Crawford Farms Basic Project Proposal

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Creating Conservation Solutions for Over 60 Years

Original Grant Proposal
Project Description

Statement of the Problem

In the Blacklick Creek Watershed Action Plan, Dysart Run (also known as Dysar Run) (RM 14.64) is identified as entrenched (Blacklick Creek WAP, p. 49), with "severe erosion" that is beginning to encroach on properties along its ravine. The eroding banks are approximately 20' high, resulting in considerable sediment loads into the creek (WAP, p. 48). Dysart Run fails to meet recreational use standards for fecal coliform bacteria (WAP, p. 51) and is in non-attainment (1.85 mi.) or partial attainment (1.15 mi.) with regard to Warmwater Habitat criteria (WAP, pp. 53-54). With regard to WWH attainment status, the primary cause of impairment is identified as siltation which is attributed primarily to land development and urban runoff (Big Walnut TSD 2000, p. 22). Impervious cover is estimated to be 23% of the total subwatershed (Blacklick Creek WAP, p. 55). Retrofitting existing stormwater basins in the Dysart Run subwatershed is an explicit action item in the Blacklick Creek WAP (p.84).

The Project and Approximate Load Reduction Estimates

This project will retrofit the stormwater basin in the Crawford Farms subdivision within the Dysart Run watershed to reduce the rate and volume of runoff discharge and provide water quality treatment to any discharge from the basin. Based on data generated by the STEPL model, the project will reduce the nitrogen load by 573 lbs./yr., the phosphorus load by 136 lbs./yr., and the sediment load by 23 tons/yr. The Blacklick Creek WAP estimates that addressing the excess runoff from the impervious surface in the entire watershed will reduce the sediment erosion by 929 tons/yr. This project will reduce the runoff from 5.8% of that impervious surface, reducing sediment erosion by 54 tons/yr. and the total phosphorus load by 54 lbs./yr. Based on these figures, the total reduction in sediment load will be approximately 77 tons/yr. and the reduction in total phosphorus loading will be 190 lbs/yr.

Description of the Project Site

Located off of the bend on Grandlin Park Dr. (39°59'34.92"N 82°47'58.908"W) (Figure 1) between Brunfield Dr. and Fairfax Loop Dr. in Crawford Farms Park in the City of Columbus, retrofit site is a dry basin located on public land—the only basin in the Dysart Run subwatershed located on public land. It is approximately 0.5 miles from Waggoner Rd. and 0.9 miles from E. Broad St., two of the major streets in this part of Franklin County (Figures 2 and 3).

This basin has an area of 1.3 acres with an elevation change of 4' from the southeast corner to the northeast corner (Figure 4). Shaped like a baseball diamond (Figure 5), the basin receives runoff from a total area of 31 acres, 10 acres of which is impervious. Roughly 40% of the soil is identified as the hydric soil, Pewamo silty clay loam (the west/northwest area), with the remainder being the somewhat poorly drained Bennington B (the east and southeast section) (Figure 6).

A playground area and additional park open space are located to the east of the basin. The total area effectively consumed by this stormwater infrastructure encompasses approximately 60% of the park, and this area is underutilized for stormwater retention and infiltration. Given its configuration, only 10% of the basin at most is filled during a normal rain event. Even after a 3" rainfall, most of the basin remains unfilled (Figure 7).

There is a visible flow path between the 36" inflow and the 18" outflow pipes, with trash accumulating in and along the channel (Figures 8 and 9). A small willow tree is growing approximately 20' north of the outflow. The southeast area of the basin (within 65' of the outflow) remains fairly soggy, with tire tracks evident in the soil and vegetation there indicating that it is kept mowed. Facultative wetland vegetation is growing in much of the basin, with poverty grass and fescue in the better drained north and east sections. The surface of the ground is best described as hummocky (Figure 10). With the exception of perhaps 2-3" of standing water in the lowest 5% of this excavated structure, the basin normally drains with 12 hours (Figure 11 and 12). During most rain events, runoff enters and leaves with little or no residence time.

The impact of this basin is compounded, since its outflow is connected to a second stormwater basin in McNeill Farms, the subdivision to the south of Crawford Farms. The McNeill Farms stormwater feature receives the runoff from a total area of approximately 40 acres, which combines with the outflow from the Crawford Farms basin (Figure 13). In effect, the McNeill Farms basin collects the stormwater from over 70 acres of subdivision and becomes a creek more than a basin during most rain events (Figure 14).

