

An aerial photograph of a wastewater treatment facility, showing several large circular tanks and industrial buildings. The Lehigh River is visible on the right side. A map overlay is present, showing a location pin for 'Lehigh County Authority Wastewater...'.

# Kline's Island Sewer System (KISS)

## Act 537 Plan

### *Review of Preliminary Alternatives Screening*

**Lehigh County Authority Board of Directors**  
**3/27/2023**

# Agenda

Interim Act 537 Plan – Background

Required Projects (Conceptual)

Kline's Island Wastewater Treatment Plant (KIWWTP) Peak Flows

Additional Projects Under Evaluation

Next Steps



# Brief Interim Act 537 Background

# Interim Act 537 Commitments

- **Connection Management (*ongoing*)**
- **Address “Trexlerstown Bottleneck” (*Upper Western Lehigh Pump Station project*)**
- **Sewage billing meter upgrades and data capture (*ongoing*)**
- **Signatory inflow & infiltration source reduction work (*ongoing*)**
- **Flow Characterization Study and KISS hydraulic model calibration (*complete*)**
- **Evaluation of alternatives for the 2026-2050 planning period (*in progress*)**
- **Preparation of long-term Act 537 Plan (*in progress*)**

As would be expected, the precipitation and resulting saturated ground conditions dramatically increased rain derived inflow and infiltration (RDII) and base flow infiltration into the sewers, and flows to the Kline's Island Wastewater Treatment Plant (KIWWTP) increased from the normal 2017 flows of approximately 32 million gallons per day (MGD) to over 40 MGD during periods in 2019. The annual average daily flow for 2019 was 37.64 MGD. During this period, the KIWWTP met all treatment-related permit requirements. However, the KIWWTP permit lists the plant's Hydraulic Design Capacity as 40 MGD, and the flows to the plant exceeded this level for three consecutive months in 2019, triggering Chapter 94 requirements.

This Interim Plan provides detail of the region's corrective action plan related to this hydraulic overload condition, and consists of:

1. A Connection Management Plan developed under the direction of Pennsylvania Department of Environmental Protection (DEP) and to be implemented during the development and adoption of a Long-term Act 537 Plan.
2. A capacity expansion of a two-mile portion of the Western Lehigh Interceptor to eliminate dry-weather overflows.
3. A Sewer Billing Meter upgrade effort to get all significant billing meters performing accurately across the dry- and wet-weather range of flows, allow data capture into a flow monitoring database, and development of baseline flow patterns for ongoing confirmation of meter accuracy between calibration cycles.
4. Source reduction efforts by all Signatories based on previous individual inflow and infiltration (I&I) investigations.
5. A Flow Characterization Study (FCS) based on flow metering and rainfall monitoring conducted in all municipalities' sewer systems to define base flows and RDII impacts and provide data to calibrate an expanded KISS model and support evaluation of alternatives.
6. Identification, development, evaluation, and costing of alternatives to provide conveyance and treatment capacity across the 2026-2050 planning period.
7. Preparation of a Long-term Act 537 Plan.

# DEP Act 537 Expectations

---

This Act 537 Plan:  
Implementation  
Schedule = 2026-2035

Future planning  
needed for projects  
from 2036-2050

# Act 537 Plan Objectives

*(Further discussion required to prioritize goals and develop decision criteria)*

1. Eliminate all overflows through 2035
2. Sequence the work to build only when needed
3. Build non-modular infrastructure to 2050 flow conditions
4. Select the most life-cycle-cost advantageous solution
5. Recognize long-term rehab needs for pipes, pumps, and force mains
6. Minimize the number of independent Signatory projects constructed inside the City
7. Recover wet-season dry-day capacity to protect KIWWTP max hydraulic permit limits
8. Recover base capacity to “free up” allocation
9. Implement projects sequentially to recognize existing issues, future issues as flow increases, and funding realities



# Links to Notable Prior Presentations

2/10/2020 – [KISS System Planning Overview](#)

5/11/2020 – [Interim Act 537 Plan Review](#)

2/22/2021 – [Flow Modeling Authorization Request](#)

9/13/2021 – [Act 537 Planning Update](#)

11/8/2021 – [Diagram of Act 537 Roles & Responsibilities](#)

3/14/2022 – [Act 537 Planning Update](#)

5/9/2022 – [Rainfall Derived I&I Study & Summary of Results](#)

8/8/2022 – [KISS Hydraulic Model Calibration Review](#)

9/12/2022 – [Problem Definition & Alternatives Screening](#)

10/10/2022 – [Preliminary Screening of Alternatives Authorization Request](#)

11/14/2022 – [KIWWTP Wet-Weather Options & BioActiflo Pilot](#)

2/27/2023 – [KISS Overview & Allentown System I&I Program Review](#)



