns of re-suspending material within the sump of the connected catch basin, we are proposing to install a new drain manhole, upstream of said catch basin. By doing this, in combination with reducing peak flow rates for each design storm event, we believe that any concern of re-suspending materials within the catch basins can be eliminated.

PSC: Adding a drain manhole at the point of connection will lessen churning the sump at the point of connection. However, as soon as flow reaches the next downgradient catchbasin churning of the sump and dissipation of contaminants will occur. The catchbasin-to-catchbasin system downgradient of the point of connection should be upgraded with a catchbasin-to-manhole system.

24. Determine the use to capacity ratio based on total system flow in the municipal drain system at the point of connection and limit the site discharge to the available capacity based on the hydrograph for the municipal system.

    A&M: As mentioned above, the project reduces the peak rate of runoff for each design storm event. For the 25-year event, which is the typical storm event used for sizing pipes, the Project reduces the peak flow rate directed to the connection point by over 26%. We are not aware of any existing problems with the municipal drainage system and therefore see no reason to reduce the flow rates any further.

    PSC: While peak rate attenuation is provided from on-site, this is achieved by detaining stormwater runoff and therefore delaying the time of peak flow. As the municipal system is likely to have a longer time of concentration, delaying the peak flow from the site is likely to decrease the offset between the time of peak flow of the on-site and off-site hydrographs and thus increase the peak rate of the combined off-site and on-site hydrographs within the municipal system. The use to capacity ratio in the Hunting Lane drain system must be determined as a prerequisite to an informed decision as to whether a direct connection can be allowed.

25. Relocate the discharge from DB2 to another location on-site that will not direct runoff towards the 400 ft. radius for a water supply well and away from the top of slope to minimize erosion.

    A&M: The reference to a 400 foot radius is incorrect. Given the amount of water proposed to be withdrawn from the well, the protective radius will be a maximum of 250 feet. With regards to erosion, the purpose of the gabion is to provide a level spreader where a slope exists. The discharge is spread over 30 linear feet and the energy is dissipated by

releasing the flow inside of a stone filled baskets. A level gabion mattress downstream will further dissipates the energy. Furthermore, the entire slope on the east side of the site will be stabilized with erosion control fabric.
PSC: Resolved.

APPLE HILL – LOW IMPACT DEVELOPMENT

26. Include a detailed evaluation of Low Impact Development measures considered and specific reasons why they could not be implemented.
A&M: Bioretention areas are considered a form of Low Impact Development (LID) and have been incorporated into the design, in two locations. Other forms of LID, such as vegetated rooftops and permeable pavement are considered impractical. Vegetated rooftops are not suited for a residential development and permeable pavement is not well suited to sites with shallow groundwater and steep slopes.
PSC: Incorporating bioretention addresses incorporating LID measures. The discussion of green roofs is not germane.

APPLE HILL – HYDROLOGY

27. Revise the HydroCAD calculations categorizing the roof areas as impervious.
A&M: The HydroCAD calculations have been revised as requested.
PSC: Resolved.

APPLE HILL – BMPs

Partial Exfiltration Basin

28. Provide the logs of all 4 test pits taken to date. Ensure that a minimum of three test pits are located within the footprint of Basin DB2, are logged by a Massachusetts soil evaluator, and are witnessed by the Town.
A&M: Test pits were performed in the locations of DB-1 and DB-2, the locations of which are shown on the Grading & Drainage Plan. Test pit logs are provided in the Appendix of the revised Drainage Report. The estimated seasonal high ground water within the test pits was found to be too shallow to provide the separation necessary to allow for infiltration. Therefore both DB-1 and DB-2 will be lined and infiltration has been provided elsewhere onsite. The two basins have been revised to include a bioretention/filtration layer and underdrains. This provides additional storage and treatment for TSS and phosphorus.
PSC: The elevation of estimated seasonal high groundwater is given in the test pits in inches referenced to the top of the test pit but is not shown in terms of an elevation

referenced to the datum. By scale, ESHGW is actually 3± feet above the bottom of DB-1 and DB-2 causing buoyancy and likely damage to the liners. Please label the elevation of ESHGW at each basin and address buoyancy as required. Further, basin DB2 is labeled "retention basin" which should be corrected to avoid confusion.

