APPENDIX VI

MiRAM Assessment Data and Summary of Categorization
and
Vegetation List

Wetland MiRAM Score Results
and
Categorization

Wetland	MiRAM Score	Wetland Type
A	56	Natural wetland
B	53	Natural wetland
C	45	Natural wetland
D	36	Natural wetland
E	61	Storm water retention basin
F	66	Storm water retention basin
G	12	Natural wetland
H	46	Storm water retention basin
I	39	Mitigated wetland (stormwater)
J	13	Natural wetland

Category *	Description	Range	Total on site
1	low quality	0-29	2
1 or 2 (gray zone)		30-34.9	
modified 2	restorable low	35-44.9	2
2	medium quality	45-59.9	4
2 or 3 (gray zone)		60.9	1
3	high quality	65-100	1

* scoring breakpoints for wetland category based on the ORAM

Vegetation List

Natural Wetlands Vegetation		
Common Name	**Scientific Name**	**Indicator Status**
buttonbush	*Cephalanthus occidentalis*	OBL
black willow	*Salix nigra*	OBL
silky gogwood	*Cornus amomun*	FACW+
American elm	*Ulmus americana*	FACW-
eastern cottonwood	*Populus deltoides*	FAC+
green ash	*Fraxinus pennsylvanica*	FACW
broad leaved cattail	*Thypha latifolia*	OBL
tall ironweed	*Vernonia altissima*	FACU-
willow herb	*Epilobium spp*	FAC
soft stemmed rush	*Juncus effusus*	OBL
fringed sedge	*Carex crinita*	FACW+
silver maple	*Acer saccharinum*	FACW
red maple	*Acer rubrum*	FAC
fowl manna grass	*Glyceria striata*	OBL
purple loosestrife	*Lythrum salicaria*	OBL
sensitive fern	*Onoclea sensibilis*	FACW
bullrush spp	*Scirpus spp*	OBL
blue vervain	*Verbena hastate*	FACW+
rice cut grass	*Leersia oryzoides*	OBL
royal fern	*Osmunda regalis*	OBL
Common Buckthorn	*Rhamnus cathartica*	UPL
sandbar willow	*Salix exidua*	OBL
red osier dogwood	*Cornus stolonifera*	FACW
swamp milkweed	*Asclepias incarnata*	OBL
gray dogwood	*Cornus racemosa*	FACW-
hop sedge	*Carex lupulina*	OBL
common elderberry	*Sambucus Canadensis*	FACW-
white meadowsweet	*Spiraea alba*	FACW+
common reed	*Phragmites australis*	FACW+
red canary grass	*Phalaris arundinacea*	FACW+
indian hemp dogbane	*Apocynum cannabinum*	FAC
torreys rush	*Juncus torreyi*	FACW
wool grass	*Scirpus cyperinus*	OBL
taper leaf water horehound	*Lycopus rubellus*	OBL
cinnamon fern	*Osmunda cinnamomea*	FACW

Wetland Indicator Status:

OBL: Obligate wetland plant that occurs almost always, 99% of the time, in wetlands under natural conditions, but which rarely occur in non-wetlands.

FACW: Facultative wetland plant that occurs usually, 67% to 99% of the time, in wetlands, but also occurs 1% to 33% of the time in non-wetlands.

FAC: Facultative plant that occurs in both wetlands and non-wetlands 33% to 67% of the time.

FACU: Plant that occurs sometimes, 1% to 33% of the time, in wetlands but occurs more often, 67% to 99% of the time, in non-wetlands.

DEQ Land and Water Management Division

MICHIGAN RAPID ASSESSMENT METHOD FOR WETLANDS (MiRAM) Field Form Version 2.0

Site Name: Arbor Hills VA	Evaluator: KJ / GC	Date: 12/28/05
Approx. how much of the Wetland was reviewed? 50 %	Has vegetation within the Wetland been altered and/or buffer areas impacted within the past 5 years? ☐ YES ☒ NO	

Note: The Evaluator must be trained in the MiRAM and should refer to the MiRAM Rating Form and User Manual when using this form.

Narrative Rating

If any of the following questions are answered yes, the Wetland is rated as high functional value and use of the Quantitative Rating is not necessary.

1. Is any part of the Wetland located within an area designated as Critical Habitat and does the Wetland *actually* contain habitat suitable for either the Piping Plover or the Hine's Emerald Dragonfly?	☐ YES ☒ NO
2. Based on the MDNR's Endangered Species Assessment Web site and/or site inspection, do federal/state-listed Threatened or Endangered plant or animal species occur within the Wetland?	☒ YES ☐ NO
3. Is more than 5 acres or more than 25% of the entire Wetland comprised of a Rare Wetland Community Type? Check all Rare Wetland Community Types below. If the Rare Wetland Community is less than 5 acres and less than 25% of the wetland, the rare community should be split off and evaluated separately. ☐ S1 or S2 Natural Community Type ☐ Southern Bog ☐ Old-Growth/Mature Forested Wetland	☐ YES ☒ NO
4. Is any part of the Wetland within 1000 feet of the Ordinary High Water Mark of any of the Great Lakes, including Lake St. Clair?	☐ YES ☒ NO

Quantitative Rating

Circle the appropriate point value(s) and assign the score for each metric. Determine the subtotal for each metric and add to determine the final score.

5 — Metric 1. Wetland Size and Distribution (9 pts max)

9 pts max

1a. Select a size class (6 pts max)	
6 pts	≥50 acres
5 pts	25 acres to <50 acres
4 pts	10 acres to <25 acres
3 pts	3 acres to <10 acres
(2 pts)	¼ acre to <3 acres
0 pt	less than ¼ acre

1b. Using the NWI, select a scarcity class (3 pts max)	
(3 pts)	0 to 20% of surrounding 2-mile radius is wetland
2 pts	>20 to 80% of surrounding 2-mile radius is wetland
1 pt	>80% of surrounding 2-mile radius is wetland

4 — Metric 2. Buffers and Intensity of Surrounding Land Use (12 pts max)

12 pts max

2a. Using an aerial photo, select the most appropriate buffer width (6 pts max)	
6 pts	Wide: ≥150 ft around perimeter
4 pts	Medium: 75 to <150 ft around perimeter
(2 pts)	Narrow: 25 to <75 ft around the perimeter
0 pt	Very Narrow: 0 (no buffer) to <25 ft around perimeter

2b. Using an aerial photo, select the surrounding land uses that comprise >25% of the total land use & average (6 pts max)	
6 pts	Very Low Intensity: Maturing forest, natural grassland, prairie, designated wildlife area, other wetland, lake or river
4 pts	Low Intensity: Shrubland/young forest, recent selective logging, hay field, lightly managed parkland, old field, lightly grazed pasture, one lane road/two track.
(2 pts)	Moderately High Intensity: Residential & lawns, manicured parkland, golf course, conservation tillage, recent clear-cut (<10 yrs.), two lane road
1 pt	High Intensity: Commercial, industrial, high-density residential, heavily grazed pasture, row crops, multi-lane paved road, construction activity, parking lot, mining

12 — Metric 3. Hydrology (26 pts max)

26 pts max

3a Select all sources of water for Wetland	
(1 pt)	Precipitation
(2 pts)	Groundwater
2 pts	Seasonal Intermittent Surface Water
5 pts	Perennial Surface Water

3b. Select all wetland connections that apply	
2 pts	100-year floodplain
2 pts	Between a Stream/Lake/Pond and Human Land Use
(2 pts)	Wetland/Upland Complex
2 pts	Riparian Corridor

3c. Select the dominant duration of inundation/saturation, or select all that co-dominate & average (4 pts max)	
4 pts	Permanently Inundated
(3 pts)	Permanently Saturated to Regularly Inundated
2 pts	Regularly Saturated to Seasonally Inundated
1 pt	Seasonally Saturated in the Upper 12 Inches of Soil

3d. Check past or ongoing hydrolgic alterations in or near Wetland. Assign a point value, or select adjoining options & average (8 pts max)

☐ ditch(s) ☐ weir(s) ☐ point-source ☐ dredging
☐ tiles(s) ☐ stormwater inputs ☐ filling/grading ☐ other. _____
☐ dikes(s) ☐ channelization ☐ road bed/RR grade

8 pts	No Hydrologic Alterations Apparent: No significant alteration(s) and/or ongoing minor alteration is rare
(6 pts)	Recovered: Significant hydrological alteration(s) occurred more than 20 years prior to the assessment and/or ongoing minor hydrological alteration is only occasional
(4 pts)	Recovering: A single significant hydrological alteration occurred within 20 years prior to the assessment, and/or ongoing minor hydrological alteration is frequent
1 pt	Recent or No Recovery: Multiple significant hydrological alterations have occurred in the 20 years prior to the assessment and/or significant alteration(s) is ongoing

21 Subtotal this page

Metric 4. Habitat Alteration and Habitat Structure Development (20 pts max)

14

20 pts max

4a. Check past or ongoing substrate/soil disturbance. Assign a point value, or select adjoining options & average (4 pts max)

☐ erosion ☐ dredging ☐ off-road vehicle use
☐ sedimentation ☐ plowing/disking ☐ construction vehicle use
☐ filling/grading ☐ intensive grazing ☐ other:

4 pts	No Substrate Disturbance Apparent: No significant disturbance and/or ongoing minor disturbance is rare
(3 pts)	Recovered: Significant substrate disturbance occurred more than 20 years prior to the assessment and/or ongoing minor substrate disturbance is only occasional
2 pts	Recovering: A single significant substrate disturbance occurred within 20 years prior to the assessment, and/or ongoing minor substrate disturbance is frequent
1 pt	Recent or No Recovery: Multiple significant substrate disturbances have occurred in the 20 years prior to the assessment and/or significant disturbance is ongoing

4c. Select the Wetland's habitat structure development, or select adjoining options & average (7 pts max)

7 pts	Excellent
(5 pts)	Good
3 pts	Fair
1 pt	Poor

4b. Check past or ongoing habitat alteration. Assign a point value, or select adjoining options & average (9 pts max)

☐ barrier/road bed/RR grade ☐ mowing or shrub removal ☐ nutrient enrichment/nuisance algae ☐ dredging ☐ farming
☐ selective cutting ☐ coarse woody debris removal ☐ herbicide/chemical treatment ☐ filling/grading ☐ other: _____
☐ clearcutting ☐ grazing ☐ sedimentation ☐ plowing/disking

9 pts	No Habitat Alteration Apparent: No significant alteration and/or ongoing minor alteration is rare
(6 pts)	Recovered: Significant habitat alteration occurred more than 20 years prior to the assessment and/or ongoing minor habitat alterations only occasional
3 pts	Recovering: A single significant habitat alteration occurred within 20 years prior to the assessment, and/or ongoing minor alteration is frequent
1 pt	Recent or No Recovery: Multiple significant habitat alterations have occurred in the 20 years prior to the assessment and/or habitat alteration is ongoing

Metric 5. Special Situations (20 pts max)

10

20 pts max

5a. Add 10 pts if any of these situations apply

High Ecological Value (see Narrative Rating above)
☐ Contains USFWS designated Critical Habitat
☐ Federal/State-listed Threatened or Endangered plant or animal species
☐ S1, S2, S3 Natural Community Type (at least 5 acres or 25% of Wetland)
☐ Southern Bog (at least 5 acres or 25% of Wetland)
☐ Old-Growth / Mature Forested Wetland (at least 5 acres or 25% of Wetland)
☐ Great Lakes Coastal Wetland

5b. Add 5 pts for Forested Wetland

5 Exhibits combined canopy cover from any group(s) of trees
Stem DBH must be ≥3 in to qualify as a tree. Must be at least 5 acres or 25% of Wetland

5c. Add 5 pts for Urban/Suburban Wetland

5 Is >50% of the landscape in a 1000-ft radius low-permeability surfaces?

5d. Subtract 10 points for Low Quality Wetland

Is the Wetland less than 1 acre and non-contiguous and either:
1) A stormwater treatment pond excavated from upland or
2) More than 75% covered by highly-invasive vegetation (See Metric 6c)

Metric 6. Vegetation, Interspersion, and Habitat Features (20 pts max)

10

20 pts max

6a. Select the cover score for each Vegetation Component and assign points (9 pts max)

Vegetation Component is >⅓ acre	>25% of Wetland area	Native species dominate coverage	high native diversity	3 pts
			moderate to low native diversity	2 pts
		invasive or non-native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
	<25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage	moderate native diversity	1 pt
			low native diversity	0 pt
Vegetation Component is <⅓ acre	>25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage		0 pt
	<25% of Wetland area			0 pt

2	0 to 3 pts	Forest Overstory
2	0 to 3 pts	Shrub/Sapling Component
0	0 to 3 pts	Herbaceous Component

6b. Estimate the total open water and assign points (3 pts max)

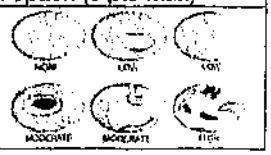
3 pts	High: 2.5 acres or more
2 pts	Moderate: 1.0 acres to <2.5 acres
1 pt	Low: 0.25 acre to <1.0 acre
(0 pt)	Absent: <0.25 acres

6c. Estimate the total coverage of highly invasive species

1 pt	Virtually Absent: <1% Aerial Coverage
(0 pt)	Nearly Absent: <5% Aerial Coverage
-1 pt	Sparse: 5-25% Aerial Coverage
-3 pts	Moderate: 25-75% Aerial Coverage
-5 pts	Extensive: >75% Aerial Coverage

6d. Select one horizontal interspersion option (5 pts max)

5 pts	High Degree of Interspersion
3 pts	Moderate Degree of Interspersion
(1 pt)	Low Degree of Interspersion
0 pt	No Interspersion



6e. Determine the amount of habitat features in the Wetland and assign points (12 pts max)

Absent (0 pt) <1 per acre or 5% of area	Sparse (1 pt) 1 to 5 per acre or 5% to 10% of area	Moderate (2 pts) 6 to 10 per acre or 10% to 50% of area	Dense (3 pts) > 10 per acre or >50% of area

0	0 to 3 pts	Hummocks/Tussocks/Tree Mounds % of area
2	0 to 3 pts	Coarse Woody Debris (CWD) # per acre
2	0 to 3 pts	Large Living/Dead Standing Trees (12 in DBH) # per acre
1	0 to 3 pts	Amphibian Breeding/Nursery Habitat % of area

Metric 7. Scenic, Recreational and Cultural Value (3 pts max)

1

3 pts max

Select all that apply and assign points

1	1 pt	Scenic Value
1	1 pt	Recreational Value
	1 pt	Cultural/Historical Value

56 **Total**

Attach location map, aerial photos, and landscape sketch.

DEQ Land and Water Management Division

MICHIGAN RAPID ASSESSMENT METHOD FOR WETLANDS (MiRAM)
Field Form Version 2.0

Site Name: Arbor Hills VP	Evaluator: [illegible]	Date: 12/22/04
Approx. how much of the Wetland was reviewed? 100%	Has vegetation within the Wetland been altered and/or buffer areas impacted within the past 5 years? ☐ YES ☒ NO	

Note: The Evaluator must be trained in the MiRAM and should refer to the MiRAM Rating Form and User Manual when using this form.

Narrative Rating

If any of the following questions are answered yes, the Wetland is rated as high functional value and use of the Quantitative Rating is not necessary.

1. **Is any part of the Wetland located within an area designated as Critical Habitat and does the Wetland *actually* contain habitat suitable for either the Piping Plover or the Hine's Emerald Dragonfly?**	☐ YES ☑ NO
2. **Based on the MDNR's Endangered Species Assessment Web site and/or site inspection, do federal/state-listed Threatened or Endangered plant or animal species occur within the Wetland?**	☒ YES ☐ NO
3. **Is more than 5 acres or more than 25% of the entire Wetland comprised of a Rare Wetland Community Type? Check all Rare Wetland Community Types below.** If the Rare Wetland Community is less than 5 acres and less than 25% of the wetland, the rare community should be split off and evaluated separately. ☐ S1 or S2 Natural Community Type ☐ Southern Bog ☐ Old-Growth/Mature Forested Wetland	☐ YES ☑ NO
4. **Is any part of the Wetland within 1000 feet of the Ordinary High Water Mark of any of the Great Lakes, including Lake St. Clair?**	☐ YES ☑ NO

Quantitative Rating

Circle the appropriate point value(s) and assign the score for each metric. Determine the subtotal for each metric and add to determine the final score.

