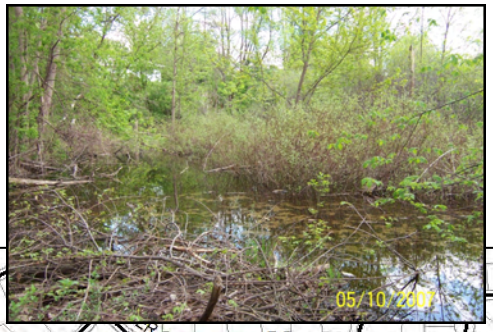
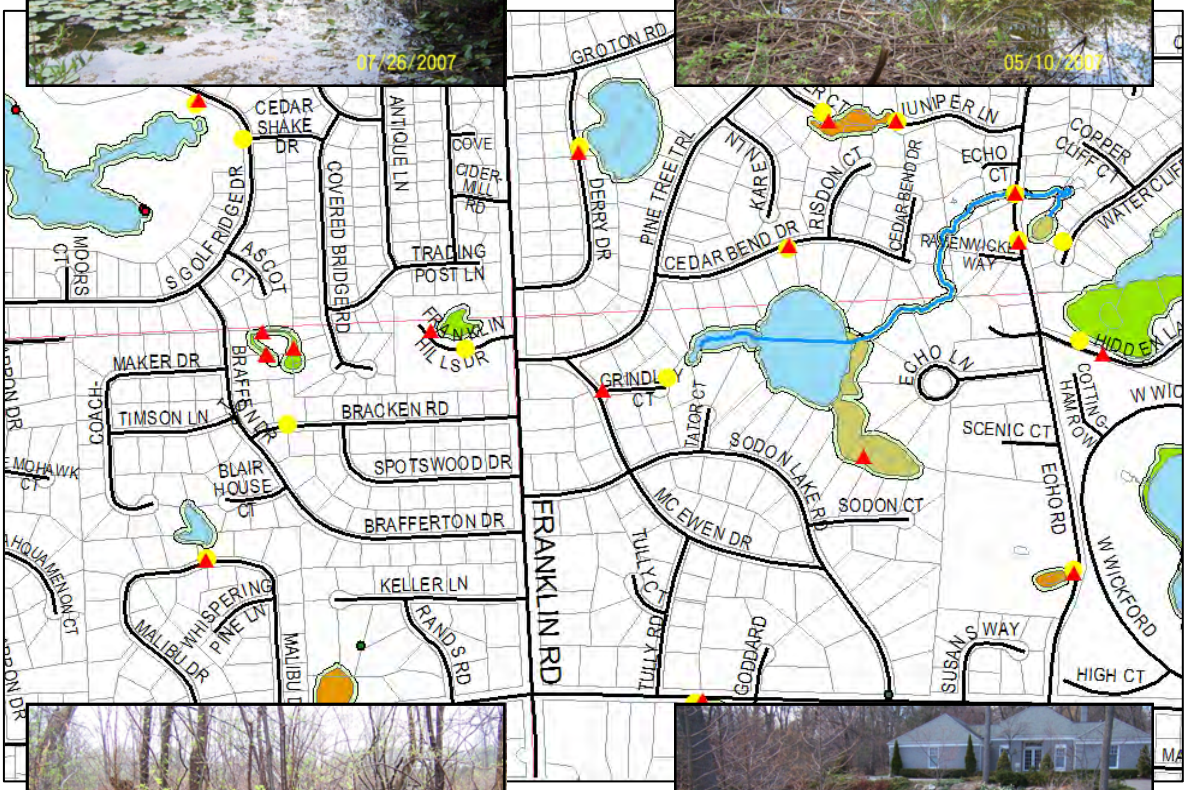
December 2007

BLOOMFIELD TOWNSHIP

Bloomfield Township Wetland Inventory
FINAL REPORT





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Niswander Environmental has completed a comprehensive Wetland Inventory of Bloomfield Township in Oakland County, Michigan. The Wetland Inventory was funded by a Rouge River National Wet Weather Demonstration Project grant and is intended to serve as an update to the existing Bloomfield Township Wetland Inventory Map that is utilized to administer the Township's local wetland ordinance. This Wetland Inventory Report describes the methods used to complete the Wetland Inventory and includes a discussion of the results and recommendations. This report is a supplement to the GIS data, and should only be used as a reference document. Any site plan review and wetland analysis should be completed utilizing the GIS data and its associated attributes. This executive summary is intended to be taken in context with the complete report and GIS, and is not intended to be used as a separate document.

