

📍 **MUNICIPAL CASE STUDY** ←

Lower Saucon, Pennsylvania

Legacy residential and industrial development in Lower Saucon has caused the township's streams to suffer from pollution and from wildlife-harming levels of dissolved oxygen. In response, a variety of groups, including Environmental Advisory Councils (EAC) members, watershed association volunteers, elected officials, and township staff, are using strict land use regulation and enforcement, careful monitoring of development proposals, and land conservation strategies to improve their township's water quality.

By: Melissa Andrews, *Environmental Planner, DVRPC*

Background

Lower Saucon Township is a 24.3-square-mile township of 10,788 residents (2015 Five-Year American Community Survey [ACS]), yielding a density of about 443 residents per square mile. Median household income is \$76,362 (2015 Five-Year ACS). The township's land cover includes 0.82 percent water.

The township is known for its farmland, woodlands, and rolling hills, as Township Manager Leslie Huhn notes, and its land use reflects that mixture: it is 17.53 percent agricultural, 26.98 percent developed, and 44.02 percent forested. Lower Saucon's U-shape, created by the presence of Bethlehem City and Hellertown Borough, divides the township into two predominant areas of land use. In the southwestern part of the "U," the township is more urbanized, with homes clustered more densely together. This area typically receives more new residents and development. In the northeastern part of the "U," the township is more rural, with parks and preserved lands.

Quick Stats
Lower Saucon

Population: 10,788 (2015)

Population density: 443 residents per square mile

Land area: 24.3 square miles

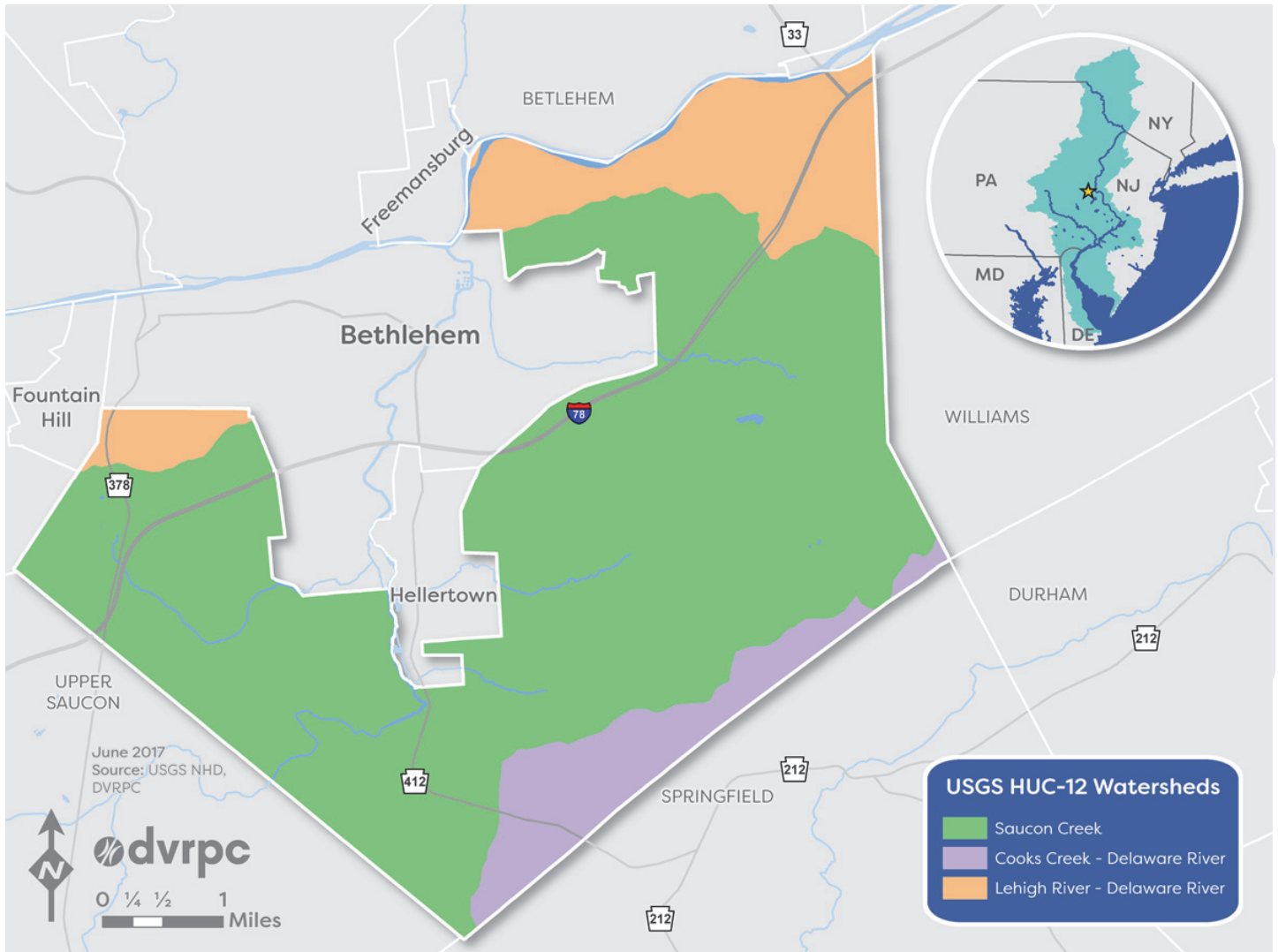
Water area: 0.2 square miles (0.82%)

