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Memorandum

To:	Washington Department of Ecology
From:	Bob Eimstad - Carollo Engineers; Dave Dittmar-Capital Project Management
Date:	August 13, 2007
Subject:	Briefing on Barton, Murray, Magnolia and North Beach CSO Control Facilities Project Status

Overview

Consistent with the findings of the 1997 Regional Wastewater Services Plan (RWSP), the 2006 Combined Sewer Overflow Control Program Review established the Barton, Murray, South Magnolia, and North Beach CSO basins as the highest priority basins for CSO control. Projects to reduce uncontrolled CSOs in these basins are scheduled to be complete by 2013. The objective of the briefing is to provide a background and current status to the Department of Ecology.

Basin Descriptions

Barton/Murray Basins

The Barton and Murray CSO basins have interdependent systems; the Barton Street Pump Station conveys flows to the Murray Avenue Pump Station, which handles flows from both the Barton and Murray basins. Therefore, the flow analysis, planning confirmation, and scenario evaluation of these two basins are being addressed together.

The Barton Basin includes 1,080 acres in West Seattle, with the current CSO discharge near the Fauntleroy ferry terminal. The basin is largely combined but does include separate storm sewers in some areas. The Barton Street Pump Station currently pumps up to 28 mgd through parallel 24-inch forcemains. Overflows occur at the Barton Street Pump Station when combined sewer flows exceed the pumping capacity of the pump station.

The Murray Basin includes 966 acres north of the Barton basin, with the current CSO discharge near the Murray Avenue Pump Station. The basin is partially separated and has a well developed storm drain system. The Murray Avenue Pump Station pumps up to 31.5 mgd through parallel 27-inch forcemains prior to overflow. The majority of peak flows conveyed out of the Barton and Murray basins are currently treated at the Alki Stormweather Treatment Facility, which is at capacity during peak events.

The 1997 CSO Plan Update evaluated a combination of approaches to control CSO. Recommendations of the 1997 plan included:

- Add 7.5 mgd of capacity to the Barton Street Pump Station, or construct a 0.5 MG storage facility near the Fauntleroy School site.
- Construct a 0.8 MG storage facility approximately 1/4 mile from the Murray Avenue Pump Station.

South Magnolia

The South Magnolia Basin includes 751 acres in Magnolia, with the current CSO discharge at the bottom of 32nd Avenue. The basin is largely combined but does include a well-developed storm sewer system in some areas. Approximately 4.3 mgd of flow is conveyed out of the basin by an existing 18-inch gravity sewer prior to overflow. Combined sewer overflows occur when the capacity of the 18-inch sewer is exceeded. The control point downstream of the overflow is the Interbay Pump Station, which is at capacity during peak events.

Recommendations of the 1997 plan to control CSOs in South Magnolia included constructing a 1.3 million gallon storage facility north of the CSO site. Rooftop separation of 900 homes was also proposed as a potential alternative to storage.

North Beach

The North Beach Basin includes 691 acres in the residential areas south of Carkeek Park, with the current CSO discharge at the North Beach Pump Station. The basin is largely separated, and peak flows are a result of infiltration and inflow (I/I). The North Beach Pump Station pumps up to 3.4 mgd through a single 14-inch forcemain prior to overflow. Overflows occur when the flow exceeds the pumping capacity of the North Beach Pump Station. Peak flows from the North Beach Basin are treated at the Carkeek Stormweather Treatment Facility, which is at capacity during peak events.

Recommendations of the 1997 plan to control CSOs in North Beach included expanding the North Beach Pump Station capacity to 4.2 mgd, and constructing a 140,000 gallon storage facility adjacent to the pump station.

Understanding the Problem

The first step in the current planning process was to update the problem definition based on the most current flow data and updated modeling approach. Existing pumping and conveyance (gravity or force main) capacities within each basin, combined with the capacities of downstream conveyance and treatment facilities, were used to establish the CSO control requirements.

To better understand the value of differing control approaches, King County modeled the impacts of wet weather events on the sewer system of each of the four CSO basins. To bracket the range of control options, they evaluated storage capacity to avoid overflows without increasing existing pumping capacity and also evaluated pumping and CSO treatment requirements if new storage is not built. A summary of the storage or pumping/treatment requirements needed to control CSOs in each basin per Ecology regulatory requirements is presented in Table 1.

