HANOVER COMPANY

March 3, 2022

Jane Carlson, Chair
Town of Weston
Zoning Board of Appeals
11 Town House Road
Weston, MA 02493

RE: *Hanover Weston* at 510, 518 and 540 South Avenue, Weston, MA ("Project")
Responses to Peer Review and Other Comments – Stormwater/Wastewater/Civil

Dear Chair Carlson and Members of the Board:

On behalf of 518 South Ave LLC, Hanover Company and our consultant team are pleased to present to the Town of Weston this compilation of responses on the above referenced topic. We have organized this submittal as follows:

1. **EXECUTIVE SUMMARY:** Reflecting Applicant's summary of findings and engineering approach to address the "big-picture" topics currently under review by this Board, and certain to be further reviewed by the Conservation Commission and Mass DEP, and likely to be further adjudicated at DEP OADR and Trial Court after appeal. With the perspectives of this Board and such future arbiters in mind, we have endeavored to be as clear and detailed as possible in outlining real solutions, compliant with all applicable regulations, well supported by good engineering, and most importantly fully protective of neighboring properties and resource areas. *Primary authorship of each section of this Executive Summary is noted.*

2. **RESPONSE MATRIX**: A detailed, point by point response matrix addressing the following peer review and abutter consultant letters.

   (a) PSC letter dated January 12, 2022
   (b) Patrick Garner letter dated January 14, 2022
   (c) J. Matthew Davis & Associates letter dated January 14, 2022 (see section 4 below)
   (d) Chessia Consulting, December 16, 2021
   (e) Scott Horsley letter dated June 2, 2021 (see Executive Summary & Section 3 below)
   (f) McDonald Morrissey Associates (MMA) letter dated January 2, 2022 (see section 4 below)

3. **NONESUCH POND**: Further response to the Horsley letter of June 2, 2021, by Dr. Thomas Ballestero, with specific attention to purported downstream impacts to Nonesuch Pond.

4. **MOUNDING**: Response to both Matt Davis and MMA letters, slides and testimony on Mounding by Founding Principal Charlie Head and Vern Kokosa, PE of Sanborn Head, and Dr Thomas Ballestero

5. **APPENDICES**: StreamStats Data and USDA Test Pit Logs

This response gives rise to plan modifications applicable to stormwater design (see executive Summary, Section II) which, along with all supporting data and revised ModFlow, will be duly filed with the Board in late March.

Copies of this response have been provided electronically to John Field for inclusion on the Town's website and distribution to peer reviewers and other interested parties. Likewise, we have copied counsel to the abutters. We look forward to further addressing these topics at the next scheduled hearing on March 8, 2022. Please contact me if additional information would be helpful in advance of the hearing.

Sincerely,
Hanover Company

David S. Hall
Regional Development Partner

cc. John Field
Jonathan Witten, Esq
Daniel Hill, Esq.
Luke Legere, Esq.

1. EXECUTIVE SUMMARY
Stormwater/Wastewater/Civil

I. **Seasonal High Groundwater Measurement for Mounding Model for Subsurface Recharge Area #1** *(by Dr. Thomas Ballestero and Robert Gemma, PE)*

Considerable discussion has taken place amongst the various experts relative to the appropriate Estimated Seasonal High Groundwater (ESHGW) elevation for Subsurface Recharge Area #1 based on the extensive soil testing conducted within the limits of the system. Despite the definitive soil test results and analysis performed within the limits of Subsurface Recharge Area #1, your peer review consultants, as well as the abutter's consultants, insisted that the ESHGW elevation should be based upon an older test pit evaluation that was outside and upgradient of the recharge area, and within an area of the site that was disturbed with an old tennis court. To definitively resolve this question, on February 9, 2022, we conducted yet another soil evaluation, excavating two test pits; one in the northwest corner of the recharge area and a second test pit in the former tennis court. The test pit within the confines of Recharge Area #1 re-affirmed the results of the other tests within the confines of the system, both in terms of soil type and ESHGW. This test pit evaluation was observed and confirmed by Patrick Garner on behalf of the Town, as well as Dr. Thomas Ballestero and Robert Gemma, PE. In addition, on this same day, another soil evaluation was performed in the clay tennis court proximal to the location of the two older test pits that reviewers Mobile and Davis believed should be included. As expected, this test pit encountered coloration within a buried subsoil layer below fill material that was not indicative of the ESHGW elevation preferred by these reviewers. The additional soil exploration previously mentioned in the footprint of the proposed infiltration system obviates the inclusion of any test pit information from the area of the clay tennis court and validates the ESHGW elevation used by the applicant for the stormwater Recharge Area #1 as 215.3 feet.

II. **Additional Stormwater Storage Chambers** *(by Nate Cheal, PE)*

Our findings summarized below on the mounding analysis indicate quite clearly that any concerns with respect the Project's potential impact on the adjacent resource area are remote, highly unlikely and of no consequence to water levels, water quality and flora & fauna within the resource area when compared to the pre-development condition. Nonetheless, Applicant has agreed to bear the significant additional expense of expanding the underground storage system along the west side of the building and adding two (2) additional stormwater storage chamber systems (at locations to be shown on plans) to once and for all ensure that the mound heights as modeled do not constitute any potential "break-out" condition on the bank above the resource area and the hydrology now mimics the pre-development condition (as witnessed during tropical storm Ida). In particular, the additional storage is provided upstream of the three (3) recharge systems. The additional storage slowly meters out stormwater prior to it flowing into the recharge systems. The recharge systems can operate over a longer period and infiltrate stormwater to groundwater in a uniform manner. Additionally, this design change renders other concerns raised by peer reviewers and abutters moot, as described below.

