MEMORANDUM

CSO 018 – Outfall Adjustment Options

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Background

A Tideflex CheckMate backflow preventer is installed upstream of the CSO 018 outfall to prevent Harbor Brook from backing up into the wetland cells during storm events. A head differential of 20 inches is required to fully open the backflow preventer and allow a quantifiable discharge to flow freely out the outfall pipe. However, a design feature of the backflow preventer is that it has a very low head loss and it opens a small amount with as little as a 1-inch pressure differential. During dry weather the water in wetland cell 3 (open to surrounding groundwater) is typically higher than that in Harbor Brook by an inch or slightly more, resulting in an unquantifiable trickle of groundwater from wetland cell 3 being discharged through the outfall. The NYSDEC has recently indicated that per SPDES requirements, despite being unquantifiable, this trickle of flow is required to be sampled on a continuous basis.

Three options were investigated for eliminating this small amount of groundwater discharge during dry weather conditions while also providing backflow prevention.

Option 1 – Flap Gate with Weights

The Tideflex CheckMate backflow preventer could be removed and replaced with a flap gate on the end of the outfall pipe to provide backflow prevention. Although most flap gates are designed to open at low heads, similar to the Tideflex, the advantage of the flap gate is that is can be modified by adding weights or adjusting the opening angle to increase the pressure head difference required to open and allow flow out the outfall. Plasti-Fab, Whipps, and Waterman all manufacture stainless steel, end of pipe flap gates that can be modified by adding weights or angles. The typical cost of flap gates produced by these manufacturers range from $7,500 to $10,000, not including the cost of weights or labor for installation.

A disadvantage of the flap gate approach would be that the existing TideFlex would need to be removed to create an ideal flow path for flow measurement. If left in place, the hydraulics of the outflow would be very complicated and the ability to obtain accurate flow measurements would be compromised. Due to its size and weight, removing the TideFlex would require significant labor and time.

Also, based on conversation with the various manufacturers, it would take as much as 500 pounds of extra weight on the flap gate to retain 20 inches or more of water on the wetland side of the flap gate, to maximize the storage volume in the wetland cells. This would be a significant amount of weight and may not be feasible.

Option 2 – Flap Gate with Float

This option is identical to Option 1, with the difference being that instead of attaching weights to the flap gate a latch would be used to keep it closed. The flap gate would remain closed until the water on the wetland side reached a certain elevation and triggered a float that would release the latch. Plasti-

Fab, Whipps, and Waterman each indicated this would be feasible with their models, with Plasti-Fab completing a similar approach on a previous project. The cost for the float and latch actuating mechanism would be approximately $2,000, in addition to the cost of the flap gate and labor for installation.

Similar to Option 1, the existing TideFlex backflow preventer would need to be removed for this approach to work properly. A second disadvantage of this approach would be that there would be additional equipment within the 36-inch outfall pipe that would need to be maintained on a regular basis.

Option 3 – Addition of a Weir with Stop Logs in MH-19

Option 3 is the addition of a watertight weir with stop logs at the point where the outfall pipe is connected to MH-19. The weir would be set to the desired elevation to hold back water in the wetland cells and maximize storage volume. The weir could be fitted with additional stop logs to add flexibility in the amount of water to hold back within the wetland cells. The addition of a weir would also allow for simpler event determination. If water were going over the weir, an event would be underway, and vice versa. At any point during dry weather conditions, the water would be below the top of the weir and no groundwater from wetland cell 3 would discharge from the outfall. The cost of the stainless steel weir would be approximately $6,000 plus labor for installation. The existing TideFlex backflow preventer would remain in place to prevent backflow from Harbor Brook from entering the wetlands when the brook level is higher than the weir.

Recommendations

Option 3, addition of a weir with stop logs in MH-19, is the simplest and most cost effective approach to eliminating the dry weather groundwater trickle from discharging through the CSO 018 outfall. Not only would this solution eliminate the groundwater discharge, but it would also allow OCDWEP to maximize wetland storage and simplify event determination.

The elevation of the weir would be determined as part of CH2M's current SWMM modeling efforts to optimize the wetlands storage. The weir could then be constructed via OCDWEP's Term Construction Contract in a relatively quick manner.