

Maryland Department of Natural Resources Planning Guidance to Promote Resource Protection in Sensitive Watersheds (recommendations in the interest of protecting the natural resources found within watersheds, streams, tidal-fresh areas, etc.)

August 16, 2012

The cumulative impacts of development in watersheds over time are quite well documented. Impacts include loss of and fragmentation of forest cover, habitat and refuge for wildlife together with substantial increases in impervious surface which, in turn, lead to deterioration of creek and stream system water quality and loss of wildlife habitat. Such losses cannot simply be offset by application of best management practices in stormwater management and sediment and erosion control or any number of measures to mitigate the impacts of development. Mitigation can reduce the degree of damage, but the limits of technology will nevertheless result in sustained adverse impacts to the watershed. Stream system health indicators decline when impervious surface within watersheds exceeds 10 percent and severe impacts and degradation can be expected when impervious surface exceeds 25 percent. Guidelines developed by the Maryland Department of Natural Resource caution that in certain highly sensitive watersheds, impacts to aquatic biodiversity can occur at impervious surfaces as low as 2 percent, and that impacts to biodiversity and fisheries are apparent between 5 and 10 percent impervious surface. Tom Schueler, former Executive Director of the Center for Watershed Protection notes that “at 10% imperviousness in its watershed, a stream is considered at risk,” and he goes on to say “if the impervious level is well over this threshold, you have a variety of management strategies available, but realistically you will not be able to restore a stream completely”.

The Maryland Department of Natural Resources initiated this effort to develop a proactive collaborative approach to strategically target and coordinate multiple state and federal agency assistance, information, and resources to protect the most ecologically valuable resources threatened by development under the spirit that “an ounce of prevention is worth a pound of cure”.

Land Use and Growth Management

1. Establish a vision for the watershed and promote it – the watershed has ecological benefits and resources and the vision to protect them should be promoted.
2. Clarify protection policies and identify proposed strategies or actions to implement them.
3. Strengthen protection measures in Resource Protection Zones.
4. Remove portions of the watershed from developmental districts, including all lands designated for Deferred Development.
5. Downzone lands in the watershed designated for Rural Conservation to a maximum density of one residential unit per 20 acres and designate area as a Transferable

Development Right (TDR) program sending area which allocates rights that can be transferred or purchased and retired.

6. Focus development away from watershed resources and build on any past efforts that have prepared specific plans within the area that are identified as “core” or “activity center” areas to concentrate development.
7. Provide greater incentives to redevelop/revitalize existing developed areas to absorb growth and reduce development pressure on resource sensitive areas.
8. Require development in Activity Centers or Town Centers to achieve Minimum Densities to assure efficient use of land in appropriate designated growth areas.
9. Mandate cluster forms of development to protect resources in the Rural Conservation-Deferred (RC-D), Rural Conservation (RC), and Low Density Residential (RL) zone districts.
10. Establish density incentives for clustering away from most sensitive resources.
11. Target portions of the watershed as a Rural Legacy Area and/or for easement or acquisition through a variety of Federal, State, local, and non-profit partnerships.
12. Use GreenPrint Targeted Ecological Area (TEA) designation as a guide to target land conservation efforts within the watershed.
13. Re-evaluate Transferable Development Right (TDR) program opportunities for additional applications.
14. Consider a TDR Bank to enhance TDR program function and use.
15. Modify TDR program provisions that allow re-purchase and transfer of development rights for use in sending areas.
16. Permit and possibly require use of TDRs for Commercial Development.
17. Focus development within Development Service Districts away from watershed resources and reduce densities in portions of the DSD where watershed resource sensitive areas co-occur.
18. Implement recommendations of low impact design techniques (if available) to minimize the amount of impervious surface and promote stormwater disconnects. Examine existing developments for stormwater retrofit opportunities.
19. Re-evaluate and revise lot coverage and impervious surface limits and standards established in the County Zoning Ordinance.

20. Target specific subwatersheds within the watershed as Special Protection Areas (SPAs) where impervious surfaces associated with new development are limited or restricted to 10% or less, depending on resource sensitivity.
21. Establish a County Purchase of Development Rights Program to supplement the TDR options and create a dedicated funding source to insure its successful operation over time.

