PRESENTATION TO
THE PARSIPPANY-TROY HILLS TOWN COUNCIL
AND MAYOR BARBERIO
REGARDING FINDINGS RELATED TO
THE LAKE HIAWATHA FLOODING OF
AUGUST 28, 2011.

Submitted: Tuesday, February 14, 2012

By: The Parsippany Troy Hills Environmental Advisory Committee

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The information contained in this report is the result of data and statistics collected by and analyzed by the Parsippany-Troy Hills Environmental Advisory Committee. It is not being used as factual data to draw conclusions on events which were unpredictable.

This report will be presented in 4 stages:

The first stage will be concerned with the national and local meteorological conditions of the weekend of August 27-28 of 2011. This section will be referred to as **Conditions.**

The second stage will be concerned with activities, both man-made and natural, that seemed to contribute to the synergist effect that eventually lead to the flooding of lower Lake Hiawatha. This section will be referred to as **Contributions.**

The third stage will be an exploration of the aerial photos and maps available of the Lake Hiawatha area that will allow us to look above and below the reservoir and include the topography, river systems and impervious surfaces in our study. This section will be called **Visual Evidence.**

The fourth stage will be suggestions put forth by the EAC to prevent a reoccurrence of this situation. This section will be called **EAC Suggested Actions.**

CONDITIONS:

RAINFALL: source – Tropical Rainfall Measuring Mission (TRMM – Nasa website)

The conditions for this storm produced a record rainfall for the state of New Jersey.

By 7 am Sunday August 28th, 7.56 "of rain had fallen in 48 hours. Our water table is one of the highest in the state (see below) and the ground was saturated, meaning it was not allowing any more water to filter through the soil. All rivers and tributaries were overflowing at this time.

The month of August 2011 was the wettest month in recorded history with 17.97 inches of rain. The next closest record is 10.78 inches. In previous years the rainfall in August had been 3.41", 6.9" and 2.5" respectively. (Data from OFFICE OF NJ STATE CLIMATOLOGIST – RUTGERS U.)

WATER TABLE: The Parsippany area has one of the highest water tables in the state. This refers to level at which the ground water rises below us. Our average water table is 5.23 feet; it is at this level the ground is already naturally saturated with water.

RIVERS AND TRIBUTARIES:

The Rockaway River is part of the Passaic- Hackensack Watershed, an extensive system of rivers and tributaries which all affect each other whether the water is going into or leading away from the direction of flow.

FEEDING INTO THE ROCKAWAY RIVER above the reservoir:

Deer Lake

Dixon Pond

Beaver Brook (Denville)

Lake Vahalla leading to Crooked Brook (Montville)

(Crooked Brook enters Lake Hiawatha at River Road below the reservoir.)

RIVERS THE ROCKAWAY RIVER GOES INTO: Whippany River and Passic River

During storms, the Rockaway River drains downhill into the Passaic River. The water is then carried to the Newark Basin and discharged into the ocean. Under normal circumstances, this is how a basic watershed works. Simultaneously, however, the Wanaque River, the Pequannock River, the Ramapo River, The Saddle River and the Whippany River all also drain into the Passaic River and were doing so that night. From another angle, the Hackensack River (a very large River) also drains into the Passaic prior to discharge into the Newark Bay. The maximum discharge amount for the Passaic River is 8,330 cubic feet per second.

RIVER CONDITIONS;

All rivers are subject to sediment deposits during a storm and their depth and width (which varies throughout the system) determines the actual flow rate. What is unknown is how much debris (i.e. fallen trees, car tires, dumped material)is in the bottom of these rivers. Too much debris would greatly affect their natural flow rate without even adding in the conditions of Hurricane Irene. Sediment deposits from river banks were greatly increased during this storm as can be seen in an aerial picture of the mouth of the Hudson River that looks like a mud hole.

STORM DRAINS:

Even if they were clear, which many are not because people dump in them, storm drains were filled to capacity and could not move water to where it normally would go to avoid flooding.

IMPERVIOUS SURFACES: Any piece of land that has a building on it or is paved no longer has the ability to absorb water. For every square foot of impervious surface, we lose that amount in natural drainage. The water is then runoff and follows the topography of the land. Again here, the watershed leads to the nearest body of water, in this case the Rockaway River.

LAKE HIAWATHA RETAINING WALL:

(Lower Lake Hiawatha, runs along River Road and Lake Shore Drive)

This wall was built in 1989 according to state standards and the Army Corps of Engineers. It was designed to be effective up to and including a 100 year flood. There is no indication that the wall broke during the storm.

(**100 year flood- Statistical techniques, through a process called frequency analysis, are used to estimate the probability of the occurrence of a given precipitation event. The recurrence interval is based on the probability that the given event will be equaled or exceeded in any given year. A 100 year flood can occur several times in 100 years.)

SOURCE: USGS: ga.water.usgs.gov/edu/100yearflood

BOONTON RESERVOIR AND DAM:

Owned and operated by United Water, a company from Paris, France. United Water operates the Jersey city Water system through a public-private partnership with the Jersey City Municipal utilities Authority (JCMUA). Under the terms of the contract United Water manages the treatment plants, watershed, aqueduct, and distribution system and provides customer service, meter reading and billing services.

This reservoir is the water source for 239,000 people in Jersey City. It is on 5,688 acres and can hold 11.3 billion gallons of water. It carries this water through 23 miles of aqueduct. The dam can only be lowered (that is water released) at the request of the NJDEP under orders by the Governor.

