

Watervliet Reservoir Watershed Protection Study



Prepared by:

**The Capital District
Regional Planning Commission**

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INTRODUCTION

According to the Environmental Protection Agency's 2002 "National Water Quality Inventory" report, three decades after the passage of the Clean Water Act, water pollution in the United States is rising. The report evaluated 700,000 miles of rivers and 17.3 million acres of lakes and noted that 39 percent of the streams, 45 percent of the lakes, and 51 percent of the estuaries are too polluted for fishing, swimming or drinking.

A separate report issued in 2002 by the U.S. Geological Survey shows that the nation's waterways have been infiltrated by a host of trace chemicals – caffeine, contraceptives, painkillers, insect repellents, perfumes, and nicotine – from items such as medications, beauty aids, cleaners and foods, which are largely unregulated, and defy municipal wastewater treatment. This emerging class of contaminants are known as "pharmaceutical and personal care pollutants," or PPCP's. The study tested water in 30 states and found at least 31 antibiotics and anti-bacterial compounds and 11 compounds linked to birth control and hormone supplements. Although the study notes that little is known about the potential health and environmental effects of exposure to PPCP's, separate studies have linked environmental exposure to hormones to deformed sex organs in wildlife, sex reversal in some fish, and declining fertility in humans, as well as cancers and other diseases.

Another recent report by the National Academy of Sciences indicates that 85 percent of the oil pollution in North American coastal waters – approximately 10.9 million gallons of petroleum every eight months – comes from non-point runoff from roads, driveways and parking lots. The academy's findings, as do the finding of the other noted reports, underline the concern that non-point pollution runoff poses one of the nation's most serious and intractable environmental problems.

The following study examines the water quality/non-point source water pollution issues of the Watervliet Reservoir, which is located in the town of Guilderland, Albany County, New York. The Watervliet Reservoir has been used by the city of Watervliet as a drinking water source for almost ninety years. During this time land use decisions were often made without adequate consideration of the potential water quality impacts. More recently the relationship between land use and water quality has become better understood, however, development

pressures and a lack of sufficient water quality protection measures continue to threaten the long-term viability of the reservoir as a drinking water source. In order to preserve the integrity of the Watervliet Reservoir, the communities in the watershed will need to better understand how land use decisions affect water quality. Of particular concern are the cumulative negative impacts to water quality of seemingly benign individual developments and practices within the watershed. The issues and trends identified in this report indicate that it will be necessary for the communities within the watershed to update their development policies, laws and practices to better protect water quality. Moreover, a new organizational mechanism should be considered in order to coordinate the development decisions of the eleven different political jurisdictions that regulate land use in the watershed.

Study Objectives

It is the goal of this study to comprehensively identify the threats – existing and potential – to the Watervliet Reservoir, and to offer potential solutions, policies, and regulatory guidelines that can mitigate these threats so that the reservoir remains a quality drinking water source in the future. More specifically this study will:

- Describe the relationship between land use and water quality;
- Examine environmental features within the watershed;
- Examine the manmade features within the watershed, including public infrastructure and land use, as well as, describe the growth trends within the watershed;
- Examine the current land use regulations within the watershed as they pertain to water quality;
- Identify potential water quality issues and threats;
- Offer recommendations for mitigating existing threats and for minimizing future threats to the water quality of the reservoir.

The Capital District Regional Planning Commission has prepared this report. The primary author is Todd Fabozzi, Program Manager. Funding for this report has been provided by a grant from the New York State Department of Environmental Conservation (NYSDEC) originating from a federal allocation from the Environmental Protection Agency (EPA) under Section 604(b) of the National Water Quality Act.

This report reflects the help and input of many people, especially the following individuals and groups: Nick Ostapkovich, Ted Ausfeld, Stephen Wilson, Jack MacDonald, Paul Murphy, Keith Menia, Steve Feeney, Jan Weston, Peter Butner, Chuck Reilly, Chuck Klaer, Hope Donovan, Liesse Mohr, Muriel Peterson, Gene Brosseau, Mark Storti, John Merrill, Laura DeGaetano, Tom Della Rocco, Tom Lacko, Dave Mosher, Peter Comenzo, Steve Lukowski, Fred Seivers, Ken Kosinski, Rob Streeter, Ricardo Lopez, the Albany County Water Quality Coordinating Committee, the Schenectady County Water Quality Coordinating Committee, Guilderland Study Circles, and the (Northeast Industrial Park) Restoration Advisory Board.

WATERVLIED RESERVOIR OVERVIEW

The Watervliet Reservoir is owned by the city of Watervliet and is the city's sole drinking water source. The reservoir is also the primary public drinking water source for the town of Guilderland. The Watervliet Reservoir watershed encompasses an area of approximately 115 square miles and falls within three New York State counties – Albany, Schenectady, Schoharie – eight towns – Guilderland, New Scotland, Knox, Princetown Duansburg, Rotterdam, Bern, Wright – and three villages – Voorheesville, Altamont, and Delanson. There are three main tributary streams to the reservoir: the Normans Kill, the Bozen Kill, and the Black Creek (see “Base Map”).

The Watervliet reservoir was created in 1915 by damming the Normans Kill. The reservoir provides a safe yield of 12 million gallons per day. Currently the city of Watervliet utilizes just over one billion gallons per year. The city's daily average was 2.75 million gallons, and the highest single day use was 3.8 million gallons. The town of Guilderland utilizes between three to four million gallons of raw water per day. The city and the town have agreed on a long-term contract in which the town can eventually increase their intake to 5 million

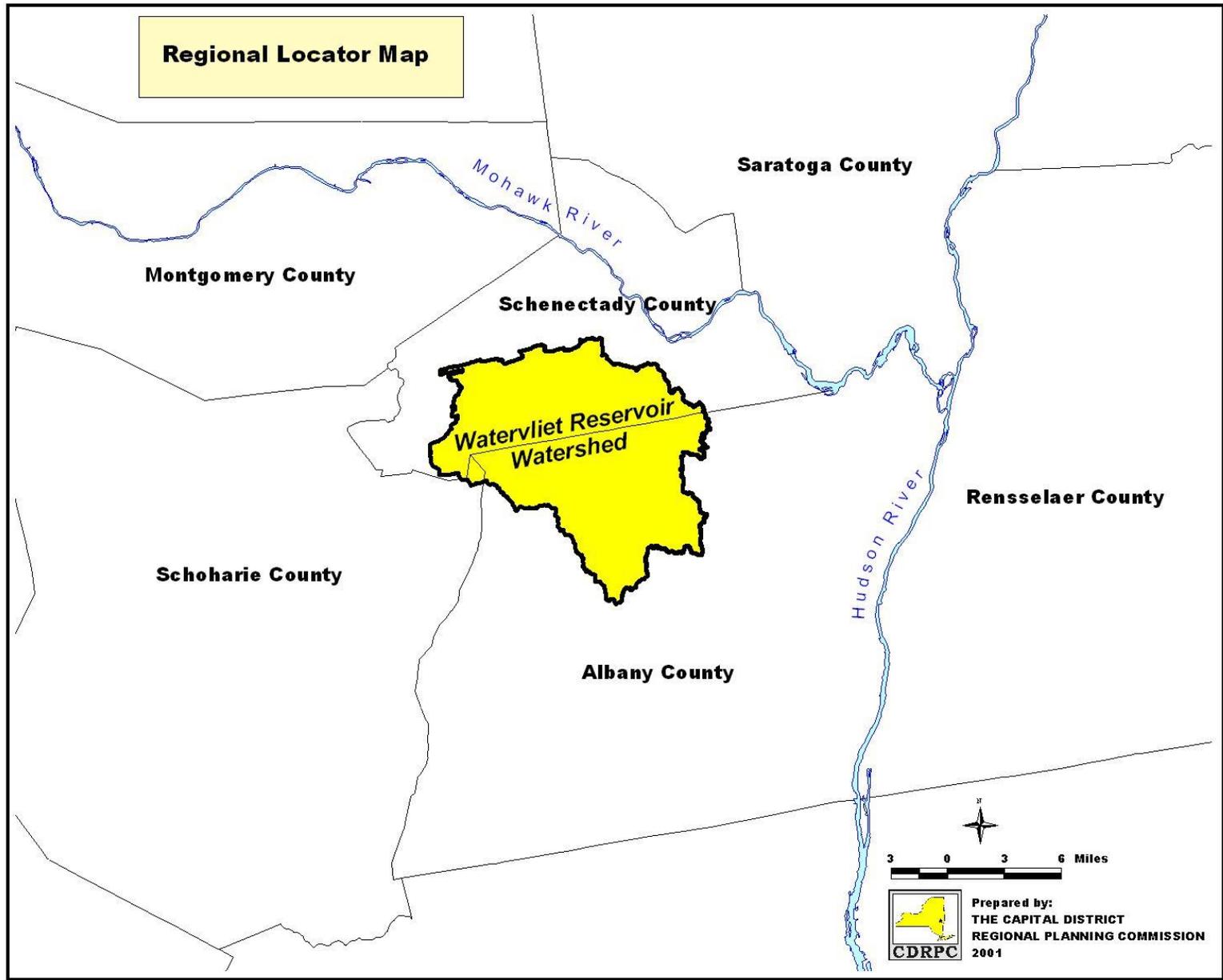
gallons per day. The city and the town have separate intakes, treatment plants, pump stations, and transmission lines for processing and distributing the reservoir water.

The reservoir impoundment was created by the construction of a hollow core, reinforced concrete slab and buttress dam that is keyed into a natural rock streambed. Crest elevation of the dam is 259 feet. There are flasher boards on the top of the dam that increase the elevation to 262 feet. The dam is 380 feet in length. The depth of the reservoir varies from mere inches to approximately 39 feet near the dam. The average depth is 33 feet.

In 1982 a one-megawatt hydroelectric facility was developed at the reservoir to generate power from excess water flows. The power generated at the plant is used at the facility to pump water to the filtration plant. The excess power is sold to Niagara Mohawk.

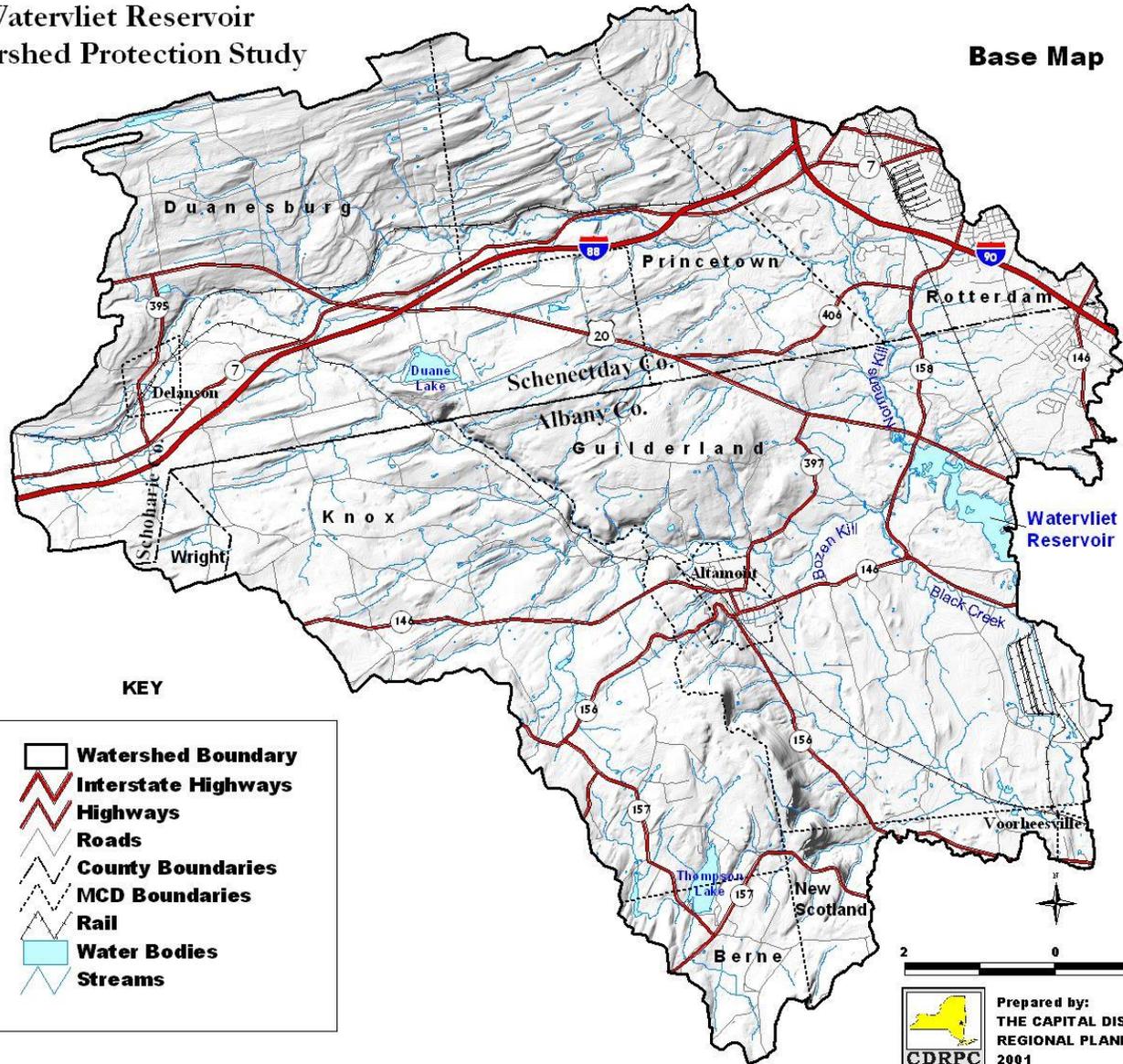


Reservoir impoundment and Watervliet intake. Guilderland intake to the right. Rail bridge in back.



**Watervliet Reservoir
Watershed Protection Study**

Base Map



KEY

- Watershed Boundary
- Interstate Highways
- Highways
- Roads
- County Boundaries
- MCD Boundaries
- Rail
- Water Bodies
- Streams

2 0 2 Miles

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WATER QUALITY OF THE RESERVOIR

Public water suppliers are required by state and federal regulation to provide residents with information regarding the quality of their drinking water. According to the year 2000 Annual Water Quality Report, the city of Watervliet conducted tests for over 80 contaminants and detected 10 of those contaminants in trace amounts, none at levels higher than state and federal standards allow. However, there was one “red flag” in the report: total trihalomethanes were detected below the current maximum contaminant level (MCL), however, the levels were detected above the new MCL of 80ug/l, which became effective as of 2001. The city has posted the following information on total trihalomethanes in drinking water: “Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and many have an increased risk of getting cancer.”

Trihalomethane is formed by the reaction of chlorine with water that contains large amounts of organic matter.

According to the year 2001 Annual Water Quality Report, the system was in compliance with all State drinking water operating, monitoring and reporting requirements. The system was no longer out of compliance for trihalomethanes, however the system did have one violation for manganese. The duration of the problem was approximately four days. The potential adverse health effects from manganese are "Excess manganese produces a brownish color in laundered goods and impairs the taste of tea, coffee and other beverages. Concentrations may cause a dark brown or black stain on porcelain plumbing fixtures. As with iron, manganese may form a coating on distribution pipes. These may slough off causing brown blotches on laundered clothing or black particles in water". This problem is typically seasonal occurring during the late summer months due to lack of rain and high temperatures.

The full water quality report can be viewed at the city of Watervliet’s website: http://www.watervliet.com/water_report.php.

The town of Guilderland, since it has its own treatment and distribution system, must also distribute an annual report on the town’s water quality. According to the year 2001 Annual Water Quality Report, the system drawing water from the Watervliet Reservoir (water treatment plant) was in compliance with all state drinking water operating, monitoring and reporting requirements.

Both the town and city continue to experience periodically high levels of Trihalomethane and Haloacetic Acid, with summer quarter readings exceeding safe standards. However, the final results met the state requirements because the final figure utilized represents an average of four quarters of readings.

RELATIONSHIP BETWEEN LAND USE, DEVELOPMENT AND WATER QUALITY

There a variety of ways in which water quality is impacted by manmade changes to the natural environment. Following is a general discussion of the ways in which land use and development practices affect water quality.

WATERSHEDS

All land areas on earth are part of a watershed. Precipitation falling on land feeds streams and replenishes groundwater. Precipitation onto water surfaces also enters into watershed flow. As water moves in surface and subsurface flows, it combines into progressively larger streams and rivers, local water tables, and regional aquifers. Watersheds may be as small as several acres or some may encompass thousands of acres of land. Furthermore, smaller sub-watersheds aggregate to form larger watersheds. Watershed boundaries are defined by the highest and lowest elevations from which water drains toward a single channel. The highest elevations are the divides that separate one watershed from another and therefore define water (and water pollution) drainage. This boundary line will intersect at the lowest elevation of the watershed planning area, typically the mouth of a stream or the outlet of a lake or reservoir.

The watershed is the appropriate geographic level in which to plan for water quality protection. Water pollution components are transported downhill and downstream within watersheds, without regard to manmade political jurisdictions. Since all the activities within a

watershed have the potential to impact the water quality downstream, it is at the watershed level that any analysis of water quality must occur.

STORM WATER RUNOFF AND IMPERVIOUS SURFACES

On undeveloped land, rainfall has greater opportunity to slowly filter into the ground water than on developed land. Trees, shrubs and grasses all help to slow rainfall as it travels along the ground thus allowing a higher degree of percolation into the soil and groundwater. Vegetative cover also helps decrease the rate of surface water flow and, therefore, reduces the amount of soil, sediment and other particles carried off site and deposited in streams, rivers and lakes.

On developed land, however, both the volume and rate of surface runoff is substantially increased due to the clearing of vegetation, soil compaction by heavy equipment, and the construction of impervious surfaces and structures. Roadways are built, fields are paved over for parking lots and buildings are constructed on previously undeveloped land thereby reducing the amount of natural ground cover for the filtering of rainwater. Since rain cannot filter through impermeable surfaces, it accumulates on these surfaces and creates larger volumes of water to run over the land surface. As surface runoff volumes increase, the rate of flow also increases. This higher volume and faster rate of water runoff accelerates the erosion of stream channels, alters runoff patterns, increases downstream flooding and carries more sediment and surface pollutants to be deposited in streams, rivers and lakes. This increase in direct runoff also reduces the amount of water left for groundwater recharge, soil moisture replenishment, and the base flow of water available to streams during dry periods, therefore, potentially impacting human water supplies and plant and animal habitats.



Less impervious cover means less stormwater runoff, less downstream flooding, and lower pollutant loadings.

EROSION AND SEDIMENTATION

Surface runoff, as a result of excess rainfall, is a natural process and one that has helped to form much of the visual landscape. This natural process involves the erosion of upland areas and the subsequent formation of wetlands and flood plains. Without man's interference, this process is usually slow. However, as man alters the natural landscape, the natural processes become unbalanced and the erosion process becomes accelerated.

Erosion and sedimentation from urban development occurs when a construction site is cleared of its natural vegetative cover. Exposed soil becomes detached by the impact of raindrops and by the force of water flowing over the land surface. As runoff gains more volume and velocity, more soil particles become detached, rills and gullies are cut into the surface, and eventually some of these soil particles end up being deposited as silt and sediment downhill in nearby water bodies. This condition becomes especially severe when critical areas such as steep slopes, highly erodible soils, and surface water boarders are disturbed.

Soil erosion from land disturbed by construction is a highly visible source of solids in urban runoff. Important sites include large-scale projects such as highway construction, large-scale residential subdivisions, commercial and industrial development and urban renewal.



Erosion from housing construction in Rotterdam. At this site, the future road is crossing the Normans Kill.

NONPOINT SOURCE POLLUTION

In addition to soil erosion from construction sites, there are many other potential sources of water quality contamination due to urban runoff. These types of pollution are known as *nonpoint source pollution* or pollution that enters a water body from diffuse origins rather than from discernible and discrete conveyances (such as a pipe or ditch). According to the NYS Department of Environmental Conservation, nonpoint source pollution is the primary source of contamination for more than 90% of the impaired waterbodies in New York State.

Listed below are a sampling of these sources as found in the **Watershed Planning Handbook for the Control of Nonpoint Source Pollution** prepared by the NYSDEC and the NYS Soil and Water Conservation Committee.

Street Pavement

The components of road surfaces, including breakup and degradation of asphalt, tar, and other oil-based substances are sources of contamination on urban runoff.

Motor Vehicles

Fuels and lubricants spill or leak, particles are worn off from tires or brake linings, exhaust emissions collect on the road surface, and corrosion products or broken parts fall from vehicles. While the quantity of material deposited from individual vehicles may be small, the combined impact from numerous vehicles is significant. Automotive services stations tend to have high concentrations of the above contaminants.

Atmospheric Fallout

Air pollutants include dust, contaminants, and particles from stacks and vents, from automobiles and planes, and from exposed land. The airborne matter will settle on the land surface and wash off as contaminated runoff.

Vegetation

Leaves, grass clippings, and other plant materials that fall or are deposited on urban land may become part of the runoff problem. Quantities depend on the geographic location, season landscaping practices, and disposal methods.

Spills

Producers and manufacturers must store and use large quantities of hazardous substances to supply the goods we demand. Sometimes - through mismanagement, neglect, or accidents - leaks or spills of these substances introduce them into the air, land and water. Consumer products such as paint thinner, lacquers, wax resins, detergents, etc., also find their way into storm drainage systems.

Litter

This consists of various kinds of discarded refuse items, packing materials, and animal droppings. Although the quantities may be small, the pollutant sources can be significant and may be the most visible form of urban runoff.

Anti-skid Components and Chemicals

In the northeast, urban areas employ large amounts of substances designed to melt ice in the winter. Salts, sand, and ash are the most commonly used agents. A variety of other chemicals may be used as fertilizers, pesticides and herbicides. Many of these substances will become part of the urban runoff when improperly stored or applied.

Storm Sewers

These tend to accumulate deposits of materials that will eventually be dislodged and transported by storm flows.

Combined Sewer Overflow

Wet-weather loading from combined storm/sewage overflows may be many times larger than loads discharged from sewage treatment plants during storms, and equal or exceed total annual discharges from sewage treatment plants. (This will only occur in areas of existing development having combined sanitary and storm sewers).

Home Septic Systems

Failing or poorly designed and/or located systems are more likely to overflow during wet weather periods. Sewage may then be carried with runoff into receiving waters.

Agricultural Uses

Land that is used for agricultural purposes such as crop lands and land treaded upon by farm animals is also effected by storm water runoff. Agricultural lands are often cleared of natural vegetation that would ordinarily help to impede the rate of water flow thereby making these lands exposed and more vulnerable to erosion and sedimentation from surface runoff. Land devoted to barnyard activities and animal enclosures is subject to greater soil displacement due to the movement of farm animals. In turn, these lands may also be the sites of accumulated animal wastes. Also, croplands are tilled and cultivated, exposing more surface soil, and allowing for faster water runoff along planting rows.

Furthermore, the intensive use of pesticides and fertilizers on these croplands introduce yet additional pollutants that may runoff into water resources. As rainwater impacts and moves across the land at roughly 30 M.P.H., pesticides, fertilizers, animal wastes, and sediments are carried along and deposited into water bodies.

Regardless of whether nonpoint source pollution is due to the disturbance of soil, the introduction of litter and petroleum-based elements caused by urban development or consists of sediment or pesticides and nutrients as the result of agricultural practices, all of these materials negatively impact the water quality within the watershed. The effects of storm water runoff pollution are illustrated below as described in the **Watershed Planning Handbook for the Control of Nonpoint Source Pollution** prepared by the NYSDEC and the NYS Soil and Water Conservation Committee.

Sediment (sand, silt, clay in colloidal suspension)

Sediment may destroy fish habitat through blanketing of fish spawning and feeding areas and elimination of certain food organisms; directly impact fish through gill abrasion and fin rot; and reduce sunlight penetration, thereby impairing photosynthesis of aquatic plants. Suspended sediment decreases recreational values, reduces fishery habitat, adds to the mechanical wear of water supply pumps and distribution systems, and adds treatment costs for water supplies. Nutrients and toxic substances attached to sediment particles are transported to water bodies and may enter aquatic food chains, cause fish toxicity problems, impair recreational uses, or degrade drinking water sources.

Thermal Stress (sunlight)

Direct exposure of sunlight to urban streams, which lack shade, may elevate stream temperatures, which can exceed fish tolerance limits, reduce survival and lower resistance to disease. Urban street surfaces and other impervious surface areas, which have been heated by sunlight, may transport thermal energy to a stream during a storm event adding stress to living organisms. Cold water fish (such as trout) may be eliminated, or the habitat may become marginally supportive of the fishery.

Nutrients (phosphorus, nitrogen)

Nutrient enrichment of surface waters may cause excessive algae and aquatic plant growth, choking open water and consuming oxygen (mainly through plant die-off). Fish and aquatic organisms, fishing and boating, and the use of the resources for water supply are thereby impacted. Nitrogen contaminants in drinking water significantly above the drinking water standard may cause methoglobinemia (a blood disease) in infants, and have forced closure of several water supplies.

Oxygen-Demanding Organics (human, animal excreta; decaying plant, animal matter/ discarded litter, food wastes)

Organic materials (natural or synthetic) may enter surface waters dissolved or suspended in runoff. Natural decomposition of these materials may deplete dissolved oxygen supplies in the surface waters. Dissolved oxygen may be reduced to below the threshold necessary to maintain aquatic life, impairing or killing fish and other aquatic plants and animals.

Toxic Substances (heavy metals, pesticides, oil and other petroleum products)

Toxic chemicals may enter surface waters either dissolved in runoff or attached to sediment of organic materials, and may enter ground water through soil infiltration. The principal concerns in surface water are their entry into the food chain, bio-accumulation, toxic effects on fish, wildlife and microorganisms, habitat degradation, and potential degradation of public water supply sources. The ground water impacts are primarily related to water supply sources.

Pathogens (bacteria, viruses)

Bacteria and viruses include infectious agents and disease-producing organisms, normally associated with human and animal wastes. The principal concerns are the survival and transmission of such organisms and their impacts on drinking water supplies, contact recreation waters, and fish and wildlife or domestic animals.

CRITICAL ENVIRONMENTAL FEATURES

Wetlands

Wetlands are those unique areas that exist at the transitional zones between land and water. Neither wet nor totally dry all year, wetlands are the swamps, marshes, or bogs in low spots and along waterways. Wetlands are areas that have three characteristics:

- Standing water or water saturated to the surface at least two weeks during the growing season for most years;
- Soils with a high water table (hydric);
- Hydric vegetation (water-loving plants).

Wetlands provide many beneficial functions: surface water is filtered and purified as it passes through, thereby trapping sediments and improving water quality; wetlands serve as important wildlife and plant habitats; wetlands serve as natural storage basins for groundwater thereby aiding in groundwater recharge and helping to reduce downstream flooding.

The NYS Department of Environmental Conservation (DEC) publishes maps of protected wetlands that are 12.4 acres or more in size. A special wetlands permit may be required for any development or disturbance within 100 feet of these wetlands.

In addition to NY State regulated and mapped wetlands, there also exist many undocumented wetlands throughout the watershed that are regulated by the U.S. Army Corps of Engineers. These wetlands have no minimum size. Identifying hydric soils from the county soil surveys can approximate their location. Their existence and extent would have to be verified on a site-specific basis according to vegetation, soil, and hydrologic conditions.

The “Environmental Features” map shows the location of DEC regulated wetlands within the watershed.

Flood Plains

A 100-year flood plain is a belt of low, flat ground bordering a stream channel, on one or both sides, which has a 1% chance of getting inundated by stream waters every year. This flood usually occurs when an overabundance of surface water combines with the effects of a high water table to supply more runoff than can stay within the stream channel.

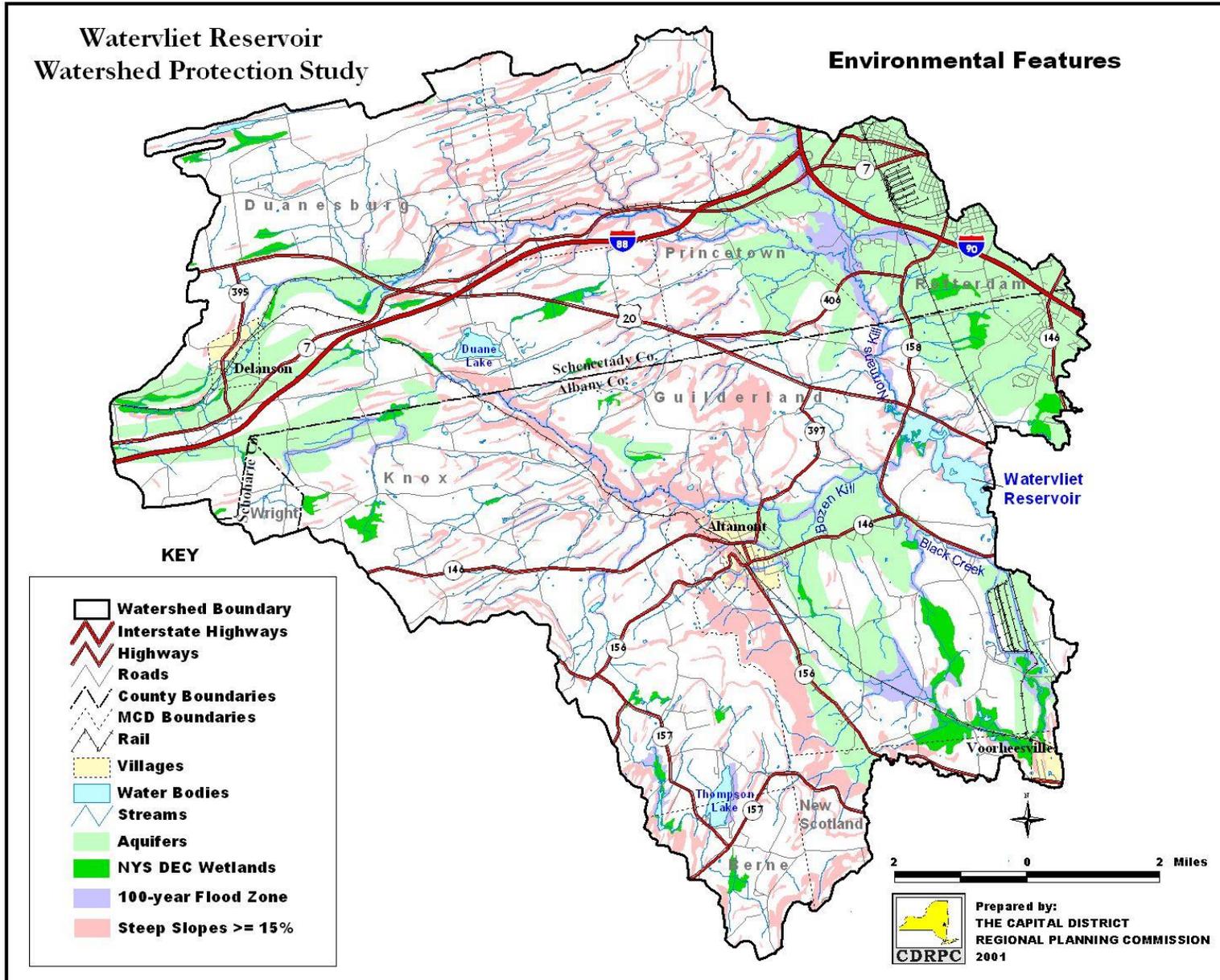
Development in the 100-year flood zone is regulated through participation in the National Flood Insurance Program (NFIP). The NFIP is a federal program enabling property owners to purchase federally subsidized flood insurance once their community adopts and enforces flood plain management regulations that meet federal requirements.

