



DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BELVOIR
9820 FLAGLER ROAD, SUITE 213 OFFICE - RICHMOND
FORT BELVOIR, VIRGINIA 22060-5928

REPLY TO
ATTENTION OF

SEP 29 2009

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Directorate of Public Works

RECEIVED

SUBJECT: Municipal Separate Storm Sewer System (MS4) Annual Report

Mr. Douglas J. Fritz
MS4 Program Manager
Department of Conservation and Recreation
203 Governor Street
Richmond, Virginia 23219-2010

Dear Mr. Fritz:

Enclosed is the Annual Report for the Fort Belvoir MS4 Permit (Permit # VAR040093).

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Point of contact is Bill Sanders, Director of Public Works, at 703-806-3017.

Sincerely,


Jerry L. Blixt
Colonel, US Army
Commanding

Enclosures

"LEADERS IN EXCELLENCE"

**VIRGINIA POLLUTANT DISCHARGE ELIMINATION SYSTEM
(VPDES) - SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS
(MS4) PERMIT**

**Permit Number VAR040093
US Army, Fort Belvoir, Virginia**

Annual Report for Permit Year July 1, 2008 through June 30, 2009

Section I of this report addresses the status of minimum goals proposed for Fort Belvoir's MS4 permit for the 1 July 2008 –30 June 2009 reporting period. Individual status summaries are provided following each permit Best Management Practice (BMP). Supplemental supporting information (e.g., public event notices and photographs) are provided as attachments to this report.

Section II provides a general summary of activities planned for the next reporting cycle.

Section III provides information on items (a) – (m) of the June 29, 2009 Department of Conservation and Recreation (DCR) letter to Fort Belvoir.

**SECTION I – ACTIVITIES ACCOMPLISHED/PURSUED DURING THE 1 JULY 2008 –
30 JUNE 2009 REPORTING CYCLE**

(1) Public Education and Outreach on Stormwater Impacts

BMP 1.1 Support Accotink Bay Wildlife Refuge Environmental Education Center.

- **Measurable Goal:** Support one activity per year on the effects of stormwater discharge.

Fort Belvoir sponsored an Earth Day event on April 22, 2009 that was attended by approximately 150 children and adults. The event had an educational station with a watershed model where participants could visualize and learn about runoff, and how chemicals and nutrients can move through watersheds. The event was advertised in advance in the installation's newspaper (The Belvoir Eagle), and via flyers posted throughout the installation. The Belvoir Eagle published an article following the event. (Attachment A.)

BMP 1.2 Present Stormwater and Watershed Information on the Belvoir Website.

- **Measurable Goal:** Present information regarding stormwater discharge to receiving waters and general watershed data on the Fort Belvoir website.

Fort Belvoir is in the process of updating the installation's website to include environmental information such as stormwater and watershed information.

Fort Belvoir updated the installation Geographic Installation System (GIS) watershed data layer in 2009 to revise subwatershed boundaries, and to include new stream information (e.g., perennality determination, Resource Protection Areas (RPAs)).

BMP 1.3 Support the Fort Belvoir Storm Drain Stenciling Initiative.

- **Measurable Goal:** Support a program for stenciling stormwater drains or inlets with phrasing to identify the structure as a storm drain, identify the receiving waters and discourage introduction of pollutants. Stencil 100% of the stormwater drains leading to the receiving waters.

Staffing and budget shortfalls precluded the installation from undertaking storm drain stenciling.

BMP 1.4 Maintain General Watershed Information on the Fort Belvoir Website.

- **Measurable Goal:** Update the watershed data to reflect changes or new information

Fort Belvoir is in the process of updating the installation website to include environmental information.

Fort Belvoir updated the installation Geographic Installation System (GIS) watershed data layer in 2009 to revise subwatershed boundaries, and to include new stream information (e.g., perennality determination, Resource Protection Areas (RPAs)). (Attachment B)

(2) Public Involvement/Participation

BMP 2.1 Support Volunteer Stream “Clean up”.

- **Measurable Goal:** Hold one volunteer stream clean up activity to police areas around streams to collect debris or trash, remove dead branches, and note any obvious signs of deterioration or pollution. Involve tenant agencies, schools, community partners, and other members of the public.

On April 4, 2009 Fort Belvoir hosted two sites along Accotink Creek and Dogue Creek for the annual “Potomac River Watershed Clean Up”. Approximately 100 volunteers participated in this event. Fort Belvoir encourages residents, soldiers, staff and tenants to participate in this event. The event was advertised in advance in the installation’s newspaper (The Belvoir Eagle), and via flyers posted throughout the installation. The Belvoir Eagle published an article following the event. (Attachment A).

BMP 2.2 Support Family Housing Occupant Orientation.

- **Measurable Goal:** Develop and distribute materials [about dumping waste oil and chemicals in stormwater systems to the housing and tenant facilities] to new tenants.

Fort Belvoir has distributed and displayed posters about dumping waste oil and chemicals in stormwater systems to the housing and tenant facilities. Posters are displayed in public areas around the installation to remind residents that dumping chemicals or oil can degrade habitat in the Chesapeake Bay. (Attachment B)

BMP 2.3 Implement Fort Belvoir Pollution Complaint “Hot Line.”

- **Measurable Goal:** Establish a phone listing accessible to persons living or working on Fort Belvoir in order for them to notify Fort Belvoir personnel of concerns, questions, or perceived environmental issues. Provide the “Hot Line” number(s) on the Fort Belvoir website and/or within the Belvoir Eagle.

Fort Belvoir is in the process of updating the installation website to include environmental information. Fort Belvoir’s Environmental Office (the Environmental and Natural Resources Division of the Directorate of Public Works, DPW-ENRD) is available by phone, with the phone number printed in the installation’s telephone directory, and by email to the main Environmental Office email address.

(3) Illicit Discharge Detection and Elimination

BMP 3.1 Develop, Implement, Update, and Support of GIS Layers.

- **Measurable Goal:** Develop, implement, update, and support GIS data layers containing stormwater systems, watershed/sub-watershed boundaries, utility data, and other information pertinent to stormwater management to reflect changes or new information.

Fort Belvoir maintains an extensive GIS database and continues to develop, revise, and update data including: inventories of the location of stormwater inlets, conveyances, and outfalls; installation soil types and topography; utility line locations; potential source and spill locations; watershed and sub-watershed boundaries; and information regarding environmentally sensitive areas. This GIS aids Fort Belvoir in determining the spatial location of stormwater system components and enhances Fort Belvoir’s ability to locate the receiving waters of a particular stormwater system, in the event that a spill or an illicit discharge is identified.

BMP 3.2 Develop Methods to Detect Illicit Discharges.

- **Measurable Goal:** Develop standardized procedures and processes to perform evaluations of various facility or installation operations, such as smoke or dye tests of drains, in order to identify illicit discharges.

The installation has investigated methods and equipment to detect illicit discharges but has not been able to secure funding to develop specific protocols.

BMP 3.3 Inform Installation Staff of Hazards Associated with Illicit Discharges.

- **Measurable Goal:** Provide information to installation staff and operations on the identification and effects of illicit discharges via an article, newsletter, presentation, or by displaying information at appropriate facility locations, or on the Fort Belvoir website.

The installation has developed a series of posters and provides training to help staff identify and understand the effects of illicit discharges.

BMP 3.4 Maintain compliance with existing VPDES registrations.

- **Measurable Goal:** Operate VPDES-registered systems in accordance with system design parameters and the registration statement, prevent and/or mitigate significant permit deviations.

Fort Belvoir has one VPDES general permit for industrial discharge (for Davison Army Airfield). The Environmental Office manages compliance with permit conditions including visual inspection of the facility for illicit discharges. The permit does not require analytic sampling. (Attachment C)

Fort Belvoir is surveying the installation to determine if there are other activities that may require VPDES industrial discharge permits.

BMP 3.5 Evaluate Storm Drain Outfalls.

- **Measurable Goal:** Perform inspections of 5% of identified outfalls for nuisance species or other indicators that would indicate illicit discharge into the storm drain system.

Staffing and budget shortfalls preclude installation-wide inspection of stormwater outfalls.

BMP 3.6 Perform Illicit Discharge Detection and Mitigation Procedures.

- **Measurable Goal:** Perform previously developed illicit discharge detection procedures at five installation facilities with the potential for illicit discharge, develop recommendations for potential mitigation actions.

Staffing and budget shortfalls preclude development of protocols for monitoring for illicit discharge.

BMP 3.7 Develop a Plan for Operations that may affect Storm Water.

- **Measurable Goal:** Develop an assessment plan to identify and evaluate other routine operations such as waterline flushing, golf course irrigation, basement drains, and condensation drains which may have an impact on stormwater quality.

Staffing and budget shortfalls preclude development of assessment plan for routine operations.

BMP 3.8 Perform Routine Operation Assessments and Develop BMPs.

- **Measurable Goal:** Implement the assessment plan to identify potential impacts to stormwater quality from various routine operations. Develop BMPs or engineering controls to address identified non-stormwater discharges. Incorporate engineering controls or implement BMPs to address identified non-stormwater discharges that impact stormwater quality; implement by the end of the fourth year. Perform inspections and necessary maintenance on engineering controls or BMPs to ensure functionality; implement by the end of the fifth year.

Staffing and budget shortfalls preclude development of assessment plan for routine operations.

BMP 3.9 Evaluate Potential Combined Sewer Overflow Connections.

- **Measurable Goal:** Conduct and/or evaluate studies of potential combined sewer overflow connections, develop recommendations and or mitigation actions.

Staffing and budget shortfalls preclude an assessment of potential combined sewer overflow connections.

BMP 3.10 Evaluate Storm Water Sampling.

- **Measurable Goal:** Evaluate the stormwater system for the potential development of a sampling strategy and, if appropriate, develop a detailed sampling plan and perform sampling in accordance with plan (as needed).

Fort Belvoir's one VPDES industrial discharge permit does not require analytic sampling.

(4) Construction Site Stormwater Runoff Control

BMP 4.1 Establish a Construction Project Review Procedure.

- **Measurable Goal:** Establish a procedure to review construction projects to evaluate the project's potential to impact water quality, and the project's compliance with MS4 and Stormwater Management Plan. Procedure will include: requiring signature of the design engineer attesting that the construction plans and design documents were prepared in accordance with the MS4 Permit and incorporates the minimum standards of the Virginia Erosion and Sediment Control Handbook (VESCH), Virginia Stormwater Management Handbook (VSWH), and Fairfax County Public Facilities Manual (FCPFM); copies of design analyses, design plans, and erosion control plans will be routed to appropriate, experienced staff at Fort Belvoir for review; each iteration in the design process must

maintain the minimum standards of the VESCH, VSWH, and FCPFM and is subject to additional review; and deficient or non-compliant documents will be returned to designers for modification and resubmission. Review 100% of construction projects for compliance with the requirements of the MS4, E&S, VSWH, and FCPFM.

Fort Belvoir has a standard protocol for the technical review of construction projects that disturb greater than or equal to 2,500 square feet of land surface. The Architect/Engineer (A/E) firm designing the project submits construction documents to the Directorate of Public Works, Environmental and Natural Resources Division (DPW-ENRD) for review. Construction plans and design documents are reviewed by DPW-ENRD staff - either a Professional Engineer or Registered Land Disturber (RLD) - and evaluated for compliance with the VESCH, the VSWH, and the Fairfax County Public Facilities Manual (PFM). Projects are typically reviewed at 35%, 65%, 95%, and 100% stages of completion. Deficient or non-compliant plans and documents are returned after each stage to the designers for modification and resubmission prior to approval of construction plans. In addition to review by DPW-ENRD staff, the A/E professional producing the plans must sign a Statement of Compliance with the Fort's MS-4 Registration/Permit on the Cover Sheet of the approved plan sets. Final approval of plans is provided by the Director of Public Works by signature on the Cover Sheet.

