Dvirka and Bartilucci
CONSULTING ENGINEERS

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November 16, 2007

Gerard Burke
New York State Department of Environmental Conservation
Division of Environmental Remediation
12th Floor, 625 Broadway
Albany NY 12233-7017

Re: Former Bouchard Junkyard Site (Site No. 4-11-014)
Wetland Pre-Excavation Characterization
D&B No. 2605

Dear Mr. Burke:

Dvirka and Bartilucci Consulting Engineers (D&B) was retained by the New York State Department of Environmental Conservation (NYSDEC) to perform wetland pre-excavation characterization monitoring and sampling at the Former Bouchard Junkyard Site located in New Lebanon, New York (see Figure 1 in Attachment A). The work was completed to define the existing hydrology, soil and vegetation conditions that currently exist within the wetlands area. The data collected will be used to define the conditions by which the post-excavation wetland restoration will be compared to gauge the success of the restoration. The following sections discuss the sampling and monitoring activities that were completed and present the results from each activity.

Hydrology Monitoring

Hydrology measurements were taken on three separate dates during the months of the growing season (July 12, 2007, August 16, 2007 and September 13, 2007) to determine the baseline water level conditions and the overall flow direction for the groundwater and surface water at the site.

Groundwater elevations were measured using a hand held electronic water level indicator. The depth was recorded as the depth to groundwater as measured from the top of the casing of the existing on-site groundwater monitoring wells (MW-1 through MW-6). The locations of the six on-site groundwater monitoring wells are shown on Figure 2 in Attachment A. Water levels were not collected from groundwater monitoring wells MW-2 and MW-6 due to damage to the well casing. Groundwater measurements for all monitoring wells are summarized in Attachment B.

Surface water elevations were measured using surface water gauges installed throughout the wetlands area (SG-1 through SG-6). The gauges were installed by D&B in six locations of the wetlands area to reflect areas that were going to be excavated and disturbed during the remedial activities (SG-3, SG-4 and SG-6) and areas that were not going to be excavated and remain undisturbed during the remedial activities (SG-1, SG-2 and SG-5). The locations of the six installed staff gauges are shown on Figure 2 in Attachment A. All measurements taken were referenced to the surveyed elevation of the top of each staff gauge. Water level measurements for all staff gauges are summarized in Attachment B.

Water levels from both the groundwater measurements and the surface water measurements were used to generate groundwater elevation contour maps and assess the overall flow direction of the water at the site. Based on the results of the mapping, the overall flow direction of water at the site is toward the south, which is consistent with the data presented as a part of the Pre-Design Investigation Report. Groundwater elevation contour maps generated are presented in Attachment C.

Soil Sampling

Soil sampling was conducted during the August 16, 2007 site visit to characterize and assess the characteristics of the existing wetland soil at the site. The samples results will be used for both the selection of fill for areas of the wetland excavated greater than 6-inches and to assess post-excavation soil conditions following the restoration.

The sample locations were consistent with the locations of the installed staff gauges. Samples were collected near staff gauges SG-03, SG-04, SG-05 and SG-06 using disposable polyethylene scoops and laboratory supplied sampling containers and plastic bags. Samples collected at each location were sent to Mitkem Laboratories and analyzed for the following parameters: grain size, permeability, bulk density, total organic carbon, pH, nitrogen and phosphorus. Due to the high water content of the samples collected, the tests for permeability and bulk density could not be completed. A summary of the sample results is provided in Attachment B.

Vegetative Monitoring

Vegetative monitoring was conducted during the July 12, 2007, August 16, 2007 and September 13, 2007 site visits to characterize the existing community vegetative structure at the site. The vegetative monitoring locations were consistent with the locations of the soil samples.

Monitoring was completed by observing the area surrounding staff gauges SG-3, SG-4, SG-5 and SG-6 and taking digital pictures. All pictures taken are provided in the photo log provided in Attachment D.

In addition to the pictures taken during each vegetative monitoring event, additional data was collected by Ecologic, LLC (Ecologic) during the August 16, 2007 monitoring event to define the following: percent cover by vertical stratification (canopy, under story and herbaceous layer), percent cover by species (community composition), and overall percent cover. The presence and quantity (stem count) of invasive

species was also documented. A summary of the findings, as prepared by Ecologic, is presented in Attachment E.

Conclusions and Recommendation

Based on the results of the wetland pre-excavation characterization performed, we offer the following conclusions and recommendations:

- Post excavation monitoring should ensure that the groundwater and surface water flows at the site continue to be toward the south.

- Fill material specified for areas of the wetland should be consistent with the physical and chemical results presented in Appendix B. The remedial contractor should be provided this information prior to performing the work.

- Vegetative data collected by Ecologic was consistent with the 2001 Fish and Wildlife Impact Assessment; however the distribution of the planting zones within the wetlands area should be modified. The remedial contractor should be provided this information prior to performing the work.

Please do not hesitate to contact me at 516-364-9890 if you have any questions.

Very truly yours,

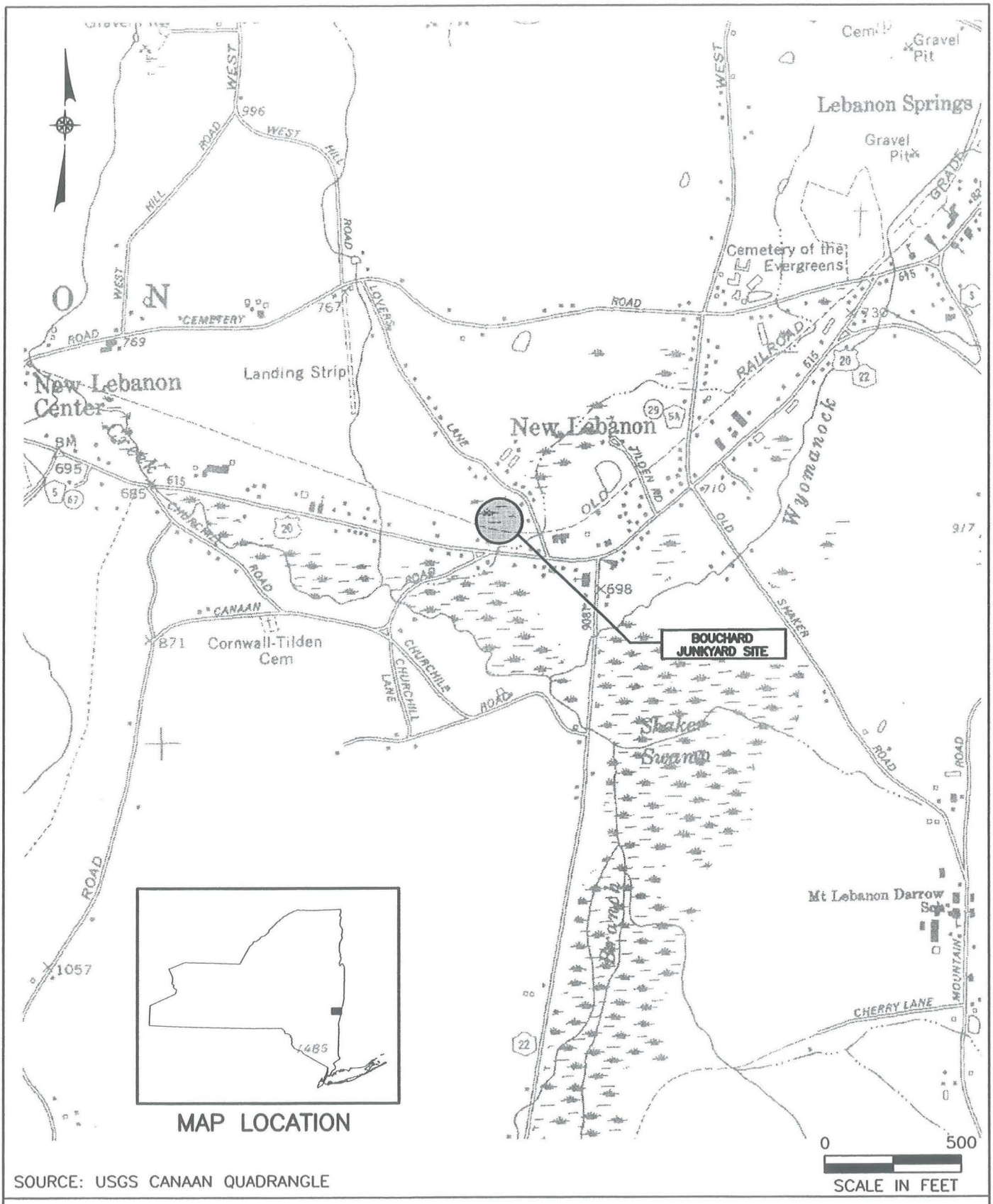
Brian Veith

Brian Veith, P.E.
Vice President

BMV/PSM(t)/tpg
Attachments
cc: L. Alden (NYSDEC)
M. Mason (NYSDEC)
J. Magda (D&B)
P. Martorano (D&B)
♦2605/BMV11027GB-LTR(R01)

ATTACHMENT A

FIGURES



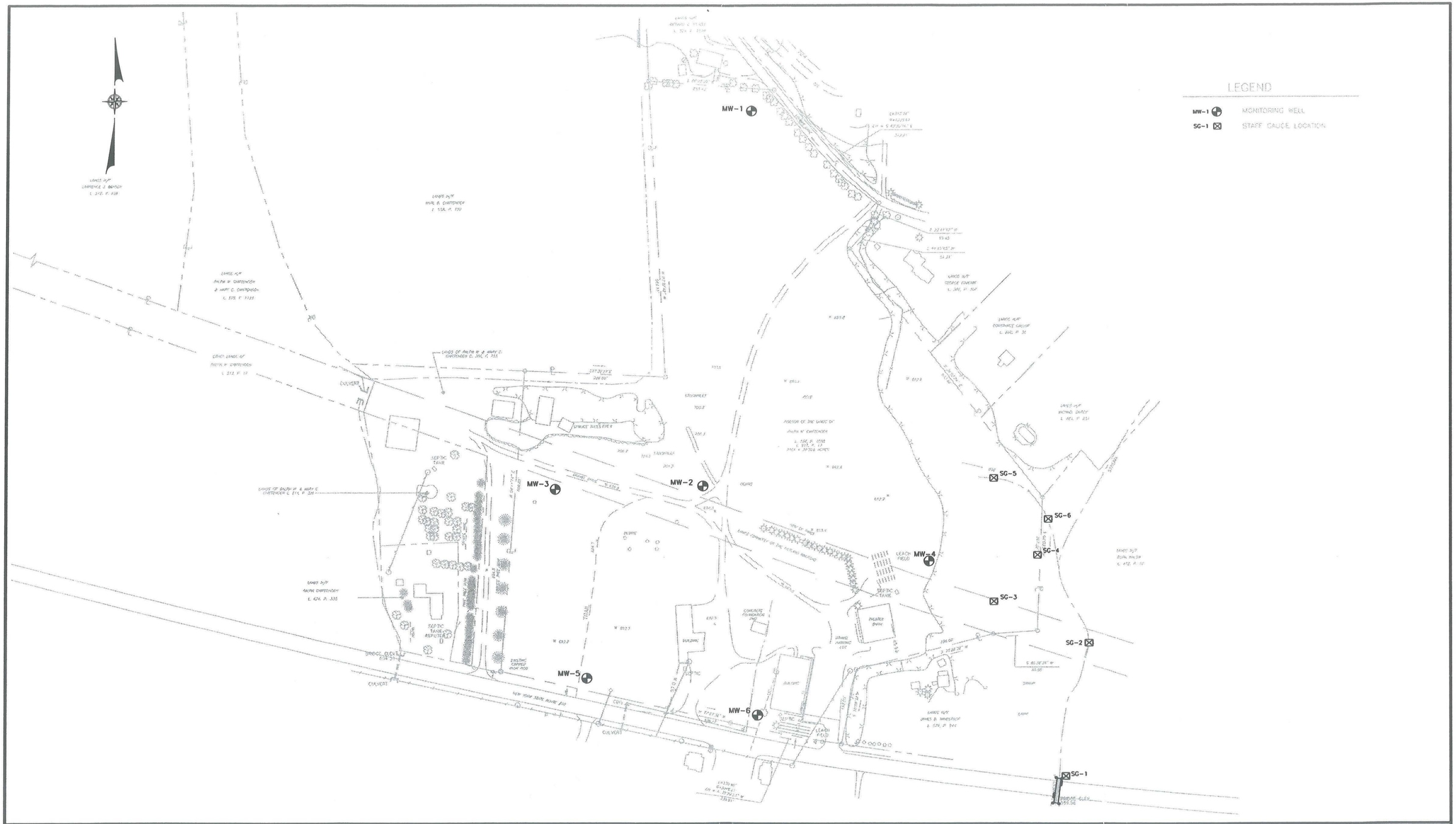
SOURCE: USGS CANAAN QUADRANGLE

BOUCHARD JUNKYARD SITE
NEW LEBANON, NEW YORK

SITE LOCATION MAP

FIGURE 1

Dvirka and Bartilucci CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.



