

## 10 Natural Resources

### 10.1 Introduction

Leroy retains an outstanding natural environment, even though residential development has increased significantly in the past three decades. Many abandoned farms have reverted to forest land, as well as land around long-gone mills that were stripped of timber in the first half of the 19<sup>th</sup> century. Natural resources found in the township help to establish and reinforce a unique identity. This begins with the extensive wooded tracts, the Grand River, river and stream valleys and watersheds, remaining wooded tracts, and species habitats.

Natural and environmental resources help define the character of the township, support the natural systems that provide for wildlife and a healthy environment, provide recreational and educational opportunities, and preserve rural character. At the same time, the township's natural resources must be safeguarded from adverse impacts of urbanization. This includes flooding, air and water pollution, groundwater contamination, noise, light and glare, and visual clutter from signs and utility structures.

The Natural Resources element, based in part on the (draft) 2005 Lake County Comprehensive Plan element, addresses rivers, streams, watersheds, woodlands and urban forestry, air quality, noise pollution and light pollution, to ensure that the natural features that define Leroy Township are protected and enhanced. The intent of this element is to promote the conservation and integration of natural systems and resources with a growing residential population, and reduce the impacts of man-made development on the community, property and lives of the residents.

### 10.2 Waterways and watersheds

#### Grand River watershed

The Grand River follows the northern boundary of the township. The entire township is located in the Grand River watershed.

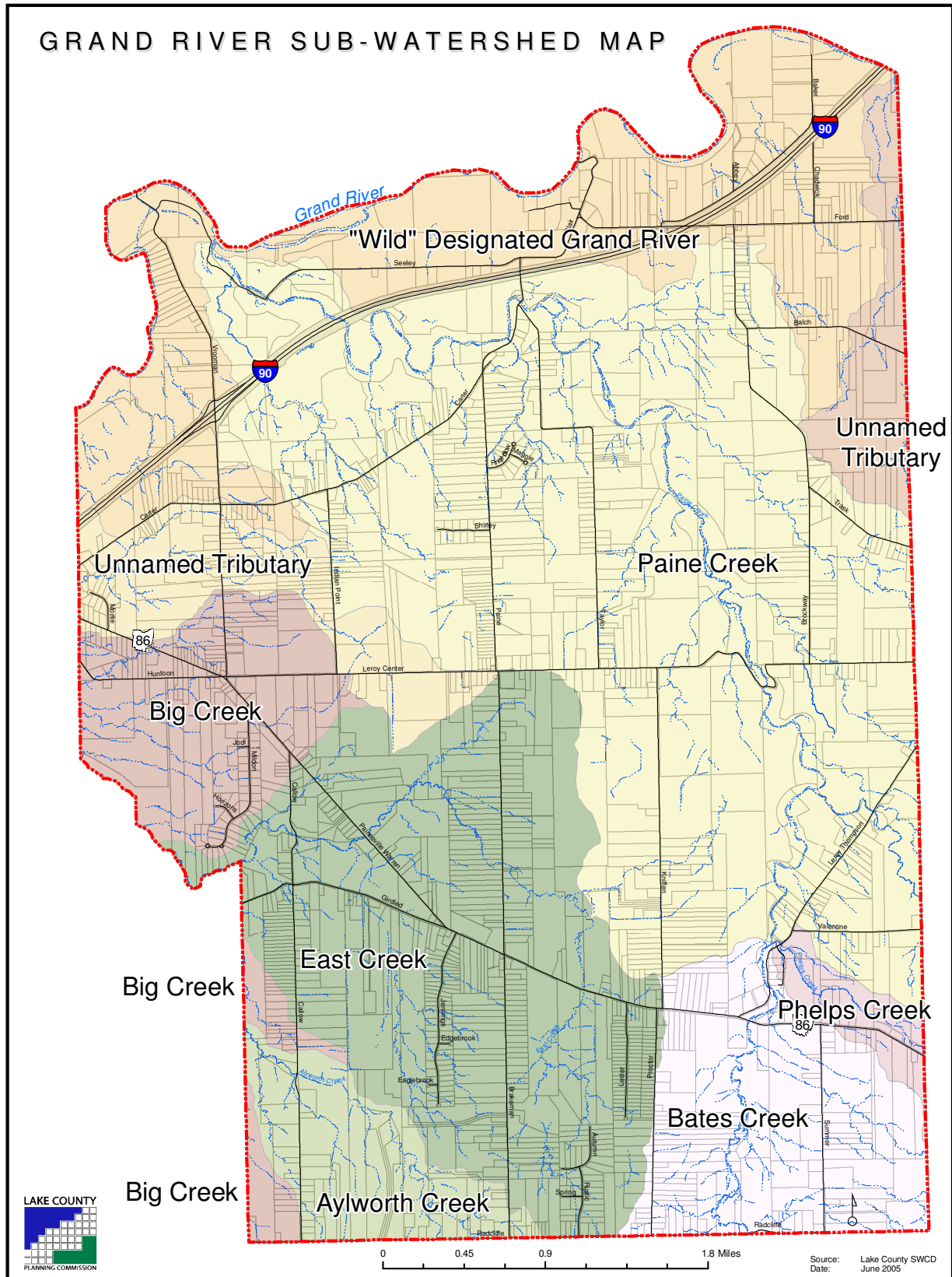
During the Ice Age, the Wisconsin glacier spread over Ohio in lobes, one known as the Grand River lobe. This lobe ground and scraped its way south across northeastern Ohio, but was halted by the steep, erosion-resistant sandstone hills found to the south. As the glacier advanced, it eroded the soft shale of the region and deposited sands and gravels. The glacier altered the topography and forced changes in the drainage patterns.

Today, the Grand River follows an odd course that was influenced by the glacier. The headwaters of the river are in Portage and Geauga counties. From there, the river flows north through Trumbull County and into Ashtabula County. In the northern part of the county, the river begins flowing westward into Lake County. In the county, the river is characterized by steeply incised valley walls of Chagrin shale.



Grand River (LOPO)

In January 1974, the Grand River became Ohio's second wild and scenic river. The designated wild section includes the portion of the river through Leroy Township. The Grand River is Ohio's highest quality river flowing into Lake Erie and helps support Ohio's million dollar Steelhead fishing industry.