DPW-ENRD maintains a current log of site plan reviews. (Attachment D) Review comments, and their resolution, are managed by procedures set by the design team. For example, projects under design control of the US Army Corps of Engineers are managed in the "Dr. Checks" system, an electronic database wherein comments are recorded, assigned to a responder and responses are tracked. Comment resolution meetings are held at key design phases.

BMP 4.2 Communicate the Requirements of the Storm Water Program.

- **Measurable Goal:** Distribute MS4 Permit requirements to designers during initial planning phases of construction projects. All construction contract packages (including designs and specifications) shall incorporate a requirement to conform to the conditions of the MS4 Permit and Program Plan.

DPW-ENRD personnel provide a checklist to the A/E Firm producing Construction Plans and Documents that details requirements for the design and implementation of stormwater and erosion and sediment control measures. This checklist and a copy of the MS-4 permit are provided to all design engineers prior to the 35% design submittal of Construction Plans and Documents.

DPW-ENRD personnel review and approve all construction plans and documents that are submitted to the DPW as outlined in section BMP 4.1.

DPW-ENRD maintains Virginia-Certified Stormwater Design Reviewers and Inspectors on staff and these individuals perform detailed reviews of construction plans to ensure that when impervious surfaces are proposed, stormwater controls are appropriately designed and

incorporated within the project. To ensure compliance with the MS-4 Permit, it is required that all projects disturbing 2,500 square feet or more of land surface obtain registration under the general Virginia Stormwater Management Program (VSMP) Permit through the Virginia Department of Conservation and Recreation (DCR). The ENRD performs reviews of applications and provides technical assistance to project designers and contractors as necessary to help them obtain the VSMP registration. No project can obtain a Land Disturbance Letter or Excavation Permit from the Fort Belvoir DPW without proof that the VSMP has been obtained.

Once construction begins on a project, certified DPW-ENRD staff performs field inspections of projects to ensure that the projects are meeting the requirements of the MS4, the project stormwater design, and any associated erosion and sediment control plan requirements. (Attachment E) These inspections are completed every 2 weeks and within 48 hours of a rainfall event of 0.5" or greater as required by the MS-4 Permit. Deficiencies or violations are recorded in the standard Fort Belvoir Erosion and Sediment Control Inspection Report, which is distributed to the construction superintendent and their RLD in charge of land disturbing activities on the project for corrective action. Copies of the Inspection Reports for each project are available upon request.

BMP 4.3 Develop a Tracking System.

- **Measurable Goal:** Establish a tracking system to ensure review comments are adequately addressed; include number and acreage of disturbed land. Develop in conjunction with National Environmental Policy Act (NEPA) and EMS regulation and policies.

The design review and comment process, including tracking of comment resolution, is addressed under BMP 4.1.

BMP 4.4 Obtain Registration under VSMP for Construction Projects.

- **Measurable Goal:** Construction projects that disturb one or more acres of land must obtain permit registration under the general VSMP Permit for construction projects and must adhere to the requirements of the permit. Incorporate a procedure under the utility clearance permit process to determine construction-VSMP applicability and verify existence of required erosion control plans prior to utility clearance permit approval.

To ensure compliance with the MS-4 Permit, it is required that all projects disturbing 2,500 square feet or more of land surface obtain registration under the general Virginia Stormwater Management Program (VSMP) Permit through the Virginia Department of Conservation and Recreation (DCR). DPW-ENRD performs reviews of applications and provides technical assistance to project designers and contractors as necessary to help them obtain the VSMP registration. No project can obtain a Land Disturbance Letter or Excavation Permit from the Fort Belvoir DPW without proof that the VSMP has been obtained. A copy of the VSMP registration statement, payment verification, and mailing receipt is required to be submitted to the DPW prior to the DPW issuing the Land Disturbance Letter and Excavation Permit.

The Excavation Permit also requires and initiates the process of marking the location of all underground utilities within the area of land disturbance.

Copies of the Excavation Permits and VSMPs for all construction projects are available in the DPW Permits Office, Building 1442, at Fort Belvoir. The garrison issued just over 494 Excavation Permits in the current fiscal year, from 1 October 2008 through 17 September 2009. It should be noted that ANY work on base requires an Excavation Permit, regardless of the amount of disturbed area, so these permits include projects which are less than 2,500 sf, which do not require a VSMP. The number of projects requiring a VSMP (greater than 2,500 sf of disturbed area) is estimated at 50.

BMP 4.5 Initiate Periodic Site Inspections.

- **Measurable Goal:** Establish periodic inspection procedures to determine adherence to the approved design plan and the construction-VSMP Permit (as applicable) and to evaluate performance of the BMPs and/or engineering controls. Require site inspectors to be Virginia Certified Stormwater Inspectors. Any deficiencies identified during inspection shall be rectified immediately. In the event that the same deficiency is noted during reinspections an immediate report shall be filed with the Virginia Department of Conservation and Recreation and site operations shall cease until the deficiency is corrected. Perform site inspections of 100% of construction projects.

DPW-ENRD staff performs field inspections of all construction projects with disturbed area greater than 2,500 sf to ensure that the projects are meeting the requirements of the MS-4 Permit, the project stormwater/BMP design, and any associated erosion and sediment control plan requirements. Virginia-Certified Stormwater Inspectors are employed by DPW-ENRD to perform these inspections, which are completed every 2 weeks and within 48 hours of a rainfall event of 0.5" or greater as required by the MS-4 Permit. These inspections are performed with a representative of the project's contractor present so it is clear if the project is in compliance or not. Corrective measures are discussed and agreed to during the inspections. Deficiencies or violations are recorded in the standard Fort Belvoir Erosion and Sediment Control Inspection Report, which is distributed to the construction superintendent and their Responsible Land Disturber (RLD) in charge of land disturbing activities on the project for corrective action. The contractor coordinates and completes the field modifications, and the DPW-ENRD inspectors ensure that the corrective measures have been completed to ensure compliance with the MS-4. If the contractor does not correct the violations, a Notice to Comply letter is issued from the Director of Public Works, which includes a Stop Work Order if the violations are not corrected. If repeat violations occur, the DCR is notified immediately by the Director of Public Works

Copies of the Inspection Reports for each project are available upon request.

BMP 4.6 Evaluate Emerging Technologies.

- **Measurable Goal:** Review or evaluate one new product or engineering control designed to reduce soil erosion, consider possibility of use and potential effectiveness.

In late 2008 Fort Belvoir undertook a construction project wherein the Accotink Creek shoreline was stabilized using a Low Impact Development technique rather than using the typical hardening technique. This project was designed and managed by Mr. Dave Derrick of the US Army Engineer Research and Development Center, Coastal and Hydraulic Laboratory. A technical workshop on the project was held on December 3, 2008. This workshop was open to the public and had approximately 40 persons. Attachment E includes detailed information and photographs on the Accotink Creek stabilization project. Attachment E also includes the article published in the Belvoir Eagle and the workshop announcement.

At Fort Belvoir's re-chlorination plant, located on the shoreline of Accotink Creek, including the opposite shoreline along Davison Army Airfield, the shoreline was actively eroding. The erosion caused slumping of the banks, threatening the infrastructure of the re-chlorination plant. The shoreline had to be stabilized in order to preserve the integrity of the re-chlorination plant's infrastructure.

Fort Belvoir DPW –ENRD contacted Mr. Dave Derrick of the US Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory for an innovative solution to the shoreline erosion problem. The installation requested a design that would address the shoreline erosion control problem in a natural and low-impact manner rather than having a hardened conventional shoreline treatment. DPW-ENRD worked with Mr. Derrick on developing the design and then permitting the engineered solution.

The stream bank stabilization project used continuous longitudinal peaked stone protection (LPSTP), bendway weirs, stone tie-ins, locked logs, and live stakes. The LSSTPs were installed by installing riprap three feet below the surface water elevation, installing live stakes into the interstitial spaces of the stone toe protection to strengthen the bank and create hydraulic roughness. Vegetated stone keys and living dike tie-backs were installed into the existing bank from the LPSTPs, trenching the keys approximately 25 feet into the stream bank. The living dikes were dug perpendicular to the stream bank and planted with live stakes. Following completion of construction at the stream bank the area was stabilized with coir matting and native seed mixture. The in-stream stabilization measures included the installation of bendway weirs and locked limbs or logs to move the thalweg to the center of the creek. The weirs were constructed using VDOT Standard Class III riprap and depressed approximately two feet below the normal water surface elevation. The locked limbs and logs were anchored into the stream bank to provide toe protection and aquatic habitat.

(5) Post-Construction Stormwater Management in New Development

BMP 5.1 Establish a Construction Project Review Procedure.

- **Measurable Goal:** All construction contract packages (including designs and specifications) shall incorporate a requirement to conform to the conditions of this MS4. Establish a procedure to review projects to evaluate proposed structural and non-structural BMPs and project compliance with MS4 and Stormwater Management Plan. Procedure will include: requiring signature of the design engineer attesting that the project was prepared in accordance with the MS4 Permit and incorporates the minimum standards of the VESCH, VSWH, and FCPFM; copies of design analyses, design plans, and information regarding stormwater control structures will be routed to appropriate, experienced staff at Fort Belvoir for review; each iteration of the design process must maintain the minimum standards of the VESCH, VSWH, and FCPFM and is subject to additional review; and deficient designs or noncompliant project documents will be returned to designers for modification and resubmission.

Fort Belvoir has a standard protocol for the technical review of construction projects that disturb greater than or equal to 2,500 square feet of land surface. The A/E firm designing the project submits construction documents to the Directorate of Public Works, Environmental and Natural Resources Division (DPW-ENRD) for review. Construction plans and design documents are reviewed by DPW-ENRD staff, either a Professional Engineer or Registered Land Disturber (RLD), and evaluated for compliance with the VESCH, the VSWH, and the Fairfax County PFM. Projects are typically reviewed at 35%, 65%, 95%, and 100% stages of completion. Deficient or non-compliant plans and documents are returned after each stage to the designers for modification and resubmission prior to approval of construction plans. In addition to review by DPW-ENRD staff, the A/E professional producing the plans must sign a Statement of Compliance with the Fort's MS-4 Registration/Permit on the Cover Sheet of the approved plan sets. Final approval of plans is provided by the Director of Public Works by signature on the Cover Sheet.

BMP 5.2 Develop a Tracking System.

- **Measurable Goal:** Establish a tracking system to include information regarding the type of BMP, the location, the receiving waters, the number of acres treated by the BMP, and inspection and maintenance information.

Fort Belvoir maintains all information on the location, type, receiving water, treatment area size, etc. for each stormwater management facility within the installation's GIS.

BMP 5.3 Initiate Periodic Site Inspections.

- **Measurable Goal:** Establish periodic inspection procedures to determine adherence to the approved design plans and to observe status of BMP. Establish periodic inspection procedures to determine adherence to the approved design plans and to evaluate performance of the BMPs and/or engineering controls. Require site inspectors to be

Virginia Certified Stormwater Inspectors. Perform site inspections of 100% of active construction projects and 10% of post-construction projects (per year).

