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LAKE ST. LOUIS SEWER IMPROVEMENT PROGRAM

PEER REVIEW MID-POINT REPORT

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AGENDA

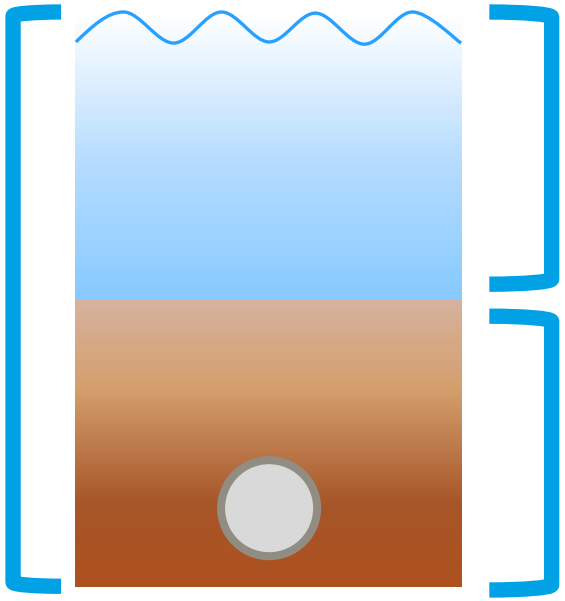
History and Timeline
Peer Review Scope of Work
Evaluation of SIP Reports
Sewer Inspection Feasibility
Re-Evaluation of Alternatives
Selection Criteria Matrix

HISTORY – SEWER IMPROVEMENT PROGRAM

WHY?

- 36,000 LF of 8- to 24-inch Subaqueous Sewers
- Built pre-1969…46+ years
- No Intermediate Access
- PWSD2 Concerns:
  - Challenging to Inspect, Maintain and Repair
  - Addressing Major or Minor Condition Defects or Collapse

Total Depth Varies
LSL – Up to 30 feet
LSLe – Up to 45 feet

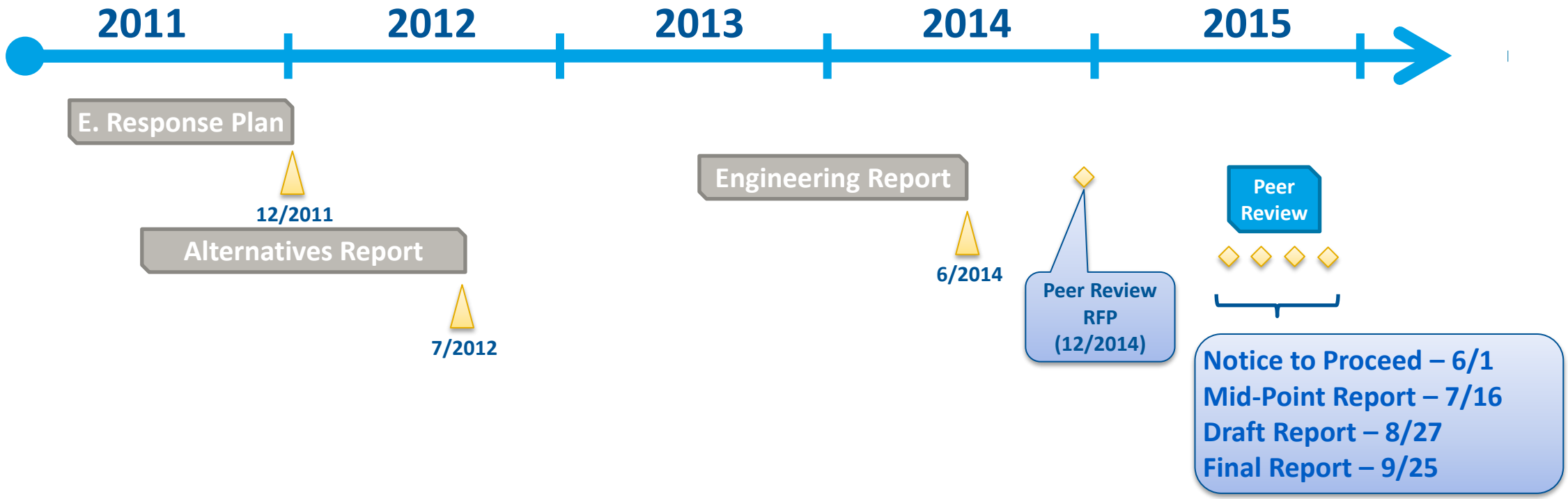


Lake Depth Varies*
LSL – Up to 20 feet
LSLe – Up to 40 feet

Soil Depth Varies*
LSL – Up to 12 feet
LSLe – ?

