Professional Services Corporation, PC

Memorandum

Date	May 15, 2021
To	Weston Zoning Board of Appeals
From	Mark S. Bartlett, PE Thomas C. Houston, PE, AICP
Project	Proposed Residential Development, 518 and 540 South Avenue Weston, MA, Middlesex County
Subject	Peer Review of Second Submission dated March 19, 2021

Professional Services Corporation, PC (PSC) reviewed the Tetra Tech submittals dated through October 30, 2020 for the "Proposed Residential Development, 518 South Avenue, Weston, MA, Middlesex County" (the Project) and issued our first peer review memorandum dated January 15, 2021. Our January 15th peer review memorandum was prepared on behalf of the Weston Conservation Commission. Our review focused on Project drainage and stormwater management. PSC issued a peer review memorandum summarizing our review of the First Submission on January 15, 2021.

PSC has received a Second Submission from Tetra Tech for the 518 South Avenue Project that included a letter dated March 19, 2021 responding to PSC comments, revised Project plans, supplemental plans, reports, and calculations. This memorandum is our second submission, and it is specific to stormwater management issues.

Summary of the outstanding issues noted in this memo:

Our January 15, 2021 memorandum had 34 numbered comments and many of the comments had multiple subparts. In total, including comment subparts, there were 65 individual issues to be addressed by the Applicant. Of these, 40 issues have been resolved by the Applicant, and 25 issues remain unresolved. The unresolved issues and item numbers are listed below:

Outstanding Issue	**Unresolved Item Numbers**
HydroCAD, and Plan errors	1, 2 and 3
Stormwater System Performance, Groundwater Mounding	6; 21.a thru f; 22.a thru c; and 25.a,b
Plan Edits, and Submittal Requirements	28 and 29
Local Rules (Stormwater Bylaw & Regulations)	32.a,b,e (submittal requirements)
Local Rules (Stormwater Bylaw & Regulations)	33.a (stormwater volume control)
Local Rules (Stormwater Bylaw & Regulations)	33.b (CN inputs), 33.e (sub-drain)
Local Rules (Stormwater Bylaw & Regulations)	33.g (SWPPP/Erosion Control Plan)

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Local Rules (Planning Board Rules & Regulations) 34 (plan content)

Start of Original Review Memo and Responses

Our evaluation of Tetra Tech responses to comments utilizes the same comment numbers from our January 15, 2021 memorandum. The original PSC comments are provided in standard font, the Applicant's responses are provided in italic font; PSC's evaluation of these responses is in bold font.

Submittal Errors and Needs for Additional Design and Details

1. Sub-catchment 4Sa is listed as 100% roof area, which may be a conservative assumption given that there is a courtyard (10,823 square feet) included in this area. The landscape plans indicate patios, pool, and plantings at this courtyard. The Applicant needs to explain how drainage from this courtyard will be collected and routed separately from the roof runoff in sub-catchment 4Sa. In addition, the Applicant needs to revise the Grading and Drainage Plans to show proposed piping for the garage runoff areas, and provide a schematic to explain the routing of stormwater from all roof areas and all parking garage levels to the pretreatment BMP. (Also see comment 2).

   Tetra Tech Response: The Grading and Drainage Plan has been revised to show a drainage stub extending from Subsurface Detention Area #1 into the Courtyard at elevation 227.0. The stub provides a point of connection for landscape drains that will be detailed as part of the Construction Documents. The finish elevation of the Courtyard will be approximately elevation 233.0, which will allow for adequate slopes on the Courtyard piping. The HydroCAD calculations have been revised to direct the Courtyard drainage to Subsurface Detention Area #1.

   The Grading and Drainage plans show two points of connection for roof drainage to Subsurface Detention Area #1. There is a point of connection on the north and south side of the basin. Internal roof drains will be piped separate from the exposed garage deck to these points of connection.

   The upper level of the parking garage will be covered with a Columbia Technologies Green Roof system. The Green Roof system is design to overflow to Subsurface Recharge System #2. An overflow pipe has been added to the Grading and Drainage plans showing a point of connection along the front of the residential building.

PSC Comment: This comment has been partially addressed: Runoff areas tributary to Recharge System 2 and Detention Area 1 (*Stormcapture* tanks) are not correct. The applicant should check and revise these. The following are noted:

Tributary Area	Area (square feet) scaled per Sheet C-7	Area noted in HydroCAD	Apparent Error	Intended Receiving Area
Area 19S (resid. green roof)	21,400 sq.ft.	17,000 sq.ft.	4,400 sq.ft. too low	Recharge System 2
Area 4Sa (north building roof)	0.43 acre	0.86 acre	0.43 acre too high	Detention Area 1
Area 4Sc (south building roof)	0.34 acre	0.46 acre	0.12 acre too high	Detention Area 1
Courtyard Area	10,823 sq.ft.	not noted	10,823 sq.ft. too low	Detention Area 1

Green Roof Systems: The Applicant should provide more detail on Sheet C-18 or in the Stormwater Report to explain how the Green Roof System will function. It is not clear how storm flow will be equalized between the soil filled trays, how flow will drain to the system outlets, and where the system outlets will be located. Specifically, provide:

- **Indicate how stormwater that is collected in the planted rooftop trays will flow tray to tray (or via some other collection system?), and ultimately how will the system flow be transferred to the rooftop outlet pipe(s) that will drain to Stormwater Recharge System #2;**
- **Provide details on the plans or on Detail Sheet C-18 to explain the inputs that are noted in the HydroCAD model for the two green roof areas, which includes: Multiple 0.6" orifices and 1.0" orifices (17 each for system 1 and 30 each for system 2); 12-inch collector pipes (330' for system #1, and 250' for system 2), and each roof system will have a 12-inch outfall pipe 50' long.**
- **Confirm if there is only one Green Roof overflow / outlet pipe to collect flow from both roof systems.**

- **The detail on Sheet C-18 shows a 12-inch buffer between green roof trays and roof parapet walls. Is this the intent for installation, and if so, does that reduce the effective area of green roof systems and storage provided in HydroCAD?**

The garage includes proposed stormwater facilities to collect, treat, and infiltrate stormwater runoff and underdrain facilities for control of groundwater. The design, installation, and operation of these systems within the garage and within 10 ft. of the exterior wall of the garage are governed by "248 CMR: 10.00 Uniform State Plumbing Code" which provides that storm water drains shall be subject to 248 CMR 10.00 (248 CMR 10.01 (2) (b))). "Plumbing includes the work and/or practice, materials and fixtures used in the installation, removal, maintenance, extension and alteration of a plumbing system…in connection with any…storm drainage facilities…within or adjacent to any building, structure…" In our opinion, the design of the garage stormwater and underdrain facilities must be performed by a Massachusetts Plumbing or Mechanical Professional Engineer and the stormwater management and underdrain facilities must comply with "248 CMR: 10.00 Uniform State Plumbing Code". The aforesaid notwithstanding, we have provided comments on the design of storm drainage facilities within the garage as submitted.

2. Submit a revised design for the garage stormwater and underdrain facilities in compliance with "248 CMR: 10.00 Uniform State Plumbing Code." Alternatively, provide documentation establishing that the provisions of "248 CMR: 10.00 Uniform State Plumbing Code" do not apply.

   Tetra Tech Response: In coordination with Wozny Barber, the MEP that typically works with the Hanover Company on similar projects, a pre-approval is being requested from the State Plumbing Board for the Cultec Subsurface Recharge System beneath the garage. A hearing is anticipated in April and the decision will be provided. Piping materials to and from the subsurface systems maybe subject to the plumbing code. All stormwater piping that is subject to the State Plumbing Code is called out to be ductile iron.

   PSC Comment: The code compliance issue has been addressed, but we note the following errors on the revised plans concerning systems under the garage floor:

   a. **Detention Area 1 (*Stormcapture* tanks) is noted in HydroCAD as Pond 19P however the post-development tributary area plan (Figure 3) requires a matching identifier for this 19P area.**

b. The southerly roof drain connection to Detention Area 1 is noted as HDPE. This should be revised to cast iron to agree with other pipes subject to the plumbing code.

c. The southerly roof drain invert out of the building should be revised to be higher: It is listed as 222.28, which is lower than the invert into Detention Area 1 (noted as 222.5 at Detail Sheet C-18).

d. Detention Area 1 outlets on Sheet C-7 do not all agree with HydroCAD inputs:

Sheet C-7, Outlet DMH-20	**HydroCAD Model for Pond 19P**
Overflow outlet (12" dia.) 217.5	Overflow outlet (12" dia.) 220.96
2" orifices (3) inv. 217.5	2" vert. orifice (3) inv. 221.0
4.5" orifice inv. 224.0	3" vert. orifice inv. 225.0
4' weir inv. 227.25	4' weir inv. 227.25 (ok)

e. Pond 19P (Stormcapture) includes a stone storage area "Field A" with invert 220 and dimensions of 8' x 496' x 8.58'. Please explain the purpose of this input, and if valid, explain the dimensions and volume calculations.

f. All connecting equalizer pipes at Recharge Area 4 should be noted as cast iron.

g. Invert elevations should be noted for all equalizer pipes at Recharge Area 4 (and it appears that this equalization elevation is 217.3…please confirm)

3. The garage floor elevation above Subsurface Recharge Area #3 needs to be specified, and the transition from floor elevation above Area #3 to the floor above Area #4 (listed as FFE 222.50) needs to be explained or detailed by the Applicant. Also, details need to be provided to explain how drag-in water and snow melt from the covered garage levels will be collected, treated, and disposed.