Development within the flood plain should be avoided, or if development takes place, specially engineered designs should be constructed. Hazards associated with flood plains could include loss of life and/or property and bacterial contamination from saturated leach fields and overflowing septic tanks.

The “Environmental Features” map shows the location of the 100-year flood plain within the watershed.

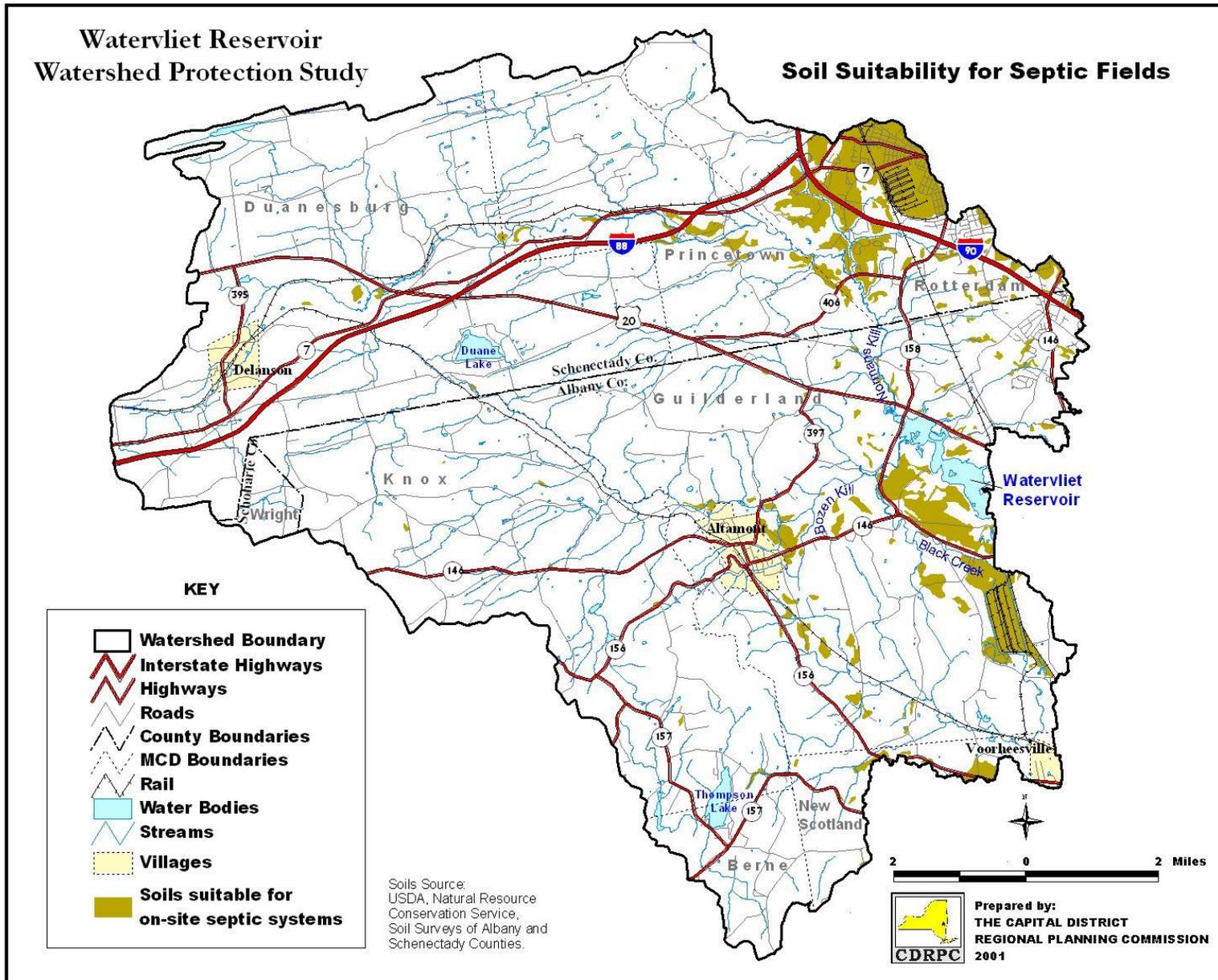
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Environmental Features



**Watervliet Reservoir
Watershed Protection Study**

Soil Suitability for Septic Fields



KEY

- Watershed Boundary
- Interstate Highways
- Highways
- Roads
- County Boundaries
- MCD Boundaries
- Rail
- Water Bodies
- Streams
- Villages
- Soils suitable for on-site septic systems

Soils Source:
USDA, Natural Resource
Conservation Service,
Soil Surveys of Albany and
Schenectady Counties.

2 0 2 Miles

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Steep Slopes

Slope refers to the degree of inclination from the horizontal of an element of ground surface. Slope can be thought of as the degree of steepness of the land surface. As the slope of the land surface increases, the flow rate of both surface and ground water increases as well. The slope of the land surface can be calculated by determining the vertical rise between two points and dividing this number by the horizontal distance between the same points and then multiplying this number by 100.

The “Environmental Features” map shows the areas of steep slope in the watershed based upon the soil series groupings from the USDA, county soil surveys. Slopes of 15% or greater are typically considered “steep.” Development on steep slopes creates problems due to the increased risk of soil erosion and sedimentation, increased construction and land excavation costs, and difficulty of access for vehicles during winter months. Steep slopes also indicate areas of rapid surface and ground water movement.

Soils

Soil information for the lands within this study can be found in the soil surveys for Albany, Schenectady and Schoharie Counties published by the Natural Resource Conservation Service. Soil surveys are scientific inventories based on soil properties and include aerial photographs with the soils indicated for all the land areas within the county. In addition, the soil survey contains interpretive tables with information on soil properties and their suitability for many different uses. These tables include attributes such as permeability, septic system suitability, depth to the water table, the degree of erosion hazard and many others.

The “Suitability for Septic Fields” map shows the location of soil groups deemed suitable for on-site septic systems within the watershed. Based on these general soil group definitions, only a small portion of the watershed contains soils conducive to individual septic systems. Most of the suitable soils are located in Rotterdam and Guilderland. Much of the land deemed suitable in Rotterdam has already been developed. Most of the land within Guilderland that is classified as suitable is located in close proximity to the reservoir and for this reason may be not be an appropriate location for future development. It should be noted, however, that it is necessary to perform site-

specific soil tests in order to accurately ascertain the soil suitability of particular lots: there may be areas within the suitable soil groups that are unsuitable for septic systems; and there may be areas outside of the “suitable” soils groups that are also suitable for on-site systems.

Aquifers

According to digital map data provided by the New York State Department of Health, Bureau of Public Water Supply Protection, there are several large areas within the Watervliet Reservoir where unconsolidated aquifers are located (see “Environmental Features” map). These aquifers can produce between 10 and 100 gallons of water per minute. In addition, there are two other areas – a small area along western Bond Road, and a larger area in southern Rotterdam below I90 south through northern Guilderland past Lydius Street and Fuller Station Road (on both sides of the rail tracks) – where the aquifers can produce over 100 gallons per minute.

Helderberg Escarpment and Karst Geology

Along the Guilderland/Knox border, and south into New Scotland, in Albany County, there is a long swath of steep rock outcrop known as the Helderberg Escarpment. Known for its imposing presence from below, and for the grand scenic vistas it provides from above, the escarpment is Albany County’s signature natural landform. Aside from its natural beauty, the escarpment is an area of environmental sensitivity where both steep slopes and karst geology/hydrology create natural constraints for development.

The word “karst” refers to a type of terrain formed by the dissolution of soluble carbonate rock (limestone and dolomite). Over millions of years, as flow routes are enlarged, carbonate aquifers change from diffuse-flow aquifers, with water moving very slowly through small openings, to high velocity conduit-flow aquifers with water moving quickly through well-developed conduit systems to discharge points at springs. As the water table lowers below the level of surface streams, the streams begin to lose water to developing cave systems below. As more and more of the surface drainage is diverted underground, stream valleys virtually disappear and are replaced by closed basins called sinkholes. Sinkholes vary from small cylindrical pits to large conical or parabolic basins that collect and funnel runoff into

karst aquifers. The nature of the groundwater flow system causes karst areas to be extremely vulnerable to groundwater contamination. Other serious hydrogeologic problems include sinkhole flooding and sinkhole collapse.

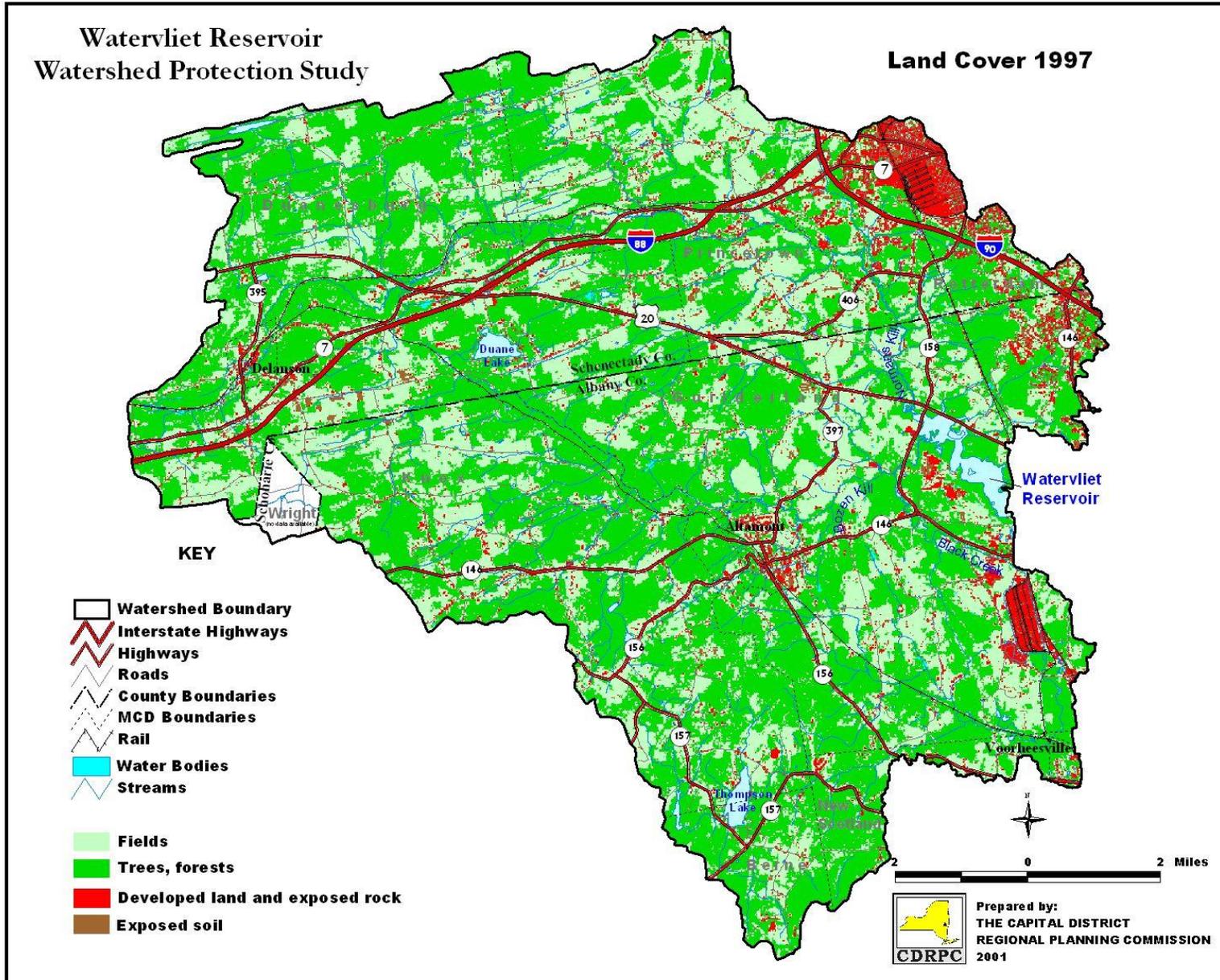
The Helderberg Escarpment Planning Committee published a planning guide for the escarpment in February, 2002. The guide contains specific data about the escarpment and offers various recommendations for the long-term management and protection of this natural resource; it is available from the Albany County Land Conservancy (www.albanylandtrust.org).



Helderberg Escarpment at Thatcher Park.

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Land Cover 1997



PUBLIC SEWER AND WATER INFRASTRUCTURE

There are currently five areas within the watershed that are served by public sewer systems (see “Public Sewer Districts” map). These areas include a portion of the town of Rotterdam surrounding the Rotterdam Industrial Park, an area around and including the village of Delanson, the village of Altamont, an area adjacent to the north east of the Northeast Industrial Park, and a portion of Guilderland northeast of the reservoir along Carman Road. Both village systems discharge treated wastewater into tributaries of the reservoir.

There are also several areas within the watershed served by public water systems (see “Public Water Districts” map). These areas generally cover the same areas as those served by public sewers, but also extend over a most of southwestern Rotterdam, and include the entire Northeast Industrial Park (and the surrounding area). A new district has also been formed that covers a large part of southern Princetown.

Public water and sewer districts are catalysts to urban growth. Given the poor soils and poor/limited water within much of the watershed, areas lacking this infrastructure will most likely remain lightly developed. However, there are substantial areas within the existing water districts available to accommodate additional growth, particularly in Rotterdam and Princetown, though there are many poor soils within these areas that would limit the amount and density of new development without the concurrent extension of public sewers.

WATER SYSTEM EXPANSION PLANS

TOWN OF GUILDERLAND

The town of Guilderland is currently studying the cost and feasibility of extending public water to additional areas in the western part of town near the reservoir. A committee of town residents has been formed to help facilitate exploring this issue. A preliminary study by Clough Harbour recommends the following:

...Based on the water quantity, water quality, housing density, and the hydraulic limitations of the existing system, it is our recommendation that the Town more fully investigate the economic viability of the water service extensions listed at the end of this subsection, taking into account the Town’s Comprehensive Master Plan referenced in Section 1.2. This investigation would include preliminary engineering, subsurface exploration, identification of permitting issues, etc. The gathering of this information is

consistent with generation of a Rural Guilderland Plan, an action step identified in the Comprehensive Mater Plan recommendations. The Town may also wish to consider preparation of a Generic Environmental Impact Statement (GEIS) to evaluate the cumulative impacts of possible development that may be encouraged by the extension of utilities. The GEIS could also facilitate the establishment of mitigation fees to developers as a means for the Town to share the cost of utility extensions. The recommended water service extensions are as follows:

- Extend municipal service from the existing 12-inch water main on West Lydius Street, across the CSX Railroad tracks along Old State Road, to the intersection of Route 158 and Chandler Road. This proposed extension would also include a section of Route 158 from Old State Road south to Route 20, including Chandler Road. Based on the cost impacts per user, additional parcels along Route 158 (south of the intersection of Routes 158 and 20) and Route 20 (west of the intersection of Routes 158 and 20) could be added to the district extension. The option of looping the system by extending service east on Route 20 to connect into the existing 8-inch main should also be considered during future planning phases.
- Extend municipal service to the intersection of Hurst Road, Route 146, and Weaver Road from the existing 12-inch water main that runs along Hurst Road. Based on the cost impacts per user, additional parcels along Weaver Road, and possibly north on Route 158 could be added to the district extension. The option of looping the system by extending service south on Route 146 from the intersection of Route 146 and Hurst Road, to connect into the existing 12-inch main on Route 146, should also be considered during future planning phases.
- Consideration should be given to looping the system along Route 158 from Route 146 to Route 20. Although this area does not have a significant number of developed parcels, looping of the system will improve the hydraulics of the water system. Again, the cost impacts per user will need to be analyzed to determine the boundaries of any extension.
- Although not located in the western Guilderland area, consideration should be given to extending water service south on Grant Hill Road from the location where the proposed 16-inch water main (Phase III project) proceeds east towards the proposed water storage tank, to the Town line. It was identified through our data search that several houses in that area have insufficient quantity and poor quality. It is important to reemphasize that the selection of these areas is based on the data reviewed for this project and takes into account the limitations of the existing system and housing density.”

The report also recommends that a household questionnaire be issued to residents to gather more well quantity and quality data.

A final report from the committee was being finalized as of this writing.

CITY OF WATERVLIET

In addition to the town of Guilderland's present water expansion plans within the town, the city of Watervliet has plans for the potential expansion of the city's water system, though on a much broader scale. A document called "White Paper on Water for the 21st Century," a short (six page) basic expansion plan commissioned by the city of Watervliet in 1999, describes the potential expansion of the city's water distribution system into Schenectady County and southern Albany County through the addition of two new transmission mains.

The plan envisions a regional water delivery system connecting numerous existing municipal systems. The first route of expansion will utilize the existing 25-mile long, 24-inch diameter transmission main that extends from Guilderland across Colonie to Watervliet. The plan suggests connections to the Albany, Guilderland, Colonie, Troy, Menands, Cohoes and Green Island systems. The second route of the proposed expansion would follow the rail right-of-way from Guilderland to New Scotland, Voorheesville and Bethlehem, connecting these communities to the city's system. The third line would provide service to Rotterdam, Princetown and Duansburg through a seven-mile transmission main built along US Route 20.

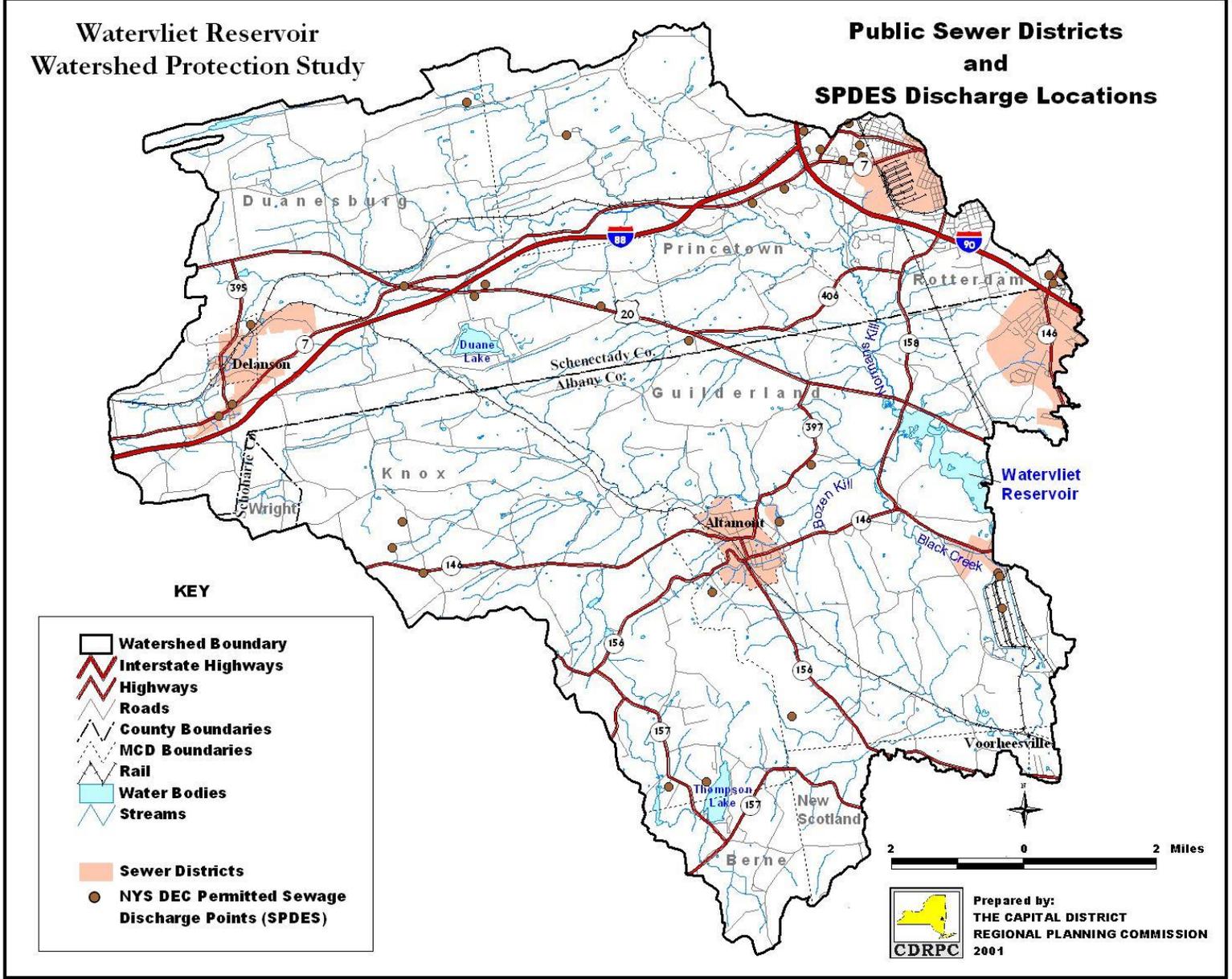
In order to service these new areas, the plans calls for expanding the reservoir capacity to produce a yield of over 40 million gallons per day by adding crest gates on top of the reinforced concrete dam. The plan envisions retiring the existing treatment facility and constructing a new state-of-the-art facility in its place.

This ambitious supply, treatment and expansion plan would be carried out through the formation of a "Western Area Water Authority."

The city of Watervliet envisions this plan as a starting point for discussion about regional water service. No specific measures for implementation have been initiated.

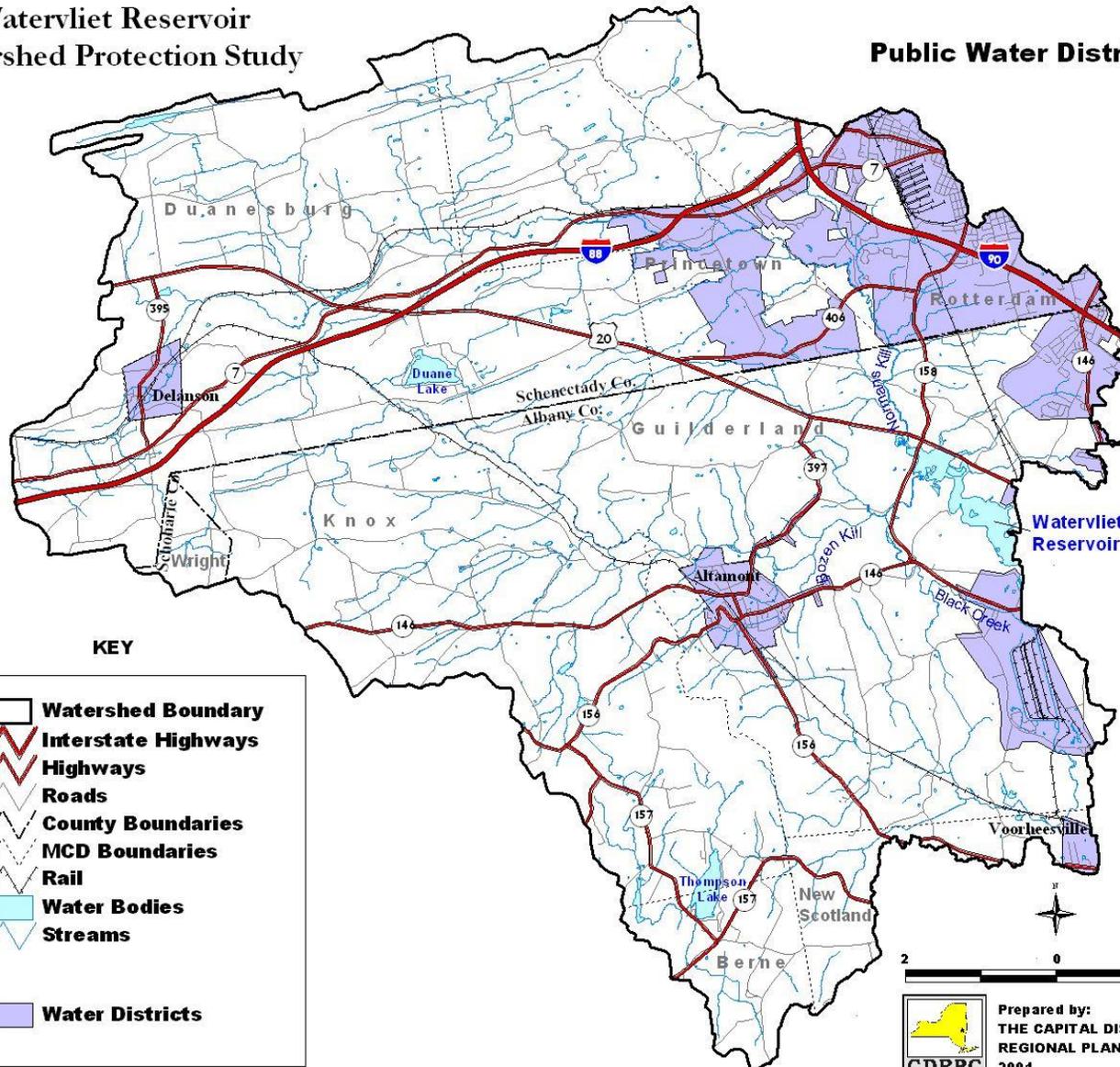
**Watervliet Reservoir
Watershed Protection Study**

**Public Sewer Districts
and
SPDES Discharge Locations**



**Watervliet Reservoir
Watershed Protection Study**

Public Water Districts



KEY

- Watershed Boundary
- Interstate Highways
- Highways
- Roads
- County Boundaries
- MCD Boundaries
- Rail
- Water Bodies
- Streams
- Water Districts

2 0 2 Miles

Prepared by:
THE CAPITAL DISTRICT
REGIONAL PLANNING COMMISSION
2001

EXISTING LAND USE

The Watervliet Reservoir Watershed is characterized by a mix of land uses (see “Existing Land Use” map). According to tax parcel maps classified using the New York State property classification system (local assessor codes), vacant land makes up 27.5% of watershed; single-family residences on lots ten acres or greater (rural residential) = 27%; agricultural land (including hay fields) = 18.3%; one and two-family housing lots = 12.1%; public opens space and recreational uses = 6.3%; industrial land = 4.1%; commercial and community services = 2.4%; and multi-family housing makes up 2% of the watershed.

Land Use	Vacant	Rural Residential	Agricultural	1&2 Family Housing	Public/Recreational	Industrial	Commercial	Multi Family Housing
% Of Watershed	27.5	27	18.3	12.1	6.3	4.1	2.4	2

Since its creation, the watershed has been primarily comprised of forested lands, active farms and sporadic rural residential lots. Over time, as local farming has become less profitable, farmland in the watershed has been (and continues to be) subdivided for housing, or has gone fallow. However, as noted above, 18% of the watershed is still actively farmed, including several large dairy farm operations.

There are almost 700 rural residential lots in the watershed. One- and two-family lots, though they take up less overall land than rural residential lots, make up the majority of the separate land parcels in the watershed (almost 8000 lots, 66% of the total land parcels in the watershed). The majority of the one- and two-family lots are located on small lots in the more urbanized eastern portion of the watershed in southern Rotterdam and in the Fort Hunter area of Guilderland (and in the village of Altamont). There are also many one- and two-family lots scattered throughout the watershed. In addition, there are several large multi-family parcels made up of multiple manufactured homes.

Industrial land is primarily comprised of land contiguous to the railroad line that bisects Schenectady County, as well as two large, active industrial parks – the Northeast and Rotterdam industrial parks – which were both former military depots established in the 1940’s.

Commercial land and land devoted to community services is minimal and sporadic within the watershed; it can be found primarily along highway corridors such as Route 7, Route 20 and Route 146.

Land classified as “Recreational/Open Space” on the land use map includes a mix of public land and private land. The category includes land used for active recreation, such as public parks; private golf courses; and land publicly owned but not used for recreational purposes (such as land bordering the reservoir and former land fills).

POPULATION GROWTH AND NEW DEVELOPMENT

An analysis of population change using block level data from the US Census Bureau indicates that between 1990 and 2000, the overall population within the Watervliet Reservoir Watershed grew by approximately 2,036 persons; a rate of change close to 9% (see chart below). There were approximately 1,450 new housing units added during this same period, which is a 17.3% increase. The town with the greatest population gain during this period was Guilderland, which gained 1,306 persons and 560 housing units. During the same ten-year period the town of Rotterdam gained 402 additional persons and 514 new housing units. The towns of Guilderland (including Altamont) and Rotterdam accounted for 84% of the population growth and 83% of the housing unit growth in the watershed from 1990 to 2000. The towns of Princetown added 117 persons and 70 housing units. The town of Duansburg added 118 persons and 103 housing units. The remainder of the communities within the watershed experienced little growth pressure.

