FINAL REPORT

FOR

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CONTRACT NO. C301994

WAPPINGER LAKE SEDIMENTATION STUDY
VILLAGE OF WAPPINGERS FALLS

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Prepared for
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1.0 INTRODUCTION:

In the spring of 2008, this office was asked by the Village of Wappingers Falls to perform the tasks associated with the New York State Department of Environmental Conservation (N.Y.S.D.E.C.) Grant C301994. The goal of the study grant is to identify sources and amounts of sediment and suspended solids entering Wappinger Lake from the stormwater drainage system in the Village. The tasks required by the grant are described in the grant contract Program Narrative (Schedule "A"). Three reports have been submitted to date describing the interim status of the project. This is the final report, and provides analysis of the data collected under the grant contract.

2.0 STUDY ACTIVITY:

The following tasks were completed as part of the grant project:

- Available maps of existing storm drainage infrastructure were researched and identified.
- Known, existing storm pipe outlets along the lake shore were located and photographed. Photographs from the start of the project were included in the August, 2008 Status Report. Additional photographs taken during the course of the project are included in this report.
- A protocol for sample collection and measurements in the field was established. A data recording form template was created for field use.
- Samples were collected from various pipe outlets and delivered to Smith Environmental Laboratory for analysis of water samples for Total Suspended Solids content (TSS).
- Locations where overland runoff flows into the lake near existing pipe outfalls were identified. Samples were collected from these locations and delivered to Smith Environmental Laboratory for analysis of water samples for TSS.
- Estimated flow rates at outfall points and amounts of Total Suspended Solids (TSS) in samples were analyzed and compared with precipitation data.
- Existing drainage areas leading to each outfall were identified from existing topographic maps and field investigations. Overland and underground drainage path information was combined to map the drainage areas.

A total of twenty-one (21) sets of water samples were collected between June 27th, 2008 and September 11th, 2009. All of the samples were tested for Total Suspended Solids (TSS) content.

The results of these tests are the basis for the analysis and are included in this report. During the course of this study, samples were collected from every known outfall at least once, with one exception. On any given day, it was difficult to collect samples from every stormwater outfall during every storm because of the vagaries of rainfall.

It was noted in previous reports that the early spring of 2009 was unusually dry. The lack of early rain was made up for during the unusually wet summer. To date, we have collected a number of samples which we believe are representative of typical precipitation events during an 'average' year. No water samples were collected between December 11th, 2008 and March 8th, 2009 because precipitation during this period fell as snow. There was no "rainfall" runoff to sample or test. The last series of samples for this project were collected on September 11, 2009.

We were able to collect only one sample from the North and South pipe outlets at the dam because the area is fenced and locked. As an alternative, we have been collecting samples of overland flow at the end of High Street which we believe can be used as a proxy for the pipes. This overland flow does not actually flow into the Lake behind the dam, however the flow comes from the same general drainage area as the outfall pipes and so we believe it is representative of the flow discharged by the outfalls into the Lake.

This reports includes a summary of all the field data collected as well as copies of all the field sampling reports. All water samples were delivered to Smith Environmental Laboratory in Hyde Park for analysis. The original protocol suggested that TSS would be measured in the field using a portable device. Following a great deal of research, it was determined that there is no portable device available for sale that is suitable for measuring the anticipated, relatively low, levels of TSS in stormwater runoff. All existing portable meters and devices are designed to measure TSS at levels typical in sludge or sanitary waste water. Lab analysis provided both the most accurate and the most cost effective means of determining TSS in the samples.

Our research into available mapping yielded several maps. The most helpful maps include a map of outfalls prepared by the Dutchess County Soil and Water Conservation District (DCSWCD) and an aerial photo GIS map of the Village purchased from the Dutchess County Office of Real Property. There is little to no detailed mapping of the Village's existing storm drain system. We have found most knowledge of the system is anecdotal and relies on individual and institutional memory of construction and maintenance. Based on this finding, we continue to recommend that the Village formally document known information about the current state of the existing drainage system for posterity.

Formal documentation could be as extensive as a complete field survey of the existing drainage system, or as limited as having Village Highway Department employees document structure and pipe locations on paper during regularly scheduled system cleaning.

Using the DCSWCD outfall map, eight (8) pipe outfalls were initially identified. Attempts were made to collect water samples from each of these outfalls during rainstorms. Except for the North Dam outfall, samples were collected from each outfall at least once. Several additional outfall locations were identified during sampling. All of these additional locations carry concentrated overland flows directly to the lake. In most cases, these outfalls were near existing pipe outfalls. The overland runoff flow at some of these locations appeared unable to reach existing storm drains due to grading, clogged piping, or other physical limitations. At other locations, no storm drains existed in the area to collect the flow. Collection and analysis of overland runoff samples was performed the same as for the pipe outfalls.

Testing and analysis of samples established measurable (i.e. greater than 1 mg/L) amounts of TSS on many occasions at all locations. A summary of the sampling results is included with this report. In the previous report, it was noted that samples from the outfalls with the greatest estimated flow rates showed relatively lower concentrations of TSS in mg/L compared to the flow. Samples from the outfalls with lower estimated flow rates had relatively higher concentrations of TSS in mg/L compared to the flow. Overall however, the outfalls with high estimated flow rates carry more sediment to the lake than the outfalls with lower estimated flow rates because the greater volume of water more than made up for the lesser TSS concentration. This general conclusion remains true for the samples collected and analyzed since the last report.

Since this study began, there has been a marked reduction in the amount of trash and debris found in the vicinity of many of the outfalls. Rubbish and trash appear to be regularly collected and removed at most locations, however, new debris is consistently deposited and dropped at all locations. It is recommended that the Village continue with its existing trash removal program. An annual (or more often) sweep of all the publicly accessible pipe outfall sites would further help reduce the amount of rubbish and trash entering the lake. For example, the Village could schedule a volunteer clean-up day for the Lake to coincide with Earth Day activities or other days of volunteering and activism. Alternatively, the Village could create an "Adopt-an-Outfall" program to provide for the regular clean-up of discharge points similar to the adopt-a-highway clean-up program sponsored by the State.

These recommendations are unlikely to reduce the amount of suspended sediment entering the lake, but should reduce the amount of floatable debris in the lake and should generally improve the overall appearance of the lake. Additionally, the involvement of the community in any type of volunteer cleanup activity will increase public awareness of the Lake, pollution, and the importance of protecting the Village's water resources. An increase in public awareness could result in changed behavior by at least some residents as they consider how their activities may affect the Lake.

Included with this report are copies of all the photographs taken during the course of this project. These photographs are submitted to provide a complete photo log for the grant contract.

A review of each outfall area, briefly describing each site and our experiences collecting samples, follows:

Dam & High Street Area:

As of September 2008, we were unable to obtain samples from both of the Dam outfalls because the locks were changed on the fence gate preventing our access to the site. We did not regain access to these pipe outfalls behind the fence. Prior to September, there was only one sample obtained from the South Dam outfall. During other times, no water was flowing out of either pipe. As an alternative, we have collected samples of overland runoff from the southern corner of the end of High Street.

This location is in the vicinity of the dam outfalls and, as previously noted, we believe it is representative of the flow at the outfalls. It has also been possible to measure flow rates at this alternate location on some days. Measuring flow rates out of the dam outfalls is impossible due to their location.

Flow in this area was impacted by nearby road construction on Mill Street during Fall 2008/Spring 2009. On November 25 and December 10, both the runoff and samples were visibly muddy. Sediment in the November 25 sample was primarily due to street construction directly uphill from the dam, at the intersection of High Street and Mill Street. This is reflected in the unusually high level of total suspended solids measured in the November 25, 2008 sample (332 mg/L). We did not expect as high a TSS concentration in the December 10 sample since the street construction was complete and the intersection was re-paved by that time. However, the TSS concentration in this sample was extraordinarily high. The sample collected in April 2009 also contained a relatively high TSS concentration. The changes in TSS led to further investigation of the flow which has confirmed an overall change in flow pattern of runoff at this sample location. We believe the change in flow patterns was a result of the Mill Street construction. During the Summer of 2009, the levels of TSS appear to have stabilized

Brown Avenue Area:

During the growing seasons, access to the outfalls at School Street and Brown Avenue and at West Street and Brown Avenue, was maintained by cutting back brush and vegetation. Access at both sites was easier from late fall to early spring as vegetation had died off. Vegetation and brush remain at the West Street outfall, partly covering the pipe outlet.

During the course of this project, the West Street outfall pipe has been over half full with debris and sediment. The vegetation at the pipe end appears to be rooting in the debris and sediment in the pipe. Flow out of the end of the pipe was inconsistent and samples were only able to be collected during the most intense periods of rain.

As an alternative, water samples were collected from a natural, eroded channel near the pipe. Runoff was noted to flow overland from the end of the paved road to the Lake through this channel. Runoff that was not collected by the storm drainage system and directed to the pipe outfall, appears to flow across the pavement and then through this channel to the Lake. The channel appears to have been created naturally over time as a result of runoff. Water has been noted flowing through this channel and samples have been collected at times when the pipe outfall has had no flow.

It is believed that flow out of the pipe is limited by the sediment in the pipe. Overland flow appears to be a combination of the runoff from the streets and gutters that is not directed to the nearby catchbasins. Overland flow does not appear to be a result of flooding or overflow from the drainage system. However, during a couple of particularly intense storms, the drainage system was inundated and the overflow did appear to contribute to the overland flow. In other words, occurrences of overland flow were not dependent on drainage system overflows, but such overflows did appear to add to and increase the volume of overland flow.

On some occasions, residential yard waste had been dumped at the West Street end of Brown Avenue where the pavement ends. This waste may have affected overland sheet flow by concentrating and directing it toward the channel. It may also have added to the total sediment in the lake as runoff can carry small waste particles as it flows to the lake. In spring 2009, household garbage was dumped in the area – apparently on private property – along the lake bank.

At the School Street end of Brown Avenue, an access path to the outfall was cut and maintained to allow sample collection and outfall monitoring. The outfall pipe is in good condition with no apparent restrictions to flow. During the fall, it was noted that fallen leaves tended to impede flow into the catchbasins at the street. Regular cleaning or maintenance of catchbasin grates during the fall will eliminate this issue.

Pelham & Mill Street Area:

At this location, the outfall pipe extends through a wood and concrete bulkhead to the lake. The end of the pipe has been bent out of round. There is a 'sandbar' beneath the pipe where a small boat is stored. The pipe invert at the outfall point has been at or below the lake water level during every site visit. As a result, it was not always possible to measure or estimate the flow rate out of the pipe.

Determining flow rate estimates at this outfall was a challenge for the duration of the project due to the pipe elevation.

Starting in November 2008, stormwater runoff was noted flowing over the edge of the bulkhead directly into the lake from the road on multiple occasions. During the summer of 2009, this overland flow was sampled and analyzed. TSS levels in these overland flow samples were comparable to those measured in the outfall samples. This leads to the conclusion that the solids are suspended in the runoff stream before the flow reaches the catchbasins at the intersection of Pelham and Mill Street. Additional sediment and solids are not suspended near or within the intersection.

Further investigation of the runoff over the bulkhead identified this flow as road runoff that is running out of the street gutter and over the bulkhead before it can be collected by the existing road drainage system. The flow has caused some surface erosion and started to create a channel from the road's edge to the bulkhead. An asphalt patch or berm was constructed, presumably by the Village, to limit further erosion at this location. This patch has slowed, but not blocked, the flow.

On December 10, 2008, it was noted that slightly muddy water was running down Pelham and into the catchbasin at the head of the outfall pipe. The muddy runoff was tracked back to a residential construction project up the hill. The home owner appeared to be constructing a new garage extension/expansion and the area of the yard around the building had turned to mud. We, therefore, expected to see, and did see, an elevated level of total suspended solids in this sample. Construction at this site has since been completed and the yard stabilized with vegetation. We believe that TSS levels in the samples from April and May of 2009 reflect unvegetated soil, road sand, and road salt carried by the runoff.

Veteran's Park Area:

Veteran's Park is one of two sites where we were able to collect samples on every attempt. We believe that we were able to collect samples from this outfall on every attempt because this outfall experiences dry weather flow. As a result, we can identify some trends from the data. The existing outfall is a 42" corrugated metal pipe. The pipe discharges into a short, rip-rap stone lined channel leading directly into the lake. The pipe and the channel are in good condition. The drainage area of this outfall is the largest in this study at 140.1 Acres.

The shoreline and area around the outfall at Veteran's Park remain generally free of litter, presumably due to regular cleanup by Village forces. A silt fence was installed along most of the lake shore line during 2009. Various birds, primarily geese, but also swans and ducks, make the park their home during the warm weather and their droppings are evident throughout the park.

In the fall of 2008, the Village planted seedlings along the lake shore in an attempt to reduce the bird population near the lake by breaking up the existing open field. Most of these seedlings died or were cut down in the spring of 2009. Over the long term, a planting program should help stabilize and protect the lake shore to a certain extent, but is unlikely to affect the outfall flows.

During the initial investigation of the site in June 2008, litter was noted along the lake shore. Since that time, following the installation of the silt fence and other changes at the park, litter is no longer apparent along the shoreline. Occasionally, floatables, such as water bottles or cans, have been noted, but the amount and frequency of such litter has been greatly reduced since the start of this project.

The park also has a boat launch and a dock for residents. The boat launch roadway is paved, but the adjacent parking area is dirt and gravel. Intermittent soil erosion in the parking area between the paved roadway and the dock was noted. Intense rainstorms during the summer of 2009 provided an opportunity to collect two samples of the runoff causing the erosion between the paved boat launch road and the dock. These samples showed that the runoff had high concentrations of TSS. The eroded area directly between the boat launch and the dock was subsequently repaired and paved by the Village between 8/13/09 and 9/11/09. The new pavement appears to have stopped further erosion in the area.

Liss Road Park Area:

The park on Liss Road has two outfalls. The larger outfall carries water from the N.Y.S.D.O.T. Route 9 drainage system and is outfitted with a trash rack. The smaller outfall carries Village drainage system flows. We have been able to collect samples from both outfalls on almost every attempt because both outfalls experience dry weather flow. As at Veteran's Park, enough samples have been collected from these outfalls to identify some trends from the data.

Both outfall pipes are corrugated metal and discharge through a concrete headwall structure to a short, rip-rap lined channel. The headwall and the pipes are in good condition. The drainage area of the N.Y.S.D.O.T. outfall is approximately 134.8 Acres. The drainage area of the Village outfall is estimated as 14.58 Acres.

During the summer of 2009, there were two occasions where flows out of the N.Y.S.D.O.T. outfall were dangerously high. No samples could be safely collected from the N.Y.S.D.O.T. outfall on 6/18/09 or on 7/21/09. Photographs of the extraordinary flow out of the N.Y.S.D.O.T. outfall are included in the photo log of this report.

The trash rack on the N.Y.S.D.O.T. outfall tends to collect litter and debris. It is unknown whether trapped material is removed from the rack by hand, if it is forced through the rack by the flow, or if some combination of these actions clear the trash.

In any case, the type and quantity of debris in the trash rack changes with each storm. In general, the area directly around the outfalls is otherwise free of litter and debris. Trash and debris were noted within the park and along the lake shore during past visits. Cursory reviews of the site since have noted some debris and trash remain, but much of it has been removed. Trash collection barrels exist at the park and are maintained.

These outfalls experience dry weather flow which is believed to be the reason we have been able to collect samples on every attempt. The Village is currently working with the N.Y.S.D.O.T. to install Vortechnics stormwater separators along Route 9 to reduce sediment load from Route 9 to the lake. This improvement should directly affect flow out of the N.Y.S.D.O.T. outfall. The improvement project is currently out to bid and the contract has been awarded. Construction will be partially funded by a separate grant from the N.Y.S.D.E.C. The N.Y.S.D.O.T. will maintain the separators in the future.

3.0 ANALYSIS:

The first part of the analysis for this project required that we identify the drainage areas contributing to the flow out of each outfall. As would be expected, the largest outfall pipes collect runoff from the largest drainage areas. The smaller outfall pipes have small, localized drainage areas. The smallest drainage area, approximately 3 ¼ Acres, flows to the outfall at West Street and Brown Avenue. The largest drainage area, approximately 140 Acres, flows to the outfall at Veteran's Park. The drainage areas for both the outfall at Veteran's Park and the N.Y.S.D.O.T. outfall at Liss Park include areas outside the municipal boundary of the Village. The existing drainage areas leading to each outfall are shown on the map enclosed with this report. The areas of each drainage basin, as calculated by planimeter, are also shown on the map.

This office made a total of twenty-one (21) attempts to collect water samples from each outfall between June 27th, 2008 and September 11th, 2009. Samples were collected every time from the Village outfall at Liss Park and from the outfall at Veteran's Park. Samples were collected from the N.Y.S.D.O.T. outfall at Liss Park on all but two occasions. Sampling was more sporadic at the other outfalls because there was not always flow at each outfall. The collection of samples from these other outfalls was not only dependent on the amount of precipitation, but also on the intensity of precipitation at the exact time of collection.

In the Brown Avenue area for example, the rainfall had to be consistently intense in order to create flow and allow sampling from the pipe outfalls. Regardless of the reported amount of rainfall, if precipitation was not intense during the exact time when samples were collected, then there would not be any flow out of the outfall and no sample could be collected. It is believed that the lack of flow from outfalls during low intensity precipitation events, specifically in the Brown Avenue area, is due to the small drainage area.

All known stormwater outfalls from the Village stormwater system were photographed at the start of the study. At some pipe outfall locations, natural channels carrying concentrated overland flow were identified. These overland outfalls were also photographed. No other outfalls to the lake from the Village were identified during the course of the study.

Samples were collected from all of the known outfall locations, except one, during the course of the study. Raw water samples were delivered to Smith Environmental Laboratory to test the level of Total Suspended Solids in each sample. The results from Smith Lab are included with this report and form the basis for the analysis of stormwater runoff sediment load calculations.

Instantaneous flow from each outfall at the time each sample was collected was estimated by timing how long it took for the flow to fill a known volume. In most cases, we measured the amount of time to fill a one liter sample bottle and converted that measurement into gallons per minute. The largest container we had available was a five gallon bucket and so the maximum flow rate we could measure was approximately 300 GPM. Several times the flow from the Veteran's Park and the Liss Park outfalls overflowed the five gallon bucket in less than 1 second. Accurate measurement of flow rates above 300 GPM (5 gallons/ 1 second) was not possible.

Flow rate estimates could not be measured at each outfall on every occasion. In some cases, particularly when flows were small, there was simply not enough discharged water to estimate flow from an outfall point. In other locations, the discharge point was at ground level or submerged thereby preventing measurement of the flow out of the pipe. This often occurred at the End of High Street, the Pelham & Mill Street outfall and the West St. & Brown Avenue outfall. In the particular case of the West Street and Brown Avenue outfall, the pipe was - and remains - partially filled with sediment. The sediment in the pipe is believed to be masking or blocking flow out of the pipe. The overland flow channel at this location was occasionally blocked with debris, thereby spreading out the flow and preventing its collection. Depending on the lake water level and erosion in the overland channel, the discharge was level with the lake surface thereby preventing flow measurement out of the channel at the discharge point. This situation also occurred at the Pelham & Mill Street pipe outfall.

Precipitation data for the study period was taken from NOAA/NNDC/NCDC Climate Data Reports for the Dutchess County Airport Weather Station, Poughkeepsie. This is the closest NOAA weather station to the study area and it is also within the Wappinger Creek watershed. We believe it provides a good estimate of the weather that affected the Village drainage system and the Lake. Precipitation events were identified as "Days with Rain or Drizzle" at the weather station from the NOAA's Global Summary of the Day.

Several graphs of the sample data collected are included with this report. The graphs show the estimated flow (gallons per minute) at the outfall on a given day with the amount of total suspended solids (milligrams per liter of water) measured in the sample. The graphs also note the amount of precipitation recorded by the NOAA weather station at the Dutchess County Airport on each day a sample was collected.

In some cases this spring, no precipitation was recorded at the Airport, but there was rainfall in the Village and samples were collected. On June 3rd specifically, a deliberate attempt was made to collect samples at the very start of rainfall in order to try to measure TSS in the "first flush" of a storm. This yielded limited results as most of the outfalls did not have any flow because it had not rained enough at the time of sampling to generate runoff at most locations.

In other cases, particularly during the summer of 2009, it appears from the NOAA rainfall data that relatively small rainstorms generated unexpectedly large amounts of runoff. For example, on July 16, 2009 a rainfall of 0.5" generated flows equal or greater than several larger rainfall events. Precipitation on adjacent days does generally affect the amount of runoff generated by a given storm. When rain fell the day before a sample was collected, the ground was saturated and the amount of runoff generally increased because rain could not be as easily absorbed into the soil.

This disparity may also be a function of when the samples were collected during each storm. If a sample and accompanying flow rate measurement were collected earlier in a large storm, the flow estimate would not reflect the peak runoff during the storm. Alternatively, if a sample and accompanying flow rate measurement were collected later during a smaller storm, the flow estimate may be larger because of the longer time of concentration. This highlights one of the inherent limitations in the method used to collect flow data.

Some trends appear in the sample data, especially in samples collected from Liss Park and Veteran's Park. There is a definite difference between the summer flows and total suspended solids measurements and the autumn samples, the turning point being the storm on September 9, 2008. There is also a change in TSS visible between summer through fall and winter through spring samples. From November through April, there is an obvious increase in TSS at most every outfall. The late spring was unusually dry in 2009, and so we did not see an expected large increase in runoff and TSS after April. Data from the summer of 2009 indicated increases in TSS over levels measured the previous summer. This is believed to be due to the greater rainfall in the summer of 2009.

The first trend can be explained for the most part by natural processes. In the summer, warm temperatures increase evapo-transpiration and generally drier soil conditions absorb more stormwater, thereby reducing runoff.

In autumn, fallen leaves and vegetation provide increased potential for solids to be suspended and transported by stormwater runoff. Generally wetter conditions and cooler weather also act to increase runoff quantities. In the summer of 2009, unusually wet weather resulted in both increased flows and increased TSS. The TSS increases between November and April we believe to be a result of sand and de-icing salt used over the winter being carried to the lake by stormwater runoff. TSS concentration spikes in March and April support this hypothesis.

It was previously reported that the three largest outfalls, Liss Park NYSDOT, Liss Park Village, and Veteran's Park, carry the greatest volume of runoff and solids to the lake. This remained generally true in the months since our last report and is true for the overall study period. During the summer of 2009, there was one occasion, July 16, in which outfalls at West St. and Brown Ave. carried more solids to the lake than the Liss Park Village outfall.

Though the Liss Park and Veteran's Park outfalls have generally lower **concentrations** of TSS than the other outfalls, the larger volume of water passing through these three outfalls transports a larger overall amount of TSS to the lake than the other outfalls. It was previously noted that the outfalls with lower flows generally tended to contain higher concentrations of TSS. However, even with the higher concentration of TSS, because the flow rates are much smaller, the lower flow outfalls discharge a small overall amount of TSS to the lake relative to the large outfalls at Veteran's Park and Liss Road.

The discharge from outfalls at the end of High Street and at Pelham & Mill Street were impacted by construction site runoff during the study period. The flow pattern of overland runoff at the end of High Street was changed permanently due to construction in 2008 on Mill Street. The underground drainage pipes and the overall drainage basin areas did not change. The overland flow path was affected by the regrading and paving of Mill Street at the intersection with High Street. The impact at Pelham & Mill Street was temporary, with TSS levels returning to more typical levels in 2009. The sediment laden runoff from up-slope construction activity accounts for at least part of the increase in total suspended solids at these two locations the fall of 2008. Both construction sites were too small to be regulated under the N.Y.S.D.E.C. SPDES Phase II Stormwater Permit for construction.

We have calculated an estimate of the amount of sediment carried by runoff to the Lake during the study period on the days when samples were collected. This calculation yielded a total load of 5,028.09 pounds of sediment and is based only on the field data collected. The amount of sediment generated during each storm does not appear to directly correlate with the total rainfall amount. Sediment is more dependent on the intensity of the storm. We had no way to determine rainfall intensity except to infer from the precipitation reported by the Airport.

We were unable to develop a satisfactory correlation between the TSS in the sampled storms and the precipitation reported at the Airport because TSS levels appear to be dependent on rainfall intensity. There was no statistically meaningful way to extrapolate sediment loading for days when it rained but no samples were collected without having rainfall intensity measurements from both the Airport and from the outfalls during sampling.

We can, however, draw several conclusions from the sample data with regard to the amount of sediment that would be transported to the Lake during a specific size and intensity of storm.

There are seasonal variations in sediment load between the winter and early spring flows and the remainder of the year. Consider the sample data from 11/25/08, 12/10/08, and 3/9/09 in comparison to the rest of the data. First, it is noted that the 24-hour precipitation amount for 12/11/08 was 0.55 inches. The hour at which the 24-hour observations were made is unknown, but we believe a portion of this rain fell on 12/10/08. There are other sample days, such as 7//21/09, where it is only reasonable to assume that a portion of the rain fall reported on the following day occurred on the sample day. Rainfall, and the amount of rain, on adjacent days affects the TSS level measured in the samples and the sediment load since saturated soils result in increased runoff.

We can safely state that precipitation on 11/25, 12/10, and 3/9 was between 0.25" and 0.56" of rain. These relatively small rainfall amounts resulted in relatively larger sediment loads of 240 to 340 pounds per day. In the summer and fall, much larger precipitation amounts were necessary to generate similar loads. For example, on 6/9/09 and 6/18/09 24-hour rainfalls of 1.07 and 0.9 inches respectively resulted in loads of approximately 105 and 250 pounds per day. It is believed that the larger sediment load in the winter is primarily due to de-icing sand and salt on the roads. We can conclude that future rainstorms of the size noted during the winter and early spring would result in similar sediment loads. In other words, a 24 hour rainstorm of approximately 0.25" to 0.5" during the winter or early spring would be expected to result in a total load of between 250 to 350 pounds of sediment per day transported to the Lake. A similar size storm in the summer or fall would be expected to result in a total load of only between 20 and 50 pounds of sediment per day. In the summer, a storm of 0.9" or greater would be needed to generate sediment loads over 250 pounds per day. Storms with less than 0.25" of rainfall during the summer and fall appear to typically generate less than 20 pounds of sediment per day. Summer storms with less than 0.75" of rainfall appear also to typically generate less than 100 pounds of sediment per day. There is no data from the winter and early spring months that establishes the sediment load for storms less than approximately 0.25 inches. It could be argued that such storms may be comparable to summer storms of twice the rainfall. Alternatively, such small storms in the winter may generate reduced sediment load because of the frozen ground and/or snow cover.

There were a couple of unique storms during the study period. The first occurred on 9/9/08, the second on 7/16/09, and the third between 7/21/09 and 7/22/09. These storms generated unusually large amounts of sediment according to our calculations. On 9/9/08 it was noted in the precipitation data that 1.38 inches of rain fell during two (2) six-hour report periods. During at least one of the six-hour report periods, more than 0.5 inches of rain must have fallen. On 7/16/09 it was noted that 0.5 inches of rain fell within one six-hour report period. The 9/9 storm created the largest load of sediment calculated on any sample day during 2008, including the winter storm events. The 7/16 storm created the largest load of sediment calculated during the study period. These high loads also correspond with the highest estimates of total flow from the outfalls in million gallons per day. These two storms had at least one period each of very intense rainfall. The corresponding calculations of estimated flow and total load lead to the conclusion that the intensity of rainfall, reflected in the high flow rates, has a direct effect on the total load of sediment.

It can be further concluded from the sample data that very intense storms, regardless of the total amount of rainfall, will result in the transport of large amounts of sediment to the Lake. This is demonstrated by the above information and the data from the 7/21 storm. A 24-hour rainfall amount of 0.01 inches was recorded at the airport on 7/21/09. A 24-hour rainfall amount of 0.94 inches was recorded on 7/22/09. It is reasonable to infer that a portion of the rain recorded on 7/22/09 actually fell on 7/21/09. Furthermore, based on the total flow of 1.32 MGD calculated for 7/21, it is reasonable to believe that the rain fall was fairly intense for a period during that day. Our field sampling report for that day noted steady rain and heavy flow at all outfalls during the collection of samples. In fact, a sample for TSS analysis could not be obtained from the N.Y.S.D.O.T. outfall at Liss Park because it was deemed unsafe due to the very heavy flow at the outfall. The total load of sediment calculated for this storm was approximately 416 pounds per day. This amount is much higher than the load calculated for the 6/9/09 storm wherein rainfall of 1.07 inches was reported. The difference in estimated total flow rate further confirms the greater intensity of rainfall during the 7/21 storm.

The storms on 9/9/08, 6/18/09, 7/16/09 and 7/21/09 all had approximate total flow calculated at approximately 1.3 MGD. They also all had total loads of sediment that were significantly higher than other summer storms with comparable, reported precipitation amounts. It can be concluded from the data, and it follows logically, that the total sediment load will be largest at times when the total flow from the outfalls is largest. However, the total flow is not always largest when the reported rainfall is highest. The total flow out of the outfalls was not a simple, direct relationship to the amount of rainfall, but was instead more dependent on the intensity of the rainfall. We would expect that future rainstorms with high intensity, not necessarily high rainfall amounts, will result in the largest sediment load to the lake.

We have calculated an approximate volume of solids delivered to the lake for the sampled storms based on the total load estimates. The unit weight of sediment was assumed to be 100 pounds per cubic foot (pcf). The unit weight of water is 62.4 pcf. The saturated weight of the sediment is the unit weight of the sediment minus the unit weight of water, or 37.6 pcf. The saturated weight was used for the sediment because the load calculations are based on the Total Suspended Solids measurements. Suspended solids measured by the TSS analysis are assumed to also be saturated.

The total volume of sediment calculated from the samples collected during the study period is approximately 133 cubic feet. This amount is calculated only from the 21 samples that were collected and analyzed between 2008 and 2009. The total volume of sediment for the length of the study period, assuming every storm during the period was included in the calculation, could not be determined from the collected data.

The data can be used to predict sediment volumes for future storm events with similar precipitation and intensity levels. For example, during the intense storm on 7/16/09, over half of the volume of solids were transported to the Lake. Other storms of high intensity and high estimated flow rate generated larger volumes and amounts of sediment, relative to the smaller, less intense storms. The lesser storms appear to generate less than 2 cubic feet of sediment per storm, whereas the larger storms generate from approximately 3 to 12 cubic feet of sediment. By this measure, about seven of the samples came from 'larger' storms. The largest storm, on 7/16/09, is in a class by itself.

For the future, it could be predicted that a typical 'large' storm, similar to those occurring 12/10/08 in the winter and 6/18/09 in the summer, would produce six to ten cubic feet of sediment. Storms of these sizes occurred several times during the study period and would likely occur several times per year – at least once per month on average. It could also be predicted that a major storm, similar in size and intensity to the 7/16/09 storm, would produce 60 to 80 cubic feet of sediment. A storm of this size might occur once or twice per year on average.

It is noted that this study encompasses only the outfalls to the Lake from the Village and its vicinity. The total area draining to these outfalls is approximately 310 acres. Located entirely within Dutchess County, the Wappinger Creek watershed, which feeds the Lake, drains approximately 134,871 acres of land within 11 towns and 2 villages. Thirty eight miles long, the Wappinger Creek originates in extensive wetlands and lakes in the Town of Pine Plains. The acreage included in this study represents 0.2% of the total watershed.

4.0 RECOMMENDATIONS:

We reiterate our previous recommendation that the Village require all private construction projects and all municipal projects within areas that drain to the lake employ and maintain basic erosion and sediment control measures. These measures should be installed to trap sediment from potential runoff flows entering gutters, storm drains, and streets. Basic measures should be required regardless of the N.Y.S.D.E.C. permit regulations. This requirement could be developed and included as part of the Village's MS4 program.

At Pelham and Mill Street, action should be taken to redirect and limit the overland flow seen running over the existing bulkhead wall. This flow is erosive to the roadway, wall, and sandbar at the base of the wall. Continued erosion could undermine the existing pavement and road shoulder as well as damage the wall. Although the flow rate and the TSS levels are not extremely large, the potential for damage to the road and bulkhead wall should make action at this location a priority.

