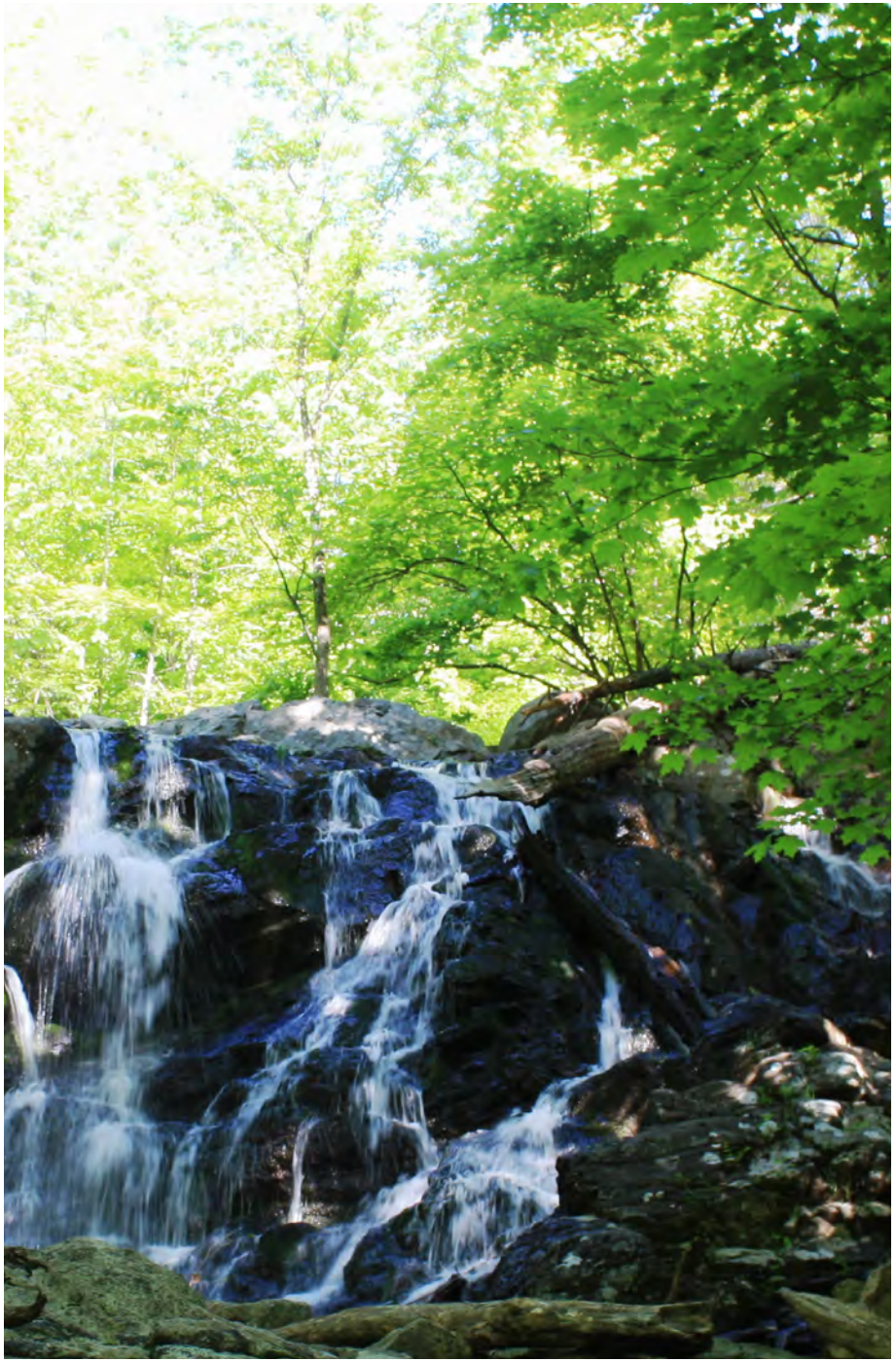
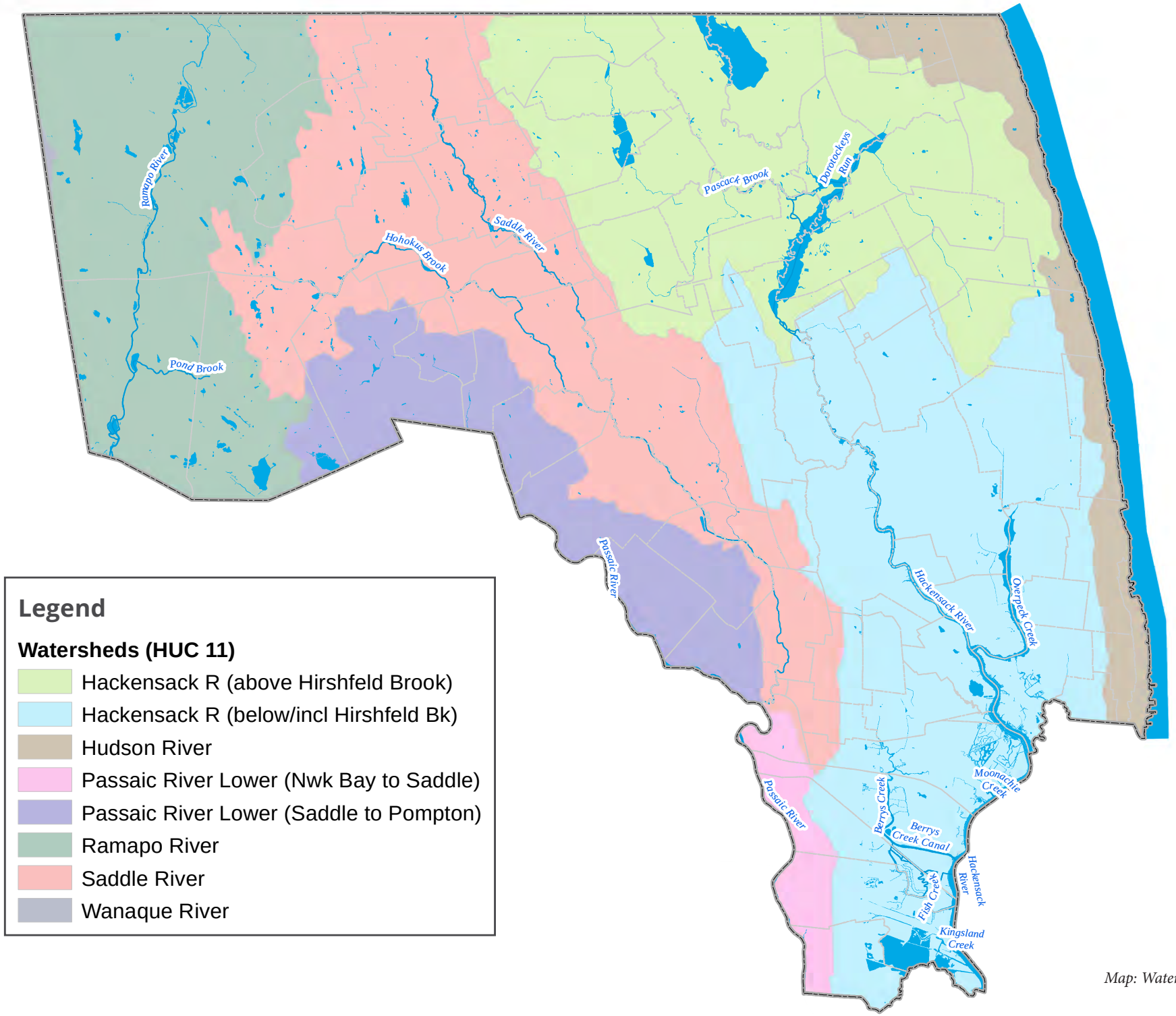
WATERSHEDS

Watershed boundaries designate the expanse of land from which water washes off and the system of waterways which all flow to one major waterway. These named watersheds correspond to the main waterways where water is collected. In Bergen County, major waterways include the Hudson River, Ramapo River, Hackensack River, Saddle River, and Passaic River. Each of these rivers help to define the landscape of the county, such as the physical boundaries created by the Passaic River also serve as some of the political boundaries between Passaic County, Essex County and Bergen County, the Hackensack River serves as a partial boundary between Bergen and Hudson County, or how the Hudson River serves as the eastern boundary of northern New Jersey.

Bergen County is located entirely in the Lower Hudson Basin, meaning that all precipitation and waterways eventually enter the Hudson River. The Lower Hudson Basin is a watershed that extends beyond Bergen County and New Jersey to include any region where water enters this river. Larger watersheds, such as the Lower Hudson Basin, are comprised of progressively smaller constituent watersheds (and conversely combine with others to form larger regions), the size and extent of which are identified by their Hydrologic Unit Code (HUC). Basically, the longer the HUC code, the smaller the watershed. On the HUC11 level, Bergen County is located within the following subwatersheds: the Ramapo River, Saddle River, Hackensack River (above Hirshfeld Brook), Hackensack River (below, and including, Hirshfeld Brook), Hudson River, Passaic River Lower (Saddle River to Pompton), and Passaic River Lower (Newark Bay to Saddle River). The Ramapo Mountains largely serve as one of the boundaries between Bergen and Passaic County, which also delineate another watershed boundary, the Wanaque River subwatershed, although it should be noted the Wanaque River subwatershed extends slightly into Bergen County, an example that watershed boundaries often do not correspond to political (state, county, municipality) boundaries. These eight watersheds are shown in the Watershed Boundaries Map.



Ramapo Valley County Reservation. Source: Colliers Engineering & Design



Map: Watersheds

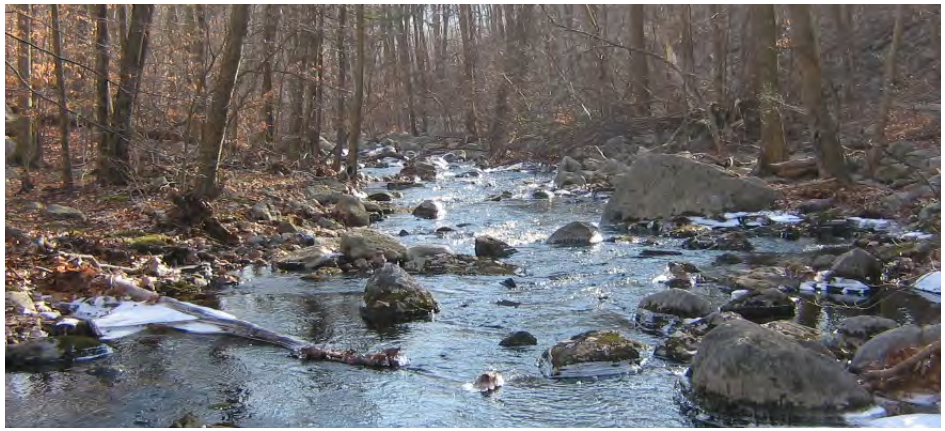
SURFACE WATERS

The New Jersey Department of Environmental Protection (NJDEP) periodically releases information about the health of the state's waterways. This includes the Integrated Water Quality Monitoring and Assessment Report, which uses methods and analysis prescribed by the Federal Clean Water Act. The report evaluates each sub-watershed for the viability of different uses which depend upon the health and safety of the water (including drinking water supplies, recreation, aquatic life, fish/shellfish consumption, and water supplies for industrial and agricultural uses). If impairments are discovered, the report identifies restorative responses. The 2010 Integrated Report found only one subwatershed in the state that fully supported all applicable uses, the Big Flat Brook, in Sussex County.[11] In Bergen County, several subwatersheds fully support drinking water uses and recreational uses, while most watersheds fully support industrial uses.

