Memorandum

DATE: September 20, 2007

TO: John F. Foley III, Sewer Authority Mid-Coastside

FROM: Tanya Yurovsky, P.E., SRT Consultants

SUBJECT: Part III of DRAFT Risk Analysis for the Wet Weather Flow Management Project

Background

Sewer Authority Mid-Coastside (SAM) lacks the storage capacity and transmission system capacity to accommodate sewer flows to the wastewater treatment plant in wet weather seasons, which leads to sewage overflows and may cause raw sewage discharge into the Pacific Coast. SAM has developed alternatives to more efficiently manage the wet weather flows through system conveyance and/or storage improvements. Alternative facilities for wet weather flow management are currently under consideration:

1. A new 600,000-gallon underground stormwater storage tank; 120x70 feet; 12.5 feet deep; or
2. A new 8,850-foot, 14-inch-diameter force main in parallel to the existing 24-year-old force main.
3. A No-Project alternative is also being considered as the third alternative.

Purpose

At its June 25, 2007 meeting, the Board of Directors requested that staff conduct an evaluation of the three current project alternatives in terms of the risk associated with the implementation of each alternative and provide a risk-benefit analysis. The initial results of the risk analysis were presented for the Board's review and consideration at the July 23, 2007 meeting.

- At the July 23, 2007 meeting the Board received the staff report on the Risk Analysis for the Draft Project Alternatives, provided comments and requested further analysis of the alternatives. The results were presented to the Board at the August 27, 2007 meeting, where the Board posed additional questions and requests for information to staff.
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- This draft memorandum presents the results of further analysis conducted at the Board's request.

Project Status

The Wet Weather Flow Management Project (Project) will improve SAM's ability to convey excess flow received during wet weather.

The Project has been divided into two phases, an environmental studies phase and an implementation phase. The first phase, the environmental studies, is currently underway and includes environmental review as required under the California Environmental Quality Act (CEQA) and the California Coastal Act. The objective of this phase is to successfully complete the required environmental review processes and obtain all necessary permits for the remaining implementation phase.

- On August 28, 2007 SAM held a Scoping Meeting to receive public input regarding the project and the potential alternatives.
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- The discussion on the additional analysis conducted since the August 27, 2007 Board meeting and responses to the questions posed by the Board follows.

Discussion

This section includes a detailed discussion in response to the requests from the Board at the July 23, 2007, meeting. Responses to each question immediately follow the question.

Board Request No. 1: Would the Portola Pump Station Require Improvements for the Storage Tank Alternative?

Response to Request No. 1

Based on our review of the existing SAM documents, including various reports by Carollo Engineers and their presentations to the Board, it appears that construction of a new 600,000-gallon storm water storage tank at the Portola Pump Station would not necessitate improvements at the pump station.

The 600,000-gallon storage tank would adequately address the two system limitations that cause overflow: (1) pumping capacity at the Portola pump station, and (2) hydraulic capacity of the Granada force main. The storage tank would allow excess flows to be stored offline during peak periods and be brought back to the pump station when inflows subside.[1]

However, it is important to note that due to the Portola Pump Station age and the stress storms put on its performance, immediate improvements to the pump station are required. Coupling the timing of these improvements with the WWFMP improvements is good engineering and public policy practice. This

[1] Carollo Engineers, Project Memorandum, June 18, 2007, page 1.

approach may allow SAM obtain grant funding for the pump station improvements as opposed to making the necessary rehabilitation of the Portola Pump Station into a separate project, which will not bring any grant funding.

The following minimum improvements are needed at this time to address the wet weather capacity of the Portola Pump Station:

- Existing pump replacement and rehabilitation;
- Discharge header modifications; and
- Flow metering improvements

Board Request No. 2: Evaluate the Potential Impacts of Alternatives (No Project, Storage Tank, or Dual Force Main) on Half Moon Bay

Response to Request No. 2

Based on limited hydraulic modeling data for a 10-year, 6-hour storm[2], the City of Half Moon Bay (HMB), due to its proximity to SAM's wastewater treatment plant (WWTP), would contribute 10.3 MGD of instantaneous stormwater inflow to the WWTP. This would occupy almost 70 percent of the plant's treatment capacity. The remaining parts of the system would be left with only 30 percent, or 4.7 MGD of available treatment capacity at the plant.

The dual force main alternative with no additional storage afforded upstream for flow coming from MWSD and GSD will be more advantageous to HMB allowing unrestricted flow and including a storage facility at the WWTP for peak flows. During this time, SAM would have to restrict flows from the other member agencies potentially causing overflows.