We recommend, as a result of the photo survey and regular site visits, that the Village continue regular trash pickup at Veteran's Park, Liss Park, and all other Village owned points of public access to the lake. We continue to recommend that the Village plan and arrange for cleanup of trash and debris along the lake shore and within the lake where possible.

Cleanup could be effected by community volunteers as part of the Village's existing public involvement program under the Phase II Municipal Separate Storm Sewer System (MS4) Permit. Alternatively, a mass public cleanup event could be coordinated with annual Earth Day or other environmental events associated with protecting the Hudson River watershed. Consideration of an education and/or involvement campaign that targets private property owners along the lake may be appropriate since some of the debris and trash is only removable through private property. In some locations it appears litter was removed only to be replaced with new litter after a few weeks. We reiterate our recommendation for stricter enforcement of anti-littering ordinances at Village Parks such as Veterans Park and Liss Road.

It is noted that debris remains floating in the lake trapped behind the dam year round. We recommend that the Village work with Windsor Machinery to arrange for removal and disposal of this debris. It is recognized that this debris is a watershed wide issue that cannot be resolved by the Village alone. It is also recognized that this debris does not necessarily affect the sediment transported to the lake. However, the same type of concentrated, watershed-wide, effort needed to clean up and reduce the debris pollution behind the dam should also help reduce sedimentation of the lake.

We suggest that the path to the outfall at School Street and Brown Ave. be cleared of brush during the growing seasons to facilitate general monitoring of the lake and outfall.

Lastly, we recommend that the outfall pipe at West Street and Brown Ave. be cleaned of all existing sediment. Since this area has apparently been used in the past as a dump for yard waste and residential debris, regular maintenance to clean out the pipe and the area around the outfall should be considered. The surrounding neighborhood may be an ideal location to test a future public education and involvement campaign to reduce pollution directed at lake front property owners. Alternatively, this may be a good location to establish an "Adopt An Outfall" program. During our most recent visit to the site on December 16, 2009, a "No Dumping" sign had been posted near the outfall, at the end of Brown Avenue. It is worth continuing to monitor this site to see if the sign causes a reduction in the amount of material dumped at this site.

5.0 SUMMARY:

Historical and anecdotal evidence state that Wappinger Lake used to be much deeper and that, over the years, the Lake has slowly been filled with sediment and silt. It is known that the existing storm drainage systems discharges some sediment and solids into the Lake. This study has attempted to quantify the amount of sediment and silt discharged to the Lake through the Village's storm drainage system.

In mapping the drainage areas, this study has outlined areas draining to the lake which are either outside the Village boundaries or not controlled by the Village. Areas outside the Village, specifically the N.Y.S.D.O.T. outfall at Liss Park, carry as much or more silt and sediment to the Lake as areas within the Village. The outfalls from the two largest drainage areas, at Liss Park and Veteran's Park, were found to experience dry weather flow. It was beyond the scope of this study to determine the source(s) of this flow. No other outfalls carried flow in dry weather.

The scope of this study was limited to the Village. A larger study would be necessary to address the larger issue of siltation, sedimentation and general pollution of the Lake from the Wappinger Creek and the overall, upstream watershed. The larger watershed appears to be the source of most of the debris and trash behind the dam. However, the Village must continue to clean up trash and debris at Village Parks and points of public access to the Lake in order to avoid adding to the debris in the lake.

Appendix "A"

Total Suspended Solids Analysis Test Results

08-030 Village of Wappingers Falls Lake Study N.Y.S.D.E.C. Grant Contract No. C301994

Total Suspended Solids (TSS) Analysis - Test Results

Location	1	2	3	4	5	6	7	8	9	10	11	12
	Liss Rd - NYSDOT	Liss Rd - Village	Veterans Park	Pelham & Mill St	Dam - North Outlet	Dam - South Outlet	School St & Brown	West St & Brown	End of High St (Dam)	West & Brown Overland	Mill & Pelham Overland	Veterans Park Boat Launch
	Est. Flow / TSS mg/L / Time				Due to location, flow cannot be measured	Due to location, flow cannot be measured.						
Sample Date									Alternate Sample for Locations 5 & 6			
6/27/2008	16.6 GPM < 1 3:45 PM	6.3 GPM < 1 3:50 PM	3.8 GPM < 1 3:20 PM									
7/14/2008	40.5 GPM < 1 9:55 AM	10 GPM < 1 9:55 AM	70 GPM 3 9:40 AM	0 9:35 AM	0 9:15 AM	Unable to I < 1 9:20 AM	0 8:52 AM	0 9:00 AM	Unable to I < 1 9:20 AM			
7/23/2008	78.9 GPM 6 4:28 PM	13.2 GPM 5 4:32 PM	28 GPM 6 4:14 PM	Submerge 11 3:56 PM	Did not collect sample	Did not collect sample	30 GPM 65 3:25 PM	Inadeq. Flo 8 3:40 PM	Did not collect sample			
8/19/2008	27.9 GPM 2 11:27 AM	6.7 GPM 1 11:32 AM	7.5 GPM 1 10:36 AM	0 10:29 AM	0 11:00 AM	0 11:00 AM	0 10:25 AM	0 10:15 AM	0 11:00 AM			
9/9/2008	>300 GPM 10 11:25 AM	>300 GPM 8 11:20 AM	300 GPM 67 11:10 AM	1.98 GPM 12 11:00 AM	NO ACCESS - LOCKS 10:50 AM	CHANGED 10:50 AM	20 GPM 32 10:45 AM	Unable to I 3 10:30 AM	3.97 GPM 32 10:55 AM	Additional Sample for Location 8		
9/26/2008	200 GPM 4 11:45 AM	150 GPM 3 11:42 AM	160 GPM 20 11:25 AM	Inadeq. Flo 6 11:15 AM	NO ACCESS - LOCKS 10:56 AM	CHANGED 10:56 AM	19.8 GPM 2 10:42 AM	Unable to I 25 10:25 AM	0.53 GPM 43 10:58 AM	7.0 GPM 115 10:30 AM		
10/28/2008	100 GPM 3 11:00 AM	24 GPM 1 10:55 AM	71.4 GPM 10 10:40 AM	Inadeq. Flo 5 10:16 AM	NO ACCESS - LOCKS	CHANGED	0.28 GPM 9 9:53 AM	0 9:40 AM	Unable to I 22 10:05 AM	3.17 GPM 10 9:40 AM		
11/25/2008	250 GPM 34 9:35 AM	150 GPM 29 9:30 AM	160 GPM 37 9:55 AM	Inadeq. Flo 50 10:05 AM	NO ACCESS - LOCKS	CHANGED	2.11 GPM 81 9:12 AM	0 9:00 AM	Unable to I 332 10:15 AM	0 9:00 AM		
12/10/2008	>300 GPM 34 10:35 AM	188 GPM 24 10:30 AM	136 GPM 37 10:15 AM	4.2 GPM 57 10:06 AM	NO ACCESS - LOCKS	CHANGED	6.35 GPM 420 9:45 AM	0 9:30 AM	3.77 GPM 687 9:59 AM	0 9:35 AM		
3/9/2009	42.9 GPM 148 10:25 AM	75 GPM 272 10:26 AM	85.7 GPM 5 10:14 AM	Inadeq. Flo 8 10:07 AM	NO ACCESS - LOCKS	CHANGED	3.96 GPM 282 10:40 AM	0 9:50 AM	0 10:00 AM	1.44 GPM 346 10:45 AM		
4/3/2009	85.7 GPM 56 11:00 AM	22.2 GPM 43 10:58 AM	37.5 GPM 5 10:43 AM	Inadeq. Flo 162 10:33 AM	NO ACCESS - LOCKS	CHANGED	0 9:57 AM	0 9:50 AM	0.72 GPM 130 10:21 AM	0 9:50 AM		
4/21/2009	75 GPM <1 11:42 AM	10.1 GPM <1 11:40 AM	51.7 GPM 2 11:30 AM	0 11:24 AM	NO ACCESS - LOCKS	CHANGED	0 11:13 AM	0 11:10 AM	0 11:20 AM	0 11:10 AM		
5/14/2009	100 GPM 8 2:10 PM	20.3 GPM 3 2:05 PM	26.1 GPM 4 2:20 PM	Inadeq. Flo 158 2:25 PM	NO ACCESS - LOCKS	CHANGED	0 2:42 PM	0 2:50 PM	0 2:28 PM	0 2:50 PM		
6/3/2009	40 GPM 1 2:25 PM	13.6 GPM <1 2:20 PM	20 GPM 2 2:35 PM	0 2:45 PM	NO ACCESS - LOCKS	CHANGED	0 2:00 PM	0 2:05 PM	0 1:55 PM	0 2:05 PM		
6/9/2009	300 GPM 2 10:45 AM	50 GPM 2 10:42 AM	>300 GPM 28 10:30 AM	Inadeq. Flo 19 10:15 AM	NO ACCESS - LOCKS	CHANGED	0.79 GPM 5 9:45 AM	0.05 GPM 90 9:25 AM	Inadeq. Flo 158 9:55 AM	0.89 GPM 18 9:22 AM	Additional Sample for Location 4	Additional Sample for Location 3
6/18/2009	>300 GPM Did not col 10:42 AM	>300 GPM 25 10:40 AM	>300 GPM 42 10:15 AM	Submerge 75 10:00 AM	NO ACCESS - LOCKS	CHANGED	0.21 GPM 6 9:25 AM	2.44 GPM 61 9:45 AM	7.22 GPM 50 9:55 AM	Inadeq. Flo 81 9:35 AM	9.33 GPM 38 10:06 AM	2.26 GPM 191 10:22 AM
7/2/2009	300 GPM 2 10:00 AM	60 GPM <1 9:57 AM	>300 GPM 7 9:40 AM	Submerge 21 9:32 AM	NO ACCESS - LOCKS	CHANGED	0.18 GPM 4 9:07 AM	0 8:55 AM	0 9:20 AM	0.17 GPM 4 9:00 AM		
7/16/2009	>300 GPM 37 12:15 PM	300 GPM 12 12:13 PM	>300 GPM 673 12:00 PM	Submerge 33 11:45 AM	NO ACCESS - LOCKS	CHANGED	11.3 GPM 39 11:30 AM	15.9 GPM 178 11:17 AM	1.44 GPM 100 11:38 AM	15.9 GPM 513 11:15 AM	0.09 GPM 32 11:50 AM	
7/21/2009	>300 GPM Did not col 11:49 AM	>300 GPM 12 11:49 AM	>300 GPM 102 11:26 AM	2.65 GPM 8 11:17 AM	NO ACCESS - LOCKS	CHANGED	4.54 GPM 29 10:55 AM	0.63 GPM 80 11:10 AM	5.29 GPM 28 11:08 AM	3.97 GPM 32 10:50 AM	7.22 GPM 7 11:19 AM	1.59 GPM 254 11:30 AM
8/13/2009	176 GPM 3 10:08 AM	40 GPM 2 10:02 AM	160 GPM 4 9:53 AM	Inadeq. Flo 13 9:43 AM	NO ACCESS - LOCKS	CHANGED	1.44 GPM 3 9:20 AM	0 9:10 AM	Inadeq. Flo 96 9:35 AM	0.22 GPM 38 9:10 AM	0 9:45 AM	
9/11/2009	150 GPM 8 2:40 PM	107 GPM 4 2:35 PM	136 GPM 21 2:23 PM	Submerge 6 2:14 PM	NO ACCESS - LOCKS	CHANGED	3.31 GPM 3 1:58 PM	0 1:50 PM	1.59 GPM 18 2:07 PM	0.40 GPM 22 1:50 PM	0.35 GPM 6 2:16 PM	Newly Paved - No Flow 2:20 PM

Note: Estimated flows are reported in Gallons Per Minute (GPM) in this chart. One GPM equals 0.002228 Cubic Feet per Second (CFS) equals 0.00144 Million Gallons per Day (MGD)

(1)

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: FRIDAY 6/27/08 **Temp:** 85°F

Weather: SCATTERED RAIN, CLOUDY, HUMID

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes	
VETERAN'S PARK OUTLET	3:20PM	15.75 SEC/ 1 GAL	~~[illegible]~~ DRAIN PIPE OUTFALL	PHOTO
VILLAGE LISS RD	3:40PM	9.5 SEC/ 1 GAL	~~DRAIN~~ PIPE OUTFALL (VILLAGE-RIGHT)	PHOTO
DOT LISS RD	3:45PM	3.6 SEC/ 1 GAL	DRAIN PIPE OUTFALL (DOT - LEFT)	PHOTO?

Additional Locations:

Additional Comments: RAINING WHILE SAMPLES WERE BEING TAKEN. ALL SAMPLES TAKEN AT PIPE OUT FALLS FROM FLOW OF WATER EXITING THE STORM DRAIN PIPE
SAMPLES HELD IN REFRIDGERATOR FROM FRIDAY AFTERNOON - DELIVERED TO SMITH ENV. LAB ON MONDAY 6/30/08 AT

Technician: JES. Date: 6/27/08

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

(2)

Date: 7/14/08 **Temp:** 70°

Weather: MOSTLY CLOUDY, ~~INTERMITTENT~~ SHOWERS PREVIOUS NIGHT

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
7 SCHOOL + BROWN	8:52 AM	NO FLOW	
8 WEST + BROWN	9:00 AM	NO FLOW	
5 DAM 1 - NORTH	9:15 AM	NO FLOW	
6 DAM 2 - SOUTH	9:20 AM	LOW - UNABLE TO MEASURE DUE TO OUTFALL LOCATION	SAMPLE TAKEN
4 MILL + PELHAM	9:35 AM	NO FLOW	
3 VETERANS PARK	9:40 AM	5 GAL / 4.28 SEC	48'Ø CMP
1 LISS PARK - DOT	9:55 AM	5 GAL / 7.4 SEC	
2 LISS PARK VILLAGE	9:55 AM	5 GAL / 30 SEC.	

Additional Locations:

Additional Comments: NO RAIN FALLING DURING SAMPLING PERIOD. TOOK SAMPLE AT LOCATION 6 BY HANGING BOTTLE INTO FLOWPATH ON A STRING FROM ABOVE.

Technician: JES. Date: 7/14/08

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

(3)

Date: 7/23/08 **Temp:** 78°F

Weather: SCATTERED SHOWERS.

Total Suspended Solids Measurement

	Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
RAINING	SCHOOL BROWNAV. (7)	3:25 PM	5 GAL / 10 SEC	RE-LABEL BOTTLE.
RAINING	WEST/ BROWN (8)	3:40 PM	FLOW NOT ADEQUATE TO MEASURE RATE	COULD NOT SAMPLE PIPE END, USED END OF NATURAL DITCH NEXT TO PIPE, CARRIES DOWN STREET DIRECTLY TO LAKE.
			OVERFLOW FROM CB/PIPE	
RAIN STOPPED	PELHAM/ MILL (4)	3:56 PM	PIPE END SUBMERGED. TOOK SAMPLE AT END OF PIPE AT LAKE WATER NOT VISIBLY MOVING.	
	VETERANS PARK (3)	4:14 PM	5 GAL / 10.7 SEC	
	LISS RD. NYSDOT (1)	4:28 PM	5 GAL / 3.8 SEC	
	LISS RD. VILLAGE (2)	4:32 PM	5 GAL / 22.8 SEC	

Additional Locations:

Additional Comments: DELIVERED SAMPLES TO OFFICE FOR OVERNIGHT STORAGE. WILL DELIVER TO SMITH LABS TOMORROW. RAIN STOPPED @ 3:45 PM.

Technician: JES. Date: 7/23/08

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: AUGUST 19, 2008 **Temp:** 75°F

(4)

Weather: MOSTLY CLOUDY, SCATTERED SHOWERS. RAIN AS I LEFT OFFICE STOPPED AS I GOT TO VILLAGE.

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8	10:15 AM	NO FLOW	NOT RAINING
7	10:25 AM	NO FLOW	NOT RAINING
4	10:29 AM	NO FLOW	NOT RAINING
3	10:3[illegible] AM	7½ QTS / 15 SECS [1 GAL, 3½ QTS]	NOT RAINING.
5	11:00 AM	NO FLOW	NOT RAINING
6	11:00 AM	NO FLOW	NOT RAINING
1 DOT	11:27 AM	5 GAL / 11 SECONDS	"
2 VILLAGE	11:32 AM	5 GAL / 44.8 SECONDS.	"

Additional Locations:

Additional Comments: RAIN FALLING AS I LEFT OFFICE TO COLLECT SAMPLES. RAIN STOPPED ~~[illegible]~~ AS I ARRIVED ~~IN~~ VILLAGE AND SKY CLEARED. WATER FLOWING ONLY AT 3 OUTFALLS. TOOK SAMPLE FROM EACH.

Technician: JES. Date: 8/19/08

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: 9/9/08 **Temp:** 70°F

(5)

Weather: RAIN, THUNDERSTORMS

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
1 LISS PARK DOT	11:25	> 5GAL/SEC	APPARENT HYDRAULIC JUMP AT OUTLET.
2 LISS PARK VILLAGE	11:20	> 5GAL/SEC	
3 VETERANS PARK	11:10AM	5GAL/SEC FLOW IN PIPE IS 5" DEEP, 42"Ø PIPE	
4 MILL + PELHAM	11:00AM	1L / 8SECS	SAMPLE FROM PIPE END
5 DAM-1 NORTH	10:50AM	NO ACCESS	TOOK SAMPLE AT LOCATION 9.
6 DAM-2 SOUTH		LOCKS CHANGED	CAPTURED OVERLAND FLOW DOWN HIGH STREET.
7 SCHOOL + BROWN	10:45	4QTS / 3SEC	
8 WEST + BROWN	10:30AM	NO WAY TO MEASURE	SAMPLE FROM PIPE END

Additional Locations:

9	10:55	1L / 4SECS.	END OF HIGH STREET. SAMPLED @ INLET DRAIN TO SLUICE D.S. OF DAM. ALTERNATE FOR LOCATIONS 5 AND 6.

Additional Comments: LOCKS CHANGED AT DAM. NO ACCESS TO OUTFALLS. TOOK SAMPLE OF WATER FLOWING DOWN HIGH STREET ~~[illegible]~~ AT INLET PIPE TO SLUICE/SPILLWAY. HEAVY RAIN DURING SAMPLING. P. PAGGI ASSISTING.

Technician: J. STANKAVAGE Date: 9/9/08

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: 9/26/08 **Temp:** 58°F

(6)

Weather: RAIN - STEADY

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
1 LISS PARK NYSDOT	11:45 AM	5 GAL / 1.5 SEC	ROCK CAUGHT IN GRATE - DISPERSED FLOW AT OUTLET. LOTS OF "SPLASH"
2 LISS PARK VILLAGE	11:42 AM	5 GAL / 2 SEC	
3 VETERAN'S PARK	11:25 AM	5 GAL / 2 SEC	HEAVY, FAST, FLOW
4 MILL & PELHAM	11:15 AM	NO WAY TO MEASURE TOO LITTLE FLOW IN PIPE	SAMPLE FROM END OF PIPE
5		NO ACCESS	
6		LOCKS CHANGED ON GATES	
7 SCHOOL & BROWN	10:42 AM	10 QTS / 5 SEC	
8 WEST & BROWN	10:25 AM	NO WAY TO MEASURE	WATER CLEANER EXITING PIPE THAN WATER FLOWING OVERLAND.

Additional Locations:

9 HIGH STREET	10:58 AM	1 LITER / 30 SEC	INLET / DRAIN TO SLUICE D.S. OF DAM ~~ALTERNATE TO LOC. 5 & 6~~
10 WEST & BROWN	10:30 AM	5 QTS / 10.7 SEC	OVERLAND

Additional Comments:

Technician: J. STANKAVAGE Date: 9/26/08

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: 10/28/08 **Temp:** 43°F

7

Weather: (RAIN ALL PREVIOUS NIGHT) RAIN, WINDY

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	9:40AM	NO FLOW	RAIN STOPPED
7 SCHOOL & BROWN	9:53AM	1L / 55.6 SECONDS	RAIN STOPPED
6		NO ACCESS - LOCKS	
5		HAVE BEEN CHANGED	
4 MILL & PELHAM	10:15AM	TO LITTLE FLOW TO MEASURE	RAIN STOPPED
3 VETERAN'S PARK	10:40AM	5GAL / 4.2 SEC.	RAIN STARTED AGAIN
2 LISS PARK - VILLAGE	10:55 AM	5GAL / 12½ SEC.	RAINING
1 LISS PARK NYSDOT	11:00 AM	5GAL / 3 SEC	RAINING

Additional Locations:

10 WEST BROWN	9:40 AM	1L / 5 SECONDS	OVERLAND FLOW COMING DOWN STREET
9 HIGH ST & END	10:05AM	TRICKLE FLOW TO LITTLE TO MEASURE	OUTLET AT END OF ROAD IN GRASS BEFORE DAM SLUICE

Additional Comments: LOCATION 10 - ALTERNATE TO LOCATE 8.
LOCATION 9 - ALTERNATE TO LOCATIONS 5 & 6 (NO ACCESS)

Technician: J. STANKAVAGE Date: 10/28/08

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: NOVEMBER 25, 2008 **Temp:** 40°F

(8)

Weather: RAIN, COLD

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	9AM	NO FLOW OUT OF PIPE; NO MEASURABLE FLOW OVERLAND (LOCATION 10)	LIGHT RAIN - EDGE OF LAKE FROZEN.
7 SCHOOL & BROWN	9:12AM	1L / 7.5 SEC	LIGHT RAIN
2 LISS PARK VILLAGE	9:30AM	5GAL / 2 SEC	RAIN HEAVIER
1 LISS PARK NYSDOT	9:35AM	5 GAL / 1.2 SEC	↓
3 VE FRANTS PARK	9:55AM	5GAL / 2SEC	
4 MILL & PELHAM	10:05AM	TRICKLE FLOW - NOT ABLE TO MEASURE	RAIN LIGHTENING UP.
5		NO ACCESS	
6			

Additional Locations:

10 WEST & BROWN	9AM	NO FLOW OVERLAND OR THROUGH PIPE OUTFALL (LOC. 8)	
9 END OF HIGH ST.	10:15AM	DIFFUSE, TRICKLE FLOW; TOO LITTLE TO MEASURE	OUTLET OPEND OF STREET IN GRASS BEFORE DAM SLUICE. VISIBLE MUDDING OF WATER DUE TO CONSTRUCTION ON MILL ST.

Additional Comments: SEE SKETCH ON BACK → AT END OF HIGH ST. — WATER USED TO EXIT FROM EXISTING PIPE IN BURIED IN GRASS. NO FLOW OUT OF PIPE TODAY. ALL FLOW COMES DOWN THE ROAD OVERLAND ON "WEST" SIDE GUTTER LINE, IS PUSHED OUT TO STREET & AT END AND THEN CURVES BACK TO FLOW OFF CORNER OF PAVEMENT INTO GRASS JUST BEFORE SLUICE AND DOWNSTREAM OF OLD PIPE END. WATER VISIBLY MUDDY COMING DOWN HIGH ST. FROM MILL ST.

Technician: J. STANKAVAGE Date: 11/25/08

(9)

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: DECEMBER 10, 2008 **Temp:** 57°F

(9)

Weather: RAIN - LIGHT TO MODERATE, MILD

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	9:30AM	FLOW INADEQUATE FOR SAMPLE	LIGHT RAIN, MATERIAL WITHIN PIPE WAS DRY.
7 SCHOOL & BROWN	9:45	1L/2.5SEC	WATER VISIBLE SEDIMENT IN GUTTER COMING DOWN SCHOOL ST. HILL
4 MILL & PELHAM	10:05AM	1L/3.75SEC	TOOK SAMPLE FROM PIPE OUTFALL NOTED FLOW OVERLAND FROM BOTH STREETS FLOWING OVER END OF RD. INTO LAKE. SEE BELOW.
3 VETERANS PARK	10:15AM	5GAL/2.2SEC	SEE BELOW.
2 LESS PARK NYSDOT	10:35AM	5GAL/<1SEC	BUCKET FULL IN LESS THAN 1 SECOND. TOOK PHOTOS.
1 LESS PARK VILLAGE	10:30AM	5GAL/1.6SEC	TOOK PHOTOS
5	NO ACCESS THROUGH GATE		
6			

Additional Locations:

10 WEST & BROWN	9:35 AM	FLOW INADEQUATE FOR SAMPLE	OVERLAND FLOW. TOOK PHOTOS.
9 END OF HIGH	9:59 AM	1L/4.2SEC	OVERLAND FLOW

Additional Comments: HOUSE/GARAGE CONSTRUCTION SITE ON PELHAM APPEARED TO BE MUDDYING RUNOFF IN GUTTER LINE AS IT FLOWED DOWN TO LAKE/C.B. OVERLAND FLOW NOTED RUNNING OFF EDGE OF ROAD (OVER BULKHEAD) AND DIRECTLY INTO LAKE. AT VETERANS PARK, SHEET FLOW NOTED OVERLAND RUNNING DOWN DRIVEWAY TO BOAT DOCK. FLOW NOT ADEQUATE/DEEP ENOUGH TO SAMPLE.

Technician: J. STANKAVAGE Date: 12/10/08

(10)

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: MARCH 9, 2009 **Temp:** 43°F

Weather: RAIN OVERNIGHT + PREVIOUS DAY; CLOUDY, NO RAIN AT START OF SAMPLING

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST + BROWN	9:50AM	NO FLOW	
7 SCHOOL + BROWN	9:55AM	NO FLOW	
4 MILL + PELHAM	10:07AM	NOT ADEQUATE TO MEASURE RATE	STARTED TO SPRINKLE
3 VETERANS PARK	10:14AM	5GAL / 3.5SECS	RAINING
2 LISS PARK VILLAGE	10:25AM	5GAL / 4SEC	"
1 LISS PARK NYSDOT	10:25AM	5GAL / 7SEC	"

Additional Locations:

10 WEST + BROWN	9:50AM	NO FLOW	OVERLAND FLOW
9 END OF HIGH ST.	10:00AM	NO FLOW	~~OVERLAND FLOW~~
7 SCHOOL + BROWN	10:40AM	1L / 4SEC.	RAINING – RETURNED AFTER RAIN STARTED.
10 WEST + BROWN	10:45AM	1L / 11 SEC	RAINING – RETURNED AFTER OVERLAND RAIN STARTED

Additional Comments: SEWAGE SMELL NOTED AT LISS PARK OUTFALLS. RETURNED TO BROWN AVE. OUTFALLS AFTER RAIN STARTED AND ABLE TO COLLECT 2 SAMPLES. FLOW AT LOCATION 8 WAS NOT ADEQUATE TO COLLECT OR MEASURE IN BOTH INSTANCES. VISIBLE CLOUDINESS/MUDDYNESS TO WATER FLOWING DOWN SCHOOL STREET AND OUT OF PIPE END – APPARENTLY FROM CONSTRUCTION OF BUILDING UP THE STREET.

Technician: J. STANKAVAGE Date: 3/9/09
P. PAGGI

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: APRIL 3, 2009 **Temp:** 53°F

Weather: RAIN

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	9:50	NO FLOW	
7 SCHOOL & BROWN	9:57	NO FLOW	
4 MILL & PELHAM	10:33	NOT ADEQUATE TO MEASURE FLOW RATE	RAIN SLOWING AGAIN.
3 VETERAN'S PARK	10:43	5GAL / 8SECS.	
2 LISS PARK VILLAGE	10:58 AM	5 GAL / 13.5 SEC	MILKY COLOR, SEWER SMELL
1 LISS PARK NYSDOT	11:00 AM	5GAL / 3.5SEC	

Additional Locations:

10 WEST & BROW	9:50 AM	NO FLOW	OVERLAND FLOW
9 END OF HIGH ST.	10:21 AM	1L / 22 SEC.	OVERLAND FLOW RAINING HARDER.

Additional Comments: SHOWERS DURING SAMPLING. PRECIPITATION VARIED DURING SAMPLING, FROM MIST AND DRIZZLE TO MODERATE RAINFALL. AT MILL & PELHAM OUTFALL, WATER RUNNING OVERLAND FROM STREET OVER THE EDGE OF RETAINING 'BULKHEAD' WALL.

Technician: J. STANKANAGE
C. MOORE

Date: 4/3/09

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: 4/21/09 **Temp:** 50°F

Weather: MIST, DRIZZLE [redacted] HEAVY RAIN PREVIOUS NIGHT

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST + BROWN	11:10AM	NO FLOW	
7 SCHOOL + BROW	11:13AM	NO FLOW	
4 MILL + PELHAM	11:24AM	NO FLOW	
3 VETERAN'S PARK	11:30AM	5GAL / 5.8SEC	STOPPED RAINING/DRIZZLING
2 LISS PARK VILLAGE	11:40AM	5GAL / 29.6SEC	
1 LISS PARK NYSDOT	11:42AM	5GAL / 4SEC	

Additional Locations:

10 WEST + BROWN	11:10AM	NO FLOW	OVERLAND FLOW
9 END OF HIGH ST.	11:20AM	NO FLOW	OVERLAND FLOW

Additional Comments: NO FLOW AT ANY OUTFALLS EXCEPT 1, 2 & 3 AS NOTED. SEDIMENT/GRAVEL/SOIL/ETC. VISIBLE IN ROADWAYS AND GUTTERS AT PELHAM AND AT BROWN AVE. - MOST LIKELY A RESULT OF PREVIOUS NIGHT'S RAIN.

Technician: JES. Date: 4/21/09

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: MAY 14, 2009 **Temp:** 68°F

Weather: RAIN STARTED @ 10:30AM; RAINING ON WAY TO LAKE; SLOWED AND STOPPED WHEN WE REACHED FIRST SAMPLE POINT.

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	2:50PM	NO FLOW	CLEARING SKIES
7 SCHOOL & BROWN	2:42PM	NO FLOW	RAIN STOPPED
4 MILL & PELHAM	2:25PM	TOO LITTLE FLOW TO MEASURE RATE	LIGHT SPRINKLES
3 VETERAN'S PARK	2:20PM	5 GAL / 11.5 SEC	SPRINKLING
2 LISS PARK VILLAGE	2:05PM	5 GAL / 14.75 SEC	STOPPED RAINING
1 LISS PARK NYSDOT	2:10PM	5 GAL / 3 SEC	

Additional Locations:

10 WEST & BROWN	2:50PM	NO FLOW	OVERLAND FLOW
9 END OF HIGH ST.	2:28PM	NO FLOW - RAIN STOPPED AGAIN	OVERLAND FLOW

Additional Comments: RAIN SLOWED AND STOPPED UPON ARRIVAL AT LAKE AND START OF SAMPLING. J. MATTOS ASSISTING WITH COLLECTION OF SAMPLES.

Technician: J. STANKAVAGE **Date:** 5/14/09

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: JUNE 3, 2009 **Temp:** 64°F

Weather: LIGHT RAIN (JUST STARTED AS I LEFT OFFICE)

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	2:05PM	NO FLOW	LIGHT RAIN FALLING
7 SCHOOL & BROWN	2:00PM	NO FLOW	"
4 MILL & PELHAM	2:45	NO FLOW	LIGHT RAIN FALLING
3 VETERAN'S PARK	2:35PM	5GAL/15SEC	LIGHT RAIN FALLING
2 LISS PARK VILLAGE	2:20PM	5GAL/22SEC	LIGHT RAIN FALLING
1 LISS PARK NYSDOT	2:25PM	5GAL / 7.5SEC	"

Additional Locations:

10 WEST & BROWN	2:05PM	NO FLOW	LT. RAIN FALLING OVERLAND FLOW
9 END OF HIGH ST.	1:55PM	NO FLOW	LT. RAIN FALLING. OVERLAND FLOW

Additional Comments: LIGHT RAIN DURING SAMPLING. ATTEMPT TO COLLECT SAMPLES AT START (FIRST FLUSH) OF STORM. RAINFALL INTENSITY WAS INADEQUATE TO GENERATE RUNOFF AT MOST SITES.

Technician: J. STANKAVAGE Date: 6/3/09

(15)

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: JUNE 9, 2009 **Temp:** 64°F

Weather: RAIN OVERNIGHT; RAIN/SHOWERS DURING DAY (AM.)

