

10 Natural Resources

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10.1 Introduction

Preserving and enhancing the natural environment of Painesville Township will prove to be a challenge in coming years. The presence of heavy manufacturing and the chemical industry have left the township with countless brownfields; many toxic or potentially so, many located in lakefront areas that would otherwise be prime real estate. Access to Lake Erie, the most valuable natural resource in Painesville Township, is limited by the presence of brownfields, remaining factories, and private residences. The excellent water quality and aquatic communities of the Grand River could be threatened by non-point source pollution and increased stormwater runoff as development in the township and areas further upstream continue.

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 pollution from signs and utility structures.

The Natural Resources element, based in part on the (draft) 2006 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 contribute to the quality of life in Painesville 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 Lake Erie

Lake Erie, the great body of fresh water forming Ohio's north coast, is the fourth largest of the five Great Lakes and the 12th largest freshwater lake in the world.

The common perception maybe that Lake Erie is a timeless entity, formed in the distant past and as ancient as any visible rock or landscape, and a feature that will remain essentially unchanged for eternity. Geologists, however, view Lake Erie in its present form as a very recent feature – less than 4,000 years old -- that is destined for a relatively short life, geologically speaking. The known history of the lake and its predecessors has taken place in the last 14,000 years.

The presence of Lake Erie was downplayed in the 1960 Lake County Comprehensive Plan. The future land use map of the 1960 plan envisioned the Lake Erie coastline as being an area lined with medium-to-high density residential uses and heavy industry, with only a few areas left untouched by development.

The scale of development predicted in the 1960 plan never took place. Today, much of the land along the lakefront remains undeveloped. Residents and businesses are increasingly recognizing that Lake Erie is a rich resource, providing both a natural habitat with few equals, and a catalyst for future sustainable economic development – if it is carefully managed. The Lake County Planning Commission, citizen groups, local government agencies and the State Department of Natural Resources have been working to avoid and reverse the mistakes of the past, and maintain a healthy balance between the wise use and thoughtful protection of the resources of coastal Lake Erie.

The Eastern Lake County Coastal Comprehensive Plan was completed in August 2003. The study region of this includes an area 1000 feet (300 meters) shoreward of Lake Erie between the Lake-Ashtabula

county line and the City of Mentor-Painesville Township boundary. The report inventories existing conditions and current and proposed projects, and also examines current and projected needs within the study area.

This project was prepared with the assistance of planning committees and representatives of underlying local government jurisdictions. An overview committee made up of representatives from each of the local committees and County level representatives was formed to represent the broader scope of the study.

Plan implementation is a long-term prospect, expected to take 10 to 15 years to fully develop. The financial return of these projects cannot be estimated, being regional in nature and affecting a significant number of other regional and statewide projects.

Although the plan deals mainly with coastal area development, it makes the following recommendations regarding natural resources.

- Local governments should assess their coastal areas, and determine what they need to protect.
- Parkland acquisition costs should include funding for shoreline stabilization projects.
- Develop shoreline protection projects.
- Restore the Fairport Harbor breakwall.
- Overall protection of historic and cultural sites, beaches, scenic views, natural resources, natural features and recreational opportunities, as well as the lake itself.
- Control non-point source pollution and stormwater runoff.

Erosion

Although it has been millennia since the end of the Ice Age, the lake and coastline continue to be shaped through the natural process of erosion. Lakeshore erosion is the predominant geologic hazard in Painesville Township, especially in the Painesville-on-the-Lake area.

Breakwalls concentrate wave energy into areas just outside the wall, resulting in accelerated erosion on land just beyond their protection. Wave action flowing around the Fairport Harbor breakwall resulted in the loss of many houses, and even entire streets, in the Painesville-on-the-Lake area.

Steep bluffs are formed where the waves impact the land. The height of the bluffs varies considerably in the township. There are deep narrow valleys where streams have carved their way through the bluffs to the lake.

High bluffs along the Lake Erie shore are also subject to other natural processes. The most dramatic process is called slumping. High bluffs fail naturally, and through time will eventually attain a natural stable angle of repose, or a stable slope. As the bottom of a bluff is cut away by erosion, the weight of bluff materials will cause the face of the bluff to break free. When this happens, large blocks of bluff material will collapse and fall into the lake. Waves will scour away silts and clays, leaving behind sand and stone. This is a natural beach-building process. The loss of sand caused by entrapment, groundwater seepage, surface water runoff, and human activity or changes in land use that would alter the hydrology or vegetation on a site can accelerate slumping.

Sand loss also has an effect on the slope beneath the water. Since beaches in the study area are narrow, there is little sand on the lake bottom to absorb wave energy. As a result, waves excavate the lake bottom close to shore. As near-shore depths increase, the amount of wave energy increases, this increasing erosion along the shoreline.

Previous efforts to slow or stop erosion have met with limited results. Excessively long groins trap sand that would have been deposited on the downdrift shore, making those areas more susceptible to erosion; there is less sand available to buffer wave action. Owners of lakefront property in the Painesville-on-the-Lake area have often taken inappropriate measures to stop erosion, such as dumping construction debris

and large objects on the beach. However, dumped material will often get stirred up during a storm, gouging out more of the shoreline and accelerating slumping.

