Scott Horsley
Water Resources Consultant
39 Chestnut Street • Boston, MA 02108 • 508-364-7818

May 2, 2024

Jenna Pirrotta
MassDEP/NERO - Wetlands Program
150 Presidential Way
Woburn, MA 01801

Dear Ms. Pirrotta;

RE: Cascade Wayland -113, 115, 117, and 119 Boston Post Road, Wayland, MA

At the request of an abutter to the above-referenced project, Carol Grumman and Protect Wayland, I have reviewed the proposed Cascade Wayland 40B project (the "Project") proposed at 113, 115, 117, and 119 Boston Post Road, Wayland, MA (the "Property"). The focus of my review is on the potential water quality impacts associated with the proposed development.

General Comments

The proposed project includes a wastewater treatment plant with a design flow of 11,000 gallons/day located within the Riverfront Area associated with Pine Brook. A Hydrogeologic Report prepared by Geosphere on behalf of the Applicant includes a groundwater model that confirms the groundwater flow direction westerly from the proposed "wastewater discharge area" toward and into Pine Brook.

Despite numerous requests by the town and regulatory requirements within the Massachusetts Groundwater Discharge Permit Regulations, the Applicant has not provided an analysis of the water quality impacts to Pine Brook associated with the proposed wastewater facility. Probable water quality impacts include eutrophication (due to nitrogen and phosphorus loading), harmful algal blooms, pathogens (including bacteria and viruses), contaminants of emerging concern (including pharmaceuticals, flame retardants and PFAS compounds), and thermal alterations associated with the coldwater fishery. My specific comments are as follows.

Specific Comments

1. The Hydrogeologic Report includes a water table map that indicates a westerly groundwater flow direction from the "wastewater discharge area" towards and into Pine Brook. Pine Brook is a "gaining stream" meaning that it derives its baseflow from surrounding groundwater that discharges into it. The proposed wastewater

discharge to groundwater will contribute directly to this baseflow (see figures 1 and 2).

