



**CITY OF BROOKHAVEN**

**MUNICIPAL INSPECTION, MAINTENANCE, AND  
OPERATION PROGRAM  
(IMOP)  
MANUAL**

**City of Brookhaven, Georgia**

**Revision History:**

<b>Version</b>		
<b>Number</b>	<b>Date</b>	<b>Summary of Revisions</b>
1.0	15 Feb 2020	First Version
1.1	31 Aug 2020	Minor Edits – Response to EPD 21 Jul 2020 comments
1.11	13 Nov 2020	Name Change: Establishment of Municipal and MS4 (EPD) Version (V2.0)



## Applicability Guide

**Purpose:** To document the inspection, maintenance, and operation procedures used for the various components of the storm drainage systems located within the corporate boundaries of the City of Brookhaven, including the regulated MS4, and designation of the responsible parties for each.

**Audience:** Public Works staff, City maintenance supervisors, EPD/EPA SWMP regulators, professional service providers in the regulated development community, property managers in the regulated development community

**Applicable to:** Publicly-owned (by deed) and maintained (City-owned) facilities  
Publicly-owned (by dedication) and maintained (City-owned) facilities  
Facilities publicly-owned by other Public entities and maintained by other Public entities  
Privately-owned and maintained facilities (privately-owned)  
Privately-owned and City-maintained (drainage easements)

**Asset Types Covered:** Outfalls, catch basins, detention/retention ponds, ditches, swales, storm drain lines, treatment facilities, control structures, runoff reduction facilities (green infrastructure), and other conveyances (except privately owned ditches/swales)

**Related Programs:** Illicit Discharge Detection and Elimination (IDDE) Program  
Post-Construction Stormwater Management Program  
Green Infrastructure (GI)/Low Impact Development (LID) Program

**Related Permit:** General NPDES Stormwater Permit No. GAG610000, *Authorization to Discharge Under the National Pollutant Discharge Elimination System, Storm Water Discharges Associated with Small Municipal Separate Storm Sewer Systems*, effective 12/6/2017 to 12/5/2022.

**SWMP BMPs Covered:**

- BMP C-2 – Outfall Map and Inventory
- BMP C-3 – IDDE Plan
- BMP E-2 – Post-Construction Stormwater Structure Inventory
- BMP E-3 – Post-Construction Stormwater Structure Inspections
- BMP E-4 – Post-Construction Stormwater Structure Maintenance
- BMP E-5 – Post-Construction GI/LID Inventory
- BMP E-6 – Post-Construction GI/LID Program
- BMP E-7 – Post-Construction GI/LID Inspection and Maintenance
- BMP F-1 – MS4 Control Structures Inventory and Map
- BMP F-2 – MS4 Control Structures Inspection
- BMP F-3 – MS4 Control Structures Maintenance
- BMP F-4 – Street Sweeping



BMP F-5 – Employee Training  
BMP F-6 Waste Disposal  
BMP F-9 Municipal Facilities



## 1.0 Introduction

A stormwater system is the group of infrastructure assets that collect, convey, provide flood storage, treat, and discharge flows generated by storm runoff. The City of Brookhaven (CoB) is responsible to operate and maintain a subset of the stormwater system known as the CoB Municipal Separate Storm Sewer System (MS4), which is a regulatory as well as functional term. Other subsets of the stormwater system include other MS4's, i.e. Georgia Department of Transportation, privately-owned and maintained systems, and systems owned by other non-City public entities.

The MS4 includes all stormwater infrastructure and assets owned and/or maintained by the CoB. To ensure the entire stormwater system continues to operate as intended, the City takes mapping and inspection responsibility over non-MS4 portions of stormwater system located inside its corporate boundaries. This helps to ensure that owners of the remaining subsets of the stormwater system properly maintain and operate their stormwater system infrastructure and assets.

GDOT owned and maintained infrastructure is covered under the GDOT MS4 permit and is excluded from discussion in this Manual.

This document, known as the Inspection, Maintenance, and Operations Program (IMOP) Manual, provides definitions of terminology used and establishes the standard operating procedures (SOPs) necessary to conduct the appropriate level of inventory, mapping, inspection, operations, and maintenance activities for the stormwater management systems. These procedures are universally referred to as the IMOP in this document unless the discussion is specific to a component of the program and refinement of the terminology is necessary.

## 1.1 Plats, Dedications, and Extent of Services

Section 25-558 – Scope of Responsibility of the Stormwater Utility provides clear and concise inspection, maintenance, and operations responsibilities for components of the City's stormwater system, and defines the portions of the stormwater system that are included in the CoB MS4. From Sec 25-558 the policy reads as follows:

*“(a)The stormwater utility shall be responsible for plan approval and construction inspection of both private stormwater facilities and public stormwater facilities located within the City. The stormwater utility shall be responsible for the design and construction of public stormwater facilities owned by the city and shall inspect, operate, and maintain them as prescribed herein.*

*(b) The City owns or has legal access for purposes of operation, maintenance and improvement of those stormwater systems and facilities which:*

*(1)Are located within public streets, rights-of-way and easements;*

*(2)Are subject to easements, rights-of-entry, rights-of-access, rights-of-use or other permanent provisions for adequate access for operation, maintenance and/or improvement of systems and facilities;*

*(3)Are located on public lands to which the city has adequate access for operation, maintenance and/or improvement of systems and facilities; or*



*(4) Are determined by the city attorney to be the city's responsibility.*

*(c) The stormwater utility shall provide for inspection of private facilities to ascertain that the stormwater facilities are functioning as designed and approved. The stormwater utility shall provide for remedial maintenance of facilities based upon the severity of stormwater problems and potential hazard to the public health, safety, and welfare, and in cases where such remedial maintenance is required the city may bill the owner of the private facility for the costs of such maintenance."*

When the City incorporated in 2013, it “inherited” a number of existing public and residential-subdivision stormwater system operation and maintenance commitments and dedications approved by DeKalb County through the Final Plat process. Beginning at the end of the 1950’s, the information, acknowledgements, dedications, and certifications shown on Final Plats significantly increased over previous years. Over the years since, the amount of information shown on plats has significantly increased, and the maintenance and operational responsibilities of the “public,” taken to mean the county or municipal government, has become more detailed as well.

CoB staff has identified at least seven different residential subdivision plat “styles,” or standard language, each conveying operation and maintenance responsibilities to different parties and at different levels. These designations are summarized in the Appendices. The IMOP Manual clearly identifies the operation and maintenance role of these responsible parties.

## **1.2 Organization**

The IMOP Manual serves to summarize a variety of functions both required to properly manage and operate the CoB MS4 and address regulatory and reporting requirements from EPA and EPD. The page preceding this document’s title page provides a quick guide to the applicability of this IMOP Manual. The body of the IMOP Manual deals with the procedures necessary to inventory, map, inspect, operate, and maintain the different stormwater asset types that together comprise the CoB MS4, and the Appendices expand on terminology, responsibilities, and regulatory environment.

Appendix A contains Definitions and Terminology used in the IMOP Manual and are provided for clarity and continuity with other MS4 related documents. Appendix B summarizes the somewhat complicated configurations of asset ownership and maintenance responsibilities. Appendix C provides an overview of the various types of stormwater assets typically encountered in the CoB. Appendix D provides the full text of Section 25-558 – Scope and Responsibility for the Stormwater Utility.

## **1.3 Regulatory Relationships**

This IMOP is essential to guide the Department of Public Works Stormwater Utility Division’s management staff to procure professional, technical, operations, and maintenance services; understand the mix, type, age, condition, and changes to the City’s existing stormwater infrastructure assets; identify maintenance and replacement trends for future routine and capital spending; and, in time, proactively manage, identify, and program life-cycle asset management into the City’s daily operations. The IMOP Manual is a key component of the City’s



comprehensive Stormwater Management Program (SWMP), which is the main regulatory framework to the City's NPDES Phase II Stormwater General Permit.

The CoB MS4 is a subset of the complete stormwater system and network located within the CoB corporate limits. Under the purview of the Clean Water Act, the General Permit allows the City to discharge stormwater from the MS4 to Waters of the US and Waters of the State.

For the non-regulated portions of the stormwater systems located in the City of Brookhaven, only the inventory and mapping provisions of the IMOP apply.

The General Permit applies to all designated Phase II permittees, most of which are municipalities, in the State of Georgia. Through the Notice of Intent process, each permittee provides formal notice to the State of Georgia that it intends to use the discharge rights provided by the General Permit in exchange for developing a SWMP containing BMPs specific to that municipality's MS4. Each BMP contains a description, establishes measurable goals, defines the documentation to be provided to self-report compliance to the terms of the SWMP, and an implementation schedule.

The SWMP is the regulatory document and framework for identifying, tracking, operating, and maintaining the stormwater assets directly in the control of the permittee (MS4) and helps ensure the permittee has the legal authority or jurisdiction, through the adoption of specific ordinances, to regulate portions of the stormwater system that are not part of the MS4.

Each February, the MS4 activities conducted during the preceding year are summarized in the MS4 SWMP Annual Report. Compliance and enforcement activities, when necessary, are initiated through the self-reporting of the Annual Report.

## 2.0 Program Description

The inventory of the stormwater drainage system components located in the City, as reported through the City's geographic information system (GIS), includes over 12,000 drainage structures, nearly 200 miles of conveyances, and more than 350 stormwater detention/retention facilities. Of these, the CoB MS4 consists of over 1,900 catch basins, 38 miles of pipes, 10 miles of ditches, and 39 detention/retention facilities. The system is under continual inspection, as-needed maintenance, programmatic maintenance, and capital improvements.

## 2.1 Inventory, Inspection, Mapping, and Condition Assessments

The City's existing storm drainage system components are inventoried, mapped, and inspected on a rolling five-year schedule by City contractors, chosen through a qualifications-based selection process. Public Works and GIS professional staff members provide quality assurance / quality control for the inventory, mapping, and conditions assessment of MS4 structures.

The contractors conduct the inventory, mapping, and conditions assessments using ESRI Collector software on cell- and GPS-enabled tablets. The Collector database is connected in real-time to ESRI's web-based GIS database. Data is immediately available once saved. This database is maintained separately from the City's physical servers, thus providing an additional measure of data integrity.

For the purpose of performing inspections on the stormwater system, the CoB is divided into five geographical areas (map of geographic areas attached). Each year, the inventory and GIS maps are updated and condition assessments are completed in one of these five areas such that 100% of the City's stormwater system, including the MS4, is inspected every five years. The City's Stormwater System IMOP goes beyond the regulatory requirements of the MS4 Phase II Program.

The following stormwater assets are inventoried, mapped, and inspected in the corresponding geographic area each year:

- Outfalls. Each is re-verified to meet the requirements of an outfall. Dry weather screening is also provided. Required by BMP C-2 and BMP C-3.
- Post-construction stormwater management structures (detention pond/retention ponds/underground vaults). Required by BMP E-2 and BMP E-3
- GI/LID structures. Required by BMP E-5 and BMP E-7
- MS4 Control Structures (catch basins, storm drain pipes, ditches, post-construction stormwater management structures). Required by BMP F-1 and BMP F-2
- Other accessible stormwater system assets not specifically covered by the SWMP.

The approach selected by the City to best serve its residents is to inventory, map, and inspect all assets to the maximum extent practicable. This means that unless a stormwater asset is

inaccessible, it will be inventoried, mapped, and assessed at least one time every five years. An asset is deemed inaccessible if:

- After a reasonable search, the asset is not visible on the surface, e.g. blind junction box, buried structure, etc.
- Access to the asset is considered to pose a danger to life and limb of a reasonably fit and equipped inspector.
- There are other physical barriers, e.g. chain link fences, privacy fences, etc.
- A landowner has refused Right-of-Entry. (this is atypical for MS4 structures, but from time to time, is encountered on privately owned and maintained stormwater assets.)

The City's comprehensive IMOP incorporates three other types of inspection activities:

1. Quality assurance inspections: verification of prior year's condition ranking
2. Remedial inspections
3. Condition driven inspection and monitoring

### **2.1.1 Inventory and Mapping**

All inventory and mapping data are stored in the CoB integrated Stormwater Asset ESRI GIS and CityWorks® Work Management System. The initial inventory was provided by DeKalb County when the City of Brookhaven incorporated. During the first five-year cycle, there was a focus on correcting deficiencies in the inventory and to add to the inventory stormwater assets that had not been previously mapped. Data sources used in the initial mapping included plats, Land Development Permits, as-built drawings, and observations. The inventory and mapping process is constantly being updated and refined.

Updates to the existing inventory and asset maps are driven by as-built drawings and approved plats that are submitted at the end of development or redevelopment. These assets are then field verified no later than the next quinquennial update.

Physical structures and conveyances are located with the coordinates of the center of structure or apparent centroid of structure. The upstream and downstream ends of conveyances are also mapped, and the ID of the corresponding nearest upstream and downstream structure is added to the asset's GIS metadata. Also captured at the time of mapping is the nearest address to the structure or center of conveyance. Physical characteristics of the asset are noted, as is condition (discussed below).

Once initially mapped, assets are not typically re-mapped unless there are compelling reasons to do so. If an asset can be found and uniquely distinguished from nearby assets, then its mapped location in the GIS is typically preserved.

Re-mapping often causes issues with the effect of rendering the data less reliable than it was prior to re-mapping. For example, the former unique naming convention for assets was to concatenate portions of its northing and easting coordinates. If the asset is moved, that unique identifier would



be re-numbered, appearing to create a new asset rather than updating an existing asset or otherwise interfere with naming conventions, overwrite distinguishing historical data, etc.

Each individual asset contains dozens of additional metadata records. To provide additional refinement in the CityWorks® Work Order system, there are over 20 unique stormwater asset classes with between 9 and 15 user accessible attributes, each providing critical location and condition data. At least one photograph is taken of each structure, and one picture is taken at the upstream and downstream end of each conveyance. These data are accessible to users by clicking on the asset. In addition, the GIS staff has access to additional data that is not normally displayed.

### **2.1.2 Newly Annexed Areas**

When new areas are annexed into the City, DeKalb County provides an initial GIS database upon which the City begins to inventory, map, and assess the systems under City specific guidelines. The City's MS4 annexation approach is to complete the initial inventory, mapping, and assessments for the added portions of the expanded stormwater system within 12 months of annexation. City Council established a special taxing district in each newly incorporated area, which is used to pay for required infrastructure inspections, assessments, maintenance, and capital improvements inside the boundaries of the newly annexed area. Funds raised by the special tax districts can be used for City-owned infrastructure (roads, sidewalks, curb, gutters, right-of-way, and the stormwater system) and parks projects.

### **2.1.3 Condition Assessment and Maintenance**

#### **Stormwater Conveyances and Structures**

For stormwater conveyances and structures, the condition assessment is completed at the time of inventory and mapping verification. The current condition assessment (most recent) for each asset accompanies the inventory and mapping data in the GIS. Overall condition is assessed on a sliding integer scale from **5 – Excellent** to **1-High Priority**. A note describing the condition is provided. If there is a specific defect or concern, additional photographs are taken. For the interior of structures and closed conduits (pipes), a pole camera is used to both inspect the interior of the structure and document internal defects.

#### **Stormwater Detention/Retention and GI/LID Structures**

Stormwater detention, retention, and GI/LID structures require a trained eye, and, due to the number of potential operation and maintenance issues, require a checklist to complete condition assessments. The CoB uses both electronic forms and paper forms to these assessments. The checklists are, at a minimum, based on the Operation and Maintenance Inspection Checklists provided in the GSMM for each type of post-construction stormwater management or GI/LID structure. Where deficiencies are found, they are noted in the GIS.