Niswander Environmental collected available GIS data from the Michigan Center for Geographic Information, Oakland County, Bloomfield Township, and the Michigan Natural Features Inventory. These data were incorporated into ArcGIS 9.1 where preliminary base maps with topography, soils, threatened and endangered species, wetlands, and watercourse information were generated. Field work was organized by identifying potential wetland areas on the preliminary base maps. In order to qualitatively evaluate the functions and values of the Township's wetlands, Niswander Environmental utilized the Michigan Wetland Rapid Assessment Methodology (MiRAM) currently being developed by the Michigan Department of Environmental Quality. In April and May 2007, Niswander Environmental conducted a comprehensive field evaluation from public right-of-ways that identified the wetlands, lakes, and watercourses of Bloomfield Township. Niswander Environmental also identified private parcels that contained wetlands not visible from publicly accessible areas and thus required landowner permission to evaluate. Upon contacting these identified property owners, a qualitative field evaluation of wetlands with granted private access was conducted in July 2007.

A total of 214 wetland areas (including 26 named lakes and ponds) were identified during the Inventory. The total area of the wetlands was 596 acres and total area of named lakes was 952 acres. Qualitative wetland data were collected at 365 survey points and photographs were taken at 351 locations during the field investigation portion of the Wetland Inventory.

Upon the completion of the field investigations, Niswander Environmental analyzed the field data and developed an interactive GIS database that connects site specific data with features located on the map. Wetlands were then analyzed for significance to the Township by categorizing them according to their MiRAM score. For example, wetlands scoring 50 or greater are considered high quality and therefore more significant than a low quality wetland that received a score of 29 or lower. GIS coverages were developed for each wetland based on the conditions assessed during the field investigations. Attribute data, including wetland type, size, quality (MiRAM score), and other pertinent information, were linked to each individual wetland. In addition, each MiRAM form is linked to the appropriate wetland polygon to allow the Township to easily access and print the data associated with each wetland.

The results of this Wetland Inventory will serve as an amendment to the existing Wetland Inventory Map, which is utilized to administer the Township's local Wetland Ordinance. The Wetland Inventory (report, maps, and GIS data) results are for preliminary planning purposes only and do not replace the need for on-site assessment. The maps and report are intended to be used as a tool to assist in indicating approximate quality of wetlands and watercourses for possible protection, preservation, and/or restoration by the Township. The presence of wetlands, lakes, and watercourses as indicated on the maps and report is not intended to imply exact location or regulatory authority and should be evaluated on a site specific basis. By utilizing the Wetland Inventory data collectively and in conjunction with more detailed on-site investigations, the Township will be able to make land use decisions with regards to wetlands more effectively.

Bloomfield Township (Township) is experiencing significant development around wetland features since most properties not constrained by wetlands have already been developed. Furthermore, wetlands and open space areas are often considered desirable amenities for construction of residential homes which can create additional pressure on wetlands. Therefore, detailed information on the Township's remaining wetlands is crucial to their protection. In addition, the Township is at the headwaters of the Main 1-2 Subwatershed of the Rouge River and protection of headwater wetlands is critical for maintaining and improving the health of the watershed. A Wetland Inventory is essential for preserving the natural beauty and significant natural features of the community while maintaining its economic vitality.

In 2006, the Township received a grant from the Rouge River National Wet Weather Demonstration Project to develop a comprehensive Wetland Inventory that identifies, categorizes, and assesses all wetlands and surface waters within the Township. The Township retained Niswander Environmental to conduct the Wetland Inventory in the Spring of 2007 with completion slated for Fall 2007. The goal of this inventory is not only to identify and characterize the Township's existing wetlands, lakes, ponds, and watercourses, but also to provide a baseline data-set to be used for future land use planning. This Wetland Inventory is intended to serve as an update to the existing Bloomfield Township Wetland Inventory Map that is utilized to administer the Township's local wetland ordinance.

The Wetland Inventory has been designed as a GIS-based tool that can be used by Township planning, engineering, environmental, and building departments on a daily basis to evaluate projects and potential impacts to the Township's remaining wetlands. The power of the GIS-based Wetland Inventory is that detailed information, including photographs, quality assessment, ownership, land use, aerial photographs, field assessment data, connectivity, and disturbance can all be assessed instantaneously with the click of a button. In addition, the GIS data can be easily updated as new information is gathered. The Wetland Inventory Map and GIS database generated during this project provides a more detailed evaluation of the wetlands that exist within the Township than was previously available. This information enables the Township to be better informed during review of proposed site plans and give them the necessary tool to defend their decisions.