Fisheries Resources

1. Concentrate growth into already developed areas, saving rural lands that create the best conditions for fish.
2. The habitat of fish and the future of fishing is linked to conserving forests, wetlands, and working farms, and conserving these areas to the maximum extent possible for fisheries should be a top priority.
3. Adopt a low development, natural resource protection scenario for your comprehensive plan – this would be a scenario that is likely to impact fisheries and fish habitat the least.
4. Apply innovative stormwater, flow, and sediment management to the watershed to reduce stream bank erosion and stream degradation associated with new and old development.
5. Management and control of erosion from construction must be improved and vigorously enforced. Construction contributes a disproportionate load of sediment for the portion of the watershed it occupies.
6. Additional measures such as wetland creation, water quality forestry, and expanded riparian buffers should be applied to further control erosion, manage flow, and improve water quality.
7. Stream revitalization measures could/should follow if flow and sediment management succeeds.
8. Environmental management measures should be paired with monitoring to evaluate success. Very little is known about how stormwater management impacts fish habitat and fisheries.
9. When de-icing roads, the amount of salt should be minimized and the use of alternative de-icers that are less toxic to aquatic organisms is recommended.

Non-Tidal Streams

1. Undeveloped areas of the watershed should be protected from alteration, development, and increases in impervious surface. Restoration of many aspects of a stream's physical

and chemical condition can be challenging and expensive, so protecting streams from alteration is the most ecologically and economically cost effective alternative to attempting to restore stream health once it has been compromised.

2. Utilize the locations where stream-dwelling rare, threatened and endangered species are present as the priority locations for the greatest levels of protection from development. Stream-dwelling rare, threatened, and endangered species tend to be more sensitive to altered conditions compared to other species.
3. It should be recognized that certain highly sensitive species can be affected by lower levels of urban and impervious land cover (under 7%), and key watershed locations should be targeted to achieve even higher levels of land protection to protect aquatic resources.
4. Protection over restoration should be the priority, and strict limits or encroachment controls to additional urbanization within the watershed should be implemented. Several recent scientific investigations have shown that the detrimental effects of urbanization are extremely difficult (maybe impossible) to reverse given current restoration practices and their performance.
5. Management recommendations for protection, restoration, and stabilization of specific streams using DNR's Triage Systems Approach methodology or other similar approaches should be considered. This will help prioritize the use of limited restoration and protection funding and achieve the maximum benefit to stream health.

Wetlands, Coastal Resources, and Coastal Climate Change

1. Continue to fully enforce existing regulation and policies.
2. Where possible, use 300-foot vegetated buffers along shorelines, streams, and wetland and hydric soils.
3. Where feasible, implement living shoreline practices for shore erosion control management.
4. Protect forested and farmed land from fragmentation and conversion to more intensive development.
5. Encourage and implement cluster development for new residential development in the watershed to protect open space and natural resources.
6. Pre-identify mitigation sites as part of capital improvement planning and include acquisition and construction costs in capital budgets.

7. Maintain the connectivity of existing natural lands as well as areas that may support wetland migration opportunities.
8. For growth and annexation areas, plan development to avoid wetland and stream impacts, and maintain contiguous green corridors.
9. Consider site design over multiple parcels to maintain contiguous wetland and stream corridors with minimum fragmentation from roads, buildings, or other structures.
10. Provide consideration of stream valleys as part of parcel development negotiations.
11. Protect high priority wetland areas to maintain natural protection for public and private infrastructure.
12. Where possible, protect wetland migration areas from impervious surfaces, development, and infrastructure that would impede the movement of coastal wetlands inland and decrease the adaptability of coastal wetlands to sea level rise.
13. Related to County Municipal Separate Storm Sewer Systems (MS-4) plans and projects – update watershed restoration plans and goals and incorporate stormwater management techniques in new development and retrofits for existing areas. Include stream system restoration, rehabilitation, and stabilization plans into MS-4 plans and capital projects.
14. Identify the range and types of recommended restoration projects that may be considered to protect existing wetlands and floodplains.
15. Adopt updated floodplain ordinances, including increased freeboard (extra elevation allowance for uncertainty above the estimated base flood elevation) standards.
16. Apply for shoreline restoration and living shoreline project implementation funding through the Chesapeake Bay Trust Request for Proposals (RFP) process.
17. Pursue opportunities to work with new partners and/or take better advantage of different funding sources to support implementation of recommended projects and activities.
18. Take full advantage of pre-application and guidance support at the Maryland Department of the Environment for proposed activities in wetlands, waterways and floodplains.
19. Review overlap between tidal-fresh wetlands and proposed zoning designations. Tidal-fresh wetlands are difficult, if not impossible, to restore and consideration should be given to avoid degradation of these wetland types wherever and whenever possible.
20. Review proposed growth and resource areas and plan to increase utilization of existing floodplain wetland functions to take advantage of natural riverine hydrology – this will prevent the need for future restoration.