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	9:25AM	1/2 LITER / 2 MINS + FLOWRATE VERY LOW. END OF PIPE CLOGGED W/ VEGETATION & SEDIMENT	RAIN SLOWING AS I ARRIVED AT SITE. 1/2 L BOTTLE
7 SCHOOL & BROWN	9:45AM	1 LITER / 20 SEC	
4 MILL & PELHAM	10:15AM	FLOW NOT ADEQUATE TO MEASURE RATE. COLLECTED SAMPLE FROM POOL AT END OF PIPE.	EROSION/MOVEMENT OF "SANDBAR" VISIBLE AT PIPE OUTFALL. SEDIMENT HAS MOVE FROM OUTFALL TOWARD LAKE RECENT INTERIOR MOVEMENT
3 VETERAN'S PARK	10:30AM	5GAL / <1 SEC	
2 LISS PARK VILLAGE	10:42AM	5GAL / 6SEC.	
1 LISS PARK NYSDOT	10:45AM	5GAL / 1SEC ±	

Additional Locations:

10 WEST & BROWN	9:22AM	1 LITER / 16 SECONDS	OVERLAND FLOW
9 END OF HIGH ST.	9:55AM	NOT ADEQUATE FLOW TO MEASURE RATE.	RAIN STOPPED. OVERLAND FLOW

Additional Comments: RAIN STOPPED ~ 9:55AM. AT MILL & PELHAM AND AT BROWN & WEST ST. - TOOK PHOTOS. OBVIOUS EROSION AT MILL & PELHAM - MOVEMENT OF SEDIMENT WAS RECENT. FLOW RATES AT VETERAN'S PARK & LISS PARK-NYSDOT WERE > 5GAL/SEC.

Technician: J. STANKAVAGE Date: 6/9/09

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: JUNE 18, 2009 **Temp:** 65°F

Weather: RAIN PREVIOUS NIGHT THROUGH MORNING

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	9:45AM	1L / 6.5 SEC	RAINING HARDER
7 SCHOOL & BROWN	9:25AM	1L / 1MIN 17 SEC	"TRICKLE" FLOW, LIGHT FLOW
4 MILL & PELHAM	10:00AM	OUTFALL END PARTLY SUBMERGED, COULD NOT DETERMINE FLOW RATE	
3 VETERAN'S PARK	10:15AM	5GAL / < 1SEC	SILT FENCE INSTALLED ALONG LAKE SHORE
2 LISS PARK VILLAGE	10:40AM	5GAL / < 1SEC	
1 LISS PARK NYSDOT	10:42AM	NO SAMPLE COLLECTED > 5GAL/1SEC (MORE LIKE 50GAL/SEC)	SEE PHOTOS UNSAFE TO SAMPLE

Additional Locations:

10 WEST & BROWN	9:35AM	LIGHT RAIN, COULD NOT MEASURE	OVERLAND FLOW
9 END OF HIGH ST.	9:55AM	1L / 2.2 SEC	OVERLAND FLOW
11 MILL & PELHAM	10:05AM	1L / 1.7 SEC.	WATERFALL OVER BULKHEAD/END OF STREET, SEE PHOTOS OVERLAND
12 VET'S PARK BOAT LAUNCH	10:22AM	1/2 L / 3.5 SEC	OVERLAND AT END OF DRIVEWAY. SEE PHOTOS

Additional Comments: LISS PARK NYSDOT OUTFALL HAD FLOW VOLUME GREATER THAN I'VE EVER SEEN BEFORE - NOT SAFE TO COLLECT SAMPLE DUE TO EXTRAORDINARY FLOW. COLLECTED FROM END OF BOAT LAUNCH PAVEMENT AT VET'S PARK - RAIN WAS ENOUGH TO GENERATE RUNOFF. ALSO COLLECTED OVERLAND RUNOFF AT MILL & PELHAM - FLOW RUNNING OVER EDGE OF BULKHEAD/RETAINING WALL. TOOK PHOTOS OF BOAT LAUNCH AND MILL & PELHAM OVERLAND FLOWS.

Technician: J. STANKAVAGE Date: 6/18/09

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: JULY 2, 2009 **Temp:** 70°F

Weather: RAIN PREVIOUS NIGHT; DRIZZLE, RAIN SLOWED + STOPPED UPON ARRIVAL TO COLLECT SAMPLES

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST + BROWN	8:55 AM	NO FLOW	NOT RAINING
7 SCHOOL + BROWN	9:07 AM	1L / 86 SEC	NOT RAINING
4 MILL + PELHAM	9:32	OUTFALL SUBMERGED	COLLECTED SAMPLE ANYWAY.
3 VETERAN'S PARK	9:40 AM	5 GAL / 1 SEC	LIGHT SPRINKLE / SEWAGE SMELL NOTED AT OUTFALL LASTED 5 MINS.
2 LISS PARK VILLAGE	9:57 AM	5 GAL / 5 SEC	NOT RAINING
1 LISS PARK NYSDOT	10:00 AM	5 GAL / 1 SEC	NOT RAINING

Additional Locations:

10 WEST + BROWN	9:00 AM	1 LITER / 90 SEC ±	MISTING OVERLAND FLOW
9 END OF HIGH ST.	9:20 AM	NO FLOW	OVERLAND FLOW

Additional Comments:

Technician: J STANKAVAGE Date: 7/2/09

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: 7/16/09 **Temp:** 72°F

Weather: HEAVY RAIN, THUNDER & LIGHTENING ; HUMID

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	11:17AM	1 L/1SEC	THUNDERSTORM STREET FLOODING AT ENDS BY LAKE
7 SCHOOL & BROWN	11:30AM	1L / 1.4SEC	RAIN STOPPED.
4 MILL & PELHAM	11:45AM	SUBMERGED - COULD NOT MEASURE FLOW RATE	SUN OUT
3 VETERAN'S PARK	12:00PM	>5GAL / 1SEC	FLOW IS VERY DIRTY. BROWN FROM OUTFALL
2 LISS PARK VILLAGE	12:13PM	5GAL / 1SEC	
1 LISS PARK NYSDOT	12:15PM	>5GAL / 1SEC	EXTRAORDINARY FLOW RATE

Additional Locations:

10 WEST & BROWN	11:16AM	1L/1SEC	MORE FLOW THAN I'VE EVER SEEN. OVERLAND FLOW
9 END OF HIGH ST.	11:38AM	1L / 11 SEC	OVERLAND FLOW
11 PELHAM & MILL (OVERLAND)	11:50AM	1L / 2MIN & 43SEC	"WATERFALL" OVER BULKHEAD WALL. OVERLAND FLOW

Additional Comments: HEAVY RAIN ON ARRIVAL @ WEST ST. & BROWN AVE. – 2" TO 3" OF WATER RUNNING DOWN BROWN AVE. TO LAKE. RAIN STOPPED SHORTLY AFTER COLLECTING & RECORDING FIRST 2 SAMPLES. VETERAN'S PARK OUTFALL EXTREMELY MUDDY. LISS PARK - NYSDOT OUTFALL HAD EXTRAORDINARILY HIGH FLOW RATE.

Technician: J. STANKAVAGE Date: 7/16/09

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: 7/21/09 **Temp:** 65°F

Weather: STEADY RAIN DURING ENTIRE COLLECTION PERIOD

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	10:45	1L / 25SEC	
7 SCHOOL & BROWN	10:55	1L / 3.5SEC	
4 MILL & PELHAM	11:17AM	1L / 6SEC	
3 VETERAN'S PARK	11:26AM	>5GAL / 1SEC	
2 LISS PARK VILLAGE	11:48AM	>5GAL / 1SEC	LOST BOTTLE ON FIRST SAMPLING ATTEMPT.
1 LISS PARK NYSDOT	~~11:49AM~~	MUCH >5GAL / 1SEC VERY HEAVY FLOW SAFELY OBTAIN	– COULD NOT SAMPLE

Additional Locations:

10 WEST & BROWN	10:50	1L / 4SEC	OVERLAND FLOW
9 END OF HIGH ST.	11:08AM	1L / 3SEC	FLOW OUT OF BOTH OUTFALLS 5 & 6 NOTED - SEEN FROM ACROSS LAKE. OVERLAND FLOW
11 PELHAM & MILL	11:19AM	1L / 2.2SEC	"WATERFALL" OVER BULKHEAD. OVERLAND FLOW.
12 VETS PARK OVERLAND/ BOATLAUNCH	11:30AM	1L / 10SEC	OVERLAND FLOW BETWEEN EDGE OF PAVED BOAT LAUNCH & DOCK

Additional Comments: HEAVY FLOW NOTED AT ALL OUTFALLS AND OVERLAND SAMPLING POINTS. SEVERE EROSION ALONG EDGE OF PAVED BOAT LAUNCH ROAD HAS CREATED A DRAINAGE CHANNEL, CONCENTRATING FLOW TO OUTFALL POINT BETWEEN PAVEMENT & DOCK – COLLECTED SAMPLE. LISS PARK NYSDOT OUTFALL WAS NOT SAFE DUE TO EXTRAORDINARY HIGH FLOW

Technician: J. STANKAVAGE Date: 7/21/09

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: 8/13/09 **Temp:** 70°F

Weather: STEADY LIGHT RAIN ON ARRIVAL, SLOWED + STOPPED ~10AM

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST + BROWN	9:10AM	NO FLOW	END OF PIPE FULL OF SILT/DIRT
7 SCHOOL + BROWN	9:20AM	1 L / 11 SEC	
4 MILL + PELHAM	9:43AM	FLOW NOT ADEQUATE TO MEASURE RATE	OUTFALL SUBMERGED
3 VETERAN'S PARK	9:53AM	5 GAL / 2 SEC.	RAIN STOPPING
2 LISS PARK VILLAGE	10:02	5 GAL / 7.5 SEC	
1 LISS PARK NYSDOT	10:06	5 GAL / 1.7 SEC	

Additional Locations:

10 WEST + BROWN	9:10	1/2 L / 35 SEC	OVERLAND FLOW
9 END OF HIGH ST.	9:35	FLOW INADEQUATE TO MEASURE RATE	RAIN SLOWED TO DRIZZLE/OIL SHEEN OVERLAND FLOW ON SURFACE OF WATER
11 PELHAM + MILL	9:45	NO FLOW	OVERLAND FLOW

Additional Comments: OIL SHEEN NOTED ON POOL OF WATER AT END OF HIGH ST. OUTFALL POINT.

Technician: J. STANKAVAGE Date: 8/13/09

FIELD SAMPLING REPORT

Village of Wappingers Falls Stormwater Discharge Study Grant
N.Y.S.D.E.C. Grant Contract C301994

Date: 9/11/09 **Temp:** 61°F

Weather: HEAVY RAIN STARTING ~ 11:30AM

Total Suspended Solids Measurement

Sample Location	Time	Estimated Flow Rate (Gal/Second)	Notes
8 WEST & BROWN	1:50PM	~~[illegible]~~ NO FLOW	RAINING
7 SCHOOL & BROWN	1:58PM	1L / 4.8SEC	
4 MILL & PELHAM	2:14PM	SUBMERGED	RAIN SLOWED TO DRIZZLE
3 VETERAN'S PARK	2:23PM	5GAL / 2.2SEC	RAIN STOPPED
2 LISS PARK VILLAGE	2:35PM	5GAL / 2.8SEC	RAIN STARTED FALLING ~~[illegible]~~ HEAVILY AGAIN
1 LISS PARK NYSDOT	2:40PM	5GAL / 2SEC	

Additional Locations:

10 WEST & BROWN	1:50PM	1L / 40SEC	OVERLAND FLOW
9 END OF HIGH ST.	2:07PM	1L / 10SEC	OVERLAND FLOW
11 PELHAM & MILL	2:16PM	1L / 45SEC.	"WATERFALL" OVER BULKHEAD OVERLAND FLOW
12 VETS PARK BOAT LAUNCH		NO FLOW. NEW PAVEMENT AROUND DOCK TO LIMIT EROSION.	BETWEEN DOCK & EDGE OF PAVEMENT OVERLAND FLOW

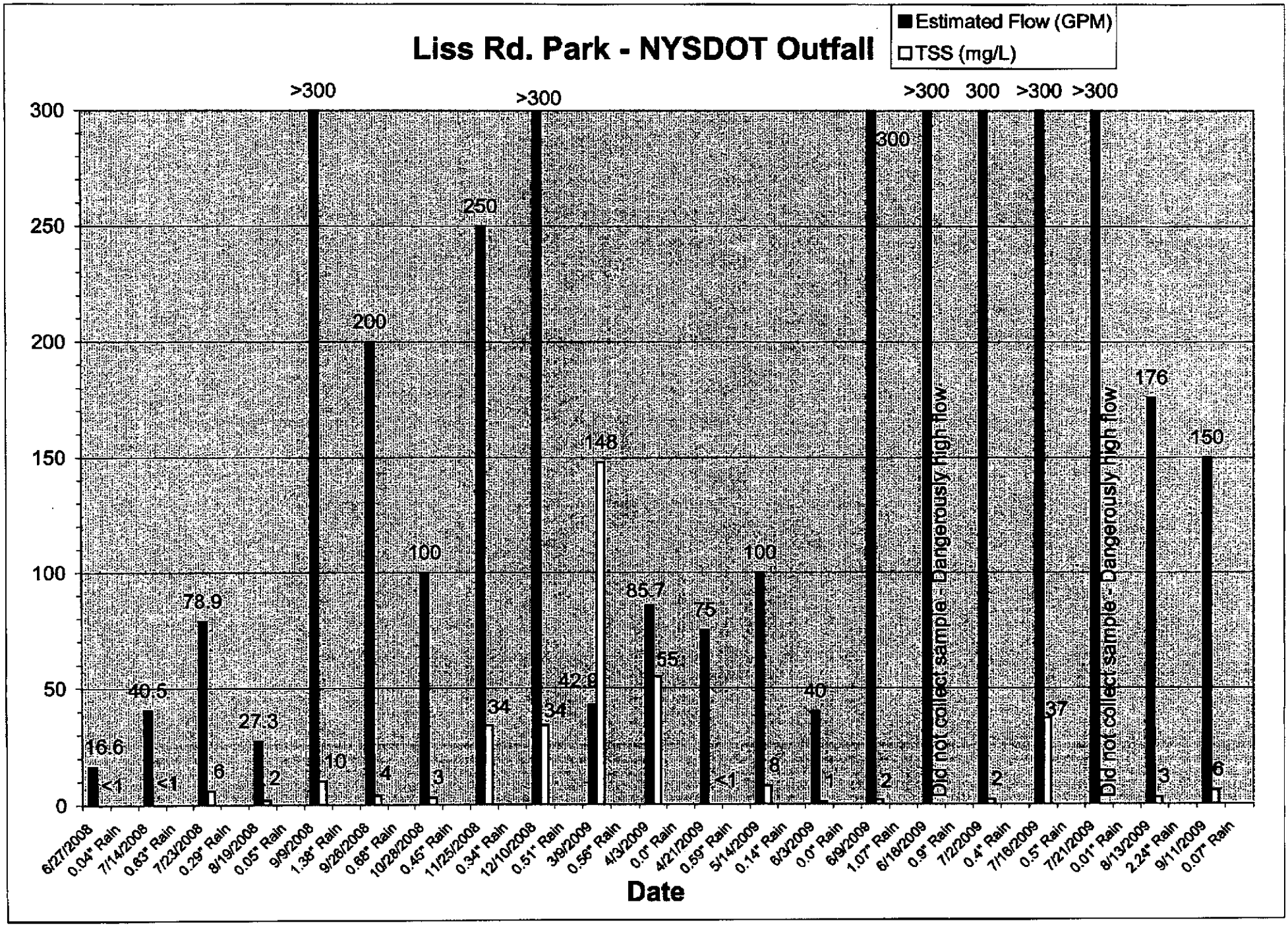
Additional Comments:

Technician: J. STANKAVAGE Date: 9/11/09

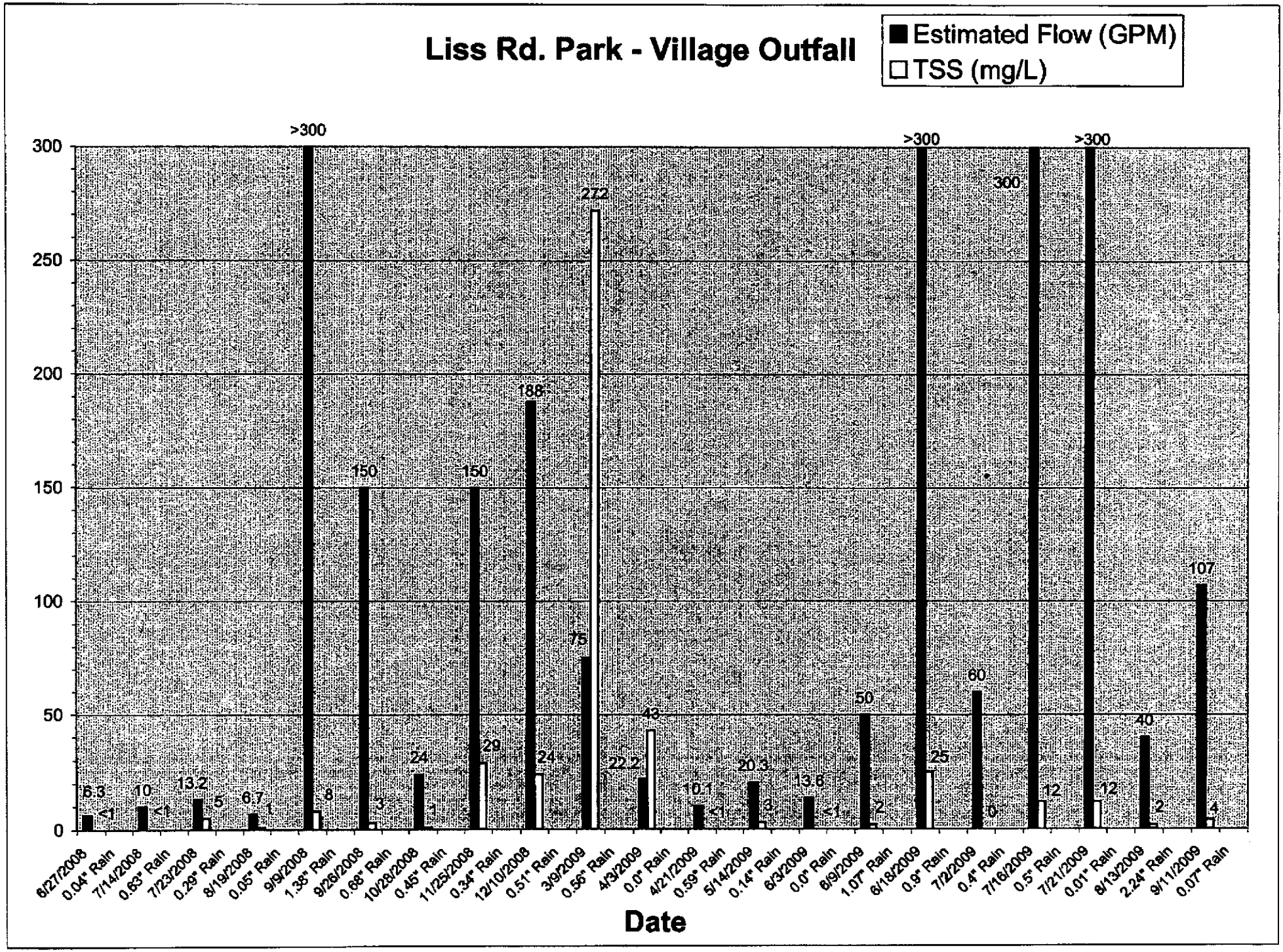
Appendix "B"

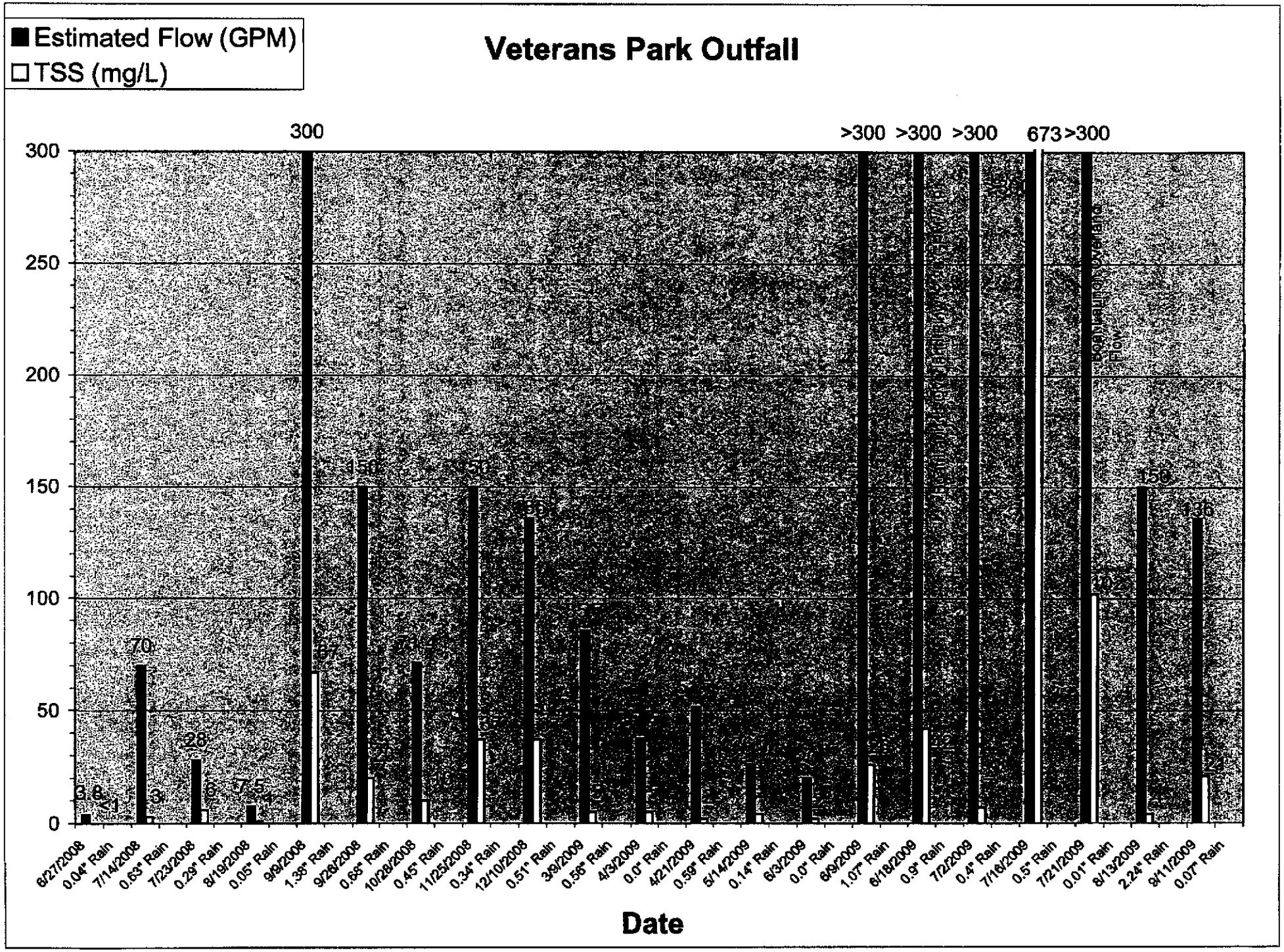
Flow Rate vs. Total Suspended Solids Concentration

Comparison Graphs

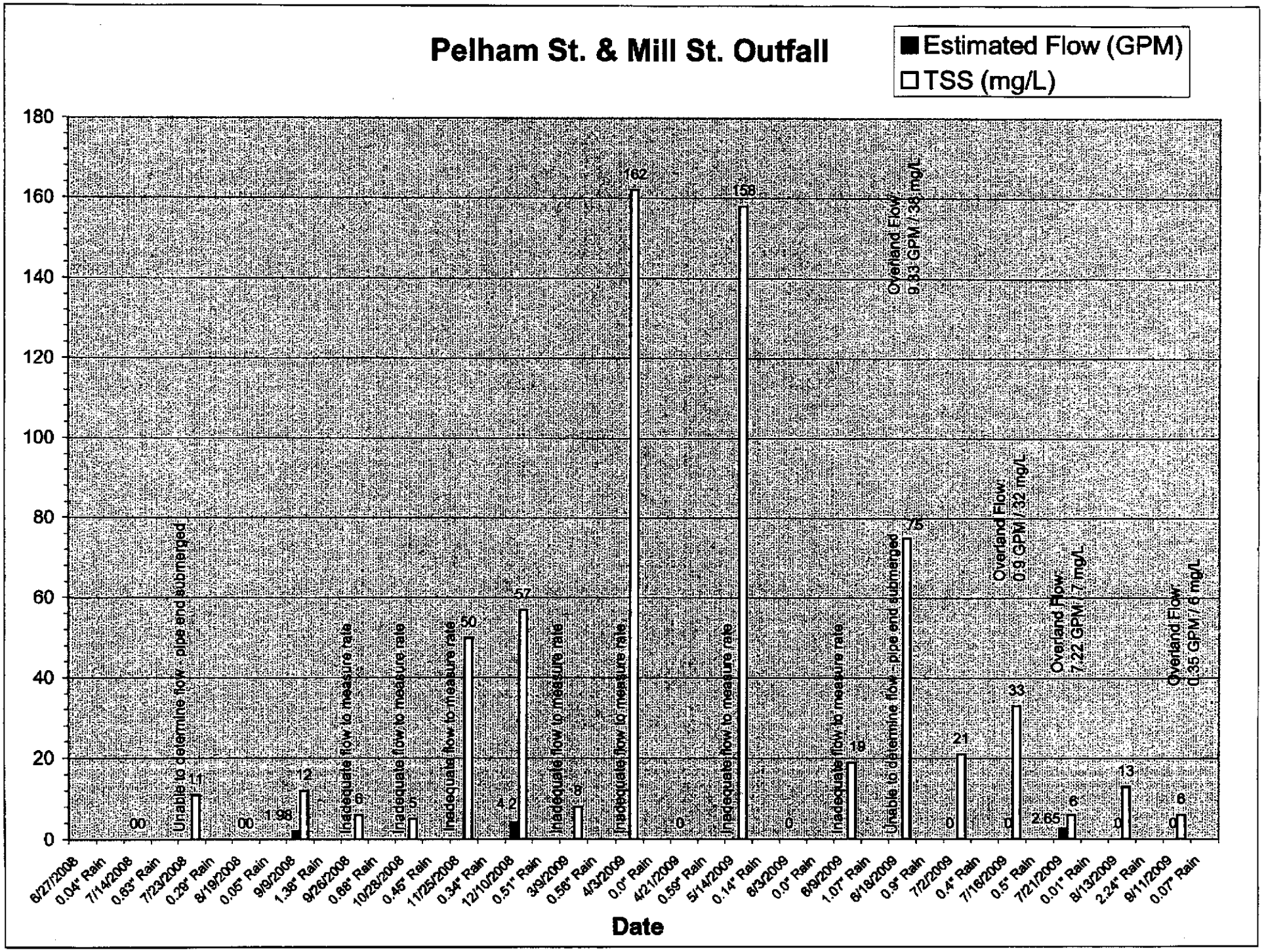


Liss Rd. Park - NYSDOT Outfall
Estimated Flow (GPM)
TSS (mg/L)
300
250
200
150
100
50
0
>300
>300
300
>300
>300
250
200
148
100
100
85.7
75
78.9
40.5
27.3
16.6
42.9
40
37
176
150
34
34
55
10
6
4
3
8
1
2
2
3
6
<1
<1
2
Did not collect sample - Dangerously high flow
Did not collect sample - Dangerously high flow
6/27/2008
0.04" Rain
7/14/2008
0.63" Rain
7/23/2008
0.29" Rain
8/19/2008
0.05" Rain
9/9/2008
1.38" Rain
9/26/2008
0.68" Rain
10/28/2008
0.45" Rain
11/25/2008
0.34" Rain
12/10/2008
0.51" Rain
3/9/2009
0.56" Rain
4/3/2009
0.0" Rain
4/21/2009
0.59" Rain
5/14/2009
0.14" Rain
6/3/2009
0.0" Rain
6/9/2009
1.07" Rain
6/18/2009
0.9" Rain
7/2/2009
0.4" Rain
7/16/2009
0.5" Rain
7/21/2009
0.01" Rain
8/13/2009
2.24" Rain
9/11/2009
0.07" Rain
Date

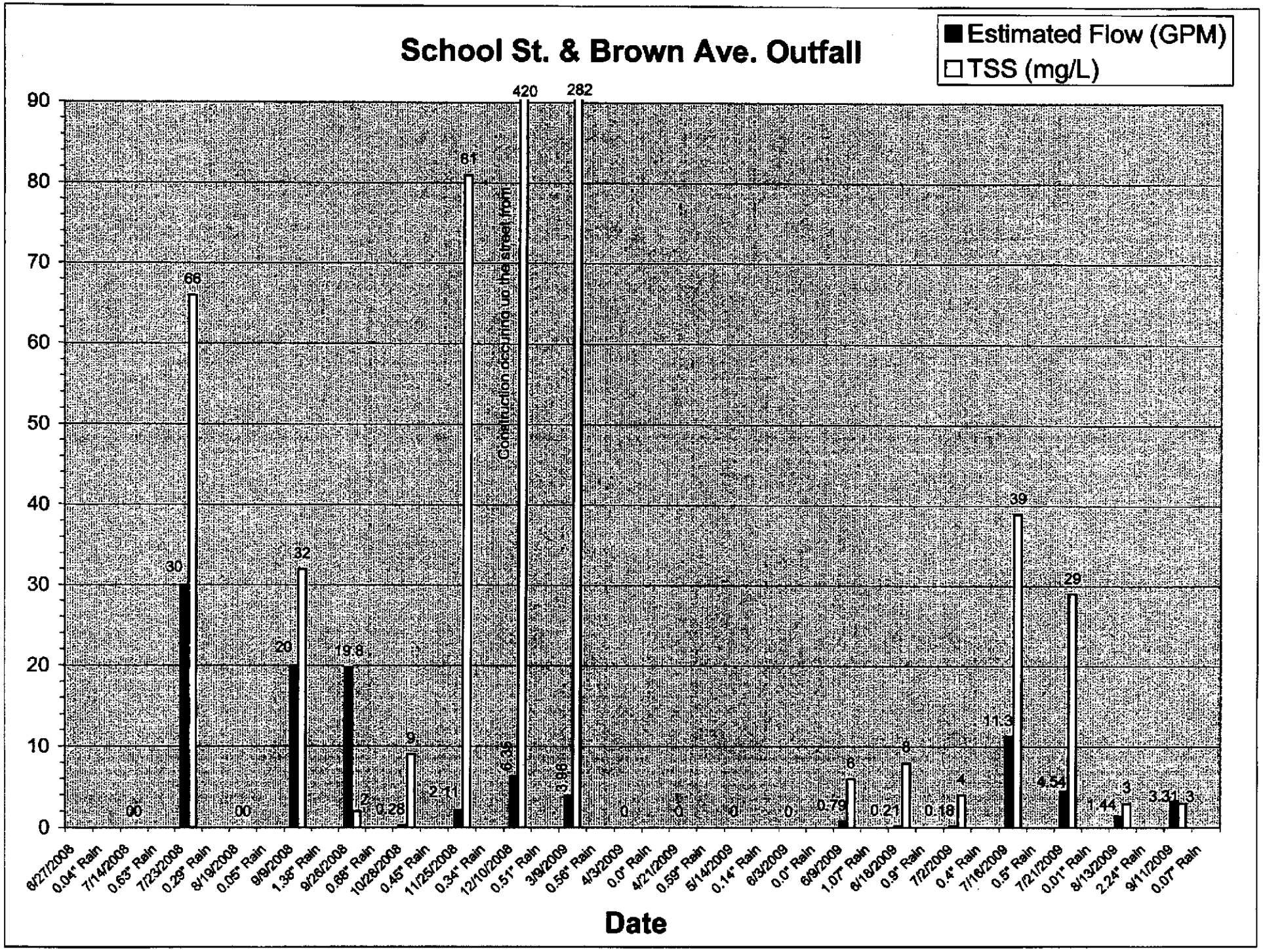

Liss Rd. Park - Village Outfall
Estimated Flow (GPM)
TSS (mg/L)
300
250
200
150
100
50
0
>300
>300
>300
272
300
188
150
150
75
107
60
50
43
40
29
25
24
24
22.2
20.3
13.6
13.2
12
12
10.1
10
8
6.7
6.3
5
4
3
3
2
2
1
1
<1
<1
<1
<1
0
6/27/2008
0.04" Rain
7/14/2008
0.63" Rain
7/23/2008
0.29" Rain
8/19/2008
0.05" Rain
9/9/2008
1.38" Rain
9/26/2008
0.68" Rain
10/28/2008
0.45" Rain
11/25/2008
0.34" Rain
12/10/2008
0.51" Rain
3/9/2009
0.56" Rain
4/3/2009
0.0" Rain
4/21/2009
0.59" Rain
5/14/2009
0.14" Rain
6/3/2009
0.0" Rain
6/9/2009
1.07" Rain
6/18/2009
0.9" Rain
7/2/2009
0.4" Rain
7/16/2009
0.5" Rain
7/21/2009
0.01" Rain
8/13/2009
2.24" Rain
9/11/2009
0.07" Rain
Date