29. The design infiltration rate must be the slowest of the infiltration rates based on Rawls.
    A&M: The test pits indicated that shallow soils onsite are predominantly loamy sand with sandy loam at deeper depths. A design infiltration rate of 1.02 inches per hour was used, which is the Rawls infiltration rate for sandy loam, the lower of the two soils found.
    PSC: Resolved.

30. Verify that a minimum of 2 feet of separation is provided to seasonal high groundwater.
    A&M: Since the basis related to this comment has been converted to a lined system, this comment is no longer relevant. Furthermore, the now re-located infiltration system will be constructed above existing ground, therefore the required separation to seasonal high groundwater is provided. As the system will be constructed above the existing grade, the fill material can be closely monitored and an evaluated for permeability during the construction process. Specific notes regarding the placement of fill under the infiltration system have been added to the plans.
    PSC: No longer applicable.

31. Provide a mounding analysis if the separation provided to seasonal high groundwater is less than 4 feet.
    A&M: As mentioned above, the infiltration system provided is located above existing ground, therefore the required separation to seasonal high groundwater is provided. A mounding analysis is not necessary.
    PSC: No longer applicable.

32. Provide a sediment forebay.
    A&M: A sediment forebay is not necessary as pretreatment is provided by the hydrodynamic separator style water quality devices.
    PSC: The hydrodynamic separator is not shown.

33. The "time to drain" calculations are not consistent with the volumes and wetted areas shown in the HydroCAD calculations.
    A&M: The "time to drain" calculations have been updated to reflect the design changes.
    PSC: Resolved.

34. Relocate the residential buildings or the basin as required to provide the required 100 ft. downgradient setback.

A&M: The infiltration system has been relocated and there are no longer any buildings within 100 ft. downgradient of the system.
PSC: Resolved.

35. Provide a fence around the basin.
A&M: Fences are not required and can impede wildlife movement, therefore not proposed.
PSC: Resolved.

36. Provide a 15 ft. wide vehicular access way around the basin.
A&M: The above comment is in reference to the previously proposed infiltration basin, which has been converted to a bioretention area. The Stormwater Manual does not have the same requirement for bioretention areas. The design incorporates an 8' wide access around the bioretention areas which is adequate for machinery to access and perform maintenance.
PSC: Resolved.

37. Regrade downgradient of the basin spillway to ensure that the discharge does not impact residences.
A&M: The area downgradient of the basin spillway has been regraded as requested.
PSC: Resolved.

<u>Infiltration Trench IS-1</u>

An infiltration trench and house drywells have replaced the infiltration function of the Partial Exfiltration Basin and serve to accommodate the required recharge volume.

37A. Provide 3 test pits establishing soil texture at the interface between the fill and the in-situ soils. Although the bottom of trench is 2± ft. above existing grade, establish ESHGW (SWHB V. 2: C. 2: P. 97).

37B. Remove A and B horizon soils beneath and extending at 1/1 from the outside edge of the trench outward.

37C. The setback between the residential buildings and the trench is 10± ft. The required setback is 20 ft (SWHB V. 2: C. 2: P. 97).

37D. The setback between the slope of greater than 20% is 0 to 10 ft. the required setback is 100 ft (SWHB V. 2: C. 2: P. 97).

37E. The setback between the Zone 1 and the trench is 140± ft. The required setback is 150 ft (SWHB V. 2: C. 2: P. 97).

37F. Modify the IS-1 detail to show the inverts and outlet controls for runoff to enter the infiltration trench (SWHB V. 2: C. 2: P. 97).

37G. Prevent runoff from entering the trench until the site if fully stabilized (SWHB V. 2: C. 2: P. 98).

