Chapter 6 - Improper Disposal of Waste

The Improper Disposal of Waste Statewide Basic Requirement (SBR) focuses on the proper disposal of wastes such as pet waste, litter, leaves, and other yard wastes. When they are disposed of improperly, they become a significant source of stormwater pollution. The Best Management Practices (BMPs) discussed below, when implemented together, may significantly reduce the addition of nutrients, disease causing microorganisms (pathogens), solids and other pollutants to receiving waters in a cost-effective manner.

Most of the BMPs found in this section require the adoption and enforcement of a regulatory mechanism. The appropriate type of regulatory mechanism (for example a resolution, ordinance, or regulation) and enforcement method (for example, fines; student, employee, or military disciplinary action; ejection from the Public Complex) will depend on the Public Complex's enabling legislation and institutional structure and procedures, and on the type of person against whom enforcement action is taken (for example, employee, student, soldier, visitor). Example regulatory mechanisms for each BMP can be found in **Chapter 2 - Stormwater Pollution Prevention Plan and Example Forms**. These example regulatory mechanisms are to assist in developing your own regulatory mechanisms, and are based on enabling legislation for most New Jersey state colleges and universities. A Public Complex may change the example regulatory mechanisms to fit their individual needs, but should ensure that their change doesn't prevent the regulatory mechanism from meeting the permit minimum standard. If your Public Complex already has a regulatory mechanism in place that meets the requirements of the permit, a new or modified regulatory mechanism is not required. However, if the regulatory mechanism does not meet the minimum standard of the permit, then the regulatory mechanism has to be modified accordingly. Your legal counsel should review all regulatory mechanisms.

Pet Waste

WHAT IS REQUIRED?

You must clean up after your pet.

Minimum Standard

Public Complexes shall adopt and enforce an appropriate regulatory mechanism that requires pet owners or their keepers to immediately and properly dispose of their pet's solid waste deposited on property operated by the Public Complex or shall prohibit pets (other than disability assistance animals) from being allowed at the Public Complex.

Measurable Goal

Public Complexes shall certify annually that they have met the Pet Waste Control minimum standard.

Implementation Schedule

Within 18 months from the effective date of permit authorization, Public Complexes shall have fully implemented the Pet Waste Control minimum standard.

WHAT DOES THIS MEAN?

Public Complexes must adopt and enforce a regulatory mechanism to ensure that pet owners and keepers (walkers or pet sitters) immediately and properly dispose of their pet's solid waste deposited on property operated by the Public Complex. This means that someone walking a pet needs to immediately pick up after the pet and properly dispose of the solid waste. They can do this by either flushing the pet waste or disposing of it in the trash. The Public Complex also has the option of prohibiting pets, other than disability assistance animals, from being allowed at the Public Complex at all.

Regulatory mechanisms and the threat of fines are often not enough to make people clean up after their pets. Therefore, it is important to educate the public about the regulatory mechanism and the environmental benefit on water quality. For a copy of the Pet Waste brochure, please refer to www.njstormwater.org.

WANT TO KNOW MORE?

Pet waste can be a significant source of organic pollutants and pathogens. When pet waste is left on yards, sidewalks and streets and is not properly disposed of, it can be carried into storm drains by rain during storm events. Most storm drains are not connected to sewage treatment plants, but drain directly to local water bodies. By controlling pet waste, pollutant loading entering these surface waters is reduced. Such pollutants include oxygen demanding substances, nitrogen and phosphorous, and pathogens. Pet waste uses up oxygen in the decay process, which in turn can harm aquatic animals and degrade overall water quality. Nitrogen and phosphorous are nutrients that can overstimulate weed and algal growth in slow moving water bodies and coastal waters. Pathogens in pet waste include protozoa, parasites and bacteria. It is estimated that about 95 percent of the fecal coliform in urban stormwater are of non-human origin. A Seattle study showed that leaking sewer lines were initially suspected but "animals, particularly household pets, were the culprits." In addition, "it has been estimated that for watersheds of up to 20 square miles draining to small coastal bay, 2-3 days of droppings from a population of about 100 dogs would contribute enough bacteria and nutrients to temporarily close a bay to swimming and shellfishing." [1, 2, 3] As a result of the impact of animal waste on water quality, regulatory mechanisms requiring pet owners and keepers to immediately clean up after their pets, makes simple environmental sense.

Recommendations

To make your pet waste regulatory mechanism more effective, the following recommendations have been provided by the Department. These recommendations may be beneficial, but are not required by the permit.

- Provide pet waste stations with pet waste removal bags and dedicated trash cans.
- Place educational posters about pet waste in highly traveled corridors or buildings.

References

1. Alderserio, K.D. Wait and M. Sobsey. 1996. Detection and characterization of male-specific RNA coliphages in a New York City reservoir to distinguish between human and non-human sources of contamination. In *Proceedings of a Symposium on New York City Water Supply Studies,* ed. Mcdonnell et al. TPS-96-2. American Resources Association. Herndon, VA.
2. Trial, W. et al. 1993. Bacterial source tracking: studies in an urban Seattle watershed. *Puget Sound Notes* 30:1-3.
3. USEPA. 1993. Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

Litter

WHAT IS REQUIRED?

Minimum Standard

Public Complexes shall adopt and enforce an appropriate regulatory mechanism regarding the control of litter or enforce the existing State litter statute (N.J.S.A. 13:1E-99.3).

Measurable Goal

Public Complexes shall certify annually that they have met the Litter Control minimum standard.

Implementation Schedule

Within 18 months from the effective date of permit authorization, Public Complexes shall have fully implemented the Litter Control minimum standard.

Litter on our streets ends up as litter on our beaches.

WHAT DOES THIS MEAN?

