

Environmental Stewardship

1.0 OVERVIEW

1.1 Report Purpose

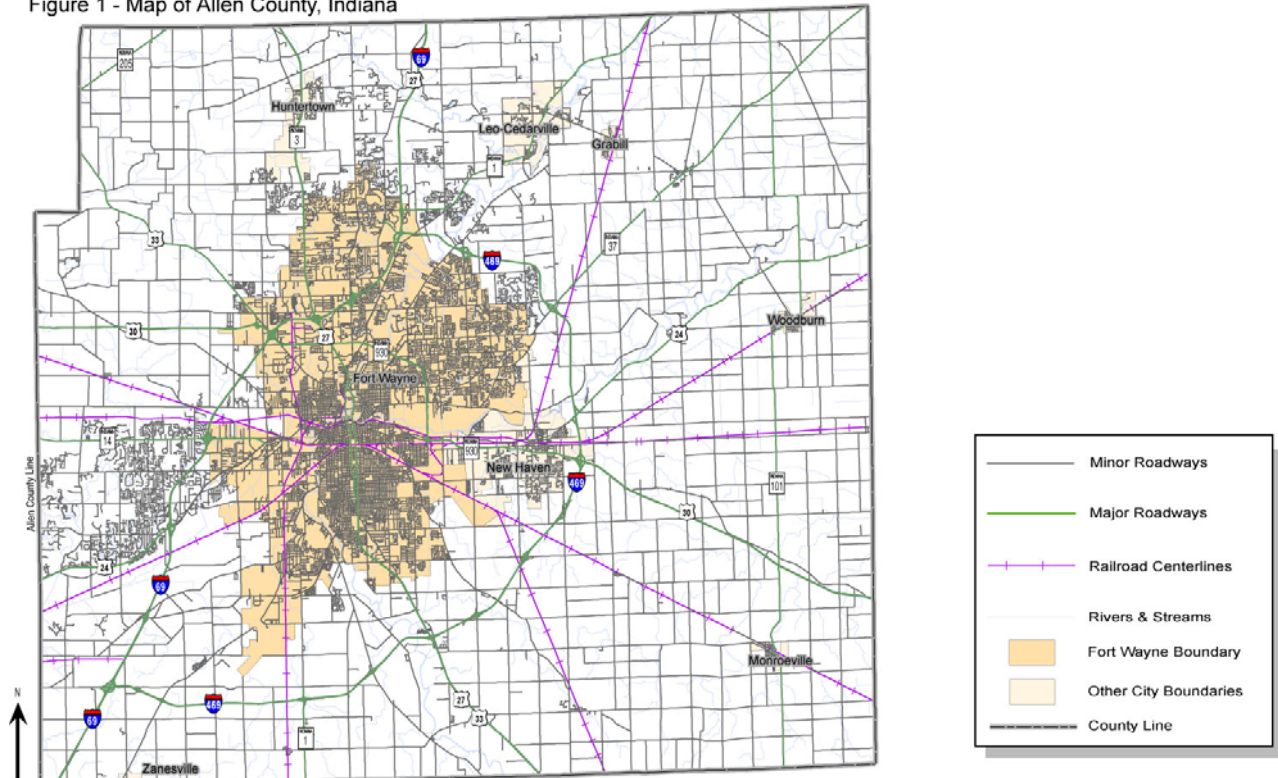
The purpose of this report is to provide baseline information, key findings, and identification of key issues associated with the natural resources of the Allen County/Fort Wayne, Indiana project area. Information documented in this report will be used as a basis for informing planning policy decisions in formulation of a Joint County/City Comprehensive Plan.

Tables and Figures referenced in the text appear at the end of this document in Appendices A and B, respectively.

1.2 Project Area

The project area encompasses all of Allen County, including the City of Fort Wayne, Allen County townships, incorporated places, and unincorporated areas of the County. **Figure 1** shows a map of Allen County and major political jurisdictions located within its boundaries. Total land area covered by the Allen County/Fort Wayne project area is 422,407 acres.

Figure 1 - Map of Allen County, Indiana

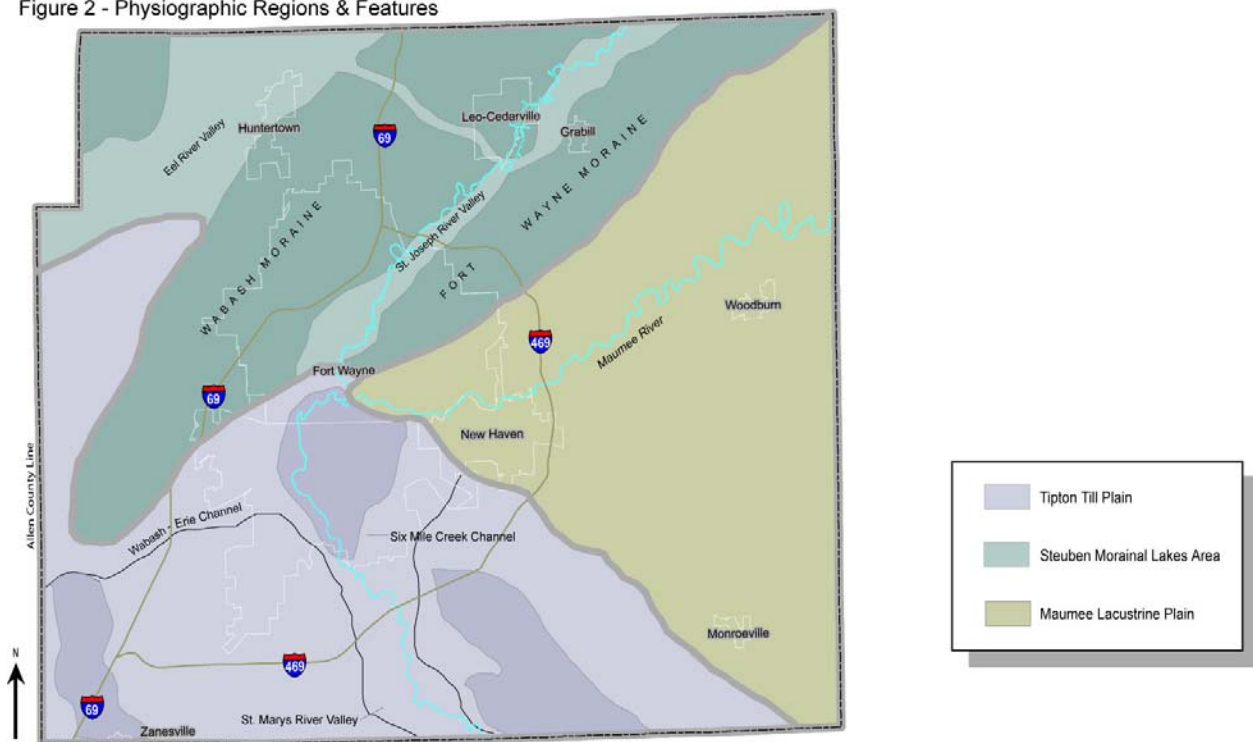


2.0 EXISTING CONDITIONS INVENTORY

2.1 Physiography

Allen County lies at the juncture of three distinct physiographic regions – the **Steuben Morainial Lakes Area**, the **Tipton Till Plains**, and the **Maumee Lacustrine Plain**. The county also lies across a major drainage divide between Lake Erie and the Mississippi River. This divide runs generally north/south through the western portion of the county. **Figure 2** shows the principal physiographic regions and features in Allen County.

Figure 2 - Physiographic Regions & Features



Source: Adapted from "The Hydrogeology of Allen County", Anthony H. Fleming, Indiana Geological Survey and Indiana University, 1994

The **Steuben Morainial Lakes Area** occupies the northern portion of the county. This area is characterized by hummocky, relatively rugged terrain that is the result of glaciation. The Wabash and Fort Wayne Moraines are prominent features in this region. These formations are end moraine features deposited during the last major glacial advance into the area around 12,000 to 15,000 years ago (Erie Lobe). The narrow St. Joseph River Valley runs between the two moraines, and the broader Eel River Valley lies to their west. The deeply incised valley of Cedar Creek cuts across the Wabash Moraine on its way to join the St. Joseph River. Lowlands in this part of the county are irregular and dotted with small lakes and wetlands.

The **Tipton Till Plains** occupy the south and west portions of the county. The Tipton Till Plains extend over most of central Indiana and give rise to the broad, flat to gently rolling topography that is characteristic of this part of the state. The southern limbs of the Wabash and Fort Wayne Moraines extend into this part of the county, providing some topographic contrast, but their relief is much subdued here relative to their northern limbs in the Steuben Morainal Lakes region. The Wabash-Erie Channel, St. Mary's River Valley, and Six Mile Creek Valley are the principal drainage features in the Tipton Till Plains region. The Mississippi-Lake Erie drainage divide is particularly evident in the Wabash-Erie Channel. The St. Mary's River flows northeast through this feature toward Lake Erie, while the Little River, which originates on the west side of the divide, flows to the southwest through this same feature toward the Mississippi River.

The **Maumee Lacustrine Plain** occupies the eastern portion of the county. It is an ancestral remnant of Lake Erie, which once extended into this area perhaps as late as 10,000 years ago. Except for the Maumee River Valley and prominent remnant beach ridges along its northern edge, this area is a flat, featureless plain. Fine textured soils derived from lake deposits cover the underlying bedrock in varying thicknesses ranging from 30 to more than 70 feet. Drainage is generally poor in this region, and much of this portion of the county has been tiled and drained by ditches.

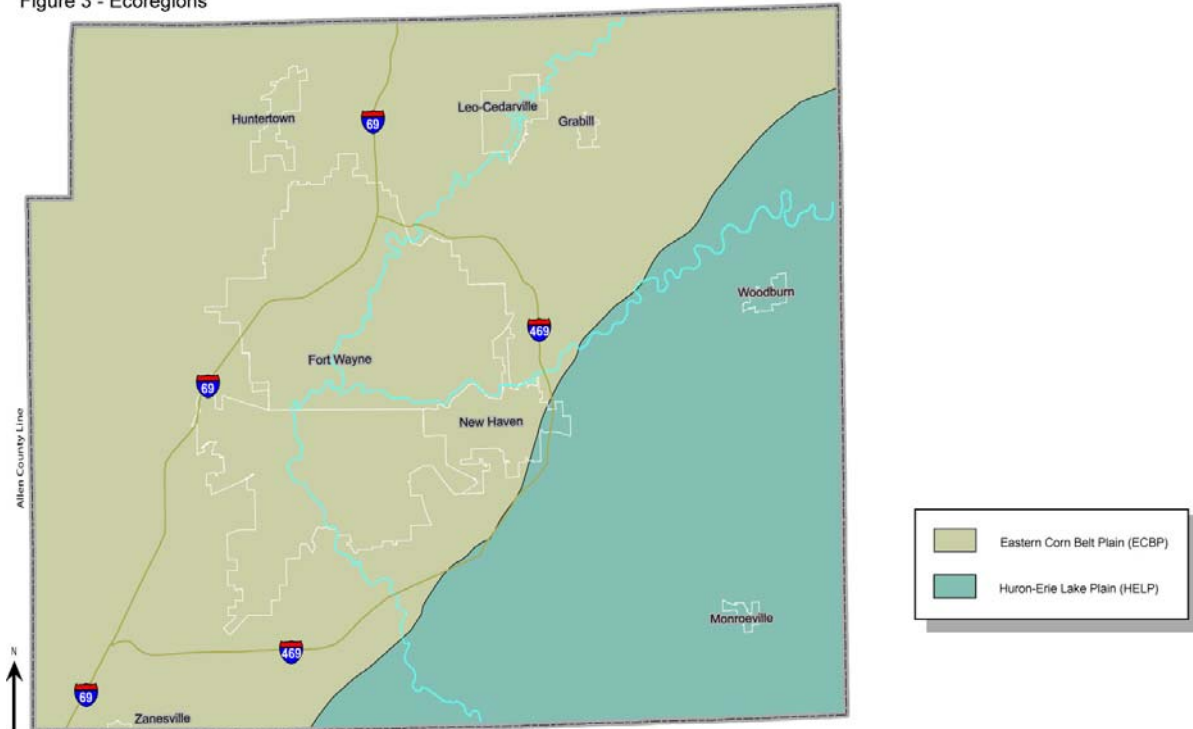
2.2 Ecoregions

Ecoregions are broad areas of relatively homogeneous climate, soils, geology, physiography, land use, and vegetation that tend to give rise to distinct ecosystems. Ecoregions are a way for natural resource planners and others to assess and compare areas on a broad scale in terms of their ability to support particular assemblages of vegetation and animal life, and their sensitivity to human impacts.

Allen County lies on the boundary between the *Eastern Corn Belt Plains (ECBP)* and *Huron/Lake Erie Lake Plain (HELP)* ecoregions. This distribution of ecoregions strongly reflects the county's glacial history. As with much of the Upper Midwest, glaciation is the principal natural force responsible for shaping differences in the landscape's potential to support particular ecosystem types, and related variations in the way it responds to human impacts. *Figure 3* shows the principal ecoregions in Allen County.

The western part of the county lies principally in the *Eastern Corn Belt Plains (ECBP)* ecoregion. This region is characterized by level to gently rolling topography on broad glacial till plains, punctuated by other glacial features - moraines, kames, and outwash plains. Most stream valleys are post-glacial in origin, tending to be shallow and relatively narrow. Watersheds tend to be large, the major ones covering thousands of square miles. There are few natural lakes. Those that exist are typically small and formed in glacial depressions. This region originally supported a virtually unbroken expanse of mixed deciduous forest, but has been cleared and largely converted to agriculture. Except for a few protected remnants, existing forested areas are regrowth stands. Many smaller natural streams have been channelized to improve drainage or prevent flooding. Constructed ditches are prevalent.

Figure 3 - Ecoregions



Source: "Ecoregions of the Upper Midwest States" EPA/600/3-88/037, 1988.

The eastern part of the county lies principally in the *Huron/Lake Erie Lake Plain (HELP)* ecoregion. This region is characterized by flat terrain reflecting its origins as an ancestral lakebed of glacial Lake Erie. Remnant beach ridges and post-glacial stream valleys account for what little topographic contrast is to be found. Soil drainage is generally poor, necessitating extensive channelization of streams and installation of tile drains to support agricultural activities. This region was historically covered by wetland forests dominated by American elm and red maple. Watersheds are generally smaller than in the ECBP regions, encompassing hundreds, rather than thousands of square miles for larger streams.

2.3 Geology

Glaciation is the principal force responsible for shaping the topography and underlying geology of Allen County. The original bedrock generally does not exert a prominent influence at or near the surface as it is buried by glacial deposits in thicknesses ranging anywhere from 30 to 300 feet thick across the county. Underlying bedrock features did play some role in influencing the patterns of glacial advance and retreat, thus contributing indirectly to the shape of the modern landscape. Bedrock geology plays a more prominent role in the county's groundwater resources (See Section 2.7.1).

Ice sheets advanced and retreated many times over northeast Indiana during the course of the Ice Age, which began perhaps 1 million years ago. The most influential advances in Allen County are the most recent, which occurred between about 22,000 and 10,000 years ago. This period is known as the Wisconsin Age. Three major ice advances into Allen County occurred during this

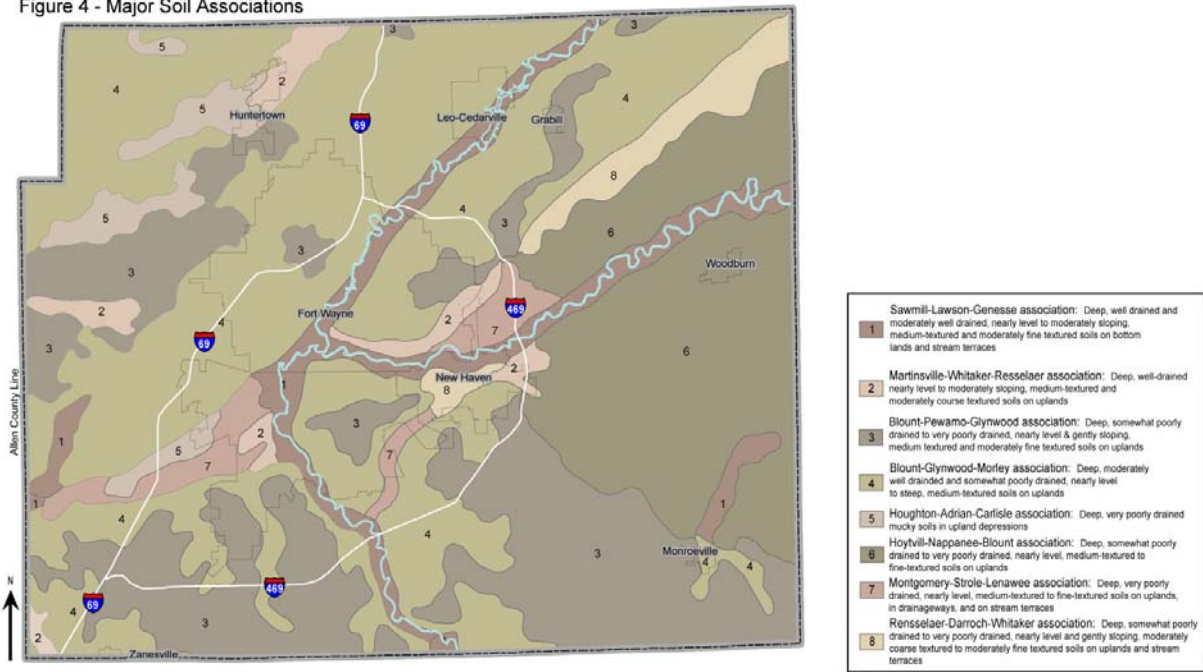
period – the Huron-Erie Lobe, followed by the Saginaw Lobe, and, finally, the Erie Lobe. Historic expansions and contractions of Lake Erie also accompanied these ice advances. Each major advance left behind a characteristic assemblage of deposits by which they may be distinguished, referred to as formations. An understanding of these formations and the glacial forces responsible for shaping them aids greatly in understanding the county’s topography, soils, groundwater resources, and other fundamental environmental factors. **Table 1** in the appendix summarizes the characteristics of the three major Wisconsin ice advances and their resulting formations.

2.4 Soils

2.4.1 General

Soils in Allen County strongly reflect their glacial origins. Eight major soil groups, known as soil associations, may be distinguished in the County. Each soil association is composed of multiple soil types that tend to occur together in a consistent pattern and proportions. Characteristics of the County's major soils associations are described in **Table 2** in the appendix. Their locations and extent are shown in **Figure 4**.