Overall condition is assessed on a sliding integer scale from **5 – Excellent** to **1-High Priority**. A note describing the condition is provided. If there is a specific defect or concern, additional photographs are taken.

#### **High Priority Rated Assessments**

For all stormwater system asset classes, *High Priority* assessment scores are independently verified by members of the City's Stormwater Utility team. *Corrective actions shall be taken within a year*

*of discovery. If the condition poses an immediate threat to public safety, the verification process will identify the threat and the required corrective actions will be taken immediately.*

City forces (contracted) assess maintain the City's regulated MS4 stormwater control structures and other City-owned stormwater system assets on a regular basis. The regulated MS4 Control Structures include MS4 Structures covered by SWMP BMP E-4, BMP E-7, and BMP F-3: catch basins, pipes, ditches, stormwater ponds; and GI/LID structures.

#### **2.1.4 Other Assessments and Maintenance**

In addition to the City's annual contract for stormwater system inspections, the City performs a host of other inspections. The list below summarizes each inspection class.

*Periodic inspection* is a proactive activity to perform inspections and monitor condition on the established geographic area based, five-year rolling schedule. **MS4 Asset Assessments.**

This assessment can result in both Remedial Inspection and Maintenance (Assessment scores of 1-HIGH PRIORITY) or Condition Driven Maintenance (Assessment scores of 2 to 5).

*Remedial inspection and maintenance* are reactive maintenance activities performed on an as-needed basis. Need for this level of inspection and maintenance is established from evidence of system failure through other ongoing City asset operation and maintenance activities, previous-years' MS4 Asset Assessments, or through citizen reported issues and/or complaints.

*Condition driven maintenance* is a predominately proactive activity that performs maintenance when certain criteria are met or are anticipated to be met.

For privately-owned or other public entity-owned stormwater infrastructure, the City provides inventory, mapping, and condition assessment inspection services on the same rolling five-year basis. When necessary, the City will attempt to provide information/ recommendations on proper maintenance to the private owners of those systems as a courtesy.

Because the MS4 is inspected on a 5-yr rolling basis, structure conditions can be tracked and compared from one inspection cycle to the next. Maintenance is either deferred and monitored on low- and medium-risk structures so that higher priority issues can be addressed first, or proactive maintenance may be conducted on selected assets.

## **3.0 Maintenance Procedures**

### **3.1 Prioritization**

These procedures apply to assets within the CoB MS4. Primary drainage systems are systems where significant harm or damage could occur if the system were to fail. The highest priority is assigned to those systems that cannot be allowed to fail due to the potential for serious threat to life/safety, public roadways, structures, and/or natural resources. Loss of access to residences and/or businesses due to roadway failures or flooding can limit access of emergency services, and, in turn, poses indirect threats to life.

Secondary drainage systems include all other drainage systems not classified as primary systems. A high priority secondary system includes systems that could cause road closures but not necessarily result in loss of access to an area. Other high priority secondary systems include those that result in flooding of non-livable structures (i.e. sheds, storage buildings, etc.) and those that cause nuisance flooding.

A drainage system's classification ties into the City's performance siltation and structural damage. Heavy siltation in a catch basin and/or pipe conveyance on a primary drainage system may receive a higher priority ranking than a severely damaged headwall on the downstream side of the ROW on a residential street.

For private systems, the same prioritization criteria utilized to document system condition. This information is passed on to the Owner of Record in the DeKalb County Tax Commissioner's office.

### **3.2 Remedial Inspection and Maintenance Procedures**

Remedial maintenance is performed based on evidence of system impairment or failure identified through citizen complaints, City staff inspection, and/or annual MS4 Asset Assessments. Re-inspection and maintenance activities are performed on an as needed basis.

Upon receipt of a complaint (excluding High Priority assessments), City staff will generate a Service Request (SR) for the preliminary assessment. A member of the City's Stormwater Utility team will perform an inspection of that complaint within five (5) business days. City staff will assess the system for condition, material, water quality issues, structural issues, etc. document the conditions, and make a recommendation for the next step. Maintenance will be recommended and performed based on the condition driven maintenance standards established below..

Maintenance is logged in as work performed through the Cityworks Work Order system. This type of maintenance can include minor maintenance activities such as sediment/litter removal, vegetation clearing, channel stabilization, and outlet structure repairs. Minor maintenance activities are performed by the City's full-time maintenance contractor.

When structural or specialized repairs are required, the work is typically performed by outside contractors who are licensed and/or qualified to perform the higher level of repair. Three quotes are generally required, and the best qualified firm with the lowest apparent quote is selected. The limit for repair versus capital improvement is based on the Scope of Work. There are no proscriptive requirements for elevating a project to a Capital Improvement versus repair. Generally, if the repair/replacement consists of like-for-like replacement of a small portion of a

system, the project remains a repair project. If the project entails relocating infrastructure, engineering calculations, relocation of utilities, permitting, and/or excessive cost, it may fall under the category of Capital Improvements.

### 3.3 Condition Driven Maintenance

Condition driven maintenance is performed based on the results of City staff inspections conducted as part of a periodic or remedial inspection program. If certain standards are not met during inspection, the City's maintenance contractor will perform applicable maintenance procedures including removal of litter, debris, or sediment; re-grading; minor repair; replacement; etc.

Standards for System Components:

- Catch Basins: Catch basins with sumps should be cleaned if accumulated sediment, debris or other deposits are equal to or greater than one-third the depth from the invert of the basin sump to the invert of the lowest pipe into or out of the basin. If catch basins are found to significantly exceed this standard, they should be inspected and cleaned more often. If deposits of concern are rarely found during regular inspections, inspection may be moved to a more infrequent schedule.
- Storm Drain Lines: Storm sewers should be inspected as the catch basins are inspected. Storm pipes shall be cleaned if accumulated sediment, debris or other deposits are blocking more than 35% of the pipe diameter.
- Culverts: Woody debris and other blockages should be immediately removed from culverts and other critical conveyance components.
- Open Drainage: Open drainage refers to ditches, canals, swales, etc. Drainage ditches should be inspected and cleaned if accumulated sediment, debris or other deposits exceed 35% of the functional depth. Excess vegetation shall be removed manually if it is restricting flow.
- Municipally-Owned Detention Ponds and other Regional Controls (systems designed one-year **after** the date of designation as a regulated MS4, October 3, 2014): Inspections of inflow and outflow structures are required. Sediment should be removed before 50% of the capacity has been lost (typically every 10 to 20 years). Stormwater structural control facilities shall be maintained according to criteria or procedures present in Volume 2 of the *Georgia Stormwater Management Manual*. Maintenance requirements are detailed at the end of each structural control design criteria section.
- Municipally-Owned Detention Ponds and other Regional Controls (systems constructed **before** the date of designation as a regulated MS4): Inspections of inflow and outflow structures are required.
  - If as-designed elevations / depths can be determined, sediment should be removed before 50% of the capacity has been lost (typically every 10 to 20 years). Stormwater structural control facilities shall be maintained according to criteria or procedures present in Volume 2 of the *Georgia Stormwater Management Manual*.

- Where no design information is available for the system, inlet and outlet pipes and/or control devices (weirs, orifices, headwalls, stand pipes, etc.) should be cleared to the invert and allow uninterrupted flow. The pond shall otherwise be maintained in accordance to the City’s Property Maintenance Code
- Damaged structures, sinks, and/or erosional damage shall repaired/stabilized.
- Outfalls: :
  - Dry weather flows: If dry weather flows are observed in an outfall during inspection a source-tracking investigation should be immediately initiated to identify the source and eliminate any illegal dumping and /or illicit connections. The procedures for source-tracking and definition of dry-weather flow should be in accordance with the City’s IDDE Program.
  - Regardless dry weather or wet weather flow, if flow from an outfall is causing erosion, energy dissipating BMPs should be installed as part of a programmed system improvement plan.

### **3.4 Emergency Maintenance**

The City may conduct emergency maintenance operations within drainage easements to protect the common good. Emergency maintenance includes maintenance necessary to remedy a condition which is potentially damaging to life, property, or public roads. Section 25-558 Scope and Responsibility for the Stormwater Utility provides sufficient authority to conduct Emergency Maintenance. Such emergency maintenance shall not be construed as constituting accepting a continuing maintenance obligation by the City, nor prevent the City from seeking reimbursement for expenses from the property owner(s) of the land that generated the condition.

### **3.5 Funding Issues (Set Funding Allocated in Budget)**

The Mayor and City Council may allocate funding for stormwater projects during each budget cycle. Projects will be recommended for implementation based on the determination of City responsibility, by Category, and by approved funding level.

### **3.6 Record Keeping**

The City staff will keep records of all inspection and maintenance activities performed as part of the MS4 inspection program. Service Requests will be generated based on citizen complaints or other unforeseen maintenance activities not usually performed as part of scheduled maintenance. The Service Request portal on the City’s website, Brookhaven Connect (also known as CitySourced) shall be residents’ primary means for reporting issues with the stormwater system:

<https://www.brookhavenga.gov/community/page/brookhaven-connect-service-request>

When a service request is posted in CitySourced, a CityWorks Service request generated, which contains an ongoing association with CitySourced.

Service Requests will detail the source of the complaint, nature of the stormwater issues, inspection results, and all maintenance and/or enforcement activities. The service request will detail the project from start to finish including dates, activities and staff. City Crews will also keep daily activity logs detailing all of their inspection and maintenance activities as they relate to system inspection and maintenance. These logs will include structures inspected, activities performed,



dates, etc.

In addition, a project specific folder will be created, in the format of Street Name (address), in a SERVICE REQUEST folder under the STORMWATER parent directory. Copies of pertinent communications, including e-mails saved as Acrobat \*.pdf files and photographs, shall be stored in this location.

## **4.0 Street Sweeping and Waste Disposal**

### **4.1 Street Sweeping**

Annually, the City will engage a Street Sweeping contractor to sweep all City maintained streets within the City limits at least one time per year, assuming funding is available. At a minimum, the City shall ensure that the minimum requirement for SWMP BMP F-4 is achieved.

The City shall maintain a list of streets for which the City is responsible, street names swept, dates swept, curb miles swept, and the amount (tonnage) of debris collected through the street sweeping activities.

### **4.2 Waste Disposal**

Public Works maintains a waste hauling contract with private haulers to lawfully dispose of waste City crews collect during the normal course of their duties. This excludes the domestic/office types of waste collected in waste bins and dumpsters at City facilities. Differentiation between the two types can be made by the identification of the waste haulers. DeKalb County Sanitation Division collects, hauls, and disposes of this domestic/office wastes. These wastes are not covered by the IMOP.

City crews collect landscaping debris, debris collected from the right-of-way, tree trimmings, concrete, aggregate, drainage structures, asphalt, and similar debris in containers positioned at different locations in the City. The private hauler routinely, weekly, semi-weekly, monthly, collects and transports this waste to the appropriate landfill. Collection frequency varies by need, but collection shall be at least monthly.

The periodic invoices for payment contain the tonnage of waste collected and disposed of during each period. These invoices are controlled by the Public Works Office Manager and copies are maintained in the Finance sub-directory under the Public Works parent folder.

## **5.0 Employee Training**

Each year, the City shall conduct training sessions for Public Works employees, Parks and Recreation employees, and members of the City's full-time right-of-way and parks maintenance crews. At a minimum, direct supervisors of the employees performing the work shall attend the training and implement that training in execution of maintenance work throughout the City.

Topics to be addressed may include:

- Pollution Prevention
- Landscape Waste Control
- Illicit Discharge Detection
- Source Tracing for Illicit Discharges
- Identification of Potential MS4 Defects
- Spill Prevention
- Proper Protection of Stored Erodible Materials
- Erosion & Sediment Control During Municipal Operations, etc.



The Stormwater Manager shall maintain a log and sign-in sheet of all training activities, subject matter, dates, and attendees.



## Appendix A – Definitions



**Best Management Practices (BMPs)** mean structural and non-structural methods to support one of the MCMs and improve water quality.

**Dry Weather Flow** means flowing water in MS4 conveyances / structures when there has been no precipitation greater than or equal to 0.1” within 72 hours. Dry weather flow is associated with illegal or illicit connections or dumping polluted water into the MS4.

**Dry-Weather Flow-Screening** means the screening of dry weather flow grab samples through color, odor, turbidity, floating materials, temperature, conductivity, pH, surfactants, fluoride, and fecal coliform.

**Georgia Stormwater Management Manual (GSMM)** means the latest addition of the GSMM published and maintained by the Atlanta Regional Commission (ARC) and any documents adopted in the GSMM by reference. **The CoB adopted the GSMM on December 5, 2014.**

**Green Infrastructure** means the variety of measures that reduce volumes of runoff introduced into downstream sewer systems and/or surface waters through storage, infiltration, evapotranspiration, reuse, diversion, landscaping. Examples are pervious pavement, bioswales, raingardens, integrated tree wells, etc. LID and GI are complementary and are often termed together, GI/LID.

**Illicit Connection** means any man-made conveyance connecting a non-stormwater discharge directly to a municipal separate storm sewer system.

**Illicit Discharge** means any direct or indirect non-stormwater discharge to a municipal separate storm sewer system, including, but not limited to, sewage, process wastewater, and wash water. The discharge may be continuous or intermittent in occurrence.

**Low Impact Design / Development (LID)** means the use of natural or semi-natural systems to manage stormwater at its source and to reduce or eliminate the development of stormwater runoff so it does not require or requires significantly reduced construction of stormwater management facilities. LID and GI are complementary and are often termed together, GI/LID.

**Minimum Control Measure (MCM)** one of the six control measures that are deemed sufficient to meet the water quality goals of the CWA. The MCMs include: Public Education and Outreach, Public Involvement, Illicit Discharge Detection and Elimination (IDDE), Construction Site Runoff Control, Post-construction Stormwater Management, and Pollution Prevention/Good Housekeeping.

**Maximum Extent Practicable** means the controls necessary for the reduction of pollutants discharged from a municipal separate storm sewer system. These controls may consist of a combination of BMPs, control techniques, system design and engineering methods, and such other provisions for the reduction of pollutants discharged from an MS4 as described in the SWMP.

**Municipal Separate Storm Sewer System (MS4)** means a specific and legally recognized stormwater management system comprised of stormwater management system components that operates under an approved SWMP. In the CoB, the MS4s which may be encountered are systems typically owned and/or operated by either a city (Brookhaven, Doraville, Atlanta, Chamblee, etc.),



DeKalb County (unincorporated portions of DeKalb County), or the Georgia Department of Transportation (GDOT).

Specifically, the Georgia Environmental Protection Division (EPD) definition for an MS4 is a conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels or storm drains, owned or operated by a municipality or other public body, designed or used for collecting or conveying stormwater runoff and is not a combined sewer or part of a Publicly Owned Treatment Works.

**MS4 Control Structures** mean catch basins, ditches, detention/retention ponds, and storm drain lines. These structures/assets must be inventoried, mapped, inspected, and maintained per the requirements of MCM #6 Pollution Prevention / Good Housekeeping. **Regulatory Term.**

**National Pollutant Discharge Elimination System (NPDES)** means the permitting program authorized by the Clean Water Act (CWA), approved by the US EPA, and implemented by the Georgia Department of Natural Resources (DNR) Environmental Protection Division (EPD) that provides authority to discharge into Waters of the United States (WOTUS) and Waters of the State.

