

MOVING TOWARD CLEAN WATERS: A 10-YEAR PLAN

A Report of the Cambridge Clean Water Advisory Committee

December 31, 2015

We imagine a future in Cambridge where water pollution is no longer a side effect of daily life and believe that the Cambridge community engaged in restoring the health of its rivers and streams will grow healthier and even more vibrant. In the future, new canopies of trees will overlap and join neighborhoods, parks will extend green spaces beyond their borders and along City streets and these green spaces will connect to the shorelines of Cambridge. Large empty spaces like excess parking lots will be renewed with rain gardens, meadows, and even groves of trees. Yards, parking lots, buildings, and streets will have designs that welcome the rain where it falls while washing out pollutants before they reach waterways. We believe that the talent, ability, and dedication exist in Cambridge to deliver on a 10-year plan that will profoundly improve the health of the Choptank and Nanticoke Rivers and the Cambridge and Jenkins Creeks.

The Cambridge Clean Water Advisory Committee (CWAC) prepared this Plan. The Mayor and City Council of Cambridge, through the dedication of staff time from the Department of Public Works (DPW) supported the Committee¹.

¹ At the City Council meeting of Monday, March 23, 2015 the Mayor and Council adopted a resolution forming the CWAC.

The organizations represented on the CWAC are:

- Chesapeake Bay Foundation
- Dorchester Citizens for Planned Growth
- Eastern Shore Land Conservancy
- Midshore Riverkeeper Conservancy
- Nanticoke Watershed Alliance
- University of Maryland Sea Grant Extension, and the
- City of Cambridge

This Plan is an invitation to the whole community to engage in a decade-long project of shared action to improve the quality of the historic waters that so closely unite Cambridge, its heritage and its soundings.

The starting point for this effort is a somewhat technical one; the **Dorchester Watershed Implementation Plan (WIP)** and the reductions it targets for pollutants in the “urban sector”². The “urban sector” refers to water pollution related to stormdrains, paved surfaces, developed shorelines and other sources that relate to how towns were built in the past and are

² The WIP is Dorchester County’s plan to reduce pollutant loadings in coordination with the State of Maryland Phase II TMDL planning for the Chesapeake Bay. While the County’s WIP was submitted to the Maryland Department of the Environment it has yet to be finalized or adopted by Dorchester County. For more information on Watershed Planning in Maryland see: www.mde.state.md.us.

lived in today. Water pollutants from septic systems, wastewater treatment plants, and agriculture are not concerns of this Plan. Efforts to reduce pollution from these source sectors are well underway. Our concern here is with the “urban sector” and science tells us that pollution from this sector will continue to grow until changes-- some simple and some more challenging-- are implemented.

Purpose and Goals

Implementation is about bringing people together so their interactions produce positive results. Working together on this report has allowed the CWAC to explore ways that its member organizations might work more effectively with each other and with the City of Cambridge to improve local water quality.

The intent of this report is to set the Cambridge community on a course of implementation. In that spirit, by setting forth a succinct plan of action, our goals are to:

1. Leverage available funding and organizational capacity to improve water quality in Cambridge through projects that can activate and energize the community, and
2. Create a framework for implementation that engages the full community on an ongoing basis.

In this report we evaluate local capacity to undertake water quality improvement projects, recommend six actions for reducing pollution and six actions to create the organizing framework to get them accomplished.

The Context

Excess amounts of nitrogen, phosphorous and sediment degrade streams and rivers. Within Cambridge, nitrogen and phosphorous wash into stormdrains and waterways with rainwater from streets, parking lots, rooftops, lawns and other hardened surfaces. These pollutants, which are measured in pounds per year, cause algae blooms and dead zones in the Choptank and Nanticoke Rivers. They also pollute the Chesapeake Bay. Projects and strategies that reduce these nutrients from entering the waterways make the water healthier for swimming, boating, and fishing.

Later in this report, we estimate the reductions in pollutant loadings that this Plan would bring about. These estimates include substantial annual reductions in the particles that wash into area waterways and ultimately settle to the bottom of the Choptank and Nanticoke Rivers. Such “suspended solids” cloud the water, disrupt natural water temperatures, and inhibit the reach of sunlight to aquatic plants. They contribute to worsening dissolved oxygen levels for fish and invertebrates such as oysters, clams, and blue crabs. The Cambridge community can meaningfully reduce the flow of these sediments and the loadings of nitrogen and phosphorus that are entering the Choptank and Nanticoke Rivers.

