October 5, 2015

Thomas E. Daley, P.E.
Director of Public Works &
Natural Resources
139 Main Street
Orleans, MA 02653

Re: Phase I Environmental Site Assessment
Department of Public Works and Natural Resources Facility
40 Giddiah Hill Road
Orleans, Massachusetts

Dear Mr. Daley,

Weston & Sampson has performed a Phase I Environmental Site Assessment (ESA) consisting of a site walk, research and regulatory database review for the proposed Department of Public Works (DPW) and Natural Resources (NR) facility to be located at 40 Giddiah Hill Road in Orleans, Massachusetts (the Site). The purpose of these activities was to identify areas of concern or recognized environmental conditions (RECs) that may exist at the Site and evaluate if site assessment will be required as part of the design for the future DPW/NR construction at the Site. See Figure 1 and Figure 2 attached for a depiction of the Site and Site vicinity. Based on our site walk, research and regulatory database review, a brief summary of our findings are presented below.

Site Description

The Site consists of seven (7) individual parcels located along 34 to 48 Giddiah Hill Road as well as a portion of 56 Lots Hallow Road in the town of Orleans, Barnstable County, Massachusetts (the Site). The Town of Orleans is the owner of each Site parcel.

34, 36, 38, 40, 42, 46 and 52 Giddiah Hill Road: These Site parcels are developed with three (3) storage buildings which are primarily utilized for highway equipment storage and/or maintenance activities (i.e., brakes and tire repairs, oil changes, etc). According to Town personnel, there is a septic system located between the buildings and within the gravel driveway access off of Giddiah Hill Road. The Town of Orleans currently provides potable water service to the Site. The buildings are heated with natural gas.

Prior to 1999, the Giddiah Hill road properties were owned by Tonn, Inc., who purchased the parcels in 1962. In 1986, Tonn Inc. constructed three (3) buildings on the properties which were utilized as rental and/or storage spaces. Former tenants included: a boat repair and storage facility; a home and garden retail company; a workshop; sign writer; and motorcycle repair shop. All structures were concrete slab-on-grade style buildings.

Prior to the purchase of the Site parcels by Tonn, Inc., the properties were owned by Clayton Eldredge and were vacant and undeveloped. However, portions of the properties next to the landfill were found to contain solid waste (i.e., household, commercial refuse and construction debris).
56 Lots Hollow Road: This is the location of the Orleans Transfer Station and capped landfill. The unlined landfill began operations in 1949 and was capped and closed in 2005. The eastern edge of the capped landfill extends onto several of the Site parcels located along Giddiah Hill Road. The limits of the landfill cap generally follow the rip-rap drainage swale which was constructed on the east, south and west side of the landfill.

The portion of the 56 Lots Hallow Road property to be redeveloped for the proposed DPW/NR facility is located in the north eastern portion of the parcel; to the east of the Gift House. The area is currently used for loosely organized composting of yard waste and temporary storage of street sweepings and/or catch basin cleanings.

Surrounding Area: The current uses surrounding Site Parcels are primarily associated with commercial activities and include: automotive repair facilities, waste transportation facilities (i.e., Nauset Disposal), recycling facilities, landscaping and excavation facilities, etc. Protected open space associated with the Town of Orleans Watershed is located adjacent and to the south of the Site.

Site Reconnaissance

On September 16, 2015, Weston & Sampson performed a visual reconnaissance of the Site.

The following was observed during the Site walk:

- Minor oil and/or hazardous material use and storage were observed within the DPW storage buildings (i.e., 5-gallon buckets and 55-gallon drums of hydraulic oil, less than 1-gallon containers of battery cleaner, windshield washer, antifreeze, sealant, ice melt and other materials associated with DPW equipment storage and/or maintenance activities). According to DPW personnel, all waste generated is properly contained and transported to the Transfer Station until it could be properly disposed. The storage buildings are concrete slab-on-grade and no floor drains were observed. No RECs were identified as part of the current operations at the property.

