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WATER AUTHORITY OF GREAT NECK NORTH

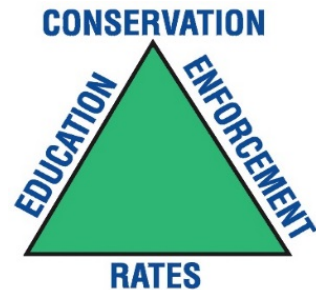
WATER USE AND CONSERVATION PLAN

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WATER AUTHORITY OF GREAT NECK NORTH

WATER CONSERVATION PLAN

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**WATER AUTHORITY OF GREAT NECK NORTH
WATER CONSERVATION PLAN**

SECTION 1

1.0 INTRODUCTION

The Water Authority of Great Neck North (WAGNN or Water Authority) was established in 1985 as a public benefit corporation. In December 1989, the Water Authority purchased the assets of Citizens Water Supply Company and has since been authorized to provide public water supply to the northern area of the Great Neck peninsula encompassing the Villages of Great Neck, Great Neck Estates, Kensington, Kings Point, Saddle Rock, and portions of Great Neck Plaza, and unincorporated areas of the Town of North Hempstead.

The Water Authority is located in the extreme northwest corner Nassau County on the Great Neck peninsula. The service area is bounded by the Long Island Sound to the north, Manhasset Bay to the east, and Little Neck Bay to the west. The Long Island Rail Road acts as an approximate southern boundary. Potable water is transmitted to residents of the aforementioned Villages. The ground elevations in the Authority's service area vary from sea level on the three shores to an elevation of approximately 140 feet at the highest point.

The Board of Directors of the Water Authority is comprised of the Mayors or their respective designees from each of the seven Villages, and the Supervisor of the Town of North Hempstead. Each Director serves for a term of two years.

The Water Authority presently serves a population of approximately 32,400 people through 9,205 residential and commercial water services within a service area of 7.5 square miles.

Water users residing in the Water Authority's service area are currently supplied with potable water through eleven (11) wells located at eight sites. Eight wells are located at six

separate well sites, and two wells (12 and 13), which were placed online in 2000, and one well (14) placed online in 2013 are located outside the Authority's service area off the peninsula.

Potable groundwater is drawn from two distinct aquifers, which underlie the Great Neck peninsula. These water bearing formations, which act as the sole source of water supply includes the Magothy and Lloyd sand members.

Long Island is underlain by bedrock, which is composed of gneiss, granite, and schist of the Lower Paleozoic and Precambrian age. The Island is composed of unconsolidated deposits of clay, silt, sand and gravel, which overlie a southeasterly sloping bedrock surface. The surface area consists of multicolored clays, or sandy clay with partly decayed rock and mineral fragments. It is considered the base of the groundwater reservoir on Long Island because of its density and low permeability. The surface of the bedrock is a smooth plain that slopes at a rate of about 85 feet per mile in a southeastern direction under the Authority. At the southwest boundary of the Authority, bedrock is located at about 400 feet below sea level.

The soil survey of Nassau County classifies the soils in the Great Neck Peninsula as Urban Land-Montauk-Riverhead. Moderate sloping, well-drained, medium textured soils, and urban land, on low hills and ridges dominate this area.

The soils are classified according to the Unified Soil Classification System based on properties that affect their use as construction material. The peninsula is surrounded by beach on three sides and urban land on one side. The predominant soil in the area of the Authority is classified as Montauk Urban and Montauk Silt loam, which has 0 to 8 percent slopes.

The topography of Long Island consists of unconsolidated glacial deposits of the Pleistocene Age and coastal-plain deposits of the late cretaceous age. The most prominent landforms created during this period are two lines of hills, which are positioned east to west and extend eastward to form the north and south forks of Long Island. These rolling hills, referred to as terminal and recessional moraines, are composed of glacial debris which was pushed ahead of,

and incorporated within, the ice sheets as the ice advanced and melted during the Pleistocene Period.