*Based on As-Built Dwgs
*Sediment Depth Unknown

TIME LINE



- No Construction in 2015

PEER REVIEW – SCOPE OF WORK

- Review Reports
- Evaluate Sewer Inspection Feasibility
- Re-Evaluate Ex. Alternatives
- Develop/Evaluate Six New Alternatives
- Develop New Decision Methodology

MID-POINT REVIEW

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EVALUATION OF SIP REPORTS

Emergency Response Plan

- Provided Several Suggestions to Enhance the Plan
- No Technical Flaws

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EVALUATION OF SIP REPORTS

Alternatives Report

- Present Worth Analysis
  - Omitted OM&R Cost for 3 of 5 Alternatives
  - Only Evaluated the Costs of 20 years of OM&R
- Design Flow Development
  - Design Flowrate Reduced from ERP
  - Missouri DNR Requires Flow Development based on Actual Flows **– THIS WAS DONE IN ENGINEERING REPORT.**

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EVALUATION OF SIP REPORTS

Alternatives Report

- Level of Service
- Decision Matrix
  - Focused on Important Parameters for the Utility
  - Omitted Unidentified Community Parameters

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EVALUATION OF SIP REPORTS

Engineering Report

- Computer-based Hydraulic Model of Sewer System
  - Calibrated to In-Sewer Flow Meters (satisfies MO Regs)
- Capital Cost Increased from $22M to $33M
  - 40% More Capacity across 30 Stations
  - Rock Excavation
  - Vortex Drop Shafts
  - 4 Additional Generators

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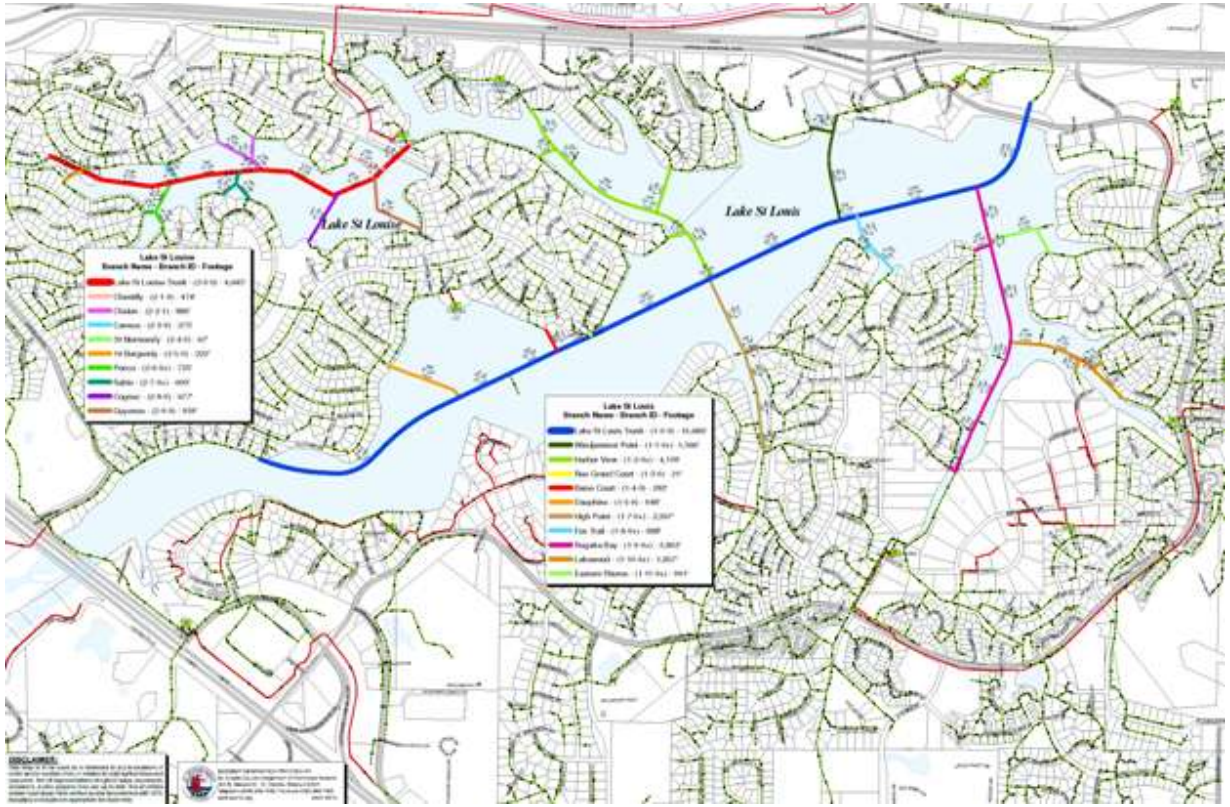
SEWER INSPECTION FEASIBILITY