Ensuring the natural heritage of the Grand River is not limited to protecting the immediate streamside environment. Land use activities within the watershed, such as urban and residential development, may have a direct and adverse effect on the long-term protection and preservation of this important Ohio water resource.

The Grand River has generally excellent water quality and aquatic communities, but there are some environmental threats that Ohio EPA is monitoring. Increasing residential development in exurban areas of the watershed can threaten the basin, by increasing impervious surface area, use of lawn and garden chemicals and pesticides, and removal of vegetation that controls erosion and soil runoff. Land near the Grand River and Paine Creek, the major tributary in Leroy Township, is usually forested. Although there is some residential development in the area, lot sizes are usually much larger than the rest of the township; the carrying capacity of the land is often lower because groundwater flows are low.

Paine Creek is the major tributary of the Grand River. Running through a valley that cuts across the eastern half of the township, Paine Creek is 7.5 miles (12 kilometers) long, and drains an area of 12 square miles (31 square kilometers). According to the Lake County Gazetteer, 16 streams in Leroy Township, including Bates Creek and Phelps Creek, and many unnamed waterways, drain into Paine Creek.

East Creek (MacMullen Creek) and two unnamed tributaries drain a watershed of 6.7 square miles (17.4 square kilometers) in Leroy and Concord Townships. Four unnamed creeks and an unnamed tributary drain a watershed of 2.1 square miles (5.4 square kilometers) into the Grand River.

The Grand River Partners works with the state scenic rivers program and other agencies to assist with the river's preservation. The township should work closely with groups involved in protecting the Grand River watershed, to ensure it remains a viable natural resource and valuable asset to the community.

### **Lake County Headwater Stream Inventory**

Lake County has about 1,000 headwater streams. Headwater streams are the smaller unnamed tributaries to larger rivers, such as the Grand and Chagrin. These small streams are often unnamed and are not shown on regional or even county maps. Headwater streams are vital to protecting the quality and function of larger rivers. Stream functions include retaining sediment, storing floodwaters, and filtering out nutrients. However, such streams are often severely impacted when land is developed, because of their small size.

In 1999 the Lake County Soil and Water Conservation District (LCSWCD) began a study to determine the quality of habitat found in these streams; the amount of different habitat types, the effectiveness of newly enacted erosion and sediment control regulations, justification of conservation easement acquisitions, and to provide accurate information to property owners and officials.

### **Effects of exurban development**

Urbanization in a watershed can have adverse effects on streams and receiving waters. Effects include increases in flooding, streambank erosion, and pollutant transport. Development results in surfaces such as rooftops, roads and parking lots, which render much of a watershed impervious to rainfall. Rainfall is unable to percolate into the soil, and instead is converted into runoff, which can overwhelm the existing drainage system of natural stream tributaries. Thus, drainage improvements, such as curbs, channels, or storm sewers, must be constructed to direct and convey the runoff through the watershed.



Bates Creek crossing (LCPC)

