Volume

1

GUIDELINES AND
STANDARD OPERATING PROCEDURES

For Stormwater Phase II Communities in Maine

Information for Program Managers

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Volume 1 Contents

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Chapter 1

1. INTRODUCTION

This section describes the regulatory basis, intended audience, and overall organization of this manual.

KEY AREAS ADDRESSED BY THIS MANUAL

- Illicit Discharge Detection and Elimination
- Pollution Prevention and Good Housekeeping for Municipal Operations

1.1 BASIS FOR THE MANUAL

In June 2003, the Maine Department of Environmental Protection (MDEP) issued a General Permit for the Discharge of Stormwater from Small Municipal Separate Storm Sewer Systems (MS4s). Twenty-eight communities became subject to Stormwater Phase II regulations based on their designation as Urbanized Areas according to the 2000 US Census. The regulation specifies issuance of a General Permit every five years. The current General Permit, which is valid from June 2003 through June 2008, requires that each regulated community develop a five-year plan to:

> *"…(R)educe the discharge of pollutants from its regulated small MS4 to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act."*

Fourteen of the regulated communities in the Casco Bay watershed, with assistance from the Casco Bay Estuary Partnership (CBEP), Cumberland County Soil and Water Conservation District (CCSWCD), and others, formed an Interlocal Stormwater Working Group (ISWG) to collaborate on selected requirements of the General Permit. In particular, the ISWG identified the need for a locally-adaptable set of guidelines and standard operating procedures (SOPs) as a top priority to improve the quality of municipal stormwater practices. Six additional communities in southern Maine and central Maine joined with the ISWG to create this manual.

Stormwater accumulates sediments, pathogens, nutrients, toxic chemicals, and other pollutants as it runs off into storm drain systems and out into receiving water bodies, and is possibly the single greatest contributor of contaminants to Casco Bay (CBEP 1995). This non-point source of pollution directly contributes to degraded water quality throughout Maine, and can result in the closure of clam flats and swimming areas as well as degraded habitats within Casco Bay and other coastal areas. CBEP's 1995 *Casco Bay Plan* prioritizes the need to minimize the loading of pathogens, toxics, nutrients, and sediments from stormwater and combined sewer overflows to Casco Bay, as well as the need to reduce loading from non-point sources of pollution.

This manual seeks to advance these goals in order to improve water quality throughout the Casco Bay watershed and the other watersheds in Maine, and is intended to provide local support to municipal staff in stormwater management efforts, guiding the employees who serve as the front-line in the implementation of the General Permit requirements.

1.2 OBJECTIVES OF THE MANUAL

The specific objectives of the manual are to:

- Provide a commonly-accepted set of technical standards and guidance on stormwater management measures that will control the quantity and quality of stormwater produced by municipal activities, new development and redevelopment;
- Assist municipalities in meeting Stormwater Phase II requirements;
- Encourage the use of targeted best management practices (BMPs) with the long-term goal of consistent application by all regulated entities within the watershed;
- Encourage cost-savings for MS4s through proper and timely maintenance of stormwater systems; and
- Promote behavior that will improve water quality in the Casco Bay watershed and other watersheds in Maine.

1.3 CONTENT OF THE MANUAL

The content of the manual is based primarily on selected requirements of the Stormwater Phase II program. Each community's five-year plan must address the following six minimum control measures:

1. Public Education and Outreach on Stormwater Impacts
2. Public Involvement and Participation
3. Illicit Discharge Detection and Elimination (IDDE)
4. Construction Site Stormwater Runoff Control
5. Post-Construction Stormwater Management in New Development and Redevelopment
6. Pollution Prevention/Good Housekeeping for Municipal Operations

This SOP manual addresses components for two of the minimum control measures, Illicit Discharge Detection and Elimination and Pollution Prevention/Good Housekeeping, as follows (text in italics is taken directly from the General Permit):

3. Illicit Discharge Detection and Elimination – This manual describes the procedures that should be taken to develop an IDDE program for a small MS4. Development of an IDDE program should be based on the specific needs of each municipality and the watersheds it falls within. Each community will develop its own unique IDDE program. Program Managers should complete the following steps to develop an effective IDDE program: *1. locate priority areas likely to have illicit discharges, 2. map the storm drain system, 3. develop an illicit discharge detection program, 4. develop procedures to trace the source of an illicit discharge, 5. develop procedures to remove a source, and 6. evaluate the IDDE program effectiveness.* This SOP manual provides guidance on how to complete each of these six steps, resulting in an effective IDDE program that fulfills the intent of the General Permit.

6. Pollution Prevention/Good Housekeeping for Municipal Operations –The General Permit requires inclusion of certain Pollution Prevention/Good Housekeeping components as part of the five-year plan, and suggests others. The required components addressed by this manual include development of:

   a) An operation and maintenance program that includes a training component for municipal employees and contractors and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations…this program must include employee training to prevent and reduce stormwater pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction, land disturbances, and stormwater system maintenance;

   b) A program to sweep all publicly accepted paved streets and publicly owned paved parking lots at least once a year as soon as possible after snowmelt;

   c) A program to evaluate and if necessary, clean catch basins and other stormwater structures that accumulate sediment at least once a year and dispose of the removed sediments in accordance with current state law; and

   d) A program to evaluate and if necessary prioritize for repairing, retrofitting, or upgrading the conveyance, structures, and outfalls of the regulated small MS4.

This manual also addresses development of *procedures for properly disposing of waste removed from the separate storm sewers,* which is a suggested component of the Pollution Prevention/Good Housekeeping minimum control measure. Just as for the IDDE Minimum Control Measure (MCM), the General Permit does not specify what the procedures should include. Therefore, each municipality will be developing its own unique program according to community needs and available resources.

1.4 MANUAL AUDIENCE AND ORGANIZATION

The Stormwater Phase II Program requires the development of new programs and training for municipal employees to implement new programs during daily activities. For this reason the manual addresses two distinct audiences: (1) Program Managers, who will direct the development of new programs, and (2) municipal employees, such as public works personnel, who will implement the programs on a day-to-day basis.

Volume 1 is intended for use by individuals who are responsible for overseeing and implementing the Stormwater Phase II Program (the "Program Manager"). For the purposes of this manual, the Program Manager is typically in a supervisory or managerial position and in a position to train other employees in procedures required by the Stormwater Phase II Program. Chapter 1 provides an introduction and overview of the manual. Chapter 2, *Illicit Discharge Detection and Elimination*, presents procedures for Program Managers to use in identifying high priority areas, tracing illicit discharges, and eliminating illicit discharges. Chapter 3, *Pollution Prevention and Good Housekeeping*, provides general discussions of the many ways that municipal activities such as vehicle and facilities maintenance may adversely affect stormwater, and reviews ways to modify municipal operations to better prevent and reduce stormwater pollution. Chapter 3 guides the Program Manager through decisions they will need to make in developing procedures related to good housekeeping and pollution prevention. Note: Tables, figures, and forms cited within the text are provided at the end of the volume.

Volume 2 is intended for use by "hands-on" municipal employees. Chapter 1 provides an introduction and overview of the manual. Chapter 2 contains Standard Operating Procedures (SOPs) and forms for use in the performance Illicit Discharge Detection and Elimination. Chapter 3 contains SOPS for use during regular work duties. The SOPs, which are designed to be concise and easy to use, are divided into three categories: *Always*, *Whenever Possible*, and *Never*. The SOPs include forms and summary sheets for use during illicit discharge tracing and elimination and routine work activities. Specific training on the SOPs will help to reinforce their importance and encourage implementation.

1.5 COMMON STORMWATER POLLUTANTS, SOURCES, AND IMPACTS

Stormwater runoff contains pollutants that can harm human health, degrade water quality and aquatic habitat, and impair ecosystem functions. On its way to streams, estuaries, and other receiving water bodies, stormwater runoff accumulates pollutants such as oil, gas, and other hydrocarbons, heavy metals, deicers, pesticides, fine sediment, fertilizers, and bacteria, all of which can impair water quality. The pollutants of greatest concern in Casco Bay are nitrogen, toxic contaminants such as polycyclic aromatic hydrocarbons (PAHs), and fecal coliform bacteria. Runoff from fertilized lawns contributes excess nutrients to water bodies, which can lead to algal blooms and in extreme cases, fish kill events due to low dissolved oxygen levels. Elevated fecal coliform levels impair water quality and can lead to restrictions on the use and enjoyment of natural resources such as shellfish beds and swimming areas. Other stormwater pollutants of concern are toxic contaminants, such as heavy metals and pesticides, which originate from vehicles and businesses or from homeowner activities.

All of these pollutants can wash into receiving waterbodies during storm events. Understanding the sources of these pollutants and the impacts each pollutant has can help inform municipal planning and assist in identifying priority goals and objectives when managing stormwater. The following table summarizes common stormwater pollutants, their sources and potential impacts.

Table 1-1: Common Stormwater Pollutants, Sources, and Impacts.

Pollutant	Sources	Impacts
Sediment	Construction sites; eroding streambanks and lakeshores; winter sand and salt application; vehicle/boat washing; agricultural sites.	Destruction of plant and fish habitat; transportation of attached oils, nutrients and other pollutants; increased maintenance costs.
Nutrients (phosphorus, nitrogen)	Fertilizers; malfunctioning septic systems; livestock, bird & pet waste; vehicle/boat washing; grey water; decaying grass and leaves; sewer overflows; leaking trash containers.	Increased potential for nuisance or toxic algal blooms; increased potential for hypoxia/anoxia (low levels of dissolved oxygen which can kill aquatic organisms).
Hydrocarbons (Polycyclic Aromatic Hydrocarbons)	Vehicle and equipment leaks; vehicle and equipment emissions; pesticides; fuel spills; equipment cleaning; improper fuel storage & disposal.	Toxic at low levels.
Heavy Metals	Vehicle brake and tire wear; vehicle/equipment exhaust; batteries; galvanized metal; paint and wood preservatives; batteries; fuels; pesticides; cleaners.	Toxic at low levels; drinking water contamination.
Pathogens	Livestock, bird and pet wastes; malfunctioning septic systems; sewer overflows.	Risk to human health leading to closure of shellfish areas and swimming areas; drinking water contamination.
Toxic Chemicals	Heavy metals; PAHs; pesticides; dioxins; PCBs; from wear, spills, illegal discharges and leaks.	Toxic at low levels.
Debris/Litter	Improper waste disposal and storage; fishing gear; leaking rubbish containers; cigarette butts; littering.	Potential risk to human and aquatic life.

Chapter

2

2. ILLICIT DISCHARGE DETECTION AND ELIMINATION

> Maine DEP defines an **illicit discharge** as any discharge to an MS4 that is not composed entirely of stormwater or the allowable non-stormwater discharges such as water from fire fighting activities, infiltrating groundwater, etc.

In most communities, the municipal separate storm drain systems discharge to receiving waterbodies without treatment. Therefore, it is particularly important that only stormwater is discharged and to ensure that illicit discharges are eliminated from the system. The General Permit requires that an IDDE program be developed by the regulated municipalities. While most municipalities have programs in place to inspect and address combined sewers or sanitary sewers, few municipalities have procedures in place related to an IDDE program. Several excellent IDDE guidance manuals were reviewed and used in developing this chapter. In particular, the Center for Watershed Protection (CWP) produced a series of manuals published related to Illicit Discharge Detection and Elimination. This manual regularly draws from the Center's 2004 publication, *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*. The New England Interstate Water Pollution Control Commission (NEIWPCC) also published a concise handbook on IDDE for municipalities in 2003.

Chapter 2 provides managers with the procedures necessary to create an effective IDDE program in accordance with the Maine General Permit. The General Permit requires each MS4 to develop, implement and enforce a program to detect and eliminate illicit discharges, but only provides a certain level of detail on specific requirements for an IDDE program. Therefore this chapter will assist Program Managers with making key decisions in developing an IDDE program that is effective for their municipality. Program Managers should first have a good understanding of the types of illicit discharges that may be encountered. Section 2.1 provides a description of various types of illicit discharges that may be present in a community. The next sections address additional steps to creating an effective IDDE program: locating priority areas within a community (Section 2.2), creating a map of the storm drain system (Section 2.3), developing an illicit discharge detection program (Section 2.4), tracing the illicit discharge back to its source (Section 2.5), removing the illicit discharge (Section 2.6), and tracking illicit discharges (Section 2.7). Lastly, Section 2.8 provides an approach to evaluating the overall IDDE program.

2.1 TYPES AND SOURCES OF ILLICIT DISCHARGES

MDEP defines an illicit discharge as *any non-permitted discharge to a regulated small MS4 or to the waters of the State that does not consist entirely of stormwater or allowable non-stormwater discharges*. Allowable non-stormwater discharges are listed in Part IV(D)(3)(b) of the General Permit. It is important to understand the types of illicit discharges that may occur to know what to look for, and to consider discharge frequency and land use in the IDDE process. Illicit discharges are often categorized according to frequency, which provides a clue about the source and helps determine which tracing techniques may be useful in locating the discharge. The Center for Watershed Protection classifies illicit discharge frequency into three categories:

1. Transitory illicit discharges are typically one-time events resulting from spills, breaks, dumping, or accidents. Transitory illicit discharges are often reported to an authority through a citizen complaint line or following observation by a municipal employee during regular duties. Because they are not recurring, they are the most difficult to investigate, trace, and remove. The best method to reduce transitory discharges is through general public education, education of municipal response personnel, tracking of discharge locations, and enforcement of an illicit discharge ordinance.