3 — **Metric 1. Wetland Size and Distribution (9 pts max)**

9 pts max

1a. Select a size class (6 pts max)	
6 pts	≥50 acres
5 pts	25 acres to <50 acres
4 pts	10 acres to <25 acres
3 pts	3 acres to <10 acres
2 pts	¼ acre to <3 acres
(0 pt)	less than ¼ acre

1b. Using the NWI, select a scarcity class (3 pts max)	
(3 pts)	0 to 20% of surrounding 2-mile radius is wetland
2 pts	>20 to 80% of surrounding 2-mile radius is wetland
1 pt	>80% of surrounding 2-mile radius is wetland

4 — **Metric 2. Buffers and Intensity of Surrounding Land Use (12 pts max)**

12 pts max

2a. Using an aerial photo, select the most appropriate buffer width (6 pts max)	
6 pts	Wide: ≥150 ft around perimeter
4 pts	Medium: 75 to <150 ft around perimeter
(2 pts)	Narrow: 25 to <75 ft around the perimeter
0 pt	Very Narrow: 0 (no buffer) to <25 ft around perimeter

2b. Using an aerial photo, select the surrounding land uses that comprise >25% of the total land use & average (6 pts max)	
6 pts	Very Low Intensity: Maturing forest, natural grassland, prairie, designated wildlife area, other wetland, lake or river
4 pts	Low Intensity: Shrubland/young forest, recent selective logging, hay field, lightly managed parkland, old field, lightly grazed pasture, one lane road/two track
(2 pts)	Moderately High Intensity: Residential & lawns, manicured parkland, golf course, conservation tillage, recent clear-cut (<10 yrs.), two lane road
1 pt	High Intensity: Commercial, industrial, high-density residential, heavily grazed pasture, row crops, multi-lane paved road, construction activity, parking lot, mining

12 — **Metric 3. Hydrology (26 pts max)**

25 pts max

3a Select all sources of water for Wetland	
(1 pt)	Precipitation
(2 pts)	Groundwater
2 pts	Seasonal Intermittent Surface Water
5 pts	Perennial Surface Water

3b. Select all wetland connections that apply	
2 pts	100-year floodplain
2 pts	Between a Stream/Lake/Pond and Human Land Use
(2 pts)	Wetland/Upland Complex
2 pts	Riparian Corridor

3c. Select the dominant duration of inundation/saturation, or select all that co-dominate & average (4 pts max)	
4 pts	Permanently Inundated
(3 pts)	Permanently Saturated to Regularly Inundated
2 pts	Regularly Saturated to Seasonally Inundated
1 pt	Seasonally Saturated in the Upper 12 Inches of Soil

3d. Check past or ongoing hydrolgic alterations in or near Wetland. Assign a point value, or select adjoining options & average (8 pts max)

☐ ditch(s) ☐ weir(s) ☐ point-source ☐ dredging
☐ tiles(s) ☐ stormwater inputs ☐ filling/grading ☐ other: _____
☐ dikes(s) ☐ channelization ☐ road bed/RR grade

8 pts	No Hydrologic Alterations Apparent: No significant alteration(s) and/or ongoing minor alteration is rare
(6 pts)	Recovered: Significant hydrological alteration(s) occurred more than 20 years prior to the assessment and/or ongoing minor hydrological alteration is only occasional
4 pts	Recovering: A single significant hydrological alteration occurred within 20 years prior to the assessment, and/or ongoing minor hydrological alteration is frequent
1 pt	Recent or No Recovery: Multiple significant hydrological alterations have occurred in the 20 years prior to the assessment and/or significant alteration(s) is ongoing

19 Subtotal this page

Metric 4. Habitat Alteration and Habitat Structure Development (20 pts max)

14

20 pts max

4a. Check past or ongoing substrate/soil disturbance. Assign a point value, or select adjoining options & average (4 pts max)

☐ erosion ☐ dredging ☐ off-road vehicle use
☐ sedimentation ☐ plowing/disking ☐ construction vehicle use
☐ filling/grading ☐ intensive grazing ☐ other:

4 pts	No Substrate Disturbance Apparent: No significant disturbance and/or ongoing minor disturbance is rare
(3 pts)	Recovered: Significant substrate disturbance occured more than 20 years prior to the assessment and/or ongoing minor substrate disturbance is only occasional
2 pts	Recovering: A single significant substrate disturbance occurred within 20 years prior to the assessment, and/or ongoing minor substrate disturbance is frequent
1 pt	Recent or No Recovery: Multiple significant substrate disturbances have occurred in the 20 years prior to the assessment and/or significant disturbance is ongoing

4c. Select the Wetland's habitat structure development, or select adjoining options & average (7 pts max)

7 pts	Excellent
(6 pts)	Good
3 pts	Fair
1 pt	Poor

4b. Check past or ongoing habitat alteration. Assign a point value, or select adjoining options & average (9 pts max)

☐ barrier/road bed/RR grade ☐ mowing or shrub removal ☐ nutrient enrichment/nuisance algae ☐ dredging ☐ farming
☐ selective cutting ☐ coarse woody debris removal ☐ herbicide/chemical treatment ☐ filling/grading ☐ other: _____
☐ clearcutting ☐ grazing ☐ sedimentation ☐ plowing/disking

9 pts	No Habitat Alteration Apparent: No significant alteration and/or ongoing minor alteration is rare
(6 pts)	Recovered: Significant habitat alteration occurred more than 20 years prior to the assessment and/or ongoing minor habitat alterations only occasional
3 pts	Recovering: A single significant habitat alteration occurred within 20 years prior to the assessment, and/or ongoing minor alteration is frequent
1 pt	Recent or No Recovery: Multiple significant habitat alterations have occurred in the 20 years prior to the assessment and/or habitat alteration is ongoing

Metric 5. Special Situations (20 pts max)

10

20 pts max

5a. Add 10 pts if any of these situations apply

High Ecological Value (see Narrative Rating above)
☐ Contains USFWS designated Critical Habitat
☐ Federal/State-listed Threatened or Endangered plant or animal species
☐ S1, S2, S3 Natural Community Type (at least 5 acres or 25% of Wetland)
☐ Southern Bog (at least 5 acres or 25% of Wetland)
☐ Old-Growth / Mature Forested Wetland (at least 5 acres or 25% of Wetland)
☐ Great Lakes Coastal Wetland

5b. Add 5 pts for Forested Wetland

5 Exhibits combined canopy cover from any group(s) of trees.
Stem DBH must be ≥3 in to qualify as a tree. Must be at least 5 acres or 25% of Wetland

5c. Add 5 pts for Urban/Suburban Wetland

5 Is >50% of the landscape in a 1000-ft radius low-permeability surfaces?

5d. Subtract 10 points for Low Quality Wetland

Is the Wetland less than 1 acre and non-contiguous and either:
1) A stormwater treatment pond excavated from upland or
2) More than 75% covered by highly-invasive vegetation (See Metric 6c)

Metric 6. Vegetation, Interspersion, and Habitat Features (20 pts max)

9

20 pts max

6a. Select the cover score for each Vegetation Component and assign points (9 pts max)

Vegetation Component is >⅓ acre	>25% of Wetland area	Native species dominate coverage	high native diversity	3 pts
			moderate to low native diversity	2 pts
		invasive or non-native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
	<25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage	moderate native diversity	1 pt
			low native diversity	0 pt
Vegetation Component is <⅓ acre	>25% of Wetland Area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage		0 pt
	<25% of Wetland area			0 pt

2	0 to 3 pts	Forest Overstory
1	0 to 3 pts	Shrub/Sapling Component
0	0 to 3 pts	Herbaceous Component

6b. Estimate the total open water and assign points (3 pts max)

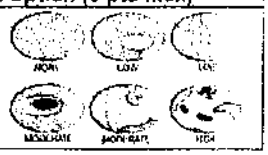
3 pts	High: 2.5 acres or more
2 pts	Moderate: 1.0 acres to <2.5 acres
1 pt	Low: 0.25 acre to <1.0 acre
(0 pt)	Absent: <0.25 acres

6c. Estimate the total coverage of highly invasive species

1 pt	Virtually Absent: <1% Aerial Coverage
(0 pt)	Nearly Absent: <5% Aerial Coverage
-1 pt	Sparse: 5-25% Aerial Coverage
-3 pts	Moderate: 25-75% Aerial Coverage
-5 pts	Extensive: >75% Aerial Coverage

6d. Select one horizontal interspersion option (5 pts max)

5 pts	High Degree of Interspersion
3 pts	Moderate Degree of Interspersion
(1 pt)	Low Degree of Interspersion
0 pt	No Interspersion



6e. Determine the amount of habitat features in the Wetland and assign points (12 pts max)

	Absent (0 pt) <1 per acre or 5% of area	Sparse (1 pt) 1 to 5 per acre or 5% to 10% of area	Moderate (2 pts) 6 to 10 per acre or 10% to 50% of area	Dense (3 pts) > 10 per acre or >50% of area
0	0 to 3 pts	Hummocks/Tussocks/Tree Mounds % of area		
1	0 to 3 pts	Coarse Woody Debris (CWD) # per acre		
2	0 to 3 pts	Large Living/Dead Standing Trees (12 in DBH) # per acre		
1	0 to 3 pts	Amphibian Breeding/Nursery Habitat % of area		

Metric 7. Scenic, Recreational and Cultural Value (3 pts max)

1

3 pts max

Select all that apply and assign points

(1 pt)	Scenic Value
1 pt	Recreational Value
1 pt	Cultural/Historical Value

53 **Total**

Attach location map, aerial photos, and landscape sketch.

DEQ Land and Water Management Division

MICHIGAN RAPID ASSESSMENT METHOD FOR WETLANDS (MiRAM)
Field Form Version 2.0

Site Name: Arbor Hills W C	Evaluator: DT / GC	Date: 12/12/07
Approx. how much of the Wetland was reviewed? 100 %	Has vegetation within the Wetland been altered and/or buffer areas impacted within the past 5 years? ☐ YES ☒ NO	

Note: The Evaluator must be trained in the MiRAM and should refer to the MiRAM Rating Form and User Manual when using this form.

Narrative Rating

If any of the following questions are answered yes, the Wetland is rated as high functional value and use of the Quantitative Rating is not necessary.

1. Is any part of the Wetland located within an area designated as Critical Habitat and does the Wetland *actually* contain habitat suitable for either the Piping Plover or the Hine's Emerald Dragonfly?	☐ YES ☒ NO
2. Based on the MDNR's Endangered Species Assessment Web site and/or site inspection, do federal/state-listed Threatened or Endangered plant or animal species occur within the Wetland?	☒ YES ☐ NO
3. Is more than 5 acres or more than 25% of the entire Wetland comprised of a Rare Wetland Community Type? Check all Rare Wetland Community Types below. If the Rare Wetland Community is less than 5 acres and less than 25% of the wetland, the rare community should be split off and evaluated separately. ☐ S1 or S2 Natural Community Type ☐ Southern Bog ☐ Old-Growth/Mature Forested Wetland	☐ YES ☒ NO
4. Is any part of the Wetland within 1000 feet of the Ordinary High Water Mark of any of the Great Lakes, including Lake St. Clair?	☐ YES ☒ NO

Quantitative Rating

Circle the appropriate point value(s) and assign the score for each metric. Determine the subtotal for each metric and add to determine the final score.

3 — **Metric 1. Wetland Size and Distribution (9 pts max)**

9 pts max

1a. Select a size class (6 pts max)	
6 pts	≥50 acres
5 pts	25 acres to <50 acres
4 pts	10 acres to <25 acres
3 pts	3 acres to <10 acres
2 pts	¼ acre to <3 acres
(0 pt)	less than ¼ acre

1b. Using the NWI, select a scarcity class (3 pts max)	
(3 pts)	0 to 20% of surrounding 2-mile radius is wetland
2 pts	>20 to 80% of surrounding 2-mile radius is wetland
1 pt	>80% of surrounding 2-mile radius is wetland

1 — **Metric 2. Buffers and Intensity of Surrounding Land Use (12 pts max)**

12 pts max

2a. Using an aerial photo, select the most appropriate buffer width (6 pts max)	
6 pts	Wide: ≥150 ft around perimeter
4 pts	Medium: 75 to <150 ft around perimeter
2 pts	Narrow: 25 to <75 ft around the perimeter
(0 pt)	Very Narrow: 0 (no buffer) to <25 ft around perimeter

2b. Using an aerial photo, select the surrounding land uses that comprise >25% of the total land use & average (6 pts max)	
6 pts	Very Low Intensity: Maturing forest, natural grassland, prairie, designated wildlife area, other wetland, lake or river
4 pts	Low Intensity: Shrubland/young forest, recent selective logging, hay field, lightly managed parkland, old field, lightly grazed pasture, one lane road/two track
2 pts	Moderately High Intensity: Residential & lawns, manicured parkland, golf course, conservation tillage, recent clear-cut (<10 yrs.), two lane road
(1 pt)	High Intensity: Commercial, industrial, high-density residential, heavily grazed pasture, row crops, multi-lane paved road, construction activity, parking lot, mining

12 — **Metric 3. Hydrology (26 pts max)**

26 pts max

3a Select all sources of water for Wetland	
(1 pt)	Precipitation
2 pts	Groundwater
2 pts	Seasonal Intermittent Surface Water
5 pts	Perennial Surface Water

3b. Select all wetland connections that apply	
2 pts	100-year floodplain
2 pts	Between a Stream/Lake/Pond and Human Land Use
(2 pts)	Wetland/Upland Complex
2 pts	Riparian Corridor

3c. Select the dominant duration of inundation/saturation, or select all that co-dominate & average (4 pts max)	
4 pts	Permanently Inundated
(3 pts)	Permanently Saturated to Regularly Inundated
2 pts	Regularly Saturated to Seasonally Inundated
1 pt	Seasonally Saturated in the Upper 12 Inches of Soil

3d. Check past or ongoing hydrologic alterations in or near Wetland. Assign a point value, or select adjoining options & average (8 pts max)

☐ ditch(s) ☐ weir(s) ☐ point-source ☐ dredging
☐ tiles(s) ☐ stormwater inputs ☐ filling/grading ☐ other: _____
☐ dike(s) ☐ channelization ☐ road bed/RR grade

8 pts	No Hydrologic Alterations Apparent: No significant alteration(s) and/or ongoing minor alteration is rare
(6 pts)	Recovered: Significant hydrological alteration(s) occurred more than 20 years prior to the assessment and/or ongoing minor hydrological alteration is only occasional
4 pts	Recovering: A single significant hydrological alteration occurred within 20 years prior to the assessment, and/or ongoing minor hydrological alteration is frequent
1 pt	Recent or No Recovery: Multiple significant hydrological alterations have occurred in the 20 years prior to the assessment and/or significant alteration(s) is ongoing

16 Subtotal this page

Metric 4. Habitat Alteration and Habitat Structure Development (20 pts max)

17 — 20 pts max

4a. Check past or ongoing substrate/soil disturbance. Assign a point value, or select adjoining options & average (4 pts max)

☐ erosion	☐ dredging	☐ off-road vehicle use
☐ sedimentation	☐ plowing/disking	☐ construction vehicle use
☐ filling/grading	☐ intensive grazing	☐ other:

4 pts	No Substrate Disturbance Apparent: No significant disturbance and/or ongoing minor disturbance is rare
(3 pts)	Recovered: Significant substrate disturbance occurred more than 20 years prior to the assessment and/or ongoing minor substrate disturbance is only occasional
2 pts	Recovering: A single significant substrate disturbance occurred within 20 years prior to the assessment, and/or ongoing minor substrate disturbance is frequent
1 pt	Recent or No Recovery: Multiple significant substrate disturbances have occurred in the 20 years prior to the assessment and/or significant disturbance is ongoing

4c. Select the Wetland's habitat structure development, or select adjoining options & average (7 pts max)

7 pts	Excellent
5 pts	Good
(3 pts)	Fair
1 pt	Poor

4b. Check past or ongoing habitat alteration. Assign a point value, or select adjoining options & average (9 pts max)

☐ barrier/road bed/RR grade	☐ mowing or shrub removal	☐ nutrient enrichment/nuisance algae	☐ dredging	☐ farming
☐ selective cutting	☐ coarse woody debris removal	☐ herbicide/chemical treatment	☐ filling/grading	☐ other: _____
☐ clearcutting	☐ grazing	☐ sedimentation	☐ plowing/disking	

9 pts	No Habitat Alteration Apparent: No significant alteration and/or ongoing minor alteration is rare
(6 pts)	Recovered: Significant habitat alteration occurred more than 20 years prior to the assessment and/or ongoing minor habitat alterations only occasional
3 pts	Recovering: A single significant habitat alteration occurred within 20 years prior to the assessment, and/or ongoing minor alteration is frequent
1 pt	Recent or No Recovery: Multiple significant habitat alterations have occurred in the 20 years prior to the assessment and/or habitat alteration is ongoing

Metric 5. Special Situations (20 pts max)

10 — 20 pts max

5a. Add 10 pts if any of these situations apply

High Ecological Value (see Narrative Rating above)
- ☐ Contains USFWS designated Critical Habitat
- ☐ Federal/State-listed Threatened or Endangered plant or animal species
- ☐ S1, S2, S3 Natural Community Type (at least 5 acres or 25% of Wetland)
- ☐ Southern Bog (at least 5 acres or 25% of Wetland)
- ☐ Old-Growth / Mature Forested Wetland (at least 5 acres or 25% of Wetland)
- ☐ Great Lakes Coastal Wetland

5b. Add 5 pts for Forested Wetland

5 — Exhibits combined canopy cover from any group(s) of trees. Stem DBH must be ≥3 in to qualify as a tree. Must be at least 5 acres or 25% of Wetland

5c. Add 5 pts for Urban/Suburban Wetland

5 — Is >50% of the landscape in a 1000-ft radius low-permeability surfaces?