**Notice of Intent or NOI** means the mechanism used to register for coverage under the Phase II General Permit.

**Phase II General Permit** means the general stormwater permit issued under the NPDES program by EPD and authorized by the US EPA that allows Phase II designated MS4s to discharge stormwater into WOTUS and Waters of the State of Georgia. The Phase II permit contains six Minimum Control Measures (MCMs) that are qualitative rather than quantitative standards deemed by EPA and EPD sufficient to meet the goals of the CWA. **The City of Brookhaven was designated a Phase II City requiring a Phase II General Permit on October 3, 2013.**

**Post-Construction Stormwater Management Structures** mean detention/retention ponds, water quality vaults, and similar (to be called Ponds hereafter) that must be inventoried and mapped under Minimum Control Measure Post-Construction Stormwater Management in New Development and Redevelopment. This includes all City-owned Ponds, publicly-owned by other public entities, and all privately-owned ponds designed and built after adoption of the GSMM.

**Outfall** means the most downstream point (i.e. final discharge point) on a MS4 where it discharges to receiving waters of the State.

**Source Tracing** means an investigation, which is initiated immediately upon the discovery of new and unknown dry weather flow in the MS4, to determine the location and character of the flow source and to screen the flow for water quality pollutants in the flow.

**Stormwater Management Program (SWMP)** means the CoB program authorized by EPD that meets the requirements of the NPDES Phase II General Permit.

**Stormwater Management Systems** mean the systems that convey, collect, and treat stormwater runoff, and, by doing so, reduce localized flooding and may provide some measure of water quality protection and enhancement.

**Stormwater Runoff** means water produced from precipitation events that is not caught in the pore spaces of asphalt, concrete, vegetation, detritus, buildings, unsaturated soil, etc. or absorbed into the ground; thus, it “runs off” the ground. The amount of stormwater runoff that is produced for



a given precipitation event is a factor of the amount of precipitation; the timeframe for the production of rainfall (known as both duration and intensity); the ground cover; the slope of the ground; the shape of the ground (terrain); antecedent rainfall; the time of year; geography; natural and manmade hydrologic features; and other factors.

**Structures, conveyances, stormwater treatment facilities, and natural drainage-ways:**

generic drainage related terms used to describe a special set of infrastructure assets known as stormwater management systems.

**Waters of the State** mean any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells, wetlands, and all other bodies of surface or subsurface water, natural or artificial, lying within or forming a part of the boundaries of the State which are not entirely confined and retained completely upon the property of a single individual, partnership, or corporation.



## Appendix B Residential Plat Dedications and Language Classes Stormwater Asset Inspection and Maintenance Responsibility

The following list summarizes the classes of stormwater asset dedications generally found in recorded plats in the City of Brookhaven. Until 2013, the area of DeKalb County that became the City of Brookhaven was unincorporated DeKalb County. A review of the dedication language found in the plats reviewed prior to the publication of the IMOP identified the following types of dedications. Following the description, *in an italics font*, is a brief description describing the status of the City's designation as a Phase II MS4 and adoption of the Georgia Stormwater Management Manual (GSMM) as the City's Stormwater Manual at the time the plat was recorded. Following the Regulatory status summary is a number or series of numbers representing the level of the City's maintenance responsibilities that are consistent with the plat dedication language. This number signifies what, as a result of any dedication language, the extent of City operation and maintenance responsibility is, e.g. a designation of **1**. Indicates the City is responsible for assets in the public right-of-way. A key to the numbering scheme is found at the bottom of each page.

1. No designation of stormwater O&M responsibilities, no drainage easements provided (generally up to the mid 1960's). *Prior to designation as a Phase II municipality – Prior to adoption of the GSMM. 1.*
2. Dedication of all infrastructure to the "Public forever." As-built drainage infrastructure are shown and subsequently dedicated. Drainage easements may or may not be shown (generally mid 1960's up to the mid 1980's). *Prior to designation as a Phase II municipality – Prior to adoption of the GSMM. 2.*
3. Dedication of all infrastructure to the "Public forever," and acknowledgment of a "special taxing district" for the maintenance of stormwater detention facilities. Drainage easements and as-built drainage infrastructure are shown and subsequently dedicated (generally mid 1980's up to the mid 1990's). *Prior to designation as a Phase II municipality – Prior to adoption of the GSMM. 3.*
4. Establishment of drainage and access easements and dedication of all drainage infrastructure and detention facilities to a mandatory Home Owners Association (HOA) (generally mid 1990's up to the mid 2000's). *Prior to designation as a Phase II municipality – Prior to adoption of the GSMM. 1.* if the ROW is public. **4.** if the ROW (aka, access and utility easements) is privately owned.
5. Establishment of drainage and access easements and dedication of all drainage infrastructure and detention facilities to a mandatory Home Owners Association (HOA). Reference to a Stormwater Facility Maintenance Agreement in the Plat (generally the early 2000's). *Prior to designation as a Phase II municipality – Prior to adoption of the GSMM. 1.* if ROW public. **4.** if ROW private.
6. Clear language making all drainage and access easements and all drainage infrastructure and detention facilities private, Reference to a Stormwater Facility Maintenance Agreement may or may not be in the Plat (generally from 1980's and

### City Maintenance Responsibilities

**1.** City right-of-way **2.** City right-of-way, drainage structures and pipes **3.** City right-of-way, drainage structures and pipes, stormwater ponds **4.** None **5.** Per SWFMA

## Appendix B



later, when used). Prior to designation as a Phase II municipality – Prior to adoption of the GSMM. 4.

7. Establishment of drainage and access easements and dedication of all drainage infrastructure and detention facilities to a mandatory Home Owners Association (HOA). Reference to a Stormwater Facility Maintenance Agreement in the Plat (generally early to mid 2010's to present). After designation as a Phase II municipality – After adoption of the GSMM. 1.

### **City Maintenance Responsibilities**

**1.** City right-of-way **2.** City right-of-way, drainage structures and pipes **3.** City right-of-way, drainage structures and pipes, stormwater ponds **4.** None **5.** Per SWFMA

## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities By Asset Type



#### **Asset Type: Post-Construction Stormwater Management Structures**

Applies to: Ponds owned by City of Brookhaven

Ownership Designation: **City-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: CoB

Maintenance Agreement Required: No

Maintenance Responsibility: CoB

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required:

- One full geographic area each year, 100% in five years:
- Applies to Inventory, Map, Inspection, and Maintenance
- Report date of inspection, number, type, ownership, condition, and priority
- Update Inventory and Map
- Perform maintenance on 100% of HIGH PRIORITY
- Work Orders with work performed for completed and incomplete maintenance

Assets are owned and maintained by the CoB. The SWMP and MS4 Permit also refers to these assets as permittee-owned or publicly-owned. The term **City-owned** shall be used in this document.

**Permittee-owned** assets are owned and maintained by the CoB. Also known as City-owned or publicly-owned. The term **City-owned** shall be used in this document.

## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities By Asset Type



#### **Asset Type: Post-Construction Stormwater Management Structures**

Applies to: Ponds owned by Other Public Entities

Ownership Designation: Publicly-owned structures owned by other public entities

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: CoB

Maintenance Agreement Required: Prior to the date of adoption of the GSMM (10/3/2014): No.  
After the date of adoption of the GSMM: Yes.

Maintenance Responsibility: Other public entity owner.

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City  
Property Maintenance Code

MS4 Annual Reporting Required: Yes

- One full geographic area each year, 100% in five years:
- Applies to Inventory, Map, Inspection
- Update Inventory and Map
- Copy of Maintenance-Required Letters sent

**Publicly-owned structures owned by other public entities** or assets **publicly-owned by other public entities** are those assets that are NOT City-owned and are NOT privately-owned. They include, but are not limited to: DeKalb County Board of Education, MARTA, GDOT, etc. They are maintained by their Owner.

## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities By Asset Type



#### **Asset Type: Post-Construction Stormwater Management Structures**

Applies to: Privately-owned Ponds constructed AFTER date of adoption of the GSMM.

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: Private Owner Preferred. Minimum: CoB (once every five years)

Maintenance Agreement Required: Yes

Maintenance Responsibility: Private-owner.

Standard for Maintenance: SWFMA, GSMM

MS4 Annual Reporting Required:

- One full geographic area each year, 100% in five years:
- Applies to Inventory, Map, Inspection
- Update Inventory and Map
- Update list of Maintenance Agreements
- Copy of Maintenance-Required Letters sent

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.



## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities By Asset Type



#### **Asset Type: Post-Construction Stormwater Management Structures**

Applies to: Privately-owned Commercial Ponds constructed BEFORE date of adoption of the GSMM

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: Default: CoB or Private Owner Preferred

Maintenance Agreement Required: No, however, preferred

Maintenance Agreement Required: No, however, preferred

Maintenance Responsibility Ponds: Private.

Maintenance Responsibility Other Assets: Private

Property Maintenance Code

Maintenance Duties: All

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City  
MS4 Annual Reporting Required: OPTIONAL

- OPTIONAL - One full geographic area each year, 100% in five years:
- OPTIONAL - Applies to Inventory, Map, Inspection
- OPTIONAL - Update Inventory and Map
- OPTIONAL - Copy of Maintenance-Required Letters sent

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.

## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities By Asset Type



#### **Asset Type: Post-Construction Stormwater Management Structures**

Applies to: Privately-owned Subdivision Ponds constructed BEFORE date of adoption of the GSMM and Recorded Plat DOES NOT establish a Special Taxing District for Subdivision and DOES NOT dedicate drains, easements, water ways to “Public Forever.”

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: Default: CoB or Private Owner Preferred

Maintenance Agreement Required: No, however, preferred

Maintenance Responsibility Ponds: Private.

Maintenance Responsibility Other Assets: Private

Maintenance Duties: All

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required: OPTIONAL

- OPTIONAL - One full geographic area each year, 100% in five years:
- OPTIONAL - Applies to Inventory, Map, Inspection
- OPTIONAL - Update Inventory and Map
- OPTIONAL - Copy of Maintenance-Required Letters sent

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.

**Appendix B**  
Inspection, Operation, Maintenance, and Reporting  
Responsibilities  
By Asset Type



**Asset Type: Post-Construction Stormwater Management Structures**

Applies to: Privately-owned Subdivision Ponds constructed BEFORE date of adoption of the GSMM and Recorded Plat DOES establish a Special Taxing District for Subdivision and DOES dedicate drains, easements, water ways to “Public Forever.”

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: Default: CoB or Private Owner Preferred

Maintenance Agreement Required: No, however, preferred

Maintenance Responsibility Ponds: Shared. CoB and Private.

Maintenance Responsibility Other Assets: CoB

Maintenance Duties: CoB conducts maintenance of platted assets in right-of-way and recorded easements, where easements are accessible and property owners have provided right-of-access.

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required: OPTIONAL

- OPTIONAL - One full geographic area each year, 100% in five years:
- OPTIONAL - Applies to Inventory, Map, Inspection
- OPTIONAL - Update Inventory and Map
- OPTIONAL - Copy of Maintenance-Required Letters sent

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.

**Appendix B**  
Inspection, Operation, Maintenance, and Reporting  
Responsibilities  
By Asset Type



**Asset Type: Post-Construction Stormwater Management Structures**

Applies to: Privately-owned Subdivision Ponds constructed BEFORE date of adoption of the GSMM and Recorded Plat DOES NOT establish a Special Taxing District for Subdivision and DOES dedicate drains, easements, water ways to “Public Forever.”

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: Default: CoB or Private Owner Preferred

Maintenance Agreement Required: No, however, preferred

Maintenance Responsibility Ponds: Private.

Maintenance Responsibility Other Assets: CoB

Maintenance Duties: CoB conducts maintenance of platted assets in right-of-way and recorded easements, where easements are accessible and property owners have provided right-of-access.

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required: OPTIONAL

- OPTIONAL - One full geographic area each year, 100% in five years:
- OPTIONAL - Applies to Inventory, Map, Inspection
- OPTIONAL - Update Inventory and Map
- OPTIONAL - Copy of Maintenance-Required Letters sent

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.

## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities

#### By Asset Type



#### **Asset Type: GI/LID Structures**

Applies to: GI/LID Structures owned by City of Brookhaven

Ownership Designation: **City-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: CoB

Maintenance Agreement Required: No

Maintenance Responsibility: CoB

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required:

- One full geographic area each year, 100% in five years:
- Applies to Inventory, Map, Inspection, and Maintenance
- Report date of inspection, number, type, ownership, condition, and priority
- Update Inventory and Map
- Perform maintenance on structures requiring maintenance
- Work Orders with work performed for completed and incomplete maintenance

Assets are owned and maintained by the CoB. The SWMP and MS4 Permit also refers to these assets as permittee-owned or publicly-owned. The term **City-owned** shall be used in this document.

**Permittee-owned** assets are owned and maintained by the CoB. Also known as City-owned or publicly-owned. The term **City-owned** shall be used in this document.

## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities

#### By Asset Type



#### **Asset Type: GI/LID Structures**

Applies to: GI/LID Structures owned by Other Public Entities built after date of designation as a MS4.

Ownership Designation: Publicly-owned structures owned by other public entities

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: CoB

Maintenance Agreement Required: YES

Maintenance Responsibility: Other public entity owner.

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required: Yes

- One full geographic area each year, 100% in five years:
- Applies to Inventory, Map, Inspection
- Update Inventory and Map
- Copy of Maintenance-Required Letters sent

**Publicly-owned structures owned by other public entities** or assets **publicly-owned by other public entities** are those assets that are NOT City-owned and are NOT privately-owned. They include, but are not limited to: DeKalb County Board of Education, MARTA, GDOT, etc. They are maintained by their Owner.

**Appendix B**  
Inspection, Operation, Maintenance, and Reporting  
Responsibilities  
By Asset Type



**Asset Type: GI/LID Structures**

Applies to: Non-residential Privately-owned GI/LID constructed AFTER date of designation as an MS4.

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: Private Owner Preferred. Minimum: CoB (once every five years)

Maintenance Agreement Required: Yes

Maintenance Responsibility: Private-owner.

Standard for Maintenance: SWFMA and GSMM

MS4 Annual Reporting Required:

- One full geographic area each year, 100% in five years:
- Applies to Inventory, Map, Inspection
- Update Inventory and Map
- Update list of Maintenance Agreements
- Copy of Maintenance-Required Letters sent

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.

## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities By Asset Type



#### **Asset Type: MS4 Control Structures**

Applies to: MS4 Control Structures (MS4 assets) owned by City of Brookhaven

Ownership Designation: **City-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: CoB

Maintenance Agreement Required: No

Maintenance Responsibility: CoB

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required:

- One full geographic area each year, 100% in five years:
- Applies to Inventory, Map, Inspection, and Maintenance
- Update Inventory and Map (ONLY INCLUDE IN ANNUAL REPORTS ASSETS THAT ARE: 1. City-owned, 2. Catch Basins, 3. Ditches, 4. Detention Ponds/Retention Ponds, and 5. Storm drain lines
- Report number added during reporting period.
- Provide spreadsheet of inspection, condition, and maintenance prioritization.
- Report number and type of MS4 Structures Maintained during reporting period.
- Provide maintenance on 100% of HIGH PRIORITY structures.
- Work Orders with work performed for completed and incomplete maintenance

Assets are owned and maintained by the CoB. The SWMP and MS4 Permit also refers to these assets as permittee-owned or publicly-owned. The term **City-owned** shall be used in this document.

**Permittee-owned** assets are owned and maintained by the CoB. Also known as City-owned or publicly-owned. The term **City-owned** shall be used in this document.



## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities By Asset Type



#### **Asset Type: MS4 Control Structures**

Applies to: Structures owned by Other Public Entities

Ownership Designation: Publicly-owned structures owned by other public entities

Inventory and Mapping Responsibility: OPTIONAL - CoB

Inspection Responsibility: OPTIONAL - CoB

Maintenance Agreement Required: No

Maintenance Responsibility: Other public entity owner.

