Environmental Resource Inventory

Borough of Hawthorne
Passaic County, New Jersey




Borough of Hawthorne
Environmental Commission

April 2022

2022 Environmental Resource Inventory
Summary of Updates

Acknowledgements – Updated

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- Updated Hawthorne's History
- Updated 2020 Census Data for Hawthorne

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I. Introduction

INTRODUCTION

Incorporated as a borough over 100 years ago, Hawthorne, New Jersey, has a diverse history dating back to the Lenni-Lenape Indians, who likely occupied the area in seasonal campsites. Hawthorne was first settled by Europeans as a farming community in the 1700s. The borough has seen a lot of growth since then and currently, the majority of Hawthorne is developed with residential communities, commercial districts, and some older industrial properties.

Hawthorne lies in a shallow valley that rises in elevation toward the north and has localized high points. The First Watchung Ridge, a volcanic extrusion of ballast that created precipitous cliffs and steep slopes, lies along the western edge of Hawthorne. Goffle Brook, a tributary to the Passaic River, which is part of the Newark Bay-Hudson Harbor estuary, flows through the valley.

Although Hawthorne is a well-developed borough, due to its location in the Passaic River watershed, and its diverse topography, it still contains many valuable natural resources. In 2022, the Environmental Resource Inventory (ERI) was updated. The Environmental Resource Inventory will continue to be reviewed and updated at that time of the Re-Examination of the Borough's Master Plan in accordance with the Municipal Land Use Law by the Hawthorne Environmental Commission. This information can be used to facilitate smart development and/or redevelopment so the existing natural resources are protected for this generation, and future generations of Hawthorne's residents to enjoy.

OVERVIEW

The Borough of Hawthorne, incorporated in 1898, will celebrate its 125th anniversary in 2023. In the 1600's, East Jersey, of which the Borough land was a part, was a province belonging to Sir George Carteret. Upon his death in 1681, his land was sold along the Passaic River to two windows, who subsequently sold the trace in 1706 to the Ryerson brothers. This original tract of land extended from the top of the Goffle Hill, east to present day Lincoln Avenue, and north from the Passaic River to present day Diamond Bridge Avenue.

The Ryerson's home at 40 Wagaraw Road still stands, not being used as a residence, but as an upscale restaurant. In the autumn of 1780, General Lafayette's headquarters was stationed on the land, and his light infantry occupied the land with tents during the Revolutionary War, which extended to where the U.S. post office on Diamond Bridge Avenue. The Borough of Hawthorne is rich with history, going back before the Revolutionary War.

This area was originally part of Saddle River Township in Bergen County, New Jersey. In 1837, Passaic County was created from portions of Bergen County and Essex County. The history of the area of present-day Hawthorne, is much older that, going back hundreds of years. Thousands of years ago, the Native American Lenni Lenape lived and hunted in this area along the banks of the Passaic River and the banks of the Goffle Brook. The Dutch word *Goffle*, does, in fact, translate to "fork," and specifically relates to where the Goffle Brook 'forks' with the Deep Voll Brook, which travels south to the Borough from the ravine. Early deeds of the area mention the Goffle Brook, and the

Native American trails followed these streams, brooks, and rivers. Early Dutch settlers hailed from New Amsterdam, just 28 miles from the wall at the northern most boundary of New Amsterdam on the Island of Manhattan. Modern day residents can view present day New York City from the ridge of the Watchung Mountains which grace the western border of the Borough.

Source: Bulletin of the Passaic County Historical Society, November 1962.

INTRODUCTION

Diverse landscapes of water, mountains, residential neighborhoods, bustling commercial districts and older industrial sections define the Borough of Hawthorne as a northern New Jersey suburb. Hawthorne is a mature community that is almost fully built out. Fortunately for its residents, however, as the municipality developed, efforts were made to protect much of the environmental resources that provide for the community's character and high quality of life. But in the future, Hawthorne will be faced with new conservation and environmental challenges that will require measured and thoughtful environmental planning.

The Environmental Resource Inventory (ERI) will provide this guidance by providing information and insight on the environmental conditions and limitations of the environmental resources that comprise this community. This ERI is produced to increase the public's awareness of environmental resources in the community and to emphasize the value of protecting environmentally sensitive areas. Developing an Environmental Resource Inventory is an ongoing and continuing process, and the ERI is a living document that should be periodically updated to address changes in the community.

View of the Passaic River and Lincoln Ave. Bridge.

VARIED TERRAIN

The terrain of Hawthorne is extremely varied. Much of the municipality is located in a shallow valley through which flows the picturesque Goffle Brook. The valley is predominantly flat increasing slowly in elevation to the north, but also containing localized high points. At the southern end of town, Goffle Brook flows into the Passaic River as it winds its way to Newark Bay and the Hudson Harbor estuary. Along the western edge of Hawthorne, the First Watchung Ridge, a volcanic extrusion of basalt, rises abruptly creating precipitous cliffs and steep slopes.

SETTLEMENT

Prior to European settlement, Lenni Lenape Indians resided at various times along Goffle Brook and the Passaic River as evidenced by numerous artifacts that have been found. The first European settlers were the Ryerson family, which purchased 600 acres of land along Goffle Brook and impounded the stream at several locations for milling. During the Revolutionary War, the Marquis de Lafayette encamped with the Continental Army's Light Infantry during the fall of 1780 at the John Ryerson house on Wagaraw Road next to Goffle Brook and the Passaic River. The location in Hawthorne was selected to protect the northeast approach to General Washington's headquarters at the Dey Mansion in Totowa.

TOWNSHIPS

Originally, the area of Hawthorne was a part of Saddle River Township, Bergen County, until the County of Passaic was created in February 1837. At that point, Hawthorne became a part of Manchester Township that included Totowa, Haledon, North Haledon, and Prospect Park. The Borough of Hawthorne broke from Manchester Township and was established as a municipal corporation of the County of Passaic on March 24, 1898.

STABLE COMMUNITY

The Borough of Hawthorne is a stable community 3.6 square miles (5.76 Km) in size with a population of 19,637 residents in 2020. This population total is much the same as it was in 1960 and represents a slight increase from a peak in population of 19,173 in 1970. Over half of the residential structures in town were constructed prior to 1947 and only 12 percent of the total housing stock after 1970. The community is mature and essentially fully built out.

View of rock outcropping along the edge of the First Watchung Ridge.

ENVIRONMENTAL DECISIONS

However, there are still land use and environmental decisions to be made. Some vacant undeveloped lands remain with environmentally sensitive wetlands and steep slopes that could be developed, and older industrial sections that will be redeveloped and rehabilitated. The Borough of Hawthorne is built around Goffle Brook and receives its drinking water from municipally managed public wells that tap into the aquifer that underlies the community. Understanding Hawthorne's land and water resources will allow for correct decision-making in the long-term health of the municipality and the protection and preservation of the environment.

II. Land Resources

GEOLOGY

INTRODUCTION

The Borough of Hawthorne is situated within a unique geologic terrain, the Newark basin, a group of rocks that have played a significant role in the evolution of the Earth sciences known as Plate Tectonics. The rocks of Hawthorne Heights, basaltic lavas that poured out over the earth in vast lava lakes, and the softer sandstones of the Goffle Brook Valley, both are evidence of a time when the continent of North America was being torn apart and the Atlantic Ocean was just being born, when dinosaurs were coming into their own, and when this part of North America was as close to the equator as Mexico is today.

By examining the bedrock geology of an area, we can determine surface stream paths, ground-water capabilities, slope, vegetation cover, and the nature of the soils present. All of the bedrock formations in the Borough date from the Late Triassic and Early Jurassic age approximately 230 to 190 million years ago (NJDEP 1999) (**Fig. 1**).

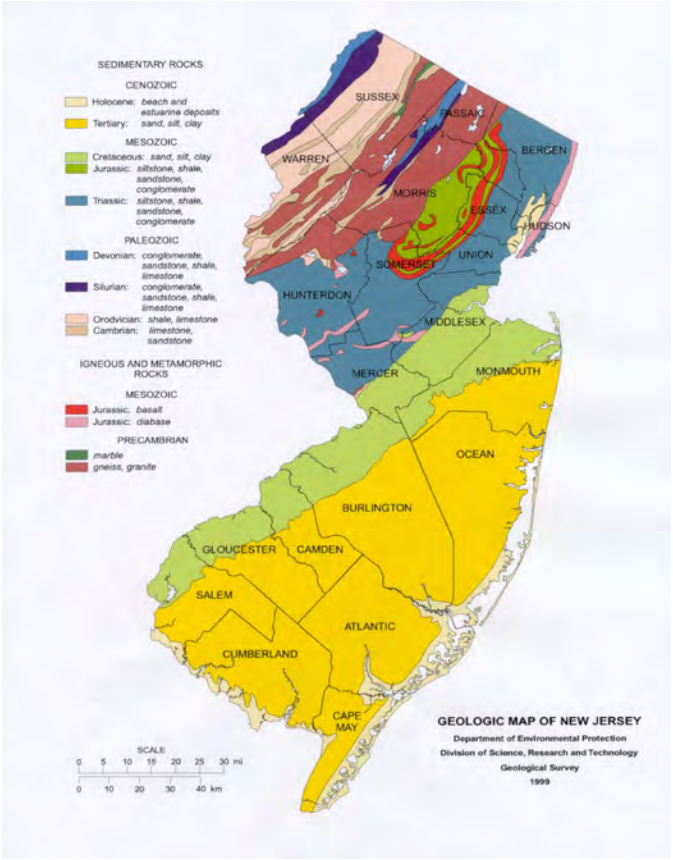

Fig. 1. Geologic Map of New Jersey bedrock geology showing sedimentary rocks.

BEDROCK GEOLOGY HISTORY

Hawthorne is located in the Newark Basin and the Piedmont Physiographic Province (**Fig. 2**) Hawthorne borders on the first (from east to west) of the three Watchung Mountains, Orange Mountain. The Watchungs were lava flows of which Orange Mountain is the oldest. The first Watchung Mountain stretches from Paterson southwest to Millburn and then to Bound Brook where it curves northwest to Pluckemin (Wolfe 1977). North of Hawthorne the mountain bends sharply to the west through Franklin Lakes and Oakland where it terminates against the Ramapo Mountains.

BEDROCK GEOLOGY

The two major geologic classes found in the Hawthorne area (**Fig. 3**.) are Triassic/Jurassic arkosic (red) sandstone and basalt (lava). The majority of Hawthorne's bedrock is comprised of two different types of this Triassic/Jurassic arkosic sandstone, labeled by geologist as **JTrpcq** and **JTrpsc**.

JTrpcq is a reddish-brown pebble conglomerate, pebble sandstone, and sandstone in upward-fining sequences 1 to 2 m thick. **JTrpsc** is brownish-red pebble conglomerate, medium – to fine-grained feldspathic sandstone, and micaceous siltstone; the unit is planar to a low-angle trough cross laminated, burrowed, and contains local pebble layers. The unit forms upward-fining sequences 0.5 to 2.5 m thick. These types of rock are generally known to be good ground water producers (NJDEP 1999).

The Triassic/Jurassic basalt is located on the western boundary of the town. It is part of the first Watchung Mountain, known to geologists as the Orange Mountain basalt. The Mountain was formed from fissure eruptions. The basalt from this mountain is medium gray in color. It is dense, fine-textured igneous rock composed of glass, submicroscopic to barely visible crystals. These crystals are generally plagioclase feldspar, pyroxene, and some magnetite as well as occasional olivine (Wolfe 1977). The basalt in this area has a maximum thickness of 155 m. Unlike sandstone, basalt is not generally known to be a good ground water producer.

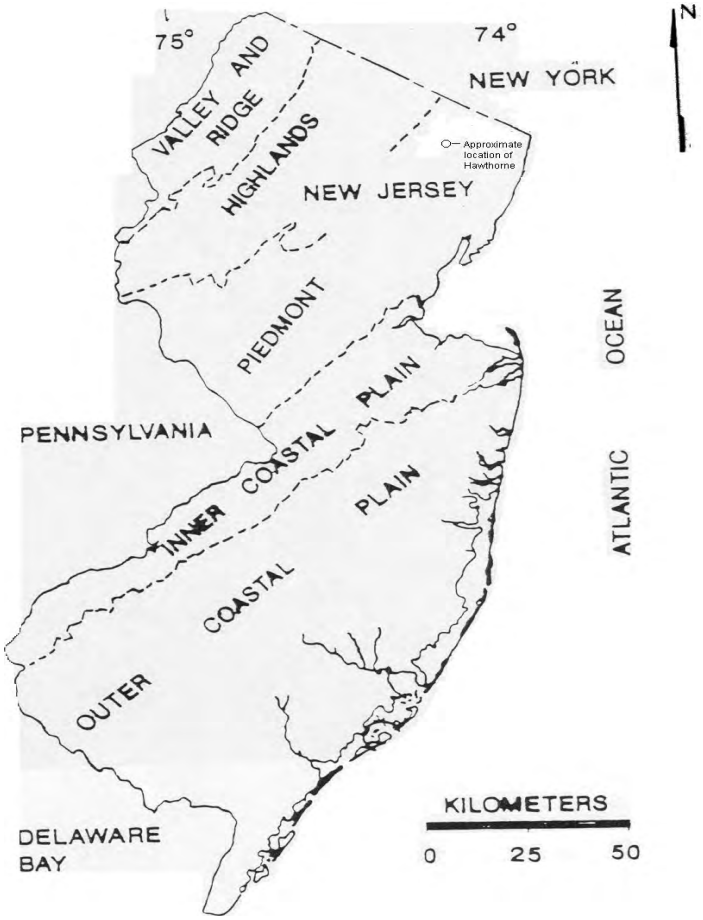

Fig. 2. Physiographic Provinces of New Jersey.

Although there are no rocks exposed on the surface within the Borough that are older than about 200 million years, Hawthorne lies between two much older geologic terrains - the very ancient, highly distorted metamorphic rocks of the Highlands to the west (roughly west of Route 287), at least 1.1 billion years old, and the somewhat less ancient metamorphic rocks of Staten Island, Manhattan, and the Bronx to the east, between 300 and 500 million years old.

These rocks record a complex history of a region that for much of the Earth's history lie along the margin of colliding and splitting continents. Over most of the Earth, the oldest rocks of the continents lie toward the continental centers while the youngest rocks lie along the edges. Sometimes, though, pieces of one continent are left "stuck" on another as the continents collide and then split apart, while at other times pieces of continents split off, drift around by themselves (like Madagascar today) and then rejoin the same or

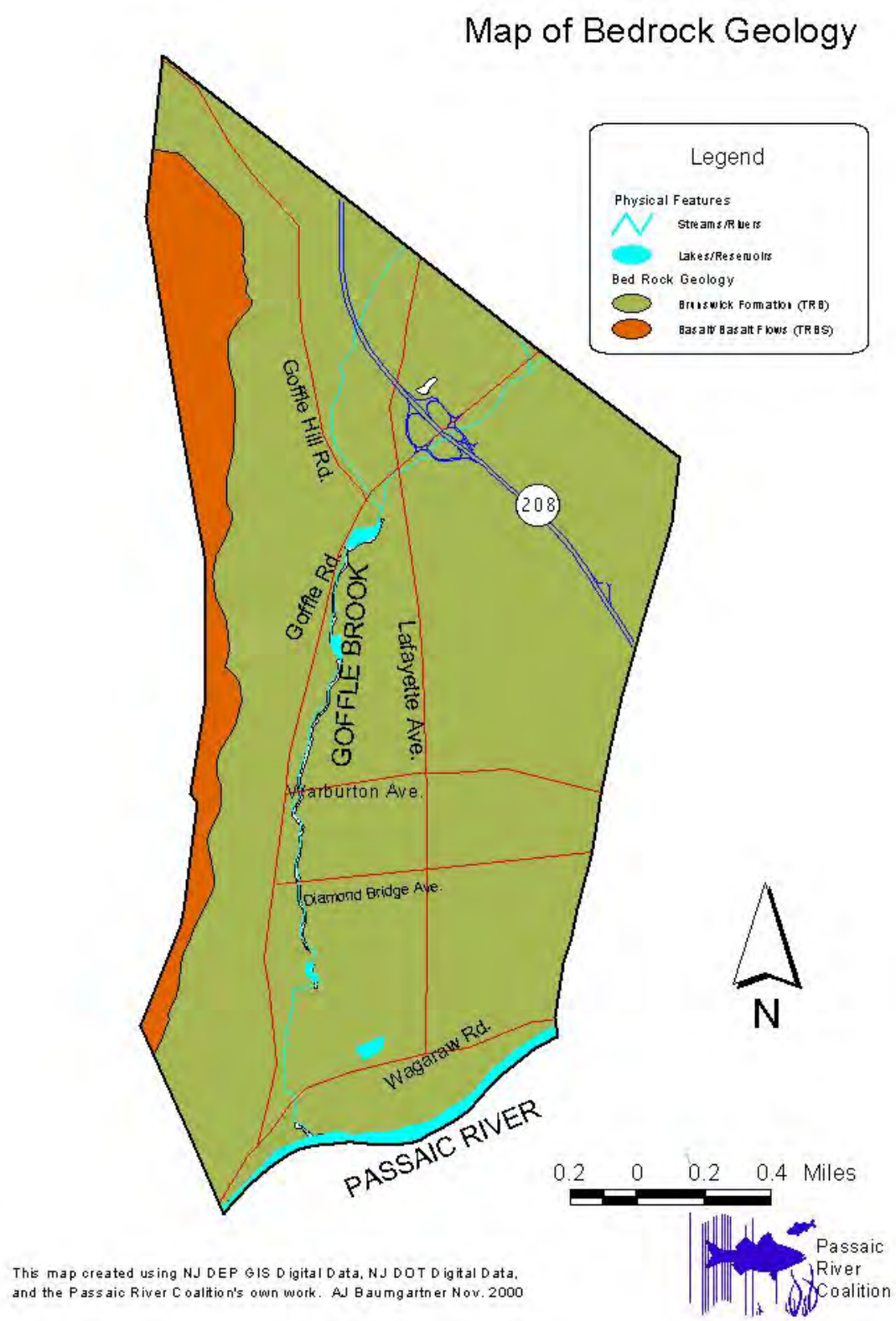

Fig. 3. Map of Bedrock Geology, Borough of Hawthorne

another continent at a very different place. The rocks of the Highlands most closely resemble the rocks of Ontario and Quebec in Canada far to the northwest, while the rocks of Manhattan and the Bronx are closely related to the rocks of the British Isles now an ocean away in Europe.

During the age of the reptiles and dinosaurs (241 to 65 million years ago), the great, single continent of Pangaea began to crack, rift, opening first as a valley and then as a long, narrow sea that would eventually become the Atlantic Ocean. The tension that ripped the valley rocks apart caused the floor of the valley to drop, into which vast amounts of sediment poured from the surrounding mountains. The tensional forces continued until these cracks grew deep enough to become conduits for molten basalt to flow up and over the valley floors in vast lava lakes. Several pauses and renewals created the inter-layering of lava and sediment that is characteristic of the Newark Basin. As the rift valley unzipped starting in the north and proceeding to the south, the Atlantic Ocean began to fill the gap, and volcanism on land finally stopped to be resumed on the new ocean floor. At some time after the entire sequence, sandstone and lava was tilted slightly (15°) back to the west, an orientation it has retained until the present time. If the area was overlain by rocks younger than Jurassic and older than the ice ages of the last 2-3 million years, no record is found in northern New Jersey.

SURFICIAL ROCKS

Unconsolidated surficial sediments are not significant in Hawthorne. Those sediments that are found in this area are **ct**: (continuous till), **dt**: (thin till and rock outcrop), **d**: (deltaic and lacustrine-fan deposits), and **fl**: (fluvian over lacustrine deposits) (**Fig. 4**). Although there are several different types of sediment, none of them have appreciable depth except for the small deltaic and lacustrine-fan deposits (**d**), which are located in the uppermost northeast corner of the town along the border with Ridgewood.

These unconsolidated, surficial sediments can be traced to one (and probably the last) advance of Pleistocene ice over the region. The ice ages of the Pleistocene consisted of several alternating cold (glacial) and warm (interglacial) periods. During glacial periods in North America, vast continental ice sheets moved down from centers in Quebec and Ontario and overrode most of what is now the northern United States, including most of northern New Jersey. Most of these ice advances crossed completely over the Hawthorne area and moved on south toward central New Jersey. The last ice advance (known as the Wisconsin) had its southern most point in this area at the southern tip of Staten Island. It covered the First Watchung Mountain as far south as Summit and crossed the Delaware River just south of the Water Gap.

The advancing continental ice sheets carved and subdued the landscape, planing down the mountains and filling the valleys. As these huge sheets of ice retreated, they left behind vast quantities of rock debris (till or drift) that underlay or form most the area's soils today. In the valleys the melt water of these glaciers filled many glacial lakes. In this area, glacial Lake Passaic filled the upper Passaic River valley to the southwest, while glacial Lake Hackensack filled the lower Passaic and Hackensack valleys to the south and east. On the floors of these lakes, tens to hundreds of feet of glacial clays accumulated, which today retard the infiltration of water into the bedrock below.

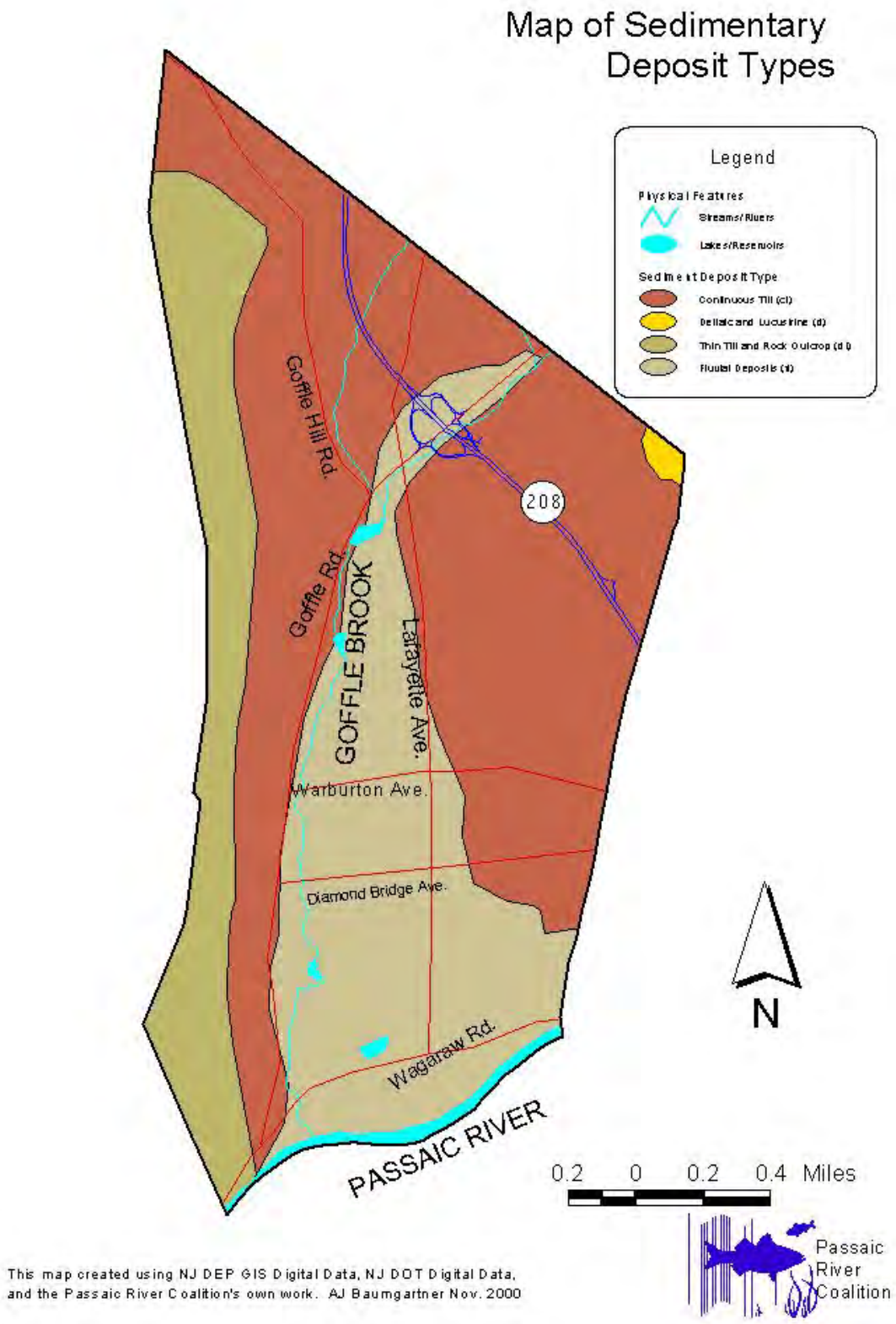

Fig. 4. Map of Sedimentary Deposits, Borough of Hawthorne

EARTH RESOURCES AND MINERALS

Trap rock mining was and still is a major industry in the Hawthorne area although there are no mines operating within the Borough today. The former North Haledon quarry along the western boundary with North Haledon is now filled with water. The Haledon trap rock quarry near the southwest border of Haledon/Prospect Park and Hawthorne is still operational.

View of North Haledon Quarry showing trap rock.

Zeolites are a rare group of minerals that are, however, fairly common in the trap rock quarries of the Paterson area. The minerals associated with the Watchung Mountains (many of which were removed from nearby Paterson quarries) are amethyst, smoky quartz, heulandite, stilbite, chabazite, prehnite, pectolite, and several zeolite minerals. (Wolfe 1977). A special exhibit of the minerals of the Paterson area can be seen in the Hall of Minerals at the American Museum of Natural History in New York City.

EARTHQUAKES

Earthquakes are recorded every year in New Jersey and the surrounding region, with many of these originating from near the boundary between the Newark basin and the New Jersey Highlands along the former Ramapo fault line (approximately Route 287). Most of these earthquakes have Richter magnitudes of less than 2 and are felt only by sensitive instruments, but as recently as October 1985, many area residents felt a magnitude 4 earthquake that originated just across the Hudson River in Westchester.

SOILS

INTRODUCTION

Soil is not an elemental material, but rather a mixture of various proportions of mineral and organic material, water, and air (Seglin 1975). The source, or parent material for the mineral component is weathered rock. The physical, biological, and chemical forces of nature cause the rock to break down, and through time, this weathered rock becomes very fine particles. In Hawthorne, the parent materials are the basalt rock of the Watchung Ridge, valley sandstone, and glacial sand and gravel deposits (Seglin 1975). The organic component is derived from plant material, such as, leaves, stems, and branches. Other important components include materials provided by animals, and the actions of bacteria and fungi.

Soils are a fundamental component of a region's plant, animal, and human ecology. These unconsolidated materials provide the growth media for plant communities, dictate the viability of the agricultural base, are the source of many construction materials and determine the capability of land development. Their permeability determines the infiltration rate of precipitation and surface water to the groundwater reservoir and the limitations for septic fields. Their strength and stability characteristics largely determine the type and size of foundations for all types of structures and the capacity to construct roads.

Although small in geographic area, Hawthorne displays a wide variety and number of different soil types (**Fig. 5**). This characterization can be attributed to the recent glacial period and the diversity of topography. Although much of the soil in Hawthorne has been altered by urbanization, a significant amount of soil is still close to or in its natural state. Understanding the structure and characteristics of soils in Hawthorne is essential for almost all planning and engineering activities.

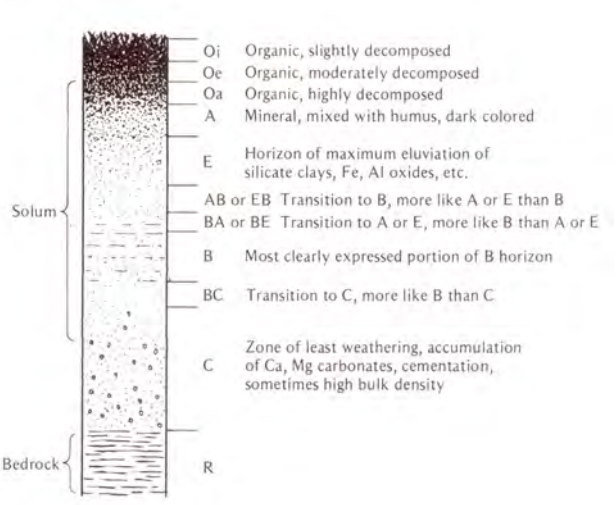

Fig. 6. Sketch of Soil Horizons. Figure modified for Brady 1984.

SOIL CLASSIFICATION

A number of different soil classification systems are in use, each designed to evaluate soils for different purposes, such as engineering and agriculture. The most common method of soil classification in this country is the United States Department of Agriculture's Soil Conservation Service (SCS) Survey (now the Natural Resources Conservation Service). This hierarchical method (United States Comprehensive Soil Classification System) divides soils into orders, suborders, great groups, subgroups, families, and series.

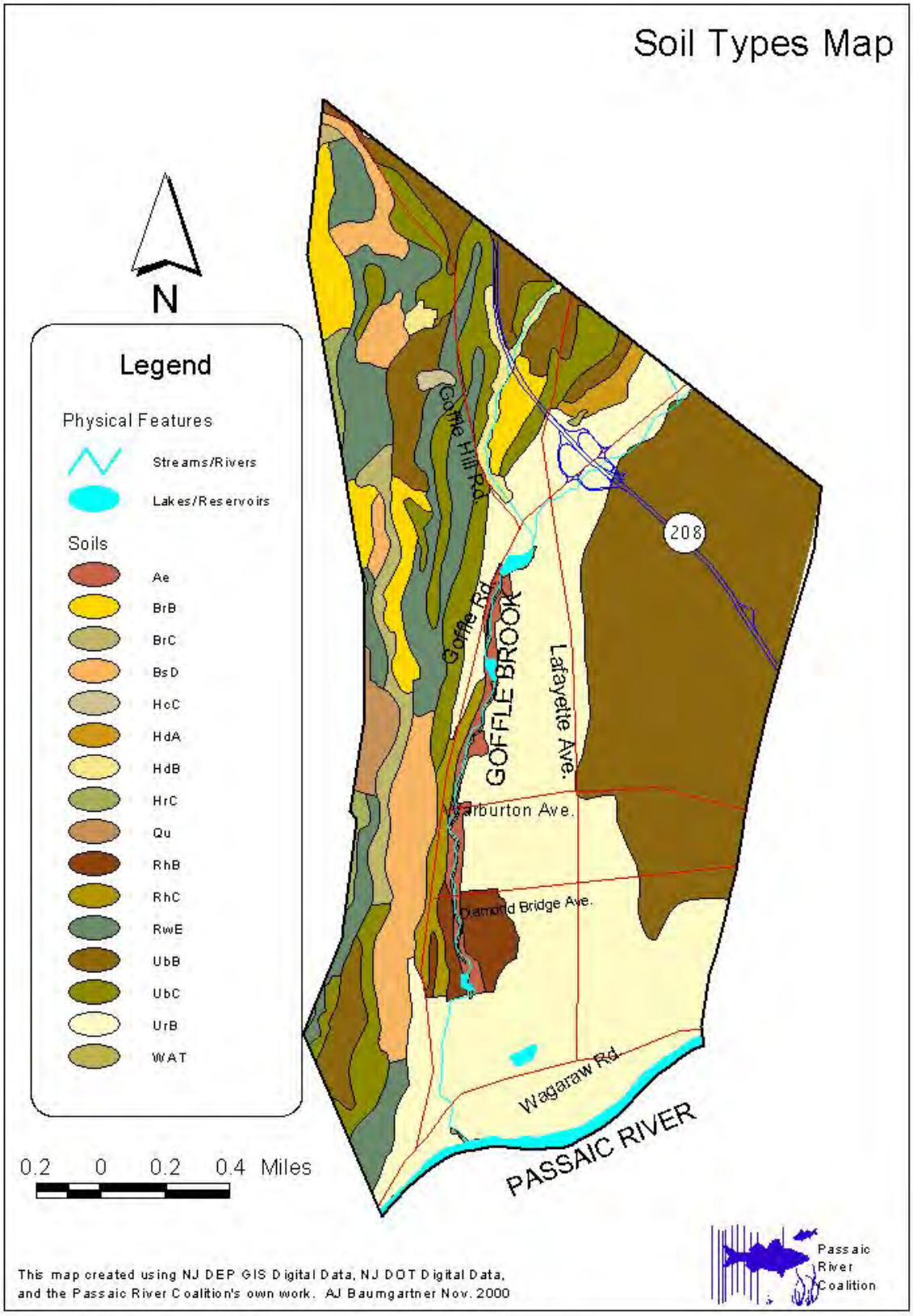

Fig. 5. Map of Soil Types in the Borough of Hawthorne.

Soil orders are very general and are identified according to the presence or absence of certain diagnostic horizons. Horizons are layers of soil representing relatively uniform materials that extend laterally (approximately parallel) to the ground surface (**Fig. 6**) (Brady 1984). In Hawthorne, there are three orders of soils: Inceptisols, Ultisols, and Alfisols (Seglin 1975). Generally, Inceptisols are much younger soils that lack significant development of soil horizons (Buol et al. 1973). Ultisols are older more weathered soils that display acidity and horizons with significant accumulations of clay. Alfisols are characterized by extensive horizon development, slight acidity, and are generally found in areas with ample rainfall.

Soil series are very specific descriptions of a local soil's characteristics. A soil series is the most specific classification and is used to identify and differentiate local soils (Donahue and Shickluna 1977). Soils within a region that have similar profiles and horizons are assigned to a soil series (Brady 1984). The soils in a series, however, will have different surface characteristics such as slope or stoniness (Seglin 1975, Brady 1984). On the basis of such textural differences, a soil series is divided into phases named to indicate a feature that affects land management. In Hawthorne there are five such textural soil types (**Fig. 5**) (Seglin 1975).

The following is a list of local soil series found in the SCS survey for Hawthorne and the orders to which they belong: Haledon Wet Variant (HdA, HdB), Holyoke (HrC), Otisville (unknown), Pompton (PvA), Preakness (Px), and Riverhead Series (RhB, RhC) soils all belong to the Inceptisol order (Seglin 1975), while the Hibernia (HpC), and Rockaway series (unknown) belong to the Ultisol order (Seglin 1975). The Boonton (BrB, BrC, and BsD) and Haledon (HcC) series belong to the Alfisol order (Seglin 1975). The three letter abbreviations are used in the legend of the soil map to identify each series (**Fig. 5**).

SOIL DESCRIPTIONS

The soils of Hawthorne are determining factors in the suitability of a site for agriculture, foundations for homes, septic tanks or landfills, roads, and other engineering or agricultural uses (Appendix). A brief description of differing soil series in Hawthorne follows.

UbB and UbC. **Urban land, Boonton complex**. These soils exist in areas where the topography has been greatly altered by urbanization and development. The original soils in this complex were primarily Boonton type soils as well as smaller amounts of Holyoke and Haledon soils. Extensive areas of this soil complex are paved over, or covered with structures. Slopes are generally between 3 and 8 percent, and the average depth to bedrock typically ranges from 3-10 feet. The UbC type soil differs in that it exhibits a slope of 8-15%, 4.6-14.9 degrees; yet it is still highly urbanized. UbC type soil poses a limit to development because the land must be extensively cut and filled in order to be

built upon. Both soils are derived from glacial deposits. Runoff is greatly increased due to the urban characteristics of the topography.

UrB. **Urban Land Riverhead complex**. This group consists of areas in which land has been altered through urbanization. Also included in this group are small inclusions of urbanized Otisville and Pompton soils. Slopes are generally between 3-8% or 1.7-4.6 degrees and large parts of the soil are under pavement or structures. Depth to bedrock is usually more than ten feet. The soil is characterized by its stony, gravelly, and sandy texture, as it was formed from glacial outwash.

RwE. **Rock Outcrop-Holyoke complex**. This complex is comprised of basalt bedrock outcrops and Holyoke soils. The basalt outcrops generally make up from 30-50% of the land area and Holyoke soils make up the other 50-70%. The slopes tend to range from 15-35% or 14.9-33.7 degrees. Small areas of Boonton and Haledon soils can also be found in this complex. The bedrock outcrops, shallow stony soils, and steep slopes seriously limit the use of the land in this complex. The land is generally not suited to construction of buildings with basements, and septic tanks are wholly impractical and ineffective on land of this type. Erosion is not a problem on land of this type that has been left unaltered.

Boonton Series. This type of soil is characterized by gently to steeply sloping loamy soils with a fragipans in the lower layers. A fragipan is a layer of silt and cemented fine sand that can range in thickness from a few inches to several feet. They have very low permeability and often result in perched water tables, as the water cannot penetrate it easily. Despite the presence of fragipans, this type of soil tends to drain well because it usually exists on sloped land. The perched water table poses a moderate limitation on the use of septic systems, and increases the risk of slope failure on road cuts. Stones on the surface are 30-100 feet apart. The erosion risk varies with steepness in the Boonton series.

> **BrB. Boonton stony silt loam**. This soil's profile is characteristic of the Boonton series, and typically displays a slope of 3-8% or 1.7-4.6 degrees. Tiny areas of Holyoke and Haledon soils are found in this group as are small areas of Boonton soils that lack fragipans.
>
> **BrC. Boonton stony silt loam**. This soil's profile is characteristic of the Boonton series, and typically displays a slope of 8-15% or 4.6-14.9 degrees. Small amounts of Holyoke and Haledon soils are found within this group, as are some isolated areas of Boonton soils that lack fragipans. The risk of erosion is moderate in areas where the natural vegetation has been removed.
>
> **BsD. Boonton very stony silt loam**. This soil's profile is generally characteristic of the Boonton series, but there are some deviations, and typically displays a slope of 15-30% or 14.9-29.2 degrees. It is different in that stones on the surface range from 5-30 feet apart. There were tiny amounts of Holyoke soil present in this group as well as small amounts of soil that lack a fragipan. Erosion becomes a problem on this type of soil when vegetation is removed due to its steepness.

Riverhead Series. This series of soils consists of deep, well drained, coarse textured soils. They are usually gently to strongly sloping and are found in areas adjacent to the

Highlands. Permeability is relatively rapid; therefore, the soils are well drained. One hazard of this rapid permeability is that septic tank effluent may cause groundwater contamination. This series of soil formed largely from glacial outwash deposits and is an excellent source of sand and gravel.

RhB. Riverhead sandy loam. This soil contains all of the characteristics of the Riverhead series, and typically demonstrates a slope of 3-8% or 1.7-4.6 degrees. Included in this mapping group were small areas of Otisville, Pompton, Preakness, Rockaway, and Hibernia soils.

RhC. Riverhead sandy loam. This soil contains the characteristics of the Riverhead profile and displays a slope ranging from 8-15% or 4.6-14.9 degrees. As with other soils in the Riverhead series, there are isolated areas of Otisville, Pompton, Rockaway, and Hibernia soils included in this mapping area.

HrC. Holyoke Series. The Holyoke Series consists of well-drained soils with a shallow bedrock base. These soils range from gently sloping to very steep and are characteristically found on the sides and tops of the basalt ridges in the southern part of the county. Holyoke soils are moderately permeable

Haledon Series. The Haledon series is characterized by poorly drained loamy soils that generally have a fragipan in the lower subsoil. A fragipan is a layer of silt and cemented fine sand that can range in thickness from a few inches to several feet. They have very low permeability and often result in perched water tables, as the water cannot penetrate it easily. The Haledon series ranges in slope from gently to strongly sloping. They can be found in waterways and toe slopes near the basalt ridges in the southern part of Passaic County. The Haledon series soils were formed in glacial till derived from basalt, red sandstone, shale, and gneiss. The soil is moderately permeable above the fragipan, but its presence leads to perched water tables and lateral flow of water underground. This lateral flow severely limits the construction of basements, septic systems, and impairs road cuts by making them more susceptible to failure. Erosion is not a serious threat with Haledon soils that are covered by vegetation.

HcB. Haledon very stony loam. This soil's characteristics are identical to those of the series, and it exhibits a 3-8% or 1.7-4.6 degree slope. The soil has high water tables, abundant stones generally at distances of 5-30 feet from each other, and a dense fragipan. In this mapping group tiny areas of Boonton, Rockaway, and Haledon soils without rocks can be found.

HcC. Haledon very stony loam. This soil has characteristics, which follow those for the soil series, and displays a slope of 8-15% or 4.6-14.9 degrees. High stone content and perched water tables characterize this type of soil. It is possible to find isolated areas of Boonton, Holyoke, and Pompton soils in this mapping group.

