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COLUMBIA GAS
of Ohio

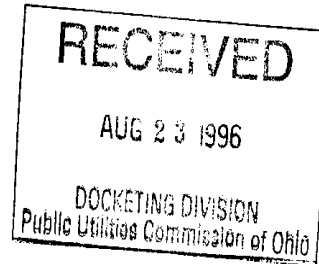


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0019

August 23, 1996

Ms. Kim Wissman
Chief, Power Siting Section
Ohio Power Siting Board
180 East Broad Street
Columbus, Ohio 43266-0573



Re: Columbia Gas of Ohio, Inc.
Westlake High-Pressure Betterment Project
Case No. 94-1026-GA-BLN

Dear Ms. Wissman:

In accordance with the stipulation filed on September 22, 1994 in the above-referenced docket, Columbia Gas of Ohio, Inc. hereby submits its annual report summarizing the results of the 1996 monitoring survey of the wetland in Lorain County, Ohio. Six copies are attached, and it is my understanding that such number is sufficient for any necessary distribution.

Please contact me at 460-4666 if you have any questions.

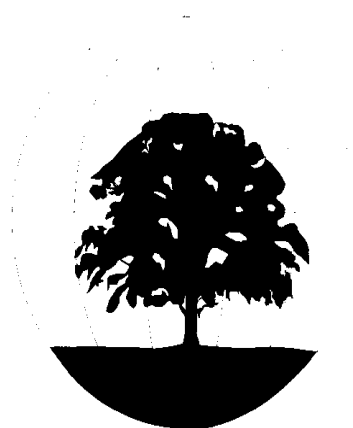
Very truly yours,

Amy L. Koncelik

Amy L. Koncelik
Attorney

Attachment

This is to certify that the images appearing are an accurate and complete reproduction of a case file document delivered in the regular course of business.
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3D/Environmental

A 3D/International Group

Project C7369.21

July 22, 1996

**THE RESULTS OF THE 1996
MONITORING SURVEY OF A WETLAND
IN LORAIN COUNTY, OHIO**

Submitted To:

Columbia Gas of Ohio, Inc.
200 Civic Center Drive
Columbus, Ohio 43215

Prepared By:

3D/Environmental
781 Neeb Road
Cincinnati, Ohio 45233

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1.0 INTRODUCTION

1.1 PURPOSE

3D/Environmental (3D/E) was retained by Columbia Gas of Ohio (Columbia) to conduct wetland monitoring over a 5 year period starting in 1995. This ongoing survey involves monitoring a shrub/scrub wetland located in Lorain County, Ohio. (Prior to the start of the monitoring, 3D/E completed a wetland delineation of the area during a pipeline corridor survey conducted on May 12, 1994). The purpose of the monitoring has been to assess impacts to wetland vegetation, soils, and hydrology resulting from directional-drilling and open-cut construction techniques. This will also provide valuable scientific information. The methods used to collect, process and report data has been standardized in order to promote replication and allow for effective comparison over time.

The present report gives the results of the 1996 survey. In addition to providing the results of the second year sampling conducted on June 6, 1996, the report compares these results with those from the 1995 survey. The original scope of the monitoring consisted of sampling three 100 m transects, however, between the 1995 sampling and the 1996 sampling, the second transect was permanently altered by the installation of a sewer line. As a result, the 1996 survey, and future surveys only include data from two transects. The yearly results are being provided to Columbia for submittal to the Ohio Power Siting Board (OPSB).

1.2 BACKGROUND

During the initial wetland delineation conducted by 3D/E on May 12, 1994 this area was determined to be a wetland. Wetlands are defined as per the interagency cooperative publication entitled the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (1987). This definition of wetlands in this manual reads as follows:

"Wetlands are those areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support and that under normal circumstances do support-a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and similar areas."

This definition identifies three essential characteristics possessed by wetlands: (1) hydrophytic vegetation; (2) hydric soils; and (3) wetland hydrology. In order to satisfy the definition of hydric vegetation, over 50 percent of the dominant species must have a wetland indicator status, as determined by the USFWS, of OBL, FAC or FACW. By definition, OBL species are found in wetlands >99 percent of the time, FACW species are located in wetlands between 67 and 99 percent of the time, and FAC species are found in wetlands between 33 and 66 percent of the time.

Soil is classified as hydric if it is saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions in the upper surface. Wetland hydrology is met if an area which is inundated or saturated to the surface for at least five percent of the growing season in most years.

1.3 DESCRIPTION OF AREA

The wetland is located in northeastern Lorain County, Ohio just north of I-90 on the southwest corner of Chester Road and Lear Nagle Road (Figures 1 & 2). The area is located in the glaciated region of Ohio (Flint 1971, USDA 1976). During presettlement the northern portion of Lorain County was composed of a combination of Mixed Oak Forest, Mixed Mesophytic Forest, Beech Maple Forest, and Elm-Ash Swamp Forest depending on elevational level (Anderson 1993; Braun, 1950; Gordon 1966, 1969; Vankat 1979). The present wetland exists on the site of a vineyard which was abandoned approximately 30 years ago.

1.0 INTRODUCTION

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Figure 1. State map of Ohio showing project location.