DPW-ENRD staff performs field inspections of all construction projects disturbing areas greater than 2,500 sf to ensure that the projects are meeting the requirements of the MS-4 Permit, the project stormwater/BMP design, and any associated erosion and sediment control plan requirements. Virginia-Certified Stormwater Inspectors are employed by DPW-ENRD to perform these inspections, which are completed every 2 weeks and within 48 hours of a rainfall event of 0.5" or greater as required by the MS-4 Permit. These inspections are performed with a representative of the project's contractor present so it is clear if the project is in compliance or not. Corrective measures are discussed and agreed to during the inspections. Deficiencies or violations are recorded in the standard Fort Belvoir Erosion and Sediment Control Inspection Report, which is distributed to the construction superintendent and their RLD in charge of land disturbing activities on the project for corrective action. The contractor coordinates and completes the field modifications, and the DPW-ENRD inspectors ensure that the corrective measures have been completed to ensure compliance with the MS4 Permit.

Copies of the Inspection Reports for each project are available upon request.

BMP 5.4 Present Sustainable Development Considerations/New Technologies.

- **Measurable Goal:** Hold one technical workshop for designers, inspectors, project managers, etc., on the implementation of BMPs; technological advances in control structure design, installation and operation; and designing for low impact and sustainable development.

Fort Belvoir had a workshop through the US Army Corps of Engineers for the Accotink Creek Stream Stabilization project (see BMP 4.6 and Attachment F). The Workshop also included a follow-up site visit to the stream bank shoreline erosion control project that was built in 1997 just upstream of the Panther Bridge on Farrar Road at Fort Belvoir property. The Workshop was held on Wednesday December 3, 2008 and had an optional field day at the project site on Thursday December 4, 2008. The Workshop included the watershed perspective, project background, sediment processes, sediment budget, channel stability, SIAM, watershed management, and the stream design.

The Workshop was attended by approximately 40 persons and was advertised by the US Army Corps of Engineers, Coastal and Hydraulics Laboratory Flood and Coastal Storm Damage Reduction Research and Development Program and Fort Belvoir.

BMP 5.5 Audits of Existing Conditions.

- **Measurable Goal:** Perform an audit of the existing conditions of stream channels and banks, outfalls, etc., to include: a topographic survey to quantify channel cross-sections, installation of monitoring points and collection of photographic documentation to allow visual comparisons of existing and future conditions.

Fort Belvoir updated the installation GIS watershed data layer in 2009 to revise subwatershed boundaries, and to include new stream information (e.g., perenniality, RPA). This update was based upon a field inspection of stream and watershed conditions.

BMP 5.6 Corrections of Existing Watersheds.

- **Measurable Goal:** Systematically correct watershed damages caused by existing conditions, poor design of control structures, or inadequate maintenance of control structures. Program and implement an investment program where 10% of identified requirements are executed each year. *→ 50% done during permit cycle!*

Fort Belvoir has identified watershed problems and detailed them in the installation's GIS watershed data layer. In 2009, Fort Belvoir undertook three major projects to correct watershed problems. One was the Accotink Creek shoreline stabilization project addressed under BMP 4.6. The other two were stream restoration projects addressed under BMP 6.7. Additional information on these projects is presented in Attachment F.

(6) Pollution Prevention/Good Housekeeping for Municipal Operations

BMP 6.1 Develop Installation Operations and Maintenance Training Materials.

- **Measurable Goal:** Develop a training program for installation personnel and partners regarding pollutant run-off reduction as it applies to various installation operations such as building and road maintenance, storm system maintenance, landscaping activities, etc.

Staffing and budget shortfalls preclude development of operations and maintenance materials.

BMP 6.2 Support Recycling and HAZMAT Programs.

- **Measurable Goal:** Support of these programs facilitates appropriate waste management. Accomplish by providing relevant information to the public through monthly periodicals or Fort Belvoir website.

Fort Belvoir actively supports recycling and HAZMAT programs by providing information during newcomer "in-briefs" to new tenants or personnel, tracking program metrics such as volumes of recycled products or collected waste and reporting these metrics to the Installation Command and to other tenant groups during Environmental Quality Control Committee meetings, ensuring that facilities have recycling bins to encourage use, and ensuring compliance with requirements of the HAZMAT program.

Fort Belvoir maintains a household hazardous waste program with a designated drop-off location and a contract mechanism for proper disposal of the waste. Information about this program is communicated to the residents of Fort Belvoir through informational flyers

located at the Fort Belvoir Community Center, recycling center and new comers' briefings. Additionally, Fort Belvoir educates personnel and encourages support of these programs during semi-annual hazardous waste handler refresher training provided through the Fort Belvoir ENRD Hazardous Waste Management Program.

BMP 6.3 Support Street Sweeping Activities.

- **Measurable Goal:** Develop street sweeping operations and maintenance standards to evaluate the effectiveness of street sweeping activities; and inspect 10% of the total street sweeping area for visible pollutants. *whit this %? only once?*

Street sweeping and dust control requirements are implemented during the Construction Plans and Documents design process and included in the approved Erosion and Sediment Control Plans. During inspections of a construction project, contractors are required to maintain streets and sweep them daily. Contractors utilize mechanical street sweepers, or workers with brooms and shovels to ensure debris is not tracked into the roadway.

BMP 6.4 Implement Periodic Inspections and Clean out of Catch Basins.

- **Measurable Goal:** Develop catch basin operations and maintenance clean out standards and perform inspections to evaluate the effectiveness of maintenance activities; and evaluate 25% of the catch basins for clean out effectiveness. *→ why this %? only once?*

The Fort Belvoir maintenance contract includes requirements for basin maintenance. Maintenance areas are identified at the start of each contract year and maintenance is performed as funds permit. Several major installation tenants, as well as private partners operating on the installation (e.g., Fort Belvoir Residential Communities military housing) perform monitoring and maintenance of stormwater facilities within their areas of control.

BMP 6.5 Ensuring Functionality of Existing Storm Water Management Structures.

- **Measurable Goal:** Develop an operations and maintenance plan to ensure functionality of existing stormwater management ponds, infiltration swales, and other stormwater engineering structures by identifying structures, and developing required maintenance tasks and associated activity completion schedules, and inspect 20% of stormwater management structures for general condition and functionality. *whit this % - only once?*

The Fort Belvoir maintenance contract includes requirements for basin maintenance. Maintenance areas are identified at the start of each contract year and maintenance is performed as funds permit. Several major installation tenants, as well as private partners operating on the installation (e.g., Fort Belvoir Residential Communities military housing) perform monitoring and maintenance of stormwater facilities within their areas of control.

BMP 6.6 Maintain Spill Response Vehicle/Trailer.

- **Measurable Goal:** Maintain a minimum of one spill response trailer equipped with appropriate equipment and absorbents; ensure appropriate training of spill response personnel.

Fort Belvoir has a Spill Response Plan and maintains a spill response trailer at Davison Army Airfield and at the Main Fire Station.

BMP 6.7 Support Stream Restoration.

- **Measurable Goal:** Support one stream restoration project, either on the installation or in partnership with the surrounding community for shared receiving water; advertise activity on the website or within the Belvoir Eagle to encourage public participation.

Fort Belvoir constructed stream restoration projects for two streams that will receive stormwater from the construction of the new Fort Belvoir Community Hospital Campus and the planned Warriors in Transition Unit (WTU). These projects were designed and undertaken to accomplish the adequate outfall requirements of the MS4 permit.

The stream channels in these areas were already severely incised and mostly disconnected from the floodplain. The goal was to restore the streams so that they can handle the anticipated volume and velocity of the storm water that is expected to be released from the Hospital and WTU sites, and to improve and restore aquatic habitat to the stream reaches.

The stream restoration project restored 2,671 linear feet of stream using natural stream design. The project consisted of the restoration of 364 linear feet of ephemeral stream, 857 linear feet of intermittent stream and 1,450 feet of perennial stream. The project included the realignment of approximately 750 linear feet of stream reach, areas of stream bed had to be raised in order to decrease channel incision and minimize impact to the adjacent forested areas as much as feasible. Rock structures were employed to provide for additional stream channel stability and to maintain a riffle and pool system. Riparian areas disturbed by the project were replanted and a riparian buffer was planted in riparian areas that had previously no woody vegetation buffer. This planting was done to provide additional terrestrial and wetland habitat.

BMP 6.8 Support “Self Help” Programs.

- **Measurable Goal:** Fort Belvoir provides access to facilities at which tenants may perform crafts or auto repair or accept chemicals and equipment for lawn maintenance. Prior to participating within such programs, individuals must understand proper use of the facility and provided materials. Insert information about these programs into stormwater pamphlets and include information about “Self help” programs on the Fort Belvoir website.

Staffing and budget shortfalls preclude development of information materials.

ATTACHMENTS:

- Attachment A. Representative Information on Public Events
- Attachment B. Example Publication
- Attachment C. VPDES Industrial Discharge Permit
- Attachment D. Design Review Log
- Attachment E. Erosion and Sediment Control Inspection Report Form
- Attachment F. Stream Restoration Project Write-ups
- Attachment G. Stormwater Structural Information

SECTION II – ACTIVITIES PROPOSED FOR NEXT REPORTING CYCLE

Generally, Fort Belvoir plans to continue implementing stormwater management activities similar in type and scope as done in this reporting cycle. Emphasis will continue to be placed on accomplishing 100 % engineer design review and 100 % site inspections for all construction projects on post, and on implementing at least one stream restoration project. Fort Belvoir anticipates being able to continue to participate in local waterway clean up events, to host at least one watershed education event, and to maintain updates to the installation GIS watershed data layer. Further, Fort Belvoir anticipates being able to continue compliance actions associated with the installation's VPDES industrial discharge permit, spill response and hazardous materials/waste management.

If additional staff and funding resources could be made available, the installation would be able to increase activities associated with education and outreach, and inspection, assessment and maintenance of existing stormwater facilities.

SECTION III – INFORMATION REQUESTED IN DCR LETTER DATED JUNE 29, 2009

a. Background Information:

- (1) *Name and permit number of the program submitting the annual report*
US Army, Fort Belvoir, Virginia
MS4 Permit, VAR040093
- (2) *Annual report permit year*
1 July 2008 – 30 June 2009
- (3) *Modifications to any operator's department's roles and responsibilities*
None
- (4) *Number of new MS4 outfalls and associated acreage by HUC added during the permit year*
None

(5) *Signed certification in accordance with 4 VAC 50-60-370*

Certification is contained in transmittal letter for this report.

b. *Status of compliance with permit conditions, an assessment of the appropriateness of the identified best management practices including an assessment of the appropriateness of the identified BMPs in addressing discharges into waters that are identified as impaired in the 2006 305(b)/303(d) Water Quality Assessment Integrated Report, and progress towards achieving the identified measurable goals for each of the minimum control measures.*

The status of the implementation of the MS4 Permit BMPs is addressed in Section I of this report.