The State of Maryland estimated that Dorchester County’s 2009 baseline contribution to the Bay’s “urban” water pollution was 138,933 pounds per year of nitrogen and 10,240 pounds per year of phosphorous. The Dorchester County WIP provides that by 2025, these annual amounts will need to be reduced by 44,600

and 4,430 pounds, respectively³. If these reductions from the County's "urban sector" could be achieved along with the progress being achieved in the other sectors by the City and others, great strides will have been made toward restoring the health of area waterways⁴.

Since the vast majority of urban land in Dorchester County is found within towns and because Cambridge is significantly larger in area and population than any other, the largest reductions are logically to be found in Cambridge. Reducing pollution within the city limits can help meet county and regional clean water goals, but it can also directly benefit Cambridge residents who experience the value that local rivers and creeks bring to the economy and livelihoods each day. This Plan is about building a framework of actions that will improve water quality while directly engaging interested citizens in the work needed to bring about a healthier, greener, and more vibrant future.

³ Under the Dorchester County WIP, these reductions in the urban sector represent 13 percent of the total targeted reduction from all sectors for nitrogen and 77 percent for phosphorous.

⁴ For planning purposes the actual reductions from the County's "urban sector" are lower for two reasons. The first is that the County WIP proposes to upgrade the Twin Cities and Vienna wastewater treatment plants to Enhanced Nutrient Removal levels and count the resulting pollution reductions toward meeting the urban sector target. Together these wastewater treatment facility upgrades would reduce overall nitrogen by 12,795 pounds per day and phosphorous by 2,401 pounds per day. Counting these reductions against the urban sector targeted reductions brings the total necessary reduction for nitrogen to 31,800 and for phosphorous to 2,030. Secondly, the County's WIP recognizes reductions due to the recently completed sewer separation project which prevent sewer overflows at City wastewater treatment plant. This improvement alone contributes pollution reductions in the amount of 2,378 pounds per year of nitrogen and 340 pounds per year of phosphorous. The County believes these should be credited against the urban sector requirements.

The Countywide pollutant reductions mentioned above, however, are sobering reminders of the challenges we face if we are to make meaningful improvements in the health of area waterways. For context, the recently completed green-street retrofit of Maryland Avenue is expected to reduce nitrogen loadings by 11 pounds per year, which is less than ½ of one percent of the County's target reduction mentioned above. While dollar-per-pound-reduced investment is high, much can be learned from this project, which provides community benefits beyond water quality. The ambitious targets for improving the health of the Chesapeake Bay help set the stage for the innovation and fortitude that communities like Cambridge can bring to bear on restoring local waters to health

So while the County WIP is a starting point in understanding the extent of the problem, it is not the end point. The possibility exists to improve local water quality through projects and strategies that uniquely reinforce the special place that Cambridge is. We recognize that what is needed is a local plan and a strategy that engages the community in addressing this important challenge.

Assessment of Local Capacity

The City of Cambridge is actively undertaking projects that will have water quality benefits.

- On Maryland Avenue, the City added green filter strips, pervious pavers, and landscape planting beds to absorb and treat stormwater in the roadway.
- At MD Route 50 and Maryland Avenue the City will demolish a nonperforming commercial site and return the land to open space as part of gateway beautification project.
- On High Street, the City will introduce rain gardens, pervious pavers, and other stormwater management improvements as part of this historic street's restoration.
- At the proposed Cannery Park, the City will restore ecological functions at the headwaters of Cambridge Creek with estimated annual reductions in nitrogen and phosphorous of 150 and 75 pounds respectively.
- At Long Wharf Park, the City will install buffer strips with rain gardens along the parking lot perimeter with the Choptank River.

Each of the above projects achieves a variety of other objectives along with improving water quality. That is the great power of water quality projects—they can improve the quality of life while quietly cleaning the water.

