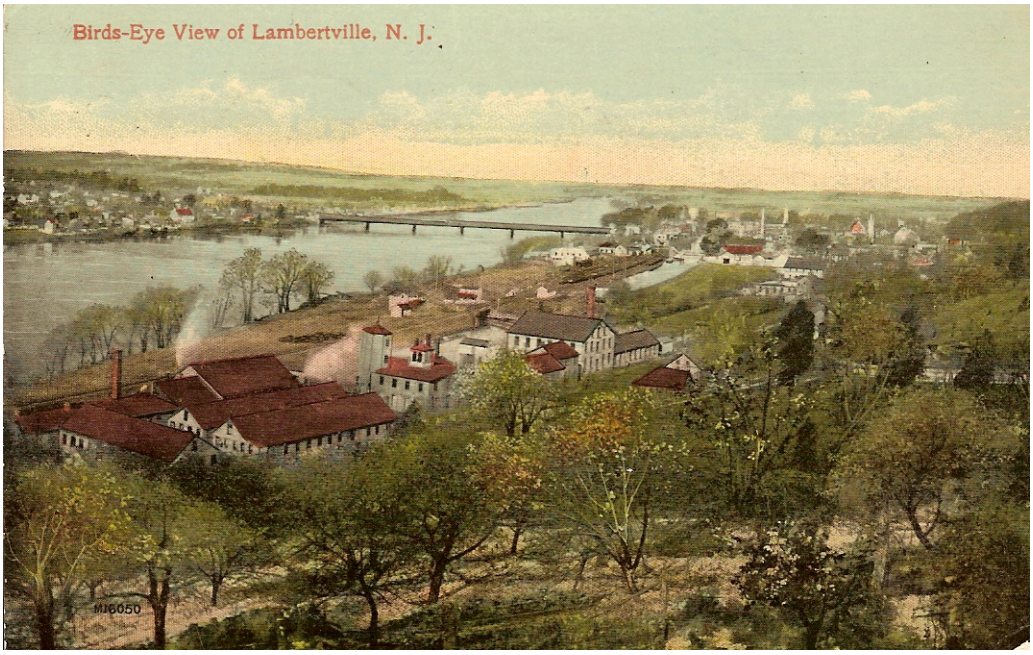
ENVIRONMENTAL RESOURCE INVENTORY

CITY OF LAMBERTVILLE

2008



This document is an updated version of the Environmental Resource Inventory prepared in 1991 by the Lambertville Environmental Commission and adopted in January 1992 by the Lambertville Planning Board. This current version was finalized by the Lambertville Environmental Commission in 2007 and adopted by the Lambertville Planning Board in May 2008.

LAMBERTVILLE ENVIRONMENTAL COMMISSION
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1. INTRODUCTION

The Environmental Resource Inventory (ERI) was initially prepared in 1991 by members of the Lambertville Environmental Commission, with the assistance of other residents, under the authority of the Environmental Commission enabling legislation (N.J.S.A. 40:56A) and the Municipal Land Use Law (N.J.S.A. 40:55D-1 et seq). Upon adoption by the City, this revised ERI will become part of the Lambertville Master Plan.

The purpose of the revised ERI is to update detailed information about natural resources and open spaces within the City's boundaries. Some of this information will be of value to the Planning Board and the Zoning Board of Adjustment as they make decisions regarding future land use in Lambertville. By updating the initial ERI and presenting current information, the revised ERI provides baseline data and becomes a tool to be used in monitoring changes that might occur in connection with land use and water resources. Additionally, the revised ERI is intended to inform the City's residents about environmental resources in Lambertville, thereby stimulating interest in the judicious use and protection of these resources.

The Environmental Commission is a municipal advisory body appointed by the Mayor and City Council. The Commission is empowered to:

- Research the current and potential uses of open lands;
- Coordinate activities of unofficial bodies that pursue similar research;
- Prepare written documents and maps;
- Make recommendations to the Planning Board regarding plans and programs for the Master Plan;
- Make recommendations to the Planning Board about the use and development of open space; and
- Advise the City with regard to water resources management, air pollution control, solid waste management, noise control, soil and landscape protection, environmental appearance, protection of flora and fauna, and other issues of an environmentally sensitive nature.

Preparation of the Environmental Resource Inventory (ERI) provides the Lambertville Environmental Commission with the opportunity to catalogue the City's significant environmental resources. The value of these resources would thus be recognized and the information useful to citizens and planners alike. The ERI consists of a report containing narrative, maps and tables. It describes the City's resources, such as open space, soils, watercourses, vegetation, and wildlife habitats, as well as "limiting features" such as wetlands, steep slopes, and floodplains. The ERI provides an objective listing that forms the basis for informed findings, conclusions, and recommendations. This revision to the ERI includes new sections on recycling, stormwater management, climate/air quality and a listing of contamination sites, along with additional updates since the original ERI was adopted in 1992. A hard copy of the 1991 version of the Environmental Resource Inventory is available for review at City Hall, and a PDF version may be viewed on the Environmental Commission's website, www.lambertvillenj.org/.

The approximately 1.14 square miles that define the City of Lambertville contain varied natural resources and landscape patterns. The City lies within a floodplain and rises steeply to upland woods; it has flat land and ridges; it is dissected by streams and bordered by a major river; it contains wetlands and open fields/meadows; it provides rare plant habitat and areas that harbor rare animal species. All of these features are important to the general character of the city and quality of life of its inhabitants. Findings from an informal survey conducted in 1990 by the City of Lambertville indicate that measures that preserve natural areas and protect streams, wetlands, and plant and animal habitats are of high priority to residents of the City. Figure 1 shows the City's location, major river and stream drainages, and topography.

Natural resource protection should be a fundamental component of municipal planning in all settings. Natural processes provide numerous benefits and do so free of cost. Floodplains, for example, moderate stormwater flows while wetlands provide critical plant and animal habitat. Woodlands and streamside vegetation moderate erosion caused by surface water runoff. Plant and animal life preserve natural diversity and serve to maintain stable ecosystems. At the same time, overuse and exploitation of natural resources overtaxes the environment. This can result in severe, if not irreversible, damage. Once disturbed, many of the natural functions are severely diminished or lost and are difficult, if not impossible, to replace. For the individual, this can mean the destruction of property, a reduction in land value, and the loss of aesthetic resources, as well as increased health and safety hazards. For the community, equivalent benefits derived from these areas can only be realized through public expenditure for such activities as water filtration, flood control projects, and repeated stocking of fish. Thus, the carrying capacity of the natural environment must be kept in mind to safeguard public health, safety and welfare, and minimize burdensome and unnecessary public costs.

Natural resource protection can involve structural or nonstructural approaches or a combination of these two approaches. Structural approaches include measures taken during construction to minimize stormwater runoff, as well as flood control devices that prevent damage to buildings in floodplains. Nonstructural approaches include open space preservation via public acquisition of land, zoning and subdivision regulations, and private stewardship. In all cases, efforts should target critical areas that have intrinsic environmental value and that are vulnerable to damage by intensive development.

The simplest way to address critical area protection in Lambertville is to delineate the City's physical resources, determine locations of areas of greatest environmental value, and then designate these places as the highest priority for preservation or protection. In addition to providing an inventory of Lambertville's environmental resources, a summary of its cultural and environmental history is provided.

2. HISTORY OF LAMBERTVILLE

Historically and continuing through today, Lambertville has been a residential and commercial hub for surrounding rural areas. The terrain and natural resources found here have been influential in shaping the city's development, with the Delaware River exerting a major influence.

Fertile farmland and the proximity of water sources led to the establishment of farms by the Holcombe, Lambert, and Coryell families in the early to mid 1700s. The first subdivision of property occurred in 1802 when John Coryell began selling building lots on Coryell Street. Between 1812 and 1832, Bridge, Union, York and Delevan Streets were laid out, thus concentrating residential and commercial land use in what is now the central part of the city. There were four houses in Lambertville in 1776, about 100 houses by 1832, and more than 500 houses in 1863. According to the 2000 census, Lambertville contained 1,860 total housing units.

While the Delaware River did not provide a navigable waterway for transport to other nearby river communities, early residents did develop methods for crossing the river to what is now New Hope, Pennsylvania. A ferry was in operation even prior to Coryell's acquisition in 1732, of the rights to operate a ferry across the Delaware River. In 1812, the first Lambertville-New Hope Bridge, a wooden structure, was built. The current iron bridge was constructed in 1904, following the original bridge's destruction in the flood of 1903, which had brought the river's level to 25 feet above normal stage.

The State's decision to allow construction of a canal connecting the Raritan and Delaware Rivers had a major impact on the development of Lambertville. The Delaware & Raritan Canal, a feeder canal, was built in the 1830s. The D&R Canal, which diverts 100 million gallons per day from the Delaware River at Raven Rock, parallels the river through Lambertville to Trenton. The D&R Canal provided Lambertville with a navigable waterway to Trenton and also brought a significant influx of new citizens, who had come to the area to work on its construction.

The population of Lambertville in 1844 was approximately 1,000 and by 1849, the year of the City's incorporation, had grown to 1,417. In 1851, the Belvedere-Delaware Railroad was constructed alongside the canal north from Trenton. The subsequent expansion of the D & R Canal in 1852 led immediately to the industrialization of Lambertville. One of the earliest industrial activities was railroad machine shops. Begun shortly after the completion of the Lambertville-Flemington line in 1854, the shops built locomotives as well as freight and passenger cars. In 1871, when the Pennsylvania Railroad took over the Belvedere-Delaware Railroad, the shops became maintenance yards for repair operations.

The Lambertville Spoke Factory, located at the north end of town at Elm and North Union Streets, originally manufactured only spokes but by 1860 was building the entire wheel. During the Civil War, this factory produced as many as 400 wheels a day, which supplied practically the entire wagon and cannon wheel needs of the Union Army.

Another important industry of national significance was rubber reclamation and manufacture. Lambertville had two rubber factories: the Lambertville Rubber Company, organized in 1882, and the New Jersey Rubber Company. Other industries in town included several saw mills, flour and flax mills, machine shops, a brass foundry, a brewery, a rope and twine factory, a cotton thread mill, and several paper mills.

In 1872, with a population of 4,637, Lambertville was designated as a city by the New Jersey State Legislature. Telephone lines were installed in 1881 and the City was electrified in 1893 with electricity that was supplied by coal fired generators located north of Arnett's Sawmill and Lumber Yard on North Union Street.

The Lambertville Hairpin Factory, founded in 1901, was an important industry in Lambertville during the beginning of the 20th century. This factory produced nearly 15 tons of hairpins each week. Another significant industry was the Lambertville Pottery Company, which began manufacturing in 1909 with 2 kilns located on North Union Street. By 1922 this company had grown to a twelve-kiln operation and was producing 300 bowls and tanks a day.

The town's economy declined in the years following World War I with the closure of the Hairpin Factory in 1922 and the Pottery Company in 1925. During this period, the New Jersey Rubber Company and the Lambertville Rubber Company also ceased operations.

Following its 75 years as a significant industrial center and then the gradual economic decline accompanying deindustrialization, Lambertville reemerged as a tourist destination and desirable residential community. Its proximity to New York City and Philadelphia, spectacular views of the Delaware River, and intact stock of Victorian homes all came to be regarded as assets. Starting in the late 1970s, restaurants, antique stores, and art galleries were attracted to the City. The 1980 census listed a Lambertville population of 4,047; the 1990 census, 3,927, and in the 2000 census it was reported at 3,868. This slow decline in population is attributable to declining average household size within a limited geographic area that is almost fully built out, as well as the fact that a significant number of traditional family households have been replaced by those consisting of same sex couples and empty nesters.

