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MEMORANDUM

TO: Brandon Kunkel, Team Leader, Weston & Sampson

FROM: Daron Kurkjian P.E., Project Manager - EGE, Weston & Sampson
Sean Healey, LSP, Team Leader - EGE, Weston & Sampson

DATE: April 4, 2018

SUBJECT: Proposed Recreation Field – Loker Conservation and Recreation Area
Focused Environmental Records Review & Soil Assessment

We understand that the Town of Wayland is considering redevelopment of portions of the Loker Conservation and Recreation Area in Wayland, Massachusetts (the Site) for recreational purposes. Pursuant to your request, we have performed an environmental records review and soil assessment of areas planned for redevelopment. A summary of our review and subsequent soil assessment is provided below.

ENVIRONMENTAL RECORDS REVIEW:

The Site planned for redevelopment is a portion of the Loker Conservation and Recreation area in the Town of Wayland. The area of the Site was previously occupied by a Dow Chemical testing facility which operated at the Site between 1964 and 1988. The Dow Chemical facility was demolished in 1999 to 2000.

The area planned for redevelopment is defined in previous environmental reports as 16-acres of the 32-acre former Dow Chemical property. Several former buildings were previously located on-Site including a main office building and laboratory building, a cooling tower building, a solvent storage shed, a garage and a small shed. The proposed area for athletic field redevelopment is limited to the area of the main office building on the western portion of the Site. Dow's research included testing relative to:

- Inorganic and organo-metallic chemistry related to the synthesis of ceramics and catalyst;
- Organic chemistry/biochemistry related to enzymes and epoxies;
- Synthesis of agricultural and pharmaceutical compounds; and
- Catalyst research related to hydrogen production.

The Site is listed with the Massachusetts Department of Environmental Protection (MassDEP) under Release Tracking Number (RNT) 3-3866. This RTN is associated with environmental investigations conducted at the Site between 1987 and 1994 by Ransom Environmental on behalf of Dow Chemical. In 1993, the Site became a MassDEP Public Involvement Plan (PIP) Site following receipt of a citizen petition. The investigations identified known and suspected areas of subsurface disposal and contamination including:

1) The Upper Septic system area, located north of the former laboratory building;
2) A former shallow disposal/glass disposal area, located in the vicinity of the former solvent storage shed and former cooling tower building;

3) A former burn area, consisting of the burn bucket and concrete pad incineration areas; and
4) A former underground storage tank (UST) and Lower Septic system area, located near the southeast corner of the laboratory building.

Of these four areas, the Upper Septic system area is the only area that is proposed to be disturbed by the proposed athletic field construction. The remaining three areas of historic environmental concern are not planned to be disturbed during the proposed athletic field construction.

Remedial actions were performed at the Site in 2000 and included:

- Removal of surface soils from a former fire training area;
- Removal of two dredge spoil piles; and
- UST removal.

None of the above remediation areas are in the areas planned to be disturbed by the proposed athletic field construction.

In 2000, Ransom submitted a Class A-2 Response Action Outcome (RAO) Statement for RTN 3-3866 in support of regulatory closure. The RAO applies to four discrete locations identified above. The RAO is supported by a Method 3 risk characterization for each of the four areas. The RAO and Method 3 concluded that there is No Significant Risk to human health or the environment from residual contaminants at the Site. Weston & Sampson has reviewed the Method 3 risk characterization and based on the data presented the conclusions appear reasonable.

Additional Site closure activities were also conducted in 2000 and included the abatement of asbestos containing material within the building and demolition of building and structures on the Site. According to previous reports, the Upper and Lower Septic tanks were removed. The Upper Septic system distribution system status is unknown and appears to remain in place. No distribution system was listed to be associated with the Lower Septic tank.

In response to a request from the Wayland Board of Health, in 2000 the Massachusetts Department of Public Health's Bureau of Environmental Health Assessment reviewed cancer incidence and potential exposure from the Site. This assessment focused on residents that live in the area of the Site. No statistically significant increased incidence of cancer was found.

Weston & Sampson focused our review within the areas associated with potential Site redevelopment. Based on our preliminary review of the RAO and Method 3 risk characterization (March 2000) and the Facility Closure Report (April 2000), we identified the following concerns:

- Site risk assessment and risk characterization applied only to the four discrete areas of the Site identified above. Of these four areas, the Upper Septic system area is the sole area proposed to be disturbed by the athletic field construction. There was limited historic soil or groundwater data in the areas planned for redevelopment as recreational fields.

