

THE ROUGE RIVER PROJECT
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Rouge River National Wet Weather Demonstration Project

Wayne County, Michigan

TECHNICAL MEMORANDUM Selection of Appropriate Wetland Nonpoint Source Pollution Abatement Locations

RPO-NPS-TM36.00

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Authors: Douglas Denison, Gretchen Messer, Catherine Riseng,
Donald Tilton, Ph.D

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Rouge River National Wet Weather Demonstration Project

MISSION STATEMENT

The mission of the Rouge River National Wet Weather Demonstration Project is to restore the water quality in the Rouge River as necessary to:

- provide a safe and healthy environment for ourselves and future generations,
- protect downriver water resources such as the Detroit River and Lake Erie, and
- re-establish a healthy and diverse ecosystem within the Rouge River Watershed.

This will be accomplished through the development, implementation, and financial integration of a technical, social, and institutional framework leading to cost efficient, and innovative, watershed based solutions to control the wet weather problems in the Rouge River Watershed.

ABSTRACT

Selection of Appropriate Wetland Nonpoint Source Pollution Abatement Locations

Douglas Denison, Gretchen Messer, Catherine Riseng, Donald Tilton, PhD.

The Rouge River National Wet Weather Demonstration Project is a federally funded initiative with the objective of developing demonstration projects to evaluate a variety of urban nonpoint source pollution reduction best management practices (BMPs) for the Rouge River Watershed. These demonstrations will in sum improve the quality of storm water runoff to the Rouge River. The function of wetland filtration for water quality improvement has been recognized as one potential BMP. Wetlands increase storm water detention capacity, increase storm water attenuation, moderate low flows, and improve water quality by removing nutrients, sediments and metals. The wetland demonstration project utilizes existing, enhanced, and created wetlands to demonstrate the value and effectiveness of wetlands in treating storm water runoff.

This document provides a summary of the existing biological and physical conditions of each of the wetland and upland areas designated for consideration for the Rouge wetlands wet weather management demonstration system. To assist in the selection of practical and feasible sites for pollution abatement using wetland sites, field surveys were conducted to identify topography, soil types, land use, utilities, natural features, and hydrologic setting. This information was used to identify sites for implementing the Rouge wetland wet weather management demonstration project.

PREFACE

The Rouge River has historically suffered and continues to suffer from the combined stress of pollutant loadings from various sources. The vast majority of continuous point sources have been eliminated through the issuance and enforcement of National Pollutant Discharge Elimination System (NPDES) permits for municipal and industrial dischargers. Yet, as established in the Rouge River Remedial Action Plan (RAP), the river remains polluted primarily because of sources associated with wet weather flow.

The Rouge River National Wet Weather Demonstration Project (Rouge Project) is intended to evaluate each of the various sources of wet weather pollution; implement alternative remedial measures; investigate wet weather waste load allocations; establish associated pollutant load reductions; examine the financial and institutional impediments to wet weather pollution control; and recommend a plan and procedure for watershed-wide pollution control which is "implementable" in the Rouge and can be readily transferred to similar urban watersheds throughout the country.

The effort is not being conducted in isolation. The Rouge RAP provides a baseline from which Rouge Project efforts have begun. In fact, the Rouge Project can be viewed as the key component of the initial implementation of the RAP. In addition, ongoing regulatory efforts aimed at controlling Combined Sewer Overflow (CSO) discharge have also been integrated into the Rouge Project and all construction facilities will be in accordance to NPDES permits.

It is widely recognized, and reinforced by RAP recommendations, that CSO control by itself will not be sufficient to restore water quality to acceptable levels in the Rouge River and other similar urban rivers. The project has established a watershed-wide concept as its focus. Within the Rouge River Watershed, a range of pollution sources have been identified. They include: traditional urban runoff, illicit connections to drainage facilities, abandoned dumps within the river flood plain, wet fall and dry fall air deposition, and contaminated sediments within the river channel and impounded lakes.

The Rouge Project has incorporated efforts to develop analysis tools, organize existing and future data, conduct field surveys, collect and analyze water quality samples, develop and implement water quality models, design and test structural and nonstructural best management practices (BMPs), and establish loadings from nontraditional wet weather sources. Additionally, it includes components that will involve watershed residents in pollution control planning, and will study the institutional structure and financial capabilities of those entities responsible for long term implementation of the recommended watershed plan.