2. Intermittent illicit discharges occur occasionally over a period of time (several hours per day, or a few days per year). Intermittent discharges can result from legal connections to the storm drain system, such as a legal sump pump connection that is illegally discharging washing machine water or a single home sanitary connection, or from illegal connections. Intermittent discharges can also result from activities such as excessive irrigation or wash down water from exterior areas. These types of discharges are more likely to be discovered, and are less difficult to trace and remove, but can still present significant challenges. These discharges can have large or small impacts on waterbodies depending on pollutant content.

3. Continuous illicit discharges are typically the result of a direct connection from a sanitary sewer, overflow from a malfunctioning septic system, or inflow from a nearby subsurface sanitary sewer that is malfunctioning. Continuous illicit discharges are usually easiest to trace and can have the greatest pollutant load.(CWP 2004)

It is also important to consider land use when looking for illicit discharges. Table 2-1 (see p. T-2-1) provides a list of conditions and activities that may produce transitory and intermittent discharges, along with associated sources and land use. Table 2-2 (p. T-2-2) lists possible sources of continuous discharges and their associated land use.

Once a Program Manager understands the types of illicit discharges that might be present in his/her community, the manager can begin to review existing information that will identify where illicit discharges are likely to be found. An effective detection and elimination program will address all types of illicit discharges.

2.2 LOCATING PRIORITY AREAS

Section 2.2 provides a methodology for locating priority areas that have a high potential for illicit discharges. Most municipalities will conduct this process once during the 2003-2008 permit cycle, and then evaluate and revise the process for each subsequent permit cycle as illicit discharges are removed (described in Section 2.6). The material provided in this section was taken from the CWP manuals (CWP 2004) and the NEIWPCC manual (NEIWPCC 2003). These manuals provide more detail on the process.

To locate priority areas within a community, the Program Manager should:

1. Become familiar with the community's waterbodies, its watersheds, local water quality classifications, and current water quality in order to divide the community into discrete areas that can be prioritized;

2. Gather and evaluate available information that will provide clues as to where in the community illicit discharges might be found; and

3. Use the existing information to assess where illicit discharges may be found and what waterbodies need to be protected from illicit discharges.

The following subsections present further discussion of each of these areas. Although a Program Manager should take the time to prioritize watersheds prior to completing any mapping, some communities may complete their mapping first, then use the results of mapping to produce a more refined evaluation.

US Geological Survey (USGS) and Natural Resource Conservation Service (NRCS) Watershed Numbering System

Level	Name	HUC Number
1	Region	2 digit
2	Sub-region	4 digit
3	Basin	6 digit
4	Sub-basin	8 digit
5	Watershed	10 digit
6	Subwatershed	12 digit
7	Drainage	14 digit
8	Site	16 digit

2.2.1 Identify Watersheds and Water Bodies

In order to identify priority areas where illicit discharges may occur, a decision must be made as to how to define an "area". The Center for Watershed Protection recommends defining watersheds for individual waterbodies. The Maine Office of Geographic Information Systems website offers coverage files that show Level 6 subwatershed boundaries (which have 12 digit Hydrologic Unit Codes [HUCs]) and Level 7 drainage boundaries (which have 14 digit HUCs). Within Maine, Level 6 subwatersheds range in size from 10,000 to 200,000 acres of land (15 to 300 square miles). Level 7 drainage areas range in size from 3,000 to 10,000 acres of land (5 to 15 square miles). Figure 2-1 shows Maine's Level 6 subwatersheds. Figures 2-2 through 2-5 show large scale Level 6 subwatershed information for the four central areas where the Stormwater Phase II regulations are in effect. For some communities, Level 6 subwatersheds provide small enough areas to use for evaluation and prioritizing.

However, using the smaller Level 7 subwatersheds would provide a more focused prioritization.

2.2.2 Review Available Information

Priority areas for IDDE will vary from one community to another depending on water quality conditions, land use, etc. A relatively simple desktop assessment of available community information can provide many clues as to where illicit discharges may be occurring. The following is a list of resources that should be collected and reviewed and a brief description of factors to consider during the prioritization process:

- Zoning maps – Industrial areas with high density development may have a high illicit discharge potential.
- Locations of previous illicit discharges – Areas with historical illicit discharge reports or previous citizen complaints should be considered high priority.
- Approximate density of known outfalls per stream mile – Areas with a high density of outfalls should be considered high priority.
- Age of infrastructure/development – Older areas of the community should be considered high priority.
- Location of public sanitary sewer/age of sewer/date of separation – Older areas that were put on public sewer or separated long ago should be considered high priority.
- Location of areas on septic systems – Older areas on septic systems should be considered high priority.
- Water Quality Information

  Water Quality Classification – Class A or Class B waterbodies may be high priority because their designated uses require the best water quality.

  Maine DEP 303(d) list – Waterbodies listed as impaired because of urban runoff should be considered high priority.

  Stream Team or Volunteer Monitoring Reports – Waterbodies that are at risk or sensitive should be considered high priority. Waterbodies that have ongoing water quality programs should have data that can be reviewed to determine if they should be considered high priority.

- Locations that drain to shellfish areas or public beaches – These areas should be designated as high priority for public health and economic reasons.

While it is important to identify areas where illicit discharges are likely to occur, it is also important to consider a waterbody's sensitivity to the impact of illicit discharges. For this reason, water quality information should be reviewed with an eye toward sensitivity (e.g., a waterbody listed as impaired may be less likely to recover from an illicit discharge and therefore should be considered high priority). It should be noted that the above list is not exhaustive. Program Managers may be aware of additional data pertinent to locating high priority areas in their community. Similarly, Program Managers may want to exclude some of this information if it is not relevant to identifying priority areas in their community. The evaluation can be qualitative, based on the Program Manager's personal knowledge and professional judgment.

2.2.3 Evaluate Illicit Discharge Potential

Once the Program Manager has an understanding of the waterbodies in the community, and has acquired and reviewed the available information, he/she can compile and evaluate the information to define areas of High, Medium, and Low priority. The CWP describes a procedure where each criterion is evaluated for each waterbody, and assigned an illicit discharge potential (IDP) of 3 for high potential, 2 for medium potential, and 1 for low potential. The scores for each waterbody are then averaged to produce a resultant overall score for the waterbody that will range from 3 (high priority) to 1 (low priority). The method is fairly simple and is illustrated in Table 2-3 (p. T-2-3). A worksheet that can be used by Program Managers to complete a similar analysis is shown in Table 2-4 (p. T-2-4).

Once the IDDE prioritization process is complete the subsequent list can be used to determine which areas should be mapped first (discussed in Section 2.3), develop community-specific detection techniques (Section 2.4), and even to prioritize storm drain system maintenance work (Section 3.3).

2.3 MAPPING THE SYSTEM

While the General Permit currently requires mapping only the outfalls of a storm drain system, most of the available guidance recommends mapping the entire system to facilitate illicit discharge detection investigations and maintenance work. This section will focus on developing a map of the storm drain system using Geographic Information Systems (GIS) since most of Stormwater Phase II regulated communities currently plan to use GIS to create their maps. Level 6 subwatershed maps for the Portland and Southern Maine Regulated Areas are provided in Figures 2-1 and 2-2 (pp. F-1 and F-2).

Equipment list for mapping:

1. Existing paper maps
2. Field sheets
3. Camera (preferably digital)
4. GPS Unit
5. Spray paint (or other marker)
6. Cell phones or hand-held radios
7. Clip boards and pencils
8. First aid kit
9. Flash light or head lamp
10. Surgical gloves
11. Tape measure
12. Temperature probe
13. Waders
14. Watch with a second hand
15. Five 1-liter sample bottles

Storm drain system mapping should begin by acquiring and reviewing all existing data, much of which will have been acquired during the prioritizing task (see Section 2.2). Most communities will have existing maps of some sort in paper or electronic form, and these, along with the list of priority areas, should be reviewed to develop a strategy for mapping outfalls and other structures. A sample strategy for mapping a small community is as follows:

1. Review/Office Preparation: Check existing available mapping data in high priority areas first, then in medium priority areas, then low priority areas (See Section 2.2.2 for a listing of possible resources). The Program Manager should decide on a numbering or naming system for outfalls and other structures. Establishment of a simple unique numbering system (SWO-0001, SWO-0002, etc.) will facilitate future inspections and documentation of maintenance. Outfalls can be marked in the field using spray paint or a paint pen. However, if a community wants to use signs or markers, these should be ordered ahead of time. Equipment for mapping should be obtained (see Equipment List, p. 2-5); and a schedule for completing mapping should be created. The Program Manager should measure the total number of stream, pond, lake, or ocean miles that should be walked, and prioritize how they should be completed. Some preliminary reconnaissance should be conducted to evaluate if watercraft are necessary to view the banks of the waterbody.

2. Field check: Using existing paper maps as a basis for locations, field personnel should start a mapping program by walking all named waterbodies within a given area of the community and collecting outfall location and design information using global positioning system (GPS) equipment capable of sub-meter (approximately 3-foot) accuracy. Use of a data logger and data collection software, such as Pathfinder®, will allow the generation of GIS files that will be useful for many years. Volume 2 contains an Outfall Characteristics Form (p. 2-10) and a Dry Weather Outfall Inspection Form (p. 2-9) that can be used to collect information in the field. The Outfall Characteristics Form contains basic location and design information that should be contained in the GIS database. The mapping should be conducted during dry weather to identify if any illicit discharges are present (see Section 2.4 Detection). Dry weather discharge information can either be collected on the paper forms for manual entry into a separate database at a later time, or can be directly entered into a database on a laptop or the data logger on-site. Both forms can be used to enter attributes and fields into the data dictionary for capture in the field with the data logger. Finally the outfall should be marked during mapping with its identifier for future location using spray paint, paint markers, or pre-manufactured signs.

3. Develop Initial GIS Maps: If the storm drain system is being mapped as part of a larger GIS database for the municipality, the data collected can be displayed with any of the existing data sets. If the storm drain system is not part of a larger data set, the Program Manager must determine what background the maps should be displayed on. Many communities prefer mapping to be displayed on aerial photographs. High resolution aerial photographs from a 2003 flight are available on the Maine Office of GIS website. Aerial photographs are one of the most interesting background

files to use to display information; however, their large file size (20 MB and larger) can make them impractical. An alternate way to display the mapped information consists of downloading either USGS quadrangles from the Maine Office of GIS, or a set of roads, waterbodies, and watershed information. Figure 2-3 (p. F-3) presents an example of a GIS map using USGS quadrangles and associated attribute table for a mapping project in South Eliot.

4. Review and field check other structures (catch basins, pipes, ditches, drain manholes, etc.): Once the outfall information has been collected and field checked, the remainder of the system can be mapped. Any paper maps of the system should first be scanned and digitized into GIS-compatible files. Then the new information should be field checked. An efficient way to do this is to send field staff along with catch basin cleaning crews to confirm catch basin locations, to observe the interior of structures, to determine which pipes enter and leave the structure, and to obtain design information on the pipes and structures. A GPS unit with a data logger can be used to record the location and design information related to the structures. The structures should be assigned unique identifiers (CB-00X for catch basins, DMH-00X for drain manholes, etc.), and a set of attributes and allowable fields to describe the structure.

5. Incorporate field data into GIS and revise as necessary: Once the GPS data files have been converted into GIS layers, and revised maps have been produced, these maps should be proofed to assess their accuracy and completeness. The reviewer should document any additional data requirements, and correct any errors in the information collected. A relational database can help illustrate connections between pipes, outfalls, and other structures.

It should be noted that there are many possible mapping strategies for a given municipality depending on the amount and format of available storm drain system data and the resources that are available. The strategy described above is presented as one way to complete mapping. For a small to medium size community (6,000 to 10,000 people), this process could take approximately two years to complete, depending upon availability of resources and land use.

2.4 DETECTION

Illicit discharges can be detected in many ways. A key component to detecting illicit discharges is conducting dry weather discharge inspections of outfalls. Initially, these inspections should be conducted during mapping and field checking. Sections 2.4.1 and 2.4.2 describe procedures that can be used during mapping and for longer term regular inspections after mapping is complete. Illicit discharges can also be detected while public works and other crews are conducting their regular work. These opportunistic inspections are described in Section 2.4.3. Illicit discharges can be detected through citizen call-in hotlines, but only if the community has identified and publicized the phone number. This program is described in Section 2.4.4. Finally, for areas where illicit discharges may occur because of failed septic systems, an active septic system inspection program may identify problem areas. This type of detection program is described in Section 2.4.5.

> **Dry Weather Discharge**
>
> The CWP defines **dry weather** as a 48 hour period with no runoff-producing rain fall. NEIWPCC defines dry weather as a 48-72 hour period with less than 1/10-inch rainfall. Each community should refine the definition of dry weather to suit its specific conditions.

Determining which detection methods are appropriate for a community can be a relatively simple process. Table 2-5 (p. T-2-5) is a blank worksheet for use by Program Managers to retain or eliminate detection techniques. As Program Managers review sections 2.4.1 through 2.4.5 they should complete Table 2-5 to document which types of inspections are appropriate for different areas of the community, and should discuss inspection frequency in the table as well.

2.4.1 Dry Weather Inspections During Mapping

As described in Section 2.3, dry weather inspections during mapping can be an efficient way to gather illicit discharge information. The Dry Weather Outfall Inspection Form (see Volume 2, p. 2-9) can be used during mapping. The form should be completed whenever evidence of an illicit discharge, such as significant flow during dry weather, the presence of raw sewage indicators, staining, or residue, is observed.