- Weston & Sampson also observed stockpiles of yard waste, compost tailings, street sweepings / catch basin cleanings and sand at the Site parcels. According to DPW personnel, the majority of the stockpiles are associated with the beneficial reuse of street sweeping and catch basin cleanings at the landfill and these materials are temporarily stored on the Site Parcels until the materials can be reused at the landfill to maintain the cover.

- Weston & Sampson did not observe evidence of underground storage tanks (USTs) or above ground storage tanks (ASTs) on any of the Site Parcels; however, according to DPW personnel, there was previously one 275-gallon diesel AST that was previously located in one of the structures that was utilized to fill DPW equipment.

- Weston & Sampson did not observe pits, ponds, or lagoons associated with any of the Site Parcels, with the exception of the detention pond which captures storm water runoff from the land fill cap.

Regulatory Database Review

Weston & Sampson contracted Environmental Data Resource, Inc., (EDR) to perform a radius search of applicable State and Federal environmental databases. The following table provides a summary of findings of EDR's report. A copy of the EDR report is included in Appendix A.
### SUMMARY OF EDR's REGULATORY DATABASE SEARCH FINDINGS

<table>
<thead>
<tr>
<th>Regulatory Database</th>
<th>Approximate Minimum Search Distance</th>
<th>Site Parcels Listed (Site)</th>
<th>Off-site Listings Within Search Distance</th>
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<tr>
<td>Federal NPL Sites</td>
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</tr>
<tr>
<td>Proposed NPL</td>
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<td>NPL Liens</td>
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*Indicates a general category of multiple databases searched by EDR. Unless applicable, only one reference to each database category is provided. The attached EDR includes references to each of these individual databases, the approximate minimum search distance of each, and the data that each was last updated.

Weston & Sampson reviewed the pertinent details of the property listed in the table above to determine the relative risk that contaminants from these properties may have impacted the Site Parcels. In all cases, available information on MassDEP's 'Searchable Sites' database (http://public.dep.state.ma.us/SearchableSites/Search.asp) was also reviewed to obtain information regarding past releases. Based on this review, Weston & Sampson is of the opinion that the off-Site properties listed in...
the table above are not likely to pose a threat to the subsurface conditions of the Site Parcels based upon the distance/gradient relative to the Site, nature and extent of contamination, lack of documented release, and/or regulatory closure status.

Municipal Records

Weston & Sampson conducted a file review at the Town of Orleans municipal offices on September 16, 2015. The following is a summary of the offices visited and the information obtained:

Orleans Assessor’s Office
Weston & Sampson performed an on-line file review with the Assessor’s Office. No direct information concerning the potential presence of RECs at any of the Site Parcels was obtained during this record review.

Orleans Building Department
Weston & Sampson performed a file review at the Orleans Building Department. Only one (1) record, a demolition permit from February 2005, was identified. The permit was for the two (2) buildings previously located at 40 Giddiah Hill Road property that were demolished as part of the landfill closure activities.

Orleans Clerk’s Office
Weston & Sampson performed a file review at the Town of Orleans Clerk’s Office. The Clerk did not have any records on file for the Site with respect to environmental cleanup liens, activity and use limitations (AULs) or licenses for hazardous materials.

Orleans Fire Department
Weston & Sampson reviewed available files related to the 56 Lots Hallow Road property at the Town of Orleans Fire Department. Based on this review, Weston & Sampson is of the opinion that the incidents the Fire Department responded to are not likely to pose a threat to the subsurface conditions of the Site Parcels based upon the distance/gradient relative to the Site, nature and extent of contamination, lack of documented release, and/or regulatory closure status. The Fire Department did not have any records for the Giddiah Hill Road Site Parcels.

