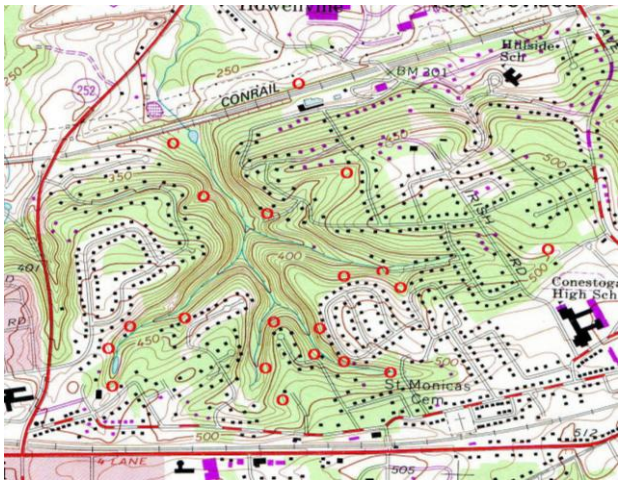
VALLEY CREEK RESTORATION PARTNERSHIP'S EFFORTS TO STABILIZE CRABBY CREEK AND CONCERNS ABOUT THE RENOVATION OF THE ADJACENT SANITARY SEWER LINE

Crabby Creek Virtues and Problems

Crabby Creek is a clean spring fed coldwater stream flowing from a one square mile Piedmont forested watershed with steep valley sides just north of Paoli, Pa. This rare gem in an urban landscape harbors a population of naturally reproducing brown trout and has been designated as an Exceptional Value stream by Pa. Department of Natural Resources. These qualities persist in spite of a development of over 500 homes in the upper watershed whose streets are drained by twenty storm water outfalls going directly into the stream. A two to three inch



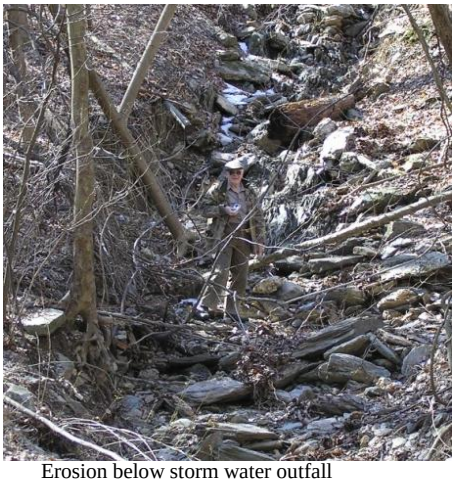
stormwater outfalls in 2009 marked with an O

rainstorm can swell the stream flow from normal by a factor of 150 or more, causing severe erosion of the banks and stream bottom. This occurs especially where the stream is pinched between steep valley walls and the adjacent sewer line and in the deep sediments over which the lower part of the stream flows. In 2004 a large fast moving head-cut (waterfall) had formed in the sediments in the lower stream that undercut the sewer line and its supports, threatening an environmental disaster if it had collapsed.

Crabby in flood in old abandoned channel below RR tunnel

Erosion along sewer line above RR tunnel

June 20, 2011



Erosion below storm water outfall
(note person in center of photo)

Erosion along sewerline

Headcut in Legacy sediments below sewerline on Feb 9, 2004

Headcut eroding under sewerline on Jan 15, 2005

VCRP Efforts to Stabilize and Monitor the Stream

Valley Creek Restoration Partnership (VCRP) comprises a group of partners including Green Valleys Association, League of Women Voters, Open Land Conservancy of Chester County, Valley Forge Trout Unlimited, and The West Chester Fish, Game and Wildlife Association, working in conjunction with Pa. DEP, Pa. Fish and Boat Commission, Valley Forge National Historical Park and local townships and universities. VCRP has been active in the Crabby watershed since 2003 and led the effort to mitigate the destructive erosion suffered in the stream. A series of professional studies[1] and projects[2] financed by more than $728,000 in grants has helped to stabilize the stream, improve its biological and forest habitat, make a start at reducing the storm water flow into the stream, and protect the sewer infrastructure. In 2008 a project was completed which moved the eroding stream bed that endangered the sewer line into a new channel stabilized by means of a Natural Channel Design restoration. Several large (under street) and small infiltration (demonstration rain gardens) projects in the headwaters have been completed; a large bio swale is about to be constructed at the Conestoga H.S. practice athletic field. We are currently engaged in seeking funding for other infiltration projects that are shovel ready and projects to stabilize the stream in the upper watershed.

Digging the new streambed through the canyon

Completed canyon reach with structures in place

Large infiltration project above storm water outfall

One of five demonstration rain gardens

Because we monitored (and will continue to do so) the condition of the stream, the erosion occurring after storms, and the sewer line on a regular basis the severe undercutting of the sewer was discovered, reported, and acted on before a crisis occurred. Our monitoring has also discovered and reported breaks in the sewer line where surface water inflow was occurring and severe leakage at a manhole cover after a storm. These problems were promptly corrected by Tredyffrin Township. We consider the security of the sewer line very important because it is a matter of public safety and health- our grand children play in and around the stream.

