ATTACHMENT 8
STREAM & MACROINVERTEBRATE REPORT

STREAM HABITAT AND AQUATIC MACROINVERTEBRATE ASSESSMENT

Albany Pine Bush Landfill Project

December 6, 2006

(AES Project # 06-0590)

Prepared by:

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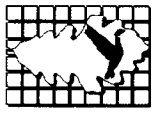

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1.0 INTRODUCTION

On September 26th, 27th and 28th, 2006 Applied Ecological Services, Inc. (AES) and Clough Harbour & Associates (CHA) ecologists conducted comprehensive baseline surveys of stream habitat and sampled aquatic macroinvertebrate communities in onsite and offsite (reference) stream and wetland systems as a component of the Albany Pine Bush Landfill Project in Albany County, New York. The purpose of this investigation is to provide baseline data that can be used to identify existing conditions and provide information needed to conduct restoration activities on the site. Two stream systems and four wetlands complexes were investigated. The first stream is an unnamed tributary to Rensselaer Lake that originates at a wetland mitigation pond and flows southeast just east of the Rapp Road Landfill. The second stream is an offsite reference tributary to Rensselaer Lake located to the east. Macroinvertebrates were sampled from three wetlands complexes just north of the landfill including a mitigation pond, button bush swamp, and bog/vernal pool. Macroinvertebrates in a fourth, offsite reference sedge meadow, were also sampled. Figures 1 and 2 depict the location of the streams and wetlands discussed above. The offsite reference sedge meadow is not shown on the figures.

Prior to conducting the field reconnaissance, the unnamed stream just east of the landfill was divided into six reaches from southeast to northwest beginning at the streams intersection with Rapp Road and continuing upstream to the mitigation pond (Figure 1). A stream reach is defined as a stream segment having fairly homogenous hydrology, geomorphology, and riparian cover as well as land use characteristics. This method of lumping portions of the stream with similar characteristics into reaches allows for more useful collection, analysis, and comparison of the data.

2.0 METHODS

2.1 Aquatic Habitat Assessment

Habitat within each stream reach comprising the unnamed tributary was assessed using the Qualitative Habitat Evaluation Index (QHEI). The index was developed by the Ohio EPA for streams and rivers in Ohio but is also useful throughout most other parts of the country. The QHEI is a repeatable physical habitat index designed to provide empirical, quantified evaluation of the general lotic macrohabitat characteristics of a stream segment that are important to warm water faunas such as fish and macroinvertebrates. Studies using QHEI scores and fish/macroinvertebrate data have shown high correlation; poor QHEI scores generally have poor fish/macroinvertebrate communities and vise versa. The QHEI is composed of six metrics including substrate composition, in-stream cover, channel morphology, riparian zone and bank erosion, pool/glide and riffle-run quality, and map gradient. Each metric is scored individually then summed to provide the total QHEI score. The best possible score is 100. QHEI scoring sheets for each stream reach can be found in Appendix A.

QHEI scores greater than 60 generally support average quality fish and macroinvertebrate communities. Scores greater than 80 typify pristine habitat conditions that have the ability to support exceptional warm water faunas. Table 1 below summarizes the QHEI score classifications. Areas with habitat scores lower than 60 may support warm water faunas but usually have significant degradation.

Table 1. QHEI score classifications

QHEI	Class	Usual Characteristics
80-100	Excellent	Comparable to pristine conditions; exceptional assemblage of habitat types; sufficient riparian zone
60-79	Good	Impacts to riparian zone
30-59	Fair	Impacts to riparian zone; channelization; most in-stream habitat gone
0-29	Poor	All aspects of habitat in degraded state

2.2 Macroinvertebrate Sampling

Macroinvertebrates were sampled using a standard D-frame kick net that was also used for jabbing, dipping, and sweeping around instream habitat. In addition to D-frame sampling, macroinvertebrates were hand picked from instream habitat using forceps. Each site and/or stream reach was sampled for approximately 10-15 minutes. All collected organisms were placed in small plastic containers with rubbing alcohol for preservation and later identification in a laboratory.

In the laboratory, all organisms obtained from each sampling site and/or stream reach were identified to at least the family level by CHA and recorded on data sheets (see Appendix B). A reference collection was also assembled by CHA and checked by AES for consistency among identifications. The resulting data was used to evaluate the general overall water quality and biological health of the stream and wetland systems by using known tolerance to organic pollution for each taxa. Macroinvertebrates provide valuable information related to pollution because they integrate cumulative effects of sediment/nutrient pollution and respond to habitat degradation.

3.0 RESULTS

3.1 Aquatic Habitat Assessment

QHEI scores along the stream Reaches 1-5 comprising the unnamed tributary ranged from a high of 55 (Fair) at Reach 2 to a low of 40 (Fair) at Reach 6 (Table 2; Appendix A). Other reaches scored between 43.5 and 50 (Fair). The offsite reference reach scored 47.5, a result comparable to conditions documented along the onsite unnamed tributary. Stream Reach 6 is a very small tributary that joins the unnamed tributary just south and east of the landfill. Because of its small size, a QHEI was not conducted on this reach. A general description of the criteria used to complete the QHEI analysis and conditions observed are summarized below.

Table 2. QHEI scores for Reaches 1-5 on unnamed tributary and offsite reference stream reach.

Reach	Substrate Score	In-stream Cover Score	Channel Morphology Score	Riparian/ Bank Erosion Score	Pool Score	Riffle Score	Gradient Score	Total Score
Max. Possible Score	**20**	**20**	**20**	**10**	**12**	**8**	**10**	**100**
Reach 1	9	11	14	10	3	0	8	**55**
Reach 2	9	6	8	9.5	3	0	8	**43.5**
Reach 3	9	5	7	8	3	0	8	**40**
Reach 4	9	10	10	9	3	0	8	**49**
Reach 5	8	10	10	6.5	3	0	8	**45.5**
Offsite Reference Reach	16	6	6	8.5	3	0	8	**47.5**

Note: No QHEI completed for stream Reach 6.

Substrate: The substrate among all reaches comprising the unnamed tributary stream is considered average quality at best. The most common substrates are muck/silt and sand but they do not appear to cover or embed other substrates. The offsite reference reach has slightly higher substrate value because it contains less silt and a variety of different substrate types.

Instream Cover: In-stream cover is less than adequate in most reaches to support high quality aquatic faunas. Although cover is between 25% and 75% of the stream along most reaches, most of this comes from logs/woody debris. The offsite reference reach also follows this instream cover pattern.

Channel Morphology: Channel morphology refers to the quality of the stream channel that relates to the creation and stability of habitat. Channel morphology is poor within all reaches (including the offsite reference stream) except Reach 1 where natural meanders are still present. Poor conditions are the result of low to no sinuosity, poor riffle-pool development, and low channel stability that appear to be the result of past channelization activities.

Riparian Condition: The riparian zones are generally wide (> 150 feet) and comprised primarily of open or forested floodplain. Bank erosion associated with riparian areas is minimal to moderate in most reaches.

Riffles and Pools: High quality riffles and pools are almost non-existent within the study reaches. This is common in sand and silt dominated steams. Where small riffles do exist, they are shallow and not adequate to support fishes and other faunas.

Gradient: Stream gradient was calculated from a USGS 7.5-minute topographic map by measuring the elevation change through a reach. Low gradient streams generally change in elevation between 0 feet and 5 feet over a mile. Moderate and high gradient streams change an average of 5 feet to 30 feet. All of the stream reaches, including the reference reach, drop about 6 feet in elevation over a mile. This represents a rather low gradient stream.

3.2 Macroinvertebrate Sampling

Table 3 presents macroinvertebrate taxa richness and general tolerance to pollution of the overall macroinvertebrate community at each location. Tolerance values were obtained from the "Quality Assurance Work Plan for Biological Steam Monitoring in New York State" produced by the New York State Stream Biomonitoring Unit: NYS Department of Environmental Conservation. According to the document, most tolerance values used are derived from calculations made by Hilsenhoff (1987) that were used to calculate the Hilsenhoff Biotic Index (HBI). The HBI was designed to rapidly assess the degree of organic pollution in streams. It is calculated by multiplying the number of organisms collected by their tolerance value, summing the products, and dividing by the total number of organisms collected. While the HBI was developed to measure organic pollution, it has been applied to evaluate general impairment of aquatic insect communities because insects that are tolerant of organic pollution are often tolerant of thermal and siltation as well. The reverse is also true; insects that are intolerant of organic pollution are often intolerant of other types of pollution including thermal and siltation. Table 3 correlates the HBI score with water quality. Tables 4 and 5 present the taxa richness and HBI scores for each survey site and/or stream reach.