HdA. Haledon very stony silt loam, wet variant. This soil contains most of the characteristics of the Haledon profile and has slopes ranging from 0 to 3% or 0-1.7 degrees. It differs in that it is wetter, more poorly drained, and usually almost perfectly flat. Stones are prevalent in this soil and are usually 5-30 feet apart, but concentration decreases with depth. Isolated spots of Whippany and Parsippany soils may be found in this mapping group.

HdB. Haledon very stony silt loam, wet variant. This soil contains most of the characteristics of the Haledon profile and has slopes ranging from 3 to 8% or 1.7-4.6 degrees. It is very poorly drained with very high water tables. Included in this mapping unit are isolated areas of Boonton soils.

Ae. Alluvial land. This type of topographic feature consists mostly of poorly drained soil on flood plains, 3-8 feet above the normal stream level. These soils are typically flooded one or more times each year, usually for a duration of 2-5 days. Slopes tend to range from 0-3% or 0-1.7 degrees. Generally the top 12 inches of alluvial land are comprised of a fine silt or sandy loam, and is typically underlain by coarse sand and gravel. The water table can vary from ½ -5 feet depending upon the season (lowest in summer), but the major limitation to use of this type of land is flooding.

Px. Preakness Soil Series. The Preakness soil series consists of deep, flat, poorly drained, loamy soils characterized by a water table at the surface during late winter and early spring. They are found in low positions on a landscape and receive large amounts of runoff. Permeability is moderate, despite the fact that it is found in areas with high water tables. Erosion is not a major threat with this type of soil, although wind toppling trees is because of the wetness of the soil

Orc or OsD. Otisville Soil Series. This soil series is unique since it is very well drained due to its sand and gravel sub-layer. Its steepness can range from gently sloping to steep. It is generally found on the sides of valleys. The permeability is very good, yet this poses a pollution risk in places with septic fields or leaking storage tanks because contaminated water is easily transported through it.

PvA. Pompton Soil Series. Pompton soils are characterized by their moderately coarse texture, gravel substratum, and poor drainage. They are derived from glacial outwash made up of shale, sandstone, gneiss, and basalt. They exhibit moderate permeability, but due to high water tables and low slopes, they are usually wet.

HpC. Hibernia Soil Series. This soil series is typified by extremely stony, poorly drained soils that have a fragipan in the lower soil layers. (Refer to Haledon series for definition of fragipan). This soil ranges from gently sloping to steeply sloping and is generally found near drainage ways. The surface of the soil is moderately permeable, but due to the presence of fragipans, perched water tables and poor drainage are very common (Seglin 1975).

SOIL DISTRIBUTION

Urban Land is the most common soil type in Hawthorne, encompassing the eastern two-thirds of the Borough (**Fig. 7**). This altered soil is a composite of gently sloping Boonton and Riverhead soils that have been utilized for construction of residential, commercial, and industrial areas. The Alluvial land in Hawthorne is located in the floodplain of Goffle Brook. The brook, due to erosion, is the source of deposition of new alluvial materials within the riparian course.

The Haledon and Riverhead series soils are located adjacent to the Alluvial soils in the Goffle Brook and Deep Brook sections of town. The Riverhead soils are remnants of glacial outwash, having high permeability rates that directly discharge into the water

body. The Haledon soils containing a fragipan, have very low permeability levels and high water tables discharging water to the adjacent water body.

The Boonton, Holyoke-rock outcrop and Rockaway series soils are located on the western edge of the Borough on the steeper slopes of the First Watchung Ridge. These soils have as part of their parent material the underlying basalt. The Holyoke and Rockaway series are shallow soils with a high content of rock outcrops. Most of this land has substantial development constraints and therefore, large areas remain vegetated.

Fig. 7. Soil Distribution throughout Hawthorne. Data generated from the Map of Soil Types in the Borough of Hawthorne & NJDEP GIS Digital Data Sketch of Soil Horizons.

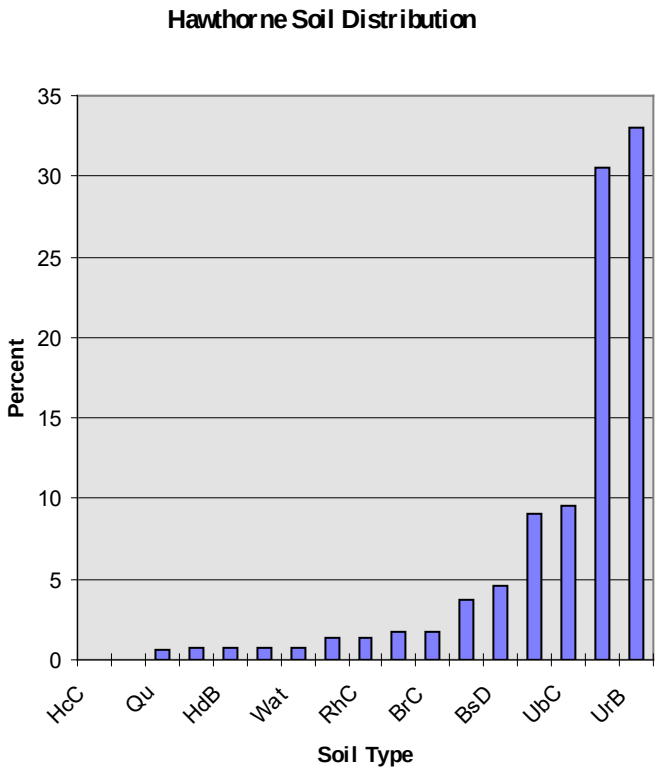

Table 1

LIMITATIONS OF SOIL FOR ENGINEERING PURPOSES

SOIL SERIES AND MAP SYMBOL	FOUNDATIONS WITH BASEMENTS	FOR DWELLING WITHOUT BASEMENTS	SEPTIC TANKS AND ABSORPTION FIELDS	SANITARY LANDFILL	LOCAL ROADS AND STREETS	LAWNS, LANDSCAPING, AND GOLF FAIRWAYS	ATHLETIC FIELDS	PICNIC AND PLAY AREAS	CAMPSITES FOR TRAILERS AND TENTS	PATHS AND TRAILS
Ae Alluvial lands	Severe: subject to frequent flooding; seasonal water table at depth of ½ to 3 ½ feet.	Severe: subject to frequent flooding.	Severe: subject to frequent flooding; hazard of stream pollution.	Severe: subject to frequent flooding; hazard of stream pollution.	Severe: subject to frequent flooding.	Severe: subject to frequent flooding.	Severe: subject to frequent flooding.	Moderate: subject to flooding 1 or 2 times for short periods during season of use.	Severe: subject to frequent flooding.	Moderate: subject to frequent flooding: water table shows depth of 20 inches for short periods during season of use
BrB Boonton stony silt loam (3-8% slopes)	Moderate: seasonal high perched water table at depth of 1 ½ to 4 feet; lateral seepage above fragipan	Slight	Moderate: seasonal high perched water table above fragipan; slow permeability; special design needed for deep trenches.	Moderate: seasonal high perched water table above fragipan; bedrock at depths of 6 feet or more	Severe: seasonal high water table at depth of 1 ½ to 4 feet; high frost-action potential	Slight	Moderate: stony and gravelly; gentle slopes	Slight	Moderate: stony	Slight
BrC Boonton stony silt loam (8-15% slopes	Moderate: seasonal high perched water table at depth of 1 ½ to 4 feet; lateral seepage above fragipan	Slight	Moderate: seasonal high perched water table above fragipan; slow permeability in fragipan; special design needed for deep ditches.	Moderate: seasonal high perched water table above fragipan; bedrock at depth of 6 feet or more.	Severe: seasonal high water table at depth of 1 ½ to 4 feet; high frost-action potential.	Moderate: strong slopes.	Severe: strong slopes.	Moderate: strong slopes	Moderate: stony; strong slopes	Slight
BsD Boonton very stony silt loam, 15-30% slopes	Severe: steep slopes	Severe: steep slopes	Severe: steep slopes	Moderate: seasonal high perched water table above fragipan; bedrock at depth of 6 feet or more; steep slopes.	Severe: seasonal high water table at depth of 1 ½ to 4 feet; high frost-action potential; steep slopes	Severe: very stony; steep slopes	Severe: very stony; steep slopes.	Severe: steep slopes.	Severe: steep slopes.	Moderate: very stony; steep slopes.
HcC Haledon very stony loam (8-15% slopes)	Severe: seasonal high perched water table at depth of ½ to 1 ½ feet.	Moderate: seasonal high perched water table at depth of ½ to 1 ½ feet.	Severe: seasonal high perched water table at depth of ½ to 1 ½ feet.	Severe: seasonal high perched water table at depth of ½ to 1 ½ feet.	Severe: seasonal high perched water table at depth of ½ to 1 ½ feet; high frost-action potential.	Moderate: very stony.	Severe: water table above depth of 20 inches during season of use; strong slopes in HcC.	Moderate: water table above depth of 20 inches for short periods during season of use.	Severe: water table above depth of 20 inches during season of use.	Moderate: water table may be above depth of 20 inches during season of use.
HdA Haledon very stony silt loam, wet variant (0-3% slopes)	Severe: seasonal high perched water table at depth of 0 to 1 foot.	Severe: seasonal high perched water table at depths of 0 to 1 foot.	Severe: seasonal high perched water table at depth of 0 to 1 foot; hazard of ground-water pollution.	Severe: seasonal high perched water table at depth of 0 to 1 foot; hazard of ground-water pollution.	Severe: seasonal high perched water table at depth of 0 to 1 foot.	Severe: seasonal high perched water table at depth of 0 to 1 foot.	Severe: very stony.	Severe: water table above depth of 20 inches or more during season of use.	Severe: water table above depth of 20 inches or more during season of use.	Severe: seasonal high perched water table at depth of 0 to 1 foot.
HdB Haledon very stony silt loam, wet variant (3-8% slopes)	Severe: seasonal high perched water table at depth of 0 to 1 foot.	Severe: seasonal high perched water table at depths of 0 to 1 foot.	Severe: seasonal high perched water table at depth of 0 to 1 foot; hazard of ground-water pollution.	Severe: seasonal high perched water table at depth of 0 to 1 foot; hazard of ground-water pollution.	Severe: seasonal high perched water table at depth of 0 to 1 foot	Severe: seasonal high perched water table at depth of 0 to 1 foot.	Severe: very stony.	Severe: water table above depth of 20 inches or more during season of use.	Severe: water table above depth of 20 inches or more during season of use.	Severe: seasonal high perched water table at depth of 0 to 1 foot.

Table 1

LIMITATIONS OF SOIL FOR ENGINEERING PURPOSES

SOIL SERIES AND MAP SYMBOL	FOUNDATIONS WITH BASEMENTS	FOR DWELLINGS WITHOUT BASEMENTS	SEPTIC TANKS AND ABSORPTION FIELDS	SANITARY LANDFILL	LOCAL ROADS AND STREETS	LAWNS, LANDSCAPING, AND GOLF FAIRWAYS	ATHLETIC FIELDS	PICNIC AND PLAY AREAS	CAMPSITES FOR TRAILERS AND TENTS	PATHS AND TRAILS
HrC Holyoke-Rockaway complex (3-15% slopes)	Severe: hard bedrock at depth of less than 1 ½ feet.	Severe: hard bedrock at depth of less than 1 ½ feet	Severe: hard bedrock at depths of less than 1 ½ feet.	Severe: hard bedrock at depth of less than 1 ½ feet.	Severe: hard bedrock at depth of less than 1 ½ feet	Severe: hard bedrock at depth of less than 1 ½ feet.	Severe: hard bedrock at depth of less than 1 ½ feet.	Moderate: strong slopes in places.	Moderate: strong slopes in places.	Slight
Px Preakness silt loam	Severe: seasonal high water table at depth of 0 to 1 foot.	Severe: seasonal high water table at depth of 0 to 1 foot.	Severe: seasonal high water table at depth of 0 to 1 foot; hazard of groundwater pollution.	Severe: seasonal high water table at depth of 0 to 1 foot; hazard of groundwater pollution.	Severe: seasonal high water table at depth of 0 to 1 foot.	Severe: seasonal high water table at depth of 0 to 1 foot.	Severe: seasonal high water table at depth of 0 to 1 foot.	Severe: water table above depth of 20 inches for month or more during season of use.	Severe: water table above depth of 20 inches for month or more during season of use.	Severe: water table above depth of 20 inches for month or more during season of use.
RhB Riverhead sandy loam (3-8% slopes)	Slight	Slight	Slight: rapid permeability in subsoil; hazard of groundwater pollution.	Severe: rapid permeability in subsoil; hazard of groundwater pollution.	Slight	Slight	Moderate: gentle slopes; gravelly	Slight	Slight	Slight
RhC Riverhead sandy loam (8- 15% slopes)	Moderte: strong slopes	Moderate: strong slopes	Moderate: strong slopes: rapid permeability in subsoil; hazard of groundwater pollution.	Severe: rapid permeability in subsoil; hazard of groundwater pollution.	Moderate: strong slopes; hazard of erosion.	Moderate: strong slopes; hazard of erosion.	Severe: strong slopes.	Moderate: strong slopes.	Moderate: strong slopes.	Slight.
RwE Rock Outcrop	Severe: rock outcrops; very steep slopes.	Severe: rock outcrops; very steep slopes.	Severe: rock outcrops; very steep slopes.	Severe: rock outcrops; very steep slopes	Severe: rock outcrops; very steep slopes	Severe: rock outcrops; very steep slopes.	Severe: rock outcrops; very steep slopes.	Severe: rock outcrops; very steep slopes.	Severe: rock outcrops; very steep slopes.	Severe: rock outcrops; very steep slopes.
UbB, UbC and **UrB**	too variable to be rated	too variable to be rated	too variable to be rated	too variable to be rated	too variable to be rated	too variable to be rated	too variable to be rated	too variable to be rated	too variable to be rated	too variable to be rated

III. Air Resources

AIR QUALITY

INTRODUCTION

Never seen, yet ever present, the atmosphere moderates climatic extremes, filters incoming solar radiation, and provides the oxygen that fuels organic metabolism and chemical combustion. With the introduction of anthropogenic (human caused) pollutants into the atmosphere, air quality becomes degraded in many ways that adversely affect human health, natural ecosystem function, drinking water quality, and building integrity and aesthetics.

Air quality is negatively affected by pollution that originates from numerous sources: stationary sources such as factories, power plants, smelters, and smaller sources such as dry cleaners and degreasing operations; mobile sources such as cars, buses, planes, trucks and trains; and naturally occurring sources such as windblown dust and volcanic eruptions. Air pollution is found all over the United States and is becoming a global problem that has disrupted the natural balance of the environment. The most well known and controversial issue is that of the global warming – the increase in carbon dioxide (CO_2) in the atmosphere that traps solar energy, raising the earth's temperature.

AIR POLLUTANT CRITERIA

As a means of addressing the problems of air pollution across the nation, Congress enacted the Clean Air Act (CAA) in 1970, and charged the Environmental Protection Agency (EPA) with regulating air pollution. The CAA provides the principal framework for national, state, and local efforts to protect air quality. Regulations, known as National Ambient Air Quality Standards (NAAQS), serve to control the release of pollutants which are considered harmful to people and the environment. The EPA Office of Air Quality Planning and Standards (OAQPS) works to ensure that these air quality standards are met, or attained (in cooperation with state, Tribal, and local governments) through national standards and strategies to control pollutant emissions from automobiles, factories, and other sources. The New Jersey Department of Environmental Protection's Bureau of Air Monitoring addresses these issues on the state level.

The EPA calls such pollutants **criteria air pollutants** because permissible standards are based on health risk (scientifically-based) factors. **Primary Standards** are set based on a pollutant's risk to human health whereas **secondary standards** are set based on risk of environmental or property damage. A geographic region that meets or exceeds the primary standard for a particular pollutant is called an **attainment area**; regions that do not meet the primary standard are called **non-attainment** areas.

Although the EPA has been regulating criteria air pollutants since the early 1970s, many urban areas are classified as non-attainment for at least one criteria air pollutant. It has been estimated that about 90 million Americans live in non-attainment areas. Of the common contaminates that comprise air pollution the EPA has classified six principal, or criteria, pollutants. The six criteria pollutants are Carbon Monoxide, Nitrogen Dioxide, Sulfur Dioxide, Lead, Particulate Matter, and Ozone (or smog):

Carbon Monoxide (CO)

- **Source** - burning of gasoline, natural gas, coal, oil etc.
- **Health Effects** - reduces ability of blood to bring oxygen to body cells and tissues; cells and tissues need oxygen to work. Carbon monoxide may be particularly hazardous to people who have heart or circulatory (blood vessel) problems and people who have damaged lungs or breathing passages
- **Criterion** - 8-hour Average 9 ppm (10 mg/m^3) Primary 1-hour Average 35 ppm (40 mg/m^3) Primary

Nitrogen Dioxide (One of the NOx); smog-forming chemical

- **Source** - burning of gasoline, natural gas, coal, oil etc. Cars are an important source of NO2.
- **Health Effects** - lung damage, illnesses of breathing passages and lungs (respiratory system)
- **Environmental Effects** - nitrogen dioxide is an ingredient of acid rain (acid aerosols), which can damage trees and lakes. Acid aerosols can reduce visibility.
- **Property Damage** - acid aerosols can eat away stone used on buildings, statues, monuments, etc.
- **Criterion** - Annual Arithmetic Mean 0.053 ppm (100 µg/m^3) Primary & Secondary

Sulfur Dioxide (SO_2)

- **Source** - burning of coal and oil, especially high-sulfur coal from the Eastern United States; industrial processes (paper, metals)
- **Health Effects** - breathing problems, may cause permanent damage to lungs
- **Environmental Effects** - SO2 is an ingredient in acid rain (acid aerosols), which can damage trees and lakes. Acid aerosols can also reduce visibility.
- **Property Damage** - acid aerosols can eat away stone used in buildings, statues, monuments, etc.
- **Criterion** - Annual Arithmetic Mean 0.03 ppm (80 µg/m^3) Primary 24-hour Average 0.14 ppm (365 µg/m^3) Primary 3-hour Average 0.50 ppm (1300 µg/m^3) Secondary

Lead (Pb)

- **Source** - leaded gasoline (being phased out), paint (houses, cars), smelters (metal refineries); manufacture of lead storage batteries
- **Health Effects** - brain and other nervous system damage; children are at special risk. Some lead-containing chemicals cause cancer in animals. Lead causes digestive and other health problems.
- **Environmental Effects** - Lead can harm wildlife.
- **Criterion** - Quarterly Average 1.5 µg/m^3 Primary & Secondary

Particulate Matter (PM-10, PM-2.5); (dust, smoke, soot)

- **Source** - burning of wood, diesel and other fuels; industrial plants; agriculture (plowing, burning off fields); unpaved roads
- **Health Effects** - nose and throat irritation, lung damage, bronchitis, early death
- **Environmental Effects** - particulates are the main source of haze that reduces visibility
- **Property Damage** - ash, soot, smoke and dust can dirty and discolor structures and other property, including clothes and furniture
- **Criteria** -
  - **PM 10** *Particles with diameters of 10 micrometers or less* Annual Arithmetic Mean 50 µg/m^3 Primary & Secondary 24-hour Average 150 µg/m^3 Primary & Secondary
  - **PM 2.5** *Particles with diameters of 2.5 micrometers or less* Annual Arithmetic Mean ** 15 µg/m^3 Primary & Secondary 24-hour Average ** 65 µg/m^3 Primary & Secondary

Ozone (O_3) (ground-level ozone is the principal component of smog)

- **Source** - chemical reaction of pollutants; VOCs and NOx
- **Health Effects** - breathing problems, reduced lung function, asthma, irritates eyes, stuffy nose, reduced resistance to colds and other infections, may speed up aging of lung tissue
- **Environmental Effects** - ozone can damage plants and trees; smog can cause reduced visibility
- **Property Damage** - Damages rubber, fabrics, etc.
- **Criterion** - **Ozone** 1-hour Average 0.12 ppm (235 $\mu g/m^3$) Primary & Secondary 8-hour Average ** 0.08 ppm (157 $\mu g/m^3$) Primary & Secondary

VOCs* (volatile organic compounds); smog-formers

- **Source** - VOCs are released from burning fuel (gasoline, oil, wood coal, natural gas, etc.), solvents, paints glues and other products used at work or at home. Cars are an important source of VOCs. VOCs include chemicals such as benzene, toluene, methylene chloride and methyl chloroform
- **Health Effects** - In addition to ozone (smog) effects, many VOCs can cause serious health problems such as cancer and other effects
- **Environmental Effects** - In addition to ozone (smog) effects, some VOCs such as formaldehyde and ethylene may harm plants

*All VOCs contain carbon (C), the basic chemical element found in living beings. Carbon-containing chemicals are called organic. Volatile chemicals escape into the air easily. Many VOCs are also hazardous air pollutants, which can cause very serious illnesses. EPA does not list VOCs as criteria air pollutants, but they are included in this list of pollutants because efforts to control smog target VOCs for reduction.

AIR MONITORING

The US Environmental Protection Agency (EPA) monitors and reports air quality using a Pollutant Standard Index (PSI). The PSI was established in 1976 as a consistent and easy to understand way of stating air pollutant concentrations and associated health implications. The PSI allows the EPA to use a uniform system for five of the six criteria pollutants. Lead is not reported using the PSI because lead tests take several weeks, and the PSI is meant to report real time data. Data is recorded in parts per million (ppm) and then converted to a PSI value. The PSI does not report each individual pollutant, but rather assigns a measure of air quality based on the sum of the multiple pollutants. The scale spans from zero to five hundred, assigning a degree of air quality to ranges within (**Table 2**).

Table 2. Health Cautions for Pollutant Standard Index. Data modified United States Environmental Protection Agency: Office of Air and Radiation, Office of Air Quality Planning and Standards.

Index Value	PSI Descriptor	General Health Effects	Cautionary Statements
0-50	Good	None for the general population	None required.
50-100	Moderate	Few or none for the general population	None required.
100-200	Unhealthy	Mild aggravation of symptoms among susceptible people, with irritation symptoms in the healthy population.	Persons with existing heart or respiratory ailments should reduce physical exertion & outdoor activity. General population should reduce vigorous outdoor activity.
200-300	Very Unhealthy	Significant aggravation of symptoms & decreased exercise tolerance in persons with heart or lung disease; widespread symptoms in the healthy population.	Elderly and persons with existing heart or lung disease should stay indoors & reduce physical activity. General population should avoid outdoor activity. All people should remain indoors, keeping windows & doors closed, and minimize physical exertion.

In June 2000, EPA updated the index and renamed it Air Quality Index (AQI) (**Table 3**). PSI and AQI are similar. They both:

- Focus on health risks of brief exposure to pollutants- a few hours or days
- Involve air pollutants regulated by the Clean Air Act (criteria pollutants)
- Use the same method to calculate index values
- Use an index value of 100 to represent pollutants concentration at the level of Air Quality Standards (NAAQS)

New qualities featured in the Air Quality Index include:

- A health risk category, *unhealthy for sensitive groups*
- Two additional pollutants: ozone averaged over 8 hours, and fine particulate matter (particle size2.5 micrometers or less)

The AQI provides a descriptive rating and a colorcode (e.g. green=good) in real-time on the internet for many sites. New Jersey is divided into 9 AirQuality Regions.

The closest stations for each parameter are as follows: Ozone (O_3) at Ramapo (Ramapo Mountain State Forest, Passaic County); $PM_{2.5}$ was measured at Paterson (Passaic County) until 2012, but currently the closest station is Newark Firehouse (Essex County; where O_3, SO_2 and CO are also measured); and nitrogen dioxide (NO_2) is measured at East Orange (Essex County, also CO) (NJDEP Bureau of Air Monitoring, February 13,

2013). It should be noted that some of these monitoring sites may receive much higher local air pollution (e.g. from traffic and industry) than Hawthorne.

Table 3. Air Quality Index. Table obtained from AIRNow Air Quality Index 2010

Category	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Hazardous
Index Value	0-50	51-100	101-150	151-200	201-300	301-500
CO (ppm)	0.0-4.4	4.5-9.4	9.5-12.4	12.5-15.4	15.5-30.4	30.5-50.4
NO_2 (ppb)	0.0-53	54-100	101-360	361-644	645-1244	1245-2044
O_3 1-hour (ppb)	-	--	125-164	165-204	205-404	405-604
O_3 8-hour (ppb)	0-59	60-75	76 -95	96-115	116-374	405-604
PM 2.5 (ug/m3)	0-15.4	15.5-35.4	35.5-65.4	65.5-150.4	150.5-250.4	250.5-500.4
PM 10 (ug/m3)	0-54	55-154	155-254	255-354	355-424	425-604
SO_2 (ppb)	0-34	35-144	145-224	225-304	305-604	605-1004

Air Quality monitoring is a tricky and expensive undertaking. Due to the way wind influences air quality and the fact that Hawthorne does not have its own air monitor, data were obtained for Passaic County as recorded by the EPA (**Table 4**). Air Quality appears to be increasing slightly over the years, but longer test ranges are needed to properly assess.

Table 4. Air Quality Measurements for Passaic County, NJ. Measurements obtained at the Ramapo Air Quality Station. Table modified from data on EPA AIRS website.

Number of days Monitored	Percent of days monitored PSI Good	Percent of days monitored PSI Moderate	Percent of days monitored PSI Unhealthful for Sensitive Groups	Percent of days monitored PSI Unhealthy	Year
277	73%	23%	3%	0%	2008
279	84%	16%	1%	0%	2009
286	74%	22%	3%	0.35%	2010
293	81%	16%	2%	0%	2011
302	78%	20%	2%	0.33%	2012
287	84%	15%	1%	0%	2013
283	83%	17%	0%	0%	2014
279	78%	20%	3%	0%	2015
270	81%	17%	2%	0%	2016
299	87%	12%	0%	0%	2017
277	84%	15%	1%	0%	2018
277	87%	12%	0%	0%	2019
262	94%	6%	0%	0%	2020

SMOG

An August 2000 study by INFORM, Inc. (Golden 2000) reports that "95 percent of New Jersey's 8.1 million residents live in areas that fail to meet federal public health standards, compared to 38 percent of the U.S. population as a whole." The report also claims "18 of New Jersey's 21 counties are in non-attainment of federal ground-level ozone standards." In addition, twelve counties, including Passaic, were ranked as being in 'severe' non-attainment just below the 'extreme' level.

Ground-level ozone is the primary component of what we typically refer to as **smog**. Ozone can be good or bad depending on its location in the atmosphere. Ozone in the **stratosphere** high above the Earth protects human health and the environment whereas ground-level ozone is the main harmful ingredient in smog. Ground-level ozone is produced by the combination of pollutants from various sources, including smokestacks, cars, paints and solvents. When a car burns gasoline, releasing exhaust fumes, or a painter paints a house, smog-forming pollutants rise into the sky. Often, wind blows smog-forming pollutants away from their sources. The smog-forming reactions take place while the pollutants are being blown through the air by the wind. Higher smokestacks are sometimes installed with the idea that they will reduce pollutant levels. While the higher stacks do reduce local levels of pollutants, they increase regional levels by placing chemicals at higher altitudes where they are exposed to hotter temperatures and remain in the atmosphere up to seven times the normal period. This, along with the influence of winds, explains why smog is often more severe miles away from the source of smog-forming pollutants. The smog-forming pollutants literally cook in the sky, and if the weather is hot and sunny, smog will form more easily. Similar to baking a cake, it takes time to cook up smog- several hours from the time pollutants get into the air until the smog gets increasingly detrimental.

Weather and geography determine where smog will go and its severity. When **temperature inversions** occur (warm air stays near the ground instead of rising) and winds are calm, smog may stay in place for days at a time. As traffic and other sources add more pollutants to the air, the smog gets worse. Since smog travels across county and state lines, when a metropolitan area covers more than one state (for instance, the New York metropolitan area includes parts of New Jersey and Connecticut), their governments and air pollution control agencies must cooperate to solve their problem. Governments on the East Coast from Maine to Washington, D.C., will have to work together in a **multistate** effort to reduce the area's smog problem.

The 1990 Clean Air Act amendments helped to further reduce pollution from criteria air pollutants, including smog. The EPA and state governors must first cooperate to identify non-attainment areas for each criteria air pollutant. The EPA then classifies the non-attainment areas according to severity of pollution. There are five classes of nonattainment areas for smog, ranging from **marginal** (relatively easy to clean up quickly) to **extreme** (will take a lot of work and a long time to clean up).

The 1990 Clean Air Act uses this new classification system to tailor clean-up requirements to the severity of the pollution and set realistic deadlines for reaching clean-up goals. If deadlines are missed, the law allows more time to clean up, but usually a nonattainment area that has missed a clean-up deadline will have to meet the stricter clean-up requirements set for more polluted areas. Not only must nonattainment areas meet deadlines, but states with non-attainment areas must also show the EPA

that they are moving on clean-up before the deadline- making reasonable further progress. States will usually do most of the planning for cleaning up criteria air pollutants, using the permit system to make sure power plants, factories and other pollution sources meet their clean-up goals. The comprehensive approach to reducing criteria air pollutants taken by the 1990 Act covers many different sources and a variety of clean-up methods. Many of the smog clean-up requirements involve motor vehicles (cars, trucks, buses). Also, as air quality continues to decline, pollution controls are mandated for smaller sources.

THE GREENHOUSE EFFECT

Water vapor and several other gases such as carbon dioxide, methane and chlorofluorocarbons (CFCs), warm the Earth's atmosphere by absorbing and reemitting radiation. They trap some of the heat energy radiating from the Earth's atmospheric system, heating the earth. This process is known as the greenhouse effect. Human activity contributes certain gases including carbon dioxide, methane, nitrous oxides and ozone, all of which have significantly increased in recent years but began with the Industrial Revolution. This increase of gases in the atmosphere is hypothesized as being responsible for global warming- the increase in average global temperature near the Earth's surface.

ACID DEPOSITION

Hawthorne, much like the rest of the United States is experiencing acid deposition, more commonly known as acid rain. Acid rain is the result of sulfur and nitrogen oxides in addition to several other acids produced from stationary sources such as power plants that burn fossil fuels and mobile sources such as automobiles. Pure rainfall has a pH of 5.0-5.6 (Miller 1996), which is slightly acidic- neutral being a pH of 7.0 on the pH scale of 0.0-14.0; a pH greater than 7.0 being alkaline. Areas most sensitive to acid deposition are those in which the bedrock or soil cannot buffer (neutralize) the acid input. Hawthorne's pH precipitation range is 4.0-4.5 (Pardi and Swanson, unpublished data). These values are concurrent with much of the pH values throughout the Northeast United States from which 80 percent of sulfur dioxide emissions and 65 percent of nitric oxides for the country come (Botkin and Keller 1995). High acidity can damage structures and ecosystems and threaten human health with respiratory problems. Acid deposition is known to cause bronchitis and asthma sufferings to be more severe (US EPA 2000).

MOBILE EMISSIONS

Mobile emissions were identified as the main cause of pollution levels in New Jersey in 2001. The state's 5.8 million vehicles are responsible for 43 percent of the volatile organic compounds and 44 percent of the nitrogen oxides, the product of combustion of fuel, utilities, and industries, which contribute to smog. Major contributing trends include:

- A higher density of truck traffic traversing the state
- A 36 percent increase in vehicle miles traveled between 1970 and 1997
- Sprawl development (the number of automobile-dependent office developments quadrupled between 1990 and 1997 while the number of transit-accessible offices remained unchanged
- The growing popularity of sport utility vehicles, which emit 40 percent more pollutants per vehicle

Motor vehicles are also major contributors to carbon monoxide and carbon dioxide emissions among other greenhouse gases. They contribute up to 70 percent of carbon monoxide emissions throughout the Northeast. In addition, New Jersey as a whole has the highest percentage of carbon dioxide emissions from transportation than any other state. Carbon dioxide makes up 82 percent of all greenhouse emissions in New Jersey, 38 percent of which arise from mobile sources.

In 2002, the EPA conducted its National Air Toxics Assessment (NATA), which revealed that mobile sources in New Jersey contributed to 67 percent of all emissions of air toxics in New Jersey; on-road mobile emissions accounted for 34 percent of these hazardous air pollutants while non-road mobile emissions accounted for 33 percent. And, of the 181 air toxics included in the NATA, the NJDEP considers 21 to be of particular concern because they exceed health benchmarks in at least one county; 14 of the 21 pollutants are a problem in 18 or more counties. 7 of the 21 pollutants come, at least in part, from mobile sources: Acetaldehyde, Acrolein, Benzene, 1,3-Butadiene, Diesel Particulate Matter, Ethylbenzene, & Formaldehyde. With the exemption of acrolein, these toxics are labeled as known or probable carcinogens. It is estimated that Passaic County emits about 3200 tons of emissions in 2002 ranking number 8 for lowest in the state, while Bergen County estimated to emit about 7800 tons of emissions in 2002 ranks highest in the state.

CLIMATE

INTRODUCTION

The climate of Hawthorne is typical of the Mid-Atlantic region and specifically the New Jersey Piedmont region. Winters are cold with sub-freezing weather, and summers are hot with temperatures in the eighties and nineties (Seglin 1975). The difference between winter and summer averages 40°F, but differences between low and high temperatures can be almost 100°F (Godfrey 1980). Precipitation, in some form, is received throughout the year.

As a result of geography, there are some meteorological occurrences that are unique to Hawthorne. The First Watchung Ridge (called Orange Mountain by geologists) plays a key role in Hawthorne's climate, especially in winter. With an elevation difference of over two hundred feet between the mountain and the valley there is a marked difference in the texture of winter precipitation when the temperature is near freezing, with snow accumulating on the mountain but melting in the valley during winter storms. The First Watchung also alters the local weather by creating thermal inversions. During nor'Easters (northeastern storms), it is common for warmer air from the ocean to be brought in by easterly winds. This warm air overrides cold air at the surface and turns snow into rain, sleet, and freezing rain. The First Watchung has the capacity to help trap cold air in the valley and extend the duration of an inversion, resulting in slightly more sleet or freezing rain for those in the valley than in the surrounding areas.

According to the NJ State Climatologist, there is growing evidence that our global climate is changing as a result of human activities. The NJ State Climatologist evaluated data from 19 stations for the NJ Climate Report Card in order to begin to document and understand climate within NJ. While statistical trends were not developed for this study, over 600 time- series graphs were created that chart weather variables over the past century (e.g. min. and max. temperature, precipitation). The weather station nearest to Hawthorne that was evaluated for this climate study was Charlotteburg Reservoir, which has been monitored since 1893 (Robinson, 2010; Hartman, 2002). The Charlotteburg Reservoir weather monitoring station is located about 16 miles west of Hawthorne, in West Milford Township, Passaic County near Route 23.

According to the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC), the temperature trend (annual average) in New Jersey is +0.2 °F per decade, and the precipitation trend is +0.41 inches per decade (for the period of record 1895 to 2012) (NOAA, June 13, 2013).

In addition, the NCDC calculates state *normals* (three-decade averages) of climatological variables, including temperature and precipitation. The normal maximum temperature for NJ hasincreased between 0.5 to 0.7°F for 1981-2010 compared to the 1971-2000 period. Normal minimum temperature for the state has increased 0.3 to 0.5°F (NOAA, May 16, 2011)

TEMPERATURE AND PRECIPITATION

As the prevailing westerlies shift north and south and vary in strength, they bring wet, dry, hot, and cold airstreams. These influence the weather throughout New Jersey, resulting in highly variable daily weather. The Office of the New Jersey State Climatologist (ONJSC) divides New Jersey into five distinct climate regions. Hawthorne is included in the Northern Zone, which mainly encompasses the Appalachian Highlands portion of the state (ONJSC, No Date).

This region has higher elevations and is more northern than the rest of the state; therefore, it experiences colder temperatures – on average 10°F colder than the Coastal Zone in the winter. The Northern Zone receives an average of 40 to 50 inches of snow, compared with an average of 10 to 15 inches in the south. This region is cloudier and wetter, as well. As moist air comes in from the west or off the ocean, it rises when it encounters the mountains, generating clouds and precipitation. During the warm season, thunderstorms are responsible for most of the rainfall, often developing in the evening. About twice as many thunderstorms occur here as in the Coastal Zone, where the Atlantic Ocean helps stabilize the atmosphere (ONJSC, No Date).

The ONJSC's New Jersey Weather and Climate Network maintains weather stations which transmit real-time data and weather forecasts on the Internet. Of these stations, the Charlotteburg Reservoir station is nearest to Hawthorne.

Table 5 displays monthly average highs and lows and mean temperature, average monthly precipitation, and record highs and lows (and the year it occurred in parentheses).

Measurable precipitation falls in this area on approximately 120 days per year. At the Charlotteburg Reservoir station, annual precipitation has averaged 50.23 inches (for the period 1893-2021), which is at the high end of the range of 40 to 51 inches in New Jersey (see **Table 5**) (ONJSC, No Date; ONJSC, December 2021).

Table 5. Temperature & Precipitation at Charlotteburg Reservoir, NJ.

Month	***Based on data from 1893-2021***					
	Temperature (°F)					**Mean Precipitation**
	Avg. High	**Avg. Low**	**Mean**	**Record High**	**Record Low**	
January	38.8	15.5	27.1	71 (1950)	-26 (1912)	3.69 in.
February	35.9	15.9	27.6	76 (1985)	-25 (1943)	3.38 in.
March	48.1	26.3	36.4	85 (1945)	-10 (1943)	4.23 in.
April	53.7	41.4	47.3	92 (1976)	6 (1923)	4.19 in.
May	63.9	48.7	57.8	96 (1936)	23 (1922)	4.21 in.
June	72.8	60.2	66.0	99 (1934)	29 (1957)	4.32 in.
July	76.1	65.6	70.7	105 (1936)	36 (1912)	4.63 in.
August	74.0	63.5	68.9	100 (1933)	32 (1940)	4.58 in.
September	68.9	56.1	62.3	100 (1953)	23 (1904)	4.51 in.
October	59.7	44.9	51.6	90 (1941)	10 (1936)	4.09 in.
November	49.4	35.3	41.3	81 (1950)	-1 (1938)	4.13 in.
December	49.3	18.9	30.9	73 (1998)	-15 (1917)	4.17 in.
Average Annual Precipitation:						50.23 in.

Rainfall is distributed fairly evenly throughout the year, with February being the driest month. On average, July, August and September have the most precipitation, but appear drier because evapotranspiration exceeds precipitation (ONJSC, December 2021). Record rainfalls are more likely to occur in August and September, due to tropical storms.

An average of 30 to 40" of snow falls annually in the lower elevations and 40 to 60" falls annually in the northern region (about 10" of snow equals 1" of rain). Each winter, about 11 to 12 days receive snowfall greater than or equal to 0.5" in Hawthorne. Days with snowfall greater than 4" occur only about 2.1 to 2.5 times per winter in this area (ONJSC, 1971-2000). Measured at Charlotteburg, the earliest snow on record was on October 10 (in 1979, with 1.5"), and the latest was April 29 (in 1909, with 2.0") (ONJSC, 1893-2010).

According to NOAA, Charlotteburg Reservoir has an average of 151 frost-free days. The average date for the last spring frost (32°F) is May 5th (although there is a 10% probability that the last freeze may be May 18th or later). The first frost in fall is usually around October 3rd (although there is a 10% probability that the first frost may be September 19th or earlier). The exact dates vary from place to place as well as from one year to another (NOAA, February 26, 2005).

During the winter, temperatures are not generally cold enough to keep the soil frozen for the whole winter. Winter rains are frequently warm enough to thaw the soil. Heavy rain on partly thawed soils is very erosive.

WIND

Wind plays an important role on the climate experienced in Hawthorne. The "Westerlies" are the dominant wind force experienced in Hawthorne, and are prime elements directing this region's climate. In this region, the "Westerlies" are the winds that influence the weather patterns, moving from west to east. The "Westerlies" vary in strength, bringing moist warm air masses from the south in summer and cool dry air from the north in winter. The prevailing winds blow from the northwest (**Fig. 8**).