To efficiently manage an effort with diverse objectives, the project has been divided into ten program elements. Each of these has a specifically defined technical or operational purpose. Within each of these elements, work plans are developed to define specific activities to be performed as part of the project. These work plans define the Tasks and level of effort.

The program elements that have been established are as follows:

- Geographic Information System (GIS) and Mapping
- Data Collection and Management
- Sampling and Analytical Program
- Modeling and Decision Support System (DSS)
- Nonpoint Source Best Management Practices (BMPs)
- Combined Sewer Overflow (CSO) Design, Build and Test Facilities
- Value Engineering
- Public Information and Involvement
- Financial and Institutional
- Project Management, Coordination and Reporting

This document has been generated under the Nonpoint Source Program Element. Its purpose is to provide a summary of the existing biological and physical conditions of each of the wetland and upland areas designated for consideration for the Rouge wetlands wet weather management demonstration system. This document is a product of Nonpoint Source Work Plan 7, Tasks 2 and 4.

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1.0 INTRODUCTION. The Rouge River National Wet Weather Demonstration Project (Rouge Project) has been initiated with the objective of developing a wet weather management plan for the Rouge River Watershed. As part of this project, an extensive investigation was completed to identify and select appropriate wetlands in the watershed where pollution abatement is feasible and prudent. The investigation included collecting relevant information to aid in the search for targeted wetland sites. The information included Michigan Resource Information System (MIRIS) maps, National Wetlands Inventory maps, aerial photography, land use maps, recreation maps, Wayne County Rouge Program Office (RPO) Geographic Information System (GIS) mapping of storm water discharges, and existing and historical drainage maps. Utilizing this information, the RPO actively searched and field surveyed various wetland types which may serve as demonstration sites to evaluate the effectiveness of wetlands in treating storm water. The sites included existing constructed wetlands, naturally occurring wetlands, potential Combined Sewer Overflow (CSO) sites for constructing new wetlands, and sites draining approximately 100 acres where wetlands could be restored.

This investigation also included a review of the existing information on site specific wetland ecology, wetland ecosystem processes, and the use of specific wetland sites for the control of storm water. Special emphasis was placed on those aspects of wetland ecology which pertain to nonpoint source pollution control such as nutrient and sediment removal processes.

The Michigan National Features Inventory and U.S. Fish and Wildlife Service were contacted regarding the occurrence of any listed threatened and endangered species in selected sites. Additionally, field surveys were conducted to identify any critical habitat that may support threatened and endangered species. There were no listed occurrences or critical habitats identified for the selected sites for the wetland wet weather demonstration project.

The relative sensitivity of the biota to water level fluctuations on the selected wetland sites was submitted to RPO in the Technical Memorandum, "Summary of Water Level Fluctuations on Rouge Wetlands" (15 October 1994). A review of the wetland types and existing plant communities for proposed wetlands for non-point sources abatement programs identified that four wetland types are represented: forested wetlands, wet meadows, scrub-shrub and shallow water wetlands. These Rouge River wetland types periodically flood with nutrient-enriched waters. The determining factors as to how the plant communities respond to these conditions are dependent on the timing, duration and depth of the flood. Because of the complex nature of direct and indirect factors, the response of Rouge River wetlands to these conditions will be studied during the demonstration project to identify both injury response and tolerance to flooding.

The majority of the wetlands associated with the Rouge River basin are forested wetlands. Research to date has provided some qualitative information about the effects of flooding

on forested wetlands. Models and field surveys have been completed on reservoir studies for various woody vegetation for the north central United States and Canada. The plant communities identified at the selected sites are primarily classified as tolerant to wide fluctuations of inundation.

The investigation reviewed a total of 25 sites (9 constructed, 13 existing, and 3 CSO) which were considered as potential NPS Abatement locations. The RPO has selected five of those sites (2 existing and 3 constructed) which are prudent and feasible for further consideration. Additionally, a sixth site may be selected for potential future projects to investigate a wetland system's capability of treating decant water from a CSO control facility.

This Technical Memorandum satisfies Work Plan No. 7, Task 2 and Task 4, and provides a summary of all wetlands sites that were evaluated as potential Nonpoint Source (NPS) and CSO pollution abatement locations.

2.0 CONSTRUCTED WETLANDS. The investigation of existing constructed wetlands which may be appropriate for NPS Pollution Abatement was completed for the Rouge River Watershed. Nine constructed wetlands distributed across the Lower, Middle and Upper Rouge were evaluated (*Figure 2-1*). Existing information on each of the sites was collected including land use, wetland type and size, controlled inlet/outlet, existing monitoring data, willing owner, and ease to establish a monitoring program. A field review was completed on nine of the constructed wetlands which appeared to be feasible and prudent for potential NPS pollution abatement locations within the watershed.