The results of the macroinvertebrate survey indicate that stream reaches exhibit fair to poor water quality while the wetland complexes exhibit good to very good water quality despite having fewer overall taxa richness than streams. Poor conditions documented in the stream reaches could also be the result of poor habitat conditions and low oxygen levels that have resulted from channelization activities.

Table 3. Water Quality Correlation to Hilsenhoff Biotic Index.

Biotic Index	Water Quality	Degree of Organic Pollution
0.00-3.75	Excellent	Organic pollution unlikely
3.76-4.25	Very Good	Possible slight organic pollution
4.26-5.00	Good	Some organic pollution probable
5.01-5.75	Fair	Fairly substantial pollution likely
5.76-6.50	Fairly Poor	Substantial pollution likely
6.51-7.25	Poor	Very substantial pollution likely
7.26-10.00	Very Poor	Severe organic pollution likely

TABLE 4. Macroinvertebrate taxa richness and pollution tolerance of macroinvertebrate communities within stream Reaches.

	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6	Offsite Reference Reach
Taxa Richness (# species)	13	12	12	10	10	8	5
Hilsenhoff Biotic Index	7.23 (Poor)	5.87 (Fairly Poor)	5.35 (Fair)	5.08 (Fair)	6.73 (Poor)	5.57 (Fair)	6.5 (Fairly Poor)

TABLE 5. Macroinvertebrate taxa richness and pollution tolerance of macroinvertebrate communities within wetland complexes.

	Mitigation Pond	Button Bush Swamp	Bog/Vernal Pond	Offsite Reference Sedge Meadow
Taxa Richness (# species)	8	8	7	10
Hilsenhoff Biotic Index	4.47 (Good)	4.03 (Very Good)	4.94 (Good)	4.68 (Good)

4.0 SITE PHOTOGRAPHS

Photo 1. Stream Reach 1 facing upstream.

Photo 2. Stream Reach 2 facing upstream.

Photo 3. Stream Reach 3 facing upstream.

Photo 4. Stream Reach 4 facing upstream.

Photo 5. Stream Reach 5 facing upstream.

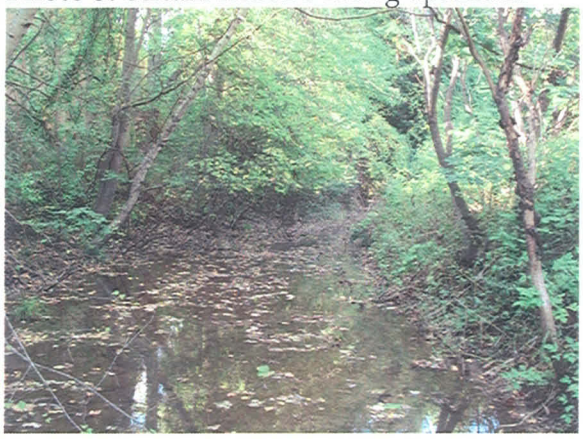


Photo 6. Stream Reach 6 (tributary to Reach 2)

Photo 7. Offsite Reference Stream

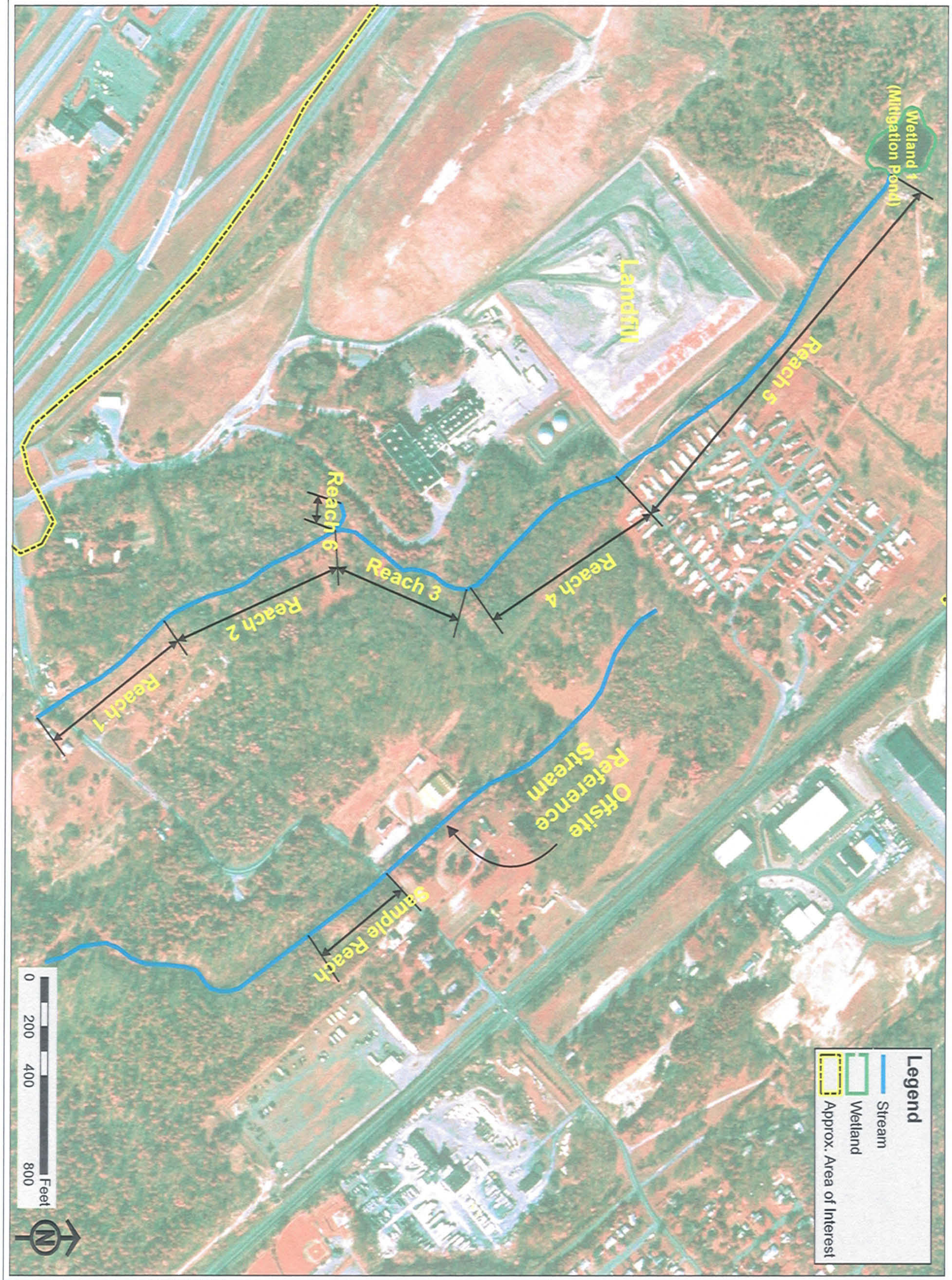
Photo 8. Wetland # 1: Mitigation Pond

Photo 9. Wetland # 2: Buttonbush Swamp

Photo 10. Wetland # 3: Bog facing north.

Photo 11. Offsite reference sedge meadow.