Figure 4 - Major Soil Associations



Source: Natural Resources Conservation Service State Soil Geographic Database

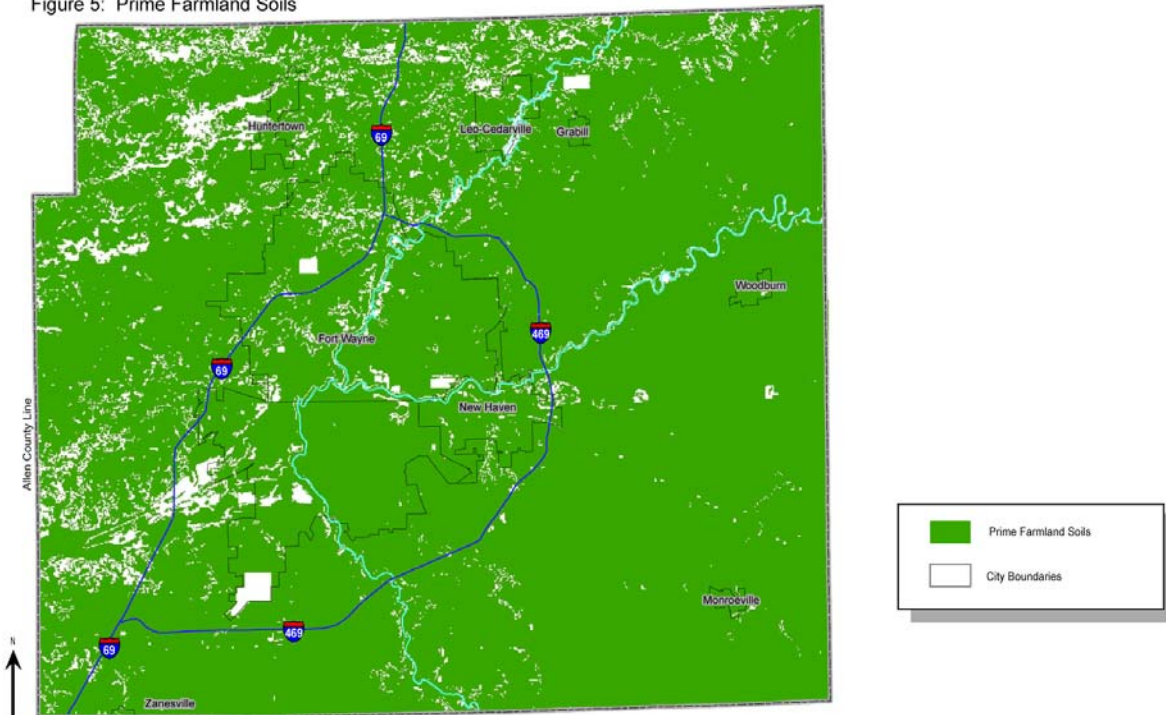
The majority of the County's soils are derived from fine-textured glacial till deposits mixed with varying amounts of coarser sand and gravel. On the Maumee Lake Plain in the eastern part of the county, very fine-textured lake bottom deposits from the ancestral remnants of Lake Erie form the principal parent material. Coarser outwash deposits in the Eel River Valley and Wabash-Erie Channel give rise to some of the County's better drained soils, however, both also contain some of the County's most extensive areas of organic soils, formed from the decayed remains of vegetation growing in glacial depressions (Carlisle-Willette Association).

Beach ridge soils, such as the Belmore, Oshtemo, and Martinsville fine sandy loams and loams found in the Martinsville-Belmore-Fox Association and as minor soils in the Rensselaer-Whitaker Association, are also of interest for their origins in ancestral beach ridges of glacial Lake Erie. These soils occur along the north and west edges of the Maumee Lake Plain to the northeast and east of Fort Wayne, a path roughly traced by SR 37. More recent alluvial deposits along the County's modern drainage ways account for the balance of principal parent material types.

2.4.2 Prime Farmland Soils

Prime farmland soils are soils that exhibit the best combinations of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops. Prime farmland soils have the soil quality, growing season, and moisture supply necessary to economically produce high yields of most crops on a sustainable basis when managed in accordance with contemporary farming methods. Specific criteria and soil types constituting prime farmland are defined at the national level by the Natural Resource Conservation Service (NRCS). According to the 2003 *Indiana Farmland Protection Plan*, an estimated 92 % of Allen County's total land area qualifies as prime farmland. Allen County also has the highest total acreage of prime farmland of all Indiana counties. Prime farmland soils in Allen County are listed in **Table 3** in the appendix. Their coverage in the County is shown on **Figure 5**.

Figure 5: Prime Farmland Soils



Source: Natural Resources Conservation Service State Soil Geographic Database

Unique farmland includes soil types other than prime farmland that are suitable for the production of high value specialty crops such as cranberries or other specialty fruits and

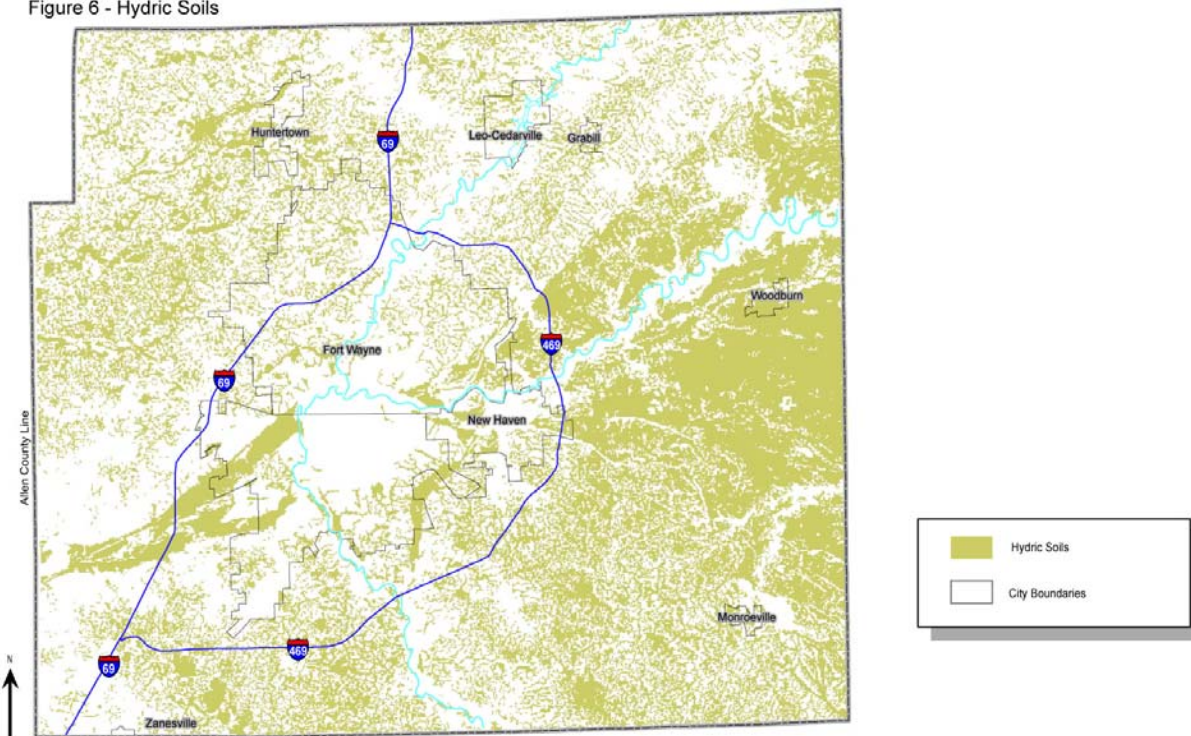
vegetables. Unique farmland soils have the particular combination of soil quality, location, topography, growing season, and moisture needed to economically produce high yields of specialty crops. Once converted, unique farmland soils can typically not be economically returned to agricultural use. No unique farmland soils have been identified in Allen County or statewide.

Farmland of Statewide Importance includes soil types other than prime or unique farmland that are considered important on a statewide basis for production of food, feed, fiber, forage and oilseed crops. In Indiana, these generally include mucky and poorly drained soils which, when managed for drainage, are capable of producing yields comparable to prime farmland. Farmland of statewide importance accounts for an estimated 2 % of Allen County's total land area. Soil types designated as farmland of statewide importance in Allen County are listed in **Table 4** in the appendix.

2.4.3 Hydric Soils

Hydric soils are soils that are saturated at or near the surface for sustained periods of time during the growing season. The source of saturation may be flooding or ponding of surface water from above, or the result of a high water table from below. Hydric soils are of interest to planners primarily for two reasons: 1) they tend to give rise to wetland conditions when not artificially drained, and 2) they pose serious limitations for construction and the siting of septic systems.

Figure 6 - Hydric Soils



Source: Natural Resources Conservation Service State Soil Geographic Database

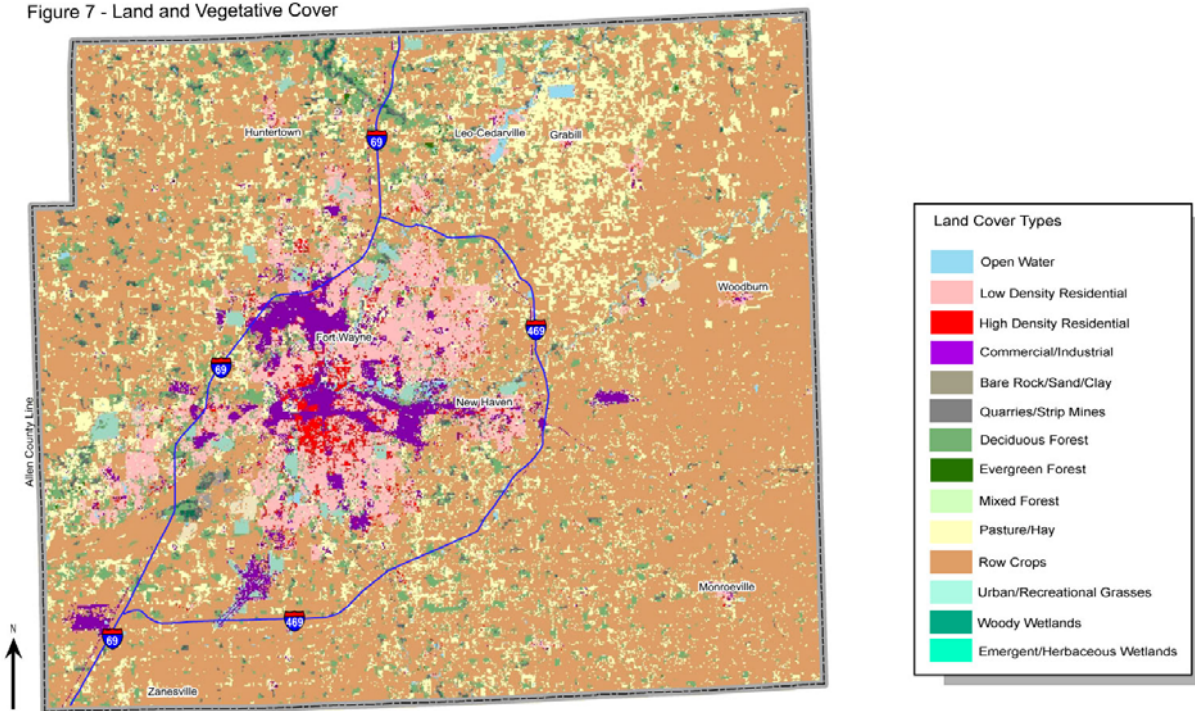
Hydric soil types are defined at the national level by NRCS, but may be supplemented at the County level. Two categories of hydric soil types are usually described: 1) soils which

themselves exhibit hydric characteristics, and 2) soils which are not themselves hydric but which may include small areas of hydric soils that cannot be mapped at the scale at which most soil surveys are completed. **Table 5** in the appendix lists the hydric soil units present in Allen County. Their location and extent are shown on **Figure 6**. **Table 6** in the appendix lists the nonhydric soil types in Allen County that may contain smaller inclusions of hydric soils. The presence of hydric inclusions can only definitively be determined at the level of individual sites.

2.5 Land and Vegetative Cover

Although it encompasses the relatively large urbanized area of Fort Wayne and its surrounding suburbs, Allen County is still overwhelmingly a rural county with most of its land area in active agricultural production. **Figure 7** illustrates land cover distribution throughout the county. Each of the principal land cover categories present in the county is described below.

Figure 7 - Land and Vegetative Cover



Source: "A GIS Atlas for Indiana", Indiana University, Indiana Dept. of Transportation, and Bernardin, Lochmueller & Associates, Inc.

Agricultural - This category includes areas in active agricultural production either in **row crops**, such as corn and soybeans, or **pasture/hay** for livestock.

Residential - This category includes areas dominated by residential uses, including both **high density** areas dominated by apartment complexes and town homes, and **low density** areas dominated by single family homes and larger lot sizes.

Commercial/Industrial - This category includes areas dominated by concentrations of **commercial** or **industrial** uses, such as shopping centers, warehouse districts, hospitals, airports, industrial parks, and large manufacturing plants.

Open Land - This category includes open *urban* and *recreational* areas dominated by *grasses* or other herbaceous vegetation, but not in active pasture. Park lands, golf courses, and maintained lawns at large institutions are examples of lands included in this category.

Disturbed Lands - This category includes *quarries*, *mines*, large construction sites, and other areas of disturbed or *bare* lands at the time of the survey.

Forested - This category includes lands dominated by mature trees. *Deciduous*, *evergreen* and *mixed* forest communities are included in this category.

Wetlands - This category includes areas dominated by wetland plants and conditions. *Woody* wetlands dominated by trees or shrubs, and *emergent* wetlands dominated by herbaceous vegetation (e.g. cattails, reeds, rushes) are included in this category.

Open Water - This category includes lakes, rivers, streams, reservoirs, farm ponds, and other significant *open water* impoundments such as sewage treatment lagoons.

2.6 Natural Heritage Features

2.6.1 Rare, Threatened and Endangered Species

The Indiana Heritage Data Base contains information regarding reported occurrences of endangered, threatened and rare (ETR) plant and animal species throughout the state. The U.S. Fish and Wildlife Service (USFWS) is responsible for designating federally endangered and threatened species on a national scale. IDNR is responsible for making similar designations at the state level.

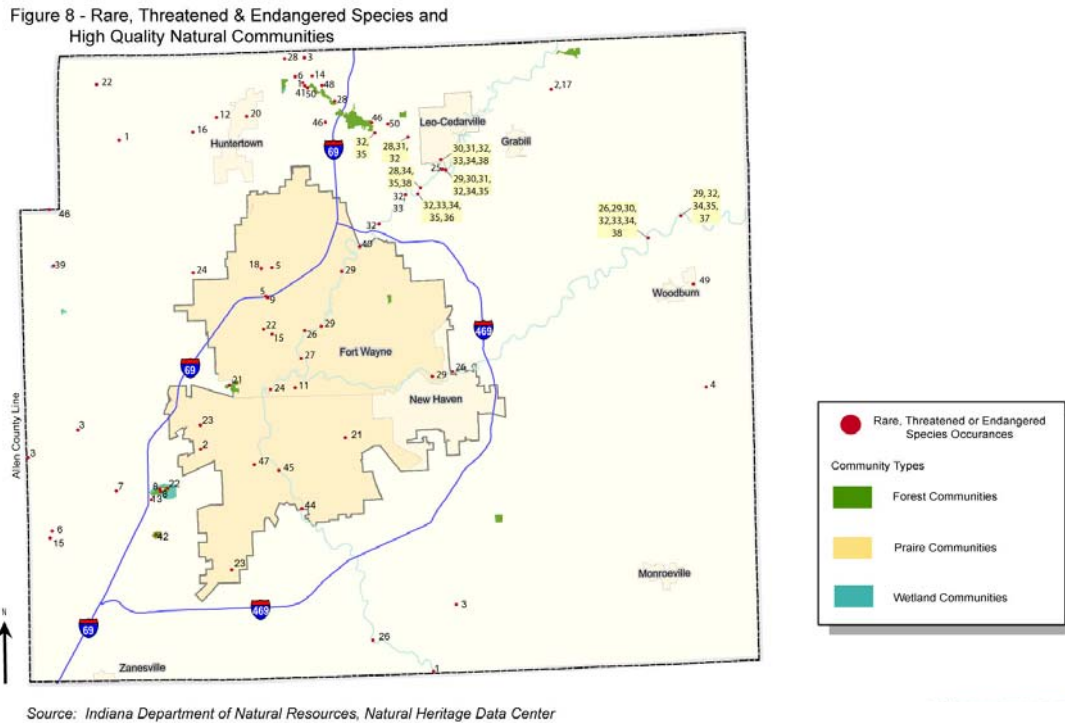
The federal “endangered” listing is the most severe, indicating that the plant or animal is in imminent danger of extinction throughout or over a significant portion of its national range. The federal “threatened” designation indicates the plant or animal is likely to become endangered on a national scale in the foreseeable future if conservation actions are not undertaken.

IDNR is responsible for making parallel determinations regarding species considered “endangered” or “threatened” in Indiana, even though they may be prevalent in other parts of their range. IDNR also maintains occurrence data for species considered “rare”, of “special concern”, on a state “watch list”, “significant”, “extirpated”, and “reintroduced” throughout the state, and for species not assigned any of the above designations, but whose rarity in Indiana warrants concern.

Table 7 in the appendix summarizes the latest available ETR reported occurrence data for Allen County (including the City of Fort Wayne). Reported occurrence locations are shown on **Figure 8**. The precision of reported occurrence locations varies from precise coordinates to very general, depending upon the information provided by the original observer. Reported occurrences also range in age from historical (e.g. 1906) to the present day.

2.6.2 High Quality Natural Communities

IDNR also tracks information about high quality plant communities in the state under the Natural Heritage Program. These communities are considered to offer exceptional habitat values, and tend to be rare on a statewide basis. Some offer habitat for threatened and endangered species. Most are located in established parks or nature preserves, but IDNR also tracks reports of high quality communities located on private properties. **Table 8** in the appendix lists reported high quality communities in Allen County. Locations of high quality communities are shown on **Figure 8**.