Median household income: \$76,362 (2015)

Lower Saucon's Watersheds and Waterways

Six named waterways run through Lower Saucon, including Black River, Bull Run, Lehigh River, Polk Valley Run, Saucon Creek (Main Branch and East Branch), and Silver Creek. Lower Saucon contains three major (HUC-12) subwatersheds. The majority of the township is located within the Saucon Creek subwatershed, but the Lehigh River-Delaware River subwatershed is present in the north of the township, while the Cooks Creek-Delaware River watershed is present in the south.

Map: Lower Saucon Township's Watersheds



Water Use and Importance in Lower Saucon

The urbanized section of the township uses a mixture of municipal water and wells, while the more rural east uses well water exclusively. About 25 percent of households use private wells, while 75 percent of households use public wells. Public water is produced by the City of Bethlehem and delivered through the Lower Saucon Authority's distribution system.

Keri Maxfield, director of the Watershed Coalition of the Lehigh Valley (among other roles), noted that water quality ranks high as an issue to residents but low in influencing their daily habits. Nevertheless, she commented that residents have opposed projects that they perceive threaten local and regional water quality, including actively opposing the Penn East pipeline and the expansion of an older landfill in the township.

Water Quality Problems

Stormwater Runoff

Lower Saucon Township is a Municipal Separate Storm Sewer System (MS4) community that is required to comply with the Pennsylvania Department of Environmental Protection's (PADEP's) MS4 permit. An MS4 is a system of infrastructure that moves stormwater, not sewer water, and that typically includes roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains, and that is owned by a public entity. Under the federal Clean Water Act of 1970, municipalities are required to control certain pollutants that the community disposes into stormwater drains and thus into waterways—specifically, waterways that are impaired functionally or ecologically by a contaminant.

Leslie Huhn cites stormwater runoff “from all uses”—residential, commercial, industrial, and agricultural—as a major threat to the township's water quality. PADEP published an “MS4 Requirements Table”¹ listing Pennsylvania municipalities' impairments in each of their waterways, and Lower Saucon's impairments reflect the ways in which its different land uses have caused pollution in its waterways.

Lower Saucon created stringent stormwater regulations in the early to mid-2000s, but the majority of its development was constructed prior to that time so much of the development presently in the township has no construction standards for stormwater. Councilman Glenn Kern feels that this older development and its lack of stormwater controls is the single limitation preventing the township from better protecting water quality. Pesticides and herbicides from agricultural and residential properties are able to flow to the creek and are in part responsible for the township's organic enrichment/low dissolved oxygen impairment. More property development over the past several decades has yielded more impervious surfaces, which can cause stormwater to flow over land at greater volumes and rates, loosening soil and depositing it into waterways. Over time, this process can cause erosion along waterways, and Keri Maxfield listed streambank collapse from flooding as a concern in the township. All of these processes together have contributed to the siltation impairments listed in several of Lower Saucon's waterways.