The City's DPW has the know-how and design experience to incorporate pollutant reduction into projects. Indeed, optimizing the water cleaning capabilities of such projects opens avenues of grant funding, which can make the difference in timely implementation. City staff can investigate, evaluate, and design stormwater retrofit and runoff reduction projects, manage engineering and construction contracts, and administer grant funding. The City does not, however, have a continuous and dedicated funding source for water quality improvement projects.

The City's DPW also administers the State of Maryland Stormwater Management regulations for new development and redevelopment. These regulations prioritize the control and cleaning of water to reduce the pollutants that flow off a development site. Redevelopment will lead to cleaner water as developers install Best Management Practices (BMPs), which control and treat stormwater.

Finally, the City's recently adopted Unified Development Code is intended to "promote development practices which conserve and restore water, energy, and other resources, prevent damage to natural resources, and protect people, property and infrastructure from rising sea levels and flooding". In this regard, the code:

- Requires wide vegetative buffers along perennial and intermittent streams as a condition of site and subdivision plan approval,
- Requires 10-foot wide landscaping strips along the perimeter of new parking lots, providing space for bio-retention, trees, and other vegetation,

- Requires adherence to landscaping standards for all development sites that will help create new tree canopies,
- Reduces parking requirements and caps the amount of parking that can be provided on development sites which will limit or actually reduce impervious surface areas,
- Requires that developers minimize to the extent practical total impervious surface area in new developments.

The Unified Development Code implements and supports the City's Comprehensive Plan, which envisions a greener future for the City as development and redevelopment proceeds. Of note is the Plan's emphasis on the preservation of a greenbelt of open and natural lands around Cambridge and the creation of parks and gateway projects that can reduce water pollution. In sum, the City of Cambridge has aligned its engineering functions, and its planning and development policies and regulations to bring about a future where water pollution can be reduced over time.

But ultimately improving water quality is also about retrofitting and modernizing infrastructure that has long aimed to transport rainwater from its source on a paved surface directly to roadside drainage swales, gutters, pipes, streams, creeks and rivers. Retrofit projects will be needed for the foreseeable future in Cambridge and communities throughout the Chesapeake Bay watershed.

Among the town's on the Eastern Shore, the City of Cambridge is uniquely qualified to undertake such projects but its capacity to undertake them could be strengthened in three areas specifically:

1. The City could adopt a watershed protection plan targeting specific BMPs for specific locations. The plan need not be a major or expensive undertaking; what is really needed is a citywide inventory and evaluation of candidate projects and an associated capital improvement program.
2. The City could dedicate annual funding for capital projects that have water quality benefits. An annual recurring appropriation will have the tangible benefit of allowing the City to pledge its matching funds, which will improve the City's odds of winning in the competition for grants. In other words, an annual commitment of funding can be leveraged to gain even more. The CWAC can advocate for the City in securing grant funding.
3. The City could call upon local volunteers and members, and/or employees of local non-profit organizations that focus on water quality. At the City, water quality projects are housed in the Engineering Division of the City's DPW, headed up by one staff engineer who has a variety of other professional responsibilities. The possibility for greater technical and programmatic coordination between the City and others should be explored to expand the capabilities of the Division. The CWAC can help.

Among other work, these organizations test and monitor the health of local rivers and streams, maintain relationships with leaders and innovators in the fields of environmental science and engineering, build and sustain public awareness, track the availability of public and private grant funding, and undertake projects and programs to improve the health of local streams and rivers.

Recommended Actions

Here are the recommended projects and programs for the next decade. By framing each action in specific and measurable terms, by the end of 2025, we should be able to clearly count the progress made.

- **Action 1: A citywide program to convert 20 acres of impervious surface to green space, including using volunteer labor, at a cost of \$250,000 over 10 years.**

Impervious areas that drain to the storm sewer system should be prioritized in a de-paving effort aimed at replacing 20 acres of impervious surfaces in Cambridge with green spaces and preferably with rain gardens and stormwater BMP's.

This could include private patios, driveways, and residential parking pads as well as excess parking surfaces on non-residential lots. To facilitate this effort, a financial incentive could be structured by which a small portion of the real property tax is refunded upon completion of a de-paving project.

The City also can play a direct role in this effort by demolishing abandoned properties, removing impervious surfaces and converting such lots,

especially those which do not conform to minimum zoning requirements, into protected open spaces through easements or other measures. For example, such lots could become the side yard for an adjacent house or be put back on the tax rolls as a future home site that would meet modern stormwater management standards.

