



Management, Operations, and Maintenance Program for Sewers

Lehigh County Authority
City Division-Sewer Line
Maintenance Department

July 2018



THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

1.0 INTRODUCTION	1-1
1.1 MOM Regulatory Initiators	1-1
1.2 LCA MOM Program Goals	1-2
1.3 LCA MOM Program Purpose	1-3
1.4 Allentown Service Area Description	1-3
1.4.1 Allentown Collection System	1-4
1.4.2 Contributory Collection Systems	1-4
1.4.3 Allentown Trunk Sewers	1-4
1.4.3.1 Lehigh River Trunk Sewer	1-5
1.4.3.2 Front Street-Union Street Trunk Sewer	1-5
1.4.3.3 Jordon Creek Trunk Sewer	1-6
1.4.3.4 Little Lehigh Creek Trunk Sewer	1-6
1.4.3.5 Emmaus Trunk Sewer	1-6
1.4.3.6 Trout Creek Trunk Sewer	1-7
1.4.3.7 District No. 29 Trunk Sewer	1-7
1.4.3.8 Maple Street Trunk Sewer	1-7
1.4.4 Signatory Relief Sewers	1-8
1.5 MOM Definitions	1-8
2.0 Operation and Maintenance Programs	2-15
2.1 Gravity Sewer Operations and Maintenance Program	2-15
2.1.1 Overview	2-15
2.1.2 Goals and Performance Measures (Appendix E)	2-16
2.1.3 Preventative Maintenance (PM)	2-16
2.1.3.1 Routine Cleaning	2-16
2.1.3.1.1 Frequency and Schedule	2-17
2.1.3.2 Closed Circuit Television (CCTV) Inspection	2-17
2.1.3.2.1 Frequency and Schedule	2-18
2.1.3.3 Root Control	2-19
2.1.3.3.1 Frequency and Schedule	2-19
2.1.3.4 Fats, Oils, and Grease Control	2-19
2.1.4 SOPs	2-20
2.1.5 Reactive Maintenance	2-21
2.1.5.1 Response to Complaints	2-21
2.1.5.2 Root Cause Analysis	2-22
2.1.6 Equipment and Spare Parts	2-22
2.1.7 Staffing	2-23
2.1.7.1 Outsourcing	2-23
2.1.7.2 Required Credentials, Training Programs, and Staff Development	2-23
2.1.8 Information Management	2-24
2.2 Sanitary Sewer Lateral Maintenance	2-25
2.2.1 Overview	2-25
2.2.2 Legal Authority to Enter Private Laterals	2-26
2.2.3 Responding to Complaints	2-26
2.2.4 SOPs	2-27

3.0 Support Programs	3-28
3.1 Capital Works Design and Construction	3-28
3.1.1 Purpose	3-28
3.1.2 Goals and Performance Measures (Appendix E).....	3-28
3.1.3 Standards	3-28
3.2 Pennsylvania One Call / Pennsylvania811	3-29
3.2.1 Purpose	3-29
3.2.2 Goals and Performance Measures (Appendix E).....	3-30
3.2.3 Components	3-30
3.2.3.1 Standards	3-31
3.2.3.2 SOPs.....	3-31
3.2.3.3 Enforcement Program.....	3-32
3.2.3.4 Line Location for Third Parties.....	3-32
3.3 PaDEP Approval Process	3-32
3.3.1 Purpose	3-33
3.3.2 Goals and Performance Measures (Appendix H).....	3-33
3.3.3 Connection Management Program	3-33
3.3.4 Components	3-35
3.4 Service Connection/Disconnection	3-36
3.4.1 Purpose	3-36
3.4.2 Goals and Performance Measures (Appendix H).....	3-36
3.4.3 Components	3-37
3.4.3.1 Unauthorized Connections	3-37
3.4.3.2 Standards	3-39
3.4.3.3 SOPs.....	3-39
4.0 Sanitary Sewer Overflow (SSO) Response, Reporting, and Recordkeeping Program.4-40	
4.1 Purpose	4-40
4.2 Goals and Performance Measures	4-40
4.3 Methods for Calculating Spill Volumes	4-41
4.4 Methods for Tracking Spills and Complaints.....	4-41
4.5 Spill Responses/Remediation Practices	4-41
4.6 Failure Impact Evaluation and Risk Management	4-42
4.7 Scheduled Flow Control Plan.....	4-42
4.8 Wet Weather Flow Control Plan.....	4-43
4.9 SSO Performance Data	4-43

All Appendices are available upon request: www.lehighcountyauthority.org/contact-us/

Appendix A

940 SEWER ORDINANCE
941 INDUSTRIAL WASTE ORDINANCE #15346 FINAL
FIGURE 1-1 ALLENTOWN COLLECTION & INTERCEPTOR SEWER SYSTEM
FIGURE 1-2 ALLENTOWN - KIWWTW SEWER SERVICE AREA
FIGURE 1-3 ALLENTOWN SANITARY INTERCEPTORS



INTRODUCTION

FIGURE 1-4 ALLENTOWN TRUNK & RELIEF SEWER SYSTEM
FIGURE 1-5 CALLOUT LIST 2018
FIGURE 1-6 SEWER LINE MAINTENANCE DEPARTMENT ORG CHART
O&M B10-B15SERIES2
O&M AQUATECH PARTS CATALOG
O&M VACTOR RAM JET SAFETY MANUAL

Appendix B

FIGURE 2-1 SEWER LINE SERVICE ORDER
FIGURE 2-2 MANHOLE INSPECTION
FIGURE 2-3 SEWER LINE INSPECTION AND CLEANING
FIGURE 2-4 ROOT CAUSE AND EFFECT
FIGURE 2-5 EQUIPMENT INSPECTION
FIGURE 2-6 DAILY JET ROUTES
FIGURE 2-7 MONTHLY JET ROUTES
FIGURE 2-8 YEARLY JET ROUTES
SOP ALTAIR 5X MSA AIR UNIT
SOP AQUATECH SEWER TRUCK# 7069 SOP CCTV SEWER INSPECTION
SOP CHOP SAW & CUT-OFF MACHINES
SOP DUMPING VACTOR #68
SOP EQUIPMENT OPERATIONS
SOP GEN ROADWORK & EXCAVATION PROC
SOP INFLATABLE SHORING - SMART SHORE SYSTEM
SOP JET TRUCK 7090
SOP SANITARY MANHOLE INSPECTIONS
SOP TRIPOD WINCH ASSEMBLY
SOP TROUBLE AREAS
TABLE 2-1 SANITARY SEWER PIPE STATISTICS
TABLE 2-2 CLEANING AND CCTV PRODUCTION
TABLE 2-3 ROOT CONTROL
TABLE 2-4 CLEANING AND INSPECTION EQUIPMENT
TABLE 2-5 HEAVY EXCAVATION EQUIPMENT

Appendix C

FIGURE 3-1 WILL SERVE LETTER - SEWER
FIGURE 3-2 PLANNING MODULE EXAMPLE
FIGURE 3-3 DEP APPROVAL LETTER
FIGURE 3-4 LCA CONSTRUCTION PERMIT - BLANK
FIGURE 3-5 CONSTRUCTION PERMIT - EXAMPLE
FIGURE 3-6 DAILY INSPECTION REPORT
FIGURE 3-7 COA PLANNING MODULE DETERMINATION FORM
SOP UTILITY LOCATE
SOP WATER SERVICE DISCONTINUATION-RESTORATION



Appendix D

FIGURE 4-1 SSO REPORT FORM - PADEP
FIGURE 4-2 SSO MASTER LIST
FIGURE 4-3 FLOW CHART - SANITARY SEWER OVERFLOW RESPONSE 6-6-17
FIGURE 4-4 FLOW CHART - SANITARY SEWER OVERFLOW RESPONSE
FIGURE 4-5 FLOW CHART - STORM DRAIN COMPLAINT
FIGURE 4-6 FLOW CHART - SHARED SSO
SOP AFTER HOUR SERVICE CALLS
SOP HURRICANE TROPICAL STORM AND FLOODING PREPAREDNESS
SOP LARGE DIAMETER SEWER BREAK POLICY SOP
SOP SANITARY SEWER RESPONSE PLAN REVISED
SOP WLI-WWRF OPERATING LOGIC 11-30-17

Appendix E

GOALS AND PERFORMANCE MEASURES
TABLE 2.2.3.1
TABLE 2.2.3.2
TABLE 2.2.3.3

THIS PAGE INTENTIONALLY LEFT BLANK

1.0 INTRODUCTION

This Management, Operations, and Maintenance (MOM) Program has been developed by Lehigh County Authority (LCA) to formalize and restate its plans for operating and maintaining the sewer system owned by the City of Allentown. LCA is responsible for proper operation and maintenance of the system under the terms of a 50-year lease agreement it signed with the City of Allentown in May 2013. The lease agreement specifies certain operating standards that LCA must meet to remain in compliance with the lease. This document has been prepared for submission to the USEPA to comply with requirements of the 2007 and 2009 Administrative Orders issued by the agency for the elimination of sanitary sewer overflows. The requirements of the Allentown lease agreement have been incorporated into this MOM program document where applicable. Any additional work described within this document shall not be interpreted to change the operating standards required by the lease.