Figure 1. Stream Reach Locations



Revisions:

No	By	Date	Description
1			
2			
3			
4			
5			

Coordinate System
UTM
North American Datum (NAD) 83
Zone 18 N
Units meters

Data
Source/Date: NRCS, 1994-1997 mosaic
Aerial Published 2002

1 inch equals 175 feet
When Printed at 24 X 36"

Albany Pine Bush Landfill
Albany County, New York
Clough Harbour & Associates, LLP
III Winners Circle, P.O. Box 6259
Albany, New York 12205-0269

Figure 1. Stream Reach Locations

Mapped by: jlc	AES Project Number: 06-0590
Field Work:	File Name: topo2of2.mxd
Checked by:	Date: 11.29.06

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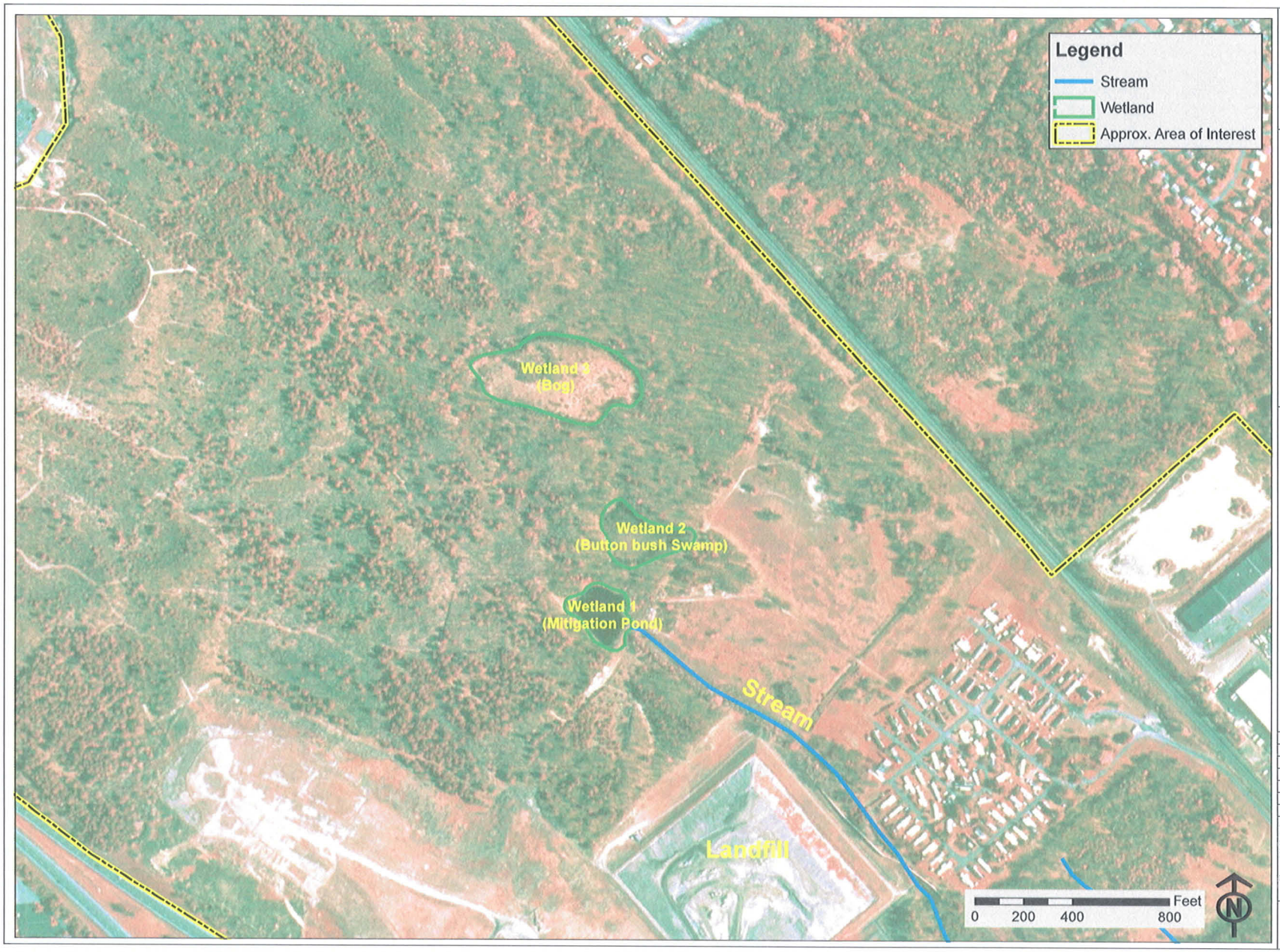
Figure 2. Wetland Locations



Applied Ecological Services, Inc.

Figure 2. Wetland Locations

Mapped by: jlc
Field Work:
Checked by:

AES Project Number: 06-0590
File Name: topoLoc2.mxd
Date: 11.29.06

Albany Pine Bush Landfill
Albany County, New York
Clough Harbour & Associated, LLP
III Winners Circle, P.O. Box 6259
Albany, New York 12205-0269

Revisions:

No	By	Date	Description
1			
2			
3			
4			
5			

Coordinate System
UTM
North American Datum (NAD) 83
Zone: 18 N
Units: meters

Data
Source/Date: NRCS, 1994-1997 mosaic
Aerial Published 2002

1 inch equals 175 feet

When Printed at 24"X36"

APPENDIX A

QHEI SCORE SHEETS

STREAM: Offsite Reference RIVER MILE: DATE: 9/27/2006 QHEI SCORE 47.50

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present) SUBSTRATE SCORE 16.00

TYPE	POOL	RIFFLE		POOL	RIFFLE
BLDER/SLAB(10)			GRAVEL(7)	X	
BOULDER(9)			X SAND(6)		
COBBLE(8)			BEDROCK(5)		
HARDPAN(4)			DETRITUS(3)	X	
MUCK/SILT(2)	X		ARTIFIC(0)	X	

TOTAL NUMBER OF SUBSTRATE TYPES: X >4(2) <4(0)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

SUBSTRATE ORIGIN (all): LIMESTONE(1) RIP/RAP(0) X TILLS(1) HARDPAN(0) SANDSTONE(0) SHALE(-1) COAL FINES(-2)

SILT COVER (one): SILT-HEAVY(-2) SILT-MOD(-1) X SILT-NORM(0) SILT-FREE(1)

Extent of Embeddedness (check one): EXTENSIVE(-2) MODERATE(-1) LOW(0) X NONE(1)

COMMENTS:

2) INSTREAM COVER: COVER SCORE 6.00

TYPE (Check all that apply)

- UNDERCUT BANKS(1)
- X OVERHANGING VEGETATION(1)
- SHALLOWS (IN SLOW WATER)(1)
- DEEP POOLS(2)
- ROOTWADS(1)
- X BOULDERS(1)
- OXBOWS(1)
- AQUATIC MACROPHYTES(1)
- X LOGS OR WOODY DEBRIS(1)

AMOUNT (Check only one or Check 2 and AVERAGE)

- EXTENSIVE >75%(11)
- MODERATE 25-75%(7)
- X SPARSE 5-25%(3)
- NEARLY ABSENT <5%(1)

COMMENTS: Boulders are artificial (riprap near bridge)

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE) CHANNEL SCORE 6.00

SINUOSITY: HIGH(4) MODERATE(3) X LOW(2) NONE(1)

DEVELOPMENT: EXCELLENT(7) GOOD(5) FAIR(3) X POOR(1)

CHANNELIZATION: NONE(6) RECOVERED(4) RECOVERING(3) X RECENT OR NO RECOVERY(1)

STABILITY: HIGH(3) X MODERATE(2) LOW(1)

MODIFICATION/OTHER: SNAGGING RELOCATION CANOPY REMOVAL X DREDGING ONE SIDE CHANNEL MODIFICATION IMPOUND ISLAND LEVEED X BANK SHAPING

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank) RIPARIAN SCORE 8.50

River Right Looking Downstream

RIPARIAN WIDTH (per bank)

L	R	(per bank)
	X	WIDE >150 ft.(4)
X		MODERATE 30-150 ft.(3)
		NARROW 15-30 ft.(2)
		VERY NARROW 3-15 ft.(1)
		NONE(0)

EROSION/RUNOFF-FLOODPLAIN QUALITY

L	R	(most predominant per bank)
X	X	FOREST, SWAMP(3)
		OPEN PASTURE/ROW CROP(0)
		RESID.,PARK,NEW FIELD(1)
		FENCED PASTURE(1)

L	R	(per bank)
		URBAN OR INDUSTRIAL(0)
		SHRUB OR OLD FIELD(2)
		CONSERV. TILLAGE(1)
		MINING/CONSTRUCTION(0)

BANK EROSION

L	R	(per bank)
		NONE OR LITTLE(3)
X	X	MODERATE(2)
		HEAVY OR SEVERE(1)

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY NO POOL = 0 POOL SCORE 3.00

MAX.DEPTH (Check 1)

- >4 ft.(6)
- 2.4-4 ft.(4)
- 1.2-2.4 ft.(2)
- X <1.2 ft.(1)
- <0.6 ft.(Pool=0)(0)

MORPHOLOGY (Check 1)

