LSL ADVISORY COMMITTEE
PROPOSED ENGINEERING PEER REVIEW SCOPE
October 22, 2014 version

Background

Public Water Supply District No. 2 (PWSD2) provides sanitary sewer services to the City of Lake St. Louis and surrounding communities. The City of Lake St. Louis, (the City) is a community situated around two lakes – Lake St. Louis (the "big" lake) and Lake St. Louise (the "small" lake) – in western St. Charles County, Missouri.

The sanitary sewer collection system serving the City consists of a network of collection subsystems that junction at trunk lines flowing to 1 of 4 existing master lift stations that pump to the neighboring sewer system of nearby City of O'Fallon, Missouri, or flow by gravity under the lakes to an interconnect with the City of O'Fallon, Missouri, sanitary sewer system. There are approximately eight miles of gravity sewer underneath the lakes. This pipe ranges in diameter from 8 to 27 inches and was installed in the 1960's. Generally speaking, approximately half of the sanitary sewage generated by the District's customers in the City flows under Lake St. Louis and Lake St. Louise.

An engineering firm was retained in 2011 to conduct an Emergency Response Plan Report should there be an under-lake sewer block or leak. The engineer also provided a subsequent document covering conceptual alternatives for assessing, improving or replacing the portions of the sanitary sewer system to reduce the potential risk should an unfavorable event occur.

Five possible options were considered in the conceptual report:

Option 1 – Maintain existing subaqueous sewers with some modifications
Option 2 – Renewal of existing subaqueous system, e.g. CIPP (e.g. Re-line exiting pipes)
Option 3 – Installation of 30 shoreline Lift Stations/Force Mains (including abandonment of the gravity sewers under the lakes)
Option 4 – New Gravity Flow System
Option 5 – Some hybrid of the above options

The initial recommendation from the engineering firm (described in *Lake St. Louis Subaqueous Conceptual Improvement Plan*, filename: LSL Subaqueous Alternates Report FINAL 20120709.pdf, dated 7/9/2012, by Gonzalez Companies, LLC and referred to as the "Conceptual Study") recommended *Option 3 – Lift Stations and Force Mains,* which would require the installation and maintenance of 30 lift stations (20 on private, lakefront residential backyards). Initial response from the Lake Saint Louis community and others have expressed significant concerns with the Lift Station option, resulting in this request for peer review/re-evaluation by an engineering firm (ENGINEER) of the original conceptual analysis and recommendations. The following describes the list of services sought.

Scope of Services

Task 1: ***Review all reports and analyses done to date regarding LSL Sewer upgrades.***

These documents include:

1. 10-257 Report FINAL 20111213.pdf
2. 13-211 LSLSIP ER_FullFinal_20140627.pdf
3. LSL Emergency Response Plan Contract with Scope.pdf
4. LSL Sewer Improvement Plan Contract with Scope.pdf
5. LSL Subaqueous Alternates Report FINAL 20120709.pdf
6. LSL Subaqueous Trunkline Alternatives Contract with Scope.pdf
7. https://www.dropbox.com/sh/iio0c1p513ohh0a/AACgX8MS_1Aojd9hY70bFWpua?dl=0 (Various scanned maps and historical documents)

The review should focus on information relevant to Tasks 2 to 8 described below.

Task 2: ***Determine necessity, feasibility, key requirements and cost of performing a Closed Circuit TV (CCTV) inspection of the big and small lakes' sewer pipes in multiple alternatives, with associated costs for each. This should include considering other technologies including laser profiling, sonar, electro-scanning, acoustic leak detection, and divers if appropriate. The primary goals of the inspection are to a) collect data to accurately and comprehensively assess the 5 alternative options, and b) determine the potential (if any) of imminent failure, and if possible estimate the remaining life of the system.***

To date, all 5 options have been considered with little technical assessment of the current condition (pipe material, age, location, access points) of both lake's sewage access, collection, and transportation capabilities. Alternative inspection approaches to collect more information for more comprehensively assessing those and other options should include, but may not be limited to, the following:

- Inspect (by CCTV or other means) laterals lines only,
- Inspect (by CCTV or other means) laterals lines plus main trunk lines without installation of additional access points and are of "low risk," or
- Inspect (by CCTV or other means) full system including all laterals and main trunks with installation of additional access points, as needed.

All inspections should include "mapping" for exact location and depth and access points in place, of the lines inspected using locating GPS or other suitable technology.

