Chapter 15
Hebron Peatlands Subwatershed Assessment

This section presents a summary of the characteristics of the Hebron Peatlands Subwatershed, as well as specific issues and challenges in this subwatershed that must be addressed in the Nippersink Creek Watershed Management Plan.

15.1 Subwatershed Characteristics

The following section provides an overview of the physical characteristics of the subwatershed.

15.1.1 Subwatershed Location

The Hebron Peatlands subwatershed is located in the northwest portion of the watershed. This subwatershed, located within northwest Hebron Township, has an area of 3,751 acres, or 5.9 square miles (2.9% of watershed). The boundary of the subwatershed is shown in Figure 15.1. This subwatershed constitutes part of the headwaters of the North Branch Nippersink Creek, which originates in southern Walworth County, Wisconsin. Hebron Creek flows northeast from the Hebron Peatlands subwatershed and joins the North Branch Nippersink in Wisconsin, and then flows southeast back into Illinois near Richmond.

Figure 15.1

Location of Hebron Peatlands Subwatershed

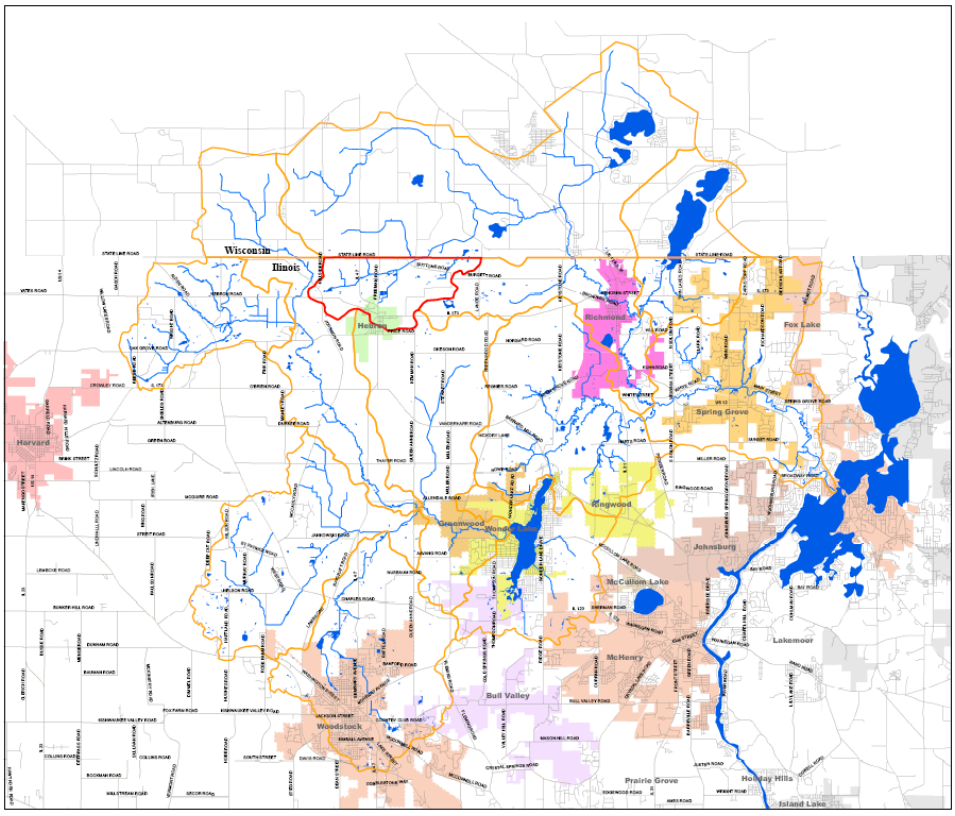
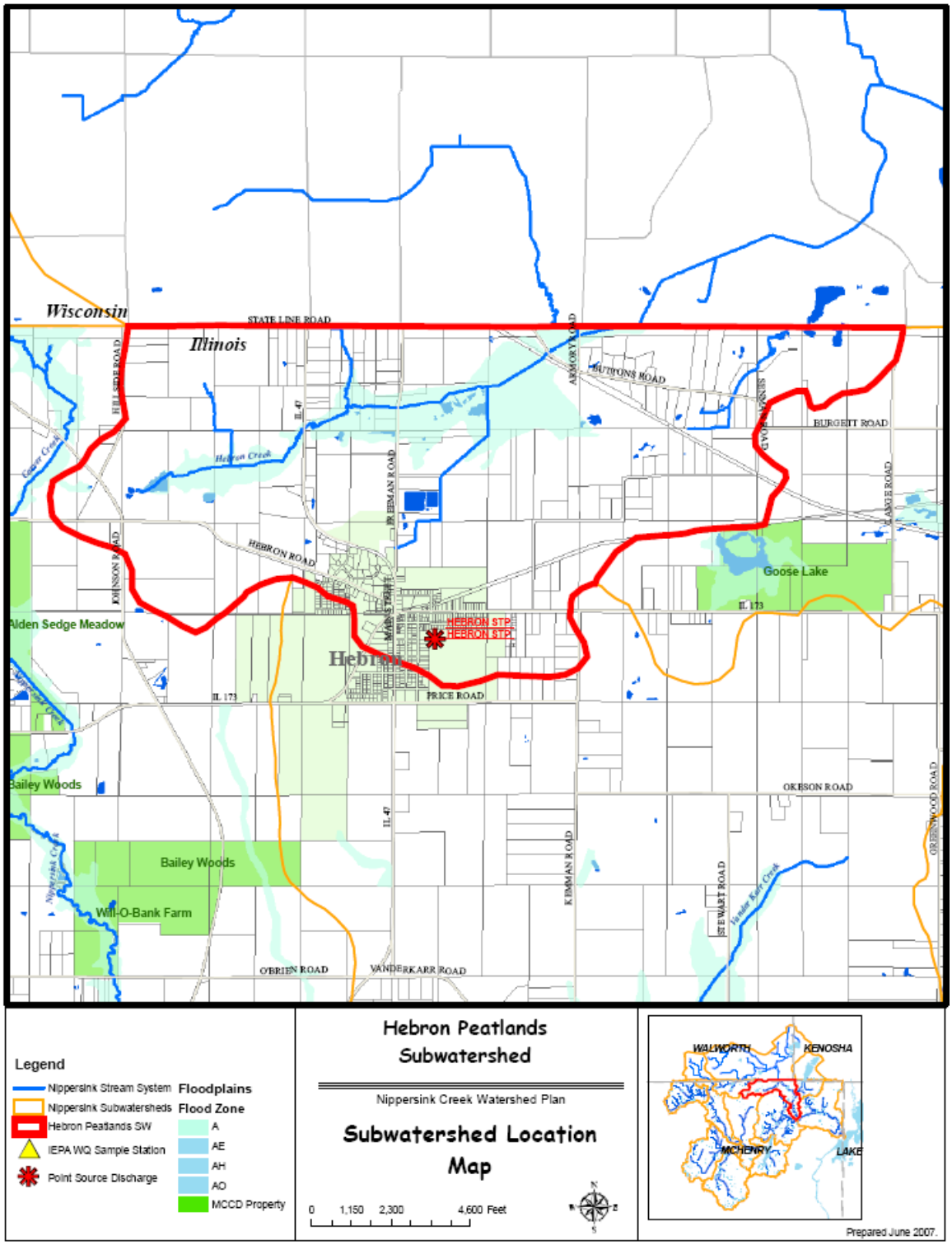