Table 1. CSO Control Requirements

Basin	Existing Pumping Capacity	Total Future Pumping/Treatment Capacity Without Increase in Storage	Storage Volume Needed Without Increase in Pumping/Treatment
Barton	28 mgd	+/- 53 mgd	0.5 MG
Murray	31.5 mgd	+/- 65 mgd	1.2 MG
Magnolia	4.3 mgd	+/- 15 mgd	2.6 MG
North Beach	3.4 mgd	+/- 12 mgd	3.5 MG

Alternatives Considered

Alternatives based on five CSO control approaches were developed and presented at two workshops in March and May, 2007. Workshop No 2 was attended by the project team and a cross section of King County groups, including CSO planning, engineering, operations and maintenance, NPDES permitting, and public involvement. Representatives from Seattle Public Utilities (SPU) also participated in the workshop. The approaches included:

1. Peak Flow Storage. Store peak flows that exceed conveyance capacity in the basin during each storm event, and use existing pumping and piping facilities to convey stored flow out of the basin once the rainfall event has subsided.

2. Convey and Treat Peak Flows. Convey peak flows out of the basin by increasing pumping and forcemain capacity, or the capacity of the gravity sewer system. This approach also requires treatment plant upgrades at the point where the peak flows are discharged (Carkeek, Alki, and/or West Point).

3. End of Pipe Treatment for Peak Flows. Treat and discharge peak flows at or near current CSO locations. Treatment processes evaluated for remote, end of pipe treatment include high rate clarification (HRC) and ultraviolet (UV) disinfection.

4. Demand Management. Demand management approaches reduce the magnitude of collection system peak flows through infiltration and inflow (I/I) reduction in separated systems, or by disconnecting impervious areas in combined systems.

5. Combined Approaches. Alternatives using various combinations of the four approaches described above.

A relative cost comparison was used to evaluate the cost effectiveness of storage, conveyance, and treatment alternatives. Relative costs were not developed for alternatives involving demand management due to the current level of uncertainty regarding the cost-effectiveness of demand management. Instead, the preliminary investigation of demand management focused on potential feasibility.

Outcome of Workshop No. 2

Following a presentation of technical and cost information, the workshop attendees developed a preliminary rating of alternatives based on the following evaluation criteria:

- Cost Effectiveness
- Operations and Maintenance Feasibility
- Technical Feasibility
- Public Health and Environmental Benefits
- Flexibility
- Community Issues
- Program Compatibility

General conclusions of the Workshop 2 analysis and alternative rating are listed below:

- Alternatives that control CSOs by increasing conveyance and adding downstream CSO treatment capacity generally have the highest capital costs, and were also rated low by the group based on non-cost criteria.

- Alternatives that store flow or provide end of pipe treatment at the CSO discharge location generally have the lowest capital cost.

- While storage and end of pipe treatment were favored based on relative cost and technical merit, these alternatives were perceived to be very difficult to implement due to community acceptance.

- Workshop participants expressed a high level of interest in CSO control alternatives that use demand management, either alone or in combination with other approaches, and recommended that the approach be further investigated.

Current Status and Planned Efforts

The project team (Carollo and the County) are continuing to refine flow modeling and evaluations of infrastructure needs to support selection of a preferred alternative in late 2008. Demand Management investigations will commence in late 2007, working with SPU, and will likely include the investigation elements outlined below.

Community and stakeholder outreach is underway, led by the County; initial meetings have been held with community organizations in all the basins. In the Barton/Murray basins the community outreach meetings are an extension of ongoing improvements to the Barton and Murray pump stations in those basins. In North Beach and Magnolia, citizens' groups have been initially briefed on the general CSO control efforts and alerted to additional meetings to come in 2007 and 2008. In general public reaction is supportive of alternative solutions to large construction projects and siting of large facilities, along with acknowledgement of the need to resolve stormwater issues, should further separation of flows be the preferred approach.

More on Demand Management Reduces Peak Flows

Demand management includes a wide range of strategies for removing stormwater and groundwater flow from the sanitary/combined sewer system. Demand management could include complete sewer separation, "green" approaches such as SEA street development, stormwater disconnection from sanitary/combined sewer and reconnection to existing storm sewer or surface

drainage, on-site detention/retention, and/or on-site infiltration.

A high level of demand management could eliminate most of the proposed CSO control facilities in the four basins. However, there is significant uncertainty regarding the level of demand management that will be cost-effective relative to the other available control options. It is likely that a cost-effective level of demand management will result in a reduction, but not elimination of storage or conveyance and treatment.

The project team is in the process of developing an approach and scope for the assessment of demand management as a CSO control tool, and recommend an incremental approach to determining its potential value. The incremental approach would include:

- Information gathering from SPU on as-built information.
- Windshield survey to confirm the SPU information.
- Public involvement and public input about demand management.
- Flow monitoring of sub-basins within the SPU system.
- Development of a hydraulic model of the sanitary/combined sewer within each basin calibrated to flow monitoring of sub basins.
- Smoke testing and other field surveys to identify connections to the sanitary/combined sewer.