Nearly two-thirds of the existing houses in Lambertville are in a special historic district designated on the State and National Historic Registers. The district was established as a result of a survey conducted under the auspices of the Delaware and Raritan Canal Commission, which sponsored a historic survey of all communities along the path of the canal. Using the data from the survey, formal application was made to include the Lambertville Historic District on the State and National Registers. The Lambertville Historic District is bounded on the west by the canal, on the east by Routes 29 and 179 and on the north and south by the areas that are presently developed. Approximately 1,200 structures are included in this district. Copies of the survey may be found in public libraries and at the Delaware and Raritan Canal Commission's main offices.

The Lambertville area has six entries on the State Historic Register. Three of these also appear on the National Register. They include:

- The James Marshall House, which dates from 1816, was added to each Register in 1970.
- The Lambertville House, dating from the early 19th century, was added to each Register in 1978.
- The People's Store (late 19th Century) and the Lilly Mansion (1851) were added to the State Register in 1981.

The Lambertville Historic District was added to each Register in 1983. Further information may be obtained from the New Jersey Office of New Jersey Heritage in the New Jersey Department of Environmental Protection, which publishes the “New Jersey Register of Historic Places.”

Sources

Survey conducted by Delaware and Raritan Canal Commission, 1982

Dale, Frank. 1996. *Delaware Diary: Episodes in the Life of a River*. New Brunswick, NJ: Rutgers University Press

3. THE INVENTORY

3.1 Land Use and Zoning

Land use patterns are the outcome of a complex array of factors, including physical constraints and opportunities, cultural values, individual needs and desires, and governmental policies and programs. The municipal Master Plan provides a broad vision for the future of the community and includes a land use element as well as optional additional community planning elements. Zoning is a specific regulatory practice concerned with permitted uses of land. Ideally, the broad land use vision is consistent with specific regulatory practices.

New Jersey's Municipal Land Use Law requires that each municipality adopt a Master Plan, and that any zoning ordinances be based on the goals, objectives, and strategies articulated in the Master Plan. In crafting Municipal Land Use Law, the Legislature recognized that land use patterns and local zoning might diverge, so municipalities are required to re-examine their Master Plan at least every six years. During the period 1996 through 1999, the Lambertville Planning Board made significant changes to the Master Plan and developed a wide range of land use ordinances for action by the Mayor and City Council. Currently, the City of Lambertville has 8 major zoning districts as designated by the City's Zoning Ordinances dated April 16, 2001, as amended, as shown in Figure 2, Zoning Map. Five districts focus primarily on residential housing uses while the remaining three are largely concerned with business and commercial uses. Park and recreational uses are allowed in all districts. As is typical of most New Jersey municipalities, Lambertville has a long-standing interest in planning and controlling future growth. Zoning reflects a concern about potential strain on municipal services when development occurs in an uncontrolled fashion.

Residential-Conservation (R-C) District: This district allows for low density single family housing in areas of severe flooding potential, poor access or sites which lack access to public water or sewer.

Residential Low Density (R-L) District: This district allows for single family detached dwellings at densities of between 1.3 and 3 units per acre. The low densities are set due to environmental constraints such as steep slopes, wetlands, shallow or stony soils, or shallow depth to bedrock. Clustered development is encouraged within this district to minimize impacts to environmentaly sensitive resources.

Residential 1 (R-1) Single Family District: Uses provided for in this district include single family houses, limited institutional uses and municipal projects. This district is largely developed and served by public water and sewer.

Residential 2 (R-2) Downtown Residential District: Uses allowed in this district include various types of residential units, limited institutional, lodging, social, and municipal projects. This district is served by public water and sewer.

Residential 3 (R-3) Townhouse District: Development allowed in this district consists of low density, modern townhouse development which incorporates common open space.

Central Business District (CBD): A variety of housing, business and commercial uses are allowed in this district.

C-2 Highway Commercial: A variety of general business and commercial uses are permitted in this district.

C-3 General Commercial: Offices, government buildings, wholesale or retail businesses and light industry are permitted uses in this district.

Residential Overlay: Encourages the development of medium and high density residential uses and enhancement of certain neighborhood qualities by requiring base standards relating to the scale, mass, architecture and overall design character of development.

Parks and Recreation

Quality-of-life issues and infrastructural issues are addressed through the Master Plan and local zoning ordinances. These are very much regional as well local-level issues. Traffic circulation and parking problems within the City, for example, are likely to intensify based on the increased development both in the City and in the surrounding areas of West Amwell, Delaware Township, Solebury Township in Pennsylvania, and beyond. A byproduct of traffic congestion is the deterioration of air quality. Because Lambertville's water-supply reservoir functions as a flood-control structure, and because the City treats sewage from Solebury Township, public water supply and sewage treatment capacity also may be strained by increased regional development. Analysis of the maximum build-out permitted by zoning ordinances in Lambertville and adjacent communities demonstrates that the sheer numbers of structures and residents permitted may be more than the city's current transportation, water supply, and sewerage infrastructure can support.

The Steep Slopes Ordinance states that construction in all zoning districts shall be limited by the following sliding scale depending upon the degree of slope of the existing topography:

1. 100% density permitted if slope is less than 15%
2. 50% density permitted if slope is between 15% and 30%
3. 0% density permitted if slope is greater than 30%
4. All building must occur on slopes of less than 20%

This scale applies only to the areas of the tract in which a particular range of slope steepness occurs, and not to the entire tract. Determination of slope shall be based on either a field survey or an aerial survey which shows even 10 foot intervals.

Sources

Master Plan, Lambertville NJ Planning Board

City of Lambertville Zoning Ordinances, June 2001, as amended

3.2 Regional Setting

Located in the southwest corner of Hunterdon County and considered by many to be more a small town than a city, the City of Lambertville is situated along the Delaware River about 18 miles upstream from Trenton, New Jersey. Approximately 1.14 square miles in area, Lambertville is bounded on its North side by Alexauken Creek, on its West side by the Delaware River, and on its South and East sides roughly by the hills overlooking the Delaware River.

About two-thirds of Lambertville lies within the lowlands of the Delaware River. A peninsula, demarcated by Alexauken and Island Creeks and known locally as Holcombe Island, abuts the river on the northwest edge of Lambertville. The Delaware and Raritan Canal lies approximately two blocks east of Holcombe Island and the Delaware River. The primary residential area of Lambertville is located in the area immediately east of the canal. East of Main Street, the elevation rises to the three hill areas of the city known as:

- Music Mountain, which is North of NJ Route 179;
- Connaught Hill, which is between NJ Route 179 and Swan Creek; and
- Cottage Hill, which is South of Swan Creek.

The City has a common boundary with West Amwell on the East side of all three hill areas. Alexauken Creek forms a common boundary with Delaware Township to the North of the City.

Though located in a rural part of central New Jersey which is generally comprised of a mix of low-density residential areas and farmland, there is fairly easy access by highways to major population areas such as Trenton (14 miles), Princeton (16 miles), New Brunswick (28 miles), Flemington (12 miles), Philadelphia (46 miles), Newark (45 miles), and New York City (67 miles). Routes 29 and 202 provide state and federal roadways for travel, commerce, and tourism. Additionally, there are several bus carriers that provide mass transit connections to Trenton, Newark, and New York City.

New Hope, Pennsylvania (Bucks County) is located directly across the Delaware River from Lambertville. New Hope Borough has a population, of 2,252 residents (2000 census) In general, the area around New Hope is more densely populated than the area surrounding Lambertville, even though New Hope's overall regional character, like Lambertville's, is best described as rural, with a mix of low-density residential and farmland.

3.3 Geology

Lambertville is located in the Piedmont physiographic region of the state. The Highlands region lies about 20 miles north of Lambertville while the Inner Coastal Plain begins about 10 miles south and east of the City. Erosion during the last 150 million years created the relief of the Piedmont, leaving the harder diabase rock (volcanic) ridges and hills and the less resistant shale lowlands.

The area of Lambertville was not reached by glaciers during the major Ice Ages. The Kansan-Illinoian glaciation was the most southerly advancing Ice Age in this part of New Jersey; its southern boundary occurred at what is now Flemington, NJ. Figure 3 is a geologic map of the city and surrounding areas.

The main bedrock formations underlying Lambertville include the Brunswick Shale (Passaic Group), and diabase in the southern part of the City. The Brunswick Shale is a major Mesozoic-Triassic (180-225 million years old) geologic unit that underlies approximately 37% of the total land area of Hunterdon County. The Brunswick Shale is normally composed of red argillaceous shale with local beds of fine-grained red sandstone, siltstone**,** and black, gray, or greenish shale. Areas underlain by Brunswick Shale in Lambertville, are characterized by a gently rolling topography. Exceptions are the narrow valleys carved by Alexauken and Swan Creeks.

The southern part of the City is underlain by diabase rocks which are extremely resistant to erosion. The western expression of the Sourland Mountain range is located in the southern part of Lambertville and underlain by these rocks.

The lowland areas of Lambertville, which lie in the floodplain section of the City, are underlain by a thin veneer of unconsolidated Pleistocene deposits comprised of silts, clays, sands and gravels.

Sources

Kasabach, H. F., *Geology and Ground Water Resources in Hunterdon County*, NJ, New Jersey Bureau of Geology, 1974

3.4 Topography

Land use planning must take into account the presence and degree of slopes, for both environmental and economic reasons. For planning purposes, slope is described by its gradient, which is expressed as a percentage. The slope gradient is the vertical change (measured in feet) in elevation of land per 100 feet of horizontal distance. A 10% gradient or slope is equivalent to a 10-foot rise in elevation over a span of 100 feet. Figure 4 shows the areas of steep slopes in the City.

The topography of the City of Lambertville is typical of most of the river towns along the Delaware River. In general, there are two topographic regions in the City; the lowlands within the historic river floodplain and the hillsides or bluffs above the floodplain.

Some residences and businesses are located in the floodplain portion of the city. Elevations here vary little, rising from approximately 60 feet at river-upland interface on Holcombe Island to near 100 feet at the base of the bluffs. From this point, elevations rise sharply up to a height of approximately 330 feet in the southeast corner of the municipality. These highlands are characterized into four areas. In the north section of town, a section of Music Mountain informally known as Cow Hill, upon which the Lambert's Hill townhouse development is located, rises to an elevation of approximately 170 feet. Just to the south of this area, between Phillips-Barber Road and Route 179, a second hill rises to around 220 feet. Between Route 179 and Swan Creek, Connaught Hill reaches an elevation of around 280 feet. Finally, Cottage Hill which is the southern most portion of the City features the highest elevations, in excess of 340 feet.

Topography is also one the defining characteristics shaping the manner in which the City has developed. Within the Delaware River floodplain, many business have been constructed within the 100 year flood elevation. Most older dwellings were not built to accommodate such flooding, which has lead to significant damage to building foundations. More recent developments like the Inn at Lambertville Station and dwellings along South Union Street have been constructed to safely withstand such flooding.

