

Date March 20, 2021
Revised March 22, 2021
To Sherborn Zoning Board of Appeals
From Thomas C. Houston, PE
Project The Pines Residences and Apple Hill Estates Comprehensive Permit Projects
Subject Stormwater Peer Review

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.

The Pines Residences is a 60-unit multifamily project with 30 dwelling units in each of two buildings and a “Common Building.” The existing site contains an existing residence which is to be preserved and several other buildings which are to be demolished. The stormwater management system provides a closed drainage system with collection, treatment, and detention facilities in systems located beneath parking areas on three sides of the two primary buildings. The Proposed Project will alter on-site stormwater flows by creating 2.5 acres of impervious surfaces, an increase of 1.7 acres (200%) over existing conditions. Predevelopment runoff is conveyed to two design points and post development runoff is conveyed to the same two design points: a culvert on Hunting Lane and North Main Street.

Apple Hill Estates is a singlefamily project with 27 new singlefamily dwellings and an existing singlefamily dwelling which is to remain. The existing site contains one residence, but otherwise is wooded and undeveloped. The stormwater management system provides a closed drainage system conveying runoff to two connected open stormwater basins. The Proposed Project will alter on-site stormwater flows by creating 1.8 acres of impervious surfaces, an increase of 0.9 acres (105%) over existing conditions. Predevelopment runoff is conveyed to four design points and post



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development runoff is conveyed to the same four design points: the residence at 39 Hunting Lane, the residence at 41 Hunting Lane, a catchbasin on Hunting Lane, and the well development lot to the east (Assessor's Map 11, Lot 3B).

The Drainage Reports (References B and E) both state that "...the project meets the MassDEP and the Town of Sherborn's Stormwater Management Regulations" rendering waiver of local bylaws and regulations unnecessary. Nonetheless, the Applicant has requested waiver of certain local bylaws and regulations. However, the Zoning Board of Appeals has not reached a Decision whether the requested waivers can be granted. Therefore, we have evaluated the stormwater management system for compliance with local standards. Identifying the extent of noncompliance and the impacts caused by noncompliance will assist the Zoning Board of Appeals in reaching its Decision on waiver of strict compliance.

Further, we note that the Stormwater Management Bylaw (Reference J) and the Stormwater Management Program (Reference K) are authorized by Federal Law, specifically the Clean Water Act, and as such are not eligible for waiver as part of the Comprehensive Permit Process.

Overall, we find that the stormwater management systems for The Pines Residences and Apple Hill Estates are properly designed and generally comply with standard engineering practice. We offer the comments that follow for consideration.

BASIS

- A. "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.
- B. "The Pines Residences, 41 North Main Street, Sherborn, MA, Drainage Report," date prepared November 23, 2020, signed and sealed November 23, 2020.
- C. "Site Development Plans for The Pines Residences, 41 North Main Street, Sherborn, MA, 01770," prepared by Allen & Major Associates, Inc. dated October 1, 2020, signed and sealed October 1, 2020 (Survey Sheet dated September 1, 2020), consisting of 11 sheets.
- D. "Site Development Plans for Apple Hill Estates, 31 Hunting Lane, Sherborn, MA, 01770," prepared by Allen & Major Associates, Inc. dated November 18, 2020, last revised March 1, 2021, signed and sealed March 1, 2021 (Survey Sheet dated September 1, 2020), consisting of 13 sheets.



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- E. "Apple Hill Estates, 31 Hunting Lane, Sherborn, Massachusetts, Drainage Report" prepared by Allen & Major Associates, Inc. dated October 1, 2020, last revised March 1, 2021, signed and sealed March 2, 2021.

REFERENCE

- F. The Stormwater Management Standards (310 CMR 10.05(6)(k))
- G. The Water Quality Certification Regulations (314 CMR 9.06(6)(a)).
- H. Stormwater Handbook, Massachusetts Department of Environmental Protection. (SWHB).
- I. 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).
- J. Chapter 25 Comprehensive Stormwater Management By-Law, Added 2011, Amended 2019.
- K. Stormwater Management Program, Sherborn, Massachusetts, revised November 2020 (SWMP).
- L. Rules and Regulations of the Sherborn Planning Board including amendments approved through February 9, 2011 (RRPB).
- M. Town of Sherborn, Board of Health Regulations, January 10, 2020 (BHR).
- N. Sherborn Wetlands Administration Bylaw Regulations, revised September 25, 2017 (SWABR).