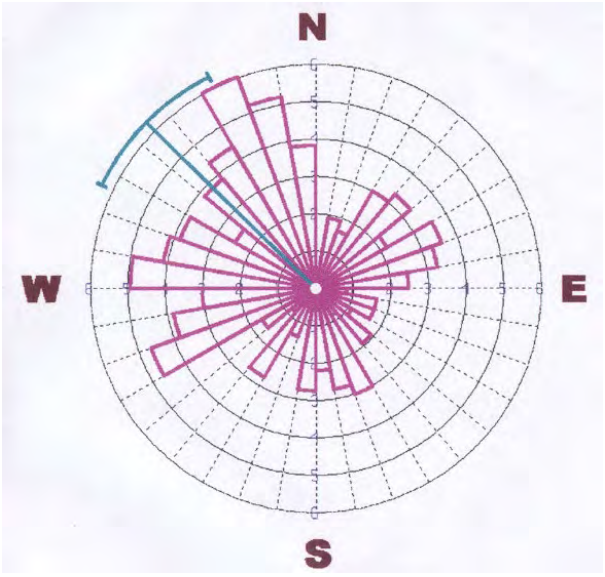

Fig. 8. The circular graph plots wind direction against percent frequency. The concentric circles within the larger circle denote percents (0-6%). The petals flow outward from the center towards the compass point of the origin of the wind. North represents 0 degrees. The single line in the chart indicates the mean wind direction, also pointing to the direction of wind origin. The lines teeing off indicate the standard error (1.37%). Graph generated from data obtained from Newark Airport

STORM EVENTS

Hawthorne has been subjected to almost all types of severe weather, including blizzards, hurricanes, tornadoes, floods, nor'Easters, and violent thunderstorms. All of these severe weather occurrences have occurred in Hawthorne at one time or another.

A low-pressure center moving into the area is usually carries moisture-laden air from the Atlantic Ocean and is indicative of rain. Wind blowing from the east, if sustained, will almost always bring rain. Although precipitation bearing weather fronts do move east to Hawthorne from the Great Lakes, it is coastal storms originating in the tropics that lead to the greater precipitation and wind events (Dunlap 1978).

Tornadoes are rare in New Jersey; Hawthorne was struck by the famous Paterson tornado of July 1903. A fully developed funnel created a swath of destruction from Lambert Castle into Hawthorne, damaging 206 buildings and leaving four dead in its wake (Ludlum 1983).

Hurricane Sandy, which made landfall near Atlantic City on October 29, 2012, was notable not for rain totals, but for sustained wind and wind gusts (48 mph at Charlotteburg, 56 mph at Hawthorne; many sites even higher) and devastating damage to homes, trees and infrastructure (Robinson, November 7, 2012).

FLASH FLOODS IN HAWTHORNE

On July 8, 2021. a predecessor rainfall event resulted in flash flooding across portions of the area as moisture streaming northward ahead of Tropical Storm Elsa encountered a stationary boundary draped across the area. Rainfall amounts ranged 1.5-4 inches, with the ASOS at Teterboro Airport reporting 2.37 inches of rain from this event. (NOAA, 2011- 2021, Storm Events Database)

On August 22, 2021, rainfall from Tropical Storm Henri resulted in widespread flash flooding across portions of northeast New Jersey With a tropical airmass in place (precipitable water values greater than 2 inches), rainfall totals generally ranged from 2-4 inches, with this rain coming in addition to the 1-3 inches that fell during the predecessor rainfall event the night before. This resulted in widespread rainfall amounts of 3-7 inches in many locations over a 24-36 hour period. The ASOS at Newark Airport recorded a total of 4.67 inches across the two days, while the COOP observer in Harrison reported a two-day total of 8.02 inches. (NOAA, 2011- 2021, Storm Events Database).

On August 22, 2021, Hawthorne announced that multiple areas of the borough are at flood risk. The borough listed a number of flooded areas in Hawthorne and warned residents not to travel, but to stay at home. Those who must travel need to avoid the affected areas.

- Lafayette Avenue between Warburton Avenue and Central Avenue
- Rea Avenue from Goffle Road to First Avenue
- Wagaraw Road from May Street to Goffle Road
- Grand Avenue
- Goffle Road and North 8th Street

(*TAP Into Hawthorne*, August 22,2021)

On Wednesday September 1, 2021, Tropical Storm IDA brought 6.28 inches of rain to the Borough of Hawthorne (William Westhoven, NorthJersey.com - Sep 3, 2021). The Borough of Hawthorne sent out several Nixle alerts to all residents to strongly urge people to stay off the roadways due to severe flooding, except for emergencies. Tropical Storm IDA brought severe flooding to Hawthorne neighborhoods. Many parts of Goffle Brook overflowed the bridges and pathways throughout Goffle Brook Park as police and firetruck sirens filled the air.

The Hawthorne Fire Department responded to nearly 50 calls for service and rescued over 20 people from their vehicles after being trapped in flood waters. Excellent job by all our dedicated members who responded throughout the night. Thank you to the Hawthorne PD, EMS, DPW, and North Haledon and Wyckoff FD's for their assistance during the storm. (Hawthorne Fire Department, 2021)

On September 7, 2021, Passaic counties were included in FEMA's Major Disaster Declaration. The declaration allowed individuals in the approved counties to register at www.disasterassistance.gov for direct federal assistance for Ida-related recovery, which may include home repairs, temporary housing, low-cost loans, and other programs to help recover from the effects of the tropical storm.

IV. Biological Resources

VEGETATION

INTRODUCTION

The existing vegetation in Hawthorne is a result of natural elements such as geology, soils, hydrology, and climate interacting with the human built environment. The type of vegetation that will grow on a site is dictated by temperature, the amount of sun or shade available, the fertility of the soil, and most important, the amount of moisture available. As plants are not static and independent organisms, species of plants will associate with similar plant species that require the same living conditions to form a community. These communities will evolve through time, changing in numbers, density, and types of species in response to environmental changes.

Human activities, however, bring about the greatest changes in the composition and health of plant communities. Air and water pollution, and human development intensify the effects and make plants more susceptible to naturally occurring diseases and insect infestation. The human desire to alter the landscape and replace native ecosystems with ornamental plantings and turfgrass has also significantly changed the vegetation of Hawthorne.

Trees can provide many benefits. In the summer, cities become “heat islands” which can get up to 12°F hotter than the surrounding countryside. Trees provide shade and reduce the heat absorbed which lowers surface temperatures by 7° to 11°F and air temperatures by 2° to 7°F. Trees also lower heating bills by blocking cold winter wind. Since trees keep cities cooler in the summer and warmer in the winter, less electricity is used for heating and cooling. (NJDEP Division of Parks & Forestry Community Forestry Cool Cities website)

In 2000, the Assessment of Our Nation’s Urban Forests by the United States Department of Agriculture and United States Forestry Service is the first national assessment of urban forest resources in the United States. It provides a basis to help develop comprehensive management plans to sustain the urban forest resource and improve environmental quality, enhance human health, and well-being, and connect people with the ecosystems in the 21st century. The report assesses metropolitan area and urban area. A metropolitan area is defined as a county, or group of counties, that contains a large population nucleus as its core; can include adjacent counties that have a high degree of economic and social integration with the core. An urban area is defined as urbanized areas and unincorporated or incorporated places (for example, cities, towns, and villages) having at least 2,500 people.

The Northeast is the most urbanized portion of the Nation; 9 of the 10 states with the highest proportion of urban land in this region. States with the highest proportion of their total tree cover in urban areas include New Jersey (22.3%), Massachusetts (14.4%), and Connecticut (14.0%). New Jersey has 143,869,000 estimated urban trees, 20 urban trees per capita, 41.4 % of urban tree cover, 22.3% portion of state tree cover, 6,916 urban area (includes land and water), and 30.6 portion of the state.

Nationally, urban areas have an average tree cover of 27.1 percent. This percentage of tree cover is not far below the national average for all lands 32.8 percent. The average

percentage of tree canopy cover for both metropolitan areas (33.4 percent) and urban areas (27.1 percent) is close to that for all land in the conterminous United States (32.8 percent), thereby demonstrating that urban areas and urban influence can coexist with a significant tree canopy.

The Borough of Hawthorne has tree canopy coverage of 20%, 8.8 square kilometers of land area, 0.1 kilometers of water area, 1990 population of 17,084 and 1,941.8 people per square kilometers (Connecting People).

BENEFITS OF VEGETATION

Vegetation plays an important functional role in the preservation of the landscape. Trees and shrubs control polluted surface runoff, soil erosion, slope stability, flood control, and microclimate (Collins and Anderson 1994). Naturally, vegetated slopes and stream corridors act as living filters, intercepting and absorbing nutrients, sediment and other pollutants and incorporating these inputs into their life cycle (Collins and Anderson 1994). The root systems of plants similarly provide structural integrity and strength to soils and slopes reducing erosion from wind and water. Floodplain and wetland vegetation provide storage area for floodwaters. The influence of plants on microclimates can also be very pronounced. The leaf canopy formed from mature trees can effectively reduce the amount of solar radiation and moderate temperatures through shade and transpiration of water. This is especially important in moderating the urban heat effect created by large areas of built surface that retain heat.

Vegetation is also important in the urban/suburban environment in establishing aesthetics, creating boundaries, influencing pedestrian behavior, and reducing noise. One of the most significant functions of vegetation is in providing beauty to parks, streets, and homes. Trees and shrubs can be utilized to frame a view, provide ornamentation to a building or house, and serve as a screen or visual barrier between conflicting land uses. Street trees establish a protective barrier between the roadway and sidewalk and create an overhead canopy providing a comfortable space for the pedestrian. Vegetation can also control noise by serving as a barrier absorbing and diverting sound energy.

HISTORICAL VEGETATION

Prior to European settlement, most of the eastern United States was covered by a large diverse deciduous forest that stretched from New England to northern Florida (Collins and Anderson 1994). The deciduous forest contains 12 distinct plant habitats based on topography that was locally differentiated by the amount of moisture in the soils (Collins and Anderson 1994). Plant communities in Hawthorne included wetlands and wooded floodplains along the streams and rivers, upland oak and maple forests on evenly drained soils in the valley and base of the ridges, and oak forests on the drier slopes and ridgetop of the First Watchung Mountain.

Along the river floodplains and riparian corridors of Goffle Brook and Depe Vole Brook, there were open scrub-shrub wetlands and closed forested areas containing water tolerant species that adapted to the seasonal fluctuations of flooding on poorly drained soils. Typical trees of these floodplains include green ash, pin oak, swamp white oak, silver and red maple, elm, river birch, sycamore, and black gum.

View of floodplain forest along the Goffle Brook

On the more evenly drained upland soils, there is a possibility of finding several different forest habitats. Depending upon the time of the most recent disturbance and at which stage of succession the forest is in, there may be a variety if different deciduous woodland combinations (Godfrey 1980). Generally, the oak-chestnut forest changes naturally over time, succeeding, to a mixed-hardwood forest that is the climax forest or final forest type. However, at any given time, the woodland could be at any stage from an open meadow following a forest fire to an old growth forest of mixed hardwoods. In the typical mixed hardwood forest, there are red, white, and black oak, hickories, red and sugar maple, white ash, beech, elm, black cherry, and tulip tree (Collins and Anderson 1994).

The Watchung Ridge that rises along the western edge of Hawthorne creates a local environment that is much drier than the adjacent valley. This site is more exposed to desiccating winter winds and severe weather and contains shallow soils that do not retain much moisture. These conditions support a unique vegetation community known as the chestnut oak forest. This plant community is dominated by chestnut oak with red oak, white oak, scarlet oak, and black birch. Of special note: the Second Watchung Ridge, located about ½ mile to the west of the First Watchung and which includes High Mountain in North Haledon and Wayne contains several globally unique plant species that grow only in southwest facing trap rock meadows. The Nature Conservancy has dedicated financial and management resources to protecting and expanding this unique vegetation community.

VEGETATION TODAY

As the Europeans arrived and northern New Jersey became settled, the native vegetation was cleared and removed for agriculture, providing land for farming, pastures for grazing livestock, and, most importantly, timber and firewood for fuel (Collins and Anderson 1994). The native deciduous forest was eliminated from all but the most inaccessible locations. After World War II a second vegetation change occurred on the landscape in Hawthorne. As the municipality grew with new residential growth and expanding neighborhoods, ornamental plants and turfgrass became the dominant habitat. Most of the ornamental trees, shrubs, and flowers were planted for aesthetic

purposes. As these plants are introduced, they are not native to this region and not useful for animal life as a source of food.

The largest undeveloped section of Hawthorne that contains substantial open space and vegetation is the County of Passaic's Goffle Brook Park. The park is maintained as a pastoral passive recreation park with large flowing swaths of turfgrass and mature shade trees. Much of the park is located within the floodplain area of the Goffle Brook with some native shrubs and trees still lining the brook within the riparian corridor, but for the most part this riparian habitat has been eliminated. The groves of large shade trees create picturesque views and areas for relaxation, but do not contain a diversified understory or herbaceous plant layer to sustain the woodland character.

The *Eight Acre Woods* municipal parkland, located adjacent to the Goffle Brook Park and Boys and Girls Club, is an excellent example of a suburban woodland area undergoing successional change that is heavily influenced by invasive exotic plants. The site is seasonally wet, as it is adjacent to the Goffle Brook and contains some wetland areas. The mature vegetation includes red maple, beech, white ash, basswood and sycamore trees and shrubs such as spicebush, witch hazel, and dogwood - all native plants (Hildebrand 2000). However, the understory contains very few seedlings of these species and is for the most part overrun by exotic plants such as multiflora rose, daylilies, Japanese knot weed, and barberry, plants that compete exceedingly well with native species for sunlight and nutrients. These exotic plants have been introduced into the United States, and do not have natural controls. Unfortunately, the exotics contain very little habitat value for wildlife, so as they overtake a site, they create a sterile and inhospitable environment.

View of the woodland area in the Eight Acre Woods.

In September 2007, an Eagle Scout project to revive the 8-acre to make the area more pleasurable for the people of Hawthorne. The goal of the project was to identify and mark the existing trails, place trail maps throughout the woods to help guide people, and cleanup the observation areas and surrounding brush. The Hawthorne Environmental Commission received the Association of New Jersey Environmental Commission Environmental Achievement Award in 2008 for the 8-acre woods project. Social deterioration led to the revival of the project in July 2010 by another Eagle Scout. By August of 2010, the project was completed successfully.

The slopes and summit of the First Watchung still contain sections of forest that is all second growth and less than 100 years old with some occasional exceptions. These woodlot areas are generally highly disturbed with a disrupted understory layer and a

purposes. As these plants are introduced, they are not native to this region and not useful for animal life as a source of food.

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The slopes and summit of the First Watchung still contain sections of forest that is all second growth and less than 100 years old with some occasional exceptions. These woodlot areas are generally highly disturbed with a disrupted understory layer and a

substantial number of invasive exotic plants adversely affecting the future forest. These woodlot areas are, however, providing essential erosion control on the steep sloped areas.

NATIVE PLANTS

Since 2012, the Hawthorne Green Team, sub-committee of the Hawthorne Environmental Commission, has been educating our residents about native plants, and we have been encouraging them to reintroduce such plants into their landscapes. Building upon our native plant efforts, in 2016, the Borough of Hawthorne received a $2,000 Sustainable Jersey Capacity grant to plant the inclusion of native plants into the landscape of property owned by the Borough of Hawthorne and Hawthorne Retailer Businesses.

The beautification of the selected Hawthorne areas provided the community the hands-on experience of how native plants can increase the biodiversity of Hawthorne's ecology system. The native plant identification area signs provide a reminder for residents of Hawthorne on the importance of native plants as well as providing a teaching tool for all generations. Seeing the actual implementation of this project and its success is not something you learn from a book or a lecture. The Green Lectures are utilized to reinforce the importance of native plants, but it's setting the example that will get the residents attention.

Native plants provide the following to the environment:

- Low Maintenance - Once established native plants are hardy and adapted to normal weather extremes. They have also developed natural defenses against pests and diseases reducing the need for applying pesticides.
- Wildlife - Native plants provide food and shelter for 10 to 15 times as many species of native wildlife as non-native plants.
- Wild Pollinators - Native plants support native pollinators. Native pollinators and native plants have co-evolved to reach an intricate balance. Many wild pollinators cannot survive without the plants they have evolved with. (i.e., Monarch Butterflies)
- Save Water - Native plants are adapted to moisture from rain and only need watering in severe conditions. One thousand square feet of lawn can use up to 10,000 gallons of water per summer.
- Air Quality - Native plants do not require motorized equipment, lawn mowers, string trimmers and leaf blowers can emit more hydrocarbons than a typical car.
- Beauty - Native plants can help blend our lands and building into the surrounding environment and create landscapes that are regional, unique, and beautiful.
- Biodiversity - Native Plants serve as an important genetic resource for future food crops or other plant-derived products.

Source: Native Plants | Hawthorne, NJ (hawthornenj.org)

The Native Plant Society of New Jersey provides information on native and Invasive Nonindigenous species of plants in New Jersey (source: www.npsnj.org)

Table 6. Native Plant Species found in Goffle Brook Park.
Photographed by Alexandra Soteriou (2020).

Common Name	Scientific Name	Photo
American Pokeweed	Phytolacca americana	
Common Milkweed (Pod)	Asclepias Syriaca	
Common Milkweed (Bloom)	Asclepias Syriaca	
Northern Bedstraw	Galium boreale	
Spotted Joe Pye Weed	Eutrochium maculatum	
Stickywilly	Galium aparine	

Common Name	Scientific Name	Photo
Swamp Buttercup	Ranunculus septentrionalis	
Whitegrass	Leersia virginica	
Wild Mint	Mentha Arvensis	
Yellow Marsh Marigold	Caltha palustris	

INVASIVE NONINDIGENOUS PLANTS

Non-native species (also called alien, exotic or introduced species) are those species that have been introduced outside their natural geographic range as a result of human actions, whether intentionally (e.g., as sources of food, for landscaping purposes or the release of unwanted pets) or unintentionally (e.g., in the ballast of a ship or in a load of lumber). Executive Order 13112 defines an *invasive species* as a species that is non-native to the ecosystem and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (USDA, February 3, 1999). The most problematic of these displace native species, contribute to local elimination of species or even extinctions, alter the community structure, and may eventually disrupt ecosystem processes (Snyder et al, 2004). Preliminary research in NJ has documented over 1,200 species of nonindigenous plant species, or as much as 62% of the state's total vascular flora (Snyder et al, 2004).

Native plants can be susceptible to introduced diseases, which they have not evolved resistance to the chestnut blight fungus was an accidental introduction that destroyed all mature American chestnut (*Castanea dentata*) trees, once one of the dominant trees in the New Jersey landscape. Another introduced fungus, Dutch elm disease, destroyed the American elm (*Ulmus americana*).

In addition, native plants may have little resistance to certain introduced insects, and/or these insects may have no natural enemies in their new surroundings, allowing them to rapidly reach pest proportions. Introduced insects, which may be impacting Oakland's trees, include the hemlock wooly adelgid, gypsy moth, scarlet oak sawfly and Beech Bark Disease (which is caused by a non-native scale insect that introduces a fungal disease) (NJ Forest Service, 2010). They weaken their host trees, which often succumb to successive years of infestation, to diseases carried by the insect pests, such as bacterial leaf scorch, or other environmental stresses.

For these reasons, the Final Report of the New Jersey Comparative Risk Project, which evaluated the relative risks of environmental problems to the people and ecosystems of New Jersey identified invasive species (including plants, insects, and other organisms) as one of the state's top environmental problems (Steering Committee of the New Jersey Comparative Risk Project, 2003).

Table 7. Invasive Nonindigenous Plant Species found in Goffle Brook Park. Photographed by Alexandra Soteriou (2020).

Common Name	Scientific Name	Photo
Birdsfoot Trefoil	Lotus corniculates	
Common Yarrow	Achillea millefolium	
Crown Vetch	Securigera varia	
Evening Lychnis	Silene latifolia	

Common Name	Scientific Name	Photo
Floss Flower	Ageratum houstonianum	
Foxtail grass	Alopecurus	
Garlic Mustard	Alliaria petiolate	
Greater Burdock	Arctium lappa	
Ground Ivy	Glechoma hederacea	
Japanese Knotweed	Polygonum cuspidatum	
Purple Deadnettle	Lamium purpureum	

Common Name	Scientific Name	Photo
Red Clover	Trifolium pratense	
Sleepydick	Ornithogalum umbellatum	
True Forget me Not	Myosotis scorpioides	

BENEFITS OF TREES

There are several benefits of trees. Below is a summary of the advantages:

1) Economic Contributions

Trees or lack of trees can influence economics. A property for sale with five large trees in the front yard yields a 4% higher price than property with small trees or no trees. Similarly, apartments and offices with a green view rent quickly and get higher rent. People also react more favorably to tree lined parking lots of shopping centers; they will pay 12% more in this atmosphere and linger longer. Trees make us feel good, and we'll pay to be around them.

2) Energy Savings

Shade Sun

A home shaded by three trees can cut energy bills by 50% in the summer thanks to shade and transpiration. Those same trees serve as windbreaks for those cold winter winds and reduce heating costs by 30%. As few as three trees properly positioned can save the average household between $100 and $250 annually in energy costs.

Block Wind

Rows of trees reduce windspeed by up to about 85%, with maximum reductions increasing in proportion to visual density. Because even a single row of dense conifers can cause large reductions in windspeed, effective windbreaks can be planted on relatively small house lots. Compared with an open area, a good windbreak that does not shade the house will save about 15% of the heat energy used in a typical home.

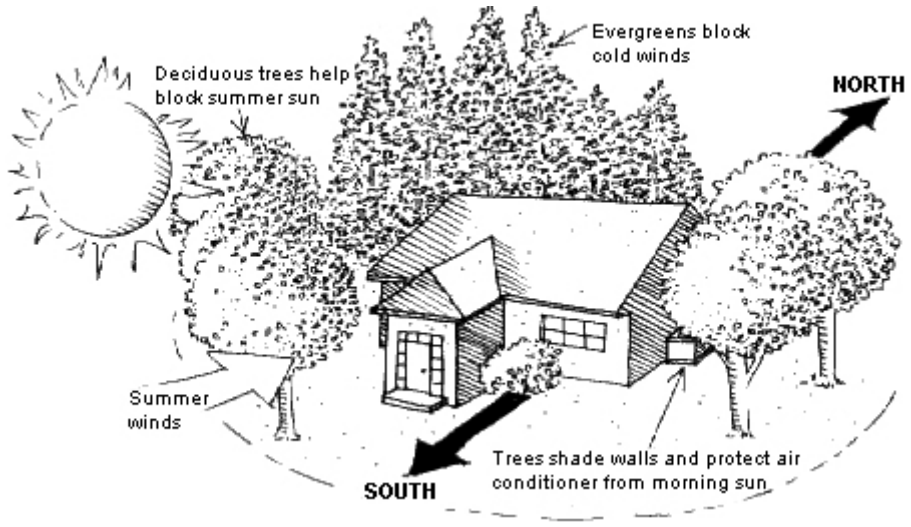


Fig. 9. How to Plant a Tree. From American Forests.

3) Environmental Health

Improve Air Quality

Trees help trap and hold particle pollutants such as dust, pollen and smoke that can damage our lungs. Trees remove pollutants by absorbing them through the pores in the leaf surface. Particulates are trapped and filtered by leaves, stems, and twigs, and

washed to the ground by rainfall. Trees also absorb CO2 and other dangerous gasses and replenish the atmosphere with oxygen. Yearly, one acre of trees absorbs enough CO2 to offset a car driven 26, 000 miles and produces enough oxygen for 18 people.

Filter Water
Trees help keep water clean and drinkable. When non-point source pollution such as oil, fertilizers, and sediment get washed away with the rain, tree roots can trap and filter out the contaminants before they affect the water supply.

Reduce Runoff
100 mature trees can intercept 100,000 gallons of rainfall per year. The rain falls on the canopy, catching the water and allowing it to gently drip to the ground or evaporate. This lessens street flooding and soil erosion.

Provide Wildlife Habitat
Wherever trees are established, wildlife and other plants are sure to follow. Trees and associated plants provide shelter and food for a variety of birds and small animals. The presence of trees creates an environment that allows the growth of plants that otherwise would not be there, enhancing the diversity.

4) Social Advantages
Reduce Medical Costs
Trees have a profound effect on those under medical care. A study of gallbladder surgery patients found that patients with a view of trees not only got out of the hospital one day sooner, but also had fewer complications and needed less pain medication. Another study found that psychiatric patients exposed to greenspace socialized more and had fewer negative encounters.

Provide Recreation Opportunities
Parks and greenspaces provide a place for recreation such as hiking, fishing, and nature watching. These activities not only allow us to connect with the natural environment, but it also provides exercise.

Calm Nervousness and Stress
Nature has been proven to reduce the stress response in both the mind and body. A tree-lined highway quells road rage. Children with Attention Deficit Hyperactivity Disorder (ADHD) are more focused and are able to complete tasks while in a natural environment.

Connect with Nature
When community members join together for a tree planting or clean-up, they feel a sense of environmental responsibility and a connection with their natural environment. The residents also have a more positive perception of their community once they had a hand in improving it. (NJDEP Division of Parks & Forestry Community Forestry Cool Cities website)

MUNICIPAL STREET TREES AND MANAGEMENT

The Borough of Hawthorne's Shade Tree Commission with the Department of Public Works (DPW) is responsible for the care and maintenance of shade trees along town streets and parks.

Shade trees require special care and attention because of the harsh environment in which they live. In the past four years (2006-2009), the Shade Tree Commission has removed approximately 246 stumps, cut and removed 559 dead trees, and trimmed 840 trees (Savoie 2010). Most of the trees are in good shape. The biggest health problems are a result of drought stress, improper planting, and anthracnose, a fungus disease that affects the leaves of broadleaf species such as maples and ash (Sowa 2000).

The Borough oversees approximately 3,400 trees of varying size, age, and species, although it is estimated that there are currently 1,500 vacancies, so that with replacement of missing trees the total could be over 4,900 (Savoie 2010). The Shade Tree Commission plants approximately 100 new trees a year that are primarily 2 1/2 inches in diameter. Since species diversity is a problem among the shade trees in Hawthorne, the Shade Tree Commission plants an estimated 64 different species of trees. (Savoie 2010).

Cool Cities initiative developed a tree species list (**Table 8**). The Shade Tree Commission utilizes the tree species, but not limited to, as a tool to select the trees that may be planted in Hawthorne.

Table 8. Cool Cities Species List

Common Name	Scientific Name	Size
Amur Maackia	Maackia amurensis	Small
Magnolia	Magnolia spp.	Small
Crabapple	Malus spp.	Small
American Hop Hornbeam	Ostrya virginiana	Small
Persian Parrotia	Parrotia persica	Small
Amur Corktree	Phellodendron amurense (Male)	Medium
Blood Good London Plane Tree	Platanus x acerifolia “Blood good”	Large
Newport Purple-leaf Plum	Prunus cerasifera “Newport”	Small
Sargent Cherry	Prunus sargentii	Small
Amanogawa Oriental Cherry	Prunus serrulata “Amanogawa	Small
Kwanzan Cherry	Prunus serrulata “Kwanzan”	Small
Yoshino Cherry	Prunus x yedoensis	Small
Chanticleer Pear	Pyrus calleryana “Chanticleer”	Large
Sawtooth Oak	Quercus acutissima	Large
Swamp White Oak	Quercus bicolor	Large
Scarlet Oak	Quercus coccinea	Large
Bur Oak	Quercus macrocarpa	Large
Pin Oak	Quercus palustris	Large
Northern Red Oak	Quercus rubra	Large
Japanese Pagoda Tree	Sophora japonica	Large
Regent Scholartree	Sophora japonica “Regent”	Large
Stewartia	Stewartia pseudocamellia	Small

Common Name	Scientific Name	Size
Ivory Silk Japanese Tree Lilac	Syringa reticulate “Ivory silk”	Small
Redmond American Linden	Tilia Americana “Redmond”	Large
Little Leaf Linden	Tilia cordata	Large
Greenspire Little-leaf Linden	Tilia cordata “Greenspire”	Large
Silver Linden	Tilia tomentosa	Large
Princeton Elm	Ulmus Americana “Princeton”	Large
Liberty Elm	Ulmus Americana “Liberty cultivars”	Large
Washington Elm	Ulmus Americana “Washington”	Large
Homestead Elm	Ulmus “Homestead”	Large
Japanese Zelkova	Zelkova serrata	Large
Trident Maple	Acer buergerianum	Small
Hedge Maple	Acer campestre	Small
Ruby Slippers Amur Maple	Acer ginnala “Ruby slippers”	Small
Armstrong Red Maple	Acer rubrum “Armstrong”	Large
October Glory Red Maple	Acer rubrum “October Glory”	Large
Red Sunset Maple	Acer rubrum “Red sunset”	Large
Bonfire Sugar Maple	Acer saccharum “Bonfire”	Large
Green Mountain Sugar Maple	Acer saccharum “Green mountain”	Large
Tatarian Maple	Acer tatarcium	Small
Norwegian Sunset Maple	Acer truncatum “Norwegian sunset”	Small
Armstrong Freeman Maple	Acer x fremanii “Armstrong”	Large
Serviceberry	Amelanchier arborea	Small
Downy Serviceberry	Amelanchier canadensis	Small
Palisade American Hornbeam	Carpinus caroliniana “Palisade”	Small
European Hornbeam	Carpinus betulus	Small
Magnifica Hackberry	Celtis laevigat x occidentalis “Magnifica”	Large
Katsura Tree	Cercidiphyllum japonicum	Large
Redbud	Cercis canadensis	Small
Chinese Fringe Tree	Chionanthus retusa	Small
Yellowwood	Cladrastis kentukea	Medium
Flowering Dogwood	Cornus florida	Small
Cornelian Cherry (single stem)	Cornus mas	Small
Kousa Dogwood	Cornus kousa	Small
Turkish Filbert	Corylus colurna	Large
Hawthorn	Crataegus x lavallei	Small
Hardy Rubber Tree	Eucommia ulmoides	Large
Autumn Purple Ash	Fraxinus americana “Autumn Purple”	Large

Common Name	Scientific Name	Size
Rosehill Ash	Fraxinus americana "Rosehill"	Large
Newport Green Ash	Fraxinus pennsylvania "Newport"	Large
Patmore Green Ash	Fraxinus pennsylvania "Patmore"	Large
Ginkgo Ginkgo Biloba	Ginkgo biloba (Male)	Large
Magyar Ginkgo Biloba	Ginkgo biloba "Magyar" (Male)	Large
Thornless Honeylocust	Gleditsia triacanthos var. inermis	Large
Dwarf Honeylocust	Gledistia triancanthos	Small
Kentucky Coffeetree	Gymnocladus dioica	Large
Silverbell	Halesia spp.	Small
Golden Rain Tree	Koelrueteria paniculata	Small
Rotundiloba Sweetgum (seedless)	Liquidamber styraciflua "Rotundiloba"	Large

In 2007 the Borough of Hawthorne began the development of a Community Forestry Management Plan for the years 2007 to 2011. The management plan is created every 5 years to identify goals and objectives (Hawthorne is the 8th municipality in the state of New Jersey to develop a plan) and provide guidance on how funds should be spent. An essential component of the plan was an inventory of all trees along the Borough's streets and on Borough property. A comprehensive survey conducted in 1998 identified the type, condition, and size of all municipal trees. The information from this inventory (**Figs. 10 and 12**) indicates that the majority of trees in the borough were maples and oaks, that the average diameter was between 1 and 2 feet and most trees were in relatively good health.

Fig 10. Shade Tree Condition

Condition of Trees	Number of Trees
Good	2,250
Fair	1,008
Poor	205
Dead	19
TOTAL	**3,482**

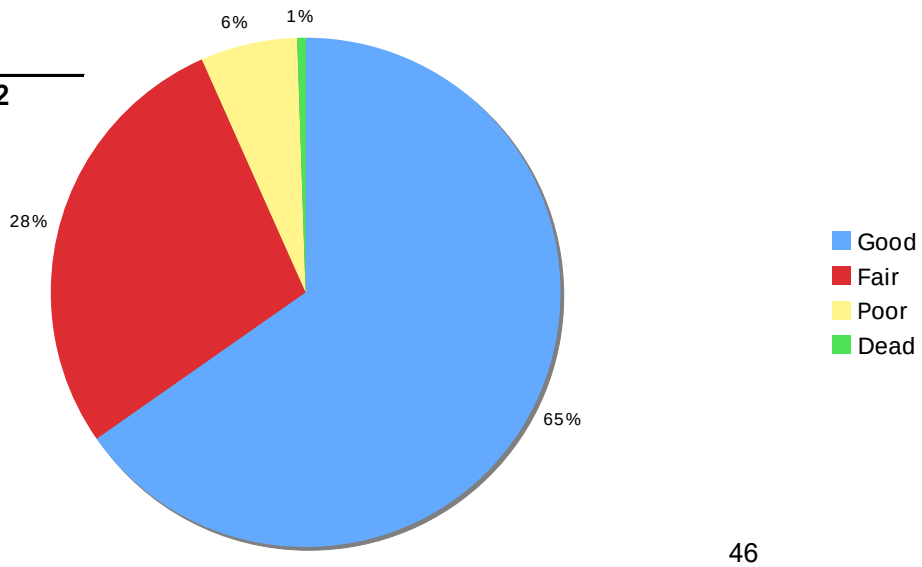


Fig 11. Shade Tree Diameter

Diameter of Trees	Number of Trees
0" - 3"	435
4" - 6"	414
7" - 12"	1,003
13" - 18"	568
19" - 24"	568
25" - 30"	279
31" - 36"	120
37" - 42"	28
>42"	10
TOTAL	**3,482**

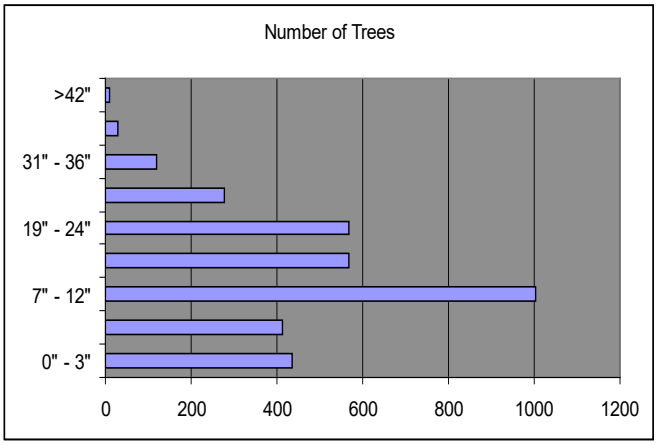
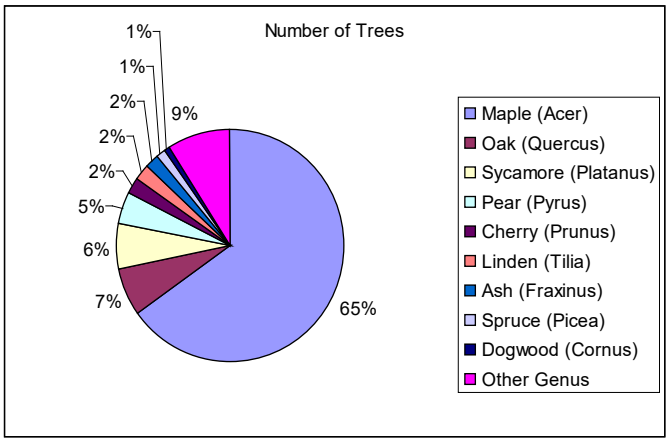


Fig 12. Shade Tree Species

Genus Composition	Number of Trees
Maple (Acer)	2,263
Oak (Quercus)	233
Sycamore (Platanus)	219
Pear (Pyrus)	157
Cherry (Prunus)	80
Linden (Tilia)	73
Ash (Fraxinus)	69
Spruce (Picea)	45
Dogwood (Cornus)	38
Other Genus	305
TOTAL	**3,482**



One of the outcomes of the 1998 plan was the purchase and implementation of a computer program and database to manage tree maintenance information. This computer management program will greatly increase data keeping functions and enhance the ability of the Shade Tree Commission to maintain shade trees. In 2010, the Shade Tree Commission is currently working on updating the tree survey.

CENTENNIAL TREES

View of 200-year-old red oaks on Washington Avenue.

As part of the Borough of Hawthorne's Centennial Celebration in 1998, the Shade Tree Commission conducted a survey to identify and acknowledge trees that were over 100 years in age. The survey was originally limited to street trees; however, as citizen enthusiasm for the survey increased, all trees that were recommended to the DPW were examined and, if eligible, listed. The final count was 97 trees. The oldest was a Black Oak estimated at 222 years in age, with an enormous 54-inch diameter trunk (Sowa 2000). The survey consisted primarily of white, red, and black oak, but also included sycamore, maple, white pine, and beech (Sowa 2000). One of the results of the survey was the realization that a large number of these trees, primarily the oaks, were located in the center of town along Washington Avenue. It appears that this area was populated by an oak dominated community that began near the floodplain of the Passaic River and extended north up the valley parallel to Goffle Brook. It is however, not clear whether these trees were intentionally planted or are the result of a longstanding historic oak community.

WILDLIFE

INTRODUCTION

The development of Hawthorne has created a suburban/urban community, eliminating most of the native habitat and reducing the ability of much of the original wildlife to successfully live within the town and greater region. However, there are wildlife species that adapt to the altered environment and flourish under these conditions. By understanding the pre-European settlement vegetation and habitat, one can predict what species of wildlife would have existed in this area.

GEOGRAPHIC REGION

New Jersey's ecosystems are among the most complex and diverse in the nation (Pettigrew 1998). Hawthorne, a suburban northern New Jersey community is located within a unique ecological setting (Pettigrew 1998). This region is an ecotone, an overlap or transition zone between ecosystems, creating a dynamic overlap between northern and southern species. Northern New Jersey is an ecosystem crossroads the southern limit for northern species, and the most northern limit for southern species. The climate and soils of an area dictate the plant life and the variety of habitats produced, which then determine which species can survive in an area. Based upon the Passaic County Soils Map, the species that might have been found in Hawthorne include various wetland and water-habitat organisms along with openland and woodland creatures (**Table 9**) (Seglin 1975).

Table 9. Wildlife Habitat that could be supported by soil types found in Hawthorne. Data Modified from Passaic County Soil Survey. Ratings are 1 = good, 2 = fair, 3= poor, 4 = very poor.

Soil Type	**Habitat**		
	Openland	Woodland	Wetland
Alluvial (Ae)	2	2	2
Boonton (BrB, BrC and BsD)	2	1	4
Haledon (HcC)	3	2	4
Haledon, wet variant (HdA)	3	2	2
Haledon, wet variant (HdB)	3	2	4
Holyoke (HrC)	2	3	4
Preakness (Px)	2	2	2
Riverhead (RhB and RhC)	1	1	4
Rockoutcrop (RwE)	4	4	4
Urban land (UbB, UbC and UrB)	Urban lands are too variable to be rated		

HABITAT FRAGMENTATION

European settlement began the process of habitat fragmentation, which leads to a loss of species diversity (Mitchell 1992). Hawthorne's land use and development has altered the habitat that would normally support larger species, such as, the white-tailed deer, bobcat, and coyote. We can frequently find a greater abundance of "edge" species when large areas of land are fragmented partially due to increased temperature, decreased soil moisture, and decreased relative humidity at the edge of the fragment (Mitchell 1992). These fragments become "islands" or pockets of forest or natural areas. Many species require large areas to hunt or breed, and are unable to survive in areas of less than 450 contiguous acres. Other limitations of urban environments for many species include toxic substances, automobiles, domestic pets, and some of the trappings of society, such as, overhead wires (Adams 1994). The loss of habitats, food, refuge, and space are probably of greater importance in many cases.

TERRESTRIAL SPECIES

Prior to the impacts of man, the area that is now Hawthorne would have had several different ecosystems, able to support a diverse number of species. Wetland species would have been able to thrive along the Passaic River and Goffle Brook, while much of the rest of the town would have been meadow or forest. The ridge of the First Watchung would have supported wildlife adapted to surviving on the windswept, barren slopes. Typical wetland species might have been ducks, geese, rails, herons and muskrats (Seglin 1975). Animals that might have been found in Hawthorne's forests would have been red and gray squirrel, gray fox, white-tailed deer, and raccoon. Mammals found on the First Watchung would probably have included the eastern gray squirrel, eastern chipmunk, and possibly short-tailed shrew, long-tailed weasel, and gray fox (Godfrey 1980). Other species that might have been found in Hawthorne are animals typical of the Piedmont geologic province (**Table 10**).