Development on the hillsides faces a different set of challenges and is regulated by the Steep Slopes Ordinance. Initially, there are increased development costs associated with construction on steep slopes because of the difficulties involved. Special design and engineering problems must be overcome. Excavation and road construction are difficult. The cost of grading is a function of the amount of earth to be removed. Steep slopes often have shallow soil and bedrock close to the surface, which makes excavation difficult. Retaining walls may be required for the construction of roads and walkways. Another factor to consider is that septic systems may be difficult to install, maintain and operate on steep slopes. A 12% slope is considered by the federal Natural Resources Conservation Service to be the maximum acceptable slope for maintaining septic systems. Significant issues associated with development on steep slopes include:

a. Increased runoff. Vegetation cover and the infiltration characteristics of underlying soil and bedrock influence the pattern of water flow on hillsides. Removal of vegetation from steeply sloped areas can lead to an increase in runoff volume, runoff velocity and soil erosion.

b. Habitat loss. Most steep slope areas are forested and are situated upslope of waterways. As such they provide valuable wildlife habitat and travel corridors. This

is especially true for Lambertville, where many of the wooded slopes connect with larger habitat blocks in adjacent areas.

c. Erosion. Increased runoff will also result in accelerated soil erosion on steep slopes. To put this concept in quantitative terms, when a 16% slope is developed, the erosion will be three times greater than on an 8% slope with comparable development. Erosion itself can have manifold consequences. For instance, soil productivity is reduced in an eroded area. Property upon which eroded soil is deposited may become damaged and costs incurred to remove the soil can be high. Water quality and quantity are also affected when the eroded soil causes excessive sedimentation of streams, causing increased flood potential, eutrophication, and destruction of aquatic habitats. Costly dredging may be required to deal with the damage. Under construction conditions, the sediment load in streams receiving soil eroded from steep slopes has been found in some instances to increase 100 times over the norm.

In recognition of the problems and perils of steep slope development and in order to mitigate these issues, the City of Lambertville enacted a steep slope ordinance in 1994 which established limits and guidelines for appropriate development. Further, a series of County and additional City requirements must be met.

Slopes in excess of 20% occur along the face of the hillsides and also along several of the stream corridors running though the City. Major steep slope areas within the City include:

1. Hillsides east of Main Street and Ely Field

2. Cliffs on both sides of Highway 179, including the area north of upper York Street

3. Cliffs north of Quarry Road

4. Cliffs east of the Laceworks and Route 29, from the south boundary of the city to Swan Street; and

5. Scattered areas on Cottage Hill and Music Mountain

<u>Sources</u>

Association of New Jersey Environmental Commissioners Handbook, 4th edition, 1997

Delaware Valley Regional Planning Commission, Resource Constraints on Development, DVRPC, April 1976

United States Geological Survey. 1975. Lambertville, NJ-PA Quadrangle

United States Geological Survey. 1981. Stockton, NJ-PA Quadrangle

3.5 Soils

The USDA-Soil Conservation Service designates 19 different soil types within the boundaries of Lambertville. These fall within the following soil series:

Birdsboro silt loam series

1. Birdsboro silt loam, 2 to 6% slope (BdB)

Hazleton channery loam series; well-drained soils that occur on uplands

2. Hazleton channery loam, 6 to 12% slopes, eroded (HaC2)
3. Hazleton channery loam, 12 to 18% slopes (HaD)

Klinesville shaly loam series; shallow and well-drained soils on uplands

4. Klinesville shaly loam, 4 to 12% slopes (K IC)

Legore gravelly loam series, deep and moderately permeable soils

5. Legore gravelly loam, 6 to 12% slopes (LgC)
6. Legore gravelly loam, 12 to 18% slopes (LgD)

Lehigh silt loam series; deep and moderately-to-poorly drained soils

7. Lehigh silt loam, 2 to 6% slopes (LkB)

Mount Lucas silt loam series, deep, moderately well-drained and somewhat poorly drained soils

8. Mount Lucas silt loam, 0 to 6% slopes (MoB)
9. Mount Lucas-Watchung very stony silt loams, 0 to 6% slopes (MwB)

Neshaminy silt loam series, deep and well-drained soils

10. Neshaminy silt loam, 6 to 12 % slopes, eroded (NeC2)
11. Neshaminy very stony silt loam, 2 to 12 % slopes MC)
12. Neshaminy very stony silt loam, 18 to 40% slopes (NhE)

Penn shaly silt loam series; moderately deep and well-drained soils on uplands

13. Penn shaly silt loam, 2 to 6% slopes (PeB)
14. Penn shaly silt loam, 6 to 12% slopes, eroded (PeC2)
15. Penn shaly silt loam, 12 to 18% slopes (PeD)

Pope fine sandy loam series, deep and well-drained soils forming adjacent to the Delaware River

16. Pope fine sandy loam, high bottom (Pk)

Quakertown silt loam series; deep and well-drained soils formed in material weathered from silty sandstone

17. Quakertown silt loam, 6 to 12% slopes, eroded (QkC2)

Rough broken land, shale is found along the Delaware River escarpment and the gorges and short tributaries that feed into the river. About 20% of this land is rock outcrop. The slopes are very steep, generally more than 25%.

18. Rough broken land, shale (Rlf)

Rowland silt loam series, deep and somewhat poorly drained soils

19. Rowland silt loam (Ro)

Merriam-Webster defines soil as “the upper layer of earth that may be dug or plowed and in which plants grow”. The soil scientist defines soil as “the total complex of rock particles, organic material, air, and water that lies on a specific site between the vegetation cover and the parent material or bedrock”. To the farmer, soil is perhaps the most vital element in the food production system, while to the engineer, it is the material on which structures will be built. Soil is a precious resource that is only very slowly renewed. Created through physical and chemical weathering processes, soil usually takes thousands of years to develop from its parent material, which is usually the bedrock that lies beneath it. Soils in specific areas indicate the geologic history of that area. In conjunction with climate and topographic conditions, the physical properties of different soils are a major controlling factor in the distribution of vegetation across the landscape. Soil properties are also often used in planning the nature and location of different types of land development. Application of soil analyses helps minimize the long-term cost and environmental impact of construction on a particular site, as well as the impact of planning on a larger, more generalized scale. See Figure 5 for a map of local soils.

Sources

Soil Conservation Service, *Soil Survey*, Hunterdon County, NJ, 1974

3.6 Floodplains

Floodplains are low-lying lands that occur adjacent to rivers and streams. They encompass the area inundated when storm events cause the waters in the river or stream to spill over their banks. Sediments deposited when these waters recede result in the formation of very fertile soils. When left undeveloped, floodplains provide valuable habitats and travel corridors for both resident and transient wildlife species. However, due to the fertility of the soils, the historic importance of water bodies to trade and travel, and the apparent suitability of level ground for residential and commercial development, many towns and cities like Lambertville were established within a floodplain.

Flooding along the Delaware River has been a continuing problem since the area was first settled during the early 1700s. Because the Delaware River basin is located in the path of major storms, excessive rainfall can cause severe flooding. In the early spring, floods resulting from heavy rainfall are made even more harmful as a consequence of moving ice and snowmelt. Major floods on the Delaware River occurred in October 1903, August 1955, May 1972, September 1999, September 2004, April 2005 and June 2006. Of these floods, the one occurring in August 1955 was the most devastating and costly. This flood, the magnitude of which occurs at an interval of approximately 150 years, caused extensive damage in Lambertville. For example, the Lambertville-New Hope Bridge was closed for 4 weeks due to structural weaknesses and the impact of storm debris. This steel bridge itself was a replacement for the wooden structure that had been completely destroyed by the flood of 1903. Businesses and factories in Lambertville also sustained major damage in 1955. Major flooding in 2004, 2005 and 2006 damaged homes and businesses along Lambert Lane, Union Streets, Swan Street and Wilson Street.

Lambertville was also threatened by floodwaters resulting from the break-up of a major ice-jam on the Delaware River in January 1996. While rising waters inundated the Lewis family property on Holcombe Island and flooded the basements of houses along Lambert Lane, most of Lambertville was spared the flood damage experienced by Yardley and Trenton. Flooding of Alexauken and Swan Creeks normally results when the waters of the Delaware River rise and overflow into these two tributaries. In addition, Alexauken and Swan Creeks are subject to flash floods, which can result in high channel velocities, streambank scour, and bank erosion.

The identification of floodprone areas and the regulation of permissible development is the responsibility of the Federal Emergency Management Agency (FEMA) and the New Jersey Department of Environmental Protection (NJDEP) under the Flood Hazard Control Act Rules (N.J.A.C. 7:13-1 et seq.). Due to the potential dangers to personal and public health and safety that can result from improper development in a floodplain, it is important to know where the floodplain is and what design standards apply to construction there. In 1996, the Mayor and City Council amended the local land use ordinances to impose design guidelines on construction in the parts of the revised Central Business District adjacent to the Delaware River, and between the river and the canal.

The flood map for the City of Lambertville, Figure 6, is the result of a 1981 Flood Insurance Study conducted by the City for FEMA. The map contains a delineation of flood zones and base flood elevation lines. The floodplain delineations on the map were determined by utilizing HEC-2 computer modeling designed for this type of analysis. The following zones are indicated:

> Zone A: Areas of 100 year flood; base flood elevations and flood hazard factors not determined.

Zone A3, A4 & A16: Areas of 100 year flood; base flood elevations and flood hazard factors are determined;

Zone B: Areas between limits of 100 year flood and the 500 year flood, or certain areas subject to 100 year flooding with average depths of less than one foot, or where the contributing drainage area is less than one square mile, or areas protected by levees from the base flood; and

Zone C: Areas of minimal flooding.

The Delaware River is currently being restudied using HEC-RAS modeling, which is an update of the HEC-2 program used when the current flood map was prepared. It is anticipated that an updated flood map will be available in late 2008.

Base Flood Elevation is the computed elevation to which floodwater is anticipated to rise during the base flood. The base flood is the one-percent annual chance flood. The one-percent annual chance flood is the flood that has a one-percent (one out of 100) chance of occurring in any given year. The base flood, which is also informally referred to as the 100-year flood, is the national standard used by the National Flood Insurance Program and all Federal agencies for the purposes of requiring the purchase of flood insurance and regulating new development.

The following waterways are shown on the flood map:

1. Delaware River for its entire length along the City's western boundary;
2. Swan Creek from its mouth on the Delaware River up to its limit on the eastern corporate boundary;
3. Swan Creek Tributary from its mouth on Swan Creek to the eastern corporate limits;
4. Alexauken Creek from its mouth on the Delaware River and along the northern boundary of the City; and
5. The Delaware and Raritan Canal for its entire length within the City.

At the state level, development within the floodplain is regulated by the New Jersey Department of Environmental Protection pursuant to the standards of the New Jersey Flood Hazard Control Act Rules (N.J.A.C. 7:13-1 et seq.). Under these rules, development within the 100-year floodplain for non-delineated streams and within the flood hazard area “design flood” for delineated streams is regulated. The area encompassed by the flood hazard design flood is based upon the elevation reached when the 100-year flood flow (which has a one percent probability of occurring in any given year) is increased by 25%. The inclusion of additional area outside of the 100-year floodplain is provided to mitigate for development which is permitted within the each specific drainage basin.

Sources

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Flood Damage Prevention Ordinance, City of Lambertville

Flood Insurance Rate Map, City of Lambertville, FEMA, April 1981

Guide to Flood Insurance Rate Maps, May 1988

Questions and Answers on the National Flood Insurance Program, August 1987

Academy of Natural Science Library, Special Report 38, *Magnitude and Frequency of Floods in New Jersey with Effects of Urbanization*

John A. Miller, Princeton Hydro LLC, personal communication

3.7 Water and Sewer

The United Water Company (formerly the Lambertville Water Company) provides water for many of Lambertville's residents using water stored at the municipal reservoir off Route 518 in West Amwell Township, approximately 0.5 miles from the City's eastern boundary. A water treatment plant, which is located just downgradient of the reservoir, treats the raw water and diverts it to the City.

Most of the downtown section of Lambertville is connected to the water company supply. Additionally, the upper parts of York Street receive city water, as does a substantial section of South Franklin Street. There is a water tank on Music Mountain, serving parts of Alexander Avenue and Delaware Road.

