



Best Management Practices Plan for the Operation and Maintenance of the Combined Sewer, Separate Sanitary Sewer and Separate Stormwater Systems

City of Camden

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Section 1 Introduction

Proper operation and maintenance of a combined sewer system, separate sanitary sewer system, and separate stormwater system is required to optimize performance. A system operated in accordance with best management practices should maximize CSO capture, reduce localized flooding and basement backups, and not include any sanitary sewer overflows. The essential elements of an Operation and Maintenance program include maintenance procedures, documentation, and reporting. The core attributes of a best management practices plan for the operation and maintenance of the collection system include:

- Prepare Standard Operating and Maintenance Procedures
- Maintain a System Inventory for all Assets
- Record keeping
- Adopt and Implement a Safety and Training Program
- Develop and implement an overflow, emergency response, and reporting procedures
- Perform timely and adequate system operation and maintenance
- Develop and implement a Communication and Outreach Program
- Develop and implement an Asset Management Plan

All of these components are interdependent and therefore it is critical to the overall success of the program that each is implemented. A description of the key elements of the recommended best management practices is described below.

1.1 Goals

The Best Management Practices (BMP) Manual is a dynamic document which is developed to state the industry accepted standards that a well run utility uses to operate and maintain its combined sewer system, separate sanitary sewer system, and separate stormwater system. To meet this objective, the goals for this BMP Manual are:

- Develop operations and maintenance practices to minimize local flooding, basement backups, and combined sewer overflows, as well as eliminate sanitary sewer overflows
- Identify and adopt performance-improving measures
- Establish a baseline of performance data, monitor performance, and continually adapt program to improve performance
- Promote regulatory awareness of staff
- Protect health and welfare of the public and the operating staff
- Protect the environment
- Preserve the long-term capability of the collection system to provide storage and collection services in order to comply with NJPDES permit requirements

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- Protect and preserve the associated equipment
- Protect public and private property from flooding and basement backups
- Minimize operational costs to the City

For the purposes of this BMP, any reference to “system,” “sewer,” or other reference shall include the requirements for the operation and maintenance of the combined sewer system, separate sanitary sewer system, and/or separate stormwater system by the Operator even if one or more of these systems is not specifically mentioned, spelled-out, or identified. Failure to specifically identify a specific system shall not eliminate the requirement to implement the requirements of this BMP for each of these systems, as may be applicable to the specific system.

1.2 Overview

The City of Camden has a total area of approximately ten square miles. In addition to a City population of about 77,344 (2010 Census), the City’s wastewater collection area also includes approximately 250 customers located in Pennsauken Township and stormwater flow from a larger part of Pennsauken Township. The City also owns separate sanitary sewer systems. Unlike the water system, the sewer collection system services all of Camden. There are approximately 6,400 customers in East Camden that are serviced by the City’s wastewater collection system that are provided water service by New Jersey American Water Company (NJAWC). The average daily wastewater flow generated within the City is estimated to be approximately 20 MGD although no metering data is available.

This information provided in this section is based on an inventory of the wastewater collection system performed in 1980 with updates to the information provided by the City in 1992.

The wastewater collection system of the City of Camden Department of Utilities consists primarily of combined sewers. According to City records, there presently exists approximately 150 miles of combined sewers containing nearly 4,000 storm inlets, about 60 percent of which were constructed before 1920. When initially constructed, these pre-1920 sewers served to convey both sanitary sewage and storm drainage directly to the nearest river without treatment. In the 1950s, interceptor sewers with regulator chambers were constructed to convey both sewage and combined flows from the wastewater collection system to the Baldwins Run and the City's Main Sewage Treatment Plants.

The newest section of the City, Fairview, was originally served by its own treatment plant and has separate sanitary sewer and stormwater collection and conveyance systems. Fairview has an area of about 0.7 square miles and contains approximately 20 miles of sanitary sewers and approximately five miles of storm sewers. While not verified, the City believes that additional separate collection systems are located along the Camden waterfront, as well.

Today, the wastewater and a portion of the stormwater are conveyed via pump and gravity flow from the City to the Delaware No. 1 Wastewater Treatment Plant, formerly the Main Sewage Treatment Plant, which is owned by the Camden County Municipal Utilities Authority (CCMUA). The balance of the wastewater and stormwater is discharged to the Delaware River. Baldwins Run and Main Sewage

Treatment Plants were purchased from the City by CCMUA in 1975. In addition to owning and being responsible for operation of the Delaware No. 1 Wastewater Treatment Plant, the CCMUA is responsible for the operation of one pumping station and force main from the Baldwins Run interceptor sewer in the northeast portion of the City to the CCMUA's wastewater treatment plant. The City has retained ownership of the interceptors, eight pumping stations, and lift stations.

1.3 Interceptor Systems

During the 1950s, the City undertook a major project to construct interceptor systems that would convey all sewage and combined flow to the City-owned treatment plants. The project included modifications to the existing Baldwins Run Sewage Treatment Plant, construction of the Camden Main Sewage Treatment Plant and construction of the following intercepting sewer systems:

- Delaware River System
- Cooper River System
- Baldwins Run System

The two treatment plants were sold by the City to the Camden County Municipal Utilities Authority (CCMUA) in 1975, but the City has retained ownership of the interceptor systems and pumping stations. In the late 1980s the CCMUA closed the Baldwins Run treatment plant and constructed a new pumping station in the vicinity of the 27th St. pumping station. Construction of CCMUA's pumping station allowed the City to abandon its own 27th St. pumping station. The pumping station constructed by CCMUA conveys combined sewage and stormwater flows generated in the Baldwins Run interceptor and a portion of the wastewater flow from Pennsauken Township to the Delaware No. 1 Water Pollution Control Facility.

1.4 Collection and Interceptor Sewers

Delaware River System - This system runs north-south along the Delaware River from Coopers Point to Fairview and intercepts fourteen sewer outlets and the Cooper River interceptor. Sewage from this system is conveyed to the Delaware No. 1 Water Pollution Control Facility. The Delaware River interceptor sewer was constructed in the early 1950s and is about 32,000 feet long. Pipe sizes range from 12 to 72 inches in diameter and are constructed mainly of reinforced concrete pipe. Except for some small lengths of 18-inch pipe which are made of clay, and a 12-inch cast iron force main in the Fairview section, the Delaware River interceptor sewer is constructed of reinforced concrete pipe.

In 1992 the City acquired, at no cost, the Audubon Park sewer system. This system was constructed in 1955 and consists of approximately 7,500 feet of eight-inch cast iron pipe. This system was originally constructed to convey sewage from the community of Audubon Park to the Delaware River interceptor system. Presently, the Audubon Park sewer system is used only to convey sewage from a trailer park located on the fringe of the service area. The Audubon Park community is presently connected to CCMUA's sewer system.

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Cooper River System - This system intercepts flows from eleven sewer outlets discharging to the Cooper River and then cuts toward the Delaware River along Spruce Street to 2nd Street, where it ties into the Delaware River interceptor. Sewers in this system range from eight to 36 inches in diameter and are made of either reinforced concrete or clay, with cast iron force mains. This system was built during the late 1950s and early 1960s.

Baldwins Run System - Unlike the Delaware River or Cooper River interceptors, the Baldwins Run interceptor sewer conveys combined sewage and storm flows to a pumping station constructed, owned and operated by CCMUA. Prior to the interceptor construction, most of the flow generated in this area was being treated at the Baldwins Run Plant. The interceptor sewer consists of approximately 2,300 feet of 12-inch clay sewer and about 3,300 feet of 10-inch cast iron force main. The Baldwins Run interceptor is the oldest of the three systems and was completed before 1953.

1.5 Pumping Stations

Delaware River System - The Delaware River System contains the Fairview and Arch Street pumping stations and 13 regulator chambers. Due to the existence of separate sanitary and storm sewer systems within the Fairview drainage basin, the Fairview pumping station conveys sewage exclusively. The Cooper River Interceptor System and the wastewater collection system ultimately discharge into the Delaware River Interceptor.

Cooper River System - The Cooper River system contains four pumping stations and seven regulator chambers. The State St, Federal St and Baird Blvd pumping stations convey combined storm and sewage flows to the Cooper River interceptor system. The Cooper River interceptor conveys storm and sewage flows to the Pine St pumping station. The Pine St pumping station conveys storm and sewage flows to the Delaware River interceptor and ultimately the Delaware No. 1 Water Pollution Control Facility.

Baldwins Run System - There are two regulators and one pumping station in the Baldwins Run interceptor system. The 27th St. pumping station is currently abandoned; however the pumps have not been removed from the station. The CCMUA constructed a new pumping station in the vicinity of the abandoned 27th St. pumping station and presently all flows conveyed by the Baldwins Run interceptor are pumped via a new force main to CCMUA's Delaware No. 1 Water Pollution Control Facility. This force main was constructed by and is maintained by the CCMUA.

Wastewater Collection System - There are two pumping stations and two ejector type stations. There are no regulators in this system.

