Kline's Island Sewer System
SERVING LEHIGH COUNTY

# KLINE'S ISLAND SEWER SYSTEM

## Regional Act 537 Plan

SUBMITTED TO:

**PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION**

SUBMITTED BY:

**KLINE'S ISLAND SEWER SYSTEM MUNICIPALITIES**

April 16, 2025

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**EXHIBIT LIST**

**ACRONYMS/ABBREVIATIONS LIST**

AEI – Alburtis Emmaus Interceptor
AGC – Aerated Grit Chambers
AO – Administrative Order
BI – Baseline Infiltration
BOD – Biochemical Oxygen Demand
CAGR – Compound Annual Growth Rate
CAP – Corrective Action Plan
CBM – Control Basin Method
CCT – Chlorine Contact Tanks
CCTV – Closed Circuit Televise
CEPT – Chemically Enhanced Primary Treatment
CIPP – Cured-in-Place Pipe
CIPPL – Cured-in-Place Pipe Lining
CMP – Connection Management Plan
COA – City of Allentown
CWSA – Coplay-Whitehall Sewer Authority
EDU – Equivalent Dwelling Unit
FAA – Final Alternative Analysis
FCS – Flow Characterization Study
FEB – Flow Equalization Basin
FRCL – Fiber-Reinforced Cured Liner
FRP – Fiberglass Reinforced Plastic
FSA – Final Screening of Alternatives
GCS – Gravity Conveyance System
GPCD – Gallons per Capita per Day
GPD – Gallons per Day
GPM – Gallons per Minute
HDPE – High Density Polyethylene
I&I – Inflow & Infiltration
IMA – Intermunicipal Agreement
IPS – Intermediate Pump Station
IST – Intermediate Settling Tanks
JCI – Jordan Creek Interceptor
KCE – Keystone Consulting Engineers
KISS – Kline's Island Sewer System
KIWWTP – Kline's Island Wastewater Treatment Plant
KGAL – 1000 Gallons
KRI – KISS Relief Interceptor
LACO – Lateral Coupling
LCA – Lehigh County Authority

LF – Linear Feet
LLI – Little Lehigh Interceptor
LLRI – Little Lehigh Relief Interceptor
LTC – Lateral Connection
LVPC – Lehigh Valley Planning Commission
MCC – Motor Control Centers
MGD – Million Gallons per Day
MG/L - Milligrams per Liter
MHI – Median Household Income
MLJ – Main Line Joint
MPS/APS – Main & Auxiliary Pump Stations
NPV – Net Present Value
NRCS – Natural Resource Conversation Service
NTW – Night Time Weiring
O&M – Operations and Maintenance
OLDS – On Lot Disposal System
PADEP – Pennsylvania Department of Environmental Protection
PHMC – Pennsylvania Historical & Museum Commission
PMTF – Plastic Media Trickling Filters
PPD –Pounds per Day
PS – Pump Station
PSOA – Preliminary Screening of Alternatives
PTP – Pretreatment Plant
PTP EPS – Pretreatment Plant Effluent Pump Stations
RDII – Rainfall Derived Inflow & Infiltration
RFMS – Regional Flow Management Strategy
RMTF – Rock Media Trickling Filters
SBM – Sewage Billing Meter
SCARP – Sewer Capacity Assurance and Rehabilitation Program
SOS – Selection of Solution
SPS – Standard Pipe Services
SRP – Source Reduction Plan
SSES – Sanitary Sewer Evaluation Studies
SSO – Sanitary Sewer Outflow
SWT – South Whitehall Township
TSS – Total Suspended Solids
UMTL – Upper Macungie Trunk Line
USEPA – United States Environmental Protection Agency
VCP – Vitrified Clay Pipe
VFD – Variable Frequency Drives
WLI – Western Lehigh Interceptor

WLSP – Western Lehigh Sewerage Partnership
WMS – Water Model Scenario

###

## EXECUTIVE SUMMARY

This Regional Act 537 Plan is the culmination of a multi-year effort to characterize the Kline's Island Sewer System (KISS) to better understand how the system reacts to Inflow and Infiltration (I&I) and develop a comprehensive plan to address it. Through extensive flow monitoring and hydraulic modeling, the KISS municipalities now recognize the sources of I&I and have developed robust I&I Source Reduction Plans (SRPs).

The overarching goals of this Regional Act 537 Plan include the following:

- Implement I&I reduction projects to cost effectively reduce both the volume of wastewater needing treatment and the scope of upgrades needed to address peak flows
- Significantly reduce the frequency of Kline's Island Wastewater Treatment Plant (KIWWTP) bypasses at Outfall 003
- Reduce the existing surcharge and future model-predicted surcharge conditions within the core interceptor system
- Eliminate sufficient I&I to avoid unnecessary interceptor expansions outside the core interceptor system
- Minimize environmental and public health risks associated with sanitary sewer overflows during storm events
- Future elimination of the existing Connection Management Plan (CMP)

Current Connection Management Plan (2020-2025):

Through its approval of an Interim Act 537 Plan (Interim Plan), the Pennsylvania Department of Environmental Protection (PADEP) has previously granted the KISS municipalities 4.6 million gallons per day (MGD) of allocation for new connections, managed through a strict Connection Management Plan (CMP) that includes quarterly reporting to PADEP and full sewage planning module implementation for all new connections. Approximately 2.6 MGD remains in the CMP unallocated at the time of this Plan submission. This Act 537 Plan was required by PADEP within the Interim Plan as the mandated Correction Action Plan for the KIWWTP Chapter 94 violation.

Since entering the CMP in 2020, the KISS municipalities have completed a significant number of I&I rehabilitation projects within their systems as detailed in a quarterly report submitted to PADEP earlier in 2025 (at the time of this writing - March 2025 - the anticipated delivery of the 2020-2024 I&I removal data is July or October of 2025). It is expected the current CMP will be increased by a corresponding amount of additional allocation for new connections based on the I&I reductions achieved during this planning period.

NEW Connection Management Plan (2026 forward):

This Plan includes sewage flow projections through the year 2035. Beyond the allocation available in the current CMP as described above, which will carry forward into this new planning period, an additional 3.80 MGD is needed for new connections expected through 2035. Through 2030, it is estimated an additional 1.87 MGD is needed for new connections. With this Plan submission, the KISS municipalities request PADEP approve the full 3.80 MGD be added to the current CMP.

Alternatives Analysis & Plan Overview:

Each municipality has developed an SRP for the specific issues within their collection systems. This Regional Act 537 Plan is based on the following analyses:

- 2021 Flow Characterization Study, which yielded detailed actionable I&I statistics for 87 basins throughout the entire system
- A preliminary analysis of each KISS municipality's I&I rates against the USEPA benchmark of 120/275 gallons per capita per day (GPCD) to the extent practicable

The selected alternatives for this Regional Act 537 Plan do not include any new infrastructure to address surcharged sewers or to increase permitted peak flow treatment capacity at the KIWWTP. The hydraulic analysis, modeling, and alternative evaluations identified all the infrastructure projects that will be needed to address projected flows through 2050. This Plan includes descriptions of those projects as well as a financial plan to implement them. However, as these projects are not anticipated to begin within the next five years, they are not included in the Implementation Schedule. The infrastructure plan can be summarized as follows:

- No infrastructure projects were selected for this Plan
- Upgrade projects previously identified within the KIWWTP's Master Plan are being implemented (Act 537 approval is not required for these projects)
- The master planning exercise for the entire KISS conveyance system through 2050 has been completed; projects were identified and selected, but not included in the Implementation Schedule due to timing considerations

Institutional alternatives were considered and opportunities for regionalization were investigated. The KISS municipalities are engaged in a process to leverage their common knowledge, equipment and expertise in the implementation of their respective SRPs. The selected institutional alternative includes the following:

- The Term Sheet for a new Intermunicipal Agreement (IMA) (to be negotiated) can be found in Appendix 13
- The existing IMAs remain in place and are adequate to fully implement the commitments in this Plan
- Unless a different approach is specifically agreed upon in the future IMA, each municipality remains responsible for their own respective I&I reduction efforts (planning, design, financing, execution, reporting)

The KISS municipalities are committed to implementing their respective SRPs. The Implementation Schedule can be summarized as follows:

- Continued SRP implementation through 2035
- Conduct another Flow Characterization Study in approximately five years from the Plan approval date

The commitments embodied in this Regional Act 537 Plan can be summarized as follows:

1. Flow Characterization Study to be completed in approximately five years from the Plan approval date, which will be used to prepare and submit Act 537 Special Study(s) in support of future projects currently

described in the Plan as "master plan" projects. *[Note: The Plan currently shows the KISS Relief Interceptor project starting in 2032 and the Western Lehigh Relief Interceptor project starting in 2036.]*

2. Negotiation and possible execution of new IMAs that address cost-sharing for current and future projects and operations and maintenance costs, with an emphasis on flow-based billing methodologies to incentivize I&I removal efforts. The new IMAs may also address regional collaboration on I&I projects, and consideration of a regional surcharge program for high-strength dischargers, and other matters outlined in the Term Sheet included in this Plan.

3. Regular reporting of the results of the municipality I&I program(s), which will include a report of projects completed and leakage removed, updated evaluations of the 120/275 GPCD USEPA benchmark for excessive I&I, and an assessment of the cost-effectiveness of the program. It is expected that the program goals will be considered as having been met when this reporting indicates absence of excessive I&I at the KIWWTP consistent with the 120/275 GPCD USEPA benchmark.

4. Continued Connection Management Plan under PADEP's direction, which recognizes the value of captured capacity via I&I source reduction to support new connections to the system. It is expected that this Connection Management Plan will be discontinued prior to 2030 when the remaining commitments listed below have been achieved.

5. Continued source reduction efforts based on the 2021 Flow Characterization Study and any future Sanitary Sewer Evaluation Studies (SSES) work described in each municipality's I&I Source Reduction Plan, which will be used to further prioritize projects during the Plan period.

6. Sewage billing meter program implementation that includes continuous data validation and data capture in a read-only combined portal for municipal access to real-time flow data. The focus of the metering program will be to ensure accurate flow monitoring at the municipal level. See Appendix 12.

7. Completion of the KIWWTP pump replacement and upgrade project, which is currently in design and permitting stages and will increase the plant's capacity to manage peak wet-weather flows. A post-construction evaluation of project performance will be conducted, including a review of treatment plant bypass activations and volume of discharges. Construction completion of this project is expected in 2029.

The KISS Regional Act 537 Plan outlines a strategic, collaborative approach to address wastewater management challenges across participating municipalities. The Plan focuses on mitigating Rainfall Derived Inflow and Infiltration (RDII), optimizing infrastructure performance, and ensuring compliance with regulatory requirements while balancing environmental and economic considerations.

# PLAN SUMMARY

## A. PROPOSED SERVICE AREA AND MAJOR PROBLEMS

### 1. PROPOSED SERVICE AREA

The KISS service area is comprised of the following municipalities and Authorities (municipalities):

- City of Allentown (COA)
  - Hanover Township (customer of COA)
- Lehigh County Authority (LCA)
  - Borough of Alburtis
  - Lowhill Township
  - Borough of Macungie
  - Lower Macungie Township (Signatory to LCA)
  - Upper Macungie Township
  - Upper Milford Township
  - Weisenberg Township
- South Whitehall Township
- Coplay-Whitehall Sewer Authority (CWSA)
  - Borough of Coplay
  - North Whitehall Township (customer of CWSA)
  - Whitehall Township
- Salisbury Township
- Borough of Emmaus
- Lower Macungie Township (Signatory to COA)

The proposed service area for this Regional Act 537 Plan is limited to the areas currently served by sewers as shown on the Kline's Island Sanitary Sewer (KISS) Collection System Map in Appendix 2. However, it is not the intent of this Regional Plan to preclude a planning module from expanding the service area. All sanitary sewage in the KISS system that discharges to the public sewer is treated at the City of Allentown's Kline's Island Wastewater Treatment Plant (KIWWTP). The KISS system is **not** a combined sewer system; it is designed to convey and treat sanitary sewage only. Although stormwater inflow and groundwater infiltration (I&I) occurs, it must be in acceptable quantities for which existing state regulations provide guidance to determine. The region is served by separate stormwater sewer systems.

### 2. MAJOR PROBLEMS

The major problem investigated in the Interim Act 537 Plan (Interim Plan) and addressed in this Regional Plan is a response to the Chapter 94 violation which occurred in late 2018 and early 2019 after three consecutive months of flows to KIWWTP exceeding the prior permitted hydraulic capacity value of 40 million gallons per day (MGD). The KISS service area remains under a Chapter 94 Corrective Action Plan (CAP) and Connection Management Plan (CMP) via the Interim Act 537 Plan which PADEP approved on

June 25, 2021. This Act 537 Plan was required by PADEP within the Interim Plan as the mandated Correction Action Plan for the KIWWTP Chapter 94 violation.

The Chapter 94 violation at KIWWTP occurred due to the exceedance of the then-current hydraulic capacity limit of 40 MGD. The regulations state that a violation occurs when the hydraulic capacity limit is exceeded for three consecutive months. KIWWTP violated this 40 MGD hydraulic capacity limit in two distinct timeframes: November 2018-January 2019 and March 2019-May 2019. This violation is a clear indication of sustained groundwater causing an extended period of infiltration. Infiltration issues will be addressed via aggressive infiltration-focused SRPs. Inflow issues related to the usage of Outfall 003 at the headworks of KIWWTP will be addressed with aggressive inflow-focused SRPs (ongoing) as well as an upgrade to the influent pumping capacity at the KIWWTP (does not require Act 537 Plan approval).

The issues with excessive I&I in the collection system have been exacerbated by an ineffective, disjointed system of sewage flow metering at the municipal boundaries, a lack of prior coordination and collaboration among the municipalities and dated IMAs (many of which contain no expiration date).

## B. IDENTIFY ALTERNATIVES CHOSEN

The KISS municipalities and LCA assembled an impressive team of highly regarded consultants to define the problems and develop alternatives. The following firms were involved in this effort:

| | |
|---|---|
| AECOM | Program Management |
| Arcadis | Collection & Conveyance |
| Kleinfelder | KIWWTP Process |
| Jacobs | Pretreatment Plant (PTP) Master Plan* |
| Raftelis | Financial Modeling |
| ARRO | Act 537 Plan Preparation |
| Salzmann Hughes | Intermunicipal Agreement – Term Sheet |

*Since PA DEP does not directly regulate the Facility, items directly related to the PTP Master Plan are not included with this Act 537 document.

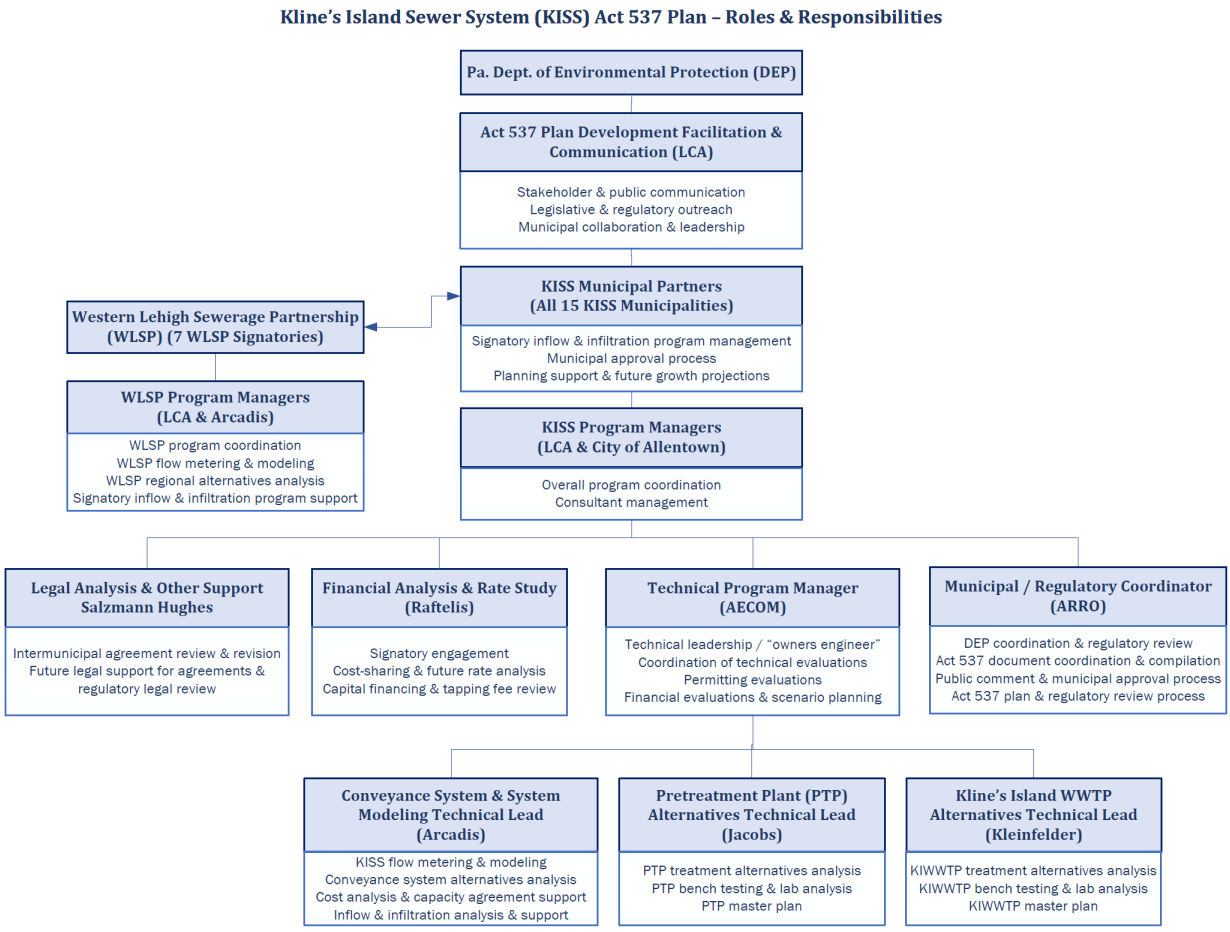


**Exhibit PS –1: KISS Act 537 Plan – Roles and Responsibilities**

Additionally, each municipality has their own appointed engineer who is intimately familiar with their respective collection and conveyance systems. All these professionals have collaborated over several years to develop these alternatives and this long-term sewage facilities plan.

The following alternatives are considered part of this Regional Act 537 Plan and are discussed in more detail below:

- Municipal implementation of Source Reduction Plans (SRPs)
- Updated approach to manage the Sewage Billing Meter (SBMs) Program
- New IMAs (to be negotiated) for Sewer Service

### Municipal Implementation of Source Reduction Plans (SRPs)

This Plan focuses on addressing sewage flow and infiltration issues through continued implementation of SRPs developed by the municipalities. These plans aim to reduce peak flows, sanitary sewer overflows (SSOs), and system rehabilitation costs by targeting high-priority areas for manhole sealing, sewer rehabilitation, and addressing I&I. Modeling studies, including data from 101 flow meters and 25 rain gauges, have guided

recommendations to meet USEPA benchmarks for I&I and eliminate SSOs in core conveyance systems by 2035. Key strategies include sealing manholes in floodplains and high-peaking basins, rehabilitating sewers with significant infiltration, and reducing baseline infiltration to increase dry weather capacity. Modeling predicts significant flow reductions after these measures. The collaborative SRPs represent ongoing efforts to address current and future capacity needs while ensuring compliance with regulatory requirements.

### Updated approach to manage the Sewage Billing Meter (SBM) Program

The goal is to ensure accuracy in measuring sewage flows for both billing and flow monitoring purposes. The proposed KISS IMA will include updated provisions that align with the previously discussed terms outlined in the Sewage Billing Meter Memo from August 23, 2024. These updated metering provisions are critical for fair and accurate billing and to ensure transparency in monitoring wastewater flows from each participating municipality. See Appendix 12.

### New Intermunicipal Agreement(s) (to be negotiated) for Sewer Service

The proposed IMA for the KISS and KIWWTP establishes a collaborative framework for managing wastewater treatment, billing, and capacity planning among the municipalities. Key provisions include fair cost-sharing based on actual sewage flows, mechanisms for trading or purchasing treatment capacity, and incentives for participation in the Regional I&I Program. The agreement supports future proposed infrastructure improvements, such as the KISS Relief Interceptor and Western Lehigh Relief Interceptor (Master Plan projects), with costs distributed equitably among the municipalities. It prioritizes reducing I&I, establishing a capital reserve fund for rate stability, and fostering information sharing and dispute resolution through a newly formed advisory committee. The IMA ensures compliance with PADEP regulations and positions municipalities for future growth, with a 10-year term and options for renewal.

## C. COST OF IMPLEMENTATION

This Plan does not propose any upgrades or expansions to conveyance or treatment facilities. SRP work to reduce RDII will be the main cost component of this Plan. The cost to implement the SRPs is included in this Plan. Also, during the preparation and analysis conducted during the creation of this Plan, several other future (Master Plan) projects were identified as being most likely necessary beyond the planning horizon of his Plan. It was felt it would be prudent to initiate financial planning for these significant projects as part of this Regional Act 537 Plan to ensure adequate funds are available to implement the projects. Not only does this serve to communicate the future needs and funds that will be required, but financial planning now will allow for the creation of financial strategies that will support rate stabilization when necessary to construct projects.

An integral part of the Regional Plan is the continued commitment of the municipalities to perform source reduction projects. Exhibit PS - 2 below summarizes the cost of projected projects by each municipality through the year 2035. More details on the proposed project financing can be found in Appendix 17.

| Customer | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alburtis | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- |
| Macungie | - | - | - | - | - | - | - | - | - | - | - | - |
| Upper Macungie | 1.25 | 1.00 | 1.00 | 0.75 | 0.75 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 6.25 |
| Lower Macungie | - | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 15.00 |
| Lowhill | - | - | - | - | - | - | - | - | - | - | - | - |
| Weisenberg | - | - | - | - | - | - | - | - | - | - | - | - |
| Upper Milford | - | 0.20 | - | - | - | - | - | - | - | - | - | 0.20 |
| City of Allentown | 3.00 | 5.00 | 5.00 | 5.25 | 5.25 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 59.50 |
| Hanover | - | 0.02 | - | - | - | - | - | - | - | - | - | 0.02 |
| Emmaus | - | 0.58 | - | 0.18 | 0.55 | 0.32 | 0.54 | 0.06 | - | - | - | 2.22 |
| Salisbury | - | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 4.00 |
| South Whitehall | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 5.94 |
| North Whitehall | - | - | - | - | - | - | - | - | - | - | - | - |
| Coplay | - | - | - | - | - | - | - | - | - | - | - | - |
| Whitehall | - | 0.03 | 0.03 | 0.37 | 0.37 | 0.37 | - | - | - | - | - | 1.16 |
| LCA | - | 0.25 | 3.00 | 3.00 | 0.30 | 0.68 | - | - | - | - | - | 7.23 |
| TOTAL | $4.79 | $9.51 | $11.47 | $11.99 | $9.66 | $10.06 | $9.23 | $8.75 | $8.69 | $8.69 | $8.69 | $101.51 |

**Exhibit PS –2: Estimated Program Funding Need for Regional SRPs ($ are in Millions)**

The financing component of this Regional Act 537 Plan is a crucial focus of the study conducted by Raftelis (See Appendix 17). The study sought to optimize cost-sharing agreements among the various municipalities that contribute to the system. Multiple cost-sharing alternatives were developed, with the goal of simplifying the current overly complex arrangements while maintaining fairness and ensuring that all participating communities contribute equitably based on their usage of the system. These alternatives included options to pool costs for system operations, maintenance, and future capital investments.

The financing strategy includes considerations for both capital and operational costs. As the system is expected to undergo significant upgrades and expansions, the financial analysis explored how these costs could be shared among the municipalities. Notably, discussions have included the possibility of a centralized surcharge program, which would assess additional fees on commercial and industrial users that discharge high-strength wastewater, thus offsetting some of the treatment costs. Also, the proposed cost-sharing models aim to provide incentives for communities to invest in reducing I&I, thereby lowering the overall burden on the system.

Ultimately, the cost-sharing alternatives have been evaluated based on their ability to balance affordability, simplicity, and the need for substantial capital investments over the coming decades. The selection of a preferred financing approach will be critical in ensuring the long-term financial sustainability of the KISS and the equitable distribution of costs among its users.

Besides the SRPs from each of the municipalities as mentioned, the other two major components comprising the Raftelis financial analysis from 2026-2030 include projects depicted in the LCA 2025-2029 Capital Plans. The Allentown Division Capital Plan include a mix of annual projects, additional manhole work (inspections and

rehab) in the City, and a capital plan related KIWWTP projects (including the 100 MGD project). A project summary can be found in Appendix 17.

The Suburban Division Capital Plan includes a mix of annual projects and miscellaneous placeholders related to the WLI from 2025-2029. A project summary can be found in Appendix 17.

Capital cost assumptions for 2030 were made for both Divisions.

## D. MUNICIPAL COMMITMENTS NECESSARY TO IMPLEMENT PLAN

New IMAs are being negotiated to implement the selected alternatives in this Regional Act 537 Plan. The municipalities have reviewed and adopted this Regional Act 537 Plan (when submitted to PADEP).

The KISS municipalities have engaged a legal consultant to help prepare and negotiate new and updated IMAs. While the current IMAs are sufficient and legal to implement the selected alternatives, this new Regional Act 537 Plan was seen as an opportunity to update, simplify and refresh the agreements.

The proposed INTERMUNICIPAL AGREEMENT FOR SEWER SERVICE – TERM SHEET establishes collaboration between the municipalities for wastewater treatment at the KIWWTP as well as conveyance to the KIWWTP (See Appendix 13).

The commitments embodied in this Regional Act 537 Plan are summarized below:

1. Flow Characterization Study (FCS) to be completed in approximately five years from the Plan approval date, which will be used to prepare and submit Act 537 Special Study(s) in support of future projects currently described in the Plan as "master plan" projects. *[Note: The Plan currently shows the KISS Relief Interceptor project starting in 2032 and the Western Lehigh Relief Interceptor project starting in 2036.]*

2. Negotiation and possible execution of new IMAs that address cost-sharing for current and future projects and operations and maintenance costs, with an emphasis on flow-based billing methodologies to incentivize I&I removal efforts. The new IMAs may also address regional collaboration on I&I projects, and consideration of a regional surcharge program for high-strength dischargers, and other matters outlined in the term sheet included in this Plan.

3. Continued Connection Management Plan under PADEP's direction, which recognizes the value of captured capacity via I&I source reduction to support new connections to the system. It is expected that this Connection Management Plan will be discontinued when the remaining commitments listed below have been achieved.

4. Continued source reduction efforts based on the 2021 Flow Characterization Study and any future Sanitary Sewer Evaluation Studies (SSES) work described in each municipality's I&I Source Reduction Plan, which will be used to further prioritize projects during the Plan period.

5. Sewage billing meter program implementation that includes continuous data validation and data capture in a read-only combined portal for municipal access to real-time flow data. The focus of the metering program will be to ensure accurate flow monitoring at the municipality level.

6. Completion of the KIWWTP pump replacement and upgrade project, which is currently in design and permitting stages and will increase the plant's capacity to manage peak wet-weather flows. A post-construction evaluation of project performance will be conducted, including a review of treatment plant bypass activations and volume of discharges.

7. Regular reporting of the results of the municipal I&I program(s), which will include a report of projects completed and leakage removed, updated evaluations of the 120/275 per-capita-per-day USEPA benchmark for excessive I&I, and an assessment of the cost-effectiveness of the program. It is expected that the program goals will be considered as having been met when this reporting indicates absence of excessive I&I at the KIWWTP consistent with the 120/275 per-capita-per-day USEPA benchmark.

## E. IMPLEMENTATION SCHEDULE

The following Implementation Schedule represents the necessary steps to implement the selected alternative. The table that follows is the best estimate of the time needed to complete the projects recommended in this Regional Act 537 Plan. The potential exists for changes during implementation which will be addressed and the schedule modified accordingly.

| Work Categories & Description | Start | Finish |
|---|---|---|
| Source Reduction Plans | 1/1/2020 | 12/31/2035* |
| KIWWTP Master Plan Projects | 1/1/2024 | 12/31/2035 |
| Long Term SBM Implementation | 1/1/2025 | 1/1/2028 |
| Negotiate Intermunicipal Agreement | 1/1/2025 | 12/31/2027 |
| KISS Chapter 94 Violation "Removal"/CMP Lifted | | 12/31/2029 |
| Collect Temporary Meter Data | 3/1/2030 | 10/31/2030 |
| Re-model KISS System (Flow Characterization Study) | 11/1/2030 | 12/31/2031 |

*SRPs will continue beyond 2035. For the purposes of the 2026-2035 planning module projections, a finish date of 12/31/35 was selected.

# MUNICIPAL ADOPTIONS

Copies of all Municipal Adoptions can be found in Appendix 20. (To be inserted later)

# PLANNING COMMISSION / COUNTY HEALTH DEPARTMENT COMMENTS

Copies of all Planning Commission and County Health Department comments can be found in Appendix 21. (To be inserted later)

## PUBLICATION

Proof of Publication can be found in Appendix 22. (To be inserted later)

## COMMENTS AND RESPONSES

Public comments and responses can be found in Appendix 23. (To be inserted later)

## IMPLEMENTATION SCHEDULE

Refer to the above for the Implementation Schedule.

## CONSISTENCY DOCUMENTATION

There were no inconsistencies identified and therefore, none to be resolved. Since this Regional Act 537 Plan is for only Source Reduction Plans, there are no projects planned for which a consistency determination is needed.

## BACKGROUND

In 2007, USEPA issued an Administrative Order (AO) to the City of Allentown requiring discharges from Outfall 003 be considered SSOs as that sewage had not received treatment and to provide corrective measures. Over the past 20 years (2003 – 2024) Outfall 003 has activated no more than three (3) times per year as a result of excessive wet-weather induce flows. Some years Outfall 003 was not activated at all. Exhibit PS-3 below provides a summary, by year, of the number of activations caused by excessive wet-weather flow.

In 2008, in response to self-reporting of conveyance capacity limitations and excess I&I from LCA's Western Lehigh Interceptor, the PADEP required LCA, Upper Macungie, Lower Macungie, Weisenberg, Lowhill, and Upper Milford townships, and Macungie and Alburtis boroughs to develop a Chapter 94.21 CAP for the areas identified as having significant capacity restrictions. The cited entities formed the Western Lehigh Sewerage Partnership (WLSP) and developed the Sewer Capacity Assurance and Rehabilitation Program (SCARP) to provide a formalized and planned method of evaluating the WLSP sewer systems, prioritize and conduct I&I source removal via sewer rehabilitation and private property clear-water elimination, and development of storage and conveyance expansions. To support this work, flow metering was conducted in 2009, and a WLSP hydraulic model was developed in 2011. Separately, the COA hydraulic model (developed by WRA) was finalized in 2013 encompassing the COA collection system and interceptors.

| Year | Number of 003 Bypasses due to Hydraulic Capacity |
|---|---|
| 2003 | 2 |
| 2004 | 3 |
| 2005 | 3 |
| 2006 | 1 |
| 2007 | 0 |
| 2008 | 1 |
| 2009 | 0 |
| 2010 | 1 |
| 2011 | 2 |
| 2012 | 0 |
| 2013 | 0 |
| 2014 | 0 |
| 2015 | 0 |
| 2016 | 1 |
| 2017 | 0 |
| 2018 | 3 |
| 2019 | 0 |
| 2020 | 3 |
| 2021 | 1 |
| 2022 | 1 |
| 2023 | 2 |
| 2024 | 1 |

**Exhibit PS–3: Number of Outfall 003 Bypasses due to Hydraulic Capacity**

In 2009, in response to self-reported overflows from Allentown's central interceptor systems, USEPA issued a second Administrative Order (AO). This AO addressed system-wide capacity issues for all municipalities to the KISS (Alburtis Borough, Emmaus Borough, Coplay Whitehall Sewer Authority, South Whitehall Township, Lower Macungie Township, Upper Macungie Township, Upper Milford Township, Salisbury Township, Lowhill Township, Macungie Borough, Weisenberg Township, Hanover Township, LCA, and COA). Each of the contributors were required to submit a semi-annual report to USEPA and PADEP indicating what actions they had taken to address RDII conditions.

During this time, there were semi-annual meetings to discuss the program on addressing the AOs while the municipalities worked independently on RDII remedial projects and programs within their service areas. There was not a more unified or collective approach to addressing the AOs until the WLSP and COA combined their two models in 2014 to form the first KISS model. COA and the WLSP individually and then jointly evaluated their projected future flows, considered the planned source reduction efforts of all municipalities, and selected a preferred alternative managing both dry and wet-weather treatment and conveyance of both current and future flows through 2040. Although a valuable tool and resource, the KISS model represented only 75% of the sewer system, was calibrated from 2008 and 2009 flow data, used only the available entry-point flows from the other sewer municipalities, and except for the WLSP portion did not model antecedent conditions or changing groundwater conditions due to climate changes. As described later in this plan, the KISS Model was updated in 2021 and served as the initial foundation for modeling flow information collected during the FCS completed as part of the approved Interim Act 537 Plan.

Over the years while the municipalities were working on their remediation projects and programs, there were periodic meetings with USEPA and PADEP. USEPA acknowledged the progress in its letter of 11/2/2017 noting , "…it is evident that the ongoing efforts to reduce inflow and infiltration (I&I) and to generally upgrade and

maintain the infrastructure in the area served by Kline's Island have been effective" and suggested that, rather than pursue multi-million dollar projects at the KIWWTP, that the municipalities should work cooperatively and develop regional solutions to the problems which would be cost effective and provide continuing and lasting reductions in RDII. USEPA suggested that the municipalities work cooperatively and submit a Regional Flow Management Strategy (RFMS). The RFMS was submitted in accordance with EPA's directive in 2018. This Regional Flow Management Strategy was intended to guide the development and implementation of municipalities' individual sewer I&I reduction plans so that they provide results that support the achievement of both municipal and regional goals for sewer system performance. The RFMS reflected broad-based commitments of action, collaboration, and cooperation. The RFMS contained flow characterization studies and anticipated conveyance or storage expansions to handle current and future dry and peak wet-weather flows.

USEPA accepted the RFMS and withdrew the AOs on 3/19/2019 noting, "USEPA has reviewed the regional flow management strategy and has found it acceptable" and "…hereby finds that all of the Respondents to the Administrative Orders CWA-03-2009-0313DN and CWA-03-2007-0332DN have completed the requirements". Oversight of the RFMS was delegated to PADEP. PADEP reviewed the RFMS and issued a review and comment letter to which the contributors responded.

According to the National Oceanic and Atmospheric Administration, beginning in August 2018 and continuing through July 2019, the Lehigh Valley received the most annual rainfall since local rainfall data began being collected in 1895. The Lehigh Valley experienced 67 inches of precipitation in 2018 and 61 inches in 2019, well over the annual average of 45 inches. In particular, during the 12-month period of August 2018 through July 2019, the region received 80 inches of precipitation. This continuing rainfall saturated the ground surrounding the collection system piping of all service areas. The groundwater levels were 20-25 feet above normal during and after that annual period. During this time period, the KIWWTP received sustained elevated flows due to high levels of infiltration throughout the system, resulting in exceedance of the plant's then-current hydraulic capacity limit of 40 MGD. This occurred for three consecutive months on two separate occasions during this period, which represented a Chapter 94 violation. During this time, the KIWWTP maintained treatment and there were no violations of its NPDES discharge permit.