- POOL WIDTH>RIFFLE WIDTH(2)
- X POOL WIDTH=RIFFLE WIDTH(1)
- POOL WIDTH<RIFFLE WIDTH(0)

POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)

- TORRENTIAL(-1)
- FAST(1)
- X MODERATE(1)
- SLOW(1)
- EDDIES(1)
- INTERSTITIAL(-1)
- INTERMITTENT(-2)

COMMENTS:

RIFFLE SCORE 0.00

RIFFLE/RUN DEPTH

- GENERALLY >4 in. MAX.>20 in.(4)
- GENERALLY >4 in. MAX.<20 in.(3)
- GENERALLY 2-4 in.(1)
- X GENERALLY <2 in.(Riffle=0)(0)

RIFFLE/RUN SUBSTRATE

- STABLE (e.g., Cobble,Boulder)(2)
- MOD.STABLE (e.g., Pea Gravel)(1)
- UNSTABLE (Gravel, Sand)(0)
- X NO RIFFLE(0)

RIFFLE/RUN EMBEDDEDNESS

- EXTENSIVE(-1)
- MODERATE(0)
- LOW(1)
- NONE(2)
- X NO RIFFLE(0)

COMMENTS:

6) GRADIENT (FEET/MILE): 6.00 % POOL 5.00 % RIFFLE 0.00 % RUN 95.00 GRADIENT SCORE 8.00

STREAM: Rapp Road Landfill Ditch RIVER MILE: Reach 1 DATE: 9/26/2006 QHEI SCORE 55.00

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present) SUBSTRATE SCORE 9.00

TYPE		POOL	RIFFLE			POOL	RIFFLE
	BLDER/SLAB(10)				GRAVEL(7)		
	BOULDER(9)			X	SAND(6)	X	
	COBBLE(8)				BEDROCK(5)		
	HARDPAN(4)				DETRITUS(3)	X	
X	MUCK/SILT(2)	X			ARTIFIC(0)		

TOTAL NUMBER OF SUBSTRATE TYPES: [ ] >4(2) [X] <4(0)

SUBSTRATE ORIGIN (all): [ ] LIMESTONE(1) [ ] RIP/RAP(0) [X] TILLS(1) [ ] HARDPAN(0) [ ] SANDSTONE(0) [ ] SHALE(-1) [ ] COAL FINES(-2)

SILT COVER (one): [ ] SILT-HEAVY(-2) [X] SILT-MOD(-1) [ ] SILT-NORM(0) [ ] SILT-FREE(1)

Extent of Embeddedness (check one): [ ] EXTENSIVE(-2) [ ] MODERATE(-1) [ ] LOW(0) [X] NONE(1)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: No gravel or cobble to measure embeddedness

2) INSTREAM COVER: COVER SCORE 11.00

TYPE (Check all that apply)

[X] UNDERCUT BANKS(1) [X] OVERHANGING VEGETATION(1) [ ] SHALLOWS (IN SLOW WATER)(1)
[ ] DEEP POOLS(2) [X] ROOTWADS(1) [ ] BOULDERS(1)
[ ] OXBOWS(1) [ ] AQUATIC MACROPHYTES(1) [X] LOGS OR WOODY DEBRIS(1)

AMOUNT (Check only one or Check 2 and AVERAGE)

[ ] EXTENSIVE >75%(11) [X] MODERATE 25-75%(7) [ ] SPARSE 5-25%(3) [ ] NEARLY ABSENT <5%(1)

COMMENTS:

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE) CHANNEL SCORE 14.00

SINUOSITY: [ ] HIGH(4) [X] MODERATE(3) [ ] LOW(2) [ ] NONE(1)

DEVELOPMENT: [ ] EXCELLENT(7) [ ] GOOD(5) [X] FAIR(3) [ ] POOR(1)

CHANNELIZATION: [X] NONE(6) [ ] RECOVERED(4) [ ] RECOVERING(3) [ ] RECENT OR NO RECOVERY(1)

STABILITY: [ ] HIGH(3) [X] MODERATE(2) [ ] LOW(1)

MODIFICATION/OTHER: [ ] SNAGGING [ ] RELOCATION [ ] CANOPY REMOVAL [ ] DREDGING [ ] ONE SIDE CHANNEL MODIFICATION [ ] IMPOUND [ ] ISLAND [ ] LEVEED [ ] BANK SHAPING

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank) RIPARIAN SCORE 10.00

River Right Looking Downstream

RIPARIAN WIDTH (per bank)

L	R	(per bank)
X	X	WIDE >150 ft.(4)
		MODERATE 30-150 ft.(3)
		NARROW 15-30 ft.(2)
		VERY NARROW 3-15 ft.(1)
		NONE(0)

EROSION/RUNOFF-FLOODPLAIN QUALITY

L	R	(most predominant per bank)
X	X	FOREST, SWAMP(3)
		OPEN PASTURE/ROW CROP(0)
		RESID.,PARK,NEW FIELD(1)
		FENCED PASTURE(1)

L	R	(per bank)
		URBAN OR INDUSTRIAL(0)
		SHRUB OR OLD FIELD(2)
		CONSERV. TILLAGE(1)
		MINING/CONSTRUCTION(0)

BANK EROSION

L	R	(per bank)
X	X	NONE OR LITTLE(3)
		MODERATE(2)
		HEAVY OR SEVERE(1)

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY NO POOL = 0 POOL SCORE 3.00

MAX.DEPTH (Check 1)
[ ] >4 ft.(6) [ ] 2.4-4 ft.(4) [ ] 1.2-2.4 ft.(2) [X] <1.2 ft.(1) [ ] <0.6 ft.(Pool=0)(0)

MORPHOLOGY (Check 1)
[ ] POOL WIDTH>RIFFLE WIDTH(2) [X] POOL WIDTH=RIFFLE WIDTH(1) [ ] POOL WIDTH<RIFFLE WIDTH(0)

POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)
[ ] TORRENTIAL(-1) [ ] FAST(1) [X] MODERATE(1) [ ] SLOW(1) [ ] EDDIES(1) [ ] INTERSTITIAL(-1) [ ] INTERMITTENT(-2)

COMMENTS: No riffles. Pool witdth measrued against run width.

RIFFLE SCORE 0.00

RIFFLE/RUN DEPTH
[ ] GENERALLY >4 in. MAX.>20 in.(4) [ ] GENERALLY >4 in. MAX.<20 in.(3) [ ] GENERALLY 2-4 in.(1) [X] GENERALLY <2 in.(Riffle=0)(0)

RIFFLE/RUN SUBSTRATE
[ ] STABLE (e.g., Cobble,Boulder)(2) [ ] MOD.STABLE (e.g., Pea Gravel)(1) [ ] UNSTABLE (Gravel, Sand)(0) [X] NO RIFFLE(0)

RIFFLE/RUN EMBEDDEDNESS
[ ] EXTENSIVE(-1) [ ] MODERATE(0) [ ] LOW(1) [ ] NONE(2) [X] NO RIFFLE(0)

COMMENTS:

6) GRADIENT (FEET/MILE): 6.00 % POOL 15.00 % RIFFLE 0.00 % RUN 85.00 GRADIENT SCORE 8.00

STREAM: Rap Road Landfill Ditch RIVER MILE: Reach 2 DATE: 9/26/2006 QHEI SCORE 43.50

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present) SUBSTRATE SCORE 9.00

TYPE	POOL	RIFFLE			POOL	RIFFLE	SUBSTRATE ORIGIN (all)		SILT COVER (one)	
[ ] BLDER/SLAB(10)			[ ] GRAVEL(7)				[ ] LIMESTONE(1)	[ ] RIP/RAP(0)	[ ] SILT-HEAVY(-2)	[X] SILT-MOD(-1)
[ ] BOULDER(9)			[X] SAND(6)				[X] TILLS(1)	[ ] HARDPAN(0)	[ ] SILT-NORM(0)	[ ] SILT-FREE(1)
[ ] COBBLE(8)			[ ] BEDROCK(5)				[ ] SANDSTONE(0)		Extent of Embeddedness (check one)	
[ ] HARDPAN(4)			[ ] DETRITUS(3)				[ ] SHALE(-1)		[ ] EXTENSIVE(-2)	[ ] MODERATE(-1)
[X] MUCK/SILT(2)	X		[ ] ARTIFIC(0)				[ ] COAL FINES(-2)		[ ] LOW(0)	[X] NONE(1)

