

## MEMORANDUM

To: Jane Fisher Carlson, Chair

Winifred Li

Sujit Sitole

From: Dr. Thomas Ballestero

Date: June 29, 2022

Re: Professional Services Corporation Memorandum dated June 27, 2022

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Messrs. Bartlett and Houston continue to counsel the Town to request design analyses beyond what is required: the performance of infiltration systems for the 25-year and 100-year rainfall events. The site systems were designed in accordance with Massachusetts Stormwater Handbook and the Weston Stormwater By-law. These standards incorporate what each entity intended to be the acceptable level of risk for infrastructure.

The stormwater systems were designed to infiltrate up to the 10-year rainfall event even when groundwater is maintained at very high levels for extended periods and water usage is continuously at the maximum level for three months prior to the 10-year event. The coincident occurrence of these three extreme events is very unlikely, yet that is what the system was designed around. When stormwater inflows exceed the capability to infiltrate, for example in the 25-year or 100-year rainfall events, the systems have stormwater bypass elements to send overflow water to the wetlands, where today such runoff flows under similar hydrologic conditions. The stormwater bypass elements are included in the design and previously presented to the board.

Messrs. Bartlett and Houston continue to claim that the stormwater systems will not infiltrate when the groundwater mound below them grows into the bottom of the systems. They have on more than one occasion used the phrase, "*... once a mounded condition reaches the base of an infiltration area, the rate of recharge is typically reduced by an order of magnitude...*", without ever giving technical support to the statement: it is only their unsupported opinion. In contrast, the applicant has provided data from similar stormwater infiltration systems that demonstrate that the systems perform much better than designed and this is because of the ability for water to move laterally in the soil. In addition, groundwater mounding into the bottom of a system under these extreme conditions does not dramatically reduce infiltration by an order of magnitude as Messrs. Bartlett and Houston claim: it is the difference in water level (energy) between the water in the stormwater infiltration chambers and the groundwater below that dictates this rate. Because the mound does not grow to the top of the stormwater infiltration chambers, there is energy to direct water downwards.

Messrs. Bartlett and Houston are concerned with the adverse interaction between the infiltration locations of stormwater and treated wastewater, and they reiterate MMA concerns that there is a disconnect between the HydroCAD (stormwater) model and the groundwater (MODFLOW) model. The site was designed to meet the local and Commonwealth guidance for these systems under extreme conditions. The reality is that design scenarios do not generally happen. For example, the rainfall pattern for the design storm is well established, however it is extremely rare to observe because it was a creation of risk modelers and not nature. Another example is how stormwater infiltration systems function: just as a homeowner's septic system leach field is designed, the stormwater infiltration chambers assume that effluent uniformly infiltrates into the ground over the entire infiltration area. This also never happens; rather water infiltrates the very first locations it is able, and only during the extreme design condition is the entire infiltration area active. Another example between design and reality, the groundwater model assumes that rainfall and the infiltrated stormwater reach the groundwater immediately. This also does not happen. It can take hours to days for infiltration to reach the groundwater table. One only needs to look at the site groundwater data for Tropical Storm Ida that was previously furnished to the Board to recognize this fact. The modeling of stormwater and groundwater were performed in accordance with industry standards with the intent of conservatively representing the design conditions in order to inform the designs.

The focus of peer reviewers on the extreme design event and with 25-year storm and 100-year storm has led them to portray the extreme design condition as the common condition. For example, in a recent ZBA meeting. Mr. Houston's opinion was that the soil under the infiltration systems would be permanently saturated. This is not true under the treated wastewater system, ever, and under the stormwater systems only during the extreme design event. It is worth repeating information submitted to the board previously:

**During normal operating conditions – those expected the majority time – the groundwater mound beneath the leaching field is less than one foot high. When the mound is added to the ambient groundwater (approximately El. 212 ft), the mounded groundwater would not exceed approximate El. 213 ft. The bottom of the leaching field bed is set at El. 222.0 feet. Therefore, almost all the time, the base of the leaching field will be about 9 feet above the mounded groundwater elevation, when only 4 feet of separation is required. (20220518 Davis Comment Response, submitted by SHA).**