Public Complexes must either adopt and enforce their own litter regulatory mechanism, or enforce the State litter statute, to help prevent the discharge of litter such as fast food wrappers, soda cans and bottles, and other trash into MS4s. (Only the State or a municipality may institute proceedings to enforce the State litter statute.) This SBR applies only to littering on property operated by the Public Complex.

WANT TO KNOW MORE?

Litter is a significant pollutant, especially in urban areas where large volumes of trash are generated. "Litter," as defined in N.J.S.A. 13:1E-215, "means any used or unconsumed substance or waste material which has been discarded, whether made of aluminum, glass, plastic, rubber, paper, or other natural or synthetic material, or any combination thereof, including, but not limited to, any bottle, jar, or any top, cap or detachable tab of any bottle, jar or can, any unlighted cigarette, cigar, match or any flaming or glowing material or any garbage, trash, refuse, debris, rubbish, grass clippings, or other lawn or garden waste, newspapers, magazines, glass, metal, plastic or paper containers or other packaging or construction material, but does not include the waste of the primary processes of mining or other extraction processes, logging, sawmilling, farming or manufacturing."

Litter is a serious problem in many states, but even more so in a state as densely populated and heavily traveled as New Jersey. It is the Department's duty to promote and encourage a clean and safe environment for future generations. Litter not only poses a threat to public health and safety, but also plays a large role in a Public Complex's aesthetic appearance, which in turn can play a part in the economics and image of that Public Complex. An attractive community creates an environment in which people will want to live, work and visit, and encourages companies considering relocation.

Waterfowl trapped in a six-pack ring. Photo: Bill Burton

Littering can significantly impact receiving waters. Litter, such as fast food wrappers, soda cans and bottles, and other trash, if not properly disposed, could eventually end up in our lakes, streams, and oceans. When litter reaches these surface water bodies, it not only causes problems aesthetically, but it can also have a negative impact on marine and other wildlife. For example, birds can easily become stuck in plastic 6-pack rings, marine mammals and sea turtles often choke on plastic bags that they mistake for jellyfish, and many sharks have been found with aluminum cans in their digestive systems. Issuing and actively enforcing litter regulatory mechanisms or the State litter statute is a cost effective means of preventing litter and floatables from reaching waters of the State.

Recommendations

The following recommendations are provided by the Department to help make your stormwater program more successful, but are not required by the permit.

- Put additional "No Litter" signs and additional trash receptacles, recycling containers, and cigarette butt containers at places where trash is likely to accumulate, like common areas and along busy streets and empty such receptacles on a regular basis.
- Develop and conduct an Annual Litter March, or similar activity, where users, residents and/or employees clean up the community within their Public Complex. Target those areas where there is a lot of litter. These activities could be coordinated with other public education activities (e.g., storm drain inlet labeling).
- Retrofit existing storm drain inlets to meet the standard contained in Attachment C earlier than required by the permit (rather than waiting until repaving or other projects).

Improper Disposal of Waste

WHAT IS REQUIRED?

Minimum Standard

Public Complexes shall adopt and enforce an appropriate regulatory mechanism prohibiting the Public Complex users and the Public Complexes employees from the improper spilling, dumping, or disposal of materials other than stormwater into the Public Complex's small MS4 (excluding those authorized in Part I, Section A.2.d). If the Public Complex observes someone other than a Public Complex user or employee violating the regulatory mechanism, the Public Complex shall report the incident to the Department's Action Hotline (877-WARNDEP).

Measurable Goal

Public Complexes shall certify annually that they have met the Improper Waste Disposal Control minimum standard.

Implementation

Within 18 months from the effective date of permit authorization, Public Complexes shall have fully implemented the Improper Disposal of Waste Control minimum standard.

WHAT DOES THIS MEAN?

This BMP requires the Public Complex, through a regulatory mechanism, to prohibit the Public Complex users and employees, while on Public Complex property, from spilling, dumping, or disposal of materials other than stormwater into the municipal separate storm sewer system (MS4). This includes materials like automotive fluids, used motor oil, paints and solvents that can have a direct impact on receiving water bodies. The BMP also requires the Public Complex to actively enforce the regulatory mechanism, which includes taking appropriate action when someone is found violating the regulatory mechanism.

A single quart of motor oil can pollute 250,000 gallons of drinking water.

This permit does allow the following new and existing nonstormwater discharges from the MS4:

- water line flushing and discharges from potable water sources;
- uncontaminated ground water (e.g., infiltration, crawl spaces or basement sump pumps, foundation or footing drains, rising ground waters);
- air conditioning condensate (excluding contact and non-contact cooling water);
- irrigation water (including landscape and lawn watering runoff);
- flows from springs, riparian habitats and wetlands, water reservoir discharges and diverted stream flows;
- residential car washing water, and residential swimming pool discharges;
- sidewalk, driveway and street wash water;
- flows from fire fighting activities;
- Flows from rinsing of the following equipment with clean water:
  - Beach maintenance equipment immediately following their use for their intended purposes; and
  - Equipment used in the application of salt and de-icing materials immediately following salt and de-icing material applications. Prior to rinsing with clean water, all residual salt and de-icing materials must be removed from equipment and vehicles to the maximum extent practicable using dry cleaning methods (e.g., shoveling and sweeping). Recovered materials are to be returned to storage for reuse or properly discarded.

  Rinsing of equipment in the above situations is limited to exterior, undercarriage, and exposed parts and does not apply to engines or other enclosed machinery.

WANT TO KNOW MORE?

The improper disposal of pollutants can have a negative effect on surface and ground water quality. Failure to properly dispose of materials like automotive fluids, motor oil, lawn and garden supplies, household cleaning supplies, paints and solvents, can have a direct impact on receiving waterbody quality. Each year nearly 180 million gallons of used oil is disposed of improperly. It is estimated that a single quart of motor oil can pollute 250,000 gallons of drinking water.

