

7.0 WATERSHED WATER QUALITY PLAN

This watershed water quality plan integrates the results of the entire watershed assessment and provides recommendations for water quality improvements. Because the Lower Bush Creek watershed, and indeed much of Frederick County, is not currently characterized by intensive urban development, the NPDES stormwater permit requirements offer a valuable opportunity to prevent future impacts of development before they occur. Therefore, this watershed water quality plan focuses on preventative measures, specifically programmatic actions that will benefit Lower Bush Creek as the expected development occurs.

7.1 Integration of Watershed Assessment Results

The Lower Bush Creek watershed is characterized by rolling topography of the Western Division of the Piedmont Physiographic Province. Agriculture is the dominant land use within the watershed; however, approximately a third of the watershed remains forested. Given the long history of human habitation and agricultural land use in the region, streams are far from pristine; however, much of Lower Bush Creek and its tributaries appear to be in reasonably good condition at present. The stream supports a variety of fish and invertebrate biota, including several sportfish species. Remaining forest and wetland areas support good biological diversity. Potential pollutants are most likely to stem from nonpoint sources; currently agricultural sources are somewhat problematic, while future development is expected to pose the most significant threat to water quality.

Development pressures are strong in Frederick County, and in order to protect natural resources, growth has been targeted to selected areas of the County in an effort to minimize the environmental impacts. Sewer and water service have been targeted for these growth areas, and plans to transport wastewater outside the watershed for treatment may improve stream water chemistry in Bush Creek; however, construction of sewer lines may impact other aspects of water quality and habitat. One challenge in managing the Lower Bush Creek watershed is to minimize environmental impacts within the designated growth areas, while also preserving the natural character of other sensitive resource areas.

An assessment and ranking of water quality problems shows that reducing impacts of current and future development, as well as those from agriculture, are key issues within the watershed. The identification of these issues provides an opportunity to develop measures to improve existing water quality in Lower Bush Creek, as well as pro-actively address future issues.

7.2 Proposed Actions to Improve Water Quality

From a list of water quality problems and potential opportunities to improve water quality in Lower Bush Creek (Table 5-1), the most promising opportunities were selected to be implemented as part of this watershed plan. Selection was based upon cost, feasibility, and the likelihood of success in improving stream habitat and water quality. Items include site-specific

opportunities as well as more general programmatic approaches, such as intensification of project review and public education. Actions will address the primary threats to water quality, as identified in the watershed assessment. These include new construction, stormwater runoff from existing development, livestock access to streams, agricultural runoff, and future construction and development. Proposed actions are detailed in Table 7-1.

The emphasis on developing programmatic improvements is appropriate as Frederick County completes this assessment of the first priority watershed. Along with benefits to Lower Bush Creek, these measures will increase the stormwater program's effectiveness countywide by building public and institutional support. As previously noted, opportunities for structural BMP retrofits in Lower Bush Creek watershed were extremely limited given that the design of newer developments appear to conform to current standards for stormwater management.

Although Frederick County government is responsible for stormwater management activities under its NPDES permit, coordination with other agencies will be necessary to carry out some programmatic improvements. For example, the Frederick and Catoctin Soil Conservation Districts are responsible for review and approval of sediment control plans required for new construction; provisions are then enforced by the County's Division of Public Works. Maryland Department of the Environment has permitting and enforcement authority for wetland and waterway construction; their role in permit review, site inspection, and enforcement may be important in minimizing the potential future impacts of sewer line construction. Ongoing coordination with the County Planning and Zoning Department will also be critical as development of watershed land continues. Along with site-specific reviews, long-term benefits could be realized by strengthening existing ordinances (e.g., setbacks restricting placement of structures near stream tributaries) to limit impacts of future development.

Building upon existing programs will help the County to cost-effectively implement certain activities. For example, Hood College has already initiated a program involving County high schools in stream assessment and monitoring. Coordination with this effort would help to further the County's own plans for public outreach. Also, educational materials already developed by various state and federal agencies could easily be incorporated into informational packages for watershed residents.