2.4.2 Long-Term Dry Weather Inspections

Long-term, regular inspections of outfalls are a primary part of an effective IDDE program. Regular inspections will not be significantly different from inspections conducted during mapping. The Dry Weather Outfall Inspection Form can be used, and the major difference will be that a crew or inspector will have historical data to work with to make assessments. These inspections can be recorded in an electronic database (recommended, especially for medium to large communities) or paper forms can be kept (which may be appropriate for smaller communities).

The Program Manager should develop a schedule of long-term inspections for outfalls. The Center for Watershed Protection recommends inspecting all outfalls once, at a minimum, during the first permit cycle. Further inspections should be conducted as personnel and funds allow. Long-term inspections should be conducted during dry weather to maximize the potential to observe evidence of illicit discharges. While winter inspections can be productive, personnel should be aware of the potential for snowmelt during warmer days.

2.4.3 Opportunistic Inspections

Most public works crews conduct their regular duties in and around the storm drain system. A Program Manager may elect to have crews conduct outfall inspections on a formal basis (actually bringing an inspection form and equipment) while performing other work, or the Program Manager may elect to have crews informally "keep a look out" for illicit discharges. If an employee observes evidence of an illicit discharge during an informal inspection, he/she should collect as much information about the potential illicit discharge as possible then contact their supervisor or dispatch office so that appropriate action can be taken. The Incident Tracking Sheet (see Volume 2, p. 2-11) can be used to collect the information observed. While it may not be reasonable to expect all public works employees to have copies of the form at all times, there are other ways to collect the information:

- The person observing the discharge can provide the information verbally to dispatch or the supervisor, who can then complete the Incident Tracking Sheet;

- The person can log as much information as they can recall onto the form upon returning to the office; or

- A third party (such as a code enforcement officer) dedicated to inspecting and tracing illicit discharges can be sent to the location as soon as possible were the potential illicit discharge was observed to collect the necessary information directly on the form.

It is important to collect as much information as possible at the time of initial observation because of the likelihood that a discharge may be transitory or intermittent. Initial identification of the likely or potential sources of the discharge is also very important.

2.4.4 Citizen Call-In Inspections

Citizen call-in programs are an important way to identify illicit discharges. Most municipalities have citizen comment or complaint lines that are publicized in the community. To maximize the effectiveness of citizen call-ins, dispatch personnel should be instructed on the use of the Illicit Discharge Hotline Incident Tracking Sheet in order to collect as much information as possible at the time of the report. Dispatch personnel should also be instructed as to where to direct the information so that appropriate action is taken. The Program Manager should identify on Table 2-5 who should be trained, and where the call-in line will be publicized.

2.4.5 Septic System Inspections

Septic system inspections can be conducted in older rural or low density areas that are prone to failed septic systems. Many communities elect to conduct these inspections around populated lakes, which are particularly susceptible to the adverse effects of a failed septic system. The Program Manager should review his/her community prioritization and determine if any areas might need septic system inspections.

Septic system inspections consist of a two-part analysis: 1) asking the homeowner a series of questions related to the septic system, and 2) completing a physical inspection of the septic system and surrounding area.

It should be noted that in Maine, inspections must be completed by a qualified professional such as a licensed site evaluator or an individual that has been certified by the Department of Health and Human Services Division of Health Engineering. Some communities may therefore need to hire an outside firm to complete this work.

2.5 TRACING ILLICIT DISCHARGES

Once an illicit discharge has been reported or detected through an inspection, the next step is to locate the source. Selection of tracing techniques will depend on the type of illicit discharge detected and the information collected during initial discovery and observation (whether through an inspection by a municipal employee or through a citizen call-in). A single technique may be used, or several techniques may need to be combined to identify the source of the discharge. Figure 2-4 (p. F-4) presents a flow chart for selecting tracing techniques that can be applied to the two categories of potential illicit discharges: (1) transitory or intermittent discharges (where upon returning to the site, no flow is present at the location where the illicit discharge was initially reported), and (2) continuous discharges (where upon returning to the site a continuous flow is present and the flow may be more easily traced to its source). Each of these circumstances is described below.

1. <u>Transitory or intermittent discharges</u>: These conditions may occur as a result of an inspection or a citizen complaint. While initial information may have been collected regarding the potential illicit discharge, a return trip may show that the discharge was either intermittent or transitory (e.g., no flow is present upon return to the site). The investigative techniques that should be used will depend on whether or not a potential source location was identified during the initial observation:

    <u>Potential source identified</u> - If a potential source for the illicit discharge was initially identified, steps should be taken to investigate the potential source site, such as inspecting the site and storm drain system in the vicinity of the site. If floor drains, sumps or other suspect discharge locations are observed during this inspection, dye testing, electronic location of subsurface pipes, or televising may be used. These techniques should definitively show whether the suspect site was the source of the illicit discharge.

    <u>Potential source not identified</u> - If no source site is suspected, and only the general area of the illicit discharge is known, it may be possible to trace the evidence of the illicit discharge by visual inspection of the storm drain access points. If this catch

basin/manhole inspection technique is not fruitful, some interim steps could be taken to try to trap water from an intermittent discharge. For example, sand bagging, damming or block testing of selected storm drain access points, combined with installation of an optical brightener trap to assess if detergents are present in a discharge, can help reveal the source of the discharge. If these techniques have no positive result (no water pools behind the weir or sand bag), the discharge was likely transitory (one time only), and it may not be possible to determine its origin. In this case, the location of the originally reported illicit discharge should be added to a regular inspection program to provide for the possibility of future incidents. If the original report of the illicit discharge was severe or gross pollution, then smoke testing or televising of the storm drain system may be warranted.

2. Continuous discharges: Tracing continuous discharges is typically more fruitful than tracing transitory or intermittent discharges. The primary difference between tracing a transitory or intermittent discharge and tracing a continuous discharge is that sandbagging and weirs are not required for continuous discharge. Visual observation of the system access points should reveal where the flow is coming from. Just as for tracing transitory or intermittent discharge, if visual inspections are not fruitful in identifying the source and the original report was severe or gross pollution, then televising, smoke testing, or sample collection would be warranted.

While these conditions may not cover the universe of discharges that may be discovered, they should provide general guidance on the selection of tracing techniques. The following subsection describes in more detail each of the techniques that can be applied, including their advantages and disadvantages.

2.5.1 Tracing Techniques

To select an effective tracing technique, one must have a good understanding of the technique and its limitations. The following is a brief summary of each of the tracing techniques that may used to locate the source of an illicit discharge:

1. Visual Inspection at manholes/catch basins: This tracing technique is typically used when there is no suspected source site. It is the most cost effective and efficient method of tracing. Structures should be systematically inspected starting at the initial detection location, gradually working upstream through the system. If the crew is tracking a continuous discharge, the inspections may be relatively easy, and the flow can be tracked back to its source. If the crew is attempting to track a transitory or intermittent discharge, the crew should make the following observations depending on the information provided from the initial identification: color and clarity of any discharge, staining or deposits on bottom of structure; oil sheen, scum, or foam on any standing fluids in

sump of structure; odors, staining or deposits on inlet pipes and outlet pipes. Depending on what the crew is looking for, and what they find, they will progressively inspect additional structures until either a potential source is found, or no further evidence is found. If no further evidence is found the crew may elect to further assess some of the structures by installing sandbags or other damming devices to determine if the discharge recurs. Crews should use standard safety procedures when conducting these inspections such as cone placement and safety vests in traffic areas, confined space entry techniques (if entry is necessary), steel-toed boots, etc.

2. <u>Sandbagging or damming</u>: Sandbagging and damming is typically only conducted when the discharge flow has ceased since initial detection. Application of this technique will show whether the discharge is one time only (no water pools behind the sandbag or dam) or intermittent (water pools behind the sandbag). CWP provides the following explanation:

   > "This technique involves placement of sandbags or similar barriers such as caulk dams within strategic manholes in the storm drain network to form a temporary dam that collects any intermittent flows that may occur. Any flow collected behind the sandbag is then assessed using visual observations or by indicator sampling. Sandbags are lowered on a rope through the manhole to form a dam along the bottom of the storm drain, taking care not to fully block the pipe (in case it rains before the sandbag is retrieved). Sandbags are typically installed at junctions in the network to eliminate contributing branches from further consideration. If no flow collects behind the sandbar, the upstream pipe network can be ruled out as a source of the intermittent discharge. Sandbags are typically left in place for no more than 48 hours, and should only be installed when dry weather is forecast. Sandbags should not be left in place during a heavy rainstorm. They may cause a blockage in the storm drain, or, they may be washed downstream and lost. The biggest downside to sandbagging and damming is that it requires at least two trips to each manhole." (CWP 2004, p. 157)

3. <u>Optical brightener monitoring traps</u>: Optical brightener monitoring (OBM) traps can be used to trace intermittent or transitory discharges that result from washwater with detergent. Detergents usually contain optical brighteners that can be detected at high concentrations using this method. However, CWP has found that the traps only pick up highly concentrated discharges. The detergent concentration required to be detected by the light is approximately the same as pure washwater from a washing machine. Consequently, OBM traps may be best suited as a simple indicator of presence or absence of intermittent flow or to detect the most concentrated flows. The traps can be made using easily acquired materials.

The traps contain an absorbent, unbleached cotton pad or fabric swatch contained inside a wire mesh trap or section of small diameter (e.g., 2-inch) PVC pipe. The traps should be anchored to the inside of an outfall at the invert using wire or monofilament that is secured to the pipe itself. Rocks can be used as temporary weights to hold the trap in place.

Field crews can retrieve the OBM traps after 24 to 72 hours of dry weather. OBM traps need to be retrieved before coming into contact with stormwater, which will contaminate the trap or wash it away. When placed under a fluorescent light, an OBM trap will indicate if it has been exposed to detergents. CWP reports that OBM traps have been used with some success in Massachusetts (Sargeant *et al.* 1998) and northern Virginia (Waye 2000). For more detailed guidance on how to use OBM traps and interpret the results, see the Reference section for World Wide Web links to the studies and guidance manuals cited above.

4. Dye testing: Dye testing is typically conducted when a potential source site has been identified, and the crew is trying to determine whether the site has floor drains or other locations that connect and discharge to the storm drain system. Permission to access the site must be obtained before dye testing can be conducted. Verbal or written requests are acceptable. The crew should review available sanitary sewer and storm drain maps before conducting the dye testing. The dye testing procedure consists of two steps: (1) discharging the dye into the suspect location, and (2) opening nearby storm drain and sanitary sewer manhole covers to determine where the dye discharges to. This procedure is fairly effective for confirming direct connections into the storm drain system for short reaches. If a longer pipe network is being evaluated, charcoal packets can be left in selected structures and later collected and analyzed for the presence of the dye.

5. Televising: Televised video inspections are a useful technique when an illicit connection or infiltration from a nearby sanitary sewer is suspected, but little evidence of the illicit discharge remains behind. Two types of video cameras are available for use: (1) a small camera that can be manually pushed on a stiff cable through storm drains to observe the interior of the piping, or (2) a larger remote operated video camera on wheels that can be guided through storm drains to view the interior of the pipe. Typically the operator of the camera has access to a keyboard to record significant findings on the videotape that is produced for future review and evaluation.

6. Smoke testing: Smoke testing is a useful technique for tracing intermittent discharges or continuous discharges that have no apparent source site. Smoke is introduced into the storm drain system, and emerges at locations that are connected to the system. Smoke testing works best for short reaches of pipe, or in situations where pipe diameters are too small for video testing.

The Center for Watershed Protection provides the following discussion on planning and executing smoke testing:

> "Notifying the public about the date and purpose of smoke testing before starting is critical. The smoke used is non-toxic, but can cause respiratory irritation, which can be a problem for some residents. Residents should be notified at least two weeks prior to testing, and should be provided the following information (Hurco Technologies, Inc. 2003):
>
> - Date testing will occur
> - Reason for smoke testing
> - Precautions they can take to prevent smoke from entering their homes or businesses
> - What they need to do if smoke enters their home or business, and any health concerns associated with the smoke
> - A number residents can call to relay any particular health concerns (e.g., chronic respiratory problems)
>
> Program managers should also notify local media to get the word out if extensive smoke testing is planned (e.g., television, newspaper, and radio). On the actual day of testing, local fire departments and 911 call centers should be notified to handle any calls from the public.
>
> The basic equipment needed for smoke testing includes manhole safety equipment, a smoke source, smoke blower, and sewer plugs. Two smoke sources can be used for smoke testing. The first is a smoke "bomb," or "candle" that burns at a controlled rate and releases very white smoke visible at relatively low concentrations. Smoke bombs are suspended beneath a blower in a manhole. Candles are available in 30 second to three minute sizes. Once opened, smoke bombs should be kept in a dry location and should be used within one year.
>
> The second smoke source is liquid smoke, which is a petroleum-based product that is injected into the hot exhaust of a blower where it is heated and vaporized. The length of smoke production can vary depending on the length of the pipe being tested. In general, liquid smoke is not as consistently visible and does not travel as far as smoke from bombs.
>
> Smoke blowers provide a high volume of air that forces smoke through the storm drain pipe. Two types of blowers are commonly used: "squirrel cage" blowers and direct-drive propeller blowers. Squirrel cage blowers are large and may weigh more than 100 pounds, but allow the operator to generate more controlled smoke output. Direct-drive propeller blowers are considerably lighter and more compact, which allows for easier transport and positioning.

Three basic steps are involved in smoke testing. First, the storm drain is sealed off by plugging storm drain inlets. Next, the smoke is released and forced by the blower through the storm drain system. Lastly, the crew looks for any escape of smoke above-ground to find potential leaks.