Table 10. Animal Species common to the Piedmont Geologic Province. Data from Dorham Associate, Inc. 1984.

Common Name	Scientific Name
Black Bear	*Ursus americanus*
Bobcat	*Felix rufus*
Cottontail rabbit	*Sylvilagus floridanus*
Eastern chipmunk	*Tamias striatus*
Eastern mole	*Scalopus aquaticus*
Gray fox	*Urocyon cinereoargenteus*
Long tailed weasel	*Mustela frenata*
Masked shrew	*Sorex cinereus*
Meadow jumping mouse	*Zapas hudonius*
Meadow vole	*Microtus pennsylvanicus*
Mink	*Mustela vision*
Muskrat	*Ondatra zibethicus*
Opossum	*Didelphus marsupialis*
Raccoon	*Procyon lotor*
Red fox	*Vulpes fulva*
Red squirrel	*Tamiasciurus hudsonicus*
Skunk	*Mephitis*
Southern Bog lemming	*Synaptomys cooperi*
Southern Red-backed vole	*Cletbrionomys gapperi*
White-tailed deer	*Odocoileus virginianus*

Although species

diversity may diminish due to urbanization and fragmentation, some species will adapt and flourish. Non-native species tend to survive in urban settings better than native species (Adams 1994). At least for bird species, it appears that generalists (able to use a wide range of food and habitat types) account for many of the species in an urban community, while specialists (restricted in either food or habitat choices) require a more natural habitat.
Some animals are so proficient at living in close proximity to man that they have become "pests". In many New Jersey communities, including Hawthorne, Canada geese are thriving due to factors such as human supplemental feeding, grazing areas surrounding lakes and ponds, lower predation casualties, and higher urban temperatures. The populations of these waterfowl are having a detrimental effect on water quality in Hawthorne (Sebetich, pers. comm. 2000). Chipmunks and squirrels are able to survive in urban/suburban areas, although predation from domestic cats may reduce the numbers of chipmunks (Adams 1994). There are known examples of white-tailed deer populations surviving in urban/suburban areas such as Princeton, New Jersey, and white-tailed deer have been observed in Hawthorne by residents (Maene, pers. comm. 2000).

Small and medium-sized predators, such as shrews and moles may be found in suburban areas, in yards, and other open spaces. A few species of bats will utilize attics of houses or other buildings as roosting sites (Adams 1994). It should be remembered that almost all bats are beneficial to people, and are frequently insectivorous (Adams 1994). Human residences may provide food for some species able to forage through refuse. Raccoons would be a prime example of a refuse scavenger. Raccoons will make their homes in tree cavities, but have also utilized such human infrastructures as underground storm sewer systems for cover.

As Hawthorne is located within the boundary of Passaic County, a list of rare invertebrate species in Passaic County (**Table 11**) (NJ Natural Heritage, 2000) and vertebrates (**Table 12**) (NJ Natural Heritage, 2000) are important components of wildlife diversity in Hawthorne. Many species are small. Both Goffle Brook and the Passaic River are possible habitats for these species.

Table 11. Rare invertebrate species of Passaic County. Data from the New Jersey Natural Heritage Database, 2000.

Common Name	Scientific Name
Acadian Hairstreak	*Satyrium acadicum*
American Burying Beetle	*Nicrophorus americanus*
Checkered White	*Pontia protodice*
Columbine Dusky Wing	*Erynnis lucilius*
Eastern Lampmussel	*Lampsilis radiata*
Four-Spotted Skimmer	*Libellula Quadrimaculata*
Frosted Elfin	*Incisalia irus*
Giant Swallowtail	*Papilio cresphontes*
Gray Comma	*Polygonia progne*
Harris' Checkerspot	*Chlosyne harrisii*
Henry's Elfin	*Incisalia henrici*
Long Dash	*Polites mystic*
Mottled Dusky Wing	*Erynnis martialis*
New England Bluet	*Enallagma laterale*
Persius Dusky Wing	*Erynnis persius*
Pipevine Swallowtail	*Battus philenor*
Ringed Boghaunter	*Williamsonia linteri*
Silver-Bordered Fritillary	*Boloria selene myrina*
Silvery Checkerspot	*Chlosyne nycteis*
Southern Grizzled Skipper	*Pyrgus wyandot*
Triangle floater	*Alasmidonta undulata*
West Virginia White	*Pieris virginiensis*

Table 12. Rare vertebrate species in Passaic County. Data from the New Jersey Natural Heritage Database, 2000.

Common Name	Scientific Name
Allegheny Woodrat	*Neotoma magister*
Bald Eagle	*Haliaeetus leucocephalus*
Barred Owl	*Strix varia*
Bobcat	*Lynx rufus*
Bog Turtle	*Clemmys muhlenbergii*
Cliff Swallow	*Petrochelidon pyrrhonota*
Cooper's Hawk	*Accipiter cooperii*
Eastern Small-footed Myotis	*Myotis leibii*
Marbled Salamander	*Ambystoma opacum*
Northern Goshawk	*Accipiter Gentilis*
Northern Cricket Frog	*Acris crepitans*
Pied-Billed Grebe	*Podilymbus podiceps*
Red-Shouldered Hawk	*Buteo lineatus*
Southern Bog Lemming	*Synaptomys cooperi*
Timber Rattlesnake	*Crotalus horridus*
Wood Turtle	*Clemmys insculpta*

BIRD SPECIES

The personal observations of local birdwatchers have identified a diverse number of bird species in the Eight Acre Woods and Goffle Brook Park (**Table 13**). Some birds are residents and nest here, while others migrate and are just passing through (DeVos and Cowen, 2021).

Table 13. Bird Species observed in Eight Acre Woods and Goffle Brook Park.

American Crow	Golden-crowned Kinglet
American Goldfinch	Gray Catbird
American Kestrel	Great Black-backed Gull
American Redstart	Great Blue Heron
American Robin	Great Egret
Bald Eagle	Green Heron
Baltimore Oriole	Hairy Woodpecker
Barn Swallow	Hermit Thrush
Bay-breasted Warbler	Herring Gull
Belted Kingfisher	Hooded Merganser
Black Duck	Hooded Warbler
Black-and-white Warbler	House Finch
Blackburnian Warbler	House Sparrow
Black-capped Chickadee	Indigo Bunting
Black-crowned Night-Heron	Killdeer
Blackpoll Warbler	Least Flycatcher
Blue Jay	Magnolia Warbler
Blue-gray Gnatcatcher	Mallard
Blue-headed Vireo	Merlin
Brown Creeper	Monk Parakeet
Brown-headed Cowbird	Mourning Dove
Canada Goose	Nashville Warbler
Carolina Wren	Northern Cardinal
Cedar Waxwing	Northern Flicker
Chestnut-sided Warbler	Northern Mockingbird
Chimney Swift	Northern Rough-winged Swallow
Chipping Sparrow	Northern Waterthrush
Common Grackle	Orange-crowned Warbler
Common Merganser	Orchard Oriole
Common Raven	Osprey
Common Redpoll	Palm Warbler
Cooper’s Hawk	Pileated Woodpecker
Dark-eyed Junco	Pine Warbler
Double-crested Cormorant	Red-bellied Woodpecker
Downy Woodpecker	Red-breasted Merganser
Eastern Bluebird	Red-headed Woodpecker
Eastern Kingbird	Red-tailed Hawk
Eastern Phoebe	Red-winged Blackbird
Eastern Towhee	Red-eyed Vireo
European Starling	Rock Dove
Field Sparrow	Rose-breasted Grosbeak
Fish Crow	Ruby-crowned Kinglet
Fox Sparrow	Ruby-throated Hummingbird

Savannah Sparrow
Sharp-shinned Hawk
Snowy Egret
Song Sparrow
Spotted Sandpiper
Tree Swallow
Tufted Titmouse
Turkey Vulture
Warbling Vireo
White-breasted Nuthatch
White-crowned Sparrow
White-throated Sparrow
Wild Turkey
Winter Wren
Wood Duck
Wood Thrush
Yellowbellied Sapsucker
Yellow-crowned Night-Heron
Yellow-rumped Warbler

ENDANGERED, THREATENED AND SPECIAL CONCERN SPECIES

As Hawthorne is located within the boundary of Passaic County, a list of rare plant species and ecological communities in Passaic County (**Table 14**) (NJ Natural Heritage, 2014) are important components of wildlife diversity in Hawthorne. Many species are small. Both Goffle Brook and the Passaic River are possible habitats for these species.

The health of an area's animal and plant populations can be an indicator of the health and sustainability of the environment for people. The decline or disappearance of one (or more) species may signal the deterioration of the habitat. Other species, and human health and welfare,may soon follow. Preserving the future of endangered and threatened species helps preserve our own species, benefiting human health and quality of life by protecting watersheds, preserving land in its natural state, and restoring wildlife habitat. Many people also place an intrinsic value on all species (Conserve Wildlife Foundation, 2002).

Many species are naturally rare in parts of their range, especially at the periphery. New Jersey often lies at the southern periphery of the range for many "northern" species and at the northern edge of the range of many "southern" species. Therefore, a species considered rare or imperiled within the state of New Jersey is not necessarily in danger of extinction worldwide. In addition, many rare species depend on large tracts of continuous undisturbed habitat to survive.If these habitats are interrupted by developed areas, the patches may become too small to supportcertain species.

The NJ Endangered Species Conservation Act was signed into law on December 14, 1973 (N.J.S.A. 23:2A-1 - 15), preceding the federal Endangered Species Act by two weeks. This milestone legislation established laws to protect and restore the state's endangered and threatenedwildlife whose survival in New Jersey is imperiled by loss of habitat, over-exploitation, pollution, or other impacts (NJDEP, October 6, 2004). In February 2012, NJDEP updated the Endangered and Nongame Species rules (N.J.A.C. 7:25), revising the species list based on science, upgrading the status of some recovering species and adding some declining species to the list (NJDEP Division of Fish and Wildlife, April 2, 2012 and January 18, 2011).

Table 15 presents the definitions used by NJDEP in describing the status of species. In order to better document the status or change in status of species, NJDEP solicits information from the general public concerning sightings of endangered, threatened and special concern species. People should use the appropriate reporting forms at NJDEP Division of Fish and Wildlife webpage - https://www.nj.gov/dep/fgw/ensp/rprtform.htm).

Table 14. Rare Plant Species and Ecological Communities presently recorded in the NJ Natural Heritage Database.

Rare Plant Species and Ecological Communities Presently Recorded in the NJ Natural Heritage Database

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
County: **Passaic**						
International Vegetation Classification						
Picea mariana / (Vaccinium corymbosum, Gaylussacia baccata) / Sphagnum sp. Woodland	Black Spruce Woodland Bog			HL	G3G5	S1
Chamaecyparis thyoides / Rhododendron maximum Forest	Atlantic White-cedar / Great Rhododendron Swamp			HL	G2G3	S1
Nonvascular Plant						
Sphagnum fuscum	Sphagnum			HL	G5	S2
Sphagnum riparium	Sphagnum		E	LP, HL	G5	S1
Sphagnum squarrosum	Sphagnum			HL	G5	S2
Sphagnum subsecundum	Sphagnum		E	LP, HL	G5	S1
Terrestrial Community - Other Classification						
Traprock glade/rock outcrop community	Traprock Glade/rock Outcrop Community				G2	S1
Vascular Plant						
Adlumia fungosa	Climbing Fumitory			HL	G4	S2
Agastache nepetoides	Yellow Giant-hyssop			HL	G5	S2
Agastache scrophulariifolia	Purple Giant-hyssop			HL	G4	S2
Agrimonia microcarpa	Small-fruit Grooveburr			HL	G5	S2
Alisma triviale	Large Water-plantain		E	LP, HL	G5	S1
Andromeda polifolia var. glaucophylla	Bog Rosemary		E	LP, HL	G5T5	S1

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
County: **Passaic**						
Anemone canadensis	Canada Anemone			HL	G5	SX
Arabis hirsuta var. pycnocarpa	Western Hairy Rockcress			HL	G5T5	S1
Asclepias quadrifolia	Four-leaf Milkweed			HL	G5	S3
Asclepias verticillata	Whorled Milkweed			HL	G5	S2
Botrychium oneidense	Blunt-lobe Grape Fern			HL	G4	S2
Calystegia spithamaea ssp. spithamaea	Erect Bindweed		E	LP, HL	G4G5T4T5	S1
Cardamine longii	Long's Bittercress		E	LP, HL	G3?	SH
Carex bebbii	Bebb's Sedge			HL	G5	S2
Carex brunnescens var. sphaerostachya	Round-spike Brownish Sedge		E	LP, HL	G5T5	S1
Carex bushii	Bush's Sedge		E	LP, HL	G4	S1
Carex deweyana var. deweyana	Dewey's Sedge		E	LP, HL	G5T5	S1
Carex disperma	Soft-leaf Sedge			HL	G5	S1S2
Carex limosa	Mud Sedge		E	LP, HL	G5	S1
Carex pallescens	Pale Sedge			HL	G5	S2
Carex siccata	Hillside Sedge		E	LP, HL	G5	S1
Carex utriculata	Bottle-shaped Sedge			HL	G5	S2
Carex willdenowii var. willdenowii	Willdenow's Sedge			HL	G5T5	S2
Castilleja coccinea	Scarlet Indian-paintbrush			HL	G5	S2
Cercis canadensis var. canadensis	Redbud		E	LP, HL	G5T5	S1
Chenopodium simplex	Maple-leaf Goosefoot			HL	G5	S2
Clematis occidentalis var. occidentalis	Purple Clematis			HL	G5T5	S2
Coeloglossum viride var. virescens	Long-bract Green Orchid			HL	G5T5	S2

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
County: **Passaic**						
Conioselinum chinense	Hemlock-parsley		E	LP, HL	G5	S1
Corallorhiza trifida	Early Coralroot			HL	G5	S2
Corallorhiza wisteriana	Spring Coralroot			HL	G5	SX
Cornus canadensis	Bunchberry			HL	G5	S1S2
Crataegus calpodendron	Pear Hawthorn		E	LP, HL	G5	S1
Crataegus chrysocarpa var. chrysocarpa	Fireberry Hawthorn			HL	G5T5	S2
Cuphea viscosissima	Blue Waxweed			HL	G5?	S3
Cynoglossum virginianum var. boreale	Northern Wild Comfrey		E	LP, HL	G5T4T5	SH.1
Cynoglossum virginianum var. virginianum	Wild Comfrey			HL	G5T5	S2
Cypripedium reginae	Showy Lady's-slipper		E	LP, HL	G4	S1
Desmodium cuspidatum var. cuspidatum	Toothed Tick-trefoil			HL	G5T5?	S2
Dirca palustris	Leatherwood			HL	G4	S2
Doellingeria infirma	Cornel-leaf Aster			HL	G5	S2
Dryopteris celsa	Log Fern		E	LP, HL	G4	S1
Elatine americana	American Waterwort			HL	G4	S2
Eleocharis halophila	Salt-marsh Spike-rush			HL	G4	S2
Elymus trachycaulus	Slender Wheatgrass		E	LP, HL	G5	S1
Epilobium angustifolium ssp. circumvagum	Narrow-leaf Fireweed			HL	G5T5	S1S2
Equisetum pratense	Meadow Horsetail		E	LP, HL	G5	S1
Eriophorum viridicarinatum	Thin-leaf Cotton-grass			HL	G5	S3
Galium labradoricum	Labrador Marsh Bedstraw		E	LP, HL	G5	S1
Gaultheria hispidula	Creeping-snowberry		E	LP, HL	G5	S1

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
County: **Passaic**						
Gentiana linearis	Narrow-leaf Gentian		E	LP, HL	G4G5	SH
Gnaphalium macounii	Winged Cudweed		E	LP, HL	G5	SH
Gymnocarpium dryopteris	Oak Fern			HL	G5	S1S2
Helianthemum bicknellii	Hoary Frostweed			HL	G5	S3
Hottonia inflata	Featherfoil		E	LP, HL	G4	S1
Ilex montana	Large-leaf Holly		E	LP, HL	G5	S1
Isotria medeoloides	Small Whorled Pogonia	LT	E	LP, HL	G2	S1
Juncus brevicaudatus	Narrow-panicle Rush			HL	G5	S2
Lechea tenuifolia	Narrow-leaf Pinweed		E	LP, HL	G5	S1
Lemna perpusilla	Minute Duckweed		E	LP, HL	G5	S1
Lemna trisulca	Star Duckweed			HL	G5	S2
Lemna valdiviana	Pale Duckweed		E	LP, HL	G5	S1
Leptochloa fascicularis var. maritima	Long-awn Sprangletop			HL	G5T3T4Q	S2
Liatris spicata var. spicata	Blazing-star			HL	G5T5?	S3
Lilium philadelphicum var. philadelphicum	Wood Lily			HL	G5T4T5	S2
Lipocarpha micrantha	Small-flower Halfchaff Sedge		E	LP, HL	G5	S1
Lonicera canadensis	American Fly-honeysuckle		E	LP, HL	G5	S1
Lupinus perennis var. perennis	Sundial Lupine			HL	G5T5?	S3
Lycopodiella inundata	Northern Bog Club-moss			HL	G5	S1S2
Lysimachia hybrida	Lowland Loosestrife			HL	G5	S3
Malaxis bayardii	Bayard Long's Adder's-mouth		E	LP, HL	G1G2	SH
Malaxis unifolia	Green Adder's-mouth		E	LP, HL	G5	SH

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
County: **Passaic**						
Melanthium virginicum	Virginia Bunchflower		E	LP, HL	G5	S1
Menyanthes trifoliata	Buck-bean			HL	G5	S2
Monarda clinopodia	Basil Beebalm		E	LP, HL	G5	SH
Muhlenbergia capillaris var. capillaris	Long-awn Smoke Grass		E	LP, HL	G5T5?	S1
Myriophyllum heterophyllum	Variable-leaf Water-milfoil			HL	G5	S2
Myriophyllum verticillatum	Whorled Water-milfoil		E	LP, HL	G5	SH
Obolaria virginica	Virginia Pennywort			HL	G5	S2
Panicum boreale	Northern Panic Grass		E	LP, HL	G5	S1
Penstemon laevigatus	Smooth Beardtongue		E	LP, HL	G5	S1
Phaseolus polystachios var. polystachios	Wild Kidney Bean			HL	G5T5?	S2
Phegopteris connectilis	Northern Beech Fern			HL	G5	S2
Picea rubens	Red Spruce		E	LP, HL	G5	S1
Platanthera ciliaris	Yellow Fringed Orchid			LP, HL	G5	S2
Platanthera flava var. herbiola	Tubercled Rein Orchid			HL	G4?T4Q	S2
Platanthera hookeri	Hooker's Orchid		E	LP, HL	G4	SH
Platanthera hyperborea var. huronensis	Leafy Northern Green Orchid			HL	G5T5?	SX
Populus heterophylla	Swamp Cottonwood			HL	G5	S2
Porteranthus trifoliatus	Indian Physic			HL	G4G5	S2
Potamogeton obtusifolius	Blunt-leaf Pondweed		E	LP, HL	G5	S1
Prenanthes racemosa var. racemosa	Smooth Rattlesnake-root		E	LP, HL	G5T4	SH
Pycnanthemum clinopodioides	Basil Mountain-mint		E	LP, HL	G1G2	S1
Pycnanthemum torrei	Torrey's Mountain-mint		E	LP, HL	G2	S1

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
County: **Passaic**						
Ranunculus ambigens	Water-plantain Spearwort			HL	G4	S2
Ranunculus fascicularis	Early Buttercup		E	LP, HL	G5	S1
Ranunculus flabellaris	Yellow Water Buttercup			HL	G5	S3
Ranunculus pusillus var. pusillus	Low Spearwort			HL	G5T4?	S2
Ranunculus trichophyllus var. trichophyllus	Thread-leaf Water Buttercup			HL	G5T5	S2
Rotala ramosior	Toothcup			HL	G5	S3
Rubus canadensis	Smooth Blackberry		E	LP, HL	G5	S1
Rubus setosus	Bristly Blackberry			HL	G5	SH.1
Sabatia dodecandra var. dodecandra	Large Marsh-pink			HL	G5?T4T5	S2
Sagittaria subulata	Awl-leaf Arrowhead			HL	G4	S2
Salix lucida ssp. lucida	Shining Willow			HL	G5T5	S1?
Salix pedicellaris	Bog Willow		E	LP, HL	G5	S1
Salix serissima	Autumn Willow			HL	G4	S2
Sanicula trifoliata	Large-fruit Black-snakeroot		E	LP, HL	G4	S1
Scirpus atrocinctus	Black-girdle Woolgrass			HL	G5	S2
Scleria pauciflora var. caroliniana	Carolina Nut-rush			HL	G5T4T5	S2
Scleria verticillata	Whorled Nut-rush		E	LP, HL	G5	S1
Scutellaria leonardii	Small Skullcap		E	LP, HL	G4T4	S1
Scutellaria nervosa	Veined Skullcap			HL	G5	S2
Selaginella rupestris	Rock Spike-moss			HL	G5	S2
Sphenopholis pensylvanica	Swamp Oats			HL	G4	S2
Spiranthes laciniata	Lace-lip Ladies'-tresses		E	LP, HL	G4G5	S1

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank
County: **Passaic**						
Stachys tenuifolia	Smooth Hedge-nettle			HL	G5	S3
Stellaria borealis var. borealis	Boreal Starwort		E	LP, HL	G5T5	S1
Streptopus lanceolatus	Rosy Twisted-stalk		E	LP, HL	G5T5	S1
Taxus canadensis	American Yew			HL	G5	S2
Tiarella cordifolia var. cordifolia	Foamflower		E	LP, HL	G5T5	S1
Trillium undulatum	Painted Trillium			HL	G5	S2
Trollius laxus ssp. laxus	Spreading Globe Flower		E	LP, HL	G5T3	S1
Vaccinium oxycoccos	Small Cranberry			HL	G5	S2
Verbena simplex	Narrow-leaf Vervain		E	LP, HL	G5	S1
Viburnum lantanoides	Witch-hobble		E	LP, HL	G5	S1
Viola hirsutula	Southern Wood Violet			HL	G4	S2
Viola septentrionalis	Northern Blue Violet		E	LP, HL	G5	S1
Wolffiella gladiata	Sword Bogmat		E	LP, HL	G5	S1
Xyris montana	Northern Yellow-eyed-grass		E	LP, HL	G4	S1.1

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Table 15. Definitions of Species Status. Presents the definitions used by NJDEP in describing the status of species.

STATE STATUS	STATE STATUS DEFINITIONS
Animals: Two animal lists provide state status codes after the Endangered and Nongame Species Conservation Act of 1973 (N.J.S.A. 23:2A-13 et. seq.): the list of endangered species (N.J.A.C. 7:25-4.13) and the list defining status of indigenous, nongame wildlife species of New Jersey (N.J.A.C. 7:25-4.17(a)). The status of animal species is determined by the Endangered and Nongame Species Program (ENSP), with the review and approval of the Endangered and Nongame Species Advisory Committee. Status for animals separated by a slash (/) indicate a dual status. First status refers to the state breeding population, and the second status refers to the migratory orwinter population.	
E	An **endangered species** is one whose prospects for survival within the state are in immediate danger due to one or many factors - a loss of habitat, over exploitation, predation, competition, disease. Anendangered species requires immediate assistance or extinction will probably follow.
T	A **threatened species** is a species that may become endangered if conditions surrounding the species begin to or continue to deteriorate.

SC	The term **Special Concern** applies to animal species that warrant special attention because of someevidence of decline, inherent vulnerability to environmental deterioration, or habitat modification that would result in their becoming a Threatened species. This category would also be applied to species that meet the foregoing criteria and for which there is little understanding of their current population status in the state.
S	A **stable species** is one whose population is not undergoing any long-term increase/decrease withinits natural cycle.
U	An **undetermined species** is one about which there is not enough information available to determine the status
Plants: Plant taxa listed as endangered are from New Jersey's official Endangered Plant Species List (N.J.A.C. 7:5C – 5.1).	
E	Native New Jersey plant species whose survival in the State or nation is in jeopardy.
FEDERAL STATUS	**FEDERAL STATUS DEFINITIONS**
LE	Taxa formally listed as **endangered.**
LT	Taxa formally listed as **threatened.**
REGIONAL STATUS	**REGIONAL STATUS CODES FOR PLANTS AND ECOLOGICAL COMMUNITIES**
LP	Indicates taxa listed by the **Pinelands Commission** as endangered or threatened within their legaljurisdiction. Not all species currently tracked by the Pinelands Commission are tracked by the Natural Heritage Program. A complete list of endangered and threatened Pineland species is included in the NJ Pinelands Comprehensive Management Plan.
HL	Indicates taxa or ecological communities protected by the **Highlands Water Protection andPlanning Act** within the jurisdiction of the Highlands Preservation Area.
GLOBAL & STATE CODE	The Nature Conservancy developed a ranking system for use in identifying elements (rare species and ecological communities) of natural diversity most endangered with extinction. Each element isranked according to its global, national, and state (or subnational in other countries) rarity. These ranks are used to prioritize conservation work so that the most endangered elements receive attention first. Definitions for element ranks are after The Nature Conservancy (1982: Chapter 4, 4.1-1 through 4.4.1.3-3).
GLOBAL CODE	**GLOBAL ELEMENT RANK DEFINITIONS**
G1	**Critically imperiled globally** because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable toextinction.
G2	**Imperiled globally** because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
G3	Either **very rare and local throughout its range or found locally** (even abundantly at some of itslocations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; with the number of occurrences in the range of 21 to 100.
G4	**Apparently secure globally**; although it may be quite rare in parts of its range, especially at the periphery.
G5	**Demonstrably secure globally**; although it may be quite rare in parts of its range, especially at theperiphery.
GH	Of **historical occurrence** throughout its range i.e., formerly part of the established biota, with the expectation that it may be rediscovered.
STATE CODE	**STATE ELEMENT RANK DEFINITIONS**

S1	**Critically imperiled in New Jersey** because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres). Elements so ranked are often restricted to very specialized conditions or habitats and/or restricted to an extremely small geographical area of the state. Also included are elements which were formerly more abundant, but because of habitat destruction or some other critical factor of its biology, they have been demonstrably reduced in abundance. In essence, these are elements for which, even with intensive searching, sizable additional occurrencesare unlikely to be discovered.
S2	**Imperiled in New Jersey** because of rarity (6 to 20 occurrences). Historically many of these elements may have been more frequent but are now known from very few extant occurrences,primarily because of habitat destruction. Diligent searching may yield additional occurrences.
S3	**Rare in state** with 21 to 100 occurrences (plant species and ecological communities in this categoryhave only 21 to 50 occurrences). Includes elements which are widely distributed in the state but withsmall populations/acreage or elements with restricted distribution, but locally abundant. Not yet imperiled in state but may soon be if current trends continue. Searching often yields additional occurrences.
S4	**Apparently secure in the state, with many occurrences.**
S5	**Demonstrably secure in state and essentially ineradicable under present conditions.**
SH	**Elements of historical occurrence in New Jersey. Despite some searching of historical occurrences and/or potential habitat, no extant occurrences are known. Since not all of the historical occurrences have been field surveyed, and unsearched potential habitat remains, historically ranked taxa are considered possibly extant, and remain a conservation priority for continued field work with the expectation they may be rediscovered.**
B	**Refers to the breeding population of the element in the state.**
N	**Refers to the non-breeding population of the element in the state.**
Note: To express *uncertainty*, the most likely rank is assigned and a question mark added (e.g., G2?). A range is indicated by combining two ranks (e.g., G1G2, S1S3).	
Source: NJDEP Division of Fish and Wildlife, March 22, 2010	

PROTECTING ENDANGERED, THREATENED AND SPECIAL SPECIES

WILDLIFE ACTION PLAN

NJDEP Division Fish and Wildlife prepared a Wildlife Action Plan (WAP) in 2008, required by the US Fish and Wildlife Service in order to qualify for future federal funds through the State Wildlife Grants program. This program provides federal funds to states for the conservation of species that are endangered, threatened, or have special conservation needs. A 25% match, provided by citizen contributions, is required. NJ has received approximately $1.2 million dollars of State Wildlife Grants funding each year (NJDEP, January 23, 2008). The report states,

> "The greatest threats to NJ's natural resources include habitat loss, destruction, alteration, and fragmentation. This has been a recurring theme within NJ for years as it is the most densely populated state in our nation with an annually increasing population requiring additional homes, roads, commercial buildings, schools, etc. Additional threats include, but are not limited to, invasive species (flora and fauna, aquatic and terrestrial), pollution, and unsustainable land management practices." (NJDEP, January 23, 2008)

A WAP specific to each region identifies habitats, wildlife of greatest conservation need, and threats. Conservation goals and actions are identified and prioritized, and potential partnerships are outlined with landowners, the public and conservation organizations, wildlife professionals and local, state and federal agencies. Hawthorne is in the Northern Highlands of the Skylands Landscape region.

On April 6, 2022, Borough of Hawthorne re-adopted a resolution in support of New Jersey's Wildlife Action Plan (Hawthorne, April 6, 2022).

FISH SPECIES

Fish species found in the Borough of Hawthorne reside in two waterways: Goffle Brook, and the Passaic River. Goffle Brook has been sporadically sampled (**Table 16**) (Sebetich 2009) and does provide habitat for some species of fish. As the sampling was not thorough, more species may reside in Goffle Brook than are listed. The Passaic River was considered highly toxic to fish for much of the Twentieth Century, but is now slowly beginning to see a return of native fish species including anadromous species as its quality improves (**Table 17**) (Papson, pers. comm. 2000). The anadromous fish, species whose life cycle contains freshwater and salt-water stages are extremely sensitive to pollution and when spawning will avoid a polluted river system. Recently, several anadromous species including shad and striped bass have been spotted below the Dundee Dam, indicating significant water quality improvement, as these species were absent from the river for many years (Papson, Pers. comm. 2000).

Table 16. Fish sampled in Goffle Brook. Sebetich 2009.

Common Name	Scientific Name
American eel	*Anguilla rostrata*
Banded killifish	*Fundulus diaphanus*
Black crappie	*Pomoxis nigromaculatus*
Blacknose dace	*Rhinichthys atratulus*
Bluegill sunfish	*Lepomis macrochirus*
Brown bullhead	*Ictalurus nebulosus*
Carp	*Cyprinus carpio*
Catfish	*Siluriformes*
Largemouth bass	*Micropterus salmoides*
Pumpkinseed sunfish	*Lepomis gibbosus*
Sculpin	*Scorpaeniformes*
Shiner	*Cypriniformes*
Tessellated darter	*Etheostoma olmstedi*
White sucker	*Catastomus commersoni*

Table 17. Fish sampling of Passaic River, Paterson, FishTrack, Division of Fish & Wildlife – Bureau of Freshwater Fisheries, NJDEP, 2010

Common Name	Scientific Name
American eel	*Anguilla rostrata*
Banded killifish	*Fundulus diaphanus*
Bluegill sunfish	*Lepomis macrochirus*
Carp	*Cyprinus carpio*
Golden shiner	*Notemigonus crysoleucas*
Largemouth bass	*Micropterus salmoides*
Pumpkinseed sunfish	*Lepomis gibbosus*
White sucker	*Catastomus commersoni*
Alewife	*Alosa pseudoharengus*
Gizzard Shad	*Dorosoma cepedianum*
White Perch	*Morone Americana*
Goldfish	*Carassuis auratus*
Blueback Herring	*Alosa aestivalis*
Brown bullhead	*Ameiurus nebulosus*
Black crappie	*Pomoxis nigromaculatus*
Redbreast Sunfish	*Lepomis auritus*
Silvery Minnow	*Hybognathus amarus*
Satin Shinner	*Cyprinella analostana*

V. Hydrology

WATER RESOURCES

Clean, plentiful water supplies are essential for all life on earth. Hawthorne's drinking water comes from the Brunswick Aquifers. There are fish in Goffle Brook and the Passaic River. All the businesses & residents in Hawthorne require water. An understanding of Hawthorne's water resources is critical for maintaining a healthy environment and clean drinking water in sufficient supply.

Water, in any form, ice, liquid, or vapor, or in any place, air, Earth surface, or ground, circulates by changing form and position. The sun's energy, directly or indirectly, evaporates water into the air. In the air, water vapor molecules coalesce into liquid droplets forming clouds. Water precipitates from clouds as rain, snow or sleet. When precipitation falls to the ground, the water either runs off the overland, or seeps into pores and cracks of the soil or rocks. Water in the ground may be evaporated or transpired by plants or animals back into the air; may move into lakes, streams, and rivers; or may be stored in the ground as ground water. Ground water and surface water tend to flow downhill towards the ocean. This process is known as the hydrologic cycle (**Fig. 13**).

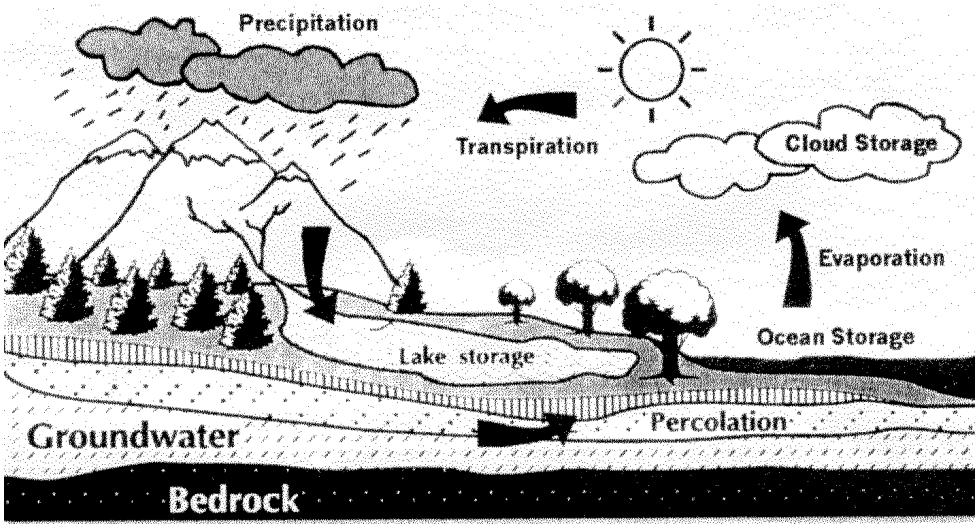


Fig. 13. Hydrologic Cycle. Diagram modified from Passaic Valley Ground Water Protection Committee's (PVGWPC) Ground Water document.

Some of the rain and snow that precipitates on Hawthorne runs off into Deep Brook, Goffle Brook or the Passaic River, and some infiltrates into the ground. Some of it even reaches the aquifer, which lies beneath the surface of Hawthorne. Water is dynamic; it moves from place to place.

Deep Brook and Goffle Brook originate in Bergen County, and flow southward into Hawthorne where they join. Goffle Brook then flows into the Passaic River. The Borough of Hawthorne lies within the Passaic River Basin. It is part of the lower Passaic River Basin, which has been designated by the State of New Jersey Department of Environmental Protection in Watershed Management Area 4 (WMA4). The Passaic River flows past Hawthorne for about three-quarters of a mile, and forms the boundary

between Hawthorne and Paterson. Since water in the Passaic River as it passes Hawthorne is draining an area of almost 800 square miles, both the quantity of water flowing in the river and its quality have been impacted by many influences, which include human uses of the land and water in the watershed above Hawthorne (USGS, 1996). Thus, what happens outside Hawthorne's borders has the potential for degrading Hawthorne's water resources.

GROUNDWATER

OVERVIEW

Hawthorne relies exclusively on groundwater for its drinking water supply. The drinking water for Hawthorne is obtained by wells tapping into an aquifer. An aquifer is a geologic unit that is saturated with water and sufficiently permeable to transmit economic quantities of water to wells and springs. Hawthorne's aquifer is in the Brunswick Formation, which is one of the Newark Group Aquifers (USGS 1996). The sediments in this aquifer date back to the Triassic period and consist of sandstone, siltstone, shale and conglomerate. The Newark Basin extends from central New Jersey to adjacent parts of Pennsylvania and New York States, and is the largest early-Mesozoic basin in the eastern United States (Trapp and Horn 1997). Water generally is present in a weathered joint and fracture system in the upper 200 or 300 feet (Kasabach and Althoff 1983). Water availability is reduced below a depth of 500 feet because fractures are fewer and smaller, depending on the rock type. The shale and sandstones of the Brunswick Formation are productive aquifers and yield as much as 1,500 gallons per minute (USGS 1996).

Drinking water in Hawthorne is obtained from twenty-one municipal wells located in areas within and adjacent to the Borough (**Table 18, Fig. 14**). The wells are located at Goffle Road, Wagaraw Road, Utter Avenue, Grand Avenue, Bamford Avenue, Goffle Hill Road, Cedar Avenue, Rea Avenue, Maitland Avenue, and First Avenue (**Fig. 14**). The wells that supply the borough range from 290 to 440 feet deep (**Table 18**). The earliest known well drilled in Hawthorne was in 1915. All wells are in working order and no problems are currently present. Hawthorne pumps from two to three million gallons per day (mgd) from this aquifer depending on the season. The pump capacities of the wells range from 75 to 400 gallons per minute depending on the location of the well. Hawthorne pumped less

Table 18. Active public community wells in Hawthorne, pumping capacity and well depth. Information provided by Department of Public Works.

ID#	Name/Location	Capacity (mgd)	Well Depth (feet)
1	Bamford Ave.	0.43	300
2	First Ave.	0.23	400
3	Goffle Road 1	0.25	293
4	Goffle Road 3	0.22	300
5	Goffle Road 4	0.36	315
6	Goffle Road 5	0.26	300
7	Goffle Road 6	0.36	485
8	Rea Ave.	0.23	400
9	Cedar Ave.	0.29	368
10	Maitland Ave.	0.19	400
11	Wagaraw Well 3	0.15	415
12	Wagaraw Well 4	0.11	300
13	Wagaraw Well 5	0.20	440
14	Wagaraw Well 6	0.22	388
15	Wagaraw Well 7	0.20	369
16	Wagaraw Well 8	0.30	416
17	Goffle Hill Well	0.14	350
18	Utter Ave. Well	0.25	300
19	S. Wagaraw Well 10	0.20	300
20	S. Wagaraw Well 12	0.40	300
21	S. Wagaraw Well 15	0.40	300

water in 2010 than it did 30 years earlier, either as a result of increased efficiency or because of decreased industrial usage or both.

