READINGTON TOWNSHIP

MUNICIPAL WATER STORY

2022

Protecting Our Next Generation

Bison with Calves (Red Dogs) at the Preserved Readington River Farm
Protecting Their Next Generation
[Location - by Round Mountain in the Headwaters of the Pleasant Run]

FOREWARD

We dedicate this project to future generations – our children and our children's children. Conservationists have been warning us for decades about the need to sustain our environment and to preserve our clean water supply. Over time, the situation has not improved. It is now generally accepted that the combination of excess carbon gas emissions along with natural temperature regulation (energy absorption, circulation, and emission) has created and sustained a serious greenhouse effect with far-reaching implications for our atmosphere, our weather, and our water supply.

Although more than 70% of the Earth's surface is covered by water, only 2.5% of that is fresh, potable water (see: Water Distribution on Earth). Now more than ever, protecting our water supply is crucially important for the health and welfare of future generations. It is from this backdrop that the ***Readington Township Municipal Water Story*** has been written.

We consider this a living document, by which we underscore: (i) that it is only as current as the *version date* noted in the document header; and (ii) that it will essentially be updated regularly as new data are collected, new programs are launched, and new water stewards step forward to take on the ever-evolving challenges that we know will materialize.

To our future water stewards, some not yet born, we send our enthusiastic encouragement in the hope that clean, natural water for all will always be a realistic objective and never a quaint remembrance of things past.

As the Chair of our Open Space Advisory Board, I have focused on protection of our environment and can report that we have successfully preserved over 325 acres of land in the past four years, with full reimbursement from both the County and State Green Acres program. I plan to work with our partners at the County and State and non-profits such as the Hunterdon Land Trust and Raritan Headwaters to continue such efforts.

To protect the environment, my intent is to preserve our natural habitat, our forests, our meadows, our streams. The goal is to protect 500 – 750 additional acres in the next five years, assuming funding continues to be available.

To protect our farmland, my goal is to continue to preserve farms when presented with the opportunity by local families or landowners.

To protect our streams and watersheds, my goal is to attain DEP category 1 status, a higher water quality standard for our streams and watersheds.

In the past four years we have continued to expand our trail system, adding new trailheads and trails and providing our residents with more recreational opportunities. In 2022 there will be park upgrades and an effort to plant trees and manage meadows in a sustainable manner. We are in the first year of a partnership with Raritan Valley Community College to jointly design an ongoing stewardship program.

Mayor Juergen Huelsebusch

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Chapter 1: INTRODUCTION

BACKGROUND

The ***Township of Readington*** lies in the easternmost portion of Hunterdon County in an area where traditional farmlands, abundant natural resources and open space have for decades waged an ongoing battle against the threat of unbridled suburban development. In this environmental context, preserving and protecting our fresh water supply in New Jersey, the nation's most densely populated state, is now and will always be a challenge. This report summarizes Readington's current strategy and future plans for accepting this challenge and embracing the goal of ***clean water for future generations***.

Covering more than 48 square miles (120 km^2), it is the largest township in the county, comprising almost 11% of the county's area. Readington Township is bounded on the north by the Lamington River and Rockaway Creek; to the east by Somerset County, to the south by the South Branch of the Raritan River, and to the west by the old West Jersey Society's line which crosses the Cushetunk Mountains and includes the vast and deep Round Valley Reservoir in neighboring Clinton Township.

In every respect, Readington Township is intricately linked to its fresh water supply. As the result of an extensive network of nine distinct sub-watersheds, more than 80 percent of residents live within three hundred feet of a stream. Similarly, over 80 percent also rely on private wells for their potable water. For these reasons, protecting and maintaining each stream's riparian buffer is very important.

Overall, Readington Township has become a prime example of what Hunterdon County has to offer, and has become known for its:

- extraordinary natural beauty
- historical significance and cultural sophistication
- vast natural wildlife habitats
- significant acreage preserved as farmland and open space
- many precious natural resources.

For more information see: Readington Township, New Jersey.

Also see ***Attachment 1: Photographs of Readington Township*** appended to this document.

FINDING A BALANCE BETWEEN SUSTAINABILITY AND GROWTH

Maintaining Readington's character despite the pressures of commercial and residential development has not been easy, nor has it happened by chance. Forward thinking Township leaders have been instrumental in approving a variety of ordinances and resolutions that protect the area's natural resources and fresh water supply. Examples include a *Resolution Supporting New Jersey's Wildlife Action Plan* [Wildlife Resolution], a *Resolution Supporting the Sustainable Land Use Pledge* [Sustainable Land Use Resolution], and the *Readington Township Master Plan* [Readington Township Master Plan 2018 Update].

Similarly, over several decades, Readington's *Open Space Advisory Board* has successfully preserved more than 9,300 acres of open space and farmland from development through thoughtful strategic planning and careful acquisitions. See Figure 1: Readington Open Space and Preserved Farmland Map 2021 .

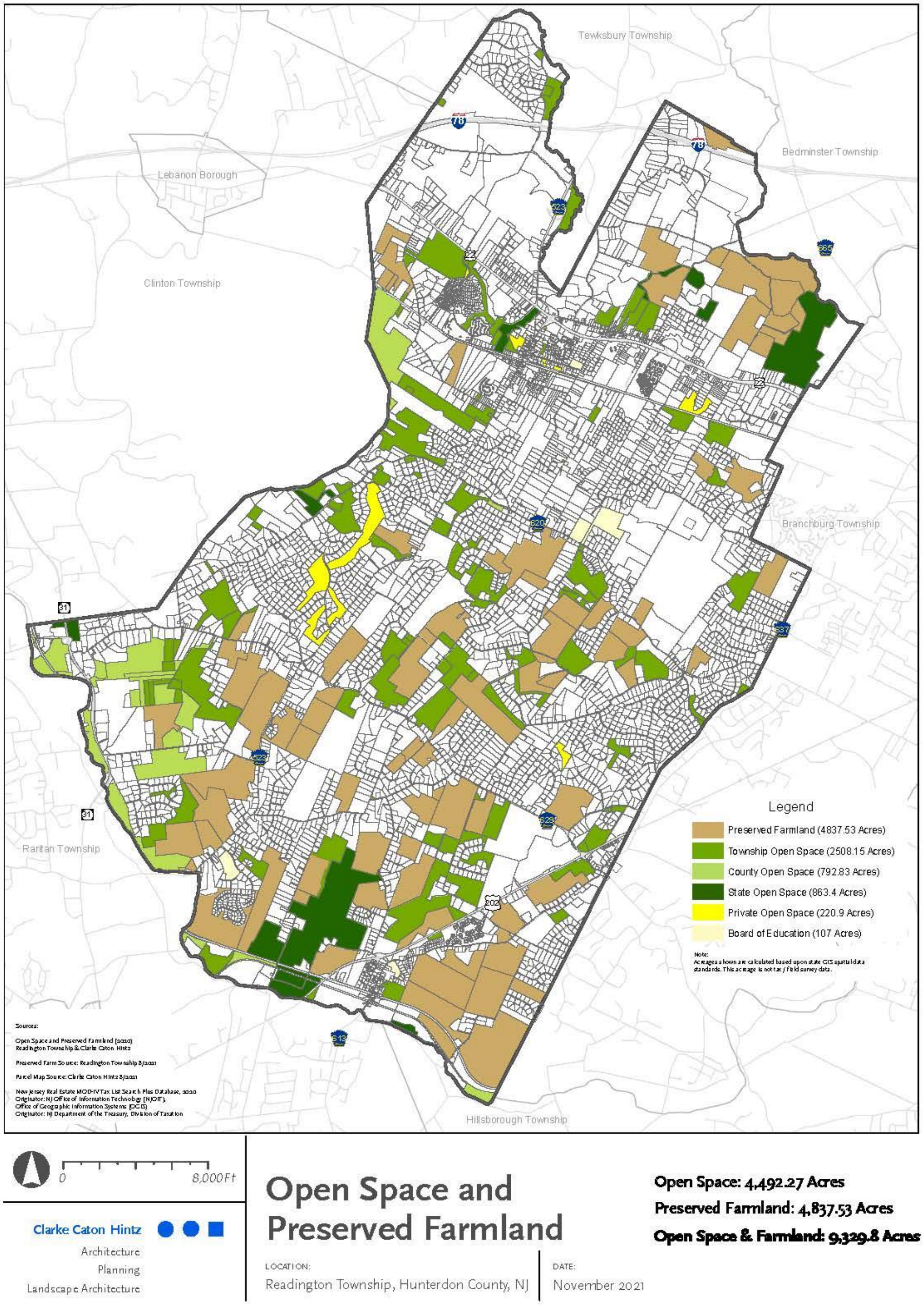

FIGURE 1: Readington Township Open Space and Preserved Farmland Map 2021

However, the population of Readington is growing nonetheless and at a significant rate. As of the 2010 United States Census, the township's population was 16,126 reflecting an increase of just 323 (+2.0%) from the 15,803 counted in the 2000 Census. During the next decade, however, Readington's population has continued to grow, but at a significantly increased rate. The projected population in 2020's latest census of 20,899 represents an increase of over 18%. See *Readington Township Population 2020 Census - page 3:* [2020 Census].

As population density increases, every aspect of an area's ecology and environmental stability is threatened, but none more graphically or fundamentally than its supply of clean, potable water. Clean water is vital to our health, our communities, and our economy. We need clean water upstream to have healthy communities downstream. Similarly, the health of nearby rivers, lakes, bays, and coastal waters depend critically on the lakes, streams, and wetlands where they originate. Streams and wetlands also provide many additional benefits to communities by trapping floodwaters, recharging groundwater supplies, filtering pollution, and providing habitat for fish and wildlife.

In the United States, our cherished way of life depends on clean water. Clean water is the foundation of healthy ecosystems which in turn provide wildlife habitat and places for humans to fish, paddle, and swim. Furthermore, our modern economy depends fundamentally, on a continuous supply of clean water. Without it, economic sectors such as manufacturing, farming, tourism, recreation, energy production, and others can neither function nor flourish.

Readington Township has a long history of protecting and restoring the municipality's natural resources. This is clearly reflected in the Township's environmentally proactive land development ordinances and master plan initiatives (See Readington Township Master Plan 2018 Update) and their extensive efforts to preserve farmland and open space (See: Readington Township Open Space Goals-Vision-Policies).

Most of the environmental accomplishments of the Township over the past two decades have been the direct result of the efforts of the Readington Township Environmental Commission (EC) and the Readington Township Open Space Advisory Board (OSAB). The EC's and OSAB's roles as the stewards of the Township's natural resources is reflected in their various projects, including the preparation of an award-winning *Natural Resources Inventory* and participation in various volunteer water quality and stream monitoring efforts.

In the next section of this paper, we describe Readington's sources of potable water, and how these sources and the water that they supply are maintained.

Chapter 2: THE SOURCES OF READINGTON'S POTABLE WATER

In Readington Township, the majority of an estimated 20,000 residents get their drinking water from private wells that tap into underground aquifers. Raritan Headwaters Association (RHA) has estimated the number of private wells in Readington to be 5,004 servicing more than 18,000 residents. See: [RHA Water Data 2021].

A much smaller number of residents rely on a public water system which is provided primarily to those who live in and around the Whitehouse Station section of Readington. More detail regarding the breakdown of these groups is provided below.

In either case – private wells or public water – it is crucial that we understand where the clean, potable liquid that your faucet delivers actually comes from. The answer is somewhat complex – the water in your glass has been many different places before reaching your faucet, some near and some very far away. In general, the process that is involved is called the Water Cycle.

THE WATER CYCLE

All the water that is available to the inhabitants of our planet moves through a series of stages in a continuous cycle. This water cycle, also known as the *hydrologic cycle*, can be thought of as a biogeochemical system whereby water is in constant motion -- on, above and below the surface of the Earth. Figure 2 is a graphic representation of this cycle. At any one point in time, all of our planet's water can be thought of as being partitioned into four major storage reserves: (i) ice or frozen water, (ii) fresh water, (iii) saline or salt water, and (iv) atmospheric or gaseous water. While the total mass of water remains fairly constant over time, the amounts that are partitioned off into these four reserve categories can vary considerably depending on a wide range of climate-related variables. In other words, although the total does not change, the water is constantly flowing from one of these partitions into another.

As the water moves from one reserve to another, such as from a river to the ocean or from the ocean to the atmosphere, it goes through different transformation processes. A drop of water can change its form – from solid to liquid, or from liquid to gas for example -- and it is these changes that are the key to understanding how water moves through our environment.

To better understand this process, we can review the steps described in Figure 2.

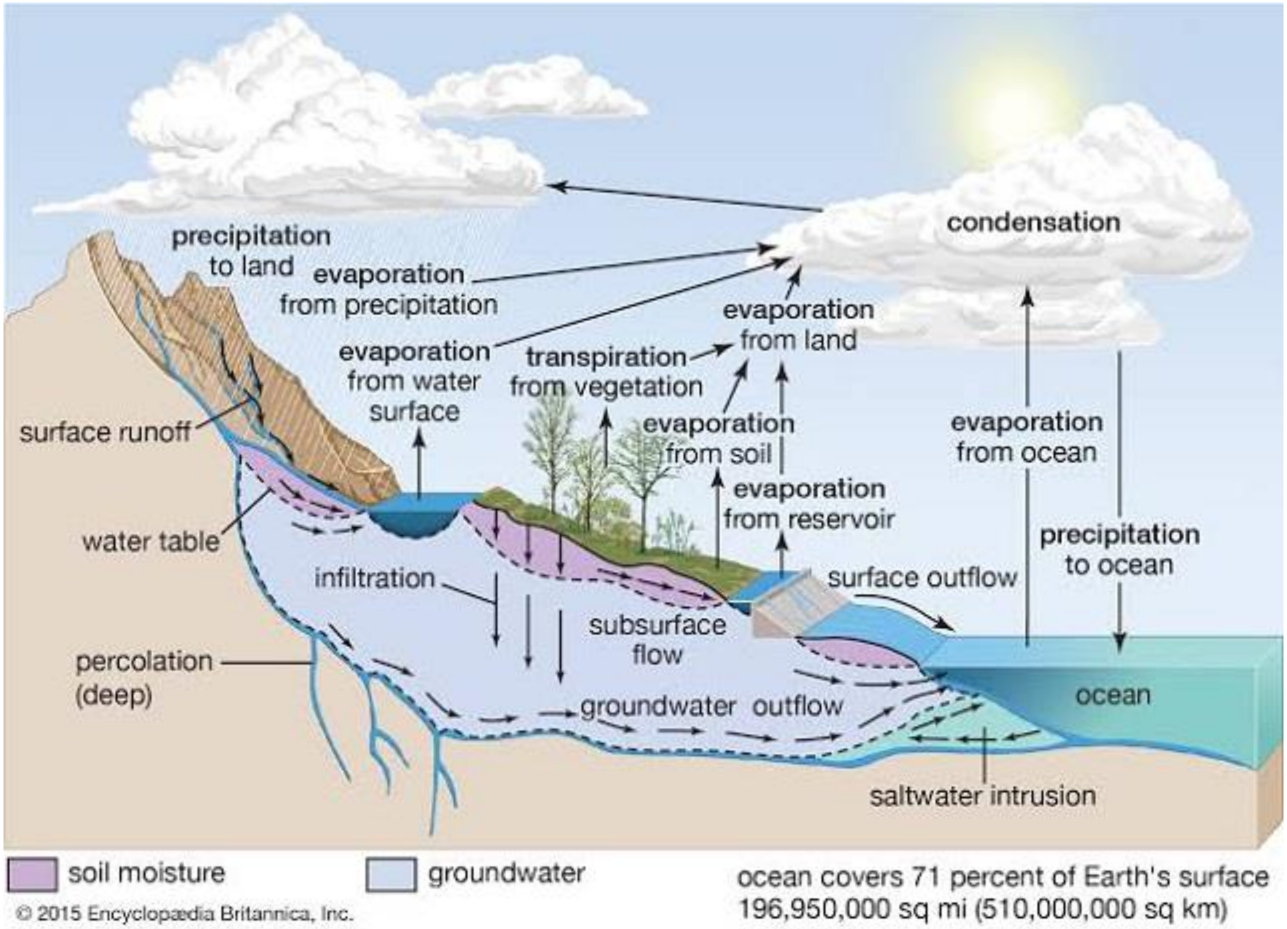

FIGURE 2: The Water Cycle or Hydrologic Cycle

These are the steps in the Water Cycle:

(1) As detailed in Figure 2, we can trace a drop of water and the transformations that this drop goes through as it moves from one reserve partition to another. As a starting point, consider a drop of rainwater falling from the sky as ***precipitation***. Some precipitation will become part of the water storage systems in lakes and ponds, the primary source of water for public water supplies, and some will contribute to the underground storage in deep water aquifers, the primary source of water for private wells. Some precipitation will also enter streams and rivers or become part of surface runoff and surface outflow – most of which eventually returns to the ocean.

