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Spring Creek Watershed Action Plan Updates
By Katherine Watt

The Spring Creek Watershed Commission will host a public meeting of watershed stakeholders to begin updating the Spring Creek Watershed Action Plan on Tuesday, July 10, from 6:30 to 9 p.m. at Calvary Harvest Fields, 150 Harvest Fields Drive in Boalsburg.

The goal is for the watershed community to examine the Spring Creek Watershed Plan Phase 1 Final Report, completed in 2003, "to delete obsolete information, refresh and upgrade data, add new relevant information, incorporate government roles in addressing watershed issues that create legislative mandates and municipal undertaking relevant to preserving and improving the quality of the Spring Creek Watershed."

This *Bailiwick News* series provides some historical background on the watershed planning process, which stalled in 2003, and some information about the current momentum toward renewal.

Overview

Back in 2003, in the "Phase 1" report, the Spring Creek Watershed Commission described itself as a group of elected and appointed officials that voluntarily met bi-monthly to discuss issues of watershed concern, with support from the Centre County Board of Commissioners through the Centre County Planning Office. From the group's website (scwatershed.com accessed June 27, 2018), the group organized in 1997, and adopted governing bylaws through an inter-municipal agreement in September 2007.

As of April 2018 – when a Penn State law school class facilitated a community forum about watershed issues – there were 12 representatives on the commission, including Janet Engeman (State College Borough); Peter Buckland (Ferguson Township); Joanne Tosti-Vasey (Bellefonte Borough); Dennis Hameister (Harris Township); Bill Sharp (College Township); Dan Trevino (Patton Township); Mark Stevenson (Half Moon Township); David Wise (Benner Township); Paul Bartley (Milesburg Borough); Don Franson (Walker Township); Bill McMath (Spring Township); and David Whiteman (Potter Township). Centre Hall Borough may also be a part of the commission.

The Phase 1 plan drafting process was funded by the Pennsylvania Department of Environmental Protection (DEP) and facilitated by ClearWater Conservancy.

A Project Management Team (PMT) – comprised of representatives from DEP, Spring Creek Watershed Commission, Centre County Planning Office, Centre Region Planning Agency, University Area Joint (Sewer) Authority, US Geological Survey and ClearWater Conservancy – worked with a watershed planner housed at ClearWater.

When drafting the Phase 1 report, the team decided not to pursue a comprehensive planning process from scratch, for three reasons: length of time, financial cost, and because so many watershed-related studies and planning documents had already been completed.

Instead, the team worked to "distill numerous existing plans, research, and data into a clear and concise statement of the challenges facing this watershed and recommend ways that its citizens can meet these challenges in the future." They used that information to create a "framework," to "begin prioritizing and advancing projects that will produce measurable positive environmental results" through identification of funding sources and project partners during a Phase 2 – which they expected would get underway in 2004.

The meat of the 2003 report examined four major watershed components:

1) surface water,
2) ground water,
3) water supply, and
4) the connection between land use and water resources.

The authors also broke each component into sub-issues, with general action recommendations but no specific project proposals, leaving those for future phases of the project. The surface water and groundwater findings and recommendations are summarized below. The rest of the 2003 report will be summarized as the series continues.

To support implementation of selected projects, the 2003 Phase 1 report also established Spring Creek Watershed Community "Coordinating Committee" – a volunteer entity which later became today's Spring Creek Watershed Association – and tasked the volunteer group with coordinating actions and fostering communication about watershed projects across political boundaries. [The watershed association has produced an excellent informational website: springcreekwatershedatlas.org]

The drafting team recognized several stakeholder organizations – back in 2003 – that they anticipated would be involved in selecting, funding and implementing projects, including: ClearWater Conservancy, the Centre County Planning Office, the Centre Regional Planning Agency, University Area Joint Authority, State College Borough Water Authority, the 14 municipalities in the watershed (12 of which appear to still be represented on the watershed commission as of 2018), Spring Creek Chapter of Trout Unlimited, Centre County Conservation District and Penn State University.

The Phase 1 drafting team also anticipated doing more research and making additional recommendations on "implementing entities" during Phase 2.

