

February 3, 2015

Mr. Stephen Kadlik, DPW Director  
Wayland Department of Public Works  
41 Cochituate Road  
Wayland, MA 01778

RE: Drainage Assessment – Wayland High School Turf Field

Dear Mr. Kadlik:

Per your request, I have conducted a review of the drainage system at the Wayland High School artificial turf field. Specifically, I conducted a site visit on January 20, 2015 to assess performance of the drainage system and observe existing conditions. I also reviewed the Conservation Commission's file on the project, including the following documents:

- October 31, 2006 letter report to Brian Monahan, Conservation Administrator, from Nathan A. Collins of Gale Associates, Inc. re: Leachate Analysis Report, Wayland High School Athletic Facility.
- November 21, 2006 Order of Conditions and Chapter 194 Permit issued by Wayland Conservation Commission.
- February 5, 2007 letter to Joel P Goolmonson, Wayland Board of Water Commissioners, from James Dillon and James Persky of the MassDEP Drinking Water Program re: Source Protection.
- April 24, 2007 letter to Nancy White, Environmental Analyst at MassDEP Northeast Regional Office from Nathan A. Collins of Gale Associates, Inc. re: Request for Information, with Drawing No. ALT1, Alternative Drainage Plan, dated April 20, 2007.
- July 12, 2007 letter to Matthew Garvey of Ropes & Gray from James Doucett of MassDEP's Bureau of Waste Prevention re: Synthetic Turf Beneficial Use Determination.
- July 18, 2007 letter to Brian Monahan, Conservation Administrator, from Nathan A. Collins of Gale Associates, Inc. re: Questions related to Water Quality Swale.
- July 24, 2007 Settlement Agreement In the Matter of Wayland Boosters Association, DEP Docket No. 2007-085, File No. 322-661.
- July 27, 2007 Final Order of Conditions In the Matter of Wayland Boosters Association, issued by the MassDEP Northeast Regional Office.
- July 27, 2007 Final Decision In the Matter of Wayland Boosters Association, DEP Docket No. 2007-085, File No. 322-66, incorporating the Settlement Agreement and Final Order of Conditions.
- July 27, 2007 letter to Nancy McShea, Director of Parks & Recreation from Brian Monahan, Conservation Administrator re: DEP File 322-661: Chapter 91 Permit – First Amendment.

- August 21, 2007 letter to Brian Monahan, Conservation Administrator, from Nathan A. Collins of Gale Associates, Inc. re: Supplemental Information for Water Quality Swale (with revised O&M Plan).

Per my Scope of Work, the focus of my investigation was on the functioning of the drainage system, the adequacy of the O&M conducted on the system, and observed or potential impacts of the drainage system on the Town's Happy Hollow well field. I have also identified several recommendations for improvement and/or further investigation.

### **Summary of Site Observations**

I was able to observe the entire drainage system during my January 20<sup>th</sup> site visit. The weather at the time was dry and the snowpack minimal, and there had been no measurable precipitation in the preceding five days. There was no standing water or snow on the field and all drainage structures appeared to be intact. I did note a small trickle of flow through the drainage system at the eastern end of the field (that discharges toward Dudley Brook and the Happy Hollow wells), probably due to melting and/or groundwater seepage.

I also observed several inches of standing water in the discharge pipe to the vegetated swale to the north of the field, but no flow through the vegetated swale itself. As can be seen in the photos attached, the elevation of the riprap at the flared outlet, in conjunction with the flat or possibly even negative gradient in the swale itself appeared to be causing the flow to back up within the sub-drain system at this location. Based on my observations, the outlet pipe would need to be at least half-full before any positive discharge would occur through the swale. While this is unlikely to lead to flooding of the field or to cause more of the sub-drainage flow to be discharged toward the Happy Hollow well field, the backing up of flow within the sub-drain system could pose a problem with freezing.

I was unable to locate any as-built plan for the drainage system, but I do note that there are several inconsistencies between the system I inspected and the April 20, 2007 design plan (Drawing ALT1) prepared by Gale Associates. First, the plan shows the top of the riprap at the flared outlet to the swale to be below the invert of the 15-inch outlet pipe, not extending above the invert as I observed. The plan also calls for the swale to slope slightly (at 0.3 percent) away from the outlet toward the wetland, while I observed what appeared to be a slight negative slope on the swale. This latter issue I believe may be attributable to a flaw in the design for the swale, since the invert specified on DWG ALT1 for the 15-inch sub-drain outlet is 0.2 feet below existing grade shown at the terminus of the swale.

As can be seen in the attached photos, there was a significant accumulation of the synthetic grass fibers from the athletic field within the vegetated swale when I inspected the site; this material had formed a mat on the bottom of the swale along its entire length. I suspect that the fibers had been blown into the swale by the wind, as there was also significant accumulation of the fibers and the denser crumb rubber infill on the surface of

the track surrounding the field, and on the field itself. I could not see whether any of the crumb rubber had also blown into the swale and settled down into the vegetation. If they are not removed, the matted fibers are likely to form a barrier to growth of vegetation in the swale and they could do likewise in the downgradient wetland if they are washed down by a high-flow discharge. Based on recent studies by the Connecticut Department of Environmental Protection, Environment & Human Health, Inc. (EHHI) and Ardea Consulting there may also be some risk of zinc toxicity in the runoff flow if the crumb rubber infill is also entering the swale. (See references attached).