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City  
Property Maintenance Code

MS4 Annual Reporting Required: NONE

- One full geographic area each year, 100% in five years:
- Applies to Inventory, Map, Inspection
- Update Inventory and Map

**Publicly-owned structures owned by other public entities** or assets **publicly-owned by other public entities** are those assets that are NOT City-owned and are NOT privately-owned. They include, but are not limited to: DeKalb County Board of Education, MARTA, GDOT, etc. They are maintained by their Owner.

## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities By Asset Type



#### **Asset Type: MS4 Control Structures**

Applies to: Privately-owned Structures constructed AFTER date of adoption of the GSMM.

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: OPTIONAL - CoB

Inspection Responsibility: : OPTIONAL - CoB or Private Owner Preferred

Maintenance Agreement Required: Yes

Maintenance Responsibility: Private-owner.

Standard for Maintenance: SWFMA. GSMM. City Property Maintenance Code

MS4 Annual Reporting Required: NONE

- One full geographic area each year, 100% in five years:
- Applies to Inventory, Map, Inspection
- Update Inventory and Map
- Update list of Maintenance Agreements
- Copy of Maintenance-Required Letters sent

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.

**Appendix B**  
Inspection, Operation, Maintenance, and Reporting  
Responsibilities  
By Asset Type



**Asset Type: MS4 Control Structures**

Applies to: Privately-owned Commercial Structures constructed BEFORE date of adoption of the GSMM

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: OPTIONAL CoB or Private Owner Preferred

Maintenance Agreement Required: No, however, preferred

Maintenance Responsibility Ponds: Private.

Maintenance Responsibility Other Assets: Private

Maintenance Duties: All

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required: NONE

- OPTIONAL - One full geographic area each year, 100% in five years:
- OPTIONAL - Applies to Inventory, Map, Inspection
- OPTIONAL - Update Inventory and Map
- OPTIONAL - Copy of Maintenance-Required Letters sent

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.

## Appendix B

### Inspection, Operation, Maintenance, and Reporting Responsibilities By Asset Type



#### **Asset Type: MS4 Control Structures**

Applies to: Privately-owned Subdivision Structures constructed BEFORE date of adoption of the GSMM and Recorded Plat DOES NOT establish a Special Taxing District for Subdivision and DOES NOT dedicate drains, easements, water ways to “Public Forever.”

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: OPTIONAL CoB or Private Owner Preferred

Maintenance Agreement Required: No, however, preferred

Maintenance Responsibility Ponds: Private.

Maintenance Responsibility Other Assets: Private

Maintenance Duties: All

Standard for Maintenance: Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required: NONE

- OPTIONAL - One full geographic area each year, 100% in five years:
- OPTIONAL - Applies to Inventory, Map, Inspection
- OPTIONAL - Update Inventory and Map
- OPTIONAL - Copy of Maintenance-Required Letters sent

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.

**Appendix B**  
Inspection, Operation, Maintenance, and Reporting  
Responsibilities  
By Asset Type



**Asset Type: MS4 Control Structures**

Applies to: Privately-owned Subdivision Structures constructed BEFORE date of adoption of the GSMM and Recorded Plat DOES establish a Special Taxing District for Subdivision and DOES dedicate drains, easements, water ways to “Public Forever.”

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: CoB

Maintenance Agreement Required: No, however, preferred

Maintenance Responsibility Ponds: Shared. CoB and Private.

Maintenance Responsibility Other Assets: CoB

Maintenance Duties: CoB conducts maintenance of platted assets in right-of-way and recorded easements, where easements are accessible and property owners have provided right-of-access.

Standard for Maintenance: Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required:

- One full geographic area each year, 100% in five years:
  - Applies to Inventory, Map, Inspection, and Maintenance
  - Update Inventory and Map (DO NOT INCLUDE IN ANNUAL REPORTS ASSETS THAT ARE NOT: 1. City-owned, 2. Catch Basins, 3. Ditches, 4. Detention Ponds/Retention Ponds, and 5. Storm drain lines
  - Report number added during reporting period.
  - Provide spreadsheet of inspection, condition, and maintenance prioritization.
  - Report number and type of MS4 Structures Maintained during reporting period.
  - Provide maintenance on 100% of HIGH PRIORITY structures.
- Work Orders with work performed for completed and incomplete maintenance

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.

**Appendix B**  
Inspection, Operation, Maintenance, and Reporting  
Responsibilities  
By Asset Type



**Asset Type: MS4 Control Structures**

Applies to: Privately-owned Subdivision Ponds constructed BEFORE date of adoption of the GSMM and Recorded Plat DOES NOT establish a Special Taxing District for Subdivision and DOES dedicate drains, easements, water ways to “Public Forever.”

Ownership Designation: **Privately-owned**

Inventory and Mapping Responsibility: CoB

Inspection Responsibility: CoB

Maintenance Agreement Required: No, however, preferred

Maintenance Responsibility Ponds: Private.

Maintenance Responsibility Other Assets: CoB

Maintenance Duties: CoB conducts maintenance of platted assets in right-of-way and recorded easements, where easements are accessible and property owners have provided right-of-access.

Standard for Maintenance: GSMM where “as-designed” data exists. Structural repairs. City Property Maintenance Code

MS4 Annual Reporting Required:

- One full geographic area each year, 100% in five years:
  - Applies to Inventory, Map, Inspection, and Maintenance
  - Update Inventory and Map (DO NOT INCLUDE IN ANNUAL REPORTS ASSETS THAT ARE NOT: 1. City-owned, 2. Catch Basins, 3. Ditches, 4. Detention Ponds/Retention Ponds, and 5. Storm drain lines
  - Report number added during reporting period.
  - Provide spreadsheet of inspection, condition, and maintenance prioritization.
  - Report number and type of MS4 Structures Maintained during reporting period.
  - Provide maintenance on 100% of HIGH PRIORITY structures.
- Work Orders with work performed for completed and incomplete maintenance

**Privately-owned** assets are owned and maintained by private-entities. Privately-owned assets built before adoption of the GSMM are not required to be included in the annual inventory of Ponds.

**Appendix B**  
Inspection, Operation, Maintenance, and Reporting  
Responsibilities  
By Asset Type



## Appendix C Stormwater Management Asset Detailed Descriptions



**Structures, conveyances, stormwater treatment facilities, and natural drainage-ways:** generic drainage related terms used to describe a special set of infrastructure assets known as **stormwater management systems**. Each term is further detailed in outline form below.

Functionally, **stormwater management systems** are comprised of the following components:

### 1. **Structures:**

#### a. **Inlets**

- i. Capture, collect, concentrate, and direct runoff;
- ii. Catch basins, curb inlets, drop inlets, trench drains, and upstream headwalls;
- iii. Connect closed conveyances;
- iv. Can change the direction and slope of the conveyances;
- v. Above groundwater table: dry during dry weather
- vi. Below groundwater table: wet during dry weather

#### b. **Junction boxes**

- i. Direct flow in closed conduits
- ii. Can change the direction and slope of the conveyances
- iii. Manholes, junction boxes, blind junction (box)

#### c. **Outfalls**

- i. Disperse, discharge, spread, and direct runoff
- ii. Downstream headwalls
- iii. Connect closed conveyances to open channel conveyances
- iv. **Dry during dry weather** (ephemeral)
  - a.) Intended to convey runoff, i.e. flow during wet weather
  - b.) If flowing during dry weather, flow could be:
    - i.) Groundwater infiltration (which infiltrates joints or pipe/structure defects)
    - ii.) Baseflow, consisting of piped stream flow from intermittent or perennial streams
      - (a.) The structure is not technically an OUTFALL (flow at this point has already been introduced to Waters of the State)
      - (b.) The “outfall” would be the junction upstream where runoff is introduced into this baseflow
    - iii.) An illicit connection or discharge

### 2. **Control Structures**

- a. Discharge water from stormwater management facilities (detention ponds, extended detention facilities, underground detention, etc.)
- b. Typically discharge at controlled or predictable rates
- c. Typically include weirs/orifices
  - i. Water quality orifice /weir (retain the first 1 inch of rainfall, used to remove at least 80% of total suspended solids)



## Appendix C Stormwater Management Asset Detailed Descriptions



- ii. Channel protection orifice /weir (detain the 1 year 24-hour storm and release at rates that are less than or equal to the discharge rate from the undeveloped, natural system)
  - iii. Overbank protection weir – controls the post-development rate of discharge to be no more than the pre-development rate for the 100-year 24-hour storm (Brookhaven) or the 25-year 24-hour storm (State of Georgia)
  - iv. Extreme event flood protection weir – controls the discharge from the extreme event, typically the 100-year 24-hour storm in a manner that downstream damage / flooding is not exacerbated.
  - d. Typically connected to a closed conveyance (pipe) which discharges into an open channel.
3. **Detention / Retention Ponds**
- a. Generic terms for engineered structures/facilities through which stormwater runoff is detained, retained, routed, controlled, treated, held, and/or released.
  - b. Detention pond: Water is temporarily detained. For sizing purposes, assumes that 100% of runoff is routed through the facility.
  - c. Retention pond: Water is retained within the confines of the stormwater facility. For sizing purposes, assumes that 100% of runoff remains on site and/or is infiltrated, is removed through evapotranspiration, or is reused.
  - d. Few facilities are pure detention or retention facilities. The term is applied to the general purpose of the facility.
    - i. If the runoff is intended to be routed through a facility (up to 72 hour residence time), it is termed detention.
    - ii. If runoff is intended to be captured in the facility (>72 hour residence time), it is termed retention.
    - iii. Retention is the process used in “runoff reduction” and/or “green infrastructure”
4. **Conveyances:**
- a. Convey stormwater runoff from one location to another
  - b. **Open Channel** (for the purposes of this document, open-to-the-air drainage-ways)
    - i. Constructed **swales** and **ditches**
      - a.) Natural drainages, creeks, streams
      - b.) Constructed swales, channels, ditches
        - i.) Shape and roughness can be expected to be dynamic.
        - ii.) Shape can be redefined through erosion, scour, deposition, etc.
  - c. **Closed conduits**
    - i. Pipes
    - ii. Box culverts
    - iii. Normally flow as open channels, but can become surcharged and flow under pressure.
      - a.) Shape and roughness are expected to be stable

## Appendix C

### Stormwater Management Asset Detailed Descriptions



- b.) Defined sizes, typically round, but can be:
  - i.) Rectangular/square
  - ii.) Elliptical /egg shaped
- d. Roads and built surfaces
  - i. Serve as flumes (concentrated flow), wide channels (shallow flow), planes (sheet flow)
  - ii. Part of the MS4 and collection system
- 5. Construction materials
  - a. **Structures**
    - i. Reinforced Concrete
      - a.) Pre-cast
      - b.) Cast-in-place
    - ii. Masonry
      - a.) Natural stone
      - b.) Brick
      - c.) Concrete block
    - iii. Other
      - a.) HDPE
      - b.) Steel/aluminum
      - c.) Corrugated metal pipe (CMP)
      - d.) Wood
  - b. **Control Structures:** See Structures
  - c. **Detention Retention Ponds**
    - i. Above-ground (have a dam, an above-natural-grade embankment) or in-ground
      - a.) Reservoir/impoundment
      - b.) Earthen
      - c.) Lined (concrete, clay, or geotechnical membrane)
      - d.) Vegetated
        - i.) Grassed
        - ii.) Planted with native vegetation
        - iii.) Natural (former in-line systems were often left natural and were defined only by the design high water level and free-board)
      - e.) GI/LID (natural systems to promote storage, retention, evapotranspiration, infiltration)
        - i.) Rain gardens
        - ii.) Bioswales/ bioslopes
        - iii.) Flow wells
        - iv.)
    - ii. Underground / Proprietary
      - a.) CMP

## Appendix C Stormwater Management Asset Detailed Descriptions



- b.) HDPE
- c.) Concrete
- d.) Other
- d. **Conveyances**
  - i. Natural
    - a.) Grass or dirt
    - b.) Concrete or rubble
    - c.) River rock / natural stone
  - ii. Manufactured (*italicized* in general order of predominance)
    - a.) *Corrugated metal pipe (CMP)*
      - i.) Unlined and/or non-galvanized
      - ii.) Bituminous (BCMP)
      - iii.) Aluminized (ACMP)
      - iv.) Pipe Arch, round, or elliptical (ECMP)
    - b.) Concrete pipe
      - i.) *Reinforced concrete pipe (RCP)*
      - ii.) Asbestos cement (AC)
      - iii.) Non-reinforced concrete pipe (CP)
    - c.) Iron Pipe
      - i.) *Ductile iron pipe (DIP)*
      - ii.) Cast iron pipe (CI or CIP)
    - d.) Steel pipe / stainless steel (SS) pipe
      - i.) Steel pipe less often used
      - ii.) Often found as a casing for stream crossings underground bores
    - e.) Plastic pipe
      - i.) *Double walled HDPE (HDPE), typically >= 12 inches*
      - ii.) *High-performance*
      - iii.) Corrugated HDPE or polyethylene pipe, single wall (HDPE or PE), < 12 inches
      - iv.) *High-performance polypropylene pipe (HPPP or PP Pipe)*
      - v.) Polyvinyl chloride (PVC)
    - f.) Other uncommon materials: brick, stone, concrete blocks, wood, natural stone (tunneled)

SCORING RUBRIC  
MS4 INSPECTIONS AND ASSESSMENTS RFP  
ITB # 23-106  
BID OPENING:

Vendor Name: \_\_\_\_\_ Points: **0** Maximum Points: **100**

A. Project Team			B. Similar Project Experience			C. Project Approach			D. Firm Information			F. Cost		
	Max points	Awarded Points		Max points	Awarded Points		Max Points	Awarded Points		Max Points	Awarded Points		Max Points	Awarded Points
<b>A. Project Team</b>	<b>33</b>	<b>0</b>	<b>B. Similar Project Experience</b>	<b>28</b>	<b>0</b>	<b>C. Project Approach</b>	<b>20</b>	<b>0</b>	<b>D. Firm Information</b>	<b>4</b>	<b>0</b>	<b>F. Cost</b>	<b>15</b>	<b>0</b>
<b>A.1. Project Team</b>	<b>21</b>	<b>0</b>	<b>B.1. Scope of Work</b>	<b>16</b>					Years in Business	1		Annual Fee Year 5	9	
Project Manager	7		Key:			Key:			Experience of Founding Partners	0.5		Hourly Cost for Source Tracing	3	
Lead Field Technician	7		Project Significantly Exceeds,	4		Meets Scope of Work and Requirements, and Proposes Project Enhancements / Innovations	20		Established local office > 3 yrs	0.5		From Rate Sheet: Cost for Project Manager, Key GIS Staff Member, EIT, and Mid-level Inspector for 160 hours	3	
Key GIS Staff Member	7		Project Meets / Matches, or	2		Meets Scope of Work and Requirements	18		Key:					
			Project Does not Match	0-1		Does not meet Scope and Requirements in more than 2 areas	10		Bankruptcies			Key:		
<b>A.2. Point of Contact</b>	Pass/Fail	<b>Fail</b>	Score:		<b>0</b>				None	2				
Principle in Charge			Project 1						Last 5 years	0		Lower 1/3 of Respondants	Item Max points	
Project Manager			Project 2						Last 7 years	1		Middle 1/3 of Respondants	2/3 Item Max points	
Key GIS Staff Member			Project 3									Upper 1/3 of Respondants	1/3 Item Max points	
			Project 4						Score:					
<b>A.3. Longevity with Firm</b>	<b>9</b>	<b>0</b>	<b>B.2. References</b>	<b>12</b>					Bankruptcies					
Key:			Key:											
> 4 yrs	3		Excellent reference, 2/3 Key staff played significant role in project. Would use again	3										
> 2 yrs < 4 yrs	2		Strong reference, but proposed project team did not play a significant role. Would use again	2										
> 1 yr < 2 yrs	1		Verified work was performed, but referenced did not play a significant Owner role	0										
< 1 yr	0		Score:		<b>0</b>									
Project Manager	3		Project 1											
Lead Field Technician	3		Project 2											
Key GIS Staff Manager	3		Project 3											
			Project 4											
<b>A.4. Other Key Staff</b>	<b>3</b>													