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For the following tasks 3-7, the ENGINEER will provide an independent assessment for each of the 5 options along the following revised evaluation parameters:

Option Evaluation Parameters List

- Capital costs ($ range) – *Addressed in Conceptual Study*
- Risk of failure (within 10 years) – *Included in Conceptual Study*
- Feasibility, complexity and timeline of implementation – *Addressed in Conceptual Study*
- Operating and maintenance costs of installed option ($ range) – *Partially addressed in Conceptual Study*. Should include fully loaded worker costs and appropriate inflation estimates over full life of the option
- Repair/Maintenance requirements (complexity, access, frequency of repair, access frequency and intrusiveness of ongoing, onsite maintenance) – *Partially addressed in Conceptual Study*
- Health and Safety Impacts (residents, pets, native fauna and workers)
- Aesthetics Impact, e.g. visual, odor, noise (suggested scale: high, medium, low)
- Estimated impact on residential and community property values
- Risk assessment as related to all activities, including installation, operation/maintenance, and environmental/personal safety of completed system
- Storm Impact, Power outage vulnerability
- Cost of decommissioning existing systems if replaced by an alternative
- Total Cost of ownership over 20 years
- Expected life of system.

Any additional perspectives on each option should be included, particularly other recent examples of complete municipality sewer system decommission and replacement and their similarity and relevance to the LSL options.

In addition to re-evaluating each option, additional considerations and parameters should be included in the re-assessment of each option, described below in Tasks 3-7.

Task 3: ***Re-evaluate Option 1 (Maintain Existing) to include the following dimensions/parameters:***

- Entire Option Evaluation Parameter List, with particular emphasis on: cost of modifications recommended; cost to maintain system; capacity to handle future sewage and runoff; adequacy of access points; and overall risk assessment
- Adequacy of current Emergency Response Plan.

Task 4: ***Re-evaluate Option 2 (Renewal Engineering, e.g. CIPP) to include the following dimensions/parameters:***

- Entire Option Evaluation Parameter List, with particular emphasis on: capital and operating costs; number of access points required; bypass requirements; and overall risk assessment
- Viability of other, similar technology options to CIPP (e.g. Pipe bursting, slipline, others).

Task 5: ***Re-evaluate Option 3 (Lift Stations/Force Mains) to include the following dimensions/parameters:***

- Entire Option Evaluation Parameter List, with particular emphasis on: data and assumptions that went into determining operating and maintenance costs; capital costs; maintenance frequency (e.g. onsite intrusions); expected life of system; and overall risk assessment
- Extend conceptual analysis to include the following:
    - Aesthetics (footprint and visual, noise, odor)
    - Safety/Health (resident, pets, fauna and worker)
    - Potential environmental impact
    - Physical access (access roads, fencing, locks, vandalism)
    - Venting requirements (above/below grade)
    - Estimated impact on property values
    - Major disaster and disaster recovery scenarios (e.g. flooding, power outage)
- Identify alternatives to 30 lift station approach, particularly those that minimize or eliminate lift stations on private properties
- Feasibility of fewer, but larger, lift stations
- Identify detailed alternatives to minimize the following: footprint and associated installation; operating and maintenance requirements; and aesthetic issues (odor, noise, health and visual issues).

Task 6: ***Re-evaluate Option 4 (New Gravity Flow System) to include the following dimensions/parameters:***

- Entire Option Evaluation Parameter List, with particular emphasis on: cost; construction time; likely disruptions; overall feasibility; and overall risk assessment. Re-evaluation should consider parallel replacement after a lake draining event (planned or unplanned) to address cost and timing with then improved access.

Task 7: ***Re-evaluate Option 5 (Hybrids) to specifically address the following hybrids:***

- Entire Option Evaluation Parameter List
- Potential for different solutions for the big and small lakes (Lake St. Louis, Lake St. Louise respectively)
- Feasibility of grinder pumps/closed low pressure system (e.g. all owners contributing small operating capacity)
- Identify and provide detail for other high potential hybrid combinations and configurations of above options

Task 8: ***Re-evaluate decision matrix for comparing potential options***

Task 8.1 - This effort includes assessing the adequacy of the existing decision matrix scheme used in the Conceptual Study. This matrix included 5 major parameters (capital cost, risk, feasibility, operations and maintenance, ability to repair). The ENGINEER should extend this matrix to identify and include additional parameters that should be included, such as the

additional evaluation parameters identified earlier (e.g. health and safety, aesthetics, environmental impact, physical access and other requirements, vulnerability, frequency of repair, impact on property values, etc.) and any others deemed relevant and applicable.

Task 8.2 - The ENGINEER will also recommend a scheme for appropriately prioritizing/weighting the existing and additional parameters. The current decision matrix uses five parameters and assumes all are of equal weight. The ENGINEER will determine if an alternative prioritization/weighting formula should be utilized.

Assumptions and Clarifications

Assumption 1: The big lake and the small lake can have different solutions.
Assumption 2: A CCTV analysis or other assessment may not be completed in time for this peer review.

Deliverables (Calendar Days-Estimated)

Deliverable 1: Midpoint Status Report	(45)
Deliverable 2: 90% Review	(90)
Deliverable 3: Final Report.	(120)