Tetra Tech Response: The garage floor elevation above Subsurface Detention Area #1 (location of the former Subsurface Recharge Area #3) is 233.67. The floor elevation will slope moderately for the first 43 feet and will ramp down towards Area #4 at 6.2%. Cube3, the architect for the project has provided a cross section depicting these

elevations and it has been added to sheet C-18. Please note that Cube3 has elevated the east end of the garage to elevation 223.0.

Drag in water and snow melt from the covered levels of the garage will be collected by garage floor drains. The floor drains will be directed to an Oil and Gas separator and then discharge to the sanitary sewer system and treated at the on-site wastewater treatment facility.

PSC Comment: This comment has been partially addressed in that floor elevations in relation to the proposed subsurface stormwater storage and recharge zones have been clarified and detailed. However, plan locations and details have not been provided for the proposed garage floor drains and proposed MWRA Oil/Water Separator (noted on Utility Plan Sheet C-9) on the lower garage level. Locations and details of floor drains, sewer piping, and Oil/Water structure should be provided to ensure that they will not conflict with proposed subsurface stormwater structures.

4. The large block retaining wall detail on Detail Sheet C-14 needs to be modified to show and call for a cap of sufficient height above the retained grade to prevent stormwater from upgradient offsite areas flowing onto the porous pavement, such as in the southwest area of the Site.

   Tetra Tech Response: A new detail on Sheet C-14 has been added to depict the wall cap extending above the adjacent retained grade, creating a swale to provide positive drainage away from the wall so run on will not occur on the porous pavement.

   PSC Comment: The spot grades added to Grading and Drainage Plan Sheet C-7, and the referenced detail on Sheet C-14 have adequately addressed this comment.

5. The design of retaining walls that border porous pavement must withstand occasional saturated subsurface conditions, and prevent short-circuiting of stormwater intended to be recharged to the subsurface (and not be released as surface flow). We concur with the Applicant's notes for the large block gravity retaining wall on Detail Sheet C-14 that call for a waterproof barrier and for retaining walls to be designed by a Massachusetts Registered Structural Engineer. However, in addition to the existing notes, we recommend that the large block gravity wall detail be modified to illustrate installation of an appropriate durable membrane to direct infiltration vertically and prevent lateral movement (through wall) from the adjacent porous pavement storage stone. The detail

should also specify the type and thickness of the membrane; and the membrane should extend to sufficient depth to prevent break-out at slope areas adjacent to the wall.

Tetra Tech Response: The large block wall detail has been revised to illustrate a 20-millimeter PVC liner to direct infiltration vertically where the wall retains the porous pavement. The detail indicates that the liner shall extend 12 inches into native soils to so that breakout will not occur in adjacent slopes.

PSC Comment: This comment has been addressed.

6. The setback of the eastern end of Subsurface Recharge Area 4 (under the garage) from the wastewater treatment facility effluent disposal area is 35-feet. Although the SWH does not specify a setback specific to a treated effluent disposal area, it does require infiltration systems to be located at least 50-feet from septic system absorption fields. The Applicant should defend the adequacy of the 35-foot setback given the interaction between effluent disposal and stormwater recharge reported in the mounding analysis.

   Tetra Tech Response: (per Sanborn Head) – The 35-foot setback of Subsurface Recharge System #4 and the wastewater soil absorption system exceeds the recommended guidance of 25 feet in the MADEP "Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal" revised July 2018 (MADEP WWTP Design Guidelines). Please refer to Table 2 on pages 43 and 44. Further, the combined flows from stormwater recharge at Area 4 and the wastewater soil absorption system were considered in the wastewater mounding analysis that was completed as part of the Hydrogeologic Evaluation Report for the wastewater system that was reviewed and approved by MADEP by letter dated June 16, 2020.

   PSC Comment: This comment has been partially addressed regarding setback rules: However, compared to the stormwater design that existed in March 2020 when the *Hydrogeologic Evaluation Report* was prepared by Sanborn Head, Stormwater Recharge Area 4, which is only 35-feet from the wastewater treatment system soil absorption system (SAS) has increased in size, and the volumes of recharge at Area 4 have increased substantially (more than doubled)[1], and, field measured infiltration

[1] March 2020 recharge volumes at Area #4: 10-year volume = 0.218 acre-feet, 100-year volume = 0.938 acre-feet

rates have been found to be more restrictive. For these reasons we continue to recommend a comprehensive groundwater mounding analysis that factors in all currently proposed stormwater recharge zones, and the treated effluent soil absorption system (SAS). Also see Comments 21.a and 32.b below.

7. The Applicant needs to revise the plan to include additional access manholes to inspect and maintain the four Subsurface Stormwater Recharge Areas, and we recommend the following:

    a. For Subsurface Stormwater Recharge Areas #1 and #2, we suggest that one 4-foot diameter manhole be located at one end of each chamber, and at the opposite end provide a 6-inch diameter clean-out brought to grade finished with a road box. Also, each chamber row needs to have at least one 6-inch inspection port in the middle of the row.

Tetra Tech Response: The 4-foot diameter manholes have been placed on Subsurface Recharge Area #1 and #2 as suggested above. Additional 6" inspection ports (which function the same as a clean out) have been called for at the end of the rows that do not have manholes. Inspection ports have been provided in the middle of each row.

PSC Comment: This comment has been addressed.

    b. For Subsurface Stormwater Recharge Areas #3 and #4 as located under the garage floor, we suggest that one 4-foot diameter manhole be located at one end of each long chamber row (there are 12 of these long rows), and at the opposite end of each long row place a 6-inch diameter clean-out access brought to grade finished with a road box. And, for the ten shorter chamber rows, we suggest placement of a 6-inch clean-out brought to grade, finished with a road box at each end. Also, each long chamber row needs to have at least one 6-inch inspection port in the middle of the row. (Also see comment 2).

Tetra Tech Response: Subsurface Recharge Area #4 has been revised to call for a 4-foot diameter manhole at one of each long row and an inspection port (which functions the same as a clean out) at the opposite end as recommended. For the shorter rows, an

Compare, current design Area #4 volumes: 10-year volume = 0.641 acre-feet, 100-year volume = 2.230 acre-feet

inspection port has been added at each end. In addition, an inspection port has been added to the middle of each long row.

For Subsurface Detention Area #1, access manholes have been placed per the manufacturer's recommendations. These subsurface detention areas can be access by maintenance personnel and they will be able move between chambers to inspect and perform maintenance.

PSC Comment: This comment has been addressed.

8. The Underground Injection Control Regulations, 310 CMR 27.00, require registration of certain infiltration best management practices, e.g., all dry wells, infiltration trenches, subsurface structures, and leaching catch basins must be registered.[2] The Applicant needs to advise on their plan to comply with this UIC policy.

Tetra Tech Response: If it is determined that the subsurface infiltration best management practices require registration under the Underground Injection Control Regulations, the Applicant will register prior to applying for a Certificate of Compliance.

PSC Comment: This comment has been addressed.

<u>Needs for Additional Field Testing to Support BMP Designs</u>

9. The infiltration rate selected for Subsurface Recharge Area #1 is based on Sanborn Head's Guelph permeameter method test at location SH-TP-205 at the south end of the proposed recharge area. The test was conducted at elevation 227±, about 3-feet above the proposed bottom elevation of this recharge area (224). Given that this important test was 3-feet above the elevation of the bottom of the proposed recharge area (infiltration tests should be conducted at the proposed system bottom elevation), and given the large size of the recharge area shown on the plans (5 chamber rows, each about 86-feet long), we recommend that the Applicant excavate a second test pit and obtain a second permeameter test at the other end of the proposed recharge zone to (1) confirm the first infiltration result, and (2) if found to be different, 50% of the lowest

[2] For information on the UIC program and its application to infiltration BMPs, see http://www.epa.gov/ npdes/pubs/sw_class_v_wells_fs.pdf. See also http://www.mass.gov/eea/agencies/massdep/water/drinking/ shallow-injection-well-closure-q-and-a-summary-for-the-.html.

value of the two tests should be used in accordance with the Massachusetts Stormwater Policy. This additional test location will help to confirm that ESHGW and bedrock will not be a concern for this system. Additional field testing (observation pits, infiltration tests) should be witnessed by a qualified Town representative.

Tetra Tech Response: Sanborn Head performed the second test pit as requested. The design infiltration rate was determined to be 1.1 inches per hour. The HydroCAD calculations were updated with the lower design infiltration rate. The size of Subsurface Recharge Area #1 remains unchanged. The Stormwater Infiltration Data Report prepared by Sanborn Head has been updated and is included in Appendix G of the revised Stormwater Management Report.

