SECTION 2 WATERSHED MANAGEMENT APPROACH FOR CENTENNIAL AND WILDE LAKES

This section describes the goals that local stakeholders have identified for the Centennial and Wilde Lake subwatersheds, and outlines a general watershed management approach for restoration activities in these two drainage areas. Watershed management practices are described, including stormwater retrofits, stream corridor restoration, discharge prevention, pervious area restoration, pollution source control, and municipal practices and programs.

2.1 WATERSHED GOALS AND STAKEHOLDERS

When pursuing watershed restoration activities at the local subwatershed level, several layers of goals frequently need to be recognized and incorporated into the plan development process. Generally, the most pressing and important goals are those of the local residents who live in and near the subwatershed, whose daily activities affect the water quality. Also to be addressed are goals that have been set by the County and regional stakeholders to ensure that the plan is recognized and funding opportunities are made available for plan implementation.

Howard County has established a **Vision** for the Little Patuxent watershed as follows:

> *Environmental resources in the Little Patuxent watershed will be protected, used wisely, and restored to health. The actions we take toward resource management will complement State and regional initiatives. Our citizens will take part in the decisions and actions that affect them, and environmental stewardship will be encouraged throughout the watershed.*

This plan, in concert with many similar local initiatives throughout the Chesapeake Bay watershed, supports the commitment to pursue actions in the tributaries that ultimately improve the health of the Chesapeake Bay, as expressed in the Chesapeake 2000 Agreement. This agreement places emphasis on moving efforts "upstream" into the tributaries to address the widespread sources of nonpoint source pollution throughout the Bay watershed.

Approximately 45 residents attended the first of a series of stakeholder meetings on November 30, 2004. The purpose of this meeting was to introduce the study to local residents and obtain their input on subwatershed problem areas and goals. Eleven primary goals were identified by participants:

1. Broaden public education and outreach and improve its effectiveness
    a. Get more people involved
    b. Figure out their hot buttons
    c. Provide more mass mailings with educational appeal
    d. Establish a "Green" web site, or just "links" to other good sites
2. Prioritize projects that will have the largest beneficial impact on the lakes
3. Work with the schools and youth on education and demonstration projects
    a. Pursue demonstration projects on school grounds—biofilters, etc.

   b. Use public service requirements for projects such as buffer plantings, rain barrels, and rain gardens

4. Target lawn care and make resources available to homeowners
   a. Work with major lawn service providers and use enforcement if necessary
   b. Provide lawn care education and soil sampling to encourage fall applications
5. Develop innovative funding mechanisms
   a. Establish a Green Fund for demonstration projects, native plantings, signage, etc.
6. Improve riparian buffer management around lakes and streams
   a. Reduce invasive plants
7. Pursue demonstration projects
   a. Incorporate rain gardens into traffic-calming measures
   b. Use permeable pavers in parking areas
   c. Create rain gardens in residential yards
8. Improve coordination between local agencies and important organizations and stakeholders in the watershed
   a. County Department of Recreation and Parks, the Board of Education, the Department of Public Works, Howard Conservancy, Columbia Association, Howard County Master Gardeners, and Little Patuxent Watershed Association
9. Address stormwater runoff
   a. Reduce runoff volume and address storm sewers with untreated runoff draining to the lakes
   b. Incorporate retrofits such as bioretention in the Department of Recreation and Parks' long-term Master Plan for Parks
   c. Build in long-term maintenance
10. Follow an action-oriented process
   a. Develop a list of action items for eventual implementation
   b. Use modeling to help determine the most important actions to address the key problems
11. Identify existing problems and set restoration goals

The vision described above, and the stakeholder goals that have been identified, will help guide development of this restoration implementation plan and priority project selection.