As a point of comparison, Albany County as a whole grew by only .6% during this period; Schenectady County’s population decreased by 1.8%. As an additional comparison, Saratoga County, though not in the watershed, was the fastest growing county in Upstate New York during this period with a growth rate of 10.7%. Therefore, comparatively speaking, the rate of population growth within the watershed is on par with some of the faster growing areas in the state; and in the Guilderland portion of the watershed, the growth rate is much higher.

APPROXIMATE POPULATION CHANGE WITHIN THE WATERSHED 1990 - 2000

Municipality	1990 Watershed Population	2000 Watershed Population	Net Population Change 1990 - 2000	Percent Population Change 1990 - 2000
Rotterdam	8700	9102	402	4.6%
Princetown	1360	1477	117	8.6%
Duanesburg	2715	2833	118	4.3%
Guilderland	5891	6984	1093	18.6%
Knox	1646	1685	39	2.4%
Bern	250	256	6	2.4%
New Scotland	216	224	8	3.7%
Delanson	361	385	24	6.6%
Altamont	1524	1737	213	14%
Voorheesville	199	215	16	8%
TOTAL	22,862	24,898	2,036	8.9%

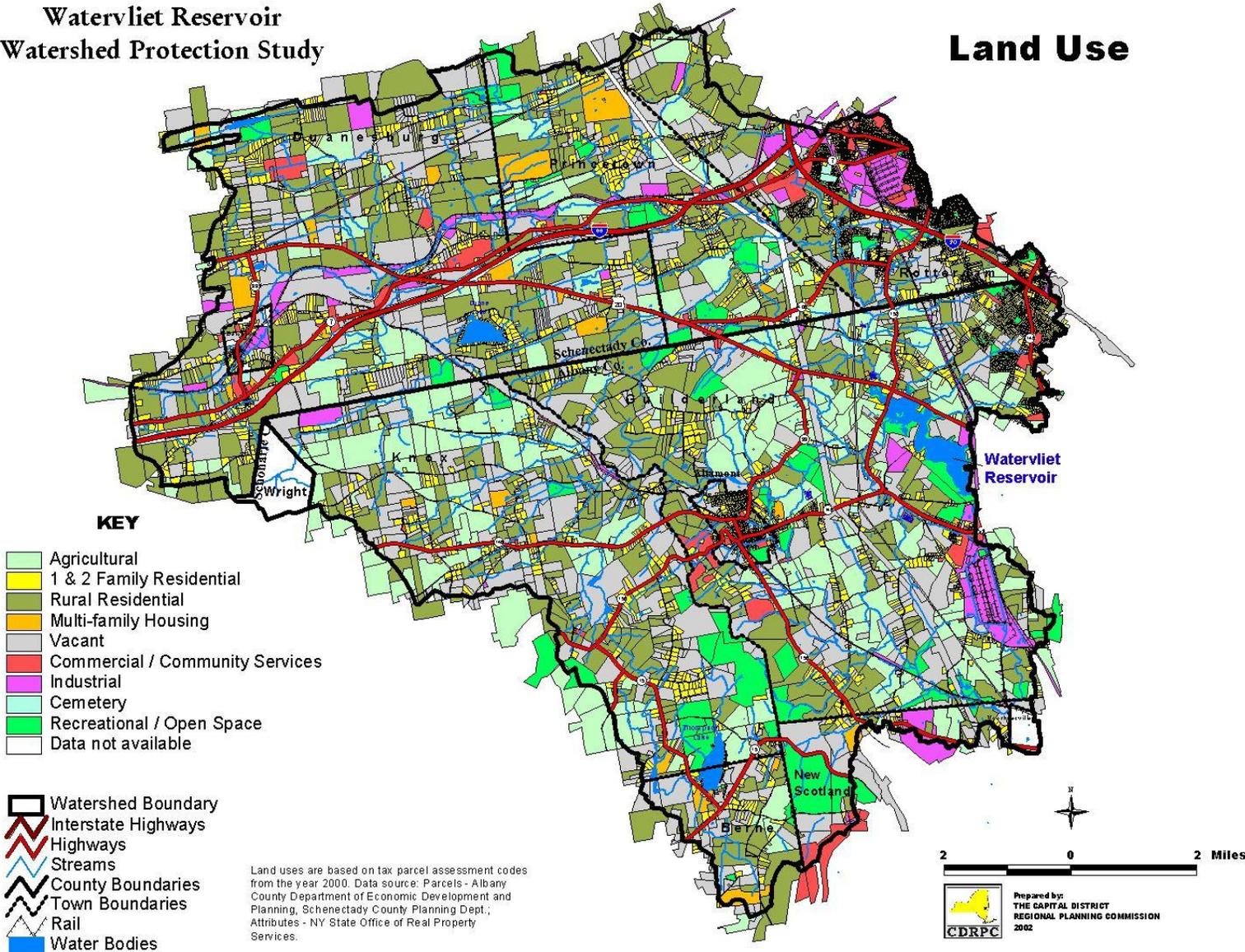
The map “Watershed Development” indicates the location and type of land use of all parcels where the land was modified from 1995 to 2001. Modification includes new structures, expansions, land clearing and pond creation. In many cases, the developed part of the parcel is only a small part of the overall parcel. Also shown are parcels that were part of large developments built since 1986.

The majority of the new subdivisions occurring over the last fifteen years in the watershed are large residential developments located in the town of Rotterdam (south of I88 and southwest of I90), in the Fort Hunter area of Guilderland off Carman Road, and, to a lesser extent, in the northeast portion of the village of Altamont.

In addition to many new single-family houses scattered throughout the watershed, there have been several large new buildings in both industrial parks, a school expansion at the Guilderland High school, a new golf course east of the village of Altamont, and several commercial uses (including a gas station) along Route 7 near the Rotterdam/Princetown border.

**Watervliet Reservoir
Watershed Protection Study**

Land Use



KEY

- Agricultural
- 1 & 2 Family Residential
- Rural Residential
- Multi-family Housing
- Vacant
- Commercial / Community Services
- Industrial
- Cemetery
- Recreational / Open Space
- Data not available

- Watershed Boundary
- Interstate Highways
- Highways
- Streams
- County Boundaries
- Town Boundaries
- Rail
- Water Bodies

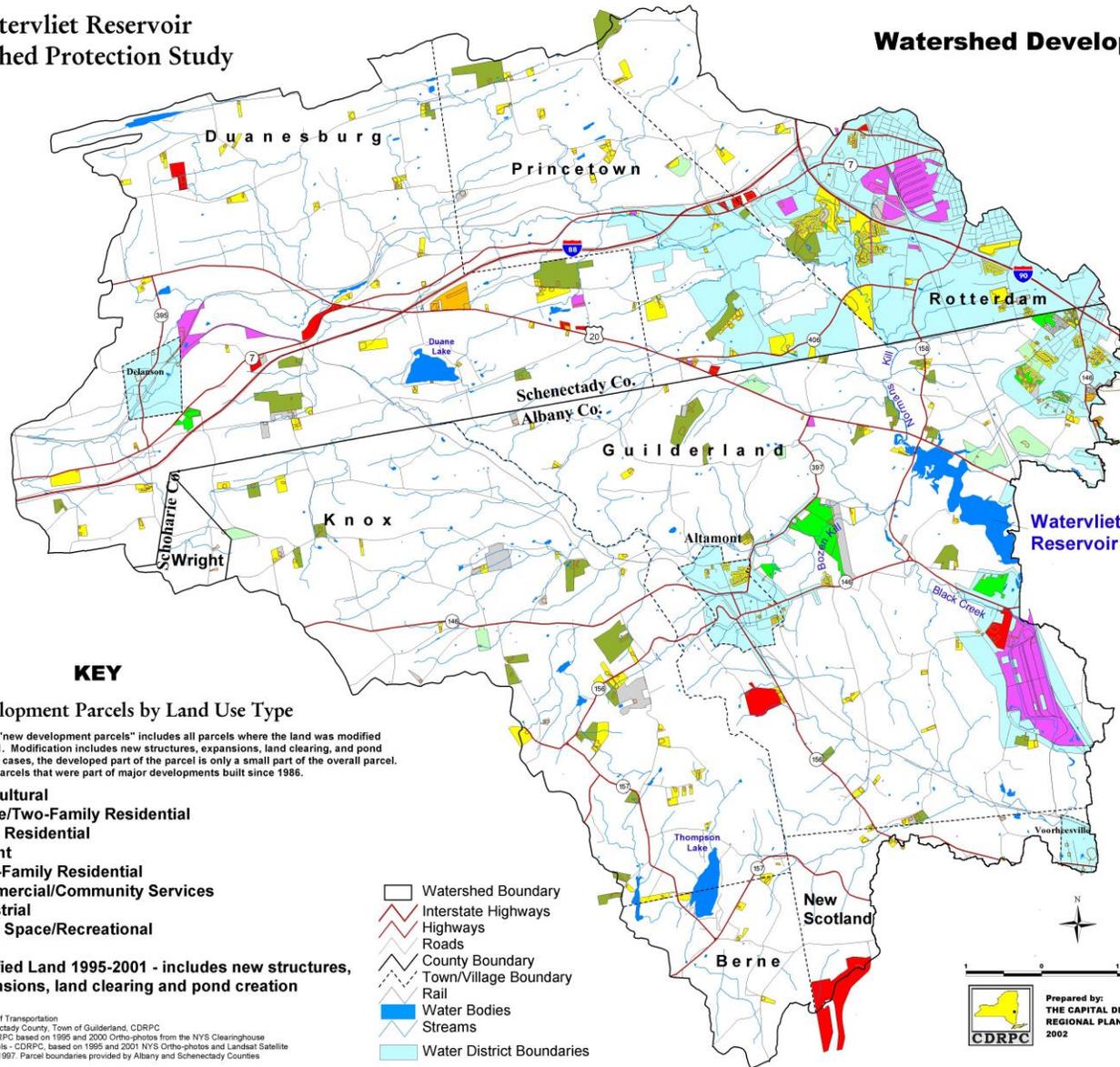
Land uses are based on tax parcel assessment codes from the year 2000. Data source: Parcels - Albany County Department of Economic Development and Planning, Schenectady County Planning Dept.; Attributes - NY State Office of Real Property Services.

2 0 2 Miles

Prepared by:
**THE CAPITAL DISTRICT
 REGIONAL PLANNING COMMISSION**
 2002

Watervliet Reservoir Watershed Protection Study

Watershed Development



KEY

New Development Parcels by Land Use Type

The color-coded "new development parcels" includes all parcels where the land was modified from 1995 to 2001. Modification includes new structures, expansions, land clearing, and pond creation. In many cases, the developed part of the parcel is only a small part of the overall parcel. Also shown are parcels that were part of major developments built since 1986.

- Agricultural
- Single/Two-Family Residential
- Rural Residential
- Vacant
- Multi-Family Residential
- Commercial/Community Services
- Industrial
- Open Space/Recreational

Modified Land 1995-2001 - includes new structures, expansions, land clearing and pond creation

- Watershed Boundary
- Interstate Highways
- Highways
- Roads
- County Boundary
- Town/Village Boundary
- Rail
- Water Bodies
- Streams
- Water District Boundaries

Sources:
Base Map - NYS Dept. of Transportation
Water Districts - Schenectady County, Town of Guiderland, CDRPC
New Development - CDRPC based on 1995 and 2000 Ortho-photos from the NYS Clearinghouse
New Development Parcels - CDRPC, based on 1995 and 2001 NYS Ortho-photos and Landsat Satellite Imagery from 1986 and 1997. Parcel boundaries provided by Albany and Schenectady Counties

N

0 1 2 Miles

Prepared by:
THE CAPITAL DISTRICT
REGIONAL PLANNING COMMISSION
2002



New housing in Guilderland and potential new commercial development in Princetown.

EXISTING POLICIES AND REGULATIONS

The purposes of this section of the report is to assess the level of protection, in the form of existing regulations and requirements, that each community within the watershed study areas enforces when new development is proposed. The regulation of development activities at the local level is typically done through the use of zoning ordinances, subdivision laws, site plan ordinances, and other specific local laws, such as soil disturbance and storm water management ordinances. In addition, there are federal and state laws and programs that directly and indirectly regulate development impacts.

FEDERAL

The National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) was passed in 1969 and was revised by the Council on Environmental Quality in 1971. Under NEPA, federal agencies are required to prepare preliminary environmental assessments to determine if proposed federal actions will significantly affect the quality of the environment. A more comprehensive environmental impact statement (EIS) may then be required to mitigate the environmental impacts of the proposed action.

The Clean Water Act (CWA)

The Clean Water Act (CWA) is the primary statute for protecting the quality of ground and surface waters in the United States. Section 208 of the Federal Water Pollution Control Act of 1972 called for states to develop best management practices (BMP's) to control non-point source pollution. Amendments to the CWA in 1987 formally listed reduction in non-point source pollution as a national goal and called for states to develop assessment reports and management programs to address non-point source pollution. The CWA also provides that storm water discharges associated with industrial activity from point sources to waters of the United States and storm water discharges from certain construction activities are unlawful, unless authorized by a National Pollutant Discharge Elimination System (NPDES) permit. In addition, Section 404 of the CWA prohibits the discharges of dredged or fill material into federally designated wetlands ("Waters of the United States") without first obtaining permit approval from the US Army Corps of Engineers.

Federal Mandates for Agriculture: The SWCS

The Natural Resource Conservation Service (NRCS, formerly the Soil Conservation Service) and the Agricultural Stabilization and Conservation Service (ASCE) were established in 1935 and 1936, under the Department of Agriculture, to address soil erosion from agricultural practices. Soil and water conservation districts were established throughout the country to control soil erosion and to conserve

water resources and protect water quality. The districts provide assistance to landowners in voluntary application of best management practices for controlling nutrients, pesticides, and sediments from farm operations. Various programs provide funding for these initiatives, including the federal Environmental Quality Incentives Program (EQIP) and the state's Agricultural Environmental Management (AEM) program.



Runoff from cropland draining into the reservoir at Route 158.



Although agricultural land uses are declining within the watershed, over 18% of the watershed land is still actively farmed. Livestock, dairy, and crop production all contribute pollutants – pesticides, fertilizers, animal wastes, and sediment – to the watershed. Farm best management practices to better control these pollutants are being utilized on many of the watershed farms, and several programs are in place to help expand the use of these management practices.

NEW YORK STATE

The New York State Environmental Quality Review Act

The NY State Environmental Quality Review Act (SEQR) became law in New York State on August 1, 1975. Part 617 of 6 NYCRR are the statewide rules and regulations created to implement the act. SEQR is a process that introduces the consideration of environmental factors into the early planning stages of public and private actions that are directly undertaken, funded or approved by local, regional and state agencies. If it is determined that a proposed action may have a significant effect on the environment, then a Draft Environmental Impact Statement is prepared to explore alternative ways to minimize adverse impacts to the environment.

The New York State Pollution Discharge Elimination System General Permit for Storm Water Discharges from Construction Activity

The New York State Pollution Discharge Elimination System (SPDES) permit requirements for construction activities were issued in 1993, pursuant to Article 1, Titles 7,8 and Article 70 of the Environmental Conservation Law. The NY SPDES permit program was created to administer the National Pollution Discharge Elimination System permit program. A SPDES general permit is currently required for storm water discharges associated with construction activity involving five or more acres of land. The general permit, among other things, requires that the discharger develop a storm water pollution prevention plan for construction activities at each site to be covered by the permit. The applicant must submit a completed Notice of Intent form approved and provided by the NY State Commissioner of Environmental Conservation.

Phase II of the storm water program will be implemented as of March 10, 2003. DEC has released final versions of two new general permits. The permits are part of the State Pollutant Discharge Elimination System (SPDES) and will cover Municipal Separate Storm Sewer Systems (MS4s) and construction activities disturbing one or more acres. The general permits will require applicants to identify and implement specific stormwater management practices and regulations that best protect the environment.

The main goal of the construction permit is to ensure that a stormwater pollution prevention plan has been developed and is being implemented before and during construction activity. The site developer is responsible for creating, implementing and maintaining the plan.

The main goal for MS4s is to design a program that reduces the discharge of pollutants, protects water quality, and satisfies water quality requirements of the federal Clean Water Act. MS4s are required to develop stormwater management plans that include the following control measures:

- Public education and outreach;
- Public involvement and participation in program development and implementation;
- Detection and elimination of illicit discharges;
- Control of runoff from construction sites disturbing one or more acres, including development, implementation and enforcement of an erosion and sediment control program;
- Control of post-construction runoff; and
- Pollution prevention/good housekeeping, including training of staff on pollution prevention measures and techniques such as regular street sweeping, reducing the use of pesticides and road salts, and frequent cleaning of catch basins.

MS4's will have to file a Notice of Intent by March 10, 2003. The notice of intent identifies the specific ways in which MS4's will carry out the program. MS4's have five years from the filing of the Notice of Intent to fully implement the program requirements. There are four communities that contain MS4 areas within the Watervliet Reservoir Watershed: Guilderland, Rotterdam, Princetown, and Voorheesville.

Under the State's Environmental Protection Fund (EPF), \$3.4 million will be provided this year to assist communities in implementing the new Storm Water Phase II regulations. In addition, \$380,000 from New York's federal nonpoint source grants and \$800,000 in partnership funding has been committed to its implementation.

Workshops, conferences and training sessions will be held throughout the State to explain the requirements and assist the regulated community and municipalities to understand and meet the requirements. Guidance materials also will be available in paper and electronic formats. The proposed permits are available at DEC's website, www.dec.state.ny.us/website/dow or can be obtained by calling (518) 402-8109.



Large stormwater retention basin for new housing development in Guilderland.

New York State Pollution Discharge and Elimination System (SPDES) Point Source Permits

The Clean Water Act also provides that storm water discharges associated with industrial activity from point sources to waters of the United States are unlawful, unless authorized by a National Pollutant Discharge Elimination System (NPDES) permit. The New York State Department of Environmental Conservation authorizes these permits under the SPDES program.

There are currently 32 active SPDES permits allowing **point** source discharge into tributaries of the Watervliet Reservoir (see “Public Sewer Districts and SPDES Discharge Locations” map above). A chart listing more detailed data about each permit location is included as APPENDIX C.

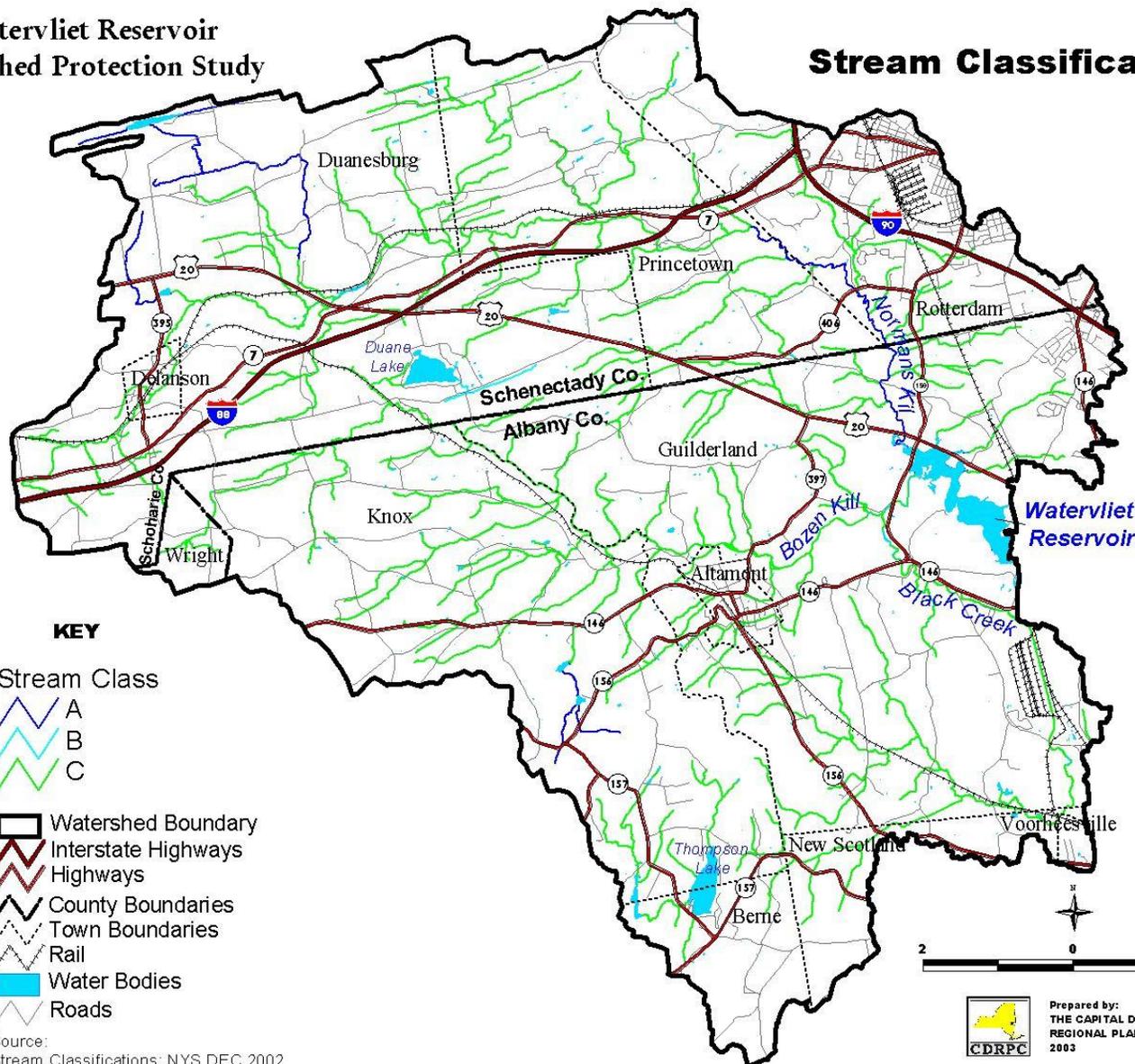
The New York State Department of Environmental Conservation Protection of Waters Program

The NY State Department of Environmental Conservation Protection of Waters Program was set forth in the Environmental Conservation Law (ECL) Title 5 of Article 15. Under this program, the disturbance of the bed or banks of a “protected stream” or other watercourse is a regulated activity. The bank of a stream is considered to be the area within 50 feet horizontally of the mean high water line. Waters of the state are classified and protected on the basis of their existing or expected best use. The highest classification, “AA” or “A” is assigned to protect waters for uses including drinking and cooking. The next category, “B”, is protected for uses including swimming and other contact recreation, but not for drinking water. Classification “C(t)” indicates waters protected at a level which will support trout populations. A “C” classification means the stream is suitable for fish propagation (though not trout). There are lower classifications of waters, but these streams are not regulated under this portion of the Protection of Waters program.

APPENDIX B, extracted from New York State Law (6 NYCRR Part 836.5), indicates the specific NYS DEC stream classification for stream segments and water bodies within the drainage basins of streams entering the Hudson River in Albany, Columbia, Greene and Rensselaer Counties. The tributaries to the Watervliet Reservoir – Normans Kill, Bozen Kill, and Black Creek – are included in the table.

**Watervliet Reservoir
Watershed Protection Study**

Stream Classifications



KEY

- Stream Class
- A
 - B
 - C
- Watershed Boundary
 - Interstate Highways
 - Highways
 - County Boundaries
 - Town Boundaries
 - Rail
 - Water Bodies
 - Roads

Source:
Stream Classifications: NYS DEC 2002

 Prepared by:
THE CAPITAL DISTRICT
REGIONAL PLANNING COMMISSION
2003

New York State Freshwater Wetlands Act

Freshwater wetlands are regulated in New York State pursuant to ECL Article 24 and DEC's implementing regulations. Freshwater wetlands are classified by the DEC according to their ability to perform wetland functions and provide wetland benefits. NYS DEC protected wetlands are a minimum of 12.4 acres in size, however, smaller wetlands of unique environmental value may also be protected. Statewide minimum land use regulations provide for development on each class of freshwater wetlands. These regulations provide a list of activities which are designated with respect to each class of wetlands as either: exempt from regulation; compatible; usually compatible; usually incompatible; or incompatible. Activities designated as exempt do not require approval. Activities designated as compatible require merely a letter of permission. Other activities require a permit. Once it is determined that the proposed activity is regulated, the applicant must seek DEC approval by obtaining either a permit or a letter of permission.

The law also provided for the delegation of authority to local governments (concurrent with the state) for the permit program under Municipal Home Rule Law, so long as such regulations are at least as stringent as the state law.

The New York State Department of Health Watershed Rules and Regulations

Following are the NYS Department of Health Watershed Rules and Regulations, adopted in 1917, which are currently in affect in the Watervliet Reservoir Watershed:

Title: Section 100.2 - City of Watervliet

100.2 City of Watervliet. (a) Application. The rules and regulations hereinafter given, duly made and enacted in accordance with the provisions of sections 70, 71, 72 and 73 of chapter 45 of the Consolidated Laws (Public Health Law) as heretofore set forth shall apply to all natural and artificial reservoirs on the Normanskill and to all HEALTH 10B watercourses tributary thereto or ultimately discharging into said reservoirs, these bodies of water being sources of the public water supply of the city of Watervliet, Albany County, New York.

(b) Definitions (1) The term reservoir wherever used in this section is intended to mean and refer to all storage and impounding reservoirs on the Normanskill which are tributary to or which serve as sources of this public water supply or to any additional reservoir which may be constructed or used for the purpose of this public water supply.

(2) The term watercourse wherever used in this section is intended to mean and include every spring, pond (other than the artificial reservoirs and filter basins), stream, ditch, gutter or other channel of any kind the waters of which, when running whether continuously or occasionally, eventually flow or may flow into the public water supply of the city of Watervliet.

(3) Wherever a linear distance of a structure or object from a reservoir or from a watercourse is mentioned in this section, it is intended to mean the shortest horizontal distance from the nearest point of the structure or object to the high-water mark of a reservoir or to the edge, margin or precipitous bank forming the ordinary high-water mark of such watercourse.

(c) Privies adjacent to any reservoir or watercourse. (1) No privy, privy vault, pit, cesspool or any other receptacle of any kind used for either the temporary storage or the permanent deposit of human excreta shall be constructed, placed, maintained or allowed to remain within 100 feet of any reservoir or within 50 feet of any watercourse tributary to the public water supply of the city of Watervliet.

(2) No privy, privy vault, pit, cesspool or any other receptacle used for the permanent deposit of human excreta shall be constructed, located, placed, maintained or allowed to remain within 300 feet of any reservoir or within 100 feet of any watercourse tributary to the public water supply of the city of Watervliet.

(3) No cesspool, pit or other receptacle of any kind used for the temporary storage of human excreta or sewage shall be constructed, located, maintained or allowed to remain between the limiting distances prescribed by paragraph (1) of this subdivision and the limiting distances prescribed by paragraph (2) of this subdivision unless said cesspool, pit or other receptacle is so arranged and equipped that the said excreta or sewage are at once removed by pump or other satisfactory means through watertight pipes or conduits to some proper place of ultimate disposal, as hereinafter provided, or unless suitable removable vessels or receptacles for the temporary storage of said human excreta or sewage are provided and at all times maintained in an absolutely watertight condition and in such manner as to permit of convenient removal of said excreta or sewage to some place of ultimate disposal as hereinafter set forth.

(4) The excreta collected in the aforesaid removable receptacles permitted under paragraph (3) of this subdivision shall be removed and the receptacles thoroughly cleaned and deodorized as often as may be found necessary to maintain the privy in proper sanitary condition and to effectually prevent any overflow upon the soil or upon the foundation or floor of the privy. In effecting this removal

the utmost care shall be exercised that none of the contents be allowed to escape while being transferred from the privy to the place of disposal hereinafter specified and that the contents, while being transferred from the privy to the place of disposal, shall be thoroughly covered and that the least possible annoyance and inconvenience be cause to occupants of the premises and the adjacent premises.

(5) Unless otherwise specially ordered or permitted by the State Department of Health, the excreta collected in the aforesaid removable receptacles permitted under paragraph (3) of this subdivision shall, when removed, be disposed of by burying in trenches or pits at a depth of not less than 18 inches below the surface and at a distance not less than 500 feet from any reservoir or watercourse tributary to the public water supply of the city of Watervliet.

(6) Whenever, owing to the character of the soil or of the surface of the ground or owing to the height or flow of subsoil or surface water or other special local conditions, it is considered by the State Commissioner of Health that excremental matter from any privy or aforesaid receptacle or from any trench or place of disposal or the garbage or wastes from any dump may be washed over the surface or through the soil in an imperfectly purified condition into any reservoir or watercourse, then the said privy or receptacle for excreta or the trench or place of disposal or the said garbage or waste dump shall, after due notice to the owner thereof, be removed to such greater distance or to such place as shall be considered safe and proper by the State Commissioner of Health. (d) Sewage, house slops, sink wastes, etc. (1) No house slops, bath water, sewage or other excretal matter from any water closet, privy, cesspool or other source, except the purified effluent from a properly constructed sewage disposal plant approved by the State Department of Health, as required by law, shall be thrown, placed, led, conducted, discharged or allowed to escape or flow in any manner either directly or indirectly into any reservoir or any watercourse tributary to the public water supply of the city of Watervliet, nor shall any such matters be thrown, placed, led, discharged or allowed to escape beneath the surface except into watertight receptacles, the contents of which are to be removed as provided by paragraph (4) of subdivision (c), within 300 feet of any reservoir or within 100 feet of any watercourse tributary to the public water supply of the city of Watervliet.