21. Incorporate language into your comprehensive plan about nontidal Wetlands of Special State Concern that are in planning, growth, or annexation areas.
22. Protect nontidal Wetlands of Special State Concern and their expanded 300 foot buffers.
23. Protect and restore wetlands and streams within the headwaters, working with County members and other groups/organizations/interests as necessary to accomplish this objective.
24. Protect tidal wetlands used as reference sites in the DNR tidal wetland vegetative community studies – these are high-quality systems (Harrison 2001; Harrison and Stango 2003).
25. Increase land conservation efforts by partnering with DNR's Coastal Zone Program to apply for Coastal and Estuarine Land Conservation Program (CELCP) funding to protect key coastal habitats and potential future wetland areas identified in Maryland GreenPrint. Utilize updated GreenPrint Targeted Ecological Area maps when partnering with DNR's Program Open Space on land conservation projects.
26. Identify locations where easement acquisition efforts should be targeted and recommend easement acquisition initiatives. This should be based on conservation priorities that enable coastal wetlands to adaptively respond to climate change stressors and/or to ensure that high value aquatic and terrestrial resources are not further degraded. Implementation opportunities and prospective partners should also be identified.
27. Identify and recommend land use planning objectives, initiatives, and reforms that minimize long-term impacts to coastal ecosystem resources.
28. Identify prospective regulatory reforms that might foster protection of land use resources.
29. Identify incentive programs or other initiatives that might be taken to reduce the number, level, and degree of likely future impacts that reduce biodiversity or impair watershed ecosystem resources.
30. Consider adopting provisions similar to those in the Baltimore County Code for plats and protective covenants (§33-3-110), and environmental protection and sustainability (§33-3-114), which would dedicate forest buffers to the County when plats are recorded.

Forest Resources

1. Maintain diversity in forest types including upland forest, riparian forest, and forested wetlands.
2. Percent forest cover within the riparian area of the watershed must be higher than that of the overall watershed to maintain high water quality.

3. Keep a high percentage of forest cover across the watershed, especially within the stream valley, and extend forest protection measures currently in place to all lands in the stream valley corridor (defined as land between stream bottoms in the watersheds to the top of surrounding slopes).
4. Reduce forest cover fragmentation (the process in which large contiguous tracts of forest are cut down to small, isolated patches) caused by development. Maintain forest cover connections between larger forested areas to maintain water quality benefits and provide wildlife corridors between larger habitats.
5. Reduce potential for increases in invasive species (exotic species that have been introduced from a different ecosystem, naturalized and have no natural predators to keep them in check) including reducing incidents of forested areas becoming edges exposed to greater sunlight and more vulnerable to occupation by invasive species.
6. Establish an on-the-ground, grassroots program to maintain and increase forest cover – some examples from other parts of Maryland include Backyard Buffers in western MD, “Rainscapes” in Montgomery Co., the Marylanders Plant Trees Program, Tree-Mendous Maryland, the Woods in Your Backyard program, enrollment in Forest Conservation Management Agreements and the Woodland Assessment Program, and the “Neighborhood Green” program in Frederick Co.

Wildlife and Rare Species Habitats

1. Utilize Maryland’s Biodiversity Conservation Network, or BioNet (a digital map GIS shapefile), to prioritize watershed locations for terrestrial and freshwater biodiversity conservation activities. This tool can also be used for targeting acquisitions and easements, locating appropriate areas for project mitigation or habitat restoration, and planning for areas that require management to sustain dwindling species and habitats.
2. Work with Maryland DNR to institute measures to protect Ecologically Significant Areas (ESA’s) that are either contained within or that overlap the watershed.
3. Reduce forest loss and fragmentation and conserve and protect habitat for Forest Interior Dwelling Species (FIDS) which are bird and animal species identified as rare, threatened, endangered, or in need of conservation.
4. Protect headwater wetlands and intermittent and perennial tributaries that are vital to maintaining hydrology and water quality of rare species’ aquatic and wetland habitats downstream.
5. Avoid permitting land uses or activities near the mouth of the creek or stream that might impact Waterfowl Staging and Concentration Areas. In order to avoid disturbance to

wintering waterfowl, significant construction or development should not be conducted during the November 15 through March 1 time frame of any given year.