However, DEP funding dried up, local funding did not materialize to replace it, and Phase 2 was abandoned in 2004.

The July 10 meeting is part of a commission effort to revive the process, spurred in part by recent community controversies around intensive land development on key groundwater recharge and streambank land along Slab Cabin Run in Ferguson Township (the Toll Brothers/Penn State "Cottages" development and associated Whitehall Road Regional Park development by the Centre Region Council of Governments) and efforts by Nestle Waters corporation to privatize and bottle groundwater in the Logan Branch sub-basin in Spring Township.

1) Surface Water: Natural Drainages and Engineered Drainages

The team looked at two types of drainage systems: natural drainages and engineered drainages constructed during land development to create new housing and commercial structures for the rising human population in the watershed.

Identified problems with natural drainages included declining stream baseflow, riparian buffer removal, increased sedimentation, thermal modification (heating), and declining biotic community (population loss among macroinvertibrate critters).

Identified problems with engineered drainages included ineffective stormwater management and malfunctions of existing stormwater basins.

Natural Drainages: Declining Stream Baseflow

Declining stream baseflow had been observed most recently (in 2003) during a drought from 1998-2001 that led to dry streambeds in segments of Slab Cabin Run and Buffalo Run, attributed not only to the drought itself, but also to pumping of groundwater by the SCBWA from public water system supply wells near Slab Cabin Run.

Proposed solutions included decreasing well withdrawals by implementing water conservation measures; developing more water wells to disperse the impact of pumping on groundwater levels; and increasing groundwater recharges through Best Management Practices (BMPs) in the design, construction and operation of stormwater management systems and through "beneficial reuse" – direct recharge – of treated wastewater.

Other proposals included protecting sinkhole recharge areas by adding overlay zoning and changing subdivision and land development procedures to limit development on and around sinkholes; discouraging removal of riparian buffers during construction; and restoring and protecting riparian buffers: planting trees to increase stream cover and decrease stream evaporation.

Natural Drainages: Riparian Buffer Removal

The 2003 report repeatedly emphasized the importance of riparian buffers – comprised of native trees, shrubs and other vegetation growing along streambanks – particularly the need to protect mature buffers from destruction from population growth and land development.

The report stated that riparian buffers fulfill several important watershed functions: filtering nutrients such as nitrogen and phosphorus from wastewater treatment plants and from agricultural, urban and suburban runoff; filtering sediments; providing shade to cool stream temperatures; stabilizing streambanks from erosion (through root systems); and providing aquatic and terrestrial wildlife habitat.

The authors stressed: "Mature buffers function effectively, whereas newly planted buffers may take years to become established. Existing buffers look better than newly planted buffers. Economically, it is less costly to preserve existing buffers than to replant them."

The problem, they noted in 2003, was that mature riparian buffer areas were being removed as land use intensified, due to a lack of legal protections for buffers, and that some individual riparian landowners were also removing or damaging their buffers.

Potential solutions clustered around preventing the destruction of mature riparian buffers and returning damaged buffers to their natural, mature state, through educating individual riparian landowners and land developers and offering incentives such as open space trading programs or density trading programs (author still researching these; preliminary research unhelpful).

Other potential solutions included direct planting of new riparian buffers and fencing streambanks in agricultural areas to keep livestock out of streams. The report highlighted Penns Valley Conservation Association as a good local model program, and identified the Centre County Conservation District (CCCD) and Chesapeake Bay Program as possible resources for funding, supplies and plants. The 2003 report suggested local volunteer groups as potential labor: Boy Scouts, civic groups, schools, etc.

The 2003 team also recommended creation of municipal riparian buffer protection ordinances or overlay zoning, and acquisition of conservation easements on riparian buffer land, or outright purchase of those parcels.

Natural Drainages: Increased Sedimentation

The report identified sedimentation as one of the reasons for impairment of 13.2 of the 16.2 stream miles identified as "degraded in the Spring Creek Watershed, and attributed the problem to two main sources: agricultural fields along rural tributaries during storm events, especially along reaches without proper riparian buffers, and urban runoff of large volumes of stormwater, eroding streambanks, causing excess silt to accumulate in the streams, coat streambeds, suffocate macroinvertebrate creatures and deter trout reproduction.