The Highlands yields approximately 379 million gallons of water daily and is a vital source of drinking water for over 5 million residents of New Jersey. Protecting New Jersey's drinking water is critically important to maintaining the future economic viability of the entire state. The Highlands region contributes a significant portion of the county's water supply. Of the 68 municipalities located outside of the Highlands region in Bergen County, all but 7 obtain their water from the Highlands; 53 municipalities receive up to 25 percent of their water from the Highlands, 4 get between 26 and 50 percent, and 4 get between 51 and 75 percent. Given the importance of water quality to Bergen County and to communities throughout the state, state legislation regulates how development can occur within the Highlands Region in order to maintain and protect water and other important natural resources. Land in the Highlands Region is designated as either Preservation or Planning Area, with lands in the Preservation Area more strictly regulated. The main difference between the Preservation and Planning Areas is that municipal and county conformance with the Highlands Regional Master Plan is required in the Preservation Area and is voluntary in the Planning Area. In Bergen County, only **Mahwah** and **Oakland** fall within the Highlands Region with areas in both the Preservation Area (**Mahwah**: 9,687 acres; **Oakland**: 2,622 acres) as well as the Planning Areas (**Mahwah**: 7,082 acres; **Oakland**: 3,007 acres).[12]

Outside of the Highlands, Bergen County relies on a series of different surface and groundwater systems. The Oradell Reservoir, the Wanaque Reservoir, and other surface and groundwater resources provide drinking water for much of the county; these supplies require replenishment from rainfall. Veolia North America (formerly known as SUEZ North America, and before that, United Water New Jersey), the largest water provider in Bergen County, relies on the Oradell, Woodcliff Lake and Lake Tappan reservoirs in Bergen County and the Lake DeForest Reservoir in Rockland County, New York.[13]

The New Jersey Meadowlands Region, also known as the Hackensack Meadowlands, consists of over 30 square miles with 8,400 acres of open space, waterways and wetlands in Hudson and Bergen Counties. The southeastern portion of Bergen County falls within the New Jersey Meadowlands District, including portions of **Carlstadt, East Rutherford, Little Ferry, Lyndhurst, Moonachie, North Arlington, Ridgefield, Rutherford, South Hackensack,** and **Teterboro**. Following the state's decision to merge the New Jersey Meadowlands Commission into the New Jersey Sports and Exposition Authority (NJSEA) in 2015, the NJSEA manages environmental protection, economic development and solid waste management for the area, continuing the original purpose of the Meadowlands Commission to preserve the delicate balance of nature, while providing special protection from air and water pollution and a special provision for solid waste disposal. The NJSEA reviews all plans for development within the Meadowlands District, including redevelopment projects, as they are responsible for establishing and enforcing zoning and subdivision regulations.



Ramapo Valley County Reservation. Source: Colliers Engineering & Design

RESOURCE MANAGEMENT

The linkages between the natural and built environment require the effective management of both to ensure the overall health and quality of life of the county. As a result, an evaluation of the environment and natural resources in Bergen County is not complete without an understanding of how these resources are utilized and affected by the built environment. As described in the introduction to this Master Plan, most of Bergen County is located in the Metropolitan Planning Area (PA-1). This designation, which is assigned by the State Plan, enables the extension of water and wastewater service into areas of the municipality where development may have originally utilized on-site wells and septic systems. In contrast, extension of utilities is limited in those areas of the county designated as Environmentally Sensitive (PA-5), which are largely located around its Category 1 waterways, reservoirs, and in the Highlands Preservation areas. To illustrate this point, private wells are the predominant water source in only 1 of Bergen County's 70 municipalities—**Upper Saddle River**.[14] Wastewater management is similarly provided by public utilities, in contrast to on-site septic systems. In Bergen County, most of **Alpine** is serviced through septic systems. In other communities where septic systems pre-dated sewer service, including **Oakland** and **Franklin Lakes**, there have been recent initiatives to extend sewer service to previously septic-dependent properties.

The following section provides a summary of water and wastewater management in Bergen County, as different entities (including private companies, utilities, municipalities, public authorities) play different roles in the ownership and management of each system, or portions of systems (collection systems, treatment systems, or in the case of drinking water, provide the source water). Furthermore, these divisions do not always follow municipal boundaries, as different entities may have different agreements in different service areas.

WATER SUPPLIES AND SYSTEMS

Most of the county receives their water through a public service, as opposed to on-site water wells. There are several water purveyors in Bergen County. Veolia North America is the largest, providing water to the majority of Bergen County, servicing all or parts of nearly 60 municipalities.[15] Veolia North America's water is sourced from a combination of aquifers, reservoirs (including the Oradell Reservoir and Wanaque Reservoir), surface waters (including the Hirschfeld Brook, Saddle River, and Sparkill Brook) as well as purchased water from the Jersey City Water Department and the Passaic Valley Water Commission.[16] Veolia North America customers in **Franklin Lakes** receive water from aquifers, the Wanaque Reservoir, as well as purchased water from the Ridgewood Water Department and **Oakland**.[17] Northwest Bergen and the western half of Central Bergen rely upon local water purveyors, whose water sources include combination of wells, surface waters, and purchases from neighboring communities and providers.

The Passaic Valley Water Commission serves customers in Bergen County, primarily those located along the Passaic River, including **Elmwood Park, Fair Lawn, Garfield, Lodi, Lyndhurst, North Arlington**, and **Wallington.** The primary source of water supply is the Pompton and Passaic Rivers. The main treatment facility is located in Totowa, in Passaic County.

In addition to the larger utility companies, there are several municipally-run water departments, including the Oakland Water Utility, Park Ridge Water Department, the Ridgewood Water Department, the Fair Lawn Water Department, and the Waldwick Water Department. In addition to the utilities that maintain the delivery infrastructure and manage the water delivery, the North Jersey District Water Supply Commission provides treated water to other entities for distribution through their own systems, managing reservoirs in Wanaque and Monksville, both located in Passaic County.

Bergen County's Office of Environmental Health, through its Wellhead Protection Program, protects public non-community water sources, such as those serving schools, restaurants, office buildings, hotels, swim clubs and parks. In addition, its Water Pollution Program addresses complaints related to illegal surface water discharges.

WASTEWATER MANAGEMENT

Wastewater is the water that is discarded after use or impact by humans. Wastewater can include sewage from residential and commercial sites (black water), water used to wash dishes and clothing (gray water), process water used in industrial plants, and stormwater runoff in the communities with combined stormwater and wastewater systems. If not treated properly, wastewater can contaminate our waterways. This can occur if a sewage system fails or a combined system overflows into streams and rivers. Because of the danger this poses to the ecosystem and to our drinking water supply, the county is committed to the safe and effective treatment and disposal of wastewater.

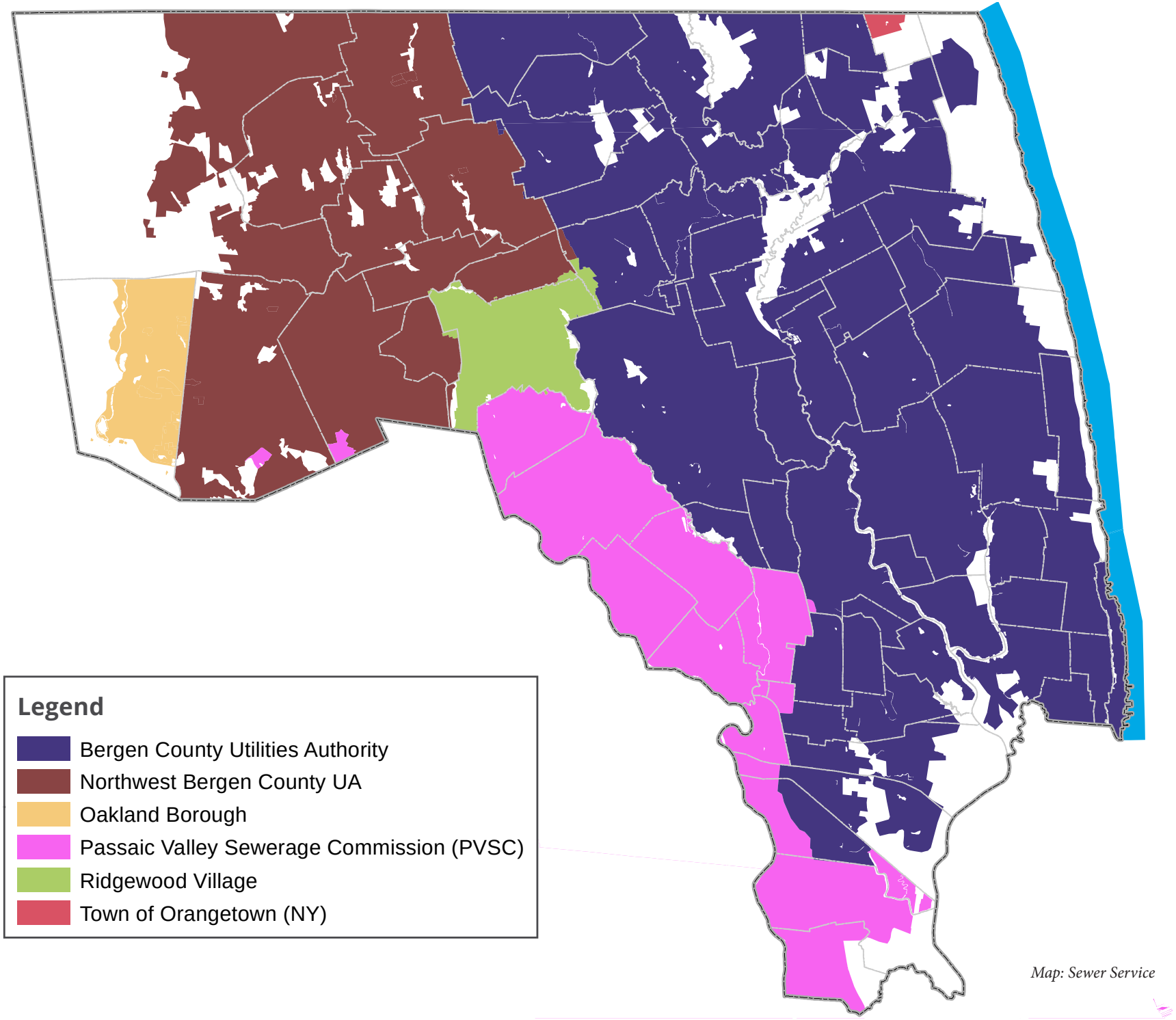
Most of Bergen County is located within a sewer service area and is serviced by a public sewer system. Wastewater treatment in Bergen County is provided primarily by three utility authorities: the Bergen County Utilities Authority (BCUA), the Northwest Bergen County Utilities Authority (NBCUA), and the Passaic Valley Sewerage Commission (PVSC). The BCUA is a public utility that covers most of the county (48 municipalities), including the entirety of the Pascack Valley and Northern Valley regions, and portions of the Central Bergen, Southeast Bergen, and Southwest Bergen regions, including **Edgewater**. The NBCUA covers most of the Northwest Bergen region. In 2018, **Oakland** revised its Wastewater Management Plan to transfer its wastewater flows to the NBCUA. PVSC generally covers the western portion of Central Bergen, and the southern portion of Southwest Bergen, as well as a connection agreement with **Franklin Lakes. Ridgewood** maintains its own individual sewer service area, and **Rockleigh's** sewer service and sewage treatment is provided by the Town of Orangetown (New York).