(2) The heat from the sun promotes ***evaporation,*** the process through which liquid water transforms into a gas and moves up into the atmosphere where it is stored. Through the sun's warmth, evaporation operates at the surface of all bodies of water -- including the ocean, which covers over 70 percent of the earth's surface.

(3) The sun also promotes evaporation from the soil where the soil is wet. In addition, the sun is the energy source that drives photosynthesis in green plants, one aspect of which is the release of additional water into the atmosphere as a gas through the leaves via a process called ***transpiration***.

(4) The gaseous water in the atmosphere collects as clouds through the process of ***condensation*** and, when various meteorological conditions are met, these clouds once again convert the gaseous water back into liquid water and release their stored contents back to the earth as ***precipitation***, completing the cycle. It should be noted that if this precipitation occurs when or where cold temperatures prevail (during winter season in many areas, or at any time at the polar ice caps or on mountaintops), the returning water will be stored as snow or ice until warmer temperatures converts it back to its liquid form.

This Water Cycle is in constant motion, transporting water from one part of the planet to another. It shapes our landscapes, transports essential minerals from deep underground to the earth's surface, and it is a prerequisite to most life on Earth. In addition, the cycle's design incorporates several natural filtration and cleaning mechanisms along the way. For example, water is filtered and, to a certain extent, scrubbed as it moves through the sub-surface groundwater systems and the vast network of deep underground aquifers . Similarly, as water moves through plants, drawn up through the roots and eventually used in photosynthesis or transpired through the leaves, additional cleansing is carried out. It would be preferable if these natural systems removed all possible contaminants in our water, but unfortunately this is not the case as we shall discuss later in this paper in Chapter 4.

As mentioned, the majority of Readington residents rely on private wells for their potable water and so we will review this water source next.

PRIVATE WELLS

Residents who get their water from private wells, rely on individual well points that tap into the unconfined portions of our underground aquifer system. These well points are connected to pumps that draw water up for personal use at ground level. As depicted in Figure 3, these unconfined aquifers are the ones closest to the surface.

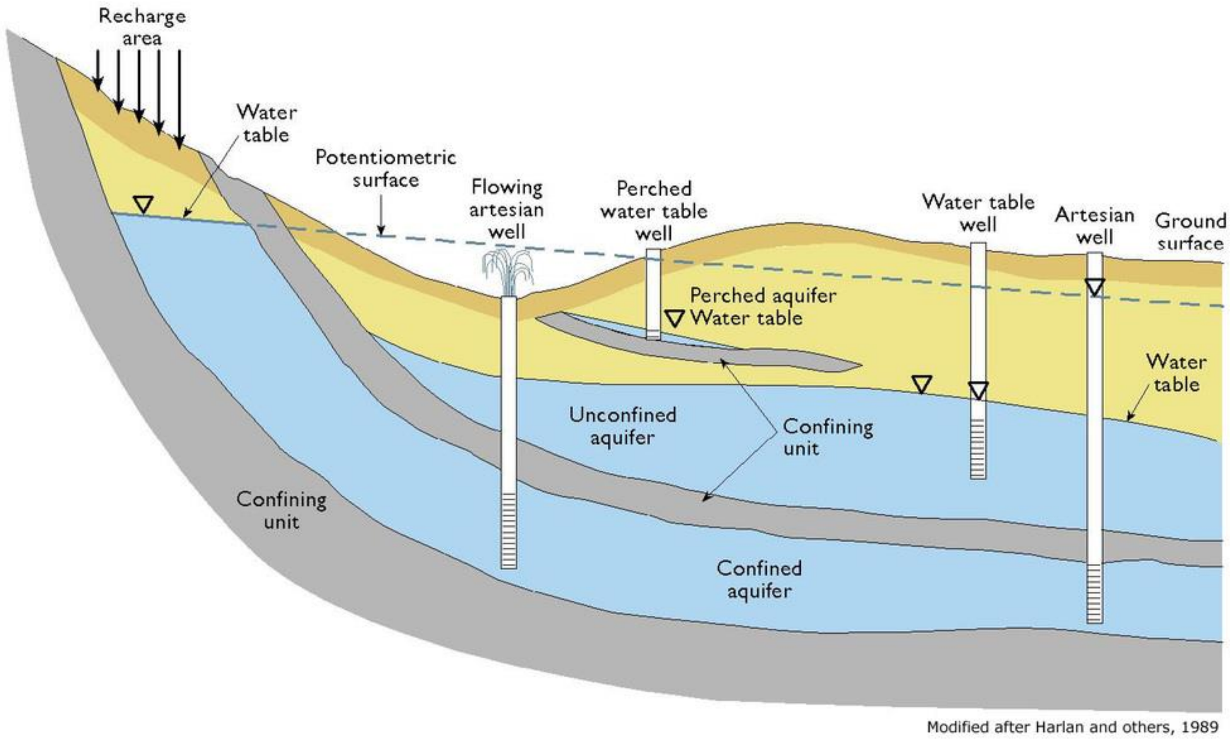

FIGURE 3: The Majority of Private Wells (or Water Table Wells) Tap into Unconfined Aquifers
Other Wells Include Shallow Point or Perched Water Table Wells and Deeper Artesian Wells

Well water is untreated groundwater stored in aquifers that course through layers of porous rock. Wells get drilled, sometimes as far down as 1,000 feet into the rock to access the water, although the average well in Readington Township is less than 200 feet deep. Pipe casing gets installed into the drilled hole, and then a concrete or clay sealant surrounds the casing to protect against contaminants. Water is pulled up through this casing via a well pump at the surface and then the well system gets capped off above ground. The water then enters your home from a pipe connecting the casing to a pressurized holding tank (typically located in your home's basement). From the holding tank, it is distributed to faucets throughout your home. See Figure 4 for an illustration of what a typical private well system looks like.

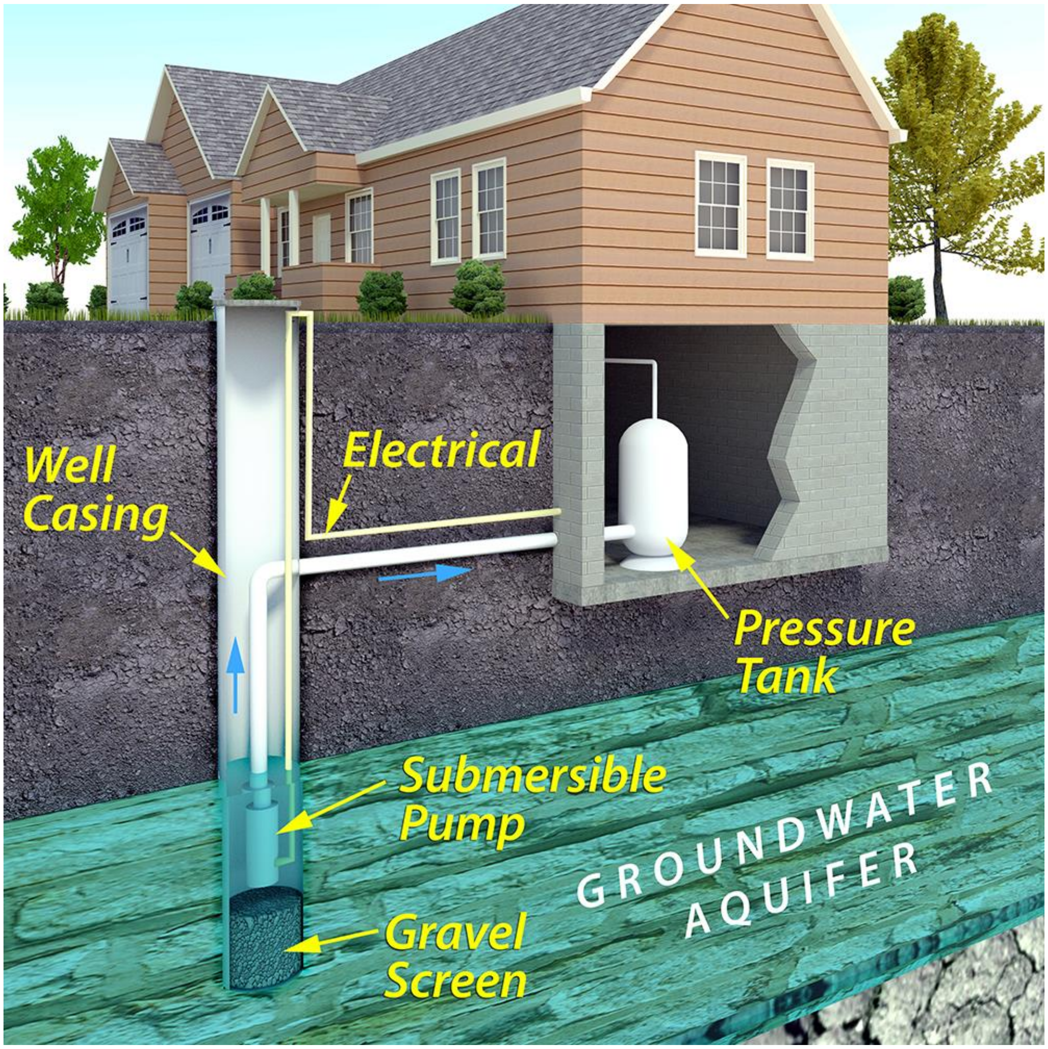

FIGURE 4: A Typical Private Well Water System

Among some there is an impression that well water is by definition "pure" since it comes from within the earth, but this is an oversimplification. Because this water has traveled through the air, across the ground, and through the soil, there are many opportunities for a variety of components to be added. First among these additions are minerals, like magnesium and calcium which, when added to water renders it *hard*. Water containing minerals can be a good thing. Nonetheless, too many minerals can create build-up in plumbing and heating systems, leading to costly repairs. Hard water also performs poorly with soaps and detergents, leaving spots on dishes, shower doors, and generally not cleaning things as well as soft water.

The water delivered by a private well may also bring with it other contaminants. Depending on where you live, iron, sulfur gas, arsenic, nitrates, tannins, and various other components like PFAS and coliform bacteria can be present. Because many of the factors that can potentially contaminant a private well cannot be seen, smelled or otherwise detected easily, homeowners with private wells should have their water tested regularly. As described in more detail in Chapter 6, community water testing is a cornerstone of Readington Township's clean water intervention programs.

PUBLIC WATER SERVICES IN READINGTON TOWNSHIP

Residents who get their water from a ***public water*** supplier rely on a somewhat different system. In terms of the broad hydrologic cycle (see Figure 2), the background process is the same for private water and public water up to the point where environmental water that has passed from evaporation and transpiration to condensation and precipitation, again returns to our interconnected deep water aquifers and surface water systems. From there, public water systems are typically serviced by companies that collect, treat, and distribute water to their customers. See: EPA Overview of Typical Public Water Systems for a summary of how such systems function.

In the case of Readington Township, this service provider is ***American Water Company (AWC)***. AWC is a subsidiary of American Water Works, which was founded in 1886 and which is the largest investor-owned corporation of its type in the United States. As a wholly owned regional subsidiary, AWC is generally subject to the same economic regulation by state Public Utility Commissions as is its parent company in the states where they operate. It is also regulated from a safety and regulatory perspective by the *Safe Drinking Act* which was passed by Congress in 1974. This act authorized the US Environmental Protection Agency (EPA) to set standards for the water delivered to citizens by every community water system in the United States that served more than 25 people. The US EPA establishes national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in water supply sources. Like other public water delivery systems, AWC is carefully regulated according to these standards and required to adhere to them. As the result, AWC performs many tests each day to ensure that customers in communities like Readington receive high-quality drinking water.

The water that AWC uses may be drawn from a variety of sources. These sources may include lakes, rivers, streams or other ***surface water intakes*** fed directly by aquifers and also recharged by precipitation. In some cases, they supplement these surface water sources with deep wells that operate much like individual, private wells.

Readington Township's Public Water System can be summarized as follows:

- ***Source***: In Readington, public water is drawn almost entirely from *surface water sources*. These sources primarily include raw water intakes along (i) the ***South Branch***

Raritan River Watershed and (ii) ***Rockaway Creek Sub-Watershed***.

- ***Pumping Stations:*** Raw, untreated water is drawn from the sources by pumps at the pumping station. These above-ground stations house a system made up of large pumping machines, pipes, and a power source to drive the pumps. The role of the pumping station is to extract the raw water from the source and deliver it to the Treatment Facility.

- ***Treatment Facility:*** After raw water is pumped from its source, it is sent to the above-ground treatment facility. This is where raw water is treated to meet the levels of purity and quality set forth by the US EPA. The primary treatment facilities servicing Readington Township are the *Raritan Millstone Plant* in Bridgewater and the *Canal Road Plant* in Somerville. These facilities house systems that subject the raw water to at least two or three stages of filtration. These filtration stages are designed to remove bad or dangerous particles (such as bacteria or viruses) as well as other debris or contamination. The water moving through the treatment facility is continuously monitored to assure that water quality standards are fully met.