# Major Act 537 Discussion Areas

## KIWWTP

- Peak Wet Weather
- Master Plan

## Regional Conveyance System

- Discussion to follow

## Signatory Conveyance Systems

- Future discussion

## I&I Source Reduction Plans (SRPs)

- 1:1 meetings needed with Signatories

## PTP Master Plan

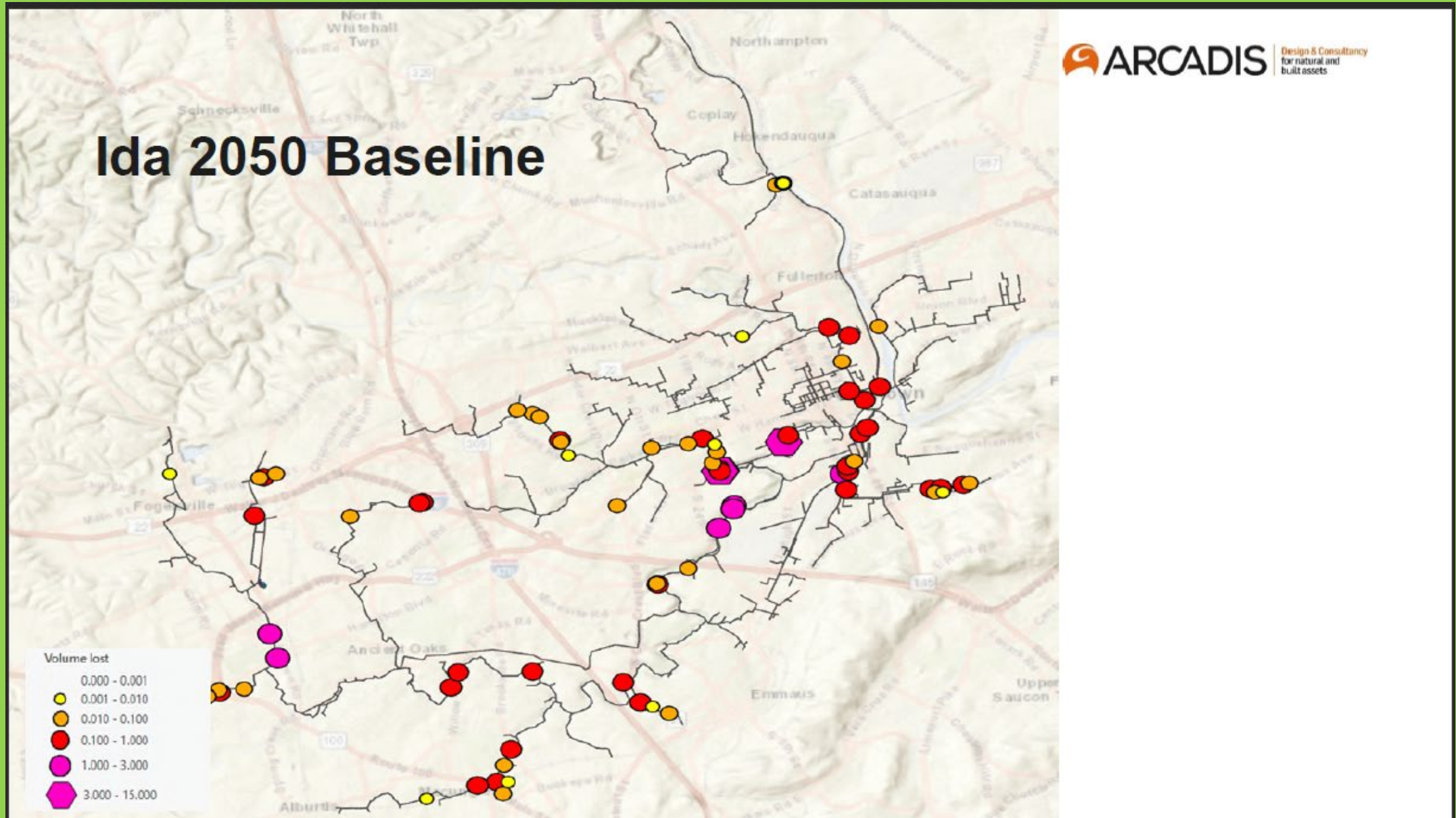
- Prepared by Jacobs





# Required Projects *(Conceptual)*

# 2050 Overflow “Blossom” Diagram (5-year design storm)



# Preliminary Screening of Alternatives Results:

## *Required Projects*

### KIWWTP

- MUST DO:
  - Master Plan related work to upgrade aging systems
  - 87 to 100 MGD peak flow upgrade
  - 100 to 120 MGD peak flow upgrade
- POTENTIAL PROJECTS:
  - New Main KIWWTP Pump Station