Dry Detention Basin

38. Provide at least one test pit to determine soils, depth to bedrock, and depth to water table.
A&M: Test pits have been performed. Locations are depicted on the Grading & Drainage Plan and test pit logs are included in the Appendix of the revised Drainage Report.
PSC: The elevation of estimated seasonal high groundwater (ESHGW) is shown in the test pit logs in inches referenced to the top of the test pit but is not shown in terms of an elevation referenced to the datum. By scale, ESHGW is actually 3± feet above the bottom of DB-1 causing buoyancy and likely damage to the liner. Please label the elevation of ESHGW at the basin and address buoyancy as required.

39. Slope the bottom of the basin at 2%.
A&M: The basins have been modified and now include a perforated underdrain as well as a filter media layer. Sloping the bottom of the basin is no longer necessary.
PSC: Resolved.

40. Relocate the spillway to existing ground, not in the embankment.
A&M: The spillway has been relocated as requested.
PSC: Resolved.

41. Provide low flow underdrains.
A&M: Underdrains are provided beneath each of the basins, as requested.
PSC: Resolved.

42. Provide a fence around the basin.
A&M: Fences are not required and can impede wildlife movement. A fence is not proposed.
PSC: Resolved.

43. Provide a 15 ft. wide access way is required connecting the roadway to the outlet control structure.
A&M: The above comment is in reference to the previously proposed dry detention basin, which has been converted to a bioretention area. The Stormwater Manual does not have the same requirement for bioretention areas. The design incorporates an 8' wide

access around the bioretention areas which is adequate for machinery to access and perform maintenance.
PSC: Resolved.

Proprietary Interceptors

44. Provide TSS removal spreadsheets for each compete treatment train.
A&M: The TSS removal spreadsheets for each treatment train have been provided as requested in the revised Drainage Report.
PSC: The treatment trains for DB2 to IS-1 and DB1 to Jellyfish include TSS removal for a hydrodynamic separator but the hydrodynamic separator is not shown on the plans.

Roofwater Infiltration

45. Provide a prototype roofwater infiltration system for a singlefamily residence.
A&M: A drywell detail is provided, see Detail 5 on sheet C-504. The roof area is modeled as impervious and the drywells have been added to the HydroCAD model.
PSC: Resolved.

APPLE HILL – PHOSPHOROUS

The Final 2016 Massachusetts Small MS4 General Permit including 2020 Modifications (effective January 6, 2021) sets the baseline phosphorous load for Sherborn at 846 kg./yr. and set the stormwater percent reduction in phosphorous load as 18%. The reduction is measured relative to the baseline phosphorous load. The baseline phosphorous load for the site is 2.72 lbs./yr. This must be reduced to 2.23 lbs./yr. Therefore, the Proposed Condition Phosphorous Loading must be reduced to 2.23 lbs./yr.

The "Proposed Condition Phosphorous Loading" is calculated for "Low Density Residential" for a phosphorous load by land use of 1.52 lbs./ac./yr. Land use categories are as defined by MassGIS, which defines High Density Residential for lots of less than ¼ acre. For the 4.57 acres in residential use, there are 28 residences or an average "parcel" size of 0.16 ac./dwelling which is less than 0.25 acres per dwelling. Accordingly, the phosphorous loading should be recomputed for high density residential.

46. Reduce the Proposed Condition Phosphorous Loading to 2.23 lbs./yr. after revising the Proposed Condition phosphorous Loading per Comment 47.
A&M: The phosphorus loading has been recalculated as requested. The target phosphorus load is now calculated as 2.03 lbs./yr. This is because the total site area has been revised to

only include the property area. Areas previously were taken from the HydroCAD model and included offsite areas.
PSC: Resolved.

47. Recalculate Proposed Condition Phosphorous Loading using "High Density Residential" having a phosphorous load by land use of 2.32 lbs./ac./yr.
A&M: The phosphorus loading has been recalculated as requested.
PSC: Resolved.

APPLE HILL – GEOHYDRO MODEL

COA: DB2 is to be included in the submitted GeoHydro model. The Board shall be copied on all written or electronic communication with DEP and shall be invited to all in person or virtual meetings with DEP regarding the GeoHydro model. The Board reserves the right to require modification of DB2 or other component in order to maintain a minimum separation to mounded groundwater.

