

# First Flush Stormwater Impacts in Coastal New Jersey

## A Cape May County and Cape May Point, New Jersey Perspective

### 1. Introduction: What is the 'first flush'?

The term first flush refers to the initial surge of stormwater runoff at the beginning of a rain event. During dry weather, pollutants build up on roads, roofs, parking areas, sidewalks, and lawns. When rainfall begins, that stored material is washed off quickly and delivered to catch basins, storm drains, and nearby waters. In practice, the opening portion of the storm often carries a disproportionate share of sediment, nutrients, bacteria, oils, trash, and other contaminants.

For coastal New Jersey communities, this matters because stormwater often moves rapidly across paved surfaces and into receiving waters with little or no treatment. NJDEP materials describe stormwater runoff as a major water-quality concern and the State's stormwater rules are intended, in part, to minimize pollutants in runoff and protect the chemical, physical, and biological integrity of waters.

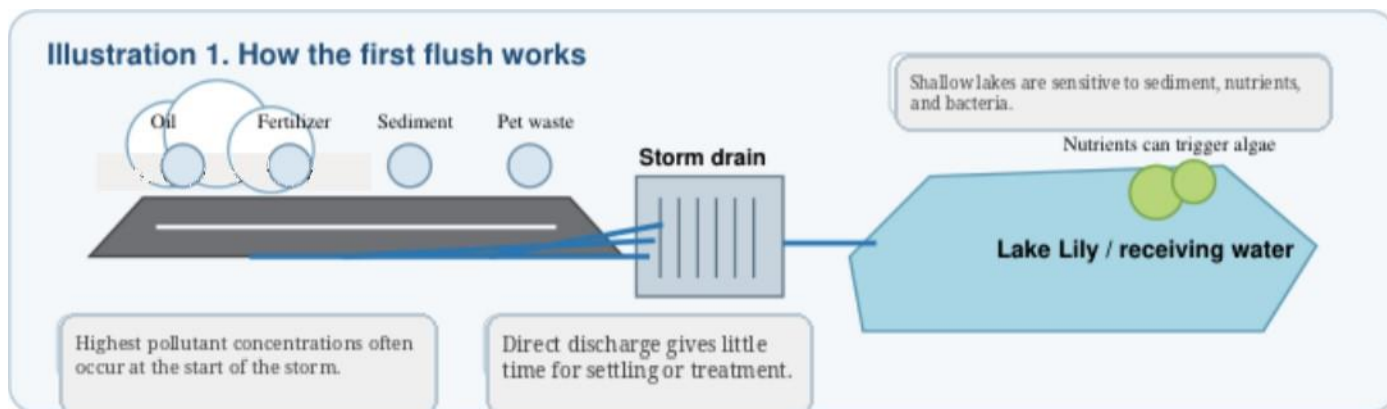


Figure note: the first flush is not a separate pipe or device. It is the pollutant-rich leading portion of runoff that occurs after pollutants have accumulated between storms.

### 2. Problems caused by the first flush

**Water-quality degradation.** The first flush can carry the highest concentrations of nutrients such as nitrogen and phosphorus, roadway grit, metals from vehicle wear, hydrocarbons, floatables, and pathogens. When these materials reach small lakes, ponds, back bays, and tidal creeks, they can cloud the water, reduce habitat quality, and impair recreation.

**Eutrophication and algal blooms.** NJDEP lake-monitoring and harmful algal bloom guidance emphasize that nutrient enrichment, especially phosphorus and nitrogen, is a key driver of nuisance algae and harmful algal blooms. In shallow, slow-moving systems, nutrient pulses delivered by stormwater can encourage rapid biological response. Harmful algal blooms (HABS) often have a bright neon-green appearance and in some cases have a slime-like appearance on the surface of the water.

**Sedimentation and shallowing.** Fine sediment settles out once runoff slows down. Over time, repeated storm events can make shallow systems even shallower, reduce storage capacity, and worsen future flooding and water-quality problems.

**Public-health and ecological impacts.** Bacteria from pet waste, wildlife, or organic debris can create health risks. Oils and metals can stress aquatic life. Trash and floatables degrade habitat and appearance. In a tourist-oriented coastal community, these effects can also undermine recreation and neighborhood quality.