In addition to the 2018-2019 situation and resulting Chapter 94 violation, PADEP expressed concerns about future growth and continued efforts to address RDII. Beginning in August 2019, a series of meetings were held with representatives of PADEP and the municipalities, to address the 2019 hydraulic overload. PADEP required a CAP be developed that would include elements already in the RFMS. An Interim Act 537 Plan was submitted by mid-September 2020 which included the steps for developing a Long-term Regional Act 537 Plan to be submitted in 2025.

Throughout the fourth quarter of 2019, PADEP directed the KISS municipalities to compile their 2020 planning module projections. On December 31, 2019, the KISS municipalities submitted an "Interim-Interim 537" as part of the first phase for the Corrective Action Plan. On January 17, 2020, PADEP granted the KISS request of 1.5 MGD of new planning connections for 2020, with the caveat that an Interim 537 would be prepared and submitted to PADEP in late 2020. The Interim 537 Plan was then prepared and submitted to PADEP in September of 2020.

More specifically, the discussions focused on evaluating and documenting the KIWWTP's capacity to address continued higher flows if wet-weather patterns continue, illustrating the region's commitment to cooperative

management of the KISS, and developing a plan to address the long-term capacity requirements of the system to meet the economic and environmental needs of the region. Through these discussions, an approach was developed as follows:

### Phase 1 – 2020 Corrective Action & Connection Management Plan (Interim Act 537 Plan)

Beginning in 2020, all new connections for all municipalities to the KISS were managed under the terms of a regional CAP managed by PADEP and implemented by LCA under the requirements of an Interim Act 537 Plan developed by the municipalities and submitted to PADEP in September 2020. The primary thrust of the CAP is the development of the Long-term Regional Act 537 Plan, submission of quarterly progress reporting to PADEP, and the approval of new developments requiring sewer service in accordance with a formal allocation request to PADEP. The Interim Act 537 Plan was approved by PADEP on June 25, 2021

As described in the beginning of this Plan Summary, the Interim Act 537 made the following commitments that have been addressed within this Regional Act 537 Plan:

- A Connection Management Plan developed under the direction of PADEP to be implemented during the development and adoption of a Long-term Regional Act 537 Plan
- A capacity expansion of a two-mile portion of the Western Lehigh Interceptor to eliminate dry-weather overflows
- A Sewer Billing Meter upgrade effort to get all significant billing meters performing accurately across the day- 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
- Source reduction efforts by all municipalities based on previous individual inflow and infiltration (I&) investigations
- A Flow Characterization Study 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
- Identification, development, evaluation and costing of alternatives to provide conveyance and treatment capacity across the 2026-2050 planning period
- Preparation of a Long-term Regional Act 537 Plan

Subsequent to the submission of the Interim Act 537 Plan, a Part 2 permit was submitted to PADEP requesting an update to the KIWWTP hydraulic capacity limit based on an engineering evaluation completed which illustrated the plant's ability to effectively meet all discharge quality parameters included in the permit at flow rates well above 40 MGD. On December 1, 2021, PADEP approved a permit change to increase the KIWWTP hydraulic capacity to 44.6 MGD.

### Phase 2 – Trexlertown Act 537 Special Study

LCA has moved forward on design and construction of facilities to address the hydraulic bottleneck in the system located in the Trexlertown area to improve service to customers in this area. In June 2022, LCA prepared and submitted the Trexlertown Act 537 Special Study to PADEP to address sewage capacity needs within the Western Lehigh Interceptor (WLI) near Trexlertown. The interceptor experiences dry-day surcharging and wet-weather overflows during intense rain events, and LCA developed alternatives to

temporarily address this situation until a long-term solution can be implemented. The selected alternative was the Interim Pump Station (2.5 MGD) and Force Main (1.5 miles; 18" HDPE) to divert sewage away from the WLI. An interceptor operating agreement between Upper Macungie Township, Lower Macungie Township, and LCA was negotiated and executed providing for a service term through at least 2040.

### Phase 3 – Regional (long-term) Act 537 Plan

From 2021 to 2025, the KISS municipalities have worked cooperatively to develop this Regional Long-Term Act 537 Plan. This plan evaluates all municipalities' flows projected through 2050, including peak flows and anticipated changes in regional weather patterns, and develops the facilities plan and other actions required to address those needs.

PADEP's requirements for the Act 537 Sewage Facilities Plan include an evaluation of flows that can be removed by I&I programs in addition to evaluation and consideration of new facilities such as upsized parallel interceptors, pump stations, storage tanks, and treatment plant expansion/upgrades. This work included flow monitoring and an update to the KISS hydraulic model to support the revised analysis of options previously evaluated, such as expansion of the KIWWTP, upgrade of LCA's Industrial Pretreatment Plant to provide full treatment, construction of parallel interceptors, construction of regional pump stations, and construction of storage facilities to address peak flows after consideration of I&I removal estimates. The plan also includes a financial and organizational / legal analysis to determine appropriate cost-sharing and IMA structures.

All KISS municipalities will continue to implement ongoing I&I source reduction programs within their sewer collection systems. New sewer connections during the period of 2021 to 2025 have been based on the needs identified in the Interim Act 537 Plan, approved by PADEP on June 25, 2021, and the region's satisfactory progress on this work as reported in quarterly reports to PADEP. The Trexlertown Act 537 Special Study was approved by PADEP on January 6, 2023. Approval of new connections to the sewer system after 2025 will be based on details of this plan and plan approval by PADEP. Since the amount in the approved Connection Management Plan is at 2,598,779 gallons (as of December 2024), an assumption was made that the Chapter 94 quarterly reporting and all planning module related processes in place since 2020 will remain moving forward. This Act 537 Plan was required by PADEP within the Interim Plan as the mandated Correction Action Plan for the KIWWTP Chapter 94 violation.

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# I. PREVIOUS WASTEWATER PLANNING

## A. EXISTING WASTEWATER PLANNING

### 1. PREVIOUS ACT 537 PLANNING

In 2009, peak flow issues in the WLSP service area caused PADEP to review sewer connections in the WLSP communities. The WLSP communities consist of Upper Milford Township, Weisenberg Township, Lower Macungie Township, Upper Macungie Township, Lowhill Township, Borough of Alburtis and the Borough of Macungie. Pursuant to communications with PADEP and in accordance with Chapter 94 requirements, LCA and the above municipalities and, where applicable, their wastewater authorities, elected to prepare and implement a CAP to collectively address the problems within each of these sanitary sewer systems. The Sewer Capacity Assurance and Rehabilitation Program (SCARP) was the resulting CAP (approved by PADEP in 2011 and was in place until late 2019).

Prior to the PADEP approval, the *Sewer Capacity Assurance and Rehabilitation Program (SCARP)* was initiated by the Western Lehigh Sewage Partners to address peak flows in the Western Lehigh service area.

Another component of the plan to address hydraulic bottlenecks in the Western Lehigh Interceptor (WLI) included the construction of the Iron Run Pump Station, which was designed and submitted to PADEP for planning approval in 2007 and approval granted in February 2009 as an Act 537 Special Study. This pump station would have diverted flow away from the WLI via a pump station and force main. The force main would have tied directly into the Spring Creek force main. This project was ultimately not built due to downstream surcharging issues. The three-million-gallon Flow Equalization Basin (FEB) at the PTP was built instead in 2010 (as part of the SCARP program) to relieve WLI issues.

Subsequently, in 2018, the Western Lehigh Sewage Partners developed *Source Reduction Plans* and *Capital Improvement Plans* for each of the municipalities in the Western Lehigh Intercept (WLI), including Upper Macungie Township and Lower Macungie Township (these Plans were submitted to the USEPA and PADEP in 2018 – see below). The SCARP was discontinued in 2019. The 2020 connection management plan replaced the SCARP for the WLSP communities.

In August of 2018, the City of Allentown and its Signatories submitted a Regional Flow Management Strategy (RFMS) to USEPA and PADEP. The key components of the RFMS included: 1) collection system operation and maintenance, 2) system characterization, 3) inflow and infiltration removal, and 4) flow monitoring. The RFMS coordinates the development and implementation of each Municipality's I&I Source Reduction Program (SRP), in order to maximize the reduction of the excess infiltration and inflow from the sanitary sewer system.

In addition, a study was completed in 2020 to identify parallel interceptor routes in the Trexlertown area. Since hydraulic sewer modeling also indicates that this parallel interceptor option also caused downstream surcharging issues, that alternative was not further considered.

The provisions of the SCARP were discontinued and were replaced by the PADEP Connection Management Plan implemented in 2020. In September of 2020, the KISS municipalities submitted an Interim Act 537 Plan to PADEP. That Plan was subsequently approved by PADEP in June of 2021. Among

other issues, the Interim Act 537 Plan included a schedule to address conveyance issues in the WLI near Trexlertown.

In June 2022, LCA prepared and submitted the Trexlertown Act 537 Special Study to address sewage capacity needs within the WLI near Trexlertown. The WLI experiences dry-day surcharging and overflows during intense rain events. During preparation of this Regional Act 537 Plan, LCA developed alternatives to temporarily address this situation until a long-term solution can be developed. The selected alternative is the interim pump station (2.5 MGD) and force main (1.5 miles; 18" HDPE) to divert sewage away from the WLI. The Trexlertown Special Act 537 Plan was approved by PADEP on January 6, 2023.

In addition to the Interim Act 537 Plan that was approved in 2021, the KISS municipalities also have previous wastewater planning:

**Borough of Alburtis**

The Borough of Alburtis' most recent Plan was approved on December 1, 1966. The Borough was also party to the WLSP Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Borough and discontinued by PADEP in 2020.

**Lowhill Township**

Lowhill Township's most recent Plan, the Northern Lehigh Act 537 Plan, was adopted in January of 2010. The Plan also included portions of Heidelberg, North Whitehall, South Whitehall and Washington Townships. Lowhill Township's previous plan was approved on December 1, 1966. The Township was also party to the WLSP Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Township and discontinued by PADEP in 2020.

**Borough of Macungie**

The Borough of Macungie's most recent Plan was approved on October 1, 1971. The Borough was also party to the WLSP Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Borough and discontinued by PADEP in 2020.

**Upper Macungie Township**

In 2010, Upper Macungie Township submitted an Act 537 Planning Supplement to PADEP to supplement its previous Act 537 Sewage Facilities Plan which was approved March 10, 1993. The supplement serves to expand the public sewer service area and add a new On-lot Sewage Management Program, to address the needs of individual on-lot systems in the Township. The Township was also party to the WLSP Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Township and discontinued by PADEP in 2020. Upper Macungie Township was also included in the Trexlertown Act 537 Special Study which included a new pump station and force main to bypass flow around portions of the WLI.

**Upper Milford Township**

In 2005, Upper Milford Township submitted an Act 537 Plan Revision to PADEP that addressed the entire area of Upper Milford Township. In addition, Upper Milford Township coordinated with both the Lehigh County Authority (LCA) and Emmaus Borough to determine if any of the municipal facilities have available capacity for transport and/or treatment of Upper Milford Township's wastewater. The Plan Revision was approved by the Department on January 27, 2006. The Township was also party to the WLSP Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Township and discontinued by PADEP in 2020.

**Weisenberg Township**

Weisenberg Township's most recent Plan was approved on January 28, 1993. The Township was also party to the WLSP Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Township and discontinued by PADEP in 2020.

**Lower Macungie Township**

Lower Macungie Township submitted an Act 537 Planning Supplement to PADEP to supplement its previous Act 537 Sewage Facilities Plan, which was approved January 1, 1987. The supplement serves to expand the public sewer service area and add a new On-lot Sewage Management Program, to address the needs of individual on-lot systems in the Township. The current supplement is dated January 2, 2013. The Township was also party to the WLSP Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Township and discontinued by PADEP in 2020. Lower Macungie Township was also included in the Trexlertown Act 537 Special Study which included a new pump station and force main to bypass flow around portions of the WLI.

**City of Allentown**

The City of Allentown's most recent Plan was approved on October 1, 1985.

**Hanover Township**

Hanover Township updated their Act 537 Plan in September 1998.

**Borough of Coplay**

The Borough of Coplay updated their Act 537 Plan in April 1993.

**Whitehall Township**

Whitehall Township updated their Act 537 Plan in November 1993.

**North Whitehall Township**

North Whitehall Township's most recent Plan, the Northern Lehigh Act 537 Plan, was adopted in January of 2010 and included portions of the Township in the Mill Creek, Coplay Creek and Jordan Creek drainage basins. The Plan also included portions of Heidelberg, Lowhill, South Whitehall and Washington Townships. North Whitehall Township's previous plan was approved on June 27, 1991.

**Borough of Emmaus**

The Borough of Emmaus' most recent Plan was approved on January 1, 1972.

**Salisbury Township**

Salisbury Township's most recent Plan was approved on May 5, 1998.

**South Whitehall Township**

South Whitehall Township's most recent Plan was approved on January 16, 1997. A portion of the Township within the Mill Creek, Coplay Creek and Jordan Creek drainage basins was also addressed in the Northern Lehigh Act 537 Plan, adopted in January of 2010. This Plan also included portions of Heidelberg, Lowhill, North Whitehall and Washington Townships.

## 2. IMPLEMENTATION SCHEDULE OMITTED ITEMS

There are no tasks within the current implementation schedule from the Interim Act 537 Plan or the Trexlertown Special Study that were omitted. All tasks from those plans are currently on schedule.

The Iron Run Pump Station was not constructed as planned in the Act 537 Special Study approved in 2009 to address surcharging in the WLI. This project was ultimately not built due to downstream surcharging issues. The three-million-gallon Flow Equalization Basin (FEB) at the PTP was built instead in 2010 (as part of the SCARP program) to relieve WLI issues.

## 3. CHAPTER 94 CORRECTIVE ACTION PLAN

Although the Interim Act 537 Plan was approved in June 2021 and the region received the Part 2 permit hydraulic re-rate for the KIWWTP in December 2021, the KISS system is still operating under the terms of a PADEP-approved CMP. The hydraulic rerate increased the peak hydraulic flow from 40.0 MGD to 44.6 MGD. This rerate addressed the Chapter 94 violations from 2018 and 2019. This Regional Act 537 Plan includes an analysis and recommendation for when the CMP can be lifted.

The major problem investigated in the Interim Act 537 Plan (Interim Plan) and addressed in this Regional Act 537 Plan is a response to the Chapter 94 violation which occurred in late 2018 and early 2019 after

three consecutive months of KIWWTP exceeding the prior permitted hydraulic capacity value of 40 MGD. The KISS service area remains under a Chapter 94 CAP and CMP via the PADEP approved Interim Plan from June 25, 2021. This Act 537 Plan was required by PADEP within the Interim Plan as the mandated Correction Action Plan for the KIWWTP Chapter 94 violation.

To enable the Interim Plan's corrective actions and maintain the established operating, administrative, and legal frameworks, on December 1, 2021, PADEP approved a new permitted KIWWTP hydraulic capacity value of 44.6 MGD. The 2023 Chapter 94 Summary Spreadsheet and the corresponding 2023 Chapter 94 Five-Year Measured and Projected Hydraulic Loads graph have reflected 44.6 MGD since this approval. However, this paper re-rate did not change the annual average flow of 40.0 MGD used to determine the KIWWTP NPDES treated effluent discharge.

## 4. PLANNING MODULES, EXEMPTIONS, AND ADDENDA

Beginning in 2020, all new connections for all municipalities to the KISS were managed under the terms of a regional CAP managed by PADEP and implemented by LCA. The primary thrust of the CAP was the development of the Interim Act 537 Plan, quarterly progress reporting to PADEP, and new developments requiring sewer service approved in accordance with a formal allocation request to PADEP. The CAP was approved by PADEP on January 17, 2020. As part of the CAP approval, PADEP granted 1,500,000 gallons per day (GPD) of additional sewer capacity to the KISS municipalities based on the region's December 31, 2019, request and commitment to completing the work outlined in the CAP.

On September 4, 2020, LCA requested 2,919,426 GPD of additional sewer capacity be granted to the KISS municipalities based on the region's Interim Act 537 Plan. On June 18, 2021, LCA revised the request to 3,117,129 GPD of additional sewer capacity to be granted to the KISS municipalities based on revisions to the region's Interim Act 537 Plan, which was subsequently approved by PADEP on June 25, 2021.

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# II. PHYSICAL AND DEMOGRAPHIC ANALYSIS

## A. PLANNING AREA, MUNICIPAL BOUNDARIES, SERVICE AREA BOUNDARIES

The Kline's Island Sewage System (KISS) provides service to a large area including the City of Allentown, Upper Milford Township, Weisenberg Township, Borough of Alburtis, Borough of Emmaus, Borough of Macungie, Lower Macungie Township, Lowhill Township, Salisbury Township, South Whitehall Township, Upper Macungie Township, North Whitehall Township, Coplay Borough, Whitehall Township and Hanover Township. The Planning Area is bordered by Berks County to the west and Northampton County to the east. Refer to the KISS Planning Area Map in Appendix 1 and the Collection System Maps found in Appendix 2 which shows the extent of the existing sewer system in the Planning Area.

Exhibit III-1 provides a summary of those municipalities who are grouped in the Lehigh County Authority system, the Allentown system, and the Coplay/Whitehall Sewer Authority system.

## B. PHYSICAL CHARACTERISTICS OF THE PLANNING AREA

The physical characteristics of the Planning Area are shown on the Topographic Map, the Wetlands and Hydric Soils Map and the Floodplains Map found in Appendix 3, 4 and 5, respectively.

**Borough of Alburtis**

The Borough of Alburtis is approximately 0.7 square miles, and is traversed by Swabia Creek, a tributary of Little Lehigh Creek.[1]

**Lowhill Township**

Lowhill Township covers approximately 14 square miles and is drained by the Jordan Creek into the Lehigh River.[2]

**Borough of Macungie**

The Borough of Macungie, the second oldest Borough in Lehigh County, covers approximately 1.0 square miles. The Borough is almost completely surrounded by Lower Macungie Township, with the exception of the southeast corner, which borders Upper Milford Township. Swabia Creek flows through the Borough and drains into the Little Lehigh Creek.[3]

**Upper Macungie Township**

Upper Macungie Township is approximately 25 square miles and is located in western Lehigh County with a resident population of approximately 25, 000 and a working population of approximately 45,000. The Township is bordered by South Whitehall Township to the east, Lower Macungie Township to the south,

[1] Per wikipedia.org

[2] Per wikipedia.org

[3] Per wikipedia.org

Berks County to the west and Lowhill and Weisenberg Townships to the north. The majority of the Township lies within the Little Lehigh Creek Watershed with a small portion located in the Jordan Creek Watershed.

**Upper Milford Township**

Upper Milford Township lies in eastern Pennsylvania at the southwestern corner of Lehigh County. It is approximately 18 square miles and lies within three major watersheds. Little Lehigh Creek drains a large portion of the Township in the north central area. Perkiomen Creek drains the southern and western sections of the Township, and the eastern portion of the Township drains to the north branch of Saucon Creek.[4]

**Weisenberg Township**

Weisenberg Township is approximately 26 square miles and lies in the western section of Lehigh County. It is bordered by Lynn Township to the north, Lowhill Township to the east, Upper Macungie Township to the south and Berks County to the west. The Township lies within two major drainage basins; the Lehigh River Drainage Basin and the Schuylkill River Drainage Basin.[5]

**Lower Macungie Township**

Lower Macungie Township is one of the largest municipalities in the Lehigh Valley, covering 22.6 square miles. The population has been rapidly increasing, growing 60% from 2000 to 2010 according to the Census. The Township is drained by the Little Lehigh Creek and Swabia Creek.[6]

**City of Allentown**

The City of Allentown is the largest of the 62 municipalities located within the Lehigh Valley and represented 34% of the total Lehigh County population in the 2020 Census. It is the third largest city in Pennsylvania at approximately 18 square miles and is located along the Lehigh River. The Little Lehigh, Jordan, Trout, and Cedar Creeks all travel throughout the city.[7]

**Hanover Township**

Hanover Township covers approximately 4.2 square miles and is located north of the City of Allentown. Hanover Township is the only Township in Lehigh County that lies east of the Lehigh River. The Township is near the geographic center of the Lehigh-Northampton County region making it an ideal location for the Lehigh Valley International Airport.[8]

[4] Per http://www.uppermilford.net

[5] Per the Weisenberg 1992 Act 537 Plan.pdf

[6] Per wikipedia.org

[7] Per the Allentown Comprehensive Plan

[8] Per the Hanover Act 537 Update

**Borough of Coplay**

The Borough of Coplay covers a total area of 0.6 square miles and is located about 5 miles north of the City of Allentown along the Lehigh River.[9]

**Whitehall Township**

Whitehall Township covers approximately 12.86 square miles and is drained entirely by the Lehigh River and several of its tributaries. Drainage basins, delineated by ridge lines, are logical areas for planning and designing water treatment and storm drainage facilities. Stream health is an important issue in Whitehall Township because the township has large impervious surfaces and quarry operations.

**North Whitehall Township**

North Whitehall Township is located on the northeast edge of Lehigh County. The largest watershed in the Township, Coplay Creek, drains 11 square miles. Most of the western portion of the Township flows into Jordan Creek, and most of the identified wetlands in the Township are along the Lehigh River.[10]

**Borough of Emmaus**

The Borough of Emmaus is primarily drained by the Leibert Creek watershed.[11] The Borough of Emmaus is located 5 miles southwest of Allentown and is approximately 2.9 square miles. The Little Lehigh Creek runs within the Borough and just outside of the border with Salisbury Township.[12]

**Salisbury Township**

Salisbury Township is located in central Lehigh County and has two separate unconnected parts due to annexations made in the early 1900s by the City of Allentown and Emmaus Borough. The western part of the Township lies to the west of Allentown and to the north of Emmaus while the eastern part of the Township lies south of Allentown and to the east of Emmaus. The National Wetlands Inventory has identified 73 acres of known wetlands area in the Township.[13]

**South Whitehall Township**

South Whitehall Township is located in south central Lehigh County immediately west of Allentown. It lies within three watersheds; the Coplay Creek, Jordan Creek, and Little Lehigh Creek watersheds, all of which drain into the Delaware River Basin. The National Wetlands Inventory has identified limited areas of wetlands, primarily located along stream banks.[14]

[9] Per wikipedia.org

[10] Per the North Whitehall Comp Plan
[11] Per the Southwest Lehigh County Comp Plan 2005
[12] Per wikipedia.org
[13] Per the Salisbury Comp Plan Final Draft 2012
[14] Per the http://www.southwhitehall.com/2009compplan.pdf

## F. POTABLE WATER SUPPLIES

### Lehigh County Authority – Central Lehigh Division

Several municipalities listed below receive water from the LCA Central Lehigh Division, as noted in the municipality's water system information. The LCA Central Lehigh Division provides service to portions of central and western Lehigh County. Its water is supplied via interconnection with the LCA Allentown Division capable of supplying up to 10.5 MGD of water, as well as 14 groundwater wells located throughout the County. The LCA Central Lehigh Division produces an average of 11.49 MGD of water to 19,367 residential, commercial, and industrial customers.

### Borough of Emmaus

The Borough of Emmaus water system includes six (6) wells which supply all water available to the Borough's water system. The following table provides a listing of the wells and their available capacity.

| Well No. | Location | Date Drilled | Date Tested | Estimated Current Capacity (GPM) |
|---|---|---|---|---|
| 1 | Main Station | 1927 | 1987 | 600 |
| 2 | Main Station | 1927 | 1987 | 0* |
| 3 | Broad Street | 1945 | - | 0* |
| 4 | Glenwood Street | 1962 | 1992 | 600 |
| 6 | Community Park | 1964 | - | 580 |
| 7 | Macungie Avenue | 1974 | 1987 | 515 |
| | | | Total Well Capacity: | 2,915 |

* Well No. 2, with an estimated capacity of 620 GPM, is not currently in service due to PFAS contamination. Well No. 3, with an estimated capacity of 243 GPM, is not currently in service due to TCE contamination.

**Exhibit II –1: Borough of Emmaus Potable Water Systems**

According to the Borough's 2023 Water Allocation Primary Facilities Report, the water system serves 4,416 customers (including the LCA bulk purchases) with annual average metered consumption of 910,997 GPD and 26 unmetered connections such as municipal facilities and lost water from breaks, etc., for an additional consumption of 392,332 GPD.

The Borough of Emmaus water system's service area is generally the geographic area within the municipal boundaries of the Borough, with the following notable exceptions:

- Due to its location on the west side of Leibert Creek, the portion of the Fields at Indian Creek 55+ development located within the Borough of Emmaus is supplied by LCA's Central Lehigh Division water system.

- Lehigh County Authority purchases bulk water from the Borough as a consecutive water supplier and distributes to some of LCA's customers in areas nearest to the Borough within Salisbury, Lower Macungie and Upper Milford Townships. This bulk purchase of water accounted for 58,186 GPD in 2023.

- The two residential properties at 340 and 380 S. Cedar Crest Boulevard are not served by the public water system.

A copy of the Water System map can be found in Appendix 10. Virtually all of the water mains located outside of the Borough limits were conveyed to LCA in 2006. The two 5th Street Reservoirs and the 12-inch line connecting them to the Borough system were not conveyed to LCA. Reservoir No 1 was removed from service and demolished in 2019.

### Lower Macungie Township

Portions of Lower Macungie Township are served by different water utilities as further described below:

Aqua PA, Inc.- 63 customers

Borough of Emmaus- 36 customers

Alburtis Borough- 53 customers

LCA Central Lehigh Division- 10,555 customers

LCA Emmaus Consecutive Division- 12 customers

The LCA-provided water service lines are shown in the "LCA Suburban Potable Water Supply" map in Appendix 10.

### South Whitehall Township

South Whitehall Township serves 6,845 customers with a capacity of 7,857,600 GPD. Water is supplied by the LCA Allentown Division and groundwater wells that are owned and operated by the Township. There are an additional 6 customers served directly by the LCA Central Lehigh Division, and 103 customers served by Aqua PA, Inc.

### Salisbury Township

Salisbury Township serves 3,324 customers with water sourced from the LCA Allentown Division. There are an additional 35 customers served directly by the LCA Central Lehigh Division, and 202 customers serviced directly by the LCA Emmaus Consecutive Division. A copy of the Water System Map for Salisbury Township can be found in Appendix 10.

### Borough of Macungie

The Macungie Borough Authority serves 1,620 customers with a capacity of 514,000 GPD from two production wells as follows:

| | |
|---|---|
| Well No.1 | 357 GPM |
| Well No. 2 | 430 GPM |

The Macungie Borough Authority water system serves the entire Borough of Macungie. A map of the Macungie water system is included in Appendix 10.

### Borough Alburtis

The Alburtis Borough Authority serves 998 residential and commercial customers within the Borough from four groundwater production wells. A map of the Alburtis water system is included in Appendix 10.

### Upper Macungie Township

There are no potable water supply systems not owned by Lehigh County Authority in Upper Macungie Township. LCA's Central Lehigh Division provides service to 7,955 residential, commercial and industrial customers in the Township.

### Hanover Township

Hanover Township has one property, located at 2100 Hoover Avenue, within the KISS service area and not served by the LCA Allentown Division. It is served by the City of Bethlehem. A map of the Hanover Township water distribution system, which is water supplied by the LCA Allentown Division, is included in Appendix 10.

### Upper Milford Township

There are no potable water supply systems not owned by Lehigh County Authority in Upper Milford Township. The LCA Central Lehigh Division provides service to 506 customers in the Township, and the LCA Upper Milford Central Division provides service to 100 customers in the Township. A map of the Upper Milford water system is included in Appendix 10.

### Lowhill Township

There are no potable water supply systems not owned by Lehigh County Authority in Lowhill Township. The LCA Central Lehigh Division provides service to 43 customers in the Township as shown in the "LCA Suburban Potable Water Supply" map in Appendix 10.

### Weisenberg Township

There are no potable water supply systems not owned by Lehigh County Authority in Weisenberg Township. The LCA Central Lehigh Division provides service to 173 customers in the area of the Township that discharges to the KISS, as shown in the "LCA Suburban Potable Water Supply" map in Appendix 10.

### City of Allentown

The City of Allentown owns the water system that is operated by Lehigh County Authority under the terms of a 50-year lease agreement that commenced in 2013. The water sources for the LCA Allentown Division include Schantz Spring, Crystal Spring, the Little Lehigh Creek, and the Lehigh River. The LCA Allentown Division serves 33,610 developed properties in the City, and provides wholesale water service to several external municipalities and authorities including: Lehigh County Authority's Central Lehigh Division, Salisbury Township, South Whitehall Township, Whitehall Township Authority, and Hanover Township. A map of the Allentown water system is included in Appendix 10.

### North Whitehall Township

The developed areas of North Whitehall Township receive public water service through agreements with Lehigh County Authority and the Northampton Borough Municipal Authority (NBMA). The LCA North Whitehall Division provides service to 986 customers in the Township, through a water supply interconnection agreement with NBMA, whose water source is the Lehigh River. A map of the North Whitehall water system is included in Appendix 10.

### Whitehall Township

The KISS areas of Whitehall Township are served by two different water utilities:

1. Whitehall Township Authority provides water service to 2,909 connections via several groundwater wells in the Jordan Creek, Coplay Creek, Lehigh River, and Catasauqua Creek watersheds. See the "Overall System Map – Whitehall Township Authority" included in Appendix 10.
2. Northampton Borough Municipal Authority provides water service to the eastern portion of the township. Its primary source of water is the Lehigh River. See the "Coplay Borough and Whitehall Township Water Supply" map included in Appendix 10.

**Borough of Coplay**

1. The entire Borough of Coplay within the KISS region is provided water service through the Northampton Borough Municipal Authority. See the "Coplay Borough and Whitehall Township Water Supply" map included in Appendix 10.

## G. WETLAND IDENTIFICATION

The National Wetlands Inventory for Pennsylvania was consulted to determine if wetlands or hydric soils were located in the area of the proposed project. Appendix 4 includes a map indicating those areas identified as wetlands or hydric soils. Since the selected alternative does not propose any new infrastructure, there is no impact to wetlands or hydric soils.

###

## III. EXISTING SEWAGE FACILITIES IN THE PLANNING AREA

Sewage flows to the KIWWTP originate from the municipalities shown in Exhibit III-1. The allocation of treatment capacity for each municipality, based on a contractual agreement, is also summarized in Exhibit III-1. A large portion of these flows comes from the LCA Signatories, which encompasses seven municipalities. A significant portion of the LCA flow receives pretreatment at the LCA Industrial Pretreatment Plant (PTP). This partially treated wastewater is then conveyed to the City of Allentown's KIWWTP.

| Municipality | Municipalities | Capacity (MGD) |
|---|---|---|
| LCA | Borough of Alburtis<br>Lowhill Township<br>Borough of Macungie<br>Lower Macungie Township<br>Upper Macungie Township<br>Upper Milford Township<br>Weisenberg Township | 10.79 |
| Lower Macungie | Lower Macungie Township[1] | 0.25 |
| Allentown | City of Allentown<br>Hanover Township | 18.82 |
| Coplay/Whitehall Sewer Authority | Borough of Coplay<br>Whitehall Township<br>North Whitehall Township | 3.76 |
| Emmaus | Borough of Emmaus | 1.40 |
| Salisbury | Salisbury Township | 1.99 |
| South Whitehall | South Whitehall Township | 2.99 |
| TOTAL (to the KIWWTP) | | 40.00 |

[1] Lower Macungie Township owns 0.25 MGD of allocation directly from the City of Allentown, which is used for a portion of the Township's sewer flows that do not flow into the LCA interceptor system.

**Exhibit III – 1: Current Allocations to the KIWWTP by Municipality**

# A. MUNICIPAL AND NON-MUNICIPAL, INDIVIDUAL, AND COMMUNITY SEWERAGE SYSTEMS IN THE PLANNING AREA

## 1. LOCATION, SIZE, AND OWNERSHIP OF FACILITIES

The location, size and ownership of each municipality and Authority collection system can be found in the Collection System Maps (Appendix 2).

## 2. TREATMENT PROCESSES WITHIN EXISTING FACILITIES

There is one permitted treatment facility within the planning area; the Kline's Island Wastewater Treatment Plant (KIWWTP). All flows within the planning area are treated at the KIWWTP before being discharged to the Lehigh River. The KIWWTP operates under NPDES Permit Number PA0026000. The most recent Water Quality Management permit number is 3915403.

LCA also owns and operates a pretreatment facility to reduce high-strength industrial waste. Since this facility ultimately discharges to KIWWTP and is not a direct stream discharge, there is not an NPDES permit associated with the facility.

### KLINE'S ISLAND WWTP (KIWWTP)

The KIWWTP is a two-stage trickling filter plant that provides secondary treatment and ammonia reduction. The plant treats sewage from the City of Allentown and 14 surrounding municipalities. The KIWWTP was initially constructed in 1928 and operates under NPDES Permit Number PA0026000. Permit limits at the time this Regional Act 537 Plan was completed are as follows:

| Parameter | Average Monthly | Average Weekly | Instantaneous Maximum |
|---|---|---|---|
| | (mg/L) | (mg/L) | (mg/L) |
| BOD5 | 20 | 30 | 40 |
| TSS | 30 | 45 | 60 |
| NH3-N: | | | |
| 05/01-10/31 | 5.0 | | 10.0 |
| 11/01-04/30 | 15.0 | | |
| DO | A minimum of 5.0 mg/L at all times | | |
| Fecal Coliform: | | | |
| 05/01-09/30 | 200/100 mL as a geometric mean | | |
| 10/01-04/30 | 2,000/100 mL as a geometric mean | | |
| pH | 6.0 – 9.0 SU at all times | | |
| TRC | 0.50 | | 1.0 |
| Cadmium | Monitor and Report | | |

**Exhibit III – 2: KIWWTP Current Permit Limits**

There are approximately 950 miles of collector and interceptor sewer systems that transport sewage to the KIWWTP. These sewer systems are individually owned and operated. None of the tributary sewers are combined sewers. Once sewage reaches the KIWWTP, it is conveyed through the treatment process which consists of headworks (screening and grit removal), primary sedimentation, carbonaceous trickling filter, intermediate sedimentation, nitrifying trickling filters, final sedimentation, and finally disinfection before being discharged to the Lehigh River. The plant also has sludge dewatering and digestion facilities on site. A process schematic of the KIWWTP follows.

