Metropolitan Council Environmental Services

PRELIMINARY INFLOW/INFILTRATION SURCHARGE PROGRAM

October 24, 2005

Metropolitan Council
Environmental Services

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The mission of the Metropolitan Council is to develop, in cooperation with local communities, a comprehensive regional planning framework, focusing on transportation, wastewater, parks and aviation systems, that guides the efficient growth of the metropolitan area. The Council operates transit and wastewater services and administers housing and other grant programs.

Cover Photo: Overflow out of a manhole as a result of excessive Inflow/Infiltration overloading an interceptor.

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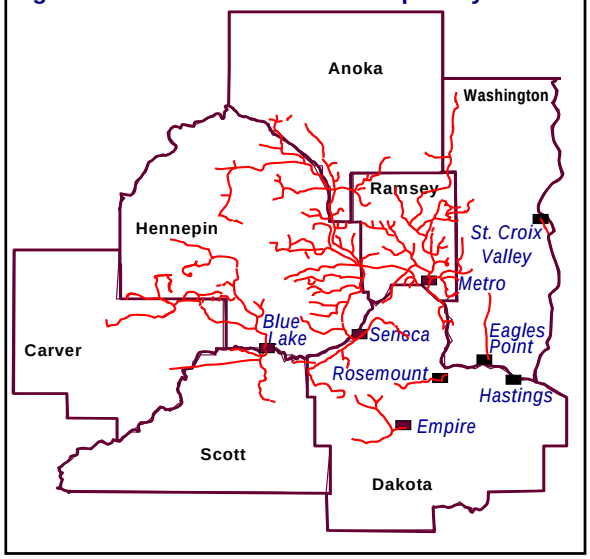
Section One

Introduction

The Metropolitan Council, through its Environmental Services Division (MCES), owns and operates extensive interceptor systems, as shown in Figure 1. The largest system conveys wastewater flow to the Metro Wastewater Treatment Plant (WWTP) and serves 65 communities. Smaller systems convey flow to the Council's plants in Shakopee (Blue Lake), Eagan (Seneca), Empire, Cottage Grove (Eagles Point), Rosemount and Oak Park Heights (St. Croix Valley). There is no interceptor system for the Hastings plant.

Figure 1: MCES Plants and Interceptor System



More than 100 communities own and operate local sewer systems that are connected to the MCES regional interceptor system. Through these local systems, wastewater service is extended to residents, commercial establishments, industry, and public agencies. These end users are charged for this service by the local community, which typically charges for wastewater on the basis of metered water use. MCES, as a wholesaler of the regional services, bills each community on the basis of its metered wastewater flow in the interceptor system. Industries with high strength waste are billed individually by MCES for the strength charge portion of their charges.

Each community bills its customers to recapture the cost charged by MCES and the costs to maintain and operate the local sewers. Because MCES bases its charge for service on the volume of wastewater received, these charges include any clear water entering the sewer system as well as the wastewater generated by the customers. Clear water includes rain water that enters the local sewer system through leaks in the publicly owned sewer and manholes and from private property sources such as rain leaders, sump pumps, foundation drains, and leaking house laterals. MCES flow records show a direct correlation between precipitation and the volume of flow from many communities served by the regional wastewater system.

The addition of clear water into the local sewer systems creates two problems.

- First, the additional flow uses system capacity that was originally designed for growth. For this reason, MCES charges communities the same rate for a community's clear water as it does for its wastewater.
- Second, in some cases the additional flow may exceed the available sewer system capacity. When the capacity of the sewer is exceeded, the wastewater may back up into basements or spill out of manholes. These occurrences may result in problems for MCES under federal and state regulations.

Communities have legal, fiscal, and public health reasons for assuring that the total system functions effectively and conforms to federal and state regulations.

Background Information

Sewers, pump stations, and treatment plants are designed to convey and treat wastewater. The capacity or size of the facilities is dependent on the flow rate of the wastewater. For conveyance facilities, the flow rate is usually the maximum rate expected for a one-hour duration. For treatment plants, the facilities must handle not only the maximum hourly rate, but the processes are designed to meet permit limits, usually specified as a peak month condition. Consequently, the maximum 30 day average flow is important for sizing treatment plants. The introduction of non-contaminated, clear water (I/I) into the collection system increases the flow of the wastewater and consumes capacity of sewers, pump stations and treatment plants. Although some allowance of I/I is included in the design for MCES' interceptors and treatment works, whenever the rate of I/I exceeds the initial basis of the design, all or a portion of the capacity allocated for growth is no longer available. In such case, either larger facilities need to be constructed, excess I/I needs to be eliminated, or growth needs to be curtailed.

A comprehensive master plan for the MCES interceptor systems was completed in December 2002. One of the more significant findings of the study was that groundwater and rainfall runoff were entering the local collection systems at rates that sometimes will overload the interceptor system. This uncontaminated clear water, called Infiltration/Inflow (I/I), is consuming interceptor and treatment plant capacity originally designed to serve future development. During significant rainfall events, portions of the interceptor system are at risk of causing a backup of wastewater into basements or spilling wastewater into the environment.

The master planning study for the interceptor system provided an opportunity to examine the long-range implications of continuing to tolerate the current levels of I/I as development continues in the region. During that examination, improvements to the MCES interceptor system were looked at in two scenarios. Under the first scenario, it was assumed that the level of I/I would be reduced to conform to the basis of the system's design. Under the second scenario, it was assumed that the I/I would remain at current levels. The cost to provide interceptor capacity that would serve regional growth under the latter scenario (based on 2030 ultimate development) was estimated at approximately half billion dollars more than the first because of the need to construct relief sewers and expand pump stations to handle high peak flows resulting from excessive I/I.

However, the impact of I/I is also substantial at the treatment plants. Even if the interceptor system capacity were expanded as assumed under the second scenario, the hydraulic capacity of the Metro wastewater treatment plant could not be doubled to treat the resulting peak rate from excessive I/I. Similarly, the hydraulic capacity of the Blue Lake plant may be constrained by the current site. Therefore, simply expanding the interceptor system (the second scenario) in conjunction with increasing treatment works capacity is not a feasible option.

Since curtailment of growth was considered highly undesirable, Council staff assessed the problem and concluded that the only viable engineering and regulatory options for the long-

term service of the region are either 1) to eliminate excessive I/I flows at the source, or 2) to store excessive I/I near its source in order to eliminate peaking and then treat the flow. The practical limitations to expanding the system, the high cost of relief sewers, larger pump stations and larger treatment facilities, and the impending federal requirements (Capacity, Management Operations, and Maintenance or CMOM, etc.) on elimination of overflows supported this conclusion. As discussed later in this program document, the former option (i.e., eliminating excessive I/I flows at the source) is the preferred option from an economic standpoint.

With this background in mind, staff recommended the formation of an I/I Task Force.