BOUCHARD JUNKYARD SITE
NEW LEBANON, NEW YORK

SAMPLE LOCATION MAP

Dvirka and Bartilucci CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

FIGURE 2

ATTACHMENT B

TABLES

FORMER BOUCHARD JUNKYARD SITE
NYSDEC CONTRACT No. D004446 / SITE No. 4-11-014
GROUND WATER LEVEL MEASUREMENTS

Monitoring Date: 7/12/2007

Well ID	TOC Elevation (feet amsl)	Ground surface elevation (feet amsl)	Depth to GW (feet)	Groundwater Elevation (feet amsl)	Depth Below Ground Surface (feet amsl)
MW-1	709.90	707.79	19.67	690.23	17.56
MW-2	----	----	----	----	----
MW-3	698.39	696.25	10.88	687.51	8.74
MW-4	692.96	690.63	5.10	687.86	2.77
MW-5	694.08	691.93	7.24	686.84	5.09
MW-6	----	----	----	----	----

Monitoring Date: 8/16/2007

Well ID	TOC Elevation (feet amsl)	Ground surface elevation (feet amsl)	Depth to GW (feet)	Groundwater Elevation (feet amsl)	Depth Below Ground Surface (feet)
MW-1	709.90	707.79	21.14	688.76	19.03
MW-2	----	----	----	----	----
MW-3	698.39	696.25	12.11	686.28	9.97
MW-4	692.96	690.63	5.81	687.15	3.48
MW-5	694.08	691.93	8.30	685.78	6.15
MW-6	----	----	----	----	----

Monitoring Date: 9/13/2007

Well ID	TOC Elevation (feet amsl)	Ground surface elevation (feet amsl)	Depth to GW (feet)	Groundwater Elevation (feet amsl)	Depth Below Ground Surface (feet)
MW-1	709.90	707.79	21.96	687.94	19.85
MW-2	----	----	----	----	----
MW-3	698.39	696.25	11.94	686.45	9.80
MW-4	692.96	690.63	5.51	687.45	3.18
MW-5	694.08	691.93	8.14	685.94	5.99
MW-6	----	----	----	----	----

FORMER BOUCHARD JUNKYARD SITE
NYSDEC CONTRACT No. D004446 / SITE No. 4-11-014
STAFF GAUGE WATER LEVEL MEASUREMENTS

Monitor Date **7/12/2007**

Staff Gauge Number	Top of Gauge Vertical Elevation (feet above msl)	Height of Top (feet)	Measured Water Level	Calculated Water Level (feet above msl)	Approximate Ground Surface Elevation (feet above msl)	Approximate Standing Water Depth (feet)
SG-01	690.95688	4	1.00	687.96	684.51	3.45
SG-02	690.726771	4	1.38	688.11	686.65	1.46
SG-03	690.365276	4	1.69	688.06	686.79	1.27
SG-04	690.627401	4	1.42	688.05	686.85	1.20
SG-05	690.738126	4	1.29	688.03	687.29	0.74
SG-06	691.054118	4	1.01	688.06	686.87	1.19
	Bottom of Culvert Opening	Top of Culvert Opening	Measured Water Level from Top of Culvert	Calculated Water Level (feet above msl)		
Culvert N	684.51	688.69	2.00	687.89		3.38
Culvert S	684.49	688.85	2.03	687.93		3.44

Monitor Date **8/16/2007**

Staff Gauge Number	Top of Gauge Vertical Elevation (feet above msl)	Height of Top (feet)	Measured Water Level	Calculated Water Level (feet above msl)	Approximate Ground Surface Elevation (feet above msl)	Approximate Standing Water Depth (feet)
SG-01	690.95688	4	0.32	687.28	684.51	2.77
SG-02	690.726771	4	0.70	687.43	686.65	0.78
SG-03	690.365276	4	1.07	687.44	686.79	0.65
SG-04	690.627401	4	0.91	687.54	686.85	0.69
SG-05	690.738126	4	1.01	687.75	687.29	0.46
SG-06	691.054118	4	0.57	687.62	686.87	0.75
	Bottom of Culvert Opening	Top of Culvert Opening	Measured Water Level from Top of Culvert	Calculated Water Level (feet above msl)		
Culvert N	684.51	688.69	2.68	687.21		2.70
Culvert S	684.49	688.85	2.69	687.27		2.78

FORMER BOUCHARD JUNKYARD SITE
NYSDEC CONTRACT No. D004446 / SITE No. 4-11-014
STAFF GAUGE WATER LEVEL MEASUREMENTS

Monitor Date **9/13/2007**

Staff Gauge Number	Top of Gauge Vertical Elevation (feet above msl)	Height of Top (feet)	Measured Water Level	Calculated Water Level (feet above msl)	Approximate Ground Surface Elevation (feet above msl)	Approximate Standing Water Depth (feet)
SG-01	690.95688	4	0.45	687.41	684.51	2.90
SG-02	690.726771	4	0.81	687.54	686.65	0.89
SG-03	690.365276	4	1.09	687.46	686.79	0.67
SG-04	690.627401	4	0.94	687.57	686.85	0.72
SG-05	690.738126	4	1.00	687.74	687.29	0.45
SG-06	691.054118	4	0.56	687.61	686.87	0.74
	Bottom of Culvert Opening	Top of Culvert Opening	Measured Water Level from Top of Culvert	Calculated Water Level (feet above msl)		
Culvert N	684.51	688.69	2.55	687.34		2.83
Culvert S	684.49	688.85	2.60	687.36		2.87

FORMER BOUCHARD JUNKYARD SITE
NYSDEC CONTRACT No. D004446 / SITE No. 4-11-014
SOIL SAMPLE RESULTS

SAMPLE ID	SD-03	SD-04	SD-05	SD-06	Range		Average	
SAMPLE TYPE	SOIL	SOIL	SOIL	SOIL				
DATE OF COLLECTION	8/16/2007	8/16/2007	8/16/2007	8/16/2007				
COLLECTED BY	D&B	D&B	D&B	D&B				
Parameters					Minimum	Maximum	- SD	+ SD
Total Organic Carbon (mg/kg)	95,000 E	100,000 E	88,000 E	87,000 E	87,000	100,000	86,363	98,637
Total Phosphate (mg/kg)	43	91	68	110	43	110		
Organic Nitrogen (mg/kg)	8,800	12,000	6,400	13,000	6400	13,000		
pH (S.U.)	5.5	6.3	5.8	6.3	5.5	6.3		

ABBREVIATIONS:

mg/kg: Miligram/kilogram

QUALIFIERS:

E: Concentration is greater than the instrument detection limit (IDL), value estimated

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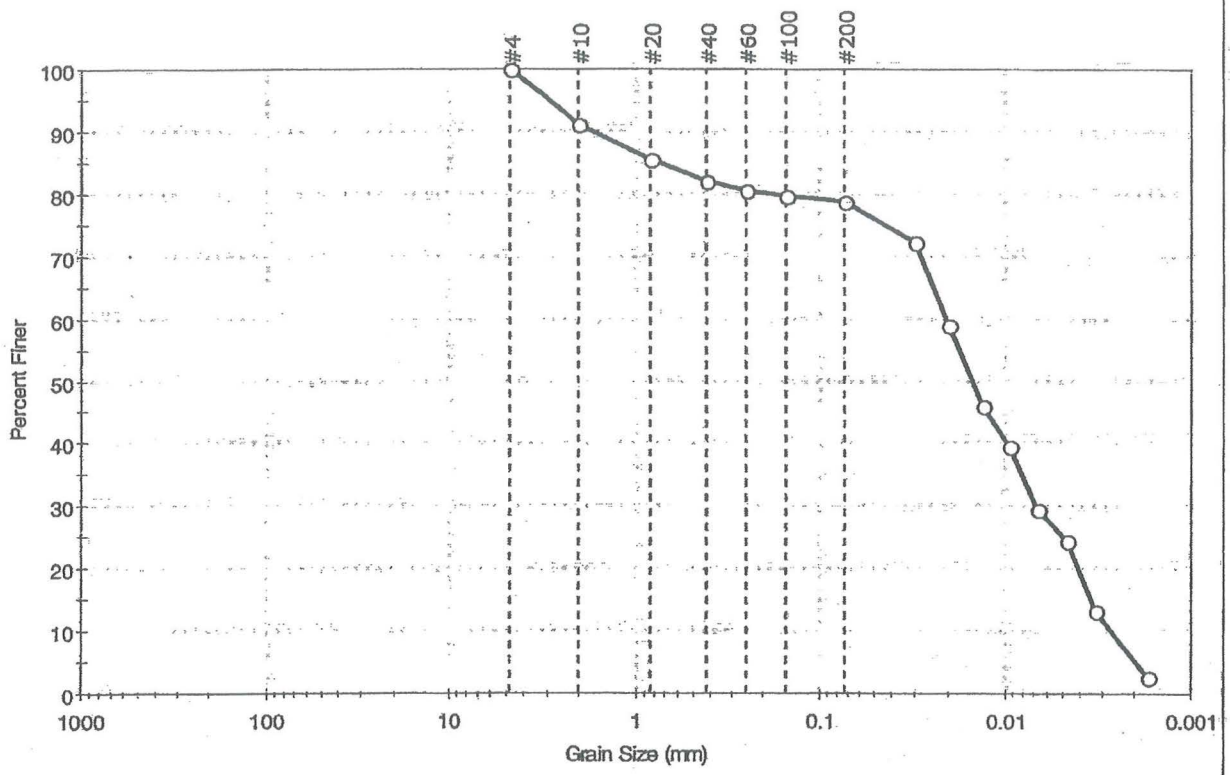
Client:	Mitkem Corporation				
Project:	F1157				
Location:				Project No:	GTX-7702
Boring ID:	08/16/2007	Sample Type:	bag	Tested By:	jbr
Sample ID:	SD-03	Test Date:	08/28/07	Checked By:	njh
Depth :	---	Test Id:	118355		
Test Comment:	Removed 48.59 grams of roots				
Sample Description:	Saturated, black silt with sand				
Sample Comment:	Sample contains organics				

Particle Size Analysis - ASTM D 422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
--	0.0	21.2	78.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	91		
#20	0.84	85		
#40	0.42	82		
#60	0.25	80		
#100	0.15	80		
#200	0.074	79		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0305	72		
---	0.0204	59		
---	0.0132	46		
---	0.0093	39		
---	0.0067	30		
---	0.0047	25		
---	0.0033	13		
---	0.0017	3		

Coefficients

D_{85} =0.7756 mm	D_{30} =0.0068 mm
D_{60} =0.0210 mm	D_{15} =0.0035 mm
D_{50} =0.0151 mm	D_{10} =0.0027 mm
C_u =7.778	C_c =0.816

