

University of Delaware
National Pollutant Discharge Elimination
System Phase II Annual Report 2007
NPDES Co-Permit #0051152



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The University of Delaware
Annual Stormwater NPDES Phase II Report
Calendar Year 2007

The University of Delaware Stormwater Management program experienced many successful accomplishments during its fifth year of operation. Voluntarily working in an interjurisdictional arrangement with the City of Newark, the University continues to strive to develop strategies and programs to ensure compliance with the Environmental Protection Agency (EPA) outlined areas of the National Pollutant Discharge Elimination System (NPDES) requirements. This report outlines the progress and suitability of the University's stormwater program.

1. A brief overview of the University of Delaware's stormwater program elements:

a. Stormwater Program Administrative Information

The Stormwater program is coordinated and managed in the Department of Occupational Health and Safety (DOHS), which is supported through the Facilities organization at the University of Delaware. The Facilities organization is directly reportable and funded through the Office of Executive Vice President and University Treasurer.

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b. Stormwater Budget Information

The Department of Occupational Health and Safety (EHS) currently employs one 0.5 full-time employee dedicated to administer and manage the stormwater program. An annual budget of \$7000.00 is dedicated for stormwater program and professional development, which include program elements such as outreach publications, stormwater catch basin marking, partnership projects with the City of Newark's Department of Public Works and supplies. Additional funds are allocated by the Associate Vice President of Facilities to support specific program initiatives.

c. Discharge and Receiving Waters

The University's main campus is primarily situated on a divided watershed land area that predominately drains to the White Clay Creek, but also drains a small portion to the Christina River.

d. Facilities and BMP Background

The University currently has a reported 41 outfall pipes that lead to either the Christina River or the White Clay Creek. These structures are inspected annually during dry weather for indications of illicit discharge.

Currently the University has 33 stormwater management areas (SWMA), which include, 21 detention/retention areas, 8 biofiltration/retention areas, and 4 water quality BMP's.

2. Compliance assessment:

a. Status of compliance with outlined Permit Conditions

The University of Delaware is currently acting proactively and abiding by the five year plan developed for the interjurisdictional agreement with the City of Newark Department of Public Works. The University is using this plan as a guideline and developing the Stormwater program in an assertive manner to reflect its firm commitment to improving the quality and reduce the quantity of stormwater runoff from our campus. The University's 2007 stormwater accomplishments are outlined below. Supporting documents for each item, if not included in the report, is on file at the Department of Occupational Health and Safety (OHS).

b. Pollution Prevention/Good Housekeeping:

Goal:

The goal of this Best Management Practice is to reduce the potential for pollution by control measures instituted at the source.

Measures taken to attain the goal:

- 1.*** The University Grounds Maintenance Department reports that parking lot and street sweeping efforts documented 66.525 tons of debris removed from grounds during 2007. This department also manages and tracks the amount of recycled materials recovered by the University annually, which totaled 538 tons of material generated exclusively by the University for the 2007 calendar year. Recycled construction debris totaled 23,423 tons and finally the Delaware Solid Waste Authority reported that they collected 683 tons of recycled materials through the Igloo container program from University properties. A table outlining these figures is included. The recycling data is collected and reported in University of Delaware's fiscal year configuration.
- 2.*** The Facilities Department reports an annual curb replacement of 665 linear feet avoiding the creation and migration of concrete debris from campus parking lots and streets to local waterways.
- 3.*** The University Facilities Department installed oil sensors in the elevator well located in Brown Lab and at the new transformer located on the North/East corner of Drake Lab. These oil sensors are engineered to automatically shut off the sump pumps in the wells if oil is detected to prevent the potential for oil contaminated water from being pumped into the storm drain system.
- 4.*** The University is in the final review of the Spill Prevention, Control and Countermeasure (SPCC) Plan developed with the assistance of Environmental Resource Management (ERM). This plan formalizes the oil spill prevention and response program for the University. Also, the University is upgrading various oil storage devices to meet the new EPA SPCC regulations.
- 5.*** The University worked collaboratively with the City of Newark to arrange for the disposal of unwanted items for both on and off campus students at the end of the school year. The effort was organized by Newark's Town and Gown Environmental Cooperative, which is a subsidiary of Newark's Town & Gown Committee. The principle basis for this initiative was to reduce the amount of trash left behind by the students departing for the summer and through this effort an estimated 84 tons of material was collected. The materials were physically separated at the drop

off site, which was the former Curtis Paper Mill and items that were recyclable or in good condition for donations were recovered and rerouted accordingly. This enabled the effort to aid 50 local families with donated furniture and other household goods. Additionally the project recovered approximately 1,500 pounds of non-perishable foods, which went to the Food Bank and another 4,500 pounds of clothing, shoes and bedding that went to the Planet Aid.

