July 24, 2020

Corporate Headquarters
108 West Airport Road
Lititz, PA 17543
T 717.569.7021
F 717.560.0577
www.thearrogroup.com

To: Kline's Island Sewer System Municipalities
(see attached distribution)

RE: Kline's Island Sewer System
Final Interim Act 537 Plan – For Adoption Submission

Dear KISS Municipality:

On behalf of the municipalities and authorities who participate in the Kline's Island Sewer System (KISS), attached please find a copy of the Final Interim Act 537 Plan for municipal adoption by resolution. As required by the Pennsylvania Sewage Facilities Act, and regulations thereunder (25 PA Code § 71), prior to adoption, the Plan must be reviewed by municipal planning agencies and must be publicly advertised for comment for a 30-day period.

On March 16, 2020 the Interim Act 537 Plan was sent to all municipal and county planning agencies for review and comment. Comments received during this period are included and addressed in this Final Plan. On June 10, 2020 the Interim Plan was advertised in the Morning Call and copies of the plan were made available to the public either at the municipal locations or on their respective websites. A copy was also available at the Lehigh County Authority office as well as on their website. Comments received during this period are included and addressed in this Final Plan.

The most significant comments received were changes to the municipal flow projections found on Table 4.1 (page 21). The most recent revision to this Table (dated 07/10/2020) follows this letter and is also found in the Public Comment section of the report.

Background

Beginning in August 2018, and continuing through July 2019, the Lehigh Valley received the highest recorded rainfall amount in a twelve (12) month period, dating back as far as 1895, or 124 years, when data was first collected on local rainfall amounts. The Lehigh Valley experienced an unprecedented, prolonged period of excessive rainfall, totaling 67 inches in 2018 and 61 inches in 2019. In particular, during the twelve (12) month period of August 2018 through July 2019, the region received 80 inches of precipitation. Normal precipitation for the KISS area is about 45 inches per year.

As would be expected, the precipitation caused a significant increase of flows to Kline's Island WWTP (KIWWTP) in excess of its permitted capacity of 40 MGD. The annual average daily flow for 2019 was 37.64MGD. Prior to the August 2018 through July 2019 rainfalls events, the annual average flows over the previous five years had ranged between 29 and 33 MGD. More importantly, however, for three consecutive months the flows to the KIWWTP exceeded 40 MGD, which required the Department of Environmental Protection to respond relative to Chapter 94 requirements. Even though KIWWTP had continuously met all permit requirements, KIWWTP was, nonetheless, considered to be hydraulically overloaded.

As a result of the hydraulic overload condtion, the KISS Signatories working group, with the assistance of ARRO Consulting, has developed this Final Interim Plan for the period of 2021 to 2025. Part of the planning process includes sewage flow projections for new development during this time period. Additional flows are projected to be approximately 2.9 million gallons per day.

Selected Alternatives

- The selected alternatives all maintain the current operating, administrative and legal strategies and continued use of existing facilities. The KIWWTP will undergo a paper rerate to increase its Design Hydraulic Capacity. This is not a plant expansion; rather it is recognition that the KIWWTP is capable of adequately treating flows in excess of its permitted capacity for short periods of time. Overall, the permitted annual average flow to the KIWWTP remains unchanged.

- A hydraulic restriction has been identified in the Western Lehigh Interceptor near Trexlertown. A feasibility study is currently under way to assess alternatives to address this challenge. The alternatives being evaluated include traditional storage, in-line storage, or a combination / hybrid approach. Future planning will be required, but this project is anticipated to be constructed during this planning period of 2021 to 2025.

- All municipalities and authorities will continue implementing their respective I/I source reduction program.

- During the 2021-2025 time period, the KISS Signatories will prepare a long-term Act 537 Plan to address sewage facility needs for the next 30 years. The long-term plan will include significant planning components including sewage flow monitoring, conveyance system modeling and calibration, and evaluation of alternatives for both conveyance and treatment.

There are no improvements, modifications or additions to the City of Allentown's centralized collection system planned under this Interim Plan. This plan does not increase the sewage service area in any of the contributing municipalities.

This Final Interim Act 537 Plan constitutes a corrective action plan intended to address sewerage needs in the KISS service area. PADEP requires each municipality in the KISS service area to adopt the Plan by resolution.

Please let me know if you have any questions. I can be reached at 717-205-4550 or Michael.schober@arroconsulting.com.

Sincerely,
ARRO Consulting

Michael A. Schober, PE, BCEE
Vice President and Business Development Director

Table 4.1 – Flow Projection Summary
(Revised 07/10/2020)

Municipality / Authority	Projected 2020 Planning Modules (gpd)	Projected 2021-2025 Planning Modules (gpd)
Borough of Alburtis[3]	0	2,230
City of Allentown	444,807	1,358,949
Coplay-Whitehall Sewer Authority[1]	76,110	191,350
Borough of Emmaus	63,630	20,160
Hanover Township	0	100,000
Lehigh County Authority	0	152,000[2]
Lower Macungie Township	276,996	260,766
Lowhill Township[3]	0	2,230
Borough of Macungie	1,115	37,464
North Whitehall Township	30,975	34,125
Salisbury Township	4,446	60,268
South Whitehall Township	169,175	344,230
Upper Macungie Township	428,269	325,772
Upper Milford Township	669	27,652
Weisenberg Township[3]	0	2,230
Rounding	3,808	
TOTAL	**1,500,000**	**2,919,426**

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

[2] 152,000 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.

[3] Projection based on 10 EDUs x 223 gpd/EDU = 2,230 gpd

KISS - Final Interim Act 537 Plan
Distribution

City of Allentown	435 Hamilton Street, Allentown, PA 18101
Whitehall Township	3219 MacArthur Road, Whitehall, PA 18052
South Whitehall Township	4444 Walbert Avenue, Allentown, PA 18104
North Whitehall Township	3256 Levans Road, Coplay, PA 18037
Coplay Borough	98 South 4th Street, Coplay, PA 18037
Salisbury Township	2900 South Pike Avenue, Allentown, PA 18103
Borough of Emmaus	28 South 4th Street, Emmaus, PA 18049
Hanover Township	3630 Jacksonville Road, Bethlehem PA 18017
Lower Macungie Township	3400 Brookside Road, Macungie, PA 18062
Borough of Alburtis	260 Franklin Street, Alburtis, PA 18011
Borough of Macungie	21 Locust Street, Macungie, PA 18062
Upper Macungie Township	8330 Schantz Road, Breinigsville, PA 18031
Lowhill Township	7000 Herber Road, New Tripoli, PA 18066
Weisenburg Township	2175 Seipstown Road, Fogelsville, PA 18051
Upper Milford Township	5671 Chestnut Street, Zionsville, PA 18092
Coplay-Whitehall Sewer Authority	3213 MacArthur Rd, Whitehall, PA 18052
Lehigh County Authority	1053 Spruce Road, Allentown, PA 18106

FINAL
FOR ADOPTION

KLINE'S ISLAND SEWER SYSTEM

Interim Act 537 Plan

SUBMITTED TO:

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

SUBMITTED BY:

KLINE'S ISLAND SEWER SYSTEM MUNICIPALITIES

Prepared by:

ARRO Consulting, Inc.

108 W. Airport Road

Lititz, PA 17543

TABLE OF CONTENTS

Appendices

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

INSTRUCTIONS FOR COMPLETING ACT 537 PLAN CONTENT AND ENVIRONMENTAL ASSESSMENT CHECKLIST

Remove and recycle these instructions prior to submission.

CHECKLIST INSTRUCTIONS

These instructions are designed to assist the applicant in completing the *Act 537 Plan Content and Environmental Assessment Checklist*.

This checklist is composed of three parts: one for "General Information," one for "Administrative Completeness," and one for "General Plan Content". A plan must be ***administratively complete*** in order to be formally reviewed by the Department of Environmental Protection (DEP). The "General Plan Content" portion of the checklist identifies each of the issues that must be addressed in your Act 537 Plan Update based on the pre-planning meeting between you and/or your consultant and DEP.

Use the right-hand column blanks in the checklist to identify the page in the plan on which each planning issue is found or to reference a previously approved update or special study (title and page number).

If you determine a planning issue is not applicable even though it was previously thought to be needed, please explain your decision within the text of the plan (or as a footnote) and indicate the page number where this documentation is found.

When information required as part of an official plan update revision has been developed separately or in a previous update revision, incorporate the information by reference to the planning document and page.

For specific details covering the Act 537 planning requirements, refer to 25 *Pa. Code* Chapters 71 and 73 of DEP's regulations.

Wastewater projects proposing funding through the following sources must prepare an "Environmental Report" as described in the Uniform Environmental Review (UER) process and include it with the plan submission designated as "Plan-Appendix A". The following funding programs use the UER process.

- The Clean Water State Revolving Loan Fund (PENNVEST, DEP, EPA)
- The RUS Water and Waste Disposal Grant and Loan Program (USDA-RD)
- The Community Development Block Grant Program (DCED, HUG)
- Other Federal Funding Efforts (EPA)

The checklist items or portions of checklist items required in the Act 537 Plan Update revision and that are also included in the UER process are indicated by shading. Most of the "Environmental Report" document may be constructed from the Act 537 Official Plan Update revision by using "copy & paste" techniques. The technical guidance document *Guidelines for the Uniform Environmental Review Process in Pennsylvania* (381-5511-111) is available electronically in DEP's eLibrary online at www.dep.pa.gov.

After Municipal Adoption by Resolution, submit 3 copies of the plan, any attachments or addenda and this checklist to DEP.

A copy of this completed checklist must be included with your Act 537 plan. DEP will use the "DEP USE ONLY" column during the completeness evaluation of the plan. This column may also be used by DEP during the pre-planning meeting with the municipality to identify planning elements that are not required to be included in the plan.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

ACT 537 PLAN CONTENT AND ENVIRONMENTAL ASSESSMENT CHECKLIST

PART 1 GENERAL INFORMATION

A. Project Information

1. Project Name Kline's Island Sewer System (KISS) Interim Act 537 Plan

2. Brief Project Description Interim facilities plan for the planning period from 2021 to 2025 to address corrective actions at the Kline's Island WWTP and portions of the Western Lehigh Interceptor. The Lehigh County Authority is acting as agent for the KISS municipalities.

B. Client (Municipality) Information

Municipality Name	County	City	Boro	Twp
Lehigh County Authority	Lehigh	☐	☐	☐

Municipality Contact Individual - Last Name	First Name	MI	Suffix	Title
DePoe	Philip			

Additional Individual Last Name	First Name	MI	Suffix	Title

Municipality Mailing Address Line 1	Mailing Address Line 2
1053 Spruce Road	PO Box 3348

Address Last Line -- City	State	ZIP+4
Allentown	PA	18106

Phone + Ext.	FAX (optional)	Email (optional)
610-398-2503		

C. Site Information

Site (or Project) Name
Lehigh County (Municipal Name) Act 537 Plan

Site Location Line 1	Site Location Line 2

D. Project Consultant Information

Last Name	First Name	MI	Suffix
Schober	Michael	A	

Title	Consulting Firm Name
Vice President	ARRO Consulting

Mailing Address Line 1	Mailing Address Line 2
108 West Airport Road	

Address Last Line – City	State	ZIP+4	Country
Lititz	PA	17543	USA

Email	Phone + Ext.	FAX
michael.schober@arroconsulting.com	717-205-4550	

PART 2 ADMINISTRATIVE COMPLETENESS CHECKLIST

DEP Use Only	Indicate Page #(s) in Plan	In addition to the main body of the plan, the plan must include items one through eight listed below to be accepted for formal review by DEP. Incomplete plans may be ***denied*** unless the municipality is clearly requesting an advisory review.
_____	i	1. **Table of Contents**
		2. **Plan Summary**
_____	PS 1	A. Identify the proposed service areas and major problems evaluated in the plan. (Reference - 25 *Pa. Code* §71.21(a)(7)(i)).
_____	PS 2	B. Identify the alternative(s) chosen to solve the problems and serve the areas of need identified in the plan. Also, include any institutional arrangements necessary to implement the chosen alternative(s). (Reference - 25 *Pa. Code* §71.21(a)(7)(ii)).
_____	PS 4	C. Present the estimated cost of implementing the proposed alternative (including the user fees) and the proposed funding method to be used. (Reference - 25 *Pa. Code* §71.21(a)(7)(ii)).
_____	PS 4	D. Identify the municipal commitments necessary to implement the Plan. (Reference - 25 *Pa. Code* §71.21(a)(7)(iii)).
_____	PS 5	E. Provide a schedule of implementation for the project that identifies the ***major*** milestones with dates necessary to accomplish the project to the point of operational status. (Reference - 25 *Pa. Code* §71.21(a)(7)(iv)).
_____	PS 8	3. **Municipal Adoption:** ***Original***, signed and sealed Resolution of Adoption by the municipality which contains, at a minimum, alternatives chosen and a commitment to implement the Plan in accordance with the implementation schedule. (Reference - 25 *Pa. Code* §71.31(f)) Section V.F. of the Planning Guide.
_____	PS 9	4. **Planning Commission / County Health Department Comments**: Evidence that the municipality has requested, reviewed and considered comments by appropriate official planning agencies of the municipality, planning agencies of the county, planning agencies with area wide jurisdiction (where applicable), and any existing county or joint county departments of health. (Reference - 25 *Pa. Code* §71.31(b)) Section V.E.1 of the Planning Guide.
_____	PS 10	5. **Publication:** Proof of Public Notice which documents the proposed plan adoption, plan summary, and the establishment and conduct of a 30-day comment period. (Reference - 25 *Pa. Code* §71.31(c)) Section V.E.2 of the Planning Guide.
_____	PS 11	6. **Comments and Responses:** Copies of ***all*** written comments received and municipal response to ***each*** comment in relation to the proposed plan. (Reference - 25 *Pa. Code* §71.31(c)) Section V.E.2 of the Planning Guide.
_____	36	7. **Implementation Schedule:** A complete project implementation schedule with milestone dates specific for each existing and future area of need. Other activities in the project implementation schedule should be indicated as occurring a finite number of days from a major milestone. (Reference - 25 *Pa. Code* §71.31(d)) Section V.F. of the Planning Guide. Include dates for the future initiation of feasibility evaluations in the project's implementation schedule for areas proposing completion of sewage facilities for planning periods in excess of five years. (Reference - 25 *Pa. Code* §71.21(c)).
_____	N/A	8. **Consistency Documentation:** Documentation indicating that the appropriate agencies have received, reviewed and concurred with the method proposed to resolve identified inconsistencies within the proposed alternative and consistency requirements in 25 *Pa. Code §*71.21.(a)(5)(i-iii). (Reference - 25 *Pa. Code* §71.31(e)). Appendix B of the Planning Guide.

PART 3 GENERAL PLAN CONTENT CHECKLIST

DEP Use Only	Indicate Page #(s) in Plan		Item Required
_____	1	I.	**Previous Wastewater Planning**
			A. Identify, describe and briefly analyze all past wastewater planning for its impact on the current planning effort:
_____	1		1. Previously undertaken under the Pennsylvania Sewage Facilities Act (Act). (Reference - Act 537, 35 P.S. §750.5(d)(1)).
_____	N/A		2. Has not been carried out according to an approved implementation schedule contained in the plans. (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(A-D)). Section V.F of the Planning Guide.
_____	N/A		3. Is anticipated or planned by applicable sewer authorities or approved under a Chapter 94 Corrective Action Plan. (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(A&B)). Section V.D. of the Planning Guide.
_____	N/A		4. Through planning modules for new land development, planning "exemptions" and addenda. (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(A)).
_____	4	II.	**Physical and Demographic Analysis utilizing written description and mapping** (All items listed below require maps, and all maps should show all current lots and structures and be of appropriate scale to clearly show significant information).
_____	4		A. Identification of planning area(s), municipal boundaries, Sewer Authority/Management Agency service area boundaries. (Reference – 25 *Pa. Code* §71.21(a)(1)(i)).
_____	4		B. Identification of physical characteristics (streams, lakes, impoundments, natural conveyance, channels, drainage basins in the planning area). (Reference - 25 *Pa. Code* §71.21(a)(1)(ii)).
_____	N/A		C. Soils - Analysis with description by soil type and soils mapping for areas not presently served by sanitary sewer service. Show areas suitable for in-ground onlot systems, elevated sand mounds, individual residential spray irrigation systems (IRSIS), and areas unsuitable for soil dependent systems. (Reference - 25 *Pa. Code* §71.21(a)(1)(iii)). Show Prime Agricultural Soils and any locally protected agricultural soils. (Reference - 25 *Pa. Code* §71.21(a)(1)(iii)).
_____	N/A		D. Geologic Features - (1) Identification through analysis, (2) mapping and (3) their relation to existing or potential nitrate-nitrogen pollution and drinking water sources. Include areas where existing nitrate-nitrogen levels are in excess of 5 mg/L. (Reference - 25 *Pa. Code* §71.21(a)(1)(iii)).
_____	N/A		E. Topography - Depict areas with slopes that are suitable for conventional systems; slopes that are suitable for elevated sand mounds and slopes that are unsuitable for onlot systems. (Reference - 25 *Pa. Code* §71.21(a)(1)(ii)).
_____	N/A		F. Potable Water Supplies - Identification through mapping, description and analysis. Include public water supply service areas and available public water supply capacity and aquifer yield for groundwater supplies. (Reference - 25 *Pa. Code* §71.21(a)(1)(vi)). Section V.C. of the Planning Guide.
_____	N/A		G. Wetlands-Identify wetlands as defined in 25 *Pa. Code* Chapter 105 by description, analysis and mapping. Include National Wetland Inventory mapping and potential wetland areas per the United States Department of Agricultural (USDA) Natural Resources Conservation Service (NRCS) mapped hydric soils. Proposed collection, conveyance and treatment facilities and lines must be located and labeled, along with the identified wetlands, on the map. (Reference - 25 *Pa. Code* §71.21(a)(1)(v)). Appendix B, Section II.I of the Planning Guide.

_____ 9 **III. Existing Sewage Facilities in the Planning Area - Identifying the Existing Needs**

A. Identify, map and describe municipal and non-municipal, individual and community sewerage systems in the planning area including:

_____ 10 1. Location, size and ownership of treatment facilities, main intercepting lines, pumping stations and force mains including their size, capacity, point of discharge. Also include the name of the receiving stream, drainage basin, and the facility's effluent discharge requirements. (Reference - 25 *Pa. Code* §71.21(a)(2)(i)(A)).

_____ 10 2. A narrative and schematic diagram of the facility's basic treatment processes including the facility's National Pollutant Discharge Elimination System (NPDES) permitted capacity, and the Clean Streams Law permit number. (Reference - 25 *Pa. Code* §71.21(a)(2)(i)(A)).

_____ 13 3. A description of problems with existing facilities (collection, conveyance and/or treatment), including existing or projected overload under 25 *Pa. Code* Chapter 94 (relating to municipal wasteload management) or violations of the NPDES permit, Clean Streams Law permit, or other permit, rule or regulation of DEP. (Reference - 25 *Pa. Code* §71.21(a)(2)(i)(B)).

_____ 15 4. Details of scheduled or in-progress upgrading or expansion of treatment facilities and the anticipated completion date of the improvements. Discuss any remaining reserve capacity and the policy concerning the allocation of reserve capacity. Also discuss the compatibility of the rate of growth to existing and proposed wastewater treatment facilities. (Reference - 25 *Pa. Code* §71.21(a)(4)(i & ii)).

_____ 15 5. A detailed description of the municipality's operation and maintenance (O & M) requirements for small flow treatment facility systems, including the status of past and present compliance with these requirements and any other requirements relating to sewage management programs (SMPs). (Reference – 25 *Pa. Code* §71.21(a)(2)(i)(C)).

_____ N/A 6. Disposal areas, if other than stream discharge, and any applicable groundwater limitations. (Reference - 25 *Pa. Code* §71.21(a)(4)(i & ii)).

_____ N/A B. Using DEP's publication titled *Act 537 Sewage Disposal Needs Identification* (3800-BK-DEP1949), identify, map and describe areas that utilize individual and community onlot sewage disposal and, unpermitted collection and disposal systems ("wildcat" sewers, borehole disposal, etc.) and retaining tank systems in the planning area including:

_____ N/A 1. The types of onlot systems in use. (Reference - 25 *Pa. Code* §71.21(a)(2)(ii)(A)).

_____ N/A 2. A sanitary survey complete with description, map and tabulation of documented and potential public health, pollution, and operational problems (including malfunctioning systems) with the systems, including violations of local ordinances, the Act, the Clean Stream Law or regulations promulgated thereunder. (Reference - 25 *Pa. Code* §71.21(a)(2)(ii)(B)).

_____ N/A 3. A comparison of the types of onlot sewage systems installed in an area with the types of systems which are appropriate for the area according to soil, geologic conditions, topographic limitations sewage flows, and 25 *Pa. Code* Chapter 73 (relating to standards for sewage disposal facilities). (Reference - 25 *Pa. Code* §71.21(a)(2)(ii)(C)).

_____ N/A 4. An individual water supply survey to identify possible contamination by malfunctioning onlot sewage disposal systems consistent with DEP's *Act 537 Sewage Disposal Needs Identification* publication. (Reference – 25 *Pa. Code* §71.21(a)(2)(ii)(B)).

_____	N/A	5. Detailed description of O & M requirements of the municipality for individual and small volume community onlot systems, including the status of past and present compliance with these requirements and any other requirements relating to SMPs. (Reference - 25 *Pa. Code* §71.21(a)(2)(i)(C)).
_____	N/A	C. Identify wastewater sludge and septage generation, transport and disposal methods. Include this information in the sewage facilities alternative analysis including:
_____	N/A	1. Location of sources of wastewater sludge or septage (Septic tanks, holding tanks, wastewater treatment facilities). (Reference – 25 *Pa. Code* §71.71).
_____	N/A	2. Quantities of the types of sludges or septage generated. (Reference - 25 *Pa. Code* §71.71).
_____	N/A	3. Present disposal methods, locations, capacities and transportation methods. (Reference - 25 *Pa. Code* §71.71).
_____	17	**IV. Future Growth and Land Development**
		A. Identify and briefly summarize all municipal and county planning documents adopted pursuant to the Pennsylvania Municipalities Planning Code (Act 247) including:
_____	17	1. All land use plans and zoning maps that identify residential, commercial, industrial, agricultural, recreational and open space areas. (Reference - 25 *Pa. Code* §71.21(a)(3)(iv)).
_____	17	2. Zoning or subdivision regulations that establish lot sizes predicated on sewage disposal methods. (Reference – 25 *Pa. Code* §71.21(a)(3)(iv)).
_____	N/A	3. All limitations and plans related to floodplain and stormwater management and special protection (25 *Pa. Code* Chapter 93) areas. (Reference - 25 *Pa. Code* §71.21(a)(3)(iv)) Appendix B, Section II.F of the Planning Guide.
_____	17	B. Delineate and describe the following through map, text and analysis.
_____	20	1. Areas with existing development or plotted subdivisions. Include the name, location, description, total number of equivalent dwelling units (EDUs) in development, total number of EDUs currently developed and total number of EDUs remaining to be developed (include time schedule for EDUs remaining to be developed). (Reference - 25 *Pa. Code* §71.21(a)(3)(i)).
_____	20	2. Land use designations established under the Pennsylvania Municipalities Planning Code (35 P.S. 10101-11202), including residential, commercial and industrial areas. (Reference - 25 *Pa. Code* §71.21(a)(3)(ii)). Include a comparison of proposed land use as allowed by zoning and existing sewage facility planning. (Reference - 25 *Pa. Code* §71.21(a)(3)(iv)).
_____	20	3. Future growth areas with population and EDU projections for these areas using historical, current and future population figures and projections of the municipality. Discuss and evaluate discrepancies between local, county, state and federal projections as they relate to sewage facilities. (Reference - 25 *Pa. Code* §71.21(a)(1)(iv) and (a)(3)(iii)).
_____	22	4. Zoning, and/or subdivision regulations; local, county or regional comprehensive plans; and existing plans of any other agency relating to the development, use and protection of land and water resources with special attention to: (Reference - 25 *Pa. Code* §71.21(a)(3)(iv)). --public ground/surface water supplies --recreational water use areas --groundwater recharge areas --industrial water use --wetlands

_____	22		5. Sewage planning necessary to provide adequate wastewater treatment for 5 and 10-year future planning periods based on projected growth of existing and proposed wastewater collection and treatment facilities. (Reference - 25 *Pa. Code* §71.21(a)(3)(v)).
_____	23	**V.**	**Identify Alternatives to Provide New or Improved Wastewater Disposal Facilities**
			A. Conventional collection, conveyance, treatment and discharge alternatives including:
_____	23		1. The potential for regional wastewater treatment. (Reference - 25 *Pa. Code* §71.21(a)(4)).
_____	24		2. The potential for extension of existing municipal or non-municipal sewage facilities to areas in need of new or improved sewage facilities. (Reference - 25 *Pa. Code* §71.21(a)(4)(i)).
_____	24		3. The potential for the continued use of existing municipal or non-municipal sewage facilities through one or more of the following: (Reference - 25 *Pa. Code* §71.21(a)(4)(ii)).
_____	24		a. Repair. (Reference - 25 *Pa. Code* §71.21(a)(4)(ii)(A)).
_____	24		b. Upgrading. (Reference - 25 *Pa. Code* §71.21(a)(4)(ii)(B)).
_____	24		c. Reduction of hydraulic or organic loading to existing facilities. (Reference - 25 *Pa. Code* §71.71).
_____	24		d. Improved O & M. (Reference - 25 *Pa. Code* §71.21(a)(4)(ii)(C)).
_____	24		e. Other applicable actions that will resolve or abate the identified problems. (Reference - 25 *Pa. Code* §71.21(a)(4)(ii)(D)).
_____	N/A		4. Repair or replacement of existing collection and conveyance system components. (Reference - 25 *Pa. Code* §71.21(a)(4)(ii)(A)).
_____	N/A		5. The need for construction of new community sewage systems including sewer systems and/or treatment facilities. (Reference - 25 *Pa. Code* §71.21(a)(4)(iii)).
_____	N/A		6. Use of innovative/alternative methods of collection/conveyance to serve needs areas using existing wastewater treatment facilities. (Reference - 25 *Pa. Code* §71.21(a)(4)(ii)(B)).
_____	N/A		B. The use of individual sewage disposal systems including IRSIS systems based on:
_____	N/A		1. Soil and slope suitability. (Reference - 25 *Pa. Code* §71.21(a)(2)(ii)(C)).
_____	N/A		2. Preliminary hydrogeologic evaluation. (Reference - 25 *Pa. Code* §71.21(a)(2)(ii)(C)).
_____	N/A		3. The establishment of a SMP. (Reference - 25 *Pa. Code* §71.21(a)(4)(iv)). See also Part “F” below.
_____	N/A		4. The repair, replacement or upgrading of existing malfunctioning systems in areas suitable for onlot disposal considering: (Reference - 25 *Pa. Code* §71.21(a)(4)).
_____	N/A		a. Existing technology and sizing requirements of 25 *Pa. Code* Chapter 73. (Reference - 25 *Pa. Code* §73.31-§73.72).
_____	N/A		b. Use of expanded absorption areas or alternating absorption areas. (Reference - 25 *Pa. Code* §73.16).
_____	N/A		c. Use of water conservation devices. (Reference - 25 *Pa. Code* §71.73(b)(2)(iii)).

______	N/A	C. The use of small flow sewage treatment facilities or package treatment facilities to serve individual homes or clusters of homes with consideration of: (Reference - 25 *Pa. Code* §71.64(d)).
______	N/A	1. Treatment and discharge requirements. (Reference - 25 *Pa. Code* §71.64(d)).
______	N/A	2. Soil suitability. (Reference - 25 *Pa. Code* §71.64(c)(1)).
______	N/A	3. Preliminary hydrogeologic evaluation. (Reference - 25 *Pa. Code* §71.64(c)(2)).
______	N/A	4. Municipal, Local Agency or other controls over O & M requirements through a SMP. (Reference - 25 *Pa. Code* §71.64(d)). See Part "F" below.
______	N/A	D. The use of community land disposal alternatives including:
______	N/A	1. Soil and site suitability. (Reference - 25 *Pa. Code* §71.21(a)(2)(ii)(C)).
______	N/A	2. Preliminary hydrogeologic evaluation. (Reference - 25 *Pa. Code* §71.21(a)(2)(ii)(C)).
______	N/A	3. Municipality, Local Agency or other controls over O & M requirements through a SMP. (Reference - 25 *Pa. Code* §71.21(a)(2)(ii)(C)). See Part "F" below.
______	N/A	4. The rehabilitation or replacement of existing malfunctioning community land disposal systems. (See Part "V", B, 4, a, b, c above). See also Part "F" below.
______	N/A	E. The use of retaining tank alternatives on a temporary or permanent basis including: (Reference - 25 *Pa. Code* §71.21(a)(4)).
______	N/A	1. Commercial, residential and industrial use. (Reference - 25 *Pa. Code* §71.63(e)).
______	N/A	2 Designated conveyance facilities (pumper trucks). (Reference - 25 *Pa. Code* §71.63(b)(2)).
______	N/A	3. Designated treatment facilities or disposal site. (Reference - 25 *Pa. Code* §71.63(b)(2)).
______	N/A	4. Implementation of a retaining tank ordinance by the municipality. (Reference - 25 *Pa. Code* §71.63(c)(3)). See Part "F" below.
______	N/A	5. Financial guarantees when retaining tanks are used as an interim sewage disposal measure. (Reference - 25 *Pa. Code* §71.63(c)(2)).
______	N/A	F. SMPs to assure the future O & M of existing and proposed sewage facilities through:
______	N/A	1. Municipal ownership or control over the O & M of individual onlot sewage disposal systems, small flow treatment facilities, or other traditionally non-municipal treatment facilities. (Reference - 25 *Pa. Code* §71.21(a)(4)(iv)).
______	N/A	2. Required inspection of sewage disposal systems on a schedule established by the municipality. (Reference - 25 *Pa. Code* §71.73(b)(1)).
______	N/A	3. Required maintenance of sewage disposal systems including septic and aerobic treatment tanks and other system components on a schedule established by the municipality. (Reference - 25 *Pa. Code* §71.73(b)(2)).
______	N/A	4. Repair, replacement or upgrading of malfunctioning onlot sewage systems. (Reference - 25 *Pa. Code* §71.21(a)(4)(iv) and §71.73(b)(5)) through:
______	N/A	a. Aggressive pro-active enforcement of ordinances that require O & M and prohibit malfunctioning systems. (Reference - 25 *Pa. Code* §71.73(b)(5)).
______	N/A	b. Public education programs to encourage proper O & M and repair of sewage disposal systems.
______	N/A	5. Establishment of joint municipal SMPs. (Reference - 25 *Pa. Code*

§71.73(b)(8)).

______ N/A 6. Requirements for bonding, escrow accounts, management agencies or associations to assure O & M for non-municipal facilities. (Reference - 25 *Pa. Code* §71.71).

______ N/A G. Non-structural comprehensive planning alternatives that can be undertaken to assist in meeting existing and future sewage disposal needs including: (Reference - 25 *Pa. Code* §71.21(a)(4)).

1. Modification of existing comprehensive plans involving:

______ N/A a. Land use designations. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ N/A b. Densities. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ N/A c. Municipal ordinances and regulations. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ N/A d. Improved enforcement. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ N/A e. Protection of drinking water sources. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ N/A 2. Consideration of a local comprehensive plan to assist in producing sound economic and consistent land development. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ N/A 3. Alternatives for creating or changing municipal subdivision regulations to assure long-term use of on-site sewage disposal that consider lot sizes and protection of replacement areas. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ N/A 4. Evaluation of existing local agency programs and the need for technical or administrative training. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ 26 H. A no-action alternative which includes discussion of both short-term and long-term impacts on: (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ 26 1. Water quality/public health. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ 26 2. Growth potential (residential, commercial, industrial). (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ 26 3. Community economic conditions. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ 26 4. Recreational opportunities. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ 26 5. Drinking water sources. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ 26 6. Other environmental concerns. (Reference - 25 *Pa. Code* §71.21(a)(4)).

______ 27 **VI. Evaluation of Alternatives**

A. Technically feasible alternatives identified in Section V of this checklist must be evaluated for consistency with respect to the following: (Reference - 25 *Pa. Code* §71.21(a)(5)(i)).

______ 27 1. Applicable plans developed and approved under **Sections 4 and 5 of the Clean Streams Law or Section 208 of the Clean Water Act** (33 U.S.C.A. 1288). (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(A)). Appendix B, Section II.A of the Planning Guide.

______ 27 2. Municipal wasteload management **Corrective Action Plans or Annual Reports** developed under 25 *Pa. Code* Chapter 94. (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(B)). The municipality's recent Wasteload Management (25 *Pa. Code* Chapter 94) Reports should be examined to determine if the proposed alternative is consistent with the recommendations and findings of the report. Appendix B, Section II.B of the Planning Guide.

______ 27 3. Plans developed under **Title II of the Clean Water Act** (33 U.S.C.A.

1281-1299) or **Titles II and VI of the Water Quality Act of 1987** (33 U.S.C.A 1251-1376). (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(C)). Appendix B, Section II.E of the Planning Guide.

______	28	4. **Comprehensive plans** developed under the Pennsylvania Municipalities Planning Code. (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(D)). The municipality's comprehensive plan must be examined to assure that the proposed wastewater disposal alternative is consistent with land use and all other requirements stated in the comprehensive plan. Appendix B, Section II.D of the Planning Guide.
______	31	5. **Antidegradation requirements** as contained in 25 *Pa. Code* Chapters 93, 95 and 102 (relating to water quality standards, wastewater treatment requirements and erosion control) and the Clean Water Act. (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(E). Appendix B, Section II.F of the Planning Guide.
______	31	6. **State Water Plans** developed under the Water Resources Planning Act (42 U.S.C.A. 1962-1962 d-18). (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(F)). Appendix B, Section II.C of the Planning Guide.
______	N/A	7. **Pennsylvania Prime Agricultural Land Policy** contained in Title 4 of the Pennsylvania Code, Chapter 7, Subchapter W. Provide narrative on local municipal policy and an overlay map on prime agricultural soils. (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(G)). Appendix B, Section II.G of the Planning Guide.
______	N/A	8. **County Stormwater Management Plans** approved by DEP under the Storm Water Management Act (32 P.S. 680.1-680.17). (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(H)). Conflicts created by the implementation of the proposed wastewater alternative and the existing recommendations for the management of stormwater in the county Stormwater Management Plan must be evaluated and mitigated. If no plan exists, no conflict exists. Appendix B, Section II.H of the Planning Guide.
______	N/A	9. **Wetland Protection.** Using wetland mapping developed under Checklist Section II.G, identify and discuss mitigative measures including the need to obtain permits for any encroachments on wetlands from the construction or operation of any proposed wastewater facilities. (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(I)) Appendix B, Section II.I of the Planning Guide.
______	N/A	10. **Protection of rare, endangered or threatened plant and animal species** as identified by the Pennsylvania Natural Diversity Inventory (PNDI). (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(J)). Provide DEP with a copy of the completed *PNDI Manual Project Submission Form*. Also provide a copy of the response letters from the 4 jurisdictional agencies regarding the findings of the PNDI search. Appendix B, Section II.J of the Planning Guide.
______	N/A	11. **Historical and archaeological resource protection** under P.C.S. Title 37, Section 507 relating to cooperation by public officials with the Pennsylvania Historical and Museum Commission (PHMC). (Reference - 25 *Pa. Code* §71.21(a)(5)(i)(K)). Provide DEP with a completed copy of a *Cultural Resource Notice* and a return receipt for its submission to PHMC. Provide a copy of the response letter or review stamp from the Bureau of Historic Preservation (BHP) indicating the project will have no effect on, or that there may be potential impacts on, known archaeological and historical sites and any avoidance and mitigation measures required. Appendix B, Section II.K of the Planning Guide.

_____	32	B. Provide for the resolution of any inconsistencies in any of the points identified in Section VI.A. of this checklist by submitting a letter from the appropriate agency stating that the agency has received, reviewed and concurred with the resolution of identified inconsistencies. (Reference - 25 *Pa. Code* §71.21(a)(5)(ii)). Appendix B of the Planning Guide.
_____	32	C. Evaluate alternatives identified in Section V of this checklist with respect to applicable water quality standards, effluent limitations or other technical, legislative or legal requirements. (Reference - 25 *Pa. Code* §71.21(a)(5)(iii)).
_____	N/A	D. Provide cost estimates using present worth analysis for construction, financing, ongoing administration, O & M and user fees for alternatives identified in Section V of this checklist. Estimates shall be limited to areas identified in the plan as needing improved sewage facilities within 5 years from the date of plan submission. (Reference - 25 *Pa. Code* §71.21(a)(5)(iv)).
_____	N/A	E. Provide an analysis of the funding methods available to finance the proposed alternatives evaluated in Section V of this checklist. Also provide documentation to demonstrate which alternative and financing scheme combination is the most cost-effective; and a contingency financial plan to be used if the preferred method of financing cannot be implemented. The funding analysis shall be limited to areas identified in the plan as needing improved sewage facilities within 5 years from the date of the plan submission. (Reference - 25 *Pa. Code* §71.21(a)(5)(v)).
_____	32	F. Analyze the need for immediate or phased implementation of each alternative proposed in Section V of this checklist including: (Reference - 25 *Pa. Code* §71.21(a)(5)(vi)).
_____	N/A	1. A description of any activities necessary to abate critical public health hazards pending completion of sewage facilities or implementation of SMPs. (Reference - 25 *Pa. Code* §71.21(a)(5)(vi)(A)).
_____	N/A	2. A description of the advantages, if any, in phasing construction of the facilities or implementation of a SMP justifying time schedules for each phase. (Reference - 25 *Pa. Code* §71.21(a)(5)(vi)(B)).
_____	32	G. Evaluate administrative organizations and legal authority necessary for plan implementation. (Reference - 25 *Pa. Code* §71.21(a)(5)(vi)(D)).
_____	33	**VII. Institutional Evaluation** A. Provide an analysis of all existing wastewater treatment authorities, their past actions and present performance including:
_____	N/A	1. Financial and debt status. (Reference - 25 *Pa. Code* §71.61(d)(2)).
_____	N/A	2. Available staff and administrative resources. (Reference - 25 *Pa. Code* §71.61(d)(2))
_____	N/A	3. Existing legal authority to:
_____	N/A	a. Implement wastewater planning recommendations. (Reference - 25 *Pa. Code* §71.61(d)(2)).
_____	N/A	b. Implement system-wide O & M activities. (Reference - 25 *Pa. Code* §71.61(d)(2)).
_____	N/A	c. Set user fees and take purchasing actions. (Reference - 25 *Pa. Code* §71.61(d)(2)).
_____	N/A	d. Take enforcement actions against ordinance violators. (Reference - 25 *Pa. Code* §71.61(d)(2)).
_____	N/A	e. Negotiate agreements with other parties. (Reference - 25 *Pa. Code* §71.61(d)(2)).

______	N/A	f. Raise capital for construction and O & M of facilities. (Reference - 25 *Pa. Code* §71.61(d)(2)).
______	33	B. Provide an analysis and description of the various institutional alternatives necessary to implement the proposed technical alternatives including:
______	N/A	1. Need for new municipal departments or municipal authorities. (Reference - 25 *Pa. Code* §71.61(d)(2)).
______	33	2. Functions of existing and proposed organizations (sewer authorities, onlot maintenance agencies, etc.). (Reference - 25 *Pa. Code* §71.61(d)(2)).
______	N/A	3. Cost of administration, implementability, and the capability of the authority/agency to react to future needs. (Reference - 25 *Pa. Code* §71.61(d)(2)).
______	33	C. Describe all necessary administrative and legal activities to be completed and adopted to ensure the implementation of the recommended alternative including:
______	N/A	1. Incorporation of authorities or agencies. (Reference - 25 *Pa. Code* §71.61(d)(2)).
______	33	2. Development of all required ordinances, regulations, standards and inter-municipal agreements. (Reference - 25 *Pa. Code* §71.61(d)(2)).
______	N/A	3. Description of activities to provide rights-of-way, easements and land transfers. (Reference - 25 *Pa. Code* §71.61(d)(2)).
______	33	4. Adoption of other municipal sewage facilities plans. (Reference - 25 *Pa. Code* §71.61(d)(2)).
______	33	5. Any other legal documents. (Reference - 25 *Pa. Code* §71.61(d)(2)).
______	34	6. Dates or timeframes for items 1-5 above on the project's implementation schedule.
______	34	D. Identify the proposed institutional alternative for implementing the chosen technical wastewater disposal alternative. Provide justification for choosing the specific institutional alternative considering administrative issues, organizational needs and enabling legal authority. (Reference - 25 *Pa. Code* §71.61(d)(2)).
______	35	**VIII. Implementation Schedule and Justification for Selected Technical & Institutional Alternatives**
		A. Identify the technical wastewater disposal alternative which best meets the wastewater treatment needs of each study area of the municipality. Justify the choice by providing documentation which shows that it is the best alternative based on:
______	35	1. Existing wastewater disposal needs. (Reference - 25 *Pa. Code* §71.21(a)(6)).
______	35	2. Future wastewater disposal needs. (5 and 10 year growth areas). (Reference - 25 *Pa. Code* §71.21(a)(6)).
______	35	3. O & M considerations. (Reference - 25 *Pa. Code* §71.21(a)(6)).
______	35	4. Cost-effectiveness. (Reference - 25 *Pa. Code* §71.21(a)(6)).
______	35	5. Available management and administrative systems. (Reference - 25 *Pa. Code* §71.21(a)(6)).
______	N/A	6. Available financing methods. (Reference - 25 *Pa. Code* §71.21(a)(6)).
______	36	7. Environmental soundness and compliance with natural resource planning and preservation programs. (Reference - 25 *Pa. Code* §71.21(a)(6)).

_____ N/A B. Designate and describe the capital financing plan chosen to implement the selected alternative(s). Designate and describe the chosen back-up financing plan. (Reference - 25 *Pa. Code* §71.21(a)(6))

_____ 36 C. Designate and describe the implementation schedule for the recommended alternative, including justification for any proposed phasing of construction or implementation of a SMP. (Reference – 25 *Pa. Code* §71.31(d))

_____ N/A **IX. Environmental Report (ER) generated from the UER Process**

_____ N/A A. Complete an ER as required by the UER process and as described in the DEP Technical Guidance (381-5511-111). Include this document as "Appendix A" to the Act 537 Plan Update Revision. ***Note: An ER is required only for Wastewater projects proposing funding through any of the funding sources identified in the UER.***

PENNVEST I.D. No. ____________________________

ADDITIONAL REQUIREMENTS FOR PENNVEST PROJECTS

Municipalities that propose to implement their official sewage facilities plan updates with PENNVEST funds must meet 6 additional requirements to be eligible for such funds. See *A Guide for Preparing Act 537 Update Revisions* (362-0300-003), Appendix N for greater detail or contact the DEP regional office serving your county listed in Appendix J of the same publication.

DEP Use Only	Indicate Page #(s) in Plan	Item Required
_____	_____	1. Environmental Impact Assessment. (Planning Phase) The UER replaces the Environmental Impact Assessment that was a previous requirement for PENNVEST projects.
_____	_____	2. Cost Effectiveness (Planning Phase) The cost-effectiveness analysis should be a present-worth (or equivalent uniform annual) cost evaluation of the principle alternatives using the interest rate that is published annually by the Water Resources Council. Normally, for PENNVEST projects the applicant should select the most cost-effective alternative based upon the above analysis. Once the alternative has been selected the user fee estimates should be developed based upon interest rates and loan terms of the selected funding method.
_____		3. Second Opinion Project Review. (Design Phase)
_____		4. Minority Business Enterprise/Women's Business Enterprise (Construction Phase)
_____		5. Civil Rights. (Construction Phase)
_____		6. Initiation of Operation/Performance Certification. (Post-construction Phase)

I/A TECHNOLOGIES

PARTIAL LISTING OF INNOVATIVE AND ALTERNATIVE TECHNOLOGIES

TREATMENT TECHNOLOGIES
Aquaculture
Aquifer Recharge
Biological Aerated Filters
Constructed Wetlands
Direct Reuse (NON-POTABLE)
Horticulture
Overland Flow
Rapid Infiltration
Silviculture
Microscreens
Controlled Release Lagoons
Swirl Concentrator

ENERGY RECOVERY TECHNOLOGIES
Anaerobic Digestion with more than 90 percent Methane Recovery
Cogeneration of Electricity
Self-Sustaining Incineration

SLUDGE TREATMENT TECHNOLOGIES

Aerated Static Pile Composting
Enclosed Mechanical Composting (In vessel)
Revegetation of Disturbed Land
Aerated Windrow Composting

INDIVIDUAL & SYSTEM-WIDE COLLECTION TECHNOLOGIES
Cluster Systems
Septage Treatment
Small Diameter Gravity Sewers
Step Pressure Sewers
Vacuum Sewers
Variable Grade Sewers
Septic Tank Effluent Pump with Pressure Sewers

PLAN SUMMARY

A. Identify Proposed Service Areas

The Kline's Island Sewer System (KISS) service area is comprised of the following municipalities and authorities:

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

The proposed service area for this Interim Plan is limited to the areas currently served by sewers as shown on the KISS Collection System Map in Appendix 2.

B. Identify Selected Alternatives

<u>PROBLEM DEFINITION</u>

Beginning in August 2018 and continuing through July 2019, Pennsylvania received the most annual rainfall since this 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 prolonged period of well-above-average precipitation 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.

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

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

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

7. Preparation of a Long-term Act 537 Plan.

The corrective action plan described above maintains the current operating, administrative and legal strategies and continued use of existing facilities. The KIWWTP will undergo a paper rerate to increase its Design Hydraulic Capacity. This is not a plant expansion; rather it is recognition that the KIWWTP is capable of adequately treating flows in excess of its permitted capacity for extended periods of time. Overall, the permitted annual average flow to the KIWWTP remains unchanged.

Hydraulic restrictions in the form of flat and sagged pipe segments in the Western Lehigh Interceptor through Trexlertown create surcharged flow conditions during normal dry-day flows. This section of the interceptor is also where sanitary sewer overflows (SSOs) occur during significant or prolonged wet-weather events such as those experienced in 2018 and2019. A feasibility study is currently under way to assess alternatives to address this challenge. The alternatives being evaluated include off-line storage, in-line storage, or a combination / hybrid approach. The selected approach will be designed to handle future flows through the planning horizon as well, but will be constructed such that it does not increase maximum flows from the LCA service area to the downstream City service area until the needed downstream treatment plant and conveyance improvements are constructed. This project is anticipated to be constructed during this planning period of 2021 to 2025.

All municipalities and authorities will continue implementing their current respective I&I source reduction programs as outlined in Appendix 9. These efforts will support characterizing I&I reduction levels for modeling following the FCS planned for 2021. This information will be critical for completing the alternatives analysis when the Long-term Act 537 Plan is being developed.

There are no capacity improvements, modifications or additions to the City's centralized collection system planned under this Interim Plan. This Interim Plan does not increase the sewage service area in any of the contributing municipalities.

C. Cost of Implementation

Cost estimates of the critical components of this Interim Plan are shown below with a description of how the costs will be allocated among the municipalities:

- Sewage Billing Meters engineering evaluation and quality control efforts will cost approximately $150,000. The cost of this will be proportionately shared based on each municipality's current treatment allocation capacity at the KIWWTP.
- Preparation cost of this Interim Plan is approximately $81,000 to be proportionately shared based on each municipality's current treatment allocation capacity at the KIWWTP.
- The KIWWTP Hydraulic Design Capacity evaluation and permit update is estimated to cost $50,000, to be proportionately shared based on each municipality's current treatment allocation capacity at the KIWWTP.
- The Trexlertown project design, planning, and construction has a preliminary cost estimate of $14 million. This will be refined upon completion of a feasibility study in 2020 and additional planning activities. Costs will be proportionately shared by municipalities in the LCA service area based on each municipality's purchased allocation of treatment capacity from LCA during the year costs are incurred. A portion of these costs will also be incorporated in LCA's tapping fees to be recovered from new users of the system.
- Costs for municipalities' I&I source reduction plans vary by municipality. It is currently anticipated that each municipality will pay for their own source reduction construction during the Interim Plan development period.
- Cost estimate for the Long-term Act 537 Plan development including data capture, modeling, alternatives analyses, and preliminary engineering work is $3 million. The full cost of this aspect of the work will be defined as engineering scopes are developed. Cost sharing for these efforts between the municipalities will be determined through regional discussions currently under way in 2020.

D. Municipal Commitments Necessary to Implement Plan

Inter-municipal agreements are already in place to implement the actions in this Interim Plan. The Signatory municipalities have reviewed and adopted this Interim Plan [when submitted to DEP], therefore, no further commitments are necessary.

E. Implementation Schedule

The proposed Implementation Schedule for the Interim Plan, including those tasks for completing the Long-term Act 537 Plan, is presented on the following page.

IMPLEMENTATION PLAN

The technical aspects of the Interim Plan are complex but definable. The inter-municipal aspects (and potential for regionalization) are even more complex and therefore difficult to define and quantify from a scheduling perspective. These discussions will begin in 2021 and will continue throughout the Long-term Act 537 planning process.

The table that follows is a best estimate of the time needed to complete this Interim Plan. The potential exists for changes during implementation which will be addressed and the schedule modified accordingly.

Work Categories & Description	Start	Finish
Immediate: ■ Sewage Billing Meter (SBM) Upgrades & data validation / capture method ■ Defined scope and meter placement for Flow Characterization Study ■ Agreement on Cost-Sharing for Planning work ■ Municipal Flow Projections → 2050 ■ Part 2 Permit Resubmission for the KIWWTP hydraulic rerate	As soon as possible	December 2020 ** Timing required to design flow metering program*
Preliminary: ■ Preliminary Treatment Alternatives Evaluation –Resolve concepts with preliminary regulatory and engineering evaluation so signatories can review impacts to inter-municipal agreements, cost-sharing, etc. ■ Inter-municipal Agreement Review ■ Evaluation of Regional Approaches ■ Conceptual Agreement on Cost-Sharing	As soon as possible	September 2021 ** Timing required to have inputs available for flow modeling work*
Flow Monitoring & Model Calibration: ■ Flow Monitoring ■ Rainfall Monitoring ■ RDII Characterization ■ KISS Model Calibration ■ Preliminary modeling of alternatives ■ Update treatment alternatives analysis	January 2021	June 2022

Work Categories & Description	Start	Finish
Alternatives Analysis: ■ KIWWTP vs. Pretreatment Plant ■ Storage vs. conveyance/pumping alternatives ■ Peak flow capacity alternatives ■ I&I removal impacts on alternatives ■ Preliminary cost estimates	June 2022	June 2023
Selection of Preferred Alternative: ■ Detailed cost estimates ■ Address impact to inter-municipal agreements ■ Develop implementation schedule ■ Stakeholder input	June 2023	June 2024
Act 537 Plan Development (Write the plan)	June 2024	September 2024
Public Notice & Municipal Adoptions	September 2024	February 2025
Final Submission		March 2025

MUNICIPAL ADOPTIONS

Copies of all Municipal Adoptions will be included in this section in the Submission to PADEP.

PLANNING COMMISSION / COUNTY HEALTH DEPARTMENT COMMENTS

Cover Letter to Planning Agencies (March 16, 2020)

Comments and Responses

Table 4.1 – Flow Projection Summary (Revised 05/15/2020)

Comment Letter –Lehigh Valley Planning Commission

Comment Letter – City of Allentown

Comment Letter – Lower Macungie Township

Comments – A.L. Tope

Revised Collection System Map

Memo - Township of Whitehall Bureau of Planning, Zoning & Development

March 16, 2020

Corporate Headquarters
108 West Airport Road
Lititz, PA 17543
T 717.569.7021
F 717.560.0577
www.thearrogroup.com

To: Municipal Planning Commissions
See Attached Distribution

RE: Kline's Island WWTP Sewer System
Draft Interim Act 537 Plan

Dear Planning Commission:

On behalf of the municipalities and authorities who participate in the Kline's Island WWTP Sewer System (KISS), we are submitting one copy of the enclosed draft Interim Act 537 Plan for your review and comment. As required by the Pennsylvania Sewage Facilities Act, and regulations thereunder (25 PA Code § 71), the Draft Plan must be reviewed by municipal planning agencies prior to public notice and municipal adoption.

Background

Beginning in August 2018, and continuing through July 2019, the Lehigh Valley received the highest recorded rainfall amount in a twelve (12) month period, dating back as far as 1895, or 124 years, when data was first collected on local rainfall amounts. The Lehigh Valley experienced an unprecedented, prolonged period of excessive rainfall, totaling 67 inches in 2018 and 61 inches in 2019. In particular, during the twelve (12) month period of August 2018 through July 2019, the region received 80 inches of precipitation. Normal precipitation for the KISS area is about 45 inches per year.

As would be expected, the precipitation caused a significant increase of flows to Kline's Island WWTP (KIWWTP) in excess of its permitted capacity of 40 MGD. The annual average daily flow for 2019 was 37.64MGD. Prior to the August 2018 through July 2019 rainfalls events, the annual average flows over the previous five years had ranged between 29 and 33 MGD. More importantly, however, for three consecutive months the flows to the KIWWTP exceeded 40 MGD, which required the Department of Environmental Protection to respond relative to Chapter 94 requirements. Even though KIWWTP had continuously met all permit requirements, KIWWTP was, nonetheless, considered to be hydraulically overloaded.

As a result of the hydraulic overload condtion, the KISS Signatories working group, with the assistance of ARRO Consulting, has developed this draft Interim Plan for the period of 2021 to 2025. Part of the planning process includes sewage flow projections for new construction during this time period. Additional flows are projected to be approximately 2.5 million gallons per day.

Selected Alternatives

- The selected alternatives all maintain the current operating, administrative and legal strategies and continued use of existing facilities. The KIWWTP will undergo a paper rerate to increase its Design Hydraulic Capacity. This is not a plant expansion; rather it is recognition that the KIWWTP is capable of adequately treating flows in excess of its permitted capacity for short periods of time. Overall, the permitted annual average flow to KIWWTP remains unchanged.

- A hydraulic restriction has been identified in the Western Lehigh Interceptor near Trexlertown. A feasibility study is currently under way to assess alternatives to address this challenge. The alternatives being evaluated include traditional storage, in-line storage, or a combination / hybrid approach. Future planning will be required, but this project is anticipated to be constructed during this planning period of 2021 to 2025.
- All municipalities and authorities will continue implementing their respective I/I source reduction program.
- During the 2021-2025 time period, the KISS Signatories will prepare a long-term Act 537 Plan to address sewage facility needs for the next 30 years. The long-term plan will include significant planning components including sewage flow monitoring, conveyance system modeling and calibration, and evaluation of alternatives for both conveyance and treatment.

There are no improvements, modifications or additions to the City's centralized collection system planned under this Interim Plan. This plan does not increase the sewage service area in any of the contributing municipalities.

This Interim Act 537 Plan constitutes a corrective action plan intended to address sewerage needs in the KISS service area. Your timely review is necessary to address ongoing sewage conveyance and treatment needs. Should you have any comments, please email them directly to the attention of Michael A. Schober at ARRO Consulting:

Michael.schober@arroconsulting.com

Lastly, while this correspondence, and the draft Interim Act 537 Plan, are specifically directed as this time to the Municipal Planning Commissions, we encourage your other municipal officials, including governing bodies, to review the draft plan, become familiar with its contents, and provide comment on it.   Early review and comment will help ensure adoption of the final Interim Act 537 Plan in accordance with DEP's required time line.

Thank you for your timely review.
Sincerely,

Michael A. Schober, PE, BCEE
Vice President and Business Development Director

Kline's Island Sewer System

Interim Act 537 Plan

Planning Commission Comments

Copies of the Draft Interim Act 537 Plan were distributed to all of the KISS municipal Planning Commissions on March 16, 2020. The 60-day comment period for Planning Commissions ended on May 15, 2020.

Lehigh Valley Planning Commission

1. Comment: The Interim Plan summary indicates that the Trexlertown project is a capacity expansion project, however, other sections indicate that no expansion of conveyance or treatment capacity is proposed with the Interim Plan.

   Response: The Interim Plan summary indicated a capacity expansion of a two-mile portion of the Western Lehigh Interceptor (WLI) to eliminate wet weather overflows. The capacity of this section of interceptor is inadequate to accommodate regional wastewater flows without experiencing normal weather surcharge conditions. The proposed improvements are intended to provide wet weather storage, which may consist of a conventional tank, inline storage (oversized pipeline), or a combination of the two. Wastewater will be released from the proposed storage facility as downstream flow conditions allow. No increase in flows into City sewer systems will be realized by this project because of downstream capacity restrictions at Kecks Bridge siphon and at Spring Creek Pump Station. The proposed facilities will be incorporated into future system capacity expansion improvements consistent with long term Act 537 planning.

2. Comment: According to the Interim Plan Summary, the proposed service area is limited to areas currently served by sewers as shown on a Collection System Map included in the Plan. The Plan also states that the projected development, as provided by the municipalities, falls within existing municipal Act 537 plan sewer service area boundaries. However, the Collection System Map provided does not include these areas. Given the sewer connection limitation, and absent such a map, consistency with the FutureLV General Land Use Plan cannot be determined.

   Response: A revised KISS Planning Area map has been included with this update that more accurately reflects the sewer service area for the KISS municipalities. Through the process of municipal Planning Commission review, no municipality identified any proposed development located beyond the current sewage planning area. As preparation of the long-term (2050 planning horizon) Act 537 Plan proceeds, the sewer service area map for the KISS municipalities will be further updated.

City of Allentown Planning Commission

1. Comment: The City issued a letter dated June 2, 2020 requesting their 2025 flow projection be changed to 1,358,949 gallons per day. The City also reissued a copy of the flow projection spreadsheet to back-up the revised flow projection.

   Response: Table 4.1-Flow Projection Summary has been updated to reflect this change and a revised copy is attached.

Lower Macungie Township Planning Commission

1. Comment: The Township issued a letter dated June 9, 2020 requesting an additional 89,200 GPD in capacity to accommodate a development that was court mandated to be approved.

   Response: Table 4.1-Flow Projection Summary has been updated to reflect this change and a revised copy is attached.

South Whitehall Township Planning Commission

1. Comment: A.L. Tope issued comments in a memo dated May 4, 2020. The comments and observations are directed to South Whitehall Township and do not require a response here.

General Note: No other Planning Commissions provided written comments to the Draft Interim Act 537 Plan.

Table 4.1 – Flow Projection Summary
(Revised 05/15/2020)

Municipality / Authority	Projected 2020 Planning Modules (gpd)	Projected 2021-2025 Planning Modules (gpd)
Borough of Alburtis[3]	0	2,230
City of Allentown	444,807	1,358,949
Coplay-Whitehall Sewer Authority[1]	76,110	191,350
Borough of Emmaus	63,630	20,160
Hanover Township	0	100,000
Lehigh County Authority	0	152,000[2]
Lower Macungie Township	276,996	260,766
Lowhill Township[3]	0	2,230
Borough of Macungie	1,115	37,464
North Whitehall Township	30,975	34,125
Salisbury Township	4,446	60,268
South Whitehall Township	169,175	177,872
Upper Macungie Township	428,269	325,772
Upper Milford Township	669	27,652
Weisenberg Township[3]	0	2,230
Rounding	3,808	
TOTAL	**1,500,000**	**2,753,068**

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

[2] 152,000 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.

[3] Projection based on 10 EDUs x 223 gpd/EDU = 2,230 gpd

Lehigh Valley Planning Commission

Planning for the Future of Lehigh and Northampton Counties at 961 Marcon Blvd., Ste 310, Allentown, PA 18109 ■ (610) 264-4544 ■ lvpc@lvpc.org ■ www.lvpc.org

May 1, 2020

Mr. Michael Schober, PE, BCEE
ARRO Consulting, Inc.
108 W. Airport Road
Lititz, PA 17543

Re: Draft Kline's Island Sewer System Interim Act 537 Plan

Dear Mr. Schober:

The Lehigh Valley Planning Commission (LVPC), at its regular monthly meeting on April 30, 2020, reviewed the above-referenced plan according to the requirements of the Pennsylvania Sewage Facilities Act (Act 537). Our review was based on the goals and policies of *FutureLV: The Regional Plan*. We offer the following comments

The draft Interim Plan proposes a rerate of the Kline's Island Wastewater Treatment Plant hydraulic design capacity from 40 million gallons per day (mgd) to 44 mgd, a sewer connection management plan, and identification and construction of an alternative to address hydraulic restrictions in a two-mile portion of the Western Lehigh Interceptor through Trexlertown. The rerate is a "paper" rerate because no physical changes to the plant are proposed. The planning period for the Interim Plan is 2021-2025. During this planning period, significant efforts will also begin in preparation and development of a long-term Act 537 plan covering a period of 2026-2050. These efforts include sewage flow monitoring, conveyance system modeling and calibration, and evaluation and selection of alternatives to address long-term regional sewer conveyance and treatment capacity needs. The Kline's Island plant service area consists of 15 Lehigh County municipalities. The municipalities will continue to implement their current infiltration and inflow source reduction programs.

Currently, the Kline's Island treatment plant permitted annual average flow and hydraulic design capacity are both 40 mgd. While the permitted annual average flow will remain at 40 mgd, the interim plan recommends a rerate of the hydraulic design capacity to 44 mgd. Due to record rainfall beginning in August 2018 through July 2019, the plant experienced flows in excess of its permitted design capacity. While the annual average flow for 2019 was below the plant's permitted 40 mgd, the average flow over three consecutive months (42.71 mgd) exceeded the plant's design capacity. According to the PA Department of Environmental Protection's (PADEP) Municipal Wasteload Management (Chapter 94) regulations, the plant was deemed hydraulically overloaded, despite continuously meeting all discharge water quality requirements. In October 2019, an evaluation of the hydraulic design capacity was conducted by a third party to determine the actual design capacity of the plant, which was found to be 54 mgd. The Interim Plan recommends a rerate of the hydraulic design capacity to 44 mgd at this time to avoid violating the Chapter 94 regulations. Future capacity needs beyond the 2021-2025 period will be evaluated as part of the long-term Act 537 planning process. Further, the current municipal treatment allocations at the plant will remain unchanged during the interim planning period.

For the purposes of the Interim Plan, each municipality provided projections for anticipated sewer service connections for 2020 as well as the 2021-2025 planning period. The projected additional flow for 2020 is approximately 1.5 mgd and another 2.5 mgd for the 2021-2025 period. PADEP has granted a sewer connection allocation of 1.5 mgd, representing the projected connections to be approved during 2020. The allocation will be administered, disbursed and tracked by Lehigh County Authority, with quarterly reports provided to PADEP. New sewer connections during the 2021-2025 planning period will be contingent upon PADEP's approval of the Interim Plan and progress made as reported in the quarterly PADEP reports. According to the plan, sewer service connections during 2020 and the 2021-2025 interim planning period will be limited to areas within existing municipal Act 537 Plan sewer service area boundaries.

The two-mile section of the Western Lehigh Interceptor through Trexlertown has experienced surcharging during normal dry-day flows and during significant/prolonged wet weather events. A feasibility study currently underway will identify and evaluate alternatives, including traditional storage, in-line storage, or a combination/hybrid approach, to address the issue. Construction of an alternative is expected during the interim planning period.

The Interim Plan proposes short-term corrective action measures, under the direction of PADEP, to meet the needs of the region through 2025. The proposed rerate of the plant's hydraulic design capacity from 40 mgd to 44 mgd during the interim period will allow the plant to be in compliance with permit discharge requirements and does not conflict with *FutureLV: The Regional Plan*. The long-range plan will evaluate regional needs beyond 2025.

The LVPC previously reviewed the proposed Western Lehigh Interceptor – Trexlertown project, which is included in the 2021-2025 LCA Preliminary Capital Plan (Suburban Division). The proposed project was found to be consistent with the County Comprehensive Plan. The Interim Plan summary indicates that the Trexlertown project is a capacity expansion project, however, other sections indicate that no expansion of conveyance or treatment capacity is proposed with the Interim Plan. It is our understanding that no capacity expansion projects will be constructed during the interim period, and the discrepancy in the plan should be corrected.

According to the Interim Plan summary, the proposed service area is limited to areas currently served by sewers as shown on a Collection System Map included in the Plan. The Plan also states that the projected development, as provided by the municipalities, falls within existing municipal Act 537 plan sewer service area boundaries. However, the Collection System Map provided does not include these areas. Given the sewer connection limitation, and absent such a map, consistency with the FutureLV General Land Use Plan cannot be determined.

Please call me if you have any questions regarding these comments.

Sincerely,

S. L. Rockwell

Susan L. Rockwell
Senior Environmental Planner

cc: Bharat Patel, PE, PA Department of Environmental Protection

Allentown
City without limits.

Irene Woodward, AICP
Director of Planning
Bureau of Planning & Zoning
435 Hamilton Street
Allentown, PA 18101-1699
Office 610-437-7611
Fax 610-437-8781
Irene.Woodward@allentownpa.gov

June 2, 2020

Michael Schober
ARRO
108 West Airport Road
Lititz, PA 17543

Re: Kline's Island WWTP Sewer System – Draft Interim Act 537 Plan

Dear Mr. Schober:

Please be advised that at the monthly meeting of the Allentown City Planning Commission held on Tuesday, May 12, 2020, the Commission reviewed the Draft Interim Act 537 Plan for Kline's Island WWTP Sewer System. The Act 537 Plan is consistent with the recently adopted Comprehensive Plan, Allentown Vision 2030. Staff provided an overview of the plan and recommended that the updated spreadsheet for the City of Allentown be included in the final plan. The correct GPD would be 1,358,949. The requested change is due to some of the cells not being included in the initial calculation. The Commission voted to recommend approval of the plan to City Council with the updated spreadsheet, which is enclosed.

If you have any questions, please contact me.

Yours very truly,

Irene Woodward

Irene Woodward, AICP
Director of Planning

INTERIM ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name **City of Allentown**

GPD/EDU:	238

TOTALS	Acres	EDUs		including cell 7-74	including cell 7-88
	523	5,710		1,195,681	1,358,940
Residential	0	0		0	
Comm./Ind.	523	5,710		1,195,681	

Development Name	Address (OPTIONAL)	Tax Parcel ID (OPTIONAL)	Zoning (OPTIONAL)	Type of Development (OPTIONAL)	Acres (OPTIONAL)	EDUs	Specifics R= Residential; NR= Non-Residential	Projected Development Year	Projected 2020-2027 Flow (gpd)
347-361 Gordon Street Apartments	347-361 Gordon Street			Conversion from industrial use to apartments		40	R		9,520
	1384 S. 5TH STREET				10.8	94	NR		22,372
Atty. General's Office	2305 28TH ST SW			Building Addition		8	NR		1,904
	1215 S. 4TH ST			Redevelopment: new bldg & update parking	0.7494	7	NR		1,554
Trout Creek Cottages	1101 S. 6TH ST.			Pocket Neighborhood Development	5.3	52	R		12,376
The Landmark	90 S NINTH ST			33 story bldg-retail, office, residential	0.119	175	NR		41,650
801 N. Meadow Street	801 N. MEADOW ST.			Recycling Processing Center	2.5	33	NR		7,854
	1330 S 4TH ST			Retail	1	9	NR		2,142
Allentown Terminals Corporation	1114-1366 N QUEBEC ST			Storage tanks and warehousing	13.35	75	NR		17,850
Townes at the Jordan	948 N FRONT ST			Townhomes (Condominium)	2.72	18	R		4,284
Airport Rd. Shopping Center	1245 1353 AIRPORT RD			Retail Center (Expansion)	3.00	26	NR		6,188
	639 E. ALLEN STREET			Install 7,000 sf garage & 6 parking spaces	3.0581	20	NR		4,760
	265 LEHIGH ST			Multi-dwelling unit bldg containing 80 units	11.1559	80	R		19,040
1018 W. Walnut St.	1018 W WALNUT ST		R-H	Semi-detached Dwellings	0.35	6	R		1,428
Fearless Fire Company	14 46 EAST JUNIATA ST		R-ML	Parking Lot/Single Family	1.23	4	R		952
Common Ridge Estates	N FILBERT/E HAMILTON STS			Twins & Apartments (Condominium)	16.52	140	R		33,320
Townes at Trexler Square II	116 S 8TH ST		R-H	Townhomes	0.79	18	R		4,284
Former K-Mart	1502 S 4th Street	640634937415	B-4		0.2906	50	NR		11,900
American Pkwy & N. Irving St	1620 AIRPORT RD	640881312529	I-2		7.66	43			10,234
N. Ellsworth St	720 N ELLSWORTH ST	640766631519	I-2		3.47	24			5,712
Seftel Site	2843 MITCHELL AVE	549584493485	I-2		6.77	41			9,758
American Pkwy & N. Dauphin St	1019 AMERICAN PKWY, 1024 N BRADFORD ST, 500 AMERICAN PKWY	640758158799, 640758248221, 640759755865	B/LI		23.34	154			36,652
LSI (former Agere Site)	555 UNION BLVD	640757990536	I-2		35.77	142			33,796
Boulevard Drive-In	540 UNION BLVD	640767821628	B/LI		12.55	7			1,666
State Hospital	1900 E ALLEN ST, 1600 HANOVER AVE	641746460329, 641726847797	I-G		192.91	400			95,200
Lehigh Landing	51 N FRONT ST	640752151002	B-5		1.48	28			6,664
UGI Tank	202 W UNION ST	640740488709	I-2		3.45	18			4,284
Montex	1112 S 6TH ST, 1102 S 6TH ST, 1101 S 6TH ST, 1120 S 6TH ST, 1102 S 5TH ST	640636108387, 640636115157, 640636415274, 640635292480, 640636625261	R-M		4.52	65			15,470
South 5th St	1406 S 5TH ST	640634564687	I-2		5.30	65			15,470
S Glenwood St.	1811 S GLENWOOD ST	549567205959	B-4		9.86	47			11,186
South St Elmo St.	1834 W FAIRVIEW ST, 1940 W FAIRVIEW ST	549646946043, 549646507548	P		6.99	42			9,996
Lehigh Parkway East	1649 LEHIGH PKWY E	549675056761	R-H		3.02	201			47,838
Davis Site - Sumner Ave	183 SUMNER AVE	640726737584	B/LI		4.32	24			5,712
Paxus Townhouses	1312 S 8TH ST	640624371202	R-M		0.43	7			1,666
Phoenix	333 W COURT ST	640731269543	B/LI		3.41	237			56,406
1902 Lehigh St.	1902 LEHIGH ST	549680433515	B-3		4.95	18			4,284
9th St and Walnut St.	901 W WALNUT ST	640609052579	B-2		1.02	89			21,182
713 N. 13th St	713 N 13TH ST	549762389361	B/LI		0.50	47			11,186
513 N. 16th St	513 N 16TH ST	549751026319	R-MH		0.96	6			1,428

N Ivey St	929 N IVY ST, 901 N IVY ST, 901 N IVY ST REAR, 21 JORDAN DR	640736880126, 640736869299, 640736994963, 640737932179	I-3		7.91	25			5,950
N Bradford St	650 N BRADFORD ST	640765184835	I-2		7.03	22			5,236
Constitution Dr.	223 E WYOMING ST REAR	640687288387	R-LC		23.90	57			13,566
Hospital Development (Unallocated)	-	-	-			300			71,400
NIZ Tax Zone Place Holder (Unalloc	-	-	-			1500			357,000
	1430 OXFORD DR	549537940329	R-H		1.58	50			11,900
	3001 EVANS ST	549583798848	R-L		1.53	11			2,618
	502 CEDAR CREEK BLVD	549634686522	R-L		1.10	8			1,904
	1450 OXFORD DR	549536988334	R-ML		1.91	18			4,284
	1213 W LINDEN ST	549679882960	R-H		0.66	22			5,236
	1820 S 12TH ST	549691748930	I-2		2.72	8.5			2,023
	1802 S 12TH ST	549691786367	B-4		1.88	1			238
	606 S 10TH ST	549697354907	I-3		18.23	57			13,566
	602 N 7TH ST	549793642421	B1/R		1.73	49			11,662
	1711 W LIBERTY ST	549740184375	B-5		1.24	3.8			904
	1501 S 12TH ST	640603726039	I-3		11.74	36.8			8,758
	108 S 7TH ST	640619169631	B-2		1.06	36.4			8,663
	810 LINCOLN DR	640698302003	R-L		1.89	13.4			3,189
	1256 S 5TH ST	640635515244	I-2		3.64	11.41			2,716
	1947 BAKER DR	640631783769	R-MH		2.34	66.4			15,803
	801 N MEADOW ST	640715953804	I-3		2.59	8.13			1,935
	125 N 4TH ST	640722700446	R-H		1.79	61.5			14,637
	566 W EMAUS AVE	640650076616	R-L		1.50	1.6			381
	241 S 3RD ST	640740557304	I-2		2.68	8.4			1,999
	101 N RAILROAD ST	640742768667	R-MH		1.43	40			9,520
	5 N FRONT ST	640752215824	B-5		3.33	10			2,380
	900 N DAUPHIN ST	640757136555	I-2		1.79	5			1,190
	739 E FAIRMONT ST	640870551131	B/LI		2.31	7			1,666
	310 W UNION ST	640740224422	B/LI		8.34	26			6,188
	1715 UNION BLVD	641729432610	B/LI		1.13	3			714
	809 TACOMA ST	641738731250	R-M		1.12	13			3,094
	2124 HANOVER AVE	641748408681	B-3		1.61	4			952
	1706 HOOVER AVE	641811093744	I-3		6.77	21			4,998
	2500 LANCASTER AVE	640527200954	R-M		2.61	30			7,140
	626 E TILGHMAN ST	640776405846	I-2		3.88	12			2,856
	401 N FRONT ST	640744636767	I-3		2.01	6			1,428
	16 W LIBERTY ST	640744852027	I-3		2.14	6			1,428
	1202 N GODFREY ST	640870507604	B/LI		2.94	9			2,142
	1117 CATASAUQUA AVE	640747079685	I-3		9.76	30			7,140
	2814 MITCHELL AVE	549595131715	I-2		2.09	6			1,428
	1115 AMERICAN PKWY	640769981892	B/LI		17.98	56			13,328
Change of Use (Unallocated)						245			58,310
Unknown Projects (Unallocated)						245			58,310
									0
									0
									0
									0

Lower Macungie Township

3400 Brookside Rd.
Macungie, PA 18062
Phone: 610 966-4343
Fax: 610-965-3654

www.lowermac.com

TO: Michael A. Schober, P.E.
Vice President and Business Development Director
ARRO Engineering
108 West Airport Road
Lititz, PA 17543

DATE: June 9,2020
SUBJECT: Lower Macungie Township Interim Act 537 Plan

Dear Mr. Schober,

Lower Macungie Township hereby requests the inclusion of 400 housing units (for 89,200 new projected flow) for the court ordered and approved Jaindl Spring Creek Properties at 8741 and 8899 Mertztown Road in Lower Macungie Township, Lehigh County as part of the proposed Interim Act 537 Program.

This subdivision has been approved for a number years and was mandated in court to be approved by the Township. Initial projections may not have included this previously approved subdivision and Lower Macungie Township now wishes to ensure this is calculated into the proposed Plan for accuracy purposes. Please see the updated table line #38 to reflect this modification.

Jaindl Land Company has additionally requested that the Interim Act 537 Plan accurately reflect this existing and approved subdivision in formal correspondence to the Township. Please contact me with any question and further, let me know if I may be of any assistance regarding this matter.