1.6 Combined Sewers

The size and type of collection sewers in the Camden system varies considerably. Circular sewers range from six to 90 inches in diameter, while oval sewers exist in sizes from 16 in. x 20 in. to 68 in. x 126 in. Small circular sewers are almost exclusively made of clay. Approximately one-half of the 15" to 20" sewers are clay and the remaining are reinforced concrete. Sewers greater than 20 inches in diameter

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consist typically of either concrete or brick. Oval sewers are constructed primarily of brick with clay sometimes used for the smaller sizes. Cast iron and asbestos cement pipe are also used.

The CCMUA's treatment plant is designed to handle only a portion of the wet weather flow, with the flows above the plant's design capacity overflowing to local rivers. Approximately 35 overflow structures (mechanical regulators and static weirs) exist on the City's approximately 180 miles of sewer system. Both the Ferry Avenue and Mt. Ephraim pump stations have bypass overflow structures and the Fairview pumping station has a static weir overflow structure.

All overflow regulators were inspected in a 1980 Combined Sewer Overflow Study for the CCMUA. According to this study, almost half of the regulators experience some dry weather overflow and two-thirds are subject to tidal inflow. In general, at that time (1980) the regulators were reported to be in good structural condition and poor mechanical condition.

The City has commenced and finalized a program to construct and commission new CSO netting facilities at each of the CSO outfalls.

1.7 Separate Sanitary Sewer and Stormwater Collection Systems

The City also includes separate sanitary sewer and stormwater collection systems in various locations, including but not limited to, the Fairview portion of the City.

1.8 Issues/Conditions That May Affect Wastewater and Stormwater Collection

The interceptor sewer systems of Camden are between 30 and 40 years old, which is approximately one-half of the normal sewer service life. The pumping stations vary in age from 30 to 70 years; however, most were built in the late 1950s. There have been a number of improvements made to certain pumping stations. In 1954, new pumps and related equipment were installed at the Fairview Pumping Station, and the superstructure was rebuilt. In 1979, pumps were rebuilt at the Arch Street Pumping Station; in 1990, two new pumps were installed at the Baird Boulevard Pumping Station; in 1983, two of three pumps at the Pine Street Pumping Station were rebuilt; in 1992, a third pump at the Pine Street Pumping Station was rebuilt and other general rehabilitation work was performed.

There are frequent failures in the wastewater collection system. Approximately 20% of the annual sewer budget is expended to repair collapsed sewers and adjacent utility structures and roadways. The City has approximately 6 staff members dedicated to the repair of collapsed sewers. Over 60 percent of the combined sewers are in excess of 75 years old, with many over 100 years old. There were 244 sewer collapses in 1997.

The City's Department of Utilities staff is responsible for maintaining and repairing all aspects of the combined sewer, separate sanitary sewer, and separate stormwater systems, including but not limited to sewers, laterals, pumping stations, catch basins, manholes, and combined sewer overflow (CSO) structures, except portions of customer services owned by the customer.

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Additionally, stormwater catch basins are consistently impacted by debris and leaves and standing water is often noted in the bottom of catch basins and pipes.

Section 2 Operation

2.1 General Provisions

The Operator shall perform the services in a professional, efficient and economical manner and in accordance with this BMP and in compliance with all federal, State and local laws, regulations and requirements, as well as all existing and future permits, and existing and future Administrative Consent Orders. The Operator shall provide, at its sole cost and expense, all labor, materials, machinery, vehicles, equipment, office equipment (copiers, typewriters, facsimile machines, computer systems, etc.), fuel, power, chemicals, supplies, materials, spare parts, expendables, consumables, testing and laboratory analysis, hardware, software and licenses, and all else necessary therefore or incidental thereto for the operation, maintenance, management and repair of the system by the Operator. Any computer hardware and software and/or licensing purchased by the Operator and/or data produced by the Operator shall be maintained by the Operator and kept current, but shall become the ownership of the City. The Operator shall, at all times, keep the system in good repair and working order. The Operator shall provide uninterrupted services and provide services twenty-four (24) hours per day, seven (7) days per week. Operational decision making shall always be based on the following overall objectives:

- Protection of health and welfare of the public
- Protection of the health and safety of the operating staff
- Preservation of the long-term capability of the combined sewer and stormwater systems
- Protection of the environment
- Protection of public and private property from flooding and basement backups
- Protection and preservation of the systems
- Maximization of operational efficiency and minimization of operational costs
- Reduction of flooding

2.2 Analytical Services

The Operator shall perform testing, sampling, and any other analytical procedures to demonstrate compliance with applicable regulatory requirements and permit provisions. The Operator shall perform all applicable testing related to process control and combined sewer, wastewater and stormwater monitoring in conformance with regulatory requirements. The Operator shall conduct all necessary analyses whether the analyses are conducted at an on-site laboratory, at an offsite laboratory operated by the Operator, or through a subcontracted service. Any laboratory that is utilized must be appropriately certified to perform the required analyses and be subject to approval by the City. The Operator shall prepare the data received from the testing laboratory for all applicable regulations, permit monitoring, and operating reports and shall forward the results from the laboratory to the appropriate State and regulatory agencies. The results of all analytical testing shall be made available to the City.

2.3 Permits

The Operator shall be responsible for operation, management, maintenance, and repair of the combined sewer system, separate sanitary sewer system, and separate stormwater systems in compliance with all permits and shall be responsible for maintaining and for obtaining continuous compliance with all federal, State and local permits related to the combined sewer system, separate sanitary sewer system, and separate stormwater systems. These permits shall include, but not be limited to, the New Jersey Department of Environmental Protection New Jersey Pollutant Discharge Elimination System (NJPDDES) Permit for the combined sewer system, as well as the NJPDDES Tier A Municipal Stormwater General Permit (MS4) for the stormwater system. Additionally, the Operator will be required to obtain any permits (federal, State or local) required to operate, maintain, or enhance the combined sewer system, separate sanitary sewer system, and separate stormwater system, with the exception of permits that are in connection with construction activities implemented by the City. However, the Operator shall review, complete, and execute the permits required for City implemented construction activities or other City approved construction activities that may be implemented by other entities (such as developers), as may be required.

The Operator shall make all filings, applications, and reports reasonably necessary to obtain and maintain such permits required to be made, obtained or maintained by or in the name of the Operator or the City under applicable law in order to operate the system. The Operator shall be required to undertake any engineering studies or modeling in order to obtain a renewal of a permit. With respect to permits that are required to be obtained in the name of the City, the Operator shall: (1) prepare the application and develop and furnish all necessary supporting material; (2) supply all data and information which may be required within its scope of knowledge; (3) familiarize itself with the terms and conditions of such permits; and (4) attend all required meetings and hearings.

2.4 Administrative Consent Orders

The Operator shall be responsible for operation, management, maintenance, and repair of the combined sewer, separate sanitary sewer system, and separate stormwater systems in compliance with all Administrative Consent Orders (ACOs). This shall also include the response to any ACOs and the improvements that are necessary to be made to the combined sewer system, separate sanitary sewer system, and stormwater system to maintain or bring these systems into compliance with any existing or future ACOs.

The Operator shall make all filings, applications and reports reasonably necessary to respond to such ACOs, obtained or maintained by or in the name of the Operator or the City under applicable law in order to operate the system. The Operator shall be required to undertake any engineering studies or modeling in order to respond to the ACOs. With respect to ACOs that are required to be responded to in the name of the City, the Operator shall: (1) prepare the response and develop and furnish all necessary supporting material; (2) supply all data and information which may be required within its scope of knowledge; (3) familiarize itself with the terms and conditions of such ACOs; and (4) attend all required meetings and hearings.

2.5 Equipment and Chemicals

The Operator shall keep all equipment in good operating conditions and maintain adequate equipment in inventory in order to facilitate the repair and replacement of used or useful equipment, if necessary, in a timely fashion so as not to disrupt the operation of the system. Such equipment shall be of a quality and durability equal to or greater than the equipment being used and sufficient for its effective and cost-effective utilization, in inventory, or required herein, and shall meet the specification provided for in the O&M Plan and as defined in the BMP.

The Operator shall operate all used or useful equipment necessary in order to maintain compliance with applicable regulatory requirements and operational requirements, including equipment placed in service, and perform all tests and testing as may be required or recommended pursuant to applicable warranties, commercial or industrial standards, federal, State, and local laws, regulations and permits, as well as with this BMP. The Operator shall be responsible for promptly notifying the City in the event of any major equipment failures and such equipment failures shall be identified in the Monthly Progress Reports.

All chemicals used for the combined sewer system, separate sanitary sewer system, and/or separate stormwater system shall be in accordance with applicable standards for its intended use.

2.6 Vehicle Maintenance and Rolling Stock

The Operator shall be responsible for leasing or purchasing any vehicles needed to perform the services. Vehicles refers to all cars, trucks, vans or other modes of transportation that require a license plate used in connection with providing the services for transporting people or things or used for other necessary functions in the operation or maintenance of the system.

The Operator shall be responsible for maintenance of rolling stock. Rolling Stock refers to equipment available for transportation or that moves on wheels other than vehicles.