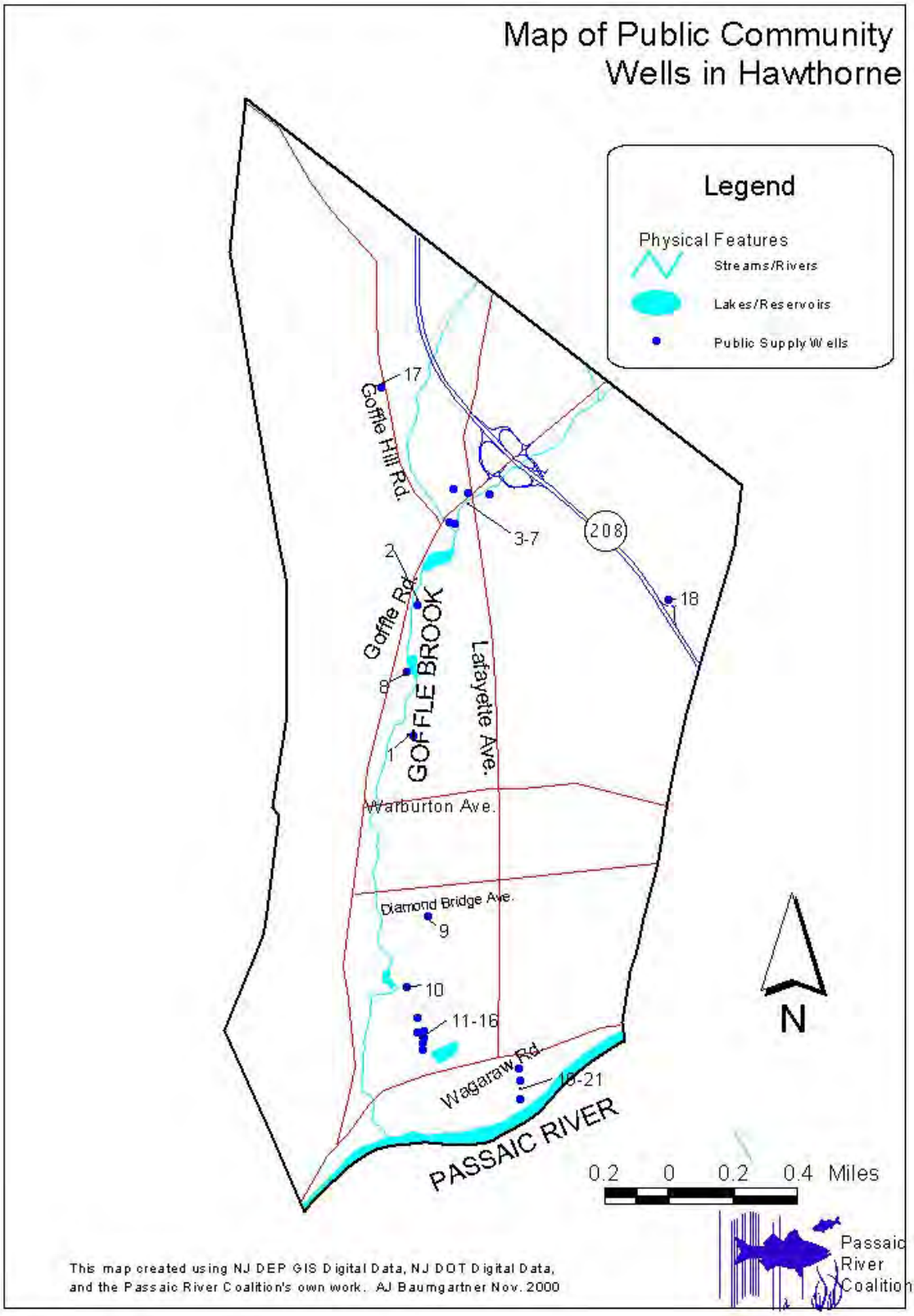


Fig. 14. Map of Public Community Wells in the Borough of Hawthorne.

In 2016, Hawthorne applied for a renewal permit to divert a maximum of 167 million gallons of water during any month at a maximum rate of 4,230 gallons per minute from the 21 existing wells. This permit has been renewed every five years. The total diversion, for each month from each well was reported quarterly to the New Jersey Department of Environmental Protection's Water Allocation Office along with the static water levels of wells identified in the monitoring plan (NJDEP Data Miner Report Water Utilization Results by Program Interest and Year - Report Criteria) In May 2001, the Hawthorne municipality approved an Interlocal Service Agreement with North Haledon which set Hawthorne to supply water to approximately 382 home units in North Haledon (Borough of Haledon v. Borough of North Haledon, et al). Hawthorne has twenty-one municipal wells that supply approximately 19,500 people with water to the following towns: Fair Lawn, Glen Rock, Ridgewood, Wyckoff, Hawthorne, North Haledon, and Prospect Park. North Haledon has the most substantial amount of water being supplied from the Hawthorne Water Department; (**Table 19 and Fig. 15**).

Table 19. What Municipalities are Served by My Water System
(NJDEP Data Miner – Water Supply and Geoscience, February 2022)

PWSID	1604001
Water System Name	HAWTHORNE WATER DEPARTMENT
Water System Type	Community
Number of Municipalities Served	7
Total Service Connections	6449

County	*Municipality*	*Max Population Served QTY*	*Comments*	*Total Service Connections QTY*
Bergen	Fair Lawn Boro	25		1
Bergen	Glen Rock Boro	12		1
Bergen	Ridgewood Village	6		1
Bergen	Wyckoff Twp	10		1
Passaic	Hawthorne Boro	18,500		5993
Passaic	North Haledon Boro	900		451
Passaic	Prospect Park Boro	5		1

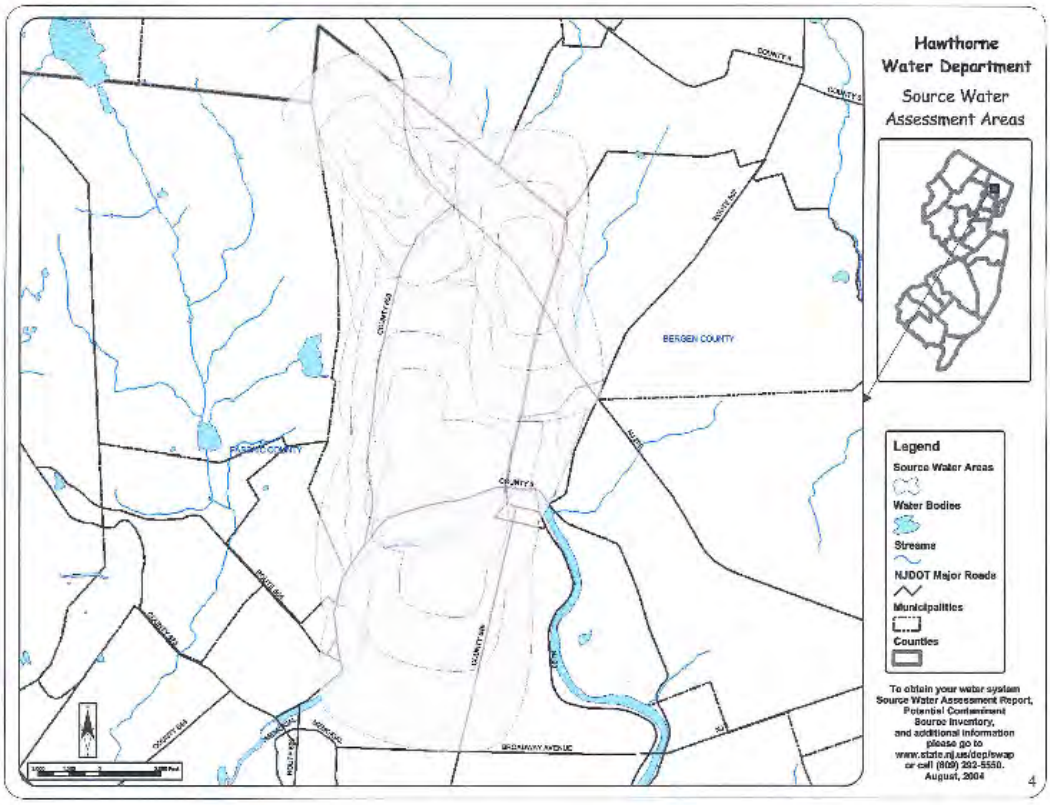


Fig. 15. Area of Water Diverted. Hawthorne Water Department – Source water Assessment Area. 2004.

GROUNDWATER RECHARGE

Groundwater recharge is one of the most important factors in the sustainability of pumping an aquifer. The water in an aquifer is the result of surface water and rainwater percolating into the ground (**Fig. 16**). The water that is not taken up by vegetation, slowly makes its way deep into the ground until it reaches the zone of saturation, a depth at which all the pores (all the voids within the soil or rock) are completely filled with water. The upper limit of the saturated zone is the water table, and this marks the upper limit of the aquifer (Price 1985). It is this portion of the hydrologic cycle that replenishes the ground water. Recharge or replenishment of the ground water is critical to maintaining availability of drinking water. Recharge rates can vary widely, but for the water level in an aquifer to be maintained, recharge must be equal to withdrawal. Impermeable surfaces, such as roads, parking lots, and buildings, prevent the infiltration of water into the ground, and if impermeable surfaces overlay an area of groundwater recharge, there will be a net loss of water from the aquifer. To understand and protect groundwater resources, the New Jersey Geologic Society is in the process of mapping aquifer recharge areas using such information as rainfall data, land use, soil types, and the extent of wetlands in the area (NJGS 2001).

It is likely that the principal areas of aquifer recharge within the Borough of Hawthorne are located to the east of the First Watchung Ridge (Orange Mountain). Recharge to the First Watchung is minimal since the ridge is composed of basalt that is relatively impermeable and which slopes away from Hawthorne towards North Haledon. Since much of this area is covered by impervious surfaces, the stability of water levels in the aquifer is something that deserves investigation. As a large portion of the watershed lies upstream and outside of Hawthorne, and these areas contain soils and surficial geology that is permeable it is reasonable to assume that a significant amount of the recharge area for the aquifer lies outside Hawthorne's municipal borders. When recharge to an aquifer is insufficient, river water may provide recharge to the groundwater.

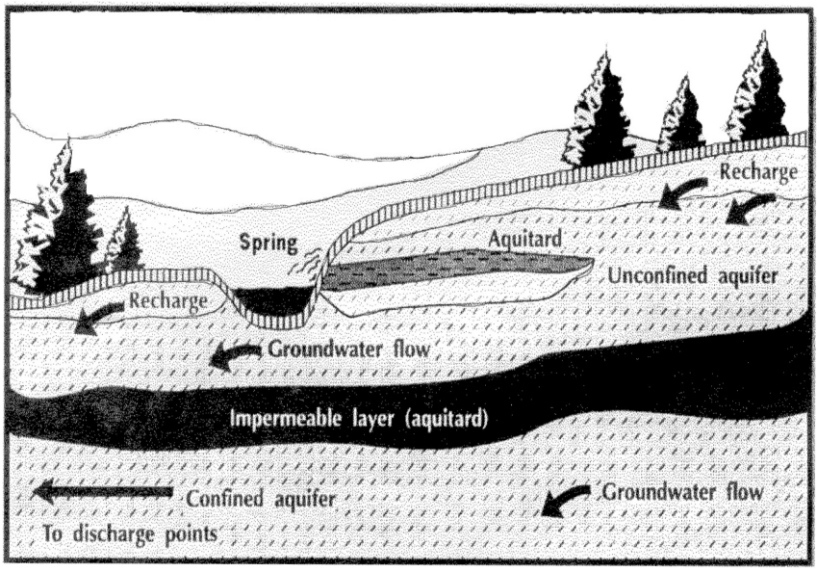


Fig. 16. Recharge of Ground Water in Aquifer. Figure is modified from PVGWPC's Ground Water document.

GROUNDWATER QUALITY

Generally, drinking water may reasonably be expected to contain at least small amounts of some substances that may be contaminants at designated concentrations. The presence of such substances does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline: (800) 426-4791. The water in aquifers of the Newark Group generally is hard (concentrations exceeding 120 mg/L hardness as calcium carbonate) and may have locally excessive concentrations of iron (11 mg/L) and sulfate (1,800 mg/L).

View of chemical air strippers attached to municipal wells at the Wagaraw site.

As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and can pick up substances resulting from the presence of animals or from human activity. These substances include microbes, such as viruses and bacteria that may come from leaky sewage lines, pets, and wildlife. Inorganic substances, such as salts and metals, can be naturally occurring or result from urban storm water runoff, or industrial wastewater discharges. Substances picked up with runoff can also include pesticides and herbicides. To ensure that tap water is safe to drink, regardless of whether it comes from wells or rivers, the Environmental Protection Agency (USEPA), under provisions of the Safe Drinking Water Act, prescribes regulations that limit the amount of certain substances in water provided by public water systems.

There is a maximum amount of a contaminant allowed in drinking water, which is referred to as Maximum Contaminant Level or MCL. MCL's are set by the EPA for specific contaminants. Maximum Contaminant Level Goals or MCLG's are set individually by state. The MCLG for a particular contaminant is referred to as the level of that contaminant in drinking water below which there is no known or expected risk to health. This allows for a margin of safety. Hawthorne's water supply is in compliance with all MCL's set by the EPA.

The Brunswick Group Aquifer, being composed of sandstone and shale, helps to purify water as it percolates through the ground. The earth and sediments between the land surface and the well serve as a filter to purify water making ground water generally of high quality, but this filtering mechanism can be overwhelmed by pollution from the surface. The quality of Hawthorne's well water is generally good, although there have been problems with contamination in some of the wells along Wagaraw Road. The municipal wells along Wagaraw Road are located under a highly industrialized section of the Borough, and close to the Passaic River, two potential pollutant sources. Primary chemical pollutants are trichlorethane and tetrachloroethylene. These two chemicals are cited as examples of chemicals frequently found in New Jersey ground water (Novotny and Chesters 1981). The levels of these two chemicals have been relatively constant at under 5 ppb in raw water and 0-1 ppb in treated water (Lakefield pers. comm. 2000). Analysis of water from the Wagaraw Road revealed the presence of volatile organic chemicals in the water that are assumed to have come from one of the many industrial sites in the area. This water is made safe for drinking by two large chemical strippers (North Station and South Station), which are visible from Wagaraw Road. Similarly an air stripper purifies the Goffle Road wells. Purification of this type is expensive, and it is in Hawthorne's best interest to avoid contamination. All wells are treated with Calcium Hypochlorite.

Perfluorotanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS), along with Perfluoronoanoic Acid (PFNA), are chemicals within a larger class of chemicals known as Per- and polyfluoroalkyl substances (PFAS). PFAS do not occur naturally, but are widespread and extremely persistent in the environment. They are man-made chemicals that have been used to make carpets, clothing, fabric for furniture, paper packaging for food, and other materials (such as non-stick cookware) that are resistant to water, grease or stains. They are also used for firefighting at airfields and in a number of industrial processes. Due to recent New Jersey Department of Environmental Protection (DEP) rules in 2020, many water utilities throughout the state, including Hawthorne Water, will be required to install new treatment processes to eliminate these chemicals that are found in their source water. Other nearby utilities affected include Ridgewood, Garfield, Waldwick, Ho-Ho-Kos, Passaic Valley Water Commission and NJ American.

In the 1st Quarter, 2021, Hawthorne began quarterly testing for PFOA and PFOS as required by regulations. On June 15, 2021, based on preliminary test results, but before any notice from the NJDEP, Hawthorne Borough Council introduced a bond ordinance (adopted on 7/7/2021) to fund the design of a treatment system to remove PFOA and PFOS. On August 31, 2021, NJDEP issued Hawthorne Water a "Notice of Noncompliance" for PFOA and PFOS requiring corrective action to remove the chemicals within one year, and requiring notice to all customers. On September 24, 2021, Hawthorne issued the required notice to water customers. NJDEP will issue a Notice of Noncompliance letters until the treatment system is installed and compliance with the regulations. Hawthorne is working with the New Jersey Infrastructure Bank for funding for the PFOA & PFOS treatment system and exploring the possibility of a lawsuit against manufacturers of PFOA and PFOS seeking to recover all or a portion of the cost of treatment.

In July, 2021, the New Jersey Legislature passed a law requiring all public water systems in the state to inventory all lead service lines and then replace them with non-lead lines within 10 years. The service line consists of the utility-owned portion of the line from main to the curb stop, and the customer-owned portion of the line from the curb stop in to the meter. Although the Hawthorne Water system has no actual **lead** lines, the **new** law classified **"galvanized lines"** (essentially steel pipe coated in zinc) as lead, and 45% of Hawthorne Water's service lines were installed using galvanized pipes. Only a handful of these have since been replaced with non-lead (copper) pipes. In compliance with the federal government's "Lead and Copper" rule, Hawthorne has tested for lead in water in selected customers' premises and Hawthorne's water system for the past 30 years. All of the results indicate no lead levels above federal or state standards.

KNOWN CONTAMINATED SITES

A brownfield is abandoned or underused industrial or commercial properties where redevelopment is complicated by actual or perceived environmental contamination. Brownfields vary in size, location, age and past use. They can range from a small, abandoned corner gas station to a large, multi-acre former manufacturing plant that has been closed for years.

A brownfield is defined under NJ state law (N.J.S.A. 58:10B-23.d) as "any former or current commercial or industrial site that is currently vacant or underutilized and on which there has been, or there is suspected to have been, a discharge of a contaminant." Generally, brownfields are properties that are abandoned or underutilized because of either *real or perceived* contamination.

The Hawthorne Environmental Commission (Commission) prioritized potential brownfield sites to be redeveloped. Utilizing the New Jersey Department of Environmental Protection (NJDEP) Dataminer site, the Commission identified and populated 6 brownfield sites out of 63 sites in Hawthorne. The 6 brownfield sites are identified as "any former or current commercial or industrial site that is currently vacant or underutilized and on which there has been, or there is suspected to have been, a discharge of a contaminant." 2 of the 6 Brownfield sites are in the process of re-development and will be completed in 2022/2023 timeframe. The Commission

eliminated home oil tanks from the known contaminate sites and narrowed it only to include former or current commercial and industrial sites that are vacant.

Table 20. Borough of Hawthorne Brownfield Inventory & Prioritization

Borough of Hawthorne Brownfield Inventory & Prioritization

Legend
Low Redevelopment Priority
Medium Redevelopment Priority
High Redevelopment Priority

February 20, 2022

	Ownership 5=Public 1=Private	Public Health Risk 5=High Risk 1=Low Risk	Redevelopment Potential 5=High use potential 1=Low use potential	Size 5=Larger 1=Small	Potential to Reduce Blight 5=High 1=Low	Potential for Open Space 5=High 1=Low	Currently in Productive Use 5=No 1=Yes	Overall Score	Comments
Weighting Factor	**2**	**5**	**3**	**2**	**3**	**2**	**4**		
Lukoil Service Station #74206 (Former) 2 Wagaraw Road PI #009267 Lidl Supermarket	1	1	5	1	5	1	1	**45**	**UPDATE STATUS:** November 2021 Planning Board Approved Lidl Supermarket on property along with a section from the adjacent property of the Shotmeyer Oil site; Remediation Cases are Closed; Two (2) Remedial Action Outcomes - Areas Unrestricted Use (most stringent clean up standards) Issued; (less 1 acre)
Graafsma Property 172 5th Avenue PI #480883	1	1	1	1	1	1	5	**37**	Remediation Case is Closed; One (1) Remedial Action Outcome -Area Unrestricted Use (most stringent clean up standards) issued; low potential for redevelopment based on size of parcel. (approximately 0.40 acres); property is vacant.
Merck & Co. Inc. (Former) 200 Wagaraw Road PI #007586 "Hedges at Hawthorne"	1	1	5	5	1	5	1	**49**	**UPDATE STATUS:** Court Settlement with Borough of Hawthorne; Developer to build 118 units of housing in a four-story, 45-foot-high building fronting on Wagaraw Road. 100 units will be market rate two-bedroom units. 17 will be affordable units, with required mix of one, two and three-bedroom units. One unit is set aside for a superintendent. There will be a four-story 30,000 square foot public storage building along the boundary shared with Kohler. There will also be a sound wall to shield residents from seeing or hearing trucks parked on the Kohler property. The wall is yet to be designed but will be between 16 and 20 feet in height. There will be retail space, roughly 2,000-2500 square feet, and a 14,000 square foot unit attached, designated as a gym; Environmental remediation in progress (Remedial Action completion is due May 7, 2022); site located adjacent to the Passaic River; (9.3 acres)
Pan Technology Corp Inc (Former) 1 Washington Avenue PI #001356	1	5	1	1	5	1	5	**69**	Environmental remediation in progress (Remediation Action completion is due May 7, 2022); LNAPL identified on November 20, 2017; property currently not in use, surrounded by fence; (1.4 acres); property is vacant.
Pyrolac Corp (Former) 55 Schoon Avenue PI # 012243	5	1	5	1	5	5	5	**77**	**UPDATE STATUS:** No viable owner of the property; property has been vacant since April 1995; Passaic County Brownfields Commission identified site for EPA's Brownfield grant program; 2009 and 2010 Preliminary Assessment and Site Investigation report was issued; Borough of Hawthorne has been working with adjacent property owner for potential re development of site; currently Borough of Hawthorne submitted HDSRF application to NJDEP in September 2018; Approved by NJDEP in 2019; PA, SI, and RI submitted July 2021 to NJDEP; In December 2021, Council approved a resolution for the Planning Board to conduct a study of redevelpment of site (2.45 acres)
Shell Service Station #138375 (Former) 902 Goffle Road PI #009260	1	1	5	1	5	5	5	**69**	Environmental remediation in progress; (Remediation Action completion is due May 7, 2022); currently not in use (less than 1 acre); property is vacant.

1. Develop your key criteria and weighting factors (row 7)
Ownership scoring: 1) Privately-Owned; 5) Public, City-owned
Public Health Hazard impacts include: 1) actual elevated human health or ecological risk; 5) containing mobile, hazardous contaminants or NAPL, location near sensitive receptors and high contaminant levels; IECs; vapor hazard
ReDevelopment Potential includes: 1) low or no use potential; 5) high use potential
Size includes: 1) - Small - less than 1 acre to 2.45 acres; 5) - Large - greater than 2.45 acres
Blight reduction potential includes: 1) development will reduce neighborhood's level of blight; 5) development will remove high blighting influence Open Space Potential includes: 1) low or no use potential; 5) high use potential
Productive Use includes: 1) Yes - active site; 5) No = inactive or vacant property

There are numerous Active and Known/Suspected Contaminated Sites in Hawthorne (**Table 21 and 22**). There are also a few Known Contaminated Sites located along Goffle Brook upstream of Hawthorne that have the potential of contaminating Goffle Brook affecting the Borough of Hawthorne. Ground water can also be contaminated by leaking Underground Storage Tanks (UST's). According to the NJDEP's Bureau of Underground Storage Tanks, there are several UST's and Active Remediation cases in Hawthorne (**Table 23 and 24**).

Several businesses and redevelopment sites have been identified with Basic Stormwater Industrial General Permit and Stormwater Construction General Permit according to NJPDES Permit Records (**Table 25**). There are no Industrial NJPDES discharges to groundwater or surface water in Hawthorne.

Table 21. Active Contaminated Sites in Hawthorne. Data compiled from information supplied by NJDEP Active Contaminated Sites List – Active Sites (NJDEP Data Miner 2022)

Site ID	PI Number	PI Name	Address	Home Owner
21014	009901	10 WAGARAW RD HAWTHORNE LP	10 WAGARAW RD	No
596245	749143	143 ETHEL AVENUE	143 ETHEL AVE	No
229278	300097	230 REA AVENUE	230 REA AVE	Yes
46979	030407	248 GOFFLE RD LLC	248 270 GOFFLE RD	No
649134	838479	35 PEACH TREE CT	35 PEACH TREE CT	Yes
37382	006777	BASF CORP CHEMICALS DIVISION	150 WAGARAW RD	No
37338	007586	CALGON CORP	200 WAGARAW RD	No
45047	011840	CHET DECKER AUTO SALES	300 LINCOLN AVE	No
56475	031200	FRANK A MCBRIDE CO	233 CENTRAL AVE	No
44852	011316	GEORGE ABBOOD & CO INC	581 LAFAYETTE AVE	No
2593	025926	HAWTHORNE LAUNDRY INC	1024 GOFFLE RD	No
22515	722392	HAWTHORNE PAINT CO INC	66 5TH AVE	No
14755	G000042038	HAWTHORNE PRINTS INC	121 129 WAGARAW RD	No
382604	477335	KERN VOLKSWAGON REPAIRS	351 WAGARAW RD	No
33012	768917	MARKET BASKET OIL SPILL	44 UTTER AVE	No
620976	787928	MARY STREET WATER TANK	420 GOFFLE RD	No
2574	001356	PAN TECHNOLOGY INC	1 WASHINGTON AVE	No
45210	012243	PYROLAC CORP (FORMER)	55 N SCHOON ST	No
21061	G000002117	SEABOARD INDUSTRIES	185 VAN WINKLE AVE	No
22050	667238	SELO METAL PRODUCTS INC	69 5TH AVE	No
2602	009260	SHELL SERVICE STATION 138375	902 GOFFLE RD	No
2573	007242	VISHDEV INC	415 WAGARAW RD	No
56526	031279	WORLD CLASS CENTER	1080 GOFFLE RD	No
23	**Site Count**			

Table 22. Known/Suspected Contaminated Sites in Hawthorne. Data compiled from information supplied by NJDEP Known/Suspected Contaminated Sites List – Active Sites (NJDEP Data Miner February 2022)

Site ID	Current Site Name	Line1 Address	Comu	Zip Code	Contamination
83812	131 GARFIELD AVENUE	131 GARFIELD AVE	1604	07506	Suspected
596245	143 ETHEL AVENUE	143 ETHEL AVE	1604	07506	LSRP Oversight
194705	166 PARMALEE AVENUE	166 PARMALEE AVE	1604	075062925	Suspected
229278	230 REA AVENUE	230 REA AVE	1604	07506	Known
649134	35 PEACH TREE COURT	35 PEACH TREE CT	1604	07506	Known
69123	96 NORTH 8TH STREET	96 N 8TH ST	1604	07506	Suspected
20682	ALEX SILK CO INC	53 BRAEN AVE	1604	07506	RAO-Entire Site (Unrestricted Use)
24201	ANDERSON PRESS INC	73 WAGARAW RD	1604	07506	RAO-Entire Site (Unrestricted Use)
37382	BASF CORP CHEMICAL DIV	150 WAGARAW RD	1604	07506	Known
228664	BROADHURST SHEET METAL WORKS	216 WARBURTON AVE	1604	07506	RAO-Entire Site (Unrestricted Use)
667311	B&S SHEET METAL CO INC	60 5TH AVE	1604	07506	LSRP Oversight
45047	CHET DECKER AUTO SALES	300 LINCOLN AVE	1604	07507	LSRP Oversight
68993	CHRISTIAN HEALTH CARE CENTER	664 GOFFLE HILL RD	1604	07506	Suspected
14755	COLLINS & CO	121 129 WAGARAW RD	1604	07506	LSRP Oversight
70332	CORNELL AVENUE & REA AVENUE	CORNELL AVE & REA AVE	1604	07506	Suspected
33012	D&L GRAPHICS INC	44 UTTER AVE	1604	07506	LSRP Oversight
597798	FLORENCE REALTY CO INC	194 5TH AVE	1604	07506	RAO-A (Unrestricted Use)
56475	FRANK A MCBRIDE CONSTRUCTION CO	233 CENTRAL AVE	1604	07507	LSRP Oversight
44852	GEORGE ABBOOD & CO	581 LAFAYETTE AVE	1604	07506	LSRP Oversight
2606	GETTY SERVICE STATION #56853	225 DIAMOND BRIDGE AVE	1604	07506	RAO-A (Limited Restricted Use)
2595	GETTY SERVICE STATION #56916	97 LAFAYETTE AVE	1604	07506	Suspected
2579	GETTY SERVICE STATION #74206	2 WAGARAW RD	1604	07506	RAO-A (Unrestricted Use)
481013	GLEN VISTA ASSOC	210 WARBURTON AVE	1604	07646	RAO-Entire Site (Unrestricted Use)

Site ID	Current Site Name	Line1 Address	Comu	Zip Code	Contamination
46979	GOFFLE BROOK SALES & SERVICE INC	248 270 GOFFLE RD	1604	07506	LSRP Oversight
385151	GRAAFSMA PROPERTY	172 5TH AVE	1604	07506	RAO-A (Unrestricted Use)
66403	HAWTHORNE BORO WAGARAW WELLFIELD CONTAM	WAGARAW RD	1604	07507	Known
2593	HAWTHORNE LAUNDRY INC	1024 GOFFLE RD	1604	07506	Known
22515	HAWTHORNE PAINT CO INC	66 5TH AVE	1604	07506	LSRP Oversight
21071	HAWTHORNE RUBBER MFG CORP	35 4TH AVE	1604	07507	RAO-A (Unrestricted Use)
122327	HEEREMA CO	200 6TH AVE	1604	07506	RAO-A (Unrestricted Use)
29504	INTEK ELITE PLASTICS	150 5TH AVE	1604	07507	RAO-Entire Site (Unrestricted Use)
382604	KERN VOLKSWAGON REPAIRS	351 WAGARAW RD	1604	07506	Known
568095	LEARNING TREE PRESCHOOL	259 LAFAYETTE AVE	1604	07506	CCF Approved
355055	LEARNING TREE PRESCHOOL PROPOSED	1083 GOFFLE RD	1604	07506	No SRP Oversight Required
2592	LUKOIL SERVICE STATION #57224	362 370 LINCOLN AVE	1604	07506	RAO-A (Limited Restricted Use)
32172	MADISON SPROCKET & GEAR INC	275 GOFFLE RD	1604	07506	RAO-Entire Site (Limited Restricted Use)
361565	MAGIC CAROUSEL PRESCHOOL	546 LAFAYETTE AVE	1604	07506	CCF Approved
620976	MARY STREET WATER TANK	420 GOFFLE RD	1604	07506	LSRP Oversight
55062	MAYFAIR GLASS	1124 GOFFLE RD	1604	07507	Known
37338	MERCK & CO INC	200 WAGARAW RD	1604	07507	LSRP Oversight
53793	MIDAS MUFFLER & BRAKE SHOP	1093 GOFFLE RD	1604	07641	No SRP Oversight Required
468771	MOLJAC MFG	187 7TH AVE	1604	07506	RAO-Entire Site (Unrestricted Use)
16314	MORLOT COLOR & CHEMICAL CO INC	111 ETHEL AVE	1604	07506	RAO-Entire Site (Restricted Use)
31722	NEW WARPING & WINDING CO	55 WESTERVELT AVE	1604	07506	RAO-Entire Site (Restricted Use)
2583	NEXUS PLASTICS INC	1 LORETTO AVE	1604	075061304	RAO-Entire Site (Unrestricted Use)
24230	NISSAN OF HAWTHORNE	805 LAFAYETTE AVE	1604	075060000	RAO-A (Unrestricted Use)

Site ID	Current Site Name	Line1 Address	Comu	Zip Code	Contamination
84064	NJ TRANSIT AUTH MAIN LINE	WAGARAW RD	1604	07506	Suspected
2574	PAN TECHNOLOGY CORP INC	1 WASHINGTON AVE	1604	07507	LSRP Oversight
389099	PASSAIC BERGEN PASSENGER SERVICE RESTORATION	VARIOUS LOCATIONS	1604	07507	Known
361586	POSITIVE PLACE PRESCHOOL	150 MAITLAND AVE	1604	07506	RAO-Entire Site (Unrestricted Use)
45210	PYROLAC CORP FORMER	55 N SCHOON ST	1604	07506	LSRP Oversight
21061	SEABOARD IND	185 VAN WINKLE AVE	1604	07507	LSRP Oversight
2601	SECHIL	716 GOFFLE RD	1604	07506	RAO-A (Unrestricted Use)
22050	SELO METAL PRODUCTS INC	69 5TH AVE	1604	07506	LSRP Oversight
25362	SERVO TEK PRODUCTS INC	1086 1096 GOFFLE RD	1604	07506	RAO-Entire Site (Unrestricted Use)
2594	SHELL SERVICE STATION	92 LAFAYETTE AVE	1604	07730	RAO-A (Limited Restricted Use)
2602	SHELL SERVICE STATION #138375	902 GOFFLE RD	1604	07506	LSRP Oversight
21014	SHOTMEYER BROS PETROLEUM CORP	10 WAGARAW RD	1604	07506	LSRP Oversight
56275	SINGER CARRIERS CO INC	17 PASSAIC AVE	1604	07506	Verified Unknown Source
68249	STARS REHABILITATION SPECIALISTS	463 LAFAYETTE AVE	1604	07507	RAO-Entire Site (Unrestricted Use)
2573	STAR SUNOCO SERVICE STATION	415 WAGARAW RD	1604	07506	LSRP Oversight
14762	TJM PROPERTY	179 185 GOFFLE RD	1604	07506	RAO-A (Limited Restricted Use)
76296	TRILECTRON INDUSTRIES INC	300 9TH AVE	1604	07507	RAO-Entire Site (Restricted Use)
52837	ULMA FORM WORKS	58 5TH AVE	1604	07507	RAO-A (Unrestricted Use)
56526	WORLD CLASS SHOOTERS	1080 GOFFLE RD	1604	07506	LSRP Oversight
19711	ZIMMER MFG CORP	200 CENTRAL AVE	1604	075060212	RAO-Entire Site (Unrestricted Use)
Count:	**66**				

Notes:
LSRP – Licensed Site Remediation Professional
CCF – Child Care Facility
RAO – Remedial Action Outcome (aka No Further Action)
RAO – A – Remedial Action Outcome Area of Concern
RAO – Entire Site Restricted (institutional and/or engineering controls implemented)
RAO – Entire Site Unrestricted (no institutional and/or engineering controls implemented)

Table 23. Underground Storage Tanks in Hawthorne. UST's Active Remediation Cases as designated by the NJDEP Bureau of Underground Storage Tanks, February 2021

PI Number	Activity Number	PI Name	Street Address
001356	LSR120001	PAN TECHNOLOGY INC	1 WASHINGTON AVE
007242	LSR100001	VISHDEV INC	415 WAGARAW RD
007242	LSR200001	VISHDEV INC	415 WAGARAW RD
009260	LSR100001	SHELL SERVICE STATION 138375	902 GOFFLE RD & WATCHUNG DR
009901	LSR120001	10 WAGARAW RD HAWTHORNE LP	12-76 WAGARAW RD
011316	LSR140001	GEORGE ABBOOD & CO INC	581 LAFAYETTE AVE
011840	LSR120001	CHET DECKER AUTO SALES	300 LINCOLN AVE
012243	LSR140001	PYROLAC CORP (FORMER)	55 SCHOON ST
012243	LSR150001	PYROLAC CORP (FORMER)	55 SCHOON ST
030407	LSR180001	248 GOFFLE RD LLC	248 270 GOFFLE RD
G000002117	LSR120001	SEABOARD INDUSTRIES	167 VAN WINKLE AVE

Table 24. Underground Storage Tanks in Hawthorne. Active Facilities with Compliant Tanks Report - Report Criteria by the NJDEP Bureau of Underground Storage Tanks, February 2021.

Facility ID	Municipality	Facility Name	Street Address	Expiration Date
009901	Hawthorne Boro	10 WAGARAW RD HAWTHORNE LP	12-76 WAGARAW RD	3/31/2023
015967	Hawthorne Boro	97 LAFAYETTE AVE LLC	97 LAFAYETTE AVE	3/31/2023
016614	Hawthorne Boro	GOFFLE BROOK PARK MAINTENANCE GARAGE	794 LAFAYETTE AVE	3/31/2022
003680	Hawthorne Boro	HAWTHORNEENTERPRISES	389 LAFAYETTE AVE	3/31/2023
009225	Hawthorne Boro	SECHIL LLC	716 GOFFLE RDE	3/31/2023
007242	Hawthorne Boro	VISHDEV INC	415 WAGARAW RD	3/31/2022

Table 25. NJPDES Active Permit List Hawthorne, NJDEP February 2022

Hawthorne Boro (Count = 12 Permits)												
NJPDES PERMIT NUMBER	PROGRAM INTEREST NUMBER	FACILITY INFORMATION						PERMIT INFORMATION				
		Name	Street Address	Municipality	County	NJSP Site X Coord.	NJSP Site Y Coord.	Regional Enforcement Office	NJDEP Case Manager	Permit Expiration Date	Discharge Category Description	Document Status
NJG0149616	201973	HAWTHORNE BORO	445 LAFAYETTE AVE Hawthorne, NJ 075062551	Hawthorne Boro	Passaic	587299	772376	Northern	Sherry Preisig	12/31/22	Tier A Municipal Stormwater General Permit (R9)	Approved
NJG0161811	270975	SHOTMEYER BROS	10 WAGARAW RD Hawthorne, NJ 07506	Hawthorne Boro	Passaic	585185	766975	Northern	David Vella	01/31/23	Basic Industrial Stormwater GP - NJ0088315 (5G2) (5G2)	Approved
NJG0168467	438114	PEERLESS COATINGS LLC	220A GOFFLE RD Hawthorne, NJ 07506	Hawthorne Boro	Passaic	584925	768008	Northern	David Vella	01/31/23	Basic Industrial Stormwater GP - NJ0088315 (5G2) (5G2)	Approved
NJG0169374	448942	COLLINS & CO LLC	121-129 WAGRAW RD Hawthorne, NJ 07524	Hawthorne Boro	Passaic	585844	767734	Northern	David Vella	01/31/23	Basic Industrial Stormwater GP - NJ0088315 (5G2) (5G2)	Approved
NJG0181935	533020	Drainage and Stormwater Improvements	Various Roads Hawthorne, NJ 07506	Hawthorne Boro	Passaic			Northern		02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0203190	574926	Hawthorne Marketplace	204 Wagaraw Road Hawthorne, NJ 07506	Hawthorne Boro	Passaic	587012	767448	Northern		02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0278424	774092	BRAIN SOTNICK DEVELOPMENT	53 BraenAvenue Hawthorne Boro, NJ 07506	Hawthorne Boro	Passaic	588283	779267	Northern		02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0292583	800398	CHRISTIAN HEALTH CARE CENTER - THE VISTA	Goffle Hill Road Hawthorne, NJ 07481	Hawthorne Boro	Passaic	583259	783105	Northern		02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0296716	810404	ROYAL QUARTERS APARTMENTS	15-27 Royal Ave. Hawthorne Boro, NJ 07506	Hawthorne Boro	Passaic	587966	770080	Northern		02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0317616	929083	204 WAGARAW ROAD LLC	204 Wagaraw road Hawthorne, NJ 07506	Hawthorne Boro	Passaic	586991.10576	767564.96611	Northern		02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0321303	938486	HAWTHORNE 2021 ROAD IMPROVEMENT PROGRAM	Tenth Ave Hawthorne, NJ 07506	Hawthorne Boro	Passaic	585839	779501	Northern		02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved
NJG0323314	944086	GOFFLE BROOK PARK REA AVE ATHLETIC FIELDS	Corner of Goffle Brook Road and Rea Ave Hawthorne, NJ 07506	Hawthorne Boro	Passaic	585722.065591	773933.94376	Northern		02/28/22	Construction Activity Stormwater (GP) (5G3)	Approved

The NJ Department of Environmental Protection, in accordance with directions from the US EPA, has begun a Well Head Protection Program (WHPP). The purpose of a Well Head Protection Program is to protect groundwater from contamination. The NJDEP considers over 100 public community wells and probably thousands of domestic wells to have been polluted. The WHPP is designed to map existing public community wells, identify possible pollution sources (PPS) within designated areas surrounding the wells, and prevent new pollutant sources from being placed within the designated area. The designated areas within a WHPP are based upon Time of Travel of a pollutant to a well. The Tier 1 designated area is based on a Time of Travel of 2 years, which is the time deemed necessary to prevent microbial pollution from migrating to the well head (PRC and PVGWPC 1998). It is thought that within two years bacteria and viruses would no longer be viable and contaminate the well. The Tier 2 designation is based upon a five-year Time of Travel for water from the edge of the tier to the well (PRC and PVGWPC 1998). The basis of the Tier 2 designation is that should a spill/discharge of hazardous material, such as, trichloroethylene occur, there would be sufficient time to identify the problem, decide on a remediation plan, and carry the plan out. The time of travel is not based upon the assumption that the toxic will no longer be a hazard to the groundwater by five years, but rather to provide sufficient time to mitigate the problem. Tier 3 would be based on 10-15 years time of travel, during which time it is thought that dilution and attenuation of pollutants would minimize the risk of well pollution (PRC and PVGWPC 1998). Public Community Water Supply Wells are being mapped and designated by the NJDEP, although Public Non-Community Wells and Domestic Wells are not. The Borough of Hawthorne is not designated in a Well Head Protection area (NJ Geological Survey www.state.nj.us/dep/njgs.)

Ground water contamination is difficult but not impossible to clean up. Remediation of ground water contamination is not as easy to clean up as surface water contamination, and is more costly and time consuming.

SOURCE WATER ASSESSMENT

As a requirement of the 1996 Amendments to the Safe Drinking Water Act, New Jersey Department of Environmental Protection (NJDEP) performed a source water assessment of each source of public drinking water and determined each source's susceptibility to contamination. Susceptibility is a measure of the potential exposure of a drinking water source to contamination.

The Source Water Assessment Program was designed to encourage protection of drinking water sources by providing information to state and local regulatory agencies and the public to assist in watershed assessment and planning and to enhance the public's role as "water stewards." The results provide information to allow state and local agencies to determine if increased regulatory controls, including local land use ordinances, are warranted. In addition, the basic data gathered through the Source Water Assessment Program, including the locations of the public water system wells and surface water sources, will be available for DEP program use in efforts to improve environment regulatory actions, such as cleanup decisions in the hazardous and solid waste programs.

New Jersey Department of Environmental Protection (NJDEP), in conjunction with the United States Geological Survey (USGS), performed the following steps to determine the drinking water sources' susceptibility.