5d. Subtract 10 points for Low Quality Wetland

Is the Wetland less than 1 acre and non-contiguous and either:
1) A stormwater treatment pond excavated from upland or
2) More than 75% covered by highly-invasive vegetation (See Metric 6c)

Metric 6. Vegetation, Interspersion, and Habitat Features (20 pts max)

7 — 20 pts max

6a. Select the cover score for each Vegetation Component and assign points (9 pts max)

Vegetation Component is >½ acre	>25% of Wetland area	Native species dominate coverage	high native diversity	3 pts
			moderate to low native diversity	2 pts
		invasive or non-native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
	<25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage	moderate native diversity	1 pt
			low native diversity	0 pt
Vegetation Component is <½ acre	>25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage		0 pt
	<25% of Wetland area			0 pt

1	0 to 3 pts	Forest Overstory
1	0 to 3 pts	Shrub/Sapling Component
1	0 to 3 pts	Herbaceous Component

6b. Estimate the total open water and assign points (3 pts max)

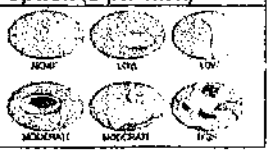
3 pts	High: 2.5 acres or more
2 pts	Moderate: 1.0 acres to <2.5 acres
1 pt	Low: 0.25 acre to <1.0 acre
(0 pt)	Absent: <0.25 acres

6c. Estimate the total coverage of highly invasive species

1 pt	Virtually Absent: <1% Aerial Coverage
(0 pt)	Nearly Absent: <5% Aerial Coverage
-1 pt	Sparse: 5-25% Aerial Coverage
-3 pts	Moderate: 25-75% Aerial Coverage
-5 pts	Extensive: >75% Aerial Coverage

6d. Select one horizontal interspersion option (5 pts max)

5 pts	High Degree of Interspersion
3 pts	Moderate Degree of Interspersion
(1 pt)	Low Degree of Interspersion
0 pt	No Interspersion



6e. Determine the amount of habitat features in the Wetland and assign points (12 pts max)

	Absent (0 pt) <1 per acre or 5% of area	Sparse (1 pt) 1 to 5 per acre or 5% to 10% of area	Moderate (2 pts) 6 to 10 per acre or 10% to 50% of area	Dense (3 pts) > 10 per acre or >50% of area
(1) 0 to 3 pts	Hummocks/Tussocks/Tree Mounds % of area			
1 0 to 3 pts	Coarse Woody Debris (CWD) # per acre			
1 0 to 3 pts	Large Living/Dead Standing Trees (12 in DBH) # per acre			
1 0 to 3 pts	Amphibian Breeding/Nursery Habitat % of area			

Metric 7. Scenic, Recreational and Cultural Value (3 pts max)

0 — 3 pts max

Select all that apply and assign points

1	1 pt	Scenic Value
1	1 pt	Recreational Value
	1 pt	Cultural/Historical Value

45 — **Total**

Attach location map, aerial photos, and landscape sketch.

DEQ Land and Water Management Division

MICHIGAN RAPID ASSESSMENT METHOD FOR WETLANDS (MiRAM)
Field Form Version 2.0

Site Name: Arbor Hills WD	Evaluator: BT / GC	Date: 12/22/09
Approx. how much of the Wetland was reviewed? 100 %	Has vegetation within the Wetland been altered and/or buffer areas impacted within the past 5 years? ☐ YES ☒ NO	

Note: The Evaluator must be trained in the MiRAM and should refer to the MiRAM Rating Form and User Manual when using this form.

Narrative Rating

If any of the following questions are answered yes, the Wetland is rated as high functional value and use of the Quantitative Rating is not necessary.

1. Is any part of the Wetland located within an area designated as Critical Habitat and does the Wetland *actually* contain habitat suitable for either the Piping Plover or the Hine's Emerald Dragonfly?	☐ YES ☒ NO
2. Based on the MDNR's Endangered Species Assessment Web site and/or site inspection, do federal/state-listed Threatened or Endangered plant or animal species occur within the Wetland?	☒ YES ☐ NO
3. Is more than 5 acres or more than 25% of the entire Wetland comprised of a Rare Wetland Community Type? Check all Rare Wetland Community Types below. If the Rare Wetland Community is less than 5 acres and less than 25% of the wetland, the rare community should be split off and evaluated separately. ☐ S1 or S2 Natural Community Type ☐ Southern Bog ☐ Old-Growth/Mature Forested Wetland	☐ YES ☒ NO
4. Is any part of the Wetland within 1000 feet of the Ordinary High Water Mark of any of the Great Lakes, including Lake St. Clair?	☐ YES ☒ NO

Quantitative Rating

Circle the appropriate point value(s) and assign the score for each metric. Determine the subtotal for each metric and add to determine the final score.

3 — 9 pts max

Metric 1. Wetland Size and Distribution (9 pts max)

1a. Select a size class (6 pts max)	
6 pts	≥50 acres
5 pts	25 acres to <50 acres
4 pts	10 acres to <25 acres
3 pts	3 acres to <10 acres
2 pts	¼ acre to <3 acres
(0 pt)	less than ¼ acre

1b. Using the NWI, select a scarcity class (3 pts max)	
(3 pts)	0 to 20% of surrounding 2-mile radius is wetland
2 pts	>20 to 80% of surrounding 2-mile radius is wetland
1 pt	>80% of surrounding 2-mile radius is wetland

1 — 12 pts max

Metric 2. Buffers and Intensity of Surrounding Land Use (12 pts max)

2a. Using an aerial photo, select the most appropriate buffer width (6 pts max)	
6 pts	Wide: ≥150 ft around perimeter
4 pts	Medium: 75 to <150 ft around perimeter
2 pts	Narrow: 25 to <75 ft around the perimeter
(0 pts)	Very Narrow: 0 (no buffer) to <25 ft around perimeter

2b. Using an aerial photo, select the surrounding land uses that comprise >25% of the total land use & average (6 pts max)	
6 pts	Very Low Intensity: Maturing forest, natural grassland, prairie designated wildlife area, other wetland, lake or river
4 pts	Low Intensity: Shrubland/young forest, recent selective logging, hay field, lightly managed parkland, old field, lightly grazed pasture, one lane road/two track
2 pts	Moderately High Intensity: Residential & lawns, manicured parkland, golf course, conservation tillage, recent clear-cut (<10 yrs.), two lane road
(1 pt)	High Intensity: Commercial, industrial, high-density residential, heavily grazed pasture, row crops, multi-lane paved road, construction activity, parking lot, mining

12 — 26 pts max

Metric 3. Hydrology (26 pts max)

3a Select all sources of water for Wetland	
(1 pt)	Precipitation
2 pts	Groundwater
2 pts	Seasonal Intermittent Surface Water
5 pts	Perennial Surface Water

3b. Select all wetland connections that apply	
2 pts	100-year floodplain
2 pts	Between a Stream/Lake/Pond and Human Land Use
(2 pts)	Wetland/Upland Complex
2 pts	Riparian Corridor

3c. Select the dominant duration of inundation/saturation, or select all that co-dominate & average (4 pts max)	
4 pts	Permanently Inundated
(3 pts)	Permanently Saturated to Regularly Inundated
2 pts	Regularly Saturated to Seasonally Inundated
1 pt	Seasonally Saturated in the Upper 12 Inches of Soil

3d. Check past or ongoing hydrolgic alterations in or near Wetland. Assign a point value, or select adjoining options & average (8 pts max)

☐ ditch(s) ☐ weir(s) ☐ point-source ☐ dredging
☐ tiles(s) ☐ stormwater inputs ☐ filling/grading ☐ other: _____
☐ dikes(s) ☐ channelization ☒ road bed/RR grade

8 pts	No Hydrologic Alterations Apparent: No significant alteration(s) and/or ongoing minor alteration is rare
(6 pts)	Recovered: Significant hydrological alteration(s) occurred more than 20 years prior to the assessment and/or ongoing minor hydrological alteration is only occasional
4 pts	Recovering: A single significant hydrological alteration occurred within 20 years prior to the assessment, and/or ongoing minor hydrological alteration is frequent
1 pt	Recent or No Recovery: Multiple significant hydrological alterations have occurred in the 20 years prior to the assessment and/or significant alteration(s) is ongoing

16 — Subtotal this page

Metric 4. Habitat Alteration and Habitat Structure Development (20 pts max)

10

20 pts max

4a. Check past or ongoing substrate/soil disturbance. Assign a point value, or select adjoining options & average (4 pts max)

☐ erosion ☐ dredging ☐ off-road vehicle use
☐ sedimentation ☐ plowing/disking ☐ construction vehicle use
☐ filling/grading ☐ intensive grazing ☐ other: _____

	4 pts	No Substrate Disturbance Apparent: No significant disturbance and/or ongoing minor disturbance is rare
(✓)	3 pts	Recovered: Significant substrate disturbance occurred more than 20 years prior to the assessment and/or ongoing minor substrate disturbance is only occasional
	2 pts	Recovering: A single significant substrate disturbance occurred within 20 years prior to the assessment, and/or ongoing minor substrate disturbance is frequent
	1 pt	Recent or No Recovery: Multiple significant substrate disturbances have occurred in the 20 years prior to the assessment and/or significant disturbance is ongoing

4c. Select the Wetland's habitat structure development, or select adjoining options & average (7 pts max)

	7 pts	Excellent
	5 pts	Good
	3 pts	Fair
(✓)	1 pt	Poor

4b. Check past or ongoing habitat alteration. Assign a point value, or select adjoining options & average (9 pts max)

☒ barrier/road bed/RR grade ☐ mowing or shrub removal ☐ nutrient enrichment/nuisance algae ☐ dredging ☐ farming
☐ selective cutting ☐ coarse woody debris removal ☐ herbicide/chemical treatment ☐ filling/grading ☐ other: _____
☐ clearcutting ☐ grazing ☐ sedimentation ☐ plowing/disking

	9 pts	No Habitat Alteration Apparent: No significant alteration and/or ongoing minor alteration is rare
(✓)	6 pts	Recovered: Significant habitat alteration occurred more than 20 years prior to the assessment and/or ongoing minor habitat alterations only occasional
	3 pts	Recovering: A single significant habitat alteration occurred within 20 years prior to the assessment, and/or ongoing minor alteration is frequent
	1 pt	Recent or No Recovery: Multiple significant habitat alterations have occurred in the 20 years prior to the assessment and/or habitat alteration is ongoing

Metric 5. Special Situations (20 pts max)

5

20 pts max

5a. Add 10 pts if any of these situations apply

High Ecological Value (see Narrative Rating above)
☐ Contains USFWS designated Critical Habitat
☐ Federal/State-listed Threatened or Endangered plant or animal species
☐ S1, S2, S3 Natural Community Type (at least 5 acres or 25% of Wetland)
☐ Southern Bog (at least 5 acres or 25% of Wetland)
☐ Old-Growth / Mature Forested Wetland (at least 5 acres or 25% of Wetland)
☐ Great Lakes Coastal Wetland

5b. Add 5 pts for Forested Wetland

☐ Exhibits combined canopy cover from any group(s) of trees.
Stem DBH must be ≥3 in to qualify as a tree. Must be at least 5 acres or 25% of Wetland

5c. Add 5 pts for Urban/Suburban Wetland

5 Is >50% of the landscape in a 1000-ft radius low-permeability surfaces?

5d. Subtract 10 points for Low Quality Wetland

☐ Is the Wetland less than 1 acre and non-contiguous and either:
1) A stormwater treatment pond excavated from upland or
2) More than 75% covered by highly-invasive vegetation (See Metric 6c)

Metric 6. Vegetation, Interspersion, and Habitat Features (20 pts max)

5

20 pts max

6a. Select the cover score for each Vegetation Component and assign points (9 pts max)

Vegetation Component is >5% acre	>25% of Wetland area	Native species dominate coverage	high native diversity	3 pts
			moderate to low native diversity	2 pts
		invasive or non-native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
	<25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage	moderate native diversity	1 pt
			low native diversity	0 pt
Vegetation Component is <5% acre	>25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage		0 pt
	<25% of Wetland area			0 pt

1	0 to 3 pts	Forest Overstory
2	0 to 3 pts	Shrub/Sapling Component
1	0 to 3 pts	Herbaceous Component

6b. Estimate the total open water and assign points (3 pts max)

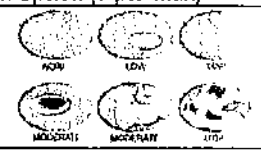
	3 pts	High: 2.5 acres or more
	2 pts	Moderate: 1.0 acres to <2.5 acres
	1 pt	Low: 0.25 acre to <1.0 acre
(✓)	0 pt	Absent: <0.25 acres

6c. Estimate the total coverage of highly invasive species

	-1 pt	Virtually Absent: <1% Aerial Coverage
(✓)	0 pt	Nearly Absent: <5% Aerial Coverage
	-1 pt	Sparse: 5-25% Aerial Coverage
	-3 pts	Moderate: 25-75% Aerial Coverage
	-5 pts	Extensive: >75% Aerial Coverage

6d. Select one horizontal interspersion option (5 pts max)

	5 pts	High Degree of Interspersion
	3 pts	Moderate Degree of Interspersion
(✓)	1 pt	Low Degree of Interspersion
	0 pt	No Interspersion



6e. Determine the amount of habitat features in the Wetland and assign points (12 pts max)

	Absent (0 pt) <1 per acre or 5% of area	Sparse (1 pt) 1 to 5 per acre or 5% to 10% of area	Moderate (2 pts) 6 to 10 per acre or 10% to 50% of area	Dense (3 pts) > 10 per acre or >50% of area
(✓) 0 to 3 pts	Hummocks/Tussocks/Tree Mounds % of area			
1 0 to 3 pts	Coarse Woody Debris (CWD) # per acre			
(✓) 0 to 3 pts	Large Living/Dead Standing Trees (12 in DBH) # per acre			
1 0 to 3 pts	Amphibian Breeding/Nursery Habitat % of area			

Metric 7. Scenic, Recreational and Cultural Value (3 pts max)

0

3 pts max

Select all that apply and assign points

	1 pt	Scenic Value
	1 pt	Recreational Value
	1 pt	Cultural/Historical Value

36 **Total**

Attach location map, aerial photos, and landscape sketch.

DEQ Land and Water Management Division

MICHIGAN RAPID ASSESSMENT METHOD FOR WETLANDS (MiRAM) Field Form Version 2.0

Site Name: Labo-Heads V E	Evaluator: BT / GC	Date: 12/22/07
Approx. how much of the Wetland was reviewed? 50%	Has vegetation within the Wetland been altered and/or buffer areas impacted within the past 5 years? ☐ YES ☒ NO	

Note: The Evaluator must be trained in the MiRAM and should refer to the MiRAM Rating Form and User Manual when using this form.

Narrative Rating

If any of the following questions are answered yes, the Wetland is rated as high functional value and use of the Quantitative Rating is not necessary.

1. Is any part of the Wetland located within an area designated as Critical Habitat and does the Wetland *actually* contain habitat suitable for either the Piping Plover or the Hine's Emerald Dragonfly?	☐ YES ☒ NO
2. Based on the MDNR's Endangered Species Assessment Web site and/or site inspection, do federal/state-listed Threatened or Endangered plant or animal species occur within the Wetland?	☒ YES ☐ NO
3. Is more than 5 acres or more than 25% of the entire Wetland comprised of a Rare Wetland Community Type? Check all Rare Wetland Community Types below. If the Rare Wetland Community is less than 5 acres and less than 25% of the wetland, the rare community should be split off and evaluated separately. ☐ S1 or S2 Natural Community Type ☐ Southern Bog ☐ Old-Growth/Mature Forested Wetland	☐ YES ☒ NO
4. Is any part of the Wetland within 1000 feet of the Ordinary High Water Mark of any of the Great Lakes, including Lake St. Clair?	☐ YES ☒ NO

Quantitative Rating

Circle the appropriate point value(s) and assign the score for each metric. Determine the subtotal for each metric and add to determine the final score.