Proposed solutions included managing urban stormwater better, by encouraging onsite recharge "best management practices" in new development, instead of retention and discharge; and managing agricultural runoff better by encouraging streambank fencing on agricultural lands, contour farming, and rotation programs for grazing livestock. Again, the proposed solutions emphasized restoration and protection of riparian buffers, by establishing buffer widths to effectively filter sediment;

riparian buffer conservation zoning, and promoting voluntary landowner management programs. Another proposed solution was to dredge the streams.

Natural Drainages: Thermal Modification

The report discussed Spring Creek's history as a high quality trout fishery and the biological needs of trout: cool water (below 65 degrees Fahrenheit) to dissolve oxygen. Without adequate oxygen, the fish suffocate. Cool groundwater (50 – 55 degrees) from springs has historically provides abundant cool water baseflow to Spring Creek, but stormwater flowing over hot paved surfaces – new housing developments and shopping centers, with streets, parking lots, and driveways – piped to the streams through storm sewer systems, was observably raising stream temperatures above the 65 degree threshold. The report also stated that removal of riparian buffers and point discharge of warm municipal and industrial wastewater were contributing to overheating local waterways.

Potential solutions again included restoration and protection of intact riparian buffers to shade the streams, along with reduction of impervious surfaces (streets, driveways, parking lots, roofs) to decrease the surface area on which stormwater heats up, through more dense development in already dense neighborhoods in preference to suburban sprawl, and decreasing of parking lot size requirements, encouraging shared parking, and infiltrating (recharging) stormwater instead of retaining and discharging it through storm sewers.

The report also suggested that warm point sources be identified, by reviewing NPDES I permits, investigating other non-permitted point source discharges, and identifying funding for retrofit projects.

Natural Drainages: Declining Biotic Community

The 2003 report noted that over the past 40 years, DEP and the Pennsylvania Fish & Boat Commission (PFBC) had conducted numerous studies of macroinvertebrate populations in the Spring Creek Watershed, supplementing physical and chemical testing with information about the diversity and numbers of the streams' biological community as key indicators of stream health.

The studies had shown drops in total numbers of macroinvertebrates and in species diversity in specific stretches of the watershed. The report emphasized: "The macroinvertebrate community is the basis for the entire stream ecosystem, and it is important to understand how to protect it."

Potential solutions included protecting existing riparian buffers and restoring damaged or destroyed buffers; reducing and/or removing sediment from streams, and creating in-stream habitat for macroinvertebrates, through installation of rip-rap, boulders and woody debris.

Engineered Drainages: Ineffective Stormwater Management

In the discussion of stormwater management, the report noted that the traditional "pipe it to the stream" philosophy had led to "serious inefficiencies and problems," and noted a history of developers and municipal governments using poor calculations and assumptions of storm event volumes; building and allowing building in floodplains; and ignoring upstream and downstream impacts, producing flooding.

The 2003 report highlighted the Thompson Run sub-watershed – along East College Ave. from the Duck Pond to Millbrook Marsh – as illustrating "all of these problems, in a concentrated area."

Potential Solutions included municipal adoption of ordinances implementing the Act 167 Stormwater Management Plan for the Spring Creek Watershed (which had been completed in 2002 by Sweetland Engineering and the Centre County Planning Office); offering developers incentives for using BMPs – tax breaks or higher density allowances in exchange for greater open space in proposed developments; and "innovative technologies for better stormwater management."

Engineered Drainages: Existing Malfunctioning Stormwater Basins

The report suggested that watershed stakeholders consider physically retrofitting malfunctioning stormwater basins, some of which had been identified in the 2002 Act 167 Stormwater Management Plan, but noted "little has been done so far to discuss how to fix" malfunctioning basins, such as methods, costs, or time needed.

The 2003 watershed plan drafting team recommended that watershed stakeholders fully inventory the problem basins through GIS and on-site assessments, rank them by priority, estimate the likely costs for repairs and retrofits and then identify and "secure funding."

