

October 24, 2008

Mr. Frederic E. Turkington  
Town Administrator  
Town of Wayland  
41 Cochituate Road  
Wayland, MA 01778

**Re: Data Interpretation Report  
Leachate Sampling for Synthetic Turf Field  
Wayland High School  
246 Old Connecticut Path, Wayland, MA  
Norfolk Project Number 1213.1.1**

Dear Mr. Turkington:

In accordance with our proposal dated September 27, 2007 (Proposal M0907162) as follows is a summary of the results of the leachate sampling and analysis for the synthetic turf field located at Wayland High School.

### **Background**

Based on information provided by the Town of Wayland, the Wayland turf field is composed of recycled rubber tire crumbs. A leachate collection sub-drain, consisting of two 10-inch perforated HDPE pipes at the west and east sides of the turf field, discharge, via a 15-inch HDPE pipe (Outfall 1), to an above-grade drainage ditch located at the northeast side of the turf field. A drainage plan which depicts the basic drainage design is attached to this report as Figure 3.

The purpose of the leachate sampling program was to evaluate potential adverse impacts on drinking water and wetlands resources in proximity to the site. According to the drainage plan (Figure 3), the north ½ of the drainage swale is situated within the 100-foot buffer of a wetland which borders the north side of the site. According to the Mass DEP Priority Resource Map (Figure 2), the swale is located within a designated Zone II of a public water supply well and is also proximate to a medium-yield potentially productive aquifer.

### **Sampling Methods**

Leachate samples were collected from the discharge outfall on January 10, 2008 following a heavy rain and significant snow melt. Samples were additionally collected on March 10, 2008, July 24, 2008, and September 29, 2008 following approximately 3 inches of rainfall over the preceding two-day or three-day periods. Prior to sampling, flow from the outfall was checked using a plastic float. During all sampling events, the outfall appeared to be partially submerged by water which was backed up in the drainage swale. Flow from the outfall was observed to be present but was weak. Photographs of the swale and outfall are attached in Appendix B.

**Table 1:**  
**Analytical Summary for Detected Parameters: Outfall 1**  
**Samples Collected January 10, 2008 through September 29, 2008**  
**Wayland Turf Field, Wayland, MA**

Detected Parameter	Date / Concentration (ug/L)				EPA Freshwater CCC* (ug/L)	MADEP Method 1 GW-1 / GW-3** (ug/L)
	January 10, 2008	March 10, 2008	July 24, 2008	September 29, 2008		
Chromium	<5	2	<5	<5	570	100 / 600
Copper	<10	5	<5	3.2	13	NE
Zinc	21	31	<47.5	35.8	120	5,000 / 900
Bis(2-ethylhexyl) phthalate	<5	<5	<6.25	3.18	NE	6 / 50,000
Di-n-octyl phthalate	<5	<5	<6.25	1.13	NE	(10,000) <sup>1</sup>
Total Suspended Solids (TSS)	8,700	<2,000	<5,000	<5,000	NE	NE
Biochemical Oxygen Demand (BOD)	3,700	<2,000	<3,000	<3,000	NE	NE
pH ( in standard units)	7.1	7.0	8.24	7.16	6.5 to 9.0	NE

\* = Chronic Criterion Concentration for fresh surface water per U.S. EPA National Recommended Water Quality Criteria, 2006, Office of Science and Technology Document 4404T

\*\* = Method 1 Concentrations for GW-1 and GW-3 Category Groundwaters per 310 CMR 40.0974(2) as amended February 2008

NE = Not Established for this analyte

( )<sup>1</sup> = Although there are no established Method 1 risk-based concentrations, the MADEP has established a Reportable Concentration of 10,000 ug/L for this analyte in GW-1 Category Groundwater areas.

Leachate samples were collected at the mouth of the outfall using a Teflon™ sampling ladle which was cleaned with distilled water prior to use. Samples were transported under chain-of-custody protocol to a Massachusetts-certified laboratory for analysis. Analytical parameters included semi-volatile organic compounds by EPA method 8270C, selected soluble metals (cadmium, chromium, copper, lead, selenium and zinc) using EPA 6000/7000 series methods, biochemical oxygen demand (BOD) by Standard Method SM521B, total suspended solids (TSS) by Standard Method SM2540D, and, pH by ASTM method 1293-99B.

### **Laboratory Results**

Laboratory results compared to EPA National Recommended Water Quality Criteria and MassDEP Method 1 Groundwater Standards are summarized on Table 1. Laboratory reports are included in Appendix C. Laboratory results indicate detectable concentrations of chromium, copper, and zinc, with zinc being the most elevated and the most prevalent. Bis (2-ethylhexyl) phthalate and di-n-octyl phthalate were detected in the latest sample collected on September 29, 2008. All detected contaminant concentrations are below the EPA Chronic Criterion Concentrations and applicable MassDEP Method 1 concentrations, where established. The pH is within the acceptable range and the BOD and TSS values are lower than is typical for most storm water runoff.

### **Contaminant Sources**

A likely source for the metals detected in the leachate samples are rubber vulcanization accelerators and rubber polymerization peptizers used in the manufacture of tires (MacCaskie, 2003 and 2006). The leaching of naturally occurring metals from soils and fill materials is another potential source of these metals. Bis (2-ethylhexyl) phthalate and di-n-octyl phthalate are common plasticizers that are used in the manufacture of rubber and various plastics (EPA, 2005, p 37). Laboratory contamination is also a possible, though unlikely, source of the phthalates.

### **Conclusions and Recommendations**

Based on the above observations and findings, it appears that potentially significant adverse impacts to surface water via direct leachate discharge and to groundwater by leachate infiltration appear to be unlikely. Additional testing or drainage design modifications are not recommended at this time based on available data.

Should it be determined that additional sampling is to be performed, Norfolk recommends that *hardness* be included as an additional analytical parameter. The EPA Chronic Criterion Concentrations for copper and zinc are hardness dependent and may require numerical adjustment (EPA, 2006, p. 23).

Should you have any questions regarding these findings and recommendations, please contact the undersigned at (508) 478-1276.

Sincerely,  
**NORFOLK RAM GROUP, LLC**

Stephen R. Lemoine  
Project Manager

Brian V. Moran, P.E., L.S.P.  
Principal

Attachments:

- Appendix A: Figures
- Appendix B: Photographs
- Appendix C: Laboratory Reports
- Appendix D: References

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