2.7 Buildings and Grounds Services

The Operator shall perform services to maintain the current condition of the combined sewer, separate sanitary sewer, and separate stormwater systems, including but not limited to all Best Management Practices, which include grassed swales, solids/floatable removal devices and interceptors, outfalls, headwalls, rip rap and slope stabilization infrastructure, and dry ponds. The facilities and facility structures shall be maintained at a level adequate for the efficient, long-term reliability, and preservation of the capital investment and in accordance with all local, State, and federal requirements and permits. The Operator shall, at a minimum, perform the following activities relevant to the equipment, buildings, and grounds:

- Wash all windows twice per year or more frequently on an as-needed basis.
- Repair all roof leaks within 10 days of discovery.
- Implement regularly scheduled pest control measures as necessary.

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- Repair all plumbing leaks and failures immediately.
- Damp mop all floors twice per week or more frequently on an as needed basis with a cleaning solution appropriate for use in such facilities. All spills are to be immediately cleaned.
- Strip all floors and apply new floor finish on a periodic basis.
- Apply floor finish to the extent necessary to maintain appearance and safety standards.
- Wash down wall tiles and clean all other walls every sixth months.
- Apply paint as necessary and appropriate, but at a minimum of every 5 years, all painted surfaces shall be repainted. Routinely perform touch-up painting and repairs of structures, buildings, piping, equipment, and all other assets, both interior and exterior.
- Clean offices and restrooms on a weekly basis, Monday through Friday.
- Provide daily collection services for solid waste and other disposable items generated by the City's combined sewer, separate sanitary sewer, and separate stormwater systems during performance of Services. A central location(s) shall be provided for storage. All solid waste shall be disposed on a minimum weekly basis.
- Shovel and/or plow all sidewalks and access roads to maintain access to all of the combined sewer, separate sanitary sewers, and separate stormwater system facility properties, including, but not limited to the pump stations, regulators, netting facilities, outfalls, and stormwater solids/floatable removal devices and interceptors, swales, headwalls, rip-rap and slope stabilization infrastructure, outfalls, dry ponds, and stormwater best management practices and keep said sidewalks and access roads free of ice and snow.
- Perform all lawn and flower bed maintenance at all combined sewer, separate sanitary sewer, and separate stormwater system facility properties, including, but not limited to, the pump stations, regulators netting facilities, outfalls, and stormwater solids/floatable removal devices and interceptors, swales, dry ponds, headwalls, rip-rap and slope stabilization infrastructure, and stormwater best management practices. Lawn and flower bed maintenance shall include, but not be limited to, cutting of lawns, removing of leaves from lawns and flower beds, and removal of weeds on a weekly basis.
- Vacuum all carpeted areas on a weekly basis, shampoo all rugs/carpeted areas twice per year or more frequently on an as-needed basis.
- Regular cleanup of litter and debris as frequently as required and on a daily basis at all combined sewer, separate sanitary sewer, and separate stormwater facilities.

2.8 Utilities

The Operator shall be responsible for supplying all utilities, including, but not limited to, natural gas, heating, fuel oil, telephone, water, and electricity, as necessary at all combined sewer, separate sanitary sewer, and separate stormwater system facilities to allow for the proper operation and maintenance.

2.9 Planning

The Operator shall be responsible for supporting the City's short and long-term planning for the system. Such support shall consist of providing system information and data and attending meetings with City officials to assist in the development of such plans as requested by the City. Additionally, the Operator shall assist the City in preparing on an annual basis its capital improvement plan for the system as further defined in this BMP. Plans to be developed and implemented by the Operator include, but are not limited to:

- Capital Improvement Plan
- Residuals Disposal Plan
- Annual Maintenance Plan
- Assist the City in review of Development Plans (to respond to inquiries from potential sewer customers).
- Review, completion, and execution of permit applications from existing or potential sewer customers

2.10 Economic Development

An important role of the combined sewer, separate sanitary sewer, and separate stormwater systems in providing reliable, below market costs is providing an attractive environment for economic development in the City. The Operator shall be a resource to the City in its economic planning by providing all reasonable services requested by the City, potential developers, or others regarding potential development or rehabilitation within the City.

2.11 Solid Waste Management

The Operator shall be required to provide containers for the disposal of and collection of all solid waste from within the combined sewer, separate sanitary sewer, and stormwater systems. The Operator shall be responsible for collection and delivery of all solid waste to City approved disposal facilities.

2.12 Facility Security

The Operator shall perform a vulnerability assessment in accordance with EPA guidelines and then develop and implement a plan to minimize vandalism and risks by providing adequate fencing, posting of signs, and other security measures in order to implement the results of the vulnerability assessment at the combined sewer, separate sanitary sewer, and separate stormwater facilities owned by the City. This Facility Security Plan shall be included in the O&M Plan and updated as often as necessary as system potential vulnerabilities are identified or other information is learned, but no less than an annual basis.

2.13 Systems Inventory

The Operator shall be responsible for reviewing available combined sewer, separate sanitary sewer and separate stormwater systems information for the purpose of identifying discrepancies between available inventories. The Operator shall resolve discrepancies and maintain an accurate inventory of the combined, separate sanitary sewer, and separate stormwater systems. The Operator shall be responsible for updating existing GIS information as appropriate and as identified in this BMP.

2.14 Collection and Interceptor Sewers

The Operator shall provide all labor, materials, machinery, vehicles and equipment necessary to repair, replace, and/or maintain any manhole or sewer main and/or outfall break, fracture, collapse, or blockage including roadway repair. All repairs shall be made within 24 hours of the reported break, fracture, collapse, or blockage. Priority attention shall be given to dangers to public life and health and to those posing a threat to public and private property.

2.15 Service Connections

The Operator shall conduct the TV inspections and the Comprehensive Sewer Rehabilitation Program. This program shall, to the extent practical, include preparation of a list of abandoned service connections to the sewer pipe that was televised. The severing of the service connections will be a Capital Improvement performed and/or paid for by the City. The Operator shall be responsible for all services lines that are on the street side of the curb line. The customer shall be responsible for the service lines that are located on the property side of the curb line and for all blockages caused by waste material discharged from the property.

Additionally, prior to allowing additional service connections to the combined sewer, separate sanitary sewer, and/or separate stormwater systems, the system should be evaluated for its ability to support the new demand while also being able to comply with local limits and the Industrial Pretreatment Program. The Operator shall confirm that all permits have been received, as necessary, prior to a new connection to the systems. New connections shall be made in accordance with local, State, and federal standards.

2.16 Pumping Stations

The Operator shall be responsible for inspecting and maintaining all City-owned pumping stations on a basis predicated on industry standards, manufacturer's recommendations and field conditions unique to the individual facility. A weekly inspection checklist shall be maintained of all inspections, services perforated, problems encountered, and other data as appropriate to the industry standards. The standby power at pump stations shall be exercised at least weekly.

Based upon inspections of the existing pumping stations performed by the Operator, the Operator shall be responsible for developing a Pumping Station Rehabilitation Program. The Pumping Station Rehabilitation Program shall define all required improvements and associated costs to maintain or return the Pumping Stations to compliance with all applicable federal, State and local rules, regulations and

requirements and may require Capital Improvements funded by the City. The Pumping Station Rehabilitation Program shall reflect and consider any current or planned capital projects.

2.17 Residuals Disposal

The Operator shall furnish all labor, materials, equipment and incidentals required to remove and properly dispose of the residuals/debris collected at the pump stations, overflow structures, netting facilities, or through cleaning of the combined sewer, separate sanitary sewer, and separate stormwater systems in accordance with the requirements of all applicable federal, State and local regulations. The Operator shall develop an annual Residuals Disposal Plan that addresses how all residuals/debris collected will be properly disposed of.

2.18 Industrial Pretreatment Program (IPP)

The Operator shall coordinate with a designated person responsible for the IPP and notify the City and the CCMUA regarding known and/or suspected illegal discharges. The Operator shall provide reasonable assistance in the form of access, inspection, or similar activity to the City and CCMUA for implementation of the IPP.

2.19 Overflow Response Plan

Standard operating procedures (SOPs) for responding to combined sewage overflows (CSOs) are intended to provide for standardized assessments of collection system releases and release reporting practices. Consistent methods allow for more efficient use of resources while ensuring the protection of public health and the environment.

The purpose of the Overflow Response Plan is to enhance the protection of public health and the environment and provide compliance with regulations through systematic response to overflows.

This plan applies to any unpermitted release of sewage, including:

- Basement back-ups caused by blockages or capacity restrictions in City-owned sewer lines
- Dry weather overflows from any portion of the sewer system, including permitted combined sewer overflow locations
- Sanitary sewer overflows during dry or wet weather
- Unpermitted combined sewer overflows

The Operator is responsible for implementing the Overflow Response Plan.

2.20 Public Education Program

The operator shall develop and maintain a public outreach program that includes a hotline, social media and webpage. The outreach program shall provide the community with information on the wastewater system while providing a means for community members to air their concerns. The outreach program shall be set-up as a valuable tool for educators as well. Other municipalities have had success with Earth Day celebrations, organized hydrant opening, fats, oils, and grease programs, and primary education programs at local schools. All of these should be considered as part of a public outreach program tailored to the City of Camden and its residents.

Provide a local telephone number where individuals that witness overflows can report the occurrence. The representative who received the call shall record the following information:

- Time and date of the call
- Time of response
- Name of caller
- Address of overflow
- Phone number of caller
- Weather
- Complaint
- Comments about actions taken

2.21 Wet Weather Standard Operating Plan

The system shall be operated, including the Capital Improvements that will be implemented to achieve maximum treatment of wastewater flow in wet weather and to comply with applicable law and the Long Term Control Plan.

