



# Bay Beach Communities Drainage Assessment

June 27, 2010

Drainage Subcommittee of the Bay Beach Community Work Group  
DNREC Division of Watershed Stewardship

# Summary

The Consultant's responsibilities will be to conduct a comprehensive drainage study of each of the Bay Beach Communities to identify problems areas caused by both major flooding events and more common "nuisance" flooding events. Including:

- Evaluation of drainage complaints to public agencies including any emergency flood response reports.
- Review of drainage or flooding problems of concern identified by area residents and landowners at public workshops in each community
- Mapping of the existing drainage infrastructure
- Field reconnaissance and review of the existing detailed topographic LiDAR data

# Review and Analysis of Problem Areas

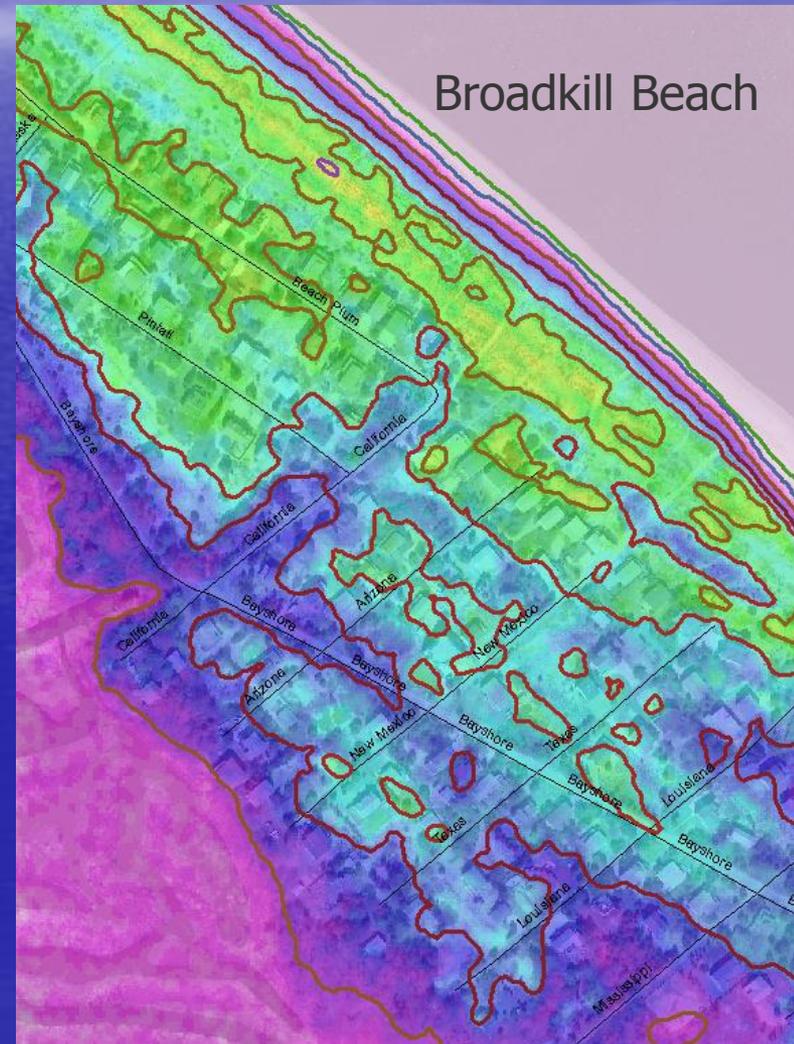
- DNREC will host a Public Workshop in each community to gather input from landowners and residents most familiar with drainage and flooding problems.
- Previously documented problems in DNREC's Drainage Concern Database will be reviewed.
- Other Public Agencies will be consulted including...
  - Municipal Leaders (If Incorporated)
  - Kent or Sussex County Government
  - Local Conservation District
  - DeIDOT



# Review Existing Drainage Network Mapping & Topography

Collect, compile, and map additional data to assist in the field reconnaissance and evaluation of the identified drainage problems.

- LIDAR
  - Detailed topographic LiDAR data
  - Mobile LiDAR Data as it becomes available will be provided by DNREC from the Economic Feasibility Study.
- All existing drainage infrastructure, including stormwater and sewage, will be collected and mapped
- Tidal Data
  - Existing where it is available
  - Temporary Tide Gauges where necessary



# Inventory Areas with Routine Drainage & Flooding Complaints

- Based on review of existing complaints, community identification of problem areas, and review of existing data, develop a comprehensive list of drainage or flooding problem areas and their locations
- Site visits shall be conducted and field data collected that describes the nature of identified drainage and flooding problems and likely causative factors.
- All locations should also be mapped in an Arc GIS compatible format.

PRELIMINARY DRAINAGE REPORT TOWN OF BOWTIE BEACH  
DECEMBER 2011

### FLOODING AND DRAINAGE DEFICIENCIES

Based on extensive field investigation and observations, survey, topographic modeling and tidal and storm event research, the following deficiencies were determined to be the major contributing factors to the flooding and drainage issues of the Town of Bowtie Beach, Delaware:

**D-1. Inefficient hydraulic performance of drainage conveyance due to clogging from sediment, fill, vegetation, and general lack of maintenance.**

A good portion of the Town's drainage conveyance system, including ditches and closed conduit (pipe), is clogged with sediment and vegetation, severely reducing its performance. Field inspection has determined that the storm drain outfall at N. Flank Avenue is currently blocked.