### KISS Conveyance

- MUST DO:
  - Little Lehigh Interceptor (LLI) upgrade (several gravity and/or pumping options)
- POTENTIAL PROJECTS:
  - New Pump Station
  - Parallel sections of Allentown-Emmaus Interceptor

### LCA / Western Lehigh Conveyance

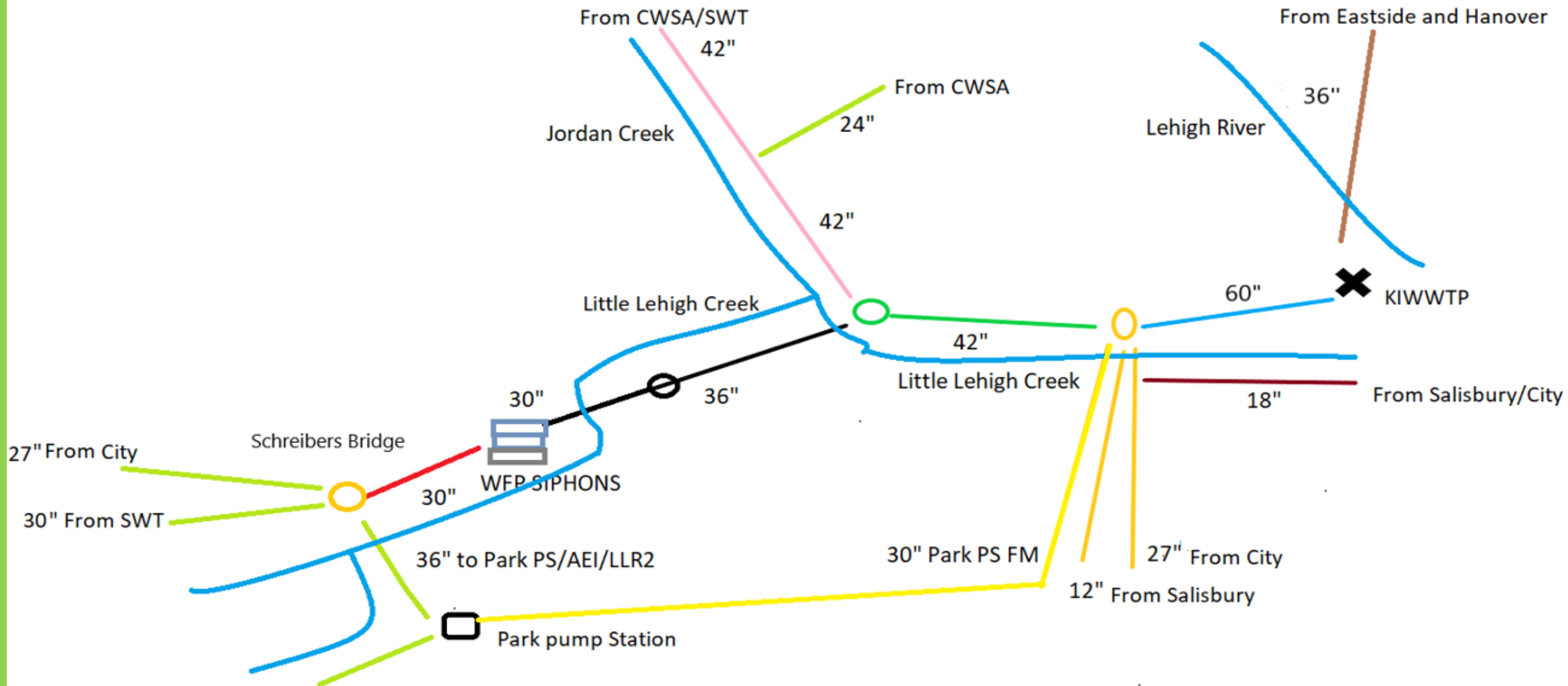
- MUST DO:
  - Western Lehigh Interceptor (WLI) upgrade (several gravity and/or pumping options, including PTP force main option)
- POTENTIAL PROJECTS:
  - Breinigsville Trunkline parallel
  - Alburtis-Macungie Trunkline parallel

### I&I Source Reduction Plans (SRPs)

- MUST DO:
  - Inflow removal via manhole inspections & sealing projects → to remove peak flows
  - Infiltration removal (various methods) → to remove wet-weather
- POTENTIAL PROJECTS:
  - Infiltration removal to recover dry-day capacity → to remove extraneous baseline flow