  The risk characterization did not evaluate a park or recreation field visitor. It did evaluate residential use in three of the four areas, which may be protective of park or recreation field visitors; however, there is no residential use evaluation in certain areas planned for redevelopment. The residential use evaluation is a conservative exposure pathway. In 2004, the

Town of Wayland added deed restrictions to the Site limiting future uses to conservation and/or recreation. Therefore, no residential redevelopment is allowed on the Site.

SOIL ASSESSMENT:

To assess soil conditions in the area of proposed redevelopment, Weston & Sampson collected soil samples from five (5) soil borings, six (6) test pits, and seven (7) surface soil sample locations. Soil assessment was focused on areas of proposed cut and fill and areas where soils are planned to be excavated and relocated on-Site. Soil sample locations were also placed in areas where future field users and spectators will congregate. Results of the soil assessment are detailed below.

Soil Borings:

On March 12, 2018, Weston & Sampson directed the advancement of five (5) soil borings at the Site. See Figure 1 for approximate soil boring locations.

Soil samples were collected at continuous intervals within the borings. Soils encountered generally consisted of brown silty sands with trace gravel. Refusal indicating shallow bedrock ranged from approximately 5 to 8 feet below ground surface (bgs). No odors or staining were observed in soil samples collected from the borings. Soil samples were field screened with a photo-ionization detector (PID) meter to evaluate potential volatile constituents. The PID readings were low and the highest reading was 4.6 parts per million by volume (ppmv).

Weston & Sampson collected and submitted soil samples for off-Site laboratory analysis. Five (5) soil samples (one from each boring) were submitted for volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), Resource Conservation and Recovery Act (RCRA) 8 metals plus cobalt and/or pesticides and herbicide analysis.

Test Pits and Surface Soil Sampling:

On March 21, 2018, Weston & Sampson directed the advancement of six (6) test pits at the Site. Soil samples were collected from at least two depth intervals from each test pit. Weston & Sampson also collected seven (7) surface soil samples at the Site. Surface soil samples were hand dug and collected to a depth of 12 inches below grade. See Figure 1 for test pit and surface soil sample locations.

The soil samples were field screened with a PID and no evidence of contamination was observed. The highest PID reading from test pits and surface soil samples was 1.5 ppmv.

In the locations of test pits TP-1 and TP-2, remnants of the Upper Septic system, including approximately six-inch diameter clay pipe, were observed. A concrete wall was also identified at the Upper Septic system location.

Five (5) soil samples from the test pits and three (3) soil surface soil samples were submitted for off-Site laboratory for varying analysis including VOCs, semi-volatile organic compounds (SVOCs), PAHs, RCRA 8 metals plus cobalt and/or pesticides and herbicide analysis. Two test pit soil samples from within or below the Upper Septic distribution system were submitted for SVOCs instead of PAH analysis. SVOC analysis includes PAH and provides a wider range of analytes than PAH analysis. As historical records indicated testing waste was discharged to the Upper Septic system, this wider range of SVOC analytes was selected for these two test pit locations (TP-1 and TP-2).

SOIL ANALYTICAL RESULTS & SUMMARY:

The soil assessment included investigation within a total of 18 locations at the Site, with 13 soil samples submitted for off-Site laboratory analysis. These sample locations were limited to areas of proposed soil disturbance or congregating areas of users or spectators. See Table 1 and Table 2 for a summary of soil analytical results. As shown in the tables, there were no analytes detected in excess of MassDEP Massachusetts Contingency Plan (MCP) reportable concentrations (RCs).

In summary, our historical records review and subsurface assessment has found no evidence of residual contamination at the Site. Analyzed soil samples exhibited analyte concentration below RCs. These analytes included VOCs, SVOCs and/or PAHs, RCRA 8 metals plus cobalt and/or pesticides and herbicide analysis. Weston & Sampson's soil assessment of Site areas to be disturbed as part of potential redevelopment do not change the findings of the 2000 Method 3 risk characterization report. Specifically, the 2000 RAO closure report conclusion remains unchanged that "the Site also poses no significant risk of harm to the safety, the environment, and public welfare." Based on these results, no further environmental testing is required or recommended for the pre-design phase of this project.

Remaining Septic System and Foundation:

The area planned for a multi-purpose athletic field is on top of the former Upper Septic field and includes much of the former building footprint. While the Upper Septic system tank was reportedly removed, we observed evidence that the septic system distribution system and a concrete wall remain below grade. We recommend that the Weston & Sampson structural engineering and/or geotechnical team review these subsurface structures and their potential impact to the proposed athletic field construction.