I/I Task Force Conclusions and Recommendations

On April 8, 2003, the Metropolitan Council appointed the Infiltration and Inflow Task Force headed by Council Member Russ Susag, District 5. The Task Force included representatives from 15 communities from across the region as well as the Association of Metropolitan Municipalities. Individuals on the Task Force from the different communities serve "at large." The I/I Task Force membership, charter and full process and findings can be found in the May 2004 Inflow/Infiltration Task Force Report at

http://www.metrocouncil.org/environment/ProjectTeams/I-I-Home.htm

The Task Force concluded and recommended that the Metropolitan Council adopt an I/I policy and corresponding implementation strategies to reduce excessive I/I from the Metropolitan Disposal System (MDS).

Notice Letters

Since the beginning of June 2004, MCES has been sending letters to the public works departments of municipalities for

1) actual excessive I/I events, or
2) potential peaking events that would have exceeded the allowable I/I limits had they occurred at the normal high flow point in the daily (diurnal) cycle.

MCES will continue this practice throughout this program.

Section Two

I/I Policy and Corresponding Financial Implementation Strategies

Based on direction from the I/I Task Force recommendations and statutory authority (Minnesota Statutes, Section 473.145), the Metropolitan Council—as part of the 2030 Development Framework and the Water Resources Management Policy Plan—adopted the following policy and fiscal implementation strategy associated with the reduction of excessive I/I in the metropolitan disposal system.

Policy

The Council will not provide additional capacity within its interceptor system to serve excessive inflow and infiltration.

The Council will establish inflow and infiltration goals for all communities discharging wastewater to the Metropolitan disposal System based on the designed peak-hour capacity of the interceptor(s) serving the community. Communities that have excessive inflow and infiltration in their sanitary sewer systems will be required to eliminate the excessive inflow and infiltration within a reasonable time period.

Fiscal Implementation Strategies

In order to address this problem, the Council will take a twofold financial approach to the excessive I/I problem. In the first place, the Council will plan and prepare for a future where sufficient I/I has not been removed from the system, resulting in a need to build storage facilities and provide treatment for excess I/I. In such a case, substantial capital improvements would be necessary to ensure system integrity and the ability to meet growing demand. This planning and preparation will include the establishment of a reserve/contingency fund to make available funds, which may be necessary to carry out capital improvements in the MDS. These funds would address the effects of excessive community inflow and infiltration should community efforts be insufficient. Second, the Council will establish financial incentives to encourage and assist those communities with excessive I/I in their systems to eliminate the sources of I/I.

Accordingly, the Council will initiate an inflow and infiltration removal program commencing in 2007. This program will consist of four elements:

- **Element 1–Imposition of Inflow/Infiltration Surcharge.** The first element will be the immediate imposition of an inflow and infiltration surcharge for communities experiencing high I/I commencing in 2007 and extending through 2012. The process by which communities will be designated to have excessive I/I and the amount of the surcharge is described in greater detail later in this program document. Funds raised by the inflow and infiltration surcharge program will be placed in a reserve contingency fund to be used for future capital improvements to address the capital improvements necessary to address the impacts of excessive I/I on the system and for treatment works costs associated with excessive I/I, should that become necessary.

- **Element 2–Incentives for Communities to Remove Excessive Infiltration/Inflow.** MCES has determined that the cost to the region as a whole for I/I remediation is most cost-effectively accomplished through the removal of excessive I/I at the local level. If successful, this approach would obviate or greatly reduce the need for expensive capital expenses for additional MCES facilities and the cost to treat I/I at the Council's treatment facilities. Accordingly, MCES will work with communities with excessive I/I in order to encourage the initiation and implementation of inflow and infiltration reduction programs in those communities' local systems. As an incentive to initiate and implement such programs, during the period in which the surcharge is imposed (2007 – 2011) the Council will provide an opportunity for communities that are subject to the excessive I/I surcharge to avoid the financial effects of the surcharge using either Option A or Option B as listed below:

  - **Option A.** Beginning in 2008 and through 2014, a community will be eligible for a rebate of the surcharges imposed by the Council on that community up to the amount the community demonstrates has been spent for the removal of excessive I/I at the local level.

  - **Option B.** Alternatively, the Council will allow a community with an inflow and infiltration reduction program in place to continue with its program and receive a credit against the surcharges to be imposed by the Council on the community in each calendar year. This will allow a community to undertake activities for inflow and infiltration reduction using local funds and not pay the surcharge amount, as long as those funds are equal to or greater than the proposed surcharge amount. The Council's I/I policy encourages I/I reduction programs to be a part of and consistent with each community's 2008 comprehensive plan. Communities could choose this alternative approach to avoid the Council's I/I surcharge by undertaking voluntary I/I reduction programs that are funded at the same or greater level as the surcharge amount. Under this approach, a community enters into an agreement with MCES to obligate local funds to undertake the same or greater effort for I/I reduction.

- **Element 3–Limitation on Increases in Wastewater Service.** Starting in 2013, the Council will limit future increases in wastewater service within each community that has not met the inflow and infiltration goal(s) set by the Council, until the problem is solved. This limitation will be implemented by, among other possible means, the Council recommending to the MPCA that no new sanitary sewer extensions should be approved for such community until the community's I/I problem has been resolved. Prior to taking such a step, MCES will work with those communities not meeting I/I goals on a case-by-case basis. The Council anticipates that all communities served by the MDS should be able to reduce their excessive I/I and meet the established I/I goals by the end of 2012. If a community's I/I program has not been effective, and its excessive I/I continues at a level that either jeopardizes the ability of MCES to convey wastewater without an overflow occurring or requires additional wastewater service capacity, MCES will notify the community of the problem. Meetings with the community will be held and attempts made to arrive at an acceptable local solution to the problem.

- **Element 4–Imposition of I/I Demand Charge.** Starting in 2013, the Council will institute a wastewater demand charge program for those communities that have not met their inflow and infiltration goal(s). The intent of the program will be to defray the cost of

providing attenuation within the MDS to avoid overloading downstream facilities. MCES will continue to review communities' progress and work with them on a case-by-case basis. The Council will design the needed storage and capacity improvements to avoid overloading downstream facilities. Funds remaining in the surcharge reserve/contingency fund will be available to defray the costs of these improvements. Any additional costs to MCES to control, convey and treat the peak flow will be charged to the community as demand charge(s).

