

FY 2009 Proposal

Identification of Key Restoration Areas in the Darby-Cobbs Watershed through the use of Watershed Sediment Assessment

Background

The Darby-Cobbs watershed discharges to the Delaware River through the wetlands of the John Heinz National Wildlife Refuge at Tinicum. The watershed encompasses approximately 80 mi² of southeastern Pennsylvania, including parts of Chester, Delaware, Montgomery, and Philadelphia Counties. It can be divided into three subwatersheds: Cobbs Creek, Darby Creek, and Tinicum and 31 municipalities (Figures 1 and 2).

Most of the Darby-Cobbs watershed is highly urbanized and as much as 66% of the surfaces are impervious. The streams and creeks within the watershed have been a consistent problem in terms of storm water runoff, flooding, streambank erosion, ecological degradation, and aesthetics. The Philadelphia District began studying this watershed in 1970 and has initiated 20 official studies over the past 38 years. Only one of these projects, gabion streambank reinforcement, was constructed. Most of these projects were initiated by individual municipalities and were terminated because it was not economically feasible to armor relatively small sections of streambank.

Many of the towns took it upon themselves to channelize and armor most of the streams and creeks, which effectively unbalanced the sediment equilibrium of the watershed, causing more problems, such as excessive sediment or erosion. Urban sprawl and the corresponding increased runoff have further compounded the problem.

Currently, there are five authorized but inactive Corps studies in the Darby-Cobbs watershed, four stream restoration projects implemented through a design build authority and the Delaware River Basin Comprehensive Study.

The Philadelphia District continues to receive project requests and complaints from communities within the Darby-Cobbs watershed, due in part to recurring floods. These potential projects include flood mitigation, protecting exposed sewage infrastructure along streambanks, and stream restoration. These requests are for different subsets of the watershed and there is no mechanism for examining how these small projects would affect other parts of this fragile watershed. There is a need to look at the watershed wide-interaction to avoid causing additional problems in the future. If one town sponsors a project, they don't want to pay for a study to examine how it will impact the rest of the watershed.

This watershed runs across several boundaries and many groups have voiced a desire for a watershed-wide study, but do not want to pay for construction in another town. The state will not participate. One potential solution is using a non-traditional model to

identify beneficial project areas. Once identified, the affected towns could co-sponsor design and construction of the projects.

Project Description

The Darby-Cobbs Watershed Sediment Assessment has two objectives. The first objective is to perform a watershed-scale assessment to develop a map of potential imbalances and identify effective design or remediation needs. The second objective of the study is to use this information to develop a framework for the restoration of urban watersheds. This framework will be applicable nationwide because watersheds plagued by urban sprawl, degraded habitat, several stakeholders with conflicting interests, and recurrent flooding are not unique to the Darby-Cobbs watershed or the Philadelphia District.

Although many of the problems in urban watersheds are a result of imbalances in the sediment equilibrium, sediment transport is rarely assessed on a watershed scale. This demonstration project provides an opportunity for the Corps to apply unbiased technical expertise to practical issues. It will also demonstrate the utility of a watershed-wide sediment assessment. The products will improve the planning and design of ongoing and future projects (Corps and non-Corps). This will benefit the Corps and many other agencies and stakeholders by selecting and encouraging the effective implementation of future projects that will restore the Darby-Cobbs watershed.

Restoration alternatives will be developed, such as proper stormwater management, storm water retention/ sediment detention areas, barrier removal, etc. These alternatives will be evaluated using a Sediment Impact Assessment Model (SIAM) of the Darby-Cobbs watershed. The result will be a comprehensive watershed plan that will recommend appropriate methods for immediate and long-term solutions. Future projects identified by the plan could be co-sponsored by several adjacent municipalities since the benefits of an effective stream restoration project will positively impact large portions of the watershed. This plan may supplement or replace the Feasibility Phase and expedite the time to construction of future Corps projects. The specific project tasks follow:

Phase 1: Preliminary Evaluation (*FY06 & FY07*)

- Coordinate with multiple stakeholders
- Assess the watershed with a field investigation
- Assemble, review, and archive existing data