The Township has adopted a proactive approach to planning for the future needs of the community. A Comprehensive Master Plan Update (2007) has been completed for the Township that takes into account the community's needs and desires. The Wetland Inventory conducted by Niswander Environmental incorporates the goals stated in this plan and will provide another tool to strengthening the protection of the Township's valuable natural resources. The Township currently administers a local wetland ordinance that regulates all wetlands greater than two acres in size or that are connected to or within 500 feet of a regulated waterbody.

The Township is a developed, urban community located in Oakland County. The Township is approximately 26 square miles (approximately 16,600 acres). Despite the fact that the Township is highly developed with commercial, residential, and institutional properties, it is still well known for its recreational opportunities due to the amount of lakes and wetlands it harbors. The Township contains 23 named lakes, dozens of smaller ponds, and over 3.5 miles of watercourses that the community uses for year-round recreation. The Township contains over 1,500 acres of wetlands and lakes, or approximately 9% of the Township's area. The Township's wetlands typically occur in association with one of its many lakes or ponds, most of which are located in the northwestern quarter of the Township. Many undeveloped parcels surrounding the lakes are wetland. In addition, this inventory revealed a significant amount of wetlands, some of considerably high quality for an urbanized environment. The following is an overview of the character of the wetlands, lakes, streams, and watersheds that exist within the Township.

Wetlands

There are over 500 acres of wetland within the Township. Wetland ecosystems are known for their biological diversity and their value to humans. They create habitat for fish and wildlife and often are home to threatened and endangered species. Wetlands are often referred to as the kidneys of the landscape and are known to improve water quality by filtering pollutants and sediment before it flows into aquatic or groundwater systems. As sediment-laden water flows through wetland vegetation, sediments are pulled out of the water and deposited in the wetland. This function reduces the amount of sediments that enter our lakes and streams, impacting the natural aquatic environment. Wetlands that occur along the edges of lakes and other watercourses reduce erosion caused by waves, high flow, and/or heavy rains. Wetlands act as a storage system for floodwaters, protecting man-made structures from water damage and ecologically sensitive areas from sedimentation. Wetlands also provide hunting and wildlife observation opportunities.

According to Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, the State of Michigan defines a wetland as, "…land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation or aquatic life". In Michigan, wetlands are determined using three factors: soils, vegetation, and hydrology. If two of these factors are present, the area is usually classified as a wetland. If vegetation is used as a determining factor, the dominant vegetation must be classified as a wet tolerant species using the Federal Army Corps of Engineers wetland indicator ranking.

Soil types found in wetland ecosystems are classified as hydric. The Oakland County Soil Survey indicates that approximately 6% of the land in the Township is classified as hydric soils. Hydric soils are defined as, "A soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (MDEQ). Anaerobic soil conditions mean that there is limited to no available oxygen located in-between the soil particles available for uptake by the plants' root systems. Wetland plant species are better adapted to surviving these conditions than plants found in an upland grassland or forest.

Wetlands within the Township generally fall under the following categories: forested, scrub-shrub, emergent, or open water. Forested wetlands are usually wet only a small portion of the year and are classified as having primarily woody vegetation greater than 30 feet in height. Forested wetlands in the Township are typically deciduous in nature and contain species such as red maple, silver maple, box elder, pin oak, swamp white oak, American elm, green ash, sycamore, and/or black willow. Scrub-shrub wetlands have varying wetness, from seemingly wet a large portion of the year to dry most of the year, and are classified as having woody vegetation less than 30 feet in height. Common species found in scrub-shrub wetlands of the Township include willow, dogwood, buttonbush, and viburnum. Buckthorn, a non-native invasive species, is also often found in this wetland cover type. Emergent wetlands, including wet meadows, are wet a large portion of the year and are primarily dominated by grasses or grass-like species and may contain some portions of open water. Common species found in the Township's emergent wetlands and/or wet meadows include cattail, sedges, rushes, pickerelweed, arrowhead, smartweeds, asters, goldenrods, and floating aquatic species. Emergent marshes provide prime habitat for many waterfowl and wading birds.