Section Three

I/I Costs in the MDS

Key Assumptions

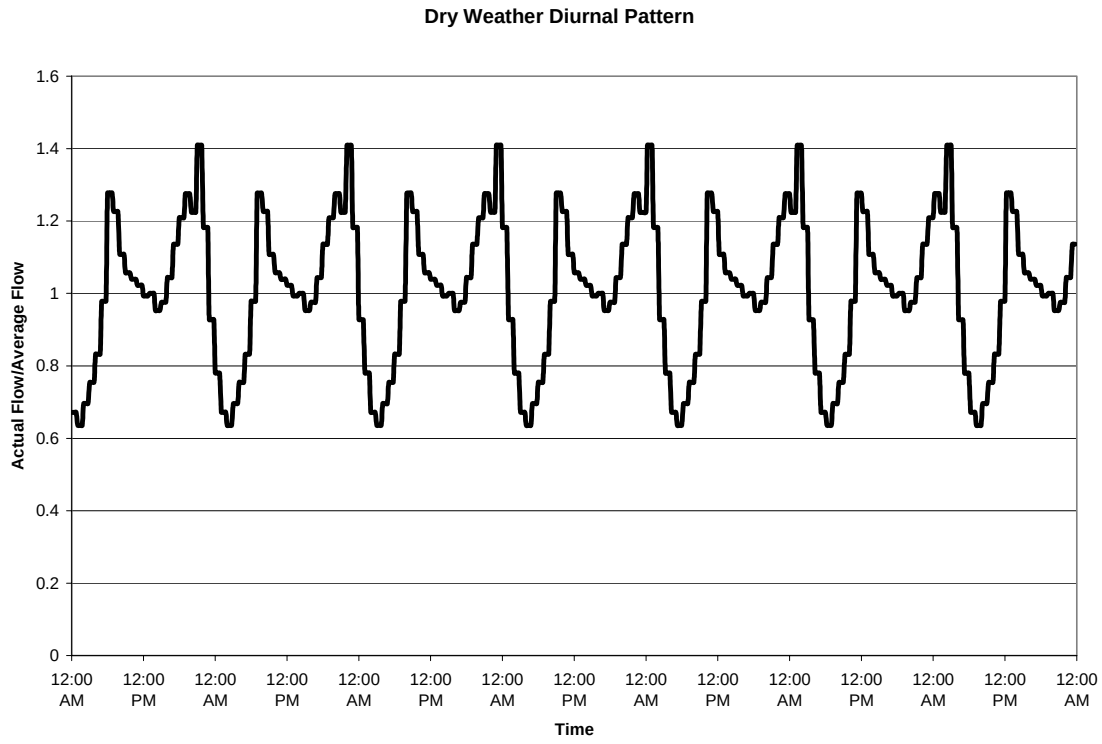
The following assumptions address the costs of managing excessive I/I throughout the MDS. Costs to store and treat excessive I/I were estimated, as were costs to reduce I/I at the community level. Several key assumptions are needed to estimate these costs until more information is available. These assumptions are as follows:

- Excessive I/I that causes peak flows to exceed the basis of design of the interceptor system would be stored underground at each point of connection to the interceptor system rather than conveyed in larger sewers and pump stations.
- The primary impact of high levels of I/I at the treatment plants is the increase of the monthly average flow. Within the MDS, the peak monthly I/I flows at Seneca, Empire, and Hastings are calculated to be about 30 gallons per capita per day (gpcd). For purposes of estimating the cost of treating excessive I/I, monthly I/I flows exceeding 30 gpcd are deemed excessive.
- The capital cost of storage is estimated at $2 to $3 per gallon, depending on the size of the storage basin required. Duluth recently constructed 2 million gallons (MG) of storage for approximately $2 per gallon, but this did not include the engineering, legal and administrative costs. In addition, the facility is near the ground surface and land costs were not included.
- The capital cost of treating I/I is estimated at $2 to $3 per gallon per day (gpd), based on actual costs of $3.50 to $5.00/gpd to expand large MCES treatment plants, and estimating that 40% of the cost is associated with solids management and the strength of the wastewater.
- Most communities have addressed I/I in the publicly-owned system but have not implemented effective programs to reduce I/I from private property (sump pumps, foundation drains and leaky house laterals). For those properties contributing I/I, it is estimated that, on average, the peak hour flow is increased about 6 gallons per minute (gpm) per connection.

Procedure for Estimating I/I Storage Volumes

The Interceptor Master Plan for MCES included characterizations of the sewersheds tributary to the interceptor system relative to rainfall dependent I/I. These characterizations were used as part of a hydrologic model to generate wet weather flow hydrographs for different design storms. When added to the dry weather base flow, the combined hydrograph represents the total flow entering the interceptor system. If the peak flow exceeds the peak flow allowed by applying the correct MCES peaking factor, the difference is deemed “excessive”. For purposes of estimating the cost to manage the “excessive” I/I, the excess flow is assumed to be diverted to below ground storage and subsequently pumped back into the interceptor after the flows recede.

The procedure used to estimate the storage volume starts with the sewershed characterization. For each sewershed the ultimate average dry weather flow was calculated at the net developable acreage and was multiplied by a wastewater generation rate. These ultimate average dry weather flows were given a standard diurnal flow pattern, as indicated below.



A rainfall dependent hydrograph was simulated for each sewershed for a 25-year rain event, using the characterization of the sewershed developed as part of the Interceptor System Master Plan. This I/I hydrograph was added to the dry weather hydrograph to generate a wet weather hydrograph reflecting ultimate development and current I/I levels in the sewershed.

The wet weather hydrograph was compared to the allowable peak flow (ultimate average flow times the appropriate MCES peaking factor). Flow above the allowable peak rate was assumed to go into storage. The total storage estimated in this manner is about 300 million gallons and the estimated capital cost for storage is approximately $700 million to manage the current level of I/I for a 25-year spring storm.

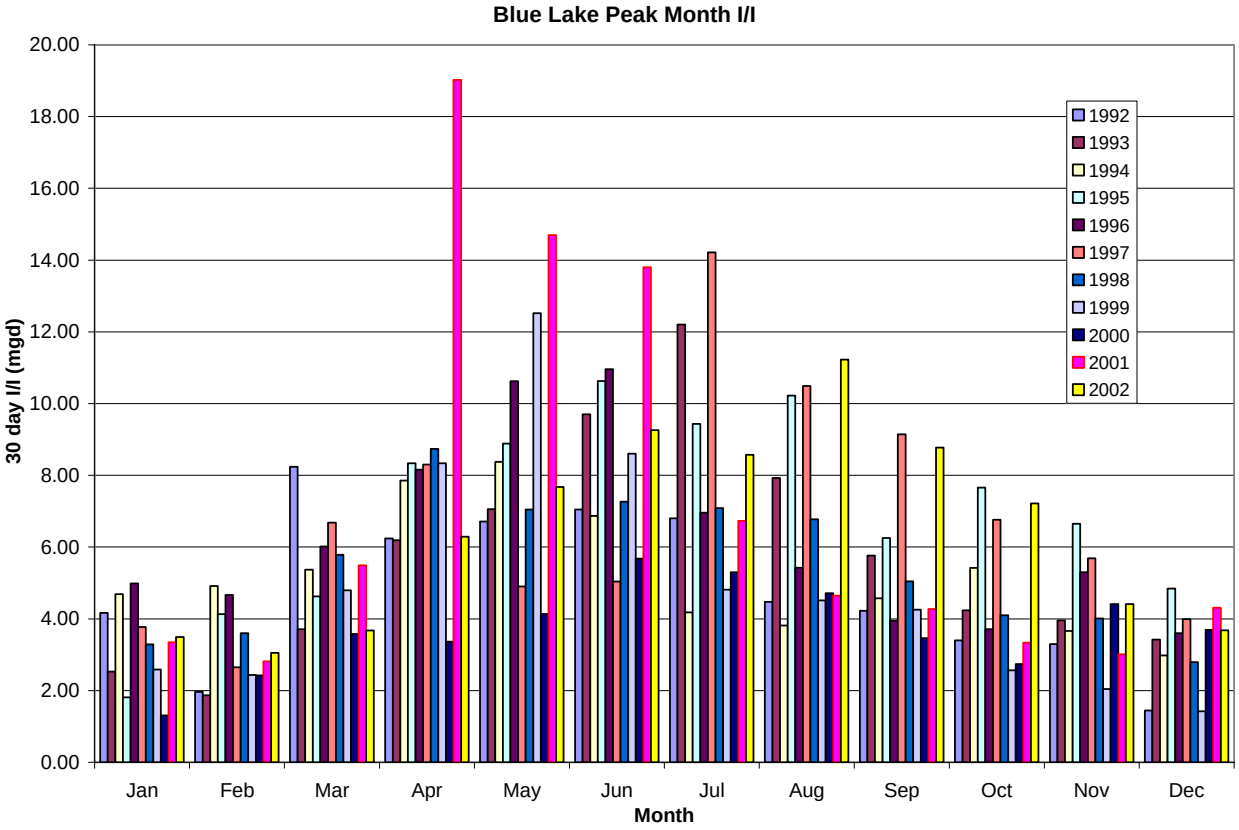
Additional metering data will help refine the estimates of storage needed. For example, the characterization of the I/I from St. Paul is primarily based on one metershed.