2.1 CONSTRUCTED WETLAND EVALUATION. Following is a summary of the nine existing constructed wetlands that were field verified within the Rouge River Watershed. These wetlands represent a variety of physical, biological, and functional values for consideration as potential NPS abatement locations:

Wetland 1 is a 6.5 acre emergent and open water wetland located in Van Buren Township east of Belleville Road. It was constructed in late 1990 and receives sheet runoff from grass fields, a large commercial parking lot, and roof runoff from a Meijer store. Detailed monitoring surveys have been completed since 1990.

Wetland 2 is a 3.0 acre emergent and scrub/shrub wetland located in Canton Township near Warren and Sheldon Roads. It was constructed late 1992, on line with the Stuart Drain adjacent to Willow Creek. Surrounding land use is *Figure 2-1*.

Wetland 3 is a 1.75 acre emergent and scrub/shrub wetland in Northville Township near 6 Mile and Napier Roads. It was constructed in 1991 as part of a remediation project and represents a closed looped ground water system. It receives some minor runoff from surrounding surface land use.

Wetland 4 is a 9.5 acre wetland in Dearborn south of Rotunda Drive near the TPC Golf Course. It was created in 1990 and receives runoff from high density residential land use. It is directly connected to the Rouge River and receives flood waters during major storm events. Detailed monitoring surveys have been completed since 1990.

Wetland 5 is a small 0.5 acre emergent wetland in Southfield near Civic Center and Northwestern Highway. It receives runoff from office complexes and highway land uses.

Wetland 6 is an 11.0 acre emergent and open water wetland in Westland near Warren and Newburgh Roads. It was constructed in 1989 and receives runoff from commercial, railway, and open field land uses.



Regional Setting - Constructed Wetlands **Figure 2-1**

Site Selection Study for Wetland Nonpoint

Source Pollution Abatement

Rouge Program Office

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Wetland 7 consists of a 40.0 acre and a 20.0 acre wetland complex consisting of emergent, forested and wet meadows separated by the Lower Rouge River. Construction has recently started on these two wetland systems with completion scheduled for early 1994. They will receive surface runoff primarily from vacant land. The 40.0 acre wetland complex lies just off-line and discharges to the McKinstry Drain of the Lower Rouge.

Wetland 8 is a 3.0 acre emergent wetland in Plymouth Township near Beck Road and M-14. It was constructed in 1988 in a developing light industrial complex and receives runoff from a major drain from the complex.

Wetland 9 is 0.6 acre emergent and scrub/shrub wetland in Bloomfield Hills near Cranbrook and Lone Pine Road. It was constructed in late 1992 and receives runoff from an institutional land use.

These constructed wetlands were presented to the RPO Technical Committee for review, and upon further investigation, three (3) constructed wetlands were selected for further study.