Metric 1. Wetland Size and Distribution (9 pts max)

6 — 9 pts max

1a. Select a size class (6 pts max)	
6 pts	≥50 acres
5 pts	25 acres to <50 acres
4 pts	10 acres to <25 acres
(3 pts)	3 acres to <10 acres
2 pts	¼ acre to <3 acres
0 pt	less than ¼ acre

1b. Using the NWI, select a scarcity class (3 pts max)	
(3 pts)	0 to 20% of surrounding 2-mile radius is wetland
2 pts	>20 to 80% of surrounding 2-mile radius is wetland
1 pt	>80% of surrounding 2-mile radius is wetland

Metric 2. Buffers and Intensity of Surrounding Land Use (12 pts max)

6 — 12 pts max

2a. Using an aerial photo, select the most appropriate buffer width (6 pts max)	
6 pts	Wide: ≥150 ft around perimeter
(4 pts)	Medium: 75 to <150 ft around perimeter
2 pts	Narrow: 25 to <75 ft around the perimeter
0 pt	Very Narrow: 0 (no buffer) to <25 ft around perimeter

2b. Using an aerial photo, select the surrounding land uses that comprise >25% of the total land use & average (6 pts max)	
6 pts	Very Low Intensity: Maturing forest, natural grassland, prairie, designated wildlife area, other wetland, lake or river
4 pts	Low Intensity: Shrubland/young forest, recent selective logging, hay field, light-y managed parkland, old field, lightly grazed pasture, one lane road/two track
(2 pts)	Moderately High Intensity: (Residential & lawn? manicured parkland, golf course, conservation tillage, recent clear-cut (<10 yrs.), two lane road
1 pt	High Intensity: Commercial, industrial, high-density residential, heavily grazed pasture, row crops, multi-lane paved road, construction activity, parking lot, mining

Metric 3. Hydrology (26 pts max)

15 — 26 pts max

3a Select all sources of water for Wetland	
(1 pt)	Precipitation
(2 pts)	Groundwater
2 pts	Seasonal Intermittent Surface Water
5 pts	Perennial Surface Water

3b. Select all wetland connections that apply	
2 pts	100-year floodplain
(2 pts)	Between a Stream/Lake/Pond and Human Land Use
(2 pts)	Wetland/Upland Complex
2 pts	Riparian Corridor

3c. Select the dominant duration of inundation/saturation, or select all that co-dominate & average (4 pts max)	
(4 pts)	Permanently Inundated
3 pts	Permanently Saturated to Regularly Inundated
2 pts	Regularly Saturated to Seasonally Inundated
1 pt	Seasonally Saturated in the Upper 12 Inches of Soil

3d. Check past or ongoing hydrolgic alterations in or near Wetland. Assign a point value, or select adjoining options & average (8 pts max)

☐ ditch(s) ☐ weir(s) ☐ point-source ☐ dredging
☐ tiles(s) ☐ stormwater inputs ☐ filling/grading ☐ other: _____
☐ dikes(s) ☐ channelization ☐ road bed/RR grade

8 pts	No Hydrologic Alterations Apparent: No significant alteration(s) and/or ongoing minor alteration is rare
6 pts	Recovered: Significant hydrological alteration(s) occurred more than 20 years prior to the assessment and/or ongoing minor hydrological alteration is only occasional
(4 pts)	Recovering: A single significant hydrological alteration occurred within 20 years prior to the assessment, and/or ongoing minor hydrological alteration is frequent
1 pt	Recent or No Recovery: Multiple significant hydrological alterations have occurred in the 20 years prior to the assessment and/or significant alteration(s) is ongoing

27 Subtotal this page

Metric 4. Habitat Alteration and Habitat Structure Development (20 pts max)

14

20 pts max

4a. Check past or ongoing substrate/soil disturbance. Assign a point value, or select adjoining options & average (4 pts max)

☐ erosion ☐ dredging ☐ off-road vehicle use
☐ sedimentation ☐ plowing/disking ☐ construction vehicle use
☐ filling/grading ☐ intensive grazing ☐ other: ____

4 pts	No Substrate Disturbance Apparent: No significant disturbance and/or ongoing minor disturbance is rare
(3 pts)	Recovered: Significant substrate disturbance occurred more than 20 years prior to the assessment and/or ongoing minor substrate disturbance is only occasional
2 pts	Recovering: A single significant substrate disturbance occurred within 20 years prior to the assessment, and/or ongoing minor substrate disturbance is frequent
1 pt	Recent or No Recovery: Multiple significant substrate disturbances have occurred in the 20 years prior to the assessment and/or significant disturbance is ongoing

4c. Select the Wetland's habitat structure development, or select adjoining options & average (7 pts max)

7 pts	Excellent
(5 pts)	Good
3 pts	Fair
1 pt	Poor

4b. Check past or ongoing habitat alteration. Assign a point value, or select adjoining options & average (9 pts max)

☐ barrier/road bed/RR grade ☐ mowing or shrub removal ☐ nutrient enrichment/nuisance algae ☐ dredging ☐ farming
☐ selective cutting ☐ coarse woody debris removal ☐ herbicide/chemical treatment ☐ filling/grading ☐ other: ____
☐ clearcutting ☐ grazing ☐ sedimentation ☐ plowing/disking

9 pts	No Habitat Alteration Apparent: No significant alteration and/or ongoing minor alteration is rare
(6 pts)	Recovered: Significant habitat alteration occurred more than 20 years prior to the assessment and/or ongoing minor habitat alterations only occasional
3 pts	Recovering: A single significant habitat alteration occurred within 20 years prior to the assessment, and/or ongoing minor alteration is frequent
1 pt	Recent or No Recovery: Multiple significant habitat alterations have occurred in the 20 years prior to the assessment and/or habitat alteration is ongoing

Metric 5. Special Situations (20 pts max)

5

20 pts max

5a. Add 10 pts if any of these situations apply

High Ecological Value (see Narrative Rating above)
☐ Contains USFWS designated Critical Habitat
☐ Federal/State-listed Threatened or Endangered plant or animal species
☐ S1, S2, S3 Natural Community Type (at least 5 acres or 25% of Wetland)
☐ Southern Bog (at least 5 acres or 25% of Wetland)
☐ Old-Growth / Mature Forested Wetland (at least 5 acres or 25% of Wetland)
☐ Great Lakes Coastal Wetland

5b. Add 5 pts for Forested Wetland

☐ Exhibits combined canopy cover from any group(s) of trees
Stem DBH must be ≥3 in to qualify as a tree. Must be at least 5 acres or 25% of Wetland

5c. Add 5 pts for Urban/Suburban Wetland

5 Is >50% of the landscape in a 1000-ft radius low-permeability surfaces?

5d. Subtract 10 points for Low Quality Wetland

☐ Is the Wetland less than 1 acre and non-contiguous and either:
1) A stormwater treatment pond excavated from upland or
2) More than 75% covered by highly-invasive vegetation (See Metric 6c)

Metric 6. Vegetation, Interspersion, and Habitat Features (20 pts max)

13

20 pts max

6a. Select the cover score for each Vegetation Component and assign points (9 pts max)

Vegetation Component is >5% cover	>25% of Wetland area	Native species dominate coverage	high native diversity	3 pts
			moderate to low native diversity	2 pts
		invasive or non-native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
	<25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage	moderate native diversity	1 pt
			low native diversity	0 pt
Vegetation Component is <5% cover	>25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage		0 pt
	<25% of Wetland area			0 pt

0	0 to 3 pts	Forest Overstory
2	0 to 3 pts	Shrub/Sapling Component
2	0 to 3 pts	Herbaceous Component

6b. Estimate the total open water and assign points (3 pts max)

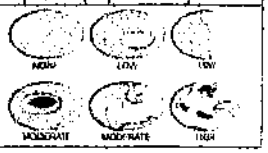
3 pts	High: 2.5 acres or more
2 pts	Moderate: 1.0 acres to <2.5 acres
(1 pt)	Low: 0.25 acre to <1.0 acre
0 pt	Absent: <0.25 acres

6c. Estimate the total coverage of highly invasive species

1 pt	Virtually Absent: <1% Aerial Coverage
0 pt	Nearly Absent: <5% Aerial Coverage
(-1 pt)	Sparse: 5-25% Aerial Coverage
-3 pts	Moderate: 25-75% Aerial Coverage
-5 pts	Extensive: >75% Aerial Coverage

6d. Select one horizontal interspersion option (5 pts max)

5 pts	High Degree of Interspersion
(3 pts)	Moderate Degree of Interspersion
1 pt	Low Degree of Interspersion
0 pt	No Interspersion



6e. Determine the amount of habitat features in the Wetland and assign points (12 pts max)

	Absent (0 pt) <1 per acre or 5% of area	Sparse (1 pt) 1 to 5 per acre or 5% to 10% of area	Moderate (2 pts) 6 to 10 per acre or 10% to 50% of area	Dense (3 pts) > 10 per acre or >50% of area
2	0 to 3 pts	Hummocks/Tussocks/Tree Mounds % of area		
1	0 to 3 pts	Coarse Woody Debris (CWD) # per acre		
2	0 to 3 pts	Large Living/Dead Standing Trees (12 in DBH) # per acre		
1	0 to 3 pts	Amphibian Breeding/Nursery Habitat % of area		

Metric 7. Scenic, Recreational and Cultural Value (3 pts max)

2

3 pts max

Select all that apply and assign points

(1 pt)	Scenic Value
1 pt	Recreational Value
1 pt	Cultural/Historical Value

61 **Total**

Attach location map, aerial photos, and landscape sketch.

DEQ Land and Water Management Division

MICHIGAN RAPID ASSESSMENT METHOD FOR WETLANDS (MiRAM) Field Form Version 2.0

Site Name: Arbor Hills W F	Evaluator:	Date: 12/20/04
Approx. how much of the Wetland was reviewed? 50 %	Has vegetation within the Wetland been altered and/or buffer areas impacted within the past 5 years? ☐ YES ☒ NO	

Note: The Evaluator must be trained in the MiRAM and should refer to the MiRAM Rating Form and User Manual when using this form.

Narrative Rating

If any of the following questions are answered yes, the Wetland is rated as high functional value and use of the Quantitative Rating is not necessary.

1. Is any part of the Wetland located within an area designated as Critical Habitat and does the Wetland *actually* contain habitat suitable for either the Piping Plover or the Hine's Emerald Dragonfly?	☐ YES ☒ NO
2. Based on the MDNR's Endangered Species Assessment Web site and/or site inspection, do federal/state-listed Threatened or Endangered plant or animal species occur within the Wetland?	☒ YES ☐ NO
3. Is more than 5 acres or more than 25% of the entire Wetland comprised of a Rare Wetland Community Type? Check all Rare Wetland Community Types below. If the Rare Wetland Community is less than 5 acres and less than 25% of the wetland, the rare community should be split off and evaluated separately. ☐ S1 or S2 Natural Community Type ☐ Southern Bog ☐ Old-Growth/Mature Forested Wetland	☐ YES ☒ NO
4. Is any part of the Wetland within 1000 feet of the Ordinary High Water Mark of any of the Great Lakes, including Lake St. Clair?	☐ YES ☒ NO

Quantitative Rating

Circle the appropriate point value(s) and assign the score for each metric. Determine the subtotal for each metric and add to determine the final score.

6 — Metric 1. Wetland Size and Distribution (9 pts max)

9 pts max

1a. Select a size class (6 pts max)

6 pts	≥50 acres
5 pts	25 acres to <50 acres
4 pts	10 acres to <25 acres
(3 pts)	3 acres to <10 acres
2 pts	¼ acre to <3 acres
0 pt	less than ¼ acre

1b. Using the NWI, select a scarcity class (3 pts max)

(3 pts)	0 to 20% of surrounding 2-mile radius is wetland
2 pts	>20 to 80% of surrounding 2-mile radius is wetland
1 pt	>80% of surrounding 2-mile radius is wetland

8 — Metric 2. Buffers and Intensity of Surrounding Land Use (12 pts max)

12 pts max

2a. Using an aerial photo, select the most appropriate buffer width (6 pts max)

(6 pts)	Wide: ≥150 ft around perimeter
4 pts	Medium: 75 to <150 ft around perimeter
2 pts	Narrow: 25 to <75 ft around the perimeter
0 pt	Very Narrow: 0 (no buffer) to <25 ft around perimeter

2b. Using an aerial photo, select the surrounding land uses that comprise >25% of the total land use & average (6 pts max)

6 pts	Very Low Intensity: Maturing forest, natural grassland, prairie, designated wildlife area, other wetland, lake or river
4 pts	Low Intensity: Shrubland/young forest, recent selective logging, hay field, lightly managed parkland, old field, lightly grazed pasture, one lane road/two track
(2 pts)	Moderately High Intensity: Residential & lawns, manicured parkland, golf course, conservation tillage, recent clear-cut (<10 yrs.), two lane road
1 pt	High Intensity: Commercial, industrial, high-density residential, heavily grazed pasture, row crops, multi-lane paved road, construction activity, parking lot, mining

12 — Metric 3. Hydrology (26 pts max)

26 pts max

3a Select all sources of water for Wetland

(1 pt)	Precipitation
(2 pts)	Groundwater
(2 pts)	Seasonal Intermittent Surface Water
5 pts	Perennial Surface Water

3b. Select all wetland connections that apply

2 pts	100-year floodplain
(2 pts)	Between a Stream/Lake/Pond and Human Land Use
(2 pts)	Wetland/Upland Complex
2 pts	Riparian Corridor

3c. Select the dominant duration of inundation/saturation, or select all that co-dominate & average (4 pts max)

4 pts	Permanently Inundated
(3 pts)	Permanently Saturated to Regularly Inundated
2 pts	Regularly Saturated to Seasonally Inundated
1 pt	Seasonally Saturated in the Upper 12 Inches of Soil

3d. Check past or ongoing hydrologic alterations in or near Wetland. Assign a point value, or select adjoining options & average (8 pts max)

☐ ditch(s) ☐ weir(s) ☐ point-source ☐ dredging
☐ tiles(s) ☒ stormwater inputs ☐ filling/grading ☐ other: _____
☐ dikes(s) ☐ channelization ☐ road bed/RR grade

8 pts	No Hydrologic Alterations Apparent: No significant alteration(s) and/or ongoing minor alteration is rare
6 pts	Recovered: Significant hydrological alteration(s) occurred more than 20 years prior to the assessment and/or ongoing minor hydrological alteration is only occasional
(4 pts)	Recovering: A single significant hydrological alteration occurred within 20 years prior to the assessment, and/or ongoing minor hydrological alteration is frequent
1 pt	Recent or No Recovery: Multiple significant hydrological alterations have occurred in the 20 years prior to the assessment and/or significant alteration(s) is ongoing

26 Subtotal this page

Metric 4. Habitat Alteration and Habitat Structure Development (20 pts max)

14 — 20 pts max

4a. Check past or ongoing substrate/soil disturbance. Assign a point value, or select adjoining options & average (4 pts max)

☐ erosion	☐ dredging	☐ off-road vehicle use
☐ sedimentation	☐ plowing/disking	☐ construction vehicle use
☐ filling/grading	☐ intensive grazing	☐ other:

4 pts	No Substrate Disturbance Apparent: No significant disturbance and/or ongoing minor disturbance is rare
(3 pts)	Recovered: Significant substrate disturbance occurred more than 20 years prior to the assessment and/or ongoing minor substrate disturbance is only occasional
2 pts	Recovering: A single significant substrate disturbance occurred within 20 years prior to the assessment, and/or ongoing minor substrate disturbance is frequent
1 pt	Recent or No Recovery: Multiple significant substrate disturbances have occurred in the 20 years prior to the assessment and/or significant disturbance is ongoing

4c. Select the Wetland's habitat structure development, or select adjoining options & average (7 pts max)

7 pts	Excellent
(5 pts)	Good
3 pts	Fair
1 pt	Poor

4b. Check past or ongoing habitat alteration. Assign a point value, or select adjoining options & average (9 pts max)

☐ barrier/road bed/RR grade	☐ mowing or shrub removal	☐ nutrient enrichment/nuisance algae	☐ dredging	☐ farming
☐ selective cutting	☐ coarse woody debris removal	☐ herbicide/chemical treatment	☐ filling/grading	☐ other:
☐ clearcutting	☐ grazing	☐ sedimentation	☐ plowing/disking	

9 pts	No Habitat Alteration Apparent: No significant alteration and/or ongoing minor alteration is rare
(6 pts)	Recovered: Significant habitat alteration occurred more than 20 years prior to the assessment and/or ongoing minor habitat alterations only occasional
3 pts	Recovering: A single significant habitat alteration occurred within 20 years prior to the assessment, and/or ongoing minor alteration is frequent
1 pt	Recent or No Recovery: Multiple significant habitat alterations have occurred in the 20 years prior to the assessment and/or habitat alteration is ongoing

Metric 5. Special Situations (20 pts max)

10 — 20 pts max

5a. Add 10 pts if any of these situations apply

High Ecological Value (see Narrative Rating above)
- ☐ Contains USFWS designated Critical Habitat
- ☐ Federal/State-listed Threatened or Endangered plant or animal species
- ☐ S1, S2, S3 Natural Community Type (at least 5 acres or 25% of Wetland)
- ☐ Southern Bog (at least 5 acres or 25% of Wetland)
- ☐ Old-Growth / Mature Forested Wetland (at least 5 acres or 25% of Wetland)
- ☐ Great Lakes Coastal Wetland

5b. Add 5 pts for Forested Wetland

5 — Exhibits combined canopy cover from any group(s) of trees. Stem DBH must be ≥3 in to qualify as a tree. Must be at least 5 acres or 25% of Wetland

5c. Add 5 pts for Urban/Suburban Wetland

5 — Is >50% of the landscape in a 1000-ft radius low-permeability surfaces?