TOTAL NUMBER OF SUBSTRATE TYPES: [ ] >4(2) [X] <4(0)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: No gravel or cobble to measure embeddedness

2) INSTREAM COVER: COVER SCORE 6.00

TYPE (Check all that apply)			AMOUNT (Check only one or Check 2 and AVERAGE)
[ ] UNDERCUT BANKS(1)	[ ] DEEP POOLS(2)	[ ] OXBOWS(1)	[ ] EXTENSIVE >75%(11)
[X] OVERHANGING VEGETATION(1)	[X] ROOTWADS(1)	[ ] AQUATIC MACROPHYTES(1)	[ ] MODERATE 25-75%(7)
[ ] SHALLOWS (IN SLOW WATER)(1)	[ ] BOULDERS(1)	[X] LOGS OR WOODY DEBRIS(1)	[X] SPARSE 5-25%(3)
			[ ] NEARLY ABSENT <5%(1)

COMMENTS:

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE) CHANNEL SCORE 8.00

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATION/OTHER	
[ ] HIGH(4)	[ ] EXCELLENT(7)	[ ] NONE(6)	[ ] HIGH(3)	[ ] SNAGGING	[ ] IMPOUND
[ ] MODERATE(3)	[ ] GOOD(5)	[ ] RECOVERED(4)	[X] MODERATE(2)	[ ] RELOCATION	[ ] ISLAND
[X] LOW(2)	[X] FAIR(3)	[ ] RECOVERING(3)	[ ] LOW(1)	[ ] CANOPY REMOVAL	[ ] LEVEED
[ ] NONE(1)	[ ] POOR(1)	[X] RECENT OR NO RECOVERY(1)		[X] DREDGING	[X] BANK SHAPING
				[ ] ONE SIDE CHANNEL MODIFICATION	

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank) RIPARIAN SCORE 9.50

River Right Looking Downstream

RIPARIAN WIDTH (per bank)			EROSION/RUNOFF-FLOODPLAIN QUALITY			BANK EROSION	
L	R	(per bank)	L	R	(most predominant per bank)	L	R (per bank)
[X]	[X]	WIDE >150 ft.(4)	[X]	[X]	FOREST, SWAMP(3)	[X]	[ ] NONE OR LITTLE(3)
[ ]	[ ]	MODERATE 30-150 ft.(3)	[ ]	[ ]	OPEN PASTURE/ROW CROP(0)	[ ]	[X] MODERATE(2)
[ ]	[ ]	NARROW 15-30 ft.(2)	[ ]	[ ]	RESID.,PARK,NEW FIELD(1)	[ ]	[ ] HEAVY OR SEVERE(1)
[ ]	[ ]	VERY NARROW 3-15 ft.(1)	[ ]	[ ]	FENCED PASTURE(1)		
[ ]	[ ]	NONE(0)					

L	R (per bank)
[ ]	[ ] URBAN OR INDUSTRIAL(0)
[ ]	[ ] SHRUB OR OLD FIELD(2)
[ ]	[ ] CONSERV. TILLAGE(1)
[ ]	[ ] MINING/CONSTRUCTION(0)

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY NO POOL = 0 POOL SCORE 3.00

MAX.DEPTH (Check 1)	MORPHOLOGY (Check 1)	POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)	
[ ] >4 ft.(6)	[ ] POOL WIDTH>RIFFLE WIDTH(2)	[ ] TORRENTIAL(-1)	[ ] EDDIES(1)
[ ] 2.4-4 ft.(4)	[X] POOL WIDTH=RIFFLE WIDTH(1)	[ ] FAST(1)	[ ] INTERSTITIAL(-1)
[ ] 1.2-2.4 ft.(2)	[ ] POOL WIDTH<RIFFLE WIDTH(0)	[X] MODERATE(1)	[ ] INTERMITTENT(-2)
[X] <1.2 ft.(1)		[ ] SLOW(1)	
[ ] <0.6 ft.(Pool=0)(0)			

COMMENTS: No riffles. Pool width measured against run width

RIFFLE SCORE 0.00

RIFFLE/RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS	
[ ] GENERALLY >4 in. MAX.>20 in.(4)	[ ] STABLE (e.g., Cobble,Boulder)(2)	[ ] EXTENSIVE(-1)	[ ] NONE(2)
[ ] GENERALLY >4 in. MAX.<20 in.(3)	[ ] MOD.STABLE (e.g., Pea Gravel)(1)	[ ] MODERATE(0)	[X] NO RIFFLE(0)
[ ] GENERALLY 2-4 in.(1)	[ ] UNSTABLE (Gravel, Sand)(0)	[ ] LOW(1)	
[X] GENERALLY <2 in.(Riffle=0)(0)	[X] NO RIFFLE(0)		

COMMENTS:

6) GRADIENT (FEET/MILE): 6.00 % POOL 5.00 % RIFFLE 0.00 % RUN 95.00 GRADIENT SCORE 8.00

STREAM: Rapp Road Landfill Ditch RIVER MILE: Reach 3 DATE: 9/26/2006 QHEI SCORE 40.00

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present) SUBSTRATE SCORE 9.00

TYPE		POOL	RIFFLE			POOL	RIFFLE
	BLDER/SLAB(10)				GRAVEL(7)		
	BOULDER(9)			X	SAND(6)	X	
	COBBLE(8)				BEDROCK(5)		
	HARDPAN(4)				DETRITUS(3)		
X	MUCK/SILT(2)	X			ARTIFIC(0)		

TOTAL NUMBER OF SUBSTRATE TYPES: [ ] >4(2) [X] <4(0)

SUBSTRATE ORIGIN (all): [ ] LIMESTONE(1) [ ] RIP/RAP(0) [X] TILLS(1) [ ] HARDPAN(0) [ ] SANDSTONE(0) [ ] SHALE(-1) [ ] COAL FINES(-2)

SILT COVER (one): [ ] SILT-HEAVY(-2) [X] SILT-MOD(-1) [ ] SILT-NORM(0) [ ] SILT-FREE(1)

Extent of Embeddedness (check one): [ ] EXTENSIVE(-2) [ ] MODERATE(-1) [ ] LOW(0) [X] NONE(1)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: No gravel or cobble to measure embeddedness

2) INSTREAM COVER: COVER SCORE 5.00

TYPE (Check all that apply)

[ ] UNDERCUT BANKS(1)
[X] OVERHANGING VEGETATION(1)
[ ] SHALLOWS (IN SLOW WATER)(1)
[ ] DEEP POOLS(2)
[ ] ROOTWADS(1)
[ ] BOULDERS(1)
[ ] OXBOWS(1)
[ ] AQUATIC MACROPHYTES(1)
[X] LOGS OR WOODY DEBRIS(1)

AMOUNT (Check only one or Check 2 and AVERAGE)

[ ] EXTENSIVE >75%(11)
[ ] MODERATE 25-75%(7)
[X] SPARSE 5-25%(3)
[ ] NEARLY ABSENT <5%(1)

COMMENTS:

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE) CHANNEL SCORE 7.00

SINUOSITY: [ ] HIGH(4) [ ] MODERATE(3) [X] LOW(2) [ ] NONE(1)

DEVELOPMENT: [ ] EXCELLENT(7) [ ] GOOD(5) [ ] FAIR(3) [X] POOR(1)

CHANNELIZATION: [ ] NONE(6) [ ] RECOVERED(4) [X] RECOVERING(3) [ ] RECENT OR NO RECOVERY(1)

STABILITY: [ ] HIGH(3) [ ] MODERATE(2) [X] LOW(1)

MODIFICATION/OTHER: [ ] SNAGGING [ ] RELOCATION [ ] CANOPY REMOVAL [ ] DREDGING [ ] ONE SIDE CHANNEL MODIFICATION [ ] IMPOUND [ ] ISLAND [ ] LEVEED [ ] BANK SHAPING

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank) RIPARIAN SCORE 8.00

River Right Looking Downstream

RIPARIAN WIDTH (per bank)

L	R	(per bank)
X	X	WIDE >150 ft.(4)
		MODERATE 30-150 ft.(3)
		NARROW 15-30 ft.(2)
		VERY NARROW 3-15 ft.(1)
		NONE(0)

EROSION/RUNOFF-FLOODPLAIN QUALITY

L	R	(most predominant per bank)
X	X	FOREST, SWAMP(3)
		OPEN PASTURE/ROW CROP(0)
		RESID.,PARK,NEW FIELD(1)
		FENCED PASTURE(1)