III. **Mounding Analysis Requirements** *(by Charlie Head, Vern Kokosa, PE, and Robert Gemma, PE)*

While we have discussed mounding methods during past public hearings, we reiterate here that the groundwater mounding analysis is required, under applicable MADEP design guidelines for small wastewater treatment facilities, to determine the surcharge on the water table that develops *under the wastewater soil absorption system (SAS),* for the sole purpose of demonstrating that a four-foot separation between the bottom of the SAS and the mounded water table is maintained.

Because the stormwater infiltration systems are designed with at least four feet of separation between the ESHGW elevation and the bottom of the stormwater infiltration systems, the Massachusetts Stormwater Handbook does not require a groundwater mounding analysis of the stormwater systems. The modeling of the stormwater systems was performed to calculate stormwater effects on the wastewater effluent mound.

We have, based on your peer reviewer's comments and in the spirit of cooperation, performed much more extensive groundwater mounding analyses than MADEP normally requires. These analyses extended far beyond what is typically required for Projects of a similar scope. These analyses looked specifically at the seepage line that would form under the design mounding condition downslope of the infiltration systems. We conclude that under the DEP-required design condition, there is no difference between pre- and post-development conditions at the edge of the wetland. The wetland will continue to function as it has pre-development during the design conditions required by DEP. We also analyzed the potential effects of building foundation and retaining wall foundations on the groundwater mound and conclude that retaining wall foundations and building foundations will have no effect on the groundwater mounding.

IV. **Stormwater and Wastewater Breakout** *(by Robert Gemma, PE)*

Previous hearings have devoted an inordinate amount of time to discussing the potential for and the impacts of water "breakout" along slopes, be it stormwater, treated wastewater, or some combination of the two. It should be recognized that the wetlands to the east of the site are wetlands because groundwater naturally breaks out here. The abutters' consultants, and to a lesser extent your peer reviewers, opine that if water indeed does breakout along a slope, it will flood the wetland and permanently alter the wetland hydrology, adversely impacting the flora and fauna of the wetland, or even down-gradient water bodies such as Nonesuch Pond. This is, in our opinion, an issue that is more manufactured than real, and is largely a red herring. There are several reasons that my team and I have reached this consensus:

First, the employed groundwater model was developed to estimate groundwater mounding impacts under the leaching field and stormwater systems and nearby, not to estimate groundwater levels at and near the wetland. To use the groundwater model to predict breakout (the model predicts a groundwater elevation, and that is compared to the ground elevation) is not suitable because a model boundary condition is too close to the location where seepage estimates are desired: groundwater predictions proximal to a boundary condition primarily reflect the boundary condition. While our experts have adjusted the MODFLOW model to better represent the wetland locations, the model does not simulate the varying watershed surface runoff inflows of stormwater runoff from a large watershed to these same wetlands during these same design events.

Second, any consideration of wetland hydrology and long-term changes should focus on the common infiltration characteristics of the proposed site. The inspection of the extreme conditions in the assessment of break-out is far from a common event and is not representative of long-term wetland hydrology. Under the prior design (e.g., no additional storage) to the extent that any water breakout along a slope would have occurred, it happens for a few hours during an extreme storm event, the 10-year, 24-hour storm, during very high groundwater conditions that are maintained fictitiously high for 90 consecutive days, all during a period of very high wastewater flow. Under even this extreme condition, it could result in the release of a few thousand gallons of water (less than 0.01 acre-feet) into a wetland body that has an approximate area of 12-acres, that can store up to 35-acre-feet of water. The resulting increase in the water level within the wetland from such an occurrence is approximately 1/64th of an inch. And, as noted, this condition is incredibly rare. Clearly, this would have imperceptible impact on the wetland hydrology and the health of the wetland plant community because it is an extremely rare occurrence: the use of this extreme event is solely to understand mounding of groundwater at or near the infiltration systems and not for wetland hydrology. However, if this breakout is considered unacceptable, adding stormwater storage to the site, and allowing the stormwater to flow to the infiltration areas in more than 60 hours, completely removes any such breakout.

Third, any such water breakout (again, under the prior design) would have had no impact on downstream water quality, including Nonesuch Pond by the Rivers School Campus. Mr. Scott Horsley, a consultant to the abutter's group, has opined, without providing any substantive analysis, that water breaking out of the slope will be nutrient-laden because of the wastewater treatment plant, and will result in adverse impacts to Nonesuch Pond. To bolster this argument, Mr. Horsley states that the discharge from the plant, at 25,000 Gallons per Day (GPD), dwarfs the negligible low flows in the intermittent stream that occur during summer months, thereby polluting the stream with phosphorus and nitrates. This is a preposterous argument, one that uses an apples and oranges comparison to reach a flawed conclusion. As noted earlier in this discussion, any water breakout that occurs happens during a rare, extreme event, the ten-year year storm, and only for a few hours during that event. The stream flow during that event is not, however, a trickle, as the flow in the stream for a 10-year storm is 46 cubic feet per second (CFS), or 29,741,760 GPD. Thus, when a 10-year storm event occurs, the flow from the wastewater plant is equal to 0.09 Percent of the stream flow. Even were all the treated wastewater to break out of the slope and flow into the stream, the concentration of phosphorous and nitrates would be diluted beyond detection. It is also of note that when the stream is in a low flow, summer condition, groundwater levels are also at their lowest, so water breakout along a slope is not a legitimate concern.