Fort Belvoir's three waterways, Pohick Creek, Accotink Creek and Dogue Creek, are listed as impaired by fecal coliform and bacteria. The three waterways are in suburban Fairfax County, and none have agricultural land uses within their watersheds. One waterway, Pohick Creek, receives discharge for the Lower Potomac Pollution Control Plant, a sanitary sewer treatment facility not operated by Fort Belvoir. The Assessment Report presently considers wildlife to be the contributor to coliform and bacteria conditions. Fort Belvoir is awaiting further guidance as to how stormwater management BMPs as established within the MS4 Permit program relate to wildlife bacterial input to water systems.

c. *Results of information collected and analyzed, including monitoring data, if any during the reporting period.*

N/A. There has been no analytic sampling or monitoring during this period.

d. *A summary of the stormwater activities the operator plans to undertake during the next reporting cycle.*

Anticipated stormwater activities are summarized in Section II of this report.

e. *A change in any identified best management practices or measurable goals for any of the minimum control measures including steps to be taken to address any deficiencies.*

No changes to BMPs or measurable goals are anticipated as necessary at this time. Several BMPs (e.g., "present stormwater and watershed information on the Belvoir website", "performance of illicit discharge detection and mitigation procedures", "evaluate potential combined sewer overflow connections", "implement periodic inspections and clean out of catch basins", and "ensure functionality of existing stormwater management structures") have not been able to be fully implemented due to staffing and budget shortfalls.

f. *Notice that the operator is relying on another government entity to satisfy some of the permit obligations (if applicable).*

N/A

g. *The approval status of any programs pursuant to Section II C of the General Permit (if appropriate), or the progress towards achieving full approval of these programs.*

N/A

h. *Information required pursuant to Section I B 9 of the General Permit.*

Information on TMDL is still being quantified.

i. *The number of illicit discharges identified and the narrative on how they were controlled or eliminated pursuant to Section II B 3 f of the General Permit.*

None.

j. *Regulated land-disturbing activities data tracked under Section II 4 c of the General Permit.*

Available upon request.

k. *All known permanent stormwater management facility data tracked under Section II B 5 b (6) of the General Permit submitted in a database format to be prescribed by the department.*

See Attachment G.

l. *A list of any new or terminated signed agreements between the operator and any applicable third parties where the operator has entered into an agreement in order to implement minimum control measures or portions of minimum control measures.*

N/A

m. *Copies of any written comments received during a public comment period regarding the MS4 Program Plan or any modifications.*

N/A



Earth Day 2009

Castle Park Tompkins Basin

April 22, 2009 10am-2pm

Free Lunch Starts at 11am

Raptor Presentation 10am - 11am

Featuring a Live Hawk, Falcon, and Owl show

Earth Day Activities and Educational Stations:

Fish, Reptile, & Amphibian Station

Wildlife & Bird Station

Trees & Plant Identification Station

Plant a Flower Station

Wetland, Netting & Seining Station

Belvoir Trail, Hikes, Pier, & Refuge Information Station

Brand New Fishing Piers will be Open all Day

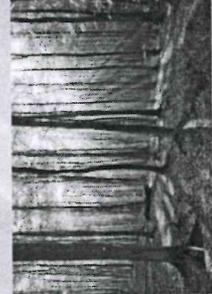
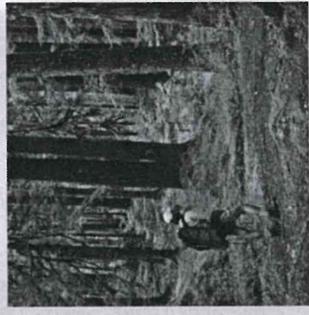
Pest Station

Recycling Education Station

Leave No Trace Station

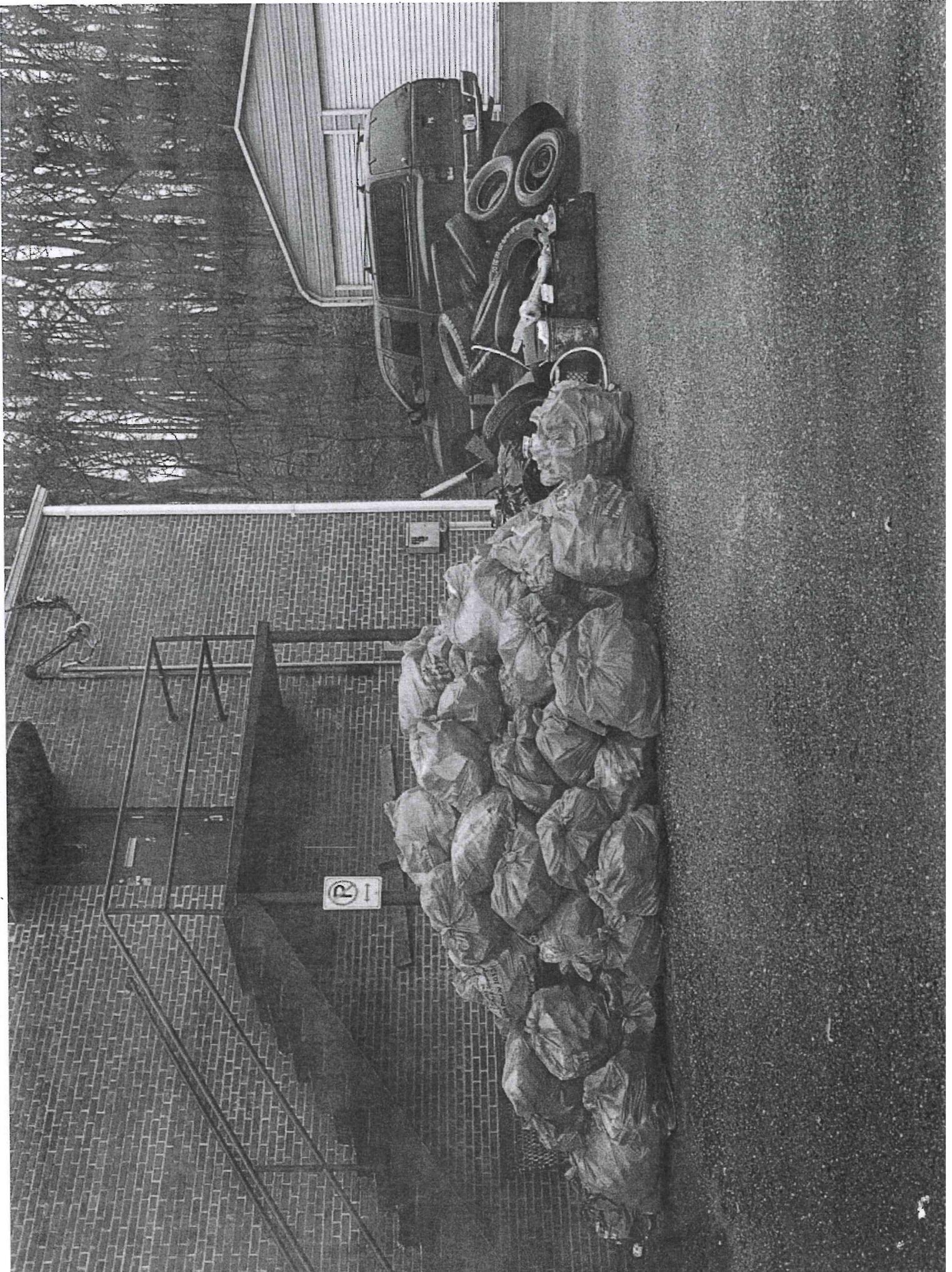
Fishing line Recycling Education

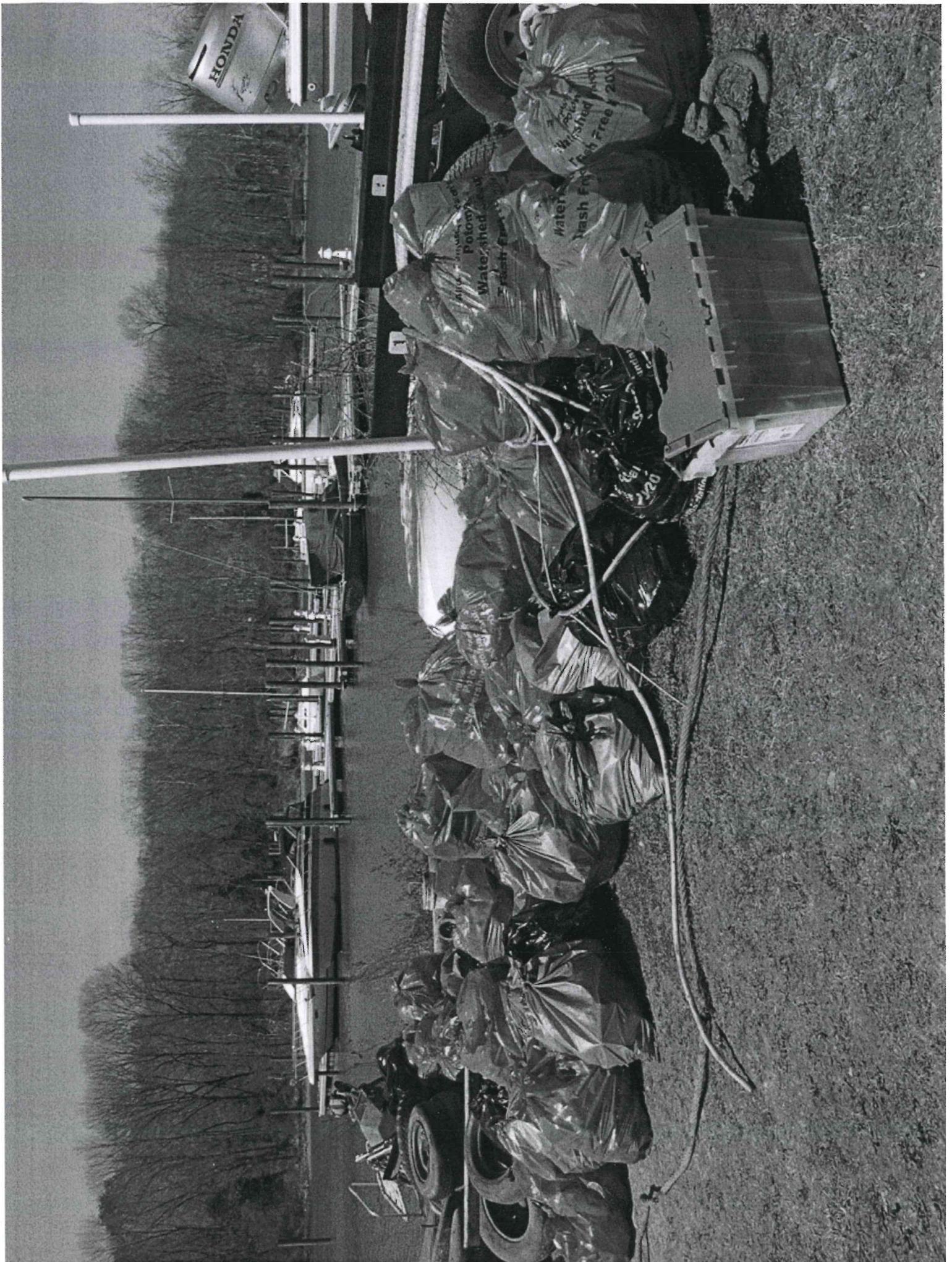
Chesapeake Bay Foundation Information Station



(Dining Events) Attachment A







We want your waste!!

(Household Hazardous Waste, that is.)

Are you harboring these in your house on Post?

- Fertilizer
- Car Batteries
- Motor Oil (used or unused)
- Paint Thinner
- Oil-Based Paint
- Weed Killer
- Antifreeze

- These waste products are often responsible for harming and endangering people and animals. Improper disposal of these household products can result in polluted creeks, streams, and woods.
- Look around your home for pesticides, insecticides, oil-based paint, chemical thinners and solvents, petroleum products, acids, automotive products, and other hazardous materials.
- Check garages, storage sheds, basements, and cabinets
- Buy only what you need and use up what you have before buying additional chemicals.
- Some empty containers can be rinsed out and safely recycled or thrown away. Follow instructions on manufacturers labels.