- ***Distribution System:*** Once the water has been treated, it is then ready to enter the distribution system. The distribution system is a network of pipes that span the distance from the treatment facilities to AWC customers in Readington. The system works by transferring ever-increasing quantities of water through increasingly smaller pipe networks. Larger aqueducts do most of the work of moving water from the treatment center to the population centers. In Readington, these larger pipes terminate at a storage tank. Then smaller pipes deliver the water from the storage tank to individual customers which include: some residents of the Whitehouse Station and Three Bridges communities, the Lake Cushetunk Residential Community, Four Seasons Development, Whitehouse Village Development, Regency at Readington Development, Ryland Inn Restaurant and Development, Hunters Crossing Development, Whitehouse Elementary School, and Whitehouse Fire Station. Most of the smaller distribution pipes are steel, although some of the newer ones have ductile iron exteriors and cement-lined interiors. There are also some that are plastic.

ESTIMATES OF READINGTON POPULATIONS WITH PRIVATE WELLS VERSUS PUBLIC WATER

These aqueducts are connected to distribution lines that feed eventually into the homes, businesses and institutions that use public water. These end users of public water are located primarily in and around the unincorporated communities of Whitehouse Station and Three Bridges, New jersey – both part of Readington Township. It should be noted, however, that significant portions of these two communities do not make use of the public water systems, relying instead on personal wells for their potable water supplies. Although accurate figures on the specific number of residents served by these AWC accounts are not available, estimates can be calculated.

The current total populations of these two communities (based on projections from the 2020 census) are approximately 2,500 and 320 respectively or 2,820 in total (See: White House Station – data and Three Bridges – data). Based on estimates provided by an AWC representative, approximately 90 percent of the total residents in these communities rely on public water, which means that 2,538 individuals rely on AWC for their potable water.

Since the current total population projection for Readington Township based on 2020 census data is approximately 21,000, we can estimate that roughly:

- 18,400 or 88% rely on private wells
- 2,600 or 12% rely on public water

For more information on this topic, see this reference: US EPA Guide to Municipal Water Systems.

The next section of this document reviews the natural water features in Readington Township, which include the main watersheds and sub-watersheds, our flood plains and other natural aspects of our locale.

Chapter 3: WATER FEATURES OF READINGTON TOWNSHIP

ROUND VALLEY RESERVOIR

The first major water feature that directly influences Readington Township's Water Story is, ironically, not geographically a part of Readington at all. It is the vast and deep, man-made body of water known as ***Round Valley Reservoir***. See: [Round Valley Recreation Area | NJDEP] for a detailed description and the map provided as Figure 5. Technically located entirely within Clinton Township, Round Valley Reservoir borders a large portion of the western edge of Readington and covers 2,350 acres. It is approximately 180 feet deep and has a water capacity of 55 billion gallons. The reservoir was formed in 1960 by the New Jersey Water Authority by constructing two large dams and flooding the large valley. The deep valley was caused by erosion of the soft sedimentary rock which forms the entire foundation of the reservoir. This means that, while impossible to quantify accurately, the contributions of the reservoir to Readington's hydrologic cycle through both deep water percolation and surface water outflow are unquestioned. In addition, the vast surface area is the most significant evaporation engine in the region -- if not the entire state.

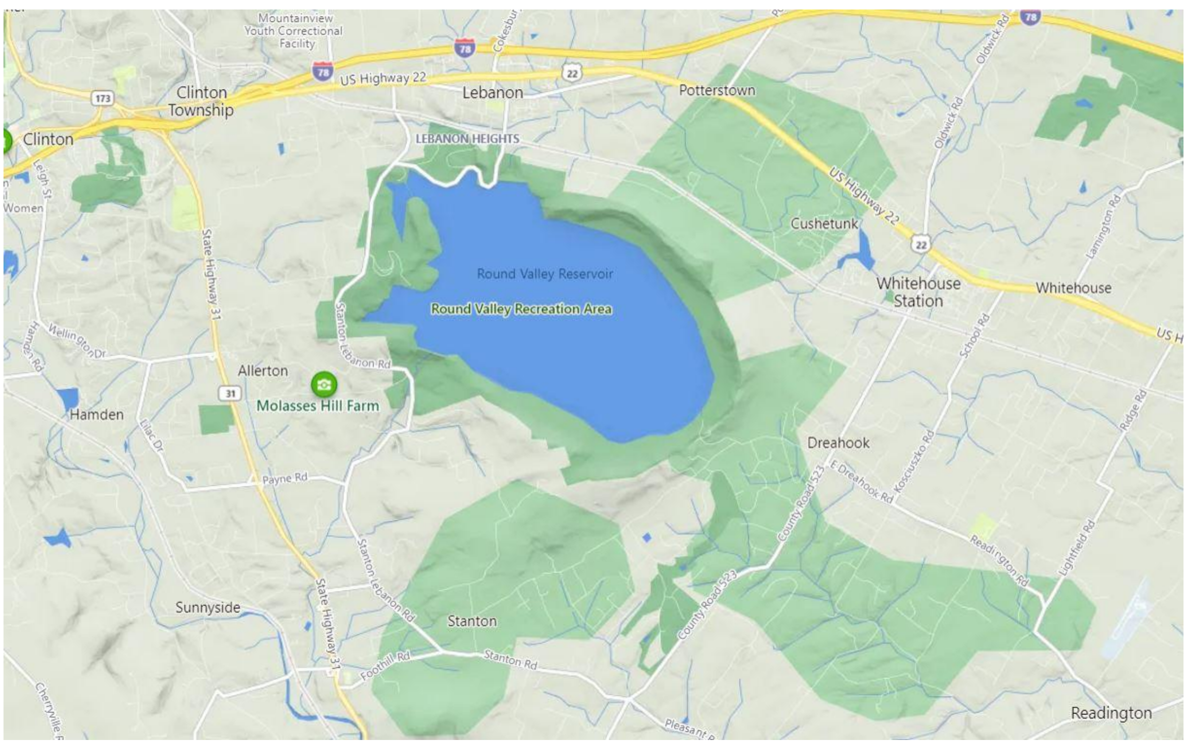

FIGURE 5: Round Valley Reservoir and Round Valley Recreation Area

SOUTH BRANCH RARITAN RIVER WATERSHED

A second major water feature which also influences every aspect of Readington Township's Water Story is the ***South Branch Raritan River***. Beginning at its headwaters at the outflow of Budd Lake, the South Branch Raritan River flows for about 50 miles including along the western border of Readington Township before it joins the North Branch to form the main stem of the Raritan River at Branchburg, New Jersey. See Figure 7: *Confluence of the South Branch and the North Branch to form the Raritan River at Branchburg, NJ.*

The South Branch forms the southern boundary of Readington Township, and it is by far the largest river or stream in the area. All of Readington, despite the contributions and interactions of several smaller sub-watersheds, can be thought of as one large watershed which drains primarily into this river, and so the ***South Branch of the Raritan River Watershed*** (see: South Branch Raritan River for more detail) collectively touches all of the water, both at the surface and sub-surface flowing through Readington.

What is a watershed? Simply put, a watershed is the area of land that drains into a body of water such as a river, lake, stream, or bay. As mentioned, it is important to recognize that the waters making up a watershed consist of, not only the surface fluids in the primary bodies of water (the rivers and streams) , but also the sub-surface groundwater in our aquifers and the land on which every drop falls. The water that comes out of our taps comes from all these sources. Watersheds are given shape by the natural contours of the land -- hills and valleys with higher areas draining into lower areas throughout the entire system. Think of a watershed overall as a basin, formed by the highest ridges surrounding a network of streams. Every raindrop falling inside this basin drains from the higher points toward the lower points and eventually into the main body of water.

It is also important to understand that Readington's watershed is an integral part of the broader, interconnected watersheds that surround it. The South Branch Raritan River Watershed is part of the Upper Raritan Watershed (which also includes the North Branch Raritan River Watershed). The Upper Raritan Watershed is part of the larger Raritan Basin, which also includes the Lower Raritan and Millstone watersheds. Covering 1,100 square miles, the Raritan Basin is about the size of Rhode Island. Water from the Upper Raritan flows into the Lower Raritan and meets the Atlantic Ocean in Raritan Bay.

Figure 6 provides a map detailing the South Branch Raritan River Watershed with the river itself forming the southern boundary of Readington Township.

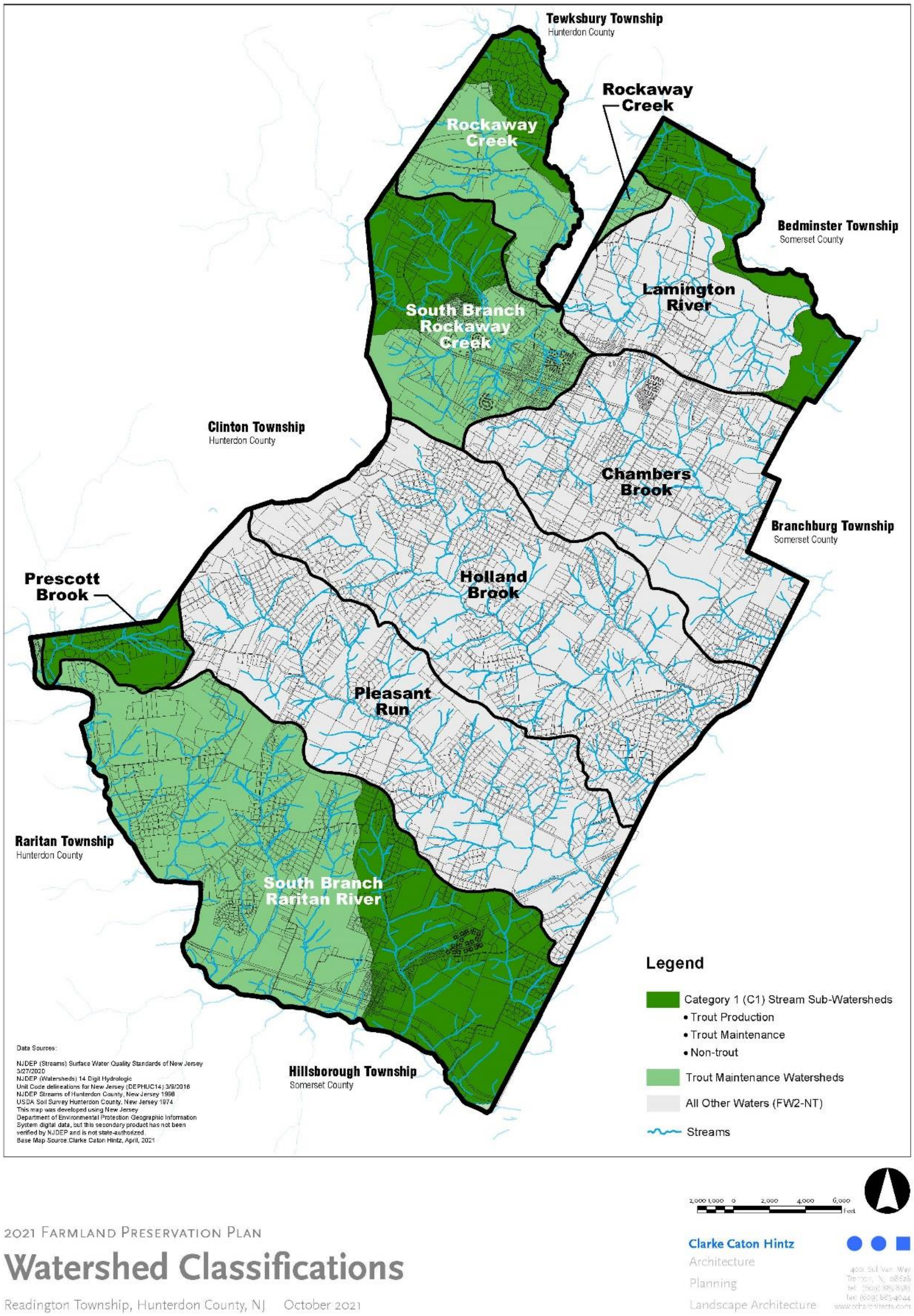

FIGURE 6: Readington Township Watershed Classifications, October 2021

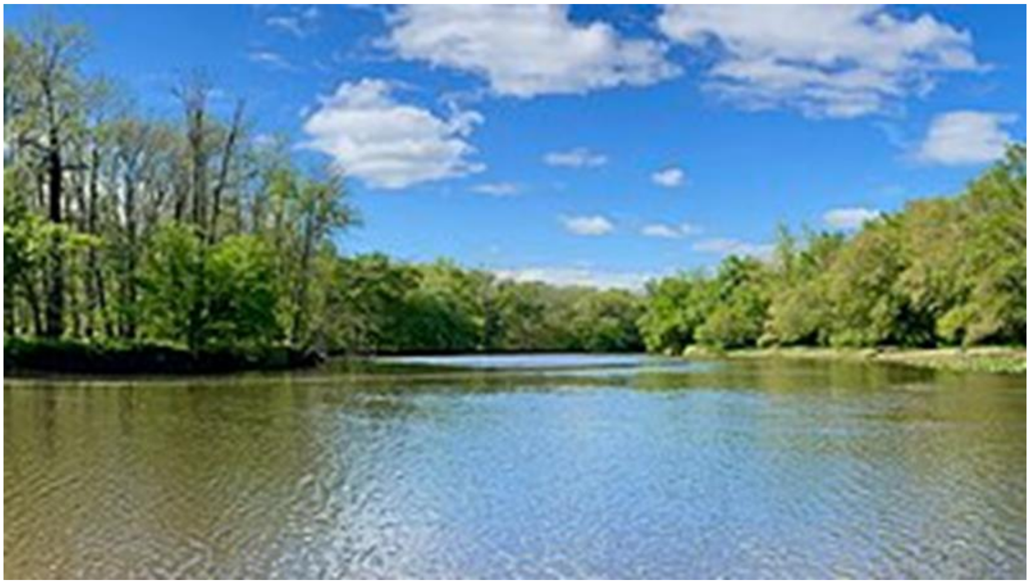

FIGURE 7: Confluence of the South Branch and the North Branch to form the Raritan River at Branchburg, New Jersey

In addition to its primary watershed, the South Branch Raritan River Watershed, there are also several sub-watersheds within Readington Township.

These sub-watersheds in Readington include:

- Lamington River
- Rockaway Creek
- South Branch Rockaway Creek
- Chambers Brook
- Holland Brook
- Pleasant Run
- Prescott Brook
- Lazy Brook

Figure 6 provides a map detailing the location of these sub-watersheds, each of which will be briefly reviewed below. First, however, it is important to understand the *Surface Water Quality Standards* that are used to classify all streams in New Jersey, including these watershed and sub-watershed streams in Readington. These classifications provide important distinctions between the various streams in Readington, as well as a mechanism for comparing them to other streams in New Jersey. New Jersey's Department of Environmental Protection (NJDEP) has established this classification system based on metrics such as water quality, ability to promote trout populations, and other factors.

