



Estate Bethlehem Watershed Water Quality Demonstration Project

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ABSTRACT

VI RC&D partnered with the V.I. Department of Planning & Natural Resources (DPNR) and USDA-NRCS to design, construct, and install conservation practices at a livestock farm in the Bethlehem watershed on St. Croix, USVI. DPNR provided \$112,965 in Nonpoint Source Pollution Management Program (\$319) grant funding, supplemented by \$89,832 of technical engineering assistance from USDA-NRCS, and \$2,600 of volunteer time from VIRC&D Council members. Funding was used to install best management practices (BMP), including a stormwater retention pond, a gabion basket stream crossing, silt fencing, erosion control mats (ECMs), pasture fencing, alternative water supplies, and vegetation – to reduce the impact of agricultural nonpoint source pollution on St. Croix's coastal waters and coral habitats, and protect natural resources by encouraging farmers in the watershed to adopt environmentally sensitive practices.



VI RC&D Council members and USDA-NRCS project engineer & staff conduct site visit for contractors, inspecting area for pond construction (May 13, 2005).

19-acre farm is regularly flooded by storm water runoff from adjacent road [top], which causes downstream flooding [bottom].

BACKGROUND

The Bethlehem Watershed is a Category I watershed encompassing a 6,660-acre drainage basin located in the central coastal plain of St. Croix, USVI. [A Category I watershed is one that does not meet clean water standards and/or other natural resources goals, or faces imminent danger of not meeting clean water or natural resources goals.]

The project site is a 19-acre farm within the Bethlehem watershed. The farm is leased by the V.I. Department of Agriculture to Mr. Herminio Torres under a 25-year lease. Mr. Torres raises cattle and chickens and grows vegetables on the property. A severely eroded natural gut [intermittent stream] crosses the property, and the farm receives high volumes of storm water runoff from Queen Mary Highway, which regularly flooded a significant portion of the property.

Livestock also roamed freely through the gut, increasing the amount of agricultural nonpoint source pollutants (from both animal waste and sediment generated through trampling of gut banks) transported in a highly concentrated flow of water entering the Caribbean Sea.

OBJECTIVES

- To design & construct a stormwater retention pond on a primary tributary to Plane Field gut which will also provide ground water recharge and water for livestock.
- To Construct 1 streambed crossing to restrict livestock from the gut.
- To Construct 2000 feet of fencing to restrict livestock from the pond & gut and provide for rotational grazing.
- To install 1 trough and 1 water tank to provide an alternate water supply for livestock.
- To stabilize 1 acre of highly erodible soils.

METHODS / IMPLEMENTATION

- DPNR-DEP provided 112,965 in Nonpoint Source Pollution Management Program (\$319) grant funding.
- USDA-NRCS provided \$89,832 in technical engineering assistance.
- Initial project design completed by NRCS Engineers September 11, 2003.
- Earth Change Permit obtained
- October 2004.
- Final project design completed by NRCS Engineers February 14, 2005.
- Invitation for Bids advertised March 26, 2005; bids received April 13, 2005.
- Contractor site visit conducted May 13, 2005.
- Contract awarded June 20, 2005.
- Project mobilization initiated September 9, 2005
- Pond construction commenced September 12, 2005
- Contractor site visit conducted May 13, 2005.
- Contract awarded June 20, 2005.
- Project mobilization initiated September 9, 2005
- Pond construction commenced September 12, 2005
- Tank construction began October 17, 2005 & completed November 16, 2005.
- Stream crossing construction began November 2005
- Construction and final stabilization completed December 27, 2005
- Project Field Day conducted for 25 Council members, government agency personnel, farmers and the media December 28, 2005.
- Project completed December 29, 2005.

Reinforced silt fence installed September 14, 2005 for temporary sediment control to minimize downstream sedimentation from pond overflow during storm events [right].



After two weeks of rain in early October 2005, the silt fence had to be reinforced with an extra layer of geotextile and supplemented by a secondary silt fence downstream from pond overflow [below].



Site clearing & grubbing; checking levels week of September 12, 2005.



Heavy rains occurred throughout the project, delaying project completion by over 40 days. Rain delays occurred September 20 – 28; October 2 – 14 & 22-25; November 8, 14-17 & 28-29; & December 7-9, 2005.



Pond still full of water & being pumped out November 1, 2005 [below].



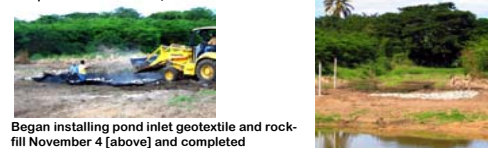
The first 2 weeks of October, work halted due to heavy rains that filled the pond and saturated soils. On October 17, 2005, work began on the concrete water tank, excavating a 15' x 15' area and spreading a layer of clay. VIRC&D Project Manager, Errol Chichester [left], inspects work progress while labors install wood forms for the tank walls [October 24, 2005].



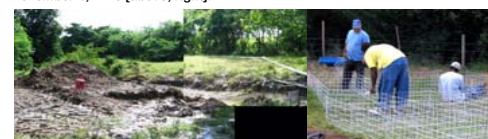
Concrete tank completed November 16, 2005 [right].



Installing principal spillway in compacted trench through pond embankment. Top left: NRCS Engineer, Lydia Collazo, inspects spillway trench dimensions & compaction November 3. Bottom left: principal spillway November 4. Center: spillway installation completed November 10. Right: rock outlet installation completed November 19, 2005.



Began installing pond inlet geotextile and rock-fill November 4 [above] and completed December 1, 2005 [above, right].



Began fabricating gabion baskets for stream crossing November 1 [right] and dewatering gut for stream crossing November 10, 2005 [left].



Began installing gabion basket stream crossing November 19, 2005 [left]; gabion keys installed November 23, 2005 [right].



Stream crossing under water November 28 through December 5 [above]; finally completed December 15, 2005 [below].



Pond fencing completed December 12, 2005; Caution sign facing road [left] and 5 strand barbed-wire livestock exclusion fencing [right].



Began grading emergency spillway September 26 [left] and, after 3 months of saturated soil, completed grading & stabilization December 28, 2005 [right].



Pond reshaping began December 23 [left], after final dewatering, and completed December 27, 2005 [right], along with hay mulch stabilization.

RESULTS

VIRC&D Project Manager, Errol Chichester [below left, at right], conducted a successful Field Day [below] for over 20 farmers, local media and government agency staff December 28, 2005 at the completed pond site [pond, below middle; principal spillway, bottom].



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