1.1 MOM Regulatory Initiators

Under existing federal regulations of 40 Code of Federal Regulations (CFR) 122.41, all NPDES permits must contain two standard conditions addressing operation and maintenance.

- Requirements established by 40 CFR 122.41(e) that mandate proper operation and maintenance of permitted wastewater systems and related facilities to achieve compliance with permit conditions.
- Requirements established by 40 CFR 122.41(d) that direct the Permittee to take all reasonable steps to minimize or prevent any discharge in violation of the permit that has a reasonable likelihood of adversely affecting human health or the environment.

LCA's City Division Sewer Line Maintenance Department (SLMD) operates the City of Allentown's sanitary sewer system under NPDES permit PA002600 issued to the City for the Kline's Island Wastewater Treatment Plant (KIWWTP) sewerage system and therefore is subject to these rules. Additionally, the City collection system is subject to action by the United States Environmental Protection Agency (USEPA) under Compliance Order CWA-03-2009-0313DN (Administrative Order) regarding sanitary sewer overflows as are all neighboring municipalities discharging sewage to the KIWWTP.

1.2 LCA MOM Program Goals

This MOM program outline describes the various components, organization, and programs comprising LCA's wastewater collection operations, maintenance, design, and management functions. The goal of the LCA City Division MOM Program is to prevent sanitary sewer overflows, to mitigate the impact of sanitary sewer overflows when they do occur, to provide customer-driven levels of service across all aspects of the wastewater collection operation, and to achieve these goals in the most economically, efficient, and sustainable manner possible.

To achieve these goals, the following practices are accepted as self-evident best wastewater utility management practices.

- Improving the efficiency of the administration and operation of the sanitary sewer system while providing acceptable levels of service to the sewer service customers.
- Proactively maintaining and upgrading the conveyance systems to minimize failure of critical system components.
- Funding a routine infrastructure rehabilitation and replacement program to sustain the City of Allentown system.
- Providing adequate capacity to convey base flows and peak flows by:

- Improving the efficiency of the existing sewer system by increasing available capacity through the reduction of infiltration and inflow of storm water, groundwater, and illicit discharges into the sewer system network
- Executing a methodical sewer cleaning program to ensure maximum conveyance capacity during dry and wet-weather flow regimes

1.3 LCA MOM Program Purpose

The purpose of this MOM Program is to document LCA's plans and practices that optimize delivery and cost of sewer collection. The proper and efficient management, operation, and maintenance of the sewer infrastructure are essential to LCA's mission to protect public health and the environment. LCA must take reasonable measures necessary to eliminate or minimize SSOs and to provide adequate system capacity. Inadequate collection system operation and maintenance practices, particularly those that lead to SSOs, violating the stipulated permit conditions.

This program documents some of LCA's sewer programs and demonstrates how LCA's various departments and divisions work together to achieve their business goals and objectives.

LCA's MOM Program serves as an operational guide for sanitary sewer collection, transmission, treatment, and disposal systems operated by the Authority. LCA will conduct a comprehensive review of this MOM Program annually to review performance, identify needed program improvements, and reflect changing business and customer realities.

1.4 Allentown Service Area Description

Under a 50-year lease and concession agreement effective August 8, 2013 with the City of Allentown, LCA operates the sanitary sewer system that exists within the geographical boundaries of the City of Allentown. Figure 1-1 shows a map of the service area for the City of Allentown.

1.4.1 Allentown Collection System

The area of the City of Allentown (City) is approximately 11,232 acres. The City's wastewater collection system consists of over 1,504,000 linear feet of sewers ranging in size from 6 to 60 inches in diameter. The majority of the sewer lines were installed between the early 1920s and 1970s. The City's wastewater collection system conveys Allentown and signatory wastewater flow by gravity to the KIWWTP.

1.4.2 Contributory Collection Systems

Beginning in the late 1950s and continuing through the late 1960s, the City entered into service agreements with surrounding municipalities and authorities, currently referred to as signatories, for treatment of wastewater at the City's KIWWTP. The first signatory agreement was executed with the Borough of Emmaus in 1959. In 1965, signatory agreements were executed with Coplay-Whitehall, Salisbury, and South Whitehall. In 1969, a signatory agreement was executed with the Lehigh County Authority.

Additional areas contributing to the City's sewer system encompass approximately 5,300 acres outside of the City limits within 14 neighboring municipalities. The following outlying jurisdictions convey wastewater flow either directly to the KIWWTP or indirectly to the KIWWTP through the City's wastewater collection system: Borough of Alburtis, Borough of Emmaus, Borough of Macungie, Coplay-Whitehall Sewer Authority, Hanover Township, Lehigh County Authority, Lower Macungie Township, Lowhill Township, Salisbury Township, South Whitehall Township, Upper Macungie Township, Upper Milford Township, and Weisenberg Township. Figure 1-2 depicts the location of the City and location of contributing communities/signatories.

1.4.3 Allentown Trunk Sewers

Currently the wastewater from Allentown and the signatories is conveyed to the KIWWTP by a system of seven (7) trunk sewers listed below:

- 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
- Maple Street Trunk Sewer

Figure 1-3 shows a map of the City of Allentown trunk sewers.

1.4.3.1 Lehigh River Trunk Sewer

The Lehigh River Trunk Sewer was constructed between the years of 1931 and 1939 with extensions completed in 1968 and provides conveyance of sewage generated by residential and commercial users located in the northeast quadrant of Allentown and also serving parts of Hanover Township. This trunk line starts at MH 22_14K on Woodlawn Street and empties into the Little Lehigh Trunk Sewer on site at the KIWWTP at MH A_3_5. With a total length of 29,656 feet, pipe sizes range from 15 to 36 inches in diameter. The type of pipe utilized for construction of this trunk line runs the full range of materials utilized during the period: cast iron; ductile iron; reinforced concrete; poured in place reinforced concrete with a tile floor; vitrified clay; and polyvinyl chloride.

1.4.3.2 Front Street-Union Street Trunk Sewer

The Front Street-Union Street Trunk Sewer was constructed in 1927 with a minor extension completed in 1959 and provides conveyance of sewage generated by residential and commercial users located in center-city Allentown. This trunk line starts in MH 4_10B on Furnace Street and empties into the Jordan Trunk Sewer near the KIWWTP at MH 3_1E. With a total length of 13,197 feet, pipe sizes range from 18 to 36 inches in diameter. Materials of construction utilized for this trunk line were as follows: vitrified clay; and polyvinyl chloride.

1.4.3.3 Jordon Creek Trunk Sewer

The Jordan Creek Trunk Sewer was constructed between the years of 1926 and 1932, providing conveyance of sewage generated by residential and commercial users located in the northern and central sectors of Allentown and parts of Coplay, South Whitehall and Whitehall townships. This trunk line starts in MH E_7_19 at Sumner Avenue and empties into the Little Lehigh Creek Trunk Sewer under the bridge at Basin Street at MH O_2_1. With a total length of 28,826 feet, pipe sizes range from 16 to 42 inches in diameter. Materials of construction utilized for this trunk line were as follows: cast iron; poured in place reinforced concrete with a tile floor; and vitrified clay.

1.4.3.4 Little Lehigh Creek Trunk Sewer

The Little Lehigh Creek Trunk Sewer was constructed between the years of 1928 and 1959 providing conveyance of sewage generated by residential and commercial users located on the west side of Allentown; municipalities connected to LCA's Western Lehigh Interceptor system; Coplay; Salisbury; South Whitehall; Whitehall Townships; and Emmaus Borough. This trunk line starts in MH 43_8dD at the Allentown Golf Course and ends at the headworks of the KIWWTP. With a total length of 36,640 feet, pipe sizes range from 12 to 60 inches in diameter. Materials of construction utilized for this trunk line were as follows: cast iron; reinforced concrete; poured in place reinforced concrete with a tile floor; and vitrified clay.

1.4.3.5 Emmaus Trunk Sewer

The Emmaus Trunk Sewer was constructed in 1959 providing conveyance of sewage generated by residential and commercial users located in the western sector of Allentown and parts of Emmaus Borough and Salisbury Township. This trunk line starts in MH EM 33_1 at Devonshire Park and empties into the Little Lehigh Creek Trunk Sewer at MH U_11_33 near Park Drive. With a total length of 19,590 feet, pipe sizes range from 21 to

36 inches in diameter. Material of construction utilized for this trunk line was reinforced concrete.

1.4.3.6 Trout Creek Trunk Sewer

The Trout Creek Trunk Sewer was constructed between the years of 1926 and 1962 providing conveyance of sewage generated by residential and commercial users located on the south side of Allentown and sections of Salisbury Township. This trunk line starts in MH 34_12B at Auburn Street empties into the Little Lehigh Creek Trunk Sewer at MH O_2_1 near the KIWWTP. With a total length of 33,102 feet, pipe sizes range from 12 to 27 inches in diameter. The type of pipe utilized for construction of this trunk line was vitrified clay.