(2) No garbage, putrescible matter, kitchen or sink wastes, refuse or waste matter from any creamery, cheese factory or laundry nor water in which milk cans, utensils, clothing, bedding, carpets or harness have been washed or rinsed nor any polluted water or liquid of any kind shall be thrown or discharged directly or indirectly into any reservoir or watercourse, nor shall any such liquid or solid refuse or waste be thrown, discharged or allowed to escape or remain upon the surface of the ground or to percolate into or through the ground below the surface in any manner whereby the same may flow into any reservoir or watercourse within a distance of 200 feet from any reservoir or within 50 feet from any watercourse tributary to the public water supply of the city of Watervliet.

(3) No clothing, bedding, carpets, harnesses, vehicle, receptacles, utensils nor anything that pollutes water shall be washed, rinsed or placed in any reservoir or watercourse.

(e) Bathing, animals, manure, compost, etc. (1) No person shall be allowed to bathe in any reservoir nor shall any animals or poultry be allowed to stand, wallow, wade or swim in any reservoir nor be washed therein. The watering of animals or poultry in any reservoir of the public water supply of the city of Watervliet is prohibited. No watering place shall be maintained in such a way as to pollute with muddy leachings or excretal matters any streams tributary to the public water supply of the city of Watervliet.

(2) No stable for cattle or horses, barnyard, hogyard, pigpen, poultry house or yard, hitching place or standing place for horses or other animals, manure pile or compost heap shall be constructed, placed, maintained or allowed to remain with its nearest point less than 100 feet from any reservoir or within 25 feet of any watercourse tributary to the public water supply of the city of Watervliet, and none of the above named objects or sources of pollution shall be so constructed, placed, maintained or allowed to remain where or in such a manner that the drainings, leachings or washings from the same may enter any such reservoir or watercourse without first having passed over or through such an extent of soil as to have been properly purified, and in no case shall it be deemed that proper purification has been secured unless the above drainings, leachings or washings shall have percolated over or through the soil in a scattered, dissipated form and not concentrated in perceptible lines of drainage for a distance of not less than 100 feet from any reservoir or 25 feet from any watercourse tributary to the public water supply of the city of Watervliet.

(3) No human excreta and no compost or other matter containing human excreta shall be thrown, placed or allowed to escape into any reservoir or watercourse nor to be placed, piled or spread upon the surface of the ground at any point on the watershed tributary to the public water supply of the city of Watervliet, nor shall such human excreta or compost or other matter containing human excreta be dug or buried in the soil at a less depth than 18 inches below the surface nor within a distance of 500 feet from any reservoir nor within 100 feet of any watercourse tributary to the public water supply of the city of Watervliet, and no manure or compost of any kind shall be placed, piled or spread upon the ground within a distance of 200 feet from any reservoir or within 25 feet from any watercourse tributary to the public water supply of the city of Watervliet.

(4) No decayed or fermented fruit or vegetables, cider mill wastes, roots, grain or other vegetable refuse of any kind shall be thrown, placed, discharged or allowed to escape or pass into any reservoir or watercourse, nor shall they be thrown, placed, piled, maintained or allowed to remain in such places that the drainage, leachings or washings therefrom may flow by open, blind or covered drains or channels of any kind into any reservoir or watercourse without first having passed over or through such an extent of soil as to have been properly purified, and in no case shall it be deemed that sufficient purification has been secured unless the above mentioned drainings, leachings or washings shall have percolated over or through the soil in a scattered, dissipated form and not concentrated in perceptible lines of drainage for a distance of not less than 100 feet before entering any reservoir or 25 feet before entering any watercourse tributary to the public water supply of the city of Watervliet. (f) Dead animals, offal, manufacturing wastes, etc. No dead

animals, bird, fish or any part thereof nor any offal or waste matter of any kind shall be thrown, placed, discharged or allowed to escape or to pass into any reservoir or watercourse. Nor shall any such material or refuse be so located, placed, maintained or allowed to remain that the drainage, leachings or washings there from may reach any such reservoir or watercourse without having first percolated over or through the soil in a scattered, dissipated form and not concentrated in perceptible lines of drainage for a distance of 200 feet from any reservoir or 100 feet from any watercourse tributary to the public water supply of the city of Watervliet.

(g) Fishing, boating and ice cutting. No boating of any kind or fishing from boats or through the ice and no ice cutting or any trespassing whatever shall be allowed in or upon the waters or ice of the reservoirs.

(h) Labor camps. No temporary camp, tent, building or other structures for housing laborers engaged on construction work or for other purposes shall be located, placed or maintained within a distance of 500 feet from any reservoir or 100 feet from any watercourse tributary to the public water supply of the city of Watervliet.

(i) Cemeteries. No interment of a human body shall be made within a distance of 300 feet from any reservoir or 100 feet from any watercourse tributary to the public water supply of the city of Watervliet.

(j) Inspections. The board of water commissioners of the city of Watervliet shall make regular and thorough inspections of the reservoirs, streams and drainage areas tributary thereto for the purpose of ascertaining whether the above rules and regulations are being complied with, and it shall be the duty of said board of water commissioners to cause copies of any rules and regulations violated to be served upon the persons violating the same with notices of such violations; and if such persons served do not immediately comply with the rules and regulations, it shall be the further duty of the board of water commissioners to promptly notify the State Commissioner of Health of such violations. The board of water commissioners shall report in writing annually, on the first day of January, the results of the regular inspections made during the preceding year, stating the number of inspections which have been made, the number of violations found, the number of notices served and the general condition of the watershed at the time of the last inspection.

(k) Penalties. In accordance with section 70 of chapter 45 of the Consolidated Laws (Public Health Law), the penalty for each and every violation of or noncompliance with any of these rules and regulations which relate to a permanent source or act of contamination is hereby fixed at \$100.

LOCAL TOWN REGULATIONS

Local laws regulating land use and site design, as well as regulations pertaining to soil erosion, sedimentation and storm water runoff are found in zoning ordinances, subdivision laws, site plan regulations, or in standalone laws. Just as there is a wide variation in the development pressures facing each municipality in the watershed, there is a wide variation in the way the communities regulate land use, site design, and the impacts of erosion, sedimentation and storm water runoff.

In many cases, requirements for protecting communities from the impacts of erosion, sedimentation, and non-point source pollution are not found in separate ordinances, or even in a separate section of an ordinance but, rather, they are often found in various places throughout the different ordinances. For example, a zoning ordinance may have sections on site plan review for certain uses (often commercial and industrial), special permit requirements for certain uses (which often require site plan review), planned unit development, cluster development, wetland disturbance, flood plain restrictions, stream buffers, parking and road width standards, conservation overlay districts, and excavation practices, each directly or indirectly addressing erosion, sedimentation and storm water runoff impacts. This variation in the actual location of the requirements within each regulation as well as the variation in the requirements themselves are confusing and often leave water quality impacts insufficiently considered.

Following are the relevant excerpts from the land use regulations of each community in the watershed as they relate to water quality protection, erosion/sedimentation, and/or pre- and post-construction runoff requirements.

Town of Guilderland

The town of Guilderland has adopted both zoning and subdivision regulations. The town's zoning law includes the following water quality provisions:

- *Residential cluster development*: The Planning Board is hereby authorized to permit or, pursuant to Town Law § 281-a, to require variance of the strict application of the provisions of this chapter with respect to lot size, building location and density in residential districts where, in the opinion of the Planning Board, the natural and scenic quality, vital environmental features

and resources of the land can be permanently preserved and maintained, the overall aesthetic aspects of residential development in the area will be enhanced, overall population density will not be adversely affected, the adequate and economical provisions of streets and utilities is facilitated and the health and general welfare of the community promoted.

- *Steep slope and watercourse setback.* No structure shall be erected within 100 feet of the water's edge of any body of water except man-made farm ponds not fed or drained by a running stream. No structure shall be erected or shall encroach upon any area lying between any stream or watercourse and a line running parallel thereto and located at grade level at the end of a line perpendicular thereto forming an angle of repose of 12° at the top of the slope of such stream or watercourse, except that where such angle or repose is less than 12°, said parallel line shall be 100 feet from the top of the slope of such stream or watercourse. No building, mobile dwelling or structure designed for human habitation shall be erected or placed within 30 feet of the line so determined.
- *Drainage easements and sedimentation controls.* The following provisions regarding drainage easements and sedimentation controls shall apply to all new development:
 - Drainage easements of sufficient width shall be provided along both sides of open drainage courses. The width of the easement shall be based on the recommendation of the Town Engineer or designated engineer. The easement shall be used for the maintenance of the open drain, remain free of obstructions, be of natural topography and contain no permanent or temporary buildings, plantings, gardens or dumpings.
 - Temporary sedimentation or catch basins shall be required for all new construction in order to minimize sedimentation of nearby watercourses. The size and location of such sedimentation basins shall be based on recommendations of the Town Engineer or designated engineer. Seeding and cover planting shall be required at the earliest possible time during site preparation.
 - Permanent retention or detention ponds may be required in larger developments by the Town Engineer or designated engineer to slow down the rate of stormwater runoff and prevent downstream flooding. The location, size and design of such ponds shall be based on recommendations of the Town Engineer or designated engineer.

In addition, the town considers the following factors as part of special permit/site plan review:

- Adequacy of provisions for the disposal of stormwater and drainage, sanitary waste and sewage, solid waste disposal and snow removal storage areas.

- Adequacy of structures, roadways and landscaping in areas with moderate to high susceptibility to flooding and ponding and/or erosion.
- Retention of existing trees and vegetation for protection and control of soil erosion, drainage, natural beauty and unusual or valuable ecology.

In addition:

- No person shall undertake to construct and new building or structure in the Town of Guilderland without first meeting the requirements of a system, or facilities, for the disposal of waterborne sewage, domestic or trade wastes in accordance with applicable regulations of the town, the New York State Department of Health, New York State Department of Environmental Conservation and other government authorities.

The town's subdivision regulations include the following water quality provisions:

“Storm Drainage Systems

- Storm drainage system shall be designed in accordance with the Highway Development Policy.
- Storm drainage systems shall be designed based on anticipated runoff from a ten (10) year storm and detention basins shall be designed based on anticipated runoff from a fifty (50) year storm.
- The subdivider's engineer shall study and report the effect of the subdivision on the existing downstream drainage facilities outside the area of the subdivision. This study will be reviewed by the Town Designated Engineer and the Planning Board.

“Preservation of the Natural Landscape”:

- In preparing a lot for construction of a structure, the owner or developer shall remove only those trees necessary to make the construction feasible, all other vegetation shall be left in place and shown on site plans. No lot shall be cleared completely of existing trees except on the approval of the Planning Board.
- No portion in excess of 25 percent of any approved plat shall be stripped of its cover at any time. This prohibition shall include land to be used for streets. The Planning Board, either directly or through a designated agent, shall inspect the site and may require interim seeding or other controls to prevent erosion.

- Onsite topsoil shall be conserved and no topsoil shall be removed off site. Topsoil shall be re-spread onto each building lot before a certificate of occupancy is issued.

“Angle of Repose”:

- No structure shall be built or encroach upon any area lying between a continuous watercourse and the angle of repose reserve (angle of repose reserve is defined as: The area comprised of any land adjacent to a continuous or intermittent watercourse where there is a slope of 12 degrees or greater. This area is established by a 12-degree angle beginning at the intersection of the slope with the horizontal plane of the watercourse, running perpendicular to the slope, and terminating at grade elevation).
- No structure shall be built or encroach upon any area lying between an intermittent watercourse and the angle of repose reserve unless approved by the Planning Board. Such approval shall be based on the Planning Board’s site inspection of the intermittent watercourse and evidence submitted by the subdivider concerning the protection of the slope and watercourse.
- No habitable structure shall be placed within the angle of repose reserve setback (angle of repose reserve setback is defined as: A line located at grade level, running thirty feet away from and parallel to the boundary of the angle of repose reserve).

“Protected Slopes”:

- No structure shall be built or encroach upon any area lying within the protected slope reserve (protected slope reserve is defined as: The area comprised of any land where there is a slope of 30 degrees or greater, and the difference in elevation between the horizontal planes at the bottom and top of the slope is twenty feet or greater).
- No habitable structure shall be placed within the protected slope reserve setback (protected slope reserve setback is defined as: A line located at grade level, running thirty feet away from and parallel to the boundary of the protected slope reserve).
- The subdivider shall provide slope stability data, grading plans and erosion control plans for all slopes 12 degrees or greater. The Planning Board reserves the right to limit construction activity on any such slopes deemed undesirable for development based on engineering and environmental considerations.

“Watercourses”:

- No structure may be built within the watercourse setback of a continuous watercourse except man-made ponds not fed or drained by a running stream.
- No structure may be built within the watercourse setback of an intermittent watercourse unless approved by the Planning Board. Such approval shall be based on the Planning Board's site inspection of the intermittent watercourse and evidence submitted by the subdivider concerning the protection of the watercourse.
- No portion (tile field, seepage pit or equivalent) of a subsurface sewage disposal system shall be constructed or placed within two hundred fifty (250) feet of a watercourse feeding into the Watervliet Reservoir or within five hundred (500) feet of said Reservoir.

Town of Rotterdam

The town of Rotterdam has adopted both zoning and subdivision regulations. The town's zoning law includes the following water quality provisions:

Site Plan approval that considers:

- The adequacy, type and arrangement of landscaping, screening, buffer zones and open space.
- The adequacy and means for complete disposal of stormwater, sanitary waste, water supply for fire protection and consumption, solid waste disposal and snow removal.
- The adequacy of structures, roadways, and landscaping in areas with susceptibility to ponding, flooding and/or erosion.
- The protection of adjoining or nearby properties against noise, vibration, dust, odor, glare, unsightliness or other objectionable features.
- The retention of existing trees to as great a degree as is practicable.

In addition, the town requires that an application for preliminary site plan approval shall be accompanied by the following information:

- Landscaping: preliminary grading and landscaping plan.
- Cut and fill: extent and amount of cut and fill for all disturbed areas, including before and after profiles of typical development areas, parking lots and roads.
- Stormwater retention: provisions for on-site stormwater retention basins during and after construction, designed to handle any increased rate of runoff.
- Wells: location and test yields in gallons per minute of all proposed on-site wells.
- Drainage fields or percolation tanks: location and percolation test results of all proposed drainage fields or percolation tanks.
- Water supply and sewage disposal: description of method of water supply and sewage disposal and location of such facilities.
- Location of existing wetlands and floodplains.

The town subdivision regulations include the following water quality provisions:

Drainage systems

- Adequate storm drainage systems shall be required in all subdivisions. The drainage system shall be designed by a person licensed to perform such work.
- Removal of spring and surface water. Any spring or surface water that may exist either previous to, or as a result of, the subdivision shall be carried away by pipe or open ditch. Such drainage facilities shall be located in the street right-of-way, where feasible, or in perpetual unobstructed easements of appropriate width.
- Drainage structure to accommodate potential development upstream. A culvert or other drainage facility shall, in each case, be large enough to accommodate potential runoff from its entire upstream drainage area, whether inside or outside of the subdivision. The Town Engineer shall approve the design and size of facility based on anticipated runoff from a ten-year storm under conditions of total potential development permitted by the Zoning Ordinance in the watershed. The cost of a culvert or other drainage facility in excess of that required for the particular subdivision may be deemed to be the

responsibility of the town, or may be prorated among the upstream property owners and access when upstream land is subdivided.

- Responsibility from drainage downstream. The subdivider's engineer shall also study and report on the effect of each subdivision on the existing downstream drainage facilities outside the area of the subdivision; and this report shall be reviewed by the Town Engineer. When it is anticipated that the additional runoff incident to the development of the subdivision will overload an existing downstream drainage facility during a ten-year storm, the Planning Commission shall notify the Town Board of such potential condition. In such case, the Planning Commission shall not approve the subdivision until provision has been made for the improvement of said condition.
- Land subject to flooding. Land subject to flooding or land deemed by the Planning Commission to be uninhabitable shall not be platted for residential occupancy, nor for such other uses as may increase danger to health, life or property or aggravate the flood hazard, but such land within the plat shall be set aside for such uses as shall not be endangered by periodic or occasional inundation or improved in a manner satisfactory to the Planning Commission to remedy said hazardous conditions.
- Drainage plan. All subdividers shall present an individual lot drainage plan for each lot in their proposed subdivision. Such plan shall be used in the grading of lots before a certificate of occupancy is granted, as required by the Zoning Ordinance. No roof leaders or footing drains which carry stormwater will be permitted to use a sanitary sewer nor a so-called dry well in an area where the dominant soil is hardpan, but shall be adequately disposed of upon the ground surface.
- Curbs and gutters. Concrete or store curbs and satisfactory gutters and storm drains shall be provided to carry snow and rain runoff from street surfaces along which sidewalks are required.

Open space; natural features

- Preservation of natural features. The Planning Commission, shall, wherever possible, establish the preservation of all natural features which add value to residential developments and to the community, such as large trees or groves, watercourses and falls, beaches, historic spots, vistas and similar irreplaceable assets. No tree with a diameter of eight inches or more as measured three feet above the base of the trunk shall be removed unless such tree is within the right-of-way of a street as shown on the final subdivision plat or individual house sites and driveways. Removal of additional trees shall be subject to the approval of the Planning Commission.

Town of Princetown

The town of Princetown has adopted both zoning and subdivision regulations. The town's zoning law includes the following statement – “The Town of Princetown is characterized by steep slopes which are prone to erosion, soils that exhibit severe development limitations, and underlying geological strata which have an extremely limited ability to supply water.” Although the zoning law does not include any direct water quality provisions, a separate Site Plan Review Law states that the Planning Board should consider, among other things, the following:

- The adequacy, type and arrangement of landscaping, screening, buffer zones and open space. Clearance of mature tree and cluster of trees shall be avoided or minimized.
- The adequacy and means for complete disposal of stormwater and sanitary waste, ...solid waster disposal and removal. All drainage networks shall be designed to ensure minimal disturbance to predevelopment watercourse patterns. Stormwater management and erosion control measures shall be utilized where needed to minimize adverse off-site impacts. Disturbed, and if necessary undisturbed areas must be planted with appropriate vegetative cover to reduce erosion and runoff volumes.

As part of site plan review, the town requires a landscaping plan that indicates extent and amount of cut and fill for all disturbed areas. In addition, a the town requires a stormwater management plan that includes: a) Calculations of pre-and post-development stormwater runoff volumes demonstrating no effective increase in discharge leaving the site for the 25 year storm; b) Design and placement of proposed permanent and temporary vegetative and structural measures for stormwater and erosion control; c) If existing culverts or other structures will be used, the capacity of these must be shown.

The town's subdivision regulations include the following water quality provisions:

Drainage Improvements

- Removal of Spring and Surface Water: The subdivider may be required by the Planning Board to carry away by pipe or open ditch any spring or surface water that may exist either previous to, or as a result of the subdivision. Such drainage facilities shall be located in the street right-of-way where feasible, or in perpetual unobstructed easements of appropriate width, and pursuant to the Princetown Street and Highway Law.
- Drainage Structures to Be Properly Designed: Drainage structures should be designed to handle expected flows and to minimize the impacts from storm runoff. All structures and facilities shall be designed in accordance with the New York

State Department of Environmental Conservation document entitled “Stormwater Management Guidelines For New Development.”

- Land Subject to Flooding: Land subject to flooding or land deemed by the Planning Board to be uninhabitable shall not be platted for residential occupancy, not for such other uses as may increase danger to health, life or property, or aggravate the flood hazard, but such land within the plat shall be set aside for such uses as shall not be endangered by periodic or occasional inundation or improved in a manner satisfactory to remedy said hazardous condition. The plat shall designate any official freshwater wetlands as defined under Article 24 of the Environmental Conservation Law, and shall conform in its layout to prohibitions contained in the law.

Parks, Open Spaces, and Natural Features

- Preservation of Natural Features: The Planning Board shall, wherever possible, establish the preservation of all natural features which add value to residential developments and to the community, such as large trees or groves, water courses and falls, beaches, historic spots, vistas and similar irreplaceable assets. No tree with a diameter of 8 inches or more as measured 3 feet above the base of the trunk shall be removed unless such tree is within the right-of-way of a street as shown on the final Subdivision Plat. Removal of additional trees shall be subject to the approval of the Planning Board. In no case, however, shall a tree with a diameter of 8 inches or more as measured 3 feet above the base of the trunk be removed without prior approval by the Planning Board.

The town requires that the following water quality-related information accompany a preliminary plat for a major subdivision:

- Storm drainage plan indicating the location and size of proposed lines and their profiles, connection to existing lines or alternate means of disposal pursuant to the Princetown Street and Highway Law.
- Proof that the subdivision will not disturb dunes, creeks, or other water bodies and meet with current standards of the U.S. Dept. of Agriculture [NRCS] Practices. In determining the required setback line from the verge of creek slopes, an angle of repose of 1:2 measured at the toe of the slope shall be used. In instances where the angle of repose is not applicable, due to a lesser degree of slope at the toe, a 100 ft. setback shall apply.
- Proof that there will be no disturbance of the natural drainage affecting runoff. The impact of such runoff upon the environment shall be calculated by the current methods available from the U.S. Dept. Of Agriculture [NRCS], so that the Planning Board may be able to determine the detrimental effect, if any, upon the adjacent property owners.

- Proof that surface water drainage will be accomplished by a method or methods which do not cause damage to the environment, either by erosion and consequent silting of creeks, ponds or other water bodies or by detrimental effects upon the water table. The suggested methods of surface water drainage are outlined in the latest version of the NYSDEC publication entitled “Stormwater Guidelines for New Development”, or its successor document.
- Proof that no development is proposed on dune slopes or adjacent to creeks to preserve open space in its natural state, thereby protecting land and water for the benefit of indigenous flora and fauna. The area to be preserved shall be delineated by the directives set forth above.
- Proof that the water and sewerage systems are in conformance with the regulation of the NY State Departments of Health and Environmental Conservation.

Town of Duanesburg

The town of Duanesburg has adopted both zoning and subdivision regulations. The town’s zoning law includes provisions for site plan and special permit review that consider the following water quality provisions:

- Adequacy of storm water and drainage facilities.
- Adequacy of water supply and sewage disposal facilities.
- Maximum retention of existing vegetation (noted in the special permit review but not under the site plan review).

The proposed special permit development must also meet the following water quality-related performance standards:

Uses shall not:

- Cause harmful waste to be discharged into sewer, streams, or bodies of water, or to be stored on said property.
- Emit dust or dirt, which is considered offensive.

In addition, the Planning Board may require that a land parcel meeting the minimum requirements be developed in a cluster design.

The town’s subdivision regulations include the following water quality-related provisions:

Drainage Improvements

- Removal of Spring Water, Surface Water, and Storm Water Runoff: The subdivider may be required by the Planning Board to carry away by pipe or open ditch any spring or surface water that may exist either previous to, or as a result of the

subdivision. Such drainage facilities shall be located in the street right-of-way where feasible, or in perpetual unobstructed easements of appropriate width.

- Land subject to Flooding: Land subject to flooding or land deemed by the Planning Board to be uninhabitable shall not be platted for residential occupancy, nor for such other uses as may increase danger to health, life or property, or aggravate the flood hazard, but such land within the plat shall be set aside for such uses as shall not be endangered by periodic or occasional inundation or improved in a manner satisfactory to the Planning Board to remedy said hazardous conditions.
- Areas of Poor Drainage: Subdivision in areas of extremely poor drainage is to be discouraged, particularly where such conditions preclude efficient and safe on-site septic disposal.

Preservation of Natural Features

- Every subdivision or land development plan shall be designed to preserve and protect the natural features of the land, including existing grades and contours, bodies of water and water courses, large trees standing alone or in groves, street shade trees and specimen trees, scenic and historic points, and other community assets.
- The burden shall be on the developer to justify any material changes in the natural features of the land by satisfactory proofs that subdivision or land development would not be feasible without such changes and that there are no practical alternatives. The fact that subdivision or land development would involve greater expense or less density because of the maintenance of certain natural features will not in and of itself be considered a justification of changes in such features.
- Removal of Trees: Compensatory Planting: Every effort should be made to avoid removal of trees having a caliper of six (6) inches or greater at DBH (diameter of breast height) from the property in the process of subdividing, land developing, grading or installing improvements. Where, in the judgment of the Planning Board, such removal is unavoidable, the developer may be required to install trees in such locations and of such size, variety and quantity as the Planning Board shall direct.

The town's subdivision regulations also include a section called: "Reservoir Watershed Districts," which states: Portions of the Town of Duanesburg fall within an area defined as the Delanson Reservoir Watershed District. Development within this area is subject to special limitations. The Building Inspector will provide, on request, the special design criteria relevant to the Watershed District.

Town of New Scotland

The town of New Scotland has adopted both zoning and subdivision regulations. The town's zoning law includes provisions for special permit and site plan review, which consider the following water quality provisions:

- The existing landscape will be preserved in its natural state insofar as practical by minimizing tree removal, disturbance and compaction of soil and the project will provide adequate landscaping to define street edges and break up parking areas.
- The development will reflect the natural capabilities of the site to support such a use. Buildings, lots and support facilities will be clustered in those portion of the site that have the most suitable conditions for development. Environmentally sensitive areas, such as wetland, steep slopes, floodplains, and unique natural features, will be maintained and preserved.
- Proper facilities are to be installed in compliance with any applicable storm water management plan or storm water management requirements.

The town's subdivision regulations include the following water quality-related provisions:

Storm Water Management Plan:

A storm water management plan must be submitted prior to the Planning Board taking any action on any Major Subdivision and/or development of land specified elsewhere in the regulations and laws of the Town of New Scotland, New York. Said plan is to comply with the requirements outlined in Appendix A of [the subdivision] regulations, as modeled after NYSDEC Division of Water, Technical and Operations Guidance Series 95.1.8. Said plan must address the following issues:

- A. Flood Control
 - 1. Peak Flow Attenuation
 - 2. 100-year flood plains
 - 3. Runoff conveyance systems
 - 4. [Stream Corridor Management]
- B. Water Quality Management
 - 1. Control of "first flush"
 - 2. Control of thermal discharges,
 - 3. Hierarchy for managing storm water quality

Town of Knox

The town of Knox has adopted both zoning and subdivision regulations. The town's zoning law includes the following water quality provisions:

Land Conservation District #1 (LC1)

The Primary purpose of the Land Conservation District #1 is to protect the Bozenkill stream bed from potential pollution and flooding due to inappropriate use or development of the land adjoining it. It is also the primary purpose of the Land Conservation District #1 to preserve and protect those areas of the Town of Knox where, because of special and unusual conditions of topography, fauna and flora, drainage and/or other natural conditions, such as scenic beauty, geological formations, and natural waterways, it has been deemed desirable to maintain the natural state of the area. This district shall hereinafter be referred to as LC1.

Supplementary Regulations

Excavations: Any proposed excavation adversely affecting natural drainage or structural safety of adjoining buildings or lands shall be prohibited. Excavations shall not create any noxious or injurious substance or condition, or cause public hazard. In the event that construction of a building or excavation relating to such construction remains idle for a period in excess of 45 days, the premises shall then be cleared of any rubbish, or building materials, and any excavation with a depth greater than two feet below existing grade shall immediately be filled in and the topsoil replaced. Any area of land, having an area of more than one acre from which topsoil has been removed or covered over by fill, shall be seeded to provide an effective cover crop within the first growing season following the start of said operation.

Activity Standards: In any district, the following standards for activities shall apply: There shall be no discharge of any liquid or solid waste into any stream or body of water, or any materials of a nature that may contaminate or degrade any water supply

The town's subdivision regulations include the following water quality-related provisions:

Water Management

A. Removal of Spring Water, Surface Water and Subsurface Water

The subdivider may be required by the Planning Board to carry away by pipe or open ditch any water that may exist any time of the year either previous to or as a result of the subdivision. Such drainage facilities shall be located in the street right-of-way where feasible, or in perpetual unobstructed easements of appropriate width. Disposal of such water shall not interfere with or damage any persons, property or land on or off the proposed subdivision.

B. Drainage Structure to Accommodate Potential Development Upstream

A culvert or other drainage facility shall, in each case, be large enough to accommodate potential run-off from its entire upstream drainage area, whether inside or outside the subdivision. The Town Engineer shall approve the design and size of the facility based on anticipated run-off from a “ten year frequency” storm under conditions of total potential development in the watershed unless the Board determines that a different frequency is required due to the size of the watershed or potential downstream hazards.

C. Responsibility for Drainage Downstream

The subdivider’s engineer shall also study the effect of each subdivision on the existing downstream drainage facilities outside the area of the subdivision; this study shall be reviewed by the Planning Board and the Town Engineer. Where it is anticipated that the additional run-off incident to the development of the subdivision will overload an existing downstream drainage facility during a “Five year frequency” storm, the Planning Board shall notify the Town Board of such potential condition. In such case, the Planning Board shall not approve the subdivision until provision has been made for the improvement of said condition using such measures as stormwater retention on the subdivision and downstream improvements. The basic objective will be to retain stormwater run-off within the subdivision to the extent that the rate of run-off will be no greater after development than from natural conditions prior to development.

D. Land Subject to Flooding

Land subject to flooding by “100 year frequency” storm or less, or land deemed by the Planning Board to be uninhabitable shall not be platted for residential occupancy, nor for such other uses as may increase danger to health, life or property, or aggravate the flood hazard, but such land within the plat shall be set aside for such uses as shall not be endangered by periodic or occasional inundation or improved in a manner satisfactory to the Planning Board to remedy said hazardous conditions.

Erosion and Sediment Control

A. Erosion and Sediment Control Plan

The subdivider may be required to submit a plan to show how erosion and sediment will be controlled on the site. The plan will include acceptable conservation measures and a time schedule for their installation and removal if of a temporary nature. Measures will be installed according to proper standards and specifications. The plan will show where the measures will be applied.

B. Installation and Use of Control Measures

1. Stripping of vegetation, grading or other soil disturbances shall be done in a manner which will minimize soil erosion. The smallest practical area of land shall be exposed at any one time and any land exposed shall be kept exposed for the shortest practical period of time. Normally, no more than 25% of the total subdivision may be clear-cut, graded or exposed at any time. Whenever feasible, natural vegetation shall be retained, protected and supplemented.
2. Sediment shall be retained on site during and after development using temporary and/or permanent erosion control and sediment retention measures. Temporary sediment structures used shall be applied prior to disturbance of an area. Temporary vegetation or mulching shall be applied as soon as possible after disturbance of the area. All temporary measures shall be maintained until permanent protection or development features are applied. Permanent vegetation, erosion control structures, water control and drainage measures shall be applied or installed on the site as early as possible and to the greatest extent possible.