Major areas of Lambertville that do not receive water from United Water Company include: 1) the majority of houses on Music Mountain that are not part of the Lambert's Hill development, 2) all houses on Connaught Hill and 3) the majority of houses on Cottage Hill. These residents of Lambertville rely on private wells for drinking water supply.

In Hunterdon County, sewerage authorities have been established in communities including Clinton Township, High Bridge, Flemington, Frenchtown, Milford, and Stockton Boroughs, and Lambertville. Relatively high housing densities and/or the presence of soils with severe septic limitations make the installation of public sewers and a centralized treatment system a necessity.

The Lambertville Sewerage Authority, located adjacent to the Delaware River in the southwestern section of the City on a 2.7-acre parcel, was built in 1955 to provide sewage treatment for the City. Since its beginning, the treatment plant has expanded in capacity, nearly doubling its original size to provide service not only for Lambertville but also for surrounding communities. The Lambertville facility provides secondary wastewater treatment - the standard prescribed by the Federal Clean Water Act. Approximately 10 miles of sewer lines and three pumping stations serve the plant. The collection system consists of gravity lines and force mains. In areas where collection pipes do not slope downhill, thereby allowing sewage movement by gravity, pumping stations are installed to raise the sewage to a higher elevation. Three pumping stations are located 1) on North Union Street between Arnett Avenue and Cherry Street, 2) on Coryell Street near the Lambert Lane intersection, and 3) on South Union Street near the Swan Street intersection.

Effluent from the plant, a product of the treatment process, is discharged directly into the Delaware River. Solid sludge is trucked away. Wastewater sludge from the Lambertville plant is shipped to the Stoney Brook Regional Sewerage Authority in Mercer County. The original sewage treatment plant at Lambertville was designed to handle 0.65 million gallons per day (MGD). As a result of expansion, the plant now has a capacity of 1.5 MGD and treats wastewater from Lambertville, Stockton, New Hope, and Solebury Township. In 2005, the total area serviced by the Lambertville Plant was 9.4 square miles with allocations as follows: City of Lambertville, 51.3%; New Hope-Solebury, 41.7%, and Stockton, 7.0%**.** In 2004 and 2005, average daily flows of 0.84 and 0.89 MGD, respectively, were recorded. Maximum flows occur primarily in April, the month with the highest rate of precipitation.

About 2,000 separate sources in Lambertville alone, mostly residential, tie into the Lambertville Sewerage Authority. While this represents a substantial portion of the City, notable areas without sewer service include most of Music Mountain (excepting Lambert's Hill), the area around the old High School, and a small portion of Cottage Hill. A complicating factor in these regions has

to do with the fact that soils and underlying bedrock there pose severe limitations on the use of septic systems.

Sources
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Uhl, Baron, Rana & Associates, Lambertville, NJ, 2006

3.8 Streams and Waterways

Certainly one of the dominant and defining environmental features of Lambertville is the proximity and extent of its various waterways, which have a major impact on the quality of life in Lambertville.

The most prominent waterway is the Delaware River, which forms the western boundary of Lambertville, and is a major environmental, recreational, and aesthetic asset. It is the focus of activity in Lambertville for a good part of the year. Many thousands of people come to or near to town to fish, boat, swim, hike, bike, dine, paint and view the river. A vestige of the traditional connection of the town to the river is retained in the net fishing of shad from Holcombe Island each spring. The return of spawning shad each spring is the inspiration and impetus for Lambertville's Shad Festival, held annually since 1981 to herald the return of spawning shad up the Delaware River. Island Creek, a backchannel to the Delaware River, flows along the eastern side of Holcombe Island and separates the river from the mainland.

The second most prominent waterway is the Delaware and Raritan Canal. The canal is man-made. The right-of-way previously containing the canal towpath and railroad now form a walking and bike path which is a major recreational attraction. It is from the towpath that one can most easily enjoy the river and the canal.

Two perennial streams and at least three seasonal streams shape Lambertville further. The Alexauken and Swan Creeks are perennial. The damming of Swan Creek, just outside of town, created the principal source of drinking water for Lambertville. This source is supplemented by water from the canal and numerous private wells. A remnant of the natural stream corridor of Swan Creek occurs intermittently east and west of Route 29, with extensive channelization. Areas of channelization occur throughout the area upstream from Route 29 to Rock Creek Woods. Stream bank stabilization of Swan Creek, where it passes through the Rock Creek Woods townhouse development, became necessary due to the clearing of natural vegetation within a few feet of the stream corridor when the development was constructed. West of Route 29, the creek flows in a straight line through backyards, under Main and Union Streets, and under the canal - which is channeled through an aqueduct - to the river.

Alexauken Creek forms the northern border of the city and its confluence with the Delaware River is at the northern end of Lewis Island. While Alexauken Creek has not been channelized, it sustained extensive stream bank damage in the early 1970s with the massive Route 202 bridge construction project. The course of the stream was altered by the construction, and large amounts of backfill impinged upon the stream, creating artificially high and steep banks along the portion of the stream which runs along Alexauken Creek Road between Routes 29 and 202. Deterioration of the bank adjacent to the American Legion Field, a short distance downstream, led to the remedial dumping of trap rock in that area.

Monitoring of the Alexauken Creek has been conducted continuously and macro invertebrate sampling is conducted periodically. These data indicate that the Alexauken Creek retains very high water quality. Data collected from Swan and Alexauken Creeks, as well as the Brookville Creek in Stockton, were incorporated into a Watershed Planning Project initiated on the Lockatong and Wickecheoke Creeks. The purpose of this project is to develop baseline geographical and biological data from these tributaries of the Delaware River.

Three seasonal, unnamed streams, flow into Lambertville:

- One at the south end of town, which has been referred to as Rubber Creek
- The second is a stream system/drainage along Route 179 (between Route 179 and York Street) that is channeled at the Ely Field area and ultimately directed into the drainage system recently installed under Delaware Avenue.
- A third stream system that begins in West Amwell Township and flows under the bridge at the entrance to Lamberts Hill. This stream ultimately flows under Main Street at Arnett Street

The southern stream drains the valley which parallels Weeden Street to the south. This stream is dammed less than one hundred meters uphill from Route 29. A small pond once existed behind this dam, but now is completely filled with silt. A second stone retaining wall is located below the dam, just upstream of a culvert that carries the flow from this stream beneath the highway. The stream flows beneath two buildings at the Laceworks complex before entering the mooring basin of the D&R Canal.

Moving northward, the second stream is of interest because of the considerable trouble it has caused residents in the vicinity of Buttonwood and North Main Streets, and the Lambertville Elementary School. These areas have been subject to frequent, extensive flooding. This stream parallels Route 179 and York Street (southwest flow direction) before making a 150° turn to a northerly direction, flowing under a house before following a course parallel with Main Street at the base of Music Mountain. Flowing along the backside of Ely Field, it is joined by a number of rivulets that course down the mountain in rainy conditions. Floodwaters from the stream are now diverted into an engineered tunnel which channels the water under Ely Field, down Delaware Avenue, and under the canal to the back channel of Holcombe Island. Normal flow continues around the school, past the Union Fire House and under Main Street. This project was completed by the NJ Department of Transportation in 2002.

Lambertville is principally underlain by two bedrock aquifer systems, the Diabase Aquifer in the extreme southern part of the City and the Brunswick Aquifer, which underlies most of the City. The Diabase Aquifer is an extension of Sourland Mountain range and consists of Jurassic, fine-grained intrusive crystalline rocks. The Diabase Aquifer is one of the lowest yielding aquifer systems in NJ yet is able to yield supplies of groundwater for single family and low use commercial establishments. The Brunswick Aquifer, which is comprised of inter-bedded sandstone and shale rocks of the Passaic Formation, is a low to moderate yielding aquifer system.

Stormwater runoff is a major source of pollutants and a direct measure of the health of the environment. In March 2005, Lambertville adopted a Municipal Stormwater Management Plan and Ordinance, the purpose of which is to set forth stormwater management requirements and, among other things, to set forth methods of reducing flood damage, minimizing the amount of pollution entering surface and ground waters, and maintaining groundwater recharge. The Stormwater Management Plan may be viewed at www.lambertvillenj.org/. For information about New Jersey Stormwater Management Rules, visit www.njstormwater.org/.

The Delaware River Basin Commission (DRBC) was formed in 1961 when President Kennedy and the governors of Delaware, New Jersey, Pennsylvania, and New York came together and signed legislation creating a regional body with the force of law to oversee a unified approach to managing the Delaware River system without regard to political boundaries.

In 1992, the DRBC adopted Special Protection Waters (SPW) regulations designed to protect existing high water quality in applicable areas of the Delaware River Basin considered “to have

exceptionally high scenic, recreational, ecological and/or water supply values." The SPW regulations discourage direct discharges of wastewater to the designated waterways, and further require that the minimal level of wastewater treatment for all new and expanding wastewater treatment projects discharging directly to Special Protection Waters will be "Best Demonstrable Technology," that is, methods of disinfection that result in no harm to aquatic life, do not produce toxic chemical residuals, and results in effective bacterial and viral destruction. The regulations also tighten the review criteria for new industrial and municipal wastewater treatment plants discharging to the Special Protection Waters drainage area.

The SPW regulations adopted in 1992 focused on controlling point (or "end-of-pipe") sources of pollution to maintain existing high water quality. In 1994, the regulations were amended to add language dealing with non-point source pollutants, which are found in stormwater runoff, especially after heavy rains. Often this type of runoff increases with new development where landscapes are altered and land that once soaked up rain and melting snow is paved over. Impervious surfaces significantly increase the amount and speed of the run-away water, flushing such contaminants as parking lot motor oil and lawn pesticides into rivers and streams.

The SPW regulations adopted in 1992 apply to a 121-mile stretch of the Delaware River from Hancock, New York downstream to the Delaware Water Gap. In January 2005, based on water quality data collected from 2000 through 2004, the DRBC temporarily classified the 76-mile stretch of the non-tidal lower Delaware River between the Delaware Water Gap National Recreation Area and Trenton, NJ as Special Protection Waters through September 30, 2005. The Commission has twice extended the temporary designation, through September 30, 2006 and again through September 30, 2007. This action is expected to be finalized once water quality analysis is completed. Including the temporary classification, the entire 197-mile non-tidal Delaware River is now covered by the SPW anti-degradation regulations.

In addition to the regional protections provided under the SPW regulations, in October 2000, Congress gave its final approval to two bills that added a section of the lower Delaware River to the National Wild and Scenic Rivers System. The Lower Delaware Wild and Scenic Rivers Act added a 38.9-mile section of the main stem Delaware (and about 28 miles of selected tributaries) to the National Wild and Scenic Rivers System, linking the previously designated Delaware Water Gap and Washington Crossing, PA segments.

The Wild and Scenic Rivers Act (the "Act") was signed into law by President Johnson in 1968, and was designed to protect the free-flowing waters of many of our nation's rivers. The Act is notable for safeguarding the special character of these rivers while recognizing the potential for appropriate use and development. The Act specifically prohibits dams and other federally assisted water resources projects that would adversely affect river values, protects outstanding natural, cultural, or recreational values, ensures water quality is maintained and requires the creation of a comprehensive river management plan that addresses resource protection, development of lands and facilities, user capacities, and other management practices.

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3.9 Wetlands

The science of describing wetlands focuses on a three-parameter approach that revolves around the type of soil and plants present and any evidence of extended wet or hydrologic conditions. Wetlands are defined as areas which are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support an abundance of vegetation typically adapted for life in saturated soil conditions. Soils found to occur in wetlands are called hydric soils. Due to their saturated condition, such soils develop anaerobic, or oxygen deficient, characteristics, which subsequently affect the types of vegetation able to grow and regenerate in them. Plants that are adapted to living in water or in saturated soil wetland conditions are called “hydrophytes”. The "National List of Plant Species that Occur in Wetlands: 1994-New Jersey" categorizes plant species by the frequency with which they are found to occur in a wetland.

