Proactive by Design

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

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August 15, 2017
File No. 01.0019274.18

Ms. Shauna Little
United States Environmental Protection Agency – Region 1
5 Post Office Square, Mail Code OEP06-4
Boston, Massachusetts 02109-3912

Re: Submittal of Notice of Intent
Remediation General Permit
Wyman-Gordon Company
244 Worcester Street
Grafton, Massachusetts

Dear Ms. Little:

GZA GeoEnvironmental, Inc. (GZA), on behalf of our client, Wyman-Gordon (W-G), is submitting the attached Notice of Intent (NOI) form (Attachment 1) for Remediation General Permit (RGP) authorization for remediation work being conducted under the Massachusetts Contingency Plan (MCP) at the 244 Worcester Street property (the Site). This NOI is being submitted for activities being conducted in accordance with the Phase IV Remedial Implementation Plan (RIP; MCP: 310 CMR 40.0870) for the West Side of the W-G property within an area known as the West PCB Area (a former industrial land fill). The work involves excavation and off-Site disposal of upland soils with polychlorinated biphenyls (PCBs) concentrations equal to or greater than 100 milligrams per kilogram (mg/kg).

This Site is also regulated by the US Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA) Corrective Action Program because of its former status as a Storage Facility of Hazardous Waste, and the remediation work requires approval from EPA under the Toxic Substances Control Act (TSCA) because it is an action to remediate PCBs.

RGP authorization is required to dewater, treat, and discharge groundwater likely to be encountered during soil excavation where excavation depths will be 6 or more feet below ground surface (bgs). The enclosed NOI form provides the required information on the general site conditions, proposed treatment system, discharge location and receiving water, and analytical results for groundwater collected from a monitoring well located within the proposed excavation area. The remediation area and proposed discharge locus at a nearby channelized, perennial stream know as Bonny Brook are shown in Attachment 3 – Figure 2A.

NOTICE OF INTENT

This NOI has included a review of literature pertaining to Areas of Critical Environmental Concern (ACEC), Endangered Species Act (ESA), and the National Historic Preservation Act (NHPA), as documented below:

Review of Appendix II "Summary of Endangered Species Act Listings" indicated that the Northern Long-eared Bat is located state-wide. However, this species is not likely to be

present within the areas of the Site to be disturbed during remediation activities due to the lack of habitat. Review of the Massachusetts Geographic Information Systems (MassGIS) DEP Priority Resources Map of Boston, shows that there are no ACECs and no habitats of Species of Special Concern or Threatened or Endangered Species within 500 feet of the subject site. Review of the IPaC online resource of the USFWS indicated that no critical habitats are present at the Site. Informal consultation was conducted with the USFWS and the results letter is attached in Attachment 5. Therefore, permit eligibility meets "Criterion B".

- An electronic review of the Massachusetts Cultural Resource Information System database, made available through Massachusetts Historical Commission, found that no area, building, burial ground, object, or structure is located on the property located at 244 Worcester Street except for the Wyman Gordon Drop Forging Company. The documentation of this review can be found in Attachment 7. The Wyman Gordon Drop Forging Company will not be affected by the discharge. The project does not involve new construction or the demolition or rehabilitation of existing buildings or other structures or facilities and historic properties are not affected by the discharge or identified in the path of the discharges regulated by this permit; therefore, permit eligibility meets "Criterion B."

- Water Quality Based Effluent Limits (WQBELs) were calculated using the spreadsheet included in Appendix V of the RGP (Attachment 7) and are based on the Site influent and receiving water sampling data. Results applicable to this discharge are included in Section D(4) of the NOI. A letter was provided to the Town of Grafton to notify it of the proposed discharge operating in accordance with the NPDES RGP Permit. A copy of the notification is included in Attachment 8.

- Laboratory analytical results, summarized in the NOI (Attachment 1), are included as Attachment 9. Groundwater influent samples were collected from one monitoring well location RGP-1 on July 19, 2017. The July 2017 sample was analyzed for Ammonia, Total Metals, VOCs, SVOCs, Total Suspended Solids, Chlorides, and 1,4- Dioxane. Refer to Figure 2B (Attachment 3) for the approximate locations of the Site monitoring well. Due to the known absence of fuels parameters in the influent which were analyzed by methods of sufficient sensitivity, Ethanol is a parameter which is believed absent at the Site due to the known absence of fuel additives at the Site.

- The receiving water was sampled upstream of Outfall 1 on July 19, 2017. Physical parameters including pH and temperature were collected using a low flow sampling apparatus fitted with instrumentation capable of accurately measuring these parameters. The receiving water was also sampled for total recoverable metals and Ammonia. The physical parameter and chemical analyses results are reported in section D(4) of the NOI.

- No dilution factor was requested because Bonny Brook has the potential to run dry during low flow conditions.

- A Best Management Practices Plan (BMPP) will be implemented upon the initiation of Site discharge.

Please do not hesitate to contact the undersigned at (781) 278-3700 if you have any questions or require further information.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Andrew Sargent EIT.
Engineer I

Randy Meuse
Consultant/Reviewer

Gregg W. McBride
Senior Principal

Attachments:
Attachment 1: NOI Form
Attachment 2: Figure 1 – Site Locus Map
Attachment 3: Figures 2A and 2B – Site Plan and Outfall Locations
Attachment 4: Figure 3 – Process Flow Diagram
Attachment 5: ESA and EFH Documentation
Attachment 6: MHC Report
Attachment 7: WQBEL Calculation Spreadsheet
Attachment 8: Town of Grafton Notification
Attachment 9: Laboratory Analytical Reports

cc: MassDEP – Central Region

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Attachment 1: NOI Form

II. Suggested Format for the Remediation General Permit Notice of Intent (NOI)

A. General site information:

<table>
<tr><td rowspan="2">1. Name of site:
Wyman-Gordon Company</td><td colspan="3">Site address: 244 Worcester Street
Street:</td></tr>
<tr><td>City: North Grafton</td><td>State: MA</td><td>Zip: 01536</td></tr>
<tr><td rowspan="4">2. Site owner
Wyman-Gordon Company

Owner is (check one): ☐ Federal ☐ State/Tribal ■ Private
☐ Other; if so, specify:</td><td colspan="3">Contact Person: Timothy Zoll</td></tr>
<tr><td colspan="2">Telephone: 508-839-8352</td><td>Email: timothy.zoll@wyman.com</td></tr>
<tr><td colspan="3">Mailing address: 244 Worcester Street
Street:</td></tr>
<tr><td>City: North Grafton</td><td>State: MA</td><td>Zip: 01536</td></tr>
<tr><td rowspan="4">3. Site operator, if different than owner
GZA GeoEnvironmental, Inc.</td><td colspan="3">Contact Person: Randy Meuse</td></tr>
<tr><td colspan="2">Telephone: 781-278-3842</td><td>Email: RMeuse@gza.com</td></tr>
<tr><td colspan="3">Mailing address:
Street: 249 Vanderbilt Avenue</td></tr>
<tr><td>City: Norwood</td><td>State: MA</td><td>Zip: 02062</td></tr>
<tr><td>4. NPDES permit number assigned by EPA:

NPDES permit is (check all that apply: ☐ RGP ☐ DGP ☐ CGP
☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:</td><td colspan="3">5. Other regulatory program(s) that apply to the site (check all that apply):
■ MA Chapter 21e; list RTN(s):
RTN 2-0535
☐ NH Groundwater Management Permit or Groundwater Release Detection Permit:
☐ CERCLA
☐ UIC Program
☐ POTW Pretreatment
☐ CWA Section 404</td></tr>
</table>

B. Receiving water information:

1. Name of receiving water(s):	Waterbody identification of receiving water(s):	Classification of receiving water(s):
Bonny Brook	No Segment ID	Unknown

Receiving water is (check any that apply): ☐ Outstanding Resource Water ☐ Ocean Sanctuary ☐ territorial sea ☐ Wild and Scenic River

2. Has the operator attached a location map in accordance with the instructions in B, above? (check one): ■ Yes ☐ No

Are sensitive receptors present near the site? (check one): ■ Yes ☐ No

If yes, specify: An uncertified Vernal Pool is present approximately 500 feet southwest of the excavation.

3. Indicate if the receiving water(s) is listed in the State's Integrated List of Waters (i.e., CWA Section 303(d)). Include which designated uses are impaired, and any pollutants indicated. Also, indicate if a final TMDL is available for any of the indicated pollutants. For more information, contact the appropriate State as noted in Part 4.6 of the RGP. Receiving Water is not listed in the States Integrated List of Waters; No TMDLs.

4. Indicate the seven day-ten-year low flow (7Q10) of the receiving water determined in accordance with the instructions in Appendix V for sites located in Massachusetts and Appendix VI for sites located in New Hampshire.	0.0372cfs
5. Indicate the requested dilution factor for the calculation of water quality-based effluent limitations (WQBELs) determined in accordance with the instructions in Appendix V for sites in Massachusetts and Appendix VI for sites in New Hampshire.	none

6. Has the operator received confirmation from the appropriate State for the 7Q10and dilution factor indicated? (check one): ■ Yes ☐ No

If yes, indicate date confirmation received:

7. Has the operator attached a summary of receiving water sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No

C. Source water information:

1. Source water(s) is (check any that apply):

■ Contaminated groundwater Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ■ Yes ☐ No	☐ Contaminated surface water Has the operator attached a summary of influent sampling results as required in Part 4.2 of the RGP in accordance with the instruction in Appendix VIII? (check one): ☐ Yes ☐ No	☐ The receiving water ☐ A surface water other than the receiving water; if so, indicate waterbody:	☐ Potable water; if so, indicate municipality or origin: ☐ Other; if so, specify:

2. Source water contaminants:	
a. For source waters that are contaminated groundwater or contaminated surface water, indicate are any contaminants present that are not included in the RGP? (check one): ☐ Yes ■ No If yes, indicate the contaminant(s) and the maximum concentration present in accordance with the instructions in Appendix VIII.	b. For a source water that is a surface water other than the receiving water, potable water or other, indicate any contaminants present at the maximum concentration in accordance with the instructions in Appendix VIII? (check one): ☐ Yes ☐ No
3. Has the source water been previously chlorinated or otherwise contains residual chlorine? (check one): ☐ Yes ■ No	

D. Discharge information

1.The discharge(s) is a(n) (check any that apply): ☐ Existing discharge ■ New discharge ☐ New source	
Outfall(s): 001	Outfall location(s): (Latitude, Longitude) 42.232558, -71.731815
Discharges enter the receiving water(s) via (check any that apply): ■ Direct discharge to the receiving water ☐ Indirect discharge, if so, specify: Treated water discharges from the location of proposed treatment system into Bonny Brook, which flows into Flint Pond. ☐ A private storm sewer system ☐ A municipal storm sewer system If the discharge enters the receiving water via a private or municipal storm sewer system: Has notification been provided to the owner of this system? (check one): ☐ Yes ☐ No Has the operator has received permission from the owner to use such system for discharges? (check one): ☐ Yes ☐ No, if so, explain, with an estimated timeframe for obtaining permission: N/A Has the operator attached a summary of any additional requirements the owner of this system has specified? (check one): ☐ Yes ☐ No	
Provide the expected start and end dates of discharge(s) (month/year): September 2017- 2-week duration Indicate if the discharge is expected to occur over a duration of: ■ less than 12 months ☐ 12 months or more ☐ is an emergency discharge	
Has the operator attached a site plan in accordance with the instructions in D, above? (check one): ■ Yes ☐ No	

<table>
<tr><td>2. Activity Category: (check all that apply)</td><td colspan="2">3. Contamination Type Category: (check all that apply)</td></tr>
<tr><td rowspan="4">☐ I – Petroleum-Related Site Remediation
☐ II – Non-Petroleum-Related Site Remediation
■ III – Contaminated Site Dewatering
☐ IV – Dewatering of Pipelines and Tanks
☐ V – Aquifer Pump Testing
☐ VI – Well Development/Rehabilitation
☐ VII – Collection Structure Dewatering/Remediation
☐ VIII – Dredge-Related Dewatering</td><td colspan="2">a. If Activity Category I or II: (check all that apply)

☐ A. Inorganics
☐ B. Non-Halogenated Volatile Organic Compounds
☐ C. Halogenated Volatile Organic Compounds
☐ D. Non-Halogenated Semi-Volatile Organic Compounds
☐ E. Halogenated Semi-Volatile Organic Compounds
☐ F. Fuels Parameters</td></tr>
<tr><td colspan="2">b. If Activity Category III, IV, V, VI, VII or VIII: (check either G or H)</td></tr>
<tr><td>■ G. Sites with Known Contamination</td><td>☐ H. Sites with Unknown Contamination</td></tr>
<tr><td>c. If Category III-G, IV-G, V-G, VI-G, VII-G or VIII-G: (check all that apply)

■ A. Inorganics
☐ B. Non-Halogenated Volatile Organic Compounds
☐ C. Halogenated Volatile Organic Compounds
☐ D. Non-Halogenated Semi-Volatile Organic Compounds
■ E. Halogenated Semi-Volatile Organic Compounds
☐ F. Fuels Parameters</td><td>d. If Category III-H, IV-H, V-H, VI-H, VII-H or VIII-H Contamination Type Categories A through F apply</td></tr>
</table>

4. Influent and Effluent Characteristics

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
A. Inorganics									
Ammonia		✔	1	350.1	100	720	720	Report mg/L	---
Chloride		✔	1	300.0	50000	59400	59400	Report µg/l	---
Total Residual Chlorine	✔		0					0.2 mg/L	
Total Suspended Solids	✔		1	2540D	5000	<5000	0	30 mg/L	---
Antimony	✔		1	200.7	10	<10	0	206 µg/L	
Arsenic	✔		1	3113B	1	<1	0	104 µg/L	
Cadmium		✔	1	3113B	0.05	0.06	0.06	10.2 µg/L	
Chromium III	✔		1	200.7	10	<10	0	323 µg/L	
Chromium VI	✔		1	3500Cr B	10	<10	0	323 µg/L	
Copper	✔		1	200.7	4	<4	0	242 µg/L	
Iron		✔	1	200.7	20	621	621	5,000 µg/L	
Lead	✔		1	3113B	1	<1	0	160 µg/L	
Mercury	✔		1	245.1	0.2	<0.2	0	0.739 µg/L	
Nickel	✔		1	200.7	10	<10	0	1,450 µg/L	
Selenium	✔		1	3113B	2	<2	0	235.8 µg/L	
Silver	✔		1	200.7	1	<1	0	35.1 µg/L	
Zinc		✔	1	200.7	10	539	539	420 µg/L	66.3
Cyanide	✔		1	4500CN	5	<5	0	178 mg/L	
B. Non-Halogenated VOCs									
Total BTEX	✔		1	524.2	0.5	<0.5	0	100 µg/L	---
Benzene	✔		1	524.2	0.5	<0.5	0	5.0 µg/L	---
1,4 Dioxane	✔		1	8270DSIM	0.25	<0.25	0	200 µg/L	---
Acetone	✔		1	524.2	5.0	<5.0	0	7.97 mg/L	---
Phenol	✔		1	420.1	100	<100	0	1,080 µg/L	

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
C. Halogenated VOCs									
Carbon Tetrachloride	✔		1	524.2	0.3	<0.3	0	4.4 µg/L	
1,2 Dichlorobenzene	✔		1	524.2	0.5	<0.5	0	600 µg/L	---
1,3 Dichlorobenzene	✔		1	524.2	0.5	<0.5	0	320 µg/L	---
1,4 Dichlorobenzene	✔		1	524.2	0.5	<0.5	0	5.0 µg/L	---
Total dichlorobenzene	✔		1	524.2	0.5	<0.5	0	763 µg/L in NH	---
1,1 Dichloroethane	✔		1	524.2	0.5	<0.5	0	70 µg/L	---
1,2 Dichloroethane	✔		1	524.2	0.5	<0.5	0	5.0 µg/L	---
1,1 Dichloroethylene	✔		1	524.2	0.5	<0.5	0	3.2 µg/L	---
Ethylene Dibromide	✔		1	504.1	0.015	<0.015	0	0.05 µg/L	---
Methylene Chloride	✔		1	524.2	0.5	<0.5	0	4.6 µg/L	---
1,1,1 Trichloroethane	✔		1	524.2	0.5	<0.5	0	200 µg/L	---
1,1,2 Trichloroethane	✔		1	524.2	0.5	<0.5	0	5.0 µg/L	---
Trichloroethylene	✔		1	524.2	0.5	<0.5	0	5.0 µg/L	---
Tetrachloroethylene	✔		1	524.2	0.5	<0.5	0	5.0 µg/L	
cis-1,2 Dichloroethylene	✔		1	524.2	0.5	<0.5	0	70 µg/L	---
Vinyl Chloride	✔		1	524.2	0.2	<0.2	0	2.0 µg/L	---
D. Non-Halogenated SVOCs									
Total Phthalates	✔		1	625 (SIM)	2.34625	<2.34	0	190 µg/L	
Diethylhexyl phthalate	✔		1	625 (SIM)	1.87	<1.87	0	101 µg/L	
Total Group I PAHs	✔		1	625 (SIM)	0.05	<0.05	0	1.0 µg/L	---
Benzo(a)anthracene	✔		1	625 (SIM)	0.05	<0.05	0	As Total PAHs	
Benzo(a)pyrene	✔		1	625 (SIM)	0.05	<0.05	0		
Benzo(b)fluoranthene	✔		1	625 (SIM)	0.05	<0.05	0		
Benzo(k)fluoranthene	✔		1	625 (SIM)	0.05	<0.05	0		
Chrysene	✔		1	625 (SIM)	0.05	<0.05	0		
Dibenzo(a,h)anthracene	✔		1	625 (SIM)	0.05	<0.05	0		
Indeno(1,2,3-cd)pyrene	✔		1	625 (SIM)	0.05	<0.05	0		

Parameter	Known or believed absent	Known or believed present	# of samples	Test method (#)	Detection limit (µg/l)	Influent		Effluent Limitations	
						Daily maximum (µg/l)	Daily average (µg/l)	TBEL	WQBEL
Total Group II PAHs	✔		1	625 (SIM)	0.19	<0.19	0	100 µg/L	---
Naphthalene	✔		1	625 (SIM)	0.19	<0.19	0	20 µg/L	---
E. Halogenated SVOCs									
Total PCBs		✔	1	608	0.09	1.0	1.0	0.000064 µg/L	---
Pentachlorophenol	✔		1	625 (SIM)	0.84	<0.84	0	1.0 µg/L	---
F. Fuels Parameters									
Total Petroleum Hydrocarbons	✔		1	1664A	5000	<5000	0	5.0 mg/L	---
Ethanol	✔		0					Report mg/L	---
Methyl-tert-Butyl Ether	✔		1	524.2	0.5	<0.5	0	70 µg/L	
tert-Butyl Alcohol	✔		1	524.2	25	<25	0	120 µg/L in MA 40 µg/L in NH	---
tert-Amyl Methyl Ether	✔		1	524.2	1.0	<1.0	0	90 µg/L in MA 140 µg/L in NH	---
Other (i.e., pH, temperature, hardness, salinity, LC_{50}, additional pollutants present); if so, specify:									
pH		✔	1						
Temperature (F)		✔	1						
Hardness		✔	1	200.7	165	40500	40500		

E. Treatment system information

1. Indicate the type(s) of treatment that will be applied to effluent prior to discharge: (check all that apply)

☐ Adsorption/Absorption ☐ Advanced Oxidation Processes ☐ Air Stripping ■ Granulated Activated Carbon ("GAC")/Liquid Phase Carbon Adsorption
■ Ion Exchange ☐ Precipitation/Coagulation/Flocculation ■ Separation/Filtration ☐ Other; if so, specify:

2. Provide a written description of all treatment system(s) or processes that will be applied to the effluent prior to discharge.

Groundwater encountered during excavation activities will be pumped into a treatment system prior to discharge to the receiving water. The first component of the treatment system will be a frac tank where solids will settle out. The effluent will next pass through a series of bag filters to remove fines, and subsequently will pass through a 1000-lb capacity liquid phase granular activated carbon vessel. The finished effluent will then pass through a flowmeter prior to entering Bonny Brook.