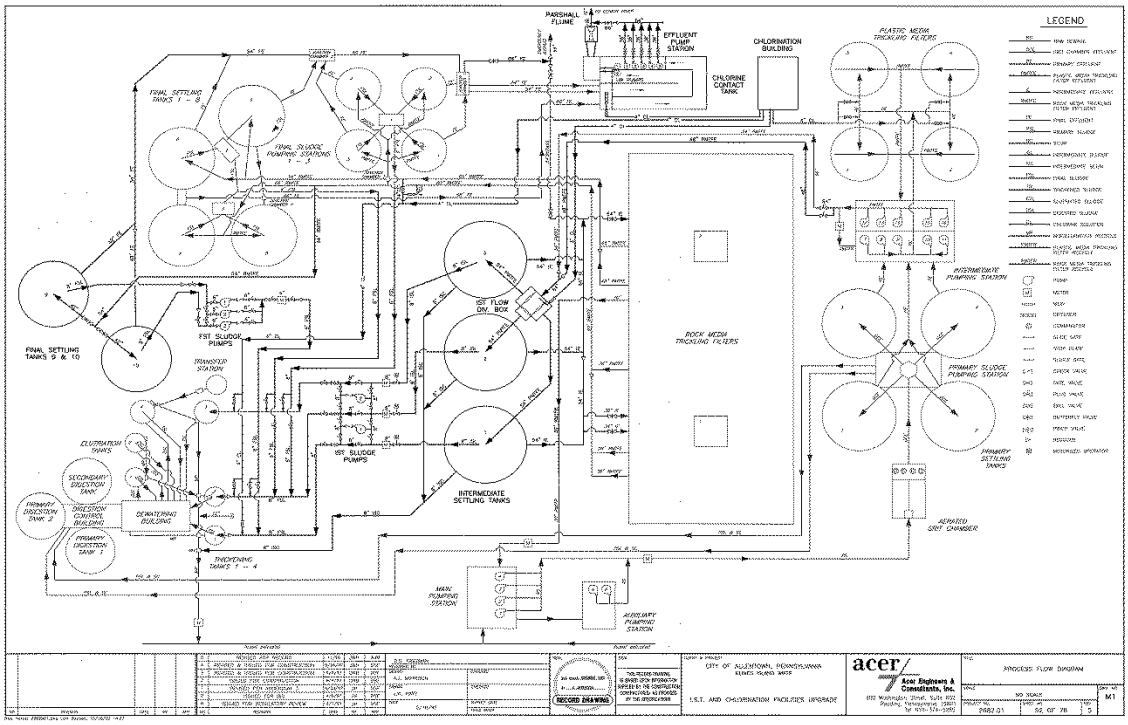



**Exhibit III – 3: KIWWTP Process Flow Schematic**

## CONVEYANCE FACILITIES

There are several interceptor systems and pump stations used to convey sewage from the service area to the KIWWTP.

The major interceptors and trunklines comprising the LCA service area include the following:

- Western Lehigh Interceptor (LCA)
- Industrial Blvd Trunkline (UMT)
- Lower Iron Run Interceptor (LCA)
- Breinigsville Trunkline (LCA)
- Upper Macungie Trunkline (UMT)
- Alburtis Macungie Trunkline (LCA)

The City of Allentown conveyance system is comprised of the following Interceptors:

- Little Lehigh
- Southside
- Trout Creek
- East Side
- Jordan Creek
- Lehigh

- Hanover
- Allentown-Emmaus
- Cedar Creek

The two major conveyance related pump stations include the following:

- Spring Creek Pump Station (LCA)
- Park Pump Station (LCA)

## 3. PROBLEMS WITH EXISTING FACILITIES

### LCA INDUSTRIAL PRETREATMENT PLANT (PTP)

Much of the facility is nearing its useful life and will require significant upgrades. LCA will be considering alternatives for this upgrade including an option to require the industries to perform their own pretreatment of their waste. Regardless of the alternative selected, it will include the necessary organic (BOD) reduction to prevent an organic overload at the KIWWTP. Therefore, the PTP is not considered a critical component of this Plan. Pretreatment of high-strength waste will still be provided, regardless of the selected alternative.

### KLINE'S ISLAND WWTP (KIWWTP)

The KIWWTP has consistently met its NPDES effluent requirements for years. Aside from infrequent maintenance issues, the plant can be relied upon to perform consistently. Even with increased flows due to RDII, including May 2019 when the monthly flow averaged 47.46 MGD, permit conditions were met every day.

Operation and maintenance of the facility has been consistently performed in accordance with industry standards. Repair, preventative and predictive maintenance on all system components has been recorded and scheduled under a computerized maintenance management system (CMMS). A Master Plan is prepared every five years and a Capital improvement Plan based on the Master Plan recommendations and staff input is updated annually.

As noted in other sections of this report hydraulic loading is a concern during wet-weather events which occasionally result in activation of Outfall 003 and during prolonged periods of persistent wet-weather such as the 2018-2019 period. Outfall 003 is activated when the influent flow rate reaches approximately 87 MGD.

The firm capacity of the KIWWTP's influent pumping system is approximately 85 MGD (i.e. the capacity with one pump out of service for maintenance). Therefore, if Outfall 003 did not exist and if the influent pumping system was operating at its firm capacity, all flow to the KIWWTP in excess of 85 MGD would overflow in the upstream conveyance system. If all pumps were in operation during a peak flow event resulting in approximately 90 MGD being pumped into the KIWWTP, 90 MGD would initially flow through the aerated grit chambers and primary settling tanks, but due to capacity limitations of the primary

effluent pumping system, which pumps primary effluent to the plastic media tricking filters, only 85 - 87 MGD of primary effluent would be pumped to the plastic media trickling filters and approximately 3 - 5 MGD would overflow the walls of the aerated grit chambers and primary settling tanks.

Based on the current configuration of the KIWWTP's upstream conveyance system, the peak flow that can be currently conveyed to the KIWWTP is approximately 105 MGD, resulting in approximately 85-87 MGD being pumped into the KIWWTP for treatment. Any peak flows over approximately 87 MGD are diverted to the Little Lehigh Creek through Outfall 003.

The plant has been in operation since 1928 and has undergone a series of improvements over its lifetime to expand its capacity, improve its effluent quality, and replace aging or outdated equipment and infrastructure. The plant performs secondary and tertiary treatment using biological trickling filters. Due to capacity expansions over the years, the plant's peak flow has increased, reducing the frequency with which Outfall 003 has been used. As part of the Act 537 planning effort, LCA evaluated several improvements to the KIWWTP to increase its ultimate peak flow capacity to 150 MGD - as modeling clearly indicates there will be an increase in future peak flows to KIWWTP (as the result of mitigating current upstream sanitary sewer constrictions). The proposed improvements to the core conveyance system will result in a future higher peak flow reaching the treatment plant based on detailed modeling conducted by Arcadis. This Regional Act 537 Plan does not include capacity expansion at KIWWTP because the potential need for capacity expansion is beyond the planning horizon of this plan.

LCA engaged AECOM to evaluate the Biochemical Oxygen Demand (BOD) capacity of the KIWWTP. This assessment was conducted using an updated GPS-X process model to analyze the plant's capacity under various conditions. A copy of the full report can be found in Appendix 6.

### LITTLE LEHIGH INTERCEPTOR (LLI)

COA's 30"- 36" cast in place Little Lehigh Interceptor (LLI) was constructed in 1928 to convey flow from the City of Allentown to the 1926 60" Jordan Creek Interceptor (JCI) immediately upstream of KIWWTP. This interceptor connected planned tributary interceptors and trunklines. COA and its surrounding communities have experienced significant development, leading to increased demand on the existing sewer infrastructure. Constructed in phases from 1928 to 1998, the current network, including the LLI and its connected interceptors, is unable to adequately handle current and anticipated future flows, necessitating the development of the KISS Relief Interceptor (KRI).

SSOs currently occur at Outfall 003 and directly upstream of the Water Filtration Plant. Other major SSOs occur upstream of the Park Pump Station in the Allentown Parkway system and near the bottleneck approximately 1,000' upstream of the KIWWTP. This bottleneck (Little Lehigh Interceptor merges with the Park Pump Station Force Main, City's Trout Creek Interceptor, and the Salisbury Relief Interceptor) is the first major issue upstream of the KIWWTP. Upstream of this bottleneck there are various siphons under the Little Lehigh Creek, including a major pinch point under the Filtration Plant's raw water intake piping.

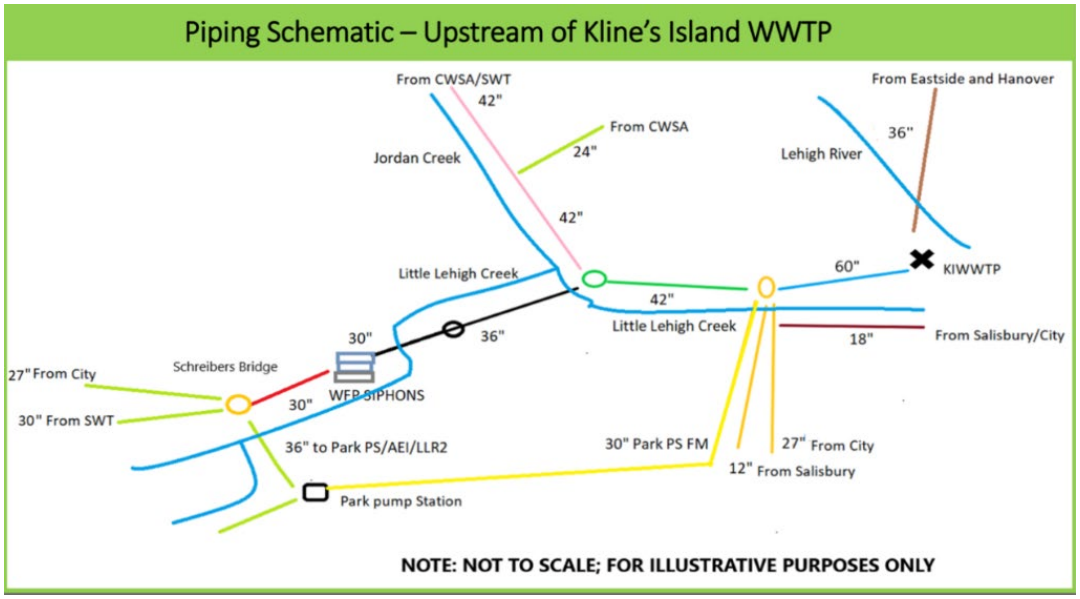



**Exhibit III – 4: Piping Schematic Upstream of the KIWWTP**

The 1930s Little Lehigh Interceptor is currently pressurized (surcharged) near the Water Filtration Plant during normal dry day flow conditions due to inadequate piping configurations. And this is occurring with four relief facilities (Park PS, Little Lehigh Relief Phase 2 parallel interceptor, South Whitehall Cedar Creek Relief Interceptor and the Salisbury Trout Creek Relief Interceptor) in operation.

The figure below is a hydraulic profile of the Little Lehigh Interceptor from KIWWTP to the Schreiber's Bridge area upstream of the Allentown Water Filtration Plant. This is a profile of the sewage flow under "normal" 2021 flow conditions as modeled with the flow characterization study data. Even with the Park Pump Station operating, the existing Little Lehigh Interceptor is surcharged during average dry weather conditions. Proper operation and maintenance of this approximately 2-mile section of interceptor is not feasible due to constant surcharging conditions.

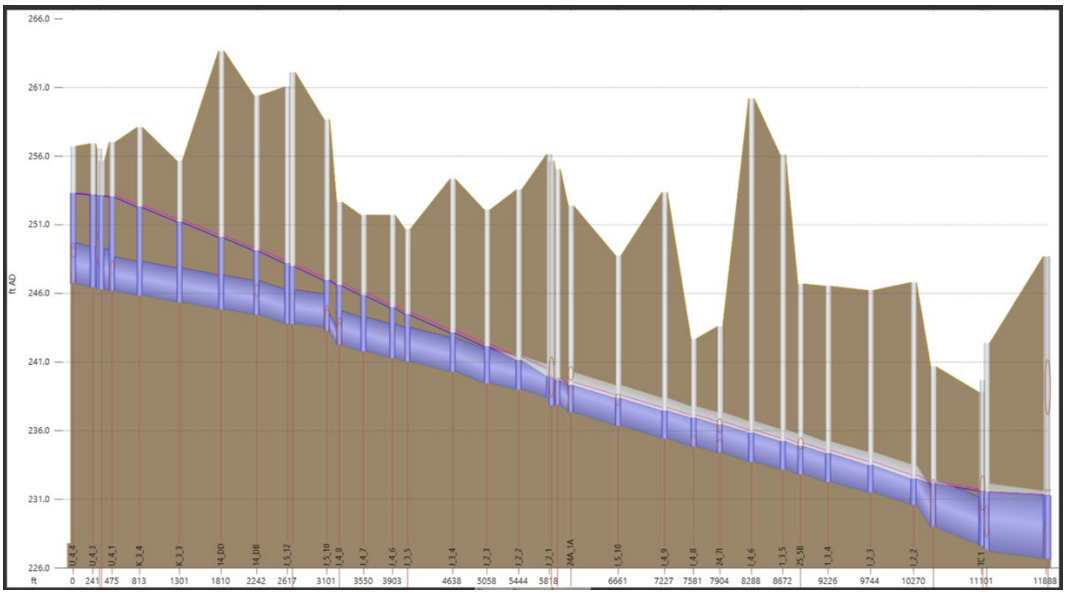



**Exhibit III – 5: Little Lehigh Interceptor Average Dry Weather Modeling Results**

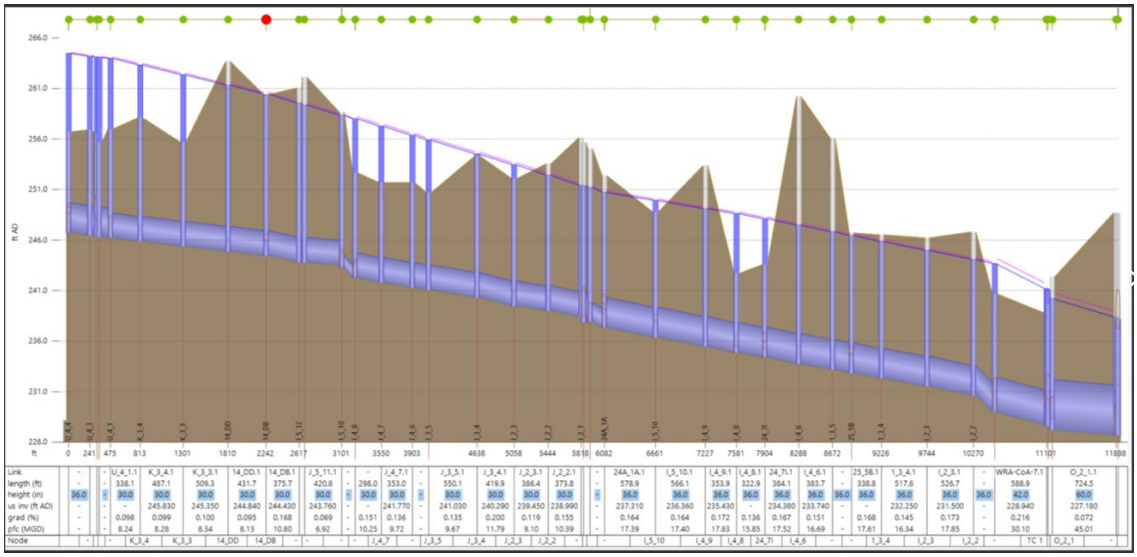



**Exhibit III – 6: Little Lehigh Interceptor Wet Weather ("Ida") Modeling Results**

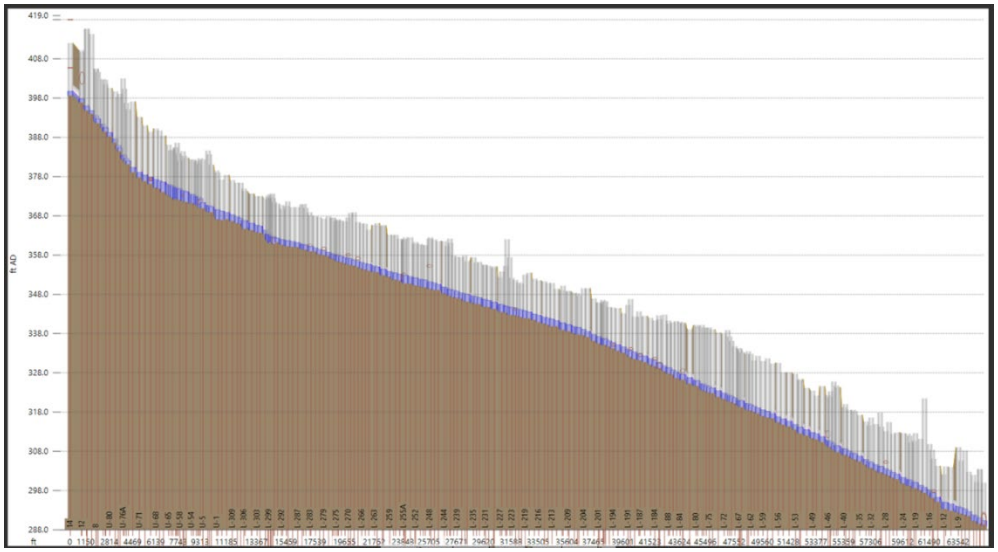
The Park Pump station and force main were originally constructed to provide relief to this section of the conveyance system. As the first relief facility built to alleviate downstream interceptor surcharging in the early 1980s, its original intent was to operate only during wet weather events. After 40 years of additional upstream growth, the facility must now operate continuously. In fact, before the Park PS was constructed, a temporary (three+ years) piping system was constructed to parallel the existing Little Lehigh Interceptor. Now, almost 50 years later, the force main is aging and will require additional evaluation and rehabilitation within the next decade. There is insufficient capacity in the interceptor to completely shut

down the force main for repairs. A failure of the force main before construction of the KISS Relief Interceptor will result in SSOs. The municipalities are mitigating this risk by initiating the planning of this improvement in this Regional Act 537 Plan. The force main was inspected by Arcadi in 2021. A copy of their inspection report can be found in Appendix 19.

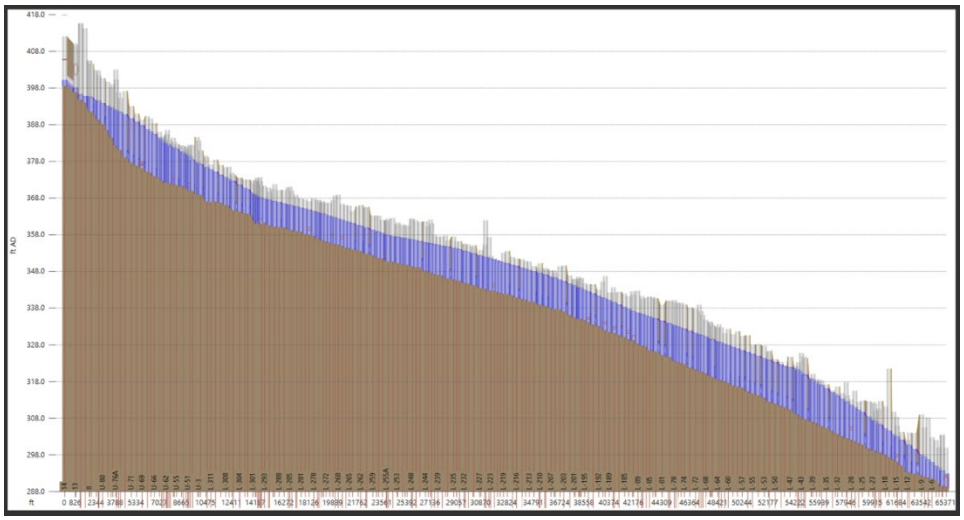
The final sizing of the proposed KRI piping will be reevaluated following the completion of the SRPs in this Regional Act 537 Plan.

### WESTERN LEHIGH INTERCEPTOR (WLI)

The Western Lehigh Interceptor (WLI), serving the LCA since 1972, has reached a point where expansion is critical to accommodate dry-weather flows as well as the growth and infrastructure demands of the WLSP. The continuous population growth along with the aging of the existing sewer assets have necessitated the need for additional conveyance relief, as supported by growth projections in this Plan. To address this, new infrastructure may be developed to manage both dry and wet weather flows for the WLSP partners, ensuring delivery to LCA's Meter Station 5. A parallel relief interceptor is envisioned to be required in the future to provide the necessary conveyance capacity.



**Existing Exhibit III – 7: Western Lehigh Interceptor Dry Weather Modeling Results**



**Existing Exhibit III – 8: Western Lehigh Interceptor Wet Weather ("Ida") Modeling Results**

## SOURCE REDUCTION PLANS (SRPs)

A statistical summary of all 87 metered basins from the 2021 FCS shows among other items, three main data points: (1) baseline infiltration %, (2) length normalized rain derived inflow and infiltration, and (3) average peaking factor.

The metered basins were strategically selected to develop the system hydraulic model. The basins can be further divided by municipality:

- City of Allentown (38)
- Coplay Whitehall Sewer Authority (15)
- Salisbury Township (5)
- Borough of Emmaus (7)
- South Whitehall Township (7)
- Hanover Township (1)
- Upper Macungie Township (7)
- Lower Macungie Township (6)

The basins were then prioritized based on each of those three criteria as illustrated in the table below:

| METER | SIGNATORY | Basin Length (LF) | Approximate MHs | *BASELINE INFILTRATION RANK* | RAINFALL-DERIVED INFILTRATION RANK | *INFLOW RANK* |
|---|---|---|---|---|---|---|
| ALBERT_Net | City | 9,059 | 45 | 3 | 1 | 1 |
| CEDAR CREEK RI_Net | SWT | 15,526 | 70 | 1 | 26 | 44 |
| UNION 2_Net | City | 11,428 | 57 | 54 | 2 | 15 |
| LITTLE CEDAR CREEK_Net | City | 40,306 | 202 | 2 | 10 | 31 |
| EB4 | EB | 45,240 | 204 | 18 | 17 | 2 |
| LITTLE LEHIGH_Net | City | 20,278 | 101 | 45 | 3 | 19 |
| SW54 | SWT | 168,942 | 761 | 72 | 29 | 3 |
| North 6th 2_Net | City | 12,585 | 63 | 7 | 4 | 22 |
| Irving Park_Net | City | 25,186 | 126 | 4 | 21 | 29 |
| EB2_Net | EB | 17,737 | 80 | 64 | 15 | 4 |
| Hanover TL_Net | City | 48,683 | 243 | 5 | 32 | 41 |
| MLK 3_Net | City+ST | 20,987 | 105 | 58 | 5 | 34 |
| MM3 aka Phase 3_Net | UMT | 87,238 | 393 | 50 | 18 | 5 |
| SUMNER 5_Net | City | 18,509 | 93 | 10 | 6 | 18 |
| North 12th | City | 48,091 | 240 | 6 | 81 | 83 |
| MLK 2_Net | City+ST | 35,573 | 178 | 20 | 19 | 6 |
| Tioga_Net | City | 26,815 | 134 | 33 | 7 | 74 |
| Ritter Elementary | City | 59,725 | 299 | 42 | 14 | 7 |
| Trout Creek Park | City | 141,700 | 709 | 8 | 47 | 59 |
| North 6th_Net | CWSA | 47,742 | 215 | 81 | 8 | 71 |
| MS2/MS2 Temp_Net | LMT | 52,177 | 235 | 37 | 31 | 8 |
| BASIN STREET 2_Net | City | 39,222 | 196 | 12 | 9 | 50 |
| SUMNER 4_Net | City | 19,914 | 100 | 9 | 30 | 39 |
| ST10 | ST | 104,982 | 473 | 16 | 20 | 9 |
| U_26_84 (ST6) | ST | 34,414 | 155 | 53 | 48 | 10 |
| CW Lehigh_Net | CWSA | 43,946 | 198 | 66 | 11 | 13 |
| Eberhart West_Net | CWSA | 46,901 | 211 | 32 | 78 | 11 |
| DS_Net | LMT | 116,879 | 526 | 11 | 12 | 55 |
| Tarkett_Net | CWSA | 47,775 | 215 | 67 | 49 | 12 |
| EASTSIDE | City | 11,651 | 58 | 14 | 13 | 73 |
| Industrial Blvd_Net | UMT | 125,630 | 566 | 13 | 56 | 82 |
| MM8 | UMT | 150,953 | 680 | 60 | 40 | 14 |
| JUNIATA_Net | City | 32,229 | 161 | 15 | 16 | 69 |
| SW51 | SWT | 44,592 | 201 | 24 | 25 | 16 |
| EB3 | EB | 15,447 | 70 | 77 | 41 | 17 |
| US Dorney | SWT | 55,608 | 250 | 17 | 35 | 53 |
| EB4a | EB | 99,644 | 449 | 19 | 50 | 36 |
| Bradford | City | 36,318 | 182 | 29 | 42 | 20 |
| AMERICAN_Net | City | 49,094 | 245 | 51 | 39 | 21 |
| ST. ELMO_Net | City | 83,039 | 415 | 21 | 44 | 32 |
| Park Blvd | City | 15,894 | 79 | 22 | 60 | 60 |
| Fairmont_Net | CWSA | 8,191 | 37 | 34 | 22 | 46 |
| MS1 | Alburtis | 48,046 | 216 | 88 | 43 | 23 |
| LEHIGH | City | 8,685 | 43 | 87 | 23 | 37 |
| ST1 Surrogate | ST | 32,860 | 148 | 23 | 84 | 87 |
| MS3_Net | Macungie | 91,552 | 412 | 74 | 57 | 24 |
| SW56 | SWT | 31,158 | 140 | 28 | 24 | 38 |
| EAST MAPLE | City | 64,042 | 320 | 59 | 38 | 25 |
| BASIN STREET 1 | City+ST | 63,689 | 318 | 25 | 37 | 35 |

**Exhibit III –9: Basin Prioritization Based on FCS Flow Monitoring Data**

The following exhibit indicates that 80% of model-predicted-inflow is from 50% of the manholes and 90% of model-predicted-inflow is from 65% of the manholes.

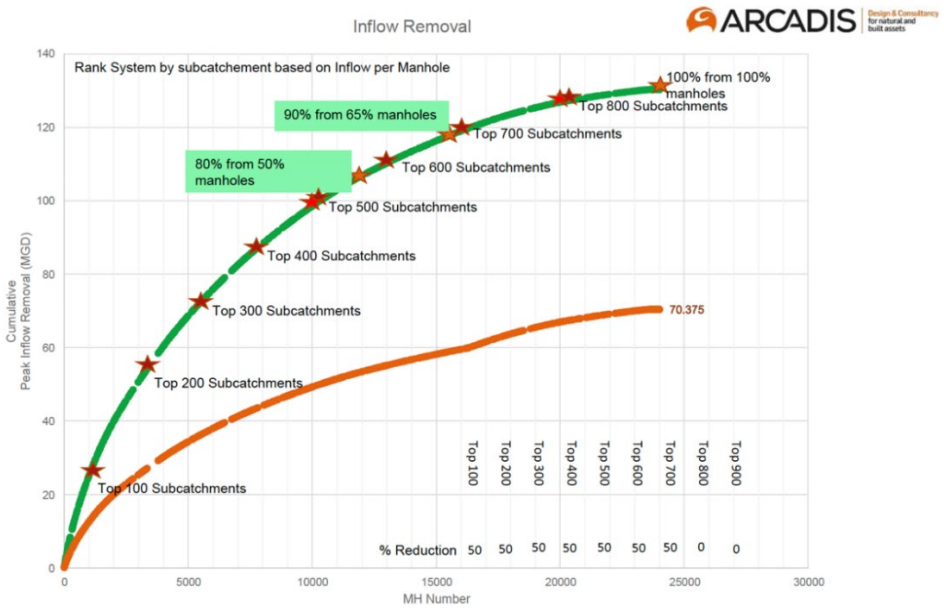



**Exhibit III –10: Basin Prioritization Based on Inflow Removal**

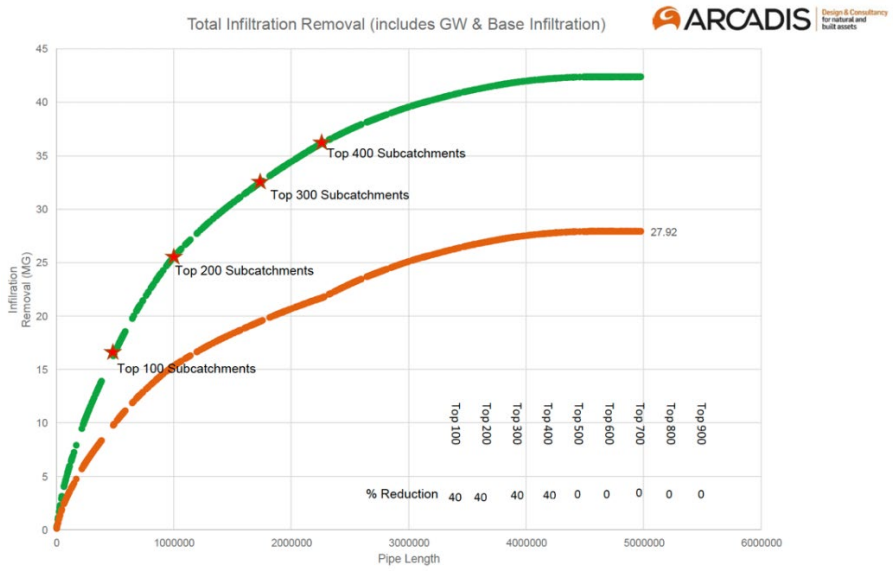



**Exhibit III –11: Basin Prioritization Based on Infiltration Removal**

Exhibit III-10 clearly indicates the inflow issue associated with manholes throughout the system. The above graph (Exhibit III-11) indicates that removing infiltration from the top 400 sub-catchments is the

ideal number to target. "Diminishing returns" result from removing infiltration beyond the top 400 sub-catchments (i.e. it becomes economically untenable).

Based on analysis of the FCS data, approximately 10 MGD out of the average metered KIWWTP flow of 31-33 MGD is a result of baseline infiltration. As will be discussed later in this plan, when using best engineering judgments in the hydraulic model with the municipality supplied SRP approach, a baseline reduction of 2 - 3 MGD is achievable. This reduction value is being further refined based on new hypothetical modeling efforts.

Each municipality developed an individual SRP tailored for their respective collection system. In many cases, several municipalities collaborated on I&I removal techniques and standardized their approaches to repairs and upgrades. These SRPs represent a collaborative effort that has already begun and will continue to be implemented throughout the planning horizon of this Regional Act 537 Plan. Additionally, these SRPs were used to predict significant removal of extraneous flow which were used in the extensive modeling effort to develop the various alternatives that address future collection and conveyance needs.

## 4. UPGRADES AND EXPANSIONS TO EXISTING FACILITIES

**Trexlertown Pump Station**

The Trexlertown Special Study proposed a new interim pump station and force main located adjacent to the Industrial Pretreatment Plant (PTP) located at 7676 Industrial Blvd., Allentown PA, that will divert flow away from the Western Lehigh Interceptor and pump it into the Upper Macungie Trunk Line (UMTL) at manhole PH3034A. The UMTL has both unused dry day capacity (approximately 2.5 MGD) and unused wet weather capacity (0.6 MGD) and flows by gravity into the Spring Creek Pump Station. Note that the Western Lehigh Interceptor also flows by gravity into the Spring Creek Pump Station, so there will be no measurable impact on the Spring Creek Pump Station.

**KIWWTP 100 MGD Upgrade**

The Intermediate Pump Station (IPS) Improvements will enhance the capacity and reliability of the KIWWTP. The project will replace outdated pumps and motors with modern equipment to increase wet-weather flow capacity from 87 to 100 MGD. The key upgrades include installing five new 300 HP vertical turbine pumps, upgrading electrical systems to handle increased load demands, and incorporating advanced motor control technologies like 18-pulse Variable Frequency Drives (VFDs) to reduce harmonic distortion.

The project also addresses maintenance challenges and system resiliency by replacing aging components like Motor Control Centers (MCCs) and improving HVAC systems to mitigate overheating issues in the electrical room. Construction strategies aim to maintain plant operations during the upgrade, including phased pump replacements and temporary power systems. The proposed improvements are projected to cost approximately $7.5 million, accounting for inflation and modern equipment costs.

This initiative aligns with the 2019 KIWWTP Master Plan's goals of addressing hydraulic bottlenecks and preparing for future wet-weather flow capacity increases to reduce sewer overflows and improve system efficiency.

In November 2024, Arcadis prepared a memo describing the impact on the collection system if the KIWWTP influent pump station's capacity was increased to 100 MGD. This "No New Conveyance Evaluation" report assesses the impacts of upgrading the Main and Auxiliary Pump Stations (MPS-APS) to 100 MGD without implementing upstream conveyance improvements. The study models both current (2021) and future (2050) flows, incorporating anticipated development, water conservation, and I&I impacts. The analysis used the August-September 2021 storm events, including Hurricane Ida, as benchmarks. Key findings include:

1. Upgrading the MPS-APS to 100 MGD benefits wet weather flows only in the final segments near the KIWWTP.
2. The model predicts there will be no activations of Outfall 003.
3. Upstream SSOs persist during peak wet periods, unaffected by the increased pumping capacity.
4. The improvements have no effect on average dry-day flows or peak hydraulic grade lines in the lower Little Lehigh Interceptor.

The study concludes that increasing MPS-APS capacity addresses localized downstream issues (Outfall 003) during wet weather but does not mitigate upstream SSOs or significantly impact dry weather performance. The results are supported by blossom diagrams illustrating hydraulic performance for various storm and dry-day scenarios. Refer to Appendix 24 for a copy of the memo.

These two projects (Trexlertown and KIWWTP 100 MGD) are being built under the existing planning approvals.

### 5. OPERATION AND MAINTENANCE REQUIREMENTS FOR SMALL FLOW FACILITIES

Lower Macungie Township is the only KISS municipality with small flow treatment facilities as follows:

| | |
|---|---|
| 6936 Mountain Road | Capacity: 400 GPD (Operating) |
| 8278 Mertztown Road | Capacity: 500 GPD (Under Construction) |

Both small flow facilities have PADEP Water Quality Management permits that define the operation and maintenance requirements. In addition, both systems have operation and maintenance agreements between the property owner and the Township which require the property owners to properly maintain the systems. If the systems are not properly maintained, the Agreements allow for municipal intervention to correct any problems. There have been no compliance or operational issues reported on the Mountain Road system.

## C. WASTEWATER SLUDGE AND SEPTAGE GENERATION, TRANSPORT, AND DISPOSAL METHODS

### 1. SOURCES OF WASTEWATER SLUDGE OR SEPTAGE

**Borough of Emmaus**

There are two single-family residential properties in the Borough of Emmaus served by On-Lot Disposal Systems (OLDS). They are located at 340 and 380 S. Cedar Crest Boulevard. The size of their tanks is

unknown, but if they have 1,000 gallon tanks and the tanks are cleaned out every 3 years, the total annual quantity of septic tank solids would be estimated at 500 gallons per year.

The Cintas commercial laundry operation, located at 164 East Main Street, has an Industrial Waste Permit for the pre-treatment facilities that handle wastewater from the laundry prior to discharge into the Borough's collector sewer system. The Borough does not have information on the specifics of the management of any solids generated.

### Lower Macungie Township

See section 2, page III-20.

### Borough of Alburtis

The Borough of Alburtis does not generate any wastewater sludge or septage within the KISS service area.

### City of Allentown

City of Allentown has 45 properties that generate septage as follows:

| Label | Property Address |
|---|---|
| 1 | 45 E EATON ST |
| 2 | 2524 ROY ST SW |
| 3 | 2524 BARNES LN |
| 4 | 1432 MACK BLVD |
| 5 | 214 MOUNTAIN PARK RD |
| 6 | 33 37 E EATON ST |
| 7 | 29 31 E EATON ST |
| 8 | 2545 2557 S ALBERT ST |
| 9 | 811 829 CONSTITUTION DR |
| 10 | 121 E WYOMING ST |
| 11 | 910 928 CONSTITUTION DR |
| 12 | 225 249E WYOMING ST |
| 13 | 805 809 CONSTITUTION DR |

14 223 E WYOMING ST

15 348 350 BARBER ST

16 337 345 BARBER ST

17 1024E ELM ST

18 1012 E ELM ST

19 1017E ELM ST

20 1136 1146 CATASAUQUAAVE

21 1135 CATASAUQUAAVE

22 1149 1153 CATASAUQUA AVE

23 1139 1147 CATASAUQUAAVE

24 1905 1909 E KEATS ST

25 765 767 HANOVER AVE

26 1025E ELM ST

27 815 831 HANOVER AVE

28 55 E EATON ST

29 2329 WOOD LN

30 117 213 MOUNTAIN PARK RD N

31 1242 1254 S 5TH ST

32 2345 WOOD LN

33 374 AUBURN ST REAR

34 2315 WOOD LN

35 110 MOUNTAIN PARK RD N

36 502 512 BASIN ST

37 1711 1759 KEYSTONE AVE

38 2619 2675 S 4TH ST

39 2624 S IVY ST

40 2702 ROY ST SW

41 315 BASIN ST

42 769 775 HANOVER AVE

43 2403 WEISS CT

44 1715 E TREMONT ST

45 121 E. WYOMING ST.