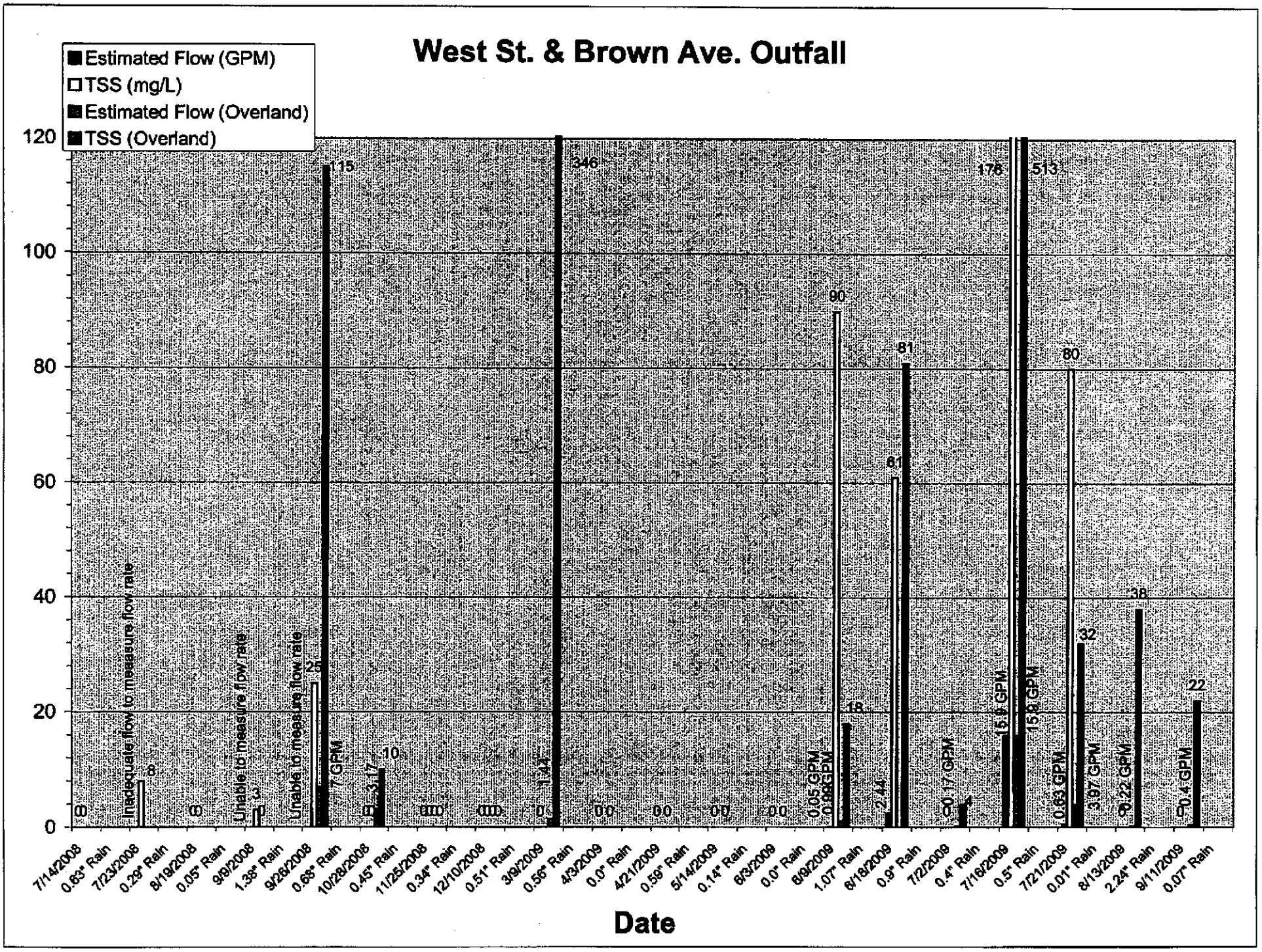


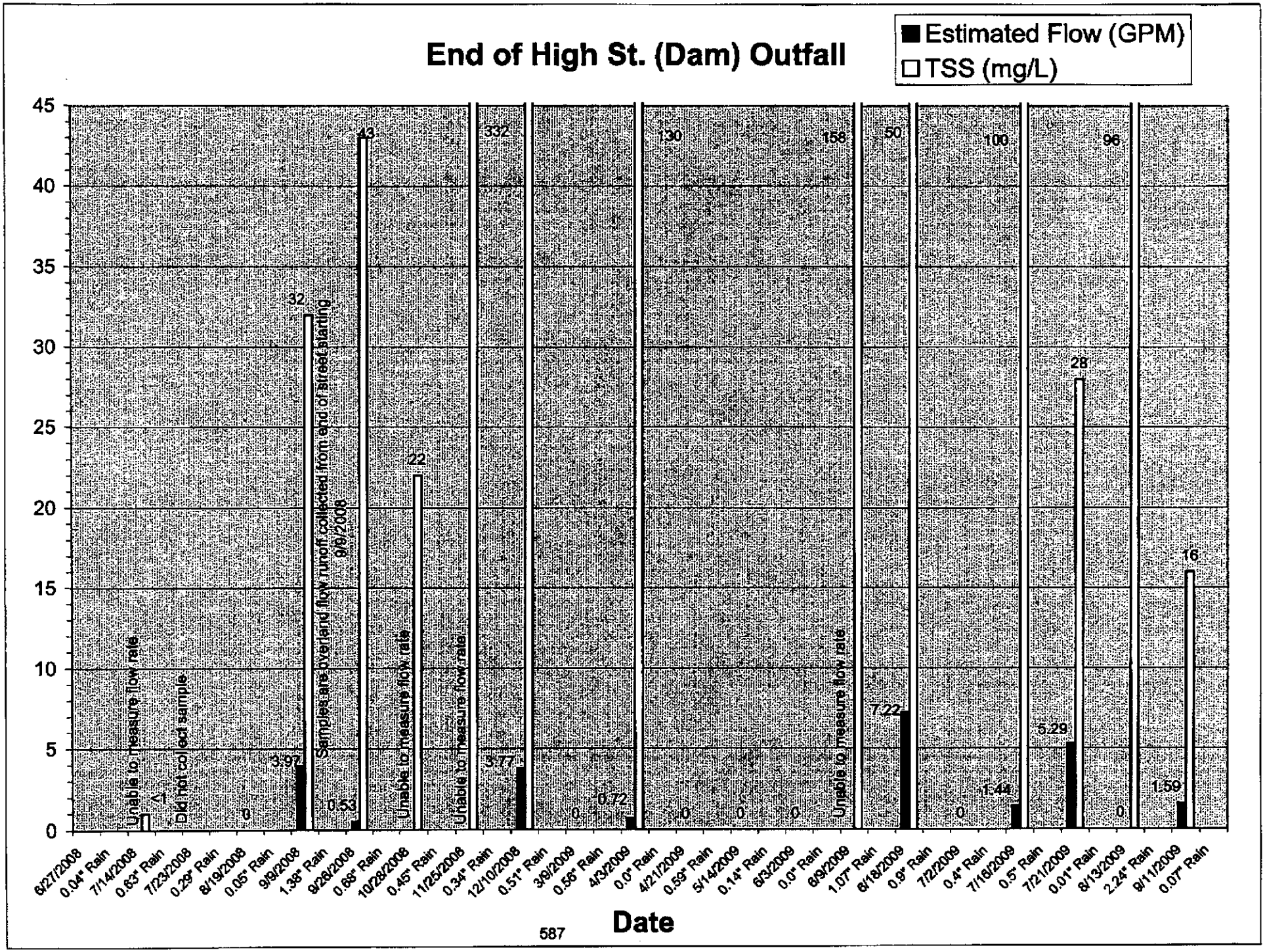
Estimated Flow (GPM)
TSS (mg/L)
Veterans Park Outfall
300
>300
>300
>300
673
>300
300
250
200
150
100
50
0
3.8
<1
70
3
28
6
7.5
150
150
150
136
6/27/2008
0.04" Rain
7/14/2008
0.63" Rain
7/23/2008
0.29" Rain
8/19/2008
0.05" Rain
9/9/2008
1.38" Rain
9/26/2008
0.68" Rain
10/28/2008
0.45" Rain
11/25/2008
0.34" Rain
12/10/2008
0.51" Rain
3/9/2009
0.56" Rain
4/3/2009
0.0" Rain
4/21/2009
0.59" Rain
5/14/2009
0.14" Rain
6/3/2009
0.0" Rain
6/9/2009
1.07" Rain
6/18/2009
0.9" Rain
7/2/2009
0.4" Rain
7/16/2009
0.5" Rain
7/21/2009
0.01" Rain
8/13/2009
2.24" Rain
9/11/2009
0.07" Rain
Date



Pelham St. & Mill St. Outfall
Estimated Flow (GPM)
TSS (mg/L)
180
160
140
120
100
80
60
40
20
0
Unable to determine flow - pipe end submerged
Inadequate flow to measure rate
Overland Flow: 9.83 GPM / 38 mg/L
Overland Flow: 0.9 GPM / 32 mg/L
Overland Flow: 7.22 GPM / 7 mg/L
Overland Flow: 0.35 GPM / 6 mg/L
00
11
00
1.98
12
6
5
50
4.2
57
8
162
0
158
0
19
75
0
21
0
33
2.65
6
0
13
0
6
6/27/2008
0.04" Rain
7/14/2008
0.63" Rain
7/23/2008
0.29" Rain
8/19/2008
0.05" Rain
9/9/2008
1.38" Rain
9/26/2008
0.68" Rain
10/28/2008
0.45" Rain
11/25/2008
0.34" Rain
12/10/2008
0.51" Rain
3/9/2009
0.56" Rain
4/3/2009
0.0" Rain
4/21/2009
0.59" Rain
5/14/2009
0.14" Rain
6/3/2009
0.0" Rain
6/9/2009
1.07" Rain
6/18/2009
0.9" Rain
7/2/2009
0.4" Rain
7/16/2009
0.5" Rain
7/21/2009
0.01" Rain
8/13/2009
2.24" Rain
9/11/2009
0.07" Rain
Date


School St. & Brown Ave. Outfall
Estimated Flow (GPM)
TSS (mg/L)
Construction occurring up the street from
Date
6/27/2008 0.04" Rain
7/14/2008 0.63" Rain
7/23/2008 0.29" Rain
8/19/2008 0.05" Rain
9/9/2008 1.38" Rain
9/26/2008 0.88" Rain
10/28/2008 0.45" Rain
11/25/2008 0.34" Rain
12/10/2008 0.51" Rain
3/9/2009 0.56" Rain
4/3/2009 0.0" Rain
4/21/2009 0.59" Rain
5/14/2009 0.14" Rain
6/3/2009 0.0" Rain
6/9/2009 1.07" Rain
6/18/2009 0.9" Rain
7/2/2009 0.4" Rain
7/16/2009 0.5" Rain
7/21/2009 0.01" Rain
8/13/2009 2.24" Rain
9/11/2009 0.07" Rain

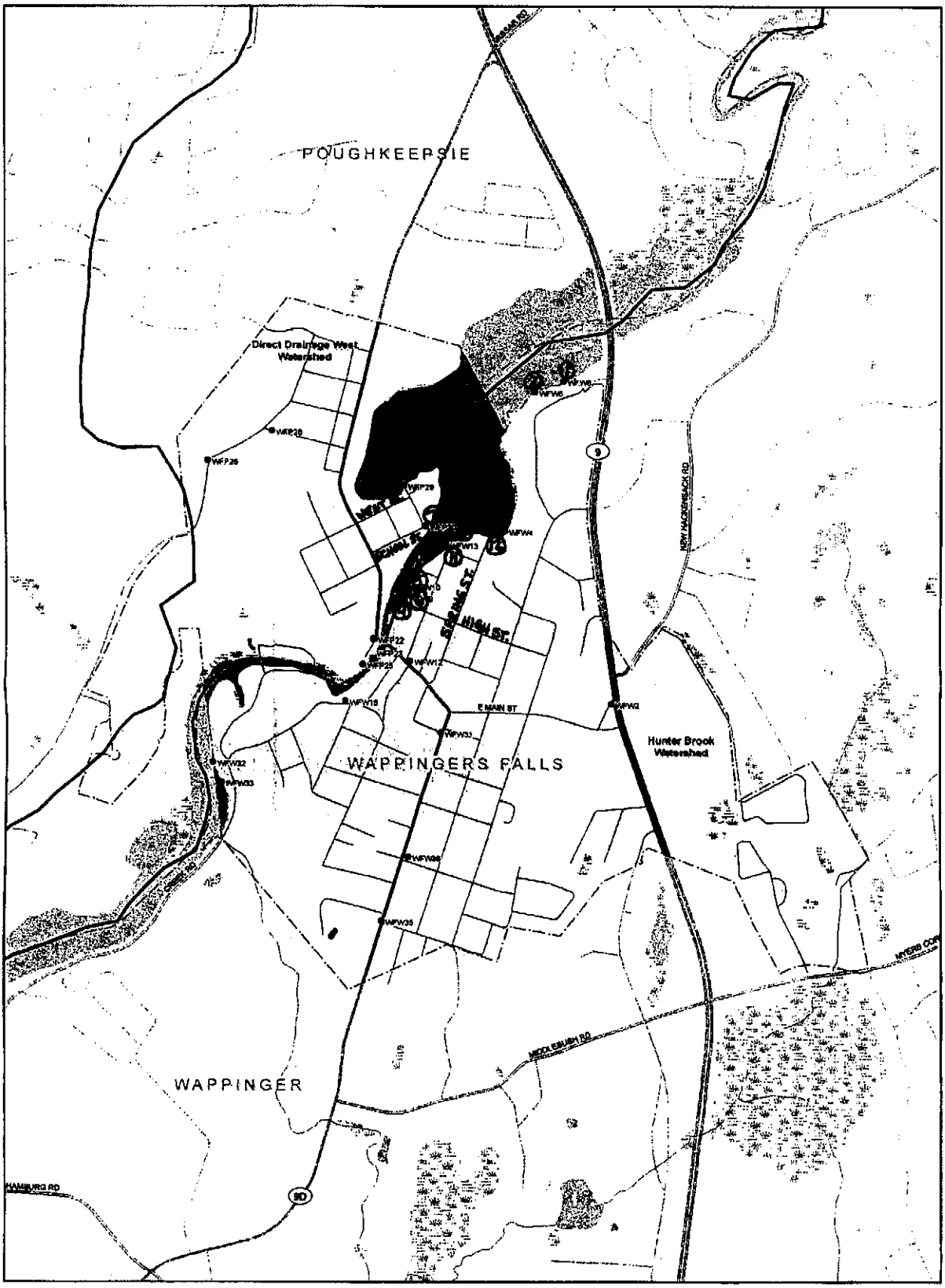

West St. & Brown Ave. Outfall
Estimated Flow (GPM)
TSS (mg/L)
Estimated Flow (Overland)
TSS (Overland)
120
100
80
60
40
20
0
Inadequate flow to meaasure flow rate
Unable to measure flow rate
Unable to measure flow rate
115
346
176
513
90
81
80
61
25
10
3
8
3.17
1.44
18
2.44
4
0.05 GPM
0.99GPM
0.17 GPM
15.9 GPM
15.9 GPM
0.63 GPM
3.97 GPM
0.22 GPM
0.4 GPM
22
32
38
7/14/2008
0.63" Rain
7/23/2008
0.29" Rain
8/19/2008
0.05" Rain
9/9/2008
1.38" Rain
9/26/2008
0.68" Rain
10/28/2008
0.45" Rain
11/25/2008
0.34" Rain
12/10/2008
0.51" Rain
3/9/2009
0.56" Rain
4/3/2009
0.0" Rain
4/21/2009
0.59" Rain
5/14/2009
0.14" Rain
6/3/2009
0.0" Rain
6/9/2009
1.07" Rain
6/18/2009
0.9" Rain
7/2/2009
0.4" Rain
7/16/2009
0.5" Rain
7/21/2009
0.01" Rain
8/13/2009
2.24" Rain
9/11/2009
0.07" Rain
Date


End of High St. (Dam) Outfall
Estimated Flow (GPM)
TSS (mg/L)
45
40
35
30
25
20
15
10
5
0
43
332
130
158
50
100
96
32
28
22
16
7.22
5.29
3.97
3.77
1.44
1.59
0.72
0.53
<1
0
Unable to measure flow rate
Did not collect sample
Samples are overland flow runoff collected from end of street starting 9/9/2008
6/27/2008 0.04" Rain
7/14/2008 0.63" Rain
7/23/2008 0.29" Rain
8/19/2008 0.05" Rain
9/9/2008 1.38" Rain
9/26/2008 0.68" Rain
10/28/2008 0.45" Rain
11/25/2008 0.34" Rain
12/10/2008 0.51" Rain
3/9/2009 0.56" Rain
4/3/2009 0.0" Rain
4/21/2009 0.59" Rain
5/14/2009 0.14" Rain
6/3/2009 0.0" Rain
6/9/2009 1.07" Rain
6/18/2009 0.9" Rain
7/2/2009 0.4" Rain
7/16/2009 0.5" Rain
7/21/2009 0.01" Rain
8/13/2009 2.24" Rain
9/11/2009 0.07" Rain
Date

Appendix "C"

Maps of Village and Drainage Areas

Village of Wappingers Falls, New York
MS4 Stormwater Outfalls



Legend

- MS4 Outfalls (22)
- Streams
- Wetlands
- Waterbodies
- Watersheds
- Municipal Boundary
- Local Road
- County Road
- State Highway
- Interstate

N W E S

1:12,000

0 500 1,000 Feet

Data Sources:

Stormwater Outfalls & Outlets: Dutchess County Soil and Water Conservation District, 2005-2007

Streams and Waterbodies: National Hydrography Dataset, U.S. Geological Survey, 2007

Wetlands: NYS Dept. of Environmental Conservation, 2006; National Wetlands Inventory, U.S. Fish & Wildlife Service, 2007

Watersheds: Dutchess County Environmental Management Council, 2004

Municipal Boundaries: Dutchess County Real Property Tax Service Agency, 2007

Roads: Dutchess County Real Property Tax Service Agency, 2006

Created December 2007
GIS Lab, Environment Program
Cornell Cooperative Extension Dutchess County
In Cooperation with Dutchess County Soil and Water Conservation District

Cornell University
Cooperative Extension
Dutchess County

CCEDC provides equal program and employment opportunities.

The programs provided by this agency are partially funded by monies received from the County of Dutchess.

Appendix "D"

Photographs of Outfalls and Surrounding Areas

LISS ROAD OUTLETS @ PARK

5/15/2008

NOTE THAT TRASH RACK (GRATE) NEEDS CLEANING

LISS ROAD OUTLETS @ PARK

MAY 15, 2008

LISS ROAD OUTLETS AT LAKE

MAY 15, 2008

LISS ROAD PARK – ALONG LAKE BANK IN WOODED AREA.

MAY 15, 2008

LISS ROAD PARK – ALONG LAKE BANK IN WOODED AREA

MISC. BOTTLES, TRASH AND DEBRIS TYPICAL ALONG EDGE OF LAKE.

MAY 15, 2008

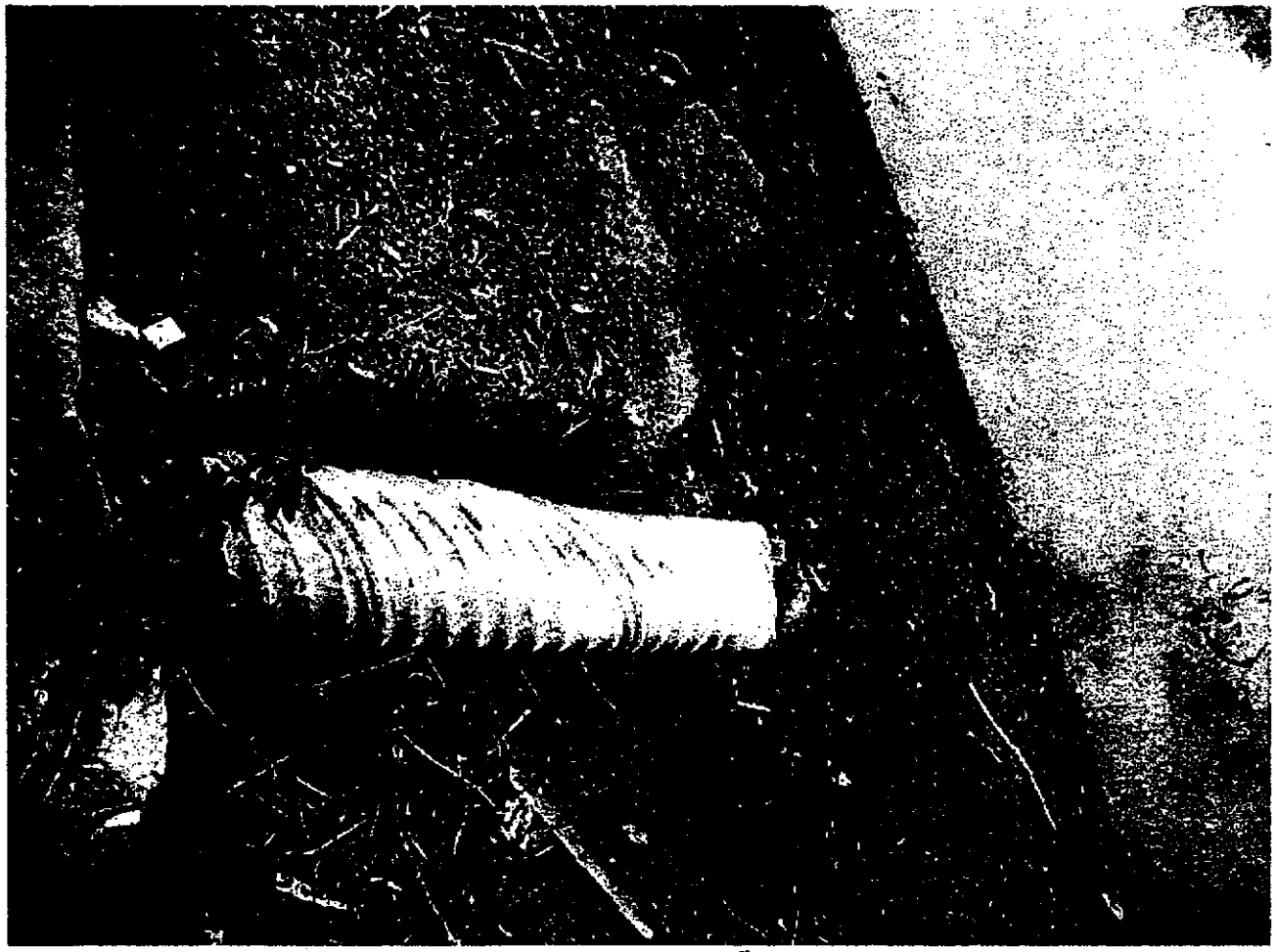
VETERAN'S PARK OUTFALL

MAY 15, 2008

VETERAN'S PARK- EDGE OF LAKE

MAY 15, 2008

PELHAM AND MILL STREET OUTFALL



MAY 15, 2008

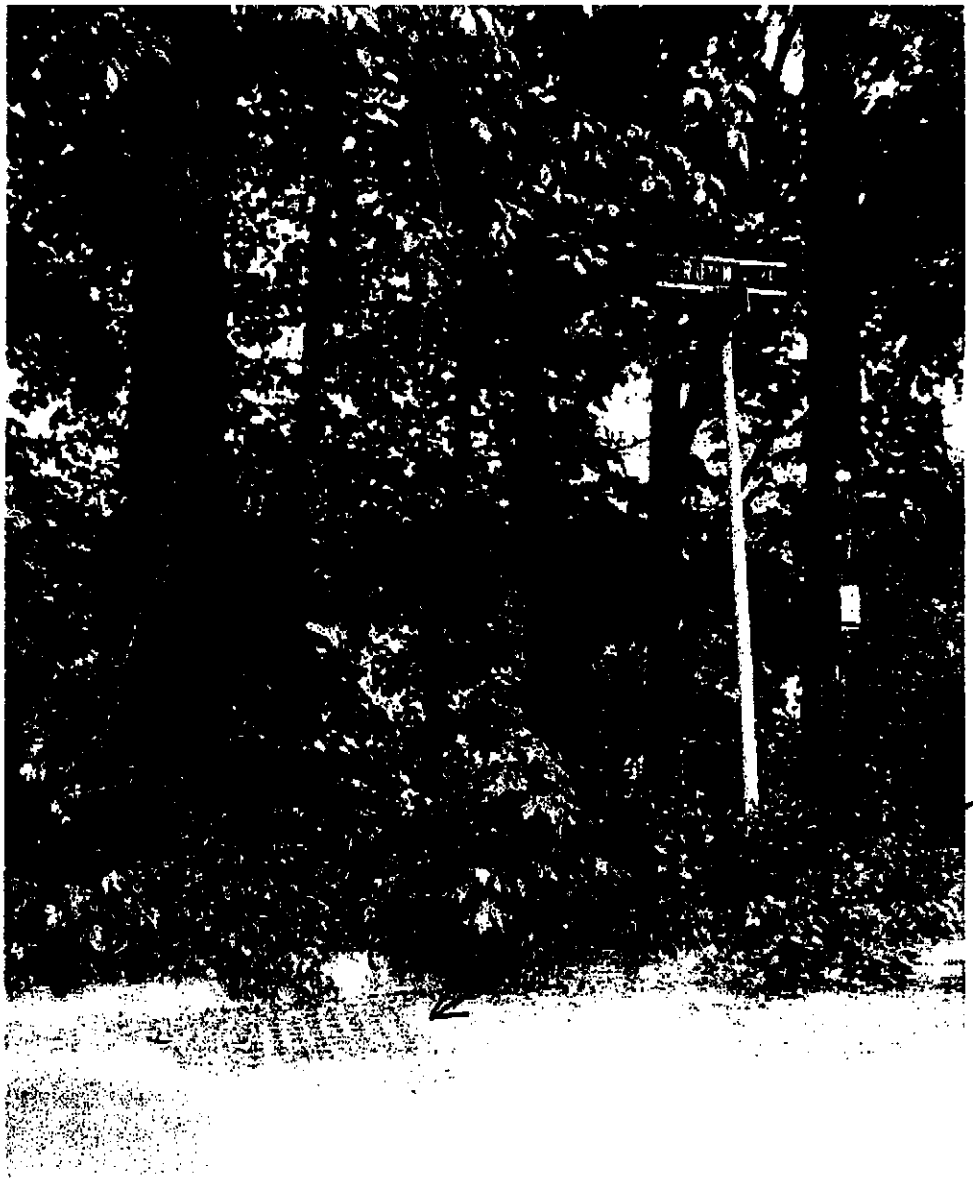
MOSTLY WOODY, "FLOATABLE" DEBRIS ON SANDBAR AT OUTFALL.

PELHAM AND MILL STREET OUTFALL

MAY 15, 2008

END OF PIPE IS SOMEWHAT CRUSHED.

SOUTH END OF BROWN AVE. @ LAKE



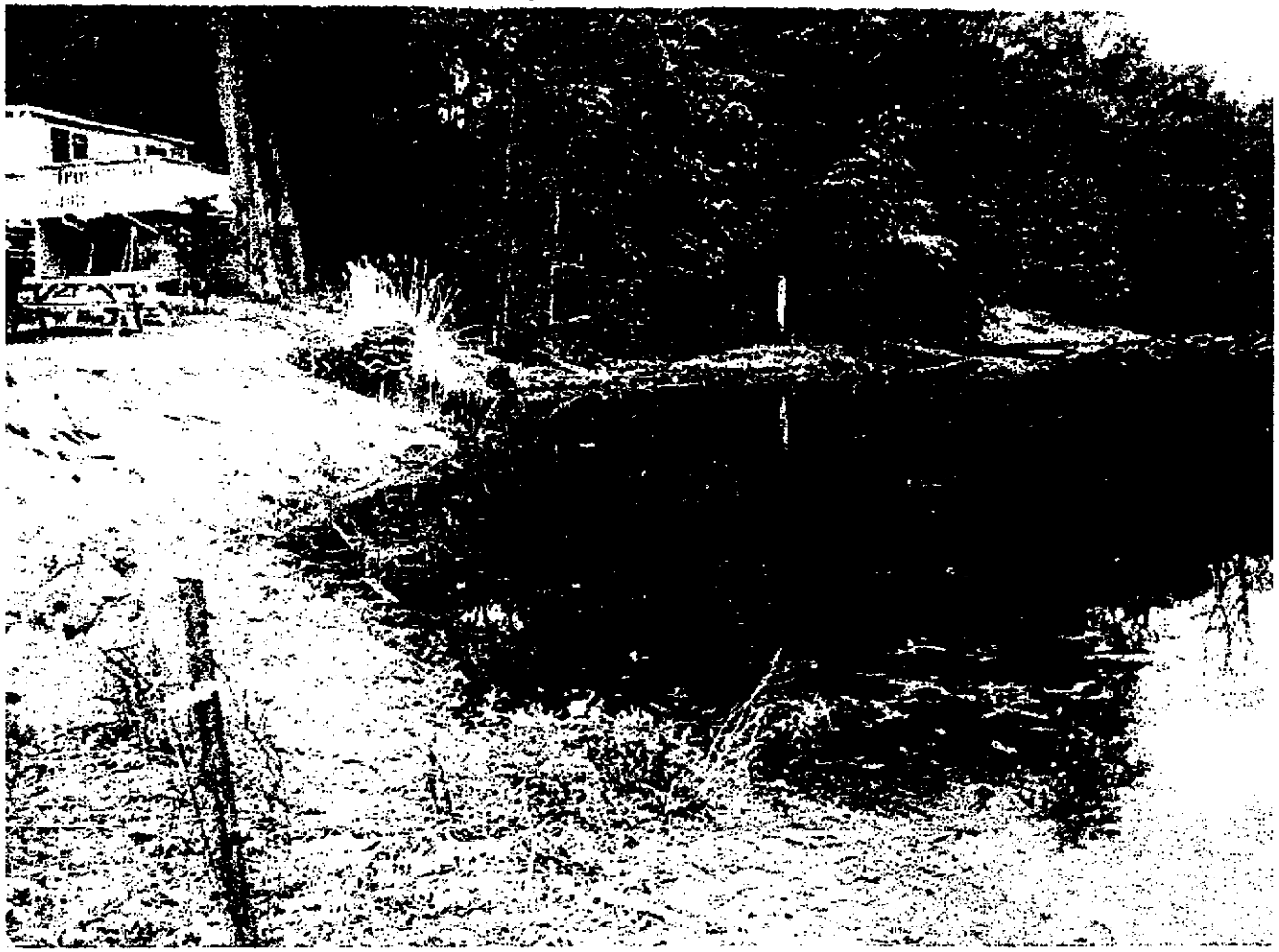
PIPE EXITS CB AND APPEARS TO RUN TOWARD LAKE.