The goal of the proposed retrofit project is to infiltrate or transpire as much as possible of the runoff entering the Crawford Farms basin area. This presents a challenge, given the soil types in the basin. Large scale infiltration practices are still relatively new in central Ohio, compounding this challenge. The project also ought to contribute to the aesthetics and the function of the park.

Figure 1: USGS Topo Map with proposed project location marked


Basin Location
PID # 515-250755
Waggoner Rd.
E. Broad St.

Figure 3: Crawford Farms subdivision with Crawford Farms Park marked and the approximate sewershed for the park stormwater basin outlined

Figure 4: Crawford Farms Park stormwater basin with elevations in feet above sea level contours marked

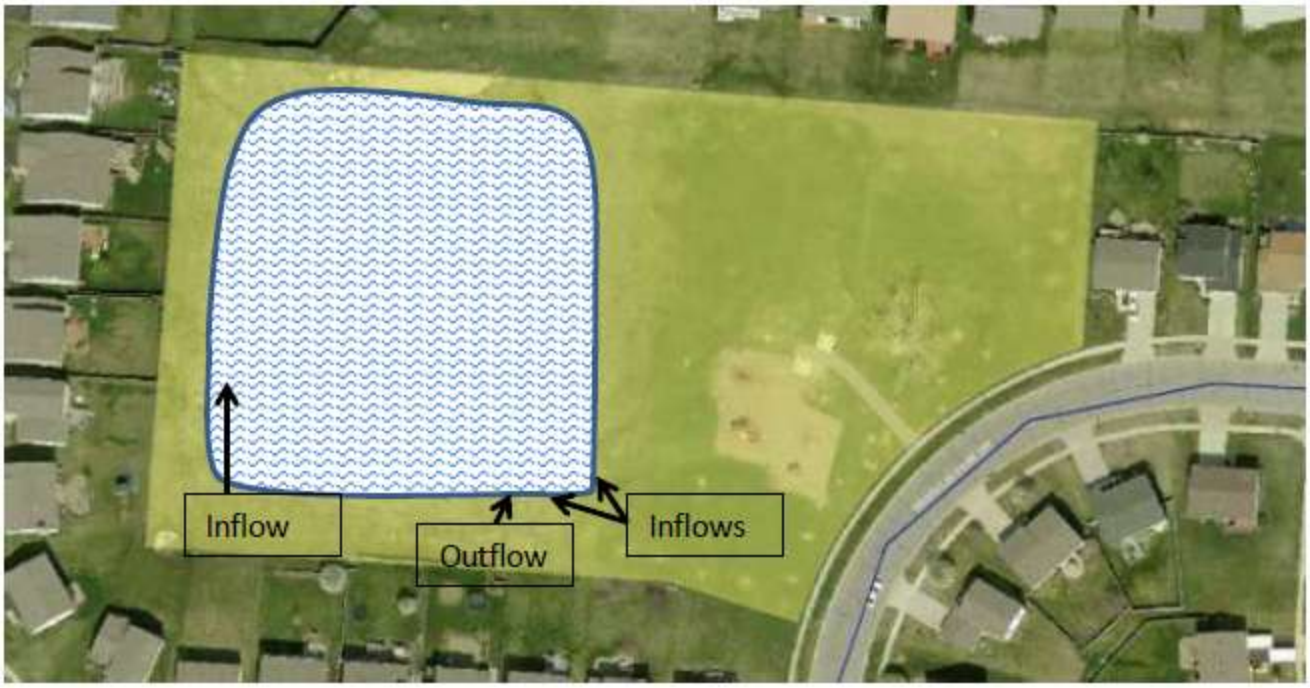


Figure 5: Crawford Farms Park stormwater basin with inflows and the outflow marked