NEW JERSEY DEP STREAM CLASSIFICATION SYSTEM

According to NJDEP these are the classifications that are used throughout the state to define streams:

- **FW1 and PL (or ONRW)**: Waters designated as **ONRW** (Outstanding Natural Resources Waters) include two general surface water classifications: Fresh Water One (**FW1**) and Pinelands waters (**PL**). The FW1 waters are intended to be set aside for posterity in their natural state and not to be subjected to any wastewater discharges or increases in runoff from human activities. All remaining waters are designated as **FW2**, the general classification that applies to all non-ONRW fresh waters.

- **FW2-TP:** Trout production waters, designated for use by trout for spawning or nursery purposes during their first summer.
- **FW2-TM:** Trout maintenance waters, designated for the support of trout throughout the year.
- **FW2-NT:** Non-trout waters, not considered suitable for trout, but may be suitable for many other fish species. There are several other classifications for saline coastal and estuarine waters but these are not relevant to the Great Swamp watershed. Associated with the applicable classifications, there are three Anti-degradation Levels of Protection.
- **C1:** Category One (C1) waters are protected from any measurable changes to the existing water quality. C1 can be applied to any of the surface water classifications except FW1 and PL, and is frequently applied to waters flowing through parks, wildlife refuges and to FW2- TP streams. "Water quality characteristics that are generally worse than the water quality criteria, except as due to natural conditions, shall be improved to maintain or provide for the designated uses where this can be accomplished without adverse impacts on organisms, communities or ecosystems of concern".
- **C2:** Category Two (C2) waters are all fresh surface waters not designated FW1, PL or Category One. "Water quality characteristics that are generally better than, or equal to, the water quality standards shall be maintained within a range of quality that shall protect the Updated August 2012 existing/designated uses". "Water quality characteristics that are generally worse than the water quality criteria shall be improved to meet the water quality criteria".

For a list of New Jersey streams and the system that NJDEP uses to classify them, see: NJDEP-N.J.A.C. 7:9B-Surface Water Quality Standards . This document is periodically updated; the most recent version carries an amendment date of April 4, 2020. According to this classification, a stream might be designated as, for example, *FW2-TP (C1)*, whereas another one might be shown as simply *FW2-NT*. In the latter case, while C2 protection is not specifically designated, it is understood and enforced.

In summary: according to current NJDEP classifications, the streams of Readington Township consist of: (i) one primary watershed and three sub-watersheds that are designated either C1 or Trout Maintenance (FW2-TM) -- these areas are differentiated in Figure 6 by green shading (darker and lighter respectively); and (ii) four additional sub-watersheds which are classified as FW2-NT, for which C2 protection is not designated but it is understood -- these areas are differentiated in Figure 6 by gray shading. It is important to note that DEP classifications are not permanent and are subject to revision based upon changes (positive or negative) in relevant criteria. This topic will be revisited later in this paper, in Chapter 7.

SUB-WATERSHEDS OF READINGTON TOWNSHIP

As described earlier, within Readington Township there is one major watershed (the South Branch Raritan River Watershed) and several sub-watersheds. This section of the paper will review these watersheds in a bit more detail, working our way from north to south.

Lamington River

The ***Lamington River*** is known as the Black River upstream of Pottersville, New Jersey. It is a tributary of the North Branch Raritan River in central New Jersey. Although for most of this river's length, it is located in municipalities other than Readington, those sections that flow through the northeastern corner of Readington Township include areas that are designated C1 and others that are designated Trout Maintenance (FW2-TM). Within Readington, these shorter sections of the Lamington are considered one of our sub-watersheds. For more information see: Lamington River and also see Figure 8.

FIGURE 8: Lamington River is a C1 tributary of the North Branch Raritan River

Rockaway Creek

In the northwestern corner of Readington is the sub-watershed called ***Rockaway Creek*** which is a tributary of the Lamington River. Overall, this is a 12-mile creek that rises as two branches -- one from the northern part of Tewksbury Township, and the other from the western border of Readington Township. The two branches then unite in Readington and flow into the Lamington. The sections of the creek that flow through Readington include an area that is designated C1 and another area that is designated Trout Maintenance (FW2-TM). For more information, see: Rockaway Creek and also see Figure 9.

FIGURE 9: Rockaway Creek is a C1 tributary of the Lamington River

South Branch Rockaway Creek

Just south of the main stem of Rockaway Creek is one of its primary branches, known as ***South Branch Rockaway Creek***. The headwaters of this creek originate in springs fed by aquifers near Cushetunk Mountain which flow through a bed of igneous rock that surrounds Round Valley Reservoir. [See: Igneous Rocks: Intrusive (plutonic)] for more information. In addition to these springs, this stream is also fed through an extensive network of smaller tributaries that direct surface water and precipitation into its principal channels. A sub-watershed in its own right, this 5.4-mile creek includes an area that is designated C1 and another area that is designated Trout Maintenance (FW2-TM). For more information, see: Rockaway Creek.

Chambers Brook

As we move further south in Readington, we find the sub-watershed of ***Chambers Brook,*** a 5.6-mile stream flowing from west to east from its headwaters to its termination where it joins the North Branch Raritan River. It originates in numerous locations where underground aquifers flowing through igneous rocks reach the surface of the ground as ***springs***. These springs, which together comprise the headwaters of the Chambers Brook are located just east of Whitehouse Station, New Jersey. Supplementing this water supply, this stream is also recharged through an extensive network of smaller tributaries that direct surface water and precipitation into its main stems. The Chambers Brook is designated by NJDEP as FW2-NT. For more information see North Branch Raritan River - tributaries and also see Figure 10.

FIGURE 10: Chambers Brook is an FW2-NT Tributary of the North Branch Raritan River

Holland Brook

The Chambers Brook is the first of three sub-watershed corridors that run in parallel through Readington Township in a very similar fashion. The second of these, located just south of the Chambers Brook is the ***Holland Brook***. The Holland Brook is a 7.6-mile stream that also flows through Readington from west to east. As is the case with the Chambers Brook, the Holland Brook also originates in numerous locations where underground aquifers, which flow through a bed of igneous rock that surrounds Round Valley Reservoir, rise to connect with the ground surface as ***springs.*** Together these springs comprise this stream's headwaters. In addition to these springs, this stream is also recharged through an extensive network of smaller tributaries that direct surface water and precipitation into its main branches. Flowing through Readington and continuing into Branchburg, this stream terminates at the South Branch Raritan River. Through this convergence, it is the South Branch Raritan River's last tributary before combining with the North Branch Raritan. Overall, from its headwaters near Cushetunk Mountain to its convergence with the South Branch Raritan River, the Holland Brook drops over 300 feet in elevation. Like the Chambers Brook, the Holland Brook is designated by NJDEP as FW2-NT. For more information, see Holland Brook .

Pleasant Run

Just south of the Holland Brook is the third sub-watershed corridor in Readington that originates from aquifer-fed springs near Cushetunk Mountain -- the ***Pleasant Run***. As is the case with the other two Readington streams to the north, these springs that feed the Pleasant Run flow through a bed of igneous rock that surrounds Round Valley Reservoir. Flowing similarly from west to east through Readington and Branchburg, the Pleasant Run is 7.4 miles from its headwaters to its convergence with the South Branch Raritan River near River Road in Branchburg. The Pleasant Run was originally called *Campbell's Brook* after John Campbell of Piscataway. Campbell in 1685, was granted a strip of land extending west from the South Branch and which included the tributary. The Pleasant Run is also designated by NJDEP as FW2-NT. For more information, see Pleasant Run and also see Figure 11.

FIGURE 11: The Pleasant Run is designated as FW2-NT by NJDEP

Prescott Brook

At the southwestern corner of Readington Township is a smaller sub-watershed that flows 3.5 miles from its headwaters in the hills surrounding Round Valley Reservoir to its termination as a tributary of South Branch Raritan River near Stanton Station, New Jersey. Although shorter in length, the entire Prescott Brook sub-watershed is designated C1 by NJDEP. For more information see South Branch Raritan River - tributaries .

Lazy Brook

Another tributary of the South Branch Raritan River, the ***Lazy Brook*** is the shortest of Readington's principal streams at just 1.7 miles in length. It is situated in the southeastern corner of the Township, and it flows from the northwest toward the southeast from its origins near Lazy Brook Road (west of Rt 202) to its termination in the South Branch Raritan River south of Three Bridges, New Jersey near Three Bridges Road.

WETLAND AREAS OF READINGTON TOWNSHIP

In addition to Readington's primary watersheds reviewed above, there are other important sources of fresh water that contribute directly to both subsurface aquifers and critical surface habitat for wildlife. These are the ***wetlands and marshes*** which rely on a combination of surface springs and seasonal precipitation to maintain a consistent level of hyper-saturation. For a summary of these important water structures, see Figure 12: *Freshwater Wetlands Map – Readington Township.*

While wetland areas have little or no development value, they are a critical component of a community's freshwater ecosystem. This is because they contribute directly to the filtering, scrubbing, and replenishing of our ground waters. For this reason, they deserve and receive protection in the form of numerous DEP regulations and statutes. See: [NJDEP Wetlands Program 2019-2022] for a detailed description of this DEP program.

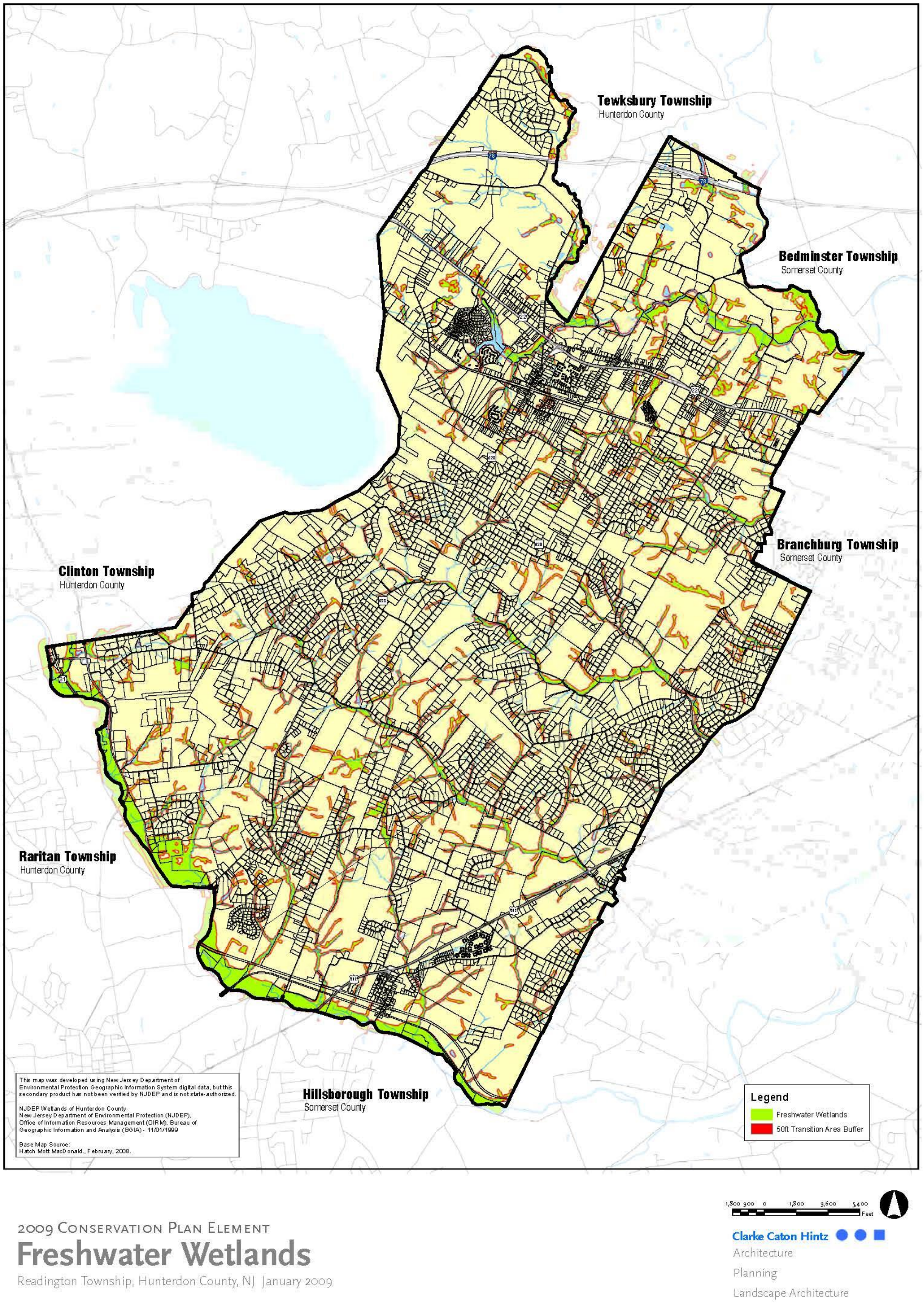

FIGURE 12: Freshwater Wetlands of Readington Township

Chapter 4: FLOOD PLAINS AND STORMWATER MANAGEMENT

FLOOD PLAINS AND FLOOD ZONES OF READINGTON TOWNSHIP

Among the important factors that significantly influence a municipality's ability to manage its local water cycle are its natural flood plains. A few definitions will help in understanding what these are and why they are so important to our water supply.

A ***flood*** is an overflow of water that submerges land that is usually dry. Flooding may occur as an overflow of water from water bodies, such as rivers, lakes, or the ocean, resulting in some of that water escaping its usual boundaries, or it may occur due to an accumulation of rainwater on saturated ground in what is referred to as an area-defined flood. In addition to direct property damage, flooding can also lead to secondary consequences, such as long-term displacement of residents, spreading of diseases and even death.

A ***flood plain*** is an area of land adjacent to a river or other body of water extending from its banks to the base of the neighboring valley walls, which experiences natural flooding during periods of heavy precipitation and high discharge. The soils in a natural floodplain usually consist of clays, silts, sands, and gravels deposited during floods. Due to the high concentration of nutrients and water, floodplains frequently have high soil fertility and for this reason, flood plains have contributed greatly to agricultural development in many areas. Flood plains are also called bottomlands.

A ***flood zone*** is a special geographic area that FEMA (the Federal Emergency Management Agency) has defined according to varying levels of flood risk. These flood zone designations came about because, over time, it became clear that relatively rare but extreme weather events exposed those living near some flood plains to additional risks to their health and wellbeing. These flood zones are depicted on each community's *Flood Insurance Rate Map (FIRM)* or *Flood Hazard Boundary Map.* Each zone reflects the severity or type of flooding in the area and the likelihood or risk of experiencing such flooding. During extreme weather events, an area's *natural flood plain* may be exceeded with waters flowing beyond the more expected flood plains into surrounding *flood zones*.