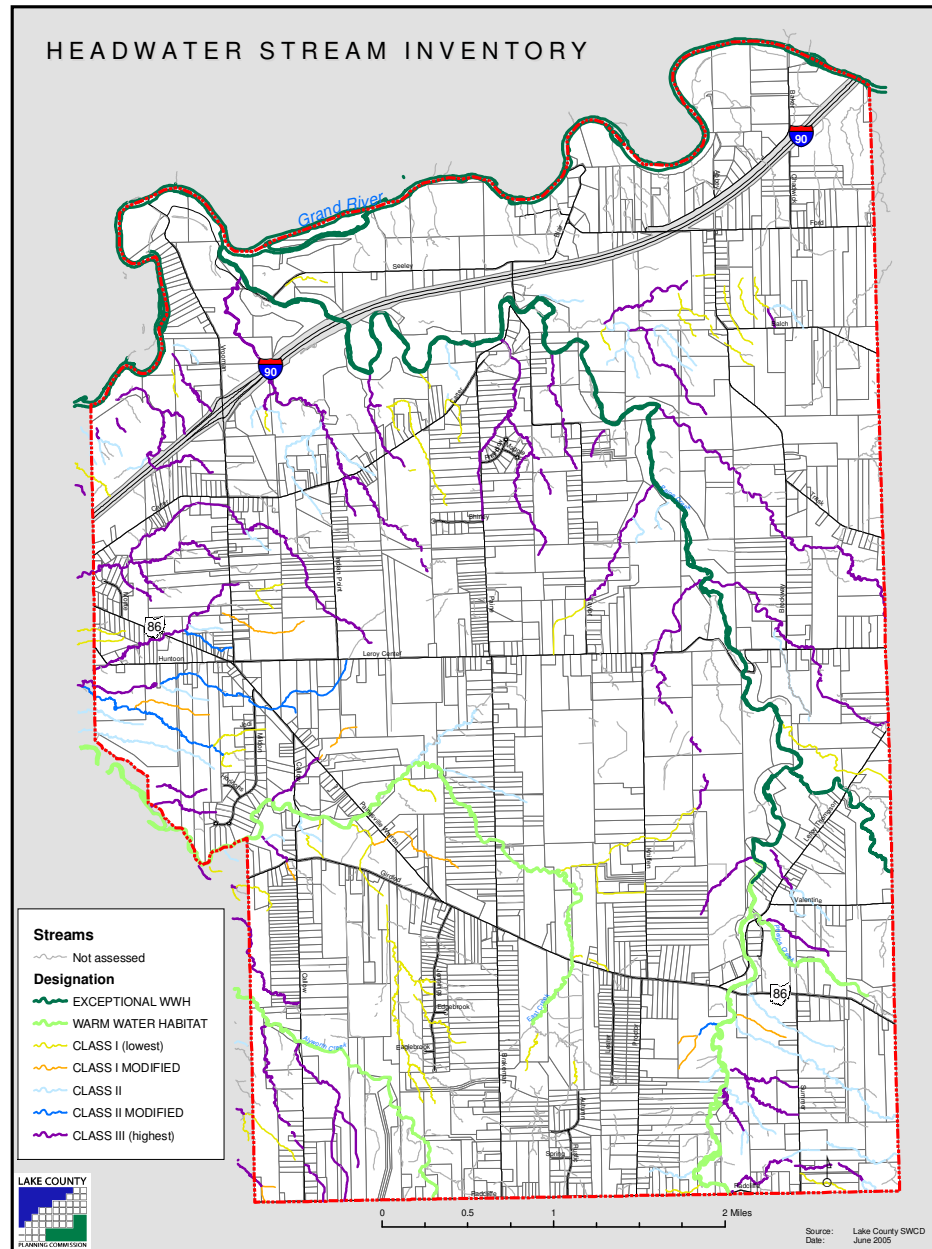


At the receiving end of the stormwater conveyance network, a stream channel must adapt to new hydrologic conditions. The primary adjustment is through channel widening, which occurs through streambank erosion. Streambanks become undercut and slump into the channel. Trees that once provided bank stability become exposed at the roots and are more likely to fall, further destabilizing adjacent land. Large quantities of sediment eroded from streambanks remain in the channel as shifting deposits of mud and sand. This can have a dramatic impact on habitats of fish, mussels and aquatic insects.

Other changes accompanying urbanization, such as changes in water temperature, oxygen levels, and pollutants carried in the runoff, can also adversely affect aquatic wildlife. In the natural system, pollutants in the runoff are removed from the water as it soaks into the ground or flows through the organic litter at the soil surface. With urbanization, these areas are replaced with pavement and buildings, and deposited pollutants are washed directly into stream channels. Pollutants in urbanized streams are frequently ten times higher than in pre-development streams. These pollutants and conditions include suspended sediment, nutrients (phosphorus and nitrogen, usually from fertilizer and equestrian waste), oil and grease, trace metals, chlorides or salts, and thermal effects due to reduced vegetation cover over the stream. These pollutants and conditions affect not only the receiving stream, but also downstream waters, such as wetlands and Lake Erie.

The low population density and large lot requirements in the township result in development that covers less surface area than in other developing areas of Lake County and the Cleveland region. However, a more densely developed town center or commercial node by I-90 – especially vehicle-related uses with large parking surfaces – would have a much greater potential impact on area streams. The township can manage stormwater through requirements implemented during the permit process for new developments. Major tools include detention basins that temporarily stores and slowly releases runoff from large storms

*Paine Falls is one of several waterfalls along Paine Creek. Most waterfalls along the creek are hidden and inaccessible from marked trails. Secret Falls, Top Secret Falls, and some unnamed cascades greet those who tread off the beaten path in Hell Hollow Park.*



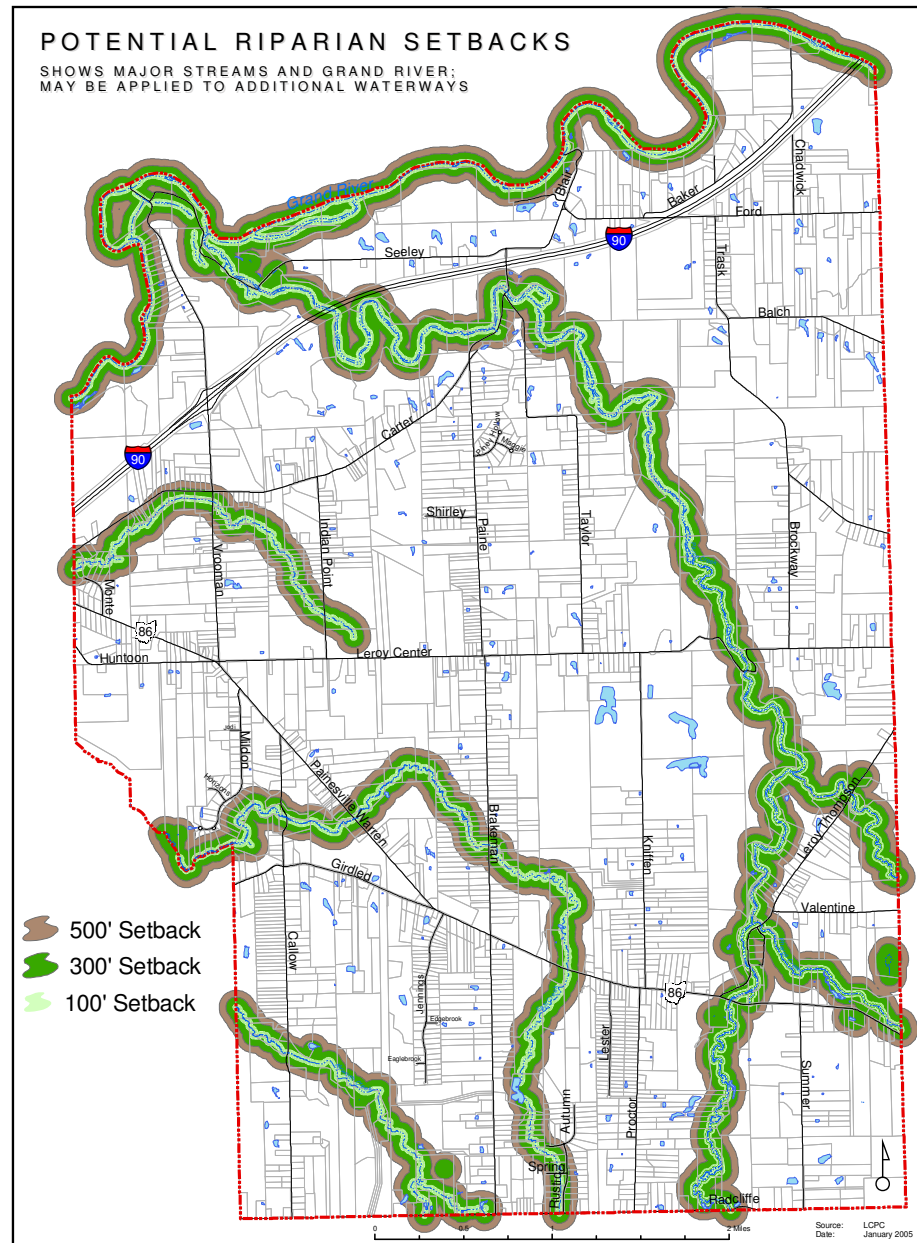
to reduce peak stormwater discharges, and restricting development in stream floodplains that are susceptible to frequent flooding. While both approaches have been effective in curtailing flooding problems, they cannot entirely mitigate the adverse impact that urbanization may have on stream habitat through increased pollutant transport.