Procedure to Estimate Treatment Plant Costs

Daily flow records for the regional plants were analyzed for a 10-year period to estimate the I/I contribution. For each plant analyzed, the wastewater generated from residences was estimated as 70 gpd/capita times the estimated connected population. Commercial flow was estimated as the employment population times 30 gpd/employee. The difference between the recorded flow and the estimated wastewater generation was assumed to be I/I. As indicated

below, the peak month I/I at Blue Lake WWTP reached 19 mgd in 2001. This was approximately 80 gpd/capita. At the Metro Plant, the peak month I/I is estimated to have reached 70 gpd/capita and at the St. Croix Valley WWTP, the value is near 60 gpd/capita. For areas that do not have excessive I/I, the peak month I/I is approximately 30 gpd/capita. Currently, systemwide excess I/I requiring treatment is approximately 80 million gallons per day (mgd).

Inflow/Infiltration becomes part of the wastewater to be fully treated. Most of the liquid treatment process in a wastewater treatment plant is sized based on hydraulics (flow rate), and comprises approximately 60% of the capital cost of a wastewater treatment plant, or $2–3 per gallon per day of capacity. Estimated capital costs for treatment is approximately $200 million (in addition to the costs for collection and storage of excess I/I).



Procedure to Estimate Local Cost for I/I Reduction

The cost to eliminate I/I from a foundation drain can range from several hundred dollars (disconnect the discharge from the sump pump) to $8,000 for installing a new outside sump pump, curb side receiver, and yard restoration. For purposes of estimating the total cost of eliminating I/I from private property, an average cost of $3,000 is assumed. The number of private property sources within the MDS is largely unknown, but has been estimated from the I/I characterization work done for the Interceptor Master Plan. The peak hour flow for a 25-year rain event was simulated using a hydraulic model calibrated with MCES meter data. Excessive peak hour I/I is estimated at 400 mgd, which is equivalent to 300,000 gpm. If each connection is contributing 6 gpm to the peak hour flow (based on observed results in a

2004/2005 I/I program in the City of Forest Lake), there would be about 50,000 connections to repair. At a cost of $3,000 per connection, the cost to eliminate the I/I at the source could reach $150 million.

This estimate can be refined as communities begin to assess the causes of high peak flows associated with rainfall.

Total Costs for Surcharge Program

The lower of 1) the sum of MDS storage and treatment costs ($900 million) and 2) the estimate of local costs to remove I/I ($150 million) was used as the target of reserve/contingency funds for the MDS that must be raised through the Surcharge Program.

Section Four

The Surcharge Program

Costs and Implementation

It has been estimated that if excessive I/I is not eliminated at its source it will cost the Region approximately $900 million to construct storage facilities and expand wastewater treatment plants to contain and treat the excessive I/I. MCES intends to begin collecting reserve/contingency funds that will allow management of I/I within the MDS, beginning with the Surcharge program.

The modeling efforts of the Council show that during a 25-year wet weather event the projected peak hourly rate of I/I exceeds the allowable rate by approximately 300,000 gpm. Staff has estimated that it will cost approximately $150 million for the communities and private parties to eliminate the excessive I/I at its source or about 15% of what MCES would have to pay to collect and treat it. Thus, MCES contingency fund raising can be targeted to $150 million in the 2007–2011 time frame. Should the Surcharge and other I/I programs not succeed by 2012, the higher amount (adjusted by mitigation efforts to date) will need to be raised through a Demand Charge that will be instituted in 2013.

The Surcharge Program

Using the $3000/connection average cost and the estimate of a 6 gallon per minute (gpm) average reduction in peak flow for an average disconnection (see section 3), the estimated exceedance cost of $500 per gpm was developed. Converted to million gallons per day (mgd) this is approximately $350,000 per mgd of exceedance. $350,000 per mgd of excess I/I will be the "Exceedance Rate" for 2007. This same rate will be applied to each municipality that has one or more I/I exceedance events recorded for them since the measurement and notice program began June 1, 2004.

2007 Surcharges

The 2007 Surcharge for each community will be equal monthly charges based on the following:

Municipal 2007 Surcharge **=** Community's I/I Total Cost (IITC) Estimate **/** 60 months

Where:

Community's IITC Estimate **=** (Max Excess I/I Peak Flow Event) **x** (Exceedance Rate)

Max Excess I/I Peak Flow Event **=** Maximum Exceedance measured in the program through June 30, 2006

Exceedance Rate for 2007 = $350,000 per mgd

The 2007 Surcharge will be imposed for 5 full billing years (2007-2011) and will not be changed unless:

1) the municipality demonstrates to MCES, through the appeal process, that the amount is not necessary to fix *all* the I/I problems in the municipality, or
2) that the full 2007 IITC has been spent earlier than 2011.

These surcharges will appear on the monthly wastewater bills for 2007-2011 as "2007 I/I Surcharge" unless offset by credits as described below.

2008 – 2011 Surcharges

New Surcharges will be initiated in subsequent years of the program if higher I/I peak events occur in the intervening flow years (e.g. Billing year 2008 corresponds to flow from July 1, 2006 to June 30, 2007). The same Surcharge formula (as for 2007, above) will be applied with the following changes:

- Instead of 60 months, the number of months remaining in the program for which the municipality may be surcharged will be used. For a Surcharge imposed in 2008 this will be 48 months; for 2009, 36 months; for 2010, 24 months; and for 2011, 12 months.
- The Exceedance Rate will be increased by inflation each year, using the most recently available CPI-U for the Region per the federal Bureau of Labor Statistics. In addition, the Council may increase or decrease the rate if subsequent engineering analysis determines a materially different average cost.
- The Max Excess I/I Peak Flow Event will be the *increment* over the Max used to previously assess Surcharges, if any. If there were no prior Surcharges, then the entire peak flow event will be used.