Lakes

The lake systems in the Township are critical resources for seasonal recreation and residential development. These lakes and ponds are utilized by the Township citizens for a number of recreational activities, including fishing, swimming, and boating. Additionally, valuable wildlife habitat and plant communities are associated with many of these lakes. The Township prides itself on the diverse recreational opportunities that the open water and natural areas provide for the community. There are 23 named inland lakes and dozens of smaller ponds covering approximately 1,031 acres within the Township, or approximately 6% of the Township's area as listed in Table 1 (Master Plan, 2007).

Water quality of the lakes is feared to be in jeopardy with the rise of development. As stated in the updated Master Plan (2007), most of the Township's lakes have been impacted by human activities in some capacity. Water quality issues are often raised when citizens notice a rapid increase in the amount of algae and vegetation in local lakes. A lake that is producing an excess of vegetation is called eutrophic; this happens when nutrients entering the lake through fertilizer runoff or overburdened septic fields encourage the plant and animal life to become more productive. Increased biotic productivity decreases water clarity and the amount of oxygen in the water. Phosphorus is a common chemical nutrient that contributes to plant and algae growth in lakes. Phosphorous and other nutrients such as nitrogen, along with sediments enter the lake via lawns that are mowed up to the lake's edge, development activities, and banks that are not

protected from erosion. Construction of sanitary sewer within the Township has alleviated much of the concern related to septic systems and eutrophication.

Table 1. Lakes located within Bloomfield Township (Master Plan Update, 2007)

Name	Acres	Name	Acres
Adams Lake	4.5	Meadow Lake	18.6
Chalmers Lake	16.6	Minnow Lake	10.2
Crest Lake	3.2	Mirror Lake	3.12
Forest Lake	49.7	Orange Lake	31.8
Fox Lake	13.5	Robbin Lake	5.4
Gilbert Lake	63	Sodon Lake	6.7
Haines Lake	9.4	Square Lake	89.5
Hammond Lake	79.4	Turtle Lake	41.3
Island Lake	110.7	Wabeek Lake	28.1
Kirkwood Lake	7.0	Wing Lake	110.7
Lower Long Lake	190.2	Wood Lake	7.9
Upper Long Lake	130.5	**TOTAL**	**1,031 acres**

Streams and Watersheds

The Township contains numerous drains, creeks, rivers, and streams. In all, eight significant watercourses flow through the Township (Table 2). There are approximately 3.5 miles of watercourses in the Township. The largest, and perhaps most significant, watercourse in the Township is the Rouge River and its associated branches, which is located in the eastern half of the Township. The other drains and streams in the Township primarily serve as connections between lakes or through wetlands and are likely important wildlife corridors.

Table 2. Significant Watercourses Flowing Through Bloomfield Township (Master Plan, 2007).

Watercourses	
Franklin Branch of the Rouge River	Sunken Bridge Drain
Main Branch Rouge River	Daly Drain
Sprague Drain	Amy Drain
Sodon Lake Drain	Forest Lake Outlet

A vast majority of the Township (~98%) lies within the Rouge River Watershed, specifically within the Main 1-2 Subwatershed (Master Plan 2007). Small portions of the northern and eastern boundary of the Township lie within the Clinton Watershed. As stated in the updated Master Plan (2007), "Bloomfield Township is an active participant in a variety of organizations and efforts whose sole aim is to protect these watercourses and their watersheds and improve them when necessary to reverse some of the damage that has been done historically by man's activities."

This Wetland Inventory is a collaborative effort between Bloomfield Township, the Rouge Program Office, the community, and Niswander Environmental. The 2007 Master Plan Update for Bloomfield Township and guidelines set forth in the Rouge River National Wet Weather Demonstration Project grant were key in developing the goals and objectives of this Wetland Inventory. Niswander Environmental developed a work plan based on the grant requirements and Township goals.