# GREEN INFRASTRUCTURE / LOW IMPACT DEVELOPMENT PROGRAM

## City of Brookhaven, Georgia

**Revision History:**

Version		
Number	Date	Summary of Revisions
1.0	15 Feb 2020	First Version
1.1	31 Aug 2020	Minor Edits – Response to EPD 21 Jul 2020 comments

## *Green Infrastructure (GI) / Low Impact Development (LID)*

### **Better Site Design – Reduce Runoff at the Source – Intentionally Maintain**

- I. Applies to Non-residential development
- II. Establishes procedures for evaluating the feasibility and site applicability of different GI/LID techniques and practices.
  - A. Internally assess feasibility - PRE-DESIGN
    1. Encourage the application of Better Site Planning and Design Techniques.
    2. Early coordination, collaboration, and communication
      - a. Internal multi-disciplinary teams: planners, design professional, Owner, and stakeholders
      - b. Concept plan review with City staff (required under New 2020 Stormwater Ordinance)
    3. Assess opportunities for conservation of natural resources
    4. Take a “Build with the Land” approach to site layout and design
    5. Assess the applicability of green infrastructure / Integrated Management Practices
  - B. Communicate feasibility / infeasibility early
    1. Hold pre-submittal plan review meetings with Community Development to discuss opportunities and constraints
    2. “Self-evaluate” your case for an infeasibility waiver
    3. Apply for an infeasibility waiver
- III. Follows current Georgia Stormwater Management Manual (GSMM) Approach
- IV. Menu of generally acceptable GI/LID Structures (approval of practices below is on a case-by-case bases and is dependent upon site suitability/applicability)
  - A. Tier 1 – GI/LID Runoff Reduction, Water Quality, and Peak Reduction
    1. Infiltration and evapotranspiration
      - a. Bioretention
      - b. Bioslope
      - c. Enhanced dry swales
      - d. Green roofs
      - e. Stormwater planters/tree boxes
    2. Infiltration
      - a. Dry wells
      - b. Infiltration trenches
      - c. Permeable / Porous pavements
    3. Harvest/use
      - a. Rainwater harvesting
    4. Proprietary systems
      - a. Physical removal
  - B. 2<sup>nd</sup> Tier -Limited Runoff Reduction
    1. Evapotranspiration and filtering

- a. Grass channel
  - 2. Filtering
    - a. Organic filter
    - b. Sand filter
    - c. Vegetative filter strip
  - C. Stormwater Quantity
    - 1. Dry detention basin
    - 2. Underground detention
- V. Requires specific procedures for the inspection and maintenance of the GI/LID structures: City-owned and non-City-owned (includes structures that are publicly-owned and maintained by other entities and structures that are privately-owned non-residential)
  - A. City-owned GI/LID structures: Inspection and maintenance is in accordance with the City's MS4 Operations and Maintenance Program
  - B. Non-City-owned GI/LID structures: Inspection and maintenance will occur in accordance to the recorded Stormwater Management Facility Maintenance Agreement (if it addresses GI/LID inspection, operation, and maintenance) or the recorded GI/LID Integrated Management Practices Inspection, Operation, and Maintenance Agreement. At least once every 5 years City will inspect these structures.

# DRAFT

## City of Brookhaven Green Infrastructure / Low Impact Development Program

### Introduction

The City of Brookhaven is one of the newest DeKalb County cities in Georgia and was incorporated in late 2012. The corporate boundaries of the City include approximately 12 square miles and stretches from the north (I-285) to the south (Briarcliff Road), the City of Atlanta on the west, and the City of Chamblee to the east. The topography includes flat valleys and floodplains, rolling hills, and steep terrain with up to 50%-60% slopes. Significant tributaries to the Chattahoochee River, N Fork Peachtree Creek and Nancy Creek, are fed by a number of named and unnamed tributaries and gullies which are found throughout the City. Soils include rock outcroppings at the surface, organic top soil, red clay, sandy clay, sand, and silt. The depth to the rock layers / bedrock vary from surface outcroppings to more than 20 or 30 feet, as does the depth to groundwater.

Most of the City is considered built-out and this is seen in the City's surface water hydrology. N Fork Peachtree Creek and Nancy Creek along with their tributaries are susceptible to short term flash and nuisance flooding. Due to the rolling topography, the distance to a gulley, dry creek bed, or stream is relatively short, and much of the development in the City has altered the characteristics of runoff in the City. Where flow regimes historically consisted of sheet flow over undisturbed forest, pasture, or cultivated soils, the ground surface in many areas has been re-graded, compacted, and built upon with landscaped and impervious areas. Most lawn areas were established on compacted earth with only 2-3 inches of topsoil.

Development has altered these natural flow regimes and increased runoff volumes. Historic sheet flow that spread over large areas before concentrating in natural gullies has been replaced by shallow concentrated and open channel flows well upslope of the natural drainage features creating new features and State waters through erosion. Point source discharges, pipe ends and headwalls, adjacent to the gullies, dry creek beds, and, streams throughout the City down to Nancy Creek and N Fork Peachtree Creek have eroded the banks carrying large sediment loads into the Chattahoochee River. N Fork Peachtree Creek, Nancy Creek, and the Chattahoochee River each are continuously listed in the State's biennial 305(b)/303(d) integrated report. List. Sediment loads, septic tanks, leaking sanitary sewers, other anthropogenic and non-anthropogenic sources contribute to the poor water quality. Structural and non-structural management, operation, and maintenance approaches can control all of these anthropogenic sources. Controlling the amount of runoff leaving a built site is an effective way to control erosion and to reduce direct hydrologic connections from fecal sources to State waters.

Green infrastructure and low impact development (GI/LID) refer to intentional and reasoned approaches to development, which together can reduce or eliminate adverse impacts on the surrounding environment. They promote the use of natural resources' inventories; early, ongoing, and frequent multi-stakeholder collaboration; preliminary site planning with the intent to design-to-the-land; selection of best management practices which promote sustainability, and accountability in the operation and maintenance of these systems. The expected result is to move towards point where the hydrology from the built environment mimics the natural and historical hydrology resulting in significant improvements to water quality. This manual defines the City's approach to implementation of a GI/LID Program.

The approach recognizing the unique character of each parcel of land, and, therefore, are not proscriptive. The Program promotes identifying the site-specific opportunities and constraints to evaluate the feasibility and site-suitability to the application of different GI/LID techniques. Using better site design techniques, consideration is given to a broad range of site-specific development and stormwater management practices that encourage infiltration, evapotranspiration, and/or onsite runoff harvesting and use to reduce discharged runoff volumes, improve water quality, and protect the City's natural resources.



Long-term sustainability of these site-specific integrated structural and non-structural best management practices is the key to a successful program. Accountability, through inspection, maintenance, and operation programs (IMOPs), customized to the unique site-specific runoff and water quality management systems, is promoted through site-specific IMOP Management Agreements that “run-with-the-land” and include compliance and enforcement provisions.

Brookhaven’s GI/LID program focuses on successful outcomes through flexible implementation of design alternatives. The predominately infill and redevelopment character of construction projects in the City requires flexibility in assessing the appropriate GI/LID planning and design approach. Each site is unique and is driven primarily by site-specific engineering, economic, geographic, and other factors. Development submittals are reviewed and approved on a case by case basis. The Georgia Stormwater Management Manual (GSMM) serves as Brookhaven’s GI/LID program guidance document. In addition, designer may consider using regional and national guidance on case by case basis with prior approval from the City.

### **GI/LID Requirements**

New development and redevelopment plans are submitted to the Brookhaven Community Development Department for project review. The development plans are reviewed by the City staff to ensure that the proposed development conforms to the applicable provisions of City Code. These codes include but are not limited to:

- Chapter 14<sup>1</sup> – Land Development and Subdivisions
- Chapter 23 – Streets and Sidewalks
- Chapter 25 – Water, Sewer, and Sewage Disposal
- Chapter 27 – Zoning

Together, these sections of code address the City’s comprehensive requirements for zoning, land and subdivision, site plans, stormwater management, street and road design, tree protection, flood zone management, erosion and sediment control, and stream buffer protection. The development regulations require that the developer submit a comprehensive package of drawings, details, calculations, best management practices, and hydrologic studies for review by the City staff.

In addition to specific City ordinances, the City adopted the GSMM and the GSMM Site Development Review Tool by reference to serve as the City’s stormwater design manual which establishes the acceptable level of design and performance standards for stormwater management. These include GI/LID practices sections which also establish stormwater management credits for when different GI/LID practices are incorporated into the development application. The GSMM also provides excellent guidance for better site planning techniques, better site design techniques, and post-construction stormwater management operation, inspection, and maintenance practices.

### **GI/LID Feasibility and Site Applicability**

The feasibility of applying GI/LID techniques and practices to a site is fully dependent upon a site’s suitability for these techniques. With the predominance of infill and redevelopment construction in Brookhaven identifying the opportunities and constraints for innovative approaches may be more challenging than in other localities. Hyper-local institutional knowledge of the City may prove to be critical in this evaluation. Pre-design City staff involvement is encouraged. Low Impact Development (LID)

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<sup>1</sup> With the publication of the Metropolitan North Georgia Water Planning District’s (MNGWPD) December 4, 2019 Post-Construction Stormwater Management for New Development and Re-Development Model Ordinance, a new City Stormwater Management Ordinance must be adopted with 12 months. The GI/LID Program will be re-evaluated for compatibility with the new ordinance within a year of adoption by City Council.

practices encouraged in Brookhaven are grouped into three major categories that generally fit with the LID implementation process. The categories are:

#### Early Coordination, Collaboration, and Communication

Early coordination, collaboration, and communication is critical to successful implementation of LID practices. Two LID practices are recognized: use of a multi-disciplinary design team; and participation in the Stormwater Pre-Design Process. Early coordination between LID planners, experienced stormwater design, operations, and management professionals, City staff, and experienced construction contractors can result in an innovative site design that optimizes multi-functional spaces and stormwater designs. This collaborative approach between these professionals has the potential to minimize the need for traditional site grading and stormwater infrastructure designs in favor of point-of-generation techniques to reduce runoff from most storm events. It also has the potential to identify, at an early stage, the potential or feasibility to apply a level of GI/LID techniques above the statutory runoff reduction requirements.

#### Conservation of Natural Features and Resources

Conservation of natural features is integral to the success of a LID site design. These LID practices involve the identification and preservation of natural features and hydrologic resources on a site for the purposes of reducing stormwater volume, pollutants and peak flow; providing stormwater storage; reducing flooding; preventing soil erosion; and promoting infiltration and evapotranspiration. These purposes align fully with the stormwater protection performance standards and are required on all applicable developments. Thus, the conservation of natural features and resources should be a first thought for site design teams who are focused on ease of compliance with stormwater performance standards.

Some of the natural features that should be considered are:

- areas of undisturbed vegetation,
- floodplains and riparian areas,
- ridgetops and steep slopes,
- natural drainage pathways,
- intermittent and perennial streams,
- wetlands
- aquifers and recharge areas,
- soils,
- shallow bedrock or high water table, and
- other natural features or critical areas.

Some of the ways used to conserve natural features and resources include the following stormwater LID practices:

- preserve undisturbed natural areas,
- avoid floodplains,
- preserve riparian buffers, and
- avoid steep slopes.

#### “Build With the Land” Design Techniques

After a site analysis has been performed and conservation areas have been delineated, there are numerous opportunities to reduce both stormwater quantity and quality impacts as the site layout is prepared. The stormwater LID practices that can be used at this stage primarily deal with the location and configuration of impervious surfaces or structures on the site, and their location relative to natural features and preservation/conservation areas. These LID practices include:

- fit the design to the terrain,
- locate the development in less sensitive areas,
- reduce the limits of clearing and grading,
- utilize open space development, and
- consider creative development design.

The goal of site design techniques that “build with the land” is to position the elements of the development project in such a way that the site design (i.e. placement of buildings, parking, streets and driveways, lawns, undisturbed vegetation, buffers, etc.) is optimized for effective stormwater management. That is, the site

design takes advantage of the site’s natural features, including those placed in conservation areas, as well as any site constraints and opportunities (topography, soils, natural vegetation, floodplains, shallow bedrock, high water table, etc.) to prevent both on-site and downstream stormwater impacts.

**Green Infrastructure / Integrated Management Practices (Control Measures):**

Green Infrastructure / Integrated Management Practices (IMPs) allowable in Brookhaven are categorized into those that are appropriate for stormwater quantity control, runoff reduction (RR), and stormwater quality control. The following table lists the IMPs from the GSMM that are acceptable to the City and presents information pertaining to the approved stormwater management mechanism and function of each.

The end-goal of the GI/LID program is to encourage the use of different GI and LID BMPs that, together, eliminate the need for traditional stormwater management detention / peak attenuation facilities. Therefore, those GI IMPs that provide RR volume reductions are considered the first tier of allowable GI IMPs and are listed below.

The unique nature of each parcel necessitates flexibility in implementation of this program. Below are listed GI IMPs that are generally pre-approved (see footnotes) when the applicant demonstrates the IMP is appropriate to the site. IMPs that total 100% of the required RR, eliminate the need to install water quality BMPs. Other GI IMPs may be approved upon demonstration of need.

**Allowable Control Measures for Stormwater Quantity and Quality Management**

GI/IMP	Stormwater Management Mechanisms Used	Function(s)
<i>Bioretention Area<sup>2</sup></i>	Infiltration and Evapotranspiration	Stormwater Quality
<i>Bioslope</i>		
<i>Green roofs</i>		
<i>Dry Wells</i>		
<i>Enhanced Dry Swales</i>		
<b>Regenerative conveyance</b>		
<b>Site reforestation/revegetation</b>		
<b>Soil restoration</b>		
<i>Stormwater planters/tree boxes</i>		
<b>Grass channel</b>	Evapotranspiration and Filtering	Stormwater Quality
<i>Infiltration practices</i>	Infiltration	
<b>Organic filter</b>	Filtering	
<b>Sand filter</b>		
<b>Vegetated filter strip</b>		
<i>Rainwater harvesting</i>	Harvest/use	
<i>Proprietary systems<sup>3</sup></i>	Physical removal	
<b>Dry detention basin</b>	Detention and velocity reduction	Stormwater Quantity
<b>Underground detention</b>		

<sup>2</sup> Tier 1 GI IMPs, which are pre-approved if appropriate for the site, are identified in this *typeface*.