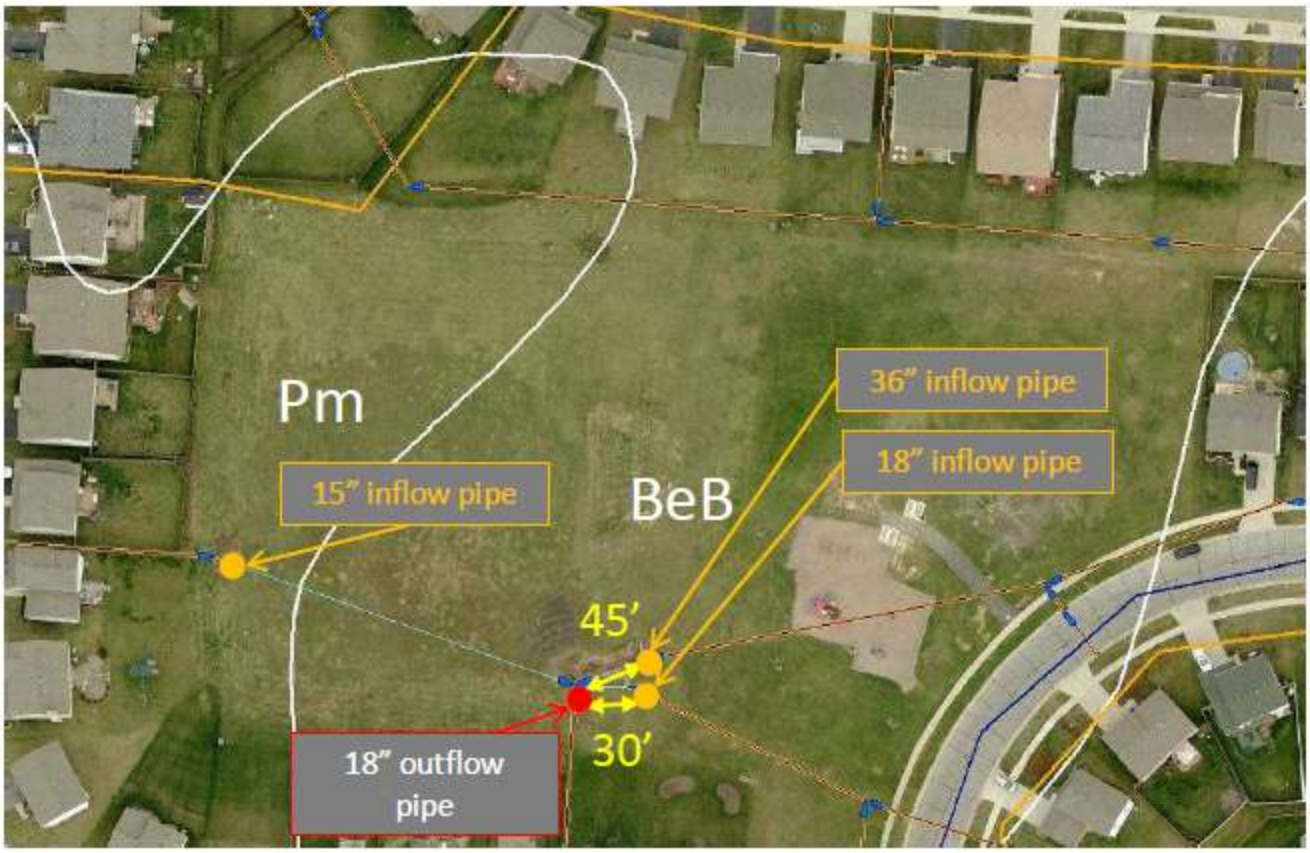


Figure 6: Crawford Farms Park stormwater basin with soil types marked

Figure 7: Basin at 6:40 PM October 19, 2011 after 3" of rain over 18 hours

Figure 8b: The view to the northwest from the 18" inflow pipe at the southeast corner of the basin

Figure 8a: The view to the west from the 18" inflow pipe at the southeast corner of the basin

Figure 8c: The view to the north from the 18" inflow pipe at the southeast corner of the basin