6. The University's College of Agriculture and Natural Resources developed the annual Nutrient Management Plan for the Agricultural areas as well as the University campus as a whole. The plan is developed through an extensive analysis of all nutrient uses on the three main UD Research and Education Centers as well as the University Grounds Maintenance department. The Plan addresses structural as well as management techniques to address the issues outlined therein.
7. The University's College of Agriculture and Natural Resources constructed a Manure Management Facility in an effort to ultimately reduce the nutrient rich runoff from the Dairy facility on campus. The system was engineered to capture, store and convert the dairy cow manure to compost allowing for optimum land applications. Previously, all dairy manure for about 130 cows was land applied about every other day, year round. All manure is now collected into a manure treatment system where manure is separated into sand, solids, and liquids. The sand is re-used as bedding. The solids, while currently exported to a remote composting facility, will likely be composted on site and exported as a soil supplement for horticultural use. Liquids are stored in a tank for application as fertilizer for crop production. As a result of the separation process, land application practices are dramatically improved to maximize plant uptake of nutrients and excess nutrients will be exported from the farm. Consequently runoff of nutrients and particulates will be minimized. Dairy manure accounts for the majority of manure land applied on the University Newark farm. In 2006, (most recent numbers at this time) dairy manure accounted for 68% of all total nitrogen, 71% of all phosphate, and 60% of all potash land applied as manure. The system was operational as of December 2007 and data on changes to nutrient application cannot yet be determined. In addition to capturing manure for separation, gutters on all structures were repaired and improved so that roof water is now diverted from areas where livestock gather and does not mix with manure. Most roof runoff is diverted to pastures where it is allowed to infiltrate for ground-water recharge.
8. In 2007 the University participated in 'Recyclemania' which is a national competition among participating Universities to see who could collect the largest amount of recycle material including corrugated cardboard, paper and bottle/cans. The program ran approximately 5 weeks and the University accumulated a total of 48 tons of materials.
9. The University works in conjunction with DART and offers five free bus passes to any University employee who registers with the Dart First State Ozone Action program. This effort is to encourage employees to use public transit to help alleviate ozone levels during the summer months and is coordinated through our Department of Public Safety. In the 2007 summer season 78 University employees took advantage of this partnership opportunity. This not only aides with the reduction of Ozone, but also eliminates this number of vehicles on campus thus reducing vehicle related pollution as well.
10. The University's Procurement Services worked collaboratively with OfficeMax to replace cardboard boxes used to ship the supplies for the University's online shopping system with blue re-usable plastic bins. This effort alone has reduced the amount of cardboard in the campus waste stream by a reported 15,000 boxes per year.

c. Public Participation and Involvement:

Goals:

To provide information to the public concerning regional stormwater issues and to encourage stewardship through information sharing.

To work towards improvement and achieve a more notable level of stewardship for the local waterways through institutional involvement and proactive contribution.

Measures taken to achieve this goal:

1. The Environmental Health Specialist attended and participated in the Christina River Tributary Action Committee functions for 2007. The team included representatives from industry, residents, water utilities, government and nonprofit agencies, which worked to develop a water shed based plan to implement TMDL's for the Brandywine, Red and White Clay Creeks and Christina River. This Control strategy was broken out into 40 voluntary and regulatory recommendations that span five fundamental categories of concentration including: stormwater recommendations, open space recommendations, wastewater recommendations, agriculture recommendations and education recommendations. The Christina Basin Pollution Control Strategy was formally presented to the DNREC authorities for review and consideration in November 2007. An electronic copy of the strategy can be found at <http://www.wr.udel.edu/ChristinaTribTeam/>.
2. Quarterly meetings were held with the City of Newark Stormwater Program Coordinator, the Director of Grounds, and representatives from the Department of Occupational Health and Safety in 2007 to discuss campus stormwater related accomplishments and information/plans for continued program advancement. The dates met were 2/9/07, 5/31/07, 8/10/07, and 11/10/07.
3. Graduate and undergraduate students in the Department of Civil and Environmental Engineering as well as the School of Urban Affairs and Public Policy have delineated the University watershed as an on-campus laboratory. They reviewed and researched stormwater and best management practices (BMP's) for the following areas:
 - Blue Hen Creek restoration project
 - The University Water Resources Agency secured a grant from the National Fish and Wildlife Federation and the Delaware Estuary Program for students to conduct a stream restoration project along the Blue Hen Creek in front of the Marriott Hotel adjacent to Clayton Hall. The students started the field surveys and field reconnaissance phases for this project in 2006 and completed the preliminary design in 2007. This included all mapping of the area, mapping of invasive and non-invasive species, and a cross section mapping of the longitudinal and latitudinal points. The project is currently on hold pending the completion of the Laird Campus Phase III construction project of a new dormitory facility slated to be finished in August 2008. At this time the work on the creek restoration will resume.
 - Rain Garden in front of the University Water Resource Agency
 - The students initiated a review process of the rain garden located in front of the Water Resources Agency building. They began analyzing both the inflow and outflow water in an effort to characterize the effect of the BMP.
 - Pomeroy Greenway Bike Trail