HHW Turn-In Procedures

- material should be in closed containers with labels identifying what the material is.
- Chemicals can not be mixed (i.e., oil mixed with antifreeze is unacceptable)
- no leaking or unmarked containers will be accepted
- containers must be inspected by the attendant on duty
- containers must be dropped off during hours of operation at the Fort Belvoir Recycling Center, building 1089, Mon – Sat 0700-1400

For any questions regarding HHW Disposal, call the Hazardous Waste Manager at 806-0022

Can I turn in.....?

People are often confused as to what is a household hazardous waste and what can be thrown out, recycled, or poured down the drain. Continue reading to find out what Fort Belvoir's HHW program will accept.

Items Accepted

- ✓ Pesticides, herbicides & rodenticides
- ✓ Petroleum products (polish, thinners, varnish)
- ✓ Solvents
- ✓ Acids (muriatic, sulfuric, phosphoric)
- ✓ Oil-based paint
- ✓ Automotive products (antifreeze, motor oil, gas)
- ✓ Batteries (car, lithium, nickel-cadmium)

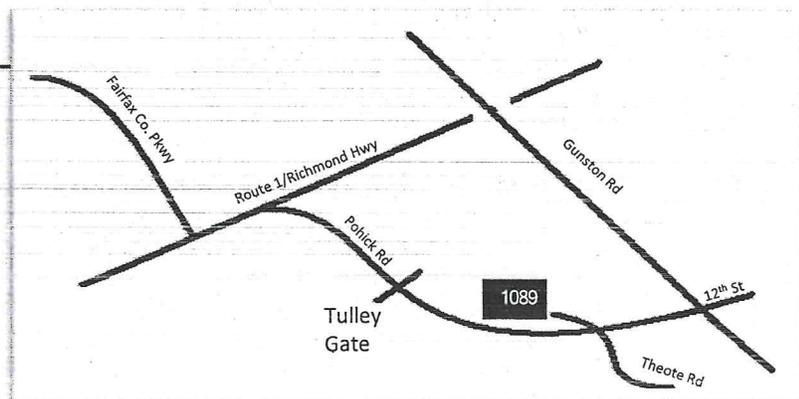


Items not accepted

- × Latex Paint: Many people think latex paint is hazardous, but it is not. Unwanted cans of latex paint can be air dried until solid and disposed of with your regular trash. Use kitty litter or newspaper to soak up excess liquid.
- × Alkaline Batteries: Common household batteries such as size A, AA, C, D, and 9-volt can be thrown out with your regular garbage. Be sure to check whether your battery is a lithium battery (often used in electronic devices). These can NOT be thrown away with regular trash.
- × Explosives: Explosives can NOT be turned in at the Recycling Center. Call the Military Police at 806-3104 for more information.
- × Cleaning Supplies: Cleaning supplies (such as bleach, liquid detergent, and comet) are not considered household hazardous waste, but they *can* harm the environment. When you move, give them to a neighbor or you can bring them to 1089.

IMPORTANT: You must be a RESIDENT of Fort Belvoir Family Housing in order to drop off Household Hazardous Waste at Fort Belvoir. If you live off post, you are not eligible to participate in this program. Your HHW should be turned in to Fairfax County. Please refer to <http://www.fairfaxcounty.gov/dpwes/trash/disphhw.htm> for more information.

**HHW is collected in
building 1089 on
Pohick Rd**





DEPARTMENT OF THE ARMY
 US ARMY INSTALLATION MANAGEMENT COMMAND
 HEADQUARTERS, UNITED STATES ARMY GARRISON, FORT BELVOIR
 9820 FLAGLER ROAD, SUITE 213
 FORT BELVOIR, VIRGINIA 22060-5928

REPLY TO
 ATTENTION OF

JUN 30 2009

Directorate of Public Works

Department of Environmental Quality
 Receipts Control
 P.O. Box 1104
 Richmond, Virginia 23218

RECEIVED
 JUN 30 2009
 DEPT. OF ENVIRONMENTAL QUALITY

Dear Sir or Madam:

Enclosed are Fort Belvoir's Virginia Pollutant Discharge Elimination System General Permit Registration Statement Industrial Activity Storm Water Discharge and the associated permit application fee form. The check will be mailed separately.

A copy of this letter is being sent to Ms. Susan Mackert at the Department of Environmental Quality, Northern Regional Office.

Point of contact is Bill Sanders, Director of Public Works at 703-806-3017.

Sincerely,

for *Dominic J. Jagan, Deputy*
 Jerry L. Blixt
 Colonel, US Army
 Commanding

Enclosures

General Permit Attachment

"EXCELLENCE THROUGH SERVICE"

**VPDES General Permit Registration Statement
Industrial Activity Storm Water Discharges (VAR05)**

(Please Type or Print All Information)

1a. Property Owner of the Facility Site

Name: US Army Garrison - Fort Belvoir c/o Bill Sanders
Mailing Address: 9430 Jackson Loop, Building 1442, Suite 100
City: Fort Belvoir State: VA Zip: 22060 Phone: 703-806-3017
E-Mail Address (where available): NA

1b. Operator Applying For Permit Coverage (if different than "1a")

Name: NA
Mailing Address: NA
City: NA State: NA Zip: NA Phone: NA
E-Mail Address (where available): NA

1c. Responsible Party Requesting Permit Coverage, and Who Will Be Legally Responsible For Compliance With This Permit

Name: US Army Garrison - Fort Belvoir c/o Bill Sanders
Mailing Address: 9430 Jackson Loop, Building 1442, Suite 100
City: Fort Belvoir State: VA Zip: 22060 Phone: 703-806-3017
E-Mail Address (where available): NA

2. Facility Information

Facility Name: US Army Garrison - Fort Belvoir
Address: 9430 Jackson Loop, Building 1442, Suite 100
City: Fort Belvoir State: VA Zip: 22060
Contact Name: Bill Sanders Phone: 703-806-3017
E-Mail Address (where available): NA

3. Facility Ownership Status: Federal State Public Private (Check one only)

4. Name(s) of the receiving water(s) that storm water is discharged into: Accotink Creek, Dogue Creek,
Potomac River, Pohick Creek, Gunston Cove, Accotink Bay, Pohick Bay

5. If the discharge is through a municipal separate storm sewer system (MS4), the name of the municipal operator of the storm sewer: Fairfax County

Additional notification for discharges to MS4s. If the facility's storm water discharges are through an MS4, the owner must notify the operator of the municipal system receiving the discharge, and submit a copy of their registration statement to the municipal system operator.

6. VPDES Permit Numbers for all permits assigned to the facility: VAR051080, VAR040093, VAG830091,
VAG830285, VAG830286

7. Attach a copy of the general location map from the SWPPP and the site map from the SWPPP.

8. Identify up to four 4-digit Standard Industrial Classification (SIC) Codes or 2-letter Industrial Activity Codes that best represent the principal products or services rendered by the facility and major co-located activities.

4-Digit SIC Codes or 2-letter Industrial Activity Codes: 9711 4522 _____

(The 2-letter Industrial Activity Codes are: HZ - hazardous waste treatment, storage, or disposal facilities; LF - landfills/disposal facilities that receive or have received any industrial wastes; SE - steam electric power generating facilities; or, TW - treatment works treating domestic sewage)

9. Attach a list identifying all applicable industrial sectors (see instructions) that cover the discharges associated with industrial activity from the facility and from major co-located industrial activities that will be covered under this permit. Also identify the storm water outfalls associated with each identified sector.

• For landfills, indicate the type of landfill: NA

• For timber products operations, indicate which outfalls (if any) receive discharges from wet decking areas:
NA

• For all facilities, indicate which outfalls (if any) receive discharges from coal storage piles:
NA

• For asphalt paving and roofing materials manufacturers, indicate which outfalls (if any) receive discharges from areas where production of asphalt paving and roofing emulsions occurs:
NA

• For cement manufacturing facilities, indicate which outfalls (if any) receive discharges from material storage piles:
NA

10. **Certification:** "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations."

Print Name Jerry L. Blixt Title: Colonel, US Army

Signature: Dennis S. Joynes, Deputy Date: 6-30-09

11. Would you like your permit sent to you electronically? Yes No

If "Yes", please list the email address to send it to:

For Department of Environmental Quality Use Only

Accepted/Not Accepted by: _____ Date: _____

Basin _____ Stream Class _____ Section _____ Special Standards _____

Antidegradation Checked? Yes No Is The Discharge to Impaired Waters? Yes No

Has a TMDL been established? Yes No N/A Is the TMDL EPA approved? Yes No N/A

**DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY DIVISION
PERMIT APPLICATION FEE FORM
EFFECTIVE JULY 1, 2004**

INSTRUCTIONS

Applicants for individual Virginia Pollutant Discharge Elimination System (VPDES), Virginia Pollution Abatement (VPA), Virginia Water Protection (VWP), Surface Water Withdrawal (SWW), and Ground Water Withdrawal (GWW) Permits are required to pay permit application fees, except farming operations engaged in production for market. Fees are also required for registration for coverage under General Permits except for the general permits for sewage treatment systems with discharges of 1,000 gallons per day (GPD) or less and for Corrective Action Plans for leaking underground storage tanks. Except for VWP permits, fees must be paid when applications for permit issuance, reissuance* or modification are submitted. Applicants for VWP permits will be notified by the DEQ of the fee due. Applications will be considered incomplete if the proper fee is not paid and will not be processed until the fee is received. (* - the reissuance fee does not apply to VPDES and VPA permits - see the fee schedule included with this form for details.)

The permit fee schedule is included with this form. Fees for permit issuance or reissuance and for permit modification are included. Once you have determined the fee for the type of application you are submitting, complete this form. The original copy of the form and your check or money order payable to "Treasurer of Virginia" should be mailed to:

Department of Environmental Quality
Receipts Control
P.O. Box 10150
Richmond, VA 23240

A copy of the form and a copy of your check or money order should accompany the permit application. You should retain a copy for your records. Please direct any questions regarding this form or fee payment to the DEQ Office to which you are submitting your application.