2.2 WATERSHED PROBLEM AREAS IDENTIFIED BY STAKEHOLDERS

At the November meeting, attendees also identified several broad watershed-wide problems and issues that need to be addressed as part of a management plan for the Lakes and streams flowing to them. These problem areas include the following:

- Inadequate buffers
- Invasive plants and the need to identify and prioritize the worst areas
- Resident geese population management
- Riparian management

  - Landowners and managers, including Columbia Association are cutting grass too close to the streams and lakes
  - Residents dispose of grass and leaves in streams and do not practice recycling
- Loss of trees with new housing developments
- Covenant restrictions that potentially prevent the implementation of some positive practices
- High runoff volumes, including runoff from parking lots and streets into the lakes
- Lack of long-term maintenance, monitoring (evaluation) and education

2.3 GENERAL WATERSHED MANAGEMENT APPROACH FOR THE LAKES

The following 12 recommendations form the basic framework for a comprehensive approach to protecting and restoring the Lake watersheds. The majority of the recommendations apply to both lakes, with the exception of number 5 which deals specifically with Centennial Lake headwaters.

1. **Build the capacity of Columbia Association and local environmental and homeowner groups** to implement recommendations, secure funding for training and project implementation, and conduct volunteer monitoring efforts on project performance and resource conditions.
2. **Develop a targeted lawn care education campaign**. Work with local lawn care companies and garden centers to make low/no phosphorus fertilizers available, and discourage the springtime application of fertilizers and pesticides/herbicides.
3. **Develop an urban outreach and pollution prevention program** including a lake awareness component with targeted education campaigns for businesses and residents. Customize educational materials with a logo or other identifying feature that calls attention to the lake drainage issue. This can be a useful tool for marking storm drains and the like. There was very little evidence of visible watershed awareness or education efforts such as signage, storm drain stenciling, and so forth.
4. **Improve waterfowl management efforts** with vegetated buffers, signage, and hands-on activities such as an egg addling program (National Humane Society's Geese Peace program).
5. **Expand Centennial Lake headwaters protection** efforts including active efforts to preserve the remaining forestland and establish forested buffers on all stream reaches.
6. **Address several stormwater pond maintenance issues and outfall stability issues identified in the field assessment.** Several stormwater ponds were identified in the field that require routine maintenance to improve their function and ensure their continued viability. A number of outfalls in the Wilde Lake subwatershed were identified that were structurally damaged or failing.
7. **Evaluate and look for areas of improvement in municipal programs and practices** such as street sweeping, winter salt and sand applications in direct drainages to lakes, and the use of fertilizers and herbicides on schools and athletic fields by grounds maintenance. Develop and implement pollution prevention plans for the County maintenance facilities located at Centennial Lake and Cedar Lane Park. The Centennial

Lake facility, in particular, needs improved practices to prevent pollution from fueling operations, and labeling/covered storage for storage drums.

8. **Install priority stormwater retrofits** to provide water quality treatment of runoff from parking lots, roadways, and other urban areas to help reduce nutrient loads to the lakes and to reduce erosion in small local streams.
9. **Implement priority stream restoration projects,** particularly efforts to address erosion in the headwater areas of Wilde Lake and stream segments in Centennial Lake that have incised as the result of clearing associated with agricultural activities.
10. **Target priority commercial and residential areas and confirmed hotspots for pollution prevention education.**
11. **Conduct watershed monitoring and project tracking efforts** to evaluate implementation success over time.
12. **Identify and secure long-term funding for watershed protection and restoration**. Within the first year of implementation, Howard County and Columbia Association should jointly identify funding responsibilities and sources for obtaining the necessary funding to implement specific projects in the Wilde Lake watershed, as well as long-term funding for ongoing initiatives such as education and outreach and monitoring efforts. Howard County should pursue sources of funding and investigate partnerships for pursuing conservation and restoration efforts in the Centennial headwaters.

2.4 WATERSHED MANAGEMENT PRACTICE RECOMMENDATIONS

This section of the plan presents an overview of the management practice recommendations for the lake drainages. These practices are geared primarily toward restoring degraded resources in the urban and suburban areas of the watersheds, as very limited additional development is expected in either watershed.