### **Adequacy of O&M**

Both the Final Order of Conditions issued by MassDEP and the amended Chapter 194 Permit issued by the Wayland Conservation Commission for the athletic field project require implementation of and conformance with the O&M Plan for the drainage system. The approved O&M Plan calls for routine inspections of the nyoplast catchbasins and cleaning of the basins as necessary, inspection of the swale at least twice per year, and mowing and cleaning of the swale at least once per year, with written inspection reports to be submitted to the Conservation Commission. I was not able to obtain any O&M Reports for the drainage system from the Conservation Commission, and it is my understanding that there have not been any submitted. It is not clear, therefore, whether the required O&M tasks have been performed. I did not observe any significant sediment accumulation in the catchbasins during my site visit, and the basins did all appear to be intact and functioning. The vegetated swale also appeared to have been mowed. As noted above though, there was an accumulation of synthetic fibers in the swale that had not been removed.

I also note that, while not a condition of the permits issued, synthetic turf fields themselves do typically require some degree of maintenance program to preserve the longevity of the field, including brushing, raking, aeration and sweeping on a periodic basis. It is not clear whether such a plan was developed for the Wayland High School project, but the accumulated material on and adjacent to the field suggest that more should be done to keep this material on the field and to prevent it from being blown or washed into nearby resource areas.

### **Impacts on Happy Hollow Wellfield**

As outlined above, the only drainage issues that I noted based on my site visit were related to the vegetated swale to the northwest of the field, and it is unlikely that the issues there would result in more flow being diverted toward Dudley Brook and the Happy Hollow well field. Based on the inverts of the system, I would expect very little of the flow in the sub-drain system to be discharged toward Dudley Brook.

Realistically, much of the drainage from the field never even enters the sub-drain system, but rather infiltrates directly into the groundwater through the porous soils beneath the field. According to Wayland's June 2011 Wellhead Protection Plan, approximately one third of the artificial turf field is within the "capture zone" of the wells, thus infiltration

from that portion of the field does drain toward the wells. Groundwater flow does provide increased time-of-travel, filtering and chemical adsorption of contaminants as compared to surface or subsurface runoff however; hence the likelihood of contamination from the synthetic materials used on the field would be lower than that from a surface discharge. Nevertheless, it would be prudent to establish one or two monitoring wells between the capture zone area turf field and the well field and to periodically test the groundwater to ensure that there is no impact. It is my understanding that the DPW is also planning to conduct some raw water sampling in the Town wells, with testing for zinc and lead.

I note that Item #7B of the Settlement Agreement cited in the DEP Final Decision calls for the Town, in consultation with Wayland 10-Citizen Group, to hire an independent consultant to develop a testing protocol and conduct testing of the leachate from the field for contaminants associated with leachate from synthetic turf and tires that are likely to have adverse effects on drinking water or wetland resources in town, and for the testing to have been conducted in each of the three months immediately following the installation of the crumb rubber infill and in the summer of 2008. Results were to be reported to the Town Administrator and shared with the Wayland 10-Citizen Group. I could find no record that this requirement was ever implemented, or that any leachate analysis was performed.

I also note that several other conditions of the Settlement Agreement aimed at protecting the Happy Hollow Wellfield were also not implemented, or at least I could find no records that they had been. Specifically, Item #7C requires the Town, in consultation with the Wayland 10-Citizen Group, to hire an independent hydrogeologist to determine whether the swale and its related components as designed by Gale Associates, would require any modifications to prevent adverse effects on drinking water or wetland resources, and to implement such modifications as are reasonable and appropriate. Item #7D calls for the Town to endeavor to use non-toxic products in cleaning, disinfecting, maintaining and repairing the Field, and to notify the Wayland Board of Health when doing so. It is my understanding that the Wayland Board of Health has not been notified of any product application on the field, e.g. for cleaning, disinfecting and maintenance purposes, as is required by the Settlement Agreement. It is not clear whether any such products have ever been applied to the field.

### **Recommendations:**

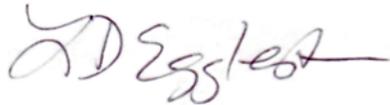
I offer the following recommendations based on my site inspection and review:

- As-built plans of the drainage system as required by the Final Order of Conditions issued by MassDEP should be developed, and should include the inverts of all sub-surface drainage structures as well as the vegetated swale. This information should then be used to determine whether the sub-drainage system can function as designed and, if not, what remedies should be applied.
- As soon as the snow melts, the synthetic matter accumulated in the vegetated swale should be cleaned out and disposed of properly. The artificial turf field and

- adjacent track should also be swept to remove loose material and keep it from getting blown into the swale or nearby wetlands.
- The O&M plan for the drainage system should be implemented in its entirety, including reporting requirements.
  - Periodic maintenance of the artificial turf field and surrounding track should also be conducted, to prevent further migration of materials from the field.
  - The leachate-testing program required by the Settlement Agreement/DEP Decision should be developed and implemented. At a minimum, zinc should be tested.
  - While it is probably less pressing, Item #7C of the Settlement Agreement/DEP Decision calling for hiring a hydrogeologist should also be implemented. Rather than focusing on the swale though, I would suggest that the hydrogeologist be tasked with more specifically assessing the potential capture zone impacts of the turf field.
  - It should be verified that no cleaning or disinfecting products have been applied to the field, and that any future application of such products will be in accordance with the Settlement Agreement/DEP Decision.

I appreciate the opportunity to assist the Wayland Board of Public Works with this review, and hope that this information is suitable for your needs. Please feel free to contact me if you have any questions or wish to schedule a meeting to discuss my findings.

Sincerely,  
EGGLESTON ENVIRONMENTAL

A handwritten signature in purple ink that reads "Lisa D. Eggleston". The signature is stylized and cursive.

Lisa D. Eggleston, P.E.

w/attach.