The US Army Corps of Engineers recommends several low-cost methods of protecting shoreline property. Beach fill, creating gently sloped beaches, will cause incoming waves to break and use up their energy before reaching inland areas. Perched beaches use low retaining walls to trap sand, creating a new beach for recreation and shore protection. Well-designed offshore barrier islands or breakwaters dissipate the energy of incoming waves, trapping sand behind them without concentrating destructive wave action elsewhere. Groin fields trap and retain sand, nourishing the beach compartments between them; however, they should be designed in a way where they will not cause unacceptable erosion of the downdrift shore. Revetments are engineered structures placed on steeper banks or bluffs in a way to absorb the energy of incoming waves, without redirecting wave energy to unprotected areas.

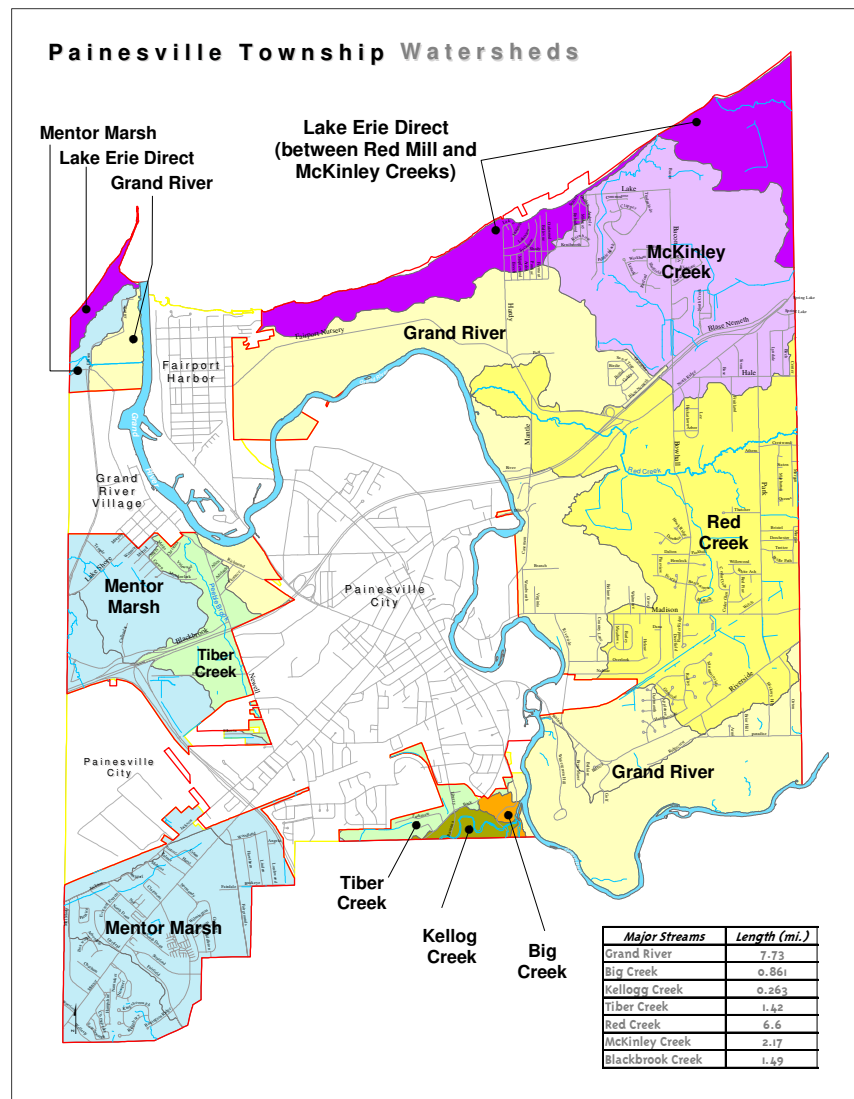
The housing element (6) also discusses recommended responses to erosion in the Painesville-on-the-Lake area.

10.3 Waterways and watersheds

Watersheds

A watershed is an area designating where water will flow. If it rains along the Lake Erie shoreline, the water will flow directly into Lake Erie. If it rains in the southwestern corner of the township, water will flow into the Mentor Marsh area and eventually enter Lake Erie. Inevitably, water that enters any watershed in the township will make its way into Lake Erie.

There are eight identifiable watersheds in Painesville Township: Lake Erie, Mentor Marsh, McKinley Creek, Red Creek, Grand River, Tiber Creek, and small portions of Kellogg Creek and Big Creek. Each watershed drains a respective area very close to or near waterways carrying the same name that is discussed above. Lake Erie's watershed drains 875 acres (354 hectares) along the coastline of the Township. Mentor Marsh drains 2,981 acres (1,206 hectares) into either the marshlands directly, or the Marsh Creek which is located in Mentor. McKinley Creek provides an area of 1,402 acres (567 hectares) of drainage to the northwestern section. Red Creek is the third largest watershed



expanding 2,190 acres (886 hectares) across the eastern-central border allowing water to flow into the Grand River. The Red Creek, Tiber Creek, Kellogg Creek, and Big Creek watersheds overlap the Grand River watershed. Without including these in the area of Grand River's watershed, it drains 6,563 (2,656 hectares) acres. Tiber Creek drains 1,312 acres (531 hectares) of the central eastern Township. Kellogg Creek and Big Creek watersheds are the smallest in the study area; Kellogg draining 60 acres (24 hectares) and Big draining 34 acres (14 hectares).

According to reports from the 1998 Clean Water Act, the Grand River Watershed from Paine Creek to Lake Erie is in relatively good health. The Total Maximum Daily Load (TMDL) of pollutants into the watershed is listed as low. Still, despite its current health, the watershed still faces some leading pollutants that can stress or degrade the water quality. These include, but are not limited to, habitat alterations, metals, and organic enrichment/low dissolved oxygen. Leading sources that create a source of water quality problems are agriculture, bridge construction, landfills, combined sewer overflow, erosion of natural chemical deposits, and other urban runoff. The best use of the watershed, and the factor most impaired by these stressors, is the support of aquatic life.