**Lowhill Township**

Lowhill Township does not generate any wastewater sludge or septage within the KISS service area.

**Borough of Macungie**

The Borough of Macungie does not generate any wastewater sludge or septage within the KISS service area.

**North Whitehall Township**

North Whitehall Township does not generate any wastewater sludge or septage within the KISS service area.

**Salisbury Township**

Salisbury Township does not generate any wastewater sludge or septage within the KISS service area.

**Upper Milford Township**

See section 2, page III-21

**Weisenberg Township**

Weisenberg Township does not generate any wastewater sludge or septage within the KISS service area.

**South Whitehall Township**

South Whitehall Township does not generate any wastewater sludge or septage within the KISS service area.

**Upper Macungie Township**

Upper Macungie Township has 779 properties with on-lot septic disposal fields. The Township manages the disposal of septage requiring one third of the systems to pump their septic tanks every year.

**Whitehall Township**

No data available.

**Borough of Coplay**

No data available.

**Hanover Township**

Hanover Township has seven residential properties with on-lot septic disposal fields. Based on water consumption records, the quantity of septage is estimated in the table below.

| Usage | Property Address | City | State | Zip Code | Tot. Use. (2024 - Q1 and Q2)* | Water Meter Size |
|---|---|---|---|---|---|---|
| Residential | 1735 N. Irving St. | Allentown | PA | 18109 | 12,000 | 5/8" |
| Residential | 1680 N. Irving St. | Allentown | PA | 18109 | 11,000 | 5/8" |
| Residential | 1640 N. Irving St. | Allentown | PA | 18109 | 20,000 | 5/8" |
| Residential | 1630 N. Irving St. | Allentown | PA | 18109 | 0 | 5/8" |
| Residential | 1620 N. Irving St. | Allentown | PA | 18109 | 16,000 | 5/8" |
| Residential | 1540 N. Irving St. | Allentown | PA | 18109 | 47,000 | 5/8" |
| Residential | 1520 N. Irving St. | Allentown | PA | 18109 | 35,000 | 5/8" |
| Residential | 770 Lloyd St. | Allentown | PA | 18109 | 13,000 | 5/8" |

**Exhibit III – 12: Summary – Hanover Township On-Lot Disposal Fields**

## 2. QUANTITIES OF WASTEWATER SLUDGE OR SEPTAGE GENERATED

**Borough of Emmaus**

The size of the tanks discussed above is unknown but septage generation is estimated to be 500 gallons per year.

**South Whitehall Township**

South Whitehall Township does not generate any wastewater sludge or septage within the KISS service area.

**Upper Macungie Township**

Upper Macungie Township has 779 properties with on-lot septic systems. Every year, one-third of those systems are required to pump out their septic tanks. The Township does not maintain records on the volume of septage removed for treatment, however, the quantity can be estimated. The Township averages 260 cleanouts per year. If the average tank size is 1,000 gallons, then approximately 260,000 gals of septage is generated each year.

**Hanover Township**

Hanover Township does not maintain records of quantities of sludge or septage pumped.

**Borough of Alburtis**

The Borough of Alburtis does not generate any wastewater sludge or septage within the KISS service area.

**City of Allentown**

It is estimated the City of Allentown has an annual septage generation of 15,000 gallons. Private haulers are used to transport the septage to the Pretreatment Plant for disposal.

**Lowhill Township**

Lowhill Township does not generate any wastewater sludge or septage within the KISS service area.

**Borough of Macungie**

The Borough of Macungie does not generate any wastewater sludge or septage within the KISS service area.

**North Whitehall Township**

North Whitehall Township does not generate any wastewater sludge or septage within the KISS service area.

**Salisbury Township**

Salisbury Township does not generate any wastewater sludge or septage within the KISS service area.

**Weisenberg Township**

Weisenberg Township does not generate any wastewater sludge or septage within the KISS service area.

**Whitehall Township**

No data available.

**Borough of Coplay**

No data available.

###

## 3. PRESENT DISPOSAL METHODS, LOCATIONS, CAPACITIES, AND TRANSPORTATION METHODS

### Borough of Emmaus

The two properties with OLDS listed above are responsible for maintenance of their private OLDS, and the Borough does not have information available on the haulers contracted by the property owners or the haulers' disposal location(s).

### Lower Macungie Township

See the below list for the companies used to haul septage in the Township. In 2021, the Township received 240 cleanout receipts. 188 receipts were received in 2022, and 248 receipts were received in 2023. That equates to an average of 225 cleanouts over the past three years. If the average tank size is 1,000 gallons, then approximately 225,000 gals of septage are generated every year.

- All Jays Septic
- Allstate Septic Systems LLP
- Barbosa Sewer and Drain, Inc.
- Christman's Septic Service
- Clemens Septic Service
- Clifford Hill Sanitation Service Inc.
- Kiriposki & Sons Inc.
- Richard R. Schmick Inc.
- Winding Creek Septic Services, LL

### South Whitehall Township

South Whitehall Township does not generate any wastewater sludge or septage within the KISS service area.

### Salisbury Township

Salisbury Township does not generate any wastewater sludge or septage within the KISS service area.

### Borough of Macungie

The Borough of Macungie does not generate any wastewater sludge or septage within the KISS service area.

### Borough of Alburtis

The Borough of Alburtis does not generate any wastewater sludge or septage within the KISS service area.

### Upper Macungie Township

See the list below for the companies used to haul septage in the Township.

- All Jays Septic
- Allstate Septic Systems LLP
- Bethlehem Sewerage & Excavating
- Christmans Septic Service
- Clemens Septic Service
- Clifford Hill Sanitation Service Inc
- Fisher Sanitary Service Inc
- Henry Yeska & Son Inc
- Millers Sanitary Service
- Richard R. Schmick, Inc.
- Siegfried Septic Service, LLC
- Valley View Construction Svc
- Zoom Drain
- Kiriposki & Sons
- Lauman's Septic

Treatment for all registered haulers is the LCA Pretreatment Plant with the following exceptions:

Clemens Septic Service takes their septage to the Quakertown WWTP.

Fisher Sanitary Service takes their septage to Kutztown WWTP.

Zoom Drain takes their septage to DELCORA WWTP.

### Hanover Township

Hanover Township does not maintain a list of registered pump haulers in the Township, nor do they track to which treatment facility the sludge / septage is being disposed.

### Upper Milford Township

Lower Milford Township residents use private haulers to dispose of their septage within the Township. The private haulers utilize the LCA Pretreatment Plant for disposal of the septage.

### Lowhill Township

Lowhill Township does not generate any wastewater sludge or septage within the KISS service area.

### Weisenberg Township

Weisenberg Township does not generate any wastewater sludge or septage within the KISS service area.

### City of Allentown

The City of Allentown includes 45 properties that have on-lot disposal systems. Based on one-third of these systems disposing of their septage each year, it is estimated that the annual septage generation is 15,000 gallons. Private haulers are used to transport the septage to the LCA Pretreatment Plant for disposal.

#### Whitehall Township

No data available.

#### Borough of Coplay

No data available.

###

# IV. FUTURE GROWTH AND LAND DEVELOPMENT

## A. IDENTIFICATION OF MUNICIPAL AND COUNTY PLANNING DOCUMENTS

### 1. ZONING AND LAND USE FOR THE PLANNING AREA

There are several land use ordinances that can be used as a guide for planning future needs in the Planning Area. Each municipality has its own land use ordinances, as follows:

- The Borough of Alburtis Subdivision and Land Development Ordinance and Zoning Ordinance
- Lowhill Township Subdivision and Land Development Ordinance and Zoning Ordinance
- Borough of Macungie Subdivision and Land Development Ordinance and Zoning Ordinance
- Upper Macungie Township Subdivision and Land Development Ordinance and Zoning Ordinance
- Upper Milford Township Subdivision and Land Development Ordinance and Zoning Ordinance
- Weisenberg Township Subdivision and Land Development Ordinance and Zoning Ordinance
- Lower Macungie Township Subdivision and Land Development Ordinance and Zoning Ordinance
- City of Allentown Subdivision and Land Development Ordinance and Zoning Ordinance
- Hanover Township Subdivision and Land Development Ordinance and Zoning Ordinance
- Borough of Coplay Subdivision and Land Development Ordinance and Zoning Ordinance
- Whitehall Township Subdivision and Land Development Ordinance and Zoning Ordinance
- North Whitehall Township Subdivision and Land Development Ordinance and Zoning Ordinance
- Borough of Emmaus Subdivision and Land Development Ordinance and Zoning Ordinance
- Salisbury Township Subdivision and Land Development Ordinance and Zoning Ordinance
- South Whitehall Township Subdivision and Land Development Ordinance and Zoning Ordinance

The purpose set forth by these subdivision and land development ordinances is as follows:

- To provide and protect for the public health, safety, and general welfare of the community;
- To guide for future growth and development of the municipality in accordance with the Comprehensive Plan;
- To provide for adequate light, air, and privacy, to secure safety from fire, flood, and other danger, and to prevent overcrowding of the land and undue congestion of population;

- To protect the character and the social and economic stability of the municipality and to encourage the orderly and beneficial development of the municipality;
- To protect and conserve the value of the land throughout the municipality and the value of buildings and improvements upon the lands; and to minimize the conflicts among the uses of land and buildings;
- To guide public and private policy and action to provide adequate and efficient transportation, water, sewerage, schools, parks, playgrounds, recreation, and other public requirements and facilities;
- To provide the most beneficial relationship between the uses of land and building, the circulation of pedestrian and vehicular traffic throughout the municipality, having particular regard to the avoidance of congestion in the streets and highways, and to provide for the proper location and width of streets and building lines;
- To establish reasonable standards of design and procedures for land development to further the orderly layout and use of the land; and to ensure proper legal descriptions and monumenting of land developments;
- To ensure that public facilities and available and will have a sufficient capacity to serve the proposed subdivision and/or land development;
- To prevent the pollution of air, streams, and ponds; to ensure the adequacy of drainage facilities; to safeguard the water table; and to encourage the wise use and management of natural resources throughout the western Lehigh region to preserve the integrity, stability, and the beauty of the community and the value of the land;
- To ensure the natural beauty and topography of the municipality and to ensure appropriate development with regard to these natural features; and
- To provide for adequate open space through the most efficient design and layout of the land.

The purpose set forth by the municipal zoning ordinance is as follows:

To promote public health, safety, morals, or the general welfare of the present and future inhabitants of the municipality by:

- Encouraging the most appropriate use of land;
- Preventing the overcrowding of land;
- Avoiding undue congestion of population;
- Conserving the value of land and buildings;
- Lessening the congestion of traffic on the roads and highways;
- Providing for adequate light and air;
- Securing safety from fire, panic, flood, or other dangers;
- Facilitating the adequate provision of transportation, vehicular parking and loading space, water, sewerage, schools, parks and other public grounds and facilities;
- Giving reasonable consideration, among other things, to the character of all areas of the Township and their suitability for particular land uses;
- Giving effect to the policies, proposals, and the statement of community development objectives contain in the Comprehensive Plan; and
- Promoting small business development and fostering a business-friendly environment in the municipality.

### 2. IDENTIFICATION OF ZONING REGULATIONS

Each municipality in the Planning Area has its own Zoning Ordinance/Code that serves to establish regulations that apply to all zoning districts.

### 3. FLOODPLAIN, STORMWATER MANAGEMENT, AND SPECIAL PROTECTION LIMITATIONS AND PLANS

The Lehigh County Emergency Services and Northampton County Emergency Services agencies jointly released the "Lehigh Valley Hazard Mitigation Plan," on October 11th, 2024. This is a comprehensive document outlining the Lehigh Valley community, employment, population, land use, and development. A major portion of the document outlines risk assessment, from inclement weather to natural disasters, and other types of hazards. Section 4.3.4 "Flood, Flash Flood, Ice Jam," deals with observed historical flooding trends of the area, in addition to efforts of mitigation.

As this plan notes, "flooding is the most significant natural hazard in the Lehigh Valley. Riverine, flash, stormwater, and ice jam floods occur around rivers, streams, and creeks found throughout the Lehigh Valley. Stormwater/urban flooding occurs in areas of ditches, storm sewers, retention ponds, and other facilities constructed to store run-off. The State has designated 16 watersheds in Lehigh and Northampton Counties for the purposes of stormwater management. The Lehigh Valley has ordinances in place for all 16 watersheds."

## B. DESCRIPTION OF GROWTH AND DEVELOPMENT

### 1. AREAS WITH EXISTING DEVELOPMENT OR PLOTTED SUBDIVISIONS

The municipalities have a network of trunk mains and tributary mains that collect flow from subdivisions within the Planning Area. The map in Appendix 2 shows the bounds of the existing collection and conveyance system. However, it is not the intent of this Plan to preclude a planning module from expanding the service area.

### 2. LAND USE DESIGNATIONS

Land use within the Planning Area is designated per each municipality's respective Zoning Ordinance. Zoning for the Planning Area can be found within each municipality's Zoning ordinance. Each Municipality submitted flow projections consistent with their respective Municipal Zoning Ordinance.

### 3. FUTURE GROWTH AREAS, POPULATION, AND EDU PROJECTIONS FOR THE PLANNING AREA

Growth and development planning module projections for the period 2020, 2021-2025, and 2026-2035 can be found in Exhibit IV-1. These projections were determined by each municipality based on known pending or anticipated development. These flow projections are based on only new projected planning modules and do not include previously approved modules. Individual flow projections for each

municipality, including project locations, EDUs, parcel address, type of development and development year can be found in Appendix 18.

This Plan proposes an additional 3.80 MGD of flow (2026-2035 connections) be approved as part of the current Connection Management Plan. With this Plan submission, the KISS municipalities request PADEP approve the full 3.80 MGD be added to the current CMP.

This Regional Act 537 Plan is based on the following:

- 4.6 MGD of new connections granted in 2020 and 2021 to 2025 (approximately 2.6 MGD remains)
- Approximately 3.80 MGD of additional new connections are requested for the period 2026-2035
- SRP Progress Reporting (municipal supplied I&I removal data) from 1/1/2020 through 12/31/2024 and beyond will be submitted to PADEP later in 2025. The future frequency of this data delivery will be determined upon PADEP feedback received from the initial submission.
- The municipalities intend to combine the remaining allocations approved by PADEP with the 2035 flow projections found in this Regional Act 537 Plan. There is an expectation that some of the developments prior to 2025 will be pushed into the 2026-2035 planning period.

Rehabilitation Effectiveness

The process for quantifying the effectiveness of planned rehabilitation projects is consistent with the previously approved WLSP *Sewer Capacity Assurance & Rehabilitation Program* from October 2009 (approved by PADEP in 2011).

Rehabilitation project specific effectiveness monitoring will be conducted to:

- Quantify the I&I removal effectiveness of the rehabilitation projects.
- Quantify the cost-benefit of the various rehabilitation methods.
- Fine tune or refocus the selection of rehabilitation techniques based on these findings.

For many of the rehabilitation projects, flow meters will be installed to gauge project specific effectiveness. Several metrics may be used to determine the effectiveness of projects designed to eliminate I&I:

1. Reduction in total system volume resulting from a rain event - Total system volume resulting from a rain event is calculated by totaling the hourly flow volumes measured during the I&I period.

2. Reduction of peak flow rate during a rain event - Peak flow rates are determined by reviewing the hourly data collected during each rain event and identifying the highest measured flow rate.

3. The Control Basin Method (CBM) of analysis may be used to analyze the pre- and post-rehabilitation flow data. The CBM is a correlation between the metrics of the basin undergoing rehabilitation and the "simultaneous" metrics from a control basin. Scatter plots are generated with the metric values from the control basin on the x-axis and the corresponding metric values from the rehabilitation basin on the y-axis. Pre-rehabilitation data is plotted separately from

post-rehabilitation data and both sets are linearly regressed. The percentage difference between the slope from the pre-rehab regression and the slope from the post-rehab regression yields the percentage reduction due to rehabilitation.

If the control basin is well selected (i.e. it exhibits similar physical condition, I&I characteristics, groundwater and rainfall conditions, and is geographically close to the rehabilitation basin), the relationship between the two basins is linear because it is a direct comparison of metrics which occurred during the same storm event. Percent reduction is determined by measuring the difference between the pre-rehabilitation and post-rehabilitation trend lines.

4. Type of rehabilitation performed - Arcadis was engaged to develop a program to track all Source Reduction work by each municipality and based on the type of rehabilitation, provide an estimate of the reduction in RDII. The program includes a detailed analysis of every aspect of collection system rehabilitation and incorporates all 2021 flow modeling data collected for the FCS to generate the flow reductions achieved. This process is described in more detail in Section V.

The following flow projections all fall within the existing Act 537 boundaries for sewer service areas. This Regional Act 537 Plan does not propose the expansion of any existing sewer service areas.

| Municipality / Authority | Projected 2020 Planning Modules (gpd) | Projected 2021-2025 Planning Modules (gpd) REVISED MAY 12, 2021 | Projected 2026-2035 Planning Modules | Total Projected 2020-2035 Planning Modules |
|---|---|---|---|---|
| Borough of Alburtis | 0 | 2,230 | 2,453 | 4,683 |
| City of Allentown | 444,807 | 1,358,980 | 387,475 | 2,191,262 |
| Coplay-Whitehall Sewer Authority* | 76,110 | 191,350 | 355,242 | 622,702 |
| Borough of Emmaus | 63,630 | 54,600 | 36,680 | 154,910 |
| Hanover Township | 0 | 99,904 | 0 | 99,904 |
| Lehigh County Authority** | 0 | 151,640 | 400,000 | 551,640 |
| Lower Macungie Township | 276,996 | 286,778 | 982,741 | 1,546,515 |
| Lowhill Township[3] | 0 | 2,230 | 2,230 | 4,460 |
| Borough of Macungie | 1,115 | 45,269 | 0 | 46,384 |
| North Whitehall Township | 30,975 | 30,975 | 29,925 | 91,875 |
| Salisbury Township | 4,446 | 60,268 | 19,760 | 84,474 |
| South Whitehall Township | 169,175 | 344,312 | 641,794 | 1,155,281 |
| Upper Macungie Township | 428,269 | 458,711 | 890,055 | 1,777,035 |
| Upper Milford Township | 669 | 27,652 | 45,492 | 73,813 |
| Weisenberg Township | 0 | 2,230 | 3,345 | 5,575 |
| Rounding / Adder | 3,808 | 0 | 2,808 | 6,616 |
| TOTAL | **1,500,000** | **3,117,129** | **3,800,000** | **8,417,129** |

[1] Coplay-Whitehall Sewer Authority projections include the Borough of Coplay and Whitehall Township.

[2] 400,000 GPD is for future industrial customers that may connect within the LCA / Western Lehigh service area. The allocation will be assigned to the municipality requesting treatment capacity from this specific pool of allocation.

**Exhibit IV – 1: Flow Projections**

On January 17, 2020, PADEP granted 1,500,000 GPD of additional sewer capacity to the KISS municipalities based on the region's December 31, 2019 request and commitment to completing the work outlined in the request. On September 4, 2020, LCA requested 2,919,426 GPD of additional sewer capacity be granted to the KISS municipalities based on the region's Interim Act 537 Plan. On June 18, 2021, LCA revised the request to 3,117,129 GPD of additional sewer capacity to be granted to the KISS municipalities based on the region's Interim Act 537 Plan.

The table below indicates the amount of allocation, per Municipality, remaining on 12/31/24. Per the Interim Act 537 approval letter dated 6/25/21, any unused allocation from the 2020 Connection Management Plan will be combined with the 2021-2025 projection requests.

| Summary of Allocation | | | |
|---|---|---|---|
| *Municipality* | *2020 Balance* | *2021-2025 Balance* | *Total Balance* |
| Borough of Alburtis | 0 | 2,230 | 2,230 |
| City of Allentown | 0 | 1,111,796 | 1,111,796 |
| Coplay-Whitehall SA | 0 | 190,599 | 190,599 |
| Borough of Emmaus | 15,811 | 54,600 | 70,411 |
| Hanover Township | 0 | 28,673 | 28,673 |
| Lehigh County Authority | 0 | 151,640 | 151,640 |
| Lower Macungie Township | 92,570 | 264,924 | 357,494 |
| Lowhill Township | 0 | 2,230 | 2,230 |
| Borough of Macungie | 0 | 21,681 | 21,681 |
| North Whitehall Township | 0 | 0 | 0 |
| Salisbury Township | 639 | 58,484 | 59,123 |
| South Whitehall Township | 16,850 | 322,969 | 339,819 |
| Upper Macungie Township | 0 | 231,400 | 231,400 |
| Upper Milford Township | 669 | 27,652 | 28,321 |
| Weisenberg Township | 0 | 2,230 | 2,230 |
| ADDER | 1,132 | - | 1,132 |
| TOTALS | 127,671 | 2,471,108 | 2,598,779 |

**Exhibit IV-2 - Summary of Allocations**

This Plan proposes an additional 3.80 MGD of flow be approved as part of the Connection Management Plan that is currently in force. This would be justified in part by the confirmed I&I reductions achieved through the Source Reduction Plans.

## 4. ZONING AND/OR SUBDIVISION REGULATIONS FOR PLANNED DEVELOPMENT

The Subdivision and Land Development regulations, which govern development within the Planning Area, are included in each individual municipality's Subdivision and Land Development Ordinances. These regulations provide each municipality with design standards for open space, recreation, storm water management, sanitary sewage systems, water supply, and other public utilities.

## 5. SEWAGE PLANNING NECESSARY TO PROVIDE ADEQUATE TREATMENT FOR 5- AND 10-YEAR FUTURE PLANNING PERIODS

As noted in the previous section, this Regional Act 537 Plan is based on a planning horizon of 2025 to 2050 as it relates to evaluating treatment and conveyance capacities. Since this Plan relies heavily on the reduction of rainfall derived I&I (RDII), additional flow monitoring is included to measure the progress of the Source Reduction Plans (SRPs). This includes a complete re-evaluation of the Sewage Billing Meters, and a new FCS planned for the early 2030s. The FCS will compare the actual measured flows to what was predicted in the current FCS. Based on this detailed knowledge of the collection and conveyance system, the municipalities can adjust their respective SRPs to maximize reduction of RDII.

This Plan proposes an additional 3.80 MGD (connections through 2026-2035) of flow be approved as part of the Connection Management Plan that is currently in force. This would be justified in part by the confirmed I&I reductions (as part of future quarterly submissions) achieved through the Source Reduction Plans.

###

# V. IDENTIFY ALTERNATIVES TO PROVIDE NEW OR IMPROVED WASTEWATER DISPOSAL FACILITIES

## A. CONVENTIONAL COLLECTION, CONVEYANCE, TREATMENT AND DISCHARGE ALTERNATIVES

### 1. REGIONAL WASTEWATER TREATMENT

Regional wastewater treatment is the current practice for the Kline's Island Sewer System. This Plan envisions continuing with that model as the most efficient method for delivering wastewater treatment to the service area. Although this Regional Act 537 Plan commits to performing only the Source Reduction Plans previously described, it is recognized that significant projects may be required to address the future needs of the service area. Therefore, this Regional Plan begins the preliminary planning (including financing) for these significant "Master Plan" projects, realizing planning must begin now to adequately finance them.

The Act 537 planning effort included evaluating several improvements to the KIWWTP to increase its peak flow capacity as there will be a significant increase in future flows to KIWWTP. Based on detailed modeling conducted by Arcadis, the result of mitigating current upstream hydraulic restrictions that cause sanitary sewer overflows with proposed improvements to the core conveyance system will result in a future higher peak flow reaching the treatment plant.

The KIWWTP peak flow Treatment Approach is based on a current permitted capacity of 44.6 MGD with a peak flow capacity of 87 MGD. Plans (design and permitting) are in place to upgrade this to 100 MGD.

The goal of the peak flow treatment strategy for KIWWTP is to mitigate the occurrence of overflows at Outfall 003 under future conditions by a combination of source reduction of extraneous wet weather flows and increased peak flow capacity to process flows arriving at KIWWTP while achieving discharge limits to the Lehigh River.

The treatment alternatives discussed below were not selected as part of this Regional Act 537 Plan. The alternatives were evaluated to provide future planning information with regard to potential costs. Significant effort was made to establish a long-term treatment plan to determine future costs and how to best start financial planning.

#### KIWWPT 100 MGD Design Enhancements

This project is being completed outside the Regional Act 537 Plan as planning for this project is already in place. The project addresses the proposed enhancements for increasing wet-weather flow capacity at KIWWTP. These improvements aim to increase peak flow capacity from 87 MGD to 100 MGD thereby reducing overflows and the frequency of Outfall 003 activations.

There are three primary areas of focus:

1. Gravity Conveyance System: It highlights upgrades to the system conveying flow from the aerated grit chambers (AGCs) to the Intermediate Pump Station (IPS). The gravity system currently limits flow to 87 MGD, but lowering the wet well level at the IPS could increase capacity to 100 MGD without overflow.

2. Temporary Tertiary Diversion: During severe storm events, biologically treated flow would bypass tertiary treatment temporarily by diverting a portion of it directly to final clarifiers. This does not constitute blending, as all flow will have undergone biological treatment. The diversion is critical for increasing the plant's wet-weather treatment capacity and preparing for future expansions to 120 MGD.

3. Splash Protection: Splash protection systems will be added to prevent overflow of turbulent water in critical chambers during peak flow events. The preferred solution involves installing fiberglass-reinforced plastic (FRP) covers over the grit chambers and primary influent distribution chambers.

In summary, the proposed design enhancements focus on improving hydraulic capacity, reducing overflows, and ensuring operational reliability during severe weather events.

### Comparison of KIWWTP Alternatives – AECOM February 7, 2024, Tech Memo

Many alternatives have been screened during the planning evaluations to manage the projected 132 MGD peak weather event while meeting the PADEP requirements for treatment facilities serving separate sanitary systems (non-combined sewer systems). More specifically, this includes providing biological treatment of all future flow arriving KIWWTP during extreme wet weather storm events in accordance with the NPDES permit requirements. Alternatives considered during the evaluation included the addition of equalization storage at KIWWTP to attenuate peak flows, the addition of in-line peak flow storage within interceptors/tunnels, addition of high-rate treatment train(s) at KIWWTP, reconfiguration of existing facilities into a peak flow arrangement and adding pumping and clarification processes. The options were ultimately refined during the final alternatives analysis stage to 1) the addition of high-rate treatment and 2) implement improvements to allow for the temporary re-configuration of the trickling filters and clarification processes typically arranged in series for typical flow needs to a parallel wet weather mode. The wet weather mode is expected only during extreme wet weather events and is anticipated to be limited to only once or twice each year. These final alternative approaches are the most cost-effective, will achieve regulatory acceptance, are scalable, and demonstrated technologies. See Appendix 6 for a more detailed description of the AECOM alternative analysis.

The goal of the AECOM study was to increase KIWWTP's capacity to manage 132 MGD during peak wet weather events, ensuring compliance with regulatory discharge limits and eliminating the need to activate Outfall 003. To accomplish this, the following alternatives were considered:

1. High-Rate Treatment (BIOACTIFLO®):

   Description: This method involves a high-rate ballasted clarification process, BIOACTIFLO®, which activates during wet weather to handle additional flow.

   Components: Includes biological treatment basins, aeration blowers, an ACTIFLO® basin, and chemical dosing for coagulation and flocculation.

   Cost: Estimated at $42.6 million.

Pros: Adaptable for phased expansion, provides redundancy.

Cons: Complex operation and maintenance, reliance on chemicals and blowers.

2. Parallel Trickling Filters:

Description: Reconfigures the existing Plastic Media Trickling Filters (PMTFs) and Rock Media Trickling Filters (RMTFs) to operate in parallel during peak flow events.

Components: Adds new aerated grit chambers, primary clarifiers, and a supplemental primary effluent pump station.

Cost: Estimated at $43.6 million.

Pros: Utilizes familiar processes, simple and quick startup, no additional chemicals required.

Cons: Limited expandability, potential construction challenges with contaminated soil.

The preferred alternative is the parallel trickling filter operation. This approach was chosen based on its ease of operation, familiarity for plant staff, lower net present value (NPV) costs, and better regulatory compliance. Advantages of this approach include minimal operator training required, straightforward ramp-up process, no new chemical systems, and integrated with existing infrastructure.

This alternative is considered one of the "Master Plan" projects and is not considered as part of the implementation of this Regional Act 537 Plan.

### Kleinfelder 132 MGD WWTP Evaluation

The proposed alternative to expand the KIWWTP to a peak wet-weather treatment capacity of 132 MGD is designed to mitigate SSOs within the Kline's Island Sewer System. This approach temporarily operates the plastic media trickling filters (PMTFs) and rock media trickling filters (RMTFs) in parallel during storm events, rather than in series, to increase the plant's capacity beyond the 100 MGD currently being designed.

Under this configuration, an additional 32 MGD of peak flow will undergo grit removal in a new aerated grit chamber and primary treatment in two new wet-weather primary clarifiers. The flow will then be pumped via a new supplemental primary effluent pump station to the RMTFs for biological treatment, followed by clarification in the existing final clarifiers and disinfection in the existing chlorine contact tank. Meanwhile, the existing 100 MGD flow will continue through the PMTFs, with effluent clarified via both the final clarifiers and the intermediate settling tanks, which will be temporarily used for final clarification.

The concept maintains compliance with regulatory requirements, ensuring significant biological treatment as defined by PADEP. The system utilizes existing infrastructure where feasible, minimizing operational complexity and avoiding the introduction of unfamiliar treatment processes. Key benefits of the plan include chemical-free operation, simple startup and shutdown procedures, and enhanced resilience against wet-weather events. Full details, including technical analyses and cost estimates, are provided in Appendix 15.

## 3. CONTINUED USE OF EXISTING MUNICIPAL OR NON-MUNICIPAL SEWAGE FACILITIES

This Regional Act 537 Plan proposes the continued use of existing municipal sewage facilities as well as the rehabilitation of existing facilities through the repair and upgrading of existing collection and conveyance facilities. Significant plans are in place to improve O&M and reduce hydraulic loading. This will be realized through the implementation of the Source Reduction Plans as described below.

The main strategy to address the identified problems is to continue implementing the I&I source reduction strategy identified by each municipality. Because some of the problems identified are based on inadequate capacity even at dry weather flows due to hydraulic restrictions and undersized piping, it is necessary to determine if a robust source reduction strategy will eliminate the need or reduce the size of a future project. The financial analysis presented in Section VII assumes that these significant Master Plan projects will occur and the financing strategy for these projects is included. The municipalities that adopt this Plan understand that, although not specifically required by this Regional Act 537 Plan, financing will most likely be needed in the current planning horizon. Once it is determined the projects will be necessary, planning via a Special Study is proposed to finalize the Act 537 Planning requirements for these Master Plan projects.

USEPA guidance on I&I states that domestic wastewater plus non-excessive infiltration should not exceed 120 GPCD during periods of high groundwater. The total daily flow during a storm should not exceed 275 GPCD, and there should be no operational problems such as surcharges, bypassing or poor treatment performance. Since modeling indicates the potential for surcharging and bypassing in the KISS, this Regional Act 537 Plan proposes to continue the work of the Source Reduction Plans until such time that it can be shown that the system sewage flows fall within current USEPA guidance and/or is no longer cost-effective in terms of eliminating these Master Plan projects or reducing their scope.

In October 2022, Arcadis prepared a report titled "Preliminary Modeling of SRP Impacts" examining the effects of various SRP scenarios on peak sewage flow rates to the KIWWTP. Using the KISS model, simulations for both 2021 and projected 2050 conditions were conducted without altering the physical infrastructure. Two scenarios were tested: a closed system with no changes, resulting in a peak flow of 207 MGD, and an open system with oversized pipes, resulting in a peak flow of 178 MGD. The actual peak flow is likely between these values, pending right-sizing of pipes and pumps. Four SRP scenarios were modeled, demonstrating varying impacts on reducing peak flows, SSOs, and overall rehabilitation costs. Arcadis recommends focusing on sealing manholes and rehabilitating sewers in high-priority basins to achieve significant flow reductions. The recommended approach involves detailed inspections and rehabilitations based on specific peaking factors and RDII characteristics, aiming for substantial long-term improvements in system performance.

The model included data from 101 sewage flow meters, 25 rain gauges and night-time weiring as shown in Appendix 14. This data and the model were used to develop I&I statistics for each of the 87 basins delineated for study. As shown in Appendix 14, each basin is evaluated for baseline infiltration, peaking factor and length normalized RDII. This analysis provides a powerful tool for identifying the basins to prioritize for source reduction.

Some of the conclusions from this study include the following:

1. Inflow through manhole frames and covers create short term peak flows which may cause SSOs.
2. Inflow through manhole frames and covers is found throughout system (90% of inflow coming from 65% of system).

3. Some mains and laterals suffer high RDII. Many of the older collection systems are at/nearing the end of useful life. These cause the 3-month max flow to exceed KIWWTP permitted hydraulic limit.
4. Infiltration into pipes and laterals occurs primarily in older unrehabilitated portions of system (85% of infiltration is coming from 40% of system).
5. The core interceptors (WLI, AEI, and LLI) are undersized for current and future dry day flows.
6. A portion of the 10 MGD of baseline infiltration can be removed and turned into dry weather capacity.

With a goal to eliminate SSOs in core conveyance systems for a 5-year design event through 2035, Arcadis recommended the following as a guideline for future source reduction plans:

1. Identify and make watertight 100% of manholes in floodplains
2. Identify and make watertight 75% of manholes in basins with peaking factors >6
3. Identify and make watertight 50% of manholes in basins with peaking factors <6 but >5
4. Identify and make watertight 25% of manholes in basins with peaking factors <5 but >4
5. Identify and make watertight 10% of manholes in basins with peaking factors <4
6. Identify and make watertight 5% of cleanouts in all basins
7. Rehabilitate all mains, taps, and risers for sewer with NTW >5 GPD/LF
8. Identify and rehabilitate 25% of mains, taps, and risers for sewers with RDII >8 GPD/LF or BI>45%
9. Identify and rehabilitate 15% of mains, taps, and risers for sewers with RDII >4 GPD/LF or BI>33%
10. Identify and rehabilitate 5% of mains, taps, and risers for sewers with RDII >2 GPD/L or BI>20%

Each municipality developed an individual SRP for their respective collection system. In many cases, several municipalities collaborated on I&I removal techniques and standardized their approaches to repairs and upgrades. These SRPs represent an effort that has already begun and will continue to be implemented throughout the planning horizon of this Regional Act 537 Plan. Additionally, these SRPs were used to predict the removal of extraneous flow incorporated into the extensive modeling effort to develop the various alternatives that address future collection and conveyance needs. Full copies of the SRPs can be found in Appendix 7.