Identify each major treatment component (check any that apply):

■ Fractionation tanks☐ Equalization tank ☐ Oil/water separator ☐ Mechanical filter ■ Media filter
☐ Chemical feed tank ☐ Air stripping unit ■ Bag filter ☐ Other; if so, specify:

Indicate if either of the following will occur (check any that apply):

☐ Chlorination ☐ De-chlorination

3. Provide the **design flow capacity** in gallons per minute (gpm) of the most limiting component. Indicate the most limiting component: Bag Filters Is use of a flow meter feasible? (check one): ■ Yes ☐ No, if so, provide justification:	100
Provide the proposed maximum effluent flow in gpm.	100
Provide the average effluent flow in gpm.	100
If Activity Category IV applies, indicate the estimated total volume of water that will be discharged:	

4. Has the operator attached a schematic of flow in accordance with the instructions in E, above? (check one): ■ Yes ☐ No

F. Chemical and additive information

1. Indicate the type(s) of chemical or additive that will be applied to effluent prior to discharge or that may otherwise be present in the discharge(s): (check all that apply)

☐ Algaecides/biocides ☐ Antifoams ☐ Coagulants ☐ Corrosion/scale inhibitors ☐ Disinfectants ☐ Flocculants ☐ Neutralizing agents ☐ Oxidants ☐ Oxygen ☐ scavengers ☐ pH conditioners ☐ Bioremedial agents, including microbes ☐ Chlorine or chemicals containing chlorine ■ Other; if so, specify:
No Chemical Additives Anticipated

2. Provide the following information for each chemical/additive, using attachments, if necessary:

a. Product name, chemical formula, and manufacturer of the chemical/additive;
b. Purpose or use of the chemical/additive or remedial agent;
c. Material Safety Data Sheet (MSDS) and Chemical Abstracts Service (CAS) Registry number for each chemical/additive;
d. The frequency (hourly, daily, etc.), duration (hours, days), quantity (maximum and average), and method of application for the chemical/additive;
e. Any material compatibility risks for storage and/or use including the control measures used to minimize such risks; and
f. If available, the vendor's reported aquatic toxicity (NOAEL and/or LC50 in percent for aquatic organism(s)).

3. Has the operator attached an explanation which demonstrates that the addition of such chemicals/additives may be authorized under this general permit in accordance with the instructions in F, above? (check one): ☐ Yes ☐ No; if no, has the operator attached data that demonstrates each of the 126 priority pollutants in CWA Section 307(a) and 40 CFR Part 423.15(j)(1) are non-detect in discharges with the addition of the proposed chemical/additive?
(check one): ☐ Yes ☐ No

G. Endangered Species Act eligibility determination

1. Indicate under which criterion the discharge(s) is eligible for coverage under this general permit:

☐ **FWS Criterion A**: No endangered or threatened species or critical habitat are in proximity to the discharges or related activities or come in contact with the "action area".

■ **FWS Criterion B**: Formal or informal consultation with the FWS under section 7 of the ESA resulted in either a no jeopardy opinion (formal consultation) or a written concurrence by FWS on a finding that the discharges and related activities are "not likely to adversely affect" listed species or critical habitat (informal consultation). Has the operator completed consultation with FWS? (check one): ■ Yes ☐ No; if no, is consultation underway? (check one): ☐ Yes ☐ No

☐ **FWS Criterion C**: Using the best scientific and commercial data available, the effect of the discharges and related activities on listed species and critical habitat have been evaluated. Based on those evaluations, a determination is made by EPA, or by the operator and affirmed by EPA, that the discharges and related activities will have "no effect" on any federally threatened or endangered listed species or designated critical habitat under the jurisdiction of the FWS. This determination was made by: (check one) ☐ the operator ☐ EPA ☐ Other; if so, specify:

☐ **NMFS Criterion**: A determination made by EPA is affirmed by the operator that the discharges and related activities will have "no effect" or are "not likely to adversely affect" any federally threatened or endangered listed species or critical habitat under the jurisdiction of NMFS and will not result in any take of listed species. Has the operator previously completed consultation with NMFS? (check one): ☐ Yes ☐ No

2. Has the operator attached supporting documentation of ESA eligibility in accordance with the instructions in Appendix I, and G, above? (check one): ■ Yes ☐ No

Does the supporting documentation include any written concurrence or finding provided by the Services? (check one): ☐ Yes ■ No; if yes, attach.

H. National Historic Preservation Act eligibility determination

1. Indicate under which criterion the discharge(s) is eligible for coverage under this general permit:

☐ **Criterion A**: No historic properties are present. The discharges and discharge-related activities (e.g., BMPs) do not have the potential to cause effects on historic properties.

■ **Criterion B**: Historic properties are present. Discharges and discharge related activities do not have the potential to cause effects on historic properties.

☐ **Criterion C**: Historic properties are present. The discharges and discharge-related activities have the potential to have an effect or will have an adverse effect on historic properties.

2. Has the operator attached supporting documentation of NHPA eligibility in accordance with the instructions in H, above? (check one): ■ Yes ☐ No

Does the supporting documentation include any written agreement with the State Historic Preservation Officer (SHPO), Tribal Historic Preservation Officer (TPHO), or other tribal representative that outlines measures the operator will carry out to mitigate or prevent any adverse effects on historic properties? (check one): ☐ Yes ■ No

I. Supplemental information

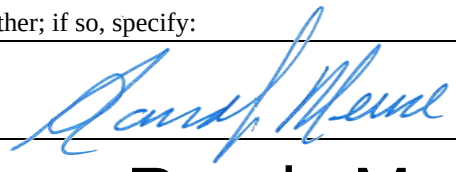
Describe any supplemental information being provided with the NOI. Include attachments if required or otherwise necessary.

Has the operator attached data, including any laboratory case narrative and chain of custody used to support the application? (check one): ■ Yes ☐ No

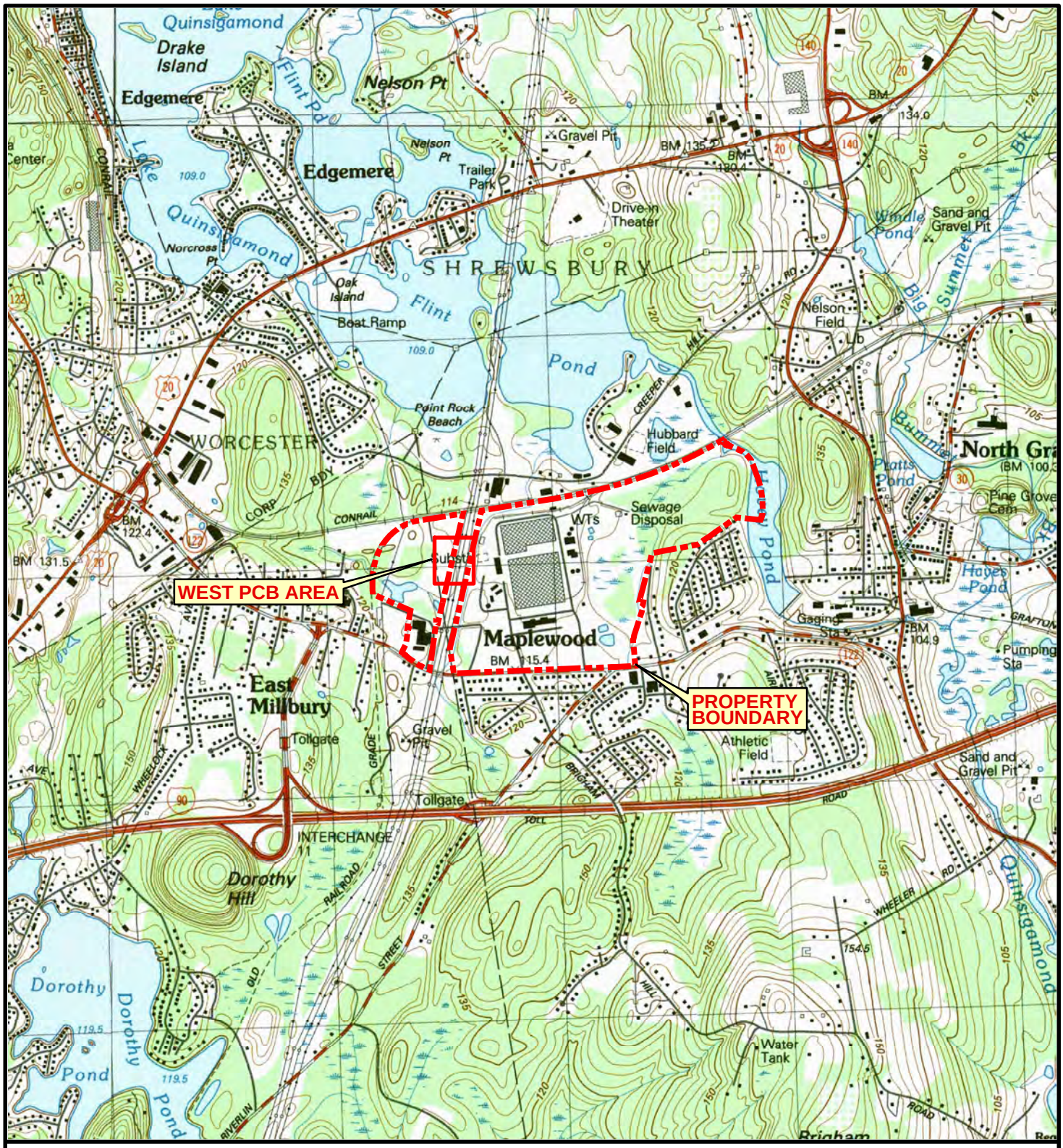
Has the operator attached the certification requirement for the Best Management Practices Plan (BMPP)? (check one): ■ Yes ☐ No

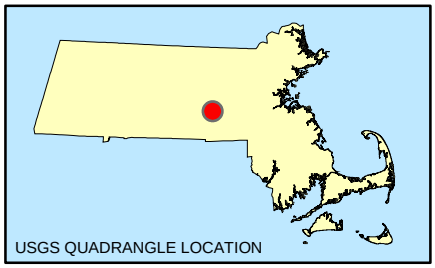
J. Certification requirement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

BMPP certification statement: A BMPP meeting the requirements of this general permit will be implemented upon initiation of discharge.	
Notification provided to the appropriate State, including a copy of this NOI, if required.	Check one: Yes ■ No ☐
Notification provided to the municipality in which the discharge is located, including a copy of this NOI, if requested.	Check one: Yes ■ No ☐
Notification provided to the owner of a private or municipal storm sewer system, if such system is used for site discharges, including a copy of this NOI, if requested.	Check one: Yes ☐ No ☐ NA ■
Permission obtained from the owner of a private or municipal storm sewer system, if such system is used for site discharges. If yes, attach additional conditions. If no, attach explanation and timeframe for obtaining permission.	Check one: Yes ☐ No ☐ NA ■
Notification provided to the owner/operator of the area associated with activities covered by an additional discharge permit(s). Additional discharge permit is (check one): ☐ RGP ☐ DGP ☐ CGP ☐ MSGP ☐ Individual NPDES permit ☐ Other; if so, specify:	Check one: Yes ☐ No ☐ NA ■
Signature: 	Date: August 15, 2017
Print Name and Title: Randy Meuse, Principal	

Attachment 2: Figure 1 – Site Locus Map





SOURCE : SCANNED USGS TOPOGRAPHIC QUADRANGLES
SCANNED BY THE MASSACHUSETTS EXECUTIVE OFFICE OF
ENVIRONMENTAL AFFAIRS, MASSGIS. DISTRIBUTED JUNE, 2001.

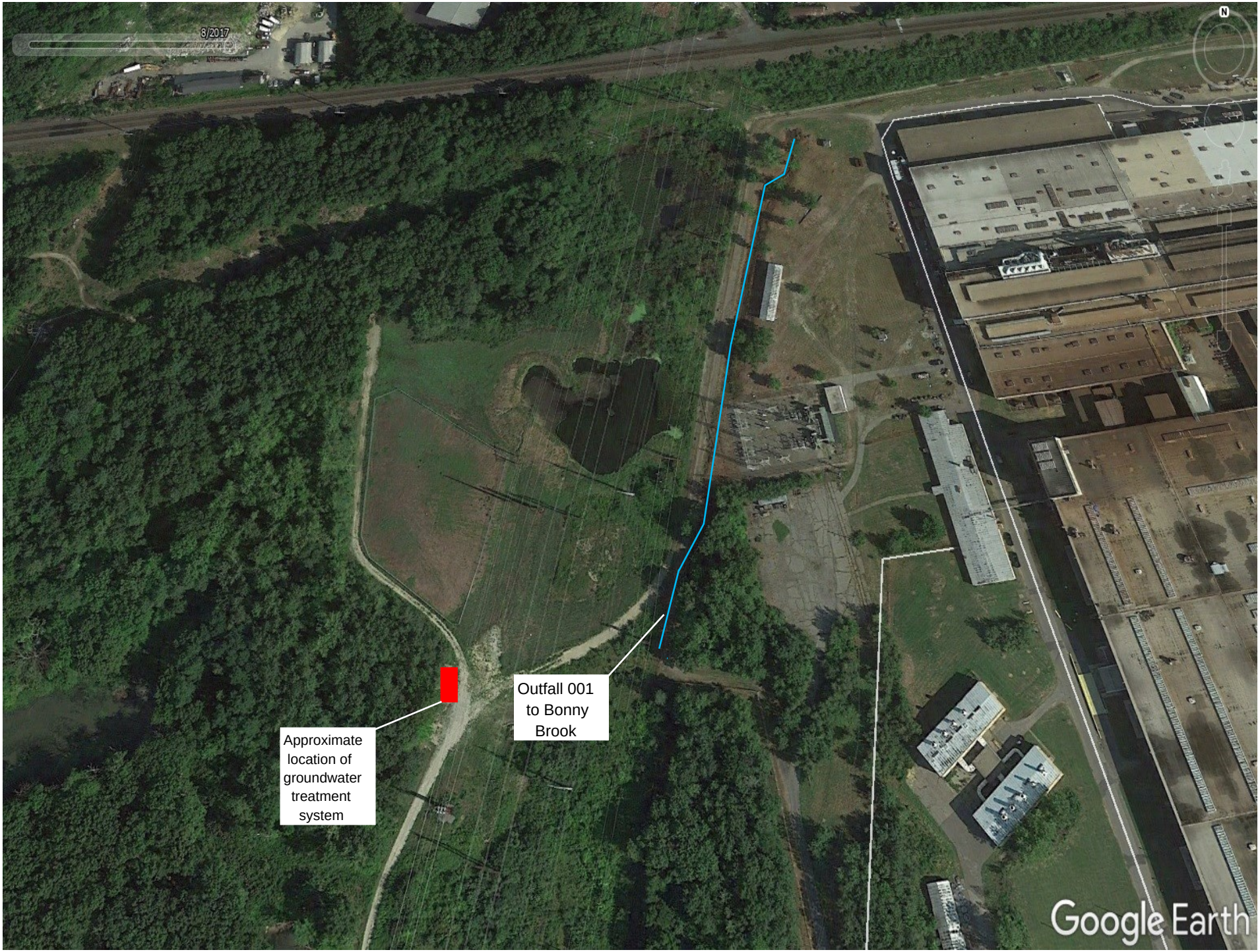
Data Supplied by : MASSGIS

0 1,000 2,000 4,000 6,000 Feet

N W E S

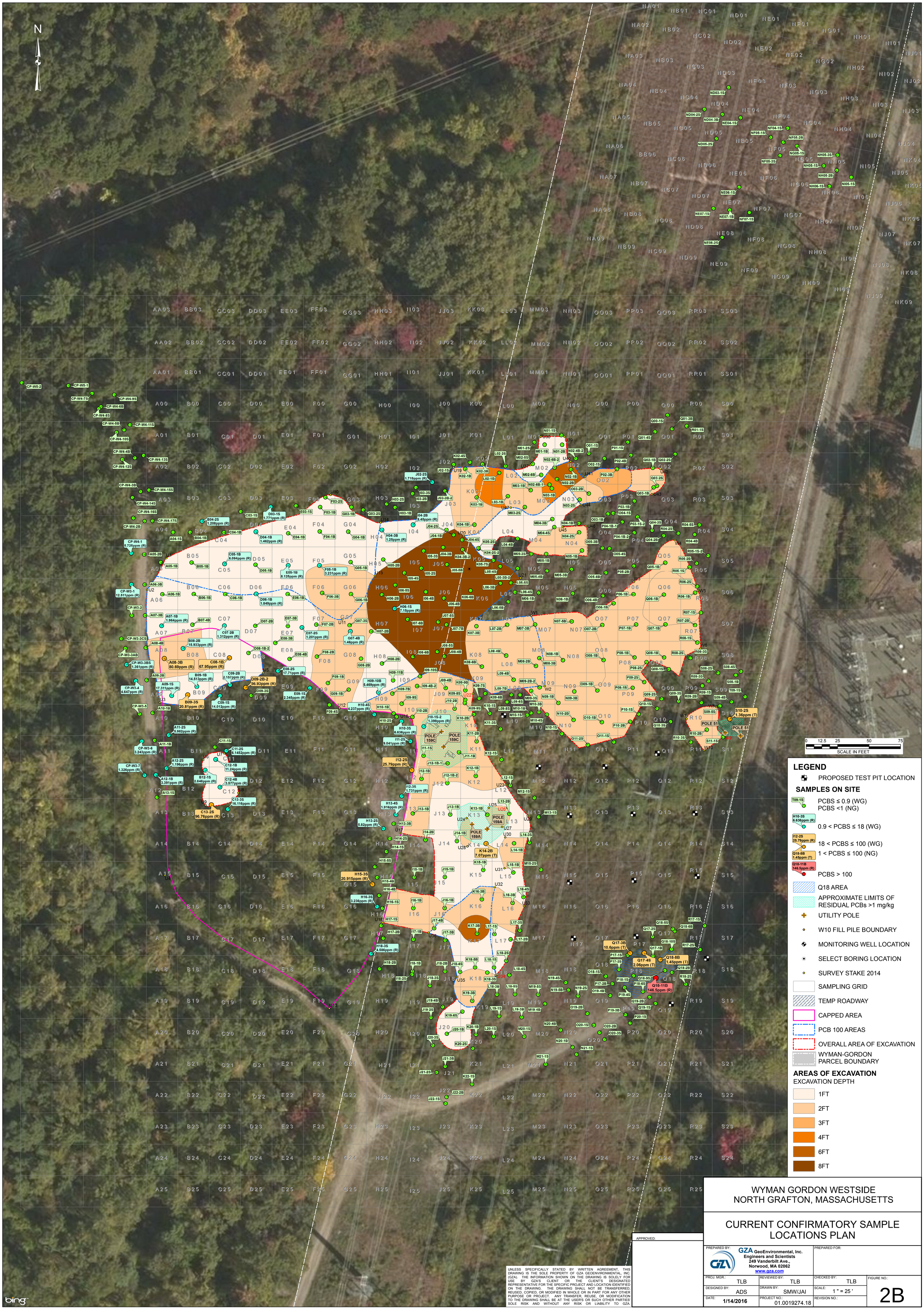
GZA	PROJ. MGR.: TLB DESIGNED BY: TLB REVIEWED BY: GWM OPERATOR: SMW DATE: 08-07-2014	LOCUS PLAN WYMAN GORDON NORTH GRAFTON, MASSACHUSETTS	JOB NO. 01.0019274.08 FIGURE NO. 1

Attachment 3: Figures 2A and 2B – Site Plan and Outfall Locations



OUTFALL LOCATION PLAN

FIGURE 2A



WYMAN GORDON WESTSIDE
NORTH GRAFTON, MASSACHUSETTS

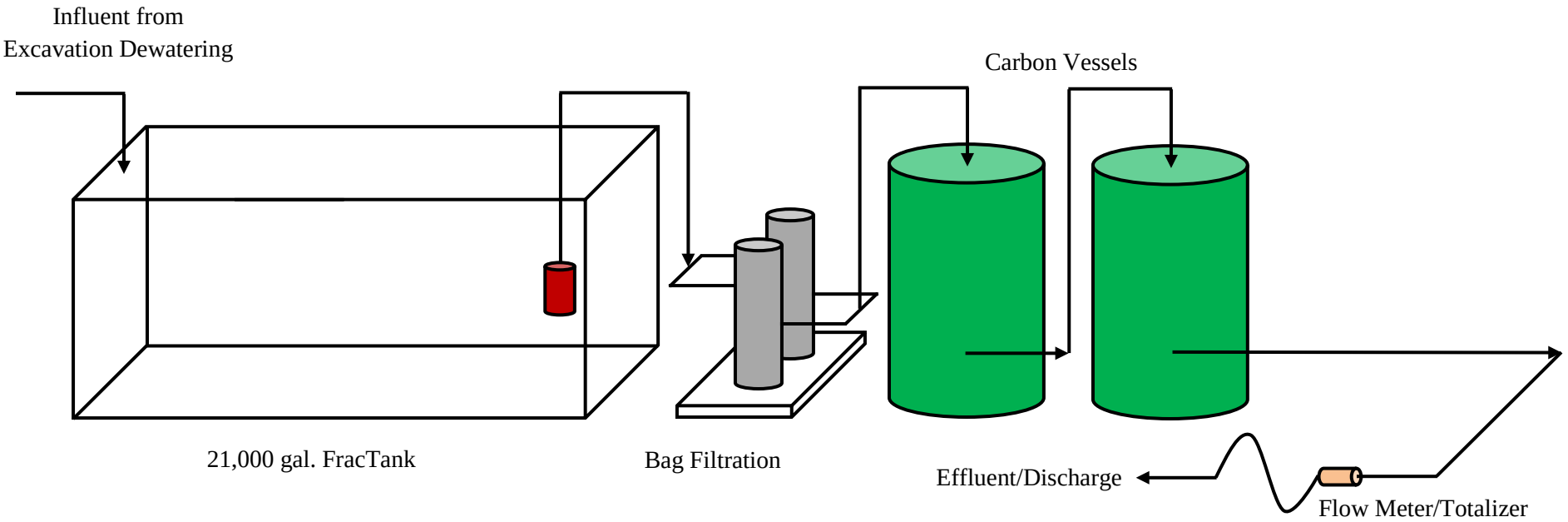
CURRENT CONFIRMATORY SAMPLE LOCATIONS PLAN

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists 249 Vanderbilt Ave., Norwood, MA 02062 www.gza.com		PREPARED FOR:	
PROJ. MGR.: TLB	REVIEWED BY: TLB	CHECKED BY: TLB	FIGURE NO.: 2B
DESIGNED BY: ADS	DRAWN BY: SMW/JAI	SCALE: 1 " = 25 '	
DATE: 1/14/2016	PROJECT NO.: 01.0019274.18	REVISION NO.:	

APPROVED:

J:\19,000-20,999\19274\19274-18 TLB\FIGURES\GIS\MXD\S19274_18_ConfirmatorySampleLocationPlan.mxd

Attachment 4: Figure 3 – Process Flow Diagram



Notes:

1.) Figure is not to scale.
2.) The water treatment system is rated for 100 gallons per minute.
3.) All discharge water shall be routed to the treatment system.