PSC Comment: This comment has been addressed.

10. The infiltration rate selected for Subsurface Recharge Area #2 is based on Sanborn Head's Guelph permeameter method test at location SH-TP-207 at the south end of the proposed recharge area. The test was conducted at elevation 224±, about 3.5-feet above the proposed bottom elevation of this recharge area (220.5). Given that this important test was about 3.5-feet above the elevation at the bottom of the proposed recharge area (infiltration tests should be conducted at the proposed system bottom elevation), and given the large size of the recharge area shown on the plans (4 chamber rows, each about 105-feet long), we recommend that the Applicant excavate a second test pit and obtain a second permeameter test at the other end of the proposed recharge zone to (1) confirm the first infiltration result, and (2) if found to be different, 50% of the lowest value of the two tests should be used in accordance with the Massachusetts Stormwater Policy. This additional test location will help to confirm that ESHGW and bedrock will not be a concern for this system. Additional field testing (observation pits and infiltration tests) should be witnessed by a qualified Town representative.

Tetra Tech Response: Sanborn Head performed the second test pit as requested. The design infiltration rate was determined to be 1.1 inches per hour. The HydroCAD calculations were updated with the lower design infiltration rate. The size of Subsurface Recharge Area #2 remains unchanged. The Stormwater Infiltration Data Report prepared by Sanborn Head has been updated and is included in Appendix G of the revised Stormwater Management Report.

PSC Comment: This comment has been addressed.

11. The infiltration rate selected for Subsurface Recharge Area #4 is based on Sanborn Head's Guelph permeameter method test at location SH-TP-201 at the middle of the south wing of this U-shaped recharge area. The test was conducted at elevation 214±, about 2-feet below the proposed bottom elevation of this recharge area (216); and the proposed recharge area base elevation (216) is close to the existing ground elevation (218) in the southeast corner. Two other more recent test pits SH-TP-305 & SH-TP-306 were excavated in the east end and north side of this proposed recharge area. TP-305 at the north side was excavated to elevation 215, 1-foot below the proposed system base; and this depth is inadequate to properly evaluate soils conditions under the system. However, TP-306 at the east end was excavated to adequate depth (elevation 209.5), and there were no signs of ESHGW or rock. Therefore, a few recommendations follow from these observed results:

    a. Because site grades vary by seven feet across this recharge area from 218 at the low end to 225 at the high end, the Applicant needs to add specifications to the Site Plans to require the removal of top and sub-soils below this system, and require the use of Title-5 sand for replacing unsuitable soils and for raising grades under the recharge system and areas the sides of the recharge systems.

Tetra Tech Response: A note has been added to the Grading and Drainage Plan that requires the removal of top and subsoils to be removed beneath the system until gravelly loamy sand layer is reached (this is layer of the permeameter test) and backfilled to elevation 216 with Title 5 sand.

PSC Comment: This comment has been addressed.

    b. Given the location of recharge area #4 under a garage floor, and given the size of recharge area #4, which will have 191 chambers arrayed in a large U-shape configuration of rows, we recommend that the Applicant excavate a second deeper test pit on the north side, and obtain a second permeameter test at this north wing, to (1) confirm the first infiltration result, and (2) if found to be different, 50% of the lowest value of the two tests should be used in accordance with the Massachusetts Stormwater Policy. The recommended deeper test pit will help confirm that ESHGW and bedrock will not be a concern in the north

wing. Additional field testing (observation pits and infiltration tests) should be witnessed by a qualified Town representative.

Tetra Tech Response: Sanborn Head performed the second test pit as requested. The design infiltration rate was determined to be 1.6 inches per hour. The HydroCAD calculations were updated with the lower design infiltration rate. The size of Subsurface Recharge Area #3 increased by adding and additional long run of chambers on each side of the system. The Stormwater Infiltration Data Report prepared by Sanborn Head has been updated and is included in Appendix G of the revised Stormwater Management Report.

PSC Comment: This comment has been addressed (note, reference to Area #3 above should be to Area #4).

12. Subsurface Recharge Area #3 is the mirror image on plan view of recharge area #4, however existing grades are moderated, varying from 232 to 236: Two test pits (SH-TP-203 & SH-TP-304) were excavated in the south wing and north wing respectively of the U-shaped area. TP-203 was excavated to elevation 225, 3.5-feet above the proposed bottom of recharge system (elevation 221.5); and TP-304 was excavated to elevation 219.5 which is only 2-ft below the proposed system base. Also, a boring SH-3/SH3-A which was drilled near the northeast corner of this proposed Recharge Area #3, at surface elevation 234, and refusal was encountered at a depth of only 6.6-feet[3]. Given the location of recharge area #3 under a garage floor, given the large system size identical to that of recharge area #4 (191 chambers), given the nearby refusal (boring SH-3/SH-3A), and given that the two soils evaluation test pits are either too high (TP-203) or not deep enough (TP-304), we recommend additional test pits to confirm soils types and to check for ESHGW and rock, and these should be excavated to 4-feet below the proposed system base elevation. In addition, because there are no reported infiltration tests for this system, we recommend two (2) Guelph Permeameter tests at the bottom of the proposed recharge area, one within each major wing of the area.

    These recommended tests will provide adequate basis for design (and also help confirm the infiltration results for area #4). The Applicant should use 50% of the lowest value of the two tests in accordance with the Massachusetts Stormwater Policy. Additional field

[3] Five (5) other borings on site encountered refusal at depths varying from 7.5' to 19.5'

testing (observation pits and infiltration tests) should be witnessed by a qualified Town representative.

Tetra Tech Response: Sanborn Head conducted the additional test pits and permeameter tests as requested. Groundwater and rock were not encountered; however, the permeameter test results indicated a design infiltration rate of 0.4 inches per hour should be used. This lower infiltration rate results in the Cultec infiltration chambers being impractical. In their place, Old Castle Stormcapture chambers will be utilized. The Stormcapture chambers are essentially large precast tanks that measure 16 feet long by 8 feet wide with depths up to 14 feet. The chambers have open panels on each side and end along with 4-inch diameter opens at the bottom slab to allow stormwater to flow into and equalize in the system.

The new system is identified as Underground Detention System #1 and consists of 40 Oldcastle Strormcapture SC2 units with a depth of 10 feet. Because the bottom of the system is concrete, there will be no infiltration from the system or interaction with groundwater. The base of the system is located above ESHGW, therefore floatation is not a concern. The HydroCAD calculations have been revised to reflect this design modification.

In addition, a green roof system has been added into the site design. Columbia Technologies Green Roof system is proposed to cover approximately 17,000 square feet of the residential building as well as the upper level of the parking garage.

PSC Comment: This comment has been addressed.

13. In reviewing all available soil evaluation test pits, it appears that a total of ten (10) test pits[4] have been conducted within the proposed porous pavement route, and there are five (5) other test pits[5] that are nearby, typically north or west of the porous pavement. Some of these test pits and infiltration tests are informative, however, in our opinion the applicant needs to perform additional field tests, and Guelph Permeameter tests for the porous pavement to confirm that subsurface conditions are consistent, and to have field documented saturated hydraulic conductivity measurement for each of the six (6) proposed porous pavement recharge areas. These field tests should confirm that

[4] DTH 5, 6, 7 8, SH: TP-308, TP-2, TP-307, TP-102, TP-303 and TP-302
[5] SH: TP-105, TP-104, TP-1, TP-103, and TP-101

ESHGW levels and bedrock, if present, are adequately below the base storage stone level at each of the six porous pavement zones. Additional field testing should be witnessed by a qualified Town representative. The recommended additional tests are:

Porous Pavement Recharge Zone	Base Stone Elevation	Recommended Tests
5aP – 125 l.f. at southwest corner	227.7	1 additional/deeper soil evaluation and 1 GP test
5bP – 105 l.f. south of building	227.7	1 deeper soil evaluation & 1 GP test
5cP – 75 l.f. adjacent to courtyard	219.7	1 additional soil evaluation & 1 GP test
5dP – 515 l.f along east side	216.7	3-GP tests about 100-ft apart from start of zone to locus of SH-TP-102[6]
5eP – 245 l.f. northeast area	215.7	1 additional soil evaluation & 2 GP tests
5fP - 75 l.f. final length	215.7	1 soil evaluation & 1 GP test

GP = Guelph Permeameter test, at proposed base stone elevation

Tetra Tech Response: Sanborn Head conducted an additional 10 test pits and 10 Guelph Permeameter test pits within the porous pavement per PSC's recommended schedule. The HydroCAD calculations have been updated to reflect the additional testing. Please note that the reservoir course for Area 5aP is noted as 9 inches on the Grading and Drainage plan. All other reservoir courses will remain at 6 inches.

PSC Comment: This comment has been addressed.

14. All new test pits or borings or infiltration tests that are completed within or near any proposed recharge area or along the porous pavement need to be clearly shown along with those already shown on the Grading and Drainage Sheets C-6 and C-7. In addition, we recommend that for each subsurface recharge area, and for points along the porous pavement where tests have been conducted, the Applicant list the ESHGW and refusal elevations that has been determined at such locations.