The City desires flexibility in the wet weather operation of the system, but within certain guiding principles and meeting certain constraints. Each year, a Wet Weather Operations workshop with the City shall be conducted to present and discuss its proposed plan for optimizing system operation in wet weather. At the workshop, a draft Wet Weather Operations Plan shall be submitted for the upcoming year. Following the workshop, the plan shall be revised in response to the City's comments and submit the final annual Wet Weather Operations Plan for approval.

2.22 Combined Sewer Overflow Response Plan

The system operator shall monitor, record, and report the volume and time of each CSO outfall discharge, in accordance with the NJPDES Permit. Upon notification of a potential dry weather overflow, a representative shall visit the overflow site as soon as possible to assess the situation and take pictures. Recommendations shall be made to the City in order to eliminate dry weather overflows.

The system operator shall be responsible for the following services:

- Monitor, meter, and gauge sites daily electronically or visually, as appropriate.
- Inspect flow meters biweekly to identify maintenance or repair needs.
- Monitor, record, and report data from the existing and new flow meters installed in the collection system on a monthly basis, including rain gauges and flow meters installed on pipelines and CSO outfalls.
- Maintain and calibrate meters. Repair meters and place them back in service within 36 hours of failure or problem notification.

New or replacement metering system and equipment shall have equal or greater capacity, quality and durability than the current metering system and equipment in place for CSO activation. All metering system and equipment shall be consistent with the City's current systems, data management and storage systems.

2.23 Flood Mitigation Plan

The Operator shall develop a flood mitigation plan within 90 days. The intent of the flood mitigation plan is to identify those areas most prone to flooding, as well as basement backups, and develop strategies to address those issues. A standard design (10-year storm, 20-year storm, etc.) for Camden City shall be used as a benchmark as required by the City; the goal of the program will be to prevent flooding and basement backups for this size storm and smaller. Flood and basement backup mitigation strategies requiring major improvements to the systems that are developed as part of the plan shall be included in the CIP. Any repairs, maintenance, or cleaning of sewers and/or catch basins that will reduce flooding and/or basement backups shall be completed immediately and in accordance with this BMP Plan.

2.24 Operator Training

Training programs shall be provided on at least an annual basis and more frequently as required for all personnel employed for performance of services related to the combined sewer, separate sanitary sewer, and separate stormwater systems. Training shall include, but not be limited to, modern process control, equipment operation, repair, and maintenance, sampling and analytical procedures, regulatory requirements, supervisory skills, and safety and occupational health procedures. Records of all training shall be maintained as part of a Training Plan to be reviewed by the City.

The Training Plan shall clearly define the classroom and practical training curriculum for each operator position and classification. Calendar dates and milestones shall be assigned to each portion of the training and a training schedule shall be submitted as part of the Training Plan. The date and duration of on-site training by each of the equipment manufacturer's technical representatives shall be shown in the schedule.

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Operators are responsible for maintaining their certification through continuing education. Work crews should be assigned based on their certifications and license to meet regulatory requirements. NJDEP has an extensive training program for operators. Information on certification and licensing can be found at NJDEP's webpage. The operator shall maintain a log of current personnel certifications including type of certification, date issued, and expiration date.

Section 3 Maintenance

3.1 Operations and Maintenance Plans

The Operator shall develop, implement, maintain, and submit to the City for approval a comprehensive computer-based Operation and Maintenance Plan/ Program (O&M Plan) for the combined sewer, separate sanitary sewer, and separate stormwater systems within 90 days. The City will review the draft O&M Plan and provide comments and required corrections within 30 days of the initial submittal. The Operator shall submit a final version of the O&M Plan incorporating City's requested changes and comments 30 days following the return of the draft manual. The O&M Plan shall then be updated annually by the Operator and submitted to the City for review and approval. Operator shall provide to the City, two (2) bound hard copies and an electronic copy of the O&M Plan initially and upon each annual update.

The City shall be provided with read-only access to the O&M Plan and provided with the ability to compile, reconcile, and print all reporting functions. The O&M Plan shall specify all procedures and tests to be conducted for the performance of the services, inclusive of all facilities and equipment. The O&M Plan shall be a comprehensive manual organized into separate sections addressing each of the unit processes involved, the overall system operation and control, historical data, inventory of spare parts, auxiliary system equipment and systems, grounds and building maintenance, and provisions for enforcing existing equipment warranties and guarantees and maintaining all warranties of existing equipment and new equipment. The O&M Plan shall dedicate a separate section to detail the Operator's major maintenance, repair and replacement program. Such program shall contain a detailed description of major maintenance, repair, and replacement activities which will be required to be performed by the Operator to maintain operability, durability, and reliability of the combined sewer, separate sanitary sewer, and separate stormwater systems. The Operator shall make and complete all major maintenance, repairs and replacements to the Facilities which are necessary to achieve such standard of repair and replacement by performing all such listed activities within the time frame indicated in the O&M Plan.

In addition to the above, a summary of the O&M Plan components for each system is provided below. This list is not intended to be all inclusive and the Operator shall be responsible to confirm that all components are included in the O&M Plan:

- Schedule of permit applications to be submitted to regulatory agencies
- Copies of all permits, licenses, and other regulatory documents obtained for Operator's services
- Staffing plan showing a breakdown by staff classification of all personnel to be utilized during operations and maintenance including, but not limited to, the shift in which the work will be completed
- Maintenance schedule for all facilities and pipes
- Operation procedures for all major equipment within the system during start-up, normal, alternate, and emergency operation modes
- Equipment and system manufacturers/suppliers O&M manuals

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- Forms and checklists to be used to monitor equipment and process system operation and preventative maintenance
- Monitoring and reporting requirements
- Updates to the O&M Plan

For each Pump Station, regulator overflow chamber and tide gates, netting facility, and stormwater solids/floatables removal device, include a detailed written explanation of the following:

- The process or system including its key components
- The system function including its purpose and normal operating parameters
- Equipment summary including nameplate data, supplier/local representative, and manufacturer
- Description of instrumentation and control system, including an alarm summary
- Emergency system operations including procedures to be followed in the event of pump station emergencies, including temporary power outages, localized or area-wide flooding, basement backups, etc.
- Maintenance, including predictive and preventative maintenance for all equipment
- Trouble shooting system malfunctions
- Safety and emergency response plan and procedures (Emergency Response Plan)

The Operator shall implement such a maintenance program to include preventative, predictive, and corrective maintenance for all components of the combined sewer, separate sanitary sewer, and separate stormwater systems, including, but not limited to, the pump stations, regulator overflow chambers and tide gates, netting facilities, outfalls, collection and conveyance pipes, interceptors, trunk mains, force mains, and inlets, catch basins, stormwater solids/floatables removal devices, as well as the following:

- Buildings and structures
- Electrical systems and instrumentation and control systems, including SCADA systems and all software upgrades, licensing renewals, and computer hardware, servers, equipment, alarms, and field instruments maintenance. The City shall also be provided with web-based view-only access for the SCADA systems.
- Mechanical equipment
- Rolling Stock
- Laboratory, monitoring and sampling equipment
- Heating, ventilation, and air conditioning
- Computer systems that are the property of the City (software and hardware)
- Chemical feed systems
- Pumping systems
- Each process component

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- Auxiliary power facilities
- Sewers and manholes
- Storm grates and drainage facilities
- Other facilities and systems contained within the Systems
- Other specialized tools and equipment owned by the City

Preventative maintenance is considered to be those activities which keep a collection system in good operation and repair. A preventative maintenance program helps preserve capital investment while preventing service interruptions, preventing infiltration/inflow, eliminate flooding and basement backups, and can minimize the number and/or volume of overflows. Preventive maintenance activities can include, but are not limited to:

- Scheduled cleaning and inspection of sewers, catch basins, and outfalls; more frequent cleaning in those areas with a history of stoppages due to sediment, roots, debris, and fats, oils, and grease
- Root control
- Recording, investigating and resolving customer complaints
- Fats, Oils, Grease, Odor, Corrosion prevention programs and controls
- Pump station inspections, maintenance, repair and emergency power load tests
- Scheduled inspection and/or cleaning as needed of force mains, siphons, catch basins, pipes, and outfalls
- Regulator and tide gate optimization and maintenance
- Maintenance activity records to support appropriate analysis and reporting

A preventative maintenance plan shall be incorporated into the O&M Plan. A preventative maintenance plan provides an opportunity to organize regular maintenance activities, capture institutional knowledge and experience that will be essential for operating an effective maintenance program into the future. Preventative maintenance shall be performed in such a manner that the operation of the Managed Assets is not impacted and the performance standards, guarantees, and/or warranties are not threatened.

The Operator shall also develop and maintain computer based preventative maintenance logs for each facility and all equipment, pipes, and other components included in the O&M Plan. The City shall have read-only privileges to these logs with the ability to generate and print all required reports.

The system operator shall also perform routine maintenance to achieve the following:

- Maintain all equipment in an operational condition at all times while meeting the applicable Performance Standards, unless undergoing repair or renewal.
- Preserve the warranties on all Managed Assets equipment.