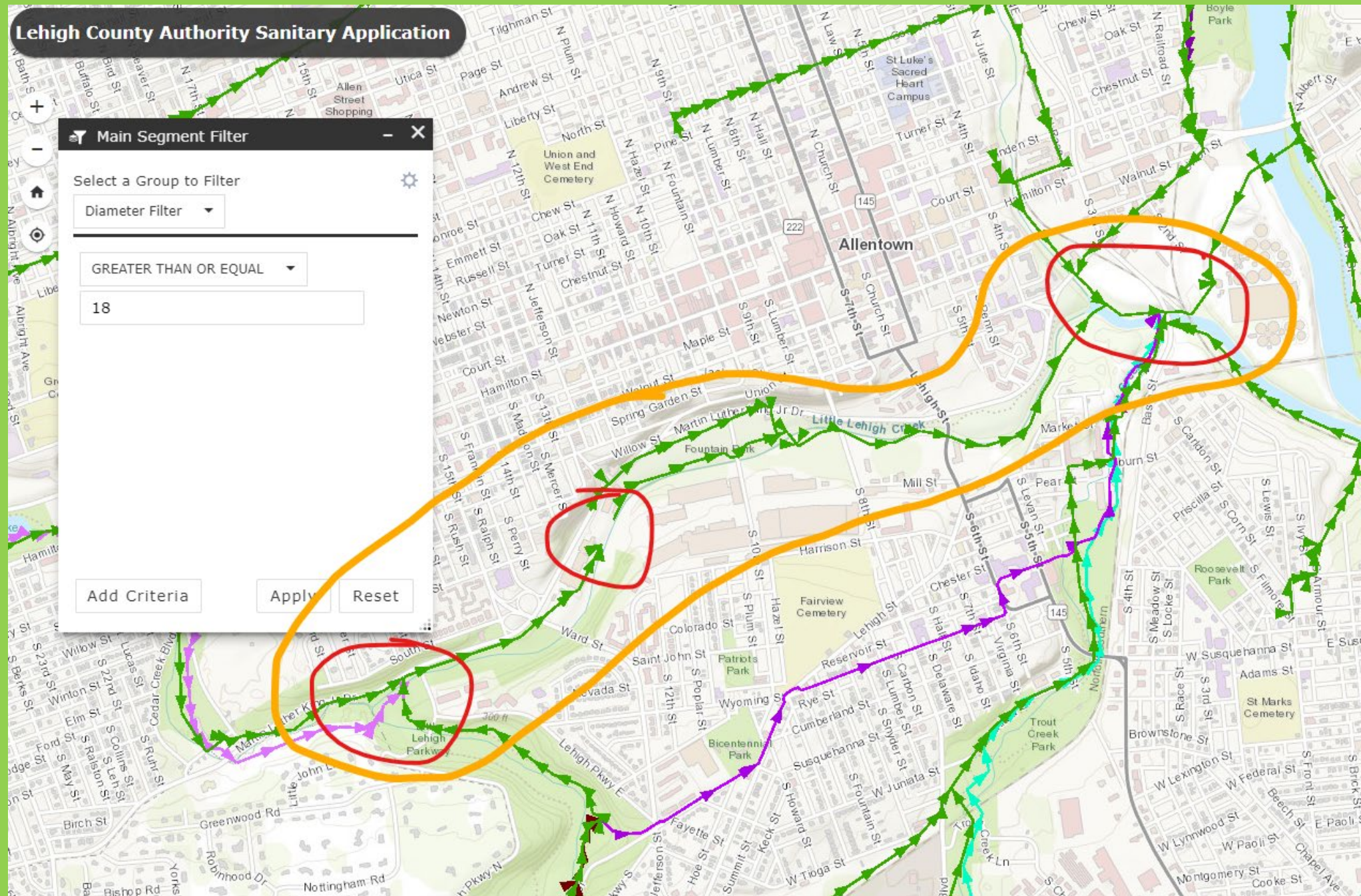


# Piping Schematic – Upstream of Kline's Island WWTP