MAY 15, 2008

NORTH END OF BROWN AVENUE @ LAKE

MAY 15, 2008

NORTH END OF BROWN AVENUE @ LAKE



MAY 15, 2008

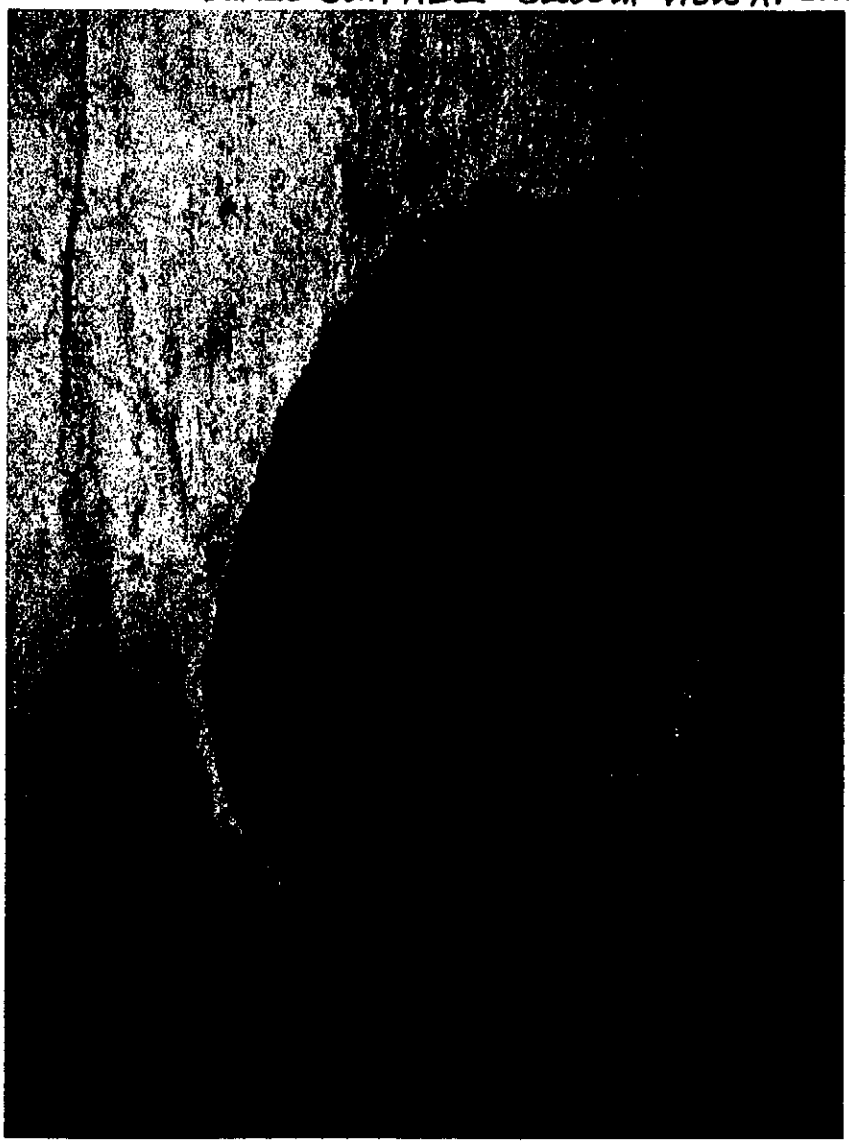
VIEW LOOKS WEST ALONG BANK.

NORTH END OF BROWN AVENUE @ LAKE

MAY 15, 2008

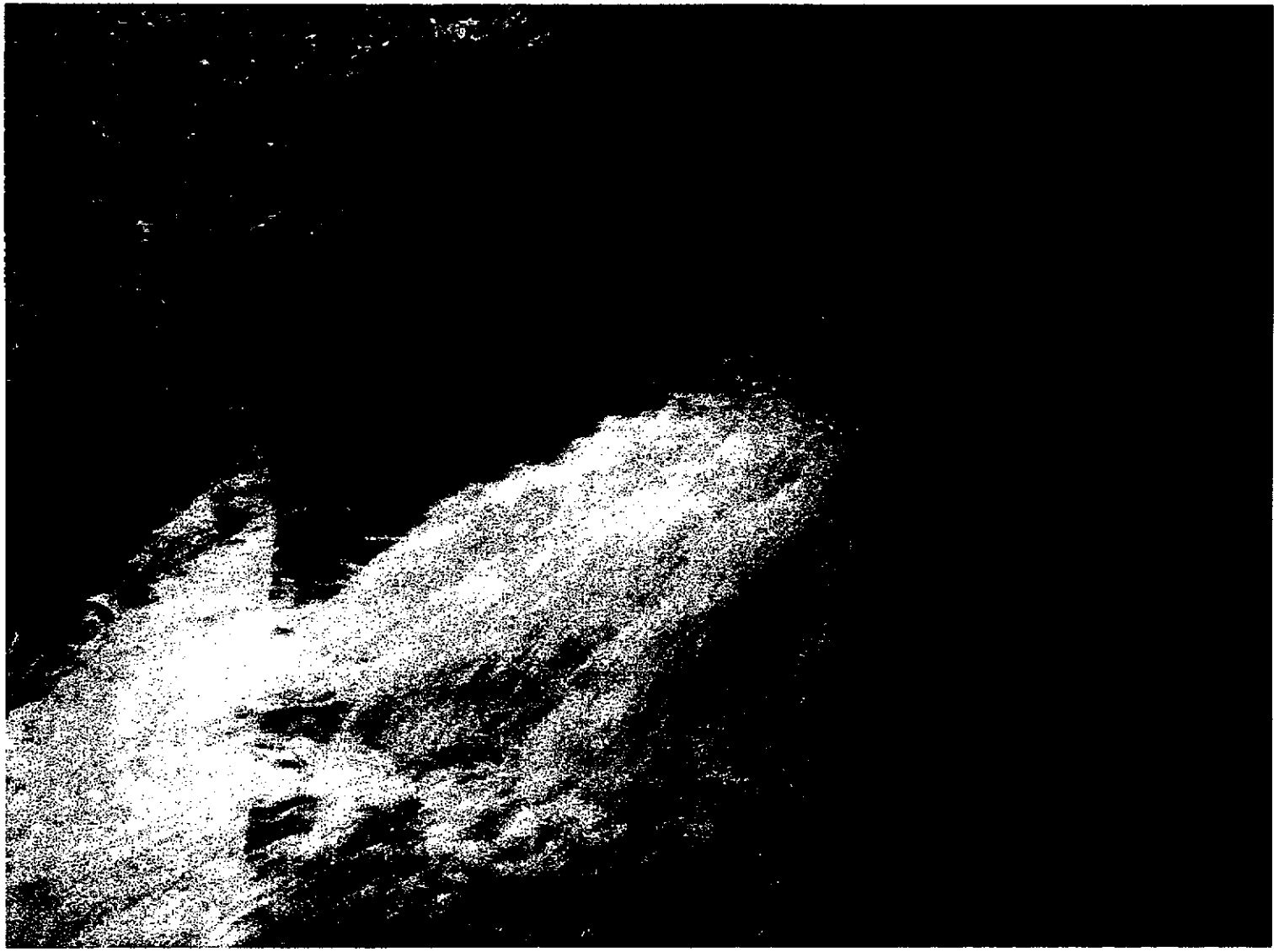
VIEW LOOKS EAST ALONG BANK, PARALLEL TO LAFFIN LN.