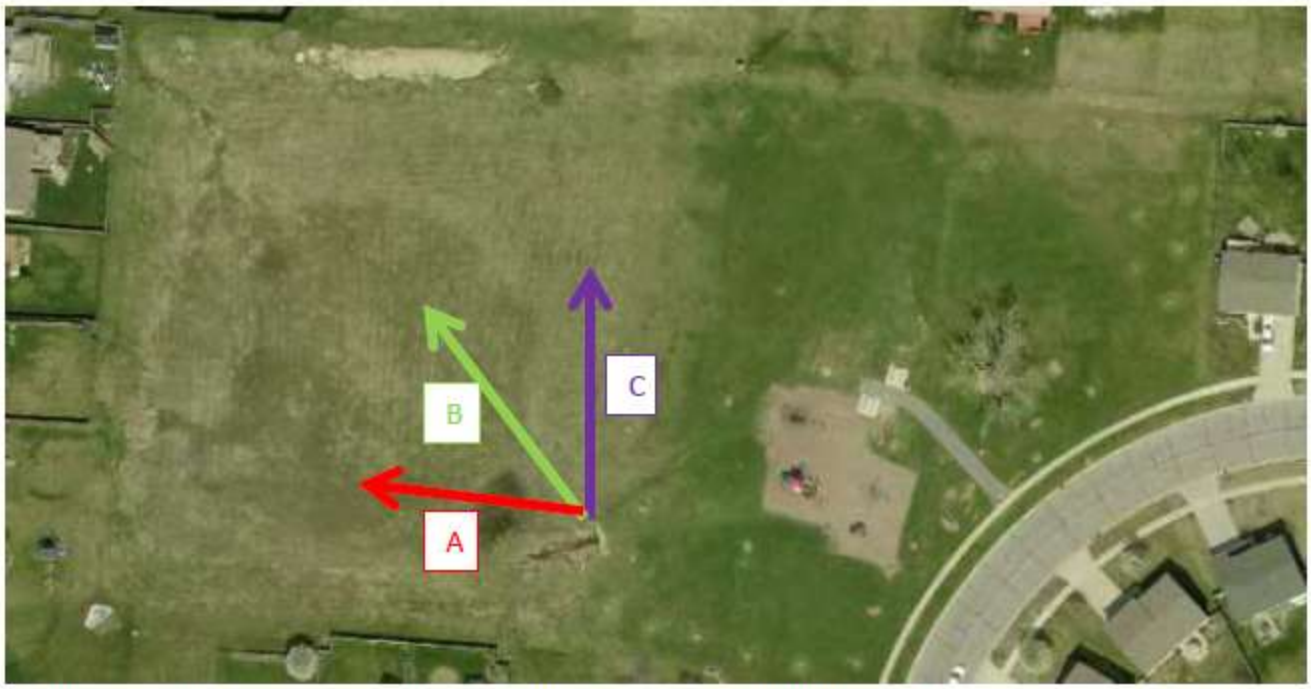


Figure 8: On-the-ground views of the Crawford Farms Park basin from the southeast corner.