Fourth and finally, despite our concerns that the review of groundwater mounding has entered into a unprecedented level of micro-management, we have further adjusted our stormwater management design to further mitigate any potential impact, real or alleged, from the wastewater and/or stormwater systems. Specifically, we have adjusted the flow distribution from the Project impervious surfaces to the three infiltration systems to limit the mound development under each of the infiltration systems. Additionally, and at great expense, we have added sub-surface storage tanks that will detain stormwater water and allow discharge to the infiltration systems over a longer period of time. This reduces the peak rate of stormwater discharged into the infiltrations systems and in turn reduces the groundwater mound height that develops. While our consultants are of the opinion that this “belt and suspenders” approach is unnecessary, we have included this component as one more indication of our commitment to address concerns raised during the public hearing.

V. **Setbacks & Compliance with Applicable Regulations** *(by Robert Gemma, PE)*

Mr. Chessia, a consultant retained by the abutters has consistently misstated governing regulations, asserting that the Project design fails to meet MADEP regulatory requirements for setbacks to wastewater absorptions systems and stormwater infiltration systems. In particular, he has asserted that guidance provided in “Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal” are regulations that must be met in order to comply with MADEP requirements. This is simply false. The referenced document is purely guidance and does not carry the weight of regulations. Our attorneys direct the Board to *Northbridge v. Natick, et al.*, 394 Mass. 70, 76 (1985), in which the Supreme Judicial Court held that while an administrative agency has the power to set guidelines “such policy statements do not have the legal force of a statute or regulations.” Moreover, the Housing Appeals Committee has held that DEP’s guidance documents are state standards and are not local requirements and thus are not a local concern outweighing the need for affordable housing. *See Matter of Weiss Farm Apartments, LLC and Town of Stoneham Zoning Bd. Of Appeals,* HAC No. 2014-10, slip op. at 31 (March 15, 2021).

The setback requirements for wastewater leaching field, or soil absorptions systems (SAS), are set forth in 314 CMR 5.00 and 310 CMR 15.00. The Project as proposed is fully compliant with these regulations without exception. Moreover, compliance with these regulations will be reviewed and conditioned by MADEP, the permitting authority for the wastewater treatment system.

Similarly, Mr. Chessia misstates the regulatory status of the MADEP Stormwater Management Handbook (SMH). The SMH is also a guidance document and does not carry regulatory weight. The Regulatory requirements for Stormwater Management are provided in 310 CMR 10.05 (6), and they do not include the guidance document setback requirements that Mr. Chessia refers to as regulations. Mr. Chessia has simply mis-represented this issue to the Board. Our design will fully satisfy the stormwater regulations stipulated in 310 CMR 10.00, without exception.

VI. **WWTP and Soil Absorption System Design** *(by Todd Chaplin, PE and Robert Gemma, PE)*

The WWTP and its associated subsurface sewage absorption system (SAS) will fully comply with the requirements of 314 CMR 5.00 (Groundwater Discharges) and 310 CMR 15.00 (Title 5). The plant will be a modern, state-of-art system that will be both permitted and monitored by MADEP. The plant will meet discharge permit limitation for nitrates of 10 PPM. Phosphorous discharge is another red herring issue raised by abutters; phosphorous discharged in a SAS binds with soil particles and does not pose a threat to nearby receiving waters.

As has been stated numerous times, for this Project to move forward, MADEP must review the plant and SAS design and issue a permit with discharge limits that protect the environment. This is a state-level permit, not subject to review during the comprehensive permit proceedings with the ZBA.

VII. **Wetland Alteration** *(by Robert Gemma. PE)*

Wetland impacts from potential water breakout along the slope above the wetland were discussed in Paragraph III. Adding a bit more context to that discussion, we note that the watershed contributing flow to the intermittent stream/wetlands, at the southerly end of this property, has an area of about 262-acres, compared with the Project area of 9.5-acres. The Project site thus constitutes less than 4 percent of the contributing watershed. Within the Project site, approximately 6.5-acres will be altered by the Project and the remaining 3-acres will remain untouched. The Project will only impact approximately 2.5 percent of the contributing watershed, measured at the terminus of the property.

Rainfall over the watershed remains constant over the watershed in both the pre-development and post-development conditions. Assuming an annual rainfall of about 44-inches, the precipitation water supplied to the watershed is 961-acre-feet of water annually.

The stormwater management systems have been designed so that groundwater recharge and surface water runoff in the pre- and post-development conditions are closely matched.

The only variable, therefore, that can alter wetland hydrology is the additional water introduced into the watershed by the Project's wastewater, which is a derivative of the potable water supplied by the MWRA system via the Norumbega Covered Storage Reservoir. This water is in essence a cross-basin transfer from the Connecticut River basin to the Charles River Basin.

On an annual basis, the wastewater plant will divert 28-AF of water into the watershed, an increase in the hydrologic budget of 3 percent. This water, through the SAS, is directed into the ground to replenish groundwater supplies, rather than as a direct surface discharge. However, if one made the absurd assumption that the SAS completely failed and all treated wastewater ran over the ground surface and into the wetland daily, this will divert 3342 cubic feet of water per day into the wetland system. The water elevation within the wetland is controlled by a hydraulic culvert located on a private driveway at 451 Wellesley Street. The wetland area above the controlling culvert is approximately 12.1-acres. With this total failure of the wastewater SAS, water levels within the wetland would rise by 0.076-inches, or 1/132 inches. Clearly this is an unmeasurable and undetectable impact.

