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

RE: Weston 518 South Avenue Proposed Development

Dear Zoning Board of Appeals Members:

I am writing this letter in response to Tom Ballestero's March 25, 2022 letters. I will respond to his comments in order. My goal is to clarify the facts and principles and to reference the applicable regulations and guidelines. This letter addresses four issues: (1) hydrological impacts to wetlands, (2) post-development water table conditions, (3) water quality impacts, and (4) Board of Health regulations.

1. Hydrologic Impacts to Wetlands: Ballestero suggests that "Horsley presents no information on what constitutes an adverse impact". I have carefully referenced the state-required performance standard for wetland impacts in my prior comment letters on multiple occasions. The standard is clearly stated in the MA Stormwater Handbook, Volume 3 (page 28). Once again, the Handbook states, "*Mounding analysis is required when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four (4) feet and the recharge system is proposed to attenuate the peak discharge from a 10-year or higher 24-hour storm (e.g., 10-year, 25-year, 50-year, or 100-year 24-hour storm). In such cases, the mounding analysis must demonstrate that the Required Recharge Volume (e.g., infiltration basin storage) is fully dewatered within 72 hours (so the next storm can be stored for exfiltration). The mounding analysis must also show that the groundwater mound that forms under the recharge system will not break out above the land or water surface of a wetland (e.g., it doesn't increase the water sheet elevation in a Bordering Vegetated Wetland, Salt Marsh, or Land Under Water within the 72-hour evaluation period)*"¹. (MSH v. 3, p. 28)

The applicant's MODFLOW model has provided several iterations of predicted water level rises in the adjacent wetlands. The first modeling report (March 19, 2020) showed significant water level rises in the wetland but omitted any discussion of these impacts. It is unclear if the applicant was aware of the location of the stream at this time as the stream was not shown in the application to DEP for the hydro study. This model also suggested groundwater flowed

¹ This reference was first provided in August 19, 2020 (some 19 months ago). At this point in time the applicant did not even identify the stream in the project site plans, even though it is highly visible on aerial photographs, USGS topographic maps, and the Town of Weston's website.

upgradient in a northeasterly direction, clearly inconsistent with expected regional flow southeasterly towards the stream.

In the subsequent iteration of the model (August 19, 2021) the applicant included a cross section that purported to show that groundwater mounding did not raise the water levels in the wetland below the wetland surface and stipulated this as evidence of no impacts. However, this model was determined to be flawed and had to be revised.

The revised report (November 2021) indicated a groundwater mound of +2.4 feet at the wetland boundary and indicated a breakout above the land and wetland surface. However, the report omitted an updated cross section (similar to the previous Figure 15) and the applicant suggested that the model cannot be relied upon to evaluate wetland impacts in this area. They therefore argued that model results showing breakout should be ignored.

The current model (March 25, 2022) continues to show breakout in the wetland. It predicts a 1.4-foot water table rise at the wetland boundary (SH-WP-105) for post-development conditions (see Table F-2). This level is above the wetland surface at this location and shows a breakout within the wetland².

The applicant is now suggesting that this type of breakout is acceptable because it occurs under existing conditions during the 10-year storm. In an attempt to justify this position, they monitored water levels during the storm Ida and suggest that this is representative of a 10-year storm under existing site conditions. However, the data presented in the March 2022 modeling report shows only a 0.77-foot rise at the wetland boundary (SH-WP-105) under pre-development conditions, which maintains water levels **below the surface (with no break out)** during the September 1 -2 storm Ida. Although this rise was insufficient to result in a surface break out at the wetland boundary under existing site conditions, under post-development conditions the model shows a net increase in groundwater mounding during the 10-year storm that results in a breakout within the wetland. Despite the clear regulatory requirements quoted above and several requests from the town and the town's peer review consultant, no analysis of the 100-year storm has been provided by the Applicant.