PART I – THE PINES STORMWATER

THE PINES – STORMWATER COLLECTION SYSTEM

Most runoff from the portion of the site proposed to be developed flows to an existing drainage structure near Hunting Lane (SP-1) with an invert of 167.19. Complete information on the type of structure and its capacity should be described.

A swale to the west of the site boundary is used to convey flow to SP-1 but is not legible in plan view due to screening of existing conditions. The capacity of this swale should be documented.



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The primary outflow from Infiltration System 2 discharges at FES 1 approximately 10 ft. from the westerly property line. An easement to the benefit of the Applicant to discharge across the adjacent property is required. The outflow from AD1 (area drain 1) discharges at FES 2 approximately 10 ft. from the westerly property line. An easement to the benefit of the Applicant to discharge across the adjacent property is required.

Inverts of catchbasins should be set above the peak elevation of downgradient subsurface structures in order to minimize backflow and resuspension of contaminants in catchbasin sumps. All catchbasins for Infiltration System 1 are set above the peak elevation 178.67 for the 2-year frequency storm event. Most catchbasins for Infiltration System 2 are set above the peak elevation of 171.64 for the 2-year frequency storm event; however, the inverts of Catchbasins 4, 15, and 16 are set just below the peak elevation and should be raised above elevation 171.64. Ideally all catchbasins connected to Infiltration #2 should be raised with invert elevations above the peak elevation of the 10-year frequency storm event storm of 172.02.

1. Provide full information on the existing drainage structure at SP-1.
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.
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).
4. Raise the inverts of Catchbasins 4, 15, and 16 above elevation 171.64.
5. If practicable, raise the inverts of all catchbasins connected to Infiltration #2 above 172.02.

THE PINES – LOW IMPACT DEVELOPMENT

The Stormwater Handbook (SWHB) requires a detailed evaluation of Low Impact Development (LID) including a rational why LID measures were not selected for implementation. Similarly, the MA MS4 General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (MA MS4) must be implemented unless infeasible. The Sherborn Wetlands Administration Bylaw Regulations which incorporate the Sherborn Stormwater Management Bylaw by reference set a primary goal of incorporating Limited Impact Development (LID) principles in the project design.

6. Include a detailed evaluation of Low Impact Development measures considered and specific reasons why they could not be implemented.



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THE PINES – BMPs

Subsurface Structure

Test pits for subsurface structure design are required to be the same as for infiltration structures. If each pipe in the subsurface structures is considered as a trench, the number of test pits required for the subsurface structures would be large. Provided that soils are consistent, a minimum of 3 test pits should be provided for Infiltration Structure 1 and 5 test pits for Infiltration Structure 2. Test pit procedures should follow the requirements of Volume 3 of the Stormwater Handbook (SWHB V. 2: C. 2: P. 105-106). Test pits should identify soil texture and seasonal high groundwater and should be logged by a Massachusetts soil evaluator and witnessed by the Town.

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.
8. Provide monitoring ports for each pipe and specify HS-20 loading.

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.

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.



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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).

The IWPA is considered a “critical area” and Infiltration System 2 discharges to this “critical area.” However, the water quality units that treat runoff discharged to Infiltration System 2 all provide in excess of 80% TSS removal. There is a proposed curb opening and a shallow infiltration basin connecting to an unlined swale within the IWPA that will allow untreated stormwater to reach groundwater. A segment of the swale is existing, and the existing swale is being reconstructed and extended. The shallow infiltration basin should be eliminated, and the swale should either be modified to include an impervious liner or replaced with a catchbasin and pipe extending beyond the IWPA. If the option of modifying the swale to provide an impervious liner is elected, test pits should be conducted to establish seasonal high groundwater. In any instance, pavement runoff must be treated for TSS removal.

