Appendix A10
District Response to June (2008) High Flow Events
Memo

To: District Municipal Customers
From: Jon W. Schellpfeffer, Chief Engineer and Director
Subject: June 2008 High Flow Events
Date: July 17, 2008

The Madison Metropolitan Sewerage District is recovering from the extraordinary precipitation events and subsequent flooding that took place in early June. We trust things are also getting back to normal in your community. The District measured its all-time high peak flow rate of 100,000 gallons per minute and its all-time high one-day wastewater volume of 106 million gallons on June 9. The average daily flow received at the Nine Springs Wastewater Treatment Plant in June was 62 million gallons per day (mgd). Daily flows are still above 50 mgd. Typical volumes during periods of normal weather are about 40 mgd.

The high flows resulted from rain water that leaked into basements and rain water that flooded streets and low areas and leaked into manholes and through defects in sewer lines. The excess flow from these sources overwhelmed the District’s conveyance system for a period of about 30 hours on June 8 and 9. Even though all pumping equipment was available and in operation during this entire event, many homes and businesses experienced basement back-ups from the sewer system. The District employed portable pumping equipment at two pumping stations to remove water from the sewer system and prevent further basement backups. Even so, the sewer system overflowed from manholes at several points. System overflows and the portable pump discharges ultimately reached nearby wetlands, streams, and the lakes.

Over the past fifteen years the District has experienced six or more significant storm events that have led to high flows in the sewer system. Many scientists now expect that storms of higher intensity and longer duration will be experienced more frequently in the future. To address this possibility and to lessen the likelihood of future events overwhelming the sewer system, the Madison Metropolitan Sewerage District is taking the following actions:

1. The District is reviewing its design standards for sizing interceptor sewers and pumping stations. The District currently provides an allowance for high flows in these facilities that varies from peak flow capacities 4.0 times greater than the
average daily flows for facilities with average day design flows of one million gallons per day to peak flow capacities 2.5 times greater than the average daily flows for facilities with average day design flows of 20 million gallons per day. The review will include data from the storm events of the past fifteen years. If higher peaking factors are judged to be necessary, the schedule for construction of replacement interceptor sewers and pumping stations will need to be accelerated, and new and replaced facilities will be larger. This will lessen the likelihood of back-ups and overflows and will result in higher costs for service.

2. The District is reviewing its design standards for materials used in constructing interceptor sewers, including manholes, to assure that rain waters are less likely to leak into these facilities during heavy rains and floods. We encourage you to do the same. During our plan review process, we will pay particular attention to details in sewer extension plans that will be constructed in areas more prone to flooding.

3. The District is reviewing flow data and inspecting its existing interceptor sewers to identify and repair defects that allowed excessive rain water leakage into the District’s system. We encourage you to make similar inspections and repairs in your local system.

4. The District is reviewing flow data from each municipality collected during the recent high flow events. We will attempt to identify likely areas in community sewer systems that experienced excessive leakage during the recent high flow events. The District will work with these communities to address these areas.

5. The District will make greater efforts to educate the public in the area of water conservation and how to prevent rain water from leaking into basements. Water conservation and reduced inflow will have positive impacts in both dry and wet weather.

Although the events of June were unprecedented, this will not be the last challenge of this type that we will face. The District is taking action now to better insure that future events will have less impact on the public and the environment.
Memo

To:               File
From:            Jon W. Schellpfeffer, Chief Engineer and Director
Subject:        Responses to June 2008 High Flow Event
Date:            June 3, 2009

The purpose of the memo is to review the various actions the District has taken since the high flow events of June 2008. At that time the District developed a list of actions it would take in response to that event, and those actions are the section headings used in this memo.


Historically the District has used a peak flow factor based on information in the 1961 Greeley and Hansen Report on Sewerage and Sewage Treatment. The peak hourly flow (PHF) factor developed in that report is applied to average daily flows (ADFs) in the range of 1 mgd to 20 mgd as follows: PHF = (ADF)^0.842 x 4. For ADFs less than 1 mgd, the peaking factor is 4. For ADFs greater than 20 mgd, the peaking factor is 2.5. It appears that this factor may not provide sufficient capacity for all District interceptors and pump stations. For those interceptors and pump stations located closer to the lakes, it appears that the peak flow factor may need to be increased by about 1.0 to account for the higher peak flows experienced recently.

More analyses need to be done to determine more precisely in which areas of the District's service area this more conservative factor should be applied. These additional analyses will be included in the Collection System Facilities Plan and completed by the end of this year. Since application of a more conservative peaking factor would, in all likelihood, accelerate the need to increase the conveyance system capacity beyond what is practical or doable, initial efforts to reduce high flows will concentrate on hardening the interceptor system to prevent excessive levels of inflow and infiltration. The appropriate peaking factor as determined by a thorough analysis of available data will be applied to all future conveyance system projects.


During interceptor design, additional attention will be directed to pipe gasket details, connections between pipes and manholes, connections between manhole sections, and sealing between manhole decks and castings. All manhole castings will be provided with
gasketed manhole covers and will be installed with chimney seals. These standards have been in use on new interceptors built in areas that could experience flooding, but will now be used for all new interceptor sewers. Where flooding is currently possible and whenever practical (for example, during pavement replacements), older manhole castings and chimneys will be replaced with new gasketed castings and chimney seals. This work will be performed by the District’s Sewer Maintenance crew. Those manholes potentially subject to flooding should be upgraded by the end of this year; however, this will be an on-going effort as new information becomes available through regular inspections, anecdotally, or from information provided by others.

Review of Flow Data and Inspection of Existing Interceptors.

Review of flow data from the June 2008 high flow event identified a number of record high flows in the conveyance system. As mentioned earlier, those portions of the conveyance system in lower-lying areas around the lakes appeared to experience the highest of the high flows. The interceptors in these areas were the first inspected after the event to locate possible inflow sources.

Immediately after the June 2008 high flow events, the District’s Sewer Maintenance crew began inspecting manholes in areas that had been flooded. One major source of inflow was discovered and repaired upstream of Pumping Station 12. Several manholes appeared to have been under water in other areas. Castings on those were raised, and those that were not equipped with gasketed covers and chimney seals were rebuilt using castings with gasketed covers and chimney seals. System inspection and the follow-up work to harden the District’s system against inflow and infiltration is an on-going and routine part of the Sewer Maintenance crew’s work. Larger more costly, but less urgent, projects are typically included in the District’s capital budget for repair, rehabilitation, or replacement.

Review of Communities Flow Data.

As with the District’s conveyance system, those communities located in low-lying areas and near the lakes experienced the highest flows. The District sent a memo to all of its municipal customers following the event. The memo summarized the record high flows and the actions the District planned to take in response to this and other recent high flow events. The memo also encouraged the communities to undertake an inspection and repair program for their local sewer systems. The District also has provided individual reports to the City of Madison, Town of Dunn Sanitary Districts 1 and 3, and Town of Windsor Lake Windsor Sanitary District. At this time, the District has not directed any community to take any specific action related to high flows.

Greater Efforts at Public Education.

In April of this year the District ran a series of four radio spots related to efforts home owners could take to prevent rain water from entering their basements (and then likely the sanitary sewer system). The District had budgeted $20,000 for this effort and has spent about $14,000 so far. Based on anecdotal feedback and increased hits on the District’s website, it appears that we were successful in reaching a fairly large audience with this information. We will need to undertake follow-up public education efforts in this area.