The Rockaway River starts on Green Pond Mountain in the Oak Ridge and runs SSW to Wharton. There it moves east in a meandering course through Rockaway, Denville and Boonton, where it passes through the Boonton Gorge. On the south side of Boonton it is impounded to form the Boonton Reservoir. Downstream from the reservoir dam it flows south, through Lake Hiawatha, where it splits and joins again. It then flows through Parsippany and into Hatfield Swamp, where it is joined by the Whippany River and then merges with the Passaic River. It is in total 35 miles long.

CONTRIBUTIONS:

(these are factors that played a role in creating conditions for flooding to occur)

Max Q (maximum dynamic pressure) upstream (of the reservoir) was 9,160 cubic feet per second at 7 pm on 8/28. The Max Q downstream was 6,140 cubic feet per second suggesting a lower flow in the river then the incoming flow in the reservoir. Interpretation would be the pressure above the reservoir was naturally pushing the water into the reservoir. If the input is greater than the output, the pressure would have pushed the water over the spillway of the dam. A dramatic drop in pressure was recorded around this time but ABOVE the reservoir. This drop is attributed to the water that detoured to Route 287 and destroyed part of that highway.

The Reservoir was a peak capacity, 100 %. This was a decision made by United Water to retain the water in the event of future emergencies. This information was given in a statement by John Hroncich, the Plant Engineer and Operations Manager for United Water at a meeting of the Montville Town Committee and Mayor Sandham. Unless directed by the DEP, the company does not have the power to lower the water level.

All lakes above the reservoir were over capacity and drain into the Rockaway River primarily at Beaver Brook in Denville and Crooked Brook in Lake Hiawatha. The Crooked Brook enters Lake Hiawatha on River Road below the reservoir. It is at this point the flooding began.

With a water table as low at 5.23 feet, the ground had easily saturated days before the flood event as it had rained days prior. The saturation level of the ground is an important factor as once the ground is saturated it does not absorb any more rainwater. Runoff will follow the topography of the ground, always leading the nearest rivers and tributaries.

Record Rainfall : On the weekend in question, it is on record that New Jersey experienced the highest rainfall amounts In the state's history. With 17.97 inches total in the month of August, 10.96 inches during the storm and a fall rate of 2 inches per minute at peak times of the storm. This amount of water taxed every water way in the state and the water began to run out of places to go.

The Lower Lake Hiawatha retaining wall was built to withstand a 100 year flood with specific levels of precipitation. This storm exceeded those numbers where the storm was declared a 100 year storm plus 25%. This would put the water level over the wall. The level of water was up to the wall edge at 1pm on Sunday. Once the water began to move over the wall later that evening, SURFACE TENSION (based on the polarity attraction of water molecules) would "pull" the water over the edge of the wall. Water will follow the path of least resistance and continue to flow until all pressure was released.

Downstream, the Passaic River (the outlet for the Rockaway River) was filled to capacity. It is at this connection that the Rockaway River connects perpendicular to the Passaic River. This identical situation occurs in Fairfield and Lincoln Park (Two Bridges Road specifically) where flooding is a yearly occurrence.

The river flow, quantitatively, must be higher upstream and move into a downstream that has room for it. On the night of the storm the upstream river input was 9,100 cubic feet per second. Under ideal conditions, the maximum discharge level for the Rockaway River to empty into the Passaic River was 8,330 cubic feet per second. This would at the very least slow the flow of the river and allow the area behind it to back up causing flooding as the river expanded its' banks to accommodate the increasing pressure.

Although **United Water** was not proactive in lowering the reservoir, there is no evidence that water was released during the evening of Sunday August 28, 2011. On this particular night. The spillway of the dam was being overrun with water. When the level went approximately 4.5 feet above the spillway and did begin to come over, a warning was sent to the Mayor of Parsippany to evacuate the affected area. This was not a warning from United Water that water was being released on purpose by United Water. This was a warning from United Water that the dam was being breached. The Mayor sent out his warning via email and reverse 911 and township acted to safely evacuate every resident from the area.

VISUAL EVIDENCE:

Maps used during this presentation are available for review upon request.

EAC SUGGESTED ACTIONS:

The ENVIRONMENTAL ADVISORY COMMITTEE thanks the Mayor and the Town Council to allow us to present our findings. After reviewing the above data, we would like to make the following suggestions:

Make sure all residents are connected to the reverse 911 emergency call. A new phone purchase or a switch to a cell phone may have changed a residents number and disconnect them from the service. Information about this should be put into Parsippany Life, the Parsippany Patch and the town website.

The township should continue to **monitor and clean ALL storm drains** in the town.

In cooperation with surrounding towns, **a study should be done of the condition of all the streams and rivers**. Particular attention should be on fallen trees, tires and sediment.

An outside firm should be hired to conduct a **full inspection of the Lake Hiawatha retaining wall.** If it is suggested that it needs to be raised or reinforced, the township should seriously look into how to do this.

The Mayor and the township officials, particularly the township engineer, should immediately **begin a dialogue with the executives at United Water** and determine a plan for several different scenarios that may take place in the future.

A long term answer may lie with the States' proposal to build the "Passaic River Flood Tunnel", a project that was started and abandoned in 1990. It was a 20.1 mile pipeline into Newark bay to move the water more quickly during storms such as Hurricane Irene. In 1990, the project would have been 1.8 billion dollars. Right now the government prefers to buy out property prone to flooding This amount would be extensive today but it still seems like an idea that may be a solution to part of the problem.

The EAC would like to express its condolences to the citizens of Lake Hiawatha who were affected by the storm. We have stated here that the conditions for flooding were a synergistic effect of many factors, very little of which was controllable at the time. From North Carolina to Vermont, millions of people were affected by Hurricane Irene. We can look back, learn from what we have experienced and make tomorrow a better day.