The report recommended tapping volunteer community experts and organizations for technical assistance, consulting other communities experiencing similar problems, working with municipal engineers to identify and prioritize problem areas, and seeking state funding through the Department of Community Economic Development.

An interesting omission: the report did not mention the possibility of requiring the developers who constructed problem stormwater basins developments to pay for the retrofits.

2) Groundwater: Recharge and Discharge

Groundwater was examined through two lenses: recharge (water going into the groundwater system from the surface) and discharge (water emerging from underground into surface waterways).

The report – which acknowledged the Spring Creek Watershed as a "karst environment" identified several recharge pathways: direct sinkhole conduits to the aquifer (point recharge), critical closed depression recharge zones (sponge recharge), and "diffuse recharge that takes place throughout the Watershed's limestone valleys."

Springs that resurface to join the flow of surface

streams and wetlands and marshes comprise the discharge aspect of groundwater.

Point recharge problems included sinkholes in two main roles: as rapid access points for surface water to replenish groundwater supplies, and as trash "dumpsites" putting groundwater at risk of contamination.

Sponge recharge problems included land development on these critical parcels, damaging their recharge capacity.

Diffuse recharge problems included increases in impervious paved surfaces replacing pervious soils, and contamination plumes from abandoned industrial facilities such as the Cerro Metals plant and the Corning-Asahi plant.

Point Recharge - Sinkholes

The 2003 report noted that "thousands of sinkholes have been identified in the Spring Creek Watershed, created by our limestone geology and topography," and described sinkholes as "conduits for surface water to enter the groundwater aquifer [that] are an important source of recharge to streams and wells, but… have the potential to transfer pollutants quickly to the groundwater.

The report also noted that sinkholes have been used a trash dumping sites, "amplifying" groundwater poulltant threats"

The drafting team recommended that sinkholes be protected and buffered so they can "continue to perform their natural recharge functions without increasing the risk of pollution or sinkhole malfunction."

Proposed solutions included municipal zoning or subdivision and land development ordinances to protect sinkholes through non-disturbance and buffers; education of individual landowners with sinkholes on their property about how to care for them and keep them clean; and discouraging use of sinkholes for stormwater management through mapping of how specific sinkholes directly connect to drinking water supplies, and encouraging best management practices (BMPs) for streams and swales that discharge to sinkholes.

Although by 2003, local volunteer groups such as ClearWater Conservancy had conducted some clean-up events at trash-filled sinkholes, the report recommended "a more structured process." The drafting team recommended monitoring of known dumping areas, fining illegal dumpers, coordinating with Centre County Solid Waste Authority, focusing municipal government attention on the problem through the MS4 (municipal separate storm sewer system) framework, and creation of a Centre County chapter of PA Cleanways, (now Keep Pennsylvania Beautiful since a 2010 merger) to develop a Centre County chapter.

Sponge Recharge

The 2003 report defined "sponge recharge" areas as parcels that can recharge "abnormally large volumes of water" because of their soils, geology, and slopes, but observed that many such sponges had not yet been mapped. The drafting team pointed to a low area in the Fox Hollow drainage basin, being studied by Penn State researchers at the time, as a good example.

Recommended solutions included working with local engineers and hydrogeologists to establish criteria and then identifying sponge areas through GIS and fieldwork; educating landowners about sponge recharge; adopt municipal overlay zoning and subdivision/land development ordinances to protect sponges; purchase conservation easements or purchase sponge parcels outright.

Diffuse Recharge: Increased Impervious Cover in the Watershed

In 2003, the report authors described the soils and geology of the valley floors in the Spring Creek Watershed as "naturally facilitating a large amount of groundwater recharge," but cautioned that land development – building construction and paving – recharge was "increasingly bypassed by impervious surfaces and stormwater collection, retention, and discharge." In 1960, impervious coverage was estimated at about 5%; by 2000 it was at about 11%. Later in the 2003 report, the authors reported many studies had demonstrated "adverse consequences" when impervious cover reaches 10%.