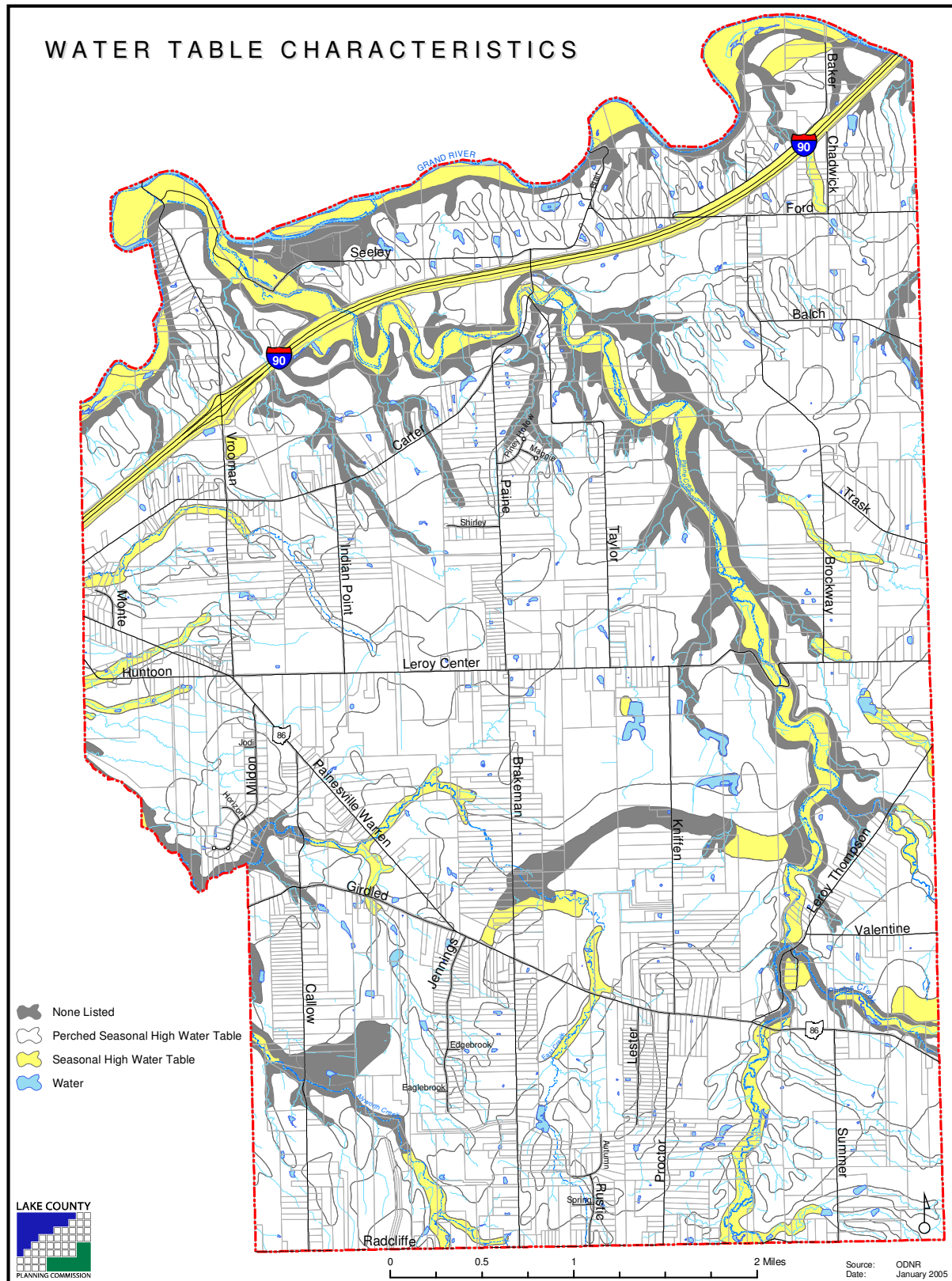
### Riparian setbacks

Riparian areas are naturally vegetated lands along rivers and streams. When appropriately sized, these areas can limit streambank erosion, reduce flood size flows, filter and settle out pollutants, and protect aquatic and terrestrial habitat. Riparian setbacks are a tool local governments can use to maintain riparian area functions. Leroy Township can establish riparian setbacks through a combination of landowner education, land acquisition, and land use controls on new development. The Lake County Soil and Water Conservation District, land trusts, and other organizations are skilled in assisting communities and landowners with education and acquisition efforts.

Riparian setbacks should:

- Range from 25 feet (8 meters) to 300 feet (100 meters) depending on watercourse drainage area.
- Minimum distances apply to both sides of designated watercourses.
- Conform to community land development patterns & natural resource management goals.
- Include provisions for communities to examine the combined impact of all setbacks (side yard, rear yard, riparian, etc.) in a subdivision or a parcel and make reasonable adjustments to ensure existing lots remain buildable, and to maintain lot yields from new subdivisions to the extent possible.





## 10.3 Groundwater

Ground water is water that saturates the voids, pores, fractures, and holes in the soil and rock at some depth below the earth's surface.

The ultimate source of all ground water is rainfall and snowfall. Part of the water that falls on the earth's surface seeps downward through the soil and collects in porous geologic formations. These formations act as sponges, and store the water. If these geologic formations are capable of yielding usable quantities of ground water to a well, they are considered aquifers.

There are two types of aquifers in Ohio; sand and gravel aquifers and bedrock aquifers. Ground water in sand and gravel aquifers occurs in pore spaces between individual grains of sand and gravel. In bedrock aquifers, ground water occurs in pore spaces and along fractures, joints, voids, and contacts between different formations. Groundwater in Lake County comes from both types of aquifers.