Because of its proximity to Bethlehem, a major steel-producing city, Lower Saucon is also affected by industrial pollution through runoff, particularly historical dumping of batteries and coal. Lower Saucon itself has its own contaminated lands. Keri Maxfield cited concern about not knowing what dissolved substances are coming out of the range of large and small outfall pipes associated with industrial facilities and homes. Lower Saucon's mercury and polychlorinated biphenyl (PCB) impairments are the result of its neighbor's and its own industrial heritage.

Dam Construction

Several residents and businesses in the eastern rural area of the township have created dams and fish hatcheries within the township's waterways. The state typically monitors for these constructions and requires removal but does not always follow up in a timely manner. Dams alter the flow of a stream, resulting in changes to the stream's physical qualities (temperature, potential of hydrogen [pH], and dissolved nutrients) as well as its ecology.

¹ Pennsylvania Department of Environmental Protection, MS4 Requirements Table (Municipal), May 9, 2107, http://files.dep.state.pa.us/Water/BNPNSM/StormwaterManagement/MunicipalStormwater/Municipal_MS4_Requirements_Table.pdf, 125.

Onsite Septic Systems

Because many residents in the township have onsite wells and septic systems, they are potentially vulnerable to the transfer of contaminants like E. coli through the groundwater, between their wastewater and drinking water. The township's underlying geology may increase this risk; Tom Maxfield, vice chairman of the township's planning commission and a former councilman, noted that "the limestone in the area fills up like a sponge." Much of Lower Saucon Township is underlain with limestone, which can carry groundwater—clean or contaminated—quickly through a property or between properties. Tom Maxfield noted that any impaired or saturated septic systems in limestone areas must be promptly replaced with new systems, which may include sand mounds and alternate septic sites.

Motivating Factors

- Rapid population growth and corresponding development
- Legacy or non-existent stormwater infrastructure
- Negative effects from agriculture and industrial land uses
- MS4 regulations

Township-Wide Interest in Natural Resources

Lower Saucon experienced a wave of development in the late 1990s. Between 1980 and 1990, it grew from 7,372 residents to 8,448 residents (14.6 percent), and between 1990 and 2000, it grew again to 9,884 residents (a 17.0 percent increase).² Because of the township's population growth, school taxes were high, and residents were concerned about the choice between tax increases and increased pressure on the school system. During this time, Lower Saucon shifted its practices toward the protection of natural resources, including water quality. Municipal leaders and residents aligned with their environmental peers because they were concerned about the strain that an influx of new residents and new development were placing on the township's natural and fiscal resources.

These actions together formed the basis for the township's ongoing water quality work. Glenn Kern is optimistic that the township is "using every tool in their toolbox to improve and protect water quality" and will continue to "network and keep abreast of new techniques and technologies to enhance our current efforts" and "continue to educate our residents and business owners about the importance of water quality and need for water quality protection."

Water Quality Solutions

Citizen Action: EAC and Watershed Associations

Leslie Huhn describes the township's EAC as being "very active" in water quality issues. The EAC started in 1999 with a core group of 10 people who were motivated to react to the presence of 30 proposed developments in the township at one time. Based on the number of proposed units, they determined how residents' taxes would increase, sent their calculations to the township, and offered advice on how to proceed to address the situation. The group also developed a map of planned development in the township. Keri Maxfield noted that it was the first time that residents had copies of that kind of map, and that it was clear that "everyone was affected by the development." Keri Maxfield points to the distribution of this map as one of the events that spurred Lower Saucon residents to act on water quality.

² Lehigh Valley Planning Commission, *Municipal Population Forecasts: Lehigh and Northampton Counties*, January 2013, from the U.S. Census, <http://www.lvpc.org/pdf/population/municipalPopulationForecasts.pdf> (accessed June 1, 2017), 7.

Key Partners

Watershed Coalition of the Lehigh Valley: An umbrella coalition representing community-based watershed associations in the Lehigh Valley. The mission is to preserve and enhance the watersheds of the Lehigh Valley, which the coalition does through outreach and education, resource and information sharing, and advocacy on key issues critical to water resource health in the Lehigh Valley.