One of three methods can be used to seal off the storm drain. (1) Sandbags can be lowered into place with a rope from the street surface. (2) Alternatively, beach balls that have a diameter slightly larger than the drain can be inserted into the pipe. The beach ball is then placed in a mesh bag with a rope attached to it so it can be secured and retrieved. If the beach ball gets stuck in the pipe, it can simply be punctured, deflated and removed. (3) Finally, expandable plugs are available, and may be inserted from the ground surface.

Blowers should be set up next to the open manhole after the smoke is started. Only one manhole is tested at a time. If smoke candles are used, crews simply light the candle, place it in a bucket, and lower it in the manhole. The crew then watches to see where smoke escapes from the pipe. The two most common situations that indicate an illicit discharge are when smoke is seen rising from internal plumbing fixtures (typically reported by residents) or from sewer vents. Sewer vents extend upward from the sewer lateral to release gas buildup, and are not supposed to be connected to the storm drain system." (CWP 2004, p. 165-166)

7. Indicator Monitoring: As shown in Figure 2-4, samples should be collected only in the event that the other investigative techniques have failed to reveal the source of an illicit discharge. Samples should be collected by personnel trained in safety and proper collection techniques. Table 2-6 (p. T-2-6) lists the parameters that a sample may be analyzed for and provides a general discussion of how the results may be interpreted. This table was taken from the CWP manual which provides a more detailed discussion of sampling procedures and analysis of results. Figure 2-5 (p. F-5) provides a flow chart for indicator monitoring.

   The CWP describes four techniques a Program Manager can use to select which types of analyses should be conducted for a given discharge. Two of the techniques apply to illicit discharges in residential areas: (1) The Flow Chart Method and (2) The Single Parameter Method. The third method is used for illicit discharges in industrial areas: the Industrial Flow Benchmarks. The fourth method, the Chemical Mass Balance Model, is a sophisticated statistical technique to identify flow types at outfalls with blended flows. This method involves development of a Chemical Library of the characteristics of local groundwater, surface water, irrigation water, and illicit discharges for use in the model which can be time consuming and costly.

   CWP provides the following explanations of the Flow Chart Method and the Single Parameter Method:

"The Flow Chart Method: The Flow Chart Method is recommended for most Phase II communities, and was originally developed by Pitt *et al.* (1993) and Lalor (1994) and subsequently updated based on new research by Pitt during this project. The Flow Chart Method can distinguish four major discharge types found in residential watersheds, including sewage and wash water flows that are normally the most common illicit discharges. Much of the data supporting the method was collected in Alabama and other regions, and some local adjustment may be needed in some communities. The Flow Chart Method is recommended because it is a relatively simple technique that analyzes four or five indicator parameters that are safe, reliable and inexpensive to measure. The basic decision points involved in the Flow Chart Method are…described below:

Step 1: Separate clean flows from contaminated flows using detergents
The first step evaluates whether the discharge is derived from either sewage or washwater sources, based on the presence of detergents. Boron and/or surfactants are used as the primary detergent indicator. Values of boron or surfactants that exceed 0.35 mg/L or 0.25 mg/L respectively, signal that the discharge is either contaminated by sewage or washwater.

Step 2: Separate washwater from sewage using the Ammonia/Potassium ratio
If the discharge contains detergents, the next step is to determine whether they are derived from sewage or washwater, using the ammonia to potassium ratios. A ratio greater than 1.0 suggests sewage contamination, whereas ratios less than one indicate washwater contamination. The benchmark ratio was developed by Pitt *et al.* (1993) and Lalor (1994) based on testing in urban Alabama watersheds.

Step 3: Separate tap water from natural water
If the sample is free of detergents, the next step is to determine if the flow is derived from spring/groundwater or comes from tap water. The benchmark indicator used in this step is fluoride, with concentrations exceeding 0.60 mg/L indicating that potable water is the source. Fluoride levels between 0.13 and 0.6 may indicate non-target irrigation water. The purpose of determining the source of a relatively "clean discharge" is that it can point to water line breaks, outdoor washing, non-target irrigation and other uses of municipal water that generate flows with pollutants.
The Single Parameter Screening Method: This method suggests that detergent is the best single parameter to detect the presence or absence of the most common illicit discharges (sewage and washwater). Because the recommended analytical method for detergents uses a hazardous reagent, the analysis needs to be conducted in a controlled laboratory setting with proper safety equipment. This may limit the ability of a community to use this method if it is conducting analyses in the field or in a simple office lab.

Ammonia is another single parameter indicator that has been used by some communities with widespread or severe sewage contamination. An ammonia concentration greater than 1 mg/L is generally considered to be a positive indicator of sewage contamination. Ammonia can be analyzed in the field using a portable spectrophotometer, which allows for fairly rapid results. This gives crews the ability to immediately track down sources and improper connections using pipe testing methods.

As a single parameter, ammonia has some limitations. First, ammonia by itself may not always be capable of identifying sewage discharges, particularly if they are diluted by "clean" flows. Second, while some washwaters and industrial discharges have relatively high ammonia concentrations, not all do, which increases the prospects of false negatives. Lastly, other dry weather discharges, such as non-target irrigation, can also have high ammonia concentrations that can occasionally exceed 1 mg/L. Supplementing ammonia with potassium and looking at the ammonia/potassium ratio is a simple adjustment to the single parameter approach that helps to further and more accurately characterize the discharge. Ratios greater than 1.0 indicate a sewage source, while ratios less than or equal to one indicate a washwater source. Potassium is easily analyzed using a probe (Horiba Cardy™ is the recommended probe)." (CWP 2004, p. 130-133)

2.6 REMOVING ILLICIT DISCHARGES

Regulated MS4 communities are required to adopt an ordinance or other regulatory mechanism to prohibit illicit discharges to their storm drain system. The Maine Municipal Association (MMA) has developed a sample ordinance for use by the regulated MS4s, which describes enforcement procedures that can be taken in the event of discovery of an illicit discharge. As of publication of this manual, most communities have adopted an ordinance or other regulatory mechanism similar to the MMA sample ordinance. This section describes the procedures that should be taken for removal assuming an ordinance has been adopted that is similar to the MMA ordinance.

Table 2-7 (p. T-2-7) summarizes the procedures that should be followed to ensure a timely and complete removal depending on the types of illicit discharges that may be discovered, and the various responsible parties. For most cases, the enforcement authority for the ordinance will coordinate discharge removal.

The following subsections address the issues of financial responsibility for removal (Section 2.6.1), forms and procedures that can be used in association with issuing notices of violation (NOVs) (Section 2.6.2), circumstances in which a municipality can take emergency action for discharges that are a threat to human health or the environment (Section 2.6.3), and procedures to follow when an illicit discharge from an exempt party is identified (Section 2.6.4).

2.6.1 Financial Responsibility

Once an illicit discharge's source has been identified, the financial responsibility of removing it must be determined. The MMA ordinance allows imposition of a fine to the person causing the illicit discharge.

It should be noted that some illicit discharges may originate from legal connections to the storm drain system. For example, a washing machine discharging through a basement sump that was a municipally approved connection to the storm drain system would be considered an illicit discharge. The connection was legal, and the MMA ordinance does not require disconnection. The ordinance requires only that the washing machine be disconnected from the sump discharge. The sump connection to the storm drain system, that was legally made, can remain.

Some illicit discharges may result from illegal connections (i.e., connections that violate state plumbing codes). For intermittent or continuous discharges that are the result of an illegal direct connection into the storm drain system, the cost for disconnection will fall to either the property owner of the illegal connection or the municipality, depending on the circumstances of the connection. For example, if the connection was incorrectly applied during a separation project conducted by the municipality, the cost to correct the connection should be borne by the municipality. If the connection was the result of a private contractor working for the resident, the resident would be financially responsible for correcting the connection. Similarly, if the illicit discharge is the result of a failed sanitary sewer line, the party responsible for the failed sanitary sewer line must pay for the correction.

2.6.2 Notice of Violation

For violations of the municipal ordinance, most municipalities will want to issue a notice of violation. Although most code enforcement officers will have their own forms, a blank letter is provided for use in Volume 2, p. 2-13. It should be noted that the NOV describes a schedule for the removal to be completed, as well as a summary of any agreements between the parties.

2.6.3 Emergency Suspensions

The MMA sample ordinance allows a municipality to suspend access to the storm drain system for discharges that present "imminent and substantial danger to the environment or to the health or welfare of persons, or to the storm drain system". The ordinance states that the suspension may include "blocking pipes, constructing dams or taking other measures on public ways or public property to physically block the Discharge". The municipal enforcement authority for the ordinance may want to call the Maine DEP Oil and Hazardous Spill Reporting Hotline when making this determination for suspension. The hotline number is 800-482-0777.

2.6.4 Discharges from Exempt Parties

Several categories of facilities are regulated by Maine DEP and/or US EPA for stormwater discharges under other permits. Because these facilities are already responsible to one enforcement authority for stormwater discharges, they have been identified in the MMA sample ordinance as being exempt from the ordinance. If a municipality encounters an illicit discharge that is suspected or determined to be coming from an exempt party that is regulated under some other stormwater regulation, the municipality should notify both the suspected discharger and the enforcement authority for that discharger. The notification can be verbal or in writing. Most municipalities have prior experience working with other enforcement authorities for suspected violations of either state or federal law.

The following is a brief list of parties that are exempt from the MMA sample ordinance because they are regulated under an alternate program:

Exempt Facility	Alternate Regulation They Are Subject To	Enforcement Authority
Maine Turnpike Authority and Maine DOT (in selected urbanized areas)	Maine General Permit for the Disdharge of Stormwater from MTA and MDOT MS4s	Maine DEP
Portsmouth Naval Shipyard, Southern Maine Community College, USM Gorham, Bangor Air National Guard	Maine General Permit for the Discharge of Stormwater from State and Federally Owned MS4s	Maine DEP
Industrial Facilities with selected SIC codes (See Table 2-8 for a complete list)	Multi Sector General Permit for Industrial Activities	USEPA (Until 10/2005) Maine DEP (After 10/2005)

As shown in Table 2-7 (p. T-2-7), if a municipality identifies that an illicit discharge has come from one of these facilities, they should notify both the discharger and the enforcement authority in writing of the activity.

2.7 TRACKING ILLICIT DISCHARGES

Sample Organization for Three Ring Binder:

Area A
- Outfall Structures (SWO-001, SWO-002, etc)
- Catchbasins (CB-001, CB-002, etc.)
- Drain Manholes (DMH-001, DMH-002, etc.)

Area B
- Outfall Structures (SWO-010, SWO-013, etc)
- Catchbasins (CB-104, CB-102, etc.)
- Drain Manholes (DMH-025, DMH-002, etc.)

Developing a long-term tracking program can help Program Managers better understand the origins of illicit discharges and identify maintenance issues for the storm drain system structures. A tracking program will also facilitate evaluation of the overall IDDE program and will expedite annual reporting. An effective tracking program should address illicit discharge and maintenance issues resulting from the following:

- Citizen complaints
- Opportunistic inspections
- Regular longer term inspections
- Removal actions taken for illicit discharges

For smaller communities, an effective tracking system can be as simple as maintaining a three-ring binder with paper copies of all the forms that document the citizen complaints, inspections, and follow up information. The binder should be organized by priority area, with a listing in the front of each section or a map showing all the structures that are contained in that section. Because each structure is assigned a unique identifier, the information within the sections can be ordered by structure type and then by unique identifier. This method could become cumbersome for a medium or larger community.

Databases provide an excellent way to organize large quantities of information, allowing retrieval at a later time of selected information as needed. Databases work nicely with GIS systems because the GIS database system can be related to a larger database that stores more rapidly changing data that will increase in volume over time. The ASIST MS4 Professional database could be used to track the IDDE program, or a separate database program could be developed. The two database options are discussed in the following subsections.

Standard Industrial Classification (SIC) codes for NPDES Stormwater Multi-Sector Permit (MSGP) Industrial Facilities are listed in Table 2-8 (p. T-2-8).

2.7.1 ASIST MS4 Professional Database

The ASIST program offers a user friendly environment for data collection and storage. The program is comprehensive, allowing storage of long-term inspection information, opportunistic inspection information, citizen complaint information, and analytical data that may be collected as part of an illicit discharge investigation. The program allows mapped data already collected as part of a GIS program to be imported as a Microsoft Access database with minimal modifications, in order to create a baseline data set. The database allows multiple users to input new or additional information to keep the database current.

The program also offers a field station export capability designed to be used with a laptop computer. The Program Manager or crew leader can export selected inspections to be conducted to the laptop, while crews can collect inspection data on the laptop in the field and then export it to the central database back in the office.

The data contained in the ASIST database can be linked to a GIS database for viewing in the GIS environment. This is accomplished by first exporting the data from the ASIST database into Microsoft Access tables using the utilities feature of the program. The data is sorted into 23 separate tables that are all related by unique identifiers that ASIST creates. These tables are then accessed by the GIS program by "relating" the GIS shape file to the Access tables. Each table must be related separately, and this task can be time consuming. It is likely that only communities with a full-time GIS operator will be using this method to view the ASIST data in the GIS environment. Communities without full time GIS operators should use the GIS and ASIST databases as separate programs.

While this program is comprehensive and could contain all the information necessary to a good tracking program, it may contain too many options to be practical unless it is to be used on a regular basis by a dedicated user.