5d. Subtract 10 points for Low Quality Wetland

Is the Wetland less than 1 acre and non-contiguous and either:
1) A stormwater treatment pond excavated from upland or
2) More than 75% covered by highly-invasive vegetation (See Metric 6c)

Metric 6. Vegetation, Interspersion, and Habitat Features (20 pts max)

15 — 20 pts max

6a. Select the cover score for each Vegetation Component and assign points (9 pts max)

Vegetation Component is >¼ acre	>25% of Wetland area	Native species dominate coverage	high native diversity	3 pts
			moderate to low native diversity	2 pts
		invasive or non-native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
	<25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage	moderate native diversity	1 pt
			low native diversity	0 pt
Vegetation Component is <¼ acre	>25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage		0 pt
	<25% of Wetland area			0 pt

1	0 to 3 pts	Forest Overstory
2	0 to 3 pts	Shrub/Sapling Component
1	0 to 3 pts	Herbaceous Component

6b. Estimate the total open water and assign points (3 pts max)

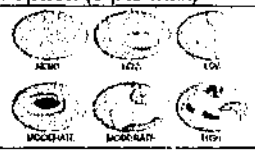
3 pts	High: 2.5 acres or more
2 pts	Moderate: 1.0 acres to <2.5 acres
(1 pt)	Low: 0.25 acre to <1.0 acre
0 pt	Absent: <0.25 acres

6c. Estimate the total coverage of highly invasive species

1 pt	Virtually Absent: <1% Aerial Coverage
0 pt	Nearly Absent: <5% Aerial Coverage
(-1 pt)	Sparse: 5-25% Aerial Coverage
-3 pts	Moderate: 25-75% Aerial Coverage
-5 pts	Extensive: >75% Aerial Coverage

6d. Select one horizontal interspersion option (5 pts max)

5 pts	High Degree of Interspersion
3 pts	Moderate Degree of Interspersion
(1 pt)	Low Degree of Interspersion
0 pt	No Interspersion



6e. Determine the amount of habitat features in the Wetland and assign points (12 pts max)

	Absent (0 pt)	Sparse (1 pt)	Moderate (2 pts)	Dense (3 pts)
	<1 per acre or 5% of area	1 to 5 per acre or 5% to 10% of area	6 to 10 per acre or 10% to 50% of area	> 10 per acre or >50% of area
1	0 to 3 pts	Hummocks/Tussocks/Tree Mounds % of area		
3	0 to 3 pts	Coarse Woody Debris (CWD) # per acre		
2	0 to 3 pts	Large Living/Dead Standing Trees (12 in DBH) # per acre		
2	0 to 3 pts	Amphibian Breeding/Nursery Habitat % of area		

Metric 7. Scenic, Recreational and Cultural Value (3 pts max)

1 — 3 pts max

Select all that apply and assign points

(1 pt)	1 pt	Scenic Value
	1 pt	Recreational Value
	1 pt	Cultural/Historical Value

66 — **Total**

Attach location map, aerial photos, and landscape sketch.

DEQ Land and Water Management Division

MICHIGAN RAPID ASSESSMENT METHOD FOR WETLANDS (MiRAM) Field Form Version 2.0

Site Name: Arbor Hills W 6	Evaluator: BL DC	Date: 12/22/04
Approx. how much of the Wetland was reviewed? 100 %	Has vegetation within the Wetland been altered and/or buffer areas impacted within the past 5 years? ☒ YES ☐ NO	

Note: The Evaluator must be trained in the MiRAM and should refer to the MiRAM Rating Form and User Manual when using this form.

Narrative Rating

If any of the following questions are answered yes, the Wetland is rated as high functional value and use of the Quantitative Rating is not necessary.

1. Is any part of the Wetland located within an area designated as Critical Habitat and does the Wetland *actually* contain habitat suitable for either the Piping Plover or the Hine's Emerald Dragonfly?	☐ YES ☒ NO
2. Based on the MDNR's Endangered Species Assessment Web site and/or site inspection, do federal/state-listed Threatened or Endangered plant or animal species occur within the Wetland?	☒ YES ☐ NO
3. Is more than 5 acres or more than 25% of the entire Wetland comprised of a Rare Wetland Community Type? Check all Rare Wetland Community Types below. If the Rare Wetland Community is less than 5 acres and less than 25% of the wetland, the rare community should be split off and evaluated separately. ☐ S1 or S2 Natural Community Type ☐ Southern Bog ☐ Old-Growth/Mature Forested Wetland	☐ YES ☒ NO
4. Is any part of the Wetland within 1000 feet of the Ordinary High Water Mark of any of the Great Lakes, including Lake St. Clair?	☐ YES ☒ NO

Quantitative Rating

Circle the appropriate point value(s) and assign the score for each metric. Determine the subtotal for each metric and add to determine the final score.

3 — Metric 1. Wetland Size and Distribution (9 pts max)

9 pts max

1a. Select a size class (6 pts max)	
6 pts	≥50 acres
5 pts	25 acres to <50 acres
4 pts	10 acres to <25 acres
3 pts	3 acres to <10 acres
2 pts	¼ acre to <3 acres
(0 pt)	less than ¼ acre

1b. Using the NWI, select a scarcity class (3 pts max)	
(3 pts)	0 to 20% of surrounding 2-mile radius is wetland
2 pts	>20 to 80% of surrounding 2-mile radius is wetland
1 pt	>80% of surrounding 2-mile radius is wetland

1 — Metric 2. Buffers and Intensity of Surrounding Land Use (12 pts max)

12 pts max

2a. Using an aerial photo, select the most appropriate buffer width (6 pts max)	
6 pts	Wide: ≥150 ft around perimeter
4 pts	Medium: 75 to <150 ft around perimeter
2 pts	Narrow: 25 to <75 ft around the perimeter
(0 pt)	Very Narrow: 0 (no buffer) to <25 ft around perimeter

2b. Using an aerial photo, select the surrounding land uses that comprise >25% of the total land use & average (6 pts max)	
6 pts	Very Low Intensity: Maturing forest, natural grassland, prairie, designated wildlife area, other wetland, lake or river
4 pts	Low Intensity: Shrubland/young forest, recent selective logging, hay field, lightly managed parkland, old field, lightly grazed pasture, one lane road/two track
2 pts	Moderately High Intensity: Residential & lawns, manicured parkland, golf course, conservation tillage, recent clear-cut (<10 yrs.), two lane road
(1 pt)	High Intensity: Commercial, industrial, high-density residential, heavily grazed pasture, row crops, multi-lane paved road, construction activity, parking lot, mining

6 — Metric 3. Hydrology (26 pts max)

26 pts max

3a Select all sources of water for Wetland	
(1 pt)	Precipitation
2 pts	Groundwater
2 pts	Seasonal Intermittent Surface Water
5 pts	Perennial Surface Water

3b. Select all wetland connections that apply	
2 pts	100-year floodplain
2 pts	Between a Stream/Lake/Pond and Human Land Use
(2 pts)	Wetland/Upland Complex
2 pts	Riparian Corridor

3c. Select the dominant duration of inundation/saturation, or select all that co-dominate & average (4 pts max)	
4 pts	Permanently Inundated
3 pts	Permanently Saturated to Regularly Inundated
(2 pts)	Regularly Saturated to Seasonally Inundated
1 pt	Seasonally Saturated in the Upper 12 Inches of Soil

3d. Check past or ongoing hydrolgic alterations in or near Wetland. Assign a point value, or select adjoining options & average (8 pts max)

☐ ditch(s) ☐ weir(s) ☐ point-source ☐ dredging
☐ tiles(s) ☐ stormwater inputs ☐ filling/grading ☐ other: _____
☐ dikes(s) ☐ channelization ☐ road bed/RR grade

8 pts	No Hydrologic Alterations Apparent: No significant alteration(s) and/or ongoing minor alteration is rare
6 pts	Recovered: Significant hydrological alteration(s) occurred more than 20 years prior to the assessment and/or ongoing minor hydrological alteration is only occasional
4 pts	Recovering: A single significant hydrological alteration occurred within 20 years prior to the assessment, and/or ongoing minor hydrological alteration is frequent
(1 pt)	Recent or No Recovery: Multiple significant hydrological alterations have occurred in the 20 years prior to the assessment and/or significant alteration(s) is ongoing

10 Subtotal this page

Metric 4. Habitat Alteration and Habitat Structure Development (20 pts max)

5

20 pts max

4a. Check past or ongoing substrate/soil disturbance. Assign a point value, or select adjoining options & average (4 pts max)

☐ erosion	☐ dredging	☐ off-road vehicle use
☐ sedimentation	☐ plowing/disking	☐ construction vehicle use
☐ filling/grading	☐ intensive grazing	☐ other:

4 pts	No Substrate Disturbance Apparent: No significant disturbance and/or ongoing minor disturbance is rare
3 pts	Recovered: Significant substrate disturbance occurred more than 20 years prior to the assessment and/or ongoing minor substrate disturbance is only occasional
2 pts	Recovering: A single significant substrate disturbance occurred within 20 years prior to the assessment, and/or ongoing minor substrate disturbance is frequent
(1 pt)	Recent or No Recovery: Multiple significant substrate disturbances have occurred in the 20 years prior to the assessment and/or significant disturbance is ongoing

4c. Select the Wetland's habitat structure development, or select adjoining options & average (7 pts max)

7 pts	Excellent
5 pts	Good
3 pts	Fair
(1 pt)	Poor

4b. Check past or ongoing habitat alteration. Assign a point value, or select adjoining options & average (9 pts max)

☒ barrier/road bed/RR grade	☐ mowing or shrub removal	☐ nutrient enrichment/nuisance algae	☐ dredging	☐ farming
☐ selective cutting	☒ coarse woody debris removal	☐ herbicide/chemical treatment	☐ filling/grading	☐ other: _____
☐ clearcutting	☐ grazing	☐ sedimentation	☐ plowing/disking	

9 pts	No Habitat Alteration Apparent: No significant alteration and/or ongoing minor alteration is rare
6 pts	Recovered: Significant habitat alteration occurred more than 20 years prior to the assessment and/or ongoing minor habitat alterations only occasional
(3 pts)	Recovering: A single significant habitat alteration occurred within 20 years prior to the assessment, and/or ongoing minor alteration is frequent
1 pt	Recent or No Recovery: Multiple significant habitat alterations have occurred in the 20 years prior to the assessment and/or habitat alteration is ongoing

Metric 5. Special Situations (20 pts max)

-5

20 pts max

5a. Add 10 pts if any of these situations apply

High Ecological Value (see Narrative Rating above)
- ☐ Contains USFWS designated Critical Habitat
- ☐ Federal/State-listed Threatened or Endangered plant or animal species
- ☐ S1, S2, S3 Natural Community Type (at least 5 acres or 25% of Wetland)
- ☐ Southern Bog (at least 5 acres or 25% of Wetland)
- ☐ Old-Growth / Mature Forested Wetland (at least 5 acres or 25% of Wetland)
- ☐ Great Lakes Coastal Wetland

5b. Add 5 pts for Forested Wetland

☐ Exhibits combined canopy cover from any group(s) of trees.
Stem DBH must be ≥3 in to qualify as a tree. Must be at least 5 acres or 25% of Wetland

5c. Add 5 pts for Urban/Suburban Wetland

5 Is >50% of the landscape in a 1000-ft radius low-permeability surfaces?

5d. Subtract 10 points for Low Quality Wetland

X Is the Wetland less than 1 acre and non-contiguous and either:
1) A stormwater treatment pond excavated from upland or
2) More than 75% covered by highly-invasive vegetation (See Metric 6c)

Metric 6. Vegetation, Interspersion, and Habitat Features (20 pts max)

2

20 pts max

6a. Select the cover score for each Vegetation Component and assign points (9 pts max)

Vegetation Component is >¼ acre	>25% of Wetland area	Native species dominate coverage	high native diversity	3 pts
			moderate to low native diversity	2 pts
		invasive or non-native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
	<25% of Wetland area	Native species dominate coverage	moderate to high native diversity	1 pt
			low native diversity	1 pt
		invasive or non-native species dominate coverage	moderate native diversity	1 pt
			low native diversity	0 pt
Vegetation Component is <¼ acre	>25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage		0 pt
	<25% of Wetland area			0 pt

	0 to 3 pts	Forest Overstory
	0 to 3 pts	Shrub/Sapling Component
	0 to 3 pts	Herbaceous Component

6b. Estimate the total open water and assign points (3 pts max)

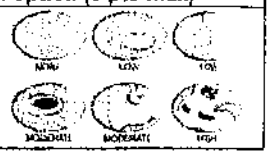
3 pts	High: 2.5 acres or more
2 pts	Moderate: 1.0 acres to <2.5 acres
1 pt	Low: 0.25 acre to <1.0 acre
(0 pt)	Absent: <0.25 acres

6c. Estimate the total coverage of highly invasive species

1 pt	Virtually Absent: <1% Aerial Coverage
0 pt	Nearly Absent: <5% Aerial Coverage
(-1 pt)	Sparse: 5-25% Aerial Coverage
-3 pts	Moderate: 25-75% Aerial Coverage
-5 pts	Extensive: >75% Aerial Coverage

6d. Select one horizontal interspersion option (5 pts max)

5 pts	High Degree of Interspersion
3 pts	Moderate Degree of Interspersion
1 pt	Low Degree of Interspersion
(0 pt)	No Interspersion



6e. Determine the amount of habitat features in the Wetland and assign points (12 pts max)

	Absent (0 pt) <1 per acre or 5% of area	Sparse (1 pt) 1 to 5 per acre or 5% to 10% of area	Moderate (2 pts) 6 to 10 per acre or 10% to 50% of area	Dense (3 pts) > 10 per acre or >50% of area
	0 to 3 pts	Hummocks/Tussocks/Tree Mounds % of area		
	0 to 3 pts	Coarse Woody Debris (CWD) # per acre		
	0 to 3 pts	Large Living/Dead Standing Trees (12 in DBH) # per acre		
	0 to 3 pts	Amphibian Breeding/Nursery Habitat % of area		

Metric 7. Scenic, Recreational and Cultural Value (3 pts max)

0

3 pts max

Select all that apply and assign points

	1 pt	Scenic Value
	1 pt	Recreational Value
	1 pt	Cultural/Historical Value

12 **Total**

Attach location map, aerial photos, and landscape sketch.

DEQ Land and Water Management Division

MICHIGAN RAPID ASSESSMENT METHOD FOR WETLANDS (MiRAM) Field Form Version 2.0

Site Name: Arbor Hills #H	Evaluator: BJT	Date: 12/22/09
Approx. how much of the Wetland was reviewed? 80 %	Has vegetation within the Wetland been altered and/or buffer areas impacted within the past 5 years? ☐ YES ☒ NO	

Note: The Evaluator must be trained in the MiRAM and should refer to the MiRAM Rating Form and User Manual when using this form.

Narrative Rating

If any of the following questions are answered yes, the Wetland is rated as high functional value and use of the Quantitative Rating is not necessary.

1. Is any part of the Wetland located within an area designated as Critical Habitat and does the Wetland *actually* contain habitat suitable for either the Piping Plover or the Hine's Emerald Dragonfly?	☐ YES ☒ NO
2. Based on the MDNR's Endangered Species Assessment Web site and/or site inspection, do federal/state-listed Threatened or Endangered plant or animal species occur within the Wetland?	☒ YES ☐ NO
3. Is more than 5 acres or more than 25% of the entire Wetland comprised of a Rare Wetland Community Type? Check all Rare Wetland Community Types below. If the Rare Wetland Community is less than 5 acres and less than 25% of the wetland, the rare community should be split off and evaluated separately. ☐ S1 or S2 Natural Community Type ☐ Southern Bog ☐ Old-Growth/Mature Forested Wetland	☐ YES ☒ NO
4. Is any part of the Wetland within 1000 feet of the Ordinary High Water Mark of any of the Great Lakes, including Lake St. Clair?	☐ YES ☒ NO

Quantitative Rating

Circle the appropriate point value(s) and assign the score for each metric. Determine the subtotal for each metric and add to determine the final score.