- Identified the area that supplies water to a public drinking water system well or surface water intake (known as the source water assessment area). For ground water sources, this area is also known as the well head protection area. Approximately 10 percent of New Jersey is contained within a community water system well's source water assessment area. For surface water, approximately 53 percent of the state falls within a source water assessment area.

- Inventoried the significant potential sources of contamination within the source water assessment area.

- Determined how susceptible each drinking water source is to contamination.

Susceptibility to the following categories of contamination was determined:

- **Pathogens** – disease causing organisms such as bacteria and viruses. Common sources are animal and human fecal wastes

- **Nutrients** – Compounds minerals, and elements that aid growth, that are both naturally occurring and man-made. Examples include nitrogen and phosphorus

- **Volatile Organic Compounds** – Man-made chemicals used as solvents, degreasers, and gasoline components. Examples include herbicides such as atrazine, and insecticides such as chlordane

- **Pesticides** – Man-made chemicals used to control pests, weeds, and fungus. Common sources include land application and manufacturing centers of pesticides. Examples include herbicides such as atrazine, and insecticides such as chlordane

- **Inorganics** – Mineral-based compounds that are both naturally occurring and man-made. Examples include arsenic, asbestos, copper, lead, and nitrate.

- **Radionuclides** – Radioactive substances that are both naturally occurring and man-made. Examples include radium and uranium

- **Radon** – Colorless, odorless, cancer-causing gas that occurs naturally in the environment. For more information to http://www.nj.gov/dep/rpp/radon/index.htm or call (800) 648 - 0394

- **Disinfection Byproduct Precursors** – a common source is naturally occurring organic matter in surface water. Disinfection byproducts are formed when the disinfectants (usually chlorine) used to kill pathogens react with dissolved organic material (for example leaves) present in surface water.

To determine susceptibility to these contaminants, the USGS, with NJDEP assistance, developed statistical models based on extensive analysis of existing well sample data and surface water intake data. The statistical models determined the relationship between environmental factors and the probability for contamination to occur. These models identified factors, such as land use or geology, found to be significantly “linked” to a public water system source’s potential to become contaminated by one or more categories of contaminants. NJDEP and USGS looked at factors that might affect the quality of drinking water sources and separated them into two categories.

The first category consists of *sensitivity factors*, which includes items related to the construction of a well (such as whether the well is in a confined or unconfined aquifer) and naturally occurring factors (such as the geology of the unit in which a well is drawing water from or over which water flows to the surface water intake).

The second category of factors affecting a source’s potential to become contaminated consists of *intensity of use factors*. This category addresses the susceptibility to contamination resulting from human activities at the land surface. Intensity of use factors include those coming from a specific point source, such as a landfill or leaking underground storage tank, and nonpoint sources of contamination grouped by land-use characteristics, such as agriculture or urban land use.

The specific sensitivity and intensity of use factors for each drinking water source are provided in the Source Water Assessment Report.

Using the susceptibility factors, the statistical models provided numerical ratings for each source of drinking water for each contaminant category, which were then converted into high (H), medium (M), or low (L) susceptibility ratings.

The Safe Drinking Water Standards or Maximum Contaminant Levels (MCLs) were used to define the three susceptibility ratings (H, M, and L). These standards are developed based health effects, analytical and treatment factors on either acute or long-term impacts related to drinking water exposure. A low susceptibility rating means a potential contaminant level was predicted to be less than 10 percent of the MCL for that contaminant category. A medium rating was given to drinking water sources where the potential contaminant level was predicted to be equal to or greater than 10 percent and less than 50 percent of the MCL. A high rating was assigned to those sources that were predicted to have potential contaminant levels equal to or greater than 50 percent of the MCL. Sources with high susceptibility ratings are still likely to have contaminant concentrations below the MCL.

To review a summary of how the other public water systems in the State of New Jersey rated, please refer to **Table 26**, "Summary of Statewide Susceptibility Ratings for Community Water System Sources (Percent)

Table 26. Summary of Statewide Susceptibility Ratings for Community Water System Sources (Percent %) (Source Water Assessment Report Table 5, December 2004)

	Pathogens	Nutrients	Pesticides	VOCs	Inorganics	Radionuclides	Radon	DBPs
Groundwater[1]								
High	4	48	0	44	27	35	36	22
Medium	40	22	23	0	38	45	38	76
Low	56	31	77	56	35	20	26	2
Surface Water[2]								
High	100	47	13	5	81	0	0	98
Medium	0	42	34	81	19	0	0	2
Low	0	11	53	4	0	100	100	0

1 Community water systems wells in New Jersey in 2003 = 2237
2 Community water system surface water sources in New Jersey in 2003 = 64

The Source Water Assessment Summary report identifies the likelihood that a contaminant would pollute certain wells in Hawthorne. **Table 27** is Hawthorne's assessment of the groundwater aquifer.

Table 27. Summary of Susceptibility Ratings for Drinking Water Sources (Percent %) (Source Water Assessment Report Table 8, December 2004)

	Pathogens			Nutrients			Pesticides			VOCs			Inorganics			Radionuclides			Radon			DBPs		
Sources	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L
Wells = 21		17	4	15	6			15	6	21			21			17	4		21				21	
GUIDI = 0																								
Surface Water Intakes = 0																								

GUIDI = Ground water under the direct influence of surface water

The rating reflects the potential for contamination of source water, not the existence of contamination. Public water systems are required to monitor for regulated contaminants and to install treatment if any contaminants are detected at frequencies and concentrations above allowable levels. If a system is rated highly susceptible for a contaminant category, it does not mean a customer is or will be consuming contaminated drinking water.

SURFACE WATER IN HAWTHORNE

OVERVIEW

Protecting and restoring natural features and improving water quality of urban streams have many benefits both to the biotic life in the stream and to human communities that live near these streams. Urban waterways can potentially be used for recreational activities, such as fishing and canoeing, and provide opportunities for urban residents to enjoy and appreciate the outdoors. A healthy aquatic ecosystem can not only deter the spread of vector borne disease, but enhance the health of the community by reducing air pollutants.

The surface waters, which flow through Hawthorne, are Goffle Brook, Deep Brook, Diamond Brook, plus direct runoff to the Passaic River that flows along the southern boundary of Hawthorne. The Borough of Hawthorne is located in several sub-watersheds. A watershed, or water catchment area, is inclusive of all the area from which water drains to the stream. In Hawthorne, 200-300 acres contribute to Diamond Brook watershed. The largest area in Hawthorne drains into Goffle Brook, which then empties into the Passaic River (**Fig. 17**). The entire borough lies within the Passaic River Basin. Non-point source pollution is a problem in many streams and rivers today.

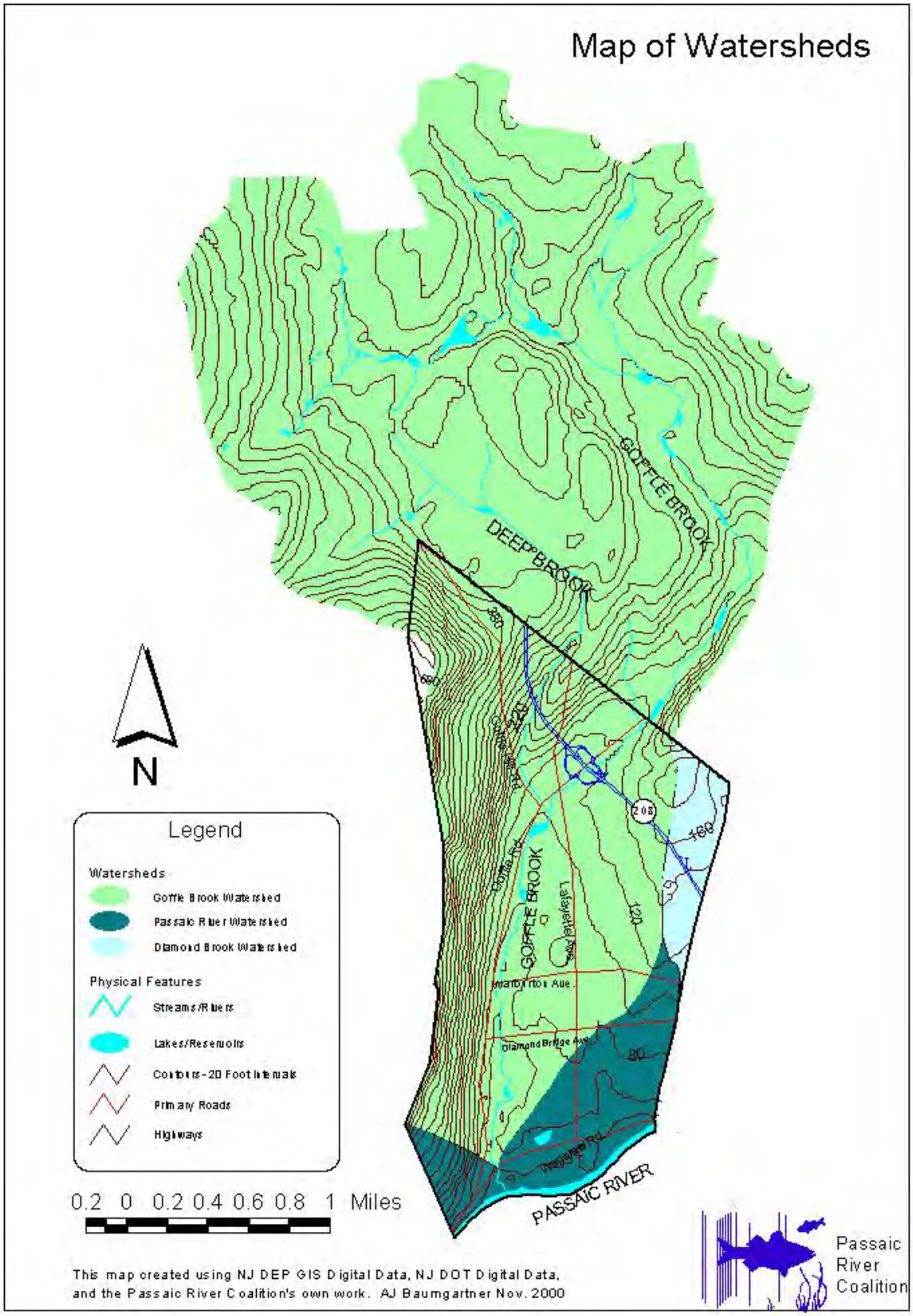


Fig. 17. Map of Watersheds in which Hawthorne is located and the Goffle Brook Watershed.

Non-point source pollution is pollution from diverse loadings, small individually but overwhelming when in great numbers. One example of non-point source pollution is commercial lawn care. It is a prevalent practice today and is a large source of insecticide, herbicide, and fertilizer runoff in developed areas (Reiser and O'Brien 1999).

GOFFLE BROOK

Physical Characteristics. Goffle Brook and its major tributary, Depe Voll (Deep Brook), are the major surface waters in Hawthorne (**Fig. 17**), and they are part of the greater Passaic River Watershed. The total area of the Goffle Brook watershed is approximately 23.81 km^2 (9.19mi^2), and includes the towns of Ridgewood, Wyckoff, Midland Park and Hawthorne. The headwaters of both Goffle Brook and Deep Brook are located in Wyckoff, Bergen County, NJ. The upper part of Goffle Brook traverses Wyckoff, passes through Midland Park and the southwest end of Ridgewood before it enters the northern end of Hawthorne near the east side of Goffle Road. In Hawthorne, Goffle Brook flows in a southerly direction roughly parallel to Goffle Road for approximately 2.65 miles (4.3 km) to its juncture with the Passaic River, at a location approximately 1.75 stream miles (2.81 km) downstream of the Paterson Falls. The total length of Goffle Brook is approximately 6.8 miles (10.9 km) from its beginning in Wyckoff to its confluence with the Passaic River. Thus, 60 percent of the total length of Goffle Brook lies outside Hawthorne's boundaries, and 40 percent is within the Borough.

Deep Brook, the major tributary (**Fig. 17**), joins Goffle Brook near the Goffle Hill Road Bridge. Over geologic time, Deep Brook has cut a deep ravine along part of its length from just north of Union Street to the Wyckoff border. Arising in Wyckoff, Deep Brook has a total length of approximately 2.4 miles (3.9 km). Its distance from the Wyckoff border to its intersection with Goffle Brook is 0.8 miles. Therefore, 33 percent of Deep Brook lies within Hawthorne, and 67 percent of its length is in the Borough of Wyckoff, Bergen County (**Table 28**).

Table 28. Linear morphometry of Goffle Brook and Deep Brook; approximate stream miles. Sebetich Unpublished Data

	Goffle Brook	Deep Brook
Total length in miles	6.8 (100%)	2.4 (100%)
Length in Bergen County, miles	4.1 (60%)	1.6 (67%)
Length in Hawthorne, miles	2.7 (40%)	0.8 (33%)

Most of the land use on either side of Goffle Brook north of Lafayette Avenue in Hawthorne is commercial and highly urban. Thus the stream is heavily influenced by nonpoint source urban runoff from Bergen County along most of its length and from the Borough of Hawthorne along a shorter stream segment, including the two-mile section that runs through Goffle Brook Park. Goffle Brook travels the entire length of Goffle Brook County Park making the stream a central focus of the park. Deep Brook still (in 2010) has riparian vegetation along much of its length, but major pipes along Goffle Hill Road deliver nonpoint source runoff water directly to the stream. Further, the runoff from a major housing development located in Wyckoff is directed into Deep Brook. Between

Union Street and Goffle Brook, Deep Brook is heavily influenced by urban land use, including Hawthorne's DPW site located on Goffle Road and Goffle Hill Road.

Both valleys of Goffle Brook and Deep Brook have been eroded and scoured by storm events. Increased development of housing projects and commercial structures in the watershed, both within and outside of the Borough of Hawthorne, have contributed to the substantial flooding of Goffle Brook. As new developments and runoff projects are completed, the increased runoff is transported directly into Deep Brook and Goffle Brook. Thus, erosion, sedimentation and flooding are serious problems in the two streams. To manage the watersheds more effectively and to reduce increases in runoff, erosion and sedimentation, the following should be considered:

> *On-site detention of storm water using site design measures such as natural drainages instead of storm pipes and culverts, detention wetlands, reforestation, rainwater cisterns, and buffer zones can delay the timing and reduce the volume and peaks of runoff and filter the water before it enters stream channels. Riparian restoration projects can help add stability to stream channels adjusting to greater flows. Buffer zones and greenways along waterways can prevent damages to structures from waterways that are adjusting and enlarging under the influence of urbanization. Native woodlands and vegetation can be returned to watershed slopes* (Riley 1998).

Water Quality Characteristics. Selected water quality variables measured at various times between 1980 and 2000 reflect the geological influence in the watershed (**Table 29 and 30**). The pH of both streams generally falls between 8 and 9, which is relatively high. The mean (N=9) total alkalinity of Goffle Brook was 114 mg $CaCO_3$/L, and the electrical conductivity of the same nine samples was 643 µS/cm. These high values indicate that the waters are most likely influenced by naturally high concentrations of calcium and magnesium from the geological formations in the watershed and most likely salt runoff from roadways.

Table 29. Deep Brook water chemistry. Site A was upstream of Deep Brook; Site B was downstream of Deep Brook. (Sebetich unpublished data).
TDS = Total Dissolved Solids, SRP = Soluble Reactive Phosphorus

Date	pH	Total Alkalinity (mg $CaCO_3$/L)	Conductivity (µS/cm)	TDS (mg/L)	Turbidity (NTU)	SRP (µg/L)
April 11, 1980 Site A	8.5	64				
April 10, 1981 Site A	8.0-8.5	100				
March 12, 1982 Site A	6.5	95	488		34	
March 12, 1982 Site B	8.0-8.5	107	528		39	
May 8, 1993 Site A	8.0-8.5	124	785	327		
May 8, 1993 Site B	8.0-8.5	113		341		
April 21, 1995 Site A	8		544	369		
April 26, 1997 Site A	8.5-9.0	132	624	450		
April 26, 1997 Site B	8.5-9.0	142	665	480		
Feb. 26, 2000 Site A	8.0-8.5	103	819	586		21.91
Feb. 26, 2000 Site B	8.0-8.5	109	1120	802		28.34
April 8, 2000 Site A	8.0-8.5	102	523	381		
Mean		**108.3**	**677.3**	**467.0**		
N		**11**	**9**	**8**		
S.D.		**20.6**	**203.2**	**160.1**		

Table 30. Deep Brook water chemistry.
(Sebetich unpublished data).

Date	pH	Total Alkalinity (mg $CaCO_3$/L)	Conductivity (µS/cm)	TDS (mg/L)
March 12, 1982	6.4	111	528	
May 8, 1993	8.0-8.5	131	795	335
April 21, 1995	8.5		540	366
April 26, 1997	8.0-8.5	154	656	475
Feb. 26, 2000	8.0-8.5	131	1,728	1,239
April 8, 2000	8.0-8.5	123	682	490
October 2, 2009	8.0-8.5		687	
Mean		**130**	**802.3**	**581**
N		**5**	**7**	**5**
S. D.		**15.7**	**454.9**	**373.9**

Phosphorus (P) is an important element that is commonly used as a water quality indicator in freshwater streams and lakes. The higher the P concentration, the lower the water quality. Deep Brook and Goffle Brook are not monitored on a regular basis for nutrients; however, some observations of phosphorus have been measured (Sebetich, unpublished data). In February 2000, Deep Brook had a phosphorus concentration of 6.55 µg/Liter. Goffle Brook had a P concentration of 21.91 µg/Liter just upstream of Deep Brook, and a concentration of 28.34 µg/Liter downstream of Deep Brook. A concentration of P above 20 µg/Liter tends to lead to eutrophic conditions in freshwaters. Based on these few data points, the P concentration in Goffle Brook is over three times that in Deep Brook, indicating that Goffle Brook has been more severely impacted by urban runoff and land use than Deep Brook. This evidence seems to indicate a lack of concern for water quality in Goffle Brook. In Bergen County, as well as in the northern end of Hawthorne, Goffle Brook is practically invisible to residents, as it has been relegated to a disposal system. The stream passes mostly unnoticed as it flows through industrial areas, parking lots, shopping centers, varied commercial properties, and along railroad tracks until it emerges as a highly visible stream in Goffle Brook Park in Hawthorne. By then the stream has accumulated the undesirable runoff products from the aforementioned land uses that have degraded the stream water quality. Ongoing and planned land development in Hawthorne will further contribute to stream degradation as the added runoff is directed into Goffle Brook.

The shallow pond impoundment of Goffle Brook, located near Goffle Hill Road, has been highly impacted by the nutrient and bacterial load from geese, ducks and seagulls for decades. These birds are encouraged to use the pond and surrounding land by the constant feeding by people. The resulting nutrient (nitrogen and phosphorus, primarily) loadings along with the fecal bacterial contamination contribute to the decreased water quality of the pond and stream. Thus the birds are major contributors to the surface water pollution, and may be a potential threat to human health and to the health of dogs that regularly drink from the stream. An adjacent municipality, the Borough of North Haledon has established an ordinance that prohibits the feeding of migratory waterfowl at their ponds. The New Jersey Department of Environmental Protection's Division of Fish and Wildlife have also initiated a special Winter Canada Goose Season from January 19 - February 15, 2010, because of problems due to their overabundance and also due to their negative impact on the migratory Atlantic Geese population (NJDEP 2010).

Only in Goffle Brook Park is the stream considered a recreational asset; however, the land use impact on Goffle Brook extends for miles upstream into Midland Park, Ridgewood and Wyckoff, where it tends to be out of sight and out of mind. Goffle Brook will continue to be the major surface water component of Hawthorne, and perhaps it is time to develop a Stream Watch Program to survey the entire watershed, coordinate with the relevant Bergen County communities, and work towards ecologically sound land use modifications that will help improve the water quality of the stream system in the coming decade.

One of the most popular activities in Goffle Brook Park takes place on the first Saturday in June, when the Hawthorne Chamber of Commerce sponsors a Fishing Derby for children at the Goffle Brook Pond. The event, first begun in 1988 to get children interested in fishing, has grown in popularity over the years with participation of over a hundred children each year. The Chamber of Commerce stocks the pond with sunfish,

bass, and trout and provides prizes for the heaviest and largest fish, and most fish caught to several age groups.

Biological Characteristics. Macroinvertebrates. Stream water quality can be inferred from on the number and kinds of macroinvertebrates and fish (Barbour et al. 1999). Macroinvertebrates include such organisms as aquatic insects, snails, worms, leeches and crustaceans. Because specific types of these organisms are sensitive to changes in water quality, and others are not, the presence and absence of these little invertebrates may be used as indicators of stream water quality (Lenat and Crawford 1994, Kennen 1999). An investigation (Sebetich 2009) was conducted using macroinvertebrates and fish to begin a baseline comparison of water quality between Goffle Brook in Hawthorne and Bear Swamp Brook Mahwah, NJ. The two stream systems compare the difference between a stream in a rural area and in urban area. The study found that urbanized areas are more likely to have lower quality streams than higher quality streams.

Biodiversity of macroinvertebrates was lower in both Deep Brook and a section of Goffle Brook (between Lafayette Avenue and Goffle Hill Road) than it was in Bear Swamp Brook (**Table 31**). However, the biodiversity increased in Goffle Brook downstream of the pond in Goffle Brook Park. The macroinvertebrates were identified only to their taxonomic order, but even this degree of investigation revealed the presence of two higher water quality indicators (Stonefly and Hellgramite) in Bear Swamp Brook, but not in Goffle Brook (**Table 31**). Continued long-term monitoring of macroinvertebrates in Goffle Brook and Deep Brook is encouraged. An educational stream watch program for the Hawthorne K-12 students could be established that would create a biological database that could be used to help maintain and improve stream water quality.

Table 31. List of organisms sampled in Deep Brook, Goffle Brook, Bear Swamp Brook (Sebetich 2009).

Common Name	Order	Deep Brook 10/2/09	Goffle Brook 10/2/09	Bear Swamp Brook 10/16/09
Mayfly	*Ephemeroptera*	-	-	+
Stonefly	*Pleoptera*	-	-	+
Caddisfly	*Fricoptera*	+	+	+
Beetle	*Coleoptera*	-	+	+
Bug	*Hemiptera*	-	+	+
Dragonfly/Damselfly	*Odonata*	-	-	+
Hellgramite	*Megaloptera/Neuroptera*	-	-	+
Blackfly	*Diptera*	+	+	-
Cranefly	*Diptera*	-	+	+
Midge	*Diptera*	-	+	-
Crayfish	*Decapoda*	-	-	+
Snail	*Stylommatophora*	+	+	-
Leech	*Arhynchobdellida*	-	+	-
Flatworm	*Platyhelminthes*	-	+	-
Earthworm	*Opisthopora*	+	+	+
Millipede	*Spirostreptida*	+	+	+
Centipede	*Scolopendromorpha*	+	+	-
Ant	*Hymenoptera*	-	-	-

Fish. Fish populations may also be indicators of stream water quality. (Chan et al. 2000) analyzed fish data collected from Goffle Brook in 1968 and 1993, and classified the stream as "poor" based on the fish species sampled. Baseline sampling of fish populations in Goffle Brook and Bear Swamp Brook has been conducted (Sebetich

2009), and will continue to be periodically by Sebetich. A list of fish species sampled is shown in **Table 32 and 33**. Most sampling in Goffle Brook ranged in differences with Bear Swamp Brook. Specifically, Brooktrout was found in Bear Swamp Brook, but not Goffle Brook. On the other hand, Catfish, Large-mouth bass, American Eel, Sucker, Bluegill, Black nose dace, Sculpin, & Shiner were all found in Goffle Brook, but not Bear Swamp. American eel is a catadromous fish that leaves freshwater to spawn in the Atlantic Ocean; the young eels can migrate up the Passaic River and into Goffle Brook.

Table 32. Fish Sampled in Goffle Brook, near the Goffle Hill Road (Data from Sebetich, unpublished)

Date	Common Name	Scientific Name
May 25, 1999	Blacknose dace	*Rhinichthys atratulus*
	Golden shiner	*Notemigonus crysoleucas*
	Pumpkinseed	*Lepomis gibbosus*
	Tessellated darter	*Etheostoma olmstedi*
	Bluegill	*Lepomis macrochirus*
April 8, 2000	Blugill	*Lepomis macrochirus*
	Pumpkinseed	*Lepomis gibbosus*
	White sucker	*Catostomus commersoni*
October 2, 2009	Catfish	*Siluriformes*
	Large-mouth Bass	*Micropterus salmoides*
	American Eel	*Anguilla rostrata*
	Sucker	*Catostomus*
	Bluegill	*Lepomis macrochirus*
	Black nose dace	*Rhinichthys atratulus*
	Sculpin	*Scropaeniformes*
	Shiner	*Notemigonus*

Table 33. Fish sampled Deep Brook, Goffle Brook, and Bear Swamp Brook, October 2 & 16, 2009. + indicates sampled, - indicates not sampled. Data from Sebetich 2009.

Common Name	Order	Goffle Brook & Deep Brook 10/02/09	Bear Swamp Brook 10/16/09
Catfish	*Siluriformes*	+	-
Large-mouth Bass	*Perciformes*	+	-
American Eel	*Anguilliformes*	+	-
Sucker	*Perciformes*	+ (3)	-
Bluegill	*Perciformes*	+(7)	+ (several)
Black nose dace	*Cypriniformes*	+	+(many)
Sculpin	*Scorpaeniformes*	+	-
Shiner	*Cypriniformes*	+	+(many)
Unknown	*N/A*	+	-
Brooktrout	*Salmoniformes*	-	+(4)

The fish species sampled in Goffle Brook included only tolerant species; therefore, based on fish, the stream did not have high water quality (Sebetich 2009). The fish data that has been obtained up to now provides a good baseline, but more intensive, long-term sampling of fish populations at various locations in Goffle Brook is recommended to help the municipalities of both Bergen and Passaic Counties focus on maintaining water quality in their streams.

While surveys of invertebrate and vertebrate aquatic life are sensitive indicators of water quality, they cannot easily be used to indicate the causes of water pollution. Ecosystem degradation as defined on the basis of such measurements is the first step in establishing the pattern of pollution. That first step, though, needs to be followed by a thorough investigation of possible chemical and biological pollutants in the stream.

PASSAIC RIVER

The Borough of Hawthorne lies within the Passaic River Basin. It is part of the Lower Passaic River Basin, which is also known as Watershed Management Area 4 (WMA4). The Passaic River flows past Hawthorne for about three-quarters of a mile, and forms the boundary between Hawthorne and Paterson. Since water in the Passaic River as it passes Hawthorne is draining an area of almost 800 square miles, both the quantity of water flowing in the river and its quality have been impacted by many influences, which include human uses of the land and water in the watershed above Hawthorne (USGS 1996).

The upper Passaic River begins in a marshy area of Mendham (elevation 600 feet above sea level) as a network of small streams (Brydon 1974). It then travels in a slight southeasterly direction, establishing the boundary between Somerset and Morris counties. As the Passaic River flows through Bernards Township, it picks up waters from two tributaries, the Great Brook and Black Brook, after they drain the Great Swamp. The Passaic River then travels north. During this change of direction the river also changes from a fast moving stream to a slow moving river. The drop in elevation for the next forty-five miles is only approximately one foot per mile, which decreases its velocity. As the Passaic River flows in a northerly direction, it forms another county boundary between Morris and Union Counties, and then between Morris and Essex Counties. A major tributary to the Passaic River is the Rockaway River, which joins the Passaic at Pine Brook as the Passaic travels along the curve of Hook Mountain. At Two Bridges (elevation 159 feet), the Pompton River, another major tributary, joins the Passaic River. It travels in an easterly direction for about four miles, again dropping only one foot in elevation. At Little Falls there is a steep drop of sixteen feet, and in a very short distance the river loses a total of 40 feet in elevation. From Little Falls it is a five and one-half mile northeastern trip to the Great Falls at Paterson. The Great Falls as they cut through the First Watchung Ridge are the second largest falls east of the Mississippi dropping seventy feet. It is after this dramatic drop in Paterson that the river, continues east to Hawthorne and then travels south to Newark Bay (approximately 25 miles south of Hawthorne), again serving as a boundary marker (between both Passaic and Bergen counties and Essex and Hudson counties). Hawthorne is 10 miles upstream from the Dundee Dam, where the Passaic River is dammed and Dundee Lake was created. Below Dundee Dam is the upper limit of tidewater for the Passaic River. At Garfield (3 miles below Dundee Dam), the Saddle River joins the Passaic. This last stretch of the Passaic flows through heavily industrialized areas (Newark, East Newark, and Harrison) curving northeast and then southeast, before joining the Hackensack River and entering into Newark Bay (Brydon 1974) (**Fig. 18**).

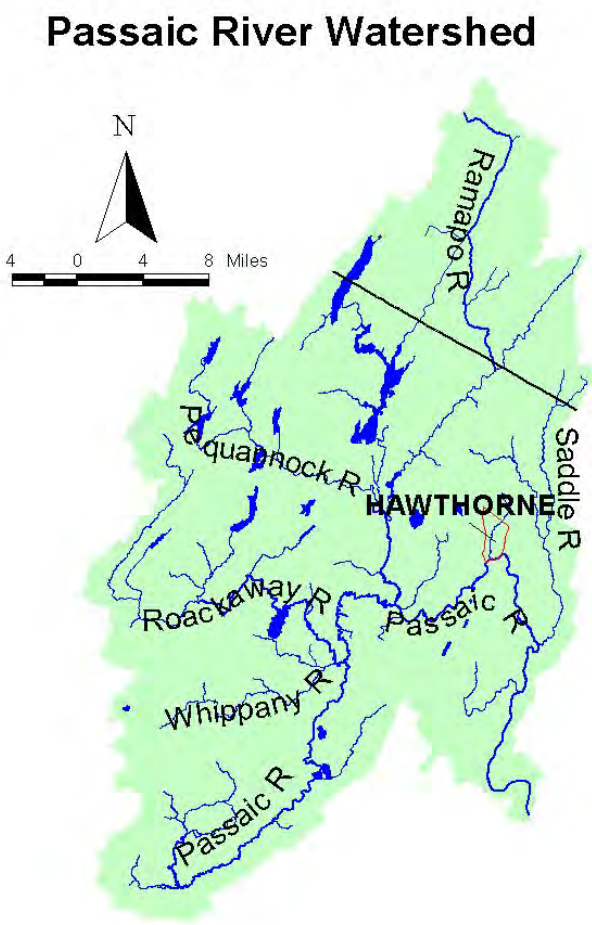


Fig. 18. Map of the Passaic River Watershed. Map displays tributaries and location of Hawthorne (red). Passaic River Coalition.

A watershed is all the land from which water drains into a river or lake. The watershed of the Passaic River is 935 mi^2 in totality. The watershed of the Passaic River at Hawthorne is over 800 mi^2. A majority of the river's watershed is in the Highlands area of New Jersey. In this area the Passaic River is classified as a trout production river, identifying its high quality. At several spots in the upper Passaic, the river and tributaries are dammed and the water is used for drinking purposes. The Passaic River in the Central Passaic River Basin travels through the region known as the Great Meadows, a remnant of Glacial Lake Passaic; much of the area is wetlands. In the Lower Basin, the Passaic River travels through a highly urbanized area. The type of land and land use through which a river travels has a significant impact on the river. It is over this land that the additional water will flow, pick up pollutants or nutrients, and join the river.

Water Quality Characteristics. The New Jersey Department of Environmental Protection (NJDEP) listed the Passaic River at Little Falls (upstream of Hawthorne) and at Elmwood Park (downstream of Hawthorne) as in exceedance of water quality criteria for fecal coliform, total phosphorus, and ammonia (NJDEP 1998). These pollutants impair the use of the Passaic River for primary contact, that is swimming, and for aquatic life support. In addition, aquatic life in the Passaic River at Hawthorne may be impaired because of excessive levels of arsenic, cadmium, chromium, cyanide, copper, lead, mercury, nickel, silver, thallium or zinc (NJDEP 1998).

Chemical data from the U.S.G.S. on the Passaic River at Elmwood Park (**Table 34**) indicates that at this stretch the river is slightly basic (mean pH = 7.8) with a mean total alkalinity of 69 mg $CaCO_3$/L. Average specific conductance was 368 µmhos and phosphorus averaged 338 µg/L for data available. As the Passaic River at Elmwood Park is downstream of Hawthorne (5.3 miles), the readings are conceivably higher than readings on the Passaic River in Hawthorne because of the input from other sites along the course of the river prior to the sampling site in Elmwood Park.

Table 34. USGS Water Quality Data for the Passaic River.
Sampled at Elmwood Park Station #01389880.

Year	pH	Total Alkalinity mg $CaCO_3$/L	Specific Conductance µmhos	Phosphorus (P) µg/L
1976	7.1 (N=17) Range 6.4-7.4	48 (N=15)	293 (N=15)	340 (N=15)
1981	7.6 (N=11) Range 7.0-8.3	Not available	416 (N=11)	560 (N=11)
1992	8.2 (N=5) Range 7.6-8.1	77 (N=5)	501 (N=5)	310 (N=5)
1993	8.1 (N=5) Range 7.3-8.7	73 (N=5)	497 (N=5)	180 (N=5)
1994	7.9 (N=5) Range 7.5-8.1	78 (N=5)	436 (N=5)	300 (N=5)
Mean	**7.8**	**69**	**368**	**338**

The water quality of the Passaic River is degraded. The river has been used for waste disposal since the beginning of this century. The upper Passaic River is fairly clean as it flows through the Great Swamp and the Millington Gorge, and deteriorates after that due to the large amount of human activity, including industry, along the river. There is hope for the river because in recent years a lot has been done to clean up wastewater going into the river and along the riverfront. Old industrial sites have been cleaned up and redeveloped stopping the toxins from entering the river system. The lower amounts of permissible discharges have also had a very positive effect on the river. Only time and money and effort will help make the Passaic River overcome years of neglect.

Biological Characteristics. Most likely anadromous fish, which travel upstream to spawn, such as shad and striped bass, were part of the aquatic biota of the Passaic River at one time. The Passaic River was actively fished prior to European settlement, as evidenced by weirs built by Native Americans, which were probably based on

migratory fish runs. The importance of migratory runs continued with the Colonial settlers, as evidenced by the fact that shad runs up the river were reported daily (Brydon 1974). As many as 500 shad might be caught in a trap at one time in early times after settlement (Brydon 1974). During that time period, sturgeon also migrated upstream to the foot of the Great Falls. In 1817 one of the largest sturgeon ever reported was caught in the Passaic River, weighing 130 lbs., and headlined in the newspaper as "The Monster Taken" (Brydon 1974).

Due to human impact, many species of fish in the Passaic River became rare, while other more pollution tolerant species proliferated. Fish species sampled in the Passaic River at Little Falls and Paterson in 1980 indicated poor water quality (**Table 35 and 36**). Water quality in the Passaic River has improved since 1980. There has been a resurgence of some species of fish indicative of good water quality, such as small mouth bass, northern pike and channel catfish. Northern pike and channel catfish stocked in the Upper River have been found down river as far as Dundee Dam, indicating improved water quality in the more urban reaches of the Passaic River (Papson 2001 pers. comm.). Below Dundee Dam, shad, stripers and river herring have been caught (Papson 2001 pers. comm.). The upsurge in fish populations, especially fish intolerant of highly polluted water, is an important statement regarding the benefits and possibilities of environmental concern. As in Goffle Brook, a Biotic Index based on macroinvertebrates was prepared for the Passaic River. Macroinvertebrate assessments for the Passaic River at Hawthorne indicate that the river is moderately impaired for aquatic life (NJDEP 1998).

Table 35. Fish Sampling of Passaic River, 600 yards downstream of the Lackawanna Bridge, Paterson, September 10, 1980. Data supplied by Bob Papson, Bureau of Freshwater Fisheries, Lebanon, NJ

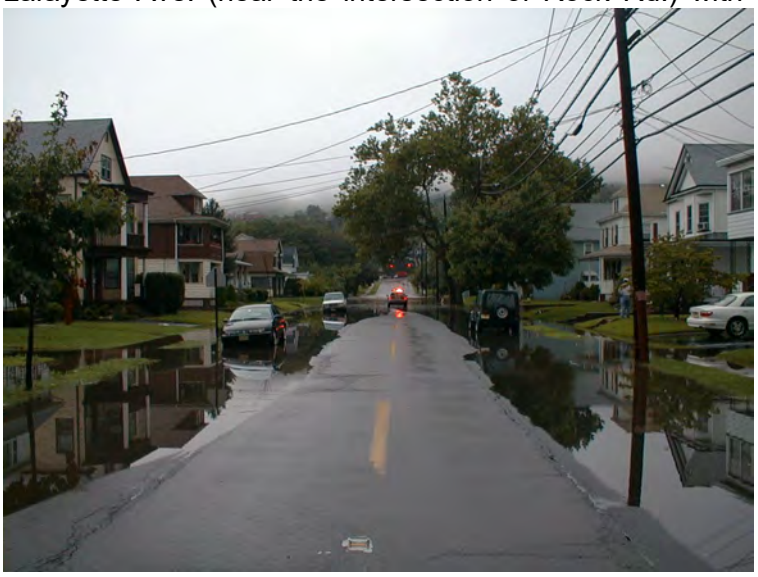
Taxon	Number	Percent by Number	Weight (pounds)	Percent by Weight
Carp	9	11.10	22.30	64.80
Carp (young of the year)	9	11.10	0.20	0.60
Carp (TOTAL)	*18*	*22.20*	*22.50*	*65.40*
White sucker	13	16.00	8.80	25.60
Goldfish	15	18.50	0.40	1.20
Banded Killifish	1	1.20	--	--
Spottail Shiner	17	21.0	0.20	0.60
Satinfin Shiner	5	6.20	0.10	0.30
American eel	12	14.80	2.40	7.00
TOTAL	**81**	**99.9%**	**34.40**	**100%**

Table 36. Fish Sampling of Passaic River, between Elmwood Park Marina and Route 80 Bridge, Elmwood Park, September 24, 1980. Data supplied by Bob Papson, Bureau of Freshwater Fisheries, Lebanon, NJ.

Taxon	Number	Percent by Number	Weight (pounds)	Percent by Weight
Carp	110	61.80	250.50	94.90
Carp (young of the year)	20	11.20	0.70	0.30
Carp (TOTAL)	*130*	*73.00*	*251.20*	*95.20*
Largemouth bass	3	1.70	2.90	1.10
White sucker	20	11.20	9.20	3.50
Golden shiner (Adults)	1	0.60	0.10	<0.10
Golden shiner (young of the year)	12	6.70	--	--
Golden shiner (TOTAL)	*13*	*7.30*	*0.10*	*<0.10*
American eel	1	0.60	0.50	0.20
Banded Killifish	1	0.60	--	--
Pumpkinseed (young of the year)	10	6.00	0.20	0.60
TOTAL	**178**	**100%**	**264.00**	**100%**

FLOODING

Flooding is a chronic problem in the Borough of Hawthorne, especially in areas such as on Wagaraw Road, where Goffle Brook enters the Passaic River. There has also been considerable flooding north of Lafayette Ave. (near the intersection of Rock Rd.) with ensuing damage to commercial and residential property. North of Route 208, where Goffle Brook is narrow and channelized, flooding problems are present.



View of flooding on Rea Avenue during Tropical Storm Floyd, 1999.

Part of the problem is that many of the natural flood prevention areas, both within Hawthorne and also further upstream in the watershed, have been developed and their flood mitigation abilities destroyed. These natural flood mitigation areas would be wetlands, riparian corridors, the flood plain area, and wetland areas upstream within the watershed. Discussion of wetlands, floodplains, and riparian corridors have overlapping concepts as much of their characteristics and benefits are similar.

RIPARIAN CORRIDORS

Riparian corridors are a combination of floodplains and wetlands occurring adjacent and following a stream or river (Mitsch and Gosselink 1993) and are occasionally flooded by these rivers and streams. These corridors have a high water table due to their proximity to the river or stream. There are variations in the amount of water these riparian corridors exhibit based on the intensity of the flood, duration of the storm event, and the number of previous flood events, but there is a fairly predictable probability of flooding in these areas from year to year. A riparian corridor is the intersection between upland and aquatic ecosystems and are highly dynamic in transferring energy and material in between the two ecosystems (Mitsch and Gosselink, 1993).