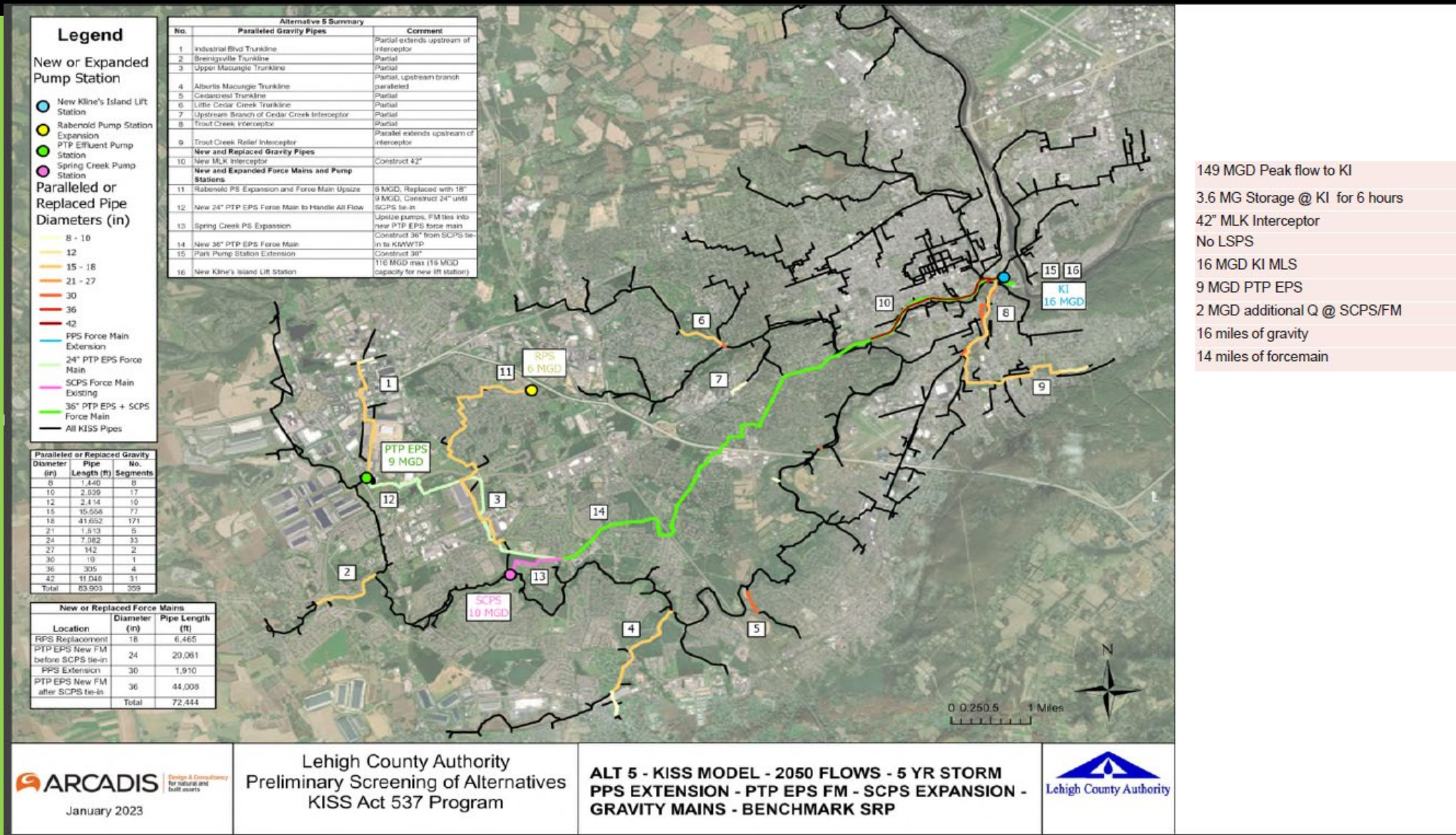
**NOTE: NOT TO SCALE; FOR ILLUSTRATIVE PURPOSES ONLY**