6. Protect any known Colonial Waterbird Nesting locations or areas documented for use by Great Blue Herons, establishing a protection area of ¼ mile radius from the rookery's outer boundary.
7. Prevent and eliminate the spread of invasive plant and animal species. These organisms can displace native species and reduce overall biodiversity.
8. Fishermen are advised to never release live, unused bait or to transport live fish or crayfish from one body of water to another. Similarly, never dispose of aquarium plants or fish or other pets into the wild.
9. Species-specific control measures should be implemented to manage established invasive species. Herbicide applications should be limited and only chemicals approved for wetland use should be used. After invasive plants have been removed, non-weedy native vegetation should be planted in any areas with exposed soil.
10. Protect known Wetlands of Special State Concern (WSSC) and any which are considered potential WSSC's.
11. Pursue environmentally sensitive design to address stormwater runoff by promoting the use of nonstructural best management practices to the maximum extent. The goal is to mimic natural infiltration patterns across the site in order to maintain natural hydrology.
12. Minimize clearing and retain forest, limiting disturbance to be the minimum needed to build homes, allow access and provide fire protection. Conduct clearing and construction in phases in order to avoid having large areas cleared at one time. Pursue clustered development in order to allow retention of large blocks of contiguous upland forest along streams and wetlands.
13. Stabilization of soil should occur immediately (within 24 hours). Special effort should be made to retain fine particle silt, sand and clay sediments including the incorporation of redundant/additional control measures in the sediment and erosion control plan to ensure maximum filtration of any sediment-laden runoff (e.g., accelerated stabilization, super silt fence instead of silt fence, etc.).
14. Provide a minimum 100 ft undisturbed forested upland buffer to permanent and intermittent streams and nontidal wetlands, and avoid disturbing steep slopes (15% slope or greater) and areas of highly erodible soils.
15. Where instream work is unavoidable, provide adequate passage for fish, reptiles and amphibians. Further consultation with the Natural Heritage Program should be sought in order to minimize impacts from instream work in or upstream from rare species' aquatic and wetland habitats.

Water Resources Management

1. Coordinate across sectors and regions to reduce potential risks associated with increasing fall and winter precipitation and lower summer precipitation.
2. Integrate climate change adaptation strategies into long-range planning processes for infrastructure, housing, and transportation.
3. Improve watershed planning and management to develop comprehensive strategies that rely on interjurisdictional partnerships and investments.
4. Promote consolidation and interconnections between and among water and wastewater utilities to improve system reliability.
5. Determine the vulnerability of the system to an increased temperatures and increases in fall and winter storms and a decrease in summer baseflows. Assessing the vulnerability of water infrastructure to impacts of climate change is also encouraged, along with the utilization of natural infrastructure such as wetlands, when possible, to address any deficits.
6. Conduct water supply studies that evaluate available water supplies and the cumulative impacts of withdrawals on the resource. Using climate change scenarios to model likely impacts during the development of water plans and Water Resources Elements (WREs) should be considered.
7. Evaluate the costs and benefits of updating flood hazard, topographic maps, and design manuals based on future predictions, not historical data.
8. Identify at-risk stream crossings and develop maintenance and high water contingency plans.
9. Evaluate monitoring networks and opportunities to increase the likelihood of detecting changes in temperature, precipitation, and streamflows and develop a systematic approach to adaptation and assessment of the cumulative impacts on watersheds.
10. Wetlands can be used to recharge groundwater, reduce downstream flooding, and in some cases store carbon, so during revisions and creation of codes and regulations, examine potential barriers to adaptation and adjust for projected impacts associated with altered rainfall and temperature.
11. Update codes for parking lot landscaping, perimeter site buffering, and/or open space preservation to incorporate tree canopy development, native species, xeriscaping (landscaping and gardening in ways that reduce or eliminate the need for supplemental water from irrigation), and integrated stormwater management.

12. Incorporate energy efficiency and green infrastructure into building design standards.
13. Evaluate floodplain maps in regards to sea level rise and increasing storm intensity.
14. Engage in comprehensive hazards management planning and include climate change adaptation in hazards management mitigation plans, land use planning, natural resource conservation plans, development review, and community visioning.
15. Implement measures to protect vulnerable drinking water sources, including implementation of source water assessments. Identify and properly abandon any unused wells, and insure that wells are properly constructed and resistant to flooding and/or storm damage to prevent any water from the land surface from entering the aquifers.
16. Preserve and manage forested and vegetative areas, especially during construction, by evaluating the potential of a staged development approach on new developments or redevelopment. Only disturb a portion of the site at any point in time because staging the development will limit the impact by reducing the amount of sedimentation.
17. Restrict development and redevelopment in areas prone to significant risk from climate change to minimize future loss of human life and impacts to property. These include 500 year floodplains, areas affected by sea level rise, and roads that experience significant flooding. Enhance adaptive capacity and human and ecological benefits in these areas through activities such as floodplain restoration, groundwater recharge, and flood-compatible agriculture.
18. Minimize water runoff by increasing the construction of retention structures on existing properties.
19. Restore and protect headwater streams, vernal pools, and ephemeral habitats.
20. Encourage comprehensive watershed management strategies that integrate water resource objectives with economic, environmental, cultural, and social goals.
21. Utilize the Water Resources Registry (WRR) to prioritize sites that maintain natural flow attenuation and water quality, as well as restore sites with compromised infrastructure, in light of protecting high quality streams and waterways.
22. Improve resilience of water utilities by diversifying water supplies and identifying alternative water sources, and increasing drinking water system storage to ensure supplies are sufficient during extended dry periods.
23. Reduce impacts of heat on human health and aquatic ecosystems.