1.4.3.7 District No. 29 Trunk Sewer

The District No. 29 Trunk Sewer was constructed between 1935 and 1940 providing conveyance of sewage generated by residential and commercial users located on the far eastern portion of Allentown and parts of Salisbury Township. This trunk line starts in MH 29_48M at E. Juniata Street and S. Gilmore and empties into the Little Lehigh Creek Trunk Sewer at MH O_2-1 at the headworks of Kline's Island. With a total length of 9,998 feet, pipe sizes range from 12 to 18 inches. Materials of construction utilized for this trunk line were reinforced concrete and vitrified clay.

1.4.3.8 Maple Street Trunk Sewer

The Maple Street Trunk Sewer was constructed in 1934 and provides conveyance of sewage generated by residential and commercial users located on the northeastern sector of Allentown and parts of Hanover, Salisbury, and Whitehall Townships. This trunk line starts in MH 23_44B at N. Wahneta and E. Kurts Streets and empties into the Lehigh River Trunk Sewer at MH B_5_11. With a total length of 785 feet, pipe sizes are 15 to 16 inches in diameter. Materials of construction utilized for this trunk line were cast iron and vitrified clay.

1.4.4 Signatory Relief Sewers

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, the City and its signatories were required to perform Sewer System Evaluation Surveys (SSESs). As part of the City's SSES performed during the period 1978-1980, the hydraulic capacity of each trunk sewer was calculated and compared to the estimated capacity required for the year 2025 based on projected population growth, per-capita wastewater generation rates, and peaking factor curves.

As a result, the construction of relief sewers was recommended to provide the additional capacity needed to accommodate year 2025 peak dry weather flows. The following relief sewers were subsequently constructed by the sewer signatories:

- LCA Little Lehigh Creek Relief Sewer
- South Whitehall Relief Sewer
- Salisbury Relief Sewer
- Coplay-Whitehall Lehigh Sewer
- Coplay-Whitehall Jordan Sewer

Figure 1-4 shows a map depicting the location of the signatory relief sewers.

1.5 MOM Definitions

Applicable standards and limitations – all State, interstate, and federal standards and limitations to which a “discharge,” a “sewage sludge use or disposal practice,” or a related activity is subject under the CWA, including “effluent limitations,” water quality standards, standards of performance, toxic effluent standards or prohibitions, “best management practices,” pretreatment standards, and “standards for sewage

sludge use or disposal” under sections 301, 302, 303, 304, 306, 307,308, 403 and 405 of CWA.

Average monthly discharge limitation – the highest allowable average of “daily discharges” over a calendar month, calculated as the sum of all “daily discharges” measured during a calendar month divided by the number of “daily discharges” measured during that month.

Average weekly discharge limitation – the highest allowable average of “daily discharges” over a calendar week, calculated as the sum of all “daily discharges” measured during a calendar week divided by the number of “daily discharges” measured during that week.

Best management practices (BMPs) – schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of “waters of the United States.” BMPs include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

CWA – the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Public Law 92–500, as amended by Public Law 95–217, Public Law 95–576, Public Law 96–483 and Public Law 97– 117, 33 U.S.C. 1251 *et seq.*

CWA and regulations – the Clean Water Act (CWA) and applicable regulations promulgated thereunder. In the case of an approved State program, it includes State program requirements.

Daily discharge – the “discharge of a pollutant” measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the “daily discharge” is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations

expressed in other units of measurement, the “daily discharge” is calculated as the average measurement of the pollutant over the day.

Direct discharge – the “discharge of a pollutant.”

Discharge – when used without qualification means the “discharge of a pollutant.”

Discharge of a pollutant –

- Any addition of any “pollutant” or combination of pollutants to “waters of the United States” from any “point source,” or
- Any addition of any pollutant or combination of pollutants to the waters of the “contiguous zone” or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation.

This definition includes additions of pollutants into waters of the United States from surface runoff collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person, which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. This term does not include an addition of pollutants by any “indirect discharger.

Environmental Protection Agency (EPA) – the United States Environmental Protection Agency.

Hazardous substance – any substance designated under 40 CFR part 116 pursuant to section 311 of CWA.

Indirect discharger – a non-domestic discharger introducing “pollutants” to a “publicly owned treatment works.”

MOM - Management, Operation and Maintenance (MOM), the name of a proposed regulation amendment to clarify the requirements of sanitary sewer utilities to meet the

“Duty to mitigate” (40 CFR 122.41(d)) and “Proper operation and maintenance” (40 CFR 122.41(e)) requirements under the NPDES permits for all collections systems feeding into permitted treatment plants. This regulation was proposed as 40 CFR 122.41 (f), but was never passed into law. Requirements from the proposed MOM regulation have been included and enforced as part of EPA Consent Decrees and are a part of many wastewater utilities NPDES permits.

MOM Program - The documents, procedures, and activities a utility implements as part of a comprehensive plan for overseeing the system’s management, operation and maintenance.

Municipal separate storm sewer system – is defined at § 122.26 (b)(4) and (b)(7).

New source – any building, structure, facility, or installation from which there is or may be a “discharge of pollutants,” the construction of which commenced:

- After promulgation of standards of performance under section 306 of CWA which are applicable to such source, or
- After proposal of standards of performance in accordance with section 306 of CWA, which are applicable to such source, but only if, the standards promulgate in accordance with section 306 within 120 days of their proposal.

Permit – an authorization, license, or equivalent control document issued by EPA or an “approved State” to implement the requirements of this part and parts 123 and 124. “Permit” includes a NPDES “general permit” (§ 122.28). Permit does not include any permit which has not yet been the subject of final agency action, such as a “draft permit” or a “proposed permit.” *Person* means an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

Point source – any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling

stock, concentrated animal feeding operation, landfill-leachate collection system, vessel, or other floating craft from which pollutants discharge. This term does not include return flows from irrigated agriculture or agricultural storm water runoff. (See § 122.3).

Pollutant – dredged spoil, solid waste, incinerator residue, filter back- wash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 *et seq.*)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean:

- Sewage from vessels; or
- Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well-used either to facilitate production or for disposal purposes is approved by authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water re- sources.

Program Manuals - Documents that relate to the LCA MOM Program, but are incorporated into LCA's MOM Program Document by reference rather than directly contained in the Program Document. These are often stand-alone documents outlining procedures and metrics of specific programs (i.e., Pretreatment Program Manual, Gravity Lines Operations and Maintenance Manual).

Process wastewater – any water, which, during manufacturing or processing, comes into direct contact with, or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Schedule of compliance – a schedule of remedial measures included in a “permit”, including an enforceable sequence of interim requirements (actions, operations, or milestone events) leading to compliance with the CWA and regulations.

SCADA (Supervisory Control and Data Acquisition) - a system for remote monitoring and control that operates with coded signals over communication channels (using typically one communication channel per remote station).

Septage – the liquid and solid material pumped from a septic tank, cesspool, similar domestic sewage treatment system, or a holding tank when the system is cleaned or maintained.

Sewage Sludge – any solid, semi-solid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced waste water treatment, scum, septage, portable toilet pumping's, type III marine sanitation device pumping's (33 CFR part 159), and sewage sludge products. Sewage sludge does not include grit or screenings, or ash generated during the incineration of sewage sludge.

Sewage sludge use or disposal practice – the collection, storage, treatment, transportation, processing, monitoring, use, or disposal of sewage sludge.

Site – the land or water area where any “facility or activity” is physically located or conducted, including adjacent land used in connection with the facility or activity.

Sludge-only facility – any “treatment works treating domestic sewage” whose methods of sewage sludge use or disposal are subject to regulations promulgated pursuant to section 405(d) of the CWA and is required to obtain a permit under § 122.1(b)(2).

Sanitary Sewer Overflow (SSO) - any spill of raw or untreated sewage out of manholes, pump stations, or any other sewage-conveyance system component onto public or private property, including waterways.

Sanitary Sewer Overflow (SSO) Response – Action taken when LCA is notified of the occurrence of an SSO.

Standards for sewage sludge use or disposal – the regulations promulgated pursuant to section 405(d) of the CWA which govern minimum requirements for sludge quality, management practices, and monitoring and reporting applicable to sewage sludge or the use or disposal of sewage sludge by any person.

Toxic pollutant – any pollutant listed as toxic under section 307(a)(1) or, in the case of “sludge use or disposal practices,” any pollutant identified in regulations implementing section 405(d) of the CWA.

Variance – any mechanism or provision under section 301 or 316 of CWA or under 40 CFR part 125, or in the applicable “effluent limitations guidelines” which allows modification to or waiver of the generally applicable effluent limitation requirements or time deadlines of CWA. This includes provisions, which allow the establishment of alternative limitations based on fundamentally different factors or on sections 301(c), 301(g), 301(h), 301(i), or 316(a) of CWA.

Wetlands – those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

2.0 Operation and Maintenance Programs

The O&M programs outlined as follows have been developed and continue to evolve and advance in order to safely, cost effectively operate and maintain the City of Allentown (City) sanitary sewer system.

