BACKGROUND

The City of Harrington is located on the Atlantic Coastal Plain, near the drainage divide between the Chesapeake Bay and Delaware Bay. The divide is near Harrington's western town limits, and the City is within the Delaware Bay Drainage area.

The area exhibits 25 feet of topographic relief, with most of the area at 50 to 60 feet above sea level. The basin of Browns Branch and its tributaries rise to approximately 50 feet above sea level from the valley bottoms that lie at 35 to 40 feet in elevation. Browns Branch and its tributaries in the Harrington area flow east, away from the City center for approximately 1 mile, and then bend north and northeastward to join the Murderkill River.

FLOODPLAIN

The Federal Emergency Management Agency (FEMA) oversees the national flood insurance program, floodplain delineation and flood elevation determinations. To participate in the insurance program, counties and municipalities must maintain ordinances that regulate development and construction within a floodplain. Harrington has had a Floodplain Ordinance in place since 1989. The ordinance was recently reviewed by DNREC Flood Mitigation Branch and was found to be pertinent and adequate. The Federal Emergency Management Agency (FEMA), as part of the Federal Flood Insurance Program, has remapped flood plains in the Harrington area. The new maps show a significantly reduced 1% Chance Annual Flood (also known as the 100-year flood) Zone along the north tributary to Browns Branch, on the north and east side of the City.

The most recent updates to the Flood Insurance Rate Maps were issued in May, 2003. The map panels for Harrington are: 10001C0330, 10001C0337 and 10001C0341. Flood plains are shown on Exhibit 5.

WETLANDS

Wetlands are an important interface between the surface drainage systems and groundwater recharge points. Wetlands can buffer uplands from flood-prone areas and trap suspended sediment in stormwater run-off, before it can enter streams and ditches. Finally, wetlands provide important habitat for many of Delaware's popular game animals and native plant and animal species.

Wetlands are highly limited within the City and are most likely to be positively identified along the margins of Browns Branch and its tributaries. Wooded areas within the City have been mapped under the National Wetlands Inventory as "Forested Wetlands," and are considered potential sites for wetlands, although no site-specific wetlands mapping has been completed within these areas.

The United State Army Corps of Engineers (USACE) regulates tidal and nontidal wetlands under Section 404 provisions of the Federal Clean Water Act. The State more stringently regulates tidal and some nontidal wetlands (i.e., perennial and intermittent streams/ditches and ponds containing a surface water connection to other wetlands) under the Subaqueous Lands Act (7 De1.C. Chapter 72) and the Regulations Governing the Use of Subaqueous Lands.

Exhibit 5 shows the National Wetlands Inventory areas of potential wetlands and the FEMA 1% Annual Chance Flood Zones.

The City should consider the following recommendations:

- Revising relevant ordinances to include wetlands setbacks to protect from infringement and/or building within the setback area.
- Drafting a planting and stream buffering program to protect and enhance water quality and drainage.
- Requiring wetland buffers that are at least 100 feet in width for projects that entail land-use change.
- Requiring a higher level of protection of isolated (non-regulated) wetlands that includes avoiding direct impacts and providing adequate upland buffers to protect and support the habitats of a high diversity of species (terrestrial, aquatic and semi-aquatic) and plants.
- Drafting a more protective ordinance that would allow for larger connected areas of forested open space.
- Requiring land development applicants to include State-regulated wetlands, and USACE approved wetlands delineation for new commercial and/or residential development projects.

WOODLANDS

The City should consider a woodlands preservation program to preserve existing woodland areas within the City, and those associated with potential annexation. The program would include prohibitions on clearing, tree planting guidelines, and preservation language to protect existing woodlands from harvest.

WATERWAYS AND DRAINAGE-STORMWATER AND TAX DITCHES

Some areas on the western side of the City have limited drainage capacity for storm water due to a combination of low slopes and undersized or un-maintained drainage structures. DelDOT had prepared a study (Phases I, II and III) to address drainage issues from Liberty Street to Mispillion Street. The City is continuing to integrate drainage improvements into transportation enhancement projects such as curb and sidewalk additions.

The City should consider the following recommendations:

- Evaluating the need for an Operation and Maintenance Plan for all streams, ditches, swales and storm drains in existing, new, and potentially annexed properties. The purpose of the O&M Plan would be to remove debris/blockages and sedimentation, and restore the drainage features to their original design grade.
- All potential annexed parcels should undergo a tax ditch right-of-way review with DNREC and Kent Conservation District prior to annexation. In addition, DNREC should be invited to the pre-application meeting to discuss drainage management, maintenance and release issues associated with the tax ditch.
- A Master Plan should be developed that identifies all existing open channels and stormwater pipes within the City boundary and future annexation areas. Riparian buffers need to be identified and maintained along the channels to provide beneficial water quality and habitat along theses areas as well as serve as a gateway to greenways.
- Watershed planning for future annexation and targeted land development areas to account for habitat protection, recreation and storm water management on a regional or county level.