2.6.3 Invasive Species

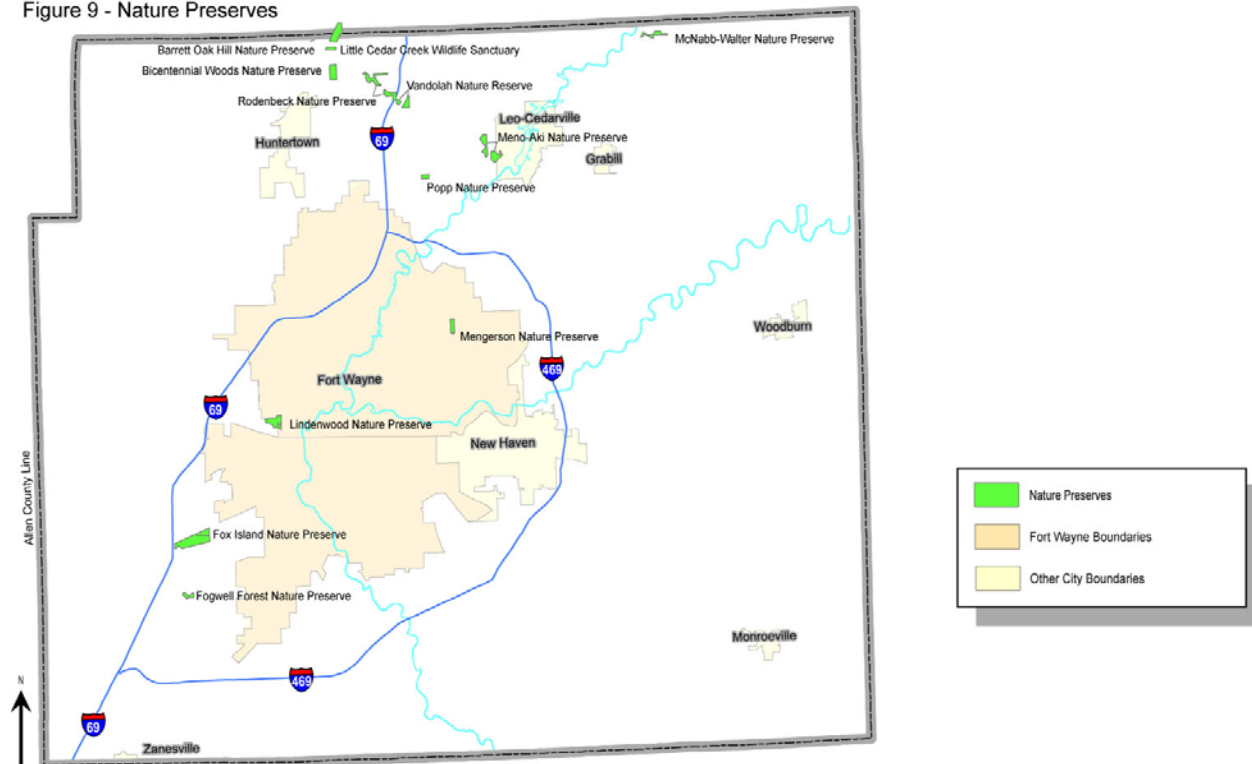
Invasive species are non-native species which spread so quickly and aggressively that they pose a threat to native plant or animal communities. Many invasive species are tolerant of a wide range of conditions and are often prevalent in urbanized and disturbed environments. IDNR undertakes a variety of control and eradication activities to control invasive species throughout the state. Allen County Parks and Recreation Department also conducts periodic controlled burns to contain the spread of invasive plant species in the parks under their management. **Table 9** in the appendix presents a list of invasive plant and aquatic nuisance species considered to be of concern in Indiana.

2.6.4 Natural Areas and Preserves

There are 13 designated nature preserves located in Allen County. These are listed in **Table 10** in the appendix. Their locations are shown on **Figure 9**. They are managed by various entities,

including IDNR Division of Nature Preserves, Allen County Parks and Recreation Department, Fort Wayne Parks Department, and two non-profit conservation organizations - the Izaak Walton League and ACRES, Inc.

Figure 9 - Nature Preserves



Source: Indiana Department of Natural Resources, Natural Heritage Data Center

Nature preserves, as the term implies, have as their focus the preservation of unique or valuable *ecological* resources and communities. While some, like Fox Island Nature Preserve are open to the public, others are restricted. Although their focus is not on recreation in the classic sense, they constitute an important component in providing a full spectrum of outdoor recreation opportunities, as well as protecting important ecological resources. A brief description of the features of each of Allen County’s nature preserves follows.

Additional information regarding these preserves and other parklands and open space in Allen County and the City of Fort Wayne may be found in the Existing Conditions document supporting the Community Facilities element of the Comprehensive Plan.

Barrett Oak Hill Nature Preserve – This nature preserve is an 85-acre property located in Allen and Dekalb County and owned by Acres, Inc. The property was a gift from the owners Jim and Patricia Barrett. Jim Barrett wrote the language for Indiana's Nature Preserve Act that was passed into law in 1967. The preserve protects high quality examples of mesic upland forest and floodplain forest along Little Cedar Creek, which is tributary to Cedar Creek. This preserve is not accessible to the public.

Bicentennial Woods Nature Preserve – Features an old growth forest remnant with trees over 200 years old. This preserve was acquired to celebrate the City of Fort Wayne’s 1994 bicentennial. Mature oaks, hickory, sugar maple, sycamore, black walnut, black cherry, and flowering dogwood are prevalent tree species. Spring wildflowers, a buttonbush swamp wetland, and upland field habitat are other features. Willow Creek, a tributary to Cedar Creek, flows through the preserve. The preserve is open to the public and offers 2 miles of walking trails.

Fogwell Forest Nature Preserve - Encompasses an old second growth forest remnant with upland and wetland components. Upland sites are dominated by mature sugar maple, beech, white and red oaks, while wetter sites are dominated by bur and swamp white oaks, red maple, and green ash. Dogwoods, spicebush, pawpaw, buttonbush, and maple leaf viburnum are prevalent understory and shrub species. Trilliums, trout lily, bloodroot, Dutchman’s breeches, and various violet species may be seen on the forest floor in spring. The preserve is open to the public and has a single walking trail.

Fox Island Nature Preserve - Features a remnant glacial sand dune and a diverse array of habitat types, including open fields, marshes, shrub wetlands, open water, and a prairie restoration site. The preserve encompasses the largest single contiguous preserved wooded tract in Allen County. The nature preserve is contained within the larger Fox Island County Park, which offers a full complement of recreational activities, including fishing and swimming at Bowman Lake. There are a number of trails through the preserve and a Nature Center that offers meeting space and educational programs. Fox Island offers excellent birdwatching opportunities.

Lindenwood Nature Preserve – Located in Lindenwood Park near St. Francis College on the west side of Fort Wayne. The preserve contains a mature oak-hickory forest, particularly rare given its urban setting. The preserve contains trails, including a handicapped access trail, and offers an active interpretive program. The forest supports a diverse array of wildflowers, especially in spring.

Little Cedar Creek Wildlife Sanctuary - This nature preserve is an 18-acre property adjoining the Barrett Oak Hill Nature Preserve. It is located along Little Cedar Creek in north Allen County. Owned and managed by ACRES, Inc., this preserve protects floodplain woods, steep ravines and upland woods along the creek. The floodplain woods include tall cottonwood, red maple, silver maple, and sycamore trees. The drier slopes and upland woods include red oak, white oak, ash, shagbark hickory and beech. There is an old oxbow pond in the floodplain as well. The preserve is not accessible to the public.

McNabb-Walter Nature Preserve - This preserve is a 41-acre wooded tract located in the northeast corner of Allen County. The preserve is owned and managed by ACRES, Inc. Most of the preserve contains mesic upland forest, and a stream flows through a portion of the preserve. About 25 acres of the preserve is an old growth forest with mature sugar maple and tulip poplar trees. Access is restricted, but may be allowed with permission.

Mengerson Nature Preserve – Located between the residential communities of Royal Oaks and Golden Acres in northeast Fort Wayne. The preserve features a Central Till Plains Flatwoods forest community with a diverse array of tree species, including red, white, and pin oaks, sugar maple, shagbark hickory, and beech. The preserve is partially wooded, and partially open field. Topography is level, with some wet areas. Multiple trails wind through the preserve. The preserve is accessible to the public.

Meno-Aki Nature Preserve – This preserve is located in Metea County Park along Cedar Creek just west of Cedarville. The preserve features a rare hill prairie community bordering the creek. Upland and floodplain forest communities are also present. The steep ravines and bluffs characteristic of the Cedar Creek valley are a unique landscape in Allen County. Trails through Metea park provide access to the southern half of the preserve. The name Meno-Aki translates as “good” or “blessed” in the Potawatomi language. The larger Metea Park is named for Chief Metea of the Potawatomi nation. The preserve is open to the public.

Popp Nature Preserve - This nature preserve is a 21-acre wooded tract along Ely Run just north of Fort Wayne, and is part of a larger 40-acre tract owned and managed by ACRES, Inc. The majority of the woods are gently rolling uplands covered with a diverse mix of tree species, most notably, mature white oaks. Ely Run winds through the preserve and there is a narrow area of floodplain forest on each side of the creek. The preserve is not accessible to the public.

Rodenback Nature Preserve – This nature preserve consists of a total of 115 acres along both sides of Cedar Creek near Cedarville. It adjoins Vandolah Nature Preserve and is owned by the Fort Wayne Chapter Isaak Walton League of America. It consists of an original 45-acre tract and a recent 70-acre addition. The preserve features bottomland forest dominated by willow, cottonwood, and sycamore and upland and ravine forest dominated by oaks and hickories. The original 45-acre tract may be accessed by permission. The 70-acre addition is not accessible to the public.

Vandolah Nature Preserve – This preserve is located along Cedar Creek near the small communities of Cedar Canyon and Cedar Shores. It is upstream of Metea Park and Meno-Aki Nature Preserve at Cedarville, and adjoins the Izaak Walton League’s Rodenback Nature Preserve to the north. The preserve features high quality upland and floodplain forest communities, and a marsh frequented by many waterfowl species. A well-marked 2-mile trail winds through the preserve, offering scenic views of Cedar Creek’s spectacular ravine and bluff topography.

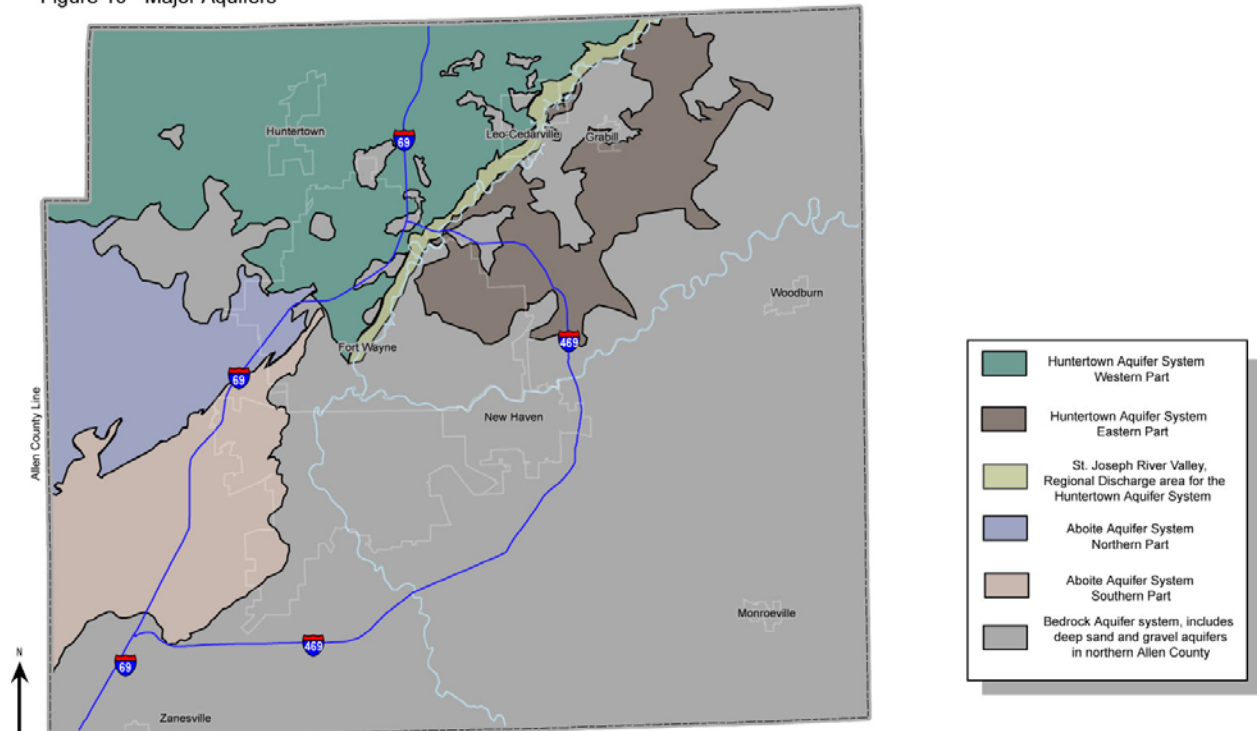
2.7 Water Resources

2.7.1 Ground Water Resources

2.7.1.1 Availability

Principal sources of groundwater in Allen County are the underlying limestone and dolomite bedrock, and near surface sand and gravel units present in glacial deposits. These productive zones (aquifers) are confined and isolated from one another by non-productive zones (confining units) of glacial till, ancestral lake deposits, and shale. **Figure 10** shows a map of the major aquifer systems in Allen County.

Figure 10 - Major Aquifers



Source: Adapted from "The Hydrogeology of Allen County", Anthony H. Fleming, Indiana Geological Survey and Indiana University, 1994

Bedrock Aquifer System - The bedrock underlying Allen County consists of limestone, dolomite, and shale formed during the Silurian and Devonian periods of the Paleozoic Era. Bedrock is entirely buried by glacial deposits across the county at depths ranging from 30 to more than 300 feet. Usable supplies of groundwater can generally be drawn from fractures and solution features in the limestone and dolomite bedrock throughout the county. Large diameter wells properly constructed in the bedrock commonly yield 100 to 500 gallons per minute (gpm), although yield rates vary widely depending upon the size and interconnectedness of the fractures or solution features tapped.

The bedrock aquifer system is particularly important in the south and east parts of the county (Tipton Till Plains and Maumee Lake Plain) where the scarcity of coarser glacial sand and gravel

deposits severely limits the availability of groundwater from near surface sources. In the northeast and north central parts of the county, Antrim Shale overlies the limestone and dolomite bedrock and also acts to limit productivity of the bedrock aquifer in this area. The presence of the Antrim Shale may also contribute to the high sulfur and mineral content characteristic of groundwater supplies in this area. However, groundwater is generally available from alternative near surface sources in this part of the county. The communities of Woodburn and Monroeville derive their water supply from the bedrock aquifer system.

Sand and Gravel Units - Glacial sand and gravel deposits generally provide usable near surface supplies of groundwater in the north and west parts of the county. Two principal sand and gravel aquifer systems may be distinguished – the *Huntertown Aquifer* system and the *Aboite Aquifer* system.

The *Huntertown Aquifer* provides groundwater across the north central and northwest part of the county. The extent of the Huntertown Aquifer corresponds almost precisely with the extent of the Huntertown Formation deposited by the Saginaw Lobe ice advance (See **Table 1** in the appendix). Basal outwash, ice-contact stratified and lacustrine deposits, delta fans, and river valley outwash deposits are the principal productive units in the Huntertown system. Groundwater flow is generally northwest to southeast along a gradient of 10 to 15 feet per mile. The St. Joseph River bisects the Huntertown Aquifer into two distinct parts and acts as a regional discharge zone for groundwater flows. The aquifer is thickest and most continuous west of the river where basal outwash and ice-contact stratified deposits predominate. East of the river, the principal productive units are lacustrine sands and fan deposits. These are thinner and interrupted frequently by ridges in the underlying Trafalgar Formation. Where the productive Huntertown units are draped over broader basins in the underlying Trafalgar Formation, they provide excellent yields, but overall, the eastern half of the Huntertown Aquifer system is less continuous and predictable than the western half. Generally speaking, groundwater availability in the Huntertown Aquifer system is the best in the county, particularly in the western part. It supplies the communities of Huntertown and Grabill, as well as churches, schools, individual domestic wells, and businesses.

The *Aboite Aquifer* system consists of a broad complex of sand and gravel units present in, overlying, and beneath the Trafalgar Formation in the west and southwest parts of the county. Two distinct parts – a northern and a southern part - may be recognized in this system. The northern part is characterized by thick sand and gravel outwash and channel deposits that are generally not connected to bedrock. The southern part contains numerous large buried meltwater and river channels that extend down to and are hydraulically connected to the underlying bedrock. The largest of these, the Wabash-Erie Channel, bisects the southern half of the aquifer and acts as the main discharge feature for the Aboite Aquifer system. Due to the connections to bedrock in the southern part of the aquifer, there is little difference in water surface elevations or flow direction between the sand and gravel units and the bedrock, so both are considered to function as a single aquifer unit. Aboite is the principal community served by this system, along with individual homes, institutions, and businesses.

2.7.1.2 Susceptibility to Contamination

The susceptibility of groundwater to contamination is determined by many factors. Chief among these are:

1. Material composition, sorting, and permeability of aquifer units
2. Degree of confinement and composition of confining units
3. Position in the groundwater flow pattern
4. Soil types
5. Surface and near-surface drainage patterns

Obviously, the presence of one or more potential sources of contaminants, the degree of exposure to groundwater, the nature and position of potential receptors, and the physical and chemical nature of contaminants themselves must also be considered in order to complete the picture of groundwater vulnerability for a given area or site location. However, the above listed factors are most influential in determining the inherent sensitivity of aquifer systems to contamination impacts.

Aquifer Composition and Permeability - The coarseness of aquifer materials and the degree to which they are sorted or stratified are principally responsible for determining permeability, a key factor in sensitivity to contamination. As a general statement, the finer and more uniformly sorted aquifer materials are, the better able they are to minimize or attenuate the adverse impacts of contamination. This is due in large part to the ability of finer-grained materials to physically retard contaminant migration, but also because they afford greater opportunities to react chemically with contaminants in ways that may reduce or neutralize their effects. Permeability is seldom uniform throughout aquifer units, so the particular distribution of materials of varying permeability is also important to consider. In general, the more heterogeneous this distribution, the more sensitive the aquifer, as junctures between differing types of deposits create pathways through which contaminants can migrate freely. Favorable distributions, such as layers of fine-grained materials deposited over coarser materials, may act to intercept and retard the migration of contaminants. At the level of individual sites, detailed subsurface investigations are necessary to definitively determine aquifer composition and permeability.