The cornerstone of this planning effort is flow monitoring to develop the alternatives analysis as well as support the municipalities' ongoing efforts to identify and remove sources of I&I. This flow monitoring began in 2021 and provides the data required to determine if existing facilities can be used to meet future flow projections beyond the planning period of 2050. Based on discussions and guidance from PADEP, the flow monitoring will serve dual purposes of characterizing flows and RDII generated by each municipality and characterizing flows within the regional sewer system components. A summary of the flow monitoring program is shown in Exhibit V-1.

The metering program equates to a resolution of approximately one flow meter installed for every 10 miles of sewer collection system, which provides for an appropriate level of detail for RDII characterization. The exhibit below summarizes the number of meters needed to accomplish the regional modeling and RDII characterization.

| Signatory | Number of Meters | Model Primary Interceptors | Model Secondary Interceptors | Model Contributing Basins | I&I |
|---|---|---|---|---|---|
| Emmaus | 4 | | | 4 | 4 |
| City of Allentown | 39 | 16 | 15 | 4 | 18 |
| CWSA | 17 | 2 | 10 | | 15 |
| Hanover | 1 | | | 1 | 1 |
| LCA | 9 | 3 | 6 | | 4 |
| Lower Macungie | 7 | | | 2 | 7 |
| Salisbury | 6 | 3 | 2 | | 6 |
| South Whitehall | 8 | 1 | 5 | | 7 |
| Upper Macungie | 10 | | 1 | | 10 |
| **Grand Total** | **101** | **25** | **42** | **11** | **72** |

**Exhibit V-1: Flow Meters for FCS Purposes**

Exhibit V-2 below provides a listing of the Municipality Sewage Billing Meters (SBMs), noting which meters were included in the FCS.

| Municipality | SBM Name | 2021 FCS Program (Y/N) |
|---|---|---|
| 1. South Whitehall | SW51 | Y |
| 2. South Whitehall | SW52 | N |
| 3. South Whitehall | SW53 | Y |
| 4. South Whitehall | SW54 | Y/N |
| 5. South Whitehall | SW55 | N |
| 6. South Whitehall | SW56 | N |
| 7. Coplay-Whitehall | CW Jordan | Y |
| 8. Coplay-Whitehall | CW Lehigh | Y |
| 9. Hanover | Hanover | Y |
| 10. Salisbury | ST1 | N |
| 11. Salisbury | ST1A | N |
| 12. Salisbury | ST2 | N |
| 13. Salisbury | ST3 | N |
| 14. Salisbury | ST4 | N |
| 15. Salisbury | ST4A | N |
| 16. Salisbury | ST5 | N |
| 17. Salisbury | ST6 | Y |
| 18. Salisbury | ST7 | N |
| 19. Salisbury | ST8 | Y |
| 20. Salisbury | ST9 | N |

| | | |
|---|---|---|
| 21. Salisbury | ST10 | Y |
| 22. Salisbury | ST11 | N |
| 23. Salisbury | ST12 | N |
| 24. Emmaus | Fox Street #1 | Y |
| 25. Emmaus | Lehigh #2 | Y |
| 26. Emmaus | Orchid #3 | Y |
| 27. Emmaus | Cedar #4 | Y |
| 28. Allentown | Main Infl | Y |
| 29. Allentown | Rock Media Recir | Y |
| 30. Allentown | SDR Recir | Y |
| 31. LCA | MS5 | Y |
| 32. LCA | MS5a | Y |
| 33. LCA | Spring Creek | Y |
| 34. Lower Macungie | County Meter | Y |
| 35. Lower Macungie | Cedarbrook | Y |

**Exhibit V-2: - Municipal Sewage Billing Meters Used for FCS Purposes**

Through a series of meetings in 2023 and 2024, the municipalities collaborated with each other to develop a sewage metering program that would serve them through this planning period. The protocol that was developed describes who will be responsible for the meters, how the costs will be shared, and how the data will be shared. The protocol addresses the need for accurate and timely sewage flow data management, crucial for ongoing system performance and regulatory compliance.

A key driver for this effort is the Interim Act 537 Plan Commitments (2021) which included an upgrade effort for all significant billing meters to ensure accuracy and data capture into a flow monitoring database. Also, the protocol contemplates cost-sharing methods that emphasize flow-based billing, accounting for the successful removal of I&I by municipalities.

The Sewage Billing Meter (SBM) framework is included in the IMA Term Sheet shown in Appendix 13 and will include the following:

1. Installation of Western Lehigh Sewage Meters:

    - Uniform billing practices necessitate installing sewage meters at appropriate locations.

    - Temporary meters will be used at connection points to ensure accurate flow readings.

2. Ownership, Maintenance, and Responsibility for SBMs:

    - Municipality retains ownership and maintenance responsibilities.

- Initial review and certification by LCA of physical structures and meter accuracy.
- Regular maintenance and calibration protocols.

3. Centralized & Secure Data Access:

- Data reporting systems will centralize all sewage meter data.
- Secure login information for municipalities to access flow data, with a goal for real-time reporting.

4. Cost-Sharing of Metering Costs:

- All program costs treated as regional KISS costs.
- Sharing through future cost-sharing methods under development.

5. Timeline:

- A three-year transition focusing on installation, agreement on ownership and responsibilities, and development of data systems.
    - Inclusion of unsatisfactory meters and defining the three-year transition scope.

This proposal aims to create a more efficient and equitable system for managing sewage flows and costs within the KISS municipalities.

## 4. REPAIR OR REPLACEMENT OF EXISTING SYSTEM COMPONENTS

This section includes descriptions of methods that will be employed to repair or replace existing system components and will address the following areas:

- Source Reduction (Repair) Work Completed to Date
- Final Alternatives Analysis 1
- City of Allentown – Sanitary Sewer Evaluation Survey Program
- Source Reduction Plans
- EPA's 120/275 Metric for I&I Evaluation
- Master Plan Projects
- Kline's Island Wastewater Treatment Plant

### Source Reduction (Repair) Work Completed to Date

The reduction of RDII is the foundation of this Regional Act 537 Plan. This Plan includes a significant commitment to the repair and rehabilitation of the collection and conveyance systems within the service area. Additionally, since the Chapter 94 issues that developed in 2018/2019, the municipalities began robust source reduction planning and have already completed a significant amount of repair and rehabilitation. Some of the completed (or committed to being completed) work is summarized below.

The following project descriptions are summaries of the various projects completed or underway in the City of Allentown, the Lehigh County Authority portions of the collection systems, and in the municipal owned collection systems.

**City of Allentown Source Reduction Work Completed**

Nighttime Weiring

In April 2022, LCA Authorized the Nighttime Weiring project for the City of Allentown as part of an ongoing effort to reduce I&I in the city's wastewater system, in line with the Interim Act 537 Plan. The project, led by Arcadis, focused on identifying areas contributing to high levels of groundwater infiltration by measuring flows at night in approximately 180 miles of sanitary sewer pipes. The nighttime weiring study builds upon data collected during the 2021 flow characterization study.

The main objectives of the project included preparing a detailed work and safety plan, selecting weir locations, conducting the weiring activities, and generating results, including a spreadsheet of the findings and GIS-based figures. The data collected informed the preparation of SRPs for specific neighborhoods. The overall aim was to reduce groundwater infiltration in the sewer system, which can overwhelm wastewater treatment facilities during wet weather.

The project had a total budget of $241,000. The work began in the spring of 2022, with the analysis and reporting phase completed by late June 2022.

2020 I&I Source Reduction Improvements

2020 I&I Source Reduction Improvements Project began on May 11, 2020, and concluded on June 19, 2020. The work in Year 1 was located on Martin Luther King Jr. Drive, adjacent to Little Lehigh Creek. The Improvements consisted of a cured-in-place lining for three consecutive segments of 30-inch-diameter sewer pipe. During the rehabilitation project, two connecting pipes were discovered to be contributing significant I&I. Both pipes were leaking through many joints and contained major longitudinal cracks. The pipes were grouted and then lined. Also, during the project, a significant 5" pressurized hole was discovered in the subsequent downstream 30" pipe (Segment 4). The hole was contributing a substantial amount of I&I to the sanitary sewer system, with an estimated range of 0.3 MGD to 2.0 MGD depending on ground water levels. The leak was repaired in August 2020.

The construction contract for 2020 was awarded to Standard Pipe Services, Inc. following a competitive bidding process. Kleinfelder, alongside Barry Isett & Associates, provided full-time construction observation and contract administration to ensure compliance with specifications and quality standards.

2021 I&I Source Reduction Improvements

2021 I&I Source Reduction Improvements Project began on May 3, 2021, and concluded on January 31, 2022. Year 2 was significantly larger than Year 1, with a total of 106 pipes scheduled for Year 2. The Year 2 project included a Base Bid and Alternate Bids. The Base Bid work areas were located in the northeast part of Allentown, and included heavy cleaning, joint grout sealing, CIPP sectional lining and CIPP full-length lining. The Alternate bid was included in the project due

to suspected high I&I and the unknown condition of the pipe segments. This alternate included an additional sewer line along Little Lehigh Creek between the railroads near the center of town. This work included CCTV inspection and CIPP-full length lining.

The construction contract for 2021 was awarded to Standard Pipe Services, Inc. following a competitive bidding process. Kleinfelder, alongside Barry Isett & Associates, provided full-time construction observation and contract administration to ensure compliance with specifications and quality standards.

2022-2023 Manhole Inspections

In December 2022, LCA authorized the City of Allentown's 2023 Manhole Inspections project, part of the city's ongoing efforts to address I&I into its wastewater system. The inspections were a key step in developing a manhole rehabilitation program, an important aspect of the city's approved Interim Act 537 Plan. The project inspected approximately 900 manholes out of an estimated total of 7,200, with the goal of identifying and addressing significant sources of inflow through manhole structures.

This initial phase of inspections was carried out in 2023, with support from Arcadis. Arcadis has been involved in multiple related projects for the city, including flow characterization studies and inflow/infiltration analyses. The inspections included fieldwork, manhole assessments, and recommendations for rehabilitation.

The total cost for the 2023 Manhole Inspections was estimated at $239,000. The inspections began in late January 2023 and were concluded by the fall. This project marks the beginning of a multi-year program to inspect and rehabilitate manholes across the city to meet I&I reduction goals.

2022 I&I Source Reduction Improvements

In March 2022, LCA implemented the 2022 I&I Source Reduction Program for the Allentown Division. This phase focused on addressing specific areas identified as high-priority zones for I&I reduction. The work was guided by a plan from Kleinfelder, which included detailed design documents outlining the pipes and areas targeted for rehabilitation. The project involved comprehensive cleaning of sewer mains, joint testing, grout sealing, and both sectional and full-length cured-in-place-pipelining (CIPP) to restore integrity and prevent groundwater infiltration into the sewer system.

The construction contract for 2022 was awarded to Vortex Services, LLC, following a competitive bidding process. Kleinfelder, alongside Barry Isett & Associates, provided full-time construction observation and contract administration to ensure compliance with specifications and quality standards. Key activities included monitoring initial and final CCTV inspections, verifying cleaning and sealing processes, and overseeing the installation of CIPP liners. Additionally, periodic project meetings facilitated coordination and addressed any construction challenges.

The project's outcomes were significant in terms of improving the condition of the sewer infrastructure, effectively reducing I&I in critical areas adjacent to the Lehigh River. The 2022 work continued the success of previous phases, allowing LCA to advance its regulatory compliance and environmental protection goals.

2023 I&I Source Reduction Improvements

In February 2023, LCA approved the 2023 phase of the City of Allentown's I&I Source Reduction Program, part of a multi-year effort to reduce the inflow of water into the city's wastewater system. The 2023 project focused on rehabilitating specific sections of the wastewater infrastructure based on ongoing assessments, including CCTV inspections and engineering studies.

Key actions included heavy sewer main cleaning, joint testing, grout sealing, and cured-in-place pipe lining (CIPP) in identified high-priority areas of the city. The aim was to prevent excess water from entering the system, which could lead to overflow or increased treatment costs. These rehabilitation activities primarily targeted the northeast and southwest sections of the city. The total cost for this phase was approximately $885,756.

Vortex Services, LLC was awarded the construction contract, while Kleinfelder managed the construction phase, including inspections, reviewing contractor submissions, and overall project administration. Work commenced in March 2023 and was completed by late November 2023. The project was part of a broader regional strategy to manage wastewater flows and meet environmental regulatory requirements.

2023-2024 Manhole Inspections

In August 2023, LCA authorized the Manhole Inspections project in the Trout Creek Interceptor Basin as part of LCA's ongoing I&I reduction efforts within the City of Allentown's wastewater system. This is a key component of the I&I Source Reduction Plan, which is part of this Regional Act 537 Plan.

The project involves accelerating the inspection of an additional 1,800 manholes in the Trout Creek Interceptor Basin to address immediate I&I issues. This basin has been identified as a high-risk area for future sanitary sewer overflows during peak wet-weather events due to rainwater inflow through manholes. The results from these inspections will inform the development of targeted rehabilitation projects to mitigate the risks.

The total cost for this phase of the project was $292,000. The inspections occurred from September 2023 through early 2024. This was part of a larger, ten-year program to inspect and rehabilitate all 7,200 public sanitary sewer manholes in Allentown, with rehabilitation work starting in 2024.

2024 I&I Source Reduction Improvements

In February 2024, LCA authorized the 2024 Construction Phase of the City of Allentown's newly developed 10-year I&I Source Reduction Program based on recommendations from the KISS Flow Characterization Study and the 2022 RDII analysis. This project aimed to reduce both dry-day and wet-weather flows in the city's sewer system.

The project focused on rehabilitating the city's three highest-priority sewer collection basins, which were identified as major contributors to I&I during wet weather. The construction phase included cleaning, inspecting, and applying cured-in-place pipelining to approximately 22,000

linear feet of sewer mains. Additionally, 150 sewer laterals were grouted, and about 1,200 vertical feet of sewer manholes were rehabilitated using cementitious and epoxy lining.

The project had a total budget of $2,717,297, with Vortex Services, LLC awarded the general construction contract for $2,492,297. Construction began in March 2024, with expected completion by the end of the year. Funding for the SRP will come from the Allentown Division's revenues, with additional costs recovered through sewer rates. A portion of the funding will also be covered by an H2O PA grant awarded to the city in 2023.

2024-2025 Manhole Rehabilitation

In September 2024, LCA Authorized the 2024-2025 Manhole Rehabilitation Project in the City of Allentown as the first phase of a 10-year initiative to inspect and rehabilitate all sanitary sewer manholes as part of the Regional Act 537 plan. The project aimed to address I&I issues, which have been identified in approximately 2,000 manholes inspected so far. This pilot phase covered the rehabilitation of 256 manholes using various repair methods to evaluate their effectiveness. The lessons learned from this phase will guide future rehabilitation work across the city.

The project had a total budget of $1,561,025, with Triangle Contracting, LLC awarded the general construction contract for $1,230,025. Arcadis provided construction phase engineering services, including construction management and field inspections. The project is expected to be completed by the summer of 2025. The work will focus on eliminating inflow issues by rehabilitating the manholes and will help improve the city's sewer system performance.

2025 SSES and I&I Reduction Projects

In January 2025, LCA initiated a Sanitary Sewer Evaluation Survey within the City of Allentown. The proposed work for the sewer system in the Allentown Division focuses on reducing I&I in the Trout Creek and Eastside sewer basins, encompassing a combined total of over 614,000 linear feet of pipes. The project aims to identify specific I&I sources and implement targeted rehabilitation efforts to address both public and private side issues. Early actions will prioritize public-side rehabilitation, including measures like cured-in-place pipe lining (CIPP), grouting, and addressing laterals up to the right-of-way. Data collection and monitoring will involve the installation of flow meters, rain gauges, and level sensors, alongside extensive smoke and dye testing, CCTV inspections, and flow isolation tests.

The project will serve as a pilot for broader applications across the 14 other municipalities in the KISS region, with findings informing a cost-effective I&I reduction strategy. Post-rehabilitation monitoring will assess effectiveness and quantify system improvements. The total capital cost for this initiative is $3.14 million, with $2.64 million allocated for professional services. Construction is set to begin immediately, targeting completion of early action projects by October 2025, followed by monitoring through 2026.

**Lehigh County Authority Source Reduction Work Completed**

Western Lehigh Interceptor Manhole Rehabilitation Project (Phase 1)

In June 2020, LCA initiated Phase 1 of the Western Lehigh Interceptor (WLI) Manhole Rehabilitation Project as part of its ongoing commitment to reduce I&I and prevent SSOs. The project, following inspections in 2015 and 2019, identified issues with manholes, including damaged frames, cracked concrete, and leaks, which were exacerbated during significant storm events. The rehabilitation efforts included raising manhole tops above floodplain levels, installing water-tight frames on 39 manholes, and injecting grout to seal leaks in 11 manholes. This phase of work, awarded to Standard Pipe Services (SPS) with construction oversight by Keystone Consulting Engineers, aimed to enhance system integrity and reliability by reducing I&I sources in the WLI service area.

Western Lehigh Interceptor Manhole Rehabilitation Project (Phase 2)

In July 2021, LCA completed Phase 2 of the Western Lehigh Interceptor (WLI) Manhole Rehabilitation Project. This project aimed to further reduce I&I and prevent SSOs following a December 2020 flooding event and subsequent inspections that revealed additional deficiencies in WLI manholes. Initial inspections, performed in 2015 and updated in 2019 and 2021, identified issues such as loose frames, cracked concrete, and persistent water infiltration, especially during significant storm events.

In Phase 2, LCA raised the tops of 12 manholes to above the floodplain, installed water-tight frames and covers on 49 manholes, and repaired damaged concrete, providing enhanced flood-proofing and reducing I&I sources. Scheuermann Excavating, Inc. was awarded the construction contract with Keystone Consulting Engineers (KCE) overseeing the inspection services, which included daily reporting, quantity verification, and photo documentation. Phase 2's work demonstrated the lasting impact of Phase 1 improvements and extended LCA's efforts to bolster the reliability of the WLI system under heavy wet weather conditions.

Western Lehigh Sewer Partners (WLSP): 2022 Nighttime Weiring

In March 2022, LCA, in collaboration with the WLSP, completed a nighttime weiring project as part of ongoing efforts to reduce I&I under the Interim Act 537 Plan. Arcadis conducted weiring inspections over approximately 240 miles of sewer pipe across key WLSP municipalities, including Weisenburg, Lowhill, Lower Macungie, Upper Macungie, and Upper Milford townships, and Macungie and Alburtis boroughs. The project aimed to identify significant groundwater infiltration points during low water usage hours, typically between 1:00 and 5:15 a.m., when residential sewage flow is minimal.

The study involved preparing a work plan, selecting optimal weir locations, and carrying out weiring activities at approximately 220 manholes. Each location was inspected multiple times on different nights to confirm consistent infiltration rates, with additional checks performed if measurements varied by more than 10%. Field data collected were processed into a weiring results spreadsheet, supplemented by GIS mapping to facilitate analysis. This process allowed LCA and WLSP to identify specific areas with high infiltration rates, thus providing a detailed prioritization framework for future source reduction interventions.

The results supported the preparation of updated SRPs, helping the WLSP target infrastructure improvements precisely where they would be most effective. Overall, the nighttime weiring

project contributed to the region's broader strategy to mitigate I&I issues, enhance sewer system performance, and meet regulatory standards more effectively.

Western Lehigh Interceptor Manhole Rehabilitation Project (Phase 3)

In November 2022, LCA executed Phase 3 of the WLI Manhole Rehabilitation Project to further reduce I&I into the WLI system and mitigate SSOs. Keystone Consulting Engineers conducted an inspection early in the year, which revealed issues such as loose frames, damaged manhole covers, cracked concrete, and flooding in manholes following significant storm events. This phase aimed to address these deficiencies by elevating manhole tops above the floodplain (adjusting up to 2 feet) and installing new water-tight frames and covers on 55 manholes to prevent floodwater infiltration.

Scheuermann Excavating, Inc., was awarded the construction contract following a competitive bid process, while Keystone Consulting Engineers provided construction inspection services, including daily reporting, photo documentation, and verification of installed quantities.

Field inspections indicated that previous rehabilitation efforts from Phases 1 and 2, conducted in 2020 and 2021, continued to provide effective I&I mitigation. Phase 3's improvements were anticipated to enhance system reliability further and support the WLI's compliance with I&I reduction goals.

Western Lehigh Interceptor Municipalities Test and Seal Sewer Rehabilitation Project - Construction Phase

In February 2023, LCA, in partnership with the WLI municipalities, initiated the Test and Seal Sewer Rehabilitation Project to address persistent I&I issues in Upper Macungie, Lower Macungie, and Upper Milford Townships. This project specifically targeted main line joints and lateral connections with documented I&I problems, identified through the 2021 Flow Characterization Study and 2022 nighttime weiring.

The project included extensive pre-construction cleaning and CCTV inspections of both main lines and laterals to assess the condition of the sewer infrastructure. Major tasks involved testing and grouting main line joints, sealing lateral connection joints, removing any protruding laterals, root removal, and manhole grouting and lining. Post-construction inspections were scheduled to ensure quality and longevity, with warranty inspections planned to verify the effectiveness of repairs.

Standard Pipe Services, LLC, was selected as the primary contractor based on competitive bidding, with Arcadis providing full-time construction inspection and engineering support. Arcadis's responsibilities encompassed daily site inspections, tracking project quantities, and verifying pre- and post-construction CCTV data.

Western Lehigh Interceptor Manhole Rehabilitation Project (Phase 4)

In October 2023, LCA initiated Phase 4 of the WLI Manhole Rehabilitation Project to further mitigate inflow and infiltration (I&I) and prevent SSOs within the WLI system. A 2023 field inspection conducted by LCA and Keystone Consulting Engineers identified issues such as loose

and damaged manhole frames, cracked concrete, and floodwater infiltration in specific manholes. These findings highlighted the need for additional floodproofing measures to enhance the system's resilience during extreme weather events.

The Phase 4 scope included raising the tops of eight manholes to above the floodplain, applying concrete repairs, and installing 160 composite water-tight frames and covers to seal the manholes against surface water entry. Scheuermann Excavating, Inc., a contractor experienced with previous phases, was awarded the construction contract, while Ferguson Supply provided the necessary frames and covers. Keystone Consulting Engineers oversaw construction management, providing part-time inspections, daily reporting, and final project verification.

**Municipalities Source Reduction Work Completed**

The following summary of source reduction work performed by the municipalities is derived from the quarterly reports that have been submitted to PADEP since 2020. It illustrates the municipal commitment to reducing RDII.

**Borough of Alburtis**

- Replaced multiple sanitary manholes and sewer pipes.
- Conducted CCTV inspections and lateral cleaning for approximately 956 sanitary sewer laterals.
- Continued nighttime weiring and basement inspections for unauthorized private connections.
- Evaluated manhole rehabilitation methods to reduce I&I, including lining and watertight covers.
- Participated in an USEPA metering program and considered replacing the pump station with a gravity sewer.
- Sealed manholes in flood-prone areas and performed targeted flow monitoring.
- Installed watertight manhole frames and covers and pursued a manhole lining demonstration.

**Borough of Macungie**

- Installed approximately 98 new lateral cleanouts and lined 400 reinstated laterals.
- Lined 447 sewer laterals and installed 136 cleanouts.
- Conducted ongoing inspections, temporary flow metering, and manhole inspections.
- Sealed flood-prone manhole covers and replaced damaged inserts.
- Applied for funding for additional manhole rehabilitation and sewer lining projects.
- Completed Source Reduction Program and initiated an ongoing inspection program.
- Identified and sealed twelve manholes in flood-prone areas.

**Lower Macungie Township**

- Inspected and sealed 31 manholes.
- Inspected 62 laterals and completed CIPP lining of 18,800 feet of sewer main.
- Grouted 65 out of 255 laterals, with the remaining scheduled for completion.
- Installed 51 lateral cleanouts and lined 51 laterals.
- Conducted manhole inspections and rehabilitation in multiple phases.
- Completed 2024 sewer relining project, lining 24,393 feet of sanitary sewer main.
- Scheduled bid for 2025 relining contract, targeting additional 23,285 feet of sewer mains and 252 lateral connections.

**Lowhill Township**

- No specific I&I projects identified due to small system size and limited infiltration.

**Upper Macungie Township**

- Installed inflow prevention dishes on 104 manholes, with additional caulking planned.
- Conducted manhole rehabilitation, inspecting 325 manholes and rehabilitating 139.
- Lined or replaced 175 laterals, using trenchless methods where necessary.
- Conducted basement clearwater inspections in targeted areas.
- Planned the 2025 Manhole Rehabilitation Project, with inspections and bidding scheduled.
- Monitored the effectiveness of inflow dish installations and adjusted sealing techniques.
- Conducted temporary metering for inflow isolation, adjusting placements for optimal identification of infiltration sources.
- Scheduled Phase 2 of lateral tap grouting for public bid.
- Planned 2025 cured-in-place lateral connection liner project for 102 lateral rehabilitations.

**Upper Milford Township**

- Participated in the 2023 Lateral Tap Grouting Project, successfully sealing leaking mainline joints and lateral taps.

**Weisenberg Township**

- No specific I&I projects identified due to small system size and limited infiltration.

**Borough of Emmaus**

- Inspected and rehabilitated manholes, including chimney grouting and epoxy sealing.
- Identified and repaired damaged laterals.
- Conducted root cutting and sewer flushing to improve system performance.
- Continued phased manhole inspections and rehabilitation efforts.
- Flushed and inspected additional sewer mains and laterals.

**Coplay-Whitehall Sewer Authority (Whitehall Township and Coplay Borough)**

- TV-inspected over 29,000 linear feet of mains.
- Repaired manhole frames and covers.
- Installed inflow prevention devices on 147 manholes.
- Conducted root control treatments on over 4,700 linear feet of mainline sewers.
- Performed pump station cleaning and structural inspections.
- Completed sectional main liner program and epoxy-lined multiple manholes.

**North Whitehall Township**

- No specific I&I projects identified due to small system size and limited infiltration.

**Hanover Township**

- Completed a manhole rehabilitation project in 2024 to address structural defects and I&I issues.

**Salisbury Township**

- Conducted smoke testing and addressed identified issues.

- Initiated planning for sewer rehabilitation projects.
- Continued phased inspections of infrastructure components.
- Lined 100 manholes in Meter Basins 10 and 12.
- Conducted grant-funded excavation and repairs on damaged sewer mains.

**South Whitehall Township**

- Lined 1,100 feet of sanitary sewer main along Dorney Park Road to reduce infiltration.
- Engaged in flow monitoring and data analysis to support future I&I reduction projects.
- Installed over 85 manhole inserts in multiple meter basins.

## FINAL ALTERNATIVES ANALYSIS 1 (FAA1)

In 2022, Arcadis developed 20 alternatives as part of the Preliminary Screening of Alternatives (PSOA) for the Kline's Island Sewer System, aiming to identify collection system infrastructure improvements needed to prevent overflows and protect homes from basement backups in response to extreme rain events, such as Hurricane Ida. Using a representative five-year frequency event for hydraulic design, the PSOA explored various conveyance, storage, and inflow and infiltration (I&I) reduction approaches. Multiple variations of theoretical SRPs were developed by Arcadis and were loaded into the model. These variations revealed the model sensitivities to proposed SRP work in different locations. Ultimately, the SRPs for the FAA1 were known as "Signatory 1 SRP." These SRPs were developed and loaded into the KISS model in late 2022. As the planning progressed in 2023 and 2024, SRPs were further refined and are included in Appendix 7. For documentation purpose, the FAA1 model run (based on the late 2022 SRPs) calls for the following work to be completed

1. City of Allentown (Inventory: 285 miles, 7,199 manholes, 33,359 taps)

    a. Evaluate 161 miles of collector sewers and tap connections through the year 2032. Pipe determined to need rehabilitation will be repaired using a combination of cured in place lining, capital grouting, and open cut same trench replacement techniques.

    b. Inspect 100% of their manholes and rehabilitate 100% of those that are subject to inflow or infiltration (estimated to be approximately 50% of inventory) between 2023 and 2032.

    c. Rehabilitate 48 miles of selected sewers as part of their long-term asset management program between the years of 2034 and 2050

    d. Via a combination of manual-entry visual inspection, CCTV inspection, and air test and grounding of 5% of their 30 miles of trunk lines and interceptors in 2023 and 2024 (completed)

    e. Rehabilitate 100% of trunk lines and interceptors between 2025 and 2050

2. Salisbury Township (Inventory: 285 miles, 7800 manholes, 5000 taps)

    a. Inspect 100% of their manholes and rehabilitate 100% of those that are subject to inflow or infiltration (estimated to be approximately 33% of inventory) between 2023 and 2032

3. Emmaus Borough (Inventory: 45 miles, 1000 manholes, 2400 taps)

    a. Rehabilitate 3.5 miles of collector sewers

    b. Rehabilitate 90 manholes

4. Coplay Whitehall Sewer Auth. (Inventory: 125 miles, 3300 manholes, 10000 taps)

    a. Rehabilitate 3.5 miles of collector sewers

    b. Rehabilitate 50 manholes

5. South Whitehall Township (Inventory: 125 miles, 3300 manholes, 10000 taps)

    a. Rehabilitate 164 manholes

6. Hanover Township (Inventory: 2 miles, 67 manholes, 200 taps)

    a. No work (data indicates no work is needed)

7. Upper Macungie Township (Inventory: 137 miles, 3200 manholes, 21000 taps)

    a. Rehabilitate 785 laterals taps and risers via capital grouting

    b. Replacement of defective manhole inflow dishes (unquantified)

8. Lower Macungie Township (Inventory: 145 miles, 3300 manholes, 9300 taps)

    a. Rehabilitate 9 miles of sewer mains via lining

    b. Rehabilitate 946 laterals taps and risers via capital grouting, lateral lining, and replacement

    c. Install 390 manhole inflow dishes

9. Borough of Alburtis (Inventory: 9 miles, 220 manholes, 1000 taps)

    a. Rehabilitate 7 manholes

10. Borough of Macungie (Inventory: 11 miles, 280 manholes, 500 taps)

    a. No work

11. Upper Milford Township (Inventory: 8 miles)

    a. Rehabilitate 3 miles of sewer mains, taps, and risers via capital grouting

    b. Inspect 100% of their manholes and rehabilitate 100% of those that are subject to inflow or infiltration, estimated to be approximately 50% of inventory) between 2023 and 2032

12. Lowhill Township (Inventory: >1 mile)

    a. No work (data indicates no work is needed)

13. Weisenberg Township (Inventory: 4 miles)

    a. No work (data indicates no work is needed)

14. North Whitehall Township

    a. No work (data indicates no work is needed)

15. Lehigh County Authority (Inventory: 18 miles, 700 manholes, 0 taps)

    a. Rehabilitate 6 miles of interceptor via capital grouting

    b. Inspect 100% of their manholes and rehabilitate 100% of those that are subject to inflow or infiltration (estimated to be approximately 50% of inventory) between 2023 and 2026

## SELECTED ALTERNATIVE – SOURCE REDUCTION PLANS

Each municipality developed an individual SRP tailored for their respective collection system. In many cases, several municipalities collaborated on I&I removal techniques and standardized their approaches to repairs and upgrades. These SRPs represent an effort that has already begun and will continue to be implemented throughout the planning horizon of this Regional Act 537 Plan. Additionally, these SRPs were used to predict the removal of extraneous flow which were used in the extensive modeling effort to develop the various alternatives that address future collection and conveyance needs. Below are summaries of the various SRPs. Full copies of the SRPs can be found in Appendix 7.

A statistical summary of all 87 metered basins from the 2021 FCS shows, among other items, three main data points: (1) baseline infiltration %, (2) length normalized rain derived inflow and infiltration, and (3) average peaking factor.

The metered basins were strategically selected to develop the system hydraulic model. The basins can be further divided by municipality:

- City of Allentown (38)
- Coplay Whitehall Sewer Authority (15)
- Salisbury Township (5)
- Borough of Emmaus (7)
- South Whitehall Township (7)
- Hanover Township (1)
- Upper Macungie Township (7)
- Lower Macungie Township (6)

The basins were then prioritized based on each of those three criteria as illustrated in the exhibit below. This analysis forms the foundation of the SRPs. The worst ranked basins will receive priority work within each municipality's collection system.

The overall statistical summary was then sorted based on the three criteria mentioned above. Exhibit V-3 displays the top 49 basins. Refer to Appendix 7 for each municipality's SRP to address each criterion. A full table listing of basins is located in Appendix 9.

| METER | SIGNATORY | Basin Length (LF) | Approximate MHs | *BASELINE INFILTRATION RANK* | RAINFALL-DERIVED INFILTRATION RANK | *INFLOW RANK* |
|---|---|---|---|---|---|---|
| ALBERT_Net | City | 9,059 | 45 | 3 | 1 | 1 |
| CEDAR CREEK RI_Net | SWT | 15,526 | 70 | 1 | 26 | 44 |
| UNION 2_Net | City | 11,428 | 57 | 54 | 2 | 15 |
| LITTLE CEDAR CREEK_Net | City | 40,306 | 202 | 2 | 10 | 31 |
| EB4 | EB | 45,240 | 204 | 18 | 17 | 2 |
| LITTLE LEHIGH_Net | City | 20,278 | 101 | 45 | 3 | 19 |
| SW54 | SWT | 168,942 | 761 | 72 | 29 | 3 |
| North 6th 2_Net | City | 12,585 | 63 | 7 | 4 | 22 |
| Irving Park_Net | City | 25,186 | 126 | 4 | 21 | 29 |
| EB2_Net | EB | 17,737 | 80 | 64 | 15 | 4 |
| Hanover TL_Net | City | 48,683 | 243 | 5 | 32 | 41 |
| MLK 3_Net | City+ST | 20,987 | 105 | 58 | 5 | 34 |
| MM3 aka Phase 3_Net | UMT | 87,238 | 393 | 50 | 18 | 5 |
| SUMNER 5_Net | City | 18,509 | 93 | 10 | 6 | 18 |
| North 12th | City | 48,091 | 240 | 6 | 81 | 83 |
| MLK 2_Net | City+ST | 35,573 | 178 | 20 | 19 | 6 |
| Tioga_Net | City | 26,815 | 134 | 33 | 7 | 74 |
| Ritter Elementary | City | 59,725 | 299 | 42 | 14 | 7 |
| Trout Creek Park | City | 141,700 | 709 | 8 | 47 | 59 |
| North 6th_Net | CWSA | 47,742 | 215 | 81 | 8 | 71 |
| MS2/MS2 Temp_Net | LMT | 52,177 | 235 | 37 | 31 | 8 |
| BASIN STREET 2_Net | City | 39,222 | 196 | 12 | 9 | 50 |
| SUMNER 4_Net | City | 19,914 | 100 | 9 | 30 | 39 |
| ST10 | ST | 104,982 | 473 | 16 | 20 | 9 |
| U_26_84 (ST6) | ST | 34,414 | 155 | 53 | 48 | 10 |
| CW Lehigh_Net | CWSA | 43,946 | 198 | 66 | 11 | 13 |
| Eberhart West_Net | CWSA | 46,901 | 211 | 32 | 78 | 11 |
| DS_Net | LMT | 116,879 | 526 | 11 | 12 | 55 |
| Tarkett_Net | CWSA | 47,775 | 215 | 67 | 49 | 12 |
| EASTSIDE | City | 11,651 | 58 | 14 | 13 | 73 |
| Industrial Blvd_Net | UMT | 125,630 | 566 | 13 | 56 | 82 |
| MM8 | UMT | 150,953 | 680 | 60 | 40 | 14 |
| JUNIATA_Net | City | 32,229 | 161 | 15 | 16 | 69 |
| SW51 | SWT | 44,592 | 201 | 24 | 25 | 16 |
| EB3 | EB | 15,447 | 70 | 77 | 41 | 17 |
| US Dorney | SWT | 55,608 | 250 | 17 | 35 | 53 |
| EB4a | EB | 99,644 | 449 | 19 | 50 | 36 |
| Bradford | City | 36,318 | 182 | 29 | 42 | 20 |
| AMERICAN_Net | City | 49,094 | 245 | 51 | 39 | 21 |
| ST. ELMO_Net | City | 83,039 | 415 | 21 | 44 | 32 |
| Park Blvd | City | 15,894 | 79 | 22 | 60 | 60 |
| Fairmont_Net | CWSA | 8,191 | 37 | 34 | 22 | 46 |
| MS1 | Alburtis | 48,046 | 216 | 88 | 43 | 23 |
| LEHIGH | City | 8,685 | 43 | 87 | 23 | 37 |
| ST1 Surrogate | ST | 32,860 | 148 | 23 | 84 | 87 |
| MS3_Net | Macungie | 91,552 | 412 | 74 | 57 | 24 |
| SW56 | SWT | 31,158 | 140 | 28 | 24 | 38 |
| EAST MAPLE | City | 64,042 | 320 | 59 | 38 | 25 |
| BASIN STREET 1 | City+ST | 63,689 | 318 | 25 | 37 | 35 |

**Exhibit V – 3: Basin Prioritization**

**Borough of Alburtis**

The Borough of Alburtis developed a Source Reduction Plan for the planning horizon 2022-2032 to address extraneous flows in the collection system. Work includes completing a lateral inspection program for approximately 950 laterals and selected repairs. Nighttime weiring performed by Arcadis shows minimal I&I in the Borough system. The Borough plans to continue its programs of raising and sealing manholes, and rehabilitating manhole frames and covers, especially in low-lying areas.