Three non-governmental entities have been working within the Grand River and Kellogg Creek watersheds towards preservation. The goal of **Grand River Partners** is to preserve the open space, natural, recreational, agricultural and scenic resources of the Grand River watershed. Another group focused on the Grand River is the **Grand River Wild and Scenic Advisory Council**. The council is appointed by the Ohio Department of Natural Resources (ODNR) chief, and focuses its attention on distributing public money within 1000 feet of the river. The **Kellogg Creek Conservancy** also works on watershed-related issues.

Grand River

Numerous natural waterways weave throughout the Painesville Township landscape, forming a complex system of water drainage to Lake Erie. The largest, most significant natural waterway in Painesville Township is the Grand River.

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

What is a Watershed?

The term *watershed* describes an area of land that drains downslope to the lowest point. The water moves through a network of drainage pathways, both underground and on the surface. Generally, these pathways converge into streams and rivers, which become progressively larger as the water moves on downstream, eventually reaching an estuary, lake and the ocean. Other terms used interchangeably with watershed include *drainage basin* or *catchment basin*.

Watersheds can be large or small. Every stream, tributary, or river has an associated watershed, and small watersheds join to become larger watersheds. It is relatively easy to delineate watersheds using a topographic map that shows stream channels. Watershed boundaries follow major ridgelines around channels and meet at the bottom, where water flows out of the watershed, a point commonly referred to as a stream or river.

The connectivity of the stream system is the primary reason for doing aquatic assessments at the watershed level. Connectivity refers to the physical connection between tributaries and the river, between surface water and groundwater, and between wetlands and water. Because water moves downstream, any activity that affects the water quality, quantity, or rate of movement at one location can affect locations downstream. For this reason, everyone living or working within a watershed needs to cooperate to ensure good watershed conditions.

-- *Watershed Stewardship Education Program Training Guide, Oregon State University and Sea Grant Extension*

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.

Approximately eight miles (12.5 kilometers) of the Grand River flows through Painesville Township. The river follows the southeastern border of the township. The river winds north, dividing the eastern end of the township from the City of Painesville. North of the Lakeland Freeway, the river is lined by vacant and active industrial sites, both on the township (north) and city (south) side of the river. A small portion of the township, home to the Morton Salt mine, is located west of the river mouth. Much of Painesville Township lies in the Grand River watershed.

The Grand River overall has generally excellent water quality and aquatic communities, but there are some environmental threats that Ohio EPA (OEPA) is monitoring. One of the most problematic pollutants in Painesville Township is mercury. Mercury can erode from natural deposits, be discharged from a refinery/factory, or run off from landfills and croplands. Mercury is categorized as a persistent bioaccumulative toxic (PBT) chemical according to the OEPA, along with lead and dioxin. PBT chemicals can persist in the environment for long periods of time, resist being destroyed, and accumulate in body tissue. Since these chemicals accumulate, poisoning may occur over time by direct contact with the PBTs, consuming animals with high levels of the toxins, and similar means.

The most helpful indicator for citizens regarding health of the river is the Ohio Sport Fish Consumption Advisory (located on the OEPA Web site). This advisory provides information for human health advisories, fish consumption/fishing, and recreational activities in different waters of Ohio. Being aware of advisories in areas where residents live and gather can help prevent contamination. The long-term solution should not be avoidance, but decontamination of vacant and occupied industrial sites with pollutants that affect the Grand River.

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 further upstream is mostly forested. Although there is some residential development upstream, lot sizes are usually large, and contamination from groundwater runoff and nonpoint source pollution is less of a threat.

According to the Ohio 2004 Integrated Water Quality Monitoring and Assessment Report, the Grand River has made the list of prioritized impaired waters needing a Total Maximum Daily Load (TMDL). The TMDL is a program that takes steps towards eliminating impairments in water quality by using watershed based planning.

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 resource.

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 Painesville Township, south and east of the Norfolk Southern railroad trestle. 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.

Grand River tributaries

Most other waterways in the township flow directly into the Grand River. Tiber Creek (1.42 miles / 2.29 kilometers), Red Creek (6.62 miles / 10.65 kilometers), and McKinley Creek (2.17 miles / 3.49 kilometers) are smaller tributaries of the Grand River. The most difficult hurdle to overcome when looking at waterways of the township, and their watersheds, is the mixture of information available on each. ODNR

and OEPA data are not available on the Grand River's tributaries. However, the Lake County Soil and Water Conservation District is planning to study these streams.

Larger, more significant tributaries of the Grand River are Big Creek (0.86 miles / 1.38 kilometers) and Kellogg Creek (0.26 miles / 0.42 kilometers). Most of the area in the Big Creek and Kellogg Creek Watersheds fall in Concord Township, with a small portion located in the south central portion of Painesville Township.