Wetlands are found throughout New Jersey and can occur as saltwater, brackish water, and palustrine (i.e. freshwater) areas. Freshwater wetlands, commonly referred to as bogs, swamps, fens and wet meadows, are most prevalent in inland areas. Only freshwater wetlands are found within the City of Lambertville. Historically, freshwater wetlands were considered to be little more than mosquito breeding wastelands. As a result, they were often drained and filled for conversion to agricultural uses or for commercial or residential development. It is estimated that between 1900 and 1970, New Jersey lost between 20% - 39% of its wetlands. Data compiled by the NJ Department of Environmental Protection show that New Jersey lost 15,798 acres of wetlands, or 1,755 acres of wetlands per year, between 1986 and 1995.

Only recently have the multiple benefits of wetlands been generally accepted and the need to preserve and protect these resources acknowledged. Wetlands provide valuable habitat for a myriad of flora and fauna. Wetlands are especially important as habitat for threatened and endangered plants. It has been reported that 249 of the 338 rare plant species (74%) in New Jersey are endemic to wetlands. Another seven rare species are normally, but not exclusively, associated with wetlands. According to the US Fish and Wildlife Service, New Jersey wetlands contain more than 1,000 different species of vascular plants. At this time, of New Jersey's 74 endangered or threatened vertebrate species, many rely on freshwater wetlands for at least a portion of their life cycle.

Wetlands also provide many important benefits including pollution filtration, flood water storage, prevention of soil erosion, sediment control, timber production, and shoreline stabilization. They also offer open space for the aesthetic enjoyment of nature as well as recreational activities such as hiking, fishing, hunting, photography, and environmental education. Wetlands can minimize flood-related damage to downstream property owners by decreasing the velocity of floodwater and acting as temporary storage basins during heavy rains. When a stream that is buffered by wetlands overflows its banks, it spreads horizontally into the surrounding wetlands vegetation, which acts as series of tiny barriers that temporarily detain the water. Along with controlling the flood waters, wetlands also serve to maintain water quality. They have a water-cleaning ability which, if not overused, can filter or take up most pollutants from runoff before those pollutants enter an adjoining watercourse. In many respects, wetlands function much like sophisticated sewage treatment facilities by removing nutrients and other pollutants prior to discharge to a waterway. Wetlands also act as a sediment trap for soil erosion resulting from natural and man-induced activities.

In New Jersey, regulatory protection of freshwater wetlands was initiated in 1972 when amendments to Section 404 of the Clean Water Act (CWA) gave the US Army Corps of Engineers and the Environmental Protection Agency (EPA) powers to regulate the discharge of

fill into the nation's waterways, including wetlands. In 1987, the New Jersey Legislature passed the Freshwater Wetlands Protection Act (FWPA) in a further effort "to preserve the purity and integrity of freshwater wetlands from random, unnecessary or undesirable alteration or disturbance" (N.J.S.A 13:9B-2). Like the CWA, the FWPA established a permitting process for the discharge of fill into wetlands. Both laws rely upon a three-parameter approach to define the extent of wetlands. This approach generally requires that, for a parcel of land to be considered a wetland, a test requiring evidence of hydric soils, hydrophytic vegetation, and hydrologic conditions (i.e. ponding, leaf staining) must be met. In addition, the FWPA provides for the regulation of ditching, draining, and clearing of wetlands, and provides for additional protection to upland transition areas or buffers of 50-150 feet adjacent to wetlands. In March 1993, New Jersey became the second state in the country to be granted by the EPA sole regulatory authority over most of the freshwater wetlands in its jurisdiction. Interstate waters and wetlands, such as those associated with the Delaware River, continue to be co-regulated by both the state and federal programs. Additional information on New Jersey's freshwater wetlands regulatory program may be obtained from the NJ Department of Environmental Protection, Land Use Regulation Program.

See Figure 7 for a map of wetlands identified in Lambertville. Almost all the wetland areas in Lambertville that are not directly adjacent to the Delaware River are in deciduous wooded areas, usually along stream banks. Included are:

1) Palustrine hardwood forest along the Delaware River south of Swan Creek;

2) Palustrine hardwood forest at the northern end of Holcombe (Lewis) Island and along several channels running through the island; and

3) Palustrine forested wetlands along Alexauken Creek between the Delaware River and Route 29.

In addition to these wetlands, smaller areas of forested wetlands occur along several tributary streams running down Music Mountain, along the rear of Ely Field adjacent to the elementary school, and along Swan Creek. It is important to note that the New Jersey Freshwater Wetland maps offer only a coarse approximation of the presence or absence of freshwater wetlands. A formal onsite delineation which applies the tests described above is necessary to clearly establish the presence or absence and extent of freshwater wetlands on a particular property.

Sources

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3.10 Vegetation and Wildlife

The 1.14 square mile area comprising the City of Lambertville is largely developed as business, residential, public properties, streets, and public parks. Vegetation associated with practically all of these areas is intentionally planted (i.e. landscaped) but it is, nevertheless, quite diverse. An informal survey of Lambertville's street trees, for example, showed that the City supports nearly 40 different tree species (See Table 1).

In terms of specimen numbers, Norway maple, white ash, and red oak trees currently predominate, though Norway maples are in decline. Some of the largest trees in the City are sycamores, even though the total number of these trees is fairly small; several significant American sycamores were removed from Buttonwood Street in connection with a street improvement project there in 2005. Among the largest street trees in Lambertville are:

1. Swamp white oak near the corner of Perry and Clinton Streets
2. Sycamore behind Ely Field on Main Street
3. Norway maple on Main Street, north of the intersection with Elm Street
4. Sugar maple in yard of 42 York Street
5. Red oak in Mary Sheridan Park
6. Red oak in front of Kalmia Club on York Street
7. White ash south of Swan Street near South Union Street
8. Sycamore on Wilson Street, behind the Lambertville Chamber of Commerce offices
9. Red oak in front of 136 North Union Street
10. Sycamores along the canal north of Niece Lumber

There are also some unusual and/or otherwise interesting street trees in Lambertville. Examples include:

1. Sourwood near the intersection of Jefferson and Main Streets
2. Princess tree, one block east of the intersection of York and Franklin Street
3. Magnolia on North Union Street, approximately 50 yards south of the intersection with Delaware Avenue
4. Japanese pagoda tree on Jefferson Street between intersections with North Union and George Streets

Also, the following stands of trees exist within City boundaries:

1. Holcombe Island and the flood plain of lower Alexauken Creek, plus the contiguous natural area south of the Delaware and Raritan Canal. The northern half of Holcombe Island is an undisturbed plant community dominated by large silver maples**.** The southern half of the island is moderately developed and contains silver maples along with several large sycamore trees (up to 100 feet in height) as well as white ash trees. Understory plants on Holcombe Island include spicebush and buttonbush along the Delaware River. The plant community between Island Creek and the Delaware River is dense and undisturbed with several silver maples and a few sycamores. East of the D & R Canal, sycamore and some silver maples dominate the flood plain of Alexauken Creek.

2. Steep slopes immediately east of Ely Field and the contiguous area north of Highway 179. The steeply-sloped land east of the playing fields and school supports a relatively undisturbed community of large white oaks, swamp white oaks, tulip trees, and several spectacular beech trees; the size and the density of the stand are rare in this part of the

Delaware Valley. The contiguous woods north of upper York Street, a community that has probably grown from farmland within the last 100 years, contains smaller specimens of mid-successional species such as Norway maple, box elder, white ash, and several scrub species.

3. Steep slopes and upland on Connaught Hill between Highway 179 and Quarry Street. Formerly a level playing field, the area behind the former Lambertville High School has become early successional scrub dominated by non-native multiflora rose bushes. A former hedgerow contains white ash and large specimens of silver maple and a sizeable sycamore (approximately 100 feet tall). East of the former playing field is an approximately 50-year-old white ash/Norway maple woodlot. The remainder of the parcel is undisturbed red oak, Norway maple, white ash, and a grove of approximately 50 large (approximately 80 feet tall) tulip trees.

4. Upland immediately south of Brunswick Avenue on the City limits. This community consists of Norway maple and white ash trees.

5. Steep slopes and upland east of Route 29 on the southern City limits. The trees here are mostly Norway maple and white ash.

The Lambertville Shade Tree Commission was formed in 1954 for the purpose of preserving and replenishing trees in Lambertville and educating the public as to the aesthetic, environmental and health benefits of trees. When the Shade Tree Commission initiates street tree plantings in town it is mindful of planting different varieties so in the event of blight, a majority of trees do not become decimated at once. The Shade Tree Commission plans to oversee the planting of 80-100 trees along Main Street/Route 29 in the near future.

Despite the fact that much of the City of Lambertville is densely populated, it nevertheless supports a wide variety of wildlife. Whitetail deer are common in Lambertville, especially in the woodlots and successional fields of Music Mountain and Connaught Hill. Other mammals known to live or sighted within the City's boundaries include raccoon, gray squirrel, woodchuck, wild turkey, black bear, opossum, eastern cottontail rabbit, striped skunk, red fox, coyote and beaver. Herptile fauna (See Table 2) can be found in the wetlands and adjacent upland areas of Alexauken Creek, Holcombe Island, the Delaware River, Island Creek, and along the D & R Canal boundaries. Additionally, there are two species of mussels that are found in the waters in and around Lambertville, the yellow lampmussel (currently a threatened species) and the Eastern elliptio. Finally, there are many species of freshwater fish which may be found within Lambertville's waterways (See Table3).

Open space areas, as well as the habitats created by careful planting and conservation in the developed areas of Lambertville, support a tremendous diversity of resident and migratory bird life. To illustrate the richness of bird populations in Lambertville during any given year, we include a list of birds that reside full time or are seasonal visitors to Lambertville (See Table 4).

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Arthur Legere, Lambertville Shade Tree Commission, 2006

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3.11 Open Space

Open space consists of undeveloped areas that provide existing or potential recreational and/or ecological benefits to the community. A formal open space inventory surveys all public and private lands meeting this definition. See Figure 8 for a map of open space in Lambertville.

Undeveloped areas are relatively uncommon in Lambertville. Still, beyond the densely settled City center and adjacent development lie noticeable stretches of wetlands, woodlands and old fields. These areas are located along the Delaware River and Alexauken Creek, the northern border shared with West Amwell, and the hills west of South Franklin Street and North Main Street. While the State and City own some of this land, most properties are privately held. Because they offer the few remaining opportunities for development in Lambertville, they are prime targets for real estate interests.

Once defined only as parks and recreation areas, open space has taken on a much broader meaning in recent years. Its preservation serves many important purposes simultaneously - benefiting not only local residents, but also the region as a whole. Open space protection helps ensure that future development takes place in an environmentally sound manner. Indeed, open space is regarded as a means for holding together the fabric of an urbanizing environment. It does so by providing the natural breaks vital to maintaining a sense of visual and aesthetic amenity for urban dwellers. Additionally, open space supplies important environmental services, such as filtration for precipitation (by contrast, paved surfaces promote rapid runoff), cleaning of the air, wildlife habitat, breathing space, and mitigation of unpleasant odors, noises, and sights.

Woodlands and wooded buffer areas along watercourses also serve important natural functions. When upland woods are retained in their natural state, they break the force of falling rain. This prevents the soil from washing away and being carried into streams, wetlands, and potable water supply reservoirs. Wooded hillsides are especially critical in this regard. Removal of ground cover and topsoil during and after construction on steep slopes accelerates runoff and resulting erosion, impacting waters below.