<sup>3</sup> Appropriate proprietary systems may be approved on a case-by-case basis

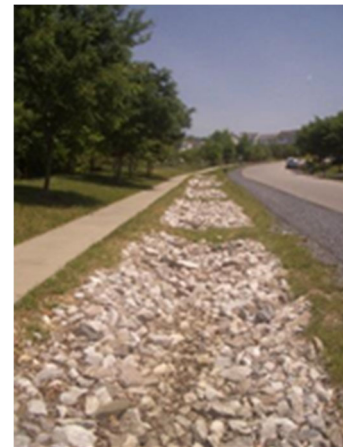
Some examples of acceptable control structures are depicted below



**Examples of Urban Bioretention**



**Examples of Urban Bioretention**



**Examples of Infiltration Trenches**

Some examples of acceptable control structures are depicted below



**Examples of Water Quality Swales**



**Examples of Rain Gardens**

When the pre-design planning and evaluation steps above have been undertaken and incorporation of GI/LID elements have been deemed to be infeasible, an administrative GI/LID waiver is available. When exceptional circumstances applicable to a site exist such that strict adherence to these provisions will result in unnecessary hardship and will not fulfill the intent of this program, a written request for a waiver shall be required and shall state document the rationale, with supporting data, for requesting a waiver. The request shall include all information necessary to evaluate the proposed waiver. The City of Brookhaven will evaluate waiver requests using following criteria on a case by case basis:

1. **Buildable Area Limitation:** Inclusion of GI/LID control measures makes site development economically infeasible.
2. **Public Health & Safety Compromised:** Inclusion of GI/LID control measures requires mitigation for its impact on Public Health (Criteria: Department of Health or documented potential public health issues, e.g. implementation will create an excessively difficult-to-control mosquito habitat)
3. **Control Measures Cost:** over 10% of site development cost or over \$100,000 whichever amount is less.
4. **Impact to Surroundings:** Inclusion of GI/LID control measures requires mitigation of downstream impacts (Criteria: Hydrology & Hydraulic assessment)
5. **Subsurface Materials and Conditions Limitation:** NRCS soil survey or other geotechnical data for determining substratum physio- chemical characteristics preclude applicability of a group of GI/LID practices.
6. The infiltration rate, as determined by an infiltrometer test, is less than 0.5 in/hr.
7. The depth to bedrock and/or the seasonal high groundwater table is less than 2 feet.

A copy of the waiver review checklist form used by the City is provided as attachment.

**Inventory, Inspection, and Maintenance Program:**

GI/LID structures covered by this program are strictly non-residential. Brookhaven recognizes two categories of GI/LID structures: 1. City-owned and maintained and 2. Non-City-Owned and maintained (includes publicly-owned and maintained by other entities and structures that are privately-owned non-residential). The City is divided into five geographic GI/LID areas. Each year, City-owned and non City-owned GI/LID structures will be re-inventoried and inspected in accordance with the City's MS4 Inspection, Maintenance, and Operation Program (IMOP) in one of the five designated geographic areas so that 100% of the City-owned and non-residential privately-owned GI/LID structures are inspected every five-years.

The inventory and maps of all, City-owned and non-City-owned, GI/LID structures will be updated each year through review of approved As-Built drawings, recorded plats, and or recorded Stormwater Facilities Maintenance Agreements / GI/LID Structures Inspection, Maintenance, and Operation Agreements. The updated inventory and map will be submitted with the respective MS4 Annual Report.

Since the design and function of each GI/LID structure varies, as part of the development plan approval process, the Design Engineer or Engineer of Record will submit for review and approval a Stormwater Facilities Maintenance Agreements / GI/LID Structures Inspection, Maintenance, and Operation (IMOP) Agreement. Upon approval, the Agreement will be recorded. The Agreement shall, at a minimum, establish the following:

- A site-specific inspection and maintenance schedule and log,
- A site-specific inspection and maintenance plan / manual / detailed maintenance procedures
- A **site-specific** inspection and maintenance checklist
- Who is responsible for inspection,
- Who is responsible for maintenance,
- Annual inspection and maintenance report

In addition to other available tools, the Agreement will serve as the legal instrument to enforce maintenance-related compliance.

Maintenance activities will be carried out on as needed basis in accordance to the IMOP. Maintenance will be tracked using our existing enterprise work order management system. City-owned structures will be maintained by the City, and all privately-owned structures are maintained by the Owner.

A copy of privately owned GI/LID structure IMOP agreement and the inspection form used by Brookhaven is provided as an attachment.

**GI / LID - SWF Inspection, Operation, and Maintenance Program Documents:**

See attachment

**STORMWATER FACILITIES MANAGEMENT AGREEMENT  
AND  
INSPECTION, OPERATION, AND MAINTENANCE PROGRAM**

**APPLICABLE TO  
NEW POST-DEVELOPMENT STORMWATER MANAGEMENT FACILITIES AND  
GREEN INFRASTRUCTURE/LOW IMPACT DEVELOPMENT FACILITIES**

Insert sample SWFMA here

EXAMPLE



**GI/LID FEATURE INSPECTION FORMS**

EXAMPLE

**GI/LID PLAN REVIEW CHECKLIST FORM**

EXAMPLE

**Checklist  
Request for Waiver  
from Brookhaven's Green Infrastructure and  
Low Impact Development Program**

**Date:** \_\_\_\_\_

**Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Parcel Number:** \_\_\_\_\_

**Phone/Contact#:** \_\_\_\_\_

**Project Number:** \_\_\_\_\_

**Project Title:** \_\_\_\_\_

Type of waiver requested	Check one
I) Buildable Area Limitation	<input type="checkbox"/>
II) Public Health Safety (mosquito habitat):	<input type="checkbox"/>
III) Control Measures Cost:	<input type="checkbox"/>
IV) Impact to Surroundings:	<input type="checkbox"/>
V) Subsurface Material and Conditions:	<input type="checkbox"/>
VI.) Infiltration Rate	<input type="checkbox"/>
VII.) Bedrock/Groundwater	<input type="checkbox"/>

**Comments:**

**Supporting documentation (please list all attached documents):**

**Engineer's Seal:**



# **City of Brookhaven, Georgia**

## **Post-Construction Storm Water Management in New Development and Redevelopment**

### **BMP E-4**

### **Maintenance Program**

**(Applies to all Publicly-Owned and Privately-Owned Facilities)**

## **1.0 Introduction**

The control of stormwater runoff from publicly-owned and privately-owned property has been a requirement in DeKalb County and the City of Brookhaven for over 25 years. The *Georgia Stormwater Management Manual (GSMM)* is an engineering design manual which advocates hydrologic procedures and methodology for the control of storm runoff quality and quantity. The manual offers design criteria for stormwater management that protects and preserves our natural water resources. Policy guidelines dictate that communities develop a program for better site development to include design and installation of water quality protection measures or Best Management Practices (BMPs) to protect Georgia's limited and valuable water supplies.

The City has a program to provide regular inspections of publicly-owned and privately-owned facilities to assure that all stormwater systems receive periodic routine inspection and maintenance. These programs will insure that the systems function as they were designed, to prevent flooding, erosion, and degradation of existing water resources. This procedure outlines the maintenance process.

## **2.0 Program Description**

An inventory of public and private ponds has been developed based on the City's GIS database inventory. The database will be used to schedule inspections of a minimum of 20% of the inventoried existing stormwater management facilities every year. The inventory process will identify special maintenance needs in addition to routine maintenance required of the structures.

## **3.0 Procedure**

The City is responsible for the maintenance of inventoried public and privately-owned facilities as accepted through plat or other legal means. These structures will also be maintained by City Staff.

Privately owned and maintained structures designed and built after October 3, 2013 will have a maintenance agreement kept on file with the City. If any repair, restoration or maintenance needs are found after an inspection, the responsible party named in the recorded stormwater management system inspection and maintenance agreement and plan shall be notified in writing about the repair, restoration or maintenance needs and the remedial measures that are required to bring the



stormwater management system into compliance with the approved stormwater management system inspection and maintenance agreement and plan. In the event that the remedial measures described in such notice have not been completed by the date set forth in the notice, any one or more of the enforcement actions may be taken against the responsible party named in the approved stormwater management system inspection and maintenance agreement and plan.

Example letter to notify homeowners of maintenance required on their Property:

*Date*

*Name*

*Address of owner*

*RE: Inspection of Detention Facility*

*Dear Name:*

*This letter is to notify you of an inspection on DATE of the detention pond located at:*

*Address of property with detention pond*

*On that date the deficiencies identified on the following page were found. In accordance with the City of Brookhaven Regulations, it is your responsibility to repair these items and notify us when they are corrected.*

*It is the city's desire to work with you to resolve this matter. Should you have any questions regarding this letter, or should you require any further information or*

*advice regarding compliance with the directions contained within this letter, please contact me at 404-637-0524.*

*Respectfully,*

*Name*

*Title*

July 12, 2019



# City of Brookhaven, Georgia

## Post-Construction Storm Water Management in New Development and Redevelopment

### BMP E-3

### Inspection Program

(Applies to all Publicly-Owned and Privately-Owned Facilities)

## 1.0 Introduction

The control of stormwater runoff from publicly-owned and privately-owned property has been a requirement in DeKalb County and the City of Brookhaven for over 25 years. With the adoption of the *Georgia Stormwater Management Manual (GSMM)* by DeKalb County and later by Brookhaven (2009) stormwater management has placed a greater emphasis on the control of both the quality, as well as the quantity, of storm runoff.

The *Georgia Stormwater Management Manual (GSMM)* is an engineering design manual which advocates hydrologic procedures and methodology for the control of storm runoff quality and quantity. The manual offers design criteria for stormwater management that protects and preserves our natural water resources. Policy guidelines dictate that communities develop a program for better site development to include design and installation of water quality protection measures or Best Management Practices (BMPs) to protect Georgia's limited and valuable water supplies.

The City wants a program to provide regular inspections of publicly-owned and privately-owned facilities to assure that all stormwater systems receive periodic routine inspection and maintenance. This program will insure that these systems function as they were designed, to prevent flooding, erosion, and degradation of existing water resources. This procedure outlines the inspection process and organizes the administrative workload.

## 2.0 Program Description

An inventory of public and private ponds to be inspected has been developed within the City's GIS database inventory. The GIS database contains an attribute field that defines ownership of each structure. The City currently inspects ALL ponds (public, private, etc.) in the City using a hybrid approach of GPS tablets and hard copy forms. Brookhaven Public Works staff have broken the City up into 5 zones to help facilitate the inspection process. One zone will be inspected during each reporting period so that all inventoried ponds get inspected during the five-year permit term. The City is currently contracting with a private firm for the inspection of ponds, but routine coordination with City staff plays a large part in the inspection program.



### 3.0 Procedure

The inventory of ponds to be inspected each year will be developed based on the City's GIS database inventory. The database will be updated each year as new ponds are added to the system.

An inspection checklist will be used and kept on file along with **any photographs made of the structure or downstream channel** and any documentation of corrective action for any problems noted during the inspection. After inspection, each job is placed into a project folder. The folder contains a copy of the final plat showing easements and boundaries and a written inspection report. The City is also attaching/linking the completed inspection forms to corresponding features in the GIS system, which will allow them to keep a historic record of inspections.

All inventoried stormwater management facilities will be inspected once every five years by the City of Brookhaven or their contracted consultant.

The inspection will include a thorough evaluation of the primary features of the BMPs. These inspections will focus on the condition of these features to insure proper operation. An operation and maintenance inspection report will be filled out to include all field notes. For inspections and maintenance, particular attention is given to the following areas:

#### A. Wet Detention Ponds

- Dam and Emergency Spillway
- Pond Inlet and Outlet
- Trash Racks
- Erosion
- Sediment Storage Capacity
- Water Quality
- Fences, Gates and Signs

#### B. Water Quality BMPs

- Riparian Buffers
- Vegetated Filter Strips and Level Spreaders
- Open Channel Practices
- Bio-retention Cells
- Constructed Wetlands
- Sand Filters
- Retention Ponds



The Format for the inspection report used by City is attached below.

## Operational and Maintenance Inspection Report for Stormwater Management Ponds

(Adapted from Watershed Management Institute, Inc.)

Inspector Name: _____	Project Location: _____
Inspection Date: _____	_____
Stormwater Pond _____	_____
Normal Pool _____	_____
Normally _____	_____
Dry _____	Watershed: _____

Inspection Items	Checked Yes / No	Maintenance Needed? Yes / No	Inspection Frequency	Comments
<b>Pond Components</b>				
1. Embankment & Emergency Spillway				
a. Adequate vegetation & ground cover			A	
b. Embankment erosion			A	
c. Animal burrows			A	
d. Unauthorized plantings			A	
e. Cracking, bulging, or sliding of dam			A	
i. Upstream Face			A	
ii. Downstream Face			A	
iii. At or beyond toe upstream			A	
iv. At or beyond toe downstream			A	
iv. Emergency Spillway			A	
f. Pond, Toe, & Chimney drains clear & functioning			A	
g. Leaks on downstream face			A	
h. Abutment protection or rip-rap failures			A	
i. Visual settlement or horizontal misalignment of top of dam			A	
j. Emergency spillway clear of debris			A	
k. Other (Specify)			A	
<b>Riser and principal spillway</b>				
Type: Reinforced Concrete _____			A	



	Corrugated pipe _____			A
	Masonry _____			A
a.	Low flow orifice obstructed			A
b.	Low flow trash rack			A
	i. Debris removal necessary			A
	ii. Corrosion control			A
c.	Weir trash rack			A
	i. Debris removal necessary			A
	ii. Corrosion control			A
d.				A
	Excessive sediment accumulation inside riser			
e.				A
	Concrete/masonry condition Riser & Barrels			
	i. Cracks or displacement			A
	ii. Minor spalling (<1")			A
	iii			A
	Major spalling (rebars exposed)			
	iv. Joint failures			A
	v. Water tightness			A
f.	Metal pipe condition			A
g.	Control valve			A
	i. Operational/exercised			A
	ii. Chained & locked			A
h.	Pond drain valve			A
	i. Operational/exercised			A
	ii. Chained & locked			A
i.	Outfall channels flowing			A
j.	Other (Specify)			A
<hr/>				
	Permanent pool (wet pond)			
a.	Undesirable vegetation growth			M
b.				M
	Floating or floatable debris removal required			
c.	Visible pollution			M
d.	High water marks			M
e.	Shoreline problems			M
f.	Other (Specify)			M
<hr/>				
	Sediment forebays			
a.	Sedimentation noted			M
b.				M
	Sediment removal when depth < 50% design depth			

Dry Pond areas				
a.	Vegetation adequate			M
b.	Undesirable vegetative growth			M
c.	Undesirable woody vegetation			M
d.	Low flow channels clear of obstructions			M
e.	Standing water or wet spots			M
f.	Sediment and/or trash accumulation			M
g.	Other (Specify)			M
Condition of outfalls into pond				
a.	Rip-rap failures			A,S
b.	Slope erosion			A,S
c.	Storm drain pipes			A,S
d.	Endwalls/headwalls			A,S
e.	Other (Specify)			A,S
Other				
a.	Enhancement on ponds or easement area			M
b.	Complaints from residents (describe on back)			M
c.	Aesthetics			M
	i. Grass height			M
	ii. Graffiti removal necessary			M
	iii. Other (Specify)			M
d.	Any public hazards (specify)			M
e.	Maintenance access			M
Constructed wetland areas				
a.	Vegetation healthy and growing			A
b.	Evidence of invasive species			A
c.	Excessive sedimentation in wetland area			A



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[\*Inspection Frequency Key A=Annual, M=Monthly, S=After major storm

Summary

1. Inspectors Remarks

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2. Overall Condition of Facility (Check one)

Acceptable  
 Unacceptable

3. Dates any maintenance must be completed by:

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Inspectors  
Signature



# City of Brookhaven, Georgia

## BMP C-3: IDDE Plan

### Dry Weather Screening Procedure

#### 1.0 Introduction

Illicit discharges are unpermitted non-stormwater flows to the stormwater drainage system that contain pollutants or pathogens. Illicit discharges can be direct discharges or dumping to the stormwater system, or can occur through upstream activities that eventually flow to storm drain or drainage channel. Illegal connections are physical connections such as pipes that allow illicit discharges to the stormwater system on an ongoing basis.

Screening of stormwater outfalls during dry weather is an important tool for investigating potential non-stormwater entries to the storm drainage system. Subsequent identification and elimination of illicit discharges and illegal connections can result in substantial improvements to local water quality.