The Great Neck Peninsula is located on the northwestern shore of Nassau County, which is part of the Coastal Plain physiographic province. The northern areas of Nassau County consist of rolling landscapes while the southern areas are mostly flat with a gently southward tilt as the land approaches the ocean. The Subsurface Geology of the Great Neck Peninsula includes the North Shore Aquifer and the North Shore confining unit.

The North Shore Aquifer and the North Shore confining unit were previously known as the Port Washington Aquifer and Port Washington confining unit, respectively. Drilling core samples obtained during a study between 1991 and 1996 indicated a complex hydrogeological framework that does not resemble that indicated in previous work. A unified nomenclature was needed to differentiate from the previous deposits recorded; therefore, the USGS used and defined the “North Shore Aquifer” and the “North Shore confining unit” for the first time in their study entitled, “Hydrogeology and Extent of Saltwater Intrusion of the Great Neck Peninsula, Great Neck, Long Island, New York.”

According to the USGS 2001 Study of Hydrogeology and Extent of Saltwater Intrusion of the Great Neck Peninsula, the North Shore Aquifer is in contact with bedrock, and is hydraulically interconnected laterally with the Lloyd Aquifer. The North Shore Aquifer lies in the northernmost part of the Great Neck Peninsula.

The North Shore confining unit underlies almost all of the Great Neck Peninsula and ends along a northeast to southwest trend line in the southeastern part of the peninsula.

The Upper Glacial Aquifer overlies the Magothy Aquifer in the southernmost part of the peninsula and overlies most of the North Shore confining unit in the rest of the peninsula.

The Water Authority of Great Neck North acquires all of its water from two aquifers that underlie the District, the Magothy Aquifer and the Lloyd Aquifer. These aquifers consist of

unconsolidated sand and gravel deposits, separated from one another by layers of silt and clay, bounded on the top by the water table surface and on the bottom by the clay member of the Raritan formation and bedrock below.

The Lloyd Aquifer is the sand member of the Raritan formation, making it the deepest of the aquifers that underlie the Authority. It lies on top of the bedrock surface in the southern portion of the Great Neck Peninsula, and is composed of lenticular deposits of coarse sands and gravel, clay, silt, and sandy clay. The Aquifer extends from approximately 150 feet below the sea level to 600 feet below sea level. The aquifer is known as the Lloyd Sand member of the Raritan Formation of Late Cretaceous age. The Lloyd Sand member is about 150 feet thick in the southern most portion of the Authority. The depth to the formation is generally very deep on Long Island, except in the northwestern area of Nassau County where it is zero feet in the north of the peninsula where it has been eroded by glacial scouring. Overlying the Lloyd Sand member is a layer of clay belonging to the Raritan formation, which reduces the potential for recharge of the Lloyd Sand member, and hydraulically confines the Lloyd Aquifer, making it an artesian aquifer. The thickness of the clay member ranges from 150 to 300 feet. The Raritan clay places the aquifer under artesian pressure and limits the recharge from above, leaving it susceptible to saltwater intrusion at the shorelines. Well numbers 5, 6, 7, 8, and 11A are screened in this aquifer. In 2016, the Authority pumped 324.3 million gallons from the Lloyd Aquifer.

The Magothy formation overlies the top of the Raritan formation and is composed of Upper Cretaceous sediments. Upper portions of the Magothy consist of lenticular and discontinuous beds of very fine sand to medium sand, and beds of clay and sandy clay.

The Magothy Aquifer under the Great Neck Peninsula has been eroded by glacial action and has been completely removed in the northern extents of the Authority. The extensive clay layers in the upper part of the aquifer confine the groundwater in the lower portions of the Magothy Aquifer. This aquifer extends approximately from sea level to 290 feet below sea level in the southern portion of the Great Neck Peninsula. Well numbers 2A, 9, 10A, 12, 13, and 14 are screened in this aquifer. In 2016, the Authority pumped 1,288.6 million gallons from this aquifer.

Recharge of the aquifers beneath the Authority is dependent entirely on the seepage of rainfall through the ground surface and through the geologic stratus. Over the past 5 year's rainfall over the Authority's supply area averaged 56 inches per year. The aquifer system acts as an underground reservoir and in 2016, the Authority pumped 1.613 billion gallons from the aquifers.