APPLICANT NAME: US Army Garrison - Fort Belvoir SSN/FIN: N/A

ADDRESS: 9430 Jackson Loop DAYTIME PHONE: (703) 806-3017
Building 1442, Suite 100 Area Code
Fort Belvoir, VA 22060

FACILITY/ACTIVITY NAME: Fort Belvoir

LOCATION: Fort Belvoir, Virginia

TYPE OF PERMIT APPLIED FOR
(from Fee Schedule): VPDES General / Industrial Storm Water Management

TYPE OF ACTION: New Issuance X Reissuance Modification

AMOUNT OF FEE SUBMITTED
(from Fee Schedule): \$500.00

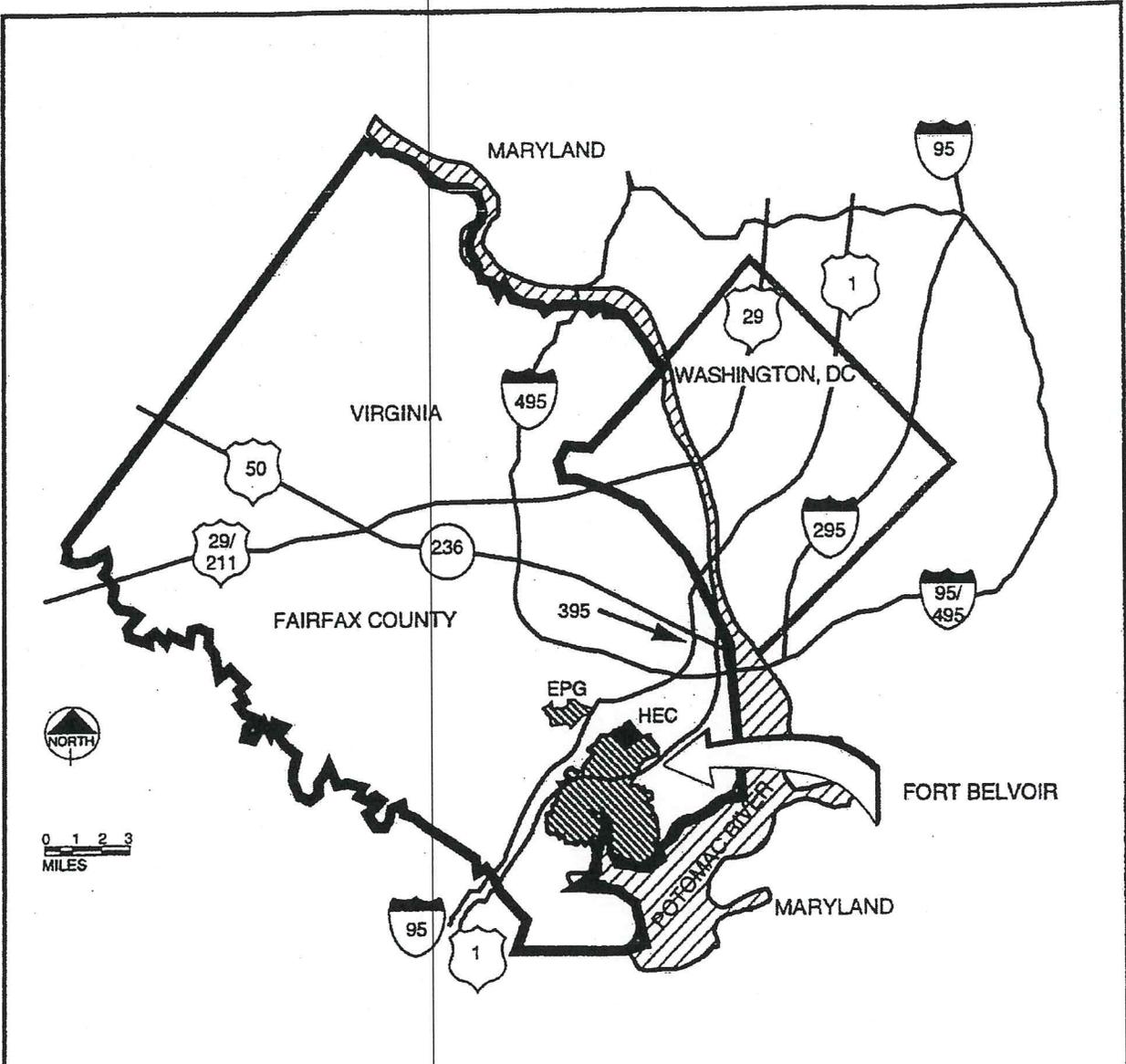
EXISTING PERMIT NUMBER (if applicable): VAR051080

DEQ OFFICE TO WHICH APPLICATION SUBMITTED (check one)

Abingdon/SWRO	Harrisonburg/WRO	<input checked="" type="checkbox"/> Woodbridge/NVRO	Lynchburg/SCRO
Richmond/PRO	Richmond/Headquarters	Roanoke/WCRO	Virginia Beach/TRO

FOR DEQ USE ONLY
Date: _____
DC #: _____

Original Form and Check - DEQ Receipts Control, Richmond Copy of Form and Copy of Check - DEQ Regional Office or Permit Program Office
--



- Legend**
-  Interstate
 -  U.S. Highway
 -  State Road
 - EPG Engineer Proving Grounds
 - HEC Humphreys Engineer Center
 -  Fort Belvoir

Approved Site Plans for Land Disturbance &/or Construction	Date Approved	Reviewer/Inspector	Project Status	Notes
DPW-ENRD Building 1442, Room 200 Plans Located in Watershed Mgmt/SWM/ESC/MS-4 Area List Updated: 3 September 2009				
<u>MAIN POST</u>				
Accotink Creek Bank Stabilization	24-Nov-08	n/a	Completed Dec '08	
ADF-East Medium Voltage Power Underground Duct Bank		C. Glassmoyer	In Review	95% Review
Belvoir Village- Land Disturbance Permit	3-Apr-09	G. Hawes/ G. Hawes	In Construction	
Building 1444 Addition		C. Glassmoyer	In Review	95% Review
D-Ceeta West Parking Structure	4-Oct-07	D. Turner	Completed	Drainage issues
Davison Army Airfield Flight Control Tower		C. Glassmoyer	In Review	95% Review
D.C. National Guard	4-Sep-07	L. Stephens	In	
Dental Clinic		C. Glassmoyer	Construction In Review	95% Review
Dental Clinic Addition		C. Glassmoyer	In Review	95% Review
Dewitt Army Community Hospital Administration Building	30-Apr-09			status unknown
DLA-Entrance Gate Security Enhancements	30-Oct-07			
Fort Belvoir Community Hospital IPO	29-Nov-07	C. Glassmoyer	Completed	Cannot find plan
Fort Belvoir Community Hospital FM & Utilities Realignment	29-Nov-07	C. Glassmoyer	Completed	
Fort Belvoir Community Hospital (Phase 1 E&S)	19-Dec-07	C. Glassmoyer	In	Cannot find plan
Fort Belvoir Community Hospital (Phase 2 E&S)	4-Sep-08	C. Glassmoyer	Construction In	
Fort Belvoir Community Hospital CUP Land Disturbance Permit	2-Apr-08	C. Glassmoyer	Construction In	
		C. Glassmoyer	Construction	W/M connection in 9th St. still not resolved-T. Betts coordinating
Fort Belvoir Community Hospital Water Main Relocation	22-Jan-09	n/a		
Fort Belvoir-Town Center Parking Lot, 65% Submittal		G. Hawes	In review?	

Main Post (Main) Attachment D

Gerber Village Phase I & Phase II (Ph. II is Stormwater Pond only)	27-Jan-09	G. Hawes/ G. Hawes	In Construction			
Jadwin Village, Phase 2	22-Apr-08					
JUIAF (Rivanna) Phase I Erosion and Sediment Control Plan	14-Aug-08	L. Stephens	In Construction			
JUIAF (Rivanna) Phase 2 Erosion and Sediment Control Plan	21-Oct-08	L. Stephens	In Construction	Cannot find plan		
Main Post Infrastructure Phase I - Belvoir & Pohick Road	11-Jun-09		On Hold	Pre-Con Meeting 4-Aug-09		
Main Post Infrastructure Phase II - Gunston, Goethals & 9th Street	Can't find plan	C. Glassmoyer	In Review	Requirements Meeting with Shirley 8/19/2009		
Main Post Infrastructure Stream Restoration		Vega/Fiorello/ Glassmoyer	In Review	95% Review		
MDA	27-Mar-09	L. Stephens	In Construction			
Mulligan Road -Phase I	?	C. Glassmoyer	In	Cannot find approved plan		Waterline Issue needs to be resolved for 16" WM x-ing near Pole Rd-- coord. With T. Betts
Mulligan Road -Phase II		C. Glassmoyer	In Review	65% Review		
Museum Support Center Facility- for Rough Grading Permit	26-Nov-08	L. Stephens	In Construction			
NARMC		C. Glassmoyer	In Review	95% Review		
Runway 32 Electrical Improvements-Davison Army Airfield	19-Aug-09			Awaiting LD/L/Dig Permit		
Soils Stockpile at Theote and Warren Roads	?	G. Hawes/ G. Hawes	In Construction			
Tompkins Basin Water & Wastewater Infrastructure Repair	6-Feb-09	n/a	Completed			
FORT BELVOIR NORTH AREA (FBNA)						
Emergency Services Center- Grading & Infrastructure Plan	29-May-09	Hawes/Glassmoyer	In Construction		Ph I ESC approval only	

EPG Sanitary Sewer	28-Aug-08	T. Betts	Completed	
EPG IPO (Phase 1 E&S)	7-Nov-07	M. Hudson	Completed	
EPG IPO (Phase 2 E&S)	5-Mar-08	M. Hudson	Completed	Reg. Size & Half-Size approved sets
EPG Temporary Access Road	31 Mar 08	M. Hudson	Completed	
EPG (SLR) Rough Grading (Phase 1)	12-Sep-08	M. Hudson	In	Plan Revision submitted 9/11/09
EPG Power Substation Rough Grading Plan	12-Sep-08	M. Hudson	Construction	
EPG - South Loop Road Bridge (Sta 226+50 to Sta 272+50)	5-May-09	M. Hudson	Construction	Waiting on LDL & Dig Permit
EPG Power Substation- Final SWM & Access Design	29-Apr-09	M. Hudson		Plan Revision Bulletin #1 submitted 9/17/09
EPG-South Loop Road (SLR)- Revision Plan	23-Dec-08	M. Hudson	In	
EPG - Barta Road Access- Backlick Rd improvements	7-Nov-08	M. Hudson	Construction	Revision to plan checked Aug 7, 2009
EPG - East North Loop Road Utilities	13-Jul-09	M. Hudson	In	
EPG-South Loop Road, 226+50 to 272+50, Paving and Traffic	6-Feb-09	M. Hudson	Construction	
EPG-Water Tank and Pump House		G. Hawes	In review?	
EPG-West North Loop Road, 129+35.09 to 151+92.84		G. Hawes	In review?	
EPG-Hooes Road Temporary Entrance Improvements		Hawes/Glassmoyer	In review?	
EPG-West North Loop Road/Cisna Road water main (Bulletin #1)		Hawes/Glassmoyer	In review?	
EPG-Fairfax County Parkway Water and Sewer Casing Plan		G. Hawes	In review?	
EPG-Fairfax Water Connection at Rolling Road		Hawes/Glassmoyer	In review?	

Fullerton Access Road	15-Jul-09	C. Glassmoyer M. Hudson			Awaiting Bid Award/ & Construction
NCE- New Campus East -Remote Inspection Facility (RIF)	6-May-09	M. Hudson	On Hold		Awaiting Bid Award/ & Construction
NGA-New Campus East- North Parking Lot	28-May-08	M. Hudson	Completed		
NGA Temporary Electric Alignment	24-Jul-08	M. Hudson	Completed		
NGA- New Campus East-Temporary Topsoil Stockpile (3B)	11-Sep-08	M. Hudson	Completed		
NGA Fill and Grading Plan Stockpile 3M	1-Apr-08	M. Hudson	Completed		
NGA Phase 2 Erosion and Sediment Control Plan	14-Apr-08	M. Hudson	In Construction		Cannot find plan
NGA- North Loop Road- Bridge Over Acotink	7-Nov-08	M. Hudson	In Construction		

Fort Belvoir Erosion and Sediment Control Inspection Report

Project Name:	Project Authority:	<input type="checkbox"/> Scheduled Inspection	Date:
RLD Name:	RLD No.:	<input type="checkbox"/> Post Rain Inspection	
Project Location:	Attendees:	<input type="checkbox"/> Re-Inspection	Time:
Inspector Name:		<input type="checkbox"/> Other	

Item #	State/Local Regulation ⁽¹⁾	Violation		Description & Location of Problem/Violation ⁽²⁾ , Required or Recommended Corrective Actions and Other Comments/Notes
		Initial	Repeat	
	MS-1 & 5			
	MS-2			
	MS-3			
	MS-4 & 6			
	MS- 7			
	MS-8, 9 & 11			
	MS-10			
	MS-12-15			
	MS-16			
	MS-17			
	MS-18			
	MS-19			

(1) Refers to applicable regulation found in the most recent publication of the *Virginia Erosion and Sediment Control Regulations (4VAC50-30)*, *Virginia Stormwater Management Regulations (4VAC3-20)*, or local ESC/SWM ordinance.