#### 2.0 Program Description

Dry weather screening (DWS) is performed on prioritized stormwater outfalls which are selected based on the potential for illicit discharges. Screening of stormwater outfalls for illicit discharges is performed during periods of dry weather, which is defined as rainfall of less than 0.1 inch per day for at least 72 hours. This criterion avoids the screening of flows that may have resulted from wet weather (stormwater) events.

Each outfall is to be inspected for flow. When a dry weather flow is observed at an outfall, the following are to be performed on the flow:

1. **Source tracing** – Immediately trace the flow up the conveyance to try to identify the source. This approach should be used to “bracket” the source, even when the specific source location cannot be identified in this manner.
2. **Field observations and measurements** – Site descriptions and qualitative observations of physical conditions of the outfall and flow, as well as measurement of several in-situ water quality parameters. This task should be performed as close to immediately as possible to document characteristics of discharge for source tracing support and legal documentation.
3. **Water Quality Sampling** – Collection of water quality samples for field analysis or laboratory analysis when indicated by the field observations and measurements.



In dry weather outfall screening, the field team is looking for indicators that point to or confirm an illicit discharge or illegal connection. Section 3.5 and 3.6 provide guidance on potential sources of pollution based upon the findings of the screening.

The discovery of an illicit discharge will warrant a more detailed pollutant source identification investigation.

An outfall is the point where a municipal separate storm sewer system discharges to waters of the State. The City will identify the outfall that is the lowest downstream point in a storm sewer system to monitor (the final outfall). The City may not maintain the storm sewer system continuously upstream from the point that is monitored, but the lowest point in the system is the best location to identify illicit connections and illegal discharges which is the objective of this procedure.

## 3.0 Procedure

### 3.1 Outfall Screening Locations

Beginning with Reporting Year 2019, the City of Brookhaven (CoB) divided the City into five geographic areas (Zones) for updating the outfall inventory and map and performing DWS in the City (map attached). Each year, one geographic area will be fully canvassed so that at the end of five years, 100% of the outfalls will have been re-confirmed in the inventory and maps and screened during dry weather.

**Outfall Clarification and Updates.** Recently, more specific guidance has been provided to MS4s related to which points of discharge should be classified as a MS4 Outfall. The inventory and maps will be updated each year in the appropriate Zone so that the Permit definition of an *Outfall* is properly applied. The Permit defines an outfall as:

“The most downstream point (i.e. final discharge point) on an MS4 where it discharges to receiving waters of the State.”

There are three criteria for an outfall: 1. It must be a point of discharge; 2. It must be part of the MS4; and 3. It must discharge directly into State waters. Therefore, the State waters **must** be directly adjacent to the most downstream point of the MS4 to qualify as an outfall.

If, for example, the conveyance system continues downstream, outside of the MS4 before discharging to State waters, there is not a CoB MS4 outfall on that conveyance system, and, this point of discharge should not be included in the MS4 Outfall inventory, maps, or DWS.



Prior to this guidance and as a matter of extreme caution, the most downstream point of discharge from a MS4 was considered to be an outfall, whether or not it discharged directly into a receiving water of the State. This resulted in an inventory of outfalls of one to two orders of magnitude greater than would be identified under the three criteria of an outfall listed above. In applying this guidance, the number of MS4 Outfalls in each Zone will significantly decrease over the next five years. Each reporting year, the inventory, map, and outfalls screened during dry weather will be updated for the reporting year's Annual Report.

## **3.2 Outfall Screening Preparation**

### **3.2.1 Preliminary Mapping and Land Use Evaluation**

To assist in outfall screening, preliminary mapping and land use evaluation will be completed following the prioritization and identification of target outfalls or drainage areas. Mapping information includes:

- Outfall locations;
- Outfall drainage areas;
- Commercial and industrial activities in each drainage area; and
- Locations of septic tanks in each drainage area.

Field maps are prepared to guide the screening team when appropriate. These maps, at a minimum, should have labeled streets and hydrologic features so field teams can orient themselves.

### **3.2.2 Field Sampling and Analysis Equipment**

*Table 1* lists the recommended equipment for dry weather outfall screening. Before undertaking field work, the field team should ensure that all of the necessary equipment is present and in order. Both the pH meter and the conductivity meter should be calibrated. In addition, field test kits should be inspected to ensure that they have sufficient reagents and test strips/discs.

**Table 1**

List of Equipment and Supplies for Dry Weather Outfall Screening	
Field Equipment	Function
Field maps (with outfall locations, drainage areas, and street information)	Locating outfalls for screening
Field measurement equipment (temperature, pH, conductivity meters)	Measuring field temperature, pH and specific conductivity of dry weather flows
Field test kits	Measuring fluoride, surfactants and fecal coliform
Sample bottles with labels	For collection of grab samples
Sealed, sterile sample bottles with labels	For collection of bacteria grab samples
Grab water sampler (dipper on long pole)	For outfalls/flows that are difficult to reach
Waders and walking stick	For reaching outfalls near a stream or water body
Hand-operated vacuum pump sampler	For shallow dry weather flows
Clear tape and applicator	To apply over label
Coolers	For transport of grab samples
Ice / ice packs	To keep samples preserved after collection and during transport from the site
Clipboard or notebook with data collection forms and COC forms / Pens	To document field data and activities
List of outfalls, directions, protocols, and Health and Safety Plan	For reference in the field
Field logbook	To record notes
Permanent marker (extra fine)	Label sample bottles
Cell phone	Communication in the field
Handheld GPS receiver (if applicable)	Determining outfall locations
Digital camera	To document dry weather flow and/or conditions and recording visual conditions
Flashlight	
First Aid Kit	Health and Safety Plan
Disposable gloves, safety shoes, and safety glasses	Health and Safety Plan

### 3.2.3 Weather Considerations

Prior to any screening field work, check local rain gages to ensure that the conditions are appropriate for dry weather outfall screening. Dry weather is defined as rainfall of less than 0.1 inch per day for at least 72 hours.

### 3.3 Outfall Screening Procedures

Figure 2, found at the end of the document, is an example Dry Weather Outfall Screening Form which is used to record the observations and analytical results of the DWS procedures. Figure 3 is an example Data Tracking Form to record Outfall Screenings.

#### 3.3.1 Field Observations and Measurements

Outfall screening is initiated by driving or walking to the outfall location. When an outfall is reached, it should be physically marked or labeled, and the coordinates logged using the GPS receiver (if applicable).



Basic descriptive information is recorded at the top part of the Dry Weather Outfall Screening Form:

- Outfall location
- Outfall ID number
- Outfall type, material and size
- Receiving stream and/or watershed name
- Date and time of screening
- Weather observations
- Staff person(s) undertaking the screening

Digital photographs are taken of the outfall and photo numbers recorded on the screening form.

Physical observations of the site are recorded on the screening form under *Field Observations and Measurements*. If no flow is observed during the outfall screening, the “Flow from outfall?” field should be checked “No” and the screening is complete. This result will be counted towards the total number of outfalls screened.

If flow is observed, then “Yes” should be checked and the following physical indicators recorded. Each of these observations associated with flowing outfalls may predict the presence of an illicit discharge or illegal connection:

**Odor** – Description of any odors that emanate from the outfall and an associated severity score. Since noses have different sensitivities, the entire field team should reach consensus about whether an odor is present and how severe it is. A severity score of one means that it is faint or the team cannot agree on its presence or origin.

A score of two indicates a moderate odor within the pipe.

A score of three is assigned if the odor is so strong that the field team smells it a considerable distance away from the outfall.

- **Color** – The visual assessment of the discharge color. The intensity of color is ranked from one (slightly tinted) to three (clearly visible in the flow). The best way to measure color is to collect the discharge in a clear sample bottle and hold it up to the light. Field teams should also look for downstream plumes of color that appear to be associated with the outfall.
- **Turbidity** – The visual estimate of the turbidity of the discharge, which is a measure of the cloudiness or opaqueness of the water. Turbidity is ranked from one (slight cloudiness) to three (opaque). Like the color observation, turbidity is best observed using a clear sample bottle. The field team should also look for turbidity in the plunge pool below the outfall and note any downstream turbidity plumes that appear to be associated with the outfall.



- **Floatables** – The presence of any floatable materials in the discharge or the plunge pool below. Sewage, oil sheen or film, and suds are all examples of floatable indicators. [Note that for DWS, trash and debris are not considered indicators of an illicit discharge or illegal connection.]

Upon completing the physical observations, measure temperature, pH, and specific conductivity of the dry weather flow (either in-situ or using a sample bottle), and record the readings on the screening form.

### 3.3.2 Water Quality Sampling

Water quality sampling of a dry weather flow is performed to identify chemical indicators which may detect, characterize or confirm the presence of an illicit discharge or illegal connection. Sampling (pH temperature, specific conductivity, fluoride and surfactants) is **required** for all dry weather flows identified during the DWS process. When the following conditions are present, *fecal coliform* sampling **must** also be performed:

- Visible sewage or sewage odor
- Specific conductivity greater than 300  $\mu\text{mho}/\text{cm}$
- Surfactants (detergents).

#### 3.3.2.1 Field Sampling and Analysis

Grab samples of the suspect discharge should be taken and analyzed with field test kits or laboratory analysis. Field test kits, when used, should be field deployed with appropriate reagents, test strips/discs, and sampling equipment and must have the ability to detect fluoride within the range 0 to 2.00 g/L and surfactants within the range 0 to 3.0 mg/L.

Follow the kit manufacturer's procedures for obtaining a test sample and completing the field analysis. Record the field analysis results on the screening form. **Section 3.5** and **Table 1** discuss interpreting results of the water quality sampling.

#### 3.3.2.2 Grab Samples

Grab samples and subsequent laboratory analysis may be performed in lieu of field sampling for one or more of the water quality parameters. Grab samples should be analyzed using laboratory analysis methods according to Title 40 of the Code of Federal Regulations, Part 136 (40 CFR Part 136).

#### 3.3.2.3 Grab Sample Collection

A manual grab sample for a dry weather flow is accomplished by inserting the sample container (either plastic or glass depending on the parameter) under or down current of a discharge with the

container opening facing upstream. In many cases, the sample container itself can be used to collect the sample. Less accessible outfalls will require the use of poles and buckets to collect the grab sample. A pre-measured cut-off milk jug can be used to capture shallow flows from the outfall. To ensure that the manual grab samples are representative, the following procedures should be followed:

- Do not open sample bottle until sample is to be actually collected.
- Use gloves at all times when handling sampling bottles.
- Take the grab from the horizontal and vertical center of the outfall.
- Make sure not to disturb any sediments or benthic growth in the outfall.
- Transfer samples into proper container (e.g., from bucket to sample container). Fecal coliform grab samples must be collected directly into the sterile sample container.

All of the equipment and containers that come into contact with the sample should be cleaned in order to avoid contamination and be non-reactive to prevent leaching of pollutants.

### 3.3.2.4 Grab Sample Handling

The grab sample bottle type, preservation requirements, and holding time requirement for those parameters being tested are listed in *Table 2*. Proper preservation and maintenance of the holding times for each parameter is essential for the integrity of the sampling results. Note that fecal coliform samples have a short holding time of six hours and must be returned to the lab for analysis within this time or the results may be unrepresentative of the flow.

**Table 2**  
Modified Handling Requirements for Samples

Parameter	Container Type <sup>1</sup>	Sample Volume (g)	Sample Preservation	Maximum Holding Time
Fluoride	P,G	500ml	Cool, 4°C	28 days
Surfactants (detergents)	P	500ml	Cool, 4°C	48 hours
Fecal Coliform <sup>2</sup>	PP,G	100 ml	Cool, 4°C	6 hours

<sup>1</sup> Polyethylene (P), Polypropylene (PP), Glass (G) – EPA-approved sample containers (40 CFR 136)

<sup>2</sup> In chlorinated waters, dechlorinate the sample with sodium thiosulfate by adding 1 ml of 10% Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> to the 100 ml sample

### 3.3.2.5 Grab Sample Identification and Labeling

A sample numbering system should be used to ensure that each sample is uniquely identified in the field and tracked on field data collection forms. The sample numbering should be as follows: ###-MMDDYY-HH:MM

Where:

- ### = A unique number for each sample location
- MMDDYY = Month, day, year

- HH:MM = Time in military units

All of the samples collected at the site should be placed in the appropriate sample containers for preservation and shipment to the designated laboratory. Each sample should be identified with a separate identification label. A waterproof, gummed label should be attached to each sampling container. Information to be recorded on the label should include:

- Site name;
- Sample number;
- Analysis to be performed;
- Date and time of collection;
- Preservation used and any other field preparation of the sample; and
- Initials of field crew collecting the sample.

### **3.3.2.6 Grab Sample Documentation**

A chain-of-custody (COC) form should accompany all samples. See *Figure 3* for a sample COC form. The COC form shall include all of the information provided on the sample label discussed in the preceding section.

The purpose of the COC form is to provide a mechanism for tracking each sample submitted for laboratory analysis. The information on the COC form must be identical to the information of the sample label. A COC form should be prepared by the sample collector for each set of samples submitted for laboratory analysis. The form should be placed in a re-sealable plastic bag (to keep the form dry) and sealed inside each sample cooler. When transferring possession of the samples, the individual relinquishing and receiving samples should sign, date, and note the time on the COC form. This record documents the transfer of custody from the sampler to another person, to/from a secure storage area, and to the laboratory. Copies of the COC forms should be kept for future reference.

### **3.3.2.7 Analytical Laboratory Coordination and Sample Delivery**

The samples should be packed in coolers with ice (or ice packs) to ensure they maintain the required temperature of less than or equal to 4°C during transport to the designated laboratory. Contact the laboratory prior to sampling to assure that the samples will be analyzed within their holding time. Samples may be placed in individual one-gallon resealable bags as a precaution to avoid spilling the sample. All glass bottles should be individually bagged and bubble-wrapped to prevent breakage on the way to the lab. Samples may be placed in a large trash bag inside a cooler (to ensure against the sample leaking) with ice completely covering the samples.



### **3.4 Quality Assurance/Quality Control**

This section describes the elements of the field quality assurance/quality control (QA/QC) program. The overall QA/QC objective for the monitoring program is to ensure that the data collected are of good quality.

#### **3.4.1 Field QA/QC**

Field quality control procedures include calibration procedures, field blanks and field duplicates. The field equipment should be calibrated appropriately prior to leaving for the sampling site to ensure proper performance of the equipment. This includes the pH meter, conductivity meter, and the thermometer. The pH meter should be calibrated using two buffers that bracket the expected pH range (typically 4 and 7). The conductivity meter is calibrated by rotating the probe below the surface in a standard Potassium Chloride solution in a circular motion. The readings must be within 10 percent to be acceptable. The thermometers used should be accurate to + 5°C.

Quality control blanks should be used in the field to determine potential sample contamination during sample collection, handling, shipment, storage, or laboratory handling and analysis. Reagent grade water should be used for the quality control blanks. A minimum of one field blank for surfactants (detergents) and fecal coliform is required each day with scheduled field screening. For fluoride, a field blank should be used with approximately 10 percent of samples (or as required by the lab).

Field duplicates should be collected on approximately 10 percent of the samples to assess the representativeness of sampling procedures in addition to the normal uncertainty associated with the analysis.

#### **3.4.2 Laboratory QA/QC**

The laboratories should follow Georgia EPD- approved methods and routinely perform quality control checks during laboratory analysis, including calibration standards, blanks, laboratory control samples, laboratory control duplicate samples, matrix spikes, and matrix spike duplicates. Spikes and duplicates should be performed on a minimum of 10 percent of the samples and should meet data quality objectives established by the client.

