

1.7 Surface Water Resources

Surface water is all water whose surface is exposed to the atmosphere. The surface water system is made up of rivers, streams, lakes, ponds, canals, reservoirs, swamps, marshes and the ocean.

Water bodies serve as a kind of circulatory system providing nutrients and metabolizing waste materials. Wildlife and the aquatic community rely on waterways for these functions, as well as shelter and a place to rest and breed. Humans enjoy the added benefits of recreation, transportation and socio-economic opportunities.

The uppermost reach of a stream is called its headwaters. Streams in a watershed can be classified according to stream “order.” A small, unbranched stream, typically a headwaters stream, is a first-order stream. When two first-order streams join, they form a second-order stream. A third-order stream has tributaries that are first and second-order streams. The stream “order number” can be useful for classifying and characterizing streams and rivers for consideration of management options, and is discussed further in Section 8.1 of this report. Streams also can be classified as “gaining” or “losing.” A gaining stream accumulates water as it flows to lower elevations. Water seeps into a gaining stream from its banks and channel bottom. A losing stream loses water as it flows to lower elevations. Water seeps out of the sides and bottom of a losing stream and into its banks.

The US Geological Survey (USGS) operates and maintains seven (7) stream flow monitoring stations in WMA 6. Table 1.7.1 provides historical flow data at these gaging stations. It must be noted that the flow past the above stations can be affected by pumpage from wells, storage at reservoirs and gate operations at dams upstream of each site.

Each watershed is subdivided into smaller watersheds using a grouping called the Hydrologic Unit Code (HUC), which uses a series of numbers to describe the relationship of each smaller watershed to the other watersheds with which it is associated. Using the 11-digit HUC for WMA 6, the subwatersheds are as follows (note that only the last three digits vary within WMA 6):

- Rockaway River Basin (02030103030)
- Whippany River Basin (02030103020)
- Passaic River Upper Basin (above Pine Brook) (02030103010)
- Passaic River Upper Basin (Pine Brook to Pompton River) (02030103040)

Rockaway River Basin (02030103030) - The Rockaway River's headwaters originate in Sparta Township, Sussex County at Acquackanonk Lake. The Rockaway River travels approximately 30 miles to the Boonton Reservoir. The Rockaway River Basin is 137 square miles in area and is located in the northern portion of WMA 6. This subwatershed is further divided into 17 HUC-14 subwatersheds that are indicated on Plate 1.1.2. A

summary of stream information in the Rockaway River Basin is as follows (obtained from available NJDEP GIS datasets):

ORDER	STREAM MILES	%
1	123.6817	48.28%
2	59.56325	23.25%
3	32.04444	12.51%
4	21.51671	8.40%
5	19.3735	7.56%
TOTAL	256.1796	100.00%

From the NJDEP GIS datasets, there are 200 artificial lakes covering 3700 acres, and 51 natural lakes covering 400 acres. The significant artificial lakes are the Boonton and Splitrock Reservoirs, which contain storage for potable water supply to the City of Jersey City. The Boonton Reservoir is supplied from the Rockaway River and includes approximately 119 square miles of runoff area to the reservoir.

Whippany River Basin (02030103020) - The Whippany River's headwaters originate at the Clyde Potts Reservoir in Mendham Township, Morris County. The Whippany River travels approximately 16 miles before joining the Rockaway River in Montville Township, Morris County. The Whippany River Basin is 70 square miles in area and is located in the central portion of WMA 6. This subwatershed is further divided into 10 HUC-14 subwatersheds that are indicated on Plate 1.1.2. A summary of stream information in the Whippany River Basin is as follows (obtained from available NJDEP GIS datasets):

ORDER	STREAM MILES	%
1	71.52127633	57.15%
2	25.65644394	20.50%
3	14.12903333	11.29%
4	13.84449508	11.06%
	125.1512487	100.00%

From the NJDEP GIS datasets, there are 123 artificial lakes covering 615 acres, and 17 natural lakes covering 104 acres. The significant artificial lake is the Clyde Potts Reservoir, which provides water for potable supply for the Southeast Morris County Municipal Utilities Authority.

Passaic River Upper Basin (above Pine Brook) (02030103010) - The Passaic River's headwaters originate in Mendham Borough, Morris County above Don Passos Pond. The river flows through the Great Swamp and continues approximately 33 miles before meeting the Rockaway River in Fairfield Township, at the borders of Essex and Morris Counties. The Passaic River Upper Basin, above Pine Brook, is 143 square miles in area and is located in the southern portion of WMA 6. The subwatershed is further divided into 18 HUC-14 subwatersheds that are indicated on Plate 1.1.2. A summary of stream

information in the Passaic River Upper Basin (above Pine Brook) is as follows (obtained from available NJDEP GIS datasets):

ORDER	STREAM MILES	%
1	153.17	53.65%
2	63.75	22.33%
3	26.47	9.27%
4	9.06	3.17%
5	6.51	2.28%
6	26.56	9.30%
	285.50	100.00%

From the NJDEP GIS datasets, there are 163 artificial lakes covering 790 acres, and 32 natural lakes covering 51 acres. The significant artificial lakes are the three Canoe Brook Reservoirs owned and operated by the New Jersey-American Water Company. These reservoirs are filled, via pumping, from the Passaic River and Canoe Brook (a tributary to the Passaic River), and are used for potable water supply.

The Great Swamp is also a very significant surface water resource within the Passaic Basin. The Great Swamp Watershed is a 55 square mile region in Morris and Somerset Counties of the state of New Jersey, and includes portions of 10 towns. The Great Swamp is a National Wildlife Refuge that has a diverse ecology of plants and wildlife. The swamp acts as a spring that provides flow to the Passaic River, and groundwater moves from the groundwater table below up to the surface into the stream channel.

Passaic River Upper Basin (Pine Brook to Pompton River) (02030103040) - This small section of subwatershed (less than 12 sq. miles) is a continuation of the Passaic River after the Passaic River has merged with the Whippany and Rockaway Rivers. The Passaic River flows approximately 11 miles through the Great Piece Meadow lowlands of Fairfield Township and then meets at the confluence with the Pompton River, leaving WMA 6 and entering WMA 4. From the NJDEP GIS datasets, there are 12 artificial lakes covering 93 acres, and 9 natural lakes covering 16 acres. This subwatershed is designated as part of the Upper Passaic Basin by USGS nomenclature, but is commonly referred to as the Middle Passaic Basin.