Figure 9b: 18" inflow pipe

Figure 9a: 36" inflow pipe

Figure 9c: 18" inflow pipe

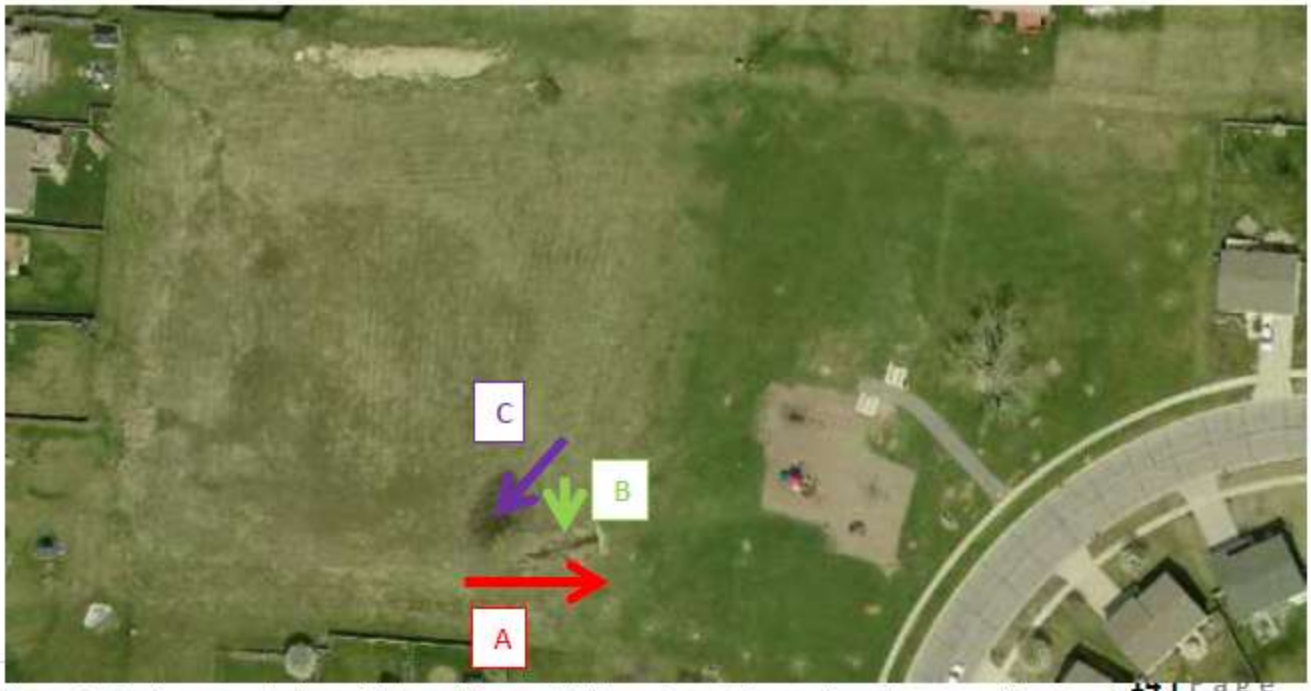


Figure 9: On-the-ground views of the outflow and inflow pipes at the southeast corner of the Crawford Farms Park stormwater basin

Figure 10b: The upland vegetation in the northwest area of the basin

Figure 10a: The wet area of the basin with tire tracks

Figure 10c: Vegetation around outflow and inflow pipes at southeast corner of basin

Figure 10: On-the-ground views of the Crawford Farms Park basin illustrating vegetation and terrain.

Figure 11: Basin inflow at 4:30 PM October 19, 2011, 22 hours after the photo in Figure 2 was taken and at the end of a 4.95" rain event over a 40 hour period. Records indicate that 3.85" total fell on October 19, 2011, and 1.15" fell on October 20, 2011.
((http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=MOH101&graphspan=day&month=10&day=19&year=2011, and http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=MOH101&graphspan=day&month=10&day=20&year=2011 , accessed April 27, 2012)

Figure 12: Basin at 4:30 PM October 20, 2011, taken at the same time as the photo in Figure

Figure 13: Crawford Farms and McNeill Farms storm sewer systems and stormwater basins

Figure 14: McNeill Farms basin at 5:00 PM October 20, 2011 after 4.95" of rain over 40 hours

Vegetated Infiltration Area

http://www.lowimpactdevelopment.org/raingarden_design/downloads/PADetentionBasinFactsheetFINAL.pdf