C. Specifications and Standards

The detailed plans, specifications and standards in the erosion and sediment control plan shall be dictated by the characteristics of the site and the nature of the development. All plans shall utilize standards and specifications available from the Albany County Soil and Water Conservation District.

Parks, Recreation Areas, Open Spaces and Natural Areas

F. Preservation and Protection of Natural Areas

The Planning Board shall designate to the subdivider what natural or unique features shall be preserved and/or protected including, but not limited to large trees or groves, water courses and falls, wetland, beaches, unique and interesting geological formations, historic or archaeological sites, vistas and similar irreplaceable assets. The following standards shall be adhered to:

1. Vegetation. No tree with a diameter of 8 inches or more as measured 4 feet above the base of the trunk shall be removed unless such tree is within the right-of-way of a street as shown on the Final Plat. Removal of additional trees shall be subject to the approval of the Planning Board. In no case, however, shall a tree with a diameter of 8

inches or more as measured 4 feet above the base of the trunk be removed without prior approval by the Planning Board.

2. Soil Limitations. When land with moderate and severe soil limitations as shown by the interpretive data on file with the Albany County Soil and Water Conservation District is subdivided, such subdivision shall be carried out in such a way that no detrimental effect will occur to persons or property of any land owner.
3. Soil Stability. Building or other permanent facilities are to be confined to soils that are not subject to slippage or other conditions of soil instability. Such instability shall be determined by on-site review by the Board or persons designated by them. Any report submitted by the subdivider showing conditions other than that determined by the Board shall be prepared by a professional engineer experienced in soil mechanics of the area.
4. Flooding. Flood plains, as indicated by an area expected to be flooded by a “100 year frequency” storm are to be reserved for uses that are consistent with their natural functions to minimize the danger to life and property.
5. Water Resources Areas. Environmental quality of water, lake-shores, streams and springs is to be conserved. Land use is to be planned so as to maintain or enhance the quantity of water resources. Significant recharge areas and Karst features such as sinkholes, must be protected. Also, see 10 NYCRR 100.4 concerning the Altamont reservoirs.
6. Freshwater Wetlands. If any freshwater wetlands lies within the boundaries of the proposed subdivision or within 100 feet of the proposed subdivision, the subdivider must comply with the requirements of the New York State Freshwater Wetlands Act and the local laws of the Town of Knox pertaining to freshwater wetlands, if such local law exists. Such compliance must be stated on the Preliminary and Final Plats before they can be approved by the Board.
7. Open Space. Open space which results from either (a) a cluster or Planned Unit Development type of development or (b) from the reservations of flood plains, preservation of wetlands, or other natural feature areas or, sites shall, wherever possible, form a connected open space system within the development, and be integrated into any open space system outside the development. Areas developed as parks or playgrounds according to Article V, Section 8, may be developed in conjunction with the open space system described above, provided land suitable for park or playground use is contained therein. When land other than land contained in the open space system is dedicated for park or playground purposes, this land shall, wherever possible, be connected to the open space system.
8. Other Unique Areas. Unique areas including geological, ecological, archaeological and historical sites will be adequately protected from overuse or damage resulting from the effects of the proposed subdivision. Areas so designated will blend appropriately with other areas of the subdivision.

Town of Berne

The town of Berne has adopted both zoning and subdivision regulations. The town's zoning law includes the following water quality-related provisions:

Excavations - Any proposed excavation adversely affecting natural drainage or structural safety of adjoining buildings or lands shall be prohibited. Excavations shall not create any noxious or injurious substance or condition, or cause public hazard.

In any district, excavation relating to the construction, on same lot, of a building or structure for which a building permit has been issued shall be permitted. In the event that construction of a building or structure is stopped prior to completion, and the building permit is allowed to expire, the premises shall immediately be cleared of any rubbish, or building materials, and any excavation with a depth greater than two feet below existing grade shall immediately be filled in and the topsoil replaced, or all such excavations shall be entirely surrounded by a substantial fence at least six feet high that will effectively block access to the area in which the excavation is located.

Any area of land, having an area of more than one acre from which topsoil has been removed or covered over by fill, shall be seeded to provide an effective cover crop within the first growing season following the start of said operation.

The town's subdivision regulations include the following water quality-related provisions:

Drainage Improvements

- Removal of Spring Water and Surface Water

The subdivider may be required by the Planning Board to carry away by pipe or open ditch any spring or surface water that may exist either previous to, or as a result of the subdivision. Such drainage facilities shall be located in the street right-of-way where feasible, or in perpetual unobstructed easements of appropriate width.

- Drainage Structure to Accommodate Potential Development Upstream

A culvert or other drainage facility shall, in each case, be large enough to accommodate potential run-off from its entire upstream drainage area, whether inside or outside the subdivision. The Town Engineer shall approve the design and size of the facility based on anticipated run-off from a "ten year" storm under conditions of total potential development permitted by the Zoning Ordinance in the watershed.

- Responsibility for Drainage Downstream

The subdivider's engineer shall also study the effect of each subdivision on the existing downstream drainage facilities outside the area of the subdivision; this study shall be reviewed by the Town Engineer. Where it is anticipated that the additional run-off incident to the development of the subdivision will overload an existing downstream drainage facility during a five year storm, the Planning Board shall notify the Town Board of such potential condition. In such case, the Planning Board shall not approve the subdivision until provision has been made for the improvement of said condition.

- Land Subject to Flooding

Land subject to flooding or land deemed by the Planning Board to be uninhabitable shall not be platted for residential occupancy, nor for such other uses as may increase danger to health, life or property, or aggravate the flood hazard, but such land within the plat shall be set aside for such uses as shall not be endangered by periodic or occasional inundation or improved in a manner satisfactory to the Planning Board to remedy said hazardous conditions.

Preservation and Protection of Natural Areas

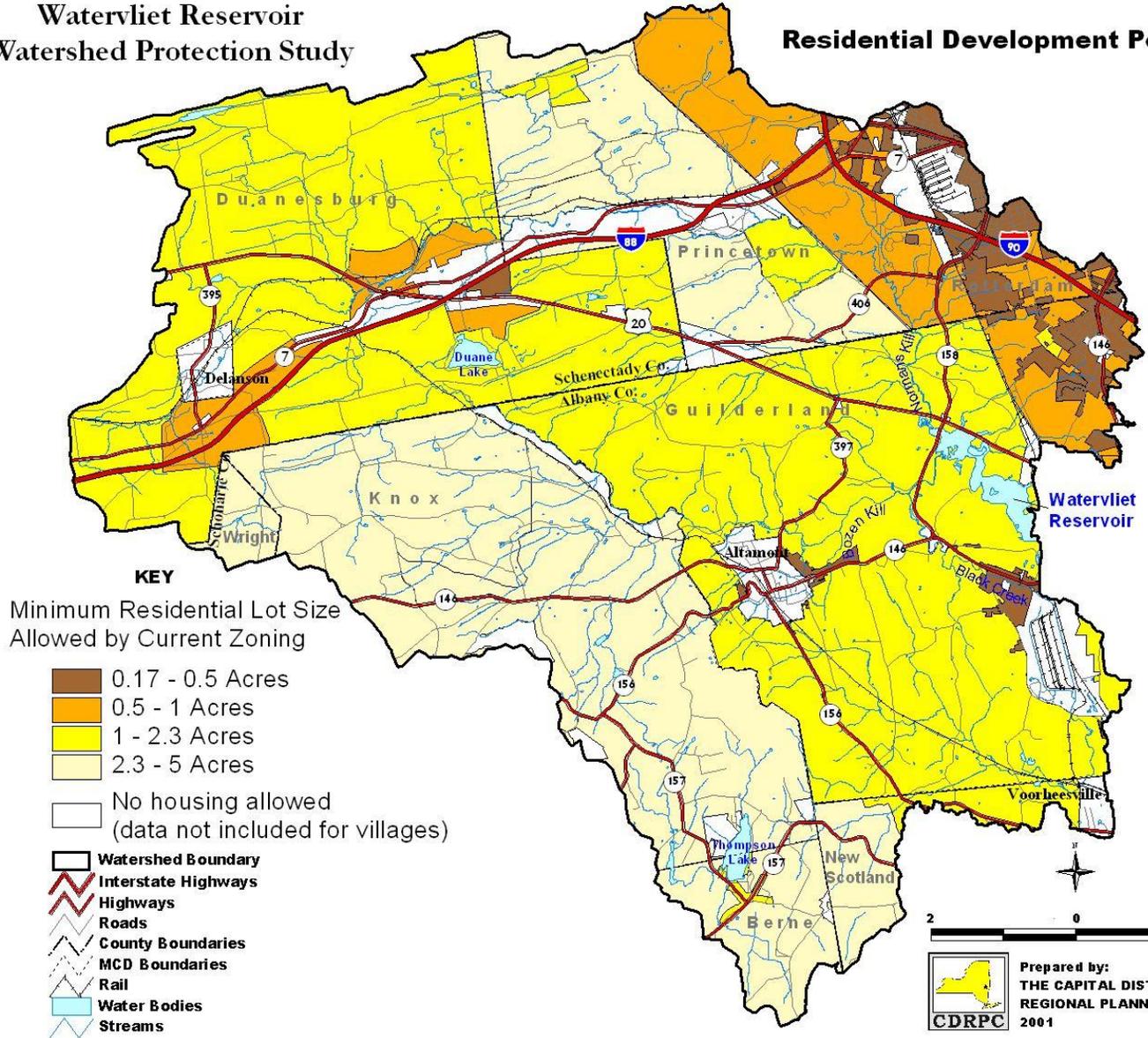
The Planning Board shall designate to the subdivider/developer what natural or unique features shall be preserved and/or protected including, but not limited to large trees or groves, water courses and falls, wetland, beaches, unique and interesting geological formations, historic or archaeological sites, vistas and similar irreplaceable assets. The following standards shall be adhered to:

- Vegetation. No tree with a diameter of 8 inches or more as measured 4 feet above the base of the trunk shall be removed unless such tree is within the right-of-way of a street as shown on the final plat. Removal of additional trees shall be subject to the approval of the Planning Board. In no case, however, shall a tree with a diameter of 8 inches or more as measured 4 feet above the base of the trunk be removed without prior approval by the Planning Board.
- Soil Limitations. When land with moderate and severe soil limitations as shown by the interpretive data on file with the Albany County Soil and Water Conservation District is subdivided, such subdivision shall be carried out in such a way that no detrimental effect will occur to persons or property of any land owner.
- Soil Stability. Building or other permanent facilities are to be confined to soils that are not subject to slippage or other conditions of soil instability. Such instability shall be determined by on-site review by the Board or persons designated by them. Any report submitted by the subdivider showing conditions other than that determined by the Board shall be prepared by a professional engineer experienced in soil mechanics of the area.

- Flooding. Flood plains, as indicated by an area expected to be flooded by a “100 year frequency” storm are to be reserved for uses that are consistent with their natural functions to minimize the danger to life and property.
- Water Resources Areas. Environmental quality of water, lake shores, streams and springs is to be conserved. Land use is to be planned so as to maintain or enhance the quantity of water resources. Significant recharge areas and Karst features such as sinkholes, must be protected.
- Freshwater Wetlands. If any freshwater wetlands lies within the boundaries of the proposed subdivision or within 100 feet of the proposed subdivision, the subdivider must comply with the requirements of the New York State Freshwater Wetlands Act and the local laws of the Town pertaining to freshwater wetlands, if such local law exists. Such compliance must be stated on the preliminary and final plats before they can be approved by the Board.
- Open Space. Open space which results from either (a) a cluster development or (b) from the reservations of flood plains, preservation of wetlands, or other natural feature areas or, sites shall, wherever possible, form a connected open space system within the development, and be integrated into any open space system outside the development. Areas developed as parks or recreation areas according to Article IV, Section 7, may be developed in conjunction with the open space system described above, provided land suitable for park or recreation use is contained therein. When land other than land contained in the open space system is dedicated for park or recreation purposes, this land shall, wherever possible, be connected to the open space system.
- Other Unique Areas. Unique areas including geological, ecological, archaeological and historical sites will be adequately protected from overuse or damage resulting from the effects of the proposed sub-division. Areas so designated will blend appropriately with other areas of the subdivision.

**Watervliet Reservoir
Watershed Protection Study**

Residential Development Potential



2 0 2 Miles

Prepared by:
THE CAPITAL DISTRICT
REGIONAL PLANNING COMMISSION
2001

CDRPC



Regulations that minimize vegetative removal can reduce construction site erosion.

ISSUES, THREATS AND RECOMMENDATIONS

There are a variety of existing and potential issues/threats that have been identified in course of the research into this study. Although recommendations will be offered for most of the issues, it will be up to the various communities and stakeholders within the watershed to determine the seriousness of each issue/threat and to prioritize them. Some of the issues will require further technical information in order to

better understand the significance of the threat and the potential solutions. Some of the technical solutions may be expensive, perhaps prohibitively so. Many of the issues will involve tradeoffs and the will and foresight to act. The following issues/threats have been identified through field investigations, interviews, public meetings, and the evaluation of existing reports, laws, plans, letters and news articles.

THE NORTHEAST INDUSTRIAL PARK

The Northeast Industrial Park is located approximately one mile from the reservoir and directly adjacent to the Black Creek. The industrial park, now privately owned by the Galesi Group, was once owned by the federal government and used as a military depot (from 1941 to 1969). The New York State Department of Environmental Conservation has identified the industrial park as a Class 2 Inactive Hazardous Waste Disposal Site. A Class 2 site is defined as one posing a “significant threat to the public health or environment – action required.”

The US Army Corps of Engineers (Corps) is conducting work at the site, under the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS). DERP-FUDS is a federal program to investigate and clean up any environmental conditions resulting from the Department of Defense's (DoD's) past activities at installations that have since been transferred to private ownership.

A Restoration Advisory Board (RAB) has been formed to facilitate communication and make recommendations to the Corps about activities at the site. The RAB is composed of interested community members, representatives from local and state agencies, and the Corps. The RAB meets every two to three months to offer and receive input from the community and the Corps about ongoing activities at the site.

The Corps has conducted several studies at the former Depot, and in concert with the Defense Logistics Agency (DLA), has prepared a Remedial Investigation Field Sampling Plan and a General Safety and Health Plan to establish and define what further environmental measures are necessary at the site. These documents are available for review at the Guilderland Library.

As of this writing, the Corps was evaluating and addressing public comments responding to this plan. A final remediation plan is expected. Additionally, a feasibility study of AOC 3 has been completed, which included additional ground water tests confirming the presence of volatile organic compounds, PCB's, metals (inc. lead), and pesticides in the soil and entering the ground water. A contaminated

plume is migrating toward the Guilderland High School. The study recommends that contaminated soil from this area be removed from the site. In March of 2003, the corps will begin a \$900,000 cleanup of this area to remove the contaminated soil.

RECOMMENDATION 1.:

The recommendations for the various “areas of concern” (AOC) included in section 4 of the draft remedial investigation plan for the industrial park site will be reiterated here. They are as follows (as they appear in the report):

“4.2 AOC 1 – U.S. Army Southern Landfill

4.2.1 Summary and Conclusions

4.2.1.1 AOC 1 is the former U.S. Army Southern Landfill. Surface water and sediment characterization data were considered data gaps in previous investigations. The objective of characterizing the surface water and sediment in the pond and wetlands adjacent to the U.S. Army Southern Landfill was met. Three surface water and sediment samples were collected from a large pond, and a seasonally-wet area. Bis(2-ethylhexyl)phthalate (BEHP) and aluminum were detected above NYSDEC criteria and upstream ranges in surface water. PAHs, pesticides, PCBs, and up to ten metals were present above NYSDEC criteria and background in sediments from the main pond. A visual survey of potential drainage structures along the railroad tracks was conducted on June 29, 2000 and did not identify any drainage structures.

4.2.1.2 The abandonment of well AMW-11 and its replacement with well GW-1 was completed as planned. However, a bedrock aquifer capable of producing suitable quantities of water for sampling and hydraulic testing was not encountered. The hydraulic communication between the shallow water bearing zone and bedrock was not evaluated by the planned pump test because insufficient water was encountered.

4.2.2 Recommendations

The water quality in the main pond adjacent to AOC 1 contains elevated concentrations of aluminum and BEHP. The sediments in the main pond and the seasonally-wet area have elevated concentrations of SVOCs, pesticides, PCBs and metals. The extent of these elevated concentrations (above background and regulatory criteria) laterally and vertically have not been fully defined. Additional sampling should be conducted to verify the full extent of impacted sediments, if remediation is required.

4.3 AOC 2 – Former Bivouac area/base commander’s landfill

4.3.1 Summary and Conclusions

4.3.1.1 AOC 2 is the former Bivouac area located west of County Route 201. This 40.6-acre parcel was part of the SADVA from its inception until its sale to a private owner who lived at the property beginning in 1963. The overall objective was to assess the presence, nature and extent of contamination at AOC 2. The objectives included locating and characterizing the extent of fill, and sampling the fill, soil, groundwater, surface water, and sediment to assess potential exposure pathways by humans and fauna. The scope of work also included sampling former on-site domestic wells and abandoning a former groundwater monitoring well. The objectives were met through the sampling of the various media as planned.

4.3.1.2 The extent of fill was determined using soil borings and test pits. The fill consisted primarily of small glass pill bottles containing salt tablets and iodine tablets. Surface debris consisting of bottles and metallic debris was observed. Analytical samples of surface soil and subsurface soil did not contain any VOCs, SVOCs, pesticides or PCBs above NYSDEC soil criteria. No VOCs or PCBs were detected above surface water criteria and no VOC, SVOCs, or PCBs were detected above sediment criteria. Pesticides were detected above surface water and sediment criteria in two samples and one sample, respectively. SVOCs were detected above surface water criteria in one sample. Metals were detected above the various criteria in each of the media sampled. The metals concentrations may be representative of the area and may not necessarily be indicative of site contamination. No VOCs, SVOC, pesticides, or PCBs were detected above Class GA groundwater standards in either of the former domestic wells. No metals were detected above Class GA criteria in the on-site domestic well. Three metals were detected above Class GA criteria in the former domestic supply well at the neighboring property.

4.3.2 Recommendations

The fill material (pill bottles and metallic debris) at the Post Commander’s Landfill area is most likely attributable to the DoD. Since this property is no longer owned by the DoD, it is recommended the fill material attributable to the DoD be removed from the site because concentrations in soil and groundwater exceed applicable NYSDEC criteria.

4.4 AOC 3 – Former Burn Pit Area

4.4.1 Summary and Conclusions

4.4.1.1 AOC 3 is the former Burn Pit Area located at the north end of the SADVA. This area is less than 10 acres in size. Historical aerial photographs suggest this area has been the site of dump areas, pits, or scarred areas. The RI objectives were to assess the nature and extent of contamination at AOC 3, including delineation of the presence and extent of surface and subsurface soil contamination in geophysical anomalies, and the characterization of shallow groundwater quality. The soil characterization objectives were met through the drilling and sampling of 10 soil borings and 21 supplemental soil borings. The groundwater characterization objectives were met through the installation of three groundwater monitoring

wells and collection of five groundwater samples from temporary wells. The three new monitoring wells and one existing well were sampled twice to further characterize groundwater quality.

4.4.1.2 Surface soils containing CPAHs, pesticides, and PCBs were identified; however, all but one of the those areas are within the footprint of the new warehouse or paved parking and roadway areas, so the exposure risk will be minimized. Subsurface soil contamination by VOCs, CPAHs, NPAHs, pesticides, and metals was detected and delineated. The former burn pit area near SB-06 was heavily contaminated. The contamination extended into the top of the water table. The vertical extent of contamination was not fully characterized and represents a data gap. Groundwater contamination (VOCs, SVOCs, and lead) was detected in SB06R and at the western property line in HP02 and MW-2. A plume appears to be moving offsite in a north-northwesterly direction. The extent of the plume is not known and represents a data gap.

4.4.2 Recommendations

The investigation results at AOC 3 indicate the vertical extent of contamination in soils and the groundwater table have not been fully delineated. It is recommended soil sampling be conducted in deeper borings to delineate the vertical extent of contamination in the center of the source area. It also recommended that monitoring wells be installed on the school grounds, downgradient of MW-2 and HP02, to determine the extent of the contaminated groundwater plume. At the same time, a sample from the school's irrigation well should be collected to assess whether that well has been impacted. Filling these data gaps will facilitate performance of the feasibility study which is being conducted to evaluate cleanup options for AOC 3.

4.5 AOC 4 – C&D Landfill

AOC 4 is the C&D Landfill located at the southern end of the NEIP west of AOC 1 (the US Army Southern Landfill) and AOC 7 (the triangular disposal area). This disposal area was not active during the period of time the SADVA was operated by the DoD, so this AOC was not included in the RI.

4.6 AOC 5 – Voorheesville Depot

4.6.1 Summary and Conclusions

4.6.1.1 AOC 5, known as the Voorheesville Depot, is currently owned by the GSA and is operated by the DLA/DNSC under the National Stockpile Program. Metallurgical ores and materials necessary for manufacturing defense materials, or materials used in national defense are stored on-site. The project objective was to assess whether the stored materials are leaching or have leached metals into the soil, groundwater, and surface water/sediments. Soil samples were collected at 12 locations. Groundwater samples were collected from four temporary well borings and one on-site

supply well. Fourteen surface water and sediment samples were collected from the perimeter ditches, site ponds, storm sewer infalls, and ditches adjacent to the former open storage area.

4.6.1.2 There were no impacts from the materials stored on-site on groundwater or surface water. The metals stored at the site were detected in soils and sediments at concentrations above the applicable criteria and background ranges. Since the stockpiles of metals and ores have been moved around all areas of the site over the past 30 years, most of the site surface soils have likely been impacted.

4.6.2 Recommendations

The primary transport mechanism is sediment suspended in storm water runoff. Measures should be taken to control the off-site migration of contaminated sediment and soils at AOC 5. The planned reconstruction and expansion of the on-site retention ponds and the possible minimization of inflow of storm water from Route 201 should reduce the potential for off-site migration of contaminated sediments. Once the site use for stockpiling metals and ores has ended, on-site surface soils will need to be covered or remediated if the future site use is to be unrestricted.

4.7 AOC 6 – Former SADVA Wastewater Treatment Plant

4.7.1 Summary and Conclusions

4.7.1.1 AOC 6 is the area near the former SADVA WWTP. Based upon the Archival Search Report (EAEST, 1999) and the Albany County Environmental Council (ACEMC, 1980) historical review, an area up to two acres in size, located in the northeast corner of the WWTP, was a possible dumping ground. The objective of the AOC 6 investigation was to investigate the presence or absence of contamination in the former fill areas accessible outside the footprint of the current WWTP. The objectives were met through the excavation of six test pits and the collection of six soil samples.

4.7.1.2 No visual evidence of fill material was observed in the test pits. Seven metals were detected above soil criteria and background ranges. These metals concentrations were only slightly above the background ranges. The characterization data for AOC 6 do not indicate that remedial action is necessary.

4.7.2 Recommendations

No further action is recommended at AOC 6.

4.8 AOC 7 – Triangular disposal area

4.8.1 Summary and Conclusions

4.8.1.1 AOC 7 is a triangular-shaped area located near the southeastern end of the former SADVA and west of AOC 1. This area was formerly bounded by railroad tracks on three sides. Aerial photographs from the early 1940s indicate the presence of a possible dump in this triangular area, as do geophysical anomalies from previous investigations. The objective of this preliminary RI was to assess the presence or absence of fill materials and to characterize impacts on surface soils, subsurface soils, and groundwater. The objectives were met through the sampling of soils in four test pit excavations and the sampling of groundwater in three temporary well borings and two permanent monitoring wells.

4.8.1.2 A small amount of fill was encountered in the test pits. The fill consisted of railroad ties, charred wood, angular gravel, and glass bottles. Metals concentrations slightly above background were widespread in surface soil and subsurface soil. BEHP was detected above the NYSDEC Class GA groundwater standard in all five groundwater samples. Since BEHP was detected in all locations, including upgradient of AOC 7, it may not be a site-specific problem attributable to AOC 7. Metals were also detected in the groundwater samples above groundwater standards. The metals concentrations may be related to turbidity in the groundwater samples and not to metals contamination.

4.8.2 Recommendations

No further action is recommended at AOC 7.

4.9 AOC 8 – Black Creek

4.9.1 Summary and Conclusions

4.9.1.1 Black Creek flows near many of the AOCs and receives surface water runoff from most of the AOCs through the perimeter ditches or by direct inflow. The objectives of the investigation were to determine background levels of surface water and sediment for Black Creek, to assess the nature and extent of contamination in Black Creek within the boundaries of the SADVA, and to assess impacts attributable to the various AOCs. The investigation objectives were met through the collection of four background surface water and sediment samples, and the collection of seven surface water and eight sediment samples on-site or downstream of the site.

4.9.1.2 SW15 and SW29 contained the greatest number of metals (five and six, respectively) above surface water standards. Sediments also contained elevated concentrations of metals at these sample locations. These two sample locations were in ditches near the former open storage area and AOC 5, and may indicate impacts from these areas. Elevated metals concentrations in sediments were also detected near the C&D landfill. Sediment pesticide concentrations were elevated downstream of AOC 3 near AOC 6. Samples SW/SD25 were collected on the upstream side of the first dam located downstream of the SADVA. One carcinogenic PAH was detected above sediment criteria and background ranges. However, the

total PAH concentration was higher upstream of the SADVA, indicating the one elevated PAH concentration at SD25 may be from a source other than SADVA. The surface water results suggest the presence of BEHP could be originating at AOC 2, but an offsite source could also exist downstream of SADVA.

4.9.2 Recommendations

The area near samples SW15 and SW29 is in a perimeter ditch along the west side of SADVA. Remediation of this ditch may not be necessary since elevated concentrations in the main channel of Black Creek do not appear to be SADVA-related. The downstream surface water and sediment results identified BEHP, one pesticide and lead concentrations are elevated above background and applicable criteria. Periodic monitoring is recommended to assess whether the concentrations increase over time, or with changing stream conditions.

4.10 AOC 9 – Building 60 Area

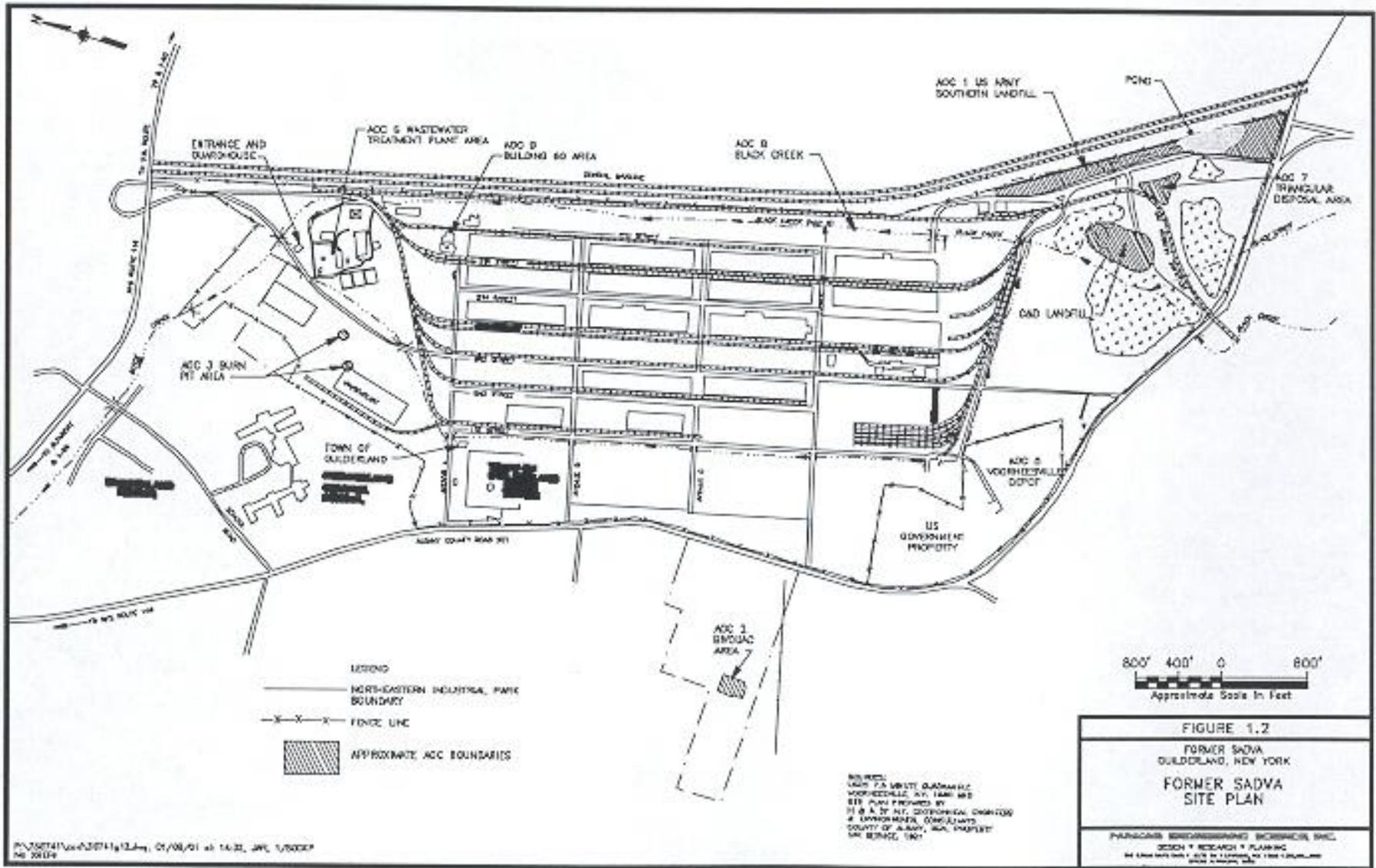
4.10.1 Summary and Conclusions

4.10.1.1 AOC 9 is located at the northeast corner of the SADVA in the area around Building 60. The potential source area for AOC 9 was an oil/water separator and a storm sewer pipeline leading from the oil/water separator to Black Creek. Both have been removed. The remaining potential source area would be residual contamination in the soil that may have originated from pipeline leaks. The objective of this preliminary RI is to assess the presence or absence of contamination at AOC 9. Soil along the former 12-inch clay sewer route was assessed to determine whether residual contamination exists. Groundwater in the vicinity of AOC 9 was also assessed to determine whether contaminants are present and whether they are migrating toward Black Creek.