L	R	(per bank)
		URBAN OR INDUSTRIAL(0)
		SHRUB OR OLD FIELD(2)
		CONSERV. TILLAGE(1)
		MINING/CONSTRUCTION(0)

BANK EROSION

L	R	(per bank)
		NONE OR LITTLE(3)
		MODERATE(2)
X	X	HEAVY OR SEVERE(1)

COMMENTS: Headcut at upstream point of reach

5) POOL/GLIDE AND RIFFLE/RUN QUALITY NO POOL = 0 POOL SCORE 3.00

MAX.DEPTH (Check 1): [ ] >4 ft.(6) [ ] 2.4-4 ft.(4) [ ] 1.2-2.4 ft.(2) [X] <1.2 ft.(1) [ ] <0.6 ft.(Pool=0)(0)

MORPHOLOGY (Check 1): [ ] POOL WIDTH>RIFFLE WIDTH(2) [X] POOL WIDTH=RIFFLE WIDTH(1) [ ] POOL WIDTH<RIFFLE WIDTH(0)

POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply): [ ] TORRENTIAL(-1) [ ] FAST(1) [X] MODERATE(1) [ ] SLOW(1) [ ] EDDIES(1) [ ] INTERSTITIAL(-1) [ ] INTERMITTENT(-2)

COMMENTS: No true riffles. Pool width measured against run width

RIFFLE SCORE 0.00

RIFFLE/RUN DEPTH: [ ] GENERALLY >4 in. MAX.>20 in.(4) [ ] GENERALLY >4 in. MAX.<20 in.(3) [ ] GENERALLY 2-4 in.(1) [X] GENERALLY <2 in.(Riffle=0)(0)

RIFFLE/RUN SUBSTRATE: [ ] STABLE (e.g., Cobble,Boulder)(2) [ ] MOD.STABLE (e.g., Pea Gravel)(1) [ ] UNSTABLE (Gravel, Sand)(0) [X] NO RIFFLE(0)

RIFFLE/RUN EMBEDDEDNESS: [ ] EXTENSIVE(-1) [ ] MODERATE(0) [ ] LOW(1) [ ] NONE(2) [X] NO RIFFLE(0)

COMMENTS:

6) GRADIENT (FEET/MILE): 6.00 % POOL 5.00 % RIFFLE 0.00 % RUN 95.00 GRADIENT SCORE 8.00

STREAM: Rapp Road Landfill Ditch RIVER MILE: Reach 4 DATE: 9/26/2006 QHEI SCORE 49.00

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present) SUBSTRATE SCORE 9.00

TYPE		POOL	RIFFLE			POOL	RIFFLE
	BLDER/SLAB(10)				GRAVEL(7)		
	BOULDER(9)			X	SAND(6)	X	
	COBBLE(8)				BEDROCK(5)		
	HARDPAN(4)				DETRITUS(3)		
X	MUCK/SILT(2)	X			ARTIFIC(0)		

SUBSTRATE ORIGIN (all): LIMESTONE(1); RIP/RAP(0); X TILLS(1); HARDPAN(0); SANDSTONE(0); SHALE(-1); COAL FINES(-2)

SILT COVER (one): SILT-HEAVY(-2); X SILT-MOD(-1); SILT-NORM(0); SILT-FREE(1)

Extent of Embeddedness (check one): EXTENSIVE(-2); MODERATE(-1); LOW(0); X NONE(1)

TOTAL NUMBER OF SUBSTRATE TYPES: >4(2); X <4(0)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS: No gravel or cobble to measure embeddedness

2) INSTREAM COVER: COVER SCORE 10.00

TYPE (Check all that apply)

- UNDERCUT BANKS(1)
- X OVERHANGING VEGETATION(1)
- SHALLOWS (IN SLOW WATER)(1)
- DEEP POOLS(2)
- X ROOTWADS(1)
- BOULDERS(1)
- OXBOWS(1)
- AQUATIC MACROPHYTES(1)
- X LOGS OR WOODY DEBRIS(1)

AMOUNT (Check only one or Check 2 and AVERAGE)

- EXTENSIVE >75%(11)
- X MODERATE 25-75%(7)
- SPARSE 5-25%(3)
- NEARLY ABSENT <5%(1)

COMMENTS:

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE) CHANNEL SCORE 10.00

SINUOSITY
- HIGH(4)
- MODERATE(3)
- X LOW(2)
- NONE(1)

DEVELOPMENT
- EXCELLENT(7)
- GOOD(5)
- X FAIR(3)
- POOR(1)

CHANNELIZATION
- NONE(6)
- RECOVERED(4)
- X RECOVERING(3)
- RECENT OR NO RECOVERY(1)

STABILITY
- HIGH(3)
- X MODERATE(2)
- LOW(1)

MODIFICATION/OTHER
- SNAGGING
- RELOCATION
- CANOPY REMOVAL
- X DREDGING
- ONE SIDE CHANNEL MODIFICATION
- IMPOUND
- ISLAND
- LEVEED
- X BANK SHAPING

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank) RIPARIAN SCORE 9.00

River Right Looking Downstream

RIPARIAN WIDTH (per bank)

L	R	(per bank)
X	X	WIDE >150 ft.(4)
		MODERATE 30-150 ft.(3)
		NARROW 15-30 ft.(2)
		VERY NARROW 3-15 ft.(1)
		NONE(0)

EROSION/RUNOFF-FLOODPLAIN QUALITY

L	R	(most predominant per bank)
X	X	FOREST, SWAMP(3)
		OPEN PASTURE/ROW CROP(0)
		RESID.,PARK,NEW FIELD(1)
		FENCED PASTURE(1)

L	R	(per bank)
		URBAN OR INDUSTRIAL(0)
		SHRUB OR OLD FIELD(2)
		CONSERV. TILLAGE(1)
		MINING/CONSTRUCTION(0)

BANK EROSION

L	R	(per bank)
		NONE OR LITTLE(3)
X	X	MODERATE(2)
		HEAVY OR SEVERE(1)

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY NO POOL = 0 POOL SCORE 3.00

MAX DEPTH (Check 1)
- >4 ft.(6)
- 2.4-4 ft.(4)
- 1.2-2.4 ft.(2)
- X <1.2 ft.(1)
- <0.6 ft.(Pool=0)(0)

MORPHOLOGY (Check 1)
- POOL WIDTH>RIFFLE WIDTH(2)
- X POOL WIDTH=RIFFLE WIDTH(1)
- POOL WIDTH<RIFFLE WIDTH(0)

POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)
- TORRENTIAL(-1)
- FAST(1)
- X MODERATE(1)
- SLOW(1)
- EDDIES(1)
- INTERSTITIAL(-1)
- INTERMITTENT(-2)

COMMENTS: No riffles. Pool width compared to run width

RIFFLE SCORE 0.00

RIFFLE/RUN DEPTH
- GENERALLY >4 in. MAX.>20 in.(4)
- GENERALLY >4 in. MAX.<20 in.(3)
- GENERALLY 2-4 in.(1)
- X GENERALLY <2 in.(Riffle=0)(0)

RIFFLE/RUN SUBSTRATE
- STABLE (e.g., Cobble,Boulder)(2)
- MOD.STABLE (e.g., Pea Gravel)(1)
- UNSTABLE (Gravel, Sand)(0)
- X NO RIFFLE(0)

RIFFLE/RUN EMBEDDEDNESS
- EXTENSIVE(-1)
- MODERATE(0)
- LOW(1)
- NONE(2)
- X NO RIFFLE(0)

COMMENTS:

6) GRADIENT (FEET/MILE): 6.00 % POOL 10.00 % RIFFLE 0.00 % RUN 90.00 GRADIENT SCORE 8.00

STREAM: Rapp Road Landfille Ditch **RIVER MILE:** Reach 5 **DATE:** 9/28/2006 **QHEI SCORE** 45.50

1) SUBSTRATE: (Check ONLY Two Substrate Type Boxes: Check all types present) **SUBSTRATE SCORE** 8.00

TYPE		POOL	RIFFLE			POOL	RIFFLE
	BLDER/SLAB(10)				GRAVEL(7)		
	BOULDER(9)			X	SAND(6)		
	COBBLE(8)				BEDROCK(5)		
	HARDPAN(4)				DETRITUS(3)	X	
X	MUCK/SILT(2)	X			ARTIFIC(0)		

