CHARACTERIZATION AND ASSESSMENT OF THE ROYCE BROOK WATERSHED

ACKNOWLEDGEMENTS

PRIMARY AUTHORS:

Steve Yergeau, Watershed Assessment Specialist
Priya Sankalia, GIS Specialist

CONTRIBUTING AUTHORS:

Andrew Rowan, Ph.D., Director, The GIS Center
Noelle MacKay, Deputy Director
Matthew J. Mulhall, P.G., M^2 Associates Inc.

The Stony Brook-Millstone Watershed Association (SBMWA) would like to thank the people who helped in the development of this Characterization and Assessment of the Royce Brook Watershed. The funding for this project was made possible by funds from **The William Penn Foundation**.

We would like to thank the members of our **Technical Advisory Committee** (Edward Clerico, James Cosgrove, Paul Drake, Donna Drewes, Tod Fairbanks, Harriet Honigfeld, John Kantorek, Bob Kecskes, Kerry Kirk-Pflugh, Matt Mulhall, Robert Ortego, Paul Pogorzelski, Stephen Souza, David Stout, Dan Van Abs, Michael Wright and Ron Yake) for their guidance, for sharing their expertise in watershed management, and providing any available data.

Adam Hale, AmeriCorps Watershed Ambassador, for performing the visual assessments of the streams in the Royce Brook Watershed.

The agencies, organizations and companies that shared their data on the environmental resources of Royce Brook for assisting to complete the picture on the Royce Brook Watershed's health.

EXECUTIVE SUMMARY

The results of this characterization and assessment represent an opportunity to properly plan the landscape of the Royce Brook Watershed in an environmentally responsible way and to work proactively to protect water quality. Overall, waterways are experiencing moderate degradation due to sedimentation in Royce Brook and stormwater is impacting the health of waterways. Sedimentation is partly due to the makeup of the underlying soils and geology. While this condition is natural, many other factors are amplifying this problem. Increases in populations in the Royce Brook Watershed, and associated land use changes, are adding to the amount of impervious surfaces, which augment the frequency and intensity of stormwater, flooding and erosion.

PLANNING FUTURE GROWTH

Finding: Populations in the Royce Brook Watershed, like the rest of New Jersey, are on the rise. The population went from 39,375 residents in 1990 to 46,977 in 2000, increasing by 19.3%. From 1986 to 1995, developed lands increased from 4,295.6 acres to 5,045.4 acres, a gain of 17.0%. Developed areas are on the increase at the expense of the remaining active agriculture in the watershed. (See Landscape section for more information.)

Recommendations:

- If not already completed, buildout analyses for each municipality should be conducted. This will allow for predictions of future growth and where current policies could lead. Regulations could be evaluated to determine if they are protective enough for preserving environmental quality.
- One way to balance the population growth with increased development is to plan for and maintain areas as town centers. These areas can be planned as mixed-use developments (projects that integrate different land uses, such as restaurants, residences, offices and parks), or low impact developments (ecologically friendly site development and stormwater management that aims to mitigate impacts to air, water and land) for maximum benefit.
- Royce Brook Watershed contains many critical habitats for a variety of threatened and endangered species. Critical habitats cover 37.0% (3,900 acres) of the Royce Brook Watershed. Many of these critical areas are adjacent to existing developments, putting them under development pressure. The municipalities that make up the watershed should review and reconsider their zoning to coincide with these environmentally important areas, restricting development and fragmentation of these habitats. Also, open space preservation can use critical habitat data as a tool to plan where efforts can be focused.

Finding: Much of the Royce Brook Watershed is developed and agricultural areas are converted to urban and developed land uses. Agricultural lands, once the basis for the area's economy, represent the rural character and a historical reference for towns. Many of the critical habitats for State threatened species within the watershed are grasslands that coincide with farmed areas in the watershed. (See Land Use section for more information.)