Municipalities should understand that the Surcharges will be based on actual wet weather events. If little wet weather occurs in a particular municipality they may have little or no Surcharges. However, a serious I/I problem may exist that will incur substantial expense once the Demand Charges begin in 2013. The responsibility to fix the problems and avoid such Demand charges resides entirely with the municipalities.

Surcharge Example

City X has had three I/I events occur since June 1, 2004 and to date, as follows:

June 9, 2004	.139 mgd
July 11, 2004	.120 mgd
July 23, 2005	.130 mgd

If no other I/I events occur before the close of the initial flow period (June 30, 2006), the maximum event will be the .139 mgd event. This peak exceedance times the Exceedance Rate ($350,000 per mgd for 2007) equals this city's IITC of $48,650. This implies a "2007 surcharge" of $9,730 per year for each year 2007 – 2011. Thus in 2007, in addition to the municipal wastewater charge, the city will see an additional "2007 Surcharge" line item for $810.83 on its monthly bill.

If in the flow period for 2008 billing (July 1, 2006 – June 30, 2007), the only additional I/I event(s) that occur are less than .139 mgd, then the 2008 billing will continue to include only the "2007 Surcharge" of $810.83/month.

If during the flow period for the 2009 billing (July 1, 2007 – June 30, 2008), additional I/I event(s) occur which exceed the prior max (of .139) then an additional surcharge will occur, as follows:

New I/I events:	August 1, 2007	.202 mgd
	August 2, 2007	.215 mgd

The new maximum event is the .215 mgd number which is .076 mgd higher (the increment) than the prior max (which has already been surcharged). This incremental peak will be multiplied by the then current Exceedance Rate. If the Exceedance rate is $370,000 (because it inflated), the incremental IITC estimate is $28,120. As there would be only 3 years remaining, the additional monthly surcharge would be $781.11. So on a monthly bill in 2009 there will be three line items: the municipal wastewater charge, the "2007 Surcharge" of $810.83, and the "2009 Surcharge of $781.11.

If during the flow period for the 2010 and 2011 billings there are no I/I events higher than the .215 mgd event, there will be no additional surcharges added. The 2007 and 2009 Surcharges will be applied each month until the end of 2011.

Surcharge Reserve/Contingency Fund

All funds received by the Council under the Surcharge Program will be placed in a Surcharge Reserve/Contingency Fund to be used for the purpose of managing I/I within the MDS system if local efforts to remove I/I are unsuccessful. The Council will maintain separate bookkeeping accounts for each community making surcharge payments. Each account shall include any amounts paid by the community and a proportionate share of any interest earned by the Surcharge Reserve/Contingency Fund.

Rebate or Avoidance of Surcharges

Communities subject to the Council's surcharges may recover or avoid all or a portion of their allocated surcharge in two ways.

Option A (Rebates)

Municipalities may receive rebates of funds, including interest, in their bookkeeping account in two situations:

1) Municipalities may receive a rebate of funds equal to the amount of eligible expenditures made by the community. Eligibility requirements will be the same as for Option B described below. Each municipality may apply at any time during a program year (but only once a year) for a rebate from their community's bookkeeping account.

2) In the fall of 2012, 2013 or 2014, if no excess I/I events have been recorded for the municipality in the three prior years, the full amount of any funds, including interest, remaining in a community's bookkeeping account will be rebated to the municipality.

NOTE: The Council intends to begin a "Demand Charge" for excess I/I in 2013. Surcharge accounts and rebates will not be altered by the initiation of the Demand Charges.

Option B (Credits)

MCES will prepare a standard I/I mitigation agreement that municipalities (that have been surcharged) may sign to offset each Surcharge. This agreement will provide a credit against the Surcharge amount for the coming year(s) and may entirely eliminate the billing. It will require that municipalities spend other funds and/or require private party spending in an amount equal to the credit. Eligible spending shall include budgeted direct staff costs for I/I inspection or engineering (but not administrative overheads) as well as the cost of loans or grants to private parties. Private party costs will be eligible based on standard costs

determined by MCES (e.g. $5000 for a foundation drain or $500 for a sump pump connection).

Appeals

Municipalities may appeal their Surcharges to the Regional Administrator of the Council, within 90 days of being notified of the charges, in the following circumstances:

- community expenditures (after June 2004, and before June 30, 2006) have fixed some problems and should be taken into account,
- extenuating circumstances caused the I/I event(s) and the event(s) should not be counted or should be reduced,
- the Exceedance Rate is more than needed to fix the community's IITC, because the specific fixes needed in the municipality, per an engineering study, will cost less than the exceedance rate, or
- the determination by MCES that some costs are ineligible costs, (if the community believes these expenditures will contribute to the reduction of their IITC).

Community Exceedance Costs

In the I/I Task Force Report the Council provided a list of communities whose measured peak flows during major wet weather events in 2001 and 2003 would have exceeded the established I/I goals for their communities. Since June 2004, MCES has been monitoring specific wet weather events and notifying those communities whose peak hour flows have exceeded their I/I goals. The following table is a list of all communities whose peak hour flows have exceeded the allowable I/I in either of these periods. Those communities that have exceeded their I/I goals and received at least one letter from the Council since June 2004 are shown with the preliminary proposed surcharge listed. As wet weather events occur the Council will continue to monitor the flows from all the communities within the Metropolitan Disposal System and update the list through June of 2006 for the 2007 surcharge billing.

Table 1. Preliminary IITC and 2007 Surcharge: Based on data through October 5, 2005

Municipalities not appearing on this list may also have excessive I/I; it is recommended that all municipalities adopt control strategies as discussed in Appendix B.

City	Actual Max Flow Event(1) (mgd)	IITC at $350,000 per Excess mgd	2007 Preliminary Surcharge(1)	2007 Potential % Inc. due to Surchrg.(1)	High Risk of Inc.
Apple Valley	2.94	$ 1,029,000	$ 205,800	9.7%	
Arden Hills	1.43	500,500	100,100	17.2%	✓
Bayport	0.28	98,000	19,600	6.5%	✓
Bloomington	0.72	252,000	50,400	0.9%	
Burnsville	0.26	91,000	18,200	0.6%	✓
Chanhassen	4.46	1,559,600	311,920	21.7%	
Chaska	0.82	287,000	57,400	4.5%	
Columbia Heights	1.17	409,500	81,900	9.9%	✓
Eagan	6.03	2,110,500	422,100	11.9%	
Eden Prairie	3.95	1,382,500	276,500	10.2%	✓
Edina	1.49	521,500	104,300	2.9%	
Excelsior	0.79	277,900	55,580	42.6%	
Farmington	0.80	280,000	56,000	6.9%	
Forest Lake (2)	0	0	0	0.0%	✓
Fridley	0.27	95,900	19,180	0.7%	
Golden Valley	5.43	1,900,500	380,100	27.0%	✓
Greenwood	0.24	84,000	16,800	44.2%	
Hopkins	1.28	448,000	89,600	9.0%	
Lakeville	3.09	1,081,500	216,300	9.5%	
Lauderdale	0.31	108,500	21,700	20.5%	
Lexington (2)	0	0	0	0.0%	✓
Lilydale	0.36	126,000	25,200	58.6%	✓
Little Canada (2)	0	0	0	0.0%	✓
Long Lake	1.30	455,000	91,000	58.4%	✓
Maple Grove	1.22	427,000	85,400	2.8%	
Maple Plain	0.25	87,500	17,500	8.8%	
Maplewood	3.36	1,176,000	235,200	9.5%	
Medicine Lake	0.13	45,500	9,100	29.3%	✓
Medina	0.43	151,550	30,310	25.4%	
Mendota	0.04	15,400	3,080	30.9%	
Minneapolis	103.00	36,050,000	7,210,000	24.7%	
Minnetonka	4.90	1,715,000	343,000	10.0%	

✓Analytical modeling shows a good chance for substantial increases.