TOTAL NUMBER OF SUBSTRATE TYPES: [ ] >4(2) [X] <4(0)

SUBSTRATE ORIGIN (all)		SILT COVER (one)	
[ ] LIMESTONE(1)	[ ] RIP/RAP(0)	[ ] SILT-HEAVY(-2)	[X] SILT-MOD(-1)
[X] TILLS(1)	[ ] HARDPAN(0)	[ ] SILT-NORM(0)	[ ] SILT-FREE(1)
[ ] SANDSTONE(0)		Extent of Embeddedness (check one)	
[ ] SHALE(-1)		[ ] EXTENSIVE(-2)	[ ] MODERATE(-1)
[ ] COAL FINES(-2)		[X] LOW(0)	[ ] NONE(1)

NOTE: (Ignore sludge that originates from point sources: score is based on natural substrates)

COMMENTS:

2) INSTREAM COVER: **COVER SCORE** 10.00

TYPE (Check all that apply)

- [ ] UNDERCUT BANKS(1)
- [X] OVERHANGING VEGETATION(1)
- [ ] SHALLOWS (IN SLOW WATER)(1)
- [ ] DEEP POOLS(2)
- [X] ROOTWADS(1)
- [ ] BOULDERS(1)
- [ ] OXBOWS(1)
- [ ] AQUATIC MACROPHYTES(1)
- [X] LOGS OR WOODY DEBRIS(1)

AMOUNT (Check only one or Check 2 and AVERAGE)

- [ ] EXTENSIVE >75%(11)
- [X] MODERATE 25-75%(7)
- [ ] SPARSE 5-25%(3)
- [ ] NEARLY ABSENT <5%(1)

COMMENTS:

3) CHANNEL MORPHOLOGY: (Check ONLY ONE per Category or Check 2 and AVERAGE) **CHANNEL SCORE** 10.00

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	MODIFICATION/OTHER	
[ ] HIGH(4)	[ ] EXCELLENT(7)	[ ] NONE(6)	[ ] HIGH(3)	[ ] SNAGGING	[ ] IMPOUND
[ ] MODERATE(3)	[ ] GOOD(5)	[ ] RECOVERED(4)	[X] MODERATE(2)	[ ] RELOCATION	[ ] ISLAND
[X] LOW(2)	[X] FAIR(3)	[X] RECOVERING(3)	[ ] LOW(1)	[ ] CANOPY REMOVAL	[ ] LEVEED
[ ] NONE(1)	[ ] POOR(1)	[ ] RECENT OR NO RECOVERY(1)		[X] DREDGING	[X] BANK SHAPING
				[ ] ONE SIDE CHANNEL MODIFICATION	

COMMENTS:

4) RIPARIAN ZONE AND BANK EROSION: (Check ONE box or Check 2 and AVERAGE per bank) **RIPARIAN SCORE** 6.50

River Right Looking Downstream

RIPARIAN WIDTH (per bank)		EROSION/RUNOFF-FLOODPLAIN QUALITY			BANK EROSION	
L	R (per bank)	L	R (most predominant per bank)	L R (per bank)	L	R (per bank)
[ ]	[ ] WIDE >150 ft.(4)	[ ]	[X] FOREST, SWAMP(3)	[ ] [ ] URBAN OR INDUSTRIAL(0)	[X]	[X] NONE OR LITTLE(3)
[ ]	[ ] MODERATE 30-150 ft.(3)	[ ]	[ ] OPEN PASTURE/ROW CROP(0)	[X] [ ] SHRUB OR OLD FIELD(2)	[ ]	[ ] MODERATE(2)
[ ]	[ ] NARROW 15-30 ft.(2)	[ ]	[ ] RESID.,PARK,NEW FIELD(1)	[ ] [ ] CONSERV. TILLAGE(1)	[ ]	[ ] HEAVY OR SEVERE(1)
[X]	[X] VERY NARROW 3-15 ft.(1)	[ ]	[ ] FENCED PASTURE(1)	[ ] [ ] MINING/CONSTRUCTION(0)		
[ ]	[ ] NONE(0)					

COMMENTS:

5) POOL/GLIDE AND RIFFLE/RUN QUALITY NO POOL = 0 **POOL SCORE** 3.00

MAX.DEPTH (Check 1)

- [ ] >4 ft.(6)
- [ ] 2.4-4 ft.(4)
- [ ] 1.2-2.4 ft.(2)
- [X] <1.2 ft.(1)
- [ ] <0.6 ft.(Pool=0)(0)

MORPHOLOGY (Check 1)

- [ ] POOL WIDTH>RIFFLE WIDTH(2)
- [X] POOL WIDTH=RIFFLE WIDTH(1)
- [ ] POOL WIDTH<RIFFLE WIDTH(0)

POOL/RUN/RIFFLE CURRENT VELOCITY (Check all that Apply)

[ ] TORRENTIAL(-1)	[ ] EDDIES(1)
[ ] FAST(1)	[ ] INTERSTITIAL(-1)
[X] MODERATE(1)	[ ] INTERMITTENT(-2)
[ ] SLOW(1)	

COMMENTS:

RIFFLE SCORE 0.00

RIFFLE/RUN DEPTH

- [ ] GENERALLY >4 in. MAX.>20 in.(4)
- [ ] GENERALLY >4 in. MAX.<20 in.(3)
- [ ] GENERALLY 2-4 in.(1)
- [X] GENERALLY <2 in.(Riffle=0)(0)

RIFFLE/RUN SUBSTRATE

- [ ] STABLE (e.g., Cobble,Boulder)(2)
- [ ] MOD.STABLE (e.g., Pea Gravel)(1)
- [ ] UNSTABLE (Gravel, Sand)(0)
- [X] NO RIFFLE(0)

RIFFLE/RUN EMBEDDEDNESS

[ ] EXTENSIVE(-1)	[ ] NONE(2)
[ ] MODERATE(0)	[X] NO RIFFLE(0)
[ ] LOW(1)	

COMMENTS:

6) GRADIENT (FEET/MILE): 6.00 **% POOL** 20.00 **% RIFFLE** 0.00 **% RUN** 80.00 **GRADIENT SCORE** 8.00

APPENDIX B

MACROINVERTEBRATE DATA SHEETS

LABORATORY DATA SHEET

River/Stream/Wetland: Rapp Road Landfill Stream

Station Number: Reach 1

Date: September 26, 2006

Sample Type: D-framed kick net

Subsample: entire ½ ¼ 100

Sorted by: David MacDougall, October-November 2006

	Sub.	Total		Sub.	Total
Nemertea			Coleoptera		
			Dytiscidae		3
Platyhelminthes					
Oligochaeta			Megaloptera		1
Hirundinea			Trichoptera		
			Hydropsychidae		7
Mollusca			Glossosomatidae		1
Physella integra		278			
Planarbula armigera		5			
Sphaerium sp.		1	Other Diptera		
Musculium sp.		1	Tipulidae		10
Crustacea					
Isopoda		15			
			Chironomidae larvae		37
			pupae		5
Ephemeroptera			total		42
Plecoptera					
Other Insecta					
Hemiptera – Gerris remigis		3			
Arachnida - Araneae		2			

LABORATORY DATA SHEET

River/Stream/Wetland: Rapp Road Landfill Stream

Station Number: Reach 2

Date: September 26, 2006

Sample Type: D – framed kick net

Subsample: entire ½ ¼ 100

Sorted by: David MacDougall, October – November 2006

	Sub.	Total		Sub.	Total
Nemertea			Coleoptera		
			Dytiscidae		5
Platyhelminthes					
Oligochaeta			Megaloptera		
Hirundinea			Trichoptera		
			Hydropsychidae		1
Mollusca					
Planorbula armigera		1			
Physella integra		15			
Musculium sp.		1	Other Diptera		
Sphaerium sp.		1	Athericidae		1
Lymnaea stagnalis		1	Tipulidae		1
Crustacea					
Isopoda		27			
			Chironomidae larvae		1
			pupae		
Ephemeroptera			total		
Plecoptera					
Other Insecta					
Hemiptera – *Gerris remigis*		3			