While most of Bergen County's municipalities have separated stormwater and wastewater systems, **Fort Lee, Hackensack**, and **Ridgefield Park** still have small sections of combined stormwater and wastewater systems. When these systems are pushed beyond their capacity, often due to a combination of heavy rains and blockages to the sewer systems from litter or deterioration of the system, combined systems will empty into waterways, known as a combined sewer overflow (CSO). Of the over 200 overflow discharge points in New Jersey, Bergen County contains approximately 10, as illustrated in the CSO Map.

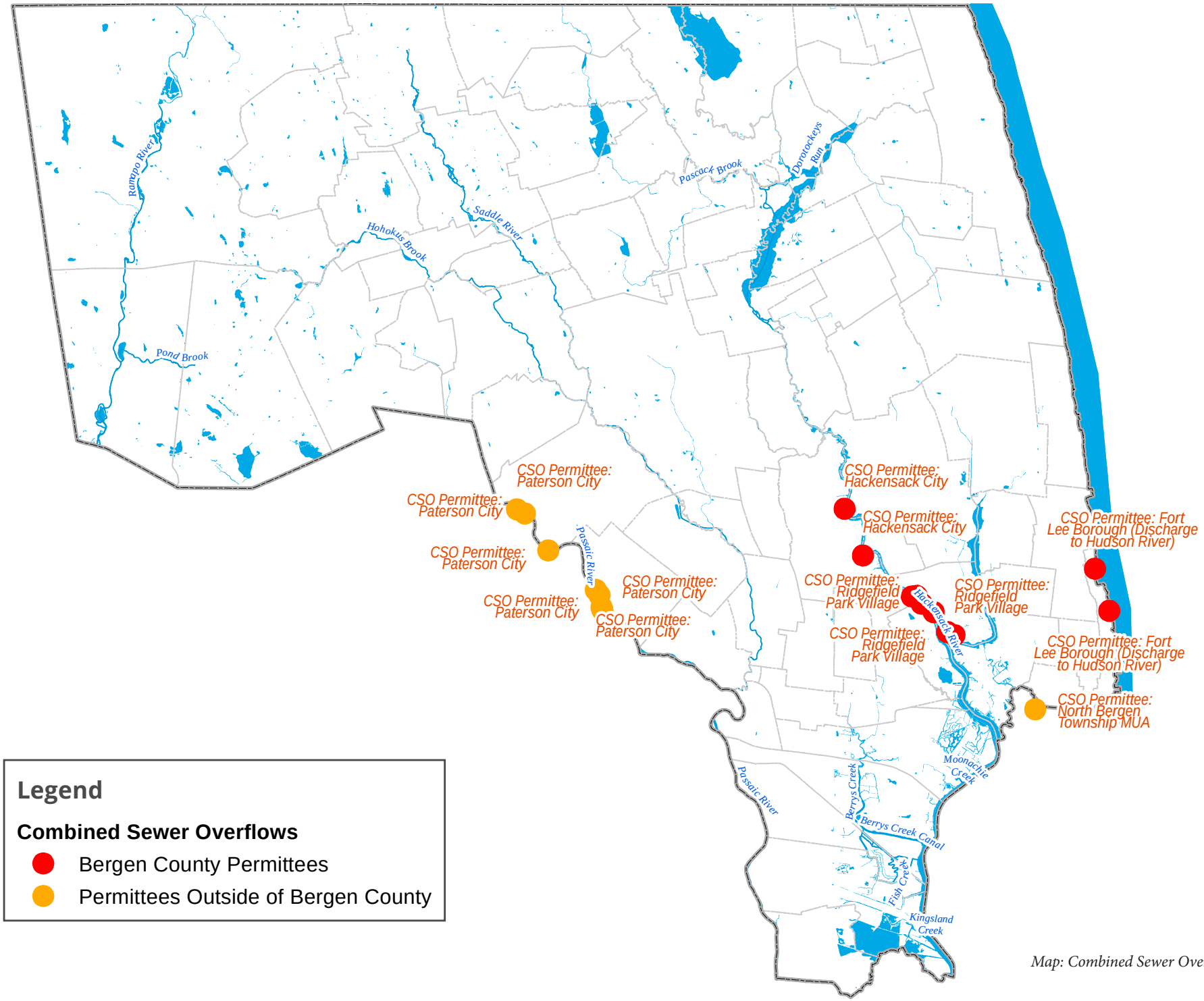
Bergen County's shared boundaries with neighboring Passaic and Hudson County along the Passaic and Hackensack Rivers, respectively, means that the county is also affected by combined sewer overflows into these rivers from neighboring communities. Currently these municipalities, along with the BCUA, are in the process of working with NJDEP to update their permits required under the Clean Water Act, known as "long-term control plans," which will require them to reduce or eliminate overflows.

There are also several areas in the county where septic systems are still utilized, either predating sewer systems, or in areas located outside sewer service area. The Northern Valley municipalities of **Alpine** and **Rockleigh** contain significant portions of their developed land area outside of sewer service areas. **Franklin Lakes** is in a sewer service area; however, many homes still utilize onsite septic systems. Recently, Northwest Bergen County Utility Authority and **Franklin Lakes** have undertaken work to convert and incorporate more properties to the sewer service areas. The Highlands communities of **Mahwah** and **Oakland** contain area in both the Highlands Planning Area, and the Highlands Preservation Area. Lands inside the Highlands Preservation Area correspond to those areas of the towns located outside of the sewer service area, as where large-scale development projects (including those that would typically require sewer service) in the Preservation Area are strictly regulated and require NJDEP approval.

A partnership program between the Bergen County Utilities Authority (BCUA) and the energy utility PSE&G is currently implementing a program to reuse wastewater. BCUA, through its Little Ferry Water Pollution Control facility, provides PSE&G with treated effluent (wastewater), for essential cooling processes in their electricity-generating procedure. Prior to its implementation, PSE&G's Bergen Generating Station would withdraw approximately 400,000 gallons of water annually from Overpeck Creek, using it to help cool the water used in their generating process before discharging it into the Hackensack River. At the same time, the adjacent BCUA plant would discharge its treated effluent into the Hackensack River. Under this program, upgrades to both systems permit PSE&G to draw from this supply of treated effluent, not only reducing the amount of potable water used for this process, but also the amount of treated effluent discharged into the Hackensack River. In 2014, this program enabled PSE&G to reuse over 1.2 million gallons of treated effluent.[18]



Map: Sewer Service



Map: Combined Sewer Overflows

STORMWATER MANAGEMENT

In a natural water system, rainwater infiltrates the ground or enters a waterbody. In developed areas, impervious surfaces inhibit natural infiltration of water, leaving runoff to collect and transport materials, chemicals, or even heat from these surfaces into the ground or waterways, polluting them and causing greater problems. While images of marine life suffocating from plastic six-pack rings have become iconic reminders of the impacts from littering, stormwater pollution can come from a variety of sources and cause extensive damage without effective management. Thermal pollution, generated when stormwater travels over hot surfaces and directly into waterways, can stress fish and other aquatic life that require a certain temperature for survival. Improper or excessive use of lawn treatment chemicals can trigger algal blooms in waterbodies and reduce oxygen availability. Winter roadway treatments using salts can harm freshwater species as well as contaminate and degrade water supply. In communities with combined stormwater and wastewater systems, ineffective stormwater management can overwhelm the system during rain events and cause sewage discharge into waterways. In Bergen County, developed lands occupy a significant portion of the landscape. Therefore, management of stormwater is necessary to protect surface and groundwater supplies relied upon not only by plants and animals, but also residents, visitors, and businesses.

In addition to the evaluation of land cover to determine existing uses, this data is also used to estimate the extent of impervious coverage, or developed lands, including paved surfaces and buildings that inhibit and redirect the natural infiltration of water into the soil. Based on an analysis of the state's 2012 statewide land cover data, the areas of the county containing the greatest concentrations of pervious coverage correspond with the regions containing natural land uses, including forests. Large expanses of this can be found in **Mahwah, Oakland, Alpine**, and the Meadowlands communities of **Lyndhurst, East Rutherford, Carlstadt**, and **Moonachie**. In the communities of **Upper Saddle River, Saddle River, Franklin Lakes, Allendale, Woodcliff Lake**, and **Wyckoff**, most of the landscape is characterized by 10 to 25 percent impervious coverage. Municipalities containing lands with the highest percentages of impervious coverage (between 85 and 100 percent) include **South Hackensack, Edgewater**, and **Teterboro**.