89 Crawford Street
Leominster, Massachusetts 01453
Tel: 774.450.7177
Fax: 888.835.0617
www.lrt-llc.net

Water Treatment System Schematic
Wyman Gordon
Grafton, Massachusetts

Attachment 5: ESA and EFH Documentation

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Barnstable	Piping Plover	Threatened	Coastal Beaches	All Towns
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	All Towns
	Northeastern beach tiger beetle	Threatened	Coastal Beaches	Chatham
	Sandplain gerardia	Endangered	Open areas with sandy soils.	Sandwich and Falmouth.
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Bourne (north of the Cape Cod Canal)
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Berkshire	Bog Turtle	Threatened	Wetlands	Egremont and Sheffield
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Bristol	Piping Plover	Threatened	Coastal Beaches	Fairhaven, Dartmouth, Westport
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Fairhaven, New Bedford, Dartmouth, Westport
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Taunton
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Dukes	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	All Towns
	Piping Plover	Threatened	Coastal Beaches	All Towns
	Northeastern beach tiger beetle	Threatened	Coastal Beaches	Aquinnah and Chilmark
	Sandplain gerardia	Endangered	Open areas with sandy soils.	West Tisbury
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

Updated 01/09/2015

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Essex	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Gloucester, Essex and Manchester
	Piping Plover	Threatened	Coastal Beaches	Gloucester, Essex, Ipswich, Rowley, Revere, Newbury, Newburyport and Salisbury
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Franklin	Northeastern bulrush	Endangered	Wetlands	Montague, Warwick
	Dwarf wedgemussel	Endangered	Mill River	Whately
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Hampshire	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Hadley
	Puritan tiger beetle	Threatened	Sandy beaches along the Connecticut River	Northampton and Hadley
	Dwarf wedgemussel	Endangered	Rivers and Streams.	Hatfield, Amherst and Northampton
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Hampden	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Southwick
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Middlesex	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Groton
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Nantucket	Piping Plover	Threatened	Coastal Beaches	Nantucket
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Nantucket
	American burying beetle	Endangered	Upland grassy meadows	Nantucket
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

Updated 01/09/2015

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN MASSACHUSETTS

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Plymouth	Piping Plover	Threatened	Coastal Beaches	Scituate, Marshfield, Duxbury, Plymouth, Wareham and Mattapoisett
	Northern Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Kingston, Middleborough, Carver, Plymouth, Bourne, Wareham, Halifax, and Pembroke
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	Plymouth, Marion, Wareham, and Mattapoisett.
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Suffolk	Piping Plover	Threatened	Coastal Beaches	Revere, Winthrop
	Red Knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal Towns
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Worcester	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Leominster
	Northern Long-eared Bat	Proposed Endangered	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

[1]Migratory only, scattered along the coast in small numbers

-Eastern cougar and gray wolf are considered extirpated in Massachusetts.
-Endangered gray wolves are not known to be present in Massachusetts, but dispersing individuals from source populations in Canada may occur statewide.
-Critical habitat for the Northern Red-bellied Cooter is present in Plymouth County.

Updated 01/09/2015

MassDEP - Bureau of Waste Site Cleanup

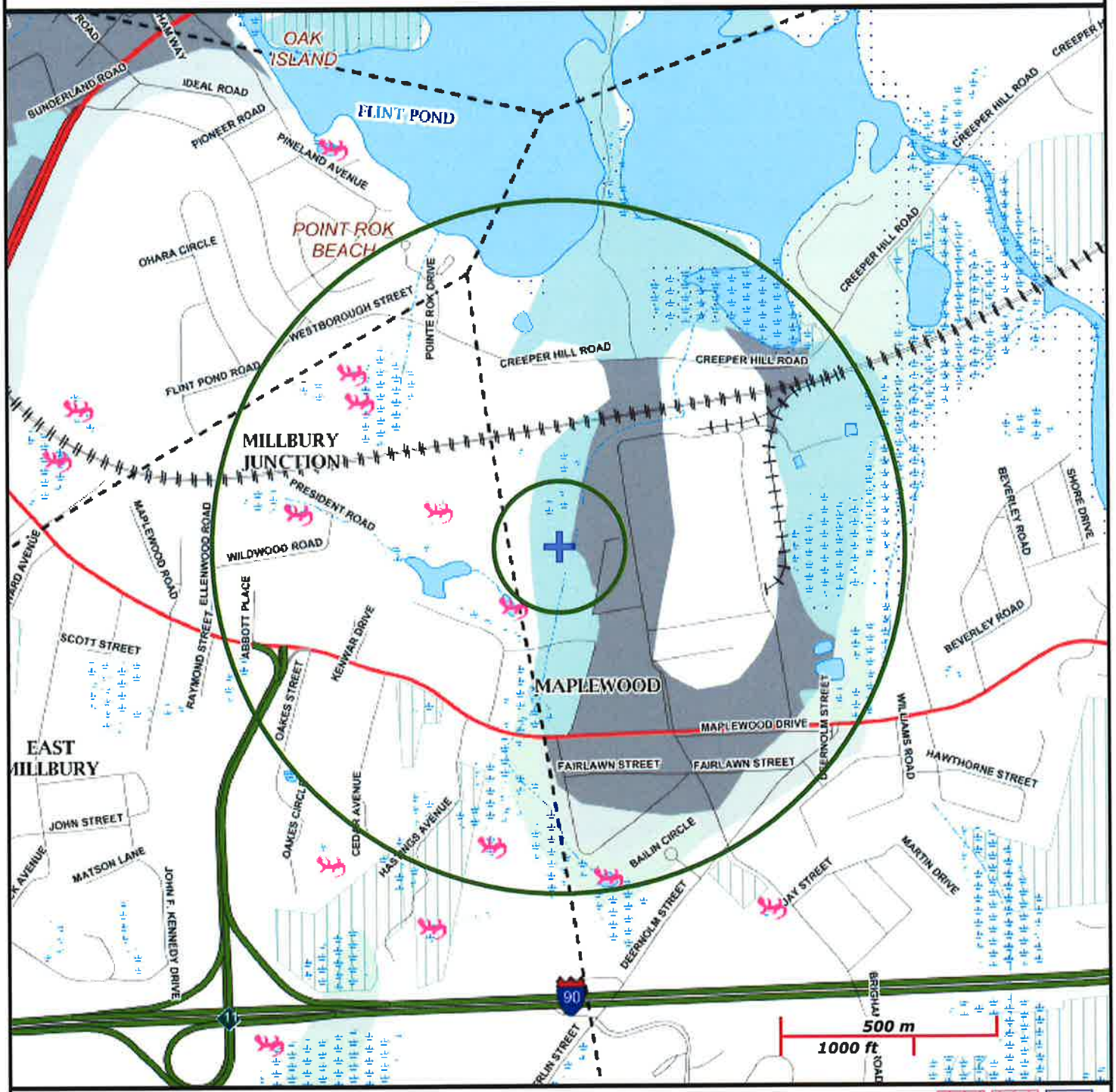
Phase 1 Site Assessment Map: 500 feet & 0.5 Mile Radii

Site Information:
WYMAN-GORDON COMPANY
244 WORCESTER STREET GRAFTON, MA

NAD83 UTM Meters:
4679182mN , 274654mE (Zone: 19)
July 18, 2017

The information shown is the best available at the date of printing. However, it may be incomplete. The responsible party and LSP are ultimately responsible for ascertaining the true conditions surrounding the site. Metadata for data layers shown on this map can be found at: http://www.mass.gov/mgis/.

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection



Roads: Limited Access, Divided, Other Hwy, Major Road, Minor Road, Track, Trail

Boundaries: Town, County, DEP Region; Train; Powerline; Pipeline; Aqueduct

Basins: Major, PWS; Streams: Perennial, Intermittent, Man Made Shore, Dam

Aquifers: Medium Yield, High Yield, EPA Sole Source

Non Potential Drinking Water Source Area: Medium, High (Yield)

PWS Protection Areas: Zone II, IWPA, Zone A

Hydrography: Open Water, PWS Reservoir, Tidal Flat

Wetlands: Freshwater, Saltwater, Cranberry Bog

FEMA 100yr Floodplain; Protected Open Space; ACEC

Est. Rare Wetland Wildlife Hab; Vernal Pool: Cert., Potential

Solid Waste Landfill; PWS: Com.GW,SW, Emerg., Non-Com.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104
http://www.fws.gov/newengland

In Reply Refer To:
Consultation Code: 05E1NE00-2017-SLI-2349
Event Code: 05E1NE00-2017-E-05120
Project Name: Wyman Gordon

August 02, 2017

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the

human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

Project Summary

Consultation Code: 05E1NE00-2017-SLI-2349

Event Code: 05E1NE00-2017-E-05120

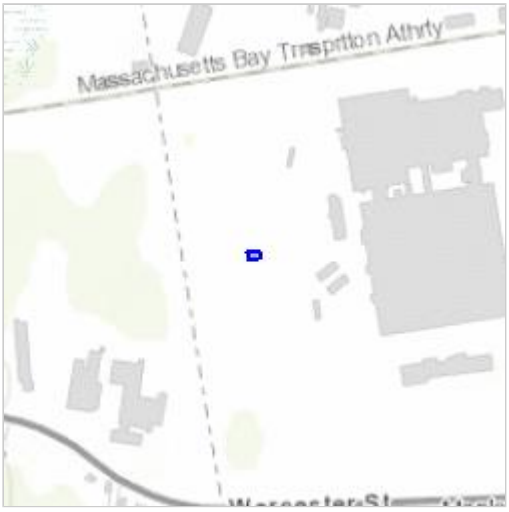
Project Name: Wyman Gordon

Project Type: DREDGE / EXCAVATION

Project Description: Limited excavation of approximately 200 cubic yards of PCB impacted soils associated with soil remediation activities. Work is scheduled for the Fall 2017.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/42.232140883923684N71.730717015094W



Counties: Worcester, MA

Endangered Species Act Species

There is a total of 1 threatened, endangered, or candidate species on this species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Critical habitats

There are no critical habitats within your project area under this office's jurisdiction.

Evaluation of Endangered Species Habitats

244 Worcester Street and Adjacent Power Transmission Corridor

Grafton, Massachusetts

The northern long-eared bat (*Myotis septentrionalis*) has a federal status of Threatened and a state status of Endangered within Massachusetts.

The northern long-eared bat is a migratory species which utilizes a variety of habitats during the year depending on the season. Between early November and April, this species hibernates in crevices in portions of caves and abandoned mine shafts which have high humidity, constant temperatures, and little air flow. Individuals tend to return to the same hibernaculum from year to year although they are also known to sometimes use other hibernacula. Hibernacula are generally located within approximately 35 miles of summer foraging habitat. Between April and October, northern long-eared bats roost and forage in forested areas. Preferred roost sites include clusters of large, live or dead, hardwood trees with cavities or peeling bark. Preferred foraging sites include wooded areas around vernal pools or small ponds or along streams. Thus, transitional zones between forested uplands and wetlands represent prime summer roosting and foraging habitat.

The parcel at 244 Worcester Street in Grafton, MA (Site) is located within an industrially developed area currently used as a drop forging facility owned and operated by Wyman-Gordon Company. A power transmission corridor owned by National Grid abuts the facility to the west. The excavation work will be conducted within the power transmission corridor under an access agreement made between Wyman Gordon and National Grid. The transmission corridor is a predominantly open upland and wetland area with few trees and no known caves. The area to the west of the transmission corridor is forested. Several potential (uncertified) vernal pools are located within ½ mile of the property with the closest potential pool located approximately 500 feet to the southwest of the proposed excavation area. A small stream named Bonny Brook flows northward along the boundary of the Wyman-Gordon and National Grid properties. The proposed excavation work will occur on an open portion of the upland area which will not require removal of trees or will disturb wetland areas. The discharge of water from remediation activities will be treated in accordance with the terms of the discharge authorization to levels well below what are currently observed within the brook. Therefore, it is unlikely that that the proposed excavation work will adversely affect the northern long-eared bat or its potential habitats.

Northern Long-Eared Bat

Myotis septentrionalis

The northern long-eared bat is federally listed as a threatened species under the Endangered Species Act. ***Endangered*** species are animals and plants that are in danger of becoming extinct. ***Threatened*** species are animals and plants that are likely to become endangered in the foreseeable future. Identifying, protecting and restoring endangered and threatened species is the primary objective of the U.S. Fish and Wildlife Service's Endangered Species Program.

Photo by Steve Taylor, University of Illinois

This northern long-eared bat, observed during an Illinois mine survey, shows visible symptoms of white-nose syndrome.

What is the northern long-eared bat?

Appearance: The northern long-eared bat is a medium-sized bat with a body length of 3 to 3.7 inches and a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*.

Winter Habitat: Northern long-eared bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible.

Summer Habitat: During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. They rarely roost in human structures like barns and sheds.

Reproduction: Breeding begins in late summer or early fall when males begin to swarm near hibernacula. After copulation, females store sperm during hibernation until spring. In spring, females emerge from their hibernacula, ovulate and the stored sperm fertilizes an egg. This strategy is called delayed fertilization.

After fertilization, pregnant bats migrate to summer areas where they roost in small colonies and give birth to a single pup. Maternity colonies of females and young generally have 30 to 60 bats at the beginning of the summer, although larger maternity colonies have also been observed. Numbers of bats in roosts typically decrease from the time of pregnancy to post-lactation. Most bats within a maternity colony give birth around the same time, which may occur from late May or early June to late July, depending where the colony is located within the species' range. Young bats start flying by 18 to 21 days after birth. Maximum lifespan for the northern long-eared bat is estimated to be up to 18.5 years.

Feeding Habits: Like most bats, northern long-eared bats emerge at dusk to feed. They primarily fly through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation or by gleaning motionless insects from vegetation.

Range: The northern long-eared bat's range includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. The species' range includes 37 States and the District of Columbia: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming.

Why is the northern long-eared bat in trouble?

White-nose Syndrome: No other threat is as severe and immediate as

this. If this disease had not emerged, it is unlikely that northern long-eared bat populations would be experiencing such dramatic declines. Since symptoms were first observed in New York in 2006, white-nose syndrome has spread rapidly from the Northeast to the Midwest and Southeast; an area that includes the core of the northern long-eared bat's range, where it was most common before this disease. Numbers of northern long-eared bats (from hibernacula counts) have declined by up to 99 percent in the Northeast. Although there is uncertainty about the rate that white-nose syndrome will spread throughout the species' range, it is expected to continue to spread throughout the United States in the foreseeable future.

Other Sources of Mortality:
Although no significant population declines have been observed due to the sources of mortality listed below, they may now be important factors affecting this bat's viability until we find ways to address WNS.

Impacts to Hibernacula: Gates or other structures intended to exclude people from caves and mines not only restrict bat flight and movement, but also change airflow and microclimates. A change of even a few degrees can make a cave unsuitable for hibernating bats. Also, cave-dwelling bats are vulnerable to human disturbance while hibernating. Arousal during hibernation causes bats to use up their energy stores, which may lead to bats not surviving through winter.

Loss or Degradation of Summer Habitat: Highway construction, commercial development, surface mining, and wind facility construction permanently remove habitat and are activities prevalent in many areas of this bat's range. Many forest management activities benefit bats by keeping areas forested rather than converted to other uses. But, depending on type and timing, some forest management activities can cause mortality and temporarily remove or degrade roosting and foraging habitat.

Wind Farm Operation: Wind turbines kill bats, and, depending on the species, in very large numbers. Mortality from windmills has been documented for northern long-eared bats, although a small number have been found to date. However, there are many wind projects within a large portion of the bat's range and many more are planned.

What Is Being Done to Help the Northern Long-Eared Bat?

Disease Management: Actions have been taken to try to reduce or slow the spread of white-nose syndrome through human transmission of the fungus into caves (e.g. cave and mine closures and advisories; national decontamination protocols). A national plan was prepared by the Service and other state and federal agencies that details actions needed to investigate and manage white-nose syndrome. Many state and federal agencies, universities and non-governmental organizations are researching this disease to try to control its spread and address its affect. See www.whitenosesyndrome.org/ for more.

Addressing Wind Turbine Mortality: The Service and others are working to minimize bat mortality from wind turbines on several fronts. We fund and conduct research to determine why bats are susceptible to turbines, how to operate turbines to minimize mortality and where important bird and bat migration routes are located. The Service, state natural resource agencies, and the wind energy industry are developing a Midwest Wind Energy Habitat Conservation Plan, which will provide wind farms a mechanism to continue operating legally while minimizing and mitigating listed bat mortality.

Listing: The northern long-eared bat is listed as a threatened species under the federal Endangered Species Act. Listing a species affords it the protections of the Act and also increases the priority of the species for funds, grants, and recovery opportunities.

Hibernacula Protection: Many federal and state natural resource agencies and conservation organizations have protected caves and mines that are important hibernacula for cave-dwelling bats.

What Can I Do?

Do Not Disturb Hibernating Bats: To protect bats and their habitats, comply with all cave and mine closures, advisories, and regulations. In areas without a cave and mine closure policy, follow approved decontamination protocols (see http://whitenosesyndrome.org/topics/decontamination). Under no circumstances should clothing, footwear, or equipment that was used in a white-nose syndrome affected state or region be used in unaffected states or regions.

Leave Dead and Dying Trees Standing: Like most eastern bats, the northern long-eared bat roosts in trees during summer. Where possible and not a safety hazard, leave dead or dying trees on your property. Northern long-eared bats and many other animals use these trees.