2.1 Gravity Sewer Operations and Maintenance Program

This section describes the programs necessary to operate and maintain the City gravity sanitary sewer system. Some programs are described in general terms and reference their program specific plans, O & M manuals, work plans, etc. for details. Others are described entirely herein.

2.1.1 Overview

LCA operates the gravity sewer system, performs routine maintenance and cleaning, conducts ongoing routine visual and CCTV assessments of the condition of the system, and performs corrective maintenance when required to keep the sewer system owned by the City of Allentown operational.

The focus of this program is twofold: first to maintain the sanitary sewers through a systematic approach of cleaning, vacuuming, and CCTV inspection along with responding to emergency calls; secondly is to repair, replace, and install sanitary sewer infrastructure as required in accordance with the Concession Lease. This program is driven by the goal to prevent SSOs before they occur.

The SLMD operates and maintains 21 miles of gravity sanitary interceptors (≥ 24 "), 22 miles of gravity sanitary trunk lines (12"-21"), 242 miles of gravity sanitary collectors (4"-10"); with 7199 sanitary sewer manholes and 33,358 sanitary sewer lateral connections. These data are shown in Table 2-1.

2.1.2 Goals and Performance Measures (Appendix E)

2.1.3 Preventative Maintenance (PM)

The SLMD conducts preventative maintenance activities on the gravity system and appurtenances on a proactive basis to identify and resolve problems before they result in failures that can cause overflows. Defined preventative maintenance schedules rest on past system performance, experience, and Concession Lease requirements.

Preventative Maintenance (PM) activities are in addition to routine maintenance activities described below. The intent of this work is to identify sources of Inflow and Infiltration (I&I) and to reduce the potential for surcharging and overflows in the system.

It should be mentioned that larger-diameter gravity sewer lines do not experience the same types of problems as the smaller-diameter gravity residential lines. For instance, Fats, Oils and Grease (FOG) accumulation and root intrusion are more of a problem in the City's smaller diameter lines than their larger lines. Accordingly, preventative maintenance practices vary by both diameter and pipe material.

2.1.3.1 Routine Cleaning

On a daily basis jet truck crews are assigned daily routes to check, Figure 2-6 provides an examples of daily jet routes. The routes consist of historical trouble spots to inspect and maintain. In addition to their daily routes, units are also responsible for responding to all emergency calls. Furthermore, the crews work on the yearly jet route and the district jetting program. These units are equipped with the ability to add degreaser in lines that exhibit the presence of heavy grease.

LCA's philosophy for the development of jet routes consists of the identification of sanitary lines that have become problematic, whether it is because of roots, grease, structural problems, etc., they are placed on the daily or monthly jet route until the problem has been rectified. A monthly route listing can be found in Figure 2-7. An example of this would be if a line keeps backing up due to any problem more than 3 times in a year, LCA will then place it on one of these two lists. When the problem is rectified, LCA will check

it frequently for six months and if no problems are observed during that period, it will be moved to the 6-month route. It will remain on the 6-month route for approximately 2 years. If no additional problems occur, it will be moved back to the yearly route. Figure 2-8 provides information on the yearly route. CCTV surveys are completed to verify initial problem and confirm the line condition.

The yearly jet route is a systematic cleaning of 43 sewer districts from a list developed over the past 20 years. New lines are added as required and example jet routes can be found in Appendix B. The SLMD is currently on its 4th sweep of the yearly route since 2013. To date, 1,035 miles have been cleaned since 2013 (last five years, this includes line with repeated cleanings). The historical cleaning production is shown in Table 2-2.

2.1.3.1.1 Frequency and Schedule

The SLMD is responsible to flush a minimum of 55,000 LF of collection system annually as per the Concession Agreement. The department's goal is to achieve a cleaning frequency of 24% of the system cleaned annually (about 75 miles per year).

Combination of the cleaner crews and the flusher truck crew clean approximately 1,246,000 LF annually is maintained. Mileage cleaned goals for 2018 are over 265 miles which includes cleaning in support of CCTV surveys.

2.1.3.2 Closed Circuit Television (CCTV) Inspection

CCTV operators certified in the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Condition Program (PACP) use the PACP rating system to identify the severity of the defects found during the inspection process. The PACP defect coding provides a level of consistency in the defect rating. Therefore, Capital Works staff and consultants reviewing the inspection records can understand and use the information accordingly.

CCTV inspection is a non-destructive, proactive approach to evaluate the City's sanitary sewer infrastructure and used when observed data is necessary to assess the condition of the pipeline interior. CCTV inspection functions include:

- Inspecting pipeline condition and determining the location of problem areas such as pipe or joint separations, drops, ruptures, obstructions, deterioration, pipe misalignment, and root intrusions
- Locating infiltration and inflow sources during routine inspections
- Inspecting the sewers for damage caused by excavation and construction
- Searching for unrecorded connections, laterals, and details such as illegal or unauthorized tap-ins
- Evaluating effectiveness of pipeline repairs, replacement, and/or rehabilitation within the sewer system
- Assessing pipeline condition of new installation before the warranty period ends

2.1.3.2.1 Frequency and Schedule

The SLMD is responsible to CCTV a minimum of 55,000 LF of collection system annually as per the Concession Lease. The long-term CCTV program has a goal of inspecting gravity sewers ≤ 10 " on a 15-year cycle. However, these goals adjust according to the condition of the pipe and City's street program and paving schedules. Portions of the gravity system that may be more subject to problems such as inverted siphons are inspected every ten years. Pipes inspected and found to have defects with a NASSCO rating of 4 or 5 are put on a list to be repaired within a reasonable timeframe based upon the defect and location. The historical CCTV survey production is shown in Table 2-2.

Although one of LCA's goals for this program is to assess all gravity segments, some segments may be inaccessible due to steep slopes, vegetative growth in easements, or

other conditions. If LCA identifies any such segment, crews assess the upstream and downstream segments (as they can) to determine if there are any issues.

2.1.3.3 Root Control

Root intrusion is a problem that can result in backups and overflows. CCTV inspections assess the condition of the pipes and determine the location of any root intrusion. Root cutting takes place in conjunction with CCTV surveys as well as daily jetting operations when a problems with roots are found in the sewer mains. When roots are present in the system and have the potential to cause an obstruction to the flow, LCA utilizes a chemical root control subcontract with Municipal Sales to control regrowth of roots. The chemical program is on a yearly basis and is generated through CCTV and problem area annotated in day to day operations with the jetting schedule. The product applied is ROO-PRU Sanafoam it is a Dichobenil contact herbicide used for terminating any root intrusion into City sewer lines. The environmental toxicity information from the SDS regarding Sanafoam indicates that it has no detrimental effects upon waste water sewer systems.

2.1.3.3.1 Frequency and Schedule

Chemical root control is used to control root intrusion on average 12 miles of chronically root-impacted sewers annually. The demand for chemical root treatment and the requirement for the Concession Lease is estimated to be about 10 miles per year. Typically the application of the root control product is completed by the contractor in July of each year when flows are generally lower. The linear feet of sewer pipe that have been root controlled over the past 5-years via chemical treatment is shown in Table 2-3.

2.1.3.4 Fats, Oils, and Grease Control

The LCA SLMD staff have found utilizing FOG controlling enzymes to combat in-line grease accumulations to be ineffective and therefore have abandoned this practice. Currently, when crews locate property owner or city line blockages that are the result of FOG, crews will issue a notice to the property owner (residential or commercial) with a copy of the work order. This notice makes them aware of the problem and explains ways

to avoid discharging FOG into the sewer system. As previously mentioned SLMD jet trucks, via sewer jet equipment, inject “Duke’s Jet Power II Degreaser” in lines that exhibit the presence of heavy grease.

Moreover, the LCA Compliance Department is conceptually developing a FOG program that will be applicable to all food service establishments within the City of Allentown that discharge to the Kline’s Island WWTP. The program will be based on specific discharge prohibitions listed in the General Pretreatment Regulations (40 CFR 403) and the City of Allentown’s Industrial Waste Ordinance. Regulated users will be required to follow Best Management Practices (BMPs). These BMPs will include regular grease interceptor cleaning/inspection with proper disposal, proper grease handling practices, and staff training. Pretreatment staff will inspect users on a yearly basis to ensure compliance with the program. Violations of compliance will be enforced according to the City Industrial Waste Ordinance.

2.1.4 SOPs

SLMD maintains Gravity Sewer O&M SOPs (See Appendix B) describing many of their regular procedures in running a gravity sanitary sewer system, such as:

- CCTV Sewer Inspections
- Sanitary Sewer Manhole Inspections
- Trouble Areas
- Road Work and Excavation
- Aquatech Sewer Truck #7069
- Jet truck #7090
- Equipment Operations
- Tripod Winch Assembly
- Chop Saw/Cut-Off Machines
- Altair 5x Atmosphere Monitor

- Smart Shore System

The SLMD staff regards SOPs as living documents, they review the existing SOPs frequently and revise as necessary. SLMD supervisors have weekly meetings with their field staff to discuss any issues and concerns. These meetings allow for a discussion of any problems arising from implementing the above-mentioned SOPs and procedures. These procedures present the general work sequence and adequately document details to maintain a repeatable standard.