2.2 SITE SELECTION STUDY FOR CONSTRUCTED WETLAND NONPOINT SOURCE POLLUTION ABATEMENT.

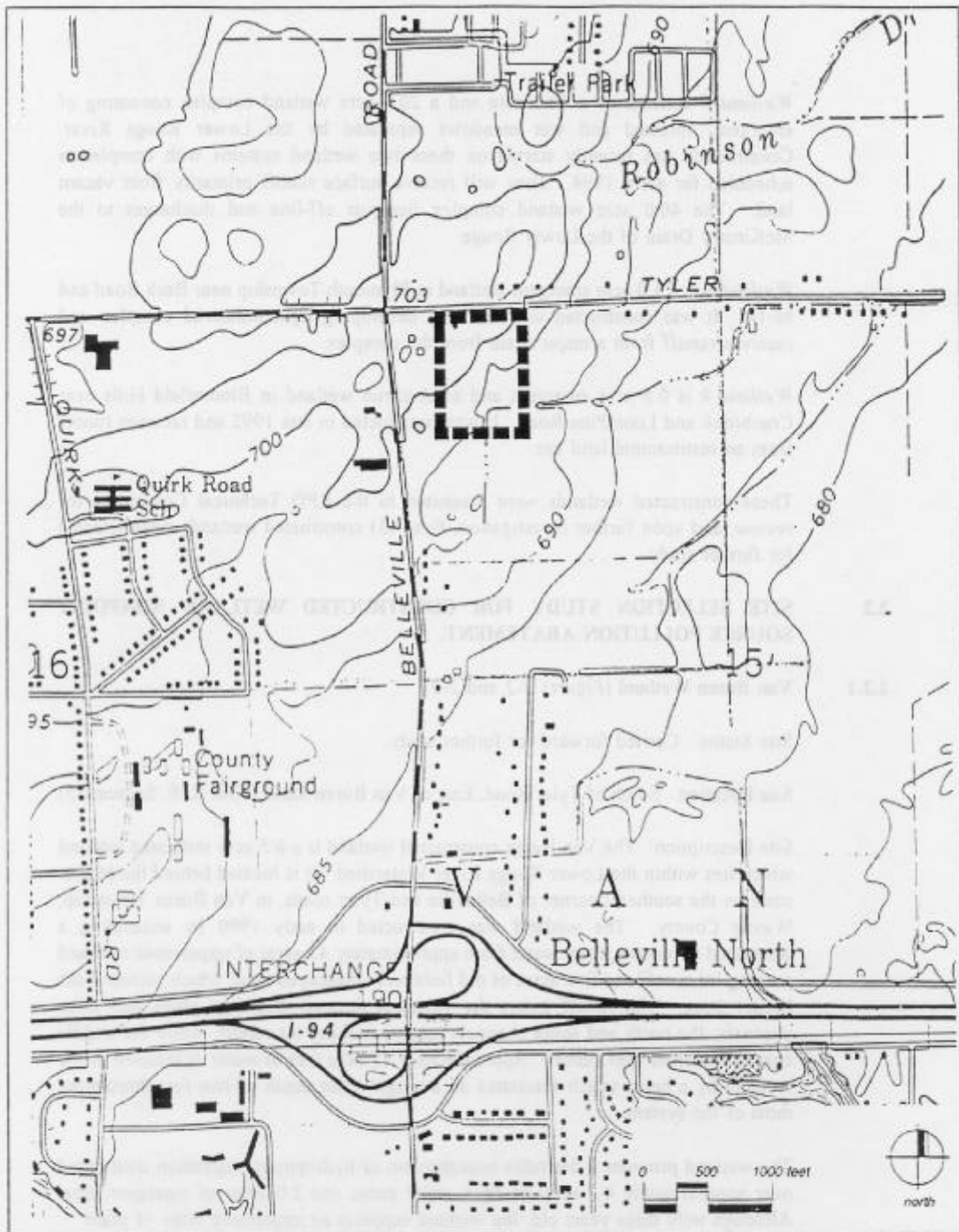
2.2.1 Van Buren Wetland (*Figures 2-2 and 2-3*).

Site Status: Carried forward for further study.

Site Location: South of Tyler Road, East of Van Buren Road (T3S, R8E, Section 15)

Site Description: The Van Buren constructed wetland is a 6.5 acre mitigated wetland which lies within the Lower Rouge River Watershed. It is located behind the Meijer store on the southeast corner of Belleville and Tyler roads, in Van Buren Township, Wayne County. The wetland was constructed in early 1990 by excavating a watershed to receive storm water from approximately 45 acres of impervious roof and parking lot runoff and five acres of old field and landscaped areas which surround the Meijer store. The runoff enters the wetlands through discharge pipes into three channels; the north and south channels receive parking lot runoff, while the middle channel receives roof runoff. Approximately 13-acre feet of water is retained in the wetland by a berm which maintains an average water depth of two feet throughout most of the system.