Respectfully,

Nathan Jones, AICP, BCO
Director of Community Development

ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name Lower Macungie Township

GPD/EDU:	223			TOTALS	1,152	2,871			513,223	621,462	16,761	0
				Residential	394	1258		Developments	280,534	278,973	1,561	0
				Comm./Ind.	758	1,613		112	232,689	342,489	15,200	0

Development Name	Address	Tax Parcel ID	Zoning	Type of Development	Acres	EDUs	Specifics	Projected Development Year	Projected Flow (gpd)	2020-2030 New Flow	2031-2040 New Flow	2041-2050 New Flow
SPRING CREEK PROPERTIES - LUTRON ELECTRONICS SEWER CONNECTION	8240 SPRING CREEK RD	546441331883	O	Light Industry	51.17	6	Warehouse	2020	1,250	1,250	0	0
	3200 ORCHARD RD	547317461693	I	Commercial	36.62	2	Warehouse	2020	485	485	0	0
TACO BELL	5374 HAMILTON BLVD	547565309727 and 547565430027	C	Commercial	0.49	19	Fast Food Restaurant and Office Building	2020	4,237	4,237	0	0
SPRING CREEK	8783 CONGDON HILL DR	546317224584	HI-S	Heavy Industry	53.38	47	Warehouse	2020	10,444	10,444	0	0
SPRING CREEK	8615 CONGDON HILL DR	546327146378	HI-S	Heavy Industry	46.29	47	Warehouse	2020	10,444	10,444	0	0
SPRING CREEK	8449 CONGDON HILL DR	546337222951	HI-S	Heavy Industry	58.81	47	Warehouse	2020	10,444	10,444	0	0
SPRING CREEK	8444 CONGDON HILL DR	546328866910	HI-S	Heavy Industry	8.02	47	Warehouse	2020	10,444	10,444	0	0
SPRING CREEK	8323 CONGDON HILL DR	546338922117	C-SC	Commercial	16.37	47	Warehouse	2020	10,444	10,444	0	0
	6240 HAMILTON BLVD	547512982095	C	Commercial	1.35	5	Commercial Building	2020	1,200	1,200	0	0
	6217 HAMILTON BLVD	547513751934	C	Commercial	6.28	5	Commercial Building	2020	1,200	1,200	0	0
	1111 GRANGE RD	547523993704	U	Commercial	2.93	11	Restaurant	2020	2,380	2,380	0	0
TREXLER BUSINESS CENTER	6150 HAMILTON BLVD	547522461516, 547512886266, 547512989833, 547522291861, 547523312452, and 547523724340	C	Commercial	9.23	26	Office Space and Retail Center	2020	5,900	5,900	0	0
JAINDL COMMERCIAL PARK NORTH	6161 HAMILTON BLVD	547523172939	C	Commercial	4.93	19	Office Building, Restaurant, and Retail Center	2020	4,200	4,200	0	0
MILLBROOK FARMS 6	4521 INDIAN CREEK RD	548463715168	S	Residential	20.93	42	42 Lot Subdivision	2020	9,366	9,366	0	0
STONE HILL MEADOWS, PHASE 2	3611 GEHMAN RD	547366121766 and 547367516707	R	Residential	62.04	85	85 Lot Subdivision	2020	18,955	18,955	0	0
WEIS MARKETS	3440 GRANDVIEW DR	547358396443	C	Commercial	13.07	85	Commercial Building	2020	18,950	18,950	0	0
SCHOENECK ROAD LOT 1 - AIR PRODUCTS	3262 SCHOENECK RD	546397842621	I	Light Industry	13.43	16	Warehouse	2020	3,500	3,500	0	0
AL-MAQASID	7394 ALBURTIS RD	547307561048	I	Commercial	12.22		Seminary	2020				0
HAMILTON CROSSINGS NORTH	617 N KROCKS RD	547567692461	HC	Residential	52.81	416	400 Apartments, Commercial Building, and Restaurant	2020	92,768	92,768	0	0
	4511 CEDARBROOK RD	547599803773	HE	Commercial	25.22	57	2 Hotels, Office Building, and Small Commercial Building	2020	12,711	12,711	0	0
SUBURBAN SELF SERVE CARWASH	6452 HAMILTON BLVD	547502627743	C	Commercial	1.83	5	Car Wash	2020	1,104	1,104	0	0
U-HAUL OF LOWER MACUNGIE	7785 SPRING CREEK RD	546454069300	SR	Commercial	4.82	5	Commercial Building	2020	1,200	1,200	0	0
INDIAN CREEK VILLAGE	5415 INDIAN CREEK RD	548420386208	S	Residential	0.74	2	2 Lot Subdivision	2020	446	446	0	0
	1620 HIDDEN VALLEY RD	548523007822	S	Residential	0.64	1	Single Family Homes	2020	223	223	0	0
MOUNTAIN VIEW ESTATES	2062 ELBOW LN	548540155494	S	Residential	13.46	27	27 Lot Subdivision	2020	6,021	6,021	0	0
SCHAEFER RUN COMMONS	8189 HAMILTON BLVD	546436126075	SR	Residential	9.82	112	Condominium Town Homes	2020	24,976	24,976	0	0
	4440 HAMILTON BLVD	548518102010	HC	Commercial	1.93	5	Commercial Building	2020	1,200	1,200	0	0
KROCKS COURT	5621 HAMILTON BLVD	547554086045	C	Commercial	1.27	15	Retail Center and Commercial Building	2020	3,345	3,345	0	0
ALLEN ORGAN REDEVELOPMENT	3370 PA ROUTE 100	547358862563	C	Commercial	14.19	16	Office Building	2020	3,500	3,500	0	0
ABE DOORS & WINDOWS REDEVELOPMENT	6718 HAMILTON BLVD	546591274189	C	Commercial	1.00	15	Car Wash and Retail Center	2020	1,200	1,200	0	0
DRIES SUBDIVISION	3500 BROOKSIDE RD	548400346497	U	Residential	7.69	20	20 Apartments	2020	4,460	4,460	0	0
JAINDL SPRING CREEK PROPERTIES	8741 AND 8899 MERTZTOWN RD	546403301298 and 545492191847	U	Residential	117.17	400	400 Lot Subdivision	2020	89,200	89,200	0	0
RESERVE ALLOCATION						560		2021 - 2025		125,000	0	0
COUNTRY HOME ACRES	1398 DORNEY AVE	548555146831	S	Residential	0.50	1	Single Family Homes	2021	223	223	0	0
SPRING CREEK	8120 SAUERKRAUT LN	546349494923	HI-S	Heavy Industry	32.96	47	Warehouse	2022	10,444	10,444	0	0
LEHIGH VALLEY S I P	7505 ALBURTIS RD	546397890673	O	Light Industry	3.58	6	Warehouse	2022	1,300	1,300	0	0
	1715 WEILERS RD	546424400941	U	Residential	0.21	1	Single Family Homes	2022	223	223	0	0
GRAYMOOR	6519 RUTHERFORD DR	547417365931	SR	Residential	2.25	1	Single Family Homes	2022	223	223	0	0
GRAYMOOR	1849 PEMBROOKE DR	547427543259	SR	Residential	0.64	1	Single Family Homes	2022	223	223	0	0
LOWER MACUNGIE FUNERAL HOME	6503 LOWER MACUNGIE RD	547510178161	U	Commercial	5.80	2	Funeral Home	2022	465	465	0	0
	6126 HAMILTON BLVD	547522687870	C	Commercial	4.34	16	Office Building	2022	3,500	3,500	0	0
	6084 HAMILTON BLVD	547523725177	C	Commercial	1.43	1	Commercial Building	2022	250	250	0	0
MILLBROOK FARMS	2887 EXETER DR	548456678394	S	Residential	1.36	1	Single Family Homes	2022	223	223	0	0
	2291 RIVERBEND RD	548459186327	S	Residential	0.29	1	Single Family Homes	2022	223	223	0	0
MILLBROOK FARMS	3170 SHEFFIELD DR	548465605590	S	Residential	0.54	1	Single Family Homes	2022	223	223	0	0
MILLBROOK FARMS	3184 SHEFFIELD DR	548465708045	S	Residential	0.53	1	Single Family Homes	2022	223	223	0	0
MILLBROOK FARMS	3177 SHEFFIELD DR	548465921353	S	Residential	0.71	1	Single Family Homes	2022	223	223	0	0
MILLBROOK FARMS	3194 SHEFFIELD DR	548475100121	S	Residential	0.95	1	Single Family Homes	2022	223	223	0	0
MILLBROOK FARMS	3183 SHEFFIELD DR	548475111895	S	Residential	0.92	1	Single Family Homes	2022	223	223	0	0
COUNTRY HOME ACRES	1406 DORNEY AVE	548555042697	S	Residential	0.49	1	Single Family Homes	2022	223	223	0	0
BODY ELITE	5518 HAMILTON BLVD	547554680166 and 547554687577	C	Commercial	0.49	2	Commercial Building	2022	530	530	0	0
SPRING CREEK	8219 SAUERKRAUT LN	546348273194	C-SC	Commercial	5.13	47	Warehouse	2023	10,444	10,444	0	0
SPRING CREEK	8290 SAUERKRAUT LN	546349045087	C-SC	Commercial	4.04	47	Warehouse	2023	10,444	10,444	0	0

ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name **Lower Macungie Township**

GPD/EDU:	223			TOTALS	1,152	2,871			513,223	621,462	16,761	0
				Residential	394	1258		Developments	280,534	278,973	1,561	0
				Comm./Ind.	758	1,613		112	232,689	342,489	15,200	0
Development Name	**Address**	**Tax Parcel ID**	**Zoning**	**Type of Development**	**Acres**	**EDUs**	**Specifics**	**Projected Development Year**	**Projected Flow (gpd)**	**2020-2030 New Flow**	**2031-2040 New Flow**	**2041-2050 New Flow**
LEHIGH VALLEY S I P	7428 INDUSTRIAL PARK WAY	546398930430	O	Light Industry	3.95	6	Warehouse	2023	1,300	1,300	0	0
ANCIENT OAKS	7680 CATALPA DR	546455709184	S	Residential	0.20	1	Single Family Homes	2023	223	223	0	0
L W & I A SCHMOYER	6275 MOUNTAIN RD	547385378248	R	Residential	2.11	1	Single Family Homes	2023	223	223	0	0
ALLEN WEST ESTATES	1065 PINE GROVE CIR	547595682090	S	Residential	1.73	5	Single Family Homes	2023	1,115	1,115	0	0
	1105 MINESITE RD	548505370858	U	Residential	1.03	1	Single Family Homes	2023	223	223	0	0
BROOKHAVEN	1885 BRIARCLIFFE TER	548561253973	S	Residential	1.60	1	Single Family Homes	2023	223	223	0	0
BROOKHAVEN	3866 MAULFAIR DR REAR	548571912045	S	Residential	3.97	1	Single Family Homes	2023	223	223	0	0
BROOKHAVEN	3800 MAULFAIR DR	548581145302	S	Residential	1.45	1	Single Family Homes	2023	223	223	0	0
ANCIENT OAKS	7601 SPRING CREEK RD	546465119437	S	Residential	0.22	1	Single Family Homes	2024	223	223	0	0
HARRIS YORK	2520 GRACIE LONE	548437783430	S	Residential	0.45	1	Single Family Homes	2024	223	223	0	0
	2164 S CEDAR CREST BLVD	548582221646	S	Residential	2.73	1	Single Family Homes	2024	223	223	0	0
SCHAEFER RUN WEST	1530 PINEWIND DR	546414784773	SR	Residential	0.18	1	Single Family Homes	2025	223	223	0	0
SCHAEFER RUN WEST	1541 WEILERS RD	546415805799	U	Residential	0.32	1	Single Family Homes	2025	223	223	0	0
SCHAEFER RUN WEST	1521 WEILERS RD	546415811614	U	Residential	0.32	1	Single Family Homes	2025	223	223	0	0
ANCIENT OAKS	7677 CATALPA DR	546455605571	S	Residential	0.22	1	Single Family Homes	2025	223	223	0	0
SPRING CREEK ESTATES	1255 DANNER RD	546590635649	U	Commercial	1.69	5	Commercial Building	2025	1,200	1,200	0	0
SCHAEFER RUN WEST	8330 SCHAEFER RUN RD	546425060178	R3	Residential	5.16	10	Condominium Town Homes	2026	2,230	2,230	0	0
ANCIENT OAKS	7699 CATALPA DR	546454684107	S	Residential	0.30	1	Single Family Homes	2026	223	223	0	0
ANCIENT OAKS	7687 CATALPA DR	546454694580	S	Residential	0.23	1	Single Family Homes	2026	223	223	0	0
ANCIENT OAKS	7673 SPRING CREEK RD	546454890055	S	Residential	0.24	1	Single Family Homes	2026	223	223	0	0
ANCIENT OAKS	7661 SPRING CREEK RD	546454990619	S	Residential	0.20	1	Single Family Homes	2026	223	223	0	0
MACUNGIE CROSSING	5949 HAMILTON BLVD	547534605755	C	Commercial	4.27	20	Commercial Shopping Center	2026	4,540	4,540	0	0
BELLE CHASE	6300 LOWER MACUNGIE RD	547429666813	U	Residential	45.65	68	68 Lot Subdivision	2027	15,164	15,164	0	0
HARRIS YORK	2645 HOUGHTON LEAN	548437003849	S	Residential	0.44	1	Single Family Homes	2027	223	223	0	0
HARRIS YORK	2630 HOUGHTON LEAN	548437133086	S	Residential	0.38	1	Single Family Homes	2027	223	223	0	0
HARRIS YORK	2605 GRACIE LONE	548437454473	S	Residential	0.39	1	Single Family Homes	2027	223	223	0	0
HARRIS YORK	2680 GRACIE LONE	548437606410	S	Residential	0.48	1	Single Family Homes	2027	223	223	0	0
CLEARVIEW MANOR	1215 MINESITE RD	548505837633	S	Residential	0.80	1	Single Family Homes	2027	223	223	0	0
	8401 BROOKDALE RD	546414452244	SR	Residential	1.59	1	Single Family Homes	2030	223	223	0	0
	1741 TREXLERTOWN RD	546455419805	C	Commercial	2.28	4	Commercial Building	2030	892	892	0	0
	2204 PA ROUTE 100	546463500437	AP	Commercial	5.65	5	Commercial Building	2030	1,200	1,200	0	0
SPRING CREEK PROPERTIES, REVISED SUBDIVISION 2	2550 PA ROUTE 100	546480379486	C-SC	Commercial	14.00	209	Warehouse	2030	46,500	46,500	0	0
	1873 MILL CREEK RD	547437488744	S	Residential	0.42	1	Single Family Homes	2030	223	223	0	0
RAY A LEIBENSPERGER	1696 BOGIE AVE	547459582883	S	Residential	0.69	1	Single Family Homes	2030	223	223	0	0
	2201 BROOKSIDE RD	547498965042	S	Commercial	38.73	10	Church	2030	2,300	2,300	0	0
	1138 MILL CREEK RD	547501927036	C	Commercial	1.36	5	Commercial Building	2030	1,200	1,200	0	0
	5500 EAST TEXAS RD	547570664009	S	Residential	0.42	1	Single Family Homes	2030	223	223	0	0
	5451 LOWER MACUNGIE RD	547580102825	S	Residential	0.47	1	Single Family Homes	2030	223	223	0	0
	895 N BROOKSIDE RD	547586843230	C	Commercial	0.20	5	Small Commercial Building	2030	1,200	1,200	0	0
	5739 N WALNUT ST	548308798301	S	Residential	0.25	1	Single Family Homes	2030	223	223	0	0
	5037 WILD CHERRY LN	548417521482	S	Residential	10.00	14	14 Single Family Homes	2030	3,122	3,122	0	0
	2812 MACUNGIE RD	548435592578	S	Residential	3.01	4	Single Family Homes	2030	892	892	0	0
	4261 INDIAN CREEK RD	548484009331	S	Residential	0.80	1	Single Family Homes	2030	223	223	0	0
	1790 MINESITE RD	548542683336	S	Residential	1.22	1	Single Family Homes	2030	223	223	0	0
	1799 MINESITE RD	548543920440	S	Residential	0.96	1	Single Family Homes	2030	223	223	0	0
	4175 EAST TEXAS RD	548544282198	S	Residential	0.14	1	Single Family Homes	2030	223	223	0	0
COUNTRY HOME ACRES	1414 DORNEY AVE	548545846577	S	Residential	0.63	1	Single Family Homes	2030	223	223	0	0
	7975 QUARRY RD	546450811376	HI-S	Heavy Industry	0.80	4	Small Commercial Building	2040	800	0	800	0
	7462 CHURCH LN	546458659265	S	Residential	1.00	1	Single Family Homes	2040	223	0	223	0
	7290 DRAGONFLY LN	546490973315	O	Commercial	1.13	5	Commercial Building	2040	1,200	0	1,200	0
SPRING CREEK ESTATES	6659 STEIN WAY	547500145077	U	Commercial	2.16	5	Commercial Building	2040	1,200	0	1,200	0
	6309 LOWER MACUNGIE RD	547510666928	U	Commercial	8.97	24	School Property	2040	5,400	0	5,400	0
	5606 EAST TEXAS RD	547570116323	S	Residential	0.50	1	Single Family Homes	2040	223	0	223	0
	1170 BROOKSIDE RD	547575517362	U	Commercial	229.89	24	School Property	2040	5,400	0	5,400	0
	4982 HAMILTON BLVD	547586456122	C	Commercial	0.25	5	Small Office Building	2040	1,200	0	1,200	0
	85 N WALNUT ST	548308523423	R-10	Residential	0.23	1	Single Family Homes	2040	223	0	223	0
	5390 INDIAN CREEK RD	548420454875	S	Residential	0.87	1	Single Family Homes	2040	223	0	223	0
	2940 MACUNGIE RD	548434570485	S	Residential	3.11	1	Single Family Homes	2040	223	0	223	0
COUNTRY HOME ACRES	1422 DORNEY AVE	548545735769	S	Residential	0.82	1	Single Family Homes	2040	223	0	223	0
	2760 RIVERBEND RD	549419516332	SR	Residential	1.00	1	Single Family Homes	2040	223	0	223	0

Kline's Island Sewer System
Interim Act 537 Plan
May 4, 2020

A summary of this document was presented to the South Whitehall Township Planning Commission at its April 16, 2020 meeting, seeking comment and review. The plan covers work planned between 2021 and 2025. As required by the Pennsylvania Sewage Facilities Act (25 PA Code S 71) the draft plan must be reviewed by municipal planning agencies prior to public notice and municipal adoption. It will require municipal planning review and adoption (but no public hearing is required.)

A bit of background first. As you may recall, the 12 month period between August 2018 and July 2019 had the highest 12 month average rainfall since 1895, which is when data were first collected. During this period, the area received 80 inches of rainfall, compared to the normal value of 45 inches.

The heavy rain had an impact on the Kline's Island treatment plant (KITP), which serves virtually all of Lehigh County, including South Whitehall Township. The plant is DEP permitted for 40 MGD (million gallons per day,) but experienced flows for three months greater than this due to the heavy rain and inflow of storm water into the sanitary sewer system. Even though the quality of the plant discharge into the Lehigh River met the quality standards of the permit, the plant was considered to be hydraulically overloaded, i.e. it was operating at volumes greater than permitted. After investigation and engineering analysis, it turns out the plant has an engineered capacity of 54 MGD. Average flow for the year 2019 was 37.64 MGD. New construction (growth and development in the service area) currently identified for the period 2021-2025 is expected to add 2.5 MGD to the total sewage flow. Thus, a need to increase permitted capacity above 40 MGD.

After due consideration, the DEP has proposed rerating the plant to 47 MGD. This gives some breathing room and makes the Interim Plan a part of a greater, I think necessary, and ultimately expensive, long term effort. It appears that last year's heavy rainfall provided a serendipitous opportunity to begin a broad review of the sewer system.

To the extent that the Planning Commission needs to take some action with regard to the plan, I would recommend that we accept it as a necessary start to an overdue, in depth, review of the sewage system that serves the Township and basically all of Lehigh County. It is not desirable that growth and development in the Township be limited by a lack of sewer capacity. That said, there are several comments/concerns to be mentioned.

1.) South Whitehall Township must maintain its current capacity allotment in the present system to facilitate growth over the coming five years.
2.) The Township's total allocation is 3 MGD. Our most recent year's use is 1.78 MGD, leaving us with 1.22 MGD for growth. Given identified projects such as Ridge Farm, I'm not sure how much capacity is left for presently unidentified growth.
3.) Will need to recognize possible limitation of sewer capacity on the Comprehensive Plan.
4.) Be aware this is only the first phase of a 30-50 year review of the sewer system. The additional capacity required will likely be expensive. Will need to be careful about methods of cost and allocation allotment among municipalities.
5.) The Plan calls for all municipalities to provide growth figures for themselves for the coming five years. The plan authors need to be careful due to the potential for mischief (deliberately overstating or understating, depending on local perspective.)

6.) Disappointed to learn that metering is “skimpy” in the existing system. From a personal perspective, I would encourage more metering. South Whitehall is “on the hook” for 4 additional sets of metering under the Interim Plan (likely in 2021). The cost is not clear at this time.

A.L. Tope 5/4/2020

Lehigh County Authority

City of Allentown*	Act 537 Boundary
City Signatories**	Current Sewer Collection System Boundary
LCA Signatories	

* Hanover Township is a direct customer to the City of Allentown

** North Whitehall Township is a direct customer of Coplay-Whitehall Sewer Authority

LEHIGH COUNTY AUTHORITY

KISS PLANNING AREA

INTERIM 537 PLAN

LEHIGH COUNTY, PENNSYLVANIA

Remarks:

KISS MUNICIPALITIES

City of Allentown	Borough of Alburtis
Borough of Coplay	Borough of Emmaus
Borough of Macungie	Lower Macungie Township
Hanover Township	North Whitehall Township
Lowhill Township	South Whitehall Township
Salisbury Township	Upper Milford Township
Upper Macungie Township	Whitehall Township
Weisenberg Township	

LEHIGH COUNTY AUTHORITY GIS

DATE: 6/8/2020

SCALE: 1:82,000

CREATED: AKW

CHECKED: MDB

TOWNSHIP OF WHITEHALL BUREAU OF PLANNING, ZONING & DEVELOPMENT

MEMORANDUM

TO: WHITEHALL TOWNSHIP BOARD OF COMMISSIONERS
MAYOR MIKE HARAKAL

FROM: LEE A. RACKUS Lee
BUREAU CHIEF, PLANNING, ZONING & DEVELOPMENT

RE: INTERIM REGIONAL ACT 537 PLAN

DATE: May 21, 2020

Please let this memo serve as written documentation that the Whitehall Township Planning Commission, at their May 20, 2020 public meeting, recommended to approve this proposed plan. The final plan document will be placed on your meeting agenda for action once all public comments have been added to same.

/lar
Copy: Whitehall Township Planning Commission
File Index
David Harleman, CWSA

PROOF OF PUBLICATION

RECEIVED JUN 2 2 2020

Proof of Publication Notice in the *Morning Call*

Under Act No. 587, Approved May 16, 1929 and its amendments

STATE OF PENNSYLVANIA)
COUNTY OF LEHIGH) SS:

Copy of Notice or Advertisement

____

of THE MORNING CALL, LLC. of the County and State aforesaid, being duly sworn, deposes and says that THE MORNING CALL is a newspaper of general circulation as defined by the aforesaid Act, whose place of business is 101 North Sixth Street, City of Allentown, County and State aforesaid, and that the said newspaper was established in 1888 since which date THE MORNING CALL has regularly issued in said County, and that the printed notice or advertisement attached hereto is exactly the same as was printed and published in regular editions and issues of the said THE MORNING CALL on the following dates, viz::

Jun 10, 2020.

Affiant further deposes that he is the designated agent duly authorized by THE MORNING CALL, LLC., a corporation, publisher of said THE MORNING CALL, a newspaper of general circulation, to verify the foregoing statement under oath, and the affiant is not interested in the subject matter of the aforesaid notice or advertisement, and that all allegations in the foregoing statements as to time, place and character of publication are true.

____
Designated Agent, THE MORNING CALL, LLC.

Sworn to and subscribed before me on this 10th day of June, 2020

Kathleen Hoch
Notary Public

Commonwealth of Pennsylvania - Notary Seal
Kathleen Hoch, Notary Public
Lehigh County
My commission expires March 3, 2024
Commission number 1296535
Member, Pennsylvania Association of Notaries

PUBLISHER'S RECEIPT FOR ADVERTISING COSTS

THE MORNING CALL, LLC., a Corporation, publisher of THE MORNING CALL, a newspaper of general circulation, hereby acknowledges receipt of the aforesaid notice and publication costs and certifies that the same have been duly paid.

THE MORNING CALL, LLC. a Corporation,
Publishers of THE MORNING CALL
A Newspaper of General Circulation

By: ______________________________

Order # - 6681959

Proof of Publication Notice in the *Morning Call*

Sold To:
Lehigh County Authority - CU00237263
PO Box 3348
ALLENTOWN,PA 18106

Bill To:
Lehigh County Authority - CU00237263
PO Box 3348
ALLENTOWN,PA 18106

OFFICIAL SEWAGE FACILITIES PLAN REVISION

NOTICE is hereby given by City of Allentown, Hanover Township, Lower Macungie Township, Upper Macungie Township, Alburtis Borough, Macungie Borough, Upper Milford Township, Weisenberg Township, Lowhill Township, South Whitehall Township, Coplay Borough, North Whitehall Township, Whitehall Township, Salisbury Township, and Emmaus Borough that it is their intention to consider a proposed Official Sewage Facilities Plan (Revision), prepared by their representative agent, Lehigh County Authority (LCA), during a public meeting to be held by each municipality. Thereafter the municipalities will, through LCA, submit the Revision to the Pennsylvania Department of Environmental Protection (DEP), Water Management Program, 2 Public Square, Wilkes-Barre, PA 18711-0790 as required by the Sewage Facilities Act (Act 537). The Revision is an Interim Act 537 Plan that covers the period from January 2021 through December 2025. The Revision was undertaken due to high sewage flows in 2018 and 2019 to Kline's Island Wastewater Treatment Plant (KIWWTP) and includes: (a) studies and evaluations incorporating an on-going sewage metering program; (b) a proposed comprehensive nine month system wide flow monitoring project termed Flow Characterization Study (FCS); (c) updating of the hydraulic model of conveyance systems and treatment capabilities based on information collected in the FCS, projected growth, rainfall events, and other inputs; and (d) the updated model will be used for alternatives analysis, financial analysis, administrative issues reviews and overall decision making to most effectively address the region's future sewage conveyance/treatment needs. There will also be a hydraulic analysis and paper re-rating of KIWWTP's hydraulic capacity. These studies will serve as the technical basis of a long term Sewage Facility Plan to be submitted to DEP in the future. In addition to studies and evaluations, the contributing entities will continue their proposed Inflow and Infiltration (I&I) remediation programs and LCA will be developing a project to address hydraulic restrictions in a sewer interceptor in the Trexlertown area.

Project Name: Interim Act 537 Plan

Type of Project: See above for description of the Revision.

Project Location: The above named municipalities of Lehigh County.

Estimated Project Cost: Interim Act 537 Plan preparation/presentation ($81,000); sewage billing metering program ($150,000); hydraulic analysis ($50,000); long term Act 537 monitoring, modeling, alternatives review, etc. ($3,000,000); Trexlertown Storage Facility ($14,000,000); I&I remediation projects (varies by entity).

Funding: All studies and planning efforts funded by the City of Allentown AO Fund; Trexlertown Storage Project funded by LCA Suburban Division; I&I characterization and remediation projects funded based on ownership or contractual obligations.

User Fees: Rates to the various entities listed above will reflect actual project costs and reimbursement to the sources of funding.

A copy of the Interim Act 537 Plan will be available for inspection beginning on June 10, 2020 online at the Lehigh County Authority website https://lehighcountyauthority.org. A hard copy will be available, by appointment, at the LCA Main Office depending on COVID-19 restrictions. Please call the office at 610-398-2503 and ask for Lisa Miller when making an appointment.

All interested persons are invited to submit written comments concerning the

scope out

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ADVERTIS

Coopersburg Borough, located at 5 North Main Street Coopersburg, PA 18036, will receive bids for the following: BID FOR THE CONSTRUCTION OF THE SAUCON RAIL TRAIL

Bids are required to be submitted electronically to Coopersburg Borough Manager, Timothy Pooshous via email to tpooshaus@coopersburgborough.org no later than 5:00 PM Wednesday, June 24, 2020 at which time bids will be publicly opened. Bids will be taken under advisement until such time as the Coopersburg Borough Council may take action on an award or rejection.

For further details visit http://www.coopersburgborough.org.

#6687376 — 06/03, 06/10/20

BETHLEHEM HOUSING AUTHORITY INVITATION FOR BIDS FOR ELEVATOR MAINTENANCE SERVICES

The Bethlehem Housing Authority will receive bids electronically via the PennBid program for ELEVATOR MAINTENANCE SERVICES . Bids will be accepted until 10:00 AM, Thursday, July 7th 2020. At which time all bids will be read aloud at the Bethlehem Housing Authority Central Service Facility, 1411 Pembroke Road Bethlehem, PA, 18017. Interested suppliers may secure specifications and bid forms at no cost on PennBid (www.pennbid.net). Questions regarding this solicitation shall be submitted via the "Questions" feature within PennBid.

BETHLEHEM HOUSING AUTHORITY
Jay D. Schuster
Executive Director

#6/1,10/20 — 6673302

**PUBLIC NOTICE
LEHIGH CAREER & TECHNICAL INSTITUTE
JOINT OPERATING COMMITTEE VIRTUAL MEETING
JOC COMMITTEES VIRTUAL MEETINGS**

Due to the Proclamation of the Governor of the Commonwealth of Pennsylvania dated March 6, 2020, proclaiming the existence of a disaster emergency throughout the Commonwealth, and other subsequent Orders and Guidance provided by Commonwealth Agencies and Departments, and to protect the public from the spread of COVID-19, the public meeting of Lehigh Career & Technical Institute (LCTI) Joint Operating Committee (JOC) will occur virtually on June 24, 2020, beginning at 6:30 p.m. The public meetings of the LCTI JOC Committees (Business & Finance, Personnel and Salary, Education, Public Relations, and Policy) will occur virtually on June 24, 2020, beginning at 5:00 p.m. Virtual meeting information providing instructions for attendance will be available on the LCTI website www.lcti.org) on and after June 22, 2020. The public is advised to check the LCTI website for any cancelations or time changes for the above publicly advertised meetings.

BY ORDER OF
Lehigh Career & Technical Institute
Joint Operating Committee
Patricia T. Bader, JOC Secretary
#6691916 — 6/10/2020

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legals, public notices

OFFICIAL SEWAGE FACILITIES PLAN REVISION

NOTICE is hereby given by City of Allentown, Hanover Township, Lower Macungie Township, Upper Macungie Township, Alburtis Borough, Macungie Borough, Upper Milford Township, Weisenberg Township, Lowhill Township, South Whitehall Township, Coplay Borough, North Whitehall Township, Whitehall Township, Salisbury Township, and Emmaus Borough that it is their intention to consider a proposed Official Sewage Facilities Plan (Revision), prepared by their representative agent, Lehigh County Authority (LCA), during a public meeting to be held by each municipality. Thereafter the municipalities will, through LCA, submit the Revision to the Pennsylvania Department of Environmental Protection (DEP), Water Management Program, 2 Public Square, Wilkes-Barre, PA 18711-0790 as required by the Sewage Facilities Act (Act 537). The Revision is an Interim Act 537 Plan that covers the period from January 2021 through December 2025. The Revision was undertaken due to high sewage flows in 2018 and 2019 to Kline's Island Wastewater Treatment Plant (KIWWTP) and includes: (a) studies and evaluations incorporating an on-going sewage metering program; (b) a proposed comprehensive nine month system wide flow monitoring project termed Flow Characterization Study (FCS); (c) updating of the hydraulic model of conveyance systems and treatment capabilities based on information collected in the FCS, projected growth, rainfall events, and other inputs; and (d) the updated model will be used for alternatives analysis, financial analysis, administrative issues reviews and overall decision making to most effectively address the region's future sewage conveyance/treatment needs. There will also be a hydraulic analysis and paper re-rating of KIWWTP's hydraulic capacity. These studies will serve as the technical basis of a long term Sewage Facility Plan to be submitted to DEP in the future. In addition to studies and evaluations, the contributing entities will continue their proposed Inflow and Infiltration (I&I) remediation programs and LCA will be developing a project to address hydraulic restrictions in a sewer interceptor in the Trexlertown area.

Project Name: Interim Act 537 Plan

Type of Project: See above for description of the Revision.

Project Location: The above named municipalities of Lehigh County.

Estimated Project Cost: Interim Act 537 Plan preparation/presentation ($81,000); sewage billing metering program ($150,000); hydraulic analysis ($50,000); long term Act 537 monitoring, modeling, alternatives review, etc. ($3,000,000); Trexlertown Storage Facility ($14,000,000); I&I remediation projects (varies by entity).

Funding: All studies and planning efforts funded by the City of Allentown AO Fund; Trexlertown Storage Project funded by LCA Suburban Division; I&I characterization and remediation projects funded based on ownership or contractual obligations.

User Fees: Rates to the various entities listed above will reflect actual project costs and reimbursement to the sources of funding.

A copy of the Interim Act 537 Plan will be available for inspection beginning on June 10, 2020 online at the Lehigh County Authority website https://lehighcountyauthority.org. A hard copy will be available, by appointment, at the LCA Main Office depending on COVID-19 restrictions. Please call the office at 610-398-2503 and ask for Lisa Miller when making an appointment.

All interested persons are invited to submit written comments concerning the Interim Act 537 Plan during a thirty (30) day period beginning June 10, 2020 and ending on July 10, 2020. Comments should be directed to the attention of Michael A. Schober (Vice President and Director of Business Development), P.E. of ARRO Consulting at michael.schober@arroconsulting.com. A copy of the received written comments, together with the written response of the Lehigh County Authority (as representative agent), will be considered by the Authority and the municipalities prior to adoption of the Interim Act 537 Plan and submission to DEP.

The following is a list of anticipated meeting dates when each municipality will consider approval of the Interim Act 537 Plan:

- City of Allentown: August 19, 2020, 7:00 P.M., City Council Chambers
- Hanover Township: August 19, 2020, 7:30 P.M., Township Building
- Upper Macungie Township: August 6, 2020, 7:00 P.M., Township Building
- Lower Macungie Township: August 6, 2020, 7:00 P.M., Township Building
- Borough of Macungie: August 3, 2020, 7:30 P.M. Macungie Institute
- Borough of Alburtis: August 12, 2020, 7:00 P.M., Borough Hall
- Upper Milford Township: August 6, 2020, 7:30 P.M., Township Building
- Weisenberg Township: August 10, 2020, 7:00 P.M., Township Building
- Lowhill Township: August 6, 2020 7:30 P.M., Township Building
- South Whitehall Township: August 5, 2020, 7:00 P.M., Township Building
- Coplay Borough: August 11, 2020, 7:00 P.M., Borough Hall
- North Whitehall Township: August 3, 2020, 7:30 P.M., Township Building
- Whitehall Township: August 10, 2020, 7:00 P.M., Township Building
- Salisbury Township: August 13, 2020, 7:00 P.M., Township Building
- Emmaus Borough: August 17, 2020, 7:00 P.M., Borough Hall

#6681959 — 6/10/2020

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**BETHLEHEM HOUSING AUTHORITY
INVITATION FOR BIDS
FOR THE PURCHASE OF A COMPACT SUV CROSSOVER
AND AN SUV.**

The Bethlehem Housing Authority will receive bids electronically via the PennBid Program for the purchase of two vehicles. Bids will be accepted until 10:00 AM, July 2, 2020. At which time all bids will be read aloud at the Bethlehem Housing Authority Central Service Facility, 1411 Pembroke Road Bethlehem PA, 18017. Interested dealers may secure specifications and bid forms at no cost on PennBid (www.pennbid.net). Questions regarding this solicitations shall be submitted via the "Questions" feature within PennBid.

BETHLEHEM HOUSING AUTHORITY JAY D. SCHUSTER EXECUTIVE DIRECTOR

#6675936 — 6/1,10/20

Home Repair & Maintenance

THE MORNING CALL

The Morning Call would like to inform you about The Home Improvement Consumer Protection Act, 53 P.S. § 517.1, et seq., effective July 1, 2009. The law applies to contractors who perform at least $5,000 worth of home improvements a year. Contractors are required to submit an application to the Pennsylvania Attorney General's Office in order to obtain a registration number.

THE REGISTRATION NUMBER MUST APPEAR IN ALL ADVERTISEMENTS CIRCULATED WITHIN THE COMMONWEALTH.

The law defines advertisements as any statement promoting home improvement services in a newspaper, periodical, pamphlet, circular, billboard, sign, letterhead, business card or other printed materials.

All contractors currently advertising in The Morning Call should contact their representative to include their registration number in their ads.

The law allows consumers to verify a contractor's registration with Attorney General's Office by visiting the Attorney General's website or by calling the toll-free contractor hotline, 1-888-520-6680.

Your can learn more about the law and its requirements by visiting the Attorney General's website: http://www.attorneygeneral.gov/hic.aspx

masonry & concrete

BRICK POINTING, WATER PROOFING, CAULKING - Masonry Repairs and Restoration. In business over 60 years. Machemer Contracting: 610-797-4778

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paper & painting

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5 years experience minimum. Must have experience loading fabricated steel. Must be able to operate 15 ton forklift & switcher. Send resume to Jennifer@weirwelding.com

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Daily & Weekly
Color TV & Air Condition.
Royal Motel. 610-433-6423

recreational vehicles

1997 Southwind Storm By Fleetwood Motorhome - No pullouts. 54,500 miles, $5500. 215-257-5483

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Voice Lifeline	$ 9.75 monthly discount
Voice Lifeline 135	$ 7.25 monthly discount
Broadband Lifeline	$ 9.25 monthly discount for qualified customers who subscribe to Fios Internet service

Only eligible consumers may enroll in the programs. You may qualify for Voice Lifeline service if you can show proof that you participate in a certain government assistance program or your annual income is 100% or below the Federal Poverty Guideline. You may qualify for Voice Lifeline 135 service or Broadband Lifeline if you can show proof that you participate in certain government assistance programs or your annual income is 135% or below the Federal Poverty Guideline. If you qualify based on income, you will be required to provide income verification. In addition, the Voice Lifeline, Voice Lifeline 135 and Broadband Lifeline programs are limited to one discount per household consisting of either broadband, wireline, or wireless service. Therefore, you are required to certify and agree that no other member of the household is receiving Voice Lifeline, Voice Lifeline 135 or Broadband Lifeline service from Verizon or another communications provider. Voice Lifeline, Voice Lifeline 135 and Broadband Lifeline services are a non-transferable benefit. Consumers who willfully make false statements in order to obtain the benefit can be punished by fine or imprisonment, or may be barred from the program.

You must meet certain eligibility requirements in Pennsylvania in order to qualify for Voice Lifeline, Voice Lifeline 135 or Broadband Lifeline service. An Application for these services can be obtained by contacting Verizon at www.verizon.com/lifeline or by phone at 1 800 VERIZON.

To find out more information, you may also call the Universal Service Administrative Company (USAC), which administers Lifeline for the FCC by calling (800) 234-9473 or by accessing their website at www.LifelineSupport.org.

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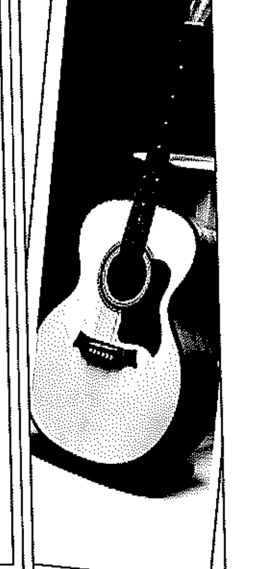
WORTH A 1000 WORDS



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Public Comments and Responses

Table 4.1 - Flow Projection Summary (Revised 07/10/2020)

Comment Letter - South Whitehall Township

Kline's Island Sewer System

Interim Act 537 Plan

Public Comments

The Draft Interim Act 537 Plan was advertised for public comment on June 10, 2020 in The Morning Call. The 30-day comment period for public comment ended on July 10, 2020.

The only comment received during this period was from South Whitehall Township.

South Whitehall Township

1. Comment: After meeting with their engineers and the South Whitehall Community Development Department planners, South Whitehall Township calculated an additional flow projection of 166,358 gpd. This brings their total requested allocation for projected flows to 344,230 gpd for the years 2021-2025.

   Response: Table 4.1 – Flow Projection Summary was revised to reflect the above request. The revised total projection for all Signatories is 2,919,426 gallons per day. A copy of the revised Table 4.1 follows this page.

Table 4.1 – Flow Projection Summary
(Revised 07/10/2020)

Municipality / Authority	Projected 2020 Planning Modules (gpd)	Projected 2021-2025 Planning Modules (gpd)
Borough of Alburtis[3]	0	2,230
City of Allentown	444,807	1,358,949
Coplay-Whitehall Sewer Authority[1]	76,110	191,350
Borough of Emmaus	63,630	20,160
Hanover Township	0	100,000
Lehigh County Authority	0	152,000[2]
Lower Macungie Township	276,996	260,766
Lowhill Township[3]	0	2,230
Borough of Macungie	1,115	37,464
North Whitehall Township	30,975	34,125
Salisbury Township	4,446	60,268
South Whitehall Township	169,175	344,230
Upper Macungie Township	428,269	325,772
Upper Milford Township	669	27,652
Weisenberg Township[3]	0	2,230
Rounding	3,808	
TOTAL	**1,500,000**	**2,919,426**

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

[2] 152,000 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.

[3] Projection based on 10 EDUs x 223 gpd/EDU = 2,230 gpd

SOUTH WHITEHALL TOWNSHIP

4444 Walbert Avenue, Allentown, PA 18104-1699
www.southwhitehall.com • 610-398-0401

July 7, 2020

Michael A. Schober, P.E. B.C.E.E.
Arro Consulting
108 W. Airport Road
Lititz, PA 17543

Re: Additional Flow Allocation for South Whitehall Township

Dear Mr. Schober:

Earlier this year, South Whitehall Township submitted their projected flows of 177,872 gpd to the Lehigh County Authority (LCA) for the years 2021-2025. Since that submission, the Township has become aware of additional development plans that would impact that total.

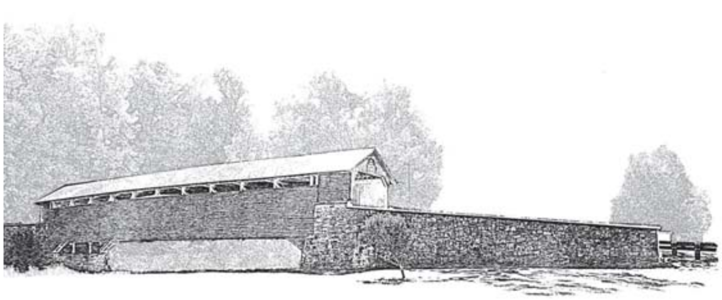
After meeting with our engineers from Spotts, Stevens and McCoy (SSM) and the South Whitehall Community Development Department planners, we have calculated an additional flow projection of 166,358 gpd. This brings our total requested allocation for projected flows to 344,230 gpd for the years 2021-2025.

SSM has updated our detailed spreadsheet that includes the new development plans and the projected flows and has submitted those numbers to LCA for inclusion in the Regional Interim 537 Plan.

Thank you,

Renee Bickel

RENEE C. BICKEL, SHRM-SCP, SPHR
Township Manager



LONG TERM ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Year 2021 thru 2025 Revised 6-30-20 by SSM

Municipality Name **South Whitehall Twp.**

				TOTALS	**0**	**1,544**			**688,460**
GPD/EDU:	**223**			Residential	0	0			0
				Comm./Ind.	0	1,544			688,460
Development Name	**Address (OPTIONAL)**	**Tax Parcel ID (OPTIONAL)**	**Zoning (OPTIONAL)**	**Type of Development (OPTIONAL)**	**Acres (OPTIONAL)**	**EDUs**	**Specifics**	**Projected Development Year**	**Projected 2020-2027 Flow (gpd)**
1960 Harold Avenue	same					5	Res -Minor	2021	1,115
Chapmans Road Warehouse	4741 Chapmans Rd.					22	Commercial	2021	5,000
Blue Barn Estates	1530 Blue Barn Rd.					6	Res-Minor	2022	1,338
Hausman Rd Flex Warehouse	1215 Hausman Rd.					4	Commercial	2021	1,000
KRE Commercial	Broadway/Centronia Rd					7	Restaurant	2021	1,500
Miscellaneous & Change in Use						50	Residential	2021-2025	11,150
Miscellaneous & Change in Use						50	Commercial	2021-2025	11,150
Ridge Farm	Walbert Ave & Cedar Crest Blvd.					50	Res/Com	2022	11,150
						83		2023	18,509
						90		2024	20,070
						90		2025	20,070
						0		2026	0
						0		2027	0
						0		2028	0
						0		2029	0
									0
Hills at Winchester	Walbert Avenue					15	Residential	2021	3,345
						15		2022	3,345
						13		2023	2,899
									0
Regency at South Whitehall	Walbert Avenue					42	Residential	2021	9,366
						40		2022	8,920
						40		2023	8,920
									0
Blue Barn Meadows	Blue Barn Road					35	Residential	2021	7,805
						35		2022	7,805
						35		2023	7,805
						35		2024	7,805
						35		2025	7,805
									0
Parkview Inn Redevelopment	1151 Bulldog Dr.					100		2023	22,300
						200		2024	44,600
						100		2025	22,300
									0
Hausman Rd. Self Storage	1600 BlockHausman Rd.					2		2022	446
									0
Residential Development	Blue Barn Rd. & Chapmans Rd.					50		2022	11,150
						75		2023	16,725
						75		2024	16,725
									0
Hotel Hamilton/King George Inn	Hamilton Blvd/ & Cedar Crest Blvd.					7		2022	1,561
						45		2023	10,035
									0
Rosevelt Flats	1700 Block Roosevelt St.					8		2022	1,784
									0
Luther Crest Addl Building	800 Hausman Rd.					70		2023	15,610
									0
Commerical Tract	SR 309/ Champmans Rd.					7		2023	1,561
						7		2024	1,561
									0
								Prior submission	177,872
								New additional	166,358

BACKGROUND

The KISS collection system network includes over 950 miles of collection and conveyance pipe.

The materials of construction, soils, age, groundwater, and generally undersized capacity for the demand loads make portions of it prone to Rain Derived Inflow and Infiltration (RDII) and/or potential sanitary sewer overflows (SSO).

The KIWWTP was originally placed in service in 1928. By the late 1970s all of the current municipal users were sending their sewage to the KIWWTP for treatment under a wide variety of inter-municipal agreements (IMAs). These IMAs referenced average day flows; none of these IMAs addressed peak wet-weather flows. All IMAs allow the use of Allentown's existing, aged, and generally capacity-limited interceptor system (primarily the Little Lehigh Interceptor and the Jordan Creek Interceptor) until such time as those are determined to be overloaded by non-Allentown flows, in which case the IMA provides provisions for requiring conveyance (and/or storage) to alleviate flow issues within Allentown's interceptors. Over the years, various conveyance expansions have been implemented to address these issues, such as LCA's Park Pump Station. In all cases, the intention of past projects has been to transport dry weather and wet-weather flows to the KIWWTP.

When the KIWWTP was expanded from 28.5 MGD to 40 MGD in 1977, funding was provided through the United States Environmental Protection Agency (EPA) Grants Program, and all treatment processes complied with then current EPA design criteria. Outfall 003, which is located at the entrance to the treatment facility, was designed and permitted as an emergency outfall to be used whenever flows due to wet-weather events drove the incoming sewage flow beyond the KIWWTP's peak capacity. This was intended to protect the equipment and treatment processes and to ensure adequate treatment recovery periods when flows normalized. The thinking at that time was that the incoming sewage was considerably diluted and the receiving stream was sufficiently swollen such that the by-passed diluted sewage could be assimilated with no adverse impact on the river's ecosystems.

Over the decades, the focus of environmental scrutiny and regulation turned to reducing or eliminating SSOs and treatment plant bypasses and their environmental impacts.

In 2007, EPA 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.

In 2008, in response to self-reporting of conveyance capacity limitations and excess I&I from LCA's Western Lehigh Interceptor, the Pennsylvania Department of Environmental Protection (DEP) required LCA, Upper Macungie, Lower Macungie, Weisenberg, Lowhill, and Upper Milford townships, and Macungie and Alburtis boroughs to develop a Chapter 94.21 Corrective Action Plan (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 (see Appendix 5). To support this work, flow metering was conducted in 2009 and a hydraulic model was developed in 2011.

In 2009, in response to self-reported overflows from Allentown's central interceptor systems, EPA issued a second AO. This AO addressed system-wide capacity issues for all Signatories 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 the City of Allentown). Each of the contributors were required to submit a semi-annual report to EPA and DEP indicating what actions they had taken to address RDII conditions.

In response to the AOs, the City conducted a city-wide flow monitoring program in 2008 and a subsequent refined monitoring program to focus on basins indicated in the initial study as being sources of high RDII. Based on this work, Phase 1 and Phase 2 sanitary sewer evaluation survey (SSES) and remediation projects were subsequently conducted. A total collection system model of the City's sewer system was developed based on the flow monitoring data and other available information.

During this time there were semi-annual meetings to discuss the program on addressing the AOs while the Signatories 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 the City combined their two models to form the first KISS model, which covered 75% of the actual KISS. The City and the WLSP individually and then jointly evaluated their projected future flows, considered the planned source reduction efforts of all Signatories, 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 current KISS model represents only 3/4ths of the sewer system, is calibrated from 2008 and 2009 flow data, uses only available entry-point flows from the other sewer Signatories, and except for the WLSP portion does not model antecedent conditions or changing groundwater conditions due to climate changes. The updated KISS Model, with noted limitations, will serve as the initial foundation for modeling flow information collected during the Flow Characterization Study (FCS) which is discussed in other sections of this report.

Over the years while the Signatories were working on their remediation projects and programs, there were periodic meetings with EPA and DEP. EPA 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 Signatories should work cooperatively and develop regional solutions to the problems which would be cost effective and provide continuing and lasting reductions in RDII. EPA suggested that the Signatories work cooperatively and submit a Regional Flow Management Strategy (RFMS). The RFMS (Appendix 8) was submitted in accordance with EPA's directive in 2018. This Regional Flow Management Strategy was intended to guide the development and implementation of Signatories' 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. This Strategy reflects broad-based commitments of action, collaboration, and cooperation. Each Signatory has prepared and included in the Appendices of the RFMS its own I&I Reduction Plan and Operation and Maintenance Plan. The RFMS contained flow characterization studies and anticipated conveyance or storage expansions to handle current and future dry and peak wet-weather flows.

EPA accepted the RFMS and withdrew the AOs on 3/19/2019 noting, "EPA 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 DEP. DEP reviewed the RFMS and issued a review and comment letter to which the contributors responded.

Unfortunately, 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 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. These continuing rainfalls 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.

As would be expected, the precipitation and resulting saturated ground dramatically increased RDII and base flow infiltration into the sewers, and flows to the KIWWTP increased from the normal 2017 flows of approximately 32 MGD to over 40 MGD during periods in 2019. The annual average daily flow for 2019 was 37.64 MGD. During this period, the KIWWTP met all treatment-related permit requirements. However, the KIWWTP permit included a flow value of 40 MGD, and the flows to the plant exceeded 40 MGD for three consecutive months, triggering Chapter 94 requirements.

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

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, a three-phase approach has been developed as follows:

Phase 1 – 2020 Corrective Action & Connection Management Plan

Beginning in 2020, all new connections for all Signatories to the KISS will be managed under the terms of a regional corrective action plan managed by DEP and implemented by LCA under the requirements of an Interim Act 537 Plan developed by the Signatories and submitted to DEP by September 2020. The primary thrust of the corrective action plan is the development of the Interim Act 537 Plan, quarterly progress reporting to DEP, and new developments requiring sewer service approved in accordance with a formal allocation request to DEP.

Phase 2 – Interim Act 537 Plan, Corrective Action & Connection Management Plan

From 2021 to 2025, the KISS Signatories will work cooperatively to develop a regional Long-Term Act 537 Plan. This plan will evaluate all Signatories' dry-weather and wet-weather flows projected through 2050, including peak flows and anticipated changes in regional weather patterns, and develop the facilities plan and other actions required to address those needs.

DEP'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 construction of new facilities such as upsized parallel interceptors, pump stations, storage tanks, and treatment plant expansion/upgrades. This work will include 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 that is ultimately developed and proposed to DEP by 2025 will include a financial and organizational / legal analysis to determine appropriate cost-sharing and inter-municipal agreement structures.

While this critical planning work is being completed, all KISS Signatories will continue to implement ongoing I&I source removal programs within their sewer collection systems. LCA also expects to move 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. This project was kicked off in 2019 with a feasibility study and hydraulic modeling being conducted in 2020.

New sewer connections during the time period of 2021 to 2025 will be contingent on DEP's approval of the Interim Plan (this Plan to be submitted by September 2020 as described in Phase 1 above) and the region's satisfactory progress on this work as reported in quarterly reports to DEP.

Phase 3 – Regional Act 537 Plan

Implementation will begin upon approval by DEP. Approval of new connections to the sewer system after 2025 will be based on details of the plan and plan approval by DEP.

I PREVIOUS WASTEWATER PLANNING

A EXISTING WASTEWATER PLANNING

The previous Act 537 Planning for the municipalities in the Planning Area varies greatly. This Interim Act 537 Plan will only update the portions and/or entirety of the municipalities that are located within the KISS Planning Area. See Appendix 1 for the map of the Planning Area.

In 2009, peak flow issues in the Western Lehigh Sewerage Partnership (WLSP) service area caused the DEP 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 corrective action plan to collectively address the problems within each of these sanitary sewer systems. The Sewer Capacity Assurance and Rehabilitation Program (SCARP) found in Appendix 5 is the resulting corrective action plan. With the approval of this Interim Plan, DEP has indicated the SCARP provisions will sunset and be replaced by this Interim Plan.

1. PREVIOUS ACT 537 PLANNING

Borough of Alburtis

The Borough of Alburtis' most recent Plan was approved on December 1, 1966. The Borough also has an approved Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Borough (see Appendix 5).

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 also has an approved Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Township (see Appendix 5).

Borough of Macungie

The Borough of Macungie's most recent Plan was approved on October 1, 1971. The Borough also has an approved Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Borough (see Appendix 5).

Upper Macungie Township

In 2010, Upper Macungie Township submitted an Act 537 Planning Supplement to PA DEP 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 also has an approved Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Township (see Appendix 5).

Upper Milford Township

In 2005, Upper Milford Township submitted an Act 537 Plan Revision to PA DEP 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 also has an approved Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Township (see Appendix 5).

Weisenberg Township

Weisenberg Township's most recent Plan was approved on January 28, 1993. The Township also has an approved Sewer Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Township (see Appendix 5).

Lower Macungie Township

Lower Macungie Township submitted an Act 537 Planning Supplement to PA DEP 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 also has an approved Sewer

Capacity Assurance & Rehabilitation Program dated October 2009 that was approved and adopted by the Township (see Appendix 5).

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.

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 Collection System map found in Appendix 2 which shows the extent of the existing sewer system in the Planning Area.

B PHYSICAL CHARACTERISTICS OF THE PLANNING AREA

The physical characteristics of the Planning Area are shown on the topographic map and the hydric soils, flood plains, and wetlands map found in Appendices 3 and 4, 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,

[1] Per wikipedia.org

[2] Per wikipedia.org

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, 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]

[3] Per wikipedia.org

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

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

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 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 2000 Census. It is the third largest city in the state of 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]

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

[6] Per wikipedia.org

[7] Per the Allentown Comprehensive Plan

[8] Per the Hanover Act 537 Update

[9] Per wikipedia.org

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 in 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]

[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

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]

[14] Per the http://www.southwhitehall.com/2009compplan.pdf

III. EXISTING SEWAGE FACILITIES IN THE PLANNING AREA

Sewage flows to the KIWWTP originate from the municipalities shown in Table 3.1. The allocation of treatment capacity for each Signatory, based on a contractual agreement, is also summarized in Table 3.1. A large portion of these flows comes from the LCA Signatory, which encompasses seven municipalities. A significant portion of the LCA flow receives pretreatment at the LCA Industrial Pretreatment Plant (IPP). This partially- treated wastewater is then conveyed to the City of Allentown's KIWWTP.

Table 3.1. Current Allocations to the KIWWTP by Signatory

Signatory	Municipalities	Capacity (MGD)
LCA	Borough of Alburtis Lowhill Township Borough of Macungie Lower Macungie Township Upper Macungie Township Upper Milford Township Weisenberg Township	10.78
Lower Macungie	Lower Macungie Township[1]	0.25
Allentown	City of Allentown Hanover Township	18.82
Coplay/Whitehall Sewer Authority	Borough of Coplay Whitehall Township North Whitehall Township	3.76
Emmaus	Borough of Emmaus	1.40
Salisbury	Salisbury Township	1.99
South Whitehall	South Whitehall Township	3.00
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.

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

1. LOCATION, SIZE, AND OWNERSHIP OF FACILITIES

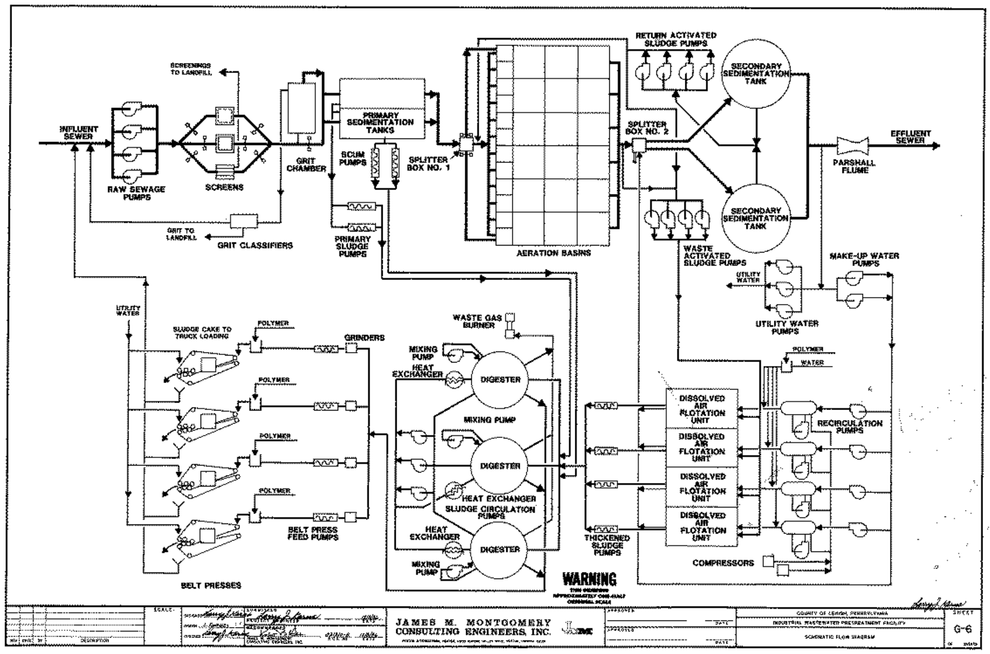
The location, size and ownership of each municipality and Authority can be found in the Regional Flow Management Strategy (Appendix 8).

2. BASIC TREATMENT PROCESS

There are two treatment facilities within the planning area; the LCA Industrial Pretreatment Plant (IPP), and the Kline's Island Wastewater Treatment Plant (KIWWTP). All flows within the planning area are ultimately treated at the KIWWTP before being discharged to the Lehigh River.

LCA INDUSTRIAL PRETREATMENT PLANT (IPP)

LCA's IPP was constructed in 1990 to provide pre-treatment of high-strength waste from Upper Macungie Township industries. The IPP currently treats this waste along with trucked-in waste from permitted haulers and some domestic sewage. The 5.75 MGD facility discharges into the Western Lehigh Interceptor which transports the waste to the KIWWTP. The existing treatment process at the IPP is designed to reduce high levels of BOD_5 and suspended solids that are contributed by several local industries before discharging the wastewater to the KIWWTP. The treatment process consists of headworks, primary sedimentation, pure oxygen activated sludge treatment utilizing the A/O process, secondary sedimentation, anaerobic digester, and odor control. There is a cryogenic plant on site to generate pure oxygen for the treatment process, and sludge dewatering, secondary sludge thickening and digestion. A process schematic of the Pretreatment plant can be found below.



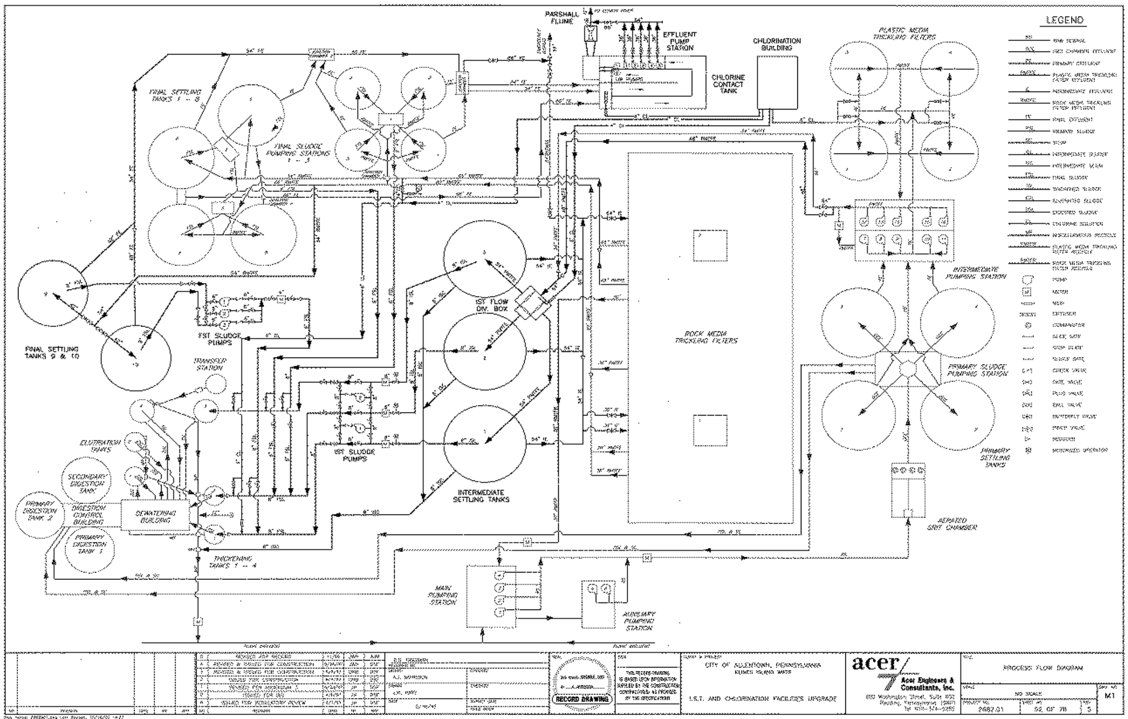
KLINE'S ISLAND WWTP (KIWWTP)

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 the 1928 and operates under NPDES Permit Number PA0026000. Permit limits at the time this Interim Plan was completed are as follows:

Table 3.2. KIWWTP Current Permit Limits

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		

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 can be found below.



3. PROBLEMS WITH EXISTING FACILITIES

LCA PRETREATMENT

The IPP operates as described in “Basic Treatment Process” and has a design capacity of 5.75 MGD. The facility is not permitted for direct discharge to a stream, and therefore does not have a permitted hydraulic capacity limit. The IPP has continually met design criteria for discharge to the Western Lehigh Interceptor at varying flow rates ranging from 3 to 10 MGD. The IPP’s performance has been reliable and consistent to the extent that LCA has been evaluating supplementing the treatment processes so that the IPP is capable of securing an NPDES permit for direct discharge into a receiving stream.

Hydraulic loading has been a concern in recent years due to wet-weather RDII. However, despite increased flows, even during the August 2018 to July 2019 period, the IPP met treatment expectations.

In 2010, a 3MG flow equalization basin was built on site using available real estate to provide regional wet-weather flow equalization.

KIWWTP

The KIWWTP has consistently met its NPDES requirements for years. 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 (MP) is done by a third-party engineering firm every five years and a Capital improvement Plan based on the MP recommendations and staff input is updated annually.

As noted in other sections of this report hydraulic loading is a concern during peak 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. Actions to address that issue are included in this submission.

TREXLERTOWN INTERCEPTOR[1]

The KISS modeling of alternatives identified the 2-mile section of the Western Lehigh Interceptor from just north of Hamilton Boulevard through to Spring Creek Road as being currently within 0.5 MGD of its dry weather capacity and within a decade of being well over its wet-weather level of protection (LOP) goals. A feasibility study is currently under way to assess alternatives to address this challenge. The alternatives being evaluated include traditional storage, in-line storage, or a combination / hybrid approach. Future planning will be required, but this project is anticipated to be constructed during the period of 2021 to 2025.

This project is intended to alleviate dry weather surcharging and increased flows during wet-weather. No increase in flows into City sewer systems will be realized by this project because of downstream capacity restrictions at Keck’s Bridge siphon and at Spring Creek Pump Station (the only two points of connections between LCA and City sewers).

[1] Arcadis WLSP Capacity Improvement Plans 2020

4. ON-GOING UPGRADES OR EXPANSION

There are no ongoing upgrades or expansions of either the IPP or the KIWWTP other than normal repair/replacement of existing treatment system components.

Reserve Capacity

Table 3.3 summarizes the allocated capacity for each signatory and 2019 flows. Since 2019 was a historically wet year, the 2017 average flows are included to show how the signatories are affected by greater than average precipitation and the resulting high groundwater level.

Table 3.3. Available Reserve Capacity to the KIWWTP by Signatory

Signatory Agreement	Municipalities	Allocated Capacity (MGD)	2017 Flows (MGD)	2017 Reserve Capacity (MGD)	2019 Flows (MGD)	2019 Reserve Capacity (MGD)
LCA	Borough of Alburtis Lowhill Township Borough of Macungie Lower Macungie Township Upper Macungie Township Upper Milford Township Weisenberg Township	10.78	8.97	1.81	11.08	-0.30
Lower Macungie	Lower Macungie Township	0.25	0.11	0.14	0.09	0.16
Allentown	City of Allentown Hanover Township	18.82	16.08	2.74	19.44	-0.62
Coplay/Whitehall Sewer Authority	Borough of Coplay Whitehall Township North Whitehall Township	3.76	1.92	1.84	2.22	1.54
Emmaus	Borough of Emmaus	1.40	0.89	0.51	1.38	0.02
Salisbury	Salisbury Township	1.99	1.31	0.68	1.62	0.37
South Whitehall	South Whitehall Township	3.00	1.48	1.52	1.78	1.22
TOTAL (To KIWWTP)		**40.0**	**30.76**	**9.24**	**37.61**	**2.39**

5. OPERATIONS AND MAINTENANCE REQUIREMENTS (I&I SOURCE REDUCTION)

In August 2018, the Signatories issued the Kline's Island Sewer System Regional Flow Management Strategy (RFMS) (see Appendix 8) which outlines each Signatory's approach to its individual sewer I&I reduction plan. The report includes the O&M programs used by each Signatory to maintain its collection system. DEP comment letters on the RFMS did not identify any deficiencies in the O&M programs. Previous sections noted there were no operations or maintenance issues with respect to the IPP or the KIWWTP.

This Regional Flow Management Strategy is intended to guide the development and implementation of Signatories' 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. This Strategy reflects broad-based commitments of action, collaboration, and cooperation. Each Signatory has prepared and included in the Appendices its own I&I Reduction Plan.

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 in order 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 in order 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 City of Allentown in order 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 the 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 over 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 particular 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.

B DESCRIPTION OF GROWTH AND DEVELOPMENT

1. AREAS WITH EXISTING DEVELOPMENT AND 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.

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.

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

Growth and development projections for the period 2021-2025 can be found in Table 4.1. 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 Signatory, including project locations, EDUs, parcel address, type of development and development year can be found in Appendix 7.

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

Table 4.1 – Flow Projection Summary

Municipality / Authority	Projected 2020 Planning Modules (gpd)	Projected 2021-2025 Planning Modules (gpd)
Borough of Alburtis[3]	0	2,230
City of Allentown	444,807	1,358,949
Coplay-Whitehall Sewer Authority[1]	76,110	191,350
Borough of Emmaus	63,630	20,160
Hanover Township	0	100,000
Lehigh County Authority	0	152,000[2]
Lower Macungie Township	276,996	171,566
Lowhill Township[3]	0	2,230
Borough of Macungie	1,115	37,464
North Whitehall Township	30,975	34,125
Salisbury Township	4,446	60,268
South Whitehall Township	169,175	177,872
Upper Macungie Township	428,269	325,772
Upper Milford Township	669	27,652
Weisenberg Township[3]	0	2,230
Rounding	3,808	
TOTAL	**1,500,000**	**2,663,868**

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

[2] 152,000 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.

[3] Projection based on 10 EDUs x 223 gpd/EDU = 2,230 gpd

4. 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 Interim Act 537 Plan is based on a planning horizon of 2021 to 2025. The subsequent Long-Term Act 537 Plan will address projected flows beyond this horizon.

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

A POTENTIAL FOR REGIONAL WASTEWATER TREATMENT

The selected alternatives under the Interim 537 Plan will maintain the current operating, administrative, and contractual arrangements and procedures currently in place. Use of the existing facilities will continue.

The KIWWTP, which operates under National Pollution Discharge Elimination System (NPDES) Permit # PA 0026000, will undergo a paper rerating to increase its Design Hydraulic Capacity. This is not a plant expansion; rather it is recognition that the KIWWTP is capable of adequately treating flows in excess of its permitted capacity for periods of weeks or months while maintaining full and continuous compliance with all permit requirements. The permitted annual average flow will remain unchanged.

There are no improvements, modifications, or additions to the City's centralized collection system planned under the Interim 537 Plan. In order to justify this approach, the City of Allentown and Lehigh County Authority engaged Kleinfelder to perform an analysis of the KIWWTP and its ability to treat additional peak flows. The result is an October 2019 Study titled "Kline's Island Wastewater Treatment Plant Hydraulic Design Capacity Analysis" which reviewed both analytical data as well as actual performance during peak flow events. The study found that the KIWWTP has a hydraulic design capacity of 54 MGD. Subsequent to this report, in October 2019, a WQM Part II permit application to rerate the KIWWTP to 54 MGD was submitted to DEP. The permit application is being held and DEP will act upon the resubmission scheduled for January 2021.

However, in accordance with guidance from DEP, the proposed paper rerate application will be to increase the KIWWTP hydraulic design capacity to 44.00 MGD consistent with the planning horizon flow projections. This 10% increase over the average annual flow is consistent with the Chapter 94 reports over the previous five years. During the 2014 - 2018 time-frame, the Max:Ave ratio has been 1.14, 1.07, 1.08, 1.07 and 1.11 respectively.

A copy of the Kleinfelder report can be found in Appendix 6.

B POTENTIAL TO EXTEND EXISTING FACILITIES TO AREAS OF NEED

The purpose of the Interim Plan is to address the Hydraulic Design Capacity at the KIWWTP and conveyance capacity within the Trexlertown Interceptor. Extending existing facilities is not being considered in this Interim Plan.

C POTENTIAL FOR CONTINUED USE OF EXISTING FACILITIES

This Interim Plan proposes the continued use of existing facilities. Referenced Source Reduction Plans for each municipality are in place to reduce and manage hydraulic loadings to existing facilities. These Source Reductions Plans address ongoing source reduction, repairs and rehabilitation of existing collection systems, operations and maintenance, and any specific needs of each of the Signatories (see Appendix 9).

Furthermore, the Western Lehigh Sewerage Partnership has developed Source Reduction Plans and Capacity Improvement Plans which set forth specific goals for each Signatory in the partnership. A copy of the Source Reduction Plan and Capacity Improvements Plan can be found in Appendix 10 and 11, respectively.

The continued use of the existing facilities beyond the planning period of 2021-2025 will also be studied and a Long-term Act 537 Plan developed in accordance with the implementation schedule listed in section VIII.B.

The cornerstone of this future planning effort will be flow monitoring to develop the alternatives analysis as well as support the municipalities' ongoing efforts to identify and remove sources of inflow and infiltration. This flow monitoring will provide the data required to determine if existing facilities can be used to meet future flow projections beyond the planning period of 2021-2025. Based on discussions and guidance from DEP, and because the flow monitoring will serve dual purposes of characterizing flows and rainfall derived I&I generated by each municipality and characterizing flows within the regional sewer system components, the proposed flow monitoring program is shown in Table 5.1.

The metering program proposed for 2021 will equate to a resolution of approximately one flow meter installed for every 10 miles of sewer collection system, which will provide for an appropriate level of detail for RDII characterization. The table below summarizes the number of meters needed to accomplish the regional modeling and RDII characterization.

Table 5.1 Estimated Flow Meters for 2021 FCS Purposes

Location	Use	# of Meters[1]
City of Allentown	I&I Characterization	16
City of Allentown	Regional Modeling	15
Coplay-Whitehall Sewer Authority	I&I Characterization	10
Borough of Emmaus	I&I Characterization	3
Hanover Township	I&I Characterization	0
LCA / Western Lehigh Municipalities	I&I Characterization	35
Salisbury Township	I&I Characterization	0
South Whitehall Township	I&I Characterization	4
Park Pump Station	Regional Modeling	1
KIWWTP	Regional Modeling	3
Interceptor Locations	Regional Modeling	10
Sewage Billing Meters[2]	Regional Modeling	18
LCA Pretreatment Plant	Regional Modeling	1
LCA Interceptor System	Regional Modeling	6
	TOTAL	122

[1] The number of meters listed for I&I Characterization is estimated based on achieving flow characterization for approximately each 10 miles of sewer collection system. During 2020, the flow monitoring program will be further refined and actual meter locations selected to achieve this goal.

[2]The sewage billing meters (SBM) at entry points into the central collection system will be used in the flow monitoring program if they have been inspected, evaluated and approved under the program submitted with the RFMS. A QA/QC and validation on the SBMs will be conducted to ensure their reliability. If not approved, temporary meters will be necessary.

Table 5.2 below provides a listing of the estimated Signatory Sewage Billing Meters. This is the best estimate at this time and these meters will be continually evaluated and adjusted as needed.

Table 5.2 Estimated Signatory Sewage Billing Meters for 2021 FCS Purposes

Location	Number of Meters
Coplay-Whitehall Sewer Authority	2
Hanover Township	1
Borough of Emmaus	4
South Whitehall Township	6
LCA / Western Lehigh	3
Lower Macungie Township (City Signatory portion)	2
Salisbury Township	0
TOTAL	18

This flow monitoring is scheduled to be completed in 2021. Therefore, the source reduction plans shown in Appendix 9 & 10 may be adjusted during this planning period of 2021-2025 if the monitoring results indicate additional I&I reductions are possible through such adjustments. The flow monitoring will also be used to develop the alternatives analysis for the Long-term Act 537 Plan described in sections VIII.B of this plan.

D 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 a potential overloading of the KIWWTP. Both scenarios would adversely impact public health, recreation and drinking water supplies. Furthermore, both scenarios would precipitate a prohibition of new connections resulting in diminished economic conditions and potential environmental degradation.

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 PA DEP 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. Section 208 of the Clean Water Act calls for the development of plans that identify the facilities necessary to meet anticipated municipal and industrial waste treatment needs. This Special Interim Plan is consistent with the Clean Streams Law since it addresses the region’s ability to meet future capacity needs.

2. MUNICIPAL WASTELOAD MANAGEMENT PLANS

All Signatories annually submit a Chapter 94 Municipal Wasteload Management Report to DEP for their respective systems.

3. TITLE II OF THE CLEAN WATER ACT

Title II of the Clean Water Act requires the development and implementation of wastewater treatment management plans and practices which provide the application of the best practical waste treatment technology before discharging into receiving waters. The selected approach in this Interim Plan does not propose any new discharges to receiving waters and is; therefore, consistent with this act.

4. COMPREHENSIVE PLANNING

Municipal Comprehensive Plans designate areas for residential, commercial, and industrial developments and agricultural preservation and floodplain areas within 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 1990 Comprehensive Plan for Heidelberg, Lowhill, Lynn, Washington and Weisenberg Townships and Slatington Borough. Details about the major recommendations of this plan were not available at the time of this Interim Plan.

Borough of Macungie

The Borough of Macungie is a part of the Southwestern Lehigh County Comprehensive Plan, adopted by the Borough in February 2005. 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 primary goals of the plan are to protect the community character of the Township and protect our natural resources and farmland preservation along with 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 1990 Comprehensive Plan for Heidelberg, Lowhill, Lynn, Washington and Weisenberg Townships and Slatington Borough. Details about the major recommendations of this plan were not available at the time of this Interim Plan.

Lower Macungie Township

Lower Macungie 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 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 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 to 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 March 2005. 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 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 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.6.1.5

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. No new surface water discharges are proposed under this Interim Plan.

6. STATE WATER PLANS

In order to meet the rapidly expanding demands for water throughout the Nation, it 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 approach in this Interim Plan does not propose any new discharges to receiving waters and is; therefore, consistent with state water plans.

7. PENNSYLVANIA PRIME AGRICULTURAL LAND POLICY

Does not apply.

8. COUNTY STORMWATER MANAGEMENT PLANS

Does not apply.

9. WETLAND PROTECTION

Does not apply

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

Does not apply.

11. HISTORICAL AND ARCHEOLOGICAL RESOURCE PROTECTION

Does not apply.

B RESOLUTION OF INCONSISTENCIES

No inconsistencies were identified in the consistency evaluation.

C ALTERNATIVE EVALUATION WITH RESPECT TO APPLICABLE WATER QUALITY STANDARDS AND EFFLUENT LIMITATIONS

The two proposed alternatives, a paper rerate of the KIWWTP hydraulic capacity and the Trexlertown Interceptor are both consistent with water quality standards. There is no additional flow proposed for the KIWWTP and no expected adverse impacts on water quality.

D IMMEDIATE OR PHASED IMPLEMENTATION

Implementation of the two alternatives will begin immediately and be completed as defined in the Implementation Schedule, Section VIII.

E ADMINISTRATIVE ORGANIZATIONS AND LEGAL AUTHORITY TO IMPLEMENT THE ALTERNATIVE

The current organizations, Authorities, municipalities and their inter-municipal agreements are sufficient and legal to implement the selected alternatives. Discussions regarding regionalization are ongoing.

VII. INSTITUTIONAL EVALUATION

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

The current organizations, Authorities, municipalities and their inter-municipal agreements are sufficient and legal to implement the selected alternatives.

B INSTITUTIONAL ALTERNATIVES NECESSARY TO IMPLEMENT THE TECHNICAL ALTERNATIVE

1. FUNCTION OF THE EXISTING OR PROPOSED ORGANIZATIONS

As discussed previously, the existing sewage collection and conveyance systems are owned by the respective municipality and operated by either the respective municipality or a service agreement with LCA. 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.

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

1. REQUIRED ORDINANCES, STANDARDS, REGULATIONS, AND INTER-MUNICIPAL AGREEMENTS

There are already existing ordinances, standards, regulations, and inter-municipal agreements for each municipality in the Planning Area. It is not a part of this Interim Plan to update these documents.

2. OTHER SEWAGE FACILITIES PLAN ADOPTIONS

It is anticipated that this Interim Plan will be adopted by the participating municipalities identified as part of the Planning Area.

3. LEGAL DOCUMENTS

No legal documents were prepared as part of this Interim Plan.

4. DATES AND TIMEFRAMES OF 1 THROUGH 3 ABOVE

The dates and time frames for the items in this section are found in the implementation schedule in Section VIII.

D IDENTIFY PROPOSED INSTITUTIONAL ALTERNATIVE FOR IMPLEMENTING THE SELECTED TECHNICAL ALTERNATIVE

No changes to the institutions are recommended to implement this Interim Plan.

The December 29, 1981 Inter-Municipal sewage agreement states in part that “the appropriate parties agree to enter into discussions and negotiations in an effort to attempt to arrive at agreements on the following matters:

(A) The establishment of a regional sewer agency of some type to possibly own and operate the Treatment Plant, to plan and build any future treatment plants as they may be needed, to own and operate major interceptors and to own and operate all the collection systems themselves.”

Although the Inter-municipal sewage agreement does not require the parties to agree to regionalization, the topic will be discussed as part of the Long-term Act 537 Planning process.

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

A JUSTIFY THE SELECTED ALTERNATIVES BASED ON THE FOLLOWING:

1. EXISTING WASTEWATER DISPOSAL NEEDS

The KIWWTP is where existing sewage is treated. No changes to this are planned. The existing institutions are adequate to implement this Interim Plan.

2. FUTURE WASTEWATER DISPOSAL NEEDS

The selected alternatives take advantage of existing facilities and existing institutions for treatment of projected flows within the Interim Plan's planning horizon.

3. OPERATIONS AND MAINTENANCE CONSIDERATIONS

Existing Source Reduction Plans for collection systems and existing O&M plans at the KIWWTP provide the necessary operations and maintenance for the selected alternatives.

4. COST EFFECTIVENESS

A paper rerate of the hydraulic design capacity at the KIWWTP is a very cost effective alternative to address peak flows. This rerate of the hydraulic design capacity does not require construction of new tanks, pipelines or equipment.

LCA expects to move 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. A feasibility study is currently under way to assess alternatives to address this challenge. The alternatives being evaluated include traditional storage, in-line storage, or a combination / hybrid approach. Future planning will be required, but this project is anticipated to be constructed during this planning period of 2021 to 2025.

5. AVAILABILITY OF MANAGEMENT AND ADMINISTRATIVE SYSTEMS

The existing Authority and Municipal institutions along with their inter-municipal agreements are adequate to implement this Interim Plan.

6. ENVIRONMENTAL SOUNDNESS

The selected alternative does not propose an expansion of conveyance or treatment capacity. It proposes to use existing treatment and conveyance facilities. Therefore, the selected alternative is consistent with environmental soundness and natural resource planning and preservation programs.

B IMPLEMENTATION SCHEDULE

The proposed Implementation Schedule for the Interim Plan as well as for completing the Long-Term Act 537 Plan is presented below. It represents a significant effort to evaluate a complex sewage collection, conveyance and treatment system. Significant amounts of data need to be collected and analyzed prior to developing the alternatives that will address the sewage needs of the region for the next 20 to 30 years.

The technical aspects of the Interim Plan are complex, but definable. However, the inter-municipal aspects (and potential for regionalization) are more difficult to define and quantify from a schedule perspective. These discussions must begin early in the process and are expected to continue throughout the planning process.

The table that follows is a best estimate of the time needed to complete this Interim Plan. The potential exists for changes during implementation which will be addressed and the schedule modified accordingly.