Currently, the SLMD maintains numerous forms, checklists, and reports for gravity sewer O&M. Refer to Appendix B for the checklists and forms used for manhole and various gravity sewer inspections. Supervisor's review these forms and procedures frequently based on operational experience or process changes.

2.1.5 Reactive Maintenance

Reactive maintenance takes place when an unanticipated problem occurs in the system because of a break, blockage, construction activity, or an act of vandalism. Reactive maintenance utilizes the same equipment and techniques used in the preventative maintenance activities. If the problem results in a release from the collection system, the responding crews can follow steps outlined in the Sanitary Sewer Response Plan. Crews record and map the locations of overflows to document causes and patterns of failures that may require additional investigation and preventative maintenance activities.

The SLMD develops project data sheets for the LCA Capital Improvement Program (CIP) based on known problems, equipment obsolescence, or known improvement opportunities. The Capital Works Department collects and analyzes CIP data sheets using an established set of criteria to establish the relative priority of each proposed project.

2.1.5.1 Response to Complaints

Typically, the Customer Service Department receives complaints. These complaints are then directed to the appropriate department supervisor. LCA staff respond to customer

complaints during normal work hours and after hours. LCA has contracted with the City of Allentown Communications Center to answer after-hours and weekend calls regarding the sewer system. The Communications Center dispatches the on-call LCA technician who responds to the complaint promptly. Nights and weekends are covered by emergency standby personnel that consist of two technicians and a supervisor. Standby crews are available 24 hours a day to respond to any emergency. If additional personnel or resources are required, the supervisor on call obtains the necessary manpower and equipment to complete the work, including private contractors if necessary.

2.1.5.2 Root Cause Analysis

The SLMD utilizes root cause analysis protocol for all reactive maintenance issues. The protocol is implemented by the maintenance supervisor and the first step is a thorough investigation of the incident. Findings from the root cause analysis are used to update SOPs and develop capital improvement projects when applicable.

2.1.6 Equipment and Spare Parts

Spare gravity sewer parts such as manhole covers, barrels and cones; and pipe of various materials and diameters are stored at the SLMD office located 1242 Martin Luther King Drive and in the yard at 112 West Union Street in Allentown. Spare parts inventory is logged utilizing Excel software and Munis operating software.

The SLMD currently utilizes Vactor cleaning equipment, Aries CCTV equipment, and WinCan CCTV data capture software. The SLMD currently has numerous vehicles used in maintaining the gravity sewer system including: 3 pickup trucks, 1 sport utility vehicle, 1 transit van, 1 vac/jet truck, 2 jet trucks and 1 CCTV Inspection truck. Table 2-4 lists the primary cleaning and inspection equipment, make, model, and relevant operating specifications. SLMD also has the heavy equipment and bypass pumping equipment required to excavate and replace any malfunctioning line, manhole, valve, or other appurtenance. Table 2-5 lists the heavy equipment for excavation and replacement, make, model, and relevant operating specifications. Years until replacement of any piece of equipment is determined by the fleet manager and appropriate operating staff.

2.1.7 Staffing

Appendix A contains a current organization chart for SLMD. There are 8 staff positions consisting of one (1) Maintenance Supervisor, three (3) Utility Technician 3 – operates CCTV unit, leads construction crew including operating required construction equipment; four (4) Utility Technician 2 – operates the combination cleaner and jet trucks, and assists construction crews. Typically, there are occasional open positions as a result of employee movement throughout the LCA organization.

2.1.7.1 Outsourcing

The SLMD outsources major repairs and bypasses. Chemical root control is currently outsourced to Municipal Sales. Any bypass pumping greater than 1000 gpm, or any bypass lasting more than two days, or any bypass greater than 200 linear feet is outsourced. Deep emergency excavations and long runs of pipe requiring replacement are also outsourced.

2.1.7.2 Required Credentials, Training Programs, and Staff Development

The SLMD entry-level positions require a valid driver's license. Promotion to the Utility Technician 2 position is contingent upon the employee receiving his/her Class A CDL driver's license (or within 120 days of start of employment in this position) and achieving a sewer collection system or water distribution system operator's license via the Pennsylvania Department of Environmental Protection. Promotion to a Utility Technician 3 position is based on available openings and employee mastery of higher level skill sets required for this position.

All SLMD positions require LCA employees responsible for gravity sewer operations and maintenance complete LCA's required safety and training modules before working in confined spaces. Equipment-specific training is provided on an as-needed basis.

SLMD crew supervisors and lead technicians are responsible for training new hires. The SLMD Division Manager is responsible for training crew supervisors, existing and new

employees, and for identifying any skills that are lacking in the department workforce. Vendor and equipment training is provided on an as-needed basis. Operators of the CCTV system receive NASSCO PACP, MACP, and LACP certification.

Training programs and corresponding certifications available to SLMD crews include:

- Commercial driver's license
- Tanker endorsement
- NASSCO PACP, MACP, and LACP certification
- Confined space entry certification
- PADEP Water and Wastewater Systems Operator Certification

SLMD employees responsible for gravity sanitary sewer operations and maintenance complete required safety and training modules. Employees train while on-the-job and in the classroom when necessary.

2.1.8 Information Management

Field crews utilize the LCA GIS system via phones and truck mounted laptop computers to locate and conceptualize buried sewer infrastructure. Maintenance and repair details are recorded on hard copies of work order forms as shown in Figure 2-1. The Maintenance Supervisor inputs this hard copy information into the CityWorks Computerized Maintenance Management System (CMMS) and into tracking spreadsheets. Examples of completed work order forms and tracking of work orders in CityWorks are shown in Figure 2-9 and Figure 2-10.

The SLMD is continuing the process of fully implementing a CMMS using CityWorks software. This system will record and keep track of maintenance records to assist staff in identifying what transpired in response to problems, identifying normal maintenance, and scheduling necessary maintenance. Inventory capability will be part of this system.

Each CCTV evaluation inspection yields reports and videos. Camera crews file reports and videos by line segment number and corresponding manhole numbers. On a quarterly basis, these videos, reports, and images are transferred from the WINCAN software to the server referred to as the Z-Drive at this file location:

Water1/PipeTechFromTruck. These data are saved on this server for a period of 5 years. Along with reports and inspection videos, crews keep an updated record of progress made against the normal inspection schedule. An up-to-date copy of CCTV inspection status spreadsheet is located N:\WTRCommon\DIST\QUARTERLY REPORTS on the wtr-dc server. A summary report is also available in the WINCAN software located on the Allentown CCTV Truck.

2.2 Sanitary Sewer Lateral Maintenance

LCA City Division SLMD does not have a formal sanitary sewer lateral maintenance program and development of a program is not currently under consideration. The City of Allentown has maintained through its sewer use ordinance that ownership of a lateral from the building to the sewer main is the responsibility of the property owner. Therefore the Allentown sanitary sewer system laterals were not part of the infrastructure lease to LCA under the 50-year concession and lease agreement.

That's not to say that visible lateral defects or evidence of clear water flows identified through CCTV surveys of the system are ignored; contrariwise they are considered the responsibility of and are directed to the property owner to be corrected.

2.2.1 Overview

The City does not own and therefore LCA does not maintain any part of the gravity sanitary sewer system service laterals that run from buildings on private property to the

sewer main. There are about 33,358 sanitary sewer laterals within the jurisdictional area of the City.

2.2.2 Legal Authority to Enter Private Laterals

After thoroughly reviewing the City's legal authority to enter private laterals, the City's legal counsel (Hall and Associates) concluded that the City can only address private laterals where the lateral is known to be defective or obstructed due to a manifested problem directly traceable to the lateral.

2.2.3 Responding to Complaints

Typically, the Customer Service Department receives complaints of basement backups or SSOs occurring on private property from lateral appurtenances such as vent pipes. These complaints then go to the appropriate department supervisor and field staff. LCA staff respond to customer complaints during normal work hours and after hours. LCA contracts with the City of Allentown Communications Center to answer after-hours and weekend calls regarding laterals. The Communications Center dispatches the on-call LCA technician who makes contact with the caller and responds to the complaint promptly if deemed appropriate. After-hours and weekends are covered by emergency standby personnel that consist of two technicians and a supervisor. Standby crews are available 24 hours a day to respond to any emergency.

In response to customer complaints, SLMD technicians check manholes, jets the main, and/or CCTV survey the main to ensure that a backup does not exist at the point of connection between the customer's lateral and the main sewer. At this point in time, the customer is directed to call a plumber to relieve the blockage in the lateral. The most effective tool utilized to force reluctant property owners to resolve the problem with the lateral is the shut off the potable water service to the building.

Responding SLMD staff typically use a vac-truck to clean up sewage pooled on the road or the ground resulting from the private property SSO. Additionally, disinfectant is applied

to the SSO affected area when considered appropriate. After-hours fees are calculated and invoiced back to the property owner as required.