LIMITATIONS:

Based on the multi-acre Site footprint, it is possible that areas of contamination may be outside of analyzed areas. In addition, the area east of the parking location was not assessed as part of our soil assessment. This area included a historic fire training that may have used per- and poly-fluorinated alkylated substances (PFAS), a class of emerging contaminants has been associated with fire training areas. Based on the proposed construction away from fire training areas, assessment of PFAS was not included in this assessment.

This memo was prepared for the use of the Town of Wayland, exclusively. The findings provided by Weston & Sampson in this report are based solely on the information reported in this document. Future investigations, and/or information that was not available to Weston & Sampson at the time of the investigation, may result in a modification of the findings stated in this memo.

Should additional information become available concerning this Site or neighboring properties that could directly impact the Site in the future, that information should be made available to Weston & Sampson for review so that, if necessary, conclusions presented in this report may be modified. The conclusions of this report are based on conditions observed by Weston & Sampson personnel at the time of the investigation, information provided by the Town of Wayland and samples collected and analyzed on the dates shown or stated in this report. This memo has been prepared in accordance with generally accepted engineering and geological practices. No other warranty, express or implied, is made.

ADDITIONAL BACK-UP FROM HISTORIC REPORTS:

Excerpt from March 2000 RAO Report:

Sampling results for each exposure area are summarized in Appendix A. Soil in the Upper Septic System Area is impacted by low concentrations of volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs). Soil in the Former Burn Area is impacted by residual concentrations of polynuclear aromatic hydrocarbons (PAHs). Soil in the Former Shallow Disposal Area is impacted by low concentrations of SVOCs including PAHs. Soil in the Former UST Area contains very low concentrations of petroleum hydrocarbons. Ground water in the area downgradient of the Former Shallow Disposal Area has been impacted by low concentrations of VOCs, including chlorinated compounds. Pond sediments are impacted by low concentrations of VOCs, SVOCs, PAHs, polychlorinated dibenzodioxins (PCDDs), and polychlorinated dibenzofurans (PCDFs). Surface water from the ponds contains trace concentrations of bis(2-ethylhexyl)phthalate (an SVOC) and low concentrations of metals.

Excerpt from April 2000 Closure Report, related to backfill:

3.5 Restoration Activities

Following removal the Site buildings, excavation of the two septic systems and sump, and elimination of the two Dredge Spoils Piles as part of the RAM, the Site was restored. An elevation survey was conducted to determine the approximate volume of material required to return all impacted areas to original grade. The baseline survey was compared to a February 1994 site plan provided by the Town of Wayland Assessor's office which depicts the original topography of the area. Approximately 3,500 yards of a loam backfill was used to grade the area formerly occupied by the Site buildings and septic system areas and approximately 12 yards of loam was used to grade the Dredge Soil Piles area. Prior to delivering backfill material, two composite samples of the backfill material were collected and submitted under chain-of-custody to Alpha and analyzed for the following parameters:

1. VOCs with an extended library search;
2. SVOCs with an extended library search; and
3. Toxicity Characteristic Leaching Procedure (TCLP) Metals.

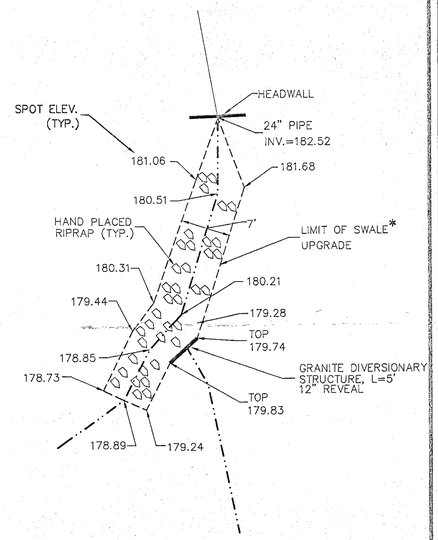
No contaminants were detected above the method detection limits in either of the samples sent for analysis. Copies of the laboratory chemical analysis data sheets are provided in Appendix H.

Weston & Sampson estimates that 12 to 24 inches of backfill are present at the Site.

APPROXIMATE EXTENT OF UPPER SEPTIC DISTRIBUTION SYSTEM

LEGEND:

- SOIL BORING LOCATION
- SURFACE SOIL SAMPLE LOCATION
- TEST PIT LOCATION



*LIMIT OF SWALE UPGRADE IS NOT INDICATIVE OF TOP OF BANK.