Most urbanized areas in Lake County get potable water from municipal water supplies that are fed from Lake Erie, but the water supply for Leroy residents and businesses comes entirely from small private on-site wells. Not all well water is potable; deep drilling in the shale bedrock often strikes sulphur water or brine.

### Groundwater yields in Leroy Township

The hydrogeologic setting of Lake County consists mostly of lake plain, with thin bands of beach ridge running east to west, and alluvial plains and buried valleys following river valleys. The geology of areas along beach ridges and alluvial plains will typically have a larger, more reliable supply of groundwater.

According to research from the Ohio Department of Natural Resources, along the beach ridges, yields from unconsolidated aquifers range from five to 25 gallons (20 to 100 liters) per minute. In areas between and south of the beach ridges, wells yield less than five gallons (20 liters) per minute. Low-yield areas include most of Leroy Township outside of the far southeastern corner. Yields of most uppermost bedrock aquifers in Lake County are five to 25 gallons (20 to 100 liters) per minute in southwestern Leroy Township. Well yields should be used as a factor in determining the "carrying capacity" of land; how much development it can support.

### Nonpoint source pollution

Nonpoint source (NPS) pollution comes from many sources in both urban and rural areas. Runoff from cropland, parking lots, lawns, mines, and septic systems often contribute to NPS pollution. Pollutants are transported to the surface and ground water by rainfall. During large storms, the runoff to surface water and infiltration to ground water increases, as does the rate of pollutant movement.

A large source of groundwater pollution comes from the overuse of agricultural chemicals. Fertilizers and herbicides, such as atrazine, are applied to fields to enhance crop yield. However, only limited concentrations of these chemicals are needed to be effective. Excess compound will remain in the soil, where they may degrade or adhere to soil particles. Any compound remaining unattached to the soil will eventually travel to an aquifer.

Increasingly, NPS pollution originates from urban uses, such as suburban lawns and gardens, street and parking runoff, and construction sites. Urban areas often don't have enough vegetation to slow the rate of contaminant travel. This can lead to a faster contamination rate where more highly concentrated pollutants are transported into aquifers. In Leroy Township, poorly-managed equestrian uses can also contribute to NPS pollution. According to an informal survey by the Lake County Soil and Water Conservation District, Leroy Township has 76 equestrian operations, considered anything from a single horse behind a garage to a stable with over 100 animals. Depending on the soil, a minimum of about two acres (1 hectare) of pasture is required to support one horse.

The Ohio Department of Natural Resources recommends using best management practices to reduce nonpoint source pollution. Best management practices are a management strategy that incorporates both engineering and cultural techniques that have been effective and practical in reducing water contamination. Best management practices include the timely and careful application of fertilizers and pesticides, the construction of filter strips surrounding fields that border a surface water source, and creation and protection of wetlands, which act as filters cleaning sediment, nutrients, and other NPS pollutants.



## 10.4 Soils

## Soil types

Two types of soils cover most of Leroy Township; Darien-Mahoning in the center, and Plateau-Pierpoint north and south.

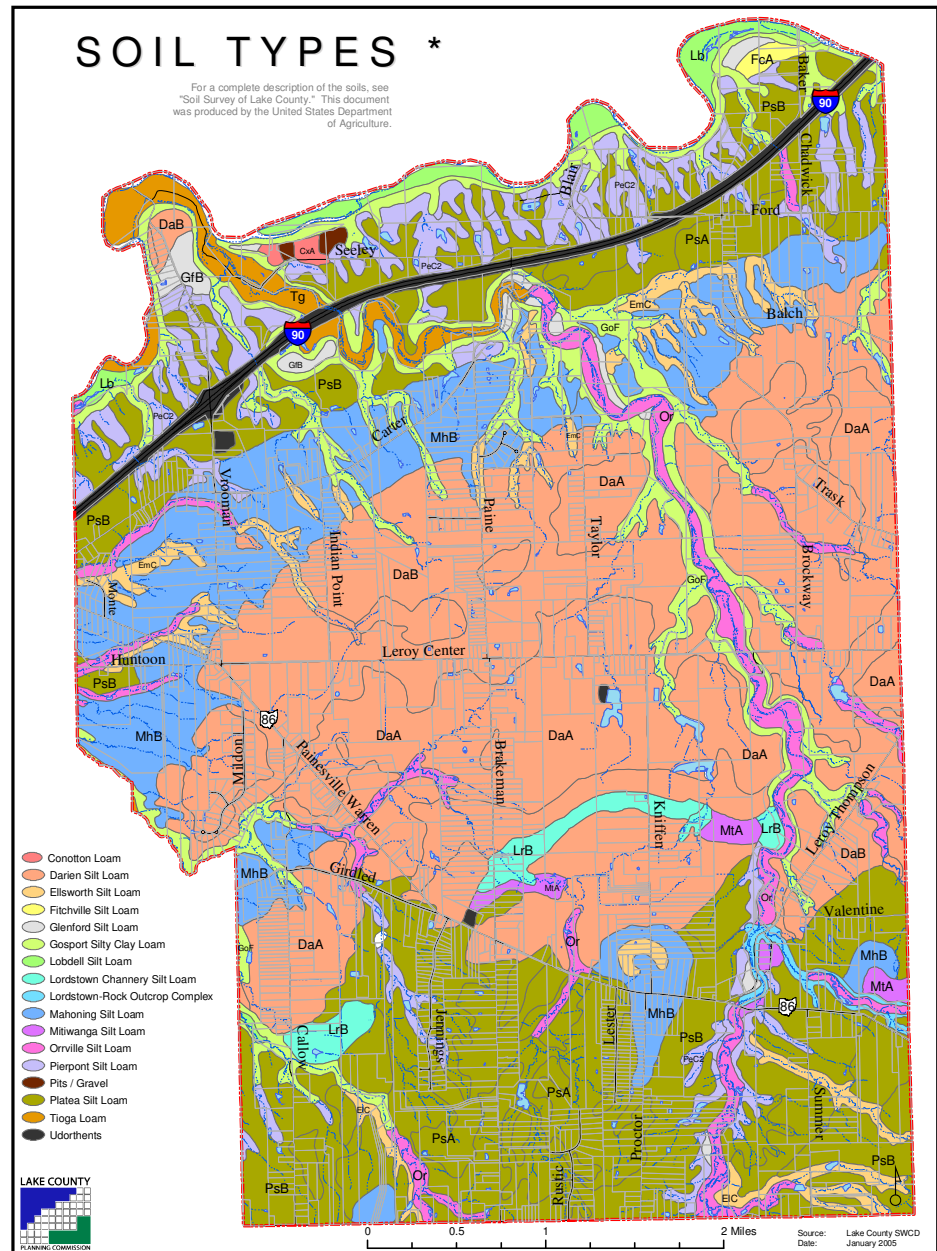
Plateau-Pierpoint soils are somewhat poorly to moderately well drained soils that formed in silty or loamy glacial till. Use of this unit is diverse and includes cultivated crops, shrubs and trees, and residential or urban development. Wetness and the hazard of erosion limit these soils for farming and for other purposes. Local ponding is common in nearly level areas. If adequately drained, they have fair potential for cultivated crops. Wetness and the slow or very slow permeability are so difficult to overcome that the potential for urban development is poor.