Mentor Marsh

The Mentor Marsh watershed is the second largest primary watershed, draining 2,981 acres of land in Painesville Township. Excluding the Mentor Marsh itself, this watershed is nearly built-out or planning is underway on the remaining vacant parcels. The ***Marsh Area Regional Coalition*** (MARC) was formed in 1999 to develop and promote a management plan to protect and enhance the environmental, social and economic assets of the Mentor Marsh Watershed and related communities for the benefit of present and future generations. The MARC is a group of government organizations, private conservation groups and individuals dedicated to the preservation and environmentally sound development of Mentor Marsh and its surrounding environs. A *Special Area Management Program* (SAMP) was developed by the MARC to address and recommend strategies for the following issues:

- Lakeshore and watershed erosion and sedimentation
- Existing development patterns
- Failing septic systems
- Hydromodification
- Industrial land uses in close proximity to environmentally sensitive areas
- Jurisdictional interests and concerns
- Brine wells
- Loss of riparian and wetland habitats
- A need for a coordinated strategic recreational plan
- Negative impacts of some types of public access
- Oil storage lagoons
- Ownership and land management
- Point source pollution
- Projected growth patterns
- Public understanding and attitudes
- Stormwater runoff
- Coastal sand supply

The issues and recommended policies found in the SAMP can be applied to the other watersheds in Painesville Township.

Effects of suburban 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.

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.

Painesville Township is managing stormwater through requirements implemented during the permit process for new development and through assistance provided by the Lake County Stormwater Utility Department. Major tools include detention basins that temporarily store and slowly release runoff from large storms 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 impact of urbanization 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. Painesville 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 and 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.

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

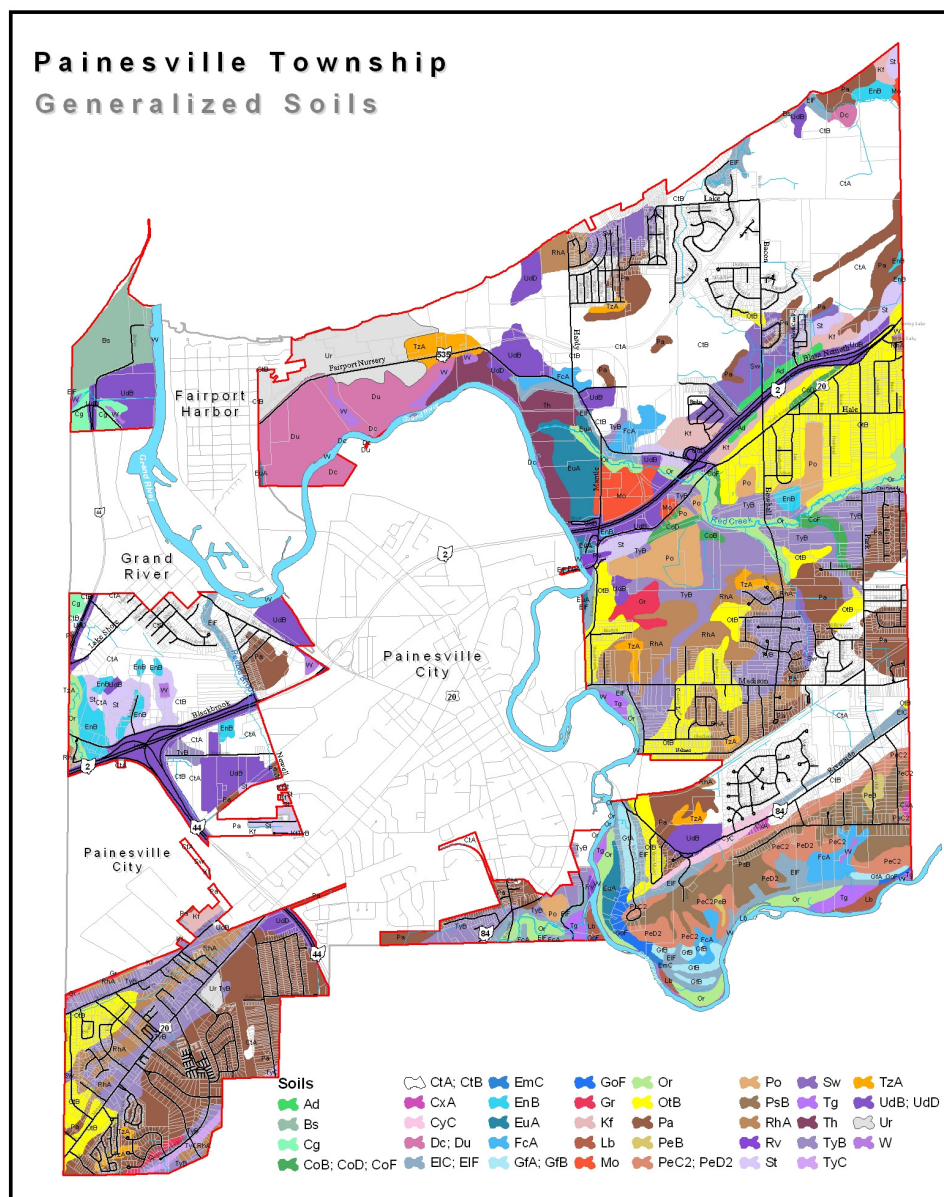
of contaminant travel. This is evident in areas with high amounts of impervious surface (commercial corridors in southwestern portion of the township). This can lead to a faster contamination rate where more highly concentrated pollutants are transported into aquifers.

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

The soils within a region range in classification from general to specific depending upon whether broad or detailed planning is occurring within an area. Detailed soil classifications and their suitability for various types of agricultural uses are not discussed, because the township is increasingly covered by suburban development. Small areas of undeveloped land, if developed, will use specific soil series and classifications on a case-by-case basis.

Painesville Township is located within the lake plain feature. The soils of this area are primarily silt and sand deposits with the exception of former glacial beach ridges. These ridges run through the center of the township, parallel to the Lake Erie shoreline. These ridges are comprised



of sandy, gravelly soils, are well drained, and have been developed into State Road 84 (Riverside Drive) and US 20 (North Ridge Road). The rest of the lake plain is comprised of poorly drained land with high potential for wetlands. The lake plain soils are often considered excellent for horticultural nurseries.