Orleans Department of Public Works
Weston & Sampson conducted several interviews with the Town and Key Site Managers of the Transfer Station and DPW facility, including Mr. Thomas Daley, P.E., Director of Town of Orleans Public Works and Natural Resources, and Mr. Matt Muir, foreman for the Town of Orleans Transfer Station who has worked at the Town for several decades. The interview did not provide any additional information of environmental significance that was not already reviewed as part of the assessment.

During an interview with DPW personnel Mr. Al Artwick, it was indicated that waste from the Site Parcels was excavated to approximately 15 feet below ground surface (bgs) and relocated to the landfill prior to capping. Mr. Artwick stated that the excavation extended from the 56 Lots Hallow Road parcel to the rear (i.e., western edge) of a building which still exists at 40 Giddiah Hill Road. According to Mr. Artwick, a soil boring advanced within the footprint of this building identified minimal amounts of residual waste and unconsolidated fill. The potential presence of residual waste and associated contamination at Site Parcels represents a REC.

Orleans Health Department
Weston & Sampson performed a file review at the Orleans Health Department with Mr. Robert Canning, Health Agent for the Town of Orleans. Mr. Canning was asked to provide relevant information concerning the
storage and use of petroleum and/or hazardous substances in connection with the Site Parcels. Mr. Canning provided copies of the information that is provided to the MassDEP concerning the landfill. Due to the large volume of records for the landfill, including several reports pertaining to environmental investigations that have occurred over the past several decades and various correspondences; Westcn & Sampson has only summarized the more recent and most relevant information as follows:

- Records reviewed indicate that buried refuse was historically located in the central portion of the Giddiah Hill Road parcels. The waste was present at various depths, ranging from 5-18 feet bgs, and was generally covered with 1-5 feet of material consisting of medium to course sand. The waste was excavated to approximately 14 to 15 feet bgs and placed under the cap as part of landfill closure activities. Information regarding the quality of the fill material utilized to backfill the Site following waste relocation was not identified.

- Historic investigations completed in 1992 at the Giddiah Hill properties prior to the landfill closure activities included soil and groundwater sampling and analysis for volatile organic compounds (VOCs), pesticides, polychlorinated biphenyls (PCBs) and metals. Site media was not found to be significantly impacted by oil or hazardous materials:
  - Soil sample analysis identified concentrations of lead in soil below current Method 1 S-1 standards. Trace concentrations of VOCs, arsenic and chromium were also detected.
  - An elevated concentration of arsenic was identified in one monitoring well at concentrations greater than the Method 1 GW-1 standard. Trace concentrations of VOCs and lead were also detected. Depth to groundwater ranged from approximately 30 to 67 ft bgs.
  - Pesticides and PCBs were not identified in any soil or groundwater samples collected from the site.

- The portion of the Transfer Station (i.e., 56 Lots Hallow Road) to be redeveloped as part of the proposed DPW/NR facility was formerly part of a septage lagoon area.
  - Residual solids formerly within the septage lagoon were not classified as hazardous waste following toxicity characteristic leaching procedure (TCLP) analysis.
  - Groundwater collected and analyzed from a monitoring well located adjacent to the former septage lagoons identified elevated levels of nitrogen compounds, sodium, sulfate dissolved iron and manganese and oil and grease. The consultant for the Town concluded that these compounds were associated with sanitary wastes and were likely present do to the usage of the area as a former septage lagoon. Various chlorinated VOCs, including tetrachloroethylene and 1,4-dichlorobenzene, and arsenic were also identified above drinking water standards.
  - The residual solids from the lagoon area were excavated, mixed with sand and incorporated into the landfill prior to closure.
  - Prior to the current detention basin which was constructed as part of the landfill closure activities, the former septage lagoon area was approved by MassDEP to be converted into detention basins for storm water runoff from the capped landfill.
  - No solid waste was identified in the lagoon area; however, prior to refuse relocation as part of the landfill closure, the deposition of waste was identified up to the bottom of the slope of the southernmost abandoned lagoon.