To avoid the problems and dangers that ineffective stormwater management poses to both the ecosystem and the drinking water supply, the county is committed to the safe and effective treatment and disposal of stormwater. While municipalities manage land use through zoning, the county planning board only has authority to review and approve subdivisions and site plans that affect county roads or drainage facilities. In addition, the State of New Jersey has delegated the review of new and amended municipal stormwater plans and ordinances to the counties (N.J.S.A. 40:55D-97 and N.J.A.C. 7:8-4.4). To date, the Bergen County has reviewed and approved municipal stormwater management plans and ordinances for all 70 municipalities. With over 450 miles of county roads and over 9,000 acres of county parkland along with numerous county properties and facilities, development regulations that promote best management practices of stormwater are critical. In 2018, the county adopted revised development regulations that incorporated new standards for stormwater management and the promotion of environmental sustainability, including recommending the use of porous pavements, solar panels, vegetated islands and buffers, low-maintenance street trees, and incentives for obtaining LEED Certification.[19]

Storm Drain. Source: Colliers Engineering & Design

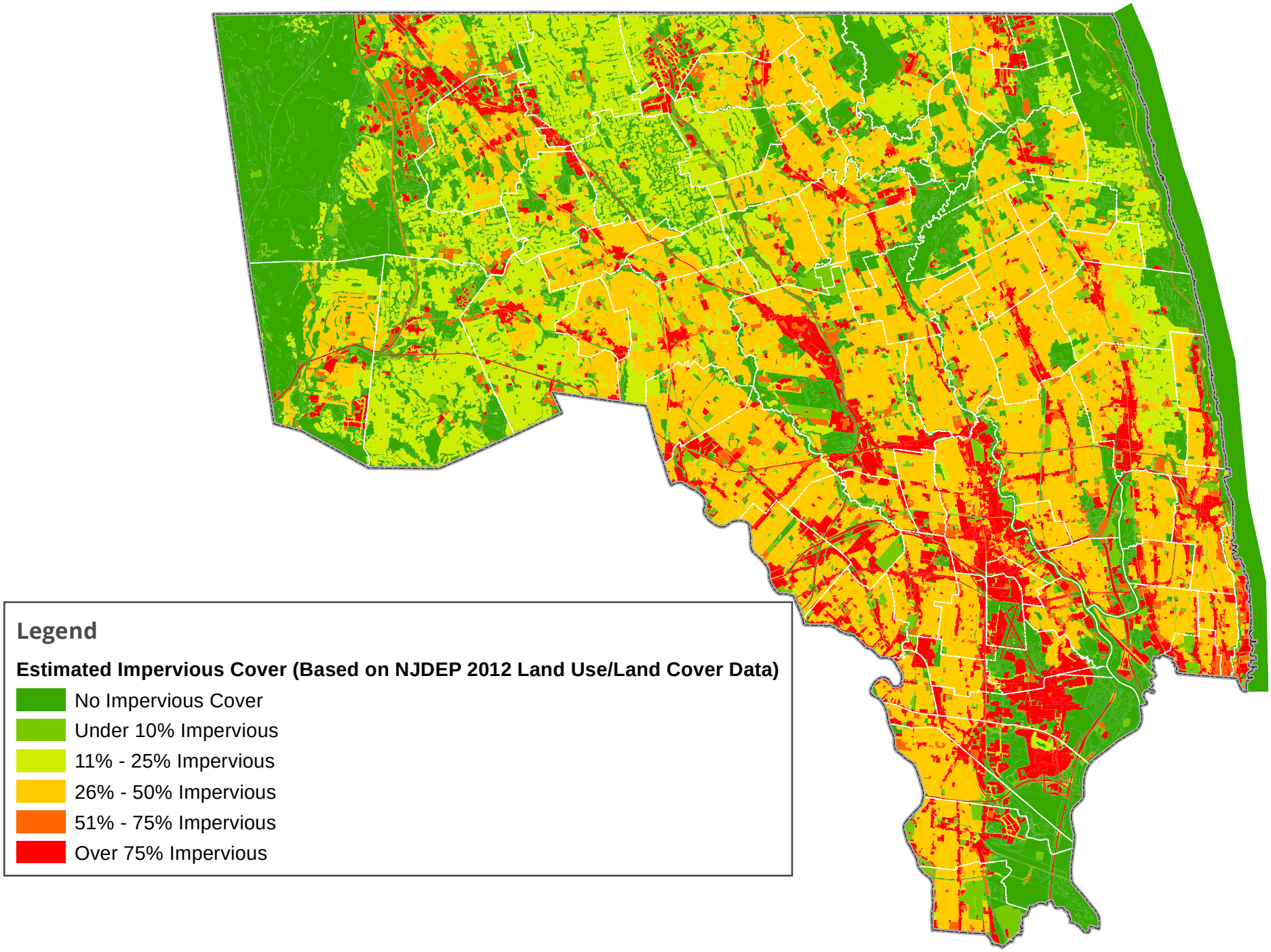
Ramapo Valley County Reservation. Source: Colliers Engineering & Design

DAMS

Dams and other water control measures are used for a variety of different purposes, including flood control (such as levees), power generation (hydroelectric dams), irrigation, and water storage (for reservoirs and recreational lakes). Given the diversity of water features in Bergen County, its large population, and its highly developed landscape, it should not come as a surprise that the county contains numerous water control features. Based on the most recent National Inventory of Dams data from the U.S. Army Corps of Engineers, Bergen County contains 25 dams that meet certain criteria (high hazard potential, height of the dam, and storage area). The dams located in Bergen County include structures that are publicly (state, county and municipal) and privately owned (water supply utilities, community associations, and golf courses). It should also be noted that this inventory is limited to those dams that the Army Corps of Engineers can verify based on state-level permitting. In addition, the Army Corps National Levee Database identifies one levee system in Bergen County, a tidal berm located in Carlstadt, Little Ferry, and South Hackensack, along portions of the Hackensack River.

The County of Bergen owns 6 water control facilities listed in the Army Corps' National Inventory of Dams: the Lake Tamarack Dam; Lake Vreeland Dam; McMillan Reservoir Dam; Darlington Lake Dam; Campgaw Mountain Lake Dam; and the Overpeck Tidal Dam. With the exception of Overpeck, these dams are managed by the Department of Parks and used to support recreational operations (such as manmade lakes).

The Overpeck Creek Tide Gates and accessory facilities are located on the east side of the northbound lanes of Interstate 95 (NJ Turnpike, I-95), were constructed in 1955 with major rehabilitations in 1968 and 1995-1996. The Overpeck Creek forms a lake (Overpeck Lake) before it empties into the Hackensack River and runs from **Teaneck**, through **Ridgefield Park, Leonia,** and **Palisades Park** before entering the Hackensack River at **Little Ferry**. The purpose of the tide gates is to control the water elevation of Overpeck Creek east of I-95 by limiting the effect of tidal influence on the Overpeck Lake. The creek and lake are under tidal influences from the Hackensack River. The tide gates prevent tidal flooding from the Hackensack River into Overpeck Creek and are programmed to maintain a set water level in the Overpeck Lake. The tide gates open to allow flow out of Overpeck Lake when the tide level in the Hackensack River is low, and close when the Hackensack River tide level is above the lake level. In addition, the tide gates open when the level in Overpeck Lake is below 0.5 ft and the tide level in the Hackensack River is higher than the lake level to restore lake water level with tidal flows. The gates operation is fully automated as a function of the tide and lake water elevations, with local operations controlled on site, and remote operations controlled from Department of Public Works (DPW) offices at the county's administration building in **Hackensack**. While operation of the tide gates have continued to function as intended, they cannot function if extreme weather, such as a storm event that causes a storm surge during a high tide period, since the gates will only open when the water level is lower on the tidal side of the creek, and can lead to increased water levels in the Overpeck Lake.



Map: Impervious Surface Cover

GREEN INFRASTRUCTURE

Green Stormwater Infrastructure (GSI), also referred to as green infrastructure, provides an alternative approach to managing stormwater. In contrast to "gray" infrastructure, which refers to a large-scale collection system to quickly channel, direct, collect and dispose of stormwater, green infrastructure mimics or employs natural processes to capture stormwater where it falls, enabling it to absorb into the ground or planted areas, evaporate, or be stored for reuse. Green infrastructure includes such elements as green roofs, street trees, rain gardens, and planted swales, but also localized systems such as rain barrels, porous pavements and collection cisterns. These systems do not necessarily replace the need for the traditional gray infrastructure; however, they can help to free up additional capacity in the larger systems. This additional capacity is especially important during heavy rain events, and also reduces the need for large scale capital expansion projects. Green infrastructure can also provide aesthetic benefits when it can serve the additional purpose of beautifying a streetscape, or recreational benefits when green infrastructure is incorporated into the design of a park.

In addition to the water quality problems associated with stormwater pollution, the quantity of stormwater can stress wastewater management systems. While this is particularly true in communities with combined stormwater and wastewater systems as described in the previous section, stormwater can also affect the wastewater systems of communities with separated systems where its entry reduces available capacity of the collection and treatment systems. In the case of separated systems, stormwater can enter the wastewater system in two ways: inflow and infiltration. Inflow occurs when roof gutter downspouts or sump pumps discharge into a wastewater line, and infiltration occurs when rainwater enters a sewage system due to leaks in the collection lines. To help reduce combined sewer discharges and the introduction of stormwater into collection systems, wastewater utilities have encouraged the use of green infrastructure through giveaways or sales of rain barrels. PVSC has also offered educational programs on the benefits of green infrastructure, and the installation of rain gardens and collection cisterns.

GREEN INFRASTRUCTURE VS. GRAY INFRASTRUCTURE

Green infrastructure refers to design techniques used to manage stormwater in a way that mimics or employs natural processes to capture stormwater where it falls instead of immediately directing it toward a storm sewer. Green infrastructure allows stormwater to either absorb into the ground or planted areas, evaporate, or be stored for reuse, and includes such designs as vegetated green roofs, downspout planter boxes, planted strips along roadways and sidewalks, and rain gardens, but can also include rain barrels and porous pavements. "Gray" infrastructure refers to stormwater management that includes drains, pipes, sewers, and outfalls used to collect and quickly remove stormwater. Gray infrastructure also refers to combined stormwater and sewer systems. Green infrastructure can be optimized when it complements gray infrastructure by managing the first inch or two of rain at the source to reduce stormwater pollution from routine weather events, while also freeing up capacity for the gray system during more extreme weather events. In contrast to most "gray" stormwater infrastructure, green infrastructure is publicly visible and can provide secondary benefits when it is used as part of a public beautification project, designed into a park, regulates temperatures in warmer months, or is reused for irrigation.

Bergen County's geographic diversity, infrastructure, and development patterns place the county at risk of natural disasters, with projections that climate change will contribute to the frequency and intensity of such events. Bergen County last updated its Multi-Jurisdictional All-Hazards Mitigation Plan in 2020 and was approved by FEMA on June 7, 2021, and will expire on June 6, 2026. This plan represents Bergen County and all 70 municipalities. Preparation of the plan also included participation and input from regional entities such as the New Jersey Sports and Exposition Authority and the New Jersey Highlands Council. In addition to natural hazards, which were emphasized as part of the 2015 Multi-Jurisdictional All-Hazards Mitigation Plan, the 2020 plan also addressed human-caused hazards (such as terrorism and cyber-attacks). The natural hazards identified by the 2020 All-Hazards Mitigation Plan include coastal erosion, dam and levee failure, drought, earthquake, flood (including riverine, coastal, storm surge, and stormwater flooding caused by local drainage and high groundwater levels), geological hazards (landslide), hurricane and tropical storms, nor'easter, severe weather (high winds, tornadoes, thunderstorms, and extreme temperature), winter storms (snow, blizzards, and ice storms), and wildfire. Each of these hazards are described at length in the plan. Each hazard also includes an examination of how it may be affected by climate change.