# Little Lehigh Interceptor (MLK Jr. Drive)



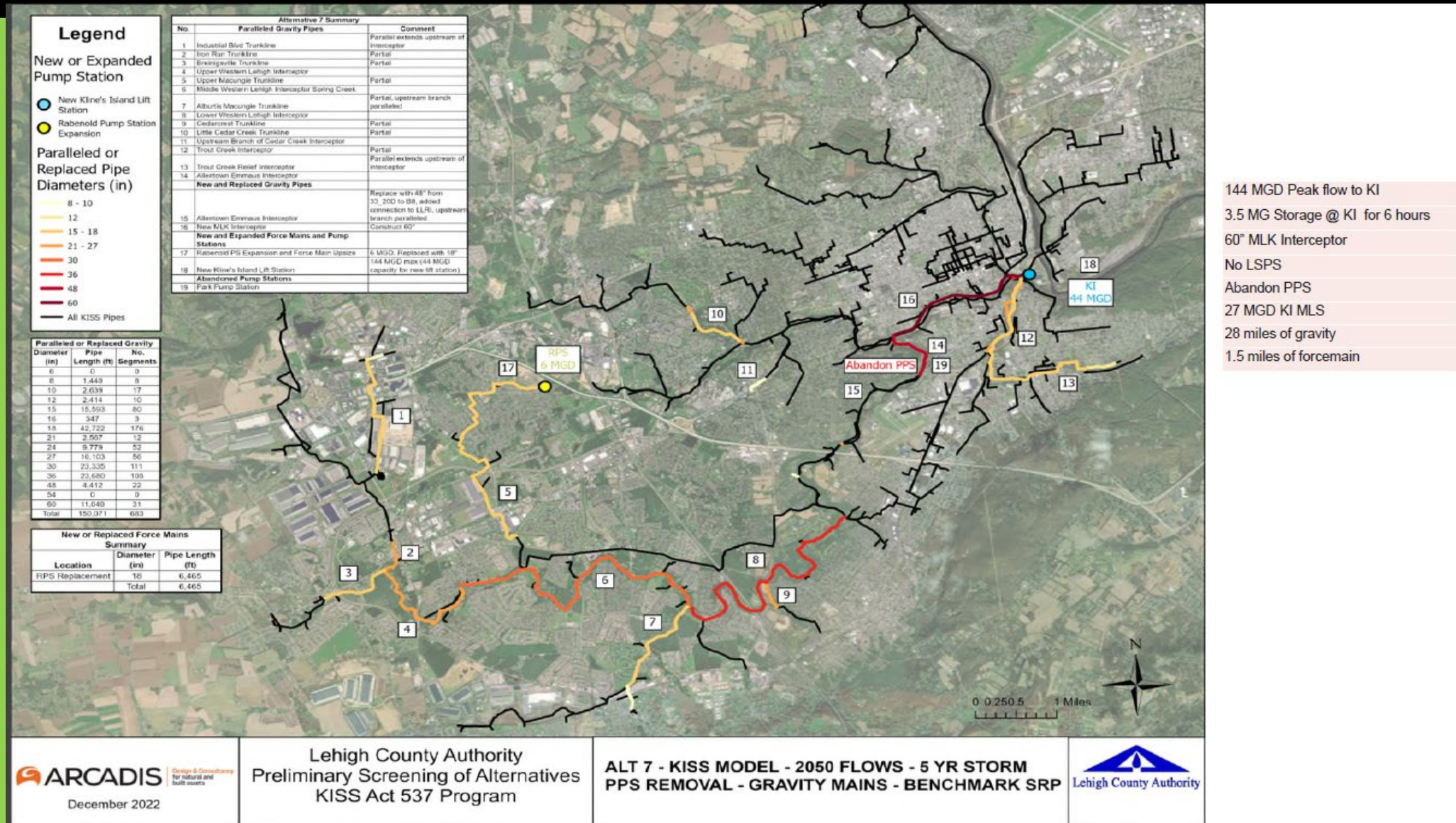


# Preliminary Alternative #5 (will move on to Final Alternatives Analysis)





# Preliminary Alternative #7 (will move on to Final Alternatives Analysis)






# KIWWTP Peak Wet Weather Projects



# *Preliminary* KIWWTP Wet-Weather Improvements

Phase 1 – Increase  