Uninformed users and employees may dump materials that are hazardous to human heath and/or the environment, such as cleaning supplies, lawn and garden care products, motor oil, paints, etc., onto streets, sidewalks, roadways, onto the ground, or down storm sewers, unintentionally causing the pollutants to enter surface and/or ground waters. Most illegal disposal occurs because people are unaware that it causes an environmental problem or that it is actually illegal. A smaller percentage of these occurrences are deliberate acts. The proper disposal of these wastes may be as simple as disposing of it with other trash. However, a better option may be to recycle or reuse these materials. Motor oil, oil filters, and automotive batteries are just a few examples of hazardous materials that can be recycled and reused. The threat they pose to the environment, as well as human health, can be greatly reduced when these materials are recycled and reused instead of being dumped down storm sewers or onto the ground.

For more information on the improper disposal of wastes please see the Local Public Education BMP, "Want to know more?" section in Chapter 5 of this guidance manual.

Recommendations

The following recommendations may be beneficial, but are not required by the permit.

- Establish a hotline for reporting the improper disposal of waste. A hotline or dedicated telephone number makes it easier to report illegal disposal
- Appropriate personnel (operators, police, fire, ER) should have emergency phone numbers such as the Municipal and/or County Office of Emergency Management and the NJDEP Action Hotline (1-877-WARN-DEP)

Wildlife Feeding

WHAT IS REQUIRED?

Minimum Standard

Public Complexes shall adopt and enforce an appropriate regulatory mechanism that prohibits the feeding at the Public Complex of any wildlife (excluding confined animals, for example wildlife confined in zoos, parks, or rehabilitation centers or as part of academic research or unconfined wildlife at environmental education centers).

Measurable Goal

Public Complexes shall certify annually that they have met the Wildlife Feeding Control minimum standard.

Implementation Schedule

Within 18 months from the effective date of permit authorization, Public Complexes shall have fully implemented the Wildlife Feeding Control minimum standard.

WHAT DOES THIS MEAN?

Public Complexes must adopt and enforce a wildlife feeding regulatory mechanism to prohibit the feeding of wildlife at the Public Complex. This prohibition helps prevent nutrients, organic pollutants, and pathogens associated with wildlife fecal matter from entering local water bodies, as well as preventing overgrazing, which can lead to erosion. The Public Complex may allow the feeding of any confined animal such as wildlife confined in zoos and petting zoos, parks, or rehabilitation centers. It is important to note that while most people understand "wildlife" to mean waterfowl, "wildlife" also includes other wild animals, like bears, deer and pigeons. The Public Complex may allow baiting of wildlife for the purposes of hunting and fishing if done in accordance with New Jersey Fish and Game regulations.

WANT TO KNOW MORE?

Many people enjoy feeding waterfowl and other wildlife. For them, it provides an escape from their everyday life and work, it gives them a sense of pleasure and fulfillment to help the animals, and it brings the wildlife closer so that their children can see them. What these people don't realize is that they are actually harming the very animals they are trying to help. Feeding wildlife can actually do more harm than good to both the animal and its habitat, and can also be harmful to people. Artificial feeding can for example result in poor nutrition, delayed migration, spread of disease, overcrowding, unnatural behavior, water pollution, and aggressive behavior.

Feeding attracts wildlife in unnatural numbers, beyond natural food and water supplies, and frequently in numbers beyond which people will tolerate. This overcrowding often results in over-grazing which can lead to erosion, which can result in excess amounts of sediment getting into our waters. These areas can quickly become unsanitary and unusable to people, and a breeding ground for wildlife disease. While these diseases are generally not transmissible in wild settings, they thrive in overcrowded and unsanitary conditions where the wildlife is eating in the same place where they defecate. Many beach closings have also been attributed to geese and other birds. When an excessive number of birds congregate near a beach or waterway, their fecal matter can sometimes overload the normal capacity of a beach to absorb natural wastes, thus degrading the water quality and requiring the area to be closed to the public. In addition to this, where birds congregate to feed, E-coli counts can swell to levels that make the water unsuitable for swimming.

Excess nutrients in ponds and other waterways caused by unnatural numbers of waterfowl and other wildlife droppings can result in water-quality problems such as summer algal blooms. These problems are directly related to a loss of habitat and wildlife, including fish kills, as well as odor nuisances, taste and odor in drinking water, and an interference with various forms of recreation (e.g., fishing, swimming, boating, etc.).

There are many other options and alternatives to feeding wildlife. If everyone stops feeding wildlife, the wildlife will not disappear. Families can still visit sites to enjoy viewing the animals. Children can still be encouraged to learn about wildlife and their natural habitats. Additionally, some zoos offer feeding of captive wildlife.

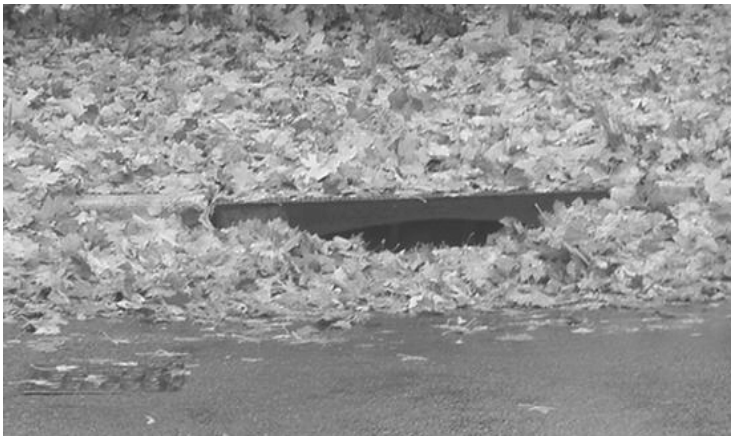
Vegetative Waste

WHAT IS REQUIRED?