[6] Existing GP test: The elevation of this test needs to be reported. If it is at or below 216.7 then it would be useful.

Tetra Tech Response: The recently completed test pits have been added to the Grading and Drainage Sheet C-6 and C-7. Also, the infiltration summary table from the updated Stormwater Infiltration Data Report has been added to the Grading and Drainage Sheet.

PSC Comment: This comment has been addressed.

Porous Pavement Design Issues

15. The proposed porous pavement section does not agree with the section recommended within Massachusetts' SWH Vol.2, Ch.2, page 119, that is based on UNHSC[7] Design Specifications. The Applicant needs to defend their alternative approach.

    Tetra Tech Response: The porous pavement detail has been revised to match the Massachusetts Stormwater Handbook.

    PSC Comment: This comment has been addressed.

16. Porous paving should not receive stormwater from other drainage areas (especially areas that are not fully stabilized). The Applicant needs to address retaining wall areas, see comment 4, where stormwater will run-on to the porous pavement.

    Tetra Tech Response: A new retaining wall detail has been added to show the wall cap extended above existing grade as suggested in comment 4. Also, the grading along the top of the wall has been shown to create a swale to direct runoff from up gradient slopes away from retaining walls.

    PSC Comment: This comment has been addressed.

17. There are six (6) sloped porous pavement areas that are designed such that the storage bed bottoms are kept level to provide the same effective storage as would exist for a flat location. This will require placement of additional stone depth to compensate for the surface slope. The Applicant needs to add a typical detail to the design plans to illustrate stone base construction, detail the transitions between zones with differing base stone elevations, and specify materials for these six proposed porous pavement recharge areas.

[7] University of New Hampshire Stormwater Center, which has conducted extensive research into the effectiveness and precautions for, and the design of porous pavement

Tetra Tech Response: A detail has been added depicting the stone base construction. The reservoir course will remain consistent with a level base to promote even infiltration. The chocker course will vary in thickness to account for the porous pavement slopes. Materials for all layers are identified on the porous pavement detail and are consistent with the Massachusetts Stormwater Handbook.

PSC Comment: This comment has been addressed.

18. Porous pavement zone 5fP needs a note added to Sheet C-6 to call out the proposed base stone elevation at its intersection with South Avenue.

    Tetra Tech Response: A note has been added to porous pavement zone 5fP to identify the proposed stone base elevation at the intersection with South Avenue.

    PSC Comment: This comment has been addressed.

19. Four (4) deep test holes by MetroWest Engineering are located in the southwest section of proposed porous pavement; and Sanborn Head has recently excavated one (1) additional test pit SH-TP-308 in this same area. As noted in comment 13, several sections of porous pavement design are not supported by on-site testing. This lack of critical field test data needs to be corrected. Nevertheless, regarding the southwest corner of pavement, the existing five test results are noted along with specific recommendations:

    a. DTH-5 and DTH-6 are located in a porous pavement area in the southwest corner of the site. Both test pits were 10-feet deep to elevation 228.7±. ESHGW was determined to be elevation 235.5 at DTH-5 and elevation 234.7 at DTH-6 which are levels about 4-feet above the proposed finished grades of the porous pavement in these areas (230.5 to 231.5). Also, boring SH-6 which was drilled at elevation 236 in this area encountered refusal at a depth of 7.5-feet (elevation 228.5) which is about the elevation of porous pavement in that area. The Applicant needs to address these findings relative to the feasibility of porous pavement in this section of the site, and discuss the potential rock removal and dewatering impacts that could result from excavating and grading to a level that is lower than ESHGW elevation. Also, more site investigation is warranted. The new test pit SH-TP-308 excavated to elevation 224 is 1.3-feet higher than the proposed base stone elevation of 221.7. The latest test pit is

helpful in finding no rock, but not deep enough to document soil conditions and to evaluate for ESHGW and rock further below the proposed porous pavement base. A deeper test pit should be excavated to at least 4-feet below the proposed system base elevation. Any additional field testing (observation pits and infiltration tests) should be witnessed by a qualified Town representative.

Tetra Tech Response: Sanborn Head excavated test pits 401 and 402 at the southwest corner of the existing building and did not encounter evidence of high groundwater that would preclude the use of porous pavement.

PSC Comment: This comment has been addressed.

20. Regarding setback requirements stated in Massachusetts' SWH for porous pavement:

    a. 50-feet from Septic Effluent Disposal (in this case, Effluent Disposal Area)[8]: The Applicant needs to address the hydraulic significance and impacts of proposing porous pavement above or within 50-feet of the effluent disposal areas at the Site, and propose an alternative solution. The design capacity of the effluent disposal area will be affected, and the storage and recharge capacity of the porous pavement in such area will be reduced. Whether one is designing a septic system disposal field or a wastewater treatment facility effluent disposal field, good design practice calls for ground surfaces above effluent disposal areas to be sloped (typically 2% minimum) so that stormwater flows off and away from such fields. Moreover, porous pavement is not the hydrological equivalent to natural soil structure with grass cover: Porous pavement is far more transmissive, whereas natural soils will retain stormwater better, and promote surface runoff when sloped. In our opinion, placement of porous pavement above or near an effluent disposal area is inappropriate and not good engineering practice.

Tetra Tech Response: Per the discussion on January 15th, the site plans have been revised to eliminate the porous pavement above the effluent disposal area. Standard pavement will be provided and graded so that runoff will flow to CB7.

8

PSC Comment: This comment has been addressed.

b. 100-feet from Surface Waters: The Site Plans indicated that the first 135-feet of porous pavement (measured from the South Avenue exit) are located within 100-ft of the surface waters of the intermittent stream, as measured from TOB1 to TOB8; and some portion of the porous pavement continues within 100-feet of the stream for another 45-linear feet (from TOB8 to TOB9). The Applicant should address this porous pavement setback requirement of the Mass SWH.

   Also, because the Wetlands Protection Act Regulations define Surface Waters as including "wetlands" [9], which are the jurisdiction of the Weston Conservation Commission, the Commission could view the porous pavement as significantly violating this 100-foot setback requirement: The first 750-feet of pavement are located within the 100-ft wetlands buffer zone. The Applicant should present their justification to the Commission for using porous pavement in this zone.

Tetra Tech Response: The Fire Chief has requested a secondary paved access and full access around the building. To accommodate the secondary access request, the existing gravel drive is being utilized as an emergency access only. Utilizing the porous pavement provides a durable and maintainable surface that the Fire Chief has requested, while allow the existing grades to be maintained to a large extent along the wetland edge. This minimizes disturbances within the 25-foot buffer zone.

PSC Comment: This response provides a reasonable explanation to justify use of porous pavement as an emergency access drive within the 100-ft wetlands buffer zone, subject of course to Conservation Commission concurrence with this approach.

c. 20-feet from building foundations: The Applicant may need to modify the plans to protect the building foundation at the southwest area of the Site where about 80-feet of porous pavement violate this setback rule, and there is another setback issue for about 20-linear feet at the southeast corner of the 5-story building foundation. Information about the building foundation is unavailable.

[9] Under 310 CMR 10.04 of the Wetlands Protection Act Regulations, Surface Waters are defined as: "All waters other than groundwaters within the jurisdiction of the Commonwealth, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, wetlands, coastal waters and vernal pools." (underline added)

Tetra Tech Response: The residential building and garage will both be constructed as slab on grade and will not have basement foundation walls. The emergency access drive was adjusted at the southwest corner of the building will be adjusted to provide a 10-foot setback to the slab on grade.

PSC Comment: This comment has been addressed.

d. 10-feet from building slabs: This does not appear to be an issue at this Site.

Tetra Tech Response: s noted above, the emergency access drive at the southwest corner of the building has been adjusted to provide the 10-foot setback to the slab on grade.

PSC Comment: This comment has been addressed.

e. 10-feet from property lines: This setback is violated at 3 locations, (1) 300-feet along the westerly side of the emergency access road off South Avenue, (2) 175-feet along the southwest property line, and (3) 290-feet along the southeast property. The Applicant needs address these setback violations.

Tetra Tech Response: As noted in the response to 20.b., porous pavement was chosen to reduce impacts within 25 feet of the wetland edge. The porous pavement has been located as far west from the wetland edge as feasible to further reduce work within the buffer zone. Given that the general groundwater flow is towards the BVW and not the property line, the porous pavement will not have adverse impacts along the property line.

PSC Comment: This comment has been addressed. We note too that the abutting property at the southwest property line is upgradient from the porous pavement, that abutting property to the southeast is not developed and not likely to be developed within 10-feet of the porous pavement, and the abutting home site on the westerly side of the emergency access drive is upgradient of the porous pavement (groundwater is presumed to flow from west to east toward the intermittent stream).