Darien-Mahoning soils are somewhat poorly drained soils that formed in silty or loamy glacial till on till plains

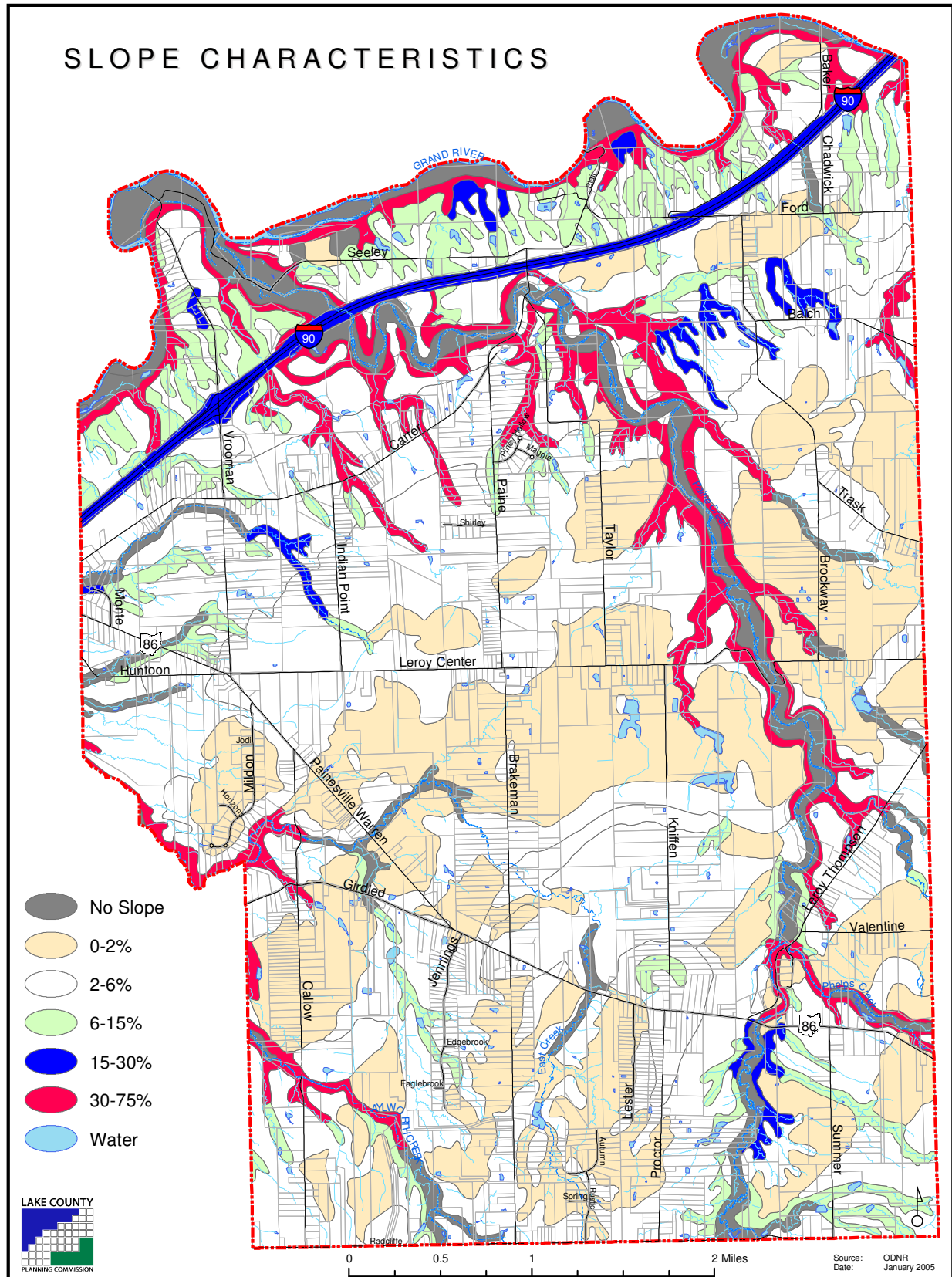
This soil family can be found on broad flats and in dissected areas along drainageways. Such soils have fair potential for farming. Wetness and

restricted permeability are such severe limitations and are so difficult to overcome that the potential for residential and other urban development is poor. The potential for wetland wildlife habitat is fair.

Much of the land in Northeast Ohio with soil classified as USDA Prime (having favorable characteristics for general agricultural production) and Prime/Special (with favorable characteristics and a sandy texture ideal for nursery production) has been urbanized. Much undeveloped land with USDA Prime soil remains in north and central Leroy Township. However, large lot development along farm roads is threatening to permanently remove such ideal soils from agricultural use. Hobby farms growing very specialized products, such as organic produce or herbs, may be viable on small sites, though. Encouraging micro-farms would also serve to keep land in agricultural production, and help retain some rural character as the population grows.







## 10.5 Mineral extraction

Limited mineral extraction has taken place in the township through the years. The Keeney quarry, located on a 19 acre (7 hectare) parcel at 13346 Girdled Road, is the only mineral extraction operation in the township. According to the Ohio Department of Natural Resources, sales of 84,352 tons (76,522 tonnes) of crushed sandstone extracted in Leroy Township were recorded in 2001.