Confining Unit Characteristics - The degree to which aquifer units are confined by less permeable, non-productive units is also critical in gauging aquifer sensitivity. Confining units may overlie, underlie, interrupt, or border aquifer units, acting to limit the migration of contaminants vertically and/or horizontally, depending upon their position relative to the aquifer unit. The principal confining unit encountered in Allen County is the glacial till of the Lagro Formation, deposited during the last ice advance 15,000 to 12,000 years ago. The Lagro till comprises the top geologic stratum over three quarters of the county and ranges to thicknesses of 80 feet or more. Its matrix is rich in clay and only slowly permeable. However, vertical surface fractures are common throughout its surface plane, some extending to depths of 20 feet. These provide conduits for the downward migration of water and contaminants, somewhat compromising its overall protectiveness. At thicknesses greater than 20 feet, however, it provides excellent confinement for underlying aquifer units, most notably for important near surface sand and gravel units in the Hometown and Aboite systems.

Groundwater Flow Patterns - The relative position of aquifer units in local and regional groundwater flow patterns is also an important factor in determining sensitivity to contamination. Most contaminants that come into contact with groundwater will either become dissolved or mix with groundwater and migrate generally in the direction of the prevailing groundwater flow. A notable exception to this general pattern are dense, non-aqueous phase liquids (DNAPLs), essentially insoluble liquid compounds denser than water. This class of chemicals includes the common industrial solvents trichloroethylene (TCE) and perchloroethane (PCE), as well as heavy-end petroleum products such as creosote. Due to their greater density, DNAPLs tend to sink through groundwater and either pool on the first confining surface encountered, or migrate relatively independently of prevailing groundwater flows along subsurface slopes until they reach an outlet or other confining surface.

As a general statement, aquifers positioned in groundwater recharge areas, such as the Eel River Valley, are most vulnerable to contamination impact. Recharge areas are typically highly permeable areas in low landscape positions that receive and percolate water from precipitation, surface runoff, or flooding. These conditions act to accelerate the migration of contaminants relative to other positions along the flow path.

Aquifers positioned in groundwater discharge areas, such as in the St. Joseph River Valley and near other streams and rivers, may receive some buffering from the preferential horizontal or upward flow of groundwater toward the discharge point. However, discharge areas, like recharge areas, also tend to be areas of significant interaction with ground water where the water table is high.

Areas within the pumping zone of influence of high-capacity wells are also particularly vulnerable, as any water-borne contaminants will tend to be drawn toward the well at an accelerated rate. Virtually any natural groundwater flow pattern is vulnerable on a local scale to disruption, or even reversal, by high capacity wells. Due to the variability among and within aquifer units, detailed subsurface investigations are necessary to definitively determine local groundwater flow patterns at a given site.

Soil Types – Soil is very often the first environmental medium to be impacted by a contaminant release. Soil characteristics are very influential in determining whether, and at what rate, contaminants may migrate and impact groundwater supplies. Through physical, chemical, and biological processes, soils have the potential to intercept, retard, transform, or even neutralize contaminants. Conversely, they may in some cases act to concentrate and accelerate contaminant migration. Soil characteristics important to contaminant attenuation include permeability, soil structure, degree and duration of saturation, organic matter content, biological activity, chemical reactivity of soil minerals, and depth to the water table. As a general statement, well-drained soils abundant in clay and organic matter with greater depths to the water table are most effective at attenuating contaminants.

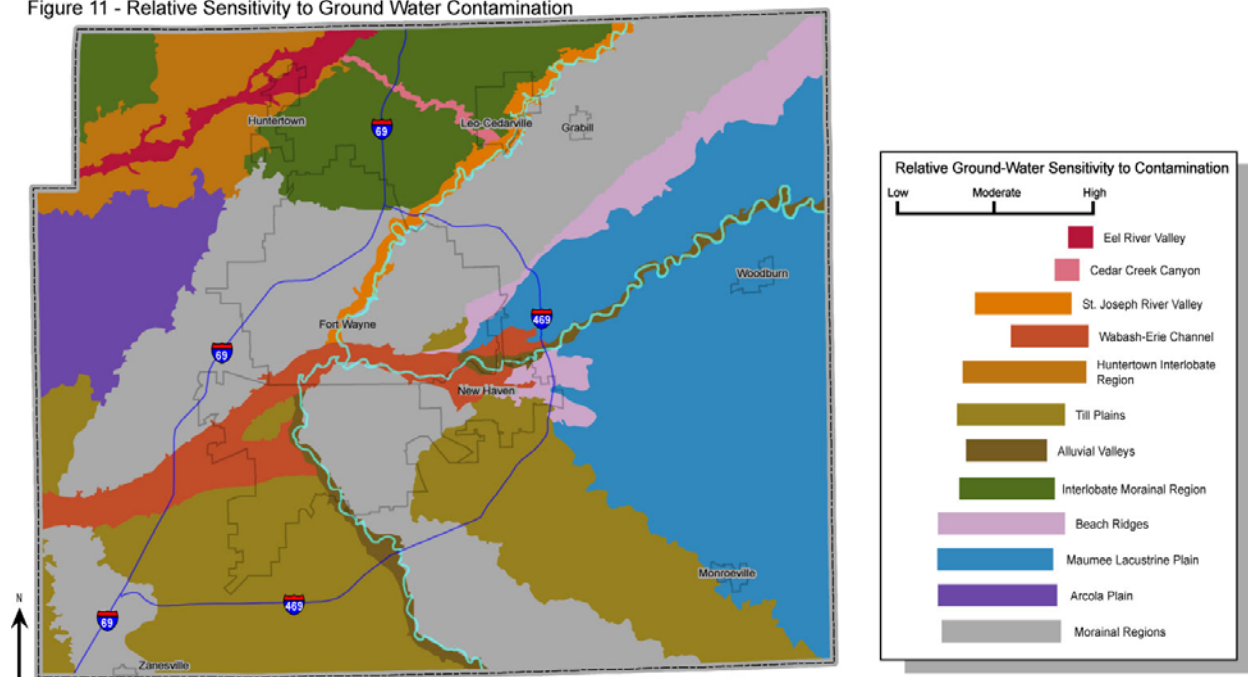
Poorly drained soils in areas with shallow depth to the water table are generally the poorest attenuators. However, there is abundant evidence that vegetated wetland systems, which are normally founded on poorly drained soils, have significant capacity to attenuate contaminants due to their high biological productivity. Where the water table is perched and does not provide

a direct conduit to underlying aquifers, wetlands can be beneficial in low areas and groundwater recharge zones. The tight structure and high clay content of till-derived soils that are prevalent throughout much of the county generally provide good attenuation potential where they are thick over underlying aquifers and occur on uplands. Where drainage is poor and the water table shallow, attenuation potential generally decreases from fair to very poor.

Surface and Near Surface Drainage Patterns - Surface and near surface drainage patterns influence how quickly and even whether a contaminant may reach groundwater. Well-drained sites tend to be higher in the landscape, steeply to moderately sloping, and higher above the water table. Contaminants released in a well-drained location may run off or be washed off overland toward a lower landscape position or to surface water before they get a chance to percolate downward through the soil to impact groundwater. Even if they do seep into soils, they are likely to be exposed to robust soil attenuation processes that may significantly reduce their adverse effects.

Conversely, poorly drained areas tend to be in level or depressional landscape positions, to receive runoff from surrounding slopes, and to be closer to the water table. Soil attenuation processes tend to be weaker due to saturation and lack of oxygen. The interrelationship between the shallow water table and underlying aquifers becomes the most influential factor in poorly drained areas. For example, fine-grained, poorly drained till soils subject to a perched water table (i.e. where the water table is isolated from the true underlying aquifer), may act to intercept contaminants and significantly retard their downward migration toward the true aquifer. If the water table actually represents the upper surface of the aquifer, or shares a sufficient connection with it, poorly drained positions are obviously among the most sensitive to contamination.

Figure 11 - Relative Sensitivity to Ground Water Contamination



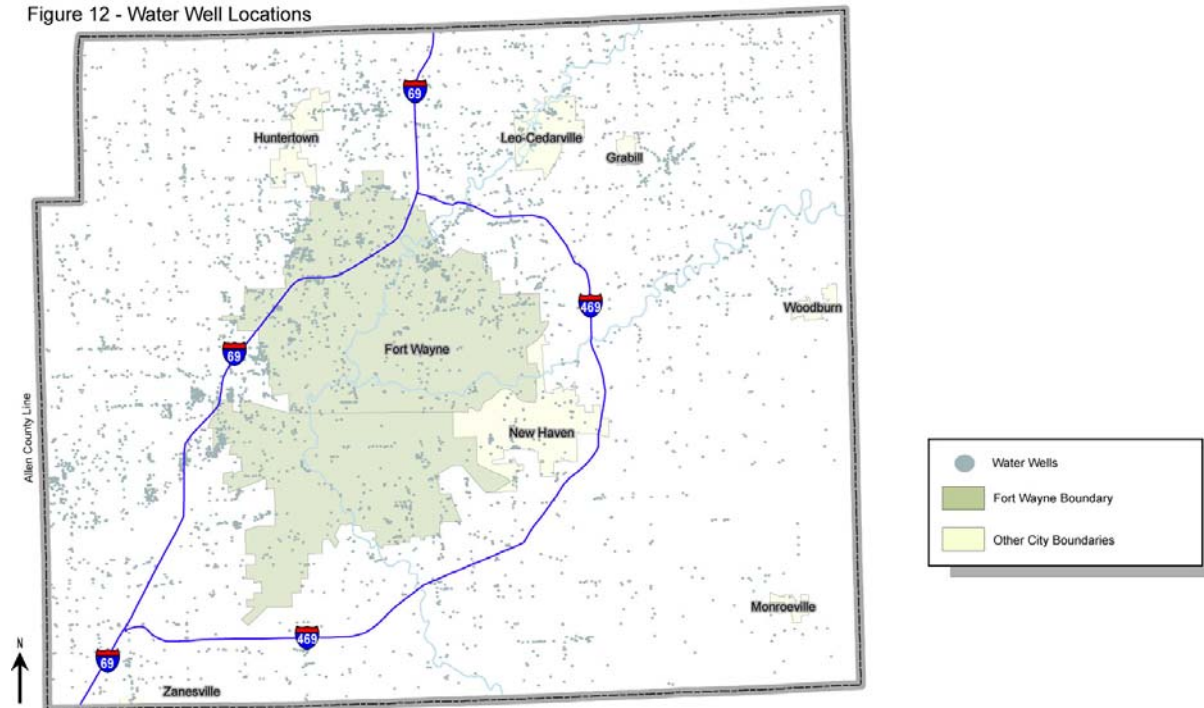
Source: Adapted from "The Hydrogeology of Allen County", Anthony H. Fleming, Indiana Geological Survey and Indiana University, 1994

Figure 11 shows the relative sensitivity of areas within Allen County to groundwater contamination.

2.7.1.3 Water Wells and Significant Withdrawals

There are over 10,000 water well records on file with the IDNR Division of Water for Allen County. Many of these wells are now inactive or abandoned. Water wells are present throughout the county, but as a general statement are most concentrated in the north and west parts of the county and sparsest in the southeast. **Figure 12** shows the distribution of water wells in Allen County as recorded in the *GIS Atlas for Indiana* (11).

Figure 12 - Water Well Locations



Source: "A GIS Atlas for Indiana", Indiana University, Indiana Department of Transportation, and Bernardin, Lochmuller & Associates, Inc.

Table 11 in the appendix lists the wells in the County that are registered with IDNR as "significant withdrawal" wells. Well and surface intake owners with a total capacity to withdraw 70 gallons per minute (gpm) or greater (or $\geq 100,000$ gallons per day) at a single location are required to register with IDNR and submit periodic updates regarding actual withdrawals. These are generally wells serving public water systems, wells used for irrigation at golf courses or plant nurseries, wells used in energy production, and industrial wells.

2.7.1.4 Public Water Systems Using Groundwater

The Indiana Department of Environmental Management (IDEM) regulates public water systems under the federal Safe Drinking Water Act and state rules of the Water Pollution Control Board (IAC 327 Article 8). A water system is considered "public" if it has 15 or more service

connections, or if it regularly serves an average of 25 individuals on a daily basis for at least 60 days in a year. There are two types of public water systems – **community systems** and **non-community systems**. Community systems serve year-round residents. Non-community systems serve nonresident populations. Noncommunity populations may serve “transient” populations, such as at rest stops, motels, or churches, or “nontransient” populations, such as at schools or workplaces.

There are currently 107 public water systems listed as active by IDEM in Allen County. Of these, 104 rely on groundwater sources. Most are small noncommunity systems serving individual churches, schools, restaurants, parks, golf courses, rest areas, and businesses. Community systems include municipal systems serving the communities of Aboite, Grabill, Roanoke, Huntertown, Harlan, Monroeville, and Woodburn, and private community systems serving several mobile home parks and other small residential systems.

Public water systems in Allen County relying principally on groundwater are listed in **Table 12** in the appendix.

2.7.1.5 Wellhead Protection Areas

A wellhead protection area is a designated zone around a drinking water well that is established to protect the well from contamination. It is intended to encompass, at minimum, the "active" zone of contribution to the well. Wellhead protection areas are typically defined on either a fixed radius or "time of travel" basis. The "time of travel" concept is based on the distance that one drop of water is predicted to move through an aquifer over a given period of time, usually expressed in years. IDEM uses either a minimum fixed radius of 3,000 ft around the well or a 5-year time of travel to define wellhead protection areas, depending upon the size and capacity of the system.

Wellhead protection requirements come from the Safe Drinking Water Act, which mandates states to develop state Wellhead Protection Programs. Indiana's Wellhead Protection Program rules (327 IAC 8-4.1) requires all community public water systems relying on groundwater to define a Wellhead Protection Area, identify potential sources of contamination within the Wellhead Protection Area, and develop a Wellhead Protection Plan. In addition, there are state-level restrictions on certain activities such as new landfills, underground storage tanks, and hazardous materials storage areas that are located within wellhead protection areas.

Table 13 in the appendix lists the water systems in Allen County with Wellhead Protection Programs.

2.7.2 Surface Waters and Water Quality

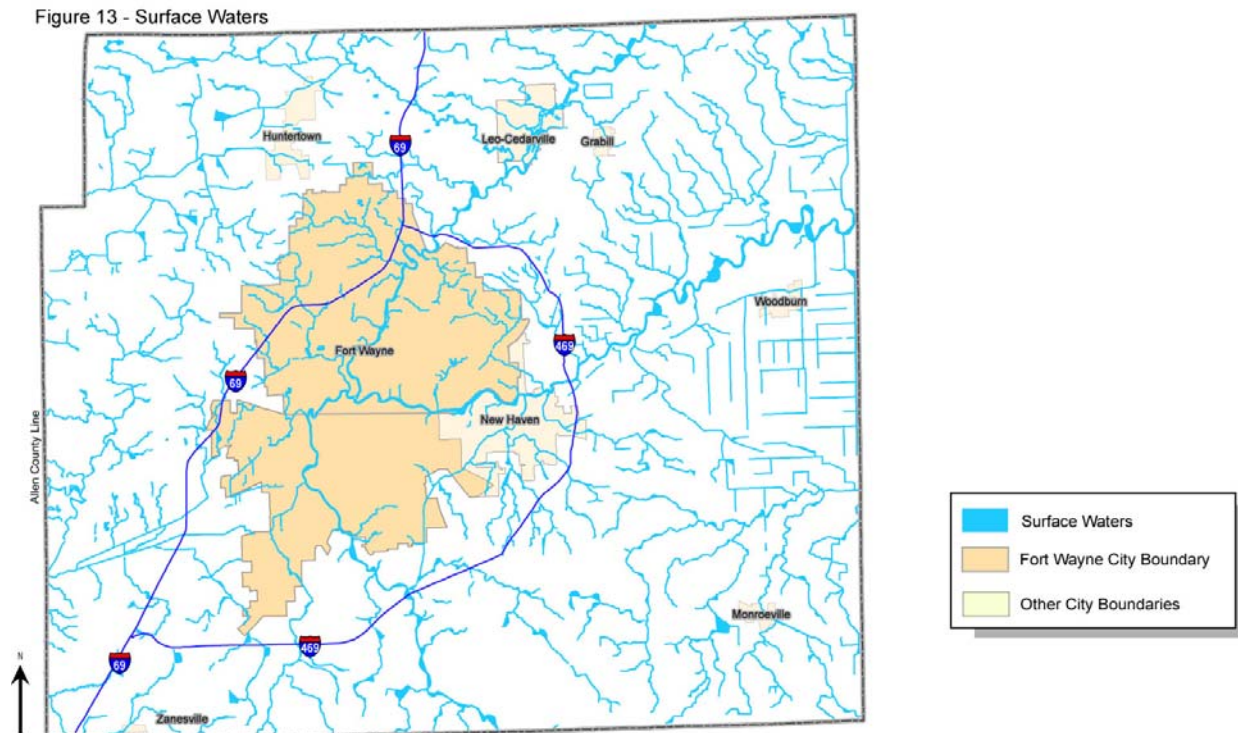
2.7.2.1 Lakes, Rivers, and Streams

Allen County spans the drainage divide between waters flowing east toward Lake Erie and those flowing west toward the Mississippi River. This divide runs roughly north/south through the western portion of the county. The Eel River, Seegar Ditch, Aboite Creek, Robinson Creek,

Little River (or Little Wabash River), and Eightmile Creek are the principal streams in the western part of the county that flow to the Mississippi. In the eastern two-thirds of the county, the St. Joseph, St. Mary's, and Maumee Rivers, and Flatrock Creek are the principal streams draining to Lake Erie. Cedar Creek, a principal tributary of the St. Joseph River, runs across the north/central part of the county and joins the St. Joseph just below Leo-Cedarville.

Principal lakes in the County include Cedarville Reservoir on the St. Joseph River at Leo-Cedarville, nearby Hurshtown Reservoir, and Lake Everett near Levert on the western edge of county. Smaller named lakes include White Lake, northwest of Huntertown, Covington Lake in Aboite, Mirror Lake at St. Francis College, and Viberg Lake near the north county line above Leo.

Figure 13 shows the principal lakes, rivers, and streams in Allen County.



Source: "A GIS Atlas for Indiana", Indiana University, Indiana Department of Transportation, and Bernardin, Lochmuller and Associates, Inc.

The St. Joseph and St. Mary's Rivers come together in downtown Fort Wayne to form the Maumee River, which then flows northeast toward Lake Erie. This junction of three rivers is a defining feature in the City's landscape today, and in the region's history. Historically, the confluence drew Native Americans and was the site of Kekionga, the principal city of the Miami Nation. The "Three Rivers" confluence represented a strategic location offering short portage between the Great Lakes and Mississippi River basins, making it attractive to early European explorers, traders, and armies as well. The French first established a series of forts in the area and traded with the Miami and other Native American Nations. The confluence lands were next occupied by the British, which won control of the territory after the French and Indian War. In

1763 "Fort Miami" was retaken by an alliance of Native American Natives under Chief Pontiac, and returned to Miami control for a period of perhaps 30 years. In 1794, General Anthony Wayne of the new American Army captured Fort Miami from the Miamis and built Fort Wayne, for which the City is named. Today, the "Three Rivers" confluence is the focus of a River Greenway trail system and a River Greenway Overlay District, which seeks to promote, recreational, aesthetic, environmental, and flood control values of the area through project review by a special Planning Commission Committee.