**Lowhill Township**

No specific Source Reduction Plan is required due to the existing small inventory amounts. Normal O&M measures will occur indefinitely moving forward.

**Borough of Macungie**

Now that the Borough has essentially completed its Source Reduction Program, it is anticipated that the Borough will continue with their ongoing Source Reduction Program which would consist of periodic TV Inspections of the sewers, temporary flow metering and manhole inspections with repairs being made to the system as deficiencies are identified. Also, the Borough will be looking to seal manhole covers of certain manholes that tend to get flooded during heavy rainfall to reduce inflow into the sewer system. The first stage of the work on the manhole lid project has been completed with the identification of 12 manholes for sealing, the first round of the sealing has been completed. The Borough has applied for and received preliminary approval for CDBG funding to complete manhole rehabilitation, lining of mains, and linings of laterals in the locust street area, this project is expected to be undertaken in the spring of 2025.

**Upper Macungie Township**

Upper Macungie Township's Source Reduction Plan (SRP) for 2025-2035 aims to mitigate infiltration and inflow (I&I) in its sanitary sewer system, continuing a proactive approach dating back to the early 1990s. The township's extensive efforts include rehabilitating manholes and sewer mains, with nearly all 25 miles of vitrified clay pipe (VCP) mains already lined with HDPE slip-liners or CIPP liners, and regular inspections via CCTV. A summary of the proposed plan is as follows:

1. Manhole Inflow Prevention Dish Replacement Program: The township will replace ineffective inflow prevention dishes with gasketed or caulk/sealant solutions. Initial trials in select subbasins have shown promising results, and a full-scale replacement is planned if effectiveness is confirmed.

2. Lateral Tap Grouting and Replacement Programs: Approximately 800 VCP laterals will undergo grouting to seal defects at connections, followed by full replacement from the main to the right-of-way line. This work addresses infiltration issues at lateral connections and joints.

3. Private Property/Basement Inspection and Clearwater Elimination Program: The township will conduct inspections to eliminate illegal clearwater connections such as sump pumps and roof leaders, starting with

the problematic Rabenold Pump Station sewershed. Inspections will expand to other areas based on need and cooperation from property owners.

4. Nighttime Weiring Follow-Up and Temporary Metering Program: Follow-up work from the 2022 nighttime weiring program will involve temporary metering to isolate high flow areas and identify specific I&I sources for elimination. This will help verify the effectiveness of rehabilitation efforts.

5. Continuance of Manhole Inspections and Repairs: Annual inspections will continue, identifying I&I sources and structural defects, with data managed through the township's GIS system and prioritized for rehabilitation.

6. Continuance of CCTV Collection System Inspections: The township will maintain its 15-year cycle of CCTV inspections, reviewing collected data to prioritize repairs and ensure manholes have effective inflow prevention measures.

**Upper Milford Township**

Several sewers in the Upper Milford Township portion of LCA's system were determined to contribute excessive inflow and infiltration. Every joint on these 7600 linear feet of sewer, including taps, lower laterals, and laterals connected to manholes will be tested and sealed using chemical grout capital grouting technologies. Phase 1 of this work occurred in portions of 2023 and 2023. Phase 2 is slated for 2025 and 2026. The anticipated cost of this project, including inspection, design engineering, construction oversight, easement clearing, and rehabilitation, is $400K.

**Weisenberg Township**

No specific Source Reduction Plan is required due to the existing small inventory amounts. Normal O&M measures will occur indefinitely moving forward.

**Lower Macungie Township**

Lower Macungie Township developed a Source Reduction Plan (SRP) for 2025-2035 to address infiltration and inflow (I&I) in its sanitary sewer system. Annual plans are based on sanitary sewer investigations performed by Township staff as well as LCA's consultant. The proposed scope of work is summarized below:

| Year | Lateral Lining | Grout Laterals | Lateral Repalcement | Manhole Sealing | Main Line Lining | Lateral Reinstatement | Manhole Inserts |
|---|---|---|---|---|---|---|---|
| 2022 | 55 | | | | | | |
| 2023 | | 175 | | 3 | 11,771 | 120 | 148 |
| 2024 | | | 15 | | 11,401 | 136 | 64 |
| 2025 | | | | | 10,426 | 152 | 59 |
| 2026 | | | | | 13,254 | 170 | 57 |
| 2027 | | | | | 12,093 | 121 | 62 |
| 2028 | | 320 | | | | | |
| 2029 | | 275 | | | | | |
| **Total** | **230** | **770** | **15** | **3** | **58,945** | **699** | **390** |

**Exhibit V – 4: Summary – Lower Macungie Township SRP**

**City of Allentown**

The City of Allentown (COA) developed a comprehensive Infiltration and Inflow (I&I) source reduction strategy for its sanitary sewer collection system, targeting a 10-year phased approach. This initiative aligns with the U.S. Environmental Protection Agency (EPA) and PADEP requirements for a connection management program and regional flow management strategies. The SRP includes several key components:

1. Collection System Overview: The COA's wastewater collection system and the KIWWTP have been operational since 1929. The system includes 285 miles of COA-owned sewer pipes, 7,199 COA-owned manholes, and connections to 33,359 sewers.

2. Nighttime Weiring Study Review: Arcadis performed a nighttime weiring study in 2022 to establish a base groundwater infiltration rate during dry weather. This study involved 311 weirs within 169 manholes across 21 sewershed basins, providing essential data for base infiltration rates.

3. Rehabilitation Priority Ranking: Utilizing GIS data and the weiring study results, a quantitative ranking system was developed to prioritize rehabilitation activities. Factors include calculated infiltration rates, proximity to flood plains, and recent or planned repairs. Pipes with high base infiltration rates in flood hazard areas without recent repairs are ranked highest for rehabilitation.

4. Rehabilitation Strategy, Costs, and 10-Year Plan: The plan primarily involves grouting leaky pipe joints, with cost estimates based on recent construction costs. Additional rehabilitation includes manhole repairs within flood hazard areas and those prone to surcharging during wet weather.

Using the data provided by the nighttime weiring and to further refine the city's SRP efforts to ensure the most effective program for removal of I&I, COA will conduct a Sanitary Sewer Evaluation Survey (SSES) to further outline the findings and recommendations in designated areas of the city's sanitary sewer system. The evaluation aims to identify sections with high baseline infiltration rates and recommend necessary rehabilitation measures.

**Objectives:**

1. Identify High Infiltration Areas: Target areas with elevated infiltration rates for further investigation.
2. Assess System Deficiencies: Determine the specific deficiencies in smaller segments of the sewer system that require rehabilitation.
3. Monitor Flow: Conduct pre-rehabilitation and post-rehabilitation flow monitoring to evaluate the effectiveness of source reduction projects.

**Methodology**

<u>High Infiltration Rate Investigation</u>

Areas identified in the Rehabilitation Priority Ranking will be subjected to SSES. Utilizing flow monitoring and visual assessments, this will pinpoint sections with significant infiltration issues.

<u>Deficiency Assessment</u>

Each identified section will undergo an evaluation to identify infiltration deficiencies such as:

1. Cracked or damaged pipes
2. Improper joint connections
3. Infiltration from lateral connections

<u>Flow Monitoring</u>

Pre-rehabilitation flow monitoring will be conducted to establish baseline data. Post-rehabilitation monitoring will occur after implementation of recommended solutions to assess impact.

<u>Recommendations</u>

Based on the findings of the SSES, the following rehabilitation example strategies are proposed:

1. Pipe Lining: Apply trenchless technology to rehabilitate damaged pipes, restoring structural integrity and reducing infiltration.
2. Grouting: Use chemical grouting to seal cracks and joints in the sewer system, effectively minimizing infiltration.
3. Lateral Sealing: Implement sealing measures for lateral connections to prevent external water from entering the system.

**Manhole Inspection and Rehabilitation Program:**

The Manhole Inspection and Rehabilitation Program is aimed at assessing the condition of the city's approximately 7,199 manholes. The primary focus of this program is to identify deficiencies that allow rain-derived inflow into the sewer system.

Objectives

1. Comprehensive Inspection: Conduct thorough inspections of all city manholes to assess their structural integrity and identify rehabilitation needs.
2. Identify Inflow Sources: Focus on deficiencies that contribute to rain-derived inflow, which can negatively impact the overall efficiency of the sewer system.

**Methodology**

Inspection Process

All manholes will undergo a systematic inspection process, including:

1. Visual assessments to identify physical damage or deterioration.
2. Assessment of sealing effectiveness to prevent inflow.
3. Documentation of conditions for each manhole.

Deficiency Investigation

The program will specifically investigate:

1. Cracks or gaps in manhole structures and area surrounding manhole.
2. Deterioration of seals and joints.
3. Presence of debris that could facilitate inflow.

Findings

The inspection program is expected to reveal critical data regarding the condition of the manholes, particularly concerning their capacity to prevent rain-derived inflow. This information will be crucial for prioritizing rehabilitation efforts.

Recommendations

Based on the inspection findings, the following actions are recommended:

1. Targeted Rehabilitation: Focus on manholes identified with significant deficiencies that allow for inflow.
2. Sealing and Repairs: Implement sealing measures and structural repairs where necessary to prevent rainwater from entering the system.
3. Ongoing Monitoring: Establish a routine inspection schedule to ensure the long-term integrity of manholes and continued prevention of inflow.

The Manhole Inspection and Rehabilitation Program will provide essential insights into the city's manhole infrastructure. By identifying and addressing deficiencies that contribute to rain-derived inflow, the city can enhance the efficiency and reliability of its sewer system.

**Hanover Township**

Hanover Township developed a Source Reduction Plan (SRP) for 2025-2035 to address infiltration and inflow (I&I) in its sanitary sewer system. The Township's system, which serves residential, apartment, and commercial properties, includes 2.3 miles of gravity sewer mains and 67 manholes, contributing to the City of Allentown's Kline's Island Wastewater Treatment Plant. Despite previous efforts in sewer rehabilitation, recent flow metering indicated moderate peaking factors due to manhole frame and cover inundation, suggesting further improvements are needed.

The SRP outlines three primary initiatives:

1. Manhole Inflow Prevention Dish Replacement Program: Existing inflow prevention dishes have been ineffective. The Township plans to replace them with more effective gasketed dishes or caulk/sealant solutions to prevent stormwater inflow through manhole covers, particularly during significant rainfall events.

2. Continuation of Manhole Inspections and Repairs: Annual inspections will continue to identify I&I sources and structural defects in manholes. Data will be recorded in the Township's GIS system, prioritized, and assigned for rehabilitation by the Township Engineer. Repairs will be handled by both Public Works personnel and outside contractors.

3. Continuation of CCTV Collection System Inspections: The Township will maintain its CCTV inspection program, televising each sewer run approximately once every 10 years. Inspection data will be reviewed to prioritize repairs, including dig repairs and lateral rehabilitation. Manholes accessed during CCTV inspections will also be inspected and equipped with inflow prevention dishes as needed.

**Coplay Whitehall Sewer Authority (Borough of Coplay and Whitehall Township)**

The Coplay-Whitehall Sewer Authority (CWSA) developed a Source Reduction Plan (SRP) for 2023-2032 to address infiltration and inflow issues in the sanitary sewer system. This initiative supports future upgrades and expansion at the Kline's Island Wastewater Treatment Plant. Based on a 2021 flow study by Arcadis, CWSA identified six drainage basin areas, covering approximately 35 miles of sewer main, for further investigation. A nighttime weiring study pinpointed 3.5 miles of sewer main requiring rehabilitation.

The SRP outlines plans to rehabilitate these 3.5 miles through pressure testing and grouting, spread across annual, bi-annual, or tri-annual schedules. Additionally, CWSA aims to identify and seal manhole lids that allow inflow during rain events, targeting 1-20 manholes per year. This plan is expected to reduce inflow and infiltration, improving the overall efficiency and capacity of the sewer system.

**North Whitehall Township**

No specific Source Reduction Plan is required due to the existing small inventory amounts. Normal O&M measures will occur indefinitely moving forward.

**Borough of Emmaus**

The Borough of Emmaus developed a comprehensive Source Reduction Plan (SRP) for 2023-2033 to address infiltration and inflow (I&I) in its sanitary sewer system, initially installed in the early 1960s. The plan builds on past efforts, including a site inspection program started in 2006, which identified and required disconnection of improper connections such as basement floor drains and sump pumps. This program significantly reduced extraneous flow, with 3,899 properties inspected by 2014.

The sewer system consists of approximately 43.66 miles of pipe and 1,073 manholes, divided into four primary drainage basins and two smaller areas. Flow data collected by Arcadis identified basins with elevated peak flows, aiding in pinpointing areas for I&I reduction. Basin 2 and Basin 4 were further divided into sub-basins for detailed flow analysis.

Future plans include securing funding through grants and loans, with an annual budget of approximately $150,000 for system maintenance and repair. A notable project is the rehabilitation of the severely deteriorated sewer mains in S. 2nd Street, funded by a $575,000 PennDOT Multimodal Grant. Additionally, a $4 million loan will finance various rehabilitation activities, such as CIPP relining, full replacement of sewer mains, point repairs, grouting and sealing manhole chimneys, and full interior epoxy sealing of manholes. The Borough aims to continually identify and address sewer system defects, enhancing system reliability and reducing I&I over the next decade.

**Salisbury Township**

Salisbury Township developed a Source Reduction Plan to address the 2022-2032 planning horizon. The intent of the plan is to inspect approximately 330 manholes per year. The undocumented portion of the collection system will be videotaped. Below is a summary of work to be performed:

| Year | Inspection Area (Meter Station) | Total Number of Manholes | Manhole repair |
|---|---|---|---|
| 2022 | 1 | 150 | Seal Inspection Manhole Covers |
| | 8 | 72 | |
| | 10 | 100 ( Trout Creek) | |
| | Total | 322 | |
| 2023 | 1 | 371 | Seal Inspection Manhole Covers |
| | Total | 371 | Repair Manhole Inspection items (approximately 100 Manholes per year) |
| 2024 | 4 | 40 | Seal Inspection Manhole Covers |
| | 4A | 68 | |
| | 1A | 56 | Repair Manhole Inspection items (approximately 100 Manholes per year) |
| | 2 | 95 | |
| | 11 | 40 | |
| | 3 | 46 | |
| | Total | 345 | |
| 2025 | 5 | 54 | Seal Inspection Manhole Covers |
| | 6 | 84 | |
| | Unmetered | 190 | Repair Manhole Inspection items (approximately 100 Manholes per year) |
| | Total | 328 | |
| 2026 | 7 | 27 | Seal Inspection Manhole Covers |
| | 9 | 48 | |
| | 12 | 26 | Repair Manhole Inspection items (approximately 100 Manholes per year) |
| | Fountain Hill | 151 | |
| | Total | 252 | |
| 2027 through 2032 | Continue Manhole Inspection Repair/General Sewer Collection System Maintenance | | |

**Exhibit V – 5: Summary – Salisbury Township SRP**

**South Whitehall Township**

The South Whitehall Township (SWT) Source Reduction Plan (SRP) targets Basins 51, 54, and 56 for priority infiltration and inflow (I&I) work due to their high flow peaking factors identified by the KISS model from Arcadis. The township has committed to sealing and raising 100% of the manholes in the system by 2033. Planned work summarized as follows:

1. Manhole Raising and Sealing: The priority basins (51, 54, and 56) include low-lying areas near creeks. Manholes will be raised 12-18 inches, where feasible, and sealed with epoxy and tar sealing materials.

2. System-Wide Manhole Sealing: Epoxy sealing of chimneys and tar sealing of lids will be applied to manholes that do not require raising, ensuring comprehensive coverage across the system.

3. Night Reconnaissance: Locate and plan for the elimination or reduction of clear flows contributing to baseline infiltration. Main line lining or full replacement, including end seals and lateral connections, will be considered.

4. Flow Monitoring: Ongoing monitoring of large private systems such as Dorney Park, office parks, and shopping malls to further reduce I&I.

## I&I REDUCTION

As previously noted, the municipalities have completed significant amounts of sewer rehabilitation focused on reducing RDII. These improvements result in a reduction of extraneous flows and an increase in available capacity. This Plan proposes the following program for the municipalities to track the rehabilitation performed and resulting RDII reductions.

For Rehabilitation Projects Already Completed:

Arcadis was engaged to develop a program to track all Source Reduction work by each municipality and based on the type of rehabilitation, provide an estimate of the reduction in RDII. The program includes a detailed analysis of every aspect of collection system rehabilitation and incorporates all 2021 flow modeling data collected for the FCS to generate the flow reductions achieved. It accounts for the following factors of the rehabilitation work completed:

- Length of sewer segment rehabilitated
- Quantity of Taps sealed
- Quantity of Risers Sealed
- Quantity of Laterals Sealed
- Quantity of Transitions Sealed
- Quantity of Soil Pipes Sealed
- Quantity of Manhole Dishes Replaced/Installed
- Quantity of Manhole Frames & Covers Waterproofed
- Quantity of Manhole Chimneys Sealed
- Quantity of Manholes Sealed
- Quantity of Sump Pumps, Area Drains, Roof Drains, Etc. Disconnected from the System

The program also considers the material of construction of the existing pipe and manholes.

Once the data for each municipality is loaded into the spreadsheet, it will estimate the amount of RDII removed based on the type of rehabilitation performed.

| | Rehab Description | Inflow - Fast Dial | RII - Medium Dial | RII and BI - Slow Dial | BI - Very Slow Dial | Notes |
|---|---|---|---|---|---|---|
| 1 | Mainline lining without tap seals or end seals | 0% | 5% | 5% | 5% | Old school CIPP |
| 2 | Mainline lining with end seals but without tap seals | 0% | 10% | 10% | 10% | Mainline alone |
| 3 | Mainline lining with end seals and grouted tap seals | 5% | 20% | 20% | 20% | CIPPL + LTC stub |
| 4 | Mainline lining with end seals and tophat tap seals | 5% | 15% | 15% | 15% | CIPPL + Tophats |
| 5 | Mainline lining with end seals and full wrap tap seals | 5% | 25% | 25% | 25% | CIPPL + Stubby |
| 6 | Mainline lining with end seals and grouted tap and riser seals | 10% | 35% | 40% | 40% | CIPPL + LTC Shorti |
| 7 | Mainline lining with end seals and full wrap tap and riser seals | 10% | 50% | 50% | 50% | CIPPL + Shorti |
| 8 | Mainline lining with end seals and T liner to property line cleanout | 20% | 55% | 70% | 70% | CIPPL + Tliner |
| 9 | Mainline line with end seals, tap grouting, and LACO grouting | 20% | 60% | 70% | 70% | CIPPL + LTC + LACO |
| 10 | Mainline lining with end seals and T liner to property line and 4x6 replacement | 25% | 65% | 75% | 75% | CIPP + Tliner through transition |
| 11 | Mainline lining with end seals and LACO to property line and 4x6 replacement | 25% | 65% | 75% | 75% | CIPP + LTC + LACO through Transition |
| 12 | Mainline grouting | 0% | 10% | 10% | 10% | MLJ |
| 13 | Mainline grouting with LTCs | 10% | 35% | 40% | 40% | MLJ and LTC |
| 14 | Mainline, LTC, and LACO grouting | 20% | 65% | 65% | 65% | MLJ, LTC, and LACO |
| 15 | Full Mainline Replacement - No manholes, no laterals | 10% | 50% | 60% | 60% | Replace main and riser |
| 16 | Full Mainline Replacement -includes manholes but no laterals | 70% | 70% | 60% | 60% | Replace main, manholes, and riser |
| 17 | Full Mainline Replacement - Manholes, laterals to curb | 70% | 75% | 75% | 75% | Replace main, manholes, and lateral to curb |
| 18 | Full Mainline Replacement - Manholes, laterals through transition | 70% | 75% | 80% | 80% | Replace main, manholes, and lateral to transition |
| 19 | Frame, Cover, and Chimney Sealing | 50% | 50% | 10% | 0% | F&C |
| 20 | Chimney sealing alone | 10% | 10% | 10% | 0% | Chimney |
| 21 | Manhole lining | 5% | 5% | 5% | 5% | FRCL |
| 22 | Manhole grouting | 5% | 5% | 5% | 5% | Injection Grout |
| 23 | Clipped Cleanout Sealing | 20% | 20% | 0% | 0% | Cap Clean out |
| 24 | Sump pump disconnect | | | | | Sump Disconnect |
| 25 | Roof Drain disconnect | | | | | Roof Drain disconnect |
| 26 | Storm/area drain disconnect | | | | | Area Drain disconnect |

**Exhibit V – 6: Modeled Rehab Effectiveness**

For Rehabilitation Projects Where Actual Flow Meter Data is Available:

As previously discussed, the municipalities have implemented a strategic sewage metering program to continually analyze the sewage flows in their respective systems. As the implementation of their SRPs continues, the municipalities will be able to directly measure their progress with the removal of RDII through the use of data from Sewage Billing Meters (SBMs) and any pre-rehab or post-rehab flow monitoring data collected. As the RDII is removed, it will create additional capacity with the system. It is intended to update the estimated I&I removal on a quarterly basis and provide that report to PADEP along with any other quarterly reporting that may be required.

For Rehabilitation Projects Where Hydraulic Calculations are Possible:

Determining the amount of I&I removed in some rehabilitation projects, like the repair of a hole in a pipe, lend themselves to simple hydraulic calculations. If the hole diameter is known and there is an estimated ground water elevation, it is possible to accurately estimate the amount of I&I that is being removed by repairing the pipe.

## EPA'S 120/275 METRIC FOR I&I EVALUATION

The United States EPA published (October 1991) a handbook titled "Sewer System Infrastructure Analysis and Rehabilitation." This document provides guidance on the evaluation and rehabilitation of existing sewers, with a strong focus on the reduction of excessive I&I. Infiltration is the volume of water that enters the sewer system from the soil through foundation drains, defective joints, broken or cracked pipes, or faulty connections. This typically occurs when existing sewer lines undergo material and joint degradation and deterioration. Infiltration can also occur when new sewer lines are poorly designed and constructed. Inflow occurs when rainfall enters the sewer system through direct connections (roof leaders, catch basins, manholes, and other direct cross connections). Infiltration and inflow are typically considered excessive when it causes overflows or bypasses, or the cost to transport and treat exceeds the cost to eliminate it. When I&I causes health or environmental risks, corrective actions are required. Balancing the cost of reducing I&I versus transporting and treating is crucial.

Within this handbook, USEPA recognizes that if wastewater flows do not exceed 120 GPCD during periods of high groundwater, then I&I flow is not considered excessive. Furthermore, if the total daily flow during a storm event does not exceed 275 GPCD, and there are no operational problems, then I&I flow is not considered excessive or economical to remove. Additionally, 40 CFR 352005 defines non-excessive infiltration as the quantity of flow which is less than 120 GPDC (domestic base flow and infiltration) or the quantity of infiltration which cannot be economically and effectively eliminated from a sewer system as determined in a cost-effectiveness analysis. It further defines non-excessive inflow as the maximum total flow rate during storm events which does not result in chronic operational problems related to hydraulic overloading of the treatment works or which does not result in a total flow of more than 275 GPCD.

This Regional Act 537 Plan proposes to use this USEPA metric to guide the municipalities in their RDII removal strategies. Each municipality will calculate their respective allowable flows based on the USEPA metric and will then compare it to their actual flows. This analysis will be performed at the KISS system level (at KIWWTP) and at the municipal level.

For those entities that meet the 120/275 metrics, only maintenance work is required. This would be the typical ongoing maintenance and repair that should be ongoing to effectively manage a sewage collection system.

Ideally, problem areas would be prioritized as follows:

> If the KISS system overall is not compliant with one or more of the metrics, then address areas where remediation measures can return a significant result that would allow the overall KISS system to come into compliance with the noncompliant metric.
>
> If municipalities are not compliant with one or more of the metrics, then address areas where remediation measures can return a significant result that would allow the overall municipal system to come into compliance with the noncompliant metric.

Exhibit V-7 below is an example hydrograph that illustrates the 120/275 USEPA benchmark. The graph shows influent flows at KIWWTP for the three months from December 1, 2023, through February 24, 2024. During this period the groundwater was higher than seasonally normal, and the region received several rain events. Rain events are shown as vertical blue lines with inches of rainfall on the right axis. The orange horizontal line depicts the flow rate of 120 GPCD while the dark green line depicts the flow

rate of 275 GPCD. The 120/275 lines were derived from a KIWWTP system population of 255,420 and industrial/commercial flows of 6.8 MGD converted to an equivalent population. Analysis during this seasonal high groundwater period indicates that influent flows at KIWWTP are below the 120/275 EPA benchmark. However, some sewer sheds above KIWWTP have flows in excess of this benchmark and need investigation and rehabilitation.

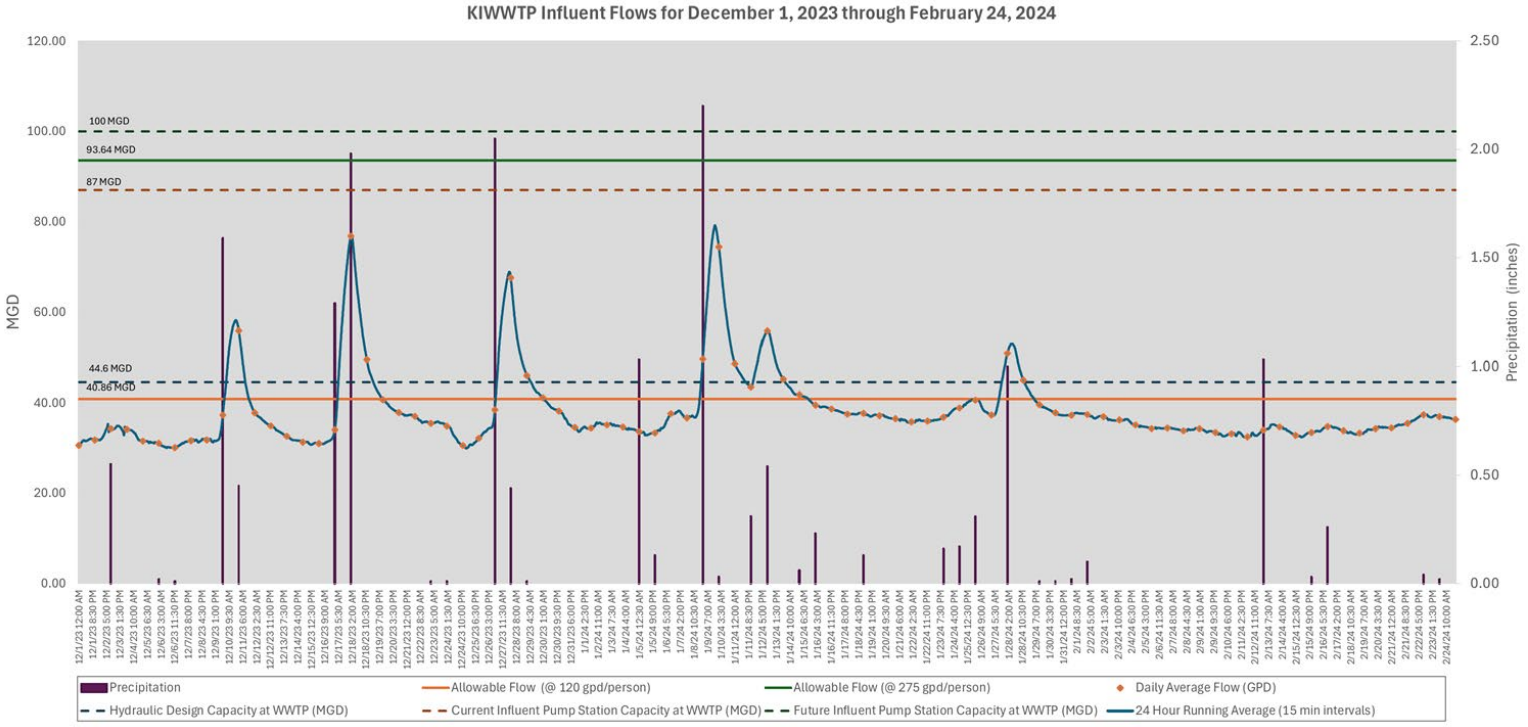



Exhibit V – 7: KIWWTP Influent Flows

## MASTER PLAN PROJECTS

The following alternative descriptions are for future Master Plan projects that are anticipated to be necessary within the 2050 planning horizon. Significant effort was expended to evaluate these alternatives so future needs could be planned for now. Although these Master Plan alternatives are not part of the commitment under this Regional Act 537 Plan, the potential financial impact of these large infrastructure projects was included so the potential future impact on user rates could be assessed. The Master Plan projects include the Little Lehigh Interceptor, the Western Lehigh Interceptor, and improvements at KIWWTP. The PTP is discussed but is not part of the alternatives in this Regional Act 537 Plan.

### LITTLE LEHIGH INTERCEPTOR (LLI)

The City of Allentown's 30"- 36" cast in place Little Lehigh Interceptor (LLI) was constructed in 1928 to convey flow from the City of Allentown to the 1926 60" Jordan Creek Interceptor (JCI) immediately upstream of KIWWTP. This interceptor connected planned tributary interceptors

and trunklines. The City of Allentown and its surrounding communities have experienced significant development, leading to increased demand on the existing sewer infrastructure. Constructed in phases from 1928 to 1998, the current network, including the Little Lehigh Interceptor (LLI) and its connected interceptors, is unable to adequately handle current and anticipated future flows, necessitating the development of the KISS Relief Interceptor (KRI).

Based on the strong potential this vital interceptor may eventually need to be expanded, a comprehensive alternatives analysis was conducted to determine the most effective method for constructing the KRI. Initial considerations included both open cut and trenchless (micro-tunneling and tunneling) construction methods. After evaluating geological, property ownership, environmental impacts, and cost factors, trenchless options were deemed prohibitively expensive. The preliminary screening of alternatives (PSOA) demonstrated that micro-tunneling and tunneling costs were significantly higher than open cut approaches, leading to the exclusion of these methods from further consideration.

Subsequently, a detailed examination of an open cut construction method, integrated with targeted trenchless technologies for specific challenging crossings (e.g., Basin Street, railroad tracks, and Kline's Island flood retention dike), was identified as the preferred approach. This hybrid method balances construction feasibility with cost-effectiveness and environmental considerations. The final selection, an open cut method supplemented by trenchless techniques for key sections, optimizes construction impact, cost, and the preservation of community and environmental resources.

Additionally, the alignment and depth of the KRI were meticulously planned to ensure efficient integration with existing infrastructure while minimizing disruption. The necessity of a new parallel gravity interceptor from the Robin Hood Bridge to the KIWWTP was emphasized to accommodate both dry and wet weather flows through at least the 2050 planning horizon, avoiding overflows and ensuring all peak wet weather flow is conveyed efficiently.

The Alignment Planning Study for the KISS Relief Interceptor (KRI) project encompassed a thorough investigation into various crucial aspects essential for finalizing the interceptor's route and ensuring its successful implementation. This comprehensive study included:

1. Easement Research and Property Ownership: Detailed analyses of property boundaries and ownership were conducted to determine the necessary easements for the construction and maintenance of the KRI. This step ensured legal access to the required lands and minimized potential disputes.

2. Subsurface Utility and Structure Identification: A meticulous survey was performed to locate and map existing underground utilities and structures, such as bridge abutments. This information was critical to avoid conflicts during construction and to plan the alignment in a manner that minimized disruptions to existing services.

3. Geotechnical Evaluations: The study included an evaluation of subsurface soil types, rock depths and quality, and groundwater conditions along the proposed alignment. These geotechnical assessments informed the design of the interceptor, particularly regarding its depth, slope, and the selection of construction methodologies.

4. Environmental and Regulatory Considerations: The planning study addressed various permitting requirements and environmental considerations, including compliance with the PADEP, the US Fish and Wildlife Service, the PA Historical and Museum Commission, the US Army Corps of Engineers, the PA Department of Transportation, and local authorities such as Lehigh County and the City of Allentown. Additionally, the study included wetland delineation and assessments of floodway and floodplain impacts to ensure that the project adhered to environmental regulations and minimized its ecological footprint.

5. Alignment Corridor Survey: A detailed survey of the entire alignment corridor was undertaken to document existing features such as roads, buildings, curbs, sidewalks, trees, streams, and more. This survey provided a comprehensive view of the physical environment the KRI would traverse, aiding in the design process and ensuring the alignment was feasible and constructable.

By addressing these diverse components, the Alignment Planning Study aimed to finalize the KRI's route with a clear understanding of the engineering challenges, legal and regulatory requirements, and environmental impacts. This careful planning and analysis are vital for ensuring that the KRI project will be executed efficiently, within budget, and with minimal disruption to the community and environment. A copy of the detailed analysis can be found in Appendix 6.

**WESTERN LEHIGH INTERCEPTOR (WLI)**

The Western Lehigh Interceptor (WLI), serving the Lehigh County Authority since 1972, has reached a point where expansion is critical to accommodate dry-weather flows as well as the growth and infrastructure demands of the Western Lehigh Sewerage Partnership (WLSP). The continuous growth and aging of the existing sewer assets have necessitated the need for additional conveyance relief, as supported by growth projections in this Plan. To address this, new infrastructure may potentially be developed to manage both dry and wet weather flows for the WLSP partners, ensuring delivery to LCA's Meter Station 5. In 2022, the WLSP established Level of Protection goals aiming to accommodate dry weather flows up to 2050 without pipe surcharging and handle peak wet weather flows during a 5-year design event without causing overflows. Additionally, Level of Service goals were determined to prevent basement backups near the interceptor and to keep a minimum of 2 feet of freeboard in manholes during peak times of the 5-year event, enhancing the system's resilience and reliability.