24. Evaluate the risk of current and planned infrastructure (wastewater and drinking water treatment plants, pipes, culverts) to flooding and incorporate climate change criteria and design standards into engineering codes and standards.
25. Take climate change into account during infrastructure upgrades and repairs, and upgrade buildings, distribution systems, and other infrastructure to withstand flooding events.
26. Develop and implement comprehensive emergency response plans for utilities and wastewater treatment plants.
27. Encourage green landscaping components, such as a set % canopy over parking lots.
28. Encourage water conservation by residential and commercial users in codes and ordinances, and implement reuse as part of a restoration strategy which could buffer the potential impacts of droughts and changes in rainfall.
29. Identify and implement ways to reduce industrial and agricultural water use and encourage accountability for water used through irrigation.
30. Broaden the capacity for rainwater harvesting as a supplement for local uses in watersheds and encourage the release during droughts to enhance baseflow in streams and waterways.
31. Develop post-disaster redevelopment plans that discourage the reconstruction of buildings and infrastructure in hazard zones following climate and weather related disaster.
32. Upgrade urban storm drainage systems based on climate predictions; managing systems to minimize high flow volume impacts during high storm flows and assessing impacts of high flow events on sewage treatment plant viability and evaluate the negative impacts of bypassing high storm flows around the treatment plant's biological processes.
33. Reduce impacts on transportation infrastructure in light of altered precipitation and temperature regimes by increasing infiltration along all roads at appropriate locations and in medians during any construction process to reduce flooding and maintain structural integrity of roads.
34. Build roads and sidewalks from porous materials to adapt to more frequent flooding, and consider sizing culverts to include a range of expected impacts of climate change on flows.
35. Incorporate adaptive planning and design, related to climate change, into stormwater design principles and Best Management Practices (BMPs), providing some overcapacity in at-risk areas.

36. Encourage consultants to design for more intense storms, anticipating that the trend is toward wetter periods in September and January and lower summer baseflows.
37. Sire designs should, at a minimum, use conservative assumptions when designing a conveyance system and should build a certain amount of additional freeboard (extra elevation allowance for uncertainty above the estimated base flood elevation) into drainage and overland flow path designs. The core of this should involve implementing MDE's model floodplain ordinance.
38. Modify stormwater conveyance systems to be relative to sea level, considering also that Maryland is expected to experience at least 2 feet of sea level rise by 2050.

Stormwater Management

1. In terms of stormwater management for new development, grandfathering of projects that were in the review process prior to the new stormwater regulations taking effect is part of the minimum standards of the new regulations. When this grandfathering is allowed, make every effort to improve the stormwater management to get as close to the new standards as possible.
2. In regards to stormwater management for redevelopment, opportunities should be evaluated that create partnerships with and/or incentives to developers to provide greater stormwater management during redevelopment projects.
3. In existing development, increase stormwater retrofit implementation to meet new municipal separate storm sewer system (MS4) permit requirements and to be in alignment with any Watershed Implementation Plan Total Maximum Daily Loads (TMDLs).
4. View stormwater as a resource and investigate reuse opportunities.
5. Develop a Stormwater Utility Fee or other dedicated funding source that will adequately fund your stormwater management program and meet the requirement of future MS4 permits.
6. State of the art sediment control technologies and methods should be required on all new and redevelopment projects and should be in alignment with EPA regulations for Construction Activity. It is important to have a robust sediment enforcement program and that this is adequately funded.
7. Surveys of all streams and drainage ways should be performed to identify restoration opportunities associated with sediment pollution and erosion issues. Methods for doing such a survey include, but are not limited to, DNR's Streams Corridor Assessment Survey and the Center for Watershed Protection's Unified Stream Assessment Survey.

8. Work with SHA to identify potential forest and wetland restoration opportunities on public and private land in anticipation of implementation activities SHA will initiate to fulfill their Watershed Implementation Plan (WIP) commitments once BMP efficiencies and crediting protocols have been refined.