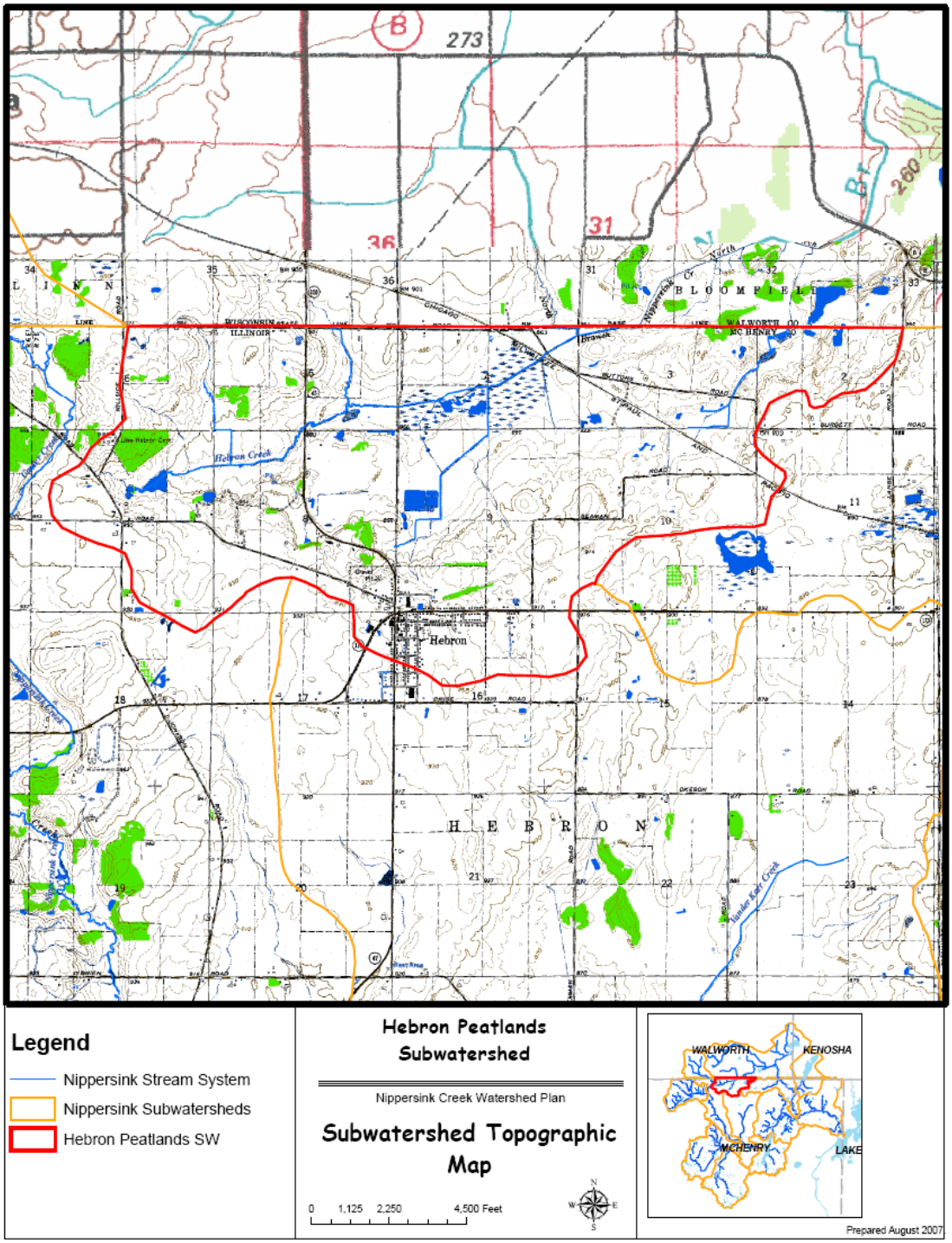
Figure 15.2 Hebron Peatlands Subwatershed Map



15.1.2 Topography & Geology

The topography of the Hebron Peatlands varies from very flat to very steep (<1% to > 15%). The highest point in the watershed is located in the cemetery on Hillside Road, about ¼ mile north of the intersection of Johnson Road and Hillside Road (elevation = 1,000'). At the subwatershed outlet, where Hebron Creek crosses the state line (1/2 mile east of Armory Road), the elevation is 854 feet above mean sea level.