As described in the previous section, many areas of Bergen County can flood during heavy rains. In the southern portions of the county along the tidal sections of the Passaic, Hackensack and Hudson Rivers, the effects of riverine flooding are increased when combined with sea level rise and storm surges.

Rutgers University's NJ Flood Mapper tool[20] is an interactive website designed to provide a visualization tool for communities to understand their risk from storms, floods, and sea level rise to promote preparedness, but also for consideration as part of future land use planning. The tool shows FEMA flood maps, sea level rise scenarios of 1 to 10 feet, hurricane scenario mapping for Category 1 through 4 storms, and municipal snapshots detailing critical facilities at risk of potential flood events. The tool also includes the extent of flooding experienced during Hurricane Sandy as a comparison, as well as locations of critical facilities (including: schools, police/fire, hospitals, assisted living facilities, energy generation facilities, wastewater treatment facilities, and evacuation routes), economic vulnerability (the number of businesses and employees at risk in a certain area), and social vulnerability (including: socioeconomic status, households with disabilities/children/seniors, race/ethnicity/language, and areas with concentrations of multi-unit housing, mobile homes, overcrowding, households with no vehicle, and group quarters).

Utilizing this tool, areas at particular risk of sea level rise and coastal flooding include the low-lying parts of **North Arlington, Lyndhurst, Rutherford, East Rutherford, Carlstadt, Moonachie, Little Ferry, Ridgefield, Ridgefield Park** and **Teterboro**. All of those municipalities have significant amounts of water or wetlands and also partially fall within the 100-year storm surge flood zone according to the Federal Emergency Management Agency (FEMA), meaning that they are considered at high risk for flooding. Additionally, the following municipalities have portions that fall within the 100-year storm surge flood zone: **Fairview, Palisades Park, Leonia, Englewood, Teaneck, Bogota, Hackensack, South Hackensack, Hasbrouck Heights**, and **Wood-Ridge**. Most of these areas experienced significant flooding from Hurricane Irene in 2011 and Hurricane Sandy 2012; hurricane projection tools suggest that a Category 1 storm would result in a similar extent of flooding, while stronger storms could inundate these same areas with more than 9 feet of water. And while sea level rise occurs more gradually than the storm surge generated by a hurricane, and the rate of sea level rise varies based on the study, a 6 foot rise in sea level suggests that the same areas inundated by Sandy could see similar flooding during high tides. Sea level rise in the Meadowlands could be particularly damaging, as the reduction of wetland areas will result in habitat loss for native species, but also remove a natural buffer to surrounding developed areas.[21] Following Hurricane Sandy, the federal government's Hurricane Sandy Rebuilding Task Force launched a design competition to develop implementable solutions to improve storm resilience. Known as Rebuild By Design, the competition included partners on the non-profit and philanthropic sectors, as well as the U.S. Department of Housing and Urban Development (HUD), and evaluated proposals from 148 teams, which were then narrowed down to 10 design teams.

The 10 design teams prepared 41 potential design opportunities, which were then narrowed down to 10 proposals. Of these proposals, HUD awarded $930 million to implement the first phases of 6 winning proposals and 1 finalist. One of these proposals, known as "New Meadowlands" focuses on flood risk reduction projects in the Bergen County municipalities of **Little Ferry** and **Moonachie**, but also encompasses **Carlstadt**, **South Hackensack**, and T**eterboro**. The Sustainability Element examines some of the approaches taken in Bergen County to incorporate storm resilience into local and regional planning as a way to mitigate these effects.

The municipalities most at risk contain crucial transportation infrastructure, with all three Bergen County NJ Transit passenger lines and multiple freight lines passing through them, plus regionally and locally important roads including the New Jersey Turnpike, I-80, numerous state and county highways, as well as Teterboro Airport. Bergen County's metropolitan planning organization, the North Jersey Transportation Planning Authority (NJTPA), has concluded that New Jersey's transportation infrastructure will face serious problems from sea level rise.

Extreme weather, such as excessive rainfall, can cause dam or levee failures, which are certainly of concern in Bergen County, which contains 79 state-regulated dams, where failure could lead to loss of life, property damage, interruption of utility service or other operations.[22] In the Pascack Valley, heavy rains from storms such as Hurricane Ida can stress reservoirs beyond their capacity, and lead to flooding in surrounding communities, including **Oradell**, **New Milford**, and **River Edge**. Extreme weather and flooding can also affect water quality. In addition to the water quality problems caused by stormwater described in the previous section, floodwaters can disrupt wastewater treatment facilities, which are typically located at low elevations. Storms that flood the facilities or block outfall pipes can cause serious problems. During Hurricane Sandy, the Passaic Valley Sewerage Commission's main treatment facility released 240 million gallons of raw or partially treated sewage per day into Newark Bay and Upper New York Bay.[23]

Extreme temperatures can also have a significant impact. Pavement can be harmed by extreme heat or cold that occurs for long spans of days at a time. Extreme heat can exacerbate air quality problems, especially when stagnant atmospheric conditions trap pollutants. The heat can lead to asphalt rutting over time, especially on roads where truck traffic is heavy. Conversely, the cold can cause the road to deteriorate over time during freeze-thaw cycles, increasing the costs for both roadway and vehicle maintenance and repairs.[24]

Droughts, such as the two events in 2002 (December 2001 through May 2002, classified as an extreme drought, and July 2002 through September 2002, classified as a severe drought) which followed a very dry winter can diminish water supplies.[25] Climate change can affect the frequency and intensity of these events. This creates cause for concern when Bergen County relies on the Oradell Reservoir and the Wanaque Reservoir, among other surface and groundwater resources, for potable water.

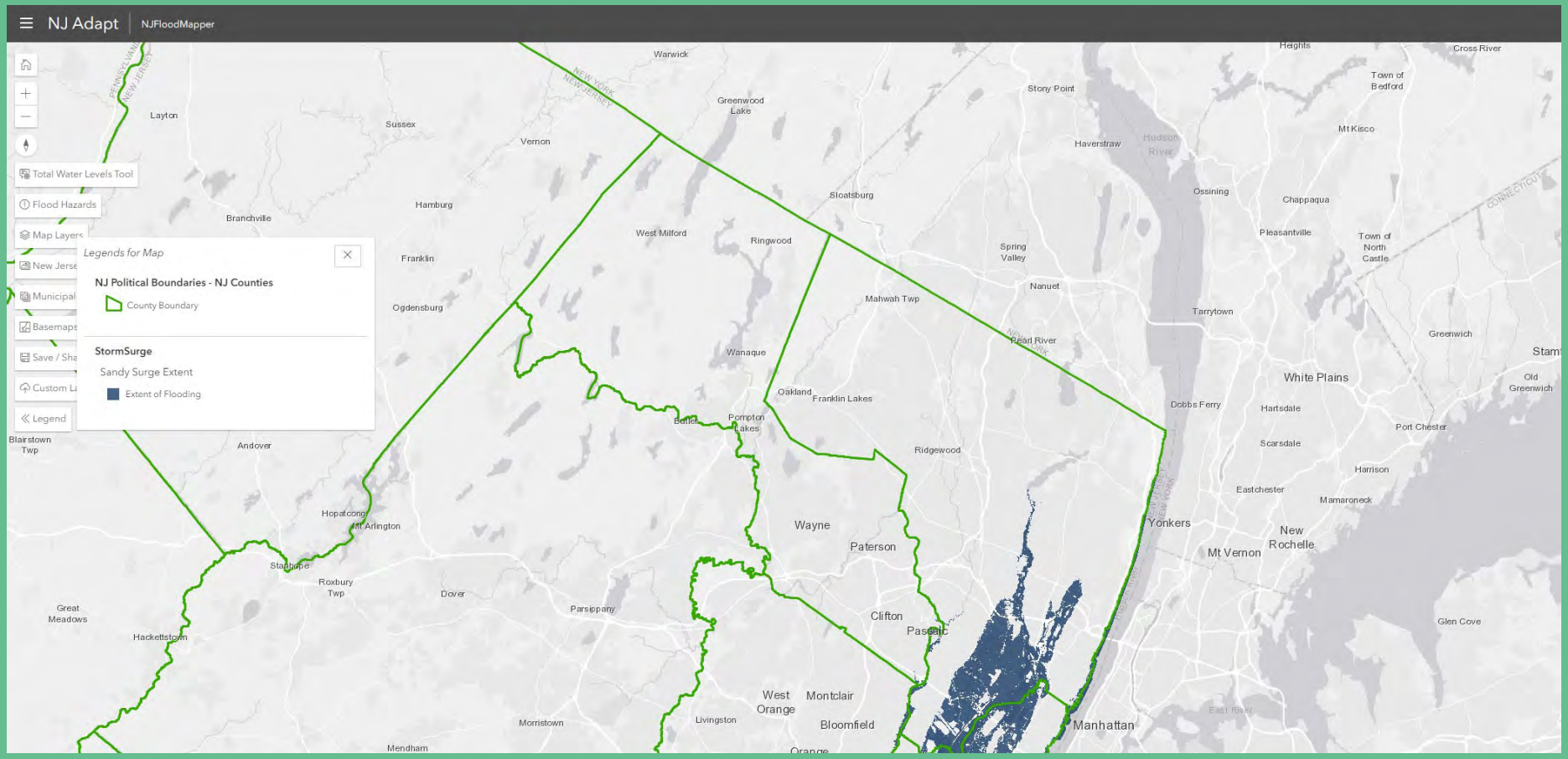
The 2020 All-Hazards Mitigation Plan also identifies earthquakes as a potential threat to Bergen County due to the presence of the Border Fault, a fault that serves as the boundary line between the Highlands and Piedmont physiographic provinces. The 2020 Plan references that the largest earthquakes to hit the region, estimated at a 5.2 magnitude, occurred in 1737 and 1834.[26] The New Jersey Geological Survey studied the impacts of an earthquake to Bergen County, estimating that a 5.0 magnitude earthquake would result in 12,800 buildings damaged, $1.08 billion in property damages, and $80 million in business interruption losses.[27] The most recent earthquake with an epicenter in Bergen County was in 2014, with a magnitude of 1.3.[28] Landslides are also identified as common to the area, with the Palisades being one of the most active areas in the state. The Plan also notes that while **Edgewater** has the greatest percent of their land area delineated with landslide susceptible soils, **Mahwah** has the greatest area delineated with landslide susceptible soils.[29]