Minimum Standard

Public Complexes must develop, when applicable, a vegetative waste collection and disposal program to ensure the proper pickup, handling, storage and disposal of vegetative wastes generated at the Public Complex. Vegetative waste shall be managed to minimize the impact of those activities on stormwater discharge quality.

Where residences are located within the Public Complex, yard waste pickups shall be performed monthly from October through December, once in the spring ("spring clean-up"), and on an "as needed" basis for the rest of the year. The frequency of the "as needed" pickups shall be determined at the discretion of the Public Complex. Any area, which the Public Complex determines to have no yard waste, will be exempt from the collections. All yard wastes may be placed at the curb no sooner than seven (7) days prior to the collection and can be placed no closer than 10 feet from any storm sewer inlet along the street, unless they are bagged or otherwise containerized.



Leaves raked to the curb get washed into storm sewers and receiving streams, adding to maintenance costs and water pollution.

Measurable Goal

Public Complexes shall certify annually that they have met the Vegetative Waste minimum standard.

Implementation Schedule

Within 12 months of the effective date of permit authorization, Public Complexes shall have developed and begun implementing the Vegetative Waste minimum standard.

WHAT DOES THIS MEAN?

Defining "Vegetative Waste" and "Yard Waste"

For purposes of the Public Complex Permit, the Department considers "vegetative waste" and "yard waste" to mean "leaves and grass clippings." Public Complexes have the discretion as to whether they will also consider any kind of brush or other plant materials to be "vegetative waste" or "yard waste."

Vegetative Waste Collection and Disposal Program

The Public Complex must develop and implement a vegetative waste collection and disposal program for all areas within the Public Complex that have vegetative waste. This program must comply with any applicable requirements of the State Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq., and the Department's implementing rules for that Act. Any questions about those requirements should be directed to the Department's Division of Solid and Hazardous Waste.

If the Public Complex contains homes where residents maintain yards, vegetative waste from those yards must be collected once a month from October through December, and once again in the spring. If the Public Complex determines that additional yard waste collections are necessary, they should be done on an "as needed" basis. Public Complexes are to prohibit all yard waste from being placed at the curb or along the street no sooner than seven (7) days prior to the scheduled collection

date and placed no closer than 10 feet from any storm sewer inlet. In order to comply with this prohibition, residents maintaining yards will need to be regularly notified of scheduled collections. If the Public Complex, as a result of an extenuating circumstance, does not perform the collection as scheduled resulting in yard waste being at the curb longer than seven (7) days, the residents would not be in violation of the prohibition. If there are any areas within your Public Complex that do not have yard wastes, they are exempted from these collections.

WANT TO KNOW MORE?

Regular vegetative waste collections help to ensure that the wastes do not end up in our storm sewers or water bodies. When leaves are placed at the curb and are carried away by stormwater, they can have several detrimental effects on the surrounding community and environment. Excess leaves and grass clippings can clog stormwater systems, causing flooding and requiring additional maintenance at the Public Complex's expense. If yard wastes enter local waterways, they remove oxygen from the water during the decomposition process and lead to increased nutrients, which cause excessive plant and algal growth.

However, yard wastes also don't belong in landfills. During the summer, grass clippings can make up to 50 percent of waste, and in the fall leaves can account for 60 percent to 80 percent of waste. To minimize the amount of yard waste in landfills, it is important that homeowners know proper alternatives to traditional disposal like mulching and composting.

Leaves and grass clippings are a valuable resource. Yard wastes can be recycled by both the Public Complex and by the individual homeowner. On-site composting, as well as "grasscycling," treats organic materials as a valuable resource, thus diverting them from disposal and reducing the environmental problems associated with landfills. On-site composting and grasscycling produces valuable soil amendments that can be used on site. It can also inoculate the soil with beneficial microbes that can extract nutrients from the soil and pass them on to the plants, therefore reducing the need for chemical fertilization. Grass clippings and leaves can be recycled directly on the lawn or by composting or mulching. When grass clippings are left on the lawn they can act as fertilizer by breaking down quickly and releasing nutrients into the soil. Leaves can have a similar effect on lawns, but will take a longer time to decompose unless they are shredded first. If the leaves are composted, they can have several other benefits to the soil, such as adding organic matter, which improves the way in which water interacts with the soil. For instance, if it is mixed with a sandy soil it will act as a sponge and retain the water, and if it is mixed with a clay soil it will add porosity and make the soil drain more quickly.

Recommendations

The following are recommendations that may be beneficial, but are not required by the permit.

- Provide for composting/mulching at recycling facilities designed and operated in compliance with Department rules for such facilities.
- Provide containers with lids to residents within the Public Complex labeled vegetative waste.

Illicit Connection Elimination and MS4 Outfall Pipe Mapping

WHAT IS REQUIRED?

Minimum Standards

i. Storm Sewer Outfall Pipe Mapping – Public Complexes must develop a map showing the location of the end of all MS4 outfall pipes that are operated by the Public Complex, and that discharge within the Public Complex's jurisdiction to a surface water body (e.g., a lake, ocean, or stream including an intermittent stream). This map shall also show the location (and name, where known to the Public Complex) of all surface water bodies receiving discharges from those outfall pipes. Each outfall pipe mapped shall be given an individual alphanumeric identifier, which shall be noted on the map. The outfall pipes shall be mapped on either a tax map prepared in accordance with Title 18, Chapter 23A of the New Jersey Administrative Code or on another map drawn to equal or larger (more detailed) scale. The Public Complex shall submit a copy of its outfall pipe map to the Department upon request.

Public Complexes must perform a visual inspection of each outfall pipe operated by the Public Complex. Dry weather flows must be investigated further.

Prohibiting Illicit Connections - Each Public Complex shall, to the extent allowable under law, effectively prohibit through an appropriate regulatory mechanism, illicit connections to the Public Complex's small MS4, and implement appropriate enforcement procedures and actions.

ii. Illicit Connection Elimination Program - Each Public Complex shall, to the extent allowable under law, develop and implement a program to detect and eliminate illicit connections into the Public Complex's small MS4. The program, at minimum, must include an initial physical inspection of all its outfall pipes. All outfall pipes that are found to have dry weather flow are to be further investigated.