Also worthy of consideration is the fact that nearly every residential and commercial property in Weston receives its potable water from the MWRA system. As a result, every time a water tap is turned on in Weston, a cross-basin water transfer occurs, subtracting water from the Connecticut River basin and adding water to the Charles River basin. The Hanover-Weston Project is therefore not unique in this regard.

VIII. **Project Scale in the Context of Nonesuch Pond** *(by Robert Gemma. PE. See also Ballestero letter, section III)*

Mr. Horsley, a consultant to the abutters, has repeatedly raised the question of potential impacts of this Project on Nonesuch Pond. He has done so with speculative theories that have lacked substantive data and supporting analysis.

To put this question in context, my team has reviewed the scale of this Project within the Nonesuch Pond watershed.

The Nonesuch Pond watershed, measured at the outlet of the pond into Bogle Brook at Winter Street, has an area of 2.97 Square Miles (SM) or 1901 acres. The Project site, at 9.5-acres, constitutes 0.5 percent of the contributing watershed.

The annual precipitation water supplied to the watershed, again based on an annual rainfall of 44-inches, is 6970 acre-feet of water. The Project site contributes 35 acre-feet of water, or 0.5% of the flow into Nonesuch Pond.

The watershed is presently 47.3 percent urbanized, which translates to approximately 899-acres of impervious area within the watershed. The Hanover-Weston Project will add about 3.7-acres of impervious area to the watershed, an increase of about 0.4 percent.

Within the urbanized areas are the Weston High School and Middle School Complex, The Rivers School Complex, a portion of the Regis College Campus, the Massachusetts Turnpike Maintenance Facility and the affordable housing Project at Dickson Lane. These properties all have more impervious area than is proposed for the Hanover Project. Within this watershed is also 2.1-miles of Interstate-90, which contributes about 24-acres of impervious area, area that is a major contributor of road-based pollutants. Additionally, the Weston public school facility has a wastewater treatment plant with a SAS.

Beyond these large complexes, the watershed is home to several hundred single family homes, large and small. These homes all have some type of SAS for wastewater disposal. While the newer homes have Title 5 compliant septic systems, there are still many homes with failing cesspools. It is well established in published scientific studies that single family septic systems are a major contributor to surface water quality degradation, certainly much more so than highly regulated and monitored WWTPs.

If Mr. Horsley's speculative assertions on water quality are to be taken seriously, he should submit a quantitative analysis that considers not only the Hanover Project, but also the existing contributors to water quality degradation including impervious areas that lack stormwater controls, existing wastewater plants and existing septic systems. Without such a quantitative analysis, Mr. Horsley's comments remain purely speculative. As your Board is certainly aware, testimony from experts must be grounded in fact, not speculation.

IX. **Neighbors Yards/Basements** (*by Charlie Head and Vern Kokosa, P.E.)*

The current groundwater model demonstrates no material rise in groundwater levels under neighbor's homes due to the post-development conditions that is different than pre-development conditions. Mounding shown by the model under neighbor's basements is due to the application of the 10-year storm; the rise in groundwater levels is no different than was measured during a natural event such as Tropical Storm Ida (which was about a 10-year storm). Our conclusion about mounding on the property immediately adjacent to the Project site referenced in Section 4.3.3 of Sanborn Head's November 22, 2021, Groundwater Model Report remains unchanged – the groundwater mound stays 1.5 feet or more below the ground surface.

RESPONSE MATRIX
Stormwater/Wastewater/Civil

(Matrix Attached)

2. NONESUCH POND

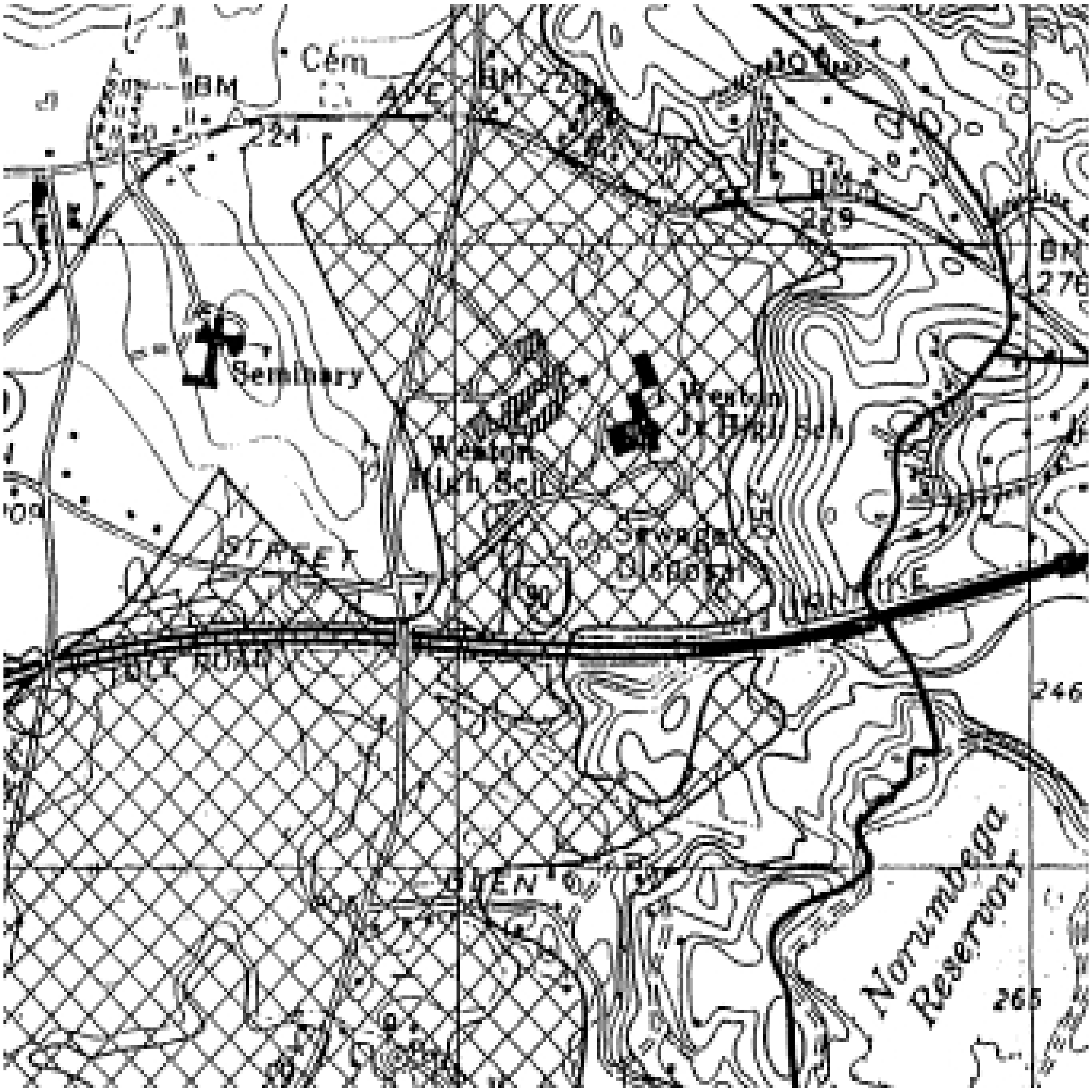
Response to Horsley letter dated 2 June 2021
Thomas P. Ballestero, PhD, PE, PH, PG, CGWP
25 February 2022