LISS PARK-VILLAGE OUTFALL - CLOSEUP VIEW AT LOW FLOW



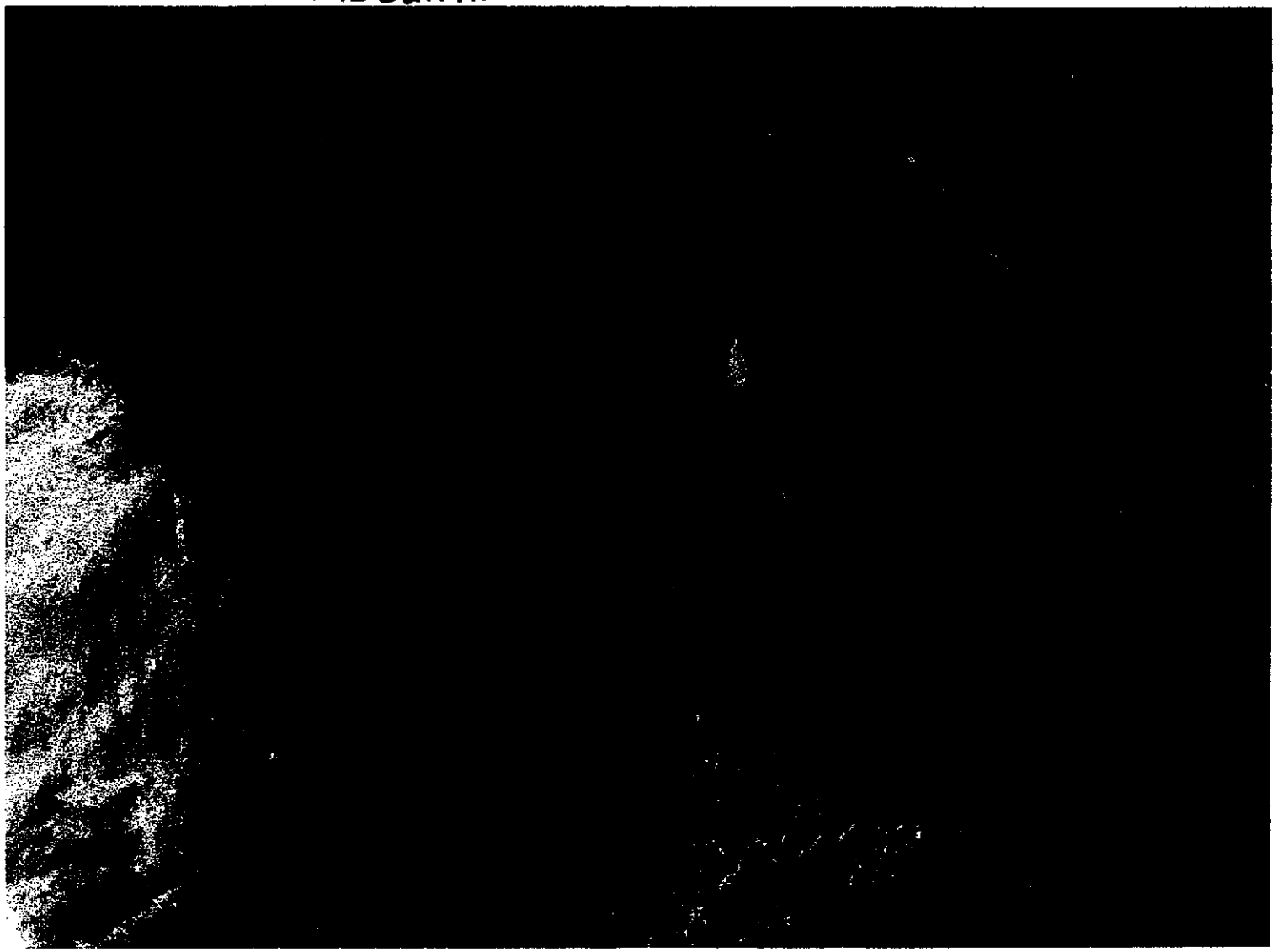
JUNE 27, 2008

LISS PARK- NYSDOT OUTFALL



DEC. 10, 2008

LISS PARK-VILLAGE OUTFALL



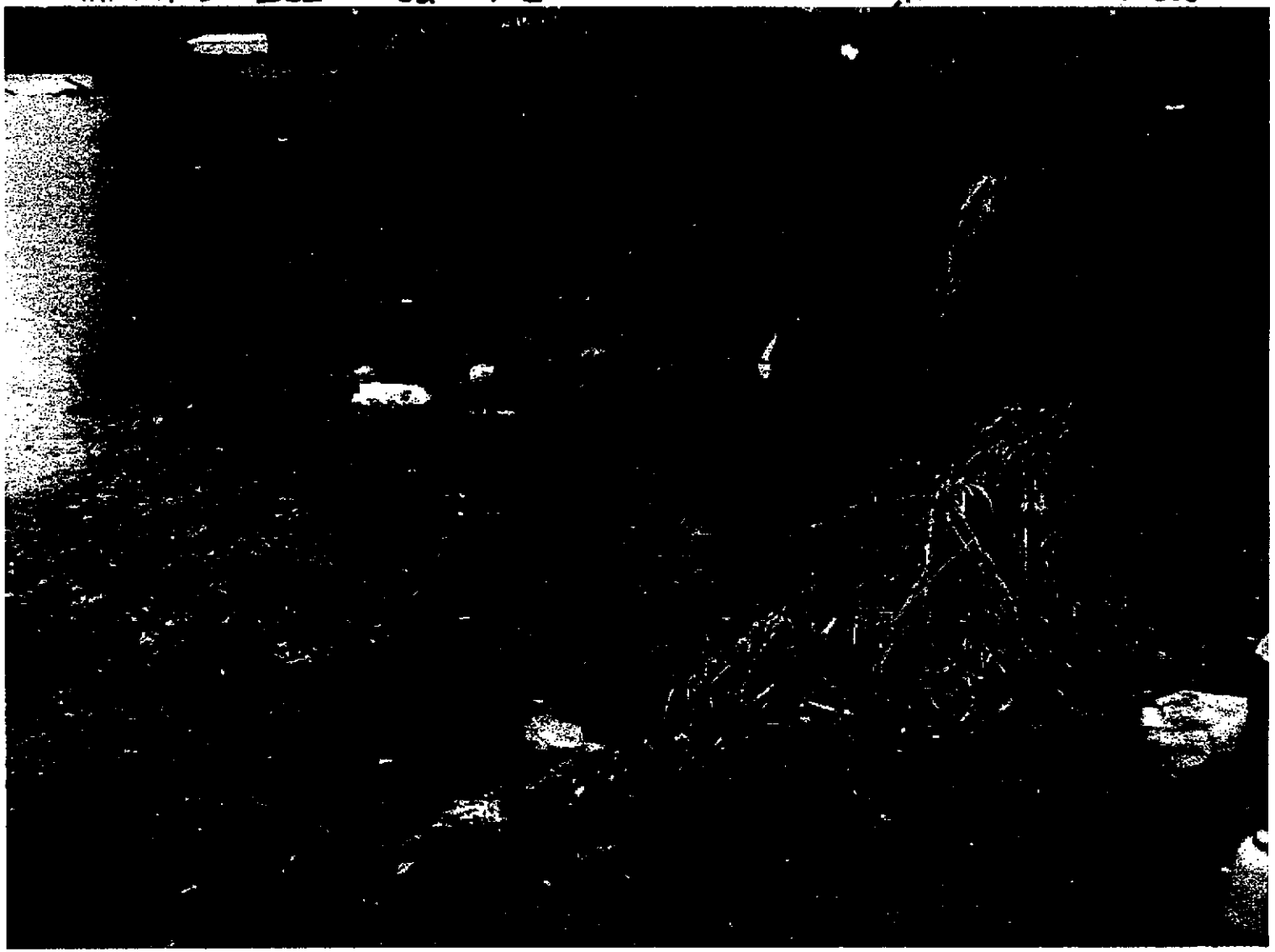
DEC. 10, 2008

CHANNEL FROM LISS PARK OUTFALLS

DEC. 10, 2008

PELHAM AND MILL ST. OUTFALL

NOTE OVERLAND FLOW



DEC. 10, 2008

PELHAM AND MILL ST. OUTFALL

DEC. 10, 2008

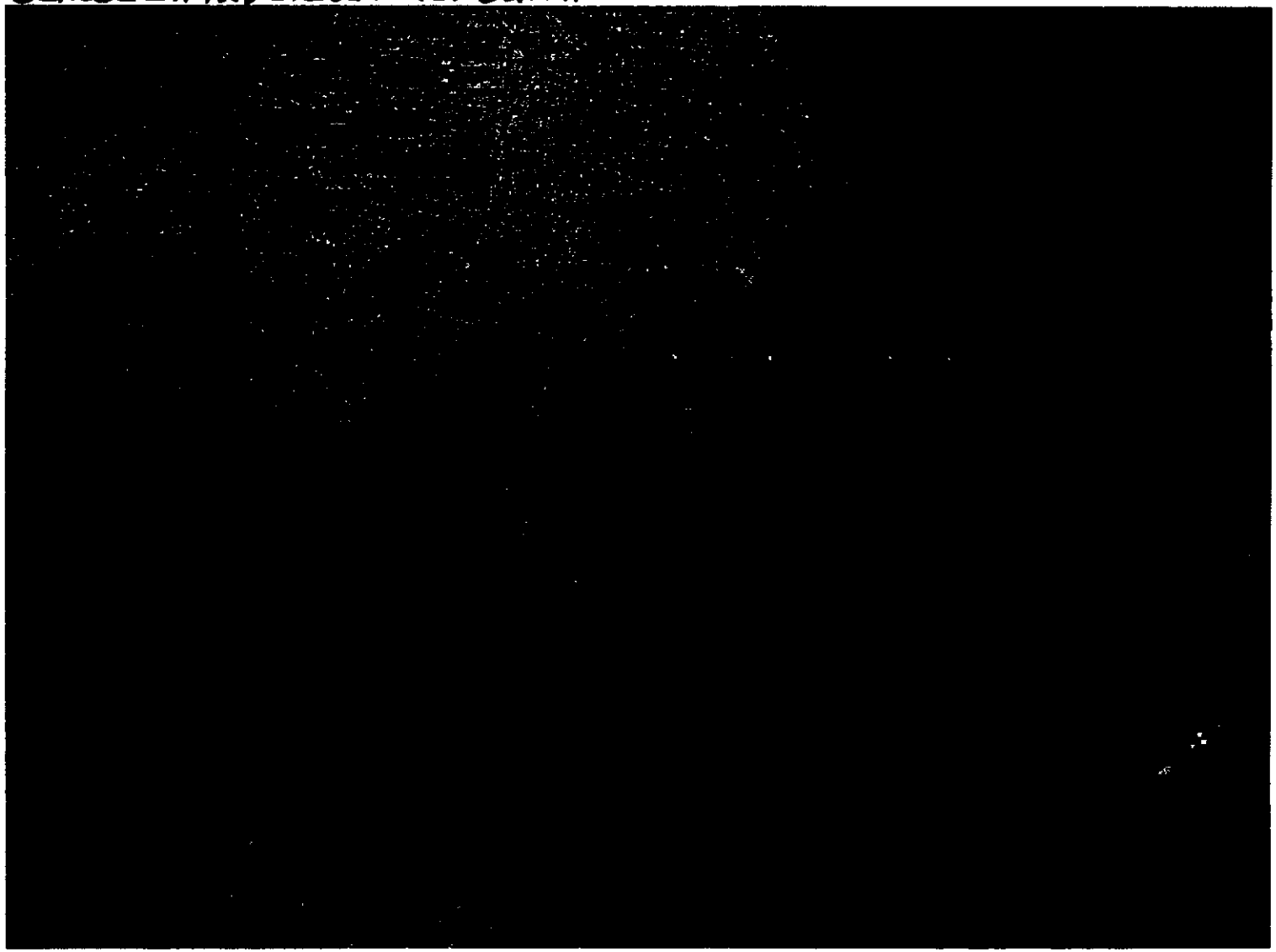
END OF HIGH ST. - BY DAM

DEC. 10, 2008

END OF HIGH ST. – VIEW OF DAM

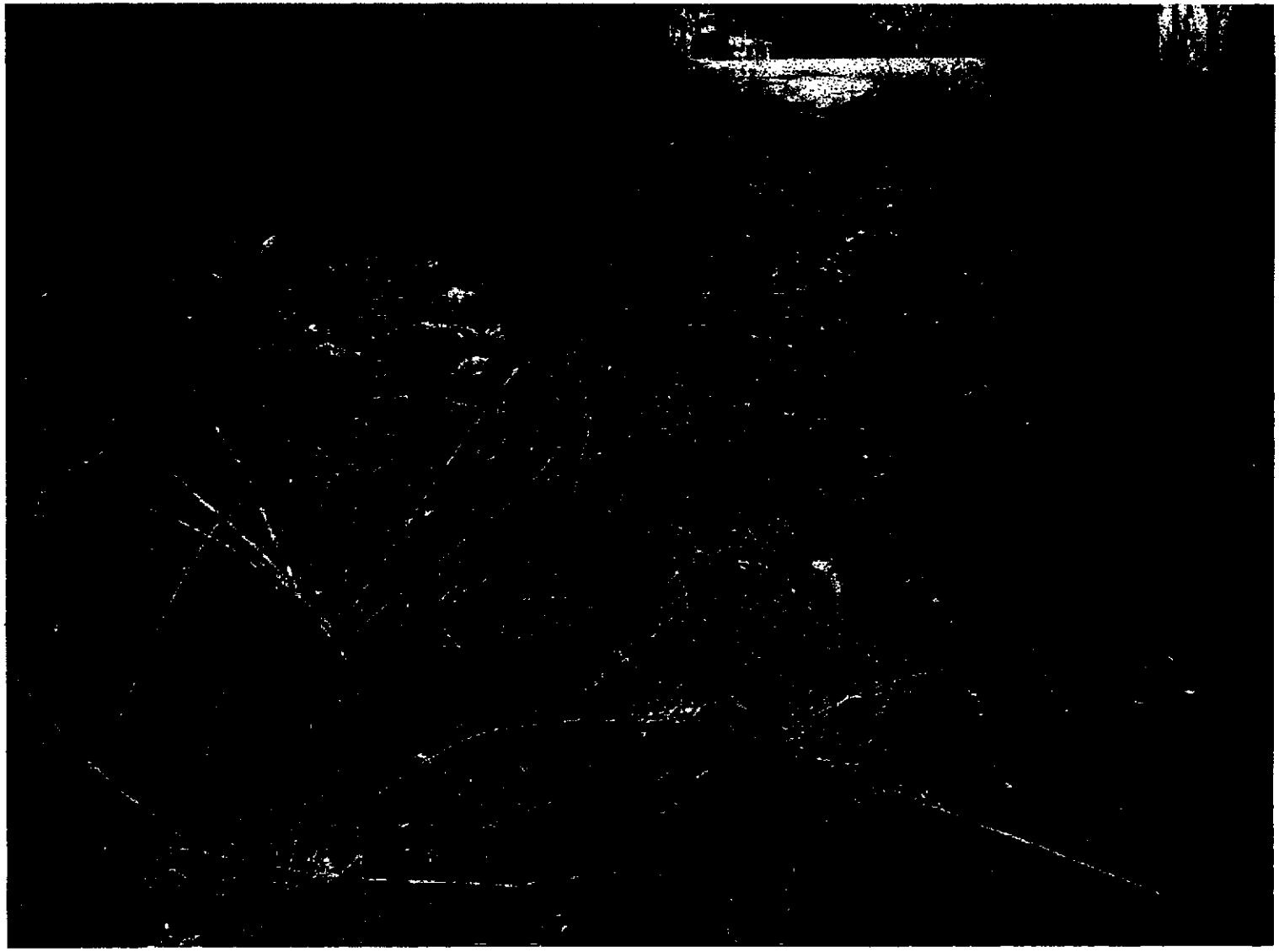
DEC. 10, 2008

SCHOOL ST. AND BROWN AVE. OUTFALL



12/10/2008

WEST ST. AND BROWN AVE. OUTFALL

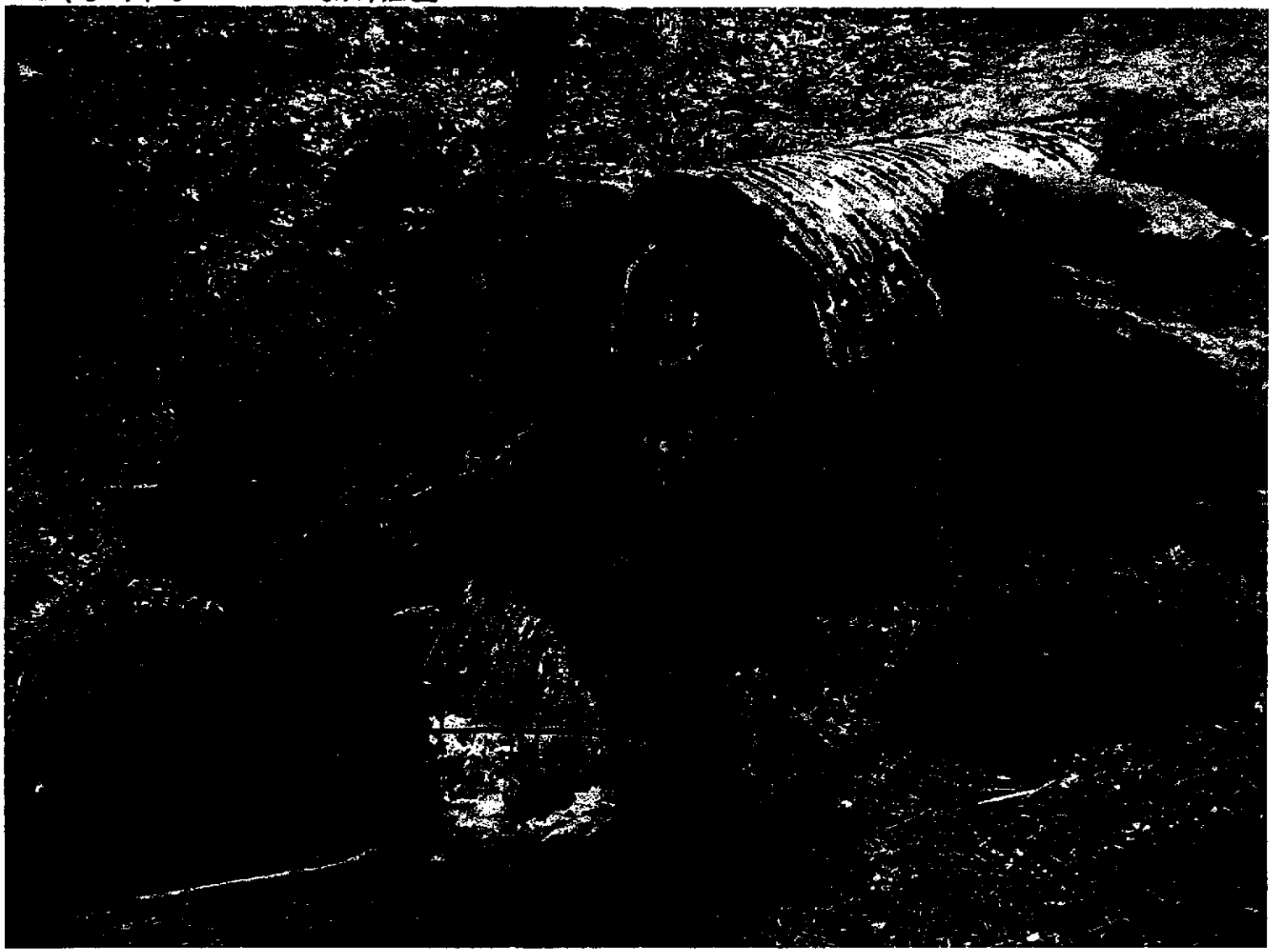


DEC. 10, 2008

VIEW NORTH FROM WEST ST. & BROWN AVE. OUTFALL

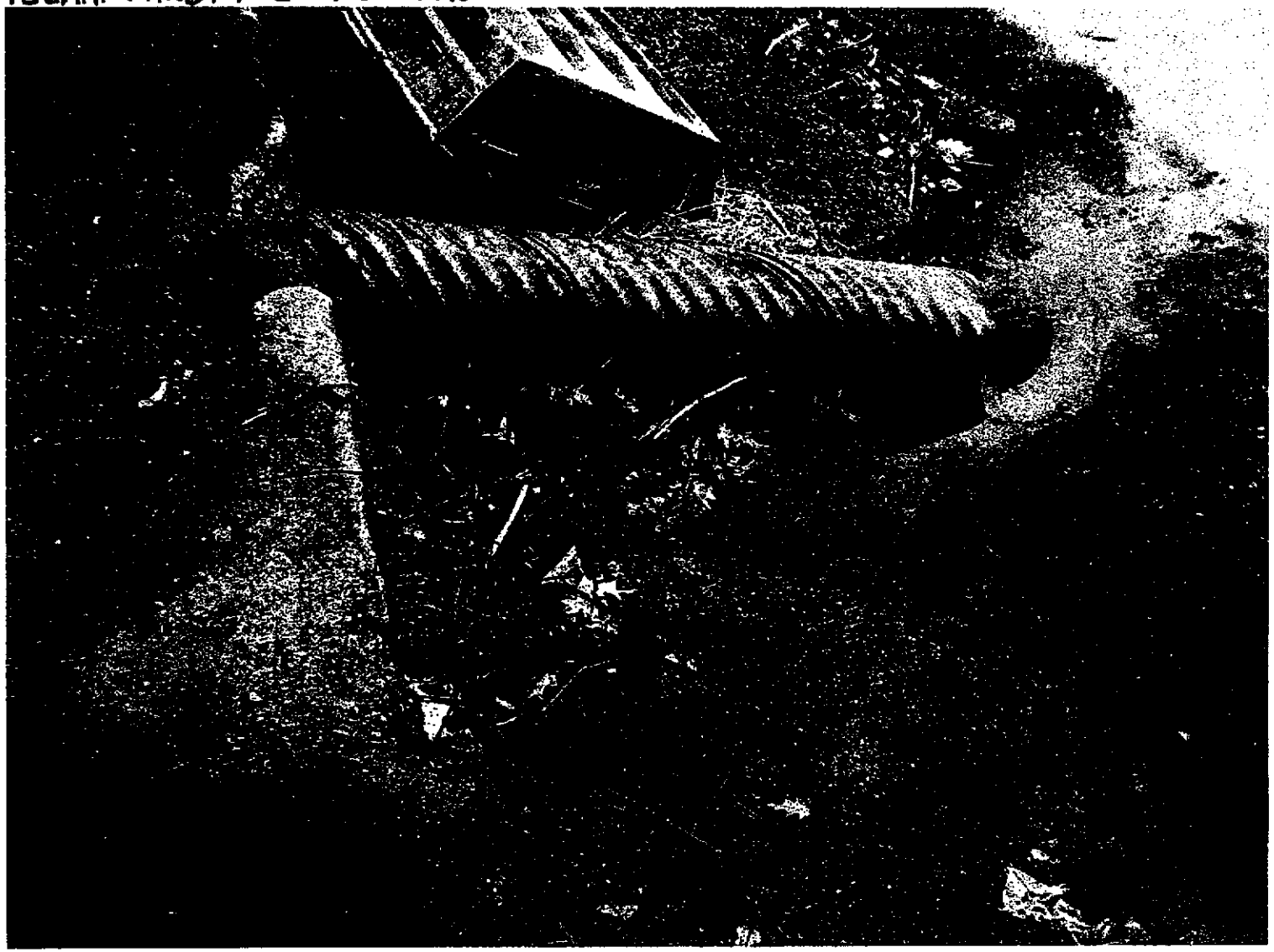
DEC. 10, 2008

VETERAN'S PARK OUTFALL



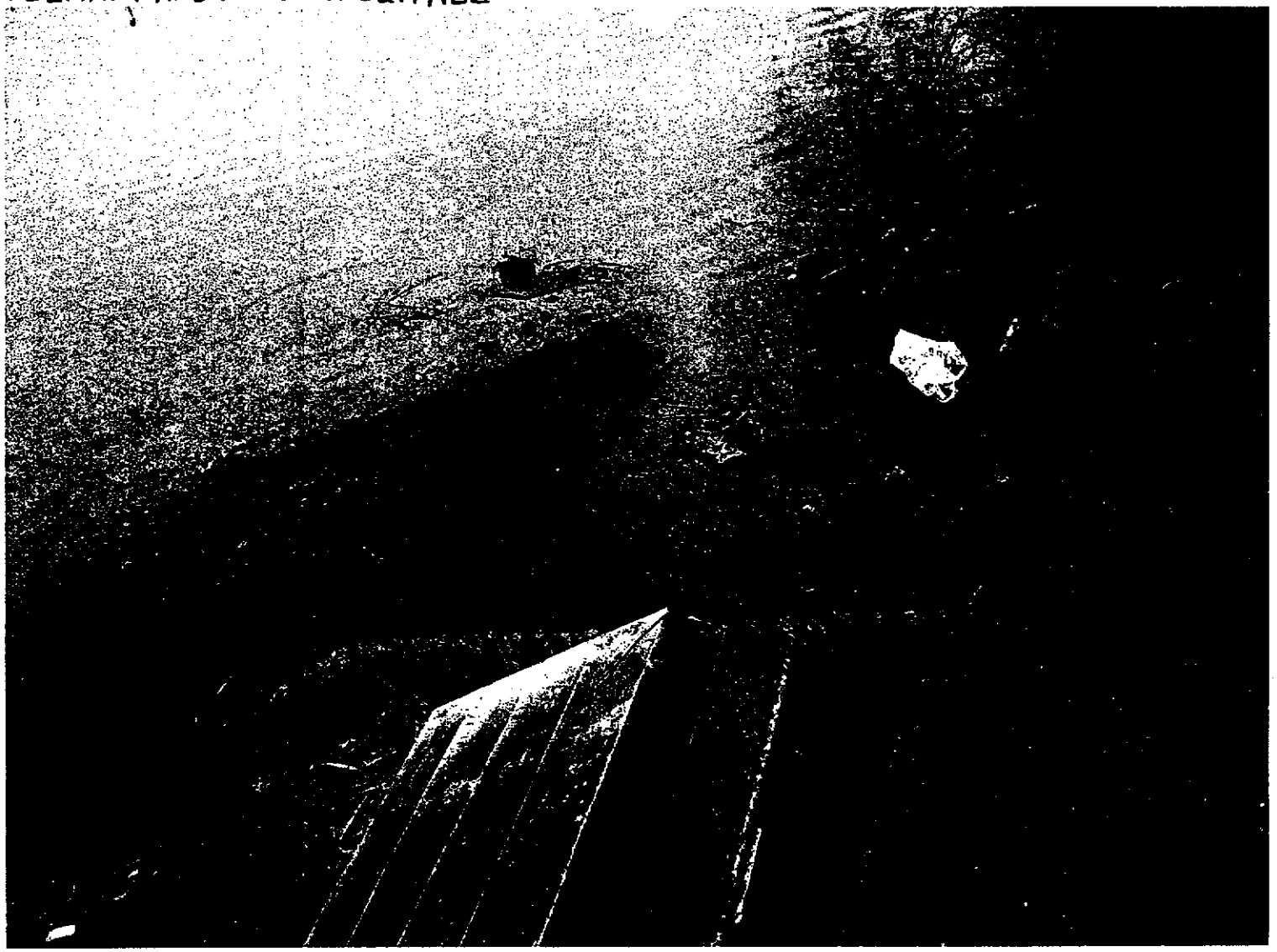
APRIL 3, 2009

PELHAM AND MILL ST. OUTFALL



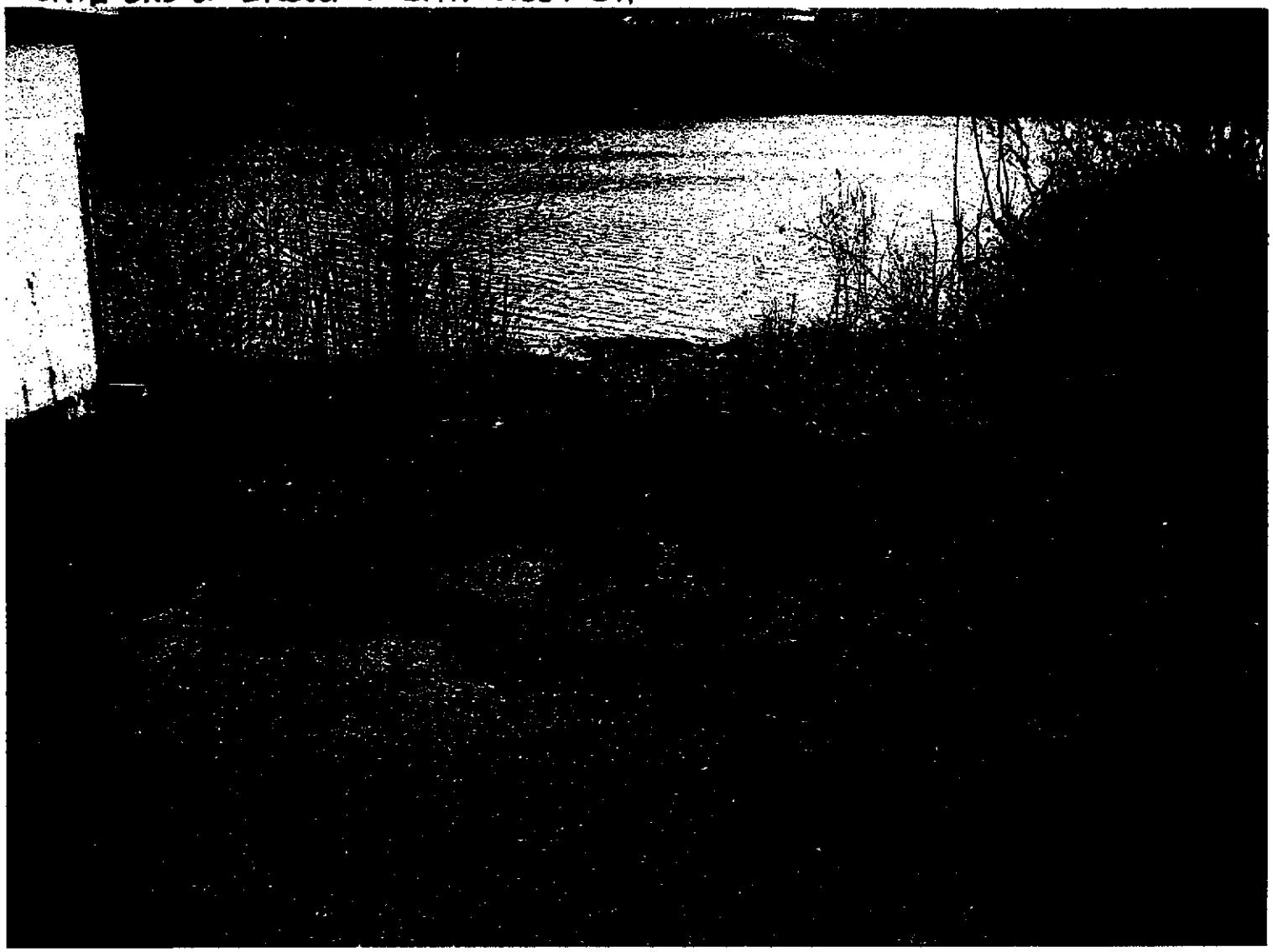
APRIL 3, 2009

PELHAM AND MILL ST. OUTFALL



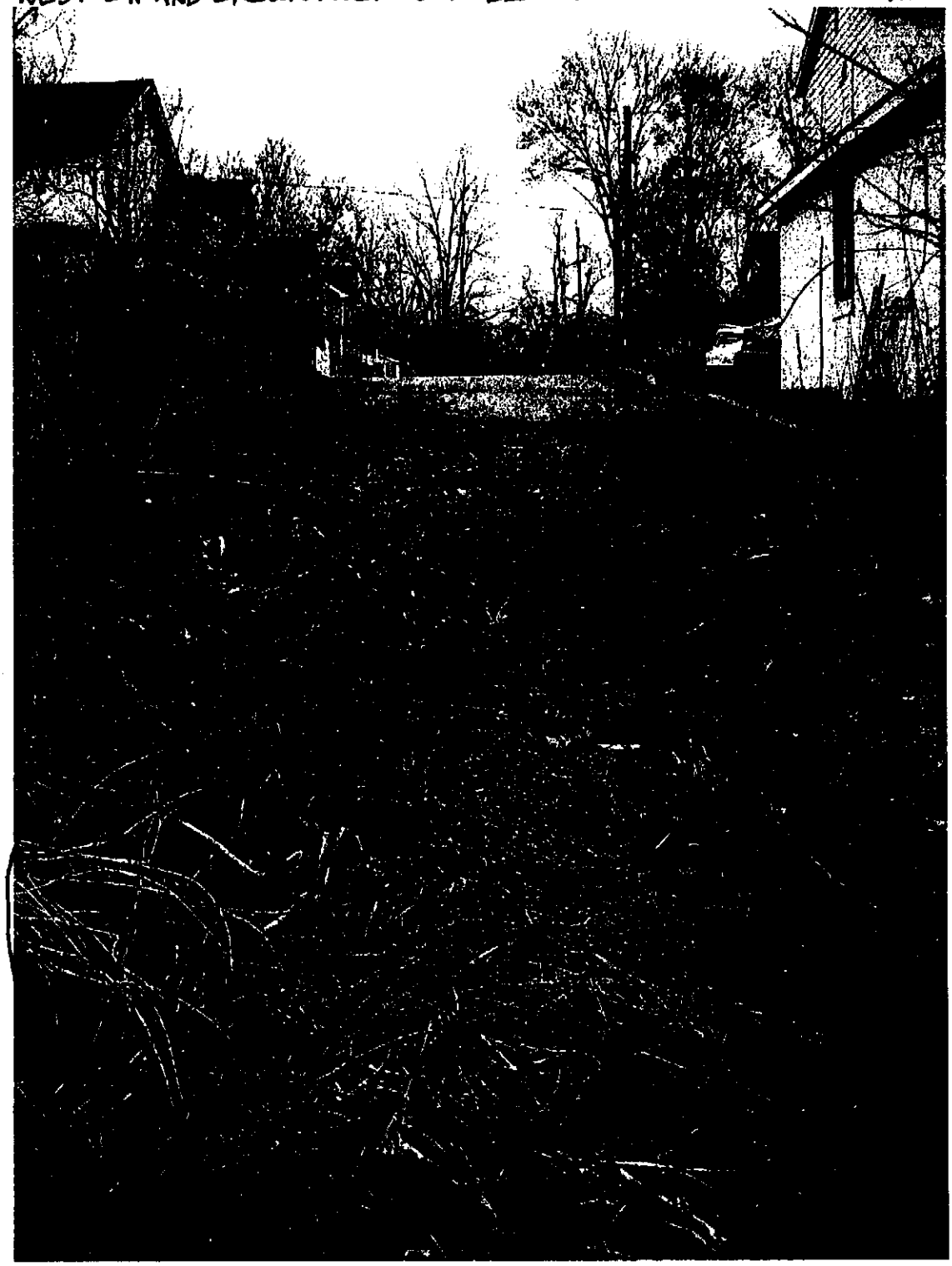
APRIL 3, 2009

NORTH END OF BROWN AVE. AT WEST ST.



APRIL 3, 2009

WEST ST. AND BROWN AVE. OUTFALL – VIEW SOUTH FROM LAKE



APRIL 3, 2009

WEST ST. AND BROWN AVE. OUTFALL

APRIL 3, 2009

PIPE ½ FULL OF SEDIMENT

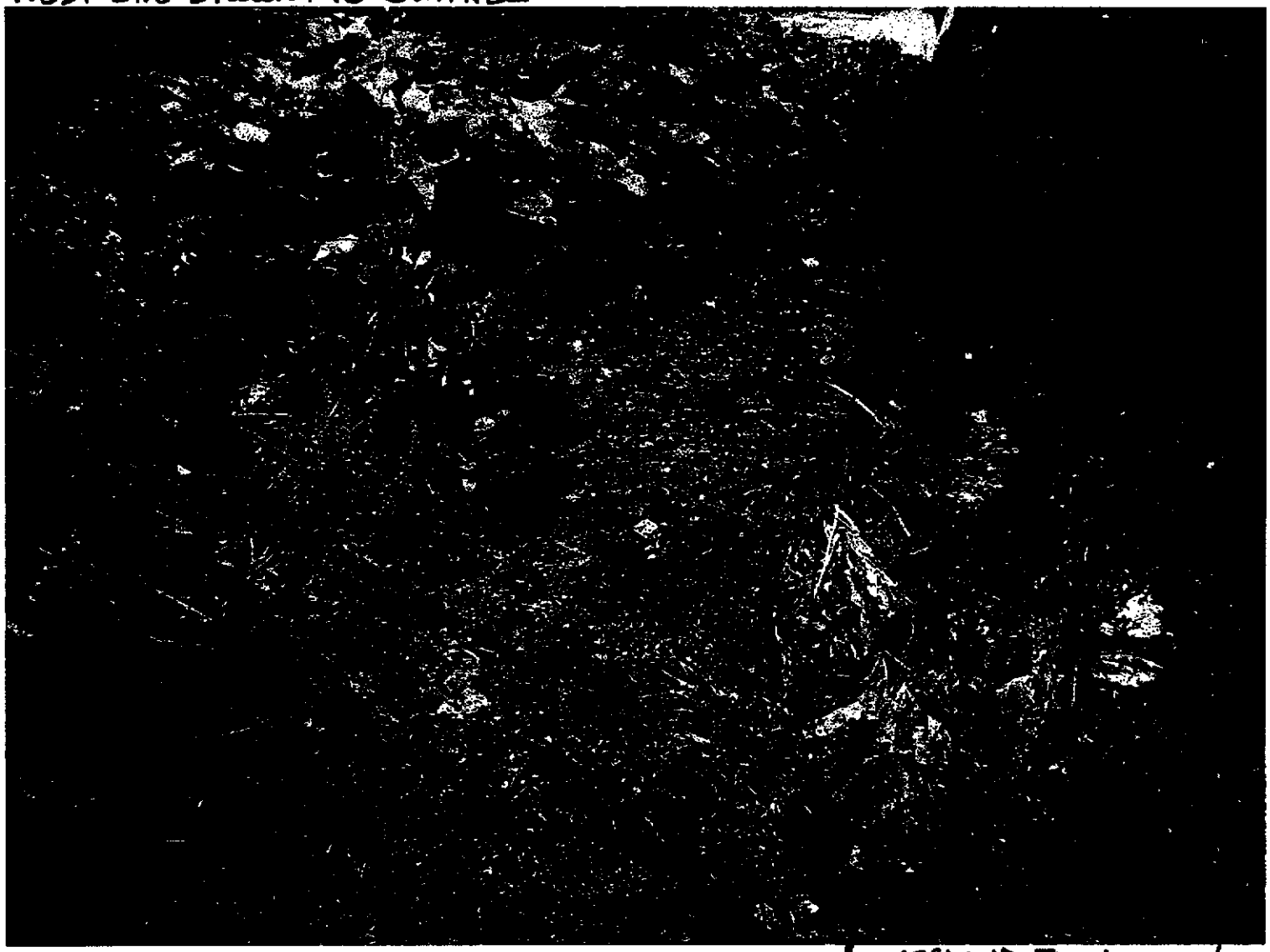
PELHAM AND MILL ST. OUTFALL

JUNE 9, 2009

PELHAM AND MILL ST. OUTFALL

JUNE 9, 2009

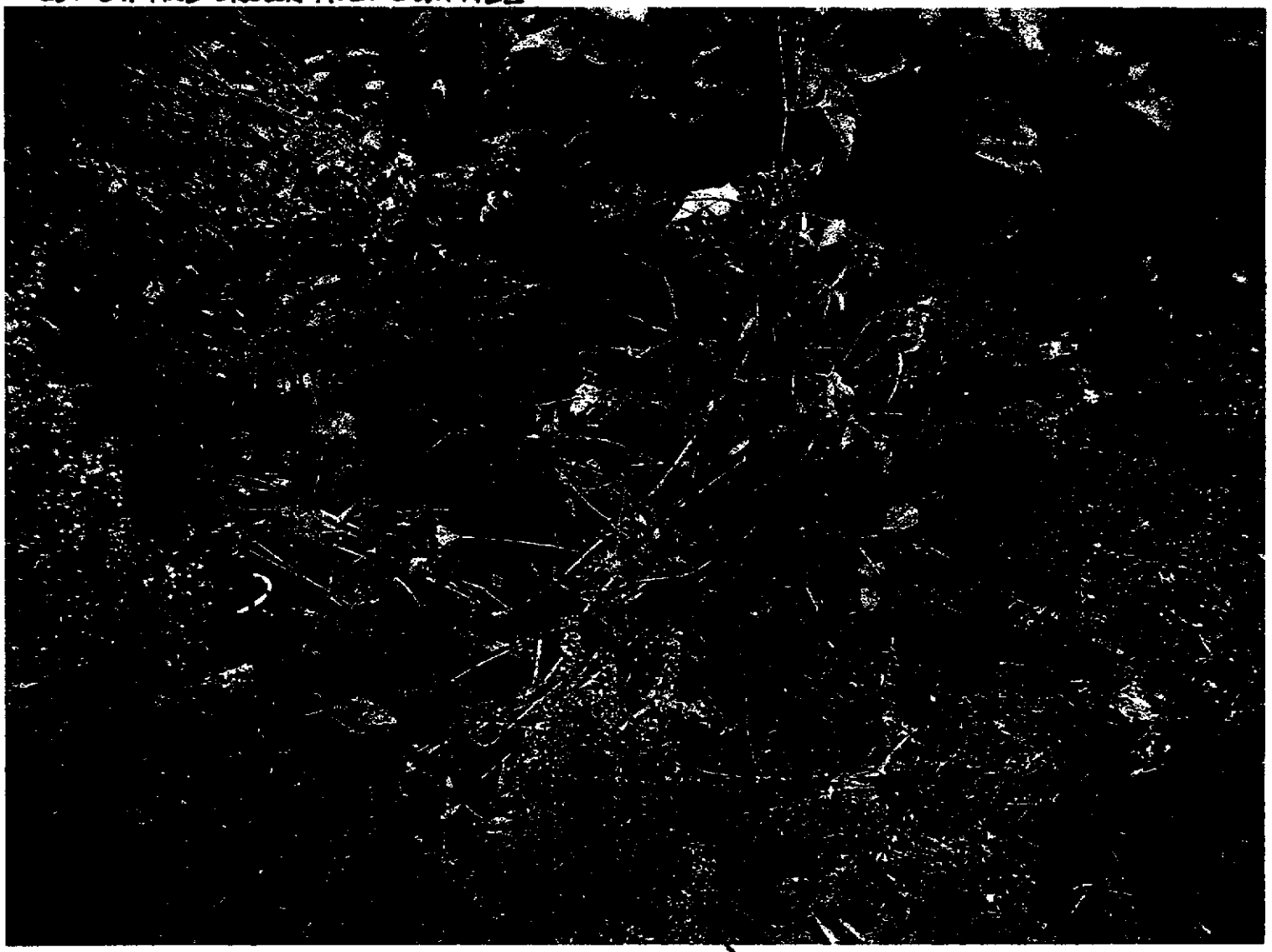
WEST ST. & BROWN AVE OUTFALL



JUNE 9, 2009

OVERLAND FLOW CHANNEL & DISCHARGE

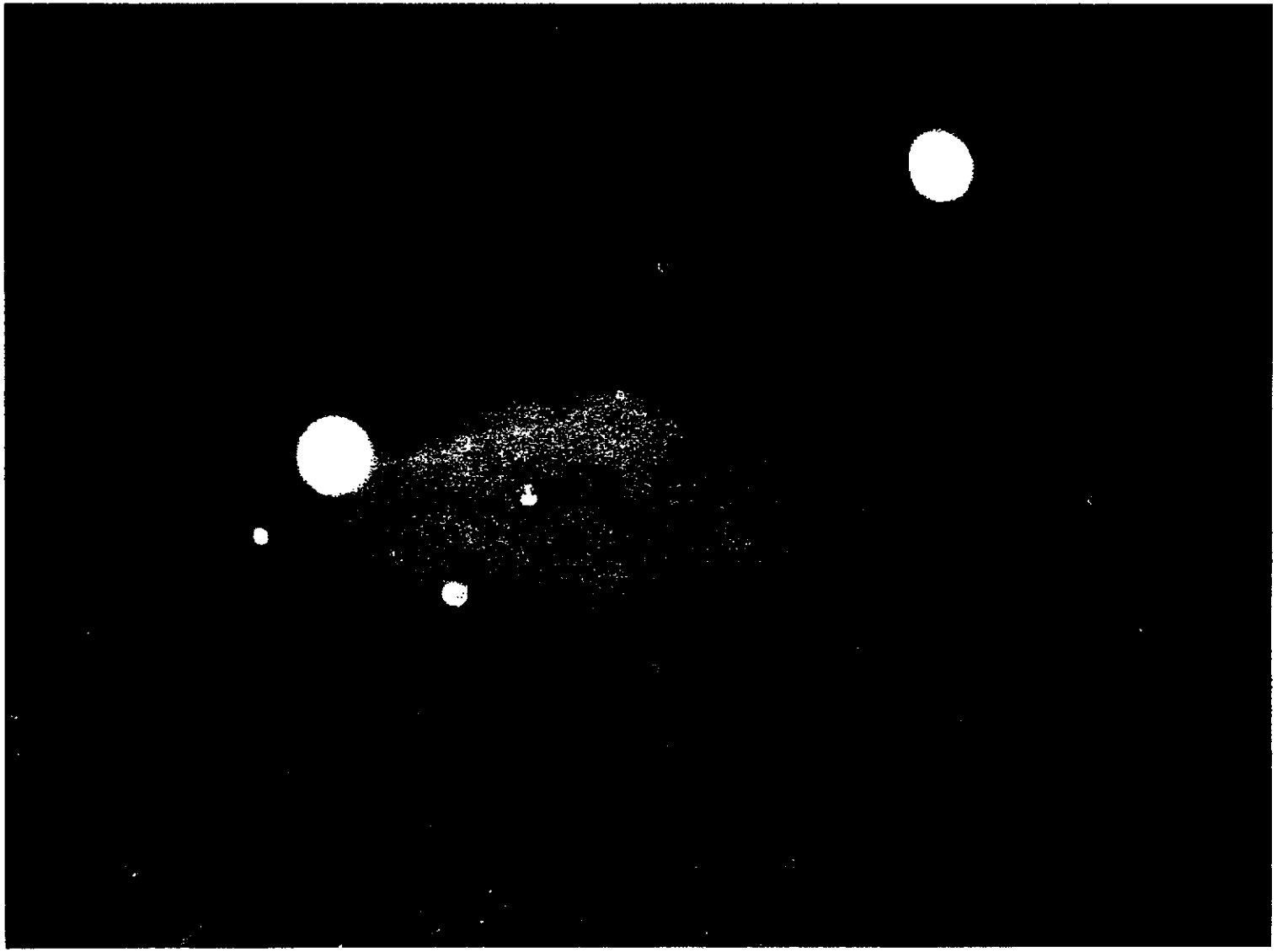
WEST ST. AND BROWN AVE. OUTFALL



JUNE 9, 2009

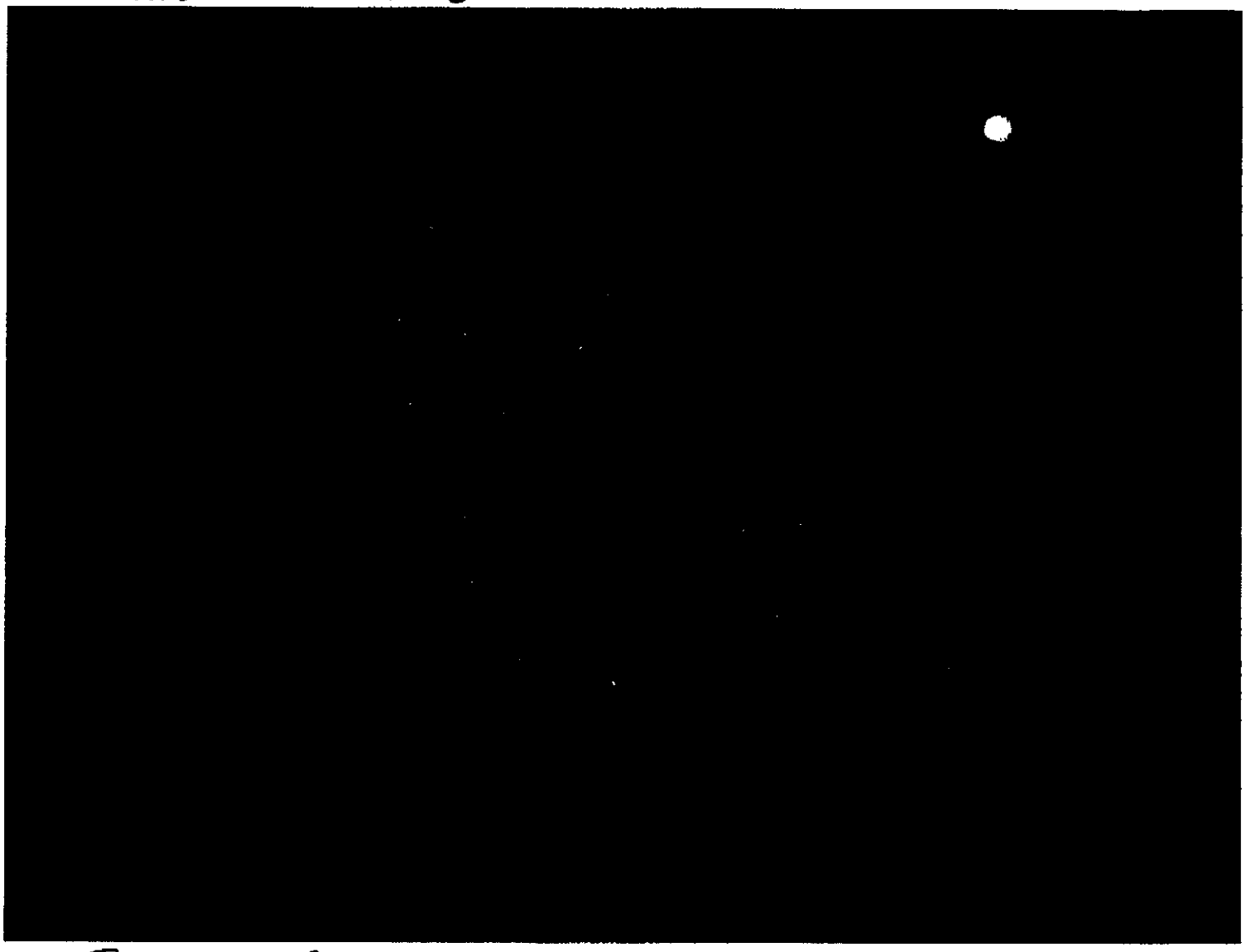
OUTFALL PIPE OVERGROWN WITH VEGETATION.

LISS PARK OUTFALLS



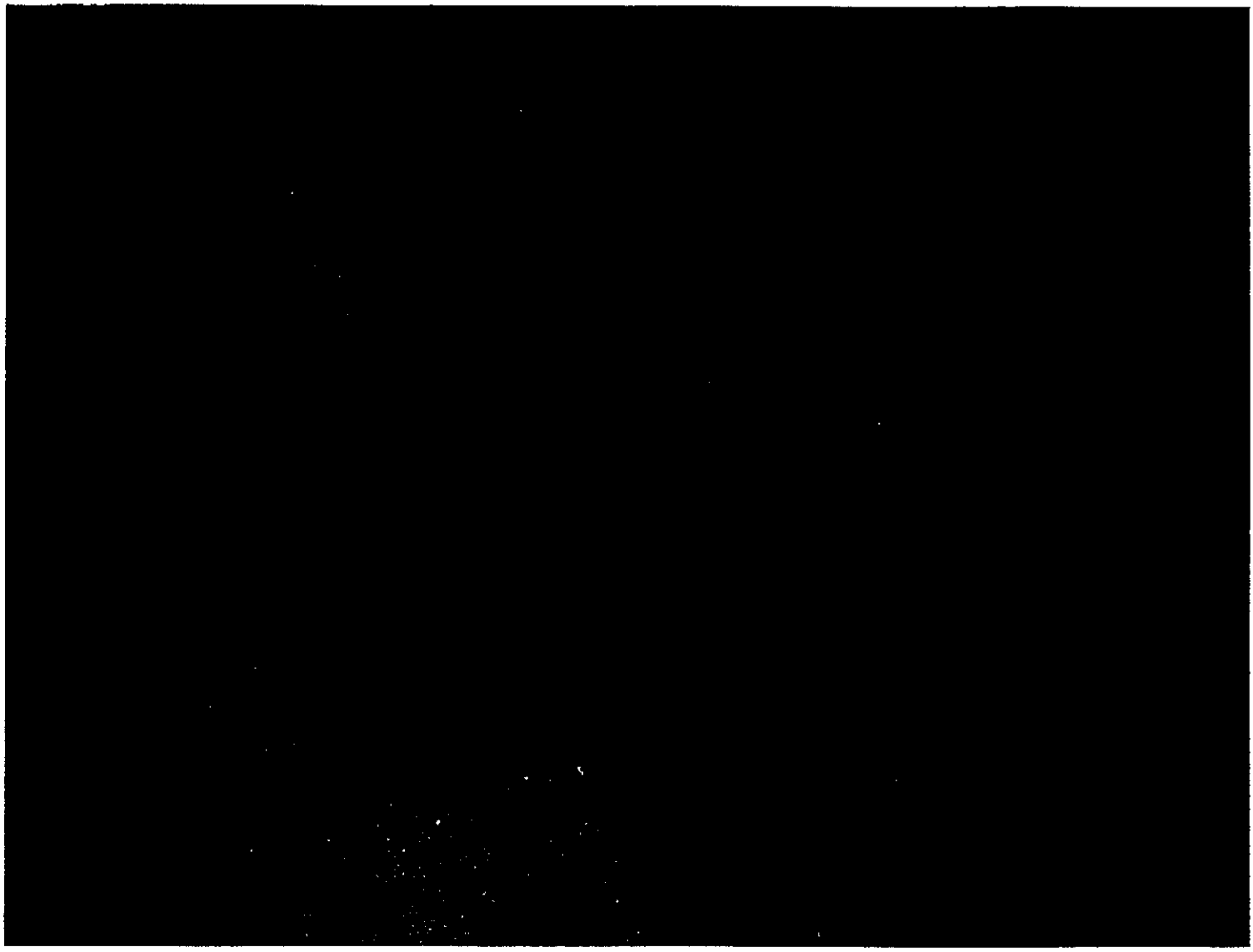
JUNE 18, 2009

LISS PARK OUTFALLS



JUNE 18, 2009

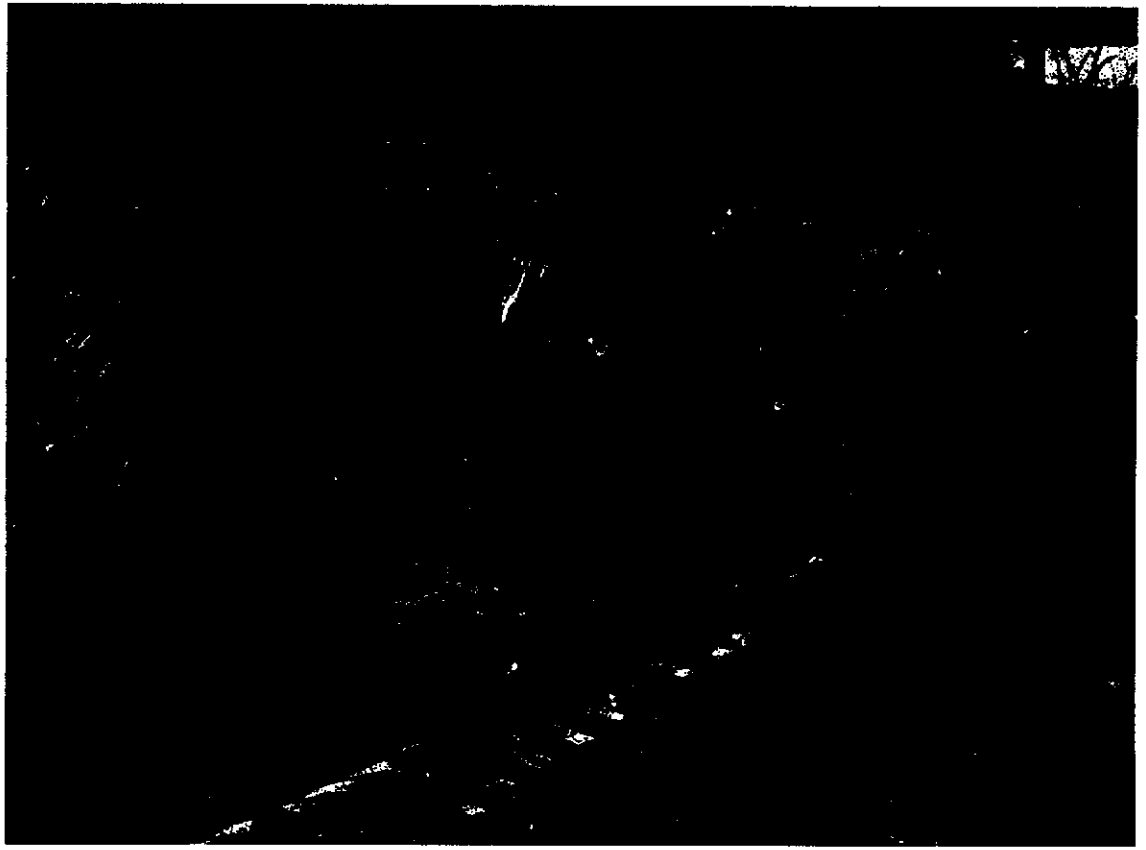
LISS PARK OUTFALLS



JUNE 18, 2009

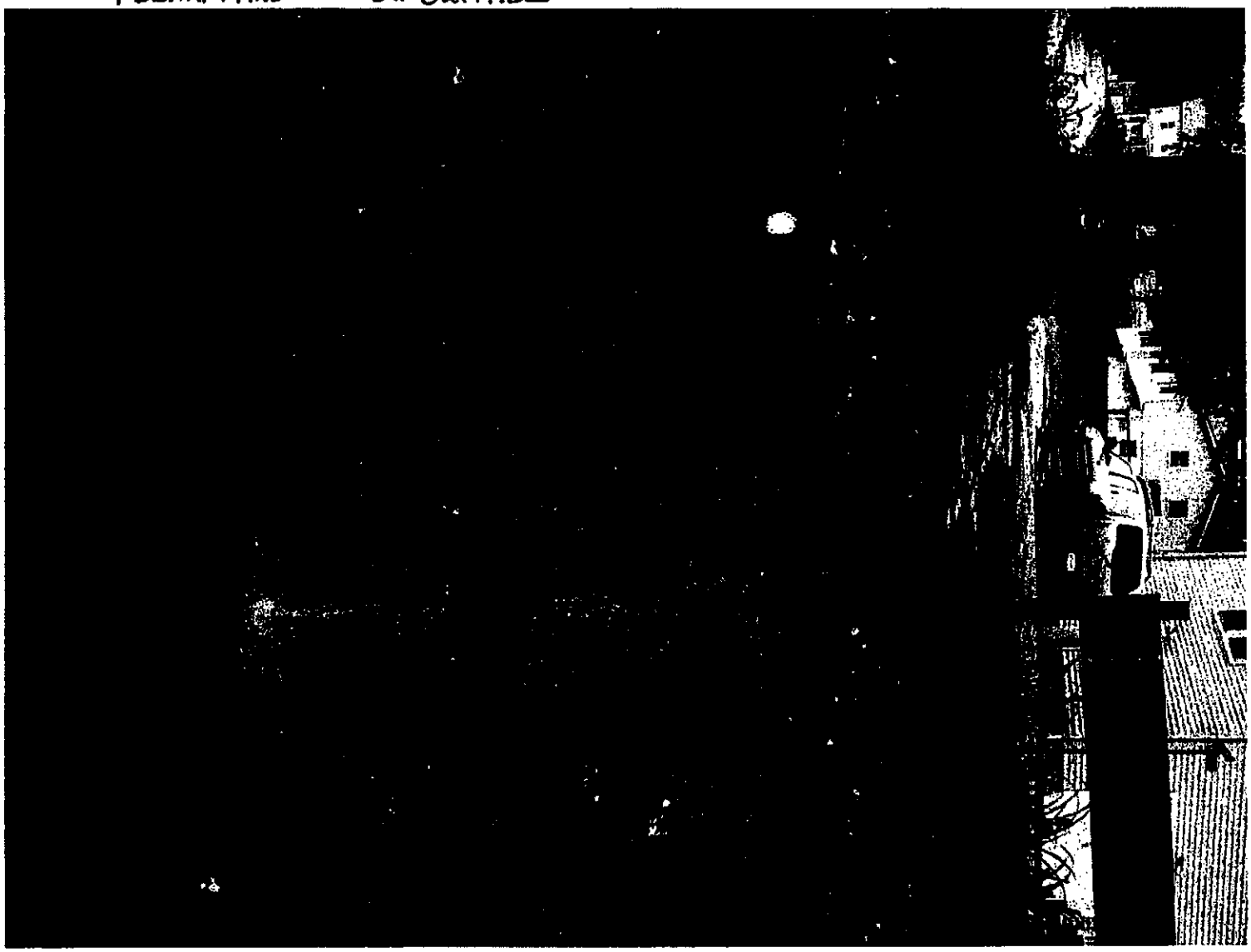
PELHAM AND MILL ST. OUTFALL

NOTE: WATERFALL DUE TO OVERLAND FLOW.