Mineral extraction operations should be conducted in a manner that does not intrude on parks or nearby agricultural and residential land uses, nor should it negatively impact watersheds, waterways, water tables and groundwater resources. Use of groundwater for mineral extraction operations should not cut off or decrease water flow to residential wells.

Heavy truck traffic associated with mineral extraction is addressed in the Transportation element.

## 10.6 Arboriculture

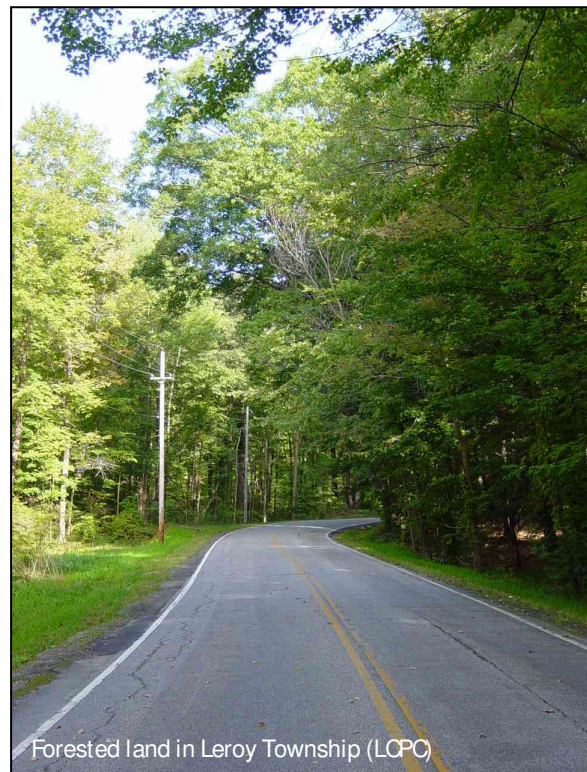
A popular belief is that, before European contact, America was dominated by impenetrable, relatively uniform forests that cloaked the landscape. The reality was quite different. Pre-settlement forests were quite dynamic, shaped by a myriad of both natural and human-caused influences, disturbances and catastrophic events that had a profound effect on the age, plant species and wildlife of the forest environment. Pre-settlement forests were a diverse mosaic of forest stands whose age, tree species and wildlife varied widely and reflected the disturbance history of the area.

The original forests of Leroy Township were not pristine in the sense of being uninfluenced by humans. Native Americans in the area lived in fixed villages, and domesticated crops accounted for more than half of their diet. Thousands of acres were cleared for fields, and more was burned to improve game habitat, facilitate travel, reduce insect pests, remove cover for potential enemies, enhance conditions for berries and to drive game. It was a shifting type of agriculture. Fields and villages were abandoned when their natural fertility ran out, new forests were cleared, and the abandoned lands quickly reverted back to forest. In Leroy Township, forests were cleared for farms, and woodlands around mills and forges were gradually depleted. As farmland was abandoned, and small mills became economically unviable, forests slowly reclaimed the land.

The ecological subregion of Leroy Township, as defined by the United States Forest Service, is: Humid Temperate Domain: Hot Continental Division: Eastern Broadleaf Forest (Continental) Province: Erie and Ontario Lake Plain Section.

Leroy Township includes 20 acres (9 hectares) of land that is classified as a forest reserve, and 150 acres (61 hectares) under conservation easements.

The amount of land in Leroy Township used for woodlots – a private area restricted to the growing of forest trees, specifically for building material or fuel – is not known. Lake County Cooperate Extension encourages sound woodlot management through educational programs and information sharing.



Forested land in Leroy Township (LOPC)

Many communities in the United States have tree preservation regulations. Under most tree preservation ordinances, site planning must consider the location of healthy, large native trees, and attempt to preserve them wherever possible. Trees subject to preservation cannot be removed unless they are replaced with trees of an equivalent caliper; for instance, a tree with a six inch diameter may be replaced with another six inch diameter tree, two trees with three inch diameters, or three two inch diameter trees, in addition to trees required by landscaping regulations.

Wooded land can still be developed with selective cutting of vegetation. However, many developers find it is more convenient to clear a site of all trees, to provide unlimited, easy access to construction vehicles. Tree preservation regulations can preserve the sylvan quality of the township, while still permitting development. Wildlife habitat is preserved, and the



provided shade reduces energy costs. Privacy and home values are also enhanced. Leroy Township does not have tree preservation regulations. The township also does not have tree planting requirements for houses built on cleared land, such as former farm and grazing sites. The township should consider minimum planting requirements for new houses, to preserve forest cover and maintain the secluded character of residential areas.

## 10.7 Oil and natural gas

According to the state Department of Natural Resources, as of May 2004 there are 92 oil wells and 365 natural gas wells in Lake County, 30 of which are in Leroy Township. (Many of the counted wells appear on DNR oil and gas township maps as existing, but generally are very old and have not been field verified; they may or may not exist.)

Most of Ohio's 62,902 active oil and gas wells are classified as "stripper" wells or wells that produce less than 10 barrels (42 gallons/160 liters per barrel) of oil per day or less than 60,000 cubic feet (1700 cubic meters) of gas per day. The total production from wells in Leroy Township is not tabulated.

## 10.8 Air quality

According to the United States Environmental Protection Agency (EPA), Leroy Township does not have any recorded commercial or industrial sources of toxic release inventory (TRI) pollutants, volatile organic compounds, sulfur dioxide emissions, nitrogen oxide emissions, particulate matter emissions, or carbon monoxide emissions. What little air pollution there is in Leroy Township blows in from the west, or comes from motor vehicles and fireplaces. The heavy tree cover in much of the township filters many airborne pollutants.

## 10.9 Noise pollution

Most noise pollution in Leroy Township is generated by traffic from construction sites and Interstate 90. Poorly muffled snowmobiles and ATVs also contribute to a growing din. As the population of Leroy Township continues to grow, traffic on once-quiet rural county roads will increase, along with the resulting noise. Noise from roads can also encroach into parks and environmentally sensitive areas, and affect wildlife habitat and mating patterns.