A&M: The stormwater design has been revised such that DB2 is no longer an infiltration system. It will be a lined bioretention area with an underdrain. This comment is no longer applicable.
PSC: Resolved.

APPLE HILL – WELLHEAD PROTECTION

The site and in particular the developed portion of the site is in close proximity to the proposed wellhead serving as the project's source of water supply. The site is sensitive in terms of water pollution including non-point source pollutants. The water resource sensitivity of the site should be addressed by modifying the Operation and Maintenance Plan.

48. Include a "no salt' (sodium chloride) prohibition in the Operation & Maintenance Plan.
A&M: The Operation & Maintenance Plan has been revised to indicate that sodium chloride should not be used, as requested.
PSC: Resolved.

49. Include a restriction limiting fertilizer to slow-release organic fertilizer in the Operation & Maintenance Plan.
A&M: The Operation & Maintenance Plan includes instruction only use slow-release fertilizer.
PSC: Resolved.

50. Include a requirement to develop and implement an Integrated Pest Management Program in the Operation and Maintenance Plan.
A&M: The Operation & Maintenance Plan includes instruction to implement an Integrated Pest Management program.
PSC: Resolved.

COA: The Board reserves the right to reexamine the design of the stormwater management system should wellhead protection zones be designated by DEP or should other restrictions be placed on the public water supply impacting on-site stormwater management.

A&M: The development of Apple Hill Estates is required to be outside of the Zone 1 wellhead protection area and has therefore been designed as such.
PSC: Resolved.

APPLE HILL – MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS

Standard 1: No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. The Proposed Project complies – there is no new direct discharge to resource areas.

Standard 2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04. As submitted post development peak rates of discharge do not exceed predevelopment peak rates of discharge. However, capacity and water quality impacts caused by the connection to the public drainage system in Hunting Lane may require redesign revising peak discharge rates.

Standard 3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook. The required recharge volume must be recomputed including building roof areas (Comment 27). Infiltration of the required recharge volume must be recomputed based upon submission of test pits and related infiltration rates end the elevation of seasonal high groundwater (Comments 28 through 31). Provide a time to drain calculation per Comment 33.

51. Recompute the required recharge volume including building roof areas per Comment 27.
A&M:
PSC: No response provided. However, required recharge volume calculations are provided.

52. Recompute infiltration of the required recharge volume per Comments 28 through 31.
A&M:
PSC: No response provided. However, infiltration calculations are provided. Test pits are required to substantiate the infiltration calculations for IS-1. See comments 37A through 37G.

Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained.
b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

TSS Removal spreadsheets must be provided for each complete treatment train (Comment 44). **Resolved as of April 15.**

Standard 5: Land Use with Higher Potential Pollutant Loads (LUHPPL). The project site is not characterized as a Land Use with Higher Potential Pollutant Loads.

Standard 6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. The site discharges to a future source of water supply. In order to address the potential that in Interim Wellhead Protection Area or other regulatory mechanism may extend onto the Project Site, a draff Condition of Approval is provided in the "Wellhead Protection" section of "Part II" of this memorandum. **As of April 15, the Onsite Engineering data indicates that the preliminary IWPA encompasses the area proposed for development.**

Standard 7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment

and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions. The Proposed Project is not a redevelopment project.

Standard 8: A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented. Construction phase sediment and erosion controls are provided, and a construction phase plan is provided in the stormwater report.

Standard 9: A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed. A long-term operation and maintenance plan is in the stormwater report.

Standard 10: All illicit discharges to the stormwater management system are prohibited. Compliance pending – a duly executed copy of the illicit discharge statement signed by the Owner or responsible property manager should be provided prior to construction.

APPLE HILL – MS4

53. Verify 90% TSS removal and 60% TP removal.
    A&M: 90% TSS removal and 60% TP removal have been provided. Calculations for each can be found in the Appendix of the Drainage Report.
    PSC: Resolved.