BASE MAP PREPARATION

Niswander Environmental collected available GIS data from the Michigan Center for Geographic Information, Oakland County, Bloomfield Township, and the Michigan Natural Features Inventory. Additionally, recent aerial photographs (2005 and 2006) were provided to Niswander Environmental by the Township, and 1998 infrared aerials were obtained from the Michigan Geospatial Digital Library (MiGDL). Niswander Environmental received all available base GIS data from the Township and overlaid existing wetland data, including National Wetland Inventory, Michigan Wetland Inventory, and Oakland County Wetland Inventory maps. This data was incorporated into ArcGIS 9.1 where a Base Map was generated that included preliminary information on wetlands, topography, soils, and threatened and endangered species information. Niswander Environmental also created GIS layers specifically for this Wetland Inventory including Township Wetlands, Photo Locations, and Survey Locations. Survey locations were largely predetermined based on the wetland data, aerial interpretation, and accessibility, and were incorporated onto the Base Map. As part of the Base Map generation, preliminary GIS layers were submitted to the Township GIS department to ensure compatibility with their existing system. The Township utilizes a GIS-based computer program designed for the Township called *Civic Site* to access their GIS data, and the Wetland Inventory will be incorporated as part of this system in order to be accessible to all Township staff. A meeting was held with the Township to review the Base Map, proposed survey locations, and preliminary GIS files. The Base Map information was utilized to gather preliminary assessment data on the potential wetlands prior to the field evaluation. The map was then separated by section for purposes of field evaluation.

FIELD INVESTIGATIONS

In April and May 2007, Niswander Environmental conducted a comprehensive field evaluation that identified the wetlands and watercourses, including lakes and ponds, of the Township. Small, private constructed ponds devoid of wetland vegetation were not included in the Wetland Inventory. For purposes of this inventory, lakes and ponds were evaluated as open water wetlands. It is important to note that a lake assessment was not completed for these features and the data should not be construed as such. The extensive field work was organized by section, investigating the survey locations within public right-of-ways as identified through the Base Map preparation. Some survey locations were modified as necessary in the field based on accessibility and unforeseen circumstances. Private parcels believed to contain wetland not seen from publicly accessible sites were identified in April/May 2007. A list of landowners owning portions of these wetlands was compiled for purposes of obtaining access permission. The Township assisted in obtaining access by sending letters to these landowners to be returned to Niswander Environmental. Landowners had the choice of granting or denying access to their

property for purposes of wetland assessment for the inventory. On July 26, 2007 Niswander Environmental conducted the private property field investigations of access granted sites and completed their MiRAM forms. Digital photographs were taken of all surveyed wetlands, and detailed information regarding each wetland was documented. Data forms were completed documenting inherent characteristics and quality assessment data for each wetland investigated.

DATA FORMS – MICHIGAN RAPID ASSESSMENT METHOD

In order to qualitatively evaluate the functions and values of wetlands, Niswander Environmental utilized the Michigan Rapid Assessment Methodology (MiRAM) for Wetlands currently being developed by the MDEQ. MiRAM is an attempt to quickly determine the ecological quality and level of function of a particular wetland. The MiRAM data form documents wetland quality information and assigns scores to each wetland based on seven matrices:

1. Wetland Area Size and Distribution (9 points maximum)
2. Upland Buffers and Surrounding Land Use (12 points maximum)
3. Hydrology (26 points maximum)
4. Habitat Alteration and Development (20 points maximum)
5. Special Wetlands (*i.e.* rare or imperiled) (10 points maximum)
6. Vegetation, Interspersion, Microtopography (20 points maximum)
7. Proximity and Accessibility to the Public (3 points maximum)

Each wetland can score up to 100 points as determined by the sum of the seven MiRAM matrices subscores. The numeric value obtained from MiRAM score should not be considered an absolute number with intrinsic meaning. Rather, conducting a MiRAM is simply a proven way to rapidly assess a wetland. Since the MiRAM is intended to compare wetlands on a larger regional scale, Niswander Environmental made minor changes to the scoring categories and to selected matrix categories to reflect wetland values within a more urbanized community. The original MiRAM form contained buffer sizes that we felt were unrealistic in an urbanized setting. The original buffer scoring categories were: very narrow (<25 feet), narrow (25 to 75 feet), medium (75 to <150 feet) and wide (>150 feet). The revised buffer categories used for this inventory that better reflected the Township's condition, were: very narrow (<10 feet), narrow (10 to <25 feet), medium (25 to <50 feet) and wide (>50 feet). In addition, the finalized scoring categories have not yet been determined by the MDEQ. Therefore scoring categories were evaluated and customized for this Wetland Inventory based on the quality of wetlands found in the field. The MDEQ was contacted regarding the testing of the MiRAM in the Township and Niswander Environmental, as part of the MiRAM development committee, will report any suggestions for MiRAM modifications to the MDEQ. The intent is that the Bloomfield Township Wetland Inventory will become a model for the State as the first community to use the MiRAM when inventorying its wetlands. Appendix A contains the draft Manual for Using the MiRAM for Wetlands as developed by MDEQ and the MiRAM scoring sheet utilized for this inventory.