(2) Note whether or not off-site damage resulting from the problem/violation was evident during the inspection.

REQUIRED CORRECTIVE ACTION DEADLINE DATE: _____	Re-inspection Date: _____
--	---------------------------

The required corrective action deadline date applies to **all violations** noted on this report. If listed violation(s) currently constitute non-compliance and/or required corrective actions are not completed by the deadline, a **NOTICE TO COMPLY, STOP WORK ORDER** and/or other enforcement actions may be issued to the entity responsible for ensuring compliance on the above project.

Inspector Signature: _____	Date: _____
----------------------------	-------------

Acknowledgement of on site report incident:

Print Name	Signature	Date
------------	-----------	------

This report will be provided to the following parties via mail, fax or e-mail within 24 hours of inspection:

BMP 4.6 Evaluate Emerging Technologies

At Fort Belvoir's re-chlorination plant, located on the shoreline of Accotink Creek, including the opposite shoreline along Davison Army Airfield, the shoreline was actively eroding. The erosion caused slumping of the banks, threatening the infrastructure of the re-chlorination plant. The shoreline had to be stabilized in order to preserve the integrity of the re-chlorination plant's infrastructure.



Photograph of the eroding shoreline just upstream of the re-chlorination plant taken 22 October 2007.

Fort Belvoir DPW Natural Resources Division (ENRD) contacted Mr. Dave Derrick of the U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory for an innovative solution to the shoreline erosion problem. The Installation requested a design that would address the shoreline erosion control problem in a natural and low impact manner rather than having a hardened conventional shoreline treatment. Fort DPW ENRD worked with Mr. Derrick on developing the design and then permitted the engineered solution.

The stream bank stabilization project used continuous longitudinal peaked stone protection (LPSTP), stone bend weirs, stone tie-ins, locked logs, and live stakes. The LPSTPs were installed by installing riprap three feet below the surface water elevation, installing live stakes into the interstitial

(stream restoration) Attachment F

spaces of the stone toe protection to strengthen the bank and creating hydraulic roughness. Vegetated stone keys and living dikes tie-backs were installed into the existing bank from the LPSTPs, trenching the keys approximately 25 feet into the stream bank. The living dikes were dug perpendicular to the stream bank and planted with live stakes. Following completion of construction at the stream bank the area was stabilized with coir matting and native seed mixture. The in-stream stabilization measures included the installation of bendway weirs and locked limbs or logs to move the thalweg to the center of the creek. The weirs were constructed using VDOT Standard Class III riprap and depressed approximately 2 feet below the normal water surface elevation. The locked limbs and logs were anchored into the stream bank to provide toe protection and aquatic habitat.



Photograph of the stream restoration project post construction. This photograph was taken on 15 December 2008 from the opposite shoreline, looking at the area shown of the eroding shoreline above.



This photograph, also taken on 15 December 2008, shows the living dikes and bendway weirs at the project. This photograph shows the upstream portion of the shoreline stabilization project on the Davison Army Airfield side.

BMP 5.4 Present Sustainable Development Considerations/New Technologies

The Installation held a Workshop through the Corps of Engineers for the Accotink Creek Stream Stabilization project (see BMP4.6). The Workshop also included a follow up visit for the stream bank shoreline erosion control project that was built in 1997 just upstream of the Panther Bridge on Farrar Road at Fort Belvoir property. The Workshop was held on Wednesday, December 3, 2008 and had an optional field day at the project site on Thursday, December 4, 2008. The Workshop included the watershed perspective, project background, sediment processes, sediment budget, channel stability, SIAM, watershed management, and the stream design.

The workshop was attended by approximately 40 persons and was advertised by the U.S. Army Corps of Engineers, USACE Coastal & Hydraulics Laboratory Flood & Coastal Storm Damage Reduction R&D Program and the U.S. Army Installation Fort Belvoir. See Attached Workshop Flyer, Registration Form and Workshop Agenda.

BMP 6.7 Support Stream Restoration

Fort Belvoir constructed stream restoration projects for two streams that will receive storm water from the construction of the new Fort Belvoir Community Hospital Campus and the planned Warriors in Transition Unit (WTU). These projects were designed and undertaken to accomplish the adequate outfall requirements of the State and Fort Belvoir's MS 4 permit.

The stream channels in these areas were already severely incised and mostly disconnected from the floodplain. The goal was to restore the streams that they can handle the anticipated volume and velocity of the storm water that is expected to be released from the Hospital and WTU sites and to improve and restore aquatic habitat to the stream reaches.

The stream restoration project restored 2,671 linear feet of stream, using natural stream design, that is comprised of the restoration of 364 linear feet of ephemeral stream, 857 linear feet of intermittent stream and 1,450 linear feet of perennial stream. The project included the realignment of approximately 750 linear feet of stream reach, areas of stream bed had to be raised in order to decrease channel incision and minimize to the adjacent forested areas as much as feasible. Rock structures were employed to provide for additional stream channel stability and to maintain a riffle and pool system. Riparian areas disturbed by the project were replanted and a riparian forest buffer was planted in riparian areas that had previously no woody vegetative buffer and to provide additional terrestrial and wetland habitat.



The stream reach 'A' along Surveyor Road before the stream restoration took place and below the same area after the stream restoration was constructed. This stream receives discharge from a storm water management facility at the East side of the new hospital project.





A view of a lower section of the same stream along Surveyor Road prior to construction and below a photograph of the same stream reach after the stream restoration was constructed.





A photograph of the second stream that was restored on the west side of the hospital construction project that receives discharges from a storm water management facility just above of where the photograph was taken and below the same section of the stream reach post construction.





View of a downstream section of the stream on the west side of the hospital project above and a photograph of the same reach after the stream restoration project was completed.



Stream restoration work part of hos

Submitted by Directorate of
Public Works

*Environmental and Natural
Resources Division*

Residents and visitors to Fort Belvoir are likely aware of ongoing construction projects throughout the post. The Belvoir Community Hospital construction has become a common sight for many.

Soon, people may also notice a large amount of equipment and activity within the woods and streambed along Surveyor Road on the other side of Belvoir Road from the hospital. The trucks, rock, and equipment in the forest and the construction activity in that streambed are all part of an important stream restoration project.

It may seem like the construction is destroying the woods and the stream there, but, actually, the project is being done to save the stream. The disturbance will only be temporary. After the construction is complete, it will correct a serious erosion problem that was threatening the continued existence of that stream.

In a year or two, the area should revert to its natural wooded state.

The stream restoration project is scheduled through April and involves two streams. In addition to the Surveyor Road stream, the project will also restore another stream in the vicinity of 9th Street and Gunston Road. The Surveyor Road stream will be the more noticeable of the two restorations. Together, the two projects represent a major effort to restore damaged streams on post.

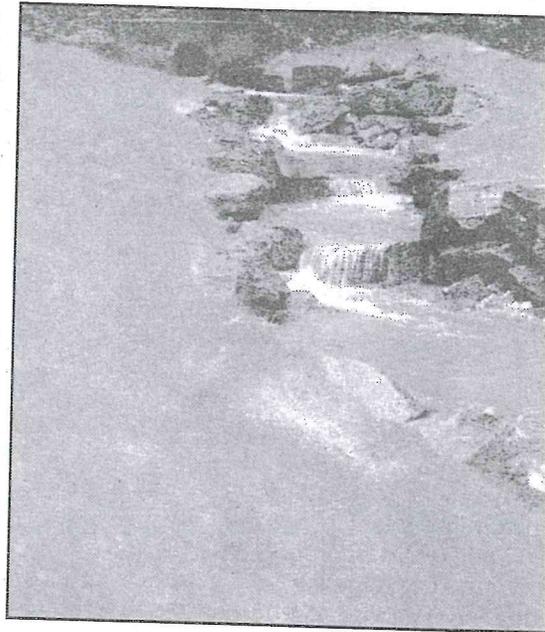
The two streams are currently deeply incised, which means heavy stormwater flows have cut into the

soil within the stream channel, and the stream is not able to handle these continued flows without suffering further damage. Too much stormwater has been passing too quickly through these stream channels, causing soil erosion, collapsed banks and fallen trees. This situation degrades water quality and stream habitats.

The stream restoration project will correct the existing physical damage to these two streams by stabilizing the stream banks and the streambed, and replanting trees along the banks. This project was designed to work with the hospital's stormwater management facilities to enable the streams to properly handle the water coming from the new hospital site.

The hospital will have two stormwater management ponds that collect stormwater run-off from the buildings and parking lots. In the ponds, sediment and excessive nutrients are allowed to settle out before the water flows into the streams. The ponds also slow the rate of the water flow to the stream. The water that then flows to the streams will be higher in quality and will drain at a reduced rate so it can be handled properly by the newly restored streams.

The stream restoration consists of re-shaping the stream channels so they have gentle bends, rocky areas and small pools. Such features, taken together with other design aspects, control the speed of the water flowing through the stream. With the quantity and speed of the water properly controlled, the risk of incision and erosion is reduced. Completing this restoration project benefits water quality and habitat conditions



This stream also went through a restoration Belvoir.

within these streams all the way down to Dogue Creek and Accotink Bay.

The project will also include work with surrounding vegetation. People may notice some trees and undergrowth being removed as a first step in the project. However, more vegetation will be planted in their place. By planting trees and shrubs along the stream banks, the site will not only be improved aesthetically, but the appropriate plants will help stabilize the soil. The new plants are part of the riparian zone (area immediately surrounding the stream) and will help filter excessive nutrients and contaminants from the water.

Stream restoration projects benefit both the community and the environment because they reduce pollutants entering the waterways and restore natural environments. The restored streams will provide



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In the Schools

School details in

Environmental Outlook

Stream restoration work part of hospital construction

Within the stream channel, the stream is not able to handle continued flows without causing further damage. Too much stormwater has been passing quickly through these channels, causing soil erosion, collapsed banks and fallen trees. This situation degrades water quality and stream habitats. Stream restoration projects protect the existing physical structure of these two streams by stabilizing the stream banks and riprap, and replanting vegetation along the banks. This project had to work with the hospital's stormwater management plan to enable the streams to handle the water coming from the new hospital site.