Install a Bat Box: Dead and dying trees are usually not left standing, so trees suitable for roosting may be in short supply and bat boxes may provide additional roost sites. Bat boxes are especially needed from April to August when females look for safe and quiet places to give birth and raise their pups.

Support Sustainability: Support efforts in your community, county and state to ensure that sustainability is a development goal. Only through sustainable living will we provide rare and declining species, like the northern long-eared bat, the habitat and resources they need to survive alongside us.

Spread the Word: Understanding the important ecological role that bats play is a key to conserving the northern long-eared and other bats. Helping people learn more about the northern long-eared bat and other endangered species can lead to more effective recovery efforts. For more information, visit www.fws.gov/midwest/nleb and www.whitenosesyndrome.org

Join and Volunteer: Join a conservation group; many have local chapters. Volunteer at a local nature center, zoo, or national wildlife refuge. Many state natural resource agencies benefit greatly from citizen involvement in monitoring wildlife. Check your state agency websites and get involved in citizen science efforts in your area.

Northern Long-Eared Bat (*Myotis septentrionalis*) Species Guidance

Family: Vespertilionidae- the evening bats

State Status: Threatened

State Rank: S1S3

Federal Status: None

Global Rank: G4

Wildlife Action Plan Area of Importance Score: 3

Range of the northern long-eared bat in Wisconsin. Source: WI Bat Program 2012

Dave Redell, Wisconsin DNR

Species Information

General Description: The northern long-eared bat, also referred to as the northern bat, is a medium-sized member of the genus *Myotis.* Adults weigh five to nine grams (0.2-0.3 oz). Individual weights vary seasonally and are lowest in the spring as bats emerge from hibernation (WI Bat Program 2010). Total length is 77-92 mm (3.0-3.63 in), adult forearm length is 34-38 mm (1.3-1.5 in), and females are generally larger than males (Kurta 1995). Wingspan is 23-26 cm (9.1-10.2 in; Barbour and Davis 1969). Fur color is light to dark brown. The northern long-eared bat is classified as a cave bat because it uses caves and mines for hibernation.

Similar Species: Three bat species in Wisconsin- the northern long-eared bat, the little brown bat (*Myotis lucifugus*) and the Indiana (*Myotis sodalis*) bat – are best distinguished by close (in-hand) inspection. The northern long-eared bat is most often confused with the little brown bat. The northern long-eared bat has longer ears than the little brown bat, and when folded alongside the head, the tips of the ears should extend 3 mm or more past the tip of the nose. Little brown bat ear length in Wisconsin, however, can be highly variable, and tragus shape and length in relation to the rest of the ear are the two best features to use to distinguish these two species (Fig. 1). The tragus of the northern long-eared bat is more pointed and spear-like than that of the little brown bat. The little brown bat also has a glossier appearance than the northern long-eared. The northern long-eared bat may also be confused with the Indiana bat, but the two can be distinguished much the same way as the little brown bat from the northern long-eared bat. The Indiana bat's keeled calcar, a spur of cartilage extended from the ankle and supporting the interfemoral membrane, is a distinguishing feature that the northern long-eared bat lacks. The northern long-eared bat can be identified by the echolocation call (Fig. 2), however both other *Myotis* species share similar call characteristics, and only trained individuals should positively identify the species through echolocation calls.

Figure 1. The asymmetrical tragus of the little brown bat (left), and the symmetrical, spear-like tragus of the northern long-eared bat (right). Dave Redell, Wisconsin DNR

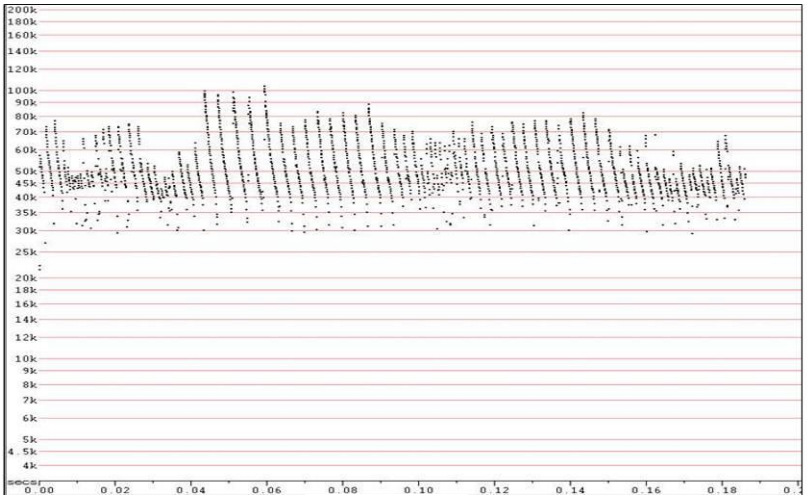


Figure 2. Echolocation call: Northern long-eared bats produce high-frequency calls of a shorter duration, broader bandwidth and lower intensity than other *Myotis* species. The call frequency ranges between 126 and 40 kHz (Caceres and Barclay 2000). The northern long-eared bat sonogram may appear similar to the little brown bat and the Indiana bat.

Associated Species: Northern long-eared bat predators include owls, hawks, occasionally snakes, and raccoons (*Procyon lotor*). As many as 13 feral cats have also been observed congregating at a mine entrance at dusk to prey upon bats as they leave the hibernaculum (D. Redell pers. obs.). Northern long-eared bats often share hibernacula with other bat species such as the tri-colored bat (*Perimyotis subflavus*), the little brown bat, the big brown bat (*Eptesicus fuscus*) and the Indiana bat, but the northern bat rarely, if ever, forms hibernating clusters with other species. Northern long-eared bats forage with other bat species, but there is no evidence of direct competition between species.

State Distribution and Abundance: Northern long-eared bats are found throughout the state of Wisconsin (but see "Threats" section below), but they are never abundant (Jackson 1961, WDNR 2013).

Global Distribution and Abundance: Northern long-eared bats are widely distributed in the eastern United States and Canada, with the exception of the very southeastern United States and Texas (see Fig. 3, BCI 2012).

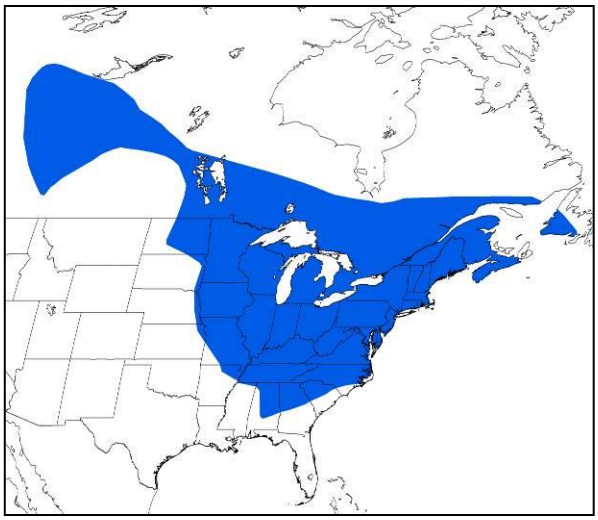
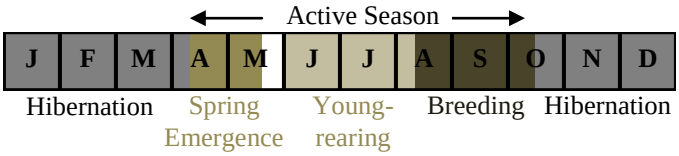


Figure 3. Global distribution of *Myotis septentrionalis*. (BCI 2012)

Diet: The northern long-eared bat is insectivorous and uses echolocation to locate and capture prey. Northern long-eared bat prey includes moths (*Lepidoptera*), flies (*Diptera*) and beetles (*Coleoptera*). This species is commonly referred to as a gleaning bat because it often catches insects that are at rest on leaves or twigs, in addition to catching insects that are flying (Lee and McCracken 2004).

Reproductive Cycle: The reproductive cycle for the northern long-eared bat begins when breeding occurs in the fall and sometimes into winter hibernation. Sperm is stored in the uterus of the female until April or May when the females emerge from hibernation and fertilization occurs. Females form small maternity colonies of up to 30 bats in late spring and females give birth to a single pup in June or early July (Caceres and Barclay 2000, Owen et. al. 2002). Pups are born hairless and flightless. The pup nurses for about a month and is left at the roost nightly while the mother goes out to feed. The pup begins to fly and explore on its own at four to six weeks. Maternity colonies disperse shortly after young are volant (able to fly) and bats move closer to hibernacula in the fall and mate before they hibernate. Young of the year do not usually mate, but some juvenile males appear reproductively active (WI Bat Program 2009, 2010). More research is needed to determine breeding and reproductive behavior of the northern long-eared bat.



Ecology: Female and male northern long-eared bats emerge from hibernation in April and May. In summer, the northern long-eared bat roosts alone, or females may form a colony with some other females. The northern long-eared bat chooses day roosts in tall trees and snags. Night roosts for this species include caves and rock shelters where they will rest between feeding bouts (Caceres and Barclay 2000). Roost fidelity is low in this species, and individual bats switch roosts about every two days in the summer (Foster and Kurta 1999). This species is a relatively long lived mammal for its size, and usually lives up to 8-10 years. Banding records indicated a northern long-eared bat caught in the wild lived up to 18 years (Caceres and Barclay 2000). In the fall, northern long-eared bats will make short migrations from summer habitat to winter hibernacula (caves and abandoned mines), and will often return to the same hibernaculum but not always in sequential seasons (Caceres and Barclay 2000). This species hibernates with other species such as the little brown bat and tri-colored bat, but often in different parts of the hibernaculum. The northern long-eared bat hibernates deep in crevices, rather than clustering on exposed surfaces like other cave bats, which makes it difficult to survey and monitor for this species during the winter (Caceres and Barclay 2000). More research is needed on northern long-eared bats' basic life history and behavior.

Natural Community Associations: (WDNR 2005 and WDNR 2009)

Many bat species are associated more with structural features within natural communities than with any particular natural community or group of natural communities (see "Habitat" section).

Significant: coldwater streams, coolwater streams, ephemeral pond
Moderate: alder thicket, bog relict, boreal rich fen, calcareous fen (southern), central sands pine – oak forest, coastal plain marsh, emergent aquatic, floodplain forest, hemlock relict, inland lakes, northern dry forest, northern dry-mesic forest, northern hardwood swamp, northern mesic forest, northern sedge meadow, oak barrens, oak woodland, open bog, shrub carr, southern dry forest, southern

dry-mesic forest, southern hardwood swamp, southern mesic forest, southern sedge meadow, submergent aquatic, submergent aquatic-oligotrophic marsh, warmwater rivers, warmwater streams, white pine – red maple swamp
Minimal: none

Habitat: Northern long-eared bat habitat use changes over the course of the year, and varies based on sex and reproductive status. Reproductive females often use different summer habitat from males and non-reproductive females.

Summer: Northern long-eared bats commonly roost in trees but have been known to roost in man-made structures. This species often roosts under bark or close to the tree trunk in crevices of tree species such as maples and ashes (Foster and Kurta 1999). Northern long-eared bats prefer to roost in tall trees with a dynamic forest structure including old growth and some young trees (Foster and Kurta 1999). Females form small maternity colonies which are located in trees, under shingles, and in buildings. Northern long-eared bats commonly forage within the forest and below the canopy mainly in upland forests on hillsides and ridges (Owen et al. 2003), but have also been noted to forage along paths, ponds and streams, and at forest edges. Foster and Kurta (1999) found all roost trees to be close to wetlands. More information is needed to more fully describe northern long-eared bat foraging habitats and summer roosting in Wisconsin.

Home range: Northern long-eared bats use approximately 150 acres for their home range in summer (Owen et al. 2003). More information is needed to accurately describe northern long-eared bat home range and habitat in Wisconsin.

Winter: The northern long-eared bat hibernates in caves and abandoned mines in winter and tends to be found in deep crevices (Kurta 1994, Caceres and Barclay 2000). More research is needed to determine what characteristics make suitable caves and mines for northern long-eared bat hibernation.

Northern long-eared bat hibernacula in southwestern Wisconsin: Passage of a mine in Grant County that houses northern bats (left), and solitary northern long-eared bat in a crevice in Pierce County (right). Heather Kaarakka, Wisconsin DNR

Edge habitat (transition zone between two types of vegetation) is important for northern long-eared bats as they migrate and forage. When bats migrate from wintering caves to summer habitat or commute from roosts to feeding grounds, they move through the landscape in a manner that protects them from wind and predators. Instead of flying the shortest distance across a field, for instance, bats will take longer routes that follow edge habitat. In addition to offering protection, this behavior may also allow bats more feeding opportunities because food is more abundant around edge habitat (Limpens and Kapteyn 1991). Commuting along edge habitat may assist the bats with navigation and orientation through use of linear edges as landmarks (Verboom and Huitema 1997).

Threats: Lack of information on bat species' basic ecology is one of the greatest threats to bat conservation in Wisconsin. The northern long-eared bat faces two emerging threats, and several ongoing threats. White-nose syndrome (WNS) was discovered in 2006 in a hibernaculum in New York State, and appears as a white, powdery substance on the bat's face, tail and wings. White-nose syndrome has spread rapidly since 2007 to other hibernacula in neighboring states (USFWS 2012). Infected little brown bat and northern bat hibernacula in New York and surrounding states have experienced mortality rates of over 90%. White-nose syndrome has been called the "most precipitous wildlife decline in the past century in North America" (BCI 2009), and is caused by a fungus called *Geomyces destructans* (Lorch et al. 2011). This fungus grows best in the cool, wet conditions of hibernacula (Verant et al. 2012). Mortality from the fungus appears to come from increased arousals during torpor, which deplete bats' fat reserves and cause starvation (Reeder et al. 2012) and dehydration (Cryan et al. 2010). For up-to-date WNS information, see the USFWS WNS website and the USGS National Wildlife Health Center website (see *Additional Information).* Neither the fungus nor the disease has been found in Wisconsin as of this writing. Cave-hibernating bats, including the northern long-eared bat, should be monitored closely for any

indication of WNS; the Wisconsin Bat Program conducts WNS surveillance and monitoring in the state.

Wind power is another emerging threat to bats – wind turbines have been shown to fatally impact all bat species in Wisconsin (Johnson 2003, Arnett et al. 2008). Wind-turbine blades cause mortality through direct impact or through the pressure differential caused by the motion of the spinning blades. This pressure differential causes a bat's lungs to fill with fluid as it flies near the spinning blades, and this phenomenon (known as barotrauma) kills the bat instantly (Baerwald et. al. 2008). More research is under way to better understand bat wind-turbine vulnerabilities, but current studies suggest that bats face the greatest risk during migration from summer foraging sites to wintering grounds (tree bats) or hibernacula (cave bats) (Johnson 2003, Kunz et al. 2007). Research is needed on all Wisconsin bat species to better understand wind-turbine mortality in the state and the long term population impacts of turbine-related deaths.

Northern long-eared bats also face the ongoing threat of habitat degradation. Habitat degradation is caused by increased agricultural, industrial, and household pesticide use, and it has negative effects on bats through direct exposure and through dietary accumulation (O'Shea et al. 2001). Pesticides are a threat to many taxa, but bats may be more vulnerable than other small mammals due to certain life characteristics (Shore et al. 1996, O'Shea et al. 2001). Bats' longevity and high trophic level means pesticides can concentrate in their body fat (Clark and Prouty 1977, Clark 1988). Even after pesticide exposure ceases, residues can be passed on to nursing young (Clark 1988). Bat species that migrate long distances may be more affected because pesticide residues become increasingly concentrated in the brain tissue as fat reserves are depleted during long-distance flights. This concentration can lead to convulsions and even death (Geluso et al. 1976, Clark 1978).

Northern long-eared bats also face the ongoing threat of hibernaculum disturbance from humans entering hibernacula in winter and waking bats from torpor. Bats in torpor reduce their metabolism and body temperature to low levels that require less energy than being fully awake. Interrupting torpor costs energy; a little brown bat uses up to 100 mg of fat reserves waking and the returning to torpor (and more if the bat starts flying), or the energetic equivalent of up to 67 days of torpor (Thomas et al. 1990, Thomas 1992). This loss clearly represents a large percentage of total body weight of the bat, and repeated arousals may cause bats to run out of energy reserves before spring arrives and therefore starve in the hibernaculum or die from exposure if they seek food outside (Thomas 1995).

Climate Change Impacts: The effects of climate change on the northern long-eared bat are unclear. Predictions suggest a northward expansion in the ranges of all cave-bat species, in pursuit of optimal hibernation (Humphries et al. 2002, USFWS 2007). This prediction assumes an abundance of suitable caves and other hibernaculum structures further north, but this assumption may not hold for karst-free regions at higher latitudes. Bat species may adapt by reducing torpor depth and duration during winter if prey insect species are available for more of the year (Weller et al. 2009), but bats' adaptive capacities in this regard may be limited and are not well known. Shifts in prey insect emergence may also cause mismatches with bat emergence and cause food shortages in the spring or fall.

Survey Guidelines: Persons handling northern long-eared bats must possess a valid Endangered and Threatened Species Permit. If surveys are being conducted for regulatory purposes, survey protocols and surveyor qualifications must first be approved by the Endangered Resources Review Program (see *Contact Information*).

Acoustic surveys, which should be done by trained individuals, are performed for all Wisconsin bat species in spring, summer, and fall; and are used to determine presence/absence, phenology, and distribution around the state. The Wisconsin Bat Program's eventual goal is to use acoustic survey data to determine bat population trends in Wisconsin. Northern long-eared bats are ubiquitous around the state, and therefore surveys can be done wherever appropriate habitat exists. Acoustic recording systems that detect echolocation calls can survey bats as they fly through an area. The bat detection system detects and records these acoustic signals as bats fly by, and records the date and time of each encounter. The Wisconsin Bat Program currently uses broadband frequency division ultrasound detection equipment with a PDA (Personal Data Assistant) and a Global Positioning System. Start acoustic surveys half an hour after sunset, but only if the daytime temperature exceeds 50° F, and conduct the survey for at least one hour. There are three seasons for acoustic surveys: spring (April and May), summer (June and July), and fall (August and September). Acoustic surveys record bat passes, which can then be identified to species by trained individuals. These surveys could be used by land managers to create inventories of species distribution and relative abundance. Visit the Wisconsin bat monitoring website for additional information.

Wisconsin DNR also conducts a roost monitoring program to determine abundance of bats roosting in buildings and bat houses. People with bat houses or other roost sites identify species and count bats over the summer at night as bats leave the roost. People who find a bat roost while doing field surveys should contact the Wisconsin Bat Program to report the information.

Summarize results, including survey dates, times, weather conditions, number of detections, detection locations, and behavioral data and submit via the WDNR online report: <http://dnr.wi.gov, keyword "rare animal field report form">

Management Guidelines

The following guidelines typically describe actions that will help maintain or enhance habitat for the species. These actions are not mandatory unless required by a permit, authorization or approval.

Summer Management

Roost availability is thought to limit northern long-eared bat populations, as it does for many bat species, and thus habitat management is important for the continued survival of this species (Duchamp et al. 2007). Northern long-eared bats are forest dwelling bats, and forest management to promote occupation by this species should increase roosting and foraging habitat (see Habitat section above). Northern long-eared bats have been shown to use both live and dead trees for roosting sites (Foster and Kurta 1999). These bats often roost under exfoliating bark, and therefore snags and dying trees may be important for encouraging northern long-eared bats. Forest managers are encouraged to promote mixed-species, mixed-aged plots as the northern long-eared bat chooses trees based on suitability of crevices and bark as roosts, rather than on tree species (Foster and Kurta 1999). The northern long-eared bat is known to switch roost trees frequently (about every 2 days) over the course of the summer, and therefore this species needs a large number of trees (Foster and Kurta 1999). As with many bat species, suitable forested habitat for northern long-eared bats is a multi-species matrix that contains some open areas (Owen et al. 2003).

Linear corridors are important for migrating and commuting bats, and forests may be managed such that suitable foraging habitat is connected by corridors; this may include managing edge habitat along roads, logging trails and riparian habitat. Land managers should also make an effort to reduce or eliminate burdock (*Arctium minus*), an exotic weed that produces seeds that trap bats and cause death from exposure.