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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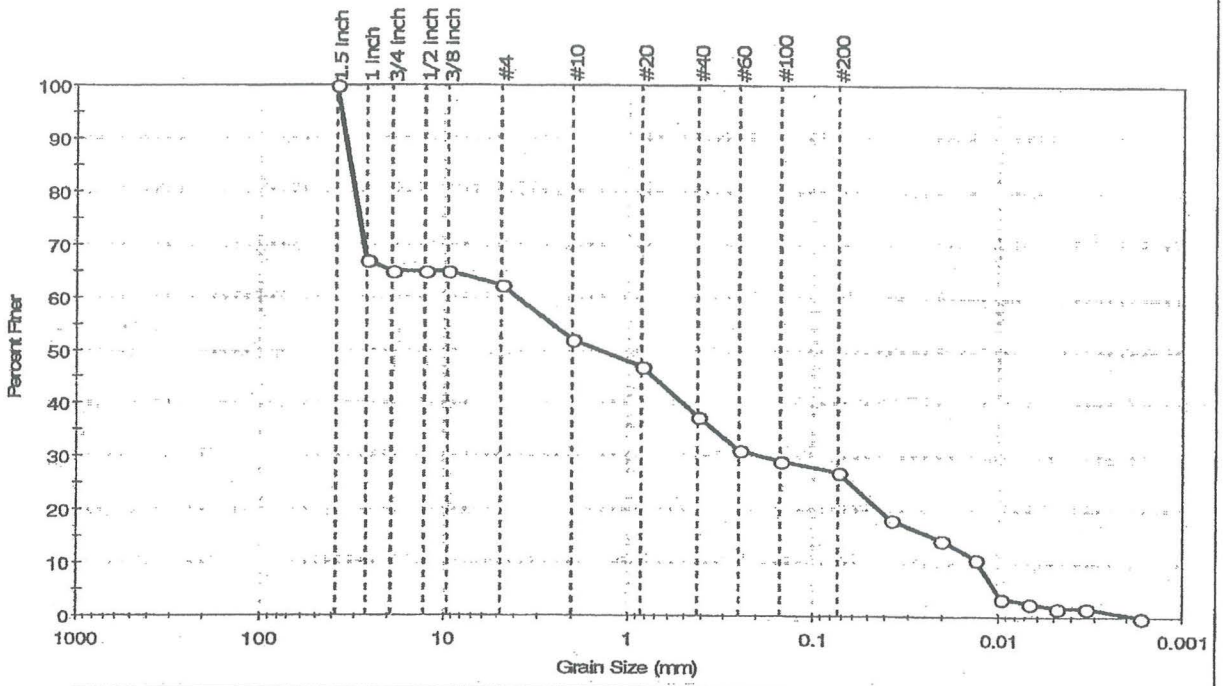
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	Mitkem Corporation				
Project:	F1157				
Location:				Project No:	GTX-7702
Boring ID:	08/16/2007	Sample Type:	bag	Tested By:	jbr
Sample ID:	SD-04	Test Date:	08/28/07	Checked By:	njh
Depth :	---	Test Id:	118356		
Test Comment:	---				
Sample Description:	Saturated, black silty gravel with sand				
Sample Comment:	Sample contains organics				

Particle Size Analysis - ASTM D 422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	37.9	35.0	27.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 inch	38.10	100		
1 inch	25.70	67		
3/4 inch	19.00	65		
1/2 inch	12.70	65		
3/8 inch	9.51	65		
#4	4.75	62		
#10	2.00	52		
#20	0.84	47		
#40	0.42	37		
#60	0.25	31		
#100	0.15	29		
#200	0.074	27		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0376	18		
---	0.0208	15		
---	0.0135	11		
---	0.0096	4		
---	0.0067	3		
---	0.0048	2		
---	0.0034	2		
---	0.0017	0		

Coefficients

D_{85} = 31.8690 mm	D_{30} = 0.1824 mm
D_{60} = 3.9673 mm	D_{15} = 0.0224 mm
D_{50} = 1.4649 mm	D_{10} = 0.0129 mm
C_u = 307.543	C_c = 0.650

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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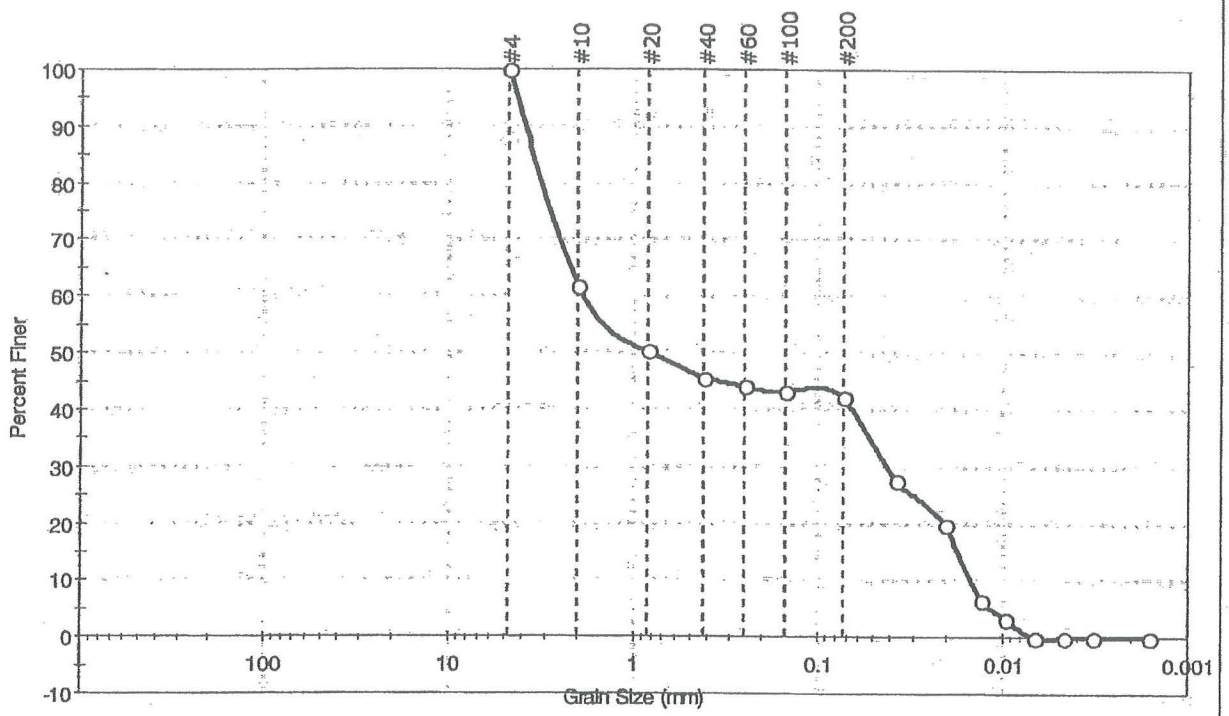
GeoTesting express
a subsidiary of Geocomp Corporation

Client:	Mitkem Corporation				
Project:	F1157				
Location:				Project No:	GTX-7702
Boring ID:	08/16/2007	Sample Type:	bag	Tested By:	jbr
Sample ID:	SD-05	Test Date:	08/28/07	Checked By:	njh
Depth :	---	Test Id:	118357		
Test Comment:	Removed 42.95 grams of roots				
Sample Description:	Saturated, black silty sand				
Sample Comment:	Sample contains organics				

Particle Size Analysis - ASTM D 422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
--	0.0	57.8	42.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	62		
#20	0.84	50		
#40	0.42	46		
#60	0.25	44		
#100	0.15	43		
#200	0.074	42		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0379	28		
---	0.0209	20		
---	0.0130	7		
---	0.0096	3		
---	0.0068	0		
---	0.0048	0		
---	0.0033	0		
---	0.0016	0		

Coefficients

D_{85} = 3.3829 mm	D_{30} = 0.0422 mm
D_{60} = 1.7502 mm	D_{15} = 0.0176 mm
D_{50} = 0.8083 mm	D_{10} = 0.0147 mm
C_u = 119.061	C_c = 0.069

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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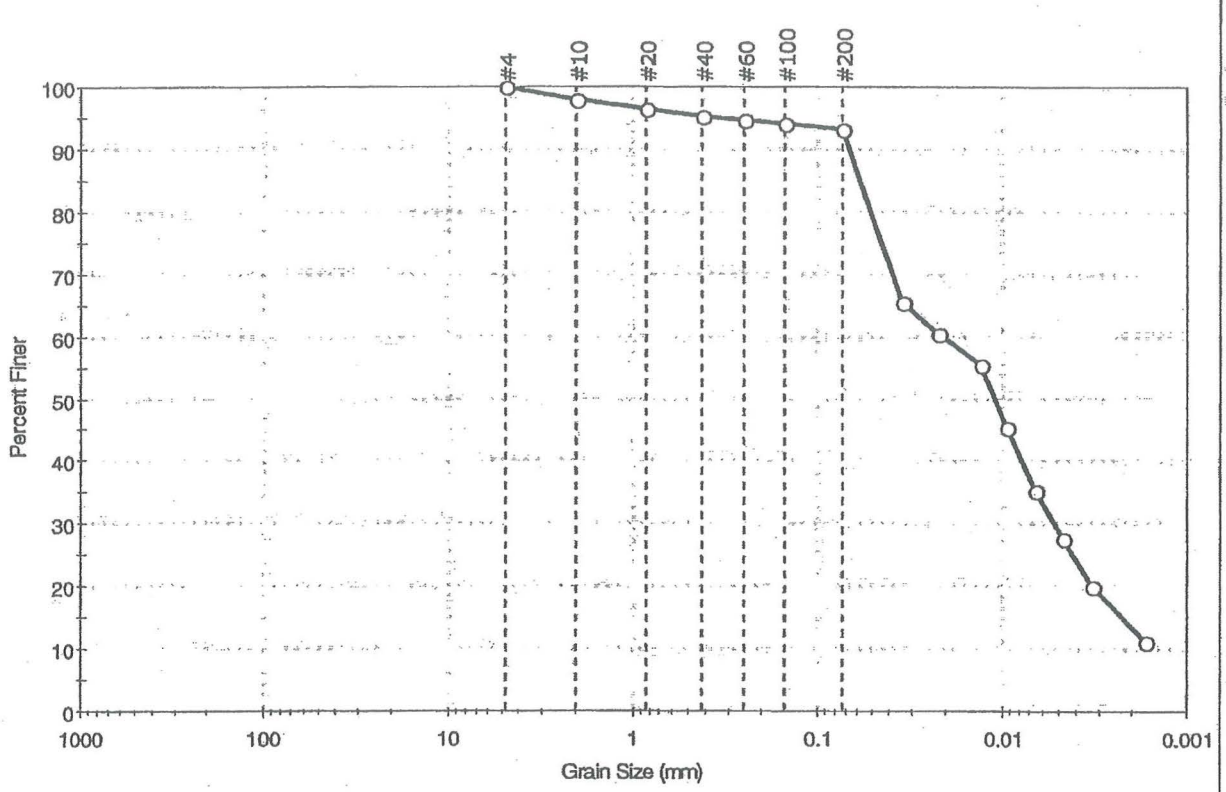
Client:	Mitkem Corporation				
Project:	F1157				
Location:				Project No:	GTX-7702
Boring ID:	08/16/2007	Sample Type:	bag	Tested By:	jbr
Sample ID:	SD-06	Test Date:	08/28/07	Checked By:	njh
Depth :	---	Test Id:	118358		
Test Comment:	Removed 82.62 grams of roots				
Sample Description:	Saturated, black silt				
Sample Comment:	Sample contains organics				

Particle Size Analysis - ASTM D 422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
--	0.0	6.7	93.3