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- Perform predictive and preventive maintenance on all Managed Assets Equipment in accordance with manufacturers' recommendations.
- Minimize corrective maintenance and emergency repairs.

Maintenance and inspection of components of the collection system is an important factor in the reduction of local flooding and basement backups, combined sewer overflows (CSOs), and sanitary sewer overflows (SSOs). Recommended maintenance programs include:

- Catch Basin Inspection and Cleaning
- Sewer/Pipe cleaning
- Chemical root control
- Manhole inspections
- Sewer inspections (CCTV)
- Pump station inspection and optimization of operations
- Regulator and tide gate inspection and optimization of operations
- Combined sewer and stormwater outfalls inspections and cleaning

The system operator shall hold an annual O&M workshop with the City to discuss the prior year's maintenance activities and recommended changes to the O&M Plan for the upcoming year.

The system operator shall also develop a metrics system to evaluate its performance of the maintenance programs.

3.2 Street Sweeping

The goal of the street sweeping program is to prevent the entry of litter and debris into the collection systems and is one of the nine minimum controls for a CSO program. Litter and debris in the collection system has the potential to clog catch basins, sewers, wet wells, and pumps. Litter and debris that reaches CSO and stormwater outfalls can further pollute receiving waterways in the event of a CSO and/or stormwater discharge.

Specialized street sweeping vehicles shall be used to collect debris from road curbs and gutters. Smaller street sweeping vehicles or equipment shall be utilized on streets that are not able to accommodate larger street sweeping vehicles such that all streets are cleaned. These vehicles require unobstructed access to the curb side of the street, which is often used as a parking area, such that the street sweeping vehicles are permitted to sweep against the curbs and gutters. A public awareness program must be developed and implemented by the Operator with coordination with the City and be used to educate residents and businesses the importance of street sweeping, notify the public of the street sweeping schedule, discourage littering, and to require different parking habits on street cleaning days.

All streets should be swept once every month. A street sweeping program shall be developed that divides the City into districts and street sweeping routes to aid in the performance monitoring of street sweeping activities. The street sweeping program shall be developed in coordination with the City. Any required signage that is proposed by the Operator to educate the public regarding parking restrictions that correspond with the street sweeping program shall be approved and installed by the City. Field observations of recurring blocked catch basins shall be reported and the Operator shall recommend if a modification to the street sweeping program should be made to address these more critical areas. Priority shall be given to those streets experiencing heavier debris and litter loadings.

3.3 Catch Basin Inspection and Cleaning

Catch basins allow stormwater flow from roadways and parking lots to enter the combined sewer system and/or separate stormwater system to prevent surface flooding and basement backups. Catch basins often have deep sumps to allow heavy solids to settle out and accumulate for future collection. Some catch basins may also have a mechanism to prevent the floatables from flowing through the outlet and into the sewer system.

During normal operation, a certain amount of debris will accumulate in the catch basin. Excessive accumulation will deteriorate the effectiveness of the catch basin, resulting in solids entering the system and decreased flow capacity. If accumulation is severe, the catch basin may no longer function as intended and local stormwater flooding and/or basement backups may occur.

The catch basin is defined as the grate, curb cut, and catch basin structure. All catch basins of the combined sewer and separate stormwater system, as well as all pipes between catch basins and from the catch basins to the combined sewer and/or stormwater mains, shall be cleaned within the first year. Additionally, any catch basin hoods that are missing and/or damaged shall be repaired or replaced. After this initial cleaning period, every catch basin, as well as the pipes between catch basins and from the catch basins to the combined sewer and/or stormwater mains, shall be inspected quarterly. The catch basins and/or the pipes between catch basins and from the catch basins to the combined sewer and/or stormwater mains shall be cleaned immediately if any debris, litter, or other obstruction is blocking the catch basin opening, or if there is any debris, litter, or other obstruction located in or at the bottom of the catch basin structure or at the bottom of the pipes. The catch basin and pipe cleaning program shall be included in the O&M Plan.

3.4 Pump Station Maintenance

Pump stations are designed to pump (or 'lift') sewage to the hydraulic grade of a receiving sewer which will allow the sewage to flow toward the wastewater treatment plant. Pump stations typically contain pumps, pump controls, wet wells, control valves, flow meters, emergency generators, and electrical equipment. Failure to maintain this equipment may result in backups and releases of sewage. There are 8 pump stations in the City's collection system as listed in Table 3-1 below.

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Table 3-1: Pump Stations

Name	Variable Speed	Emergency Power
Arch Street PS	New VFDs Being Installed	Is Currently Being Installed
State Street PS	New VFDs Being Installed	Is Currently Being Installed
Federal Street PS	New VFDs Being Installed	Is Currently Being Installed
Baird Boulevard PS	New VFDs Being Installed	Is Currently Being Installed
Pine Street PS	New VFDs Being Installed	Is Currently Being Installed
City Line (Ferry Avenue) PS	New VFDs Being Installed	Is Currently Being Installed
Mt. Ephraim Avenue PS	New VFDs Being Installed	Is Currently Being Installed
Fairview PS	New VFDs Being Installed	Is Currently Being Installed

The Operator shall develop an inspection checklist to be used on a weekly basis to guide the pump station inspection procedures. This checklist shall be submitted to the City for review and approval prior to use in the field. All maintenance and inspection activities shall be completed weekly with records maintained in a format which allows continuous electronic access to the City. The pump station maintenance program shall include, but not be limited to, the following tasks:

- **Wet well cleaning:** inspect wet wells for accumulation of grit/floatables and promptly remove accumulated materials.
- **Compressors and Seal Water System Maintenance:** Inspect and maintain hydraulic accumulator compressors and the seal water system.
- **Alarm testing:** Inspect and maintain electrical and alarm system.
- **Monitoring oil level:** Perform preventive maintenance for pumps, generators, and engines.
- **Pump clogging/rag removal:** Inspect and remove clogging or rags when they are found.
- **Lubrication of pump motor and bearings:** Inspect and lubricate pump motor and bearings, as needed.
- **Ground maintenance around pump stations:** As needed during the growing season and snow removal as further defined in this BMP.

3.4.1 Pump Lubrication

Lubrication of pumps shall be according to the recommendations of the manufacturer of the pump.

3.4.2 Generator

Each pump station should have a back-up emergency power generator. Permanent generators should automatically exercise themselves weekly. If a permanent generator does not have this capability, the generator shall be manually exercised weekly in accordance with the manufacturer's recommended procedures. Generators shall be refueled as needed.

3.4.3 Pump draw-down testing

Pump draw-down testing is required to analyze the performance of each individual pump. Pump draw-down tests shall be conducted annually. During a pump draw-down test, the wet well level should be allowed to rise and a single pump used to lower the wet well in constant speed mode taking note of pressure head and flow rate. Each pump should be tested a minimum of 3 times and at various speeds, if applicable. This data shall be used to create adjusted pump curves to be included in the annual O&M Plan.

3.4.4 Perform diagnostic testing or associated equipment

Equipment shall be maintained in accordance with the manufacturer's specifications. Regular calibration of the equipment is also necessary to provide accurate operations.

3.5 Regulator Chambers and Tide Gate Cleaning and Repair

Regulators are sewer structures intended to divert excess flow that cannot be handled by downstream portions of the system to CSO outfalls. Diversion is necessary to prevent upstream flooding, especially within basements.

Inspection and maintenance of the regulating chambers and tide gates shall be performed since operational malfunctions of the regulators and tide gates could cause a dry weather discharge or a premature discharge during a wet weather event. Dry weather discharges are a violation of regulatory requirements and can also have a major impact on stream water quality. Combined sewer-regulating chambers inspections and clearing of any blockages prior to causing a dry weather discharge are a priority. Many of the discharges that do occur are a result of debris such as rags, sticks and other debris accumulating after large storms.

A tide gate automatically modulates to prevent tidal water from entering the collection system. If a tide gate is not functioning properly, there is the potential for the entry of the receiving stream into the collection system, which will flow to the Water Pollution Control Facility, and/or cause flooding and

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basement backups, increasing the overall demand for treatment, and decreasing the effective wet weather capacity of the system.

Regulator chambers and tide gates should be inspected, cleaned, and maintained during dry-weather and at low tide when the gate is fully above the water level of the receiving waterbody. Regulator chambers and tide gates should be inspected, cleaned, and maintained monthly. Cleaning activities shall include removal of debris and/or blockages that prevent the tide gate from fully opening or closing. The tide gate may also require lubrication and/or adjustment to provide the full range of movement.

3.6 Netting Facilities

Netting facilities at Combined Sewer Overflow (CSO) outfalls provide solids/floatables controls when an overflow occurs. These facilities reduce the amount of litter and debris that is discharged by the CSO into the receiving waterbody.

The Operator shall provide for labor and materials associated with:

- Removal of nets, furnishing of new nets, and replacement of the nets at each facility as required following a CSO event
- Disposal of used nets and debris at a suitable disposal facility
- Minor and major repairs to the netting facilities, net frames and retrieval facilities
- Maintenance of the facility sites including snow plowing, grass cutting, and leaves removal

The netting facilities shall be cleaned within 48-hours following a wet-weather event or snow melt. Nets should also be inspected quarterly for damage including rips, tears, or dislodging. If the netting is noted to be damaged, repairs should be made or the net should be replaced in its entirety. If the net is dislodged from the outfall structure, it should be reconnected. Nets shall be replaced, as needed, and disposed of at an appropriate facility.

