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From : Stephen H. Kaiser

## Draft NPDES Permit 0101074 for Cambridge CSOs

I have reviewed the draft NPDES permit for Cambridge, 0101974 and offer the following comments, with respect to Alewife Brook only.

### **THE SUBREGIONAL PROBLEM**

Within the Alewife Brook watershed, the water quality situation is complicated by the existence of other sewage contributions along Alewife Brook from the several communities through which it flows. From the Little River tributary comes significant upstream fecal pollution due to wastewater malfunctions in the non-CSO town of Belmont. In recent years, Belmont has engaged in major repair and maintenance work on its neglected sewer systems. A reduced pollution problem remains.

Cambridge, Somerville and MWRA are under court order to reduce the amounts of CSO-related sewage entering Alewife Brook. A virtual unspoken factor in past discussions has been the pollution contribution from SSOs and other defective sanitary sewage systems which release pollution within the Mystic River watershed. In the past year, MWRA has made notable efforts to recognize the SSO problem, even if its reporting methods lack a certain essential clarity.

## **PROBLEMS FROM ADDING DRAINAGE OBJECTIVES TO THE CSO PROJECT**

Cambridge has complicated the sewer separation problem by its introduction of drainage improvements as a designed-in element of the total CSO program. Moreover, complete CSO separation along Alewife Brook has been dropped as an ultimate objective. Attachment B for the draft permit lists six existing CSO pipes under the jurisdiction of the City of Cambridge, and only two of these are proposed for closure as part of any near or long-term plan. It is fair to say that separation of additional Cambridge CSOs has been precluded for budgetary reasons, because of the considerable expense involved in the drainage program advocated by the City of Cambridge, called Contract 12.

In fairness to Cambridge officials, their dilemma has been triggered by flooding and drainage problems in the Concord Avenue and New Street area due to a 50-year flood event in 1996 and a 25-year flood in 1998. The consequence of these floods has been intense political pressure from businesses and some residential areas for relief from the dire consequences of flooding. The City has attempted to respond with the drainage relief program of a large parallel stormwater culvert that would remove floodwaters from the New Street business area and would deliver those floodwaters to Alewife Brook.

The 2001 NPC recognized the flooding problems created by the project, and proposed as mitigation the creation of a flood berm along the East Arlington frontage to Alewife Brook. Due to neighborhood concerns (as well as the possibility of making flooding worse elsewhere) MWRA abandoned its berm mitigation plan, but did not replace it with any other proposal. In effect, the project's flooding impacts remain unmitigated.

One result of Contract 12 is to increase flooding in Alewife Brook, and with the increased flooding comes greater amounts of inflow into the local and MWRA sewer systems during highwater conditions. In effect, there is reverse flow from the brook into the CSO chambers and thence into the MWRA interceptors. The CSO problem at Alewife is two-way. First there are the flows of combined sewage from the Cambridge system discharged into Alewife Brook. Second, there is the reverse flow or inflow of floodwaters from the brook passing into the Alewife

interceptors and overloading the MWRA system downstream, causing the SSO near Dilboy Field.

During both the October 2005 and March 2006 floods (ten year events) I observed overland SSO flows coming from the rear of the MWRA Alewife Brook Pump Station near Dilboy Field. I saw significant deposition of solid fecal matter on the ground.

My measurements of Alewife Brook flood elevations during those storms showed that flood crests were well above the weir elevations within Cambridge's CSO structures. I concluded that brook inflow into those CSO facilities was a significant contributing factor to the SSO overflows experiences at MWRA near Dilboy Field.

One consequence of Cambridge's Contract 12 drainage work is heightened flood elevations in Alewife Brook. The City's own flood studies for the 2001 NPC and 2003 Variance Request show identical analyzes of increased flood elevations along Alewife Brook, with elevations in a 10-year storm being 1.5 inches higher near the MWR003 outfall on Little River (Table ES-4 on page ES-12). No 100-year flood impact was calculated by Cambridge or MWRA.

This increased flooding along Alewife Brook caused by Cambridge's drainage project will increase the physical extent of the flooding as well as the water depth for those properties within the flood plain. More importantly for water quality, it allows even more inflow of brook water through the CSO system and into the MWSRA interceptors, triggering even larger SSO discharges near Dilboy Field.

MWRA has proposed and supported the concept of installing flap gates on all remaining CSO pipes from Cambridge. Cambridge has indicated its preference for funding the drainage project rather than inflow controls.

Other elements of the CSO separation in Cambridge work both ways as well. The plans shown in the NPC indicate larger connection pipes between Cambridge's CSO system and the MWRA interceptor. This provision allows for less CSO overflow during shorter, more intense flows, but also produces larger volumes of inflow from the brook into the MWRA system. Again, flap gates would

reduce this problem, but they are not an approved element in the current CSO plan.

Finally, there is a scarcity of quality measurements of flood elevations along Alewife Brook. No government entity has reported any flood data since 1996. Water quality sampling and modeling have also been deficient in either frequency or accuracy or both.

### **SUMMARY OF THE FOUR PRIMARY PROBLEMS**

From the problem assessment above for Alewife Brook, there are four basic elements in the current plan that need to be addressed by planners, engineering designers and permitting agencies :

1. There is no plan at any time in the future for the full separation of combined sewers in Cambridge
2. The drainage plan proposed by Cambridge will worsen flooding conditions generally in Alewife Brook, and will increase brook inflow into MWRA interceptor sewers during major storms, with SSO problems worsened downstream. Cambridge has adopted no mitigation plan.
3. The failure to install flap gates on all remaining CSO pipes in Cambridge will result in no reduction in the brook flood inflow through CSO structures into MWRA interceptor sewers. Such flap gates are needed.
4. There is inadequate data and circulated information on the interaction between flooding and sewer overflows (both CSO and SSO). More measurements with greater accuracy need to be made.