54. Add the requirement to submit an as-bult plan to the drawings.
    A&M: A note has been added to the Grading & Drainage Plan, as requested.
    PSC: Resolved.

APPLE HILL – STORMWATER MANAGEMENT PROGRAM

The Stormwater Management Program incorporates as a post-construction ordinance the Rules and Regulations off the Planning Board Part 2.3.6.a.ii, §3.4.2.16 and §4.4 and §12 of the Board of Health Regulations.

The Planning Board Regulations require that all runoff be held on-site unless otherwise approved (RRPB §3.4.2.19) (Comments 22 to 25).

A&M: .Pre vs post reduction achieved, which concludes that the net difference of the runoff is held on site

PSC: Attenuation of peak rates is not functionally equivalent to retention of all runoff.

Soil percolation and/or permeability tests are required to document the capacity of the soil to accommodate the discharge design (RRPB §3.4.2.19) (Comments 28 and 38).

A&M: .The test pits indicated that shallow soils on site are predominantly loamy sand with sandy loam at deeper depths. A design infiltration rate of 1.02 inches per hour was used, which is the Rawls infiltration rate for Sandy loam the lower of the two soils found.

PSC: Test pits are required for IS-1. See Comment 37A.

Impacts to adjacent properties caused by discharge of runoff must be authorized by ownership, i.e., drainage easements (RRPB §4.4.3.b.3) (Comment 3).

A&M: .Adjacent property owner is also the applicant who is satisfied with the anticipated discharges.

PSC: The Applicant's team states that the well site is in separate ownership. The owner should provide easements to address future changes in ownership. It is anticipated that ownership will change with the well site transferred to a corporation or comparable legal entity who will license and operate the public water company serving The Pines Residences and Apple Hill Estates.

55. Evaluate the option of holding all runoff on-site.

A&M: As exists today, stormwater runoff exits the subject parcel and it is unrealistic to presume that this runoff would be required to held solely within the parcel limits ahead of any development. The intent of RRPB 3.4.2.16 is for the protection of adjacent properties or natural resources. Through the use of currently accepted methods (TR-55 Urban Hydrology for Small Watersheds, developed by the U.S. Department of Commerce, Engineering Division and the HydroCAD 10.00)an estimation of the peak rate of runoff from various rainfall events has been provided for both existing and proposed conditions. Through the implementation of a stormwater management system, the analysis indicates that the proposed site development reduces the rate of runoff during all storm events at the identified points of analysis. In our professional opinion, the spirit and intent of RRPB 3.4.2.16 is met as the difference in runoff (pre vs post) from the site is illustrated to be held on-site.

PSC: While peak rate attenuation is provided from on-site, this is achieved by detaining stormwater runoff and therefore delaying the time of peak flow. As the municipal system is likely to have a longer time of concentration, delaying the peak flow from the site is likely to make the time of peak flow of the on-site and off-site hydrographs more

coincident and thus increase the peak rate of the combined off-site and on-site hydrographs within the municipal system. The use to capacity ratio in the Hunting Lane drain system must be determined in order to identify the potential impacts of allowing connection of the on-site system to the Hunting Lane system.

Apple Hill – STORMWATER MANAGEMENT BYLAW REGULATIONS

The Stormwater Management Bylaw Regulations apply as disturbance exceeds 40,000 sq.-ft. The Regulations require compliance with the stormwater management standards. Neither the rate or volume of stormwater runoff leaving the site shall increase nor shall nor shall runoff be discharged to any adjoining properties, public ways, or any wetland resource areas, unless otherwise permitted based on improvement over existing conditions. The Regulations require application of fertilizers and pesticides sparingly and encourage use of slow-release nitrogen and low phosphorus fertilizers (Comments 48, 49, and 50).

A&M: The project reduces the rate of runoff for all design storm events, for all Study Points, which is an improvement over existing conditions. As mentioned above, the Operation & Maintenance Plan includes limitations on fertilizers and pesticides.

PSC: The volume of runoff leaving the site increases violating the Stormwater Management Bylaw Regulations.