Sieve Name	Sieve Size mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	98		
#20	0.84	96		
#40	0.42	95		
#60	0.25	95		
#100	0.15	94		
#200	0.074	93		
---	Particle Size (mm)	Percent Finer	Spec. Percent	Complies
---	0.0344	65		
---	0.0224	60		
---	0.0131	55		
---	0.0094	45		
---	0.0067	35		
---	0.0047	28		
---	0.0033	20		
---	0.0017	11		

Coefficients

D_{85} = 0.0589 mm	D_{30} = 0.0052 mm
D_{60} = 0.0214 mm	D_{15} = 0.0023 mm
D_{50} = 0.0110 mm	D_{10} = 0.0016 mm
C_u = 13.375	C_c = 0.790

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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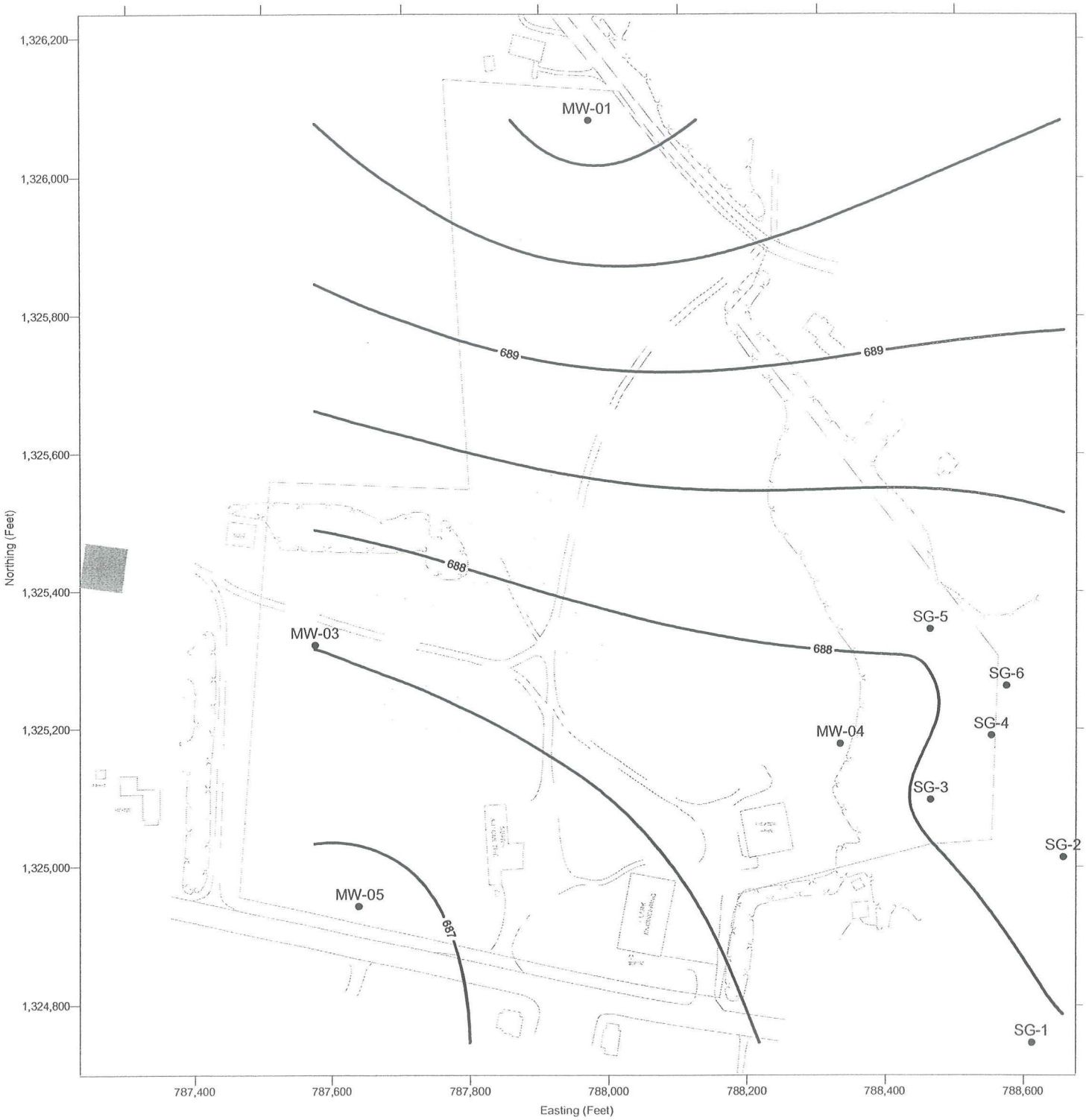
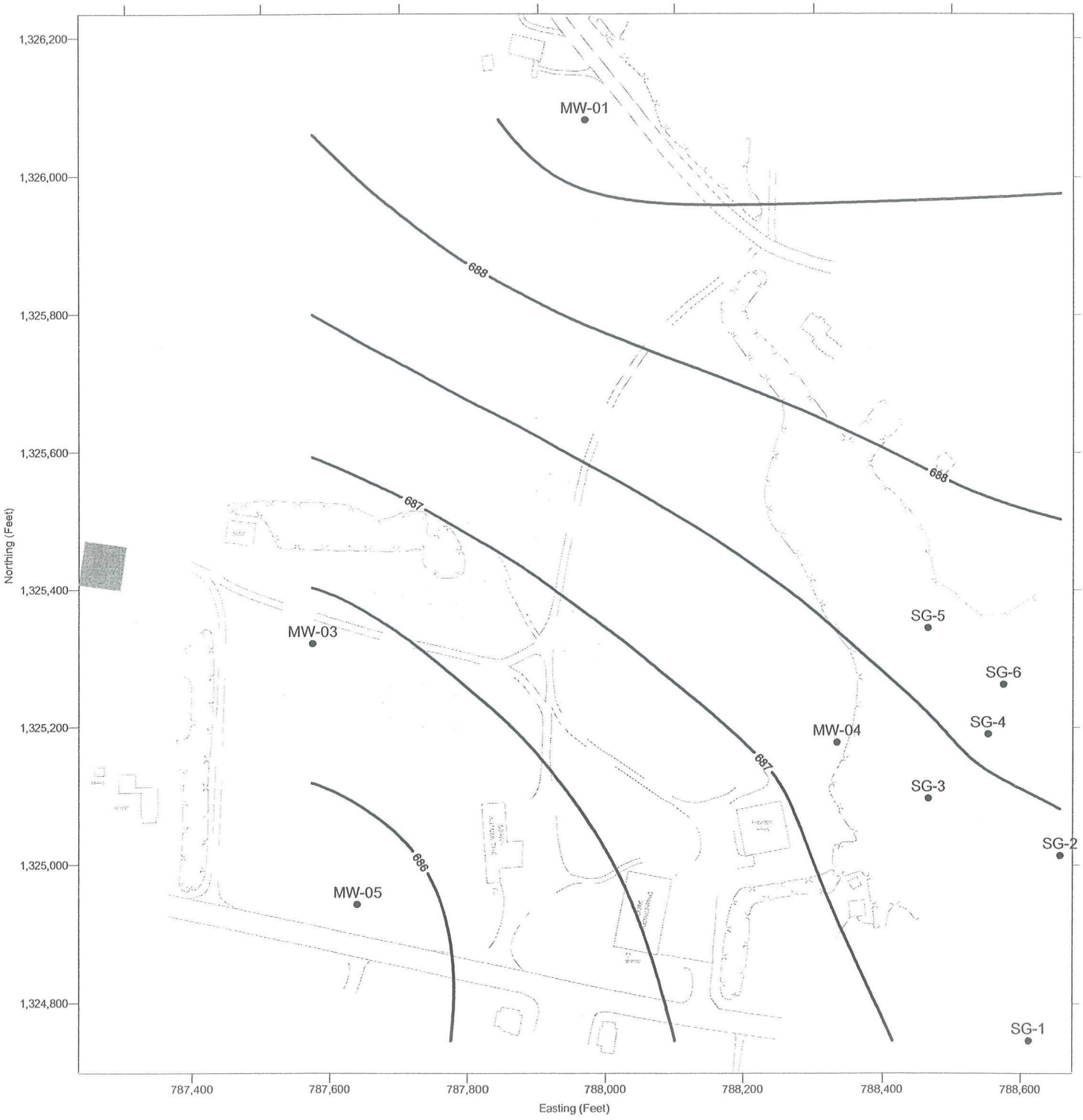
ATTACHMENT C