Needs for a Comprehensive Stormwater Mounding Analysis

21. The Applicant's Hydrogeologic Evaluation Report (Figure 9) provides a cross-section view of a mounded high groundwater condition that approaches the top elevation of Subsurface Infiltration Area #3, which is the higher of the two recharge systems proposed below the garage floor[10]. Extrapolating from what is shown on Figure 9, it appears that Subsurface Infiltration Area #4 could be inundated by 6-feet of ground water. These mounded conditions will significantly reduce the effectiveness of these systems' recharge (in fact, once a mounded condition reaches the base of an infiltration area, the rate of recharge is typically reduced by an order of magnitude). Given these indications, a separate and thorough mounding analysis must be prepared and submitted with the Applicant's Stormwater Management Report. For the purpose of a complete Stormwater Management Report, the applicant needs to provide a comprehensive mounding analysis for the Site stormwater recharge systems that factors in all of the following:

    a. All four subsurface stormwater recharge areas

Tetra Tech and Sanborn Head Response: Recharge Systems 1, 2 and 4 provides 4-feet of separation to ESHGW, so a stormwater mounding analysis is not required by the Massachusetts Stormwater Handbook (see volume 3, chapter 1, page 28). Supporting subsurface data is provided in the Updated Infiltration Data Report by Sanborn Head dated March 10, 2021 included in Appendix G of the revised Stormwater Management Report. Recharge System #3 has been modified to a subsurface detention system with a concrete bottom. Recharge System #4 has been considered in the wastewater mounding analysis completed for the Hydrogeologic Evaluation Report that was reviewed and approved by MADEP.

PSC Comment: See our response to Comment 6 above. We understand that the SWH may not require a mounding analysis given the 4-foot separation from bottom of recharge to ESHGW. However, there are many factors of concern that override the SWH guidance: the Applicant's *Hydrogeologic Evaluation Report* of March 2020 has demonstrated that a mounded condition will result in groundwater contact with the bottom of the recharge system under the garage floor, based on the stormwater design at that time. Moreover, compared to the stormwater design of March 2020,

[10] In addition, Mounding Analysis figures in Hydrogeologic Evaluation Report Appendix F seem to indicate, in one case, that mounded groundwater elevation will exceed the top of Recharge Systems #3 and #4 by 19-feet. This would be extreme and would result in total temporary failure of these systems and represent a significant structural issue due to hydraulic pressure below the garage floor concrete slabs.

Stormwater Recharge Area 4, which is only 35-feet from the wastewater treatment system SAS has increased in size, and the volumes of stormwater recharge concentrated in that area have more than doubled since, and field measured infiltration rates have been found to be more restrictive. For these reasons we continue to recommend a comprehensive groundwater mounding analysis that factors in all currently proposed stormwater recharge zones, and the treated effluent SAS. Also see Comment 32.b below.

b. All porous pavement recharge areas

Tetra Tech Response: As noted in previous response letters, the porous pavement will only receive runoff from its own surface area and will not receive run on from other areas or concentrate runoff from other areas. Therefore, a groundwater mound would not form. The porous pavement has been removed from above the soil disposal area and replaced with standard pavement that will be routed through Subsurface Recharge System #4. Also, all porous pavement system provides a buffer in excess of 3 feet to ESHGW as recommended by the MADEP Stormwater Handbook (see volume 2, chapter 2, page 121).

PSC Comment: This comment has been partially addressed because the Applicant has eliminated the use of porous pavement above the wastewater treatment SAS; and the porous pavement does not receive run-on from other areas, and the design is now compliant with the MADEP Stormwater Handbook requirements. Nevertheless, given the importance of complying with the prior request for a revised, comprehensive mounding analysis (see Comments 6 and 21 above), we believe that it is prudent to incorporate recharge from the proposed porous pavement areas along with all other stormwater recharge inputs into the hydrogeological model.

c. Analysis of mounding with and without the foundation underdrains noted in the Hydrogeologic Evaluation Report for the foundation footing of the 4-5 story building. (Hydrogeologic Evaluation Report Figures 7 & 9).

Tetra Tech Response: per Sanborn Head – The foundation underdrain is a functional and required component of the wastewater soil absorption system and the foundation system for the garage. The foundation drain was considered in the wastewater mounding analysis that was completed as part of the Hydrogeologic Evaluation Report for the wastewater system that was reviewed and approved by MADEP.

PSC Comment (c.1): The Applicant has admitted that the underdrain is a required component to control the limits of mounding below the wastewater SAS and the garage floor, and for this reason, and for the reasons stated in our responses to Comments 6 and 21.a above, we recommend the Applicant prepare a revised comprehensive Modflow model mounding analysis that incorporates, as appropriate, corrected assumptions on depth of aquifer (see Comment 21.e below) and corrected saturated hydraulic conductivities based on latest field measurements in the region of Stormwater Recharge Area #4 . This model must also include the latest design plan dimensions and elevations of Recharge Area #4, and the correct underdrain location (17-feet laterally from Recharge Area #4), and correct underdrain elevation (2-feet above the bottom of the southern length of Recharge Area #4).

PSC Comment (c.2): The Applicant's latest HydroCAD analysis has included a simplified assumption of a steady state underdrain flow rate based on their March 2020 Modflow analysis (and their derivation of this is not clear); and, as noted earlier, the analysis is based on the original stormwater recharge system design which has since increased (see Comment 6 above). We believe this model approach, intended for checking wastewater SAS compliance with MADEP requirements, is inadequate in predicting the changes in flow rates and volumes that will pass through the proposed underdrain during the various stormwater events. For these reasons, the Applicant's HydroCAD model should be revised to include the underdrain as a true subdrainage feature (not a linked Modflow derived estimate of flow rate) that will demonstrate underdrain performance (peak flows and volumes) based on the hydraulic heads that will develop during the various stormwater events' mounding in proximity to revised Stormwater Recharge Area #4. The HydroCAD model should include key inputs of: (1) being located 17-ft (laterally) from the south side of Recharge Area #4, (2) underdrain elevation 218.0 which will be 2-feet above the base stone elevation (216.0) of Recharge Area #4, (3) the specific diameter and perforation design of the underdrain (and this information needs to be added to the Project plans too)[11], and (4) the latest design of Recharge Area #4 which has increased in size and volume of recharge and is located in a soil zone with reduced saturated hydraulic conductivity (which reduces Recharge Area #4 recharge rates and rate of saturated flow toward the underdrain).

[11] The underdrain diameter and perforation specifications need to be noted on the Grading and Drainage Plan (Sheet C-7), and a "to scale" detail should be added to one of the detail sheets to illustrate a north-south cross section elevation view of Stormwater Recharge Area #4 in relation to the proposed underdrain.

d. The average effluent disposal rate from the wastewater treatment facility,

Tetra Tech Response: per Sanborn Head - The combined flows from stormwater recharge Area 4 and the wastewater soil absorption system were considered in the wastewater mounding analysis that was completed as part of the Hydrogeologic Evaluation Report for the wastewater system that was reviewed and approved by MADEP by letter dated June 16, 2020.

PSC Comment: This response is not acceptable. See our response to Comment 21.c above.

e. The depth of the aquifer should be established by one or more soil borings with the depth of the aquifer set at refusal, if encountered, or at the elevation where the boring is terminated, and,

Tetra Tech Response: per Sanborn Head – The assumptions used for the wastewater mounding analysis completed for the Hydrogeologic Evaluation Report for the wastewater soil absorption system were reviewed and approved by MADEP.

PSC Comment: Unfortunately, MADEP review and approval for the purpose of the existing hydrogeological report, which focused on the wastewater SAS, does not assure us that the Modflow model was properly designed and calibrated, or properly accounted for stormwater recharge inputs. And, as noted earlier there is now new information on stormwater systems' designs and new field measured saturated hydraulic conductivities where the stormwater systems will interact with groundwater mound formation. Moreover, expert testimony on behalf of the abutting property owners during the recent ZBA Public Hearing (May 4, 2021) clearly stated concerns about model assumptions, i.e., the assumed aquifer depth of 50-feet when the deepest on-site boring hit refusal at 22-ft, and the latest field measurements of saturated hydraulic conductivities in the area of proposed stormwater recharge zones, which could both have significant impact on the Modflow model predictions. Therefore, we continue to recommend revision to both the Modflow model and the stormwater HydroCAD model (see responses to Comments 6 and 21 above).

f. Given upward trends in rainfall extremes, we recommend that inputs include at least the 25-year storm event, and preferably the 100-year 24-hour storm event.

Tetra Tech Response: per Sanborn Head – The wastewater mounding analysis completed for the Hydrogeologic Evaluation Report for the wastewater soil absorption system included the effects of flow from Recharge Areas 3 and 4 for the 10-year, 24-hour storm event at the request of MADEP which is consistent with the MADEP WWTP Design Guidelines (see Table 2, pages 43 and 44, footnote #3). We note that Recharge Area 3 has since been modified to a detention system with a concrete bottom, so the combined wastewater and stormwater flow has decreased compared to the assumptions used for the wastewater mounding analysis.