3D/Environmental

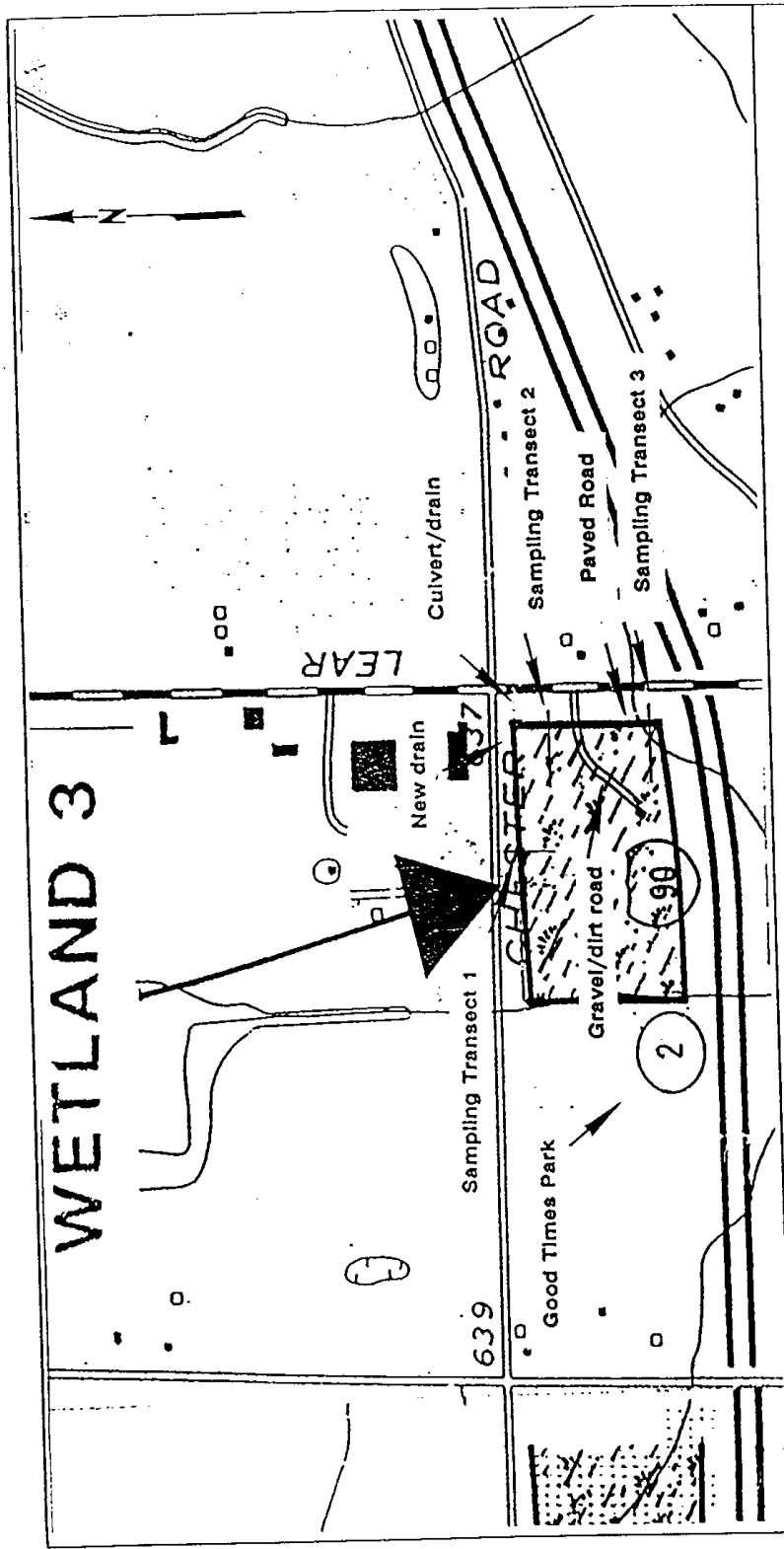


Figure 2. Site Location of Wetland Monitoring Project in Northeastern Lorain County, Ohio.

3D/ENVIRONMENTAL

Project # C7506.31

2.0 METHODS

2.1 VEGETATION SAMPLING

The objective of the vegetation monitoring is to: (1) identify the conditions of vegetation within the area of impact; (2) monitor changes in species composition over time (with particular emphasis on wetland species); and (3) monitor the invasion of exotic plants which could potentially impede the growth of wetland species. Vegetation was monitored qualitatively and quantitatively using both passive and active sampling methods as described below.

2.1.1 Active Sampling

Quantitative sampling was conducted using a modified line-intercept technique and nested-quadrat. The line-intercept technique was used to identify and record existing conditions and determine changes in the species complement and vigor of the canopy (i.e., trees and shrubs > 3 m tall). Transects crossing the pipeline were randomly selected and permanently-marked with rebar stakes. Species which intercepted the line were recorded along with their coverage. Permanent transects allow a direct measurement of vegetative change from year to year. In addition, three categories were used to determine the condition of trees and shrubs: (1) LIVE -- appears to be in relatively good condition, leaves are green, there is no wilting, or dieback; (2) STRESSED -- appears to be in poor condition, chlorotic leaves, wilting or leaf drop; and (3) APPARENTLY DEAD - no observable green foliage, the stem is dry and brittle with no live wood.

Nested-quadrats (3m^2 , 1m^2 and 0.5m^2) were used to identify and record existing conditions and determine changes in herbaceous species. Six nested-quadrats were randomly established along each of three transect which crossed the pipeline. However, following the 1995 survey a sewer line was put in and destroyed transect 2. As a result, the 1996 survey and future surveys, will consist of just 2 transects. The nested-quadrats were permanently-marked using rebar stakes. At each quadrat location, the frequency and percent cover of all species were recorded. Plants were identified using a variety of field manuals including: Fernald (1950), Gleason (1952abc), Fassett (1957), Braun (1961), Braun (1967), Radford et al. (1968), Weishaupt (1970), Hitchcock (1971), Voss (1972), Stuckey and Roberts (1977), Harlow et al. (1978), Barnes (1981), Lellinger (1985), Voss (1985), Weishaupt (1985), Case (1987), Fisher (1988), Burns and Honkala (1990), Gleason and Cronquist (1991), Brewer and Vankat (1992abc), Flora of North America editorial committee (1993), Homoya (1993), and Cooperrider (1994). Particular attention was given to native wetland species. The hydric status of individual species was based on its National Wetland Inventory Status (USFWS, 1988).

Numerous exotic (alien) plant species have established in northeastern Ohio. As alien plants invade natural areas, they compete with native species for resources, alter

microenvironments and plant community structure, and change patterns of succession (Bratton, 1982; Ebinger, 1983; Ebinger et al., 1984; Harty, 1987; Westman, 1990). During the monitoring, particular attention was given to *Rosa multiflora* (Appendix D). *Rosa multiflora* was introduced from eastern Asia for wildlife cover and food. It is a thorny shrub with a broad based stem system rather than an erect growth form, and may reach a height of 15 feet. *Rosa multiflora* invades prairies, savannas, open woodlands, pastures, and forest edges and forms dense, impenetrable thickets which smothers native vegetation. Seeds can remain viable for one to two decades. *Rosa multiflora* can also propagate by layering (where tips of branches touch the ground and form roots) or by shallow root sprouting (Szafoni, 1990).

2.1.2 Passive Sampling (Photomonitoring)

Photographs were taken at three points corresponding to the transects at the time of active vegetation sampling. These photographs provide a permanent ground-level record of physical changes in the wetland as it exists during the field survey. Although this method does not provide detailed information, it does provide time-based illustrations of vegetative growth, composition and the interspersed of vegetative communities.

2.2 SOILS

Soil monitoring consisted of collecting soil cores within the nested plots and recording the physical conditions of the soil. Information on soils was gathered in order to determine if characteristics of hydric soils are altered by pipeline construction. Munsell Soil Color Charts (1975) were used to identify the hue, value and chroma of each soil sample. An overview of soil characteristics was provided by the soil survey of Lorain County (USDA, 1976).

2.3 HYDROLOGY

Hydrologic parameters important to wetlands include: precipitation (frequency and duration), depth of flooding, and a seasonal high ground water. Surface-water levels were determined and reordered at locations corresponding to the soil sample. If surface water was not present, the depth to free-standing water in soil cores or the depth to soil saturation was recorded. The soil survey of Lorain County (1976) was used determine hydrological factors.

3.0 RESULTS

3.1 VEGETATION

3.1.1 Active Sampling

Five species of shrubs were found along the line transects producing a total of 83.5 percent cover (Table 1, Appendix A and B). *Viburnum recognitum* was the most abundant shrub with 51.0 percent cover followed by *Rhamnus alnifolia* (22.5 percent), and *Ulmus americana* and *Cornus racemosa* (each with 3.5 percent), and *Salix* sp. (3.0 percent). Of the six shrub species in the line transects, one was Obligate (OBL), two were Facultative Wetland (FACW), and two had not been given indicator status by (USFWS, 1988). A total of 77.7 percent of the species were OBL, FACW or FACW. The shrub layer satisfies the vegetation criteria as defined by the USCOE for a wetland since over 50.0 percent of the species were OBL, FACW or FAC.

Table 1. Average percent cover for shrubs (1-3 meters) from both transects.

Species	Percent	Indicator Status
<i>Viburnum recognitum</i>	51.0%	FACW
<i>Rhamnus alnifolia</i>	22.5%	OBL
<i>Ulmus americana</i>	3.5%	FACW
<i>Cornus racemosa</i>	3.5%	-
<i>Salix</i> sp.	3.0%	-

Total	83.5%	

Two trees species were found along the line transects for a total of 53.5 percent cover (Table 2). *Ulmus americana* was the most abundant with 46.0 percent and *Acer rubrum* had 7.5 percent. Since both species (100 percent) are considered wetland species (one FACW and one FAC), the vegetation criteria for a wetland was satisfied.