Commercial uses can be the source of constant noise, coming from car washes, loudspeakers and public address systems at gas stations and auto dealers, idling vehicles at drive-through windows, and loading areas and after-hours deliveries at supermarkets and big box stores. These uses are not prevalent in the township, but proactive adoption of regulations intended to regulate and buffer fixed point sources of noise – requiring large buffer zones, berms, and/or masonry walls between residential and commercial uses, especially loading areas, accessory car washes and trash enclosures; and/or restricting music and advertising at gas stations – can prevent the intrusion of unwanted noise into residential and environmentally sensitive areas. Noise pollution can be mitigated with sound walls; tree preservation and screening; conservation development in areas close to sources of noise, and large building setbacks from highways and loud industrial uses.

## 10.10 Light pollution

Light spillover from development creates a nighttime glow above much of northeast Ohio, which many find to be unappealing. Light pollution also obscures clear views of the nighttime sky, an attribute often seen as a benefit of exurban and rural living. The sources of light pollution include poorly shielded lighting from commercial development – particularly auto dealerships, gas stations, and businesses with large parking lots that remain illuminated long after business hours – cobra-head style street lighting, sports facilities, and residential security lighting. Artificial light that is not properly directed downward can spill into the night sky and onto other properties, causing a nuisance to adjacent property owners. Except for gas stations with overly bright under-canopy and pole lights, Leroy Township does not have many sites that generate stray or excessive light. However, that can change as development continues.



Tall light pole at an Ashtabula truck stop (LCPC)



Heavy foliage, such as the forest cover found throughout much of Leroy Township, filters some stray artificial light, but light from taller light poles and lights in cleared areas can pass unblocked onto neighboring properties and into the night sky.

Curbing light pollution in Leroy Township may not greatly improve views of the night sky, especially considering sources of artificial light in more heavily developed parts of the Cleveland metro area. Maintaining dark skies above Leroy Township will help to preserve its peaceful, rural character. Lighting can be addressed through the implementation of requirements for light pole height, illumination levels, type of light, shielding, dispersal of light onto adjacent properties, and other elements in the township zoning resolution.

## 10.11 Goals and policies

Each primary paragraph (**in bold type**) is a statement of a goal. The subparagraphs are policies for implementing the goal.

### **NR-1 Activities and land uses that could harm waterways and watersheds are discouraged.**

- NR-1-p1 Promote continued preservation and restoration of natural habitat areas and high priority sites in the Grand River watershed, in conjunction with county, state, federal and local government agencies.
- NR-1-p2 Work with county, state and federal agencies to purchase, or acquire easements or development rights, to high priority sites and areas of outstanding natural significance, for restoration and/or preservation.
- NR-1-p3 Support appropriate uses along rivers and streams that limit their impact and protect the environmental qualities of these natural systems, including parks and open space, carefully planned residential development, institutional uses, and civic uses where located outside floodplains.
- NR-1-p4 Promote conservation along rivers and streams through the location of parks, open space, floodplain preservation, requirement of forested buffers, and use of conservation easements.
- NR-1-p5 Encourage green construction practices, such as permeable pavement and green roofs, which are intended to reduce groundwater runoff.
- NR-1-p6 Create maps of existing and mitigated wetlands.
- NR-1-p7 Keep floodplains in a natural state wherever possible, to ensure natural functions are maintained and not compromised.
- NR-1-p8 Seek continued preservation and restoration of natural habitat areas and high priority sites in watersheds, in conjunction with county, state, federal and local government agencies.

### **NR-2 The availability and quality of groundwater will be an important consideration in planning and development.**

- NR-2-p1 Discourage development in areas where groundwater availability or well yields are low. Appropriate land uses in such areas include large residential estates, agricultural operations that require no irrigation, public parks, and open space.
- NR-2-p2 Discourage land uses that draw or consume a disproportionately large amount of ground water, to the detriment of existing and future well users in the area.
- NR-2-p3 Require incorporation of design features that will reduce or eliminate the impact of non-point source pollution from areas with large impervious surfaces.

### **NR-3 Appropriate soils will be considered in planning and development.**

- NR-3-p1 Preserve areas with unique soils, or soils of local significance. Development in such areas should be minimally disruptive, with as little impervious cover as possible.

**NR-4      The arboriculture of Leroy Township will be preserved and enhanced.**

- NR-4-p1      Work with Lake County to implement development and design standards that promote preservation of healthy existing native trees, plants and groundcovers. Work with property owners and developers to consider alternative site designs to reduce tree loss in the development review process. Discourage clearcutting mature woodlots and forests, especially healthy second generation forests.
- NR-4-p2      Implement stronger landscaping requirements for residential, commercial and industrial uses. Encourage retrofitting older, otherwise barren commercial and industrial sites with landscaped areas.
- NR-4-p3      Expand urban forestry operations as funds become available. Urban forestry efforts should include planting of native trees, preferably those grown by local nurseries, in road rights-of-way, parks, and public land.
- NR-4-p4      Preserve the heavily forested visual character of the I-90 corridor.
- NR-4-p5      Encourage sound management of woodlots. Work with local government agencies, Cooperative Extension, and other groups to educate property owners about sustainable woodlot management.

**NR-5      Air pollution will be minimized.**

- NR-5-p1      Monitor state and federal legislation intended to improve air quality, and support as appropriate.

**NR-6      Noise pollution will be minimized.**

- NR-6-p1      Adopt design standards to address and reduce effects of noise pollution.
- NR-6-p2      Encourage use of earthen berms, noise-reducing pavement, and/or other features that will reduce or eliminate effects of highway noise, without deflecting it elsewhere.

**NR-7      Light pollution will be minimized.**

- NR-7-p1      Adopt lighting standards to address and reduce light pollution. This includes using cutoff fixtures, lighting building and pedestrian spaces only, low-impact lighting of parking lots and gas station canopies, and reducing light generated during non-business hours.
- NR-7-p2      Substitute conventional light fixtures at Township facilities and along Township roads with fixtures that maximize light downward, eliminate stray light and reduce light, as they are replaced.