Work Categories & Description	Start	Finish
Immediate: ■ Sewage Billing Meter (SBM) Upgrades & data validation / capture method ■ Defined scope and meter placement for Flow Characterization Study ■ Agreement on Cost-Sharing for Planning work ■ Municipal Flow Projections → 2050 ■ Part 2 Permit Resubmission for the KIWWTP hydraulic re-rate	As soon as possible	December 2020 ** Timing required to design flow metering program*

Work Categories & Description	Start	Finish
Preliminary: ■ Preliminary Treatment Alternatives Evaluation – Resolve concepts with preliminary regulatory and engineering evaluation so signatories can review impacts to inter-municipal agreements, cost-sharing, etc. ■ Inter-municipal Agreement Review ■ Evaluation of Regional Approaches ■ Conceptual Agreement on Cost-Sharing	As soon as possible	September 2021 ** Timing required to have inputs available for flow modeling work*
Flow Monitoring & Model Calibration: ■ Flow Monitoring ■ Rainfall Monitoring ■ RDII Characterization ■ KISS Model Calibration ■ Preliminary modeling of alternatives ■ Update treatment alternatives analysis	January 2021	June 2022
Alternatives Analysis: ■ KIWWTP vs. Pretreatment Plant ■ Storage vs. conveyance/pumping alternatives ■ Peak flow capacity alternatives ■ I&I removal impacts on alternatives ■ Preliminary cost estimates	June 2022	June 2023
Selection of Preferred Alternative: ■ Detailed cost estimates ■ Address impact to inter-municipal agreements ■ Develop implementation schedule ■ Stakeholder input	June 2023	June 2024
Act 537 Plan Development (Write the plan)	June 2024	September 2024
Public Notice & Municipal Adoptions	September 2024	February 2025
Final Submission		March 2025

APPENDIX 1

KISS Planning Area

Lehigh County Authority

City of Allentown*

City Signatories**

LCA Signatories

Act 537 Boundary

* Hanover Township is a direct customer to the City of Allentown

** North Whitehall Township is a direct customer of Coplay-Whitehall Sewer Authority

LEHIGH COUNTY AUTHORITY

KISS PLANNING AREA

INTERIM 537 PLAN

LEHIGH COUNTY, PENNSYLVANIA

Remarks:

KISS MUNICIPALITIES

City of Allentown	Borough of Alburtis
Borough of Coplay	Borough of Emmaus
Borough of Macungie	Lower Macungie Township
Hanover Township	North Whitehall Township
Lowhill Township	South Whitehall Township
Salisbury Township	Upper Milford Township
Upper Macungie Township	Whitehall Township
Weisenberg Township	

LEHIGH COUNTY AUTHORITY GIS

DATE: 3/5/2020 SCALE: 1:82,000

CREATED: AKW CHECKED: MDB

APPENDIX 2

KISS Collection System

Lehigh County Authority

Legend			
Pump Station	Western Lehigh Interceptor	Trout Creek Trunk Sewer Line	Jordan Creek Trunk Line
Treatment Plant	Alburtis Sanitary Main	District No. 29 Trunk Sewer Line	Lehigh River Trunk Line
Spring Creek Force Main	Emmaus Sanitary Main	Emmaus Sewer Trunk Line	Little Lehigh Trunk Line
Western Lehigh Sanitary Service Area	South Whitehall Sanitary Main	Front Street - Union Street Trunk Line	Maple Street Sewer
	Lower Macungie Sanitary Main		City of Allentown Signatories
	Upper Macungie Sanitary Main		

LEHIGH COUNTY AUTHORITY

KISS COLLECTION SYSTEM

INTERIM 537 PLAN

LEHIGH COUNTY, PENNSYLVANIA

Remarks:

1. Borough of Macungie infrastructure not shown
2. Salisbury Infrastructure not shown
3. Coplay - Whitehall Sewer Authority Infrastructure not shown
4. Hanover Infrastructure not shown

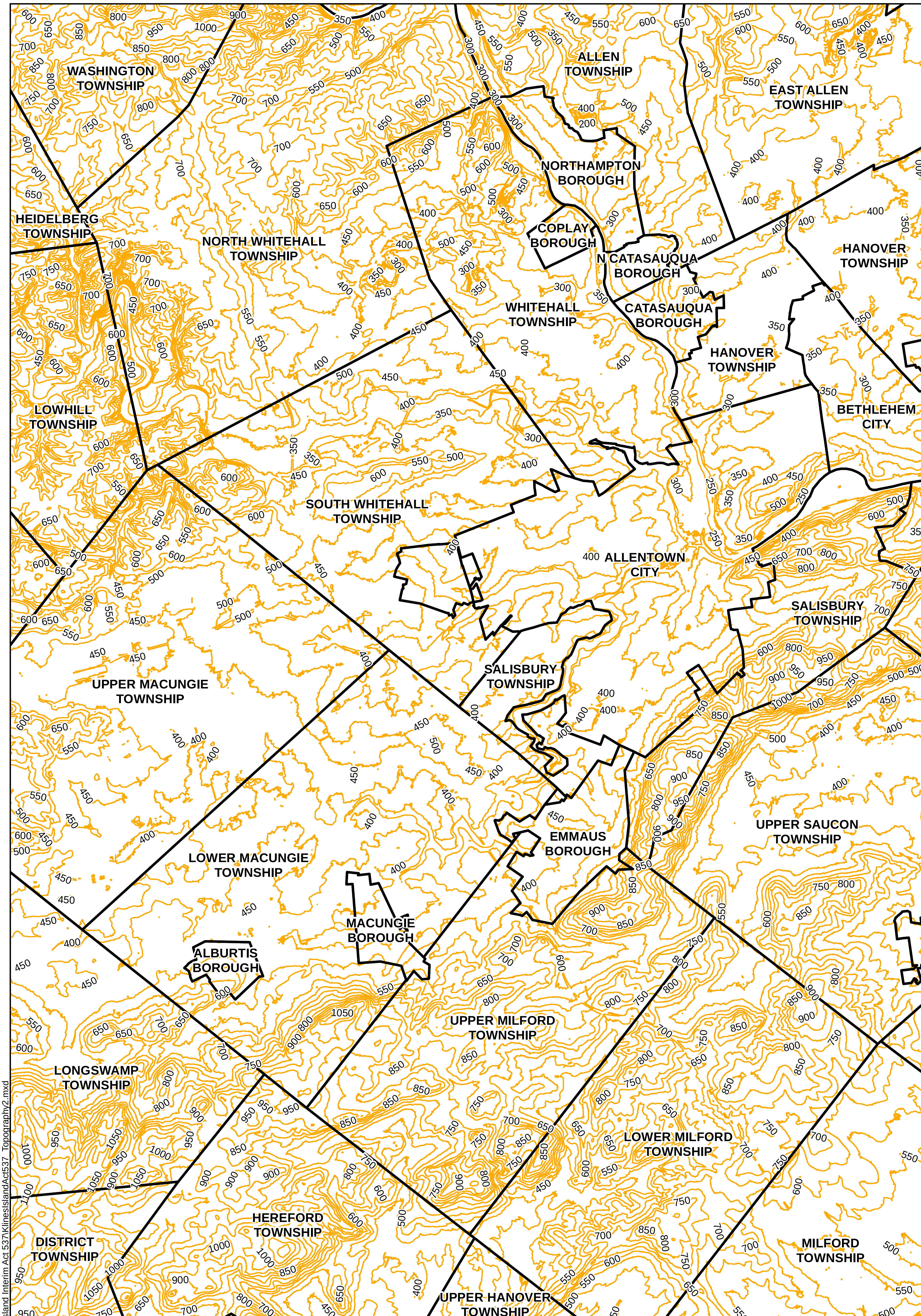
LEHIGH COUNTY AUTHORITY GIS

DATE: 3/4/2020 *SCALE: 1:40,000*

CREATED: AKW *CHECKED: MDB*

APPENDIX 3

Topographic Map



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Legend

50-Foot Countour

Municipal Boundary

Kline's Island Interim Act 537 Plan

Topography

0 3,750 7,500 15,000 Feet

1 inch = 7,500 feet

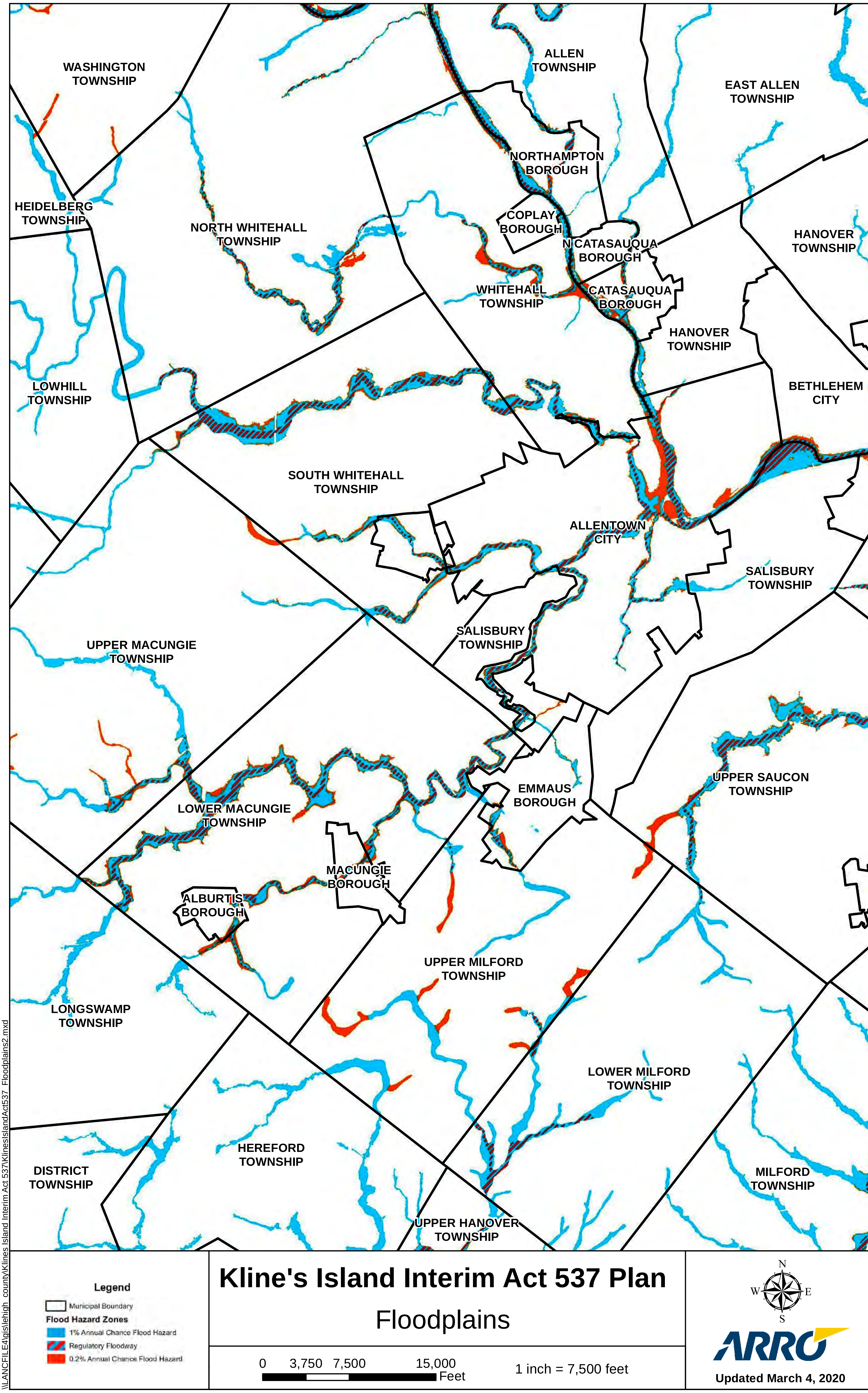
N W E S

ARRO

Updated March 4, 2020

APPENDIX 4

Flood Plain Map



Kline's Island Interim Act 537 Plan

Floodplains

1 inch = 7,500 feet

ARRO

Updated March 4, 2020

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APPENDIX 5

Western Lehigh Sewage Partners Sewer Capacity Assurance & Rehabilitation Program Approach Outline(2009)

BOROUGH OF ALBURTIS SEWER AUTHORITY
UPPER MACUNGIE TOWNSHIP AUTHORITY
LOWHILL TOWNSHIP

LEHIGH COUNTY AUTHORITY

Sewer Capacity Assurance & Rehabilitation Program
Program Approach Outline

Western Lehigh Sewerage Partnership

October 2009

Report Prepared By:

Malcolm Pirnie, Inc.

640 Freedom Business Center
King of Prussia, PA 19406
610-768-5813

0247-505
P:\0247 - LCA\505 - WLSP SCARP\SCARP\Program Approach Outline\LCA SCARP Approach Outline.Rev5.Docx

MALCOLM PIRNIE

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Appendices

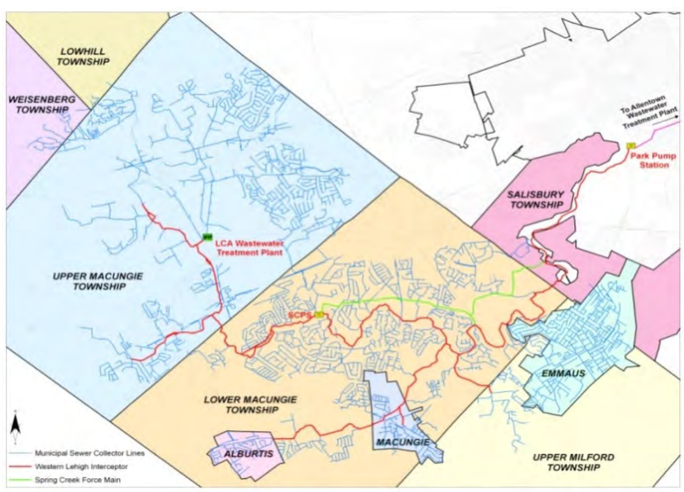
1. Introduction

Peak flow issues in the Lehigh County Authority (LCA) sewer conveyance systems and in the collections systems connected to it (namely Upper Milford Township, Weisenberg Township, Lower Macungie Township (LMT), Upper Macungie Township (UMT), Lowhill Township, Alburtis, and Macungie) have caused the Pennsylvania Department of Environmental Protection (PADEP) to begin reviewing sewer system extensions in each of these communities. Pursuant to communications with PADEP and in accordance with Chapter 94 requirements, LCA and the above municipalities and, where applicable, their wastewater authorities, have elected to prepare and implement a corrective action plan to collectively address the problems within each of these sanitary sewer systems. LCA and the above named LCA signatory parties have formed the Western Lehigh Sewerage Partnership (WLSP) to jointly investigate and develop an appropriate corrective action plan. The Sewer Capacity Assurance and Rehabilitation Program described in this outline will address both PADEP concerns and other related long-term wastewater needs for the Partners.

Since initial formation of the WLSP, the United States Environmental Protection Agency issued a Compliance Order to all municipal dischargers to the City of Allentown's Klines Island wastewater treatment plant. The technical requirements of that order are also addressed in this Program.

1.1. System Overview

All told, there approximately 262 miles of sewer mains in the above municipalities and LCA's system that discharge through the Western Lehigh Interceptor. Approximately 18,000 wastewater connections served by these systems.



1.1.1. Lehigh County Authority

In 1972, Lehigh County and Lehigh County Authority placed into service a sanitary sewer interceptor system in western Lehigh County to convey wastewater from the Boroughs of

Alburtis and Macungie and the Townships of Upper and Lower Macungie to the City of Allentown's Allentown/Emmaus Interceptor. Today, the system additionally serves portions of the Townships of Weisenberg, Upper Milford, and Lowhill, and portions of the Borough of Emmaus. The interceptor system, known as the Western Lehigh Interceptor (WLI) System, consists of 18 miles of gravity sewers ranging in size from 8 inch to 36 inch diameter pipe, one relief pumping station and force main (Spring Creek Road Pump Station), and five meter stations. Wastewater from the WLI discharges into the Allentown/Emmaus Interceptor at Keck's Bridge. The Allentown/Emmaus Interceptor flows from Keck's Bridge to its downstream confluence with the Cedar Creek Interceptor and Little Lehigh Interceptor. The Little Lehigh Interceptor begins at this confluence and serves as the final conveyance step in the transport of wastewater to the City of Allentown Wastewater Treatment Plant at Kline's Island. The Allentown/Emmaus Interceptor, Cedar Creek Interceptor, and Little Lehigh Interceptor are owned by the City of Allentown.

LCA also owns, operates, and maintains relief facilities along the Little Lehigh Creek to address intermittent hydraulic overloading of the Little Lehigh Interceptor: Park Pumping Station and Little Lehigh Relief Force Main, and the Keck's Bridge Relief Interceptor between Keck's Bridge and Park Pumping Station. The Park Pumping Station and Little Lehigh Relief Force Main were placed in operation in the fall of 1983 to supplement capacity in the Little Lehigh Interceptor and pump it through a force main to a location immediately upstream of the Kline's Island Wastewater Treatment Plant. In August 1986, the LCA completed construction of the Keck's Bridge Relief Interceptor to relieve overflows during storm events in existing interceptors in the Keck's Bridge area and to allow for future development in LCA service areas. The capacity of Park Pumping Station was also increased in 1986 to accommodate additional flows from the Keck's Bridge Relief Interceptor.

In 1998, the Spring Creek Road Pump Station (SCRPS) began operation. This relief pumping system includes 2,500 feet of 20-inch diameter force main and 11,900 feet of 24-inch diameter force main which bypass approximately 24,000 linear feet of the WLI in Lower Macungie Township. The pump station is designed to pump up to 7 MGD during peak flow periods typically associated with severe rain events.

In 2005, the 10,250 LF 24-inch SCRPS force main extension from Millrace Road to the 42-inch Little Lehigh Relief Interceptor near the interception of Devonshire Road and Keystone Avenue (approximately 2,000 feet downstream of Kecks Bridge) was completed. This extension relieved hydraulic loading on that section of the WLI between manholes L-66 and L-1.

1.1.2. Upper Milford Township

Upper Milford Township (UMiT) is located in southern Lehigh County, adjoining Emmaus Borough, Lower Macungie Township and the Borough of Macungie. The sanitary sewer system in UMiT is owned and operated by the Lehigh County Authority pursuant to a sewer service agreement dated January 1, 1982. UMiT designates the areas of the UMiT where sewer service will be provided and approves the allocation granted.

Currently, there are over 400 properties being served in the UMiT sewer system consisting of over 40,000 feet of pipe. Over 94% of the system is 8 inch pipe, 5% is 2 inch force main and less than 1% is 10 inch. The system is 95% PVC and the remainder is DIP. The majority of the system was constructed in the 1980s. The system consists of collection systems discharging into the Emmaus Borough system, into the Lower Macungie Township system and into the LCA WLI Interceptor system.

In 2009, an additional 21 EDUs will be connected in the S. 7th St. area. Sewering the Vera Cruz area of the Township is in final design phase. The project includes construction of 4.65 miles of low pressure force main and 276 grinder pumps to connect 299 existing EDUs.

1.1.3. Weisenberg Township

Weisenberg Township is located in the northwestern section of Lehigh County, adjoining Lowhill and Upper Macungie Township. The sanitary sewer system in Weisenberg Township is owned and operated by the Lehigh County Authority. In an agreement dated 4/19/1990, Weisenberg Township designated LCA as the operating agent for the Pointe West and Pennsylvania State University wastewater systems in the Township. Also in an agreement with Upper Macungie Township dated 4/19/1990, Upper Macungie Township agreed to accept the wastewater from the Pointe West Development. The agreement provided for repair and/or elimination of I&I by Weisenberg Township.

In an agreement dated 4/22/2002, the Township conveyed the wastewater systems in Service Area 1 and Service Area 2 to the LCA. Service Area 1 is the Pointe West system which discharges into the Upper Macungie Township collection system. The 4/19/1990 agreement between Upper Macungie Township and Weisenberg Township was transferred to LCA. Service area 2 is a separate system which is not part of the LCA Western Lehigh Interceptor system.

There are 149 customers being served in Weisenberg Township with a system consisting of almost 21,000 feet of pipeline which discharge flows through Upper Macungie Township and the WLI Interceptor system. Over 97% of the system is 8 inch pipe and 3% is 2 inch force main. The system is 99% PVC and 1% DIP. No new connections are expected within Weisenberg Township.

1.1.4. Upper Macungie Township and Upper Macungie Township Authority

Upper Macungie Township is a second class Township governed by a three member board of supervisors. UMT covers 24.5 square miles and is located in the southwestern portion of Lehigh County. The population, based on current information available, is approximately 17,390. A general breakdown of the land use within UMT shows that residential development accounts for about 22% of its land use while commercial and industrial development make up about 26% with the remaining 31% of the land divided among agriculture and public uses or is undeveloped.

The UMT sanitary sewer system is owned and operated by the Upper Macungie Township Authority (UMTA). UMTA is an operating authority managed by a five member board appointed by the Supervisors. The collector system comprises approximately 139 miles of sewer pipe and includes seven wastewater pumping stations. The sanitary sewer system based on the Act 537 boundary serves approximately 55% of UMT and contains 735,445 linear feet of 8-inch through 24-inch sewer main, 3,060 manholes and seven pumping stations and appurtenances. The original sanitary sewer system was installed in 1968 and was completed in 1972. Extensions to the public sewer system were added over the years by various UMTA projects as well as through development growth in UMT which accounts for its present size. Currently the UMTA system customer base consists of 5690 residential, 305 commercial and 7 industrial customers.

A breakdown of the of the UMTA sewer system by material, pipe size, length and age are as follows:

Material	**Pipe Size**	**Length**	**Year**
Vitrified Clay Pipe	8” to 15”	139,000’	1968-1982
Reinforced Concrete Pipe	15” to 18”	2,700’	1968-1972
Ductile Iron Pipe	8” to 24”	34,000’	1968-Present
PVC / C900	8” to 24”	540,500’	1982-Present
Low Pressure Force Main (PVC)	1¼” to 3”	17,700’	1998-Present

1.1.5. Lower Macungie Township

Lower Macungie Township is a first class township governed by a five member Board of Commissioners. LMT covers 22.5 square miles and is located in the southwestern portion of Lehigh County. The population, based on current information available, is approximately 31,000. LMT is characterized as a residential suburban community. A general breakdown of LMT land use based on zoning districts indicates residential development accounts for about 50% of the land use while commercial and industrial development makes up about 17%. The remaining 33% is divided among agriculture and public uses or is undeveloped.

The LMT sanitary sewer system is owned and operated solely by the LMT and administered by the Board of Commissioners. The collector system comprises approximately 122 miles of sanitary sewer pipe. The sanitary sewer system based on the current Act 537 boundary serves approximately 55% of LMT and contains 644,100 linear feet of 8-inch through 16-inch sewer main and 3,567 manholes. There are no pumping stations in the LMT sewer system. The original sanitary sewer system was constructed in 1968 and completed in 1972. Extensions to the public sewer system were added over the years by various LMT sponsored projects as well as through development growth which accounts for its present size. Currently the LMT system customer base consists of 8,971 residential and 24 commercial/industrial customers.

Most of the LMT sewer system drains, through a number of connection points, into the Lehigh County Authority conveyance system which in turn flows through the City of Allentown sewer system to the city wastewater treatment facility. There are several connection points in the LMT system that drain to the South Whitehall Township. Segments of the LMT sewer system which drain to South Whitehall Township are not included in the SCARP.

A breakdown of the of the LMT sewer system by material, pipe size, length and age follows:

Material	**Pipe Size**	**Length**	**Year**
Vitrified Clay Pipe, Polyvinyl Chloride Pipe and Ductile Iron Pipe	8”	605,000’	1968-Present

Vitrified Clay Pipe, Polyvinyl Chloride Pipe and Ductile Iron Pipe	10”	30,000’	1968-Present
Vitrified Clay Pipe, Polyvinyl Chloride Pipe and Ductile Iron Pipe	12”	1,800’	1968-Present
Vitrified Clay Pipe, Polyvinyl Chloride Pipe and Ductile Iron Pipe	15”	5,700’	1968-Present
Ductile Iron Pipe	16”	400’	1968-Present

1.1.6. Borough of Alburtis and Borough of Alburtis Sewer Authority

The Borough of Alburtis is governed by a seven member Borough Council. The Borough covers approximately 0.7 square mile and is located in the southwestern portion of Lehigh County. It is surrounded by Lower Macungie Township. The population is approximately 2,100 based on current census data. The Borough is characterized generally as a residential community although it does supports retail commercial business and industrial districts. A general breakdown of land use based on zoning districts indicates residential development accounts for about 75% of the land use while commercial and industrial accounts for about 20% of the land use. The remaining 5% is used for community facilities and parks.

The Borough of Alburtis sanitary sewer system is owned by the Borough of Alburtis Sewer Authority and is operated by the Borough of Alburtis. The collector system comprises approximately 8.04 miles of sanitary sewer pipe. The sewer system serves approximately 60% of the Borough and contains 42,480 linear feet of 8-inch through 12-inch sewer main and 220 manholes and one wastewater pumping station. The initial sanitary sewer system was constructed between 1968 and 1972. Extensions to the public sewer system were added primarily by development growth over the years accounting for its present size. Currently the Borough system customer base consists of 833 residential, 26 commercial and 1 Industrial customer.

The Borough’s sewer system drains directly to the Lehigh County Authority conveyance system which in turn flows through the City of Allentown sewer system to the city wastewater treatment facility. A breakdown of the of the Borough sewer system by material, pipe size, length and age follows:

Material	Pipe Size	Length	Year
Vitrified Clay Pipe	8”	28,304’	1968-1982
Vitrified Clay Pipe	10”	3,584’	1968-1972
Vitrified Clay Pipe	12”	555’	1968-1972
Cast Iron Pipe	8”	645’	1968-1972
Cast Iron Pipe	10”	287’	1968-1972
Cast Iron Pipe	4”	339’	1968-Present
Polyvinyl Chloride Pipe	8”	25,776’	1982-Present

1.1.7. Borough of Macungie

The Borough of Macungie is governed by a seven member Borough Council. The Borough covers approximately 1.0 square mile and is located in the southwestern portion of Lehigh County. It is primarily surrounded by Lower Macungie Township except on the south side where it borders Upper Milford Township. The population of the Borough is 3,039 based on the 2000 census. The Borough is characterized generally as a residential community although it does support retail commercial business and industrial districts. A general breakdown of the Borough land use based on zoning districts indicates residential development accounts for about 75% of the land use while commercial and industrial accounts for about 18% of the land use. The remaining 7% is used for community facilities and parks.

The Borough of Macungie sanitary sewer system is owned and operated by the Borough. The collector system comprises approximately 11.4 miles of sanitary sewer pipe. The sewer system serves approximately 65% of the Borough and contains 60,330 linear feet of 8-inch through 12-inch sewer main and 315 manholes. The initial sanitary sewer system construction began in 1968 and was completed in 1972. Extensions to the public sewer system were added primarily by development growth over the years accounting for its present size. Currently the Borough system customer base consists of 1654 residential, 83 commercial and 3 Industrial customers.

The Borough sewer system drains directly to the Lehigh County Authority conveyance system which flows through the City of Allentown sewer system to the city wastewater treatment facility. A breakdown of the of the Borough sewer system by material, pipe size, length and age follows:

Material	Pipe Size	Length	Year
Vitrified Clay Pipe	8”	32,114’	1968-1982
Vitrified Clay Pipe	10”	1,675’	1968-1972
Cast Iron Pipe	8”	645’	1968-1972
Cast Iron Pipe	10”	120’	1968-1972
Polyvinyl Chloride Pipe	8”	25,776’	1982-Present

1.1.8. Lowhill Township

Lowhill Township is located the northwestern section of Lehigh County, adjoining Weisenberg and Upper Macungie Township. The sanitary sewer system in Lowhill Township is operated by the Upper Macungie Township Authority through a service agreement. There are being served in Lowhill Township that eventually discharge to the LCA system. The Lowhill Township system consists of 3,052 feet of 8” PVC gravity pipeline and 587 feet of 2” PVC force main through which 43 connections discharge into the Upper Macungie Township collector system and ultimately into the LCA system.

1.2. Satellite System Obligations to LCA

There are a number of contractual and regulatory obligations of the signatory systems to LCA that compels actions by LCA on the signatories to ensure the LCA system is able to meet its regulatory requirements. LCA has a number of agreements in place to deal with accepting the wastewater from the municipalities that discharge from their collection systems to LCA’s Western Lehigh Interceptor system. Following are excerpts from those agreements that set forth an obligation to deal with inflow and infiltration in both types of relationships.

1.2.1. April 1, 1983 Agreement- LCA and its Signatories

§4.02 - Hydraulic Flow. If for any calendar year a Municipality's average hydraulic flow which shall be defined as the hydraulic flow as determined under the provisions of Section 3.o2 plus its pro rata share of the service area infiltration and inflow, exceeds the hydraulic flow allocations as set forth in this Agreement, then the Municipality shall pay penalty charges as follows…..

§5.03 - LCA and the Municipalities agree to pursue the removal of infiltration and inflow ("I/I") as part of the ongoing operation and maintenance of their respective systems…

1.2.2. August 4, 1987 Agreement (Post-1985 Allocation) - LCA and its Signatories

§3.02 - The Municipalities and LCA agree to cooperate in the institution of a coordinated program of inflow and infiltration (I/I) detection and removal. Any Municipality which fails to comply with the provisions of this program shall not have access to the allocation available under this Agreement. Determination of failure to comply shall be by vote of the Municipalities, excluding the accused Municipality, as provided in §2.09.

1.3. LCA Obligations to City of Allentown

There are a number of contractual requirements that LCA has toward the City that compel actions on the part of LCA to ensure the LCA system is able to meet its contractual obligations. LCA has agreements with the City of Allentown for transmission of some of its wastewater through City transmission mains and as well as for treatment of wastewater at the City's Kline's Island Treatment Plant. Although the December 29, 1981 Agreement between the City and various municipal entities that discharge to the City system (including LCA) is generally the governing agreement, the 1981 Agreement specifically states that if an issue is not addressed in the 1981 Agreement, in the case of LCA the pre-existing 1969 Agreement would govern. Since the 1981 Agreement does not have specific language dealing with inflow and infiltration, the following excerpts from the 1969 Agreement establish the Authority obligation to the City to deal with inflow and infiltration.

§4 - The City and LCA agree that the sewage and wastes discharged by any user into a City sewer line shall not contain storm water, roof or surface drainage…..

§11 - …LCA further agrees that it will cause to have enacted and enforced ordinances, resolutions, rules and regulations governing sewer connections and the admission of sewage into the sewers, which ordinances, resolutions, rules and regulations shall conform with existing ordinances, rules and regulations of the City and further agrees to cause to be enacted and enforced additional ordinances, resolutions, rules and regulations to conform with future ordinances, rules and regulations adopted by the City to govern the admission of sewage into the Allentown Collection System or Treatment Plant… .

1.4. Program Purpose

The purpose of this Sewer Capacity Assurance and Rehabilitation Program (SCARP) Approach Outline is to define a formal methodology to be used by the Partners (namely Upper Milford Township, Weisenberg Township, LCA, Lower Macungie Township (LMT), Upper Macungie Township (UMT), Upper Macungie Township Authority, Lowhill Township, Alburtis, Alburtis Sewer Authority, and Macungie) for planning, evaluating, prioritizing, and conducting sewer rehabilitation, conveyance expansion, and/or storage construction in a coordinated and consistent manner. The SCARP will be the mechanism by which the Partners achieve mutually agreed upon objectives and meet regulatory requirements in a timely, fiscally responsible, and cost effective manner.

As described in earlier paragraphs, the Partners recognize that the problems faced by partner community with respect to its sanitary sewer system are, for the most part, the same as those problems faced by the other partners. By acknowledging that the problems faced in one community eventually negatively impact the other parties, the Partners have agreed to take a unified regional approach to addressing these common problems. By acting in a coordinated manner, the common problems experienced by all of the Partners can be addressed in the most effective and efficient manner. This regional approach:

- Offers lower costs due to both economy of scale and the ability to apply resources and experience from multiple communities.
- Reduces the regulatory burden by nearly an order of magnitude.
- Increases the likelihood of success by ensuring all actions are complementary and mutually supported.
- Reduces the conflict between the parties that tends to arise when multiple communities try to independently solve their portion of a regional problem.

The Partners will develop and execute a memorandum of understanding (MOU) that will reference this SCARP Program Approach Outline and will commit the Partners to working together on all program activities through the investigative phase of the program.

Following completion of the investigative phase of the project, definitive information relative to the hydraulic and physical condition of the entire sewer collection system will be available. At the commencement of the implementation phase of the program, a second MOU will be considered for the balance of the SCARP.

In the event a partner elects not to participate in the Partners second MOU, a description of the plan for achieving their independent program objectives will be separately provided by said community.

1.5. Program Approach Outline Purpose

This Sewer Capacity Assurance and Rehabilitation Program Approach Outline (SCARP Approach Outline) is intended to outline the proposed planning, data gathering, and evaluation steps needed to determine the SCARP Improvements Plan, which will consist of two complementary plans: a Capital Improvement Plan and a Long-term Asset Management Plan.

This SCARP Approach Outline is the first of several SCARP planning and management documents that will be prepared. As the SCARP progresses, the availability of new information will promote further analysis and study that will undoubtedly require refinement of the SCARP. Phasing of the planning and management documents described in this SCARP Approach Outline is necessary because of the current overall lack of information and the time needed to collect the data necessary to properly define and quantify the problem(s), to evaluate methods of redress, and to determine the corrective actions required to achieve the goals of the SCARP and comply with regulatory requirements. The anticipated planning and management documents to be prepared for this SCARP are:

- SCARP Approach Outline (this document)
- SCARP Program Management Plan - Investigation Phase
- SCARP Objectives Evaluation
- SSES Workplan
- SCARP Improvements Plan
- SCARP Program Management Plan - Implementation Phase
- Annual Reports

The work involved in each of the various steps of the SCARP, the underlying logic and rationale for their sequence, and their place in each of the planning and management documents is more fully described in Section 3. Section 4 describes a methodology for the determination of future capacity allocation. The components, sequence of activities, and schedule of each report are elaborated in Section 5.

1.6. Regulatory Process Management

This SCARP Approach Outline is the first of several SCARP documents that will be submitted to PADEP. The following documents will be submitted to PADEP for action as noted:

- SCARP Approach Outline (this document) – for review, comment, and acceptance by PADEP
- SCARP Objectives Evaluation – for review and comment by PADEP

- SSES Workplan – for review and comment by PADEP
- SCARP Improvements Plan – For review, comment, and acceptance by PADEP
- Annual Reports

Each member of the WLSP has Act 537 and Chapter 94 planning and reporting responsibilities. Since the WLSP will be acting in concert (at least through the investigation phases of the SCARP), a streamlined regulatory process is desirable.

The SCARP Approach Outline (this report) constitutes a major sewerage planning change for each of the Partners. Accordingly, each municipal entity will issue a resolution adopting the SCARP Approach Outline as a 537 amendment. All WLSP resolutions will accompany the SCARP Approach Outline as a single deliverable to PADEP for review, comment, and acceptance.

All subsequent documents to be submitted to PADEP as part of the SCARP will be submitted in a similar manner. The SCARP Objectives Evaluation and the SSES Workplan will be submitted for regulatory review and comment only. The findings and recommendations from both of these documents will be detailed in the final planning document submission, the SCARP Improvements Plan, which will be submitted for PADEP review, comment, and acceptance in the same fashion as the SCARP Approach Outline; each municipal entity will issue a resolution adopting the SCARP Improvements Plan as a 537 amendment, and all WLSP resolutions will accompany the SCARP Improvements Plan as a single deliverable to PADEP.

2. Drivers, Problem Definition, and Objectives

2.1. Drivers

WLSP stakeholders participated in a number of workshops to identify program drivers, develop problem definition, and develop a list of preliminary objectives. The stakeholders are the individual communities and their associated authorities (where appropriate), as listed below:

- Lehigh County Authority
- Upper Milford Township
- Weisenberg Township
- Lower Macungie Township
- Upper Macungie Township
- Upper Macungie Township Authority
- Lowhill Township
- Borough of Alburtis
- Borough of Alburtis Sewer Authority
- Borough of Macungie

The drivers identified by the stakeholders as well as relevance to each stakeholder are summarized below:

- Keeping base infiltration flows controlled to help keep baseline flows below a yet to be defined rate to avoid having infiltration trigger expensive treatment expansions/upgrades
- Reducing peak flows at Klines Island WWTP to eliminate bypass
- Keeping peak flows below a yet to be defined rate to try to avoid triggering expensive treatment expansions/upgrades
- Preventing Sanitary Sewer Overflows (SSOs) in interceptors between Park Pump Station (PPS) and Klines Island WWTP
- Preventing SSOs in Western Lehigh Interceptor (WLI) and Little Lehigh Interceptors (LLI).
- Preventing SSOs in individual collection systems

- Providing aging collection systems with consistent and effective asset management practices that provide long term sustainability.

2.2. Generalized Problem Definition

Each of the Partners generally acknowledges that there are base flow and wet weather flow problems in their respective sewer collection systems. While each of the Partners has to a greater or lesser extent investigated their individual flow problems, the available information is not adequate to conduct broadly effective sewer rehabilitation or conveyance enhancements or to implement sophisticated long-term asset management programs as described in Section 3.8. The process for collecting the information necessary to define and quantify base and wet weather flow problems is summarized in Section 3 of this SCARP Approach Outline.

Several flow related problems beset the Partners. These are:

- Peak wet weather flows within some of the satellite WLSP systems may exceed their trunk lines' capacity, causing SSOs and/or sewage backups into basements (SIB). The current level of service (LOS) provided by each system individually, and by the total system as an integrated sanitary sewer system is undefined; therefore, the LOS gap is not quantified; therefore, this aspect of the problem is ill-defined.
- Peak wet weather flows, to which all of the Partners contribute, exceed the capacities of the WLI, LLI, and PPS, causing SSOs. The current level of service provided by these major conveyance components is ill-defined; therefore, this aspect of the LOS gap is not quantified; therefore, the problem is ill-defined.

- Peak wet weather flows, including flow from all of the Partners, exceed the capacity of the Klines Island WWTP headworks, causing bypasses of wet weather diluted sewage flows from the normal wastewater treatment processes. The current level of service provided is undefined; therefore, the LOS gap is not quantified; therefore, the problem is ill-defined.
- Infiltration, to which all of the Partners contribute, is consuming base capacity intended for planned 537 growth, and continued growth without significant reductions in baseline flows via infiltration reductions will trigger expensive upgrades at Kline Island WWTP to comply with recent DRBC regulations.
- Some system components are deteriorated, leak badly, and require rehabilitation or replacement. Structurally sound and leak-free sewers will require rehabilitation in the future to sustain their value, and these less compromised components require different

operation and maintenance attention than typically traditionally provided to sustain their life cycles.

The problem descriptions provided above contain a number of common elements that must be addressed before the problems can be properly defined and plans developed for resolution. The most important element is definition of the current and desired level of service. The current wet weather level of service of a system is generally defined by the ability of the system to contain and convey flows during periods of stress (i.e., high groundwater coincident with record period storms). During the investigative phase of this program, information about the sewer collection systems will be collected that will be used to define the current level of service. Once the levels of service are accurately defined, the rehabilitation, replacement, and expansion improvements strategies required to close any gap will be determined.

2.3. Preliminary Objectives

Based on the drivers and problem descriptions developed to date, the following preliminary SCARP objectives have been developed:

- Reduce peak wet weather flows to minimize the need for capacity expansion of the Western Lehigh Interceptor and the Little Lehigh Interceptor and their appurtenant components for system demands through 2030.
- Reduce peak wet weather flows from WLSP systems to help City of Allentown prevent bypasses from triggering expansions and upgrades at Klines Island WWTP and to prevent City of Allentown from claiming the bypasses are caused by the Partners.
- Reduce baseline flows to help prevent Partners from triggering treatment plant expansions and upgrades.
- Eliminate wet weather SSOs and SIBs in all systems within the yet to be defined level of service goals.
- Secure long term sustainability of all components of the sanitary sewer systems.

These preliminary objectives may be modified based on the extent of the problems (once they are quantified) and the cost and time needed to address them as described in Section 3.8. Additional goals may also be added as knowledge of the system increases and the need for further objectives are identified.

3. SCARP General Path Forward

3.1. Overview

As stated in Section 2, there is general recognition by the Partners that there are dry and wet weather related flow problems throughout the sanitary sewer system. These problems have caused capacity problems in the trunk lines, interceptors, pump stations and treatment plants. The exact nature, extent, and causes/sources underlying these problems are not currently defined. Without a thorough understanding of the underlying problems, it is not possible to develop an effective plan for addressing the recognized capacity issues. The SCARP activities as described in this Section will provide the information necessary to address the currently experienced problems and serve as the mechanism by which all Partners will meet the preliminary objectives described in Section 2. This Section outlines the overall SCARP program by introducing the steps of the SCARP, including management, planning, investigation, evaluation, and implementation.

The purpose of each major step of the SCARP is introduced below:

SCARP Management Planning - Establish management plans for the investigative and implementation phases of the program. The management plans will identify the responsibilities and authorities of each WLSP with respect to participating and funding of the SCARP. They will address commitments of labor, equipment, consultants, and other resources to the demands of the SCARP schedule.

SCARP Objectives Evaluation – Quantitatively define wet and dry weather flow performance characteristics necessary to define the current level of service.

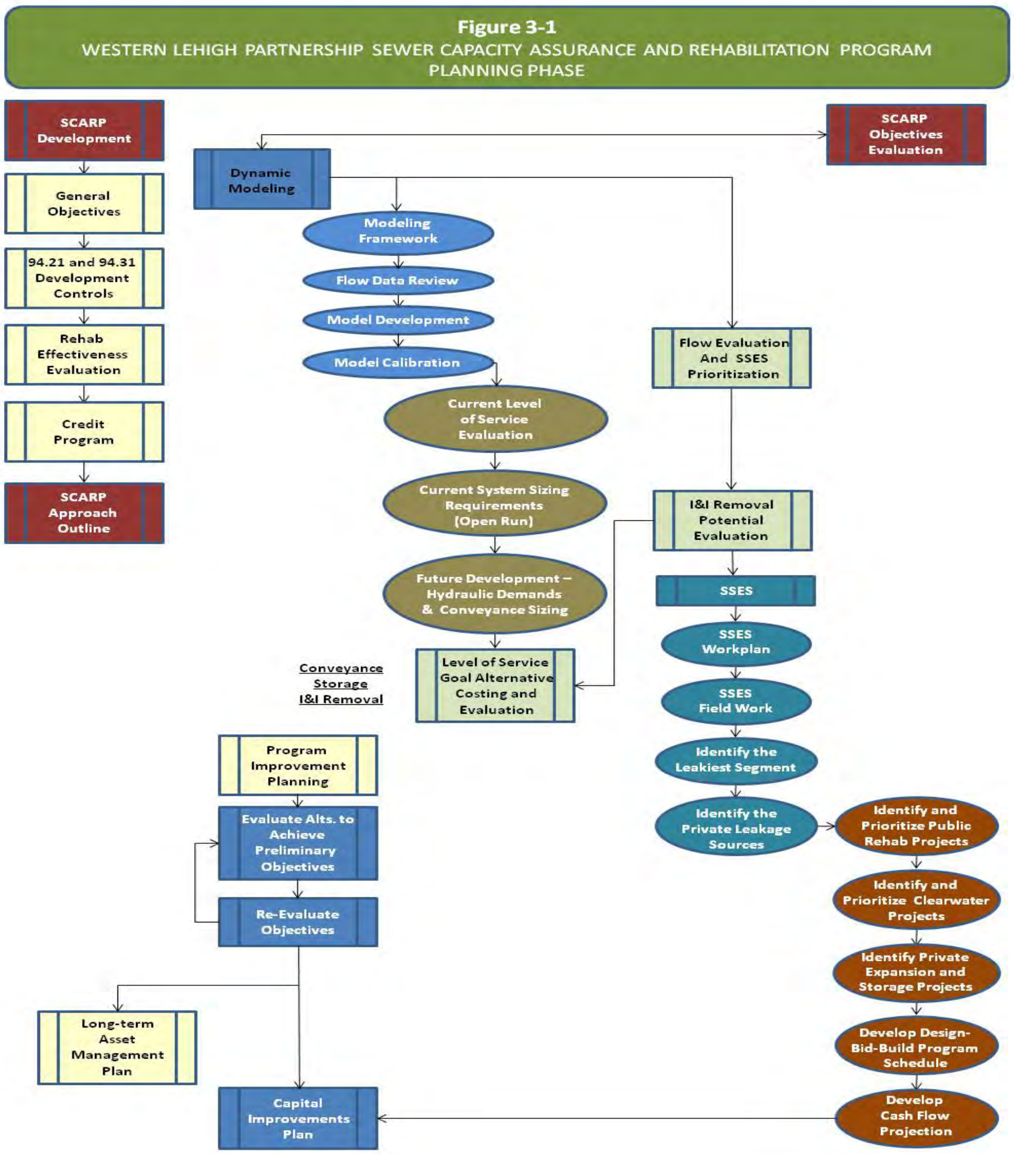
Sanitary Sewer Evaluation Study (SSES) Workplan – Develop a plan describing the field activities to be performed to collect the information necessary to identify specific areas and defects in segments of the sewer system that will require rehabilitation.

SCARP Improvements Planning – Evaluate and develop capital improvement and long-term asset management plans to achieve the final SCARP objectives.

Annual Reports and Closeout – Document actual implementation and effectiveness of the SCARP.

The remainder of this Section generally describes each component of the SCARP including relevance, purpose, methodologies, procedures, and relationship and sequences to other SCARP components. Most of these components will be reported or presented in one or more of the deliverables described in Section 1.6. Figure 3-1 shows the relationship and sequence of the SCARP components. The anticipated actual contents and schedule of each report is provided in Section 5.

Figure 3-1: SCARP Planning Phase Elements



3.2. SCARP Objectives Evaluation Steps

The first steps of the SCARP are focused on defining current system performance and to begin to assess what it might take to achieve various preliminarily considered objectives. The first steps are primarily data gathering and modeling steps that include collecting the information necessary to evaluate base and wet weather flows, defining the current level of service, and conducting hydraulic evaluations to determine if the preliminary objectives described in Section 2 can be achieved.

As described in Section 2.0, the information used to establish the preliminary SCARP objectives included institutional O&M knowledge, a limited amount of flow data, and wet weather flow observations. As there is very little empirical data available upon which to base SCARP objectives, these data will need to be collected at the onset of the program to verify the overall feasibility of the preliminary objectives. Once accurate and relevant data is collected and evaluated, the preliminary objectives will be reviewed and, if appropriate, revised. The information to be collected and used for validation of the preliminary objectives and, if necessary, development of final SCARP objectives is described in the following paragraphs.

3.2.1. Flow Evaluation Including I/I Removal Potential

In 2008, LCA retained the services of ADS, Inc. to conduct two individual flow metering programs. The program completed in March 2008 included installation of 16 ultrasonic flow meters including 6 in the LCA WLI, 1in Macungie, 1 in Alburtis, 1 in Upper Milford Township, 3 in Upper Macungie Township and 4 in Lower Macungie Township. The program completed in early November 2008 included installation of 17 ultrasonic flow meters including 4 in the LCA WLI, 3 in Macungie, 1 in Alburtis, 1 installed in Upper Milford Township, 4 in Upper Macungie Township, 3 in Lower Macungie Township and 1 in Weisenberg Township. The data collected as part of these flow monitoring programs helped to confirm that there are areas of the system that are significantly impacted by I/I. However, the location of the leakiest segments are not currently known and therefore cannot be systematically prioritized.

In March 2009, LCA initiated a comprehensive flow monitoring program that extended through September 2009. Included in the program is installation of 148 ultrasonic flow meters and 14 rain gages. Of the 148 flow meters, 10 were installed in Macungie, 4 were be installed in Alburtis Borough, 4 were installed in Upper Milford Township, 2 were installed in Emmaus, 50 were installed in Upper Macungie Township, 47 were installed in Lower Macungie Township, 22 were installed on LCA's Western Lehigh Interceptor, and 10 were installed in the Little Lehigh and Cedar Creek Interceptors.

Two quality assurance (QA) reviews on the first and last submittals of the flow data will be conducted. The initial QA review will check that the data being collected is valid and suitable for the RDII analysis phase and will provide recommendations for improving data suitability as needed. The final review will confirm the suitability of the full dataset for purposes of the RDII analysis. The reviews will address such issues as meter imbalance, sensor failure, low flow/level situations, velocity gain adjustments, and loss of storm peaks. The reviews will include data from 148 meters and flow balance analysis for 68 network balance points. The features and benefits of the QA review and RDII analysis are summarized in Table 1. A time series data management system will be used to store and evaluate all flow and rainfall data. All data will be validated to identify questionable flow meter and rain gauge data.

Table 3-1:
Features and Benefits

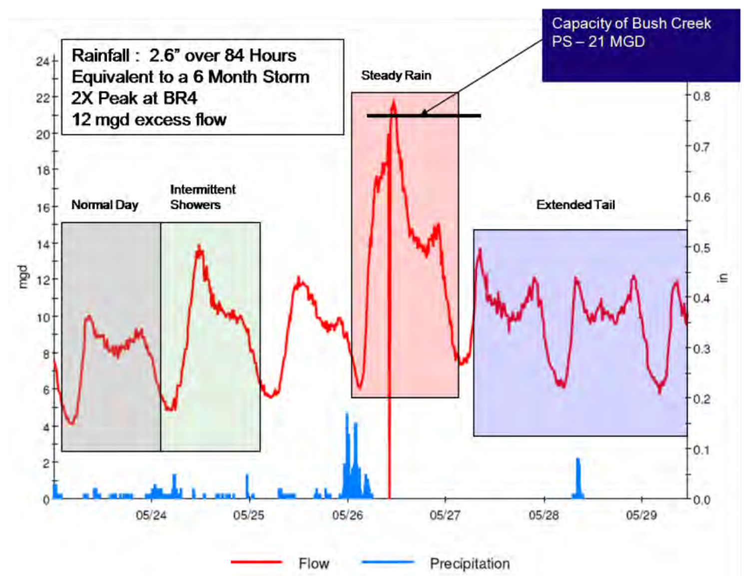
Problem	Probability/ Frequency of Occurrence	Risk/Consequence	Feature/Solution	Benefit
Meter network imbalance	40%	Data from one or more meters cannot be used	Calculate flow balances on intermediate data deliverables	Identify problems during collection period and address the issues
Sensor failure	10%	Meter down time; no data collected by failed meter	Independent review of data; a "second set of eyes"	Greater percentage of valid data for analysis and modeling
Low flow/low level	20%	If levels are low, velocity-level meters can under-report flow	Identify low level situations and recommend appropriate technology	Greater confidence in meter accuracy; additional valid data
Velocity gain adjustment	15%	Velocity readings adjusted to balance meters; can result in inaccurate flows	Compare velocity adjustments and verify their necessity	Assurance that velocity adjustments are field verified and valid
Loss of storm peaks	20%	Automated software can remove storm peaks; inaccurate RDII analysis	Compare raw data to edited data	Recover deleted storm peaks for more accurate RDII analysis

The goals of the 2009 Comprehensive Flow Study program are to:

- Determine the nature and extent of the various types of inflow and infiltration in each sewer basin.
- Identify the sources/locations of various types of infiltration and inflow.

The results of the 2009 Comprehensive Flow Study will be used to:

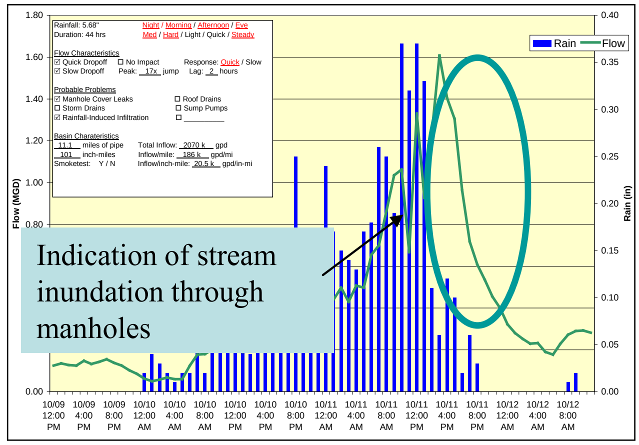
- Quantify the baseline and seasonal infiltration rates for each catchment.
- Identify the types and amounts of I/I for each catchment. Within each flow basin, interpretation of the flow hydrographs will yield the identity of potential I/I sources.
- Identify the SSES activities to be included in the SSES Workplan for each catchment. Using the flow monitoring data, the most effective and efficient methods of inspection can be selected to identify the sources of infiltration or inflow. Not all SSES activities need to be performed in each catchment.
- Determine the peak flows throughout the system and where they occur. The comprehensive flow monitoring network will record the peak flows at many points throughout the system.
- Pinpoint the locations of hydraulic restrictions in the system's interceptors and trunklines. The peak flows will be compared to the maximum allowable load to the interceptors, pump stations, and treatment plants to establish how much I/I must be removed to meet the level of service goals and to confirm that it is realistic to expect I/I source removal efforts (i.e., sewer rehabilitation) to achieve the desired performance levels.



- Serve as the basis for the calibration and validation of future dynamic hydraulic modeling efforts.

3.2.2. SSES Prioritization

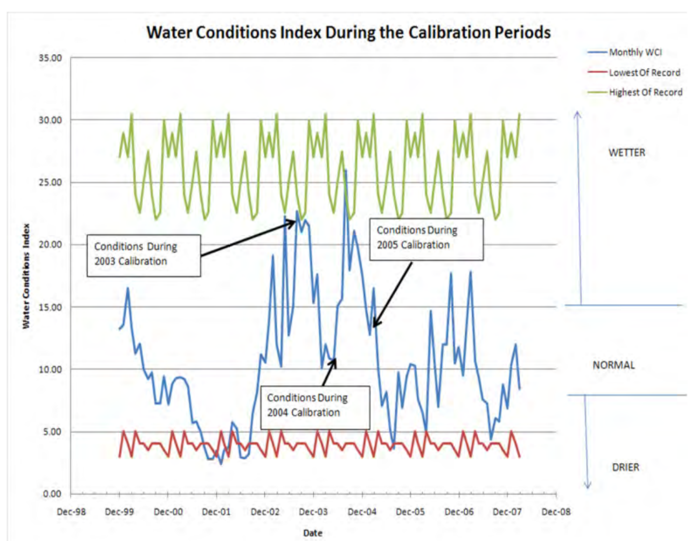
Analysis of the flow hydrographs described in Section 3.2.1 will provide insight into the sources of I/I in each catchment. Different sources of I/I have different flow signatures. For example, high peaks in the hydrograph over a short duration are evidence of sources of inundation or inflow. SSES activities in the workplans for these catchments will include strategies that specifically identify inflow and inundation sources as well as cross connections with storm sewer systems as well as illicit storm and/or groundwater connections to the sewer system by private property connections. Conversely, hydrographs illustrating peaks that are sustained over a long duration are evidence of sources of rainfall induced infiltration. Hydrographs may also indicate a combination of infiltration and inflow within the same catchment. In summary, the hydrograph for each catchment will be used to select the initial SSES activities.



The hydrographs will also be used to prioritize catchments for SSES activities. In addition to identifying the types of I/I sources present in a catchment, the hydrograph will also be used to determine the actual amount of I/I entering the system under wet and dry weather conditions. Each catchment will be prioritized based on the amount of wet weather I/I entering the system. The activities to be performed as part of each SSES is described in Section 3.7.

3.3. Dynamic Modeling

A dynamic hydraulic model (e.g., XP-SWMM, InfoWorks) will be developed for the system to assess sewer capacity, to better understand current system performance during record period storm events, to assess where potential capacity improvements (e.g., pump station upgrades, construction of relief or replacement interceptors, storage) might need be needed, and to estimate what impact I/I reduction projects might have on overflows and basement backups. The



existing GIS system contains asset information that when combined with the results of the 2009 Comprehensive Flow Study will serve as the backbone for a hydraulic/hydrologic model.

The flow data and rainfall data collected during flow monitoring will be utilized to calibrate and validate the dynamic model for both dry and wet weather conditions. This calibration will include storm data that can be reasonably extrapolated to the LOS goal.

Once calibrated, the model will be used to determine current system performance (i.e., what type of storm events under what type of groundwater conditions cause the system to overflow). The model will also be used to determine what reductions in flows are needed to achieve the LOS goal.

Year 2040 future flow conditions will be projected and analyzed. Existing and future system assessments /evaluations will employ continuous simulations of historic rainfall and groundwater records to develop design storms based on peak flow frequency analysis of actual events.

Critical to the development of the model plan will be coordination with any ongoing modeling efforts by the City of Allentown. The interconnected nature of the WLSP's systems and the Allentown collection systems requires an integrated approach to model development, calibration, and long-term planning usage. Meetings with Allentown's modeling team to ensure similar procedures are developed and applied will be required.

3.3.1. Flow and Rainfall Monitoring Data Review

A detailed review of the flow and rain data collected during the 2009 Comprehensive Flow Study to ensure the data are useful for calibration and verification will be conducted. Base (dry weather) flow patterns will be generated for each of the flow meters which will be used in conjunction with rain events and water consumption values to calculate I/I influence. Wet weather events will be defined and classified according to local Intensity/ Duration/Frequency (IDF) curves.

3.3.2. Collect and Review Additional System Information

Additional system information will be used to complete the model development and calibration. This will include:

- Census Data: In the absence of water consumption data, population data will be used to estimate dry-weather flow allocations. Readily available census data will be collected in GIS format.
- Land Use/Zoning Mapping: Information will be used in conjunction with the water consumption data to determine current and future dry weather loads.

- Water Consumption Information: Water consumption information will be collected for a winter quarter period. Water consumption data will be used to allocate dry-weather flows to each of the modeled subbasins. The water and/or sewer billing data will also be reviewed and processed to calculate the average daily sanitary flow for each parcel. Missing or inconsistent information will be documented and presented for review. For parcels without adequate billing records, the land use mapping, populations, or building square footage will be used to estimate the average flow.
- Contributing Community Information: This information includes wastewater collection system assets (sewer, manholes, force mains, etc.), scanned or hard-copy as-built drawings, service boundaries, parcel data, census data, and land use/zoning. The quality and quantity of available data from the Partners may be insufficient or inadequate, so field work/survey may need to be conducted.

These additional data will provide information to adequately represent sewer drainage areas, base wastewater (dry weather) flow contributions, and future development potential.

3.3.3. Model Development

The dynamic model developed for use in the SCARP will have hydrologic and hydraulic modeling capabilities. The hydrologic model provides the basis for generating wet weather flows for routing in the hydraulic model. Analysis of meter data from small, upstream catchments will be used for development of typical diurnal flow patterns that will be applied throughout the model. Using the catchment delineations, a model network will be defined. At a minimum, the model will include:

- All pipes in the WLSP system 10-inches and greater
- Interceptors from the Park PS to the head of the Klines Island WWTP
- Lift stations and force mains
- Other hydraulic controls structures within the 10-inch and greater network
- All known structural sanitary sewer overflow (SSO) locations
- Areas served by 8-inch diameter sewers will be added where necessary to define known chronic problem areas or expand the model to sufficient detail for I/I and capacity planning.

3.3.4. Model Calibration

The model will be calibrated using data collected at 50 flow meter locations and 10 rain gage locations throughout the collection system. It is anticipated that four wet weather events will be used for model calibration, and two wet weather events will be used for model verification. Calibration will be comprised of:

- **Dry weather calibration:** Calibration of the model to dry weather flows or inter-wet weather events, including diurnal patterns and seasonally varying groundwater infiltration. The following will be compared:
  - Verify that the model is routing dry-weather flows correctly. If the modeled flow data does not closely match the monitored flow data, the model will be reviewed for possible connectivity errors.
  - A continuous simulation will be performed to adjust parameters such as infiltration rates that are more directly affected by inter-event hydrologic conditions. Such continuous simulation will be done by simulating the entire monitoring period or selected portions of the monitoring period to predict the pre and post storm conditions at each of the meter locations.
  - Compare the measured and modeled flow depths, adjusting Manning's n as needed, or identifying the cause of discrepancies (e.g., downstream blockage, manhole friction losses, local flow effect).
  - Interviews with key collection system operation staff to find known capacity problems as well as locations of other service-related problems, such as roots and grease
- **Wet weather calibration:**
  - Calibration of the model will be completed for up to four storm events at the flow meters throughout the collection system. These events will cover a range of events from smaller storms to significant storm events.
  - The calibration will be completed by adjusting additional parameters to simulate the rainfall-induced flow response of the system for each storm event. Hydrologic parameters will be adjusted as needed to generate volume and peak flow.
  - Peak flow, total volume and surcharge depth model to monitor comparisons will be made in order to develop a robust tool for future flow projections and I/I alternative analyses.
- **Wet weather validation:**
  - Once the model is calibrated, a period of up to one year *not used for the* calibration will be simulated to assess the validity and robustness of the model calibrations dependent on available flow data sets.
  - The model validation period will be taken from available historic data. The use of a storm of record will be considered if sufficient comparative data are available (e.g., flow data, customer complaint data, etc.).
  - Model results will be compared to available data to assess the model calibrations.

3.4. Current Level of Service Assessment

Until completion of the 2009 Comprehensive Flow Study, adequate data will not be available to define the levels of service currently provided in each catchment. Having an accurate understanding of current conditions is paramount to understanding if the current level of service provided in each catchment is consistent with utility performance goals.

Until actual data are available, the current level of service can only be broadly estimated. It is likely that the current level of service provided by the system is somewhat below the level desired by the Partners. In this event, an evaluation will be performed to identify the alternatives needed to narrow the gap between current and desired levels of service.

It is envisioned that the current level of service will be established for the following groupings:

- Trunk lines within townships and boroughs
- LCA trunklines tributary to the Western Lehigh Interceptor
- Western Lehigh Interceptor/Spring Creek Road Relief Pump Station
- Little Lehigh Interceptor/Spring Creek Road Relief Pump Station
- Park Pump Station, the Little Lehigh Interceptor immediately downstream of the Park Pump Station, and the Cedar Interceptor immediately downstream of the confluence of the Little Lehigh and Cedar Creek Interceptors.

The dynamic model will be used to determine the current level of service for each portion of the system. The calibrated model will be used to conduct a detailed system analysis and identify deficiencies in existing system components. The first step will be to perform an existing system performance analysis for dry weather and wet weather conditions using 50 years of historic rainfall records. Statistical analyses will be performed to determine the peak flow and peak overflow volume frequency event. The selected level of control events will be used for subsequent tasks to assess and evaluate the system's level of service: the combination of rainfall and antecedent moisture conditions under which portions of the system overflow. It also shows where immediate capacity and other service-related problems potentially exist. This existing system analysis will define capacity issues and bottlenecks within the systems, including the existing gravity sewers from Keck's Bridge to Kline's Island WWTP. The current Level of Control Assessment will include:

- System performance (overflow frequency, volume, and location) during wet weather events using a continuous simulation of approximately 50 years of hourly rainfall data collected from a nearby weather station
- System performance during dry weather conditions using a continuous simulation described above. The analysis will focus on select dry weather intervals.
- System performance under peak wet weather flows using a continuous simulation where all hydraulic bottle necks are removed (open system) to eliminate all surcharging and flooding
- Statistical comparison of the overflow volume and frequency as well as the open system peak flow to determine the recurrence intervals for up to five historic events and to determine a desired level of control event for system improvement analysis

The system performance evaluations will be conducted for five selected storm events and will include a wet weather capacity assessment to identify the hydraulic bottlenecks of the existing system. The five events, determined from the continuous simulation described above, will be used on an open system model to determine the peak wet weather flows in each of the gravity sewers. The resulting sewer peak flow will be compared to its flowing full capacity to identify hydraulic bottlenecks in the system for the wet weather events.

3.5. Current System Sizing Requirements

The calibrated model and the Current Level of Service Assessment will be used to develop alternatives for providing necessary relief to any areas identified as capacity limited under existing conditions. This will involve an evaluation of system performance during wet weather events using the historic level of service events where all hydraulic bottle necks are removed (open system) such that all surcharging and flooding is eliminated. Estimates of I/I removal required to eliminate capital improvements will also be made using the model. The system performance evaluation will be conducted using the five selected storm events to identify the appropriate size of the conveyance if no storage or I/I reductions are made. The capital costs of these capacity increases will be estimated as well as any projected benefits (increased level of service).

3.6. Future Development – Hydraulic Demands and Conveyance Sizing

Future populations and additional wastewater flows (both dry and wet weather) into the WLSP systems will be projected so that the evaluation of alternatives for capacity management recognize the impact of these loadings too. Estimated future population and employment/industrial growth will be estimated through Year 2040, and will include estimates for the following communities:

a. Allentown
b. Emmaus
c. LCA and LCA signatory communities
d. Salisbury Twp.
e. South Whitehall Twp.

This will require collection of all available growth projections (primarily through each municipality's existing 537 Plan projections), outlining of appropriate additional areas that will be added to the WLSP service area either through development growth or acquisition/annexation, and projecting both dry and wet weather flows. It is anticipated that wet weather flows will be based on calibrated model parameters, slightly modified to reflect core assumptions such as ongoing increases in I/I over the planning horizon due to continued sewer deterioration.

Using the 2040 development projections, an analysis will also be completed for each event considered to determine how much I/I would need to be removed to eliminate overflows and minimize capacity limitations, and the required system improvements to convey wet weather flows without any I/I reductions.

Where necessary, additional service areas will be added and new facilities necessary to convey flows to the system will be incorporated into a baseline future model.

3.7. SSES Steps

Upon conclusion of the activities described in Section 3.2 through 3.6, the following information will be known for all catchments:

- Volume of baseline infiltration prioritized by catchment.
- Volume of rainfall derived I/I (RDII) contributed by each catchment, and likely cause (nature) of the catchment's RDII.
- Level of service for each catchment.
- Segments of the system that are undersized for current or anticipated future flows.
- Locations of anticipated wet weather SSOs.
- I/I volume and peak inflow reduction needed to eliminate capacity expansion or storage now and at all points through 2040.

This information will be used to define SSES activities for each catchment impacted by I/I. Review of flow monitoring data and flow hydrographs will identify the nature and extent of infiltration or inflow experienced in each catchment, but not the actual locations of the leaks. The goal of the SSES activities described in this Section is to specifically identify neighborhoods, pipe segments, or private properties contributing the highest levels of infiltration and or inflow. The following steps will be followed to successfully execute all SSES activities.

- Develop the SSES Workplan
- Conduct the SSES Fieldwork
- Identify Leakiest Public Sewers
- Identify Private Leakage Sources

Each of these steps are described in greater detail in the following sections.

3.7.1. SSES Workplan

An SSES Workplan will be developed for each catchment. The purpose of the workplan is to ensure that all SSES activities are planned and executed in a consistent and efficient manner. The workplan will be the mechanism by which all field personnel will consistently collect, record, and store all field collected data. In addition to addressing administration and management concerns, the workplan will define the SSES activities to be performed in each catchment. Each workplan will define the procedures, techniques, data capture and management tools, analysis methods, and QA/QC steps to be used by each WLSP for each type of SSES activity to be performed. The potential SSES activities that will be prescribed by the workplans include smoke testing, basement inspections, stormwater observations, post-storm trunkline walks, wet weather CCTV work, weiring, and manhole inspections. Not all SSES activities described above will be used in each catchment.

In addition to including written policies and procedures for performing the work, the workplans will ensure that the SSES activities performed by each WLSP is performed in a consistent manner that will yield the data necessary to select the appropriate rehabilitation/replacement strategies.

3.7.2. SSES Fieldwork

Field personnel will conduct the SSES activities as described in each SSES Workplan. The information collected during this step will serve as the basis for selecting rehabilitation or replacement strategies to address the identified defects. The SSES activities potentially included in each workplan are described in the following paragraphs.

3.7.2.1. Smoke Testing

In the event flow meter data indicate that direct inflow sources exist (e.g., cross-connected roof leaders or storm drains, badly leaking manholes/covers), additional investigation will be necessary to find these particular sources. Smoke-testing will be utilized for its effectiveness and low cost in locating inflow sources without traps or check valves (i.e., it won’t locate sump pumps, or roof drains connected to soil pipes with P-traps).

Alternatively, dye testing may also be used to verify suspected cross connections in the event smoke testing is not practical or in an effort to confirm sewer connections on a small scale basis.

3.7.2.2. Basement Inspections

In the event flow meter data indicate that direct inflow sources such as cross connected sump pumps or punctured floor drains exist, it will be necessary to conduct basement inspections. Basement inspections will be conducted to specifically identify households containing illegal connections to the sewer system. These connections often take the form of punctured floor drains, punctured riser pipes, and cross connected sump pumps.

3.7.2.3. Above-Grade Stormwater Observations

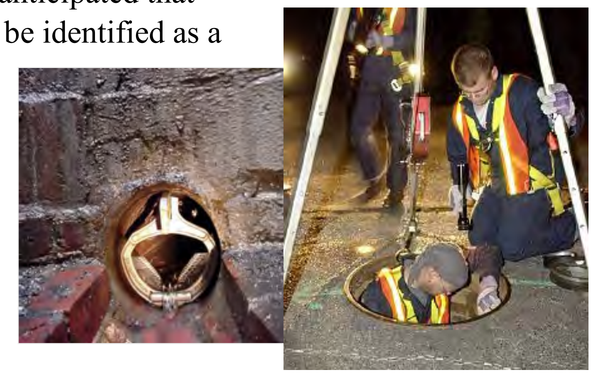
It is also helpful to physically inspect the system during wet-weather events. On-site observations will be conducted in catchments that are heavily impacted by direct inflow sources and of manholes in the streets impacted by sheet runoff or manholes in easement areas that may become inundated by elevated stream levels. Manholes will also be opened to see if there is any overtly obvious significant increases in flows resulting from direct inflow sources.

3.7.2.4. CCTV Inspections During Rainfall

Closed circuit television inspection is the best, albeit most difficult and expensive method of conducting gravity system condition assessments where sources of RDII are suspected. Standardized coding of defects using the NASSCO PACP system will be used to reduce the subjectivity of data evaluation.

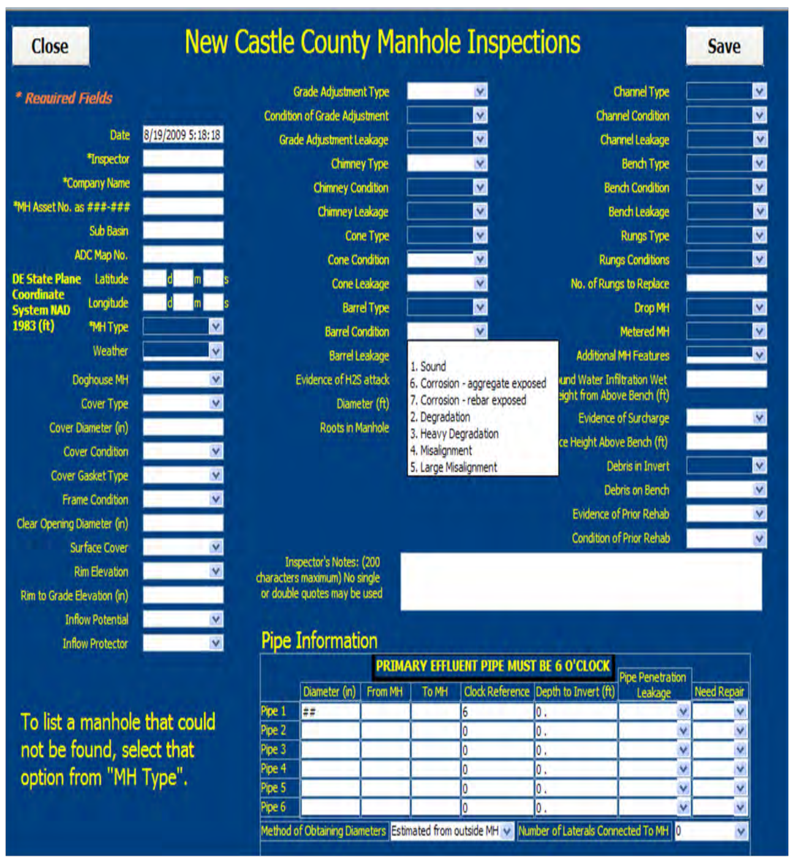
3.7.2.5. Nighttime Flow Weiring

Given the age of the collection system, it is anticipated that rainfall-induced infiltration (RII) will likely be identified as a major contributor of flow in some catchment areas. For these catchments, night-time weiring work will be conducted during elevated groundwater conditions to identify which sections do and do not leak. While nighttime weiring is, strictly speaking, a measurement of infiltration, it is also a good surrogate indicator of RII.



3.7.2.6. Manhole Inspections

Manhole inspections will be conducted on every manhole utilized during weiring and smoke testing. These inspections will be used to not only collect structural information, but to also assess the hydraulic condition of these manholes. The elevated groundwater conditions that are preferred field conditions for weiring work will also reveal if any of the inspected manholes are subject to infiltration. This work will gather structural and hydraulic information and provide even greater inspection coverage of the manholes in each sewer basin. This work will be considered preliminary only, as experience has shown that groundwater levels rise dramatically after sewer main and lateral rehabilitation, and manholes that previously appeared to be watertight in fact leak significantly once the lower lying components are sealed.

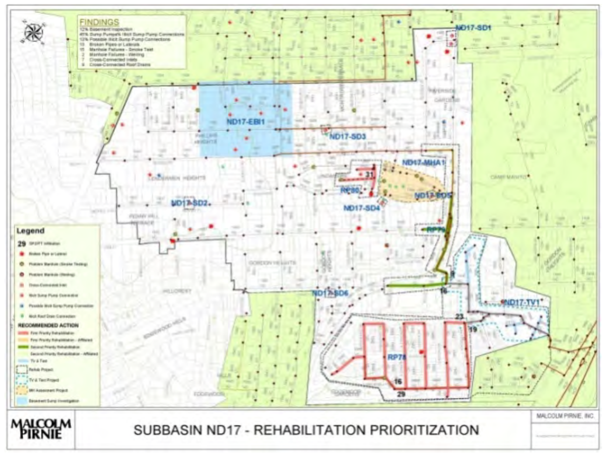


	Diameter (in)	From MH	To MH	Clock Reference	Depth to Invert (ft)	Pipe Penetration Leakage	Need Repair
Pipe 1	##			6	0.		
Pipe 2				0	0.		
Pipe 3				0	0.		
Pipe 4				0	0.		
Pipe 5				0	0.		
Pipe 6				0	0.		

Finally, manhole inspections will be conducted in areas along streams to identify manholes that either become inundated during stream flooding or have evidence of overflow or surcharge. Data on manholes exhibiting evidence of surcharge will be used to support truthing of modeling.

3.7.3. Identify Leakiest Public Sewers

From the SSES work, the actual hydraulic condition of sections of the public sewer system will be clearly understood and the location of leakage will be documented. The data collected during the SSES activities will be used to organize the leaking segments on a neighborhood by neighborhood basis. Leaking defects that are anticipated to be identified within the domain of the WLSP (public sewers) include cross connections between the sanitary and stormwater system, leaking pipe joints, collapsed and broken piping, illicit connections to private systems, deteriorated manholes, and manholes that are subject to inundation due to stream flooding or sheet flow generated by impervious surfaces.



3.7.4. Identify Private Leakage Sources

SSES activities will also locate illicit connections to the public sewer system as well as private clearwater sources. The sewer ordinance of each WLSP will be used to determine whether a suspect connection is illicit. If the connection is not permitted in accordance with the sewer ordinance, the owner of the illicit connection will be required to eliminate the connection or obtain a permit for its operation. Private leakage sources detected during the performance of basement and CCTV investigations may include clearwater connections such as roof drains, cross-connected sump pumps, leaking building drains, and area drains.

The cost and political inexorabilities of a private clearwater disconnection program will be weighed. Similarly, an evaluation of the financial and political costs and benefits of addressing those portions of leaking laterals owned by the property owner will also be conducted.

3.8. Program Improvements Planning Steps

The purpose of these steps of the SCARP are to identify the rehabilitation needs, replacement needs, expansion requirements, costs of improvements, and schedule for implementing a program to achieve the SCARP objectives. This will be accomplished by evaluating the various combinations of methods and costs to achieve the preliminary objectives, revising the preliminary objectives to yield final SCARP objectives (if necessary), prioritizing projects, developing a design and construction schedule, and projecting a cash flow plan that constitutes a reasonable Capital Improvements Plan, and developing of a long-term Asset Management Plan to maximize the overall life-cycle of all assets.

3.8.1. Evaluate Alternatives to Achieve Preliminary Objectives

There is no one path forward that will achieve the preliminary objectives. All of the information necessary for this analysis will be available following development of the hydraulic model, identification of likely I/I sources, and identification of the actual sanitary sewer leakage locations through implementation of the SSES Workplan (Section 3.7.

It is likely that the path forward to meeting the level of service goals will not consist solely of either I/I reduction or capacity enhancements. The SSES and modeling data will be used to build and analyze the feasibility of alternatives that include combinations of I&I source removal, storage, and conveyance expansion for addressing the preliminary objectives and level of service goals.

From the SSES work, sections of the public sewers system will be prioritized for replacement or rehabilitation based on their leakage, location, and cost:benefit ratio. From the SSES work, an evaluation of the impact of flows from privately owned clearwater connections such as roof drains, cross-connected sump pumps, leaking building drains, and area drains and the cost and political inexorabilities of a private clearwater disconnection program will be weighed. Similarly, an evaluation of the financial and political costs and benefits of addressing those portions of leaking laterals owned by the private property owner will be conducted.

Methods for rehabilitation and replacement of public sewers that will be considered as part of this evaluation will include, but are not limited to, replacement of pipe segments, pressure testing and chemical grouting, cured-in-place pipe lining, cured-in-place lateral lining, and removal of other illegal connections to the sewer system including sump pumps, roof drains, etc. Estimates of the potential amount of I/I that can be removed upon implementation of a rehabilitation program utilizing each of the methods above will also be prepared.

The hydraulic model will be used to evaluate what combinations of I&I source removal, storage, and conveyance expansion best meet future flow conditions for storm return frequencies of 1, 5, 10 and 20 years and an I/I creep rate of 0.5% per year. These alternatives will be developed using the model and costed for both capital and operating costs. The model will be used to analyze the following scenarios:

a. System improvements, including storage tank locations/sizes and trunkline/interceptor/relief pump station expansion and paralleling requirements, that would be needed assuming no I/I is removed.
b. Impact of system capacity restored as a result of eliminating sources of I/I and/or construction of system improvements on future development and demand for service.
c. Amount of I/I that will need to be removed to reduce/eliminate the need for storage or increased conveyance capacity.
d. Impact of alternative on sanitary sewer overflows for the various return frequencies.
e. Effect of the alternatives on City of Allentown flows.

The alternatives analysis described above will be used to determine the rehabilitation, replacement, and expansion requirements to meet the preliminary objectives. Included in these analyses will be the physical reality that much of the existing piping systems will require rehabilitation or replacement with the next 30-50 years. The rehabilitation, replacement, storage, and expansion alternatives identified to meet the preliminary objectives will be ranked based on effectiveness, constructability, timeliness, capital cost, and lifecycle cost.

3.8.2. Re-evaluate Objectives

The analysis conducted in the previous section will be the first real attempt by the Partners to identify actual strategies and life cycle costs for achieving the preliminary objectives. The identified strategies will undergo an analysis of cost versus effectiveness to identify the strategies that have the greatest “bang for the buck”. It is likely that the most attractive strategies will not be perfectly aligned with the preliminary objectives. The preliminary objectives will need to be reviewed and if necessary revised based on the specific political and financial considerations of each WLSP. It is intended that “knee-of-the-curve” cost: benefit evaluation will be used to drive selection of the final LOS objectives.

Upon re-evaluation of the objectives, new or modified final SCARP objectives will be confirmed by each WLSP. The MOU will be amended to include the final SCARP objectives as well as the overall strategy for achieving the objectives.

3.8.3. Develop Capital Improvements Plan

As previously stated, the overall strategy for achieving the SCARP objectives will likely reflect a balance between storage, conveyance expansion, I/I reduction via public sewer rehabilitation, I/I reduction through private sewer rehabilitation, and clearwater removal.

From a capital expense perspective, it is obvious that the required improvements will not be simultaneously implemented. All planned improvements will need to be sequenced to reflect available capital resources. The Capital Improvements Plan will be the mechanism for implementing the recommended improvements. This Capital Improvement Plan will have the following components:

- I/I Mitigation: Based on the hydraulic modeling analysis, flow metering data evaluation, and SSES results and engineering experience, a comprehensive I/I mitigation plan that will prioritize areas for follow-up SSES investigation and I/I mitigation based on comprehensive data and modeling analyses will be proposed. This portion of the plan will provide a target I/I removal percentage.
- Capacity and Storage: Augmenting the I/I mitigation activities will be recommended capacity and storage improvements for the conveyance systems that will provide sufficient capacity (assuming the target I/I reductions are achieved) for a selected, cost-effective level of service.
- Implementation of Final Future Alternative Analysis: A phased Implementation Plan that will outline an achievable program that will address existing and projected future capacity needs.
- Costs: Estimated life-cycle costs, including O&M, will be developed for the recommended Improvements Plan.

A schedule for the needed improvements based on an estimate of I/I removal, future flows and growth of the service area will be prepared. A sewer rate model specific to the Partners will be developed and used to determine if sewer rate increases are required to support the desired improvements. In the event the cost of the needed improvements exceeds capital generated by an acceptable increase in sewer rates, the improvement implementation schedule will be revised to reconcile these competing demands.

Once the iterative process of rectifying the implementation schedule and capital funding has been completed, a Capital Improvement Plan (CIP) will be finalized. The Capital Improvements Plan will define the needed improvements, implementation schedule, cash flow demands by WLSP, and any needed changes to the existing sewer rate structure to support the implementation schedule.

3.8.4. Develop Long-term Asset Management Plan

An Asset Management Plan will be developed and implemented that is complementary to the Capital Improvements Plan and ensures that the improvements defined by the Capital Improvements Plan are integrated with supporting operation and maintenance strategies to maximize the life cycle of critical assets. In essence, the combination of the Long-term Asset Management Plan and the CIP will effectively provide a common CMOM Plan for all the Partners. The Asset Management Plan will address utility organization, business processes, information and technology systems, design standards, operating and maintenance procedures to ensure that these important elements can support the overall

SCARP objectives within the available financial resources. The Asset Management Plan is intended to be a living document with revisions occurring at biannual frequency.

The long term Asset Management Plan will include:

Engineering

- System Inventory Procedures
- System Mapping Procedures
- New Sewer System Design Standards
- New Sewer Construction inspection Standards and Procedures
- Rehabilitation Inspection Standards and Procedures
- Continuing Sewer System Assessment Procedures
- Scheduled Manhole Inspection Procedures
- Flow Monitoring Procedures
- CCTV Procedures
- Gravity System Defect Analysis Procedures
- Service Lateral Investigation Procedures
- Pump Station O&M Procedures
- Pumping Station Scheduled Inspection Procedures
- Pumping Station Performance and Adequacy Evaluation
- Force Main Assessment Procedures
- Sanitary Sewer Overflow Reporting, Notification and Record Keeping Procedures
- Un-permitted Discharge Reporting, Notification and Record Keeping Procedures
- Emergency Operation and Maintenance Procedures

Management

- Training Programs
- Safety Programs
- Confined Space Entry Procedures
- General Safety Procedures
- Traffic Management Procedures

Operations and Maintenance

- Wet Well Cleaning Procedures
- Odor and Corrosion Control Procedures
- Air Relief and Vacuum Relief Valve Maintenance Procedures
- Standby Power Operations Procedures
- Emergency Operating Procedures
- Grease Trap Inspection and Enforcement Procedures
- New Connection Tap-in Procedures
- Line Location for Third Parties Procedures
- Pumping Station Maintenance Procedures
- Force Main Maintenance Procedures
- Valve Exercise Procedures
- Gravity Line Hydraulic Cleaning Procedures
- Gravity Line Mechanical Cleaning Procedures
- Gravity Line Root Control Procedures
- Manhole Preventative Maintenance Procedures
- Maintenance of Rights of-Way and Easements Procedures

3.9. Annual Reporting

To document the progress of the SCARP, the Partners will prepare a joint Annual Report for submission to PADEP. With respect to the SCARP, program progress will be measured by improvements made with respect to the following criteria:

- Project Implementation
- Rehabilitation Effectiveness
- Level of Service Performance Measurement

3.9.1. Project Implementation

In accordance with the Capital Improvement Plan, projects will be scheduled for implementation and completion on an ongoing basis. The Annual Report will track the progress of projects scheduled for implementation or completion. SCARP success will initially be based on the ability of the Partners to maintain the implementation schedule.

3.9.2. Rehabilitation Effectiveness

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. Two metrics will 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.

The above metrics will be based on actual post-rehabilitation flow monitoring data. Ideally, flow monitoring will be conducted in each project area for six months prior to the start of rehabilitation and for six months after completion of rehabilitation in order to capture data from a significant number of storms. At least six storms are anticipated to be captured by the flow monitoring both before and after rehabilitation.

The Control Basin Method (CBM) of analysis will 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 the measuring the difference between the pre-rehabilitation and post-rehabilitation trend lines.

3.9.3. Level of Service Performance Measures

When source removal work is a featured part of a sewer capacity assurance and rehabilitation program, it is impossible to predict exactly how much work will be required to meet the level of service program performance goals. The only way to demonstrate that the improvements have met the goals is to project flow monitoring results collected after the system improvements have been implemented to the level of service event using dynamic modeling.

It is anticipated that the Program Improvements Plan will be broken into at least two phases, with flowmetering, recalibration of the system model, and level of service performance evaluations conducted after each phase. It is anticipated that the first phase will be 8-12 years in duration.