GROUNDWATER CONTOUR MAPS

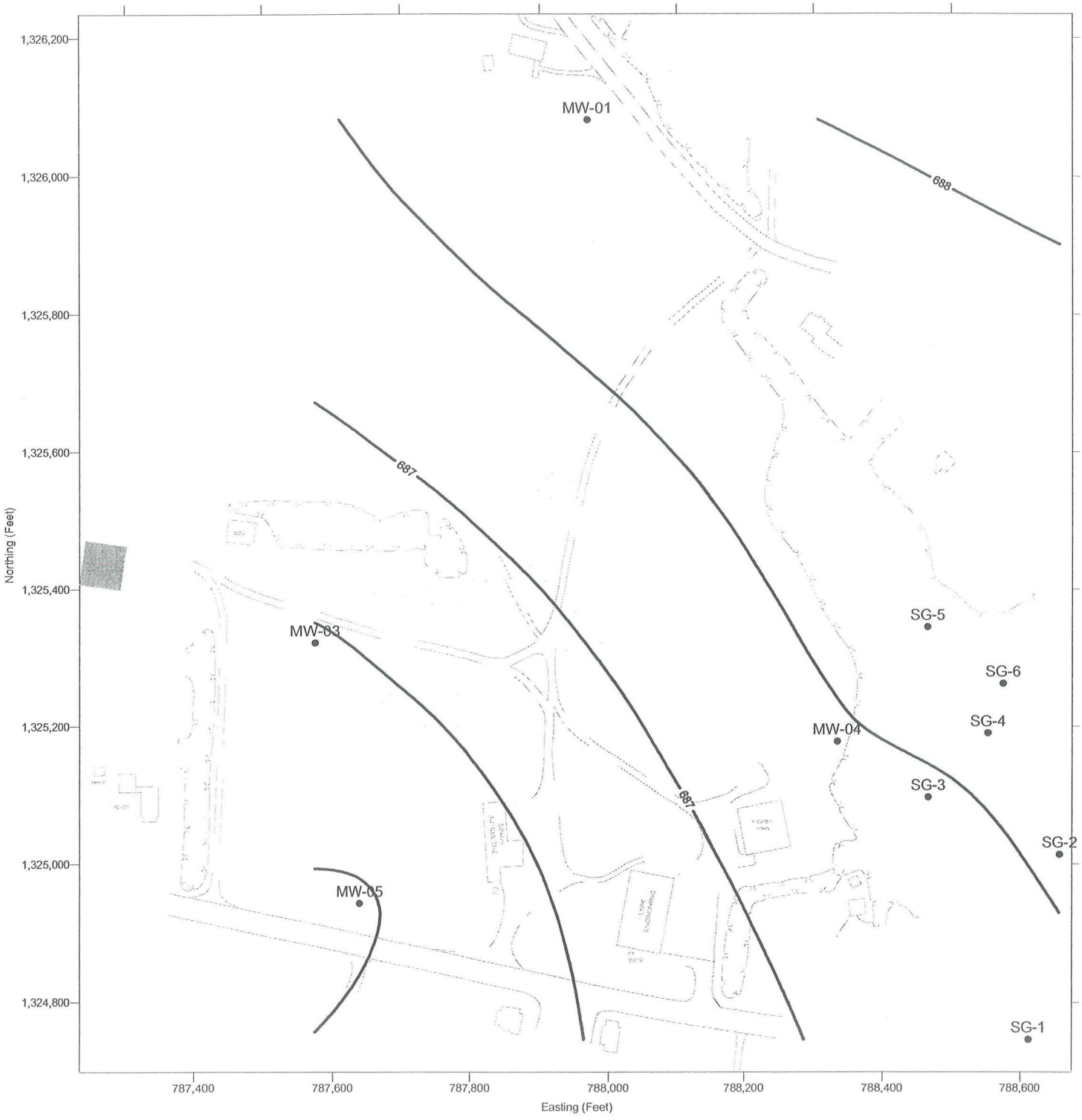
FORMER BOUCHARD JUNKYARD SITE
WATER TABLE SURFACE ELEVATION
JULY 12, 2007



FORMER BOUCHARD JUNKYARD SITE
WATER TABLE SURFACE ELEVATION
AUGUST 16, 2007



FORMER BOUCHARD JUNKYARD SITE
WATER TABLE SURFACE ELEVATION
SEPTEMBER 13, 2007



ATTACHMENT D

VEGETATION MONITORING PHOTO LOG

VEGETATIVE SAMPLING DATE: 7/12/07

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 03

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 03

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 03

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 03

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 03

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 03

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 04

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 04

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 04

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 04

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 04

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 04

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 04

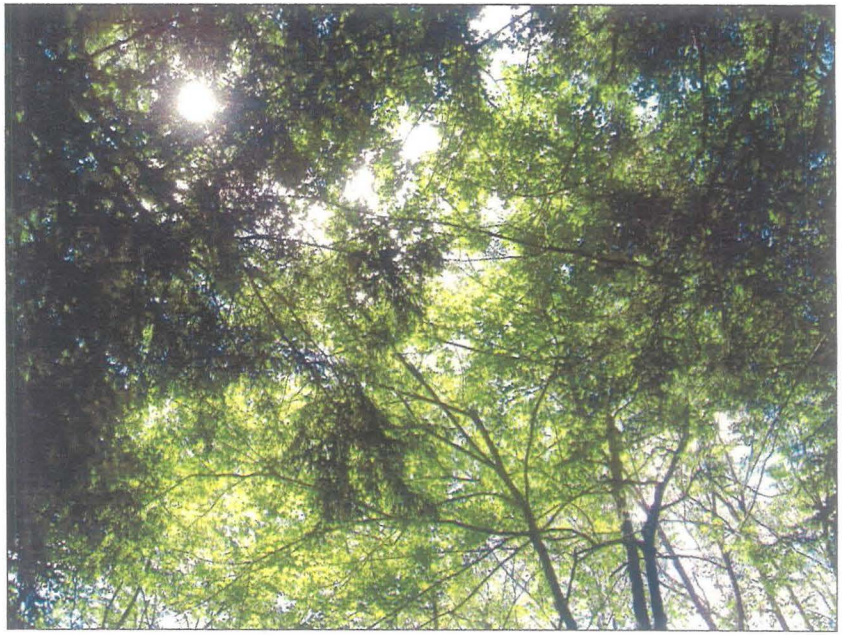
Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 04

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 05

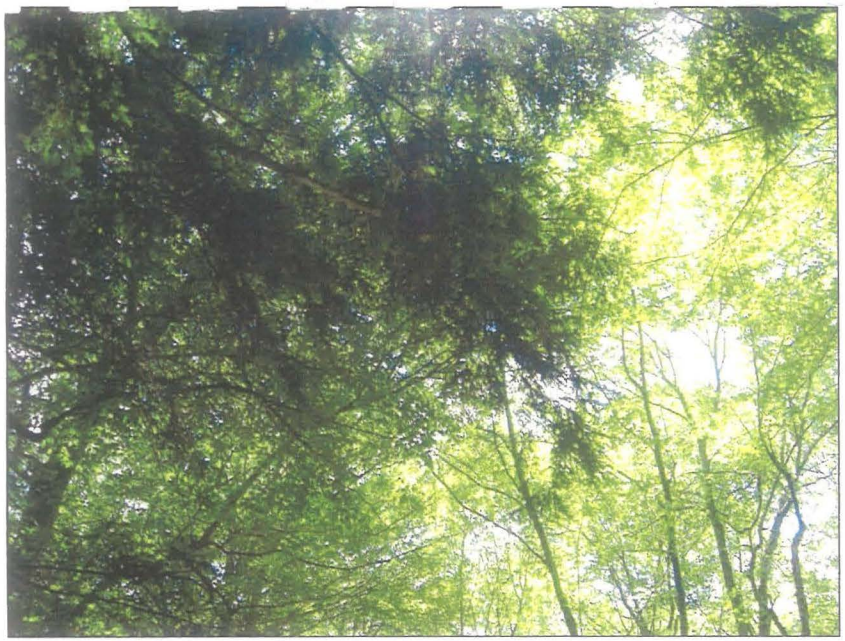
Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 05

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 05

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 05

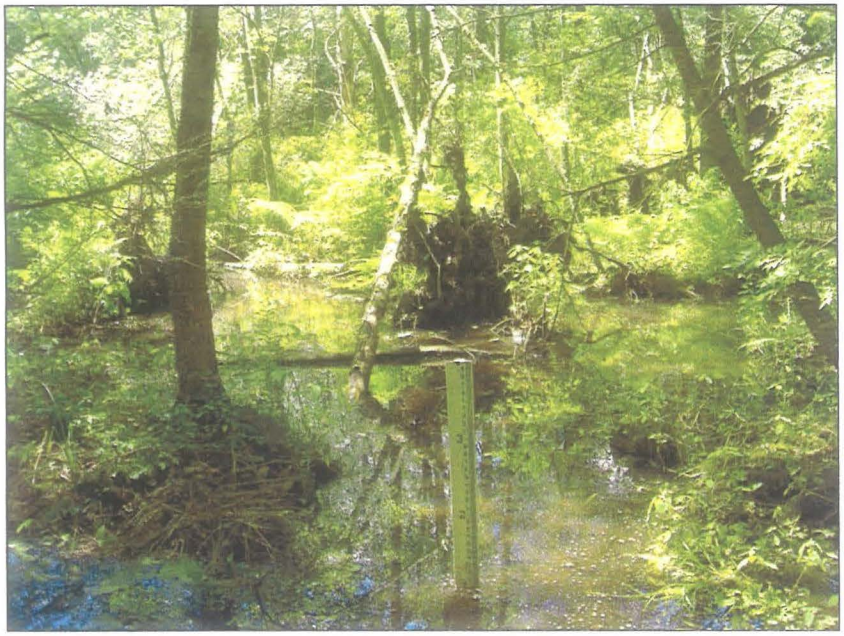


Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 05



Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 05

Vegetative Sampling Date: 07/12/07
Description: Vegetation near Staff Gauge 06



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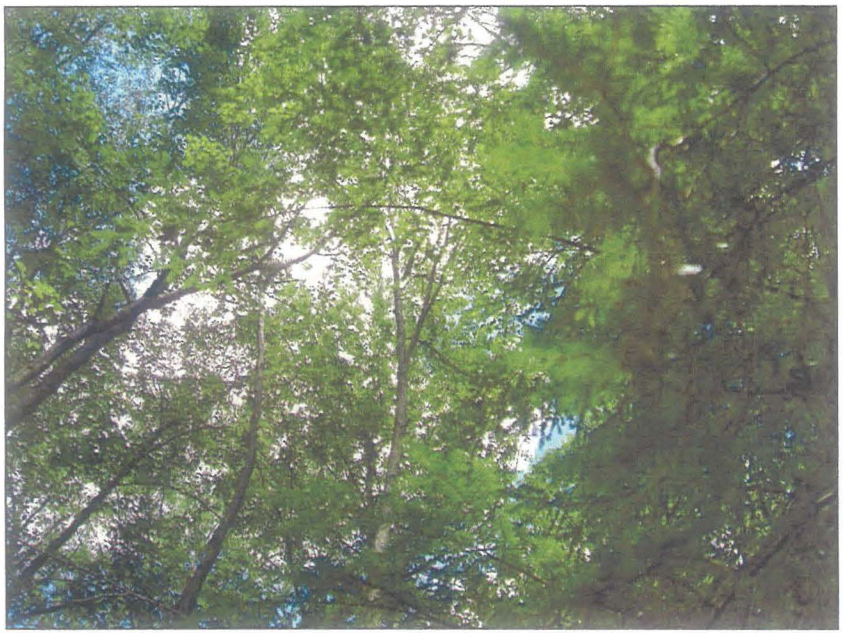

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VEGETATIVE SAMPLING DATE: 8/16/07

Vegetative Sampling Date: 08/16/07
Description: Vegetation near Staff Gauge 03

Vegetative Sampling Date: 08/16/07
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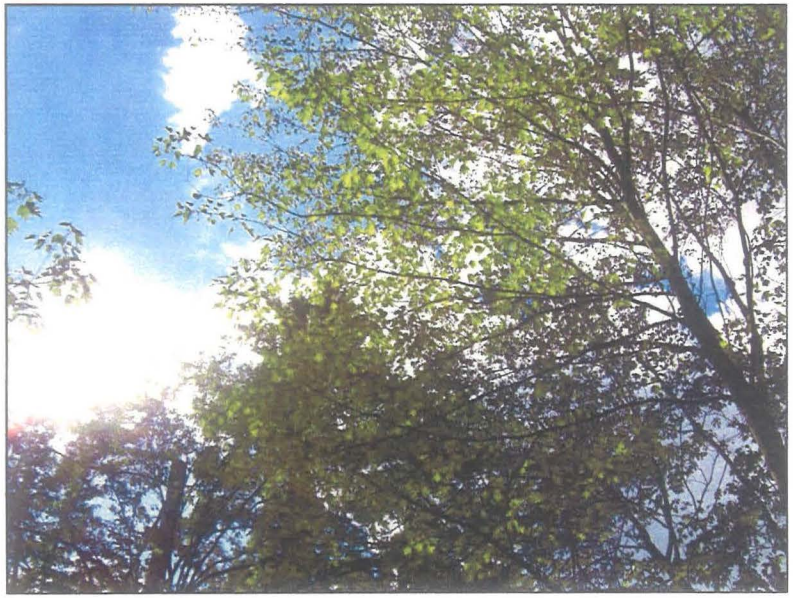

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Vegetative Sampling Date: 09/13/07
Description: Vegetation near Staff Gauge 04

Vegetative Sampling Date: 08/16/07
Description: Vegetation near Staff Gauge 04

Vegetative Sampling Date: 08/16/07
Description: Vegetation near Staff Gauge 05

Vegetative Sampling Date: 08/16/07
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VEGETATIVE SAMPLING DATE: 9/13/07

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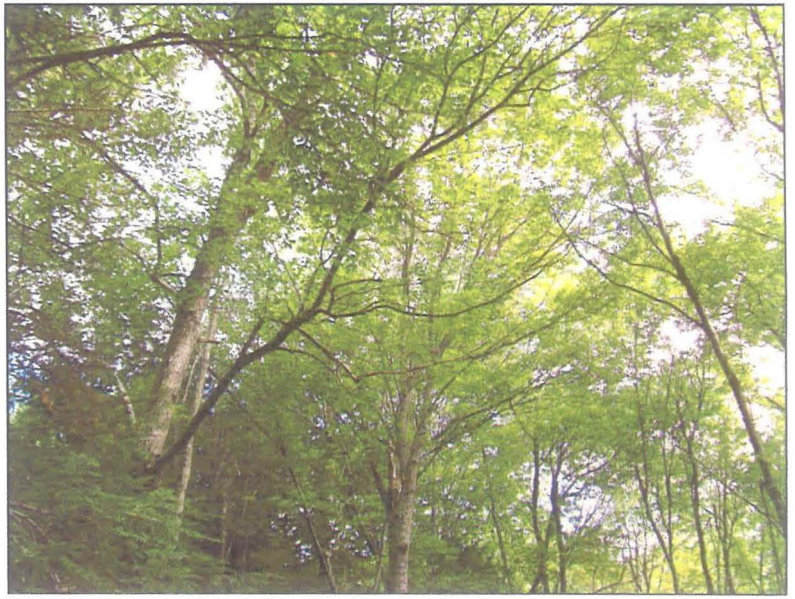