Many of the County's streams have historically been channelized or otherwise modified to improve drainage. Allen County has over 2,500 miles of Regulated Drains, which are governed by the Indiana Drainage Code (IC 36-9-27). Requirements of the Indiana Drainage Code are administered primarily by County Drainage Boards. In Allen County, the Drainage Board is housed in the County Surveyors Office.

2.7.2.2 Outstanding Waters

IDNR's Division of Outdoor Recreation has compiled a list of water bodies within the state that exhibit "outstanding" ecological, recreational, cultural and/or aesthetic values. Two waterways are listed as "Outstanding Waters" in Allen County - Cedar Creek, and the Little River.

Cedar Creek is designated as a State Scenic River from County Road 68 in Dekalb County to its confluence with the St. Joseph River at Leo-Cedarville. It is also designated an "Outstanding Resource Water" for water quality purposes, and identified under IDNR's Natural Heritage Program as an exceptional ecological resource.

Little River is listed based on its inclusion in the Wabash Heritage Corridor. The Wabash Heritage Corridor is a state-legislated program dedicated to preserving, enhancing, and promoting the significant historic, scenic, and natural values of the Wabash River. The program is administered by the Wabash Heritage Corridor Commission and IDNR. In addition to direct promotional activities of its own, the Commission oversees a grant fund that provides funding reimbursements to local governments and nonprofit organizations for land acquisition and construction or renovation of recreational facilities and trails in the Corridor.

2.7.2.3 Public Water Systems Using Surface Water

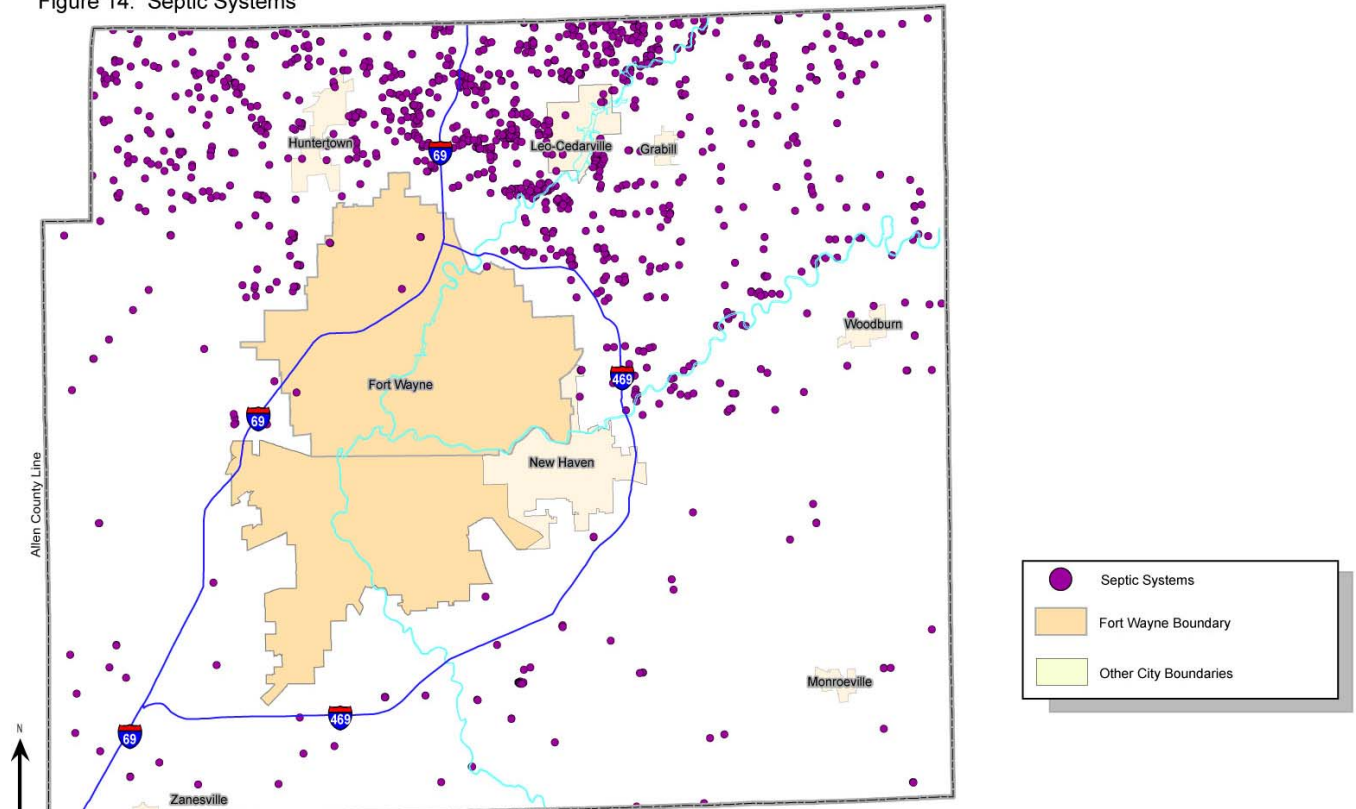
As can be seen from *Table 12* in the appendix, most public water systems in Allen County rely on groundwater for source water. However, the County's largest public water system, serving the City of Fort Wayne, relies on surface water drawn from the St. Joseph River. The City of New Haven and Sunnymede Community Water Association also rely on surface water purchased from the City of Fort Wayne. Additional information regarding the City of Fort Wayne drinking water supply system may be found in the Utilities Existing Conditions report.

2.7.2.4 Septic Systems

As can be seen from *Table 14* in the appendix, most soil types in Allen County pose severe limitations to the siting of conventional residential septic systems that rely on gravity and

traditional leach fields to distribute and dispose of effluent. Slow permeability and high water table are the most common limitations. Too rapid percolation can also be a problem in highly permeable or steep soils, as it may allow effluent to seep too far into the soil, beyond the reach of beneficial aerobic bacteria. Increased leach field size and alternative designs, such as mound systems, sand or gravel filter systems, or wetland-based systems can be employed to overcome soil limitations. However, alternative designs are generally more expensive to install or construct, require specialized design experience, may be unfamiliar and therefore not explicitly allowed by local codes, and typically require periodic equipment maintenance or replacement. **Figure 14** illustrates the location of Septic systems throughout Allen County.

Figure 14: Septic Systems



Source: Fort Wayne / Allen County Department of Health

Septic systems in poorly suited soils generally fail because the saturated soil conditions favor *Escherichia coli* (*E. Coli*) and other pathogens in sewage, which tend to be *anaerobic*. Under normal, moist soil conditions, beneficial *aerobic* bacteria break down organic matter and keep pathogens in check. Under saturated conditions, organic matter fails to break down, clogging pipes and trenches, and undesirable pathogens multiply. At low densities, these problems typically remain localized, however, failing septic systems that discharge to or are located too close to stream courses or other conduits may spread bacterial contamination beyond the source property.

E.coli levels exceeding water quality standards have been detected in Cedar Creek, the St. Joseph River, St. Mary's River, St. Joseph and Cedarville Reservoirs, and Willow Creek in Allen County (see **Table 17** in the appendix). Sources of *E.coli* may be animal or human, and definitively distinguishing among sources is difficult. Failing septic systems can be a contributing cause of

contaminated waterways and wells, but other common causes of high pathogen levels in surface waters include sewer infiltration and overflows, insufficient treatment at municipal sewage treatment plants, and waterfowl or livestock concentrations. Higher density residential areas not served by sewers are the most vulnerable to significant off lot impacts and contamination of water sources.

2.7.2.5 NPDES Permitted Facilities

The National Pollutant Discharge Elimination System (NPDES) program is a federal program which controls discharges of pollutants from definable "point sources" (e.g. pipes, culverts) through permits which restrict the level of pollutants which may be discharged directly to a river, stream, or other "waters of the U.S. Facilities that discharge indirectly via public sewers are regulated under "pretreatment" programs implemented by municipal sewage treatment plants (STPs).

A general distinction is made in the NPDES program between process discharges from industrial and sewage treatment plants, and storm water discharges that may be contaminated. Standard NPDES permits for process dischargers typically have numeric limits stated for concentrations and loadings of the pollutants of concern for that particular source. The storm water side of the NPDES permit program typically utilizes broadly written "general" permits which call for preparation of a storm water management plan and employment of "Best Management Practices" (BMPs) to minimize the potential for storm water to become polluted, but do not impose numeric limits. General permits have also been established for other routine types of discharges, such as cooling water, groundwater remediation, and quarry settling basin discharges.

U.S. EPA recently implemented "Phase 2" of its NPDES storm water program, which focuses on small municipal storm sewer systems serving populations less than 100, 000, and smaller construction activities (1 to 5 acres). Phase 1 of the storm water program focused on industrial sources, including large construction sites (> 5 acres), and larger municipal storm sewer systems. Issues related to storm sewers and storm water management in the County are further addressed in the Utilities Existing Conditions report.

IDEM's Office of Water Quality is responsible for issuing and administering NPDES permits in Allen County and statewide. *Table 15* in the appendix lists active NPDES permit holders in Allen County.

2.7.2.6 Impaired Stream Segments

IDEM's Office of Water Quality is responsible for assessing and maintaining water quality in the State of Indiana. The Total Maximum Daily Load (TMDL) program was established by the federal Clean Water Act to identify "impaired" stream segments and other water bodies which are failing, or are in danger of failing, to meet their designated water quality uses and associated water quality standards. Simply put, a TMDL is an expression, usually numeric, of the amount of a given pollutant that a stream segment can assimilate on a daily basis and still support the water quality uses and water quality standards assigned to it.

The TMDL program has evolved in recent years from a relatively simplistic summing of all loadings allocated to NPDES permit holders on the affected reach, to a more complex watershed-based approach. The outcome of today's TMDL process is, for all intents and purposes, a watershed management plan for the affected segment and its surrounding drainage area, including strategies to control pollution from diffuse, otherwise non-regulated "nonpoint" sources.

Waterways classified as "Category 5A" and "Category 5B" in IDEM's water quality assessment hierarchy require TMDLs to be developed. IDEM has prioritized and developed a schedule for developing TMDLs, which it publishes in its latest *Integrated Water Quality Assessment Report*. The *2004 Integrated Water Quality Assessment Report* (8) was submitted to U.S. EPA in April 2004.

Table 16 in the appendix lists the water bodies in Allen County that are identified as "impaired" and requiring TMDLs according to IDEM's 2004 TMDL list (also known as the "303 [d]" list). A TMDL Assessment document has been completed for *E.coli* loadings in Cedar Creek.

2.7.2.7 Watershed Groups and Initiatives

Cedar Creek, the *St. Joseph River*, and the *Little River* are represented by watershed groups or citizen groups with a watershed focus.

The Cedar Creek Wildlife Project, Inc. is a non-profit group of landowners in the Cedar Creek watershed. Organized in 1965, the Cedar Creek Wildlife Project promotes water quality, preservation, and wildlife habitat objectives in the Cedar Creek watershed.

The St. Joseph River Watershed Initiative (SJRWI) was organized in 1998, and conducts water quality monitoring, education, conservation, source water protection, and watershed planning activities in the watershed. Membership includes citizens, local soil and water conservation districts, the business community, local government officials, conservation organizations, and the academic community. The St. Joseph River Watershed Initiative has prepared a Watershed Management Plan for the St. Joseph watershed-at-large, as well as a subwatershed plan for Cedar Creek, its principal tributary.

The Little River is represented by the Wabash Heritage Corridor Commission as a tributary to the Wabash, and by the Little River Wetlands Project, Inc (LRWP). Although the focus of the Little River Wetlands Project is acquisition and restoration of the wetlands historically present in the watershed, the group also promotes the rich cultural history and ecological values of this small, but historically significant watershed.

2.8 Wetlands

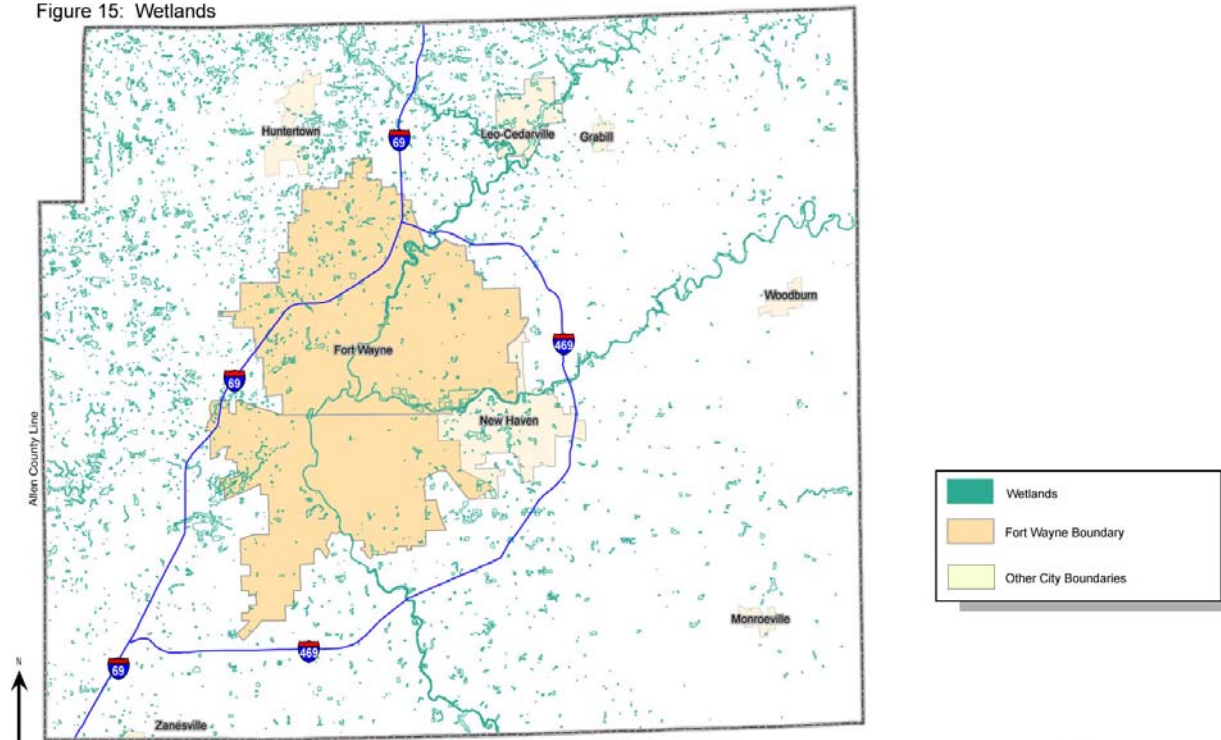
Wetlands are areas that are flooded, ponded, or saturated often enough and for sufficient duration during the growing season to support hydrophytic vegetation - defined as vegetation adapted for growth in saturated soil conditions. Historically considered of little value, wetlands have come to be recognized as areas affording exceptional ecological and water quality values, including

flood and storm flow attenuation, water quality improvement, groundwater discharge and recharge, and wildlife habitat. Wetlands are particularly important to amphibians, migratory birds, and as nursery areas for many fish and shellfish species. Most of Indiana's historical wetlands have been drained and converted to agriculture or developed uses. Because wetland habitats themselves are increasingly rare, many of the species dependent upon them are now considered threatened or endangered.

Wetlands are of importance to planners for the resource values they afford, and also because they are regulated as "waters of the U.S." under Section 404 of the Clean Water Act. Section 404 requires a federal permit before placement of any fill material in "waters of the U.S.", including wetlands. Because of their exceptional values, wetlands are classified as "special aquatic sites" under the Section 404 program, and are subject to more stringent review. In most states, including Indiana, the Section 404 program is administered by the U.S. Army Corps of Engineers. Because the Section 404 permit is a federal permit, States are afforded an opportunity to approve, condition, or even deny Section 404 permit decisions through issuance of a State Water Quality Certification under Section 401 of the Clean Water Act. IDEM's Office of Water Quality administers the Section 401 program in Indiana.

Wetlands that are determined by the U.S. Army Corps of Engineers not to be "waters of the U.S." because they are *isolated* from the national network of streams and rivers are regulated at the state level under a new State Regulated Wetlands program, also administered by IDEM's Office of Water quality (IC 13-18-22). Currently, no additional wetlands ordinances or other regulatory restrictions are applied by Allen County or the City of Fort Wayne beyond the scope of these existing federal and state programs.

Figure 15: Wetlands



Source: National Wetlands Inventory, U. S. Fish & Wildlife Service

The U.S. Fish and Wildlife Service has developed National Wetland Inventory (NWI) maps from analysis of high-altitude aerial photography. NWI maps may be used as a starting point for identifying wetlands for broad scale planning. NWI maps also identify deepwater habitats such as streams, rivers, lakes, and ponds.

NWI maps are presented at the same scale as U. S. Geologic Survey 7.5 minute topographic quadrangle maps (1:24,000) and generally do not pick up wetland areas smaller than one to three acres. Narrow wetlands in stream corridors, at the edges of ponds and small lakes, and forested wetlands obscured by dense canopy cover also tend to be underestimated due to the scale and limitations of the photo interpretive methods used to produce NWI maps. It is also important to keep in mind that NWI maps represent only a "snapshot" limited to the period in time the photography was taken, typically spring, and are generally not revised at intervals less than 10 years. However, as a general statement, NWI maps provide an effective screening tool for identifying areas where wetland conditions are likely to be present and to persist in the absence of hydrologic modifications. Most of Indiana's NWI maps are based on photography taken in the spring or fall between 1980 and 1987.

Figure 15 shows forested, emergent, and shrub/scrub wetlands in Allen County, as mapped in the NWI.