Table continued on next page

Table 1. Continued

City	Actual Max Flow Event(1) (mgd)	IITC at $350,000 per Excess mgd	2007 Preliminary Surcharge(1)	2007 Potential % Inc. due to Surchrg.(1)	High Risk of Inc.
Minnetonka Beach	0.38	$ 134,400	$ 26,880	73.9%	
Mound	0.16	56,000	11,200	2.0%	✓
New Brighton	0.39	136,500	27,300	2.3%	
New Hope	0.14	49,000	9,800	0.8%	✓
Newport	1.64	574,000	114,800	89.8%	
North St. Paul (2)	0	0	0	0.0%	✓
Oakdale	2.77	969,500	193,900	12.9%	✓
Orono	1.28	448,000	89,600	29.3%	
Plymouth	0.98	343,000	68,600	1.6%	
Roseville (2)	0	0	0	0.0%	✓
Savage	0.82	287,000	57,400	4.5%	
Shoreview	1.23	430,500	86,100	5.6%	
Shorewood	4.78	1,673,000	334,600	69.6%	
South St. Paul	5.67	1,984,500	396,900	19.2%	
St. Anthony	3.42	1,197,000	239,400	55.1%	
St. Bonifacius	0.26	92,050	18,410	14.5%	
St. Paul	93.70	32,795,000	6,559,000	50.8%	
Stillwater	1.20	420,000	84,000	7.1%	
Tonka Bay	0.13	45,500	9,100	6.4%	✓
Vadnais Heights	0.84	294,000	58,800	7.9%	✓
Waconia	2.14	749,000	149,800	31.4%	
Wayzata (2)	0	0	0	0.0%	✓
West St. Paul	1.89	661,500	132,300	10.4%	
White Bear Lake (2)	0	0	0	0.0%	✓
White Bear Township	0.09	31,500	6,300	1.1%	
Woodbury	0.14	49,000	9,800	0.4%	
Total	**275**	**$96,186,300**	**$19,237,260**		

Notes: **(1)** These 2007 surcharge amounts will be increased if excessive I/I events occur after October 5, 2005 and before July 1, 2006.

(2) Municipalities that appear on the list with no actual flow event numbers, have exceeded their I/I goals in 2001 or 2003 and, therefore, MCES believes they are vulnerable to excessive I/I events.

✓Analytical modeling shows a good chance for substantial increases.

Appendix A

Definitions and Acronyms

CMOM: Capacity, Management, Operations, and Maintenance federal regulations. Regulates Sanitary Sewer Overflows (SSOs). Will become part of NPDES permit requirements. Will require creation and maintenance of a plan to demonstrate a governmental unit's ability to plan and manage its sewer system effectively, and maintain its integrity so that it has adequate capacity and stays in good condition over the years.

Demand Charge: A demand charge is the amount that MCES will charge a community (starting in 2013) for the cost of excess capacity paid by MCES, because of the community's excessive I/I. The charge is not a penalty; it is based on MCES' cost of service for providing improvements that were the community's responsibility.

Design Average Flow: The design average flow is calculated as the product of the developable area of the long-term service area times 800 gallons per acre per day. This value represents an annual average flow from a service area at long-term development.

Design Peak to Average Flow Ratio: The ratio of the peak hour flow used for hydraulic design divided by the design average flow. MCES has adopted a table (Attachment No. 1) that identifies the Design Peak to Average Ratio to be used for ranges of design average flows.

Exceedance Rate: The charge per mgd of excessive I/I (per Section 4 of this report).

Excessive I/I:

a) I/I that results in the community's wet weather flows to exceed the Metropolitan Council's established I/I goals for the community.

b) I/I that causes the peak hourly flow to exceed the value determined by multiplying the average flow by the value of the peak to average ratio used by MCES to design interceptors and pump stations.

c) I/I that exceeds 25 gallons per day per capita on a maximum monthly basis (MPCA).

gpm: Gallons per minute

gpcd: Gallons per capita per day

I/I: Infiltration and Inflow is that component of sanitary sewage flow that originates from clear water connections, i.e., sump pumps and foundation drains, stormwater entering manholes and groundwater entering through pipe joints and cracks. It is water that would normally not require any type of treatment. However, once it is co-mingles with sanitary wastewater it cannot be separated, and must be treated along with the sanitary wastewater.

I/I Event: An hour when excessive I/I occurs as determined by MCES.

IITP: The Inflow/Infiltration Total Cost for each community.

Infiltration: The seepage of groundwater into sewer pipes through cracks or joints in the pipes.

Inflow: Inflow is typically flow from a single point, such as discharge from sump pumps and foundation drains, or stormwater entering openings in the sewer access covers

Lateral: The small sewer pipe from buildings to the city sewers in the street.

MDS: Metropolitan Disposal System

mgd: Million gallons per day

MPCA: Minnesota Pollution Control Agency

Metershed: The area tributary to an MCES flow meter.

NPDES: National Pollutant Discharge Elimination System

Potential Peaking Event: The amount of flow (usually quoted in mgd) that would have exceeded allowable flow (based on the Design Peak to Average Flow Ratio), had an observed peak flow occurred at the diurnal peak (of the normal dry weather flow cycle) instead of when it actually occurred.

SSO: Sanitary Sewer Overflow

Sewershed: The area tributary to the MCES interceptor system at a single point is a sewershed.

Surcharge: A contingent charge to a local government unit for estimated costs of the MDS, based on actual I/I events as described in Section 4 of this report.

WWTP: Wastewater Treatment Plant

Appendix B

Possible Control Strategies

Options for Reduction of I/I in Local Collection Systems

New Facilities

The design and construction of new sewers and the connection of new buildings to the sewer system should meet the industry standards for tightness and minimize the entry of I/I into the collection system.

The state of Minnesota requires that new sewers be designed and installed so leakage into the sewer is less than 100 gallons per day per inch-diameter per mile of sewer. For one mile of 12-inch diameter sewer, the leakage into the new sewer must be less than 1,200 gallons per day (less than 1 gallon per minute). Adherence to this standard depends on inspection during construction and verification testing prior to acceptance by the owner. The task force agreed that the Metropolitan Council should require certification by a professional engineer that new facilities are installed in accordance with all specifications. Each community must retain records of these certifications so that MCES can audit them.