- The Division of Watershed Stweardship is requesting involvement in stormwater and drainage reviews via the City's preapproval requirements for new developments. The applicant will need to complete and submit a Stormwater Assessment Study to the State. The pre-application meeting would also involve the Kent Conservation District.
- Stormwater system improvements are under current consideration by the City. Upgrades to existing system may reduce pollutant loads and help reach established total maximum daily loads for nitrogen, phosphorus, and bacteria.
- Including sediment and stormwater requirements on any application checklists for construction projects.
- Evaluating existing drainage patterns within future annexation areas to ensure adequate drainage for the cumulative stormwater impact from full buildout of the annexation area.

SOURCE WATER ASSESSMENT AND PROTECTION

The Delaware Department of Natural Resources and Environmental Control's (DNREC) Division of Water Resources completed a Source Water Assessment for the public water supply wells for Harrington Water Department as required under the 1996 amendments to the Safe Drinking Water Act. This assessment was performed using the methods specified in the State of Delaware Source Water Assessment Plan (DNREC, 1999). As stated in the August 2003 assessment, Harrington Water Department uses three wells to provide drinking water to the system. All three wells withdraw water from the confined Frederica aquifer. These wells predate State well construction regulations. As confined aquifer wells, the wellhead protection areas were delineated using a fixed radius of 150 feet.

This public water supply system provides water to an average daily population of 3,562 residential consumers from January 1 to December 31 through 1,223 residential service connections.

These sites have substantial contaminant potentials that may pose a significant threat to the drinking water resources.

An analysis of land use activities in the area show over 48 percent of the total wellhead protection area for the system contains residential land uses. The next largest land use is commercial land uses covering approximately 37 percent of the wellfield.

Although water samples may have been taken from within the distribution system, no raw water (well tap) samples have been recorded for this Public Water Supply System.

The City should consider the following recommendations:

- Updating Chapter 440 – Zoning to help strengthen the Source Water Protection Ordinance.
- Requiring an impervious mitigation plan for all residential and commercial developments that exceed 20% cover.

TOTAL MAXIMUM DAILY LOADS (TMDLs)

Under Section 303(d) of the 1972 Federal Clean Water Act (CWA), states are required to identify all impaired waters and establish total maximum daily loads to restore their beneficial uses (e.g., swimming, fishing, and drinking water). A TMDL defines the amount of a given pollutant that may be discharged to a water body from point, nonpoint, and natural background sources and

still allows attainment or maintenance of the applicable narrative and numerical water quality standards. A TMDL is the sum of the individual Waste Load Applications (WLAs) for point sources and Load Allocations (LAs) for nonpoint sources and natural background sources of pollution. A TMDL may include a reasonable margin of safety (MOS) to account for uncertainties regarding the relationship between mass loading and resulting water quality. In simplistic terms, a TMDL matches the strength, location and timing of pollution sources within a watershed with the inherent ability of the receiving water to assimilate the pollutant without adverse impact.

A Pollution Control Strategy (PCS) specifies actions necessary to systematically reduce nutrient and bacterial pollutant loading to the level(s) specified by the Total Maximum Daily Load; and must reduce pollutants to level specified by the State Water Quality Standards. A variety of site-specific best management practices (BMPs) will be the primary actions required by the PCS to reduce pollutant loading(s).

The City of Harrington is located within the greater Delaware River and Bay Drainage, specifically within the Murderkill River watershed. The pollutants targeted for reduction in the Murderkill watershed are nutrients (e.g., nitrogen and phosphorus) and bacteria (See Table below). As mentioned previously, the PCS will require specific actions that reduce nutrient and bacterial loads to levels consistent with the goals and criteria specified in the State Water Quality Standards.

TMDL Nutrient (Nitrogen and Phosphorus) and reduction requirements for the Murderkill watershed.

Delaware River and Bay Drainage	N- reduction requirements	P- reduction requirements	Bacteria- reduction requirements
Murderkill Watershed	30%	50%	32%

The City should consider the following recommendations:

- The City should consider requiring developers to use Best Management Practices to meet the required TMDLs for the affected watershed.