Fifty-two species of plants were found in the nested herbaceous quadrats. The 0.5 m² quadrats had 33 species, the 1.0 m² quadrats had 38 species, and the 3.0 m² quadrats had 52 species. The plant species and the average percent cover for 3.0 m² are shown in Table 3. The plant species and their percent cover for the 0.5 m² quadrats and 1.0 m² quadrats are given in Appendix A, along with all the data for the nested quadrats.

Table 2. Average percent cover for trees (>3 meters) from both transects.

Species	Percent	Indicator Status
<i>Ulmus americana</i>	46.0%	FACW
<i>Acer rubrum</i>	7.5%	FAC
Total	53.5%	

The most abundant species in the 3.0 m² quadrats was *Viburnum recognitum* with 22.4 percent, followed by *Lysmachia nummaralia* (12.1 percent), *Rhamnus alnifolia* (9.9 percent), *Juncus tenuis* (7.0 percent), *Juncus effusus* (4.2 percent), *Bidens* sp. (3.3 percent), *Polygonum* sp. (2.8 percent), *Solidago canadensis* (2.6 percent), *Prunella vulgaris* (2.0 percent), *Medicago saiva* (1.9 percent), *Typha latifolia* (1.3 percent), *Cornus racemosa* (1.2), *Euthamia graminifolia* (1.2 percent), *Rumex crispus* (1.2 percent), and *Geum laciniatum* (1.0 percent). All other species had less than 1.0 percent cover.

Of the fifty two species in the 3.0 m² quadrats fourteen were Facultative Upland (FACU), eight Facultative (FAC), six Facultative Wetland (FACW), and seven Obligate (OBL) (USFWS, 1988). No Obligate Upland (UPL) were found in the quadrats. Seventeen species did not have a status because they could not be identified to the species level, or they simply had not been given an indicator status by the U.S. Fish and Wildlife Service (USFWS, 1988). Some taxa could not be identified to species because of the lack of flowers or other parts, but may be determined to species during the subsequent sampling. A total of 67.5% of the species were OBL, FACW, or FAC. Since over 50.0% of the species were OBL, FACW, or FAC the wetland satisfies the herbaceous vegetation criteria for a wetland.

The average percent frequency for 3.0m² quadrats are given in Table 4. The average percent frequency for the 0.5m² quadrats and 1.0 m² are given in Appendix A and B. *Viburnum recognitum* was the most frequently occurring species in the 3.0 m² quadrats (83.0 percent), followed by *Geum laciniatum* (75.0 percent), *Rhamnus alnifolia* (67 percent), *Lycopus americanus* (50 percent), *Lysmachia nummalaria* (50 percent), *Polygonum* sp. (41.7 percent), *Prunella vulgaris* (41.7 percent), *Solidago canadensis* (41.7 percent), and *Valerianella* sp. (41.7 percent). All other species had an average percent frequency of less than 40.0 percent.

3.1.1.1 Present Condition of Shrubs and Trees

The number and condition of the shrub and tree stems found along the transects is shown in Tables 5 and 6. There were a total of 72 stems of shrubs. *Viburnum recognitum*

Table 3. Average percent cover for the herbaceous plant species from the 3.0- m² quadrats.
 *-designates exotic species (non-native)

Species	Average Percent Coverage	Indicator Status
<i>Viburnum recognitum</i>	21.86%	FACW
<i>Lysimachia nummularia</i> *	12.75%	OBL
<i>Juncus tenuis</i>	6.92%	FAC-
<i>Rhamnus alnifolia</i>	6.11%	OBL
<i>Bidens</i> sp.	3.44%	-
<i>Juncus effusus</i>	3.19%	FACW
<i>Polygonum</i> sp.	2.72%	-
<i>Solidago canadensis</i>	2.03%	FACU
<i>Medicago sativa</i> *	1.75%	-
<i>Geum laciniatum</i>	1.53%	FAC+
<i>Solidago</i> sp.	1.25%	-
<i>Prunella vulgaris</i>	1.22%	FACU+
<i>Typha latifolia</i>	1.11%	OBL
<i>Poa pratensis</i> *	0.89%	FACU
Unknown	0.89%	-
<i>Lycopus americanus</i>	0.86%	OBL
<i>Rumex crispus</i> *	0.78%	FACU
<i>Valerianella</i> sp.	0.69%	-
<i>Trifolium repens</i> *	0.67%	FACU-
<i>Cornus racemosa</i>	0.61%	FACW
<i>Euthamia graminifolia</i>	0.61%	FAC
<i>Carex vulpinodea</i>	0.47%	OBL
<i>Dipsacus sylvestris</i>	0.42%	FAC
<i>Agrimonia parviflora</i>	0.36%	FAC
<i>Apocynum cannabinum</i>	0.31%	FAC
<i>Erigeron</i> sp.	0.31%	-
<i>Potentilla simplex</i>	0.31%	FACU
<i>Ulmus americana</i>	0.31%	FACW
<i>Rubus flagellaris</i>	0.28%	-
<i>Ambrosia artemisiifolia</i>	0.25%	FACU
<i>Eupatorium perfoliatum</i>	0.19%	FACW+
<i>Asclepias incarnata</i>	0.17%	OBL
<i>Parthenocissus quinquefolia</i>	0.14%	FACU
<i>Toxicodendron radicans</i>	0.14%	FAC
<i>Aster</i> sp.	0.11%	-
<i>Brasica nigra</i> *	0.11%	-
<i>Urtica</i> sp.	0.11%	-
<i>Vicia</i> sp.	0.11%	-
<i>Achillea millefolium</i> *	0.08%	FACU
<i>Cornus stolonifera</i>	0.08%	FACW+
<i>Acer rubrum</i>	0.06%	FAC
<i>Cirsium discolor</i>	0.06%	-
<i>Lathyrus</i> sp.	0.06%	-
<i>Rosa multiflora</i> *	0.06%	FACU
<i>Trifolium pratense</i> *	0.06%	FACU
<i>Tussilago farfara</i> *	0.06%	FACU
<i>Hypericum punctatum</i>	0.03%	FAC-
<i>Oxalis</i> sp.	0.03%	-
<i>Quercus</i> sp.	0.03%	-
<i>Rubus allegheniensis</i>	0.03%	FACU-
<i>Salix</i> sp.	0.03%	-
<i>Scirpus atrovirens</i>	0.03%	OBL
Sum Total	77.20%	

Table 3. Average percent cover for the herbaceous plant species from the 3.0- m² quadrats.