3.7 Outfall Maintenance

The Operator shall be responsible for the inspection and cleaning and continued maintenance of all regulators, weirs, flood gates, and outfalls for the combined sewer and separate stormwater sewer systems as further defined in this BMP.

3.8 Systems Inspection

The purpose of the combined sewer, separate sanitary sewer, and separate stormwater system inspection program is to:

- Assess the condition of the sewers

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- Identify areas that require maintenance in order to develop a preventative maintenance program and minimize emergency repairs.
- Identify cracks, roots, and I/I in the collection system
- Identify methods to mitigate flooding and basement backups
- Identify faulty lateral connections that require coordination with private owners
- Diagnose problem areas
- Optimize operations and maintenance

The Operator shall annually inspect 33% of each of the combined sewer, separate sanitary sewer, and separate stormwater systems using CCTV so that the entire system has been inspected every 3 years. This inspection shall also include the inspection of the combined sewer and stormwater outfalls located within the same local drainage area as the combined sewer and stormwater systems being inspected. The CCTV video and records shall be maintained digitally and be available for City review. All manholes, sewer reaches, and service connections shall be inspected. The CCTV video and records shall note the location of all laterals relative to both the manholes and the sewer, defects, blockages, pipe size and material, and other pertinent information. Defects such as cracks, misaligned joints, grease, sags, roots, and blockages shall also be recorded. Observed flooding, basement backups, and/or standing water in pipes and manholes shall also be recorded and reported to the City. The Operator shall provide the reason for the flooding, basement backups, and/or standing water with documentation of the flooding, basement backups, and/or standing water, including photos and impacted addresses.

Upon request by the City, the Operator shall also CCTV sewers to assist the City and to locate laterals if the particular sewer in question has not already been inspected.

Based on the results of the CCTV inspections, the Operator shall be responsible for the development of a Comprehensive Sewer Rehabilitation Program which summarizes the results of the inspection, identifies recommended improvements, and provides estimated costs for the rehabilitations, and which may require Capital Improvements by the City. This program shall also include preparation of a list of abandoned service connections to the sewer pipe that was televised. The Operator shall be responsible for all services lines that are on the street side of the curb line and shall clear any reported blockages or repair any breaks in this portion of the service line. The customer shall be responsible for the service lines that are located on the property side of the curb line and for all blockages caused by waste material discharged from the property.

Priority should be given to work related to basement back-ups, flooding, and potential sewer cave-ins. The recommendations included in the Comprehensive Sewer Rehabilitation Program shall be incorporated into the recommended Capital Improvement Plan as discussed in this BMP. Subsequent to any significant repairs to the sewer system, the area of repair shall be re-inspected via CCTV to confirm that the repairs were successful.

3.9 Systems Cleaning

The purpose of a sewer cleaning program is to remove debris, grease, roots and other obstructions from the sewers to maintain their capacity and integrity. Combined sewer, separate sanitary sewers, and the separate stormwater system shall be cleaned by a system that propels high pressure water through a sewer to collect dirt and debris. Other cleaning methods may be proposed by the Operator for review and approval by the City. The cleaning shall also include the cleaning of the combined sewer and stormwater outfalls and regulators located within the same local drainage area as the combined sewer and stormwater systems being cleaned. The collected debris shall be vacuumed out of the manhole, inlet, and/or other access point and properly disposed of.

33% percent of the combined sewer, separate sanitary sewer, and separate stormwater systems that are scheduled for the CCTV inspections shall be cleaned each year so that every 3-years the entire system has been cleaned, with the exception of hot spots, which shall be cleaned more frequently as further defined in this BMP. Priority shall be given to areas of flooding and basement backups and existing pipes that contain debris in the first year. The City shall be divided into sewer cleaning districts to monitor the progress of system maintenance. The System Cleaning Program shall be developed by the Operator and included in the O&M Plan for review by the City.

3.9.1 Hot Spots

Sewer segments that are identified as hot spots shall be cleaned more frequently than others. Hot spots are often in the vicinity of restaurants and trees in which grease build-up and root intrusion are more likely to occur. The Operator and the City shall identify these hot spots based on flow data, surface flooding, basement flooding, and customer complaints. SOPs shall be developed by the Operator and reviewed by the City. Cleaning will occur on an as-needed basis for these hot spots and is expected to be completed within 1-week of the initial hot spot being identified and then as often as necessary to mitigate this hot spot. Additionally, recommendations for improvements of these hot spots shall be made by the Operator and included in the Capital Improvement Plan, as appropriate.

The Operator shall prepare and submit a quarterly report to the City for the reported hot spots and the recommended corrective action. Any corrective maintenance and repair actions shall be completed by the Operator.

3.10 Repairs

Routine repairs are defined as those that do not pose an immediate risk to the health and safety of the community and/or do not impede the daily activities of the community. Examples include sagging sewer lines, sewer cracks found during inspection, faulty regulators, or faulty metering equipment. Work orders should be completed whenever a needed repair is identified. All work orders will follow the appropriate procedure as described in this BMP.

3.10.1 Manhole Repairs

Repairs to all manholes shall be performed by the Operator. Structural deterioration of manholes result from corrosion due to hydrogen sulfide gas and the formation of sulfuric acid, groundwater infiltration, traffic loads and freeze/thaw cycles. Manholes shall be routinely inspected to verify their structural integrity and identify potential I/I.

3.10.2 Root Control

The purpose of the root control program is to remove roots that obstruct the flow of sewage and damage pipe structure. Root intrusion through structural defects or at pipe joints is a major contributor to sewer blockages. Root intrusion is most likely to be identified during sewer inspections but can also found through customer complaints. When roots are damaging the sewers the system, the Operator shall determine the proper course of action for tree maintenance or removal and coordinate this tree maintenance with the City. Damaged sewers should be repaired by the Operator using appropriate methodologies in a timely manner.

3.10.3 Sewer Breaks and Repairs

Repair, rehabilitation, and new construction of sewers are a common activity. The goal of this BMP guideline is to minimize the amount of sewer repair needed. Nevertheless, sewer repairs will be required to maintain the integrity of the system when cracks, leaks, or failures occur. A sewer break represents a loss in the integrity of the collection system, allows for infiltration and inflow, and has the potential to cause sink holes. When a sewer break is reported, the exact location shall be identified and an emergency response crew shall be dispatched to isolate the area, set up any necessary road blocks or barricades, and isolate the affected area.

Residents and commercial/industries shall be contacted if the break disrupts their service. Local utilities shall be notified if excavation is required that impacts other underground utilities. NJDEP shall be notified if the break resulted in an overflow or unauthorized discharge. If the break is causing an overflow or unauthorized discharge, temporary bypass pumping or other means shall be furnished and implemented to alleviate the overflow.

Breaks in the sewers can disrupt the community and affect safe passage. Therefore, sewer breaks, where an overflow or unauthorized discharge is caused or the break is otherwise impeding the proper operation of the system, should be repaired immediately so the Operator and City can contact NJDEP within 6 hours of any event. The incident should be reported to the City immediately and a complete repair provided within 24-hours. Major breaks should be treated as a top priority with on-call staff available 24 hours a day, 365 days a year to respond to a major sewer break. In any event, all sewer breaks, whether minor or major, shall be repaired within 24 hours of the reported break. All materials used to repair the sewer breaks shall be in accordance with the City's latest Ordinance.

Combined sewer, separate sanitary sewer, and separate stormwater system repairs should be prioritized and addressed in a timely manner based on the degree of repair needed and the potential impact on the collection system and community. Repair work shall be performed without interruption of service whenever possible. If an interruption is necessary, the repair work shall include considerations to minimize the length of time for the outage. Any newly constructed or repaired sewer must be performed in accordance with industry standards and manufacturer's recommendations.

A sewer break repair procedure shall be incorporated into the O&M Plan.

3.10.4 Repair of Regulator Chambers and Tide Gates

Failed components of the regulator chambers and tide gates that are no longer operational shall be repaired within 24-hours. These repairs shall be documented in the Monthly Progress Report.

3.10.4.1 Optimization

All regulators and tide gates shall be inspected after every rainfall event, with priority being given to those that have been proven to be problematic. Regulators will be adjusted to maximize the amount of in-line storage without causing additional flooding and/or basement backups. Tide gates shall also be adjusted, as necessary, to allow for the proper operation.

3.11 Green Infrastructure Inlet Cleaning

Several green infrastructure sites are located within the boundaries of the collection system. Surface inlets and outlets of these structures shall be kept clean of litter and other debris to allow for optimal performance of the technology. Debris at the inlet and outlet structures including catch basins, pipe openings, gratings, or other structures shall be removed. These devices shall be inspected quarterly. Maintenance to the plantings and structures of the green infrastructure sites shall also be performed, which shall include, but not be limited to, removal of leaves, litter, and other debris on a weekly basis.

3.12 Written Procedures for Maintenance

Maintenance procedures for all types of equipment and activities shall be up-to-date and reviewed on an annual basis, at a minimum, and shall be included in the O&M Plan. All maintenance procedures shall include the type of equipment, location of all features in the system, standard maintenance procedures for preventive and emergency maintenance, frequency of maintenance, equipment required to perform the maintenance, record keeping requirements, and reference to warranty and manufacturer requirements.