Finally, to access selected data from the ASIST database that can be used to evaluate the IDDE program and complete an annual report, a special report must be created using the ASIST *Report* feature. This report can allow selection of custom information such as: an evaluation of how many citizen reports of illicit discharges have been identified versus how many were resolved, a comparison of how illicit discharges have been identified, or a comparison of how many illicit discharges have been identified in each priority area of the municipality.

2.7.2 Customized Database

A separate option for IDDE tracking is to set up a distinct Access database that includes all the fields on the Dry Weather Outfall Inspection Form. The advantage to this tracking program is that this Access database can be easily linked to the GIS. Linking to a GIS allows mapping of illicit discharge locations, citizen complaint locations, and many other IDDE issues which can assist greatly in the overall program.

2.8 EVALUATING THE PROGRAM

Program Managers should evaluate their IDDE program at the end of each year to assess if it is effective and efficient. Table 2-9 (p. T-2-9) is a worksheet that Program Managers can use to evaluate the following components:

1. Priority Areas: Are the priority areas initially identified still appropriate? Considerations should include reviewing the priority worksheet to assess if any changes have occurred since the initial evaluation was completed (such as: Have additional illicit discharges been discovered in any of the areas? Has a new 303(d) list come out naming new waterbodies as impaired?)

2. Detection Program: Is the detection program effective? Documenting the number of illicit discharges detected by the various detection mechanisms (opportunistic inspections, mapping inspections, citizen call-ins, or long-term inspections) can help a Program Manager decide where to allocate resources.

3. Tracing Techniques: What tracing techniques were generally used? What tracing techniques were generally effective? In how many instances were visual inspections of the area sufficient to identify the source of the illicit discharge? Were there any times the equipment necessary to effectively trace an illicit discharge wasn't used because it was not available, or was too costly to obtain? Documenting the effectiveness of tracing techniques can help Program Managers to be more efficient.

Although completing an evaluation of the overall IDDE program may be time consuming, its benefits may include reduced costs for future inspection and IDDE efforts. Keeping track of where illicit discharges are likely to occur and what techniques are useful can save a municipality time and money.

Chapter 3

3. POLLUTION PREVENTION AND GOOD HOUSEKEEPING

Many municipal activities can result in stormwater pollution if not conducted properly. Activities such as vehicle maintenance, fueling, and landscaping involve handling, storage, and use of chemicals and petroleum products that must be used properly to prevent stormwater from becoming polluted. In addition, construction activities conducted during general maintenance of infrastructure can result in sedimentation and erosion of soil that can be swept by stormwater into the storm drain system or directly into waterbodies.

The Pollution Prevention / Good Housekeeping components of the General Permit require that municipalities re-evaluate how they manage the municipal infrastructure and develop procedures that are protective of stormwater, and ultimately the waterbodies the stormwater discharges to. The specific language for required items is listed in Part IV (D)(6)(a) of the General Permit:

> *i. The permittee shall develop and implement an operation and maintenance program that includes a training component for municipal employees and contractors and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations.*
>
> *ii. Using training materials that are available from the EPA, the State or other organizations, this program must include employee training to prevent and reduce stormwater pollution from activities such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and stormwater system maintenance.*
>
> *iii. The permittee shall develop and implement a program to sweep all publicly accepted paved streets and publicly owned paved parking lots at least once a year as soon as possible after snowmelt.*
>
> *iv. The permittee shall develop and implement a program to evaluate and, if necessary, clean catch basins and other stormwater structures that accumulate sediment at least once a year and dispose of the removed sediments in accordance with current state law.*
>
> *v. The permittee shall develop and implement a program to evaluate and, if necessary, prioritize for repairing, retrofitting or upgrading the conveyances, structures and outfalls of the regulated small MS4.*

Part IV (D)(6)(b) of the General Permit also suggests, at a minimum, that the following items be considered in developing a Pollution Prevention/Good Housekeeping program:

i. Structural and non-structural stormwater controls to reduce floatables and other pollutants discharged from your separate storm sewers.

ii. Controls for reducing or eliminating the discharge of pollutants from streets, roads, highways, municipal parking lots, maintenance and storage yards, fleet or maintenance shops with outdoor storage areas, salt/sand storage locations, snow disposal areas, and waste transfer stations.

iii. Procedures for properly disposing of waste removed from the separate storm sewers and areas listed above (such as dredge spoil, accumulated sediments, floatables, and other debris).

iv. Ways to ensure that new flood and stormwater management projects assess the impacts on water quality and examine existing projects for incorporating additional water quality protection devices or practices.

v. Implement an operation and maintenance plan for all stormwater management structures. This measure is intended to improve the efficiency of these systems and require new programs where necessary.

This chapter addresses all of the required components of the General Permit, as well as the first three suggested components, listed above. To address these components, the Chapter is divided into four subsections that describe four major categories of operations completed by municipalities: Vehicle/Equipment Maintenance (Section 3.1), Facilities Maintenance (Section 3.2), Storm Drain System Maintenance (Section 3.3), and Construction Activities (Section 3.4).

Each of these four operational areas contains a diverse set of activities, for which SOPs are appropriate. SOPs associated with each of these operational areas are contained in Volume 2, Chapter 3. The SOPs summarize the best management practices that should be used to minimize impacts on stormwater. Some of the SOPs apply to more than one operational area. For example, both vehicle maintenance and facilities maintenance require handling, storage, and disposal of petroleum products. Therefore, the SOPs for petroleum handling, storage and disposal in Volume 2 address both of these operational areas. Table 3-1 (p. T-3-1) shows the relationship between the SOPs that are contained in Volume 2, and the operational areas that are described in this Chapter.

3.1 VEHICLE/EQUIPMENT MAINTENANCE

Vehicle and equipment maintenance activities can pose a significant threat to stormwater. The USEPA considers automotive maintenance facilities to be potential sources of petroleum, trace metals, antifreeze, and sediments that can contaminate stormwater runoff (USEPA 2004). Many petroleum products and chemicals are handled, stored, and disposed of on a regular basis during vehicle maintenance. Proper handling, storage, and disposal are critical to preventing contact with stormwater. Exterior storage of supplies, spare parts, vehicles, and equipment can be a source of stormwater pollution. Generally, good housekeeping and proper management of wastes can have a significant impact on stormwater runoff quality. The SOPs related to vehicle maintenance activities have three basic themes:

(1) Store inside whenever possible.

(2) Handle with care to avoid spills.

(3) Recycle or dispose of properly.

The SOPs associated with Vehicle Maintenance activities provide best management practices to follow. Program Managers should review the "Whenever Possible" components of the SOPs and make determinations as to which components will work for their facility. Table 3-2 (p. T-3-2) is a worksheet to assist Program Managers in selecting the components of the program their facility will follow. Table 3-2 addresses the following categories:

Floor Drains: Floor drains should either be connected to a regularly maintained holding tank or to a regularly maintained oil/water separator that discharges to the sanitary sewer. If the discharge location is unknown, it can be determined by televising or dye testing (see Chapter 2 for discussion of advantages and disadvantages of each method). If floor drains do not connect to one of these two devices they should not be used. The facility should connect the floor drains to the appropriate device or close and seal the floor drains, and run a "dry shop". All floor drains, whether active or sealed, must be registered with the Maine DEP Underground Injection Control Program (207-287-7814).

Parts Cleaning: If chlorinated solvents are used, they should be disposed of as hazardous waste by a licensed contractor. Citrus based cleaners can be recycled by an off-site contractor reducing overall cost of its use. Steam cleaning or use of a commercial washer allows discharge to the sanitary sewer. Using non-hazardous chemicals reduces the risk of stormwater pollution.

Petroleum Storage: Areas should be kept clean and neat. Regular inspection and use of spill adsorbent and pads can minimize impacts to stormwater in exterior areas. If a facility has a total storage capacity in excess of 1,320 gallons for bulk petroleum products (55-gallon size containers), the facility needs a Spill Prevention, Control, and Countermeasure (SPCC) Plan, in accordance with 40 CFR Part 112 (federal environmental regulations). Generally, facilities with this quantity of storage capacity are at greater risk for spills and leaks that can impact stormwater. Implementation of the SPCC Plan can reduce the potential for contact with stormwater.

Vehicle Storage: Vehicles should be stored on impervious areas that are inspected on a regular basis and which can be cleaned with a street sweeper as necessary. Drip pans should always be used to collect leaking fluids. A dedicated, convenient storage area should be provided and clearly labeled for the drip pans and for the fluids they will contain.

Vehicle Washing: Vehicles should be washed in a dedicated area that can appropriately handle the runoff. Preferably, vehicles should be washed in a dedicated wash bay that is equipped with an oil/water separator connected to the sanitary sewer. If it is not feasible to install such a system, washing in an area with sufficient buffers to diffuse the washwater and allow infiltration is a viable alternative. Engine washing and undercarriage washing should only be conducted in areas where the washwater is collected and treated.

Vehicle Fueling: Vehicle fueling areas are a significant generation point for petroleum contamination of stormwater. Vehicle fueling areas should be inspected and swept with a street sweeper on a regular basis. A spill kit and covered garbage container should be located near the fueling area and should be well labeled for individuals to use when needed.

Completing Table 3-2 and using the SOPs in Volume 2 will provide documentation of a reasonable and effective Operation and Maintenance program for vehicles and equipment that will be protective of stormwater.

An important component of stormwater protection at vehicle and equipment maintenance facilities is general good housekeeping. Conducting regular inspections of a facility can be a effective pollution prevention technique. Table 3-3 (p. T-3-3) is an inspection checklist that should be used on a regular basis to identify areas of potential storm water pollution. The form can be modified to suit a specific vehicle maintenance facility. The Program Manager should determine an appropriate frequency for inspection.

3.2 FACILITIES MAINTENANCE

Most municipalities own and operate buildings, parks, and other green spaces. General maintenance activities include mowing and trimming, painting, pest control, weed control, and all of the chemical and petroleum handling that is associated with these activities. The SOPs contained in Volume 2 provide best management practices to protect stormwater from the potential hazards associated with each of these activities. Facilities maintenance personnel should be trained in each of the SOPs associated with their job.

3.3 STORM DRAIN SYSTEM MAINTENANCE

Storm drain system maintenance consists of three components: cleaning, repairing (or retrofitting), and upgrading. The General Permit requires that catch basins be cleaned on an annual basis. Historically, storm drain systems have been repaired or upgraded only when catastrophic failures have occurred, such as those causing flooding, road failures, or severe erosion. The General Permit requires that each regulated municipality develop an Operation and Maintenance program for the repair, retrofit, or upgrade of the storm drain system.

Section 2.2 of this manual reviews how the Program Manager can divide a municipality into distinct areas and prioritize the areas based on their illicit discharge potential. A component of that evaluation considers the age and material of the infrastructure, which is an indicator of failure potential. This prioritization should be reviewed and used to develop a maintenance program for the system. Additional useful resources include the capital budget and the GASB 34 accounting information. All of these items should be reviewed and evaluated to identify where and when repairs, retrofits and upgrades should be conducted. The storm drain system operation and maintenance program can be developed using a process that is similar to the pavement management program described below.

1. Vitrified clay storm drain pipe or asbestos cement pipe in older areas should be replaced or retrofitted as part of other infrastructure work (street reconstruction, or CSO work). Televising and/or manual inspections should be performed to confirm the degree of repair or replacement necessary.

2. An inspection and replacement program should be developed for newer pipes and structures in order to conduct preventative maintenance that can affect long-term cost savings and avert catastrophic failures. The inspection and replacement program should consist of the following items:

   <u>Storm Drain Pipe/Outfall Cleaning and Inspections</u> – A cleaning and inspection prioritization should be established for storm drain pipes and

outfalls. The Program Manager should consider conducting annual inspections on storm drains and outfalls in high priority areas. Less frequent inspections (every 2 to 3 years) should be completed for medium and low priority areas. Inspections for structural conditions should be combined with the inspections for illicit discharges as described in Section 2.4.2.

Catch basin Cleaning and Inspection – A prioritization plan should also be established for catch basin cleaning. The prioritization can be completed by the Program Manager using the following two considerations: (1) amount of sand spread in different areas, and (2) areas that have historically accumulated a large quantity of sediment or debris. Most communities that conduct separation activities for combined sewers have already developed a prioritization for cleaning as part of their master planning. This prioritization should be reviewed and updated, especially if separated areas have been dropped from the prioritization. The re-evaluation should use the same two criteria listed above (sand application and historical sediment accumulation). Program Managers should identify a reasonable frequency of cleaning based on need, municipal budgets, and personnel availability.

The Catch Basin Cleaning Form contained in Volume 2, p. 2-12, should be used during cleaning as a method to inspect the catch basins to evaluate the integrity of the structure and identify necessary repairs. Any repairs identified on the forms should be incorporated into the municipality's work order system. Communities that outsource catch basin cleaning should either require that the contractor use the inspection form or should consider sending a public works employee, intern, or other municipal representative along with the contractor to evaluate structures.

Disposal of catch basin cleaning liquids and solids should be done in accordance with all pertinent regulations and the Maine DEP *Guidance on Disposal and Use of Assorted Solid Wastes Generated in Maine*.

3.4 CONSTRUCTION ACTIVITIES AND OTHER LAND DISTURBANCES

As municipalities perform construction activities and other activities which disturb soil, they should take precautions to prevent erosion and runoff of sediment. Road crews and landscaping crews should be trained in erosion and sediment control methods. The Maine DEP publication *Best Management Practices Manual for Sediment and Erosion Control* describes a variety of methods that are appropriate for a wide range of situations. The Manual describes proper use and installation techniques. The Maine DEP Non-Point Source Training Center offers training sessions for this manual. In particular, the Contractor Certification Program is appropriate for public works crews. The Maine Local Roads program offered by the Maine DOT also offers training sessions for erosion/sediment control titled, "Drainage, Drainage, Drainage".