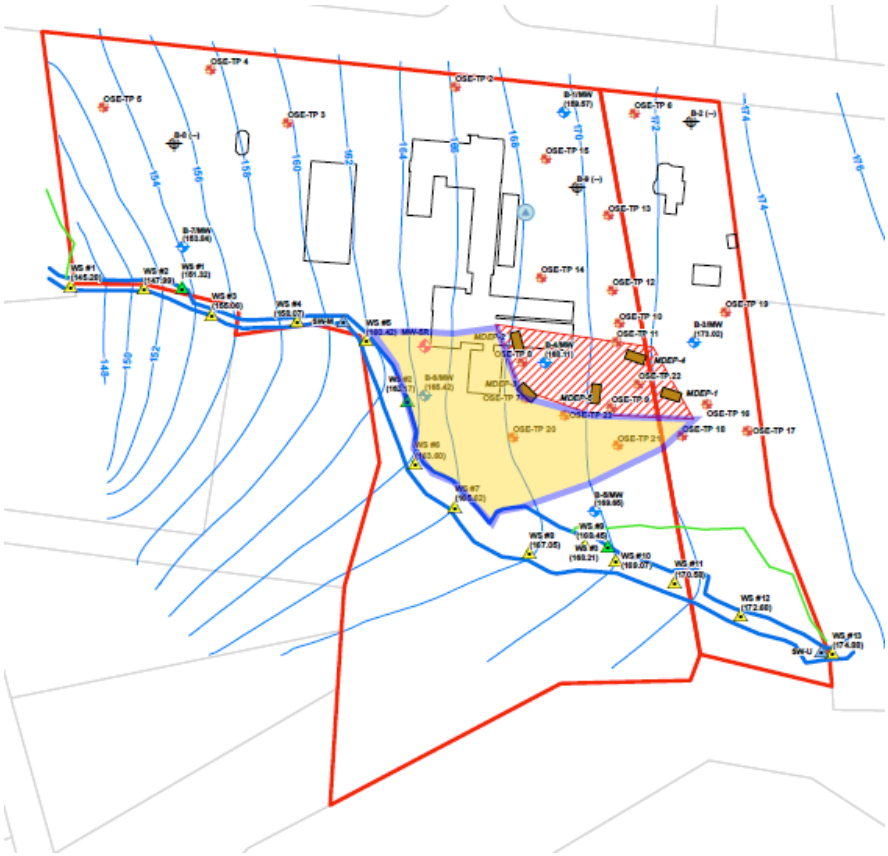


Figure 1 – Site Plan Showing Wastewater Discharge Area and Groundwater Flow Directions Towards Pine Brook

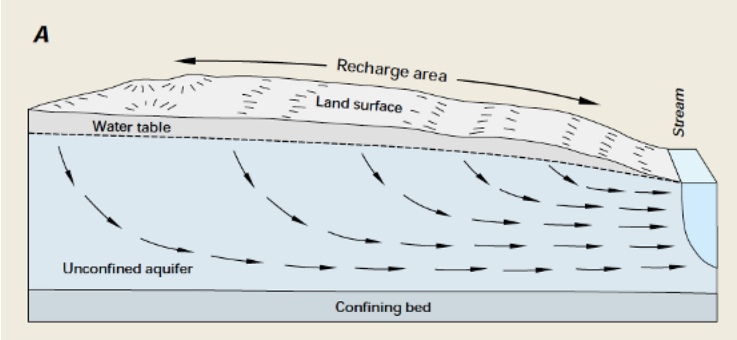


Figure 2 – Cross Section Showing Groundwater Flow to Stream (United States Geological Survey)

2. The Hydrogeological Report provided by the Applicant is limited to on-site soils investigations, evaluations of seasonal high groundwater, groundwater flow direction analysis, and groundwater mounding analyses. To my knowledge, the

subject of water quality impacts on surface waters was not evaluated by the Applicant as part of the MADEP review process nor by the Wayland Conservation Commission Notice of Intent process.

3. The Wayland Conservation Commission requested information regarding water quality impacts, it was not provided, and ultimately they cited lack of information to "determine that the subsurface sewage disposal system would not adversely impact protected interests in the Act" in their denial Order of Conditions (OOC).

4. The MADEP Groundwater Discharge Permit Regulations make it clear that other state and local laws pertaining to water quality (such as the Massachusetts Wetlands Protection Act Regulations) must be complied with. The Regulations state, *"Issuance of an individual permit or coverage under a general permit pursuant to 314 CMR 2.00: Permit Procedures and 5.00 does not relieve the permittee of its obligation to comply with all applicable, Federal, State, and local laws and regulations".*

5. It is clear that the proposed wastewater discharge is within the Riverfront Area and therefore within jurisdiction of the Wayland Conservation Commission. It is also clear that the stream (Pine Brook) is a jurisdictional wetland resources area. The Massachusetts Wetlands Protection Regulations (310 CMR 4.00) and the Wayland Wetlands Bylaw define alter as, *"(d) the changing of water temperature, biochemical oxygen demand (BOD), and other physical, biological or chemical characteristics of the receiving water".*

6. The Applicant should have included an evaluation of impacts on surface water quality in their Hydrogeologic Report. The Groundwater Discharge Permit Regulations (314 CMR 5.09) clearly indicate that it is the *"duty"* of the applicant *"to determine whether the proposed discharge will cause or contribute to a violation of 314 CMR 4.00 Surface Water Quality Standards"* (see excerpt below). The applicant did not comply with this requirement/duty.