Subaqueous Trunk Sewers

- **Lake St. Louis**
  - 3,000 feet – 12-inch
  - 3,364 feet – 16-inch
  - 2,655 feet – 18-inch
  - 4,642 feet – 24-inch
- **Lake St. Louise**
  - 4,645 feet – 8-inch



- **Additional Length of 8-inch & 10-inch Collectors/Laterals**

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REVIEW OF INSPECTION TECHNOLOGIES

- **Pipe Wall Condition Assessment**
  - Pure Technologies
  - Pipeline Inspection & Condition Analysis Corporation (PICA)
- **Closed Circuit Television (CCTV)**
  - Doetsch Environmental
  - Hibbard Inshore
  - Interactive Pipeline Inspection (IPI)
  - RedZone Robotics

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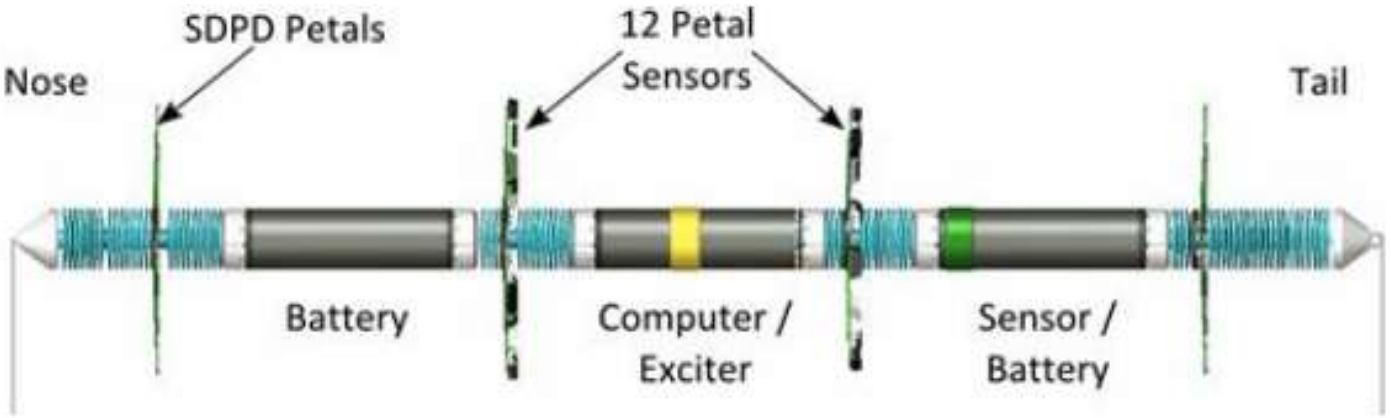
SEWER INSPECTION FEASIBILITY

Pipe Wall Assessment

- **Pure Technologies**
  - Electromagnetic Tethered Tool – Pulled Through the Trunk Pipe



- **Pipeline Inspection and Condition Analysis (PICA)**
  - Remote Field Eddy Current Tool – Pulled Through the Trunk Pipe

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SEWER INSPECTION FEASIBILITY

CCTV

- **Phased Approach Begin With Inspection**
  - Crawler for 12” and Smaller Diameter
  - Floating or Crawler for 16” and Larger Diameter
- **Results Determines Need for Cleaning or Not**
- **Limited by Access and Length of Cable**

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SEWER INSPECTION FEASIBILITY

External Inspection

- Excavation Required
- Not Directly Related to Conditions Under the Lake
- Provide Data on Corrosion Potential of Soils
- Conduct Non-destructive Testing on Pipe to Determine Wall Thickness
- Tap Pipe/Collect Coupon for Analysis

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SEWER INSPECTION FEASIBILITY

Conclusions

- Inspection is Feasible; Limited by Access/Length of Cable
- Inspection Can Start Prior to Cleaning
- CCTV Inspection will Provide Information to Determine if Extent of Cleaning
- External Inspection will Provide Data on Condition of Pipe