JUNE 18, 2009

PELHAM AND MILL ST. OUTFALL



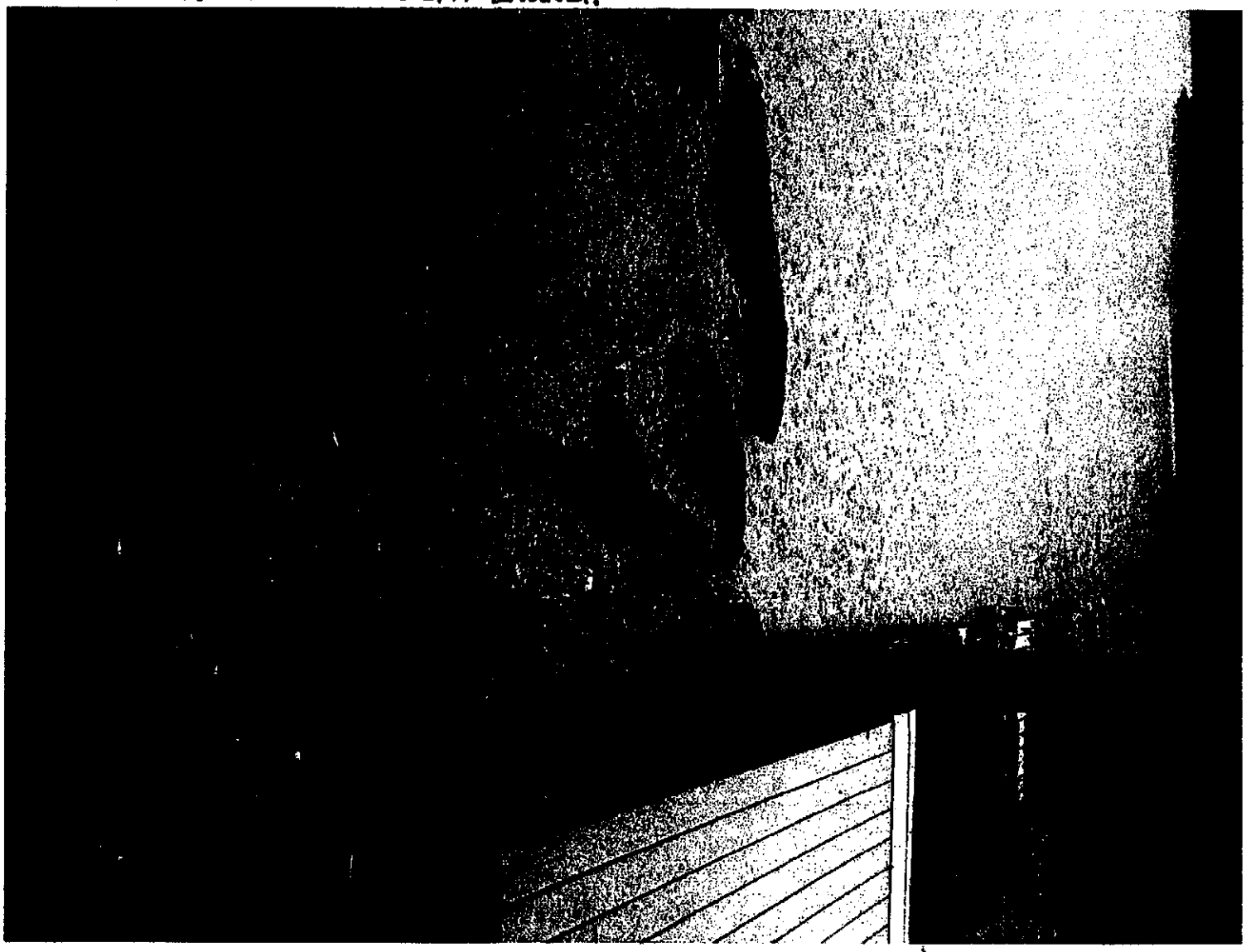
JUNE 18, 2009

NOTE OVERLAND FLOW PATH

VETERAN'S PARK - BOAT LAUNCH

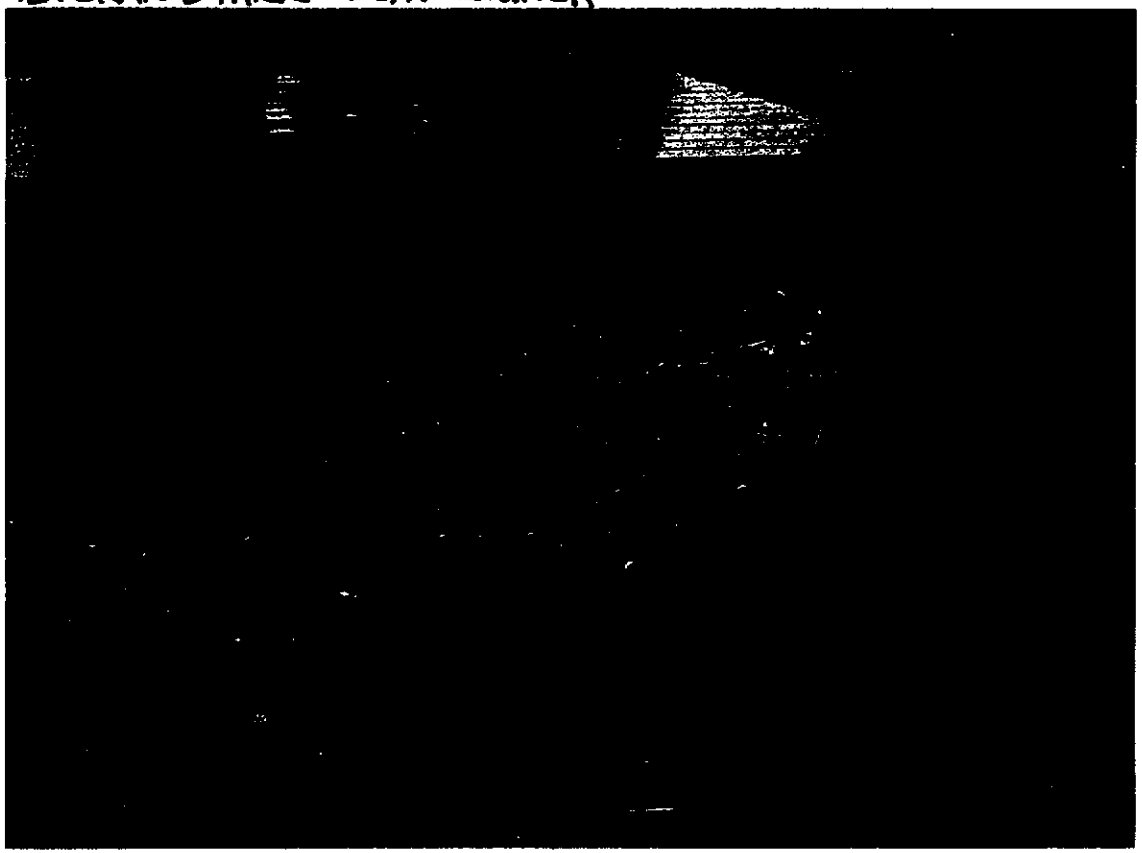
JUNE 18, 2009

VETERAN'S PARK - BOAT LAUNCH



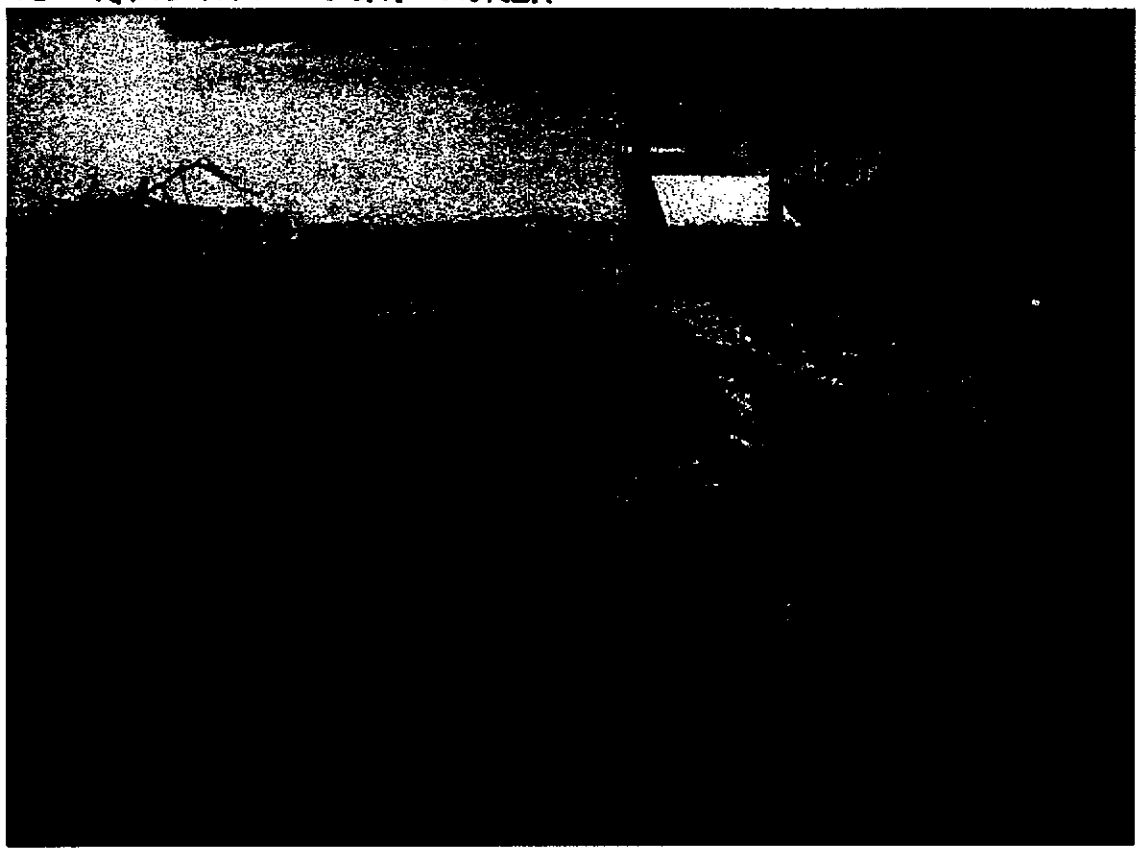
JUNE 18, 2009

VETERAN'S PARK- BOAT LAUNCH



JUNE 18, 2009

VETERAN'S PARK- BOAT LAUNCH



JUNE 18, 2009

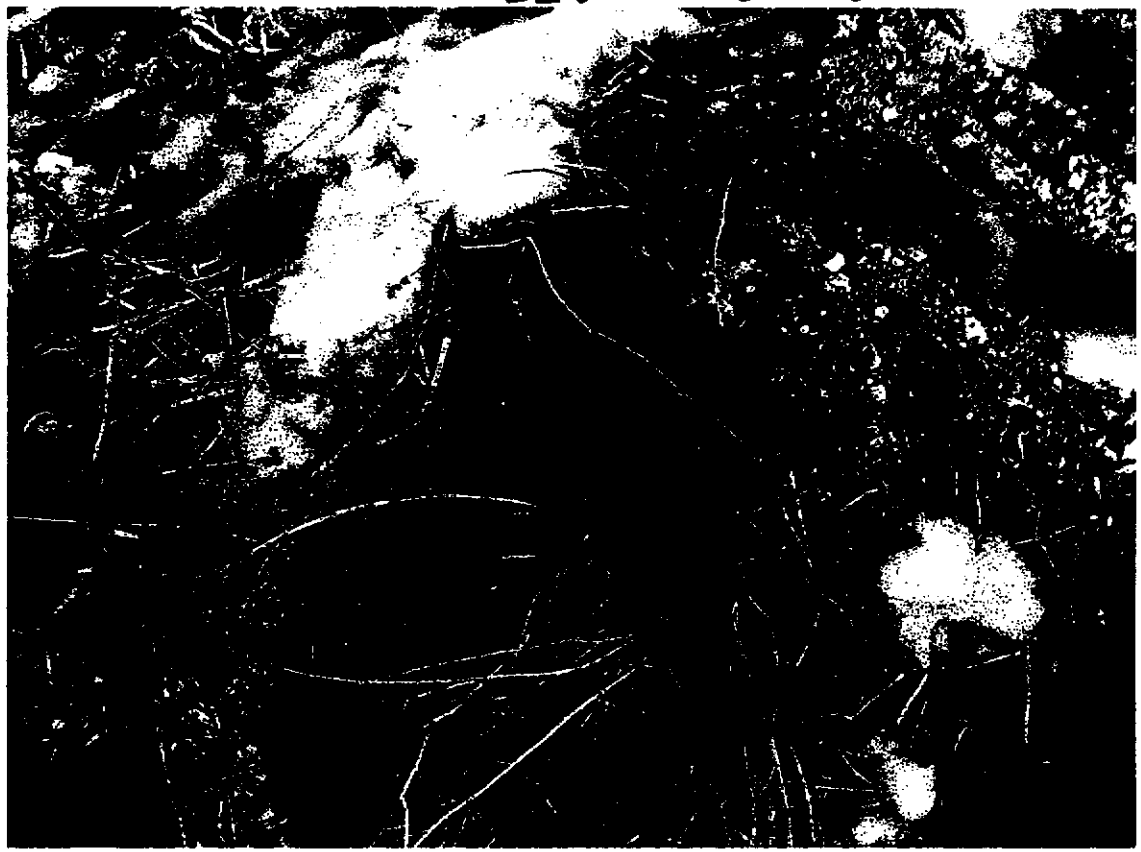
VETERAN'S PARK – VIEW OF INSTALLED SILT FENCE

JULY 2, 2009

WEST ST. AND BROWN AVE. OUTFALL

DEC. 16, 2009

WEST ST. AND BROWN AVE. DETAIL OF OUTFALL PIPE



DEC. 16, 2009

NOTE: PIPE REMAINS FULL OF SEDIMENT

Appendix "E"

Sediment Load Calculations and Rainfall Data

Sediment Load Calculations:

Date	Precipitation Reported at D.C. Airport Inches		Total Flow MGD	Total Load lb/day	37.6 pcf Saturated weight of soil	Volume Cubic Feet
6/27/2008	0	Incomplete data	0.04	0.00		0
7/14/2008	0.63	24hr amt	0.17	2.52		0.07
7/23/2008	0.29	24hr amt	0.22	32.55		0.87
8/19/2008	0.05	1-6hr report	0.06	0.83		0.02
9/9/2008	1.38	2-6hr reports	1.33	315.74		8.40
9/26/2008	0.68	24hr amt	0.77	62.38		1.66
10/28/2008	0.45	24hr amt	0.29	13.46		0.36
11/25/2008	0.34	24hr amt	0.81	240.58		6.40
12/10/2008	0.04	24hr amt	0.92	298.60		7.94
					2008 Total 966.66	
3/9/2009	0.56	24hr amt	0.30	346.04		9.20
4/3/2009	0	24hr amt	0.21	76.60		2.04
4/21/2009	0.59	24hr amt	0.20	1.24		0.03
5/14/2009	0.14	3-6hr reports	0.21	16.62		0.44
6/3/2009	0	Incomplete data	0.11	0.96		0.03
6/9/2009	1.07	24hr amt	0.94	104.22		2.77
6/18/2009	0.9	24hr amt	1.33	258.13		6.87
7/2/2009	0.4	4-6hr reports	0.95	32.94		0.88
7/16/2009	0.5	1-6hr report	1.36	2740.65		72.89
7/21/2009	0.01	24hr amt	1.32	416.41		11.07
8/13/2009	2.24	24hr amt	0.53	16.63		0.44
9/11/2009	0.07	24hr amt	0.58	50.97		1.36
					2009 Total 4061.43	
		Study Period Total Load:		5028.09	Total Volume:	133.73

Total Flow is a composite sum of estimated flow rates from Village outfalls converted from Gallons Per Minute to Million Gallons per Day.

Load is calculated by multiplying Total Flow in MGD x TSS in mg/L x 8.34 for each outfall and sample. Total Load as shown is the sum of the Load calculated for each outfall. Units are Pounds of mass (solids) per Day.

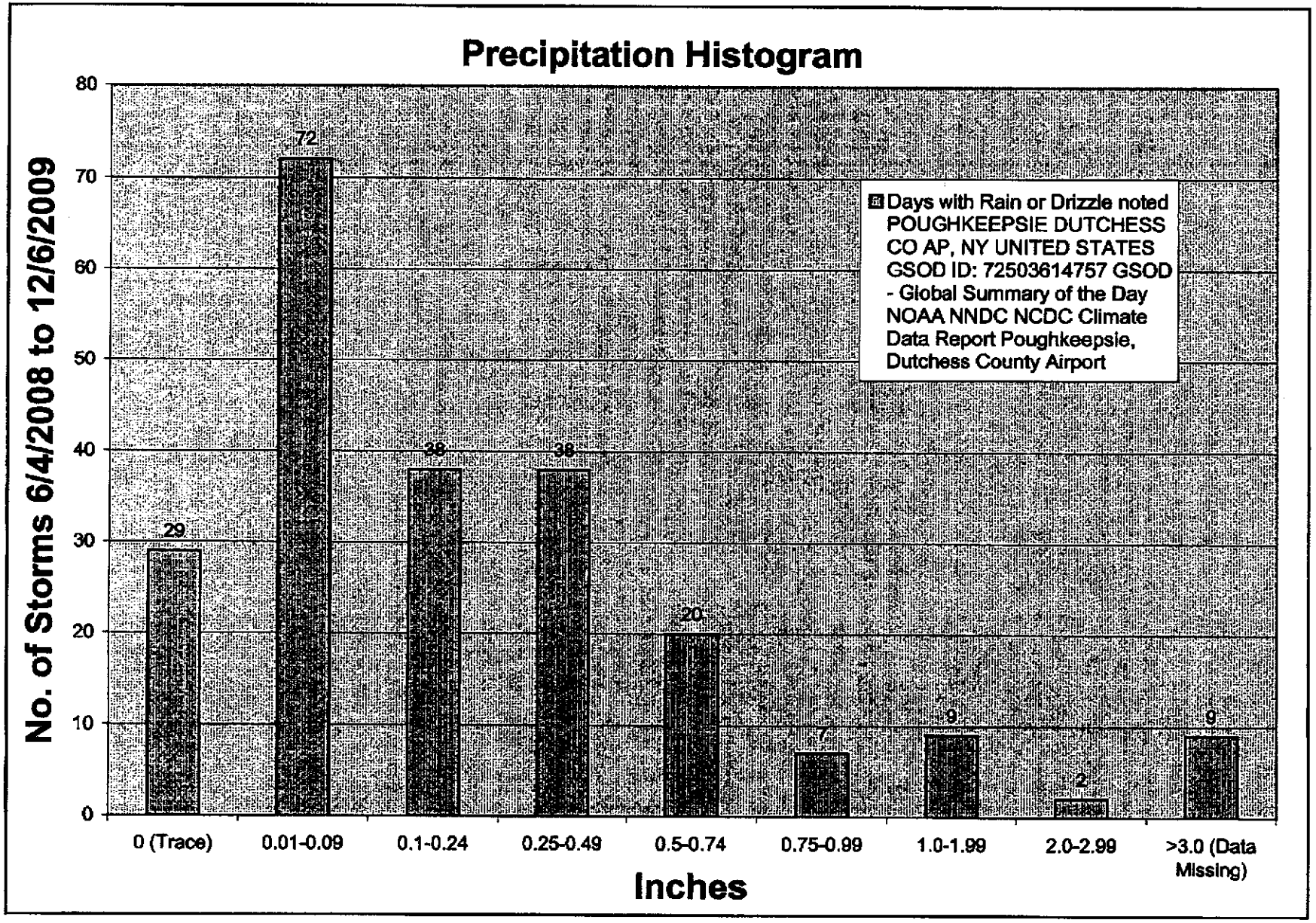
Volume is calculated by dividing the total load by the saturated weight of the solids - 37.6 pcf.

	5/27/2008	TSS	MGD	Lb/Day	7/14/2008	TSS	MGD	Lb/Day	7/23/2008	TSS	MGD	Lb/Day	8/19/2008	TSS	MGD	Lb/Day	9/9/2008	TSS	MGD	Lb/Day	9/26/2008	TSS	MGD	Lb/Day
1 Lias Rd - NYSDOT	16.8 GPM	0	0.023904	0	40.5 GPM	0	0.05832	0	78.9 GPM	6	0.113616	5.685345	27.3 GPM	2	0.039312	0.655724	300 +GPM	10	0.432	36.0288	200 GPM	4	0.288	9.60768
2 Lias Rd - Village	6.3 GPM	0	0.009072	0	10 GPM	0	0.0144	0	13.2 GPM	5	0.019008	0.792834	6.7 GPM	1	0.009648	0.080464	300 GPM	8	0.432	28.82304	150 GPM	3	0.216	5.40432
3 Veterans Park	3.8 GPM	0	0.005472	0	70 GPM	3	0.1008	2.522016	28 GPM	6	0.04032	2.017613	7.5 GPM	1	0.0108	0.090072	300 GPM	67	0.432	241.393	150 GPM	20	0.216	36.0288
4 Pelham & Mill St				0			0	0	1.98 *Submerge	11	0.002851	0.261569				0	1.98 GPM	12	0.002851	0.285348	2.65 *Inadequat	6	0.003816	0.189953
7 School St & Brown				0			0	0	30 GPM	66	0.0432	23.77901				0	20 GPM	32	0.0288	7.686144	19.8 GPM	2	0.028512	0.47558
8 West St & Brown				0			0	0	0.17 *Inadequat	8	0.000245	0.016333				0	0.05 *Unable to	3	0.000072	0.001801	2.44 *Unable to	25	0.003514	0.732586
9 End of High St (Dam)				0	0 Unable to	0	0	0			0	0				0	3.97 GPM	32	0.005717	1.5257	0.53 GPM	43	0.000763	0.273609
10 West & Brown Overland				0			0	0			0	0				0			0	0	7 GPM	115	0.01008	9.667728
Precipitation-D.C.Airport Inches		0.04	0.04	0.00		0.63	0.17	2.52		0.29	0.22	32.55		0.05	0.06	0.83		1.36	1.33	315.74		0.88	0.77	62.38

	10/26/2008	TSS	MGD	Lb/Day	11/25/2008	TSS	MGD	Lb/Day	12/10/2008	TSS	MGD	Lb/Day	3/9/2009	TSS	MGD	Lb/Day	4/3/2009	TSS	MGD	Lb/Day	4/21/2009	TSS	MGD	Lb/Day
1 Lias Rd - NYSDOT	100 GPM	3	0.144	3.60288	250 GPM	34	0.36	102.0816	300 GPM	34	0.432	122.4979	42.9 GPM	148	0.061776	76.25135	85.7 GPM	56	0.123408	56.60725	75 GPM	0	0.108	0
2 Lias Rd - Village	24 GPM	1	0.03456	0.28823	150 GPM	29	0.216	52.24178	188 GPM	24	0.27072	54.18732	75 GPM	272	0.108	244.9968	22.2 GPM	43	0.031968	11.46436	10 GPM	0	0.0144	0
3 Veterans Park	71.4 GPM	10	0.102816	8.574864	150 GPM	37	0.216	66.86328	136 GPM	37	0.19584	60.43231	85.7 GPM	5	0.123408	5.146114	37.5 GPM	5	0.054	2.2518	51.7 GPM	2	0.074448	1.241793
4 Pelham & Mill St	2.65 *Inadequat	5	0.003816	0.159127	4.2 *Inadequat	50	0.006048	2.522016	4.2 GPM	57	0.006048	2.875098	2.65 *Inadequate	8	0.003816	0.254604	2.65 *Inadequat	162	0.003816	5.155721			0	0
7 School St & Brown	8.28 GPM	9	0.000403	0.030264	2.11 GPM	81	0.003038	2.052581	5.36 GPM	420	0.009144	32.0296	3.96 GPM	282	0.005702	13.41136			0	0			0	0
8 West St & Brown			0	0			0	0			0	0			0	0			0	0			0	0
9 End of High St (Dam)	1.59 *Unable to	22	0.00229	0.420096	3.77 *Unable to	332	0.005429	15.0317	3.77 GPM	587	0.005429	26.57712			0	0	0.72 GPM	130	0.001037	1.124099			0	0
10 West & Brown Overland	3.17 GPM	10	0.004565	0.380704			0	0			0	0	1.44 GPM	348	0.002074	5.983963			0	0			0	0
Precipitation-D.C.Airport Inches		0.45	0.29	13.46		0.34	0.81	240.58		0.29	0.82	298.60		0.58	0.30	346.04	Reported on date:	0	0.21	78.60		0.59	0.20	1.24

	5/14/2009	TSS	MGD	Lb/Day	6/3/2009	TSS	MGD	Lb/Day	6/9/2009	TSS	MGD	Lb/Day	6/18/2009	TSS	MGD	Lb/Day	7/2/2009	TSS	MGD	Lb/Day	7/16/2009	TSS	MGD	Lb/Day
1 Lias Rd - NYSDOT	100 GPM	8	0.144	9.60768	40 GPM	1	0.0576	0.480384	300 GPM	2	0.432	7.20576	300 +GPM	0	0.432	0	300 GPM	2	0.432	7.20576	300 +GPM	37	0.432	133.3056
2 Lias Rd - Village	20.3 GPM	3	0.029232	0.731385	13.6 GPM	0	0.019584	0	50 GPM	2	0.072	1.20096	300 +GPM	25	0.432	90.072	60 GPM	0	0.0864	0	300 GPM	12	0.432	43.23456
3 Veterans Park	26.1 GPM	4	0.037584	1.253802	20 GPM	2	0.0288	0.480384	300 +GPM	26	0.432	93.87488	300 +GPM	42	0.432	151.321	300 +GPM	7	0.432	25.22016	300 +GPM	673	0.432	2424.738
4 Pelham & Mill St	2.65 *Inadequat	158	0.003816	5.02842			0	0	1.98 *Inadequat	19	0.002851	0.451801	4.2 *Submerge	75	0.006048	3.783024	1.98 *Submerge	21	0.002851	0.498356	1.98 *Submerge	33	0.002851	0.784707
7 School St & Brown			0	0			0	0	0.79 GPM	6	0.001138	0.056926	0.21 GPM	8	0.000302	0.020176	0.18 GPM	4	0.000259	0.008647	11.3 GPM	39	0.016272	5.292631
8 West St & Brown			0	0			0	0	0.05 GPM	90	0.000072	0.054043	2.44 GPM	61	0.003514	1.787509			0	0	15.9 GPM	176	0.022896	33.80766
9 End of High St (Dam)			0	0			0	0	0.72 *Inadequat	158	0.001037	1.368212	7.22 GPM	50	0.010397	4.335466			0	0	1.44 GPM	100	0.002074	1.729382
10 West & Brown Overland			0	0			0	0	0.99 GPM	18	0.001426	0.214011	7 *Inadequat	81	0.01008	6.808443	0.17 GPM	4	0.000245	0.008167	15.9 GPM	513	0.022896	97.9587
Precipitation-D.C.Airport Inches		0.14	0.21	16.62		0	0.11	0.96		1.07	0.94	104.22		0.9	1.33	256.13		0.4	0.95	32.94		0.5	1.38	2740.65
		Reported on date:																						1 - 6hr report: 0.5" in 6 Hrs.