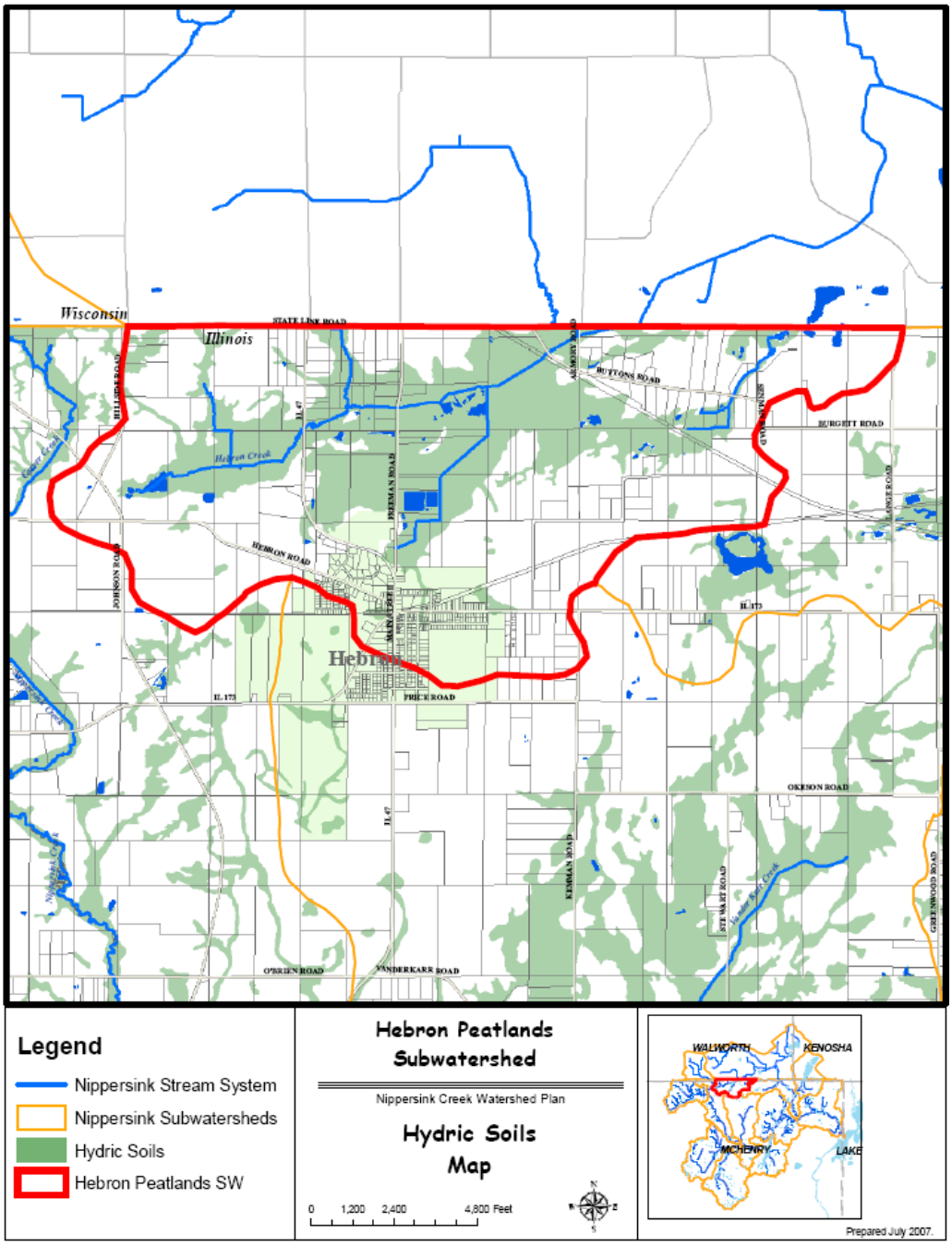
Figure 15.3 USGS Topographic Map for the Hebron Peatlands Subwatershed



15.1.3 Soil Characteristics

The glacial advances across McHenry County resulted in a wide variety of soil associations. The soils in the subwatershed consist of mainly Houghton and Lena muck and Ringwood and Kish loam soil units on 0% - 2% slopes. Each major grouping of soil associations has potential impact on current and future land uses within the subwatershed. For example, hydric (wetland) soils constitute 1,232 acres, or 33% of the 3,751 acre subwatershed, and indicate those areas that contain functional wetlands, or former / degraded wetland areas that could be restored or enhanced.

Figure 15.4 Hydric Soils in the Hebron Peatlands Subwatershed



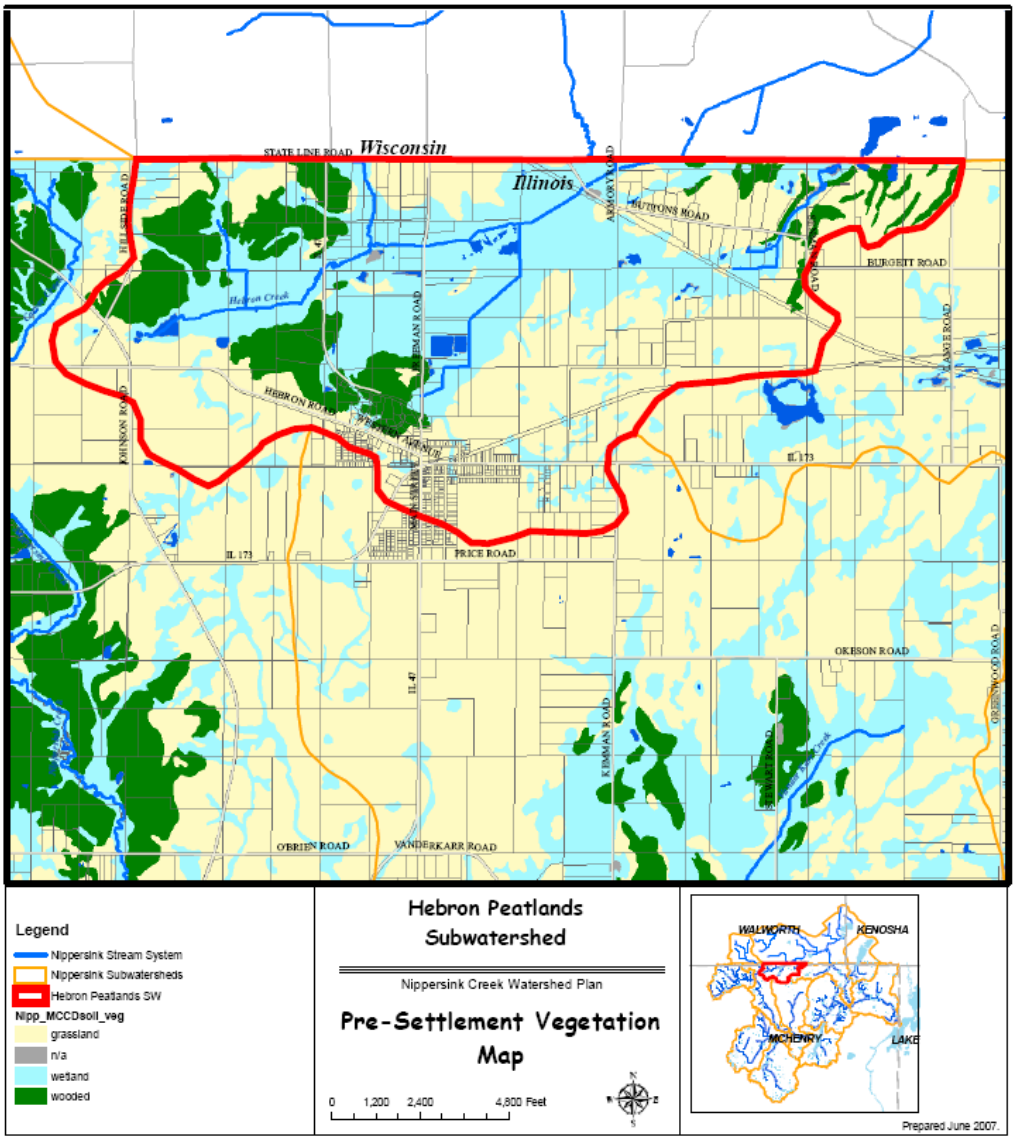
15.1.4 Pre-settlement Vegetation

To guide future land management or restoration efforts, it is important to recognize the native plant communities that naturally evolved subsequent to the last glacial advances. Prior to European settlement in the 1830's, the Hebron Peatlands Subwatershed was comprised of a mixture of grassland, woodland, and wetland, as described in Table 15.1, and depicted in Figure 15.5.

