

**The University of Delaware**  
**Annual Stormwater NPDES Report**  
**2006**

The University of Delaware Stormwater Management program experienced many successful accomplishments during its fourth year of operation, January 2006 - December 2006. 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 stormwater program.

The University accomplishments are outlined below. Supporting documents for each item is kept on file at the Department of Occupational Health and Safety (OHS).

**1. Compliance assessment:**

*a. Describe the 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. We are using this plan as a guideline and developing the Stormwater program in an assertive manner to reflect our firm commitment to improving the quality and reduce the quantity of runoff from our campus.

*b. Pollution Prevention/Good Housekeeping:*

**Goal:**

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

**Measures taken to attain the goal:**

1. The University Facilities Department reports that parking lot and street sweeping efforts documented 54.34 tons of debris removed from grounds during 2006.
2. The Facilities Department reports an annual curb replacement of 3470 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 elevator wells located in Purnell Hall and the new Center for the Arts building. 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 finalizing its Spill Prevention, Control and Countermeasure (SPCC) Plan through 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 organized 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.

6. The Environmental Health Specialist conducted three separate Environmental evaluations on campus in an effort to identify opportunities for the University to enhance the stormwater program. The evaluations focused on the identification of environmental risks as related to stormwater and the subsequent prevention of potential incidents. The areas included the Agricultural Farm, Grounds Maintenance, and Vehicle maintenance. A number of measures have been taken to improve these areas. The DOHS plans to implement this evaluation system as an annual occurrence.
7. The University's College of Agriculture and Natural Resources developed a 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.

***c. 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 the Viewed an EPA Web Cast program on 5/10/06 entitled Developing an Efficient Municipal Stormwater Management Program for Construction Sites.
2. The Environmental Health Specialist attended a Public meeting presented by US Environmental Protection Agency focusing on the proposed revisions to Total Maximum Daily Loads (TMDL) in the Christina River Basin February 2, 2006.
3. The Environmental Health Specialist attended and participated in the Christina River Tributary Action Committee functions for 2006. The team included representatives from industry, residents, water utilities, government and nonprofit agencies, which worked to development recommendations addressing the TMDL issue for the Christina basin. The initiative of the team was to develop pollution control strategies in an effort to reduce the non-point source pollution in the Delaware portion of the Christina River through out the course of the year that would be submitted to the state authorities for review and consideration.
4. The Environmental Health Specialist attended and participated in a public forum to gather public opinions concerning the selection of an approach designed by the Tributary Action Committee addressing a methodology for TMDL reduction.
5. 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 2006 to discuss campus stormwater related accomplishments and information/plans for continued program advancement. The dates met were 2/9/06, 5/11/06, 8/10/06, and 12/1/06.
6. Dr. Luther, a professor in the College of Marine Studies, conducted studies in 2005 involving the water quality in the inland bays. He studied the nutrient (specifically the hydrogen sulfide, phosphorous) and complex metals levels in the bays, which are elevated/aggravated by stormwater migration. His findings were published in the Aquatic Microbial Ecology Vol. 44, 2006.

7. John Gingrich (Post Doctoral Fellow) and Robert Anderson (Graduate student), both of the University's Entomology and Wildlife Ecology Department concluded their research in 2006 delineating a campus stormwater retention pond, located on Syncock Lane, as an outdoor laboratory. They worked on a research project entitled: "*Potential of Retention Ponds to Produce Nuisance Mosquitoes and West Nile Virus Vectors. Part II: Field Trials for the Non-Pesticidal, Self-Sustaining Control of Mosquitoes*". The researchers used the retention pond on Syncock Lane to test the effectiveness of Alum in controlling/diminishing the mosquito larvae populations.
8. 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.
  - Center for the Arts underground Stormwater Management System
  - 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.
9. The University Water Resources Agency works as local watershed coordinators for:
  - Christina Basin Clean Water Partnership with the goal to restore the Brandywine, Red Clay, White Clay, and Christina Creeks to fishable/swimmable status by 2015.
  - White Clay Creek (WCC) Wild and Scenic River Watershed Committee in 2006 working in the watershed signage and trail maps project.
10. The Department of Occupational Health and Safety initiated a campus wide storm drain marking project. The first phase of the project began in June of 2006 using a global positioning system (GPS) to begin locating and documenting existing storm drains. A student intern worked for approximately three months in the summer of 2006 to initiate and conduct the first phase of the project.
11. In October 2006, the University announced the formation of a new Center for Critical Zone Research, where several University scientists have teamed up with a number of other researchers to launch a national initiative involving the study of the earth's critical zone. The researchers are studying the outermost surface including soil, water and air and the interactions that occur at this level. This group of researchers hopes that the knowledge gained through this collaborative effort may someday better sustain the food production in the future.
12. 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 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.