Over the past several decades, the significance of flood zones has increased dramatically. Environmental challenges created by human decisions have coincided with increases in the intensity and frequency of flooding. (see: Environmental Impact of Human Behavior.) For example, land use changes (see also: deforestation and removal of wetlands), reliance on fossil fuels, and other practices have contributed directly to global climate change which in turn has led to sea level rise and increases in the frequency and intensity of severe weather events. For an overview of this topic, see: How Climate Change is Making Record-breaking Floods the New Normal in: *United Nations Environmental Program*, 3 March 2020.

In Hunterdon County, communities had, for many years, been using flood maps published in May 2009. Based on 2009 data, Readington Township (as well as most of Hunterdon County) was designated ***Zone X*** or "*minimal flood risk*". (See Figure 14: Map of FEMA Flood Zones in Hunterdon County). Other *Special Flood Hazard Area* designations relevant to Readington are Zones A and AE. ***Zone A*** is a special flood hazard area that is defined as having a 1 percent chance of being inundated by flood waters in any given year (thus the creation and misuse of the term "100-year flood plain"). Flood waters have an equal chance of submerging these areas every year for five straight years, or not at all for 200 years; there is simply a 1 percent statistical possibility EVERY year.

Zone AE is an area that presents a 1-percent annual chance of flooding (the equivalent of a Zone A risk) plus an additional 26% chance over the life of a 30-year mortgage, according to FEMA. These regions are clearly defined in Flood Insurance Rate Maps or FIRMs. A small portion of Readington in 2009, specifically near the bottomlands surrounding the South Branch Raritan river and Rockaway Creek was designated either Zone A or Zone AE.

By 2018, both, county and community officials had recognized the need for updating the 2009 projections due to more rapid than anticipated changes in climate and weather patterns. In Fall 2018, FEMA Region 2 (which includes Readington Township) began a flood study of where the upper Raritan River affected Hunterdon County, and in April 2021, Region 2 published preliminary maps for *Readington Township.* Note: maps were also developed for the townships of Clinton, Franklin, Raritan, and Union at this time.

Those 2021 preliminary flood maps for Readington (and the other Region 2 municipalities involved in this project) incorporate the best available data, up-to-date engineering methods, and information gained over years of engagement for predicting flood risk. These maps are officially called Flood Insurance Rate Maps (FIRMs). In addition to communication insurance requirements, these updated flood maps help state and local leaders plan for the future of their communities and reduce the impacts of disasters on people, businesses, property and the environment.

On April 16, 2020, FEMA Region 2 conducted a Flood Risk Review (FRR) meeting, where representatives had the opportunity to provide input on draft maps for the upper Raritan River communities in Hunterdon County. A year later in April of 2021, FEMA worked with the six communities in Region 2 to develop new maps that updated all known riverine flood hazards in the area. For a more detailed description of this process, see: FEMA -- Hunterdon County Fact Sheet -- 2021.

Compared to the 2009 FEMA Map, the 2021 updates for Readington were not substantial. Some of the Zone A areas were changed to Zone AE (near the South Branch Raritan River) and a few new Zone A areas were added, (near for example, larger sub-watersheds like the Chambers Brook). For the most part, however, Readington Township was still designated Zone X for minimal flood risk. (See: FEMA Preliminary Flood Maps for Upper Raritan River Communities in Hunterdon). It should also be noted that Readington is one of more than 550 New Jersey communities that participate in the National Flood Insurance Protection (NFIP) Plan (see: NJ Communities Participating in the NFIP Plan), but, like most communities outside of the areas nearest New Jersey's Atlantic coastal region, the uptake rate for residents buying such policies is relatively low. (See Figure 13: *NFIP Program Take-Up Rates in Readington*).

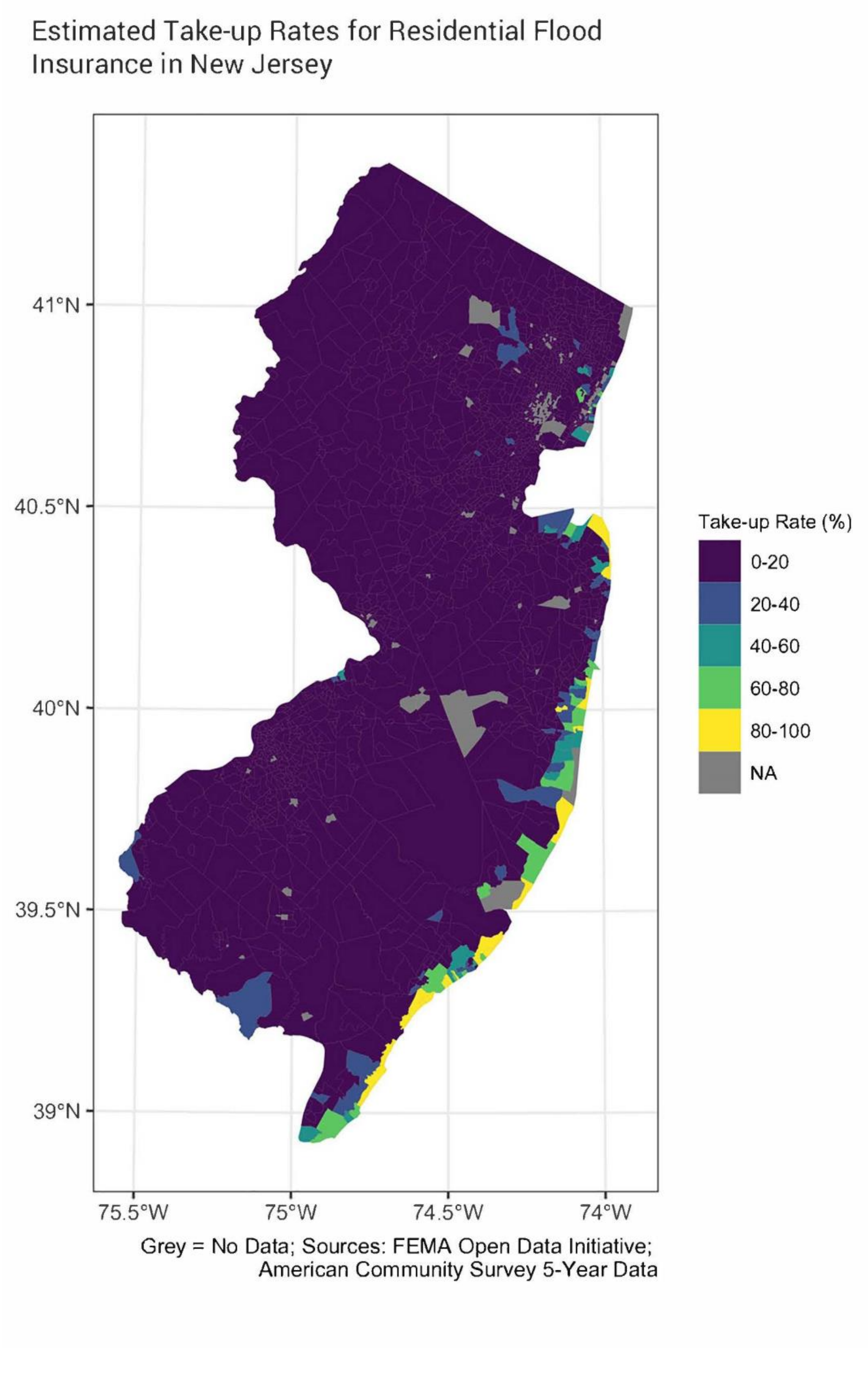

FIGURE 13: NFIP Program Take-Up Rates in Readington Range from 0 - 20%

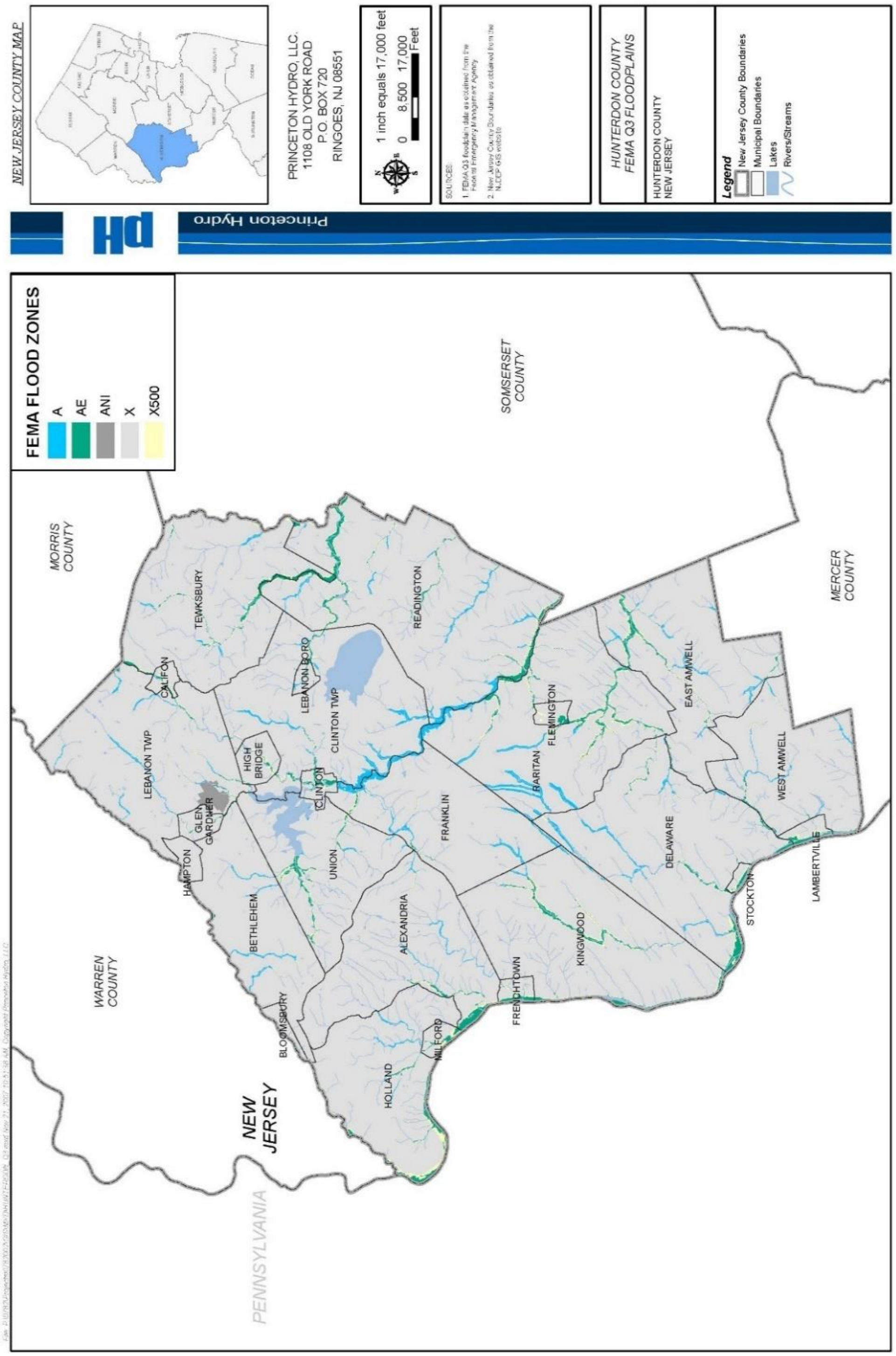

FIGURE 14: FEMA Flood Zones in Hunterdon County
(Source: [FEMA FLOOD ZONES Hunterdon NJ](#))

STORMWATER RUNOFF

One of the consistent themes that runs throughout this Water Story is that, left to its own devices, our planet's ecosystem has the inherent ability and a remarkable capacity to maintain our clean water supply within a broad range of conditions and circumstances, including a wide variety of natural catastrophic events. This system of checks and balances is fundamentally based upon the assumption that all living creatures that inhabit our planet will make choices when presented with options that are consistent with successful evolution and the survival of their species. Failure to act in the best interest of their species' survival, places their long-term success in jeopardy. Those, very simply, are the rules of natural selection.

Unfortunately, humans are now facing a world in which, for many decades, our developed countries have adopted practices that were not in the best interests of our species' long-term survival. These have included: (i) over development and over population; (ii) burning of fossil fuels rather than reliance on sustainable forms of energy; (iii) deforestation rather than practicing sustainable forestry; and A(iv) emphasis on mass production farming rather than sustainable livestock and agriculture. Such practices have, over time, contributed to a global greenhouse gas emergency that is now raising the temperature of our atmosphere and our oceans and our polar ice caps at a significant rate.

As the result of these practices, there has been a general warming trend globally and increases in the number, severity, and frequency of severe weather events. While the details supporting this conclusion do not need restating here, they can be reviewed in several reliable sources. See for example: Climate change and the 1991-2020 U.S. Climate Normals | NOAA Climate.gov .

Recent events in Readington Township support these conclusions regarding extreme weather events. In early September, 2021 a storm named Ida devastated Readington and other areas in New Jersey causing an unprecedented level of death and destruction. Experiencing a large rainstorm in Hunterdon County in September was not very surprising, but several aspects of this particular storm, including its origin, did catch many veteran weather professionals and average storm watchers completely by surprise. This storm made landfall in Louisiana as a powerful hurricane that had formed over the Gulf of Mexico. Ida did not, however, follow the expected trajectory of hurricanes making landfall, which typically lose most of their power due to no longer being over the ocean's vast supply of water. Instead, this storm crossed half of the continent overland while losing little of its original power and in fact gaining in intensity as it approached New Jersey from the southeast. It eventually ripped through New Jersey and much of the northeast where hour after hour of torrential rains and winds caused every river and stream to flood far beyond any levels that could be remembered. Afterward, stormwater risk in Readington took on new meaning. We had never seen a storm wreak such havoc – especially one that should have been nearly depleted according to all estimates by the time it reached our fair state. This underestimation of the storm's power as it approached New Jersey has been identified as the one of the causes of deaths in our state where more residents lost their lives than in Louisiana where the storm's overland journey had begun. This was the result of many individuals remaining in their homes and others seeking shelter in their basements, not realizing that the approaching storm was destined to flood their entire area and drown them in the process.

While global warming did not directly cause Hurricane Ida to form in the Caribbean, it did contribute directly to the conditions that allowed it to travel for more than a thousand miles overland while remaining truly dangerous. Since these environmental conditions now seem to be a part of the world we are living in, we can only assume that this is an indication of what may lie ahead. Stormwater management, therefore, now takes on even more significance and more urgency than before.

