WATER ENVIRONMENT SERVICES
A Department of Clackamas County

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Director

M E M O R A N D U M

TO: Mike Kuenzi, Director

FROM: Capacity Management Implementation Team

DATE: May 31, 2007

SUBJECT: Capacity Management Program
Technical Recommendation – Near Term

Background

The Capacity Management Program has reached a major technical milestone. We are presenting our technical recommendation to provide treatment capacity for the next 8 to 10 years. This detailed technical recommendation implements the CAC Recommendation No. 1 presented in their November 2006 report to the BCC, which states, "Address near-term needs – To eliminate potential restrictions to additional development within the District."

The memo presents the recommendation from the Implementation Team. This team has members from WES management, and line staff along with the project managers and principal engineers from the design firms working on the preliminary design.

This memo presents the recommendation first, followed by the discussion of the reasoning for the recommendation. Technical design and operational issues are addressed for only the interim period (the next 8 to 10 years). Long-term preliminary designs cannot be complete until the site for the new plant is selected. Modifications to existing facilities in anticipation of new neighbors are not part of this recommendation, although the presence of neighbors has been considered in the process selection and expanded facility designs.

Recommendation

Treatment Capacity

1. Expand the Tri-City Plant to serve an additional 20,000 equivalent dwelling units (EDUs) of capacity by:
    a. installing membrane filters on two of the four aeration basins;
    b. adding fine (2 millimeter) screens to the process train, including necessary screenings handling and pumping facilities;

c. fully enclose all new facilities and provide odor control on all new facilities, and;
d. provide associated control rooms, chemical storage, feed, and receiving stations.

2. Construct a new digester for biosolids treatment, including gas handling and energy recovery and power generation facilities.

3. Construct a biosolids dewatering, dewatered solids truck loading, and chemical storage facility with full odor control.

4. Construct liquid biosolids truck unloading facility and liquid biosolids storage tank so that Kellogg biosolids can be dewatered at this site.

5. Upgrade the electrical switching, transformers, and power distribution system so that power is not interrupted during a severe flood and install backup power generators so that power is always provided to the new facilities.

Conveyance

1. Construct the east side diversion to carry 20,000 EDUs of flow and load to utilize the interim capacity at Tri-City in two stages.

   Stage 1: Clackamas Interceptor Diversion
   - Construct a gravity connection to divert the entire flow in the Clackamas Interceptor to the Clackamas Pump Station
   - Upsize the Clackamas Pump Station and pipe lines to Tri-City to convey the entire Clackamas interceptor flow to Tri-City for treatment.
   - Replace the burned timbers on the old 82nd avenue Clackamas River bridge so that the approach span can carry the diversion pipelines and pedestrians.

   Stage 2: Three Creeks Diversion
   - Construct the Three Creeks Pump Station and pipe lines to the Clackamas Pump Station to increase the diversion capacity to 20 MGD peak hydraulic capacity.

2. Build necessary pump station support facilities including backup power generators.

Kellogg Plant Reliability and Water Quality Upgrades

Download the Kellogg Plant to 28,000 EDUs by increasing the diversion of flow to Tri-City. In addition to reducing flow, the following improvements are needed to keep the Kellogg Plant operating reliably at 28,000 EDUs until replacement capacity can be built.

1. Install chemical injection and storage systems to improve settling in both the primary and secondary clarifiers.

2. Replace the sodium hypochlorite and sodium bisulfite storage tanks and piping to correct the system leaks.

3. Replace the aeration blowers, piping, and air control systems. Consider replacing the air diffusers if an upgrade will reduce operating cost,

4. Construct hydraulic improvements to assure that peak flow can receive primary treatment, blended with secondary effluent, and disinfected before discharge.

5. Digester Improvement
    a. Replace the existing digester mixing system with a pump mixing system.
    b. Improve the digester solids heating and temperature control system so that proper digester temperatures are maintained.
    c. Replace the old waste gas incinerator.
    d. Replace or overhaul the existing digester gas engine generator.

6. Install an Aeration Basin biomass enhancing system so that ammonia can be more effectively controlled.

7. Support Systems

    a. Upgrade the power distribution system including transformers and distribution switch gear to prevent overloads and power availability to critical systems.

    b. Replace the aging programmable logic controllers and control computers with current technology and control software.

    c. Replace aging yard piping to prevent leaks and assure reliability of wash water service.

Discussion

Treatment Capacity

The 20,000 EDU's of interim capacity is sized to provide CCSD No. 1 with enough capacity to meets its current needs, maintain reliable operations at all facilities, and meet expected growth until the long-term solution can be built. Membrane technology was selected because it takes less land area, allows more waste load to be treated in existing process tanks, produces superior water quality, and the capital cost is comparable. Employing membrane technology for this expansion does not prevent additional conventional treatment process to be added to the plant later. Expanding biosolids facilities is needed to handle the larger amount of biosolids created as the overall plant load increases. Odors will be reduced by loading and unloading biosolids trucks indoors where odorous air can be captured and treated. The electrical systems will need to be expanded. The existing transformers and switches will be relocated so that they are protected from flood.

Conveyance

The increased treatment capacity can be utilized when flow is delivered to the expanded plant. The proposed east side route was selected for the interim diversion over the trolley trail route because the route is 2.1 miles shorter; will use half the energy for pumping because the water will not need to be lifted as high; the east side pipeline and pump stations can be utilized in many future system configurations, minimizing the possibility for stranded investment; and the connection pump stations and pipeline construction can be phased in two fully operable segments making it possible to spread the cost over several fiscal years. This two stage approach allows the south half of the project to be placed in operation while the north half is being designed and build.

Kellogg Improvements

The Kellogg improvements are being proposed to improve plant reliability, hydraulic capacity, and effluent water quality. These improvements were developed from three detailed plant assessments:

- equipment, structural, and systems condition assessment,
- detailed hydraulic assessment
- process functionality assessment

The list represents only those improvements needed to extend the plants life for 8 to 10 years at a reduced capacity of 28,000 EDUs. Significant additional upgrades can be expected if the plant remains in service past 10 years. Proposed upgrades for these longer term needs are not part of this proposal.