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<i>Viburnum recognitum</i>	21.86%	FACW
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<i>Rhamnus alnifolia</i>	6.11%	OBL
<i>Bidens</i> sp.	3.44%	-
<i>Juncus effusus</i>	3.19%	FACW
<i>Polygonum</i> sp.	2.72%	-
<i>Solidago canadensis</i>	2.03%	FACU
<i>Medicago sativa</i> *	1.75%	-
<i>Geum laciniatum</i>	1.53%	FAC+
<i>Solidago</i> sp.	1.25%	-
<i>Prunella vulgaris</i>	1.22%	FACU+
<i>Typha latifolia</i>	1.11%	OBL
<i>Poa pratensis</i> *	0.89%	FACU
Unknown	0.89%	-
<i>Lycopus americanus</i>	0.86%	OBL
<i>Rumex crispus</i> *	0.78%	FACU
<i>Valerianella</i> sp.	0.69%	-
<i>Trifolium repens</i> *	0.67%	FACU-
<i>Cornus racemosa</i>	0.61%	FACW
<i>Euthamia graminifolia</i>	0.61%	FAC
<i>Carex vulpinodea</i>	0.47%	OBL
<i>Dipsacus sylvestris</i>	0.42%	FAC
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<i>Apocynum cannabinum</i>	0.31%	FAC
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<i>Potentilla simplex</i>	0.31%	FACU
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<i>Rubus flagellaris</i>	0.28%	-
<i>Ambrosia artemisiifolia</i>	0.25%	FACU
<i>Eupatorium perfoliatum</i>	0.19%	FACW+
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<i>Toxicodendron radicans</i>	0.14%	FAC
<i>Aster</i> sp.	0.11%	-
<i>Brasica nigra</i> *	0.11%	-
<i>Urtica</i> sp.	0.11%	-
<i>Vicia</i> sp.	0.11%	-
<i>Achillea millefolium</i> *	0.08%	FACU
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<i>Acer rubrum</i>	0.06%	FAC
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<i>Lathyrus</i> sp.	0.06%	-
<i>Rosa multiflora</i> *	0.06%	FACU
<i>Trifolium pratense</i> *	0.06%	FACU
<i>Tussilago farfara</i> *	0.06%	FACU
<i>Hypericum punctatum</i>	0.03%	FAC-
<i>Oxalis</i> sp.	0.03%	-
<i>Quercus</i> sp.	0.03%	-
<i>Rubus allegheniensis</i>	0.03%	FACU-
<i>Salix</i> sp.	0.03%	-
<i>Scirpus atrovirens</i>	0.03%	OBL
Sum Total	77.20%	

*-designates exotic species (non-native)

Table 4. Average percent frequency for the herbaceous plant species from the 3.0-m² quadrats

Species	Average Percent Frequency	Indicator Status
<i>Viburnum recognitum</i>	83.33	FACW
<i>Geum laciniatum</i>	75.00	FAC+
<i>Rhamnus alnifolia</i>	58.33	OBL
<i>Lycopus americanus</i>	50.00	OBL
<i>Lysimachia nummularia</i> *	50.00	OBL
<i>Polygonum</i> sp.	50.00	-
<i>Erigeron</i> sp.	41.67	-
<i>Prunella vulgaris</i>	41.67	FACU+
<i>Solidago canadensis</i>	41.67	FACU
<i>Valerianella</i> sp.	41.67	-
<i>Bidens</i> sp.	33.33	-
<i>Cornus racemosa</i>	33.33	FACW
<i>Juncus effusus</i>	33.33	FACW
<i>Poa pratensis</i> *	33.33	FACU
<i>Potentilla simplex</i>	33.33	FACU
<i>Rubus flagellaris</i>	33.33	-
<i>Agrimonia parviflora</i>	25.00	FAC
<i>Brasica nigra</i> *	25.00	-
<i>Dipsacus sylvestris</i>	25.00	FAC
<i>Euthamia graminifolia</i>	25.00	FAC
<i>Juncus tenuis</i>	25.00	FAC-
<i>Rumex crispus</i> *	25.00	FACU
<i>Trifolium repens</i> *	25.00	FACU-
<i>Achillea millefolium</i> *	16.67	FACU
<i>Ambrosia artemisiifolia</i>	16.67	FACU
<i>Apocynum cannabinum</i>	16.67	FAC
<i>Asclepias incarnata</i>	16.67	OBL
<i>Aster</i> sp.	16.67	-
<i>Cirsium discolor</i>	16.67	-
<i>Eupatorium perfoliatum</i>	16.67	FACW+
<i>Medicago sativa</i> *	16.67	-
<i>Parthenocissus quinquefolia</i>	16.67	FACU
<i>Solidago</i> sp.	16.67	-
<i>Toxicodendron radicans</i>	16.67	FAC
<i>Ulmus americana</i>	16.67	FACW
<i>Urtica</i> sp.	16.67	-
<i>Vicia</i> sp.	16.67	-
<i>Acer rubrum</i>	8.33	FAC
<i>Carex vulpinodea</i>	8.33	OBL
<i>Cornus stolonifera</i>	8.33	FACW+
<i>Hypericum punctatum</i>	8.33	FAC-
<i>Lathyrus</i> sp.	8.33	-
<i>Oxalis</i> sp.	8.33	-
<i>Quercus</i> sp.	8.33	-
<i>Rosa multiflora</i> *	8.33	FACU
<i>Rubus allegheniensis</i>	8.33	FACU-
<i>Salix</i> sp.	8.33	-
<i>Scirpus atrovirens</i>	8.33	OBL
<i>Trifolium pratense</i> *	8.33	FACU
<i>Tussilago farfara</i> *	8.33	FACU
<i>Typha latifolia</i>	8.33	OBL
Unknown	8.33	-

*-designates exotic species (non-native)

had the greatest number of stems with 52, followed by *Ulmus americana* with 15. Three of the 72 stems (4.2 percent) were dead. All the dead stems were *Viburnum recognitum*. Of the 72 stems of shrubs 69 (95.8%) were live. No stems appeared to be stressed.

For tree species, a total of 29 stems were located within the transects. *Ulmus americana* was the densest with 27, followed by *Acer rubrum* with 2 stems. Of the 29 stems, 23 (79.3 percent) were live and 6 (20.7 percent) dead. No stems were classified as stressed.

Table 5. Total number of live, stressed, and dead stems of shrub's (1-3 m tall) found along the two 100 ft transects.

Species	Live	Stressed	Dead	Total
<i>Viburnum recognitum</i>	49	-	3	52
<i>Rhamnus alnifolia</i>	3	-	-	3
<i>Ulmus americana</i>	15	-	-	15
<i>Cornus racemosa</i>	1	-	-	1
<i>Salix sp.</i>	1	-	-	1
	---	---	---	---
Total	69	0	3	72

Table 6. Total number of live, stressed, and dead stems of trees (> 3 m tall) found along the two 100 ft transects.

Species	Live	Stressed	Dead	Total
<i>Ulmus americana</i>	21	-	6	27
<i>Acer rubrum</i>	2	-	-	2
	---	---	---	---
Total	23	0	6	29

3.1.1.2 Exotic Plant Species

No exotic trees or shrubs were found along the transects. Ten species of plants in the herbaceous layer are considered to be exotic (non-native) producing a total percent cover of 17.3 percent. *Lysimachia nummularia* had the greatest percent cover with 12.8 percent, followed by *Medicago sativa* (1.8 percent). The remaining exotic species all had percent cover values less than 1.0 percent. The exotic species with the greatest percent frequency was *Lysimachia nummularia* with 50.0 percent. The remaining seven exotic species all had a frequency of less than 40.0 percent.

3.1.2 Passive Sampling

Photographs were taken at three points corresponding to the line transects and are provided in Appendix C & D. These photographs provide a permanent ground-level record of physical changes in the wetlands. Although this method does not provide detailed information, it does provide time-based illustrations of vegetative growth and composition and the interspersed vegetative communities. The 1996 photographs, along with the vegetative sampling, were taken at the same time of the year as they were in 1995 in order to produce adequate comparisons between years. In comparing the photographs there were no significant changes in vegetation between 1995 and 1996.

3.2 SOIL SAMPLING

The wetland in which the vegetation sampling was conducted is composed primarily of Miner silty clay loam which is a hydric soil (3D/Environmental, 1994, USDA, 1976). All soil samples taken in the nested quadrats had a low chroma matrix and mottles, which qualify them as hydric. The soil color for all soil samples are given in Table 7. The soil colors had not changed significantly since the 1995 survey.