The lake plain contains two major soil map units; the northern shore with Conotton-Conneaut-Allis, the rest of the township with Mahoning-Canfield-Rittman-Chilli. These soils formed in glacial deposits during the Ice Age. They have a low lime content and are not extremely fertile; lime otherwise neutralizes the acidity of soils allowing for more fertile crop production.

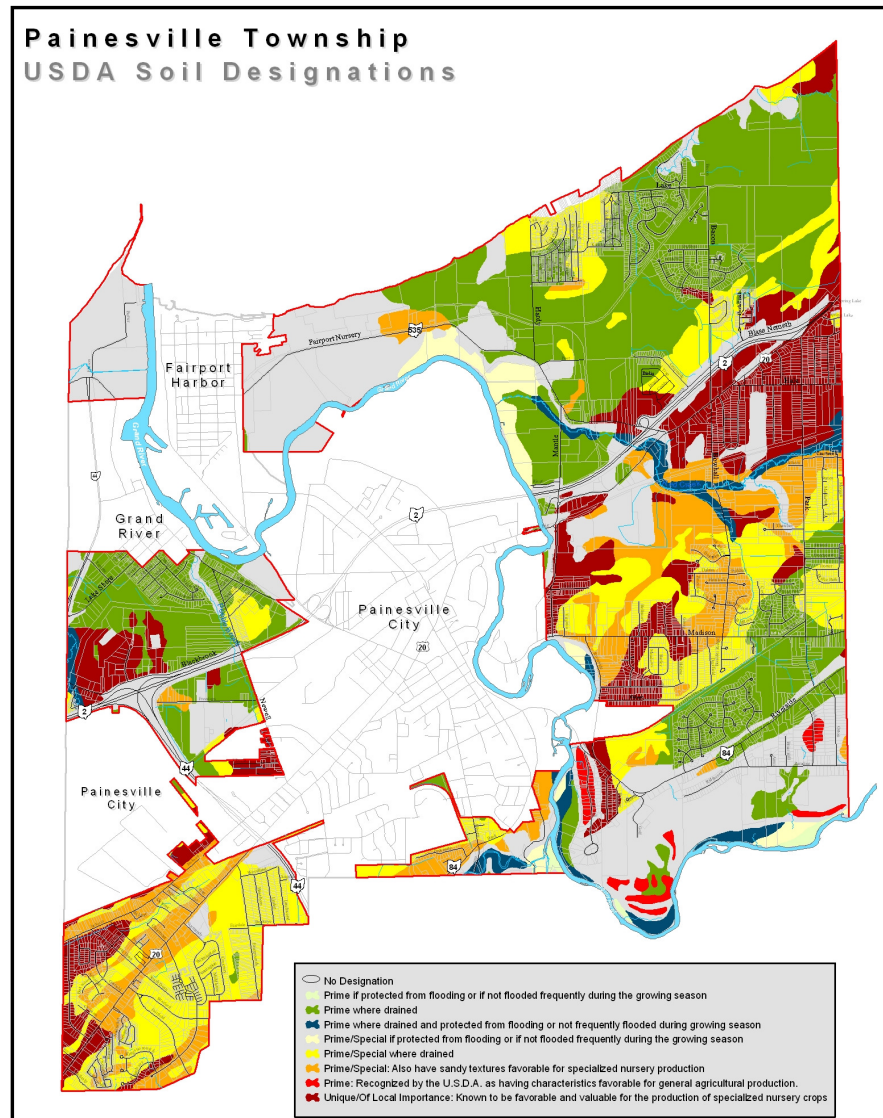
In the two above-mentioned areas, six prominent soil types can be specified. The northern third of the township is primarily Conneaut Silt Loam. This soil tends to be very wet with a high water table, is highly erodible, and has a very slow percolation rate.

South of US 20 and east of the Grand River, most of the soils are either Otisville Gravelly Sandy Loam or Redhook Sandy Loam. Otisville soils are very dry soils which have a very high sand content and a low water table; the soil type tends to be droughty and excavations may cave in. Redhook soil is the opposite; with a high water table, use of septic tanks can be troublesome. Sewers should serve development on Redhook soil.

West of the Grand River and south of US 20, most soil is either Painesville Fine Sandy Loam or Tyner Loamy Sand. As with the east side of the township, one soil, Tyner, is very dry, and the other, Painesville, is very wet. Development on wet soils such as Painesville Loamy Sand should be sewered.

Along South Ridge Road in the eastern part of the township, the predominant soil is the Conneaut Silt Loam. On the highlands in the extreme southeast corner is an area of Pierpont Silt Loam. This is a much heavier soil, but it is still very wet, and has the added disadvantage of being highly erodible.

Any of the major soil groups in the Painesville Township area have a moderate development potential, but all have some minor problems that can be overcome.