Table 15.1 Pre-settlement Vegetation Summary

Land Cover Type	Area (acres)	Percent of Subwatershed
Grassland	1,877.5	50%
Wooded	526.6	14%
Wetland	1,307.3	35%
n/a	34.1	1%

Figure 15.5 Pre-Settlement Vegetation in the Hebron Peatlands Subwatershed



15.1.5 Subwatershed Drainage Features

Streams

The principal stream in the Hebron Peatlands subwatershed is Hebron Creek. Hebron Creek is a 3.3 mile long perennial stream that has its origins in the agricultural pond just to the northeast of the Hebron Road / Johnson Road intersection. About 70% of this stream has been subjected to channelization. Of the seven miles of streams in the subwatershed, 81% are channelized.

Manmade Drainage Systems

Analysis of land uses and aerial photography indicates that the majority of the man-made drainage features in the subwatershed consist of open channel swales and culverts associated with the existing roadway system. Structural drainage features such as detention basins and storm sewers are more or less limited to a 225 acre area within the Village of Hebron. There are approximately five dry-bottom detention facilities in the subwatershed, all located in the newer sections of the Village of Hebron. Given its age, the existing storm water system was not designed or constructed to treat the runoff from developed areas prior to discharge to the sensitive streams and wetlands in the subwatershed.

Agricultural Tile Systems

Due to the predominantly agricultural nature of the subwatershed, it is likely that there many functioning underground drain tile systems remaining in the subwatershed, particularly in the western half of the subwatershed. Historically, these were the areas that had poor drainage characteristics, but that farmers could successfully convert to agricultural usage by the installation of agricultural drain tile systems.

Identifying agricultural drain tile networks is important in watershed planning because current local flooding and drainage problems can often be linked to damage or age-related failure of drain tile systems. From a watershed preservation / restoration perspective, it is important to identify functional drain tile systems to determine opportunities for their removal or reconfiguration for the purposes of restoring valuable wetland habitat, and water quality benefits. There is little doubt that many of the depressional and low lying areas in the subwatershed that are serviced by drain tiles today for agriculture were once wetland habitats that supported a very diverse ecosystem.

15.1.6 Population

The use and analysis of population data in watershed planning is critical because there is a direct correlation between the number of people residing in a watershed and the degree of impacts to the quality and quantity of the watershed's natural resources. According to the 2000 US Census, the population in the Hebron Peatlands subwatershed was about 990 people, or about 170 persons per square mile. In 1990, the population in the subwatershed was estimated at 800, or 137 persons per square mile (23% increase)

14.1.7 Land Cover

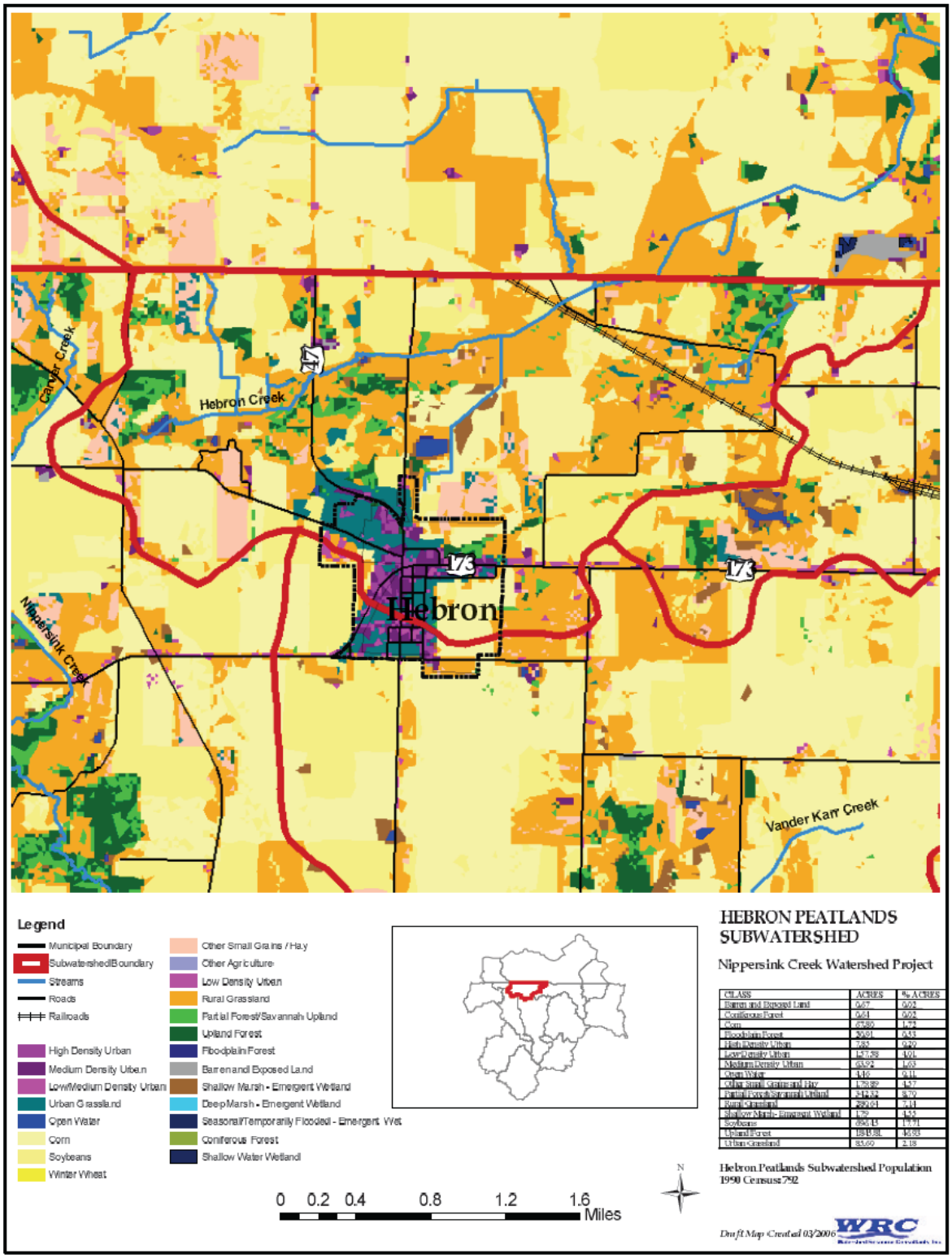
Often, the terms Land Cover and Land Use are used interchangeably. However, there are differences. Land Cover refers to the vegetation, structures, or other features that cover the land. On the other hand, Land Use (as discussed in Section 12.1.7) refers to how land is used by humans.