The inspections of outfall pipes and investigations of dry weather flows are to be conducted in accordance with the procedures for detecting, investigating, and eliminating illicit connections contained in Attachment B of the permit. Results of the inspections of outfall pipes and dry weather flows are to be recorded on the Department's Illicit Connection Inspection Report form contained in the Department's "Public Complex General Permit Guidance Document". Inspection reports for dry weather flows discovered as a result of initial physical inspections or as part of the ongoing program must be submitted to the Department with the annual certification. If the dry weather flow is intermittent the Public Complex must perform, at minimum, three (3) additional investigations in an attempt to locate the illicit connection. If an

illicit connection cannot be located or is found to emanate from an entity other than the Public Complex then the Public Complex must submit to the Department a written explanation detailing the results of the investigation. If the illicit connection is found to be from another public entity, the Public Complex shall also notify that entity. All illicit connections found that result from the Public Complex's own illicit connections must be eliminated within six (6) months of the discovery.

After the completion of the initial physical inspection of all outfall pipes, Public Complexes must maintain an ongoing program to detect and eliminate illicit connections. The ongoing program will respond to complaints and reports of illicit connections, including those from operating entities of interconnected small MS4s, and continue to investigate dry weather flows discovered during routine inspections and maintenance of the small MS4.

Measurable Goal

i. Public Complexes shall certify annually that an outfall pipe map has been completed or is being prepared in accordance with permit conditions and shall report the number of outfall pipes mapped within the year being reported and the total number of outfall pipes mapped to date.

ii. Public Complexes shall submit an annual certification to the Department certifying that an appropriate regulatory mechanism is in place prohibiting illicit connections and is being actively enforced.

iii. Public Complexes shall certify annually that an illicit connection elimination program has been developed in accordance with permit conditions to detect and eliminate illicit connections into the Public Complexes' small MS4. Annual certifications shall also include the number of outfalls physically inspected, the number of outfalls found to have dry weather flow, the number of illicit connections found and the number of illicit connections eliminated. Copies of inspection reports shall be submitted with the annual certification for those outfalls found to have dry weather flow.

Implementation Schedule

i. Storm Sewer Outfall Pipe Mapping – Public Complexes shall divide the Public Complex into two (2) sectors for the purposes of outfall mapping. A diagram of the Public Complex showing the two (2) sectors shall be part of the Public Complex's SPPP. Public Complexes shall map the location of the end of small MS4 outfall pipes in one sector 36 months from the EDPA; and map the location of the end of all small MS4 outfall pipes on or before 60 months from the EDPA.

ii. Prohibiting Illicit Connections - Within 18 months from the effective date of permit authorization, Public Complexes shall effectively prohibit through an appropriate regulatory mechanism, illicit connections to the Public Complex's small MS4, and implement appropriate enforcement procedures and actions in accordance with the minimum standard.

iii. Illicit Connection Elimination Program - Within 18 months from the effective date of permit authorization, Public Complexes shall have developed and begun implementing a program to detect and eliminate illicit connections into the Public Complex's small MS4 in accordance with the minimum standard. Public Complexes shall perform an initial physical inspection of all outfall pipes using the Department's Illicit Connection Inspection Report form within 60 months from the EDPA.

WHAT DOES THIS MEAN?

Public Complexes are required to develop and maintain an ongoing program to detect and eliminate illicit connections. The first step in this program is to develop an outfall pipe map, showing the location of the end of all MS4 outfall pipes that are operated by the Public Complex and that discharge to surface water. If any outfalls are found to have a dry weather flow, they must be further investigated. If they are found to have an illicit connection, the illicit connection must be eliminated (or reported to the Department if the illicit connection is found to emanate from an entity other than the Public Complex). A regulatory mechanism prohibiting illicit connections shall be adopted and enforced. Finally, an annual report shall be submitted to the Department certifying that the map is being prepared, or has been completed according to the schedule set in the permit, that the illicit connection elimination program has been developed and is being implemented, and that the regulatory mechanism prohibiting illicit connections is in place and is being enforced. Additionally, the Public Complex is required to fill out an Illicit Connection Inspection Report Form for each outfall inspected. For outfalls that are found to have dry weather flows, these forms must be submitted to the Department with the annual report. A copy of this form can be found in Chapter 12 of this document.

(**Important Note:** The Public Complex is not required to map its entire municipal separate storm sewer system, just the ends of the outfall pipes. In addition, the Public Complex is not required to map outfall pipes that are operated by another entity (e.g., NJDOT or other State agency, municipality, county, another Public Complex, private entity, etc.).

WANT TO KNOW MORE?

An "illicit connection," as described in Attachment B in the permit, means any physical or non-physical connection that discharges the following to the Public Complex's small MS4, unless that discharge is authorized under a New Jersey Pollutant Discharge Elimination System (NJPDES) permit other than the Public Complex Permit (non-physical connections may include, but are not limited to, leaks, flows, or overflows into the municipal separate storm sewer system):

- Domestic sewage
- Non-contact cooling water, process wastewater, or other industrial waste (other than stormwater); or
- Any category of non-stormwater discharges that the Public Complex identifies as a source or significant contributor of pollutants pursuant to 40 C.F.R. 122.34(b)(3)(iii).

Illicit connections of non-stormwater discharges have been shown to contribute substantial levels of contaminants to surface water bodies. These illicit connections may originate from sources such as improperly connected sanitary sewage lines, industrial flows and from leaking or overflowing sanitary sewer lines and pumping stations. The first step in implementing an illicit connection elimination program is to identify and map stormwater outfall pipes.