These written procedures shall be incorporated into the O&M Plan and also incorporated into the training program. If special training is required, a list of approved staff to complete the training shall be included with the written procedures. The written procedures shall be submitted to the City for review and approval on an annual basis.

3.13 Maintenance Training Policies and Procedures

Training programs shall be provided on at least an annual basis and more frequently as required for all personnel employed for performance of services related to the combined sewer, separate sanitary sewer, and separate stormwater systems. Training shall include, but not limited to, modern process control, equipment operation, repair, and maintenance, sampling and analytical procedures, regulatory requirements, supervisory skills, and safety and occupational health procedures. Records of all training shall be maintained as part of a Training Plan to be reviewed by the City.

The Training Plan shall clearly define the classroom and practical training curriculum for each operator position and classification. Calendar dates and milestones shall be assigned to each portion of the training and a training schedule shall be submitted as part of the Training Plan. The date and duration of on-site training by each of the equipment manufacturer's technical representatives will be shown in the schedule.

3.14 Emergency Maintenance and Response

The goal of this program is to prevent the need for emergency repairs through preventative maintenance practices. However, it is recognized emergency repairs may be needed when the health and safety of the community are a concern. Emergency maintenance often involves the temporary repairing of failures until a permanent solution can be designed and constructed. Emergency maintenance shall be given a high priority and addressed immediately.

3.14.1 Emergency Customer Service and Utility Mark Outs

The Operator shall respond promptly (within two (2) hours) to the extent practicable and in a reasonable manner to all customer problems and emergencies pertaining to the system. In addition, requests for utility mark outs shall be completed within three business days. The Operator shall maintain a toll-free 24 hour telephone number so that customers of the system can report any problems and emergencies. The Operator shall immediately notify the City of any activity, problem, or circumstance of which it becomes aware that threatens the safety, health, or welfare of the customers of the combined sewer, separate sanitary sewer, and separate stormwater systems. The Operator shall maintain a computerized emergency maintenance log of all problems and emergencies identified and measures taken by the Operator to remedy such problems and emergencies. The City shall be provided with read-only access to the emergency maintenance log with the ability to compile and print all reports.

Emergency procedures shall address at a minimum:

- Chemical Spills
- Personnel Emergencies
- Fire and Explosions
- Pipe, Valve, or Pump Failure
- Equipment and Process Failure

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- Power Failure
- Acts of God (i.e., Hurricanes, Wind storms, and Floods)
- Dry weather overflows, sanitary sewer overflows, and/or unauthorized discharges
- Emergency Telephone Numbers
- Emergency Equipment Inventory
- Records Preservation
- Industrial Waste Inventory and Monitoring System
- Coordinating Instructions with Public Safety Agencies
- Troubleshooting Guides

3.14.2 Collapsed/Sewer Repairs

The most common need for emergency maintenance is caused by collapsed or failed sewers. Sewer breaks and repairs shall be repaired as defined in this BMP.

3.14.3 Night, Weekend, and Holiday Response Procedure

On-call staff is required to be made available during and after work hours, weekends, and holidays. This staff shall be provided with communication devices so they can be reached at all hours. An appropriately sized crew of various training should be used for all night, weekend, and holiday response teams.

The emergency response crew shall be made aware of the timing requirements for completing the repair work and responding to emergencies. All necessary equipment, tools, and vehicles shall be made available to the emergency response crew.

3.14.4 Emergency Contact Information

The Operator is responsible for developing and maintaining emergency contact information and procedures. At a minimum the list of emergency contacts must include the name, phone number, and email of City and Operator staff as well as any local and State personnel that should be contacted in the event of an emergency. The list of emergency contacts should be prepared in cooperation with the City and updated as needed to ensure the latest information is always provided. The list should be reviewed quarterly.

Section 4 Record Keeping and Inventory

4.1 Work Orders

Work orders should be completed whenever a needed repair is identified. All work orders will follow the appropriate procedure as described in the operation and maintenance manual. A standard work order format should be developed. All work orders should be available in paper and digital database format. The digital database should be organized by equipment ID (pipe ID, valve ID, hydrant ID, etc.) so a review of the database provides information of the frequency of repair needed at each individual location. This provides valuable information on water loss and clusters of asset failure. The City shall be provided with read-only access and the ability to print reports for the work orders.

4.1.1 Generation

Work orders can be generated in a variety of ways including operator field notes, City notices, or customer complaints/comments. Any reported incident should result in the generation of a unique work order. Location, equipment involved, severity, and a general description of the maintenance/repair needed should be recorded as part of the work order. Once a work order is generated, the work shall be completed within a 2-week period unless the item needed repair is causing flooding, basement backups, sewer backups, is otherwise impeding the proper operation of the system, or the BMP indicates that a type of repair should be completed sooner. In the case of an item causing flooding, basement backups, sewer backups, or is otherwise impeding the proper operation of the system, the work shall be completed immediately. Work orders shall be given a priority designation based on their impact on the operational integrity of the distribution system and public welfare. The operator shall visit the site and make the final determination of the maintenance activity required. If the work cannot be completed at that time, the operator shall document the reason that the work cannot be completed at that time, as well as what is required to complete the work order, and then the work shall be scheduled to be completed within the 2-week period or sooner depending on the type of repair as previously described.

4.1.2 Completion Procedures

To complete a work order, the Operator shall indicate the corrective action taken, the date the work order was completed, and the personnel involved in carrying-out the corrective action. A completed work order should be entered into the digital database. If any follow-up action is required, it shall also be included in the database with a new work order created. The original work order should reference the new work order for the follow-up work and the new work order for the follow-up work should reference the original work order such that there is a complete history and record for the items in need of repair.

4.2 Daily Operating Logs/Records

Record keeping is an important tool in understanding how the system is operating. Accurate and detailed records can be used to mitigate flooding and basement backups, are a valuable accounting tool, and are

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required to document the operation of the systems. It is essential that these records for operation, maintenance and performance of the system be up-to-date and accurate.

All records should be maintained in accordance with the requirements outlined in this BMP plan. The Daily Operating Logs shall be maintained electronically and City personnel shall be provided read-only access with the ability to print reports from the logs.

4.2.1 Maintenance and Inspection Logs

Maintenance logs shall be completed daily and with each assigned maintenance task. Maintenance logs should be tailored to the different types of maintenance activities. Information included on the log should contain, but not be limited to:

- Pipe material, diameter, length
- Pump and equipment description, location, and manufacturer
- Generator description, location, and manufacturer
- Valve description, location and manufacturer
- Quantity of chemicals on hand, volume of additional chemicals provided
- Description of maintenance required
- Description of maintenance preformed
- Names and signature of operator completing the work action
- Names and signature of inspector approving the work action
- Warranty information
- Safety precautions implemented
- Incident report
- Follow-up actions

The maintenance logs should be reviewed regularly and revised based on performance needs. These logs will serve as basis for reporting requirements and therefore need to align with the reporting criteria. The inspection logs can be completed simultaneously with the maintenance logs or independently. Inspection logs will be used as support documents for regulatory requirements and therefore need to be accurate and up-to-date.

4.3 Incident Log

Incidents are described as emergency repairs that result from significant failure of the system (such as pump station failure), excessive flooding, basement backups, dry-weather overflows or unauthorized discharges, or other repairs that require immediate action and/or reporting to regulatory agencies. These logs should be developed in accordance with reporting standards and include the date the incident occurred, a description of the incident, and when the corrective action was completed. Personnel

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involved in completing and inspecting the repair should also be provided. The incident log shall be maintained electronically and City personnel shall be provided read-only access with the ability to print reports from the maintenance logs.

4.4 GIS Update

Camden City has an established GIS database with several shape files showing various assets of the system. When changes are made to the system assets or existing assets are discovered that are not correctly reflected in the GIS database or it is discovered that existing assets are not reflected in the GIS database, the Operator shall update this information in the GIS databases. The Operator shall provide the equipment, software licensing, and associated effort to maintain and periodically update the GIS system to display and plot the system maps and aid in the tracking of maintenance activities. At a minimum, the system shall consist of a base map showing sewers/pipes, pump stations, solids/floatable removal devices, manholes, catch basins, storm inlets, valves, regulators, netting facilities, and outfalls, as well as all pertinent information related to same to aid in maintenance of the system. The database shall contain fields that will include such information, including, but not limited to, location of assets, size of pipes, age of pipes, pipe material, maintenance performed with dates, attribute identification numbers, etc.

The GIS database shall be maintained by the Operator with continuous electronic access provided to the City with the ability to print files and maps.

4.5 Spare Parts Inventory

In order for the system to be maintained properly, an accurate list of spare parts should be kept. Replacement meters, valves, and other parts for critical equipment should be kept on hand so routine repairs can be completed within a timely manner. The Operator shall maintain a computerized spare parts inventory and the City shall be provided read-only access with the ability to print reports.