Special consideration should be given to protecting snags or dying trees, especially those near known roost locations, particularly from June 1 through August 15 while bats may have pups at the roost.

Seasonal pools in woodlands may be important foraging and water sources for the northern long-eared bat and other Wisconsin bat species because they provide areas for feeding and drinking in an otherwise closed-canopy forest (Francl 2008). Pool size and depth do not appear to determine usage by northern long-eared bats; instead the presence of an opening in the forest is enough to encourage foraging and drinking (Francl 2008).

Fall Management

During fall swarm, large proportions of Wisconsin's cave bat population gather near entrances of the state's hibernacula (see "Habitat" section), and become concentrated and vulnerable to direct impacts. To avoid disturbance during crucial life history events, management activities such as logging and use of heavy machinery within 0.25 miles of hibernacula entrances should be avoided during fall swarm (August 15-October 15) or during spring emergence (April 1-May 15) because bats may use the surrounding area for roosting during those time periods.

Winter Management

Little is known about how northern long-eared bats choose hibernation sites, but suitable Wisconsin hibernacula typically have steady temperatures between 4° C and 12° C (39-53° F), high humidity, and no human disturbance. Artificial sites that can mimic this environment may provide suitable hibernacula. Artificial hibernacula include bunkers, food storage-caves and basements. Contact the Wisconsin Bat Program to inquire about developing artificial hibernacula.

Natural hibernacula can also be managed to encourage bat use. For example, closing but not sealing the entrance to an abandoned mine not only buffers temperature and humidity, but also reduces disturbance from humans and predators. Eliminating disturbance from humans, except for WNS surveillance, is the best management activity for natural cave hibernacula. Contact the Wisconsin Bat Program for more information about managing bat hibernacula.

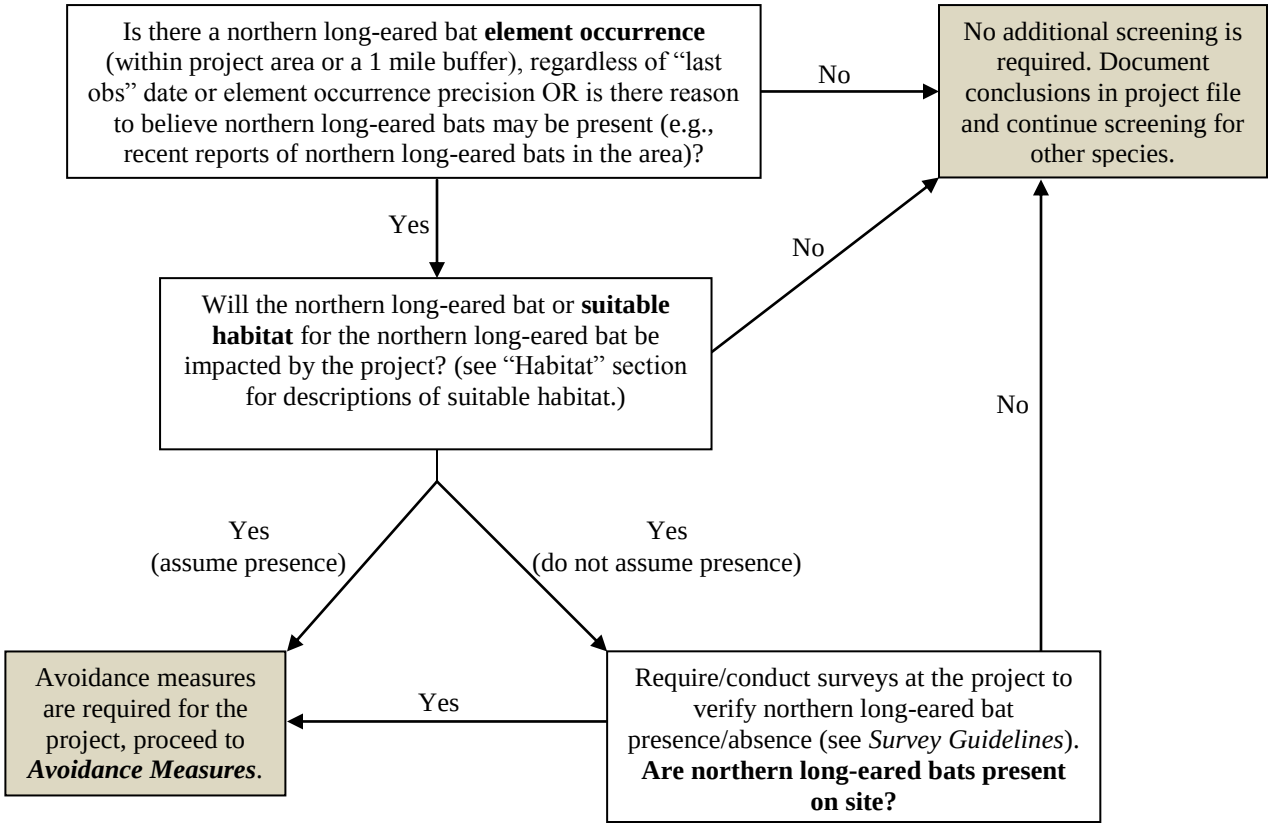
Northern long-eared bats – and their populations as a whole – are particularly vulnerable during winter hibernation because they are concentrated in just a few major hibernacula and because repeated disturbance during hibernation can lead to mortality (see "Threats" section above). Each time a bat is aroused from torpor, it uses up a substantial proportion of the fat reserves it relies on to hibernate through the winter and faces greater odds of starvation before spring (see "Threats" section above). Therefore, avoid entering hibernacula from October 1 through May 15 unless conducting approved and permitted management, surveillance, or research.

Screening Procedures

The following procedures must be followed by DNR staff reviewing proposed projects for potential impacts to the species.

Follow the "Conducting Endangered Resources Reviews: A Step-by-Step Guide for Wisconsin DNR Staff" document (summarized below) to determine if northern long-eared bats will be impacted by a project (WDNR 2012):

Those seeking to complete wind farm projects should review and follow the Guidance for Minimizing Impacts to Natural Resources from Terrestrial Commercial Wind Energy Development created by the WDNR.



Avoidance Measures

The following measures are specific actions required by DNR to avoid take (mortality) of state threatened or endangered species per Wisconsin's Endangered Species law (s. 29.604, Wis. Stats.) These guidelines are typically not mandatory for non-listed species (e.g., special concern species) unless required by a permit, authorization or approval.

According to Wisconsin's Endangered Species Law (s. 29.604, Wis. Stats.), it is illegal to take, transport, possess, process, or sell any wild animal on the Wisconsin Endangered and Threatened Species List (ch. NR 27, Wis. Admin. Code). Take of an animal is defined as shooting, shooting at, pursuing, hunting, catching or killing.

If *Screening Procedures* above indicate that avoidance measures are required for a project, follow the measures below. If you have not yet read through *Screening Procedures*, please review them first to determine if avoidance measures are necessary for the project.

1. The simplest and preferred method to avoid take of northern long-eared bats is to avoid directly impacting individuals, known northern long-eared bat locations, or areas of suitable habitat (described above in the "Habitat" section and in *Screening Procedures*). The U.S. Fish and Wildlife Services identifies humans and their equipment as a possible vectors for spores of *Geomyces destructans* – the fungus that causes white-nose syndrome (WNS) – and therefore simply entering hibernacula at any time of year and moving between them poses threats to bats. Cavers and researchers must observe all cave and mine closures and decontamination protocols (s. NR 40.07, Wis. Admin. Code; see *Additional Information*). In addition, it is illegal to use pesticides and poisons when attempting to evict bats from house roosts (s. 94.708, Wis. Stats.).

2. If suitable habitat cannot be avoided, follow these time-of-year restrictions to avoid take:

Summer Avoidance **(June 1-Aug 15)**

Reproductive females and their young are highly vulnerable to mass mortality during the species' maternity period (June 1 – August 15) because they may aggregate in maternity colonies, and because pups cannot fly and therefore cannot leave the roost for several weeks after birth. Maternity colonies may occur in human structures, and those seeking to exclude bats from a building or other roost must follow the Cave Bat Broad Incidental Take Permit and Authorization (see *Additional Information*).

3. If impacts cannot be avoided during restoration or management activities, including wind projects and forestry management, but activities are covered under the Cave Bat Broad Incidental Take Permit and Authorization; the project is covered for any unintentional take that may occur. For information about natural roost avoidance, see *Management Guidelines* and "Habitat" section above.

4. If northern long-eared bat impacts cannot be avoided, please contact the Natural Heritage Conservation Incidental Take Coordinator (see *Contact Information*) to discuss possible project-specific avoidance measures. If take cannot be avoided, an Incidental Take Permit or Authorization (see *Additional Information*) is necessary.

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Linked Websites:

- Cave bat Broad Incidental Take Permit and Authorization:< http://dnr.wi.gov/topic/erreview/itbats.html>
- Natural Communities of Wisconsin: <http://dnr.wi.gov/org/land/er/communities/>
- Natural Heritage Conservation Permit Requirements: <http://dnr.wi.gov/topic/EndangeredResources/permits.html>

- Rare Animal Field Report Form: <http://dnr.wi.gov, key word "rare animal field report form">
- USFW WNS Website: <http://www.whitenosesyndrome.org>
- USGS National Wildlife Health Center: <http://www.nwhc.usgs.gov/disease_information/white-nose_syndrome/>
- Wind Guidance: <http://dnr.wi.gov/topic/Sectors/documents/energy/WindGuidelines.pdf>
- Wisconsin Bat Program Exclusion Instructions: <http://wiatri.net/inventory/bats/Monitoring/Roosts/docs/BatExclusion.pdf>
- Wisconsin Bat Program: <http://wiatri.net/inventory/bats>
- WDNR Decontamination Protocols for Preventing Spread of White-nose syndrome: <http://dnr.wi.gov/topic/WildlifeHabitat/documents/WNS_DeconProtocols.pdf>
- Wisconsin Endangered and Threatened Species: <http://dnr.wi.gov, key word "endangered resources">
- Wisconsin Endangered and Threatened Species Permit: <http://dnr.wi.gov, key word "endangered species permit">"
- Wisconsin Initiative on Climate Change Impacts: <http://www.wicci.wisc.edu/>
- Wisconsin Natural Heritage Inventory Working List Key: <http://dnr.wi.gov/topic/NHI/WList.html>
- Wisconsin's Wildlife Action Plan: <http://dnr.wi.gov/topic/wildlifehabitat/actionplan.html>

Funding

- Natural Resources Foundation of Wisconsin: <http://www.wisconservation.org/>
- USFWS State Wildlife Grants Program: <http://wsfrprograms.fws.gov/subpages/grantprograms/swg/swg.htm>
- Wisconsin Natural Heritage Conservation Fund
- Wisconsin DNR Division of Forestry

Endangered Resources Review Program Contacts

- General information (608-264-6057, DNRERReview@wisconsin.gov)
- Rori Paloski, Incidental Take Coordinator, Wisconsin DNR, Bureau of Natural Heritage Conservation (608-264-6040, rori.paloski@wi.gov)

Bat Contact Information

- John Paul White Conservation biologist, Wisconsin DNR, Bureau of Natural Heritage Conservation (John.white@wisconsin.gov)
- Wisconsin Bat Program (608-266-5216, DNRbats@wisconsin.gov)

Suggested Citation

- Wisconsin Department of Natural Resources. 2013. Wisconsin Northern Long-Eared Bat Species Guidance. Bureau of Natural Heritage Conservation, Wisconsin Department of Natural Resources, Madison, Wisconsin. PUB-ER-700.

Developed by

- Heather M. Kaarakka, Emma M. Pelton, David N. Redell primary authors
- Gregor W. Schuurman, primary editor

Wisconsin Department of Natural Resources
Bureau of Natural Heritage Conservation
PO Box 7921
Madison, WI 53707-7921
http://dnr.wi.gov, keyword "ER"

Attachment 6: MHC Report

Massachusetts Cultural Resource Information System
Scanned Record Cover Page

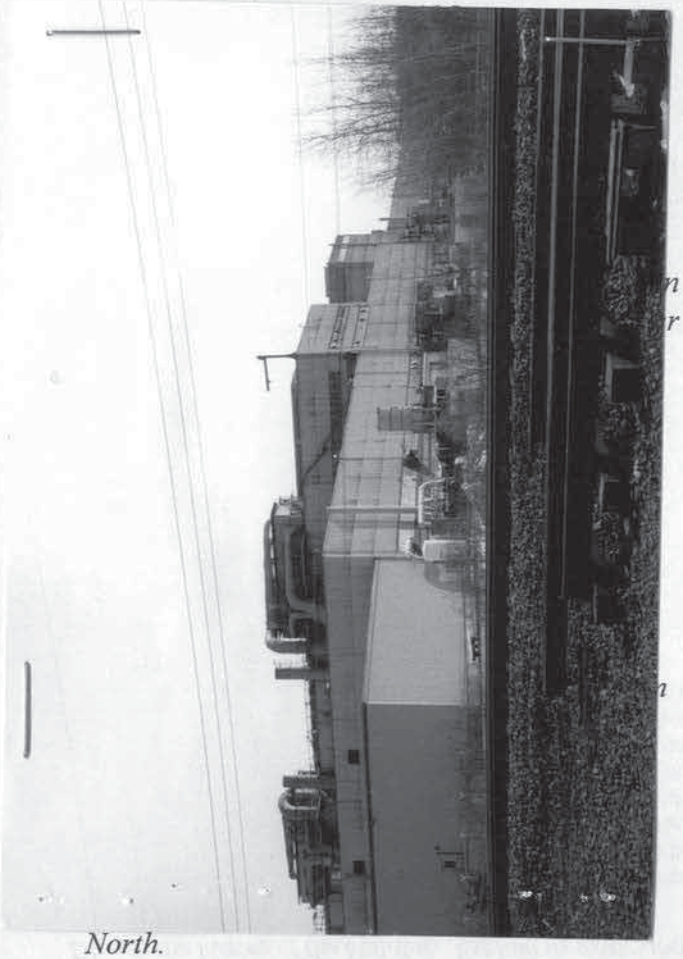
Inventory No:	GRF.1187
Historic Name:	Wyman-Gordon Drop Forging Company
Common Name:	
Address:	244 Worcester St
City/Town:	Grafton
Village/Neighborhood:	North Grafton
Local No:	111-35-1
Year Constructed:	c 1930
Architect(s):	
Architectural Style(s):	No style
Use(s):	Forge; Industrial Complex or District; Machine Factory
Significance:	Architecture; Industry; Military
Area(s):	
Designation(s):	
Building Materials(s):	Roof: Tar, Built-up Wall: Brick; Concrete Unspecified; Sheet Metal; Concrete Cinderblock Foundation: Concrete Unspecified

Commonwealth of Massachusetts
Massachusetts Historical Commission
220 Morrissey Boulevard, Boston, Massachusetts 02125
www.sec.state.ma.us/mhc

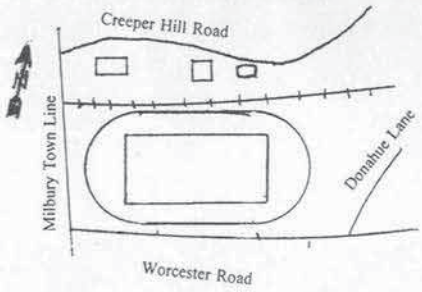
FORM B - BUILDING

Assessor's number	USGS Quad	Area(s)	Form Number
111/35/1	Milford GRAFTON		1187

Massachusetts Historical Commission
Massachusetts Archives Building
220 Morrissey Blvd.



North.



Recorded by Sanford Johnson

Organization Timelines Inc.

Date 04/96

Town GRAFTON

Place *(neighborhood or village)* NORTH GRAFTON

Address 244 Worcester Street

Historic Name WYMAN-GORDON COMPANY

Uses: **Present** Industrial

Original Industrial

Date of Construction ca. 1930

Source Company employee

Style/Form No style

Architect/Builder

Exterior Material:

Foundation Concrete

Wall/Trim Brick and concrete

Roof Tar

Outbuildings/Secondary Structures

Major Alteration *(with dates)*
Several large additions

Condition Good

Moved ☒ no ☐ yes Date

Acreage 189

Setting Commercial/residential with Conrail tracks to the north.

Follow Massachusetts Historical Commission Survey Manual instructions for completing this form.

GRF.1187

BUILDING FORM

ARCHITECTURAL DESCRIPTION ☐ *see continuation sheet*

Describe architectural features. Evaluate the characteristics of this building in terms of other buildings within the community.
No. 244 Worcester Street is a mid twentieth-century industrial/manufacturing complex built in many phases, beginning in ca. 1930. It is a one-story, flat-roof structure composed of several rectangular building sections occupying several hundred thousand square feet. It is constructed of brick, glass undetermined corrugated metal and concrete with aluminum roof vents. Sashes are fixed panes with metal frames. There is a large, rectangular brick section that was attached to the front of the structure in the mid twentieth century. The building appears in fair to good condition. Adjacent buildings are residential and industrial.

HISTORICAL NARRATIVE ☐ *see continuation sheet*

Discuss the history of the building. Explain its association with local (or state) history. Include uses of the building, and the role(s) the owners played within the community.

The approximate site of the Wyman-Gordon company was occupied in 1870 by a Mrs. N. (possibly Nelson), according to the Beers atlas of that year. The company was started in Worcester in 1883 by two graduates of Worcester Polytechnic Indstitute named Wyman and Gordon. The company began manufactruring drop forgings for loom and weaving equipment and expanded to include railroad and auto parts. By the 1890s, 40 men were employed by Wyman-Gordon and the product line was again expanded to include bicycles. The present building was first constructed prior to 1930, when Wyman-Gordon began forging aircraft, automobile and marine engine parts. During the same period, it became the largest drop-forging company in the world, employed 1,200 people at the new facility in Grafton and in Illinois, and produced 75% of all automobile-engine crankshafts. The company continued to grow through the purchase of larger hydraulic press equipment and did sufficient business with the railroad to install a siding to facilitate product shipment. The company continues to occupy the site and produce drop forgings.

BIBLIOGRAPHY and/or REFERENCE ☐ *see continuation sheet*

Beers atlas of Worcester County, 1870; Charles Brigham, Jr., 1831 map of Grafton; MHC Reconnaissance Report 1984; Ivan Sandrof, Massachusetts Towns: An 1840 Overview, 1963; Orra Stone, History of Massachusetts Industries, 1930.

☐ Recommended for listing in the National Register of Historic Places. *If checked, you must attach a completed National Register Criteria Statement form.*

GRF.1187
Groton AJ-
1187

The Commonwealth of Massachusetts

William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

September 9, 1996

Diana Parcon
Environmental Permitting Specialist
Massachusetts Bay Transportation
Authority
Ten Park Plaza
Boston, MA 02116-3974

RE: Cultural Resources Survey, Worcester Commuter Rail Extension Project; MHC #9415

Dear Ms. Parcon:

Staff of the Massachusetts Historical Commission have reviewed Volume II, "Historic Properties Survey For the Right-of-Way of the Worcester Commuter Rail Extension" which was submitted to this office together with original Area, Building, and Structure Forms. Please have two (2) additional copies of the final Volume II report submitted to the MHC to complete our files.

In general, the report is well-organized and comprehensive and MHC staff concur with the majority of the consultant's eligibility determinations for listing in the National Register of Historic Places and recommendations for further research. However, MHC staff do not agree that the right-of-way for the commuter rail extension constitutes a National Register-eligible entity; a fragment of the larger Boston & Worcester Railroad line, it retains insufficient integrity as an eligible property in its own right. After review and evaluation of this information, MHC staff have the following comments.