2.9 Riparian Corridors

Riparian corridors are the landward zones adjacent to, and influenced by, the channels of flowing streams and rivers. Their interaction with the hydrology of the stream or river and its aquatic environment gives them a distinct character from surrounding uplands, and, like most "ecotones" or transitional areas, endows them with exceptional biodiversity and high ecological values. Ecological benefits of a mature, intact, functional riparian corridor include:

- Provides shade to cool average water temperatures and buffer temperature fluctuations in the stream
- Stabilizes stream banks and moderate channel adjustments
- Slows velocity and intercepts peak runoff flows
- Attenuates flood flows
- "Captures" excess sediment, nutrients and other contaminants in runoff
- Provides organic matter used for food and cover by aquatic organisms
- Buffers channels and aquatic life from surrounding disturbances
- Provides diverse habitat and migration corridors valuable to a wide range of wildlife species

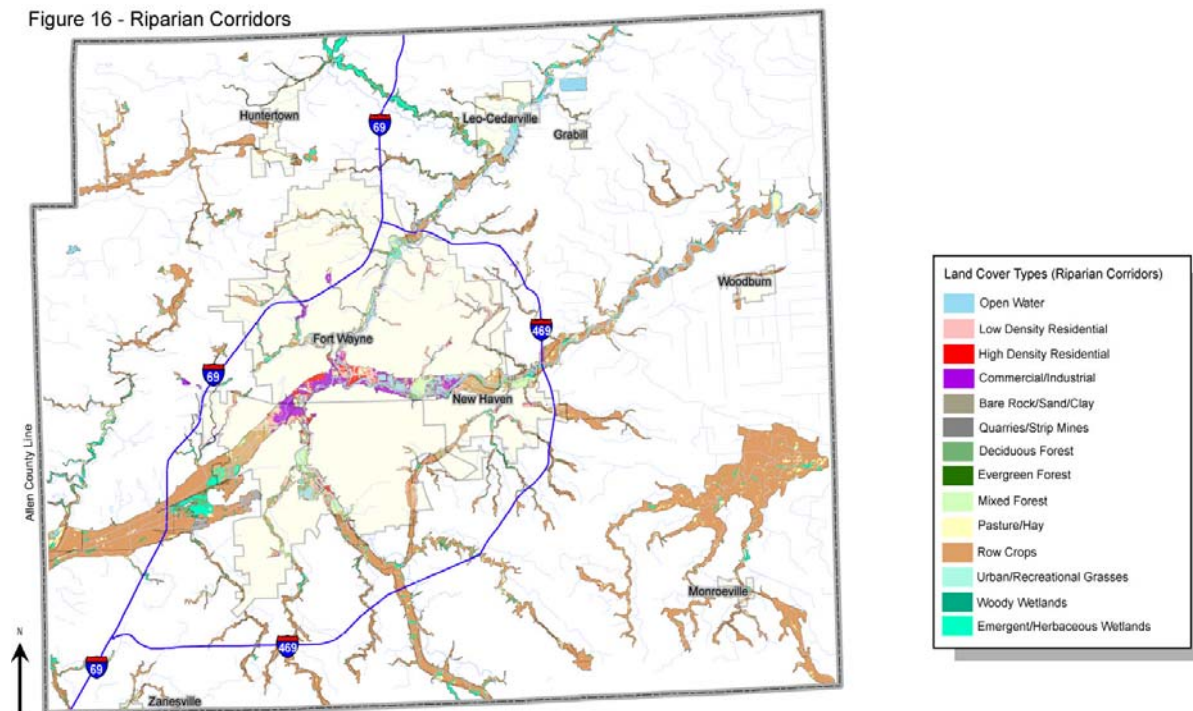
In addition to their many ecological benefits, functional riparian corridors also provide scenic, aesthetic, recreational, water quality, and flood protection benefits to human communities. Stream channels bordered by continuous riparian corridors conserved in a natural state contribute much to channel stability and water quality, thus mitigating many of the adverse impacts of flooding, bank erosion, channel downcutting, lateral erosion, sedimentation and water pollution..

This juncture of ecological and human values has made riparian corridors a particular focus of current environmental stewardship efforts both nationwide and globally.

There is no generally agreed upon method for defining what constitutes a "riparian corridor". Methods range from arbitrary "50-foot" or "100-foot" setbacks measured relative to the channel bank, to complex geomorphological definitions that encompass adjacent floodplains, terraces, and upland slopes. Although definition of an arbitrary, limited corridor is certainly preferable to defining no protected or buffer zone adjacent to streams, ideally, riparian corridors should be defined on a functional basis, and encompass all the lands influenced by and interacting with the stream channel. These include the geomorphic floodplain (i.e. the historic floodplain within which the stream has meandered over time) and adjacent transitional uplands, as well as the stream channel and presently active floodplain.

In relatively undisturbed riparian zones, changes in the character of vegetation can be a guide to the functional limits of riparian corridors. Riparian corridors generally develop distinct plant communities different from surrounding uplands. In disturbed and highly modified riparian zones, vegetation may be lacking or even absent, and original geomorphological relationships may be obscured. Analysis of historic aerial photographs, maps, soil surveys, and other literature may offer clues as to the original corridor extent and condition.

Figure 16 - Riparian Corridors



Source: "A GIS Atlas for Indiana", Indiana University, Indiana Department of Transportation, and Bernardin, Lochmuller and Associates, Inc.

Figure 16 shows the principal riparian corridors in Allen County. For purposes of this report, riparian corridors are defined to include the 100-year floodplain of major streams, and a 120-foot width adjacent to smaller streams.

The City of Fort Wayne has adopted a River Greenway Overlay District (RGO) as part of the City's Zoning Code. The RGO encompasses FEMA-designated floodway zones, plus an additional 100 feet, along the City's three principal rivers - the St Joseph, St. Mary's, and Maumee. The Overlay District is administered by a separate River Greenway Committee of the Planning Commission. The Committee reviews proposed projects in the RGO for conformance to RGO objectives. The RGO promotes scenic, flood control, recreation, and compatible economic development objectives in addition to ecological health. Approximately 17 miles of pedestrian and bike trails have been constructed to date in the RGO, and future expansions are proposed. The City Board of Park Commissioners has prepared a Rivergreenway Plan to guide future planning efforts. The Greenway Consortium, a citizen's group founded in the 1980's, has also been active in river greenway planning efforts.

2.10 Other Natural Corridors

The "greenway" concept can also be applied to other, manmade corridors as an effective mechanism for increasing protected natural areas in an ecologically meaningful way. Continuous corridors are preferable to fragmented preservation efforts because they allow animals to move freely from place to place in search of food, shelter, and breeding habitats, which may all exist in different habitat types. Plants are able to colonize more effectively over a continuous area than widely separated ones. Many bird species also tend to follow and inhabit linear corridors during seasonal migrations.

Rail and utility corridors generally offer the highest potential as greenways because they tend to be separated from traffic, are typically continuous over significant distances, are controlled by a single or limited number of entities, and typically already include "buffer" space for safety and compatibility with surrounding land uses.

Like riparian corridors and greenways, rail and utility corridors also lend themselves to co-use as bicycle and pedestrian trails, and recreational use. Potential benefits to rail and utility companies from participation in "greenway" efforts include enhanced public image, assistance from local governments and citizen groups in securing and maintaining easements, and a share in the economic development benefits shown to be spurred by successful greenway development.

Recent incarnations of the Intermodal Surface Transportation Efficiency Act (ISTEA), the principal federal transportation funding act, explicitly provide support for establishment of greenway trails along railway corridors. Successful examples of greenway partnerships with pipeline, electric, and telecommunications utilities exist in Indianapolis, Michigan City, and elsewhere nationwide. Additional information regarding the development of greenway trails in Allen County may be found in the Transportation Existing Conditions report.

2.11 Floodplains and Floodplain Management

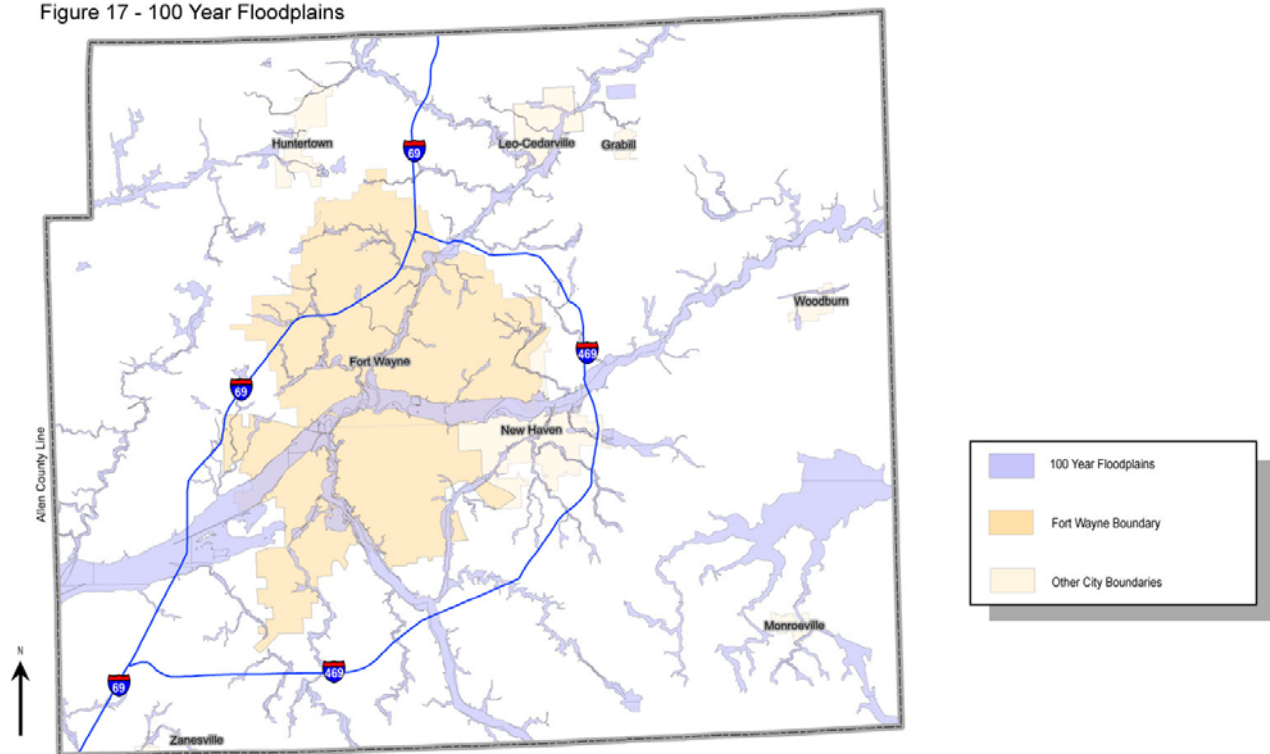
Floodplains are areas adjacent to streams and rivers subject to inundation at flow stages that exceed the capacity of the stream or river channel. For human planning purposes they are generally described in terms of the probability, or recurrence interval, associated with floodwaters reaching a particular elevation. For example, the "100-year floodplain" is defined as

the predicted elevation that water from a storm event with a 1 in 100 (1 percent) chance of occurring in any given year would reach if that "100-year" storm event did indeed occur.

The 100-year floodplain is, by convention, the most commonly defined flood interval used for human planning purposes. It is used by the Federal Emergency Management Agency (FEMA) as the basis for the National Flood Insurance Program (NIFP) and production of Flood Insurance Rate Map (FIRM) panels. Within the 100-year floodplain, a *floodway* and *floodway fringe* are generally recognized. The floodway may be thought of as the "active" part of the floodplain that actually conveys the floodwaters. The floodway fringe is the remaining area within the floodplain that is subject to inundation by standing or slack water, but is not actively involved in flood conveyance.

It is worth noting that floodplain areas associated with more frequent events are receiving increased attention for their importance in maintaining stream stability and ecological health. For example, observations of natural stream systems indicate that storm events with a recurrence interval of somewhere between 1 to 2-years (i.e. with a 100 to 50 percent chance of occurring in a given year) are principally responsible for maintaining stable stream form, and that a 50-year recurrence interval (2 percent chance) is associated with the degree of entrenchment a stream channel exhibits in relation to its floodplain. Unfortunately, modeling and mapping of these more frequent floodplain zones is as yet in its infancy. Currently, they are primarily being defined by researchers in the field of fluvial geomorphology, based on detailed stream measurements.

Figure 17 - 100 Year Floodplains



Source: Allen County iMap Database, 2004

The principal authorities with roles in floodplain management in Allen County are FEMA, IDNR, the Natural Resources Commission, the Maumee River Basin Commission, Allen County, and the City of Fort Wayne. Allen County and the City of Fort Wayne both have conventional floodplain management ordinances that incorporate minimum IDNR and FEMA requirements. As discussed in Section 2.9, the City of Fort Wayne has also established the RGO District along the St. Mary, St. Joseph, and Maumee Rivers, in part to promote flood control improvement. The Maumee River Basin Commission is a regional organization that promotes flood control, soil and water conservation, and water quality improvement objectives within the Maumee River watershed. The Maumee River Basin Commission has developed a Flood Control Master Plan for the Basin and provides financial assistance for stream obstruction removal and floodplain buyouts.

The City of Fort Wayne has historically been subject to flooding. Since a major flood struck the downtown area in 1982, many structural improvements have been made to mitigate flooding in the City. A flood dike system now helps protect much of the city. The city also has a state-of-the-art flood monitoring system that provides real-time rainfall and stream level information throughout the Fort Wayne area. Over the past several years, The City has worked with the Maumee River Basin Commission to remove businesses and residences from the flood plain through buyouts. The development of Headwaters Park near the City/County Building downtown provides a supplemental catch basin for periodic floodwaters.

The Association of State Floodplain Managers (ASFPM), of which Indiana is a member, has recently launched a "No Adverse Impact" (NAI) initiative, which promotes a more holistic approach to floodplain management. The NAI initiative is organized around the principle that the actions of one property owner should not adversely impact other property owners from a flooding standpoint. The NAI initiative promotes planning tools and approaches that improve upon the conventional "piecemeal" approach to floodplain regulation, which generally consists of permitting or licensing projects on a property-specific basis. The Maumee River Basin Commission is in the process of developing a basin wide NAI program.

Examples of measures which might be undertaken by municipalities consistent with an NAI approach to floodplain management include, but are certainly not limited to, improved floodplain mapping, cumulative tracking of floodplain impacts, stream setbacks, "greenway" ordinances such as the RGO, incorporating "green infrastructure" into site development plans, adoption of a Certified Floodplain Manager program, and establishing more stringent requirements for expansions or improvements to existing buildings in flood prone areas.

2.12 Air Quality

2.12.1 General

Historically, air quality in Allen County has been in attainment with national standards. A review of available U.S. EPA and IDEM compliance data also shows a generally low incidence of air violations at individual industrial facilities in the County. Only one facility in Allen County, the General Motors Assembly Plant in Fort Wayne, appears on IDEM's most recent state list of "Top 95% Emitters" with a rank of 69 out of a total of 82 facilities in terms of total

reported emissions. The "Top 95% Emitters" list is compiled based on periodic emissions reports that are required to be filed with IDEM and is not a record of emissions violations.

Despite Allen County's generally compliant history, recent changes to the federal ambient air standard for ground-level ozone have resulted in a "nonattainment" designation for the county, effective June 15, 2004. The nonattainment designation has implications for transportation planning, and for permitting of "major" new industrial sources or expansions. Background and implications of the ozone nonattainment designation are discussed in greater detail below.

2.12.2 Ozone Nonattainment Designation

U.S. EPA has established National Ambient Air Quality Standards (NAAQS) for six common air pollutants, referred to as the "criteria air pollutants. These are:

- carbon monoxide (CO)
- nitrogen dioxide (NO₂)
- ozone (O₃)
- lead (Pb)
- particulate matter (PM₁₀)
- sulfur dioxide (SO₂)

Compliance with NAAQS is assessed through ambient air monitoring and analysis of emission inventories. There are four ambient air monitors located in Allen County as shown in *Table 17* below. These air monitors are operated by IDEM and typically collect samples from the surrounding air on an hourly basis.

Emission inventories are also used to monitor NAAQS compliance. Emission inventories are compiled from reports of estimated emissions required to be submitted by certain facilities under Indiana's Emissions Reporting Rule (326 IAC 2-6). The rule generally requires facilities emitting criteria pollutants to submit emissions data on a triennial or annual basis, depending upon location, emissions potential, and other factors.

NAAQS compliance is a complicated matter to evaluate. NAAQS are generally expressed as a certain concentration in the ambient air that cannot be exceeded more than a given number of times during a specified averaging period. For example, an area is considered to be in compliance with the currently prevailing 1-hour ozone NAAQS if, based on a 3-year average, the standard of 0.125 ppm is not exceeded more than once in a three year period. NAAQS compliance is evaluated by IDEM and U.S. EPA, usually on a county-by-county basis. Since problems with attainment of NAAQS normally occur in urbanized areas, Metropolitan Statistical Areas (MSAs) are also used by U.S. EPA to define nonattainment area boundaries. MSA boundaries may cross county or even state lines, creating the need for regional cooperation and remedial strategies.

As mentioned above, Allen County has historically been in compliance with all NAAQS, including those for ozone. However, in 1997, U. S. EPA adopted a lower, 8-hour standard for ozone of 0.085 ppm to replace the 1-hour standard of 0.125 ppm. Compliance with the 8-hour standard is evaluated based on averaging together the 4th highest daily maximum 8-hour averages for each year over a 3-year period. If any 3-year average of these 4th highest values exceeds the 0.085 ppm standard, the area is considered to be in nonattainment.

The Leo High School monitor had a 4th highest 8-hour average of 0.088 ppm for ozone over the 2000-2003 and 2001 to 2003 periods, resulting in an ozone nonattainment designation for the Fort Wayne MSA, including all of Allen County. Final 8-hour ozone nonattainment designations were announced by US EPA on April 15th, 2004 and officially became effective June 15th, 2004.

As U.S. EPA has not yet fully implemented all aspects of the new 8-hour ozone standard, it is still unclear what the precise implications of the new nonattainment designation will be. Allen County is currently classified as a “basic” ozone nonattainment area, the least severe category.

At present it seems likely that, at minimum, IDEM will have to apply more stringent permitting and control requirements to larger industrial sources of ozone precursors (i.e. NOx and VOCs) in Allen County, and that transportation conformity requirements will apply. Transportation conformity mandates certain coordination activities between transportation planners and air pollution control agencies, and requires planners to demonstrate that proposed transportation projects will stay within certain emission “budgets” for mobile sources. Transportation conformity implications of the new ozone nonattainment designation are further discussed in the Transportation section.

The current schedule calls for IDEM to submit a plan spelling out these requirements by 2007, and for Allen County to achieve compliance with the new ozone standard by 2009. Related rules imposing limitations on NOx emissions from power plants (NOx SIP Call Rules) are also expected to help remedy the ozone nonattainment problem. Emissions of VOCs from vehicles and industrial sources are the other principal sources of ozone nonattainment.

2.12.3 Permitted Facilities

IDEM's Office of Air Quality (OAQ) is the principal agency responsible for issuing and administering air pollution control permits in Allen County. *Table 18* in the appendix lists the Allen County facilities currently recorded in OAQ's permit tracking database. These generally include the county's larger industrial facilities, however, minor sources and sources with only registered or exempt equipment also appear in the database. Most facilities in the database are located in the City of Fort Wayne; however, significant industrial sources are also located in Grabill, Woodburn, Roanoke, and New Haven.