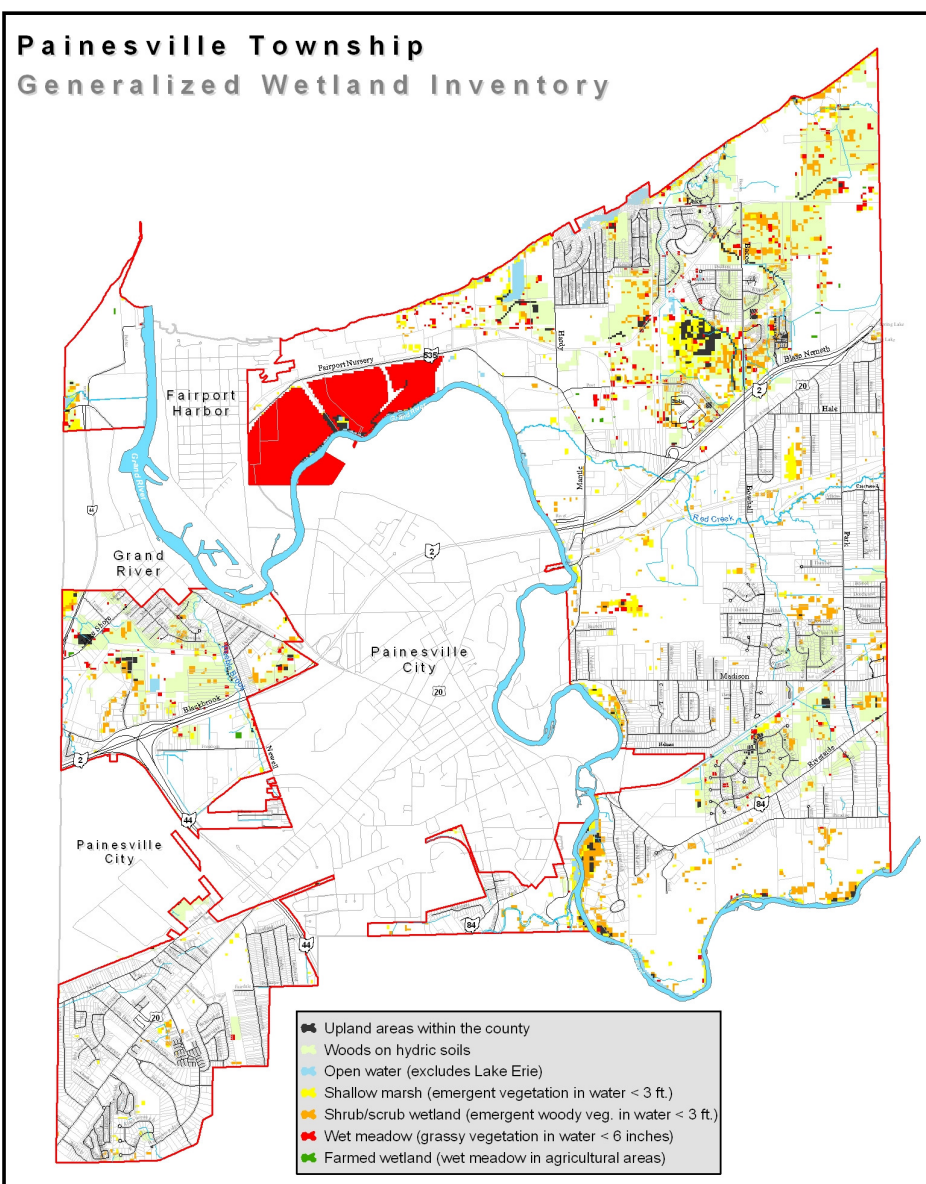
10.6 Wetlands

Wetlands are important components for water quality and quantity. According to the US EPA, wetlands provide water quality protection, fish and wildlife habitat, natural floodwater storage and reduction in the erosive potential of surface water.

In Ohio, 90% of the original wetlands have been destroyed since the 1800s. Locally, development pressures have disturbed a large amount of natural wetlands. ODNR data indicated pockets of wetlands along the in the northeastern portion of the township and Blackbrook Rd. corridor.

Mitigation is required for developers who disturb wetlands on site, but the creation of new wetlands often occurs outside of the watershed that has been impacted.

A local wetland mitigation bank would be an extremely valuable asset for Painesville Township and Lake County as a whole.



10.6 Groundwater

Because most of the Township is urbanized and sewerred, groundwater quality is less critical than in outlying areas. However, health of groundwater resources is important for numerous reason including, but not limited to, the direct relation to the health of streams, rivers, Lake Erie, and any other surface water entity; irrigation where it is still used on crops and lawns; and protection of plants, animals, children and other such entities from contaminated water that has percolated out of the ground. Groundwater, like surface water, is constantly in motion; nonpoint source pollutants affecting

groundwater in Painesville Township would eventually impact the potable water supply of other communities.

Groundwater pollution is most susceptible in three key areas of Painesville Township: the mouth and riparian corridor of the Grand River, the former glacial beach ridge corridor through the township, and along and in the beach ridges in the southwestern and eastern portion of the township. Most of these areas have been developed, or are slated for residential development in the near future.

The former glacial beach ridges have the highest potential for pollution. Most of the beach ridges are covered with impervious surfaces, due to the paving of State Route 84 and US 20, along with the commercial and industrial development along those roads. It could be assumed that there is little potential for pollution. However, impervious surface does not cover the entire area at risk. Due to soil absorbency and potential for runoff from paved and impervious surfaces, the risk factor for this area increases during heavy rain and snow. When a storm exceeds the stormwater expectancy, overflow will seep into the surrounding soils.

Absorbent Soils	+	Impervious Surfaces	+	Concentrated Contaminants	=	Increased levels of groundwater pollution
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The mouth and riparian corridor of the Grand River is the second area of notably high risk for groundwater pollution. Similar risk to the groundwater can be prevented through riparian setbacks, discussed in the Waterways and Watersheds section.

10.6 Oil and gas

According to the Ohio Department of Natural Resources (ODNR) Emergency Oil and Gas Well Locator, there are 33 natural gas wells in Painesville Township. No oil wells exist inside township boundaries. Most of the state's 62,902 active wells are classified as "stripper" wells, which produce less than 60,000 cubic feet (1,700 cubic meters) of gas per day.