- Students prepared design drawings for the development of the Pomeroy Greenway Bike Trail which will travel between the Laird Campus and the White Clay creek. The drawings were completed in 2007 and submitted to the City of Newark.
- 4. The University Water Resources Agency continues to work as local watershed coordinator for:
 - Christina Basin Clean Water Partnership with the goal to restore the Brandywine, Red Clay, White Clay, and Christina Rivers to fishable/swimmable status by 2015. The meeting dates were March 28th, June 28th, October 25th, November 30th, and December 13th 2007.
 - The White Clay Creek (WVC) Wild and Scenic River Watershed Committee in 2007 working on the watershed signage and trail maps project.
- 5. The Department of Occupational Health and Safety completed the first phase of the campus wide storm drain marking project, which initiated with the mapping segment of the project. The project was initiated in June 2006 and was completed in August 2007 using a global positioning system (GPS) to locate and document existing storm catch basins on campus property. Several student interns worked throughout the 14 month period and documented/mapped approximately 850 stormwater catch basins on campus property. The next phase involves the physical marking which is slated to be initiated in 2008 and continue forward to completion. The data and map will be updated on a consistent basis as necessary.
- 6. The Delaware Experimental Program to Stimulate Competitive Research (EPSCoR) based at the Biotechnology Institute of Technology in Newark awarded \$460,000 dollars to researchers at the University of Delaware and Delaware State University to support several studies throughout the year that directly or indirectly involve aspects of stormwater quality. These include:
 - A study on a plant reportedly used frequently in rock gardens called *Alyssum murale* (yellowtuft) and its capacity to absorb nickel, thus naturally decontaminating the soil.
 - An analysis of the chemical reactivity of carbon nano-particles that can be released through the burning of fossil fuels and deforestation and may play a significant role in the conveyance of pollutants on land and water.
 - Research on the microscopic algae as it relates to nutrient changes particularly nitrogen, which may be useful for future research regarding the overloading of nutrients on algae blooms.
 - A study to investigate carbon nano-tubes and their inherent ability to absorb toxic contaminants as well as any effects oxidation may have on aquatic organisms.
 - Research that involves the assembly of environmentally sensitive nanostructures that will essentially aid in the understanding of environmental occurrences.
 - A study to assess microbes on metals to ultimately predict the microbial change of arsenic, which is an element found in pesticides, herbicides and insecticides.
 - An analysis of the interaction between marine organisms and nano-particles of titanium dioxide and silver.
 - A study using an autonomous underwater vehicle (AUV) to test a model of the relationship between water quality and fish behavior. The researchers will be studying the direct observations made by the AUV to a model prediction of the implications of low oxygen conditions on juvenile fish residing in the inland bays.
 - Research involving the exploration of viruses in extremely hostile hydrothermal settings. Ultimately the researchers would like to glean a better understanding of the role of viruses in communities of co-existing microbes.
- 7. The UDaily, which is the University's online news source, announced on February 26, 2007 that several researchers from the University had devised a methodology for the removal of harmful micro organisms from drinking water using highly reactive iron. The UDaily also announced on March 2, 2007 that these researchers were featured in several media sources for their work including National Public Radio and United Press International as well as many web sites including Water and Wastewater, Earthtimes, and Water Technology to name a few.