Phase 2: Detailed Assessment (*FY07, FY08, & proposed for FY09*)

- Continue coordination with stakeholders
- Detailed data evaluation and development of a database
- Develop a sediment budget
- Perform a watershed-level geomorphic assessment
- Identify data gaps and collect additional data

Phase 3: Analysis and Planning (*FY10 & future efforts*)

- Develop restoration alternatives
- Format data for model input
- Analyze alternatives using Sediment Impact Assessment Model (SIAM) and other models
- Write a comprehensive watershed plan

FY06 Activities

Phase 1 was completed in FY06:

- The District coordinated with multiple municipal and county environmental agencies and watershed groups that work throughout the Darby-Cobbs watershed.
- A 3-day preliminary watershed assessment was conducted with Meg Jonas, a sediment transport expert and hydraulic engineer from the Engineering Research and Development Center (ERDC) Coastal and Hydraulics Laboratory. The team visited 24 different sites throughout the watershed.
- The District compiled historic and current data that was collected by the Corps, watershed groups, the Philadelphia Water Department, and various agencies.
- A site visit report was written.

FY07 Activities

Part of Phase 2 was completed in FY07:

- Compiled data (Corps and non-Corps) taken in the watershed over the past century in collaboration with watershed groups and other partners
- Developed a database
- Digitized old reports
- Compiled hundreds of photos from FY06 site visits

FY08 Activities

Part of Phase 2 was completed in FY08:

- Detailed development of database of reports
 - Worked with partners to ensure we have all existing data
 - Categorized reports based on type of data
 - Georeferenced each report
- Developed interactive map layer- reports
 - Map references locations of each study and report title and links to table describing data available in the report
 - All reports available for public to download
 - Will be used for model development
- Developed interactive map layer- photos
 - ~300 photos from FY06 site visit georeferenced to sites representative of various conditions in the watershed
 - Linked to notes describing site conditions
 - “Virtual tour of watershed”
 - Part of partnering with watershed groups and public outreach
 - Geographically and pictorially documents areas with erosion and deposition

- Interactive maps will be posted on the District's RSM website by the end of November 2008 (ACE-IT transition has caused significant delays in web-based program access)
- Developed urban stream pamphlet with feedback from watershed groups
 - Public outreach & education
 - Intended to explain sediment and water transport in easily understood terms
 - Improve public perception of the Corps
 - Increased likelihood of future partnering opportunities
 - More positive view of the Corps' work when our involvement in the watershed increases
 - Watershed groups have offered to distribute at various events
 - Will be printed in mid-November 2008

Proposed FY09 activities

Phase 2 (cont.):

- Develop sediment budget
 - Determine location and magnitude of sedimentation & source (bank or bed)
 - Extract sedimentation and cross-section data from existing (georeferenced) reports
 - Measure turbidity or suspended sediment, perform gradation analyses, pebble counts, or estimate channel changes (aggradation or degradation)
 - Will help determine potential project sites and be used for future development of the model
 - Will leverage data, labor, and funds with agency and watershed partners

Table 1. Time and Cost Estimate of Proposed FY08 Activities

Task	Resource	Time Required	Cost
Travel to RSM meetings	NAP Special Studies Section, ERDC CHL	Travel & per diem costs for 2 people	\$8,000
Project coordination	NAP Special Studies Section (project management), NAP H &H Section (labor for data extraction coordination and site visits)	Labor for 1 person for 80 hours and 1 person for 40 hours	\$12,000
Extraction of data from existing reports	ERDC CHL or H&H section or contractor (TBD)	Labor for ~3 weeks	\$12,000
Collect of additional data	ERDC CHL and/or a contractor (TBD)	Travel expenses, per diem, and labor	\$10,000
Calculation of sediment budget	ERDC CHL	Labor	\$30,000
Total to Complete FY09 Product			\$72,000