One exception is the uncertainty associated with a large agricultural parcel that has development potential in the Centennial Lake drainage. This area is recommended for protection from future development. This parcel is currently

The ICM is based on the following assumptions and caveats. The ICM:

1. Applies only to 1,st 2,nd and 3rd order streams.
2. Requires accurate estimates of percent impervious area, which is defined as the total amount of impervious area over a subwatershed area.
3. Predicts *potential* rather than *actual* stream quality. It can and should be expected that some streams will depart from the predictions of the model. While impervious cover (IC) can be used to initially diagnose stream quality, supplemental field monitoring is recommended to actually confirm it.
4. Does not predict the precise score of an *individual* stream quality indicator, but rather predicts the average behavior of a *group* of indicators over a range of IC. Extreme care should be exercised if the ICM is used to predict the fate of individual species (e.g., trout, salmon, mussels).
5. Is virtually impossible to distinguish real differences in stream indicators within a few percentage points of watershed IC (e.g., 9.9 vs. 10.1%). Because the thresholds, defined as 10 and 25% IC, are not sharp breakpoints, but reflect instead the expected transition of a composite of individual indicators in that range of IC.
6. Should be applied only within the ecoregions where it has been tested, including the mid-Atlantic, Northeast, Southeast, Upper Midwest, and Pacific Northwest.
7. Has not yet been validated for nonstream conditions (e.g., lakes, reservoirs, aquifers and estuaries). Additional locally based research is needed to adapt the ICM model for these conditions. The ICM is conservative in that it does not predict the potential mitigating impact of watershed treatment practices. At this time, researchers are not sure that they can *detect* the impact of watershed treatment, and none has gone so far as to assert that it dramatically shifts the basic ICM.

zoned Rural Conservation, which would allow low-density residential development. Since the parcel is larger than 20 acres the development must be clustered and sensitive resources such as the stream would be placed in a preservation parcel. Based on the Center for Watershed Protection (CWP) Impervious Cover Model (ICM), the development of this rural area of the subwatershed would have the effect of shifting the subwatershed from "sensitive" to "impacted" based on the amount of additional impervious area that would be created (see box to the right). Figure 2.1 shows how stream quality is impacted by the amount of impervious cover.

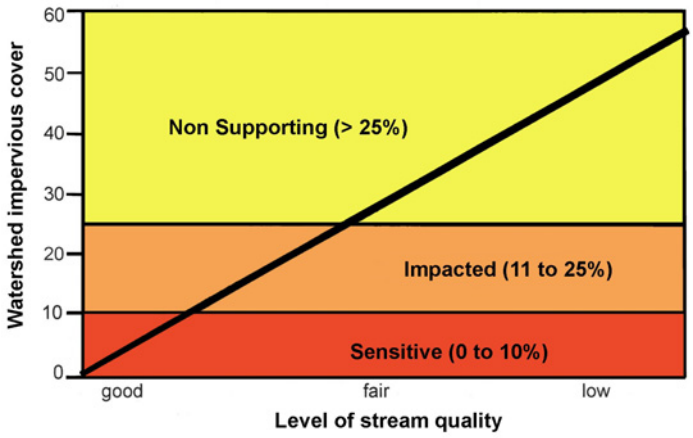

Figure 2.1 Stream Quality and Impervious cover

If the parcel is ultimately acquired for conservation purposes, practices such as pervious area restoration, buffer enhancement, and invasive control should be pursued. If, on the other hand, the parcel is developed, the County should encourage reforestation, incorporation of better site design principles, and enhanced erosion and sediment control practices.

Restoration practices that are recommended to address problem areas in both subwatersheds include stormwater retrofits, stream corridor restoration, discharge prevention, pervious area restoration, pollution source control, and municipal practices and programs. While potential stream buffers and stream restoration projects were identified on Clark's Farm, agricultural BMPs for cropland and pasture are also important for overall nutrient load reduction in the Centennial Lake subwatershed but were considered outside the focus of this report, as it is more the purview of the Howard Soil Conservation District than the Howard County Department of Public Works. The Clark Farm is already working with the Howard Soil Conservation District to successfully implement agricultural BMPs.

Table 2.1 provides more information on specific components of these practices. Each practice is described in more detail below and referenced throughout the remainder of this report.