This Horsley letter addresses potential consequences to Nonesuch Pond resulting from the infiltration of treated wastewater effluent at the proposed 518 South Avenue site. In addition, the letter addresses some more global issues with the infiltrated treated wastewater from the 518 South Avenue proposal.
An estimated travel time in Bogle Brook from the 518 South Avenue site to Nonesuch Pond is reported as 4 hours, however no supporting documentation is provided. This estimate conflicts with other assumptions made in the letter, to be discussed later. Groundwater flow is described as moving from the site, and southerly under the Massachusetts Turnpike and then westerly to Nonesuch Pond. Again, no supporting documentation is provided to support this statement aside from a sketch on a USGS topographic map on the second page of the document. In peer-reviews such as this, the same level of effort and documentation should be held for the peer reviewers as for the applicant.
The letter then goes on to introduce harmful algal blooms and in the same paragraph mentions Nonesuch Pond. No information is provided for nutrient concentrations in Nonesuch Pond or if harmful algal blooms have ever occurred on the Pond. The Massachusetts impaired waters list was reviewed for the last two reporting periods (2016 https://www.epa.gov/sites/default/files/2020-01/documents/2016-ma-303d-list-report.pdf and 2018-2020 https://www.epa.gov/system/files/documents/2022-02/2018-2020-ma-303d-list-report.pdf). Bogle Brook is not listed as impaired. Nonesuch Pond is listed as impaired: the impairment is not nutrients but rather non-native aquatic plants (curly leaf pond weed).
Horsley notes that harmful algal blooms are becoming problematic throughout the Commonwealth and more than likely caused by excessive amounts of nitrogen and phosphorus (nutrients). He then states" *The concentrations of these nutrients in Nonesuch Pond are dependent upon upstream sources including discharges of wastewater and stormwater*". Which is in part true, but he fails to mention that the Nonesuch Pond nutrients are also derived from land uses on the shores of the Pond itself as well as in and on the pond itself (legacy Phosphorus in the sediments, atmospheric deposition, birds. Horsley fails to distinguish between total Phosphorus (TP) and soluble reactive Phosphorus (SRP). This is very important because although regulations my be promulgated on TP, it is SRP that is most associated with eutrophication in ponds and lakes.
Horsley then goes on to describe his Phosphorus loading assessment from the 518 South Avenue site to Nonesuch Pond. The analysis presented in severely flawed. To begin with, the 518 South Avenue site treated wastewater effluent is infiltrated into the ground, and the ground has a very high capacity of absorption of Phosphorus (Ryden and Pratt, 1980 https://hilgardia.ucanr.edu/Abstract/?a=hilg.v48n01p036). This means that the Phosphorus concentration used by Horsley (4 mg/l) is unrealistic. Horsley uses the design flow for his

analysis (38,000 gallons per day), which is incorrect: the design flow is 33,000 gallons per day. However, the design flow should not be used in an analysis like Horsley's because the design flow is an uncommon high flow event, rather the average flow should be used, and that is 22,000 gallons per day. To continue with his analysis, Horsley then uses the 7Q10 flow as a flow to compare to the wastewater discharge: this is an "apples to oranges" comparison. Bogle Brook next to the 518 South Avenue site is an intermittent stream: there is no flow in the intermittent stream at the 518 South Avenue site at very low flows. The 7Q10 value that Horsley uses for his Phosphorus analysis is a 7Q10 from a Streamstats effort presented to the Weston Conservation Commission and this streamflow is 0.00586 cfs. Horsley then takes the inflated treated wastewater flow and mixes it with the 7Q10 flow. Horsley's error here is that the infiltrated treated wastewater does not all flow into Bogle Brook at the site, rather it is almost entirely underground: moving and mixing with all other groundwaters in its flow towards Nonesuch Pond and not flowing into Bogle Brook as Horsley insinuates. Horsley presents no documentation to support this assumption. As a result, the completely mixed Phosphorus loading to Nonesuch Pond, presented by Horsley, is fiction. If Horsley's analysis had any semblance of reality associated with it, the other, already existing treated wastewater infiltration systems in the watershed would have already driven Nonesuch Pond to eutrophication, and this has not happened.