It is widely felt that any in-roads made in eliminating the large number of inappropriate entries into storm sewer systems will further enhance conventional pollution control programs. Secondary treatment of sanitary sewage is standard throughout the country, yet these efforts in upgrading treatment are undercut by untreated sanitary wastes being discharged via illicit connections from our MS4 systems.

Types of pollutants discharged via illicit connections vary widely and can originate from a myriad of sources. Illicit discharges may include; sanitary sewage, cooling water, industrial flows, and wash water and can contribute pollutants such as pathogens, nutrients, metals, petroleum hydrocarbons,

detergents, chlorine, organics and heat. All of these pollutants can cause an adverse effect on receiving waters and contribute substantial levels of contaminants.

Procedures for Detecting, Investigating, and Eliminating Illicit Connections

Requirements for these procedures can be found in Attachment B of the permit. This section may include some of these requirements, but also includes recommendations provided by the Department that are not required by the permit.

Detection

MS4 outfall pipes, for the most part, should not be discharging during substantial dry periods (72 hours after a rain event). Such flow is frequently referred to as "dry weather flow," which may be the result of an illicit connection. All dry weather flows are generally non-stormwater discharges, however not all dry weather flows are illicit connections. Some non-stormwater flows result from the improper disposal of waste (e.g., radiator flushing, engine degreasing, improper disposal of oil) and some may be the result of allowable discharges such as residential car washing, irrigation runoff, permitted (NJPDES) discharges and natural waters (spring water and groundwater infiltration). By using the Department's Illicit Connection Inspection Report form[1] and making physical observations, a Public Complex will compile information that will help determine if the dry weather flow is an illicit connection and the most likely source of the illicit connection. After making these physical observations, additional chemical field-testing will enable a Public Complex to further narrow the potential source(s) of the illicit connection.

Physical observations of the discharge for turbidity, staining, odor, and color can help determine the source of the illicit connection.

The first physical observation is to observe if there is a dry weather flow. Some dry weather discharges are continuously flowing and some are intermittent. Observations will allow the Public Complex to establish with reasonable certainty if there is an intermittent flow. If there are indications of intermittent flows (staining, odors and deterioration of outfall structure) follow-up investigations are required (see Investigation section). An estimate of the flow rate of the discharge should also be noted (e.g., flow rate can sometimes be estimated by various methods, including timing how long it takes to fill a container of a known size). Additional physical observations and measurements should be made for odor, color, turbidity, floatable matter, temperature, deposits and stains, vegetation and algal growth and condition of outfall structure (see Illicit Connection Inspection Report form). Information compiled from physical observations and field monitoring should be used to help identify potential sources. These observations are very important since they are the simplest method of identifying grossly contaminated dry weather flows. If physical observations alone are sufficient to warrant further investigation, then field testing is not required.

[1] A copy of this form can be found in Chapter 12 of this document

If a dry weather flow exists, and after making all physical observations (unless physical observations are enough to warrant further investigation), the flow should be tested for detergents (surfactants as methylene blue active substances (MBAS). Results of monitoring for detergents, using a testing procedure with a detection limit of 0.06 mg/L, can accurately distinguish between discharges that are contaminated by sanitary wastewater and those that are not. Dry weather flows that contain detergents in excess of the detection limit require further investigation and should be given the highest priority. Dry weather flows that do not test positive for detergents and do not show physical characteristics of sanitary wastewater (odor, floatables, and/or color) are unlikely to be from sanitary wastewater sources, yet they may still be illicit connections of industrial wastewater, rinse water, backwash, or cooling water.

Non-stormwater discharges that are detergent-free, and therefore not sanitary, should be tested for fluoride. Fluoride concentration is a reliable indicator of whether the non-stormwater flow is from a potable or non-potable water source. Fluoride treated potable waters usually have concentrations of total fluoride in the range of 1.0 to 2.5 mg/L. Non-stormwater discharges that test below the detection limit for fluoride (0.13 mg/L using a Hach Colorimeter DR/850) are likely to be groundwater infiltration, springs or streams. In some instances a Public Complex may find a non-stormwater discharge that originates from an on-site well used for industrial cooling water which will test non-detect for both detergents and fluoride. Public Complexes will have to rely on temperature to differentiate between these cooling water discharges and ground water infiltration and other natural flows. Fluoride testing won't be able to pinpoint the source of the illicit connection, but is a helpful tool in further narrowing the search.

The ratio of ammonia (as N) to potassium can be used to help distinguish a sanitary wastewater source from a washwater source. Detergents will be present in both sanitary sewage and washwater. Generally the ammonia/potassium ratio of sanitary sewage will be greater than 0.60. Non-stormwater flows with an ammonia/potassium ratio less than 0.60 are likely to be a washwater source.

All of the tests recommended for the tracing of illicit connections may be performed in the field by employees of the Public Complex or may be contracted out. Lab certification for those parameters is **not** required. It is advised that the person taking the field sample be familiar and trained in appropriate field testing protocol and be familiar with the equipment to be used. Analysis for detergents (MBAS), fluoride, ammonia, and potassium may be conducted by using a field spectrophotometer produced by various lab instrument manufacturers. The spectrophotometers are accurate, easy to use with limited training and are designed to be used in the field. The flow chart on the following page (Figure 2) illustrates the recommended steps to use when identifying an illicit connection.

Investigation

Any storm sewer outfall pipe found during the initial inspection, or on any subsequent inspection to have a non-stormwater discharge, or indications of an intermittent non-stormwater discharge, requires further investigation by the Public Complex to identify and locate the specific source. Non-stormwater discharges suspected of being sanitary sewage and/or significantly contaminated should prioritize and investigated first. Dry weather flows believed to be an immediate threat to human health or the environment shall be reported immediately to the NJDEP Action Hotline at 1-877-WARNDEP (1-877-927-6337). Investigations of non-stormwater discharges suspected of being cooling water, washwater, or natural flows may be delayed until after all suspected sanitary sewage and/or significantly contaminated discharges have been investigated, eliminated and/or resolved.