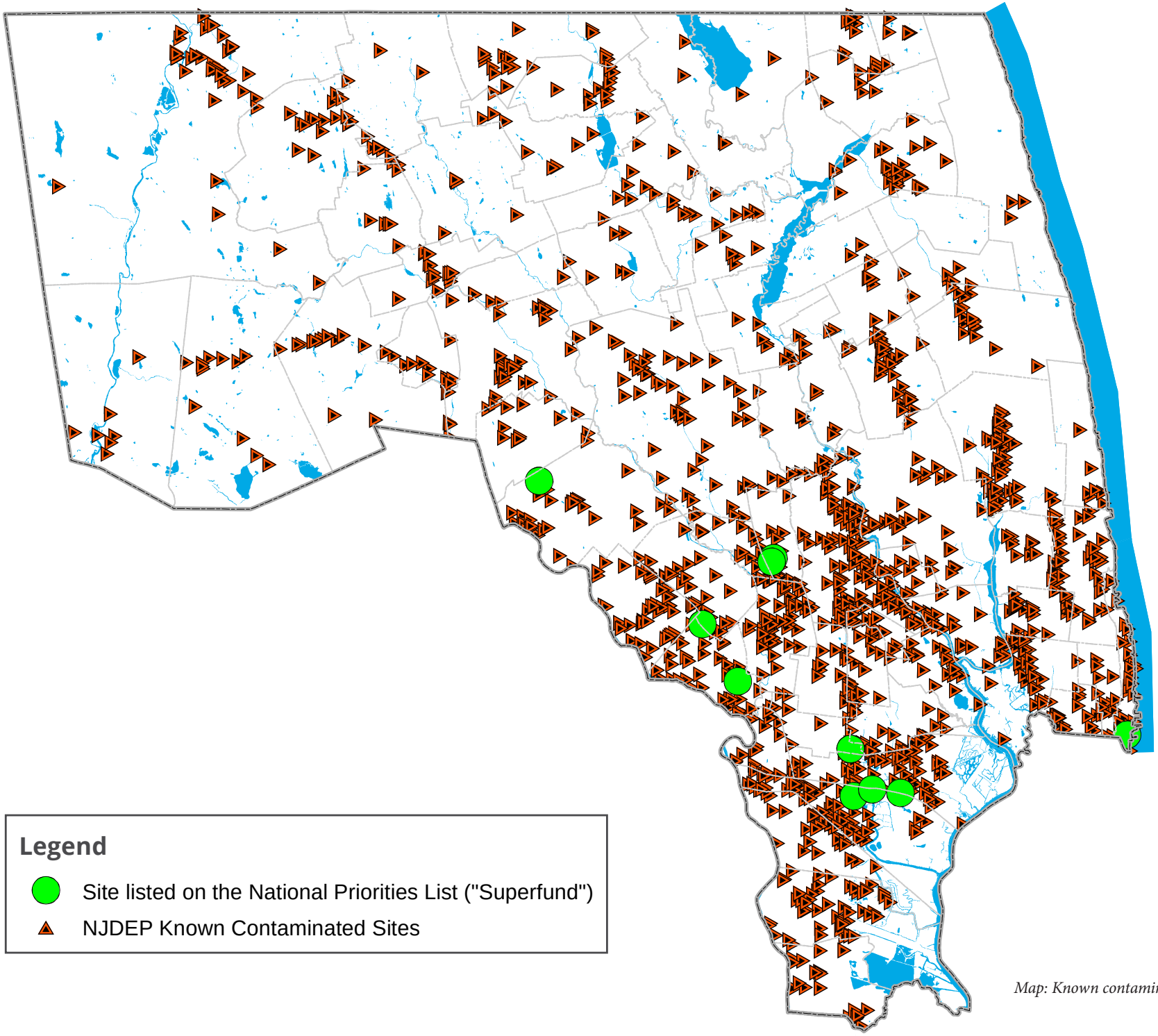
CONTAMINATED SITES

Bergen County's extensive urbanization and industrial areas in the central and south of the county has not come without impact to the environment. The New Jersey Department of Environmental Protection (NJDEP) maintains a list of sites that are known to contain, or suspected of containing, contamination. In Bergen County, NJDEP has identified 3,191 known or contaminated sites.[30] The Contaminated Sites map shows 1,490 of these sites, as NJDEP does not have the precise coordinates for all sites. This map, as well as the contaminated sites list, shows concentrations of contaminated sites in the southern half of Bergen County which generally correspond to the areas of existing and historic industrial activity. This is not to suggest that other areas of the county do not contain known or suspected contamination; in fact, all 70 Bergen County municipalities have at least several known or suspected contaminated sites. While each site is subject to different regulations and regulatory authorities based on the date of contamination, scale of contamination, pollutants involved in the contamination and other factors, understanding the location and potential impacts of such contamination are useful tools for future remediation and potential redevelopment. Additional details on the different tools and programs to address brownfields and contaminated sites can be found in the Economic Vitality Element.

NJ FLOODMAPPER

The NJ Floodmapper is an interactive website developed by the National Oceanic and Atmospheric Administration (NOAA)'s Office for Coastal Management, the Jacques Cousteau National Estuarine Research Reserve (JCNERR) and the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA) at Rutgers University. The tool was created in order to provide communities with a way to visualize flood hazards, storm scenarios, and sea level rise in order to inform decisions for future disaster preparedness and long-term land use planning. The tool shows FEMA flood maps, sea level rise scenarios of 1 to 10 feet, and hurricane scenario mapping for Category 1 through 4 storms. The tool also includes the extent of flooding experienced during Hurricane Sandy as a comparison, as well as locations of critical facilities, economic vulnerability, and social vulnerability.





Map: Known contaminated sites

Ramapo Valley County Reservation. Source: Colliers Engineering & Design

GOALS & OBJECTIVES

GOAL 1: Preserve, protect, conserve, and enhance water supply

What is it?

This Goal emphasizes the importance of managing the availability of clean drinking water through the protection of surface and groundwater resources from over-consumption and pollution.

What will it do?

Water quality protection is a key focus in planning for future growth and development.

Why should the county pursue it?

Protecting and conserving water is necessary to sustain increasing demands from a growing population and ensuring the availability of supplies during periods of drought. A regional approach to address stream corridor management is critical when development upstream affects residents, businesses and communities downstream. Without a coordinated effort, municipalities may be discouraged from taking steps to improve water quality along a stream corridor if neighboring municipalities do not participate. The county, as a regional governmental entity, can help its municipalities better plan for growth while reducing water consumption.

Objective 1.1: Promote and publicize water protection and conservation

Consider ways to promote water conservation and resource protection, such as providing access to helpful information (websites, publications, speakers, and workshops). Greater public education and awareness about different water conservation tools, such as irrigation alternatives (including rain barrels that collect water from rooftops, or smart meters that prevent in-ground systems from watering during rain events), new development or retrofits of homes and commercial buildings with low flow fixtures, and the installation of green infrastructure (including rain gardens, vegetated roofs, bioretention basis, and swales) can increase water conservation practices. Education and awareness should link not only the ecological benefits of water conservation, but also the tangible benefits to users such as cost reductions, mitigation of nuisance flooding, and other quality of life improvements. Grant funding is often available for the development of demonstration projects or to offset the cost of conservation expenses (including rebates for water-efficient appliances and low flow faucets, rain barrels, or native plants).

Objective 1.2: Coordinate water conservation, enhancement, and protection programs

Establish -- and strengthen existing -- partnerships with municipalities, neighboring counties, relevant federal and state agencies, as well as private and nonprofit stakeholders to promote regional watershed protection and other natural resource initiatives. One example to examine is the Common Waters Partnership, which serves as a regional partnership of public and non-profit organizations and agencies focused on supporting the development of sustainable communities and working landscapes in the Delaware River watershed. This partnership, which includes representatives from New York, New Jersey and Pennsylvania, has provided a regional forum in which partners can share information, promote common goals, and leverage funding to implement shared objectives.

Objective 1.3: Link land use regulation to water resource management

Work with communities to incentivize the use of green infrastructure where localized flooding is a problem, while also creating aesthetic and recreational benefits. Bergen County updated its subdivision and site plan ordinances in 2018, when it adopted the "Bergen County Standards for Sustainable Land Development-Subdivisions" and the "Bergen County Standards for Sustainable Land Development-Site Plans." The ordinances now include incentives for LEED Certification and includes standards for green infrastructure. These ordinances were adopted in response to emerging trends and changing conditions; continuing to update these ordinances in order to remain current is critical to ensuring that new development follows best practices and minimizes impacts on county infrastructure.

Objective 1.4: Optimize solid waste management practices to protect water quality and water infrastructure

Coordinate with the BCUA to ensure that waste and recycling policies complement county efforts to promote water quality. For example, increasing the use of the BCUA's composting incentive program could help reduce the amount of waste generated for landfills, but this should be complemented by a simultaneous initiative to promote the use of natural soil improvements that avoid excessive chemical amendment, such as fertilizers, that ultimately affect water quality. Beginning on May 4, 2022, state law prohibits the use of single-use plastic carryout bags and polystyrene foam service products, and restricts the use of single-use paper bags. Following these developments, particularly those on the state level, will be necessary to understand what actions, if any, will be needed for compliance. Promotion of convenient, compliant alternatives may help assist residents with the transition (e.g. providing reusable bags for purchase). Reduction in the use of these types of products, particularly those that take years, if not decades, to biodegrade, will also help protect the performance and efficiency of wastewater and stormwater water infrastructure from materials that can cause clogs, sewer backups and overflows, and localized flooding.

GOALS & OBJECTIVES

GOAL 2: Maintain and update aging infrastructure to meet existing and future demand

What is it?

Aging infrastructure is a national issue with local implications. While stories of wooden sewers and Civil War-era water main breaks in neighboring counties often dominate the headlines, Bergen County is not immune to these problems. This is most visible in the municipalities that still contain combined stormwater and wastewater systems, including **Ridgefield Park, Fort Lee,** and **Hackensack**, and it is likely that these and other older settlements in Bergen County contain aging water supply, stormwater, and wastewater systems in need of repair. As described in the Land Use Element, the median age of the housing stock in Bergen County is over 60 years old; if the infrastructure supporting these homes is also over 60 years old, then maintenance programs are likely necessary.

What will it do?

Protecting the longevity and reliability of the water, wastewater, and stormwater systems that service the county's residents, businesses, and visitors will help ensure that the county remains a place to invest, live, work, and play.

Why should the county pursue it?