Even prior to Storm Ida, the situation had called for great concern. Over the previous three decades, the changes that were being documented by meteorologists (e.g. in Climate change and the 1991-2020 U.S. Climate Normals | NOAA Climate.gov) were not being taken seriously and recommendations for mitigation were frequently ignored. Land development and non-sustainable practices over many decades had already dramatically altered the hydrologic cycle (see Figure 2) in many areas with impacts effecting, in some cases, entire watersheds. Prior to over development, native vegetation could either directly intercept precipitation or draw up much of that portion that had infiltrated into the ground and return it to the atmosphere through transpiration. As modern development continuously removes this beneficial vegetation and replaces it with lawns or impervious cover, infiltration and transpiration rates are reduced. Clearing and grading a site can remove depressions that store rainfall and construction activities can compact the soil and diminish its infiltration potential. Through these practices, rainfall that once served to restore water tables to their natural baselines, has effectively been prevented from returning to the deep-water aquifers. Instead, rainwater has been converted into ever increasing volumes and rates of stormwater runoff.

Impervious areas that are connected to each other (for example gutters, driveways, paved roads, curbs, and storm sewers) can transport runoff much more quickly and efficiently than natural areas, so more and more of the rain that falls, ends up in places where it does little good for the ecosystem. In other words, this shortening of the rainfall transport time quickens the stormwater runoff response of the drainage area, causing flow in downstream waterways to peak faster and higher than under natural conditions. These increases can create downstream flooding and erosion problems and increase the quantity of sediment in the channel. The potential for filtration or scrubbing of this runoff to remove pollutants – normally a job carried out by surface soil and vegetation -- is vastly reduced or even eliminated by storm sewers that discharge runoff directly into streams.

Similarly, increases in impervious areas can also decrease opportunities for general soil infiltration that, in turn, reduces stream base flow and groundwater recharge. The combination of reduced base flows and increased peak flows produces greater fluctuations between normal and storm flow rates, which then can also increase stream channel erosion. Reduced base flows can also negatively impact the hydrology of adjacent wetlands and the health of biological ecosystems that depend on base flows. In addition, the erosion and sedimentation caused by these processes can destroy habitat – a challenge from which some species cannot recover.

Besides these challenges created by the excess volume and rate of rainwater from storms, the combination of impervious surfaces and lack of natural water table recharging also creates the ideal platform for the delivery and accumulation of soluble pollutants. Among the sources of these waterborne pollutants are the atmosphere, fertilizers, animal wastes, and vehicles; they can range from metals, suspended solids, and hydrocarbons to pathogens and excess nutrients.

Beyond these direct negative impacts, unmanaged stormwater runoff can also have devasting indirect impacts as well. For example, stormwater falling on impervious surfaces or stored in detention or retention basins can quickly become heated by the sun and this effluent can raise the temperature of the downstream waterway, adversely affecting many temperature-sensitive plant and animal species. Similarly, typical development practices can remove trees along stream banks that normally provide shading and soil stabilization. These streamside trees also contribute to the flora that falls naturally into streams becoming food and shelter for the aquatic life forms.

STORMWATER MANAGEMENT

A great deal has been done in efforts to address the challenges that New Jersey municipalities face when confronting excess stormwater and the need to manage it. Early examples included two sets of ***stormwater management rules*** that were published in 2004 in the New Jersey Register. These rules established a comprehensive framework for addressing water quality impacts associated with existing and future stormwater discharges. Based on this early guidance, the State of New Jersey (see: NJDEP Stormwater Management Guidelines) and the County of Hunterdon (see: Hunterdon County Environmental Toolbox: Stormwater Model Ordinance) have more recently provided municipalities like Readington Township with considerable assistance in planning for and directly addressing stormwater management locally.

In compliance with these guidelines, Readington has developed a Stormwater Management Plan [Stormwater Management Plan: Readington Township] that details actions to be taken. Following from this ordinance and the related planning framework, Readington has planned a series of actions that have been summarized separately and submitted to Sustainable Jersey under the heading of ***Enhanced Stormwater Management Control Ordinance Actions.***

See: [Stormwater Management Ordinance Action] for a detailed framework that reviews these actions.

The Township's most recent update of its Stormwater Management ordinance in 2022 includes the following key changes:

- Reducing the amount of disturbed area for ***Major Development required*** to ½ acre and/or ¼ acre of regulated motor vehicle surface in order for Green Infrastructure Stormwater Management requirements to apply
- Including ***Minor Development*** requirements for disturbed areas of more than 500 square feet
- Setting a stormwater management ***target of 95% retained on-site*** in the development plan
- Establishing that ***Green Infrastructure*** will be the preferred and expected method to manage stormwater retention via on-site infiltration/absorption, on-site particulate filtration, and on-site capture for reuse

GREEN INFRASTRUCTURE PROJECTS

In order to make optimal use of any of these stormwater planning resources, it is fundamentally important to recognize the expanding amount of impervious infrastructure that is replacing natural (pervious) infrastructure through typical urban and suburban development in communities like Readington (see Figure 15: *Types of Land Use in Readington Township*.

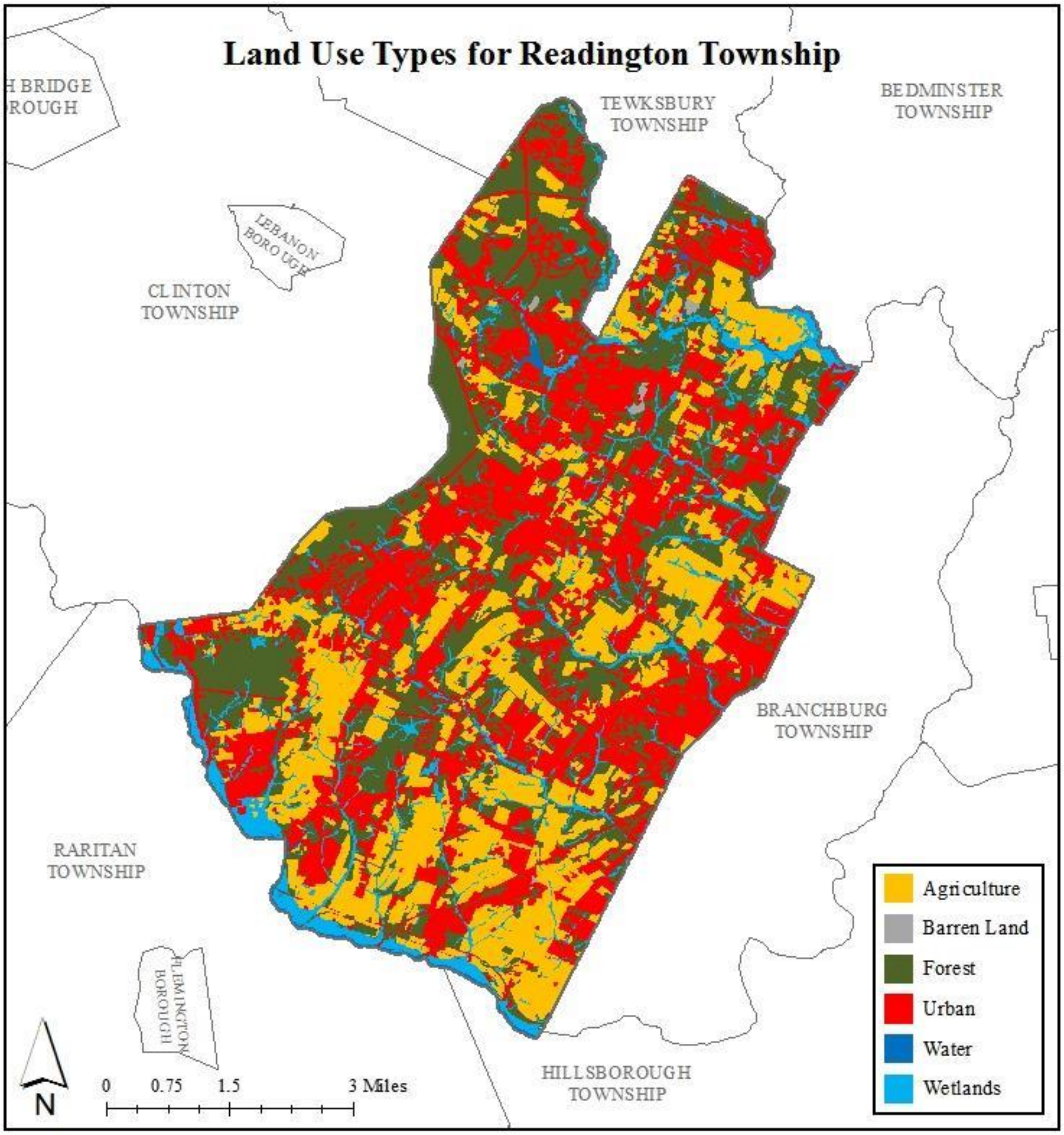

FIGURE 15: Types of Land Use in Readington Township

As documented for Readington by the *Rutgers University Cooperative Extension Water Resources Program* in their report titled ***An Impervious Cover Reduction Action Plan for Readington Township***, the strategy for curbing the effects of impervious infrastructure include both: (i) reducing the amount of impervious surface that is installed year-over-year in Readington and, (ii) increasing the number of green infrastructure projects that can effectively work in opposition to the impervious infrastructure in place. See: [Rutgers Impervious Cover Reduction Plan] for a complete description of this plan. Readington Township has already carried out several successful green infrastructure projects which will be reviewed as a part of our ***Community Outreach and Intervention Programs*** in Chapter 6.

STORMWATER MANAGEMENT RESOURCES

The following resources provide additional detail regarding Readington Township's current and future plans for managing stormwater:

Stormwater Pollution Prevention Plan

Municipal Stormwater Management Plan

Outfall Location Map

Stormwater Facility Detention Basin

Pet Waste Ordinance

Wildlife Feeding Ordinance

Litter Control Ordinance

Improper Disposal of Waste Ordinance

Containerized Yard Waste/Yard Waste Collection Ordinance

Private Storm Drain Inlet Retrofitting Ordinance

Illicit Connection Ordinance

Stormwater Control Ordinance

Chapter 5: WASTEWATER MANAGEMENT

Just as two different groups were identified in terms of how Readington residents sourced their fresh water supply (private wells and public water), there are also two different groups with respect to how wastewater is managed. While there is some overlap, most individuals who own private wells also have private septic systems, and most who have public water also make use of the public sewers.

The overlap occurs in situations where the Township may have extended the underground infrastructure for one or the other utility (usually sewers are extended first) into neighborhoods where homeowners currently have both private wells and private septics. Since this is usually done on an opt "in" or "out" basis, the result can be that some homes in the same neighborhood will then have a hybrid system (private well and public sewer) and others will have a traditional combination of private well and private septic. Accurate statistics on how many hybrid situations exist in Readington are not currently available but the estimate is that these situations are in the minority.

Next, we will review private septic systems and how they function. Following this, public sewer systems will be discussed.

PRIVATE SEPTIC SYSTEMS

According to the Environmental Protection Agency (EPA), (See: How Your Septic System Works | US EPA) in its simplest form a private septic system consists of:

- A ***collection tank*** receives all sewage from a household toilet and drainpipe plumbing system. Typically made of concrete and sized according to the number of occupants living in the residence that it serves, this container can hold from 1000 gallons for smaller homes to 2000 gallons for larger ones. It is designed so that solids sink to the bottom and liquids rise to the top where they can overflow into a leech field. Although designed to require years to fill up with solids, the emptying of this tank by local companies specializing in this pumping service is maintenance that should be performed regularly – on average every two years.

- An ***overflow field*** (also called a leech field or soil absorption field) is designed so that overflow from the tank is distributed across trenches lined with crushed stone, peat or other material that can filter and scrub the liquid effluent before returning it to the sub-surface ground water supply.

Each private septic system needs to match the specific demands of the household for which it has been designed. This includes number of individuals living in the house (as estimated by the number of bedrooms) and how much gray water waste (from laundry, dishes, baths and showers, etc.) is regularly created. When properly designed and maintained, the effluent returned from private septic systems to the sub-surface ground water supply has no negative impact on the potable water supply.

The proper functioning of these systems is very much dependent upon proper maintenance and upkeep. As with private wells, the responsibility for maintenance and proper performance of these private septic systems is entirely the responsibility of the owner. A related issue for homeowners is the potential of crossover or intermingling of potable water with wastewater systems, due either to the proximity of the installed systems on the building lot or a connection being made between the systems due to stormwater runoff and flooding from extreme weather events as reviewed earlier in this chapter.

We will revisit these challenges created by private wells and private septic systems (and the related need for homeowner maintenance) later in this paper in Chapter 7: IDENTIFICATION OF WATER ISSUES.

PUBLIC SEWER SYSTEMS

While the majority of Readington residents manage their wastewater through private septic systems as reviewed above, a smaller percentage handles its sewage and gray water waste through access to a collaborative called the Readington Lebanon Sewerage Authority (RLSA). See Readington-Lebanon Sewerage Authority for an overview of this system.

Residents who rely on this system drain all their wastewater (sewage and gray water) into a ***sewer lateral*** which is the lowest and largest diameter drainpipe inside of their home. The sewer lateral is also called a soil pipe. Most sewer laterals are buried beneath house foundations. Like other drainpipes, the sewer lateral runs at a downward sloping angle to take advantage of gravity. The sewer lateral eventually empties out into the public municipal sewer system. From the home's sewer lateral, wastewater empties into a ***sewer main*** that runs underneath the street and sidewalks. This sewer main line is generally made up of large pipes that are from 3 to 5 feet in diameter. These main pipes have intersecting ***vertical pipes*** which run up from the underground main to the surface. These verticals connect to hatches in buildings or manhole covers at street level that allow general access to the pipe system for maintenance.

These sewer mains flow progressively into larger and larger converging pipes until the wastewater, known as effluent, reaches the ***treatment plant***. In order to help gravity do its job, the treatment plant is located, when possible in a low-lying area by a stream or riverbed. When this is not possible, **pumping stations** are used to raise the wastewater up over elevations in the topography.

When the wastewater reaches the treatment plant, it is subjected to several physical, chemical, and biological processes (similar to the processes used for treating incoming raw water on the supply side). These ***processes are used to remove contaminants*** and produce treated wastewater ***effluent*** that is safe enough for release into the environment without any fear of ecological damage. A by-product of sewage treatment after releasable wastewater effluent has been removed is a semi-solid waste or slurry, called ***sludge*** which must undergo further treatment before being suitable for disposal or application to land.

As with all wastewater management systems, the potential for crossover or intermingling of public potable water systems with public wastewater systems, due to stormwater runoff and flooding from extreme weather events is a significant public health risk that requires from municipalities that they remain constantly vigilant.

Chapter 6: COMMUNITY OUTREACH AND INTERVENTION PROGRAMS

LOCAL ORGANIZATIONS AND COLLABORATIONS

Every effort to improve and to maintain the clean water supply of Readington, past and present, has relied heavily on collaborations and partnerships between a wide variety of local government groups and private organizations. These cooperative partnerships are essential components of Readington Township's Municipal Water Story. Some of these are briefly reviewed here.