To continue with his example, Horsley then uses EPA guidance for Phosphorus concentrations in streams and lakes. Horsley states in his letter that, "*The U.S. Environmental Protection Agency has established a standard of 0.050 mg/liter for freshwater streams (USEPA, 1986) and 0.084 mg/liter for lakes (USEPA, 1999)…* ". What Horsley failed to present from the document he cites (EPA, 1986 https://www.epa.gov/sites/default/files/2018-10/documents/quality-criteria-water-1986.pdf) is that at the very beginning of the Phosphate Phosphorus section it states, "*Although a total phosphorus criterion to control nuisance aquatic growths is not presented, it is believed that the following rationale to support such a criterion, which currently is evolving, should be considered*." EPA has not set a Phosphorus standard for freshwater or lakes. There is only guidance. In the Commonwealth of Massachusetts, the guidance for water quality is 13 CMR 4 (https://www.epa.gov/sites/default/files/2014-12/documents/mawqs-2006.pdf). In this guidance, water quality limits are developed by drainage basin. Bogle Brook is in the Charles River Basin, the only established water quality criteria in the Charles River watershed is for copper. Horsley focuses his analysis on Bogle Brook Phosphorus concentration without touching on the fact that Bogle Brook is in the Charles River watershed and therefore subject to the Upper/Middle Charles River Total Maximum Daily Load (TMDL) criteria for Phosphorus (EPA, 2011). It is in the TMDL context that Mr. Horsley should be presenting his Phosphorus analyses. Horsley requests a detailed Phosphorus analysis based upon his faulty presentation, as noted previously. Factually, the treated wastewater infiltration is subject to the permit granted to the facility by MA DEP. Horsley presents no evidence that there is an existing or pending Phosphorus issue in Bogle Brook or Nonesuch Pond. The most likely source of groundwater Phosphorus to Nonesuch Pond are groundwaters in closest proximity to the Pond itself, including other wastewater disposal systems, due to the fact that with a short travel distance through soil, little of the subsurface Phosphorus would have been absorbed by soils. In addition, the other direct inputs of Phosphorus to the Pond are from: atmospheric deposition, highway runoff, and birds. Without this watershed context or providing documentation, Horsley's comments are hollow.

Horsley mentions that the groundwater flow path from the 518 South Avenue site crosses the Weston Aquifer protection district. Horsley's concern is that the aquifer is, "… *a potential drinking water supply area*…" As the 518 South Avenue site is on the northwest fringe of this district, it is not the optimal location for a community water suppl well. If the concern is that the infiltrated treated wastewater would flow eastward towards a more logical location for a community water supply well, this reverses Horsley's hydrogeologic conceptual model previously presented in his letter: earlier, when discussing Phosphorus, the infiltrated treated wastewater would discharge to the stream, yet now for this aquifer concern the water would flow past the stream to recharge the aquifer on the other side of the stream. In ambient settings (without pumping or excessive hydraulic stresses) Bogle Brook acts as a barrier to groundwater moving from one side of the stream to the other. Therefore the scenario Horsley posits of the treated wastewater is conceptually unrealistic. The most logical place for a community water supply well is south of I90 between Winter Street and Wellesley Street. A portion of this aquifer protection district may be found in the following figure. Horsley failed to recognize in his letter that the high school and junior high school wastewater (2017 MA groundwater discharge permit 629: 28,900 gpd flow) is disposed of into this same aquifer protection district.



Horsley then switches from nutrients in the infiltrated wastewater to per- and poly-fluorinated substances (PFAS and PFOS), "…*may also contribute a range of so-called "contaminants of emerging concern". The contaminants include pharmaceuticals, flame retardants, and per- and polyfluoroalkyl substances (PFAS) that are showing up in groundwater and surface waters*." Horsley presents no documentation to support this speculative claim, and as such this is another hollow claim. If this is truly a concern, the Town may certainly add as a condition of approval that all efforts shall be taken to use products for the construction of the site structures that are free of these contaminants. Horsley then asserts without any documentation that, *"…These contaminants are derived from human wastewater and can reach unsafe concentrations in higher density (concentrated) developments with wastewater discharges*." In the first place, these contaminants are not derived from wastewater, rather, they move via various pathways then contaminants enter the wastewater stream. The most common sources of PFAS/PFOS are: Drinking water; Soil and water at or near waste sites; Fire extinguishing foam; Manufacturing or chemical production facilities that produce or use PFAS; Food; Food packaging; Household products and dust; Personal care products; and Biosolids (source: https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas). Note that biosolids (the sludge remaining after wastewater treatment is a source of PFAS, however wastewater is not listed. Nor has EPA promulgated regulations or action plans for domestic wastewater whereas it has embarked on rulemaking for wastewater from PFAS manufacturers (source: https://www.epa.gov/newsreleases/epa-announces-plans-new-wastewater-regulations-including-first-limits-pfas-updated). The biosolids from the 518 South Avenue wastewater treatment facility are to be disposed of offsite and therefore do not pose as a risk to Bogle Brook. In the second place, Horsley provides no documentation that PFAS concentrations are related to site density. Horsley's statements about PFAS in treated wastewater at the 518 South Avenue site are grossly misleading.