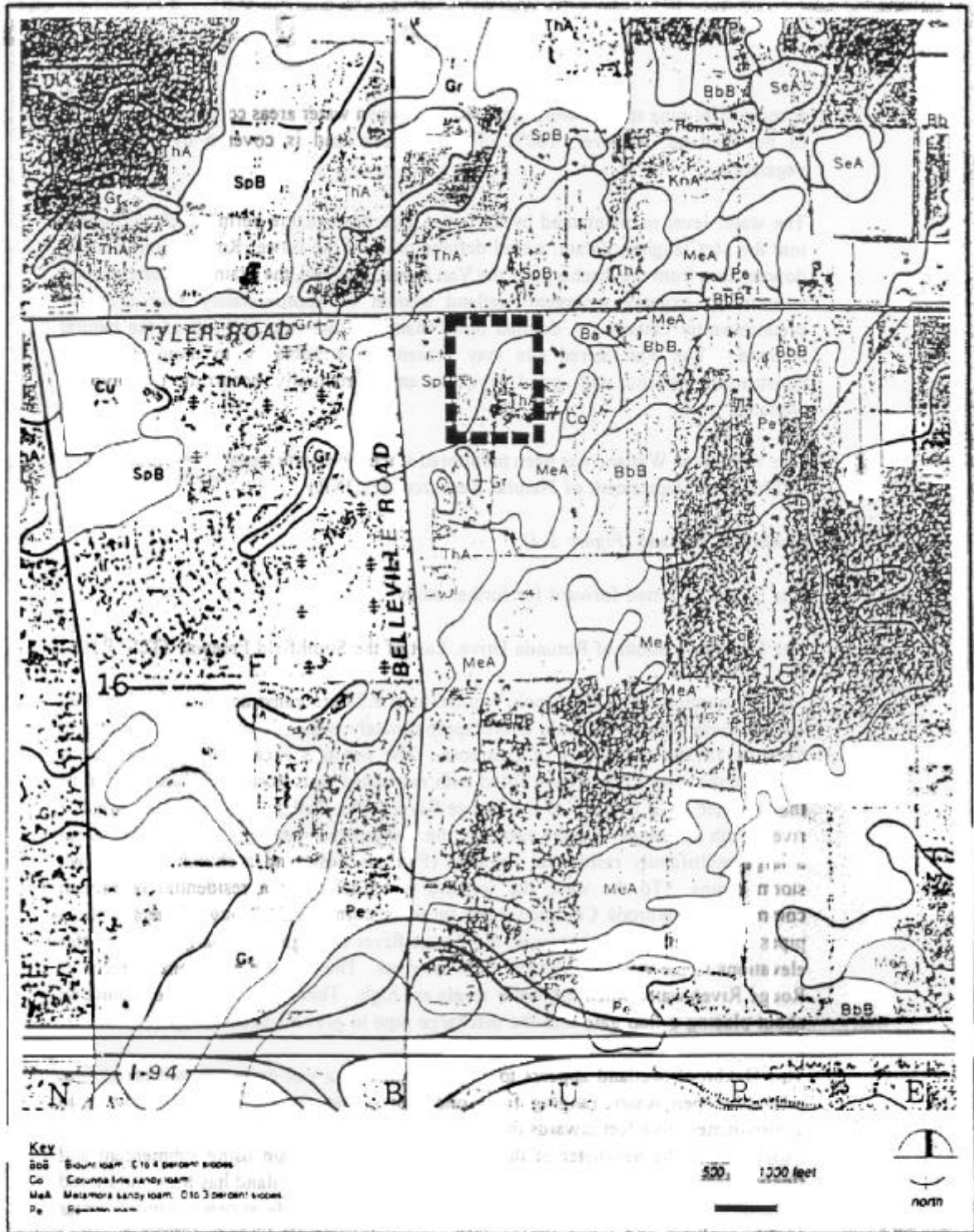
The wetland provides a desirable interspersion of hydrophytic vegetation distributed over approximately 4.5 acres of open water zones and 2.0 acres of emergent zone. Although only three years old, the wetland supports an impressive array of plant



Van Buren Site - Topography
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Figure 2-2

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Van Buren Site - Soils
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Figure 2-3

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species; fifty-nine species were recorded. The open water areas compose the majority of the wetland, however, 100% of the bottom land is covered by submergent vegetation.

The water level is maintained by an outlet pipe through the berm which discharges into the McClaughrey Drain, a well defined drain of the Lower Rouge. Immediately downstream from the discharge of the Van Buren Wetland, the drain broadens out into a naturally existing emergent wetland system of approximately four acres of predominantly cattails. A defined open channel flows into and out of the natural wetland. The Van Buren site may present an opportunity to monitor both a constructed wetland with good diversity and a naturally occurring monotypical wetland.

The Van Buren Wetland has been monitored since 1990 with annual reports submitted to Michigan Department of Natural Resources (MDNR).