Breakout of stormwater under post-development conditions conflicts with the MADEP Stormwater Handbook requirement as stated above. This is of particular concern for this project in that the stormwater infiltration system is immediately adjacent to the wastewater disposal area and, as a result, would likely be a breakout of a mixture of both stormwater and wastewater discharges.

Ballestero also suggests that the resulting higher water tables associated with the groundwater mounding will add to "fringe wetlands" resulting in wetland boundaries migrating landward. If this is true it would further compromise setback distances from the proposed wastewater

² I defer to Dr. Mike Mobile for further evaluation of the validity of the revised groundwater model.

discharge. It may also impact abutting properties by compromising buildable upland areas and required setbacks.

2. Post-Development Water Table Conditions. It appears that Ballestero misunderstands my comment on this issue. His letter states, “the model starting water elevations for the design storm is a high groundwater table that is maintained for 90 days, 90 days of a high rate of treated wastewater infiltration, and then a 10-year, 24-hour storm. This is incorrect. The post-development “starting” water table conditions result from not only the wastewater discharge but the post-development stormwater recharge, prior to the design storms.

The post-development higher water table conditions are a direct result of three factors. First, water is being imported to the site (from an off-site water supply) then discharged as wastewater on-site. Second, the project will add significant areas of impervious surfaces from which high volumes of runoff will be infiltrated. Third, large areas of native vegetation will be removed eliminating the evapotranspiration water uptakes³. Together these three factors will cause increased groundwater recharge, higher water tables, and alterations to the hydrologic regime of the adjacent wetlands.

Ballestero attempts to minimize the impacts of the project by diluting it with the entire Bogle Brook watershed. He calculates the hydrologic change resulting from the project at 4 percent of the entire watershed. However, this simple calculation does not take into account cumulative impacts throughout the watershed and assumes that this development is the sole contributor of impacts. A more logical and sustainable approach is to evaluate and regulate cumulative impacts on a parcel-by-parcel basis. In this manner the receiving waters can be protected.

3. Water Quality Impacts on Stream and Downgradient Waters. I must begin by reminding the Board that the applicant did not even show the stream on their originally submitted site plans (shown below). As a result of my initial review, I added the (blue shaded) stream using aerial photograph imagery to bring this to the Board’s (and applicant’s) attention. Figure 1 below is a copy of the applicant’s earlier site plan showing the beginning of the stream (shown as parallel black lines) but suspending it mid-way through the site before reaching the location of the proposed wastewater discharge).

³ Evapotranspiration (ET) rates in this area of Massachusetts are estimated at 22 inches/year (nearly half of the annual precipitation rate of approximately 45 inches/year). These ET rates are based upon largely forested areas where trees and understory extract soil moisture during the growing seasons. During the summer growing seasons periods little or no recharge to groundwater occurs.

baseflow from groundwater discharging to them (see figure 2). This hydrologic connection between streams and surrounding groundwater is widely accepted.

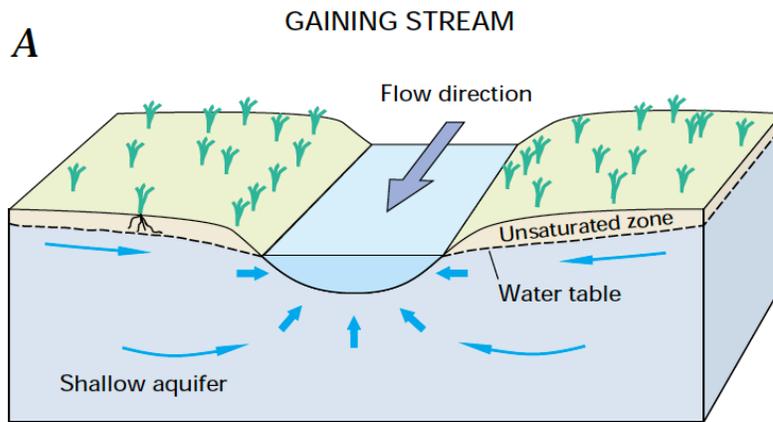


Figure 2 - Gaining Stream (USGS) showing groundwater discharging to the stream

Despite the widely accepted understanding of groundwater providing baseflow to streams, Ballestero states, “even when it is (flowing) the infiltrated wastewater is not flowing into the stream, but to groundwater that flows under and parallel to the stream” (emphasis added). He continues, “Some may ultimately show up in the stream, but not all”. This position suggests that the applicant has not yet developed an understanding of where groundwater is flowing and how it interacts with the adjacent wetland/stream, an alarming omission given the amount of field investigations and modeling that has occurred and the importance of this issue.