Board Request No. 3: Compare Expected Service Life for HDPE vs. PVC Pipe

Response to Request No. 3:

1. HDPE pipe: 50+ years

The service life for High-Density Polyethylene (HDPE) pipe has been estimated to be 50+ years by the polyethylene (PE) pipe industry. Independent testing of PE in sewer service for 25 years shows no significant changes in the material's physical or chemical properties. PE pipe provides inflow and Infiltration (I&I) elimination and corrosion resistance, and is highly resistant to the wet hydrogen sulfide gas and the low concentration acid found in sanitary sewers.[3] However, under loading or localized tensile stress, some grades of HDPE are subject to environmental stress cracking, a.k.a. slow crack growth. Exhibited as premature rupture, this phenomenon can occur when stressed HDPE plastics are attached

[2] Carollo Engineers, Project Memorandum, January 20, 2005, Figure 17 and Figure 19
[3] Plastic Pipe Institute: http://www.plasticpipe.org/municipal_pipe/sewer_force_main.html

by a reagent (even storm runoff) that causes cracking or rupture at stress levels well below design performance expectations.[4]

2. PVC pipe: 50+ years

Pipe manufacturers claim and independent studies provide data that flexible pipe such as PVC has an average service life of 50+ years.[5] Durability of PVC pipe depends on chemical degradation of the polymer used in the pipes. When the pipes are buried, no chemical degradation is expected to take place. For this reason the durability of the PVC material in buried pipes is expected to be high. The weakness of PVC pipe, however, is in its limited resistance to surge pressures.[6] Such limitation must be taken into account when selecting PVC to be the pipe material and when designing the system.

Board Request No. 4: HMB enjoys unrestricted flow to the WWTP. Evaluate the financial responsibility of HMB during those moments.

Response to Request No. 4:

Costs of operating and maintaining SAM's facilities are shared among the member agencies using a cost sharing formula established in the Joint Powers Agreement. This formula, and other terms stated in the Agreement, need to be carefully reviewed to appropriately evaluate HMB's financial responsibility during peak flow conditions.

Based on limited hydraulic modeling data of a 10-year, 6-hour storm[7], HMB, because of its proximity to the WWTP, would contribute 10.3 MGD of instantaneous stormwater inflow to the WWTP. This would occupy almost 70 percent of the plant's treatment capacity. The remaining parts of the system would be left with only 30 percent, or 4.7 MGD of available treatment capacity at the plant.

Under the proposed project, the inflow rate from upstream of HMB would vary significantly, therefore presenting an opportunity for SAM to reevaluate and/or adjust the cost sharing formula. SAM could apply extra treatment cost per the peak flow rate of each member agency, or restrict flows from all agencies such that the inflows would be equivalent to the agency's respective cost share amount[8]. Factors such as the sequence of inflow from the member agencies,

[4] Extract from brochure: http://www.contech-cpi.com/media/assets/asset/file_name/4507/bro_A2000D.pdf
[5] City of Santa Rosa 2006 Sewer System Master Plan
[6] Ductile Iron Pipe Research Association, *Ductile Iron Pipe Versus PVC*, referencing to Robert T. Hucks, Jr., "Design of PVC Water-Distribution Pipe," *Civil Engineering,* June 1972, p. 73.
[7] Carollo Engineers, Project Memorandum, January 20, 2005, Figure 17 and Figure 19.
[8] 45% by the City of HMB, 31% by Granada Sanitary District, and 23% by the Montara Water and Sanitary District in FY 2005; 2006 EPA Report, page 4.

and the quantity and rate of inflow should all be taken into consideration when evaluating such formula.

Board Request No. 5: Evaluate the Flow Metering at the Portola Pump Station

Response to Request No. 5:

Flow rate at the Portola Pump Station is measured by a magnetic flow meter.[9] Information regarding the meter model installed at the pump station was not readily available. Based on the Portola Pump Station 1979 design drawings, the flow meter was installed on a vertical pipe, with approximately 10 feet of straight pipe run between the meter and the force main. This configuration reveals potential flaws in flow measuring, as flow meters are required to be installed on horizontal runs with 10-15 pipe diameters (i.e. 17.5 feet for the 14-inch force pipe) straight run of pipe before and after the flow metering device. Discharge header modifications will be required to properly install the flow metering device.

Board Request No. 6: What Software was used by Carollo Engineers to develop the model simulations?

Response to Request No. 6:

The model simulations were developed using the EPA Storm Water Management Model Version 5 (SWMM5),[10] a dynamic rainfall-runoff simulation model used for single event or long-term (continuous) simulation of runoff quantity and quality from primarily urban areas.

[9] Carollo Engineers, Project Memorandum, August 19, 2004, Figure 1; MAC Intertie Pipelines Engineering Drawings M-10.6.
[10] Carollo Engineers, Project Presentation, January 22, 2007, Slide 3.