KIWWTP capacity  
from 87 to 100  
MGD

Phase 2 – Increase  
KIWWTP capacity  
from 100 to 120  
MGD





# Phase 1:

## 87 to 100 MGD

*Master Plan driven projects (replacement of aging equipment & pumps)*

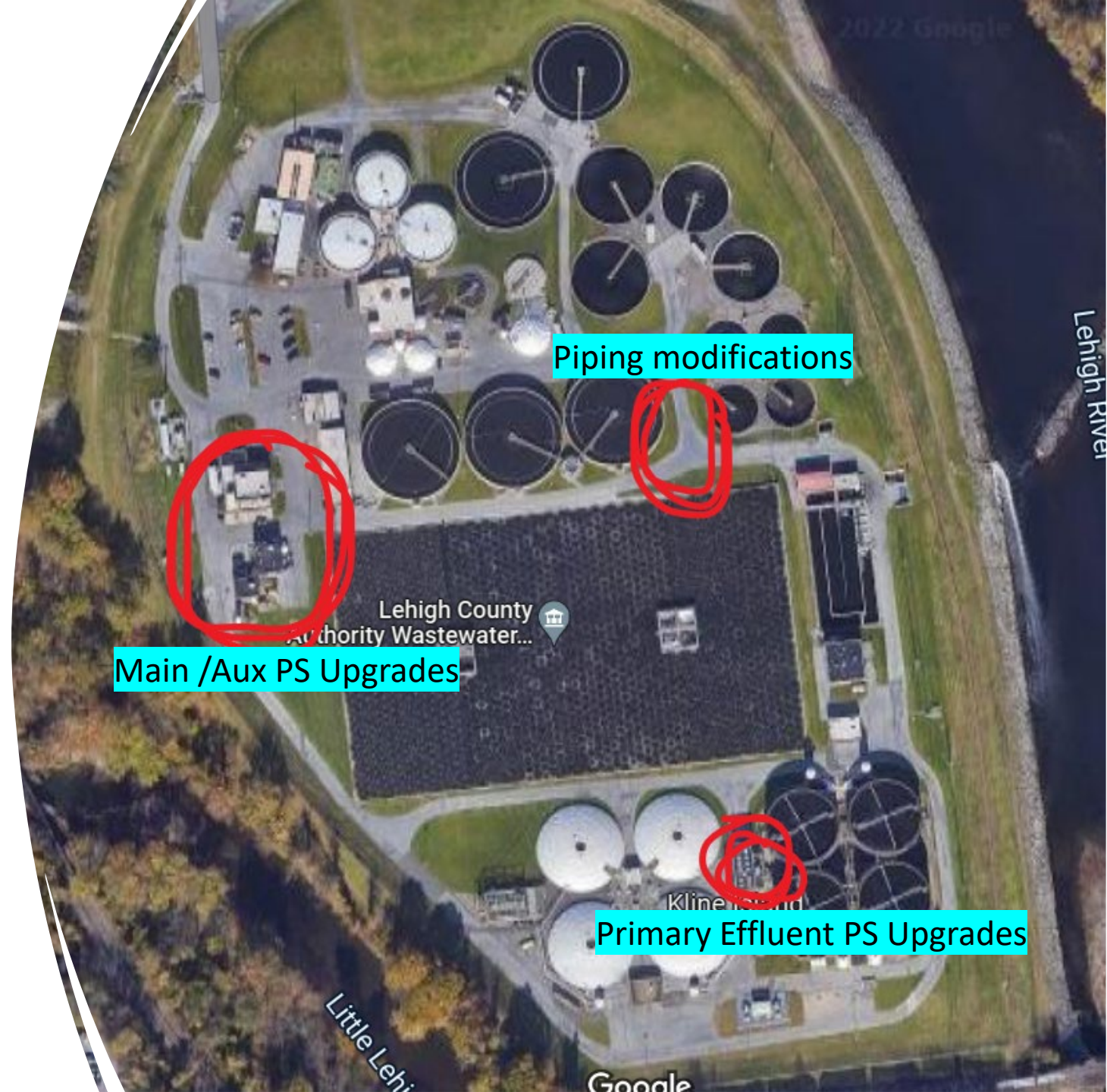
### What is needed?