6 — **Metric 1. Wetland Size and Distribution (9 pts max)**

9 pts max

1a. Select a size class (6 pts max)		
	6 pts	≥50 acres
	5 pts	25 acres to <50 acres
	4 pts	10 acres to <25 acres
(circled)	3 pts	3 acres to <10 acres
	2 pts	¼ acre to <3 acres
	0 pt	less than ¼ acre

1b. Using the NWI, select a scarcity class (3 pts max)		
(circled)	3 pts	0 to 20% of surrounding 2-mile radius is wetland
	2 pts	>20 to 80% of surrounding 2-mile radius is wetland
	1 pt	>80% of surrounding 2-mile radius is wetland

4 — **Metric 2. Buffers and Intensity of Surrounding Land Use (12 pts max)**

12 pts max

2a. Using an aerial photo, select the most appropriate buffer width (6 pts max)		
	6 pts	Wide: ≥150 ft around perimeter
	4 pts	Medium: 75 to <150 ft around perimeter
(circled)	2 pts	Narrow: 25 to <75 ft around the perimeter
	0 pt	Very Narrow: 0 (no buffer) to <26 ft around perimeter

2b. Using an aerial photo, select the surrounding land uses that comprise >25% of the total land use & average (6 pts max)		
	6 pts	Very Low Intensity: Maturing forest, natural grassland, prairie, designated wildlife area, other wetland, lake or river
	4 pts	Low Intensity: Shrubland/young forest, recent selective logging, hay field, lightly managed parkland, old field, lightly grazed pasture, one lane road/two track
(circled)	2 pts	Moderately High Intensity: Residential & lawns, manicured parkland, golf course, conservation tillage, recent clear-cut (<10 yrs), two lane road
	1 pt	High Intensity: Commercial, industrial, high-density residential, heavily grazed pasture, row crops, multi-lane paved road, construction activity, parking lot, mining

10 — **Metric 3. Hydrology (26 pts max)**

26 pts max

3a Select all sources of water for Wetland		
X	1 pt	Precipitation
X	2 pts	Groundwater
	2 pts	Seasonal Intermittent Surface Water
	5 pts	Perennial Surface Water

3b. Select all wetland connections that apply		
	2 pts	100-year floodplain
	2 pts	Between a Stream/Lake/Pond and Human Land Use
X	2 pts	Wetland/Upland Complex
	2 pts	Riparian Corridor

3c. Select the dominant duration of inundation/saturation, or select all that co-dominate & average (4 pts max)		
X	4 pts	Permanently Inundated
	3 pts	Permanently Saturated to Regularly Inundated
	2 pts	Regularly Saturated to Seasonally Inundated
	1 pt	Seasonally Saturated in the Upper 12 inches of Soil

3d. Check past or ongoing hydrologic alterations in or near Wetland. Assign a point value, or select adjoining options & average (8 pts max)

☐ ditch(s) ☐ weir(s) ☒ point-source ☐ dredging
☐ lilet(s) ☒ stormwater inputs ☐ filling/grading ☐ other: _____
☐ dikes(s) ☐ channelization ☐ road bed/RR grade

	8 pts	No Hydrologic Alterations Apparent: No significant alteration(s) and/or ongoing minor alteration is rare
	6 pts	Recovered: Significant hydrological alteration(s) occurred more than 20 years prior to the assessment and/or ongoing minor hydrological alteration is only occasional
	4 pts	Recovering: A single significant hydrological alteration occurred within 20 years prior to the assessment, and/or ongoing minor hydrological alteration is frequent
(circled)	1 pt	Recent or No Recovery: Multiple significant hydrological alterations have occurred in the 20 years prior to the assessment and/or significant alteration(s) is ongoing

20 Subtotal this page

Metric 4. Habitat Alteration and Habitat Structure Development (20 pts max)

12

20 pts max

4a. Check past or ongoing substrate/soil disturbance. Assign a point value, or select adjoining options & average (4 pts max)

☐ erosion ☐ dredging ☐ off-road vehicle use
☐ sedimentation ☐ plowing/disking ☐ construction vehicle use
☐ filling/grading ☐ intensive grazing ☐ other: _____

4 pts	No Substrate Disturbance Apparent: No significant disturbance and/or ongoing minor disturbance is rare
3 pts	Recovered: Significant substrate disturbance occurred more than 20 years prior to the assessment and/or ongoing minor substrate disturbance is only occasional
2 pts	Recovering: A single significant substrate disturbance occurred within 20 years prior to the assessment, and/or ongoing minor substrate disturbance is frequent
1 pt	Recent or No Recovery: Multiple significant substrate disturbances have occurred in the 20 years prior to the assessment and/or significant disturbance is ongoing

4c. Select the Wetland's habitat structure development, or select adjoining options & average (7 pts max)

7 pts	Excellent
5 pts	Good
3 pts	Fair Down trees, Dead but Mere Veg ?
1 pt	Poor

4b. Check past or ongoing habitat alteration. Assign a point value, or select adjoining options & average (9 pts max)

☐ barrier/road bed/RR grade ☐ mowing or shrub removal ☐ nutrient enrichment/nuisance algae ☐ dredging ☐ farming
☐ selective cutting ☐ coarse woody debris removal ☐ herbicide/chemical treatment ☐ filling/grading ☐ other: _____
☐ clearcutting ☐ grazing ☐ sedimentation ☐ plowing/disking

9 pts	No Habitat Alteration Apparent: No significant alteration and/or ongoing minor alteration is rare
6 pts	Recovered: Significant habitat alteration occurred more than 20 years prior to the assessment and/or ongoing minor habitat alterations only occasional
3 pts	Recovering: A single significant habitat alteration occurred within 20 years prior to the assessment, and/or ongoing minor alteration is frequent
1 pt	Recent or No Recovery: Multiple significant habitat alterations have occurred in the 20 years prior to the assessment and/or habitat alteration is ongoing

Metric 5. Special Situations (20 pts max)

5

20 pts max

5a. Add 10 pts if any of these situations apply

High Ecological Value (see Narrative Rating above)
☐ Contains USFWS designated Critical Habitat
☐ Federal/State-listed Threatened or Endangered plant or animal species
☐ S1, S2, S3 Natural Community Type (at least 5 acres or 25% of Wetland)
☐ Southern Bog (at least 5 acres or 25% of Wetland)
☐ Old-Growth / Mature Forested Wetland (at least 5 acres or 25% of Wetland)
☐ Great Lakes Coastal Wetland

5b. Add 5 pts for Forested Wetland

Exhibits combined canopy cover from any group(s) of trees.
Stem DBH must be ≥3 in to qualify as a tree. Must be at least 5 acres or 25% of Wetland

5c. Add 5 pts for Urban/Suburban Wetland

X Is >50% of the landscape in a 1000-ft radius low-permeability surfaces?

5d. Subtract 10 points for Low Quality Wetland

Is the Wetland less than 1 acre and non-contiguous and either:
1) A stormwater treatment pond excavated from upland or
2) More than 75% covered by highly-invasive vegetation (See Metric 6c)

Metric 6. Vegetation, Interspersion, and Habitat Features (20 pts max)

7

20 pts max

6a. Select the cover score for each Vegetation Component and assign points (9 pts max)

Vegetation Component is >¼ acre	>25% of Wetland area	Native species dominate coverage	high native diversity	3 pts
			moderate to low native diversity	2 pts
		Invasive or non-native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
	<25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		Invasive or non-native species dominate coverage	moderate native diversity	1 pt
			low native diversity	0 pt
Vegetation Component is <¼ acre	>25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		Invasive or non-native species dominate coverage		0 pt
	<25% of Wetland area			0 pt

1	0 to 3 pts	Forest Overstory Pole Bank 1800
1	0 to 3 pts	Shrub/Sapling Component
1	0 to 3 pts	Herbaceous Component Cattails

6b. Estimate the total open water and assign points (3 pts max)

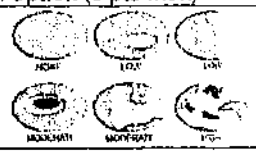
3 pts	High: 2.5 acres or more
2 pts	Moderate: 1.0 acres to <2.5 acres
1 pt	Low: 0.25 acre to <1.0 acre
0 pt	Absent: <0.25 acres

6c. Estimate the total coverage of highly invasive species

1 pt	Virtually Absent: <1% Aerial Coverage
0 pt	Nearly Absent: <5% Aerial Coverage
-1 pt	Sparse: 5-25% Aerial Coverage
-3 pts	Moderate: 25-75% Aerial Coverage
-5 pts	Extensive: >75% Aerial Coverage

6d. Select one horizontal interspersion option (5 pts max)

5 pts	High Degree of Interspersion
3 pts	Moderate Degree of Interspersion
1 pt	Low Degree of Interspersion
0 pt	No Interspersion



6e. Determine the amount of habitat features in the Wetland and assign points (12 pts max)

	Absent (0 pt) <1 per acre or 5% of area	Sparse (1 pt) 1 to 5 per acre or 5% to 10% of area	Moderate (2 pts) 6 to 10 per acre or 10% to 50% of area	Dense (3 pts) > 10 per acre or >50% of area
0 to 3 pts	Hummocks/Tussocks/Tree Mounds % of area			
1	0 to 3 pts	Coarse Woody Debris (CWD) # per acre		
1	0 to 3 pts	Large Living/Dead Standing Trees (12 in DBH) # per acre		
1	0 to 3 pts	Amphibian Breeding/Nursery Habitat % of area		

Metric 7. Scenic, Recreational and Cultural Value (3 pts max)

1

3 pts max

Select all that apply and assign points

1 pt	Scenic Value
1 pt	Recreational Value
1 pt	Cultural/Historical Value

46

Total

Attach location map, aerial photos, and landscape sketch.

DEQ Land and Water Management Division

MICHIGAN RAPID ASSESSMENT METHOD FOR WETLANDS (MiRAM)
Field Form Version 2.0

Site Name: Ann Arbor Hills W I	Evaluator: [illegible]	Date: 12/22/09
Approx. how much of the Wetland was reviewed? 80 %	Has vegetation within the Wetland been altered and/or buffer areas impacted within the past 5 years? ☐ YES ☒ NO	

Note: The Evaluator must be trained in the MiRAM and should refer to the MiRAM Rating Form and User Manual when using this form.

Narrative Rating

If any of the following questions are answered yes, the Wetland is rated as high functional value and use of the Quantitative Rating is not necessary

1. Is any part of the Wetland located within an area designated as Critical Habitat and does the Wetland *actually* contain habitat suitable for either the Piping Plover or the Hine's Emerald Dragonfly?	☐ YES ☒ NO
2. Based on the MDNR's Endangered Species Assessment Web site and/or site inspection, do federal/state-listed Threatened or Endangered plant or animal species occur within the Wetland?	☒ YES ☐ NO
3. Is more than 5 acres or more than 25% of the entire Wetland comprised of a Rare Wetland Community Type? Check all Rare Wetland Community Types below. If the Rare Wetland Community is less than 5 acres and less than 25% of the wetland, the rare community should be split off and evaluated separately. ☐ S1 or S2 Natural Community Type ☐ Southern Bog ☐ Old-Growth/Mature Forested Wetland	☐ YES ☒ NO
4. Is any part of the Wetland within 1000 feet of the Ordinary High Water Mark of any of the Great Lakes, including Lake St. Clair?	☐ YES ☒ NO

Quantitative Rating

Circle the appropriate point value(s) and assign the score for each metric. Determine the subtotal for each metric and add to determine the final score.

5 — 9 pts max

Metric 1. Wetland Size and Distribution (9 pts max)

1a. Select a size class (6 pts max)	
6 pts	≥50 acres
5 pts	25 acres to <50 acres
4 pts	10 acres to <25 acres
3 pts	3 acres to <10 acres
(2 pts)	¼ acre to <3 acres
0 pt	less than ¼ acre

1b. Using the NWI, select a scarcity class (3 pts max)	
(3 pts)	0 to 20% of surrounding 2-mile radius is wetland
2 pts	>20 to 80% of surrounding 2-mile radius is wetland
1 pt	>80% of surrounding 2-mile radius is wetland

4 — 12 pts max

Metric 2. Buffers and Intensity of Surrounding Land Use (12 pts max)

2a. Using an aerial photo, select the most appropriate buffer width (6 pts max)	
6 pts	Wide: ≥150 ft around perimeter
4 pts	Medium: 75 to <150 ft around perimeter
(2 pts)	Narrow: 25 to <75 ft around the perimeter
0 pt	Very Narrow: 0 (no buffer) to <25 ft around perimeter

2b. Using an aerial photo, select the surrounding land uses that comprise >25% of the total land use & average (6 pts max)	
6 pts	Very Low Intensity: Maturing forest, natural grassland, prairie, designated wildlife area, other wetland, lake or river
4 pts	Low Intensity: Shrubland/young forest, recent selective logging, hay field, lightly managed parkland, old field, lightly grazed pasture, one lane road/two track
(2 pts)	Moderately High Intensity: Residential & lawns, manicured parkland, golf course, conservation tillage, recent clear-cut (<10 yrs.), two lane road
1 pt	High Intensity: Commercial industrial, high-density residential, heavily grazed pasture, row crops, multi-lane paved road, construction activity, parking lot, mining

12 — 26 pts max

Metric 3. Hydrology (26 pts max)

3a Select all sources of water for Wetland		
X	1 pt	Precipitation
X	2 pts	Groundwater
	2 pts	Seasonal Intermittent Surface Water
	5 pts	Perennial Surface Water

3b. Select all wetland connections that apply		
	2 pts	100-year floodplain
	2 pts	Between a Stream/Lake/Pond and Human Land Use
X	2 pts	Wetland/Upland Complex
	2 pts	Riparian Corridor

3c. Select the dominant duration of inundation/saturation, or select all that co-dominate & average (4 pts max)	
4 pts	Permanently Inundated
(3 pts)	Permanently Saturated to Regularly Inundated
2 pts	Regularly Saturated to Seasonally Inundated
1 pt	Seasonally Saturated in the Upper 12 Inches of Soil

3d. Check past or ongoing hydrologic alterations in or near Wetland. Assign a point value, or select adjoining options & average (8 pts max)

☐ ditch(s) ☐ weir(s) ☒ point-source ☐ dredging
☐ tiles(s) ☒ stormwater inputs ☐ filling/grading ☐ other: _____
☐ dikes(s) ☐ channelization ☐ road bed/RR grade

8 pts	No Hydrologic Alterations Apparent: No significant alteration(s) and/or ongoing minor alteration is rare
6 pts	Recovered: Significant hydrological alteration(s) occurred more than 20 years prior to the assessment and/or ongoing minor hydrological alteration is only occasional
(4 pts)	Recovering: A single significant hydrological alteration occurred within 20 years prior to the assessment, and/or ongoing minor hydrological alteration is frequent
1 pt	Recent or No Recovery: Multiple significant hydrological alterations have occurred in the 20 years prior to the assessment and/or significant alteration(s) is ongoing

21 — Subtotal this page

Metric 4. Habitat Alteration and Habitat Structure Development (20 pts max)

9 — 20 pts max

4a. Check past or ongoing substrate/soil disturbance. Assign a point value, or select adjoining options & average (4 pts max)

☐ erosion	☐ dredging	☐ off-road vehicle use
☐ sedimentation	☐ plowing/disking	☐ construction vehicle use
☐ filling/grading	☐ intensive grazing	☐ other:

4 pts	No Substrate Disturbance Apparent: No significant disturbance and/or ongoing minor disturbance is rare
(3 pts)	Recovered: Significant substrate disturbance occurred more than 20 years prior to the assessment and/or ongoing minor substrate disturbance is only occasional
2 pts	Recovering: A single significant substrate disturbance occurred within 20 years prior to the assessment, and/or ongoing minor substrate disturbance is frequent
1 pt	Recent or No Recovery: Multiple significant substrate disturbances have occurred in the 20 years prior to the assessment and/or significant disturbance is ongoing

4c. Select the Wetland's habitat structure development, or select adjoining options & average (7 pts max)

7 pts	Excellent
5 pts	Good
(3 pts)	Fair Pond trees, Bare Trees
1 pt	Poor

4b. Check past or ongoing habitat alteration. Assign a point value, or select adjoining options & average (9 pts max)

☐ barrier/road bed/RR grade	☐ mowing or shrub removal	☐ nutrient enrichment/nuisance algae	☐ dredging	☐ farming
☐ selective cutting	☒ coarse woody debris removal	☐ herbicide/chemical treatment	☐ filling/grading	☐ other:
☐ clearcutting	☐ grazing	☐ sedimentation	☐ plowing/disking	

9 pts	No Habitat Alteration Apparent: No significant alteration and/or ongoing minor alteration is rare
6 pts	Recovered: Significant habitat alteration occurred more than 20 years prior to the assessment and/or ongoing minor habitat alterations only occasional
(3 pts)	Recovering: A single significant habitat alteration occurred within 20 years prior to the assessment, and/or ongoing minor alteration is frequent
1 pt	Recent or No Recovery: Multiple significant habitat alterations have occurred in the 20 years prior to the assessment and/or habitat alteration is ongoing

Metric 5. Special Situations (20 pts max)

0 — 20 pts max

5a. Add 10 pts if any of these situations apply

High Ecological Value (see Narrative Rating above)
- ☐ Contains USFWS designated Critical Habitat
- ☐ Federal/State-listed Threatened or Endangered plant or animal species
- ☐ S1, S2, S3 Natural Community Type (at least 5 acres or 25% of Wetland)
- ☐ Southern Bog (at least 5 acres or 25% of Wetland)
- ☐ Old-Growth / Mature Forested Wetland (at least 5 acres or 25% of Wetland)
- ☐ Great Lakes Coastal Wetland

5b. Add 5 pts for Forested Wetland

5 — Exhibits combined canopy cover from any group(s) of trees. Stem DBH must be ≥3 in to qualify as a tree. Must be at least 5 acres or 25% of Wetland

5c. Add 5 pts for Urban/Suburban Wetland

5 — Is >50% of the landscape in a 1000-ft radius low-permeability surfaces?