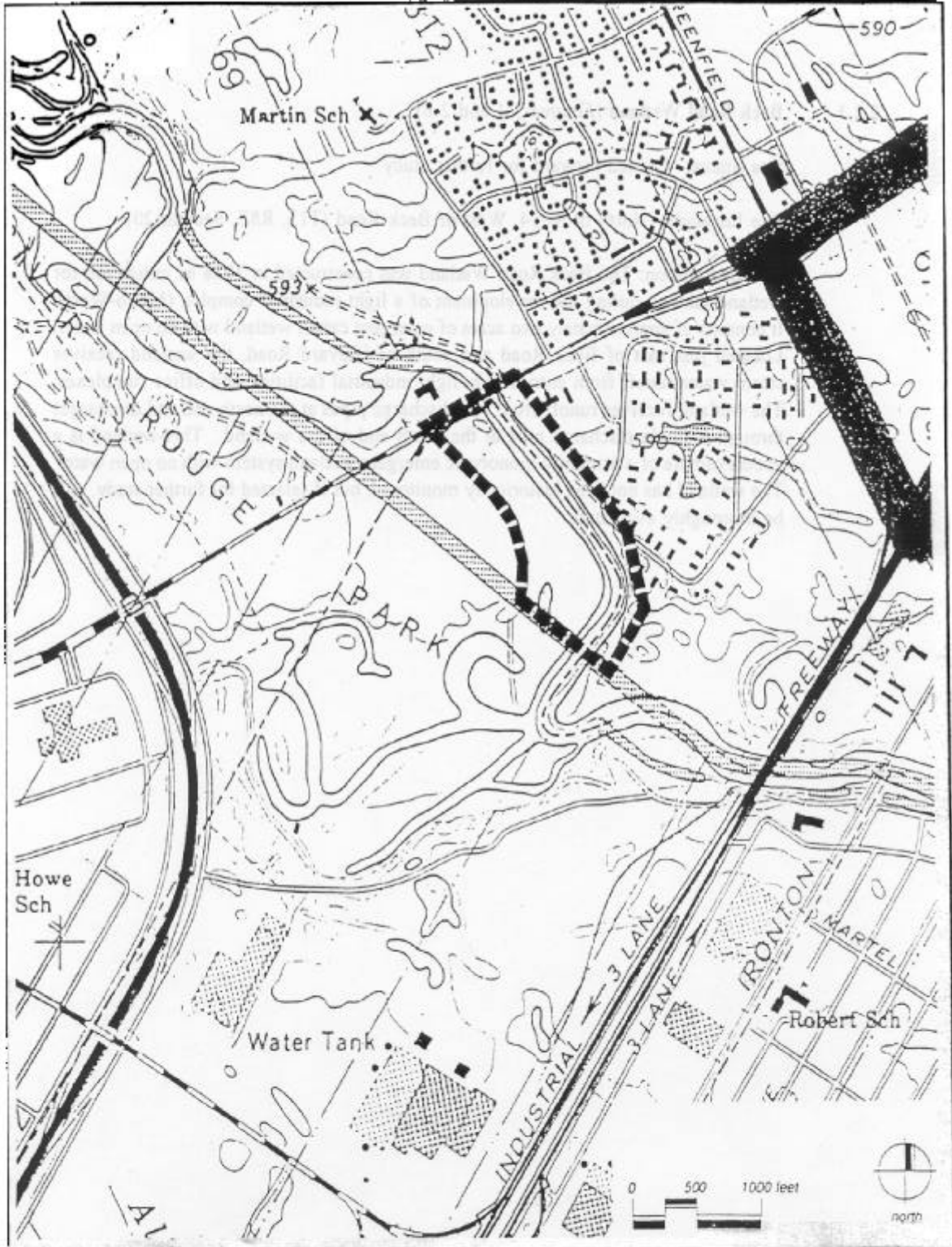
2.2.2 Oakbrook Wetland (*Figure 2-4*).

Site Status: Carried forward for further study.

Site Location: South of Rotunda Drive, East of the Southfield Freeway (T2S, R10E)

Site Description: The Oakbrook Wetland is a 9.5 acre constructed wetland located on the south side of Rotunda Drive approximately one mile east of the Southfield Freeway (M39) in the City of Dearborn. The site was excavated in 1989 from a former oxbow which had been filled with excavated soils during the construction of the concrete lined channel of the Rouge River. The wetland resembles the original river width and shape. On the east side, the wetland receives storm water runoff from a large multifamily residential complex (Fairlane East) and a church through two storm drains. To the west, the wetland is bordered by a residential retirement community (Oakbrook Commons) and receives storm water through three discharge pipes. The wetland discharges to the Rouge River through a discharge pipe. Water elevations in the wetland fluctuate with the river. The wetland occasionally receives Rouge River water when the water levels are high. There has been some discussion about placing a flap gate into the discharge pipe to prevent backflow.

This Oakbrook wetland appears to function more as a wet detention watershed with primarily open water, ranging from one foot in the south and central portion to approximately five feet towards the north end. A narrow band of emergent vegetation exists around the perimeter of the site. A planting program using submergent and floating leaved plants has recently been completed. The wetland has been monitored since 1990 documenting qualitative vegetation and wildlife surveys, limited water quality analysis, and series photographs.