The largest concentrations of natural gas wells can be found in the northeastern corner of the township. These wells are commonly Ohio shale and Clinton formation wells.

Recently, all regulatory actions regarding gas wells were delegated to the ODNR. Some general guidelines when considering well locations in residential areas are:

- A vertical well cannot be drilled closer than 100 feet (30 meters) from any property not in the drilling unit.
- A directional well can conceivably be drilled right next to a property line.
- A well cannot be closer than 50 feet (15 meters) to the edge of a road shoulder.
- Distance between new homes and existing wells or tanks is not regulated. However, new wells and production equipment must be at least 100 feet (30 meters) from existing homes.

Hydrogen sulfide emission is the primary concern of gas wells near residential areas. Hydrogen sulfide is a colorless gas that has a strong odor of rotten eggs in certain concentrations. The Ohio Division of Oil and Gas monitors emission reports of hydrogen sulfide, and provides information on signs to look out for if exposed to it.

10.8 Air quality

The Lake County General Health District operates four monitoring sites in Lake County. These sites monitor the county Air Quality Index (AQI). The AQI is an standardized index for reporting daily air quality, indicating how clean or polluted your air is, and what associated health effects might be a concern for you.

The AQI measures six criteria air pollutants – ozone (the principal component of smog), volatile organic compounds (released from solvents, paints, glues and burning fuel), particulate matter (dust, smoke and soot), carbon monoxide (from burning fuels), nitrogen dioxide (from burning fuels, especially gasoline), sulfur dioxide (from coal and oil burning power plants and other industrial processes) and lead.

AQI measurements are available on a county level. The AQI for Lake County is in “good” environmental health levels. The General Health District is concerned about high ozone levels, and is working to help bring the County into compliance with EPA standards.

To better study Painesville Township, more air monitors are needed. This would expand current knowledge of where pollutants are entering the atmosphere, how weather and wind patterns move pollutants, how it affects the microclimate, and what can be done on the local level to influence county and statewide air conditions. Airshed planning should be taken into consideration as a step the township can make towards bettering air quality for itself and its neighbors.

Air quality is also inventoried in the Toxic Release Inventory (TRI) for the 44077 ZIP code. This is the smallest reported area that encompasses Painesville Township. According to data from 1988 to 2002, the fugitive air and stack air emissions of various chemicals is showing a downward trend; the air is getting cleaner. (*Stack air emissions* include any chemical release through a confined air stream such as a vent, duct, pipe, or smokestack; *fugitive air emissions* include equipment leaks, spills and other releases that are not intentionally directed away from the source.)

Total air emissions are comprised of the total of fugitive air and stack air release amounts. By following all three data sets from 1988 to 2002, the declining air pollution trend can be attributed to two main factors:

- Stricter chemical disposal monitoring and regulation through the EPA and other environmental agencies.
- Overhaul of the manufacturing industry in its raw material usage, product output, and discharge of waste.

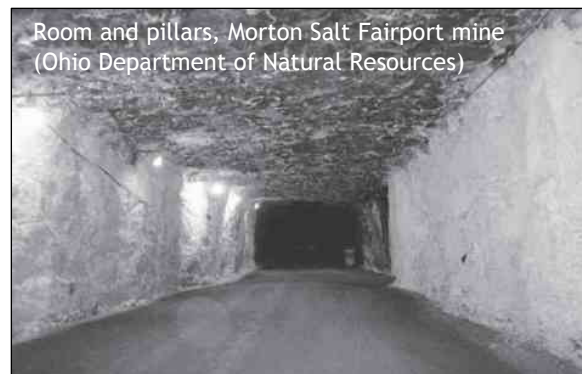
Increased tree cover, described in the arboriculture section, can help filter many airborne pollutants.

10.9 Mineral extraction

According to the Ohio Department of Natural Resources, there are only three minerals being mined in Painesville Township: salt, sand, and gravel. Salt mines from Painesville Township used for ice and snow removal. Sand and gravel are often mined together, to be used in construction as an aggregate for concrete, asphalt, or cement. Gravel is commonly used as a fill material for driveways. Sand is often used for ice control, molding sands, and sand-blasting.

In 1959, Morton Salt opened the Fairport Salt Mine in Painesville Township, at the mouth of the Grand River. The mine, 2,500 feet (750 meters) under ground, extends three miles (5 kilometers) north under Lake Erie. Between 1990 and 2000, the Fairport mine averaged 1,200,000 tons (1,090,000 tonnes) of salt in annual sales. Caverns from earlier solution mining operations of salt in Painesville Township are now used for propane storage.

Sidley-Painesville Plant, operated by R.W. Sidley, is located on Casement Avenue near Erie Street. While sand and gravel was extracted in the past, at the time this plan was written, top soil was the only material removed from the property. With the eventual redevelopment of the nearby Casement Airport property, the mine site may be suitable for reclamation and redevelopment for residential use.



10.10 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 Painesville 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 Painesville Township, forests were cleared for farms and nurseries. As farmland was abandoned, forests slowly reclaimed the land.

The ecological subregion of Painesville 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.

The amount of land in Painesville 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 Cooperative Extension encourages sound woodlot management through educational programs and information sharing.

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 for 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. Painesville 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, nursery and reclaimed greenfield sites. The township should consider minimum planting requirements for new houses, to preserve forest cover, reduce the potential of urban heat islands, filter polluted air, and prevent soil erosion. Promoting urban forestry through mandatory tree planting requirements and municipal planting programs for public rights-of-way also has the benefit of protecting the local nursery industry.