## Illustration 2. Pollutants in the first flush and why they matter

Nutrients	Sediment	Hydrocarbons & metals	Bacteria
Sources: Lawn fertilizer, organic debris Effects: Algal blooms, oxygen stress	Sources: Bare soil, roadway grit Effects: Cloudy water, lake shallowing	Sources: Vehicles, roofs, pavement wear Effects: Toxicity, film on water	Sources: Pet waste, wildlife, organic waste Effects: Public health and recreation concerns

NJDEP materials identify stormwater runoff and nutrient loading as major water-quality concerns; shallow lakes are especially vulnerable.

### 3. What contributes to the problem?

**Impervious surfaces.** Pavement, roofs, and compacted areas prevent water from soaking into the ground. That increases runoff volume, runoff speed, and the efficiency with which pollutants are conveyed to storm drains.

**Pollutant buildup between storms.** Dry days allow leaves, sediment, fertilizers, pet waste, oils, and atmospheric deposition to accumulate. A longer dry period can produce a more concentrated opening wash-off when rain finally arrives.

**Older drainage systems.** Many developed shore communities rely on direct conveyance systems designed to move water away quickly, not necessarily to treat it before discharge. Where runoff is routed straight to a pond or lake, the receiving water bears the impact.

**Coastal conditions.** Cape May County's low relief, shallow groundwater, wetlands, and proximity to sensitive coastal waters all make stormwater quality particularly important. Small changes in sediment or nutrient loading can be noticeable in small, shallow receiving waters.

### 4. Why Cape May Point is especially vulnerable

Cape May Point has a particularly important local receptor: Lake Lily. Borough planning materials describe Lake Lily as the central stormwater receiving basin for the community, with storm-drain flows directed toward the lake. That means the first flush does not disperse broadly at the outset; instead, it is concentrated into a small, shallow water body where dilution and flushing are limited. Lake Lily is less than 8 feet deep in some areas and as little as ankle depth in others.

This arrangement creates several risks. First, the lake can receive a strong early pulse of sediment, nutrients, oils, and bacteria. Second, because the water body is shallow, a relatively modest pollutant input can still have a visible effect. Third, accumulated sediment gradually reduces storage and water depth, increasing long-term maintenance challenges. Finally, when water levels are already high, additional runoff can stress the drainage system and downstream conveyance paths.

### Illustration 3. Schematic map of Cape May Point and drainage focus on Lake Lily

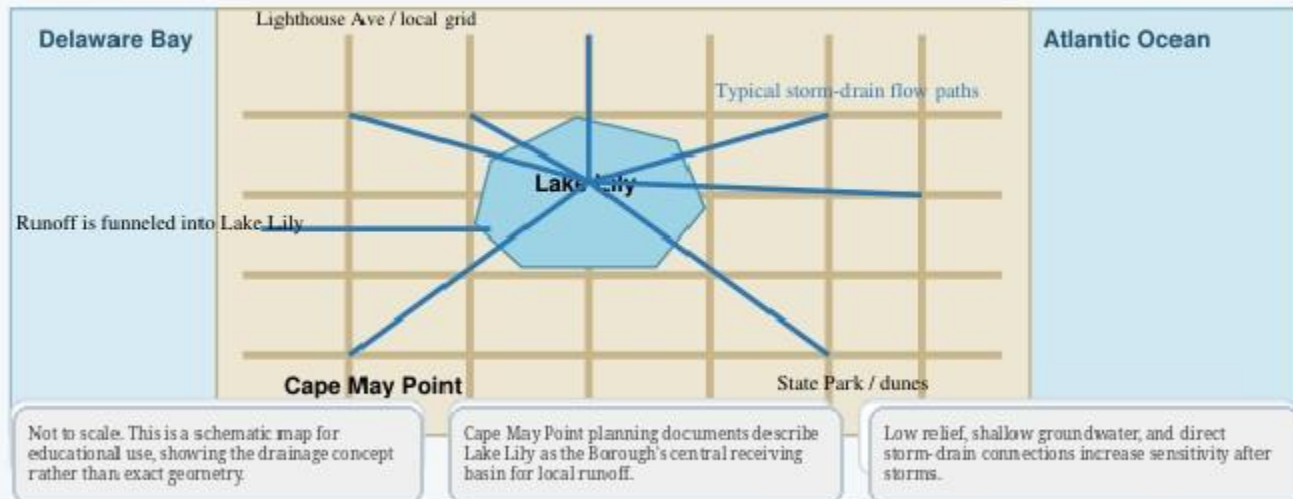


Figure note: this schematic map is for educational communication. It is not a surveyed GIS product, but it illustrates the local drainage concept referenced in Borough planning documents: neighborhood runoff is directed toward Lake Lily.