The hospital will have two stormwater management ponds to collect stormwater run-off from buildings and parking lots. The ponds, sediment and nutrient traps, will allow nutrients to be filtered out before the water flows into the streams. The ponds also will reduce the velocity of the water flow to prevent erosion. The water that then flows into the streams will be higher in quality and will drain at a rate so it can be handled by the newly restored

Stream restoration consists of stabilizing the stream channels with gentle bends, rocky riffles and small pools. Such features, together with other structures, control the speed of water flowing through the stream with the quantity and velocity of water properly considered. Completing this project benefits water quality and habitat conditions



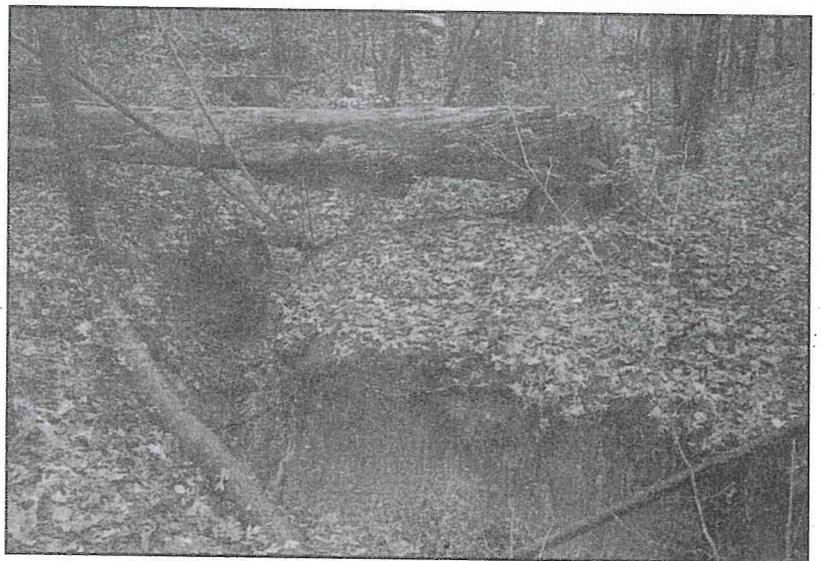
Courtesy photos

This stream also went through a restoration project, similar to what's being performed on Fort Belvoir.

within these streams all the way down to Dogue Creek and Accotink Bay.

The project will also include work with surrounding vegetation. People may notice some trees and undergrowth being removed as a first step in the project. However, more vegetation will be planted in their place. By planting trees and shrubs along the stream banks, the site will not only be improved aesthetically, but the appropriate plants will help stabilize the soil. The new plants are part of the riparian zone (area immediately surrounding the stream) and will help filter excessive nutrients and contaminants from the water.

Stream restoration projects benefit both the community and the environment because they reduce pollutants entering the waterways and restore natural environments. The restored streams will provide



This is how another project's stream looked before it was restored.

revitalized habitat for both aquatic and terrestrial organisms. The construction project may be unattractive in the short term, but will be a great, long-term benefit to Belvoir and the environment it shares.

In the Schools

**ACCOTINK CREEK PROJECTS – OLD AND NEW
FAIRFAX COUNTY, VIRGINIA**

FREE WORKSHOP AND SITE VISIT

INNOVATIVE APPROACHES TO STREAM STABILIZATION AND RESTORATION

DATE: Wednesday, December 3, 2008 (optional field day on December 4)

TIME: 9:00 am to mid-afternoon

LOCATION: Mosby Reserve Center, 8831 Farrar Road, Fort Belvoir, VA 22060. (rooms 103-104)

INSTRUCTORS: Meg Jonas¹, Dave Derrick¹, and Dr. Mark Sudol²
U.S. Army Corps of Engineers (USACE)

¹Research Hydraulic Engineer, USACE Engineer Research & Development Center, Coastal & Hydraulics Laboratory (ERDC-CHL)

² Group Manager, USACE Army Engineer Institute for Water Resources (IWR)

This exciting FREE workshop will showcase three innovative stream projects on Accotink Creek in northern Virginia. It will present the stream stabilization methods used, design considerations, ongoing Corps research, and the role of sediment management in watershed planning and restoration.

The **Panther Bridge project** was built in 1997 as an environmentally sensitive and cost-effective means of reducing severe erosion problems. Despite receiving flows from a highly urbanized watershed, the project has performed well, and exhibits the use of two methods: stone toe bank protection and bendway weirs. In one area, stone toe was used to initiate the formation of a new bank line and floodplain. This is an excellent case study. **Hip boots, waders or rubber boots are recommended for the Panther Bridge site visit.**

Two new projects on Accotink Creek will be constructed the week of December 1-5 to protect the runway and the re-chlorination plant. These will use a variety of innovative streambank stabilization measures, many of which incorporate vegetation. They include locked limbs, slit brush layering, rooted stock plantings, slit trench living dikes, longitudinal peaked stone toe protection (LPSTP), live siltation behind LPSTP, curved vegetative keys, short bendway weirs, and native grasses. **Since this project is a construction site, safety gear will be required: hard hat, safety vest, and work boots or rubber boots .**

On **Wednesday, December 3**, we will start the day with classroom presentations, visit the Panther Bridge site, eat lunch, and end the day at the two projects under construction. In the morning, we will place an order (and collect money) for box lunches.

Thursday, December 4, is an optional field day at the new project.

Workshop Sponsors: U.S. Army Fort Belvoir; USACE Coastal & Hydraulics Laboratory Flood & Coastal Storm Damage Reduction R&D Program, Streambank Protection Measures Work Unit.

Register early! Workshop space is limited!

Registration form on next page

Contact Meg Jonas at Margaret.m.jonas@usace.army.mil with questions.

(Stream Restoration) Attachment E

**ACCOTINK CREEK PROJECTS – OLD AND NEW
FAIRFAX COUNTY, VIRGINIA**

FREE WORKSHOP AND SITE VISIT

INNOVATIVE APPROACHES TO STREAM STABILIZATION AND RESTORATION

DECEMBER 3, 2008 (WEDNESDAY)

REGISTRATION FORM

Registration is FREE
Participants will pay for lunch

Name: _____ **Email:** _____
Affiliation: _____ **Phone:** _____
Address: _____ **Fax:** _____
City/Zip: _____

Submit Registration Form to Meg Jonas by e-mail:
Email: Margaret.m.jonas@usace.army.mil
Questions? Call Meg Jonas at 574-299-0214

Accotink Creek Workshop
Wednesday, December 3, 2008

Agenda

Time	Instructor	Topic
0900	Chris Landgraf Meg Jonas	Welcome Introductions, lunch plans
0915	Dr. Mark Sudol	Watershed perspective (part 1)
0935	Meg Jonas	Streambank protection measures: general information on stone toe and bendway weirs
0955	Dave Derrick Mike Hudson	Panther Bridge project: background and specifics
1015		Break
1030	Dave Derrick, Meg Jonas	Field - Panther Bridge site. Hip boots, waders or rubber boots are recommended.
1200		Lunch
1230	Dr. Mark Sudol	Watershed perspective (part 2)
1250	Meg Jonas	Sediment processes in the reach and watershed: sediment budget, channel stability, SIAM, watershed sediment management
1310	Dave Derrick	Classroom introduction to projects under construction on Accotink Creek (runway and re-chlorination plant)
1330		Break (also safety and logistics for field)
1345	Dave Derrick	Field - Projects under construction. Safety equipment REQUIRED: hard hat, safety vest, and work boot or rubber boots.
1530 approx		End of workshop

Thursday, December 4
Optional field day - projects under construction

MS4 Permit Reporting Year 1 July 2008 - 30 June 2009
 Permit No. VAR040093
 Fort Belvoir, Virginia

<u>BMP Type</u>	<u>HUC</u>	<u>Impaired Water</u>	<u>No. of Acres Treated</u>
Extended Detention	PL27	Dogue Creek	55.8
Enhanced Extended Detention	PL27	Dogue Creek	6.5
Sediment Forebay	PL27	Dogue Creek	6.5
Extended Detention	PL27	Dogue Creek	12.2
Extended Detention	PL27	Dogue Creek	9.1
Detention	PL27	Dogue Creek	4.7
Extended Detention	PL27	Dogue Creek	8.4
Detention	PL27	Dogue Creek	4.2
Detention	PL27	Dogue Creek	12.7
Extended Detention	PL27	Dogue Creek	16.8
Detention	PL27	Dogue Creek	5.4
Detention	PL27	Dogue Creek	3.6
Detention	PL27	Dogue Creek	14.5
Detention	PL27	Dogue Creek	2.3
Detention	PL27	Dogue Creek	20.4
Detention	PL27	Dogue Creek	16.7
Detention	PL27	Dogue Creek	3.4
Detention	PL27	Dogue Creek	6.2
Detention	PL27	Dogue Creek	5.8
Enhanced Extended Detention	PL27	Dogue Creek	26.4
Enhanced Extended Detention	PL27	Dogue Creek	15.7
Sediment Forebay	PL27	Dogue Creek	15.7
Rain Garden	PL27	Dogue Creek	0.75
Rain Garden	PL27	Dogue Creek	0.75
Enhanced Extended Detention	PL27	Dogue Creek	18.4
Bioretention	PL27	Dogue Creek	10.2
Enhanced Extended Detention	PL27	Dogue Creek	18.4
Enhanced Extended Detention	PL27	Dogue Creek	14.8
Enhanced Extended Detention	PL27	Dogue Creek	14.8

(Station: water distribution info) Attachment A

Enhanced Extended Detention	PL27	Dogue Creek	16.9
Rain Garden	PL27	Dogue Creek	0.25
Detention	PL27	Dogue Creek	4.5
Rain Garden	PL27	Dogue Creek	0.25
Rain Garden	PL27	Dogue Creek	0.25
Rain Garden	PL27	Dogue Creek	0.25
Rain Garden	PL27	Dogue Creek	0.25
Enhanced Extended Detention	PL27	Dogue Creek	15.6
Enhanced Extended Detention	PL27	Dogue Creek	15.6
Sediment Forebay	PL27	Dogue Creek	15.6
Enhanced Extended Detention	PL27	Dogue Creek	14.3
Enhanced Extended Detention	PL27	Dogue Creek	14.3
Enhanced Extended Detention	PL27	Dogue Creek	13.8
Enhanced Extended Detention	PL27	Dogue Creek	13.8
Enhanced Extended Detention	PL27	Dogue Creek	14.8
Sediment Forebay	PL27	Dogue Creek	25.7
Enhanced Extended Detention	PL27	Dogue Creek	14.8
Enhanced Extended Detention	PL27	Dogue Creek	13.6
Bioretention	PL30	Accotink Creek	33.2
Enhanced Extended Detention	PL30	Accotink Creek	7.4
Detention	PL30	Accotink Creek	4.9
Detention	PL30	Accotink Creek	9.5
Infiltration	PL30	Accotink Creek	10.7
Detention	PL30	Accotink Creek	56.8
Retention	PL30	Accotink Creek	5.5
Detention	PL30	Accotink Creek	6.9
Extended Detention	PL30	Accotink Creek	24.8
Enhanced Extended Detention	PL30	Accotink Creek	11.5
Extended Detention	PL30	Accotink Creek	7.4
Detention	PL30	Accotink Creek	12.9
Detention	PL30	Accotink Creek	18.4
Detention	PL30	Accotink Creek	19.6
Extended Detention	PL30	Accotink Creek	4.5
Detention	PL30	Accotink Creek	6.2

Detention
Detention
Rain Garden
Bioretention
Retention
Extended Detention
Plunge Pool

PL30
PL30
PL30
PL30
PL30
PL30
PL30

Accotink Creek
Accotink Creek
Accotink Creek
Accotink Creek
Accotink Creek
Accotink Creek
Accotink Creek

7.8
5.6
0.75
16.5
42.7
26.8
3.5