8. The University's Department of Fashion and Apparel Studies hosted a lecture by Jill Dumain, the Director of Environmental Analysis for Patagonia, for the Fashioning Social Responsibility lecture series. Ms. Dumain spoke of the company's commitment to focus on their ecological footprint. Patagonia is committed to producing quality clothing without producing adverse environmental effects using a number of different methodologies including using recycled materials in the construction process.
9. The senior class of 2007 donated their senior class gift of \$62,000 to augment the recycling program on campus. With this gift the University installed paving under several recycle areas on campus and instituted a pilot program for a paper recycling program in the dorms. Two different types of test receptacles have been placed in dorms (one in George Reed Hall and one in Warner Hall) in an effort to determine student interest and level of participation. This effort is currently on hold since the University may be going forward with a single stream recycling program to reflect the recent changes in the City of Newark.
10. Anna Ciulla, the Chairperson of the University's Department of Medical Technology, spear heads a printer cartridge collection with the help from other individuals from the University mailroom. The cartridges are eventually shipped to recycling companies and the profits are used to aid with a philanthropic organization. Ms. Ciulla reported that she has raised as much as \$4000.00 dollars for this project in the past.
11. Thirty six students were honored for their community service including two students who worked with Delaware Nature Society collecting data and conducting water quality testing.
12. Nancy Targett, Dean of the University's College of Marine and Earth Studies, spoke at a luncheon for retired faculty members December 6th, 2007 at Clayton Hall on campus. Her lecture centered on the premise that the atmosphere, the ocean and the earth are linked together and the importance of education and accepting stewardship to protect the environment.
13. The University Department of Occupational Health and Safety sponsored The City of Newark's Community Clean up day, which was held in April of 2007 with a monetary donation.
14. The University Department of Occupational Health and Safety updated the General Safety-Fire-Security Survey Checklist in January 2007 to include stormwater related items. This checklist is used by the each of the University Safety committee's to conduct a quarterly inspection of their buildings and facilities. The updates include an inspection of high priority areas commonly problematic for stormwater related issues such as loading dock, dumpster and outdoor storage areas in an effort to not only raise the stormwater awareness, but to also initiate a mechanism for continual observation and consequent clean up if necessary. The additions include numbers 4, 5, and 6 in the "outside Building" section of the form.
15. University of Delaware's Water Resource Center funded nine undergraduate internships during the '07-'08 school year which are either directly or indirectly related to storm water quantity and quality. The funded projects included:
 - *"Willingness to Pay for Sustainable Agricultural Practices in an Urbanizing Region"*
 - *"Determining Stress Levels of Mummichog (*Fundulus heteroclitus*) in Simulated Commercial Holding Tanks Treated with Various Water Conditioners"*
 - *"Evaluating the Use of Zerovalent Iron to Remove Pathogens from Water"*
 - *"Effects of Wastewater Disposal on Ground Water Flow in Southern New Castle County"*
 - *"Assessment of Baseline Water Quality and Influent Pollutant Source Identification in the Noxontown Pond Watershed, Middletown, DE"*
 - *"Benefit-Cost Analysis of Pelletized Broiler Litter in Agronomic Crop Production and Turf Grass Management"*

- *“Hydraulic Properties and Ground Water Flow Modeling of the Unconfined Aquifer, Southern New Castle County”*
- *“Viability of a Freshwater Mussel (Elliptio complanata) as a Biological Filter for Aquaculture Pond Water Quality”*
- *“Stream Restoration of a Piedmont Headwater Stream in the White Clay Creek Wild and Scenic Watershed”*

16. The University Environmental Health Specialist attended a storm water training program sponsored by the Center for Watershed Protection in Toledo, Ohio October 9 – 11, 2007. The training outline and certificate are enclosed.

17. Other notable Participation and Involvement work conducted by the University at our campus located in Lewes, Delaware:

- Dr. Luther, a professor in the College of Marine Studies, conducted studies in 2001-2006 involving the water quality in the inland bays. He studied the nutrient (specifically the ammonia, nitrate, hydrogen sulfide, phosphate) and complex metals levels in the bays, which are elevated/aggravated by stormwater migration. His findings were published in the Aquatic Electroanalysis, Vol. 19, 2007 as well as two other publications in previous years.
- Marine Studies conducted informational tours in June, July and August of 2007, of the Lewes campus and discussed research initiatives including the impacts of development on water quality.
- The University’s College of Marine Studies was awarded a Sea Grant of \$1.3 million dollars from the National Oceanic and Atmospheric Administration to move forward with public outreach, research, and education programs to address the major issues involving the coastal regions.
- The University co-hosted the Broadkill Tributary Action Team along with the Delaware Department of Natural Resources (DNREC). The group was formed to develop a pollution control strategy for the watershed, which will ultimately be used to implement regulatory initiatives aimed to increase the water quality in the local waterways. A draft of the strategy and other information regard the Tributary Action Team can be found at <http://broadkill.ocean.udel.edu/>
- The University introduced a Coastal Community Enhancement program in December 2007 in an effort to balance rapid growth while maintaining a quality of life/environment for the residents in Sussex County coastal areas. This effort involves the College of Agriculture and Natural Resources and the Cooperative Extension Service, the College of Human Services, Education and Public Policy, and the College of Marine and Earth Studies working collaboratively with the public and officials to develop strategies for sustainable growth that will benefit both the community and the environment. The deans from each of the above colleges have appropriated a committee to review pertinent activities related to the community and development in Sussex County and determine ways to they could better work together to coordinate and inform/educate the public as well.
- Nicole Minni of Water Resource Agency constructed a base map for Lewes and Milton storm drain marking projects and provided to the municipalities.
- Joe Farrell, a university staff member in the College of Marine Studies manages and coordinates a variety of important watershed programs including:
 - Coordinated statewide NEMO (Non Point Education for Municipal Officials) Program.
 - Gave introduction to NEMO presentation to Lewes Council, Planning Commission and Board of Public Works.
 - Manage UD Citizen Monitoring Program, which includes
 - Inland Bays Citizen Monitoring Program
 - Broadkill River Monitoring Program

- Bacteria Monitoring Program (Rivers, Bays and Ocean) - source of bacteria in stormwater runoff
 - Harmful Algal Bloom Monitoring Program (Bays and Ocean)
 - Broadkill stream assessment in support of the Broadkill Tributary Action Team, coordinated registration and participated in assessment. Reportedly 40 participants were involved in the assessment.
 - Conducted a Broadkill watershed storm water assessment survey on December 6-7, 2007 in conjunction with DNREC and Center for Watershed Assessment.
 - Served on a planning committee (DNREC, UD and NEMO sponsored with local towns) and participated in the storm drain marking projects in Lewes and Milton, Delaware.
- Dr. Gallagher, research scientist Denise Selisker and graduate student Kayti Tigani, who all work in UD's College of Marine Studies and Earth Sciences, received a grant in 2006 to initiate research focusing on the improvement of propagation of eelgrass techniques. The aquatic grass benefits the bay in a number of ways including removing excess nutrients, stabilizing the bay bottom and trapping sedimentation. The grass is difficult to grow and the team is focusing on research that could increase the success and speed up the process of promulgation to aid with bay restoration projects in the state. Their research extended through 2007 as well and they hope to have publishable data in the coming year.

d. Public Education and Outreach Activities:

Goals:

To educate the public about stormwater and stormwater related issues.

To encourage involvement and accountability in an effort to motivate the public to proactively participate both at home and in the community.

Measures taken to achieve this goal:

1. Representatives from DOHS participated in three Business Industry Education Alliance (BEI) programs, which were coordinated through the Delaware Center for Teacher Education's Office for School to Work. We conducted a stormwater presentation at three different area schools using the enviroscape (a tabletop model of a watershed) to aide in the children's understanding of pollution and its migration to our waterways through stormwater. The participating schools included The College School on Thursday November 15th, Skyline Middle School on January 5th, and Lewes Elementary on January 24th and a total of approximately 193 students attended the sessions.
2. The University Stormwater webpage was updated on 2/16/07 to include upcoming annual events including Christina Creek Clean up Day, Community Clean-up Day, Ag Day, Community Day and Newark Night. These are all venues that either work to better the water quality or to perform outreach activates and disseminate information. To view the current webpage please visit <http://www.udel.edu/OHS/environment/stormwaterevents.html>.
3. The DOHS worked in cooperation with the City of Newark Department of Public Works to develop and distribute 11,000 placemats to restaurants throughout the City of Newark that highlighted stormwater related information. The template for the placemats was taken from the Stormwater Outreach Materials on EPA's website and the only modifications made included the addition of contact information for the City as well as DOHS. Ultimately, we distributed the placemats to nine different local restaurants including Eagle Diner, 1st Sate Diner, Friendly's on South College Ave., McDonald's on South College Avenue, McDonald's on Main St., Matilda's, Season's Pizza, The Post House, and Timothy's
4. The DOHS worked collaboratively with the City of Newark Department of Public Works in the development of an informative stormwater pamphlet for inclusion into the utility statements distributed to City residents and rental units in September 2007. The pamphlet outlined typical stormwater problems with associated solutions. This year we printed the pamphlet in color and circulated a total of 9000 copies to Newark residents.
5. On 3/2/07 Murray Tate and Leslie York-Hubbard members of the OHS staff, conducted spill control training for the staff of the University Maintenance Shop. This was an informal training which focused on spill control and prevention methods including absorbents and management of the waste generated from an incident.
6. Stormwater awareness training was conducted during 2007 for a total of 522 members of the University staff. The training consisted of regulatory information, proper disposal methods for liquid and solid chemical wastes, contact information and instructions for reporting suspicious activity, and ways they could help better the quality of the storm water on campus as well as at home. The number and department breakout is provided below.