	7/21/2009	TSS	MGD	Lb/Day	8/13/2009	TSS	MGD	Lb/Day	9/11/2009	TSS	MGD	Lb/Day
1 Lias Rd - NYSDOT	300 +GPM	0	0.432	0	176 GPM	3	0.25344	6.341088	150 GPM	6	0.216	10.80864
2 Lias Rd - Village	300 +GPM	12	0.432	43.23456	40 GPM	2	0.0576	0.960768	107 GPM	4	0.15408	5.140109
3 Veterans Park	300 +GPM	102	0.432	367.4938	150 GPM	4	0.216	7.20576	136 GPM	21	0.19584	34.29942
4 Pelham & Mill St	2.65 GPM	6	0.003816	0.190953	1.98 *Inadequat	13	0.002851	0.308127	2.65 *Submerge	6	0.003816	0.190953
7 School St & Brown	4.54 GPM	29	0.006536	1.581184	1.44 GPM	3	0.002074	0.061881	3.31 GPM	3	0.004766	0.119255
8 West St & Brown	0.83 GPM	80	0.000907	0.605284			0	0			0	0
9 End of High St (Dam)	5.29 GPM	28	0.007618	1.778862	1.44 *Inadequat	96	0.002074	1.660207	1.59 GPM	16	0.00229	0.305524
10 West & Brown Overland	3.97 GPM	32	0.005717	1.5257	0.22 GPM	38	0.000317	0.1004	0.40 GPM	22	0.000576	0.105984
Precipitation-D.C.Airport Inches		0.01	1.32	416.41		2.24	0.63	18.63		0.07	0.58	50.97
		Reported on date:										


Precipitation Histogram
No. of Storms 6/4/2008 to 12/6/2009
80
70
60
50
40
30
20
10
0
72
38
38
29
20
7
9
2
9
Days with Rain or Drizzle noted POUGHKEEPSIE DUTCHESS CO AP, NY UNITED STATES GSOD ID: 72503614757 GSOD - Global Summary of the Day NOAA NNDC NCDC Climate Data Report Poughkeepsie, Dutchess County Airport
0 (Trace)
0.01-0.09
0.1-0.24
0.25-0.49
0.5-0.74
0.75-0.99
1.0-1.99
2.0-2.99
>3.0 (Data Missing)
Inches

Days with Rain or Drizzle noted
POUGHKEEPSIE DUTCHESS CO AP, NY
UNITED STATES
GSOD ID: **72503614757**
GSOD - Global Summary of the Day 6/4/2008 to 12/11/2008

NOAA NNDC NCDC Climate Data Report
Poughkeepsie, Dutchess County Airport Global Summary of the Day (GSOD)

YEARMODA	PRCP	Fog	Rain/Drizzl	Snow/Ice	Hail	Thunder	Tornado/Fu
6/4/2008	0.24 G	0	1	0	0	0	0
6/6/2008	0.34 G	0	1	0	0	1	0
6/8/2008	0.02 A	0	1	0	0	0	0
6/11/2008	0.19 B	0	1	0	0	1	0
6/14/2008	99.9 9	0	1	0	0	1	0
6/16/2008	0 H	0	1	0	0	1	0
6/18/2008	0 H	0	1	0	0	1	0
6/22/2008	99.9 9	0	1	0	0	1	0
6/23/2008	99.9 9	0	1	0	0	1	0
6/26/2008	99.9 9	0	1	0	0	0	0
6/27/2008	0 H	0	1	0	0	0	0
6/28/2008	0.08 B	0	1	0	0	0	0
6/29/2008	0.03 B	0	1	0	0	0	0
6/30/2008	0.41 G	0	1	0	0	1	0
7/1/2008	0.01 G	0	1	0	0	1	0
7/2/2008	0 G	1	1	0	0	0	0
7/3/2008	0.01 G	0	1	0	0	1	0
7/4/2008	0.34 G	0	1	0	0	0	0
7/5/2008	0.39 G	0	1	0	0	0	0
7/9/2008	0.03 B	0	1	0	0	0	0
7/14/2008	0.63 G	0	1	0	0	0	0
7/21/2008	0.02 G	0	1	0	0	0	0
7/22/2008	0 G	0	1	0	0	0	0
7/23/2008	0.29 G	0	1	0	0	0	0
7/24/2008	1.52 G	0	1	0	0	1	0
7/27/2008	0.17 C	0	1	0	0	1	0
8/2/2008	0.99 B	1	1	0	0	1	0
8/6/2008	0.37 G	0	1	0	0	0	0
8/7/2008	0 G	0	1	0	0	1	0
8/8/2008	0.12 G	1	1	0	0	1	0
8/10/2008	0.01 G	0	1	0	0	1	0
8/11/2008	0.05 G	1	1	0	0	1	0
8/12/2008	1.39 G	0	1	0	0	0	0
8/14/2008	0.37 G	0	1	0	0	1	0
8/15/2008	0 G	0	1	0	0	0	0
8/16/2008	0.02 G	0	1	0	0	1	0
8/19/2008	0.05 A	0	1	0	0	0	0
8/25/2008	0.02 G	0	1	0	0	0	0
8/30/2008	0.26 G	0	1	0	0	0	0
9/6/2008	0.32 G	0	1	0	0	0	0
9/7/2008	1.88 G	0	1	0	0	0	0
9/9/2008	1.38 B	0	1	0	0	1	0

9/10/2008	99.9 9	1	1	0	0	0	0
9/12/2008	0.42 B	0	1	0	0	0	0
9/13/2008	0.03 A	1	1	0	0	0	0
9/14/2008	0.28 G	0	1	0	0	0	0
9/22/2008	0.01 G	0	1	0	0	1	0
9/26/2008	0.68 G	0	1	0	0	0	0
9/28/2008	99.9 9	0	1	0	0	0	0
10/1/2008	0.01 G	0	1	0	0	0	0
10/3/2008	0 H	0	1	0	0	0	0
10/5/2008	0 H	0	1	0	0	0	0
10/9/2008	0 H	0	1	0	0	0	0
10/16/2008	0.01 A	0	1	0	0	0	0
10/21/2008	0.03 A	0	1	0	0	0	0
10/25/2008	0.43 C	0	1	0	0	0	0
10/26/2008	1.39 G	0	1	0	0	0	0
10/28/2008	0.45 G	0	1	0	0	0	0
11/5/2008	0 H	0	1	0	0	0	0
11/6/2008	0.16 G	0	1	0	0	0	0
11/8/2008	0.01 G	0	1	0	0	0	0
11/9/2008	0 G	0	1	0	0	0	0
11/13/2008	0.02 G	0	1	0	0	0	0
11/14/2008	0.31 G	0	1	0	0	0	0
11/15/2008	0.25 G	0	1	0	0	0	0
11/16/2008	0.45 G	0	1	0	0	0	0
11/24/2008	0 H	0	1	0	0	0	0
11/25/2008	0.34 G	0	1	0	0	0	0
11/30/2008	0.39 B	1	1	1	0	0	0
12/1/2008	0.31 C	1	1	0	0	0	0
12/4/2008	0.04 B	0	1	0	0	0	0
12/10/2008	0.04 G	0	1	0	0	0	0
12/11/2008	0.55 G	1	1	0	0	0	0
12/12/2008	2.66 G	1	1	0	0	0	0

12/15/2008 to 6/22/2009

YEARMODA	PRCP	F	R	S	H	T	T
12/15/2008	0.04 B	0	1	0	0	0	0
12/16/2008	0.12 G	0	1	1	0	0	0
12/17/2008	0.19 G	1	1	1	0	0	0
12/20/2008	0.06 B	1	1	1	0	0	0
12/21/2008	0.18 D	1	1	1	0	0	0
12/24/2008	0.2 G	1	1	1	0	0	0
12/25/2008	0.71 G	0	1	0	0	0	0
12/27/2008	0.04 G	0	1	0	0	0	0
1/5/2009	0.03 G	1	1	0	0	0	0
1/7/2009	0.28 G	1	1	1	0	0	0
1/8/2009	0.41 G	1	1	1	0	0	0
1/11/2009	0.34 G	1	1	1	0	0	0
1/28/2009	0.91 C	1	1	1	0	0	0
1/29/2009	0.01 A	0	1	0	0	0	0
2/12/2009	0.14 G	1	1	0	0	0	0
2/18/2009	0.04 A	1	1	1	0	0	0
2/19/2009	0.23 G	1	1	1	0	0	0
2/22/2009	0.14 B	1	1	1	0	0	0

2/27/2009	0.12 A	0	1	0	0	0	0
2/28/2009	0.1 A	0	1	0	0	0	0
3/8/2009	0.06 A	0	1	0	0	0	0
3/9/2009	0.56 G	0	1	0	0	0	0
3/10/2009	0.19 G	0	1	0	0	0	0
3/11/2009	0.19 G	0	1	0	0	0	0
3/19/2009	0.17 A	0	1	0	0	0	0
3/26/2009	0.01 B	0	1	0	0	0	0
3/27/2009	99.9 9	1	1	0	0	0	0
3/29/2009	0.1 G	0	1	0	0	0	0
3/30/2009	0.56 G	1	1	0	0	1	0
4/1/2009	0 G	0	1	0	0	0	0
4/2/2009	0.28 G	1	1	0	0	0	0
4/3/2009	0 G	0	1	0	0	1	0
4/4/2009	0.33 G	0	1	0	0	0	0
4/6/2009	0.33 B	0	1	0	0	0	0
4/7/2009	0.02 A	0	1	0	0	0	0
4/8/2009	0 H	0	1	0	0	0	0
4/10/2009	0 H	0	1	0	0	0	0
4/11/2009	0.13 G	0	1	0	0	0	0
4/15/2009	0.01 G	0	1	0	0	0	0
4/20/2009	0.06 A	0	1	0	0	0	0
4/21/2009	0.59 G	0	1	0	0	0	0
4/22/2009	0.17 G	1	1	0	0	0	0
5/1/2009	0.01 G	0	1	0	0	0	0
5/2/2009	0.23 G	0	1	0	0	0	0
5/3/2009	0 G	0	1	0	0	0	0
5/4/2009	0.1 G	1	1	0	0	0	0
5/5/2009	0.05 G	0	1	0	0	0	0
5/6/2009	0.39 G	0	1	0	0	0	0
5/7/2009	1.18 G	0	1	0	0	0	0
5/8/2009	0 G	0	1	0	0	0	0
5/9/2009	0.19 G	0	1	0	0	0	0
5/14/2009	0.14 C	0	1	0	0	0	0
5/15/2009	0.63 G	0	1	0	0	0	0
5/16/2009	0 G	0	1	0	0	0	0
5/17/2009	1.1 G	0	1	0	0	1	0
5/23/2009	0.01 G	0	1	0	0	0	0
5/24/2009	0 G	0	1	0	0	1	0
5/26/2009	0 H	0	1	0	0	0	0
5/27/2009	0.18 G	0	1	0	0	0	0
5/29/2009	0.15 G	0	1	0	0	0	0
5/30/2009	0.02 G	0	1	0	0	0	0
6/2/2009	0 H	0	1	0	0	0	0
6/3/2009	0 H	0	1	0	0	0	0
6/4/2009	0.06 G	0	1	0	0	0	0
6/5/2009	0 G	0	1	0	0	0	0
6/6/2009	0.1 G	1	1	0	0	0	0
6/7/2009	0.01 G	0	1	0	0	0	0
6/9/2009	1.07 G	0	1	0	0	1	0
6/10/2009	0.22 G	0	1	0	0	0	0
6/11/2009	0.12 G	0	1	0	0	0	0

6/12/2009	0 G	0	1	0	0	1	0
6/14/2009	0.97 G	0	1	0	0	0	0
6/15/2009	0.47 G	0	1	0	0	1	0
6/18/2009	0.9 G	0	1	0	0	0	0
6/20/2009	0 G	0	1	0	0	0	0
6/21/2009	0.87 G	0	1	0	0	0	0
6/22/2009	0.43 G	0	1	0	0	0	0
			6/23/2009 to 11/12/2009				
YEARMODA	PRCP	F	R	S	H	T	T
6/24/2009	0.41 C	0	1	0	0	0	0
6/26/2009	0.01 B	0	1	0	0	1	0
6/30/2009	0.31 A	0	1	0	0	1	0
7/1/2009	0.44 D	1	1	0	0	0	0
7/2/2009	0.4 D	0	1	0	0	0	0
7/16/2009	0.5 A	0	1	0	0	1	0
7/17/2009	0.14 B	1	1	0	0	0	0
7/18/2009	99.9 9	0	1	0	0	0	0
7/21/2009	0.01 G	0	1	0	0	0	0
7/22/2009	0.94 G	0	1	0	0	0	0
7/24/2009	0.1 G	0	1	0	0	0	0
7/26/2009	0.93 G	0	1	0	0	0	0
7/27/2009	0.08 G	0	1	0	0	1	0
7/28/2009	0.18 G	0	1	0	0	0	0
7/30/2009	0.3 G	0	1	0	0	0	0
7/31/2009	0.05 G	0	1	0	0	0	0
8/1/2009	0.54 G	1	0	0	0	0	0
8/3/2009	0.55 G	0	0	0	0	0	0
8/7/2009	0.01 G	0	0	0	0	0	0
8/12/2009	99.9 9	1	1	0	0	1	0
8/13/2009	2.24 G	0	1	0	0	0	0
8/14/2009	0.18 G	1	0	0	0	0	0
8/18/2009	0.01 G	0	0	0	0	0	0
8/21/2009	0.25 A	0	1	0	0	1	0
8/22/2009	0.58 D	0	1	0	0	0	0
8/23/2009	0.01 C	0	1	0	0	0	0
8/24/2009	0.01 G	1	0	0	0	0	0
8/26/2009	0.01 G	0	1	0	0	0	0
8/27/2009	0.01 G	0	0	0	0	0	0
8/29/2009	0.69 G	0	1	0	0	0	0
8/30/2009	0.06 G	0	0	0	0	0	0
8/31/2009	0.01 G	0	0	0	0	0	0
9/3/2009	0.01 G	0	0	0	0	0	0
9/4/2009	0.01 G	1	0	0	0	0	0
9/11/2009	0.07 G	0	1	0	0	0	0
9/12/2009	0.63 G	0	1	0	0	0	0
9/14/2009	0.01 A	0	0	0	0	0	0
9/16/2009	0.04 A	0	1	0	0	0	0
9/17/2009	0.04 C	0	1	0	0	0	0
9/18/2009	0.01 A	0	0	0	0	0	0
9/27/2009	0.62 G	0	1	0	0	0	0
9/28/2009	0.24 G	0	1	0	0	0	0
10/3/2009	0.16 G	0	1	0	0	0	0

10/4/2009	0.02 G	1	0	0	0	0	0
10/5/2009	0.01 G	0	0	0	0	0	0
10/7/2009	0.35 G	0	1	0	0	0	0
10/8/2009	0.01 G	0	0	0	0	0	0
10/10/2009	0.51 G	0	1	0	0	0	0
10/13/2009	0.02 G	0	1	0	0	0	0
10/15/2009	0.21 C	1	1	1	0	0	0
10/16/2009	0.01 C	1	1	0	0	0	0
10/18/2009	0.01 G	0	1	0	0	0	0
10/19/2009	0.12 G	1	0	0	0	0	0
10/23/2009	0.03 A	0	1	0	0	0	0
10/24/2009	0.42 G	0	1	0	0	0	0
10/25/2009	1.15 G	0	1	0	0	0	0
10/27/2009	0.07 B	0	1	0	0	0	0
10/28/2009	0.57 G	1	1	0	0	0	0
10/29/2009	0.56 G	0	0	0	0	0	0
10/31/2009	0.01 G	0	1	0	0	0	0
11/1/2009	0.08 G	0	0	0	0	0	0
11/2/2009	0.01 G	0	0	0	0	0	0
11/5/2009	0.01 A	0	1	0	0	0	0
			11/13/2009 to 12/6/2009				
11/13/2009	0.01 A	0	1	0	0	0	0
11/14/2009	0.38 G	0	1	0	0	0	0
11/15/2009	0.27 G	0	1	0	0	0	0
11/19/2009	0.02 A	0	1	0	0	0	0
11/20/2009	0.52 B	0	1	0	0	0	0
11/24/2009	0.00 H	0	1	0	0	0	0
11/25/2009	0.04 A	0	1	0	0	0	0
11/30/2009	0.19 B	0	1	0	0	0	0
12/2/2009	0.00 H	0	1	0	0	0	0
12/3/2009	0.72 G	0	1	0	0	0	0

Surface Water - Field Measurements

USGS 01372500 WAPPINGER CREEK NEAR WAPPINGERS FALLS NY

Dutchess County, New York
Hydrologic Unit Code 02020008
Latitude 41°39'11", Longitude 73°52'23" NAD27
Drainage area 181 square miles
Contributing drainage area 181 square miles
Gage datum 114.37 feet above sea level NGVD29

Meas. Number	Date Time	Who	Stream flow (ft^3/s)	Gage Height (ft)	Rating No.	Shift Applied (ft)	% Diff.	GH Change (ft)	Meas. Duration (hr)	Meas. Rated	Control
848	12/1/2009 13:36:30	MSR	135	3.37	46	0.04	0.7	0	0.98	FAIR	CLER
849	12/1/2009 13:30	MSR	136	3.37	46	0.04	1.5	0	0.9	FAIR	CLER
847	10/22/2009 14:54	tls	46.4	2.84	46	0	-2.1	0.01	0.88	GOOD	LGDB
846	8/21/2009 10:16	TFH	94.3	3.18	46	0	3.4	-0.01	0.73	FAIR	CLER
845	2009-06-15 12:30:30	TFH	633	4.64	46	0	1.7	0	0.35	GOOD	CLER
844	2009-05-01 12:03	TFH	158	3.46	46	0.04	2.9	0	1	FAIR	CLER
843	2009-02-05 10:27	TFH/MS	93.2	3.26	46	0.04	-16.7	-0.05	0.53	FAIR	SICE
842	2008-12-10 12:51	TFH	237	3.74	46	0.04	3.5	0.02	0.4	GOOD	CLER
841	2008-10-07 12:59	TFH	58.7	2.92	46	0	5	0	1.2	FAIR	CLER
840	2008-08-25 15:12	TFH	34.5	2.67	46	0	6.5	0	0.8	FAIR	CLER
839	2008-08-25 14:09	TFH	35.9	2.68	46	0	8.4	-0.01	0.9	FAIR	CLER
838	2008-07-01 14:00	TFH	83.6	3.09	46	0	7.8	-0.01	2.27	FAIR	CLER
837	2008-04-30 15:44	TFH	424	4.28	46	0	0	0	0.3	GOOD	CLER
836	2008-03-04 -- --	TFH	508	4.45	46	0	-0.6	-0.01	0.3	GOOD	CLER
835	2008-02-19 11:30	TFH	3260	8.15	46	0	-3.6	0	0.3	GOOD	CLER
834	2008-01-09 14:51	TFH	612	4.62	46	0	0.3	0.01	0.3	GOOD	CLER

Precipitation Data - on Sampled Days

STN---	WBAN	YEARMODA	TEMP	Count	DEWP	Count	SLP	Count	STP	Co	VISIB	Co	WDSP	Co	MXSPD	GUST	MAX	MIN	PRCP	SNDP	FRSHTT	Precipitation Total Estimate
725036	14757	6/26/2008	72.2	15	63	15	9999.9	0	9999.9	0	9.1	15	2.5	15	5.1	999.9	77.0*	64.4*	99.99	999.9	010000	0 No Precip. Or Data Missing
725036	14757	6/27/2008	75.1	17	66.9	17	1009.8	11	9999.9	0	8.6	17	2.1	17	7	999.9	78.8*	69.8*	0.00H	999.9	010000	0 Incomplete
725036	14757	6/28/2008	74.2	23	67.7	23	1009.3	23	9999.9	0	7.4	23	2.3	23	12	15.9	88	62.1	0.08B	999.9	010000	0.08 2 - 6hr reports
725036	14757	7/13/2008	76.3	24	62.2	24	1011.9	24	9999.9	0	10	24	5.8	24	9.9	19	84.9	69.1	0.00I	999.9	000000	0 No Precip. Reported
725036	14757	7/14/2008	73.1	24	64.2	24	1008.8	21	9999.9	0	9.1	24	3.4	24	8.9	30.9	81	66	0.63G	999.9	010000	0.63 24 hr amt.
725036	14757	7/15/2008	71.7	24	58.5	24	1015.8	24	9999.9	0	10	24	2	24	8	999.9	84.9	57.9	0.00G	999.9	000000	0 24 hr amt.
725036	14757	7/22/2008	75	24	67.7	24	1011	22	9999.9	0	9.9	24	1.7	24	8	999.9	88	66	0.00G	999.9	010000	0 24 hr amt.
725036	14757	7/23/2008	71.9	24	68.9	24	1013.4	13	9999.9	0	7.4	24	2.7	24	9.9	15.9	80.6*	66.2*	0.29G	999.9	010000	0.29 24 hr amt.
725036	14757	7/24/2008	72.2	24	66.3	24	1012.7	19	9999.9	0	7.8	24	4.3	24	9.9	16.9	82.4*	66.2*	1.52G	999.9	010010	1.52 24 hr amt.
725036	14757	8/18/2008	72	24	61.9	24	1012.8	24	9999.9	0	9.8	24	3.4	24	8.9	999.9	86	57.9	0.00G	999.9	000000	0 24 hr amt.
725036	14757	8/19/2008	70.7	24	60.8	24	1012.3	23	9999.9	0	9	24	5	24	15	22	77.0*	62.6*	0.05A	999.9	010000	0.05 1 - 6hr report
725036	14757	8/20/2008	61.1	24	49.6	24	1021.3	24	9999.9	0	10	24	2.7	24	8.9	999.9	75	45	0.00I	999.9	000000	0 No Precip. Reported
725036	14757	9/8/2008	65.1	24	55.6	24	1018.9	24	9999.9	0	10	24	1.2	24	7	999.9	78.1	53.1	0.00G	999.9	000000	0 24 hr amt.
725036	14757	9/9/2008	65	24	62.2	24	1015.6	19	9999.9	0	8.3	24	2.5	24	8.9	14	71.1	59	1.38B	999.9	010010	1.38 2 - 6hr reports
725036	14757	9/10/2008	61	24	52.5	24	1022.3	19	9999.9	0	7.9	24	3.1	24	11.1	14	69.8*	48.2*	99.99	999.9	110000	0 No Precip. Or Data Missing
725036	14757	9/25/2008	55.5	24	47.1	24	1030.6	24	9999.9	0	9.9	24	2.6	24	8	999.9	66.9	42.1	0.00I	999.9	000000	0 No Precip. Reported
725036	14757	9/26/2008	55.9	21	54	21	1027.6	10	9999.9	0	5.7	21	6.6	21	11.1	999.9	60.8*	51.8*	0.68G	999.9	010000	0.68 24 hr amt.
725036	14757	9/27/2008	67.5	12	64.6	12	9999.9	0	9999.9	0	6.9	12	2.1	12	8	999.9	73.4*	60.6*	0.00G	999.9	000000	0 24 hr amt.
725036	14757	10/27/2008	46.1	24	40.6	24	1012	24	9999.9	0	9.1	24	1.9	24	8.9	999.9	59	35.1	0.00G	999.9	000000	0 24 hr amt.
725036	14757	10/28/2008	42.2	24	38.1	24	999.3	21	9999.9	0	8.1	24	9.7	24	22	37.9	50.0*	37.4*	0.45G	999.9	010000	0.45 24 hr amt.
725036	14757	10/29/2008	39.5	24	27.6	24	1003.9	24	9999.9	0	10	24	11.4	24	15.9	27	44.1	37	0.75G	999.9	000000	0.75 24 hr amt.
725036	14757	11/24/2008	31.9	24	21.9	24	1025	24	9999.9	0	9.8	24	2.5	24	8.9	18.9	46.9	19.9	0.00H	999.9	010000	0 Incomplete
725036	14757	11/25/2008	40.6	24	37.9	24	1009	13	9999.9	0	7.1	24	2.7	24	8.9	20	45	36	0.34G	999.9	010000	0.34 24 hr amt.
725036	14757	11/26/2008	34.5	24	29.3	24	1009.8	23	9999.9	0	8.8	24	3.3	24	12	19	44.1	24.1	0.19G	999.9	000000	0.19 24 hr amt.
725036	14757	12/9/2008	31.3	24	18.4	24	1027.8	24	9999.9	0	9.8	24	2.1	24	9.9	14	45	17.1	0.00H	999.9	001000	0 Incomplete
725036	14757	12/10/2008	52.4	22	48.9	22	1014.9	14	9999.9	0	7.4	22	6.1	22	19	28.9	59.0*	37.4*	0.04G	999.9	010000	0.04 24 hr amt.
725036	14757	12/11/2008	32	15	30.3	15	1015.8	9	9999.9	0	3.4	15	5.2	15	8	999.9	41.0*	30.2*	0.55G	999.9	110000	0.55 24 hr amt.
725036	14757	3/8/2009	55.5	24	44.3	24	1010.4	24	9999.9	0	8	24	6.2	24	12	18.1	59.0*	46.4*	0.06A	999.9	010000	0.06 1 - 6hr report
725036	14757	3/9/2009	42.4	24	39.9	24	1012.7	20	9999.9	0	6.8	24	3.1	24	8	999.9	46.9	39	0.56G	999.9	010000	0.56 24 hr amt.
725036	14757	3/10/2009	36.8	24	31.6	24	1026.3	20	9999.9	0	9.1	24	3.1	24	9.9	14	44.6*	28.4*	0.19G	999.9	010000	0.19 24 hr amt.

725036	14757	4/2/2009	48.4	24	43.6	24	1016.3	20	9999.9	0	6.2	24	1.3	24	5.1	999.9		66		41	0.28G		999.9	110000		0.28	24 hr amt.
725036	14757	4/3/2009	56	24	52.8	24	1004	15	9999.9	0	8.8	24	6.5	24	13	21	60.8*		53.6*		0.00G		999.9	010010		0	24 hr amt.
725036	14757	4/4/2009	48.9	24	36.4	24	994.5	23	9999.9	0	9.9	24	13.3	24	19	35	60.8*		44.6*		0.33G		999.9	010000		0.33	24 hr amt.
725036	14757	4/20/2009	45.9	24	31.9	24	1019.9	24	9999.9	0	10	24	6.1	24	14	26		57		42.1	0.06A		999.9	010000		0.06	1 - 6hr report
725036	14757	4/21/2009	49.8	24	47.5	24	1008.2	19	9999.9	0	8.5	24	4	24	12	19		59		43	0.59G		999.9	010000		0.59	24 hr amt.
725036	14757	4/22/2009	51.6	24	44.4	24	1004.4	21	9999.9	0	8.8	24	3.6	24	8	20		55.9		42.1	0.17G		999.9	110000		0.17	24 hr amt.
725036	14757	5/13/2009	54.6	24	39.6	24	1026.9	24	9999.9	0	10	24	3	24	14	19		70		37	0.00I		999.9	000000		0	No Precip. Reported
725036	14757	5/14/2009	57.7	24	50.1	24	1024.6	21	9999.9	0	9.5	24	4.8	24	13	20		64.9		51.1	0.14C		999.9	010000		0.14	3 - 6hr reports
725036	14757	5/15/2009	64.6	24	56	24	1022.3	21	9999.9	0	8.1	24	2.8	24	12	15	78.8*		57.2*		0.63G		999.9	010000		0.63	24 hr amt.
725036	14757	6/2/2009	64.8	24	53.7	24	1014	24	9999.9	0	10	24	2.9	24	7	999.9		75.9		53.1	0.00H		999.9	010000		0	Incomplete
725036	14757	6/3/2009	59.7	24	51.1	24	1015.8	24	9999.9	0	9.6	24	2.6	24	12	999.9		70		51.1	0.00H		999.9	010000		0	Incomplete
725036	14757	6/4/2009	61.5	23	51.3	23	1015.2	22	9999.9	0	10	23	1.2	23	6	999.9	71.6*		53.6*		0.06G		999.9	010000		0.06	24 hr amt.
725036	14757	6/8/2009	67.1	24	56.1	24	1014.3	24	9999.9	0	10	24	3	24	8	999.9		79		57	0.04G		999.9	000000		0.04	24 hr amt.
725036	14757	6/9/2009	62.9	24	59.5	24	1012.5	15	9999.9	0	8.4	24	3.5	24	11.1	999.9	68.0*		57.2*		1.07G		999.9	010010		1.07	24 hr amt.
725036	14757	6/10/2009	64	24	59.5	24	1013.2	19	9999.9	0	10	24	3.2	24	7	999.9	69.8*		57.2*		0.22G		999.9	010000		0.22	24 hr amt.
725036	14757	6/17/2009	61.3	24	51.6	24	1023	23	9999.9	0	9.3	24	3.3	24	8	999.9		71.1		53.1	0.00G		999.9	000000		0	24 hr amt.
725036	14757	6/18/2009	60.7	24	57.7	24	1015.9	14	9999.9	0	6	24	2.9	24	8	999.9		64.9		57	0.90G		999.9	010000		0.9	24 hr amt.
725036	14757	6/19/2009	67.8	24	62.4	24	1007.7	19	9999.9	0	9.6	24	1.5	24	5.1	999.9	80.6*		62.6*		1.10G		999.9	000000		1.1	24 hr amt.
725036	14757	7/1/2009	66.1	24	62.6	24	1005.4	14	9999.9	0	6.3	24	1.5	24	11.1	18.1		80.1		59	0.44D		999.9	110000		0.44	4 - 6hr reports
725036	14757	7/2/2009	67.5	24	64.2	24	1007.4	14	9999.9	0	8.4	24	1.6	24	7	999.9		77		62.1	0.40D		999.9	110000		0.4	4 - 6hr reports
725036	14757	7/3/2009	67.4	23	62.6	23	1008.7	20	9999.9	0	8.8	23	1.1	23	8	999.9	75.2*		60.8*		0.00B		999.9	000010		0	2 - 6hr reports
725036	14757	7/15/2009	85.9	24	52.9	24	1018.2	24	9999.9	0	10	24	2.3	24	8.9	15		82		50	0.00I		999.9	000000		0	No Precip. Reported
725036	14757	7/16/2009	71.5	24	64.3	24	1010.2	22	9999.9	0	9.3	24	2.6	24	8	999.9	82.4*		62.6*		0.50A		999.9	010010		0.5	1 - 6hr report
725036	14757	7/17/2009	70.3	23	64.8	23	1008.4	19	9999.9	0	7.2	23	2.6	23	8.9	21		84		60.1	0.14B		999.9	110000		0.14	2 - 6hr reports
725036	14757	7/20/2009	74.4	15	62.4	15	1020.4	9	9999.9	0	10	15	1.5	15	8	999.9	82.4*		60.8*		0.00I		999.9	000000		0	No Precip. Reported
725036	14757	7/21/2009	64.9	24	62.7	24	1020.9	16	9999.9	0	7.7	24	2.5	24	8.9	15	73.4*		62.6*		0.01G		999.9	010000		0.01	24 hr amt.
725036	14757	7/22/2009	69.1	24	64	24	1019.6	18	9999.9	0	8.8	24	1.9	24	5.1	999.9	80.6*		62.6*		0.94G		999.9	010000		0.94	24 hr amt.
725036	14757	8/12/2009	78.3	7	69	7	1014.3	4	9999.9	0	8.6	7	5.4	7	8	999.9	80.6*		69.8*		99.99		999.9	110010		0	No Precip. Or Data Missing
725036	14757	8/13/2009	69.7	24	67.3	24	1018.4	12	9999.9	0	7.5	24	1.9	24	6	999.9	73.4*		66.2*		2.24G		999.9	010000		2.24	24 hr amt.
725036	14757	8/14/2009	71.8	24	65.5	24	1020.9	19	9999.9	0	8.1	24	0.4	24	4.1	999.9		84.9		62.1	0.18G		999.9	100000		0.18	24 hr amt.
725036	14757	9/10/2009	59.5	24	48.1	24	1028.2	24	9999.9	0	10	24	4.4	24	15	21	69.8*		46.4*		0.00I		999.9	000000		0	No Precip. Reported
725036	14757	9/11/2009	55.8	23	51.8	23	1024.6	19	9999.9	0	8.7	23	6.7	23	9.9	15	59.0*		51.8*		0.07G		999.9	010000		0.07	24 hr amt.
725036	14757	9/12/2009	63.1	24	61.1	24	1015.3	22	9999.9	0	9.4	24	5.6	24	11.1	15		70		57.9	0.63G		999.9	010000		0.63	24 hr amt.