0 5 10 20
SCALE in FEET
1"=10'

SWALE UPGRADE DETAIL

NOTES:

1. BASE MAP AND TOPOGRAPHY PREPARED BY ENVIRONMENTAL SCIENCES AND SERVICES (ESS).
2. TOPOGRAPHICAL AND SWALE UPGRADE AS-BUILT SURVEY PERFORMED BY RANSOM ENVIRONMENTAL CONSULTANTS, INC. ON APRIL 7, 2000.
3. PROPERTY LINE INFORMATION OBTAINED FROM ESS BASE MAP. RANSOM ENVIRONMENTAL CONSULTANTS, INC. NOT RESPONSIBLE FOR INACCURATE PROPERTY LINE INFORMATION OR BUILDING LOCATIONS.
4. EXISTING UNDERGROUND UTILITIES OBTAINED FROM MAP ENTITLED, "POND ENHANCEMENTS/GRADING PLAN", PREPARED BY ANDERSON-NICHOLS & CO., INC., DATED JULY 21, 1992.

LEGEND:

- PROPERTY LINE
- 220 EXIST. ELEVATION CONTOUR LINE
- 190 CONTOUR LINE AT AREA OF NEW GRADING
- DRAINAGE SWALE
- EDGE OF EXISTING POND
- EXISTING RIP RAP

0 25 50 100
SCALE in FEET
1"=50'

NOTES:
1. SITE SKETCH OVERLAIN ON RANSOM 2000 AS BUILT PLAN.
2. ALL LOCATIONS ARE APPROXIMATE AND FOR GRAPHICAL PURPOSES ONLY.
3. FIELD SAMPLING PERFORMED BY WESTON & SAMPON IN MARCH 2018.

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FIGURE 1: SITE SKETCH
LOKER CONSERVATION AND RECREATION AREA

Table 1
Summary of Soil Boring Analytical Results
Loker Conservation and Recreation Area
Wayland, Massachusetts

Parameter	Reportable Concentrations (RCs)		SAMPLING LOCATION (Depth)				
	RCS-1	RCS-2	B-8 (1-2')	B-9 (2-3')	B-10 (1-2')	B-11 (0-2')	B-12 (2-3')
Sampling Date			3/12/2018				
Metals (mg/kg)							
ARSENIC	20	20	< 2.1	< 1.9	**3.9**	**4.8**	**3.7**
BARIUM	1000	3000	**25**	**21**	**22**	**33**	**27**
CADMIUM	70	100	< 0.21	< 0.19	< 0.22	< 0.19	< 0.21
CHROMIUM	100	200	**19**	**16**	**17**	**11**	**17**
COBALT	500	5000	**5.4**	**9.7**	**4.7**	**7.0**	**5.8**
LEAD	200	600	**21**	**5.5**	**13**	**6.1**	**10**
MERCURY	20	30	**0.052**	< 0.028	**0.043**	< 0.029	< 0.031
SELENIUM	400	700	< 4.2	< 3.7	< 4.3	< 3.7	< 4.1
SILVER	100	200	< 0.42	< 0.37	< 0.43	< 0.37	< 0.41
Pesticides (mg/kg)							
TOTAL PESTICIDES	~	~	NT	ND	NT	ND	NT
Herbicides (µg/kg)							
TOTAL HERBICIDES	~	~	NT	ND	NT	ND	NT
VOCs 8260C (mg/kg)							
TOTAL VOCs	~	~	ND	ND	ND	ND	ND
SVOCs 8270D (mg/kg)							
FLUORANTHENE	1000	3000	**0.36**	< 0.19	< 0.22	< 0.19	< 0.21
PHENANTHRENE	10	1000	**0.24**	< 0.19	< 0.22	< 0.19	< 0.21
PYRENE	1000	3000	**0.30**	< 0.19	< 0.22	< 0.19	< 0.21

NOTES:
1. **Bolded** values are detected compounds.
2. ND = Not detected above the lab reporting limits.
3. NT = Not tested.
4. ~ = No Massachusetts Contingency Plan (MCP) standard available
5. Soil results compared to MCP Reportable Concentrations (RCs).
6. mg/kg = milligrams per kilogram
7. VOCs = volatile organic compounds, SVOCs = semi-volatile organic compounds.
8. RCs taken from the MCP 310 Code of Massachusetts Regulations (CMR) 40.00 dated 4/25/2014.