Rutgers University Cooperative Extension Water Resources Program

Through this partnership, the Rutgers team has helped the Township identify locations (based on local drainage calculations) for a variety of green infrastructure projects (see Rutgers Impervious Cover Reduction Plan). This assistance has included detailed design recommendations for each of these projects, optimized for the various installation locations. The plan will serve as a strategic guide for Readington as we move forward with green infrastructure projects in the future.

Raritan Valley Community College, Center for Environmental Studies

Under the direction of Dr. Jay Kelly, this local academic program has formed strong ties to Readington Township. Through a variety of collaborative research projects, RVCC students have enhanced their understanding of complex ecological science while at the same time, contributing directly to the improvement the Township's ecological sustainability. Projects have included tree planting to replace dying ash trees, deer exclosure construction, native plant installation projects, meadow design and plantings to enhance butterfly survival, and small stream rebuilding and stewardship, among many other topics.

Raritan Headwaters Association (RHA)

For many years, the most significant and productive organizational collaborator for Readington Township in its efforts to protect its fresh water supply has been the Raritan Headwaters Association (RHA). From their wide variety of established programs and initiatives to the extensive educational resources which they make available, RHA has worked side-by-side with our community to further its clean water goals at every level. Readington's Township Committee, Open Space Advisory Board, Environmental Commission, and WaterWatch

Advisory Committee all have regular and ongoing interactions with the professionals at RHA and have for many years. We look forward to a continued and mutually beneficial association with this outstanding organization in the future.

Readington Township Environmental Commission (EC)

Readington Township has a long history of protecting and restoring its natural resources. This is clearly reflected in the Township's environmentally proactive land development ordinances and master plan initiatives. Most of the environmental accomplishments of the Township have been achieved through the efforts of its Environmental Commission (EC). The EC's accepted role as the stewards of the Township's natural resources is reflected in their various projects, including the preparation of an award-winning *Natural Resources Inventory* and participation in various community conservation programs. Also noteworthy in the context of this Municipal Water Story is the EC's role as Lead Planning Agency for the NJDEP approved *Watershed Protection Plan* (2009) for two of our local streams – Holland Brook and Pleasant Run.

Readington Township Open Space Advisory Board (OSAB)

Another driving force behind Readington's tradition of actively protecting its farmland traditions and natural resources has been the strategic planning and leadership provided by its Open Space Advisory Board (OSAB). Through forward thinking ordinances, resolutions, master plan initiatives, and strategic acquisitions, Readington's OSAB has been successful in preserving over 4,352 acres of land as of 2021, with the goal of 3,000 new preserved acres by 2050 (Preserved farmland and Open Space combined). Preserving our land and protecting it from overdevelopment is a shared value and a specific goal for all of the collaborators on this list.

Readington WaterWatch Advisory Committee (RWW)

Recognizing the critical significance of water-based initiatives to every one of Readington's sustainability goals, the Township decided in 2021 to establish a new Advisory Committee focused aggressively and entirely on clean water preservation and related sustainability issues. Named the *Readington WaterWatch* (RWW), this committee has collected and organized all of Readington's water-related initiatives under one umbrella, relying on active and seamless collaboration with each of the other organizations named in this section. RWW took the lead in preparing this Water Story and hopes to continue providing leadership for Readington's clean water initiatives in years to come.

OUTREACH AND INTERVENTION PROGRAMS

Readington Township has an impressive and diversified history of designing and implementing clean water initiatives – particularly over the past 30 years. These efforts have, in the past, been integral components of all open space preservation, farmland preservation, and environmental conservation programs. As the result, the essential focus on clean water preservation has been woven through all strategic planning and related documentation – including the Township's Master Plan -- for many years. Summarized in this section are a number of the outreach and intervention activities that have evolved over the years to become anticipated annual events.

Annual Fall Well Testing

For more than 15 years, Readington Township has been collaborating each Fall with Raritan Headwaters Assciation (RHA) to plan, promote, and implement a community-wide well water testing event. Typical programs have averaged 200 households tested each year. Planning has involved the identification of dates, locations, and a myriad of details following a framework that RHA has designed and used successfully throughout the broad region that it serves. Promotion has traditionally been through the Township's web site and email list as well as the local newspaper. Just as with all typical community activities over the past 2 years, participation rates and overall success have been hampered by the pandemic. Nonetheless, the programs were carried out, with minor modifications each year and as these annual reports document, the programs were unquestionably successful. See: [RHA Well Test 2020] and [RHA Well Test 2021] for data reports from this program in 2020 and 2021.

The goals of the program are straightforward: first, to promote and to maximize participation among as many residents who own private wells as possible; and second, to educate the community through the results of this program regarding test results (positive and negative) and steps that can be taken to improve the water supply over time.

Through this RHA program, data was collected in 2021 from 286 wells on ***Primary Contaminants of Concern*****.** The results are detailed in Figure 16. As the result of heavy stormwater runoff in the months preceding this testing, a higher than typical number and percent of wells that were tested were found to exceed the recommended MCL (maximum contamination levels) for *E. Coli* and coliform bacteria. Other important contaminants of concern included arsenic, lead, and radon.

Based on these results, community education efforts are planned that will promote practices that address these concerns. In many cases, the most effective way to address many of the named contaminants is through a remediation system. These systems are installed by plumbers or well water professionals and they are typically added in-line near the location where the water supply is delivered to the home plumbing system. The untreated water passes through these treatment systems before being passed along for use within the home. Within these systems they are subjected to various technologies such as reverse osmosis, distillation, and carbon filtration – in each case designed chemically to remove the contaminants of interest. In most cases, all costs are covered by the homeowners.

Contaminant	# wells tested in 2021	Range of results (ND=NonDetect)	Limit or MCL*	# wells exceeding MCL	Percent wells exceeding MCL
Coliform bacteria	286	Abs-Pres	Absent	86	30%
E.coli (fecal bacteria)	286	Abs-Pres	Absent	19	7%
Nitrate	266	ND-7.27 mg/L	10 mg/L	0	0%
Arsenic	137	ND-11.61 ppb	5 ppb	14	10%
Lead	107	ND-101.5 ppb	15 ppb	4	4%
Gross Alpha (uranium + radium)	53	ND- 9.9 pCi/L	15 pCi/L	0	0%
Radon	87	ND- 5625.9 pCi/L	2000 pCi/L**	32	37%

** Maximum Contaminant Level (MCL). The maximum level of a contaminant which is permitted in public*

water supplies. Maximum contaminant levels are specified in the Primary Drinking Water Standards set by EPA for contaminants that affect the safety of public drinking water.

*** There is no standard set in NJ for radon in water. Standards set in other states in our region are used*
as guidelines. The most protective of these standards is 2000 pCi/L in New Hampshire.

FIGURE 16: Readington 2021 Well Testing Data – Results Provided by RHA

Special Note Regarding Lead: Although this initiative has been referred to for many years as the *Well Testing Program,* this name does not adequately recognize a very important aspect of Readington's water testing program – the ***testing for and remediation of lead contamination*** in the water supplies of some Readington residents, many of whom do not have private wells.

The most common sources of lead in drinking water are the metal components of a home or business plumbing system that deliver water to the user. Certain supply pipes that carry drinking water from the water source to a home or business may contain lead, as can household plumbing fixtures, welding solder, and pipe fittings made prior to 1986. While these design features are more prevalent among homes and businesses in the smaller portion of Readington that is supplied by public water service (see Chapter 2 above), there are also some homes that rely on private wells that have similar plumbing installations and, therefore, have comparable risk of exposure.

In such situations, lead moves into the water supply from the metal pipes, solder or fixtures through the process of ***corrosion*** and, when consumed sufficiently over time, can lead to illness and death. Optional tests are available through the RHA program to specifically identify lead levels in the water supplies of residents using either private wells or public water service. If lead is found, remediation is recommended. Although the federal ***Safe Drinking Water Act*** sets a maximum concentration of 15 parts per billion (ppb) of lead for tap water, the EPA has set the maximum contaminant level goal (MCLG) for lead in drinking water at zero. No amount of lead is good for you, so if any amount of lead is found in water test results, it is best to treat for it. Remediation methods are similar to treatments for other contaminants. They include reverse osmosis, distillation, and carbon filters -- specially designed in this case to remove lead.

Annual Spring Stream Cleanup

Each Spring for more than a decade, Readington Township has collaborated with Raritan Headwaters Association (RHA) to plan, promote, and implement a community-wide stream cleanup event. Planning has involved the identification of dates, locations, and a myriad of details following a framework that RHA has designed and used successfully throughout the broad region that it serves. Promotion has traditionally been through the Township's web site and email list as well as through the local newspaper.

Just as with most community activities over the past 2 years, participation rates and overall success have recently been hampered by the pandemic. Nonetheless, the initiative was carried out each spring without fail with minor modifications and adjustments. Following the brief pandemic hiatus however, planners were rewarded in 2022 by participation rates returning to near normal rates.

FIGURE 17: Annual Cleanup Events Help to Maintain Local Stream Health in Readington

The program has a few simple goals: first, to promote and to maximize participation among as many community residents as possible; second, to reduce the negative impact of consumer-generated refuse on some of our streams by removing as much as possible during a single 3-hour event; and third, to educate the community through the results of this cleanup event regarding the negative impact of preventable consumer trash and steps that can be taken to reduce waste and improve the water supply over time.

Over the years, Readington's community participation in these clean-up events has been very successful with individuals, families, and organizations (such as scout troops and emergency squad team members) showing up and bagging impressive amounts of trash and recyclables. See [RHA Stream Cleanup 2021] for an overview of program results in 2021. Though this event in 2022 was only recently completed (04-23-2022), some preliminary highlights include:

- Despite a rainy day, approximately 70 volunteers participated

- As the result of careful planning and scheduling by Readington site monitors, a cleanup was successfully carried out at 6 different locations along the South Branch Raritan River including one new site that was added to last year's list

- In total, more than 65 bags (of trash and recyclables combined) plus a wide variety of tires and other items were collected, sorted and later picked up for processing.

Integral to the success of this effort each year is the help and collaboration of Readington's Department of Public Works (DPW) who collect and carefully process the collected materials in the days following the event. Of note this year was the unfortunate dumping of more than 25 plastic containers of used oil which were successfully recovered by volunteers and picked up by DPW who were able to safely recycle the contents through their departmental used-oil program. Also of note was a group of kayaks led by Readington's Mayor and Vice-Mayor who paddled down the river, attacking the stream-side trash problem from the water. This team successfully transferred a significant amount of trash (including some tires) to the on-land collection sites.

See: Stream Cleanup - Raritan Headwaters for a more detailed description of this highly successful program.

Annual Stream Monitoring Program

Just as Readington has worked closely with RHA over the years to organize and implement well testing and stream cleanup efforts, the Township has also relied on this partner to guide and assist us in the implementation our annual stream monitoring initiative. From the training and certification each year of new stream monitors (see: Stream Monitor Training - Raritan Headwaters), to the provision of data collection protocols and water sampling equipment, RHA has effectively created a team of ***citizen scientists*** who venture forth in the late Spring to monitor the health of our local watersheds (see: Stream Monitoring Program - Raritan Headwaters). For more than 25 years, this award-winning program has used the data that is collected to produce RHA's ***annual report card*** – an assessment of the health and current status of the Raritan Headwaters Watershed (see: How Healthy Is Our Watershed? - Raritan Headwaters).

While the Readington data collection sites in the past have focused on the South Branch Raritan River plus a couple of our sub-watersheds, an expansion of the program to include all 8 of the Townships sub-watersheds is under discussion. This expansion would be designed to supplement Township efforts to eventually have each of these streams reclassified as C1 through the NJDEP classification process.

Annual Rain Barrel Workshop

Through collaboration with Raritan Headwaters Association (RHA), Readington now offers an *Annual Rain Barrel Workshop* designed to teach residents how to utilize rain barrels for rainwater preservation, and also how to make their own from readily available household materials. The workshop uses a 3-hour (one-morning) format, trained instructors from RHA, and highly engaging educational materials. The community is responsible for identifying a suitable location (renovated barns have been ideal), promoting the event to residents, and generating overall community support and participation.

See: Rain Barrel Workshop in Readington - Raritan Headwaters for a more detailed description of this popular program.

Community Rain Gardens

One of the effective methods for reducing impervious infrastructure and improving green (pervious) infrastructure is the creation of rain gardens throughout the community. Readington has made significant progress toward this objective. As a part of the ***Impervious Cover Reduction Plan*** created for the Township by Rutgers University (see: Rutgers Impervious Cover Reduction Plan), a ***detention basin*** (designed to hold rainwater and then dump it into streams) at Readington Middle School was converted into a ***retention basin*** (designed to hold water and recycle it back into the ground water system through a rain garden). In addition, with guidance from the Rutgers teams, initial planning and fundraising have been completed for another *detention to retention basin conversion* at Three Bridges Elementary School. The finalized design and implementation of this initiative will be carried out later in 2022.

As part of a separate initiative, Readington Township applied for and received a 319h grant that was focused on green infrastructure promotion projects. The intention of this project was originally to design and build a series of affordable rain gardens using neighborhood-to-neighborhood promotion and volunteer support. Though implementation was significantly hampered by pandemic restrictions, the Township was able to acquire the knowledge needed to organize and plan for such projects, several of which are planned for the near future. Despite these setbacks, the Township was able to design and implement several 319h projects that will serve as examples and provide inspiration for our green infrastructure efforts in the future. These projects are described in the section *Grant Programs – 319h Grant* below.

Schools Programs Student Engagement

If the next generation can be motivated to work for clean water, our efforts as we move forward will be more successful. For this reason, an important target for promoting the health of our fresh waters in Readington Township is our local school system. Readington WaterWatch (RWW) has identified a liaison to the schools who attends all school meetings related to sustainability and who is a member of the ***Readington Schools Green Team***. A number of collaborative programs have grown out of this liaison including:

- ***School Rain Garden Maintenance Projects*** involve students in the care of rain gardens and native plant gardens that are located on school property and educational modules related to these plantings are integrated into the standard curricula.

- ***Trout in the Classroom***, an educational program sponsored by Trout Unlimited, gives students an opportunity to raise fertilized trout eggs in the classroom until large enough to release into local trout-stocked streams. Students learn the basic principles of what factors influence stream health and how stream health determines what flora and fauna can live in a stream. See Trout in the Classroom - Trout Unlimited for a detailed description of this outstanding program.

- The ***Student Ambassadors Program*** has been designed to give selected students an opportunity to attend virtual Webex meetings of various Township Advisory Committees and to provide feedback and input into issues of importance to young and old alike. Introduced first to RWW to provide their perspectives on current and future clean water programs, future participation in EC and OSAB are also planned.