Discharges to a critical area require source controls to minimize or eliminate runoff. Applicable source controls include elimination of road salt, limiting fertilizer to slow-release organic fertilizer, and controlling the application of landscape chemicals thought development and implementation of an Integrated Pest Management Program.

11. Relocate the Proposed Common Building outside the Zone I and modify the site plan to accommodate this change.
12. Eliminate the shallow infiltration basin within the Interim Wellhead Protection Area.
13. Replace the unlined swale with a lined swale or provide a sealed drainline extending to beyond the IWPA.
14. If the lined swale option is selected, provide test pits to establish the elevation of seasonal high groundwater.
15. Provide a treatment train for pavement runoff in the swale or swale/pipe system providing TSS removal.
16. Include a “no salt” (sodium chloride) prohibition in the Operation & Maintenance Plan.



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17. Include a restriction limiting fertilizer to slow-release organic fertilizer in the Operation & Maintenance Plan.
18. Include a requirement to develop and implement an Integrated Pest Management Program in the Operation and Maintenance Plan.

The source of water supply for the Proposed Project will be a water system on a separate lot in separate ownership. The well will serve over 200 persons daily for 365 days per year. DEP categorizes a water system serving over 25 persons daily for at least 60 days per year as a "Public Water System." The applicant has not provided information on the status of DEP permitting for the public water supply. 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. The nature and extent of regulatory protection zones will impact the design of the stormwater management system. We recommend that the Board reserve the right to reexamine the design of the stormwater management system following conclusion of the water supply permit process. Should a Comprehensive Permit issue, a recommended draft Condition of Approval is as follows:

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.

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.

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



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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.

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).

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.

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



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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.
20. Add the requirement to submit an as-built plan to the drawings.

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). 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).



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

THE PINES – SHERBORN WETLANDS ADMINISTRATION BYLAW REGULATIONS

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).

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 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).

PART II – THE APPLE HILL STORMWATER

APPLE HILL – STORMWATER COLLECTION SYSTEM

Most of the runoff from the site is discharged by a direct connection to a municipal catchbasin in Hunting Lane. It is unlikely that the municipal system has sufficient capacity at the point of discharge. No information is provided for the municipal system forcing us to evaluate the impacts of the proposed connection generically. However, older municipal systems are commonly designed for smaller flows than used in current practice. The proposed connection is a 15-inch diameter pipe with additional flow contributed by an overflow spillway. The proposed point of connection is in the lower reaches of the off-site watershed and the time of peak flow is likely later than the unattenuated peak flow from the site. The peak discharges from the site are virtually unchanged (de



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minimis decreases) for all storm events. On-site detention delays the time of peak flow from on-site. It is likely that the delayed on-site peak flow is discharged nearer to the time of the peak off site flows thus increasing total flow in the municipal system. Additionally, a direct connection to a catchbasin, particularly a high-volume connection, will contaminate runoff by churning and resuspending contaminants in the existing catchbasin sump and carrying them down stream. The submitted plans do not provide a plan of the existing Hunting Lane stormdrain system. However, only catchbasins are shown. It is likely that this is a "catchbasin to catchbasin" system. Any new connection that adds substantial flow to such a system will contribute to water pollution because the substantial flow will churn and resuspend contaminants in each downgradient catchbasin sump and carry the resuspended contaminants downstream.

Additionally, Gabion-1, which is the discharge from DB2 should be relocated. It directs runoff including runoff from pavement toward the 400 ft. radius surrounding a proposed water supply. Although not formally designated this is comparable to a Zone I. It should also be relocated away from the top of a high 3.5:1 slope area due to erosion potential.

22. Analyze and map the municipal stormdrain system in Hunting Lane and determine if it is a catchbasin-to-catchbasin system.
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.
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.
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.

