

Town of Pine Knoll Shores

Roadside Swale Installation Project



LOCATION

Carteret County, NC

FUNDING SOURCE

N.C. Department of Environmental
Quality – Resilient Coastal
Communities Program (RCCP)

PROJECT TYPE

Stormwater Management & Flood
Mitigation

FUNDING AMOUNT

\$300,000

Community Context

Pine Knoll Shores, a coastal town on Bogue Banks, experiences recurring localized flooding during heavy rainfall events. Several residential streets—locally known as the “Tree Streets”—including Cedar Road, Holly Road, Willow Road, Yaupon Road, and Juniper Road, have historically experienced poor drainage due to limited roadside stormwater infrastructure.

Through the **Resilient Coastal Communities Program (RCCP)**, the Town prioritized a project to improve stormwater management along these streets to reduce chronic flooding, enhance roadway safety, and protect water quality in surrounding areas.

Project Description

The project involved the installation of roadside swales along both sides of the five targeted streets. These swales collect and infiltrate stormwater, reducing runoff from the street surface and minimizing the volume of polluted stormwater entering local waterways.

To complement the swales, the streets received a **fresh asphalt overlay** designed with a 2% crown along the centerline (*following NCDOT standards*). This grading ensures positive drainage from the road surface into the swales and prevents the roadway from acting as a conduit for stormwater.

By combining vegetated swales with proper road grading, the project enhances natural infiltration, reduces flooding in the streets, and improves overall stormwater management for the community.



*Willow Road before Stormwater Management
and Flood Mitigation*

Resilience and Environmental Benefits


REDUCE CHRONIC FLOODING
ALONG THE TREE STREETS


IMPROVE WATER QUALITY
BY CAPTURING AND FILTERING
ROADWAY RUNOFF
BEFORE IT REACHES
LOCAL DRAINAGE VALLEYS


INCREASE INFILTRATION AND
GROUNDWATER RECHARGE
IN VEGETATED RIGHT-OF-WAY


ENHANCE COMMUNITY RESILIENCE
BY INTEGRATING LOW-IMPACT
NATURE-BASED
STORMWATER SOLUTIONS
INTO EXISTING INFRASTRUCTURE



North Carolina
Coastal Resiliency

Project Outcomes / Performance Highlights

On May 15–16, 2024, Pine Knoll Shores experienced a short, intense rainfall event totaling 2.35 inches. Due to the intensity, placing temporary pumps on Willow Road was not feasible. By 7:00 a.m. on May 16, the Town's Public Services Director inspected the street and reported that water had already receded, demonstrating the effectiveness of the newly installed roadside swales and road crown in facilitating rapid drainage.

Willow Road Before/After Improvements



Before: Hurricane Florence, 2018



During 1.11 inches of rain, the swales working to get water off the road



After: These observations confirm that the project successfully reduces flooding duration and volume, protecting the roadway and surrounding areas while improving stormwater management.

Project Partners & Next Steps

This project was funded by the **N.C. Department of Environmental Quality's Resilient Coastal Communities Program (RCCP)**. The Town of Pine Knoll Shores led the design and implementation in coordination with local engineers and contractors.

Following installation, the Town will continue to maintain the swales and monitor their performance to ensure long-term drainage improvements and stormwater benefits.

Funded by the N.C. Department of Environmental Quality's Resilient Coastal Communities Program (RCCP) in partnership with local engineers and contractors.