3.3 SOIL HYDROLOGY

All 12 soil samples were saturated in the upper 12 inches of the soil profile (Table 7). Given the fact that the wetland was saturated on 6 June 96 it is very likely that it had been saturated for at least two weeks during the growing season, which qualifies it as having soil hydrology. Stained leaves located at various locations in the wetland also indicate that the wetland has soil hydrology.

Table 7. Soil matrix and mottle colors for 12 soil samples taken from nested-quadrats located in the 2 transects as well as depth to soil saturation.

Sample	Matrix Color	Mottle Color	Saturation Depth
<u>Transect #1</u>			
Sample #1	10YR 5/1	10YR 6/8	10"
Sample #2	10YR 5/1	10YR 4/4	10"
Sample #3	10YR 5/1	10YR 5/6	10"
Sample #4	10YR 4/1	10YR 6/6	10"
Sample #5	10YR 4/1	10YR 4/4	10"
Sample #6	10YR 4/1	10YR 4/4	10"
<u>Transect #3</u>			
Sample #13	10YR 5/1	10YR 5/8	inundated
Sample #14	10YR 4/1	10YR 6/6	not saturated
Sample #15	10YR 4/1	10YR 5/8	not saturated
Sample #16	10YR 5/1	10YR 6/6	10"
Sample #17	10YR 5/1	10YR 6/6	10"
Sample #18	10YR 4/1	10YR 4/6	10"

4.0 CONCLUSION

Because over 50% of species in the tree, shrub, and herbaceous layers in the 1996 survey were either Facultative (FAC), Facultative Wetland (FACW), or Obligate (OBL), the vegetation criteria to categorize this area as a wetland were satisfied. Likewise, the criteria for soils, and hydrology were also met. As a result, the study area is still considered a wetland as of 6 June 1996. Comparing photographs taken of the wetland during the preliminary survey conducted on 4 May 1994 (3D/Environmental, 1994), and the 1995 monitoring survey with the present 1996 survey there appears to be no real difference in the wetland before and after the directional boring. Based on the composition of trees, shrubs, and herbs in the three transects and nested-quadrats this wetland continues to be very similar in composition to other early successional wetlands in this part of the state (Anderson 1993).

The evaluation of the condition of the shrubs and trees showed that only 4.2% of the shrubs and 20.7% of the trees were stressed or dead. In addition, of the dead trees (20.7%) were American elms that had been infected by Dutch elm disease. As a result, the death of American elms during the 1996 survey, or future surveys, can not be attributed to the construction of pipeline. Also, a ditch going into the northeast end of the wetland has been constructed by the owner of the wetland in an attempt to drain it. If the wetland is successfully drained it may cause the death of trees, shrubs, and herbs resulting in a change in composition and structure from a wetland plant community to an upland plant community; a change in the wetland that may have very little to do with the directional-drilling and open-cut construction techniques that are being monitored in this study. In addition, during the spring of 1996 the ditch that parallels Chester Road has been enlarged, which may also contribute to the draining of the wetland.

No exotic species of trees or shrubs were found in the two transects. Although no exotics were found in the shrub layer *Rosa multiflora* is found in other parts of the wetland and if this species increases significantly the wetland may be converted to upland. Ten species of plants in the herbaceous layer are considered to be exotic (non-native) producing a total percent cover of 17.3 percent. *Lysimachia nummularia* had the greatest percent cover with 12.8 percent, followed by *Medicago sativa* (1.8 percent). The remaining exotic species all had percent cover values less than 1.0 percent. Since the dominant exotic herbs are not considered aggressive invaders they will probably not be a problem with regard to replacing wetland plants at this site.

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APPENDIX A: DATA FOR NESTED-QUADRATS

A	B	C	D	E	F	G	H	I	J	K	L	M	N
1													
2	0.5 m ² quadrats	Percent Cover for each quadrat in transects 1 and 3.											
3		1-1	1-2	1-3	1-4	1-5	1-6	3-1	3-2	3-3	3-4	3-5	3-6
4	<i>Acer rubrum</i>												Average
5	<i>Achillea millefolium</i>												0.0%
6	<i>Agrimonia parviflora</i>												0.0%
7	<i>Ambrosia artemisiifolia</i>					3.0%			5.0%		1.0%		0.7%
8	<i>Apocynum cannabinum</i>												0.1%
9	<i>Asclepias incarnata</i>												0.0%
10	<i>Aster</i> sp.												0.0%
11	<i>Bidens</i> sp.	2.0%	50.0%	5.0%									4.8%
12	<i>Brasica nigra</i>												0.0%
13	<i>Carex vulpinoidea</i>		2.0%										0.2%
14	<i>Cirsium discolor</i>												0.0%
15	<i>Cornus racemosa</i>									3.0%			0.3%
16	<i>Cornus stolonifera</i>								5.0%	3.0%			0.0%
17	<i>Dipsacus sylvestris</i>												0.7%
18	<i>Erigeron</i> sp.												0.0%
19	<i>Eupatorium perfoliatum</i>												0.2%
20	<i>Euthamia graminifolia</i>									2.0%			0.4%
21	<i>Geum laciniatum</i>	15.0%			3.0%	2.0%				2.0%		2.0%	2.0%
22	<i>Hypericum punctatum</i>												0.0%
23	<i>Juncus effusus</i>	30.0%											2.5%
24	<i>Juncus tenuis</i>			5.0%							80.0%		7.1%
25	<i>Lathyrus</i> sp.												0.0%
26	<i>Lycopus americanus</i>			10.0%					3.0%				1.1%
27	<i>Lysimachia nummularia</i>							90.0%	5.0%	2.0%	20.0%	50.0%	13.9%
28	<i>Medicago sativa</i>									20.0%			1.7%
29	<i>Oxalis</i> sp.												0.0%
30	<i>Parthenocissus quinquefolia</i>				1.0%								0.1%
31	<i>Poa pratensis</i>	5.0%							1.0%	5.0%			0.9%
32	<i>Polygonum</i> sp.			30.0%	5.0%			10.0%					3.8%
33	<i>Potentilla simplex</i>								2.0%				0.2%
34	<i>Prunella vulgaris</i>		2.0%										0.2%
35	<i>Quercus</i> sp.												0.0%
36	<i>Rhamnus alnifolia</i>			10.0%	10.0%	5.0%			10.0%				2.9%
37	<i>Rosa multiflora</i>												0.0%
38	<i>Rubus allegheniensis</i>												0.0%
39	<i>Rubus flagellaris</i>										1.0%		0.1%
40	<i>Rumex crispus</i>							5.0%					0.4%