The long-term prosperity and quality of life in Bergen County is contingent on the maintenance and upkeep of its infrastructure; deferred maintenance will only increase long-term costs of emergency repairs, waters lost from leaking pipes, and ultimately replacement. Water systems prone to disruptions can inconvenience residents and businesses or even deter new residents and businesses from investing in a community.

Hackensack Meadowlands. Source: Donna Brennan, Bergen County

Objective 2.1: Inventory infrastructure and prepare a capital investment strategy

Considering that most of Bergen County has already been developed, and many of these developed areas have existed for many years, the effective management of existing water supply, stormwater, and wastewater infrastructure relies upon a complete understanding of the existing inventory, including age, location, condition, and ownership. This information is critical to preparing an effective capital investment strategy of identifying where best to allocate resources, identify partners, and prioritize projects that provide the greatest return on investment. For example, with stormwater management this inventory may reveal assets were overlooked, and where improvements to such would be more cost effective than the acquisition of new land or a major capital overhaul of an existing system. Before constructing new systems, optimizing the efficiency and effectiveness of existing systems may provide a greater benefit at less cost. It should be noted that in 2017 the Governor signed the Water Quality Accountability Act, which requires public water systems with 500 or more service connections to implement asset management plans designed to inspect, maintain, repair and renew its infrastructure consistent with standards established by the American Water Works Association; the Act requires that purveyors dedicate funds each year to address the highest priority projects. Asset management plans were required to be established and implemented by April 19, 2019. As described in the existing conditions section, most of Bergen County is serviced by public water. Considering that most of the public water providers in the county service more than 500 connections, this requirement affects a significant portion of the county's water infrastructure. In addition, the Act specifies a methodology for routinely testing valves and fire hydrants, as well as the development of a cybersecurity program.

Objective 2.2: Consider best management practices to reduce demands and increase capacity of existing infrastructure

In many places, decades of deferred infrastructure maintenance have led to increased costs associated with emergency repairs and ultimately high costs for replacement. In addition, there are the costs to residents and businesses from inaction, whether it is water main breaks that result in an interruption of service, poor drainage or blockages in culverts that cause flooding and deterioration on the roadways, or sewer systems that back up or overflow. While some of these costs are unavoidable, new development and retrofits to existing development could reduce the strain on these systems. This could include providing incentives for development that utilizes water-efficient devices and appliances to reduce demands on the water and sewer systems, adopting complete streets policies to encourage non-motorized travel and avoid the need to expand the roadway, or the installation of green infrastructure to address localized areas of problematic flooding. Integrating sustainable practices on the county level into infrastructure management and capital planning could help reduce long-term costs, improve environmental quality, and provide a local example to inspire municipal and private developers.

COMPLETE AND GREEN STREETS

What are green streets? To explain, it is first important to understand the concept of complete streets. As described in the Transportation and Mobility Element and the Sustainability Element of this Master Plan, Complete streets are systems that ensure that roadways can accommodate users of all ages and abilities by providing multiple modes of travel, including: walking, bicycling, mass transit, and motorized vehicles. Communities that adopt a complete streets policy are expected to consider complete streets as part of future road improvements and development projects.

Similar to complete streets, "green streets" provide an additional way to improve and manage stormwater as part of future capital improvements to roads and drainage systems. While a complete streets program requires municipalities to consider the needs of all users and abilities as part of a roadway improvement or development project, green streets incorporate green infrastructure into roadway design. In New Jersey, communities such as Hoboken have started to incorporate green streets into roadway projects. In managing its 247 miles of roadway, Passaic County has taken steps to adopt complete and green streets. In 2012, the County adopted Moving Passaic County, the Transportation Element of its Master Plan, which included a set of complete streets guidelines. In 2018, the County adopted a Green Stormwater Infrastructure Element, which included a set of "Green Streets Guidelines" providing instructions for siting and design considerations for use in conjunction to its existing Complete Streets Guidelines.

For instance, the accompanying renderings shows how a streetscape can be improved with bicycle and pedestrian elements, such as a bike lane and sidewalk, but also include green infrastructure elements as permeable pavements, street trees, and bioretention systems. The use of green infrastructure here helps to not only manage stormwater, but also provides aesthetic benefits in terms of streetscape beautification, and the trees provide shade to help regulate temperatures in the summer months.

Objective 2.3: Consider the adoption of a "green streets" program for future roadway improvements

The county's recent adoption of its site plan and subdivision ordinances include numerous best management practices for sustainable development. A "green streets" program could provide an additional way to improve conditions and manage stormwater as part of future capital improvements to county roads and drainage systems. While a "complete streets" program requires municipalities to consider the needs of all users and abilities as part of a roadway improvement or development project, a "green streets" program incorporates green infrastructure into roadway design. Recently, neighboring Passaic County adopted guidelines for green streets as part of a 2012 update to their Master Plan Transportation Element, providing guidelines about siting and design considerations for green infrastructure, along with information on potential best management practices based on different street types.

Objective 2.4: Invest in new infrastructure that provides multiple benefits

As described in the Transportation and Mobility element and the Public Facilities and Services element, the County of Bergen maintains roads and drainage facilities. The County's Engineering Division also makes improvements to this infrastructure, including roads, bridges, culverts, and stormwater pipes on an annual basis through the County's capital budget.

Evaluate areas where capital projects can achieve numerous goals, particularly as it relates to natural resource protection, to maximize return on investment. For example, county road improvements that incorporate green infrastructure in a community with combined sewers can help the municipality address its permitting requirements and improve water quality to affected waterways, while also creating attractive amenities for the local community. Another example might include strategic land preservation acquisitions that provide recreation space while also mitigating sources of water quality degradation.

Objective 2.5: Develop infrastructure financing programs, public/private partnerships, and seek coordination with other providers, governmental entities, and utilities

Even with optimization and effective asset management, the costs of upgrading and maintaining infrastructure will be expensive and will need to be phased in over time. Different funding possibilities exist, including: low interest loans from the New Jersey Infrastructure Bank; partnering with other local departments (e.g., transportation, public works, and parks and recreation agencies) to leverage funding for joint projects; leveraging private investment in new development and redevelopment projects; forming public–private partnerships with investor-owned water utilities, private water services companies, or developers; and coordinating development projects to reduce long-term costs, such as road openings.

Objective 2.6: Reduce impermeable surfaces, heat island impacts, and stormwater runoff

The state routinely publishes information related to impervious coverage. This data could be used in conjunction with other studies and information to evaluate ways to reduce impervious coverage as part of future capital improvements to roads, drainage facilities, and county buildings, as is currently integrated under Bergen County's recently revised site plan and subdivision ordinances.

In March 2019, Governor Murphy signed the Clean Stormwater and Flood Reduction Act (S1073/A2694) into law, which provides municipalities and counties the option to establish stormwater utilities as a way to fund stormwater improvements through the assessment of fees on the impervious surfaces that contribute into the stormwater system. Prior to this legislation, stormwater utilities were not authorized in New Jersey, however they have been employed in communities throughout the country (Philadelphia is one notable example). This type of program would particularly help Bergen County's municipalities with combined sewer systems (**Fort Lee, Hackensack,** and **Ridgefield Park**) reduce the amount of sewer discharges, but it would also help all communities address problems associated with stormwater. Aiding communities interested in this program may help to encourage adoption, including technical assistance, model ordinances, and demonstrating how stormwater management can complement land preservation programs.

In addition, NJDEP recently adopted changes to the state's stormwater management rules (N.J.A.C. 7:8), that require developers to utilize green infrastructure to meet the minimum standards for stormwater management standards for water quality, groundwater recharge and stormwater volume control as part of any major development. Previously, developers were only required to consider and incorporate green infrastructure "to the maximum extent practicable," which the NJDEP now acknowledges involved a measure of subjectivity.

Ramapo Valley County Reservation. Source: Colliers Engineering & Design

GOALS & OBJECTIVES

GOAL 3: Encourage land use decisions that will protect open space, natural lands, publicly owned lands, and parkland to leverage ecosystem services.

What is it?

The success of natural lands conservation does not hinge entirely on raw quantity of acreage. Meeting an acreage target overlooks the questions of quality and stewardship. For example, if preservation is used to protect residents and businesses from flooding, what percentage of floodplains are free from development, or in protecting water supplies and aquatic biodiversity, what is the percentage of intact riparian buffers? Many of these issues are discussed in further detail in the Sustainability Element and the Open Space, Agriculture, Parks and Recreation Element. The county and various municipalities maintain parks such as Ramapo Reservation in **Mahwah** (county property) and the Celery Farm in **Allendale** (municipal property) that are habitat to native species of flora and fauna and serve as destination recreation areas. In addition to parks, the county and its municipalities own or protect lands as part of open space preservation, agricultural and silvicultural preservation, and for government offices and facilities. Private landowners and non-profits also own large tracts of natural lands. Ecosystem services provided by such natural lands include clean air, clean water, cooling shade of trees, and aesthetic benefits.

What will it do?

To optimize these ecosystem services, responsible management of publicly owned lands can provide valuable demonstration sites that the county can showcase to municipalities and private landowners.

Why should the county pursue it?

The ecosystem services provided by open space improve the health and wellbeing of businesses, residents and visitors. Public recreational areas and nature preserves also serve as tourist attractions and destination land uses for numerous outdoor activities (including hiking, bicycling, fishing, hunting, bird watching, and climbing).

Objective 3.1: Support hands-on learning and other educational programs for all ages at the parks to educate the public on the importance of protecting wetlands, marshes, forests, wildlife, and farmland

Continue to provide and enhance educational resources, including workshops, programs, and web and mobile applications that provide residents and visitors opportunities to understand and appreciate the county's natural resources. This includes resources that identify and describe the plants, animals, and physical geography of the area, describe the various processes undertaken to mitigate degradation as part of new development, and programs that support responsible land management (including improvements to support songbirds, soil improvements and plant selection without excessive irrigation or amendment, timber management, and agricultural techniques that promote water quality) for municipalities, schools, community groups, businesses, residents and visitors. Seek grant funding to facilitate production of educational materials and programming.

Objective 3.2: Promote environmental stewardship around environmentally sensitive areas

Evaluate county policies for land stewardship, both on its protected lands and parks, but also those used for county operations. Coordinate with institutional partners, conservation experts, community groups, and others to identify potential improvements that will benefit the surrounding natural and developed communities.

Ramapo Valley County Reservation. Source: Colliers Engineering & Design

Objective 3.3: Promote strategic acquisitions or protections of natural lands

Well-informed open space preservation and natural lands stewardship is critical to maximizing ecosystem services. Land protection methodologies that overlook sound planning in favor of political or a "Not in My Back Yard"-based desire to stop new development projects may not provide the most effective return on investment. The county should consider evaluating its land protection strategies to prioritize funding for projects that can achieve multiple benefits, including water quality improvements, flood mitigation, air quality improvements, species habitat, and increased access to outdoor recreation. Development of a strategic guide to land preservation and stewardship can then be shared with municipalities. Adoption of such an approach can also help to leverage alternative funding sources for preservation and stewardship, especially when preservation achieves additional benefits, such as stormwater management.