2.13 Brownfields

"Brownfields" is a term used to describe underutilized or abandoned properties, usually located in urban infill areas, which were formerly used for commercial or industrial purposes and have the potential to be redeveloped, but are complicated by the presence or perceived presence of environmental contamination. Highly contaminated sites, such as those on the federal Superfund list are generally not considered brownfields. The goal of brownfields redevelopment programs is to facilitate clean up and redevelopment of properties with relatively low levels of common industrial contaminants such as petroleum, solvents, and metals.

The principal brownfields program is U.S. EPA's ***Brownfields Economic Redevelopment Initiative***, which provides grants to state and local government entities for eligible brownfields cleanups and programs. IDEM's Office of Land Quality (IDEM/OLQ) has used a federal Brownfields program grant to capitalize a state ***Brownfields Cleanup Revolving Loan Fund*** program, which provides low-interest loans for brownfields cleanup. In addition, the Indiana legislature established the ***Environmental Remediation Revolving Loan Fund***, which similarly provides low-interest loans and grants to local communities for brownfields cleanups. Federal and state tax credits are also available for brownfields redevelopment. Brownfields funding is administered by the Indiana Development Finance Authority.

IDEM/OLQ also administers a Voluntary Remediation Program (VRP), which provides for agency review and certification of non-mandated cleanups. One of the first of its kind in the nation, the VRP program offers site owners a Certificate of Completion (COC), issued by IDEM, and a Covenant not to Sue (CNTS), issued by the Governor's Office, at the end of the process to provide assurances that remediation has been conducted properly. VRP sites tend to be at actively operating facilities, but brownfields sites are not precluded from participation and may indeed benefit from the assurances provided by the VRP.

To date, the City of Fort Wayne Redevelopment Department has completed two brownfields redevelopment projects in the City - one at the former ***Bowser Pump Plant***, on Bowser Avenue just southeast of downtown, and at the former ***Myers Petro*** terminal on Leesburg Road at St. Francis University. The former Bowser Pump Plant has been redeveloped for housing, green space, and police facilities. The Myers Petro site has been redeveloped for new university facilities.

Table 19 in the appendix lists existing brownfields and VRP sites in Allen County

3.0 RESULTS OF ANALYSIS

3.1 Key Findings and Issues

Principal findings and issues identified as a result of compilation and analysis of the Environmental Stewardship Existing Conditions Inventory are summarized as a series of statements below.

Physiography, Ecoregions, and Geology

1. *Glaciation is the principal natural force responsible for shaping the County's landscape, underlying geology, and related natural resources. An understanding of the County's glacial origins greatly aids in understanding differences in topography, water supply availability and vulnerability, soil capability, ecological potential, and other fundamental environmental factors across the County.*
2. *The County lies across the boundary of two distinct ecoregions - the Eastern Corn Belt Plains (ECBP) and the Huron/Lake Erie Lake Plain (HELP). The original (i.e. pre-European settlement) condition of both regions was a virtually unbroken expanse of deciduous forest. The ECBP region was generally dominated by a mixed deciduous forest community while the HELP region was generally dominated by wetland forests. Though wide scale restoration to original condition is seldom feasible today, knowledge of original condition can help resource planners work with, rather than against, an area's inherent ecological potential and avoid costly misallocation of resources resulting from fundamentally inappropriate solutions.*

Policy Implications: Allen County lies at the juncture of three distinct physiographic regions (Maumee Lake Plain, Tipton Till Plains, and Steuben Morainal Lakes Area) and two distinct ecological regions (Eastern Corn Belt Plains and Huron/Lake Erie Lake Plain). These inherent, physical differences result in significant differences in the availability and vulnerability of key natural resources across the County, affecting (for example) soil capabilities and limitations, ecological restoration potential, and water supply availability and vulnerability from place to place within the County/City planning area.

An understanding and awareness of these differences should, ideally, inform not only natural resource planning efforts, but also the formulation of policies in other arenas, most notably with respect to Utilities and Land Use. Development of "blanket" policies and priorities that are uniformly applicable countywide may not be appropriate in all cases as a result of these differences. Where this is the case, a clear relationship to the underlying physiographic or ecological differences should be established and articulated in the policy itself, or in the formulation record. Where the relationship is not well understood based on available existing data, additional studies or investigation may be necessary as an initial step in policy development.

The original "natural" condition of most lands in Allen County was forested; with both upland and wetland deciduous forest communities represented depending upon variations in topography,

drainage, soils, aspect, microclimate and other factors. While restoration to "original" conditions is not always a feasible or desirable goal for natural resource planning efforts today, a forested condition represents the most appropriate ecological reference for such efforts and should at least be considered as a starting point for projects where ecological integrity figures prominently, such as acquisition or enhancement of nature preserves, wetland restoration projects, or restoration of stream corridors.

Soils

3. *Prime farmland soils are an abundant and significant resource in Allen County. 92% of the County's land area qualifies as prime farmland and Allen County has the highest total acreage of prime farmland in the State of Indiana. Loss of prime farmland reduces the overall efficiency of crop production, with adverse impacts on farming returns, food prices, and energy and chemical inputs. Conversion of prime farmland to urbanized uses is generally irreversible.*
4. *Approximately 40 % of the County's land area is occupied by hydric soils, and many additional soil types present in the County have the potential to encompass small inclusions of hydric soils. This has significant implications for construction, identification and protection of wetlands, drainage, and septic system siting.*

Policy Implications: The County's soil resources are among its richest natural assets and also pose the County and City with some of its most significant planning challenges. Current Land Use data indicates that approximately 65% of the County's total 422,484 acres is currently in active agricultural use (approximately 275,000 acres). Virtually all (94% percent) of this existing agricultural acreage qualifies as "prime" farmland, i.e., farmland best suited to producing crops most efficiently and economically on a sustained basis under standard management.

Land Use trend data indicates that, by several measures, suburban development on the outskirts of Fort Wayne is proceeding at increasingly lower densities in recent years (e.g. a 21 % decline in persons/acre 1987- 2003, a 39.5 % increase in urbanized land area versus a 12.3 % population increase 1987 - 1997, and a 27.3 % increase in per household land consumption 1987 to 2003), resulting in an overall higher rate of land conversion to developed uses, most of it occurring on former agricultural lands. This pattern of development also contributes to fragmentation of farmland as larger tracts of land are subdivided without regard to their positioning in the landscape and potential adverse impacts on agricultural efficiency. Similar trends are evident in surrounding counties as well. Analysis of regional commuter patterns and other demographic data indicates these areas are strongly influenced by growth in the City of Fort Wayne, which functions as the region's principal employment center. According to the American Farmland Trust's 1997 "Farming on the Edge" report, Fort Wayne and Indianapolis both show this pattern of prime farmland juxtaposed with high development. Between the two cities, a significant percentage of the state's prime farmland is at risk of being irrevocably converted to suburban and urban development.

Although some experts disagree, it is generally accepted that the United States is not in danger of running out of land for food production in an absolute sense within the foreseeable future. Within foreseeable human planning timeframes, concerns regarding the conversion of prime farmland to developed uses center more on issues of efficiency, compatibility, economics, cultural resources, and tradition, rather than on survival.

Prime farmland soils are valuable primarily because of their greater *efficiency* in producing crops. Continued, unrestricted loss of prime farmland inevitably shifts agricultural production onto less favorable lands at some point in time, resulting in the need for greater energy, chemical, and management inputs to maintain the same levels of production. Not only does this tend to drive up the cost of agricultural products, it also increases the consumption of other valuable and limited resources, such as energy, water, and chemical inputs. Correspondingly, it tends to increase the quantity and complexity of pollution associated with the processing of wastes and by-products. Technological innovations have shown a remarkable ability to keep pace with these changes and to artificially boost agricultural efficiency as a means of compensating for productivity losses. However, the upper limit on our ability to continue doing so is unknown, and the application of these technologies is not without its own costs.

Given the viability of agriculture in the County and the irrevocability of prime farmland losses to urban conversion, it seems prudent to at least consider the desirability of establishing some level of protection for Allen County's remaining prime farmlands. Obviously, farmland protection needs to be considered in the context of an overall County/City Land Use Plan. Many potential protection mechanisms exist, including (but not limited to) differential assessment, property tax relief, agricultural zoning districts, purchase of development rights, long-term contracts, and strategic assemblage of conservation easements.

Local farmland protection efforts are greatly facilitated by the existence of a supportive state-level framework and can be difficult to "pioneer" in the absence of such a framework. The State of Indiana currently allows agricultural zoning and applies use-value assessment to agricultural lands; however, it has yet to establish a true state-level farmland protection program, despite periodic consideration of the issue since the 1970's. In 2002, the Indiana Farmland Protection Technical Advisory Committee (IFPTAC) was established to implement terms of the Federal Farmland Protection Program, created by the Farm Security and Rural Investment Act of 2002. The Committee has a long-term goal of establishing a state-level farmland protection program, but in the short term administers federal funding provided under the Act, and makes technical recommendations to the NRCS State Technical Committee. A potential model for non-regulatory protection exists in Kosciusko County, where the IFPTAC has coordinated the purchase of approximately 400 acres of conservation easements using federal financial assistance in order to protect prime farmlands in a cohesive way.

Urban and suburban residents generally express feelings of support for farmland preservation at the urban fringe. However, the realities of coexistence are often quite a different story. While they tend to value surrounding farmlands for the "breathing room" or open space they provide, urban and suburban residents are often not prepared for or as accepting of the odors, fugitive dust, chemicals, heavy machinery, and late-night hours that go with most working farm operations. Land use compatibility can be a contentious and often overlooked aspect of farmland

preservation programs targeting the urban fringe. Conscious decision making, clearly articulated policies, meaningful public involvement, and provisions for dispute mediation go a long way toward minimizing these, as they do all, land use conflicts. Ongoing farming operations may also be provided with explicit relief from "new" nuisance suits by incoming residents.

The value of tradition as a factor in farmland protection should not be discounted. Although most of the nation's food supply today is actually generated by larger, commercial or contract farming operations, the ideal of the "family farm" is still widely upheld as an important aspect of our American heritage, particularly in the Midwest. Allen County is host to a large and vibrant Amish population which embodies the values of self-reliance, enterprise, cooperation, and family reflected in this ideal. Even though urban and suburban residents may not directly experience or benefit from this way of life, they may still find value in its continued existence and be supportive of policies that affirm it.

The prevalence of hydric soils in Allen County also poses significant planning challenges. Because of the presence of water, either from below in the form of a high water table or above in the form of flooding or ponding, hydric soils pose severe limitations to construction in general, and in particular, to the siting of conventional gravity residential septic systems. While this problem is certainly not unique to Allen County, the rate of septic system failures in the County prompted the State Legislature to enact County-specific legislation in 2002 (SEA 461) calling for IDEM/OWM to develop a general discharge permit to regulate discharging septic systems that were installed to replace failing conventional ones (327 IAC 15-14).

The IDEM permit only regulates discharging systems. The vast majority of on-site septic systems are regulated by the Allen County Department of Health in accordance with technical standards established by the Indiana State Department of Health (ISDH). The ISDH recently attempted to update these standards in 2003, but was proscribed in the 2004 Session by another piece of legislation (HEA 1017) from implementing certain groundwater monitoring requirements. ISDH subsequently withdrew the proposed standards and initiated a new rulemaking cycle in August 2004.

Alternative septic system designs such as pressurized systems, sand filters, mound systems and constructed wetlands can overcome some, but not all site limitations. They generally are more expensive to install, and require diligent maintenance on the part of homeowners in order to function properly. Absolute prohibition based strictly on soil suitability is certainly an option, but seldom a realistic one. Such policies are indifferent to all the other factors that contribute to a sensible pattern of growth and are politically contentious. The pattern of low-density suburban growth at the urban fringe, in advance of or without regard to the advancement of central utilities, poses the greatest potential for problems with septic system failures. Densities are high enough to concentrate the impacts of failures, yet not high enough to support centralized utilities. A coordinated planning approach which aligns Land Use and Utility needs and policies is arguably the most effective remedy.

Land and Vegetative Cover

5. *Although it is host to one of Indiana's largest populated areas, the County is still predominantly a rural county, with most of its acreage in active agricultural production.*
6. *The County's historical forests have largely been cleared and converted to agriculture and urban land uses. Today's forested areas are generally small and scattered along stream corridors and in small rural woodlots. The Cedar Creek corridor and Fox Island Park in the Little River watershed contain the County's largest remaining contiguous forested areas.*

Policy Implications: High resolution, quantifiable data on vegetative land cover types was not found to be available for Allen County. Data obtained for the Existing Conditions report was extracted for Allen County from the National Land Cover Data Set (NCLD) maintained by USGS. The NCLD data is 30-meter resolution raster (image) data which, although satisfactory for graphic display, does not readily lend itself to further manipulation and analysis. Land cover may be distinguished from land use by its focus on the type of vegetation (or lack thereof) covering the land, as opposed to how it is being used. For example, lands classified as "Agricultural" for land use purposes would typically not be further subdivided into areas covered by row crops or pasture grasses, as they typically would be for land cover analysis purposes. Good quality land cover inventory data is useful for many planning applications, including (but not limited to) runoff modeling and prediction, facility siting, watershed management, habitat analysis, land use planning, and monitoring land use change. The County and City may wish to consider developing a County-specific land cover database to facilitate future planning efforts. IDNR, NRCS, other conservation agencies, and local and state universities may be sources of technical or financial assistance in this regard.

Natural Heritage Features

7. *There are over 100 reported occurrences of rare, threatened, and endangered species on file for Allen County. Many, though not all, of these are historical in nature. Most are associated with established parks and nature preserves, however, a significant number are mapped within City of Fort Wayne corporate limits. Several federally endangered mussel species are reported in the St. Joseph River, Cedar Creek, and the Maumee River. As a general statement, mussels, amphibians, and plant species are most vulnerable to habitat loss due to their limited ability to move to a new location.*
8. *Over 30 species of plants, fish, and other aquatic organisms considered to be invasive are present or believed present in Allen County. Invasive species pose a potential threat to native species and natural communities in natural areas and surface waters. The St. Joseph, St. Mary's and Maumee Rivers are particularly vulnerable to invasion by several aquatic nuisance species due to their connection to the Great Lakes. Allen County Parks and Recreation and IDNR currently monitor and undertake periodic control activities for invasive plant and aquatic nuisance species.*
9. *Only about 0.2 percent of the County's total land area is currently set aside in the form of designated nature preserves. There are 13 designated preserves in the County, most of*

which are *accessible to the public. They contain high quality communities and rare habitats that have or are disappearing throughout the County and the state.*

Policy Implications: As stated above, less than 1 percent of County and City lands have been formally set aside with ecological preservation as their primary goal. All park lands (including those primarily used for human recreation) make up only 2 percent of total land area in the County and 8 percent of land in the City of Fort Wayne. Public opinion appears strongly in favor of expanding the amount of parkland and open space. Desired objectives vary from active to more contemplative forms of recreation, including an expressed concern for the preservation and restoration of functioning ecosystems. A "full spectrum" approach to parks and recreation would seem to be called, for, with ecological preservation objectives represented and distributed on a par with other objectives. Existing nature preserves and reported occurrences of rare or endangered species may form logical nuclei around which to acquire future areas. With the exception of Cedar Creek, preservation of exceptional aquatic communities would seem to be underrepresented. Based on rare or endangered species occurrences, potential opportunities would appear to exist along all three major rivers, including segments within the City of Fort Wayne. IDNR is a potential source of technical and financial assistance in this regard, as are the U.S. Fish & Wildlife Service, NRCS and other conservation agencies. An active and informed coalition of non-profit organizations such as the ACRES Land Trust, Izaak Walton League, Little River Wetlands Project, Cedar Creek and St. Joseph River watershed groups is an asset which, though already recognized, should be fully consulted and utilized in the formulation of relevant policies.

Because of their connection to the Great Lakes, Allen County's waterways are vulnerable to colonization by over 30 aquatic nuisance species, both plant and animal. There appear to yet be opportunities to monitor and minimize invasion by most of these aquatic species because they are not yet widely distributed beyond the Great Lakes. In the terrestrial environment, the primary concern is protection of high quality plant communities against colonization by invasive non-native plant species. As a general statement invasive species generally pose the greatest problem in "exceptional" ecological areas where high quality native plant and animal communities are present and desired to be maintained. Legal prohibition of invasive species is generally not effective because most invasive species are already "loose" in the environment at large. Prohibitions against use of nuisance aquatic species as bait might be an example to the contrary where this is the primary method by which the species has been distributed. "Early warning" monitoring and discovery, prompt intervention, and commitment to a long-term management strategy are generally required to be effective in controlling invasive species.

Ground Water Resources

10. *There are three major aquifer systems in the County: 1) the Huntertown aquifer system in the north and northwest; 2) the Aboite aquifer system in the west; and the underlying limestone bedrock throughout the County. The Huntertown and Aboite aquifers are near-surface systems formed in glacial deposits, while the bedrock aquifer is generally found at greater depths.*

11. *Groundwater is generally available throughout the County in sufficient quantities and yields to support domestic and agricultural needs. Large capacity wells to serve industrial and municipal uses are generally best developed at depth in the bedrock aquifer. Large capacity wells are generally used for public water supply, irrigation of golf courses, industrial, and energy production.*
12. *As a general statement, the Eel River Valley, Cedar Creek Canyon, and St. Joseph River Valley exhibit the highest sensitivity to potential groundwater contamination in the County, while the bedrock aquifer is generally the least sensitive. However, many factors enter into any determination of aquifer sensitivity, including the nature of aquifer materials, degree of confinement, position along the groundwater flow path, soil type, surface drainage patterns, the presence of potential contamination sources, and well withdrawal rates.*
13. *There are currently 107 active public water systems in Allen County. Of these, 104 rely on groundwater sources. Most are small noncommunity systems serving individual churches, schools, restaurants, parks, golf courses, rest areas, and businesses. The communities of Aboite, Grabill, Roanoke, Hometown, Harlan, Monroeville, and Woodburn rely on groundwater for drinking water supply.*
14. *Wellhead Protection Programs are currently required only for "community" public water systems that rely on groundwater. No similar protective requirements currently apply to the many small "noncommunity" public water systems in the County or to individual wells.*

Policy Implications: Ninety-seven percent of Allen County's 107 public water systems rely on groundwater, as well as thousands of individual residences utilizing private wells. Most public water supply systems are small, serving individual churches, schools, restaurants, parks, golf courses, rest areas, and businesses, although the communities of Aboite, Grabill, Roanoke, Hometown, Harlan, Monroeville, and Woodburn rely on groundwater for drinking water supply. Groundwater availability and quality generally appears to be sufficient to meet current needs; however, the County's heavy reliance on groundwater for drinking water obviously makes the quality and availability of future supplies an important issue. The adequacy of existing drinking water systems to meet current and future demands is addressed primarily under the Utilities element of the plan.

