Selecting the long-term solution

The project team is completing its evaluation of the solutions so the City Council can determine the best course of action later this summer. Long-term solutions still under consideration are the in-lake buoyant gravity-flow system and the around-the-lake pumped system. Once the selection is made, several activities will begin: engineering to prepare detailed plans and specifications for construction contracting, preparation of regulatory agency permit applications and supporting documents, negotiation with property owners for acquisition of required easements, and selection of a construction contractor. Upon completion of these tasks, construction is anticipated to begin during the summer of 2009 with completion by 2012. Portions of the work could begin sooner if a phased approach is selected.

Preliminary capital costs for the remaining solutions are now being refined to help the Council make a final decision. The estimated costs will also include projected in-service, operation, and maintenance costs for the possible solutions will be available this spring.

The Oswego Lake Interceptor Sewer replacement project is one of the largest, most complex and important capital projects in the City’s recent history. The citizens of Lake Oswego will play an integral role in the decision making process. The project team will soon begin meeting with interested parties and will host public open houses this spring. Using sound scientific principles, strong engineering design and valuable public input, a project can be implemented that best protects our resources and reliably meets the community’s sewer system needs well into the future.

Watch upcoming issues of Hello L.O. for project updates and open house dates.

For more information or to schedule a briefing for your group, please contact:
Joel Komarek, P.E.
City Engineer
PO Box 369
Lake Oswego, OR 97034
jkomarek@ci.oswego.or.us
(503) 697-6588

Check out the project website: www.lakeinterceptor.com

What is copper sulfate?
Copper sulfate was reportedly used in Oswego Lake from the mid 1960’s through the mid 1990’s to reduce algae growth. A potential concern that emerged during development of interceptor replacement solutions is whether copper accumulations in lakebed sediments are toxic and how much they would be disturbed by construction. Though copper has no toxicity to humans, certain invertebrates and salmon are sensitive to copper when it is available in the water. Recent extensive studies on a similar lake in Washington where copper sulfate was used showed no significant toxicity to invertebrates or fish as the copper was tightly bound in the sediments. The City’s preferred construction approach will minimize suspension of disturbed sediments in the water by requiring most of the excavation of lakebed sediments during a lake drawdown.

strict compliance schedule and describes measures the City will take to reduce overflows until the interceptor upgrade is constructed.

Structural soundness – Many of the interceptor’s pile supports are at risk of failing during a moderate earthquake. In addition, corrosion of these steel piles is continuing and may soon compromise the integrity of the system.

What is the problem?
In 2000 and 2001, engineering studies concluded that the pipeline itself is in relatively good condition, but two major deficiencies must be addressed:

Capacity – The interceptor was designed to handle sewer flows from about 3,500 developed acres.
Today, it serves nearly 4,500 acres of development and lacks capacity for peak wet weather flows. This problem will only worsen as the City continues to grow. Prolonged periods of rain can cause the system to back up and flow out of manholes into the lake or onto streets near the lake. Such spills violate the Federal Clean Water Act (CWA) and are unacceptable to the City. The City is entering into an agreement with the State Department of Environmental Quality (DEQ), which establishes a

OSWEGO · LAKE · INTERCEPTOR · SEWER

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The interceptor is located 12 to 18 feet below the lake surface and most of the pipeline is elevated above the lakebed on piling to maintain a slope that allows gravity flow. About 40 manholes provide maintenance access to the interceptor and the tributary lines throughout the lake, canals, and bays. The final 1,000 feet of the interceptor is located above ground on piers.

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Search for a solution

In 2002, the City began looking for solutions that could meet both feasibility and reliability criteria.

**Feasibility criteria:**
- Technical – Can the solution be constructed?
- Cost – How does the cost of the solution compare to other possible solutions?
- Regulatory permits – Is the solution acceptable to agencies that would issue the necessary permits?
- Public acceptance – Can the community, affected property owners, and elected officials support the selected solution?

**Reliability criteria:**
- Longevity – Can the solution survive the design earthquake and withstand other environmental conditions for 75-100 years and accommodate anticipated growth?
- Dependability / Operations and Maintenance – Can we depend on the selected solution to perform in both routine and extreme conditions? Can it be safely and economically operated and maintained?