At the end of each phase, the model will be updated to reflect physical changes to the system such as the storage tanks and in-line storage, relief line or line expansion, flow diversions, and system extensions. The model will be recalibrated using flow meter data collected from the inter-phase flow monitoring. Additionally, the period during which these data are collected will be cross referenced to the water conditions index to ensure that the model is recalibrated using flow data subject to appropriate water conditions index to ensure an appropriate level of consistency is achieved between the 2010 Model and the subsequent models. The newly calibrated model will be used to characterize improved system performance under the new flow regimes derived from the I/I source removal projects and to determine the Level of Service provided by the Partners systems at the end of each phase.

4. Future Capacity Allocation

The Western Lehigh Sewerage Partnership(WLSP) has acknowledged that, under PA Code 94.21, each Partner must implement a corrective action plan that addresses hydraulic overloads and specifies how new connections will be responsibly managed. As stated in 94.21.a.3, the written corrective action plan must include, but not be limited to, a program for control of new connections to the overloaded sewerage facilities and a schedule showing the dates of each step toward compliance. This SCARP Approach Outline constitutes the required corrective action plan.

The corrective action plan includes a program for control of new connections. Accordingly, the procedure described in the following paragraphs will be used to control new connections to the sewer system to ensure that new development does not outpace capacity assurance and flow reduction measures taken by the Partners.

4.1. Development Flow Credits

New connections to the system will be allowed as measurable reductions in flows, through a combination of I/I reduction, capacity increases, or storage, are achieved. In the interim, proposals for new connections will continue to be received, reviewed and conditionally approved by LCA using existing review and approval procedures, with the codicil that they may not be connected to the sewer system until flow is made available, as described below. New connections are those connections from development that receive PADEP planning module approval on or after January 1, 2009; these shall not be permitted to connect to and utilize any of the WLSP collection systems unless they receive an allocation of sufficient development flow credits. Those developments that received PADEP planning module approval prior to January 1, 2009, are not new connections, and do not need an allocation of development flow credits, and there shall be no reduction in the Development Flow Credit Account related to any of those connections. LCA will track the flow credits for all municipalities within the LCA system and provide letters to municipalities for inclusion with planning module submissions stating that an amount equal to the development's wastewater flow will be allocated from the Development Flow Credit Account for the project when the connection is made for each EDU within the Development. In addition LCA will monitor the number of actual connections to the sewer system from developments that received PADEP planning module approval prior to January 1, 2009 to ensure those connections do not occur at a pace that will impact negatively on the collection and conveyance system.

As capital projects are completed, benefits to peak flow conditions in the sewer system will be realized. Capacity increases will reduce flow levels in critical lines and, properly done, will not cause flow levels to unacceptably increase in other portions of the sewer system. Storage will reduce peak flow volumes in critical lines. Rehabilitation and clearwater removals will reduce the I/I demands placed on the sewer system. However, there may be a delay in measured response as the system is currently surcharged (pressurized) and leakage removed, stored, or conveyed may be replaced by leakage from other sources not currently able to enter the system due to pressurization, or by flows that are currently leaving the sewer via SSO that, once I/I flows are reduced, will now stay in the sewer.

Reduction in flows from rehabilitation and clearwater removals and in flow levels from storage and capacity increases will be largely applied directly to reducing the current hydraulic overload. A portion will be made available to new connections, as described below.

4.1.1. Source Reductions via Rehabilitation

To determine the actual effectiveness of rehabilitation, post-rehabilitation flow monitoring will be conducted to measure the amount of I/I eliminated from the system using the Control Basin Method (CBM) described in Section 3.9.2. Both the volume of flow eliminated and the peak flow rate reduction achieved will be calculated. The point of calculation of reduction between the control basin data and the rehabilitated basin data will be four times the average daily dry day diurnal peak rate. Thirty percent of the lower of these two reductions will be applied to a Development Flow Credits Account.

Because determination of actual flow benefits won’t be completed until at least six months after completion of the project, and to continue to foster economic growth, a method that applies some portion of the anticipated flow reduction earlier will be used. The anticipated effectiveness of each rehabilitation project can be estimated based on previously conducted rehabilitation work. The anticipated reduction for each project will be documented in a memo that includes a documented basis for flow reduction. One third of the anticipated flow credit will be applied to a Development Flow Credits Account at project award, and this front loaded credit will be deducted from final, actual flow credit applied upon completion of rehabilitation effectiveness determination.

4.1.2. Source Reductions via Clearwater Removals

Source reduction for clearwater removals will be dependent on the nature of the clearwater disconnection. Cross connected sump pumps have been demonstrated in past investigations to deliver an average of 6 gallons per minute during storm events. (Actual rates of discharge vary from 0 gpm to 70 gpm, but when averaged out over the duration of storm events, they average 6 gpm. This has been confirmed via post disconnection analysis using CBM methods describe in the above section.

Leaking building drains deliver widely different rates of I/I. For the purposes of this SCARP, it will be assumed that they deliver two-thirds the rate of a cross connected sump pump: 4 gpm. (Sump pumps deliver flow at pressure and are able to discharge into surcharged sewers). Clearwater flows will be converted to volume by assuming a 24 hour event. Therefore, a sump pump will discharge 8640 gallons and a leaking building drain will discharge 5760 gallons.

Roof drains, driveway drains, and area drains rate of discharge is a function of the area serviced by the drain. For the purposes of the SCARP, flow removals from these clearwater connections will be calculated by multiplying the areas served by the depth of the 2 year- 24 hour storm (inches).

Thirty percent of these source water reductions will be applied to a Development Flow Credits Account upon successful disconnection.

4.1.3. Peak Flow Reductions via Storage

Peak flow reductions provided by additionally provided storage in off-line tank storage will be the volume of the tank. Peak flow reductions provided by additionally provided storage in in-line pipe storage will be measured using the dynamic model run under a 2 year-24 hour storm event using an Alternating Block synthetic storm distribution. Thirty percent of the flow benefit will be applied to a Development Flow Credits Account. One third of this credit will be applied at project award, and this front loaded credit will be deducted from final, actual flow credit applied upon completion of construction.

4.1.4. Peak Flow Reductions via Capacity Increases

Peak flow reductions provided by additionally provided capacity increase (e.g., relief interceptor, interceptor replacement with larger diameter pipe, interceptor lining with lower Mannings coefficient materials, relief pump station/force main) will be measured using the dynamic model run under a 2 year-24 hour storm event using an Alternating Block synthetic storm distribution. The calculation of benefit will be the difference in SSO volume under the current system performance (as provided by the model described in Section 3) versus SSO volume with the new storage in place. Thirty percent of the flow benefit will be applied to a Development Flow Credits Account.

One third of the flow credit will be applied to a Development Flow Credits Account at project award, and this front loaded credit will be deducted from final, actual flow credit applied upon completion of construction.

4.1.5. Conversion of Peak Flow to EDUs for Development Flow Credits

I&I reductions and flow capacity improvements will be appropriately measured at peak flow periods, and a portion of that peak flow reduction will be converted to Development Flow Credits which will allow ongoing development as described above. For the purposes of the applying these Development Flow Credits to allowable connections, the resulting peak flow reductions will be converted at a rate of 223 gpd per EDU.

For example, a 10 unit subdivision with a 223 gallon per day per unit base wastewater load is proposed. This equals a base load rate of 2230 gallons per day. These 2230 gallons per day will be subtracted from the peak flow reduction credit accrued in the Development Flow Credits Account as each connection is made.

4.2. Storage and Conveyance Measures Underway

4.2.1. Iron Run Pump Station and Flow Equalization Basin

For the last few years, LCA has been designing a third high flow sewage relief pumping station (the first two being the Park Pump Station and the Spring Creek Road Pump Station) to alleviate overflows from the upper third of the Western Lehigh Interceptor during extreme rainfall events. This new pump station, coined the Iron Run Pump Station (IRPS), is designed to be located just downstream of the LCA wastewater pretreatment plant (WWPTP). Designed to take treated flow from the WWPTP and pump it into the existing force main of the Spring Creek Pump Station and discharge the flow into the Little Lehigh Interceptor downstream of Kecks Bridge and upstream of the Park Pump Station, this station would reduce or eliminate overflows between the LCA WWPTP and Spring Creek Pump Station. Since its original conception, however, broader issues regarding overflows in the Little Lehigh Interceptor and the downstream components of Allentown’s conveyance system have added design objectives that the IRPS cannot meet. Recent modeling to demonstrate the efficacy of the IRPS shows that while overflows in the Western Lehigh Interceptor and Little Lehigh Interceptor will decrease, overflows in the Little Lehigh Interceptor near Park Pump Station will increase with the operation of the Iron Run Pump Station. See Appendix A.

Concurrent with the design of the IRPS has been a separate effort to increase the flow equalization capabilities at the LCA WWPTP. LCA recently completed modeling that indicates a flow equalization basin (FEB) located at the head of the LCA WWPTP would perform similarly to the IRPS with regard to SSO volume reductions between the WWPTP and the Spring Creek Pump Station; unlike the IRPS, the FEB does not increase overflows near Park Pump Station. As shown in Appendix A, modeling predicted that the FEB would store approximately 2.3 MG during the March 27, 2005 storm (a 2-year 24 hours storm that caused several overflows in the WLI system). To provide for additional growth in Upper Macungie Township, a 3.0 MG FEB was proposed as the hydraulic basis of design.

Because the FEB meets the goals of the IRPS without increasing overflows near Park Pump Station, is half the cost of the IRPS, and better supports the possible conversion of the LCA WWPTP to a direct discharge WWTP, a 3.0 MG FEB will be constructed at the head of the LCA WWPTP. This FEB is currently being designed, with the facility slated to come on line in Fall 2010. This FEB will postpone or eliminate the need to construct the IRPS.

4.2.1.1. FEB Development Credit Calculation

Per Section 4.1.3, 10 percent of the total 3.0 MG benefit (300,000 gallons) will be applied to the Development Flow Credits Account at storage project award, which is anticipated in November 2009, and PADEP receives the 537 Plan Amendment resolutions adopting this SCARP Program Approach Outline,. This front loaded credit will be deducted from the final 30 percent credit (900,000 gallons) applied upon completion of construction. The remaining 70% of the FEB benefit will be applied to SSO/flow reduction. These flows need to be adjusted per Section 4.1.5 for final application to residential, commercial, and/or industrial flows (for example, for the Coke development).

4.3. Development Flow Credit Reporting

The WLSP will prepare and submit to PADEP a Development Flow Credit Report annually on March 31st as part of the Annual Report documenting what source reduction or peak flow reduction work has been planned, awarded, implemented, and measured. These reports will include supporting calculations for each project, including projections of likely benefits, pre- and post- rehabilitation/construction flow monitoring data, efficacy analyses, modeling results, and any other supporting proofs of project benefits. These will be presented in a single table that lists all projects included in the SCARP. The first of these will be the FEB.

A second table reporting new connections to WLSP system that had planning module approval after January 1, 2009 and demonstrating available flow credits will also be prepared; LCA will be responsible for tracking both credits and their distribution and reporting these to PADEP. The WLSP will also track and report the new approved planning modules for the reporting period and report the number of actual connections to the sewer system that had planning module approval before January 1, 2009.

4.3.1. PADEP Approvals

To facilitate responsible development and redevelopment, PADEP will have 60 calendar days to reject the flow credits or request additional supporting information. If no response is received from PADEP within 60 days of receipt of the report, the credits and their application to the listed residential, commercial, and industrial developments at the rates shown in the report will be automatically approved.

5. Management and Implementation Documents

This Section describes the deliverable documents that will be submitted to PADEP over the planning and implementation phases of the SCARP. A project schedule for the investigation and planning phase of the program is shown in Figure 5-1.

5.1. Program Management Plan - Investigation Phase

5.1.1. Purpose

The management plan for the investigative phase will be developed following finalization of the Program Approach Outline and execution of the MOU. One common management plan for all Partners will be developed for the investigation phase of the program which includes the activities described in Section 3.2 through 3.7. The purpose of the Program Management Plan developed for the investigative phase of the project will be to define, coordinate, and manage the SCARP efforts of each WLSP.

5.1.2. Components

For the investigative phase of the SCARP program, it is envisioned that one common Program Management Plan will be developed for all Partners. The Program Management Plan will include:

Introduction and Purpose – Description of the Partners, system components, and the MOU. Also included will be definition of program drivers, problem definition(s), primary objectives, and secondary objectives.

Administration and Management Plan – Description of how the Partners will work together to complete the investigation phase of the SCARP. The plan will include definition of roles and responsibilities of each WLSP, resource allocation, identification of written agreements between Partners, and description of reporting requirements. During the investigative phase, a benefit of developing one program for all Partners is that each WLSP will be committing fewer resources than if implementing individual programs. The strength of each WLSP with respect to management, administration, operations, and engineering will be considered when assigning resources from each WLSP to the program.

Financial Plan – The estimated budget for the investigative phase of the program will be identified. As the program progresses, the budget will be periodically revised to reflect changing conditions and a greater understanding of program requirements. The management plan will also identify the financial obligations of each WLSP including definition of program budgets, financial obligations of each WLSP, and description of methodologies for managing budget change.

Risk Management Plan – Throughout the investigative and implementation phases of the program, a risk register will be maintained and revised as necessary to identify project risks that could impede the achievement of the program objectives. The risk register will also include identification of program risks and mitigation strategies.

Schedule – An overall program schedule will be developed and used to monitor program progress.

Reporting Requirements - Throughout the investigative and implementation phases of the program, periodic progress reports will be distributed to the Partners and an Annual Report to PADEP. Report templates will be developed to maintain consistency of content.

Public Relations – Throughout the investigative and implementation phases of the program, plans for obtaining and maintaining public support for the program will be developed. Opportunities for public communications and education include program websites, community fliers, and newspaper articles.

5.1.3. Sequence and Schedule

Development of the Program Management Plan – Investigative phase will begin in the fourth quarter of 2009. A draft of the plan will be submitted to PADEP in the first quarter of 2010 for information purposes and comment only; as this is largely an internal workplan, no acceptance or approval from PADEP will be required. Critical to completion of the management plan will be execution of the MOU and agreements between the Partners defining fiscal responsibility.

5.2. Program Objectives Evaluation

5.2.1. Purpose

This document will define current system performance and begin to assess what it might take to achieve various preliminarily considered objectives. In the event it is determined that the current system performance cannot meet the current desired level of performance, the preliminary objectives will be revised and the improvements to meet the revised objectives in both the near and long-term will be identified.

5.2.2. Components

The deliverable for the Program Objectives Evaluation will contain the following Sections:

Flow Evaluation and I/I Removal Potential - Presentation of the flow data, discussion of model development and calibration, and findings with respect to base flows, wet weather flows, locations of hydraulic restrictions, quantification of the baseline and seasonal infiltration rates for each catchment, identification of the types and amounts of I/I for each catchment.

SSES Prioritization – The catchments will be prioritized based on the amount of I/I entering the system. The activities to be included in each catchment's SSES Workplan will be identified.

Dynamic Modeling – A description of the model including its framework, development, and calibration will be provided.

Current Level of Service – The level of service for each catchment and for the groupings described in Section 3.4 will be established.

Current System Sizing Requirements – Development of alternatives for providing necessary relief of any area identified as capacity limited under existing conditions.

Future Development – Hydraulic Demands and Conveyance Sizing – Future 2040 growth projections, hydraulic loads, and capacity requirements will be calculated. An assessment of the potential improvements necessary to provide adequate future capacity will be performed.

5.2.3. Sequence and Schedule

The 2009 Comprehensive Flow Study is currently in progress with scheduled completion in the fourth quarter of 2009. Collection of accurate data during wet weather periods of differing intensities, durations, and frequencies will be critical to accurate hydraulic model calibration. The hydraulic model will be calibrated using the 2009 data in the 2010. Current level of service, current system flow sizing requirements, and sizing for future flow demands will be defined by the end of 2010.

5.3. SSES Workplan

5.3.1. Purpose

The SSES Workplan will describe the actual SSES activities (as described in Section 3) to be performed in each catchment.

5.3.2. Components

Workplans will be developed for selected catchment based on the recommendations provided at the conclusion of Program Objectives Evaluation. It is anticipated that a single workplan will be developed to encompass all catchments. For each catchment included in the SSES, the SSES Workplan will contain the following Sections:

Hydraulic Condition Assessment – Description of the scope of activities to be performed including but not limited to smoke testing, night-time weiring, above-grade stormwater observations, and basement inspections.

Physical Condition Assessment – Description of the scope of activities to be performed including but not limited to manhole and CCTV inspection. The information collected during this assessment will be used to collect information necessary for the design of the rehabilitation strategy to be implemented.

Standard Procedures and Protocols – Written procedures to be used for all activities will be prepared. Procedures will be prepared for the planning, data collection, and analysis phase for each SSES activity. Standard tools will be developed for all activities including procedures for collecting information, inspection forms, data bases, and interfaces will be developed to ensure that all Partners are performing and documenting the SSES activities in a consistent, efficient, and effective manner.

Cost Estimate – Detailed cost estimates for SSES activities for each catchment will be presented.

Schedule – Detailed schedule for performing hydraulic and physical condition assessment activities. Included in the schedule will be tasks for review and analysis of SSES data.

5.3.3. Sequence and Schedule

The comprehensive SSES Workplan will be completed for Spring 2010. All SSES activities will be completed within two years of approval of the SSES Workplan by PADEP. Critical to the success of SSES Workplan development and implementation will be coordination and consistent data collection, evaluation, and storage between the Partners and SSES engineers and contractors.

5.4. Program Improvements Planning

5.4.1. Purpose

The Program Improvements Planning phase of the SCARP will identify the rehabilitation needs, replacement needs, expansion requirements, costs of improvements, and schedule for implementing a program to achieve the SCARP objectives within the desired level of service.

5.4.2. Components

The Program Improvements Plan will consist of two documents; the Capital Improvement Plan and the Long-term Asset Management Plan. The anticipated sections to be included in each plan are summarized below:

1. Capital Improvement Plan

    a. **Objectives** – In addition to the SCARP objectives, additional objectives will be developed that address administration, operations, financial, engineering, and information technology.

    b. **Prioritization of Recommended Improvements** – The recommended improvements developed as described in Section 3 will be grouped into projects and prioritized.

    c. **Cost Analysis** – The capital and life cycle costs for the prioritized projects will be developed.

    d. **Implementation Schedule** – The prioritized projects will be scheduled for implementation based on available funding.

    e. **Impact on Sewer Rate Structure** – The impact of the cost analysis and implementation schedule on the existing sewer rate structure will be evaluated. Sewer rates necessary to fund the recommended improvements will be calculated and the existing sewer rate structure will be adjusted as necessary.

2. Long-term Asset Management Plan

    a. **Objectives** – In addition to the SCARP objectives, additional objectives will be developed that address administration, operations, financial, engineering, and information technology.

    b. **Administration and Management** – Definition of authorship responsibilities for the required standard policies and procedures.

    c. **Standard Procedures** – Written Standard policies, procedures, and programs for the Engineering, Management, and Operations and Maintenance groups within each WLSP.

    d. **Implementation Schedule** – Schedule for developing the policies and procedures, review of existing policies and procedures, and overall implementation of the Long-term Asset Management Plan.

5.4.3. Sequence and Schedule

The Capital Improvement Plan and Long-term Asset Management Plan will be completed by Summer 2012. Critical to development of the Capital Improvement Plan will be the Long-term Asset Management Plan. In addition to the improvements required for the collection system, the asset management plan will identify other improvement needs that encompass the entire organization including information technology, administration, and operations. All of these improvement needs must be addressed by the Capital Improvement Plan.

5.5. Program Management Plan - Implementation Phase

5.5.1. Purpose

A management plan for the implementation of the Capital Improvements and Long-Term Asset Management Plan will be developed by each LCP simultaneous to the Program Improvements Planning steps described in Section 3.12. While each Partners will develop their own plan, many elements of the plan will be developed jointly with the other Partners as appropriate. The purpose of the Program Management Plan developed for the implementation phase of the project will be to define, coordinate, and manage the SCARP efforts of each WLSP.

5.5.2. Components

For the implementation phase of the SCARP program, it is envisioned that one common Program Management Plan will be developed for all Partners. The Program Management Plan will include the following sections:

Introduction and Purpose – Description of the Partners, system components, and the amended MOU. Also included will be definition of program drivers, problem definition(s), primary objectives, and secondary objectives.

Administration and Management Plan – Description of how the Partners will work together to complete the implementation phase of the SCARP. The plan will include definition of roles and responsibilities of each WLSP, resource allocation, identification of written agreements between Partners, and description of reporting requirements. A breakdown of the responsibilities with respect to authoring the policies and procedures defined in Section 3.12.4 will also be provided.

Financial Plan – The estimated budget for the implementation phase of the program will be identified. As the program progresses, the budget will be periodically revised to reflect changing conditions and a greater understanding of program requirements. The management plan will also identify the financial obligations of each WLSP including definition of program budgets, and description of methodologies for managing budget change.

Risk Management Plan – Throughout the implementation phases of the program, a risk register will be maintained and revised as necessary to identify project risks that could impede the achievement of the program objectives. The risk register will also include identification of program risks and mitigation strategies.

Schedule – An overall program schedule will be developed and used to monitor program progress.

Reporting Requirements **-** Throughout the implementation phases of the program, periodic progress reports will be distributed to the Partners and an Annual Report to PADEP. Report templates will be developed to maintain consistency of content.

Client Relations – Throughout the implementation phases of the program, plans for obtaining and maintaining public support for the program will be developed. Opportunities for public communications and education include program websites, community fliers, and newspaper articles.

5.5.3. Sequence and Schedule

The Management Plan for the implementation phase will be developed in conjunction with the CIP and Long-term Asset Management Plan and will be maintained for the duration of the SCARP program.

5.6. Annual Reports

5.6.1. Purpose

The Annual Reports will provide PADEP and Partners a way to monitor SCARP progress and effectiveness.

5.6.2. Components

The Annual Report will include the following components:

Performance Measures Summary – Summary of the success of the signatory parties with respect to the metrics established for each performance measure. This section will also include descriptions of new/revised performance measures, associated metrics, scores, and strategies to improve success.

Improvements Summary – Summary of the improvements implemented throughout the year. A project description including scope, schedule and budget will be included for each completed and on-going project summary. The improvements described in this section will include projects described in the Capital Improvements Plan as well as those described in the Asset Management Plan.

Implementation Schedule – A schedule will be prepared which illustrates projects and programs planned for continuation, initiation, or completion in the upcoming year. The schedule will include anticipated start dates, durations, and project/program dependencies.

Rehabilitation Effectiveness – For all completed rehabilitation or replacement projects designed to eliminate I/I, an estimate of the volume of I/I eliminated will be provided.

Redevelopment Flow Credits – Based on the effectiveness of rehabilitation as documented above, a summary of the flow credits calculated in accordance with the method described in Section 4 and with the semiannual reports provided under Section 4.3 will be provided.

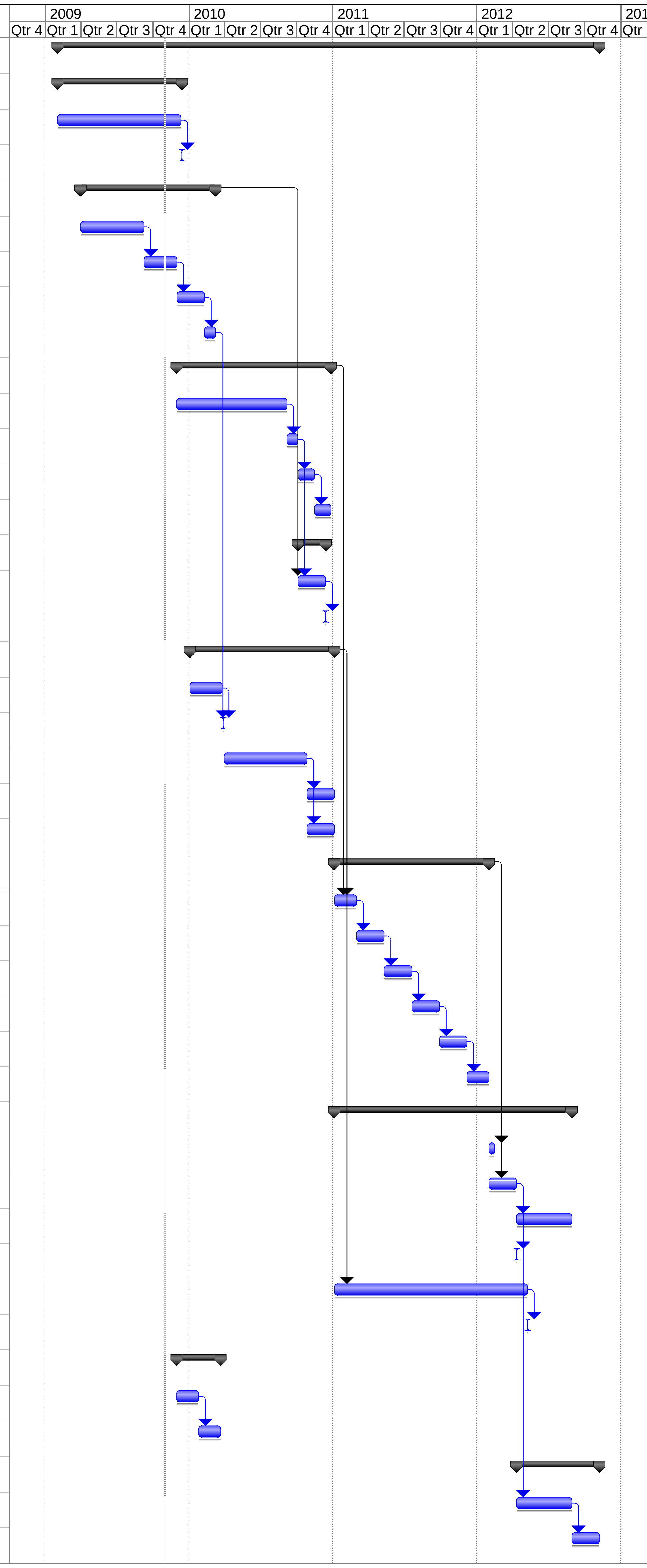
5.6.3. Sequence and Schedule

Annual Reports will be submitted to PADEP by March 31st of each year, with the first report due March 31, 2011.

Figure 5-1 Planning Phase Schedule

Figure 5-1 Planning Phase Schedule

ID	Task Name
1	**SCARP**
2	**SCARP Program Approach Outline**
3	SCARP Program Approach Outline Development
4	SCARP Program Approach Outline Submission
5	**Flow Assessment**
6	Flow Metering Field Work
7	Flow Data Compilation
8	I&I Removal Potential Evaluation
9	SSES Prioritizations
10	**System Modeling**
11	Model Development and Calibration
12	Current Level of Service Assessment
13	Current System Sizing Requirements
14	Hydraulic Demands/Sizing for Future Development
15	**Preliminary Objectives Evaluation**
16	Preliminary Objectives Evaluation
17	Preliminary Objectives Evaluation Report Submission
18	**SSES**
19	SSES Workplans Development
20	SSES Workplan Submission
21	SSES Field Activities
22	Prioritization of Public Sewers
23	Identification of Private Leakage Sources
24	**Alternative Analysis**
25	Identification of Storage, Conveyance, and Source Reduction Options
26	Modeling of Options
27	Cost Evaluation of Options
28	Development and Costing of Alternatives
29	Alternatives Evaluations
30	Objectives Reevaluation
31	**Program Improvements Planning**
32	Level of Service Goals and Key Performance Indicators Finalizations
33	Draft Capital Improvements Plan, Schedule, and Cash Flow
34	Financial Wherewithal Analysis and Rate Planning
35	Captial Improvements Plan Submission
36	Long-term Asset Management Plan Development
37	Long-term Asset Management Plan Submission
38	**Program Management Plan - Investigation Phase**
39	Develop PMP-Investigation Phase
40	MOU- Investigation Phase
41	**Program Management Plan - Implementation Phase**
42	Develop PMP-Implementation Phase
43	MOU- Implementation Phase



APPENDIX A

Malcolm Pirnie Memo, dated ______, entitled FEB Memo

MALCOLM PIRNIE

Technical Memorandum

Date: July 22, 2009

To: Mike Barron, Lehigh County Authority

Copy: Craig Murray

From: Eric Harold, William Barrack, Carolina Gonzalez

Re: Phase 1 Modeling Impacts and Alternatives Analysis

Executive Summary

This memorandum presents the results of the dynamic modeling analysis that was performed to address the three primary issues listed below:

1. Effect of Coca-Cola Discharge on Western Lehigh Interceptor/Little Lehigh Relief (WLI/LLR)
2. Effect of Proposed Iron Run Pump Station (IRPS) on WLI/LLR and Park Pump Station (Park PS)
3. Effect of Proposed Flow Equalization Basin (FEB) on WLI/LLR and Park PS

The Phase 1 model of the LCA sewer system represents a planning-level model that was developed using the best available information as of Spring 2009, and calibrated to Spring 2005 conditions. The purpose of this sewer system model is to establish a solid, consistent analysis tool to support the Authority in planning level capacity analyses, to assess the efficacy of proposed capital improvements, and to provide a tool capable of predicting sewer system responses to a given discrete hydrologic event (single storm).

Once the model was calibrated to Spring 2005 flow and depth data, the model was updated as described in Section 2 of this memo, and then evaluated under dry weather conditions (Coca-Cola discharge analysis only) and wet weather conditions (Coca-Cola discharge, IRPS, and FEB analyses). For wet weather analysis, both a 2-year storm (rainfall event recorded on March 27, 2005) and a 5-year 24-hour synthetic design storm event were used.

The analysis revealed that the WLI/LLR system has very limited dry weather capacity issues and the addition of Coca-Cola flow does not create any dry weather capacity concerns. The wet weather simulation for the 2-year event (March 27, 2005) indicated no overflows at the Park PS. Wet weather simulations for the 5-year 24-hour synthetic storm indicated flow reaching or exceeding theoretical pipe capacities throughout the modeled network as well as potential flooding near the Park PS.

Table 1 summarizes the projected flooding near the Park PS during the 5-year 24-hour synthetic storm for all four scenarios. Based on the results presented in this table and on the figures presented in Section 3, the following conclusions were made:

Table 1
Summary of Park PS Overflows for All Modeled Scenarios
5-Year 24-Hour Synthetic Storm

	Existing Conditions	With Additional Coca-Cola Discharge	IRPS Analysis	FEB Analysis
Overflow Near Park PS (MGal)	0.5	0.5	1.0	0.5
Percent Change: Overflow Volume Near Park PS[1]	NA	0.0%	100.0%	0.0%

[1] Change in Park PS overflow volume for IRPS and FEB scenarios is with respect to "With Additional Coca-Cola Discharge" volumes.

1. LCA System Performance During Wet Weather:

   After reviewing LCA documentation for the period 1997 through 2005, it was determined that while overflows were reported at manholes near Park PS, they occurred infrequently and in nearly all cases due to flows resulting from storms at or greater than a 5-year return period. This observation was confirmed by running the LCA model for the recorded 2-year storm event (March 27, 2005), which revealed no predicted overflows near the Park PS.

2. Effect of Coca-Cola Discharge on WLI/LLR:

   As expected, during dry weather conditions, the additional discharge (172,500 gpd) from Coca-Cola has very little effect on the available dry weather capacity. For wet weather conditions (5-year 24-hour synthetic storm), the increased flow from Coca-Cola has a negligible impact on projected overflow volumes near Park PS.

3. Effect of Proposed IRPS on WLI/LLR and Park PS:

   While the IRPS will improve conditions along the WLI between the PTP and Keck's Bridge, the discharge flow from the pump station is projected to increase the flows in the LLR and the parallel Allentown sewer down to Park PS. This increases the overflows near the Park PS.

4. Effect of Proposed FEB on WLI/LLR and Park PS:

   Model results indicate that this option will significantly reduce flow in the downstream system during storm events. For the 5-year 24-hour synthetic storm, and predicted Park PS overflow volumes will be reduced by 4 percent. The volume diverted for the recorded 2-year storm (March 27, 2005), assuming the discharge downstream of the pre-treatment plant was limited to 3.5 MGD, was approximately 2.3 million gallons. This confirmed the planned 3 million gallon sizing of the FEB.

1.0 Introduction

This document summarizes the results of the Phase 1 model analysis. Please note that all figures not embedded directly in this document are included at the end of the memorandum. Model development, calibration, and quality assurance procedures were documented in technical memorandum *Phase 1 Model Development and Calibration Procedures* submitted to LCA May 11, 2009. Model calibration results were presented in technical memorandum *Phase 1 Model Calibration Results* submitted to LCA June 11, 2009. This memorandum presents the results of the analysis to address the three primary issues listed below:

1. Effect of Coca-Cola Discharge on Western Lehigh Interceptor/Little Lehigh Relief (WLI/LLR)
2. Effect of Proposed Iron Run Pump Station (IRPS) on WLI/LLR and Park Pump Station (Park PS)
3. Effect of Proposed Flow Equalization Basin (FEB) on WLI/LLR and Park PS

The Phase 1 model of the LCA sewer system represents a planning-level model that was developed using the best available information as of Spring 2009, and calibrated to Spring 2005 conditions. The purpose of this sewer system model is to establish a solid, consistent analysis tool to support the Authority in planning level capacity analyses, to assess the efficacy of proposed capital improvements, and to provide a tool capable of predicting sewer system responses to a given hydrologic event (single storm).

While the LCA Phase 1 model meets these objectives, there are the following limitations that the Authority should be aware of as it continues to update and apply the model:

- The model was developed to meet master planning level goals and objectives, which provides a system-wide overview of performance, not a design-level analysis.
- The model calibration parameters, and therefore any projected design storm flows, have greater uncertainty in areas that were not directly metered (e.g., near the Park PS). Any recommendations resulting from this model can be more specific in locations that have more calibration data (i.e., the larger pump stations or the larger downstream trunk sewers).

While these accuracy limitations are unavoidable, the model still represents the best available tool to adequately represent complex system interactions for facilities planning purposes.

The anticipated Phase 2 model development would expand the model to include all sewers 10-inches and greater, extend into the signatory communities, and include a portion of the system between Park PS and Kline Island WWTP to further evaluate City of Allentown effects on Park PS. This model would include more detailed calibration using data from up to 40 flow meters from Spring – Summer 2009 and nearly 14 rain gauges. This expanded model will provide LCA an extremely useful tool to conduct system-wide planning and analysis of available capacity, assess wet weather management strategies and evaluate proposed inflow and infiltration (I/I) mitigation measures.

2.0 LCA Phase 1 Baseline Model Development

This section briefly summarizes the model development and calibration methodology and goals, describes the computer software used and explains model and data limitations.

2.1 Spring Creek Force Main

The Phase 1 model is a skeletal representation of the main Western Lehigh Interceptor (WLI) and the Little Lehigh Relief (LLR) Sewer down to the Park PS. Existing pump stations that were explicitly modeled are the Spring Creek and Park Pump Stations. The existing conditions model, calibrated to 2005 conditions, has the original Spring Creek force main connection upstream of Keck's Bridge (meter L-3). During Spring 2005 the force main was reconstructed to connect to the Little Lehigh Relief Sewer downstream of Keck's Bridge. This connection became active in August 2005. Figure 1 shows the updated baseline Phase 1 model extents including the location of the modeled pump stations, the original Spring Creek force main connection and the new force main connection.

2.2 2009 Baseflows

The Phase 1 model was calibrated to 2005 conditions, and applied water consumption data to develop base wastewater conditions. Model evaluations for this analysis were conducted on 2009 conditions. Generally, adjustments to base wastewater flows would be warranted to account for increased growth and changes in industrial activity between 2005 and 2009. Before making adjustments, model dry weather flows were compared to 2009 metering data for dry weather conditions at several key locations along the interceptor (LCA-23 near the PTP, ALN-80 and ALN-81 near Park PS). Comparison of model dry weather flows to monitored dry weather flows at those locations showed very good correlation, and in the case of meters ALN-80/ALN-81 modeled dry weather flows were slightly higher than recorded dry weather flows in Spring of 2009. Therefore, no changes to modeled dry weather flows were made.

2.3 Boundary Conditions

The Phase 1 calibration model did not include any boundary conditions downstream of the Park PS. The effect of the City of Allentown system near the Park PS as well as at the Park PS force main discharge point was modeled for calibration purposes as a free outfall. The locations of the five meters available for calibration in relation to these points are sufficiently upstream (over five miles from the most downstream calibration point L-3 to the Park PS) that any affect of the City of Allentown system downstream of Park PS can be ignored.

For system analysis, however, the influence of the Allentown system downstream of Park PS on the Park PS and potential overflows in that area needs to be accounted for. To do this, City of Allentown flow monitoring data was evaluated to develop a suitable boundary condition near the Park PS connection point. Data from meter ALN-U613 for the period March through May 2009 were reviewed and a boundary condition level was chosen to approximate downstream Allentown system effects on the Park PS. This boundary condition was applied as a fixed level at the model outfall just downstream of Park PS, and therefore is not suitable for a complete assessment of the impact of the City of Allentown system on the Park PS. The full ramifications of this and the influence of the City of Allentown system on the Park PS will be better understood in the Phase 2 expanded model of the LCA system.

3.0 Model Evaluation of Coca-Cola Discharge, IRPS and FEB

After the Phase 1 model of LCA's wastewater collection system was developed, it was calibrated to match model-predicted responses to in-system meter data collected during the Spring 2005 monitoring period. The model was further checked against historical daily influent flow records for the same period at the Pre-treatment Plant (PTP) as well as dry weather flows collected in the system during Spring 2009. The purpose of calibrating the model was to ensure that it can be used for analysis of existing system capacity around the proposed Coca-Cola discharge as well as for analyzing the affects of the proposed FEB and IRPS on the Park PS. Using rainfall data collected in the Spring 2005 period, the sewer system model was calibrated to flow and depth data collected during the same period. The model was calibrated to meet industry-standard guidelines (see memo *Phase 1 Model Calibration Results*, June 11, 2009).

Once the calibration was completed, the model was updated as described in Section 2 of this memo, and then evaluated under dry weather conditions (Coca-Cola discharge analysis only) and wet weather conditions (Coca-Cola discharge, IRPS, and FEB analyses). For wet weather analysis, a 5-year 24-hour synthetic storm event was applied. Since a 2-year event does not cause overflows at Park PS, the 5-year storm allows for a better analysis of the impacts of the IRPS and FEB.

3.1 Evaluation of Coca-Cola Discharge

Based on information provided by LCA, the Phase 1 model was evaluated to assess the impact of an expected 172,500 gpd discharge from the Coca-Cola plant. Since the specific location within the LCA system to which Coca-Cola discharges was not included in the Phase 1 model, this flow was loaded at the PTP. Further, the 172,500 gpd was applied as a constant flow over the entire day. The potential effects of this discharge were analyzed for the following conditions:

a. Existing (2009) conditions, without Coca-Cola flow
b. Existing (2009) conditions, with Coca-Cola flow
c. Dry weather flow analysis for both conditions above
d. Wet weather flow analysis for both conditions above

The following figures summarize the projected affects of the Coca-Cola discharge on the WLI/LLR system:

- **Figure 2 through Figure 5:** Thematic maps summarizing projected *dry weather depth ratio* as assessed by the peak depth to pipe diameter ratio (Figures 2 and 4) and pipe capacity as assessed using the peak DWF / pipe capacity ratio (Figure 3 and Figure 5) for existing conditions and with the additional 172,500 gpd Coca-Cola discharge. These maps show the following information:

Parameter	Map Coding	Parameter Value
Pipe Depth Ratio: Measured by Peak Depth to Pipe Diameter Ratio	Green Yellow Red	< 0.5 0.5 to 0.9 > 0.9
Pipe Capacity: Measured by Peak Flow to Pipe Capacity Ratio	Green Yellow Red	< 0.5 0.5 to 0.9 > 0.9

- **Figure 6 and Figure 7:** These figures present thematic maps that summarize results of the 5-year 24-hour synthetic storm for existing conditions (Figure 6) and with the additional Coca-Cola discharge (Figure 7). The maps show the following information:

Parameter	Map Coding	Parameter Value
Model predicted pipe status	Green Yellow Red	Pipe peak flow less than capacity Backwater Insufficient Capacity

Figures 2 through 5 indicate that the additional Coca-Cola discharge will have little impact on available dry weather capacity. Overall, more than 60 percent of the modeled network has less than 50 percent of the pipe capacity utilized during dry weather under both existing conditions and with the additional Coca-Cola discharge. Less than 6 percent of the system is predicted to have dry weather flows exceed 90% of the theoretical pipe capacity. Maximum flow depth compared to pipe diameter under dry weather conditions, however, appears a bit more extensive than the pipe capacity utilization would indicate. Almost 20 percent of the modeled system has a dry weather peak depth to pipe diameter ratio of greater than 0.9, and the addition of the Coca-Cola discharge increases this slightly.

A comparison of Figure 6 and Figure 7 also indicates that the addition of the Coca-Cola discharge may slightly increase the amount of predicted surcharge within the modeled WLI/LLR system. However, this does not translate into a noticeable increase in overflow volume at the Park PS.

3.2 Evaluation of Iron Run Pump Station (IRPS)

The Phase 1 baseline model was evaluated to assess the effect of the IRPS on the system operation during wet weather conditions. For this analysis, the Coca-Cola discharge (172,500 gpd) was included. To model the operation of the IRPS, a pump station was added to the model downstream of the PTP. The pump curves were applied assuming maximum pump speed/capacity. The IRPS was modeled discharging to the existing force main from the Spring Creek PS. Further, flow was limited downstream of the IRPS to 3.5 MGD. Figure 8 summarizes the results of the 5-year 24-hour synthetic storm for existing conditions with the additional Coca-Cola discharge and the IRPS. These results should be compared to Figure 7. The maps show the following information:

Parameter	Map Coding	Parameter Value
Model predicted pipe status	Green Yellow Red	Pipe peak flow less than capacity Backwater Insufficient Capacity

As shown on Figure 8, the inclusion of the IRPS greatly reduces the projected capacity issues by reducing flow between the PTP and the Iron Run & Spring Creek Force Main discharge point. However, flooding near the Park PS is projected to increase by approximately 100 percent, a result of the IRPS manifolding with the Spring Creek PS and subsequently discharging in the LLR upstream of the Park PS.

3.3 Evaluation of Flow Equalization Basin (FEB)

The Phase 1 baseline model was evaluated to assess the effect of the IRPS on the system operation during wet weather conditions. For this analysis, the Coca-Cola discharge (172,500 gpd) was included. To model the operation of the FEB, an outfall pipe was added to the model downstream of the PTP. As with the IRPS, flow was limited downstream of the FEB to 3.5 MGD, and any flow in excess was diverted to the FEB.

This simple configuration allowed for the evaluation of the effect of removing excess flow from the downstream system and for the estimation of required storage volumes. Storage tank dewatering was not modeled in this analysis. Figure 9 summarizes the results of the 5-year 24-hour synthetic storm for existing conditions with the additional Coca-Cola discharge and the FEB. These results should be compared to Figure 7. The maps show the following information:

Parameter	Map Coding	Parameter Value
Model predicted pipe status	Green Yellow Red	Pipe flow less than capacity Backwater Insufficient Capacity

As shown on Figure 9, the inclusion of the FEB greatly reduces the projected capacity issues in the WLI/LLR system by reducing flow in the modeled system downstream of the PTP. In addition, flooding near the Park PS is projected to remain about the same or even less than existing conditions. The predicted volume diverted to the FEB under the 2-year storm event, assuming a limiting discharge of 3.5 MGD, would be approximately 2.3 million gallons.

4.0 Conclusions

The results presented in Section 3 indicate that the WLI/LLR system has very limited dry weather capacity issues. Wet weather simulations for the 5-year 24-hour synthetic storm indicated flow reaching pipe capacity throughout the modeled network and flooding at the Park PS.

Table 2 summarizes the projected flooding near the Park PS for all four scenarios.

Table 2
Summary of Park PS Overflows for All Modeled Scenarios
5-Year 24-Hour Synthetic Storm

	Existing Conditions	With Additional Coca-Cola Discharge	IRPS Analysis	FEB Analysis
Overflow Near Park PS (MGal)	0.5	0.5	1.0	0.5
Percent Change: Overflow Volume Near Park PS[1]	NA	0.0%	100.0%	0.0%

[1] Change in Park PS overflow volume for IRPS and FEB scenarios is with respect to "With Additional Coca-Cola Discharge" volumes.

Figure 10 displays the change in projected model pipe status by percent of total length of modeled pipe for simulated wet weather conditions (5-year 24-hour synthetic storm) for the following three scenarios:

- Existing system with Coca-Cola discharge (blue bar)
- IRPS with Coca-Cola discharge (red bar)
- FEB with Coca-Cola discharge (green bar)

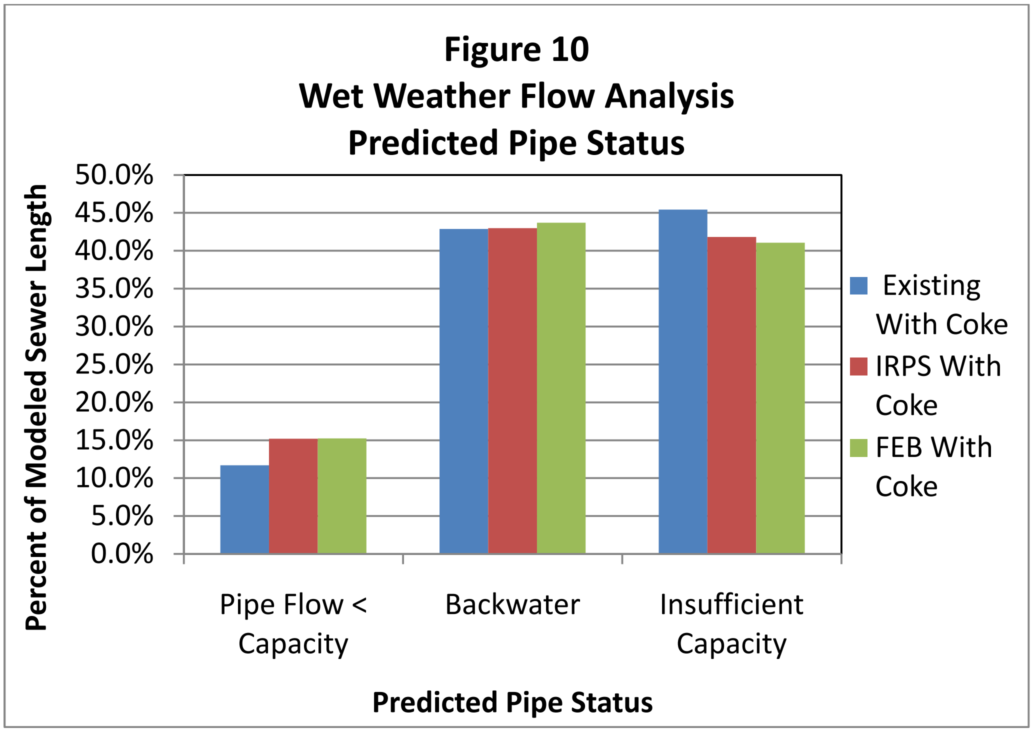
Parameter	Parameter Value
Model predicted pipe status	Pipe flow less than capacity Backwater Insufficient Capacity

As can be seen, both the IRPS and the FEB show a net benefit on overall system operation, by reducing the length of modeled pipe predicted to have insufficient capacity as well as increasing the percent of modeled pipe predicted to be able to convey peak wet weather flows for the 5-year 24-hour storm. The FEB shows the greatest improvement to the overall system capacity.

Based on the results presented on this Table 2, Figure 10, and on the figures presented in Section 3, the following conclusions were made:

1. LCA System Performance During Wet Weather:

   After reviewing LCA documentation for the period 1997 through 2005, it was determined that while overflows were reported at manholes near Park PS, they occurred infrequently and in nearly all cases due to flows resulting from storms at or greater than a 5-year return period. This observation was confirmed by running the LCA model for the recorded 2-year storm event (March 27, 2005), which revealed no predicted overflows near the Park PS.



2. Effect of Coca-Cola Discharge on WLI/LLR:

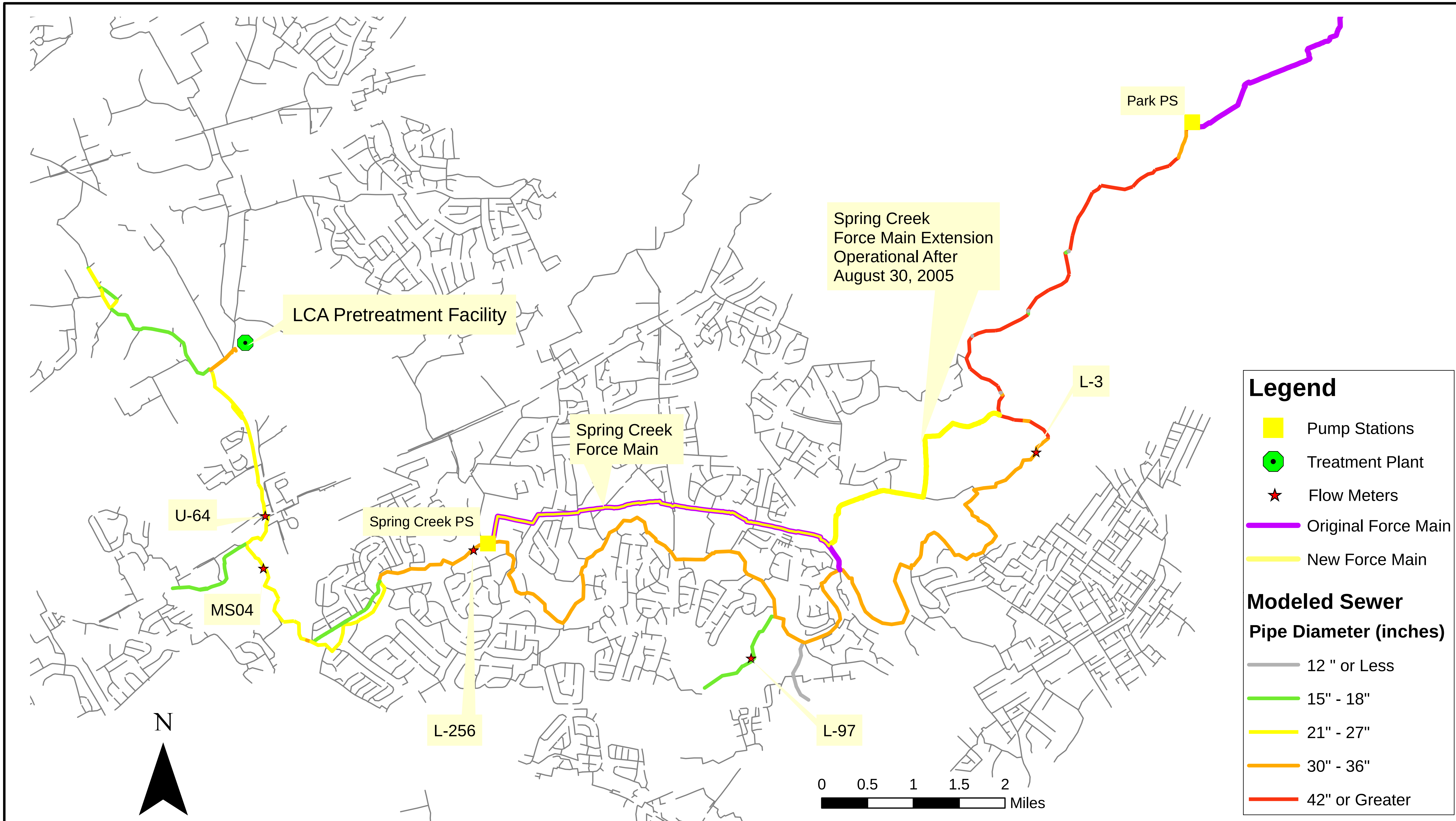
   As expected, during dry weather conditions, the additional discharge (172,500 gpd) from Coca-Cola has very little effect on the available dry weather capacity. For wet weather conditions (5-year 24-hour synthetic storm), the increased flow from Coca-Cola has a negligible impact on projected overflow volumes near Park PS.

3. Effect of Proposed IRPS on WLI/LLR and Park PS:

   While the IRPS will improve conditions along the WLI between the PTP and Keck's Bridge, the discharge flow from the pump station is projected to increase the flows in the LLR and the parallel Allentown sewer down to Park PS. This increases the overflows near the Park PS.

4. Effect of Proposed FEB on WLI/LLR and Park PS:

   Model results indicate that this option will significantly reduce flow in the downstream system during storm events. For the 5-year 24-hour synthetic storm, and predicted Park PS overflow volumes will be reduced by 4 percent. The volume diverted for the recorded 2-year storm (March 27, 2005), assuming the discharge downstream of the pre-treatment plant was limited to 3.5 MGD, was approximately 2.3 million gallons. This confirmed the planned 3 million gallon sizing of the FEB.

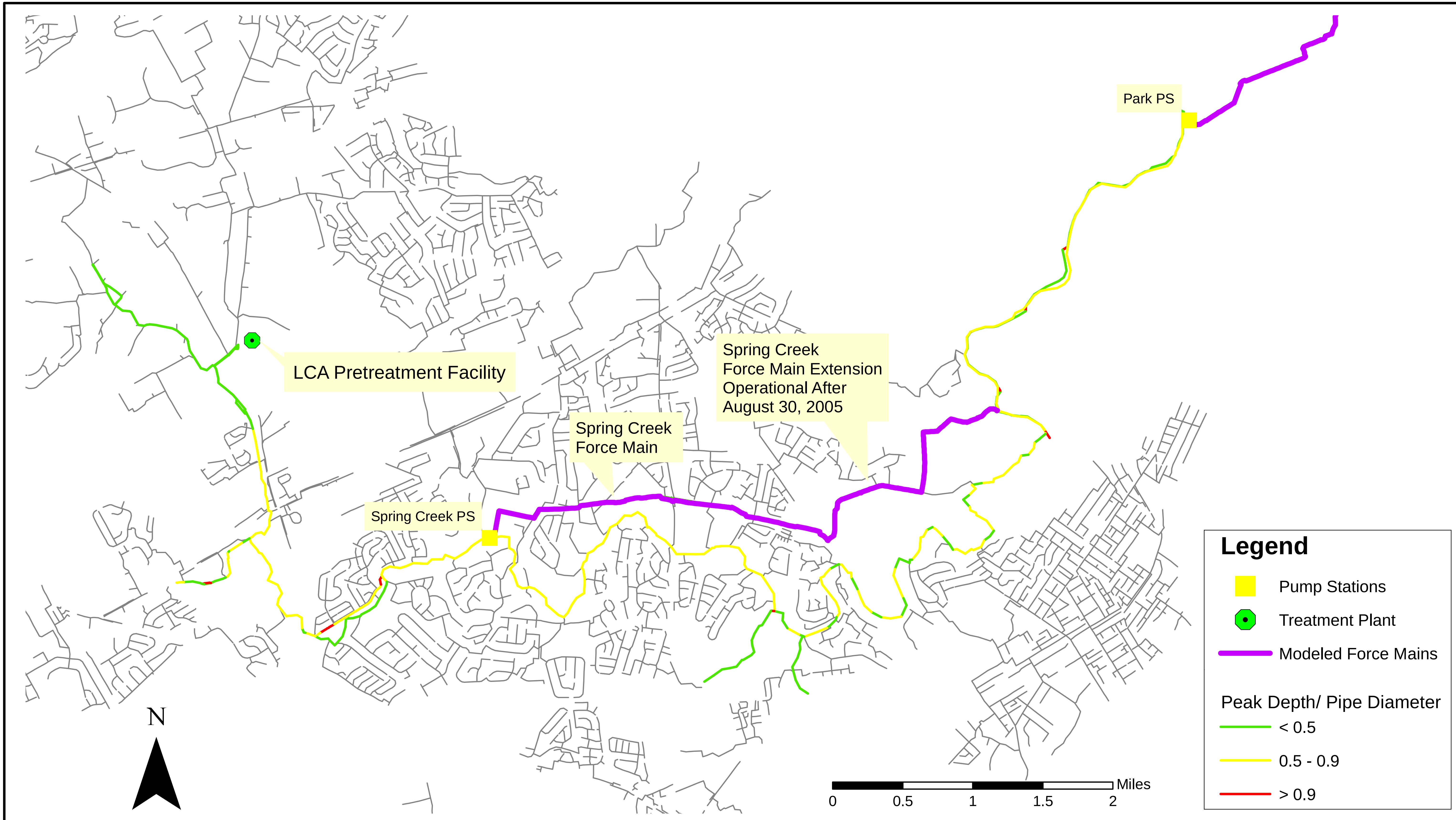


MALCOLM PIRNIE

Western Lehigh Interceptor and Little Lehigh Relief Sewer
Phase 1 Hydraulic/Hydrologic Model and Analysis

Figure 1
Baseline Model System Overview

LEHIGH COUNTY AUTHORITY

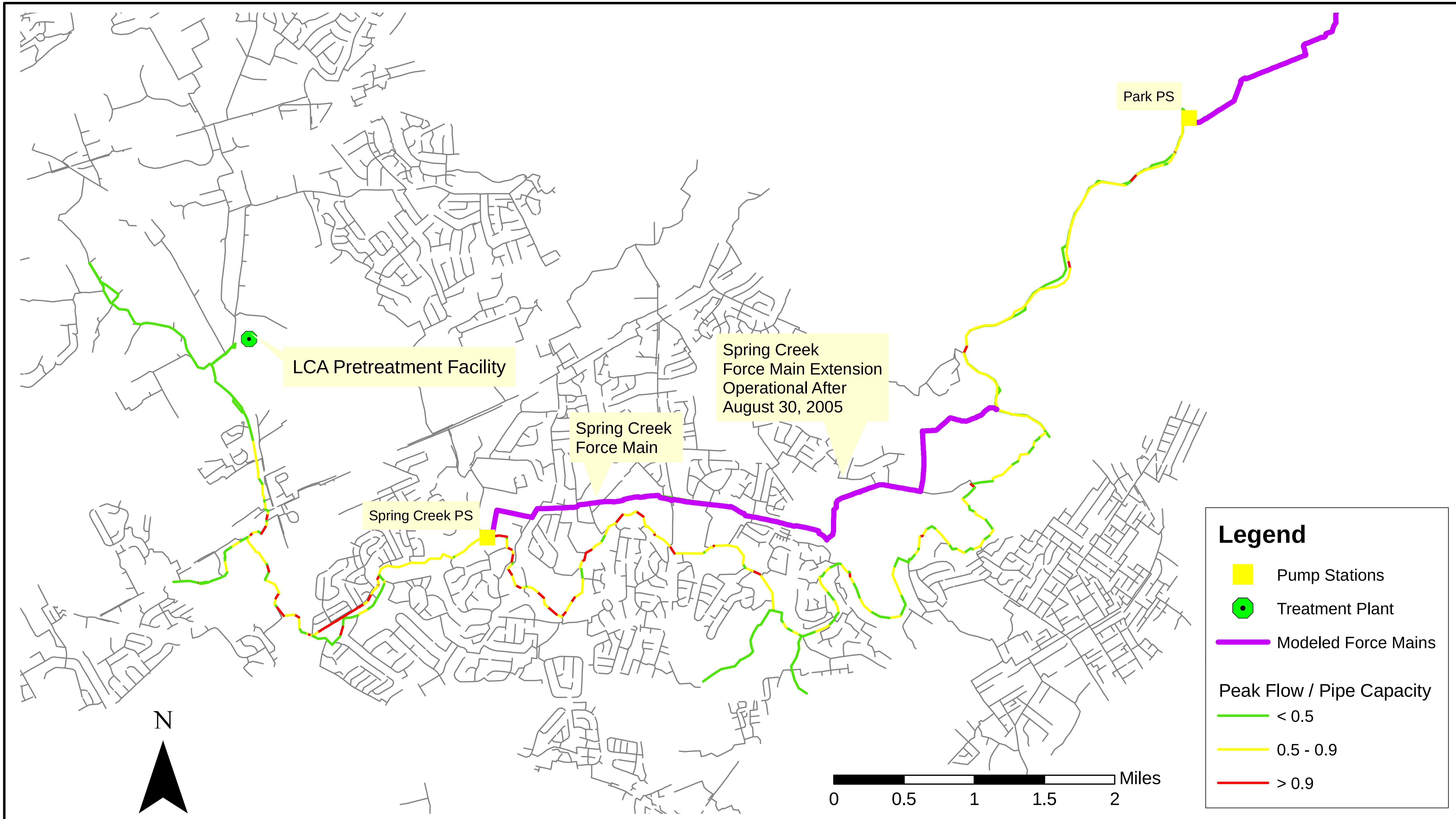


MALCOLM PIRNIE

Western Lehigh Interceptor and Little Lehigh Relief Sewer
Phase 1 Hydraulic/Hydrologic Model and Analysis

Figure 2
Dry Weather Flow
Pipe Depth Ratio

LEHIGH COUNTY AUTHORITY



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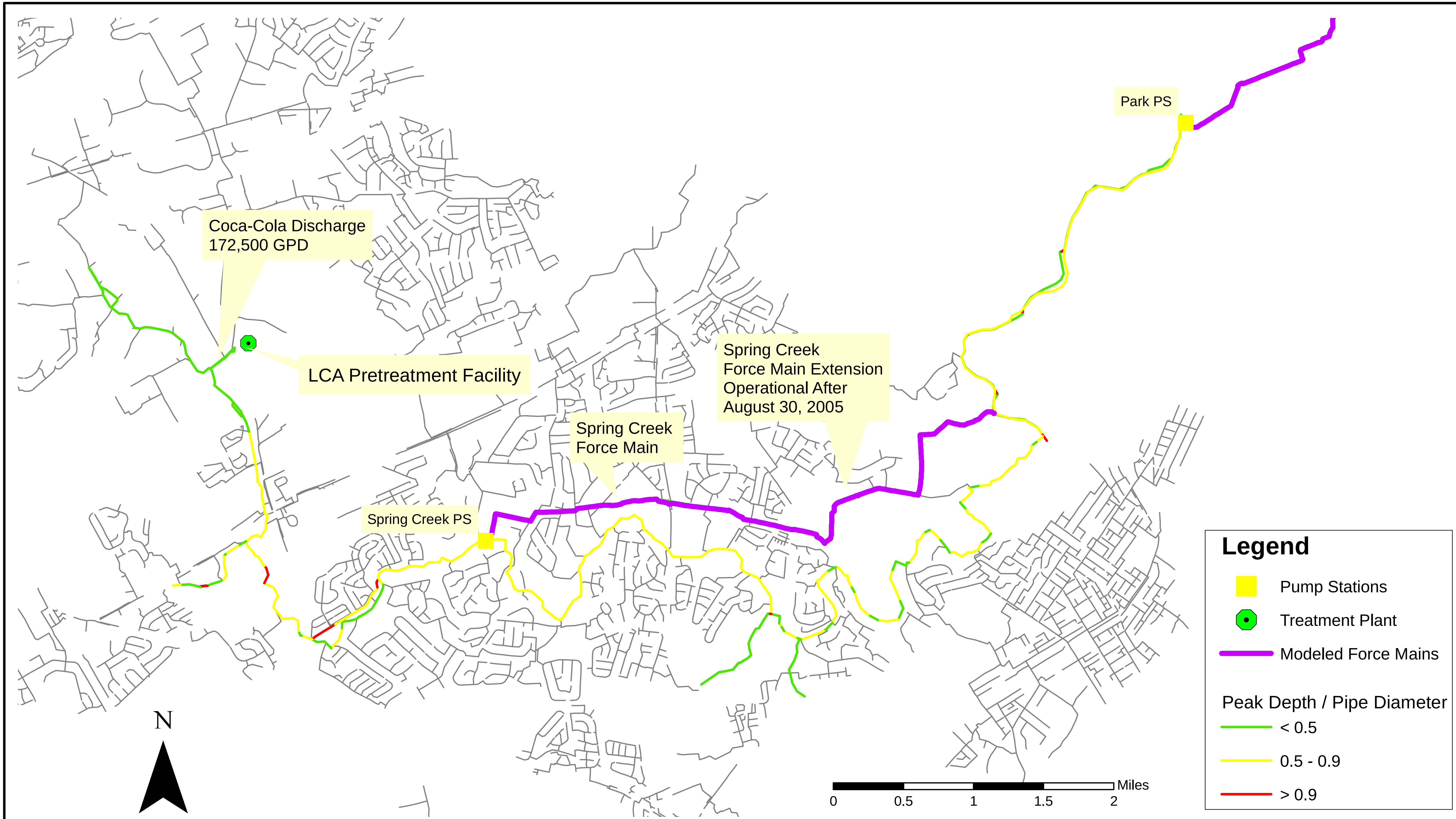
Western Lehigh Interceptor and Little Lehigh Relief Sewer
Phase 1 Hydraulic/Hydrologic Model and Analysis

Figure 3
Dry Weather Flow
Peak Flow/ Pipe Capacity Ratio

LEHIGH COUNTY AUTHORITY



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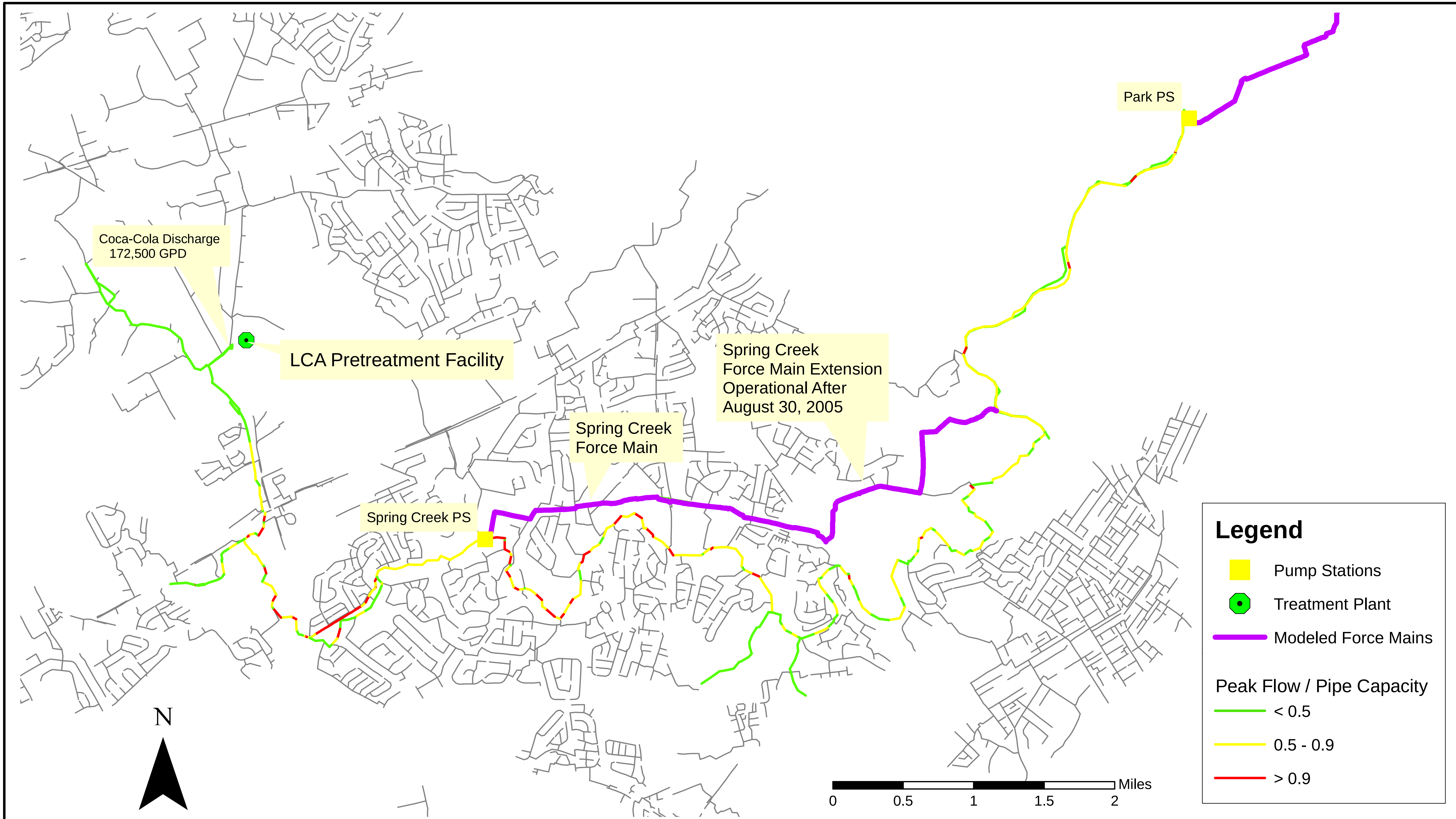
Western Lehigh Interceptor and Little Lehigh Relief Sewer
Phase 1 Hydraulic/Hydrologic Model and Analysis

Figure 4
Dry Weather Flow
Pipe Depth Ratio with Coca-Cola Flow

LEHIGH COUNTY AUTHORITY

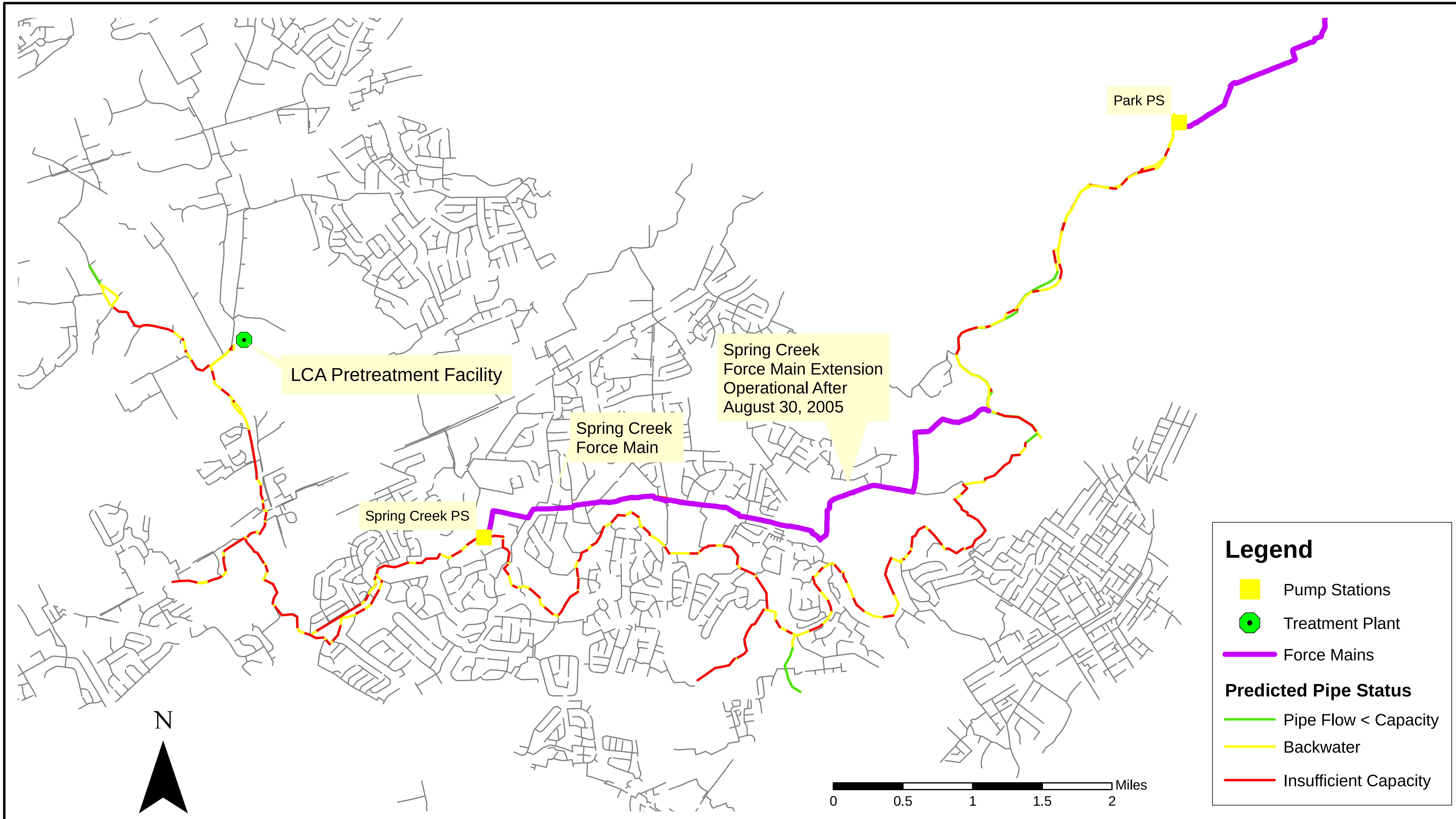


MALCOLM PIRNIE

Western Lehigh Interceptor and Little Lehigh Relief Sewer
Phase 1 Hydraulic/Hydrologic Model and Analysis

Figure 5
Dry Weather Flow
Peak Flow / Pipe Capacity Ratio with Coca-Cola Flow

LEHIGH COUNTY AUTHORITY

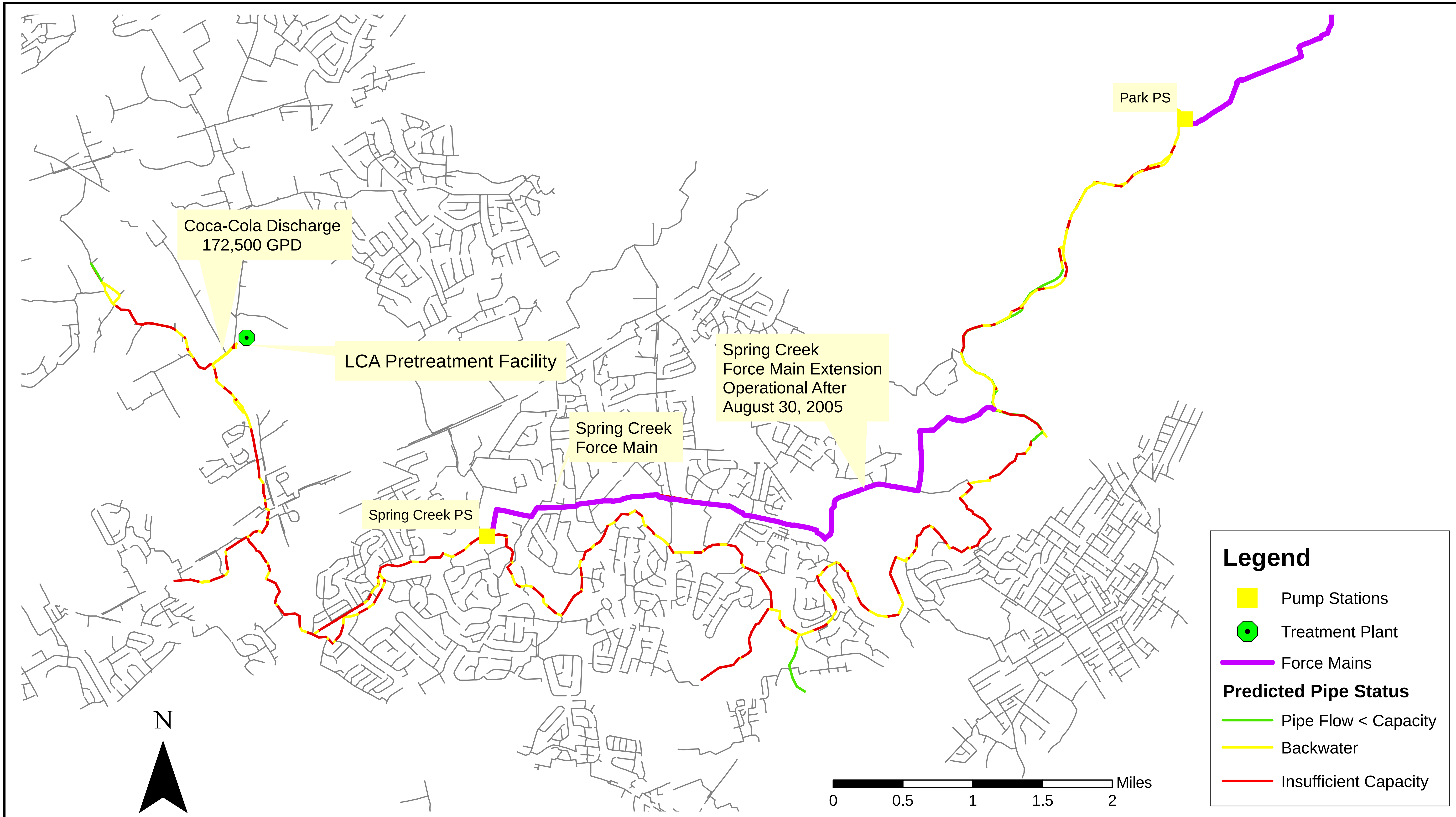


MALCOLM PIRNIE

Western Lehigh Interceptor and Little Lehigh Relief Sewer
Phase 1 Hydraulic/Hydrologic Model and Analysis

Figure 6
Wet Weather 5-year 24-Hour Synthetic Storm
Existing System

LEHIGH COUNTY AUTHORITY

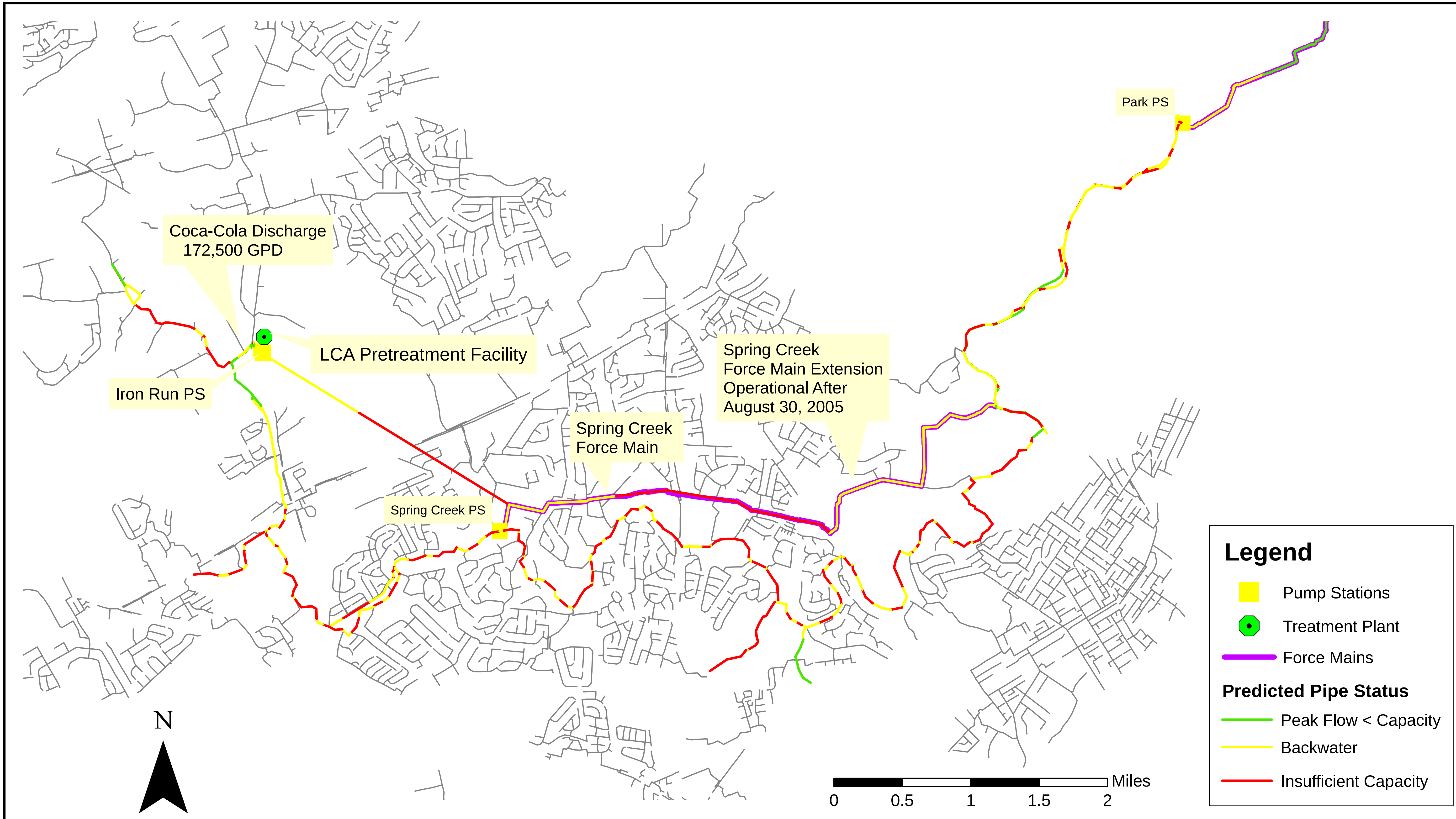


MALCOLM PIRNIE

Western Lehigh Interceptor and Little Lehigh Relief Sewer
Phase 1 Hydraulic/Hydrologic Model and Analysis

Figure 7
Wet Weather 5-Year 24-Hour Synthetic Storm
Existing System with Coca-Cola Flow

LEHIGH COUNTY AUTHORITY

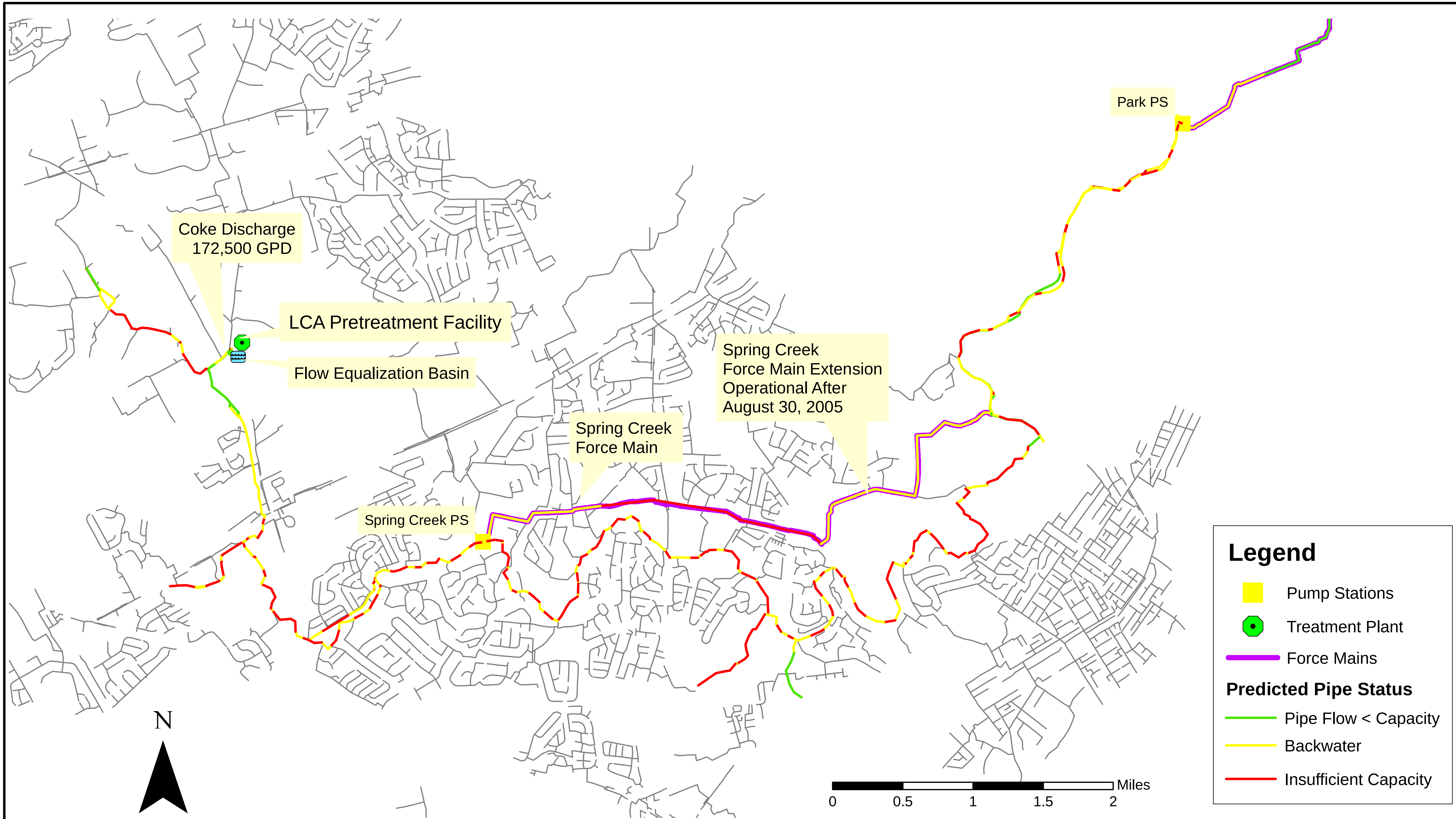


MALCOLM PIRNIE

Western Lehigh Interceptor and Little Lehigh Relief Sewer
Phase 1 Hydraulic/Hydrologic Model and Analysis

Figure 8
Wet Weather 5-Year 24-Hour Synthetic Storm
IRPS with Coca-Cola Flow

LEHIGH COUNTY AUTHORITY



MALCOLM PIRNIE

Western Lehigh Interceptor and Little Lehigh Relief Sewer
Phase 1 Hydraulic/Hydrologic Model and Analysis

Figure 9
Wet Weather 5-Year 24-Hour Synthetic Storm
FEB with Coca-Cola Flow

LEHIGH COUNTY AUTHORITY

APPENDIX 6

Kline's Island Wastewater Treatment Plant Hydraulic Design Capacity Evaluation

KLEINFELDER
Bright People. Right Solutions.