PSC Comment: See our responses to Comment 6 above and to the other subparts of Comment 21 above. Our comments requesting evaluation of mounding for the stormwater recharge systems 1, 2 and 4 are focused on (1) determining accurate predictions of stormwater system performance as ultimately related to predicted releases to the wetlands, (2) as related to impacts to abutters septic systems and basements (at systems 1 & 2) and (3) as related to impacts to Recharge System #4 which is 35-feet from the wastewater SAS. Therefore, in the interests of Town boards, we do not believe that the character of this analysis should be dictated solely by MADEP WWTP Design Guidelines.

Also, regarding the elimination of recharge system #3 due to poor saturated hydraulic conductivity (latest field measurements), we have noted that the size (volume and footprint) and predicted performance (recharge volumes) of the remaining Recharge System #4, 35-feet from the wastewater SAS, have increased. The volumes of recharge at Area 4 have more than doubled[12], and latest field measured saturated hydraulic conductivity rates have been found to be more restrictive.

22. As a follow up to the engineering work noted above, if foundation drains are placed near or below the proposed garage subsurface recharge areas, this will reduce the effectiveness of these BMPs to recharge to groundwater and control peak flow and runoff volumes. Therefore, if any underdrains are required to manage groundwater levels and/or mounding effects of stormwater recharge combined with wastewater treatment effluent disposal area(s) then the Applicant needs to do the following additional work:

[12] March 2020 recharge volumes at Area #4: 10-year volume = 0.218 acre-feet, 100-year volume = 0.938 acre-feet
Compare, current design Area #4 volumes: 10-year volume = 0.641 acre-feet, 100-year volume = 2.230 acre-feet

a. revise the HydroCAD hydrologic model to include the underdrains and then: (1) evaluate the reduction of exfiltration to groundwater, and (2) to identify estimated runoff flows and volumes via the underdrains toward wetland resource areas;

Tetra Tech Response: The underdrain south of the garage and north of the reserve disposal area has been added into the plan. The Hydrogeologic Evaluation indicates that the under drain should be at elevation 212.0 at the east end of the garage. This elevation does not allow a pipe to extend to daylight upgradient of the wetland. Therefore, a pump chamber will be provided that will pump to Recharge Area #2. A link has been created in the HydroCAD model to reflect the flow from the underdrain. The flow from the underdrain is estimated from the MODFLOW analysis to be 1,287 cubic feet during the 100 year storm event, with a peak flow rate of 7.5 gallons per minute.

PSC Comment: This comment has not been addressed. See our response to Comment 21.c above.

b. quantify the reduction in recharge caused by the underdrains' drawdown of stormwater from the garage subsurface recharge areas and if necessary, to meet recharge requirements, compensate by directing underdrain flow to additional infiltration facilities capable of recharging intercepted runoff from the garage subsurface recharge areas; and

Tetra Tech Response: As noted above, the underdrain will be pumped to Recharge Area #2, therefore a reduction in recharge volume is not anticipated.

PSC Comment: This comment has not been addressed. See our response to Comment 21.c above.

c. Site Plans need to be revised to show the locations of all underdrain designs on the Grading & Drainage Plan and on the associated Detail Sheets, including underdrain system invert elevations, underdrain outlet elevations, and underdrain trench construction including proposed backfill.

Tetra Tech Response: The underdrain has been added to the Grading & Drainage Plan. No other underdrains are proposed. A typical underdrain detail has been added to Detail Sheet C-18.

PSC Comment: The underdrain shown on Grading & Drainage Plan Sheet C-7 should specify size and refer to the detail that has been provided on Sheet C-18. The Underdrain detail should also specify the size, spacing and angles of the perforation holes, and the number of holes that will be provided per unit length of underdrain. As noted in our response at Comment 21.c above this information should be included as inputs for developing an underdrain element for analysis within the HydroCAD model.

O&M Plan Deficiencies

23. Because porous pavement is prone to clogging, aggressive maintenance with jet washing and vacuum street sweepers is required. The Applicant's O&M plan has addressed many of the appropriate procedures for care of porous pavement. In addition to what is already proposed, the Applicant needs to revise the post-construction stormwater operation and maintenance plan to include the following additional advisories for porous pavement:

    a. Clean the porous pavement surface monthly using a combination of jet washing and vacuum street sweeping (modification of "vacuum sweeping" only in the current O&M plan).

    Tetra Tech Response: Section 3.2.9 of the O&M plan has been revised to include monthly cleaning using a combination of jet washing and vacuum sweeping.

    PSC Comment: This comment has been addressed.

    b. Keep landscaped areas well maintained to prevent soil from being transported onto the pavement.

    Tetra Tech Response: Section 3.2.9 of the O&M plan has been revised to identify the need to keep adjacent landscaped areas well maintained.

    PSC Comment: This comment has been addressed.

    c. Regularly monitor the paving surface to make sure it drains properly after storms.

Tetra Tech Response: Section 3.2.9 of the O&M plan has been revised to require regular monitoring of the porous pavement after storm events to ensure that it is draining properly.

PSC Comment: This comment has been addressed.

d. Attach rollers or rubber blades to the bottoms of snowplows to prevent them from damaging the porous pavement.

Tetra Tech Response: Section 3.2.9 of the O&M plan has been revised to require rubber blades on snowplows.

PSC Comment: This comment has been addressed.

e. Also, for proper maintenance, the Massachusetts SWH recommends posting signs identifying porous pavement areas. (Also see comment 27.)

Tetra Tech Response: Section 3.2.9 of the O&M calls for the placement of signs identifying the porous pavement. The Site Layout Plan has also been updated to show the location of the porous pavement signage.

PSC Comment: This comment has been addressed.

Construction Period Precautions

24. Construction staging, means & methods, and erosion and sediment control must all be taken into consideration when using infiltration practices and porous pavements. The Site Plans (e.g., Erosion Control Sheets) need to be revised to specify the following precautions for the porous pavement areas and the four subsurface recharge areas:

    a. Prevent the compaction of underlying soil at these infiltration practices

Tetra Tech Response: Notations have been added to the Erosion Control Plans that specify minimum subgrade elevations at infiltration practices to prevent compaction of subbase.

PSC Comment: This comment has been addressed.

b. Prevent contamination of stone subbase with sediment and fines

Tetra Tech Response: Notations has been added to the Erosion Control Plan to indicate that the subsurface recharge areas shall not receive construction stormwater in order to protect the stone base from being contaminated with fines. Also, a general construction sequence has been added to Sheet C-17 which calls for preparing and constructing the porous pavement system after adjacent areas are stabilized.

PSC Comment: This comment has been addressed.

c. Prevent tracking of sediment onto porous pavement

Tetra Tech Response: As noted above, a general construction sequence has been developed. To protect the porous pavement from tracking, the standard pavement base course is called to be installed before work on the porous pavement starts. Also, a note has been added to the Erosion Control Plan limited construction vehicles and machinery on the porous pavement to only what is necessary to complete construction.

PSC Comment: This comment has been addressed.

d. Prevent drainage of sediment laden waters onto porous surfaces or into constructed infiltration beds

Tetra Tech Response: The general construction sequence requires the areas adjacent to the porous pavement to be stabilized prior to prevent sediment lades waters from running on. Notations have been added to each subsurface recharge system indicating that construction stormwater shall not be discharged to them.

PSC Comment: This comment has been addressed.

And in addition, because site contractors often seek to utilize infiltration basin areas as temporary stormwater detention basins during construction:

e. The Applicant needs to add a note to the Site Plans for infiltration basin areas that specifies procedures if such areas are used as temporary drainage management basins during construction. For example, one approach is that excavation to finished grade should not be completed until site construction is

completed. Then, any accumulated siltation is removed along with the final 1-foot of excavation to the final subgrade where drainage stone is to be placed.

Tetra Tech Response: The Erosion Control Plan has been updated to show temporary sediment basins in the area of Subsurface Recharge Area #1 and #2. Notes have been added specifying that a minimum subbase elevation that are one foot above the bottom elevation of the recharge systems. Also, a note has been added requiring the removal and disposal of accumulated sediment prior to constructing the recharge systems. Similar notation has been added to Subsurface Recharge Area #4.

PSC Comment: This comment has been addressed.

Massachusetts Stormwater Management Standards:

This section of the review memo discusses project compliance with Massachusetts' ten Stormwater Management Standards. The Applicant's Stormwater Management Report includes an evaluation of compliance with the Stormwater Management Standards as presented in the Massachusetts Stormwater Handbook (SWH). Our view of the Project's compliance with Stormwater Management Standards are addressed for each standard below:

Standard 1: No New Untreated Discharges or Erosion to Wetlands. Compliance with this standard has been partially demonstrated. However our concerns regarding additional field tests, design and construction period controls need to be addressed in order to be sure that uncontrolled releases or erosion potential does not exist, (see comments 9 through 13, 16, 17, 20, 22 & 24).

Standard 2: Peak Rate Attenuation. Compliance with this standard has been partially demonstrated in that the current design proposal complies with Standard 2 and the current post-development peak flows do not exceed the pre-development runoff rates. However, several concerns have been raised in the prior sections of this letter with requests for additional site testing design inputs, which depending on results could lead to revised design of the five infiltration BMPs. These issues must be addressed first followed by a recheck of the HydroCAD model if it is revised to match any design revisions.