Lower Saucon EAC: Has over 300 members. Contributions include reviewing riparian buffer regulations and promoting water quality to other residents through rain barrel workshops and other events.

Saucon Creek Watershed Association (SCWA): Is a volunteer organization dedicated to protecting and preserving the Saucon Creek and its watershed through science and advocacy, including riparian buffer plantings, stream visual assessments, illegal dump clean ups, and educational workshops.

Cooks Creek Watershed Association: Has worked to protect, preserve, and improve the quality of water, land and life in the Cooks Creek Watershed since 1974.

Lower Saucon elected officials: Care deeply about water quality issues and view water quality as a high priority.

Boucher and James (planning consultant): hiring a professional planner, Judy Stern Goldstein, with open space knowledge introduced the township to riparian corridor ordinances, cutting-edge stormwater mitigation technologies, reference studies about water quality, and the idea of cluster development.

Pennsylvania Department of Conservation and Natural Resources (DCNR): Acquired open space and developed parkland.

The EAC is now the most popular commission in the township. Since its first project, it has grown in membership to over 300 people. Most of the original founders, including Keri and Tom Maxfield, Sandra Yerger, and Glenn Kern, are still active in Lower Saucon, but the EAC now has a second generation of participants. Keri Maxfield believes they have been successful because of their “open-mindedness and careful listening.” She observed that officials do not always have time to visit particular sites that need work, but the EAC does. Most recently, they have augmented the township’s work by reviewing riparian buffer regulations and promoting water quality to other residents through rain barrel workshops and other events.

Residents—including some elected officials—serve on two active local watershed associations, one for Cooks Creek and one for Saucon Creek. The SCWA, of which Keri Maxfield is president, worked with other members to conduct a visual assessment of the Saucon Creek and used it to develop a management plan, which led to riparian buffer restoration efforts. The watershed association also received a grant to buy tools for a heavy rain barrel construction initiative in different municipalities: it included building 500 rain barrels and running an educational session. They additionally ran a habitat-building session with an educational component on landscaping to achieve clean water and have completed numerous illegal-dump-site cleanups, including a site with over 300 tires.

The watershed association is small and members are aging and have more limited mobility, so it focuses on conducting outreach while relying on volunteers and other organizations, such as student orientation groups, to do the more physical work. Some members have moved on to manage other projects, including forming other EACs, helping pass open space referenda, and preserving open space.

Committed Leadership

A common observation among those interviewed was that Lower Saucon’s officials care deeply about water quality issues. Glenn Kern effused that “we are blessed to have an entire Town Council in agreement” on water quality as a high priority. Leslie Huhn noted that their council is “proactive” in the MS4 program.

In the late 1990s, the township surveyed residents to see what they wanted in the township. Major responses included passive recreation and preserved farmland. The township was due to update its comprehensive plan, and because the rewrite occurred in 2000, the plan incorporated and thus made an official and guiding record of those sentiments.

Tom Maxfield recalls that beginning 10 years ago, elected officials began considering water quality as “incredibly important,” and became aware of flooding and runoff issues from residential development—some of which was determined to contain harmful chemicals. He noted that residents at the time generally accepted any environmental protection that the township proposed, as it was a “hot button issue.”

Informed Consultants

Part of township leaders’ commitment to water quality is reflected in its choice of, as Leslie Huhn describes, a “talented planning consultant.” The township’s planner, Judy Stern Goldstein, is the managing director of Boucher and James and has a background in planning for natural resources. According to Leslie Huhn, she “complements the work of [our] engineer and adds more proactivity.”

Among other projects, Judy Stern Goldstein has developed riparian corridor ordinances, researched cutting-edge stormwater mitigation technologies, selected reference studies about water quality for the township to consult, and introduced the township to the idea of cluster development.

Tom Maxfield describes hiring a professional planner with open space knowledge as “the best thing that [the township] did.” Tom Maxfield recommends that municipalities hire a good planner—a community planner, not just a resources planner—who “understands how it all works together.”