Information compiled from physical observations and field monitoring should be used to help identify potential sources. These observations are very important since they are the simplest method of identifying grossly contaminated dry weather flows (see Figure 3).

The use of field testing further narrows the potential sources of the non-stormwater discharge. However, it is unlikely that either the physical observations or the field testing alone will pinpoint the exact source of the dry weather discharge. As a result, Public Complexes will need to perform investigations "upstream" (but not outside Public Complex property) to identify potential illicit connections to systems with identified problem outfalls.

Common approaches to identifying potential sources of illicit connections include drainage system surveys (field testing at upstream manholes, visual inspections, video/televised, smoke and dye testing), and industrial and commercial site assessments.

A drainage system survey may require that a Public Complex similarly inspect each stormsewer line that connects into the main storm drain trunk line much like the initial inspections performed on each outfall pipe. Physical observations and additional field testing will help locate the dry weather flow as you trace the source moving further and further up the storm sewer pipe. Depending on the size and complexity of the storm drain system, it may be possible to isolate smaller portions of the system for more intensive investigations including smoke tests, dye testing and televised inspections.

Information may be compiled from industrial and commercial facilities within the Public Complex by distributing or performing industrial inventories. Through inspections or facility self-inspections it may be possible to locate illicit connections at likely sources such as floor drains, wash bays, and cooling water systems.

Facilities may not be aware that these connections are illicit and may find these connections while completing the questionnaire and correct them on their own. Information from these surveys may also allow Public Complexes to eliminate certain industries as potential sources during an investigation.

All non-stormwater discharges, whether continuous or intermittent, must be investigated by the Public Complex. All investigations must be resolved. If the source is found to be a non-stormwater discharge authorized under Part I, Section A.2.d of the permit, then no further action is required. If a non-stormwater discharge is found but no source is located within six (6) months of beginning the investigation, then the Public Complex shall submit an Closeout Investigation Form to the address(es) listed on the form. The Public Complex must document that a good faith effort was made to find the source of the dry weather discharge and document each phase of the investigation. If the observed discharge is intermittent, the Public Complex must make and document a minimum of three (3) separate attempts to investigate the discharge when it is flowing. If these attempts are unsuccessful, the Public Complex shall submit the Closeout Investigation Form with the Annual Report and Certification (see Chapter 12). However, since this is an ongoing program, Public Complexes should periodically recheck these suspected intermittent discharges.

Elimination

Non-stormwater discharges traced to their source and found to be the Public Complex's own illicit connections shall be eliminated within six (6) months of the discovery. The Public Complex may apply for a NJPDES permit for the discharge, but the discharge shall be ceased until a valid NJPDES permit has been issued by the Department. Public Complexes are required to verify that the illicit discharge was eliminated within the specified timeframe and ensure that measures taken to

cease the discharge are permanent and are not done in such a manner that would allow easy reconnection to the MS4.

If an illicit connection cannot be located or is found to emanate from an entity other than the Public Complex, then the Public Complex must submit to the Department a written explanation detailing the results of the investigation. If the illicit connection is found to be from another public entity, the Public Complex shall also notify that entity.

Mapping and Illicit Connection Program Recommendations

The following recommendations may be beneficial, but are not required by the permit.

- To help reduce costs, when mapping your outfall pipes, look for signs of outfall pipe stream scouring (see Outfall Pipe Stream Scouring Remediation BMP in Chapter 7 of this guidance document), and complete your Illicit Connection Report form. This will ensure that you do not have to make multiple visits to the same outfall pipes.
- Map your entire MS4 system in addition to the required maps. An accurate map of the entire storm sewer system will aid in the investigation and elimination of illicit connections and allow for better stormwater facilities management and better planning of new development.
- If the entire storm sewer system is mapped, indicate on the map primary uses and development in areas within the system (e.g., residential, industrial, commercial, farm/agriculture).
- Use the most accurate methods feasible for locating the end of the outfall pipe, including Global Positioning System technology.
- In tidal areas, mapping field work should coincide with low tide to help ensure that outfall pipes are visible.
- Aerial, infrared and thermal photography may be helpful in identifying suspect discharges.
- Support and sponsor stream or shoreline walks by environmental groups, watershed associations and civic groups to assist in identifying suspect discharges.
- Conduct routine dye testing of industries and commercial establishments that have a greater probability of illicit connections (automobile-related businesses, restaurants).

References:

USEPA, Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems, January 1993.

USEPA, National Menu of Best Management Practices for Storm Water Phase II, last modified May 31, 2001.

Pitt, Robert, Illicit Discharge and Elimination, Presentation at the USEPA *National Storm Water Coordinator's Meeting*, Orlando, 2001.