The community can participate in meeting the 20-acre goal through citizen based de-paving efforts aimed at reducing impervious areas on residential lots and especially on underused parking areas on the grounds of governmental and institutional properties. There is precedence for this throughout the United States⁵.

The role of private sector land redevelopment in reducing overall impervious surface area without direct cost to the City cannot be overlooked. Redevelopment of commercial and industrial sites over the next ten years will likely reduce some impervious surface areas. Leadership by the City Planning Commission and professional guidance from the City planning and public works staffs will help bring this about.

To secure the water quality benefits discussed later in this Plan we assume under this action that one-half of the 20 acres converted to green space would utilize on-site BMP's such as filtering strips, constructed wetlands, swales and/or other practices designed or approved by the City's DPW.

⁵ For examples and inspiration, research community de-paving efforts at www.depave.com.

- **Action 2: A citywide program to plant 500 cityscape canopy trees at cost of \$60,000 over ten years and to make available native understory trees to every household without charge at a cost of \$180,000 over 10 years.**

Cityscape trees are canopy trees of a sufficient size to have an immediate visual impact. The intent is that they be planted in parts of the City that support existing beautification and development policies such as the Great Streets recommendations set forth in the Comprehensive Plan. Volunteers could plant the trees.

Understory trees, native to our area (such as dogwood redbud, sweet bay magnolia, holly and eastern red cedar), are appropriately sized for small yards and all residential and commercial lots. They immediately bring seasonal color and beauty to neighborhoods and business areas. A welcome package for every new Cambridge resident could include a token for one or more small trees for planting in the yard.

Under this program, we should seek to create canopy coverage where it does not yet exist aiming for one hundred trees per acre in most parts of the City⁶. The community should plant 5,000 understory trees by the end of 2025. In practice, this may mean that trees are planted not just on residential lots but also on portions of large commercial, industrial, institutional, and Home Owner Association properties.

⁶ With a standard canopy of 200 square feet per small understory tree, trees planted at a density of 100 trees per acre would provide 46 percent canopy coverage over that acreage which is a very attainable objective within much of Cambridge outside of downtown and any density developed areas.

- **Action 3: A citywide program to redirect 1,000 downspouts from impervious surface areas at a cost of \$100,000 over 10 years.**

The preference for this program is to redirect downspouts to rain barrels where rooftop runoff is collected and stored and then released following rain events for watering landscape and rain garden plants. The alternative to a rain barrel is simply to redirect the downspout flow from a hard surface to a pervious area such as a healthy lawn or a planting bed. Existing rain barrel programs should be expanded through neighborhood based networking and citywide marketing. This program will have the greatest resonance in the older sections of Cambridge developed before modern stormwater management.

- **Action 4: A citywide program to bring about better management of leaf, grass clippings, and yard waste and a reduction in the use or amount of lawn fertilizers. This is called “urban nutrient management” at a cost of \$100,000 over 10 years.**

Under this program, the Cambridge community could aim to bring 5,000 acres under nutrient management. For context, 5,000 acres is less than 10 percent of the area of the City of Cambridge.

The Chesapeake Bay Network defines urban nutrient management as the proper management of major nutrients for turf and landscape plants to best protect water quality⁷.

⁷ See Chesapeake Bay Network at chesapeakestormwater.net

There are 10 core practices that reduce the risk that fertilizers, leaves, and grass clippings will leave a property and pollute area waters⁸. Most City residents and residential and commercial property owners and property management companies can undertake these practices readily and in fact some undoubtedly do already. Through public outreach and education property owners could be encouraged to sign a pledge to follow the 10 core practices. The CWAC can assist in this program by establishing and marketing a certification program for private lawn care and landscape companies whose employees voluntarily complete best practice training so homeowners will know what companies are following Cambridge's river-friendly practices.

- **Action 5: A City and State Highway Administration program to increase green space within street rights-of-way by up to one acre (43,560 square feet), by expanding or adding tree planting boxes, extending planting strips, and partially converting medians to green spaces at a cost of \$653,430 over 10 years.**

Rights-of-way with great potential include U.S. Route 50, High Street, Poplar Street, Cedar Street from U.S. Route 50 to Race Street and Race Street from Poplar Street to Washington Street.