13. The University introduced a Coastal Community Enhancement program in December 2006 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.
14. University of Delaware's Water Resource Center funded a number of undergraduate internships during the '05-'06 school year, seven of which were stormwater related. The funded projects included:
- "Climate Impact on Global/Delmarva Hydrological Cycles"
  - "Measuring Groundwater Discharge in the Inland Bays"
  - "Detection of Salmonella in Biosolids using PCR (polymerase chain reaction)"
  - "An Assessment of Macro-infauna Associated with Oyster (*Crassostrea Virginica*) Aquaculture, Indian River Bay, Delaware"
  - "Sustainable Mosquito Control for Storm-Water Ponds"
  - "The Effects of Dietary Level and Source of Copper on the Broiler Copper Excretion and Movement through Broiler Excreta-Amended Soils"
  - "Hydraulic Properties of the Unconfined Aquifer in Southern New Castle County"
15. Joe Farrell, a university employee in the College of Marine Studies manages and coordinates a variety of watershed programs including:
- Coordinated statewide NEMO (Non Point Education for Municipal Officials) Program, including:
    - Reprinted manual (200) for local officials - "Delaware NEMO Guide to Natural Resource based Planning" 2006
    - Revised and made copies (500) of companion CD Provide workshop on "Planning that Protects Natural Resources" through UD IPA professional planning training series
    - Reprinted program brochure (2,000)
  - 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 is stormwater runoff
    - Harmful Algal Bloom Monitoring Program (Bays and Ocean)
  - Convened Broadkill River Watershed Steering Committee and held community forums to address non point source pollution in watershed (includes Lewes, Georgetown, Milton)

***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 five 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 five different area schools using the enviroscape (a tabletop model of a watershed) to aid in the children's understanding of pollution and its migration to our waterways through stormwater. Participating schools included Skyline Middle School, The College School, Albert Jones Elementary, Southern Elementary, and Thurgood Marshall Elementary and a total of approximately 310 students attended.
2. On 5/3/06 DOHS trained the University department of Public Safety about the stormwater program at the University and how they could help while out on campus conducting their daily routines. We trained 34 Public Safety Officers in total.
  3. Trained one member of the College of Agriculture on 11/18/06 about the current University Stormwater Program.
  4. Conducted 11 sessions of Stormwater Training for the Custodial Services staff on campus during July and August of 2006. The training addressed the current regulations, the University's Stormwater program, proper disposal methods for liquid and solid wastes, ways to identify stormwater violations and how to respond if they observe or suspect a violation has occurred on campus. A total of approximately 195 staff members were trained through this initiative.
  5. Participated in the Newark 4H camps held on the University campus on three separate days in June of 2006 and presented stormwater quality program using the enviroscape (a tabletop model of a watershed) on loan from the City of Newark. We trained approximately 65 children ranging in age from 5 years to 13 years old.
  6. On 8/25/05 we trained the University Public Safety Student Helpers about our stormwater program and what they can do to help with the program while out on campus. The training included information concerning stormwater violations and how to respond if they observe or suspect a violation. We trained approximately 23 student helpers.
  7. The University offered several water related courses for students as well as continuing education participants including:
    - School of Urban Affairs and Public Policy*
      - UAPP 623 Introduction to GIS
      - UAPP 652 GIS in Public Policy
    - Department of Civil and Environmental Engineering*
      - CIEG 440 Water Resources Engineering
      - CIEG 467 Watershed Engineering, Planning and Design
    - 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
      - EGTE 467 Green Tech Design for Stormwater Mgt.
  8. The College of Marine Studies offered on-line videos and PowerPoint presentations to the general public addressing a number of topics including "Trace Pollutant Metals" and "Understanding Mid-Atlantic Residents' Concerns, Attitudes, and Perceptions about Harmful Algal Blooms *Pfiesteria piscicida*." Each of these presentations implicated stormwater as a player in the development of the incidents.
  9. The College of Marine Studies published the "Sea Grant Reporter," which is an update focusing on the College's research and educational resources and activities. The Reporter addressed two segments outlining an initiative for enhancing coastal communities and an announcement of the creation of a Non-point Education Guide for Municipal officials.
  10. Webpage updating and maintenance:

- A link to the United State Environmental Protection Agency’s “Water for Kids” webpage containing outreach information that could be used by teachers and other interested parties.
  - A link to the Delaware Department of Natural Resources and Environmental Control Division of Water Resources webpage. The page provides contact information for anyone who might be interested in technical or educational services from the state.
  - A link to University of Delaware’s Water Resources Center page for additional information as well as educational opportunities available.
  - Provided a new link to the USGS “Water Science for Schools” webpage containing outreach information that could be used by teachers and other interested parties.
- 11.** The University of Delaware’s College of Marine and Earth Studies celebrated their 30th Coast Day event highlighting the University’s effort in marine research, education and outreach programs. The event included several poster presentations and exhibitions that were either directly or indirectly stormwater related including:
- children’s activities developed to inspire children to take care of their environment both now and in the future and making mud move
  - an activity that focused on sedimentation in the Delaware Estuary, a plant demonstration garden featuring native plants
  - a poster presentation concerning the use of Geographic Information Systems (GIS) to aid in Marine Policy decisions
  - a poster presentation entitled “Nutrient and Primary Production in the Delaware Estuary and Chesapeake Bay”
  - a poster highlighting the “Direct Groundwater Inputs to Estuaries and Coastal Bays.”
- 12.** The DOHS worked in cooperation with the City of Newark Department of Public Works to develop and distribute 10,000 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.
- 13.** 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.
- 14.** 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 water bill distributed to City residents and rental units. The pamphlet outlined typical stormwater problems with associated solutions. We printed and circulated a total of 9000 copies.
- 15.** The DOHS actively participated in the University’s 2006 Ag. Day activities, which is an annual event held at the University celebrating agriculture and natural resources and features educational activities and entertainment. DOHS’s stormwater booth included a display table housing literature, children’s activities books, games and stickers, and a bean bag toss for the children. This year we had the children build a terrarium in a bag. The activity consisted of wetting a paper towel and placing it in a Ziploc bag. Once the paper towel was in the bag the children placed wild flower seeds in the bag and sealed it. Instructions for taping the bag to a sunny window were on each of the bags. As the participants were constructing their terrariums we discussed the value of plants

for helping rainwater to infiltrate the ground. Additionally, we had a drawing for a potted flower and asked all of those who were interested in the drawing a stormwater related question or discussed the value of plants for the infiltration of stormwater. Approximately 450 - 500 visitors visited the booth.

16. 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 build a terrarium in a bag. The activity consisted of wetting a paper towel and placing it in a Ziploc bag. Once the paper towel was in the bag the children placed wild flower seeds in the bag and sealed it. Instructions for taping the bag to a sunny window were on each of the bags. As the participants were constructing their terrariums we discussed the value of plants for helping rainwater to infiltrate the ground. We had approximately 610 total participants at our booth for the day event.
17. The College of Agriculture hosted three bus tours of the Agricultural Farm where the natural resource protection initiatives were the primary focus.
  - Christina Bus Tour on September 8th, 2006. This annual tour is given to the Christina River Tributary Action Team steering committee.
  - Delmarva Wetland Conference Bus Tour on October 12, 2006. This is a semi-annual tour sponsored by DNREC and provided to conference participants.
  - American Farmland Trust National Conference on November 14, 2006. The tour and presentation were provided to the conference participants.

#### ***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 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 limits area. We now provide a copy as each construction project is initiated with instructions to post and maintain in each construction trailer or other shared space area for maximum exposure.
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 two main sites on campus included the Center for the Arts project and the Laird Campus Residence Halls project. Duffield and Associates was contracted by the University Facilities Department to provide third party CCR weekly surveys. The reports were forwarded 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.

***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 and correct any reported problems.
2. DOHS worked collaboratively to survey and update the SWMA as well as update the map with the University Grounds Department in May 2006. Generated service orders for SWMA that needed repair.
3. Worked with the City of Newark to coordinate and initiate the repairs needed.

***g. Illicit Discharge Investigation***

***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. DOHS worked with Facilities Plumbing Services to find the source of a constant flow of water at a stormwater outfall which was initially reported to the DOHS 12/23/05. We worked in conjunction with the City of Newark's Department of Public Works to find and mitigate the source of the flow. In the end, the staff of the plumbing shop was able to use a remote listening device to locate the source, which was a broken potable water pipe. The water seeped out of the pipe and found its way to a nearby french drain (foundation drain) and ultimately into the stormwater system. Once the leak was located it was immediately repaired.
2. In June 2006 DOHS responded to a report of improper paint waste by a contractor in a storm drain. Upon investigation the DOHS staff member found that the paint had not migrated out of the catch basin. The responsible individual was instructed to properly clean and mitigate the paint and was monitored for effectiveness and completion. The contractor was also instructed on proper paint water disposal in general in addition to specific University of Delaware requirements.
3. On July 7, 2006 DOHS received a call reporting the presence of a white cloudy substance in one of our stormwater creeks. DOHS staff responded and through the investigation found that one of the University's custodial personnel was responsible for improperly disposing of a 10 gallon solution of a floor stripper into a storm drain. A review of the Material Safety Data Sheet and subsequent calculation indicated that the quantity was below the reportable quantity limit. The City of Newark' Stormwater Manager, Kelley Dinsmore, was contacted and recommended the University contact the Department of Natural Resources and Environmental Control (DNREC). DOHS made the contact and met with Mari Grohefsky, an Environmental Officer, who held a meeting with all parties involved the following day. Additionally, a follow up meeting was

scheduled for 7/13/06 to discuss measures the University should take to eliminate the possibility of a duplicate situation which included training of all custodial personnel and a storm drain marking program.