Forested areas are also extremely important from the standpoint of species diversity. Even when small urban woodlots of 2 acres or less contain adequate shrub understory (that is, vegetative "edge" of sufficient width (25-100 feet) and the proper mix of mature and dead standing trees), such woodlots can be valuable habitat for dense populations of woodland animals and breeding birds.

Vegetative buffer strips along streams, wetlands, and reservoirs are critical for mitigating effects of urban and agricultural runoff and serve to enhance sediment control, stream bank and stream bed erosion control, nutrient and pollutant removal, stream temperature control, protection of aquatic species, and wildlife habitat. According to the NJDEP, a buffer strip with a minimum width of 50-300 feet often is necessary to protect a body of water from pollution.

Woodlands in the floodplain provide the food, cover, water, and space that wildlife requires. In fact, woodlands existing in floodplains are considered to be one of the most productive wildlife areas known, likely owing to their complex vegetative structure and multiple habitat features. These ecosystems become even more important when connected to larger upland woods. An integrated open space system containing both riparian areas and uplands can support a greater diversity of wildlife by linking otherwise isolated habitat types.

Open space needs in New Jersey are well documented and public support for its protection is solid. In 1998, New Jersey voters overwhelmingly approved a ballot issue that authorized expenditure of $1 billion for open-space acquisition over the succeeding 10 years. Public recreation and open space needs are considered to be pressing in urban, as well as suburban and rural, areas. The preliminary State Development and Redevelopment Plan states that the need for recreation and public open space land is urgent and pervasive. The Plan further suggests that these needs may be met in part via the creation of greenways and blueways, which are defined as continuous corridors of open space associated with stream corridors, abandoned railroad rights-of-way, scenic trails, historic areas, public parks, etc. The Delaware & Raritan Canal State Park, which defines the Western boundary of Lambertville, is an excellent example of a multipurpose greenway that protects water supply for much of central New Jersey and at the same time supports recreational activities and preserves the integrity of the Delaware River and its adjacent lands.

Lambertville is situated in the far western part of the Sourland Mountains. Although the city itself contains very little of the characteristic forested Sourlands ecosystem, its southern and eastern boundaries directly abut it. The Sourlands is a 65-square mile region that extends east from the Delaware River to Hillsborough Township. Although much of the area was logged and farmed in the 18th and 19th centuries, today the Sourlands is an oasis of forested biodiversity, especially rich in threatened and endangered bird species. The difficulty of drilling wells, the need to drill to great depths, and the extensive presence of perched wetlands have conspired to limit the residential development that is so common in areas adjacent to the Sourlands. Increasingly, however, there are threats to the region's ecological integrity, especially from large-lot houses and housing developments near its edges. The Sourlands Planning Council, formed in 1986, conducts studies and promotes regional planning aimed at protecting the area's ecological, open-space, and recreation values. The Mayor of Lambertville is an Honorary Trustee of the Council.

The following are Open Space areas in Lambertville. Items 1-3 are more fully described in Section 3.10 (Vegetation and Wildlife).

1. Holcombe Island and the flood plain of lower Alexauken Creek plus the contiguous natural area south of the Delaware and Raritan Canal

2. Lambertville Nature Trail and contiguous steep slopes immediately east of Ely Field, and the adjoining area north of Highway 179

3. Steep slopes and upland on Connaught Hill between Highway 179 and Quarry Street

4. The American Legion ball field on the north edge of town, east of North Union Street and south of Alexauken Creek

5. Ely Field along Main Street

6. Mary Sheridan Park

7. Cavallo Park

8. Area between D&R Canal & Route 29, south of Cavallo Park

9. Land between the Inn at Lambertville Station south to the area near the wingdam (excluding the Lambertville Sewerage Treatment Plant)

10. Mount Hope Cemetery

11. Steep slopes and wetland south of Swan Creek and north of Brunswick Avenue

12. Upland immediately south of Brunswick Avenue at the City limits

13. Steep slopes and upland east of Route 29 at the southern City limits

14. Arnett Park, on Connaught Hill

Sources

West Windsor Environmental Commission, Greenbelt Plan, August 1977

J. A. Kusler, *Our National Wetland Heritage*, Washington DC, Environmental Law Institute, 1983

J. T. Linehan, R. E. Jones, J. R. Longcore, *Breeding Bird Populations in Delaware's Urban Woodlots*. Field Notes, December 1967

Hunterdon County Cross-Acceptance Report, December 2004. Preliminary Draft, Volume I

3.12 Solid Waste Disposal/Recycling

Passed in 1987, the "New Jersey Statewide Mandatory Source Separation and Recycling Act" (Recycling Act) required New Jersey's twenty-one counties to develop recycling plans that mandated the recycling of at least three designated recyclable materials, in addition to leaves. County recycling plans were also required to designate the strategy to be utilized for the collection, marketing and disposition of designated recyclable materials, and municipalities were required to adopt a recycling ordinance based upon their county's plan. The Recycling Act initially called for recycling of 15% of municipal solid waste and 25% of the municipal solid waste thereafter. In 1992, the Recycling Act was amended and the goal was reset to 50% of the municipal solid waste stream and 60% of the overall waste stream by the end of 1995. The Hunterdon County Division of Solid Waste and Recycling Services is charged with, among other things, enforcement of municipal recycling programs

Lambertville currently recycles glass, metal and paper through a biweekly curbside recycling program managed internally through the City's Department of Public Works. Leaves are collected curbside in the fall, yard waste may be taken at any time to the Public Works Garage on Quarry Street, and Christmas trees are collected in December/January. Hunterdon County's Hazardous Waste Clean-Up Days are held three times per year, during which time hazardous materials may be taken to the County Garage in Flemington. Most construction debris from the city is recycled by the contractors responsible for removing it. In 2005, Lambertville recycled 26% of its residential waste and 79% of all waste (including construction debris); 487 tons of recyclable aluminum, steel, glass and paper.

In the fall of 2006, the Mayor and City Council appointed a committee to explore expanding the city's recycling program to include plastics and cardboard. In January 2007, the committee recommended that the City pursue the use of a single-stream recycling program. With single-stream recycling, residents would be able to place all recyclables (paper, glass, metals, cardboard and plastics (#1-7) into a single lidded container. Compactor trash trucks would pick up the materials, eliminating the need for curbside sorting and increasing the amount carried in a single truckload. With the convenience of single-stream recycling, plus the addition of cardboard and plastics into the recycling program, routine curbside recycling in Lambertville is expected to increase by approximately 50%, based on waste stream composition and quantities typically recycled. Implementation would require providing a large recycling cart for each household and use of a truck equipped with lifters to handle the heavier carts. The program is tentatively scheduled to begin in early 2008.

The use of single-stream recycling will help Lambertville reduce both its ongoing costs for waste disposal and help it meet state-mandated recycling targets. Single-stream recycling is expected to reduce the amount of waste Lambertville sends to landfills each year by about 250 tons per year. Furthermore, the City will receive approximately $20/ton for recyclables.

Sources

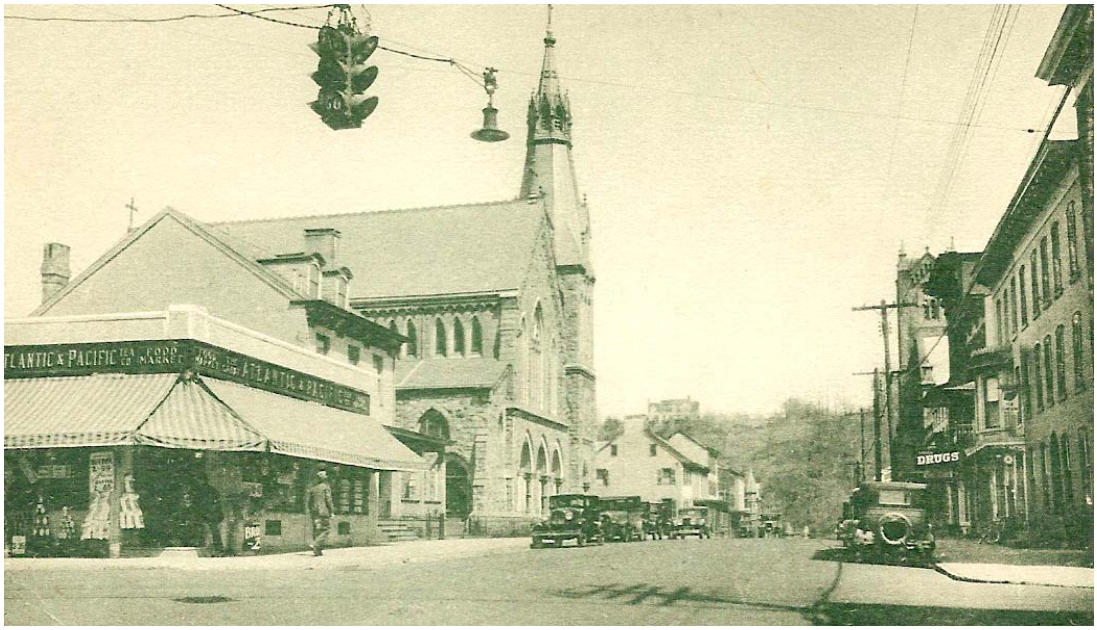
City of Lambertville 2005 Tonnage Report, Hunterdon County Utilities Authority, Division of Solid Waste and Recycling

NJDEP Solid & Hazardous Waste/Recycling website re The New Jersey Statewide Mandatory Source Separation and Recycling Act (N.J.S.A. 13:1E-99.11 et seq.)

US Environmental Protection Agency - Municipal Solid Waste website (www.epa.gov/garbage/facts-text.htm)

The State of Garbage in America, Phil Simmons, Nora Goldstein, Scott Kaufman, Nickolas Themelis and James Thompson, Biocycle Magazine, April 2006

Lambertville Recycling Committee presentation to the Mayor and City Council, January 2007



3.13 Climate/Air Quality

Lambertville is located at New Jersey's western border, roughly at the state's latitudinal midpoint. The Atlantic Ocean and prevailing wind patterns from the west and northwest shape our region's weather. Several types of air masses affect our area: Arctic (cold, dry), Polar Continental (cold, dry, sometimes unstable), Polar Maritime Pacific (mild, dry), Polar Maritime Atlantic (cool, moist), Tropical Maritime Atlantic (warm, humid), and Tropical Continental (hot, dry). Lambertville's latitude puts it in the battleground zone between air masses, with frequent, sometimes dramatic, shifts in weather. Locally, condensation from the Delaware River contributes to occasional foggy conditions.

Lambertville's climate type is humid continental, with prevailing air flow typically from the southwest in the summer and from the northwest in the winter. The monthly mean temperatures in Lambertville range from 30.9 degrees Fahrenheit in January to 75.0 degrees Fahrenheit in July.

Storm tracks extending from the Mississippi Valley and Gulf region, over the Great Lakes, along the St. Lawrence Valley, and up the East Coast provide a major source of precipitation for our region. Frequent summer storms and precipitation associated with frontal passages also contribute to annual totals. Lambertville receives an annual mean precipitation of 46.2 inches. While totals vary, February is driest, averaging approximately 2.76 inches of precipitation and July is the rainiest month, at 4.68 inches. Most areas in New Jersey receive 25-30 thunderstorms per year. Snowfall occurs between November and April, with an average annual snow accumulation of 23.6 inches. The largest average monthly snowfalls occur in January and February.