FRAMINGHAM

MHC staff concur that Lloyd's Diner (aka Worcester Lunch Car No. 749), 156 Fountain Street, is individually eligible for National Register listing. FRM.1073

The Fountain Street Area, a comparatively well-preserved complex of manufacturing and support buildings associated with the shoe, textiles, leather, and auto body manufacturing enterprises of Richard H. Long in the early 20th century, is National Register eligible. FRM.MA

The former Gossamer Rubber Company, 885 Waverly Street, appears to be eligible for listing for its associations with one of the oldest and largest rubber clothing manufacturers in the United States in the late 19th century; however, if National Register listing were to be pursued, additional information on construction dates and the physical development of the complex would be required. FRM.I

220 Morrissey Boulevard, Boston, Massachusetts 02125 · (617) 727-8470
(617) 727-5128, TDD: 1-800-392-60

GRF.1187

FRAMINGHAM (cont.)
The following properties are ineligible for National Register listing:

Angier Company Building, 50 Fountain Street FRM. 1074
R.H. Long Car Showroom, 635 Waverly Street FRM. 1075
Residence, 949 Waverly Street FRM. 1077
Residence, 997 Waverly Street FRM. 1078
Residence, 1007 Waverly Street FRM 1079
Residence, 1015 Waverly Street FRM. 1080
Residence, 1035 Waverly Street FRM 1081
Residence, 1045 Waverly Street FRM. 1082
Residence, 1051 Waverly Street FRM 1083

ASHLAND
The Tilton Avenue/Cherry Street Area is eligible for National Register listing as part of a larger Ashland Center historic district. ASL.C

The Kane/Ward Farmhouse, 34 Fountain Street, is individually eligible for National Register listing as a well-preserved example of a mid-19th century farmhouse with attached barn. ASL 416

The former Telechron Watch Company, constructed in 1927 at 50 Homer Street is eligible for individual listing in the National Register as the only Moderne Style building in Ashland. ASL.47

The following properties are ineligible for National Register listing:

Highway Department Garage, 80 Cherry Street ASL. 45
Cloyes Farm, 2-4 High Street ASL 411
Residence, 15 Metcalf Street ASL.25
C.H. Tilton Shoe Factory, 60 Pleasant Street ASL.23
Saving Spring Company, 280 Pleasant Street ASL 24
Commercial/Professional Complex, 360 Pleasant Street ASL.22
Beckongreen Garden Center, 18 Waverly Street ASL 48

SOUTHBOROUGH
The two mill villages of Cordaville and Southville, which developed in the mid-1800s in response to the 1830s construction of the Boston & Albany Railroad, are eligible for National Register listing. Although the mills at Cordaville are no longer extant, the community retains a significant collection of Early and Late Industrial residential architecture associated with industrial and commercial operations in the village. SBR. C

The village of Southville also retains a diverse collection of housing stock constructed in the mid and late 19th century in association with no longer extant boot and shoe factories, woolen and cotton mills, and a grist mill. In addition to the residences, the village also contains a church, former railroad depot, and community hall. Historical archaeological deposits at Cordaville and Southville may retain sufficient integrity as archaeological sites to be found eligible under Criterion D. MHC staff expects that additional information will be forthcoming as the result of archaeological investigations being undertaken. SBR. B

GRF.1187

WBO 408
WBO. 415
WBO. 416
WBO. 417
WBO 420
WBO 421
WBO 422
WBO. 419
WBO 409

WESTBOROUGH

The properties at 25, 27, and 46 High Street Extension, 11, 13, and 15 State Street, 38, 43, and 49 Water Street, and 20 Willow Street are eligible for National Register listing as an extension of the existing West Main Street Historic District.

The Eliezer Rice House, 37 Maynard Street, is individually eligible for National Register listing as a remarkably well-preserved example of a circa 1830 Federal Style farmhouse with an earlier circa 1730 rear ell, and for its associations with Eliezer Rice, an early settler of Westborough. WBO 37

The following properties are ineligible for National Register listing:

Corrugated Paper, 111 Milk Street WBO 418
Bay State Abrasives, Union Street WBO 423

GRAFTON

The Westborough Road Area, a grouping of moderately intact circa 1870 to 1900 single-family residences, appears to eligible for National Register listing; however, if National Register listing were to be pursued, additional information would be required regarding the area's association with the nearby J.S. Nelson shoe factory. GRF RQ

The Wyman-Gordon Company Building, 244 Worcester Street, is not eligible for listing. GRF 1187

WORCESTER

The East Worcester Street Area is eligible for listing in the National Register as a well-preserved complex of industrial and public-works buildings associated with the late 19th and early 20th century development of the City of Worcester. WOR EA

The following properties are ineligible for National Register listing:

Industrial Building, 1451 Grafton Street WOR 2254
Residence, 5 Hecla Street WOR 2257
Residence, 34 Nathaniel Street WOR 2260
White, Peavy & Dexter Co., Building, Putnam Lane WOR 2261
Industrial Building, 383 Shrewsbury Street WOR 2262

BRIDGES

The following bridges are individually eligible for listing in the National Register:

Ashland- Conrail over Stream (Boston & Albany Railroad Bridge No. 26.35) ASL 908
Conrail over Sudbury River (Boston & Albany Railroad Bridge No. 23.54) ASL 909

Southborough- Conrail over Ash Stream (Boston & Albany Railroad Bridge No. 27.29); also considered a contributing element in the Cordaville Historic Area SBR 925

Westborough- Conrail over Millpond (Boston & Albany Railroad Bridge No. 33.12) WBO. 937

GRF. 1187

The following bridges in Southborough are not individually eligible for National Register listing, but are considered eligible as contributing elements in the Cordaville Historic Area:

Conrail over Pedestrian Underpass (Boston & Albany Railroad Bridge No. 27.47) SBR 924
Conrail over Route 85 (Boston & Albany Railroad Bridge No. 27.34) SBR 923

The following bridges are ineligible for National Register Listing:

Ashland- Conrail over Indian Brook (Boston & Albany Railroad Bridge No. 25.84) ASL 910
Conrail over Sudbury River (Boston & Albany Railroad Bridge No. 23.83) ASL 911

Westborough- Conrail over Arch Street (Boston & Albany Railroad Bridge No. 34.73) WBO 934
Conrail over East Main Street (Boston & Albany Railroad Bridge No. 31.99) WBO 935
Fruit Street over Conrail (Boston & Albany Railroad Bridge No. 28.92) WBO 939
Conrail over Maynard Street (Boston & Albany Railroad Bridge No. 33.18) WBO 936
Conrail over Millpond (Boston & Albany Railroad Bridge No. 33.12) WBO 937
Conrail over Water Street (Boston & Albany Railroad Bridge No. 32.22) WBO 938

Grafton- Conrail over Blackstone River (Boston & Albany Railroad Bridge No. 38.24) GRF 9017
Conrail over Pedestrian Subway (Boston & Albany Railroad Bridge No. 37.82) GRF 9015
Conrail over Shrewsbury Street (Boston & Albany Railroad Bridge No. 37.90) GRF 9016

Worcester- Conrail over Putnam Avenue (Boston & Albany Railroad Bridge No. 43.31) WOR 947
Conrail over Route 20 (Boston & Albany Railroad Bridge No. 39.92) WOR 946
Conrail over Sunderland Road (Boston & Albany Railroad Bridge No. 40.23) WOR 945
Conrail over Seasonal Stream (Boston & Albany Railroad Bridge No. 41.89) WOR 944

Finally, MHC staff look forward to reviewing Volume IV on the Ashland, Southborough, and Westborough stations, and consulting on ways to avoid, minimize, or mitigate adverse effects to any significant historic or archaeological resources that may be affected by the project.

These comments are provided to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800), Massachusetts General Laws, Chapter 9, Sec. 26-27c, as amended by Chapter 254 of the Acts of 1988 (950 CMR 71), MEPA (301 CMR 11), and the terms of the Process Memorandum of Agreement for this project.

If you have additional questions, please contact Allen Johnson or Edward L. Bell of this office.

Sincerely,

Judith B. McDonough
Executive Director
State Historic Preservation Officer
Massachusetts Historical Commission

cc: Local Historical Commissions
Michael Roberts, Timelines, Inc.
Leslie Donovan
James Herlihy, Edwards & Kelcey, Inc.
Jaqueline Wilkins, Rackemann Environmental Services, Inc.

FORM B - BUILDING

Assessor's Number	USGS Quad	Area(s)	Form Number
111/35/1	Milford		GRF.1187

Massachusetts Historical Commission
80 Boylston Street
Boston, Massachusetts 02116

Town Grafton

ighborhood or village)

244 Worcester Street

Name Wyman-Gordon Company

resent Commercial

riginal Commercial

Construction ca. 1945

Company Employee

rm

t/Builder

Exterior Material:

Foundation Concrete

Wall/Trim Brick and concrete

Roof Tar

Outbuildings/Secondary Structures

Major Alterations *(with dates)*

Condition Good

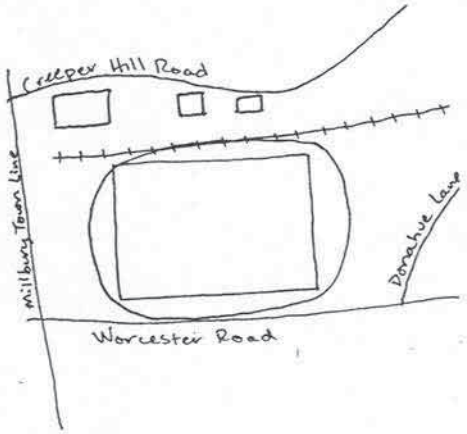
Moved ☐ no ☐ yes Date

Acreage 189 acres

Setting Commercial/residential with Conrail tracks to the north.

Sketch Map

Draw a map showing the building's location in relation to the nearest cross streets and/or major natural features. Show all buildings between inventoried building and nearest intersection or natural feature. Label streets including route numbers, if any. Circle and number the inventoried building. Indicate north.



Recorded by Barbara Putnam and Rachel Smith

Organization Timelines, Inc.

Date *(month/year)* 1/95

Follow Massachusetts Historical Commission Survey Manual instructions for completing this form.

GRF.1187

BUILDING FORM

ARCHITECTURAL DESCRIPTION ☐ *see continuation sheet*

Describe architectural features. Evaluate the characteristics of this building in terms of other buildings within the community.

Rising a tall single story from a concrete foundation, 244 Worcester Street is a brick and concrete, flat-roofed industrial building. The shape of this building is highly irregular and it appears that many concrete-block additions to the north have been made to this structure, home of the Wyman-Gordon Company. The facade of the building has a band of brick, a band of windows, and a band of concrete from bottom to top. Many metal vent shafts are located throughout the main building and the extensions to the north. 244 Worcester Street is located in a residential/industrial area (the other side of the road is residential) and is atypical of its surroundings.

HISTORICAL NARRATIVE ☐ *see continuation sheet*

Discuss the history of the building. Explain its associations with local (or state) history. Include uses of the buildings, and the role(s) the owners/occupants played within the community.

This section of North Grafton, between Worcester Road and Creeper Hill Road, west of the present Donahue Lane, remained undeveloped prior to the construction of the Wyman-Gordon Company complex. Involved in aircraft forging, this company was started with an 18,000-ton hydraulic press and by 1963 had added a 35,000-ton and a 50,000-ton hydraulic press. Located south of and adjacent to the tracks of the Boston and Albany Railroad, the plant is reached by several railroad spurs to facilitate shipping and receiving.

BIBLIOGRAPHY and/or REFERENCES ☐ *see continuation sheet*

Beers, F.W.
1870 *Atlas of Worcester County. Massachusetts.* F.W.Beers, New York.

Brigham, Jr., Charles
1837 Map of Grafton, Worcester County. Pendleton's Lithography, Boston.

Massachusetts Historical Commission
1984 *Reconnaissance Survey Report: Grafton*. Massachusetts Historical Commission, Boston.

Sandrup, Ivan
1963 *Massachusetts Towns: An 1840 Overview.* Barre Publishers, Barre.

☐ Recommended for listing in the National Register of Historic Places. *If checked, you must attach a completed National Register Criteria Statement Form.*

Massachusetts Cultural Resource Information System

MACRIS

MACRIS Search Results

Search Criteria: Town(s): Grafton; Street No: 244; Street Name: Worcester St; Resource Type(s): Area, Building, Burial Ground, Object, Structure;

Inv. No.	Property Name	Street	Town	Year
GRF.1187	Wyman-Gordon Drop Forging Company	244 Worcester St	Grafton	c 1930

Attachment 7: WQBEL Calculation Spreadsheet

Enter number values in green boxes below

Enter values in the units specified

↓

0.024	Q_R = Enter upstream flow in **MGD**
0.144	Q_P = Enter discharge flow in **MGD**
0	Downstream 7Q10

Enter a dilution factor, if other than zero

↓

0

Enter values in the units specified

↓

40.5	C_d = Enter influent hardness in **mg/L** $CaCO_3$
105	C_s = Enter receiving water hardness in **mg/L** $CaCO_3$

Enter **receiving water** concentrations in the units specified

↓

7.3	pH in **Standard Units**
27.34	Temperature in **^oC**
0.19	Ammonia in **mg/L**
105	Hardness in **mg/L** $CaCO_3$
0	Salinity in **ppt**
0	Antimony in **µg/L**
2.2	Arsenic in **µg/L**
0.16	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
0	Copper in **µg/L**
1780	Iron in **µg/L**
0	Lead in **µg/L**
0	Mercury in **µg/L**
0	Nickel in **µg/L**
0	Selenium in **µg/L**
0	Silver in **µg/L**
385	Zinc in **µg/L**

Enter **influent** concentrations in the units specified

↓

0	TRC in **µg/L**
0.72	Ammonia in **mg/L**
0	Antimony in **µg/L**
0	Arsenic in **µg/L**
0.06	Cadmium in **µg/L**
0	Chromium III in **µg/L**
0	Chromium VI in **µg/L**
0	Copper in **µg/L**
621	Iron in **µg/L**
0	Lead in **µg/L**
0	Mercury in **µg/L**
0	Nickel in **µg/L**
0	Selenium in **µg/L**
0	Silver in **µg/L**
539	Zinc in **µg/L**
0	Cyanide in **µg/L**
0	Phenol in **µg/L**
0	Carbon Tetrachloride in **µg/L**
0	Tetrachloroethylene in **µg/L**
0	Total Phthalates in **µg/L**
0	Diethylhexylphthalate in **µg/L**
0	Benzo(a)anthracene in **µg/L**
0	Benzo(a)pyrene in **µg/L**
0	Benzo(b)fluoranthene in **µg/L**
0	Benzo(k)fluoranthene in **µg/L**
0	Chrysene in **µg/L**
0	Dibenzo(a,h)anthracene in **µg/L**
0	Indeno(1,2,3-cd)pyrene in **µg/L**
0	Methyl-tert butyl ether in **µg/L**

Dilution Factor	1.2			
	TBEL applies if bolded		WQBEL applies if bolded	
A. Inorganics				
Ammonia	**Report**	mg/L	---	
Chloride	**Report**	µg/L	---	
Total Residual Chlorine	0.2	mg/L	**13**	µg/L
Total Suspended Solids	**30**	mg/L	---	
Antimony	**206**	µg/L	747	µg/L
Arsenic	**104**	µg/L	11	µg/L
Cadmium	**10.2**	µg/L	0.1612	µg/L
Chromium III	**323**	µg/L	56.7	µg/L
Chromium VI	**323**	µg/L	13.3	µg/L
Copper	**242**	µg/L	6.0	µg/L
Iron	**5000**	µg/L	1000	µg/L
Lead	**160**	µg/L	1.52	µg/L
Mercury	**0.739**	µg/L	1.06	µg/L
Nickel	**1450**	µg/L	33.7	µg/L
Selenium	**235.8**	µg/L	5.8	µg/L
Silver	**35.1**	µg/L	1.3	µg/L
Zinc	420	µg/L	**66.3**	µg/L
Cyanide	**178**	mg/L	6.1	µg/L
B. Non-Halogenated VOCs				
Total BTEX	**100**	µg/L	---	
Benzene	**5.0**	µg/L	---	
1,4 Dioxane	**200**	µg/L	---	
Acetone	**7970**	µg/L	---	
Phenol	**1,080**	µg/L	350	µg/L
C. Halogenated VOCs				
Carbon Tetrachloride	**4.4**	µg/L	1.9	µg/L
1,2 Dichlorobenzene	**600**	µg/L	---	
1,3 Dichlorobenzene	**320**	µg/L	---	
1,4 Dichlorobenzene	**5.0**	µg/L	---	
Total dichlorobenzene	**---**	µg/L	---	
1,1 Dichloroethane	**70**	µg/L	---	
1,2 Dichloroethane	**5.0**	µg/L	---	
1,1 Dichloroethylene	**3.2**	µg/L	---	
Ethylene Dibromide	**0.05**	µg/L	---	
Methylene Chloride	**4.6**	µg/L	---	
1,1,1 Trichloroethane	**200**	µg/L	---	
1,1,2 Trichloroethane	**5.0**	µg/L	---	
Trichloroethylene	**5.0**	µg/L	---	
Tetrachloroethylene	**5.0**	µg/L	3.9	µg/L
cis-1,2 Dichloroethylene	**70**	µg/L	---	

Vinyl Chloride	**2.0**	µg/L	---	
D. Non-Halogenated SVOCs				
Total Phthalates	**190**	µg/L	---	µg/L
Diethylhexyl phthalate	**101**	µg/L	2.6	µg/L
Total Group I Polycyclic Aromatic Hydrocarbons	**1.0**	µg/L	---	
Benzo(a)anthracene	**1.0**	µg/L	0.0044	µg/L
Benzo(a)pyrene	**1.0**	µg/L	0.0044	µg/L
Benzo(b)fluoranthene	**1.0**	µg/L	0.0044	µg/L
Benzo(k)fluoranthene	**1.0**	µg/L	0.0044	µg/L
Chrysene	**1.0**	µg/L	0.0044	µg/L
Dibenzo(a,h)anthracene	**1.0**	µg/L	0.0044	µg/L
Indeno(1,2,3-cd)pyrene	**1.0**	µg/L	0.0044	µg/L
Total Group II Polycyclic Aromatic Hydrocarbons	**100**	µg/L	---	
Naphthalene	**20**	µg/L	---	
E. Halogenated SVOCs				
Total Polychlorinated Biphenyls	**0.000064**	µg/L	---	
Pentachlorophenol	**1.0**	µg/L	---	
F. Fuels Parameters				
Total Petroleum Hydrocarbons	**5.0**	mg/L	---	
Ethanol	**Report**	mg/L	---	
Methyl-tert-Butyl Ether	**70**	µg/L	23	µg/L
tert-Butyl Alcohol	**120**	µg/L	---	
tert-Amyl Methyl Ether	**90**	µg/L	---	

Attachment 8: Town of Grafton Notification

Proactive by Design

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

249 Vanderbilt Avenue
Norwood, MA 02062
T: 781.278.3700
F: 781.278.5701
F: 781.278.5702
www.gza.com

Notification of Discharge under the 2016 Remediation General Permit

August 15, 2017
GZA File No. 01.0019274.18

Mr. Timothy P. McInerney
Town Administrator
Grafton Memorial Municipal Center
30 Providence Road
Grafton, MA 01519

Re: Notification of Discharge under 2017 Remediation General Permit
Wyman Gordon Company
244 Worcester Street
Grafton, Massachusetts

Dear Mr. McInerney:

Federal National Pollution Discharge Elimination System (NPDES) regulations require operators of discharges permitted under the 2017 Remediation General Permit (RGP) jointly administered by the United States Environmental Protection Agency (USEPA) and the Massachusetts Department of Environmental Protection (MassDEP), to notify the municipality of said discharge. These notice requirements are contained in Part 3.4(a) of the 2017 RGP. An electronic version of the 2017 RGP is available at https://www3.epa.gov/region1/npdes/rgp.html. In compliance with these requirements, GZA GeoEnvironmental, Inc. (GZA), on behalf of Wyman-Gordon Company, is notifying the Town of Grafton of the discharge of treated water derived from the dewatering of excavations at the property located at 244 Worcester Street, in Grafton Massachusetts.

A copy of the Notice of Intent (NOI) submitted to USEPA can be made available upon request.
Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Randy Meuse, PG.,
Principal
J:\19,000-20,999\19274\19274-18.TLB\Remedial General Permit\NOI 7-2017\Attachment 8- Notice to Town of Grafton\Town of Grafton Notification.docx

Attachment 9: Laboratory Analytical Reports

CERTIFICATE OF ANALYSIS

Randy Meuse
GZA GeoEnvironmental, Inc.
249 Vanderbilt Avenue
Norwood, MA 02062

RE: Wyman Gordon - RGP (01.0019274.18)
ESS Laboratory Work Order Number: 1707435

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 4:14 pm, Jul 27, 2017

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

SAMPLE RECEIPT

The following samples were received on July 20, 2017 for the analyses specified on the enclosed Chain of Custody Record.