Standard 3: Stormwater Recharge. The intent of Standard 3 is to ensure that the infiltration volume of precipitation into the ground under post-development conditions is at least as much as the infiltration volume under pre-development conditions. Compliance with this standard has been generally demonstrated. However, the following still needs to be addressed:

25. In order to determine compliance with Standard 3, the analysis should address the following:

    a. The Applicant needs to demonstrate that all five of the subsurface infiltration BMPs proposed are designed based on complete data obtained from the recommended additional on-site soil evaluations to confirm soil morphology that will identify (a) ESHGW, and (b) the appropriate hydraulic conductivity (in this case, 1/2 the minimum measured Guelph permeameter rate) of soil underlying the sites where infiltration systems are proposed. It is critically important that the Applicant conduct the recommended additional field testing, witnessed by a qualified Town representative, to provide adequate information for the design of all five key infiltration systems, see related comments 9 through 13, and comments 21 and 22.

Tetra Tech Response: Sanborn Head completed the additional testing as recommended. The Stormwater Management Report has been updated to reflect the additional testing data and the groundwater recharge calculations updated accordingly. The revised calculations demonstrate compliance Standard 3.

PSC Comment: With respect to completing additional testing, this comment has been addressed.

However, on maintaining infiltration volume of precipitation into the ground under post-development conditions to be at least as much as the infiltration volume under pre-development conditions, there are two cases where this standard is not met: As noted in our response to Comment 33.a below, pre- to post-development discharge volumes (surface flow) released to design point 2 (wetlands) will increase 13% for the 25-year storm (increase from 0.093-acre-feet to 0.105-acre-feet) and increase 84% for the 100-year storm (increase from 0.727-acre-feet to 1.338-acre-feet). Any increase in surface flow can be inversely interpreted as loss of infiltration that was occurring in the pre-development condition.

    b. The volume intercepted by any building or garage underdrains need to be quantified, including discharge released to wetlands, and if necessary additional infiltration should be provided sufficient to accommodate volume intercepted.

Tetra Tech Response: As noted previously, the underdrain noted in the Hydrogeological Evaluation has been added to the Grading and Drainage Plan. The underdrain will be drained to a sump pump and directed to Subsurface Recharge Area #2. There will not be a release to wetlands and the intercepted volume will be returned to infiltration practices. Therefore, there will not be a reduction in overall infiltration volume.

PSC Comment: This comment has not been addressed because of required revisions. See our response to Comment 21.c above, and our response to Comment 25.a above.

Standard 4: Water Quality. The Stormwater Report and design plans demonstrate that stormwater runoff from all paved areas will be collected and directed through adequate pre-treatment and contained infiltration. The Stormwater Report and design plans generally demonstrate compliance with Standard 4, however we defer on issuing an opinion on full compliance with this Standard until the other issues noted above have been addressed.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs). The stormwater report incorrectly states that the Site is not categorized as a LUHPPL. The Project Site is classified as a "Land Use with Higher Potential Pollutant Loads" (LUHPPL, per SWH V.1: C.1: p.14) because there will be a "*parking lot with high-intensity-uses (1000 vehicle trips per day or more)*"[13]. This area also meets the definition of a "Hotspot" under the Weston Stormwater Regulations (see SECR definitions Appendix A).

26. Although it appears that the Stormwater Management Report adequately provides design and supporting calculations consistent with LUHPPL and Weston Stormwater Hotspot requirements, we recommend that the Applicant revise the Stormwater Management Report to formally address compliance with each of the special LUHPPL requirements (e.g., demonstrate 44% TSS removal as pre-treatment for infiltration, demonstrate that pre-treatment treatment trains includes an "*oil grit separator, sand filter, filtering bioretention area or equivalent*", confirm for this Standard that the required water quality volume (Standard 4) equals 1-inch times the total impervious area of the post-development site), and identify source controls to limit introduction of contaminants in runoff. A source control relating to traffic would be a prohibition on road salt.

[13] See Vanasse Associates traffic impact report for the project

Tetra Tech Response: Sections 3.4 and 3.5 of the Stormwater Management Report have been revised as requested.

PSC Comment: This comment has been addressed.

27. The Massachusetts SWH classifies porous pavement as unsuitable for LUHPPL areas (see p.118, V.2.Ch.2) however, since the proposed area is only for emergency access, the use might be considered acceptable as long as there are adequate provisions to prevent day to day use of the porous pavement route by residents exiting the parking garage. The Applicant needs to discuss with Town of Weston emergency services their preferences for installing an emergency access gate at both entrances to this proposed emergency access way.

    Tetra Tech Response: We would concur that the use of porous pavement is appropriate as it is only for emergency vehicle access. The Site Layout Plan has been updated with two locations proposed for gates and it is noted that the gate types shall be as approved by the Weston Fire Department.

    PSC Comment: This comment has been addressed.

Standard 6: Critical Areas. The Project Site does not fall within a Critical Area and compliance with this standard is not required.

Standard 7: Redevelopment Project. The Site is entirely altered and there is a substantial increase in impervious area, therefore the entire site development must be categorized as a new development, and full compliance with the Massachusetts Stormwater Policy is required (see SWH: V.1, C.1, item 2 under Standard 7, p.23). Compliance with Standard 7 is not relevant.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls: The Applicant has provided plans and instructions for erosion and sedimentation in the Site Development Plans (see sheets C-10, C-11 and C-17). However, we have recommended some additions to Sheet C-17 (see comment 24), and we also recommend the following:

28. Revise Sheet C-17 to add a note calling for the use of erosion control netting on all new or disturbed sloped areas until vegetation is established and slopes are stabilized.

    Tetra Tech Response: A slope stabilization detail has been added to Sheet C-17 that call for erosion control netting.

PSC Comment: We note that there is a "Slope Erosion Control Material" detail provided on Sheet C-17 that illustrates the installation of erosion control netting, however we continue to recommend that a note specifically calling for the "use of erosion control netting on all new or disturbed sloped areas until vegetation is established and slopes are stabilized" be included with this detail on Sheet C-17 and also be noted on the Erosion & Sediment Control Plans, Sheets C-10 and C-11.

The Stormwater Management Report correctly states that the Project will result in the disturbance of greater than one (1) acre of land and requires coverage under the U.S. EPA National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Construction Activities (CGP). The Applicant has indicated that prior to commencement of earth disturbing activities, a project-specific Storm Water Pollution Prevention Plan (SWPPP) will be prepared, and a Notice of Intent will be submitted to the EPA. However, as noted in comment 29 below, a SWPPP must be submitted along with a signed copy of EPA's NOI and approval letter as part of a Town of Weston Stormwater Management Permit (SWP) application. The Town's Stormwater & Erosion Control Regulations (SECR) allow a SWPPP that meets requirements of the NPDES General Permit to be equivalent to the Erosion and Sediment Control Plan that is required as part of their SWP application. Therefore:

29. We recommend that the Applicant prepare a SWPPP now, and submit it with a completed SWP as required by the Town's Stormwater & Erosion Control Regulations (see SECR Section 6.B.1)[14]. The SWPPP is a document that can always be updated in the future should contractors' means and methods change from those proposed by the engineer.

    Tetra Tech Response: The SWP and the Town's Stormwater & Erosion Control Regulations are not subject to review under the Wetland Protection Act. Also, the current

[14] SECR Section 6.B.1: "*If a project requires a Stormwater Pollution Prevention Plan (SWPPP) per the NPDES General Permit for Storm Water Discharges from Construction Activities (applicable to construction sites that disturb one or more acres of land), then the Applicant is required to submit a complete copy of the SWPPP (including the signed Notice of Intent and approval letter) as part of its application for a SMP. If the SWPPP meets the requirements of the NPDES General Permit, it will be considered equivalent to the Erosion and Sediment Control Plan described in this Section.*

NPDES Construction General Permit (which dictates the SWPPP requirements) is set to expire in February 2022 and a new permit issued, likely with additional requirements. The project is unlikely to break ground prior to the expiration of the current NPDES Construction General Permit. Therefore, we respectfully request that the preparation of the SWPPP be deferred until construction is ready to begin so that it can be prepared in accordance with the appropriate NPDES Construction General Permit Requirements. A copy of the SWPPP and evidence of NPDES coverage will be provided to the Conservation Commission Staff prior to construction.

PSC Comment: The Town's Conservation Commission and ZBA do have the option of honoring the Applicant's deferral request as noted above, however we continue to recommend that the Applicant prepare a SWPPP now, and submit it with a completed SWP as required by the Town's Stormwater & Erosion Control Regulations.

The Applicant has also indicated in the Checklist for Stormwater Report that a Construction Period Pollution Prevention and Erosion and Sedimentation Control has not been included in the Stormwater Report but will be submitted before land disturbance begins. However, because of the Towns SECR noted above, we have recommended this be addressed now (see comment 29 above).

Standard 9: Operation and Maintenance Plan. A long-term Pollution Prevention and Stormwater Operation and Maintenance Plan (O&M) has been submitted as part of the Stormwater Management Report (Appendix F). This plan needs to be amended as follows:

30. The O&M Plan needs to include recommendations for the level spreader that receives overflow from the infiltration systems prior to release to the wetlands.