4.10.1.2 To meet the objectives, a series of four soil borings were drilled along the former sewer pipe path. Eight soil samples were collected to characterize the soils. Four groundwater samples were collected from four existing monitoring wells to characterize groundwater at AOC 9. Metals concentrations slightly above background were widespread in soils. None of the metals detected were anomalously higher than the soil criteria and background ranges. Groundwater contamination was present in MW9. MW9 contained bis(2-ethylhexyl)phthalate slightly above the groundwater standards and arsenic, iron, and manganese above groundwater standards. The integrity of well MW9 is in question and should be redeveloped and resampled prior to making remedial action decisions.

4.10.2 Recommendations

AOC 9 can not be closed out until groundwater contamination in MW9 is evaluated further. MW9 should be redeveloped, and filtered and unfiltered samples should be collected from MW9 to determine whether there is a dissolved metals problem, or whether turbidity in the groundwater sample is impacting the analytical results.”



Site Plan of the Northeast Industrial Park with Areas of Concern (AOC) identified

In addition to contamination issues related to the former military uses of the Northeast Industrial Park site, there is also a concern that existing and future uses could pose a treat to the water quality of the reservoir, since the industrial park straddles the Black Creek (which empties into the Bozen Kill and then into the reservoir). In addition to concerns about parking lot runoff (petroleum products, road salt, etc), which drains directly into the Black Creek, there are ongoing concerns regarding the industrial activities and the potential pollution byproducts occurring at the individual sites. For example, a glass recycling facility in the park was leaving dirty bottles and broken glass exposed to storm water. Also, a large mound of garbage has been identified recently on the park property, a few hundred feet from the creek. The recycling facility has since closed, but these problems illustrate the necessity to limit the types of uses that should be allowed into the industrial park. In addition, it points to the need for existing and future activities in the park to utilize best management practices so as to minimize any potential water pollution runoff from the site.

The town of Guilderland reviews developments proposed for the park under the rules of the town’s zoning ordinance. Currently, the industrial park is zoned “Industrial.” A “special use” permit is required, which is authorized by the Zoning Board of Appeals (ZBA). Under the permit review, the ZBA considers, among other factors, the adequacy of provisions for the disposal of stormwater and drainage, sanitary waste and sewage, solid waste disposal, and snow removal storage.

Although the ZBA considers water quality factors of development proposals, it does so on a site-by-site basis, without necessarily evaluating the overall cumulative water quality impact from the development of the entire site over time. However, there is presently no comprehensive mechanism for treating stormwater runoff from the entire industrial park site. Although the zoning law prohibits the discharge of pollutants from any individual site, in the event of an accident, pollutants could easily migrate from the site to the Black Creek. In addition, the current zoning law does allow uses such as fuel, gasoline, and oil storage, dry-cleaning, and assorted manufacturing activities, all of which have the potential to affect surface and ground water quality.

In recognizing the shortcomings of site-by-site review, the ZBA has requested that the Northeast Industrial Park complete a “Generic Environmental Impact Statement (GEIS)” for the eventual full build-out of the park site. In response to this request, a “Draft Scoping

Document” was prepared. However several years have passed since this scoping document was prepared (which is only the first step in the environmental review process), with no further action taken on the part of the industrial park to follow through with the full GEIS.

RECOMMENDATION 2.: The owners of the Northeast Industrial Park should complete a full Generic Environmental Impact Statement for the eventual full build-out of the industrial park site. Particular attention should be paid to minimizing potential water quality impacts to the Black Creek/Watervliet Reservoir from current and future activities at the industrial park site. A means of containing and treating stormwater from the entire park site should be considered. Best management practices should be evaluated for on-site storage and disposal of materials. The GEIS should also evaluate the items identified under the original scoping document, which are as follows:

“2. Water Resources

a. Groundwater:

Potential Impact: Both groundwater quantity and quality may be impacted by an increase in impervious surfaces associated with full build-out of the Park.

Information Needed to Address the Impact:

(i) Existing Information - Analysis of groundwater has been previously conducted in connection with U.S. Army investigations of the environmental impacts of its Southern Disposal Area and bum pits.

(ii) Required New Information and Methodology for Obtaining - An estimate of the current volume of stormwater will be developed as described below for the investigation of potential impacts to surface water.

Initial Identification of Mitigation Measures: The potential impacts will be mitigated by the measures identified in the stormwater and erosion control plan. Mitigation measures could include construction of detention and/or retention basins, wet ponds, grass-lined ditches or other water quality protection measures.

b. Surface Water

Potential Impact: The Project site contains various surface water resources including Black Creek, a small pond and NYS DEC Wetland V 19 and may contain federal jurisdictional wetlands. These could be impacted by erosion and sedimentation during construction and/or change in water quantity both during construction and as a result of reduced infiltration and increased stormwater runoff from impervious surfaces created by the Project. In addition, the hazard of flooding within the 100-year flood plain could be increased by increased stormwater runoff and construction in certain areas of the site could displace flood waters which could result in other areas becoming flooded.

Information Needed to Address the Impact: In order to address these potential impacts it will be necessary to approximate the locations of all surface water bodies, estimate both the current volume of stormwater runoff and peak discharge rates and the runoff following full build-out, and develop a plan to protect surface and groundwater resources.

(i) Existing Information - An important step in this process will be reviewing existing mapping and other data relating to the Project area, including:

- FEMA Flood Plain Mapping
- USGS Topographical Mapping
- SCS Soil Survey
- aerial photographs
- any other previous studies conducted in or affecting the Project area.

(ii) Required New Information and Methodology for Obtaining - An in-depth field reconnaissance will be conducted to confirm the locations of the surface water resources and review the existing watershed conditions. Based on review of existing information and site investigation, the existing and proposed conditions will be evaluated for the 10-, 25-, 50- and 100-year 24-hour storm events using SCS TR-55 methodologies. Post-development conditions will be based on the "ultimate build-out" scenario described in the Master Plan to be prepared for the Park.

Initial Identification of Mitigation Measures: A stormwater management and erosion control plan will be developed to mitigate potential impacts both during construction and as a result of increased impervious surfaces. Flood control measures and measures to accommodate displaced flood waters elsewhere on the site will be also be discussed. Mitigation measures could include construction of detention and/or retention basins, wet ponds, grass-lined ditches or other water quality protection measures.”



Industrial park garbage pile to the upper right of photo. Black Creek in foreground.



**Location of migrating toxic groundwater plume from Northeast Industrial Park superfund site heading toward Guilderland High School.
Bus Garage at top next to Black Creek.**

FORMER TOWN LANDFILL

A former town of Guilderland landfill lies within 1,500 feet of the reservoir. The site may have been utilized as a dump for wastes from the former army depot. It's not publicly known what kinds of wastes were dumped at the site from the depot. The town began using the site as a solid waste dump in 1970's until it ceased operation in early 1990's. The site is unlined and therefore has the potential to be leaking toxic leachate. An underground brook coming from the direction of the dump discharges water directly into the reservoir within 100 feet of the town and city intake points.

RECOMMENDATION:

In order to prevent possible contamination of the reservoir from ground water coming from the landfill, the town of Guilderland and the city of Watervliet should pursue NYS DEC approval to re-route the underground brook so that it discharges below the reservoir dam. Although there is no indication that toxins are currently being discharged from this brook, rerouting it would be a prudent preventative measure that should preclude contamination if leachate were to enter this watercourse in the future. In addition, the municipalities should monitor and sample the brook water after it is realigned to ensure that contaminants are not entering the Normans Kill creek down stream from the dam. The municipalities may be able to subsidize some of the costs of this undertaking through grant and loan funding sources such as the NYS Clean Air Clean Water Bond Act. Information about the bond act funding can be obtained at: www.dec.state.ny.us/website/bondact/index.html

* On a somewhat related topic, it should be noted that during the research for this study, the Gazette newspaper reported that an illegal pipe had been discovered discharging toxic leachate from the former town of Duansburg landfill into the Normanskill Creek for an eight-year period (from its closing in 1992 until 2000). The creek feeds into the Watervliet Reservoir. The town removed the pipe after DEC officials discovered it in early 2000. The Gazette reported that both the DEC and the Attorney General's Office are conducting investigations concerning the illegal discharges. As of this writing, no official charges have been made. It is not known whether the toxic discharges have infiltrated the reservoir.



Closed, unlined town landfill next to reservoir. An underground brook flowing from the direction of the landfill discharges into the reservoir near the city and town intake points.

PROXIMITY OF ROADS

The Watervliet Reservoir is bounded on two sides by highways: US highway 20 on the northeast, and county highway 158 on the northwest. The close proximity of these highways to the reservoir presents a direct threat to its water quality. Both of these highways carry relatively large traffic volumes, including trucks carrying substances such as fuel oil. In the case of an accident, an accidental spill could result in the direct contamination of the water body. In addition, the close proximity between these roads and the reservoir leaves the reservoir vulnerable to deliberate contamination. Lastly, the city of Watervliet has detected trace levels (below state and federal standards) of Chloride and Sodium in the water, which may be partly attributed to road salt runoff (though both substances are also naturally occurring).

RECOMMENDATION: The vast expanse of the Watervliet Reservoir watershed (~115 sq. miles) makes it difficult to completely protect the reservoir from chemical spills. In order to minimize the contamination of the reservoir due to an accidental spill, the town of Guilderland and the city of Watervliet should develop a joint spill response plan to address both accidental and purposefully contamination. The city of Watervliet presently has an emergency response plan for chemical spills within the reservoir, storage reservoir, and watershed, which includes the following actions:

Call John McDonald of McDonald Engineering immediately. John shall act as the lead person representing the city. In the event that John is not available, contact James Basha. The lead person shall secure the necessary equipment and labor to address the spill. The lead person shall direct all activities associated with the cleanup.

Other actions will include:

1. Call Albany County Health Department and the NYS Department of Environmental Conservation.
2. Call the Guilderland Water Department.
3. Call the Guilderland Police.

4. Isolate the transmission main if necessary.
5. Isolate the service reservoir if necessary.
6. Flush reservoir, transmission main, or service reservoir if necessary.
7. Adjust treatment processes at the filter plant if necessary.
8. Inform consumers via TV and radio of the nature of the problem and the steps to be taken to remedy the situation – Utilize the PINS number.
9. Activate interconnects if necessary.
10. Restrict usage if necessary.
11. Perform testing of water entering and leaving the plant.

Although the city's plan noted above is comprehensive, there may be ways to make it even more effective. For example, the city and town could pool their resources to formulate a coordinated response plan to address an emergency spill. There may be immediate actions that town of Guilderland personnel could take – such as placing booms to contain oil slicks – prior to the arrival of an emergency response company summons by Jack McDonald. Moreover, in the event that neither Jack McDonald nor James Beshia is not immediately reachable, another backup lead person should be identified, preferable one in close proximity to the reservoir.

The need for coordination becomes more paramount in addressing the threat of purposeful contamination. Due to the sensitive nature of this type of threat, a detailed listing of current safety measures will not be described. However, it should be noted that since 9-11, the town has increased police patrols of the reservoir, and surveillance cameras have been installed. Although the town and city have already begun coordinating terrorist-related protection measures, they should continue to search for more effective ways to best utilize the resources of both municipalities in addressing purposeful and accidental spills.



State Highway 158 crossing the Normans Kill at the reservoir inlet.



Water Chestnuts and other plant growth in reservoir. US Highway 20 in foreground.

INVASIVE PLANTS

The reservoir is currently under the threat of two invasive plant species: Chinese Water Chestnuts, and Eurasian Milfoil. The growth and extent of Water Chestnuts is much more prevalent than the Milfoil. Both of these plants have become an aquatic nuisance species in North America because of their ability to reproduce rapidly (including from fragments) and form extensive floating mats. Their low food value for wildlife can potentially have a substantial impact on native species. Their decomposition contributes towards lower oxygen levels in shallow waters that impacts other aquatic organisms. The continual buildup of detritus and decomposed plant matter lowers the retention capacity of the reservoir and increase the treatment costs for the town and the city as additional impurities must be filtered from the water.

An additional problem that may be related to invasive species (and excess organic matter) is that the city has detected the presence of trihalomethanes at levels above the new maximum contaminant level of 80ug/l that became effective in 2001. Trihalomethane (TTHM) is formed by the reaction of chlorine with water that contains large amounts of organic matter. Some people who drink water that contains trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and many have an increased risk of getting cancer.

There are three general control strategies that can be employed to control/eliminate invasive plants: mechanical or manual, chemical, and biological. Biological controls, with pathogens and insects, are being evaluated by various studies; operational biological controls are available but are still under evaluation. Attempts have been made to find suitable bio-control in China, Japan, South Korea and the Russian Far East but no appropriate candidates were found. More predictable controls may be available in the next several years. Grass carp are not specific and will consume many native plants, but are used in some states. Mechanical and manual control, either by hand pulling, raking, or harvesting, is relatively effective at reducing the current abundance of plants and is useful to clear channels or maintain access. It will not, however, result in eradication, and depending upon growing conditions, several removals may be needed each year, and regrowth may be fast unless roots are removed or plants are harvested close to the sediment.

The city of Watervliet has attempted to deal with the growth of Water Chestnut mats by purchasing and utilizing a motorized, mechanical weed harvester. Studies have shown that repetitive harvesting over a number of years may be effective in eradicating this aquatic

weed in small, enclosed bodies of water. However, such mechanical harvesting likely will only serve to control or eliminate major growths in waterways on an interim basis and will not provide a long term solution to control in heavily infested areas since the harvester simply cuts the mats without eliminating the roots, thus allowing the plants to grow back.

Chemical control can be effective in controlling invasive plants, however, chemical control often needs to be repeated every year to every three years. Systemic herbicides such as 2-4-D, fluridone (Sonar) or Trichlopyr are most effective for Eurasian watermilfoil and can, under appropriate circumstances, give selective control. Selective control is difficult to achieve, however, and professionally applied chemical control can cost from \$200-2,000 per acre. However, due to the unknown human impacts of chemical treatments, chemical control is not advisable for treating invasive plants in a water bodies used as drinking water sources.

RECOMMENDATION: The city of Watervliet should continue to utilize the mechanical weed harvester to control the spread of Water Chestnuts. However, recognizing the limitations of this approach, the city, in conjunction with the town of Guilderland, should also consider hiring a consultant to evaluate the feasibility of dredging the reservoir. Dredging could help to alleviate several issues related to the watershed. For example, dredging would remove excess sedimentation buildup in the reservoir, thus increasing the reservoir capacity. Dredging would also remove much of the excess decayed plant matter on the reservoir bottom (potentially reducing the trihalomethane problem). Dredging would also be effective in greatly reducing invasive plant species in the reservoir. However, the overall cost of dredging, as well as the potential impacts to the water system, would need to be thoroughly evaluated before the option of dredging the reservoir is pursued.



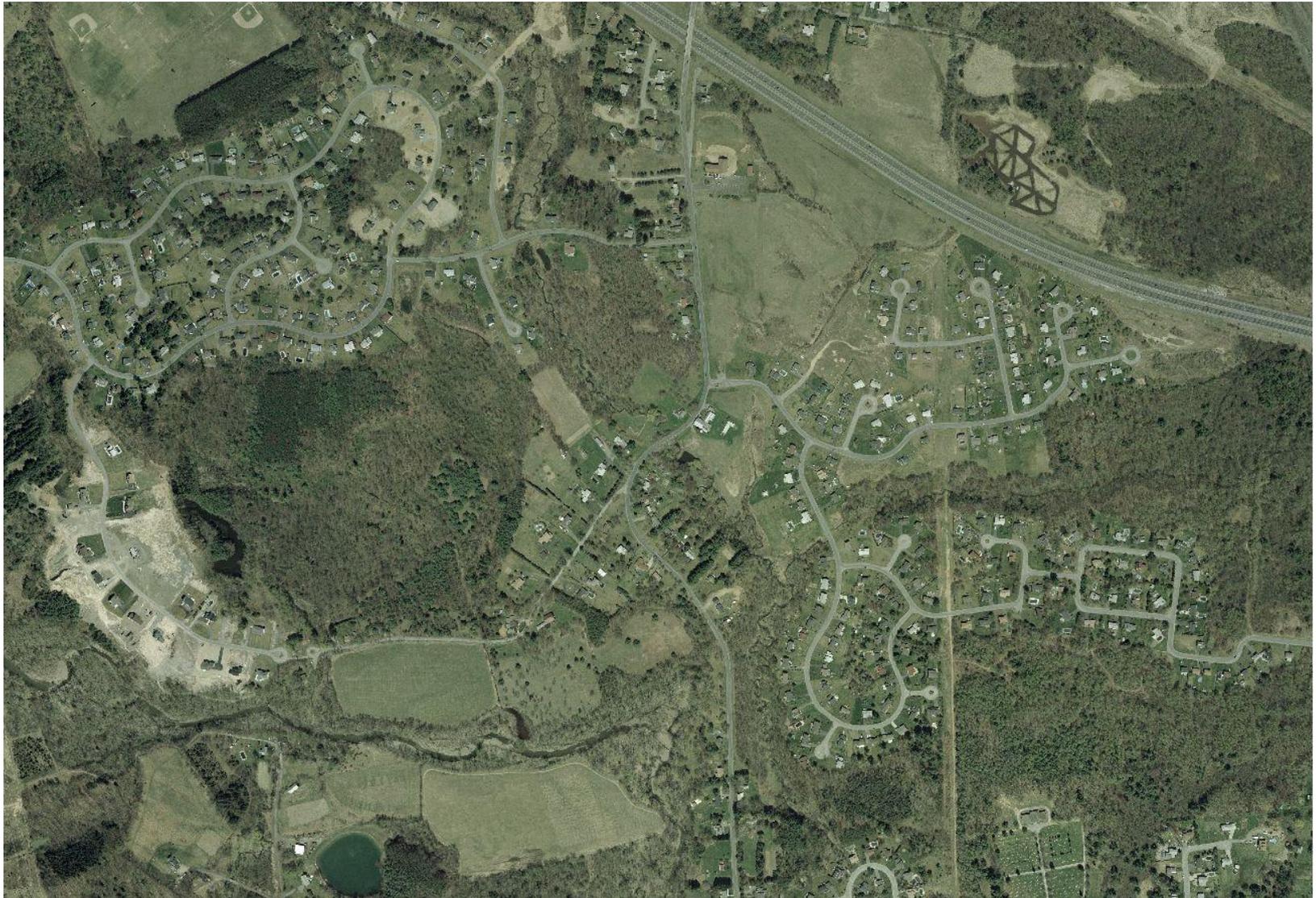
Larned Gravel Quarry next to reservoir.

GRAVEL QUARRY

The William Larned and Sons gravel pits are located directly adjacent to the reservoir on Stitt Road. An area of approximately 25 acres is currently being mined, however this area is near the end of its productivity. In order to prevent the site from being used in the future in ways that may contaminate the reservoir (the site is hydrologically connected to the reservoir), the city has discussed purchasing the reclaimed mine area from the company. The reclamation plan for the mine site requires that it be converted into a natural game preserve. A portion of the land could be used for dredge spoils from the reservoir. Negotiations for the land purchase are currently stalled.

In addition, the gravel company is negotiating with the town of Guilderland and with landowners along Stitt road to purchase the area containing a portion of Stitt Road, which could then be used for a new mining area. If this were to occur, a portion of Stitt Road would be relocated.

RECOMMENDATION: The city of Watervliet should consider reviving site purchase negotiations with the gravel pit owners. The land, once reclaimed, could be converted into a public park with hiking and cross-country skiing trails. There are numerous existing trails that traverse the land adjacent to the reservoir. Some of this land is already owned by the city of Watervliet, and some of the land is private property. A plan could be created to purchase easements from private property owners, improve the public trails, and create new trails on the reclaimed mine land that link with existing trails. The park and trails could also be used as an outdoor classroom to teach students and interested citizens about water quality issues.



Large-scale suburban housing development in Rotterdam, next the Normans Kill, without public sewers.

FRAGMENTED DEVELOPMENT REVIEW

Since the Watervliet Reservoir does not fall within the city of Watervliet's boundaries, the city does not have land use regulatory control over activities in the watershed; it must instead rely on the NY State Health Department's Watershed Rules and Regulations and the local land use controls of eleven different municipalities, only one of which utilizes the water from the reservoir. The existing health department regulations are out-of-date and currently inadequate to protect the reservoir from pollution. Local land use regulations vary greatly from town to town, and on the whole, are also currently inadequate to protect the water quality of the reservoir.

The city of Watervliet, through their engineering consultant, John MacDonald Engineering, has developed a draft update to the NYS Department of Health Watershed Rules and Regulations. The city has made several attempts over the last ten years to have these new regulations adopted by the NYS Department of Health. However, with each attempt, the city has been turned away. The State Health Department has told the city that it will not consider any new watershed regulations, or any updates to existing regulations, at this time.

As described earlier in this report, the NYS Department of Environmental Conservation has recently implemented the Phase II stormwater program, in which they are requiring, among other things, the local adoption of erosion, sedimentation, and stormwater management regulations within designated "MS4 areas" (urbanized areas with census block population density of at least 1,000 persons per sq. mile). DEC's Phase II permit for construction activities regulates the land outside the MS4 areas, where the onus is on any developer who disturbs an acre or more of land to implement site-specific erosion and sedimentation plans; and, for larger projects, more comprehensive stormwater management plans. Unfortunately, the areas in the watershed most likely to face new development pressure will be the lands just outside the existing urban areas, and therefore, the areas that are not under the MS4 program (and therefore, not under local review), unless the local municipality chooses on its own to adopt the program town-wide. Therefore:

RECOMMENDATION 1:

The NY State Department of Health should consider amending and updating the existing watershed rules and regulations for the watershed. The health department could begin by guiding the city of Watervliet through the steps needed to start the update process. The

update and amendments should follow the proposed revision to the watershed rules and regulations drafted by John MacDonald Engineering, which are included in APPENDIX A of this report.

RECOMMENDATION 2:

The eleven watershed municipalities should convene a joint meeting to discuss the water quality issues within the watershed and to become better acquainted with the relationship between local development and water quality impacts. Staff from the Capital District Regional Planning Commission would be available to coordinate the meeting and to present the information and issues contained in this study. In addition, representatives from the city of Watervliet and the town of Guilderland could also discuss their perspectives on the water quality issues of Watervliet Reservoir watershed. Each watershed municipality would be encouraged to appoint two representatives who would participate in the meeting and would also agree to participate in a Watervliet Reservoir Watershed Coalition. The Coalition could have quarterly meetings. The long-term goal would be to communicate watershed issues and to coordinate watershed development. Standard water quality practices – such as stream buffers, wetland buffers, cluster development, erosion control, stormwater runoff control, impervious surface reduction, and best management practices – could be implemented throughout the watershed. A watershed water quality compact could eventually be created and adopted by the watershed municipalities.



Lawn chemicals recently applied. The Normans Kill is in the background

LAWN CHEMICALS

There is growing concern, and growing evidence, that common lawn pesticides cause cancer in humans. Approximately 80 percent of the pesticides sprayed and spread in New York State come from non-farm applications, primarily suburban lawns and golf courses. And according to the National Academy of Sciences, homeowners are likely to use 10 times more chemical per acre on their lawns than farmers use on agricultural land. As new homes continue to be built in the Watervliet Watershed, pollution from lawn pesticides is a mounting concern. In addition, there are several golf courses in the watershed, including one directly adjacent to the reservoir, and one newly built on a former apple farm adjacent to the Bozen Kill tributary. The type and amount of pesticides used on these golf courses is not currently known.

What is known, however, is that in 1999 in New York State over twenty million pounds of lawn pesticides were applied by commercial applicators and sold to farmers. In Albany County the amount applied and sold was 55,579 gallons and 293,784 pounds, and in Schenectady County 12,930 gallons and 137,469 pounds of pesticides were applied and sold. These figures don't include the additional lawn chemicals purchased and applied directly by private individuals.

In many cases, the weed weapon of choice was 2,4D (dechlorophenoxyacetic acid), which is being reevaluated by the E.P.A. to determine if it should be classified as a carcinogen. Although many industry-sponsored studies have deemed that 2,4D is not a human carcinogen, other studies have concluded otherwise. In 1986, a study published in the Journal of the American Medical Association suggested that Kansas crop workers who had applied 2,4D had a heightened rate of non-Hodgkin's lymphoma. An additional study found higher than average levels of the disease in lawn service applicators. In 1991, the National Cancer Institute calculated that diagnosis of non-Hodgkin's lymphoma among farm workers had increased by 75 percent in the past 20 years and considered 2,4D a possible contributor. In 1996, a University of Minnesota study published in Environmental Health Perspectives found almost twice the number of birth defects

among children of pesticide applicators than in a control population. A 1997 another study linked a whole list of cancers to heavy wheat growing regions where 2,4D had been heavily used.

In addition to concerns about 2,4D, the most widely used lawn chemical in New York State – atrazine – has been linked to cancer in humans and deformities in frogs that caused them to grow both testes and ovaries. Recently, workers at Syngenta, which is the manufacturer of atrazine and the largest agribusiness company in the world, have brought a lawsuit against the company claiming they got prostate cancer after being exposed to the chemical. There is also scientific evidence that infants and children may be especially vulnerable to developmental problems or to cancer if they or their nursing mothers are exposed even to relatively small amounts for a short time, as when spring rains wash the chemicals off the ground and into the water. Approximately 60 million gallons of the chemical are used in the US each year, and its traces are found in 40 percent of NY State's water supplies and up to 75 percent in farming areas of the Hudson River valley. The chemical is banned in several European countries. In December 2000, the E.P.A, under pressure from Syngenta, removed atrazine from its list of chemical that probably cause cancer.

RECOMMENDATION:

Dangerous pesticides are still used in large quantities even though less hazardous alternatives exist for virtually all pesticide uses. Eliminating these needless risks will require both that people choose non-pesticide strategies for their own homes and gardens, and that New York's policy-makers adopt policy reforms that address the problem. Americans need to re-conceptualize and reprioritize the weed-free notion of the "ideal suburban lawn," particularly in watersheds that supply public drinking water, and make the transition to natural lawn maintenance. More specifically, New York State should enact a ban on pesticides used for solely aesthetic purposes, such as lawn care. The marketing boom in lawn care pesticides has manufactured its own new chemical aesthetic, creating a source of risk where there was none before. State legislation to ban aesthetic use of pesticides has been introduced by Assemblyman Thomas P. DiNapoli and Senator Kenneth LaValle, and we have an example in our neighbor to the north, Quebec Province, which recently enacted such a policy province-wide after several of its smaller municipalities did so.

New York State should also support and subsidize organic farming, as many European nations do, to combine good economics with good health and environmental stewardship.

In addition, homeowners should institute a soil rebuilding and natural lawn program, which could include: aeration and compost applications, seeding with grasses best suited to your area, corn gluten for pre-emergence weed control, biological controls for insects if necessary, and one or more applications annually of a slow-release nitrogen organic fertilizer. Additional steps could include mowing lawns high at 2 to 3 inches, deep watering early in the morning, and performing periodic soil test to determine needed amendments such as lime or rock dust. Lastly, homeowners need to learn to accept “weeds” as a normal component of the natural environment.



Golf course next to reservoir.



New commercial development in Princetown.



New housing developments in Rotterdam. Note the pavement width of “Country Walk Rd.”

FUTURE WATERSHED DEVELOPMENT AND DEVELOPMENT PRACTICES

As noted earlier in this report, there are several areas within the Watervliet Reservoir Watershed that are under relatively high development pressure, particularly the lands north of the reservoir in Guilderland, Rotterdam and Princetown, which are served by public water systems. These areas pose the greatest threat to water quality from future development and should therefore be the priority areas for implementing the recommendations to follow.

If past events give us an indication of future trends, then the potential for additional development will greatly increase with new extensions of municipal water. Presently, a new water district is being considered for land surrounding the reservoir in Guilderland. If this extension occurs, it will likely increase development activity in this sensitive area. Development adjacent to the reservoir has a high potential to impact the water quality of the reservoir, especially without the extension of public sewers.

In addition, public discussions have taken place regarding the extension of sewer lines along Route 7 from Rotterdam to Duanesburg, which may be funded by the Schenectady Metroplex Authority. If this extension were to occur, new suburban growth would likely follow.

In the same regard, the city of Watervliet's plan for regional water service, if carried out, would greatly increase the development activity within the watershed.

These expansion plans must be tempered by a more regional understanding of the fact that the nearby cities of Albany, Schenectady and Troy, combined, have the infrastructure in place right now for at least 100,000 new residents (to make up for the almost 100,000 residents lost since 1950). Neither the local municipalities nor the state can afford to wastefully expand infrastructure to "green-fields" while underutilizing and neglecting previous infrastructure investments, especially when these extensions create the conditions that lead to future water quality degradation. If the proposed public water/sewer expansions were to occur, and large-scale developments were built under the land use laws currently in place in the watershed, the watershed would be greatly impacted by suburban sprawl, its associated impervious surfaces, and the water quality impacts that come from the conventional suburban development required under existing land use laws.