Estimated costs for proposed water quality improvement actions are listed in Table 7-2. These costs should be viewed as general guidelines for allocating staff time or resources, because the nature of many of these activities precludes a precise estimate. The total staff time for all activities is estimated at 1304 hours (0.65 person-years, assuming a 2000 hour work year). Ongoing activities, comprising 31% of the total estimate, are those that presumably would be undertaken by the County as part of routine operation of the stormwater program while also fulfilling the recommendations of this watershed water quality plan. Other activities already slated to be done as part of NPDES compliance, such as public outreach, make up 37%. Therefore, new activities proposed under this water quality plan represent 32% or 424 hours, at

Table 7-1. Proposed actions to improve water quality

Problem Type	Location	Stream Affected	Opportunities to Improve Stream Water Quality	Proposed Actions to Improve Water Quality	Item Number	Schedule
New construction	Urbana PUD	Peter Pan Run and Bush Creek mainstem	Take action to minimize short-term and potential long-term impacts during construction phase.	<ul style="list-style-type: none"> Investigate programmatic ways to improve the review, approval, and enforcement of erosion and sediment control practices on developer-funded and capital improvement projects. 	1	Ongoing
New construction	Urbana sewer line	Peter Pan Run, Bush Creek mainstem, Tributary to Monocacy River near Araby Church Rd.	Take action to minimize short-term and potential long-term impacts during construction phase.	<ul style="list-style-type: none"> See #1 above 		See above

Table 7-1. (Continued)

Problem Type	Location	Stream Affected	Opportunities to Improve Stream Water Quality	Proposed Actions to Improve Water Quality	Item Number	Schedule
Livestock access to stream	Various	Bush Creek and tributaries	Install cattle fencing along streams to limit animal access to designated crossing locations. Placement of fencing set back from the stream edge allows riparian vegetation to recover and re-establish natural buffer. Opportunity for public outreach. Coordinate with Natural Resource Conservation Service, Maryland Cooperative Extension, or local Soil Conservation District to enlist participation of landowners.	<ol style="list-style-type: none"> 1. Develop an internal procedure for contacting SCD and NRCS to address agricultural impacts. 2. Identify opportunities to work with the agricultural community and urban developers to provide agricultural BMPs in lieu of, or in conjunction with, urban BMPs. 	<p>2</p> <p>3</p>	<p>Develop procedure by May 2001</p> <p>On-going</p>
Runoff from cropland	various	Bush Creek and tributaries	Implement agricultural BMPs to reduce problems. Opportunity for public outreach. Coordinate with Natural Resource Conservation Service, Maryland Cooperative Extension, or local Soil Conservation District to enlist participation of landowners.	<ol style="list-style-type: none"> 3. See #3 above. 		See #3 above

Table 7-1. (Continued)

Problem Type	Location	Stream Affected	Opportunities to Improve Stream Water Quality	Proposed Actions to Improve Water Quality	Item Number	Schedule
Future construction	Bush Creek Sewer Interceptor	Bush Creek mainstem	Take action to minimize short-term and potential long-term impacts during construction phase. Enforce BMP requirements for erosion and sediment control during construction.	<ol style="list-style-type: none"> During review of project plans, identify potential stream water quality impacts, particularly impacts of sediment and erosion; evaluate whether number of stream crossings could be reduced. Provide more stringent enforcement by training water, sewer, and road inspectors to identify erosion and sediment control problems (e.g., Green Card Class). 	4 5	On-going June 2002
Future residential, commercial, and industrial development	Various	Bush Creek and tributaries	In planning process, enforce requirements for stormwater management controls, with goal of not altering flows or pollutant loads from pre-development condition. Also, minimize short-term impacts of construction. With increasing population in new residential developments, conduct public outreach through schools and community organizations to raise awareness of individual actions to reduce water quality impacts.	<ul style="list-style-type: none"> Continue to review project plans and enforce requirements for stormwater management, including strict adherence to construction BMPs Compile public outreach materials emphasizing individual actions to improve water quality; add to packages distributed to new residents Initiate contact with local organizations (e.g., schools, community associations) to develop approach for educating and involving watershed residents and business people Conduct educational/outreach programs targeted to high growth areas (e.g., Q&A session, web page, fact sheets, storm drain stenciling) 	6 7 8 9	As needed Compile materials by June 2002 Initiate contact by Dec. 2002 Initiate education efforts by Dec. 2002