As stated above, the Eel River Valley, Cedar Creek Canyon, and St. Joseph River Valley generally exhibit the highest inherent sensitivity to potential groundwater contamination in the County, while the bedrock aquifer is generally the least sensitive. However, many factors enter into the question of groundwater sensitivity, including human-influenced factors such as the location of potential contaminating sources, withdrawal rates, and the position of wells in the groundwater flow pattern and with respect to other wells. Ultimately a definitive determination can only be made at the site-specific level. However, a general awareness of differences that are evident at a larger scale may be used as a basis for prioritizing groundwater protection planning efforts on a countywide basis.

The concept of a Wellhead Protection Plan provides a mechanism for integrating these many factors into a plan which both provides information and a basis for managing the potential for

contamination at the scale of individual wells or well fields. Currently, only the County's 11 "community" public water systems are required to have Wellhead Protection Plans. However, the Wellhead Protection Plan concept provides a model that could readily be expanded to all or additional subsets of wells in the County. The County's many "noncommunity" public water supply systems, large capacity wells, and wells sited in highly vulnerable areas would seem to be logical candidates.

135 wells are registered with IDEM as "significant withdrawal" wells, meaning they have the capacity to withdraw greater than 100,000 gallons per day (or 70 gallons per minute). They are used for drinking water supply, irrigation of nursery crops and golf courses, quarries, energy production, and industry. "Significant withdrawal" wells are required to report their actual withdrawal rates annually to IDNR, but not at the local level. As they constitute the largest groundwater withdrawals, it seems prudent to at least consider local monitoring of reported annual withdrawal rates. Local reporting of complaints from surrounding wells and preparation of Wellhead Protection Plans are other policy options that seem appropriate for consideration with regard to large capacity wells.

Surface Water Resources

15. *The confluence of three major rivers - the St. Joseph, St. Mary's, and the Maumee - and the County's position spanning a narrow divide between the Lake Erie and Mississippi River basins are the reason for initial human settlement of the County, first by Native Americans, and later by European settlers. Though diminished in strategic and commercial importance with the advent of the railroad and automobile, the "Three Rivers" confluence and historic portage routes have left the City of Fort Wayne and the County with a rich cultural legacy.*
16. *Many of the County's streams have been channelized or otherwise modified to improve drainage. Channelization, removal of streamside vegetation, maintenance dredging, and debris removal to facilitate drainage tend to have adverse impacts on natural stream stability and ecological health. Balancing inherently conflicting drainage and ecological objectives represents a significant surface water management challenge faced by both the City of Fort Wayne and the County.*
17. *Cedar Creek and the Little River are identified as "outstanding" waters at the state level. Cedar Creek is one of few streams in the County that remains largely unaltered and bounded by a reasonably contiguous, forested corridor. The bases for Cedar Creek's outstanding designation are its exceptional scenic and ecological values. The Little River is a highly modified stream, but has a rich historical heritage as part of the Wabash River Heritage Corridor.*
18. *Soils in Allen County are generally poorly suited to the siting of conventional septic systems. Septic systems are concentrated in the north part of the County. Failing septic systems are a potential source of high E.Coli levels in Cedar Creek and other streams in this part of the County. Other potential E.Coli sources include sewer overflows, improperly treated sewage treatment plant discharges, and waterfowl and livestock concentrations.*

19. *Permitted wastewater dischargers in the County consist primarily of municipal sewage treatment plants and industrial facilities, but also include development projects, transportation related facilities, and other facilities permitted for storm water discharges.*
20. *High levels of E.coli bacteria, nutrients, and PCBs and mercury in fish; and unaccounted for signs of impairment in aquatic communities are the principal reasons for water quality impairment in Allen County streams. Impairments in segments of Cedar Creek, the St. Joseph, St. Mary's, and Maumee Rivers, St. Joseph and Cedarville Reservoirs, Hamm Interceptor Ditch, Willow Creek, Black Creek, Flatrock Creek, Bullerman, Botern, Gromeaux, and Swartz-Carnahan Ditches, and Spy Run are severe enough to require preparation of Total Maximum Daily Loads (TMDLs) for the pollutants of concern. TMDLs are prepared by IDEM with input from stakeholders in the affected watersheds, typically over a time span of multiple years.*

Policy Implications: The City of Fort Wayne is the largest public water supply system in the County and the only one to rely on surface, rather than groundwater. This and its position at the confluence of three major Midwestern rivers make the quality and character of surface water resources a particular issue for the City. The adequacy and quality of current and future drinking water supply for the City is addressed under the Utilities element of the Plan. "Greenway" and Flood Control implications of the City's Three Rivers area downtown are addressed elsewhere in this report. Riverfront development and land use implications in the Three Rivers district are addressed under the Land Use element of the Plan.

Although no such rating exists, the overall quality of Allen County's surface waters might be described as "good to fair", based on current IDEM/OWM assessment data. High levels of E.coli bacteria, nutrients, PCBs and mercury in fish were found by IDEM in segments of several of the County's major streams (see list above), resulting in their designation as "impaired" and requiring preparation of a Total Maximum Daily Load (TMDL) program for each. The outcome of the TMDL process is essentially a watershed management plan involving input from landowners, watershed groups and other stakeholders in the watershed. The TMDL process provides a "ready made" framework for identifying the most seriously impacted waterways in the County, and for County and City efforts to remediate them. Active participation as a stakeholder in TMDL development for these streams represents a minimum policy "floor" for addressing the County's most pressing water quality problems. The County's three principal watershed groups are also potential stakeholders and partners in the TMDL development process and should be actively consulted early in or prior to initiation of the TMDL process by IDEM.

Cedar Creek and the Little River are designated as "outstanding" waters in the County. Cedar Creek is recognized for its scenic and high quality ecological values, while Little River is recognized primarily for its heritage value as part of the Wabash River corridor. These values are worthy of protection and consideration in future development and facility planning in their surrounding areas. The potential for overlay districts similar to the RGO in downtown Fort Wayne exists for both.

Wetlands

21. *The County's historical wetlands have largely been drained and converted to agriculture. Remaining wetlands are, for the most part, small and scattered over the landscape in localized depressions or adjacent to lakes, ponds, rivers and streams. Many of these smaller isolated wetlands are forested. Wetlands are most concentrated in the north and west of the County. Significant concentrations exist along the Little River, Cedar Creek, Aboite Creek, the St. Joseph above Cedarville Reservoir, and Hoffman Ditch.*

Policy Implications: Historically considered of little value, wetlands have come to be recognized as areas affording exceptional ecological and water quality values, including flood and storm flow attenuation, water quality improvement, groundwater recharge, and wildlife habitat. Wetlands are particularly important to amphibians, migratory birds, and as nursery areas for many fish and shellfish species. Because wetland habitats themselves are increasingly rare, many of the species dependent upon them are now considered threatened or endangered.

Wetlands are of importance to planners for the above resource values they afford, and because they are regulated as "waters of the U.S." under Sections 404 and 401 of the Clean Water Act. Administration of the Section 404 and 401 programs falls to the U.S. Army Corps of Engineers and IDEM/OWM, respectively; however, an increasing number of counties, cities, and other local government entities are incorporating or adopting wetland requirements of their own. A common strategy is to explicitly incorporate wetlands into site plan and/or subdivision plat reviews and require verification of Section 404/401 approvals as a condition of local approval. This is a realistic and effective way for local entities to serve as a "check" that wetland permitting requirements are being followed, collect information on wetland losses (and gains) in their community, provide comment regarding local impacts, and, if desired, to become involved in the quality and type of compensatory mitigation being offered. More aggressive strategies may include adoption of local wetland protection or wetland mitigation ordinances that exceed state and federal Section 404/401 requirements.

Existing wetlands (as shown in the National Wetlands Inventory compiled by U.S. Fish & Wildlife) are most concentrated in the north and west parts of the County. Most are small and scattered. Significant concentrations exist along the Little River, Cedar Creek, Aboite Creek, the St. Joseph above Cedarville Reservoir, and Hoffman Ditch. These areas may be initial targets for consideration with regard to formal wetland preservation. The prevalence of hydric soils in the County also presents significant opportunities for creation of new wetland areas. Where native hydric soils are still in place, restoration of wetlands can often be accomplished relatively easily by removing drainage tiles or otherwise restoring hydrology. Wetland preservation and restoration efforts should ideally be pursued within the context of a larger strategy for expanding overall land area devoted to ecological preservation, as discussed under Natural Heritage Features.

The County has the beginnings of a wetlands inventory in its iMap® Database, drawn from the National Wetlands Inventory (NWI) compiled by the U.S. Fish & Wildlife Service. The County/City may wish to consider refining this inventory using local information. Incorporating

wetlands into the development review process as suggested above could provide such information, and also allow the County and City to track future trends in wetland losses or gains.

Riparian and Other Corridors

22. *The original riparian setting of most streams in Allen County was most probably that of a continuous, mature forested corridor. Forested corridors have generally been greatly diminished or removed entirely to facilitate agriculture, development and drainage. Cedar Creek is a notable exception. Continuous, mature, vegetated riparian zones, ideally encompassing both active and historic floodplain areas as well as adjacent uplands, contribute significantly to stream stability and health through shading, sediment and nutrient filtering, bank stabilization, and attenuation of storm flows and flooding. Riparian zones also lend themselves to human aesthetic and recreational uses. Inherent conflicts often exist between these objectives and the desire to develop riparian corridors for agriculture, residential, or urban uses.*
23. *The River Greenway Overlay District (RGO) established by the City of Fort Wayne along the City's three principal rivers represents an example of how riparian zones may be defined and protected with resulting benefits for both human and ecological communities*
24. *Rail and utility corridors represent other corridors with the potential to contribute both human and ecological values when protected. Protection of linear corridors is generally more effective in an ecological sense than preservation of many small, isolated areas in a fragmented pattern because they allow plants to colonize more readily and animals to move freely among a diversity of habitat types within a single protected zone. Benefits to corridor owners include enhanced public image, assistance securing easements, assistance with maintenance, and enhanced economic development. Generally, successful corridor protection efforts are initiated by local government entities and proceed as public/private partnerships with utility or transportation companies.*

Policy Implications: There is significant public interest in expanding the existing system of trails and greenways in both the County and City. The River Greenway trail system in downtown Fort Wayne is popular and appears well utilized, as are other existing trails. An active coalition of trail advocacy groups representing different parts of the County exists, including (but not limited to) the Greenway Consortium, Aboite New Trails, Inc., The New Haven Parks & Recreation Department, and the Little River Wetlands Project. Trail proponents view trail and greenway systems not only as recreation areas, but also as transportation corridors. There is strong interest in moving beyond the existing recreational trail systems largely confined to parks and floodplain areas to establish meaningful linkages within and among communities capable of providing effective pedestrian and bicycle *transportation*, as well as recreation. The Northeast Indiana Regional Coordinating Council (NIRCC) has coordinated local trail proposals into a draft plan that provides a logical starting point for incorporation into the Comprehensive Plan. Because of their transportation focus and the need to coordinate with planned transportation improvements, trail expansions should be considered in concert with Transportation elements of the Plan.

The potential for greenways to simultaneously provide transportation, recreation, economic, and ecological values appears well understood and supported. From an ecological perspective, continuous corridors are preferable to fragmented preservation efforts because they allow animals to move freely over a wider area in search of food, shelter, and breeding habitats, which may exist in different locations. Plants are able to colonize more effectively over a continuous area than widely separated ones. Many bird species also tend to follow and inhabit linear corridors during seasonal migrations. Stream, rail and utility corridors offer the greatest potential in this regard because they tend to be separated from traffic and continuous over significant distances. Expansion of the existing River Greenway system, acquisition of additional riparian lands along Cedar Creek to fill in "gaps", and adoption of countywide stream setback or buffer requirements for all new development would seem to be three initial policy directions worth considering for their potential to contribute meaningfully to riparian corridor enhancement, capitalize on favorable existing conditions, and be reasonably implemented within near to mid-range planning timeframes.

Rail and utility corridors have additional advantages in that they are usually controlled by one or a limited number of entities and already include "buffer" space for safety and compatibility with surrounding land uses. Successful examples of greenway partnerships with pipeline, electric, and telecommunications utilities exist in Indianapolis, Michigan City, and elsewhere nationwide. Potential benefits to rail and utility companies from participation in greenway efforts include enhanced public image, assistance from local governments and citizen groups in securing and maintaining easements, and positive indirect economic development benefits shown to be spurred by successful greenway development.

Floodplains

Principal flood control agencies in Allen County include FEMA, IDNR, the Natural Resources Commission, The County, the City of Fort Wayne, and the Maumee River Basin Commission. Both the City and County have traditional flood control ordinances that reflect FEMA Flood Insurance Program and state requirements. The Maumee River Basin Commission is a regional organization that provides technical and financial assistance for flood control and storm water management.

The City of Fort Wayne has historically been plagued by floods. Significant structural projects and floodplain buyouts have been implemented in the City since a major flood in 1982.

The Association of State Floodplain Managers (ASFPM), a non-regulatory professional organization, has recently launched a "No Adverse Impact" (NAI) initiative, which seeks to promote a more holistic approach to floodplain management. Examples of strategies advanced by the NAI include improved floodplain mapping, cumulative tracking of floodplain impacts, greenway ordinances such as the City of Fort Wayne RGO District, "green infrastructure", and certification programs for floodplain management professionals. The Maumee River Basin Commission is in the process of developing a basin wide NAI program.

Policy Implications: Flooding is principally a concern in the City of Fort Wayne, although there are areas within the County which are also subject to significant flooding. Since a major flood

struck the downtown Fort Wayne area in 1982, many structural improvements have been made to mitigate flooding in the City. The City also has a state-of-the-art flood monitoring system that provides real-time rainfall and stream level information throughout the Fort Wayne area. Over the past several years, the City and the Maumee River Basin Commission have worked to remove businesses and residences from the flood plain through buyouts. The development of Headwaters Park near the City/County Building downtown provides a supplemental catch basin for periodic floodwaters.

Both the County and City have traditional flood control ordinances which reflect minimum FEMA requirements. The City has moved somewhat beyond traditional structural and regulatory approaches in establishing the River Greenway Overlay (RGO) District and in its use of floodplain buyouts in partnership with the Maumee River Basin Commission. The ASFPM's "No Adverse Impact" program would seem to offer an accessible, realistic and flexible model for the development of additional, forward-looking flood control and floodplain management policy tools with potential applicability in both the County and City. At minimum, the County and City should consider actively participating and assisting the Maumee River Basin Commission in its efforts to develop a regional NAI program. Expansion of the RGO District concept, cumulative tracking of floodplain impacts, incorporation of "green infrastructure" criteria into the site plan review process, and floodplain manager certification would seem to be reasonably achievable and effective NAI floodplain management strategies worthy of consideration in development of the Comprehensive Plan. Obviously, flood control and floodplain management issues are inseparable from Land Use and Utilities elements of the plan and need to be considered in concert with storm water management and land use policies and priorities.

Air Quality

25. Allen County was recently designated a nonattainment area with respect to new federal standards for ozone (effective June 15, 2004). Although the full implications of the new designation are still uncertain at this time, it is probable that, at minimum, more stringent requirements for "major" new or expanding industrial facilities and transportation planning will be applied on a countywide basis.

Policy Implications: Historically, Allen County and the Fort Wayne MSA have been in compliance with national air standards. However, with the recent change in U.S. EPA's ground level ozone standard, Allen County is now designated a "nonattainment" area for ozone, as of June 15, 2004. The designation is "basic", the least severe category provided for under the new rule. Nonattainment is attributed primarily to transportation-related emissions (i.e. fumes from cars) and nitrogen oxide emissions from power plants. IDEM/OAQ is principally responsible for implementing the new rules, which are extremely complex and not yet fully promulgated.

The current schedule calls for IDEM to submit a plan to U.S. EPA for achieving compliance by 2007, and for compliance to be achieved by 2009. At minimum, IDEM will have to apply more stringent permitting and control requirements to larger industrial sources of ozone precursors (nitrogen oxides and volatile organic compounds), such as power plants and coating lines, and demonstrate compliance with "transportation conformity" requirements. Although the application of stricter permitting requirements and controls to the industrial community is

"automatic" and primarily falls to IDEM, the County and City may wish to consider establishing one or more local programs to facilitate understanding and compliance with these new requirements as a strategy for offsetting potential stigmatizing effects. Related rules imposing limitations on nitrogen oxide emissions from power plants (NOx SIP Call Rules) are also expected to help remedy the ozone nonattainment problem.

Transportation conformity is a complex program that mandates certain coordination activities between transportation planners and air pollution control agencies, and requires planners to demonstrate that proposed transportation projects will stay within certain emission "budgets" for mobile sources (i.e. vehicles). The Northeast Indiana Regional Coordinating Council (NIRCC) is the principal agency that will work with IDEM on transportation conformity under the new rules. Transportation conformity may be achievable through mere attrition of older vehicles, or may require more aggressive measures such as mandatory carpooling, although the latter seems unlikely given the low severity of Allen County's designation. Transportation conformity will obviously need to be integrated into the Transportation element of the Comprehensive Plan.

Brownfields

26. The City of Fort Wayne's history and ongoing presence as a diverse manufacturing center make it a prime location for brownfields redevelopment. The City's Redevelopment Department has completed two successful brownfields projects to date, one at the former Bowser Pump Plant downtown, and one at the former Myers Petro terminal at St. Francis University. The City has defined a Brownfields Study Area in the downtown area. Although the bulk of the County's manufacturing base is located in Fort Wayne, significant industrial communities also exist in New Haven, Roanoke, Grabill, and Woodburn. Coordination of brownfields redevelopment efforts with IDEM's Voluntary Cleanup Program poses opportunities to "leverage" available funding, legal assurances, and technical assistance resources.

Policy Implications: The City of Fort Wayne has completed two successful brownfields projects in the downtown Fort Wayne area, and has defined a Brownfields Study Area for future downtown projects. In addition to continuing with implementation of present efforts, the City and County may wish to consider expanding the Study Area concept to encompass other areas within the City, and in other communities. The State's Voluntary Cleanup Program offers opportunities to extend the brownfields concept even further, for example, by tapping financial and technical resources available under both programs, or by using the VCP program to achieve cleanups on neighboring properties or on smaller sites which may not be eligible or explicitly included in brownfields agreements.

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