Under this program, new or expanded openings in impervious surfaces can be

⁸ The biggest benefits of Urban Nutrient Management occur at new construction sites and other higher risk sites including lawns with compacted soils and lots with high water tables, within 300 feet of waterways or containing steep slopes.

made and then planted with grass, native vegetation, or street trees depending on location. This is a targeted approach aimed at highly visible locations that can call attention to community's efforts to address water quality and become a greener place.

- **Action 6: The installation of new or rehabilitation of existing stormwater facilities serving drainage areas totaling 40 acres at a cost of about \$22,500 per impervious acre treated or \$900,000 over 10 years⁹.**

Retrofit projects would target areas in which stormwater is untreated or is inadequately treated by existing infrastructure or techniques. Retrofit projects are meant to store and clean water within the urban landscape providing infiltration of pollutants, where soils permit, through sand or other media and in other cases the actual absorption of pollutants by vegetation.

The City DPW can undertake an inventory of candidate sites and the CWAC encourages the Department to identify projects on both public and private properties in two categories: (1) the installation of new retrofits and (2) the enhancement of existing practices which are less expensive to implement.

⁹ The cost per acre treated for new retrofit projects can be as high as \$30,000. The cost can be considerably less, about \$15,000, when simply enhancing or restoring existing best management practices. The \$900,000 cost estimated here assumes 20 acres treated by new retrofits and 20 acres treated by rehabilitating existing practices.

Evaluation of Projects

Costs

These recommended projects would cost the community approximately \$2.2 million over 10 years.

This cost will not be borne by the City of Cambridge alone but the City, if it agrees, could be expected to contribute manpower, technical expertise, and funding for the infrastructure and stormwater retrofits in particular. Most of the cost of implementing this Plan would be funded by grants, which are the primary source of funding used now by the DPW. As a qualifying and capable public entity, with the ability to match certain funding, the City is uniquely situated to receive and manage grant funding. Indeed, to date the Department is working through grants totaling \$3.2 million; already earmarked for the types of projects that are recommended in this Plan.

Some of the costs should also be offset by donations from private foundations and tax-deductible contributions from individuals and local corporations. Fund raising must become a mission of the implementing entity discussed in the next section of this report.

The CWAC strongly believes the City of Cambridge should continue its laudable efforts to incorporate water quality improvements into public works projects such as proposed at Cannery Park and Long Warf and continue to undertake special “green-street” and gateway enhancement projects such as Maryland Avenue. These all have water quality benefits and when they are designed to meaningfully reduce pollutants, they become eligible for a variety of public and private grants.

Pollutant Reduction Associated with the Plan

At the technical level, water quality improvements are measured in pounds of nitrogen, phosphorous, and suspended solids, that are prevented from entering and polluting waterways.

The table on the following page shows the pollutant reductions associated with each of the six recommended actions. In sum, the Plan would reduce the amount of nitrogen entering area waters by 950 pounds per year and the amount of phosphorous by 49 pounds per year. It would also reduce suspended solids by nearly 17,000 pounds per year.

These reductions would add to those associated with the City’s ongoing efforts to implement the projects discussed earlier and its future projects.

Projected Pollution Reduction by Recommended Action

Recommended Action	Annual Reductions (lbs.)		
	Nitrogen	Phosphorous	Suspended Solids
Action 1: Remove 20 acres of Impervious Surface Area (with SWM treatment on 1/2)	42.8	16.4	8,855.8
Action 2: Citywide Tree Planting (Plant 500 City Scape Trees + 5,000 small trees)	259.1	10.5	1,705.0
Action 3: Install 1,000 Rain Barrels	12.8	1.8	1,035.7
Action 4: Create a Citywide Urban Nutrient Management (enroll 500 acres in program)	513.7	9.6	n/a
Action 5: Add Green Space in Street Rights-of-Way (1 acre)	5.4	0.7	501.8
Action 6: Complete Stormwater Retrofits (serving area totaling at least 40 acres)	115.9	10.1	4,830.0
Total	949.6	49.0	16,928.2

Source: Jakubiak & Associates, Inc. using the Nutrient and Sediment Reduction Calculator from the University of Maryland Center for Environmental Science, Maryland, Department of Natural Resources.