5d. Subtract 10 points for Low Quality Wetland

-10 — Is the Wetland less than 1 acre and non-contiguous and either:
1) A stormwater treatment pond excavated from upland or
2) More than 75% covered by highly-invasive vegetation (See Metric 6c)

Based on 1 acre limit

Metric 6. Vegetation, Interspersion, and Habitat Features (20 pts max)

7 — 20 pts max

6a. Select the cover score for each Vegetation Component and assign points (9 pts max)

Vegetation Component is >¼ acre	>25% of Wetland area	Native species dominate coverage	high native diversity	3 pts
			moderate to low native diversity	2 pts
		invasive or non-native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
	<25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage	moderate native diversity	1 pt
			low native diversity	0 pt
Vegetation Component is ≤¼ acre	>25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage		0 pt
	<25% of Wetland area			0 pt

1	0 to 3 pts	Forest Overstory
1	0 to 3 pts	Shrub/Sapling Component
1	0 to 3 pts	Herbaceous Component

6b. Estimate the total open water and assign points (3 pts max)

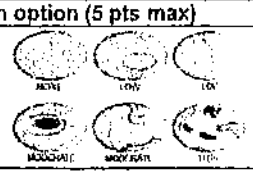
3 pts	High: 2.5 acres or more
(2 pts)	Moderate: 1.0 acres to <2.5 acres
1 pt	Low: 0.25 acre to <1.0 acre
0 pt	Absent: <0.25 acres

6c. Estimate the total coverage of highly invasive species

1 pt	Virtually Absent: <1% Aerial Coverage
0 pt	Nearly Absent: <5% Aerial Coverage
-1 pt	Sparse: 5-25% Aerial Coverage
(-3 pts)	Moderate: 25-75% Aerial Coverage
-5 pts	Extensive: >75% Aerial Coverage

6d. Select one horizontal interspersion option (5 pts max)

5 pts	High Degree of Interspersion
3 pts	Moderate Degree of Interspersion
(1 pt)	Low Degree of Interspersion
0 pt	No Interspersion



6e. Determine the amount of habitat features in the Wetland and assign points (12 pts max)

	Absent (0 pt)	Sparse (1 pt)	Moderate (2 pts)	Dense (3 pts)
	<1 per acre or 5% of area	1 to 5 per acre or 5% to 10% of area	6 to 10 per acre or 10% to 50% of area	> 10 per acre or >50% of area
1	0 to 3 pts	Hummocks/Tussocks/Tree Mounds % of area		
1	0 to 3 pts	Coarse Woody Debris (CWD) # per acre		
1	0 to 3 pts	Large Living/Dead Standing Trees (12 in DBH) # per acre		
1	0 to 3 pts	Amphibian Breeding/Nursery Habitat % of area		

Metric 7. Scenic, Recreational and Cultural Value (3 pts max)

2 — 3 pts max

Select all that apply and assign points

1	1 pt	Scenic Value
1	1 pt	Recreational Value
0	1 pt	Cultural/Historical Value

39 — **Total**

Attach location map, aerial photos, and landscape sketch.

DEQ Land and Water Management Division

MICHIGAN RAPID ASSESSMENT METHOD FOR WETLANDS (MiRAM)
Field Form Version 2.0

Site Name: Arbor Hills W5	Evaluator: BT / GC	Date: 10/21/04
Approx. how much of the Wetland was reviewed? 100 %	Has vegetation within the Wetland been altered and/or buffer areas impacted within the past 5 years? ☑ YES ☐ NO	

Note: The Evaluator must be trained in the MiRAM and should refer to the MiRAM Rating Form and User Manual when using this form.

Narrative Rating

If any of the following questions are answered yes, the Wetland is rated as high functional value and use of the Quantitative Rating is not necessary.

1. Is any part of the Wetland located within an area designated as Critical Habitat and does the Wetland *actually* contain habitat suitable for either the Piping Plover or the Hine's Emerald Dragonfly?	☐ YES ☒ NO
2. Based on the MDNR's Endangered Species Assessment Web site and/or site inspection, do federal/state-listed Threatened or Endangered plant or animal species occur within the Wetland?	☒ YES ☐ NO
3. Is more than 5 acres or more than 25% of the entire Wetland comprised of a Rare Wetland Community Type? Check all Rare Wetland Community Types below. If the Rare Wetland Community is less than 5 acres and less than 25% of the wetland, the rare community should be split off and evaluated separately. ☐ S1 or S2 Natural Community Type ☐ Southern Bog ☐ Old-Growth/Mature Forested Wetland	☐ YES ☒ NO
4. Is any part of the Wetland within 1000 feet of the Ordinary High Water Mark of any of the Great Lakes, including Lake St. Clair?	☐ YES ☒ NO

Quantitative Rating

Circle the appropriate point value(s) and assign the score for each metric. Determine the subtotal for each metric and add to determine the final score.

5 — **Metric 1. Wetland Size and Distribution (9 pts max)**

9 pts max

1a. Select a size class (6 pts max)	
6 pts	≥50 acres
5 pts	25 acres to <50 acres
4 pts	10 acres to <25 acres
3 pts	3 acres to <10 acres
(2 pts)	¼ acre to <3 acres
0 pt	less than ¼ acre

1b. Using the NWI, select a scarcity class (3 pts max)	
(3 pts)	0 to 20% of surrounding 2-mile radius is wetland
2 pts	>20 to 80% of surrounding 2-mile radius is wetland
1 pt	>80% of surrounding 2-mile radius is wetland

1 — **Metric 2. Buffers and Intensity of Surrounding Land Use (12 pts max)**

12 pts max

2a. Using an aerial photo, select the most appropriate buffer width (6 pts max)	
6 pts	Wide: ≥150 ft around perimeter
4 pts	Medium: 75 to <150 ft around perimeter
2 pts	Narrow: 25 to <75 ft around the perimeter
(0 pt)	Very Narrow: 0 (no buffer) to <25 ft around perimeter

2b. Using an aerial photo, select the surrounding land uses that comprise >25% of the total land use & average (6 pts max)	
6 pts	Very Low Intensity: Maturing forest, natural grassland, prairie, designated wildlife area, other wetland, lake or river
4 pts	Low Intensity: Shrubland/young forest, recent selective logging, hay field, lightly managed parkland, old field, lightly grazed pasture, one lane road/two track
2 pts	Moderately High Intensity: Residential & lawns, manicured parklands, golf course, conservation tillage, recent clear-cut (<10 yrs.), two lane road
(1 pt)	High Intensity: Commercial, industrial, high-density residential, heavily grazed pasture, row crops, multi-lane paved road, construction activity, parking lot, mining

0 — **Metric 3. Hydrology (26 pts max)**

26 pts max

3a Select all sources of water for Wetland	
(1 pt)	Precipitation
2 pts	Groundwater
2 pts	Seasonal Intermittent Surface Water
5 pts	Perennial Surface Water

3b. Select all wetland connections that apply	
2 pts	100-year floodplain
2 pts	Between a Stream/Lake/Pond and Human Land Use
(2 pts)	Wetland/Upland Complex
2 pts	Riparian Corridor

3c. Select the dominant duration of inundation/saturation, or select all that co-dominate & average (4 pts max)	
4 pts	Permanently Inundated
3 pts	Permanently Saturated to Regularly Inundated
(2 pts)	Regularly Saturated to Seasonally Inundated
1 pt	Seasonally Saturated in the Upper 12 Inches of Soil

3d. Check past or ongoing hydrologic alterations in or near Wetland. Assign a point value, or select adjoining options & average (8 pts max)

☐ ditch(s) ☐ weir(s) ☐ point-source ☐ dredging
☐ tiles(s) ☐ stormwater inputs ☐ filling/grading ☐ other: _____
☐ dikes(s) ☐ channelization ☐ road bed/RR grade

8 pts	No Hydrologic Alterations Apparent: No significant alteration(s) and/or ongoing minor alteration is rare
6 pts	Recovered: Significant hydrological alteration(s) occurred more than 20 years prior to the assessment and/or ongoing minor hydrological alteration is only occasional
4 pts	Recovering: A single significant hydrological alteration occurred within 20 years prior to the assessment, and/or ongoing minor hydrological alteration is frequent
(1 pt)	Recent or No Recovery: Multiple significant hydrological alterations have occurred in the 20 years prior to the assessment and/or significant alteration(s) is ongoing

12 — Subtotal this page

Metric 4. Habitat Alteration and Habitat Structure Development (20 pts max)

7

20 pts max

4a. Check past or ongoing substrate/soil disturbance. Assign a point value, or select adjoining options & average (4 pts max)

☐ erosion	☐ dredging	☐ off-road vehicle use
☐ sedimentation	☐ plowing/disking	☐ construction vehicle use
☐ filling/grading	☐ intensive grazing	☐ other:

4 pts	No Substrate Disturbance Apparent: No significant disturbance and/or ongoing minor disturbance is rare
(3 pts)	Recovered: Significant substrate disturbance occurred more than 20 years prior to the assessment and/or ongoing minor substrate disturbance is only occasional
2 pts	Recovering: A single significant substrate disturbance occurred within 20 years prior to the assessment, and/or ongoing minor substrate disturbance is frequent
1 pt	Recent or No Recovery: Multiple significant substrate disturbances have occurred in the 20 years prior to the assessment and/or significant disturbance is ongoing

4c. Select the Wetland's habitat structure development, or select adjoining options & average (7 pts max)

7 pts	Excellent
5 pts	Good
3 pts	Fair
(1 pt)	Poor

4b. Check past or ongoing habitat alteration. Assign a point value, or select adjoining options & average (9 pts max)

☑ barrier/road bed/RR grade	☐ mowing or shrub removal	☐ nutrient enrichment/nuisance algae	☐ dredging	☐ farming
☐ selective cutting	☑ coarse woody debris removal	☐ herbicide/chemical treatment	☐ filling/grading	☐ other:
☐ clearcutting	☐ grazing	☐ sedimentation	☐ plowing/disking	

9 pts	No Habitat Alteration Apparent: No significant alteration and/or ongoing minor alteration is rare
6 pts	Recovered: Significant habitat alteration occurred more than 20 years prior to the assessment and/or ongoing minor habitat alterations only occasional
(3 pts)	Recovering: A single significant habitat alteration occurred within 20 years prior to the assessment and/or ongoing minor alteration is frequent
1 pt	Recent or No Recovery: Multiple significant habitat alterations have occurred in the 20 years prior to the assessment and/or habitat alteration is ongoing

Metric 5. Special Situations (20 pts max)

−5

20 pts max

5a. Add 10 pts if any of these situations apply

High Ecological Value (see Narrative Rating above)
- ☐ Contains USFWS designated Critical Habitat
- ☐ Federal/State-listed Threatened or Endangered plant or animal species
- ☐ S1, S2, S3 Natural Community Type (at least 5 acres or 25% of Wetland)
- ☐ Southern Bog (at least 5 acres or 25% of Wetland)
- ☐ Old-Growth / Mature Forested Wetland (at least 5 acres or 25% of Wetland)
- ☐ Great Lakes Coastal Wetland

5b. Add 5 pts for Forested Wetland

☐ Exhibits combined canopy cover from any group(s) of trees. Stem DBH must be ≥3 in to qualify as a tree. Must be at least 5 acres or 25% of Wetland

5c. Add 5 pts for Urban/Suburban Wetland

☒ Is >50% of the landscape in a 1000-ft radius low-permeability surfaces?

5d. Subtract 10 points for Low Quality Wetland

Is the Wetland less than 1 acre and non-contiguous and either:
- 1) A stormwater treatment pond excavated from upland or
- (2) More than 75% covered by highly-invasive vegetation (See Metric 6c)

Metric 6. Vegetation, Interspersion, and Habitat Features (20 pts max)

−1

20 pts max

6a. Select the cover score for each Vegetation Component and assign points (9 pts max)

Vegetation Component is >½ acre	>25% of Wetland area	Native species dominate coverage	high native diversity	3 pts
			moderate to low native diversity	2 pts
		invasive or non-native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
	<25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage	moderate native diversity	1 pt
			low native diversity	0 pt
Vegetation Component is <½ acre	>25% of Wetland area	Native species dominate coverage	moderate to high native diversity	2 pts
			low native diversity	1 pt
		invasive or non-native species dominate coverage		0 pt
	<25% of Wetland area			0 pt

/	0 to 3 pts	Forest Overstory
/	0 to 3 pts	Shrub/Sapling Component
/	0 to 3 pts	Herbaceous Component

6b. Estimate the total open water and assign points (3 pts max)

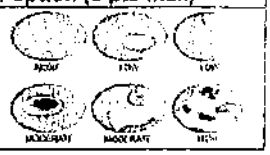
3 pts	High: 2.5 acres or more
2 pts	Moderate: 1.0 acres to <2.5 acres
1 pt	Low: 0.25 acre to <1.0 acre
(0 pt)	Absent: <0.25 acres

6c. Estimate the total coverage of highly invasive species

1 pt	Virtually Absent: <1% Aerial Coverage
0 pt	Nearly Absent: <5% Aerial Coverage
-1 pt	Sparse: 5-25% Aerial Coverage
(-3 pts)	Moderate: 25-75% Aerial Coverage
-5 pts	Extensive: >75% Aerial Coverage

6d. Select one horizontal interspersion option (5 pts max)

5 pts	High Degree of Interspersion
3 pts	Moderate Degree of Interspersion
(1 pt)	Low Degree of Interspersion
0 pt	No Interspersion



6e. Determine the amount of habitat features in the Wetland and assign points (12 pts max)

	Absent (0 pt) <1 per acre or 5% of area	Sparse (1 pt) 1 to 5 per acre or 5% to 10% of area	Moderate (2 pts) 6 to 10 per acre or 10% to 50% of area	Dense (3 pts) > 10 per acre or >50% of area
1	0 to 3 pts	Hummocks/Tussocks/Tree Mounds % of area		
	0 to 3 pts	Coarse Woody Debris (CWD) # per acre		
	0 to 3 pts	Large Living/Dead Standing Trees (12 in DBH) # per acre		
	0 to 3 pts	Amphibian Breeding/Nursery Habitat % of area		

Metric 7. Scenic, Recreational and Cultural Value (3 pts max)

0

3 pts max

Select all that apply and assign points

/	1 pt	Scenic Value
/	1 pt	Recreational Value
/	1 pt	Cultural/Historical Value

13 **Total**

Attach location map, aerial photos, and landscape sketch.

APPENDIX VII

Water Sample Location Map
And
Water Quality Results

LEGEND:

APPROXIMATE WETLAND BOUNDARY

WS-4 APPROXIMATE WATER SAMPLE LOCATION

SCALE 1" = 300 FEET (0, 150, 300)

WATER SAMPLE LOCATION MAP
CITY OF ANN ARBOR
WASHTENAW COUNTY, MICHIGAN

REFERENCE
AERIALS EXPRESS, LLC
2005 AERIAL PHOTOGRAPH
AERIAL IMAGERY AND GIS VIEWER, DETROIT METRO
WASHTENAW COUNTY, MICHIGAN

PROJECT: 08004831
DATE: JANUARY 13, 2010
DRAWN: BWT
CHECKED: GC
CAD FILE: 08004831EC-02

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OFFICES IN NORTH AMERICA AND ASIA

Water Quality Results: Field Measurements

Field Measurements			
Wetland	**Type**	**Parameter**	**Measurement**
H	Storm water	Temperature (°C)	1.9
		Turbidity	3
		Dissolved Oxygen (mg/L)	15.54
		pH	7.22
E	Storm water	Temperature	3.5
		Turbidity	51
		Dissolved Oxygen	13.77
		pH	6.75
F	Storm water	Temperature	0.7
		Turbidity	122
		Dissolved Oxygen	14.73
		pH	5.75
I	Mitigated	Temperature	1
		Turbidity	7
		Dissolved Oxygen	15.44
		pH	6.14

Fibertec
environmental
services

Thursday, January 07, 2010

Fibertec Project Number:	37434
Project Identification:	Arbor Hills Ecological Assessment /08004831
Submittal Date:	12/22/2009

Ms. Guedelupe Cummins
Atwell LLC - Southfield
Two Towne Square
Suite 700
Southfield, MI 48076

Dear Ms. Cummins,

Thank you for selecting Fibertec Environmental Services as your analytical laboratory. The samples you submitted have been analyzed in accordance with NELAC standards and the results compiled in the attached report. Any exceptions to NELAC compliance are noted in the report. These results apply only to those samples submitted. Please note samples will be disposed of 30 days after reporting date.

Total Kjeldahl Nitrogen analyzed by Merit Laboratories. Fecal Coliform analyzed by WaterTech.