- Increase influent pumping capacity → 100 MGD
- Increase the capacity of the primary clarifier effluent pumps → 100 MGD
- Construct piping and valving → route 50 MGD from the Plastic Media Trickling Filters to the Final Clarifiers (also needed for Phase 2)

# Phase 1:

## Three main areas of construction

---



# Phase 2: 100 to 120 MGD

*Parallel biological  
treatment mode (EQ OR  
High-Rate treatment  
also being evaluated)*

## Key Features & Considerations:

- Park Pump Station (capacity of 20 MGD) currently pumps to City interceptor approximately 1,000 feet upstream of KIWWTP
- Extending force main an additional 1,000 feet to KIWWTP will increase regional conveyance capacity to 120 MGD
- Phase 1 improvements (87-100 MGD) cannot be extended to 120 MGD
- “Parallel” operation to treat 100-120 MGD is acceptable to DEP



# Phase 2: 100 to 120 MGD

*Parallel biological treatment mode (EQ OR High-Rate treatment also being evaluated)*

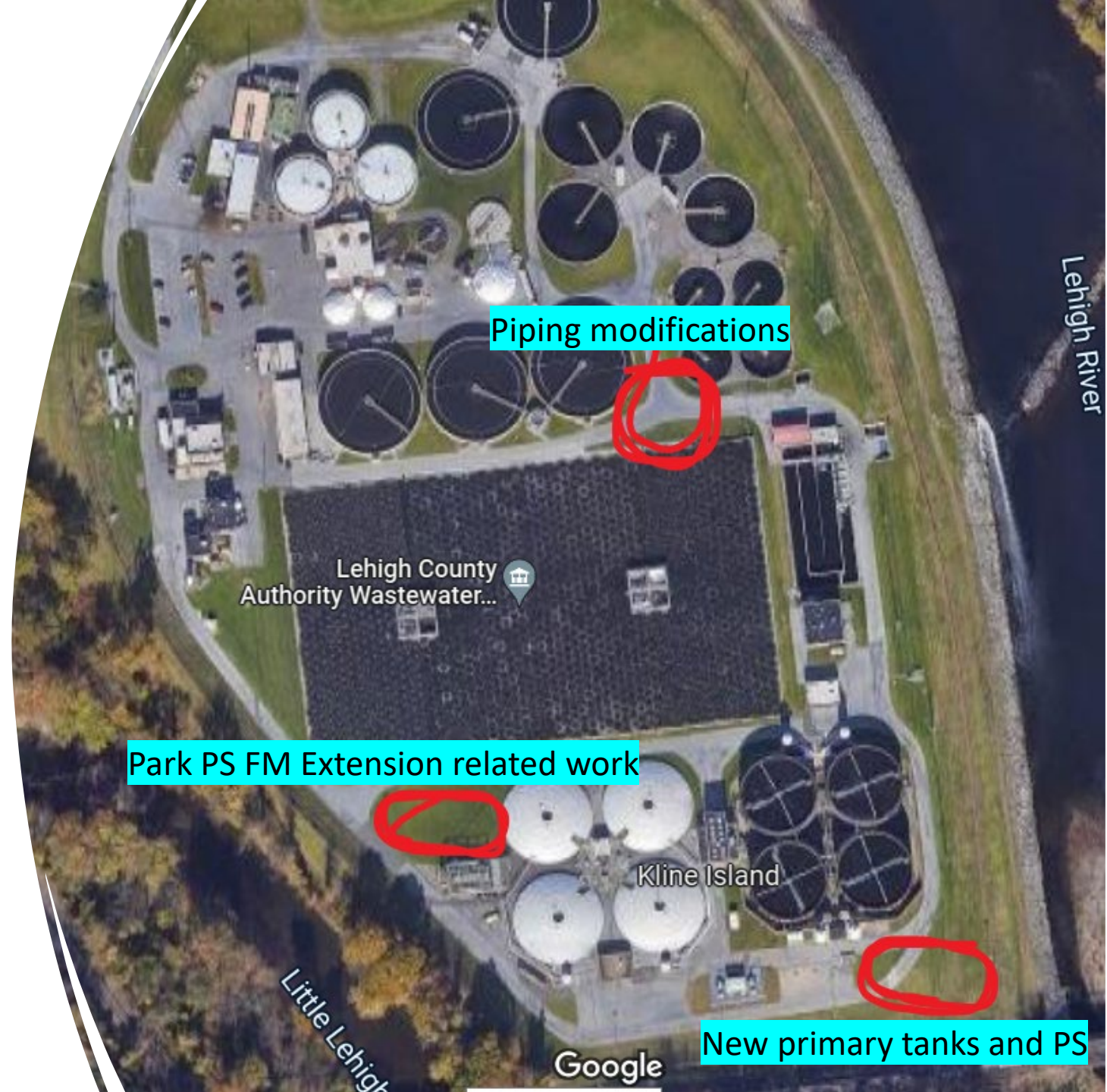
## What is needed?

- Park Pump Station Force Main extension
  - *New screening system for the 20 MGD of flow from the extension*
  - *One additional aerated grit chamber*
- Two supplemental primary settling tanks
  - *20 MGD supplemental primary effluent pumping station (no solids removal)*
- Increase capacity of effluent pumping system to 120 MGD
- Additional piping and valving modifications

# Phase 2:

## Three main areas of construction

---



# Status of Phase 1 & Phase 2 KIWWTP Wet-Weather Improvements

---

## Pa. Department of Environmental Protection

- Review in June, August, and November 2022
- Comfortable Phase 1 and Phase 2 can be permitted

## Delaware River Basin Commission

- Review in October 2022
- Comfortable Phase 1 and Phase 2 will meet definition of “no substantial alteration”

## Design & Construction

- Preliminary design for Phase 1 under way
- Phase 1 to be constructed by ~2026
- Phase 2 to be included in KISS Act 537 Plan for design & construction by ~2029
- More detailed project review, including cost estimates, to be presented at future LCA meetings



Additional Project  
Concepts  
*(to be evaluated in Final  
Alternatives Analysis)*

# Impacts of I&I Source Reduction Work

Peak flows to KIWWTP > 120 MGD

Sizing of regional conveyance system upgrades (i.e. Little Lehigh & Western Lehigh interceptors and pump stations)

Ability to stay under KIWWTP hydraulic capacity limit during prolonged periods of wet weather (such as 2018-2019)

Ability to recapture dry-day capacity to support economic development

Identification of additional problem areas within signatory conveyance systems

# Potential Additional Projects / Problem Areas

## KIWWTP

- > 120 MGD peak flow upgrade
- Sizing of potential new main pump station

## Regional Conveyance

- Trout Creek Interceptor
- Spring Creek Pump Station

## Signatory Conveyance

- Trout Creek Relief Interceptor
- Lehigh Interceptor
- Little Cedar Creek Interceptor
- Hamilton Boulevard area
- Cedar Crest Trunkline
- Industrial Boulevard Trunkline
- Rabenold Pump Station

NOTE: Not all areas above will be problematic (i.e. only certain portions of the interceptors)



# Major Non-Technical Items to Address in Final Alternatives Analysis

Affordability

Cost Sharing

Timing

Resources / Implementation

# What's Next?

Individual meetings with Signatories (April 2023)

Final Alternatives Analysis Authorization Request (April 2023)

Program Manager Re-authorization Request (May 2023)

KISS/DEP Meeting (early May 2023)

Selection of Solution (Q1 2024)

Submit 537 to Planning Commissions (September 2024)



Questions?