What possible solutions are being considered?

Earlier studies suggested that an in-lake replacement of the interceptor was the best option to pursue, so investigations concentrated on an in-lake gravity solution. In 2005, the “Oswego Lake Interceptor Sewer Upgrade Project, Predesign Report: Phase 1, In-Lake Gravity Alternatives” (Phase 1 Report) was completed. In addition to an in-lake replacement, the feasibility of an out-of-lake pumping and conveyance system was also examined.

This update summarizes the possible solutions that have been examined and focuses on those still under consideration:

- **Buoyant in-lake gravity-flow interceptor system** - replaces interceptor in Main Lake, Main Canal, and Blue Heron Canal by constructing over 19,000 feet of new HDPE pipe held in place with an anchor and tether system.
- **Around the lake pumped interceptor system** - replaces over 8,000 feet of in-lake interceptor and trunks in the west end and constructs six pump stations and over 27,000 feet of new force mains and gravity sewers through City streets.

In-lake gravity flow solutions

The Phase 1 report provides the findings of geotechnical tests, alignment surveys, materials research and even an in-line video inspection. The study concluded that replacing the existing interceptor with a buoyant pipeline would be the most feasible and reliable in-lake solution. A pile-supported interceptor was also considered but was found for most of the alignment to be more costly, though it might be used in certain limited reaches at either end of the lake.

Buoyant interceptor

A buoyant system means that the interceptor would literally float a safe distance below the lake surface. The floating pipe would be made of HDPE (high-density polyethylene, a thick durable plastic) and held down by tethers anchored to bedrock. There are two buoyant systems possible — floating pontoon and tethered pipeline.

There are several benefits with buoyant systems. Buoyant systems are not as susceptible to seismic events as pile supported systems. Another benefit is that the HDPE is not subject to corrosion. It is also believed that a buoyant system is less expensive than a pile-supported system and may be easier to secure regulatory permits.

However, there are challenges. Maintaining a uniform grade to move the flows is critical. Rigorous computer analysis will be conducted this spring to refine the placement and spacing of anchors, crucial to accommodating the thermal expansion/contraction that occurs as the lake temperature fluctuates from winter to summer. For infrequent maintenance of any in-lake solution, submerged manholes will need to be accessed from a work boat using removable standpipes and divers, similar to the process currently used on interceptors in Seattle’s Lake Washington.

Pumping solutions

(in-lake and around-the-lake alignments)

Given the cost of in-lake gravity flow solutions, the Phase 2 Preliminary Design effort was commissioned to look much more closely at solutions that use pumps and pressure pipelines (force mains) to transmit sewer flows around the lake to the treatment plant. In addition, this phase of work involved cleaning the worst accumulations of debris from the existing pipeline to increase current interceptor capacity, evaluating interim options for solving capacity (overflow) problems, and taking a closer look at the seismic vulnerability of the existing interceptor.

**Improving Interim Capacity**

Possible interim wet weather capacity solutions considered included:

- Diverting excess flows to the Clean Water Services treatment facility in Durham.
- Building an auxiliary pressure pipeline through the lake to pump the extra sewage to the treatment plant.

While both of these options supplement the existing pipeline, they do nothing to address the earthquake or corrosion problems. In December, the City Council dropped from further consideration the interim capacity improvement ideas, concluding that a long-term solution would still be needed to address capacity and seismic issues. After the long-term solution is constructed, the auxiliary line or diversion line would not be necessary. The Council agreed to focus on finding a solution that addresses the overflow, seismic, and corrosion problems.

**Pumping alignment**

In-lake and around-the-lake pumping solutions were examined. In-lake solutions were quickly eliminated due to problems with air accumulation and venting, air/vacuum release valve locations and access for maintenance, and alignment/grade difficulties. The around-the-lake option was found to be feasible and reliable. However, this solution involves more public disruption during construction and requires approval for siting new pump stations along the alignment. The map below shows the improvements required for the around-the-lake pumping and conveyance alternative.
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