Land cover data for the Nippersink Creek Watershed is available from the Illinois Department of Natural Resources using LANDSAT data collected between 1998 and 1999. The dominant land cover, according to this data, was rural grasslands and agricultural row crops (82%). Urban landscapes accounted for roughly 8.4% of the Hebron Peatlands subwatershed area, while wooded areas and wetlands account for an additional 9.6% of the subwatershed.

Table 15.2 1999 Land Cover for the Hebron Peatlands Subwatershed

Land Cover Description	Total Acres	Percent of Subwatershed
Barren & Exposed Land	2.6	0.1%
Corn, Soybeans, Other Small Grains & Hay (row crop agriculture)	1,766.0	47.1%
Winter Wheat	0	0.0%
Rural Grassland	1,306.0	34.8%
Low Density Urban	44.8	1.2%
Medium Density Urban	61.9	1.7%
High Density Urban	23.2	0.6%
Urban Grassland	184.3	4.9%
Shallow Marsh – Emergent Wetland	59.4	1.6%
Partial Forest /Savannah Upland	153.9	4.1%
Upland Forest	128.9	3.4%
Floodplain Forest	2.1	0.1%
Coniferous Forest	1.7	0.0%
Deep Marsh / Emergent Wetland	0	0.0%
Open Water	15.9	0.4%
TOTAL	**3,750.7**	**100.0%**

Figure 15.6 1999-2000 Land Cover Map in the Hebron Peatlands Subwatershed



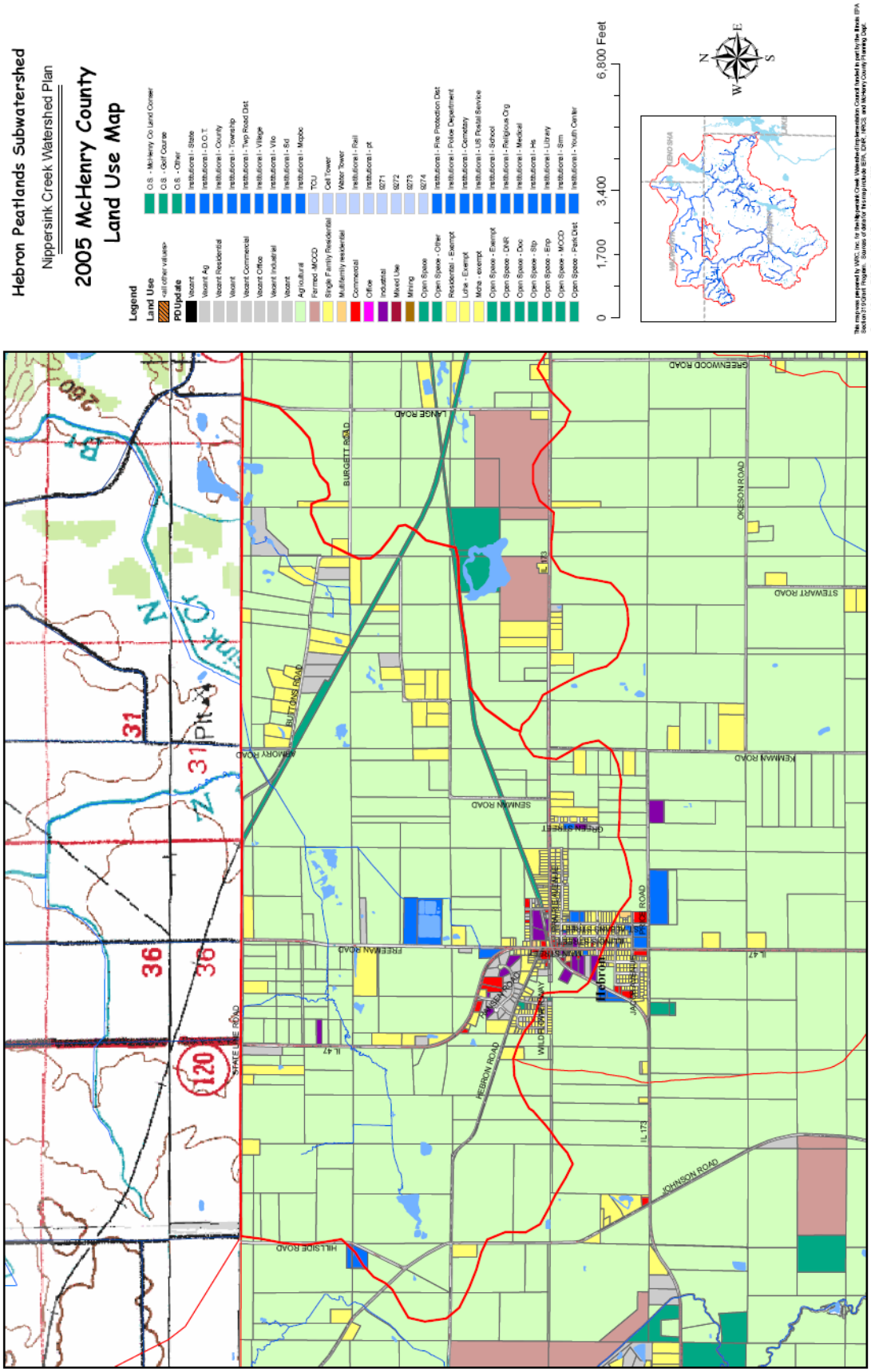
15.1.8 Land Use / Existing Watershed Development

According to the 2005 McHenry County Land Use / Zoning map, 82% of the subwatershed is zoned for agricultural use, while about 17% is either already developed or zoned for development in the future. Only 1.3% is classified as open space.