Grant Programs -- 319h Grant

Readington has an impressive history of applying for and receiving funding for community projects. Of significance to this Water Story is the recent ***319h grant*** which was described above in the context of community rain gardens. In addition to those benefits already mentioned, the Township has also been able to create a separate program that has the potential for significantly influencing community acceptance of clean water initiatives both in Readington and beyond.

Working once again with our outstanding partners at ***Raritan Headwaters Association***, a brochure (see: Figure 18) has been created that has a number of unique features:

- First, it is designed as a two-sided, three-panel handout that covers a broad range of actions that residents can take themselves to improve our water supply – both for our current and future generations.

- Second, RHA has skillfully integrated the material in the brochure with specific educational pages on their comprehensive web site (See: Raritan Headwaters Association). In this way, the brochure motivates participation, and the web site provides training for necessary skills.

- Third, the brochure has been designed so that the name and data blocks which identify the community being targeted can easily be changed so that after disseminating it broadly throughout Readington, the product can be modified for reuse in neighboring communities like Raritan, Clinton, or Branchburg. In this way, Readington can establish itself as a leader among Hunterdon County municipalities in efforts to promote clean water. Outreach to our neighbors has already been initiated by RWW (***Readington WaterWatch Advisory Committee***) and this group will take the lead in sharing and disseminating the various programs and approaches that various communities have found to be successful.

We anticipate that this innovative program in collaboration with RHA will create many opportunities for Readington Township that have not existed previously.

Readington Township

- Our community offers areas of extraordinary beauty, wildlife habitat, agriculture, and precious natural resources.

Readington Township is bounded on the north by the Lamington River and Rockaway Creek; east by Somerset County; south by the South Branch of the Raritan River; and west by the old West Jersey Society's line which crosses the Cushetunk Mountains.

Streams
Roads

1.8 Million+ people depend on the water we protect

Healthy Water Healthy Life

Raritan Headwaters Association is a nonprofit conservation organization that protects water in our rivers, our streams, and our homes. Our vision is that everyone within our reach has access to safe, clean water that is swimmable, fishable, and above all, drinkable.

www.RaritanHeadwaters.org

Raritan Headwaters

908-234-1852

Headquarters
Fairview Farm Wildlife Preserve
2121 Larger Cross Road
Bedminster, NJ

South Branch Office
124 Main Street
LL Suite 2
Flemington, NJ

Township of Readington New Jersey

We have much to protect now and for future generations

Photo by Edward Dirk

READINGTON TOWNSHIP

- Your Community's Land and Water

Produced by Raritan Headwaters

Readington Township **Land and Water**

- Readington Township has 16,000 residents living in an area of 47.8 sq miles.
- There are 5,004 private wells in our town. It's up to you to test your well.

Contaminants identified in wells tested in Readington that **exceeded NJ Drinking Water Standards.**

21% ARSENIC | 11% PH | 8% IRON

- There are 152 miles of stream in Readington Township. **36%** of forested stream corridors have been altered by development or agriculture.

Readington Land Use - Land Cover

Forest	Agriculture	Wetlands	Urban
31%	26%	7%	35%

- Estimated 2 billion, 70 million gallons of stormwater runoff in an average year due to impervious surfaces (e.g., pavement, roofs)

What you can do to protect your town's precious natural resources.

- Vegetated riparian buffers control erosion and prevent pollutants from entering our waterways. Plant native trees and shrubs along streambanks to help keep our streams clean and healthy!
- Stormwater runoff that carries pollutants into streams and rivers can be managed through "green infrastructure" like rain gardens that allow water to slow down, penetrate, and filter out contaminants before they enter our waterways. They also add beauty to the landscape and support a diversity of birds and butterflies.
- Have your septic system pumped every three years to ensure proper functioning. Excess nitrates and bacteria from poorly maintained systems can contaminate nearby drinking water wells and streams.
- Advocate for protecting and restoring natural habitats in your community. Attend township committee meetings and stay current with land use planning, zoning rules, and proposed developments.
- In Readington, most residents get their drinking water from underground aquifers and rely on private wells. Well water testing is an important part of keeping you and your family healthy and also helps monitor our aquifers.
- Look for the Hunterdon County Hazardous Waste Clean-Up Days schedule to safely dispose of paints, cleaners, oil, prescription drugs and pesticides that pose a threat to water quality and human health.

Watch for RHA's Annual Stream Cleanup in April.

CALL **Report Pollution 1-877-WARNDEP**

FIGURE 18: A Six-Panel Brochure Created by RHA for Readington and Beyond

In addition, the 319h grant was also used to design and implement several specific projects in Readington related to ***green infrastructure improvement***. One example was the ***Readington River Buffalo Farm Project.*** This project was designed to create a ***water and sediment control basin*** within the farm's pasture that improved stormwater runoff into the Pleasant Run. This involved extensive reengineering and renovation of the stream's riparian buffer. See the before and after photos in Figure 19. This project was completed in 2018.

FIGURE 19: Before and After Creation of Stormwater Control Basin at the Readington River Buffalo Farm Project

A second example of ***green infrastructure improvement*** initiatives funded through the 3139h grant was the ***Readington Middle School Stormwater Basin Renovation Project***. The project was designed to modify an existing stormwater basin to increase pollutant removal and decrease downstream runoff volume by installing a rain garden consisting of deep-rooted, native plant vegetation. See Figure 20 for before and after photos of this transformation. The project was completed in 2018.

FIGURE 20: Before and After Transformation of Stormwater Basin into Native Plant Rain Garden

Storm-Related Cleanup Efforts – Dealing with the Aftermath of Storm Ida

The massive storm that devastated New Jersey in September 2021 left many of Readington's streams partially or mostly blocked with storm-related debris. The debris ranged from trees and branches to a wide variety of household objects. As soon as the storm subsided and the high waters receded, a plan was put into action to address some of the damage. In compliance with Hunterdon County and NJ State program announcements, members of RWW were deployed in teams of two to each of our small streams to collect photographic and GPS data that would document the damage suffered in our Township. All collected data was then organized according to the county and state forms that were provided and the data submitted as requests for storm-related assistance. While this process has been slow in responding, we remain confident that it will, in the end, provide much needed help. In the meantime, a number of volunteers have taken steps to begin smaller scale cleanup efforts on their own.

Stream Restoration Projects

Because Readington is traversed by many small streams (see: Chapter 3) and because over 80 percent of its residents live within 300 feet of a year-round stream, there is a significant opportunity for collaboration between the Township and individual residents to improve specific streams and the lands that they flow through. One such opportunity that we hope will serve as a model for others to follow is the ***Holland Brook Restoration Project***.

One Readington resident is the owner of a 17-acre farm that has a ¾ mile section of the Holland Brook running through it. His farm, in addition to straddling the Holland Brook, is adjacent to an upstream 9-acre land parcel that is owned by the Township which had been previously preserved as Open Space. In the course of seeking assistance from the Natural Resources Conservation Service (NRCS) for farm infrastructure projects through NRCS's Environmental Quality Incentive Program (EQIP), the owner was made aware of a funding opportunity for stream habitat restoration. Because of the proximity to the Township-owned land, the owner sought to expand the project to encompass the stream corridor on both his farm and the Township property. A collaboration was formed with the Township which agreed to provide several types of in-kind support, and federal funding was awarded. This 2-3 year project was initiated early in 2021 and, once completed, it will restore stream habitat (including both streambed and riparian zones) for approximately 4000 feet of the Holland Brook – a major contribution to this stream's viability.

A similar project is currently being planned in collaboration with a farmer who owns land that adjoins both a Township-owned Open Space parcel and a segment of the Prescott Brook.

Chapter 7: IDENTIFICATION AND PRIORITIZATION OF WATER ISSUES

Overview

The Sustainable Jersey (SJ) Municipal Water Story provides a framework for organizing and reporting on the activities, plans, successes, and frustrations as New Jersey communities struggle with the challenges of protecting their clean water supply in a the most densely populated state in the Nation. This concluding chapter of the exercise is intended to address the key issues that each community has identified as high priority. Once identified, the expectation is that these issues will be addressed over the coming months by following a plan that SJ has provided in a document called the ***Navigational Path Template*** (see: Sustainable Jersey Navigational Path Template).

This template provides a guide to developing the ***Navigational Path***, a required component of the Municipal Water Story for municipalities pursuing the Gold Star Standard in Water. Using this Navigational Path Template, Readington will ***identify at least two specific actions*** and any related steps that it will undertake to address specific water issues that have been identified in the Municipal Water Story. Each Navigational Path is obviously specific to the municipality and responsive to the water issues prioritized as most important.

Following the Template, Readington will then evaluate the identified actions and develop a timeline for their completion. This plan, with all defined ***next steps*** included, will become part of a submission to the Readington Township Committee for municipal endorsement. Completion of the Navigational Path and all related steps is intended to demonstrate Readington's commitment to steady progress towards a sustainable water system and it will serve as our pledge to guide our water-related work over the next certification cycle.

We should note that, while each the ***seven issues*** listed below are very important to our overall objectives, ***#'s 1, 3, and 4*** are considered to be ***foundational*** to our success going forward.

The seven issues detailed below have not yet been vetted through the Navigation Path process. This list of issues represents a first draft prepared by ***Readington WaterWatch*** and the team that wrote this Water Story. We anticipate that it will be a good place to begin the next phase of our work.

OBJECTIVES WITH A (PROBABLE) ONE-YEAR TIMELINE

Issue 1: Community Participation. In a community of more than 20,000 individuals, our participations rates for most of our programs, events and activities are unacceptably low. The more aggressive two-year and five-year goals that we have identified will be impossible to meet without significant increases in community involvement.

Goal: to achieve a significant increase (TBD) in participation rates for water programs within 1 year among adults in the community.

Strategy: define, design and approve of an effective social media-based communication system to regularly reach members of the Readington community.

Issue 2: Student Participation. Engaging more students in clean water preservation activities and creating a sense of environmental ownership among them will increase the likelihood that they will become clean water stewards themselves later in life.

Goal: to achieve a significant increase (TBD) in student participation rates for water programs within 1 year among students in the community.

Strategy: increase our outreach and liaison effort that involve the schools; expand the basic social media-based system designed for Issue 1 to effectively reach the student population.

OBJECTIVES WITH A (PROBABLE) TWO-YEAR TIME LINE

Issue 3: Well Testing Participation. Because the majority of Readington's residents rely on private wells for their potable water, and because knowing the quality of the water in a private well requires regular testing, the percentage of residents participating in well testing must increase.

Goal: to achieve a significant increase (TBD) in well testing participation overall within 2 years among private well owners.

Strategy:

- Optimize social media promotion of test events
- For 'never testers': promote "Get your First Well Test"
- For 'one-time testers': promote "Pledge to retest every 2 years (with reminders)"

- For all participants, promote "Agree to tell one neighbor about the importance of well testing"

Issue 4: Green Infrastructure Projects. In recognition of the importance of green infrastructure projects as strategies for mitigating the effects of stormwater runoff, projects are suggested that address this issue directly.

Goal: to plan, raise necessary funds, and implement projects (number of projects TBD) recommended by Rutgers in the ***Impervious Cover Reduction Plan*** (see: Chapter 6) and as detailed in Readington's 319h grant plan as neighborhood-to-neighborhood rain gardens.

Strategy:

- Identify grant writers
- Identify funding sources and deadlines
- Develop timeline for preparation and submission of applications

OBJECTIVES WITH A (PROBABLE) FIVE-YEAR TIMELINE

Issue 5: NJDEP Stream Category 1 Classification. As summarized earlier in Chapter 3 , some of Readington's streams have been designated by NJDEP as ***C1***, one of the highest and most protected levels of classification. Significant changes to this system were recently enacted when the Department adopted 600 miles of new Category One (C1) waters on April 6, 2020. This adoption also increased the width of the riparian zone (RZ) to 300-feet along these waters as well as any upstream tributaries that lie within the same HUC-14 watershed.

However, most Readington's streams have not been classified C1 and they lack the riparian protection that this classification affords.

Goal: to achieve C1 designation for all Readington watersheds and sub-watersheds within 5 years (see Figure 6 and Chapter 3).

Strategy:

- Review the range of criteria used for justifying C1, how these criteria are defined, and how these criteria are measured; note: these criteria include (i) exceptional ecological significance; (ii) exceptional water supply significance; (iii) exceptional fisheries and recreational resources

- Promote community support of C1 classification for all Readington watersheds based primarily on "exceptional water supply significance" and gather proof of level of support
- Determine schedule for NJDEP hearings that deal with stream classification and work closely with RHA who are regularly invited contributors to all NJDEP discussions of stream classification

Issue 6: Riparian restoration and Stream Repair. Stormwater runoff has significantly damaged the riparian zones of all Readington streams. Ash tree mortality due infestation by ash borer beetles has also been (and will continue to be) a major cause of green infrastructure reduction. Riparian restoration and stream repair provide tools that can begin to correct this situation.

Goal: To plant (TBD number) of trees and bushes in riparian zones and in areas where ash tree mortality has been most severe.

Strategy:

- Identify grant writers
- Identify funding sources and deadlines (See for example: NJDEP | Natural Climate Solutions Grants)
- Develop timeline for preparation and submission of applications

Issue 7: Dam Removal on the South Branch Raritan River

FIGURE 21: Dam at Rockafellow Mills on the South Branch Raritan River

Historically, Readington Township was the site of several operating grain mills that were built during the last century along the banks of the South Branch Raritan River. In many of these locations, dams were built across the river to improve the efficiency of the mills. Despite the mills no longer being in operation, two dams remain – one at Darts Mill and one at Rockafellow Mill – that continue to block water flow and fish migration. Removal of such mills will significantly improve water flow and the stream habitat for all aquatic life.

Goal: to remove one or more (TBD) dams along the South Branch Raritan River with 5 years (See: Figure 21 as an example)

Strategy:

- Begin to work closely with local NJ groups that facilitate dam removal projects; see for example: NJ Statewide Dam Removal Partnership *Infrastructure Bill Funding and Dam Removal* NJ Statewide Dam Removal Partnership Infrastructure Bill Funding and Dam Removal .

- Continue to work closely with our partners at RHA who have been instrumental in removing other dams along the South Branch Raritan River to develop a strategic plan for the removal of our two dams. See: Dam Removal - Raritan Headwaters .

ATTACHMENT 1: WELCOME TO READINGON TOWNSHIP

Small one-room post offices are found in various parts of Readington.

Annual *Hot Air Balloon Festival* at Readington's Solberg Airport.

Readington is known for Its excellent school system .

The Bouman Stickney Farmstead Museum is one of several preserved historical properties in Readington.

Evidence of Readington’s agricultural heritage can be seen in the farming operations that are still active, like this farm near Summer Road …

and also in other farmsteads, like this one that has been retired and preserved for use as a public garden and hiking trail.

Readington's train station provides NJ Transit connectivity to surrounding communities as well as New York City.