    Tetra Tech Response: The O&M Plan has been updated include recommendations for the level spreader and the subsurface detention system.

    PSC Comment: This comment has been addressed.

31. The O&M Plan needs to include the additional recommendations for porous pavement as noted above in comment 23.

    Tetra Tech Response: The O&M Plan has been updated to include the additional recommendations for porous pavement.

PSC Comment: This comment has been addressed.

Standard 10: Prohibition of Illicit Discharges. An Illicit Discharge Compliance Statement has been submitted, and this Standard has been met.

Status of the Proposed Project per Town Stormwater Rules:

As noted in the first part of this letter, this peer review checks project compliance Weston's Stormwater and Erosion Control By-Law, and with applicable drainage / stormwater provisions of Weston's Site Plan and Land Subdivision Rules and Regulations as typically referenced during local Site Plan or Special Permit approvals. Town stormwater requirements will be applicable unless waived by the Weston ZBA or by a Commonwealth authority (e.g., HAC).

Weston Stormwater Regulations (SECR):

The Applicant's submittal does not include an evaluation of compliance with the Weston Stormwater Management Rules and Regulations. In our review, we have found several points of non-compliance with Weston SECR and an associated need for Applicant Response.

32. The Applicant may need to file for a Major Permit per Section IV.2, and a Major Stormwater Management Permit application needs to meet the requirements stated in the Town's 2-page application checklist. In reviewing the requirements of this, we find that the Applicant's existing submittals will probably meet all submittal requirements except for the following deficiencies:

    a. "*Locations of all existing bodies of water*": The Applicant needs to show the intermittent stream in its entirety past intermittent stream flag TOB11 to a point parallel to the southern extent of the Project Site. Currently the intermittent stream is only partially shown on the Site Plans (see Sheet C-2).

    Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

    PSC Comment: Our recommendation in Comment 32.a stands, subject to Town Board and legal review of the Applicant's position.

    b. "*All components of existing septic systems*": For this the Applicant needs to show any septic systems on two other abutting lots, one owned by Nardone and one

owned by Butera, and note septic system setbacks to proposed infiltration systems #1 and #2 in the north part of the Site.

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: Our recommendation in Comment 32.b stands, subject to Town Board and legal review of the Applicant's position. In addition to the need to show the neighboring septic systems per this Town rule, we have recommended an evaluation for mounding effects from stormwater recharge systems #1 and #2 to ensure that these abutters' septic systems and basements will not be impacted by the proposed stormwater recharge systems 1 & 2. Also see our response to Comment 21.f above.

c. "*Locations of all soil testing including test pits/deep holes, boring, and perc tests*": For this we recommend that the Applicant show all test locations on both the Existing Conditions Plan and the Grading and Drainage Plans within the Site Plans. (See comment 14.)

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: This comment has been addressed by the Applicant's response to Comment 14 above.

d. "*Show the foundation drain. Foundation drain is not to be connected to an infiltration system for stormwater*": See comment 22.

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: This comment has been addressed in part by the Applicant's response to Comment 22 above. However as noted previously, we believe the proximity of the underdrain (17-ft from, and 2-feet above) the bottom or Recharge Area #4 results in an effective connection of the foundation drain to the proposed infiltration system, and warrants the more detailed Modflow and HydroCAD analysis recommended in our responses to Comments 21 and 22 above .

e. "*An Erosion and Sediment Control Report shall be prepared in conformance with the Design Standards contained in Section 7.B*". See comment 29.

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: See our response to Comment 29 above.

33. The Applicant's submittals will probably meet all of the Design Standards stated in Section 6.0 of the Towns SECR regulations, except for the following:

a. SECR Section 6.A.2.d – "*The total volume of discharge as well as peak rate of runoff shall be evaluated at each control point. The analysis must demonstrate that the design achieves a net reduction of volume and peak flow rate in all design storms when comparing existing with proposed conditions*."

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: The Applicant's October 2020 stormwater report included a Table 4 that summarized their analysis of runoff volumes generated by the developed site: It indicated that post-development discharge volumes decreased for all storms except for a 7.7% increase in the 100-year volume at Design Point 2 (the wetland). However, the Applicant's most recent report (March 2021) does not contain a summary table for runoff volumes. Therefore, PSC checked the latest HydroCAD data for the revised design: This data shows pre- to post-development discharge volumes released to design point 2 (wetlands) will increase 13% for the 25-year storm (increase from 0.093-acre-feet to 0.105-acre-feet) and increase 84% for the 100-year storm (increase from 0.727-acre-feet to 1.338-acre-feet). The Applicant should address the increased volumes by modified design in order to comply with the Town stormwater bylaw requirement.

b. SECR Section 6.A.2.e. – "Non-typical curve numbers (CN) will be as follows":

i. *CN 80 must be used for porous pavement* - the Applicant has used 98 per the Massachusetts SWH and this would need to be discussed with the Town Stormwater Permitting Authority.

ii. "*The curve numbers that are applicable for Woods in Poor Condition….shall be used for new landscaped areas, based on the applicable Hydrologic Soil Group…*": In the Applicant's case, it appears that the CN value of 45 would be required for new landscaped areas and the HydroCAD model should be revised accordingly.

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: Our recommendations in Comments 33.b.i & ii above stand, subject to Town Board and legal review of the Applicant's position.

c. SECR Section 6.A.2.ii.c. – "*Unsuitable material is to be removed and replaced with suitable granular material for a distance of 2-ft. horizontally in all directions from the infiltration system; at a minimum, the A and B horizons shall be removed. The excavation for the infiltration system is to extend into the C-layer a minimum of 6-inches.*" See comment 11.a.

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: This comment has been addressed by the Applicant's response to Comment 11.a above.

d. SECR Section 6.A.2.ii.d. – "*Systems must be designed so that inspection and maintenance can be readily performed. All infiltration systems are to have inspection ports. The inspection ports are to be installed to finish grade*." See comment 7.

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: This comment has been addressed by the Applicant's response to Comment 7 above.

e. SECR Section 6.A.2.ii.f. – "*Foundation drains will not be allowed to connect to infiltration systems that were designed for stormwater*." See comment 22. It is

not known how the Town's Stormwater Permitting Authority would interpret the foundation drain that is proposed by the Applicant in their Hydrogeologic Evaluation Report and if it would be considered "connected" to the subsurface recharge areas under the garage floor. Our opinion is that any underdrains that would influence the mounding of groundwater should be considered "connected" hydraulically.

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: This comment has been addressed in part by the Applicant's response to Comment 22 above. However as noted, we believe the underdrain proximity to Recharge Area #4 results in an effective connection of the foundation drain to the proposed infiltration system, and warrants more detailed Modflow and HydroCAD analyses as recommended in our responses to Comments 21 and 22 above.

f. SECR Section 6.A.2.ii.g. – "*A cleanout with a sump or other structure with a minimum 2-ft. sump will be installed before all new infiltration systems*." See comment 7. It is not known how the Town's Stormwater Permitting Authority would rule on this however we have recommended access manholes as noted in comment 7, and such manholes could easily have a 2-foot sump specified.

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: This comment has been addressed by the Applicant's response to Comment 7 above.

g. SECR Section 6.B. – "*Approval of an Erosion and Sediment Control Plan by the SWPA is required prior to any site altering activity*." See comment 29.

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: Our recommendations in Comments 29 and 33.g above stand, subject to Town Board and legal review of the Applicant's position.

Planning Board Rules and Regulations as Applicable for Stormwater (PBRR):

The Applicant's submittals do not include an evaluation of compliance with Weston Planning Board Rules and Regulations regarding stormwater and drainage. The most applicable sections of the PBRR are ARTICLE IV. DESIGN STANDARDS, Section 4.19 Drainage; ARTICLE V. CONSTRUCTION STANDARDS, Section 5.09 Drains, Catch Basins, etc. In our review of the foregoing sections, we have found that the Applicant's submittals would be in compliance.

Town of Weston Rules and Regulations for Site Plan Approval

The Applicant's submittals do not include an evaluation of compliance with Weston's Rules and Regulations for Site Plan Approval regarding stormwater and drainage issues. Our review of the applicable sections of these rules (for stormwater and drainage) finds that the Applicant's submittals would be in general compliance, with the following exception:

34. Subsection 4.05 NATURAL SITE CHARACTERISTICS states: "*The plans shall show location of water resources including ponds, lakes, brooks, intermittent streams, vernal ponds, streams, flood plains and all proposed changes to these features*." For this the Applicant needs to show the intermittent stream in its entirety, past intermittent stream flag TOB11 to a point parallel to the southern extent of the Project Site. Currently the intermittent stream is only partially shown on the Site Plans (see Sheet C-2). See comment 32a.

Tetra Tech Response: Comments 32, 33 and 34 relate to local regulations and are not subject to review under the Wetland Protection Act.

PSC Comment: Our recommendation in Comment 34 stands, subject to Town Board and legal review of the Applicant's position. See also the first paragraph of this memorandum.