Recommendations:

- Hillsborough Township has prioritized suitable farms within its borders to preserve. Data on critical habitats and ground water recharge should also be reviewed in conjunction with soils data and factors that maintain and enhance agricultural viability when determining which farms to preserve. Farms that contain both of these environmentally sensitive features can be preserved and will not only preserve the rural character of the municipality, but will also protect threatened species and water supplies in the region (Figure 27).
- A few areas within the Royce Brook Watershed have been planned for limited growth and development. The planned areas within Hillsborough Township are mostly in agricultural lands. If these lands are currently not within State farmland preservation programs, then they should be high priority to be included in such, since a majority of agricultural lands are also being converted to urban land uses.
- Riparian corridors are being increasingly encroached upon for development in the Royce Brook Watershed. These areas are particularly sensitive to land use changes, as they are the natural buffers that protect the stream itself from a variety of pollution sources. Placing of new construction in the Royce Brook Watershed needs to be sensitive to or avoid altogether the riparian corridors in order to maintain ecological integrity. One way to ensure that riparian corridors are protected is to have the Royce Brook Watershed's municipalities and counties support the State recommendation of C1 protection for Royce Brook and its tributaries.
- Stream corridor ordinances will preserve the riparian corridor and prevent further development to these critical areas. The municipalities that do not have this protection for area streams should develop and implement such a strategy, if feasible.

Finding: Impervious cover prevents the movement of water into the soil. The Royce Brook Watershed is covered by 15.4% impervious cover. While this is below the 25% impervious cover limit where there is a shift to poor stream conditions that include diminished aquatic diversity, water quality, and habitat functioning, it is above the 10% impervious cover limit where sensitive elements are lost from the stream system. The municipalities need to be aware that much of the underlying soils in the Royce Brook Watershed are highly erodible and also have very slow infiltration rates, which increase the amount of runoff in this region. Water quality impacts have been noted due to the erodible nature of the soils in this region. (See Land Use section for more information.)

Recommendation:

- Increasing impervious cover will only exacerbate water quality problems by increasing the frequency and intensity of storm flows and flooding, a problem that has plagued Manville Borough over the past century. Municipalities need to incorporate innovative ways to plan developments including re-zoning (changing zoning classifications to permit

development that is less dense or restrictive), mixed-use development (projects that integrate different land uses, such as restaurants, residences, offices and parks), conservation design and town-center designation (centralized growth areas through incentives and allows for developing at higher densities). Redeveloping existing urban land uses will also help to maintain current amounts of impervious cover in those areas.

MAINTAINING GROUNDWATER RESOURCES

Finding: There are 29 known contaminated sites (KCSs) in this 16.5 square mile watershed. Twenty-five sites are found within Hillsborough Township alone. This large number of KCSs in the Royce Brook Watershed warrants that the potentially responsible parties remediate any contamination present. (See Known Contaminated Sites section for more information.)

Recommendation:

- The wellhead protection area (WHPA) in Manville Borough is a significant source of drinking water for the entire Millstone Watershed. Even though there are no KCSs located within this WHPA, all adjacent KCSs need to have consistent monitoring by NJDEP to ensure that no contamination is documented in the vicinity of the WHPA.
- The creation and implementation of an ordinance to provide wellhead protection to the delineated WHPAs by the municipalities in the Royce Brook Watershed will ensure that groundwater is protected from possible contamination.

Finding: Much of the Royce Brook Watershed (83.1%) contains areas with high ground water recharge. These areas need to be protected by ordinances by their respective municipalities (Hillsborough Township, in particular) to restrict development in these areas. Reduced development in the high ground water recharge areas will aid in ensuring that plentiful supplies of water are available for the future. (See Water Supply section for more information.)

Recommendations:

- Since some of the high ground water recharge areas are located in agricultural areas in Hillsborough Township, this municipality needs to encourage regulations on the use of chemicals (especially harmful chemicals like pesticides) in the agricultural areas above ground water recharge zones to prevent possible contamination. If this is not possible, farms need to review and evaluate the many options available to reduce their pesticide use in such areas. For example, participation in the New Jersey Conservation Reserve Enhancement Program (CREP) to help farmers reduce impairment from agricultural water runoff sources in an effort to improve water quality along both impaired and unimpaired New Jersey streams through best management practices (BMPs).
- To ensure that ground water and aquifers maintain adequate water supply, municipalities can include the use of infiltration ponds and basins in new developments. These ponds are lined with permeable soils and materials that allow water to be slowly released back into the ground.

PROTECTING WATER QUALITY

Finding: The nature of Piedmont geology has a large influence on the water resources and environmental quality of the Royce Brook Watershed. Sandstones, siltstones and shales typify the Piedmont Physiographic Province. (See Geology section for more information.)