2.5 STORMWATER RETROFITS

CWP breaks retrofits into three major categories: storage retrofits, on-site residential treatments such as bioretention and filtering practices, and on-site commercial treatments such as sand filters or underground storage and filtering systems. Appendix A provides more detailed examples of retrofit opportunities that were encountered in the field. Application of practices in the different categories varies according to the impervious cover and land use makeup of a subwatershed as well as the restoration goals being pursued. Storage retrofits such as ponds and wetlands provide the widest range of watershed restoration benefits; however, they can be challenging to implement in a developed subwatershed. On-site retrofit practices such as

bioretention and filtering practices and impervious area reduction can provide a substantial benefit when applied over large areas. The goal of this assessment was to identify candidate sites within all three categories of retrofits, with the primary objective of increasing water quality treatment and recharge to mitigate known water quality concerns in both lakes.

Table 2.1 Urban Management Practices Recommended for Centennial and Wilde Lakes

Type		Practices
Restoration Practices	Stormwater Retrofits*	• Storage (large, off-site or on-site ponds and wetland facilities) • On-site quality treatments (rain gardens, rain barrels, bioretention, infiltration) • On-site design measures (impervious area reduction, rooftop disconnects)
	Stream Corridor Restoration	• Simple stream repair (bank stabilization), stream channel restoration, and habitat enhancements** • Buffer reforestation (tree planting, invasive removal) • Stream cleanups and adoption**
	Discharge Prevention	• Discharge investigation and elimination • Community hotline • Education and employee training • Outfall monitoring
	Pervious Area Restoration	• Natural regeneration • Tree plantings
	Pollution Source Control***	• Residential pollution prevention • Lake wildfowl management • Hotspot source control
	Municipal Practices and Programs	• Street sweeping, winter road treatment • Grounds maintenance (schools and recreational fields) • Inspection and maintenance programs (ESC, SWM, catch basin cleanouts) • Spill prevention and response • Maintenance facility pollution prevention plans

* See Appendix A for more detail and guidance.
** See Appendix B for more detail on stream repair practices.
*** See Appendix C for more detail on residential and hotspot source control practices.

The developed nature of the neighborhoods in these watersheds provides limited potential for implementing new storage projects other than retrofitting existing ponds, so an important aspect of this study was to identify smaller, on-site practices and water quality improvements that can be implemented within existing neighborhoods. An additional objective was to look for retrofit opportunities that would improve habitat and channel erosion conditions in local neighborhood streams.

2.6 STREAM CORRIDOR RESTORATION

Stream corridor restoration practices are used to enhance the appearance, stability, and aquatic function of urban stream corridors. Primary practices for use in the Wilde Lake and Centennial subwatersheds include stream repair, buffer reforestation, and stream cleanups.

Stream Repair

Stream repair refers to a large group of practices used to enhance the appearance, structure, or function of urban streams. The practices range from routine stream cleanups to simple stream repairs such as vegetative bank stabilization and localized grade control, to comprehensive repair applications such as full channel redesign and realignment. Stream repair practices are often combined with stormwater retrofits and riparian management practices to meet subwatershed restoration objectives.

Buffer Reforestation

Another aspect of stream corridor restoration is the enhancement or reforestation of impacted stream buffers. The benefits of stream buffers are numerous and worth the restoration effort. In the Wilde Lake subwatershed, most of the streams are in protected CA buffers; however, a few small areas could benefit from improved riparian buffers, and the Lake itself is in need of buffer improvements. In the Centennial subwatershed, more opportunity exists to improve buffer function on residential lots and in the agricultural areas. Many of these areas are on private property, requiring a specific focus on education and working with local resource agencies such as the Soil Conservation District and CREP program.

Invasive plant species control has been identified as a priority in both watersheds and needs to be addressed through the education and training of grounds maintenance staff, as well as development of a dedicated cadre of volunteer "weed warriors."

Several neighborhoods exhibited evidence that homeowners were dumping yard waste and other refuse in the buffer area. In some cases, these homeowners may not understand the benefits of buffers on their local streams. Buffer signage and outreach tools should be an important part of watershed education efforts, along with continuing the strides that have been made through the County's existing outreach program.