Oakbrook Site - Topography
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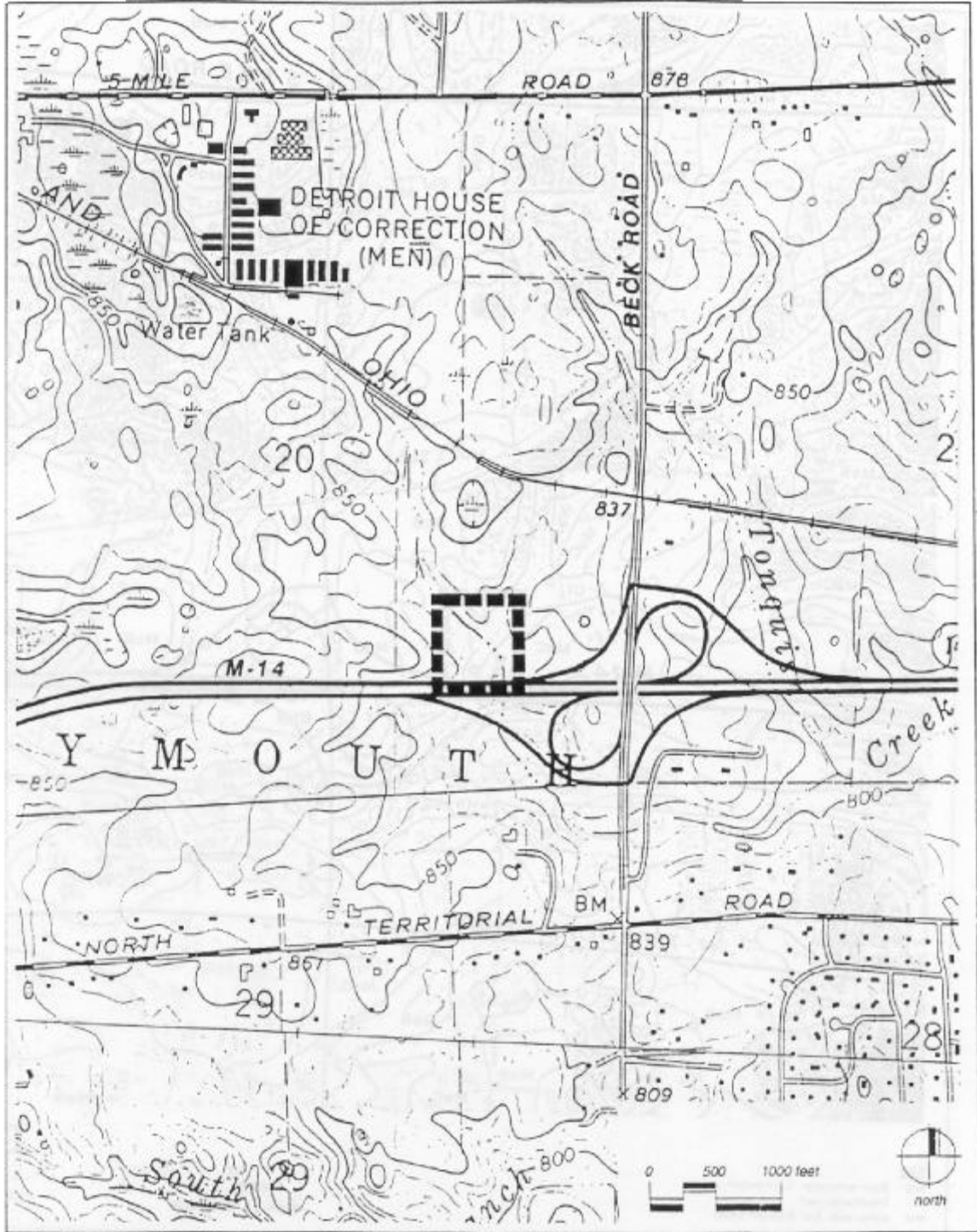
Figure 2-4
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2.2.3 Beck Road Wetland (*Figures 2-5 and 2-6*).

Site Status: Carried forward for further study.