2.2.4 SOPs

The SLMD maintains Lateral O&M SOPs (see Appendix B) that include:

- After Hours Service Calls
- Service Order Forms
- Sanitary Sewer Response Plan

3.0 Support Programs

3.1 Capital Works Design and Construction

3.1.1 Purpose

The LCA Capital Works Department ensures that the design of new or improved City infrastructure is in accordance with applicable standards, codes, and guidelines, and is inspected and built to the specified standards set forth in LCA's General Specifications for Sanitary Sewer Construction (dated September 1989).

3.1.2 Goals and Performance Measures (Appendix E)

The general goal of the Capital Works Design and Construction program is to minimize repair costs to the utility by ensuring the assets will meet all necessary functions over their lifetime. To achieve this, LCA's Capital Works Design and Construction Program identified the following specific goals:

- Design and construct new and rehabilitated infrastructure projects that comply with design standards, laws, rules, and regulations set forth in the General Specifications
- Perform new and rehabilitation projects in an effective and efficient manner that protects the environment during construction
- Create a prioritized CIP based on a comprehensive set of criteria to support capital planning and spending

3.1.3 Standards

Supervision and inspection of LCA's construction and rehabilitation projects usually occur through a contractual arrangement with an engineering firm. In-house staff inspects smaller construction and rehabilitation projects. As part of the plans and specifications for new projects, the design engineer, the LCA Capital Works-staff project manager, and the inspector implement strict procedures for testing the facilities. LCA has the authority to

ensure the proper installation, inspection, and testing of new and rehabilitated sewers in all parts of the City system.

3.2 Pennsylvania One Call / Pennsylvania811

3.2.1 Purpose

This section identifies the legal requirements and responsibility for LCA to: locate entity owned sewer lines for construction excavation projects; implement this program as required by law; and identify responsible technicians to repair lines if damaged due to mismarking or failure to locate occurs. State law (Act 50, Signed into law 10-30-2017) specifies the legal responsibility for damage to the utilities. If an entity does not call for locates or damage occurs from a properly marked utility, the entity or construction crew causing the damage is responsible for the repairs and subsequent impacts of the damaged asset, including loss of time. If the utility is mismarked and out of the tolerance zone, the marker is responsible for repair costs and subsequent impacts including loss of time. If information supplied to the marker was incorrect, the supplier of the information is responsible for repairs and subsequent impacts of the damaged asset or assets.

The SLMD staff performs buried infrastructure locate responsibilities as a daily job function and LCA has subsequently identified this work as a required use of staff time and budget. On an annual basis the time and materials utilized to locate underground assets is reevaluated and budget adjusted accordingly.

This program exists to ensure that third parties doing excavation underground work unrelated to the City system do not damage City/LCA assets, and are responsible for satisfactory repairs/reparations if damage occurs. LCA participates in PA One Call by Law to prevent damage to the City's underground assets by locating and marking underground lines prior to construction or other excavation activities. LCA follows PA One Call standards, which use Common Ground Alliance Best Practices 15.0 for Temporary Marking (ANSI standard Z535). White is used for proposed excavation; Pink for temporary survey markings; Red for electric power lines, cables, conduits and lighting cables; Yellow

for gas, oil, steam, petroleum or gaseous materials; Orange for communication, alarm or signal lines, cables or conduits and traffic loops; Blue for potable water; Purple for reclaimed water, irrigation and slurry lines; and, Green for sanitary and storm sewer lines.

This program educates LCA employees regarding excavation laws and responsibilities and prevents and/or reduces damage/interruption of service to City's as well as other utilities lines and/or customers.

3.2.2 Goals and Performance Measures (Appendix E)

The goal of this program is prevent and minimize damage from occurring to City assets by third party individuals. Responsibilities of repairs lies with LCA if there are no line locates delineated and proper PA one calls were completed. Metrics include number of calls responded to, turnaround time for standard calls, turnaround time for emergency calls, turnaround time for design calls, marked lines, cleared lines, and the number of assets damaged due to in accurate and inaccurate mark outs.

LCA has the goal of accurately marking the underground lines to ensure that no damage occurs to City facilities. LCA responds to several types of PA One Call (KARL) tickets within the designated time required by the program. The current program utilizes a third party damage prevention software produced by KorTerra.

3.2.3 Components

Pennsylvania state law requires that LCA, as the utility operator, participate in PA One Call. Anyone preparing to excavate must place a call to PA One Call (KARL) to have all underground utilities located and marked before digging. Pennsylvania811 coordinates the calls and notifies all utilities of possible conflicts. Pennsylvania811 issues a ticket depending on the type of job or excavation. Pennsylvania811 designates tickets as designer, regular, update, emergency, meeting, or special project tickets.

LCA is required to respond to all tickets received and is typically required to mark City utilities within 3-10 business days (or sooner depending on the type of ticket) of the

notification. If the project is under design and someone requests a physical survey of the utilities, this “designer” ticket allows LCA up to 10 working days to mark the utilities in conflict and/or provide record drawings. The marking crew utilizes record drawings, tracer wire, line of sight, and other location technologies to provide the location of the underground utility.

3.2.3.1 Standards

Standards, set by legislation, include:

- Minimum Notice between mark out request and work
- Maximum response time
- Requirements for “emergency” excavation and excavation priority
- Required action by contractor if line is damaged
 - When marked correctly
 - When mismarked
 - When not marked out by LCA within the required period
 - When work is conducted without notice

3.2.3.2 SOPs

Written procedures for the Line Location Program focus on field procedures and include:

- Responding to calls
 - Identifying where no field work is needed
 - Marked out lines
 - Special situations

- “Emergency” excavations
- Locating lines
 - Using mapping
 - Using land marks such as cleanouts and manholes
 - Using line tracing equipment
- Marking Lines
 - Mains and or trunk lines

3.2.3.3 Enforcement Program

If a contractor works near City facilities and LCA did not receive the proper notification, the contractor must stop working. The contractor, while performing work, is liable for any repairs to damaged City infrastructure, if the work was improperly marked or not called in to PA One Call. LCA may file an insurance claim to recover repair expenses not assumed by the contractor.

3.2.3.4 Line Location for Third Parties

LCA may operate pipes in areas where the PA One Call does not apply or a contractor may be working on or near a plant or pump station and request that underground utilities be marked. Upon request, LCA may mark the utilities in these areas. This service ensures the integrity of City pipelines and structures.

3.3 PaDEP Approval Process

This section identifies the required PaDEP approval process for control of connections to the sanitary sewer system resulting from development within the City and from satellite systems. It cites the authority by which LCA monitors these flows and, if necessary, prohibit flows and/or enforce compliance.

3.3.1 Purpose

LCA has developed a PaDEP approval process for reviewing proposed new connections or major modifications to existing connections to the City sewer system. The process allows for the orderly and consistent review of new service requests and coordinates the review process between LCA's Capital Works Department, the City of Allentown and the Pennsylvania Department of Protection. These new flows primarily consist of new developments (usually sub-divisions) or single dwelling units.

3.3.2 Goals and Performance Measures (Appendix H)

No goals or performance measures identified at the current time. However, the below goals could be used for the program. The proposed goals of the PaDEP Approval Program are to:

- Allow for adequate long term capacity planning in the system
- Track new connections and provide for adequate planning
- Provide an opportunity for LCA to ensure connections meet LCA's design criteria, which are in the LCA General Specifications for Sanitary Sewer Construction

3.3.3 Connection Management Program

The responsibility of meeting the sewage disposal needs (conveyance and treatment) of the municipality rests with the municipality. Each municipality is required to have an Act 537 Official Sewage Facilities Plan to adequately address these needs. Adoption by resolution of a planning module is the vehicle for legally amending the municipality's Official Plan. LCA as a requirement of the concession and lease agreement acts as the City's agent in the processing Act 537 Sewage Facility Planning Modules for projects within the City and connected municipalities.

LCA Capital Works Department manages the following activities in the planning process:



- Certifies available capacity when available for the project in the collector sewer, trunk line and wastewater treatment plant and issues the “will serve” letter; an example letter is provided in Figure 3-1
- Directs the developer to submit a Sewage Facilities Planning Module for PADEP approval
- For projects within the City:
 - Approves the site and plumbing plans for projects within the City
 - Verifies that the developer obtains road opening permits from the municipality and/or PA-DOT to construct the sewer mains and/or services
 - Issues LCA Developer's Sewer System Agreement or a Construction Permit for construction of the sewer mains and/or services
 - Assures developer installation of the sewer system is in accordance with the approved plans and applicable LCA policies and regulations, including the current General Specifications for Sewer System Construction
 - Ensures developer's compliance with the terms and conditions of LCA's Rules and Regulations for Sewer Service, including completion of an Application for Sewer Service and payment of applicable fees and charges in its Schedule of Wastewater Rates & Charges
 - Collects the capacity tapping fees paid to LCA prior to building permits being provided by the City

The developer's engineer is typically responsible for completing the planning module application and relies upon LCA to certify the available capacity and for LCA CEO's to sign: Section G, Proposed Wastewater Disposal Facilities and Section J, Chapter 94 Consistency Determination. An example of a Sewage Facilities Planning Module

application can be found in Figure 3-2. The PADEP then reviews the proposed 537 Plan revision in the form of the Planning Module and if all is found to be acceptable PADEP issues an approval letter to Allentown's City Clerk. The City Clerk provides for amendment of the City's 537 Plan through adoption of a resolution by the Allentown City Council. An example of a PADEP planning module approval letter is provided in Figure 3-3. Upon enactment of the resolution the City issues the Developer building permit.