Community Engagement

The strategy for completing the recommended projects and programs by the end of 2025 rests on broad and active public engagement—a 10-year community commitment. We believe this can be achieved and sustained over a decade if a lead organization is established and it commits to full transparency related to funding and budgeting, the sharing of information especially related to progress made, and the mindset to continually seek solutions and better ideas from the community at large.

Citizen volunteers, civic groups, and institutions in the Cambridge community could drive many of the projects. To this end the following will need to be undertaken.

1. An organization will need to be formalized and the optimal structure should be decided immediately. The CWAC provides a good start for the organization, but the leadership or board members of this entity should also include residents, businesses, corporations, and other institutions local to Cambridge.

The City of Cambridge should have a seat at the table and an invitation to Dorchester County should be extended as well. Having said that, this Plan envisions that the implementation entity will be non-governmental in its makeup. The organizing structure for this entity should readily provide for tax-deductible contributions from corporations, businesses and individuals aimed at implementing this plan.

City resident or local business should be able to become members and financial sponsors of the organization and membership will entitle individuals a say in how the recommended projects are implemented.

2. A digital presence will need to be established. A website or a comparable alternative to a full website should be established as soon as possible. The recommended projects are presented in terms of key performance indicators (20 acres of impervious surface area removed over ten years, for example). The web site should track progress in each area so that the community is engaged in the work.

Implementing projects should actively engage the community. For example, a neighborhood-by-neighborhood competition can be held to identify and vote on the impervious surfaces to be replaced with green space. An initial grant of funds is necessary to build the digital presence, though it can start right away as a “one page” website.

3. A team of volunteers that can undertake tree planting and other works should be assembled and granted special status and recognition within the community at large. This could include a resolution of the Mayor and City Council, for example.

4. It is worth reinforcing: **Businesses and corporations** located within Cambridge should be asked to participate as sponsors, providers of low cost or discounted services, organizers of volunteers, promoters of special events, and contributors of funds.

5. Innovative reward and incentive techniques are needed to promote behavioral changes. To help bring about the changes in the way people manage their yard wastes and lawn care, the community will need to think through innovative reward and incentive techniques, create teams of volunteers, and perhaps conduct surveys and volunteer training in each neighborhood.

6. The resources and students from local schools should be asked to participate. Clean water action projects could be tied into the science curriculum and the manpower of student volunteers could be used to supplement the need for other volunteers in the community. Students, once educated and included, would have the knowledge to impact improvements at home and in their neighborhoods.

In sum, the work of a community dedicated to a series of specific performance indicators can bring about real improvements. True and sustaining engagement with the community will be essential to raise the \$2.2 million needed for this Plan.

Conclusion

This brief Plan has set forth six recommended actions that the Cambridge community can undertake which will measurably, increasingly and perpetually improve area waterways. In doing so, these actions will help build a more beautiful Cambridge now and for future generations. They will lead to more green spaces, more trees, and more attractive streets.

It has also recommended six steps to implement these projects starting with forming the right organizing entity, work on which should get under way as soon as possible.

While we recommend three ways that the City of Cambridge can enhance its capacity to deliver water quality improvement projects (i.e. prepare a plan, commit local funding every year, and accept assistance from volunteers) this Plan fundamentally asks for the assistance of the entire community of Cambridge.

Indeed the most cost effective actions for reducing the pollutants entering local waters happen to be those actions that involve every person in Cambridge who is interested and willing to make a difference.

Every homeowner has the space to plant a small ornamental tree. Every lawn can be made healthier and river-friendly. Every homeowner, institution, and commercial or industrial building owner can install a rain barrel.

Every person and business can participate in efforts to remove excess paved surfaces and plant vegetation. The cumulative effects of these actions are transformative for clean water.

Like most investments worth making, the sooner we start on this Plan the better. The six actions listed here will prevent 950 pounds of nitrogen, 49 pounds of phosphorous, and nearly 17,000 pounds of suspended solids **every year** from polluting the Choptank and Nanticoke Rivers. The sooner these reductions are achieved, the sooner and longer the benefits will be able to compound year after year to the benefit of the Cambridge community and those that love the water that is so intrinsically tied to it.