## 5. What homeowners can do

Individual lots cannot solve a borough-wide drainage problem by themselves, but homeowners can reduce both pollutant buildup and runoff volume before water reaches the street.

**Capture rooftop runoff.** Install rain barrels or cisterns where practical. Even temporary storage can reduce the earliest runoff pulse from a roof.

Create infiltration areas. Use rain gardens, native planting beds, and amended soils to help runoff soak in rather than immediately flow to the street.

**Reduce nutrient inputs.** Apply fertilizer carefully, only when needed, and keep it off pavement. Sweep stray material back onto the lawn or planting bed instead of hosing it into the street.

**Prevent bacteria and debris.** Pick up pet waste promptly and keep leaves and yard debris out of gutters and storm drains.

**Limit pavement.** When replacing walkways or patios, consider permeable pavers or reducing hardscape area where site conditions permit.

**Maintain the lot.** Fix vehicle leaks, store chemicals under cover, and avoid washing dirt, soap, or debris into the street.

### Illustration 4. Practical actions for homeowners

#### Capture roof runoff

Rain barrels and cisterns reduce the first surge from downspouts.

#### Slow and soak

Rain gardens and native landscaping help water infiltrate.

#### Reduce pollutants

Use fertilizer carefully; pick up pet waste; keep leaves out of gutters.

#### Cut pavement runoff

Permeable pavers and smaller hardscapes lower peak runoff.

These small changes do not replace municipal upgrades, but they can reduce pollutant buildup and runoff volume at the lot scale.

## 6. Conclusion

The first flush is one of the most important moments in a storm event because it can deliver a concentrated pulse of pollution just as runoff begins. In coastal communities such as Cape May County, and especially in Cape May Point, the problem is magnified when drainage systems route stormwater directly into a small receiving lake such as Lake Lily. A practical response requires both municipal infrastructure management and lot-scale action: less pollutant buildup, more infiltration, better maintenance, and better public awareness.

## 7. Additional Homeowner Resources

Homeowners interested in reducing stormwater runoff and improving water quality on their property can consult the following step-by-step guides:

### **Rain Garden Design and Installation – Local guidance by Rutgers**

[Rain Garden Manual of NJ](#)

### **Rain Barrel Construction, Installation and Use – Local guidance by Rutgers**

[How to build a Rain Barrel: Part 1](#)

[Rain Barrels Part 2: Installation and Use](#)

## References

- New Jersey Department of Environmental Protection. N.J.A.C. 7:8 Stormwater Management NJDEP stormwater rules state that one purpose is to minimize pollutants in stormwater runoff from new and existing development in order to restore, enhance, and maintain water quality. Available from the NJDEP stormwater rules page.
- New Jersey Department of Environmental Protection. NJ Stormwater website\_ Official program page for New Jersey stormwater management guidance, technical information, and municipal permit materials\_
- New Jersey Department of Environmental Protection. Lake Monitoring NJOEP Bureau of Freshwater and Biological Monitoring page describing ambient lake monitoring and harmful algal bloom sampling.
- New Jersey Department of Environmental Protection. Total Maximum Daily Loads for Phosphorus to Address Eutrophication in Atlantic Coastal Water Region Lakes (Atlantic Coastal Lakes TMDL report). NJDEP report on phosphorus-related eutrophication in coastal-region lakes.
- New Jersey Department of Environmental Protection. Harmful Algal Blooms FAQs and HAB management guidance. NJDEP materials identify sunlight, slow-moving water, and nutrient pollution as factors that support bloom formation.
- Cape May Point Borough. *Watershed Management Plan*. Borough planning document indicating that Lake Lily functions as a central stormwater receiving basin and describing direct drainage connections into the lake.
- Cape May Point Borough. *Municipal Stormwater Management Plan* and related stormwater pollution prevention planning documents. Borough materials describing local stormwater management strategy and storm-drain discharge patterns.