Lehigh County Authority

KLINE'S ISLAND WASTEWATER TREATMENT PLANT

HYDRAULIC DESIGN CAPACITY EVALUATION

PREPARED BY:
KLEINFELDER, INC.

OCTOBER 2019

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
TIMOTHY DAVID BRADLEY
ENGINEER
No. 35163E

TIMOTHY D. BRADLEY, P.E.
PA P.E. LIC. NO. PE-035163-E

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1.0 INTRODUCTION

As defined in the Chapter 94 municipal wasteload management regulations, hydraulic design capacity is the "*maximum monthly design flow, expressed in millions of gallons per day, at which a plant is expected to consistently provide the required treatment… This capacity is specified in the water quality management permit (Part II permit issued under Chapter 91).*"

The most recent Part II permit issued for the Kline's Island Wastewater Treatment Plant (KIWWTP), Permit No. 3915403, lists the KIWWTP's Hydraulic Design Capacity as 40 million gallons per day (mgd). It also lists the "annual average flow" as 40 mgd and the "design organic capacity" as 70,000 lbs/day.

As also defined in the Chapter 94 municipal wasteload management regulations, hydraulic overload is the "condition that occurs when the monthly average flow entering the plant exceeds the hydraulic design capacity for 3-consecutive months out of the preceding 12 months." Because the KIWWTP's monthly average flow recently exceeded 40 mgd for three consecutive months during an unprecedented wet period, the Pennsylvania Department of Environmental Protection (PADEP) notified the City of Allentown (City) and Lehigh County Authority (LCA) that a hydraulic overload occurred, thus requiring follow-up actions in accordance with Section 94.21 of the municipal wasteload management regulations.

During the unprecedented wet period in which the KIWWTP monthly average flow exceeded 40 mgd for three consecutive months, the KIWWTP performed exceptionally well, fully complying with all effluent limitations by a significant margin. As a result, and as discussed in detail during a meeting between PADEP, the City and LCA on September 12, 2019, the KIWWTP's actual hydraulic design capacity has been demonstrated to be significantly greater than 40 mgd. However, a detailed evaluation is required to determine the specific extent to which the KIWWTP's hydraulic design capacity exceeds 40 mgd.

The objective of the Kline's Island Wastewater Treatment Plant Hydraulic Design Capacity Evaluation is to determine the KIWWTP's actual hydraulic design capacity in comparison to the hydraulic design capacity of 40 mgd presented in the Part II permit noted above.

The findings of this evaluation will be used to support and formally request a revision to the Part II permit's hydraulic design capacity of 40 mgd. A modification of the KIWWTP's 40 mgd permitted Annual Average Flow is not being requested and is not required.

2.0 KIWWTP OVERVIEW

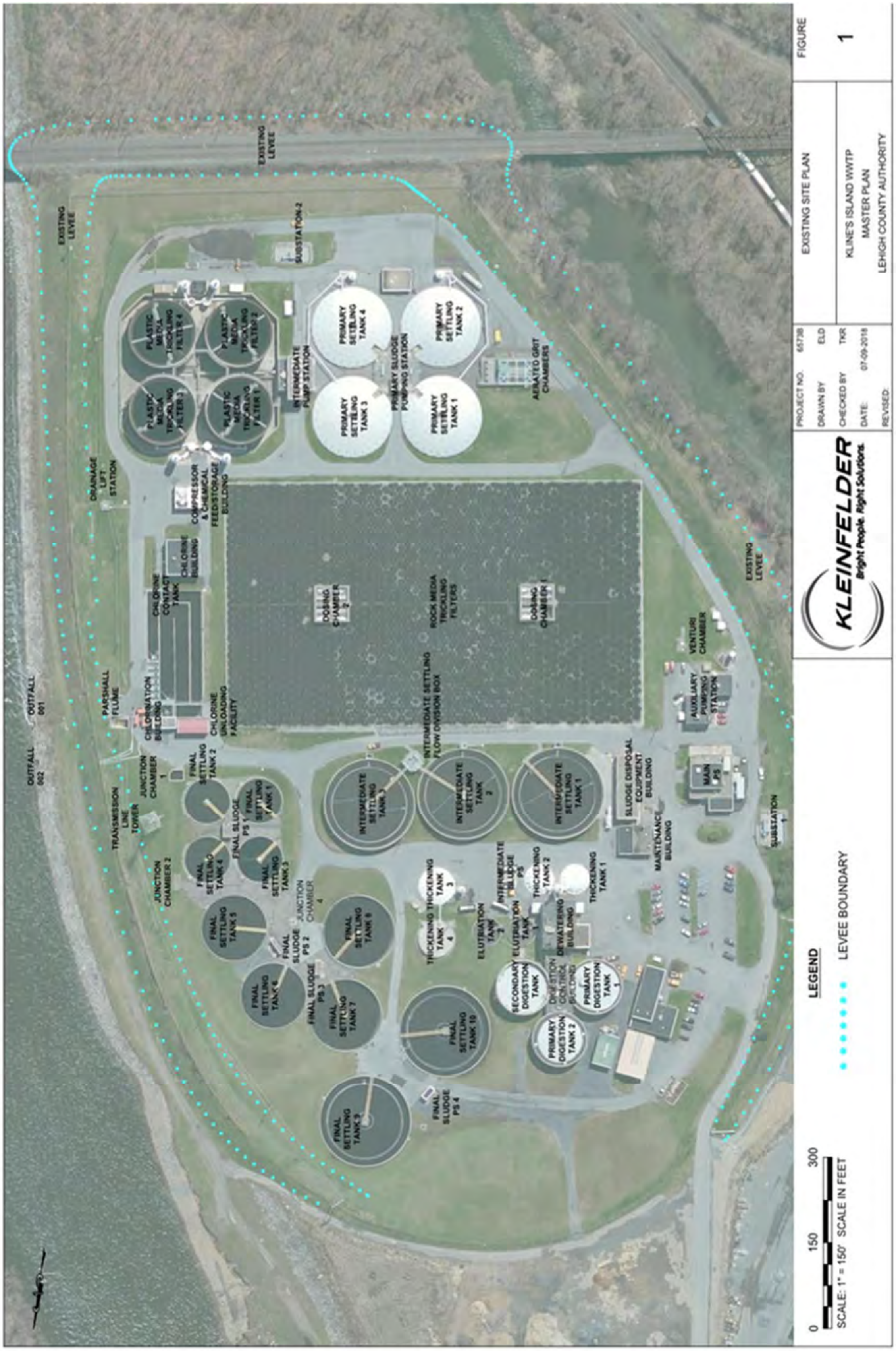
The KIWWTP has been in operation since November 1929. Many improvements have been implemented over its long period of service to address various needs including capacity expansion, enhancing the level of treatment, and rehabilitating or replacing aging infrastructure. An aerial site plan of the existing KIWWTP is presented as Figure 1. The levee shown in Figure 1 that surrounds the KIWWTP provides flood protection. Figures 2 and 3 present the wastewater flow schematic and solids flow schematic, respectively, for the KIWWTP, which collectively depict all unit processes that the KIWWTP comprises.

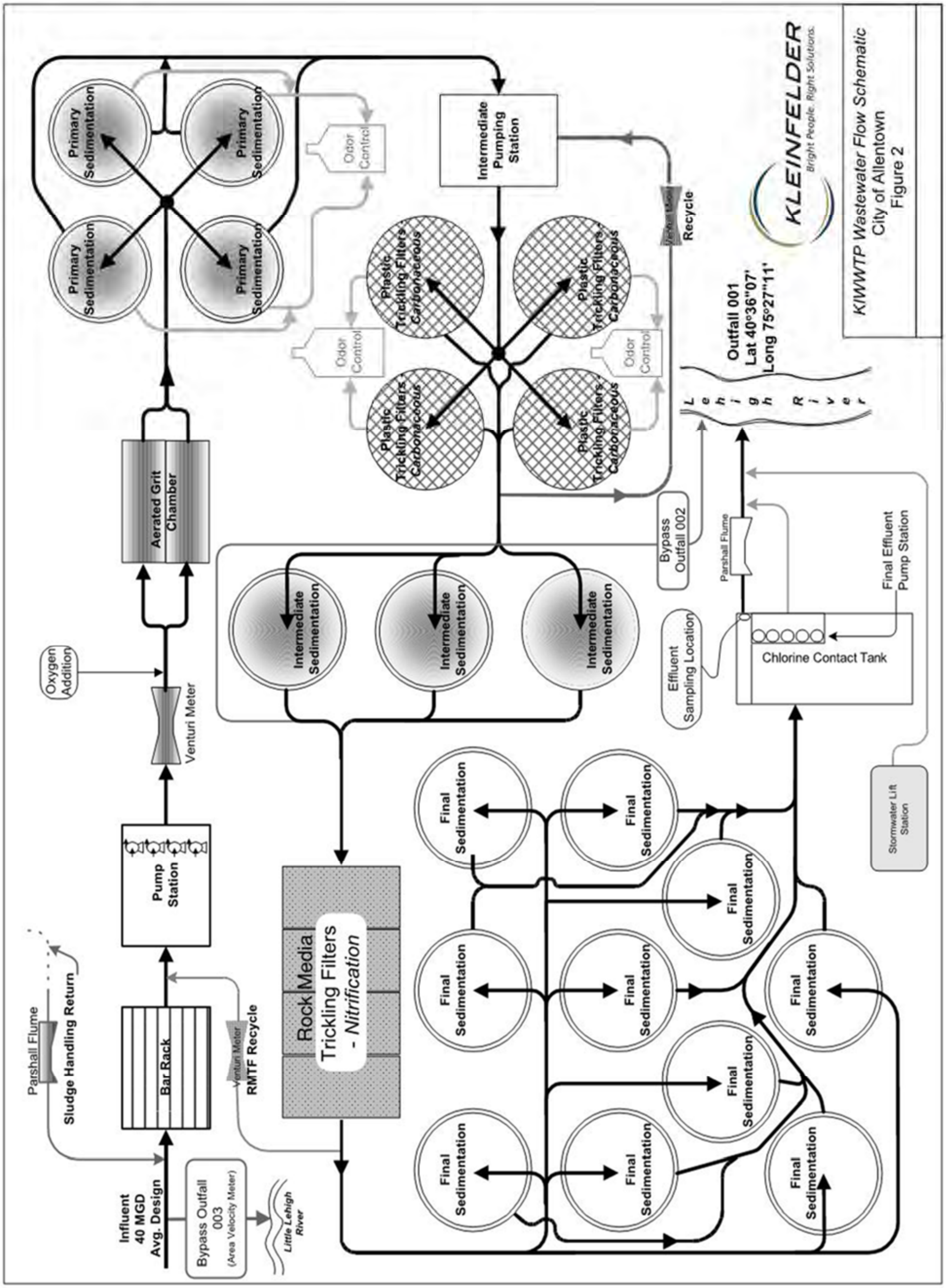
The KIWWTP is authorized to discharge treated effluent to the Lehigh River in accordance with National Pollutant Discharge Elimination System (NPDES) Permit No. PA-0026000. The key effluent limitations stipulated by the NPDES permit are presented in Table 2-1.

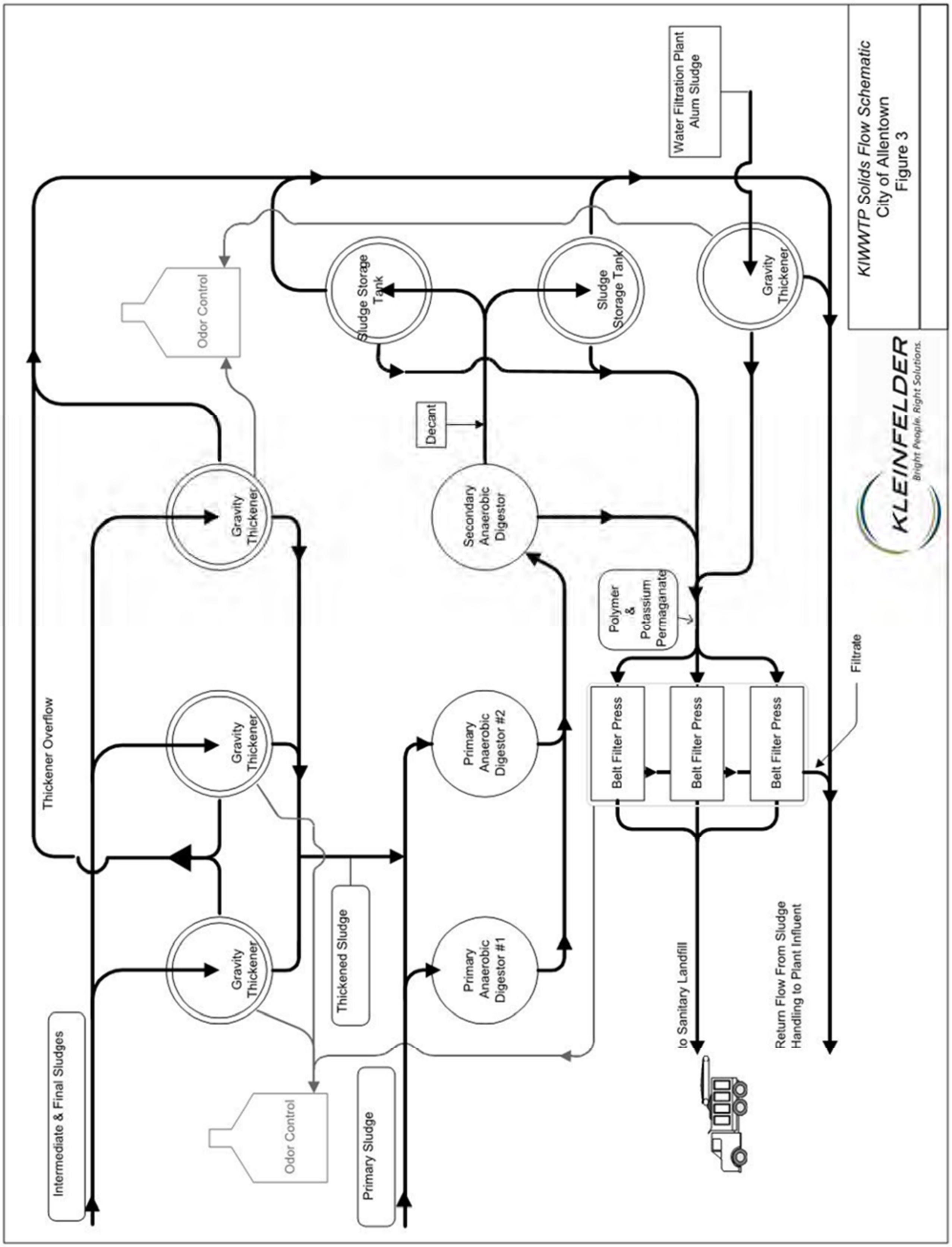
Table 2-1: KIWWTP Key NPDES Permit Effluent Limits

Parameter	Monthly Average Effluent Limit	Weekly Average Effluent Limit	Instantaneous (Daily) Maximum Effluent Limit
Flow	(1)	(1)	(1)
$CBOD_5$	20 mg/l & 6,672 lbs/day	30 mg/L & 10,008 lbs/day	40 mg/l
TSS	30 mg/l & 10,008 lbs/day	45 mg/l & 15,012 lbs/day	60 mg/l
NH_3 (5/1 – 10/31)	5 mg/l & 5,004 lbs/day	-	10 mg/l
NH_3 (11/1 – 4/30)	15 mg/l	-	30 mg/l
Fecal Coliform (5/1 – 9/30)	200/100 ml geometric mean (2)		
Fecal Coliform (10/1 – 4/30)	2,000/100 ml geometric mean		
Residual Chlorine	0.5 mg/l	-	1.0 mg/l
pH	6.0 to 9.0 SU		
Dissolved Oxygen	5.0 mg/l minimum		

(1) Flow is not a regulated parameter, requiring only continuous monitoring.
(2) Not more than 10% of the samples shall have a fecal coliform concentration greater than 1,000/100 ml


EXISTING SITE PLAN
KLINE'S ISLAND WWTP
MASTER PLAN
LEHIGH COUNTY AUTHORITY
FIGURE
1
LEGEND
LEVEE BOUNDARY
SCALE: 1" = 150' SCALE IN FEET
0
150
300
EXISTING LEVEE
ROCK MEDIA TRICKLING FILTERS


Influent
40 MGD
Avg. Design
Bypass Outfall
003
(Area Velocity Meter)
Little Lehigh
River
Parshall Flume
Sludge Handling Return
Bar Rack
Venturi Meter
RMTF Recycle
Pump
Station
Venturi Meter
Oxygen
Addition
Aerated Grit
Chamber
Primary
Sedimentation
Odor
Control
Intermediate
Pumping
Station
Plastic
Trickling Filters -
Carbonaceous
Venturi Meter
Recycle
Intermediate
Sedimentation
Rock Media
Trickling Filters
- Nitrification
Final
Sedimentation
Bypass
Outfall 002
Parshall Flume
Effluent
Sampling Location
Chlorine Contact Tank
Final Effluent
Pump Station
Stormwater Lift
Station
Outfall 001
Lat 40°36'07'
Long 75°27'11'
Lehigh River
KLEINFELDER
Bright People. Right Solutions.
KIWWTP Wastewater Flow Schematic
City of Allentown
Figure 2


KIWWTP Solids Flow Schematic
City of Allentown
Figure 3
Water Filtration Plant Alum Sludge
Gravity Thickener
Sludge Storage Tank
Sludge Storage Tank
Odor Control
Decant
Secondary Anaerobic Digestor
Gravity Thickener
Gravity Thickener
Gravity Thickener
Thickener Overflow
Polymer & Potassium Permaganate
Filtrate
Belt Filter Press
Belt Filter Press
Belt Filter Press
Primary Anaerobic Digestor #2
Primary Anaerobic Digestor #1
Thickened Sludge
to Sanitary Landfill
Return Flow From Sludge Handling to Plant Influent
Intermediate & Final Sludges
Odor Control
Primary Sludge

As described in Part A of the NPDES permit, the effluent limitations presented in Table 2-1 were determined by PADEP using an effluent discharge rate of 40 mgd. This is consistent with the above-referenced Part II permit indicating that the KIWWTP's permitted Annual Average Flow is 40 mgd. As previously indicated, a modification of the permitted Annual Average Flow is not being requested, nor is it required.

Wastewater is conveyed to the KIWWTP through 933 miles of sewer pipe from a total of fourteen (14) municipalities. The fourteen (14) municipalities have collaboratively developed a Regional Flow Management Strategy (RFMS) to reduce infiltration and inflow over a multi-year period.

The first step in the hydraulic capacity evaluation is to characterize the wastewater flow and loads to the KIWWTP over several years encompassing both dry and wet periods such that variability in flows and loads can be properly assessed, particularly during wet periods, because such periods are directly relevant to determining the KIWWTP's hydraulic design capacity.

3.0 WASTEWATER CHARACTERIZATION

The specific purpose of wastewater characterization is to establish the variability in wastewater flows and loads on an annual average, maximum month (maximum 30-day average), and maximum day (maximum 24-hour average) basis. The variability in flows and loads must be known to evaluate the hydraulic design capacity of each unit process and thus to determine the KIWWTP's overall hydraulic design capacity.

The period of analysis selected for wastewater characterization is January 1, 2015, through July 31, 2019. The annual rainfall in each of these years is presented in Table 3-1.

Table 3-1: Precipitation

Year	Annual Precipitation, Inches
2015	40.24
2016	36.82
2017	50.18
2018	66.96
2019(1)	41.50(2)

(1) January 1, 2019, through July 31, 2019.
(2) Total rainfall of 41.5 inches during the first seven months of 2019 exceeded the total 12-month rainfall during the years 2015 and 2016 of 40.24 and 36.82 inches, respectively.

Based on data from the National Centers for Environmental Information, the twelve (12) month total rainfall in Pennsylvania for the period September 2018 through August 2019 was the wettest twelve (12) month period in the last one hundred and twenty-four (124) years. Therefore, the period of study for wastewater characterization encompasses a broad range of wet and dry periods, with the wet period in 2018 and 2019 unprecedented in recent history.

Influent wastewater characteristics are measured at the effluent of the aerated grit chamber, which, in addition to influent wastewater, includes rock media trickling filter (RMTF) recycle flows (recycle of flow to the RMTF is needed during low flow periods to maintain a minimum acceptable wetting rate for the biofilm on the rock media), and solids processing (SP) return flows. The influent flow rate is measured at the influent flow meter, and the RMTF and SP return flows are metered separately. For reporting of influent flow on the discharge monitoring reports, RMTF flow and SP flow are subtracted from the influent flow measured at the effluent end of the aerated grit chambers. Similarly, to characterize the plant influent loads, the load contributions from the RMTF and SP return flows are subtracted from the values measured at the aerated grit chamber.

The plant influent also includes trucked septage and leachate, which are received at the plant to generate revenue. Septage is not characterized on a routine basis, and therefore limited analytical data is available. Leachate is characterized on a regular basis, and is processed with the gravity sludge thickener overflow, which is accounted for in the SP return flow. From a hydraulic loading perspective, septage and leachate flows are insignificant.

3.1 Influent Flow

Table 3-2 summarizes the calculated influent annual average, maximum month, and maximum day flows for the period 2015 through 2019 resulting from the subtraction of measured SP return flows and RMTF recycle flows from the metered influent which includes these flows.

Table 3-2: Annual Average Influent Flow and Precipitation

Year	Annual Avg Flow, mgd	Max Month Flow, mgd	Max Day Flow, mgd	Annual Rainfall, Inches
2015	30.44	36.16	55.25	40.24
2016	29.65	36.41	69.98	36.82
2017	30.80	34.53	51.92	50.18
2018	36.07	44.42	72.46	66.96
2019(1)	41.25	47.46	68.89	41.50

(1) January 1, 2019, through July 31, 2019.

As indicated, and consistent with all wastewater systems, annual average, maximum month, and maximum daily flows vary in response to changes in rainfall. The changes in groundwater levels resulting from changes in precipitation also impact wastewater flow rates.

The maximum monthly average flows are particularly relevant to hydraulic design capacity, because compliance with NPDES effluent limits must be achieved each month of the year, and because PADEP defines hydraulic design capacity as the maximum monthly design flow at which a plant is expected to consistently provide the required treatment.

As shown in Table 3-2, the highest monthly average flow during the period of study was 47.46 mgd, which occurred in May of 2019, i.e. within the wettest 12-month period during the last 124 years. Therefore, the maximum monthly average flow of 47.46 mgd was the result of an unprecedented and prolonged period of precipitation.

3.2 Influent BOD Load

As previously noted, the influent biochemical oxygen demand (BOD) loads were calculated by subtracting the BOD loads of the return streams from the BOD loads measured at the aerated grit chamber. Table 3-3 presents the calculated influent annual average BOD loads during the years 2015 through 2019 and the corresponding annual average flows.

Table 3-3: Influent Annual Average Flow and BOD Loads

Year	Annual Average Flow, mgd	Annual Average BOD Load, lbs/day
2015	30.44	48,421
2016	29.65	50,871
2017	30.80	45,970
2018	36.07	47,079
2019(1)	41.25	46,167

(1) January through July.

As shown in Table 3-3, the increase in annual average flow in 2018 and 2019 did not result in an increase in the influent BOD load. This is expected, because the increase in flow was due to infiltration and inflow (I&I) entering the system during the unprecedented wet period, and I&I does not contain significant concentrations of BOD, because it is a combination of groundwater and rainfall entering the system.

It is also noted that the annual average BOD loads are substantially less than the KIWWTP's design organic loading of 70,000 lbs/day presented in the Part II permit.

Table 3-4 presents the monthly average influent BOD loads during the maximum monthly flow month during each year of the study.

Table 3-4: Influent BOD Loads during Maximum Monthly Average Flow

Year	Maximum Monthly Average Flow, mgd	Monthly Average BOD Load, lbs/day
2015	36.16	46,199
2016	36.41	44,552
2017	34.53	39,817
2018	44.42	43,538
2019(1)	47.46	47,267

(1) January through July.

By comparing the influent BOD loads in Table 3-3 and 3-4, it is evident that the influent BOD loads during the maximum monthly flows are not greater than the influent BOD loads during the annual average flows. This is because whether it is a wet year or dry year, maximum monthly average flows are the result of I&I entering the system, which does not contribute to organic loading.

As also indicated in Table 3-4, the monthly average BOD load during the unprecedented wet period in 2018 and 2019 were essentially the same as during the preceding years with normal annual precipitation and were substantially less than the KIWWTP's design organic loading of 70,000 lbs/day presented in the Part II permit.

In summary, the temporary high flows resulting from the unprecedented wet period in 2018 and 2019 did not result in an increase in organic loading to the KIWWTP.

3.3 Influent TSS Load

Table 3-5 presents the calculated influent annual average total suspended solids (TSS) loads during the years 2015 through 2019 and the corresponding annual average flows.

Table 3-5: Influent Annual Average Flow and TSS Loads

Year	Annual Average Flow, mgd	Annual Average TSS Load, lbs/day
2015	30.44	50,525
2016	29.65	54,633
2017	30.80	48,504
2018	36.07	50,977
2019(1)	41.25	49,294

(1) January through July.

As shown in Table 3-5, the increase in annual average flow in 2018 and 2019 did not result in an increase in the influent TSS load. This is expected, because the increase in flow was due to I&I entering the system during the unprecedented wet period, and I&I does not contain significant concentrations of TSS, because it is a combination of groundwater and rainfall entering the system.

Table 3-6 presents the monthly average influent TSS loads during the maximum monthly flow month during each year of the study.

Table 3-6: Influent TSS Loads during Maximum Monthly Average Flow

Year	Maximum Monthly Average Flow, mgd	Monthly Average TSS Load, lbs/day
2015	36.16	46,421
2016	36.41	42,541
2017	34.53	42,811
2018	44.42	48,880
2019(1)	47.46	52,943

(1) January through July.

By comparing the influent TSS loads in Table 3-5 and 3-6, it is evident that there is not a significant increase in TSS loads during the maximum monthly average flow compared to the TSS loads during the annual average flow. This is because whether it is a wet year or dry year, maximum monthly average flows are the result of I&I entering the system, which does not contribute to TSS loading.

In summary, the temporary high flows resulting from the unprecedented wet period in 2018 and 2019 did not result in a significant increase in TSS loading to the KIWWTP.

3.4 Influent TKN Loads

Table 3-7 presents the calculated influent annual average total Kjeldahl nitrogen (TKN) loads during the years 2015 through 2019 and the corresponding annual average flows.

Table 3-7: Influent Annual Average Flow and TKN

Year	Annual Average Flow, mgd	Annual Average TKN Load, lbs/day
2015	30.44	8,572
2016	29.65	9,002
2017	30.80	8,549
2018	36.07	8,486
2019(1)	41.25	9,358

(1) January through July.

As shown in Table 3-7, the increase in annual average flow in 2018 and 2019 did not result in a significant increase in the influent TKN load. This is expected, because the increase in flow was due to I&I entering the system during the unprecedented wet period, and I&I does not contain a significant concentration of TKN, because it is combination of groundwater and rainwater.

Table 3-8 presents the monthly average influent TKN loads during the maximum monthly flow month during each year of the study.

Table 3-8: Influent TKN Loads during Maximum Monthly Average Flow

Year	Maximum Monthly Average Flow, mgd	Monthly Average TKN Load, lbs/day
2015	36.16	9,752
2016	36.41	8,172
2017	34.53	8,643
2018	44.42	8,441
2019(1)	47.46	9,920

(1) January through July.

By comparing the influent TKN loads in Table 3-7 and 3-8, it is evident that the influent TKN loads during the maximum monthly flows are not significantly greater than the influent TKN loads during the annual average flows. This is because whether it is a wet year or dry year, maximum monthly average flows are the result of I&I entering the system, which does not contain significant concentrations of TKN.

In summary, the temporary high flows resulting from the unprecedented wet period in 2018 and 2019 did not result in an increase in TKN loading to the KIWWTP.

3.5 Influent Ammonia Loads

Table 3-9 presents the calculated influent annual average ammonia (NH_3) loads during the years 2015 through 2019 and the corresponding annual average flows for ease of comparison.

Table 3-9: Influent Annual Average Flow and NH_3

Year	Annual Average Flow, mgd	Annual Average NH_3 Load, lbs/day
2015	30.44	4,044
2016	29.65	4,715
2017	30.80	4,767
2018	36.07	4,548
2019(1)	41.25	5,272

(1) January through July.

As shown in Table 3-9, the increase in annual average flow in 2018 did not result in an increase in the influent NH_3 load. However, there was a nominal increase in the influent NH_3 loading in the first half of 2019 compared to the preceding years. This is believed to be an anomaly, because I&I does not contain significant concentrations of NH_3.

Table 3-10 presents the monthly average influent NH_3 loads during the maximum monthly flow month during each year of the study.

Table 3-10: Influent NH_3 Loads during Maximum Monthly Average Flow

Year	Maximum Monthly Average Flow, mgd	Monthly Average NH_3 Load, lbs/day
2015	36.16	4,293
2016	36.41	4,651
2017	34.53	4,761
2018	44.42	4,846
2019(1)	47.46	5,290

(1) January through July.

By comparing the influent NH_3 loads in Table 3-9 and 3-10, it is evident that the influent NH_3 loads during the maximum monthly flows are not greater than the influent NH_3 loads during the annual average flows. This is because whether it is a wet year or dry year, maximum monthly average flows are the result of I&I entering the system, which does not contain significant concentrations of NH_3.

In summary, the temporary high flows resulting from the unprecedented wet period in 2018 and 2019 did not result in a significant increase in NH_3 loading to the KIWWTP.

3.6 Recycle Streams

3.6.1 Rock Media Trickling Filter Recycle Flow

As previously noted, recycling of RMTF effluent is performed to maintain a minimum wetting rate for the RMTF biofilm. Table 3-11 presents the annual average and maximum monthly average RMTF recycle flows for the period 2015 - 2019.

Table 3-11: RMTF Recycle Flows

Year	Annual Average Flow, mgd	Max Month Flow, mgd
2015	3.84	5.51
2016	4.11	4.97
2017	3.33	4.95
2018	1.61	4.12
2019(1)	0.28	0.98

(1) January through July.

Consistent with LCA's operational procedure to maintain a flow rate of approximately 35 mgd through the RMTF, the recycle flow is reduced as the plant influent flow increases. As a result, the annual average recycle flow in 2018 and 2019 were negligible. Therefore, RMTF recycle flow is not relevant to the KIWWTP's hydraulic design capacity.

3.6.2 Solids Processing Return Flow

The SP return stream includes sludge thickening supernatant, sludge digester supernatant, sludge holding tank supernatant, and belt filter press filtrate. As previously noted, leachate is bled into the thickener overflow and therefore contributes flow and load to the SP return stream.

Table 3-12 presents the annual average, maximum monthly, and maximum daily SP flows for the period 2015 - 2019.

Table 3-12: SP Return Flows

Year	SP Annual Average Flow, mgd	SP Flow during Max Month Flow, mgd
2015	1.58	1.85
2016	1.63	1.56
2017	1.68	1.83
2018	1.88	1.94
2019(1)	1.86	1.77

(1) January through July.

As shown in Table 3-12, the annual average SP return flows are not significantly different between dry and wet years, and the SP flows during the KIWWTP maximum monthly average flow are not significantly different than the SP return flows during the KIWWTP annual average flows. Because SP return flows are directly related to sludge production, and sludge is generated by the removal of BOD and TSS from the wastewater, this finding is consistent with the fact that the BOD and TSS influent loads do not vary significantly between wet and dry years and the maximum monthly average loads are not significantly different than during the annual average flow.

Because of the consistency and magnitude of SP flows, they are not significant in terms of the KIWWTP's hydraulic design capacity.

3.7 Sludge Production

The monthly average sludge production during the period 2015 - 2019 and the monthly average sludge production during the maximum monthly average flow each year are presented in Table 3-13.

Table 3-13: Sludge Production

Year	Monthly Average Sludge Production, lbs	Monthly Sludge Production during Max Monthly Flow, lbs
2015	1,130,649	1,220,022
2016	1,156,043	993,005
2017	1,166,382	1,209,739
2018	1,058,446	1,014,231
2019(1)	1,065,532	1,149,086

(1) January through July.

As shown in Table 3-13, the increase in annual average flow in 2018 and 2019 did not result in an increase in monthly average sludge production compared to the preceding years with normal precipitation. This is expected, because sludge is generated by the removal of BOD and TSS from the wastewater, and the BOD and TSS loads in 2018 and 2019 were not significantly different that the BOD and TSS loads in the preceding years with normal precipitation.

As also shown in Table 3-13, the monthly sludge production during maximum monthly average flow each year was not significantly different than the monthly average sludge production throughout each year. This is because maximum monthly average flows are due to I&I, which does not contain significant concentrations of BOD or TSS and therefore does not result in additional sludge production.

4.0 KIWWTP PERFORMANCE

This section of the report summarizes overall performance of the KIWWTP during the period 2015 - 2019. It also addresses the performance of the individual unit processes.

Table 4-1 presents a performance and compliance summary of the KIWWTP during the maximum three-month average flow during the period 2015 - 2019. The maximum three-month average flow during this period was 42.71 mgd, which occurred during May 2019 through July 2019. Performance during the maximum three-month average flow is relevant because a “hydraulic overload” is defined by PADEP as the condition that occurs when the monthly average flow entering the plant exceeds the hydraulic design capacity for three consecutive months.

Table 4-1: Performance and Compliance Summary during Max Three-Month Average Flow

Parameter	Data	NPDES Limit
Maximum 3-Month Average Flow (mgd)	42.71	Report only
$CBOD_5$ 3-Month Avg (mg/l)	4.5	20
$CBOD_5$ 7-Day Avg (mg/l)	5.9	30
$CBOD_5$ 3-Month Avg Load (lbs/day)	1,641	6,672
$CBOD_5$ 7-Day Avg Load(lbs/day)	2,643	10,008
NH_3 3-Month Avg (mg/l)	1.5	5
NH_3 3-Month Avg Load (lbs/day)	534	1,668
TSS 3-Month Avg (mg/l)	6.3	30
TSS Max 7-Day Avg (mg/l)	9.3	45
TSS 3-Month Avg Load (lbs/day)	2,295	10,008
TSS Max 7-Day Avg Load (lbs/day)	4,190	15,012
Fecal Coliform 3-Month Avg (^/100 mg)	9.7	200 (geomean)
Residual Cl_2 3-Month Avg (mg/l)	0.45	0.5

As shown in Table 4-1, the KIWWTP complied with all NPDES concentration-based and load-based effluent limits, by a significant margin, during the maximum three-month average flow of 42.71 mgd.

Table 4-2 presents a performance and compliance summary of the KIWWTP during the maximum monthly average flow during the period 2015 - 2019. The maximum monthly average flow during this period was 47.46 mgd, which occurred in May 2019. Performance during the maximum monthly average flow is relevant because hydraulic design capacity is defined by the PADEP as the maximum monthly design flow at which a plant is expected to consistently provide the required treatment.

Table 4-2: Performance and Compliance Summary during Max Monthly Average Flow

Parameter	Data	NPDES Limit
Maximum Monthly Avg Flow (mgd)	47.46	Report only
$CBOD_5$ Monthly Avg (mg/l)	5.3	20
$CBOD_5$ Max 7-Day Avg (mg/l)	6	30
$CBOD_5$ Monthly Avg Load (lbs/day)	2,095	6,672
$CBOD_5$ Max 7-Day Avg Load (lbs/day)	2,643	10,008
NH_3 Monthly Avg (mg/l)	1.5	5
NH_3 Monthly Avg Load (lbs/day)	579	1,668
TSS Monthly Avg (mg/l)	8	30
TSS Max 7-Day Avg (mg/l)	9	45
TSS Monthly Avg Load (lbs/day)	3,219	10,008
TSS Max 7-Day Avg Load (lbs/day)	4,190	15,012
Fecal Coliform Monthly Avg (^/100 mg)	11	200 (geomean)
Residual Cl_2 Monthly Avg (mg/l)	0.45	0.5

As shown in Table 4-2, the KIWWTP complied with all NPDES concentration-based and load-based effluent limits, by a significant margin, during the maximum monthly average flow of 47.46.

Therefore, the demonstrated hydraulic design capacity of the KIWWTP is greater than 47.46 mgd.

The KIWWTP also has concentration-based maximum day effluent limits for several parameters. Table 4-3 on the following page presents a performance and compliance summary during the maximum daily flow during each month of the unprecedented wet period during January 2018 through July 2019.

Table 4-3: Performance and Compliance Summary during Maximum Daily Flows

Month	Maximum Daily Flow (mgd)	$CBOD_5$ Max Day (mg/l)	NH_3 Max Day (mg/l)	TSS Max Day (mg/l)
January 2018	48.01	5	2.7	5
February 2018	47.01	5	1	7
March 2018	56.86	7	2.9	10
April 2018	47.51	7	1.8	6
May 2018	43.81	5	1.8	7
June 2018	35.87	5	1.8	4
July 2018	45.36	5	2.2	4
August 2018	72.46	6	1.2	7
September 2018	57.49	5	0.8	6
October 2018	43.73	5	1.9	6
November 2018	71.16	7	1.7	11
December 2018	62.36	8	1.6	11
January 2019	62.69	7	3.5	11
February 2019	44.69	5	2.9	8
March 2019	56.99	6	1.6	10
April 2019	54.04	8	0.6	8
May 2019	68.89	6	1.4	10
June 2019	49.67	4	2.1	6
July 2019	64.3	6	2.1	5

Maximum Day Effluent Limits	
Parameter	**Limit**
Maximum Day Flow (mgd)	Report only
$CBOD_5$ Max Day (mg/l)	40
NH_3 Max Day (mg/l), Summer	10
NH_3 Max Day (mg/l), Winter	30
TSS Max Day (mg/l)	60
DO Max Day	N/A
Fecal Coliform Max Day	N/A
Residual Chlorine Max Day	N/A

As shown in Table 4-3, the KIWWTP complied with all maximum day effluent limits during the maximum daily average flow during each month of the unprecedented wet period of January 2018 through July 2019.

Table 4-4 presents the monthly average effluent concentration of BOD, TSS, TKN, NH_3 and fecal coliform during the maximum monthly average flow during each year of the period of study. Table

4-4 also presents the concentration of various parameters at various intermediate sampling locations throughout the KIWWTP including aerated grit chamber effluent (INF), primary settling tank effluent (PRI), plastic media trickling filter effluent (PMTF), intermediate settling tank effluent (IST), and final plant effluent (EFF).

Table 4-4: Performance Summary During Maximum Monthly Average Flows

Maximum Month	Flow (mgd)	BOD (mg/l)					
		Return	INF	PRI	IST	EFF	
March 2015	36.16	44	142	75	25	6	
February 2016	36.41	35	134	81	25	6	
July 2017	34.53	41	128	69	27	3	
November 2018	44.42	96	118	74	30	5	
May 2019	47.46	130	122	79	37	5	
Maximum Month	**TSS (mg/l)**						
	Return	**INF**	**PRI**	**PMTF**	**IST**	**EFF**	
March 2015	161	148	51	45	17	6	
February 2016	57	130	56	75	21	6	
July 2017	100	141	49	77	18	3	
November 2018	71	131	58	64	33	8	
May 2019	71	133	61	85	36	8	
Maximum Month	**TKN (mg/L)**						
	Return	**INF**	**PRI**	**PMTF**	**IST**	**RMTF**	**EFF**
March 2015	70.2	27.4	24.5	10.9	8.8	2.9	3.4
February 2016	70.5	27.7	26.3	9.6	7.4	3.0	3.3
July 2017	30.5	29.0	21.7	10.6	7.2	2.4	2.8
November 2018	78.9	25.6	22.9	9.9	8.9	No Sample	3.4
May 2019	84.5	30.0	24.0	13.0	10.9	No Sample	3.6
Maximum Month	**NH3-N (mg/l)**				**Fecal Coliforms**		
	INF	**PRI**	**IST**	**EFF**	**(^/100 ml)**		
March 2015	15.9	15.6	5.7	1.6	15		
February 2016	16.4	16.6	5.4	1.5	18		
July 2017	17.6	15.5	5.2	1.4	14		
November 2018	15.9	16.0	6.1	1.9	17		
May 2019	16.0	15.5	5.6	1.5	11		

*2019 data through July

Based on the data presented in Table 4-4 for the maximum flow month of May 2019, the KIWWTP settling unit processes achieved the following removal efficiencies during a monthly average flow of 47.46 mgd:

1. Primary Clarifier BOD removal efficiency – 35%
2. Primary Clarifier TSS removal efficiency – 54%
3. Intermediate Settling Tank BOD removal efficiency – 59%
4. Intermediate Settling Tank TSS removal efficiency – 48%
5. Final Clarifier BOD removal efficiency – 86%

6. Final Clarifier TSS removal efficiency – 78%

Based on the removal efficiencies listed above, each of the KIWWTP's settling-related unit processes performed exceptionally well during a maximum monthly average flow of 47.46 mgd.

5.0 UNIT PROCESS HYDRAULIC DESIGN CAPACITY EVALUATION

As previously described, the Chapter 94 municipal wasteload management regulations define hydraulic design capacity as the "maximum monthly design flow, expressed in millions of gallons per day, at which a plant is expected to consistently provide the required treatment."

In this section of the report, the hydraulic design capacity of each unit process is assessed individually, beginning with the mechanically cleaned screens at the head end of the KIWWTP.

5.1 Mechanically Cleaned Influent Screens

Wastewater entering the KIWWTP first undergoes screening by two (2) climber-type mechanically cleaned screens with ¾-inch spacing between bars and a manufacturer's rated capacity of 100 mgd per screen. Therefore, the firm capacity of the influent screens (i.e. with one unit of service for maintenance) is 100 mgd.

Because the mechanically cleaned screens can consistently and reliably screen the influent wastewater at a rate of 100 mgd, the hydraulic design capacity of the mechanically cleaned screens is 100 mgd.

5.2 Main and Auxiliary Pumping Stations

Screened influent wastewater flows by gravity to the Main and Auxiliary pumping stations, which function together to pump screened influent wastewater via force main to the aerated grit chambers. There are four (4) pumps in the Main Pumping Station and two (2) pumps in the Auxiliary Pumping Station. The four (4) pumps in the Main Pumping Station consist of two (2) pumps rated for 11,000 gpm at 40 feet total dynamic head (TDH) and two (2) pumps rated for 15,300 gpm at 42.5 feet TDH. The two (2) pumps in the Auxiliary Pumping Station are both rated for 16,000 gpm at 30 feet TDH.

The firm capacity of the Main and Auxiliary pumping stations, i.e., with the largest capacity pump out of service for maintenance, is 85 mgd. Therefore, because the Main and Auxiliary pump stations can consistently and reliably pump screened influent wastewater at a rate of 85 mgd, the hydraulic design capacity of the Main and Auxiliary pumping stations is 85 mgd.

5.3 Aerated Grit Chambers

Aerated grit chambers are sized to achieve a minimum acceptable hydraulic detention time (HDT) at peak flow. The PADEP Domestic Wastewater Facilities Manual does not specifically present sizing/design parameters for aerated grit chambers. The Metcalf & Eddy (M&E) Wastewater Engineering textbook recommends a HDT of 2 to 5 minutes at peak flow (based on a 0.21 mm grit particle), while the 10 States Standards recommendation is 3 to 5 minutes at peak flow. There are no HDT guidelines for average flow, because adequate grit removal is provided at HDTs equal to or less than the HDT at peak flow. Therefore, an aerated grit chamber can be operated at the peak flow HDT for 30 consecutive days (i.e. the maximum monthly design flow) and consistently provide effective grit removal.

The two aerated grit chambers are each 52 feet long, 18 feet wide, and 12 feet deep, resulting in a combined volume of approximately 168,000 gallons. Based on a 2.5 minute HDT at peak flow, the hydraulic design capacity of the aerated grit chambers is 96.8 mgd.

5.4 Primary Clarifiers

Primary clarifiers are sized to achieve specific surface overflow rates (SORs) at average and peak flow. SOR is the flow rate per square feet of tank surface area expressed in gpd/sf. While older publications such as the PADEP Domestic Wastewater Facilities Manual present guidelines for weir loading rates, the M&E Wastewater Engineering Textbook states that "weir loading rates have little effect on the efficiency of primary sedimentation tanks and should not be considered when reviewing the appropriateness of clarifier design." Therefore, the hydraulic design capacity assessment of the primary clarifiers is based on SOR.

The PADEP Domestic Wastewater Facilities Manual recommends that the SOR should not exceed 1,000 gpd/sf at maximum monthly average flow and 2,500 gpd/sf at peak hourly flow. The M&E Wastewater Engineering textbook recommends 800 to 1,200 gpd/sf at average flow and 2,000 to 3,000 gpd/sf at peak hourly flow. The 10 States Standards recommendation is 1,000 gpd/sf at design average flow and 1,500 to 2,000 gpd/sf at design peak hourly flow. Based on feedback from PADEP on another project, PADEP primary clarifier sizing guidelines can be exceeded if justified. The M&E Wastewater Engineering Textbook recommendations should be considered justification to exceed the PADEP SOR guidelines, particularly when actual performance during sustained wet-weather flows supports a higher SOR.

The four primary clarifiers are each 120 feet in diameter and 12 feet deep, resulting in a combined surface area of approximately 45,239 sf. As previously indicated, during the maximum monthly average flow of 47.46 mgd, the KIWWTP achieved all effluent limits by a significant margin, and as indicated in Table 4-4, the primary clarifiers achieved BOD and TSS removal efficiencies of 35% and 58%, respectively. At 47.46 mgd, the primary clarifier SOR was 1,050 gpd/sf. Therefore, a SOR greater than 1,050 gpd/sf is justified. Due to the extent to which the KIWWTP achieved its effluent limits combined with the high primary clarifier BOD and TSS removal efficiencies achieved at an SOR of 1,050 gpd/sf, a 1,200 gpd/sf SOR (i.e., the upper end of the M&E recommended range) will be used to establish the hydraulic design capacity of the primary clarifiers.

At a 1,200 gpd/sf maximum month SOR, the resulting hydraulic design capacity of the primary clarifiers is 54 mgd.

A hydraulic design capacity of 54 mgd is further justified by the exceptional performance of the KIWWTP during maximum flow days that exceeded 54 mgd, as presented in Table 4-3.

5.5 Intermediate Pumping Station

The Intermediate Pumping Station contains a total of ten (10) two-stage vertical turbine pumps arranged into two sets of pumps with five (5) pumps in each set. The first set is the primary effluent pumps, which pump primary effluent to the PMTFs. The second set is the PMTF effluent pumps, which pump PMTF effluent to the intermediate clarifiers.

All ten (10) pumps have a rated capacity of 15,000 gpm at 44 ft TDH. The design firm capacity of each set of pumps (i.e. with one pump out of service) is 60,000 gpm or 86.4 mgd.

Because both pumping systems in the Intermediate Pumping Station have a firm capacity of 86 mgd, the primary effluent and PMTF effluent can consistently and reliably pump at a rate of 86 mgd. Therefore, the hydraulic design capacity of the Intermediate Pumping Station is 86 mgd.

5.6 Plastic Media Trickling Filters

The key design/sizing criteria for PMTFs is the BOD loading rate in pounds per day per 1,000 cubic feet (ppd/1,000 ft^3) of trickling filter media. The resulting hydraulic loading rate in gallons per day per square feet (gpd/sf) of tank area should then fall within a broad range of acceptable hydraulic loading rates. To achieve a conservative 82% BOD removal rate (excluding the BOD removal that occurs in the upstream primary clarifiers and the downstream rock media trickling filters), the M&E Wastewater Engineering textbook recommends a BOD loading rate of less than or equal to 62 ppd/1000 ft^3 and a resulting hydraulic loading rate that should fall within the range of 245 to 1,800 gpd/sf of tank area. The PADEP Domestic Wastewater Facilities Manual does not present specific sizing criteria for plastic media trickling filters, nor does the 10 States Standards.

The four PMTFs are each 100 feet in diameter, with a 32-foot-depth of plastic media. The original PMTFs had 18 layers of Surfpac media with a surface area of 27 square feet per cubic foot of volume. In 1998, the first layer of the filter media was replaced with Brentwood media with a surface area of 30 square feet per cubic foot of packing volume. The total resulting volume of media in service is 1,005,310 cubic feet, and the total surface area of the plastic media trickling filter tanks is 32,416 square feet.

From a hydraulic design capacity perspective, the PMTFs need to achieve the required effluent limits every month of the year, including the month with the highest average flow. However, as previously describe in Section 3.0, the influent BOD loading is not significantly different during extreme wet-weather events than during dry periods. Therefore, the KIWWTP performed essentially the same during the unprecedented wet period in 2018 and 2019 as it did during the years of 2015, 2016 ad 2017, which had normal amounts of precipitation.

Based on the M&E textbook recommended BOD loading rate of 62 ppd/1000 ft^3 of media and 1,005,310 ft^3 of media in service, the resulting BOD loading capacity is 62,329 ppd, which is substantially greater than the influent BOD loads that occurred in 2015 - 2019. Furthermore, this BOD loading capacity applies to the primary clarifier effluent, not influent wastewater. Because the primary clarifiers remove approximately 35% of the influent BOD, the PMTFs can accommodate an KIWWTP influent BOD loading rate approximately 35% greater than 62,329 lbs/day.

As noted above, based on a BOD loading rate of less than or equal to 62 ppd/1000 ft^3, the hydraulic loading rate should fall within the range of 245 to 1,800 gpd/sf. As previously indicated, during the maximum monthly average flow of 47.46 mgd, the KIWWTP achieved all effluent limits by a significant margin. At 47.46 mgd, the PMTF hydraulic loading rate was 1,464 gpd/sf. Therefore, a hydraulic loading rate greater than 1,464 gpd/sf is justified.

Due to the extent to which the KIWWTP achieved its effluent limits at a hydraulic loading rate of 1,464 gpd/sf, a hydraulic loading rate at the upper end of the recommended range (i.e., 1,800 gpd/sf) will be used to establish the hydraulic design capacity. At a hydraulic loading rate of 1,800 gpd/sf, the corresponding hydraulic design capacity is 58 mgd.

A hydraulic design capacity of 58 mgd is further justified by the exceptional performance of the KIWWTP during maximum flow days that exceeded 58 mgd, as presented in Table 4-3.

5.7 Intermediate Settling Tanks

ISTs, like primary clarifiers, are sized based on SOR. There are three (3) ISTs, each 138 feet in diameter and 12 feet deep, resulting in a total surface area of 44,870 sf. They were specifically designed in 1994 for a peak hourly flow of 93.3 mgd. At the maximum monthly flow of 47.46 mgd that occurred in May 2019, the SOR was 1,060 gpd/sf. As indicated in Table 4-4, the ISTs achieved 58% and 49% BOD and TSS removal efficiencies, respectively, during the maximum monthly average flow of 47.46 mgd.

PADEP's recommended SOR at peak flow is 1,500 gpd/sf, which results in a peak hourly flow capacity of 67 mgd rather than 93 mgd. The M&E textbook does not present recommendations specifically for ISTs, only for final settling tanks following trickling filters. The 10 States Standards recommendation is an SOR of 1,200 gpd/sf at peak hourly flow but that higher SORs may be used “if such rates are shown to have no adverse impact on subsequent treatment units.”

Because the ISTs achieve similar removal efficiencies at 47.46 mgd as the primary clarifiers, the hydraulic design capacity of the intermediate settling tanks will be based on the same SOR as the primary clarifiers, i.e., 1,200 gpd/sf.

At a 1,200 gpd/sf maximum month SOR, the resulting hydraulic design capacity of the ISTs is 54 mgd. A hydraulic design capacity of 54 mgd is further justified by the exceptional performance of the KIWWTP during maximum flow days that exceeded 54 mgd, as presented in Table 4-3.

5.8 Rock Media Trickling Filters

The four (4) RMTFs have a total surface area of 5.3 acres (230,868 square feet) and a 10-foot-depth of rock media. The RMTFs were originally designed for BOD removal before the PMTFs were constructed in the late 1970s. The rock media trickling filters currently provide NH_3 removal via the nitrification process prior to final settling.

As shown in Table 4-4, during the maximum monthly average flow of 47.46 mgd, the IST effluent NH_3 concentration was 5.6 mg/l. Therefore, the PMTF removed 63% of the influent ammonia. As a result, the RMTFs only need to remove a nominal amount of NH_3 to enable the KIWWTP to comply with its NH_3-N effluent limitations. As shown in Table 4-4, the effluent NH_3 concentration during the 47.46 mgd maximum monthly average flow was 1.5 mg/l, i.e., substantially below the monthly average effluent limit of 5 mg/l.

The 10 States Standards does not present sizing criteria for nitrifying rock media trickling filters, nor does the PADEP Domestic Wastewater Facilities Manual or the M&E Wastewater

Engineering textbook. However, the United States Environmental Protection Agency (EPA) Process Design Manual for Nitrogen Control indicates that a 9-foot-deep bed of rock media in a separate stage trickling filter for nitrification can be expected to remove 2.4 pounds per day of NH_3 per 1,000 cubic feet of rock media.

The total volume of rock media in the 5.3-acre RMTF is 2,308,680 cubic feet. Based on an NH_3 removal rate of 2.4 pounds per day per 1,000 cubic feet; the RMTF has the capacity to remove 5,540 pounds per day of NH_3.

From a hydraulic design capacity perspective, the RMTF needs to achieve the required effluent limits every month of the year, including the month with the highest average flow. However, as previously described in Section 3.0, the influent NH_3 loading is not significantly different during extreme wet-weather events than during dry periods. Therefore, the KIWWTP performed essentially the same from an NH_3 removal perspective during the unprecedented wet period in 2018 and 2019 as it did during the years of 2015, 2016 and 2017, which had normal amounts of precipitation.

The EPA Process Design Manual for Nitrogen Control does not provide design guidelines for hydraulic loading rates to rock media trickling filters. However, logically, the hydraulic loading rates to rock media trickling filters should not be significantly different than the hydraulic loading rate to plastic media trickling filters. Therefore, to establish a conservative hydraulic design capacity for the RMTF, the very low end of the recommended range of hydraulic loading rates for plastic media trickling filters will be used, i.e., 245 gpd/sf. Based on a hydraulic loading rate of 245 gpd/sf, the corresponding hydraulic design capacity of the RMTF is 56 mgd.

A hydraulic design capacity of 56 mgd is further justified by the exceptional performance of the KIWWTP during maximum flow days that exceeded 56 mgd, as presented in Table 4-3.

5.9 Final Clarifiers

Final clarifiers following trickling filters are sized based on SORs. The PADEP Domestic Wastewater Facilities Manual and the 10 States Standards both indicate that the SOR should not exceed 1,200 gpd/sf based on peak hourly flow. They do not present average flow SORs. The M&E Wastewater Engineering textbook indicates that the recommended average and peak flow SOR is a function of clarifier depth. At a typical depth of 10 feet, the recommended average and peak flow SORs are 500 gpd/sf and 1,030 gpd/sf, respectively.

There are 10 final clarifiers of varying diameters and depths. Final clarifiers 1 through 4 are 70 feet in diameter, and 8.5 feet deep. Final clarifiers 5 and 6 are 100 feet in diameter and 9.5 feet deep. Final clarifiers 7 and 8 are 110 feet in diameter and 11 feet deep. Final clarifiers 9 and 10 are 138 feet in diameter and 11 feet deep. The total combined surface area of the final settling tanks is 80,020 ft^2.

At the PADEP and 10 States Standard peak flow SOR of 1,200 gpd/sf, the peak flow capacity of the ten (10) final clarifiers is 96 mgd. At the M&E textbook recommended average flow SOR of 500 gpd/sf, the average flow capacity of the final clarifiers is 40 mgd. However, during the maximum monthly average flow of 47.46 mgd, the SOR was 593 gpd/sf, which resulted final clarifier BOD and TSS removal efficiencies of 86% and 78%, respectively, which produced effluent BOD and TSS concentrations substantially below the effluent limitations for BOD and TSS.

Because the KIWWTP achieve all effluent limits by a substantial margin at a SOR of 593 gpd/sf, it is reasonable to assume that compliance would be achieved at an SOR 15% greater than 593 gpd/sf. Therefore, to establish the hydraulic design capacity of the final clarifiers, a SOR of 680 gpd/sf will be utilized. Based on a SOR of 680 gpd/sf, the hydraulic design capacity of the final clarifiers is 54 mgd.

A hydraulic design capacity of 54 mgd is further justified by the exceptional performance of the KIWWTP during maximum flow days that exceeded 54 mgd as presented in Table 4-3. For example, during the maximum daily flow of 57.49 mgd in September 2018, the effluent CBOD and TSS concentrations were 5 mg/l and 6 mg/l, respectively. During the maximum daily flow of 62.36 mgd in December 2018, the effluent CBOD and TSS concentrations were 8 mg/l and 11 mg/l, respectively, and during the maximum daily flow of 64.3 mgd in July 2019, the effluent CBOD and TSS concentrations were 6 mg/l and 5 mg/l, respectively. Therefore, a hydraulic design capacity of 54 mgd is conservative.

5.10 Chlorine Contact Tank

Chlorine contact tanks are sized to achieve certain specific HDTs at average and peak flows. The PADEP Domestic Wastewater Facilities Manual requires a minimum contact period of 15 minutes at peak hourly flow and 30 minutes at the maximum monthly average flow. The 10 States Standards recommendation is a minimum contact period of 15 minutes at the design peak hourly flow and does not require a minimum contact time at average or maximum monthly average flow. The M&E Wastewater Engineering textbook does not recommend minimum contact periods but rather identifies C_rt values (C_rt is the product of dose and contact time) to achieve various log reductions of bacteria.

There is one chlorine contact tank, 194 feet by 83 feet, and 11 feet deep, resulting in a volume of 1,324,900 gallons. Based on this volume and the PADEP contact time of 30 minutes at maximum monthly average flow, the maximum monthly average flow capacity of the chlorine contact tank is 63.6 mgd. Because the maximum monthly average flow capacity is the hydraulic design capacity, the hydraulic design capacity of the chlorine contact tank is 63.6 mgd.

5.11 Effluent Pumping System

During infrequent periods when the Lehigh River reaches flood levels, treated and disinfected effluent from the KIWWTP must be pumped to the Lehigh River.

The effluent pumping system consists of a total of five (5) pumps each rated for a capacity of 13,890 gpm at 26 feet TDH. The design firm capacity of the effluent pumping system (i.e. with one pump out of service) is 86 mgd.

Therefore, because the effluent pumping system can consistently and reliably pump treated and disinfected effluent at a rate of 86 mgd, the hydraulic design capacity of the effluent pumping system is 86 mgd.

5.12 Solids Handling Processes

The KIWWTP's solids handling processes consist of the following:

1. Gravity thickeners to thicken IST and final clarifier sludge prior to anaerobic digestion (primary sludge is not gravity thickened prior to anaerobic digestion).
2. Anaerobic digesters to reduce the mass of solids to be disposed and to produce digester gas for beneficial reuse.
3. Belt filter presses to dewater the anaerobically digested sludge prior to disposal.

Each of these solids handling processes are sized based on sludge flows and loads, which are generated by the removal of BOD and TSS from the influent wastewater.

As previously shown in Table 3-12, the increase in annual average flow in 2018 and 2019 did not result in an increase in sludge production compared to the preceding years with normal precipitation. This is expected, because sludge is generated by the removal of BOD and TSS from the wastewater, and the BOD and TSS loads in 2018 and 2019 were not significantly different than the BOD and TSS loads in the preceding years with normal precipitation.

As a result, hydraulic design capacity is not relevant to the solids handling unit processes.

5.13 Hydraulic Design Capacity Summary

A summary of the hydraulic design capacity of the individual unit processes is presented in Table 5-1 on the following page.

Because the overall hydraulic design capacity of the KIWWTP is dictated by the unit processes with the lowest hydraulic design capacity, it is the primary clarifiers, intermediate settling tanks and final clarifiers that limit the overall design capacity of the KIWWTP to 54 mgd.

Table 5-1: Hydraulic Design Capacity Summary

UNIT PROCESS	HYDRAULIC DESIGN CAPACITY
Influent Screening	100 mgd
Main and Auxiliary Pumping Station	85 mgd
Aerated Grit Removal	96.8 mgd
Primary Clarifiers	54 mgd
Intermediate Pumping Station	86 mgd
Plastic Media Trickling Filters	58 mgd
Intermediate Settling Tanks	54 mgd
Rock Media Trickling Filters	56 mgd
Final Clarifiers	54 mgd
Chlorine Contact Tank	63.6 mgd
Effluent Pumping System	86 mgd
Solids Handling Unit Processes	n/a (1)

(1) As further described in Section 5.12, hydraulic design capacity is not applicable to the solids handling unit processes.

6.0 CONCLUSION AND RECOMMENDATION

The overall conclusion is that the KIWWTP's actual hydraulic design capacity is 54 mgd rather than 40 mgd as shown in the Part II permit referenced in Section 1.0.

Therefore, it is recommended that the incorrect 40 mgd hydraulic design capacity presented in the Part II permit be corrected to 54 mgd.

This recommendation has no bearing on the KIWWTP's permitted annual average flow of 40 mgd, which should remain 40 mgd.

APPENDIX 7

Individual Municipality Flow Projections

City of Allentown

Signatory Flow Projections

INTERIM ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name **City of Allentown**

GPD/EDU: **238**

TOTALS	**523**	**5,710**	**1,195,681**
Residential	0	0	0
Comm./Ind.	523	5,710	1,195,681

Development Name	Address (OPTIONAL)	Tax Parcel ID (OPTIONAL)	Zoning (OPTIONAL)	Type of Development (OPTIONAL)	Acres (OPTIONAL)	EDUs	Specifics R= Residential; NR= Non-Residential	Projected Development Year	Projected 2020-2027 Flow (gpd)
347-361 Gordon Street Apartments	347-361 Gordon Street			Conversion from industrial use to apartments		40	R		9,520
	1384 S. 5TH STREET				10.8	94	NR		22,372
Atty. General's Office	2305 28TH ST SW			Building Addition		8	NR		1,904
	1215 S. 4TH ST			Redevelopment: new bldg & update parking	0.7494	7	NR		1,554
Trout Creek Cottages	1101 S. 6TH ST.			Pocket Neighborhood Development	5.3	52	R		12,376
The Landmark	90 S NINTH ST			33 story bldg-retail, office, residential	0.119	175	NR		41,650
801 N. Meadow Street	801 N. MEADOW ST.			Recycling Processing Center	2.5	33	NR		7,854
	1330 S 4TH ST			Retail	1	9	NR		2,142
Allentown Terminals Corporation	1114-1366 N QUEBEC ST			Storage tanks and warehousing	13.35	75	NR		17,850
Townes at the Jordan	948 N FRONT ST			Townhomes (Condominium)	2.72	18	R		4,284
Airport Rd. Shopping Center	1245 1353 AIRPORT RD			Retail Center (Expansion)	3.00	26	NR		6,188
	639 E. ALLEN STREET			Install 7,000 sf garage & 6 parking spaces	3.0581	20	NR		4,760
	265 LEHIGH ST			Multi-dwelling unit bldg containing 80 units	11.1559	80	R		19,040
1018 W. Walnut St.	1018 W WALNUT ST		R-H	Semi-detached Dwellings	0.35	6	R		1,428
Fearless Fire Company	14 46 EAST JUNIATA ST		R-ML	Parking Lot/Single Family	1.23	4	R		952
Common Ridge Estates	N FILBERT/E HAMILTON STS			Twins & Apartments (Condominium)	16.52	140	R		33,320
Townes at Trexler Square II	116 S 8TH ST		R-H	Townhomes	0.79	18	R		4,284
Former K-Mart	1502 S 4th Street	640634937415	B-4		0.2906	50	NR		11,900
American Pkwy & N. Irving St	1620 AIRPORT RD	640881312529	I-2		7.66	43			10,234
N. Ellsworth St	720 N ELLSWORTH ST	640766631519	I-2		3.47	24			5,712
Seftel Site	2843 MITCHELL AVE	549584493485	I-2		6.77	41			9,758
American Pkwy & N. Dauphin St	1019 AMERICAN PKWY, 1024 N BRADFORD ST, 500 AMERICAN PKWY	640758158799, 640758248221, 640759755865	B/LI		23.34	154			36,652
LSI (former Agere Site)	555 UNION BLVD	640757990536	I-2		35.77	142			33,796
Boulevard Drive-In	540 UNION BLVD	640767821628	B/LI		12.55	7			1,666
State Hospital	1900 E ALLEN ST, 1600 HANOVER AVE	641746460329, 641726847797	I-G		192.91	400			95,200
Lehigh Landing	51 N FRONT ST	640752151002	B-5		1.48	28			6,664
UGI Tank	202 W UNION ST	640740488709	I-2		3.45	18			4,284
Montex	1112 S 6TH ST, 1102 S 6TH ST, 1101 S 6TH ST, 1120 S 6TH ST, 1102 S 5TH ST	640636108387, 640636115157, 640636415274, 640635292480, 640636625261	R-M		4.52	65			15,470
South 5th St	1406 S 5TH ST	640634564687	I-2		5.30	65			15,470
S Glenwood St.	1811 S GLENWOOD ST	549567205959	B-4		9.86	47			11,186
South St Elmo St.	1834 W FAIRVIEW ST, 1940 W FAIRVIEW ST	549646946043, 549646507548	P		6.99	42			9,996
Lehigh Parkway East	1649 LEHIGH PKWY E	549675056761	R-H		3.02	201			47,838
Davis Site - Sumner Ave	183 SUMNER AVE	640726737584	B/LI		4.32	24			5,712
Paxus Townhouses	1312 S 8TH ST	640624371202	R-M		0.43	7			1,666
Phoenix	333 W COURT ST	640731269543	B/LI		3.41	237			56,406
1902 Lehigh St.	1902 LEHIGH ST	549680433515	B-3		4.95	18			4,284
9th St and Walnut St.	901 W WALNUT ST	640609052579	B-2		1.02	89			21,182

713 N. 13th St	713 N 13TH ST	549762389361	B/LI		0.50	47			11,186
513 N. 16th St	513 N 16TH ST	549751026319	R-MH		0.96	6			1,428
N Ivey St	929 N IVY ST, 901 N IVY ST, 901 N IVY ST REAR, 21 JORDAN DR	640736880126, 640736869299, 640736994963, 640737932179	I-3		7.91	25			5,950
N Bradford St	650 N BRADFORD ST	640765184835	I-2		7.03	22			5,236
Constitution Dr.	223 E WYOMING ST REAR	640687288387	R-LC		23.90	57			13,566
Hospital Development (Unallocated)	-	-	-			300			71,400
NIZ Tax Zone Place Holder (Unalloc	-	-	-			1500			357,000
	1430 OXFORD DR	549537940329	R-H		1.58	50			11,900
	3001 EVANS ST	549583798848	R-L		1.53	11			2,618
	502 CEDAR CREEK BLVD	549634686522	R-L		1.10	8			1,904
	1450 OXFORD DR	549536988334	R-ML		1.91	18			4,284
	1213 W LINDEN ST	549679882960	R-H		0.66	22			5,236
	1820 S 12TH ST	549691748930	I-2		2.72	8.5			2,023
	1802 S 12TH ST	549691786367	B-4		1.88	1			238
	606 S 10TH ST	549697354907	I-3		18.23	57			13,566
	602 N 7TH ST	549793642421	B1/R		1.73	49			11,662
	1711 W LIBERTY ST	549740184375	B-5		1.24	3.8			904
	1501 S 12TH ST	640603726039	I-3		11.74	36.8			8,758
	108 S 7TH ST	640619169631	B-2		1.06	36.4			8,663
	810 LINCOLN DR	640698302003	R-L		1.89	13.4			3,189
	1256 S 5TH ST	640635515244	I-2		3.64	11.41			2,716
	1947 BAKER DR	640631783769	R-MH		2.34	66.4			15,803
	801 N MEADOW ST	640715953804	I-3		2.59	8.13			1,935
	125 N 4TH ST	640722700446	R-H		1.79	61.5			14,637
	566 W EMAUS AVE	640650076616	R-L		1.50	1.6			381
	241 S 3RD ST	640740557304	I-2		2.68	8.4			1,999
	101 N RAILROAD ST	640742768667	R-MH		1.43	40			9,520
	5 N FRONT ST	640752215824	B-5		3.33	10			2,380
	900 N DAUPHIN ST	640757136555	I-2		1.79	5			1,190
	739 E FAIRMONT ST	640870551131	B/LI		2.31	7			1,666
	310 W UNION ST	640740224422	B/LI		8.34	26			6,188
	1715 UNION BLVD	641729432610	B/LI		1.13	3			714
	809 TACOMA ST	641738731250	R-M		1.12	13			3,094
	2124 HANOVER AVE	641748408681	B-3		1.61	4			952
	1706 HOOVER AVE	641811093744	I-3		6.77	21			4,998
	2500 LANCASTER AVE	640527200954	R-M		2.61	30			7,140
	626 E TILGHMAN ST	640776405846	I-2		3.88	12			2,856
	401 N FRONT ST	640744636767	I-3		2.01	6			1,428
	16 W LIBERTY ST	640744852027	I-3		2.14	6			1,428
	1202 N GODFREY ST	640870507604	B/LI		2.94	9			2,142
	1117 CATASAUQUA AVE	640747079685	I-3		9.76	30			7,140
	2814 MITCHELL AVE	549595131715	I-2		2.09	6			1,428
	1115 AMERICAN PKWY	640769981892	B/LI		17.98	56			13,328
Change of Use (Unallocated)						245			58,310
Unknown Projects (Unallocated)						245			58,310
									0
									0
									0
									0

Lehigh County Authority

Signatory Flow Projections

ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name **Lehigh County Authority**

														2025
				TOTALS	0	1,580			352,340	151,640	89,200	111,500	0	151,640
GPD/EDU:	223			Residential	0	0		Developments	0	0	0	0		
				Comm./Ind.	0	1,580		8	352,340	151,640	89,200	111,500		

Development Name	Address	Tax Parcel ID	Zoning	Type of Development	Acres	EDUs	Specifics	Projected Development Year	Projected Flow (gpd)	2020-2030 New Flow	2031-2040 New Flow	2041-2050 New Flow	2020	2021-###
Industrial Development						0		2021	0	0	0	0	-	-
Industrial Development						0		2022	0	0	0	0	-	-
Industrial Development						0		2023	0	0	0	0	-	-
Industrial Development						380		2024	84,740	84,740	0	0	-	84,740
Industrial Development						300		2025	66,900	66,900	0	0	-	66,900
Industrial Development						400		2031	89,200	0	89,200	0	-	-
Industrial Development						300		2041	66,900	0	0	66,900	-	-
Industrial Development						200		2050	44,600	0	0	44,600	-	-
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Borough of Macungie

Signatory Flow Projections

ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name Borough of Macungie

GPD/EDU:	223

	TOTALS	56	203	45,269	40,809	2,230	2,230
	Residential	52	158	35,234	35,234	0	0
	Comm./Ind.	4	45	10,035	5,575	2,230	2,230

Development Name	Address	Tax Parcel ID	Zoning	Type of Development	Acres	EDUs	Specifics	Projected Development Year	Projected Flow (gpd)	2020-2030 New Flow	2030-2040 New Flow	After 2040 New Flow
Deleted									0	0	0	0
Brookside Country Club	901 Willow Lane	15 K08 15	R-10	Residential	10.00	95		2020	21,185	21,185	0	0
Main Street Commons, Phase 2	200 W MAIN ST	15 L08NW1A 0	GC	Comm./Ind.	3.50	15		2020	3,345	3,345	0	0
MSTJ Properties LLC	153 LUMBER ST	15 L08NW1C 0	TC	Residential	3.20	20		2021	4,460	4,460	0	0
Donald Young	123 E MAIN ST	15 L08NW1C 0	TC	Residential	1.40	15		2022	3,345	3,345	0	0
DRN REAL ESTATE OF MACUNG	* S LEA ST	15 L08NW1C 0	TC	Residential	0.10	2		2023	446	446	0	0
SUBJINEPROPERTY	33 S LEA ST	15 L08NW1C 0	TC	Residential	0.30	6		2024	1,338	1,338	0	0
TYLER PENN LLC	99 W MAIN ST	15 L08 001 00	TC	Residential	37.00	20		2025	4,460	4,460	0	0
MISC. OTHER	VARIES			Comm./Ind.	0.00	10		2026	2,230	2,230	0	0
MISC. OTHER	VARIES			Comm./Ind.		10		2036	2,230	0	2,230	0
MISC. OTHER	VARIES			Comm./Ind.		10		2046	2,230	0	0	2,230
									0	0	0	0
									0	0	0	0
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Lower Macungie Township

Signatory Flow Projections

ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name Lower Macungie Township

GPD/EDU: 223

				TOTALS	1,034	2,471			424,023	532,262	16,761	0
				Residential	276	858		Developments	191,334	189,773	1,561	0
				Comm./Ind.	758	1,613		111	232,689	342,489	15,200	0

Development Name	Address	Tax Parcel ID	Zoning	Type of Development	Acres	EDUs	Specifics	Projected Development Year	Projected Flow (gpd)	2020-2030 New Flow	2031-2040 New Flow	2041-2050 New Flow
SPRING CREEK PROPERTIES - LUTRON ELECTRONICS SEWER CONNECTION	8240 SPRING CREEK RD	546441331883	O	Light Industry	51.17	6	Warehouse	2020	1,250	1,250	0	0
	3200 ORCHARD RD	547317461693	I	Commercial	36.62	2	Warehouse	2020	485	485	0	0
TACO BELL	5374 HAMILTON BLVD	547565309727 and 547565430027	C	Commercial	0.49	19	Fast Food Restaurant and Office Building	2020	4,237	4,237	0	0
SPRING CREEK	8783 CONGDON HILL DR	546317224584	HI-S	Heavy Industry	53.38	47	Warehouse	2020	10,444	10,444	0	0
SPRING CREEK	8615 CONGDON HILL DR	546327146378	HI-S	Heavy Industry	46.29	47	Warehouse	2020	10,444	10,444	0	0
SPRING CREEK	8449 CONGDON HILL DR	546337222951	HI-S	Heavy Industry	58.81	47	Warehouse	2020	10,444	10,444	0	0
SPRING CREEK	8444 CONGDON HILL DR	546328866910	HI-S	Heavy Industry	8.02	47	Warehouse	2020	10,444	10,444	0	0
SPRING CREEK	8323 CONGDON HILL DR	546338922117	C-SC	Commercial	16.37	47	Warehouse	2020	10,444	10,444	0	0
	6240 HAMILTON BLVD	547512982095	C	Commercial	1.35	5	Commercial Building	2020	1,200	1,200	0	0
	6217 HAMILTON BLVD	547513751934	C	Commercial	6.28	5	Commercial Building	2020	1,200	1,200	0	0
	1111 GRANGE RD	547523993704	U	Commercial	2.93	11	Restaurant	2020	2,380	2,380	0	0
TREXLER BUSINESS CENTER	6150 HAMILTON BLVD	547522461516, 547512886266, 547512989833, 547522291861, 547523312452, and 547523724340	C	Commercial	9.23	26	Office Space and Retail Center	2020	5,900	5,900	0	0
JAINDL COMMERCIAL PARK NORTH	6161 HAMILTON BLVD	547523172939	C	Commercial	4.93	19	Office Building, Restaurant, and Retail Center	2020	4,200	4,200	0	0
MILLBROOK FARMS 6	4521 INDIAN CREEK RD	548463715168	S	Residential	20.93	42	42 Lot Subdivision	2020	9,366	9,366	0	0
STONE HILL MEADOWS, PHASE 2	3611 GEHMAN RD	547366121766 and 547367516707	R	Residential	62.04	85	85 Lot Subdivision	2020	18,955	18,955	0	0
WEIS MARKETS	3440 GRANDVIEW DR	547358396443	C	Commercial	13.07	85	Commercial Building	2020	18,950	18,950	0	0
SCHOENECK ROAD LOT 1 - AIR PRODUCTS	3262 SCHOENECK RD	546397842621	I	Light Industry	13.43	16	Warehouse	2020	3,500	3,500	0	0
AL-MAQASID	7394 ALBURTIS RD	547307561048	I	Commercial	12.22		Seminary	2020				0
HAMILTON CROSSINGS NORTH	617 N KROCKS RD	547567692461	HC	Residential	52.81	416	400 Apartments, Commercial Building, and Restaurant	2020	92,768	92,768	0	0
	4511 CEDARBROOK RD	547599803773	HE	Commercial	25.22	57	2 Hotels, Office Building, and Small Commercial Building	2020	12,711	12,711	0	0
SUBURBAN SELF SERVE CARWASH	6452 HAMILTON BLVD	547502627743	C	Commercial	1.83	5	Car Wash	2020	1,104	1,104	0	0
U-HAUL OF LOWER MACUNGIE	7785 SPRING CREEK RD	546454069300	SR	Commercial	4.82	5	Commercial Building	2020	1,200	1,200	0	0
INDIAN CREEK VILLAGE	5415 INDIAN CREEK RD	548420386208	S	Residential	0.74	2	2 Lot Subdivision	2020	446	446	0	0
	1620 HIDDEN VALLEY RD	548523007822	S	Residential	0.64	1	Single Family Homes	2020	223	223	0	0
MOUNTAIN VIEW ESTATES	2062 ELBOW LN	548540155494	S	Residential	13.46	27	27 Lot Subdivision	2020	6,021	6,021	0	0
SCHAEFER RUN COMMONS	8189 HAMILTON BLVD	546436126075	SR	Residential	9.82	112	Condominium Town Homes	2020	24,976	24,976	0	0
	4440 HAMILTON BLVD	548518102010	HC	Commercial	1.93	5	Commercial Building	2020	1,200	1,200	0	0
KROCKS COURT	5621 HAMILTON BLVD	547554086045	C	Commercial	1.27	15	Retail Center and Commercial Building	2020	3,345	3,345	0	0
ALLEN ORGAN REDEVELOPMENT	3370 PA ROUTE 100	547358862563	C	Commercial	14.19	16	Office Building	2020	3,500	3,500	0	0
ABE DOORS & WINDOWS REDEVELOPMENT	6718 HAMILTON BLVD	546591274189	C	Commercial	1.00	15	Car Wash and Retail Center	2020	1,200	1,200	0	0
DRIES SUBDIVISION	3500 BROOKSIDE ROAD	548400346497	U	Residential	7.69	20	20 Apartments	2020	4,460	4,460	0	0
RESERVE ALLOCATION						560		2021 - 2025		125,000	0	0
COUNTRY HOME ACRES	1398 DORNEY AVE	548555146831	S	Residential	0.50	1	Single Family Homes	2021	223	223	0	0
SPRING CREEK	8120 SAUERKRAUT LN	546349494923	HI-S	Heavy Industry	32.96	47	Warehouse	2022	10,444	10,444	0	0
LEHIGH VALLEY S I P	7505 ALBURTIS RD	546397890673	O	Light Industry	3.58	6	Warehouse	2022	1,300	1,300	0	0
	1715 WEILERS RD	546424400941	U	Residential	0.21	1	Single Family Homes	2022	223	223	0	0
GRAYMOOR	6519 RUTHERFORD DR	547417365931	SR	Residential	2.25	1	Single Family Homes	2022	223	223	0	0
GRAYMOOR	1849 PEMBROOKE DR	547427543259	SR	Residential	0.64	1	Single Family Homes	2022	223	223	0	0
LOWER MACUNGIE FUNERAL HOME	6503 LOWER MACUNGIE RD	547510178161	U	Commercial	5.80	2	Funeral Home	2022	465	465	0	0
	6126 HAMILTON BLVD	547522687870	C	Commercial	4.34	16	Office Building	2022	3,500	3,500	0	0
	6084 HAMILTON BLVD	547523725177	C	Commercial	1.43	1	Commercial Building	2022	250	250	0	0
MILLBROOK FARMS	2887 EXETER DR	548456678394	S	Residential	1.36	1	Single Family Homes	2022	223	223	0	0
	2291 RIVERBEND RD	548459186327	S	Residential	0.29	1	Single Family Homes	2022	223	223	0	0
MILLBROOK FARMS	3170 SHEFFIELD DR	548465605590	S	Residential	0.54	1	Single Family Homes	2022	223	223	0	0
MILLBROOK FARMS	3184 SHEFFIELD DR	548465708045	S	Residential	0.53	1	Single Family Homes	2022	223	223	0	0
MILLBROOK FARMS	3177 SHEFFIELD DR	548465921353	S	Residential	0.71	1	Single Family Homes	2022	223	223	0	0
MILLBROOK FARMS	3194 SHEFFIELD DR	548475100121	S	Residential	0.95	1	Single Family Homes	2022	223	223	0	0
MILLBROOK FARMS	3183 SHEFFIELD DR	548475111895	S	Residential	0.92	1	Single Family Homes	2022	223	223	0	0
COUNTRY HOME ACRES	1406 DORNEY AVE	548555042697	S	Residential	0.49	1	Single Family Homes	2022	223	223	0	0
BODY ELITE	5518 HAMILTON BLVD	547554680166 and 547554687577	C	Commercial	0.49	2	Commercial Building	2022	530	530	0	0
SPRING CREEK	8219 SAUERKRAUT LN	546348273194	C-SC	Commercial	5.13	47	Warehouse	2023	10,444	10,444	0	0
SPRING CREEK	8290 SAUERKRAUT LN	546349045087	C-SC	Commercial	4.04	47	Warehouse	2023	10,444	10,444	0	0
LEHIGH VALLEY S I P	7428 INDUSTRIAL PARK WAY	546398930430	O	Light Industry	3.95	6	Warehouse	2023	1,300	1,300	0	0
ANCIENT OAKS	7680 CATALPA DR	546455709184	S	Residential	0.20	1	Single Family Homes	2023	223	223	0	0

ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name Lower Macungie Township

GPD/EDU:	223

TOTALS	1,034	2,471			424,023	532,262	16,761	0
Residential	276	858		Developments	191,334	189,773	1,561	0
Comm./Ind.	758	1,613		111	232,689	342,489	15,200	0

Development Name	Address	Tax Parcel ID	Zoning	Type of Development	Acres	EDUs	Specifics	Projected Development Year	Projected Flow (gpd)	2020-2030 New Flow	2031-2040 New Flow	2041-2050 New Flow
L W & I A SCHMOYER	6275 MOUNTAIN RD	547385378248	R	Residential	2.11	1	Single Family Homes	2023	223	223	0	0
ALLEN WEST ESTATES	1065 PINE GROVE CIR	547595682090	S	Residential	1.73	5	Single Family Homes	2023	1,115	1,115	0	0
	1105 MINESITE RD	548505370858	U	Residential	1.03	1	Single Family Homes	2023	223	223	0	0
BROOKHAVEN	1885 BRIARCLIFFE TER	548561253973	S	Residential	1.60	1	Single Family Homes	2023	223	223	0	0
BROOKHAVEN	3866 MAULFAIR DR REAR	548571912045	S	Residential	3.97	1	Single Family Homes	2023	223	223	0	0
BROOKHAVEN	3800 MAULFAIR DR	548581145302	S	Residential	1.45	1	Single Family Homes	2023	223	223	0	0
ANCIENT OAKS	7601 SPRING CREEK RD	546465119437	S	Residential	0.22	1	Single Family Homes	2024	223	223	0	0
HARRIS YORK	2520 GRACIE LONE	548437783430	S	Residential	0.45	1	Single Family Homes	2024	223	223	0	0
	2164 S CEDAR CREST BLVD	548582221646	S	Residential	2.73	1	Single Family Homes	2024	223	223	0	0
SCHAEFER RUN WEST	1530 PINEWIND DR	546414784773	SR	Residential	0.18	1	Single Family Homes	2025	223	223	0	0
SCHAEFER RUN WEST	1541 WEILERS RD	546415805799	U	Residential	0.32	1	Single Family Homes	2025	223	223	0	0
SCHAEFER RUN WEST	1521 WEILERS RD	546415811614	U	Residential	0.32	1	Single Family Homes	2025	223	223	0	0
ANCIENT OAKS	7677 CATALPA DR	546455605571	S	Residential	0.22	1	Single Family Homes	2025	223	223	0	0
SPRING CREEK ESTATES	1255 DANNER RD	546590635649	U	Commercial	1.69	5	Commercial Building	2025	1,200	1,200	0	0
SCHAEFER RUN WEST	8330 SCHAEFER RUN RD	546425060178	R3	Residential	5.16	10	Condominium Town Homes	2026	2,230	2,230	0	0
ANCIENT OAKS	7699 CATALPA DR	546454684107	S	Residential	0.30	1	Single Family Homes	2026	223	223	0	0
ANCIENT OAKS	7687 CATALPA DR	546454694580	S	Residential	0.23	1	Single Family Homes	2026	223	223	0	0
ANCIENT OAKS	7673 SPRING CREEK RD	546454890055	S	Residential	0.24	1	Single Family Homes	2026	223	223	0	0
ANCIENT OAKS	7661 SPRING CREEK RD	546454990619	S	Residential	0.20	1	Single Family Homes	2026	223	223	0	0
MACUNGIE CROSSING	5949 HAMILTON BLVD	547534605755	C	Commercial	4.27	20	Commercial Shopping Center	2026	4,540	4,540	0	0
BELLE CHASE	6300 LOWER MACUNGIE RD	547429666813	U	Residential	45.65	68	68 Lot Subdivision	2027	15,164	15,164	0	0
HARRIS YORK	2645 HOUGHTON LEAN	548437003849	S	Residential	0.44	1	Single Family Homes	2027	223	223	0	0
HARRIS YORK	2630 HOUGHTON LEAN	548437133086	S	Residential	0.38	1	Single Family Homes	2027	223	223	0	0
HARRIS YORK	2605 GRACIE LONE	548437454473	S	Residential	0.39	1	Single Family Homes	2027	223	223	0	0
HARRIS YORK	2680 GRACIE LONE	548437606410	S	Residential	0.48	1	Single Family Homes	2027	223	223	0	0
CLEARVIEW MANOR	1215 MINESITE RD	548505837633	S	Residential	0.80	1	Single Family Homes	2027	223	223	0	0
	8401 BROOKDALE RD	546414452244	SR	Residential	1.59	1	Single Family Homes	2030	223	223	0	0
	1741 TREXLERTOWN RD	546455419805	C	Commercial	2.28	4	Commercial Building	2030	892	892	0	0
	2204 PA ROUTE 100	546463500437	AP	Commercial	5.65	5	Commercial Building	2030	1,200	1,200	0	0
SPRING CREEK PROPERTIES, REVISED SUBDIVISION 2	2550 PA ROUTE 100	546480379486	C-SC	Commercial	14.00	209	Warehouse	2030	46,500	46,500	0	0
	1873 MILL CREEK RD	547437488744	S	Residential	0.42	1	Single Family Homes	2030	223	223	0	0
RAY A LEIBENSPERGER	1696 BOGIE AVE	547459582883	S	Residential	0.69	1	Single Family Homes	2030	223	223	0	0
	2201 BROOKSIDE RD	547498965042	S	Commercial	38.73	10	Church	2030	2,300	2,300	0	0
	1138 MILL CREEK RD	547501927036	C	Commercial	1.36	5	Commercial Building	2030	1,200	1,200	0	0
	5500 EAST TEXAS RD	547570664009	S	Residential	0.42	1	Single Family Homes	2030	223	223	0	0
	5451 LOWER MACUNGIE RD	547580102825	S	Residential	0.47	1	Single Family Homes	2030	223	223	0	0
	895 N BROOKSIDE RD	547586843230	C	Commercial	0.20	5	Small Commercial Building	2030	1,200	1,200	0	0
	5739 N WALNUT ST	548308798301	S	Residential	0.25	1	Single Family Homes	2030	223	223	0	0
	5037 WILD CHERRY LN	548417521482	S	Residential	10.00	14	14 Single Family Homes	2030	3,122	3,122	0	0
	2812 MACUNGIE RD	548435592578	S	Residential	3.01	4	Single Family Homes	2030	892	892	0	0
	4261 INDIAN CREEK RD	548484009331	S	Residential	0.80	1	Single Family Homes	2030	223	223	0	0
	1790 MINESITE RD	548542683336	S	Residential	1.22	1	Single Family Homes	2030	223	223	0	0
	1799 MINESITE RD	548543920440	S	Residential	0.96	1	Single Family Homes	2030	223	223	0	0
	4175 EAST TEXAS RD	548544282198	S	Residential	0.14	1	Single Family Homes	2030	223	223	0	0
COUNTRY HOME ACRES	1414 DORNEY AVE	548545846577	S	Residential	0.63	1	Single Family Homes	2030	223	223	0	0
	7975 QUARRY RD	546450811376	HI-S	Heavy Industry	0.80	4	Small Commercial Building	2040	800	0	800	0
	7462 CHURCH LN	546458659265	S	Residential	1.00	1	Single Family Homes	2040	223	0	223	0
	7290 DRAGONFLY LN	546490973315	O	Commercial	1.13	5	Commercial Building	2040	1,200	0	1,200	0
SPRING CREEK ESTATES	6659 STEIN WAY	547500145077	U	Commercial	2.16	5	Commercial Building	2040	1,200	0	1,200	0
	6309 LOWER MACUNGIE RD	547510666928	U	Commercial	8.97	24	School Property	2040	5,400	0	5,400	0
	5606 EAST TEXAS RD	547570116323	S	Residential	0.50	1	Single Family Homes	2040	223	0	223	0
	1170 BROOKSIDE RD	547575517362	U	Commercial	229.89	24	School Property	2040	5,400	0	5,400	0
	4982 HAMILTON BLVD	547586456122	C	Commercial	0.25	5	Small Office Building	2040	1,200	0	1,200	0
	85 N WALNUT ST	548308523423	R-10	Residential	0.23	1	Single Family Homes	2040	223	0	223	0
	5390 INDIAN CREEK RD	548420454875	S	Residential	0.87	1	Single Family Homes	2040	223	0	223	0
	2940 MACUNGIE RD	548434570485	S	Residential	3.11	1	Single Family Homes	2040	223	0	223	0
COUNTRY HOME ACRES	1422 DORNEY AVE	548545735769	S	Residential	0.82	1	Single Family Homes	2040	223	0	223	0
	2760 RIVERBEND RD	549419516332	SR	Residential	1.00	1	Single Family Homes	2040	223	0	223	0

Upper Macungie Township

Signatory Flow Projections

ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name **Upper Macungie Township**

GPD/EDU:	223

TOTALS	1,904	7,804
Residential	1,273	3,402
Comm./Ind.	631	4,402

	1,740,236	1,066,170	351,783	322,284
Developments	758,646	336,061	120,643	301,942
94	981,590	730,109	231,140	20,342

TOTALS	591,659	458,970
- Grandfathered	59,764	66,454
- Approved	103,628	66,744
= NET	428,267	325,772

Development Name	Address	Tax Parcel ID	Zoning	Type of Development	Acres	EDUs	Specifics	Projected Development Year	Projected Flow (gpd)	2020-2030 New Flow	2031-2040 New Flow	2041-2050 New Flow	2020 Flows	2021-2025 Flows	PLANNING MODULE STATUS
Woodmont Phase II	5265 Rockrose Lane	547624398227	GI	Residential	35.36	30	2 - Apartment Bldgs, 30 Units	2020	6,690	6,690	0	0	6,690	-	APPROVED
Ridgeline Warehouse	7352 Industrial Boulevard	546548068154	LI	Light Industry	91.86	1794	811200 - Manufacturer	2020	400,000	400,000	0	0	400,000	-	
Above and Beyond	5844 Daniel Street	547527381168	R2	Commercial	6.74	29	49714 - Care Facility	2020	6,489	6,489	0	0	6,489	-	APPROVED
67 Werley Road	67 Werley Road	547662332960	R5	Residential	12.11	112	7 - 16 Apartment Buildings	2020	24,976	24,976	0	0	24,976	-	APPROVED
Townplace Suites by Marriot	5828 Memorial Road	546685245001	HC	Commercial	4.03	21	14012 (Hotel) 7450 (Restaurant)	2020	4,594	4,594	0	0	4,594	-	APPROVED
Isett Development	5420 Crackersport Road	547606891901	LI	Light Industry	6.05	5	21609 Office	2020	1,200	1,200	0	0	1,200	-	
NFI - Lehigh Valley West	0371 - 0171 Oldt Road / 255 Nestle Way	545546394524, 545556280552, 545556886863, 545566289323, 545566695106, 545577129831	LI	Light Industry	51.50	5	384500 Warehouse	2020	1,148	1,148	0	0	1,148	-	
Wrenfield	1230 PA Route 100	545674239470	R5	Residential	15.00	111	Condominium Town Homes	2020	24,753	24,753	0	0	24,753	-	GRANDFATHERED
Laurel Fields Phase 5	Werley Road	547652518261	R5	Residential	7.45	25	Condominium Town Homes	2020	5,575	5,575	0	0	5,575	-	
Lehigh Hills Lot 5 (KRE Apartments)	1670 Route 100, 1250 Nursery Street, 1325 Church Street	545646416416, 545666149618, 545663095372, 545663817989, 545665892003	R2	Residential	51.05	273	Apartments	2020	60,879	60,879	0	0	60,879	-	APPROVED
Shoppes at Trexler Plaza	5917 W. Tilghman Street	546675889200	HC	Commercial	1.29	8	Service/Retail	2020	1,784	1,784	0	0	1,784	-	
Schaefer Run Commons	1445 Weilers Road	546426892469	R3	Residential	28.05	157	Twins	2020	35,011	35,011	0	0	35,011	-	GRANDFATHERED
Atas International	8364 Main Street	545640486849	LI	Light Industry	30.00	7	496800 Manufacturing Center	2020	1,561	1,561	0	0	1,561	-	
Mill Creek Hotel	0671 Grange Road	547515262267	R5	Commercial	11.00	76	142025 (6-Story Hotel)	2020	16,999	16,999	0	0	16,999	-	
Valley West Estates	0448 Oldt Road	545536806264	R1	Residential	25.00	18	18 Additional Connections	2021	4,014	4,014	0	0	-	4,014	GRANDFATHERED
Oak Tree Manor	5528 Muth Circle	547539186567	R2	Residential	0.47	1	Single Family Lots	2021	223	223	0	0	-	223	GRANDFATHERED
Parkland Fields	Krock's and Schantz's Road	Various	R2	Residential	3.25	6	6 - Single Family	2021	1,338	1,338	0	0	-	1,338	APPROVED
Trexler Fields	Swallow Tail Lane / Spring White Drive	Various	R2	Residential	3.08	25	Twins	2021	5,575	5,575	0	0	-	5,575	GRANDFATHERED
Trinity Wesleyan Church Additions	6735 Cetronia Road	546585241740	R2	Commercial	8.31	2	5500 Addition	2021	513	513	0	0	-	513	APPROVED
Lehigh Hills Lot 5 (Jaindl SFD)	1670 Route 100, 1250 Nursery Street, 1325 Church Street	545646416416, 545666149618, 545663095372, 545663817989, 545665892003	R2	Residential	211.93	291	Twins, Single Homes, Commercial Facility	2021	64,893	64,893	0	0	-	64,893	APPROVED
Weilers Road Twins	8451 Hamilton Boulevard	546407565875	R3	Residential	12.90	82	82 - Twins	2021	18,286	18,286	0	0	-	18,286	GRANDFATHERED
Woda Development	8853 Hamilton Boulevard	545486074486	NC	Commercial	8.65	55	Townhomes	2021	12,265	12,265	0	0	-	12,265	
Oak Tree Manor	5540 Muth Circle	547539591504	R2	Residential	0.50	1	Single Family Lots	2022	223	223	0	0	-	223	GRANDFATHERED
Upper Macungie Community Center	0360 Grange Road	546567986933	R2	Commercial	14.74	15	63750 Public Center	2022	3,345	3,345	0	0	-	3,345	
	1050 Mill Road	545697510390	LI	Light Industry	8.54	9	Office/ Warehouse	2023	2,114	2,114	0	0	-	2,114	
(Potential Large Industrial User?)	8364 Main Street	545640486849	LI	Light Industry	145.00	1000	Office/ Warehouse	2023	223,000	223,000	0	0	-	223,000	
Hidden Meadows	0600 Werley Road	547633789965	R5	Residential	34.77	168	Condominium Town Homes	2024	37,464	37,464	0	0	-	37,464	GRANDFATHERED
Summit Reality	Grim and Mosser	545590537065	HC	Commercial	5.00	25	Commercial Center	2025	5,575	5,575	0	0	-	5,575	
Summit Reality	1046 Grim Road	546500437908	HC	Commercial	6.12	27	Commercial Center	2025	6,021	6,021	0	0	-	6,021	
Haaf-tercha Industrial Park No. 2	9230 Long Lane	545449785823	R1	Residential	84.00	64	Single Family Lots	2025	14,272	14,272	0	0	-	14,272	
	7034 Ambassador Drive West	546607903881	LI	Light Industry	9.20	5	Office/ Warehouse	2025	1,200	1,200	0	0	-	1,200	
	7124 Ambassador Drive	545685938300	LI	Light Industry	19.13	158	Office/ Warehouse	2025	35,234	35,234	0	0	-	35,234	
	1331 Blue Barn Road	546698869134	R2	Residential	2.01	1	Single Family Lots	2025	223	223	0	0	-	223	
Green Hills	1330 Highland Drive	546659258727	R2	Residential	1.20	1	Single Family Lots	2025	223	223	0	0	-	223	GRANDFATHERED
Green Hills	5760 Clauser Road	546669313869	R2	Residential	1.50	1	Single Family Lots	2025	223	223	0	0	-	223	GRANDFATHERED
Morningside	6454 Overlook Road	546639810179	R2	Residential	1.11	1	Single Family Lots	2025	223	223	0	0	-	223	GRANDFATHERED
	5831 Cetronia Road	547527746367	R3	Residential	1.00	1	Single Family Lots	2025	223	223	0	0	-	223	
(fmr. Faust Junkyard)	0681 Grange Road	547515975744	R5	Residential	9.67	100	100 Apartments	2025	22,300	22,300	0	0	-	22,300	
Trexlertown Shopping Center	7150 Hamilton Boulevard	546469492409	HC	Commercial	14.96	13	Shopping Center	2026	2,999	2,999	0	0	-	-	
Lone Pond Estates	0319 Cressman Drive	547508747553	R2	Residential	0.72	1	Single Family Lots	2026	223	223	0	0	-	-	GRANDFATHERED
Hopewell Farms	6066 Palomino Drive	547526882409	R2	Residential	0.50	1	Single Family Lots	2028	223	223	0	0	-	-	GRANDFATHERED
Hopewell Farms	6074 Palomino Drive	547536091266	R2	Residential	0.50	1	Single Family Lots	2028	223	223	0	0	-	-	GRANDFATHERED

ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name Upper Macungie Township

GPD/EDU:	223

TOTALS	1,904	7,804
Residential	1,273	3,402
Comm./Ind.	631	4,402

	1,740,236	1,066,170	351,783	322,284
Developments	758,646	336,061	120,643	301,942
94	981,590	730,109	231,140	20,342

TOTALS	591,659	458,970
- Grandfathered	59,764	66,454
- Approved	103,628	66,744
= NET	428,267	325,772

Development Name	Address	Tax Parcel ID	Zoning	Type of Development	Acres	EDUs	Specifics	Projected Development Year	Projected Flow (gpd)	2020-2030 New Flow	2031-2040 New Flow	2041-2050 New Flow	2020 Flows	2021-2025 Flows	PLANNING MODULE STATUS
Hopewell Farms	6082 Palomino Drive	547537109316	R2	Residential	0.75	1	Single Family Lots	2028	223	223	0	0	-	-	GRANDFATHERED
	5947 Reppert Lane	547526702383	R3	Residential	3.16	1	Single Family Lots	2028	223	223	0	0	-	-	
Mill Run	1001 Glenlivet Drive	545683174905	LI	Light Industry	4.07	18	Office/ Warehouse	2030	4,068	4,068	0	0	-	-	
Blue Barn Estates	1450 Blue Barn Road	546699232555	R2	Residential	7.24	14	14 Lot Subdivision	2030	3,122	3,122	0	0	-	-	
	9141 Hamilton Blvd	545457900766	R1	Residential	11.78	19	Single Family Lots	2030	4,237	4,237	0	0	-	-	
Coke Expansion	7551 Schantz Road	546519682040	LI	Light Industry	43.01	734	100000-50000	2035	163,579	0	163,579	0	-	-	APPROVED
Two Windsor Plaza	7500 Windsor Drive	546601173950	LI	Light Industry	5.00	27	Office	2035	5,999	0	5,999	0	-	-	
Tamerler	0935 Blue Barn Road	546686969436	NC	Commercial	15.84	5	Commercial Center	2035	1,200	0	1,200	0	-	-	
Fallbrook	9160 Schantz Road	545542002551	R1	Residential	51.59	74	74 - Single Family	2035	16,502	0	16,502	0	-	-	GRANDFATHERED
Lone Pond Estates	0320 Burrell Boulevard	547508943111	R2	Residential	1.20	1	Single Family Lots	2035	223	0	223	0	-	-	GRANDFATHERED
Lone Pond Estates	0323 Burrell Boulevard	547518160051	R2	Residential	0.60	1	Single Family Lots	2035	223	0	223	0	-	-	GRANDFATHERED
Holiday Hills	5830 Mertz Drive	547610290812	R2	Residential	0.30	1	Single Family Lots	2035	223	0	223	0	-	-	GRANDFATHERED
Park Place West	0227 Hopewell Drive	546599845527	R2	Residential	0.30	1	Single Family Lots	2035	223	0	223	0	-	-	GRANDFATHERED
Mosser Road Development	1050 Mosser Road	546500715895	R3	Residential	7.78	10	10 - Single Family	2035	2,230	0	2,230	0	-	-	GRANDFATHERED
	0110 PA Route 100	546507790709	LI	Light Industry	11.31	51	Office/ Warehouse	2035	11,311	0	11,311	0	-	-	
	7761 Industrial Boulevard	546516308616	Li	Light Industry	20.37	91	Office/ Warehouse	2035	20,369	0	20,369	0	-	-	
	7762 Industrial Boulevard	546524269913	LI	Light Industry	38.82	5	Office/ Warehouse	2035	1,200	0	1,200	0	-	-	
	0749 PA Route 100	546535100991	LI	Light Industry	6.27	28	Office/ Warehouse	2035	6,282	0	6,282	0	-	-	
	0871 PA Route 100	545683851133	LI	Light Industry	9.97	75	Office/ Restaurant	2035	16,801	0	16,801	0	-	-	
	7312 Windsor Drive	546612222713	LI	Light Industry	7.62	8	Office/ Warehouse	2035	1,800	0	1,800	0	-	-	
	7240 Windsor Drive	546612728695	LI	Light Industry	2.04	8	Office/ Warehouse	2035	1,800	0	1,800	0	-	-	
	8738 Hamilton Boulevard	545486321583	NC	Commercial	2.67	4	Small Commercial Property	2035	801	0	801	0	-	-	
	8026 Main Street	545662219785	NC	Residential	1.00	1	Single Family Lots	2035	223	0	223	0	-	-	
	8557 Main Street	545631277726	R1	Residential	17.00	30	30 - Single Family	2035	6,690	0	6,690	0	-	-	
	0621 Twin Ponds Road	545560688996	R1	Residential	7.15	12	Single Family Lots	2035	2,676	0	2,676	0	-	-	
	5177 Cetronia Road	547517313750	R2	Residential	13.70	25	25 - Single Family	2035	5,575	0	5,575	0	-	-	
	9129 Breinigsville Road	545456811550	R2	Residential	1.57	1	Single Family Lots	2035	223	0	223	0	-	-	
	1190 Grange Road	547524880744	R5	Residential	46.00	200	200 Apartments	2035	44,600	0	44,600	0	-	-	
	6748 Ruppsville Road	546651689151	R3	Residential	10.10	52	52 Units (Apartments)	2040	11,596	0	11,596	0	-	-	
	5562 East Lane	546751861330	R1	Residential	13.87	12	12- 'Single Family Homes	2040	2,676	0	2,676	0	-	-	
	0450 Bastian Lane	546662292655	R3	Residential	26.42	120	120 - 'Twins	2040	26,760	0	26,760	0	-	-	
Allentown Osteopathic Med Center	5511 Crackersport Road	546697829967	R5	Residential	46.30	427	Town Homes and Apartments	2045	95,221	0	0	95,221	-	-	
Ash Lane	9229 Mertztown Road	545470990647	U	Residential	44.70	22	22 Lot Single Family Subdivision	2045	4,906	0	0	4,906	-	-	
	1334 Trexlertown Road	546448110709	C	Residential	21.84	70	Single Family Lots	2045	15,610	0	0	15,610	-	-	
	7540 Ruppsville Road	546543581137	LI	Light Industry	8.72	45	Office/ Warehouse	2045	9,999	0	0	9,999	-	-	
	0121 Nestle Way	545576122157	LI	Light Industry	3.76	5	Office/ Warehouse	2045	1,200	0	0	1,200	-	-	
	0690 Church Street	545671537591	NC	Commercial	9.00	41	Commercial Center	2045	9,143	0	0	9,143	-	-	
	9762 Trexler Road	545424874856	R1	Residential	28.00	60	60 - Single Family	2045	13,380	0	0	13,380	-	-	
	1260 Church Street	545642574354	R1	Residential	27.00	47	47 - Single Family	2045	10,481	0	0	10,481	-	-	
	8771 Main Street	545611783743	R1	Residential	80.50	141	141 - Single Family	2045	31,443	0	0	31,443	-	-	
	8363 Main Street	545642015742	R1	Residential	22.91	40	40 - Single Family	2045	8,920	0	0	8,920	-	-	
	9249 Newtown Road	545447796601	R1	Residential	7.52	14	Single Family Lots	2045	3,122	0	0	3,122	-	-	
	9233 Newtown Road	545457269545	R1	Residential	10.06	18	Single Family Lots	2045	4,014	0	0	4,014	-	-	
	9230 Long Lane	545449785823	R1	Residential	84.39	148	Single Family Lots	2045	33,004	0	0	33,004	-	-	
	5137 Schantz Road	547651078042	R2	Residential	6.97	16	16 - Single Family	2045	3,568	0	0	3,568	-	-	
	5383 Cetronia Road	547640516674	R2	Residential	9.42	21	21 - Single Family	2045	4,683	0	0	4,683	-	-	
	5148 Schantz Road	547650089963	R2	Residential	15.05	33	33 - Single Family	2045	7,359	0	0	7,359	-	-	
	9058 Hamilton Boulevard	545433245589	R2	Residential	11.70	40	40 - Single Family	2045	8,920	0	0	8,920	-	-	
	7051 Cetronia Road	546575017948	R2	Residential	35.06	80	80 Lot Subdivision	2045	17,840	0	0	17,840	-	-	
	6718 Ruppsville Road	546652186858	R3	Residential	2.00	4	4 - Single Family Homes	2045	892	0	0	892	-	-	
	7974 Hamilton Blvd	546437335092	R3	Residential	28.37	113	Twins	2045	25,199	0	0	25,199	-	-	
	9521 Hamilton Blvd	545437189821	RT	Residential	26.77	60	Twins, Single Homes	2045	13,380	0	0	13,380	-	-	

Upper Milford Township

Signatory Flow Projections

ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

GPD/EDU: 223

1/13/2020

Municipality Name **Upper Milford Township**

Development Name	Address	Tax Parcel ID	Zoning	Type of Development	Acres	EDUs	Sq. Ft	Projected Development Year	Projected Flow (gpd)	2021-2025 New Flow	2030-2040 New Flow	After 2040 New Flow	Explanation for Change
Maple Ridge Estates	4401 Main Road West/ 5051 Milford Road West	549304363575 549314377445	R-A	Residential	29.00	30	30 Lot Subdivision	2022	6,690	6,690	0	0	Only 30 Lots, Final Plans have been submitted.
Minnie Young	4489 Fairview Lane	548396873552	R-SR	Residential	1.00	1	Single Family Home	2022	223	223	0	0	Maple Ridge Sewer Extension Connections
Minnie Young	4501 Linda Lane	548396745700	R-SR	Residential	1.00	1	Single Family Home	2022	223	223	0	0	Maple Ridge Sewer Extension Connections
Minnie Young	4492 Linda Lane	548396516951	R-SR	Residential	1.00	1	Single Family Home	2022	223	223	0	0	Maple Ridge Sewer Extension Connections
Minnie Young	4496 Linda Lane	548396714139	R-SR	Residential	1.00	1	Single Family Home	2022	223	223	0	0	Maple Ridge Sewer Extension Connections
Minnie Young	4500 Linda Lane	548395991941	R-SR	Residential	1.00	1	Single Family Home	2022	223	223	0	0	Maple Ridge Sewer Extension Connections
Minnie Young	4549 Linda Lane	549306130321	R-SR	Residential	1.00	1	Single Family Home	2022	223	223	0	0	Maple Ridge Sewer Extension Connections
John Mondin	4502 Shimerville Rd.	549306214662	R-A	Residential	1.00	1	Single Family Home	2022	223	223	0	0	Maple Ridge Sewer Extension Connections
John Mondin	4741 Linda Lane	549306440631	R-A	Residential	1.05	1	Single Family Home	2023	223	223	0	0	Maple Ridge Sewer Extension Connections
John Mondin	4742 Linda Lane	549306214662	R-A	Residential	1.00	1	Single Family Home	2023	223	223	0	0	Maple Ridge Sewer Extension Connections
John Mondin	4773 Linda Lane	549306546040	R-A	Residential	1.25	1	Single Family Home	2023	223	223	0	0	Maple Ridge Sewer Extension Connections
John Mondin	4801 Linda Lane	549306734593	R-A	Residential	1.65	1	Single Family Home	2023	223	223	0	0	Maple Ridge Sewer Extension Connections
John Mondin	4833 Linda Lane	549306827245	R-A	Residential	1.58	1	Single Family Home	2023	223	223	0	0	Maple Ridge Sewer Extension Connections
John Mondin	4832 Linda Lane	549306508021	R-A	Residential	1.33	1	Single Family Home	2023	223	223	0	0	Maple Ridge Sewer Extension Connections
John Mondin	4780 Linda Lane	549306401760	R-A	Residential	1.37	1	Single Family Home	2023	223	223	0	0	Maple Ridge Sewer Extension Connections
NA	4758 Jasper Rd	549316034067	R-A	Residential	1.00	1	Single Family Home	2024	223	223	0	0	Future connections from Maple Ridge Extension
NA	4774 Jasper Rd	549316149226	R-A	Residential	1.80	3	Multi Family	2024	669	669	0	0	Future connections from Maple Ridge Extension
NA	4802 Jasper Rd	549316347050	R-A	Residential	1.00	1	Single Family Home	2024	223	223	0	0	Future connections from Maple Ridge Extension
NA	4820 Jasper Rd	549316315729	R-A	Residential	1.70	1	Single Family Home	2024	223	223	0	0	Future connections from Maple Ridge Extension
NA	4832 Jasper Rd	549316419324	R-A	Residential	1.00	1	Single Family Home	2024	223	223	0	0	Future connections from Maple Ridge Extension
NA	4848 Jasper Rd	549315590405	R-A	Residential	1.50	1	Single Family Home	2024	223	223	0	0	Future connections from Maple Ridge Extension
NA	4886 Jasper Rd	549315574924	R-A	Residential	1.80	1	Single Family Home	2024	223	223	0	0	Future connections from Maple Ridge Extension
NA	4878 Jasper Rd	549315262176	R-A	Residential	1.30	1	Single Family Home	2024	223	223	0	0	Future connections from Maple Ridge Extension
NA	4862 Jasper Rd	549315175899	R-A	Residential	1.70	1	Single Family Home	2024	223	223	0	0	Future connections from Maple Ridge Extension
NA	4854 Jasper Rd	549315093815	R-A	Residential	2.00	1	Single Family Home	2024	223	223	0	0	Future connections from Maple Ridge Extension
NA	4946 Jasper Rd	549315609270	R-A	Residential	3.00	1	Single Family Home	2024	223	223	0	0	Future connections from Maple Ridge Extension
Weaver	4521 Chestnut	548378534234	C	Commercial	1.80	4	Church	2021	892	892	0	0	Future connection
Weaver	4751 Mill Rd	548378838665	SR	Commercial	1.80	2	Commercial & Residential	2025	446	446	0	0	Future connection of existing buildings on lot
Tank Farm Road Future connect to exiting lots	From Raymond Court to Ford Drive		S-R & C	Residential		12		2024	2,676	2,676	0	0	existing lots with on-lot systems that could connect
Buckeye Road Future connections to exiting lots	Tank Farm Road to Chestnut Street		S-R & C	Residential		38		2024	8,474	8,474	0	0	existing lots with on-lot systems that could connect
Indian Creek Industrial Park	4650 Indian Creek Road	5484715755603	I	Commercial		11	11 Lot Subdivision	2023	2,453	2,453	0	0	
Total						124			27,652	27,652			

South Whitehall Township

Signatory Flow Projections

LONG TERM ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Year 2021 thru 2025

Municipality Name **South Whitehall Twp.**

GPD/EDU:	223

TOTALS	**0**	**798**	**177,872**
Residential	0	0	0
Comm./Ind.	0	798	177,872

Development Name	Address (OPTIONAL)	Tax Parcel ID (OPTIONAL)	Zoning (OPTIONAL)	Type of Development (OPTIONAL)	Acres (OPTIONAL)	EDUs	Specifics	Projected Development Year	Projected 2020-2027 Flow (gpd)
1960 Harold Avenue	same					5	Res -Minor	2021	1,115
Chapmans Road Warehouse	4741 Chapmans Rd.					22	Commercial	2021	5,000
Blue Barn Estates	1530 Blue Barn Rd.					6	Res-Minor	2022	1,338
Hausman Rd Flex Warehouse	1215 Hausman Rd.					4	Commercial	2021	1,000
KRE Commercial	Broadway/Centronia Rd					7	Restaurant	2021	1,500
Miscellaneous & Change in Use						50	Residential	2021-2025	11,150
Miscellaneous & Change in Use						50	Commercial	2021-2025	11,150
Ridge Farm	Walbert Ave & Cedar Crest Blvd.					50	Res/Com	2022	11,150
						83		2023	18,509
						90		2024	20,070
						90		2025	20,070
						0		2026	0
						0		2027	0
						0		2028	0
						0		2029	0
									0
Hills at Winchester	Walbert Avenue					15	Residential	2021	3,345
						15		2022	3,345
						13		2023	2,899
									0
Regency at South Whitehall	Walbert Avenue					42	Residential	2021	9,366
						40		2022	8,920
						40		2023	8,920
									0
Blue Barn Meadows	Blue Barn Road					35	Residential	2021	7,805
						35		2022	7,805
						35		2023	7,805
						35		2024	7,805
						35		2025	7,805
									0
									0
									0
									0
									0

Coplay – Whitehall Sewer Authority

Signatory Flow Projections

INTERIM ACT 537 PLAN - FUTURE 2020 & 2021 - 2025 DEVELOPMENT FLOWS - PLANNING MODULE REQUIRED																	
COPLAY WHITEHALL SEWER AUTHORITY SERVICE AREA - WHITEHALL TOWNSHIP & COPLAY BOROUGH																	
GPD / EDU		215															
Line Ref #	Township Index	CWSA File	Development Name	PIN	Zoning	Type	Acres	Total Estimated EDU's	Total Estimated Discharge	Planning Year 2020	Planning Year 2021	Planning Year 2022	Planning Year 2023	Planning Year 2024	Planning Year 2025	Int	Comments
1	1733-07	D07-013	Catasauqua Rd & Lehigh Ave - Munzer Yacoub	640815635125	R-5A	Residential	0.7600	5	1,075	1,075							PM Required - In Process
2	1846-14	D15-009	215 Quarry St - Fullerton Mills - Redevelopment	640812367096	R-5A	Residential	1.2400	49	10,535	10,535							PM Required - Resolution Passed by Whitehall Twsp 11-13-2017
3	1884-16	D16-004	Eagle View Townhomes	558070209488	R-5A	Residential	7.8140	38	8,170	8,170							PM Required - Not Submitted by Developer
4	1821-12	D16-112	4154 Roosevelt Street - Factory Redevelopment	558040606115	R-5A	Residential	1.2100	49	10,535	10,535							PM Required - Not Submitted by Developer
5	NA	D17-104	Harrison Street	558050845809		Residential	3.2700	32	6,880	6,880							PM Required - Not Submitted by Developer
6	1913-18	D18-004	1942 Schadt Avenue	549823832220	R-4	Residential	4.6600	3	645	645							PM Required - In Process
7	1914-18	D18-005	2138 Lehigh Avenue - Atanos	640816118484	R-5A	Residential	0.6000	2	430	430							PM Required - Not Submitted by Developer
8	1915-18	D18-006	3101 MacArthur Road - Arlington Cemetary	549920401123	R4	Residential	14.7750	50	10,750	10,750							PM Required - Not Submitted by Developer
9	1916-18	D18-007	4303 Spruce Street	558050600259	R-5A	Residential	0.2300	4	860	800							PM Required - In Process
10	1917-18	D18-008	3030 S 3rd Street	549951424741	R-5A	Residential	0.6300	5	1,075	1,075							PM Required - In Process
11	NA	D18-108	4601 Quarry Street - Timberidge Nuss	548917042351	R-3A	Residential	2.8816	3	645	645							PM Required - Not Submitted by Developer
12	1930-19	D19-001	3585 S Church Street - Industrial Warehouse	548972994040	I	Industrial	39.3630	19	4,085	4,051							PM Required - In Process
13	1936-19	D19-007	135 Crest Drive	640716893289	R-4	Residential	1.3512	5	1,075	1,075							PM Required - Not Submitted by Developer
14	1941-19	D19-012	3434 N Front Street	549954815943	R-5A	Residential	0.4700	4	860	860							PM Required - Not Submitted by Developer
15	1943-19	D19-014	Townes at Schadt Avenue - United Liberty	549803441182	R-3A	Residential	6.6200	33	7,095	7,095							PM Required - Not Submitted by Developer
16	1944-19	D19-015	3614 Lehigh St - 4,000 SF Warehouse, 10 Empl	549849051858	C-2	Commercial	2.2490	2	430	430							PM Required - Not Submitted by Developer
17	1945-19	D19-016	3937 Mechanicsville Road	548887590427	R-2	Residential	21.5854	2	430	430							PM Required - Not Submitted by Developer
18	NA	CWSA Project	Summit Street	Various		Residential		32	6,880	6,800							PM Required - Not Submitted by CWSA - Whitehall Twsp
19	NA	CWSA Project	Prospect Street	Various		Residential		20	4,300	4,300							PM Required- Not Submitted by CWSA - Whitehall Twsp
20			LV Dairy Site - 1026 MacArthur Rd - Redevelopment	549785471751	C-2	Commercial	10.0415	47	10,105			10,105				DCF	Proposed 100,000 SF Retail Space x 0.10 GPD/SF = 10,000 GPD
21			LV Dairy Site - 1002 MacArthur Rd -Redevelopment	549786010140	C-2	Commercial	13.4100	47	10,105		10,105					DCF	
22	1951-19	D19-022	Creekside Apartments - (4) Bldgs (40) Apartments	549769438539	R-5A	Residential	2.9770	40	8,600		8,600					JC	
23			Whitehall Mall - Sears Redevelopment	549872328571	C-2	Commercial		50	10,750			10,750				JC	
24			Jandl Realty LP - 4321 S Church Street	548945571210	R-1	Residential	35.6900	26	5,590						5,590	CC	
25			Jandl Realty LP	548935244151	R-1	Residential	23.8100	18	3,870						3,870	CC	

INTERIM ACT 537 PLAN - FUTURE 2020 & 2021 - 2025 DEVELOPMENT FLOWS - PLANNING MODULE REQUIRED																	
COPLAY WHITEHALL SEWER AUTHORITY SERVICE AREA - WHITEHALL TOWNSHIP & COPLAY BOROUGH																	
GPD / EDU		**215**															
Line	**Township**	**CWSA File**	**Development**	**PIN**	**Zoning**	**Type**	**Acres**	**Total**	**Total**	**Planning**	**Planning**	**Planning**	**Planning**	**Planning**	**Planning**	**Int**	**Comments**
Ref #	**Index**		**Name**					**Estimated**	**Estimated**	**Year**	**Year**	**Year**	**Year**	**Year**	**Year**		
								EDU's	**Discharge**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**		
26	1735-07	D07-014	Fort Deshler Office Complex - Chestnut St	548985454391	OS-2	Commercial	8.0000	20	4,300					4,300		CC	
27			Winding Brook - Redevelopment - Lauser	548993615940	C-2A	Commercial	7.4800	45	9,675					9,675		CC	Estimated 9 lots x 5 EDU's/Lot = 45 EDU's
28			Radio Towers - Redevelopment - Vertical Bridge	548980994728	R-2	Residential	33.2349	49	10,535						10,535	CC	
29			Radio Towers - Redevelopment - Vertical Bridge	548981086101	OS-2	Residential	9.9000	4	860						860	CC	
30			HA Williams	548983908300	C-2A	Commercial	2.9470	20	4,300					4,300		CC	Estimated 4 Lots x 5 EDU's/Lot = 20 EDU's
31			Vacant Land - Lehigh Valley Hospital Inc	548898689455	R-2	Residential	142.6000	212	45,580				45,580			CC	
32			Vacant Land - Saint Lukes Hospital of Bethlehem	549900241499	R-2	Residential	25.3600	38	8,170					8,170		CC	
33	1622-04	D04-013	Ringer Road Subdivision - (5) PIN's	548868873462	R-2	Residential	66.8127	130	27,950						27,950	CC	Subdivision will follow Line Ref 31 Lehigh Valley Hopsital
34			Ringer Road Subdivision	548868872135	R-2	Residential	1.9900										
35			Ringer Road Subdivision	548858655549	R-2	Residential	7.6656										
36			Ringer Road Subdivision	548950903760	R-2	Residential	13.9738										
37			Ringer Road Subdivision	548869856334	R-2	Residential	17.0400										
38			T Bossard - 3937 Mechanicsville Road	548887590427	R-2	Residential	21.9300	32	6,880					6,880		CC	Subdivision will follow Line Ref 31 Lehigh Valley Hopsital
39			M Hobel T/A Whitehall Realty - 3430 W	548980202758	R-2	Residential	14.6000	22	4,730					4,730		CC	Subdivision will follow Line Ref 31 Lehigh Valley Hopsital
40	1612-04	D04-006	Country Glen II	548886640488	R-3A	Residential	2.8200	5	1,075					1,075		CC	
41			Rural Road - Walter & Marilyn Groller	548886960381	R-3A	Residential	0.4940	1	215					215		CC	
42			Rural Raad - Edmund & Dolres Krupa	548886952410	R-3A	Residential	0.4760	1	215					215		CC	
43			Rural Road - Walter Groller & Dolores Krupa	548886943576	R-3A	Residential	0.4590	1	215					215		CC	
44	1947-19	D19-008	New K-1 Elementary School (Full Day Kindergarden)	549826530918	R-3A	School	46.3475	20	4,300		4,300					CC	350 Students x 25 GPD/Student = 8,750 GPD/2= 4,375 GPD
45			5127_Railroad_St_On-Lot	559002734669	OS-1	Residential	0.3352	1	215			215				UL	PennDOT Cementon - Northampton Bridge Project - Pocket Area
46			5121_Railroad_St_On-Lot	559002831301	OS-1	Residential	0.1833	1	215			215				UL	PennDOT Cementon - Northampton Bridge Project - Pocket Area
47			5119_Railroad_St_On-Lot	559002833028	OS-1	Residential	0.0720	1	215			215				UL	PennDOT Cementon - Northampton Bridge Project - Pocket Area
48			5117_Railroad_St_On-Lot	559002824923	OS-1	Residential	0.0742	1	215			215				UL	PennDOT Cementon - Northampton Bridge Project - Pocket Area
49			5115_Railroad_St_On-Lot	559002825784	OS-1	Residential	0.1277	1	215			215				UL	PennDOT Cementon - Northampton Bridge Project - Pocket Area
50			5103_Railroad_St_On-Lot	559002920286	OS-1	Residential	0.5419	4	860			860				UL	PennDOT Cementon - Northampton Bridge Project - Pocket Area
INTERIM ACT 537 PLAN - FUTURE 2020 & 2021 - 2025 DEVELOPMENT FLOWS - PLANNING MODULE REQUIRED																	
COPLAY WHITEHALL SEWER AUTHORITY SERVICE AREA - WHITEHALL TOWNSHIP & COPLAY BOROUGH																	
GPD / EDU		**215**															
Line	**Township**	**CWSA File**	**Development**	**PIN**	**Zoning**	**Type**	**Acres**	**Total**	**Total**	**Planning**	**Planning**	**Planning**	**Planning**	**Planning**	**Planning**	**Int**	**Comments**
Ref #	**Index**		**Name**					**Estimated**	**Estimated**	**Year**	**Year**	**Year**	**Year**	**Year**	**Year**		
								EDU's	**Discharge**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**		
51			5105 Main_Street On-Lot	559012011806	OS-1	Residential	0.5670	1	215			215				UL	PennDOT Cementon - Northampton Bridge Project - Pocket Area
52			Thomas Iron Works - WHW Company	549963670791	OS-1	Residential	49.057	19	4,085				4,085			ML	
53			Bible Fellowship Homes	548893625521	R-3A	Residential	12.786	33	7,095		7,095					LL	
57																	
			Totals - Planning Module Required					**1,247**	**268,105**	**76,581**	**30,100**	**23,005**	**49,665**	**39,775**	**48,805**		191,350
				Check	268,105												

North Whitehall Township

Signatory Flow Projections

LONG TERM ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Year 2021 thru 2025

Municipality Name **North Whitehall Twp.**

				TOTALS	**0**	**130**			**28,990**
GPD/EDU:	**223**			Residential	0	0			0
				Comm./Ind.	0	130			28,990
Development Name	**Address (OPTIONAL)**	**Tax Parcel ID (OPTIONAL)**	**Zoning (OPTIONAL)**	**Type of Development (OPTIONAL)**	**Acres (OPTIONAL)**	**EDUs**	**Specifics**	**Projected Development Year**	**Projected 2020-2027 Flow (gpd)**
						40		2021	8,920
						30		2022	6,690
						30		2023	6,690
						20		2024	4,460
						10		2025	2,230
									0
									0

Salisbury Township

Signatory Flow Projections

INTERIM ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS - 2020 through 2024

Municipality Name **SALISBURY TOWNSHIP**

TOTALS	**0**	**262**	**64,714**
Residential		30	7,620
Comm./Ind.		232	57,094

GPD/EDU: **247**

Development Name	Address (OPTIONAL)	Tax Parcel ID (OPTIONAL)	Zoning (OPTIONAL)	Type of Development (OPTIONAL)	Acres (OPTIONAL)	EDUs	Specifics	Projected Development Year	Projected 2020-2024 Flow (gpd)
Mosser Drive Residential Subdivision						5			1,235
Miscellaneous Residential Building Permits						25			6,175
Miscellaneous Commercial Building Permits						30			7,410
New Fire Station						2			494
Lehigh Valley Hospital Expansion						200			49,400
									0
									0
									0
									0
									0
									0
									0
									0
									0

Borough of Emmaus

Signatory Flow Projections

INTERIM ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name **Emmaus Borough**

GPD/EDU: **280**

Development Name	Address (OPTIONAL)	Tax Parcel ID (OPTIONAL)	Zoning (OPTIONAL)	Type of Development (OPTIONAL)	Acres (OPTIONAL)	EDUs	Specifics	Projected Module Submittal	Projected Development Year	Projected 2020-2027 Flow (gpd)
				TOTALS	**160**	**579**		(This column added by Hanover Engineering)		**162,106**
				Residential	154	560				156,870
				Comm./Ind.	6	19				5,236
Developments exempt from Planning or with Planning Modules previously approved but not yet developed/connected to the public sewer system										
710 Furnace Street	(Single open lot)			Residential	0.25	1			2021	280
Fields at Indian Creek	Former Golf Club of Emmaus site (total of 27 EDU's)			Residential	12.50		New 55+ Community	2017	2019 - 2021	0
|------>	Occupancy in 2019			Residential		5			2019	1,400
|------>	Occupancy in 2020			Residential		10			2020	2,800
|------>	Occupancy in 2021+			Residential		12			2021+	3,360
Wawa Convenience Store	11th & Green Streets			Comm./Ind.	2.30	6	New development	2019	2020	1,596
Re-Development of properties where the principal bldg. was previously removed and not yet redeveloped										
17 Main Street	(Single dwelling demolished)			Residential		1	Demolished 2014		?	280
327 S. 4th Street	(Single dwelling demolished)			Residential		1	Demolished 2015		?	280
56 S. Cherry Street	(Single dwelling demolished)			Residential		1	Demolished 2015		?	280
512 Chestnut Street	(Former jewelry shop)			Comm./Ind.		1	Demolished 2016		?	280
504 E. Main Street	(Single dwelling demolished)			Residential		1	Demolished 2016		?	280
1134 Pennsylvania Avenue	(Former school / Rodale offices)			Comm./Ind.		4	Demolished 2018		?	1,120
										0
Developments currently in the planning/design phase - Sewage Facilities Planning not yet submitted/approved as of 12/17/2019										
123 Macungie Ave Subdivision	123 Macungie Ave			Residential	0.10	1	One new residence			280
Towns at South Mountain	Between Arch & Tilghman	549420946925-1		Residential	9.84	49	New Development	Late 2019	2021	13,720
Chestnut Ridge at Rodale	S. 10th Street			Residential	32.10	2	Re-development of offices	Late 2019	2021	630
300 Furnace Street Apartments	Furnace & S. Mountain Streets			Residential	9.10	144	New Development	Early 2020	2021	40,320
Turkey Hill Redevelopment	6th & Chestnut Streets			Comm./Ind.	1.26	5	Re-development of mini-mart	Early 2020	2021	1,400
Wesley Works Townhouses	6th & NorthStreet			Residential	1.94	26	Re-development of office/whse	Early 2020	2021	7,280
										0
Other properties with development potential within a 5-year planning period										
Re-development of Rodale Offices	33 E. Minor Street			Residential	5.20	50	Former office bldg.	2021	2022	14,000
Fields at Indian Creek	Addl. Land for Development			Residential	5.50	17	55+ community	2021	2023	4,760
Slaski Subdivision	1267 Tilghman Street			Residential	1.14	5	6, less credit for 1 exist.	2021	2022	1,400
										0
										0

Development Name	Address (OPTIONAL)	Tax Parcel ID (OPTIONAL)	Zoning (OPTIONAL)	Type of Development (OPTIONAL)	Acres (OPTIONAL)	EDUs	Specifics	Projected Module Submittal	Projected Development Year	Projected 2020-2027 Flow (gpd)
Other properties with future development potential (long-term planning - no specific timeline projections available)										
Unami Fish & Game property	S. 2nd St		CR	Residential	20.27	34				9,520
	50 S. 6th St		RHO	Residential	2.26	66				18,480
	218 S. 6th St		RHO	Residential	0.60	3				840
	1318 S. 10th St		RL	Residential	0.80	3				840
	1254 S. 10th St		RL	Residential	1.30	6				1,680
	1264 S. 10th St		RL	Residential	0.80	4				1,120
	310 S. 12th St		RM	Residential	0.09	1				280
	S. 15th St		RL	Residential	4.90	12				3,360
	110 S. 16th St		RL	Residential	2.09	10				2,800
	306 Broad St		RHO	Residential	0.33	10				2,800
	306 Broad St, Rear		RHO	Residential	0.33	2				560
	301 Franklin St		RM	Residential	1.60	6				1,680
	710 Furnace St		RL	Residential	0.25	1				280
	123 Macungie Ave		RL	Residential	0.27	1				280
	165 E. Main St		BH	Comm./Ind.	0.10	1				280
	152 E. Minor St		IL	Comm./Ind.	1.80	1				280
	321 E. Minor St		RHO	Residential	0.41	1				280
	1002 PA Ave		IL	Comm./Ind.	0.28	1				280
	1017 PA Ave		RL	Residential	5.80	19				5,320
	1020 PA Ave		RM	Residential	0.95	5				1,400
	1030 PA Ave		RM	Residential	0.41	1				280
	1034 PA Ave		RM	Residential	0.41	1				280
	1258 PA Ave		RL	Residential	0.75	1				280
	1362 PA Ave		CR	Residential	3.80	6				1,680
	1480 PA Ave		CR	Residential	9.60	15				4,200
	1490 PA Ave		CR	Residential	3.91	6				1,680
	1527 PA Ave		CR	Residential	6.10	7				1,960
	Shimerville Rd		CR	Residential	3.87	4				1,120
	1380 Shimerville Rd		RL	Residential	1.20	3				840
	1378 Shimerville Rd		RL	Residential	1.05	3				840
	1222 Tilghman St		CR	Residential	1.94	2				560
	1260 Tilghman St		RL	Residential	0.28	1				280
										0
										0
										0
										0
										0
										0
										0
										0
										0
										0
										0
										0

Hanover Township

Signatory Flow Projections

INTERIM ACT 537 PLAN – FUTURE DEVELOPMENT FLOWS

Municipality Name **Hanover Township, Lehigh County**

GPD/EDU:	223

TOTALS	0	1,121	99,904
Residential	0	0	0
Comm./Ind.	0	1,121	99,904

Development Name	Address (OPTIONAL)	Tax Parcel ID (OPTIONAL)	Type of Development (OPTIONAL)	Acres (OPTIONAL)	EDUs	Projected Development Year	Projected 2020-2027 Flow (gpd)
Good Mac	Lloyd & Irving				224	2022	49,952
Patriot American	1110 American Pkwy				561	2023	
Goodman	Airport Centre				224	2025	49,952
New Pro	Dauphin St.				112	2025	
							0
							0
							0
							0
							0
							0
							0
							0
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							0
							0
							0

APPENDIX 8

Kline's Island Sewer System Regional Flow Management Strategy (August 2018)

Kline’s Island Sewer System Regional Flow Management Strategy

City of Allentown
Lehigh County Authority
South Whitehall Township
Coplay-Whitehall Sewer Authority
Salisbury Township
Borough of Emmaus
Hanover Township (Lehigh County)
Lower Macungie Township
Borough of Alburtis
Borough of Macungie
Upper Macungie Township
Lowhill Township
Weisenberg Township
Upper Milford Township

August 1, 2018

Contents

Tables

Figures

Appendices

Acronym List

AO	Administrative Order
CCTV	Closed Circuit Television
COA	City of Allentown
CWSA	Coplay Whitehall Sewer Authority
FEB	Flow Equalization Basin
I/I	Inflow and Infiltration
KISS	Kline’s Island Sewer System
KIWWTP	Kline’s Island Wastewater Treatment Plant
LCA	Lehigh County Authority
LF	Linear Feet
LMT	Lower Macungie Township
MGD	Million Gallons per Day
NWT	North Whitehall Township
O&M	Operations and Maintenance
PADEP	Pennsylvania Department of Environmental Protection
PTP	Pre Treatment Plant
PVC	Poly Vinyl Chloride Pipe
RCP	Reinforced Concrete Pipe
RDII	Rainfall Derived Inflow and Infiltration
SCARP	Sewer Capacity Assurance and Rehabilitation Program
SCPS	Spring Creek Pump Station
SRP	Source Reduction Program
SSES	Sanitary Sewer Evaluation Study
SSO	Sanitary Sewer Overflow
SWT	South Whitehall Township
UMT	Upper Macungie Township
UMiT	Upper Milford Township
USEPA	United States Environmental Protection Agency
VCP	Vitrified Clay Pipe
WLI	Western Lehigh Interceptor
WLSP	Western Lehigh Sewerage Partnership
WWTP	Wastewater Treatment Plant

1. Overview

1.1. Background

For purposes of this document, the City of Allentown (COA), Lehigh County Authority (LCA), and each party's respective municipal signatories, all of whom are named in the Administrative Orders addressed by this submission, are referred to as a "Signatory" or collectively as "Signatories."

In addition, LCA and its municipal signatories in 2009 entered into memorandum of understanding to form the Western Lehigh Sewerage Partnership (WLSP) to address these matters cooperatively where possible. Members of the WLSP are LCA, Upper Macungie, Lower Macungie, Upper Milford, Weisenberg and Lowhill townships, and the boroughs of Alburtis and Macungie. Some portions of this document and appendices refer to the WLSP's past or planned work to represent the collective work of the partnership.

Flow issues in the primary components of the Kline's Island Sewer System (KISS) and activation of the Kline's Island Wastewater Treatment Plant (KIWWTP) high flow bypass outfall (Outfall 003) led to USEPA to issue two Administrative Orders (2007 and 2009) and the Pennsylvania Department of Environmental Protection (PADEP) to cause implementation of a connection management program in portions of the system in 2009. Progress related to these three actions have been regularly reported to both agencies since 2010, both in written annual/semi-annual reports and in regular meetings. Signatories have offered several independent strategies and plans to USEPA and PADEP, several of which were received positively by the regulators. Consistent with the 2009 Administrative Order's requirement for cooperative management of flows, USEPA and PADEP have requested a Regional Flow Management Strategy developed in collaboration among the Signatories that guides the development and implementation of each Signatory's individual sewer I/I reduction plan.

The USEPA has identified the following as critical components of the Regional Flow Management Strategy:

- Collection System Operation and Maintenance
- System Characterization
- Inflow and Infiltration Removal
- Flow Monitoring

1.2. Purpose and Use

This Regional Flow Management Strategy is intended to guide the development and implementation of Signatories' 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. This Strategy reflects broad-based commitments of action, collaboration, and cooperation.

Each Signatory has prepared and included in the Appendices its own I/I Reduction Plan and Operation and Maintenance Plan.

Each Signatory will provide information to LCA (as the operator of the KIWWTP and most of the primary conveyance components of the KISS) to prepare any required regular and/or special progress reports as may be requested in the future by USEPA or PADEP.

2. Physical Inventory and Attributes

The KISS service area is shown in Figure 1-1Figure 3-1. The KISS consists of 933 miles of sewer pipe from 14 municipal entities as shown in Table 2-1.

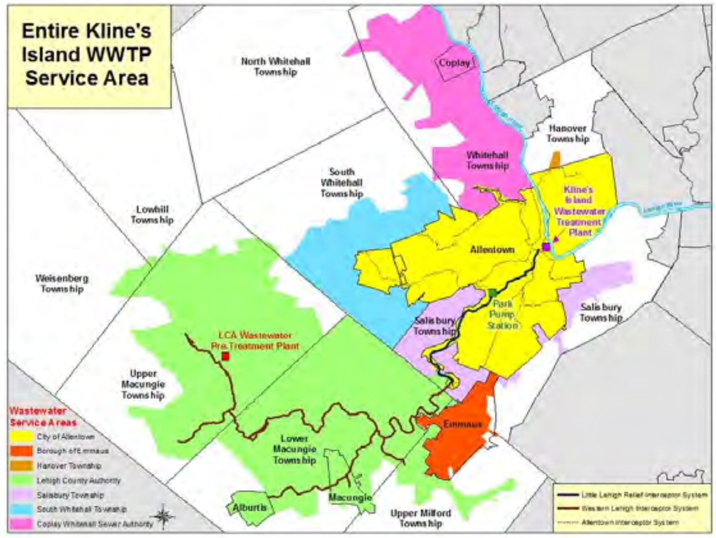


Figure 1-1 - KISS Service Area

Table 2-1 - Sewer Mileage per Signatory

SIGNATORY	Total Miles of Sewer	Percentage of Total
Allentown	285	30.55%
Coplay Whitehall	125	13.40%
Lower Macungie	123	13.18%
South Whitehall	118	12.65%
Upper Macungie	117	12.54%
Salisbury	69	7.40%
Emmaus	45	4.82%
LCA	18	1.93%
Macungie	11	1.18%
Alburtis	8	0.86%
Upper Milford	8	0.86%
Weisenburg	4	0.43%
Hanover	1.8	0.19%
Lowhill	0.2	0.02%

2.1. City of Allentown

The COA's KIWWTP and its tributary collection system has been in operation since 1929 protecting water quality and public health within the Lehigh Valley.

Beginning in the late 1950s and continuing through the late 1960s, COA entered into service agreements with surrounding municipalities and authorities for conveyance of wastewater through COA-owned trunk sewers and for treatment of wastewater at the KIWWTP. The first signatory agreement was executed with the Borough of Emmaus in 1959. Signatory agreements were subsequently executed with Coplay-Whitehall Sewer Authority, Salisbury Township and South Whitehall Township in 1965, and in 1969 a signatory agreement was executed with LCA. Due to the need to treat flow from the signatories together with growth within the city, the KIWWTP was expanded to an average flow capacity of 28.5 mgd in 1968 and to 40 mgd in 1978, which is the current average flow capacity of the KIWWTP. The corresponding peak flow capacity of the KIWWTP is 87 mgd.

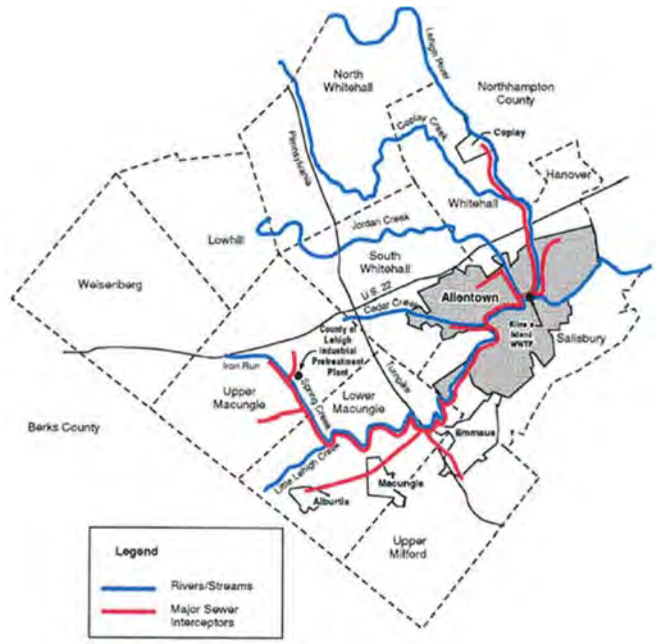
The KIWWTP is comprised of the following major components: influent screens, main and auxiliary influent pumps, aerated grit chambers, primary clarifiers, intermediate pump station, plastic media trickling filters, intermediate clarifiers, rock media trickling filters, final clarifiers, chlorine contact tank and chlorine feed system, effluent pumping system, sludge pumping, sludge thickening, anaerobic digestion, sludge dewatering, and odor control facilities.

At the time the original signatory agreements were executed, wastewater was conveyed to the KIWWTP by a total of seven COA-owned trunk sewers:

- Lehigh River Trunk Sewer
- Front Street-Union Street Trunk Sewer
- Jordon Creek Trunk Sewer
- Little Lehigh Creek Trunk Sewer
- Emmaus Trunk Sewer
- Trout Creek Trunk Sewer
- District No. 29 Trunk Sewer

As a condition of the construction grant obtained in the mid-1970s to expand the KIWWTP's capacity from 28.5 mgd to 40 mgd, COA and the Signatories were required to perform Sewer System Evaluation Surveys (SSESs). As part of COA's SSES performed during the period, the hydraulic conveyance capacity of each trunk sewer was calculated and compared to the estimated capacity required for the year 2025. Based on this analysis, the sewer signatories subsequently constructed the following relief sewers which are owned and operated by the signatories:

- LCA Little Lehigh Creek Relief Sewer
- South Whitehall Relief Sewer
- Salisbury Relief Sewer
- Coplay-Whitehall Lehigh Sewer
- Coplay-Whitehall Jordan Sewer



The collection system currently consists of: (1) 285 miles of COA-owned sewer pipe, of which 242 miles is 4 to 10-inches in diameter, 22 miles is 12 to 21-inches in diameter and 21 miles is 24 inches and larger in diameter; (2) 7,199 COA-owned manholes and 382 privately owned manholes; and (3) 33,359 connections to COA-owned sewers and 18 connections to privately owned sanitary sewers. The table below presents a detailed breakdown of sanitary sewers by diameter and length

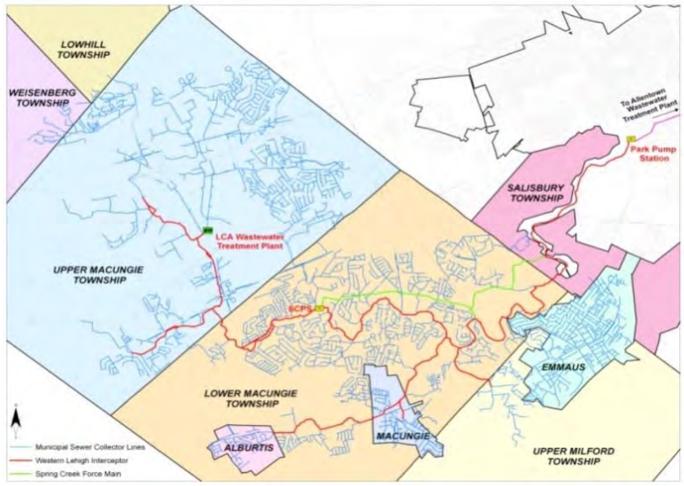
Table 2-2 - COA Sewer Inventory

Sewer Diameter (inches)	Sewer Length (feet)	Sewer Diameter (inches)	Sewer Length (feet)
4	10	21	11,566
6	1,745	24	53,805
8	1,155,844	27	10,026
10	117,748	30	9,891
12	34,165	33	2,017
14	1,517	36	28,613
15	31,579	39	1,922
16	703	42	4,977
18	34,613	54	245
20	2,577	60	936

Sewer pipe type includes reinforced concrete, vitrified clay, polyvinyl chloride (schedule 40, SDR 26 and SDR 35), cast iron, ductile iron, terra cotta, and reinforced poured in place concrete with tile floor.

2.2. Lehigh County Authority

In 1972, Lehigh County and LCA placed into service a sanitary sewer interceptor system in western Lehigh County to convey wastewater from the Boroughs of Alburtis and Macungie and the Townships of Upper and Lower Macungie to Allentown's Allentown/Emmaus Interceptor. Today, the system additionally serves portions of the Townships of Weisenberg, Upper Milford, and Lowhill, and portions of the Borough of Emmaus. The interceptor system, known as the Western Lehigh Interceptor (WLI), consists of 18 miles of gravity sewers ranging in size from 8-inch to 36-inch diameter pipe, one relief pumping station and force main (Spring Creek Road Pump Station), and five meter stations. Wastewater from the WLI discharges into the Allentown/Emmaus Interceptor at Keck's Bridge. The Allentown/Emmaus Interceptor flows from Keck's Bridge to its downstream confluence with the Cedar Creek Interceptor and Little Lehigh Interceptor. The Little Lehigh Interceptor begins at this confluence and serves as the final conveyance step in the transport of wastewater to KIWWTP. The Allentown/Emmaus Interceptor, Cedar Creek Interceptor, and Little Lehigh Interceptor are owned by Allentown.



In 1981, Allentown compelled LCA to remove a portion of LCA's peak wet weather flows from Allentown's Little Lehigh Interceptor. LCA built and now operates and maintains relief facilities along the Little Lehigh Creek to address intermittent hydraulic overloading of the Little Lehigh Interceptor: Park Pump Station and Force Main, and the Keck's Bridge Relief Interceptor between Keck's Bridge and Park Pump Station. The Park Pump Station and Force Main were placed in operation in the fall of 1983 to supplement capacity in the Little Lehigh Interceptor and pump it through a force main to a location approximately 1000 linear feet (lf) upstream of the KIWWTP. In August 1986, LCA completed construction of the Keck's Bridge Relief Interceptor to relieve overflows during storm events in existing interceptors in the Keck's Bridge area and to allow for future development in LCA service areas. The capacity of Park Pump Station was increased in 1986 to accommodate additional flows from the Keck's Bridge Relief Interceptor.

In 1998, the Spring Creek Pump Station (SCPS) began operation. This relief pumping system includes 2,500 feet of 20-inch diameter force main and 11,900 feet of 24-inch diameter force main which bypass approximately 24,000 linear feet of the WLI in Lower Macungie Township. The pump station is designed to pump up to 7 MGD during peak flow periods typically associated with severe rain events.

In 2005, the SCPS force main was extended through the installation of 19,250 LF of 24-inch force main from Millrace Road to connect with the 42-inch Little Lehigh Relief Interceptor near the intersection of Devonshire Road and Keystone Avenue (approximately 2,000 feet downstream of Keck's Bridge. This extension relieved hydraulic loading on that section of the WLI between manholes L-66 and L-1.

LCA also operates a pretreatment plant (PTP) in Upper Macungie Township that treats the industrial wastewater from the Fogelsville industrial corridor in the upper quarter of the LCA service area as well as the residential wastewaters from the areas upstream of the pretreatment plant.

In 2009, LCA built a 3 MG Flow Equalization Basin (FEB) immediately upstream of the PTP to capture and hold increased flows during significant rain events. Since then, this concrete above ground tank has been responsible for most of the improvement in wet weather performance in LCA's WLI and in Allentown's Little Lehigh and Jordan Creek Interceptors.

2.3. South Whitehall Township

The sanitary sewer system is operated under the jurisdiction of the Township Board of Commissioners.

The oldest portions of the sewage collection system date to the mid-1930s. Sewer pipe materials include Vitrified Clay Pipe (VCP), concrete, cast iron, ductile iron, and PVC. The system serves approximately 6,700 customers and includes nearly 118 miles of sanitary sewer pipe ranging in size from 6 to 30-inches in diameter. All sewage flows through the system by gravity – the Township does not own or operate any sewage pumping stations. The system is currently arranged into six (6) sub-basins, and each is metered for billing purposes, as well as to monitor inflow and infiltration. All flow from the Township (except for one drainage area that flows through the Coplay-Whitehall Sewer Authority system) is transported directly to the City of Allentown sewage collection system for ultimate treatment at the Kline's Island WWTP.

The sanitary sewer collection system is maintained by the Township Public Works Department. Employees routinely flush and televise the sewer mains looking for defects, grease, and root blockages. When a problem is discovered, the crew uses a pressurized water jet flusher to eliminate the grease and blocks, and debris is vacuumed for later disposal. When defects in pipes or manholes are identified, they are prioritized for repair depending on severity. Township staff is available on a 24-hour basis each day of the week to respond to any emergency situation in the sewage collection system.

2.4. Coplay-Whitehall Sewer Authority

The Coplay Whitehall Sewer Authority (CWSA) is a Pennsylvania Municipal Authority created in 1963 by Whitehall Township and the Borough of Coplay under the Pennsylvania Municipal Authorities Act of 1945, as amended. The sole purpose for the CWSA's creation is to provide public sanitary sewer service to the customers (currently 13,850) located within the Whitehall Township / Coplay Borough service area. The CWSA's system is a collection and conveyance system which by Inter-municipal Agreements connects to the City of Allentown's conveyance system for treatment of its effluent at the KIWWTP. The Authority is governed by a 7 member Board, 4 members appointed by Whitehall Township and 3 members appointed by Coplay Borough.

The CWSA's original system was constructed during 1965 and 1966 and for the most part consists of 8-inch diameter vitrified clay (VCP) collection mains and reinforced concrete pipe (RCP) interceptors. Since completion of the original system in 1966, there have been system additions constructed by the CWSA through Act 537 Plans, and main extensions by Developers that were then turned over to the CWSA for future maintenance and repair as required. CWSA's system currently includes 3,311 manholes, 1 pumping station, and 124.80 miles of pipe ranging in size from 6-inch to 36-inch in diameter. Sewer pipe type includes vitrified clay, reinforced concrete, polyvinyl chloride (schedule 40, SDR 35 and SDR 26,) cast iron, ductile iron and reinforced concrete cylinder pipe.

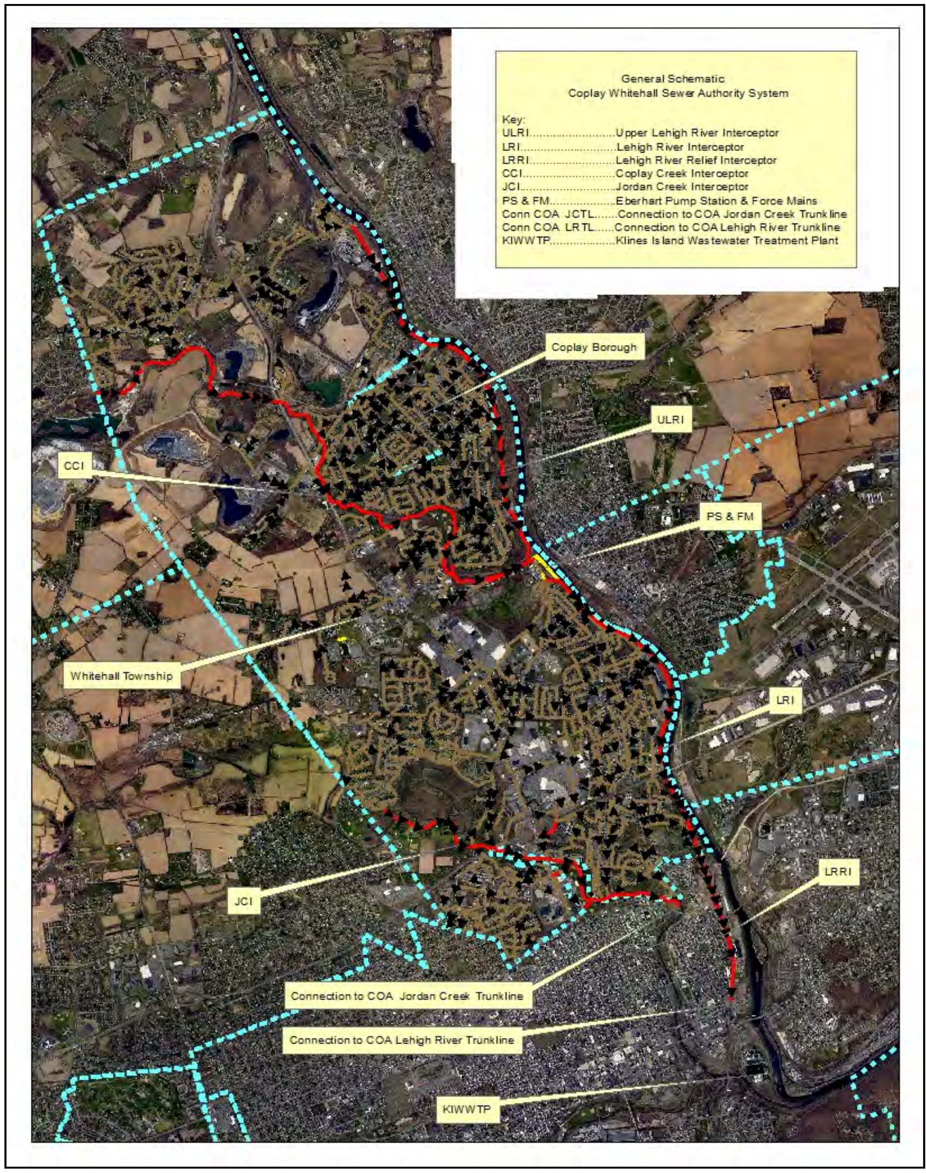


Figure 2-2 - CWSA Service Area

Table 2-3 - CWSA Sewer Inventory

Pipe Diameter (inches)	Pipe Length (Feet)	Pipe Length (Miles)
6	345	0.065
8	551,105	104.376
10	18,610	3.525
12	7,925	1.501
15	3,113	0.590
16	4,938	0.935
18	31,974	6.056
20	4,388	0.831
24	8,695	1.647
27	9,415	1.783
30	14,353	2.718
36	4,082	0.773
Total	658,943	124.800

In addition to the typical 8-inch VCP and PVC collector mains, the CWSA's system includes the following key conveyance components:

- Jordan Creek Interceptor & Metering Station
- Coplay Creek Interceptor
- Lehigh River Interceptor & Metering Station consisting of different sections as follows:
    - Lehigh River Relief Interceptor
    - Lehigh River Interceptor
    - Upper Lehigh River Interceptor
- Eberhart Pump Station & Force Main

The CWSA has entered into Inter-Municipal Agreements with neighboring South Whitehall Township (SWT) and North Whitehall Township (NWT), which provide for the connection to CWSA's system for conveyance of effluent originating from sections of each of these Townships through the CWSA system for treatment at the KIWWTP. SWT and NWT each have two connections to the CWSA System. SWT connects to CWSA at the SWT's Jonathan and Quail Metering Stations and then utilize CWSA's Jordan Creek Interceptor. NWT connects to the CWSA System at the Quarry and Omrod Metering Stations and then discharge to CWSA's Coplay Creek Interceptor.

The Eberhart Pump Station is located midway along the Lehigh River Interceptor. The Coplay Creek Interceptor and Upper Lehigh River Interceptor flows are tributary to the Eberhart Pump Station, and these flows are then pumped and discharged to the Lehigh River and Lehigh River Relief Interceptor and connect to the COA's Lehigh River Trunk line and ultimately to the KIWWTP. The second CWSA connection to the COA is through the CWSA's Jordan Creek Interceptor to the COA's Jordan Creek Trunkline. The CWSA does not utilize any section of the Western Lehigh Interceptor or any other facilities owned by others that service the western portion of Lehigh County.

2.5. Salisbury Township

The Township of Salisbury is a first-class Township located in the south-central part of Lehigh County and is separated into two unconnected parcels due to annexation in the early 1900's. The Township has a population of approximately 13,501 based on the latest census and covers 11.3 square miles. The Township is generally characterized as a residential community with selected areas designated for commercial and industrial development. The remaining areas are reserved for parks, recreation or public use.

The Township of Salisbury owns, operates and maintains a sanitary sewer collection system under direct control of the Township elected five-member Board of Commissioners. The Township's sanitary sewer system serves approximately 4,381customers and is comprised of approximately 358,912 linear feet of gravity sewer pipe ranging in size from 8-inch to 18-inch in diameter. The sewer system utilizes two sewage pump stations and approximately 4,681 linear feet of 4", 6" and 8" force main to transport flow from low lying areas to the gravity mains, as well as, 335 linear feet of 1-1/2-inch low pressure sewer main. The majority of the developed areas of the Township are served by public sewer service. Most of the Township's sewage is treated KIWWTP.

2.6. Borough of Emmaus

The Borough of Emmaus is governed by a seven member Borough Council. The Borough covers approximately 2.9 square miles and is located in the south-central portion of Lehigh County. The Borough's municipal neighbors include the City of Allentown and the Townships of Lower Macungie, Salisbury, and Upper Milford. The Borough's population is 11,211, as of the 2010 census. Land use in the Borough of Emmaus is mostly residential, although it does include a significant number of retail/commercial businesses and industrial uses, along with park and conservation areas. There is limited open land area in the Borough available for new development, but there are many opportunities for modernizing and/or re-purposing of existing developed property.