Table 15.3 McHenry County 2005 Land Use in the Hebron Peatlands Subwatershed

Land Use	Total Acres	Percent of Subwatershed
Vacant	1.0	0.0%
Vacant; Zoned Residential	64.0	1.7%
Vacant; Zoned Commercial	1.8	0.0%
Vacant; Zoned Office	0	0.0%
Vacant; Zoned Industrial	29.2	0.8%
Agricultural	3,093.7	82.5%
Single Family Residential	298.5	8.0%
Multi-Family Residential	1.5	0.0%
Commercial	13.7	0.4%
Office	0.4	0.0%
Industrial	22.5	0.6%
Mixed Use	0.8	0.0%
Mining	0	0.0%
Open Space	48.2	1.3%
Institutional	40.2	1.1%
Right of Way	135.5	3.6%
TOTAL	**3,751.0**	**100.0%**

Figure 15.7 2005 McHenry County Land Use Map in Hebron Peatlands Subwatershed



Development in the subwatershed has historically occurred through unincorporated residential development, although this subwatershed is currently experiencing development growth through municipal annexations by the Village of Hebron.

Table 15.4 Municipal Areas in the Hebron Peatlands Subwatershed

Municipality	Area (acres)	Percent of Subwatershed
Village of Hebron	364.1	9.7%
Unincorporated McHenry County	3,387.2	90.3%

There are 16.8 miles of roads in the subwatershed, which equates to more than 57 acres of impervious cover (roadway pavement only – excludes parking lots, sidewalks, and driveways).

Point Source Discharges

There is one point source discharge in the subwatershed. Tthe Village of Hebron maintains a municipal waste water treatment plant which discharges into a tributary of Hebron Creek.

Table 15.5 NPDES Point Source Discharges in the Hebron Peatlands Subwatershed

Name	Average Discharge (mgd)	Receiving Stream	IEPA Permit Number
Hebron WWTP	0.1	Tributary to Hebron Creek	IL0026433

Water quality and discharge information for Hebron WWTP can be found on the EPA's website at: **http://oaspub.epa.gov/enviro/pcs_det_reports.detail_report?npdesid=IL0026433**

15.1.9 Natural Resources

McHenry County Conservation District Properties

There are no McHenry County Conservation District properties in the subwatershed,

Other Publicly Protected Land

The Village of Hebron and Hebron Township own about 47 acres of land in the subwatershed. Most of this is used for municipal / township infrastructure purposes.

Table 15.6 Other Publicly Protected Land in the Hebron Peatlands Subwatershed

Name	Area (acres)	# of Parcels
Hebron Township	13.8	7
Village of Hebron	33.0	8
Total	**46.8**	

McHenry County Natural Areas Inventory

There are three McHenry County Natural Area Inventory (MCNAI) Sites within the subwatershed, representing about 23% of the entire subwatershed.

Table 15.7 McHenry County Natural Areas Inventory Sites in the Hebron Peatlands Subwatershed

MCNAI Site ID	Name	Area in SW (acres)	Total MCNAI Site Area	Ownership
HEB04	Hidden Marsh	51.5	51.9	Private
HEB09	Vanderpal Prairie	68.6	68.6	Private
HEB03	Hebron Peatlands	744.4	744.4	Private
	TOTAL	**864.5**		

Wetlands

McHenry County completed an Advanced Identification (ADID) Wetland Study in 2003. This study identified a total of 40 wetlands, totaling 771 acres, or 20.6% of the Hebron Peatlands subwatershed. Of these wetlands, 548.6 acres (71%) were determined to be of High Quality.

Table 15.8 Mapped Wetlands in the Hebron Peatlands Subwatershed

ADID Code	Wetland Type	Number of Wetlands	Total Area (acres)
HFV	High Functional Value	5	120.3
HQW	High Quality Wetland	4	548.6
FW	Farmed Wetland	22	44.4
W	Other Wetlands (lower quality)	9	57.7
	TOTAL	**40**	**771.0**

Threatened & Endangered Species

Threatened and Endangered (T&E) species data were extracted from T&E data records documented in the McHenry County Natural Areas Inventory Database. The data were collected by the McHenry County Conservation District during field studies undertaken at subwatershed Natural Area Inventory Sites. The data indicates that there are at least four threatened or endangered animal species living in the subwatershed.

Table 15.9 Threatened and Endangered Species in the Hebron Peatlands Subwatershed

Common Name	Scientific Name	Type	Status	MCNAI Site
Tamarack	Larix laricina	Plant	St Threatened	HEB03
Common Bog Arrow Grass	Triglochin maritima	Plant	St Threatened	HEB03
False Asphedel	Tofieldia glutinosa	Plant	St Threatened	HEB09
Sandhill Crane	Grus Canadensis	Bird	St Threatened	HEB04

Source: McHenry County Natural Areas Inventory Database, 2005

Fishery

No fishery surveys have been conducted on the streams in the Hebron Peatlands subwatershed.

Mussels

No mussel surveys have been conducted on the streams in the Hebron Peatlands subwatershed.

Existing Greenways

There are no formal greenways within the subwatershed. However, the Hebron Trail associated with an abandoned railroad right-of-way, extends east from Hebron, and links up with the Prairie Trail, north of Richmond.

15.2 Analysis of Subwatershed Data and Problem Identification

15.2.1 Water Quality Data & Identified Problems

The Illinois Environmental Protection Agency (IEPA) is tasked with assessing the quality of the surface water resources of Illinois. The IEPA has determined Nippersink Creek's designated uses are:

- Aquatic Life
- Fish Consumption
- Primary Contact
- Secondary Contact
- Aesthetic Quality

The IEPA periodically produces a 303(d) list, which identifies waterways that are not achieving certain designated uses. In the 2006 IEPA 303(d) list, Nippersink Creek is identified as being in Full Support of its Aquatic Life Designated Use, which is notable for a stream in northeastern Illinois.

However, Nippersink Creek was also determined to be Non-supporting of its Primary Contact Designated Use, due to excessive levels of fecal coliform. This pollutant, associated with human and animal waste, was listed as coming from an unknown source. The IEPA also identified fish consumption, secondary contact and aesthetic quality as designated uses for Nippersink Creek, although the ratings for these uses were classified as "not assessed".

There is no published information regarding the water quality or biological health of streams in the Hebron Peatlands subwatershed.