LABORATORY DATA SHEET

River/Stream/Wetland: Rapp Road Landfill Stream

Station Number: Reach 3

Date: September 26, 2006

Sample Type: D – framed kick net

Subsample: entire ½ ¼ 100

Sorted by: David MacDougall, October-November 2006

	Sub.	Total		Sub.	Total
Nemertea			Coleoptera		
			Dytiscidae		3
Platyhelminthes					
Turbellaria - Planaria		9			
Oligochaeta			Megaloptera		
Hirundinea			Trichoptera		
			Hydropsychidae		4
Mollusca			Limnephilidae		2
Physella integra		2			
Musculium sp.		2			
			Other Diptera		
			Tipulidae		4
			Stratiomyidae		3
Crustacea					
Isopoda		15			
			Chironomidae larvae		3
			pupae		
Ephemeroptera			total		
Baetidae		1			
Plecoptera					
Other Insecta					
Hemiptera – *Gerris remigis*		1			

LABORATORY DATA SHEET					
River/Stream/Wetland: Rapp Road Landfill Stream					
Station Number: Reach 4					
Date: September 26, 2006					
Sample Type: D – framed kick net					
Subsample: entire ½ ¼ 100					
Sorted by: David MacDougall, October – November 2006					
	Sub.	Total		Sub.	Total
Nemertea			Coleoptera		
Platyhelminthes					
Turbellaria - Planaria		23			
Oligochaeta			Megaloptera		4
Hirundinea			Trichoptera		
			Glossosomatidae		1
Mollusca			Hydropsychidae		1
Lymnaea stagnalis		1			
			Other Diptera		
			Tipulidae		9
			Athericidae		1
Crustacea					
Isopoda		83			
			Chironomidae larvae		2
			pupae		
Ephemeroptera			total		
Baetidae		3			
Plecoptera					
Other Insecta					

LABORATORY DATA SHEET

River/Stream/Wetland: Rapp Road Landfill Stream

Station Number: Reach 5

Date: September 26, 2006

Sample Type: D – framed kick net

Subsample: entire ½ ¼ 100

Sorted by: David MacDougall, October-November

	Sub.	Total		Sub.	Total
Nemertea			Coleoptera		
			Dytiscidae		5
Platyhelminthes					
Oligochaeta		1	Megaloptera		3
Hirundinea			Trichoptera		
Mollusca					
Musculium sp.		100			
Sphaerium sp.		82			
			Other Diptera		
			Ptychopteridae		68
			Stratiomyidae		2
Crustacea					
Isopoda		1			
			Chironomidae larvae		2
			pupae		
Ephemeroptera			total		
Plecoptera					
Other Insecta					
Hemiptera – *Gerris remigis*		1			

LABORATORY DATA SHEET

River/Stream/Wetland: Rapp Road Landfill Stream

Station Number: Reach 6

Date: September 28, 2006

Sample Type: D – framed kick net

Subsample: entire ½ ¼ 100

Sorted by: David MacDougall, October – November 2006

	Sub.	Total		Sub.	Total
Nemertea			Coleoptera		
Platyhelminthes					
Oligochaeta			Megaloptera		
Hirundinea			Trichoptera		
Mollusca					
Planorbula armigera		1			
Sphaerium sp.		20			
Musculium sp.		8	Other Diptera		
Lymnaea stagnalis		3			
Physella integra		8			
Crustacea					
Isopoda		62			
			Chironomidae larvae		5
			pupae		
Ephemeroptera			total		
Plecoptera					
Other Insecta					
Hemiptera – *Gerris remigis*		1			

LABORATORY DATA SHEET

River/Stream/Wetland: Rapp Road Landfill – Offsite Reference Stream

Station Number: N/A

Date: September 26 & 27, 2006

Sample Type: D – framed kick net

Subsample: entire ½ ¼ 100

Sorted by: David MacDougall, October – November 2006

	Sub.	Total		Sub.	Total
Nemertea			Coleoptera		
Platyhelminthes					
Oligochaeta			Megaloptera		
Hirundinea			Trichoptera		
Mollusca					
Physella integra		1			
			Other Diptera		
			Ptychopteridae		2
			Tipulidae		1
Crustacea					
			Chironomidae larvae		3
			pupae		1
Ephemeroptera			total		4
Plecoptera					
Other Insecta					
Hemiptera: Notonectidae		1			

LABORATORY DATA SHEET					
River/Stream/Wetland: Rapp Road Landfill - Mitigation Pond					
Station Number: Wetland # 1					
Date: September 27, 2006					
Sample Type: D – framed kick net					
Subsample: entire ½ ¼ 100					
Sorted by: David MacDougall, October – November 2006					
	Sub.	Total		Sub.	Total
Nemertea			Coleoptera		
			Dytiscidae		2
Platyhelminthes					
Oligochaeta			Megaloptera		
Hirundinea			Trichoptera		
Mollusca					
			Other Diptera		
			Dixidae		33
Crustacea					
			Chironomidae larvae		
			pupae		
Ephemeroptera			total		
Plecoptera					
Other Insecta					
Hemiptera: Notonectidae		30			
Hemiptera: Corixidae		31			
Odonata: Anisoptera: Aeshnidae		18			
Odonata: Anisoptera: Libellulidae					
Celithemis sp.		9			
Odonata: Zygoptera: Lestidae		72			
Hemiptera: Belostomatidae		1			

LABORATORY DATA SHEET

River/Stream/Wetland: Rapp Road Landfill – Button Bush Swamp

Station Number: Wetland # 2

Date: September 27, 2006

Sample Type: D – framed kick net

Subsample: entire ½ ¼ 100

Sorted by: David MacDougall, October – November 2006

	Sub.	Total		Sub.	Total
Nemertea			Coleoptera		
			Dytiscidae		1
Platyhelminthes					
Oligochaeta			Megaloptera		
Hirundinea			Trichoptera		
Mollusca					
Planorbula armigera		10			
			Other Diptera		
			Dixidae		9
Crustacea					
			Chironomidae larvae		
			pupae		
Ephemeroptera			total		
Plecoptera					
Other Insecta					
Odonata: Anisoptera: Aeshaidae		4			
Hemiptera: Notonectidae		11			
Hemiptera: Corixidae		1			
Odonata: Zygoptera: Lestidae		3			
Odonata: Anisoptera: Libellulidae					
Libellulinae: *Leucorrhinia sp.*		2			

LABORATORY DATA SHEET

River/Stream/Wetland: Rapp Road Landfill – Bog/Vernal Pond Reference Site

Station Number: Wetland # 3

Date: September 27, 2006

Sample Type: D – framed kick net

Subsample: entire ½ ¼ 100

Sorted by: David MacDougall, October – November 2006

	Sub.	Total		Sub.	Total
Nemertea			Coleoptera		
			Dytiscidae		2
Platyhelminthes					
Oligochaeta			Megaloptera		
Hirundinea			Trichoptera		
			Phryganeidae - *Ptilostomis*		2
Mollusca					
			Other Diptera		
			Dixidae		1
Crustacea					
			Chironomidae larvae		
			pupae		
Ephemeroptera			total		
Plecoptera					
Other Insecta					
Odonata: Anispotera: Aeshnidae		10			
Hemiptera: Notonectidae		36			
Hemiptera: Belostomatidae		1			
Odonata: Zygoptera: Coenagrimidae		1			

LABORATORY DATA SHEET

River/Stream/Wetland: Rapp Road Landfill – Offsite Reference Sedge meadow

Station Number: Wetland # 4

Date: September 27, 2006

Sample Type: D – framed kick net

Subsample: entire ½ ¼ 100

Sorted by: David MacDougall, October – November 2006

	Sub	Total		Sub	Total
Nemertea			Coleoptera		
			Dytiscidae		19
Platyhelminthes					
Oligochaeta			Megaloptera		
Hirundinea			Trichoptera		
Mollusca					
Planorbula armigera		8			
			Other Diptera		
			Dixidae		3
Crustacea					
			Chironomidae larvae		
			pupae		
Ephemeroptera			total		
Plecoptera					
Other Insecta					
Hemiptera: *Ranatra elongata*		3			
Odonata: Anisoptera: Aeshnidae		4			
Hemiptera: Notonectidae		21			
Hemiptera: Corixidae		29			
Odonata: Anisoptera: Libellulidae					
Libellulinae: *Leucorrhinia sp.*		12			
Odonata: Anisoptera: Libellulidae					
Libellulinae: *Libellula sp.*		2			
Odonata: Zygoptera: Lestidae		16			