The connection of a building lateral to the local sewer system is usually permitted by the local building department. The steps taken to confirm that the connection is done correctly vary among communities. Some communities require that a licensed plumber certify that the connection was made in accordance with the building code.

Ordinances

All communities must have adopted ordinances that prohibit the connection of roof leaders, foundation drain tiles, and sump pumps from new construction to the sanitary sewer system. Cities should have ordinances that require the disconnection of any roof leaders, foundation drain tile, or sump pumps currently connected to the sanitary sewer system.

Municipal Authority

M.S. 471.342 gives specific authority to Minnesota cities (but not to townships) to establish I/I programs, including loans or grants to property owners. City and township funding can come from Council Surcharge refunds as described in Section 4.

Disconnection of Foundation Drains and Sump Pumps

The disconnection of foundation drains and sump pumps from the sanitary sewer system is one of the most difficult I/I reduction measures for a community to undertake. The identification of the locations that should be disconnected is a major step and a difficult one for most communities. Generally, the house to house inspection of the plumbing in the basement does not cause much public concern if the program is well explained to the public and they understand the reason for the inspections. These inspection programs take time and a concerted communications effort. The inspection for connected gravity drains often requires some form of dye testing around the foundation of a building. Dye is sprinkled around a foundation and water is added to flush the dye down the wall of the foundation. Concurrently, a TV camera is placed to observe the building lateral to see if dye is discharged. The local ordinance must be written to allow for this type of testing.

There are a range of options to address this and examples from other communities to follow. Options to consider include the following.

- **Voluntary disconnection and reimbursement:** Building owner is notified of connection and offered some form of reimbursement for disconnection if performed within a specified time frame. No penalty for remaining connected.
- **Point of sale:** Seller must provide community proof that code is met prior to building sale.
- **Age of structure:** Some communities require new building lateral and confirmation of disconnection if building permit is issued for building that is a certain age (40 years old, for example).
- **Mandatory disconnection with reimbursement:** Building owner is notified of connection and offered some form of reimbursement for disconnection if performed within a specified time frame. The owner is fined if remaining non-compliant after a certain period.

In all cases the disconnnection should be certified by community staff or a licensed plumber. These certifications should be on file and accessible for audit by the Metropolitan Council.

I/I Reduction in Local Sewers

The investigation of I/I sources in publicly owned sewer systems is fairly well developed and the standard practices well documented on the basis of the sewer system evaluation surveys. The basic steps included the following.

- **Flow monitoring and analysis:** Locate areas generating high I/I and estimate I/I rates.
- **Smoke testing:** Locate inflow sources.
- **Dye water flooding:** Locate cross connections between drainage system and sanitary sewer system.
- **Closed circuit TV inspection:** Often conducted during the dye water flooding tests, the TV inspection locates specific I/I sources and structural defects that should be rehabilitated or replaced. Manhole inspections are usually done concurrently with sewer inspections.

Most communities have ongoing sewer cleaning and inspection programs as part of the routine maintenance of the collection system. I/I sources are often identified during inspection and include open and leaking sewer joints, cracked pipes, missing joint gaskets, broken house lateral connections, running services (problem likely on private property), pick holes in manhole covers, and offset manhole frames. Many communities address these I/I sources as part of their infrastructure rehabilitation program.

Relief Sewers

Relief Sewers to convey excessive I/I to the MCES interceptor system are not permitted.

MCES Toolbox Assistance

Additional information and resources on reduction actions/practices can be found in the MCES I/I Reduction Toolbox located at:

http://www.metrocouncil.org/environment/ProjectTeams/I-I-Home.htm

Appendix C

Case Studies of I/I Related Costs

City of Milwaukee Case Study

The Milwaukee Metropolitan Sewerage District began a $2.3 billion sewer improvement program in 1986 to store and treat I/I to comply with stricter federal water quality standards. This program included a $716 million Deep Tunnel, put in operation in 1994, with a storage capacity of 405 million gallons (this is $2.40 per gallon in 2005 dollars), and an interceptor system of 153 overflow points from which untreated wastewater may be discharged into local waterways during heavy rain. The District estimates that the Deep Tunnel has captured more than 40 billion gallons of wastewater and prevented 240 sewer overflows since 1994, with the average annual volume of sewer overflows reduced by 7.2 billion gallons annually, or 81.3% from estimated pre-tunnel levels.

However, the Deep Tunnel, which was expected to virtually eliminate sewer overflows, has not been as successful as planned, resulting in untreated wastewater overflows of 13.2 billion gallons since 1994 (partly because capacity was exceeded during five large storms). The District plans to address limitations of its sewer system by spending an additional $786.4 million to increase capacity through projects that include:

Project	Cost
Improvements to the District's conveyance system	$458.4m
Construction of 116 million gallons of additional storage capacity for sanitary sewage	$175.5m (or $1.50 per gallon)
Redesign siphons	$ 96.2m
Purchase of enhanced storm tracking and real-time flow monitoring equipment to improve the prediction of storage capacity needs	$ 16.5m
Increase treatment plant capacity	$ 5.8m
Other (e.g. property acquisition, levee construction, contaminated soil removal)	$ 34.0m
Total	$786.4m

Furthermore, in part to reduce the amount of stormwater entering the District's sewer system, the Deep Tunnel, and treatment plants, the District has:

- adopted new inflow and infiltration limits and funded $2.1 million in local demonstration projects, in an effort to reduce I&I by 5% district-wide through 2010,
- adopted rules that require municipalities to include runoff management systems as part of any development plans, and

- planned to spend $410 million for watercourse improvement projects to reduce flood damage to structures, improve water quality and reduce the inflow of stormwater into the sewer system.

City of Forest Lake: Sump Pump Inspection Program

The interceptor system that provided wastewater service to the City of Forest Lake had experienced capacity limitations during peak wet weather conditions. The City initiated a sump pump inspection program in 2004 designed to locate and eliminate the illegal discharge of sump pump water to the sanitary sewer system. The City has expended $120,000 to inspect approximately 3,300 homes and has found approximately 370, or 11%, with sump pumps illegally connected to the sanitary sewer system. The City estimates that the average cost to disconnect a sump pump and direct it outside the building is $100. The City has not had to provide additional discharge points for the clear water from the sump pumps to a local collector.

City of St. Anthony: Drain Tile Inspection Program

The City of St. Anthony had experienced the backing up of sewage into homes during peak wet weather conditions. The City completed an investigation as to the cause of the I/I entering their system and determined that it was from passive drain tile connections to the sanitary sewer system. The City passed an ordinance requiring homes to be inspected and drain tile disconnected from the sanitary system at point of sale. The program began in 2001. Currently, the City has inspected 340 homes for improper drain tile connections. The average price to the home-owner for disconnecting the tile from the system, installing a sump basket, and directing the pump outside the home is $1,200. As in Forest Lake, St. Anthony has not had to provide additional discharge points for the clear water from the sump pumps to a local collector.