The Emmaus sewer system currently serves approximately 3,958 residential, 280 commercial, 51 industrial, and 15 municipal connections. The sanitary sewer system is owned by the Borough and operated by the Public Works Department under a full time Borough Manager and a full time Public Works Director.

The Emmaus sewer system consists of approximately 45 miles of 8-inch to 15-inch gravity collector sewers and approximately 5 miles of 18-inch to 24-inch gravity interceptor sewers. The system includes approximately 1,045 manholes. The original 1961 sewer lines were constructed with 5-foot sections of gasket joint vitrified clay pipe (VCP) and 4-foot diameter precast concrete manholes. Beginning in the 1970s, pipe extensions were constructed using 18-foot sections of polyvinyl chloride (PVC) gasket joint pipe.

There are two small areas of the Borough that are served by low pressure sewer systems. In these areas, grinder pumps, owned by the individual customers, discharge their flow to the gravity collector sewer system via small diameter low pressure lines. There are no publicly owned pump stations in the Emmaus sanitary sewer system.

There is a Borough-owned sewage meter station located at the downstream end of each of four primary gravity flow basins. Due to geographical constraints, wastewater from a small number of Borough customers does not flow through the master sewer meters but drains directly to downstream systems owned by Salisbury Township, Lehigh County Authority, or the City of Allentown. Similarly, flow from several properties in the surrounding townships is transported through the Borough system to downstream interceptors. The accounting of these flows for inter-municipal transportation and treatment billing is handled administratively.

2.7. Borough of Alburtis

The Borough of Alburtis is governed by a seven member Borough Council. The Borough covers approximately 0.7 square mile and is located in the southwestern portion of Lehigh County. It is surrounded by Lower Macungie Township. The population is approximately 2,300 based on current census data. The Borough is characterized generally as a residential community although it does support retail commercial business and industrial districts. A general breakdown of land use based on zoning districts indicates residential development accounts for about 75% of the land use while commercial and industrial accounts for about 20% of the land use. The remaining 5% is used for community facilities and parks.

The Borough of Alburtis sanitary sewer system is owned by the Borough of Alburtis. The collector system comprises approximately 8.04 miles of sanitary sewer pipe. The sewer system serves approximately 60% of the Borough and contains 42,480 linear feet of 8-inch through 12-inch sewer main and 220 manholes and one wastewater pumping station. The initial sanitary sewer system was constructed between 1968 and 1972. Extensions to the public sewer system were added primarily by development growth over the years accounting for its present size. Currently the Borough system customer base consists of 929 residential, 26 commercial and 1 Industrial customer.

The Borough sewer system drains to the Alburtis-Macungie Trunkline into the WLI to KIWWTP.

2.8. Borough of Macungie

The Borough of Macungie is governed by a seven member Borough Council. The Borough covers approximately 1.0 square mile and is located in the southwestern portion of Lehigh County. It is primarily surrounded by Lower Macungie Township except on the south side where it borders Upper Milford Township. The population of the Borough is 3,074 based on the 2010 census. The Borough is characterized generally as a residential community although it does support retail commercial business and industrial districts. A general breakdown of the Borough land use based on zoning districts indicates residential development accounts for about 75% of the land use while commercial and industrial accounts for about 18% of the land use. The remaining 7% is used for community facilities and parks.

The Borough of Macungie sanitary sewer system is owned and operated by the Borough. The collector system comprises approximately 11.4 miles of sanitary sewer pipe. The sewer system contains 60,330 linear feet of 8-inch through 10-inch sewer main and 315 manholes. The initial sanitary sewer system construction began in 1968 and was completed in 1972. Extensions to the public sewer system were added primarily by development growth over the years accounting for its present size. Currently the Borough system customer base consists of 1654 residential, 83 commercial and 3 Industrial customers.

The Borough sewer system drains to the Alburtis-Macungie Trunkline into the WLI to KIWWTP.

2.9. Lower Macungie Township

Lower Macungie Township (LMT) is a first class township governed by a five member Board of Commissioners. LMT covers 22.46 square miles and is located in the southwestern portion of Lehigh County. The population, based on current information available, is 31,964. LMT is characterized as a residential suburban community. A general breakdown of LMT land use based on zoning districts indicates residential development accounts for about 34% of the land use while commercial and industrial development makes up about 19%. The remaining 48% is divided among agriculture and public uses or is undeveloped.

The LMT sanitary sewer system is owned and operated by Lower Macungie. The collector system comprises approximately 126 miles of sanitary sewer pipe. The sanitary sewer system based on the current Act 537 boundary serves approximately 78% of LMT and contains approximately 666,800 linear feet of 8-inch through 16-inch sewer main and 3,500 manholes. There are no pumping stations in the LMT sewer system. The original sanitary sewer system was constructed in 1968 and completed in 1972. Extensions to the public sewer system were added over the years by various LMT sponsored projects as well as through development growth which accounts for its present size. Currently the LMT system customer base consists of 8,971 residential and 24 commercial/industrial customers.

Most of the LMT sewer system drains, through a number of connection points, into the WLI to KIWWTP. There are several connection points in the LMT system that drain to either the South Whitehall Township or Salisbury Township sanitary sewer systems.

2.10. Upper Macungie Township

Upper Macungie Township (UMT) is a second class Township governed by a three member Board of Supervisors. UMT covers 26.24 square miles and is located in the western portion of Lehigh County. The population, based on current information available, is approximately 23,884. A general breakdown of the land use within UMT shows that residential development accounts for about 23% of its land use while commercial and industrial development make up about 31% with the remaining 46% of the land divided among agriculture and public uses or is undeveloped.

The UMT sanitary sewer system is owned and operated by Upper Macungie Township. Note that the former Upper Macungie Township Authority (UMTA) was an operating authority which owned and operated the UMT sewer system at the time of issuance of the Administrative Order, but was subsequently dissolved in 2016. The collector system comprises approximately 157 miles of sewer pipe and includes six wastewater pumping stations. The sanitary sewer system based on the Act 537 boundary serves approximately

64% of UMT and contains approximately 829,000 linear feet of sewer pipe, 3,200 manholes, and six pumping stations and appurtenances. The original sanitary sewer system was installed in 1968 and was completed in 1972. Extensions to the public sewer system were added over the years by various UMT/UMTA projects as well as through development growth in UMT which accounts for its present size. Currently the UMT system customer base consists of 6,498 residential, 373 commercial and 8 industrial customers.

Most of the UMT sewer system drains, through two connection points, into the WLI to KIWWTP.

2.11. Lowhill Township

Lowhill Township is located the northwestern section of Lehigh County, adjoining Weisenberg and Upper Macungie Townships. In June of 2016, the sanitary sewer system in Lowhill Township was acquired by LCA, who now owns and operates the system. A service agreement has been executed with Upper Macungie Township Authority to allow the flow of wastewater through their system to the WLI. The Lowhill Township system consists of 3,052 feet of 8-inch PVC gravity pipeline and 587 feet of 2-inch PVC force main through which 43 connections discharge into the Upper Macungie Township collector system and ultimately into the LCA WLI system.

2.12. Weisenberg Township

Weisenberg Township is located in the northwestern section of Lehigh County, adjoining Lowhill and Upper Macungie Township. The sanitary sewer system in Weisenberg Township is owned and operated by LCA. In an agreement dated April 19, 1990, Weisenberg Township designated LCA as the operating agent for the Pointe West and Pennsylvania State University wastewater systems in the Township. Also in an agreement with Upper Macungie Township dated April 19, 1990, Upper Macungie Township agreed to accept the wastewater from the Pointe West Development. The agreement provided for repair and/or elimination of I/I by Weisenberg Township.

In an agreement dated April 22, 2002, the Township conveyed ownership of the wastewater systems to the LCA.

There are 149 customers being served in Weisenberg Township with a system consisting of almost 21,000 feet of pipeline which discharge flows through Upper Macungie Township and the WLI to KIWWTP. Over 97% of the system is 8-inch pipe and 3% is

2-inch force main. The system is 99% PVC and 1% DIP. No new connections are expected within Weisenberg Township.

2.13. Upper Milford Township

Upper Milford Township (UMiT) is located in southern Lehigh County, adjoining Emmaus Borough, Lower Macungie Township and the Borough of Macungie. The sanitary sewer system in UMiT is owned and operated by LCA pursuant to a sewer service agreement dated January 1, 1982. UMiT designates the areas of the UMiT where sewer service will be provided and approves the allocation granted.

Currently, there are over 800 customers being served in the UMiT sewer system consisting of over 70,000 feet of pipe, including 29,000 lf of low pressure pipe installed to serve the Vera Cruz area of the Township. Over 55% of the system is 8-inch pipe, 45% is either 2-inch force main, low pressure force main, or 10-inch. The system is 95% PVC and the remainder is DIP. The majority of the system was constructed in the 1980s with the low pressure system constructed in 2012 and 2013. The system consists of collection systems discharging into the Emmaus Borough system, into the Lower Macungie Township system and into the WLI to KIWWTP.

2.14. Hanover Township

Hanover Township, Lehigh County is a Home Rule Township governed by a five member Board of Supervisors. The Township covers 4.25 square miles and is located in the northeastern portion of Lehigh County. The population, based on current information available, is approximately 1,571. A general breakdown of the land use within Hanover Township, Lehigh County shows that the Lehigh Valley International Airport covers 52% of the Township, and the remainder is predominantly commercial and industrial. The residential portion is minimal and houses 426 residential units with one apartment complex with 240 units.

The Township sewer system connected to the KISS services the southern portion of the Township and discharges to the COA sewer system through one metering station located at 700 Lloyd Street, Allentown PA.

The Hanover Township, Lehigh County sanitary sewer system is owned and operated solely by Hanover Township, Lehigh County and is administered by the Council of Hanover Township, Lehigh County. The collector system comprises approximately 1.8 miles of sewer pipe and includes one metering station. The sanitary sewer system based on the Act 537 boundary serves approximately 30% of Hanover Township, Lehigh

County and contains approximately 9,448 linear feet of sewer pipe. This area of the Hanover Township, Lehigh County sewer system drains, through one connection point, into the City of Allentown conveyance system, which in turn flows through City wastewater treatment facility. The flows through the one metering point are approx. 45,000 gallons per day.

There have been no extensions to the public sewer system over the recent years, which accounts for its present size. Hanover Township does expect future projects that will require an extension of the system which would provide more flow through the system. Currently the Hanover Township, Lehigh County system customer base consists of 15 residential, 240 apartment units and 22 commercial customers.

3. System Flow Characterization

3.1. Past Flow Characterizations

Flow and rainfall data were collected in Allentown in 2008 and used to calibrate a hydraulic planning model of the City of Allentown sewer system.

Flow and rainfall data were collected by the WLSP in 2009 and used to calibrate a hydraulic planning model of the WLSP sewer system. Figure 3-1 displays the locations of the gravity flow monitors and rain gauges, as well as the pump stations and municipalities' boundaries.

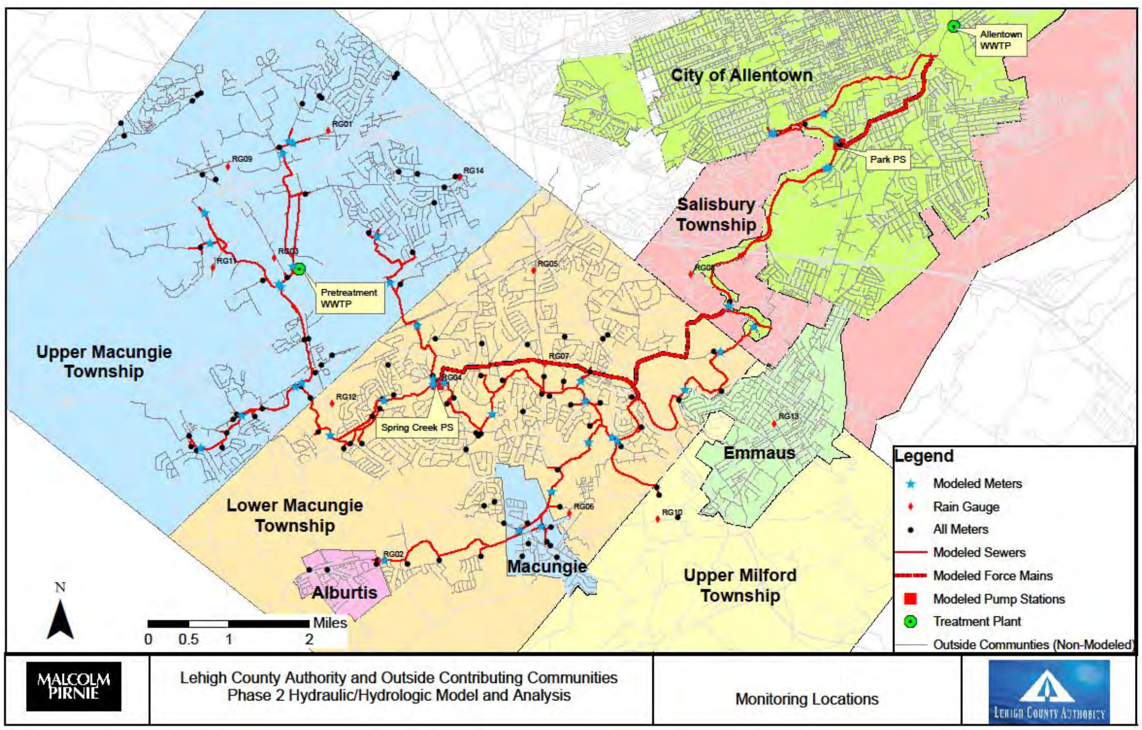


Figure 3-1: Monitoring Locations for the WLSP's Sanitary Sewer System

In 2014, the WLSP planning-level model was combined with the Allentown hydraulic model to create a single hydraulic model called the Kline's Island Sewer System (KISS) Model. This model confirmed that portions of the primary conveyance components were experiencing high hydraulic grade lines in conveying dry-day flows and, accordingly, had limited ability to convey significant peak wet-weather flows. It should be noted that while this modeling work was completed in 2014, it used data gathered in 2008 and 2009, which must be updated to reflect updated system conditions since that time. See Section 3.4 for more details on Flow Characterization Updates planned as part of this strategy.

3.2. I/I Reduction Since 2009

All Signatories have conducted I/I identification and reduction activities since 2009. These have been detailed in the semiannual reports to USEPA. As EPA stated in their letter of November 2, 2017, 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."

3.3. Permanent Flow Monitoring (Sewer Billing Meters)

There are 33 permanent meters at the municipal boundaries that have historically been used for billing purposes. These sewer billing meters (SBM) are owned and operated by the individual Signatories. These meters provide jurisdictional level monitoring of dry-day and wet-weather sewage flows for the City and its Signatories which will be used for system characterization, ongoing flow management, RDII analysis, and model recalibration efforts. These meters use a wide variety of metering technologies and data capture systems, and some meter stations may need to be updated. Cooperative efforts are underway to ensure SBM accuracy and develop protocols for installation upgrades, data capture, reporting for billing purpose, and for reporting for wet-weather events that produce flows at the KIWWTP greater than 60 MGD.

3.4. Flow Characterization Updates

Additional development flows have been added to the KISS by all Signatories since the last system flow characterization in 2008. Additionally, source reduction and capacity improvements that improve levels of protection and reduce the frequency of SSOs have also been undertaken. An updated flow characterization of the primary KISS components is necessary to understand the current average dry day and peak wet weather flow demands on the primary regional conveyance components of the KISS. The primary KISS components are:

- LCA FEB
- Western Lehigh Interceptor
- Spring Creek Pump Station
- Park Pump Station
- Allentown Emmaus Interceptor
- Little Lehigh Relief Interceptor
- Little Lehigh Interceptor
- Jordan Creek Parallel Interceptor
- Main KIWWTP Lift Station
- Cedar Creek Interceptor
- South Whitehall Relief Interceptor

- Jordan Creek Trunk Sewer
- Lehigh River Trunk Sewer
- District 29 Trunk Sewer
- Trout Creek Trunk Line
- Salisbury Relief Sewer

This flow characterization work will:

- Quantify the dry- and wet-day impacts of new development flows added since 2008
- Quantify the dry- and wet-day effectiveness of the I/I reduction work conducted since 2008
- Quantify the dry- and wet-day effectiveness of capacity improvements made since 2008

To accomplish this, a program of flow monitoring, rainfall monitoring, future flow projections, and dynamic hydraulic modeling will be conducted. Much of the metering needed for this work can be provided by the Signatories' SBMs provided they are capable of meeting the data quality objectives. This monitoring and modeling work is expected to take 18 months to complete, with the majority of this time dedicated to flow data collection to recalibrate the KISS Model. This completion time frame assumes adequate rainfall and antecedent precipitation conditions will occur during this time period.

This Flow Characterization Update will be conducted as soon as possible, but will begin no sooner than 2019 to allow for the prioritized SBM evaluations and upgrades described in Section 3.3 to be completed. If any SBMs are unable to be upgraded in time for this Flow Characterization Update to begin, temporary flow meters will be used to capture flows at the jurisdictional level.

A similar flow characterization update as described above will also be undertaken at some future date to be determined based on the success of the SRPs and other I/I remediation efforts, future flows, possible SSOs, and other factors. This future flow characterization update will provide information critical to the determination of need, size, and extent of future capital improvements needed at KIWWTP or the conveyance system.

3.5. Anticipated Growth and Impact on Dry and Wet Weather Flows

Flow projections will be added to the KISS Model to evaluate depth of dry and wet weather flows within the various primary conveyance components of the KISS. Concurrent with the flow metering and modeling, sewage growth forecasts for all areas served by the KISS will be conducted by each of the Signatories in conjunction with modeling efforts.

4. Operations and Maintenance Programs

Each of the Signatories has developed an Operations and Maintenance (O&M) Plan for its individual sewer system. These O&M Plans ensure that the I/I Source Reduction Plans are integrated with supporting operation and maintenance strategies to maximize the life cycle of critical assets and to minimize maintenance-related overflows. The goal of these O&M Plans is to:

- Maintain the intended hydraulic level of protection and level of service in the sewers.
- Mitigate the impact of sanitary sewer overflows when they do occur.
- Achieve these goals in the most economically efficient and sustainable manner possible.

The O&M program components vary between Signatories because of differences in sewer inventory. Where applicable, the O&M Plans cover:

- Pump stations and force mains
- Gravity sewers
- Laterals
- Lower pressure sewers

Within each O&M Plan section, the following topics are generally covered:

- Purpose
- Overview
- Goals and Performance Measures
- Preventative Maintenance
- Reactive Maintenance
- SOPs
- Equipment and Spare Parts
- Staffing
- Information Management

The individual Signatory O&M Plans are in the Appendices.

5. Inflow and Infiltration Source Reduction Programs

Each of the Signatories has developed an Inflow and Infiltration Source Reduction Plan (SRP) for its individual sewer system. The goal of these SRPs is to:

- Define excessive inflow and infiltration
- Identify and locate sources of excessive inflow and infiltration
- Reduce sources of excessive inflow and infiltration in sewer collection systems through rehabilitation of sewer mains, taps, laterals, cleanouts, manholes, and manhole covers/frames
- Reduce sources of excessive inflow and infiltration by eliminating private property clearwater connections and reducing leakage in upper laterals
- Achieve these goals in the most economically efficient and sustainable manner possible.

SRP projects vary between Signatories because of differences in sewer inventory, leakage sources, and preferred rehabilitation and programmatic approaches. Within each SRP Plan is listed each Signatory's anticipated SRP projects, along with anticipated purpose, scope, cost, schedule, and effectiveness, where known.

The individual Signatory SRPs are in the Appendices.

6. Progress Reporting

6.1. Annual Progress Reports

Each Signatory will report its activities and progress individually to LCA by March 1st for compilation into the annual PADEP Chapter 94 report.

Appendix A: CITY OF ALLENTOWN O&M PLAN

Appendix B: LCA, LOWHILL, WIESENBERG, AND UPPER MILFORD O&M PLAN

Appendix C: SOUTH WHITEHALL TOWNSHIP O&M PLAN and I/I SOURCE REDUCTION PLAN

Appendix D: COPLAY-WHITEHALL SEWER AUTHORITY O&M PLAN and I/I SOURCE REDUCTION PLAN

Appendix E: SALISBURY TOWNSHIP O&M PLAN

Appendix F: BOROUGH OF EMMAUS O&M PLAN

Appendix G: BOROUGH OF ALBURTIS O&M PLAN

Appendix H: BOROUGH OF MACUNGIE O&M PLAN

Appendix I: UPPER MACUNGIE TOWNSHIP O&M PLAN

Appendix J: LOWER MACUNGIE TOWNSHIP O&M PLAN

Appendix K: HANOVER TOWNSHIP O&M PLAN

Appendix L: CITY OF ALLENTOWN I/I SOURCE REDUCTION PLAN

Appendix M: WESTERN LEHIGH SEWERAGE PARTNERSHIP SEWER CAPACITY AND REHABILITATION PROGRAM IMPLEMENTATION PLAN

Appendix N: SALISBURY TOWNSHIP I/I SOURCE REDUCTION PLAN

Appendix O: BOROUGH OF EMMAUS I/I SOURCE REDUCTION PLAN

Appendix P: HANOVER TOWNSHIP I/I SOURCE REDUCTION PLAN

APPENDIX 9

Individual Municipality I&I Source Reduction Plans

City of Allentown

Source Reduction Plan

CITY OF ALLENTOWN

I&I SOURCE REDUCTION PROGRAM PLAN

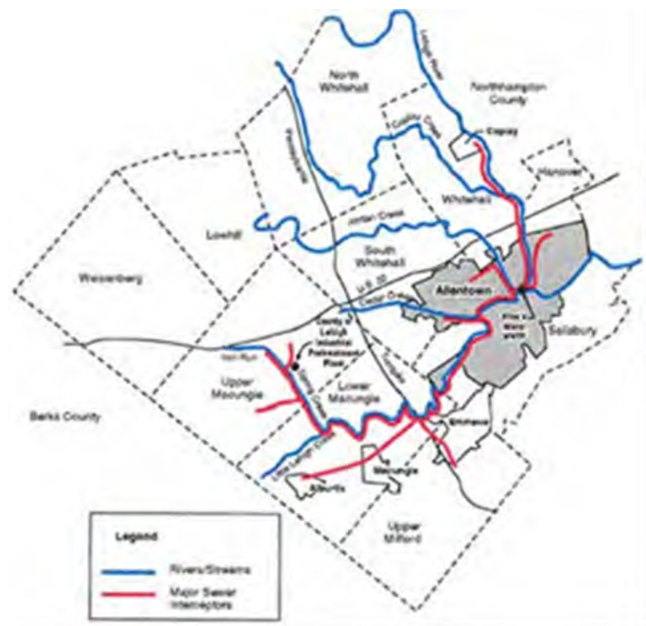
TABLE OF CONTENTS

1.0 COLLECTION SYSTEM OVERVIEW

The City of Allentown's (City's) wastewater collection system (collection system) and its Kline's Island Wastewater Treatment Plant (WWTP) have been in operation since 1929 and originally served only residents of the City. Beginning in the late 1950's and continuing through the late 1960's, the City entered into service agreements with surrounding municipalities and authorities for conveyance of wastewater through City-owned trunk sewers and for treatment of wastewater at the KIWWTP. The first signatory agreement was executed with the Borough of Emmaus in 1959. Signatory agreements were subsequently executed with Coplay-Whitehall Sewer Authority, Salisbury Township and South Whitehall Township in 1965, and in 1969 a signatory agreement was executed with the Lehigh County Authority. Due to the need to treat flow from the signatories together with growth within the City, the KIWWTP was expanded to an average flow capacity of 28.5 mgd in 1968 and to 40 mgd in 1978, which is the current average flow capacity of the KIWWTP. The corresponding peak flow capacity of the KIWWTP is 87 mgd.

At the time the original signatory agreements were executed, wastewater was conveyed to the KIWWTP by a total of seven (7) City-owned trunk sewers:

- Lehigh River Trunk Sewer
- Front Street-Union Street Trunk Sewer
- Jordon Creek Trunk Sewer
- Little Lehigh Creek Trunk Sewer
- Emmaus Trunk Sewer
- Trout Creek Trunk Sewer
- District No. 29 Trunk Sewer



As a condition of the construction grant obtained in the mid-1970's to expand the KIWWTP's capacity from 28.5 mgd to 40 mgd, the City and its signatories were required to perform Sewer System Evaluation Surveys (SSESs). As part of the City's SSES performed during that period, the hydraulic conveyance capacity of each trunk sewer was calculated and compared to the estimated capacity required for the year 2025. Based on this analysis, the sewer signatories subsequently constructed the following relief sewers which are owned and operated by the signatories:

- LCA Little Lehigh Creek Relief Sewer
- South Whitehall Relief Sewer
- Salisbury Relief Sewer
- Coplay-Whitehall Lehigh Sewer
- Coplay-Whitehall Jordan Sewer

The City's collection system currently consists of: (1) 285 miles of City-owned sewer pipe, of which 242 miles is 4 to 10-inches in diameter, 22 miles is 12 to 21-inches in diameter and 21 miles is 24-inches and larger in diameter; (2) 7,199 City-owned manholes and 382 privately-owned manholes; and (3) 33,359 connections to City-owned sewers and 18 connections to privately owned sanitary sewers. The table below presents a detailed breakdown of sanitary sewers by diameter and length.

Sewer Diameter (inches)	Sewer Length (feet)	Sewer Diameter (inches)	Sewer Length (feet)
4	10	21	11,566
6	1,745	24	53,805
8	1,155,844	27	10,026
10	117,748	30	9,891
12	34,165	33	2,017
14	1,517	36	28,613
15	31,579	39	1.922
16	703	42	4,977
18	34,613	54	245
20	2,577	60	936

Sewer pipe type includes reinforced concrete, vitrified clay, Polyvinyl Chloride (schedule 40, SDR 26 and SDR 35), cast iron, ductile iron, terra cotta, and reinforced poured in place concrete with tile floor.

2.0 COMPLETED I&I SOURCE REDUCTION ACTIVITES

In 2007, the Environmental Protection Agency (EPA) issued an Administrative Order (AO) to the City of Allentown (City) to eliminate use of the Kline's Island Wastewater Treatment Plant's (KIWWTP's) emergency outfall 003, which EPA considered to be a sanitary sewer overflow (SSO) because it is physically located upstream of the KIWWTP's headworks facilities.

In 2009, the EPA issued an AO to the City and its Signatories which convey flows directly or indirectly to the KIWWTP to address collection system SSOs. Under the 2009 AO, the City and the Signatories were to eliminate the SSOs and demonstrate continual progress toward this end goal. In working toward this goal, over the last decade, the City has undertaken and completed the following activities related to identifying and eliminating sources of infiltration and inflow:

- ADS Environmental Services (ADS) was retained in 2008 to perform a City-wide flow metering program to gain an understanding of the locations and magnitude of Infiltration and Inflow (I/I) entering the sewer collection system. The Flow Monitoring program conducted by ADS Environmental Services resulted in 90 days of flow data at 169 locations. The monitoring period began on 31 July and ended 31 October 2008.

- In 2009, ADS performed targeted flow monitoring on 10 of the original basins from the 2008 study to help locate I&I sources and magnitude in smaller geographic areas. The targeted metering was conducted with 18 ADS flow meters, deployed between April and June of 2009.
- Using the data from the flow monitoring studies in 2008 and 2009, Whitman Requardt and Associates (WR&A) developed and calibrated a hydraulic model of the sewer collection system within the City. This model was the basis of the System Assessment and Phase 1 Corrective Action Plan, developed in 2013, which outlined alternatives for reduction and elimination of SSOs. One of the improvements identified in the Phase 1 Corrective Action Plan was the removal of I&I entering the sewer collection system. Included in the Phase 1 Corrective Action Plan was an I&I removal analysis pin pointing areas where the greatest I&I is present within the City and where removal of excess flows would be most beneficial to reducing and eliminated SSOs.

- Based on the flow monitoring and Phase 1 Corrective Action Plan recommendations, the top twenty basins with approximately 8 percent of the total linear footage of sewers within the City, were identified for having the highest potential impact on SSOs due to excessive I&I. The twenty basins are referred to as the Primary and Secondary Basins, and are shown on Figure 1, located on Page 4. The modeling results from WR&A indicated that flows from these twenty basins have an above-average impact on SSOs system-wide.

- In 2014, the Lehigh County Authority (LCA) contracted with Video Pipe Services, Inc. to perform a Sewer System Evaluation Survey (SSES), consisting of CCTV investigations of the twenty basins in the City identified previously as having the highest potential impacts on SSOs. The investigations included CCTV of the pipe segments in the basins, as well as manhole inspections. A ranking system based on the National Association of Sewer Service Companies (NASSCO) standards was used to quickly determine which pipe segments were in most need of rehabilitation.

- During the CCTV inspections by Video Pipe Services, Inc., LCA and the City wanted to be proactive in addressing severe defects, when they were encountered in the field. As a result, some defects were repaired shortly after completing the CCTV investigations. In addition to point repairs, heavy cleaning was performed for some pipelines. Smoke testing was also performed in selected locations.

- Over the past decade, the City has also undertaken additional sewer inspection and rehabilitation work throughout the collection system. The work performed is detailed in the semi-annual Progress Reports for the EPA Order for Compliance and Request for Information, Docket Number CWA-03-2009-0313DN. The sewer inspection and rehabilitation work has consisted of the following activities:
    - Detailed inspections of approximately 1,800 Manholes
    - Installation of manhole inserts in all 7,199 City-owned manholes
    - Repairs to and lining of over 400 manholes

- CCTV Inspections of over 400,000 linear feet of Sanitary Sewers
- A total of 194 Sewer repairs by excavation and trenchless methods
- CCTV Inspection of storm sewers – no cross connections have been found
- Building and Downspout Inspections and removal of illegal connections
- Ongoing trestle and bridge clearing and root control

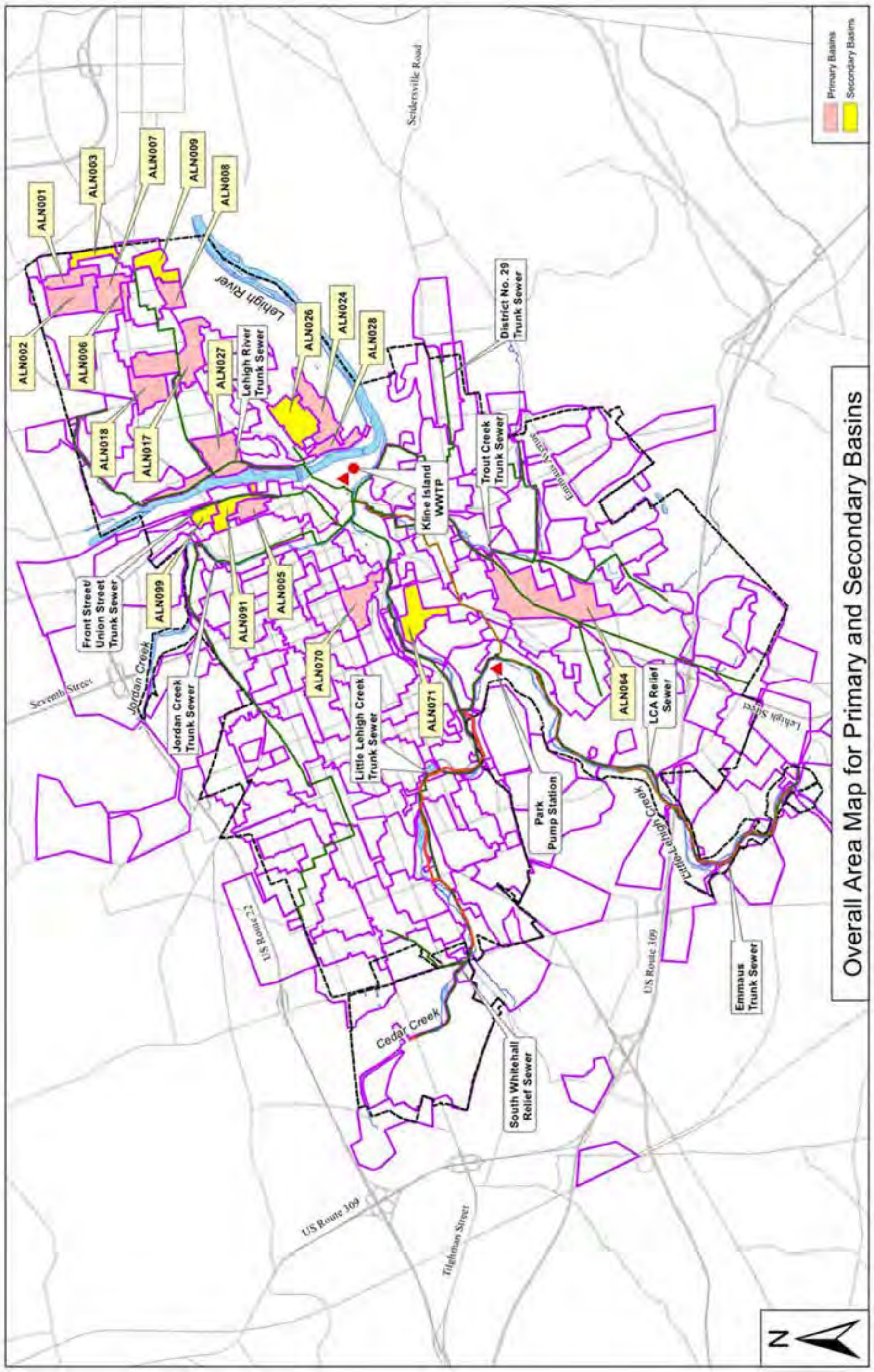


Figure 1: Primary and Secondary Basins

3.0 SOURCE REDUCTION PROGRAM PLAN – 5 YEAR PLAN

The City will implement the remaining I&I source reduction measures identified within the Primary and Secondary Basins, as well as additional areas identified by LCA and City staff, by repairing these previously identified defects and will continue to implement repairs to correct defects identified in the future during its ongoing CCTV program, including the recently identified need for repair of the sewer along Auburn Avenue. The following corrective action types were previously recommended:

- Corrective Action 1 – Heavy or Specialty Cleaning
- Corrective Action 2 – Grouting
- Corrective Action 3 – Lining Point Repair
- Corrective Action 4 – Excavated Point Repair
- Corrective Action 5 – Lining Entire Pipe Segment
- Corrective Action 6 – Complete Pipe Replacement

Some of the corrective actions were previously completed in 2014 by Video Pipe Services shortly after completing the CCTV inspections. For example, all pipe segments that called for Corrective Action 6, complete pipe replacement, have already been repaired.

The remaining source reduction activities within the twenty Primary and Secondary Basins, as well as areas identified by LCA and City staff, have been organized into a 5-Year Plan, with each year focusing on a different geographic region of the City's sewer collection system infrastructure. The proposed Plan starts in Year 1 with the implementation of a significant lining project along the Little Lehigh Creek adjacent to Martin Luther King Jr. Drive (MH K_3_4 to MH 14_DB). The Plan then generally moves to the northeastern sections of the sewer collection system in Year 2 and ends in the southern sections in Year 5.

Note that while a five-year plan is presented below, consideration will also be given to an aggressive approach in which all the work is performed as combined annual projects or as one single project. This would result in significant cost savings and a fast-tracked implementation of the improvements. Details of the proposed five-year Source Reduction Program are below and outlined for each year of the Plan.

Year 1 Plan

The Year 1 Plan consists of a lining project (Corrective Action 5) for a section of 30-inch sewer identified by LCA and City Staff, located along the Little Lehigh Creek adjacent to Martin Luther King Jr. Drive (MH K_3_4 to MH 14_DB). The table below summarizes the proposed corrective actions and quantities for sewer rehabilitation during Year 1. The total estimated construction cost for this work is approximately $450,000, not including engineering costs or any contingency or allowance for repair additional identified defects.

Source Reduction Program: Year 1					
Basin #	**(1) Heavy or Special Cleaning (LF)**	**(2) Grouting (# of Joints)**	**(3) Lining Point Repairs (#)**	**(4) Excavated Point Repairs (#)**	**(5) Lining Entire Pipe (LF)**
MLK Dr.	-	-	-	-	1,500

The location of the Martin Luther King Jr. Drive 30-inch diameter section of pipe that is described above is shown in Figure 2 below.

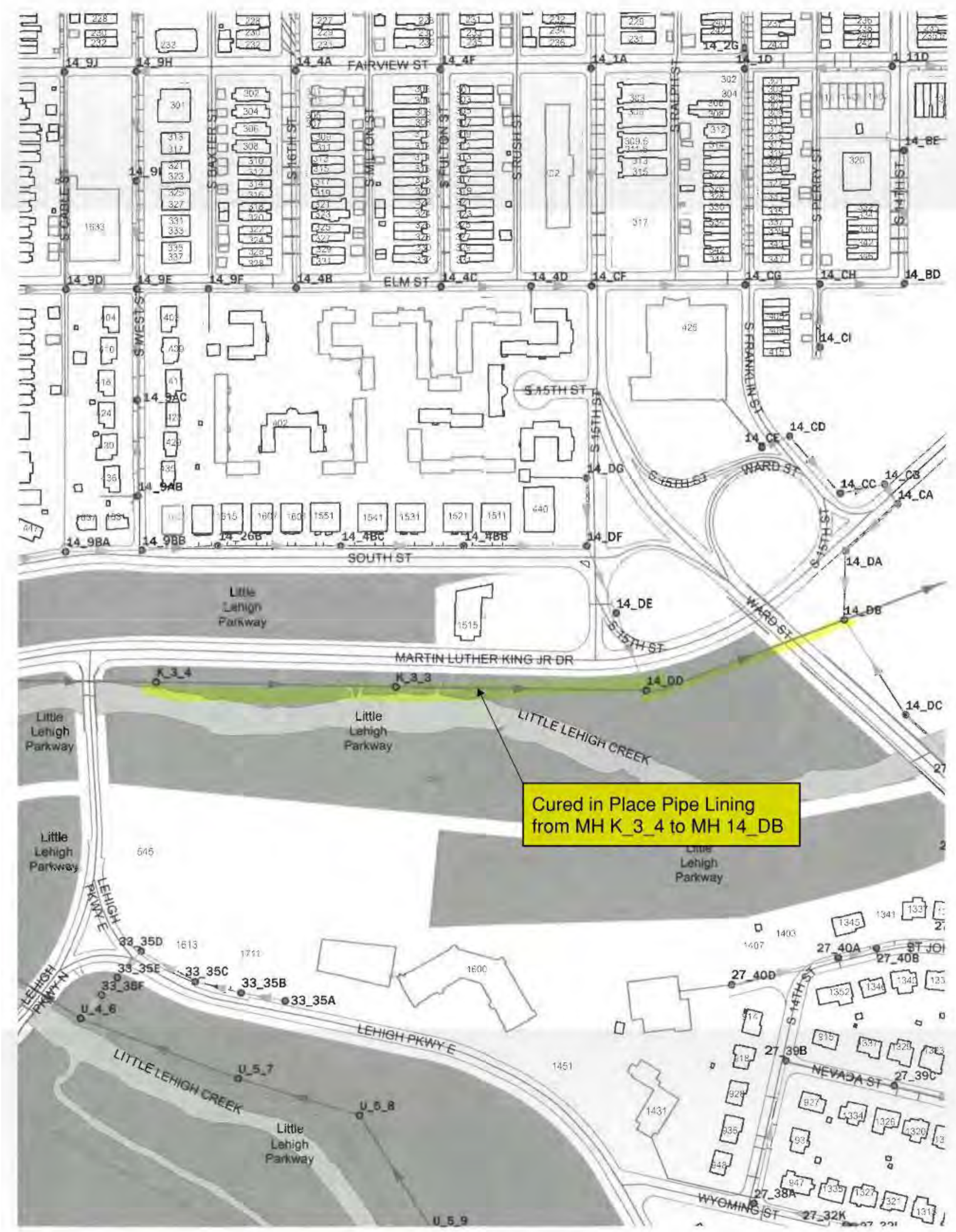


Figure 2. Section of 30" Sewer along Martin Luther King Jr. Drive to be Lined

Year 2 Plan
The Primary and Secondary Basins included in the Year 2 Plan are ALN001, ALN002, ALN003, ALN006, and ALN007, ALN008, ALN009, ALN017, ALN018. These basins are located in the northeast corner of the City's sewer collection system in the vicinity of Union Boulevard and Hanover Avenue. The table below summarizes the proposed corrective actions and quantities for sewer rehabilitation during Year 2. The total estimated construction cost for this work is approximately $505,000, not including engineering costs or any contingency or allowance for repair additional identified defects.

Source Reduction Program: Year 2					
Basin #	(1) Heavy or Special Cleaning (LF)	(2) Grouting (# of Joints)	(3) Lining Point Repairs (#)	(4) Excavated Point Repairs (#)	(5) Lining Entire Pipe (LF)
ALN001	-	164	3	-	299
ALN002	268	194	2	1	316
ALN003	612	30	3	1	-
ALN006	599	-	-	-	-
ALN007	3,261	201	50	3	-
ALN008	583	37	3	-	-
ALN009	301	161	2	-	-
ALN017	1,334	453	14	-	-
ALN018	537	108	2	1	-

Year 3 Plan
The Primary and Secondary Basins included in the Year 3 Plan are ALN024, ALN026, ALN027, ALN028, and ALN099. These basins are also located along the Lehigh River in the vicinity of the KIWWTP. The table below summarizes the proposed corrective actions and quantities for sewer rehabilitation during Year 3. The total estimated construction cost for this work is approximately $345,000, not including engineering or any contingency for repair of additional identified defects.

Source Reduction Program: Year 3					
Basin #	(1) Heavy or Special Cleaning (LF)	(2) Grouting (# of Joints)	(3) Lining Point Repairs (#)	(4) Excavated Point Repairs (#)	(5) Lining Entire Pipe (LF)
ALN024	1,362	231	3	-	-
ALN026	963	286	4	-	398
ALN027	2,183	357	46	2	-
ALN028	-	-	3	-	-
ALN099	742	119	1	1	107

Year 4 Plan
The Primary and Secondary Basins included in the Year 4 Plan are ALN005 and ALN091. These two basins are also located just to the west of the Lehigh River and to the north of the KIWWTP. The table on the following page summarizes the proposed corrective actions and

quantities for sewer rehabilitation during Year 4. The total estimated construction cost for this work is approximately $270,000, not including engineering costs or any contingency or allowance for repair of any additional identified defects.

Source Reduction Program: Year 4					
Basin #	**(1) Heavy or Special Cleaning (LF)**	**(2) Grouting (# of Joints)**	**(3) Lining Point Repairs (#)**	**(4) Excavated Point Repairs (#)**	**(5) Lining Entire Pipe (LF)**
ALN005	335	220	7	-	-
ALN091	1,137	217	12	1	255

Year 5 Plan

The Primary and Secondary Basins included in the Year 5 Plan are ALN064, ALN070 and ALN071. These basins are located in the central and southern portions of the City's sewer collection system. In addition, approximately 2,370 linear feet of 18-inch sewer is proposed to be lined adjacent to Auburn Street and Little Lehigh Creek, from MH M_2_1 to MH M_3_9, as part of the Year 5 Plan. A location plan showing this section of pipe to be lined using cured in place technology is presented in Figure 3 on Page 9. The table below summarizes the proposed corrective actions and quantities for sewer rehabilitation during Year 5. The total estimated construction cost for this work is approximately $420,000, not including any contingency or allowance for repair of additional identified defects.

Source Reduction Program: Year 5					
Basin #	**(1) Heavy or Special Cleaning (LF)**	**(2) Grouting (# of Joints)**	**(3) Lining Point Repairs (#)**	**(4) Excavated Point Repairs (#)**	**(5) Lining Entire Pipe (LF)**
ALN064	1,106	168	9	1	-
ALN070	282	-	-	-	-
ALN071	150	-	3	1	-
Auburn St	-	-	-	-	2,372

4.0 5-YEAR PROGRAM BUDGETARY COSTS

The budgetary construction costs described in Section 3.0 were estimated using typical unit costs from previous projects and based on professional judgement. Attachment A provides the detailed calculations that were the basis of the cost estimates. In addition to the direct construction costs, additional budget will be established for planning, design, bidding and construction administration costs. A contingency and allowance will also be included to correct additional defects that may be identified through ongoing CCTV and other routine maintenance and inspection activities during the 5-year program. The contingency and allowance funds could also be used to continue targeted flow monitoring and inspection work within the City's sewer collection system.

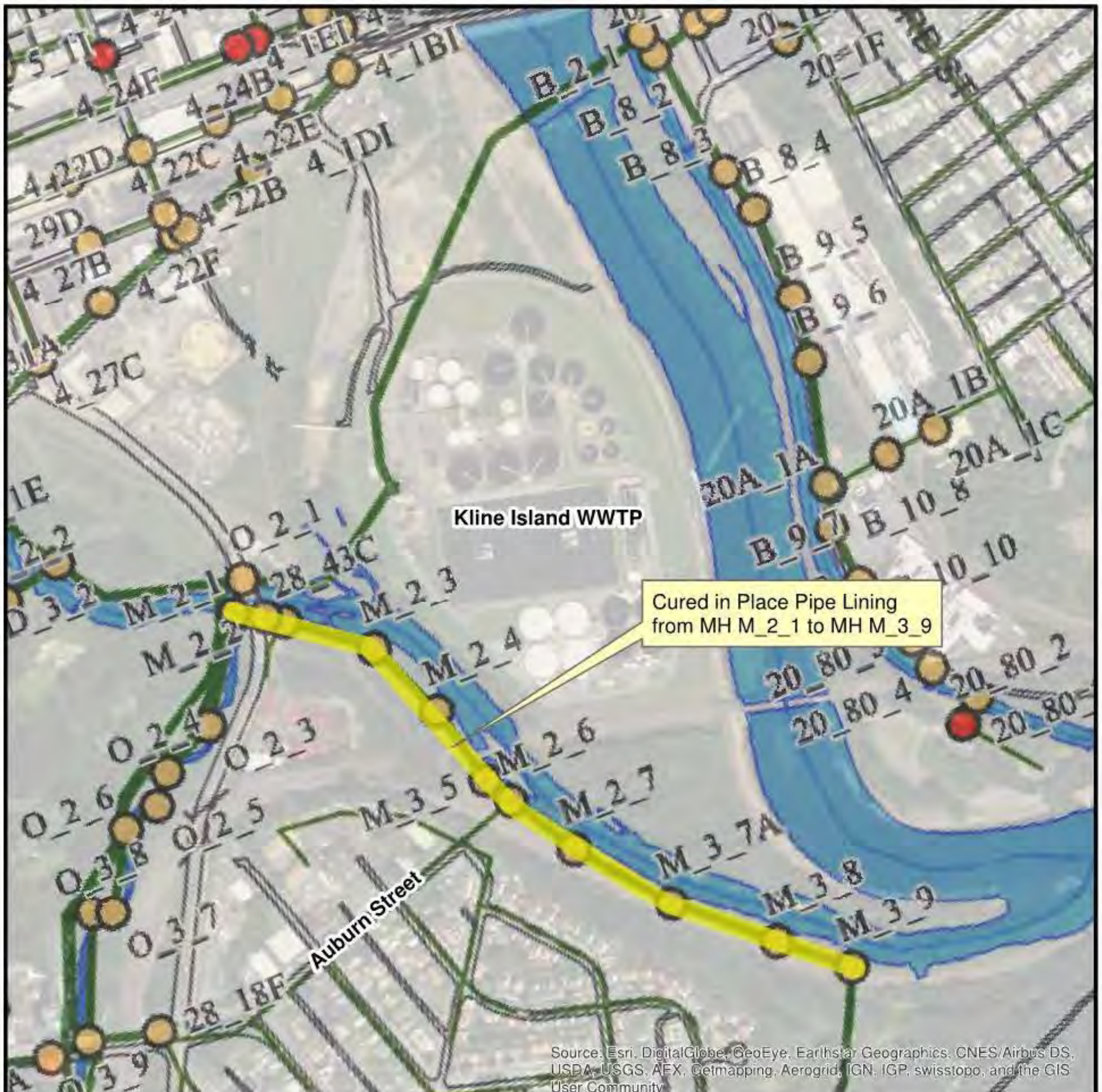


FIGURE 3:
Auburn Street
Sewer Rehabilitation

Lehigh County Authority
Allentown, PA

KLEINFELDER
Bright People. Right Solutions.
321 Wall Street, Princeton, NJ 08540
609-924-8821 · www.Kleinfelder.com

Sewer Rehabilitation

Drawing Sources:

1. 2018 ESRI Basemaps
2. 2011 City of Allentown Inspected Sanitary Manholes Map

PROJECT #:	6278E
DRAWN:	July 2018
DRAWN BY:	ELD
CHECKED BY:	BJF
FILE NAME:	S:\6278E - COA AO Consulting Services\GIS\6278E_AuburnSt.mxd

0 500 1,000
Feet

The table below summarizes the recommended overall budgetary costs for the 5-year program.

Plan Year	Budgetary Construction Cost[1]	Planning and Design (10%)	Bidding and Construction Administration (20%)	Contingency and Allowances (25%)	Total Budgetary Cost
Year 1	$450,000	$45,000.00	$90,000.0	$112,500.0	**$697,500**
Year 2	$480,000	$48,000.00	$96,000.0	$120,000.0	**$744,000**
Year 3	$340,000	$34,000.00	$68,000.0	$85,000.0	**$527,000**
Year 4	$270,000	$27,000.00	$54,000.0	$67,500.0	**$418,500**
Year 5	$420,000	$42,000.00	$84,000.0	$105,000.0	**$651,000**

[1] Budgetary costs based on typical unit costs and professional judgement, and assume prevailing wage rates

As shown in the table above, the annual total budgetary costs range from approximately $420,000 to $745,000.

The resulting total budgetary cost for the 5-year program is approximately $3.0 million.

5.0 PROGRAM SCHEDULE

As previously discussed, the source reduction program can be implemented over the course of five years. It is anticipated that the EPA review process could take up to six months. As a result, the following schedule has been developed outlining the timeframe for planning/design, bidding, and construction for each year of the source reduction program, starting in January 2020.

Plan Year	Planning and Design Timeframe	Bidding Timeframe	Construction Timeframe
Year 1	January – March 2020	April – May 2020	June – December 2020
Year 2	January – March 2021	April – May 2021	June – December 2021
Year 3	January – March 2022	April – May 2022	June – December 2022
Year 4	January – March 2023	April – May 2023	June – December 2023
Year 5	January – March 2024	April – May 2024	June – December 2024

However, as previously stated, consideration will be given to completing the proposed sewer rehabilitation work more aggressively, which would have the following significant benefits:

- Cost savings associated with economies of scale.
- Reduced administrative costs.
- Reduction in costs associated with project bidding services.
- Reduced contractor mobilizations.
- Reduced construction inspection and construction administration services costs.
- RDII reductions will be realized sooner, with associated quicker reductions to SSOs at the KIWWP.

6.0 PROGRAM ENHANCEMENTS FOR INCORPORATION INTO 537 PLANNING

In addition to the original fifteen (15) meters earmarked for installation in the City's collection system under the FCS submitted with the RFMS, the city will increase the meter sites by sixteen (16) to a total of thirty-one (31) sites. Increasing the number of sites will assist the city in more specifically identifying the locations within the collection system that indicate high levels of I&I due to wet weather.

Based on current planning, in 2022, the City will review and evaluate the work completed and to-be-completed under the I&I Reduction Program Plan and the findings from the FCS and develop a Phase II I&I Reduction Program Plan. The Phase II I&I Reduction Program Plan will focus on remediation work that most efficiently and cost effectively provides the greatest volumetric reduction in wet weather I&I. The Phase II scope of work will likely include SSES analyses of the identified areas of concern and subsequent development of contracts detailing work activities required.

ATTACHMENT A

Budgetary Cost Details

City of Allentown Sewer Rehabilitation Program
5-Year Program Construction Cost Summary

	# Pipe Segments	Total Length (ft)	Est. Direct Cost	W/ O&P
Year 1	1	1,500	$ 375,000	$ 450,000
Year 2	99	22,581	$ 401,814	$ 482,176
Year 3	59	14,016	$ 285,695	$ 342,834
Year 4	30	7,202	$ 223,772	$ 268,526
Year 5	30	6,651	$ 351,962	$ 422,354

Unit Costs

Corrective Action #	Diameter	Unit Price	Unit	Notes
1	8	$ 3.00	LF	
1	10	$ 3.00	LF	
1	12	$ 3.00	LF	
1	18	$ 3.00	LF	
1	20	$ 4.50	LF	
1	21	$ 4.50	LF	
1	24	$ 4.50	LF	
1	36	$ 10.00	LF	
2	8	$ 80.00	EA	Assume 1 joint every 8 ft
2	10	$ 100.00	EA	Assume 1 joint every 8 ft
2	12	$ 125.00	EA	Assume 1 joint every 8 ft
2	20	$ 150.00	EA	Assume 1 joint every 8 ft
2	21	$ 150.00	EA	Assume 1 joint every 8 ft
2	24	$ 175.00	EA	Assume 1 joint every 8 ft
2	36	$ 200.00	EA	Assume 1 joint every 8 ft
3	8	$ 3,500.00	EA	Assume 1 repair per segment, unless verified with CCTV
3	10	$ 3,750.00	EA	Assume 1 repair per segment, unless verified with CCTV
3	12	$ 4,000.00	EA	Assume 1 repair per segment, unless verified with CCTV
3	15	$ 5,000.00	EA	Assume 1 repair per segment, unless verified with CCTV
3	18	$ 5,500.00	EA	Assume 1 repair per segment, unless verified with CCTV
3	20	$ 6,000.00	EA	Assume 1 repair per segment, unless verified with CCTV
3	21	$ 6,000.00	EA	Assume 1 repair per segment, unless verified with CCTV
3	24	$ 7,500.00	EA	Assume 1 repair per segment, unless verified with CCTV
4	8	$ 20,000.00	EA	Assume 1 repair per segment, unless verified with CCTV
4	12	$ 20,000.00	EA	Assume 1 repair per segment, unless verified with CCTV
5	8	$ 40.00	LF	Resin Liner, Includes bypass and cleaning
5	18	$ 100.00	LF	Resin Liner, Includes bypass and cleaning
5	20	$ 150.00	LF	Resin Liner, Includes bypass and cleaning
5	30	$ 250.00	LF	Resin Liner, Includes bypass and cleaning

1	Heavy or special cleaning
2	Grouting
3	lining point repair
4	excavated point repair
5	lining entire pipe segment
6	complete pipe replacement

Construction Cost Calculations

				Values				
Repair Year	Basin #	Corrective Action Option	Sewer Diam (in)	Count of # of Laterals	Number of Segments	Sum of Length (ft)	# Joints	Cost Estimate
Year 1	MLK Dr	5	30		1	1,500	188	$ 375,000.00
Year 1 Total					1	1,500		$ 375,000.00
Year 2	ALN001	2	8	3	3	726	91	$ 7,280.00
			10	1	1	320	40	$ 4,000.00
		3	8	1	1	295	37	$ 3,500.00
			10	1	1	320	40	$ 3,750.00
		5	8	2	2	616	77	$ 24,640.00
		2,3	10	1	1	267	33	$ 7,050.00
	ALN002	2	8	5	5	1,281	160	$ 12,800.00
		3	8	2	2	373	47	$ 7,000.00
		4	8	1	1	308	39	$ 20,000.00
		5	8	1	1	316	39	$ 12,632.80
		1,2	8	1	1	268	33	$ 3,442.83
	ALN003	1	8	1	1	94	12	$ 280.83
			12	1	1	280	35	$ 839.43
		3	12	3	3	756	94	$ 12,000.00
		4	12	1	1	161	20	$ 20,000.00
		1,2	8	1	1	239	30	$ 3,116.97
	ALN006	1	8	2	2	598	75	$ 1,795.44
	ALN007	1	8	9	9	1,559	195	$ 4,676.31
			10	1	1	201	25	$ 602.61
			12	1	1	129	16	$ 387.30
		2	8	3	3	773	97	$ 7,760.00
		3	8	1	1	198	25	$ 3,500.00
			10	1	1	200	25	$ 3,750.00
		1,2	8	3	3	661	83	$ 8,623.57
			12	1	1	175	22	$ 3,275.36
		1,4	8	1	1	235	29	$ 40,706.32
			12	1	1	301	38	$ 20,902.22
	ALN008	3	8	2	2	453	57	$ 7,000.00
		1,2	8	1	1	295	37	$ 3,845.18
		1,3	8	1	1	288	36	$ 4,363.25
	ALN009	2	8	1	1	202	25	$ 2,000.00
			12	3	3	783	98	$ 12,250.00
		3	8	1	1	273	34	$ 3,500.00
			10	1	1	80	10	$ 3,750.00
		1,2	8	1	1	301	38	$ 3,941.80
	ALN017	1	8	5	5	1,068	133	$ 3,203.37
			10	1	1	266	33	$ 797.67
		2	8	6	6	1,509	189	$ 15,120.00
			10	2	2	210	26	$ 2,600.00
			24	2	2	764	95	$ 16,625.00
		3	8	4	4	690	86	$ 1,000.00
			10	1	1	154	19	$ 3,750.00
			24	1	1	324	40	$ 7,500.00
		1,2	10	1	1	97	12	$ 1,489.98
		1,3	10	1	1	105	13	$ 4,063.56
		2,3	8	5	5	878	110	$ 26,300.00
			10	1	1	163	20	$ 5,750.00
	ALN018	1	8	2	2	468	59	$ 1,405.05
			10	1	1	69	9	$ 206.70
		2	8	1	1	311	39	$ 3,120.00
			10	1	1	246	31	$ 3,100.00
		3	8	1	1	310	39	$ 200.00
		4	8	1	1	317	40	$ 20,000.00
		2,3	8	1	1	310	39	$ 6,620.00
Year 2 Total				99	99	22,581		$ 401,813.55

Year 3	**ALN024**	1	8	3	3	545	68	$ 1,633.53
		2	8	4	4	808	101	$ 8,080.00
			12	1	1	225	28	$ 3,500.00
		3	8	2	2	653	82	$ 10,500.00
		1,2	8	3	3	558	70	$ 7,274.69
			12	2	2	259	32	$ 4,776.13
	ALN026	1	10	1	1	191	24	$ 574.32
		2	8	5	5	1,138	142	$ 11,360.00
		3	8	3	3	873	109	$ 10,500.00
		5	8	1	1	398	50	$ 15,904.80
		1,2	8	2	2	771	96	$ 9,994.29
		2,3	8	1	1	375	47	$ 7,260.00
	ALN027	1	8	3	3	567	71	$ 1,701.78
			36	1	1	458	57	$ 4,580.30
		2	8	1	1	267	33	$ 2,640.00
			36	4	4	1,255	157	$ 31,400.00
		1,2	36	2	2	791	99	$ 27,714.70
		1,2,3	8	1	1	264	33	$ 6,931.13
		1,3	24	1	1	103	13	$ 7,962.78
		2,4	8	1	1	281	35	$ 42,800.00
	ALN028	3	24	2	2	673	84	$ 22,500.00
	ALN099	1	8	5	5	742	93	$ 2,226.15
		2	8	5	5	949	119	$ 9,520.00
		3	8	2	2	265	33	$ 7,000.00
		4	8	1	1	423	53	$ 20,000.00
		5	8	2	2	184	23	$ 7,360.80
Year 3 Total				**59**	**59**	**14,016**		**$ 285,695.40**
Year 4	**ALN005**	2	8	3	3	725	91	$ 7,280.00
		3	8	5	5	995	124	$ 17,500.00
		1,2	8	2	2	338	42	$ 4,374.48
		2,3	8	2	2	700	87	$ 13,960.00
	ALN091	1	8	2	2	378	47	$ 1,133.97
		2	8	1	1	236	29	$ 2,320.00
			20	1	1	55	7	$ 1,050.00
		3	8	3	3	758	95	$ 14,000.00
			18	1	1	207	26	$ 5,500.00
			20	2	2	636	80	$ 12,000.00
		4	8	1	1	252	32	$ 40,000.00
		5	8	1	1	255	32	$ 10,183.20
		1,2	8	1	1	246	31	$ 3,217.13
		1,2,3	18	1	1	294	37	$ 11,931.97
		1,3	20	1	1	220	27	$ 6,988.11
		2,3	8	1	1	256	32	$ 6,060.00
			20	1	1	331	41	$ 12,150.00
		2,5	20	1	1	321	40	$ 54,123.00
Year 4 Total				**30**	**30**	**7,202**		**$ 223,771.86**
Year 5	**ALN064**	1	8	1	1	191	24	$ 1,530.72
			21	1	1	386	48	$ 1,737.81
		2	8	1	1	304	38	$ 3,040.00
			21	2	2	347	43	$ 6,450.00
		3	8	3	3	471	59	$ 10,500.00
			15	1	1	199	25	$ 5,500.00
			21	2	2	599	75	$ 12,000.00
		1,2	21	1	1	321	40	$ 7,444.28
		1,3	8	1	1	208	26	$ 7,622.95
		2,3	8	1	1	174	22	$ 5,260.00
		2,4	8	1	1	196	24	$ 21,920.00
	ALN070	1	8	1	1	282	35	$ 845.97
	ALN071	3	8	3	3	453	57	$ 10,500.00
		1,4	8	1	1	150	19	$ 20,450.24
	Auburn St	5	18		10	2,372	296	$ 237,160.00
Year 5 Total				**20**	**30**	**6,651**		**$ 351,961.97**
Grand Total				**208**	**219**	**51,950**	**TOTAL**	**$ 1,638,242.78**

South Whitehall Township

Source Reduction Plan

South Whitehall Township

Sewer Collection System

Inflow/Infiltration Source Reduction Plan

February 2020

South Whitehall Township
Sewer Collection System
Inflow/Infiltration Source Reduction Plan
February 2020

1. COLLECTION SYSTEM MANAGEMENT

a. Goals

South Whitehall Township's (SWT) Source Water Reduction Plan (SRP) covers the assets managed in the wastewater collection system and has a goal to continuously implement practices and procedures to reduce and remove, to the greatest extent possible, Inflow and Infiltration (I/I) from the wastewater collection system. The SRP combines preventive, predictive and corrective strategies aligned with best management practices, so that the Township can effectively manage its wastewater collection system and achieve the following goals:

Goals

- Prevent public health hazards
- Protect the environment
- Comply with regulations
- Minimize the frequency of SSOs
- Mitigate the impact of SSOs
- Minimize disruptions in service
- Protect Coplay Whitehall Sewer Authority's large investment in the sewer collection system by maintaining maximum capacity and extending the useful life of the associated assets
- Prevent unnecessary damage to public/private property
- Efficiently use the funds available for the maintenance of the infrastructure and the operation of services
- Convey wastewater to the City of Allentown Waste Water Treatment facility with a minimum of infiltration, inflow and exfiltration
- Provide adequate capacity to convey peak flow
- Utilize evolving technology to increase our effectiveness and efficiency
- Provide reliable service now and into the future, maximizing available capacity via the reduction of extraneous flows to the wastewater collection system.

b. Relation to Other Municipal Functions

Many activities of the South Whitehall Township sewer collection system are supported by the following departments within the Township:

- Collection system mapping is supported by a GIS consultant. The consultant is responsible for maintaining and updating the GIS existing sewer infrastructure mapping system.
- The Community Development Department provides support, policy recommendations, and advice concerning future growth and development, and is assisted by the consulting engineer.
- Resources and budget are overseen by the Township's finance department.
- Training for collection system staff is provided through training partners approved by the PA Department of Environmental protection.
- Outreach to building contractors is done by the Community Development Department.
- Design and Construction Standards for installation, rehabilitation and repair are overseen and reviewed by the Public Works Department with input from the consulting engineer.
- Standards for inspection and testing are developed by the Public Works Department with input from the consulting engineer.

c. Training

SWT's training program provides a mechanism for educating employees and establishing their technical competence through the USEPA, EPWPCOA, PA-AWWA, PA DEP, and NASSCO certification programs. SWT utilizes a combination of in-house skill training and the purchase of specialized training through state and national associations, conferences and vendor training programs to enhance skills for performing daily work duties and provide certified operators continuing education hours. Skills training for SWT's employees includes, but is not limited to:

- Routine Line Maintenance
- Line Testing and Inspection
- Infrastructure Installation
- Meter Station Operation and Maintenance
- Electrical and Instrumentation

d. Public Information and Education Program

South Whitehall Township uses a variety of outlets for providing information and education to customers. The outlet(s) used to disseminate information is often based on the type of information and the targeted audience. South Whitehall Township routinely uses the outlets listed below to provide its citizens with the most up-to-date information possible:

- Township Website
- Local Media (TV and Newspaper)
- South Whitehall Township Board of Commissioner's Meeting Agenda
- Public Hearings
- Personal Visits / Phone Calls
- Door Hangers
- Sign Postings
- Customer Mailings

South Whitehall Township has had good community relations regarding issues with the operation and maintenance of our collection system. Types of information and education provided to our customers as part of the SRP includes:

<u>Information and Education Programs</u>
Sewer System Evaluation Survey Work
Major Repairs and Rehabilitation
New Construction
Point Repairs for Street Paving
Sewer Use Rates
Service Connection Requirements
Wastewater Collection

e. Information Management and Geographic Information Systems

South Whitehall Township uses ARC GIS to manage information on its collection system. The following Table shows the information that is included in our GIS database of the collection system.

Table 1: **Collection System Map Information included in South Whitehall's GIS**

Manholes Basic Map Information - ID number or other unique identifier - Location, with reference to streets and property lines - GPS coordinates - Size	**Manholes Additional Map Information** - Date built - Rim elevation - Invert elevation - Material Type
Pipes and Siphon Basic Map Information - ID number or other unique identifier - Location, with reference to streets, surface waters, property lines and manholes - Size - Direction of flow - Length - Material type	**Pipes Additional Map Information** - Slope - Pipe invert elevations - Plan or as-built ID number - Service laterals
Meter Stations Basic Map Information - ID number - Location - Service Area	**Pump Stations Additional Map Information** - Record drawings of each meter station

General System information is managed in various software programs and includes:

<u>Collection System</u>

- Continuous Sewer System Assessment
- Collection system mapping
- Collection system inventory
- Flow monitoring
- SSO/Emergency response

f. Legal Authorities and Controls

1. Sewer Use Ordinance

South Whitehall Township has established and implemented regulations regarding the use of the wastewater collection system. The Township has a comprehensive sewer use ordinance, consistent with EPA's model ordinance, and complimentary to the standards required by the City of Allentown's wastewater treatment plant. As regulations and requirements have changed, the Township has passed additional ordinances to address those issues. Ordinances are kept up-to-date and are available electronically at the Township's website.

The items addressed through our sewer ordinances include: sewer use and standards, access to pipelines and structures, FOG management, pretreatment requirements, service connections, hauled waste/septage, user rates, permitting of flows into the system, inflow/infiltration control, enforcement of proper design, installation, and testing standards, and inspection requirements for new and rehabilitated sewers. The Township also has agreements with the Coplay-Whitehall Sewer Authority and the City of Allentown. The Finance Department, the Township Manager, and the Board of Commissioners review the adequacy of user rates annually.

g. Collection System Details

- Service Area: 13 Square miles
- Customers Served in primary community: 6,700
- System Inventory owned by South Whitehall Township, below:

Miles of gravity sewer	Miles of force main	Number of pump stations		Number of siphons	Number of air relief valves
		Public	Private		
100	0	0	0	0	0

- Wastewater Flow Characteristics in MGD

Annual Average Daily System Flow	Average Daily Dry Weather Flow	Peak Wet Weather Flow	Treatment Plant Allocation (MGD)	
2.0 MGD	1.8 MGD	3.2 MGD	Average: 3.0	Maximum Flow: 9.0

h. Age Distribution of Collection System

South Whitehall Township conducts an ongoing program to assess the structural condition and maintenance needs of the collection system as a part of our Cleaning, Inspection and Assessment program and our capital planning. The oldest portions of the system date to the 1930's.

i. Length of Pipe by Diameter (Mains)

Pipe Diameter (inches)	Length (miles)
6	11.67
8	70.66
10	3.97
12	4.09
15	2.46
16	0.86
18	1.39
21	1.95
24	0.32
30	2.50
TOTAL	99.87

j. Sanitary Sewer Overflow History

The Township has not experienced any sanitary sewer overflows (SSOs) in the last 5 years. The following table describes the overflow dates, locations, quantities and causes.

Table 2: Sanitary Sewer Overflow History - **NONE**

SSO date	Location	Volume released	Cause of release

To assure sewer capacity, the Township has developed programs to address capacity, inflow/infiltration, and the condition of our collection system.

2. CLEANING, INSPECTION AND ASSESSMENT PROGRAM

In 2007 South Whitehall Township began development of a preventive maintenance plan (PMP). This includes a Cleaning, Inspection, and Assessment program to assess the maintenance needs and structural condition of the entire collection system. The goal of this program is to complete the entire system assessment within 5 years.

The Township began the cleaning, inspection and assessment program with a focus on the known problem areas and the older sections of the service area near the City of Allentown. The results from the cleaning, inspection and assessment program are used to categorize the cleaning frequency and the repair or replacement needs for each component. Critical infrastructure components will also be identified and assessed. Previous knowledge of the condition of the sewer system has also been used to establish more frequent cleaning scheduled for identified problem areas.

The cleaning, inspection and assessment efforts are performed by the Public Works Department staff. All data is entered into the GIS system.

All work is performed on a drainage area basis, with the goal of completing the cleaning and inspection of approximately 15 to 20% of the entire collection system each year, such that 100% of the system is televised after a 5 year period. The drainage basins are each metered and labeled as follows for the purposes of recording the data:

- MS 51
- MS 52
- MS 53
- MS 54
- MS 55
- MS 56

The cleaning, inspection and assessment program includes: sewer cleaning, CCTV inspection of piping, visual inspection and classification of the manhole structures and their flow channels, and an evaluation of the condition of the pipes and manholes. Results from the assessment program are used to categorize the cleaning and inspection frequencies for both the sub-areas and problem pipe-sections.

The cleaning and CCTV schedules are closely coordinated. As the Township's goal is to have a complete cleaning, inspection and system assessment every 5 years, approximately 20 percent of the system is reviewed by CCTV each year. Approximately 20 percent of the system is cleaned annually: the cleaning performed each year includes the priority cleaning plus the remaining parts of the collection system, factoring in the intermediate and long term interval cleaning schedules. All of the system cleaning is for gravity lines.

Information from cleaning and inspections (see Inspection section, below), including any findings, is entered into an EXCEL database, and incorporated into the maintenance software for scheduled maintenance and capital improvement. This information is also used to update this long term Preventive Maintenance Plan (PMP). Televised and cleaned lines are also recorded in the GIS system. Effective execution of the PMP is a critical part of the effectiveness of the SRP, as many defects are identified and resolved with this program.

a. Cleaning

The primary sewer maintenance activity is sewer line cleaning. The Township's service area is divided into 6 drainage areas as shown on the collection system map.

The cleaning of sewer lines, manholes and other appurtenances is categorized as: priority (annual or more frequent cleaning); intermediate (2-5 year interval); or long term (6 or more year interval).

Areas of the system with higher concentrations of restaurants are typically targeted for priority cleanings. Other priority areas include known structural defect areas, such as sagged lines or lines with minimal slope.

Manhole deficiencies are also noted in cleaning logs. Information about manholes requiring attention is provided to the Assistant Public Works Director and either a repair work order is issued or it is added to the capital repair schedule.

b. Pipe and Manhole Inspection

Planned manhole and pipe inspections are coordinated with the cleaning program and generally follow the cleaning schedule. South Whitehall Township uses television inspections to document:

- the structural condition of the pipe
- root intrusion
- grease
- protruding taps
- evidence of inflow and infiltration (I/I) or surcharging
- manhole pave-overs, and
- other deficiencies that factor into condition assessment

Planned video inspections are generally scheduled to follow the planned cleaning schedule. However, in the event of a blockage, a video inspection assesses the cause of the blockage.

All newly constructed sewer lines are required to be CCTV inspected by the contractor or developer to verify as-built drawings and ensure the line has no construction defects. Additionally, all new pipes and manholes are required to be pressure tested to ensure tightness and prevent release of sewer odors and future infiltration of storm water. This inspection and testing process must be completed prior to backfilling and before the Township will accept the infrastructure from the construction contractor.

Manhole inspections help keep tthe asset inventory up to date and are used not only to update collection system maps, but to determine structural condition. During manhole inspections, field crews take a complete inventory of each manhole including construction materials, ring size, depth to invert, flow conditions and evidence of problems.

Manhole inspection results are reviewed for condition rating. Those needing repair are placed on a priority schedule, and routine repairs are coordinated with re-paving work when possible. When repairs are recommended, as described below, work orders are created.

Public Works Department staff are responsible for completing structural repairs to manholes. Repairs include invert work, frame and cover grade adjustment, and frame and cover replacement. More comprehensive repairs, such as complete relining of the manhole structure, are performed by outside contractors.

c. Assessment

Pipe condition information is used to determine short and long term maintenance strategies including increased cleaning, root treatment, sewer line repair, or replacement. The condition assessment helps establish the cleaning frequency and inform the Townships' capital planning. As more condition assessment information becomes available, the priority of capital projects may change. Sewer line repair or replacement projects are also coordinated with re-paving schedules.

Condition assessments document the following details and deficiencies:

1. Characteristics including pipe diameter, and age and type of material
2. Dips in line
3. Grease build-up
4. Root intrusion
5. Sediment accumulation and encrustation
6. Structural condition, including cracks, corrosion and erosion
7. Joint alignment and movement
8. Reverse slope
9. Obstructions
10. Deformations in line

Condition Rating	Condition Description	Maintenance Required
0	New	Normal
1	Excellent Condition	Normal
2	Minor Defects Only	Minor
3	Backlog Maintenance	Significant
4	Requires Major Renewal	Renew
5	Almost Unserviceable	Replace

3. CAPACITY MANAGEMENT

a. Sewer Capacity Certification/ Connection Policy

The Sewer Capacity Certification is a process where any new development requiring the connection of its sanitary sewer service to the Township's sewer system is reviewed to determine whether adequate sewer system capacity exists to convey the new wastewater flow from the proposed development to the City of Allentown's wastewater treatment facility. A capacity certification analysis by a professional engineer is required for all developments, or any existing customer that requires an increase in its sewer allocation. The certification process also assigns the development capacity within the Township's current treatment allocation of 3 million gallons per day.

This process aligns with the processing of Sewage Facilities Planning Modules with the PA Department of Environmental Protection.

b. Flow Metering

Flow data is recorded continuously from the Authority's six permanent metering stations as noted below:

The drainage basins are each metered and labeled as follows for the purposes of recording the data:

- MS 51
- MS 52
- MS 53
- MS 54
- MS 55
- MS 56

These facilities serve as the key indicators of rising flows and the need to address SRP activities within a given drainage basin. The Township will also make arrangements for the installation of supplemental portable flow meters within a drainage basin if needed to further identify the location of problem areas. Depending on circumstances, the Township could elect to deploy as many meters as needed at critical flow paths to determine the source of excess sewage flows and emerging I/I problems.

4. RESOURCES AND BUDGET

a. Budget Process

The Public Works Department's budget is a part of the Township's overall budget cycle. Specific items related to the operation of the sewage collection system are identified under separate categories within the Department budget. Public Works staff works with the Finance Department and Township Management staff through a process to present a budget to the Board of Commissioners for approval. For the Collection System operations and maintenance budget, the process begins with last year's numbers and projected needs for the next budget year. The Township maintains a multi-year budget process to manage anticipated expenses.

b. Rate Review

The current sewer rate structure is based on metered water usage. Customers are billed quarterly for wastewater services based on 100 % of the metered water use. In addition to flow charges, customers are also assessed a base charge to recover fixed costs. Rates are examined and adjusted as needed based on anticipated O & M and Capital expense for the sewer system.

c. Operating and Maintenance Expense

Operating and maintenance expenses include:

- Employee salary and compensation
- Operating supplies
- Utilities
- Repair and maintenance
- Professional services
- Routine capital outlay
- Debt service expenses for repair and replacement

Professional Services includes planning and engineering studies for replacement projects and daily operations.

Contractor Services includes contractual work for cleaning sewer lines and manholes, CCTV, and improvements to the collection system map.

Routine Capital Outlay includes items that are considered capital assets and are purchased from annual operating revenue rather than through bonds or the capital reserve fund. Items such as vehicles, specialized maintenance equipment, pumps, motors, office equipment and other smaller items are included in this category.

Debt service is the annual principle and interest payments for bonds, loans and other fiduciary instruments owed by the Township. The debt service supports capital improvement projects.

d. Capital Improvement Program Overview

The Township has prepared a 5-Year Capital Improvements Plan to address the implementation of projects that are essential to the long-term successful operation of the sanitary sewer system. The 5-year Plan addresses the following types of projects:

- Excavation repairs to replace defective pipe segments
- Trenchless repair of isolated pipe defects
- Lining of existing sanitary sewers
- Replacement of sanitary sewers and sewer laterals
- Manhole rehabilitation
- Continual sewer televising and cleaning
- Updates and improvements to flow measurement facilities and installation of portable flow meters where needed

The 5 year budget is intended to be a fluid document that can be adjusted as necessary to meet the Township’s needs. The plan will be reexamined each year and projects will be added, adjusted, or revised as necessary as work is completed and new work is identified.

5. SEWER SYSTEM PREVENTIVE MAINTENANCE PLAN UPDATES

a. Plan Update Process

South Whitehall Township will complete reviews of its Preventive Maintenance program annually. This will be done in conjunction with the preparation of its annual "Chapter 94 Report" that is prepared for review by the Department of Environmental Protection. The review will consider the progress that has been made in developing and implementing its Preventive Maintenance Program, the results of monitoring programs, and will incorporate updates to this Plan including:

- Changes to organizational structure, information management, contacts, and system maps,
- Changes to information on the collection system, such as the size and age of pipes, to incorporate information on repairs completed during the year,
- Incorporation of successful cleaning, inspection and assessment program improvements during the past year,
- Changes to the Sewer Use Ordinance and Fats, Oils and Grease programs,
- Budget and Capital Planning updates

b. Monitoring, Measurement, and Program Modifications for Infiltration and Inflow Source Reduction

The Township will maintain records of key information to continually assess improvements to the collection system.

The information will measure the effectiveness of the Maintenance program by tracking various parameters related to service calls and maintenance and inspection activities. Comparison of trends from previous years and identifying system defects are key components. Tracking the following parameters will measure the effectiveness of the Plan and its effectiveness in reducing Inflow and Infiltration:

- Number and cause of SSOs per year
- Length of gravity sewers cleaned annually
- Actual versus scheduled cleaning dates for gravity sewers
- Length of gravity sewers CCTV inspected annually
- Percent of system rehabilitated (repaired or upgraded) each year
- Number of FOG inspections and compliance with FOG requirements
- Improvements in capacity due to reductions in I/I
- Safety history/incidents
- Continuous tracking of average and peak flows within each metered drainage basin to determine the effectiveness of repair and maintenance activities.
- Conducting supplemental flow-metering within the major drainage basins to identify and lead to the correction of emerging I/I issues.

Coplay – Whitehall Sewer Authority

Sewer Collection System

Source Reduction Plan

Coplay-Whitehall Sewer Authority

Sewer Collection System

Inflow/Infiltration Source Reduction Plan

Prepared by SSM Group, Inc

March 10, 2020

Coplay-Whitehall Sewer Authority
Sewer System
Inflow/Infiltration Source Reduction program

March 2020

1. COLLECTION SYSTEM MANAGEMENT

a. Goals

Coplay-Whitehall Sewer Authority's (CWSA) Source Water Reduction Plan (SRP) covers the assets managed in our wastewater collection system, and has a goal to continuously implement practices and procedures to reduce and remove, to the greatest extent possible, Inflow and Infiltration (I/I) from the wastewater collection system . The SRP combines preventive, predictive and corrective strategies aligned with best management practices, so that the Authority can effectively manage its wastewater collection system and achieve the following goals:

Goals

- Prevent public health hazards
- Protect the environment
- Comply with regulations
- Minimize the frequency of SSOs
- Mitigate the impact of SSOs
- Minimize disruptions in service
- Protect Coplay Whitehall Sewer Authority's large investment in the sewer collection system by maintaining maximum capacity and extending the useful life of the associated assets
- Prevent unnecessary damage to public/private property
- Efficiently use the funds available for the maintenance of the infrastructure and the operation of services
- Convey wastewater to the City of Allentown Waste Water Treatment facility with a minimum of infiltration, inflow and exfiltration
- Provide adequate capacity to convey peak flow
- Utilize evolving technology to increase our effectiveness and efficiency
- Provide reliable service now and into the future, maximizing available capacity via the reduction of extraneous flows to the wastewater collection system.

b. Relation to Other Functions

SRP activities of the Coplay-Whitehall Sewer Authority's sewer collection system are supported by the following departments within the Authority:

- Collection system mapping is maintained on a GIS platform by the Authority Manager. The Manager is responsible for maintaining and updating the GIS existing sewer infrastructure mapping system.
- Resources and budget are overseen by the Authority's finance committee.
- Training for collection system staff is provided through training partners approved by the PA Department of Environmental Protection.
- Design and Construction Standards for installation, rehabilitation and repair are overseen and reviewed by the Authority Manager with input from the Operations Manager and the consulting engineer.
- Standards for inspection and testing are developed by the Authority with input from the consulting engineer.

c. Training

CWSA's training program provides a mechanism for educating employees and establishing their technical competence through the USEPA, EPWPCOA, PA-AWWA, PA DEP, and NASSCO certification programs. CWSA utilizes a combination of in-house skill training and the purchase of specialized training through state and national associations, conferences and vendor training programs to enhance skills for performing daily work duties and provide certified operators continuing education hours. Skills training for the SRP for CWSA's employees includes, but is not limited to:

- Routine Line Maintenance
- Line Testing and Inspection
- Infrastructure Installation
- Meter Station Operation
- Pump Station Operation

d. Public Information and Education Program

Coplay-Whitehall Sewer Authority uses a variety of outlets for providing information and education to customers. The outlet(s) used to disseminate information is often based on the type of information and the targeted audience. Coplay-Whitehall Sewer Authority routinely uses the outlets listed below to provide its citizens with the most up-to-date information possible:

- Authority Website
- Local Media (TV and Newspaper)
- Coplay-Whitehall Sewer Authority Meeting Agenda
- Personal Visits / Phone Calls
- Door Hangers
- Sign Postings
- Customer Mailings

Coplay-Whitehall Sewer Authority has had good community relations regarding SRP issues. Types of information and education provided to our customers as part of the SRP includes:

Information and Education Programs

Sewer System Evaluation Survey Work

Major Repairs and Rehabilitation

Clear Water Home Inspections

e. Information Management and Geographic Information Systems

Coplay-Whitehall Sewer Authority uses ARC GIS to manage information on its collection system. The following Table shows the information that is included in the GIS of the collection system.