Land Use Regulation and Enforcement

Zoning Overlays

Lower Saucon has also used overlay zones to protect natural resources where appropriate. Sandra Yerger considers this strategy to have been “very effective” in the township. The township has a natural resources protection overlay zone that protects steep slopes, woodlands, and stream corridors. The township has also adopted other overlays from bordering municipalities, making the protections more regional in scope.

Zoning Ordinance

Lower Saucon’s zoning ordinance (Chapter 180 of the municipal code) contains resource protection requirements that place limits on the amount of development in sensitive natural areas, including woodlands, floodplains, and wetlands, and along steep slopes. The zoning ordinance furthermore requires that those areas be protected. Notably, the zoning ordinance contains a riparian protection ordinance that protects riparian corridors.

The zoning ordinance also includes upper bounds for percentage of impervious coverage for development. Tom Maxfield notes that residents are not always happy about these limits because they are sometimes unable to add decks and other features to their properties, but stated that the township has continued to address these negative initial reactions by talking to residents and developers about the area’s historic flooding issues and making the connection to the imperviousness regulations, which are divided into zones based on septic system locations and soil drainage properties. The township can also cite studies that EAC chair and planning commission member Sandra Yerger compiled, stating the ideal limits of impervious coverage.

According to Tom Maxfield, residents and developers push back against the regulations less now than they did previously.

Through the zoning ordinance, the township also encourages clustering development. In this strategy, the developed area is reduced to a smaller portion of the site and the remainder is dedicated as open space. Though not as helpful for reducing impervious surface cover in a municipality as redeveloping, this strategy keeps development away from a site's most important natural resources. The township tries to fit incentives into cluster development, where more units are permitted if developers follow the cluster regulations. Through clustering, Tom Maxfield noted that the township was able to work with developers to protect an "immaculate wetland" located near developable land.

Stormwater Management Ordinance

The township has a detailed stormwater management ordinance (Chapter 137). Among other elements, it requires best management practices for construction projects, including bioretention, capture/reuse, constructed wetlands, wet or dry extended detention ponds, minimum disturbance/minimum maintenance practices, significant reduction of existing impervious cover, stormwater filters (sand, peat, compost, etc.), vegetated buffers/filter strips/swales, vegetated roofs, and water quality inlets. This has been a requirement for all new development over the past 12 years.

The ordinance also contains wellhead protection provisions for public water supplies within 400 feet of the site. Infiltration is prohibited close to the wellhead, within a Zone I radius dimension that is defined by the public water supplier. However, if the developer does not receive a radius value from the public water supplier, they must still develop at least 200 feet from the wellhead.

Floodplain Ordinance

The township has a separate floodplain ordinance (Chapter 90) that restricts disturbance in the Flood Hazard District, which is defined as special flood hazard areas in the township's 2014 Flood Insurance Rate Maps plus any community-identified flood hazard areas. No disturbance can increase flood levels in the community.

Variance and Waiver Review Process

According to Sandra Yerger, many entities in the township partner to ensure that the zoning ordinance is not undermined by monitoring variance and waiver requests and giving opinions on the requests to the township's zoning board. The EAC makes sure that the planning commission is aware of updates to ordinances, especially when the planning commission members change. The township's zoning officer is also a key player in this process. Their zoning officer is trained as an engineer, giving him a greater awareness of the design and environmental implications of approving a waiver and variance. The zoning officer informs the planning commission of pending or granted variance requests and keeps a log of all of the variances or waivers in areas where stormwater issues are located, enabling him to look at the big picture. The engineer and planner also provide oversight by attending planning commission meetings and governing board meetings to review comments on the variance or waiver requested.

The landowner requesting the variance or waiver comes before the governing board in a public meeting before going to the zoning hearing board. The planner, engineer, and lawyer all review and voice their opinions during that meeting. If they are in opposition, the lawyer attends the zoning board meeting to voice objection. All of these responsibilities help keep the township's regulations around stormwater and other natural resources intact.

Partnerships outside Lower Saucon

Lower Saucon partners with its neighboring municipalities on water quality issues, particularly Springfield Township (Bucks County) and Hellertown Borough (Northampton County). The township also relies on the state for funding water quality initiatives, having received grants from the DCNR for acquiring open space and for developing parkland. They work with non-profits, especially the Heritage Conservancy and Wildlands Conservancy, as well as their local watershed groups and the EAC.