Forebay

http://dsf.chesco.org/conservation/lib/conservation/pdf/Devonshire_Site4.pdf

Vegetated Infiltration Area with Wet Meadow

http://www.montgomeryconservation.org/site1.pdf

Wet Channel

http://switchboard.nrdc.org/blogs/kbenfield/outstanding_urbanism_and_state.html

Wetland Pool

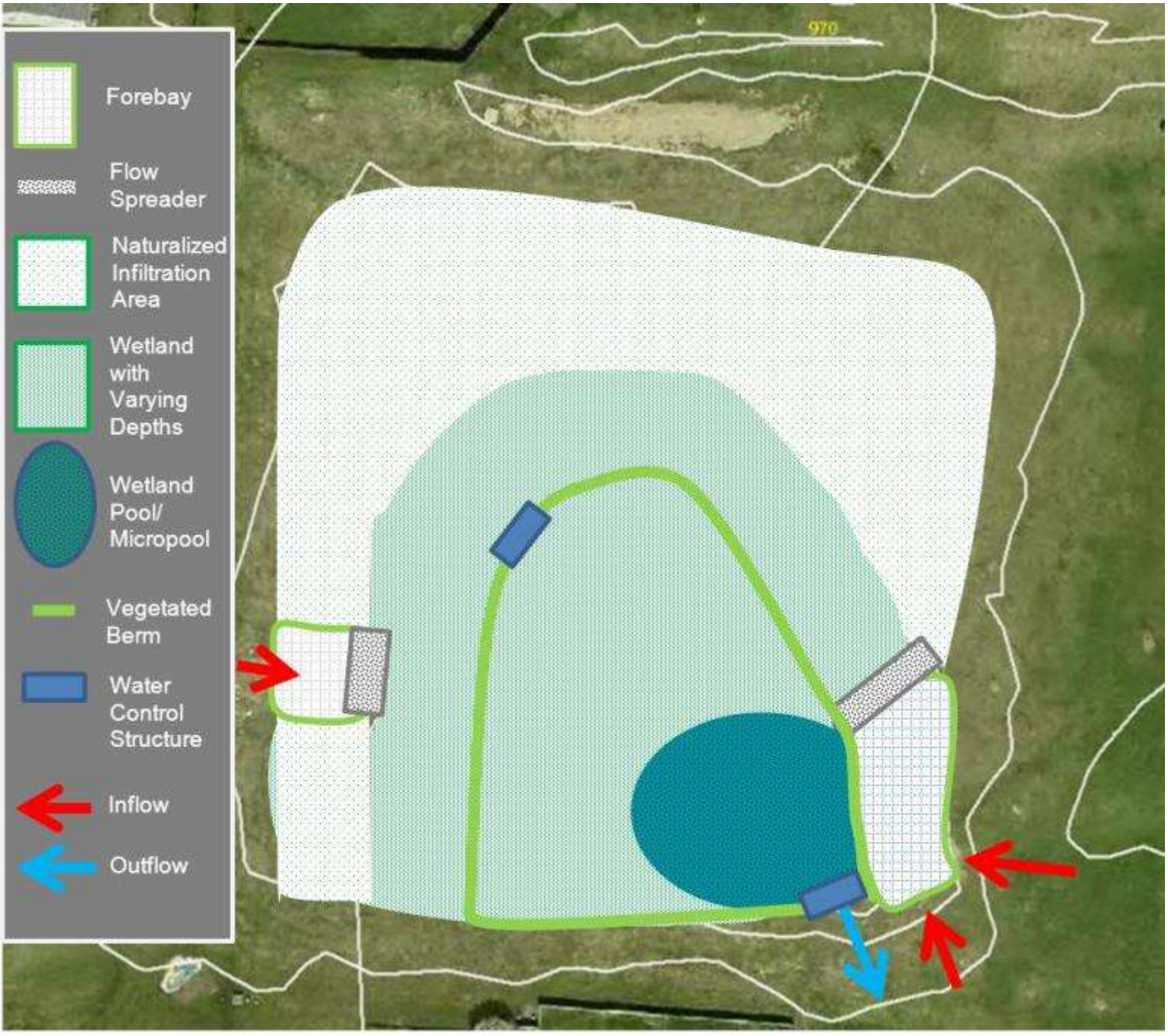
http://www.abbey-associates.com/splash-splash/picture_gallery.html

Dry Channel (at bottom of image)

http://www.albemarle.org/department.asp?department=water&relpage=4319

Figure 15: Possible design components

A Conceptual Design



Budget

Project Sponsor	Franklin Soil and Water Conservation District			
PROJECT Title	Crawford Farms Park Stormwater Treatment Wetland Design and Retrofit			
Deliverable	# of Units to be Completed (such as hours of service)	$$ Cost per Unit	Total Est. $$ Costs	**Description**
Detention Basin Retrofit Design	150 Hours	$100	$15,000	Professional services to develop engineering plans and specifications
Construction: Sediment Forebay	2 Each	$4,000	$8,000	Construction services, including excavation, stone placement and underdrain
Construction: Micro-pool(s)/ Wetland Features	1 Each	$14,000	$14,000	Construction services, including excavation, grading and replacement of topsoil
Construction: Modified Outlet Structure	1 Each	$6,000	$10,000	Construction services, replace outlet headwall with multi-stage riser and BMP orifice
Construction: Wetland Features	0.5 Acres	$18,000	$18,000	Construction services, install grade control structure and wetland berm, install wetland plants
Construction Administration	30 Hours	$60	$1,800	Construction Inspection
Construction: Planting and Seeding	1 Acre	$9,000	$9,000	Construction services, including planting of native trees and shrubs as well as stabilizing ground cover
Total Sub-Contracting Costs Associated with this Project			$75,800	