DATA ANALYSIS

After the field investigations were completed, Niswander Environmental analyzed the field data and developed an interactive GIS database that connects site specific data with points and polygons located on the map. The observed wetland boundaries were digitized to the level of accuracy as allowed during the field investigation and through Base Map interpretation. For the wetlands not accessible during field evaluation, the boundaries were interpreted from the Base Map data only. During the digitizing process, all data were entered into the pre-determined GIS attribute fields associated with each created wetland polygon. The MiRAM forms were finalized and were linked to each wetland polygon. Attribute data, including wetland type, size, quality (MiRAM score), and other pertinent information were linked to each individual wetland. The photos taken in the field were organized, compressed, and linked to points on the map. There are often several photo points attributed to one wetland polygon to ensure a representative view of the entire wetland. Once all data was entered into GIS, an analysis of the priority ranked wetlands was completed based on the resulting MiRAM score. Additional analysis of the wetland data in conjunction with Township land use was also completed.

A public meeting to present the final results to the community and the Township Board was held at the Township during a regular Board Meeting on December 10, 2007. Niswander Environmental demonstrated how the Wetland Inventory was conducted and how it will aid the Township in planning for their future land use goals. The Township Board adopted the Wetland Inventory Map into the local Wetland Ordinance during this meeting. The Township will make the final report and the Wetland Inventory Map available for public download on its website.

A Wetland Inventory Map (Fig. 1) and GIS database was generated that identifies the wetlands within the Township as well as the primary wetland classification type within that wetland. The Wetland Inventory Map complies with local government wetland map requirements, as stated in Part 303, Wetlands Protection, of the Michigan Natural Resources Protection Act of 1994 (Act 451), as amended, and Bloomfield Township's Wetland Ordinance (No. 473). Based on the findings of the Wetland Inventory field investigation, wetlands were classified into four categories based on their hydrology, vegetation, and substrate: forested wetlands (PFO), scrub-shrub wetlands (PSS), emergent wetlands (PEM), and open water (POWZ). This system of classification, known as the Cowardin Classification, was created by Lewis Cowardin and others (1979) to map and inventory the Nation's wetlands to create the National Wetland Inventory Maps. Often, larger wetland systems contain several or all classifications. For example, 79 of the 211 wetland complexes in the Township had dual or multiple classifications (*i.e.*, PEM/PSS, POWZ w/PEM, etc.). The primary wetland type shown on the map does not identify all wetland types found in that wetland, only the predominant type as seen in the field. However, the GIS data provides more detailed information regarding the additional types found in each wetland.

WETLAND INVENTORY

The Wetland Inventory identified 188 wetlands within the Township, totaling 596 acres, which constitutes approximately 3% of the Township's total area. In addition, 26 named lakes were identified totaling 952 acres that are largely associated with many of these wetlands. For purposes of this inventory, these lakes were considered to be open water wetlands. Wetland data were collected at 365 survey points and photographs were taken at 351 locations during the Wetland Inventory. Previously, the Township utilized a Combined Wetland Inventory Map that overlaid the National Wetland Inventory (NWI), Michigan Wetland Inventory, and Oakland County Wetland Inventory maps to assist in administering their local ordinance.

To indicate the value of completing field evaluations as part of a wetland inventory, in addition to the primary Wetland Inventory Map generated during this project, a revised Combined Wetland Inventory Map (Fig. 2) was generated that combines the new wetland data with the previously available wetland data. This map reveals that the wetland boundaries are clearly more accurate and the real-life data collected invaluable. It should be noted, however, that the digitized boundaries for the field verified wetlands are only a close representation of the boundary location and do not preclude an actual wetland delineation. In addition, not all areas were completely accessible, and other small wetlands may exist within the Township.

