

# Kline's Island Sewer System (KISS): Act 537 Planning

## *Capacity Problem Definition Proposal*

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Presented to:

Lehigh County Authority

Board of Directors

June 13, 2022

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# Agenda

BRIEF REVIEW OF 537  
TIMELINE TO DATE

DETAILED REVIEW OF  
CURRENT 537 PROPOSAL

DISCUSS WHAT IS NEXT  
WITH 537

# Capacity Problem

Definition:  
Prep work from  
2021 – Present

## Flow Characterization Study

- March – October 2021

## QA/QC of flow data concludes

- December 2021

## KISS Model Preparation/Calibration

- Q1 2021 – June 2022

## KISS Model is “ready”

- July 2022

# Current 537 Proposal:

## *Capacity Problem Definition*

### Introduction:

- “Pre-alternative modeling work”
- “First-stage Preliminary Screening of Alternatives (PSOA)”

### Objectives:

- Select actual rain → design storm stand-in
- Identify SSOs with storms
- Apply various SRP approaches

### Scope of Work:

- Identified via Tasks 1-5
- Detailed on next slides

### Deliverables:

- Combination PowerPoints, Word documents, GIS figures, Excel tables
- Assumes 12 meetings

### Schedule:

- June – September 2022 (if proposal authorized)

### Budget estimate:

- PSA = \$196,000
- CPA = \$236,000

# Task 1:

## *Design Storm Evaluation*

### Using the 2021 KISS system...

- Using current demands
  - Assumes no physical improvements
- Run an extended simulation using 2000-2022 hourly rainfall from ABE NOAA station
  - Tabulate system flows for each rain event
  - Rank and characterize the nature of the rainfall

### From the 2000-2022 Record Period...

- Identify which events are equivalent with the 3-year, 5-year, 10-year, and 20-year recurrence intervals
  - Program Steering Committee will select the 3, 5, 10, and 20 year “stand-in” events for alternatives modeling

### Why is this needed?

- Final proof for selected solution will include rainfall from 2000-2023
  - Running 22-23 years’ worth of rainfall requires enormous computing power
- Selecting the “stand-in” storms → alternative analysis can then occur in a reasonable timeframe

## *Task 2: Existing System Performance*

### Using the four selected “stand-in storms”

- Develop GIS figures and tables → will show overflow locations by size (“blossom diagrams”)
  - Will list locations, durations, volume of SSOs
- 2021 flow conditions and current infrastructure

### Using the four selected “stand-in storms”

- Develop GIS figures and tables → will show overflow locations by size (“blossom diagrams”)
  - Will list locations, durations, volume of SSOs
- 2050 flow conditions and current infrastructure
  - 0.5% I&I creep per year
  - No base foul flow reduction

### Why is this needed?

- Figures and tables generated will define the 537 hydraulic capacity problem definition

# Task 3:

## *Interceptor and Trunkline Dry Day Performance*

### Using the Task 1 data set...

- Two dry day types to evaluate:
  - Typical average dry day (June 1-7, 2021)
  - Dry day flow during wet years (December 1-7, 2018)

### From the prior analyses...

- Each of the 18" and greater pipes:
  - Depth of flow over full pipe (d/D)
  - Depth of surcharge or pressurization
  - Depth below rim for each MH (2021 flow and 2050 demands)

### Why is this needed?

- Provides information on pipes designed for gravity (yet operating under pressure)
- Provides information for setting dry weather operating condition goals

*Task 4:  
KISS Model Specific  
Procedures for  
Modeling Various  
Types of I&I  
Reductions*

Expanding beyond industry standard to...

- Develop KISS specific rules for modeling proposed I&I reductions (via Signatory supplied Source Reduction Plan)
  - RDII analyses → KISS system is highly inflow-impacted
- Need to distinguish between inflow reductions vs. infiltration reductions

Modeling rules for I&I removal via...

- Inflow
  - Through manholes (sheet flow vs. stream flooding) or through cleanouts
- Baseline infiltration
- Rainfall induced infiltration

Why is this needed?

- DEP expects Signatory I&I reduction plans with the Act 537 submission
- Taking “credit” for future I&I work is highly important to the Signatories



# Task 5:

## *Existing System Performance following “common sense” SRPs*

### Using the Task 1 data set...

- Develop the same figures as described in Task 2 + three levels of SRPs:
  - (1) No SRPs
  - (2) Peak inflow sources
  - (3) Sewer rehab
  - (4) 2+3 above

### “Common Sense” SRPs...

- Using historical system knowledge + the RDII analysis + the nighttime weiring analysis:
  - Assumes no municipal boundaries
  - Disregards funding concerns
  - Address the most obvious “low hanging fruit”

### Why is this needed?

- Will define the hydraulic capacity problem definition under various “common-sense” SRPs
- This provides an ideal view of what *could* be done
- Signatory supplied SRPs are due in mid-October 2022 → will be modeled under the next phase of 537 (PSOA)

What are  
the next  
major Act  
537  
activities?

### Preliminary Screening of Alternatives

- October 2022 – February 2023

### Final Alternatives Analyses

- March 2023 – December 2023

### Selection of Solution

- January 2024 – April 2024

### Finalize Act 537 Plan

- May 2024 – August 2024

### Act 537 Municipal Approval Process

- September 2024 – March 2025

# Questions?

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