10.11 Noise pollution

Most noise pollution in Painesville Township is generated by vehicle traffic from the Lakeland Freeway and other major streets, idling vehicles in commercial areas, and the two major rail lines that cut across the community. As once-vacant land in the northeast corner of the township is developed, traffic on once-quiet 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. Closure of Casement Airport in 2000 reduced noise pollution from aviation.

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. 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. Mitigation for noise pollution includes sound walls; tree preservation and screening; conservation development in areas close to sources of noise, and generous building setbacks from highways and loud industrial uses.

10.12 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 not properly directed downward can spill into the night sky and onto other properties, causing a nuisance to adjacent property owners. Light pollution generated from strip plazas and auto dealers along Mentor Avenue lends to the poor appearance of the area, creates a nuisance for nearby residents, and contributes to the glow over the night skies of northeast Ohio.

Curbing light pollution in Painesville 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. Light pollution and nuisance lighting can be addressed by adding and enforcing 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.

10.13 Goals and objectives

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

- NR-1 Lake Erie will be considered the most significant natural resource in Painesville Township.**
- NR-1-O1 Support and implement the plans and policies of the Lake County Coastal Development Plan.
- NR-1-O2 Seek the continued preservation and restoration of natural habitat areas and high priority coastal sites along Lake Erie, in conjunction with state, federal and local government agencies.
- NR-1-O3 Encourage the clustering of new development along the Lake Erie shore, to preserve natural and environmentally sensitive areas and high priority coastal sites, and provide public access to the lakefront.
- NR-1-O4 Acquire easements or development rights to high priority coastal sites and areas of outstanding natural significance along the lakeshore, for restoration and/or preservation.
- NR-1-O5 Implement shoreline protection techniques, to slow erosion and rebuild a natural environment that is more resistant to future erosion. Shoreline protection techniques should be minimally invasive, both physically and visually. Shoreline protection techniques that ultimately result in the creation of new beaches and recreational areas will be encouraged.
- NR-1-O6 Discourage shoreline protection techniques that would potentially increase erosion in other areas.
- NR-1-O7 Update zoning regulations to increase building setbacks of lakefront properties in erosion-prone areas. Prevent construction of new buildings that would be immediately subject to erosion concerns.
- NR-1-O8 Expand public access to natural resources along Lake Erie, provided it does not hurt such resources.
- NR-2 Activities and land uses that could harm waterways and watersheds are discouraged.**
- NR-2-O1 Promote the 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-2-O2 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-2-O3 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-2-O4 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-2-O5 Encourage green construction practices, such as permeable pavement and green roofs, which are intended to reduce groundwater runoff.
- NR-2-O6 Create maps of existing and mitigated wetlands.
- NR-2-O7 Require subdivisions and development sites to be designed so no building sites are located in the 100 year flood plain, and where other improvements avoid the flood plain, wetlands and other riparian features wherever possible.
- NR-2-O8 Establish a minimum riparian setback requirement for properties adjacent to or near waterways, streams, wetlands and floodplains.
- NR-2-O9 Keep floodplains in a natural state wherever possible, to ensure natural functions are maintained and not compromised.
- NR-2-O10 Work with state and federal officials to obtain grants and assistance to clean or seal toxic sites.
- NR-3 The availability and quality of groundwater will be an important consideration in planning and development.**
- NR-3-O1 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-3-O2 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-3-O3 Require the incorporation of design features that will reduce or eliminate the impact of non-point source pollution from areas with large impervious surfaces.
- NR-4 Appropriate soils will be considered in planning and development.**
- NR-4-O1 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-O2 Discourage development on inappropriate sites, including areas with slopes that exceed 15%, and areas that are considered unsuitable for building and agriculture given the nature of the soils and underlying geology. Such areas should be set aside for public or private open space.
- NR-4-O3 Consider soil drainage in assessing development. Avoid poorly drained soils wherever possible in locating buildings, or address such constraints through building and site improvements.
- NR-5 The arboriculture of Painesville Township will be preserved and enhanced.**
- NR-5-O1 Work with Lake County to implement development and design standards that promote the 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-5-O2 Implement stronger landscaping requirements for residential, commercial and industrial uses. Encourage retrofitting older, otherwise barren commercial and industrial sites with landscaped areas.

NR-5-O3 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-6 Air pollution will be minimized.

NR-6-O1 Increase urban forestry efforts in areas where there is a large concentration of polluting industries.

NR-6-O2 Monitor and support state and federal legislation intended to improve air quality.

NR-7 Noise pollution will be minimized.

NR-7-O1 Adopt design standards to address and reduce the effects of noise pollution.

NR-7-O2 Encourage the use of sound walls, earthen berms, noise-reducing pavement, and/or other features that will reduce or eliminate the effects of highway noise, without deflecting it elsewhere.

NR-7-O3 Require the buffering of residential uses located near sources of noise pollution, such as the Lakeland Freeway, using sound walls, berms, existing and new vegetation, and other techniques that will not deflect sound into other areas. Future residential development near the Lakeland Freeway should be sited or clustered to reduce or eliminate the effects of highway noise.

NR-7-O4 Discourage the placement of noise-sensitive land uses, such as schools, hospitals and nursing homes, adjacent to major arterials, unless they are well-buffered to reduce the effects of highway noise.

NR-8 Light pollution will be minimized.

NR-8-O1 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 the light generated during non-business hours.

NR-8-O2 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.