Appendix D

Inflow/Infiltration Surcharge Program
2007 Option B Agreement

Draft of 9/27/05 (Conceptual)

Whereas, Excess Inflow and Infiltration (I/I) of clear water into the Metropolitan Disposal System (MDS) is projected to cost the Metropolitan Council (Council) over $900 million for extra capacity over the next 25 years, and

Whereas, local efforts to mitigate this excessive I/I are projected to cost approximately $150 million, and

Whereas, the Council has instituted an I/I Surcharge Program, pursuant to M.S. 473.517, to encourage local governments to solve this problem at the local level, and

Whereas, the municipality of _____ (Municipality) has had excessive I/I event(s) and thus has been allocated a "2007 Surcharge" for each year 2007 to 2011 of $_____ per year, and

Whereas, the Council allows municipalities credit against this Surcharge by entering into this Option B agreement, and

Whereas, Municipality prefers to mitigate I/I within the municipality using other funds of Municipality or through local regulation rather than paying the Surcharge,

Now, Therefore, Municipality and Council hereby enter the following agreement:

1.0 Municipality agrees to spend or cause to be spent on eligible I/I mitigation costs, (as defined in section 3.0) funds at least in the amount of $_____ during calendar years 2007-2011.

2.0 Council agrees to credit Municipality and thereby reduce the Surcharge by up to the amount listed in section 1.0, but no more than the full amount of the Surcharge assessed to the Municipality for each year.

3.0 Municipality agrees that it will work to mitigate I/I, as follows:

3.1 Municipality will spend its own funds on eligible I/I projects and costs. I/I projects shall be those projects that are intended in whole or in part to reduce clear water entering the MDS. If part of a project is I/I mitigation then only the portion of the costs for I/I work will be eligible. Eligible labor costs for municipal staff will include only direct labor costs for inspection, engineering or construction support on I/I mitigation projects. Fringe benefits for these employees may be included. No administrative overhead shall be included. All contract services for I/I mitigation shall be eligible. The Municipality's plan for I/I projects and costs is identified in Attachment A.

3.2 Private party costs incurred within the municipal borders as a result of the Municipality's I/I project(s), for disconnections from the sewer, may be included on a standard cost basis for the completion of disconnections on private properties as identified in Attachment A. Any municipal costs for loans or grants to private parties, counted under section 3.1, must be subtracted from these standard private party costs, such that the local spending is counted only once.

3.3 Municipality may once each fall modify the plan in Attachment A, subject to the review and approval of the Council. Such approval shall not be unreasonably withheld. In addition, failure of the Council to object, in writing, within 30 days constitutes approval of the Plan modifications.

3.4 Municipality agrees to certify to the Council on a quarterly basis the "actual local funds spent" (i.e. the expenditure of municipal funds on eligible I/I costs and the number of private party disconnections actually accomplished).

3.5 Municipality agrees that if actual local funds spent on I/I projects on a cumulative basis are less than the plan as described in Attachment A, at the end of each calendar year, the net reduction in local I/I

spending (Attachment A plan less actual spent) shall be added to the Surcharge amount in the next calendar year.

4.0 Municipality agrees that Council or its agents shall have reasonable access to its relevant records for the purpose of auditing all records that pertain to this agreement.

5.0 Municipality agrees to indemnify and hold harmless the Council and its agents for all work performed under this agreement.

6.0 Municipality acknowledges that the Council makes no representations as to the adequacy of this work to fix the I/I problems in the municipality, and that the Municipality may be subject to a Council Demand Charge for excess I/I beginning in 2013 regardless of the work performed hereunder.

7.0 This agreement shall not change, in any way, other responsibilities of the Council or the Municipality under state or federal laws, rules or regulations, or the Comprehensive Plan of the Municipality pertaining to I/I.

8.0 The term of this agreement shall be 5 years, through the end of 2011. Obligations in sections 3.2, 4.0 and 5.0 shall survive for an additional 3 years after the end of the term.

Appendix D: Attachment A

The municipality plan to spend funds on I/I mitigation projects and costs is described below:

I. Calendar Year = 2007

a) Municipal Costs:

_____
_____
_____
_____
_____
_____
_____
(attach additional sheets as necessary)

b) Private Party cost credits for work within the Municipal borders:

____ Sump Pump Disconnections @ $100 per dwelling = $_____
____ Foundation drain disconnections @ $3,000 per building = $_____
____ Rain Leader disconnections @ $100 per single family dwelling $_____
____ Rain Leader disconnections @ $3,000 per commercial or multi-family dwelling $_____
____ Service Lateral Repairs @ $5,000 $_____

Other: (describe below)

_____
_____
_____
_____
_____

Total to be spent by the end of 2007: $_____

II. Calendar Year = 2008

a) Municipal Costs:

_____
_____
_____
_____
_____
_____
_____
(attach additional sheets as necessary)

b) Private Party cost credits for work within the Municipal borders:

____ Sump Pump Disconnections @ $100 per dwelling = $_____
____ Foundation drain disconnections @ $3,000 per building = $_____
____ Rain Leader disconnections @ $100 per single family dwelling $_____
____ Rain Leader disconnections @ $3,000 per commercial or multi-family dwelling $_____
____ Service Lateral Repairs @ $5,000 $_____

Other: (describe below)

_____
_____
_____
_____
_____

Cumulative Total to be spent by the end of 2008: $_____

III. Calendar Year = 2009

a) Municipal Costs:

_____
_____
_____
_____
_____
_____
_____

(attach additional sheets as necessary)

b) Private Party cost credits for work within the Municipal borders:

____ Sump Pump Disconnections @ $100 per dwelling =	$_____
____ Foundation drain disconnections @ $3,000 per building =	$_____
____ Rain Leader disconnections @ $100 per single family dwelling	$_____
____ Rain Leader disconnections @ $3,000 per commercial or multi-family dwelling	$_____
____ Service Lateral Repairs @ $5,000	$_____

Other: (describe below)

_____
_____
_____
_____
_____

Cumulative Total to be spent by the end of 2009: $_____

IV. Calendar Year = 2010

a) Municipal Costs:

_____
_____
_____
_____
_____
_____
_____

(attach additional sheets as necessary)

b) Private Party cost credits for work within the Municipal borders:

____ Sump Pump Disconnections @ $100 per dwelling = $_____
____ Foundation drain disconnections @ $3,000 per building = $_____
____ Rain Leader disconnections @ $100 per single family dwelling $_____
____ Rain Leader disconnections @ $3,000 per commercial or multi-family dwelling $_____
____ Service Lateral Repairs @ $5,000 $_____

Other: (describe below)

_____
_____
_____
_____
_____

Cumulative Total to be spent by the end of 2010: $_____

V. Calendar Year = 2011

a) Municipal Costs:

_____
_____
_____
_____
_____
_____
_____
(attach additional sheets as necessary)

b) Private Party cost credits for work within the Municipal borders:

____ Sump Pump Disconnections @ $100 per dwelling = $_____
____ Foundation drain disconnections @ $3,000 per building = $_____
____ Rain Leader disconnections @ $100 per single family dwelling $_____
____ Rain Leader disconnections @ $3,000 per commercial or multi-family dwelling $_____
____ Service Lateral Repairs @ $5,000 $_____

Other: (describe below)

_____
_____
_____
_____
_____

Cumulative Total to be spent by the end of 2011: $_____