3.3.4 Components

LCA has the legal authority to accept, reject, and control connections to the City sanitary sewer system through the planning module approval program. It is LCA's responsibility to maintain an effective PaDEP approval process.

There are two classifications of sanitary sewer flow acceptance: single service connections and system extension. Single service connections encompass new individual meters and service lines. System extensions encompass new sources of large flow, usually housing sub-divisions.

3.4 Service Connection/Disconnection

3.4.1 Purpose

LCA inspects connections and disconnections to make sure there are not any illegal connections, improper connections, and lapses in recording connections/disconnections.

The purpose of LCA's Service Connection/Disconnection Program is to:

- Prepare accurate and detailed records of new work
- To ensure qualified and approved contractors perform work on service connects/disconnects
- Provide information to the Billing Department on new service connections/disconnections

3.4.2 Goals and Performance Measures (Appendix H)

LCA inspects connections and disconnections to make sure there are no illegal connections, improper connections, and lapses in recording connections/disconnections.

The overall goal of the Service Connection/Disconnection Program is to eliminate clear water and structural problems arising from poor connections.

Accomplishment of this overall goal is by LCA providing:

- Installation of all new residential connections to ensure Standard Specifications are meet
- Inspection of all new industrial connections to ensure Standard Specifications are meet
- Efficient turnaround time for new tap installations

3.4.3 Components

The Service Connection/Disconnection Program is responsible for projects that connect to an existing City collector sewer, projects that require a new tap connection, or projects with proposed gravity connections to City trunk lines. For all three scenarios, LCA oversees the new connection processes. Responsibility lies with the property owner and/or their contractor to provide LCA with proper notification. An LCA designated inspector is required to be present at the location of the connection. All materials used in constructing the service must be new and meet Standard Specifications.

Connections to the City's gravity main sanitary sewer system must meet all Standard Specifications. These procedures allow LCA to control the connection process, to preserve system integrity, and to practice due diligence while supporting appropriate service inspection.

3.4.3.1 Unauthorized Connections

Infiltration and inflow (I/I) of extraneous stormwater and groundwater to sanitary sewers can overwhelm the conveyance capacity of sewers and is a significant cause of system overflows. Sewer laterals, which connect buildings on private properties to sewer mains, are often a significant source of I/I. Clean water is frequently directed into the sanitary sewer system through unauthorized private connections. The need to remove sources of non-wastewater "inflow" into the sanitary sewer system from private property is a concern for SLMD managers. These inflow sources can include connections from roof leaders, area drains, and basement sump pumps. LCA is not responsible for the formalized house to house inspections of private property for unauthorized connections within the City of Allentown, however if clear water flow from a lateral is observed during CCTV surveys the SLMD staff responds in the following manner:

- Supervisor contacts the property owner
- If permission is granted, the property is inspected for the inflow source. This may require the use of a dye test to verify connection(s) to sanitary sewer system

- If an inflow source is identified, the property owner is sent a letter notifying them they have 30 days to correct the problem
- Once the problem is corrected, a follow up inspection is performed
- If the clear water inflow involves the buried portion of lateral, other technology may be employed to identify source

The primary responsibility for systemized private property inspections to identify unauthorized connects remained with the City upon execution of the lease of the sanitary sewer system. The City's Bureau of Building Standards and Safety is dedicated to pre-sale inspections and the inspection of rental properties in order to determine compliance with the City of Allentown Property Rehabilitation & Maintenance Code. Of these codified Ordinances, Article 1747.15 does not permit rain water conductors to be directed into the sanitary sewer system and Article 1743.07 does not permit sump pumps to be directed into the sanitary sewer system.

As a routine part of these inspections, the housing inspectors are required to check for sources of RDII such as sumps and downspouts connected to the sanitary sewer. Certificates of Occupancy are withheld and transfer of property prevented until code violations involving illicit sources of RDII have been disconnected. Housing Units in Allentown are inspected for illicit sources of stormwater and groundwater through the rental unit inspection program. Properties with illicit connections identified are issued a 30-day residential rental revocation notices to compel disconnection.

In conjunction with property inspections, the City Stormwater Department is conducting visual downspout inspections of each property included in the Primary and Secondary Basins identified by the 2008 ADS flow metering project. If a downspout connection cannot be determined through visual inspection, a dye test is performed. Also, while televising a line, the crew employs a procedure of counting laterals and comparing the number to GIS data. If an unidentified lateral is discovered which is not in the GIS, dye

tests are performed in order to determine if the lateral is storm or sanitary. If the downspout is determined to be connected to the sanitary sewer, the property owner is required to disconnect.

3.4.3.2 Standards

Standards for the Service Connection/Disconnection Program typically focus on legal connections to the system and appropriate material standards. With the assistance of the legal support staff, connection standards (including enforcement provisions) are now legal code. LCA's General Specifications contains piping material standards and mirrors the plumbing code.

3.4.3.3 SOPs

LCA staff does not have Service Connection/Disconnection Program written procedures for field work since this is the responsibility of the developer; however, SOPs will be developed for inspection service LCA does perform.

4.0 Sanitary Sewer Overflow (SSO) Response, Reporting, and Recordkeeping Program

4.1 Purpose

As the system operator, LCA has the responsibility under State law to respond, report, and keep records on releases from the City sanitary sewer system. The purpose of the SSO Response, Reporting, and Recordkeeping Program is to prevent or reduce the environmental and/or public health impact of SSOs by providing structured guidance for release response, compliant reporting of SSOs, and accurate recordkeeping of SSOs. LCA ensures program compliance by:

- Correctly identifying overflows
- Responding, tracking, documenting, and resolving overflows
- Reporting to the appropriate governmental agencies and other affected groups
- Properly training employees who respond, report, and record SSO's
- Providing emergency operations
- Meeting reporting and recordkeeping requirements

LCA reports all unauthorized releases or spills of untreated wastewater or treated wastewater where endangerment of public health or the environment is likely, as soon as practical, but no later than 4 hours from the time LCA's City Sewer Line Maintenance Department becomes aware of the discharge. LCA notifies the PA DEP of sewage spills of any volume and if the spill reached a body of water.

4.2 Goals and Performance Measures

Goals and performance measures can be found in tables provided in Appendix H.

4.3 Methods for Calculating Spill Volumes

LCA employs various methods to calculate spill volume during a SSO event. Pages 6 and 7 of LCA Standard Operating Procedure titled Sanitary Sewer Response Plan provides general guidance on calculating SSO spill volumes. The flow estimate method applied is dependent upon the nature and origin of the spill, the method or methods used to remediate the spill, the characteristics of the area receiving the spill, the operational data available, and actual observations of the spill.

4.4 Methods for Tracking Spills and Complaints

LCA's Sanitary Sewer Overflow Report documents the specific details of an SSO. Figure 4-1 shows an example SSO compliance report. During normal business hours, a work order is initiated for SLMD field personnel to respond to the occurring SSO. Once the SSO has been neutralized, SLMD Maintenance Supervisor completes the SSO Compliance Report. The report is then forwarded to LCA's Compliance Department. The Compliance Department reviews the SSO Compliance Report and offers comments. The D&C Clerk submits the final document to PADEP. The SLMD retains the SSO Compliance Reports for record keeping purposes. Completed SSO reports for each SSO go into the SLMD management system for proper accounting and recording. Table 4-2 shows an example of the SSO tracking spreadsheet

4.5 Spill Responses/Remediation Practices

The response and remediation taken in response to a SSO are dependent on several factors. To the extent possible, the City collection system receives back any captured discharged wastewater resulting from an SSO. Hand tools, such as rakes and shovels, and vacuum trucks (operated by either the SLMD or LCA's contractor) are used to return the discharged wastewater to the collection system. After every gravity system SSO, the SLMD field crew will inspect the sewer mains using a closed circuit television (CCTV) camera within 5 days to determine the root cause or underlying exacerbating cause for the dry weather SSO. These results are used to determine if additional cleaning is needed

or if any other remedial or corrective actions should be taken, and by whom. Procedures developed by the sewer maintenance staff specific to SSO's contained Appendix D are:

1. Sanitary Sewer Response Plan
2. Sanitary Sewer Overflow Response Flowchart
3. Communication and Documentation for After Hours Service Calls

These SOP's are maintained by SLMD.

Disinfection of the spill area occurs using one of several products approved by PADEP. A listing of disinfection products, by preference, is below:

- Sodium Hypochlorite
- Hydrated Lime (granular).