Table 7-1. (Continued)

Problem Type	Location	Stream Affected	Opportunities to Improve Stream Water Quality	Proposed Actions to Improve Water Quality	Item Number	Schedule
Future commercial / industrial development	Interoastal Industrial Center	Bush Creek and tributaries	In planning process, enforce requirements for stormwater management controls, with goal of not altering flows or pollutant loads from pre-development condition. Also, minimize short-term impacts of construction.	1. Continue to review project plans and enforce requirements for stormwater management, including strict adherence to BMPs during construction phase	10	As needed

an estimated cost of \$25,440. Dollar estimates were derived assuming a labor cost of \$60/hour (including overhead and benefits). Cost estimates are based on costs that would be incurred if a consultant was hired to perform these tasks. Otherwise, if existing County staff completed these tasks, all costs would be indirect, in the form of staff time away from their current projects. Hiring of an additional county staff person would reduce this indirect cost.

Cost estimates in Table 7-2 assume that actual costs for installation of agricultural BMPs would be covered by outside funding, such as federal or state cost-sharing programs. For example, in Maryland, incentive programs are available for establishment of riparian buffers at little or no cost to landowners (Palone and Todd 1998).

7.3 Monitoring to Evaluate Effectiveness of Water Quality Improvements

Outlined here are proposed procedures to monitor and evaluate the effectiveness of water quality improvements as a result of plan implementation. Monitoring efforts will be integrated with long-term monitoring at Peter Pan Run and within the entire Lower Bush Creek watershed. It is important to note that because Lower Bush Creek is highly undeveloped at present, the goal in implementing many of these proposed actions is to maintain the current level of stream quality or to prevent severe degradation in the face of future urbanization. In a few cases, such as cattle fencing or increased application of other agricultural BMPs, actual water quality improvements may be realized.

To evaluate the effectiveness of management measures implemented at the Urbana PUD and at the sewer line construction site along Peter Pan Run, water quality and flow will continue to be monitored regularly at an instream monitoring station (Station 01) under stormflow and baseflow conditions. Monitoring at a second water chemistry monitoring station, located at stormwater outfall pond A2 at the Urbana PUD, will be added. In addition, water quality, physical habitat, and biological conditions in Peter Pan Run (Stations 01 to 04) will be monitored annually throughout the remainder of the NPDES permit cycle, following procedures specified in the Long-Term Monitoring Plan for the Peter Pan Watershed (Southerland et al. 1999).

The Long-Term Monitoring Plan also specifies that water quality, physical habitat, and biological conditions throughout Lower Bush Creek watershed be monitored periodically. To evaluate the effectiveness of the other management measures implemented throughout the watershed (e.g., riparian buffer restoration, implementation of more stringent requirements on new construction, individual landowner actions), we recommend that the six other watershed monitoring stations (Stations 05 to 10) be reevaluated every two years, using the procedures described in Southerland et al. (1999). Assessing these stations every other year, instead of annually, would save on monitoring costs while still providing sufficient information to track watershed conditions.

In addition to stream monitoring data, we recommend that supplemental visual inspections and photographic documentation of specific site locations be conducted at least annually to monitor effectiveness of management actions. For example, sites where cattle fencing is installed should

be revisited to ensure that fences are properly maintained and to inspect for the natural regrowth of streamside vegetation. A photographic log of riparian, stream bank, and instream conditions would document the successful long-term implementation of livestock fencing practices.

Problems could be identified and necessary repairs made. Because natural variability may make it difficult to detect trends in stream monitoring data until a long-term data set is amassed, visual inspection results will help demonstrate whether management actions are beginning to achieve the desired benefit, or whether additional corrective measures are needed.