The samples and analyses listed below were analyzed in accordance with the 2017 Remediation General Permit under the National Pollutant Discharge Elimination System (NPDES).

ESS Laboratory is unable to achieve the required detection limit of 0.4 mg/L for Ethanol for the RGP permit. We have also been unable to procure a subcontract laboatory that is able to achieve this limit. The data for Ethanol has been reported using our current method reporting limit.

Lab Number	Sample Name	Matrix	Analysis
1707435-01	RGP-1	Ground Water	1664A, 200.7, 245.1, 2540D, 300.0, 3113B, 350.1, 3500Cr B-2009, 420.1, 4500 CN CE, 504.1, 524.2, 608, 625 SIM, 8270D SIM
1707435-02	SW-1	Surface Water	200.7, 245.1, 3113B, 350.1, 3500Cr B-2009

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

PROJECT NARRATIVE

625(SIM) Semi-Volatile Organic Compounds
CG72101-BSD2 **Surrogate recovery(ies) above upper control limit (S+).**
2,4,6-Tribromophenol (112% @ 15-110%)

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution
C7G0356-TUN1 **Pentachlorophenol tailing factor > 2.**

Total Metals
CG72035-BS1 **Blank Spike recovery is above upper control limit (B+).**
Lead (125% @ 85-115%), Selenium (119% @ 85-115%)

No other observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH / VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035 - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP
Client Sample ID: RGP-1
Date Sampled: 07/19/17 14:00
Percent Solids: N/A

ESS Laboratory Work Order: 1707435
ESS Laboratory Sample ID: 1707435-01
Sample Matrix: Ground Water
Units: ug/L

Extraction Method: 3005A

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Antimony	ND (10.0)		200.7		1	KJK	07/21/17 10:35	100	20	CG72035
Arsenic	ND (1.0)		3113B		1	KJK	07/27/17 3:55	100	20	CG72035
Cadmium	**0.06** (0.05)		3113B		1	KJK	07/25/17 16:56	100	20	CG72035
Chromium III	ND (10.0)		200.7		1	EEM	07/21/17 10:35	1	1	[CALC]
Copper	ND (4.0)		200.7		1	KJK	07/21/17 10:35	100	20	CG72035
Hardness	**40500** (165)		200.7		1	KJK	07/21/17 10:35	1	1	[CALC]
Iron	**621** (20.0)		200.7		1	KJK	07/21/17 10:35	100	20	CG72035
Lead	ND (1.0)		3113B		1	KJK	07/27/17 1:30	100	20	CG72035
Mercury	ND (0.200)		245.1		1	MJV	07/21/17 19:19	20	40	CG72036
Nickel	ND (10.0)		200.7		1	KJK	07/21/17 10:35	100	20	CG72035
Selenium	ND (2.0)		3113B		1	KJK	07/27/17 6:45	100	20	CG72035
Silver	ND (1.0)		200.7		1	KJK	07/21/17 10:35	100	20	CG72035
Zinc	**539** (10.0)		200.7		1	KJK	07/21/17 10:35	100	20	CG72035

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP
Client Sample ID: RGP-1
Date Sampled: 07/19/17 14:00
Percent Solids: N/A
Initial Volume: 25
Final Volume: 25
Extraction Method: 524.2

ESS Laboratory Work Order: 1707435
ESS Laboratory Sample ID: 1707435-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: DMC

524.2 Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1-Trichloroethane	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
1,1,2-Trichloroethane	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
1,1-Dichloroethane	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
1,1-Dichloroethene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
1,2-Dichlorobenzene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
1,2-Dichloroethane	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
1,3-Dichlorobenzene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
1,4-Dichlorobenzene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Acetone	ND (5.0)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Benzene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Carbon Tetrachloride	ND (0.3)		524.2		1	07/25/17 14:33	C7G0358	CG72532
cis-1,2-Dichloroethene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Ethylbenzene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Methyl tert-Butyl Ether	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Methylene Chloride	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Naphthalene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Tertiary-amyl methyl ether	ND (1.0)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Tertiary-butyl Alcohol	ND (25.0)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Tetrachloroethene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Toluene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Trichloroethene	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Vinyl Chloride	ND (0.2)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Xylene O	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532
Xylene P,M	ND (0.5)		524.2		1	07/25/17 14:33	C7G0358	CG72532

	%Recovery	*Qualifier*	*Limits*
Surrogate: 1,2-Dichlorobenzene-d4	*107 %*		*80-120*
Surrogate: 4-Bromofluorobenzene	*103 %*		*80-120*

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP
Client Sample ID: RGP-1
Date Sampled: 07/19/17 14:00
Percent Solids: N/A
Initial Volume: 1060
Final Volume: 1
Extraction Method: 3510C

ESS Laboratory Work Order: 1707435
ESS Laboratory Sample ID: 1707435-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: SMR
Prepared: 7/21/17 9:54

608 Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.09)		608		1	07/21/17 12:12		CG72118
Aroclor 1221	ND (0.09)		608		1	07/21/17 12:12		CG72118
Aroclor 1232	ND (0.09)		608		1	07/21/17 12:12		CG72118
Aroclor 1242	ND (0.09)		608		1	07/21/17 12:12		CG72118
Aroclor 1248	ND (0.09)		608		1	07/21/17 12:12		CG72118
Aroclor 1254 [2C]	**1.00** (0.09)		608		1	07/21/17 12:12		CG72118
Aroclor 1260	ND (0.09)		608		1	07/21/17 12:12		CG72118
Aroclor 1262	ND (0.09)		608		1	07/21/17 12:12		CG72118
Aroclor 1268	ND (0.09)		608		1	07/21/17 12:12		CG72118

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*84 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*88 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*74 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*81 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP
Client Sample ID: RGP-1
Date Sampled: 07/19/17 14:00
Percent Solids: N/A
Initial Volume: 1070
Final Volume: 0.25
Extraction Method: 3510C

ESS Laboratory Work Order: 1707435
ESS Laboratory Sample ID: 1707435-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 7/21/17 14:09

625(SIM) Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Acenaphthene	ND (0.19)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Acenaphthylene	ND (0.19)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Anthracene	ND (0.19)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Benzo(a)anthracene	ND (0.05)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Benzo(a)pyrene	ND (0.05)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Benzo(b)fluoranthene	ND (0.05)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Benzo(g,h,i)perylene	ND (0.19)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Benzo(k)fluoranthene	ND (0.05)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
bis(2-Ethylhexyl)phthalate	ND (1.87)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Butylbenzylphthalate	ND (2.34)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Chrysene	ND (0.05)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Dibenzo(a,h)Anthracene	ND (0.05)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Diethylphthalate	ND (2.34)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Dimethylphthalate	ND (2.34)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Di-n-butylphthalate	ND (2.34)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Di-n-octylphthalate	ND (2.34)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Fluoranthene	ND (0.19)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Fluorene	ND (0.19)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Indeno(1,2,3-cd)Pyrene	ND (0.05)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Naphthalene	ND (0.19)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Pentachlorophenol	ND (0.84)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Phenanthrene	ND (0.19)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101
Pyrene	ND (0.19)		625 SIM		1	07/21/17 23:09	C7G0323	CG72101

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*36 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*58 %*		*15-110*
Surrogate: 2-Fluorobiphenyl	*51 %*		*30-130*
Surrogate: Nitrobenzene-d5	*55 %*		*30-130*
Surrogate: p-Terphenyl-d14	*72 %*		*30-130*

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP
Client Sample ID: RGP-1
Date Sampled: 07/19/17 14:00
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 1707435
ESS Laboratory Sample ID: 1707435-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: VSC
Prepared: 7/24/17 17:30

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,4-Dioxane	ND (0.250)		8270D SIM		1	07/25/17 23:36	C7G0356	CG72442

	%Recovery	Qualifier	Limits
Surrogate: 1,4-Dioxane-d8	48 %		15-115

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP
Client Sample ID: RGP-1
Date Sampled: 07/19/17 14:00
Percent Solids: N/A

ESS Laboratory Work Order: 1707435
ESS Laboratory Sample ID: 1707435-01
Sample Matrix: Ground Water

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Ammonia as N	**0.72** (0.10)		350.1		1	JLK	07/21/17 16:49	mg/L	CG72026
Chloride	**59.4** (50.0)		300.0		100	JLK	07/25/17 18:29	mg/L	CG72537
Hexavalent Chromium	ND (10.0)		3500Cr B-2009		1	EEM	07/20/17 13:10	ug/L	CG72024
Phenols	ND (100)		420.1		1	JLK	07/25/17 18:50	ug/L	CG72540
Total Cyanide (LL)	ND (5.00)		4500 CN CE		1	EEM	07/21/17 10:55	ug/L	CG72115
Total Petroleum Hydrocarbon	ND (5)		1664A		1	CRR	07/26/17 15:15	mg/L	CG72515
Total Suspended Solids	ND (5)		2540D		1	EEM	07/20/17 16:45	mg/L	CG72021

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP
Client Sample ID: RGP-1
Date Sampled: 07/19/17 14:00
Percent Solids: N/A
Initial Volume: 35
Final Volume: 2
Extraction Method: 504/8011

ESS Laboratory Work Order: 1707435
ESS Laboratory Sample ID: 1707435-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: JXS
Prepared: 7/26/17 10:00

504.1 1,2-Dibromoethane / 1,2-Dibromo-3-chloropropane

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,2-Dibromoethane	ND (0.015)		504.1		1	07/26/17 16:16		CG72615

	%Recovery	Qualifier	Limits
Surrogate: Pentachloroethane	*107 %*		*30-150*
Surrogate: Pentachloroethane [2C]	*113 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP
Client Sample ID: SW-1
Date Sampled: 07/19/17 14:30
Percent Solids: N/A

ESS Laboratory Work Order: 1707435
ESS Laboratory Sample ID: 1707435-02
Sample Matrix: Surface Water
Units: ug/L

Extraction Method: 3005A

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Antimony	ND (10.0)		200.7		1	KJK	07/21/17 10:51	100	20	CG72035
Arsenic	**2.2** (1.0)		3113B		1	KJK	07/27/17 4:07	100	20	CG72035
Cadmium	**0.16** (0.05)		3113B		1	KJK	07/25/17 19:06	100	20	CG72035
Copper	ND (4.0)		200.7		1	KJK	07/21/17 10:51	100	20	CG72035
Hardness	**105000** (165)		200.7		1	KJK	07/21/17 10:51	1	1	[CALC]
Iron	**1780** (20.0)		200.7		1	KJK	07/21/17 10:51	100	20	CG72035
Lead	ND (1.0)		3113B		1	KJK	07/27/17 1:47	100	20	CG72035
Mercury	ND (0.200)		245.1		1	MJV	07/21/17 19:22	20	40	CG72036
Nickel	ND (10.0)		200.7		1	KJK	07/21/17 10:51	100	20	CG72035
Selenium	ND (2.0)		3113B		1	KJK	07/27/17 6:51	100	20	CG72035
Silver	ND (1.0)		200.7		1	KJK	07/21/17 10:51	100	20	CG72035
Zinc	**385** (10.0)		200.7		1	BJV	07/24/17 12:42	100	20	CG72035

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP
Client Sample ID: SW-1
Date Sampled: 07/19/17 14:30
Percent Solids: N/A

ESS Laboratory Work Order: 1707435
ESS Laboratory Sample ID: 1707435-02
Sample Matrix: Surface Water

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Ammonia as N	**0.19** (0.10)		350.1		1	JLK	07/21/17 16:50	mg/L	CG72026
Hexavalent Chromium	ND (10.0)		3500Cr B-2009		1	EEM	07/20/17 13:10	ug/L	CG72024

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
				Total Metals						
Batch CG72024 - [CALC]										
Blank										
Chromium III	ND	10.0	ug/L							
LCS										
Chromium III	ND		ug/L							
LCS Dup										
Chromium III	ND		ug/L							
Batch CG72035 - 3005A										
Blank										
Antimony	ND	10.0	ug/L							
Arsenic	ND	1.0	ug/L							
Cadmium	ND	0.05	ug/L							
Chromium III	ND	4.00	ug/L							
Copper	ND	4.0	ug/L							
Hardness	ND	165	ug/L							
Iron	ND	20.0	ug/L							
Lead	ND	1.0	ug/L							
Nickel	ND	10.0	ug/L							
Selenium	ND	2.0	ug/L							
Silver	ND	1.0	ug/L							
Zinc	ND	10.0	ug/L							
LCS										
Antimony	109	10.0	ug/L	100.0		109	85-115			
Arsenic	113	25.0	ug/L	100.0		113	85-115			
Cadmium	57.5	25.0	ug/L	50.00		115	85-115			
Chromium III	110	4.00	ug/L							
Copper	112	4.0	ug/L	100.0		112	85-115			
Hardness	7100	165	ug/L							
Iron	524	20.0	ug/L	500.0		105	85-115			
Lead	125	25.0	ug/L	100.0		125	85-115			B+
Nickel	112	10.0	ug/L	100.0		112	85-115			
Selenium	239	50.0	ug/L	200.0		119	85-115			B+
Silver	50.8	1.0	ug/L	50.00		102	85-115			
Zinc	114	10.0	ug/L	100.0		114	85-115			
LCS Dup										
Antimony	108	10.0	ug/L	100.0		108	85-115	1	20	
Chromium III	110	4.00	ug/L							
Copper	111	4.0	ug/L	100.0		111	85-115	0.6	20	
Hardness	7080	165	ug/L							
Iron	527	20.0	ug/L	500.0		105	85-115	0.7	20	
Nickel	111	10.0	ug/L	100.0		111	85-115	0.8	20	
Silver	55.7	1.0	ug/L	50.00		111	85-115	9	20	
Zinc	113	10.0	ug/L	100.0		113	85-115	1	20	
Batch CG72036 - 245.1/7470A										

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Total Metals										
Batch CG72036 - 245.1/7470A										
Blank										
Mercury	ND	0.200	ug/L							
LCS										
Mercury	5.98	0.200	ug/L	6.000		100	85-115			
LCS Dup										
Mercury	5.97	0.200	ug/L	6.000		99	85-115	0.3	20	
524.2 Volatile Organic Compounds										
Batch CG72532 - 524.2										
Blank										
1,1,1-Trichloroethane	ND	0.5	ug/L							
1,1,2-Trichloroethane	ND	0.5	ug/L							
1,1-Dichloroethane	ND	0.5	ug/L							
1,1-Dichloroethene	ND	0.5	ug/L							
1,2-Dichlorobenzene	ND	0.5	ug/L							
1,2-Dichloroethane	ND	0.5	ug/L							
1,3-Dichlorobenzene	ND	0.5	ug/L							
1,4-Dichlorobenzene	ND	0.5	ug/L							
Acetone	ND	5.0	ug/L							
Benzene	ND	0.5	ug/L							
Carbon Tetrachloride	ND	0.3	ug/L							
cis-1,2-Dichloroethene	ND	0.5	ug/L							
Ethylbenzene	ND	0.5	ug/L							
Methyl tert-Butyl Ether	ND	0.5	ug/L							
Methylene Chloride	ND	0.5	ug/L							
Naphthalene	ND	0.5	ug/L							
Tertiary-amyl methyl ether	ND	1.0	ug/L							
Tertiary-butyl Alcohol	ND	25.0	ug/L							
Tetrachloroethene	ND	0.5	ug/L							
Toluene	ND	0.5	ug/L							
Trichloroethene	ND	0.5	ug/L							
Vinyl Chloride	ND	0.2	ug/L							
Xylene O	ND	0.5	ug/L							
Xylene P,M	ND	0.5	ug/L							
Surrogate: 1,2-Dichlorobenzene-d4	*5.41*		ug/L	*5.000*		*108*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*5.19*		ug/L	*5.000*		*104*	*80-120*			
LCS										
1,1,1-Trichloroethane	10.2		ug/L	10.00		102	70-130			
1,1,2-Trichloroethane	10.3		ug/L	10.00		103	70-130			
1,1-Dichloroethane	9.9		ug/L	10.00		99	70-130			
1,1-Dichloroethene	11.0		ug/L	10.00		110	70-130			
1,2-Dichlorobenzene	10.0		ug/L	10.00		100	70-130			
1,2-Dichloroethane	10.1		ug/L	10.00		101	70-130			
1,3-Dichlorobenzene	10.4		ug/L	10.00		104	70-130			

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
524.2 Volatile Organic Compounds										
Batch CG72532 - 524.2										
1,4-Dichlorobenzene	10.3		ug/L	10.00		103	70-130			
Acetone	52.4		ug/L	50.00		105	70-130			
Benzene	10.4		ug/L	10.00		104	70-130			
Carbon Tetrachloride	10.6		ug/L	10.00		106	70-130			
cis-1,2-Dichloroethene	10.2		ug/L	10.00		102	70-130			
Ethylbenzene	10.3		ug/L	10.00		103	70-130			
Methyl tert-Butyl Ether	10.1		ug/L	10.00		101	70-130			
Methylene Chloride	10.5		ug/L	10.00		105	70-130			
Naphthalene	10.1		ug/L	10.00		101	70-130			
Tertiary-amyl methyl ether	10.1		ug/L	10.00		101	70-130			
Tertiary-butyl Alcohol	48.6		ug/L	50.00		97	70-130			
Tetrachloroethene	10.3		ug/L	10.00		103	70-130			
Toluene	10.1		ug/L	10.00		101	70-130			
Trichloroethene	10.7		ug/L	10.00		107	70-130			
Vinyl Chloride	10.2		ug/L	10.00		102	70-130			
Xylene O	9.9		ug/L	10.00		99	70-130			
Xylene P,M	19.5		ug/L	20.00		97	70-130			
Surrogate: 1,2-Dichlorobenzene-d4	*5.29*		ug/L	*5.000*		*106*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*5.22*		ug/L	*5.000*		*104*	*80-120*			
LCS Dup										
1,1,1-Trichloroethane	9.9		ug/L	10.00		99	70-130	3	20	
1,1,2-Trichloroethane	10.2		ug/L	10.00		102	70-130	0.3	20	
1,1-Dichloroethane	9.3		ug/L	10.00		93	70-130	6	20	
1,1-Dichloroethene	10.4		ug/L	10.00		104	70-130	6	20	
1,2-Dichlorobenzene	9.5		ug/L	10.00		95	70-130	5	20	
1,2-Dichloroethane	9.6		ug/L	10.00		96	70-130	5	20	
1,3-Dichlorobenzene	9.7		ug/L	10.00		97	70-130	6	20	
1,4-Dichlorobenzene	9.6		ug/L	10.00		96	70-130	6	20	
Acetone	50.8		ug/L	50.00		102	70-130	3	20	
Benzene	9.8		ug/L	10.00		98	70-130	6	20	
Carbon Tetrachloride	9.8		ug/L	10.00		98	70-130	7	20	
cis-1,2-Dichloroethene	10.0		ug/L	10.00		100	70-130	2	20	
Ethylbenzene	9.8		ug/L	10.00		98	70-130	5	20	
Methyl tert-Butyl Ether	10.0		ug/L	10.00		100	70-130	1	20	
Methylene Chloride	10.1		ug/L	10.00		101	70-130	4	20	
Naphthalene	9.8		ug/L	10.00		98	70-130	3	20	
Tertiary-amyl methyl ether	9.7		ug/L	10.00		97	70-130	5	20	
Tertiary-butyl Alcohol	47.3		ug/L	50.00		95	70-130	3	25	
Tetrachloroethene	9.8		ug/L	10.00		98	70-130	4	20	
Toluene	9.7		ug/L	10.00		97	70-130	5	20	
Trichloroethene	10.3		ug/L	10.00		103	70-130	4	20	
Vinyl Chloride	9.8		ug/L	10.00		98	70-130	4	20	
Xylene O	9.3		ug/L	10.00		93	70-130	6	20	
Xylene P,M	18.9		ug/L	20.00		94	70-130	3	20	
Surrogate: 1,2-Dichlorobenzene-d4	*5.15*		ug/L	*5.000*		*103*	*80-120*			