APPLE HILL – LOW IMPACT DEVELOPMENT

The Stormwater Handbook (SWHB) requires a detailed evaluation of Low Impact Development (LID) including a rationale why LID measures were not selected for implementation. Similarly, the MA MS4 General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (MA MS4) must be implemented unless infeasible. The Sherborn Wetlands Administration Bylaw Regulations which incorporate the Sherborn Stormwater Management Bylaw



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by reference set a primary goal of incorporating Limited Impact Development (LID) principles in the project design.

26. Include a detailed evaluation of Low Impact Development measures considered and specific reasons why they could not be implemented.

APPLE HILL – HYDROLOGY

The HydroCAD calculations model the roof area which totals 47,200 sq.-ft. as pervious (grass). This is inaccurate because roofwater systems typically contain only the first flush of runoff. Modeling roof area as grass minimizes flow for all storms including the 10 and 100-year frequency storm events. While roofwater recharge should always be provided so that recharge is over a larger area replicating predeveloped conditions. However, roof water should be calculated as flowing to the primary collections system due to the inability to ensure continued functioning of the roofwater systems. Homeowners can intentionally or inadvertently disable or impact the drywell systems and roof areas should be calculated as contributing runoff to the primary collection and treatment systems.

27. Revise the HydroCAD calculations categorizing the roof areas as impervious.

APPLE HILL – BMPs

Partial Exfiltration Basin

Vegetated Above Ground Stormwater Basin DB2 is a “partial exfiltration basin system” (SWHB V. 2: C. 2: P. 88). No test pits are provided to determine the allowable infiltration rate or to establish the elevation of seasonal high groundwater. A minimum of three test pits are required (SWHB V. 2: C. 2: P. 88-89). The test of the drainage report states that test pits were obtained but the logs of the test pits have not been provided.



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In order to receive credit for TSS removal, the basin must have a sediment forebay complying with the Stormwater Handbook (SWHB V. 2: C. 2: P. 13).

No separate TSS removal credit is given for the sediment forebay but the forebay must be a component of the basin to receive any TSS removal credit.

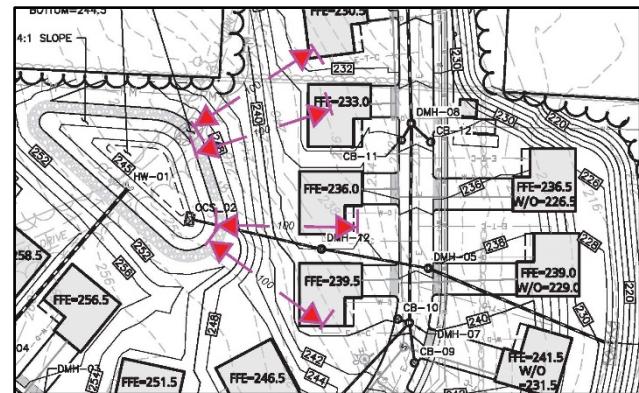
Further the minimum permitted separation between the basin and downgradient structures is 100 feet (SWHB V. 2: C. 2: P. 88). Four proposed residences are within this prohibited distance and either the basin or the residences must be relocated.

Unimpeded access around the basin with a minimum width of 15 feet is required (SWHB V. 2: C. 2: P. 91).

The spillway as designed shuts runoff toward the residences (SWHB V. 2: C. 2: P. 91).

Calculations are provided for infiltration BMPs draining within 72 hours; however, calculation input is not consistent.

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.
29. The design infiltration rate must be the slowest of the infiltration rates based on Rawls.
30. Verify that a minimum of 2 feet of separation is provided to seasonal high groundwater.
31. Provide a mounding analysis if the separation provided to seasonal high groundwater is less than 4 feet.
32. Provide a sediment forebay.
33. The “time to drain” calculations are not consistent with the volumes and wetted areas shown in the HydroCAD calculations.
34. Relocate the residential buildings or the basin as required to provide the required 100 ft. downgradient setback.
35. Provide a fence around the basin.





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36. Provide a 15 ft. wide vehicular access way around the basin.
37. Rergrade downgradient of the basin spillway to ensure that the discharge does not impact residences.