The regulations currently in place within the reservoir watershed are inconsistent from community to community, and as whole, inadequate to accommodate a large amount of new development in a sustainable fashion. Not one community in the Watervliet Reservoir Watershed meets the impervious surface standards recommended by the Center for Watershed Protection. In each case, large lots, large setbacks, overly wide roads, and oversized parking lots are required, creating excess impervious surfaces. Although a few of the communities utilize several appropriate watershed protection tools, in general, the towns in the watershed all still rely on zoning and subdivision techniques that ensure auto-dependent, disconnected, segregated, land intensive development (i.e. sprawl).

The potential water quality impacts from new urban/suburban development were noted in an earlier section of this report. However, water quality impacts from new development can be greatly mitigated with the use of better land development practices. These practices must have the force of law and be incorporated into the local land use laws of the communities within the watershed.

RECOMMENDATIONS:

There are a number of critical water quality development practices that the watershed communities should incorporate into their local land use laws. They are as follows:

1. *PROTECT SENSITIVE ENVIRONMENTAL AREAS*: Prevent development from occurring in floodplains, wetlands, steep slopes, mature forests, critical habitat areas, and along stream banks. In addition, on site septic systems should not be allowed on soils that can't adequately filter septic effluent.
2. *ESTABLISH STREAM and WETLAND BUFFERS*: Establish a wide vegetative buffer adjacent to the stream channel and adjacent to significant wetland areas not designated by NYS DEC (a 100 ft. buffer is currently required for state regulated wetlands). The buffers should be at least one hundred feet wide from the stream angle of repose or from the springtime extent of the wetland areas. No structures or clearing, including lawn mowing, should be allowed in these buffer zones. A stream buffer

overlay zone could be incorporated into the local zoning codes. In cases where no viable use is left for a parcel, the municipality should purchase the land.

3. *REDUCE IMPERVIOUS SURFACES*: Less impervious cover means less stormwater runoff, less downstream flooding, and lower pollutant loadings. Reducing impervious surfaces can also significantly reduce the overall cost of the development by reducing the amount of pavement and the length of utilities. The techniques used to reduce impervious surfaces can also reduce suburban sprawl by creating development patterns that are less land intensive and less reliant on automobiles.

Healthy watersheds usually have no more than 10 to 15% of their area covered by impervious surfaces. The overall percent of impervious surfaces within the Watervliet Reservoir Watershed, as of 1997, was approximately 12%. The “Land Cover 1997” map above shows the areas of impervious surface within the watershed.

There are a number of subdivision and/or zoning code modifications that should be considered by all the watershed municipalities to reduce impervious surfaces. The most important recommendations are as follows:

- A. Reduce road width standards for roads within new housing developments.
- B. Reduce the size of parking lots and require shared parking (particularly in commercial areas).
- C. Require shorter driveways by reducing setback requirements.
- D. Require cluster development for major subdivisions.
- E. Require clusters to interconnect to make a town-scaled cluster built around a town center.
- F. Allow higher development densities, and therefore, less road frontage per housing unit, in targeted “neighborhood centers” already served by public infrastructure.
- G. Downzone (reduce allowable density) in outlying areas un-served by public utilities and infrastructure and limit infrastructure expansion in outlying areas.



Excessive road widths (impervious surfaces) in a housing development in Guilderland.

4. *CONTROL EROSION FROM CONSTRUCTION ACTIVITY*: Sediment accumulation and soil movement – erosion – are influenced by five primary factors: soil erodibility, vegetative cover, topography, climate and season. When a site is considered for development, each of these factors must be evaluated in order to minimize erosion from construction activities. Planning

boards should assess the variations in soil structure, texture, and percentage of organic matter with particular attention paid to highly erodible soils. Steep slope areas should be avoided, as should ground clearing in the spring when the surface soil first thaws and the ground underneath remains frozen. Most importantly, developers must minimize vegetative cover removal (phased construction and clearing restrictions) and quickly establish new vegetative cover in cleared areas. Finally, communities must inspect construct sites to ensure that erosion plans are being properly implemented and maintained.

In order to properly mitigate erosion and sedimentation from construction activities, all the watershed communities should require the submission of a detailed erosion and sedimentation prevention plan for any development will that disturb one acre or greater. The Department of Environmental Conservation, under the Phase II SPDES General Permit for Stormwater Discharges from Construction Activity, is now requiring that such plans must be implemented. However, the DEC is not currently requiring that the erosion plans be locally reviewed and approved. This report recommends that all the communities within the Watervliet Reservoir Watershed incorporate the Phase II Construction Permit requirements into their local land use codes so that the individual municipalities can review and approve erosion/sediment control and stormwater plans, and local building inspectors can inspect construction sites to ensure proper plan implementation and maintenance. A more detailed discussion of erosion and sedimentation plans is included in Appendix D.



Buried and improperly maintained silt fence adjacent to Normans Kill in new Rotterdam housing development. Proper maintenance of erosion/sedimentation plans is crucial for effective mitigation.

5. *MANAGE AND TREAT POST-CONSTRUCTION RUNOFF*: An important component of any water quality strategy will be to implement methods of treating the quantity and quality of stormwater runoff generated by impervious surfaces from new development. The general goal of post-construction stormwater management is to try and replicate predevelopment stream hydrology and water quality to prevent downstream flooding and limit offsite non-point source pollution. All the watershed

communities should require a post-construction stormwater management plan for development activity that disturbs one acre or greater. As part of this requirement, each community should institute an inspection and maintenance program to ensure proper compliance and functionality. The specific stormwater management practices utilized would depend on the particular conditions present at the development site. Following are the most common general stormwater management practices:

- A. *Stormwater Ponds*: Practices that have either a permanent pool of water or a combination of permanent pool and extend detention capable of treating the water quality storage volume.
- B. *Stormwater Wetlands*: Practices that include significant shallow marsh areas, and may also incorporate small permanent pools and extended detention storage to achieve the full water quality storage volume.
- C. *Infiltration Practices*: Practices that capture and temporarily store the water quality storage volume before allowing it to infiltrate into the soil.
- D. *Filtering Practices*: Practices that capture and temporarily store the water quality storage volume and pass it through a filter bed of sand, organic matter, soil, or other acceptable treatment media.
- E. *Open Channel Practices*: Practices explicitly designed to capture and treat the full water quality storage volume within dry or wet cells formed by check dams or other means.

A more detailed discussion on how to properly manage stormwater runoff can be found in the *New York State Stormwater Management Design Manual* available from the New York State Department of Environmental Conservation.

6. *REQUIRE A "LOOPED" INFRASTRUCTURE SYSTEM*: As noted previously in this report, both the city of Watervliet and the town of Guilderland have experienced periodic high levels of trihalomethane (TTHM), which is disinfection byproduct created as a result of using chlorine to make water microbiologically safe. Although the causes of high levels of this byproduct are manifold (water temperature, amount of organic matter, pH, amount and type of disinfectant), there is evidence to suggest that dead-end

areas along the water delivery system may be a significant contributing factor, especially in areas farthest from the treatment plant where water and chlorine are in contact for longer periods of time.

In addition to the water quality benefits, a looped system, which is really an interconnected grid, would be a more efficient means of moving traffic (multiple options); would allow for higher density use of land; could be more pedestrian friendly; and would provide the structure for a more legible sense of place and neighborhood connectedness. Therefore, except for areas with severe environmental constraints, looped, interconnected streets should be required for all areas served (or may be served in the future) by public water infrastructure.

In addition to the six recommendations above, the watershed communities should consider creating local programs to:

1. *DETECT AND ELIMINATE ILLICIT DISCHARGES*: Illicit discharges are discharges that are not directly attributable to precipitation runoff, or are discharges not properly treated and permitted, such as untreated sanitary wastewater, septic tank effluent, car wash wastewater, laundry wastewaters, roadway spills, improperly disposed auto and household toxics. Although the New York State Department of Environmental Conservation's MS4 Phase II permit requires a program to detect and eliminate illicit discharges in MS4 areas, this report recommends the expansion of that requirement to the entire Watervliet Reservoir Watershed. As part of the illicit discharge program, watershed communities should: develop and maintain a map showing the location of all outfalls and the receiving water body; legally prohibit illicit discharges into the storm sewer system (no dumping laws); offer dye testing for suspected failing septic systems; and establish local stream cleanup programs (which could also assist in identifying illicit discharge points).
2. *EDUCATE THE PUBLIC ABOUT WATER POLLUTION PREVENTION PRACTICES*: All the residents living in the Watervliet Reservoir Watershed should be aware of the affect their private decisions can have on downstream water quality. First off, it is

the responsibility of all watershed planning board members to become aware of the impacts that development has on water quality, and to understand the best management practices that mitigate such impacts. In addition, local elected officials should be aware of development-induced water quality impacts so that the need for regulatory changes is understood and endorsed. Moreover, watershed municipalities should assist in the process of educating their residents about water quality impacts. For example, local municipalities could: support local speakers and educational programs focused on water quality; appoint a representative to serve on the county water quality coordinating committee who would report back to the municipal board about water quality issues; and mail out educational materials to residents with their tax bills, such as fliers which discuss septic system maintenance, lawn care practices, pest waste management, and proper auto and home product disposal.



Carpet cleaning service in Rotterdam subdivision - discharging onto lawn?



Erosion from a housing development in Rotterdam heading toward a Normans Kill tributary.

CONCLUSION

Many of the issues noted in this report arose because of land use decisions made without adequate consideration of the potential water quality impacts. If water quality were a primary concern, as it should be, an unlined landfill would never have been sited next the reservoir; the Black Creek would not have been channelized, and toxic chemicals would not be dumped and buried near it; the Guilderland High school bus garage would have been moved away from the Black Creek and separated by a vegetative buffer (rather than rebuilt directly adjacent to it); golf courses next the reservoir or adjacent to its tributaries would have been located elsewhere (or would not apply lawn chemicals); duplicitous individuals would not purposefully pour toxic leachate into the headwaters of the reservoir; large housing

developments next the Normanskill would not be allowed without public sewers, they would not use lawn chemicals, they would not be built in the flood zone, and they would not leave bare soil exposed for years at a time. Unfortunately, all of these circumstances currently exist within the Watervliet Reservoir Watershed. In each case, conscious human decisions failed to adequately address water quality concerns.

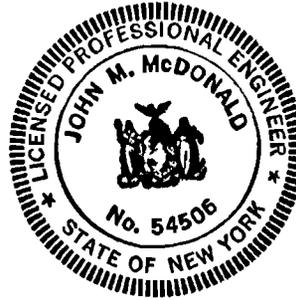
If the Watervliet Reservoir is to continue functioning as a viable drinking water source, land use practices like those sited above must cease. The communities within the Watervliet Reservoir Watershed must do a better job in the future to address water pollution from new development. As described earlier in this report, pollution from construction erosion, post-construction stormwater runoff, and other non-point sources is the primary cause of contamination for more than 90% of the impaired water bodies in New York State. The recommendations included in this report, if implemented, should help ensure that the water quality of the Watervliet Reservoir is maintained and non-point source pollution is minimized. It will be up to both the New York State Department of Health, the New York State Department of Environmental Conservation, and, primarily, the local municipalities, to make and enforce the necessary regulatory changes recommended in this report. It will be up to the citizens living in the watershed to educate themselves about water quality, to support local regulatory changes, and to modify their behaviors, so that the protection of drinking water quality becomes a primary practice and concern.

**APPENDIX A: Proposed Revision to the NYS Department of Health
Watershed Rules and Regulations for the Watervliet Reservoir Watershed.**

**CITY OF WATERVLIET
DRAFT**

**RULES AND REGULATIONS
FOR
PROTECTION FROM CONTAMINATION
OF THE
PUBLIC WATER SUPPLY
OF THE
WATERVLIET RESERVOIR
ALBANY COUNTY**

Promulgated by the New York State Commissioner of Health
Under Section 1100 of the Public Health Law



Prepared by:

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Pursuant to the authority vested in me as State Commissioner of Health by Section 1100 of the Public Health Law, I hereby repeal Section _____ of Part _____, Title 10 (Health) of the Official Compilation of codes, Rules and Regulations of the State of New York, this _____ day of _____, 1993 to be effective on filing in the Office of the Department of State, and add a new section to read as follows:

Section _____; City of Watervliet

A. Application: The rules and regulations set forth in this section, duly made and enacted in accordance with the provisions of Sections 1100-1107 of the Public Health Law shall apply to Watervliet Reservoir and all watercourses tributary thereto or which may ultimately discharge into said Watervliet Reservoir or which may be developed in the future to serve as sources of the water supply to the City of Watervliet, Albany County, New York. The location of boundaries designated for the protection zones, which comprise the Normans Kill and Bozenkill Watersheds to the Watervliet Reservoir are described on the watershed protection zone map, dated _____, 1993 and filed with the New York State Commissioner of Health, Albany, New York, and with the City Clerk of the City of Watervliet, Albany, County, New York, and included as Appendix A of these Rules.

Definitions

1. Agriculturally associated animal waste shall mean manure obtained from agricultural industries.
2. Agriculturally associated animal waste area shall mean land used for the deposition of agriculturally associated animal waste on the surface of the ground for fertilization purposes.
3. Chloride salt shall mean any bulk quantities of chloride compounds and other deicing compounds intended for application to roads, including mixtures of sand and chloride compounds in any proportion where the chloride compounds constitute over eight percent of the mixture. A bulk quantity of chloride compounds means a quantity of one thousand pounds or more, but does not include any chloride compounds in a solid form, including granules, which are packaged in waterproof bags or containers which do not exceed one hundred pounds each.

4. Commissioner of Health, unless otherwise noted, shall be the Commissioner of Health of the State of New York.
5. Disposal shall mean the discharge, deposit, injection, dumping, spilling, leaking or placing of any solid waste, radioactive material, hazardous waste or wastewater into or on any land or water so that such solid waste, radioactive material, hazardous waste or wastewater will remain on the land or water and will not be removed.
6. Environmental assessment form shall be a form used by an agency to assist it in determining the environmental significance or nonsignificance of actions as defined in 6 NYCRR, Part 617.
7. Fertilizers shall be any commercially produced mixture generally containing phosphorous, nitrogen and potassium which is applied to the ground to increase nutrients to plants.
8. Flood plain shall be the land contiguous to streams, ponds, estuaries and lakes which would be inundated by the flood having a one percent chance of being equaled or exceeded in any given year.
9. Groundwater shall be any water beneath the land surface in the saturated zone.
10. Hazardous material shall mean any substance listed in or exhibited characteristics identified in either 6 NYCRR Part 371 or 6 NYCRR Part 597.
11. Herbicides shall mean any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any weed and being those substances defined as herbicides pursuant to Environmental Conservation Law Section 33-0101.
12. Human excreta shall mean human feces and urine.
13. Junkyard shall mean an area where two or more unregistered, old or secondhand motor vehicles are being accumulated for purposes of disposal, resale or used parts or reclaiming certain materials such as metal, glass, fabric and/or the like.

14. Linear distance shall mean the shortest horizontal distance from the nearest point of a structure or object to the high water mark of a reservoir or to the edge, margin or steep bank forming the ordinary high water line of watercourse.
15. Manure shall mean animal feces and urine.
16. Non-agriculturally associated animal waste shall mean manure obtained from non-agricultural industries.
17. Non-point discharge shall mean discharges of pollutants not subject to SPDES (State Pollutant Discharge Elimination System) permit requirements.
18. Open storage shall mean the holding of a material in a way that the material is exposed to the elements of nature.
19. Pest shall mean (1) any insect, rodent, fungus, weed or (2) any other form of terrestrial or aquatic plant or animal life or virus, bacteria or other micro-organism (except viruses, bacteria or micro-organisms on or in living man or other living animals) which the Commissioner of Environmental Conservation declares to be a pest as provided by Environmental conservation Law Section 33-0101.
20. Pesticide shall mean any substance or mixture of substances intended for preventing, destroying, repelling or mitigating any pest, and any substance or mixture of substances intended for use as a plant regulator, defoliant or desiccant and being those substances defined as pesticides pursuant to Environmental Conservation law Section 33-0101 et seq.
21. Point Source discharge shall mean pollutants discharge from a point source as defined in Environmental Conservation Law Section 17-0105.

22. Pollutant shall mean dredge, spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, chemical waste, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal and agricultural waste discharged into water.
23. Protection zone shall mean any of the watershed management zones, as delineated on the watershed protection zone map, dated 1993 and included as Appendix A of these Rules and described herein. These zones shall be designated Zone I, Zone II and Zone III.
24. Radiation shall mean ionizing radiation; that is, any alpha particle, beta particle, gamma ray, x-ray, neutron, high-speed proton, and any other atomic particle producing ionization, but shall not mean any sound or radio wave, or visible, infrared, or ultraviolet light.
25. Radioactive material shall mean any material in any form that emits radiation spontaneously, excluding those radioactive materials or devices containing radioactive materials whose receipt, possession, use and transfer are exempt from licensing and regulatory control pursuant to regulations of the New York State Department of Labor or United States Nuclear Regulatory Commission.
26. Recyclables handling and recovery facility shall mean a solid waste management facility, other than pickup and transfer vehicles, at which recyclables are separated from the solid waste stream, or at which previously separated recyclables are collected, for collection, storage and off-site shipment.
27. Reservoir shall mean any natural or artificial lake or pond which is tributary to or serves as a source of the public water supply of the City of Watervliet.

28. Septage shall be the contents of a septic tank, cesspool, or other individual wastewater treatment work which receives domestic sewage wastes.
29. Sludge, or biosolids shall be the solid, semi-solid or liquid waste generated from a waste processing facility, but does not include the liquid stream of effluent.
30. Solid waste shall mean all putrescible and nonputrescible materials or substances discarded or rejected as being spent, useless, worthless or in excess to the owners at the end of such discard or rejection, including, but not limited to, garbage, refuse, industrial and commercial waste, sludges from air or water control facilities, rubbish, ashes, contained gaseous material, incinerator residue, demolition and construction debris, discarded automobiles and offal but not including sewage and other highly diluted water carried material or substances and those in gaseous form, and being those wastes defined as solid waste pursuant to Environmental Conservation Law Section 27-0701.
31. Solid waste management facility means any facility employed beyond the initial waste collection process including, but not limited to, transfer stations, bailing facilities, rail haul facilities, processing systems, including recycling and resource recovery facilities or other facilities for reducing solid waste volume, sanitary landfills, sewage sludge or biosolids disposal facilities,

facilities for the disposal of construction and demolition debris, plants and facilities for compacting, composting or pyrolization of solid wastes, incinerators and other solid waste disposal, reduction or conversion facilities, as defined in Environmental Conservation Law Section 27-0701, et seq.

32. Spill shall mean any escape of a substance from the containers employed in storage, transfer, processing or use.
33. State Pollutant Discharge Elimination System (SPDES) shall mean the system established pursuant to Article 17, Title 8 of Environmental Conservation Law for issuance of permits authorizing discharges to the waters of the State of New York.
34. Storm water runoff recharge basins shall mean a man-made device capable of retaining surface water runoff to induce groundwater infiltration.
35. Toxic substance shall mean any substance which is listed in the latest printed edition of the National Institute for Occupational Safety and Health Registry of Toxic Effects of Chemical Substances, or which has yielded positive evidence of acute or chronic health hazards in human, or animal or biological testing.
36. Wastewater treatment works shall mean any treatment plant, sewer, disposal field, lagoon, pumping station, septic system, collection and distribution pipes, on-site disposal systems and seepage units, constructed drainage ditch or surface water intercepting ditch, or other works not specifically mentioned in this paragraph, installed for the purpose of transport, treatment, neutralization, stabilization, storage or disposal of wastewater.
37. Wastewater shall mean aqueous carried waste including, but not limited to: dredge spoil, solid waste, hazardous waste, incinerator ash and residue, septage, garbage, refuse, sludge, chemical waste, infectious waste, biological material, radioactive materials, heat, and industrial, municipal and agricultural waste.

38. Water Reservoir Protection Zone shall mean the total land area, known as Zone I, delineated on the map, dated _____, 1993 and filed with the New York State Commissioner of Health and with the City Clerk of the City of Watervliet and included as Appendix A of these Rules. The Water Reservoir Protection Zone includes the Watervliet Reservoir and all city-owned lands bordering the reservoir.
39. Water Supply Protection Zone shall mean the land area, known as Zone II, delineated on the map, dated _____ 1993 and filed with the New York State Commissioner of Health and with the City Clerk of the City of Watervliet, and included as Appendix A of these Rules. The Water Supply Protection Zone includes all primary and secondary watercourses flowing directly or indirectly into the Watervliet Reservoir and all lands within 200 feet of primary and secondary watercourses.
40. Watershed Protection Zone shall mean the land area, known as Zone III, which is tributary to Zone I and Zone II and is the tributary surface area from which the reservoir is replenished by runoff. The Watershed Protection Zone is delineated on the map, dated _____ 1993 and filed with the New York State Commissioner of Health and with the City Clerk of the City of Watervliet, and included as Appendix A of these Rules.
41. Water supply shall mean the public water supply of the City of Watervliet.
42. Watercourses shall mean every spring, stream, marsh or channel of water of any kind which flows or may flow into the indicated water supply.
- a. Primary watercourses will be classified as those flowing directly into the Watervliet Reservoir.
Primary watercourses of the watershed include the Bozenkill, Normans Kill and Black Creek.
 - b. Secondary watercourses include all watercourses within the watershed not classified as primary watercourses.

43. Watershed shall mean the entire drainage area contributing water to the City of Watervliet water supply and shall include the three designated protection zones known as Zone I, Zone II and Zone III.

C. General Provisions:

1. No person, including State agencies or political subdivisions having jurisdiction, shall perform any act or grant any permit or approval which may result in the contravention of the standards for raw water quality as contained in Part 170, Title 10 (Health) of the official Compilation of Codes, Rules and Regulations of the State of New York (10 NYCRR Part 170). In addition to observing the specific requirements set forth herein, all individuals or entities occupying land on or adjacent to the Watervliet Reservoir or any watercourse tributary thereto shall refrain from any activity, including those not specifically mentioned herein, which may result in contamination of the public water supply.
2. The maintenance of the water supply source shall be subject to the approval and enforcement authority of the Albany and Schenectady County Health Departments, NYSDEC and New York State Department of Health (NYSDOH) so as to eliminate the opportunity for pollution to enter the water sources.
3. Recreation Restrictions:
 - a. Bathing and swimming: No bathing and/or swimming shall be allowed in the Watervliet Reservoir or any watercourse owned by the City of Watervliet.
 - b. Boating: No boating shall be allowed in or upon the waters of the Watervliet Reservoir or in any watercourse owned by the City of Watervliet except by duly authorized employees of the City of Watervliet in the performance of their duties of supervision and maintenance of the water supply.

- c. Fishing and Trespassing: No fishing and/or trespassing shall be allowed in or upon any reservoir watercourse owned by the City of Watervliet within 1000 foot linear distance of water supply intakes except by duly authorized employees of the City of Watervliet in the performance of their duties of supervision and maintenance of the water supply. Public fishing will be permitted only in areas specifically designated for such a purpose.
 - d. Motorized vehicles: No motorized vehicles will be allowed on the water, or on the ice, of the Watervliet Reservoir, or any watercourse tributary thereto, except by duly authorized employees of the City of Watervliet in the performance of their duties of supervision and maintenance of the water supply.
 - e. Public notification: Notification of the public of these restrictions shall be made by posting signs in appropriate places. Regular patrols shall be made during recreation season(s) to enforce this restriction.
4. Other Zone I Regulations: In addition to the above-described regulations, all of the following regulations for Watershed Zones II and III also apply to Zone I.
- E. Specific Regulations for Watershed Zone II (Primary and Secondary Watercourses):
- 1. On-site Disposal Systems:
 - a. No human excreta or sewage shall be deposited or allowed to escape into any reservoir or primary or secondary watercourse on the watershed.
 - b. All wastewater treatment works discharging to groundwater and receiving wastewater without the admixture of industrial or other wastes, as those terms are defined in Environmental Conservation Law, Section 17-0701, in quantities of less than 1,000 gallons per day shall be designed, installed and maintained in accordance with the sanitary code and standards

- established in 10 NYCRR Part 75 (Appendix 75A) and any wastewater disposal standards promulgated by the Albany or Schenectady County Health Departments where such standards are more stringent.
- c. A permit is required prior to the installation of any subsurface disposal system. This permit must be obtained from the County Health Department or from the Town or Village office having local jurisdiction. Conditions for a permit shall include an approved engineering plan, verification of the percolation rate by a disinterested party and inspection of the installation prior to backfilling. Permits are renewable on a five-year basis. All septic tanks shall be pumped clean every five years or more often if conditions warrant.
 - d. The applicable standards and permit requirements of the NYS Department of Environmental Conservation shall apply to systems with flows in excess of 1,000 gallons per day or those which contain industrial wastewater.
 - e. No portion of the seepage unit shall be constructed, placed or rebuilt within 50 feet linear distance of a lake, reservoir, impoundment, stream or their tributary watercourses.
2. Point of source discharges, other than storm water runoff conduits, are prohibited except pursuant to an authorization issued by the New York State Department of Environmental Conservation.
 - a. Storm sewer outlets shall not be made directly to lakes, reservoirs, impoundments, streams or their tributary watercourses. Provisions shall be made to discharge to the surface at least 100 feet from lakes, reservoirs, impoundments, streams and their tributary watercourses.
 3. Animal Wastes:

- a. No concentration of animal wastes from an agricultural operation, including but not limited to: Manure piles, feedlots, barnyards and yarding areas, shall be located within a 100 feet linear distance from any lake, reservoir, impoundment or watercourse. Areas utilized for the storage or stockpiling of manure and agriculturally associated animal waste shall be constructed and maintained such that seepage, leachate and runoff from storage or stockpiling of animal waste cannot adversely impact the quality of the groundwater or surface water.
- b. Barnyards, feedlots, yarding areas and manure piles shall be separated from streams and water bodies by ditches or surface grading to prevent their runoff from entering streams and water bodies.
- c. Drainage from barnyards, feedlots, yarding areas and manure piles shall not be discharged directly to a lake, reservoir, impoundment or watercourse. Such drainage shall be dispersed over the surface of the ground at a minimum distance of 250 feet linear distance from any lake, reservoir, impoundment or watercourse.
- d. Provisions shall be made for satisfactory disposal of milk house waste either by surface or subsurface irrigation that prevents any discharge to any lake, reservoir, impoundment or watercourse. Such facilities shall be located at least 100 feet linear distance from any lake, reservoir, impoundment or watercourse.
- e. Manure shall not be spread on frozen ground if there is any likelihood that surface runoff will be carried into adjacent lakes, reservoirs, impoundments or watercourses. No manure shall be spread on land within 250 feet of a lake, impoundment or watercourse from November 1 through March 31.
- f. No structures of any kind for the purpose of sheltering or corralling animals shall be constructed within a 100 foot linear distance of any reservoir or watercourse.

- g. No animal shall be allowed to stand, wallow, wade or swim in any reservoir or watercourse.
 - h. Pet owners in urban areas must provide for animal waste disposal on an individual basis.
4. Fertilizer and Manure Use:
- a. Open storage of fertilizers for nonfarm and nonresidential use is prohibited.
 - b. Agricultural use of fertilizers and land application of manure shall be in conformance with best management practices and to the degree practicable with “Controlling Agricultural Nonpoint Source Water Pollution in New York State – A guide to the Selection of Best Management Practices to Improve and Protect Water Quality”, dated 1991 and included as Appendix C of these rules.
 - c. Fertilizer use for non-farm and non-residential usage shall not be applied in a manner or at rates which would contaminate the water supply.
5. Pesticide and Herbicide Use:
- a. All pesticide and herbicide storage, use, application and disposal shall be under permit as provided in Environmental Conservation Law, Article 33, subject to the approval and enforcement authority of the NYSDEC.
 - b. Disposal of water used for make-up water or for washing of equipment is prohibited except pursuant to an authorization issued by the NYSDEC.
 - c. Use of lakes, reservoirs or streams as a source of water or for make-up water or washing of equipment used in conjunction with pesticides and herbicides is prohibited.
6. Solid Waste Management Facilities:

- a. Not junkyard shall be located with a 500 foot linear distance of any lake, impoundment, reservoir or watercourse.
 - b. The establishment or continued operation of solid waste management facilities shall conform to 6 NYCRR Part 360, and be under valid permit from, or other authorization by, the NYSDEC.
 - c. No refuse shall be deposited either on or beneath the surface of the ground within a 250 foot linear distance of any reservoir or watercourse.
 - d. Waste disposal areas (including, but not limited to, landfills, compost, recycling, resource recovery, transfer stations, sludge construction and demolition landfills, waste tire, medical wastes or incineration facilities) are prohibited except for the solid waste generated from a single-family residence or farm, provided that the disposal area is located within the property boundaries of the single-family residence or farm and the refuse disposal area is not located within a 500 foot linear distance of any reservoir or watercourse.
 - e. Land application (including storage) of septage and sludge is prohibited except by permit issued per 6 NYCRR Part 360 by the NYSDEC.
 - f. Abandoned landfills and dumps shall be investigated, and they shall be monitored when data warrant, and remedial action shall be undertaken if undesirable conditions are present.
7. Radioactive Material: Storage, use and disposal of radioactive material is subject to the approval and enforcement authority of the NYSDEC, the NYSDOH and any other State or Federal agencies having jurisdiction. No radioactive material shall be disposed of by burial in soil at any point within the watershed.
8. Hazardous Material:

- a. Storage and use of hazardous materials are subject to the approval and enforcement authority of the NYSDEC or other agency having jurisdiction.
 - b. No container used for the storage of toxic chemicals or substances shall be stored or deposited on the ground within a 1000 foot linear distance of any reservoir or watercourse.
 - c. Disposal of hazardous or toxic chemicals and substances will be prohibited at all points within the watershed.
9. Bulk Storage:
- A. Aboveground or underground petroleum storage tanks, including design, installation and maintenance, are subject to the approval and enforcement authority of the NYSDEC as per Environmental Conservation Law Sections 17-0303 and 17-1001 et seq.
 - b. Abandoned petroleum tanks are subject to the closure requirements of 6 NYCRR, Section 613.9.
 - c. Storage of chloride salts is prohibited except in structures designed to minimize contact with precipitation, constructed on low permeability pads designed to control seepage and runoff, and at least 500 foot linear distance from any reservoir of watercourse.
10. Accidental Spills:
- a. Spills of any material stored in bulk shall be reported as required by Environmental Conservation Law Section 1743. Cleanup of spills is the responsibility of the owner; in cases of material in transit, cleanup is the responsibility of the carrier.
 - b. The NYSDEC shall be advised of any accidental spills within two hours by phoning 1-800-457-7362.
11. Deicing Salts and Snow Disposal:

- a. Deicing salt application is restricted to the minimum amount needed for public safety in accordance with best management practices as developed by the New York State Department of Transportation. Calcium chloride shall be used instead of sodium chloride where possible to limit sodium input to area waters.
 - b. Snow disposal of snow removed from streets, roads or parking areas is prohibited from being dumped or deposited within a 1000 foot linear distance of any reservoir or a 200 foot linear distance of any watercourse.
12. Sediment Generation:
- a. Farm tillage practices shall be in conformance to the degree practicable with “Controlling Agricultural Nonpoint Source Water Pollution in New York State – A Guide to the Selection of Best Management Practices to Improve and Protect Water Quality”, dated 1991 and included as Appendix C of these Rules.
 - b. Land disturbing activities which may result in deterioration of the quality or quantity of the public water supply source, including general construction, highway construction, access road construction and maintenance are prohibited except where measures have been put in place to prevent erosion and sediment production.
13. Cemeteries: Not interment of human body shall be made within a 250 foot linear distance of a lake, reservoir, impoundment or watercourse.
14. Atmospheric Fallout: Appropriate monitoring of the constituents of precipitation shall be undertaken by the water supply agency and the NYSDOH and NYSDEC, and where data indicate, appropriate action shall be taken.
15. Land Use Management:

- a. Where surface water deterioration is likely to be caused by land development, the water supplier, municipal officials and the NYSDOH shall insure that appropriate zoning and other controls are implemented to protect the surface water.
- b. All lands or tributary streams draining to public water supply reservoirs, lakes, or impoundments, shall be so identified on land use maps and in zoning regulations.