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2	0.5 m ² quadrats													
3		1-1	1-2	1-3	1-4	1-5	1-6	3-1	3-2	3-3	3-4	3-5	3-6	Average
41	Salix sp.													0.0%
42	Scirpus atrovirens													0.0%
43	Solidago canadensis	20.0%	5.0%			2.0%			5.0%	10.0%				3.5%
44	Solidago sp.				1.0%						1.0%			0.1%
45	Toxicodendron radicans													0.0%
46	Trifolium pratense								5.0%	3.0%	2.0%			0.8%
47	Trifolium repens													0.0%
48	Tussilago farfara													0.8%
49	Typha latifolia						10.0%			2.0%				0.2%
50	Ulmus americana													1.7%
51	Unknown													0.1%
52	Urtica sp.			1.0%				5.0%	1.0%					0.5%
53	Valerianella sp.					5.0%	80.0%	20.0%			5.0%		50.0%	20.8%
54	Viburnum recognitum													0.1%
55	Vicia sp.									1.0%				
56	sum total % cover	72.0%	59.0%	61.0%	110.0%	17.0%	80.0%	140.0%	42.0%	51.0%	127.0%	62.0%	50.0%	72.6%
57														
58	1.0 m ² quadrats	1-1	1-2	1-3	1-4	1-5	1-6	3-1	3-2	3-3	3-4	3-5	3-6	
59	Acer rubrum													0.1%
60	Achillea millefolium								1.0%	1.0%				0.1%
61	Achillea millefolium								1.0%	1.0%				0.2%
62	Agrimonia parviflora					1.0%					1.0%			0.2%
63	Ambrosia artemisiifolia								2.0%	5.0%				0.6%
64	Apocynum cannabinum													0.0%
65	Asclepias incarnata													0.0%
66	Aster sp.													2.3%
67	Bidens sp.	2.0%	20.0%	5.0%				1.0%						0.0%
68	Brasica nigra													0.8%
69	Carex vulpinodea		10.0%											0.0%
70	Cirsium discolor													0.4%
71	Cornus racemosa								3.0%	1.0%			1.0%	0.2%
72	Cornus stolonifera								2.0%	1.0%	2.0%			0.3%
73	Dipsacus sylvestris													0.2%
74	Erigeron sp.		1.0%								1.0%			0.1%
75	Eupatorium perfoliatum										1.0%			0.3%
76	Euthamia graminifolia								1.0%		2.0%			0.3%

A		B	C	D	E	F	G	H	I	J	K	L	M	N
114 3 m ² quadrats		1-1	1-2	1-3	1-4	1-5	1-6	3-1	3-2	3-3	3-4	3-5	3-6	
115										1.0%				0.1%
116	<i>Acer rubrum</i>								1.0%	1.0%				0.2%
117	<i>Achillea millefolium</i>					1.0%			1.0%	1.0%				0.3%
118	<i>Agmonia parviflora</i>									5.0%	1.0%			0.5%
119	<i>Ambrosia artemisiifolia</i>								2.0%	2.0%				0.3%
120	<i>Apocynum cannabinum</i>							5.0%		1.0%				0.5%
121	<i>Asclepias incarnata</i>									1.0%				0.3%
122	<i>Aster</i> sp.			3.0%				2.0%						3.3%
123	<i>Bidens</i> sp.	2.0%	20.0%	15.0%						1.0%	2.0%			0.3%
124	<i>Brasica nigra</i>		1.0%											0.4%
125	<i>Carex vulpinodea</i>		5.0%											0.2%
126	<i>Cirsium discolor</i>						10.0%		1.0%	1.0%			1.0%	1.2%
127	<i>Cornus racemosa</i>								2.0%	1.0%	1.0%			0.1%
128	<i>Cornus stolonifera</i>								2.0%	1.0%	1.0%			0.3%
129	<i>Dipsacus sylvestris</i>								1.0%	1.0%	1.0%			0.8%
130	<i>Eriogonum</i> sp.	5.0%	1.0%	1.0%						2.0%	10.0%			0.3%
131	<i>Eupatorium perfoliatum</i>			3.0%					2.0%	1.0%	1.0%			1.2%
132	<i>Euthamia graminifolia</i>						2.0%		1.0%	1.0%	1.0%	3.0%	1.0%	1.0%
133	<i>Geum laciniatum</i>	1.0%		1.0%								1.0%		0.1%
134	<i>Hypericum punctatum</i>													4.2%
135	<i>Juncus effusus</i>	30.0%	10.0%	8.0%	2.0%			3.0%			80.0%			7.0%
136	<i>Juncus tenuis</i>	1.0%												0.1%
137	<i>Lathyrus</i> sp.										1.0%			0.9%
138	<i>Lycopus americanus</i>	1.0%	1.0%	2.0%	5.0%			80.0%	2.0%	2.0%	20.0%	40.0%		12.1%
139	<i>Lysimachia nummularia</i>		1.0%						3.0%	20.0%				1.9%
140	<i>Medicago sativa</i>													0.1%
141	<i>Oxalis</i> sp.		1.0%		1.0%									0.2%
142	<i>Parthenocissus quinquefolia</i>	1.0%							2.0%	5.0%				0.8%
143	<i>Poa pratensis</i>	1.0%		2.0%										2.8%
144	<i>Polygonum</i> sp.	1.0%	5.0%	10.0%	10.0%	2.0%		5.0%	2.0%	1.0%	1.0%	1.0%		0.4%
145	<i>Potentilla simplex</i>								1.0%	2.0%				2.0%
146	<i>Prunella vulgaris</i>	1.0%	15.0%		5.0%									0.1%
147	<i>Quercus</i> sp.					1.0%			20.0%	10.0%	1.0%			9.4%
148	<i>Rhamnus alnifolia</i>		10.0%	60.0%	10.0%	2.0%			2.0%					0.2%
149	<i>Rosa multiflora</i>								1.0%					0.1%
150	<i>Rubus allegheniensis</i>								2.0%					0.6%
151	<i>Rubus flagellaris</i>								2.0%	1.0%	1.0%	1.0%	3.0%	1.2%
152	<i>Rumex crispus</i>		3.0%					10.0%						0.1%
153	<i>Salix</i> sp.								1.0%					0.1%

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
114	3 m ² quadrats													
115		1-1	1-2	1-3	1-4	1-5	1-6	3-1	3-2	3-3	3-4	3-5	3-6	
154	<i>Scirpus atrovirens</i>								1.0%					0.1%
155	<i>Solidago canadensis</i>	15.0%	2.0%			1.0%			8.0%	5.0%				2.6%
156	<i>Solidago</i> sp.										1.0%	1.0%		0.2%
157	<i>Toxicodendron radicans</i>				1.0%	1.0%								0.2%
158	<i>Trifolium pratense</i>	2.0%							1.0%	2.0%	1.0%			0.3%
159	<i>Trifolium repens</i>													0.2%
160	<i>Tussilago farfara</i>	2.0%						15.0%						1.3%
161	<i>Typha latifolia</i>									1.0%	5.0%			0.5%
162	<i>Ulmus americana</i>									1.0%				0.1%
163	Unknown								1.0%	1.0%				0.2%
164	<i>Urtica</i> sp.								1.0%	1.0%				0.7%
165	<i>Valerianella</i> sp.			1.0%				4.0%	1.0%	1.0%		1.0%		22.4%
166	<i>Viburnum recognitum</i>		5.0%	10.0%	60.0%	70.0%	70.0%	5.0%	7.0%	1.0%	1.0%		40.0%	0.2%
167	<i>Vicia</i> sp.									1.0%	1.0%			
168	sum total percent cover	65.0%	80.0%	116.0%	95.0%	80.0%	80.0%	129.0%	69.0%	72.0%	131.0%	48.0%	45.0%	