15.2.2 Flooding Problems

At the time of this writing, no data were provided by the County or municipalities regarding existing flooding problems. Analysis of available floodplain information suggests that there are no dwellings in the 100 Year Floodplain.

15.2.3 Projected Development & Growth

Development in the Hebron Peatlands subwatershed will likely occur through municipal annexation of residential and to some degree commercial/office development by the Village of Hebron. There is currently about 96 acres of agricultural land zoned as vacant residential or vacant commercial. In addition to this, there is approximately 575 acres of land adjacent to the current village limits that are prime development locations. All totaled, this new development could increase the amount of development in the subwatershed from 8% to more than 25%.

15.2.4 Natural Area Protection / Preservation Issues

McHenry County Natural Area Inventory Sites

In the Hebron Peatlands subwatershed, 0% of the McHenry County Natural Area Inventory Sites (MCNAI) sites are protected through public ownership (MCCD property).

The Hebron Peatlands (MCNAI HEB03) is the largest MCNAI site in the subwatershed. This 544 acre site contains a sedge meadow, a graminoid fen, a forested fen, and a basin marsh. The MCNAI database indicates that the Hebron Peatlands site is currently impaired by water table alterations, brush encroachment, and invasive species (Reed Canary Grass, Cattails), siltation, and bank erosion.

The Vanderpal Prairie (MCNAI HEB09) is a 69 acre site that contains mesic and wet silt loam prairies, graminoid fens, and sedge meadows. The MCNAI database indicates that the site is currently impaired by water table alterations, brush encroachment, encroachment from development, and railroad right of way maintenance.

The Hidden Marsh (MCNAI HEB04) is a 52 acre dry gravel prairie. The MCNAI database indicates that the site is currently impaired by water table alterations and brush encroachment.

15.3 Subwatershed-Specific Recommendations to Protect Water Resources

The following section discusses the Best Management Practices (BMP's) identified for this subwatershed that should be implemented to address existing or potential water quality impairments. The location of each recommended BMP project is presented in Figure 15.8.

Pollutant Loading Modeling, as discussed in Chapter 3, identified current and future pollutant loadings, based upon land use, soils, slopes, etc., and quantified these loadings. The results of this Pollutant Loading modeling were then used to identify the types of BMP's that should be implemented to create a loading reduction of those pollutants. Table 15.10 presents a summary of the recommended BMP projects, as well as the expected pollutant loading reductions expected if the BMP's are implemented, and function as intended.

Table 15.11 presents detailed cost and logistical information on each of the recommended BMP projects. Below is a summary list of recommendations for the subwatershed to help stakeholders and decision makers meet the Goals and Objectives set forth for Nippersink Creek. Background information regarding how each type of recommendation addresses watershed concerns and/or impairments (existing or future) can be found in Chapter 4.

Type:	Education / Outreach; Regulatory; Site Restoration; Monitoring; Permanent Habitat Protection, Water Quality
Target Goals:	Which watershed plan goals the recommendation is intended to address.
Initial Implementation Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Initial Outreach Cost:	The initial cost, in 2007 dollars to initiate the recommended action, if applicable.
Annual Cost:	The long term expected annual cost (in 2007 dollars) to successfully implementation of the recommendation
Responsible Party:	Identifies the LEAD agency, entity, or landowner who will ultimately have to execute the recommendation. SUPPORTING parties, such as government agencies, grant sources, etc. may also be identified here.
Priority:	A ranking of the BMP recommendations, based upon the nature / urgency of the existing / potential impairment; the availability of willing landowners)/ partners; short-term vs. long-term development pressure; and whether the project is a new effort, or a retrofit of an existing practice.

The project cost estimates contained in this report should be considered preliminary, and are only presented to identify the potential magnitude of cost, from a watershed scale perspective. No site-specific investigation, analysis, or design of any recommended project, from which accurate cost information could be obtained, was completed as part of the preparation of the 2008 Nippersink Creek Watershed Plan.

If a watershed stakeholder decides to apply for grant funding assistance to implement any of the recommended projects presented in this report, they should first undertake any additional studies / research needed to determine an updated / accurate project cost. They should not solely rely on the cost estimates presented in the NCWP report as the basis for their grant request.

Note: The following acronyms for responsible parties identified in Table 15.11 are presented below:

NCWPC	Nippersink Creek Watershed Planning Committee
NRCS	Natural Resource Conservation Service
SWCD	McHenry County Soil and Water Conservation District
MCCD	McHenry County Water Conservation District
TLC	The Land Conservancy of McHenry County
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
MCDOT	McHenry County Department of Transportation
MCDEF	McHenry County Defenders