Dry Detention Basin

Soils, depth to bedrock, and depth to water table should be evaluated as part of the design of a dry detention basin (SWHB V. 2: C. 2: P. 110). The bottom slope should be 2% (SWHB V. 2: C. 2: P. 110). The spillway must be located in existing ground, not in the embankment (SWHB V. 2: C. 2: P. 110). Low flow underdrains should be provided to ensure complete draining. A 15 ft. wide access way is required connecting the roadway to the outlet control structure (SWHB V. 2: C. 2: P. 111).

38. Provide at least one test pit to determine soils, depth to bedrock, and depth to water table.
39. Slope the bottom pf the basin at 2%.
40. Relocate the spillway to existing ground, not in the embankment.
41. Provide low flow underdrains.
42. Provide a fence around the basin.
43. Provide a 15 ft. wide access way is required connecting the roadway to the outlet control structure.

Proprietary Interceptors

Calculations are provided for three Stormceptor 450i catchbasin units (catchbasins CB-02, CB-03, and CB-05) and one inline unit (DMH-08). However, total suspended solids removal must be provided for systems and the site as a whole.

44. Provide TSS removal spreadsheets for each compete treatment train.

Roofwater Infiltration

The text of the report proposes infiltration of roofwater; however, this is not reflected on the drawings or drainage calculations.

45. Provide a prototype roofwater infiltration system for a singlefamily residence.



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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. Recalculate Proposed Condition Phosphorous Loading using “High Density Residential” having a phosphorous load by land use of 2.32 lbs./ac./yr.

APPLE HILL – GEOHYDRO MODEL

The soil absorption system for the proposed wastewater treatment unit is located upgradient of the stormwater management system including DB2. The proposed soil absorption system is located in an area of low permeability soil (HSG D) and therefore the height and lateral extent of the wastewater mound will be significant. During the Groundwater Discharge Permit Process, it is also possible that the location of the soil absorption system may be moved to an area of higher permeability soil which is closer to the components of the stormwater management system. In comment 31, we recommend an initial mounding analysis if the separation between the bottom of the basin and seasonal high groundwater is less than 4 ft. However, the wastewater mound may impact DB2 or other components of the stormwater management system. We recommend that the Board reserve the right to reexamine the design of DB2 and other system components following conclusion of the Groundwater Discharge Permit Process. It is critical that DB2 be included in the Applicant’s submitted GeoHydro model. To ensure that the GeoHydro model incorporates DB2, a representative of the Town should be copied on all written or electronic communication with DEP



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and should be invited to all in person or virtual meetings with DEP regarding the GeoHydro model. Should a Comprehensive Permit issue, a recommended draft Condition of Approval is as follows:

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.

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.
49. Include a restriction limiting fertilizer to slow-release organic fertilizer in the Operation & Maintenance Plan.
50. Include a requirement to develop and implement an Integrated Pest Management Program in the Operation and Maintenance Plan.

The source of water supply for the Proposed Project will be a water system on a separate lot in separate ownership. The well will serve over 200 persons daily for 365 days per year. DEP categorizes a water system serving over 25 persons daily for at least 60 days per year as a "Public Water System." The applicant has not provided information on the status of DEP permitting for the public water supply. However, as part of that process, DEP may designate a Zone 1, interim wellhead protection area or other protection zone at the wellhead. The nature and extent of regulatory protection zones will impact the design of the stormwater management system. We recommend that the Board reserve the right to reexamine the design of the stormwater management system following conclusion of the water supply permit process. Should a Comprehensive Permit issue, a recommended draft Condition of Approval is as follows:

COA: The Board reserves the right to reexamine the design of the stormwater management system should wellhead protection zones be designated by DEP



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or should other restrictions be placed on the public water supply impacting on-site stormwater management.

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.
52. Recompute infiltration of the required recharge volume per Comments 28 through 31.

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



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c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

TSS Removal spreadsheets must be provided for each complete treatment train (Comment 44).

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 draft Condition of Approval is provided in the "Wellhead Protection" section of "Part II" of this memorandum.

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.

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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.

53. Verify 90% TSS removal and 60% TP removal.
54. Add the requirement to submit an as-built plan to the drawings.

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). 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). 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).

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

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 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).