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
524.2 Volatile Organic Compounds										
Batch CG72532 - 524.2										
Surrogate: 4-Bromofluorobenzene	*5.22*		ug/L	*5.000*		*104*	*80-120*			
608 Polychlorinated Biphenyls (PCB)										
Batch CG72118 - 3510C										
Blank										
Aroclor 1016	ND	0.10	ug/L							
Aroclor 1016 [2C]	ND	0.10	ug/L							
Aroclor 1221	ND	0.10	ug/L							
Aroclor 1221 [2C]	ND	0.10	ug/L							
Aroclor 1232	ND	0.10	ug/L							
Aroclor 1232 [2C]	ND	0.10	ug/L							
Aroclor 1242	ND	0.10	ug/L							
Aroclor 1242 [2C]	ND	0.10	ug/L							
Aroclor 1248	ND	0.10	ug/L							
Aroclor 1248 [2C]	ND	0.10	ug/L							
Aroclor 1254	ND	0.10	ug/L							
Aroclor 1254 [2C]	ND	0.10	ug/L							
Aroclor 1260	ND	0.10	ug/L							
Aroclor 1260 [2C]	ND	0.10	ug/L							
Aroclor 1262	ND	0.10	ug/L							
Aroclor 1262 [2C]	ND	0.10	ug/L							
Aroclor 1268	ND	0.10	ug/L							
Aroclor 1268 [2C]	ND	0.10	ug/L							
Surrogate: Decachlorobiphenyl	*0.0442*		ug/L	*0.05000*		*88*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0481*		ug/L	*0.05000*		*96*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0288*		ug/L	*0.05000*		*58*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0327*		ug/L	*0.05000*		*65*	*30-150*			
LCS										
Aroclor 1016	0.92	0.10	ug/L	1.000		92	40-140			
Aroclor 1016 [2C]	0.94	0.10	ug/L	1.000		94	40-140			
Aroclor 1260	0.92	0.10	ug/L	1.000		92	40-140			
Aroclor 1260 [2C]	0.86	0.10	ug/L	1.000		86	40-140			
Surrogate: Decachlorobiphenyl	*0.0525*		ug/L	*0.05000*		*105*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0541*		ug/L	*0.05000*		*108*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0458*		ug/L	*0.05000*		*92*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0476*		ug/L	*0.05000*		*95*	*30-150*			
LCS Dup										
Aroclor 1016	0.82	0.10	ug/L	1.000		82	40-140	12	20	
Aroclor 1016 [2C]	0.84	0.10	ug/L	1.000		84	40-140	11	20	
Aroclor 1260	0.84	0.10	ug/L	1.000		84	40-140	8	20	
Aroclor 1260 [2C]	0.79	0.10	ug/L	1.000		79	40-140	8	20	

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
608 Polychlorinated Biphenyls (PCB)										
Batch CG72118 - 3510C										
Surrogate: Decachlorobiphenyl	*0.0460*		ug/L	*0.05000*		*92*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0468*		ug/L	*0.05000*		*94*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0404*		ug/L	*0.05000*		*81*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0418*		ug/L	*0.05000*		*84*	*30-150*			
625(SIM) Semi-Volatile Organic Compounds										
Batch CG72101 - 3510C										
Blank										
Acenaphthene	ND	0.20	ug/L							
Acenaphthylene	ND	0.20	ug/L							
Anthracene	ND	0.20	ug/L							
Benzo(a)anthracene	ND	0.05	ug/L							
Benzo(a)pyrene	ND	0.05	ug/L							
Benzo(b)fluoranthene	ND	0.05	ug/L							
Benzo(g,h,i)perylene	ND	0.20	ug/L							
Benzo(k)fluoranthene	ND	0.05	ug/L							
bis(2-Ethylhexyl)phthalate	ND	2.00	ug/L							
Butylbenzylphthalate	ND	2.50	ug/L							
Chrysene	ND	0.05	ug/L							
Dibenzo(a,h)Anthracene	ND	0.05	ug/L							
Diethylphthalate	ND	2.50	ug/L							
Dimethylphthalate	ND	2.50	ug/L							
Di-n-butylphthalate	ND	2.50	ug/L							
Di-n-octylphthalate	ND	2.50	ug/L							
Fluoranthene	ND	0.20	ug/L							
Fluorene	ND	0.20	ug/L							
Indeno(1,2,3-cd)Pyrene	ND	0.05	ug/L							
Naphthalene	ND	0.20	ug/L							
Pentachlorophenol	ND	0.90	ug/L							
Phenanthrene	ND	0.20	ug/L							
Pyrene	ND	0.20	ug/L							
Surrogate: 1,2-Dichlorobenzene-d4	*1.07*		ug/L	*2.500*		*43*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*2.84*		ug/L	*3.750*		*76*	*15-110*			
Surrogate: 2-Fluorobiphenyl	*1.34*		ug/L	*2.500*		*54*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.41*		ug/L	*2.500*		*56*	*30-130*			
Surrogate: p-Terphenyl-d14	*1.62*		ug/L	*2.500*		*65*	*30-130*			
LCS										
Acenaphthene	3.02	0.20	ug/L	4.000		75	40-140			
Acenaphthylene	2.91	0.20	ug/L	4.000		73	40-140			
Anthracene	3.19	0.20	ug/L	4.000		80	40-140			
Benzo(a)anthracene	3.31	0.05	ug/L	4.000		83	40-140			
Benzo(a)pyrene	3.84	0.05	ug/L	4.000		96	40-140			
Benzo(b)fluoranthene	3.78	0.05	ug/L	4.000		95	40-140			
Benzo(g,h,i)perylene	3.87	0.20	ug/L	4.000		97	40-140			

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
625(SIM) Semi-Volatile Organic Compounds										
Batch CG72101 - 3510C										
Benzo(k)fluoranthene	3.90	0.05	ug/L	4.000		98	40-140			
bis(2-Ethylhexyl)phthalate	3.72	2.00	ug/L	4.000		93	40-140			
Butylbenzylphthalate	3.56	2.50	ug/L	4.000		89	40-140			
Chrysene	3.43	0.05	ug/L	4.000		86	40-140			
Dibenzo(a,h)Anthracene	4.01	0.05	ug/L	4.000		100	40-140			
Diethylphthalate	3.14	2.50	ug/L	4.000		79	40-140			
Dimethylphthalate	3.48	2.50	ug/L	4.000		87	40-140			
Di-n-butylphthalate	3.79	2.50	ug/L	4.000		95	40-140			
Di-n-octylphthalate	3.79	2.50	ug/L	4.000		95	40-140			
Fluoranthene	3.64	0.20	ug/L	4.000		91	40-140			
Fluorene	3.34	0.20	ug/L	4.000		83	40-140			
Indeno(1,2,3-cd)Pyrene	4.07	0.05	ug/L	4.000		102	40-140			
Naphthalene	2.68	0.20	ug/L	4.000		67	40-140			
Pentachlorophenol	3.76	0.90	ug/L	4.000		94	30-130			
Phenanthrene	3.08	0.20	ug/L	4.000		77	40-140			
Pyrene	3.71	0.20	ug/L	4.000		93	40-140			
Surrogate: 1,2-Dichlorobenzene-d4	*1.26*		ug/L	*2.500*		*50*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*3.68*		ug/L	*3.750*		*98*	*15-110*			
Surrogate: 2-Fluorobiphenyl	*1.67*		ug/L	*2.500*		*67*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.65*		ug/L	*2.500*		*66*	*30-130*			
Surrogate: p-Terphenyl-d14	*1.94*		ug/L	*2.500*		*78*	*30-130*			
LCS Dup										
Acenaphthene	3.45	0.20	ug/L	4.000		86	40-140	14	20	
Acenaphthylene	3.34	0.20	ug/L	4.000		83	40-140	14	20	
Anthracene	3.66	0.20	ug/L	4.000		91	40-140	14	20	
Benzo(a)anthracene	3.71	0.05	ug/L	4.000		93	40-140	11	20	
Benzo(a)pyrene	4.33	0.05	ug/L	4.000		108	40-140	12	20	
Benzo(b)fluoranthene	4.19	0.05	ug/L	4.000		105	40-140	10	20	
Benzo(g,h,i)perylene	4.30	0.20	ug/L	4.000		108	40-140	11	20	
Benzo(k)fluoranthene	4.44	0.05	ug/L	4.000		111	40-140	13	20	
bis(2-Ethylhexyl)phthalate	4.46	2.00	ug/L	4.000		112	40-140	18	20	
Butylbenzylphthalate	4.09	2.50	ug/L	4.000		102	40-140	14	20	
Chrysene	3.95	0.05	ug/L	4.000		99	40-140	14	20	
Dibenzo(a,h)Anthracene	4.48	0.05	ug/L	4.000		112	40-140	11	20	
Diethylphthalate	3.74	2.50	ug/L	4.000		94	40-140	17	20	
Dimethylphthalate	4.15	2.50	ug/L	4.000		104	40-140	18	20	
Di-n-butylphthalate	4.29	2.50	ug/L	4.000		107	40-140	12	20	
Di-n-octylphthalate	4.30	2.50	ug/L	4.000		108	40-140	13	20	
Fluoranthene	4.05	0.20	ug/L	4.000		101	40-140	11	20	
Fluorene	3.90	0.20	ug/L	4.000		97	40-140	15	20	
Indeno(1,2,3-cd)Pyrene	4.56	0.05	ug/L	4.000		114	40-140	11	20	
Naphthalene	2.89	0.20	ug/L	4.000		72	40-140	8	20	
Pentachlorophenol	4.35	0.90	ug/L	4.000		109	30-130	15	20	
Phenanthrene	3.54	0.20	ug/L	4.000		88	40-140	14	20	
Pyrene	4.33	0.20	ug/L	4.000		108	40-140	15	20	

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
625(SIM) Semi-Volatile Organic Compounds										
Batch CG72101 - 3510C										
Surrogate: 1,2-Dichlorobenzene-d4	*1.30*		ug/L	*2.500*		*52*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*4.21*		ug/L	*3.750*		*112*	*15-110*			*S+*
Surrogate: 2-Fluorobiphenyl	*1.77*		ug/L	*2.500*		*71*	*30-130*			
Surrogate: Nitrobenzene-d5	*1.85*		ug/L	*2.500*		*74*	*30-130*			
Surrogate: p-Terphenyl-d14	*2.09*		ug/L	*2.500*		*84*	*30-130*			
8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution										
Batch CG72442 - 3535A										
Blank										
1,4-Dioxane	ND	0.250	ug/L							
Surrogate: 1,4-Dioxane-d8	*2.27*		ug/L	*5.000*		*45*	*15-115*			
LCS										
1,4-Dioxane	9.62	0.250	ug/L	10.00		96	40-140			
Surrogate: 1,4-Dioxane-d8	*1.95*		ug/L	*5.000*		*39*	*15-115*			
LCS Dup										
1,4-Dioxane	10.0	0.250	ug/L	10.00		100	40-140	4	20	
Surrogate: 1,4-Dioxane-d8	*2.63*		ug/L	*5.000*		*53*	*15-115*			
Classical Chemistry										
Batch CG72021 - General Preparation										
Blank										
Total Suspended Solids	ND	5	mg/L							
LCS										
Total Suspended Solids	44		mg/L	43.50		101	80-120			
Batch CG72024 - General Preparation										
Blank										
Hexavalent Chromium	ND	10.0	ug/L							
LCS										
Hexavalent Chromium	0.497		mg/L	0.4998		99	90-110			
LCS Dup										
Hexavalent Chromium	0.496		mg/L	0.4998		99	90-110	0.3	20	
Batch CG72026 - NH4 Prep										
Blank										
Ammonia as N	ND	0.10	mg/L							
LCS										
Ammonia as N	0.11	0.10	mg/L	0.09994		105	80-120			
LCS										
Ammonia as N	0.98	0.10	mg/L	0.9994		98	80-120			
Batch CG72115 - TCN Prep										
Blank										

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Classical Chemistry										
Batch CG72115 - TCN Prep										
Total Cyanide (LL)	ND	5.00	ug/L							
LCS										
Total Cyanide (LL)	20.5	5.00	ug/L	20.06		102	90-110			
LCS										
Total Cyanide (LL)	150	5.00	ug/L	150.4		100	90-110			
LCS Dup										
Total Cyanide (LL)	151	5.00	ug/L	150.4		100	90-110	0.5	20	
Batch CG72515 - General Preparation										
Blank										
Total Petroleum Hydrocarbon	ND	5	mg/L							
LCS										
Total Petroleum Hydrocarbon	14	5	mg/L	19.38		71	66-114			
Batch CG72537 - General Preparation										
Blank										
Chloride	ND	0.5	mg/L							
LCS										
Chloride	2.5		mg/L	2.500		101	90-110			
Batch CG72540 - General Preparation										
Blank										
Phenols	ND	100	ug/L							
LCS										
Phenols	102	100	ug/L	100.0		102	80-120			
LCS										
Phenols	968	100	ug/L	1000		97	80-120			
504.1 1,2-Dibromoethane / 1,2-Dibromo-3-chloropropane										
Batch CG72615 - 504/8011										
Blank										
1,2-Dibromoethane	ND	0.015	ug/L							
1,2-Dibromoethane [2C]	ND	0.015	ug/L							
Surrogate: Pentachloroethane	*0.196*		ug/L	*0.2000*		*98*	*30-150*			
Surrogate: Pentachloroethane [2C]	*0.189*		ug/L	*0.2000*		*95*	*30-150*			
LCS										
1,2-Dibromoethane	0.220	0.015	ug/L	0.2000		110	70-130			
1,2-Dibromoethane [2C]	0.192	0.015	ug/L	0.2000		96	70-130			
Surrogate: Pentachloroethane	*0.211*		ug/L	*0.2000*		*105*	*30-150*			
Surrogate: Pentachloroethane [2C]	*0.195*		ug/L	*0.2000*		*97*	*30-150*			
LCS										
1,2-Dibromoethane	0.082	0.015	ug/L	0.08000		103	70-130			
1,2-Dibromoethane [2C]	0.082	0.015	ug/L	0.08000		102	70-130			

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
504.1 1,2-Dibromoethane / 1,2-Dibromo-3-chloropropane										
Batch CG72615 - 504/8011										
Surrogate: Pentachloroethane	*0.0786*		ug/L	*0.08000*		*98*	*30-150*			
Surrogate: Pentachloroethane [2C]	*0.0749*		ug/L	*0.08000*		*94*	*30-150*			

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

Notes and Definitions

U	Analyte included in the analysis, but not detected
S+	Surrogate recovery(ies) above upper control limit (S+).
PT	Pentachlorophenol tailing factor > 2.
D	Diluted.
B+	Blank Spike recovery is above upper control limit (B+).
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit

CERTIFICATE OF ANALYSIS

Client Name: GZA GeoEnvironmental, Inc.
Client Project ID: Wyman Gordon - RGP

ESS Laboratory Work Order: 1707435

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: GZA - Norwood, MA - GZA/MM

Shipped/Delivered Via: ESS Courier

ESS Project ID: 1707435
Date Received: 7/20/2017
Project Due Date: 7/27/2017
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 3.3 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** (Yes) / No / NA
10. Were any analyses received outside of hold time? Yes / (No)

11. Any Subcontracting needed? Yes / (No)
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? (Yes) / No
    a. Air bubbles in aqueous VOAs? Yes / (No)
    b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? (Yes) / No
    a. If metals preserved upon receipt: Date: Time: By:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / (No)
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
01	149514	Yes	NA	Yes	1L Amber - H2SO4	H2SO4	
01	149515	Yes	NA	Yes	1L Amber - H2SO4	H2SO4	
01	149516	Yes	NA	Yes	1L Amber - Unpres	NP	
01	149517	Yes	NA	Yes	1L Amber - Unpres	NP	
01	149518	Yes	NA	Yes	1L Amber - Unpres	NP	
01	149519	Yes	NA	Yes	1L Amber - Unpres	NP	
01	149520	Yes	NA	Yes	1L Amber - Unpres	NP	
01	149521	Yes	NA	Yes	1L Amber - Unpres	NP	
01	149522	Yes	NA	Yes	1L Poly - Unpres	NP	
01	149525	Yes	NA	Yes	500 mL Poly - HNO3	HNO3	
01	149526	Yes	NA	Yes	500 mL Poly - HNO3	HNO3	
01	149528	Yes	NA	Yes	500 mL Poly - H2SO4	H2SO4	pH >12 ms 7/20/17 1119
01	149529	Yes	NA	Yes	250 mL Poly - NaOH	NaOH	
01	149531	Yes	NA	Yes	250 mL Amber - Unpres	NP	
01	149532	Yes	No	Yes	VOA Vial - HCl	HCl	
01	149533	Yes	No	Yes	VOA Vial - HCl	HCl	
01	149534	Yes	No	Yes	VOA Vial - HCl	HCl	
01	149535	Yes	No	Yes	VOA Vial - HCl	HCl	
01	149536	Yes	No	Yes	VOA Vial - HCl	HCl	
01	149537	Yes	No	Yes	VOA Vial - HCl	HCl	
02	149523	Yes	NA	Yes	500 mL Poly - HNO3	HNO3	
02	149524	Yes	NA	Yes	500 mL Poly - HNO3	HNO3	
02	149527	Yes	NA	Yes	500 mL Poly - H2SO4	H2SO4	
02	149530	Yes	NA	Yes	250 mL Amber - Unpres	NP	

ESS Laboratory Sample and Cooler Receipt Checklist

Client: GZA - Norwood, MA - GZA/MM

ESS Project ID: 1707435
Date Received: 7/20/2017

2nd Review
Are barcode labels on correct containers? Yes / No

Completed By: _____ Date & Time: 7/20/17 1119

Reviewed By: _____ Date & Time: 7/20/17 1144

Delivered By: _____ 7/20/17 1151

5 DAY

ESS Laboratory

Division of Thielsch Engineering, Inc.

185 Frances Avenue, Cranston, RI 02910-2211

Tel. (401) 461-7181 Fax (401) 461-4486

www.esslaboratory.com

CHAIN OF CUSTODY

ESS LAB PROJECT ID: 1707435

Turn Time: ✓ Standard Rush _____ Approved By: _____

Reporting Limits -

State where samples were collected: MA NH

Is this project for: RGP

Electonic Deliverable: Yes ✓ No _____

Format: Excel ✓ Access _____ PDF ✓ Other _____ *

Project Manager: Randy Mercer

Company: GZA

Address: 249 Vanderbilt Ave Norwood Ma 02062

Project #: 19274.18

Project Name: Wyman Gordon

PO #

ESS Lab Sample ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample Identification	# of Containers	RGP Metals Total	RGP Metals Dissolved	Hardness (Calculation)	Ethanol ASTM D3695	Chloride 300.0*	Total Cyanide 4500 LL	TPH 1664	TSS 2540D*	TRC 4500-CL D*	Ammonia 350.1	Tri Cr (Calc. MUST run T. Cr)	Hex Cr 3500	Phenol 420.1	RGP VOC Long List 524	1,4-Dioxane 8270-SIM	EDB 504.1	RGP SVOC Log List 625-SIM *	PCB 608	Comment #
1	7-19-17	1400	G	GW	RGP-1	20 22	X		X		X	X	X	X		X	X	X	X	X	X	X	X	X	1,2
2	7-19-17	1430	G	SW	SW-1		X		X							X		X							
Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_____							4	4	4	1	1	5	2	1	1	3	-	1	3	2	1	2	1	1	
Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA							P	P	P	V	P	P	AG	P	P	P	-	P	AG	V	AG	V	AG	AG	

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present ___Yes ___No

Seals Intact ___Yes ___No NA: X

Cooler Temperature: 3.3 iced

Sampled by : ANDY Sargent

added analysis for sample #2 per AS, 1130 7/20/17

Comments: 1) RGP Metals include Sb, As, Cd, Cu, Fe, Pb, Ni, Se, Ag and Zn by 200.7/200.9 and Hg by 245.1

2) Parameters in **BOLD** have Short hold-time

PERMIT ATTACHED

* TSS, TRC and Cl taken from the same container

* Need limit of at least 2.2 ug/L for bis 2 diethylhexyl phthalate

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	7-19-17 1730			7/20/17 10:10	
	7/20/17 11:01	7/20/17 1108			

Please E-mail all changes to Chain of Custody in writi

Page ___ of ___