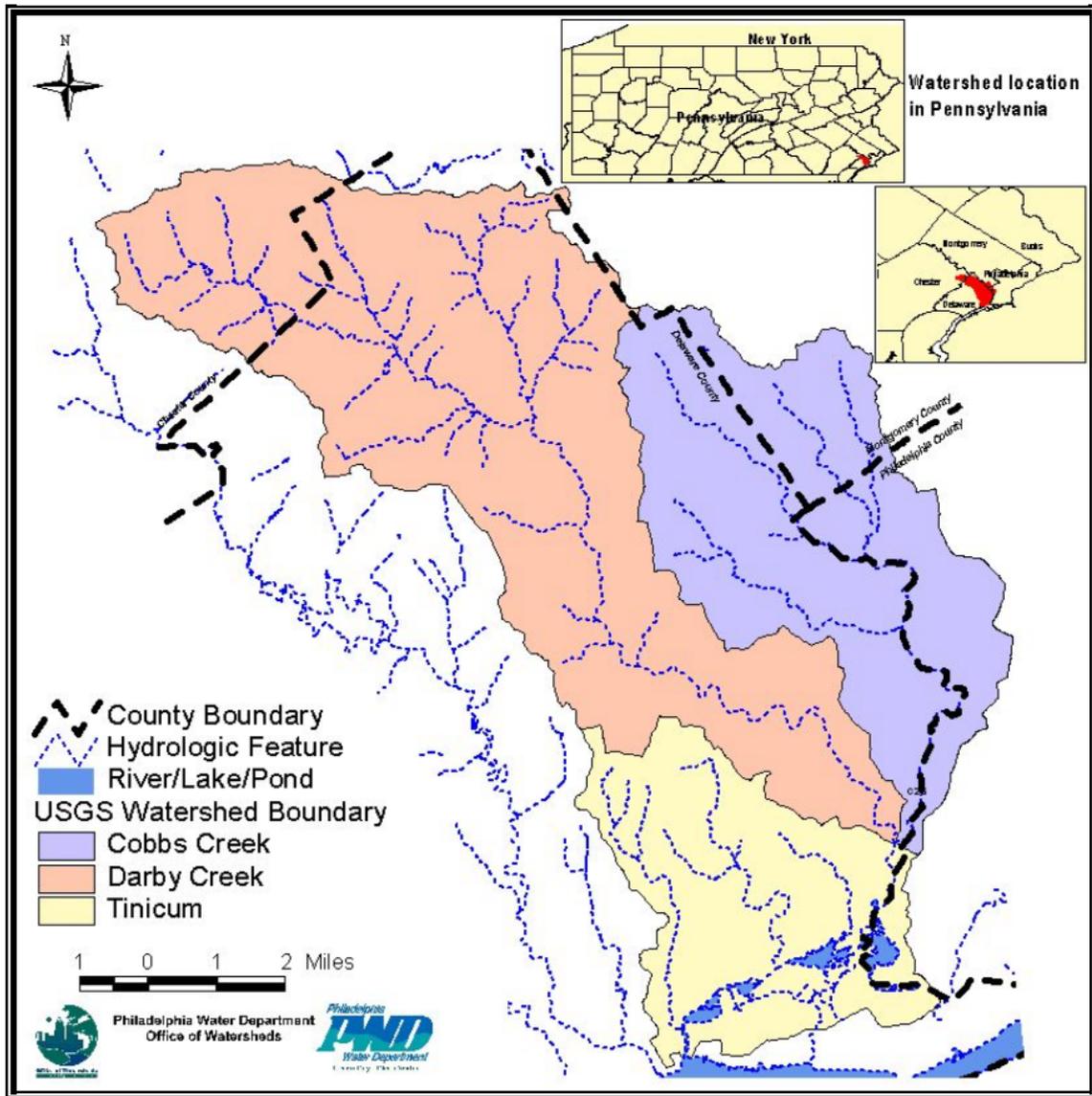


Figure 1. Darby-Cobbs Watershed

Map taken from *Cobbs Creek Integrated Watershed Assessment Plan*, Philadelphia Water Department, Darby-Cobbs Watershed Partnership, October 2004.



Figure 2. Darby-Cobbs Watershed