The Water Authority currently maintains three (3) water storage tanks with a total volume of 2.5 million gallons (MG). The Water Authority currently has two 1.0 MG above ground storage tanks, and one 0.5 MG elevated storage tank.

Design average daily pumpage on a yearly basis is 4.419 MGD. Design peak summer or maximum day demand is 8.275 MGD. Loss of an individual well due to a mechanical or physical problem will not affect the supply capacity of the Water Authority during a maximum day. Presently, the Water Authority has an excess well capacity of 15 MGD which would make up for the loss of any three wells on a peak day.

With all the wells and most booster pumps in service, the Water Authority has an available system capacity of 19 MGD rate in 2016. Maximum day plus fire demand was 13.32 MGD rate and maximum hour demand is 0.7 MGH rate. The Water Authority has the capacity and ability to meet both of these demands, even with a couple of wells or booster pumps out of service.

The Water Authority maintains the capacity of meeting 120-139 percent of its maximum day demand through the use of auxiliary power units, dependent upon at which well the portable generator is utilized. Auxiliary capacity is sufficient to maintain more than adequate service through a complete black out or loss of electrical power to the region.

The Water Authority owns and maintains over 117 miles of various types and sizes of water main. Water main diameters vary from 1-inch to 24-inches throughout the service area. Most of the Water Authority's mains are constructed of ductile or cast iron with the remaining

comprised of wrought iron, transite, steel, copper, and PVC. All water services are metered in the supply service.

1.1 Conservation Efforts to Present

In 1986/1987, the Citizens Water Supply Company implemented a water conservation program in reaction to the New York State Department of Environmental Conservation (NYSDEC) pumpage caps. Many of the components of their plan remain in effect with the Water Authority of Great Neck North subsequent to the purchase of Citizens Water Supply Company in December of 1989.

With the completion of the salt water intrusion study prepared by the Nassau County Department of Public Works and promulgation of “Minimum Water Conservation Program Requirements and Guidance for Development of Acceptable Programs” by NYSDEC in late 2016/2017, the Board of Directors of the Water Authority has authorized a report to be prepared in order to examine the impacts of current water usage trends on the future availability of potable water within the Authority service area.

The Board of Directors also acknowledged that it recognized the fragility of the resource on the peninsula and possible repercussions from lack of a conservation program that may adversely affect the current and future residents of the Water Authority’s service area. It was, therefore, the intention of the Water Authority to evaluate and recommend what is one of the most aggressive water conservation programs on Long Island in order to protect its most precious and limited resource.

1.2 Pumpage Caps

In mid-1986, the NYSDEC imposed pumpage caps for all of the public water suppliers in Nassau County, after reviewing the pumpage over a 10-year period. The Water Authority’s cap was based on the five-year pumpage average for the years 1981 through 1985 (1,693 MG) and

any current five-year running average, and 1,753 MG as a maximum pumpage in any one year while still maintaining the consecutive running five-year average below the 1,693 MG.

To meet these pumpage caps, the Water Authority implemented more stringent conservation requirements and programs than what was in place under Citizens Water Supply. These included the following:

- No lawn watering between 10:00 a: m and 4:00 p: m;
- No water for flushing and spraying public sidewalks and private driveways;
- All automatic underground lawn sprinklers must be equipped with a working rain sensor gauge;
- Meter Replacement Program to include the installation of Smart Meters to capture low flow usage;
- Leak Detection Program;
- Water Use Audit Program;
- Plumbing Retrofit Program;
- Coordination with Local Municipal Officials;
- Public Awareness Program;
- Aggressive Rate Structure-;
- General Water Conservation;
- Water Conservation Coordinator.
- Separate water services for Lawn Irrigation and Pools.

Nassau County also issued a Water Conservation Ordinance. See Appendix H. The Water Authority's conservation rules and regulations meet the requirement of this ordinance and in many instances exceeds them.