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Table 2-1: LAND USES, LIKELY SOURCE LOCATIONS AND ACTIVITIES THAT CAN PRODUCE *TRANSITORY OR INTERMITTENT* ILLICIT DISCHARGES

Land Use	Likely Source Locations	Condition or Activity that Produces Discharge
Residential	• Apartments • Multi-family • Single Family Detached	• Car Washing • Driveway Cleaning • Dumping/Spills (e.g., leaf litter and RV/boat holding tank effluent) • Equipment Wash-downs • Lawn/Landscape Watering • Septic System Maintenance • Swimming Pool Discharges
Commercial	• Campgrounds/RV Parks • Car Dealers/Rental Car Companies • Car Washes • Commercial Laundry/Dry Cleaning • Gas Stations/Auto Repair Shops • Marinas • Nurseries and Garden Centers • Oil Change Shops • Restaurants • Swimming Pools	• Building Maintenance (power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Outdoor Fluid Storage • Parking Lot Maintenance (power washing) • Vehicle Fueling • Vehicle Maintenance/Repair • Vehicle Washing • Wash-down of Greasy Equipment and Grease Traps
Industrial	• Auto recyclers • Beverages and brewing • Construction vehicle washouts • Distribution centers • Food processing • Garbage truck washouts • Marinas, boat building and repair • Metal plating operations • Paper and wood products • Petroleum storage and refining • Printing	• All Commercial Activities • Industrial Process Water or Rinse Water • Loading and Un-loading Area Wash-downs • Outdoor Material Storage (fluids)
Municipal	• Airports • Landfills • Maintenance Depots • Municipal Fleet Storage Areas • Ports • Public Works Yards • Streets and Highways	• Building Maintenance (power washing) • Dumping/Spills • Landscaping/Grounds Care (irrigation) • Outdoor Fluid Storage • Parking Lot Maintenance (power washing) • Road Maintenance • Emergency Response • Vehicle Fueling • Vehicle Maintenance/Repair • Vehicle Washing

SOURCE: Modified from *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection, 2004, p. 12, Table 2.

Table 2-2: LAND USES, LIKELY SOURCE LOCATIONS AND ACTIVITIES THAT CAN PRODUCE ***CONTINUOUS*** ILLICIT DISCHARGES	
Land Use	**Condition or Activity that Produces Discharge**
Residential	• Failed sanitary sewer infiltrating into storm drain • Sanitary sewer connection into storm drain • Failed septic systems discharging to storm drain system
Commercial/Industrial	• Failed sanitary sewer infiltrating into storm drain • Process water connections into storm drain • Sanitary sewer connection into storm drain
Municipal	• Failed sanitary sewer infiltrating into storm drain • Sanitary sewer connection into storm drain

Table 2-3: PRIORITIZING AREAS USING AVAILABLE INFORMATION

	Land Use	MDEP Category on 303(d) List	Density of stormwater outfalls (# of outfalls per stream mile)	Average age of development (years)	Raw IDP Score	Normalized IDP Score**
Area A	Commercial (2)*	Impaired (not Urban Runoff) (2)*	14 (2)*	40 (2)*	8	2
Area B	Residential (1)	Not Impaired (1)	10 (2)	10 (1)	5	1.25
Area C	Industrial (3)	Impaired (Urban Runoff) (3)	16 (2)	75 (3)	11	2.75
Area D	Residential (1)	Not Impaired (1)	9 (1)	15 (2)	5	1.25
Area E	Residential (1)	No data available	21 (3)	20 (1)	5	1.67

Notes:
* The number in parentheses is the Illicit Discharge Potential (IDP) "score" (with 3 defined as a high IDP) earned for that area for the category identified. Basis for assigning scores (based on benchmarks) to assess IDP is defined as follows:
Land Use: Industrial = High (3), Commercial = Medium (2), Residential = Low (1)
MDEP Category: Impaired – Urban Runoff = 3, Impaired – not Urban Runoff = 2, Not Impaired = 1
Stormwater outfall density: 10 = 1; 10-20 = 2; 20 = 3
Average age of development: 25 = 1; 25-50 = 2; 50 = 3
** Normalizing the raw IDP scores (by dividing the raw score by the number of screening factors assessed) will produce scores that fall into the standard scale of 1 to 3 for low to high IDP, respectively.

SOURCE: Modified from *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection, 2004, p. 53, Table 15.

Table 2-4: WORKSHEET TO PRIORITIZE AREAS						
Area of Community	Categories of Information Reviewed					
					Raw Score	Normalized IDP Score

Category Definitions

(3) High				
(2) Medium				
(1) Low				

Table 2-5: WORKSHEET TO DEVELOP A DETECTION PROGRAM	
Type of Detection Program	**Retained/Eliminated from Municipal IDDE Program (Provide Discussion)**
Inspections During Mapping	
Area A	
Area B	
Area C	
Area D	
Area E	
Longer Term Inspections	
Area A	
Area B	
Area C	
Area D	
Area E	
Opportunistic Inspections	
Citizen Call-In Program	
Septic System Inspections	
Area A	
Area B	
Area C	
Area D	
Area E	

Table 2-6: INDICATOR PARAMETERS USED TO DETECT ILLICIT DISCHARGES

Parameter	Discharge Types it can Detect				Laboratory/Analytical Challenges
	Sewage	Washwater	Tap Water	Industrial or Commercial Liquid Wastes	
Ammonia	?	?	?	?	Can change into other nitrogen forms as the flow travels to the outfall.
Boron	?	?	?	*	
Chlorine	?	?	?	?	High chlorine demand in natural waters limits utility to flow with very high chlorine concentrations.
Color	?	?	?	?	
Conductivity	?	?	?	?	Ineffective in saline waters, generally highly variable.
Detergents - Surfactants	?	?	?	?	Reagent is a hazardous waste.
E. coli Enterococci Total Coliform	?	?	?	?	24-hour wait for results. Need to modify standard monitoring protocols to measure high bacteria concentrations.
Fluoride**	?	?	?	?	Reagent is a hazardous waste. Exception for communities that do not fluoridate their tap water.
Hardness	?	?	?	?	
pH	?	?	?	?	
Potassium	?	?	?	?	May need to use two separate analytical techniques, depending on the concentration.
Turbidity	?	?	?	?	

? Can almost always (>80% of samples) distinguish this discharge from clean flow types (e.g., tap water or natural water). For tap water, can distinguish from natural water.

? Can sometimes (>50% of samples) distinguish this discharge from clean flow types depending on regional characteristics, or can be helpful in combination with another parameter.

? Poor indicator. Cannot reliably detect illicit discharges, or cannot detect tap water.

* Data are not available to assess the utility as a single parameter, but when combined with additional parameters (such as detergents, ammonia and potassium), it can almost always distinguish between sewage and washwater.

** Fluoride is a poor indicator when used alone, but can distinguish between washwater and sewage when combined with analysis for detergents, ammonia and potassium.

SOURCE: Modified from *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection, 2004, p. 122, Table 39.

Table 2-7: NOTIFICATION AND REMOVAL PROCEDURES FOR ILLICIT DISCHARGES			
Financial Responsible Party	**Source Identified**	**Enforcement Authority**	**Procedure to Follow**
Exempt 3rd Party	Any	USEPA (or) MDEP	• Notify exempt third party and USEPA or MDEP of Illicit Discharge
Private Property Owner	One-Time Illicit Discharge (i.e., spill, dumping, etc.)	Ordinance Enforcement Authority (i.e., Code Enforcement Officer)	• Contact Owner • Issue Notice of Violation • Issue fine
Private Property Owner	Intermittent or Continuous from Legal Connection	Ordinance Enforcement Authority (i.e., Code Enforcement Officer)	• Contact Owner • Issue Notice of Violation • Determine schedule for removal • Confirm removal
Private Property Owner	Intermittent or Continuous from Illegal Connection or Indirect (i.e., infiltration or failed septic)	Plumbing Inspector	• Notify plumbing inspector
Municipal	Intermittent or Continuous from Illegal Connection or Indirect (i.e., failed sewer line)	Ordinance Enforcement Authority (i.e., Code Enforcement Officer)	• Issue work order • Schedule removal • Remove connection • Confirm removal

Table 2-8: SIC CODES FOR MSGP INDUSTRIAL ACTIVITIES	
Sector Name	**SIC Code Listing**
Sector A: Timber Products	2411 .... Log Storage and Handling (Wet deck storage areas only authorized if no chemical additives are used in the spray water or applied to the logs). 2421 .... General Sawmills and Planning Mills. 2426 .... Hardwood Dimension and Flooring Mills. 2429 .... Special Product Sawmills, Not Elsewhere Classified. 2431–2439 (except 2434) .... Millwork, Veneer, Plywood, and Structural Wood (see Sector W). 2448, 2449 .... Wood Containers. 2451, 2452 .... Wood Buildings and Mobile Homes. 2491 .... Wood Preserving. 2493 .... Reconstituted Wood Products. 2499 .... Wood Products, Not Elsewhere Classified.
Sector B: Paper and Allied Products	2611 .... Pulp Mills. 2621 .... Paper Mills. 2631 .... Paperboard Mills. 2652–2657 .... Paperboard Containers and Boxes. 2671–2679 .... Converted Paper and Paperboard Products, Except Containers and Boxes.
Sector C: Chemical and Allied Products	2812–2819 .... Industrial Inorganic Chemicals. 2821–2824 .... Plastics Materials and Synthetic Resins, Synthetic Rubber, Cellulosic and Other Manmade Fibers Except Glass. 2833–2836 .... Medicinal chemicals and botanical products; pharmaceutical preparations; in vitro and in vivo diagnostic substances; biological products, except diagnostic substances. 2841–2844 .... Soaps, Detergents, and Cleaning Preparations; Perfumes, Cosmetics, and Other Toilet Preparations. 2851 .... Paints, Varnishes, Lacquers, Enamels, and Allied Products. 2861–2869 .... Industrial Organic Chemicals. 2873–2879 .... Agricultural Chemicals. 2873 .... Facilities that Make Fertilizer Solely from Leather Scraps and Leather Dust. 2891–2899 .... Miscellaneous Chemical Products. 3952 (limited to list) .... Inks and Paints, Including China Painting Enamels, India Ink, Drawing Ink, Platinum Paints for Burnt Wood or Leather Work, Paints for China Painting, Artist's Paints and Artist's Watercolors.
Sector D: Asphalt Paving and Roofing Materials and Lubricants	2951, 2952 .... Asphalt Paving and Roofing Materials. 2992, 2999 .... Miscellaneous Products of Petroleum and Coal.
Sector E: Glass Clay, Cement, Concrete, and Gypsum Products	3211 .... Flat Glass. 3221, 3229 .... Glass and Glassware, Pressed or Blown. 3231 .... Glass Products Made of Purchased Glass. 3241 .... Hydraulic Cement. 3251–3259 .... Structural Clay Products. 3261–3269 .... Pottery and Related Products. 3271–3275 .... Concrete, Gypsum and Plaster Products. 3291–3299 .... Abrasive, Asbestos, and Miscellaneous Nonmetallic Mineral Products.
Sector F: Primary Metals	3312–3317 .... Steel Works, Blast Furnaces, and Rolling and Finishing Mills. 3321–3325 .... Iron and Steel Foundries. 3331–3339 .... Primary Smelting and Refining of Nonferrous Metals. 3341 .... Secondary Smelting and Refining of Nonferrous Metals. 3351–3357 .... Rolling, Drawing, and Extruding of Nonferrous Metals. 3363–3369 .... Nonferrous Foundries (Castings). 3398, 3399 .... Miscellaneous Primary Metal Products.
Sector G: Metal Mining (Ore Mining and Dressing)	1011 .... Iron Ores. 1021 .... Copper Ores. 1031 .... Lead and Zinc Ores. 1041, 1044 .... Gold and Silver Ores. 1061 .... Ferroalloy Ores, Except Vanadium. 1081 .... Metal Mining Services. 1094, 1099 .... Miscellaneous Metal Ores.