<i>Department</i>	<i>In Attendance</i>
University Custodial Services	231
Facilities Maintenance	101
Public Safety Officers	34
Student Police Aides	35
University Dining Services	121
Total	522

7. Participated in the Newark 4H camps held on the University campus on two separate days held in the month of June and August of 2007 and presented stormwater quality training using the interactive enviroscape (a tabletop model of a watershed). The first group of children was 5 – 7 years of age and consisted of approximately 40 campers. The second group was middle school age children participating in an Environmental Science camp and consisted of approximately 20 children.
8. The University hosts a Cooperative Extension office, which is available to the community and facilitates a link to the University expertise and resources concerning water quality and environmental management issues among other topics. The office addresses regional and/or agricultural needs, offers information, publications and educational programs that incorporate stormwater management information. They offer one-on-one assistance and guidance to anyone who calls concerning a stormwater related question. Additionally, when a member of the extension office is called out to urban subdivisions for landscaping assistance they also incorporate a discussion on stormwater management practices. Finally, they have a web page defining renewable resources, which includes water, and offer publications and programs throughout the year. The website for the cooperative extension is <http://ag.udel.edu/extension/index.php>.
9. The University offered several water related courses for students as well as continuing education participants including:
 - Department of Civil and Environmental Engineering*
 - CIEG 440 Water Resources Engineering
 - CIEG 441 Hydrology
 - CIEG 442 Hydraulic Engineering
 - College of Agriculture and Natural Resources*
 - EGTE 103 Land and Water Management - This course was offered via both the traditional class setting and online distance learning
 - EGTE 321 Storm Water Management
10. The DOHS actively participated in the University’s 2007 Ag. Day activities, which is an annual event held at the University celebrating agriculture and natural resources and features educational activities as well as entertainment. DOHS’s stormwater booth included a display table housing literature, children’s activities, games and stickers. This year we had the children construct a mini terrarium. The activity consisted of placing soil, wildflower seeds and water in a clear plastic ice cream cup. The children then snapped on a lid and were given information about the water cycle that would take place inside the container if they placed it in a sunny spot once home. As the children were constructing their terrariums we engaged the adults in a question and answer game for a free bottle of water. The questions consisted of typical “backyard” storm water issues and we asked for the participants to come up with a solution. All the questions and answers used were directly taken from the storm water pamphlet that was mailed to all Newark residents in the utility

billing cycle in September 2006 and 2007. Once the questions were answered we gave out a free bottle of water as well as a copy of the storm water pamphlet. There was also additional information available for both children and adults. Approximately 731 participants visited the booth.