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Table 2
Summary of Surface Soil (SS) Sample and Test Pit (TP) Soil Sample Analytical Results
Loker Conservation and Recreation Area
Wayland, Massachusetts

Parameter	Reportable Concentrations (RCs)		SAMPLING LOCATION (Depth)							
	RCS-1	RCS-2	SS-1 (0-12")	SS-3 (0-12")	SS-6 (0-12")	TP-1 (0-16")	TP-1 (43")	TP-2 (59")	TP-4 (0-16")	TP-5 (12-16")
Sampling Date			March 21, 2018							
SM 2540G (% Wt)										
% Solids	~	~	**77.5**	**51.2**	**79.3**	**85.0**	**95.9**	**96.0**	**85.8**	**87.0**
Metals (mg/kg)										
ARSENIC	20	20	< 2.1	**3.9**	**4.0**	**3.9**	**1.9**	< 1.7	< 1.9	**3.4**
BARIUM	1000	3000	**12**	**12**	**19**	**17**	**14**	**9.4**	**12**	**15**
CADMIUM	70	100	< 0.21	< 0.32	**0.30**	**0.30**	< 0.17	< 0.17	< 0.19	**0.26**
CHROMIUM	100	200	**6.1**	**7.5**	**7.1**	**6.2**	**6.4**	**4.8**	**4.3**	**5.3**
COBALT	500	5000	< 2.1	< 3.2	**2.2**	**2.0**	< 1.7	< 1.7	**3.4**	< 1.9
LEAD	200	600	**9.6**	**55**	**36**	**26**	**4.8**	**5.5**	**4.5**	**34**
MERCURY	20	30	**0.045**	**0.12**	**0.040**	**0.042**	**0.52**	**0.95**	**0.043**	< 0.029
SELENIUM	400	700	< 4.1	< 6.4	< 4.3	< 3.9	< 3.5	< 3.4	< 3.7	< 3.8
SILVER	100	200	< 0.41	< 0.64	< 0.43	< 0.39	**1.6**	**2.2**	< 0.37	< 0.38
Pesticides (mg/kg)										
4,4'-DDT	6	30	NT	NT	**0.072**	< 0.047	< 0.0042	< 0.0042	NT	NT
TOTAL PESTICIDES	~	~	NT	NT	**0.072**	ND	ND	ND	NT	NT
Herbicides (µg/kg)										
TOTAL HERBICIDES	~	~	NT	NT	ND	ND	ND	ND	NT	NT
VOCs 8260C (mg/kg)										
TOTAL VOCs	~	~	ND	ND	ND	ND	ND	ND	ND	ND
SVOCs 8270D (mg/kg)										
TOTAL SVOCs	~	~	NT	NT	NT	NT	ND	ND	NT	NT
SVOCs PAH Subset 8270D (mg/kg)										
ANTHRACENE	1000	3000	< 0.22	< 0.33	**0.31**	< 0.20	NT	NT	< 0.20	< 0.20
BENZO(A)ANTHRACENE	7	40	< 0.22	< 0.33	**1.6**	< 0.20	NT	NT	**0.82**	< 0.20
BENZO(A)PYRENE	2	7	< 0.22	< 0.33	**1.8**	**0.22**	NT	NT	**0.73**	< 0.20
BENZO(B)FLUORANTHENE	7	40	< 0.22	< 0.33	**2.6**	**0.31**	NT	NT	**0.95**	< 0.20
BENZO(G,H,I)PERYLENE	1000	3000	< 0.22	< 0.33	**1.3**	< 0.20	NT	NT	**0.53**	< 0.20
BENZO(K)FLUORANTHENE	70	400	< 0.22	< 0.33	**1.0**	< 0.20	NT	NT	**0.38**	< 0.20
CHRYSENE	70	400	< 0.22	< 0.33	**2.1**	**0.26**	NT	NT	**0.98**	< 0.20
DIBENZ(A,H)ANTHRACENE	0.7	4	< 0.22	< 0.33	**0.30**	< 0.20	NT	NT	< 0.20	< 0.20
FLUORANTHENE	1000	3000	< 0.22	< 0.33	**5.4**	**0.56**	NT	NT	**2.0**	< 0.20
INDENO(1,2,3-CD)PYRENE	7	40	< 0.22	< 0.33	**1.4**	< 0.20	NT	NT	**0.53**	< 0.20
PHENANTHRENE	10	1000	< 0.22	< 0.33	**3.0**	**0.27**	NT	NT	**1.5**	< 0.20
PYRENE	1000	3000	< 0.22	< 0.33	**4.8**	**0.55**	NT	NT	**1.8**	< 0.20

NOTES:
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5. Soil results compared to MCP Reportable Concentrations (RCs).
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