- The most recent round of semi-annual groundwater monitoring conducted at the landfill was in May 2015. Samples were collected and analyzed from nine (9) monitoring wells for the following parameters; VOCs, dissolved metals, total dissolved solids (TDS), nitrate–nitrogen, total cyanide, sulfate, chloride, acetone, methyl ethyl ketone, and methyl isobutyl ketone.
GW-2S (located north of former lagoon area) continues to have frequent exceedances of primary drinking water standards for nitrate-nitrogen (10 mg/L). Concentrations of 1,4-dioxane in monitoring GW-2S (1.9 ug/L) were determined to exceed the revised Method 1 GW-1 standard of 0.3 ug/L, promulgated in June 2014. According to the report, the Town is working to identify if there are any private wells downgradient which may be a potential receptor to the contamination and will continue to monitor the results during future sampling events to determine whether a trend is observed at this location. No additional VOC exceedences were identified during this sampling event.

Site and Area History

Historical information for the Site and surrounding area was obtained from EDR and has been provided in Appendix A. No historical Sanborn® Fire Insurance Maps were available for the Site; however, topographic maps and/or aerial photographs dating from 1893 to 2012 were reviewed. These historical sources did not provide any additional information of environmental significance that was not previously identified during assessment activities.

Conclusions

The Phase I ESA site walk, research and regulatory database review identified the following concerns:

- Given the commercial nature of the surrounding properties and the historic use of the Site Parcels, it is Weston & Sampson’s opinion that that there is potential for Site media to be impacted. In addition, information regarding the quality of the fill material utilized to backfill the Site following waste relocation as part of the landfill closure was not identified. Therefore, the potential presence of residual soil and/or groundwater contamination at Site Parcels represents REC. Future excavations for the proposed project may intersect this residual soil contamination.

- A groundwater plume emanating from the former Orleans landfill has been known to exist and flow in a north/northeasterly direction. Depth to groundwater is approximately greater than 30 feet bgs. It is our opinion that the potential migration of this contamination represents a REC for the Site Parcels. However, intercepting this residual groundwater contamination during future excavations as part of redevelopment and/or vapor intrusion concerns is unlikely at the Site given the depth to groundwater.

- The most recent round of semi-annual groundwater monitoring conducted at the landfill in May 2015 identified concentrations of 1,4-dioxane in monitoring GW-2S (1.9 ug/L) which exceed the reportable concentration (RC) GW-1 standard of 0.3 ug/L. This detection of 1,4-dioxane required notification to MassDEP under the MCP, and we assume that the Town’s solid waste consultant has already notified MassDEP.

- Migrating landfill gas is not expected to be a concern at the Site Parcels due to the presence of an active landfill gas collection / flare system that was installed as part of the landfill closure activities. The system, when properly balanced, has been effective in intercepting and reducing migrating gas levels.
Recommendations

Based on the above, a subsurface investigation should be performed at the Site to assess soils that may be encountered during proposed construction activities. The investigation should include the sampling and analysis of surficial soils, soils in areas that will be excavated, and soils in areas of planned drainage structures for the Site. If construction activities will require soils to be disposed of off-site, additional laboratory analyses will be required.

At this time, Weston & Sampson is not proposing to install a groundwater monitoring well. Given that the anticipated depth to groundwater is greater than 30 feet bgs, groundwater dewatering and management is not anticipated to be required as part of construction activities at the Site. However, if during drilling/test-pitting activities groundwater is observed to be at a shallower depth (i.e., 15 feet bgs or less), a groundwater monitoring well will be required to be installed at the Site and sampled.

If you have any questions or concerns regarding this letter report, please do not hesitate to contact the undersigned at (978) 532-1900.

Very truly yours,
WESTON & SAMPSON

Sarah R. DeStefano
Sarah R. DeStefano
Project Engineer

Attachments/Enclosures

Figures
Appendix A: EDR Report, Topographic Maps and Aerial Photographs