To conclude, Horsley employs faulty logic and methods to insinuate that the infiltrated treated wastewater at the 518 South Avenue site will adversely affect Nonesuch Pond, all the while completely ignoring all other nutrient sources in the watershed draining to Nonesuch Pond. Horsley seizes on a known worldwide contaminant, PFAS and PFOS, and then implies that the 518 South Avenue Project will produce large quantities, without providing any evidence or supporting documentation.

Response to:
MMA Comment Letter of January 3, 2022, and
J. Matthew Davis Memo of January 14, 2022

MMA Observation 1: MODFLOW mounding simulations suggests proposed, post - development conditions will create a new mixed groundwater and septic effluent breakout condition (i.e., mounding exceeding local land surface elevation) that would not occur under a comparable, predevelopment scenario.

Davis Issue #3: Lacking Breakout Analysis
It is recommended that the applicant assess breakout in the areas that will be filled, using post-development design elevations. And it is recommended that the applicant assess the potential for groundwater seepage between the retaining wall to the east of the Primary Leach Field and the wetland boundary.

The mounding analysis has been updated to assess groundwater seepage into the wetland. The following changes were made:

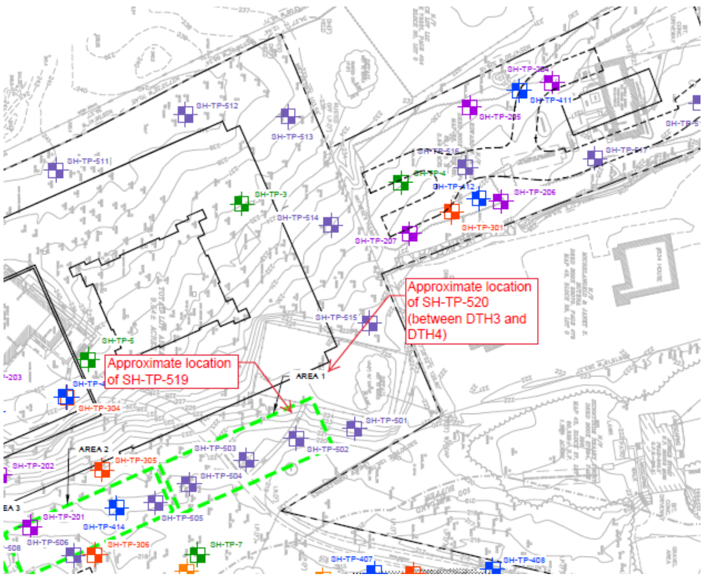
- The drain boundary to the east of the site was changed to a constant head boundary coincident with the stream within the wetland and the no flow boundary was expanded slightly so there is no flow west of the stream constant head boundary.
- Small adjustments were made to reflect post-development impervious areas more accurately.
- Stormwater infiltration rates were adjusted to reflect hydrographs accounting for the addition of stormwater storage; and
- Based on subsequent verification model runs, the specific yield of the zones representing the sand and the transition between the sand and the till were adjusted from 0.125 to 0.1 and from 0.1 to 0.08, respectively, to better match the model outcomes with the observed groundwater response to Tropical Storm Ida.

An updated calibration plot and model matches to the observed Ida response are are to be presented in slide format at the March 8 continued public hearing.

Based on updated model simulations, and assuming a design condition of 80% treated wastewater loading for 90 days plus the addition of a 10-year storm event at day 90 added to the Estimated Seasonal High Groundwater (ESHGW) table, a groundwater seepage face will form at the wetland boundary and will dissipate over a few days' time. This is the same seepage condition predicted by the model for the pre-development condition if Tropical Storm Ida had occurred during seasonal high groundwater.

Conclusion: Under the DEP-required design condition, there is no difference between pre- and post-development conditions at the edge of the wetland. The wetland will continue to function as it has pre-development during the design conditions required by DEP.

MMA Observation 2: Certain relevant information appears to be excluded in estimating starting groundwater conditions near the proposed stormwater infiltration areas. Including this information suggests the analysis is not successful in demonstrating these areas will function reliably and/or in a manner consistent with how they have been modeled.