Local ozone levels are recorded by the NJDEP Air Quality monitoring station in nearby Flemington, NJ. Ozone is measured using a scale of parts per million (ppm) over an 8-hour period. The 8-hour ozone health standard is 0.08 parts per million (ppm); for concentrations to be considered exceedances (i.e., unhealthy air quality), they must be 0.085 or above. Data from preceding years include:

2006 – at the time of this writing, data was available through September 2006. There were 5 days over the acceptable ozone limit through that date; ppm data unavailable
2005 – 13 days over, with an average overage of .089 and a high of .093ppm
2004 - 6 days over, with an average overage of .090 and a high of .098 ppm
2003 - 7 days over, with an average overage of .095 and a high of .115 ppm

The EPA monitors the diameter of both particulate matter (PM) 2.5 and PM10. The PM 2.5 monitoring station is located 5 miles south of Lambertville in Washington Crossing. While the PM 2.5 national standard is 15 µm (10^{-6}), the Washington Crossing testing results have averaged at approximately 10-11 µm, below the national standard. The closest EPA station monitoring for PM10 is located in Trenton, approximately 12 miles south of Lambertville. The EPA national standard for PM is 150 µm. The Trenton site reports average readings at approximately 60 µm, also below the national standard.

Radon, a naturally occurring radioactive gas caused by the decay of uranium, is found in soil everywhere in varying concentrations. In New Jersey, there is a particularly uranium-rich geological formation called the Reading Prong, which stretches from Pennsylvania through northwestern New Jersey into Southern New York State. Testing of homes built along this geologic formation has revealed high indoor levels of radon gas. Radon can move easily through soil and tiny cracks in rock. When it reaches the surface of the soil, it disperses and is diluted to

very low levels in the outdoor environment but when the gas moves upward through soil beneath a home, it may enter through cracks or other openings in the foundation and build up to unacceptable levels. Long term exposure to radon has been linked to lung cancer, yet because the gas is colorless and odorless, it may accumulate undetected in enclosed places (such as a house). Of the three tier system for ranking the potential of radon occurrences in specific areas of NJ, Lambertville is located in Tier 1 (High Radon Potential) on the NJDEP Radon Potential Map and in Zone 1 (Highest Potential) on the EPA Map of Radon Zones. Each Tier 1 and Zone 1 reflect the highest potential for radon, at concentrations greater than or equal to 4 pCi/L (pico curies per liter). The only way to detect the presence of radon gas and measure the level is by specifically testing for it. A common method of mitigating radon is a depressurization (venting and sealing) system. A pipe is installed that runs from below the basement flooring to above the roofline, with a fan at the top that draws radon out from under the slab. Cracks and openings in the foundation are sealed. The radon is vented through the pipe to the outside, where it is quickly diluted.

Sources

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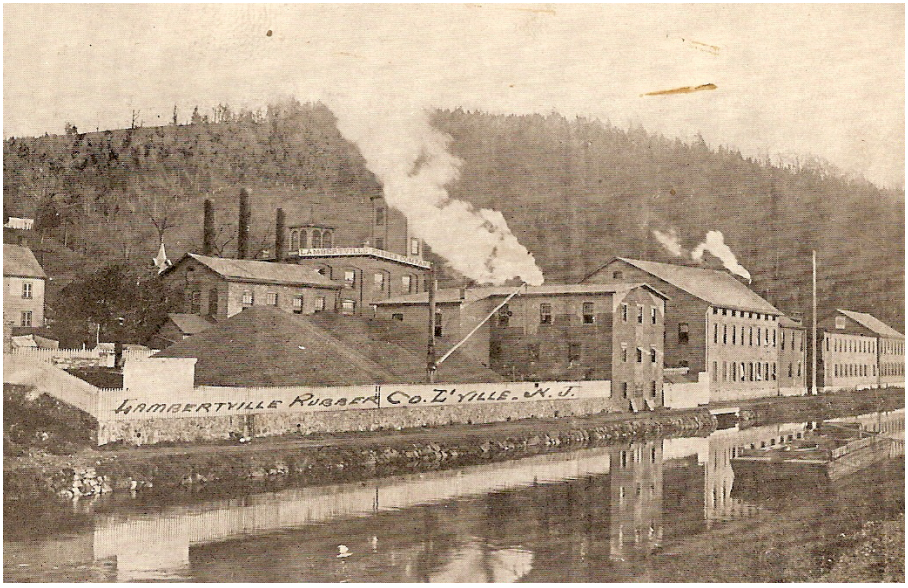
www.climate.rutgers.edu/stateclim_v1/njclimoverview.html
www.climate.rutgers.edu/stateclim_v1/monthlydata/index.html

NJ Department of Environmental Protection Bureau of Air Monitoring website
www.state.nj.us/dep/airmon/

United States Environmental Protection Agency Particulate Matter webpage
www.epa.gov/air/airtrends/pm.html

NJ Department of Environmental Protection Radiation Protection Program webpage
www.nj.gov/dep/rpp/radon/radoinfo.htm

U.S. Environmental Protection Agency, EPA Map of Radon Zones
www.epa.gov/radon/zonemap.html

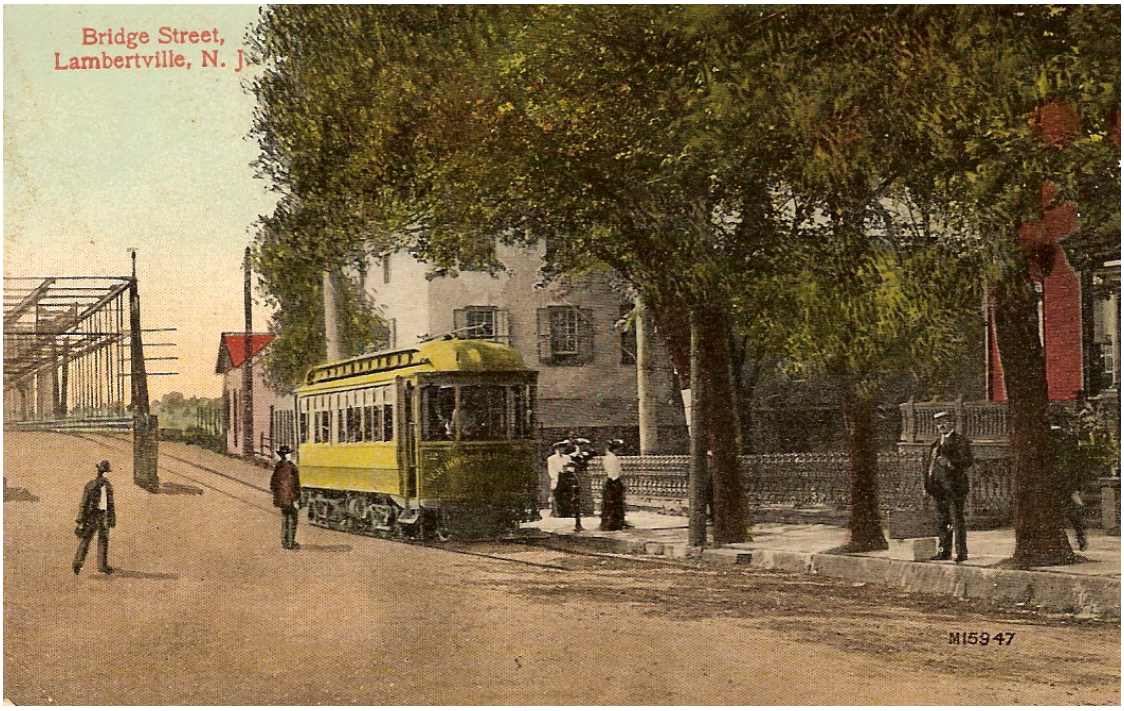


3.14 Contamination Sites

The NJDEP defines "contaminated site" as "all portions of environmental media at a site and any location where contamination is emanating, or which has emanated therefrom, that contain one or more contaminants at a concentration which fails to satisfy any applicable remediation standard." As of Spring 2006, the most recent date that data is available at the time of this writing, there were eight sites in Lambertville listed in the 7th Edition of Known Contaminated Sites in NJ. This report, prepared by the NJDEP's Site Remediation and Waste Management Program, provides a list of sites where contaminated soil and/or ground water has been confirmed. It is possible that since the date this revised ERI was published, remediation of those sites has been completed. Refer to the NJDEP's Site Remediation and Waste Management website for the most up to date information.

Sources

NJDEP Site Remediation and Waste Management website, www.state.nj.us/dep/srp/kcs-nj/



4. ACKNOWLEDGEMENTS

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Ron Walker, Landscape Architect

CITY OF LAMBERTVILLE
David M. DelVecchio –Mayor

Steven Stegman -Council President
Cynthia Ege -Councilwoman
Wardell Sanders -Councilman
Ron Pittore -Councilman

Paul Cronce – Planning Board
Ron Pittore – Planning Board
Timothy Korzun – Planning Board
Paul Kuhl – Planning Board
Lisa Nichols – Planning Board
Beth Ann Gardiner – Planning Board
Jackie Middleton – Planning Board
John Miller – Planning Board
Derek Roseman – Planning Board
Vincent Uhl –Planning Board

Loretta Buckelew – City Clerk/Registrar

Table 1
Street Trees of Lambertville

Scientific Name	Common Name
Acer negundo	Box Elder
Acer palmatum	Japanese Maple
Acer rubrum	Red Maple
Acer platanoides	Norway Maple
Acer saccharinum	Silver Maple
Acer saccharinum	Sugar Maple
Aesculus hippocastanea	Horse Chestnut
Albizia julibrissin	Silk Tree
Betula lutea	Yellow Birch
Betula nigra	Black Birch
Carya ovata	Shagbark Hickory
Catalpa ovata	Catalpa
Cedrus spp.	Cedar
Crataegus spp.	Hawthorn
Fraxinus americana	White Ash
Fraxinus pennsylvanica	Green Ash
Ginkgo biloba	Maidenhair Tree
Gleditsia triancanthos	Honey Locust
Ilex spp.	Holly
Liriodendron tulipifera	Tulip Tree
Liquidambar styriciflua	Sweetgum
Magnolia soulangiana	Magnolia
Malus spp.	Crabapple
Morus alba	Mulberry
Oxydendrum arboreum	Sourwood
Paulownia tomentosa	Princess Tree
Pinus strobus	White Pine
Platanus; occidentalis	Sycamore
Platanus x acerifolia	London plane
Prunus spp.	Flowering Cherry
Prunus serotina	Wild Black Cherry
Pyrus calleryana	Callery Pear
Quercus bicolor	Swamp White Oak
Quercus borealis	Red Oak
Quercus palustris	Pin Oak
Robinia pseudoacacia	Black Locust
Salix spp.	Willow
Sophora japonica	Japanese Pagoda Tree
Tilia cordata	Basswood
Tsuga canadensis	Hemlock
Ulmus americana	Elm
Zelkova serrata	Japanese zelkova

Table 2
Herptile Fauna of Lambertville

Common Snapping Turtle (Chelydra serpentina)
Common Musk Turtle (Sternotherus odoratus)
Eastern Mud Turtle (Kinosternon subrubrum subrubrum)
Spotted Turtle (Clemmys guttata)
*Wood Turtle (Clemmy insculpta)
Eastern Box turtle (Terrapen carolina carolina)
Common Map Turtle (Graptemys geographica)
Red-eared Slider (Trachemys scripta elegans)
Eastern Painted Turtle (Chrysemys picta picta)