Wildlife habitats are an important benefit of riparian corridors. The corridor provides access to rivers and streams for drinking, and this may be especially important in winter when other water sources are frozen and unattainable. The corridor functions as an ecotone or transition zone between the river and the wetland, the river and upland, the wetland and the upland and the river channel and backwater habitats, providing habitats for many species.

Riparian corridors of native vegetation provide protection of streams from runoff. When land is cleared to the banks of the river, the water becomes silty due to erosion, leading to decreased flows, increased temperatures, and harm to the aquatic life. For example, with an increase of silt, trout populations decline because the habitat of the eggs and fry of Salmonidae are in the gravel, and an increase in silt clogs the air spaces within the gravel. The eggs and fry die by suffocation, as do many of the invertebrates upon which the older fish feed (Hynes 1970).

The protection of the stream from runoff also helps decrease pollution to the stream, because pollutants from the soil and rain are trapped and filtered on the forest floor. The settling out process that soil and vegetation provides helps to decrease the sediment load, the nutrient load and pesticides to the river. This flow of pollutants and nutrients from diffuse sources into a river or lake is called nonpoint source pollution. Much of the ecological water problems today are not a result of point source pollution, such as, an industrial establishment dumping chemicals into the water, but rather the diffuse and overloading pollution from runoff. Fertilizer entering a water body can cause an increase in algal production that minimizes the health, beauty and lifespan of the river or lake. On the other hand, nutrients that travel through a forested or vegetated riparian corridor are taken up by the plants, and stored in the vegetation. Nitrogen will then be converted to nitrogen gas by bacteria and returned to the atmosphere. Microorganisms on the forest floor also help to breakdown pollutants to less harmful materials. Pollutants, such as oil and grease from streets and parking lots, attach to erosional sediments and are ingested by aquatic organisms, thus becoming harmful to the entire food chain. By the reduction of pollutants entering streams, life within them can flourish. Overhanging tree branches provide shade while their falling leaves provide an important link in the river food chain. The higher the temperature of water, the less dissolved oxygen it can hold, so the shade and lower temperatures provide more oxygenated water, which is crucial to many species of fish.

The benefits of trees and vegetation adjacent to the stream also apply to water quantity concerns. During a heavy precipitation event, rainwater can be soaked up by the soil

and the trees, thereby decreasing the heavy flow to downstream areas. During drought or low water conditions, water can seep out from the soil to the river providing flow.

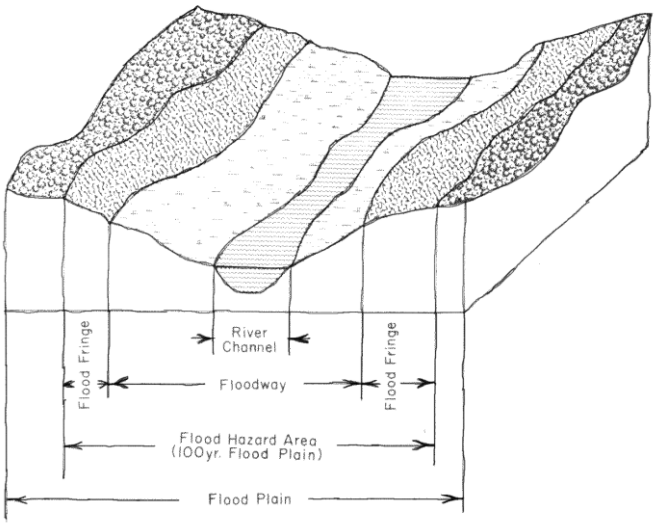
The provision of riparian corridors is of prime importance and should be considered in any development or redevelopment plan. Protecting and restoring riparian corridors provides a cooling system, habitat and food source for life in streams. The economic benefits of riparian corridors are many. The cost of river cleanups is decreased, and provision of clean drinking water to many people is increased when ecological planning is enforced. Three billion dollars worth of flood damage occur in this country every year (NJDEP 2001). The ability of riparian corridors to help decrease flooding, and maintain a more even flow of water is an economic factor that should be considered.

FLOODPLAINS

Floodplains, or the area adjoining the channel of a natural stream that has been or may be covered by floodwater, encompasses the riparian corridor but also all that land that might be inundated by flood (**Fig. 19**). Delineation of the floodplain is based on the area covered by water during a 100-year flood. A 100-year flood is based on the occurrence of a flood event that would be expected to occur once in 100 years. Land use in the floodplain is regulated by the NJDEP, under the Flood Hazard Area Control Act, The purpose of the Flood Hazard Area Control Act is building in the floodplain puts life and property at that site, and also further downstream, at risk. Floodplains provide nutrient sinks, water storage to help alleviate downstream flooding, areas for aquifer recharge/discharge and wildlife habitat (Brinsen et al. 1983). Hawthorne's floodplains can be seen in **Fig. 20** and would be considered temporarily or intermittently flooded wetlands, meaning the area is flooded for brief periods but otherwise water table may be below surface.

View of the Goffle Brook floodplain following Tropical Storm Floyd, 1999. Floodplain provides storage area for floodwaters.

Fig 19. Diagram of Floodplain as delineated by the NJ Flood Hazard Area Control Act.



WETLANDS

Wetlands can be defined as areas with standing water present on either an intermittent or permanent basis (Mitsch and Gosselink 1993). Features of wetlands are the presence of water either at surface or within the root zone, unique soil conditions which support hydrophilic (water-loving) vegetation species and slow decomposition due to anoxic (lacking oxygen) conditions. A majority of northern New Jersey's wetlands were formed after the retreat of the Wisconsin glacier approximately 18,000 years ago (Tiner 1985). During the post-glacial period, wetlands formed in former glacial lake basins, such as The Great Swamp, as the ice retreated and the glacial lakes drained. Wetlands may recharge groundwater aquifers, prevent floods, protect shorelines, and act as purifiers, cleansing wastes, and contaminants from upstream (Mitsch and Gosselink 1993). Very little wetlands still exist in Hawthorne today (**Fig. 20**). The Haledon Wet Variant soil is considered a wetland soil (Tiner 1985), but much of that area is now developed. Wetlands still exist along the Goffle Brook in Goffle Brook Park, a small amount in 8-Acre Woods, and the largest wetland area in Hawthorne is along Goffle Brook west of the High School.

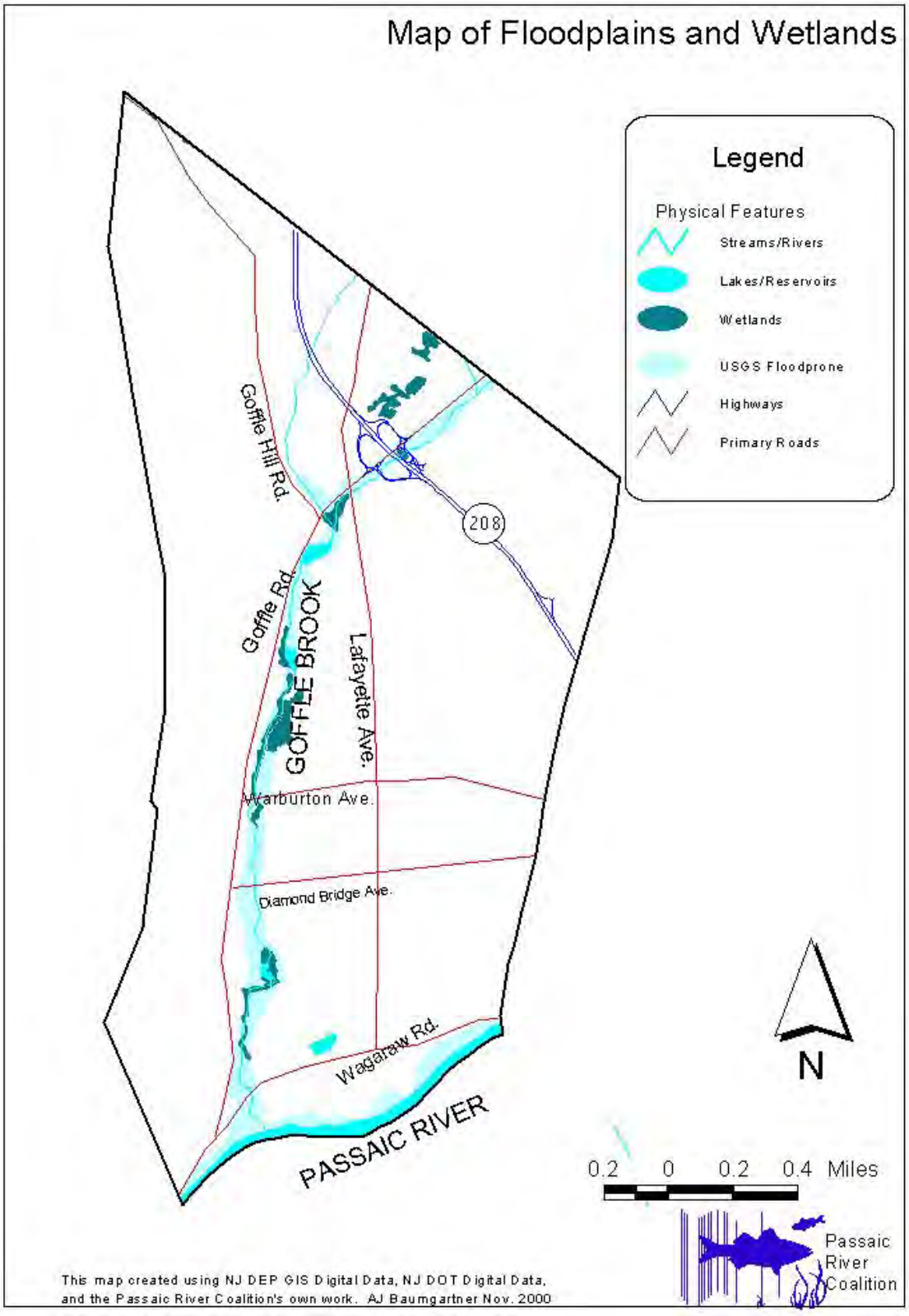


Fig. 20. Map of Floodplains and Wetlands in the Borough of Hawthorne.

FLOOD PREVENTION

While removal of vegetation may increase flood peaks (Darnell et al. 1976), naturally vegetated riparian corridors, wetlands, and the absence of buildings within floodplains provides water storage during a flood and can serve to moderate and reduce. The water will be slowly released via ground water and seep back to the stream during low water flow. Protection of the banks of the stream from erosion can be accomplished with soil bioengineering methods (Riley 1988). Wetlands and floodplains can influence water flow by intercepting stormwater runoff and providing stormwater storage, thereby decreasing sharp runoff peaks to slower discharges over longer periods of time (U.S. Army Corps of Engineers). Mitigation of floods is dependent on the size of a wetland area, the distance the wetland is located downstream, intensity of the flood event, the availability of an upstream wetland, or the lack of upstream storage areas (U.S. Army Corps of Engineers).

Although much of the area along Goffle Brook has already been developed, any redevelopment plans should be required to provide a stream setback to help provide wetland/riparian corridor/flood hazard areas, for flood protection, stream protection and provision of wildlife habitat.

VI. Natural Resource Use

LAND USE AND OPEN SPACE

MUNICIPAL LAND USE

The 2011 Borough of Hawthorne Master Plan Reexamination Report and Land Use Plan Update is part of a continuing comprehensive planning effort that has been undertaken by the Borough over the past several decades (Burgis, 2011). In 1968, the Borough adopted its first comprehensive master plan. Since that time, the Borough Planning Board adopted Periodic Reexamination Reports on August 3, 1982, August 16, 1988, July 19, 1994, and most recently, on December 19, 2000.

The Municipal Land Use is guided by a municipality's Master Plan. The General Plan for the Borough of Hawthorne was adopted in 1968 followed by adoption of the Master Plan in October 1978 with updates every six years. The 1994 Master Plan acknowledges that less than 10% of privately owned land remains vacant and available for development, so that the principal concern is to promote and encourage the continued upkeep and maintenance of existing uses in the best possible condition.

The predominant land use in the Borough of Hawthorne is one and two family residential dwellings located in residential neighborhoods. Historically, residential development in Hawthorne was single-family residences. During the 1990's most new residential development was condominium and townhouse subdivisions.

The business area of Hawthorne is primarily located within a central business district along Lafayette Avenue and Diamond Bridge Avenue and extending into residential districts. The area at the intersection of Lafayette Avenue and Goffle Road north to Wyckoff is a secondary business section.

Industrial uses have been a primary ingredient in the development of Hawthorne. The initial industrial development followed the NYS&W freight railroad right-of-way through the center of town. The other primary industrial area was located along the Passaic River providing access to unlimited water and disposal.

DEVELOPMENT AND REDEVELOPMENT

In the 2011 Reexamination Report, the Housing Element and Fair Share Plan was adopted by the Planning Board on July 20, 2004 (Burgis, 2011). The Housing Element and Fair Share Plan was adopted by the Planning Board on June 16, 2009. This plan element reexamined the Borough's ability to meet its COAH-determined rehabilitation share of 34 units, 1987-1999 cumulative prior- round obligation of 58 low and moderate income units, and its Third Round growth share obligation for the period of 2004-2018 of 230 units.

The Borough adopted a Housing Plan and Fair Share Element indicating there is less than an acre of developable vacant land remaining in the Borough. Hawthorne is a fully developed community with the only possible future development occurring in the form of redevelopment. This imposes a new set of planning issues for the Borough to address as part of its master planning efforts.

In the 1994 update of the Housing Element the Master plan 62 parcels are listed as vacant land in the Borough of which 33 are environmentally sensitive and 29 not suitable for inclusionary development (Burgis Assoc. 1994). Most of these remaining tracts of land contain sever environmental constraints such as steep slopes and wetlands which make them difficult to develop. There continue, however, to be proposals for new land developments on some of these properties. To provide guidance and protect public safety and health the Borough of Hawthorne has adopted several environmental ordinances to the zoning rules, this includes a steep slope ordinance.

In the 1994 update of the Housing Element, the cumulative total of these 62 parcels of vacant land is 25.99 acres; most of the properties are very small, less than one acre in size. This accounts for 10.25 acres. The remaining 15.75 acres consists of three properties that have environmental constraints. As a comparison in 1968 there were 339 acres of vacant land, or 14.6% of the total land area in the Hawthorne (Candeub 1968). The existing 25.99 acres comprise a little more than 1% of the total land area.

The greatest land use issue in 2000 was the future of 30 acres of former industrial land located along the Passaic River. In December 2004, a redevelopment study of the Wagaraw Road area had begun to provide reasonable development opportunities in this section of Hawthorne to balance the needs of the Borough, neighborhood and adjacent landowners (**Fig. 21**). The site's two properties have historically been a center of industrial activity and are currently undergoing remediation, ultimately becoming viable for redevelopment.

The 2004 Study covers approximately 216 acres in the borough, roughly 10% of the total Hawthorne land area. Of this area, twelve Brownfield sites which are defined as former industrial or commercial land that is contaminated. The study found six points of notability for the municipality after research:

- Some buildings are unsafe, unsanitary, substandard, dilapidated, or obsolescent for living or working conditions
- Abandonment of buildings where they come to a state of no longer being tenantable such as former Pyrolac Corporation & former Calgon Corporation
- Several municipally-owned & unimproved vacant lands that contain several physical disadvantages for development which are not likely to be developed through private capital
- Dilapidation of buildings are threatening the communities' well-being
- Lack of proper utilization of land area
- The plan for redevelopment be consistent with smart growth principals adopted as law or regulation

Fig. 21. Map of Proposed Wagaraw Road Redevelopment Study Area

One aspect of the redevelopment plan has been shown through the redevelopment of the former BASF & Calgon Site into a commercial distribution center, Kohler Distribution, completed in 2004.

After thirteen years of planning and wrangling, ground was finally broken for the commencement of construction at 204 Wagaraw Road on May 29, 2021 (Bedrin 2021). The Bedrin Organization, which owns the Hawthorne Center (known informally to some locals as “The Rag Shop Center”) at 111 Wagaraw Road, will finally see their goals of developing the 204 Wagaraw site realized.

The area, an approximately 8.8 acre stretch of land just south of Wagaraw Road against the Passaic River, had been proposed as the site of a Kohl’s and a Wal-Mart supermarket before its current incarnation as a mixed residential-retail site.

The project will have 118 units of residential apartment complex, a gym and two retail spaces, and a third building that will offer self-storage. The facilities have been carefully designed to accommodate the requirements of the borough and input from locals.

Other potential redevelopment sites include the Pan Chemical property on Washington Avenue adjacent to the New Jersey Transit Main Line parking lot and the Pyrolac Corporation located on Schoon Avenue. These properties are currently located in the

Industrial Zone but could potentially be redeveloped as administrative office, commercial, or public parking lots.

PUBLIC OPEN SPACE AND RECREATION

The Borough of Hawthorne contains approximately 170 acres of public open space for passive and active recreation and environmental protection. Of this total, about 50 acres are municipally owned, and the majority is used as active recreation facilities. The following list of open space is identified on **Fig. 22** Open Space and Recreation Map.

PASSAIC COUNTY

A. Goffle Brook Park. One of the most recognizable features of Hawthorne is the 90-acre Passaic County greenway park along Goffle Brook. The prestigious Olmsted Brothers Landscape Firm designed Goffle Brook Park during the early stages of the creation of the Passaic County Park System. The park was established for passive recreation and to provide environmental protection, preserving the floodplain and wetlands of the Goffle Brook and creating a buffer between the waterbody and the growing community. The park contains a former millpond, picnic areas and pastoral scenic vistas, and active recreation facilities, such as, baseball/softball fields, soccer fields, a playground and a dog run. Passaic County was in the process of developing a pedestrian & bike pathway along Goffle Brook that will connect the park to the Passaic River, but Passaic County Planning did not pursue planning.

BOROUGH OF HAWTHORNE

B. Hawthorne Municipal Pool and Tennis Courts. This 10-acre property located on Wagaraw Road is Hawthorne's primary recreation complex. The property contains an outdoor swimming pool, tennis courts, baseball/softball field and a passive recreation area.

C. Wagaraw Road Fields. This 12-acre property is located on Wagaraw Road adjacent to the Passaic River. The property is a baseball/softball complex with three fields and a concession stand. The site also contains the municipal recycling facility and a passive recreation area along the Passaic River waterfront.

On August 15, 2020, Hawthorne Environmental Commission, Hawthorne Green, and Borough of Hawthorne held a grand opening for the Gateway to the Passaic River project. This project enhanced an existing walkway to access the Passaic River that can be enjoyed by the residents of Hawthorne and Passaic County for fishing and recreation activities, such as kayaking, canoeing and small boats. Additionally, two (2) rain gardens were installed to capture storm water sheet flow from a parking lot, which is situated between the Hawthorne ballfields and the Passaic River. The Hawthorne Environmental Commission and Hawthorne Green Team members along with borough employees, private companies, members of the Shade Tree Commission – Hawthorne's Arborists, as well as Boy Scouts, and other civic minded people of the community worked to build and complete project successful.

The "Gateway to the Passaic River" project provided an opportunity to enhance and promote Hawthorne's waterfront open space; the importance of utilizing native plants of New Jersey; and increasing Hawthorne's biodiversity. Lastly, this project promoted the

aesthetics of the Passaic River and provide current and future generations the opportunity to enjoy fishing and water recreation activities. (Boro Website's Green Infrastructure, 2020)

D. Pumphouse Field. The former Pumphouse Field is a single six acre baseball/softball field located on the Borough's Department of Public Works complex on Goffle Road. In 2013, the 9/11 Memorial was built in dedication to Salvatore J Zisa, Hawthorne resident. The memorial inscription stated "In Loving Memory: "We will never forget.", Salvatore J Zisa, 9-11-01.

On the 12th anniversary of the terroristic events of 9/11 Hawthorne unveiled its planned tribute of remembrance and honor to the men, women, and children killed in the terror attacks of September 11, 2001 and recognition of the efforts of those who responded in it's aftermath. The borough received a 24-foot beam from the World Trade Center in 2011. The beam is now placed in the memorial, located at 970 Goffle Road between the Hawthorne Volunteer Ambulance Corps building and Fire Rescue 5 headquarters.

The memorial centered around the beam includes four granite monuments representing the public and the three branches of emergency services – police fire and ambulance corps. The memorial for Sal Zisa Jr., the only Hawthorne resident who perished in the 9/11 attacks, was also relocated to the new location with the steel beam. The four granite monuments were unveiled by the Hawthorne fire department, police department, ambulance corps and Ed McGuirk, a Hawthorne resident who escaped from one of the towers, to represent the public.

In 2014, Hawthorne Community Garden was built adjacent to the 9/11 Memorial. There are a total of sixteen (16) garden beds available to Hawthorne residents.

E. Eight Acre Woods. The Eight Acre Woods is an 8-acre conservation/natural area located adjacent to Goffle Brook Park. The natural area protects a small wetland area and woodland that is a sanctuary to wildlife. It is also a popular bird watching spot.

F. McFarlan Avenue Open Space. This property is an 8-acre conservation/natural area that protects a wooded steep slope along the front edge of the First Watchung.

G. Rhodes Park – The land for Rhodes Park was donated by a local builder, Mr. VanderZee, who built many of the houses in the surrounding area. It is approximately 1.2 acres. His intention, when he donated the land, was that the land be forever used by the borough as an open park land forever.

H. Veterans' Field. On May 30th, 2009, a 3 acre soccer field opened up on the former BASF & Calgon Site site. The land is primarily used for soccer and currently undergoing lighting improvements.

I. Franklin Fields. These fields are split up into two sections. The first section is 1.32 acres and is located behind the Hawthorne Public Pool and is used for recreational activities. The second section is 2 acres lot located next to the Boys & Girls Club and contains a football stadium.

J. Pocket Park – Borough of Hawthorne is leasing a corner pocket of land, approximately 1,200 square feet, at the corner of Diamond Bridge Avenue and Lafayette Avenue. The pocket park was made possible through donations from: The Mele family, The Ruta Family, Edward A. Easse Architect; Hawthorne Lions Club, Field of Dreams, John Lane, Kevin Russell, Friends of Marcus Ruta, Bill Post, Rose Conklin, Hawthorne Water Dept., Downes Tree Service and Rousseau's Nursery.

BOARD OF EDUCATION

The Hawthorne Board of Education maintains five schools, of which four contain noteworthy recreational facilities – approximately 30 acres total. The Washington School, Roosevelt School, and Jefferson School each contain a playground area and baseball/softball field and play areas. The Hawthorne High School has a substantial recreational complex, which is adjacent to Goffle Brook Park. The recreation complex includes a football field, running track, baseball fields, hockey rink, and basketball court.

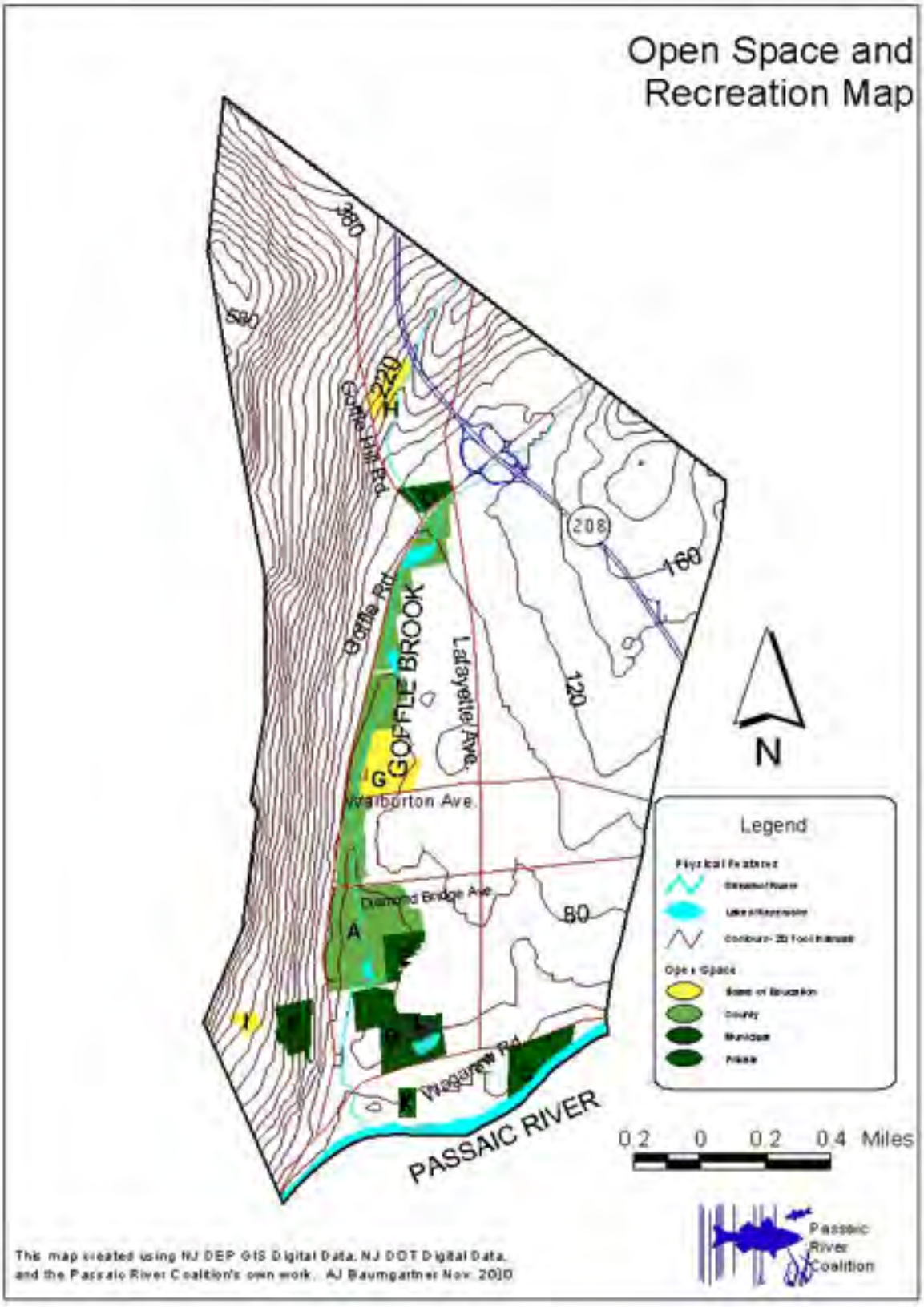
K. Hawthorne High School – approximately 9.4 acres

L. Roosevelt Elementary School – approximately 8.4 acres

M. Washington Elementary School – approximately 2.7 acres

N. Jefferson Elementary School – approximately 8.4 acres

Fig. 22. Map of Open Space and Recreation in the Borough of Hawthorne.



TRANSPORTATION

Transportation exists to provide mobility to people enabling them to access all of the necessary activities in their daily lives, such as, a job, school and social activities. The transportation resources available to residents in Hawthorne are outstanding and provide excellent opportunities for citizens to utilize the region's roads and highways, and public transit to move throughout the region. **Fig. 23** is a map of Hawthorne displaying transportation routes.

HISTORY

According to the Borough of Hawthorne Tercentenary Souvenir book, transportation in Hawthorne has evolved and grown through time. Prior to the Civil War, there were three main roads in the area: Goffle Road, Wagaraw Road, and Lincoln Avenue. Lafayette Avenue was created in 1872 when it was cut through the agricultural area of central Hawthorne (Borough of Hawthorne 1964). As the community grew and subdivisions were developed, streets were platted out predominantly in a grid pattern.

The first railroad, the Erie Railroad, was established in 1848 when a bridge was constructed across the Passaic River from Paterson to create a linkage into New York State; however, due to a lack of demand, the train did not stop in Hawthorne until 1867 when a depot was constructed at Wagaraw Road. This station was named Hawthorne, establishing the place name for the town. The station is currently being moved several feet away from the road to avoid traffic collisions into the station. In 1869, a second railroad was constructed through Hawthorne, the New York Susquehanna and Western (NYS&W), to link upstate New York with the Pennsylvania Railroad in Jersey City. The new rail line crossed the Passaic River and Wagaraw Road adjacent to the Erie rail line facilitating access between the two railroads at the Hawthorne Depot. Later the NYS&W sited many of their maintenance facilities in the center of Hawthorne and constructed a second station at Diamond Bridge Road to serve the growing population in this section of town.

View of original railroad station for the NYS&W
at Diamond Bridge Road.

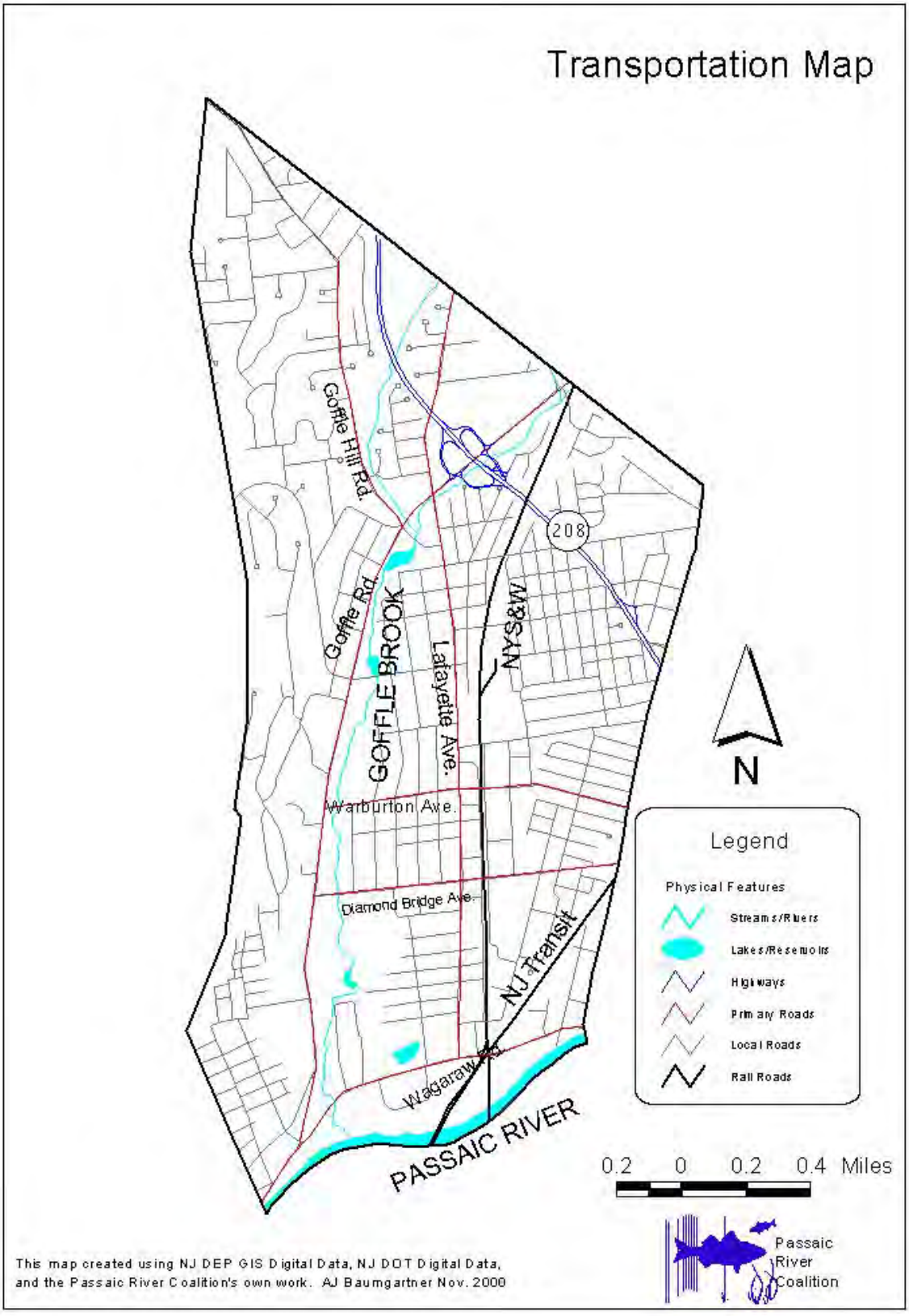


Fig. 23. Map of Transportation.

In 1911, an electric street trolley line was constructed to provide public transportation from the communities of Hawthorne, Glen Rock, and Midland Park to the City of Paterson. The electric trolley line ran from Paterson along Goffle Road to Wagaraw Road, and then north on Lincoln Street and into Glen Rock at Rock Road. The streetcar line provided commuter service to the growing suburbs of Paterson, which ultimately led to the creation of bus service that connected the suburbs to the city.

HIGHWAYS AND ROADS

Along the northern edge, Hawthorne is bisected by Route 208, which provides access to the west to Route I-287 and the New York State Thruway and to the east to Route 4, the Garden State Parkway, Route 17 and New York City. Interstate Route 80, the main east-west interstate connecting the continental United States and Route 46, an east-west state highway connecting northern New Jersey, is easily accessible by Route 20, a state roadway that parallels the Passaic River in Paterson.

View of intersection of Route 208 and Goffle Road.

Within Hawthorne there are several county and municipal thoroughfares that serve as the primary roadways linking residential, commercial and industrial sections of town to outside communities. All of the principal arterial north-south roadways begin at Wagaraw Road along the Passaic River and provide a connection to communities in Bergen County. The primary roads with distance include (Lipiner, 1999):

- **Goffle Road** (2.87 miles, 4.6 km), the primary north-south roadway that parallels the Goffle Brook and the Passaic County Goffle Brook Park. Goffle Road is a key access road for both regional and local travelers as it provides access to US 208 and the City of Paterson, and links Hawthorne with the Bergen County communities of Wyckoff and Ridgewood.

- **Lafayette Avenue and Lafayette Ave., extension** (2.37 miles, 3.8 km), the main street of Hawthorne, runs in a north-south direction, and serves as the main artery to the central business district (CBD) and as the center of the community. The extension provides a connection into Wyckoff.

- **Lincoln Avenue** (1.74 miles, 2.8 km), runs in a north-south direction and serves as the eastern boundary of the municipality, separating Hawthorne from the Borough of Fair Lawn. The roadway provides a connection between the City of

Paterson and Glen Rock and Ridgewood, and contains a commercial/retail section.

- **Wagaraw Avenue** (0.97 miles, 1.5 km), runs along the Passaic River connecting Fair Lawn and Prospect Park and serves as the southern link to all north-south roadways. The area around Wagaraw Avenue was historically the center of commercial and industrial activity and remains that way today although the area is undergoing redevelopment.

- **Goffle Hill Road** (1.55 miles, 2.5 km), is a primary road traveling west into Bergen County linking residential neighborhoods to the center of Hawthorne. The road begins along the ravine created by the Depe Vol Brook through the First Watchung Ridge and travels on up and across the ridge.

- **Diamond Bridge Avenue** (0.93 miles, 1.5 km) **Rea Avenue** (1.67 miles, 2.7 km) **and Warburton Avenue** (0.95 miles, 1.5 km), are primary east-west streets that link Goffle Road, Lafayette Avenue, and Lincoln Avenue together. These three streets provide the connections between downtown residential neighborhoods, the CBD, the commercial/industrial zone along the rail line, and Goffle Brook Park.

Within Hawthorne are numerous municipal streets that serve the large residential sections of town. The older sections of town contain streets laid out in grid patterns, many in north/south-east-west configuration and others rotated at angles. Newer sections of the community, such as the neighborhoods on the Watchung Ridge contain curvilinear streets that respond to the slope of the hill.

PUBLIC TRANSPORTATION AND COMMUTING

There are a wide variety of existing transportation services that include New Jersey Transit trains and buses, as well as new programs for expanding the capacity and increasing opportunities.

Although Hawthorne is served by both bus and rail, as of the 2019 American Community Survey from the US Census Bureau (2019 ACS), most residents and those who worked in the community selected the automobile to get to work. According to the 2019 American Community Survey commuter transportation, 84.5% of workers in Hawthorne drove alone to work, followed by those who carpooled to work (5.38%) and those who used public transit to get to work (4.31%) (2019 ACS). **Fig. 24** shows the number of households using each mode of transportation over time, using a logarithmic scale on the y-axis to help better show variations in the smaller means of commuting.

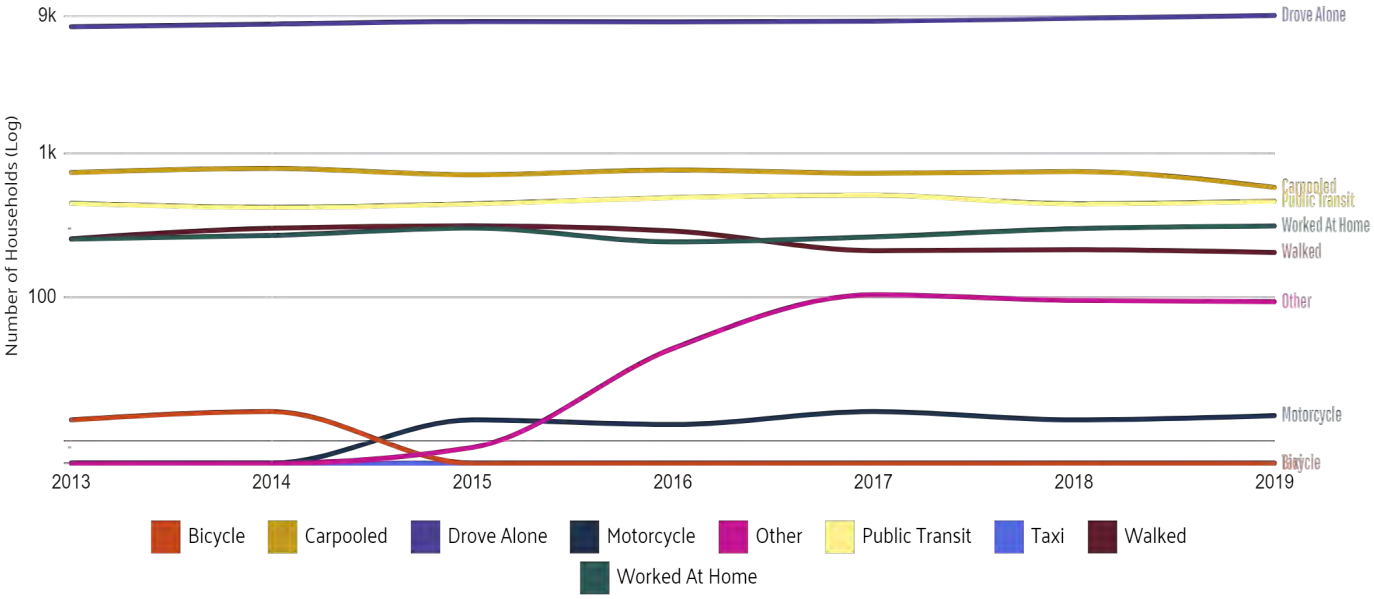


Fig. 24. 2019 American Community Survey Commuter Transportation.
Source: Chart Survey/Program: 2019 ACS 5-Year Estimates Subject Tables

The 2020 census survey did not include any questions regarding the journey to work statistics (U.S. Census Bureau 2020).

New Jersey Transit provides an extensive bus system that has numerous routes that provide access to all of northern New Jersey. Hawthorne is served by bus route Local 722, which has three stops in Hawthorne: at Lafayette Ave. at Diamond Bridge Ave., Goffle Rd. at NJ Route 208, and Van Winkle Ave. at 8th Ave. These three locations allow downtown residents to select a bus stop within walking distance. There is a commuter parking lot, located at Diamond Bridge and Lafayette Avenue for automobiles. However, with an additional bus stop location at Utter Ave and Route 208 the bus service opportunities could be increased. The route between the City of Paterson and Bergen Community College, contains a connection to the Passaic-Wayne 744 Route.

New Jersey Transit's rail system provides another source of commuter transportation resource. The Main Line runs diagonally across the lower part of Hawthorne across the Passaic River and into Glen Rock with a station located at Washington Street that has a small parking lot that is free and unrestricted. The Main Line provides access to Bergen County with stops in Glen Rock, Ridgewood and Ramsey. However, the most significant benefit to commuters is the connection to Hoboken where riders can utilize the PATH system, NYC Waterway ferry system, or NJ Transit bus service to gain access into New York City. At times, the Norfolk and Southern Railroad utilizes the Main Line to move freight from Port Newark northward to New York State (Lipiner, 2000).