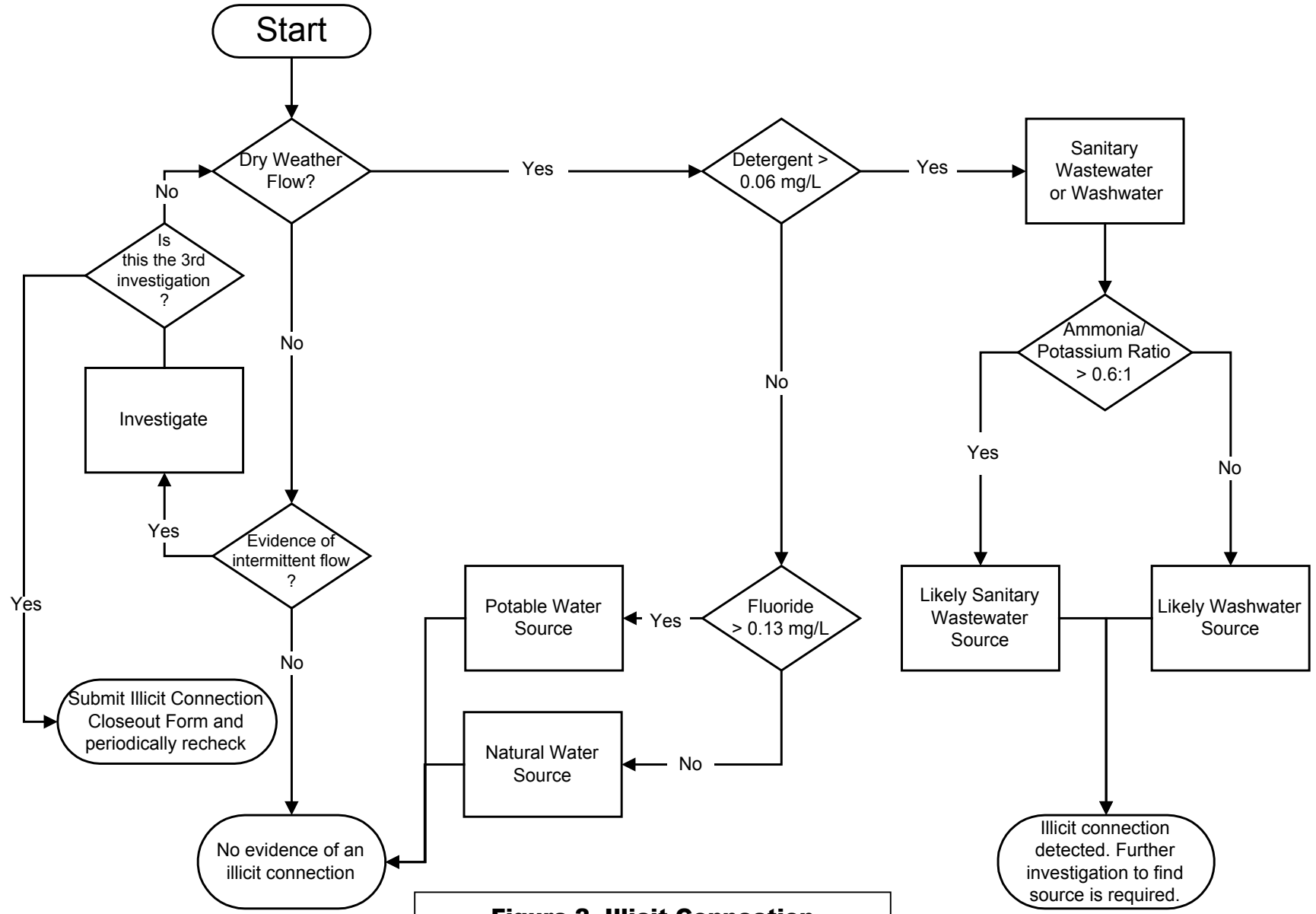


Figure 2. Illicit Connection Investigation Flow Chart

Interpretations of Physical Observations and Likely Associated Sources

Odor	*Sewage:* smell associated with stale/septic sanitary wastewater. *Sulfur ("rotten eggs"):* industries that discharge sulfide compounds or organics (meat packers, canneries, dairies, etc.). *Oil and gas:* petroleum refineries or many facilities associated with vehicle maintenance or petroleum product storage. *Rancid-sour:* food preparation facilities (restaurants, hotels, etc.).
Color	Important indicator of inappropriate industrial sources. Industrial dry weather discharges may be of any color, but dark colors, such as brown, gray, or black, are most common. *Yellow:* chemical plants, textile and tanning plants. *Brown:* meat packers, printing plants, metal works, stone and concrete, fertilizers, and petroleum refining facilities. *Red:* meat packers. *Gray:* dairies, sewage.
Turbidity	Often affected by the degree of gross contamination. Dry weather industrial flows with moderate turbidity can be cloudy, while highly turbid flows can be opaque. High turbidity is often a characteristic of undiluted dry weather industrial discharges. *Cloudy:* sanitary wastewater, concrete or stone operations, fertilizer facilities, and automotive dealers. *Opaque:* food processors, lumber mills, metal operations, pigment plants.
Floatable Matter	A contaminated flow may contain floating solids or liquids directly related to industrial or sanitary wastewater pollution. Floatables of industrial origin may include animal fats, spoiled foods, solvents, sawdust, foams, packing materials, or fuel. Floatables in sanitary wastewater include fecal matter, toilet paper, sanitary napkins and condoms.
Deposits and Stains	Deposits and stains on outfall structures may be evidence of intermittent non-stormwater discharges. Deposits and stains include coatings, residues or fragments of materials. Grayish- black deposits that contain animal flesh or hair may be from leather tanneries. White crystalline powder is usually due to nitrogenous fertilizer wastes. Excessive sediment deposits may be attributed to construction site erosion. Sources of oily residues may include petroleum refineries, storage facilities, and/or vehicle service facilities.
Vegetation	Vegetation surrounding an outfall may show the effects of industrial pollutants. Decaying organic materials coming from food processors may cause increased vegetation growth. Other toxic materials from industrial discharges may decrease or kill vegetation. Non-stormwater discharges that contain excessive nutrients from concentrated animal feeding activities may also kill vegetation.
Damage to Outfall Structures	Cracking, deterioration, and scouring of concrete or peeling of paint at an outfall pipe may be caused by severely contaminated industrial discharges that are extremely acid or basic. Primary metal industries may discharge highly acidic batch dumps. Food processors with discharges that become "septic" produce hydrogen sulfide gas, which quickly deteriorates metal surfaces.
Temperature	Both sanitary wastewater and cooling water may substantially increase the outfall discharge temperature. Elevated temperature measurements in discharges that test negative for detergents are likely to be cooling water discharges. Sources of cooling water discharges would be industrial facilities in the drainage area.

Figure 3