Table 3 shows the compared wetland acreage by type between the previous and current wetland data. The primary difference is seen in the types of wetlands identified. Since the NWI was conducted in the mid-1970's and were produced largely from aerial photograph interpretation, it was expected that significant change may be found. The Township Wetland Inventory revealed that the wetland types have either significantly changed within each system, or have been depleted due to development. Forested wetland acreage saw the largest decline, which may be attributed to development or conversion to another wetland type through flooding or clearing. Clearing trees within a wetland is not an activity that is regulated by the State, and therefore often occurs fairly frequently. Flooding often occurs as an indirect result of surrounding development as water often either gets rerouted from its historic flow patterns through increased

runoff or removal of natural outflow (*i.e.,* road construction). Flooded forested wetlands often then convert to either emergent or scrub-shrub wetlands. Emergent wetland acreage appears to have increased significantly, with open water and scrub-shrub wetland acreages slightly increased; all of these increases are likely for the same reasons as mentioned above. This increase may also be attributed to the increase in detention basins and created ponds associated with development within the Township. These results are very typical of wetland trends across the State of Michigan. The Township's total wetland acreage actually slightly increased from the NWI data, which may be an indication of the effectiveness of the Township's ordinance.

Table 3. Comparison of Wetland Acreage within Township from Updated Inventory

Wetland Type	National Wetland Inventory	Niswander Env. Wetland Inventory
Emergent	123.51	264.22
Scrub-Shrub	136.10	157.82
Forested	208.19	48.85
Open Water	1,019.82	1,076.83
TOTAL	1,487.62	1,547.72

Table 4 shows an updated list of named lakes and ponds found within the Township and the actual acreage of the lakes within the Township boundaries. Three additional named lakes and ponds were identified during this inventory that were not listed within the Master Plan Update. According to the MDEQ, the definition of a lake is a natural or artificial body of water that has "definite banks, a bed, visible evidence of a continued occurrence of water, and a surface area of water that is more than 5 acres". A pond is defined as "permanent open water with a surface area that is more than 1 acre, but less than 5 acres". The acreage identified during this inventory was very similar to that previously listed; however, the data collected during this inventory reflects the acreage of the lake within the Township boundaries, not the entire lake acreage.

Table 4. Lakes located within Bloomfield Township (NE Wetland Inventory, 2007)

Name	Acres	Name	Acres
Adams Lake	4.50	Upper Long Lake	90.14
Chalmers Lake	16.64	Meadow Lake	18.57
Crest Lake	3.32	Minnow Lake	10.37
Crescent Lake*	2.67	Mirror Lake	3.25
Forest Lake	38.15	Orange Lake	31.88
Fox Lake 1	1.62	Robbin Lake	4.77
Fox Lake 2	3.58	Sodon Lake	6.72
Gilbert Lake	61.9	Square Lake	91.89
Haines Lake	17.05	Turtle Lake	41.48
Hammond Lake	35.32	Vernor Lake*	5.65
Heather Lake*	6.15	Wabeek Lake	28.08
Island Lake	111.65	Wing Lake	112.16
Kirkwood Lake	7.10	Wood Lake	7.80
Lower Long Lake	189.74	**TOTAL**	**952.15 acres**

Niswander Environmental was able to evaluate wetlands at many publicly accessible sites. However, 12 areas believed to contain wetland habitat (based upon aerial interpretation) were not able to be adequately assessed via public right-of-ways. The Township sent a total of 67 letters to private landowners requesting permission to access their property. Niswander Environmental received a total of 21 access granted responses, which allowed access to eight wetlands. Niswander Environmental did not gain access to four potential wetlands, and thus an incomplete assessment will be noted in the GIS for these wetlands. All areas believed to be wetland based on Base Map data were included in the Wetland Inventory regardless of accessibility. MiRAM scoring sheets were completed for all wetlands identified, with the exception of the four that were not accessible through public right-of-ways and private access was not granted.

In addition, at the request of the Township, parcels were identified (a total of 2,201) that either contain wetlands, lakes, or streams or are within the Township's required 25-foot Natural Features Setback. A total of 1,679 parcels contain a wetland or stream, and 522 parcels contain a Natural Features Setback only. This information will be incorporated into the Township's *Civic Site* to assist the Building Department and others in indicating which proposed projects should be reviewed by the Engineering and Environmental Services Department.

QUALITY ASSESSMENT

Each of the Township's accessible wetlands have been scored and categorized qualitatively. The MiRAM scoring categories were customized for this Wetland Inventory based on the quality of wetlands found in the field and are summarized in Table 5 below. Wetlands scoring 0-29 are those that typically indicate small, low-quality wetlands often dominated by invasive species, while those scoring 49.5 or greater are generally considered to be large, diverse, and/or relatively undisturbed high-quality systems. These categories will be utilized to determine which wetlands are of significant importance to the Township.