Currently, this commuter line is heavily used, and unfortunately, due to the small size of the parking lot, there are an inadequate number of parking spaces. In November 2006, the municipality passed Ordinance No. 1888-06 to resolve the parking issue. The ordinance contains the following: established commuter parking & resident restricted parking areas, resident & non-resident parking stickers, prohibited parking without a

parking sticker, the right of enforcement to display stickers, the right to suspend any parking regulations, and the right to fine for violations and penalties.
A second rail line, the New York Susquehanna and Western (NYS&W), runs through the center of Hawthorne paralleling Lafayette Avenue and then the Goffle Brook. This line is a freight line that has been examined for commuting opportunities. The proposed commuter rail reconstruction project, known as the Passaic-Bergen Passenger Service Restoration Project, has been updated & changed for several years. The overall goal of the project is to connect the light rail to the main line.

On May 13, 2009, the NJ Transit Board of Directors authorizing the agency to enter an agreement with the New York, Susquehanna and Western Railway (NYS&W). The Board approved a Memorandum of Understanding (MOU) with NYS&W that provides a framework for NJ TRANSIT's plan to construct and operate the Passaic-Bergen line using the NYS&W Main Line right-of-way between Hawthorne and Hackensack. The Passaic-Bergen rail service will serve nine new stations along more than eight miles of the NYS&W's Main Line corridor between Hawthorne and Hackensack. The project's proposed station in Hawthorne is a short walk from the existing Main Line station, making it easy for riders to connect to the wider NJ TRANSIT commuter rail system. The Passaic-Bergen rail service will serve nine new stations along more than eight miles of the NYS&W's Main Line corridor between Hawthorne and Hackensack. The project's proposed station in Hawthorne is a short walk from the existing Main Line station, making it easy for riders to connect to the wider NJ TRANSIT commuter rail system. Construction of the project could begin as soon as early 2009 and take approximately three years to complete**.** (NJ Transit press release May 13, 2009)

TRANSPORTATION PLANNING

Planning for transportation is done at several different scales. The North Jersey Transportation Planning Association (NJTPA) and the County of Passaic undertake regional planning. The NJTPA is the federally designated Metropolitan Planning Organization for northern New Jersey that oversees the annual federal and State of New Jersey transportation investments. The Borough of Hawthorne is located in Corridor 18, the transportation region created by the NJTPA that encompasses primarily the Route 17 corridor in western Bergen County (NJTPA, 2000). Decisions on transportation issues and funding for Hawthorne are based on the identified needs of this corridor. The County of Passaic oversees the maintenance of all county roads and bridges, and provides guidance and coordination in the planning of regional transportation programs.

In 1998, a Transportation Task Force was established by Passaic County to secure a $100,000 grant from the North Jersey Transportation Planning Association to develop a transportation action plan (Lipiner 1999). As part of this process, Hawthorne identified a transportation wish list of policies and actions, improvements, and upgrades for the Borough (Laiosa, 2000). These included broad proposals such as:

- The resurfacing of municipal and county roads,
- The replacement of deteriorating county bridges over the Goffle Brook,
- Improvements to sidewalks and curbs,
- Reconfiguration of road intersections.

Other specific proposals included:

1. The development of a pedestrian/bicycle pathway through Goffle Brook Park that would connect with the properties along Wagaraw Road that are being redeveloped.

2. The creation of a new station for NJ Transit's Main Line at the Merck property on Wagaraw Road. This project would offer a non-auto alternative and provide a catalyst to the redevelopment of the 20 acres of commercial/industrial zoned land along the Passaic River.

3. Flooding problems with the Goffle Brook created by the inadequate maintenance and capacity of the Goffle Brook culvert that passes under Rea Avenue and Wagaraw Road.

4. The exit ramps from US 208 at Goffle Road appear to be inadequate and unsafe for truck traffic, as there have been a number of incidents where trucks have overturned.

As of August 2010, the Transportation Task Force no longer exists. In order to maximize transportation potential in Hawthorne, these suggested proposals should be considered in the future.

VII. Historical References

HISTORICAL REFERENCES

NATIONAL REGISTER

Created in 1966 by the National Historic Preservation Act, the National Register is a national listing of significant points of interest from our nation's history. The mission is to, "protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to tribes." The program is a coalition between the National Conference of State Historic Preservation Officers and the United States Department of the Interior. The National Register of Historic Places includes significant properties, classified as buildings, sites, districts, structures, or objects (National Register).

By the register's standards' buildings, sites, districts, structures, and objects are defined by the following (Historic Preservation):

- **Building** – any structure created to shelter human activity; examples would include houses, barns, schools, railroad stations, theaters, factories

- **Structure** – any construction other than a building; examples would include bridges, lighthouses, water towers, tunnels, and civil engineering structures such as a canal

- **Object** – a construction of functional aesthetic, cultural, historical, or scientific value that may be moveable but is also generally related to a specific setting or environment; examples would include boats, locomotives, monuments, sculptures

- **Site** – the location of a significant event, prehistoric or historic activity, or remnant of a building or structure such as a battlefield, landscape, or the ruins of a building or structure

- **District** – a geographically definable area containing buildings, structures, objects and/or sites that are linked historically or aesthetically by plans or physical development and acknowledged to posses collective importance

NEW JERSEY REGISTER

In 1970, New Jersey Legislation passed the New Jersey Register of Historical Places Act which established the state's list of historical resources. The list is modeled after the National Register and uses the same criteria and forms for nominating properties (Historic Preservation).

REGISTER EVALUATION

For both the State and National levels of registers, the following criteria is used to define a significance in Federal/State History (Historical Preservation):

- It is associated with events that have made a significant contribution to the broad patterns of history

- It is associated with the lives of persons significant in our past

- Embodying the distinctive characteristics of a type, period, or method of construction, or representing the work of a master or possess high artistic values, or representing a significant or distinguishable entity whose components may lack individual distinction

- Have yielded or may be likely to yield information important in prehistory or history

HAWTHORNE HISTORICAL SITES

Founded in 2006, the Hawthorne Historical Society is dedicated towards preserving its history. Currently, the society is not a commission; however, the Borough of Hawthorne has been very supportive towards helping the Hawthorne Historical Society preserve the town's history.

The Hawthorne Historical Society has deemed many sites to be of historical importance to the Borough of Hawthorne. The following is a list of some sites and an explanation of its history (MacDonald Ditko, per. com. 2010).

Goffle Brook Park (National Register and State Register)
Goffle Brook Park was designed by the sons of New York Central Park architect Frederick Law Olmsted and their partner Percival Gallagher and commissioned by the Passaic County Park Commission in 1927. The 115-acre park required the purchase or condemnation of 99 acres of private property. Included were three historically significant brown sandstone houses on Goffle Road: the John W. Rea House (1840); the Vreeland House (1760); and the John George Ryerson House (1750), also called Lafayette's Headquarters. Only the Rea House still stands today and is currently called the Passaic County Arts Center at the John W. Rea House. The park's original Olmsted design was actually arranged around these historical houses. The design also included several foot bridges and bridal paths to ride horses, as Hawthorne used to have several horse farms. Today Goffle Brook Park is located off of Goffle Road and runs along much of the borough. It is still maintained by Passaic County.

Rea Mansion (**National Register and State Register)**
Originally, this Dutch brown sandstone house on Goffle Road was called the Doremus House and was built in 1840. In 1857, a well-known minstrel comedian bought the house on Goffle Road for his family. John W. Rea, whose stage name was Jack Raynor, toured across North America and Europe. While in Europe he bought the house unseen, which was then called a "farm." It was in an area called North Paterson, which was then part of Manchester Township. It included 150 acres and cost $10,000. Rea retired from performing in 1875 and was elected Justice of the Peace of Manchester, and from then on was called "Squire Rea," and settled small disputes. He also served as Superintendent of Manchester schools. He died in 1900 and was interred in his wife's (Marr) Family's mausoleum at the Midland Park Methodist Cemetery on Godwin Avenue.

Sometime after Rea's death, the house was sold to the Knapik family who operated the Knapik Inn and/or Goffle Inn starting in 1920. It was a tavern and hotel that was relatively short-lived, since only a decade later, they were forced to sell it for the creation of Goffle

Brook Park. It was deemed historic then and was preserved as part of the park. At one time it served as the Boys and Girls Club, and then as Senior Citizen offices. Today it houses the Passaic County Arts Center at the John W. Rea House and the office of the Hawthorne Historical Society.

House of Johannes Ryerson/Ryerson House Monument 367 Goffle Road

The grandfather of the builder of this house was Martin Ryerszen, who emigrated from Amsterdam about 1646 and settled at Breukelen, where on May 14, 1663, he married Annetje, daughter of Joris Jansen de Rapalje. Their son Joris Martinse Ryerse, baptized September 19, 1666, died about 1749-50, was married August 11, 1691 to Anneken Schouten, widow of Theunis Dey. At the time of his marriage, he lived at the Wallabocht on Long Island. In 1695 he joined Arent Schuyler and others in buying extensive tracts of land on both sides of the Pequannock River. He settled at Pacquanac (near Mountain View) about 1710. He was a judge and a very prominent man. He had 3 stepchildren and 11 children. Of these, Dirck Dey built the mansion at Lower Preakness, Marten Ryerson built on the south branch of the Raritan River near Flemington, and Johannes Ryerson built at the Goffle.

On November 11, 1706 Joris Ryerse of Pompton joined with Ryer and Frans Ryerse of New York in buying a tract north of the Passaic River along the Wagaraw or Goffle Brook from Blandina Bayard of New York; this tract was surveyed and divided between the owners on June 7, 1721. In his will of 1744 Joris Ryerse devised his plantation at Wagaraw, on which his son Johannes lived, to this Johannes. The settlement of Wagaraw was on the north bank of the Passaic River at the bend north of Paterson. From here a road led northward along the Goffle Brook to the house and mill of Cornelis Lozier at the present Midland Park. As farms were opened up along the brook, this settlement became known as the Goffle. Johannes Ryerse was living here in 1744 and may have removed here shortly after the survey of 1721. He probably built an earlier house no longer existing as well as the present house, if it was built in 1750 as claimed.

Johannes Ryerse, also called John G. Ryerson, baptized August 8, 1694, died between 1779-82, was married October 27, 1716 to Maritie Janse Spier and later married Geertje Hessels, and had 9 children in all. He was a Justice of the Peace. He lived at the Goffle on a farm left him by his father, and in 1779 willed one third of the estate upon which he dwelt to his grandson John, eldest son of his son George. Joris or George I. Ryerson left all his lands in 1801 to his only son John. This John G. Ryerson, born July 3, 1769, died in 1835, married on July 21, 1793 to Leah, daughter of Cornelius Westervelt, who died in 1861 aged 87 years). He lived on his father's and grandfather's place on the east side of the Goffle Road in the house still standing (1936). After the marriage of his only child, he gave him the farm of 180 acres, and removed to his wife's farm. This son, George I. Ryerson, born December 17, 1793, died December 16, 1875, married on September 19,

1813 to Hillegont, daughter of Gerrebrant Van Houten; after her death June 23, 1847, he married Mrs. Eliza Burtsell of New York, and thirdly Margaret Hanson. He lived on the place occupied by his grandfather on the Goffle Road. His son Henry Garrison Ryerson, born December 3, 1822, died 1879, married Martha, daughter of Adam Dater. He was an auctioneer and continued to reside in the ancestral home. It later passed to his two children, George who died in 1887 and Elizabeth who married John Ackerman of HoHoKus. The Ackerman estate owned it and it became unoccupied (1936).

It is claimed that the house was erected in 1750. This date could only apply to the wing by the road, as the main house was probably post-revolutionary. The wing was built of roughly cut stone and the main of dressed stone, whitewashed; the rear of both units was of stone rubble, and both sections were covered by gable roofs, extending to form an overhang on the south front. (The photograph shows the rear view.) An unusual feature was the string course of carefully cut and finished sandstone at the floor level of the main story of the house and also the rare type of fanlight. The double Dutch doors and solid shutters had typical paneling. The house stood on the east side of Goffle Road by the Goffle Brook, about one mile north of the Passaic River.

The Ryerson homestead stood for many years in disrepair after Goffle Brook Park was created (see Goffle Brook Park above) and burnt down mysteriously in 1950. A bronze plaque and memorial plaza now stand in Goffle Brook Park where the house once stood. They were erected in 1952.

Vreeland House Goffle Road (Opinion eligibility of State SHPO)
Edo Van Marselis, a fourth-generation resident of the American Colonies and prominent landowner, allegedly built what became known as the Vreeland House in 1760. The house no longer exists but was originally deemed to become part of Goffle Brook Park. Passaic County planners decided to remove the Vreeland House in 1934 during the height of the Great Depression, however there were no funds to either demolish or maintain it. In 1939, the Vreeland House was again set to be demolished but the community protested enough to halt the work. It is not clear exactly when, but this house was razed anyway.

There is a house on the opposite side of Goffle Road that is commonly called the Vreeland VanDenBerg house. It has historical significance and now houses the Van Dyk Memory Care Center, a division of the nearby Van Dyk Park Place Assisted Living.

Ryerson DeGray House now the Bottagra Restaurant 80 Wagaraw Road
One of the earliest homesteads, this building was constructed in Hawthorne (formerly Manchester Township) around 1730 by John Francis Ryerson. Ryerson also built a grist mill, potash works, sawmill and a store in the area. The home was confiscated by the State of New Jersey in 1779 as Ryerson was a loyalist. General Lafayette with two brigades of light infantry encamped here on the property during October and November 1780. While guarding the approaches to Washington's main body in Totowa.

Richard Dirrick DeGray owned a farm, grist and saw mill, potash works, and a store, and fought in the Revolutionary War. He purchased the house (then located at 40 Wagaraw Road and now 80 Wagaraw Road) in May 1800. Its previous owner was his uncle John Francis Ryerson, who was a loyalist with the British Army and was stripped of his possessions. His uncle fled to Nova Scotia. About 140 acres were included in Richard DeGray's purchase of the house. DeGray later added an east wing. Wagaraw Road was

also once called Ryerson Lane. A DeGray descendant lived in the house until the 1960's. The house later on became Scordato's Restaurant starting in 1970 and then Alexus Steakhouse & Tavern, and now currently houses the Bottagra restaurant.

Bottagra Restaurant has great historical significance as the place where a Revolutionary War soldier lived, General Lafayette was encamped on the property, and is one of the oldest buildings Hawthorne. Although it has been altered, the restaurant retains some of the features of the original DeGray house built in the 1730s.

Frick Bartsch House Lynack Road (Privat Residence)
On Lynack Road nestled on the hillside is the post-Revolutionary home known to residents as the Frick-Bartsch House. The original structure which has several prototypes around North Jersey was a simple two-room sandstone house circa 1810. The ground level kitchen containing a fireplace for cooking was the living quarters while the family's bedroom was upstairs. The sandstone block in the earlier structure still bears the identifying marks cut in by workers who mined it from the nearby quarry, located at the top of what is now Brockhuizen Lane.

The name of the original owner is veiled in history and the earliest record available is when Elias E. Vreeland deeded the house to Charles Frick in 1863.

A cornerstone on a subsequent two-story addition is dated Frick 1863. The reddish sandstone seems to have been mined out of the same quarry as the original. The walls are two feet thick. Another addition was made in 1900 of frame overlaid with red stucco. That section contains the living room and large front door. House is currently undergoing extensive renovations.

John Lambert House Goffle Road (Private Residence)
Dating back to the campaign of George Washington is the sandstone frame house on Goffle Road known as the John Lambert House. The small one-and-a-half story section on the right is the original home where the family lived. It still has the old fireplace and the low ceiling with hand hewn beams.

Duncan Macfarlan bought the house in 1868 along with 10 acres of property extending north to Diamond Bridge Avenue. Goffle Brook Park was originally part of the Macfarlan's farm.

Hawthorne Library 345 Lafayette Avenue
On December 18, 1913, a group of residents met at the home of Mr. and Mrs. A.T. Sticker to consider plans for founding a Public Library in the Borough of Hawthorne. An association was formed to be known as The Hawthorne Public Library Association Incorporated. Rooms were rented over the old post office on Diamond Bridge Avenue and books were received as gifts were ready for circulation. A building fund was started almost immediately and in 1930 lots were purchased on Lafayette and Grand Avenue. Through the sale of some of these lots, it was possible to purchase and own free and clear the property on which the library building stands today.

The original Hawthorne Library was just a one-room building on Lafayette Avenue, which now houses the administrative offices of the library and old periodicals and newspapers in the basement. It was built in 1931.

The library changed its name to the Louis Bay 2nd Library to honor longtime mayor Louis Bay. An addition to the library, which is now the main library and the Children's Wing, was designed by local architect Larry Tromeur. He had been part of firm Neil Greydanus in Hawthorne, and later Jim Pipens, and opened his own firm, Associated Architects, in Paterson. Tromeur was inspired by the designs of Frank Lloyd Wright and Ludwig Meis van der Rohe. He also designed the municipal building in Hawthorne and the Wells Fargo Bank building.

Hawthorne Theatre 300 Lafayette Avenue
"Our borough has a modern and attractive motion picture theatre, the HAWTHORNE THEATRE."

In the late 1920s, a group of Hawthorne citizens decided that Hawthorne needed a theater, and they formed the Community Theater Corporation. The theater was built and leased to Mark Block who opened the doors of the Hawthorne Theatre on January 14, 1928. A capacity audience that night came to admire the new theater and to see the picture "Topsy and Eva" with the Duncan Sisters.

A few years later the operation of the theater was taken over by William C. Herman. Bill, together with his wife, Jessie, and son, Howard, reopened the theater on October 30, 1930, with "Common Clay" starring Constance Bennett and Lew Ayres. In 1930, the theater changed hands to the Herman family, who operated the theater for 50 years over two generations. Under the Hermans' guidance, the theater was remodeled in 1950 by John Eberson, a noted theater architect of the time and was one of the first theaters in the State to have air conditioning.

During WWII, the Hawthorne Theatre helped in the sale of War Bonds and in 1950 helped in the Korean Orphan Clothing Drive. Throughout the years, the theater has helped raise funds for the Red Cross, March of Dimes, and many other charities.

The Hermans took great care in the quality of movies shown at the Hawthorne Theatre and strove to bring the best motion picture entertainment to Hawthorne in comfortable and attractive surroundings."

It was among the first theaters in the State to be air-conditioned. It also pioneered in the policy of special shows for children on Saturday matinees. A series of "Great Opera Nights" proved very popular.

In 1980, the cinema was sold to Lee and Moe Sayegh who renamed it CJM Cinemas and then Hawthorne Theatre. The Sayeghs revamped the theater in 2009, restoring the front of the building to show old seascape motifs, and added Dolby digital.

Masonic Temple Lafayette Avenue
On the night of May 25, 1918, the Hawthorne Masonic Lodge, No. 212, F. & A.M. was instituted. Meetings for the first five years were held at Lafayette Hall at Fire Company No. 1 on Lafayette Avenue. Membership swelled and the group created the Hawthorne Masonic Building Association for the purpose of erecting a building where they could hold meetings and other activities. A plot was purchased on Lafayette Avenue and on November 7, 1925, a cornerstone for the Masonic Temple was laid. The first regular meeting of the Lodge was held in the finished building on September 16, 1926. By 1948,

there were 200 members of the Hawthorne Masonic Lodge. Today, the Masonic Temple building has been converted into offices.

Hawthorne (Diamond Bridge Avenue) Train Station (SHPO)

The first station to serve Hawthorne in the early 1870s via the New Jersey Midland Railway was located on Wagaraw Road. Midland trains terminated here, and passengers descended stairs to transfer to trains run by the Erie Railroad for points east of Hawthorne. By the early 1890s Hawthorne's population began to steadily increase. New residents began to settle and develop in the area slightly west of the Wagaraw Road station. The New York Susquehanna & Western Railroad (successor to the New Jersey Midland) constructed a new station in 1894 and called it "Hawthorne" to meet the needs of the residents in the downtown area. This small station continued to serve the borough's commuter's needs until June 30, 1966 when the Susquehanna ceased passenger operations.

The railroad leased the building for many years, most notably to a local newspaper dealer and more recently to the Volunteer Railroaders Association. The Volunteer Railroaders Association through various fundraising activities was able on September 17, 2010, to move the station 75 feet north from its original location. This was done to protect the building from structural damage resulting from tractor trailers turning from Royal Avenue onto Diamond Bridge Avenue. A small park with fundraised brick pavers has been created for the former station site.

This was not the first-time residents were interested in moving the station. Hawthorne wanted to make a transit center in the early 1940s, which required the relocation of the station. The original plan was to move the station to sit across from Ashley Avenue on Royal Avenue. The last set of blueprints were drawn up in 1941, and the project was abandoned when the U.S. entered World War II in December of that year.

Dutch Cemetery Brockhuizen Lane

Holland Cemetery, or Vermeulen Cemetery, was used by local Dutch reformed churches in the 1800s off Brockhuizen Lane. Abraham Vermeulen and John Holster established this land as a cemetery in 1868. Vermeulen later sold a plot that would become the Ahavath Joseph cemetery. Today, there are just a few gravestones remaining of the Dutch cemetery. Most of the bodies and stones were exhumed in the 1920s and moved to Fair Lawn Memorial Cemetery on Maple Avenue, which was also owned by the Vermeulen family. Those gravesites remaining give a chilling glimpse of life two centuries ago. A child only 1 year 9 months old has a tiny gravestone. Others are entirely in Dutch with names such as Van Adrianis and Veeneman.

Ahavath Joseph Jewish Cemetery Brockhuizen Lane
The Ahavath Joseph Cemetery, located on Brockhuizen Lane, was purchased by a group of people originally from Slutsk, Lithuania (now Belarus) from Abraham Vermeulen (see above section on Holland Cemetery). They moved to Paterson in the 1890s and formed a Jewish congregation on Godwin Street in Paterson. Many of the gravestones reveal people succumbed to the Influenza epidemic of 1918 and the Diphtheria epidemic of the 1920s. Many stillborn and very young babies were also buried at that time without gravestones, following Jewish tradition. Records no longer exist on where these children were buried in the cemetery. Other people buried in the cemetery include members of the Spira family, who founded Spira's Department Store in Paterson in 1898. The gates of the cemetery were donated by Dina Solte Webster, one time owner of the Junior Shop in Paterson. The Ahavath Joseph congregation eventually merged with Congregation B'nai Israel in Paterson, adopting the B'nai Israel/Ahavath Joseph name. That congregation is still alive today in Paterson and cares for the cemetery.

Thomas Road/DeGray-Ryerson Cemetery
Now located on the Kohler property off Thomas Road, the ancient DeGray-Ryerson cemetery stands in a fenced-in area and is in very poor condition and missing some of the original gravestones. In 1748, John DeGray married Lena Ryerson. She was 18 years old; he was 20. They settled on the Goffle Brook on what is now Goffle Road. They had three children: John, Richard, and Jenneke. According to old records, only sons John and Revolutionary War hero Richard (see Bottagra Restaurant above) were buried in the DeGray-Ryerson cemetery.

Others buried in the original cemetery included Lena Ryerson's father Frans Ryerson. Ties can be seen in old family trees between the DeGray family and former graves with the names Berry, Doremus, Westervelt, and VanWinkle. John DeGray married Mary Berry. His sister, Jenneke, married John Berry. The Berry's relative, Catherine Berry, married Hassel Doremus (who was widowed and then married Gasiah Westervelt, who was interred in the cemetery). Lena's brothers and sisters married into the VanWinkle, Doremus, and VanBlarcom families, which were names once found in the cemetery. Like many families in small towns, intermarriage was common.

House of John Van Winkle 868 Goffle Road
The ancestor of the family was Jacob Walingen, who emigrated to this country by 1639, probably from the village of Winkel in North Holland. He died in the summer of 1657, and his widow Tryntje Jacobs married three times before she died May 11, 1677. Their son Symon Jacobse Van Winckel, baptized August 24, 1653 at New York died 1728-32 married at Bergen December 15, 1675, Annatje Sip of New York, sister of Jan Adriaensen Sip, owner of the house at Bergen. He was allotted two tracts in the Acquackanonk patent of 1685 and settled on the west side of the Passaic River in the present Passaic, near the Van Wagenings to the north and the Sips to the south. His son Simeon Van Winkle, baptized August 6, 1686, died 1775, lived several miles further north near the ford at the Bogt at the west side of the Passaic River (now the eastern part of Paterson). His house of white washed stone was often referred to in deeds as the White House; it was torn down in 1828. He had 20 children by his two wives.

John S. Van Winkle, born 1723, was a son by the first wife, Prientje Van Giesen, daughter of Abraham Van Giesen, probable owner of the house at Third River in Essex County. On February 9, 1730, Richard Ashfield sold a tract at Wagaraw to Gerrit Gerritse, who on June 8, 1743, sold 212.5 acres to Simeon Van Winkle of Essex County;

on October 26, 1774 Simeon Van Winkle, shortly before he died, deeded to his son John the 212.5 acre tract where John was then living at Wagaraw. Wagaraw was the name of the region above the most northerly bend of the Passaic River, north of the present Paterson. The settlement in the northern part of Wagaraw along the Wagaraw or Goffle Brook came to be called the Goffle. It was here that John S. Van Winkle settled some time between 1743 and 1774. The old part of the present house is said to have been built by him in 1761. On December 5, 1746, at Acquackanonk he married Janneke Ryerson of New York, and had two sons. He deeded the Wagaraw tract to his son Simeon on May 24, 1783, but lived many years longer, and probably continued to occupy his home until he died in January 1816. His son Simeon J. Van Winkle born December 12, 1749, died November 4, 1828, aged 78 years, 10 months and 22 days, married Claesje, daughter of Cornelis Gerritse. Although his father deeded him the Wagaraw homestead, he did not reside here; he was known as Simeon of the Bogt and lived at Riverside in a stone house destroyed about 1880.

Simeon's son Judge John S. Van Winkle, born November 13, 1784, lived on his grandfather's place at the Goffle and built the main part of the present house in 1811. He ran a grist mill here. On March 24, 1805 he married Jannetje, daughter of Pieter Kip, born January 14, 1788. He and his wife were foully murdered the night of January 9, 1850, by John Johnson, an English farmhand who Judge Van Winkle sympathetically released from jail, where he had been lodged on some complaint. Their surviving son Cornelius Van Winkle, born September 9, 1806, died May 26, 1873, married May 31, 1826, Catrina Leah Van Dean, born March 4, 1809. They lived at the Goffle, at Riverside, and later in Paterson. The place at the Goffle was inherited by their only son Simon Peter Van Winkle, born July 6, 1831, married October 10, 1852 Maria Ackerman; they lived however, at Paterson. Their daughter Jennie Van Winkle married Aaron Van Houten of Passaic, and the property at the Goffle was sold by her estate about 1901. It was purchased by Thomas Arnold whose son Ivan Arnold became owner (1936). Until the Arnolds purchased it, the house had been occupied for many years by farmhands, tenants of the Van Winkles. In 1942, Dr. Claude Van Stone purchased the house in an auction and passed it down to his daughter, Jean Brennan, who sold it in 2002.

It has been stated that Judge Van Winkle replaced his grandfather's old house in 1811 by a larger stone dwelling. But the present wing certainly dates from his grandfather's time, and it is probable that the wing formed the whole of the early house, and that Judge Van Winkle greatly enlarged it rather than tearing down some of it. The old wing was built by John Van Winkle at some time after his marriage in 1746 and before 1774; the date 1761 has been ascribed to it. The old house is built of rough stone laid in irregular courses and is covered by a steep gable roof extending in front to form an overhang. The main house has a cornerstone dated 1811; it is characteristic of the period, built of well-dressed stone, and covered by a gambrel roof which has a beautiful curving slope. The main house contains unusually beautiful specimens of carved woodwork of the period and a paneled over-mantel. The house is on the northwest side of the Goffle Road, on the opposite side of which runs the Goffle Brook. It stands at the foot of Goffle Hill Road leading to Sicomac and the Ponds settlements and is less than 2 miles north of the north bend of the Passaic River.

33 Forest Avenue – Forest Mills Apartments

In the early 1900s, Excello Hosiery Mill was built. This large 3-story brick structure served for many years as the Prospect Park Furniture retail store, and later the Valley Furniture retail store. In 2004, Joseph and Anthony Dello Buono purchased the old factory and converted the building into 21 high-end apartments in 2006. The façade is original to the Excello Hosiery Mill and still appears etched in the top of the facade. The condos retain the high ceilings of the three-story old factory and new windows were inserted into already existing openings. The freight elevator is also original to the early 1900s building. An adjoining house was knocked down to make room for parking for the condominium residents.

Scola Piece Dyeing & Finishing Co. 1121 Goffle Road

Photo Courtesy: Hawthorne Historical Society, 2022

The firm now known as Scola Dye Works, Inc. 1121 Goffle Road in Hawthorne, began operating in November 1904 under the management of the late Anthony Scola. Several additions have been made to the original plant, but the original building is still in use. From 1904 to 1913 the operations consisted of dyeing of pure silk piece goods only. Then in 1913 a finishing department was added, and the plant was called Scola's Piece Dyeing and Finishing Works.

Frank A. Scola, was general manager of the plant, had been active in the business since 1910. He took over as general manager in 1922 when his father, Anthony Scola, retired. He continued operating under the name of Scola's Piece Dyeing and Finishing Works, in partnership with his wife, Margaret F. Scola.

In January 1952, the plant was incorporated, and the name changed to Scola Dye Works, Inc, with Frank A. and Margaret Scola as majority stockholders. Frank A. Scola was general manager and Chairman of the Board. The other officers were Anthony Vars of Hawthorne, President; Charles Fried, 2nd Vice President; and Eleanor Veenstra, Secretary-Treasurer. Thomas Maselli was Assistant Manager.

At top production the plant could process approximately 200 pieces of pure silk goods a day and Scola had the distinction of being one of the few plants which processed only pure silk goods. They processed all types of dress silk, silk suiting, and novelty weaves, and enjoyed a reputation for excellent workmanship (Hawthorne Historical Society, 2022).

In 2022, the former Scola Dye Works Inc building is utilized by the operations of Hawthorne Family Practice and HOME furniture store.

A HISTORY OF HAWTHORNE STREET NAMES

Provided by the Hawthorne Historical Society, Jackie Walsh, President (February 2022)

Brockhuizen Lane – named for John Brockhuizen, who arrived in the United States from the Netherlands in the 1890s. The family farm of approximately 10 acres was located in this area.

Diamond Bridge Avenue – was first called Janes Lane. Where Lincoln Avenue (formerly Cherry Lane) crossed the railroad, a grade crossing was made and continued in use until 1865 when a bridge was erected over the tracks at right angles. The bridge was built of heavy wooden timbers in the form of a diamond frame from which the local name of Diamond Bridge originated.

Goffle Road – Goffle is a Dutch word meaning a fork and was derived from the fact that two brooks mentioned in early deeds divided or forked at this place.

Lafayette Avenue – was cut through the existing farms in 1872. It was named for the Marquis de Lafayette who with his Light Infantry Corps were encamped in Hawthorne in 1780 as the vanguard of Washington's army which was located in nearby Totowa.

Lincoln Ave – was laid out as a road in 1794. Formerly called Cherry Lane, the name was derived from the many cherry trees in the area.

Macfarlan Avenue – named for Reuben Macfarlan, the sixth Mayor of Hawthorne who served from 1911 to 1915. He was the Superintendent of the Dexter and Lambert Silk Company.

Mawhinney Avenue – named for Rev. William B. Mawhinney, pastor of St. Clement's Episcopal Church.

Rea Avenue – named for John W. Rea, one of the best known and respected citizens of Hawthorne. He was better known in this country and abroad as Jack Raynor, organizer of the original Christy Minstrels. A singer of unusual talent he toured the United States and Europe. He resided at his homestead on Goffle Road for over forty years.

Stam's Alley – named for Peter Stam who immigrated from Holland in the early 1900s.

Utter Avenue – named for Dr. Sylvester Utter, the first Mayor of Hawthorne. Dr. Utter served from 1898 to 1901. He was a dermatologist associated with St. Joseph's Hospital in Paterson.

Wagaraw Road – its name is derived from the Lenni Lenape Indian word meaning "where the river bends".

Westervelt Avenue – named for an early Dutch family who probably came from the Hackensack area.

VIII. Noise

NOISE

Noise pollution, defined as unwanted or excessive sound, is another undesirable byproduct of modern life. It can be a nuisance, interfere with activities, and can cause physical damage. Transportation noise is among the most pervasive noise sources in our environment today, particularly for people who live within five hundred feet of heavily traveled highways or within one hundred to two hundred feet of lightly traveled roads (Bedminster Township 2010).

STATE NOISE RESTICTIONS

New Jersey's Noise Control Act was enacted in 1971 to protect citizens from noise pollution. These regulations include a daytime sound level standard of 65 decibels and a nighttime standard of 50 decibels as measured at the property line of an affected person. The standards were set based on scientific information dealing with speech interference and sleep interruption, respectively. Indoor noise is currently not regulated under the State noise regulations. However, the Department's regulatory authority is limited. The Federal Railroad Administration (FRA) oversees railroad noise, aircraft noise is overseen by the Federal Aviation Administration (FAA) and the New Jersey Department of Transportation oversees state highway noise (Noise Control in New Jersey).

HAWTHORNE NOISE RESTRICTIONS

Under Hawthorne's "Code of the Borough of Hawthorne", last updated in 2003, Chapter 139, Section 139-1 clearly specifies the restrictions of noise. The following acts are considered loud, offensive, disturbing, and unnecessary noise:

- Radios, televisions, & phonographs that disturb the peace, quiet, and comfort of the neighboring inhabitants **or** at a louder volume necessary for the convenient hearing of the people listening.
- Operation of any radio, television, or phonograph between the hours of 11:00 pm and 7:00 am that can be plainly audible at a distance of one hundred feet from the source.
- Playing loudspeakers or sound amplifiers on the streets or in public places **or** that can be heard in streets or public places.
- Yelling, shouting, hooting, whistling, or singing on the public streets at any time so as to annoy or disturb the quiet or comfort of any person in the vicinity.
- Owning an animal that causes frequent or long-continued noise that disturbs the comfort of any person.
- Sounding a horn or other warning device on any motor vehicle except when required by law.

- Discharging the exhaust of any steam engine, stationary internal-combustion engine, or motor vehicle except through a muffler or other device that will prevent loud or explosive noises.

- Using any defective vehicle that will create loud and unnecessary grating, grinding, rattling, or otherwise.

- Performing any construction or repairs that will make any loud or disturbing noise on any Sunday, legal holiday, or on weekdays between the hours of 6:00pm and 7:00 am that is within one thousand feet of any dwelling or business property. In cases of emergency, a permit may be obtained from the Director of the Department of Public Safety or the Construction Code Official.

- Creating any excessive noise on any street adjacent to any school, institution of learning, church, or court while the institution is in use and unreasonably interferes with the working of such institution.

- Sounding of any or the blowing of any whistle attached to any building or locomotive.

- Creating any loud or excessive noises when loading & unloading any vehicle.

- Using or playing any drum, loudspeaker, or other instrument for the purpose of attracting attention to any performance, show or sale, or display of merchandise.

- Operating any air conditioner, refrigerator unit, cooling tower, evaporative condenser, air-cooled condenser, mechanical fan, compressor unit, or other such apparatus that causes frequent, irregular, or continued noise that causes discomfort or annoyance to or which unreasonably invades the privacy of the public.

The above are only situations that are specified in the Code of the Borough of Hawthorne, New Jersey; however is not exclusive to other similar situations. Most, if not all, of these scenarios have worsened consequences if done between the hours of 10:00 pm and 7:00 am. Any person who is found guilty of these violations shall be subject to: (1) a fine not to exceed $1000 (2) imprisonment for a term not to exceed ninety days (3) required to perform community service for a period not to exceed ninety days (Code 2003).

I-1 INDUSTRIAL ZONES

Hawthorne's "Code of the Borough of Hawthorne, New Jersey", Chapter 225, Article X, Section 225-76 is reading building permits and certificates for all uses in I-1 Industrial Zone Districts. No building permit and certificate of occupancy shall be issued unless in compliance with the following performance standards. All shall be conditional upon and subject to continuing compliance with such stands:

Frequency Ranges Containing Stand Octave Bands (cycles per second)	Octave Band Sound-Pressure Level (decibels re 0.0002 dyne/cm^2)
20-75	69
75-150	54
150-300	47
300-600	41
600-1,200	37
1,200-2,400	34
2,400-4,800	31
Above 4,800	28

Table 37. Noise Restriction Levels. Code of the Borough of Hawthorne, New Jersey

Table 37 can be spelled out in more simpler terms, in order to fully understand. The column on the left describes the frequency of the sound. The higher the frequency, the "higher" the sound. For example, a high note on a musical scale has a higher frequency than a low note. The right column describes how loud a sound can be at a certain decibel. For example, if strumming a guitar and you strum one string, that same string, though the same frequency, can be played loud or soft. In short, given a certain frequency, a sound can only be a certain decibel level (Fedorko 2010).

However, certain corrections to the decibel level can be made given a certain situation. If the noise is not smooth and continuous and is not radiated at nighttime between the hours of 7:00 pm and 7:00 am, one or more of the following corrections shall be added or subtracted from each of the decibel bands given above (Code of the Borough of Hawthorne, New Jersey):

- Day time operation only (+5)
- Noise source operates less than:
    - 20% of any 1-hour period (+5)
    - 5% of any 1-hour period (+10)
- Noise of impulsive character (hammering, etc) (-5)
- Noise of periodic character (hum, screech, etc) (-5)
- Property is located not within 500 feet measured horizontally or vertically of any R District (+10)

COMPARISON CHART

In order to understand decibels, a chart of common comparisons is provided (**Fig. 25**). On the low end of the chart, breathing is averaged to be about ten decibels; while a normal conversation is said to be about sixty decibels. At around 120 decibels the human begins to feel discomfort from sound; and at about 130 decibels, the average human ear will feel pain.

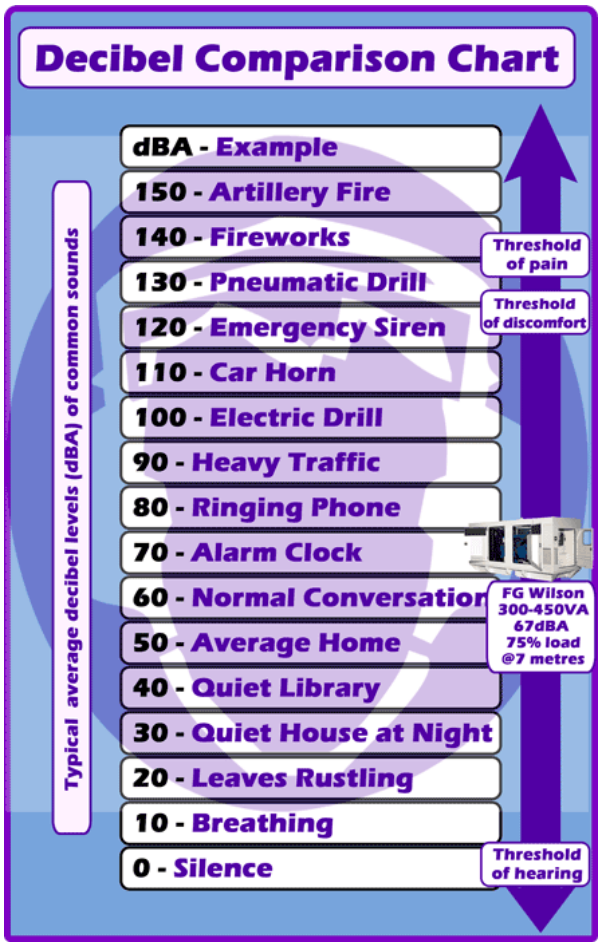


Fig. 25. Decibel Comparison Chart. Chart from the Stuart Group.

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O_3: Ramapo (Ramapo Mountain State Forest) (~9 miles from Hawthorne)
http://www.njaqinow.net/StationInfo.aspx?ST_ID=23

CO, NO_2, Temperature, RH%: East Orange (~13 miles from Oakland)
http://www.njaqinow.net/StationInfo.aspx?ST_ID=9

$PM_{2.5}$, winddir, windsp, wd, ws, SO_2-Tr, CO-Tr (also $O_{3)}$: Newark Firehouse (~15 Miles from Hawthorne) http://www.njaqinow.net/StationInfo.aspx?ST_ID=34

SO_2, CO, smoke: Jersey City (~17 miles from Hawthorne)
http://www.njaqinow.net/StationInfo.aspx?ST_ID=16

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