Table 2-8: SIC CODES FOR MSGP INDUSTRIAL ACTIVITIES (continued)	
Sector Name	**SIC Code Listing**
Sector H: Coal Mines and Coal Mining Related Facilities	1221–1241 .... Coal Mines and Coal Mining-Related Facilities.
Sector I: Oil and Gas Extraction and Refining	1311 .... Crude Petroleum and Natural Gas. 1321 .... Natural Gas Liquids. 1381–1389 .... Oil and Gas Field Services. 2911 .... Petroleum Refineries.
Sector J: Mineral Mining and Dressing	1411 .... Dimension Stone. 1422–1429 .... Crushed and Broken Stone, Including Rip Rap. 1442, 1446 .... Sand and Gravel. 1455, 1459 .... Clay, Ceramic, and Refractory Materials. 1474–1479 .... Chemical and Fertilizer Mineral Mining. 1481 .... Nonmetallic Minerals Services, Except Fuels. 1499 .... Miscellaneous Nonmetallic Minerals, Except Fuels.
Sector K: Hazardous Waste Treatment, Storage, or Disposal Facilities	HZ .... Hazardous Waste Treatment Storage or Disposal.
Sector L: Landfills and Land Application Sites	LF .... Landfills, Land Application Sites, and Open Dumps.
Sector M: Automobile Salvage Yards	5015 .... Automobile Salvage Yards.
Sector N: Scrap Recycling Facilities	5093 .... Scrap Recycling Facilities.
Sector O: Steam Electric Generating Facilities	SE .... Steam Electric Generating Facilities.
Sector P: Land Transportation and Warehousing	4011, 4013 .... Railroad Transportation. 4111–4173 .... Local and Highway Passenger Transportation. 4212–4231 .... Motor Freight Transportation and Warehousing. 4311 .... United States Postal Service. 5171 .... Petroleum Bulk Stations and Terminals.
Sector Q: Water Transportation	4412–4499 .... Water Transportation.
Sector R: Ship and Boat Building or Repairing Yards	3731,3732 .... Ship and Boat Building or Repairing Yards.
Sector S: Air Transportation	4512–4581 .... Air Transportation Facilities.
Sector T: Treatment Works	TW .... Treatment Works.
Sector U: Food and Kindred Products	2011–2015 .... Meat Products. 2021–2026 .... Dairy Products. 2032 .... Canned, Frozen and Preserved Fruits, Vegetables and Food Specialties. 2041–2048 .... Grain Mill Products. 2051–2053 .... Bakery Products. 2061–2068 .... Sugar and Confectionery Products. 2074–2079 .... Fats and Oils. 2082–2087 .... Beverages. 2091–2099 .... Miscellaneous Food Preparations and Kindred Products. 2111–2141 .... Tobacco Products.
Sector V: Textile Mills, Apparel, and Other Fabric Product Manufacturing, Leather and Leather Products	2211–2299 .... Textile Mill Products. 2311–2399 .... A pparel and Other Finished Products Made From Fabrics and Similar Materials. 3131–3199 (except 3111) .... Leather and Leather Products, except Leather Tanning and Finishing (see Sector Z).

Table 2-8: SIC CODES FOR MSGP INDUSTRIAL ACTIVITIES (continued)	
Sector Name	**SIC Code Listing**
Sector W: Furniture and Fixtures	2434 .... Wood Kitchen Cabinets. 2511–2599 .... Furniture and Fixtures.
Sector X: Printing and Publishing	2711–2796 .... Printing, Publishing, and Allied Industries.
Sector Y: Rubber, Miscellaneous Plastic Products, and Miscellaneous Manufacturing Industries.	3011 .... Tires and Inner Tubes. 3021 .... Rubber and Plastics Footwear. 3052, 3053 .... Gaskets, Packing, and Sealing Devices and Rubber and Plastics Hose and Belting. 3061, 3069 .... Fabricated Rubber Products, Not Elsewhere Classified. 3081–3089 .... Miscellaneous Plastics Products. 3931 .... Musical Instruments. 3942–3949 .... Dolls, Toys, Games and Sporting and Athletic Goods. 3951–3955 (except 3952 facilities as specified in Sector C)............ Pens, Pencils,and Other Artists' Materials. 3961, 3965 .... Costume Jewelry, Costume Novelties, Buttons, and Miscellaneous Notions, Except Precious Metal. 3991–3999 .... Miscellaneous Manufacturing Industries.
Sector Z: Leather Tanning and Finishing	3111………………………………..Leather Tanning and Finishing.
Sector AA: Fabricated Metal Products	3479………………………………..Coating, Engraving, and Allied Services . 3411–3499 .... Fabricated Metal Products, Except Machinery and Transportation Equipment and Cutting, Engraving and Allied Services. 3911–3915 .... Jewelry, Silverware, and Plated Ware.
Sector AB: Transportation Equipment, Industrial or Commercial Machinery	3511–3599 (except 3571–3579) Industrial and Commercial Machinery (except Computer and Office Equipment) (see Sector AC). 3711–3799 (except 3731, 3732) Transportation Equipment (except Ship and Boat Building and Repairing) (see Sector R).
Sector AC: Electronic, Electrical, Photographic, and Optical Goods	3571–3579 .... Computer and Office Equipment. 3612–3699 .... Electronic, Electrical Equipment and Components, except Computer Equipment. 3812 .... Measuring, Analyzing and Controlling Instrument; Photographic and Optical Goods.
Sector AD: Non-Classified Facilities	N/A .... Other storm water discharges designated by the Director as needing a permit (see 40 CFR 122.26(g)(1)(I)) or any facility discharging storm water associated with industrial activity not described by any of Sectors A–AC. **Note:** Facilities may not elect to be covered under Sector AD. Only the Director may assign a facility to Sector AD.

Table 2-9: IDDE PROGRAM EVALUATION WORKSHEET

Priority Areas	List any factors that have changed since initial priority was set	Recommended Change (Circle)	
A		Leave Priority Same	Re-evaluate
B		Leave Priority Same	Re-evaluate
C		Leave Priority Same	Re-evaluate
D		Leave Priority Same	Re-evaluate
E		Leave Priority Same	Re-evaluate

Detection Program	# Mapping Inspections		# Longer Term Inspections		# Citizen Complaints		# Opportunistic Inspections	
Priority Areas	Identified	Resolved	Identified	Resolved	Identified	Resolved	Identified	Resolved
A								
B								
C								
D								
E								

Comments/Recommended Changes

Table 3-1
GOOD HOUSEKEEPING/POLLUTION PREVENTION SOPS/ACTIVITY MATRIX

SOP	Vehicle/Equipment Maintenance	Facilities Maintenance	Storm Drain System Maintenance	Construction Activities and Other Land Disturbances
3.1 Catch Basin Cleaning			X	
3.2 Catch Basin Repair			X	
3.3 Outfall Repair			X	
3.4 Storm Drain System Repair			X	
3.5 Sediment and Erosion Control		X	X	X
3.6 Landscape Design and Management		X		X
3.7 Lawncare - Fertilizer and Pesticide Storage and Disposal		X		X
3.8 Lawncare – Fertilizing and Turf Health		X		X
3.9 Lawncare - Weed and Pest Control		X		
3.10 Lawncare - Mowing and Watering	X	X		
3.11 Vehicle and Equipment Storage	X	X	X	X
3.12 Vehicle and Equipment Washing	X	X		X
3.13 Vehicle Fueling	X	X		X
3.14 Spill Clean-up	X	X		X
3.15 Parts Cleaning	X			
3.16 Spare Parts Storage	X	X		
3.17 Alternative Products Use/Storage/Disposal	X	X		
3.18 Petroleum and Chemical Disposal	X	X		
3.19 Petroleum and Chemical Handling	X	X		
3.20 Petroleum and Chemical Storage - Bulk	X	X		
3.21 Petroleum and Chemical Storage – Small Quantity	X	X		
3.22 Garbage Storage	X	X		
3.23 General Facility Housekeeping	X	X		
3.24 Floor Drains	X	X		
3.25 Painting	X	X		
3.26 Street Sweeping	X	X		X
3.27 Snow Disposal		X		
3.28 Sand and Salt Storage		X		
3.29 Salt Application		X		

Table 3-2
VEHICLE/EQUIPMENT MAINTENANCE WORKSHEET

Program Category	Available Options (Circle all that apply)
Floor Drains	Don't Use Floor Drains → Run a Dry Shop Use Floor Drains → Discharge to Oil/Water Separator (Sanitary Sewer) → Maintain Use Floor Drains → Discharge to Holding Tank → Maintain → Pump Quarterly or Semi-annually → Contractor' Name
Parts Cleaning	Chlorinated Solvent → Disposal Contractor's Name Citrus-Based Cleaner Steam Clean/Pressure Wash → Discharge to Holding Tank or Oil/Water Separator (sanitary sewer)
Petroleum Storage	<1,320 gallons → Follow Best Management Practices ≥ 1,320 gallons → SPCC Plan/secondary containment
Petroleum Disposal	Recycle with Licensed Transporter → Retain Records for Three Years Burn on-site → Analyze for Maine Waste Oil Parameters → Retain Records for Three Years
Vehicle Storage	Pervious Areas → Inspect (Frequency _____) → Use Drip Pans → Provide Drip Pan and Oil Storage Impervious Areas → Inspect (Frequency _____) → Use Drip Pans → Provide Drip Pan and Oil Storage → Street Sweep (Frequency _____)
Vehicle Washing	Storm Drain → Provide Treatment (if possible) → Cold Water Biodegradable/Phosphate-free Soap If Dedicated Area Discharges to: → Oil/Water Separator & Sanitary Sewer → Engine and Undercarriage Washing Allowed If not to Oil/Water Separator & Sanitary Sewer, Not Allowed. Provide treatment (if possible).
Vehicle Fueling	Spill Kit Location: ________________ Street Sweep — Frequency ____________ Optional: Provide a canopy over area to minimize runon/runoff

Table 3-3
INSPECTION CHECKLIST

Date: ____/____/____ **Inspector: ____________________**

Inspection Area	Practice Followed	Comments
Check refuse areas for trash on the ground that could contaminate stormwater or be washed away in stormwater	Acceptable/Needs Attention	
Check all exterior vehicle and equipment areas for leaks, spills, drips, or excess dirt – Street sweeping necessary?	Acceptable/Needs Attention	
Check all exterior vehicle and equipment areas for leaks, spills, drips, or excess dirt – Drip pan use acceptable?	Acceptable/Needs Attention	
Check fueling areas for leaks, spills or drips	Acceptable/Needs Attention	
Check exterior petroleum storage areas for leaks, spills, or drips	Acceptable/Needs Attention	
Clean-up of tracked sand that might allow stormwater transport of sand	Acceptable/Needs Attention	
Clean-up tracked salt that might result in stormwater transport	Acceptable/Needs Attention	
Check calcium chloride tank for leaks, spills or cracks	Acceptable/Needs Attention	
Check vehicle washing area for excess sediment or wastes	Acceptable/Needs Attention	
Other:	Acceptable/Needs Attention	
Other:	Acceptable/Needs Attention	