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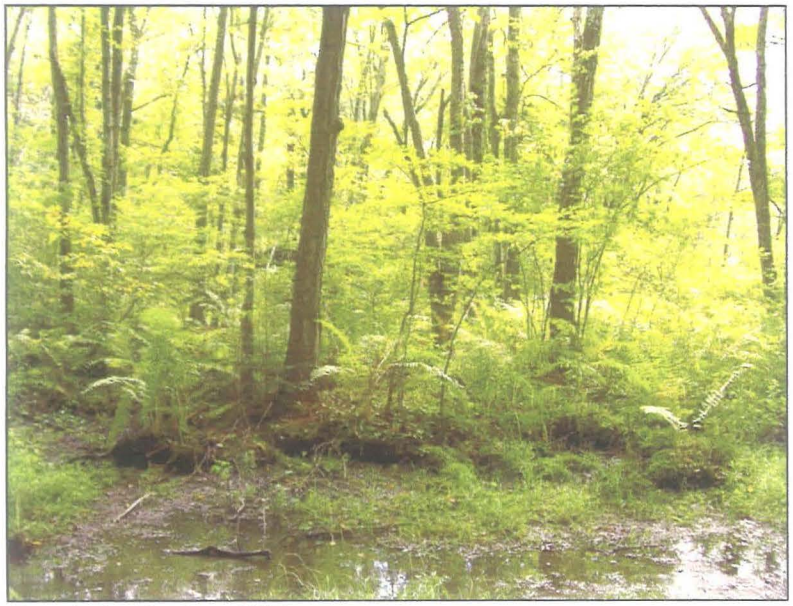

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Description: Vegetation near Staff Gauge 05

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Description: Vegetation near Staff Gauge 05

Vegetative Sampling Date: 09/13/07
Description: Vegetation near Staff Gauge 06

Vegetative Sampling Date: 09/13/07
Description: Vegetation near Staff Gauge 06

ATTACHMENT E

BASELINE VEGETATION SURVEY

REPORT

Baseline Vegetation Survey

Former Bouchard Junkyard Site
Town of New Lebanon
Columbia County, New York
(Site Registry NO. 4-11-014)

Prepared for

Dvirka and Bartilucci Consulting Engineers

Prepared by

EcoLogic LLC

Cazenovia, NY

September 2007

EcoLogic

List of Figures

Appendices

1 Introduction

The purpose of this report is to document the baseline vegetation survey, conducted prior to remediation of PCB-contaminated wetland soils/sediments, at the Former Bouchard Junkyard Site, a Class 2 inactive hazardous waste disposal site, registry No. 4-11-014.

The Former Bouchard Junkyard Site (the Site), is located on the north side of United States (U.S.) Route 20, approximately 400 feet west of Lovers Lane, and approximately 900 feet west of its intersection with New York State Route 22, in the Town of New Lebanon, Columbia County, New York (Figure 1).

A Remedial Investigation (RI) was conducted at the site by Dvirka and Bartilucci (D&B) in 2001/2002. PCBs were identified as the primary contaminant of concern, and surface soil was identified as the primary medium of concern. Polychlorinated biphenyls (PCBs) were also detected in subsurface soils and in surface water sediment. The Site was determined to pose a significant threat to human health and the environment. A Feasibility Study (FS) was prepared for the Site by D&B to identify and screen potentially applicable remedial technologies. NYSDEC selected excavation and off-site disposal as the amended remedy to eliminate or mitigate the current threats.

As a result of this remediation, approximately ¾ of an acre of the regulated wetland on the Site will be impacted by the excavation of contaminated soils and sediments. The excavated areas will be restored to pre-disturbance elevations, and trees and shrubs planted to restore the vegetative cover.

EcoLogic LLC (EcoLogic) was contracted by D&B to develop a wetland restoration plan in 2007 (Restoration Plan). The Restoration Plan directed that baseline measurements of soil, hydrology and vegetation should be conducted before the wetland area is disturbed by remediation activities. These baseline measurements will be used to evaluate the success of the wetland restoration.

This report documents the baseline vegetation measurements for the purpose of the wetland restoration. Soils and hydrology baseline measurements are being collected by D&B.

2 Approach/method

The Restoration Plan identified two elements for vegetative monitoring of the wetland restoration project:

1. To verify the plant list and planting plan strategy, estimate existing overall percent cover, percent cover by stratified layers (canopy, understory and herbaceous), and species percent cover.

2. To provide measurable basis for evaluating whether vegetation communities in the restored wetland areas are comparable with pre-disturbance conditions, establish four sampling sites in the wetland (three in areas to be excavated and one in an area to remain undisturbed).

Following the Restoration Plan, four locations were selected – three to be excavated, one as a control (Figure 2). These locations were also associated with staff gauges installed for monitoring surface water elevations.

During the vegetation survey conducted on August 16th, photographs (Appendix 1) were taken of each site and vegetative measurements were taken.

The approach for estimating cover was designed using the Army Corps of Engineers Wetland Delineation Manual (1987) as a basis. The manual suggests collecting data in this manner for a comprehensive survey:

> Trees – collect diameter at breast height (DBH) measurements for trees within 30 ft radius of the sample point. Convert DBH to basal area, sum the basal areas for each species, then rank each species from highest to lowest sum total basal area to identify the dominant tree species.
>
> Shrubs – collect height estimates of shrubs within 10 ft radius of the sample point. Convert the height estimates into height classes. Sum the height classes for each species, and then rank each species from highest to lowest sum height classes to identify the dominant shrub species.
>
> Herbaceous – collect percent cover estimates of herbaceous plants within 1.5 ft radius of the sample point. Convert the percent cover estimates into percent cover classes. Sum the percent cover classes for each species, and then rank each species from highest to lowest sum total cover class to identify the dominant herbaceous species.

The staff gauges at each site were used as the central sample point, since the gauges were surveyed and the locations could be found again post-excavation. The gauges were, of necessity, located in areas with surface water generally present. Additionally, the wetland in the gauged areas consisted of relatively drier, vegetated hummocks interspersed among wetter, unvegetated hollows.

The wetland manual approach was subsequently modified, using the staff gauge as the approximate center point, so that observations were made of vegetation within approximately 30' of the gauge. Where the hummocks could be safely accessed, actual measurements of DBH and shrub height were taken. Where hummocks within 30' of the gauge were not accessible, DBH and shrub heights were estimated from the nearest possible vantage point. Herbaceous percent cover was estimated by eye for the approximately 30' radius.

This approach, along with photographic documentation, provides a basis for characterizing the vegetation in the area surrounding the staff gauges for post-restoration monitoring.

3 Monitoring locations

3.1 Staff Gauge Location 6 (Control)

This location, which will serve as an undisturbed control, was on east side of site. The staff gauge was located in the intermittent stream identified on site plans. Immediately surrounding the gauge was an open space of mud and standing water. Around this area were raised hummocks supporting trees and other vegetative growth. The canopy was fairly closed over this location. Shrubs were abundant, but were not so dense as to prevent walking through the area. Herbaceous vegetation was distributed predominantly on hummocks, although aquatic vegetation such as duckweed and tearthumb were observed in the hollows. For additional photographs, see Appendix 1.

Staff Gauge Location 6.

3.2 Staff Gauge Location 4 (East)

Located on the eastern side of the site at its lowest elevation, this location was the wettest vegetation sampling point and the area will be excavated during remediation. This area was characterized by multiple tree blow-downs and a shrubby understory. Vegetative growth was predominantly clustered on raised hummocks, while some herbaceous vegetation tolerant of wetter conditions were observed in the lower areas. The canopy was relatively open due to the number of blowdowns in the area. For additional photographs, see Appendix 1.

Staff Gauge Location 4.

3.3 Staff Gauge Location 5 (North)

Located on north side of site, this gauge was situated in the wetland adjacent to upland and residential properties. This area will be excavated during remediation. The shrub and herbaceous understory in the wetland was fairly dense with highbush blueberry, cinnamon fern and sedges; overall, the shrub and herbaceous layers were dense enough to make walking difficult. On the upland side, walking was easier as the herbaceous and shrub layers were less densely populated. The canopy was generally closed, although there was one blowdown just east of the gauge.

Staff Gauge Location 5.

For additional photographs, see Appendix 1.

3.4 Staff Gauge Location 3 (South)

Located on south side of site adjacent to upland of the former railway bed, this area was quite wet the day of the site visit. This area will be excavated as part of the remediation. The canopy in the immediate vicinity of the gauge was open, as the gauge was located adjacent to a blowdown. Vegetation generally grew on raised hummocks. Shrub growth was fairly dense. For additional photographs, see Appendix 1.

Staff Gauge Location 3.

4 Community structure

4.1 Overall Percent Cover by Sample Plot

At each monitoring site, vegetation was generally clustered on hummocks. These hummocks were roughly between 4 and 6 ft in diameter, elevated between 1-2 ft above the mud or surface water. The distance between the hummocks ranged from about 3 ft to about 12 ft. Between the hummocks, the substrate was wet and generally unstable for walking. Bare mud or standing water was present, with sparsely distributed aquatic vegetation.

Overall percent cover was estimated by eye. Each of the four sample plots exhibited from 80-95% overall cover, including the canopy, shrub and herbaceous layers.

The Restoration Plan states that the target for restoration based on overall percent cover is within 30% of the baseline. For these sites, an overall percent cover target range within 30% of the baseline, would be about 60%-95% by the end of the monitoring period.

4.2 Stratified Percent Cover by Sample Plot

The strata that were evaluated were canopy, shrubs, and herbaceous vegetation. The strata were defined as:

Strata	Definition
Canopy	woody plants with a diameter at breast height greater than 3 inches
Shrubs	woody plants with a diameter at breast height less than 3 inches
Herbaceous	non-woody plants less than 3 feet tall

The percent cover by strata within 30 ft of the four staff gauges was estimated by eye. The estimated percent cover range at each location for each stratum was:

	Gauge 6 (control)	Gauge 4	Gauge 5	Gauge 3
Canopy	50%-70%	30%-50%	70%-90%	30%-50%
Shrubs	40%-60%	40%-60%	30%-50%	50%-70%
Herbaceous	40%-60%	50%-70%	60%-80%	60%-80%

The Restoration Plan defines the target for restoration based on strata percent cover over time. The tree canopy will take longer than the five year monitoring period to become re-established; therefore a target for restoration of the canopy was not defined. The table below identifies the target range for each of the four monitoring sites (rounded for simplicity) then extrapolates a target for the whole restoration area using the minimum and maximum targets of the four sites.

	Restoration Target	Sample Site-Specific Targets				Site-wide Range
		Gauge 6 (control)	Gauge 4	Gauge 5	Gauge 3	
Shrubs						
Year 1	60%	20%-80%	20%-80%	10%-70%	30%-90%	10%-90%
Year 2	40%	30%-70%	30%-70%	20%-60%	40%-80%	20%-80%
Year 3	30%	40%-70%	40%-70%	30%-60%	50%-80%	30%-80%
Herbaceous						
Year 1	60%	20%-80%	30%-90%	40%-100%	40%-100%	20%-100%
Year 2	40%	30%-70%	40%-80%	50%-90%	50%-90%	30%-90%
Year 3	30%	40%-70%	50%-80%	60%-90%	60%-90%	40%-90%

Note: Restoration Target is the criteria, expressed as within a percent of baseline, that future percent cover observations should approach the baseline observations. The site-wide target represents the high and low of the individual monitored sites.

4.3 Species Composition by Sample Plot

The composition of the plant community by stratum and species were noted. Measurements were taken, where possible, to identify the dominant species in each stratum.