The Preliminary Screening of Alternatives (PSOA) outlined three strategies for enhancing conveyance capacity while meeting these established goals:

1. Construction of parallel interceptors
2. Establishment of a Pretreatment Plant Effluent Pump Station (PTP EPS) and force main
3. A hybrid solution involving a new Krick's Lane Pump Station.

The PSOA phase concluded with minimal cost differences among the options, setting the stage for a more detailed Final Alternatives Analysis (FAA).

The FAA focused on evaluating the discharge locations for the PTP EPS force main, juxtaposing gravity-based solutions against pumped alternatives. This detailed analysis underscored the benefits of gravity systems in moderating flow rates to the KIWWTP and offering significant in-line storage, thereby reducing peak flows.

Transitioning to the Selection of Solution (SOS) phase, two prominent alternatives were carried forward:

1. Parallel interceptor construction
2. A new pump station and force main from the Pretreatment Plant.

The parallel interceptor construction was identified as the preferred solution due to its operational and economic advantages. This alternative, despite an initial capital cost estimate slightly higher than the pumped solution, presents a lower life cycle cost, emphasizing the gravity system's efficiency in handling not only the peak wet weather flow but also the crucial dry-weather flows. This strategy balances cost-effectiveness with functional performance, offering a sustainable solution to the WLSP's conveyance challenges.

**KLINE'S ISLAND WASTEWATER TREATMENT PLANT (KIWWTP)**

Reuse of KIWWTP was discussed earlier in this section. The existing wastewater plant will be used to the maximum extent practicable to treat projected flows. Upgrade projects may be necessary based on the results of the Source Reduction Plans. While this Regional Act 537 Plan does not include these upgrade projects, since they are considered likely in the future, the financial planning for them is included herein. A more detailed description of the KIWWTP alternatives evaluated is included in section V (A) (1) above.

**INDUSTRIAL PRETREATMENT PLANT (PTP)**

Much of the facility is nearing its useful life and will require significant upgrades. LCA will be considering alternatives for this upgrade including an option to require the industries to perform their own pretreatment of their waste. Regardless of the alternative selected, it will include the necessary organic (BOD) reduction to prevent an organic overload at the KIWWTP. Therefore, the PTP is not considered a critical component of this Plan. Pretreatment of high-strength waste will still be provided regardless of the ultimate selection of an alternative and will be monitored with the current USEPA Pretreatment Program administered by LCA.

### 5. NEED FOR NEW COMMUNITY SEWAGE SYSTEMS

This Regional Act 537 Plan does not anticipate the need for new community sewage systems. The infrastructure in place will be reused or upgraded to meet the sewage collection, conveyance and treatment requirements throughout the planning horizon.

### 6. USE OF INNOVATIVE/ALTERNATIVE METHODS OF COLLECTION/CONVEYANCE

Since the infrastructure is already in place to provide sewage collection, conveyance and treatment, innovative or alternative methods were not considered. To the extent practicable, use of the existing infrastructure will be maximized as the most cost efficient and economical approach.

## G. NON-STRUCTURAL COMPREHENSIVE PLANNING ALTERNATIVES

### 1. MODIFICATION OF EXISTING PLANS

This Regional Act 537 Plan is limited to the areas currently within the sewer service area. Since this Plan does not contemplate extending the sewer service area, the use of Non- Structural Comprehensive Planning Alternatives to meet the existing and future sewage disposal needs of planning area is not considered a viable solution to address the issues noted in Section III of this Plan.

### 2. CONSIDERATION OF A LOCAL PLAN WITH REGARD TO LAND DEVELOPMENT

As detailed in Section II, the municipalities of the KISS have detailed planning documents that regulate development within their jurisdictions. Since this Plan does not contemplate extending the sewer service area, a local comprehensive plan is not needed to meet the existing and future sewage disposal needs.

### 3. ALTERNATIVES FOR CREATING OR CHANGING MUNICIPAL SUBDIVISION REGULATIONS

The KISS municipalities have individual zoning district designations and regulations and subdivision and land development plans, which state their own building requirements for new or existing properties. Each of the ordinances state requirements regarding lot sizes and the establishment of private or on-lot sewage systems. Therefore, this is not considered a viable solution due to existing plans that are already in place.

### 4. EVALUATION OF EXISTING LOCAL AGENCY PROGRAMS AND TRAINING

LCA has all the necessary experience and resources available to effectively operate and maintain the collection and conveyance systems and the proposed improvements at KIWWTP. Furthermore, the individual municipalities are also highly capable of the operation and maintenance of their respective collection and conveyance facilities. Municipalities often collaborate with each other on operation and maintenance issues and share resources and equipment when the need arises.

## H. NO-ACTION ALTERNATIVE IMPACTS

The No-Action alternative could have adverse impacts on water quality/public health, growth potential, Community Economic Conditions, recreational, opportunities, drinking water sources and may create other environmental concerns.

No-Action would eventually result in an increase of sanitary sewer overflows and would adversely impact public health, recreation and drinking water supplies. Furthermore, no-action would precipitate a prohibition of new connections resulting in diminished economic conditions and potential environmental degradation.

### 1. WATER QUALITY/PUBLIC HEALTH

An increase or continuation of sanitary sewer overflows would negatively impact water quality and public health.

### 2. GROWTH POTENTIAL

An increase or continuation of sanitary sewer overflows would limit or prevent additional connections to the sewer system in this service area. A connection limitation or moratorium would negatively impact growth potential in the service area.

### 3. COMMUNITY ECONOMIC CONDITIONS

An increase or continuation of sanitary sewer overflows would result in a limitation or moratorium to connections as discussed in the section above. These limitations would suppress or stop economic growth in the service area.

### 4. RECREATIONAL OPPORTUNITIES

An increase or continuation of sanitary sewer overflows would negatively impact local waterways and could limit recreational activities such as swimming, fishing, and boating.

### 5. DRINKING WATER SOURCES

An increase or continuation of sanitary sewer overflows could negatively impact downstream drinking water sources by increasing the concentrations of contaminants in the drinking water source supply.

### 6. OTHER ENVIRONMENTAL CONCERNS

An increase or continuation of sanitary sewer overflows could negatively impact public health due to the increased potential for human direct contact with untreated sewage.

# VI. EVALUATION OF ALTERNATIVES

## A. CONSISTENCY DETERMINATION

Title 25, Chapter 71.21(a)(5) of the Pennsylvania Code requires that each alternative which is available to provide for new or improved sewage facilities for each area of need be evaluated for consistency with the objectives and policies of Comprehensive Plans, state water plans, plans developed under Chapter 94, plans developed under the Federal Water Quality Act, anti-degradation requirements, Pennsylvania's prime agriculture land policy, plans adopted by the county and approved PADEP under the Storm Water Management Act, wetland protection, protection of rare, endangered or threatened plant and animal species as identified by the Pennsylvania Natural Diversity Inventory, and the Historical and Museum Commission. The consistency determination is as follows:

### 1. CLEAN STREAMS LAW/ CLEAN WATER ACT

Sections 4 and 5 of the Clean Streams Law require that consideration be given to: water quality management and pollution control in a watershed as a whole, present and possible future uses of particular waters, the feasibility of combined or joint facilities, the state of scientific and technical knowledge, and immediate and long-range economic impact upon the Commonwealth and its citizens. Section 208 of the Clean Water Act calls for the development of plans for the identification of treatment works necessary to meet the anticipated municipal and industrial waste treatment needs of an area over a 20-year period.

The selected alternatives are consistent with Section 4 and 5 of the Clean Streams Law and Section 208 of the Clean Water Act in that the selected alternatives focus on reduction of I&I in the system. To the extent practicable, the various systems are a joint facility for treatment of wastewater. The selected alternatives will provide a long-range solution to the service area with a positive economic impact. Furthermore, the selected alternatives will reduce wet weather-related overflows and activation of bypass Outfall 003 thereby creating better downstream recreational opportunities.

Point sources of pollution will be treated at the KIWWTP. Non-point sources of pollution will be addressed by each municipality in the service area through their respective MS4 programs. For Lehigh County, the comprehensive water quality management efforts are overseen by the LCA and the Lehigh County Conservation District. LCA focuses on providing high-quality water and wastewater services, adhering to both federal and state regulatory requirements under the Clean Water Act and Safe Drinking Water Act. They perform regular water quality monitoring and reporting and address emerging contaminants like PFAS. Lehigh County Conservation District handles plan reviews, complaint processing, and permit issuance related to erosion, sediment control, and post-construction stormwater management. They also coordinate with the PADEP for stream encroachment and wetland permitting issues.

In summary, these organizations work collaboratively to manage and protect water quality in Lehigh County by setting policies, enforcing regulations, and implementing strategic projects to address both current and emerging water quality issues.

The 2009 Sewer Capacity Assurance & Rehabilitation Program for the Western Lehigh Partners was superseded by the PADEP approval of the Interim Act 537 Plan in June of 2021. Flow issues in the Kline's Island Sewer System and activation of Outfall 003 led USEPA to issue two Administrative Orders in 2007

and 2009. Both required the KISS municipalities to reduce excessive I&I flow into the collection system. Both Administrative Orders were satisfactorily resolved.

## 2. MUNICIPAL WASTELOAD MANAGEMENT PLANS

All municipalities annually submit a Chapter 94 Municipal Wasteload Management Report to PADEP for their respective systems. The 2024 Chapter 94 Reports submitted by the municipalities identified their individual efforts toward extraneous I&I flow reduction. This Regional Act 537 Plan is consistent with the plans identified in the Municipal Chapter 94 Reports.

## 3. TITLE II OF THE CLEAN WATER ACT

There are no current Section 201 Facility Plans in effect on this system. Therefore, there are no Section 201 Facility plans with which to measure consistency.

## 4. COMPREHENSIVE PLANNING

Municipal Comprehensive Plans designate areas for residential, commercial, and industrial developments and agricultural preservation and floodplain areas within the municipalities. This Regional Act 537 Plan is consistent with the various Comprehensive Plans of the municipalities. A brief summary of each municipality's comprehensive plan is as follows.

**Borough of Alburtis**

The Borough of Alburtis is a part of the Southwestern Lehigh County Comprehensive Plan, adopted by the Borough in December 2017. The other municipalities addressed in the Comprehensive Plan are Emmaus and Macungie Boroughs, and Lower Milford, Lower Macungie, and Upper Milford Townships. The major recommendations include updating each municipality's development regulations to carry out the land use plan, updating existing zoning ordinances, and resolving outstanding traffic issues.

**Lowhill Township**

Lowhill Township was part of the 2022 Northern Lehigh Comprehensive Plan for Heidelberg, Lowhill, Lynn, Washington and Weisenberg Townships and Slatington Borough.

**Borough of Macungie**

The Borough of Macungie is a part of the Southwestern Lehigh County Comprehensive Plan, adopted by the Borough in December 2017. The other municipalities addressed in the Comprehensive Plan are Alburtis and Emmaus Boroughs, and Lower Milford, Lower Macungie, and Upper Milford Townships. The major recommendations include updating each municipality's development regulations to carry out the land use plan, updating existing zoning ordinances, and resolving outstanding traffic issues.

**Upper Macungie Township**

The Upper Macungie Township Comprehensive Plan (A Plan for Growth Management and Preservation) was adopted October of 2019. The plan's main goals are to protect the Township's community character, its natural resources, farmland preservation, and sustainable development. This plan does not expand our current Urban Growth Boundary (Act 537 Boundary) but rather encourages extending the Open Space Preservation District zoning regulations outside the Act 537 Sewer Service Area to protect natural resources.

**Upper Milford Township**

Upper Milford Township is a part of the Southwestern Lehigh County Comprehensive Plan, adopted by the Township in April 2005. The other municipalities addressed in the Comprehensive Plan are Alburtis, Emmaus and Macungie Boroughs and Lower Milford and Lower Macungie Townships. The major recommendations include updating each municipality's development regulations to carry out the land use plan, updating existing zoning ordinances, and resolving outstanding traffic issues.

**Weisenberg Township**

Weisenberg Township was part of the 2022 Northern Lehigh Comprehensive Plan for Heidelberg, Lowhill, Lynn, Washington and Weisenberg Townships and Slatington Borough.

**Lower Macungie Township**

Lower Macungie Township is a part of the Southwestern Lehigh County Comprehensive Plan, adopted by the Township in 2017. The other municipalities addressed in the Comprehensive Plan are Alburtis, Emmaus and Macungie Boroughs, and Lower Milford and Upper Milford Townships. The major recommendations include updating each municipality's development regulations to carry out the land use plan, updating existing zoning ordinances, and resolving outstanding traffic issues.

**City of Allentown**

The City of Allentown's comprehensive plan, Vision 2030, was adopted by City Council in December of 2019. The plan focuses on four main strategies: economic inclusivity, the city as a steward, diversity and inclusion, community empowerment and collaboration. The plan describes Allentown's urban systems and demonstrates how they could apply to city neighborhoods with Area Plans and makes recommendations that inform leaders on how to use the land to guide future growth and development.

**Hanover Township**

The Hanover Township Comprehensive Plan was updated in 1995 and then amended in 2003. The amendment serves to update some significant changes that occurred over time and caused the Township to reconsider some of the assumptions and planning projections of the plan. The major recommendations focused on updating the zoning ordinance, capital improvements planning, participation in grant and loan

programs, special studies (specifically Airport Area Transportation Network Task Force planning), and continued planning.

**Borough of Coplay**

The Coplay Borough Comprehensive Plan was adopted in May 2010 by the Borough Council. The main objectives of the plan are to update the zoning ordinance, create incentives for rehabilitation of residential buildings, encourage senior housing in the Borough, begin a phased streetscape improvement program in the downtown area, begin a multi-year program to improve Coplay Parkway, continue participation in planning and implementing new trail improvements, and continue to monitor the Borough's participation in regional water and sewer entities.

**Whitehall Township**

Whitehall Township is an older municipality and a suburb of the third-largest city in Pennsylvania. Issues such as redevelopment, commercial revitalization, and village development are important land use issues affecting the Township. Recognizing the importance of planning even when a considerable portion of the Township's land use has been developed, the Whitehall Township Board of Commissioners, in 2003, authorized the Whitehall Township Planning Commission to undertake a new comprehensive plan for the Township. The new Comprehensive Plan was adopted by the Township on August 8, 2005.

**North Whitehall Township**

The North Whitehall Township Comprehensive Plan was adopted in June of 2009. The major actions recommended by the plan focus to revise the existing zoning ordinance, revise the existing subdivision, and land development ordinance, prepare and carry out a five-year capital improvements program, identify needed transportation improvements and utilize state funding for said improvements, and review and update both the official sewage facilities plan and the comprehensive plan.

**Borough of Emmaus**

The Borough of Emmaus is a part of the Southwestern Lehigh County Comprehensive Plan, adopted by the Borough in November 2018. The other municipalities addressed in the Comprehensive Plan are Alburtis and Macungie Boroughs, and Lower Milford, Lower Macungie, and Upper Milford Townships. The major recommendations include updating each municipality's development regulations to carry out the land use plan, updating existing zoning ordinances, and resolving outstanding traffic issues.

**Salisbury Township**

The Salisbury Township Comprehensive Plan was adopted in September of 2012. The major recommendations include updating development regulations, updating the zoning and subdivision and land development ordinance, studying and developing traffic improvements, implementing a Township wide trail network, and preparing a pathways plan.

**South Whitehall Township**

The South Whitehall Township Comprehensive Plan was adopted in July of 2009. The primary goals of the plan are to revise the existing zoning ordinance, develop and maintain a capital improvements plan, adopt a historic preservation ordinance, and adopt a traditional neighborhood development ordinance.

## 5. ANTIDEGRADATION REQUIREMENTS

Chapters 93, 95 and 102 under Pennsylvania's Clean Stream Law classifies all surface waters according to uses to be protected and establishes water quality criteria which need to be maintained in the surface waters. The proposed alternatives in this Regional Act 537 Plan do not propose to increase the monthly average flow at the KIWWTP and is consistent with Chapter 95 and 102. No new surface water discharges are proposed under this Regional Act 537 Plan.

## 6. STATE WATER PLANS

In order to meet the rapidly expanding demands for water throughout the Nation, it is the policy of the Congress to encourage the conservation, development, and utilization of water and related land resources of the United States on a comprehensive and coordinated basis by the Federal Government, States, localities, and private enterprise with the cooperation of all affected Federal agencies, States, local governments, individuals, corporations, business enterprises, and others concerned. The selected alternatives in this Regional Act 537 Plan do not propose any new discharges to receiving waters and is, therefore, consistent with state water plans.

## 7. PENNSYLVANIA PRIME AGRICULTURAL LAND POLICY

Pennsylvania's Prime Agricultural Land Policy aims to safeguard prime agricultural lands from irreversible conversion to non-agricultural uses, thereby preserving them for environmental sustainability and essential food production. State agencies are mandated to avoid using state and federal funds to promote such conversions if feasible alternatives exist. Prime agricultural lands are defined according to criteria set by the United States Department of Agriculture Natural Resource Conservation Service (NRCS), including lands marked as "prime," "unique," or of significant state or local importance, lands actively used for agriculture, or soils within agricultural preservation areas as per the Pennsylvania Municipalities Planning Code. Municipalities are required to use NRCS's inventory to identify and map these prime lands in relation to proposed service areas and anticipated growth regions over the next five and ten years. The policy also emphasizes the importance of local efforts to protect these lands through zoning, land use planning, and other measures. Additionally, the identification of farmland enrolled in state conservation programs is necessary. Sewage facilities plan updates must consider the policy's directives when establishing service areas or future growth areas, evaluating the potential adverse impacts of irreversible land use conversion and the extension of sewer services to adjacent prime agricultural areas. The analysis must explore resolutions to any conflicts between proposed sewerage facilities and agricultural land preservation, ensuring that alternatives are considered, or local preservation efforts are adjusted before adopting plan updates.

The municipalities within the KISS sewage collection area have zoning and planning in place to identify and protect prime agricultural land. There are no projects proposed within this Regional Act 537 Plan that would impact prime agricultural land.

## 8. COUNTY STORMWATER MANAGEMENT PLANS

In 2006, the Lehigh Valley Planning Commission prepared a Global Act 167 update for the County which includes an exemption from requirements to meet the Drainage Plan preparation provision of the Model ordinance. This applies to new developments which are expected to have an insignificant impact on the watershed. The exemption provides that any development which would create 10,000 square-feet or less of additional impervious cover will not be required to meet the Drainage Plan. None of the proposed projects in this Regional Act 537 Plan will be above this threshold.

## 9. WETLAND PROTECTION

The National Wetlands Inventory for Pennsylvania was consulted to determine if wetlands or hydric soils were in the proposed projects' area. Appendix 4 includes a map indicating those areas identified as wetlands or hydric soils. Since there are no planned infrastructure projects, there is no impact on wetlands or hydric soils.

As expected, the potential Master Plan projects to parallel the Little Lehigh Interceptor and the Western Lehigh Interceptor fall within areas designated as wetlands or hydric soil. According to PADEP's "A Guide for Preparing Act 537 Plan Update Revisions," if it is determined that there will be no impact on wetlands from the construction of sewage facilities (sewers, treatment plants, etc.) but it is obvious from the information submitted that associated construction activities (road crossings, utility lines, etc.) will be in or through mapped wetland areas, the sewage facilities plan may be approved by PADEP with a specific statement in the approval letter which identifies this obvious wetland impact, and the need to secure Chapter 105 permits prior to construction. The Guide further states that if sewage facilities system component locations or routes are set, the municipality may obtain a letter from PADEP's Water Management Program or the municipality's consulting engineer stating that a general permit is applicable to the encroachments and identifying which general permit will apply. While not part of this Regional Act 537 Plan, this requirement may come into play when the Master Plan projects are implemented.

## 10. PROTECTION OF RARE, ENDANGERED OR THREATENED PLANT AND ANIMAL SPECIES

A Pennsylvania Department of Conservation and Natural Resources Project Search was not conducted since this Regional Act 537 Plan does not propose any new construction of infrastructure. Should the need arise to build new infrastructure, the PNDI search will be conducted for the proposed project(s).

## 11. HISTORICAL AND ARCHEOLOGICAL RESOURCE PROTECTION

The Pennsylvania Historical Preservation Act of 1978 mandates cooperation between Commonwealth agencies, municipalities, and the Pennsylvania Historical and Museum Commission (PHMC) for the preservation of archaeological resources. For sewage facilities plan updates potentially impacting such resources, municipalities must inform PHMC to assess the impact of their chosen alternative.

Significant impacts on archaeological or historical resources by sewage projects necessitate consultation with PHMC to find reasonable resolutions. Discrepancies between municipal plans and PHMC's requirements should be addressed prior to plan implementation and submission to PADEP. If PHMC's investigations reveal significant archaeological findings, their work should be completed before the municipality finalizes the sewage facilities plan update. In cases where sewerage facility locations are provisional, municipalities may seek PADEP's conditional approval for their plan revisions, ensuring compliance with the Pennsylvania Historic Preservation Act and safeguarding archaeological and historical resources.

The PHMC Project Search was not conducted since this Regional Act 537 Plan does not propose any new construction of infrastructure. Should the need arise to build new infrastructure, the PHMC search will be conducted for the proposed project(s).

## B. RESOLUTION OF INCONSISTENCIES

No inconsistencies were identified in the consistency evaluation.

## C. WATER QUALITY STANDARDS, EFFLUENT LIMITATIONS, AND OTHER REQUIREMENTS APPLICABLE TO ALTERNATIVES

The proposed alternative includes a significant reduction in rainfall derived I&I through rehabilitation and improvements to conveyance systems. All this is being proposed to reduce the potential for overflow at Outfall 003. Elimination of activations at Outfall 003 is consistent with water quality standards. Previous sections of the Regional Act 537 Plan identified the NPDES permit under which the KIWWTP operates. Previous sections also detailed the potential for treatment improvements at KIWWTP. The potential KIWWTP improvements will meet the effluent requirements dictated in the NPDES permit and therefore there are no expected adverse impacts on water quality.

## D. COST ESTIMATES AND PRESENT WORTH ANALYSIS

**Source Reduction Plans**

An integral part of the Regional Act 537 Plan is the continued commitment of the municipalities to perform source reduction projects. Exhibit VI-1 below summarizes the cost of projected projects by each municipality through the year 2035. More detail on the proposed project financing can be found in Appendix 17.

| Customer | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alburtis | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- |
| Macungie | - | - | - | - | - | - | - | - | - | - | - | - |
| Upper Macungie | 1.25 | 1.00 | 1.00 | 0.75 | 0.75 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 6.25 |
| Lower Macungie | - | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 15.00 |
| Lowhill | - | - | - | - | - | - | - | - | - | - | - | - |
| Weisenberg | - | - | - | - | - | - | - | - | - | - | - | - |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper Milford | - | 0.20 | - | - | - | - | - | - | - | - | - | 0.20 |
| City of Allentown | 3.00 | 5.00 | 5.00 | 5.25 | 5.25 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 59.50 |
| Hanover | - | 0.02 | - | - | - | - | - | - | - | - | - | 0.02 |
| Emmaus | - | 0.58 | - | 0.18 | 0.55 | 0.32 | 0.54 | 0.06 | - | - | - | 2.22 |
| Salisbury | - | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 4.00 |
| South Whitehall | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 0.54 | 5.94 |
| North Whitehall | - | - | - | - | - | - | - | - | - | - | - | - |
| Coplay | - | - | - | - | - | - | - | - | - | - | - | - |
| Whitehall | - | 0.03 | 0.03 | 0.37 | 0.37 | 0.37 | - | - | - | - | - | 1.16 |
| LCA | - | 0.25 | 3.00 | 3.00 | 0.30 | 0.68 | - | - | - | - | - | 7.23 |
| TOTAL | $4.79 | $9.51 | $11.47 | $11.99 | $9.66 | $10.06 | $9.23 | $8.75 | $8.69 | $8.69 | $8.69 | $101.51 |

**Exhibit VI-1 Cost to Implement Source Reduction Plans ($ Millions)**

Besides the SRPs from each of the municipalities as mentioned, the other two major components comprising the Raftelis financial analysis from 2026-2030 include projects depicted in the LCA 2025-2029 Capital Plans. The Allentown Division Capital Plan includes a mix of annual projects, additional manhole work (inspections and rehab) in the City, and a capital plan related KIWWTP projects (including the 100 MGD project). A project summary can be found in Appendix 17.

The Suburban Division Capital Plan includes a mix of annual projects and miscellaneous placeholders related to the WLI from 2025-2029. A project summary can be found in Appendix 17.

Capital cost assumptions for 2030 were made for both Divisions.

The combined annual impact of these investments on customers is estimated in Exhibit VI-2, first as an overall impact for the KISS system costs only, then for total costs including KISS system costs and local collection system costs and finally broken out by municipality to show the local impact of total KISS system costs and local costs. This analysis neutralizes the impacts of distinct local rate structure, funding and financing practices, cash targets and balances by customer by simply dividing the total allocated revenue requirements by the total flow in thousands of gallons. This gives an equalized sense purely of how costs are expected to change based on system investments and operating cost projections. It should be noted that cost allocations will shift once a high-strength surcharge program is implemented. At the time of this report's publication, information was still being gathered regionally on commercial and industrial high-strength loadings activity and various policy and rate-setting procedures around the high-strength surcharge program were yet to be determined.

| Cost Pool | 2023 Flow (kgal) | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 | CAGR[15] |
|---|---|---|---|---|---|---|---|
| **KISS System Costs** | 11,775,120 | $1.87 | $2.00 | $2.21 | $2.26 | $2.31 | **5.4%** |
| **KISS System Costs + Local Muni Costs** | 11,775,120 | $6.07 | $6.40 | $6.89 | $7.06 | $7.28 | **4.7%** |

| Municipality | 2023 Flow (kgal) | FY 2026 | FY 2027 | FY 2028 | FY 2029 | FY 2030 | CAGR |
|---|---|---|---|---|---|---|---|
| **LCA Collection Systems (Lowhill, Weisenberg & Upper Milford)**[16] | 90,027 | $6.68 | $4.96 | $5.56 | $5.46 | $5.66 | **-4.1%** |
| **CWSA** | 725,217 | $6.62 | $6.65 | $7.32 | $7.59 | $7.75 | **4.0%** |
| **Alburtis** | 57,000 | $7.84 | $8.22 | $8.91 | $8.91 | $9.21 | **4.1%** |
| **Emmaus** | 390,592 | $6.63 | $7.62 | $8.05 | $8.17 | $8.39 | **6.1%** |
| **Upper Macungie**[17] | 1,845,154 | $5.02 | $4.94 | $4.90 | $4.71 | $4.83 | **-0.9%** |
| **Macungie** | 74,773 | $10.58 | $11.05 | $11.82 | $11.91 | $12.30 | **3.8%** |
| **Hanover** | 25,851 | $9.59 | $9.89 | $10.18 | $10.50 | $10.81 | **3.0%** |
| **Lower Macungie** | 637,036 | $8.05 | $8.41 | $9.13 | $9.05 | $9.31 | **3.7%** |
| **Salisbury** | 576,298 | $5.52 | $5.53 | $5.60 | $5.91 | $5.89 | **1.7%** |
| **South Whitehall**[18] | 757,067 | $4.31 | $4.45 | $4.59 | $4.80 | $4.91 | **3.3%** |
| **Allentown**[19] | 5,904,326 | $2.86 | $3.16 | $3.48 | $3.68 | $3.88 | **7.9%** |

**Exhibit VI – 2 Cost per 1000 Gallons (kgal) of Flow ($/kgal)**

It is anticipated that a high-strength surcharge program will be developed to allocate costs for loadings that are above domestic strength wastewater. The creation of this program allows for cost allocations that are primarily based on flow as primarily domestic strength wastewater would be expected to have the same loadings characteristics and cost drivers per unit of flow across customers. At the time of the development of this Act 537 Plan the exact parameters of the high-strength surcharge program were still in development. Specifically, more information needs to be gathered on commercial and industrial customers across the region to understand high-strength end users by community and estimate the number of participants that would be expected in the program. It is likely that a minimum flow threshold may be established for high strength surcharge program participation to avoid excessive administrative complexity and economic impacts to small businesses. This will ensure an efficient program design that focuses on the largest contributors of high-strength waste to the system and will be designed to ensure equitable cost recovery across customers. It is expected that LCA would share in the administrative burden of this program to ensure consistency in loadings sampling and centralize certain aspects regionally. LCA would identify the high-strength cost allocation in the municipal sewer bills, and the municipalities would then be responsible for billing and collecting the revenue for those costs from their direct customers.

[16] The CAGR for the LCA Collection Systems is estimated to decline over the planning period due to planned sewer system rehab work scheduled for 2026, with spending levels reduced in the remaining years of the period.

[17] The CAGR for Upper Macungie declines slightly over the period as projected for their LCA payments under the new cost allocation process in part because estimates of high-strength surcharges are not included as part of the analysis due to unknown levels of activity across the region.

[18] The CAGR for South Whitehall may be understated over the period under the new cost allocation process likely in part because estimates of high-strength surcharges are not included as part of the analysis due to unknown levels of activity across the region.

[19] This represents the total projected wastewater revenues collected from the City of Allentown direct customers per kgal of total flow including I&I. Revenue generated by the city direct customers is governed by the terms of the 50-year city's water and sewer system lease to LCA. The lease terms allow for full recovery of approved major capital improvements, with the remaining revenue generated by rates that increase annually based on the rate of inflation + 2.5%.

It is worth noting that in the current KISS system cost allocations detailed in this report, the high-strength surcharge program revenues were not estimated as offsets to the allocated revenue requirement because of the number of unknowns about program design at the time of publication. Once implemented, the high-strength surcharge program would have the impact of directing more treatment costs to those municipalities with more high-strength waste dischargers, which would have the effect of lowering the flow-based cost allocation to municipalities with fewer high-strength waste dischargers.

Since the alternative of reducing RDII was selected, a present worth analysis was not performed because the alternatives did not include ongoing operation and maintenance costs. A present worth analysis is a financial evaluation technique used to compare the total cost or value of different alternatives over a specified period by converting all future expenses to their present value using a discount rate. Since there are no ongoing operation or maintenance costs associated with the selected alternative a present worth analysis is not needed.

## E. FINANCING METHODS

This Plan does not propose any upgrades or expansions to conveyance or treatment facilities. However, it was felt it would be prudent to initiate financial planning for these significant projects as part of this Regional Act 537 Plan to ensure adequate funds are available to implement the projects in the future. Not only does this serve to communicate the future needs and funds that will be required, but financial implementation now will allow for the creation of a reserve fund that will support rate stabilization when necessary to construct projects.

In order to create a plan to finance the SRPs along with the anticipated projects that may be needed beyond the scope of this Regional Plan, LCA engaged the services of Raftelis. Raftelis helps local governments and utilities thrive by providing management and financial consulting expertise. Raftelis created a cost sharing approach (see Appendix 17) for the municipalities that simplifies the current approach by:

- Focusing primarily on measured sewage flow-based allocations
- Removing BOD and TSS loadings from municipal cost allocations (loadings used for calculating pre-treatment program industrial surcharges)
- Eliminating complicated excess removal credit calculations from Western Lehigh signatory billing
- Isolating PTP investments to a smaller project serving a subset of industrial customers

The following tables summarize the cost sharing concepts for both the Regional Act 537 Plan as well as for the anticipated capital projects that may be needed beyond the scope of this Regional Plan.

# KISS System Cost Sharing Concepts

| Cost Pool | Signatory Group | Concept |
|---|---|---|
| KIWWTP | City Signatories including LCA | Share of actual flow |
| City Interceptors (CIT INT) | City Signatories including LCA | Share of actual flow |
| KISS Relief Interceptor (KRI) | City Signatories including LCA | Modeled flow-miles |
| Little Lehigh Relief Interceptor (LLRI-1 & 2) | LCA / LLRI Signatories | Share of actual flow |
| Western Lehigh Interceptors (WLI) | WL Signatories | Share of actual flow |
| Inflow & Infiltration (I&I) | All Signatories | Directly paid for by signatories or regional participation option |

**Exhibit VI –3: KISS System Cost Sharing Concepts**

The following table (Exhibit VI-4) calendarizes the projected capital outlay for all planned projects as well as those projects that may be required beyond this Regional Act 537 Plan. As can be seen, in addition to the municipality SRPs shown in Exhibit VI-1 above, the financial projection includes the KIWWTP 100 MGD project, the City of Allentown interceptor work, the KISS Relief Interceptor, the Little Lehigh Relief Interceptor and the Western Lehigh Interceptor. *Section VIII.B. Designation of Financing Plan* details how this infrastructure is assumed to be funded and financed.

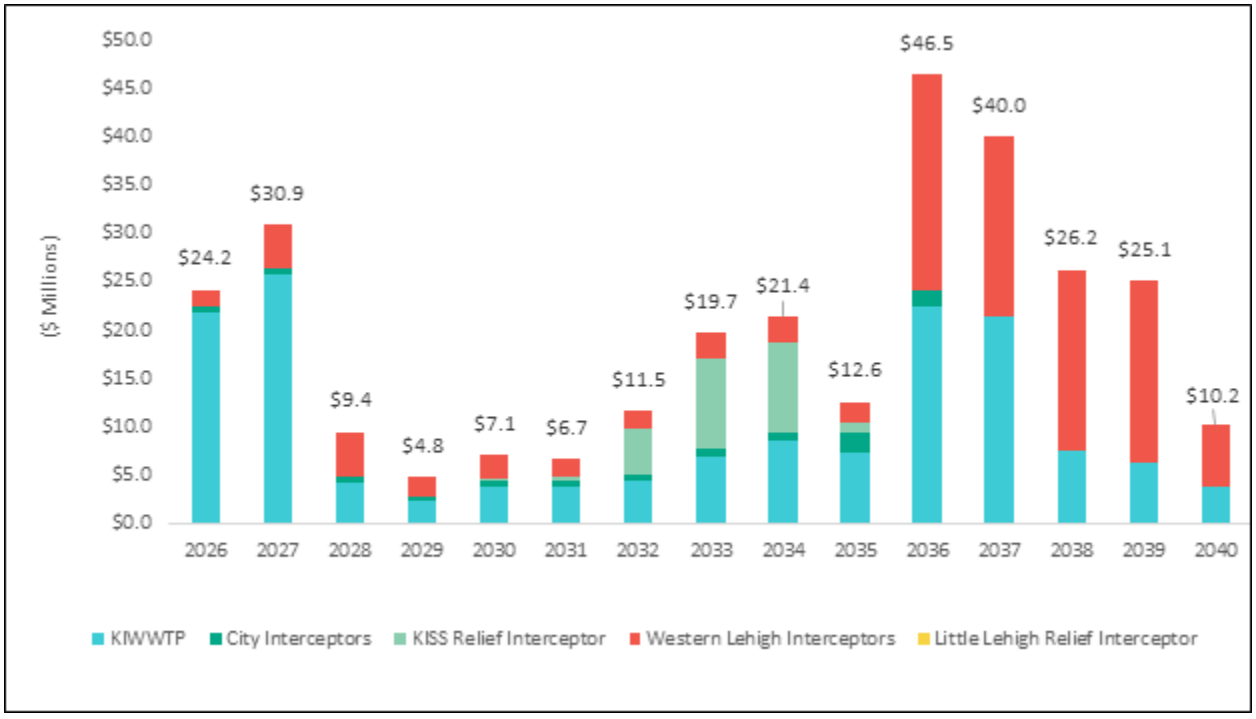



**Exhibit VI – 4: Planned KISS System Capital Investments (2024 Dollars)[20]**

[20] The City of Allentown's interceptor system includes horizontal assets used exclusively by the City as well as shared assets through which flow is routed for other KISS system customers. For the purposes of this analysis the shared portion of the City interceptor system is assumed to be 9.41% of total costs, which is then further allocated to each applicable customer on a flow basis per Exhibit VI-4.

