CHARACTERIZATION AND ASSESSMENT OF THE CRANBURY BROOK WATERSHED

ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

This characterization and assessment represents an opportunity to properly plan the future landscape of the Cranbury 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 Cranbury Brook and stormwater is impacting the health of waterways. Increased sedimentation is attributed 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 Cranbury Brook Watershed, traditional construction practices 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 Cranbury Brook Watershed, like the rest of New Jersey, are on the rise. The population went from 70,753 residents in 1990 to 93,836 in 2000, increasing by 32.6%. From 1986 to 1995/97, developed lands increased from 3,507.9 acres to 4,605.9 acres, a gain of 31.3%. 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 such as the new town center in Plainsboro Township, and maintain villages such as Cranbury Township. 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.
- Cranbury Brook Watershed contains many critical habitats for a variety of threatened and endangered species. Many of these critical areas are adjacent to increasing development, putting them under pressure to be built upon. 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: Newly developed lands have been created in the Cranbury Brook Watershed. Much of the conversion was from agricultural areas to urban land uses. Agricultural lands maintain the rural character and history of towns that were founded upon a farming economy. Many of the critical habitats within the watershed are grasslands and coincide with farmed areas. (See Land Use section for more information.)

Recommendations:

- Decreasing the rate of conversion of farmlands in the Cranbury Brook Watershed to urban areas through participation in the State's farmland preservation programs, adopting and enforcing a stream corridor ordinance, or protecting riparian areas with conservation easements would help to protect water quality.
- Monroe Township needs to determine suitable areas to preserve farmlands if they have not done so already. Cranbury and Plainsboro Townships have a prioritization system for preserving farmlands in place. Data on critical habitats and ground water recharge should 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).
- Riparian corridors are being increasingly encroached upon for development in the Cranbury 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 Cranbury 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 Cranbury Brook Watershed municipalities and counties support the State recommendation of C1 protection for Cranbury 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 Cranbury Brook Watershed is covered by 13.9% 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 Cranbury Brook Watershed are moderately erodible. Water quality impacts have been noted due to the erodible nature of the soils in this region. (See Land Use section for more information.)

Recommendations:

- Increasing impervious cover will only exacerbate water quality problems by increasing the frequency and intensity of storm flows and flooding. Municipalities need to incorporate innovative ways to plan developments including re-zoning (changing zoning classifications to permit development that is less dense), 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).

- In order to maintain its 13.9% impervious cover, new developments in the Cranbury Brook Watershed should consider the use of porous pavement or other porous materials in the design of streets, walkways and other appropriate structures, if feasible. These materials allow for the infiltration of precipitation back into ground water supplies.

MAINTAINING GROUND WATER RESOURCES

Finding: There are 18 known contaminated sites (KCSs) in this 22 square mile watershed. Eleven sites are found within Cranbury Township alone. This large number of KCSs in the Cranbury Brook Watershed warrants the potentially responsible parties remediate any contamination present. (See Known Contaminated Sites section for more information.)

Recommendations:

- Ground water contamination is a concern at one particular KCS: Plainsboro Township Sanitary Landfill. This site is located within a half-mile of a public well in Plainsboro Township. Ground water impacts to this site have been rated as moderate by the NJDEP. Special attention needs to be given to the continued monitoring of this site by the NJDEP to ensure that public safety is maintained.
- The creation and implementation of an ordinance to provide wellhead protection to the delineated wellhead protection areas by the municipalities in the Cranbury Brook Watershed will ensure that public community wells are protected from possible contamination.

Finding: The nature of Coastal Plain geology has a large influence on the water resources of the Cranbury Brook Watershed. The unconsolidated nature of the sediments has two major implications from the standpoint of water resources. First, streams and rivers of the Coastal Plain are typified by large amounts of alluvial sediment because of the erodibility of the underlying deposits. The soils are easily eroded and carried to other areas of the watershed. Second, the lack of cementation of the buried sediments means that the sandy units retain a high porosity, making them very productive aquifers. (See Geology and Soils sections for more information.)

Much of the Cranbury Brook is classified as hydrologic soil group B, covering 6,616 acres out of a total of 14,240 acres (46.5%) in the entire watershed. Hydrologic soil group B represents soils with a moderate infiltration rate and is representative of the moderately coarse soils seen in the Coastal Plain Physiographic Province. This aids the extensive aquifers in the region by allowing for much ground water to be recharged to the soil. Most of this soil underlies the agricultural areas in Cranbury and Monroe Townships and the developed areas of Plainsboro Township. (See Soils section for more information.)

Recommendation:

- Increasing urbanization in the Cranbury Brook Watershed also increases the amount of impervious cover. This has the effect of decreasing the amount of water flowing into the aquifer by diverting precipitation over the landscape to streams and not downward into the soil. Placement of new development, and therefore impervious cover, out of areas that have high value for recharging the aquifers will help to maintain water levels for drinking, irrigation and industrial use.

Finding: There are many portions of the Cranbury Brook Watershed that contain areas with high ground water recharge. These areas need to be protected by ordinances by their respective townships (Cranbury and Monroe, in particular) to restrict development. Reduced development in the high ground water recharge areas will ensure that there are plentiful supplies of water for many years to come. By working together to protect ground water supplies and aquifers, municipalities can coordinate preservation and protection efforts across town lines to look at areas regionally beyond the borders of the Cranbury Brook Watershed. (See Water Supply section for more information.)

Recommendation:

- Since the majority of high ground water recharge areas are located in agricultural areas in Cranbury and Monroe Townships, these municipalities need 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: Based upon the visual assessment data and observations during the biological assessments, the most likely stressor affecting the macroinvertebrate communities in Cranbury Brook is heightened sedimentation. The cause of this heightened sedimentation may be due to the soil composition and erodibility of the Cranbury Brook Watershed itself. This moderate to high erodibility of its soils combined with the sandy geology seen in much of the southeastern portion of the Millstone Watershed probably accounts for much of the sedimentation observed. Increasing the sampling effort in Cranbury Brook and its tributaries will help

to clarify the impacts affecting its water quality. (See Water Quality section for more information.)

Recommendations:

- 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.
- 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.
- In order to accurately assess the environmental health of Cranbury Brook, long-term trends in water quality need to be determined. Currently, there is a lack of reliable monitoring data on the water resources in this region. Intensive monitoring needs to occur to determine the health of Cranbury Brook, its tributaries and its ponds and lakes. Future monitoring could be performed by municipal ECs through the State's ESP Matching Grant program, as was done by Cranbury Township.
- Point source discharges in the Cranbury Brook Watershed need to work within the guidelines of their active permits in order to maintain the health of Cranbury Brook.
- Nonpoint-source pollutant loadings for nitrogen, phosphorus and total suspended solids (TSS) in the Cranbury Brook Watershed are found mostly within the moderate to high levels for the model used in this report. Of special note are the loadings for TSS, as the land use practices modeled in the Cranbury Brook Watershed are providing moderate levels of sediments to the streams in this region. This is important, as the soils in this area are already unconsolidated and therefore highly erodible. Therefore, municipalities in the Cranbury Brook Watershed (especially Cranbury and Monroe Townships) need to enact sediment control ordinances to prevent materials from washing into streams and degrading habitat and water quality.
- Middlesex County and municipalities within Cranbury Brook Watershed are already moving forward with developing a regional stormwater management plan for Cranbury Brook and also Cedar Brook, Devils Brook and Shallow Brook. This is a step in the right direction, as stormwater management needs to be addressed regionally in order to adequately handle the additional loads of nitrogen, phosphorus and TSS.

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