Lehigh Valley Greenways Conservation Landscape

SUCCESS STORY

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Johnston Preserve Bog Study

SUMMARY

The Friends of Johnston are studying the only known bog in Northampton County as part of a university study in hopes of restoration of the unique habitat for wildlife, stormwater management and as a study site for citizen science bird banding and research for the nature center.

HYDROGEOLOGICAL ASSESSMENT AND PRELIMINARY WETLAND DELINEATION OF PEATLAND AT CAMEL'S HUMP FOOTHILL, BETHLEHEM, PA

By: Michelle Barakat, Master of Science in Applied Geosciences '18

Background

- Camel's Hump is located on the Johnston Estate in Bethlehem, Northampton County Pennsylvania (Figure 1).
- Intricate subsurface network of water flow, springs, and the piezometric tendencies characteristic of the karst topography found in the area.
- Preserving it is very important to the biodiversity and overall health of the Monocacy Creek watershed.
- **Purpose: Collect preliminary geological, hydrological, and wetland characteristic data to assist in local stormwater management plan implementation, including the restoration of the peatland.**

Figure 1: Map of Camel's Hump Farm in relation to adjacent towns (Google Inc., 2017)

Figure 2: Aerial view of the peatland restoration site at Camel's Hump Farm on the Johnston Estate (Google Inc., 2017)

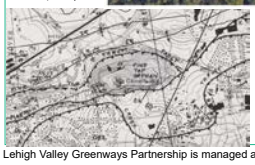

Figure 3: Geologic map of a section of Northampton County, including Camel's Hump (USGS, 2014).

- Where limestone meets the base of Camel's Hump, a thrust fault is present which allows for the establishment of multiple underground springs and the pooling of water on the surface which is ideal for wetland classification (Figure 3).
- The geology of the study area is mainly comprised of Byram gneiss and Beekmantown limestone (Figure 2).

Methods

Geophysics

- An electrical resistivity survey was used to get a better idea of the depth to the water table, the sources of water underground, and the possible flow paths of this water located at Camel's Hump.
- One transect was surveyed using SuperS2ng technology
- 55 electrodes, each spaced 1 meter apart

Preliminary Wetland Delineation

- A preliminary wetland investigation was conducted the wetland determination protocol the U.S. Army Corps of Engineers.
- Wetland Determination Data Form and guidelines for Eastern Mountains and Piedmont Region were used to determine if the area was a wetland and the general boundaries will be considered when implementing the desired stormwater management plan.

Analysis

Geophysics

- The transect that was surveyed using electrical resistivity was placed in the very center of the wetland area that has the most moist soils (Figure 4).
- The two lighter-darker blue contours located on the far left and right sides of Figure 4 are possible sources of water, such as springs, for the wetland.

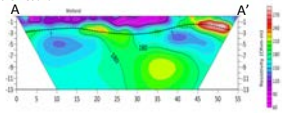

Figure 4: Results of electrical resistivity survey (modified to depict more clear trends in the color scheme)

Preliminary Wetland Delineation

- It is evident that this area, which spans 1.162 acres, exhibits the characteristics of a wetland and that it is spring-fed (Figures 5-7).

Figures 5-7: Field photos taken during the soil investigation for the preliminary wetland delineation (above).

Figure 8: Wetland assessment boundaries (dark blue) soil samples (green), ER survey (orange) and stream that intersects the Site (light blue) (below).

Discussion

- All preliminary wetland characteristics were met at this site.
- Wetland hydrology indicators: surface water, high water table, iron deposits, concave surface.
- Hydrophytic vegetation was both observed and researched and species tests were passed.
- Hydric soil indicators: depleted material below the dark surface and redox features in the matrix.
- Geophysical data proves that the wetland is fed by springs.

Conclusion

- All preliminary wetland characteristics were met at this site and moving forward, the stormwater management plan can modify its plans to treat this area as such.
- This area is confirmed to be fed by both spring water and seasonal flooding and this should be taken into consideration when designing ponding areas.

Works Cited
Google Maps. Google Inc., 2008. Accessed November 2017.
USGS. Geology of Pennsylvania, 2014. Accessed November 2017.
U.S. Army Corps of Engineers. Wetland DelineaZon Form and guidelines – Eastern Mountains and Piedmont Region, 2013.

Lehigh Valley Greenways Partnership is managed as a public-private partnership by the Pennsylvania Department of Conservation and Natural Resources and Delaware & Lehigh National Heritage Corridor

CHALLENGE

The bog was discovered and documented on the Johnston Preserve in 1806. Unfortunately, the bog was drained by past land owners to use the site as pastureland. The restoration of the bog will not only create unique habitat for the wildlife, but will also serve as a natural purification system for the stormwater that comes on the property and is degrading the HQ-CWF Monocacy Creek.

Our multiple challenges stemmed from working in the mucky soils, trying to protect the delicate native plants while removing invasive species and 60+ Ash trees in decline by hand.

FUNDING

Grant Award: $9,500.00

Match: $14,853.26

Total Project Cost: $24,353.26

PARTNERSHIP IS KEY

-University of Pennsylvania and Susquehanna University provided engineering and materials

-Boy Scouts- volunteers to clear downed trees, develop paths and replant trees and shrubs

-Eagle Scout- boardwalk design and installation

-Bethlehem Area School District Spirit Program- special needs students for

FRIENDS OF JOHNSTON
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SOLUTION

This project could not have been accomplished without the nearly 100 volunteers who worked in snow, muck, rain and sweltering heat over 8 months to accomplish our goals! The study of the bog including wetland delineation, subsurface imaging, hydrology, soil studies and vegetation inventory provided the data necessary to understand the complex properties of the site and began the process of planning and restoration. The Forest and Wetland Conservation Plan informed the planting of the native wetland trees and shrubs along the perimeter of the bog to protect the bog and provide shade for the delicate skunk cabbage and understory species that inhabit the area. The Boardwalk offers a safe path for up-close viewing and study of the bog. The project will be added to in 2019 with the planting of native wetland-bog species.

RESULTS

All work was completed to satisfy the grant in 2018

1) The Wetland study was completed by Michelle Barakat, University of Penn Graduate student in Hydrogeology and Susquehanna University professor and submitted as a study and poster including - vegetation, soils, subsurface imaging for hydrology
2) 2.5 acres of bog land was cleared of invasives and hazard trees
3) A forest conservation plan and master plan for restoration and maintenance was developed and submitted to DCNR for approval
4) 100 native trees and shrubs were planted and mulched along 350' of pathway and riparian buffer along drainage swale
5) A 200' Boardwalk was built as an Eagle Scout project
6) Temporary interpretive signage was developed and installed- to explain the importance of the protection of the bog in creating habitat and protection of the waterway

Contact

LEHIGH VALLEY GREENWAYS

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