

May 5, 2021

To: Mr. Richard S. Novak, Chair
 Zoning Board of Appeals
 Town of Sherborn
 19 Washington Street
 Sherborn, MA 01770

A&M Project #: 2513-02
Re: Response to Peer Review of Stormwater Management System & Stormwater Report
 Apple Hill Estates – Hunting Lane
 Sherborn, Massachusetts

Copy:

Dear Chair Novak and Members of the Zoning Board of Appeals:

Please find Allen & Major Associates, Inc. (A&M) responses to the Stormwater Peer Review dated May 4, 2021 as prepared by Professional Services Corporation, PC (PSC) in reference to their review of Apple Hill multifamily residential community to be located at 33 Hunting Land in Sherborn, Massachusetts (hereafter referred to as the "Project". Listed below are the non-traffic related comments from the PSC peer review letter followed by our response on behalf of the Applicant. For ease of review, comments indicated as "Resolved" have been omitted from this response letter. Responses to the remaining comments will be provided by others under separate cover.

**PART II – THE APPLE HILL STORMWATER
 APPLE HILL – STORMWATER COLLECTION SYSTEM**

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

1st Response: 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.

Response: **See response to comment #23 below.**

Comment 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.

1st Response: 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.

1st Response: As previously stated, the project proposes to install a drain manhole to alleviate concerns of re-suspending material within the sump of the connected catch basin. The project also reduces peak flow rates for all design storm events. Additionally, the development team will review the option to clean the catch basins within Hunting Lane, downstream of the project connection, prior to completion of construction.

PSC: Water pollutants added to stormwater in the public drainage system by churning and mixing contaminants in the catchbasin sums correlates with both the peak rate and volume of discharge. For the 2-year frequency storm event, the volume of discharge from the site to the Hunting Lane system increases by 42%. For the 100-year frequency storm event, the volume of discharge from the site to the Hunting Lane system totals ¾ million gallons. We recommend that any favorable Decision include a Condition of Approval requiring that the Applicant provide a catchbasin to manhole system in Hunting Lane between the point of connection at the Project Site to North Main Street. Design of the system shall be subject to approval of the Director of Public Works.

Response: *As stated previously, the peak rate of flow has been reduced to below pre-development rates both through the implementation of an on-site stormwater management system and the introduction of an additional energy dissipating manhole upstream of the municipal connection. As the peak rate of flow has been reduced, we disagree with the reviewer's statement of "Water pollutants added to stormwater in the public drainage system by churning and mixing contaminants in the catchbasin sums correlates with both the peak rate and volume of discharge". One study (Pitt, 1985) concluded that catch basins can capture sediments up to approximately 60% of the sump volume. When sediment fills greater than 60% of their volume, catch basins reach steady state. Storm flows may then bypass treatment as well as re-suspend sediments trapped in the catch basin. As this project is required to have a written stormwater management system maintenance program, it is presumed that the Town of Sherborn would also have such procedures in place for their own municipal systems, therefore the existing catch basin structures located within Hunting Lane would be cleaned on a regular basis, further reducing the likelihood of re-suspension of any aforementioned contaminants.*

Comment 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.

1st Response: 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.

2nd Response: The HydroCAD model indicates that the peak rate of runoff occurs earlier in the storm event for both the 10 and 100 year storm events. Therefore the above suggestion that "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" is incorrect for these two storm events. The peak rate of runoff does occur later during the 2 year storm event, but by less than two minutes. Since this is the smallest storm design storm event, this offset is irrelevant. The offset for the 25 year storm event is barely over one minute, which is insignificant, given that the peak rate of runoff during the 25 year storm event is decreased by 25%, compared to the existing conditions. We therefore posit that any further analysis of the municipal system is unnecessary, seeing that it will not be adversely affected by the proposed site work.

PSC: Open item. A piped connection to the municipal storm drain system requires authorization by the Department of Public Works. Quantifying the use to capacity ratio as a basis is a reasonable basis for determining if a connection can be allowed.