Strata	Definition	Evaluated using
Canopy	woody plants with a diameter at breast height greater than 3 inches	Diameter at breast height (inches)
Shrubs	woody plants with a diameter at breast height less than 3 inches	Shrub height (ft)
Herbaceous	non-woody plants less than 3 feet tall	Estimated percent cover

The population structure by stratum are represented as the percent noted for the individual species, which, depending on the stratum, is based on

- Canopy - the basal area (sum of basal area by tree species divided by total basal area for monitoring site)
- Shrubs - height (sum of height categories by shrub species divided by total height for monitoring site)
- Herbaceous - estimated percent cover

The following table summarizes the percent contribution by species and strata.

Strata	Species	Gauge 6 (control)	Gauge 4	Gauge 5	Gauge 3
Canopy *(using basal area)*	American Hornbeam			1%	
	Eastern Hemlock	38%		47%	
	Eastern Hophornbeam	3%			7%
	Eastern White Pine			4%	
	Red Maple	59%	100%	41%	73%
	Yellow Birch			8%	
	Black Locust				14%
	Paper Birch				5%
Shrubs *(using height)*	American Hornbeam	6%			
	Beech	11%			
	Black Locust				5%
	Common Elder	49%		7%	
	Dogwood				14%
	Eastern Hemlock	9%		3%	
	Eastern White Pine	3%			
	Red Maple			3%	14%
	Shagbark Hickory	6%		2%	
	White Oak			1%	
	Witch Hazel		10%	10%	14%
	Yellow Birch			6%	

Strata	Species	Gauge 6 (control)	Gauge 4	Gauge 5	Gauge 3
Shrubs *(continued)*	Green Ash		30%		
	Highbush Blueberry		20%	67%	27%
	Arrow wood		15%		
	Maleberry				14%
	Meadowsweet (Broadleaf)		10%		
	Meadowsweet (Narrowleaf)		15%		
	Common Winterberry Holly	17%			14%
Herbaceous *(using percent cover)*	Bittersweet Nightshade				2%
	Cinnamon Fern	12%	1%	3%	
	Duckweed		22%		45%
	Goldenrod	2%		3%	2%
	Grasses		9%	43%	11%
	Halberd-leaved Tearthumb	2%		17%	2%
	Jewelweed	2%	9%	17%	11%
	Mosses	50%	9%	17%	27%
	Sedges	30%	49%		
	Sensitive Fern	2%	1%		2%

The Restoration Plan indicates that species composition will be within 50% of baseline the first year, 40% the second year and 30% the third year as natural colonization takes place. The percent distribution target ranges for the first year at each monitoring site are:

Strata	Species	Gauge 6 (control)	Gauge 4	Gauge 5	Gauge 3
Canopy *(using basal area)*	American Hornbeam			0-30	
	Eastern Hemlock	10-60		20-70	
	Eastern Hophornbeam	0-30			0-30
	Eastern White Pine			0-30	
	Red Maple	35-85	75-100	15-65	50-100
	Yellow Birch			0-30	
	Black Locust				0-35
	Paper Birch				0-30
Shrubs *(using height)*	American Hornbeam	0-30			
	Beech	0-35			
	Black Locust				0-30
	Common Elder	20-70		0-30	
	Dogwood				0-35
	Eastern Hemlock	0-30		0-30	
	Eastern White Pine	0-30			
	Red Maple			0-30	0-35
	Shagbark Hickory	0-30		0-30	
	White Oak			0-30	
	Witch Hazel		0-35	0-35	0-35
	Yellow Birch			0-30	
	Green Ash		5-55		
	Highbush Blueberry		0-45	40-90	0-45
	Arrow wood		0-40		
	Maleberry				0-35
	Meadowsweet (Broadleaf)		0-35		
	Meadowsweet (Narrowleaf)		0-40		
	Common Winterberry Holly	0-40			0-35

Strata	Species	Gauge 6 (control)	Gauge 4	Gauge 5	Gauge 3
Herbaceous	Bittersweet Nightshade				0-30
(using	Cinnamon Fern	0-35	0-30	0-30	
percent	Duckweed		0-45		20-70
cover)	Goldenrod	0-30		0-30	0-30
	Grasses		0-30	20-70	0-30
	Halberd-leaved Tearthumb	0-30		0-40	0-30
	Jewelweed	0-30	0-30	0-40	0-35
	Mosses	25-75	0-30	0-40	0-45
	Sedges	5-55	20-70		
	Sensitive Fern	0-30	0-30		0-30

Note that the canopy, comprised of trees with DBH >3 inches, may not meet criteria for several years.

The population targets by species and site for years 2 and 3 of monitoring are presented in the attachment.

4.4 Invasive Species

Most of the species identified at each location were native, with the exception of bittersweet nightshade (*Solanum dulcamara*) at Gauge 3.

Invasive or introduced species were identified at the Former Bouchard Junkyard Site during the 2001 Fish and Wildlife Impact Assessment. These species were not identified at the four vegetation survey locations. The invasive or introduced species identified in the FWIA would usually be found in upland areas, including garlic mustard (*Alliaria officinalis*), Tree of Heaven (*Ailanthus altissima*), multiflora rose (*Rosa multiflora*) and Japanese honeysuckle (*Lonicera japonica*).

5 Planting list verification

A planting list was suggested in the Restoration Plan, based on the species identified in the 2001 FWIA. The plants identified in the vegetation survey that were also on the planting list are marked with an "x" in the following table:

Common Name	Taxon	Wetland Indicator	Staff Gauge Location			
			6	4	5	3
Balsam Fir	*Abies balsamea*	FAC				
Red Maple	*Acer rubrum*	FACW+	x	x	x	x
Sugar Maple	*Acer saccharum*	FACU-				
Paper Birch	*Betula papyrifera*	FACU				x
White Pine	*Pinus strobus*	FACU	x		x	
Eastern Hemlock	*Tsuga Canadensis*	FACU	x		x	
American Elm	*Ulmus americana*	FACW-				
Speckled Alder	*Alnus rugosa*	FACW+				

Common Name	Taxon	Wetland Indicator	Staff Gauge Location			
			6	4	5	3
Red Osier Dogwood	*Cornus sericea*	FACW+				
Winterberry Holly	*Ilex verticillata*	FACW+	x			x
Elderberry	*Sambucus Canadensis*	FACW-	x	x	x	x
Highbush Blueberry	*Vaccinium corymbosum*	FACW-		x	x	x

Wetland indicator status:

FACU: Facultative upland – usually occurs in nonwetlands, but occasionally found in wetlands (probability 1-33%)
FAC: Facultative – equally likely to occur in wetlands or nonwetlands (probability 34-66%)
FACW: Facultative wetland – usually occurs in wetlands but occasionally found in nonwetlands (probability 67-99%)
OBL: Obligate wetland – occur almost always under natural conditions in wetlands (probability >99%)
+/-: indicates frequency toward higher end (+) or lower end (-) of category, where higher end is more frequently found in wetlands and lower end is less frequently found in wetlands.

The western area of the wetland adjacent to the open field was not surveyed for vegetation.

The elevation data for the locations included in the baseline survey were:

- Staff Gauge Location 3 – 686.79 ft
- Staff Gauge Location 4 – 686.85 ft
- Staff Gauge Location 5 – 687.29 ft
- Staff Gauge Location 6 – 686.87 ft

The elevations of the surveyed sites were within half a foot elevation of one another, in the range 686.8 ft to 687.3 ft. Based on the observations in the vegetation survey, the initial distribution of FACW, FAC and FACU species proposed by elevation planting zones in the Restoration Plan may be refined as follows:

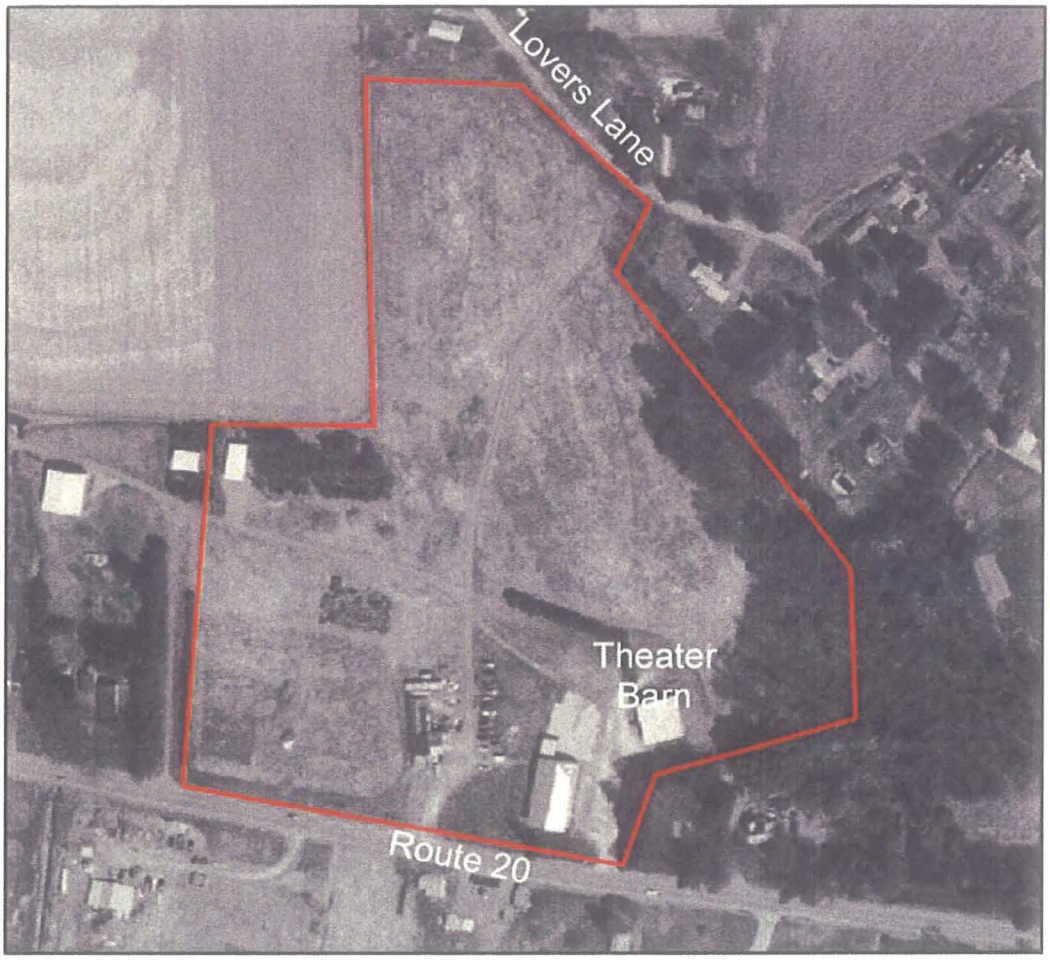
Elevation Range from Restoration Plan	Restoration Plan Zone Species by indicator status	Suggested Modification
less than 686 ft	100% FACW	50% FACW, 50% FAC
686 ft – 687 ft	70% FACW, 30% FAC	30% FACW 45% FAC 25% FACU
687 ft – 688 ft	30% FACW, 70% FAC	
greater than 688 ft	50% FAC, 50% FACU	50% FAC, 50% FACU

The baseline water elevation data should be reviewed to evaluate the hydroperiod and adjust the elevation planting zones accordingly.