	Q	R	S	T	U
1	Average percent cover for the quadrats				
2					Grand
3		0.5-m ²	1.0-m ²	3.0-m ²	Average
4	<i>Acer rubrum</i>	0.00%	0.08%	0.08%	0.06%
5	<i>Achillea millefolium</i>	0.00%	0.08%	0.17%	0.08%
6	<i>Agrimonia parviflora</i>	0.67%	0.17%	0.25%	0.36%
7	<i>Ambrosia artemisiifolia</i>	0.08%	0.17%	0.50%	0.25%
8	<i>Apocynum cannabinum</i>	0.00%	0.58%	0.33%	0.31%
9	<i>Asclepias incarnata</i>	0.00%	0.00%	0.50%	0.17%
10	<i>Aster</i> sp.	0.00%	0.00%	0.33%	0.11%
11	<i>Bidens</i> sp.	4.75%	2.33%	3.25%	3.44%
12	<i>Brasica nigra</i>	0.00%	0.00%	0.33%	0.11%
13	<i>Carex vulpinodea</i>	0.17%	0.83%	0.42%	0.47%
14	<i>Cirsium discolor</i>	0.00%	0.00%	0.17%	0.06%
15	<i>Cornus racemosa</i>	0.25%	0.42%	1.17%	0.61%
16	<i>Cornus stolonifera</i>	0.00%	0.17%	0.08%	0.08%
17	<i>Dipsacus sylvestris</i>	0.67%	0.25%	0.33%	0.42%
18	<i>Erigeron</i> sp.	0.00%	0.17%	0.75%	0.31%
19	<i>Eupatorium perfoliatum</i>	0.17%	0.08%	0.33%	0.19%
20	<i>Euthamia graminifolia</i>	0.42%	0.25%	1.17%	0.61%
21	<i>Geum laciniatum</i>	2.00%	1.58%	1.00%	1.53%
22	<i>Hypericum punctatum</i>	0.00%	0.00%	0.08%	0.03%
23	<i>Juncus effusus</i>	2.50%	2.92%	4.17%	3.19%
24	<i>Juncus tenuis</i>	7.08%	6.67%	7.00%	6.92%
25	<i>Lathyrus</i> sp.	0.00%	0.08%	0.08%	0.06%
26	<i>Lycopus americanus</i>	1.08%	0.58%	0.92%	0.86%
27	<i>Lysimachia nummularia</i>	13.92%	12.25%	12.08%	12.75%
28	<i>Medicago sativa</i>	1.67%	1.67%	1.92%	1.75%
29	<i>Oxalis</i> sp.	0.00%	0.00%	0.08%	0.03%
30	<i>Parthenocissus quinquefolia</i>	0.08%	0.17%	0.17%	0.14%
31	<i>Poa pratensis</i>	0.92%	0.92%	0.83%	0.89%
32	<i>Polygonum</i> sp.	3.75%	1.67%	2.75%	2.72%
33	<i>Potentilla simplex</i>	0.17%	0.33%	0.42%	0.31%
34	<i>Prunella vulgaris</i>	0.17%	1.50%	2.00%	1.22%
35	<i>Quercus</i> sp.	0.00%	0.00%	0.08%	0.03%
36	<i>Rhamnus alnifolia</i>	2.92%	6.00%	9.42%	6.11%
37	<i>Rosa multiflora</i>	0.00%	0.00%	0.17%	0.06%
38	<i>Rubus allegheniensis</i>	0.00%	0.00%	0.08%	0.03%
39	<i>Rubus flagellaris</i>	0.08%	0.17%	0.58%	0.28%
40	<i>Rumex crispus</i>	0.42%	0.75%	1.17%	0.78%
41	<i>Salix</i> sp.	0.00%	0.00%	0.08%	0.03%
42	<i>Scirpus atrovirens</i>	0.00%	0.00%	0.08%	0.03%
43	<i>Solidago canadensis</i>	3.50%	0.00%	2.58%	2.03%
44	<i>Solidago</i> sp.	0.08%	3.50%	0.17%	1.25%
45	<i>Toxicodendron radicans</i>	0.08%	0.17%	0.17%	0.14%
46	<i>Trifolium pratense</i>	0.00%	0.00%	0.17%	0.06%
47	<i>Trifolium repens</i>	0.83%	0.83%	0.33%	0.67%
48	<i>Tussilago farfara</i>	0.00%	0.00%	0.17%	0.06%
49	<i>Typha latifolia</i>	0.83%	1.25%	1.25%	1.11%
50	<i>Ulmus americana</i>	0.17%	0.25%	0.50%	0.31%
51	Unknown	1.67%	0.92%	0.08%	0.89%
52	<i>Urtica</i> sp.	0.08%	0.08%	0.17%	0.11%
53	<i>Valerianella</i> sp.	0.50%	0.92%	0.67%	0.69%
54	<i>Viburnum recognitum</i>	20.83%	22.33%	22.42%	21.86%
55	<i>Vicia</i> sp.	0.08%	0.08%	0.17%	0.11%
56	Sum Total	72.58%	73.17%	84.17%	76.64%

Average percent frequency for the quadrats				Grand
	0.5-m ²	1.0-m ²	3.0-m ²	Average
<i>Acer rubrum</i>	0.00	8.33	8.33	5.56
<i>Achillea millefolium</i>	0.00	8.33	16.67	8.33
<i>Agrimonia parviflora</i>	16.67	16.67	25.00	19.44
<i>Ambrosia artemisiifolia</i>	8.33	16.67	16.67	13.89
<i>Apocynum cannabinum</i>	0.00	16.67	16.67	11.11
<i>Asclepias incarnata</i>	0.00	0.00	16.67	5.56
<i>Aster</i> sp.	0.00	0.00	16.67	5.56
<i>Bidens</i> sp.	25.00	33.33	33.33	30.56
<i>Brasica nigra</i>	0.00	0.00	25.00	8.33
<i>Carex vulpinodea</i>	8.33	8.33	8.33	8.33
<i>Cirsium discolor</i>	0.00	0.00	16.67	5.56
<i>Cornus racemosa</i>	8.33	25.00	33.33	22.22
<i>Cornus stolonifera</i>	0.00	8.33	8.33	5.56
<i>Dipasacus sylvestris</i>	16.67	16.67	25.00	19.44
<i>Erigeron</i> sp.	0.00	16.67	41.67	19.44
<i>Eupatorium perfoliatum</i>	8.33	8.33	16.67	11.11
<i>Euthamia graminifolia</i>	8.33	16.67	25.00	16.67
<i>Geum laciniatum</i>	41.67	66.67	75.00	61.11
<i>Hypericum punctatum</i>	0.00	0.00	8.33	2.78
<i>Juncus effusus</i>	8.33	16.67	33.33	19.44
<i>Juncus tenuis</i>	16.67	8.33	25.00	16.67
<i>Lathyrus</i> sp.	0.00	8.33	8.33	5.56
<i>Lycopus americanus</i>	16.67	33.33	50.00	33.33
<i>Lysimachia nummularia</i>	41.67	41.67	50.00	44.44
<i>Medicago sativa</i>	8.33	8.33	16.67	11.11
<i>Oxalis</i> sp.	0.00	0.00	8.33	2.78
<i>Parthenocissus quinquefolia</i>	8.33	16.67	16.67	13.89
<i>Poa pratensis</i>	25.00	25.00	33.33	27.78
<i>Polygonum</i> sp.	25.00	25.00	50.00	33.33
<i>Potentilla simplex</i>	8.33	25.00	33.33	22.22
<i>Prunella vulgaris</i>	8.33	25.00	41.67	25.00
<i>Quercus</i> sp.	0.00	0.00	8.33	2.78
<i>Rhamnus alnifolia</i>	33.33	41.67	58.33	44.44
<i>Rosa multiflora</i>	0.00	0.00	8.33	2.78
<i>Rubus allegheniensis</i>	0.00	0.00	8.33	2.78
<i>Rubus flagellaris</i>	8.33	16.67	33.33	19.44
<i>Rumex crispus</i>	8.33	16.67	25.00	16.67
<i>Salix</i> sp.	0.00	0.00	8.33	2.78
<i>Scirpus atrovirens</i>	0.00	0.00	8.33	2.78
<i>Solidago canadensis</i>	41.67	0.00	41.67	27.78
<i>Solidago</i> sp.	8.33	50.00	16.67	25.00
<i>Toxicodendron radicans</i>	8.33	16.67	16.67	13.89
<i>Trifolium pratense</i>	0.00	0.00	8.33	2.78
<i>Trifolium repens</i>	25.00	25.00	25.00	25.00
<i>Tussilago farfara</i>	0.00	0.00	8.33	2.78
<i>Typha latifolia</i>	8.33	8.33	8.33	8.33
<i>Ulmus americana</i>	8.33	8.33	16.67	11.11
Unknown	16.67	16.67	8.33	13.89
<i>Urtica</i> sp.	8.33	8.33	16.67	11.11
<i>Valerianella</i> sp.	16.67	33.33	41.67	30.56
<i>Viburnum recognitum</i>	50.00	66.67	83.33	66.67
<i>Vicia</i> sp.	8.33	8.33	16.67	11.11