11. Cooperatively participated in Newark's Community Day activities with the City of Newark Stormwater Program Coordinator by operating an informational booth and providing stormwater related literature as well as give-aways (i.e. ball caps, t-shirts, rain drop stress balls, and coloring books and crayons). This year we had the children construct a mini terrarium. The activity consisted of placing soil, wildflower seeds and water in a clear plastic ice cream cup. The children then snapped on a lid and were given information about the water cycle that would take place inside the container if they placed it in a sunny spot once home. We had approximately 514 total participants at our booth for the day event.
12. The College of Agriculture hosted two separate facility tours of the Agricultural Farm where the natural resource protection initiatives were the primary focus.
 - American Water Resources Association tour on 9/21/07.
 - Delaware Holstein Association tour of the new dairy waste separation system.
13. Other notable Outreach and Education activities conducted by the University's College of Marine Studies include:
 - The Sea Grant Program highlights an outreach program that involves several aspects that can be utilized by the citizens to be informed and involved Town Hall meetings, water quality education, a coastal resource clearinghouse, and public issue education. More information about the Resource Management programs can be viewed at <http://www.ocean.udel.edu/seagrant/outreach/management.html> - publicissue
 - The "Sea Grant Reporter" was published in June 2007, which is an update focusing on the College's research and educational resources and activities. The 2007 Reporter included a segment outlining an initiative that involved the help from citizens to monitor for signs of harmful algae blooms. The Sea Grant Reporter can be viewed at the following website <http://www.ocean.udel.edu/publications/newsletter/reporter/2007/index.html>.
 - The 31th Coast Day event highlighting the University's effort in marine research, education and outreach programs. This year the event included Essay contest winners from local elementary schools. The assignment was for the students to write about a single drop of water on its journey through the watershed and into the Delaware Bay. This effort gave the students the opportunity to learn more about water and watersheds. The event included several poster presentations and exhibitions that were either directly or indirectly stormwater related. Information concerning the Coast Day Celebration can be found at <http://www.udel.edu/PR/UDaily/2008/oct/lewes101207.html>
 - The University worked collaboratively with Sussex County Conservation District, DNREC and several other organizations to augment the Native Coastal Plant Demonstration Site at the University's Lewes campus. The goal of the ongoing project is to demonstrate a sample garden with native plants and that a drainage containment area is environmentally beneficial.
 - The University hosted a workshop for Sussex County residents focusing on development issues, on June 28th at the UD's Elbert N. and Ann V. Carvel Research Center in Georgetown. The basic initiative was to gain insight from the residents as well as information sharing. Other topics included a discussion on coastal community enhancement initiative regarding how to best preserve the coastal habitats, and software solutions to help with growth projections scenarios.

e. Construction Site Runoff Control

Goal:

To monitor and maintain construction sites on campus that work to eliminate any contribution of sediment to our local waterways.

Measures taken to achieve this goal:

1. DOHS worked in partnership with the City of Newark's Department of Public Works developing an informative poster in 2006 pertaining to construction site runoff prevention. The goal of this initiative was to provide a means for information distribution to construction contractors on campus as well as in the Newark City area. We distributed the poster in 2007 to two separate projects on campus. The Laird Campus phase III project and the Milking Parlor project and confirmed that the posters were posted during routine visits to the site.
2. All construction activities on campus greater than one acre in size were required to have a Certified Construction Reviewer (CCR) conduct weekly site visits unless special arrangements were made with the consent from the City due to weather or other factors. The University had one site that this applied to, which was the Laird Campus Phase III project. Duffield and Associates was contracted by Whiting Turner to provide third party CCR weekly surveys. The reports were routed to the University Project Manager, the University Environmental Health Specialist, the contractor Site Supervisor and/or other contracted individuals that are responsible for the stormwater quality on each construction site, and to the City of Newark Department of Public Works. Thirty four CCR reports were received for the calendar year 2007, which spanned March – December. Each report was reviewed and if necessary had follow up action taken by the EHS and or the City Department of Public Works, which generally consisted of walking the site with a representative from the Contractor, Whiting Turner. Items to be addressed were discussed and noted by the Contractor for action.

f. Post Construction Site Runoff Control:

Goals:

To maintain functional stormwater management areas through annual structural and management practice reviews of all stormwater management areas on campus.

To rectify any issues that arises through the year in one of the SWMA to ensure maximum functionality.

Measures taken to achieve this goal:

1. The University Grounds department maintains the stormwater management areas (SWMA) on a regular basis to ensure proper functioning of the areas. Additionally, they respond to and correct any reported problems.
2. DOHS conducted visual inspections of all SWMA's on campus during the month of August 2007 and updated the data file. Service orders were generated for all SWMA's that needed maintenance or repair, which is the University's internal maintenance and repair system. In summary, thirteen service slips were generated for follow up; eight new slips were and five previous slips still in the system awaiting completion.
3. The University installed a new subsurface stormwater management system in 2007 engineered to capture and hold stormwater runoff. The system is engineered to provide two major stormwater management accomplishments including reduction quantity and an increase in quality of stormwater runoff. Through engineering, these systems essentially capture and hold the runoff in a series of subsurface chambers. The base of the horseshoe shaped chamber is lined with a geofabric, which, coupled with an extended period of detention and retention, ultimately promotes stormwater infiltration and ground water recharge. Additionally, the system outflow pipe is elevated within the system to allow for the settling of total suspended solids. The site of the new system is behind the new Administration building on Academy Street.

g. Illicit Discharge Detection and Elimination

Goals:

To survey all campus outfall areas during dry weather for possible detection of the improper discharges.

To investigate and mitigate any spill or improper discharge incidents.