Table 1 Collection System Map Information included in CWSA's GIS System

Manholes Basic Map Information	**Manholes Additional Map Information**
- ID number or other unique identifier - Location, with reference to streets and property lines - GPS coordinates - Size	- Date built - Rim elevation - Invert elevation - Material Type - Repair and rehabilitation information
Pipe Basic Map Information - ID number or other unique identifier - Location, with reference to streets, surface waters, property lines and manholes - Size - Direction of flow - Length - Material type	**Pipes Additional Map Information** - Slope - Pipe invert elevations - Plan or as-built ID number - Service laterals - Repair and rehabilitation information
Meter Stations Basic Map Information - ID number - Location - Service Area	**Meter Stations Additional Map Information** - Record drawings of each meter station
Pump Station Basic Information - ID number - Location - Service Area	**Pump Stations Additional Map Information** - Record drawings of each pump station

f. Collection System Details

- Service Area: Whitehall Township – 12.8 sq. miles and Coplay Borough – 0.6 sq. miles
- Customers Served in primary community: 13,900
- System Inventory owned by Coplay-Whitehall Sewer Authority, below:

Miles of gravity sewer	Miles of force main	Number of pump stations		Number of siphons	Number of Meter Stations
		Public	Private		
124.8	0.5	1	0	0	2

- Wastewater Flow Characteristics in MGD

Precipitation Range	Year	Annual Precipitation Inches	Avg. Daily Flow MGD*	Peak Hourly Flow MGD	Treatment Plant Allocation
Dry	2015	38.46	1.822	Not Available	3.76
Average	2013	45.98	1.918	Not Available	3.76
Wet	2011	71.72	2.415	Not Available	3.76
Wet	2019	60.66	2.213	8.28	3.76

*Includes flows from both CWSA and North Whitehall Township

g. Age Distribution of Collection System

Coplay-Whitehall Sewer Authority conducts an ongoing program to assess the structural condition and maintenance needs of the collection system as a part of our Cleaning, CCTV Inspection and Assessment program (NASSCO) and our capital planning. The oldest portions of the system date to 1965.

h. Length of Pipe by Diameter (Mains)

Pipe Diameter (inches)	Pipe Length (Feet)	Pipe Length (Miles)
6	345	0.065
8	551,105	104.376
10	18,610	3.525
12	7,925	1.501
15	3,113	0.590
16	4,938	0.935
18	31,974	6.056
20	4,388	0.831
24	8,695	1.647
27	9,415	1.783

30	14,353	2.718
36	4,082	0.773
Total	658,943	124.800

i. Sanitary Sewer Overflow History

The Authority has not experienced any sanitary sewer overflows (SSOs) caused by lack of pipe capacity in the last 5 years. The following table describes the overflow dates, locations, quantities and causes of any such SSOs.

Table 2: Sanitary Sewer Overflow History - **NONE**

SSO date	Location	Volume released	Cause of release

To assure sewer capacity the Authority has developed programs to address capacity, inflow/infiltration, and the condition of our collection system.

2. CLEANING, INSPECTION AND ASSESSMENT PROGRAM

The Coplay-Whitehall Sewer Authority has consistently used a preventive maintenance plan (PMP) since the1980's. This includes a Cleaning, CCTV Inspection, MH Inspection and Assessment program to determine the maintenance needs and structural condition of the entire collection system. The goal of this program is to completely televise and inspect the entire system within a 5 to 6 year period. Once the entire system has been televised and inspected, we then start from the beginning and re-inspect the system in a round robin 5-6 year cycle.

The Authority's cleaning, inspection and assessment program focuses on the known problem areas. The entire collection system is broken down into sub-basins that align with the original construction contracts for each portion of the system. All data is recorded by drainage basin. The results from the cleaning, inspection and assessment program are used to categorize the cleaning frequency and the repair or replacement needs for each component. Critical infrastructure components will also be identified and assessed. Previous knowledge of the condition of the sewer system has also been used to establish more frequent cleaning schedules for identified problem areas.

The cleaning, inspection and assessment efforts are performed by the Authority staff. All data is entered into the GIS system.

As previously mentioned, all work is performed on a drainage area basis, with the goal of completing the cleaning and inspection of approximately 15 to 20% of the entire collection system each year, such that 100% of the system is televised after a 5 to 6 year period. The drainage basins are each metered and labeled for the purpose of recording the data. All sub-basins are eventually tied to either of the Authority's two major drainage basins, each of which is metered:

- Jordan Creek Interceptor Basin
- Lehigh River Interceptor Basin

The cleaning, inspection and assessment program includes: sewer cleaning, CCTV inspection of piping, visual inspection and classification of the manhole structures and their flow channels, and an evaluation of the condition of the pipes and manholes. Results from the assessment program are used to categorize the cleaning and inspection frequencies for both the sub-areas and problem pipe-sections.

The cleaning and CCTV schedules are closely coordinated. As the Authority's goal is to have a complete cleaning, inspection and system assessment every 5 years, approximately 20 percent of the system is reviewed by CCTV each year. Approximately 20 percent of the system is cleaned annually: the cleaning performed each year includes the priority cleaning plus the remaining parts of the collection system, factoring in the intermediate and long term interval cleaning schedules. All of the system cleaning is for gravity lines.

Information from cleaning and inspections (see Inspection section, below), including any findings, is entered into an EXCEL database, and incorporated into the maintenance software for scheduled maintenance and capital improvement. This information is also used to update this long term Preventive Maintenance Plan (PMP). Televised and cleaned lines are also recorded in the GIS system. Effective execution of the PMP is a critical part of the effectiveness of the SRP, as many defects are identified and resolved with this program.

a. Cleaning

Our primary sewer maintenance activity is sewer line cleaning.

The cleaning of sewer lines, manholes and other appurtenances is categorized as: priority (annual or more frequent cleaning); intermediate (2-5 year interval); or long term (6 or more year interval).

Areas of the system with higher concentrations of restaurants are typically targeted for priority cleanings. Other priority areas include known structural defect areas, such as sagged lines or lines with minimal slope.

Manhole deficiencies are also noted in cleaning logs. Information about manholes requiring attention is provided to the Operations Manager and either a repair work order is issued or it is added to the capital repair schedule.

b. Pipe and Manhole Inspection

Planned manhole and pipe inspections are coordinated with the cleaning program and generally follow the cleaning schedule. Coplay-Whitehall Sewer Authority uses television inspections to document:

- the structural condition of the pipe
- root intrusion

- grease
- protruding taps
- evidence of inflow and infiltration (I/I) or surcharging
- manhole pave-overs, and
- other deficiencies that factor into condition assessment

Planned video inspections are generally scheduled to follow the planned cleaning schedule. However, in the event of a blockage, a video inspection assesses the cause of the blockage.

All newly constructed sewer lines are required to be cleaned and CCTV inspected by the contractor or developer to verify as-built drawings and ensure the line has no construction defects. Additionally, all new pipes and manholes are required to be pressure tested to ensure tightness and prevent release of sewer odors and future infiltration of storm water. This inspection and testing process must be completed before the Authority will accept the infrastructure from the developer.

Manhole inspections help keep the asset inventory up to date and are used not only to update collection system maps, but to determine structural condition. During manhole inspections, field crews take a complete inventory of each manhole including construction materials, ring size, depth to invert, flow conditions and evidence of problems.

Manhole inspection results are reviewed for condition rating. Those needing repair are placed on a priority schedule, and routine repairs are coordinated with re-paving work when possible. When repairs are recommended, as described below, work orders are created.

Authority staff are responsible for completing minor structural repairs to manholes when needed. Repairs include invert work, frame and cover grade adjustment, and frame and cover replacement. More comprehensive repairs, such as complete relining of the manhole structure, are performed by outside contractors.

c. Assessment

Pipe condition information is used to determine short and long term maintenance strategies including increased cleaning, root treatment, sewer line repair, or replacement. The condition assessment is used to establish cleaning frequency and inform the Authority's capital planning. As more condition assessment information becomes available, the priority of capital projects may change. Sewer line repair or replacement projects are also coordinated with re-paving schedules.

All Authority staff are NASSCO certified to perform CCTV inspections and provide a condition rating assessment.

Condition assessments document the following details and deficiencies:

1. Characteristics including pipe diameter, and age and type of material
2. Dips in line
3. Grease build-up
4. Root intrusion

5. Sediment accumulation and encrustation
6. Structural condition, including cracks, corrosion and erosion
7. Joint alignment and movement
8. Reverse slope
9. Obstructions
10. Deformations in line

Condition Rating	Condition Description	Maintenance Required
0	New	Normal
1	Excellent Condition	Normal
2	Minor Defects Only	Minor
3	Backlog Maintenance	Significant
4	Requires Major Renewal	Renew
5	Almost Unserviceable	Replace

3. CAPACITY MANAGEMENT

a. Sewer Capacity Certification/ Connection Policy

The Sewer Capacity Certification is a process where any new development requiring the connection of its sanitary sewer service to the Authority's sewer system is reviewed to determine whether adequate sewer system capacity exists to convey the new wastewater flow from the proposed development to the City of Allentown's wastewater treatment facility. A capacity certification analysis is required for all developments, or any existing customer that requires an increase in its sewer allocation. The certification process also assigns the development capacity within the Authority's current treatment allocation within its Agreement with the City of Allentown.

This process aligns with the processing of Sewage Facilities Planning Modules with the PA Department of Environmental Protection.

b. Flow Metering

Flow data is recorded continuously from the Authority's two permanent metering stations – the Lehigh Creek and Jordan Creek Stations. These two facilities serve as the key indicators of rising flows and the need to address SRP activities within a given drainage basin. The Authority will also make arrangements, if necessary, for the installation of supplemental portable flow meters within the two major drainage basins if needed to further identify the location of problem areas. Depending on circumstances, the Authority could elect to deploy up to 6 additional portable flow meters in each of the major drainage basins to identify emerging I/I problems.

c. Inflow & Infiltration - System Wide Flow Monitoring Study

In order to identify problem areas within the CWSA System that may be subject to excessive Inflow and Infiltration, the CWSA contracted with ADS Environmental Services to perform a system wide flow monitoring study. The study consisted of placing 45 portable flow meters and four (4) rain gauges within CWSA's system and monitoring flows at each location over a 3-month period from March 14, 2011 to June 14, 2011. The final report titled "RDII Report prepared for the Coplay Whitehall Sewer Authority by ADS Environmental Services December 15, 2011" identified a total of four (4) areas where Inflow and Infiltration may be excessive in the CWSA system. The four areas suspected of having excessive Inflow and Infiltration have been classified by CWSA as "Red Zones" and have been targeted by CWSA maintenance for concentration of TV Inspections, Manhole Inspections, Clear Water Home Inspections and installation of manhole inflow bowl inserts.

4. RESOURCES AND BUDGET

a. Budget Process

The budget is a part of the Authority's overall budget cycle. Specific items related to the operation of the sewage collection system are identified under separate categories within the budget. Authority staff works with the Finance Committee to present a budget to the complete Authority Board for approval. For the Collection System operations and maintenance budget, the process begins with last year's numbers and projected needs for the next budget year. The Authority maintains a multi-year budget process to manage anticipated expenses.

b. Rate Review

The current sewer rate structure is based on metered water usage. Customers are billed quarterly for wastewater services based on 100 % of the metered water use. In addition to flow charges, customers are also assessed a base charge to recover fixed costs. Rates are examined and adjusted as needed based on anticipated O & M and Capital expense for the sewer system.

c. Operating and Maintenance Expense

Operating and maintenance expenses include:

- Employee salary and compensation
- Operating supplies
- Utilities
- Repair and maintenance
- Professional services
- Routine capital outlay
- Debt service expenses for repair and replacement

Professional Services includes planning and engineering studies for replacement projects and daily operations.

Contractor Services includes contractual work for cleaning sewer lines and manholes, CCTV, and manhole and sewer line rehabilitation.

Routine Capital Outlay includes items that are considered capital assets and are purchased from annual operating revenue rather than through bonds or the capital reserve fund. Items such as vehicles, specialized maintenance equipment, pumps, motors, office equipment and other smaller items.

Debt service is the annual principle and interest payments for bonds, loans and other fiduciary instruments owed by. The debt service supports capital improvement projects.

d. Capital Improvement Program Overview

The Authority has prepared a 5-Year Capital Improvements Plan to address the implementation of projects that are essential to the long-term successful operation of the sanitary sewer system. The 5-year Plan addresses the following types of projects:

- Excavation repairs to replace defective pipe segments
- Trenchless repair of isolated pipe defects
- Lining of existing sanitary sewers
- Replacement of sanitary sewers and sewer laterals
- Manhole rehabilitation
- Continuous sewer televising and cleaning
- Updates and improvements to flow measurement facilities

The 5 year budget is intended to be a fluid document that can be adjusted as necessary to meet the Authority's needs. The plan is examined each year and projects will be added, adjusted, or revised as necessary as work is completed and new work is identified.

5. SEWER SYSTEM PREVENTIVE MAINTENANCE PLAN UPDATES

a. Plan Update Process

Coplay-Whitehall Sewer Authority will complete reviews of its Preventive Maintenance and Source Reduction Program annually. This will be done in conjunction with the preparation of its annual "Chapter 94 Report" that is prepared for review by the Department of Environmental Protection. The review will consider the progress that has been made in implementing its Preventive Maintenance Program and SRP, the results of monitoring programs, and will incorporate updates to this Plan including:

- Changes to organizational structure, information management, contacts, and system maps,
- Changes to information on the collection system, such as the size and age of pipes, to incorporate information on repairs completed during the year,
- Incorporation of successful cleaning, inspection and assessment program improvements during the past year,
- Changes to the Sewer Use Rules and Regulations
- Budget and Capital Planning updates
- Required projects to support the SRP

b. Monitoring, Measurement, and Program Modifications for Infiltration and Inflow Source Reduction

The Authority will maintain records of key information to continually assess improvements to the collection system.

The information will measure the effectiveness of the Maintenance program by tracking various parameters related to service calls and maintenance and inspection activities. Comparison of trends from previous years and identifying system defects are key components. Tracking the following parameters will measure the effectiveness of the Plan and its effectiveness in reducing Inflow and Infiltration:

- Number and cause of SSOs per year
- Length of gravity sewers cleaned annually
- Home clear water inspections
- Manhole Inflow Prevention Inserts Installation
- Manhole and manhole chimney rehabilitation
- Actual versus scheduled cleaning dates for gravity sewers
- Length of gravity sewers CCTV inspected annually
- Percent of system rehabilitated (repaired or upgraded) each year
- Improvements in capacity due to reductions in I/I
- Safety history/incidents
- Continuous tracking of average and peak flows within each metered drainage basin to determine the effectiveness of repair and maintenance activities.
- Conducting supplemental flow-metering within the major drainage basins to identify and lead to the correction of emerging I/I issues.

The Authority has been implementing an aggressive maintenance and capital improvements plan for over 30 years. These programs are well into their maturity stage, as the Authority has replaced or updated a number of its major system components within the last 20 years as identified below:

1. Jordan Creek Interceptor Replacement Project.................................. Final Completion 2009
2. Collection System Repairs.. Final Completion 2011
3. RT-22 Crossing.. Final Completion 2012
4. Coplay Creek Interceptor Replacement .... Final Completion 2013
5. Lehigh River Interceptor Relocation – LSB .... Final Completion 2013
6. Ruch Street Replacement.. Final Completion 2013
7. SR 22 Section 400 Replacement...Final Completion 06-30-2015
8. Lehigh Meter Station & Pipe Replacement ....Final Completion 11-11-2016
9. Front Street Coplay Replacement ....Final Completion 06-15-2018
10. Front Street Coplay Improvements..Final Completion 09-11-2018

Since 2008 the Authority has spent close to 15 million dollars on upgrades, replacements, and improvements to its wastewater collection system.

The table below summarizes the Authority's history of connections vs. flows contributed to the City of Allentown.

Year	Number EDUs	Number Days	Precipitation (inches)	CWSA Volume* (gallons)	GPD/EDU	Average Daily Flow (MGD)
2007	13,470	364	45.38	732,068,630	149.31	2.011
2008	13,551	371	46.65	758,102,208	150.79	2.043
2009	13,616	362	40.77	717,654,725	145.64	1.983
2010	13,672	365	50.62	708,972,439	142.07	1.942
2011	13,677	365	71.72	863,009,249	172.87	2.364
2012	13,771	364	41.02	655,629,501	130.80	1.801
2013	13,735	371	45.98	690,794,750	135.56	1.862
2014	13,801	364	44.72	665,828,346	132.54	1.829
2015	13,790	363	38.46	636,534,400	127.16	1.754
2016	13,789	365	38.82	644,188,100	127.99	1.765
2017	13,814	364	50.18	673,169,364	133.88	1.849
2018	13,860	364	66.96	789,592,020	156.51	2.189
2019	13,902	371	60.66	791,666,823	153.49	2.134

*CWSA Flows only – does not include North Whitehall Township Flows.

Following is an analysis of the effectiveness of the CWSA's capital program based on the data summarized in the preceding table.

Item Description	Pre Construction (2007)	Post Construction (2014)
Flow to Allentown	2.011 MGD	1.829 MGD
Connections	13,470	13,801
Flow per EDU	149.31 gpd	132.54 gpd
Average daily flow reduction		182,021 gpd

Taking into account year 2007 and 2014 flows, where precipitation amounts were essentially equal, these results demonstrate the effectiveness of the Authority's previous efforts, and more importantly show that maintenance of the programs in place will continue to yield similar, if not better results.

The CWSA will continue to implement its 5-year television inspection/cleaning program over its entire collection system and implement repair and replacement projects as system defects are identified. Continuous monitoring of Lehigh River and Jordan Creek Interceptor basins will show the CWSA the effectiveness of all work performed via the monitoring of peak flows, total daily flows, and precipitation, along with supplemental flow monitoring as warranted within the sub-basins of the Jordan Creek and Lehigh River Interceptors.

North Whitehall Township

Source Reduction Plan

NORTH WHITEHALL TOWNSHIP

LEHIGH COUNTY
3256 LEVANS ROAD
COPLAY, PA 18037

I/I SOURCE REDUCTION PLAN

FEBRUARY 2020

PREPARED BY:
KEYSTONE CONSULTING ENGINEERS, INC.
PO BOX 639
KRESGEVILLE, PA 18333
(610) 681-5233

1. GENERAL

North Whitehall Township has an existing sanitary sewer allocation of 140,000 GPD, which is conveyed through the Coplay-Whitehall Sewer Authority (CWSA) system, with ultimate treatment and disposal at the Kline's Island Sewer Treatment Plant. With average daily flows of approximately 80,000 GPD, North Whitehall Township is well within its allocated amount.

North Whitehall Township Public Works employees monitor and visually inspect the sanitary sewer system throughout the year. The Township maintains a GIS data base and maps to assist in the identification of areas for Infiltration/Inflow (I/I) reduction or rehabilitation of the sanitary infrastructure.

2. PROJECTS COMPLETED

The Township performs periodic inspections for potential I/I issues. Also, in 2011, a substantial portion of North Whitehall's sanitary sewer mains were videoed and evaluated. As a result of these inspections and the closed circuit tv evaluation, the Township has completed the following source removal and rehabilitation projects:

a. Repairs to three (3) sanitary sewer laterals in the Village of Ormrod, to eliminate infiltration.
b. Repairs to three (3) sanitary sewer manholes to eliminate infiltration.
c. Installation of 150 manhole inserts to alleviate surface inflow.

In addition to the above source removal projects, in 2020, the Township is planning to televise their entire sanitary sewer system in order to evaluate and prioritize its continued operation, maintenance, and source reduction program and projects.

3. COSTS

In 2020, The Township anticipates spending approximately $50,000.00 to camera their entire sanitary sewer system and to flush and vacuum sanitary sewer mainlines. Based on the results of the cctv work, the Township will budget for future projects accordingly.

4. SOURCE REDUCTION BENEFIT

Based on comparable projects elsewhere, the Township anticipates reducing I/I within their system by approximately 15%.

5. FUTURE SOURCE REDUCTION PROJECTS

Future projects will be dependent on the results and evaluation of the cctv work being done in 2020. Future projects could include the following:

a. Repair and/or replacement of sanitary sewer pipes which are allowing I/I into the system.
b. Repair and/or replacement of sanitary sewer manholes which are allowing I/I into the system.
c. Continue with the Township's CCTV inspection program as necessary.
d. Continue with yearly inspections of all manholes within the system. The condition of each manhole will be recorded in the GIS data base with repair or replacement as necessary.

The Township anticipates budgeting $100,000.00 to $250,000.00 for these future improvements to the sanitary sewer system. The Township hopes continued source reduction will result in a 20% decrease of infiltration/inflow into the system.

Salisbury Township

Source Reduction Plan

6 Phase 1 Source Reduction Program

6.1. ***TOWNSHIP of SALISBURY***

6.1.1 ***Completed Projects:***

Over the past several years the Township of Salisbury has undertaken a number of source removal projects within the Township's sanitary sewer system specifically targeting the designated infiltration/inflow priority areas. The completed projects included various source removal projects such as main line and lateral TV inspection, main line and lateral test and sealing joints, main line spot repairs, main line cured-in-place pipe lining, and manhole I/I observations/investigations.

6.1.11 ***Purpose:***

Most all of the completed source removal projects fall within the high priority infiltration/inflow areas or basins identified by flow meter evaluation analysis. Selected projects were identified within the designated priority area as a result of systematic data analyses. Subsequently, specific sewer system rehabilitation efforts and tasks began in these areas or catchments with the expectations that the initial rehabilitation work will have an immediate and significant impact on Rainfall Derived Infiltration/Inflow (RDII) removal.

6.1.1.2 ***Scope:***

The scope of the completed source removal programs or rehabilitation efforts included the following:

- Mainline and Lateral TV Inspection: The Townships has CCTV inspected approximately 88,236 linear feet of mainline pipe and approximately 127 services laterals within the priority areas.

- Test and Seal Mainline and Service Laterals: The Township has contracted with various contractors to pressure test and seal approximately 4,851 mainline joints and 127 services laterals. Each mainline joint and service lateral was individually pressure tested and sealed as necessary.

- Spot Repairs: At various locations, where the mainline pipe was either broken, cracked, showing signs of structural fatigue or at locations where the mainline pipe was broken into to install a service lateral that portion of the main was either excavated and restored, or provided with a cured-in-place spot repair or mechanical link pipe repair. A total of 60 spot repairs were identified and rehabilitated as a result of the CCTV inspections.

- Cured-in-Place Pipe Lining: Approximately 11,000 linear feet of clay pipe sewer mains within the existing sewer system has been rehabilitated by the Cured-in-Place pipe lining method. This represents approximately 30% of all the existing clay pipe in the Townships designated priority areas.

- Manhole rehabilitation. A total of approximately 65 manholes have gone through some form of rehabilitation including drill and grouting of active leaks, chimney grouting/parging, and the installation of manhole inserts.

- Mainline Pipe Replacement: As a result of the CCTV inspection phase the Township has replaced a number of clay pipe sewer mains and service laterals within their sewer system. A total of 9 mainline runs have been identified and replaced with SDR 26 PVC pipe since 2009

- (See attached spread sheet for a detailed list and description of all main line and manhole rehab work completed to date.)

6.1.1.3 ***Cost:***

To date, the Township of Salisbury has expended a total of **$1,154,000** since 2009 on various sanitary sewer rehabilitation projects associated with the RDII source removal program.

6.1.1.4 ***Schedule:***

All source reduction projects undertaken by the Township of Salisbury were completed between 2009 through 2017.

6.1.1.5 ***Effectiveness:***

Based on flow meter data analysis, the Township anticipates the infiltration/inflow reduction rate as a result of the ongoing source removal programs to be approximately 15% to 20% of the total system infiltration/inflow within the priority areas.

6.1.2 ***Anticipated Projects***

6.1.2.1 ***Purpose***

In the next several years, 2018 through 2025, the Township of Salisbury will continue to address various source removal projects in an effort to improve the RDII reductions as well as to maintain a reasonably effective infiltration/inflow reduction program.

6.1.2.2 ***Scope:***

The scope of the Township's continuing source removal program and infiltration/inflow rehabilitation efforts will include the following sanitary sewer source removal and I/I projects between 2018 to 2025.

- Continue efforts to investigate and address clearwater source removal to reduce RDII and infiltration/inflow into their sanitary sewer system.

- The Township will continue to schedule selective mainline and lateral CCTV inspection of their priority area sanitary sewers to further evaluate the integrity of their I/I program.

- Continue the cured-in-place pipe lining rehabilitation of the old clay (VCP) mainline pipe within the Townships designated priority areas. The lines will be CCTV inspected, evaluated and CIPP lined or rehabilitated as may be necessary.

- Continue a scheduled manhole inspection and review program to determine, the type of repairs and/or rehabilitation methods as may be necessary.

- The Township will schedule a lateral investigations and rehabilitation program through 2025 and follow-up to develop, repair and/or rehabilitation procedures as may be necessary.

6.1.2.3 ***Cost:***

The Township anticipates budgeting an estimated $1,500,000 between 2018 and 2025 to fund the various rehabilitation investigations and construction projects associated with the long-term source removal program.

6.1.2.4 ***Schedule:***

All the above source removal projects undertaken by the Township are scheduled to be developed, designed and constructed between 2018 and 2025.

6.1.2.5 ***Anticipated Effectiveness:***

The Township anticipates all source reduction work, when completed, will result in an infiltration/inflow reduction rate of approximately 15% to 20% of the total system I/I.

SAL-17-012

Township of Salisbury

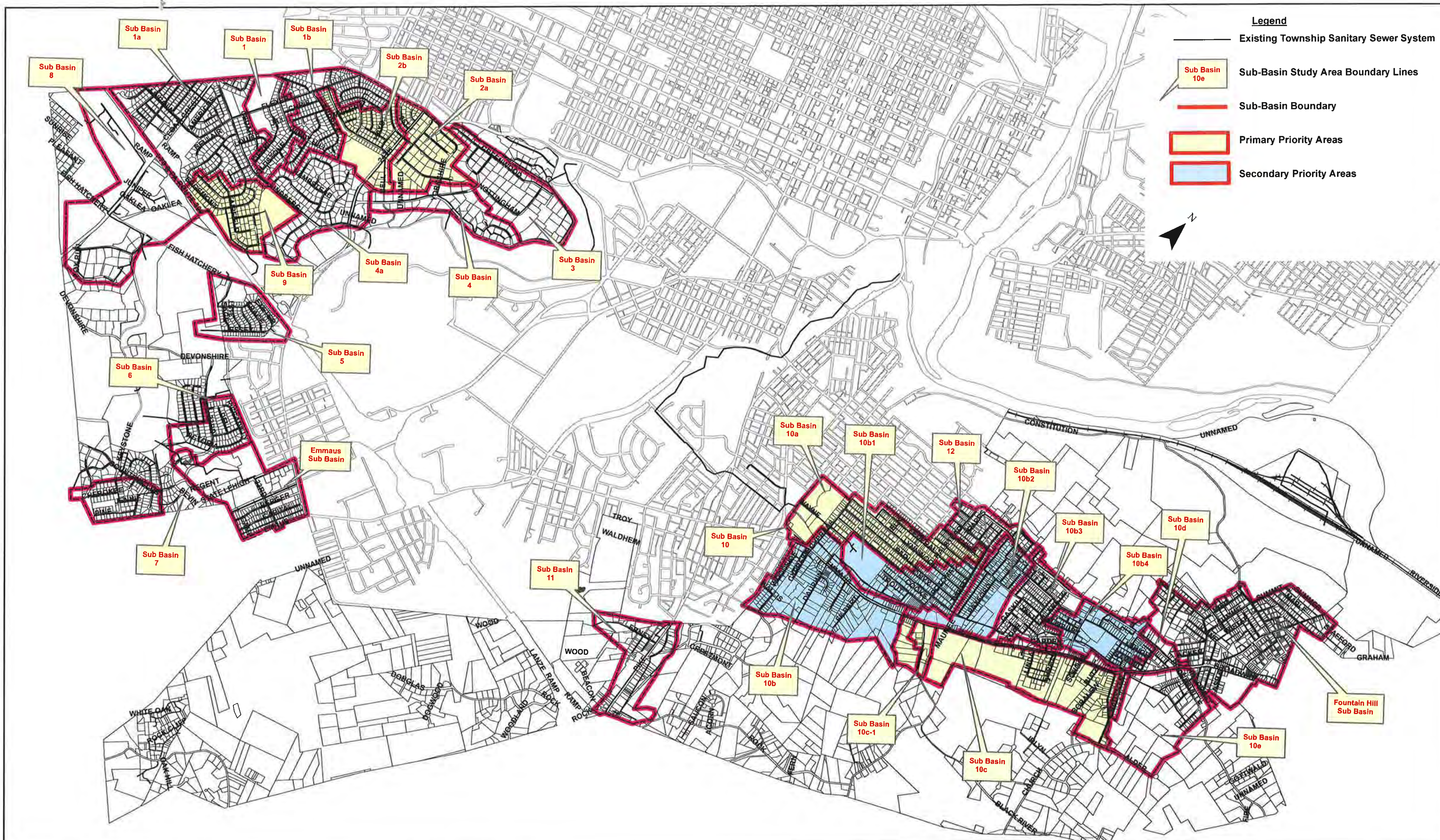
SANITARY SEWER SYSTEM

I / I REHABILITATION WORK

2009 to 2017

Year	TV Inspection (Main)	TV Inspection (Laterals)	Cured-In-Place Main Lining (VCP)	Manhole Rehabilitation	Test & Seal Main Line Joints	Test & Seal (Lateral)	Spot Repairs	Main Line Pipe Replacement
2009							19	4
2010				10				
2011				3				1
2012								
2013	39,241'	80		44	Test 1840, Seal 185	80	5	2
2014	48,995'	47		8	Test 3011, Seal 196	47	30	
2015			4,215'				6	
2016			2,932'					2
2017			3,861'					
Totals	**88,236'**	**127**	**11,008'**		**Test 4851, Seal 381**	**127**	**60**	**9**

P:\SAL\2017/SAL17-012\SAL 2009-2017 Work



Keystone Consulting Engineers Inc.
6235 Hamilton Blvd.
Wescosville, PA., 18106

Rev:
Date: January 2018

Sanitary Sewer System
Source Reduction Program Priority Areas

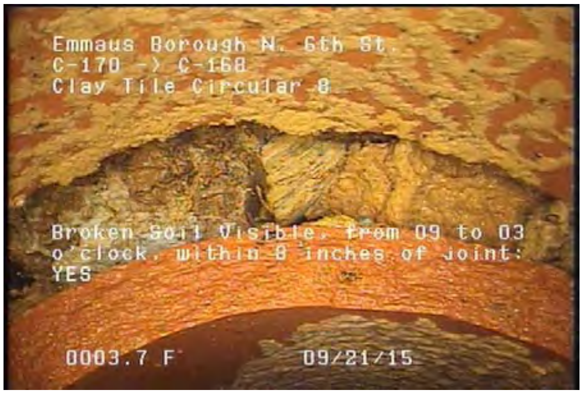
Sacle: NTS
SAL 18-012

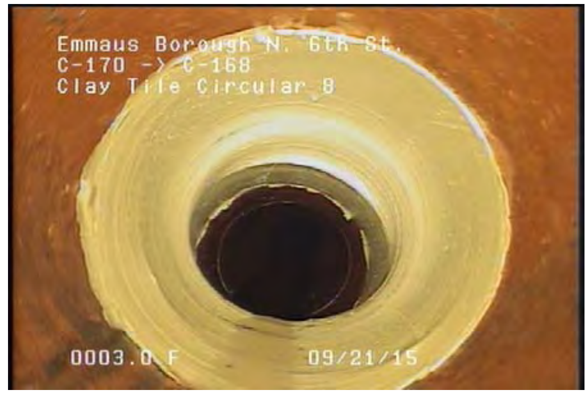
Township of Salisbury
Sanitary Sewer System
Infiltration / Inflow Program
Priority Basin Map

Borough of Emmaus

Source Reduction Plan

Borough of Emmaus
Inflow and Infiltration Source Reduction Program





Overview

Sanitary sewer systems are designed and constructed to safely collect wastewater from the customer's facilities (homes, businesses, industries, etc.) and transport these flows to the wastewater plant for treatment prior to discharge to Waters of the Commonwealth. Borough of Emmaus wastewater is collected and transported via multiple interceptors to the Kline's Island Wastewater Treatment Plant (KI WWTP) in Allentown where it is treated, disinfected, and discharged to the Lehigh River.

Ideally, sanitary sewer systems would only collect and convey used water and human waste. However, extraneous stormwater and groundwater can enter typical gravity sanitary systems and significantly increase peak flows, potentially causing pipe overloads, backups into buildings, overflows into streets and streams, and disruption of the treatment plant process.

Inflow occurs when rainwater is misdirected into the sanitary sewer system instead of storm sewers. Examples are: roof leaders, sump pumps, yard and area drains, manhole covers, and cross connections from storm drains. The remedy for inflow is to remove improper connections to the sanitary sewer system. *Infiltration* occurs when ground water seeps into the sanitary sewer system through cracks or leaks in sewer pipes or manhole structures. The cracks or leaks may be caused by age related deterioration, loose joints, physical damage, or root intrusion. The remedy for infiltration is repairing or replacing the leaking infrastructure and removing the underlying causes of the defects. Identifying the sources followed by reducing the volume of Inflow and Infiltration (I&I) that enters the sanitary sewer system are the ultimate goals of the Borough's I&I Source Reduction Program.

As I&I becomes a significant component of sanitary flow, it is generally more cost-effective to reduce I&I than upgrade infrastructure to convey and treat additional non-wastewater flows. Literature shows that success reducing I&I has been mixed, and that a well-planned I&I management plan is required to achieve satisfactory I&I control with the limited funds available. Traditionally, most I&I reduction efforts have been targeted at rehabilitating publicly owned sewer infrastructure. However, dealing with private service laterals for I&I reduction is now recognized as a necessary component of municipal sewer system maintenance.

Identification of I & I

Studies conducted to identify I&I can be very elaborate involving special consultants and costing large amounts of money or they can be basic and conducted by system operators. The size of the system and the extent of the problem will dictate what measures are necessary.

Methods that are commonly used for identifying the location and extent of infiltration and inflow are:

- Windshield Surveys – Operations staff can perform neighborhood drive-by inspections to learn much about potential I&I in the sewer system. Uneven road surfaces over sewer trenches may indicate unstable ground conditions and possible damage to sewer lines. Broken paving around manholes can indicate failure of masonry risers. Significant trees along streets and front yards may be an indicator of potential root intrusion in service laterals.
- Late Night Surveys – Very little flow should be occurring in the collection system in the early morning hours (2:00 AM – 4:00 AM). By surveying manholes for clear water that is near ground temperature a generalized idea of the extent of infiltration can be made.
- Closed Circuit Television (CCTV) Inspections – CCTV inspection is primarily used to identify infiltration problems and structural defects in sewer pipes. A purpose built camera is inserted into the collections lines and the line is videotaped so problem areas can be analyzed. A thorough line cleaning prior to video tapping is very important. Sewer pipe joint pressure testing is sometimes performed in conjunction with CCTV inspections.
- Physical Inspections – Manholes can be opened and inspected to identify structural deterioration and evidence of leakage. This work can be performed in conjunction with CCTV inspections or it can be done as a stand-alone program.
- Smoke Testing – Smoke testing is sometimes used to identify broken joints and leaking manhole barrels that could allow infiltration to enter the system and to identify illegal taps or connections to the sewer system that would allow storm water to enter. For this test, smoke is forced into the collection system by an engine driven fan located over a manhole opening.
- Flow Records – Wastewater flow meter records are often used to identify and quantify the severity of storm events that introduce inflow into the collection system. Also, flow records that show a constant early morning flow during periods of run-off can be used to identify infiltration. Chart recording flow measurement devices and digital data logging systems allow the volume and duration of I&I to be characterized.
- In-Home Inspections – Individual properties can be inspected for open or missing caps on cleanouts, and yard/roof drain and sump pump connections to sewer piping.

Remediation of I&I

Following the identification of specific sources of I&I, the Borough can determine the appropriate remedial actions to repair or replace the affected components, develop a budget of estimated costs, and prioritize implementation of the remedial work.

Specific pipe repairs may include one or more the following methods, depending upon site conditions:

- Pressure Grouting Pipe Joints – This involves specialized equipment to inject a self-setting grout, typically acrylamide gel, into structurally sound leaking joints or small wall cracks in mainline sewer pipes. The grout travels outside of the joint into surrounding soils and bonds with those soils to create a seal collar of material around the leaking joint or wall defect. Equipment advancements in recent years have expanded the capabilities of this methodology to allow sealing of defects in lateral pipes. The maximum life expectancy of properly mixed and placed grout is not yet known, but samples have been examined after 30 years and found to be in "like new" condition. However, if humidity in the soil declines for a long period, the grout may begin to dry out. In areas of the Borough sewer system that have been inspected, tested, and repaired with pressure grout, it is recommended that spot checks be performed in subsequent years to verify the water tightness of the joints.

- Cured in Place Pipe (CIPP) Lining – This involves installation of a complete new fiberglass or polyester based interior lining into sewer pipe runs from manhole to manhole. This method is appropriate where the pipe run has many leaks or extensive but moderate structural damage. Service lateral penetrations are typically re-opened after the lining is installed from within the sewer main pipe. Numerous companies have developed methods to insert, expand, seal, and cure a tubular mat saturated with 100% solids epoxy resins into damaged pipes, creating structural repairs with an expected minimum lifespan of 50 years. New equipment has been developed to expand the capabilities of CIPP lining to include repairing service lateral pipes and connections.
- Pipe Lining Spot Repair – This involves placement of a short length (typically 2 to 10 feet) of lining material at isolated cracks or damaged locations inside a sewer pipe. These spot repairs can involve CIPP lining or thin metal sleeves that are bonded to the pipe interior to cover and seal the defect.
- Pipe Bursting –This method is used on pipes that are severely damaged, for replacing an entire pipe system, or for repairing larger sections of sewer pipeline. Hydraulic power is used to drag a "bursting head" through the pipe. As it makes its way through the system, breaking the old pipe apart, it pulls in a new seamless pipe behind it. Service lateral connections must be excavated and cut into the new pipe. The replacement pipe is a plastic material that should be impervious to root intrusion for up to a 100 year life expectancy.
- Open Trench Pipe Repair – This method is generally used, as a last resort, when a pipe section is found to have severe structural damage including collapse or full tree root intrusion that cannot be removed with a remote cutter.

Specific manhole repairs may include one or more the following methods, depending upon site conditions:

- Manhole Cover Inserts – One of the simplest manhole I&I reduction methods, this involves placement of a pre-formed plastic dish into the manhole frame immediately under the cover to limit the amount of water that can enter the sewer system from around the rim or through vent holes in the lid. Since the Borough currently uses metal-edge snow plows, these inserts can only be used where the perimeter of the manhole frame is at an elevation of at least one quarter inch below the surrounding roadway elevation so the lid does not protrude above the pavement. Manhole frames can be set at a depressed elevation during repaving operations or reconstruction of sewer manholes. As an alternative, thin, tapered pads can be applied to the paving around the manhole frame to create a small ramp for plows to glide over without catching the edge of the manhole lid.
- Manhole Frame Riser Repair – This can involve one or multiple repair methods, including replacing the grade rings between the concrete manhole "chimney" and the frame, wrapping the exterior of the riser and frame with a waterproof membrane, or placing a waterproof liner inside the riser. Concrete or brick grade adjustment rings can be subject to significant deterioration from traffic loads and frost impacts. Brick risers, split or multi-piece concrete rings, and the use of multiple layers of rings when manhole structures are significantly lower than the

finished road surface can introduce many more joint locations for subgrade water to penetrate and enter the sewer system. If the riser and grade adjustment rings are in good structural condition, an interior rubber seal can be installed with stainless steel compression rings without having to excavate and repair the paving around the manhole. If the grade rings are deteriorated and/or the profile of the manhole frame does not match the cross slope of the paving, the riser can be excavated, rebuilt with level or tapered grade rings, and sealed with an exterior wrap prior to backfilling and repaving. A new manhole frame and lid can be installed if needed.

- Grouting – This involves drilling holes in the manhole walls and injecting pressurized grout through the walls into the surrounding backfill to seal the exterior surface from water intrusion. Grouting can be used to reduce leaks in otherwise structurally sound manholes and can be performed without excavation.
- Interior Sealing – This involves spray or trowel installation of a surface coating on the interior surfaces of manholes, and is effective at repairing surface damage from sulfide corrosion. These coatings can be fiber reinforced cementitious mortar or high-build epoxy. Interior coatings can reduce water intrusion, but water actively flowing through holes and cracks in the manhole walls should be remediated by grouting before attempting to install most interior sealing products.

Borough I&I Reduction Projects

Flow Characterization

The Borough has reviewed the condition of its four (4) permanent master sewer meter stations and has determined that some data logger equipment is obsolete and that some flow measurement elements are not ideally situated to ensure accurate measurement over a wide range of flows. The Borough has applied for a grant to replace two (2) data loggers and to replace the digital readout faceplate on a third. The grant would also fund the replacement of the primary flow nozzle at the Fox Street (Meter #1) Station and the complete replacement of the vault and flume at the Berger Street (Meter #2) Station. These replacements will help the Borough obtain more accurate flow data during normal and wet weather events.

The Borough will continue its periodic visual inspections of the sewer system at night and during rainfall events to identify areas contributing higher than expected peak flows. This inspection program is also expected to identify key junctions in the sewer system where temporary, portable meters can be installed to record sub-area flows over extended periods of time for further analysis and pin-pointing of problem areas for additional investigation and rehabilitation.

Pipe Inspection, Joint Testing, and Pressure Grouting

In previous years, the Borough awarded bid contracts for televideo inspection, cleaning, and pipe joint grout repair for sewer Districts #1 and #3 (the areas draining to the Fox Street and Orchid Place Meter Stations, respectively) and for numerous sub-areas within District #4. Now that the Borough has acquired its own televideo equipment, inspections can be performed without having to pre-arrange the work area and timing. Borough inspection records can be used to visually identify areas with structural defects and potentially leaking joints so that future contracted projects can more cost-effectively focus on the areas with specifically identified problems.

Borough personnel should "circle back" to previously grouted pipe sections on a rotating basis at intervals of ten to fifteen (10 to 15) years, or more frequently if found to be needed, to see if the grouted lines are remaining watertight. Signs of leaks should be identified for preparing contracts to have specialty contractors re-grout or apply CIPP lining repairs.

Inspection and Spot Repairs

Video inspections in certain sub-areas of Basin #4 identified dozens of locations where structural defects required localized repair. Bid contracts were awarded for spot repairs in those areas. Now that the Borough has acquired its own televideo equipment, on-going inspections can be performed in other areas of the sewer system to identify locations of defects requiring specialty contractor repairs.

Inspection and CIPP Lining

Video inspections in 2008 identified two (2) adjacent pipe runs near a creek crossing in Basin #4 where numerous severe leaks were allowing excessive groundwater into the pipes. A bid contract was later awarded for full-length CIPP relining in that area. Now that the Borough has acquired its own televideo equipment, on-going inspections can be performed in other areas of the sewer system to identify locations of defects requiring specialty contractor repairs.

Customer Site Inspections

The Borough initiated a site inspection program, beginning in 2006, that required inspection of Borough sewer customers' buildings to identify basement floor drains, sump pumps, driveway drains, yard drains and downspouts, and to require disconnection from the sewer system if such connections were found. By the end of 2014, the Borough successfully completed the program with 3,899 properties inspected, and only 5 properties refusing entry for inspection. Based on reduced average annual flow in the Borough sewer system over this timeframe, it is believed that this program resulted in significant reductions of extraneous flow in the system.

Service Lateral Inspection and Repair

Previous and on-going sewer video inspections have revealed a number of potential I&I issues related to lateral connections throughout the Borough. These include tree root intrusion, clear water flow, and broken/unsealed lateral connections to the sewer mains.

The Borough Council adopted Ordinance No. 1185 on January 21, 2019, requiring inspection of customer sewer connections when a property is placed on the market for sale. Defects identified would need to be repaired prior to settlement or sufficient funds would need to be escrowed to cover the cost of performing the repair work within an allotted period of time. This program is expected to address as many as fifty to seventy percent (50% to 70%) of Borough properties within a ten-year period without adding an undue financial burden to long-time occupants.

Manhole Inspection and Rehabilitation

The Borough has recently increased its Public Works Department sewer maintenance staff and has increased the level of expertise in the Department. Borough staff inspected 240 manholes in 2017 and identified many locations requiring sealing or complete reconstruction of access frame risers. Some manholes were also found to have deteriorated or missing steps and many should have flow reducing dish inserts added below the lids. The Borough was awarded a grant to partially fund the required rehabilitation and repair work, which was completed in 2019. A total of 145 manhole tops were completely rebuilt as part of this project.

Borough forces will continue the annual manhole inspection program to identify leaks and other structural defects so that repair projects can be efficiently planned, budgeted, and bid in subsequent years.

Upstream Watershed Management

The Borough sanitary sewer system transports wastewater from multiple upstream sub-areas in Lower Macungie, Salisbury, and Upper Milford Townships to the downstream interceptors and the City's wastewater treatment plant. Only two (2) of these out-of-Borough sub-areas are metered. Flow from the others is unmetered and may have an impact on peak flows transported through the Borough and measured at the Borough's master meter stations. Inter-municipal agreements require the upstream townships to monitor and maintain their systems in good repair and prohibit the introduction of stormwater and groundwater flows into the sewer system. Without master metering, however, it is difficult to routinely confirm that township sewer system I&I is being properly controlled.

The Borough, in conjunction with the neighboring townships' personnel, should periodically conduct visual inspections of the township sewer connection points at night and during rainfall events to identify areas contributing higher than expected peak flows. The appropriate township would then be responsible for the necessary upstream investigation and rehabilitation of their system. Temporary, portable flow meters might be useful for identifying excess wet weather flows at connections of the larger sub-areas, but may not be accurate enough for sub-areas that serve limited numbers of out-of-Borough customers.

Hanover Township

Source Reduction Plan

HT-18-027

HANOVER TOWNSHIP, LEHIGH COUNTY
2202 GROVE ROAD
ALLENTOWN, PA 18109

I/I SOURCE REDUCTION PLAN

JULY 2018

PREPARED BY:
KEYSTONE CONSULTING ENGINEERS, INC.
2870 EMRICK BOULEVARD
BETHLEHEM, PA 18020
(610) 865-4555

1. GENERAL

As part of Hanover Township Capital Improvements Program, a yearly report of future sanitary sewer projects is compiled and presented to Council. The primary focus of the sanitary sewer capital improvements is to replace existing clay pipe (VCP) and aging manholes to reduce infiltration/inflow into the system. The Township maintains a GIS data base and maps to assist in the identification and future replacement or rehabilitation of the sanitary infrastructure.

2. PROJECT COMPLETED

Since 2010 Hanover Township has televised all of the sanitary sewer mains within the City of Allentown/Klines Island WWTP service area. Additionally, the Township perform periodic inspections of the sewer system for potential infiltration/inflow issues. As a result of these inspections, the Township has completed the following source removal and rehabilitation projects:

a. Replacement of approximately 1,200 feet of clay pipe with 8" PVC sanitary sewer pipe.
b. Replacement and/or rehabilitation of approximately 30 sanitary sewer manholes.
c. Repairs and/or replacement of approximately 22 sanitary sewer laterals and cleanouts.
d. Installation of 32 manhole inserts to alleviate surface inflow.

In addition to the above source removal projects, in 2017 the Township installed a telog system within their metering station to accurately track trends during wet weather events.

3. COSTS

Between 2010 and 2017, Hanover Township has invested approximately $300,000.00 on the replacement or rehabilitation of the sanitary sewer infrastructure for source removal purposes.

4. SOURCE REDUCTION BENEFIT

Although there is no exact method for quantifing the benefits of the above-referenced improvements, Hanover Township estimates a 15% reduction in the infiltration/inflow into their sanitary sewer systems.

5. FUTURE SOURCE REDUCTION PROJECTS

As part of the Township's Capital Improvements Program, source reduction projects will continue with the sanitary sewer system tributary to the Klines Island WWTP. Future projects are to include the following:

a. Replace 1,197 feet of existing 8" and 10" VCP with PVC SDR26 sanitary sewer pipe in the Lower Lloyd Street area. This project also includes four (4) new manholes plus lateral replacement. The project has been awarded with a completion date of August 31st at a cost of $220,000.00.
b. Installation of eighteen (18) manhole inserts within the Patriot American property located on the south side of Route 22. The completion of this work is anticipated for fall of 2018.
c. The Township will continue with their CCTV inspection program for the entire sanitary sewer system.
d. Future projects will include the continued replacement of clay pipe with PVC.
e. Continue with yearly inspections of all manholes within the system. The condition of each manholes will be recorded in the GIS data base with repair or replacement as necessary.

The Township anticipates budgeting $800,000.00 to $1,000,000.00 for these future improvements to the sanitary sewer systems. The continued source reduction program will result in a 20% decrease of infiltration/inflow into the system.

APPENDIX 10

Western Lehigh Sewerage Partnership Source Reduction Plans

LOWHILL TOWNSHIP

LEHIGH COUNTY AUTHORITY

Source Reduction Plans

Western Lehigh Sewerage Partnership

March 15, 2020

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ARCADIS Design & Consultancy for natural and built assets

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Acronym List

10YR24Hr	10-year 24-hour
AO	Administrative Order
ARV	Air Vacuum Release Valve
BEM	Broadband Electromagnetic
CCTV	Closed Circuit Television
CMOM	Capacity, Management, Operations, and Maintenance
CIPLL	Cured in Place Lateral Lining
CIPPL	Cured in Place Pipe Lining
COA	City of Allentown
FEB	Flow Equalization Basin
I/I	Inflow/Infiltration
JCI	Jordan Creek Interceptor

KCE	Keystone Consulting Engineers
KISS	Kline’s Island Sewer System
KIWWTP	Kline’s Island Wastewater Treatment Plant
LCA	Lehigh County Authority
LF	Linear Feet
LMT	Lower Macungie Township
LLI	Little Lehigh Interceptor
LLRI	Little Lehigh Relief Interceptor
LOP	Level of Protection
LOS	Level of Service
MGD	Million Gallons per Day
O&M	Operations and Maintenance
PADEP	Pennsylvania Department of Environmental Protection
PTP	Pre-Treatment Plant
RDII	Rainfall Derived Inflow and Infiltration
SCARP	Sewer Capacity Assurance and Rehabilitation Program
SCPS	Spring Creek Pump Station
SRP	Source Reduction Program
SSES	Sanitary Sewer Evaluation Study
SSO	Sanitary Sewer Overflow
TTI	Trexlertown Interceptor
UMiT	Upper Milford Township
UMT	Upper Macungie Township
USEPA	United States Environmental Protection Agency
WLI	Western Lehigh Interceptor
WLSP	Western Lehigh Sewerage Partnership

1. Source Reduction Programs

1.1. Background Overview

Building on the significant I/I source reductions we have made over the past decade, the WLSP's intent is to continue to focus on aggressive I/I source reductions through sewer rehabilitation and clearwater disconnections. Predictions of reductions likely to be achieved are based on extensive flow monitoring and SSES work conducted 2010-2012 and subsequent hydrologic modeling efforts conducted in 2013-2014. This engineering evaluation indicated that up to 27% of the peak wet weather storm volume could potentially be removed from the WLSP system by focusing on the leakiest areas identified during the hydraulic condition assessment work (54 miles, or 20% of the 272 miles of collection sewer mains).

Accordingly, source reduction work was begun in 2009 within the Partners' collection systems. As has been reported in the annual reports to PADEP and in our December 2019 PADEP report, by the end of 2019, 98% of the 42 miles of collection sewer mains have been rehabilitated. Additionally, lateral work had begun in all Partner systems and nearly 3600 manholes had been repaired. These Source Reduction Programs (SRP) work continues today, and will continue through the end of 2025, when the pipes, laterals, and manholes within the prioritized (i.e., leaking) catchments are either rehabilitated or proven not to have excessive I/I. Additionally, several of the Partners are aggressively extending their rehabilitation efforts outside the priority catchments to include all clay pipe and/or any other pipe found via routine CCTV inspections to have significant defects, as well as many of the manholes.

Additionally, LCA has evaluated and rehabilitated 95% of their 22 miles of trunk line and interceptor system. All of the trunk lines of the LCA conveyance system (Breinigsville Trunkline, Alburtis-Macungie Trunkline, Upper Iron Run Trunkline, and Upper Milford Trunkline) were rehabilitated in 2017. The LCA interceptor systems (Western Lehigh Interceptor and Little Lehigh Relief Interceptor) from the pretreatment plant to Spring Creek Pump Station have been rehabilitated. The remaining segments are discussed below.

At the completion of these efforts, 100% of the LCA interceptors and trunk lines will have been rehabilitated or shown not to have excessive I/I, and all of the leakiest collection sewers (i.e., those found to be contributing significant amounts of inflow and infiltration during the 2009-2012 hydraulic condition assessment work) will have been rehabilitated.

Additionally, each of the Partners initiated comprehensive investigations of clearwater connections to their sanitary sewers as part of the hydraulic condition assessment work detailed in Section 2. Many of these connections have already been removed from the sanitary system, and the Partners intend to continue this work through 2025 to eliminate located clearwater connections to the extent practical.

1.2. Lehigh County Authority

1.2.1. Purpose

The manholes of the WLI were inspected in 2014, and a list of recommended rehabilitation to 260 specific manholes was developed. In 2017, the entire WLI Trunkline system was air tested and, in the few locations found to leak, sealed. In 2019, historically high groundwater table conditions allowed LCA to inspect the entire WLI main stem while under extreme groundwater stress to definitively identify leaks. Sites found to leak will be sealed to reduce/eliminate inflow and infiltration from the WLI.

1.2.2. Scope

All manholes on the WLI main stem and trunklines have been inspected. Repairs to the barrel, bench, and pipe penetrations to eliminate leakage will be done at all places where leakage is observed. Additionally, all manholes, siphon hatches, and pump station hatches will be again evaluated for inflow potential and made watertight. The few locations in the lower WLI main stem that were found to be leaking but have not been rehabilitated (Phases 4-6) will be sealed. All leaking end seals in the Upper Iron Run Trunk Line.

1.2.3. Cost

The anticipated cost of these projects, including design engineering, construction oversight, easement clearing, and rehabilitation, is estimated to cost $1.5M.

1.2.4. Schedule

This work is anticipated to be conducted in 2020-2025.

1.2.5. Anticipated Effectiveness

The manhole cover, siphon hatch, and pump station hatch sealing will eliminate inflow into the system during stream flooding conditions. The manhole sealing will significantly reduce groundwater and river-water driven infiltration into manholes. The pipe joint grouting and end seal repair work will significantly reduce any groundwater and river-water driven infiltration into the WLI pipes.

1.3. Upper Milford Township

Flow metering and SSES investigations indicated there are no areas of excessive I/I in the LCA operated portions of Upper Milford Township. Therefore, no SRP works are planned.

1.4. Weisenberg Township

Flow metering and SSES investigations indicated there are no areas of excessive I/I in the LCA operated portions of Weisenberg Township. Therefore, no SRP works are planned.

1.5. Upper Macungie Township

1.5.1. Purpose

Between 2020 and 2025, UMT plans to continue source removal projects in an effort to improve the RDII reductions as well as to maintain a reasonably effective Infiltration/Inflow reduction program.

1.5.2. Scope

UMT’s Source Reduction Program or I/I rehabilitation efforts will be conducted in the areas shown in Figure 4-2, and will include the following projects:

- Continue private property sump pump and clearwater source investigations and removal as necessary.
- Continue with the scheduled 5-year cycle of individual manhole inspections (~600 manholes per year) program and determine the type of repairs and/or rehabilitation methods as may be necessary.
- Conduct lateral investigation and rehabilitation program. Rehabilitation and replacement will be based on findings. Current estimate of work is approximately 1500 laterals through 2025.

1.5.3. Cost

The anticipated cost for engineering, construction, and construction oversight for these works is estimated at $7M.

1.5.4. Schedule

The above projects are scheduled to be developed, designed, and constructed between 2020 and 2025.

1.5.5. Anticipated Effectiveness

UMT anticipates all source reduction work, when completed in 2025, will result in an infiltration/inflow reduction within the project area of 40-60%.

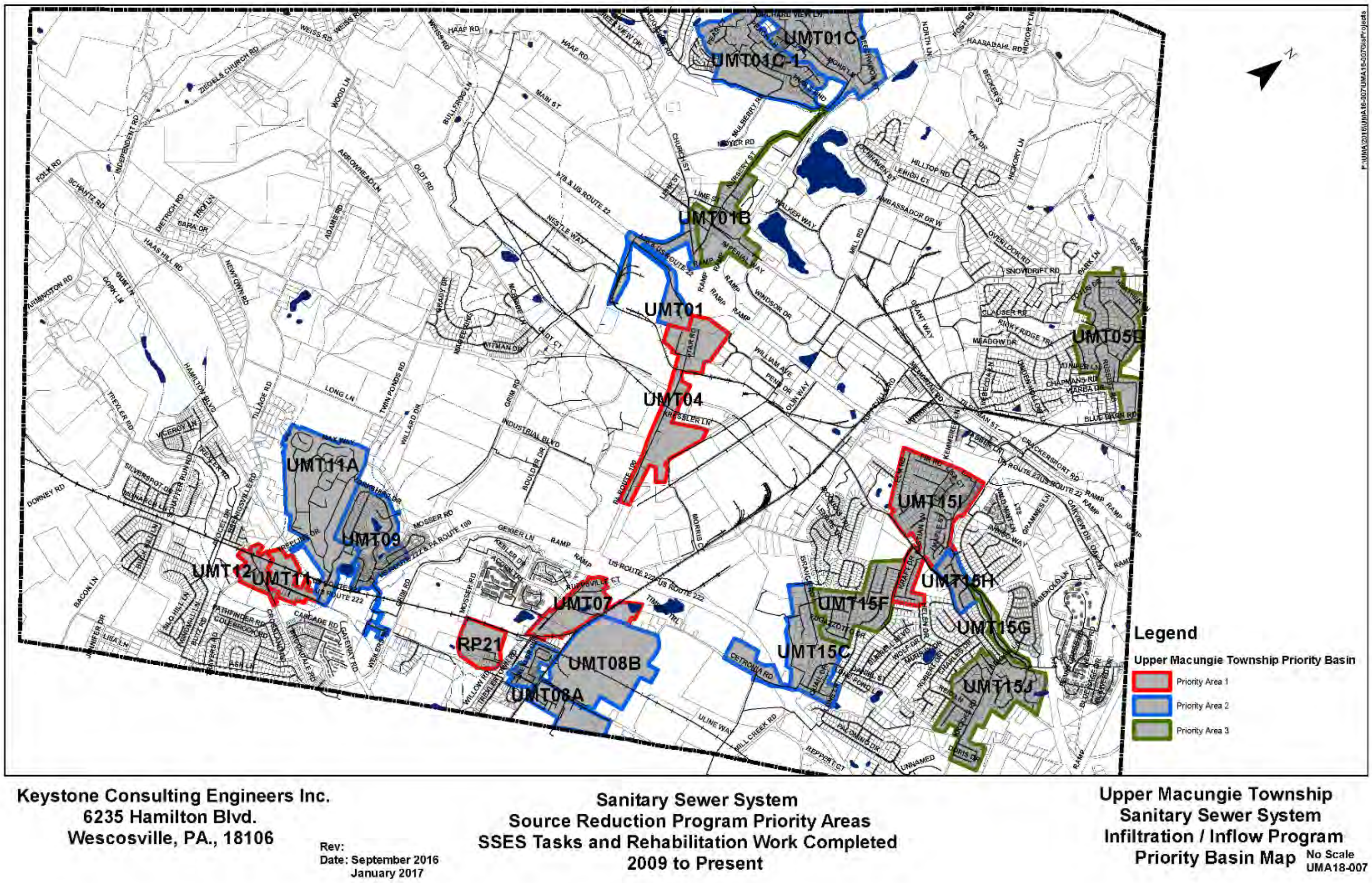


Figure 1-1 - UMT SRP Project Areas

1.6. Lower Macungie Township

1.6.1. Purpose

Between 2020 and 2025, LMT plans to continue source removal projects in an effort to improve the RDII reductions as well as to maintain a reasonably effective Infiltration/Inflow reduction program.

1.6.2. Scope

LMT's Source Reduction Program or I/I rehabilitation efforts will be conducted in the areas shown in Figure 4-3, and will include the following projects:

- Continue private property sump pump and clearwater source investigations and removal as necessary.
- Continue the cured-in-place pipe lining of the VCP sewers until all VCP within the Township sanitary sewer system is lined. Anticipated to be completed in 2020.
- Continue with the scheduled 5-year cycle of individual manhole inspections (~250 manholes per year) program and determine the type of repairs and/or rehabilitation methods as may be necessary.
- Conduct lateral investigation and rehabilitation program of 1200 laterals through 2025.

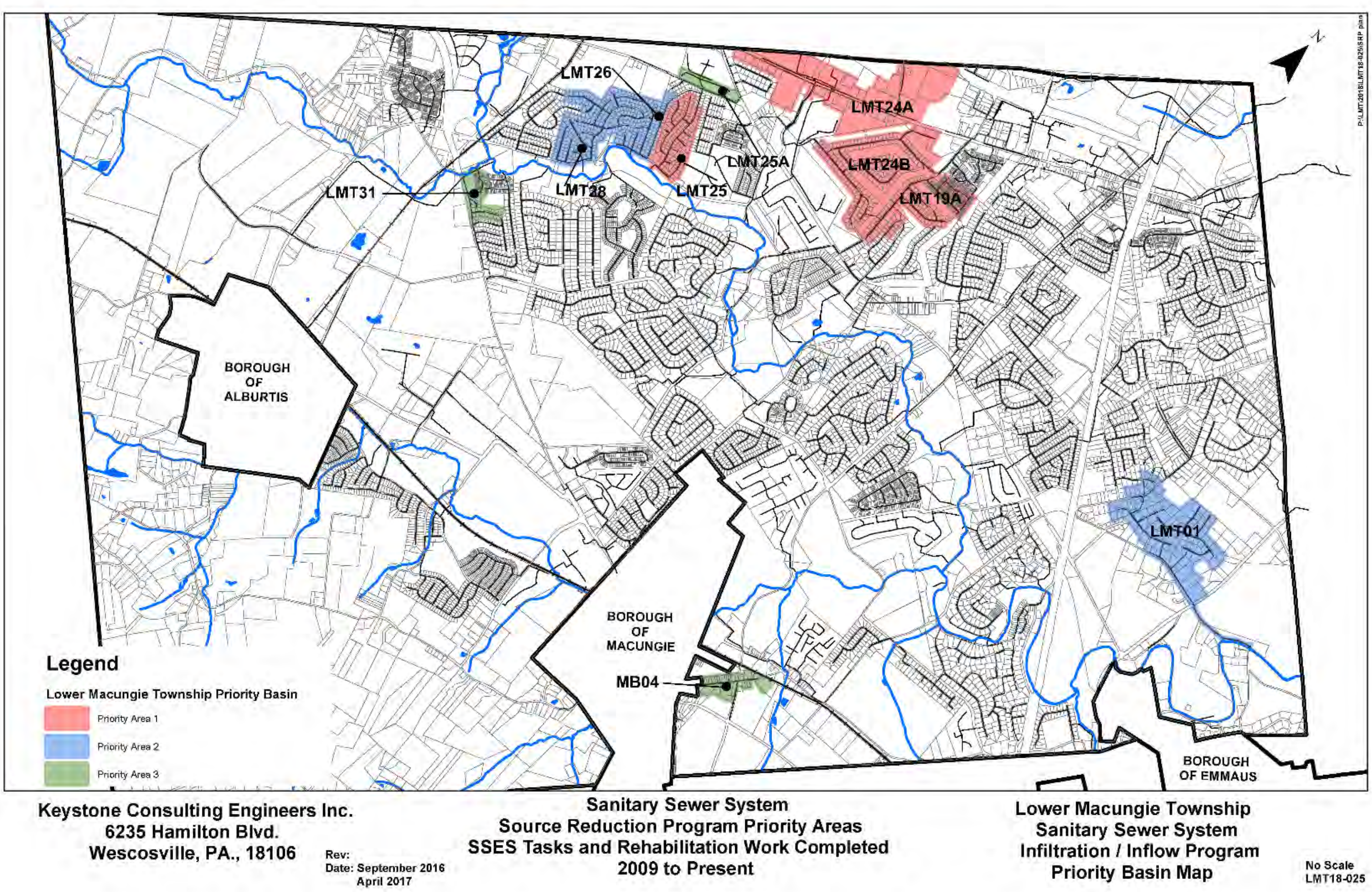


Figure 1-2 - LMT SRP Project Areas

1.6.3. Cost

The anticipated cost for engineering, construction, and construction oversight for these works is estimated at $4M.

1.6.4. Schedule

The above projects are scheduled to be developed, designed, and constructed between 2020 and 2025.

1.6.5. Anticipated Effectiveness

LMT anticipates all source reduction work, when completed in 2025, will result in an infiltration/inflow reduction within the project area of 40-60%.

1.7. Borough of Alburtis

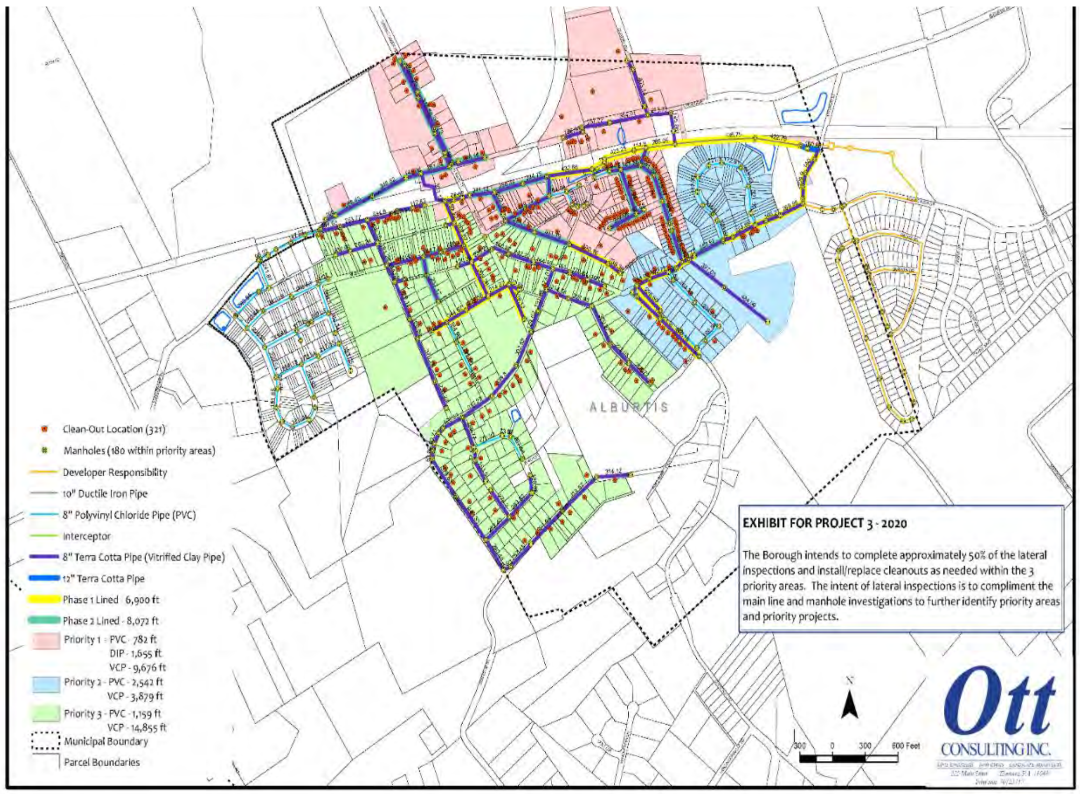
1.7.1. Purpose

The purpose of these projects is to reduce inflow and infiltration entering through cleanouts and laterals within the priority areas.

1.7.2. Scope

Cleanout cap replacement and ewer mains, lateral, and manhole rehabilitation will be completed in yet-to-be-determined locations will be completed in yet-to-be-determined locations within the priority areas as shown in Figure 4-6.

Figure 1-3 – Alburtis 2020 SRP Project



1.7.3. Cost

This work is estimated to cost $1,000,000.

1.7.4. Schedule

This work is scheduled to be completed by 2025.

1.7.5. Anticipated Effectiveness

This project is anticipated to reduce rainfall derived infiltration volume by 35-70% from the project area.

1.8. Borough of Macungie

1.8.1. Purpose

The purpose of these projects is to reduce I&I.

1.8.2. Scope

Approximately 98 new lateral cleanouts will be installed and 400 reinstated laterals will be lined. It is estimated that 130 will be sealed with a top hat, 130 will be lined with a shortie liner, and 130 will be lined with a full length CIPLL liner to the right-of-way line.

1.8.3. Cost

The cost for engineering, construction, and construction oversight for this project was $2.2M.

1.8.4. Schedule

The installation of the cleanouts is anticipated to be done by end of 2021.

1.8.5. Anticipated Effectiveness

Macungie anticipates all source reduction work, when completed in 2021, will result in an infiltration/inflow reduction of 35-70%.

1.9. Lowhill Township

Flow metering and SSES investigations indicated there are no areas of excessive I/I in the LCA operated portions of Lowhill Township. Therefore, no SRP works are planned.

APPENDIX 11

Western Lehigh Sewerage Partnership Capital Improvement Plans

LOWHILL TOWNSHIP

LEHIGH COUNTY AUTHORITY

Capacity Improvements Plans

Western Lehigh Sewerage Partnership

March 15, 2020

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ARCADIS Design & Consultancy for natural and built assets

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KIWWTP	Kline's Island Wastewater Treatment Plant
LCA	Lehigh County Authority

LF	Linear Feet
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LLI	Little Lehigh Interceptor
LLRI	Little Lehigh Relief Interceptor
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LOS	Level of Service
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TTI	Trexlertown Interceptor
UMiT	Upper Milford Township
UMT	Upper Macungie Township
USEPA	United States Environmental Protection Agency
WLI	Western Lehigh Interceptor
WLSP	Western Lehigh Sewerage Partnership

1. Capacity Improvements

There are several capacity related projects that will need to be conducted contemporaneously with the 537 Work Plan and completed before the 537 Report is completed. These are primarily refurbishment and rehabilitation projects designed to extend the life of existing components without increasing capacity. The exceptions to this are the Park Force Main Extension, which provides needed partial capacity relief in the JCI, and the Trexlertown Interceptor, which provide needed additional dry day and wet weather conveyance capacity in the upper section of the WLI.

Finally, capacity improvements will be made to relieve the level of service-impacted sections of the Trexlertown portion of the Western Lehigh Interceptor either by constructing a parallel Trexlertown Interceptor or by constructing a new Iron Run Pump Station and force main (unless the Source Reduction Program's greatly exceed expectations). The selection of one of these two options and the sizing of them will be completed as part of the SCARP effort. Additional capacity improvements will be evaluated within the context of normal Chapter 94 reports and Act 537 planning efforts.

Additionally, the WLSP will participate in regional capacity improvements to eliminate the dry weather operational issues in Allentown's LLI and JCI caused by flows from multiple Signatories as well as improvements needed at the KIWWTP to manage peak wet weather flows to the treatment plant.

1.1. Park Pump Station Refurbishment

1.1.1. Purpose

The Park Pump Station was constructed in the early 1980s and was originally intended to serve as a wet weather flow relief facility for the Western Lehigh and Little Lehigh Interceptors during wet weather events. The station conveys wastewater from ten municipalities (Upper Milford Township, Weisenberg Township, Lower Macungie Township, Upper Macungie Township , Lowhill Township, Alburtis, Macungie, Borough of Emmaus, Salisbury Township, and South Whitehall Township) to the Jordan Creek Interceptor just upstream of KIWWTP. Since 2012, dry day flows from these municipalities and Allentown have increased to the point that daily overflows would occur in Allentown's Little Lehigh Interceptor and Jordan Creek Interceptor if LCA's Park Pump Station were not daily operated as a dry day pump station. Age, increased operation, and wet well characteristics have resulted in significant wear and tear on equipment, with many components at or beyond their service life. The increasing frequency of pump related repairs and declining pump performance has necessitated an upgrade of this essential asset in order to restore the station to its design capacity and avoid sanitary sewer surcharging and overflows in the interceptors. The purpose of this project is to restore the station to its design capacity (level of service), extend the service life, and enhance station reliability

1.1.2. Scope

The scope of work includes the replacement of extended shaft type pumps with dry pit submersible type pumps, replacement of the electrical controls and rheostat drives with modern controls and variable frequency drives, upgrade of HVAC system, replacement of roof system, replacement of (inoperable) force main drain valve, replacement of wet well level control system, replacement of influent slide gate, installation of new hoist system and related structural members, construction of new floor opening and hatch to access dry well, electrical service upgrade, SCADA system upgrade and associated new instrumentation, and replacement of internal process piping, valves and fittings in order to complete a comprehensive structural/mechanical/electrical upgrade to the station.Cost

1.1.3. Cost

The cost for engineering, construction, and construction oversight for this project is $4.5M.

1.1.4. Schedule

Engineering for this project was completed in 2017. The DEP Part 2 Water Quality Management Permit was approved (dated 9/27/17permit) and design was completed by the end of November 2017. The project was advertised for bid (via PennBid) on 12/13/17, the pre-bid meeting was held on 1/4/18, and bids were opened on 2/1/18. Construction has begun and is anticipated to be completed by Summer 2020.

1.1.5. Anticipated Effectiveness

This project will provide 20 MGD of firm capacity from the Park Pump Station, allow for higher levels of operating efficiencies during dry day (lower flow demand) operations than the older motors/pumps, and provide an additional 25 years of life to pump station.

1.2. Park Forcemain and ARV Rehabilitation

1.2.1. Purpose

The Park Pump Station was intermittently operated during storm events only from start of operations in 1981 through mid-2000s. Beginning around 2005, the Park Pump Station began intermittent dry day operations to relieve City of Allentown's hydraulically overloaded Little Lehigh Interceptor; during this period, the pump station would operate for up to 4 hours per day several days per week. Beginning around 2013, the Park Pump Station began daily operations to relieve City of Allentown's hydraulically overloaded Little Lehigh Interceptor; during this period, the pump station would operate for one or two 4-hour cycles each day. During this entire 38-year period, the air release vacuum valves (ARV) would allow air to enter the Park Forcemain each time the pump station shutoff, allowing the pipeline to partially drain. Between periods of operation, the sewage in the line would turn completely septic, to the point where when the pumps turned on the grass around the ARVs would be killed by the hydrogen sulfide gases. These same gases supported sulfide reducing bacteria inside the pipe that produce sulfuric acid that attacks the interior cement mortar and steel cylinder of the prestressed concrete cylinder pipe forcemain. This may have compromised the structural integrity of the forcemain. Inspections are planned to assess the condition and possible need for rehabilitation or replacement of the forcemain.

1.2.2. Scope

The scope of Park Forcemain rehabilitation is not determined. The initial inspections are scheduled for Spring 2020, with follow-up inspections, if needed, to follow later in 2020 or 2021.

1.2.3. Cost

The cost of Park Forcemain rehabilitation is not determined.

1.2.4. Schedule

The schedule for corrective action for the Park Forcemain depends on the extent and nature of the work needed. If spot repairs are needed, the work will be conducted in 2021. If rehabilitation is required, the work will be conducted in 2021-2022. If replacement is required, the work will be conducted 2021 - 2023, depending on the difficulty of identifying and procuring easements for a new pipeline.

1.2.5. Anticipated Effectiveness

The intention is to extend the life of the Park Forcemain so it is commensurate with that of the newly refurbished Park Pump Station.

1.3. Spring Creek Pump Station Force Main and ARV Rehabilitation

1.3.1. Purpose

The SCPS was intermittently operated during storm events only from start of operations in 1994 through mid-2000s. Beginning around 2013, the SCPS began irregular but increasingly routine daily operations to relieve high flow levels in the WLI between SCPS and Kecks Bridge. In 2016, the influent gate to the SCPS failed open, and the SCPS has operated regularly since that time. During most of this entire 24-year period, the air release vacuum valves (ARV) were shut off (and in some cases removed entirely) to prevent odors from leaving the pipeline when the pumps turned on. Between periods of operation, the sewage in the line would turn completely septic, allowing air/sulfide gases inside the pipe to develop into pockets that move as the pumps turn on and off. This may have compromised the structural integrity of the ductile iron forcemain. Inspections are planned to assess the condition and possible need for rehabilitation or replacement of the forcemain as well as replace the ARVs.

1.3.2. Scope

A PURE SmartBall investigation will be attempted to identify the location of gas pockets. A broadband electromagnetic (BEM) tests will be conducted at locations were gas pockets are found to determine remaining wall thickness and assess the remaining useful life of the forcemain before repair, rehabilitation, or replacement is needed.

An evaluation of the impact of vacuum on the pipeline from inoperable vacuum release valves will be conducted to determine if vacuum release valves are warranted. An evaluation of the need for and location required to remove gas pockets will be conducted to determine if air release valves are warranted. Pipeline rehabilitation and ARV replacement or relocation will be completed as needed.

1.3.3. Cost

As the scope of work is undefined, no costs for this work have been as yet determined.

1.3.4. Schedule

Inspections and testing will be conducted in 2021. Pipeline rehabilitation and ARV replacement or relocation, if needed, will be completed as dictated by the findings.

1.3.5. Anticipated Effectiveness

The intention is to extend the life of the Spring Creek Forcemain so it is commensurate with that of the remaining useful life of the SCPS.

1.4. Trexlertown Interceptor Paralleling

1.4.1. Purpose

The KISS modeling of alternatives identified the 2-mile section of the WLI from just north of Hamilton Boulevard (starting around the Sportmen's Association) through to Spring Creek Road as being currently within 0.5 MGD of its dry weather capacity and within a decade being well over its wet weather LOP goals. This section will be paralleled with a new Trexlertown Interceptor (TTI) to alleviate dry weather surcharging during wet periods. This new interceptor will be sized to handle peak wet weather flows for the 2050 planning horizon. No increase in flows into City sewer systems will be realized by this project because of downstream capacity restrictions at Kecks Bridge siphon and at Spring Creek Pump Station (the only two points of connections between LCA and City sewers.

1.4.2. Scope

The TTI will consist of approximately 2 miles of 24-inch and 27-inch centrifugally cast fiberglass reinforced polymer mortar pipe. The alignment of this new interceptor is not yet determined.

1.4.3. Cost

The cost for easements, engineering, construction, and construction oversight for this project is $13M.

1.4.4. Schedule

Alignment evaluation and easement acquisition are anticipated to start in 2019 and take at least two years to complete. Once complete, a 537 Plan Update submission, Part 2 WQM permits, and engineering will be completed, with an anticipated start of construction in 2022 and completion of construction in 2023.

1.4.5. Anticipated Effectiveness

This work will achieve all 2050 capacity goals within this reach of the WLI.

1.5. Post-2025 Capacity Improvements

As previously reported in the semiannual reports, existing regional dry weather flows cause daily surcharging of LCA's WLI and COA's LLI and JCI. Dry-day overflows are avoided through the daily operation of LCA's wet weather relief pump stations. Source reduction efforts by all Signatories will reduce the impact of wet weather flows, and some measures may also incrementally reduce base flow infiltration entering these interceptors, but previously conducted modeling efforts indicate a probability these interceptors will remain hydraulically overloaded. The additional flows projected by the Signatories to enter these lines will exacerbate the overload.

It is anticipated that additional conveyance improvements may be required, and this will be evaluated as part of the 537 Plan alternatives evaluation process. The options previously studied during the Administrative Order process suggest LCA capacity improvements may include construction of additional parallel sections of the WLI while other Signatory capacity improvements may include construction of a new regional pump station, transfer of the existing Park Pump Station from an LCA facility to a regional facility, paralleling of COA's LLI and JCI interceptors, paralleling of other Signatory interceptors, and peak and dry day flow treatment and hydraulics improvements at KIWWTP to address all KISS Signatory flows. Solutions that utilize the LCA Pretreatment Plant may alter the size and length of these capacity projects.