16. Recreational land use shall be so managed to prevent any adverse impact on water quality.

F. Specific Regulations for Watershed Zone III (Remaining Watershed Lands):

- 1. The specific regulations of Watershed Zone II also apply to Watershed Zone III, except that the linear setback distances referred to generally apply only to Watershed Zone 1 and II areas. Where the linear setback distances exceed the boundaries of Watershed Zone II, or I the specific regulation also applies to Watershed Zone III.
- 2. Surveillance: Maintain Information on any system, facility or activity that could pose a pollution threat to the water source.
- 3. Compliance: Require compliance with general water pollution control program and related environmental protection programs.

G. Inspection: The General Manager of the City of Watervliet or any persons charges with the maintenance or supervision of the public water supply system by its officers or their duly appointed representative, shall make regular and thorough inspections of the identified protection zones to ascertain compliance with the rules and regulations set forth in this section. It shall be the duty of the aforesaid officials to cause copies of any rules and regulations violated to be served upon the persons violating the same, together with notices of such violations. If such persons served do not immediately comply with the rules and regulations, it shall be the further duty of the aforesaid officials to notify the NYS Commissioner of Health or his designee of such violations.

H. Penalties for Violations: Any person, firm or corporation who violates any provisions of these Watershed Rules and Regulations shall be subject to those penalties specified in Section 1103 of the New York State Public Health Law. Any such violation may be enjoined subject to Section 1104 and 1005 of the New York State Public Health Law.

The rules and regulations for the protection from contamination of the public water supply of the City of Watervliet, promulgated by the NYS Commissioner of Health on the 15th day of June 1962, are hereby repealed and the foregoing rules and regulations for the protection from contamination of the public water supply of the City of Watervliet are hereby duly made, ordained and established on this _____ day of _____, 1993, pursuant to Section 1100 of the Public Health Law effective upon filing in the office of the Department of State.

Commissioner of Health of the State of New York

_____, 1993
Albany, New York

Appendix A: City of Watervliet – Watershed Protection Zone Map, _____ 1993

Appendix B: Watervliet Watershed Inventory and Census Summary, _____ 1993

Appendix C: “Controlling Agricultural Nonpoint Source Water Pollution in New York State – A guide to the Selection of Best Management Practices to Improve and Protect Water quality, dated 1991

Text of proposed rule appendices, the regulatory impact statement and the regulatory flexibility analysis, if any, may be obtained from: Donald MacDonald, Department of Health, Bureau of Management Services, Corning Tower, Room 2230, Empire State Plaza, Albany, NY 12237, (518/474-8734).

Data reviews or arguments may be submitted to: Same as above.

APPENDIX B: NYS DEC Stream Classifications (see map on pg. 45)

NYS DEC stream classification for stream segments and water bodies within the drainage basins of streams entering the Hudson River in Albany, Columbia, Greene and Rensselaer Counties. The tributaries to the Watervliet Reservoir – Normans Kill, Bozen Kill, and Black Creek – are included in the table.

During the research into this study, concerns were raised about the low stream classification (C) for most of the tributaries within the Watervliet Reservoir Watershed. Discussions with NYS DEC personnel indicate that a “C” classification does not mean that the Watervliet Reservoir is not being adequately protected from upstream discharges. Streams are classified according to their best usage, but discharges and treatment requirements for SPDES discharge permits are conditioned by the downstream affect the discharge could have. In the case of the Watervliet Reservoir Watershed, discharge treatment requirements are based on the potential downstream impact to the Watervliet Reservoir. So, for example, sewage discharge in a “C” classified upstream tributary must undergo tertiary treatment because the stream feeds into a downstream drinking water source. Following is the NYS DEC stream classification for stream segments and water bodies within the drainage basins of streams entering the Hudson River in Albany, Columbia, Greene and Rensselaer Counties, including the tributaries to the Watervliet Reservoir.

Item No.	Index No.	Name	Description	Map	Class	Standards
637	H-221-4 portion	Normans Kill	From mouth to Route 43 bridge.	K-24se K-24ne K-24nw	C	C
638	H-221-4 portion	Normans Kill	From Route 43 bridge to outlet of P 270.	K-24nw	B	B
639	H-221-4-P 270	Watervliet Reservoir		K-24nw	A	A
640	H-221-4 portion including P 281	Normans Kill	From inlet of P 270 to trib. 18.	K-24nw J-24sw J-23se	A	A
641	H-221-4 portion	Normans Kill	From trib. 18 to source.	J-23se J-23sw K-23nw	C	C
641.1	H-221-4-P 287, P 288, P 289	Tribs. of Normans Kill	Mill Pond (P 289).	J-23se J-23sw	C	C
642	H-221-4-1, 2 and all tribs. including P 251a, P 253a	Tribs. of Normans Kill		K-24se K-24ne	C	C
643	H-221-4-3 portion	Krum Kill	From mouth to outlet of P 256.	K-24ne	C	C(T)
644	H-221-4-3 portion including P 256, P 257134134	Krum Kill	From mouth of outlet of P 256 to source.	K-24ne	A	A
645	H-221-4-3-1a, 1b, 1	Tribs. of Krum Kill		K-24ne	C	C

	including P 257c, P 257d					
646	H-221-4-3-1-P 254	Isolated Pond		K-25ne	C	C(T)
647	H-221-4-3a, 3b, 4, 4a, 5, 6, 6a, and all tribs. including P 257a	Trib. of Normans Kill		K-24nw	C	C
648	H-221-4-4-1-P 253b	Subtrib. of Normans Kill		K-24nw	C	C
649	H-221-4-5-P 259a	Isolated Pond		K-24nw	B	B
650	H-221-4-7 portion as described	Vly Creek	From mouth to outlet of P 259.	K-24nw	C	C(T)
651	H-221-4-7-P 259	Trib. of Vly Creek		K-24nw	B	B(T)
651.1	H-221-4-7 portion as described	Vly Creek	From inlet of P 259 to trib. 2.	K-24nw	C	C(TS)
652	H-221-4-7 portion including P 261a	Vly Creek	From trib. 2 to trib. 4.	K-24nw K-24sw	C	C(T)
652.1	H-221-4-7 portion as described	Vly Creek	From trib. 4 to source.	K-24nw K-24sw	C	C
653	h-221-4-7-P 261, P 261d	Trib. of Vly Creek		K-24nw	C	C
654	H-221-4-7-P 262a and trib. 2a including P 206g	Vly Creek Reservoir		K-24sw	A	A
655	H-221-4-7-1, 1a, 2, and all tribs., including P 260	Trib. of Vly Creek		K-24nw K-24sw	C	C
656	H-221-4-7-3, 4	Trib. of Vly Creek		K-24nw	C	C(T)
657	h-221-4-7-3-P 261b, P 261c	Isolated Pond		K-24nw	C	C
658	H-221-4-7-P 262b	Voorheesville Reservoir		K-24sw		
659	H-221-4-7a including P 265a	Trib. of Normans Kill		K-24nw	C	C
660	H-221-4-8 including P 266, P 266b	Hunger Kill	Glass Pond (P 266).	K-24nw	C	C(T)
661	H-221-4-8-1	Kaikout Kill		K-24nw	C	C(T)
662	H-221-4-8-1-P 265b	Trib. of Kaikout Kill		K-24nw	C	C
663	H-221-4-8-1-1	Blockhouse Creek		K-24nw	C	C(T)
664	H-221-4-8-1-1-1	Trib. of Blockhouse Creek		K-24nw	C	C
665	H-221-4-8-2, 4, 5	Trib. of Hunger Kill		K-24nw	C	C(T)
666	h-221-4-8-1a, 1b, 3, 5a,	Trib. of Hunger Kill		K-24nw	C	C

	6 including P 266a					
667	h-221-4-8a, 8b, 8c, 9, 9b including P 267, P 267a	Tribs. of Normans Kill		K-24nw	C	C
668	H-221-4-P 270-1	Bozen Kill		K-24nw K-23ne K-23nw	C	C
669	H-221-4-P 270-1-1 including P 272b, P 273h, P 273i	Black Creek		K-24nw K-23ne	C	C
670	H-221-4-P 270-1-P 272a	Trib. of Black Creek		K-24nw	B	B
671	h-221-4-P 270-1-1-1, 3, 4, 4a, 5, 6, and all tribs. including P 272, P 272c, P 273, P 273b, P 273c, P 273d, P 273e, P 273f, P 273g	Tribs. of Black Creek		K-24nw K-23ne	C	C
672	H-221-4-P 270-1-1-2 portion	Trib. of Black Creek	From mouth to trib. 1.	K-24nw K-23ne	C	C(T)
673	H-221-4-P 270-1-1-2 portion as described	Trib. of Black Creek	From trib. 1 to source.	K-23ne	C	C
674	H-221-4-P 270-1-1- 2-1, 2, 3, 3a, 3b	Subtribs. of Black Creek		K-23ne	C	C
675	H-221-4-P 270-1-1- 2-P 274	Thompson's Lake		K-23ne	A	A(T)
676	H-221-4-P 270-1-1- 2-P 274-a, 1, 1b, 1c, and all tribs. including P 274b and 136tribs.	Tribs. of Thompson's Lake		K-23ne K-23se	C	C
677	H-221-4-P 270-1-2, 3, 3a, 5, 6, 6a, 6b, 6c, 7, 7a, and all tribs. including P 276d	Tribs. of Bozen Kill		K-24nw K-23ne	C	C
678	H-221-4-P 270-1-8 portion as described	Trib. of Bozen Kill	From mouth to outlet of P 276.	K-23ne	C	C
679	H-221-4-P 270-1-8 including P 276, P 276c	Altamont Reservoir (P 276b)	From outlet of P 276 to source.	K-23ne	A	A
680	H-221-4-P 270-1-8-1 and tribs. including P	Subtribs. of Bozen Kill		K-23ne	C	C

	276c					
681	H-221-4-P 270-1-8-3	Subtrib. of Bozen Kill		K-23ne	A	A
682	H-221-4-P 270-1-9, 11, 11a, 11b, 12, 12a, 13, 14, 14a, 15a, 15b and all tribs. including P 276e, P 276f, P 276h, P 276i, P 276j, P 276l	Tribs. of Bozen Kill		K-23ne K-23nw	C	C
683	H-221-4-P 270-1-13-1a-P 276a and all tribs.	Duane Lake		K-23ne J-23se	B	B
684	H-221-4-P 270-2, 3, 3a and all tribs. including P 277, P 277b, P 277c, P 277d, P 278a, P 278b, P 278d137	Tribs. of Watervliet Reservoir		K-24nw	C	C
685	H-221-4-10 and tribs. including P 279a	Indian House Creek		K-24nw K-23ne J-23se	C	C
686	H-221-4-11, 12, 12a, 12b, 12c, 12d, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, and all tribs. including P 281a, P 281b, P 281c, P 281e, P 281f, P 281g, P 281h, P 281i, P 281j, P 281k, P 281l, P 282, P 282a, P 282b, P 282c, P 282d, P 283, P 283a, P 283b, P 284, P 284a, P 286, P 287a, P 287b, P 287c, P 287d, P 288a, P 288b, P 288d, P 288e, P 288f, P 288g, P 289a, P 289a, P 289b, P 289c, P 290b	Tribs. of Normans Kill		K-24nw J-23se K-23ne J-23sw	C	C
687	H-221-4-13	Becker Brook		J-23se	C	C(T)
688	H-221-4-13-1 portion	Trib. of Becker Brook	From mouth to 1.0 mile above mouth.	J-23se J-24sw	C	C(T)
689	H-221-4-13-1 portion as described	Trib. of Becker Brook	From 1.0 mile above mouth to source.	J-24sw	C	C

690	H-221-4-13-1-1	Subtrib. of Becker Brook		J-24sw	C	C
691	H-221-4-13-2, 3	Tribs. of Becker Brook		J-23se J-24sw	C	C
692	H-221-4-31 portion as described and trib. 2 including P 290a	Trib. of Normans Kill	From mouth to Duanesburg Churches Road	J-23sw	C	C

APPENDIX C:New York State Pollution Discharge and Elimination System (SPDES) Point Source Permits

SPDES#	EXP_DATE	Permittee Name	Facility Name	Township	WNAME
0022217	1/1/2002	GUILDERLAND (T) DEPT OF WATER & SANITATN	PARK GUILDERLAND-NORTHEAST IND PARK STP	GUILDERLAND (T)	NORMANS KILL
0029092	7/1/2004	SARATOGA- CAPITAL DIST STATE PK & REC CO	JOHN BOYD THATCHER STATE PARK	NEW SCOTLAND (T)	BLACK CREEK TRIB
0031534	11/1/2005	ALTAMONT (V)	ALTAMONT (V) SEWAGE TREATMENT PLANT	ALTAMONT (V)	BOZEN KILL
0096750	1/1/2020	SISTERS OF THE PRESENTATION	COBB MEMORIAL SCHOOL	GUILDERLAND	BOZEN KILL TRIB
0103179	1/1/2020	MOLLER,JEFFREY J	KOUNTRY KNOLLS TRAILER COURT	KNOX	BOZEN KILL TRIB
0104981	1/1/2020	SARATOGA-CAPITAL DIST STATE PK & REC COM	THOMPSON:S LAKE STATE PARK	KNOX	THOMPSONS LAKE TRIB
0123561	11/1/2001	PEDE BROTHERS ITALIAN SPECIALTY FOOD INC	PEDE BROTHERS ITALIAN SPECIALTY FOOD INC	ROTTERDAM (T)	GROUNDWATER
0124010	1/1/2020	BREMILDAN HOUSE	BREMILDIAN HOUSE		BOZEN KILL TRIB
0125105	3/7/2025	NATIONAL RESORT SERVICES DBA FROSTY ACRE	FROSTY ACRES RESORT	DUANESBURG (T)	NORMANS KILL TRIB
0191451	10/1/2004	ROBERT & ARLEEN LENT	3,7 & 8 LENT COURT	ROTTERDAM (T)	GW-POENTIC KILL
0191507	5/1/2003	SCHALMONT CENTRAL SCHOOL DIST	SCHALMONT SR HIGH & MIDDLE SCHOOL	ROTTERDAM (T)	GW-BECKER BROOK TRIB
0191949	9/1/2003	ANTHONY VALENTINE	VALENTINE APT-CARMAN ROAD (14 UNITS	ROTTERDAM (T)	GW-NORMANS KILL TRIB
0192147	8/1/2004	PHILOMENA VALENTINE	VALENTINE APT-RTE 146-CARMAN RD(18 UNITS	ROTTERDAM (T)	GW-NORMANS KILL TRIB
0205087	10/1/2005	RAYMOND M FLOWER	GREEN ACRES TRAILER PARK	KNOX (T)	THOMPSONS LAKE SUBTRIB
0205125	10/31/2025	ALTAMONT HOME FOR ADULTS	ALTAMONT (THE) HOME FOR ADULTS	KNOX	BOZEN KILL TRIB
0205192	3/7/2025	JOSEPH LUCARELLI	CAREFREE VILLAGE SECTION 1	ROTTERDAM (T)	GW-TRIB NORMANS KILL CR
0205559	10/31/2025	STEWART'S ICE CREAM CO INC	DUANESBURG #250	DUANESBURG (T)	NORMANS KILL TRIB
0212521	1/1/2020	JOSEPH J DUNBAR	112 SOUTHWOODS COURT APTS.	ROTTERDAM (T)	GROUNDWATER
0212776	2/1/2004	LORETEX CORP.	LORETEX CORP.	GUILDERLAND (T)	BLACK CREEK
0212822	4/1/1993	GUILDERLAND (T)	GUILDERLAND WATER TREATMENT PLANT	GUILDERLAND /T/	BLACK CREEK
0213209	1/1/2004	PIONEER SAVINGS BANK	PINE GROVE APARTMENTS	ROTTERDAM (T)	GROUNDWATER
0223301	12/15/2003	BEATRICE KONWISARZ C/O KATHY'S APTS.	KATHY'S APARTMENTS	DUANESBURG (T)	GW-NORMANS KILL TRIB
0223654	7/1/2004	SCHENECTADY CO.DEPT.ENG.OF PUBLIC WORKS	SCHENECTADY CO. HIGHWAY GARAGE	ROTTERDAM (T)	BECKER BROOK TRIB 2
0224367	8/1/2005	JOCK FARNSWORTH	TREE FARM INC	PRINCETOWN (T)	INDIAN HOUSE CREEK
0224812	3/7/2025	ROBERT B BUTLER	QUAKER INN	DUANESBURG (T)	NORMANS KILL
0224855	3/7/2025	SARATOGA, LLC	HILLCREST COMMONS	DUANESBURG (T)	NORMANS KILL SUBTRIB
0240851	10/31/2025	RESIDENTIAL OPPORTUNITIES INC.	GROUP HOME - PRINCETOWN	PRINCETOWN (T)	GW-NORMANS KILL
0241067	10/31/2025	SCHENECTADY CO. CHAP. NYSARC, INC	PRINCETOWN RIDGE DAY TREATMENT CENTER	PRINCETOWN (T)	GW-NORMANS KILL TRIB
0241342	12/1/2003	DOUGLAS & KATHLEEN YAUCHLER	YAUCHLER RESIDENCE	DUANESBURG (T)	NORMANS KILL TRIB
0241628	8/1/2004	FEUZ MFG.	FEUZ MFG.	ROTTERDAM (T)	GROUNDWATER
0242659	7/9/2001	NYS DOT	NYS DOT MAINTENANCE SUBHEADQUARTERS-DUAN	DUANESBURG (T)	ISLAND CREEK TRIB
0261017	3/1/2004	ORCHARD CREEK REALTY LLC	ORCHARD CREEK GOLF COURSE	GUILDERLAND (T)	WETLANDS
0261271	11/1/2005	DUANESBURG (T)	DUANESBURG/DELANSON SEWER DISTRICT 1	DUANESBURG (T)	NORMANSKILL CREEK

APPENDIX D: Sediment and Erosion Control, Storm Water Management Guidelines and Best Management Practices

Many of the negative impacts from new development can be greatly minimized or avoided by the implementation of proper erosion and sediment control and storm water management measures. This appendix includes a summary of erosion and sediment control guidelines and common erosion and sediment control and storm water management practices (best management practices) for new development.

The publication, *New York Guidelines for Urban Erosion and Sediment Control*, distributed by the Empire State Chapter of the Soil and Water Conservation Society contains excellent comprehensive information regarding erosion and sediment control measures and guidelines and should be consulted for more details. These guidelines provide information on minimizing erosion and sediment problems on land undergoing urban development. They show how to use soil, water and plants to improve the quality of our environment. The manual contains standards and specifications commonly used on construction sites including both vegetative and structural measures. This manual is a valuable tool for planners, engineers, local officials, contractors and others involved in development activities. Listed below are a sampling of guidelines and management practices contained in this manual.

THE SITE PLANNING PROCESS

The following procedure is recommended to develop a plan that will efficiently control erosion and sedimentation throughout the site development process.

- Plan the Development to Fit the Site

Assess the physical characteristics of the site to determine how it can be developed with the smallest risk of environmental damage. Minimize grading by utilizing the existing topography wherever possible. Avoid disturbing wetlands or other environmentally sensitive areas. Minimize off-site impacts by maintaining vegetative buffer strips between disturbed and adjacent areas.

- Determine Limits of Clearing and Grading

Decide exactly which areas must be disturbed in order to accommodate the proposed construction. Pay special attention to critical areas (e.g. steep slopes, highly erodible soils, surface water borders) which must be disturbed. Staged clearing and grading should be considered as an alternative to massive clearing and grading.

- Divide the Site into Natural Drainage Areas

Determine how runoff will drain from the site. Consider how erosion and sedimentation can be controlled in each small drainage area before looking at the entire site. Remember, it is more advantageous to control erosion at the source and prevent any problems than to design perimeter controls to trap sediment.

- Select Erosion and Sediment Control Practices

Erosion and sediment control practices can be divided into vegetative and structural controls.

- Vegetative Controls - The best way to protect the soil surface and limit erosion is to preserve the existing vegetative ground-cover. Where land disturbance is necessary, temporary seeding or mulching should be used on areas which will be exposed for long periods of time prior to construction. Permanent stabilization should be performed as soon as possible after completion of grading. Erosion and sediment control plans must contain provisions for permanent stabilization of disturbed areas. Seed type, soil amendments, seedbed preparation, and mulching should be described on the plans. Selection of permanent vegetation should include the following considerations for each plant species:
 1. establishment requirements;
 2. adaptability to site conditions;
 3. aesthetic and natural resource values;
 4. maintenance requirements.
- Structural Controls - Structural sediment control practices may be necessary when disturbed areas cannot be promptly stabilized with vegetation. Structural practices should be constructed and maintained in accordance with the guideline standards and specifications found in the *New York Guidelines for Urban Erosion and Sediment Control*.

SITE MANAGEMENT

Site management for effective implementation of erosion and sediment controls involves the following:

- Clear only what is required for immediate construction activity. Large projects should be cleared and graded as construction progresses. Mass clearing and grading off the site should be avoided.

- Re-stabilize disturbed areas as soon as possible after construction is completed. Certain sections of large construction projects may be completed before others and be ready for stabilization before the total project is completed. Waiting until the end of the project to commence all site stabilization may leave areas exposed for an unnecessarily long duration.
- Divert off-site runoff from highly erodible soils, steep slopes; and disturbed land and convey to stable areas.
- Physically mark off limits of land disturbance on the site with tape, signs, or other methods, so the workers can see areas to be protected.
- Make sure that all workers understand the major provisions of the erosion and sediment control plan.
- Designate responsibility for implementing the erosion and sediment control plan to one individual.
- Implement a daily inspection program to determine when erosion and sediment control measures need maintenance or repair. Pay particular attention to the inspection following rainfall events.

The following sample of Best Management Practices for controlling erosion, sedimentation and storm water runoff, as described in part, in *A Guide on Soil and Water Management for Local Officials* by the USDA Soil Conservation Service, can also be utilized as a means of controlling or avoiding the negative effects of land clearing for new development. In addition, detailed information about the means of controlling stormwater runoff can be found in the *New York State Stormwater Management Design Manual* and *Reducing the Impacts of Storm Water Runoff from New Development* available from the NYS Department of Environmental Conservation.

COMMON EROSION AND SEDIMENT CONTROL PRACTICES

- **Diversion:** A channel to intercept runoff constructed across a slope with a supporting ridge on the lower side. Diversions are effective for erosion control on steep or long slopes and are a key practice in controlling runoff. Each diversion must have a stable outlet and adequate capacity to carry peak runoff without eroding or overtopping.
- **Drop Structure:** Carries runoff through a sudden change in grade or elevation. The structure is usually made of concrete, aluminum or timber. It is used with a waterway or a diversion.
- **Filter Strips:** Removes sediment and other pollutants from runoff water by filtration, deposition, infiltration, absorption, decomposition, and/or volatilization. Slope and soil type are important factors to evaluate before using this practice. Also

consider the type and volume of pollutants that pass through the filter strip. Protect against erosion where flow enters a stream or channel.

- **Gabions:** Rectangular, rock-filled baskets. Gabions are used to line the bed and/or banks of streams or to divert flow away from eroding streambank sections. Gabions should be used with caution in corrosive environments, such as acidic soils.
- **Grassed Waterways:** A natural or constructed channel that is shaped or graded to required dimensions and established in suitable vegetation for the safe conveyance of runoff. Grassed waterways may be used to carry runoff from diversions or other water concentrations. The most critical time in installing grassed waterways is when vegetation is being established. Usually mulch or erosion netting is needed to help stabilize the channel during this critical establishment time.
- **Mulching:** The application of plant residues or other suitable materials to the soil surface. Straw is the most common mulch, but erosion fabrics and nettings are also available. Mulching is effective in preventing soil erosion caused by raindrop impact on soil. Mulching alone will not control erosion due to concentrated runoff. However, mulch anchored with netting, peg and twine or other erosion control fabric will protect the soil from concentrated flows.
- **Riprap:** A permanent, protective layer of stones to protect soil from erosion or slippage in susceptible areas. Riprap is used in areas of concentrated flows where the velocities are too high for vegetation to protect the soil. Rock size is determined by the expected runoff velocity. Blocky rock should be used on steep slopes since rounded rocks are likely to be unstable.
- **Sediment Basin:** An impoundment that temporarily stores sediment-laden runoff. Sediment basins are relatively effective for trapping medium and coarse grained sediment particles like sands and silts. Fine silts and clays suspended in runoff are difficult to remove. Approximately 70% sediment trapping efficiency can be achieved with a typical sediment basin.
- **Storm Drain Inlet Protection:** A sediment barrier placed around a storm drain inlet. This practice provides good removal of coarse and medium grained sediment from runoff. Straw bales, gravel and filter fabrics are usually used for the barrier. Erosion control practices should be used to limit sediment movement from construction areas.
- **Straw Bale/Fabric Sediment Trap:** A row of entrenched and anchored straw bales or filter fabric installed to detain and filter sediment-laden runoff. This type of sediment trap removes coarse sediments from small amounts of runoff before it leaves the site. Straw bales and filter fabric are not recommended in areas of concentrated flow.

- **Streambank Protection Measures:** Vegetative and/or structural measures to stabilize eroding streambanks. Planting of grasses and deep-rooted shrubs are vegetative ways of stabilizing streambanks. Structural measures are used in areas of higher water velocity and include riprap, gabions, sacked concrete, and timber or metal pilings. Bioengineering is a new approach that combines the use of vegetation and structures.
- **Stream flow Deflectors:** Used to deflect high velocity flows away from the streambank. Deflectors are made of large rock, rock-filled gabions, logs or pilings.
- **Temporary Seeding:** The establishment of temporary vegetative cover on disturbed areas by seeding with suitable fast growing annual vegetation. It is used to stabilize construction areas that will be bare for more than 45 days but less than a year. Temporary seeding is only effective once the vegetative cover is established.

COMMON STORM WATER MANAGEMENT PRACTICES

The loss of natural ground cover increases the volume of storm water runoff in a watershed. The goal of good storm water management is to have no more water runoff leave the site after development as compared to the pre-development conditions. The primary purposes of controlling runoff in developing areas are to: minimize flooding; handle storm discharges in a safe manner; and to keep erosion and sedimentation to a minimum. The following storm water management practices describe the various ways in which runoff is controlled.

- **Detention Basin:** Impoundment that temporarily stores runoff water. It can be dry or have a permanent pool. The basin holds storm water runoff and releases it at a safe rate that minimizes downstream flooding. A side benefit of this practice is the removal of some sediment from the runoff.
- **Diversion:** A channel with a supporting ridge on the lower side to carry flows across a slope. A diversion carries runoff to places where it can be used or disposed of safely.
- **Drop Inlet Structure:** A catch basin that collects surface flow, traps some sediment, and transfers all or a portion of the flow to subsurface conduits or pipes. This practice effectively transfers prolonged flows to an underground pipe, eliminating down-slope wetness and erosion.

- **Infiltration Trench:** A shallow, excavated trench, usually 2 to 10 feet in depth, back-filled with stones or gravel. This allows the temporary storage of runoff in the space between the stones. The stored runoff slowly infiltrates into the soil. Trenches are often placed at the edge or under a portion of a driveway or parking lot.
- **Lined Channels:** Channels with an erosion resistant lining of rock, concrete, asphalt or other structural material. It conveys runoff water safely to a discharge point. It is useful in areas of prolonged flow or where flow velocities exceed those allowable for grassed waterways.
- **Parking Lot Storage:** Water storage area that is within and a part of the parking lot. It is useful in controlling runoff from small areas up to several acres. It is often used with roof-top storage, infiltration trenches and grass filter strips.
- **Retention Basin :** A basin designed to store storm water runoff by collection as a permanent pool of water without release except by means of evaporation, infiltration, or attenuated release when runoff volume exceeds the permanent storage capacity of the permanent pool. A retention basin, also known as a wet pond, is usually designed to achieve peak flow attenuation as well as pollution removal. Other benefits of wet pond include: creation of wildlife habitat, increased recreational opportunities, landscaping opportunities, and enhanced property values.

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