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March 18, 2024

Mr. Charles Tirone, Chairperson  
Town of Arlington  
Conservation Commission  
730 Massachusetts Avenue  
Arlington, MA 02476

RE: Thorndike Place

Dear Chairperson Tirone and Conservation Commissioners:

I am writing in response to the BSC letter dated February 28, 2024 and specifically regarding their comments regarding estimated seasonal high groundwater (ESHGW) levels and groundwater mounding.

**Estimated Seasonal High Groundwater (ESHGW)**

As I documented in my prior letters dated November 13, 2023 and February 7, 2024 the test pit information and estimated seasonal high groundwater (ESHGW) levels do not conform with the MADEP Stormwater Handbook. In summary the MADEP Handbook requires the following<sup>1</sup>:

1. test pits must be located at the location of the infiltration facility
2. estimated seasonal high groundwater can be established using redox features
3. if redox features are not present, wells should be installed and groundwater levels should be measured in the spring
4. groundwater levels in wells should be compared to USGS index wells

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<sup>1</sup> The MADEP Stormwater Handbook, Volume 3 states, “*Conduct tests at the point where recharge is proposed...Seasonal high groundwater represents the highest groundwater elevation. Depth to seasonal high groundwater may be identified based on redox features in the soil (see Fletcher and Venneman listed in References). When redox features are not available, installation of temporary push point wells or piezometers should be considered. Ideally, such wells should be monitored in the spring when groundwater is highest and results compared to nearby groundwater wells monitored by the USGS to estimate whether regional groundwater is below normal, normal, or above normal (see: <http://ma.water.usgs.gov>)*”<sup>1</sup>

The test pit data at the location of the primary stormwater facility (System INF-1) is limited to two test pits (TP 7 and TP 8). Test pit TP8 provided no data on redox features or water levels.

TP 7 does show redox features at elevation 5.6. However, in response to the Commission's request about redox information in Test Pit 7 the BSC letter states, "The redox features noted in Test Pit 7 were observed by Whitestone Associates, the Town's peer reviewer, approximately between elevations 4.4 and 5.6, but appropriately disregarded by Whitestone in determining the groundwater elevation in their June 28, 2023, review."

In my opinion a groundwater elevation of 5.6 at this location seems reasonable given the site topography, other groundwater levels provided and the elevation of the adjacent wetland. However, the applicant recommends not using this redox feature as a representative ESHGW elevation. Therefore, they must rely upon measured water levels in a well located at the infiltration system and measured during spring conditions as identified in the MADEP Stormwater Handbook.

Only one well was installed at the location of the infiltration system at TP7. The water levels reported by BSC in their recent February 28, 2024 letter are - 0.24 (May 2023) and - 0.20 (February 2024). These reported water levels are below mean sea level and approximately 5 - 6 below the level of the adjacent wetland.

In my experience I have never seen groundwater levels to be below sea level in Massachusetts. Additionally, groundwater levels are typically at or above the elevation of adjacent wetlands. Simply put, these water levels are inconsistent with standard hydrologic principles and are suspect. Although no well construction diagrams or descriptions are provided it is possible that there may have been a problem with the design or installation of the well at TP7.

Regardless of these unusual water level readings at well TP7, BSC has relied upon these measurements and conducted USGS (Frimpter) water level adjustment calculations to provide an estimate of ESHGW levels.

As was discussed at the February 1, 2024 Conservation Commission meeting and requested by the Commission, it would be easy and inexpensive to install additional (properly constructed) wells at the location of the proposed infiltration system and to make water level measurements during the current seasonal high groundwater period to provide a greater level of certainty about groundwater conditions and a more conservative foundation upon which the stormwater infiltration system could be designed.

### **Groundwater Mounding**

I have read BSC's explanation for selecting a groundwater mounding duration of 1.22 hours. I do not agree with their proposal to limit the analysis to less than the 24-hour design storm

and the following 72-hour period as outlined in the MADEP Stormwater Handbook. I see no logical reason why the modeling duration would be less than the storm duration (which is 24 hours). This will only give a false underestimate of the impacts.

The MADEP Stormwater Handbook, Volume 3, Chapter 2 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)”*.

Thank you for the opportunity to provide these comments. Please contact me directly with any questions that you might have.

Sincerely,

A handwritten signature in black ink, appearing to be 'S. Horsley', with a stylized, overlapping loop structure.

Scott W. Horsley  
Water Resources Consultant