**D-2. Inefficient hydraulic design and alignment (vertical and horizontal) of drainage conveyance systems.**

Portions of the drainage conveyance system, including ditches and closed conduit (pipe), are aligned and vertically set in a way that is hydraulically inefficient or nearly impossible to properly drain. Some systems are set too low (into tideflats) to properly convey runoff, and in fact provide a point of tidal inflow and surcharge at low-lying inlets, culvert entrances, and ditches. Large flow rates are also conveyed through pipe segments which are already under the influence of tidal flooding, exacerbating the flood condition.



**D-3. The erosion of the sand dunes located along the Delaware Bay coastline.**

The height and width of the existing sand dunes is severely deficient, allowing waves to breach the dunes in severe storm events. The existing structure located at 172 Bayshore Drive provides a breach location in the existing dune system.



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# Rank / Prioritize Drainage Problems

- Using the Prioritization matrix, developed by the Drainage Subcommittee of Bay Beach Community Work Group, Rank the Inventoried Drainage problems.
- Once the problems are ranked additional funding will be needed for Design and Construction.
  - Grouping of projects should be considered if there are economies of scale.
  - Opportunities for Water Quality Improvements will also be considered
- DNREC will continue to work on projects in the order of prioritization as long as funding is available.

PRELIMINARY DRAINAGE REPORT TOWN OF BAY BEACH  
DECEMBER 2007

**RELATIONSHIPS BETWEEN ISSUES AND DRAINAGE DEFICIENCIES**

The following table summarizes the flooding and drainage issues and the corresponding deficiencies as listed in the previous sections of this report:

		FLOODING AND DRAINAGE DEFICIENCIES					
		D-1	D-2	D-3	D-4	D-5	D-6
FLOODING AND DRAINAGE ISSUES	S1	X	X		X		X
	S2	X	X		X		X
	S3		X			X	X
	S4	X	X		X		
	S5	X	X		X	X	X
	S6						X
	S7	X	X				
	S11	X	X		X	X	X
	S12					X	X
	N3		X	X	X	X	X
	N4			X			
	N5	X	X	X	X	X	X
	N6					X	X
	E1			X		X	X
E2			X				

**Issues:**

S1 - S7 Spring Tide Flooding Events  
 N1 - N6 Nor'easter Flooding Events  
 E1 - E2 Extratropical Storm Inland Flooding

**Deficiencies:**

D-1 Inefficient hydraulic performance of drainage conveyance due to clogging from sediment, fill, vegetation, and general lack of maintenance.  
 D-2 Inefficient hydraulic design and alignment (vertical and horizontal) of drainage conveyance systems.  
 D-3 The erosion of the sand dunes located along the Delaware Bay coastline.  
 D-4 Malfunctioning or absence of tide control valves.  
 D-5 Low lying roadway elevations.  
 D-6 Ineffectiveness or absence of seawall, low-lying bulkhead and boat ramp area elevations.

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A coastal landscape featuring a sandy dune in the foreground with a small, bare tree. A stream flows from the dune towards the ocean on the left. The background shows a wide beach and the ocean under a cloudy sky.

# A Quick Summary of Drainage Program Work in Each Community

# South Bowers Beach

## 1 Drainage Concern

- Could not obtain landowner permission for improvement project



# Pickering Beach

## No Documented Drainage Concerns



# Kitts Hummock

Numerous Drainage Concerns over the last 10-15 years.

Chronology of work:

- 2002 – Tide Gate & New Outfall Installed, South Bay Drive ditch dipped out for first time.
- 2008 - South Bay Drive ditch had debris removed
- 2009 - South Bay Drive ditch dipped out
- 2010 - Kitts Hummock area residents petitioned to investigate forming a tax ditch organization



# Bowers Beach

- 5 Drainage Related Contacts in Incorporated Area
- 3 - 21<sup>st</sup> Century Fund Projects
  - Projects were incorporated into Drainage Study undertaken by the Delaware Coastal Management Program (DCMP)
- DCMP Drainage Study
  - Phase I Assessment and Design is Complete
  - Phase II Implementation of Solutions to 3 problem areas (★).



# Slaughter Beach

- 6 Contacts in Incorporated Area
  - Including 3 related to drainage problems
- Drainage Program Staff met with DNREC Wetlands Staff and Slaughter Beach officials to Discuss drainage problems in Spring of 2010.
- At that time Town was going to work with landowners and DeIDOT to adjust roadside drainage.



# Primehook Beach

- 2 Beach Construction Contacts
- No Documented Drainage Concerns



# Broadkill Beach

- 5 Contacts Broadkill Beach
  - Includes 4 Beach Construction Contacts
- No Current 21<sup>st</sup> Century Fund Projects



# City of Lewes Beachside Area Only

- 6 Contacts in Beachside Area
  - Includes 2 Beach Construction Contacts
- 2 – 21<sup>st</sup> Century Fund Projects
  - Lewes Beach Houston Street
  - Lewes Tide Gate Structure
- Lewes Beach Houston Street
  - Drainage Study by GMB Engineers
  - Resulted in Cleanout of Old Mosquito Control Ditches
- Lewes Beach Tide Gate Structure
  - DNREC and Lewes Board of Public Works have had preliminary conversations but have not moved forward.