Marbled Salamander (Ambrystoma Opacum)
*Blue-spotted Salamander (Ambrystoma laterale)
Spotted Salamander (Ambystoma maculatum)
Red-spotted Newt (Notophthalmus viridescens viridescens)
Northern Dusky Salamander (Desmognathus fuscus fuscus)
Redback Salamander (Plethedon cinereus)
Northern Slimy Salamander (Plethedon glutinosus)
Four-toed Salamander (Hemidactylium scutatum)
Northern Spring Salamander (Gyrinophilus porphyriticus porphyriticus)
Northern Rd Salamander (Pseudotriton ruber ruber)
Northern Tow-lined Salamander (Eurycea bislineata)
*Long-tailed Salamander (Eurycea longicausda longicauda)

American toad (Bufo americanus)
Fowler's Toad (Bufo woodhousii fowleri)
Northern Cricket Frog (Acris crepitans crepitans)
Northern Spring Peeper (Pseudacris crucifer crucifer)
Northern Gray Treefrog (Hyla versicolor)
Bullfrog (Rana catesbeiana)
Green Frog (Rana clamitans melanota)
Wood Frog (Rana sylvatica)
Southern Leopard Frog (Rana utricularia)
Pickerel Frog (Rana palustris)

Northern Water Snake (Nerodia sipedon sipedon)
Eastern milk snake (Lampropeltis triangulum triangulum)
Black rat snake (Elphe obsoleta obsoleta)
Northern black racer (Coluber constrictor constrictor)
Eastern hognose snake (Heterodon platyrhinos)
Northern brown snake (Storeria dekayi dekayi)
Northern red belly snake (Storeria occipitomaculata occipitomaculata)
Eastern worm snake (Carphophis amoenus amoenus)
Northern ring snake (Diadophis punctatus edwardsii)
Eastern Garter snake (Thamnophis sirtalis sirtalus)
Eastern ribbon snake (Thamnophis sauritus sauritus)
Northern copperhead (Agkistrodon contortrix mokasen)

* Endangered or Threatened species

Table 3
Freshwater fish species of Lambertville and vicinity

Acipenseridae – sturgeons

Shortnose sturgeon	Acipenser brevirostrum

Amildae – bowfins

Bowfin	*Amia calva*

Anguillidae – freshwater eels

American eel	*Anguilla rostrata*

Catostomidae - suckers

White sucker	*Catostomus commersoni*
Creek chubsucker	*Erimyzon oblongus*
Quillback	*Carpiodes cyprinus*

Centrachidae - sunfishes

Rock bass	*Ambioplites rupestris*
Redbreast sunfish	*Lepomis auritus*
Green sunfish	*Lepomis cyanellus*
Pumpkinseed sunfish	*Lepomis gibbosus*
Bluegill sunfish	*Lepomis macrochirus*
Longear sunfish	*Lepomis megalotis*
Smallmouth bass	*Micropterus dolomieui*
Largemouth bass	*Micropterus salmoides*
White crappie	*Pomoxis annularis*
Black Crappie	*Pomoxis nigromaculatus*

Clupeidae - herrings

Blueback herring	*Alosa aestivalis*
Hickory shad	*Alosa mediocris*
Alewife	*Alosa pseudoharengus*
American Shad	*Alosa sapidissima*
Gizzard shad	*Dorosoma cependianum*

Cyprinidae - carps & minnows

Goldfish	*Carassius auratus*
Carp	*Cyprinus carpio*
Cutlips minnow	*Exoglossum maxillingua*
Golden shiner	*Notemigonus crysoleucas*
Satinfin shiner	*Notropis analostanus*
Common shiner	*Notropis cornutus*
Spottail shiner	*Notropis hudsonius*
Comely shiner	*Notropis amonenus*
Swallowtail shiner	*Notropis procne*
Bluntnose minnow	*Pimephales notatus*
Blacknose dace	*Rhinichthys atratulus*
Longnose dace	*Rhinichthys cataractae*
Fallfish	*Semotilus corporalis*

Cyprinodontidae - Killfishes

Banded killifish	*Fundulus diaphanous*

Esocidae - pikes

Tiger muskellunge	*Esox lucius x Esox masquinongy*
Muskellunge	*Esox masquinongy*
Chain pickerel	*Esox niger*

Gasterosteidae

Four spine stickleback	*Apeltes quadracus*

Ictularidae – bullhead catfishes

White catfish	*Ictalurus catus*
Brown bullhead	*Ictalurus nebulosus*
Channel catfish	*Ictalurus punctatus*
Margined madtom	*Noturus insignis*
Stonecat	*Noturus flavus*

Percichthyidae – temperate basses

White perch	*Morone americana*
Striped bass	*Morone saxatilis*

Percidae – perches

Tessellated darter	*Etheostoma nigrum*
Yellow perch	*Perca flavescens*
Shield darter	*Percina peltata*
Walleye	*Stizostedion vitreum*

Petromyzontidae – lampreys

Sea lamprey	*Petromyzon marinus*
American brook lamprey	*Lampetra appendix*

Salmonidae – trouts

Rainbow trout (stocked from tributaries)	*Oncorhynchus mykiss*
Brown trout (stocked from tributaries)	*Salmo trutta*
Brook trout (stocked from tributaries)	*Salvelinus fontinalis*

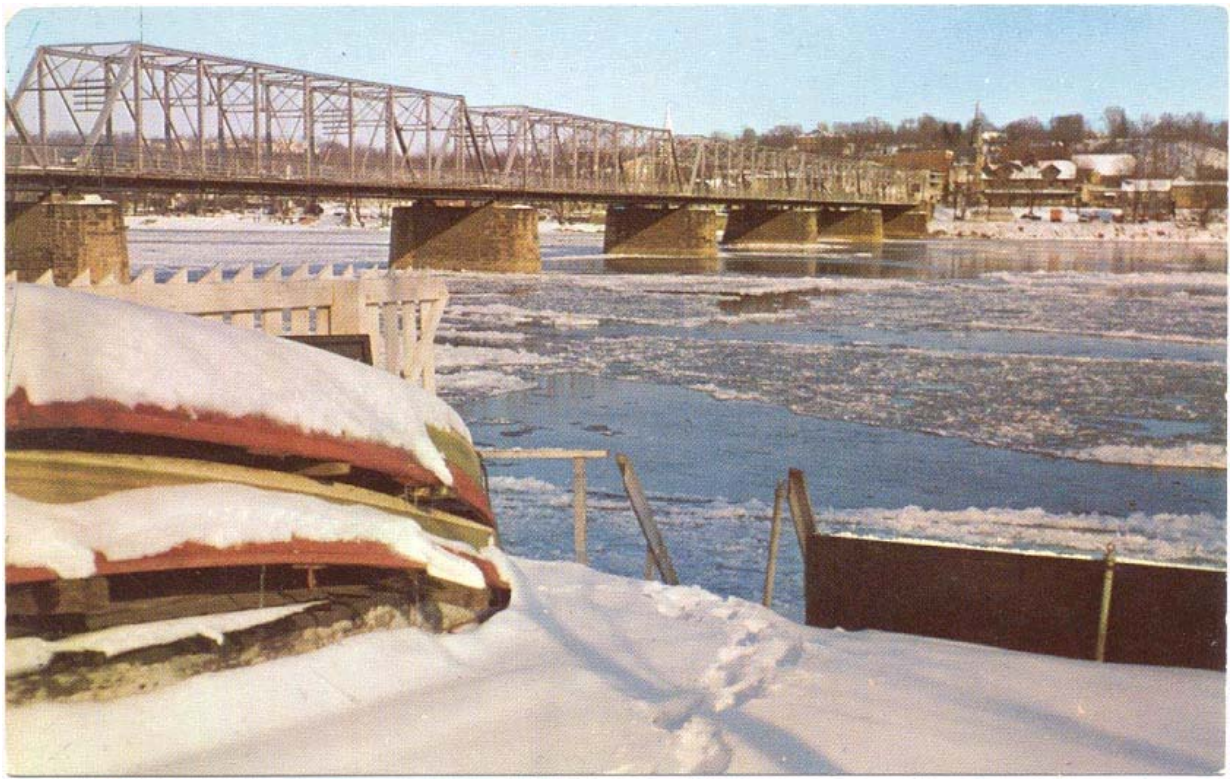

Table 4
Bird species of Lambertville and vicinity

Red-throated Loon
Pied-billed Grebe
Horned Grebe
Double-crested Cormorant
Least Bittern
Great Blue Heron
Green-backed Heron
Great Egret
Black-crowned Night-heron
Canada Goose
Snow Goose
Wood Duck
Green-winged Teal
Blue-winged Teal
American Black Duck
Mallard
American Wigeon
Ring-necked Duck
Common Goldeneye
Bufflehead
Common Merganser
Hooded Merganser
Black Vulture
Turkey Vulture
Osprey
Bald Eagle
Sharp-shinned Hawk
Cooper's Hawk
Broad-winged Hawk
Red-shouldered Hawk
Red-tailed Hawk
American Kestrel
Rough-legged Hawk
Ring-necked Pheasant
Wild Turkey
American Coot
Killdeer
Greater Yellowlegs
Lesser Yellowlegs
Solitary Sandpiper
Spotted Sandpiper
Purple Sandpiper
Dunlin
Bonaparte's Gull
Ring-billed Gull
Herring Gull
Glaucous Gull
Great Black-backed Gull
Rock Dove
Mourning Dove
Yellow-billed Cuckoo
Black-billed Cuckoo
Eastern Screech Owl
Great Horned Owl
Common Nighthawk
Chimney Swift
Ruby-throated Hummingbird
Belted Kingfisher
Pileated Woodpecker
Red-bellied Woodpecker
Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Eastern Wood-Pewee
Acadian Flycatcher
Willow Flycatcher
Least Flycatcher
Great Crested Flycatcher
Eastern Phoebe
Eastern Kingbird
Purple Martin
Tree Swallow
Northern Rough-winged Swallow
Bank Swallow
Cliff Swallow
Barn Swallow
Blue Jay
American Crow
Fish Crow
Black-capped Chickadee
Carolina Chickadee
Tufted Titmouse
Red-breasted Nuthatch
White-breasted Nuthatch
Brown Creeper
Carolina Wren
House Wren
Winter Wren
Marsh Wren
Golden-crowned Kinglet
Ruby-crowned Kinglet
Blue-gray Gnatcatcher

Eastern Bluebird
Veery
Swainson's Thrush
Hermit Thrush
Wood Thrush
American Robin
Gray Catbird
Northern Mockingbird
Brown Thrasher
Cedar Waxwing
European Starling
White-eyed Vireo
Blue-headed Vireo
Yellow-throated Vireo
Warbling Vireo
Red-eyed Vireo
Blue-winged Warbler
Tennessee Warbler
Nashville Warbler
Northern Parula Warbler
Yellow Warbler
Chestnut-sided Warbler
Magnolia Warbler
Cape May Warbler
Black-throated Blue Warbler
Yellow-rumped Warbler
Black-throated Green Warbler
Blackburnian Warbler
Yellow-throated Warbler
Pine Warbler
Prairie Warbler
Palm Warbler
Bay-breasted Warbler
Blackpoll Warbler
Cerulean Warbler
Black-and-White Warbler
American Redstart
Ovenbird
Northern Waterthrush
Louisiana Waterthrush
Common Yellowthroat
Canada Warbler
Yellow-breasted Chat
Scarlet Tanager
Northern Cardinal
Rose-breasted Grosbeak
Blue Grosbeak
Indigo Bunting
Eastern Towhee
American Tree Sparrow
Chipping Sparrow
Field Sparrow
Fox Sparrow
Song Sparrow
Swamp Sparrow
White-throated Sparrow
White-crowned Sparrow
Dark-eyed Junco
Eastern Meadowlark
Common Grackle
Brown-headed Cowbird
Orchard Oriole
Baltimore Oriole
House Finch
Purple Finch
Common Redpoll
American Goldfinch
Evening Grosbeak
House Sparrow