Figure 2-1
LEVEL 6 SUBWATERSHEDS WITHIN THE PORTLAND REGULATED AREA

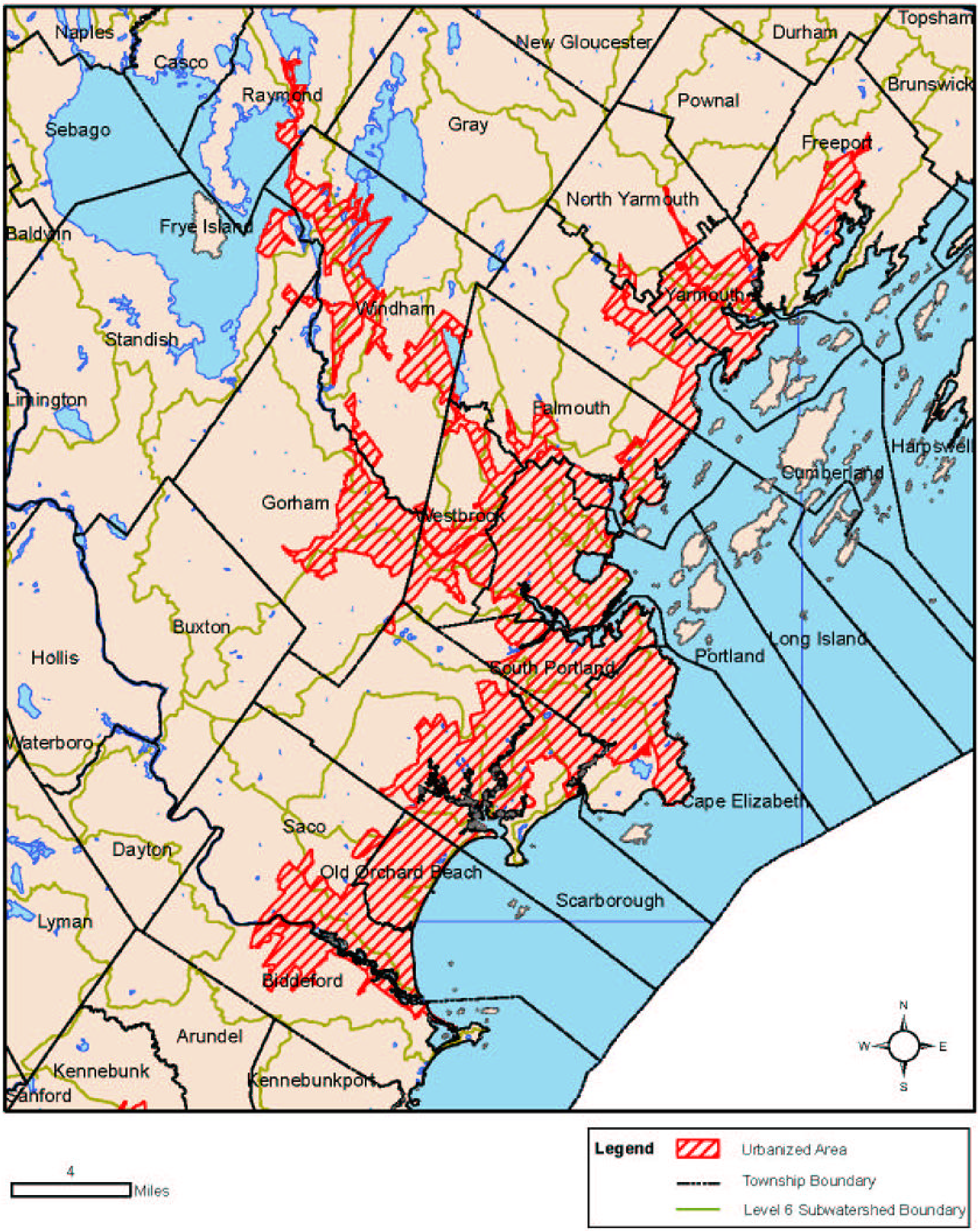


Figure 2-2
LEVEL 6 SUBWATERSHEDS WITHIN THE SOUTHERN MAINE REGULATED AREA

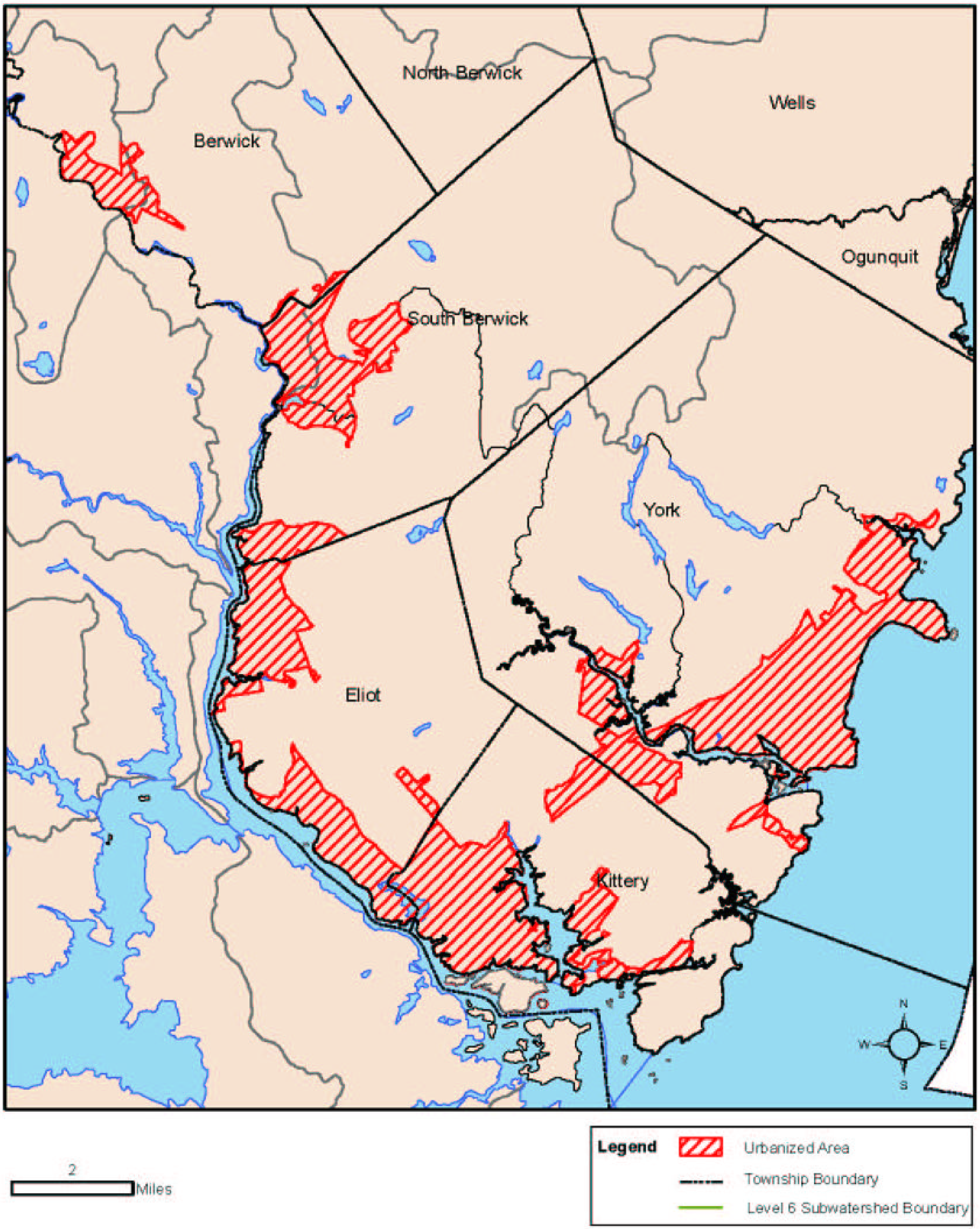
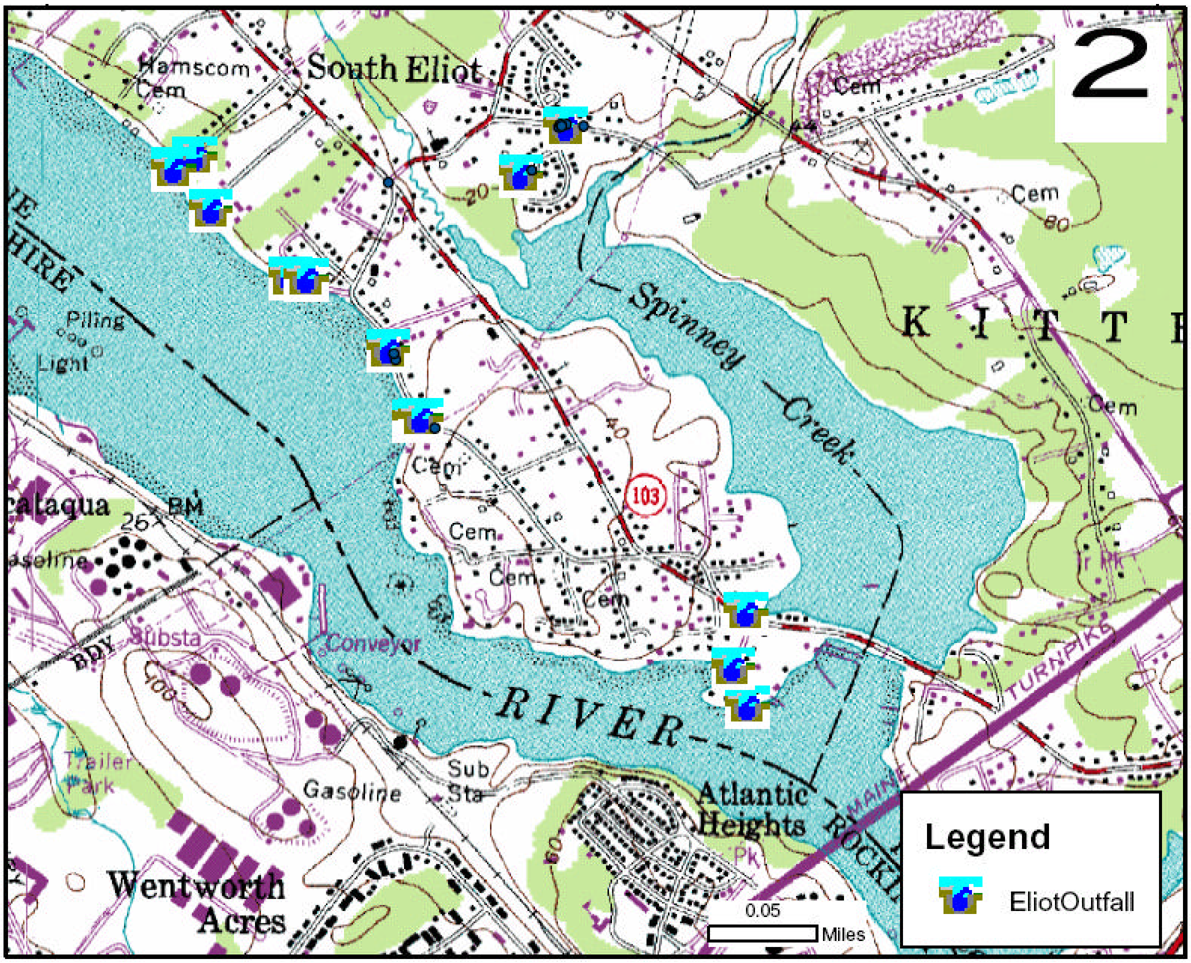


Figure 2-3
GIS MAP AND ATTRIBUTE TABLE SOUTH ELIOT STORM DRAIN OUTFALLS



FID	Shape*	OUTFALL_ID	Diameter	Material	Date	Sediment	Discharge	Outfall_Co
0	Point	SWO_ 001	18	Precast Conc	12/16/2004	None	Heavy	Good
1	Point	SWO_ 002	8	can't determine	12/16/2004	Plugged	None	Poor
2	Point	SWO_ 003	12	CMP	12/16/2004	1/2 Full	None	Fair
3	Point	SWO_ 004	6	Other	12/16/2004	None	None	Good
4	Point	SWO_ 005	4	steel	12/16/2004	None	Moderate	Good
5	Point	SWO_ 006	16	CMP	12/16/2004	None	Moderate	Good
6	Point	SWO_ 007	6	Other	12/17/2004	1/2 Full	Moderate	Poor
7	Point	SWO_ 007A	100	Other	12/17/2004		Moderate	
8	Point	SWO_ 008	8	CMP	12/17/2004	other	None	Poor
9	Point	SWO_ 009	6	steel	12/17/2004	other	Trickle	Poor
10	Point	SWO_ 010	4	Other	12/17/2004	None	None	Good
11	Point	SWO_ 011	6	can't determine	12/17/2004	None	None	Good
12	Point	SWO_ 012	6	Other	12/17/2004	None	None	Excellent
13	Point	SWO_ 013	10	Other	12/17/2004	None	Trickle	Good
14	Point	SWO_ 014	24	CMP	12/17/2004	1/4 Full	Moderate	Fair
15	Point	SWO_ 015	6	steel	12/17/2004	None	None	Pipe Corrosion
16	Point	SWO_ 016	12	Other	12/17/2004	other	Trickle	Good
17	Point	SWO_ 017	12	Other	12/17/2004	None	None	Excellent

Figure 2-4
FLOW CHART TO SELECT TRACING TECHNIQUES

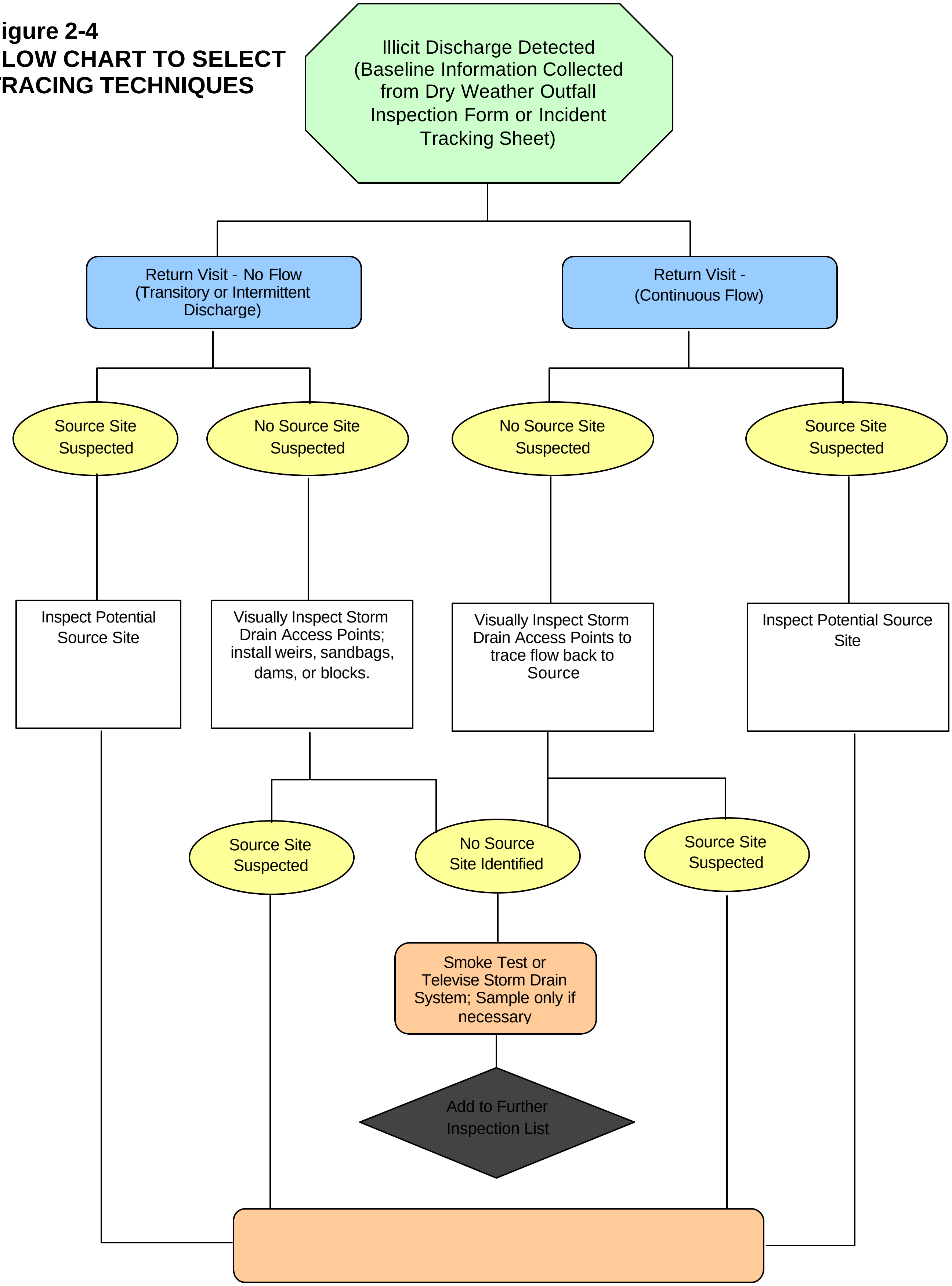


Figure 2-5
FLOW CHART METHOD OF INDICATOR MONITORING