4.6 Failure Impact Evaluation and Risk Management

Assessment of potential impacts from potential sanitary sewer failures, and subsequent SSOs to identify the areas of the system that will have the greatest impact if a failure occurs and focus asset management resources to minimize the risk. LCA uses the KISS hydraulic model for their sanitary sewer system. While the purposes of this model are manifold, the model is used to identify which areas have current hydraulic capacity limited sections and are likely to experience wet weather SSOs. Knowing the locations of hydraulic capacity limited sections allows the delegation of appropriate resources, which can mitigate any possible SSOs.

4.7 Scheduled Flow Control Plan

When LCA has a pending construction project that has the potential to trigger an overflow or potential problem, a contingency flow control plan is developed and implemented by SLMD. When implementing the diversion plan, the appropriate personnel are notified of the temporary changes to the collection system.

4.8 Wet Weather Flow Control Plan

When there is an impending significant wet-weather event that has the potential to trigger an overflow, LCA implements a structured wet-weather flow control plan readying resources across all divisions of the authority. LCA infrastructure constructed to handle storm flows is operated based on the Wet-Weather Relief Facilities Operating Logic (WWRFOL); a copy of the logic can be found in Appendix D. The WWRFOL defines the timing for early activation of the Spring Creek Road and Park Pumping Stations in order to provide storage in the interceptor system in order to attenuate collection system surcharging resulting from Rain Derived Inflow & Infiltration (RDII).

Additionally, the logic tree identifies the trigger point for activation of the Flow Equalization Basin (FEB), located at the LCA Industrial Pretreatment Plant in Fogelsville. The FEB is capable of storing 3 million gallons of stormwater during a significant wet-weather event and returning it to the collection system after peak storm flows have subsided.

The SOP titled, Hurricane, Tropical Storm, and Flooding Preparedness delineates the responsibility of each manager for implementation of specific components of the wet-weather plan. Notwithstanding all the preparations made to handle peak flows in the collection system, if the KIWWTP fails to treat wastewater to its full hydraulic capacity SSOs will certainly occur. This SOP addresses handling peak flows at the plant.

4.9 SSO Performance Data

Table 4-3 through 4-7 provide a quick, but thorough, summary of pertinent City system SSO data. This summary allows for the identification and review of multi-year trends. Table 4-3 contains the physical characteristics of the City sanitary sewer collection system. Table 4-4 provides evaluation metrics for the collection system. Table 4-5 presents data on the number and causes of SSOs. Table 4-6 lists data pertaining to the volume of overflows by cause.

Table 4-3: SSO Performance Assessment Report Part 1				
Sanitary Sewer System Characteristics	2016	2017	2018	2019
Total length of gravity sewers (ft.)	1,504,499	1,504,499		
Total length of force mains (ft.)	0	0		
Total number of manholes	7,199	7,199		
Total number of pump stations	0	0		

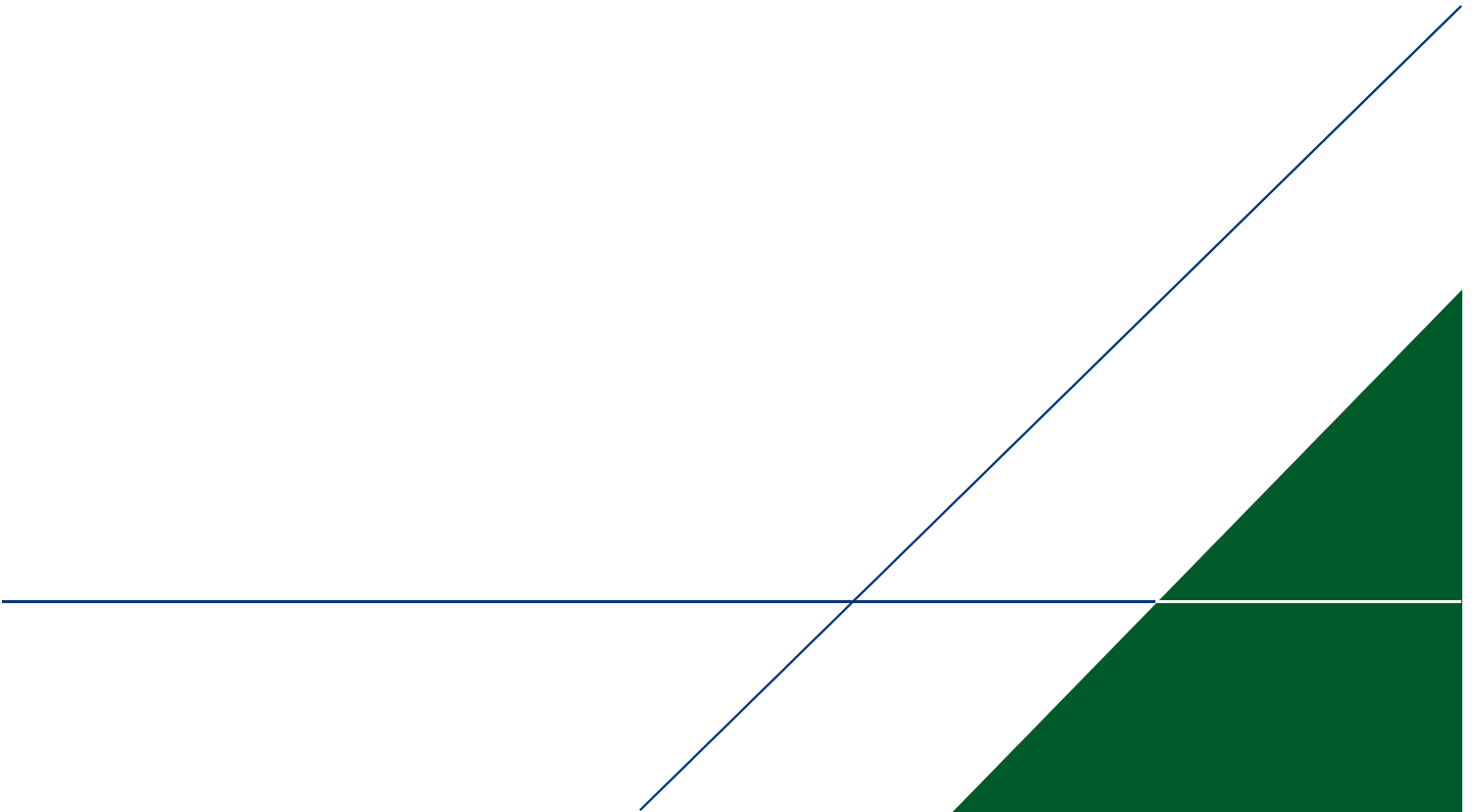
Table 4-4: SSO Performance Assessment Report Part 2				
Sanitary Sewer System Metrics	2016	2017	2018	2019
Total sewer main inspected by CCTV (lf.)	69,854	82,738		
Total number of sewer main point repairs (ea.)	45	35		
Total sewer main rehabilitated (lf.)	600	1,695		
Total sewer main replaced (lf.)	296	67		
Total number of manholes inspected (ea.)	361	295		
Total number of manholes rehabilitated (ea.)	24	2		
Total number of manholes replaced (ea.)	0	0		
Total number of Utility Tickets issued (ea.)	5563	7240		

Table 4-5:SSO Performance Assessment Report Part 3				
Sanitary Sewer System SSO Evaluation	2016	2017	2018	2019
SSOs (# or %) caused by:				
Maintenance – Roots	0	1		
Maintenance – Debris	1	3		
Maintenance – Grease	1	4		
Power Loss	0	0		
Damage by others (third party actions)	0	0		
Capacity – wet weather related	0	0		
Infrastructure – gravity main failure	0	0		
Total Number of SSOs:	2	8		

Table 4-6: SSO Performance Assessment Report Part 3B				
Sanitary Sewer System SSO Evaluation	2016	2017	2018	2019
Overflow volume (gal.) by:				
Maintenance – Roots	0	0		
Maintenance – Debris	60	81,220		
Maintenance – Grease	50	105		
Power Loss (Park Pumping Station)	0	0		
Damage by others (third party actions)	0	0		
Capacity – wet weather related	0	0		
Infrastructure – gravity main failure	0	0		

Sanitary Sewer Overflow (SSO) Response, Reporting, and Recordkeeping Program

Infrastructure – force main failure	0	0		
Infrastructure – pump station failure	0	0		
Total Overflow Volume (gal.):	110	81,325		



APPENDIX A: SEWER MAPS AND STAFF INFORMATION

AVAILABLE UPON REQUEST:
www.lehighcountyauthority.org/contact-us/



APPENDIX B: LCA GRAVITY SEWER O&M SOP'S, CHECKLISTS, AND FORMS

AVAILABLE UPON REQUEST:

www.lehighcountyauthority.org/contact-us/



APPENDIX C: LCA LATERAL O&M SOP'S, CHECKLISTS, AND FORMS

AVAILABLE UPON REQUEST:
www.lehighcountyauthority.org/contact-us/

APPENDIX D: SSO SOP'S, CHECKLISTS, AND FORMS

AVAILABLE UPON REQUEST:

www.lehighcountyauthority.org/contact-us/



APPENDIX E: GOALS AND PERFORMANCE MEASURES

AVAILABLE UPON REQUEST:
www.lehighcountyauthority.org/contact-us/