Figure 15.8 Hebron Peatlands Subwatershed Site Recommendations Map

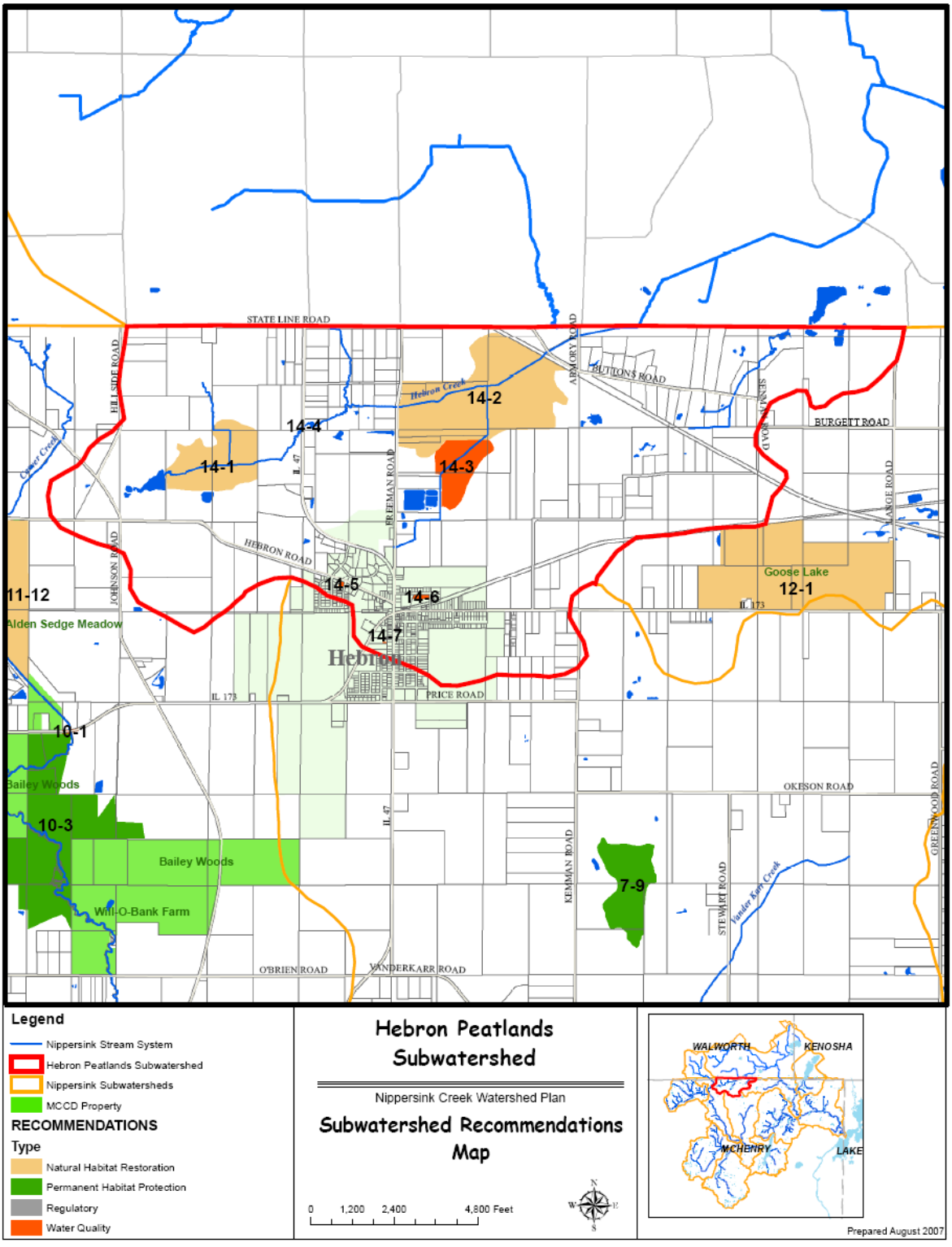


Table 15.10 BMP Selection & Associated Pollutant Load Reduction for the Hebron Peatlands Subwatershed

BMP	Type of BMP	Project Locations**	BMP		Removal Efficiency***			(lbs/year) ****			Percentage Reduction		
			Size	Unit	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
Conservation Development Practices	Site-specific	14-3	46	acres	53%	51%	88%	520	31	33	3.3	3.1	5.4
Stormwater BMPs	Site-specific	14-4	1	lump sum	36%	95%	95%	86	14	9	0.5	1.4	1.4
Detention Basin Retrofit	Site-specific	14-5, 14-6, 14-7	7	acres	32%	55%	68%	48	5	4	0.3	0.5	0.6
Regulatory*	Watershed-Specific	Subwatershed wide	1	Water-shed	5%	5%	5%	800	50	31	5	5	5
Nutrient Management	Watershed-specific	Subwatershed wide	500	acres	70%	28%	-	7,463	185	-	46.7	18.7	-
Wetland Restoration	Site-specific	14-1, 14-2	320	acres	53%	51%	88%	3,616	216	231	22.6	21.8	37.5
Total								12,533	501	307	78.4	50.5	50

*Regulatory programs are assumed to have nominal pollutant reduction rates of 5%.

** Project locations and details are described in the corresponding chapter.

*** TN = total Nitrogen; TP = total Phosphate; TSS = total suspended solids or Sediment.

**** The unit of “TSS” is “Tons/year”.

Table 15.11 Recommended Projects in the Hebron Peatlands Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Hebron Peatlands	14-1	Natural Habitat Restoration	Landowner Outreach to re-establish 90+ acre wetland previously drained for agriculture	NCWPC / NRCS / SWCD	91.1	$2,500	$227,758	$1,000	$9,110	D
Hebron Peatlands	14-2	Natural Habitat Restoration	Landowner Outreach to expand and enhance existing 230 acre High Quality ADID Wetland (N 10) between Armory Road and Freeman Road	NCWPC / TLC / MCDEF	233.8	$1,500	$350,723	$1,500	$23,382	D
Hebron Peatlands	14-3	Water Quality	Government Outreach to provide 46+ acre water quality polishing wetland as part of any future Hebron WWTP expansion	NCWPC / VILLAGE OF HEBRON	46.4	$5,000	$232,160	$1,000	$11,608	E
Hebron Peatlands	14-4	Water Quality	Government Outreach to install Stormwater BMP's to treat roadway runoff at IL 47 prior to discharge into Hebron Creek; non-structural if adjacent land is available; structural BMP devices if no land for basin	NCWPC / IDOT			$50,000	$500	$2,500	E
Hebron Peatlands	14-5	Water Quality	Landowner / Government Outreach to retrofit existing dry bottom detention basin at Hebron Drive and Wildflower Way with native vegetation and minor regrading to increase pollutant removal	NCWPC / VILLAGE OF HEBRON			$11,000	$500	$1,000	E
Hebron Peatlands	14-6	Water Quality	Landowner / Government Outreach to industrial landowner to retrofit existing dry bottom detention basin at Mead & Church Street; minor re-grading and install native vegetation to increase pollutant removal	NCWPC / VILLAGE OF HEBRON			$20,000	$500	$1,000	E

Table 15.11 Recommended Projects in the Hebron Peatlands Subwatershed

SUB WATERSHED	RECOMMENDATION #	TARGET GOAL	DESCRIPTION	RESPONSIBLE PARTY	ACRES	UNIT COST	INITIAL IMPLEMENTATION COST	INITIAL OUTREACH COST	ANNUAL MAINTENANCE COST	PRIORITY
Hebron Peatlands	14-7	Water Quality	Landowner / Government Outreach to industrial landowner to retrofit existing dry bottom detention basin at 12121 RT 173; minor re-grading and install native vegetation to increase pollutant removal	NCWPC / VILLAGE OF HEBRON				$12,000	$500	$1,000	E
				SW TOTALS	**371.4**			**$903,640**	**$5,500**	**$49,600**	

PRIORITY

- **A Projects that have cooperating partners, can move to implementation quickly. Implementation Timeframe 1 to 3 years**
- **B Projects subject to imminent development pressure, Implementation Timeframe 1 to 2 years**
- **C Projects needed to protect sensitive areas. Timeframe 1 to 2 years**
- **D Restoration projects, Timeframe 1 to 5 years**
- **E Retrofit Projects, Timeframe 1 to 5 years**
- **F Existing Pollution Potential, Timeframe 1 to 2 years**
- **G Policy / Opportunity Review Project, Timeframe 1 to 3 years**

Note: This Page is Intentionally Blank