Site Location: North of M-14, West of Beck Road (T1S, R8E, Section 20)

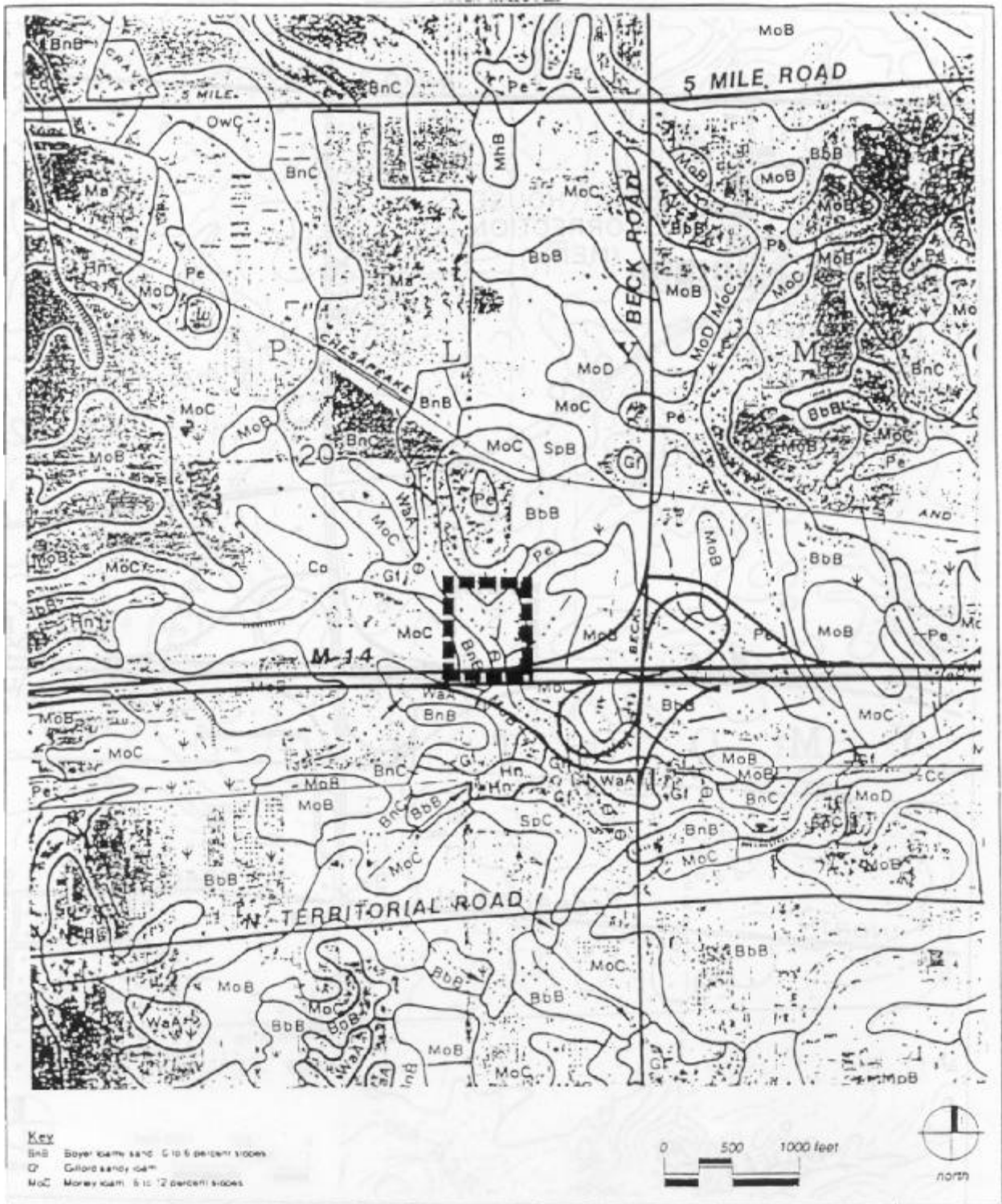
Site Description: The Beck Road Wetland was constructed in 1988 as mitigation for wetland takings during the development of a light industrial complex (Metro-West). It consists of approximately two acres of emergent cattail wetland with no open water. Located just east of Beck Road and south of Halyard Road, the wetland receives storm water runoff from entry roads, light industrial facilities, and office complexes. The wetland receives runoff from two discharge pipes at the north end and discharges through a single discharge pipe at the south end of the wetland. This wetland is a good example of a primarily monotypic emergent wetland system with no open water. The wetland has not been historically monitored, but if selected for further study, will be thoroughly evaluated.



Beck Road Site - Topography
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Figure 2-5

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Beck Road Site - Soils
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Figure 2-6

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