Furthermore, if the groundwater does not discharge to the stream (contrary to widely accepted hydrologic principles) it then flows southerly into the Blaney aquifer. But wastewater discharge to the Blaney Aquifer would be forbidden because the town’s Blaney Aquifer overlay protection district prohibits wastewater treatment plants.

Ballestero also asserts that “the wastewater treatment plant shall be permitted by the Commonwealth of Massachusetts to meet effluent requirements”. This is a highly presumptive statement. No permit has been issued. The Commonwealth (MADEP) is not obligated to issue a permit. Any such permit must be based on DEP’s review of hydrogeologic conditions and impacts on downstream waters. The hydrogeologic report submitted to the MADEP provides no analysis of water quality impacts on the stream or downgradient waters.

Ballestero’s statement suggests that the town of Weston should not be concerned with water quality impacts in their town because there is a state permit required. Water quality is a major concern to the residents of Weston and they have every right to require a reliable water quality impact assessment of this project. As I have clearly stated in my comment letter the site is directly upgradient of Bogle Brook, the Blaney Aquifer, and Nonesuch Pond. I have recommended that the applicant provide a water quality impact assessment for nearly two years. Nothing has been provided.

The wastewater discharge will contain significant loads of nutrients (phosphorus and nitrogen) that are widely recognized as drivers in surface water eutrophication (including algae blooms and cyanobacteria). In contrast to old-school theories that phosphorus is retained in soils and is not mobile, recently published research by the United States Geological Survey (USGS) and others has demonstrated that in fact, phosphorus does move through soils⁵. The research has shown that phosphorus temporarily binds to iron and other metals in the soils and when these binding sites are exhausted, the phosphorus moves and will reach the receiving waters (in this case the stream).

I have provided preliminary nutrient loading calculations that include typical concentrations in wastewater and summer baseflow rates in the stream. The Massachusetts Department of Environmental Protection, Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal recognizes the phosphorus issue. It states, *“There has been substantial recent evidence that, under certain conditions, the ability of the soil to adsorb phosphorus is finite and that it could migrate and reach sensitive receptors. The location of sensitive receptors within the plume area shall be identified and the potential impact of phosphorus will be evaluated on a case-by-case basis”*.

Another critical water quality impact of concern is per- and polyfluoroalkyl substances (PFAS), so-called “forever” chemicals that are persistent in the environment and are believed to be human health threats in low concentrations. These compounds are being widely detected throughout Massachusetts and have been closely associated with concentrated wastewater treatment plant discharges.

Ballestero suggests that PFAS is not of concern because “the 518 South Avenue development is new construction and therefore material can be selected that manufacturers represent have low to no PFAS”. But the source of PFAS in wastewater treatment plants is not just the materials that the treatment plant itself is made of. In fact, the sources of PFAS include many household products that contribute to residential wastewater including coated cookware, outdoor clothing treatments, food packaging. These diffuse sources of PFAS become problematic when wastewater is concentrated in a high-density development. The manufacturers of the wastewater treatment facility will have no control over the use of these products by residents. A concentrated wastewater discharge such as the proposed project will have significant loads of PFAS contaminants. I provided a summary of the PFAS issues to the town in my August 5, 2021 letter.