Response: Agreed, the project will coordinate with DPW to obtain the necessary authorization for the connection to the municipal system as well as a street opening permit and trench excavation permit. All of which will be obtain prior to construction.

APPLE HILL – BMPs

Partial Exfiltration Basin

Comment 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.

1st Response: 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.

1st Response: The ESHGW for each test pit was labeled on the plan and the label for DB-2 was corrected. Modifications have been made to the design of DB-1 and DB-2 in order to address buoyancy concerns. The liner in both basins was changed to a clay liner for additional weight and ease of installation (12" of clay for DB-1 and 4" of clay for DB-2). Another 12" of filter media was added to DB-1 to provide additional buoyancy resistance. The outlet controls for DB-1 were modified slightly to maintain peak rates of runoff. A figure has been added to the end of the appendix of the Drainage Report to illustrate that the liner will be maintained in position.

PSC: ESHGW in DB-1 creates an upward buoyant force of 125 lbs./sq.-ft. and ESHGW in DB-2 creates an upward buoyant force of 170 lbs./sq.-ft. Although the weight per sq.-ft. is not provided for the filter media, the combined weight of the filter media plus the clay liner should resist overall buoyancy. However, the resistance to water intrusion particularly of the 4 in. clay layer in DB-2 is not provided. We recommend that any favorable Decision include a Condition of Approval requiring that prior to construction, the integrity of the 4 in. clay layer in DB-2 to preclude water intrusion be calculated.

Response: We respectfully request that the condition state "The design engineer provide periodic observations of the installation of the clay liner during construction and provide documentation to the Town outlining the field observations".

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).

1st Response: We respectfully request that it be made a condition of approval to perform the requested test pits prior to construction. We believe this is a reasonable request seeing that the bottom of the trench is above existing grade. A note regarding these test pits have been added to the plan.

PSC: We generally do not recommend deferring soils testing. However, the scale of the system is relatively small and there should be alternative on-site locations where infiltration could be provided.

Response: Agreed.

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).

1st Response: 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.

Response: **The sites are, and will remain, under the same ownership. A comparable legal agreement will be required as part of the public water supply permitting process.**

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

1st Response: As exists today, stormwater runoff exits the subject parcel and it is unrealistic to presume that this runoff would be required to be 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.

1st Response: See response to comment 24 above.

PSC: Open item. The option of holding runoff on-site can be achieved by increasing infiltration, decreasing impervious materials, or a combination of the two. The feasibility of connecting to the catchbasin-to-catchbasin system in Hunting Lane has not been established.

Response: **As stated previously, the peak rate of flow has been reduced to below pre-development rates both through the implementation of an on-site stormwater management system and the introduction of an additional energy dissipating manhole upstream of the municipal connection. As the peak rate of flow has been reduced, we disagree with the reviewer's statement of "Water pollutants added to stormwater in the public drainage system by churning and mixing contaminants in the catchbasin sumps correlates with both the peak rate and volume of discharge". One study (Pitt, 1985) concluded that catch basins can capture sediments up to approximately 60% of the sump volume. When sediment fills greater than 60% of their volume, catch basins reach steady state. Storm flows may then bypass treatment as well as re-suspend sediments trapped in the catch basin. As this project is required to have a written stormwater management system maintenance program, it is presumed that the Town of Sherborn would also have such procedures in place for their own municipal systems, therefore the existing catch basin structures located within Hunting Lane would be cleaned on a regular basis, further reducing the likelihood of re-suspension of any aforementioned contaminants.**

We trust that this information is responsive to the comments that were raised in the May 4, 2021 *Peer Review of Stormwater Managements Systems and Stormwater Reports* prepared by PSC. If you should have any questions or would like to discuss our responses in more detail, please feel free to contact our office.

Very Truly Yours,
ALLEN & MAJOR ASSOCIATES, INC.



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