Provide municipalities with information and model ordinances to identify and pursue innovative and context-sensitive development regulations that help to protect water quality. In 2013, the state adopted amendments to the Municipal Land Use Law that provide municipalities with additional options to regulate new development, including non-contiguous clustering and lot size averaging. In contrast to a traditional subdivision, where a tract of land is divided into smaller components of equal size, or a contiguous cluster, where development is concentrated on a portion of the site and the remainder is preserved as open space or farmland, non-contiguous clustering permits development at greater density on one site, while preserving another site. While similar to a Transfer of Development Rights (TDR) program, noncontiguous cluster relies on a private transaction between landowners, and does not include many of the regulatory requirements and infrastructure that is required for a TDR program. Lot size averaging permits residential subdivision of lots smaller than permitted, provided that the density of the underlying zoning is not exceeded. These can be used by municipalities to enable the subdivision of land while protecting specific features important to the community (including historic sites, farmland, and natural lands). Communities interested in protecting landowner equity should consider these as potential options in addition to the existing suite of tools like cluster zoning and TDR as ways to encourage preservation of areas subject to flooding. Preserving lands around waterways and in floodplain areas reduces the number of structures at risk of flooding, improves water quality, and limits damage to infrastructure.

GOALS & OBJECTIVES

GOAL 4: Assist municipalities with floodplain management

What is it?

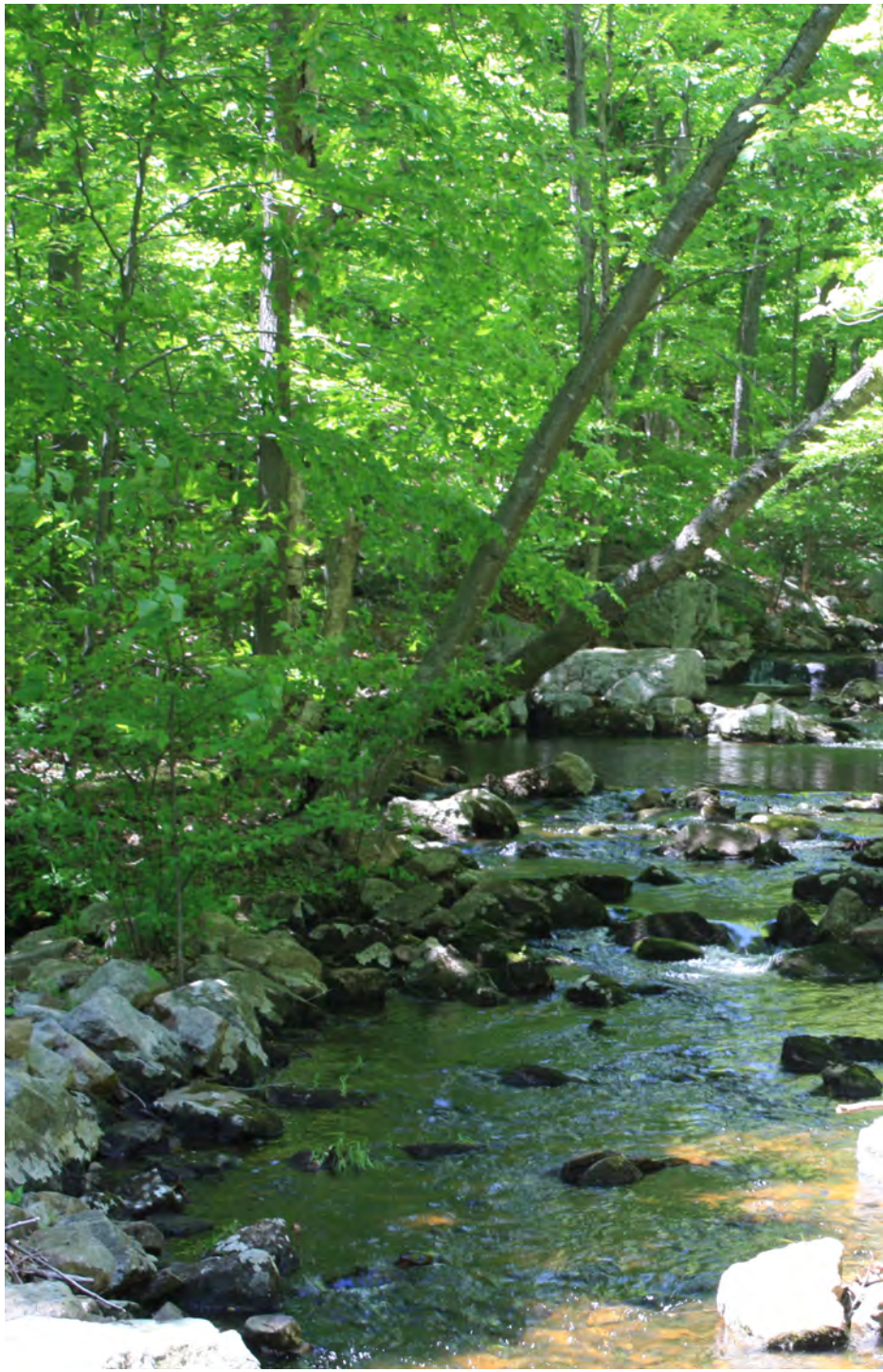
Managing floodplain development helps to improve resiliency and reduce damages in the community and for others downstream.

What will it do?

National Flood Insurance Program (NFIP) participation requires municipalities to meet a minimum set of standards for regulating floodplain development. Municipalities that adopt higher standards are eligible for additional discounts to flood insurance premiums for residents and businesses as part of the Community Rating System (CRS). CRS points are awarded to towns that leverage their natural resources to increase community resiliency through activities such as public education, enhanced design guidelines, and preserving open spaces in floodplains.

Why should the county pursue it?

The NFIP administers the CRS program and scores towns on their effectiveness in dealing with the mitigation of flood hazard events. Communities participating in the CRS program can earn points that lower flood insurance premiums for homeowners and businesses located in Special Flood Hazard Areas.



Ramapo Valley County Reservation. Source: Colliers Engineering & Design

Objective 4.1: Encourage municipal participation in NFIP's CRS program

Currently, the county has 9 communities participating individually in the CRS program. In addition, the Meadowlands District participates on behalf of its constituent municipalities. Work with municipalities by providing professional and technical assistance for towns interested in participation or advancement in NFIP's CRS program. This can range from providing towns with baseline data, information, mapping support, and model ordinances, hosting educational events that can be used toward CRS credit, to supporting land preservation projects that target lands in flood hazard areas.

Objective 4.2: Encourage municipal participation in the National Flood Insurance Program

Currently, 2 Bergen County municipalities (Alpine and Englewood Cliffs) do not participate in the National Flood Insurance Program, as they do not contain any identified Special Flood Hazard Areas at this time. Future storms or extreme weather and changes to the built environment could eventually change this finding, and NFIP participation will provide residents and businesses with access to government-backed flood insurance. The county's 2015 Hazard Mitigation Plan indicates that FEMA has reached out to these communities to provide information on the benefits of NFIP participation. The county should follow up with these communities, to assess their interest in participation.

Objective 4.3: Coordinate mitigation plans with utilities, local governments and other relevant agencies, and ensure public awareness and participation in the process and its implementation

Bergen County recently adopted its 2020 Multi-Jurisdictional Hazard Mitigation Plan, which will not require another update until 2026. These plans involve extensive coordination with different agencies and local government before they are eventually reviewed and approved by the state and FEMA. The 2020 plan identified county-owned properties (some being critical infrastructure, e.g. BCUA) in which mitigation strategies were collected from those entities and documented for potential future mitigation funding consideration. As funding for large scale projects becomes increasingly limited, the county is best positioned to convene its communities and utilities to identify potential efficiencies (including shared services and mutually beneficial capital improvements) and provide a broader perspective.

Ramapo Valley County Reservation. Source: Colliers Engineering & Design

Objective 4.4: Prepare multi-jurisdictional floodplain management plans for different stream corridors to promote equitable land use regulation between municipalities

Increased impervious surfaces in the floodplain or inefficient stormwater management upstream can lead to problems with water quality and quantity. With county assistance, communities with shared river corridors should consider the preparation of shared studies or plans to manage land use and floodplain management.

Objective 4.5: Encourage use of the county's Blue Acres program

Following Hurricane Sandy, New Jersey's Green Acres Program was expanded to include a "Blue Acres" component, which funded the purchase of residential properties in flood prone areas in order to demolish the structures and return them to a natural state. The program primarily targeted tidal areas affected by Sandy (including Bergen County), but also included communities in the Passaic River basin. The state program focused on clusters of homes and required municipal support for the acquisition. In Bergen County, the state program has been active in **Hillsdale, New Milford**, and **Oakland**. As described in the Open Space, Agriculture, Parks and Recreation Element, a similar program has been implemented on the county level, when in 2013, the county's land preservation program was amended to include the acquisition of flood-prone properties. Removing structures from the floodplain and returning the land to a natural state not only reduces the number of buildings in areas at risk of flooding, it helps mitigate flood impacts to other areas. In addition, these properties can then be used toward additional credit for communities participating in the CRS program.

Objective 4.6: Analyze and mitigate potential impacts from hazards for all public facilities, infrastructure and policies

The county's 2018 amendments to its land development regulations include several new measures to promote sustainability and best management practices of stormwater. Building on these efforts, evaluate these regulations to identify where additional amendments may complement municipal actions related to floodplain management. Despite the large number of entities responsible for the regulation of land use in Bergen County, FEMA regulations require specific actions and minimum standards for participation in the National Flood Insurance Program (NFIP) and outline the types of actions eligible for credit under the Community Rating System. As part of any evaluation of land development regulations, identify if amendments are needed to ensure that county does not unintentionally inhibit any efforts by municipalities to improve their floodplain management practices or CRS standing.

Similar to the above, evaluate existing county-owned or managed facilities and infrastructure as part of future updates to the county's All Hazards Mitigation Plan. Consider conducting a vulnerability assessment of all critical facilities, county roads, county-owned stormwater systems, and the county-owned tide gates to determine their vulnerability to extreme weather and climate change and analyze the potential risks to the community to ensure that: facilities are located strategically to ensure that the county can respond to natural hazards; facilities are located outside of floodplains to promote long term resilience and improve municipal CRS standing; and, facilities minimize the quantity of stormwater generated.

Ramapo Valley County Reservation. Source: Colliers Engineering & Design

Overpeck Park Bridge. Source: Bergen County Division of Economic Development