Proposed solutions included more education for developers to promote use of stormwater recharge BMPs in new developments, using Act 167 guidelines; incentives for developers to reduce impervious cover in new developments such as tax incentives and higher permitted density; adoption of more municipal ordinances requiring specific open space percentages in new development; retrofitting of existing "highly impervious developments" such as asphalt removal, shared parking, rain gardens, and permeable paving, and BMP retrofits.

Diffuse Recharge and Spring Discharge: Groundwater Contamination

The 2003 project team documented several known groundwater contaminant plumes in Spring Creek Watershed, which were – at that time – being tracked by DEP to identify sources and prepare cleanup plans. Chemical contaminants of concern included trichloroethylene (TCE), perchloroethylene (PCE), Kepone and Myrex – which had seeped from the surface at industrial sites, through soil layers to enter groundwater during recharge. Bacterial contamination had been found in other springs. As of 2003, Bathgate, Thornton and Thompson springs were known to be contaminated, and to be discharging contaminated water into Spring Creek.

The report noted that a contamination monitoring well network was already in place and expanding.

Proposed solutions included GIS mapping of contaminated springs and streams, identification of pollutant sources, cleanup and continued monitoring, plus establishment of an "alert system" to notify officials and the public of increased contaminant concentrations.

Wetlands/Marshes Discharge: Declining Groundwater Levels

The second discharge source – wetland and marshes like Millbrook Marsh, where groundwater seeps up through soils to join surface flows – were jeopardized by declining groundwater levels, in turn jeopardizing the water filtration, flood absorption, and wildlife habitat functions they play in the local ecosystem.

2003 project team recommendations included many solutions proposed for other problems: identifying wetlands and marshes through GIS and field investigations; placing of conservation easements on wetlands and marshes and buffers; outright purchase of wetland and marsh parcels and buffers; managing stormwater for groundwater recharge rather than surface drainage; retrofitting highly-impervious existing developments; reducing impervious surfaces in new developments; and promoting "beneficial reuse" direct recharge of treated wastewater.

Critical Analysis – Part 1

Back in 2003, several issues emerged that remain challenging today, including the lack of a watershed-wide "implementing entity" to carry out watershed-based projects and initiatives; widely disparate population growth projections and zoning assumptions used by different entities in different planning contexts – creating different levels of concern about potential development-related damages and risks for the watershed; and the critical role of "community consensus" in moving projects from proposal to implementation.

Also, back in 2003, the drafting team was – as noted above – already putting significant emphasis on the crucial role played by riparian buffers – native trees, shrubs and other vegetation growing along streambanks – and the acute and chronic need to protect mature buffers from destruction from population growth and land development.

Throughout the report, the authors advocated several mechanisms to protect existing buffers, including better stewardship by current landowners, conservation easement purchases, land purchases, and riparian overlay zoning.

The 2003 report concluded with emphasis on the need for continued public engagement and pressure on local governments, ongoing water resource monitoring, as well as "authorizing an effective implementing agency and ensuring sustainable funding."

One of the first steps in the new plan drafting process should be assessment of the current – 2018 – impervious cover percentage.

Another proposal – which *Bailiwick News* endorses as a way to set the bar high at the outset – is for watershed municipalities to adopt 2,650-foot (half-mile) Riparian Buffer zones around all creeks, streams, sinkholes, closed depressions, swales, fractures and other critical watershed ecosystem components within their political boundaries.

This would create mile-wide, forested Riparian Buffer corridors throughout the Spring Creek Watershed, serving as a zoning-based legal tool to cap land development for a mildly fluctuating population density roughly equal to or below current levels.

Under this framework, existing structures within Riparian Buffer zones would be permitted to remain, but new groundbreaking in those Riparian Buffer zones would be effectively prohibited.

Land developers seeking income-generating projects would be restricted to purchase of existing structures for refurbishment or demolition and replacement.

Note: The author serves as vice-president of Nittany Valley Environmental Coalition, a 501(c)4 nonprofit organization with a mission of "protecting Pennsylvanian's Constitutionally-guaranteed rights."

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Bailiwick News is an independent newspaper offering reporting and critical analysis of Centre County public affairs.

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