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ALTERNATIVE RE-EVALUATION

Existing Alternatives

- Alternative 1 – Maintain Existing Subaqueous Sewers
- Alternative 2 – Rehabilitate Existing Subaqueous Sewers
- Alternative 3 – Lift Stations and Force Mains
- Alternative 4 – Reroute Gravity Sewers
- Alternative 5 – Hybrid (Big Lake: Lift Stations and Small Lake: Rehabilitate Sewers)

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ALTERNATIVE RE-EVALUATION

New Alternatives

- Alternative 6 – Lift Stations (Minimize Stations on Private Property)
- Alternative 7 – Lift Stations (Fewer, but Larger PSs)
- Alternative 8 – Parallel Replacement of Existing Sewers (Drained Lake)
- Alternative 9 – Add Access and Rehab Existing Sewers (Drained Lake)
- Alternative 10 – Parallel Replacement (Subaqueous Installation)
- Alternative 11 – Individual Grinder Pumps and Low Pressure Force Mains

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PEER REVIEW
LAKE ST. LOUIS
SEWER IMPROVEMENT PROGRAM

SELECTION CRITERIA MATRIX

TABLE 1 Draft Selection Criteria Matrix		ALT 1 Use Existing Sewers	ALT 2 Rehab Existing Sewers	ALT 3 New Lift Stations and Force Mains	ALT 4 New Gravity Sewers, Tunneled	ALT 5 Hybrid - ALT 3 Big Lake / Alt 2 Small Lake	ALT 6 Lift Stations (Min Stations on Priv. Prop.)
Alternatives Report	Capital Cost:	$3,655,000	$35,400,000	$21,920,000	$75,000,000	$36,207,000	
	OM&R PW Cost:			$6,676,000		$5,386,000	
	Total PW Cost:	$3,655,000	$35,400,000	$28,596,000	$75,000,000	$41,593,000	
Engineering Report	Capital Cost:			$32,615,911			
	OM&R PW Cost:			n/a			
	Total PW Cost:			n/a			
Peer Review	Capital Cost:	TBD	TBD	TBD	TBD	TBD	TBD
	OM&R PW Cost:	TBD	TBD	TBD	TBD	TBD	TBD
	Total PW Cost:	TBD	TBD	TBD	TBD	TBD	TBD

Selection Criteria	Weight Factor	Rating	Score	Rating	Score	Rating	Score	Rating	Score	Rating	Score	Rating	Score
Capital Cost	25%	9	2.25	5	1.25	10	2.50	1	0.25	4	1.00	0	0.00
OM&R Cost	10%	1	0.10	9	0.90	3	0.30	10	1.00	5	0.50	0	0.00
Property Value Impact	10%	1	0.10	10	1.00	3	0.30	7	0.70	5	0.50	0	0.00
Level of Service Upgrade	5%	1	0.05	3	0.15	9	0.45	10	0.50	6	0.30	0	0.00
O&M - H&Safety/Accessibility	4%	1	0.04	3	0.12	10	0.40	7	0.28	5	0.20	0	0.00
O&M - Frequency	4%	7	0.28	7	0.28	3	0.12	10	0.40	5	0.20	0	0.00
O&M - Complexity	4%	1	0.04	3	0.12	10	0.40	3	0.12	5	0.20	0	0.00
Pub. Impact - Aesthetics/Odor	4%	3	0.12	10	0.40	3	0.12	5	0.20	5	0.20	0	0.00
Pub. Impact - Disruption d. Con.	4%	7	0.28	10	0.40	3	0.12	5	0.20	5	0.20	0	0.00
Pub. Impact - H&Safety	4%	1	0.04	10	0.40	3	0.12	5	0.20	5	0.20	0	0.00
Ind. Property Owner Impact	6%	9	0.54	9	0.54	1	0.06	2	0.12	5	0.30	0	0.00
Constructability/Risk	6%	1	0.06	3	0.18	10	0.60	1	0.06	6	0.36	0	0.00
Risk of Op Failure	7%	1	0.07	7	0.49	3	0.21	10	0.70	5	0.35	0	0.00
Consequence of Op Failure	7%	1	0.07	3	0.21	10	0.70	3	0.21	5	0.35	0	0.00
TOTAL SCORE:	**100%**	**4.0**		**6.4**		**6.4**		**4.9**		**4.9**		**0.0**	

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