### **3.5 Evaluating Dry Weather Screening Results**

#### **3.5.1 Background**

DWS of stormwater outfalls is an important tool used to evaluate non-stormwater flows in the storm drainage system. The first and most critical step in identifying an illicit discharge is source-

tracing the dry weather flow up the conveyance system to locate, and or isolate to a discrete area, the probable source of the illicit discharge. Effectively evaluating and interpreting DWS results and data are important supporting steps to identify, trace, and eliminate a potential illicit discharge or illegal connection.

### **3.5.2 Field Observations**

Field observations of a dry weather flow include odor, color, turbidity and floatables. These parameters are qualitative indicators detected by visual inspection and smell and require no measurement equipment. They are important in evaluating a dry weather flow for a potential illicit discharge and may confirm the most severe or obvious discharges.

*Table 3* lists the field observation parameters, along with potential sources for a number of observed conditions.

### **3.5.3 Field Measurements and Water Quality Sampling Results**

Field measurements and water quality sampling provide additional information which may detect, characterize or confirm an illicit discharge or illegal connection. Temperature, pH and conductivity measurements are completed in-situ using probes or other equipment that is calibrated prior to field work. Water quality sampling for the presence of fluoride, surfactants and fecal coliform is performed either in-field using test kit equipment or by collecting grab samples for laboratory analysis.

*Table 4* lists the various parameters included in the DWS protocol along with benchmarks and guidance on evaluating results. *Figure 1* provides a flow chart which can be used to identify illicit discharges based upon findings.

*Table 3: Field Observation Parameters and Potential Sources*

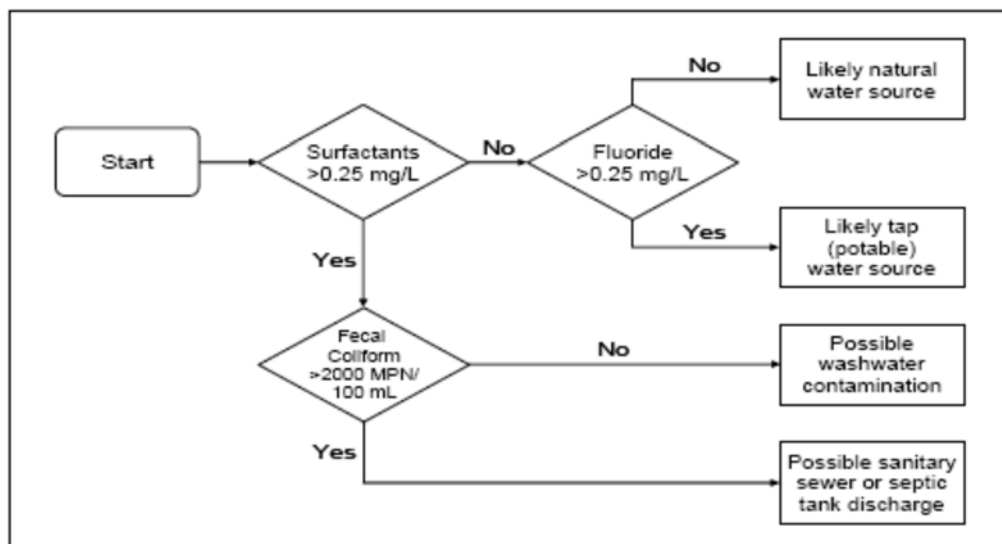
Physical Observations and Potential Sources

Parameter	Observations	Potential Source(s)
Odor	Sewage	Sanitary sewer; septic tank discharges
	Sulfur (rotten eggs)	Industrial discharge (sulfides and/or organics); sanitary sewer; septic tank discharges
	Oil / gasoline	Facilities associated with vehicle maintenance and operation; petroleum product manufacturing or storage; industrial discharge
	Rancid / sour	Food preparation facilities (restaurants, hotels, etc.)
Color	Orange / rust	Construction site or unstabilized soil (eroded soil and clay)
	White / milky	Sanitary sewer; septic tank discharges; residential or commercial washwater; concrete or stone operations; fertilizer
	Grey	Residential or commercial washwater; dairies
	Red	Meat packers
	Yellow	Industrial discharge
	Green	Industrial discharge; Facilities associated with vehicle maintenance and operation (antifreeze)
	Brown / black	Industrial discharge
Turbidity	Cloudy	Sanitary sewer; septic tank discharges; residential or commercial washwater; concrete or stone operations; fertilizer; industrial discharge
	Opaque	Food preparation facilities (restaurants, hotels, etc.); industrial discharge
	Silty / Muddy	Construction site or unstabilized soil (eroded soil and clay)
Floatables	Sewage	Sanitary sewer; septic tank discharges
	Petroleum (oil sheen)	Facilities associated with vehicle maintenance and operation; petroleum product manufacturing or storage; industrial discharge
	Suds	Sanitary sewer; septic tank discharges; residential or commercial washwater

**Table 4**  
Interpretation of Field Measurements and Water Quality Sampling Parameters

Parameter	Benchmarks	Evaluation
Temperature	Temperature should be near or below ambient conditions for groundwater or stormwater runoff.	Higher than ambient temperature may indicate stream condensate or industrial process water.
pH	The normal pH range for stormwater runoff is between 6 and 8, with 7 being neutral.	pH is a relatively good indicator of liquid wastes from industries, which can have very high or low pH values (ranging from 3 to 12). The pH of residential and commercial washwater tends to be in the range of 8 or 9.
Conductivity	Stormwater should have a low conductivity (under 300 $\mu\text{mho/cm}$ ).	Conductivity greater than 300 $\mu\text{mho/cm}$ indicates a high dissolved solids content in the flow which may be from an illicit discharge or illegal connection
Fluoride	There should no traces of fluoride in the stormwater.	Presence of fluoride indicates the presence of potable (treated) water. Fluoride can often be used to separate treated potable water from untreated water sources, such as stormwater, groundwater or non-potable industrial waters.
Surfactants (detergents)	There should be no traces of surfactants (detergents) in the stormwater.	This parameter is associated with cleaning/washing operations and may indicate residential or commercial wastewater.
Fecal Coliform	Fecal coliform is an indicator of fecal bacteria from warm-blooded animals.	Its presence in high numbers often indicates contamination with sanitary waste, although high levels of pet waste may also produce similar results.

**Figure 1: Flowchart to Identify Illicit Discharges Using Outfall Screening Sampling Results**



### 3.6 Following Up on Potential Illicit Discharges

All outfalls with dry weather flow require immediate follow-up actions and activities to determine the specific source(s) of contamination. The first action should always be to source-trace by walking up the conveyance system to identify or isolate the source of the dry weather flow. In addition to walking the conveyance, there are a variety of other methods for illicit discharge source identification, including:

- **Mapping Analysis** – Evaluation of the drainage area, land uses and properties above the outfall including the route of the storm drainage system and locations of storm drains. This enables local staff to predict the likely locations of illicit discharges and illegal connections. Geographic Information Systems (GIS) are a useful tool for identifying illicit discharges through mapping analysis.
- **Drainage Area Investigation** – A windshield survey or more detailed property inspections in the drainage area that has the illicit discharge. These inspections are often performed following a mapping analysis.
- **Piping Schematic Review** – Examination of building plans and plumbing details for potential sites where improper connections to the storm drainage system may have occurred.
- **Smoke Testing** – Testing of pipes to locate connections by injecting a non-toxic vapor (smoke) into the system and following its path of travel.
- **Dye Testing** – Addition of colored dye to the drain water in suspect piping and subsequent surveillance to determine if dyed water appears in the storm drain system, thus indicating an illegal connection.
- **Septic System Investigation** – Low density residential watersheds may require special investigation methods when failing septic systems are suspected.
- **Homeowner surveys, surface investigations and infrared photography** have all been used successfully to identify problem septic system facilities.

The appropriate method for any given outfall or area will be heavily dependent on the watershed and land use conditions, drainage system characteristics, available resources and the nature of the discharge and screening results.

### 3.7 VIOLATIONS, ENFORCEMENT, AND PENALTIES.

#### 3.7.1 Violations

Any person who has caused an illicit discharge, may be subject to the enforcement actions outlined in this section.

In the event the illicit discharge constitutes an immediate danger to public health or public safety, the City personnel is authorized to enter upon the subject private property, without giving prior





notice, to take any and all measures necessary to abate the violation and/or restore the property. The CoB is authorized to seek costs of the abatement.

### **3.7.2 Warning Notice**

When the City finds that any person has violated, or continues to violate, any provision of Article VI. - Storm Sewer Illicit Discharge and Illegal Connection, or any order issued hereunder, the City may serve upon that person a written Warning Notice, specifying the particular violation believed to have occurred and requesting the discharger to immediately investigate the matter and to seek a resolution whereby any offending discharge will cease. Investigation and/or resolution of the matter in response to the Warning Notice in no way relieves the alleged violator of liability for any violations occurring before or after receipt of the Warning Notice. Nothing in this subsection shall limit the authority of the City to take any action, including emergency action or any other enforcement action, without first issuing a Warning Notice.

### **3.7.3 Notice of Violation**

Whenever the City finds that a person has violated a prohibition or failed to meet a requirement of Article VI, the City may order compliance by written notice of violation to the responsible person. The Notice of Violation shall contain:

1. The name and address of the alleged violator;
2. The address when available or a description of the building, structure or land upon which the violation is occurring, or has occurred;
3. A statement specifying the nature of the violation;
4. A description of the remedial measures necessary to restore compliance with this ordinance and a time schedule for the completion of such remedial action;
5. A statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed;
6. A statement that the determination of violation may be appealed to the City by filing a written notice of appeal within 7 days of service of notice of violation; and
7. A statement specifying that, should the violator fail to restore compliance within the established time schedule, the work will be done by a designated governmental agency or a contractor and the expense thereof shall be charged to the violator.

Such notice may require without limitation:

1. The performance of monitoring, analyses, and reporting;
2. The elimination of illicit connections or discharges;



3. That violating discharges, practices, or operations shall cease and desist;
4. The abatement or remediation of storm water pollution or contamination hazards and the
5. Payment of a fine to cover administrative and remediation costs; and
6. The implementation of source control or treatment BMPs.

## **4.0 References**

*“Illicit Discharge Detection and Elimination – A Guidance Manual for Program Development and Technical Assessments.”* Center for Watershed Protection. 2004.

*“District-Wide Watershed Management Plan Standards and Methodologies for Surface Water Quality Monitoring.”* Metropolitan North Georgia Water Planning District, March 2007.

*“Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems – A User’s Guide. EPA/600/R-92/238,”* U.S. Environmental Protection Agency, January 1993.

*“NPDES Stormwater Sampling Guidance Document. EPA-833-92-001,”*  
U.S. Environmental Protection Agency, July 1992.

Figure 2: Dry Weather Outfall Screening Form

Dry Weather Outfall Screening Form	
Name of City or County:	Data Sheet Number:
Date of screening (MM/DD/YY):	Time of screening:
Weather conditions:	
Sampling performed by:	
Outfall Description	
Outfall Location:	Outfall I.D. Number:
Outfall Type/Material: <input type="checkbox"/> Closed Pipe (circle): RCP CMP PVC HDPE Other: _____ <input type="checkbox"/> Open Channel (circle): Concrete Earthen Grassy Other: _____	Outfall Diameter/Dimensions:
Receiving stream and watershed name:	
Land use/industries in drainage area:	
GPS Coordinates:	Photo numbers:
Field Observations and Measurements	
Flow from outfall? <input type="checkbox"/> Yes <input type="checkbox"/> No      Flow Description: <input type="checkbox"/> Trickle <input type="checkbox"/> Moderate <input type="checkbox"/> Substantial	
Odor: <input type="checkbox"/> None <input type="checkbox"/> Sewage <input type="checkbox"/> Sulfide (rotten eggs) <input type="checkbox"/> Petroleum/gas <input type="checkbox"/> Rancid/sour <input type="checkbox"/> Other _____	
Relative severity: <input type="checkbox"/> 0-None <input type="checkbox"/> 1-Faint <input type="checkbox"/> 2-Easily Detected <input type="checkbox"/> 3-Noticable from a distance	
Color: <input type="checkbox"/> Clear <input type="checkbox"/> White <input type="checkbox"/> Gray <input type="checkbox"/> Orange/Rust <input type="checkbox"/> Red <input type="checkbox"/> Yellow <input type="checkbox"/> Green <input type="checkbox"/> Brown/Black <input type="checkbox"/> Other _____	
Relative severity: <input type="checkbox"/> 0-None <input type="checkbox"/> 1-Faint <input type="checkbox"/> 2-Clearly visible in bottle <input type="checkbox"/> 3-Clearly visible in flow _____	
Turbidity: <input type="checkbox"/> None <input type="checkbox"/> Cloudy <input type="checkbox"/> Opaque <input type="checkbox"/> Silty <input type="checkbox"/> Muddy <input type="checkbox"/> Other _____	
Relative severity: <input type="checkbox"/> 0-None <input type="checkbox"/> 1-Slight cloudiness <input type="checkbox"/> 2-Cloudy <input type="checkbox"/> 3-Opaque	
Floatables: <input type="checkbox"/> None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum (oil sheen) <input type="checkbox"/> Suds <input type="checkbox"/> Other _____	
Relative severity: <input type="checkbox"/> 0-None <input type="checkbox"/> 1-Few/slight <input type="checkbox"/> 2-Some <input type="checkbox"/> 3-Heavy	
Flow Temperature (°C):	
Flow pH:	pH meter calibrated? <input type="checkbox"/> Yes <input type="checkbox"/> No
Flow Conductivity (µmho/cm):	Conductivity meter calibrated? <input type="checkbox"/> Yes <input type="checkbox"/> No
Water Quality Sampling	
Field Test Kit Manufacturer:	Model:
Fluoride (mg/L):	Fecal Coliform (MPN/100ml):
Surfactants (mg/L):	Analysis Comments:
Grab sample for lab? (fluoride/surfactants) <input type="checkbox"/> Yes <input type="checkbox"/> No	Bacteria Grab sample for lab? (fecal coliform) <input type="checkbox"/> Yes <input type="checkbox"/> No
Grab Sample ID:	Bacteria Grab Sample ID:

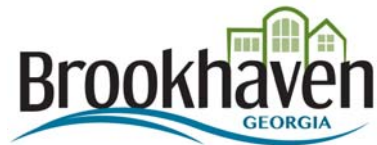


Figure 3: Dry Weather Outfall Screening – Data Tracking Form

Date	Outfall I.D. Number	Flow? (Y/N)	Odor (describe)	Color (describe)	Turbidity (describe)	Floatables (describe)	Temp (°C)	pH	Conductivity (µmho/cm)	Fluoride (mg/L)	Surfactants (mg/L)	Fecal Coliform (MPN/100ml)	Follow-up Actions

Figure 4: Sample Chain of Custody Form

REPORT TO:		CONTACT		PHONE NO.	SALESMAN
		PROJECT NAME		PROJECT NO.	P.O. NO.
		DATE SAMPLED		SAMPLER(S)	
BILL TO:		<p>ANALYSES TO BE PERFORMED</p>		REMARKS	
TOTAL NO. OF CONTAINERS					
TIME OF SAMPLING					
SAMPLE DESCRIPTION/LOCATION					
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				
REMARKS:					
SHIPPING CARRIER:					
SHIPPING TICKET NUMBER:					
CHAIN-OF-CUSTODY SEAL:					
RELINQUISHED BY:		INTACT	BROKEN	ABSENT	
DATE	TIME	RECEIVED BY:	DATE	TIME	DATE
DATE	TIME	RELINQUISHED BY:	DATE	TIME	DATE
DATE	TIME	RELINQUISHED BY:	DATE	TIME	DATE

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