

Clean Water Actions for the Bay

NASA Langley steps up efforts for clean water

Bioretention and Biofiltration – buzz words for a relatively simple process of letting plants and soil do all of the work in cleaning our stormwater. These two words also describe the coupled processes of both filtering water for quality and controlling water quantity. Evidence of these practices can now be seen in action at several locations here at NASA Langley. This activity is expected to increase as we continue to build a better future here with the continuation of the VITAL program.

It all started with the Headquarters Building, B2101. The design for this LEED-certified building included permeable pavers and a large bioretention area designed to capture rainwater from the roof and let it filter through plants and soil rather than dropping straight into the storm sewer. Now these features have been in place since 2010, helping to filter our runoff before it reaches our nearby creeks and marshes. These efforts continued with the design and construction of B2102, The Integrated Engineering Services Building, with more bioretention areas and a LOT more permeable pavers. This building project also included accessory parking areas with additional permeable pavers and bioretention/biofiltration.



BIORETENTION AREA AT IESB, BUILDING 2102

These stormwater “best management practices” (BMPs) not only help clean our water before it leaves the Center, they are also sometimes necessary for meeting LEED

certification and/or required for meeting federal stormwater management requirements under section 438 of the Energy Independence and Security Act (EISA) of 2007. EISA requires that “any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet [must use] site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.” All that technical jargon boils down to a requirement that new buildings cannot create any additional stormwater runoff from the site. This actually makes practical sense when you consider a Center like ours with aging storm sewers and a limited capacity to meet our current drainage needs. You would not replace your bathtub with a swimming pool and expect it to drain as quickly or efficiently. We have seen evidence of this concern when parts of West Taylor and other Center roads flood when we have large storm events. The goal is to divert rainwater into the ground rather than concentrating it into a pipe or running it off of a large paved surface.

The next two buildings slated for development under the Center’s New Town Master Plan will include more of these innovative approaches to managing rainwater. Slated to begin construction this year, the Computational Research Facility is designed to meet the current and future needs of computing at LaRC. This ambitious endeavor also happens to feature ingenious management of rainwater as well. The upcoming Measurement Systems Laboratory will also employ a number of stormwater BMPs to meet requirements for water quality and quantity.

The Chesapeake Bay TMDL and New Stormwater Requirements

Along with all this new construction comes additional requirements to meet tightened regulations for stormwater through the Commonwealth of Virginia. Virginia’s most important waterbody, the Chesapeake Bay, has the attention of the President and ultimately the nation:

“The Chesapeake Bay is a national treasure constituting the largest estuary in the United States and one of the largest and most biologically productive estuaries in the world...Despite significant efforts by Federal, State, and local governments and other interested parties, water pollution in the Chesapeake Bay prevents the attainment of existing State water quality standards and the “fishable and swimmable” goals of the Clean Water Act... The pollutants that are largely responsible for pollution of the Chesapeake Bay are nutrients, in the form of nitrogen and phosphorus, and sediment...Restoration of the health of the Chesapeake Bay will require a renewed commitment to controlling pollution from all sources...The Federal Government should lead this effort.”

-Executive Order 13508

On May 12 2009, President Barack Obama signed Executive Order 13508, declaring the entire Chesapeake Bay estuary a “National Treasure,” and with good reason. According to the 2009 Fisheries Economics of the U.S. report by the National Oceanic and Atmospheric Administration (NOAA), the commercial seafood industry in Maryland and

Virginia contributed \$3.39 billion in sales, \$890 million in income, and almost 34,000 jobs to the local economy.

With this designation came increased scrutiny by the EPA of Bay watershed states and how they regulate clean water. Although the Bay states have worked under cooperative agreements for years to protect and restore the Chesapeake Bay, conditions of this nation's largest estuary continued to worsen. The EPA decided that more action was

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needed and developed the Chesapeake Bay Total Maximum Daily Load (TMDL). In short, the Bay TMDL put a cap on the amount of nitrogen, phosphorus, and sediment the Bay could receive before it would be considered polluted.

This was a big deal - a really big

deal. The Bay states were left scrambling to find ways to meet this requirement and most responded with tighter requirements on all of the areas that they could control with permitting. This is where we come in. NASA Langley operates under several permits for water quality that were open for these tighter restrictions (<https://sites-e.larc.nasa.gov/environmental/water/>). Arguably the most wide-ranging of these is the Center's Municipal Separate Storm Sewer System (MS4) permit. This permit is the general stormwater runoff permit for the entire Center and is very important for the Water Program here at LaRC. It's the reason we sweep debris from the streets. It's the reason every construction project features the ubiquitous black or orange fencing around its borders. This permit is re-issued on a 5-year basis and requires annual reporting and a rigorous inspection and enforcement program. With the Bay TMDL, it also brings new requirements for the entire Center.

This year, staff in our Environmental office with the help of the GIS team will be retracing our Center changes and clean water actions from the past several years. This information will be used to put together a Chesapeake Bay TMDL Action Plan that will be shared with the LaRC community. We will account for all of the demolitions and the new buildings, and we will develop an accounting system of a different kind for LaRC. The new currency is Nutrients and Sediment, and we have to account for every penny. The new stormwater regulations not only place requirements on new buildings, there are also requirements for accounting for runoff from the existing campus that may have exceeded our allotment for nutrients and sediment. This is where retrofits come in. That's right, LaRC's going RETRO! Some of this has recently occurred in the form of a new kind of storm sewer inlet, the tree box filter.



CONTRACTORS INSTALL A TREE BOX FILTER

Recently contractors installed this new kind of storm inlet in several locations on Center as a pilot project. These innovative BMPs feature a filtering media (basically a special soil mixture) and a tree planted in the middle of the device. Rainwater has the potential to carry nutrients, sediment, and other pollutants when it flushes across surfaces like roadways and parking areas. These units are designed to filter this runoff through the planting box media and root zone to reduce these pollutant loads prior to discharging to the conventional storm sewer. We may install more of these as we get a better understanding of what we need to do to retrofit our existing landscape.

Another potential “BMP” in our toolbox would be to replant unused areas of maintained landscape to forest and streamside buffer. We could get credit towards our stormwater “debt” while also increasing habitat for wildlife and beautifying the Center at the same time.

In the meantime, new buildings will be held to even higher standards than before. Another important water permit in play for our Center’s new construction is the General Permit for Construction activities issued by the Virginia Department of Environmental Quality with authority from EPA. The “CGP” permit is required to be registered for any land disturbing activity (construction) of an acre or more.

Here's where things get even more interesting. In order to meet construction permit requirements and still maintain control over what is happening on our Center, the Environmental Office pursued the option of developing State-approved stormwater requirements that allow Center personnel to review projects in-house and have control over our own compliance and enforcement. In-house review means we control our own timeframes for review and permitting, which could prove very helpful for time-sensitive projects. In fact we were recognized by NASA Headquarters in 2014 as the first federal facility in the Bay Watershed to establish their own program of stormwater authority, and we take pride in that. We are striving for NASA Langley to be a leader in stormwater management for the Bay TMDL and for our local waters. With the help of our Center leadership and LaRC staff as a whole we have achieved much already, but we're just getting started...



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