5.09: Duty to Submit Hydrogeological Evaluation

(1) Except as otherwise provided in 314 CMR 5.09(2) or as otherwise determined by the Department, no person shall apply for an individual permit or file a notice of intent requesting coverage under a general permit for a proposed discharge of pollutants to the ground water without an authorization from the Department. A person shall apply for such authorization by:

(a) preparing a scope of work for a hydrogeological investigation in accordance with the Department's guidelines to determine whether the proposed discharge site is a suitable location for the proposed discharge, to assess the impact of the proposed discharge on all potentially impacted ground water sources of potable water for public water systems and all private drinking water supplies, and to determine whether the proposed discharge will cause or contribute to a violation of 314 CMR 4.00: *Massachusetts Surface Water Quality Standards* or impair the actual or potential use of the ground water as a source of potable water;

7. Pine Brook is a coldwater fishery and is utilized for both primary and secondary recreational contact. YMCA Camp Chickami is located on Pine Brook and directly downstream of the proposed development. This facility is reported to utilize the brook and attached ponds as a play area for children, who would be put at risk of harmful algal blooms (HABs) caused by excessive nitrogen and phosphorus discharges.

8. The proposed 11,000 gallons/day wastewater discharge represents a significant pollutant load to Pine Brook which has a 7Q10 baseflow of 58,100 gallons/day[1]. This suggests that at design flow Pine Brook would contain approximately 16% wastewater effluent during critical low flow periods.

9. Nitrogen moves readily through groundwater with no attenuation. Historically, phosphorus was thought to be retained in soils and not mobile in groundwater. However, more recent data and the current consensus suggests that as phosphorus binding sites are exhausted it will also move with groundwater and enter the stream[2]. Researchers at the University of Waterloo have documented wastewater-derived phosphorus movement in groundwater[3].

10. Elevated nitrogen and phosphorus are known to cause eutrophication within streams and lakes. Eutrophication can result in excessive weed and algae growth, depleted oxygen levels, and harmful algal blooms (HABs) including cyanobacteria.

[1] The Massachusetts Surface Water Quality Regulations (314 CMR 4.03(3)) cite the use of the 7Q10 flow as a regulatory standard. They state, "for rivers and streams, the lowest flow condition at and above which aquatic life criteria must be applied is the lowest mean flow for seven consecutive days to be expected once in ten years (7Q10)".

[2] The MADEP Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal (2018) states, "Phosphorus is a critical parameter in most freshwater systems and can be the limiting parameter with regard to eutrophication of surface waters…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."

[3] Robertson, W.D., Irreversible Phosphorus Sorption in Septic System Plumes?, Vol. 46, No. 1—GROUND WATER—January–February 2008 (pages 51–60).

11. The United States Environmental Protection Agency (USEPA) has established guidelines for maximum nitrogen and phosphorus concentrations in streams[4]. The guideline for maximum phosphorus is reported at 24 ug/liter. According to preliminary field work conducted by EBT Environmental Consultants, Inc. on September 19, 2017, the existing phosphorus concentration in Pine Brook was measured at 21 ug/liter, below the EPA threshold. The proposed wastewater discharge is likely to "cause or contribute to a violation of the Massachusetts Surface Water Quality Regulations" (314 CMR 5.09).

12. Pine Brook is designated as a coldwater fishery by the Commonwealth of Massachusetts (see Figure 2). The thermal impacts of the proposed 11,000 gallons/day wastewater discharge associated with the 7Q10 baseflow of 58,100 gallons/day of Pine Brook should be evaluated.