Recommendation:

- Due to the somewhat consolidated nature of the stones in the Piedmont Physiographic Province, infiltration rates for water entering the ground are slow to very slow. This has the potential to produce a high amount of runoff from storm events. This stormwater runoff needs to be controlled or managed by the municipalities, especially Manville Borough, which is almost completely developed, so that it does not degrade water quality or increase the potential for flooding.

Finding: Much of the Royce Brook Watershed is classified as having hydrologic soil group C, covering 9,388.5 acres out of a total of 10,568.0 acres (88.8%) in the entire watershed. Hydrologic soil group C represents soils with a slow infiltration rate, and is representative of the moderately consolidated soils seen in the Piedmont Physiographic Province. The second most common hydrologic soil group in the Royce Brook Watershed is group D, representing very slow infiltration rates. Most of these soil groups are located in headwater areas of tributaries to Royce Brook. Category D soil groups have very slow infiltration rates since most of these soils are clayey or are shallow to an underlying impervious layer. Runoff from these soils will be moderate to rapid due to these moderately coarse-textured soils having slow to very slow infiltration rates.

Based upon the visual assessment data and observations during the biological assessments, the most likely stressor affecting the macroinvertebrate communities in Royce Brook is heightened sedimentation. The basis for this heightened sedimentation may be due to the soil composition and high erodibility of the Royce Brook Watershed itself, which is exacerbated by the high amount of developed lands in the watershed. The nature of the Piedmont soils in the Royce Brook Watershed is an important factor impacting water quality of Royce Brook (especially macroinvertebrate communities and their habitats). (See Water Quality and Soils sections for more information.)

Recommendation:

- Because municipalities rely on their local Soil Conservation Districts (SCDs) to enforce the sediment and soil management regulations, SCDs need to be aware of the characteristics of a site's underlying soils when they review and enforce plans to control and manage soils during construction activities.
- To help alleviate any heightened sedimentation of waterways within the Royce Brook Watershed, municipalities that currently do not have sediment and soil erosion control ordinances should enact such an

ordinance. It is especially critical to have these regulations in place during construction activities (as the region is undergoing increased development). Agricultural activities (as much of this region is still farmland and many farms are located near streams) need to investigate the use of BMPs to help alleviate sediment loads into area streams.

Finding: The visual assessment information and biological data available shows that there are impacts to water quality, mostly stemming from the high amount of developed land in the Royce Brook Watershed. The Royce Brook is listed by the NJDEP as impaired due to non-support of aquatic life or as having insufficient data to determine the health of the waterways. (See Water Quality section for more information.)

Recommendations:

- In order to accurately assess the environmental health of Royce Brook, long-term trends in water quality need to be determined. Currently, there is a lack of reliable monitoring data (biological or chemical) on the water resources in this region, especially basic water quality information for many of the area's tributaries, which have an impact on the Royce Brook itself. Intensive monitoring needs to occur to determine the health of Royce Brook and its tributaries. Future monitoring could be performed by municipal environmental commissions through the State's Environmental Services Program Matching Grant, as has been done successfully by other towns.
- Point source discharges in the Royce Brook Watershed need to work within the guidelines of their active permits in order to maintain the health of Royce Brook.
- Nonpoint source pollutant loadings for nitrogen, phosphorus, and total suspended solids (TSS) in the Royce Brook Watershed are found mostly within the moderate to high levels for the model used in this assessment. Of special note are the loadings for TSS, as the land use practices modeled in the Royce Brook Watershed are providing moderate levels of sediments to the streams in this region. This is important, as the soils in this area are mostly uncemented and therefore highly erodible. Since the infiltration rates of the soils in the Royce Brook Watershed are slow to very slow, the potential for runoff in this region is high. Therefore the municipalities in the Royce Brook Watershed (especially Hillsborough Township) need to enact sediment control ordinances to prevent materials from washing into streams and degrading habitat and water quality.
- Since the Royce Brook Watershed is already highly developed, the municipalities in this region need to incorporate stormwater management to help reduce the loadings of nonpoint source pollutants into the Brook. Somerset County has moved this process forward and the municipalities within Royce Brook Watershed should cooperate to develop a regional stormwater management plan for Royce Brook and its tributaries.

31 Titus Mill Road
Pennington, NJ 08534

PHONE: (609) 737-3735
FAX: (609) 737-3075
http://www.thewatershed.org