Measures taken to achieve goal:

1. The University EHS visually inspected all University owned outfall structures during dry weather opportunities, which is defined more than 24 hours with no measurable rainfall prior to the inspection. The University currently houses at least 15 outfall structures and the information compiled included structure integrity, vegetation, sediment accumulation and flow from the outfall. The findings included three service request orders to the university Grounds Maintenance Department for maintenance including vegetation removal, sediment removal and re-grading and structural repair to better facilitate water flow. Four additional outfalls had at least a minimal flow of water and in all four cases the Plumbing Services were immediately contacted and a review of the site conducted. In all four cases the Plumbing Services Supervisor after observing the flow was confident that it was from non-contact condensate from air conditioning units directly serviced by lines leading to the outfall structures in question. The State of Delaware Department of Natural Resources and Environmental Control's Regulation Governing the Control of Water Pollution section 3.04.1 excludes a permit requirement for condensate from any cooling system for air temperature control. It was determined that the non-contact condensate does not alter the physical, chemical, biological properties of the receiving waters; therefore, it is excluded from regulation.
2. A new Annual Dry Weather Form was constructed and used. The form mirrored the form currently used by the City of Newark and was developed in an effort to standardize and increase the effectiveness of information gathered with each inspection.

3. Brief Summary of stormwater initiatives planned for 2008

a. Annual Activities:

1. Advertise City of Newark Storm Water Activities to the University community through UDaily (when available) and DOHS website.
2. Regularly power-sweep parking lots throughout campus and record amount of debris collected.
3. Update the University's storm water webpage.
4. Participate in educational outreach to local schools with the City's enviroscape model to teach about stormwater protection.
5. Inspect all University outfall pipes in dry weather one time per year for illicit discharge detection.
6. Conduct dry weather walk/travel of White Clay Creek in areas likely to be affected by University Activities to investigate for illicit discharge detection.
7. Upon identification of an illicit and/or contaminated discharge, investigate and mitigate the source in a timely manner.
8. Sample suspicious dry weather discharges if source is unknown.
9. Participate in Ag Day and Community Day activities each year for community outreach.
10. Provide annual report in conjunction with the City to DNREC outlining measurable goals of the MS4 permit.
11. Regularly inspect active construction sites on campus. Ensure that BMP's are in place and being properly maintained. Review and follow up on all Certified Construction Review (CCR) reports as well as any reports from the City of Newark to ensure all outlined items therein are adequately addressed in a timely manner.
12. Meet with the City of Newark's Stormwater Program Coordinator on a quarterly basis to coordinate program elements as appropriate.
13. Update the stormwater related maps on an ongoing basis, including catch basins, stormwater management areas, and outfall pipes.
14. Provide annual training to University employees on stormwater protection measures.
15. Document any storm drain cleaning completed by University or contracted personnel.
16. Identify areas on campus that tend to accumulate trash and develop a means to reduce the trash accumulation.
17. Inspect all Grounds, Agriculture and Transportation Services facilities for adequacy of environmental controls. A list of environmental improvements shall be compiled along with a plan for resolution of findings.
18. Work with Facilities Planning and Construction (FP&C) to ensure there is adequate DOHS representation at pre-construction meetings to allow for Green Technologies to be explored and considered for each new forthcoming capital project on campus.
19. Sponsor a Community Clean up Day.
20. Survey a random 20 percent of stormwater facilities annually during a significant or 2 year storm event or a storm event that produces the most rainfall during the year to ensure that they are functioning as designed.
21. Inspect all Stormwater management areas with Grounds Maintenance in an effort to promote and initiate a proactive maintenance schedule.
22. Provide annual HAZWOPER training to the City of Newark Department of Public Works .
23. Conduct one stormwater related training for the City of Newark's Public Works Department employees as outlined in the interjurisdictional agreement.
24. Conduct one stormwater related presentation/workshop for residential population as outlined in the interjurisdictional agreement.

b. 1st Year Goals: 2008

1. Develop literature that can be provided to all incoming students concerning stormwater information. Work with Residence Life to distribute the literature to each new incoming student.
2. Train a group of University employees that have not previously been trained on stormwater quality.
3. Research/Explore the possibility of implementing a green roof on campus.

4. Develop a collaborative stormwater information lecture with the City of Newark's Stormwater Coordinator and offer to the community. Use WVUD and public television announcements to help disseminate information about the lecture time and location.
5. Work to get the high priority catch basins marked with "no dumping" markers. Continue annually until the high priority catch basins have been successfully marked.