

# Improving Water Quality around Pivers Island

In 2003, the National Oceanic and Atmospheric Administration (NOAA), Duke University Marine Lab (DUML), and the N.C. Coastal Reserve & National Estuarine Research Reserve (NCNERR) received a \$40,000 planning grant from the N.C. Clean Water Management Trust Fund (CWMTF) to develop a plan to reduce stormwater runoff on Pivers Island. The design for the plan was completed by Moffatt & Nichol in February 2008. In February 2010, an additional \$496,000 from CWMTF was awarded to construct Best Management Practices (BMP) that reduce stormwater runoff entering the island's surrounding waters. Over the last six years, the plan has been revised based on the evaluation and feasibility of various BMP retrofit concepts. In August 2015, construction workers broke ground, beginning the final phase of the island-wide stormwater project.

The type and placement of stormwater BMPs on the island were selected based on field assessments, goals expressed by NOAA, NCNERR, and DUML, and overall practicality. They are designed to fit within the existing landscape and infrastructure while minimizing disturbance. Here is a summary of the BMPs:



## Two Stormwater wetlands

The turtle pens near the NOAA dock will be retrofitted to mimic the function of natural wetlands. This BMP will treat stormwater pollution using chemical, physical, and biological processes by rerouting aquaculture outfalls to a modified wetland area located within the pens. Rather than a direct outfall from the aquaculture labs, water will slowly infiltrate through the wetlands before reaching the sound. A second stormwater wetland will be built at the NOAA/DUML property line to the left of the stop sign on Pivers Island Road.

*Stormwater wetland on Pivers Island, N.C.*

## Permeable parking lot

Next to the aforementioned stormwater wetland area, a permeable parking lot will be installed on DUML property. This BMP will reduce runoff by trapping suspended solids and filtering pollutants from the water.

## Boat washing station oil/water separator

An oil/water separator will be installed at the NOAA boat washing station. The oil-contaminated water will be collected in a trench drain and passed through the separator. Oil-water separations are dynamic flow basins that allow suspended oil to float to the surface while water is allowed to pass through.

## Three Bioretention cells (rain gardens)

The rain gardens will filter runoff using plants and soil. Plants and soil in these areas will efficiently remove suspended solids, heavy metals, absorbed pollutants, and nutrients through absorption, filtration, and biological decomposition. They will also allow for natural infiltration of water through ground transmission.

Designs and materials for the three rain gardens vary based on site-specific characteristics. A shrub & perennial in-situ rain garden will be built in front of the NOAA building, a lined rain garden will be located at the southernmost end of Pivers Island, and a grassed in-situ soil bioretention cell will be placed to the left of the NOAA administration building.



*New rain gardens installed in front of the NOAA Beaufort Lab administration building.*

**Ultra urban filters**

These units are designed to remove trash/debris and sediment. The Smart Sponge technology in the filters removes low levels of oil and destroys unwanted bacteria in water. They will be installed in existing storm drains in the parking lot in front of the maintenance building.

**Rock check dams**

Check dams are small mounds erected in a swale intended to slow the flow of water in a channel. These BMPs effectively slow water flow and provide improved infiltration. Two rock dams will be built in the grassy swale located behind the NOAA building, which drains stormwater from the courtyard and the roof to a storm drain.

**Three Cisterns**

Newly added cisterns will catch rainwater from roofs for alternate uses. Two cistern sites at Duke (dining hall & Lab 1) will allow for daily toilet flushing and irrigation of the immediate surroundings. A third will be installed behind the maintenance building at NOAA and will be used to wash lab gear or field equipment.

The seven BMPs incorporated at 12 sites on the island will use existing infrastructure coupled with minor retrofitting to allow for the most cost-efficient improvements. Better infiltration and retention should improve the quality of the runoff retained on-site while new technology and natural processes will improve the quality of the stormwater discharges.

In addition to the newly installed BMPs, informational signs will be placed at select sites informing visitors of the project and function of the stormwater management BMPs. The NCNERR's Coastal Training Program will use these sites as a field trip in workshops related to stormwater management and low impact development. Thanks to the collaborative efforts of NOAA, DUML, and NCNERR, Pivers Island will serve as an example of how to protect coastal water quality through small-scale retrofits. This project was recently featured in the Carteret County News-Times. You can read the article [here](#).