6 References

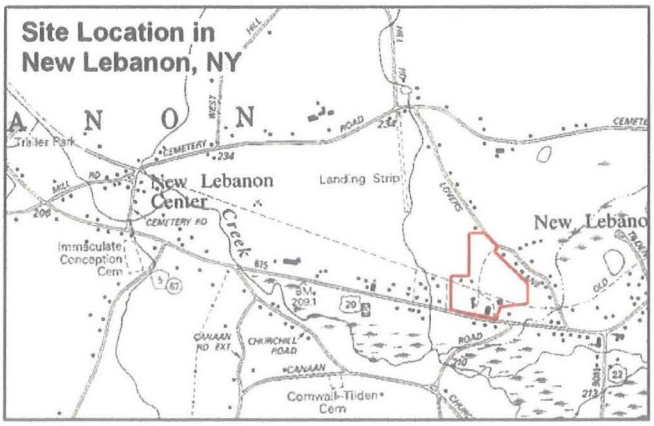
EcoLogic, LLC. 2007. Wetland Restoration Plan. Former Bouchard Junkyard Site, Town of New Lebanon, Columbia County, New York (Site Registry NO. 4-11-014). Prepared for Dvirka and Bartilucci Consulting Engineers. April 2007.

Figure 1
Former Bouchard Junkyard Site, New Lebanon NY
Site Location



0 125 250 500 750 1,000 Feet

N



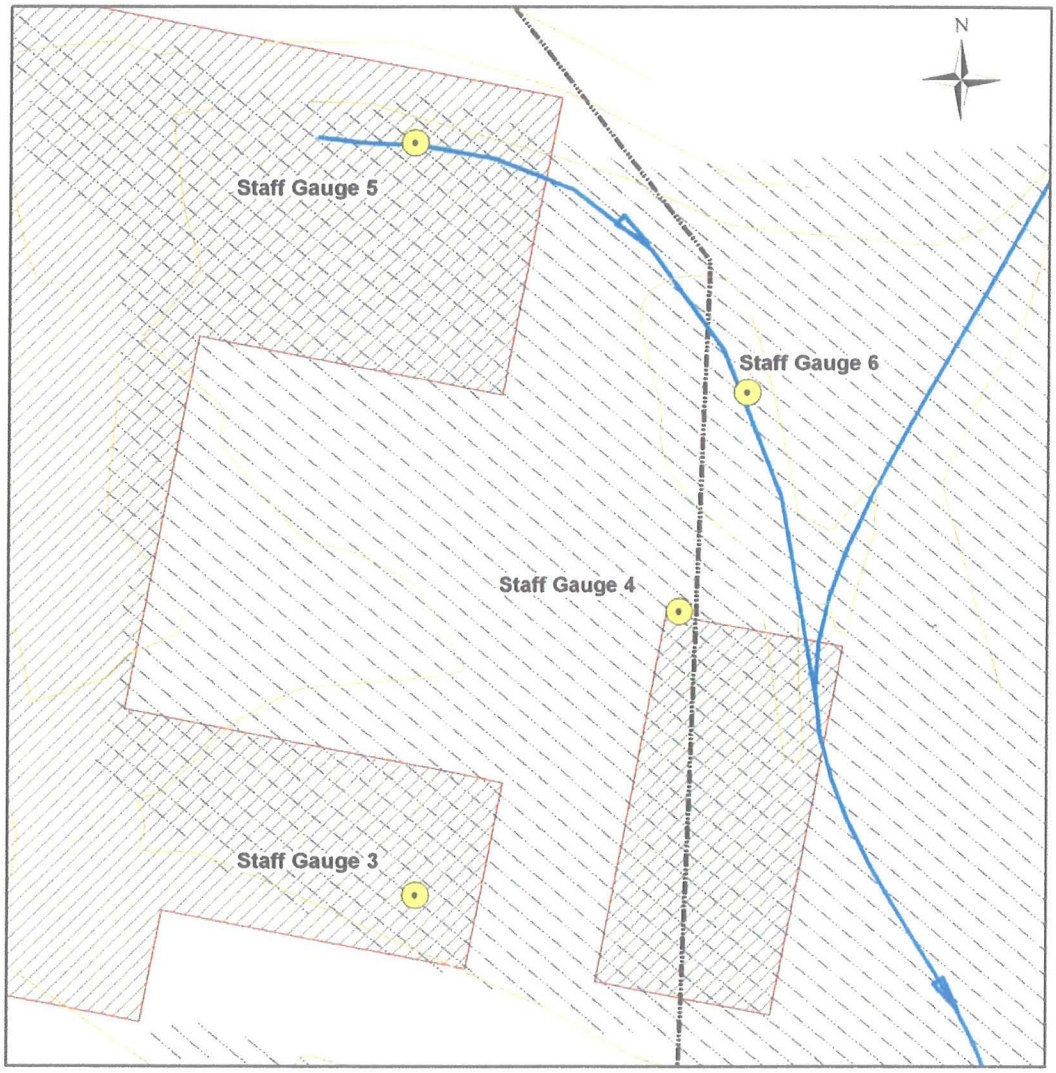
Legend

Approximate Property Line

Orthoimage: 2004 2-ft Panchromatic
USGS Canaan Quadrangle 1:24000

EcoLogic

Figure 2
Former Bouchard Junkyard Site, New Lebanon NY
Vegetation Survey August 2007 – Approximate Locations



Details from CADD files provided by Dvirka & Bartilucci Consulting Engineers.

EcoLogic

APPENDIX 1
PHOTOGRAPH LOG

Staff Gauge Location 4. View from hummock east of gauge facing west. Red maple dominates the canopy, multiple "blow-downs" in the vicinity. Shrub layer includes green ash, meadowsweet, highbush blueberry and arrow wood. Herbaceous layer includes sensitive fern, jewelweed, mosses, and sedges.

Staff Gauge Location 4. View from hummock east of gauge facing northwest. Vegetation occurring north of the gauge (gauge is out of the image to the left). Water was present at the surface, and soils were saturated. Plants were growing on raised hummocks.

Staff Gauge Location 4. View from hummock east of gauge facing south. Multiple blow-downs have occurred in this area; one in foreground and two in background of this image. Gauge is outside of this image to the right, adjacent to another blowdown. There is another blowdown behind the photographer. Approximately eight blowdowns were noted in this area.

Staff Gauge Location 4. View of the four-tree hummock (center) east of Gauge Location 4, facing south. Image was taken from a hummock about half-way between Gauge Location 4 and Gauge Location 6. Gauge 4 is outside of the image to the right and is not visible from this vantage point.

Staff Gauge Location 6. View from hummock north of gauge facing south. Herbaceous vegetation visible includes Halberd-leaved tearthumb, jewelweed, duckweed, sedges and mosses. Canopy dominated by red maple with eastern hemlock. Shrub layer dominated by common elder.

Staff Gauge Location 6. View from hummock north of gauge facing east of gauge (gauge is out of the image to the right). Most of the vegetation grows on hummocks that rise a foot or two above the saturated elevation. Between hummocks, saturated conditions seem to limit most plant growth.

Staff Gauge Location 6. View from hummock north of gauge facing west of gauge (gauge is out of the image to the left). Standing water was present with saturated soils in the foreground. Plants including jewelweed and mosses grow on elevated hummocks; duckweed was observed in the water.

Staff Gauge Location 5. View from hummock in wetland southwest of gauge facing northeast toward upland. Wetland area is to the south of the gauge; north of the gauge becomes upland. Red maple and dogwood dominate the wetland side; eastern hemlock and common elder dominate the upland side in canopy and shrub layers, respectively.

Staff Gauge Location 5. View from edge of wetland north of gauge facing southwest into wetland. Upland is behind the photographer. Gauge is outside of the image, to the left.

Staff Gauge Location 5. View from edge of wetland north of gauge facing east into wetland. Upland is behind the photographer. Gauge is outside of the image, to the right. This image is an example of a blowdown, located just east of the gauge.

Staff Gauge Location 3. View from edge of wetland south of gauge facing north-northwest into wetland. The canopy is generally open due to nearby blowdown. Soils were saturated with standing water. One of the grassy areas near the gauge in this image is an island formed by a tire.

Staff Gauge Location 3. View from edge of wetland south of gauge facing north-northeast into wetland. Saturated soils conditions observed.

Staff Gauge Location 3. View from edge of wetland west of gauge facing east-northeast into wetland. Saturated soils conditions and standing water observed. Duckweed and jewelweed were present.

Staff Gauge Location 3. View from upland southwest of gauge facing northeast toward wetland.

Staff Gauge Location 3

Staff Gauge Location 4

Staff Gauge Location 5

Staff Gauge Location 6 - Control

Views of canopy cover at each vegetation survey point. (Images courtesy of Dvirka and Bartilucci).

APPENDIX 2
MONITORING YEARS 2 AND 3 SPECIES COMPOSITION TARGETS

Year 2 of monitoring:
Percent targets for species contribution to the community structure.

Strata	Species	Gauge 6	Gauge 4	Gauge 5	Gauge 3
Canopy	American Hornbeam			0-20	
(using basal	Eastern Hemlock	20-60		30-70	
area)	Eastern Hophornbeam	0-20			0-30
	Eastern White Pine			0-20	
	Red Maple	40-80	80-100	20-60	50-90
	Yellow Birch			0-30	
	Black Locust				0-30
	Paper Birch				0-30
Shrubs	American Hornbeam	0-30			
(using	Beech	0-30			
height)	Black Locust				0-30
	Common Elder	30-70		0-30	
	Dogwood				0-30
	Eastern Hemlock	0-30		0-20	
	Eastern White Pine	0-20			
	Red Maple			0-20	0-30
	Shagbark Hickory	0-30		0-20	
	White Oak			0-20	
	Witch Hazel		0-30	0-30	0-30
	Yellow Birch			0-30	
	Green Ash		10-50		
	Highbush Blueberry		0-40	50-90	10-50
	Arrow wood		0-40		
	Maleberry				0-30
	Meadowsweet (Broadleaf)		0-30		
	Meadowsweet (Narrowleaf)		0-40		
	Common Winterberry Holly	0-40			0-30
Herbaceous	Bittersweet Nightshade				0-20
(using	Cinnamon Fern	0-30	0-20	0-20	
percent	Duckweed		0-40		30-70
cover)	Goldenrod	0-20		0-20	0-20
	Grasses		0-30	20-60	0-30
	Halberd-leaved Tearthumb	0-20		0-40	0-20
	Jewelweed	0-20	0-30	0-40	0-30
	Mosses	30-70	0-30	0-40	10-50
	Sedges	10-50	30-70		
	Sensitive Fern	0-20	0-20		0-20

Year 3 of monitoring:
Percent targets for species contribution to the community structure.

Strata	Species	Gauge 6	Gauge 4	Gauge 5	Gauge 3
Canopy	American Hornbeam			0-20	
(using basal	Eastern Hemlock	20-50		30-60	
area)	Eastern Hophornbeam	0-20			0-20
	Eastern White Pine			0-20	
	Red Maple	40-70	90-100	30-60	60-90
	Yellow Birch			0-20	
	Black Locust				0-30
	Paper Birch				0-20
Shrubs	American Hornbeam	0-20			
(using	Beech	0-30			
height)	Black Locust				0-20
	Common Elder	30-60		0-20	
	Dogwood				0-30
	Eastern Hemlock	0-20		0-20	
	Eastern White Pine	0-20			
	Red Maple			0-20	0-30
	Shagbark Hickory	0-20		0-20	
	White Oak			0-20	
	Witch Hazel		0-30	0-30	0-30
	Yellow Birch			0-20	
	Green Ash		20-50		
	Highbush Blueberry		10-40	50-80	10-40
	Arrow wood		0-30		
	Maleberry				0-30
	Meadowsweet (Broadleaf)		0-30		
	Meadowsweet (Narrowleaf)		0-30		
	Common Winterberry Holly	0-30			0-30
Herbaceous	Bittersweet Nightshade				0-20
(using	Cinnamon Fern	0-30	0-20	0-20	
percent	Duckweed		10-40		30-60
cover)	Goldenrod	0-20		0-20	0-20
	Grasses		0-20	30-60	0-30
	Halberd-leaved Tearthumb	0-20		0-30	0-20
	Jewelweed	0-20	0-20	0-30	0-30
	Mosses	40-70	0-20	0-30	10-40
	Sedges	20-50	30-60		
	Sensitive Fern	0-20	0-20		0-20