Davis Issue #1: Use of ESHGW Data in Analysis

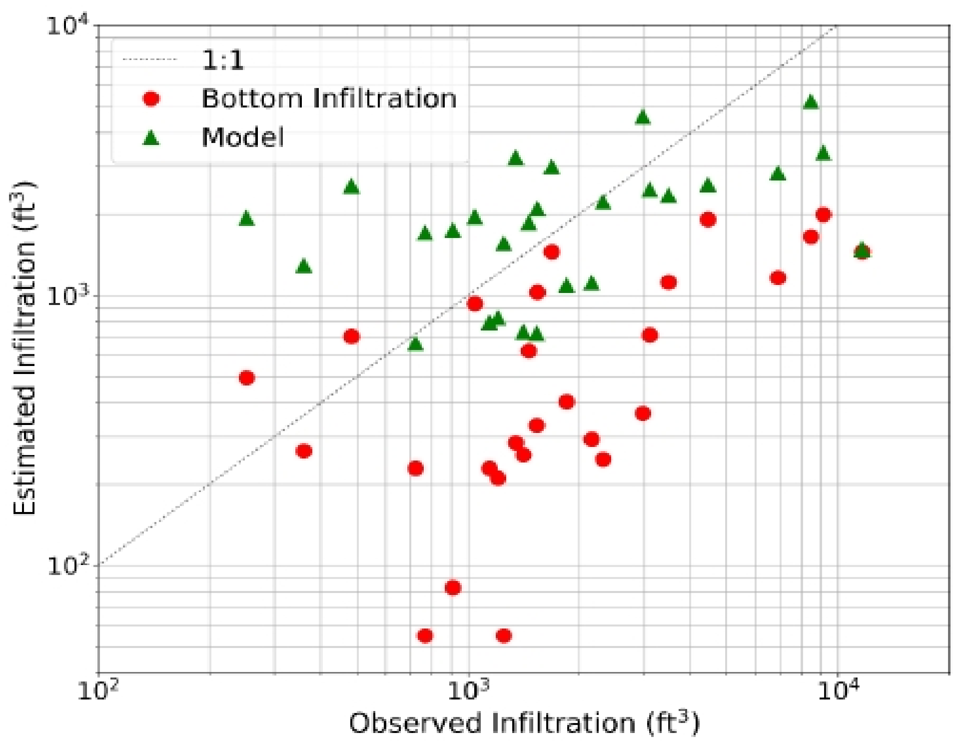
On February 9, 2022, two test pits were excavated by Wellesley Contracting, Inc. in locations shown on the site sketch below. The test pits were observed and logged by Luke Norton, P.E. of Sanborn Head, a certified Soil Evaluator in Massachusetts. The test pits were also witnessed by the Town of Weston's peer reviewer, Patrick Garner, plus representatives of the applicant, including Dr. Thomas Ballestero and Robert Gemma, PE.

Test pit TP-519 was excavated in the northwest corner of the proposed stormwater infiltration Area No. 1. This test pit encountered soil conditions like other test pits excavated in Stormwater Area No. 1. Groundwater was encountered at 126 inches below grade, or about elevation 212.5 feet consistent with groundwater observations in other test pits and monitoring wells in the stormwater infiltration area. Test pit logs are attached.

Test pit TP-520 was excavated in the former tennis court area between previous test pits DTH-3 and DTH-4 and encountered soil conditions like other test pits excavated in Area No. 1. Further, observations in test pit TP-520 indicated that redoximorphic features and coloration were at the level of buried subsoil associated with tennis court construction, and not estimated seasonal high groundwater (ESHGW). Groundwater was not encountered to a depth of 6 feet.

Previously, the applicant used an ESHGW level of elevation 215.3 for design of proposed Stormwater Area No. 1 based on redoximorphic features observed in test pit TP-503. Test pit TP-503 is located inside the proposed Stormwater Area No. 1 area about 60 feet to the south of the recently excavated test pit TP-519. Soil conditions in test pit-503 were observed to be very similar to test pit TP-519 and groundwater was encountered in test pit TP-503 at about 212.2 feet, consistent with observations in test pit TP-519.

Reviewers were concerned about mounded groundwater growing into the stormwater infiltration areas and that this would limit their ability to infiltrate water. The reality is that while for design, only infiltration out the bottom of a system is employed as a metric to be conservative in sizing systems, the reality is that during the real performance of these systems a very significant portion of infiltration in subsurface stormwater infiltration systems occurs out the sidewalls. Therefore, during the short period of time in the extreme storms that such mounding occurs in the infiltration systems, their performance will not be diminished. To support this conclusion, below is a figure that shows the actual infiltration observed in a stormwater infiltration system and that was estimated using a model. The solid black line is the line of perfect agreement. The red dots are points plotted using a model that only allows infiltration out the bottom of the system and the green triangles are the points plotted when using a model that allows sidewall and bottom infiltration. This system is in a soil with lower permeability than the soil at the 518 South Avenue site. As is evident, in general bottom infiltration underpredicts the infiltration volume. Particularly with large storms (the points at the right of the plot), the larger the storm, the more water moves out the sides rather than the bottom. This is because with small storms, the water does not pond high enough in the system to even have the ability to flow out the sides. For the large storms, when water is able to pond in the systems, well over half of the infiltrated water flows out the sidewalls of these systems.



Comparison of measured versus modeled stormwater infiltration (Macadam, 2018: https://www.unh.edu/unhsc/pubs-specs-info)

Conclusion: An ESHGW level of elevation 215.3 feet is still considered the appropriate basis of design for Stormwater Area No. 1.

Observation 3: Retaining walls and associated impermeable liners that are components of the proposed design may significantly affect and locally increase groundwater mounding under post-development conditions. No information has been provided to demonstrate mounding interference will not occur, as has been assumed in the MODFLOW model.

Davis Issue #2: Disconnect between Pre-development vs. Post-development; Impact of Structures on Mounding
It appears that the retaining walls will impact the groundwater flow, though these effects have not yet been accounted for and it appears that the retaining walls will impact the groundwater flow, though these effects have not yet been accounted for.

The groundwater mound formed under the design condition after the addition of stormwater storage does not encroach on building or retaining wall foundation elements.

Conclusion: Retaining wall foundations and building foundations will have no effect on the groundwater mounding.

4. APPENDICES
StreamStats / Test Pit Logs / Wall Details

PDF
StreamStats-518Sou
thAve.pdf

PDF
StreamStats-Nones
uchPond.pdf

PDF
20220209 USDA
Test Pit Logs.pdf

PDF
Typical Stone
Strong Retaining Wall Details.pdf