4.6 Annual Equipment Report

The Operator shall maintain a list of equipment owned by the City as well as the Operator. The list of equipment shall identify the following at a minimum:

- Owner of the equipment
- Type of equipment
- Year
- Make
- Model
- Hours/Miles of Use
- Warranty Status
- Maintenance Log

- Inspection Records
- Inspection Date

Any City-owned equipment in need of repair should be highlighted in the report. Should City owned equipment be damaged, vandalized, stolen, or rendered inoperable the Operator shall notify the City within 24-hours of the event. An annual report shall be provided to the City which includes the equipment log described above along with a summary of the condition of the equipment. Additionally, the Annual Equipment Report shall be maintained electronically and the City shall be read-only access and the ability to print reports associated with the Annual Equipment Report.

4.7 Capital Improvement Plan

A Capital Improvement Plan (CIP) is a short-range plan which identifies capital projects and provides a link between planning schedule and funding resources. It is the Operator's responsibility to develop an annual CIP that provides recommendations to the City for review and consideration. The CIP shall outline the recommended capital improvements for the next five year period on a rolling basis. A narrative with project description, reason for the capital improvement, construction cost analysis and anticipated operational and maintenance savings, and operational benefit shall be provided for each item listed in the CIP. The capital improvements shall be listed in order of priority with the highest priority item listed first and then the remaining items listed in descending priority order. Priority shall be given to those measures which reduce flooding and basement backups, provide operational and maintenance costs savings, and/or improve the operation of the system. The City will review the CIP to verify the plan meets customer needs while maintaining the operational performance of the distribution system.

4.8 Asset Management Plan

The City's combined sewer, separate sanitary sewer, and separate stormwater system is composed of many critical assets both above and below ground. The physical components of the system include pipes, valves, pumps, regulators, tide gates, netting facilities, stormwater solids/floatable removal devices, among others. Aging infrastructure requires repairs to maintain its usefulness. Costs of operation and maintenance will increase as the assets age and without proper maintenance and asset tracking the City will be faced with excessive costs for repair to deliver the required standard of service to its customers. The intent of an Asset Management Plan is to provide the long-term sustainability of the wastewater collection system by helping the City make informed decisions on when it is most appropriate to repair, replace, or rehabilitate particular assets and by developing a long-term funding strategy, the City can meet its goal of delivering a high level of service.

There are six core components of an Asset Management Plan including:

- Asset Inventory
- Level of Service
- Critical Assets

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- Condition Assessment
- Risk Profile
- Maintenance/Renewal Strategies

The asset inventory is simply a list of all assets in the collection system. The list should include the type of equipment, location, age of the asset, material, manufacturer, estimate on the remaining life of the asset and the owner of the asset. This information should be kept in an organized digital database such as Microsoft Excel or Access that can be made readily available to the City for review and printing.

The Level of Service requirement is a narrative which describes how the utility owner, managers, and operators want the system to perform over the long term. Financial considerations of the most economical way to deliver the require standard of service should also be discussed. To complete this requirement the critical assets must be identified based on an asset's current condition and its impact on the overall operation of the collection system. The overall system current performance of the system should also be provided. This narrative will serve as a guide for system management and operation staff as well as a basis for annual reporting. The key goal of the level of service narrative is to provide a direct link between costs and services.

While all assets are a necessary component of the overall system, they are not all equally important. Critical assets are those that are essential for system operation such as pump stations. In preparing the list of critical assets, the system operator should determine how likely the asset is to fail and the consequences of its failure. Essentially, this step of the Asset Management Plan is a risk analysis that can be used to prioritize when and where repairs are needed and what funding is needed to support those repairs. Several factors may impact this decision including the asset age, condition, failure history, general experience with the asset, and impact of failure on the overall system performance. The list should include a numerical listing of the critical assets from most critical to least and a description of its likelihood to fail along with the anticipated remaining useful life of the asset.

The Asset Management Plan shall be prepared, updated, and submitted to the City on an annual basis and the Asset Management Plan should be closely coordinated with the Capital Improvement Plan. The City will make the final determination on which assets need repair or replacement.

4.9 Monthly Progress Report

The Operator shall prepare a Monthly Progress Report regarding the Services. The Monthly Progress Reports shall be prepared by the 10th of every month for the previous month of Services. The Monthly Progress Reports shall be submitted to the City for review and shall be maintained electronically with read-only access and printing capabilities provided to the City. The Operator shall prepare the Progress Reports in a format subject to approval by the City. The Monthly Progress Reports shall include data pertaining to performance, including analysis of permit requirements, flows, overflows, unauthorized discharges, flooding, basement backups, and any other information required by the applicable regulatory agencies, the City, and/or as outlined in this BMP. The Monthly Progress Reports shall also include a

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description of preventive and corrective maintenance activities and emergency services performed during the previous month.

The Operator shall include the following in the Monthly Progress Report and any other information required by the City:

- A summary of quantity and type of process chemicals used.
- A summary of quantity and description of residuals/solid waste.
- A description of pump station shutdowns and repairs during the prior month, and predicted for the current month.
- List any adverse conditions which may be expected to arise during the current month that may affect the ability of the Operator to control overflows.
- Number of overflows.
- Unauthorized discharges and action taken.
- Flooding and/or basement backups.
- The results of-any regulatory or insurance inspections conducted during the prior month including follow-up actions by the Operator.
- Summary of unscheduled repairs and action taken.
- Summary of scheduled inspections and repairs and action taken or postponed. Explanations shall be provided for unscheduled repairs and postponements of repairs.
- Inventory of repair parts.
- Information on utility outages.
- Quantities of utility services used during the month.
- The results of safety tests or other monitoring procedures conducted by staff or regulating agency.
- Status of all preventative, predictive, and corrective maintenance, including, but not limited to, street sweeping, catch basin inspection and cleaning, pipe inspection and cleaning, netting facilities, etc.
- Status of Pump Station Rehabilitation Program.
- Status of Comprehensive Sewer Rehabilitation Program.
- Status of billings and collections.
- New connection applications.

Additionally, any copies of all final reports as submitted to the regulatory agencies shall be sent to the City and appropriate consultants of the City as directed by the City.

4.10 Annual Operation and Maintenance Report

The Operator shall develop, implement, maintain, and submit to the City for approval a comprehensive computer-based Operation and Maintenance Report, as well as three (3) hard copies for the combined sewer, separate sanitary sewer, and separate stormwater systems. The Operation and Maintenance Report shall be prepared on an annual basis and be submitted to the City within 30 days of the new calendar or contract year. The purpose of this Report will be to provide a year-end summary of the operation and maintenance of the systems, and, shall include, but not be limited to, the current condition of the systems, a summary of the information provided in the Monthly Progress Reports, as well as any additional information that is relevant and required by the City.

4.11 Audit of Systems

Within 60 days, the Operator shall conduct a complete combined sewer, separate sanitary sewer, and separate stormwater systems audit to determine the condition of the systems. Such audit shall be presented to the City upon completion for verification and approval of the conclusions drawn there from. Following the initial audit, subsequent audits shall be performed by the Operator on a frequency proposed by the Operator, but in no case shall an audit be performed less than every five years. The City shall be notified of the audit schedule and offered an opportunity to participate directly and/or periodically. In any event, at the City's discretion, the City may conduct its own audit at any time.

The Operator's Audit shall include a detailed, comprehensive survey, and inspection of the facilities to identify the physical and operational conditions and general status of repair of all equipment, buildings, structures, pavements, grounds, utility lines and system, spare parts inventories, operation and maintenance records, etc. The Audit shall include a detailed report documenting the findings of the survey/inspection. The report shall include an assessment of the current condition of each item or component, its estimated remaining service life, and whether the current condition is consistent with the maintenance and general upkeep requirements and expected normal wear and tear. An estimated cost for repair, renewal or placement shall be included for each item or component which is judged deficient. Estimates shall include a reasonable contingency allowance that will vary depending on the nature of the work required.

4.12 Summary of Reports

Several reports have been identified in the BMP as necessary for a well run utility to categorize, monitor, and economically manage the collection system. Table 4-1 below summarizes the required reports and the frequency each report shall be prepared and submitted to the City for review. It should be noted that the below Table 4-1 is provided for convenience only. The Operator is required to prepare all reports and documents as outlined in this BMP and as required by the regulatory agencies, regardless if the report is, or is not, listed in Table 4-1.

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Table 4-1: Summary of Required Reports/Logs/Databases

Report	Frequency	City Provided Continuous Digital Access
Operation and Maintenance Manual	Annual	Yes
Monthly Progress Reports	Monthly	Yes
Standard Operating Procedures	Annual	Yes
Overflow Response Plan	Annual	Yes
Wet-Weather Operating Plan	Annual	Yes
Flood Mitigation Plan	Annual	Yes
Training Plan	Annual	Yes
Preventative Maintenance Plan and Logs	Annual	Yes
Maintenance, Repair and Replacement Plan	Annual	Yes
Asset Management Plan	Annual	Yes
Hot Spot Report	Quarterly	Yes
Capital Improvement Plan	Annual (5-Year Rolling)	Yes
Equipment Report	Annual	Yes
Residuals Disposal Plan	Annual	Yes
Pumping Station Rehabilitation Program	Annual	Yes
Comprehensive Sewer Rehabilitation Program	Annual	Yes
Annual Operation and Maintenance Report	Annual	Yes
Audit of Systems	Within 60 days and then no less than every 5 years	Yes

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