Table 5. Wetland MiRAM Scores and Corresponding Categories

MiRAM Score	0-29	29.5-39	40.5-49	49.5+
	Degraded - Low Quality	Degraded but Restorable - Moderate Quality	Relatively Intact - Moderately High Quality	Intact - High Quality

A Quality Assessment Map (Fig. 3) was generated that shows the wetlands according to quality ranking and thus priority to the Township. Table 6 below summarizes the quality of wetlands present in the Township, based on Niswander Environmental's assessment and subsequent MiRAM scores. Twenty-five (25) wetlands identified in this inventory received a MiRAM score of 50 or higher and are considered to be intact and of high quality. The highest score received within the Township was 68. Many wetland areas are located in the northwestern portion of the Township. Not coincidentally, roughly half of the named lakes within the Township occur in this general vicinity. In addition, 16 of the 25 wetlands classified as high quality (*i.e.*, receiving MiRAM scores of 49.5 or greater) lie in this portion of the Township.

Table 6. Summary of Wetland Quality in Bloomfield Township.

MiRAM Score	Number of Wetlands and Lakes
0-29.5 (Degraded – Low Quality)	84
30-39.5 (Degraded but Restorable – Moderate Quality)	57
40-49.5 (Relatively Intact – Moderately High Quality)	48
50+ (Intact – High Quality)	25
TOTAL	**214**

CORRIDOR ANALYSIS

Niswander Environmental conducted a corridor analysis and subsequently generated a map depicting existing wetland and/or natural corridors (*i.e.*, green corridor) within the Township (Fig. 4). These green corridors were selected based on connectivity between identified wetlands, watercourses, lakes, and woodlands as well as correlation with the Township's land use category of open space or recreation designation. A majority of these corridors currently exist due to the presence of lakes or streams.

The results of this Wetland Inventory, and comparison of new parcel maps with historic maps, indicate that past development has fragmented some of these natural corridors. This fragmentation can quickly isolate high quality wetlands and green corridors and undermine the goals of the Township. This Corridor Analysis will allow for the Township to identify its existing corridors and evaluate new projects and their potential impact on the corridors. Furthermore, the GIS based wetland inventory gives the Township the ability to evaluate projects from a landscape perspective.

This report provides a brief summary of the findings of the Wetland Inventory; however, it should be noted that the Wetland Inventory has been developed in a GIS and is intended to be used on a daily basis by the Township staff when evaluating land use. The power of the GIS-based Wetland Inventory is that detailed information, including photographs, quality assessment (*i.e.*, MiRAM scores), ownership, surrounding land use, aerial photographs, field assessment data, and connectivity can all be assessed instantaneously with the click of a button. This Wetland Inventory is also meant to be a dynamic tool that can be easily updated as new information becomes available.

It should also be noted that the Wetland Inventory provides approximate location of wetlands as determined by field investigation and aerial interpretation, but does not determine specific boundaries. Furthermore, while it was the intent to map all wetlands, it is possible that additional wetland areas may occur that were not mapped. Likewise, the likely regulatory status of the inventoried wetlands was not determined. Therefore, a professional wetland delineation and jurisdictional assessment will still be required for any new development. In addition, the user should recognize that the MDEQ has the final jurisdictional authority on wetlands and watercourses in the State of Michigan.

The Township currently has a Wetlands Ordinance (No. 473) that protects wetlands from irresponsible development. This map will aid in administering the current ordinance in order to better assist the Township in its administration. Public notification of the map amendment, as required by State law, was sent out with the Township Tax Assessment Notice in November 2007. This Wetland Inventory Map was presented to, and subsequently adopted by, the Township Board on December 10, 2007.

The Wetland Inventory has the potential to affect immediate and long term land use decisions. The completed inventory shows more detailed information on the location and types of wetland than was previously available and thus will enable the Township to be better informed during the site review process. Furthermore, wetlands can be evaluated in a landscape context. The Township now has the information necessary to uphold their land use decisions and to educate residents about not only the importance of the natural resources they own, but also what they can do to protect them. Niswander Environmental recommends referring to this Wetland Inventory when making site plan approval decisions to ensure that linkages between high quality wetlands and green corridors are maintained and that habitat fragmentation is avoided. Maintaining large blocks of high quality wetland and connectivity between the smaller portions is key to the integrity of the Township's natural resources.

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APPENDIX A
Manual for Using Michigan Rapid Assessment Methodology for Wetlands
(WORKING DRAFT)
Example MiRAM form