**APPENDIX B: VASCULAR PLANT SPECIES OBSERVED WITHIN THE
NESTED-QUADRATS AND THREE TRANSECTS ESTABLISHED
IN THE WETLAND IN LORAIN COUNTY AS WELL AS
REPRESENTATIVE ILLUSTRATIONS**

Vascular plant species observed within the nested-quadrats and three transects established in the wetland in Lorain County.

Species	Common Name
ACERACEAE <i>Acer rubrum</i> L.	Red maple
ALISMATACEAE <i>Alisma subcordatum</i> Raf.	Water plantain
ANACARDIACEAE <i>Toxicodendron radicans</i> (L.) Kuntze	Poison ivy
APIACEAE <i>Daucus carota</i> L.	Queen Anne's lace
APOCYNACEAE <i>Apocynum cannabinum</i> L.	Indian hemp
ASCLEPIADACEAE <i>Asclepias incarnata</i> L.	Swamp milkweed
ASTERACEAE <i>Achillea millefolium</i> L. <i>Ambrosia artemisiifolia</i> L. <i>Aster</i> sp. <i>Bidens</i> sp. <i>Cirsium discolor</i> (Muhl.) Spreng. <i>Cirsium</i> sp. <i>Erigeron philadelphicus</i> L. <i>Erigeron</i> sp. <i>Eupatorium perfoliatum</i> L. <i>Euthamia graminifolia</i> (L.) Nutt. <i>Solidago canadensis</i> L. <i>Solidago</i> sp. <i>Taraxacum officinale</i> Weber <i>Tussilago farfara</i> L.	Yarrow Annual ragweed Aster Tickseed Field thistle Thistle Daisy fleabane Fleabane Boneset Flat-top goldero Canada goldenrod Goldenrod Common dandelion Coltsfoot
BALSAMINACEAE <i>Impatiens</i> sp	Touch-me-not
BRASSICACEAE <i>Brassica nigra</i> L.	Black mustard
CAPRIFOLIACEAE <i>Viburnum recognitum</i> Fern.	Arrow-wood
CHENOPODIACEAE <i>Chenopodium album</i> L.	Lamb's quarters

Vascular plant species observed within the nested-quadrats and three transects established in the wetland in Lorain County.

Species	Common Name
CLUSIACEAE <i>Hypericum</i> sp.	St. John's-wort
CORNACEAE <i>Cornus amomum</i> Mill. <i>Cornus stolonifera</i> Michx.	Silky dogwood Red osier dogwood
CYPERACEAE <i>Carex lacustris</i> Willd. <i>Carex vulpinoidea</i> Michx. <i>Carex</i> sp. <i>Scirpus atrovirens</i> Muhl.	Sedge Fox sedge Sedge Bulrush
DIPSACACEAE <i>Dipsacus sylvestris</i> Huds.	Teasel
FABACEAE <i>Lathyrus</i> sp. <i>Medicago lupulina</i> L. <i>Medicago sativa</i> L. <i>Trifolium pratense</i> L. <i>Trifolium repens</i> L. <i>Vicia</i> sp.	Vetchling Black medick Alfalfa Red clover White clover Vetch
FAGACEAE <i>Quercus</i> sp.	Oak
GUTTIFURAE <i>Hypericum punctatum</i> (Lam.)	Dotted St. John's-wort
JUNCACEAE <i>Juncus effusus</i> L. <i>Juncus tenuis</i> Willd. <i>Juncus</i> sp.	Jointed rush Path rush Rush
LAMIACEAE <i>Lycopus americanus</i> Muhl. <i>Prunella vulgaris</i> L.	Water horehound Heal-all
ONOCLEACEAE <i>Onoclea sensibilis</i> L.	Sensitive fern
OXALIDACEAE <i>Oxalis</i> sp.	Wood Sorrel

Vascular plant species observed within the nested-quadrats and three transects established in the wetland in Lorain County.

Species	Common Name
POACEAE	Muhly
<i>Muhlenbergia</i> sp.	Canada bluegrass
<i>Poa compressa</i> L.	Kentucky bluegrass
<i>Poa pratensis</i> L.	
POLYGONACEAE	Smartweed
<i>Polygonum</i> sp.	Red sorrel
<i>Rumex acetocella</i> L.	Curled dock
<i>Rumex crispus</i> L.	
PRIMULACEAE	Marsh seedbox
<i>Lysimachia nummularia</i> L.	
RHAMNACEAE	Alder buckthorn
<i>Rhamnus alnifolia</i> L'Her.	
ROSACEAE	Small-flowered agrimony
<i>Agrimonia parviflora</i> Ait.	Agrimony
<i>Agrimonia</i> sp.	Hawthorn
<i>Crataegus</i> sp.	Wild strawberry
<i>Fragaria virginia</i> Duchesne.	Rough avens
<i>Geum laciniatum</i> Murray	Common cinquefoil
<i>Potentilla simplex</i> Michx.	Black cherry
<i>Prunus serotina</i> Ehrh.	Multiflora rose
<i>Rosa multiflora</i> Thunb. ex Murr.	Blackberry
<i>Rubus allegheniensis</i> T. Porter	Dewberry
<i>Rubus flagellaris</i> Willd.	Blackberry
<i>Rubus</i> sp.	
SALICACEAE	Black willow
<i>Salix nigra</i> L.	Willow
<i>Salix</i> sp.	
TYPHACEAE	Common cattail
<i>Typha latifolia</i> L.	
ULMACEAE	American elm
<i>Ulmus americana</i> L.	
VALERIANACEAE	Corn salad
<i>Valerianella</i> sp.	
VITACEAE	Virginia creeper
<i>Parthenocissus quinquefolia</i> (L.) Planch.	Virginia creeper
<i>Parthenocissus</i> sp.	River grape
<i>Vitis riparia</i> Michx.	

APPENDIX C: PHOTOGRAPHS OF THE THREE TRANSECTS IN THE WETLAND



Figure 1. Photograph on the left shows Transect #1 taken from Chester Road in 1995, while the photograph on the right shows Transect #1 in 1996.



Figure 2. Photograph shows the location of the former Transect #2 which was destroyed by the new sewer line.



Figure 3. Photograph on the top shows Transect #3 taken from Lear Road in 1995, while the photograph on the bottom shows Transect #3 in 1996. (Because the vegetation had grown up along the Lear Road the 1996 photo was taken from a slightly different angle.)

APPENDIX D: GENERAL PHOTOGRAPHS OF WETLAND



Figure 1. Photograph showing the enlarged ditch along Chester Road which could add to the draining of the wetland.



Figure 2 Photograph of man-made drainage ditch going into the wetland.



Figure 3. Two photographs of the wetland taken from different locations along Chester Road.