Stream Cleanups and Adoption

Stream cleanup is a simple practice that enhances the appearance of the stream corridor by removing unsightly trash, litter, and debris. Cleanups are commonly conducted by volunteers and continue to be one of the most effective outlets for generating community awareness and involvement in watershed activities.

The practice of urban stream repair is relatively new, with most of the experience occurring in the last 2 decades. Controlling upstream hydrology is the most sustainable way to achieve actual stream restoration in urbanized systems, as opposed to simple repair efforts. If the upland sources of sediment and stormwater are not properly managed, stream repair practices have a greater chance of failure. However, in highly urban channels, including portions of Wilde Lake, where upland stormwater treatment prospects are limited, it is still necessary and justified to pursue stream repair in instances where infrastructure and property are being adversely affected.

Other studies in similar urban areas have found that the process of stream channel adjustment to accommodate the increased flows associated with urbanization can take as many as 50 years (MacRae, 1992). Although a detailed assessment of channel evolution and geomorphology was not in the scope of this study, the general conclusion can be drawn that many areas of the Wilde Lake drainage are still actively adjusting to increased flow volumes after more than 30 years of development. If left unaddressed, these actively eroding reaches could continue to generate significant amounts of sediment for many years until a new stable channel dimension is formed. This process will have continuing impacts on the lake, both in sediment loads and in associated nutrients that are adsorbed to the sediment particles. Therefore, stream repair combining upland stormwater retrofits and in-stream grade control strategies is the recommended approach as reflected in priority project descriptions.

2.7 DRY WEATHER DISCHARGE PREVENTION

Discharge prevention targets dry weather flows that contain significant pollutant loads. Examples include illicit discharges, sewage overflows, or industrial and transport spills. These dry weather discharges can be continuous, intermittent, or transitory, and, depending on the volume and type, can cause extreme water quality problems in a stream. Sewage discharges can directly affect public health (bacteria), while other discharges can be toxic to aquatic life (e.g., oil, chlorine, pesticides, and trace metals). Discharge prevention focuses on four types of discharges that can occur in a subwatershed, as described in Table 2.2 and are discussed in detail in Illicit Discharge Detection and Elimination (CWP and Pitts, July 2004).

Table 2.2 Types of Discharges

Illicit Sewage Discharges	Sewage can get into urban streams when septic systems fail or sewer pipes are mistakenly or illegally connected to the storm drain pipe network. In other cases, "straight pipes" discharge sewage to the stream or ditch without treatment, or sewage from RVs or boats is illegally dumped into the storm drain network.
Commercial and Industrial Illicit Discharges	Some businesses mistakenly or illegally use the storm drain network to dispose of liquid wastes that can exert a severe water quality impact on streams. Examples include shop drains that are connected to the storm drain system; improper disposal of used oil, paints, and solvents; and disposal of untreated wash water or process water Into the storm drain system.
Industrial and Transport Spills	Tanks rupture, pipelines break, accidents cause spills, and law-breaking individuals dump pollutants into the storm drain system. It is only a matter of time before these events occur in most urban subwatersheds, allowing potentially hazardous materials to move through the storm drain network and reach the stream.
Failing Sewage Lines	Sewer lines often follow the stream corridor, where they may leak, overflow, or break, sending sewage directly to the stream. The frequency of failure depends on the age, condition, and capacity of the existing sanitary sewer system.

CWP identified a handful of outfalls with evidence of dry weather or inappropriate flows that warrant further investigation. These are discussed in more detail in Sections 3 and 4. Based on the field work conducted during 2004, it would appear that dry weather flows are probably not a major source of pollutant load delivery, but are nevertheless present and should be addressed. Howard County already has an ongoing program for the identification and elimination of illicit discharges and will investigate the flows observed and eliminate them where warranted.