⁵ In the USGS report, “Phosphorus Doesn’t Migrate in Ground Water? Better Think Again” they state, “In the past, ground-water scientists thought that phosphorus in ground water migrated little and hence was of minimal ecological concern. Years of monitoring data on phosphorus concentrations in the plume of treated sewage on Cape Cod has shown that phosphorus does migrate in ground water, raising concerns that phosphorus-containing ground water discharging into Ashumet Pond may accelerate the eutrophication of the pond”. They state, “The DEP is concerned that land disposal of wastewater through infiltration basins and septic leaching fields can lead to discharge of phosphate-enriched ground water to sensitive lakes and streams”. (https://toxics.usgs.gov/highlights/phosphorous_migration.html)

Ballestero asserts that the project could not have significant impacts on Nonesuch Pond due to the distance and size of its watershed. But that ignores well known and widely accepted watershed-based nutrient loading methodologies that allocate pollution sources on a parcel-by-parcel basis and evaluate the cumulative impacts of all land uses within the watershed.

In summary, the proximity of the project to the stream and downgradient water resources and the scale of the proposed wastewater and stormwater discharges warrants a water quality impact analysis. This is the applicant's responsibility. It is their burden of proof. The town has the right to this analysis. At the recent ZBA hearing on March 29 I tried to make this clear and asked if the applicant would present a quantitative analysis of these impacts. It is my understanding that the ZBA concurs with this request, so it is baffling why none has been performed.

4. Weston Board of Health Regulations. The proposed wastewater discharge is approximately 50 feet from the wetland boundary. The Weston Health Regulation (Chapter VI) states, "no part of the structural components of a leaching facility shall be located within 100 feet of a wetland as defined in M.G.L. chapter 131 section 40 (Wetland Protection Act)".

The preamble of Chapter VI of the Weston Health Regulations states, "*these regulations are a more environmentally restrictive code for the design and construction of subsurface sewage disposal systems than required by Title V*". The regulations do not stipulate a maximum design flow to which they apply. A more restrictive code can certainly include a broader jurisdiction (range of flows) of wastewater discharges beyond those included in Title 5. There is no preemption in the state codes that would limit the application of these regulations to smaller flows.

Furthermore, common sense would suggest that if the town requires a minimum setback of 100 feet to wetlands for a small leachfield for a single-family home with a design flow of 330 gallons/day, this same setback would also apply to the proposed leachfield that is nearly a hundred times bigger of 28,000 gallons/day. As stated above, MADEP's Guidelines for wastewater treatment plants include a minimum setback of 100 feet from "surface waters"⁶ which includes "wetlands"

Finally, it is interesting and instructive to note that Ballestero attaches Robert Gemma's December 21, 2020 letter in support of his statements. However, that document argues that the proposed wastewater treatment plant discharge does qualify as a Title 5 discharge for the purposes of relying on the Title 5 presumption in the MA Wetlands Regulations. His letter states, "while it is true that the WWTP and disposal system proposed for this project are regulated under 314 CMR 5.00, that body of regulations default to Title 5 as far as the disposal bed is concerned. Specifically, under definitions, 314 CMR 5.02 defines On-Site Subsurface

⁶ Massachusetts Department of Environmental Protection, Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal, July 2018

Sewage Disposal System as a system or series of systems for the treatment or disposal of sanitary sewage below the ground”.

Gemma did not include the full text of the Title 5 presumption that recognizes the importance of local regulations. It states that the presumption applies, *“only if the soil absorption system of said system is set back at least 50 feet horizontally from the boundary of said areas, as required by 310 CMR 15.211: Minimum Setback Distances, or a greater distance as may be required by more stringent local ordinance, by-law or regulation” (310 CMR 10.03(3))”*.

In summary the applicant is arguing that the local Health Regulations do not apply because this is not a Title 5 system, but they also suggest that they are entitled to the “Title 5 presumption” because it does qualify as a Title 5 system. They can’t have it both ways.

Please contact me with any questions that you might have.

Sincerely,

A handwritten signature in black ink, appearing to be 'SH' or similar initials, written in a cursive style.

Scott Horsley
Water Resources Consultant