If you have any questions regarding these results or if we may be of further assistance to you, please contact me at (517) 699-0345.

Sincerely,

Daryl P. Strandbergh
Laboratory Director

DPS/kc

Enclosures

Client Identification:	**Atwell LLC - Southfield**	Sample Description:	**H**	Chain of Custody:	**99223**
Client Project Name:	**Arbor Hills Ecological Assessment**	Sample No:	**1**	Collect Date:	**12/22/09**
Client Project No:	**08004831**	Sample Matrix:	**Ground Water**	Collect Time:	**08:50**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable NN: Parameter not included in NELAC Scope of Analysis.

Alkalinity by Titrimetry (EPA 0310.2) — **Aliquot ID: 37434-001A** — **Matrix: Ground Water** — **Analyst: HLL**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Bicarbonate Alkalinity (NN)	**210000**		µg CaCO3/L	24000	4	NA	NA	12/28/09	WP09L28A
2. Carbonate Alkalinity (NN)	U		µg CaCO3/L	6000	1	NA	NA	12/28/09	WP09L28A
3. Hydroxide Alkalinity (NN)	U		µg CaCO3/L	6000	1	NA	NA	12/28/09	WP09L28A

Phosphorus, Total (EPA 0365.3) — **Aliquot ID: 37434-001B** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Phosphorus	**160**		µg/L	10	1	12/28/09	WF09L28A	12/28/09	WF09L28A

Trace Elements by ICP/AES, Total Recoverable (EPA 3005A/EPA 6010B) — **Aliquot ID: 37434-001C** — **Matrix: Ground Water** — **Analyst: MAP**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Calcium	**77000**		µg/L	60000	10	12/28/09	PT09L28B	12/29/09	PT09L28B
2. Magnesium	**17000**		µg/L	300	10	12/28/09	PT09L28B	12/29/09	PT09L28B
3. Potassium	**3300**		µg/L	1000	10	12/28/09	PT09L28B	12/29/09	PT09L28B
4. Sodium	**210000**		µg/L	60000	10	12/28/09	PT09L28B	12/29/09	PT09L28B

Inorganic Anions by IC (EPA 9056) — **Aliquot ID: 37434-001A** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Chloride	**330000**		µg/L	40000	4	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
2. Nitrate-N	**1200**		µg/L	46	2	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
3. Nitrite-N	U		µg/L	30	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
4. Sulfate	**39000**		µg/L	1000	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B

Residue, Total (Gravimetric, Dried at 103-105°C) (EPA 0160.3/SM 2540 B.) — **Aliquot ID: 37434-001A** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Total Solids	**800000**		µg/L	80000	8	12/28/09	WH09L28A	12/29/09	WH09L28A

Nitrogen, Ammonia (ISE) (SM 4500-NH3 D.) — **Aliquot ID: 37434-001B** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Ammonia-N	U		µg/L	50	1	NA	NA	12/28/09	WJ09L28A

Nitrogen, Kjeldahl (SM 4500-Norg B.) — **Aliquot ID: 37434-001D** — **Matrix: Ground Water** — **Analyst: ML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Total Kjeldahl Nitrogen (NN)	**900**		µg/L	100	1	NA	NA	01/06/10	NA

Client Identification:	**Atwell LLC - Southfield**	Sample Description:	**H**	Chain of Custody:	**99223**
Client Project Name:	**Arbor Hills Ecological Assessment**	Sample No:	1	Collect Date:	**12/22/09**
Client Project No:	**08004831**	Sample Matrix:	**Ground Water**	Collect Time:	**08:50**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable NN: Parameter not included in NELAC Scope of Analysis.

Biochemical Oxygen Demand, 5 Day (SM 5210 B.) **Aliquot ID: 37434-001A** **Matrix: Ground Water** **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. BOD	U		µg/L	5000	5	NA	NA	12/28/09 00:00	WE09L23A

Fecal Coliform Membrane Filter Procedure (SM 9222 D.) **Aliquot ID: 37434-001** **Matrix: Ground Water** **Analyst: WT**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Coliform, Fecal (NN)	**20.0**		CFU/100 mL	10.0	1	NA	NA	12/22/09 00:00	NA

Client Identification:	**Atwell LLC - Southfield**	Sample Description:	**E**	Chain of Custody:	**99223**
Client Project Name:	**Arbor Hills Ecological Assessment**	Sample No:	**2**	Collect Date:	**12/22/09**
Client Project No:	**08004831**	Sample Matrix:	**Ground Water**	Collect Time:	**10:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable NN: Parameter not included in NELAC Scope of Analysis.

Alkalinity by Titrimetry (EPA 0310.2) — **Aliquot ID: 37434-002A** — **Matrix: Ground Water** — **Analyst: HLL**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Bicarbonate Alkalinity (NN)	**200000**		µg CaCO3/L	24000	4	NA	NA	12/28/09	WP09L28A
2. Carbonate Alkalinity (NN)	U		µg CaCO3/L	6000	1	NA	NA	12/28/09	WP09L28A
3. Hydroxide Alkalinity (NN)	U		µg CaCO3/L	6000	1	NA	NA	12/28/09	WP09L28A

Phosphorus, Total (EPA 0365.3) — **Aliquot ID: 37434-002B** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Phosphorus	**270**		µg/L	10	1	12/28/09	WF09L28A	12/28/09	WF09L28A

Trace Elements by ICP/AES, Total Recoverable (EPA 3005A/EPA 6010B) — **Aliquot ID: 37434-002C** — **Matrix: Ground Water** — **Analyst: MAP**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Calcium	**93000**		µg/L	60000	10	12/28/09	PT09L28B	12/29/09	PT09L28B
2. Magnesium	**21000**		µg/L	20000	10	12/28/09	PT09L28B	12/29/09	PT09L28B
3. Potassium	**2900**		µg/L	1000	10	12/28/09	PT09L28B	12/29/09	PT09L28B
4. Sodium	**41000**		µg/L	1000	10	12/28/09	PT09L28B	12/29/09	PT09L28B

Inorganic Anions by IC (EPA 9056) — **Aliquot ID: 37434-002A** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Chloride	**55000**		µg/L	10000	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
2. Nitrate-N	**13000**		µg/L	920	40	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
3. Nitrite-N	U		µg/L	30	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
4. Sulfate	**19000**		µg/L	1000	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B

Residue, Total (Gravimetric, Dried at 103-105°C) (EPA 0160.3/SM 2540 B.) — **Aliquot ID: 37434-002A** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Total Solids	**550000**		µg/L	80000	8	12/28/09	WH09L28A	12/29/09	WH09L28A

Nitrogen, Ammonia (ISE) (SM 4500-NH3 D.) — **Aliquot ID: 37434-002B** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Ammonia-N	U		µg/L	50	1	NA	NA	12/28/09	WJ09L28A

Nitrogen, Kjeldahl (SM 4500-Norg B.) — **Aliquot ID: 37434-002D** — **Matrix: Ground Water** — **Analyst: ML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Total Kjeldahl Nitrogen (NN)	**800**		µg/L	100	1	NA	NA	01/06/10	NA

Client Identification:	**Atwell LLC - Southfield**	Sample Description:	**E**	Chain of Custody:	**99223**
Client Project Name:	**Arbor Hills Ecological Assessment**	Sample No:	**2**	Collect Date:	**12/22/09**
Client Project No:	**08004831**	Sample Matrix:	**Ground Water**	Collect Time:	**10:00**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable NN: Parameter not included in NELAC Scope of Analysis.

Biochemical Oxygen Demand, 5 Day (SM 5210 B.) **Aliquot ID: 37434-002A** **Matrix: Ground Water** **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. BOD	**7400**	J	µg/L	7300	7.33	NA	NA	12/28/09 00:00	WE09L23A

Fecal Coliform Membrane Filter Procedure (SM 9222 D.) **Aliquot ID: 37434-002** **Matrix: Ground Water** **Analyst: WT**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Coliform, Fecal (NN)	**10.0**		CFU/100 mL	10.0	1	NA	NA	12/22/09 00:00	NA

Client Identification:	**Atwell LLC - Southfield**	Sample Description:	**I**	Chain of Custody:	**99223**
Client Project Name:	**Arbor Hills Ecological Assessment**	Sample No:	**3**	Collect Date:	**12/22/09**
Client Project No:	**08004831**	Sample Matrix:	**Ground Water**	Collect Time:	**10:35**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable NN: Parameter not included in NELAC Scope of Analysis.

Alkalinity by Titrimetry (EPA 0310.2) — **Aliquot ID: 37434-003A** — **Matrix: Ground Water** — **Analyst: HLL**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Bicarbonate Alkalinity (NN)	**260000**		µg CaCO3/L	24000	4	NA	NA	12/28/09	WP09L28A
2. Carbonate Alkalinity (NN)	U		µg CaCO3/L	6000	1	NA	NA	12/28/09	WP09L28A
3. Hydroxide Alkalinity (NN)	U		µg CaCO3/L	6000	1	NA	NA	12/28/09	WP09L28A

Phosphorus, Total (EPA 0365.3) — **Aliquot ID: 37434-003B** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Phosphorus	**160**		µg/L	10	1	12/28/09	WF09L28A	12/28/09	WF09L28A

Trace Elements by ICP/AES, Total Recoverable (EPA 3005A/EPA 6010B) — **Aliquot ID: 37434-003C** — **Matrix: Ground Water** — **Analyst: MAP**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Calcium	**100000**		µg/L	60000	10	12/28/09	PT09L28B	12/29/09	PT09L28B
2. Magnesium	**22000**		µg/L	20000	10	12/28/09	PT09L28B	12/29/09	PT09L28B
3. Potassium	**3300**		µg/L	1000	10	12/28/09	PT09L28B	12/29/09	PT09L28B
4. Sodium	**17000**		µg/L	1000	10	12/28/09	PT09L28B	12/29/09	PT09L28B

Inorganic Anions by IC (EPA 9056) — **Aliquot ID: 37434-003A** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Chloride	**27000**		µg/L	10000	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
2. Nitrate-N	**79**		µg/L	23	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
3. Nitrite-N	U		µg/L	30	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
4. Sulfate	**50000**		µg/L	1000	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B

Residue, Total (Gravimetric, Dried at 103-105°C) (EPA 0160.3/SM 2540 B.) — **Aliquot ID: 37434-003A** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Total Solids	**400000**		µg/L	100000	10	12/28/09	WH09L28A	12/29/09	WH09L28A

Nitrogen, Ammonia (ISE) (SM 4500-NH3 D.) — **Aliquot ID: 37434-003B** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Ammonia-N	U		µg/L	50	1	NA	NA	12/28/09	WJ09L28A

Nitrogen, Kjeldahl (SM 4500-Norg B.) — **Aliquot ID: 37434-003D** — **Matrix: Ground Water** — **Analyst: ML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Total Kjeldahl Nitrogen (NN)	**600**		µg/L	100	1	NA	NA	01/06/10	NA

Client Identification:	**Atwell LLC - Southfield**	Sample Description:	I	Chain of Custody:	**99223**
Client Project Name:	**Arbor Hills Ecological Assessment**	Sample No:	**3**	Collect Date:	**12/22/09**
Client Project No:	**08004831**	Sample Matrix:	**Ground Water**	Collect Time:	**10:35**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable NN: Parameter not included in NELAC Scope of Analysis.

Biochemical Oxygen Demand, 5 Day (SM 5210 B.) **Aliquot ID: 37434-003A** **Matrix: Ground Water** **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. BOD	U		µg/L	5000	5	NA	NA	12/28/09 00:00	WE09L23A

Fecal Coliform Membrane Filter Procedure (SM 9222 D.) **Aliquot ID: 37434-003** **Matrix: Ground Water** **Analyst: WT**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Coliform, Fecal (NN)	U		CFU/100 mL	10.0	1	NA	NA	12/22/09 00:00	NA

Fibertec environmental services

Analytical Laboratory Report
Laboratory Project Number: 37434
Laboratory Sample Number: 37434-004

Client Identification:	**Atwell LLC - Southfield**	Sample Description:	**F**	Chain of Custody:	**99223**
Client Project Name:	**Arbor Hills Ecological Assessment**	Sample No:	**4**	Collect Date:	**12/22/09**
Client Project No:	**08004831**	Sample Matrix:	**Ground Water**	Collect Time:	**11:35**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable NN: Parameter not included in NELAC Scope of Analysis.

Alkalinity by Titrimetry (EPA 0310.2) — **Aliquot ID: 37434-004A** — **Matrix: Ground Water** — **Analyst: HLL**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Bicarbonate Alkalinity (NN)	**180000**		µg CaCO3/L	24000	4	NA	NA	12/28/09	WP09L28A
2. Carbonate Alkalinity (NN)	U		µg CaCO3/L	6000	1	NA	NA	12/28/09	WP09L28A
3. Hydroxide Alkalinity (NN)	U		µg CaCO3/L	6000	1	NA	NA	12/28/09	WP09L28A

Phosphorus, Total (EPA 0365.3) — **Aliquot ID: 37434-004B** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Phosphorus	**1700**		µg/L	40	4	12/28/09	WF09L28A	12/28/09	WF09L28A

Trace Elements by ICP/AES, Total Recoverable (EPA 3005A/EPA 6010B) — **Aliquot ID: 37434-004C** — **Matrix: Ground Water** — **Analyst: MAP**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Calcium	**76000**		µg/L	60000	10	12/28/09	PT09L28B	12/29/09	PT09L28B
2. Magnesium	**16000**		µg/L	300	10	12/28/09	PT09L28B	12/29/09	PT09L28B
3. Potassium	**3400**		µg/L	1000	10	12/28/09	PT09L28B	12/29/09	PT09L28B
4. Sodium	**12000**		µg/L	1000	10	12/28/09	PT09L28B	12/29/09	PT09L28B

Inorganic Anions by IC (EPA 9056) — **Aliquot ID: 37434-004A** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Chloride	**17000**		µg/L	10000	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
2. Nitrate-N	**110**		µg/L	23	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
3. Nitrite-N	U		µg/L	30	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B
4. Sulfate	**16000**		µg/L	1000	1	12/22/09 00:00	WA09L22B	12/22/09 00:00	WA09L22B

Residue, Total (Gravimetric, Dried at 103-105°C) (EPA 0160.3/SM 2540 B.) — **Aliquot ID: 37434-004A** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Total Solids	**320000**		µg/L	100000	10	12/28/09	WH09L28A	12/29/09	WH09L28A

Nitrogen, Ammonia (ISE) (SM 4500-NH3 D.) — **Aliquot ID: 37434-004B** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Ammonia-N	**190**		µg/L	50	1	NA	NA	12/28/09	WJ09L28A

Nitrogen, Kjeldahl (SM 4500-Norg B.) — **Aliquot ID: 37434-004D** — **Matrix: Ground Water** — **Analyst: ML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Total Kjeldahl Nitrogen (NN)	**1700**		µg/L	100	1	NA	NA	01/06/10	NA

Client Identification:	**Atwell LLC - Southfield**	Sample Description:	**F**	Chain of Custody:	**99223**
Client Project Name:	**Arbor Hills Ecological Assessment**	Sample No:	**4**	Collect Date:	**12/22/09**
Client Project No:	**08004831**	Sample Matrix:	**Ground Water**	Collect Time:	**11:35**

Sample Comments:

Definitions: Q: Qualifier (see definitions at end of report) NA: Not Applicable NN: Parameter not included in NELAC Scope of Analysis.

Biochemical Oxygen Demand, 5 Day (SM 5210 B.) — **Aliquot ID: 37434-004A** — **Matrix: Ground Water** — **Analyst: CML**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. BOD	**12000**	J	µg/L	7300	7.33	NA	NA	12/28/09 00:00	WE09L23A

Fecal Coliform Membrane Filter Procedure (SM 9222 D.) — **Aliquot ID: 37434-004** — **Matrix: Ground Water** — **Analyst: WT**

Parameter(s)	Result	Q	Units	Reporting Limit	Dilution	Prep Date	Prep Batch	Analysis Date	Analysis Batch
1. Coliform, Fecal (NN)	**270**		CFU/100 mL	10.0	1	NA	NA	12/22/09 00:00	NA

Definitions/ Qualifiers:

- **A:** Spike recovery or precision unusable due to dilution.
- **B:** The analyte was detected in the associated method blank.
- **E:** The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
- **J:** The concentration is an estimated value.
- **U:** The analyte was not detected at or above the reporting limit.
- **X:** Matrix Interference has resulted in a raised reporting limit or distorted result.
- **W:** Results reported on a wet-weight basis.
- ***:** Value reported is outsice QA limits

Exception Summary:

Method:	**SM 5210 B.**
Sample Number:	**37434-002A**
Parameter:	**BOD**
Exception:	**Analyte is found in the associated method blank as well as in the sample.**
Sample Number:	**37434-004A**
Parameter:	**BOD**
Exception:	**Analyte is found in the associated method blank as well as in the sample.**

Accreditation Number:

100312