Several discharge prevention activities can be implemented throughout the watershed that are simple to do, can involve watershed volunteers, and can increase community awareness about the watershed issues. Examples of implementation projects include the following:

- Marking outfalls with potential problems or known past illicit discharge locations with unique identifications to facilitate locating and tracking suspicious discharges
- Educating residents near areas with suspected problems about a 24-hour hotline for reporting suspicious discharges
- Conducting surveys about homeowner practices with respect to septic system maintenance, pool dewatering, and household hazardous waste disposal
- Creating fact sheets that can be distributed to homeowners and businesses or posted on a web site

2.8 PERVIOUS AREA RESTORATION

Pervious areas and natural area remnants provide important natural recharge functions in the drainage area, and should be optimized to promote natural infiltration properties. These areas also present an opportunity for reforestation in the watershed. Reforestation is generally the highest priority in terms of improving the infiltration and recharge functions; however, other techniques such as soil aeration, mulching, and establishing native plantings and meadows also serve a higher function than turfgrass. Priority sites should have little evidence of soil compaction, invasive plants, and trash/dumping and be reforested with minimal site preparation. Parcels that meet these criteria are good candidates for more detailed investigations and landowner contact. Most pervious areas are municipally owned, but institutional landowners can also have extensive lawns and open space.

While not an assessment priority, CWP noted several areas in the subwatersheds where active tree plantings and/or natural regeneration could be done. These areas include unused open space around the lakes and a large expanse of open area at the Faulkner Ridge Center. Each of these sites can be considered a potential or good candidate for regeneration or reforestation.

2.9 POLLUTION PREVENTION/SOURCE CONTROL EDUCATION

Residents and businesses engage in behaviors and activities that can negatively influence water quality, including overfertilizing; using excessive amounts of pesticides; maintaining poor housekeeping practices such as inappropriate disposal of paints, household cleaners or automotive fluids; and dumping into storm drains. Alternatively, positive behaviors such as tree planting, disconnecting rooftops, and picking up pet waste can help improve water quality. Whether a pollution prevention program is designed to discourage negative behaviors or encourage positive ones, targeted education is needed to deliver a specific message that promotes behavior changes. Local watershed organizations and other civic groups such as the Little Patuxent Watershed Association, Columbia Association and Master Gardeners are in a position to be able to influence these changes using pollution prevention education and outreach to teach citizens how to properly care for the watershed.

Pollution source control also includes the management of "hotspots," which are certain commercial, industrial, institutional, municipal, and transport-related operations in the

watershed. These hotspots tend to produce higher concentrations of polluted stormwater runoff than other land uses and also have a higher risk for spills. Specific on-site operations and maintenance pollution prevention practices can significantly reduce the occurrence of "hotspot" pollution problems. Local government agencies must adopt pollution prevention practices for their facilities and operations and lead by example, along with inspection and incentive-based educational efforts for privately operated sites with enforcement measures as a backstop. Howard County has already written Stormwater Pollution Prevention Plans for its treatment plant and vehicle maintenance facilities. The ability to conduct such inspections and enforcement actions needs to be clearly articulated in local codes and ordinances and through education programs.

2.10 MUNICIPAL PRACTICES AND PROGRAMS

Municipal programs and practices can directly support subwatershed restoration efforts. These programs range from more efficient trash/recycling pickup and street sweeping to construction inspection (especially erosion and sediment control enforcement) and educating municipal staff to be more aware of potential pollution sources.

Several observations were made regarding the current state of municipal practices in the watershed. Positive signs included evidence of stenciled storm drains, although they were frequently old and faded; frequent trash pickup and storm drain cleanout; and residential recycling programs. The following observations represented opportunities for improvement:

- Storage and pollution prevention at certain municipal facilities
- Several exceptions to the normally excellent erosion and sediment control practices found in the County

Street Sweeping

Using street sweepers to remove debris, dirt, and pollutants from the storm drain conveyance system is a very important activity and is primarily undertaken by the municipality. Effective street sweeping usually involves using a vacuum-assisted sweeper and having a schedule that coincides with things like trash pickup days or seasonal changes such as leaf litter in the fall and more frequent lawn care activities by residents in spring and summer.

Spill Prevention and Response

Spill prevention and response plans describe operational procedures to reduce spill risks and ensure that proper controls are in place when they do occur. Spill prevention plans standardize everyday procedures and rely heavily on employee training and education. The investment is a good one for most operations, since spill prevention plans reduce potential liability, fines and costs associated with spill cleanup.