To complete their MS4 requirements to conduct monitoring on the Cooks Creek and Saucon Creek, the township also partners informally with local colleges, including Lafayette University and Lehigh University, to conduct this monitoring work. Professors and classes from these schools have provided information and data to supplement the township's knowledge of watershed protection.

Land Conservation

Leslie Huhn noted that the council is engaged in land conservation and in using natural resource vulnerabilities to prioritize parcels for conservation. Glenn Kern is one council member who values open space acquisition as a means of "preventing haphazard development" and thus protecting water quality.

In the late 2000s, the township took the lead in determining the cost benefits of protecting natural resources over developing them. Prior to its first open space tax referendum in 2006, the township determined that when accounting for costs from school taxes, there would be less financial loss from protecting land than from developing as residential. The township's open space referendum program continues to this day; in the November 2016 election, Lower Saucon residents (58 percent) approved a referendum to extend their 10-year-old 0.25 percent earned income tax for open space. The tax is expected to generate about \$1 million per year for five years.^{3,4}

A recent township acquisition was an aging golf course, in order to remediate its hydrology and ecology, and convert it into a park with passive and active amenities. According to Tom Maxfield, who cites this property as his favorite preserved parcel in the township, the golf course previously caused flooding in downstream areas. However, these floods will likely be mitigated now that the parcel will be left "wild," as he noted, in alignment with his conviction that "habitat will take care of itself."

Municipal Concerns and Challenges Ahead

Keri Maxfield believes that a mixture of additional funding, staff capacity, and technical understanding would help Lower Saucon move its water quality projects forward. She cited several projects that have remained "on the backburner." She would like to do more work beyond the township's ongoing basin naturalization project to address heavy flooding in Silver Creek. According to her, large riparian restorations are being held up by lack of funding and the need for landowner permission, and more oversight and outreach from the township is needed on obstructions on the creek, like dams.

Education of Municipal Officials and Staff

Tom Maxfield noted that the township used to run workshops for municipal officials, and while a budget still exists for those classes, it has decreased. According to him, education of municipal officials is critical for

³ Andrew Wagaman, "Upper Milford, Lower Saucon vote yes on open space taxes," *The Morning Call*, November 9, 2016, <http://www.mcall.com/news/local/elections/mc-saucon-milford-tax-questions-20161108-story.html> (accessed June 1, 2017).

⁴ The Trust for Public Land, *LandVote*, <https://tpl.quickbase.com/db/bbqna2qct?a=dbpage&pageID=8> (accessed June 1, 2017).

addressing water quality issues. He would also like the township to be educated on new technologies for addressing waste storage or waste-to-energy products because, according to him, Northampton County's sewage disposal works along the Lehigh River are not efficient; he has been told that when facilities are overstressed, sewage gets dumped into the river.

Keri Maxfield wants to see an "introduction to water quality protection" class for elected officials that is accompanied by a manual on environmental issues, as new officials do not know the history of these issues in Lower Saucon and do not understand what triggered the township's existing regulations.

Education of Private Property Owners

Keri Maxfield also desires more education for private property owners; she believes that a class helping streamside property owners understand the best way to maintain their property would be beneficial, as well as instructions on protecting well water and naturalizing privately owned stormwater basins. According to her, the township needs to change residents' habits, such as around grass clipping practices. She acknowledges that the township continues to face challenges in getting enough property owners to attend these types of events but hypothesized that "hot-button" issues like "know your rights but manage your property" might interest more attendees.

Larger-Scale Responsibilities

There are many water quality issues stemming from Bethlehem's legacy industrial activities that arise on the township's boundaries. As the issue is multi-municipal, regional solutions are needed.

Keri Maxfield has also observed instances where the Pennsylvania Department of Transportation (PennDOT) has chopped down planting projects along its roadways, and from that experience, she feels that federal and state agencies (most relevant to this case, DCNR and PennDOT) need to work together and ensure that their goals and activities around water quality align.

Key Factors in Success

The key factors to Lower Saucon's success are:

- Educated local leaders
- Talented consultants
- Help from technical assistance providers

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