The following table (Exhibit VI-5) summarizes the expected operations and maintenance (O&M) costs through the planning horizon. These projected costs, along with projected capital costs, were used in the development of the rate structure needed to sustain the financial requirements.

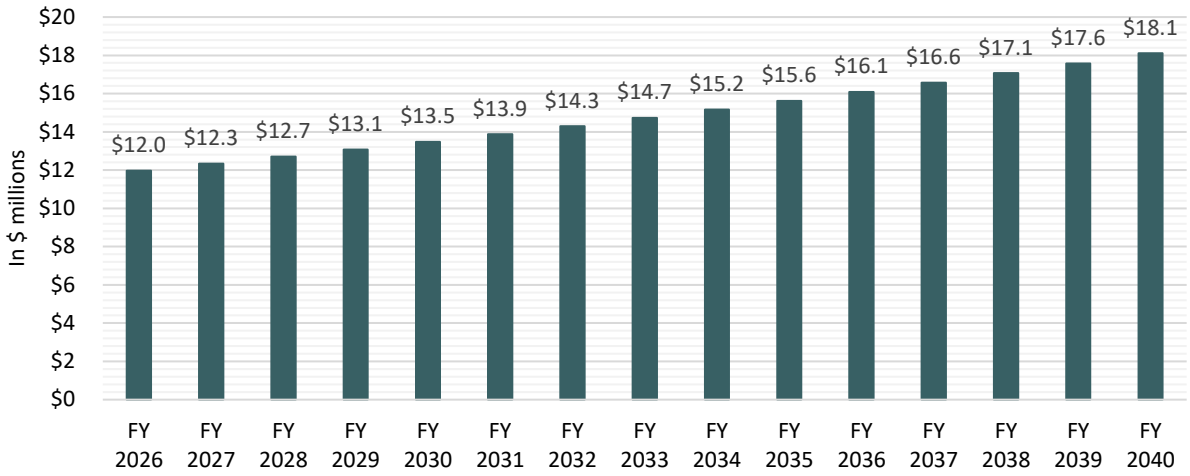



**Exhibit VI – 5: Projected KISS System O&M Costs**

The following table (Exhibit VI-6) summarizes the revenue requirements for each year through 2040 should all the anticipated projects be needed. This represents a clear understanding of the financial requirements and the corresponding impacts on user rates. Raftelis has used this capital projection to project the required user rates through the planning horizon as shown in Exhibit VI-2 above.

| Cost Pool | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 |
|---|---|---|---|---|---|---|---|---|
| KIWWTP | $17,543,456 | $18,530,256 | $19,207,827 | $20,776,898 | $20,957,681 | $21,872,581 | $20,959,917 | $21,123,824 |
| CIT INT | 712,295 | 722,761 | 812,163 | 947,509 | 949,791 | 975,960 | 1,041,921 | 1,017,890 |
| KRI | 54,371 | 54,371 | 54,371 | 54,371 | 282,910 | 576,737 | 3,243,095 | 3,725,085 |
| WLI | 3,566,469 | 4,073,329 | 5,736,635 | 4,627,918 | 4,868,305 | 3,997,220 | 4,069,662 | 4,484,934 |
| LLRI - 1 & 2 | 167,510 | 167,510 | 167,510 | 167,510 | 167,510 | 167,510 | 167,510 | 167,510 |
| **Total** | **$22,044,101** | **$23,548,227** | **$25,978,505** | **$26,574,205** | **$27,226,196** | **$27,590,008** | **$29,482,105** | **$30,519,242** |
| | | | | | | | | |
| **Cost Pool** | **2034** | **2035** | **2036** | **2037** | **2038** | **2039** | **2040** | |
| KIWWTP | $22,068,872 | $25,078,028 | $24,966,083 | $26,088,982 | $26,448,911 | $27,432,117 | $28,129,352 | |
| CIT INT | 1,061,000 | 2,076,183 | 833,817 | 682,020 | 695,382 | 709,145 | 723,321 | |
| KRI | 4,101,679 | 2,097,262 | 1,505,023 | 1,505,023 | 1,505,023 | 1,505,023 | 1,505,023 | |
| WLI | 4,624,889 | 4,611,561 | 8,553,068 | 8,896,818 | 10,593,542 | 12,341,166 | 12,139,301 | |
| LLRI - 1 & 2 | 167,510 | 167,510 | 167,510 | 167,510 | 167,510 | - | - | |
| **Total** | **$32,023,950** | **$34,030,545** | **$36,025,500** | **$37,340,353** | **$39,410,367** | **$41,987,451** | **$42,496,997** | |

**Exhibit VI – 6: KISS System Revenue Requirements by Cost Pool**

## F. NEED FOR IMMEDIATE OR PHASED IMPLEMENTATION OF ALTERNATIVES

The selected alternative requires each municipality to implement their respective SRPs. These SRPs have been developed over the past several years and the municipalities have already begun implementing them. Therefore, there is no need for a phased implementation, other than the annual implementation identified within each SRP.

There are no activities necessary to abate critical public health hazards.

## G. ADMINISTRATIVE ORGANIZATIONS AND LEGAL AUTHORITY TO IMPLEMENT THE ALTERNATIVE

The KISS municipalities have engaged a legal consultant to help prepare new and updated IMAs. While the current IMAs are sufficient and legal to implement the selected alternatives, this new Regional Act 537 Plan was seen as an opportunity to update and refresh the agreements. This is discussed in more detail in Section VII.

###

# VII. INSTITUTIONAL EVALUATION

## A. ANALYSIS OF THE MUNICIPALITIES, PAST ACTIONS, AND PRESENT PERFORMANCE

### 1. FINANCIAL & DEBT STATUS

The LCA is financially responsible for major treatment facilities and major conveyance facilities including the PTP, KIWWTP, WLI, LLRI, and two pump stations. LCA is reimbursed by the various KISS municipalities in accordance with agreements that address each KISS municipality's share of the expenses. Each KISS municipality or municipal authority is financially responsible for the sewage collection system within their municipal boundaries. Ultimately, each community recovers retail revenues from households and businesses to cover the costs of both KISS system shared costs and their own local collection system operations and capital costs.

A summary of the financial and debt status of each KISS municipality is provided in Exhibit VII-1.

| KISS Partner | Annual Sewer Revenues | Annual Sewer Expenses | Current Debt Service | Notes[21] |
|---|---|---|---|---|
| **City of Allentown[22]** | $62,894,802 | $33,665,278 | $15,446,543 | 1 |
| **LCA Collection Systems** | $1,008,869 | $1,091,629 | $79,429 | 2 |
| **Coplay Whitehall Sewer Authority** | $4,405,099 | $3,678,884 | $743,159 | 1 |
| **North Whitehall** | $465,939 | $284,750 | $0 | 1 |
| **Alburtis** | $1,097,003 | $669,130 | $0 | 1 |
| **Emmaus** | $2,183,912 | $2,206,665 | $0 | 1 |
| **Upper Macungie** | $11,839,891 | $8,876,538 | $0 | 1 |
| **Macungie** | $583,703 | $722,503 | $0 | 2 |
| **Hanover** | $1,683,000 | $2,311,500 | $0 | 2 |
| **Lower Macungie** | $5,552,868 | $4,877,328 | $0 | 1 |
| **Salisbury** | $2,324,650 | $2,264,296 | $207,689 | 1 |
| **South Whitehall** | $4,375,865 | $4,006,285 | $0 | 1 |

**Exhibit VII-1 Summary of Financial and Debt Status (2023)**

[21] "1": Revenues were sufficient to meet all operations and maintenance expenses and debt services. "2": Revenues were not sufficient to meet all operations and maintenance expenses and debt services. Some communities may have used cash reserve to bridge the differences, while others may have relied on interfund transfers. Actuals are not available for 100% of communities. Where full 2023 actuals were not available, projected actuals (Salisbury) or budgets (Hanover) were used instead.

[22] Financial information for the City of Allentown includes combined revenues, expenses, and debt service from the combined accounting structure of the city's 50-year water and sewer lease with LCA, which includes both water and wastewater services.

## 2. STAFFING AND ADMINISTRATIVE RESOURCES

LCA is responsible for the operation and maintenance of the major treatment facilities and major conveyance facilities including the PTP, KIWWTP, WLI, LLRI, and pump stations. LCA maintains adequate professional and administrative staff to perform ongoing maintenance and to advance the projects proposed in this Plan. Staff are regularly supplemented with outside professional staff to perform detailed planning, design, permitting and construction phase services.

LCA staff are broken down into departments as shown below:

| | |
|---|---|
| Executive Staff, Administration & Finance | 21 |
| Engineering & Asset Management | 18 |
| Information Technology | 8 |
| Customer Care, Billing & Metering | 21 |
| Field Services Management | 9 |
| Allentown Division Field Services (Sewer Collection & Water Distribution Systems) | 26 |
| Suburban Division Field Services (Sewer Collection & Water Distribution Systems) | 12 |
| Plant Operations Management | 9 |
| Allentown Division – KIWWTP Maintenance & Residuals | 15 |
| Allentown Division – KIWWTP Plant Operations | 12 |
| Allentown Division – Water Plant Operations | 11 |
| Allentown Division – Water Plant Maintenance | 5 |
| Allentown Division – Industrial Pretreatment Program | 3 |
| Laboratories & Compliance | 10 |
| Suburban Division Plant Operations | 11 |
| **Total LCA Staffing (2025 Budget):** | **191** |

**Exhibit VII-2 Staffing and Administrative Resources**

The municipalities' sewage collection systems are owned by the respective municipality and operated by the municipality, a municipal authority, or via a service agreement with LCA. The municipalities have the necessary staff and resources in place for day-to-day operations and maintenance of their respective system either through their own authority or an agreement with another, and the existing municipal governments oversee this staff.

A summary of the staffing and administrative resources of each municipality is provided in Exhibit VII-2.

## 3. LEGAL AUTHORITY

Through existing IMAs, the municipalities have authorized LCA to be their agent in managing certain interceptors and conveyance facilities in their respective townships. Also, LCA is responsible for the operation of the KIWWTP and PTP. The various KISS municipalities own and operate their respective collection systems and are responsible for billing for sewer services. Through the IMAs, LCA sends a quarterly bill to the KISS municipalities. The KISS municipalities pay LCA for this service and then directly bill their direct sewer customers to recoup the cost.

The table below further illustrates the arrangements in place, per the existing IMAs:

| KISS Municipality | Sewer System Asset(s) | Ownership | Responsibility for O&M and Capital Financing | Who Bills Customer? | Legal Note |
|---|---|---|---|---|---|
| City of Allentown | - KIWWTP<br>- Sewer Collection System<br>- Shared City Interceptors | City | LCA | - LCA bills direct customers<br>- LCA bills City municipal signatories | 50-year City water & sewer lease agreement with LCA executed in 2013 |
| Whitehall Township | Sewer Collection System | Coplay-Whitehall Sewer Authority (CWSA) | CWSA | CWSA | CWSA is signatory to City agreement |
| Borough of Coplay | Sewer Collection System | CWSA | CWSA | CWSA | CWSA is signatory to City agreement |
| North Whitehall Township | Sewer Collection System | North Whitehall | North Whitehall | North Whitehall | Township is a customer of CWSA |
| South Whitehall Township | Sewer Collection System | South Whitehall | South Whitehall | South Whitehall | - Township is signatory to City agreement<br>- Township is signatory to LCA LLRI 1 & 2 agreement |
| Salisbury Township | Sewer Collection System | Salisbury | Salisbury | Salisbury | - Township is signatory to City agreement<br>- Township is signatory to LCA LLRI 1 & 2 agreement |
| Hanover Township | Sewer Collection System | Hanover | Hanover | Hanover | Township is a customer of the City / LCA (lease) |
| Borough of Emmaus | Sewer Collection System | Emmaus | Emmaus | Emmaus | - Borough is signatory to City agreement<br>- Borough is signatory to LCA WLI agreement |

| KISS Municipality | Sewer System Asset(s) | Ownership | Responsibility for O&M and Capital Financing | Who Bills Customer? | Legal Note |
|---|---|---|---|---|---|
| Lehigh County Authority (LCA) | - Western Lehigh Interceptor<br>- Little Lehigh Relief Interceptor<br>- Pretreatment Plant<br>- Park & Spring Creek Pump Stations | LCA | LCA | - LCA bills WLI costs to Western Lehigh Sewerage Partnership (WLSP) municipalities and Emmaus<br>- PTP expenses captured via industries, haulers & WLSP<br>- LLRI 1 & 2 expenses billed to WLSP plus S. Whitehall, Salisbury | - LCA is signatory to City agreement on behalf of WLSP<br>- Separate agreements for WLSP, LLRI 1 & 2, and PTP cost sharing |
| Lower Macungie Township | Sewer Collection System | Lower Macungie | Lower Macungie | Lower Macungie | Township is signatory to WLSP agreement |
| Upper Macungie Township | Sewer Collection System | Upper Macungie | Upper Macungie | Upper Macungie | Township is signatory to WLSP agreement |
| Borough of Macungie | Sewer Collection System | Macungie | Macungie | Macungie | Borough is signatory to WLSP agreement |
| Borough of Alburtis | Sewer Collection System | Alburtis | Alburtis | Alburtis | Borough is signatory to WLSP agreement |
| Lowhill Township | Sewer Collection System | LCA | LCA | LCA | - LCA owns township system<br>- Township is signatory to WLSP agreement |
| Weisenberg Township | Sewer Collection System | LCA | LCA | LCA | - LCA owns township system<br>- Township is signatory to WLSP agreement |

| KISS Municipality | Sewer System Asset(s) | Ownership | Responsibility for O&M and Capital Financing | Who Bills Customer? | Legal Note |
|---|---|---|---|---|---|
| Upper Milford Township | Sewer Collection System | LCA | LCA | LCA | - LCA owns township system<br>- Township is signatory to WLSP agreement |

**Exhibit VII-3 Intermunicipal Agreement Responsibilities**

These intermunicipal agreements and current PA Municipal Code and/or PA Municipality Authorities Act provide the legal authority for the KISS municipalities and authorities to complete the following:

a. Implement Recommendations
LCA owns or is responsible for the operation and maintenance of the PTP, KIWWTP, LLRI (which includes the Park Pump Station) and WLI (which includes the Spring Creek Pump Station). LCA owns the Pretreatment Plant which is operated under contract by Jacobs. Through a long-term lease with the City of Allentown, LCA is responsible for operating the KIWWTP. LCA will continue to provide coordination of and reporting on work conducted as part of the SRPs.

b. Implement Operation & Maintenance Activities
LCA is responsible for operating the LLRI and WLI, the Lehigh County Pretreatment Plant and Kline's Island WWTP. The LCA is already responsible for operations and maintenance and will continue to have the responsibility for these facilities as well as the proposed selected alternatives.

Source reduction, operation and maintenance activities within the KISS municipal collection systems are performed by the respective municipalities.

c. Set User Fees and Purchasing
LCA has an administrative staff that performs purchasing duties as part of the Authority's responsibilities under the IMAs with the KISS municipalities. The same IMAs establish the fees that LCA will charge the municipalities for their services. The municipalities then determine the appropriate user fees to charge to their direct sewer customers.

Within the collection systems of each of the KISS municipalities, sewer use fees are set by the respective municipalities/authorities and collected by the respective municipalities/authorities.

d. Take enforcement action against ordinance violators
Sewer use ordinances are enacted and enforced by the individual municipalities within the KISS service area. These municipalities have the legal right under Pennsylvania law to enforce properly adopted ordinances within their respective jurisdictions.

e. Negotiate Agreements
As described above, the KISS municipalities and authorities have previously negotiated and entered into various IMAs dating back many years for the proper operation of the system. The PA Municipal

Code and PA Municipality Authorities Act provides the authority necessary for the KISS municipalities or authorities to negotiate new IMAs, as contemplated within this Regional Act 537 Plan.

f. Raise Necessary Capital

Through existing IMAs, the KISS municipalities have authorized LCA to be their agent in managing certain interceptors and conveyance facilities in their respective municipalities. These same agreements authorize LCA to operate the KIWWTP and PTP. LCA is authorized to raise capital to perform the responsibilities outlined in the IMAs. Each municipality is also authorized to raise capital necessary to perform their individual I&I source reduction projects.

## B. INSTITUTIONAL ALTERNATIVES NECESSARY TO IMPLEMENT THE TECHNICAL ALTERNATIVE

### 1. NEED FOR NEW MUNICIPAL DEPARTMENTS OR MUNICIPAL AUTHORITIES

There is no need for new municipal departments or municipal authorities. The existing sewage collection and conveyance systems are owned by the respective municipality and operated by either the respective municipality or municipal authority (LCA or CWSA). The municipalities have the necessary staff and resources in place for day-to-day operations and maintenance of the overall system either through their own authority or an agreement with another, and the existing municipal governments oversee this staff.

LCA's existing staff and organization are capable of coordinating and reporting on the projects proposed in this Regional Act 537 Plan as well as the continued operation and maintenance of the facilities.

### 2. FUNCTIONS OF EXISTING AND PROPOSED ORGANIZATIONS

The existing sewage collection and conveyance systems are owned by the respective municipality and operated by either the respective municipality or municipal authority (LCA or CWSA). The municipalities have the necessary staff and resources in place for day-to-day operations and maintenance of their respective system either through their own authority or an agreement with another. The existing municipal governments oversee this staff. LCA is responsible for the operation of the Lehigh County Pretreatment Plant and Kline's Island WWTP as well as the major conveyance interceptors and pump stations. The LCA is responsible for operations and maintenance and will continue to take responsibility for these facilities as well as the proposed selected alternatives. There is no identified need for additional organizations.

### 3. COST OF ADMINISTRATION, IMPLEMENTABILITY AND CAPABILITY TO REACT TO FUTURE NEEDS

LCA has existing administrative, planning, engineering, and purchasing departments already established and capable of performing multiple large infrastructure projects. The Authority performs robust capital planning as well as growth planning and is constantly evaluating future needs. The cost to administer the selected alternatives has been evaluated by LCA and shared with the KISS municipalities.

The KISS municipalities have existing administrative, planning and engineering staff and programs in place to perform their ongoing operation, maintenance, and source reduction efforts. The cost to administer this work will be recovered through user fees.

LCA and the KISS municipalities have the legal authority to raise capital and set user fees sufficient to collect revenues required for the payment of debt service on capital monies and the cost of operation and maintenance of the wastewater collection, conveyance, and treatment systems.

## C. ADMINISTRATIVE AND LEGAL ACTIVITIES TO BE COMPLETED AND ADOPTED TO ENSURE THE IMPLEMENTATION OF THE TECHNICAL ALTERNATIVE

### 1. INCORPORATION OF AUTHORITIES OR AGENCIES

Additional Authorities or agencies are not required to implement the selected alternatives in this Regional Act 537 Plan.

### 2. REQUIRED ORDINANCES, STANDARDS, REGULATIONS, AND INTERMUNICIPAL AGREEMENTS

All required Ordinances, Regulations and IMAs are already in place. Additional Ordinances or Regulations are not required. The KISS municipalities have engaged a legal consultant to help prepare new and updated IMAs. While the current IMAs are sufficient and legal to implement the selected alternatives, this new Regional Act 537 Plan was seen as an opportunity to update and refresh the agreements.

The proposed IMA for Sewer Service – Term Sheet establishes collaboration between the municipalities for wastewater treatment at the KIWWTP as well as conveyance to the KIWWTP. Key points of the Agreement include:

- The City of Allentown and LCA, both in regional and local capacities, will provide wastewater treatment services to other municipalities.
- Each municipality is allocated specific treatment capacity at KIWWTP based on past agreements. Exceeding these capacities may result in penalties unless offset by contributions to a Regional Inflow and Infiltration (I&I) Program.
- Charges for treatment will be billed quarterly based on actual flows, covering operational, maintenance, and capital expenses.
- A regional I&I program may be developed to manage groundwater and stormwater inflows, funded by participants, who will receive credit for recovered treatment capacity.
- Shared facilities, such as interceptors, will have their operational and capital costs distributed based on flow. Future capacity expansions will be triggered by flow levels or Chapter 94 compliance.
- A KISS Municipality Advisory Committee will oversee system performance, costs, and capital improvements, and parties will work together on information sharing and dispute resolution.

This agreement outlines a framework for long-term cooperation, aiming to ensure efficient and equitable wastewater management. A copy of the Intermunicipal Agreement for Sewer Service – Term Sheet can be found in Appendix 13.

The proposed IMA outlines terms for the conveyance and treatment of sewage to KIWWTP. Key issues addressed include billing for wastewater treatment services, with each municipality responsible for paying based on actual sewage flows. The document highlights capacity allocations, penalties for exceeding limits, and provisions for excess flows under a regional I&I program. Municipalities can trade or purchase treatment capacity, and a capital reserve fund is established to ensure financial stability. The agreement includes terms for cost-sharing of new infrastructure, such as the KISS Relief Interceptor, and outlines dispute resolution through mediation. Finally, it mandates collaboration among parties for information sharing, prioritizing projects, and future capacity expansions, subject to PADEP oversight. The agreement is set for a 10-year term with options for renewal. A copy of the Term sheet outlining what will be included in the Intermunicipal Agreement for Sewer Service can be found in Exhibit 13. The Term Sheet addresses the following items:

**Treatment**

LCA is responsible for treating wastewater at the KIWWTP. Each participating municipality is required to deliver its wastewater to designated connection points, as described in their Act 537 Plans. This section also defines pre-established treatment capacities for each party, based on prior agreements. These capacities remain fixed unless modified through mutual agreements for trade or purchase. Penalties are introduced for municipalities that exceed their hydraulic capacity limits annually, with exceptions for those participating in the Regional I&I Program. The capacity allocations for each municipality are detailed.

**General Billing Procedures**

This section outlines the process for billing municipalities for sewage treatment and transportation services provided by LCA. Each municipality is billed quarterly, with charges determined by actual sewage flows and budgeted costs. All costs, including operations, maintenance, capital expenses, and debt service, will be based on actual flows unless otherwise specified. Each municipality is considered a bulk service customer, and new capital reserve funds will be established to ensure rate stability and eliminate the need for annual reconciliations. The quantity of wastewater discharged by each municipality will be measured through wastewater flow meters at designated connection points. For Allentown, flows will be determined by subtracting the total flow discharged by other municipalities from the KIWWTP headworks meter reading. The goal is to provide an accurate, fair, and transparent billing system for all parties involved.

**Meters**

This section addresses provisions related to the sewage billing meters. The goal is to ensure accuracy in measuring sewage flows for both billing and flow monitoring purposes. The KISS Agreement will include updated provisions that align with the previously discussed terms outlined in the Sewage Billing Meter Memo from August 23, 2024. These updated metering provisions are critical for fair and accurate billing and to ensure transparency in monitoring wastewater flows from each participating municipality.

**Infiltration and Inflow (I&I)**

This section details the responsibilities and objectives related to reducing excessive I&I of groundwater and stormwater into sewer systems. Each municipality is required to conduct studies

and implement corrective measures to limit these inflows. The Regional I&I Program, funded through debt financing and capital contributions from participating municipalities, was established to address these issues. The program is optional, but those who participate will be eligible for additional sewage capacity based on their financial contributions. This recovered capacity can be used for approving new connections to the KISS. Municipalities will be charged an annual fee based on an agreed cost-sharing structure, and capacity will be reallocated proportionately to contributions. The program also prioritizes projects using hydraulic flow modeling results, and LCA will oversee design, construction, and monitoring. Additionally, individual municipalities may undertake their own I&I projects.

**Western Lehigh Interceptor**

The WLSP will be responsible for covering the full cost of the Western Lehigh Interceptor and any associated relief facilities. This includes both capital and operation and maintenance (O&M) expenses. The costs will be shared among the municipalities according to their usage and allocation, ensuring that the financial burden for maintaining and improving the infrastructure is distributed fairly among all parties involved in the partnership.

**City-Owned Shared Interceptors**

This section describes the cost-sharing arrangement for sewer interceptors owned by the City of Allentown that serve multiple municipalities. These interceptors, referred to as "City-Owned Shared Interceptors," will have their operation, maintenance, and capital costs divided among the municipalities based on each party's annual average sewage flow. It also clarifies that municipalities will no longer contribute to the costs associated with unshared portions of Allentown's sewer collection system, ensuring that expenses are fairly distributed based on actual usage of the shared infrastructure.

**KISS Relief Interceptor (KRI)**

This section describes the ownership and cost-sharing arrangements for the KISS Relief Interceptor (KRI). The City of Allentown will own the physical KRI infrastructure, but each municipality involved will own a proportionate share of the pipeline's capacity. This share is based on the capital contributions made by each party during the planning, design, and construction phases. The cost-sharing allocations are calculated according to each party's projected future wastewater flows (up to the year 2050). As the KRI project preliminary design began in 2024, there is an interim cost-sharing method in place, which will be reconciled later to ensure equitable sharing of final costs. Once the KRI is completed, it will be included in the City-Owned Shared Interceptors group, and the ongoing costs for operation, maintenance, and capital improvements will be shared among the parties based on their use of the system.

**Little Lehigh Relief Interceptor (LLRI)**

This section outlines the cost-sharing arrangements for the Little Lehigh Relief Interceptor (LLRI) and the Park Pump Station (phases 1 and 2). The municipalities will share the costs based on the existing cost-sharing methodologies in place. There may be further discussions and updates to this agreement to ensure that all parties contribute fairly to the expenses associated with these facilities. The allocation of costs will be subject to future negotiations to reflect any updates in the terms or methodologies used among the participating municipalities.

**Kline's Island Wastewater Treatment Plant (KIWWTP)**

This section outlines the cost-sharing model for KIWWTP's operational and capital expenses. Costs will be distributed among the participating municipalities based on actual wastewater flows, and a high-strength surcharge program will be implemented to cover the costs from dischargers of high-strength waste. A transition plan will recognize pre-paid capital contributions from municipalities in future billings. Capacity expansions may be triggered if Chapter 94 reports indicate that flows will exceed 40 MGD within five years or 44.6 MGD over three consecutive months, with the costs shared among municipalities based on current and projected future flows. Additionally, the Connection Management Plan will track new sewer connections, and municipalities will be able to share or trade their capacity allocations. Municipalities participating in the Regional I&I Program will not face penalties for exceeding their capacity limits if they have sufficient recovered capacity.

**Term**

The proposed term is 10 years or as otherwise determined based on timing of future regional flow monitoring efforts included in the Act 537 Plan, with renewal options. Parties will begin negotiating a revised IMA three years prior to sunset date of this IMA.

**KISS Municipality Advisory Committee**

This section describes the creation of a committee composed of representatives from the KISS municipalities. This committee will meet at least twice a year to review various aspects of the KISS system, including financial performance, the high-strength surcharge program, reserve fund balances, planned capital improvements, and rate calculations. The committee will play a key role in monitoring and guiding the performance of the KISS system and ensure that decisions align with the interests of all participating municipalities. The specific roles and responsibilities of the committee will be further developed and outlined in the final KISS Agreement.

**Dispute Resolutions**

Disputes will first be mediated, with arbitration or other legal processes used if necessary.

**Information Sharing**

This section outlines the responsibilities of the municipalities and LCA regarding the exchange of information. The parties are expected to share all relevant data necessary for administering their duties under the agreement, including records and details about wastewater flows and infrastructure. This cooperation extends to facilitating the construction, maintenance, and operation of the wastewater collection systems. The LCA will provide each party with information about costs, capacities, and other critical details related to KIWWTP upon request. Additionally, the costs of gathering and providing any specialized data that would not typically be incurred will be borne by the requesting Municipality. Finally, a timeline is established for sharing reports related to annual waste load management in compliance with regulatory requirements.

**Prior Agreements**

All historical agreements will be reviewed and acceptable terms carried over into the new IMAs, thereafter all historical agreements will be voided.

### 3. ACTIVITIES TO PROVIDE RIGHTS-OF-WAY, EASEMENTS, AND LAND TRANSFERS

Implementation of the SRPs and the new IMAs do not require additional rights-of-way, easements or land transfers.

### 4. ADOPTION OF OTHER MUNICIPAL SEWAGE FACILITIES PLANS

This Regional Act 537 Plan covers the entire KISS sewer service area. There is no other sewage facility plans for this area and therefore there are no sewage facility plans to adopt.

### 5. LEGAL DOCUMENTS

All existing IMAs that are in place are adequate to implement the selected alternatives. Additional legal documents are not required. The KISS municipalities have engaged the services of a legal consultant to assist with preparing new and updated IMAs. While the current IMAs are sufficient and legal to implement the selected alternatives, this new Regional Act 537 Plan was seen as an opportunity to update and refresh the agreements.

### 6. DATES AND TIMEFRAMES

No documents or other administrative activities are required to implement this Plan so there are no tasks to add to the Implementation Schedule.

## D. IDENTIFY PROPOSED INSTITUTIONAL ALTERNATIVE FOR IMPLEMENTING THE SELECTED TECHNICAL ALTERNATIVE

No changes to the institutions are recommended to implement this Regional Act 537 Plan, except the negotiation and adoption of updated IMAs as described above.

###

# VIII. IMPLEMENTATION SCHEDULE AND JUSTIFICATION FOR SELECTED TECHNICAL AND INSTITUTIONAL ALTERNATIVES

## A. IDENTIFY AND JUSTIFY THE SELECTED ALTERNATIVE BASED ON THE FOLLOWING:

The selected alternatives have been thoroughly vetted based on many attributes including capital costs, operating costs, maintenance, ease of operation and environmental soundness. The alternatives include a commitment to reduce rainfall derived I&I through a robust source reduction plan in each municipality.

### 1. EXISTING WASTEWATER DISPOSAL NEEDS

All the selected alternatives leverage existing infrastructure in place for many decades. The Plan proposes significant rehabilitation of existing facilities so the selected alternatives will provide adequate service for decades.

### 2. FUTURE WASTEWATER DISPOSAL NEEDS

The selected alternative considers growth and flow projections throughout the KISS Service Area through the 2050 planning horizon. Details of the KISS flow projections can be found in Appendix 18.

### 3. OPERATIONS AND MAINTENANCE CONSIDERATIONS

The existing Source Reduction Plans for collection systems and existing O&M plans for pump stations and the KIWWTP provide the necessary operations and maintenance for the selected alternatives. The proposed KIWWTP improvements are common processes that will easily integrate into the overall treatment process. LCA staff regularly operate and maintain interceptors throughout the LCA service area.

### 4. COST EFFECTIVENESS

Years of study and analysis have concluded the KISS collection system has excessive rainfall derived I&I. In certain areas, the amount of I&I exceeds the USEPA benchmark of 120 GPCD for average flow and 275 GPCD for peak flow. If flows exceed these amounts, USEPA states it is more cost effective to remove the excessive I&I than it is to build infrastructure to transport and treat the I&I. This Regional Act 537 Plan, therefore, focuses on I&I source reduction to address system challenges described throughout this plan. Additional flow monitoring and system modeling will be conducted toward the end of the Plan period to determine if any of infrastructure projects included in the Master Plan can be eliminated or reduced in size or scope as a result of the removal of I&I from the system.

### 5. AVAILABILITY OF MANAGEMENT AND ADMINISTRATIVE SYSTEMS

The existing authority and municipal institutions along with their IMAs are adequate to implement the projects selected in this Regional Act 537 Plan. However, the municipalities are discussing the potential to create a new and updated IMA. The new agreement is not needed to implement the selected alternatives in this plan; however, a new and updated IMA may better serve the region as this plan and future plans are implemented. Details of this new agreement are outlined in Appendix 13.

### 6. AVAILABLE FINANCING METHODS

LCA has several financing methods available to implement the KIWWTP projects and other regional infrastructure work included in the selected alternative. LCA has the ability to borrow funds, issue bonds and submit grant funding applications. LCA debt financing options include revenue bonds or PENNVEST, which is the Commonwealth of Pennsylvania's revolving loan fund program that offers access to federally and state subsidized interest rates but may come with certain restrictions that require consideration. LCA will pursue grants as opportunities emerge, though financial modeling conducted as part of this plan's development did not assume any grant funds not already committed. Each municipality will be responsible for financing their own I&I source reduction plan (SRP) projects, unless a Regional I&I Program is developed as contemplated in the new IMA term sheet described in Appendix 13. In the event that a Regional I&I Program is developed, then various SRP projects may be financed as a package with participating municipalities paying a proportionate share of the debt service costs.

### 7. ENVIRONMENTAL SOUNDNESS AND COMPLIANCE

The selected alternatives do not propose the construction of any new infrastructure. Rather, the selected alternative will consist of the rehabilitation of existing sewer infrastructure. Therefore, the selected alternative is consistent with environmental soundness and natural resource planning and preservation programs.

## B. DESIGNATION OF FINANCING PLAN

For projects that will be financed by LCA, the selected financing alternative used for purposes of developing this Regional Act 537 Plan financial analysis included a mix of 90% debt financing via traditional bond financing using 30-year tax-exempt municipal bonds and 10% cash financing. The cash financing proportion was selected to modestly reduce the requirement to issue new debt. The use of tax-exempt municipal bonds was selected due to current uncertainties related to applicability of other low-cost financing that may be available from the state revolving fund, Pennvest, or federal programs such as EPA's Water Infrastructure Financing & innovation Act (WIFIA) program. LCA is currently exploring potential changes that may be required within its existing bond documents to allow participation in these programs.

The cost-sharing approach and rate impacts described in Section VI illustrate the potential financial results of using this financing approach.

If Pennvest or WIFIA financing is found to be a viable option to support LCA projects, the alternative financing approach will include maintaining the cash-financed proportion of 10% described above, with the remainder financed via the lowest-cost-available financing via Pennvest, WIFIA or traditional bonds or bank loans.

For the I&I source reduction projects to be implemented by the municipalities directly, each municipality will finance the projects through a mix of current / future rate revenue, bond / bank financing, and grant funding as may become available from time to time.

## C. IMPLEMENTATION SCHEDULE

The following Implementation Schedule represents the necessary steps to implement the selected alternative. The table that follows is the best estimate of the time needed to complete the projects recommended in this

Regional Act 537 Plan. The potential exists for changes during implementation which will be addressed and the schedule modified accordingly.

| Work Categories & Description | Start | Finish |
|---|---|---|
| Source Reduction Plans | 1/1/2020 | 12/31/2035* |
| KIWWTP Master Plan Projects | 1/1/2024 | 12/31/2035 |
| Long Term SBM Implementation | 1/1/2025 | 1/1/2028 |
| Negotiate Intermunicipal Agreement | 1/1/2025 | 12/31/2027 |
| KISS Chapter 94 Violation "Removal"/CMP Lifted | | 12/31/2029 |
| Collect Temporary Meter Data | 3/1/2030 | 10/31/2030 |
| Re-model KISS System (Flow Characterization Study) | 11/1/2030 | 12/31/2031 |

*SRPs will continue beyond 2035. For the purposes of the 2026-2035 planning module projections, a finish date of 12/31/35 was selected.

###