Sewage spouting from broken manhole cover above RR

Broken lateral allowing surface water to get into sewer

We also carefully monitored the performance of the restoration in the new streambed and publicly reported on some of its engineering failures[3] as well as its successes. We learned from both. Subsequently, a grant was obtained and an emergency stabilization of the damaged portions of the stream completed in late 2010. We have worked to find funding and a firm that will provide a successful restoration plan, one that will provide long-term stabilization of the streambed. Long- term stabilization is important for the biological habitat of the stream as well as the prevention of future stream destabilization that could again place the sanitary sewer in jeopardy.

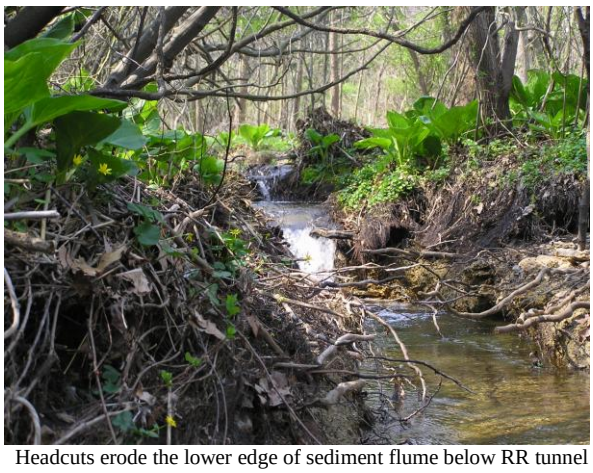
Failed structures in restoration due to erosion of underlying silt

After emergency stabilization of failed reach

Pending Sanitary Sewer Line Renovation

The pending sewer line renovation will have a serious impact on the Partnerships efforts to stabilize Crabby Creek above the area of the relocated streambed. In the upper watershed a sewer runs down each of the branches and they connect and continue down the main streambed, in many stretches making it a flume and minimizing the already small contact that the steam can have with the floodplain in the steep walled narrow valley. This lack of contact with increased land area and vegetation limits the natural reduction in energy that occurs on the floodplain. The result is severe erosion of the channel banks that are made up of the fill that had been used to cover the sewer line. In some areas the sewer line has been nearly exposed, as illustrated in previous photographs. This eroded sediment has been carried downstream below the railroad tunnel to create a large unstable flume of sediment burying access manholes to the sewer line in that area. This sediment field is being destabilized on the downstream edge by head-cuts.

Sewer lines along Crabby Creek- all narrow the streambed and are a sediment supply during high water



Headcuts erode the lower edge of sediment flume below RR tunnel

VCRP is concerned about the loss of tree cover when the old line is uncovered. Additionally, if the line is rebuilt in the same way as was done before, i.e., channelized with high banks that minimize contact of high water with the flood plain, and with fill that cannot with stand the shear forces of high flow, it will have been left in the same or worse condition as the present installation. The same set of problems that previously destroyed habitat and put the sewer line at risk will begin anew. The covered sewer line and the stream channel need to be reconstructed to minimize problems that can lead to high erosion.

We believe that VCRP can act as a responsible and reliable partner with the sewer renovation designer and contractor to insure that this project results in both a renovated sewer line and a more stable streambed that has better biological habitat and better protects the sewer from the problems it has experienced in the past. We also note that most of this work will occur in Township park property and we will assure the best possible outcome for these natural areas. We also will be willing to monitor the completed work and publicize the results.

Footnotes

1. *Crabby Creek Watershed Study* prepared by Land Studies, Lititz, Pa. June, 2005; - $30,000
2. a. *William Penn Foundation Grant* (to move the stream away from the endangered sewer line and into a reconstructed streambed,plus infiltration projects and a report) - $403,000
   b. *National Fish & Wildlife Foundation (Grant #2006-0101-005)* - $20,000
   c. *Growing Greener Grant* (for extension of length of stream restoration) - $12,600
   d. *Growing Greener & Valley Creek Trustee Council Grants* , Conestoga High School;Bioswale - $105,000
   e. *Growing Greener and Valley Creek Trutee Council*, Infiltration Trench - $110,000
   f. *Valley Forge Trustee Council*, Backyard Ecology, Rain gardens - $15,000
   g. *Environmental Fund for Pennsylvania*, Rain Garden, Farley's Residence - $3,000
   h. *National Fish & Wildlife Foundation Grant* (#2007-0084-086) funds transfer from Valley to Crabby - $30,000
   i. *PA DEP Emergency Repair Grant* - $30,000

3. Annotated slide presentation given to 2010 Schuylkill Watershed Conference (located on Valley Forge Trout Unlimited website: http://www.valleyforgetu.org/resources/whitepapers/)