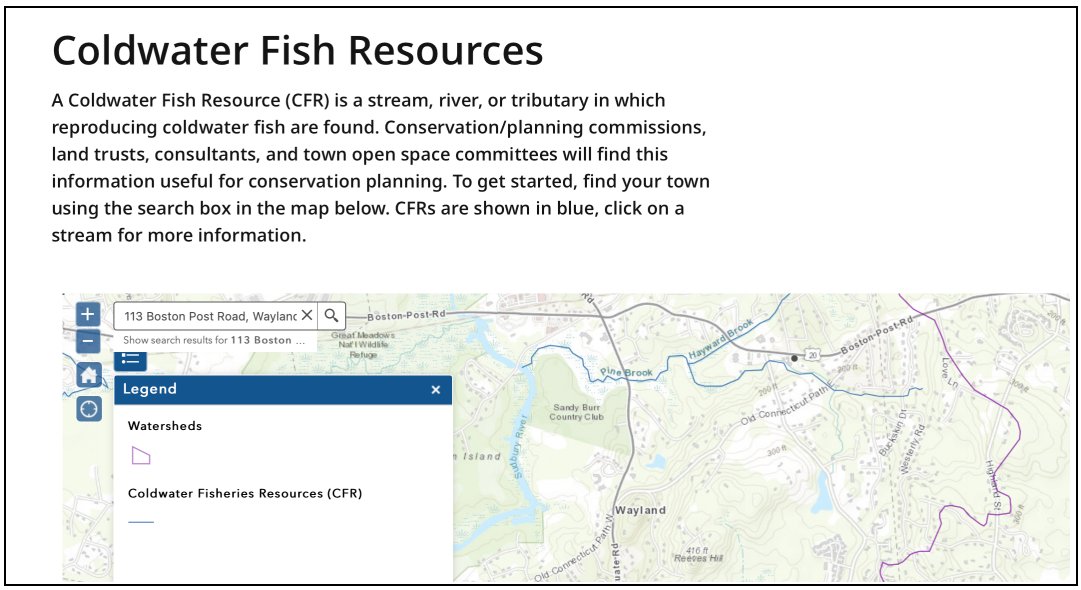


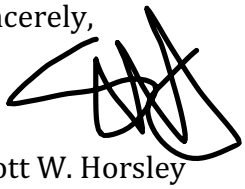
Figure 1 - Coldwater Fishery (Source: Massachusetts Division of Fisheries and Wildllife)

13. A more detailed analysis of water quality impacts is required to evaluate the probable "alterations" to wetland resource areas (including Pine Brook). This has not been provided as part of the Notice of Intent (NOI) process. According to the Hydrogeologic Report submitted to MADEP as part of the Groundwater Discharge Permit process these impacts have not been evaluated.

[4] In December 2000, EPA released "Ecoregional Nutrient Criteria," (USEPA 2000) established as part of an effort to reduce problems associated with excess nutrients in water bodies located within specific areas of the country. The published criteria represent conditions in waters within each specific ecoregion which are minimally impacted by human activities, and thus are representative of waters without cultural eutrophication. Wayland, MA is within Ecoregion XIV, Eastern Coastal Plains (level III ecoregion 59). The recommended total phosphorus criterion for Ecoregion XIV is 24 ug/l (0.024 mg/l) and can be found in the "Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Ecoregion XIV".

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

Sincerely,



Scott W. Horsley
Water Resources Consultant

Qualifications: I have over 40 years of professional experience in the field of water resources management and on a broad range of water contamination and restoration projects. I have been retained as a consultant to federal, state, and local government agencies, non-governmental organizations (NGOs), and private industry throughout the United States, Central America, the Caribbean, the Pacific Islands, Bulgaria, and China. I have served as an instructor for a nationwide series of U.S. Environmental Protection Agency (USEPA) workshops on drinking water protection and watershed management. I have also served on numerous advisory boards to the USEPA, the National Academy of Public Administration, Massachusetts Department of Environmental Protection (MADEP), Massachusetts Executive Office of Energy and Environmental Affairs (EEA), and the National Groundwater Association. I have received national (USEPA) and local awards for my work in the water resources management fields. I serve as Adjunct Faculty at Harvard University Extension School and Tufts University, where I teach courses in water resources policy, wetlands management, green infrastructure, and low impact development (LID). I have served as an expert witness in state and federal courts as a hydrologist in matters relative to the federal Clean Water Act, the Massachusetts Wetlands Protection Act and Regulations, Massachusetts Environmental Code (Title 5), Massachusetts Surface Water Quality Regulations, Massachusetts Stormwater Standards, and the Massachusetts Groundwater Discharge Permit Regulations.