## **NINE MINIMUM CONTROLS**

The proposed permit provides a sound structure for which to build an effective permit. Among the nine Minimum controls, the permit emphasizes five : #1,5, 6, 8, and 9. I would urge that EPA add #2 and #4 :

“(2) Maximum use of the collection system for storage. ....

(4) Maximization of flow to the POTW for treatment.”

Both of these are related to the use of flap gates on all remaining CSOs to reduce the amount of brook inflow into the MWRA system. The goal would be to maximize both the storage of existing system as well as maximizing the available capacity in the MWRA system to allow for sewage flow to the Deer Island treatment plant.

“(9) Monitoring to effectively characterize CSO and the efficacy of CSO controls.”

Proper monitoring should include information both on flooding/rainfall and CSO activity (both discharge and inflow). Cambridge must calibrate and report regularly on data from their two existing stream monitors. The USGS at Broadway gage has been down for over two years, with no data on stream elevation. Cambridge has simply not been reporting their flood data publicly.

## **LIMITATIONS AND CONTROLS**

Other problems arise from the peculiar nature of the permit, which establishes limits on the amount of storm discharge, but has no penalty structure and no method of enforcement. There does not appear to be any opportunity for peer review of any measurements. modeling or calculations to be performed by the City of Cambridge.

My concerns about this element of the permit are probably not peculiar to this permit, but are related to all NPDES permits. However, I would be most interested in seeing how Cambridge measures and evaluates flood events.

With respect to "effluent limitations and requirements," there should be greater clarity as to how the limitations affect actual water quality. The lack of opportunity for enforcement enforcement action needs to be explained.

### **TECHNICAL DEFINITIONS**

The interactions between rainfall, stormwater, flooding and sewage overflows can be quite complicated. Unfortunately, those who deal with flooding (FEMA) are separate agencies from those that deal with water quality (EPA). Closer coordination is needed.

For example, a storm should be evaluated for some reasonable period after the end of rainfall, at least as long as inflow through CSOs remains a problem. During the March 21 to April 2m 2004 flood (a ten-year event), Alewife Brook crested at elevation 5.6 NGVD -- two feet higher then the lowest CSO invert. The brook level did not drop below the CSO invert level for 36 hours. Thus the definition of wet weather as contained in the permit :

"1. During wet weather, the permittee is authorized to discharge combined storm water and sanitary wastewater from combined sewer outfalls"

should be modified to cover this additional inflow period.

In terms of submitting valid data, the following is acceptable

" 4. .... When estimating, the permittee shall make reasonable efforts (i.e. gaging, measurements) to verify the validity of the estimation technique. "

..... except that the term "calibration" should be used to validate any measurements or estimation methods. In terms of actual measurements for flood elevation, it is my understanding that Cambridge maintains two in-stream meters from which elevation data can be utilized. Calibration of the base or reference elevation of the gage should be included in any report to EPA.

Reports on precipitation should include peak hourly precipitation as well as total storm precipitation (with times for storm beginning and end). Notation should be made of recent rains in the week prior to the flood crest and the presence of surface snow or ice. Such conditions represent the classic winter freshet situation of rains striking melting snow or frozen ground conditions. Historically, Boston's worst winter freshet occurred in 1886 Stony Brook Flood, while a significant 25-year flood in March 2001 was created by a one-year rainfall striking snow and frozen ground.

### **RESPONSES TO EXCEEDANCES**

The draft permit stipulates that if CSO discharges are significantly higher than expected, Cambridge shall include a discussion of possible abatement activities and their possible impact :

"Where CSO discharges are determined to be greater than the activation frequency or volume in either document above, the permittee shall include their assessment of such result, a discussion of remaining CSO abatement activities and an assessment of the impact of those projects on attaining the level of CSO control identified ....."

One key mitigation element which should be considered is the dredging of Alewife Brook. Existing sediments are about four feet deep, with 18 inches of water depth in the brook itself. Removal of these sediments would result in better stream flow and hence a flooding benefit, while also removing pollutant-laden materials within the brook. The flooding benefit can be utilized as mitigation for the worsened flooding attributed to Contract 12, as well as any needed flooding mitigation due to flap gates. The flap gates would have the effect of reducing flood water in the MWRA interceptors, but with an increment of increased flooding in the brook itself. In this scenario, flap gates can be used to reduce inflow, and full flood mitigation is provided by the dredging. I have made this proposal and submitted it twice to MWRA.

I believe that it should be possible to utilize the NPDES permit to encourage the various parties concerned with water quality and flooding issues along Alewife Brook to reach a reasonable resolution with mitigation. I welcome any effort that EPA can give to this effort and appreciate this opportunity to comment on the draft permit.

While I did request the opportunity for a public hearing and extension of the comment period, I believe that with the upcoming NPDES review of MWRA permits in the Alewife Brook/Mystic River area will include a public hearing. By completing these comments, I have no further need for time to respond to the draft permit for Cambridge. Therefore, I withdraw my request for a hearing and extended public comment period for Cambridge permit MA0101074.

Sincerely,



Stephen H. Kaiser, PhD

cc, Michael Hornbrook, MWRA  
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