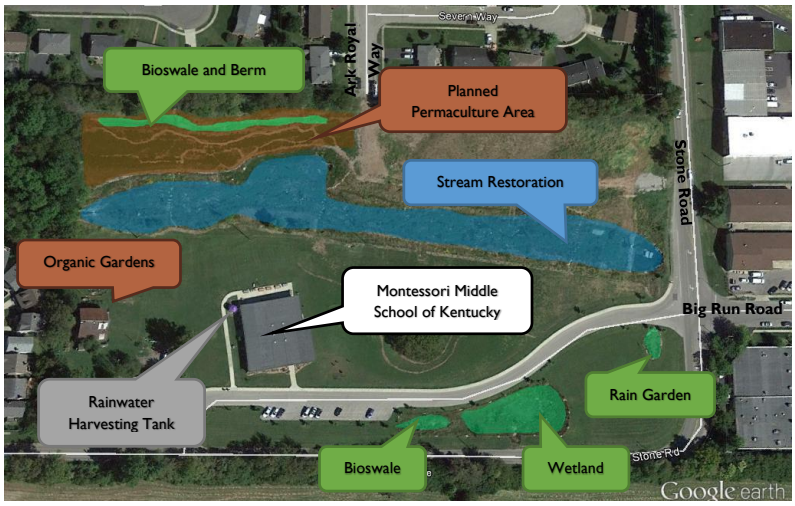
At the Montessori Middle School of Kentucky (MMSK), what was once an unsightly ditch has been transformed to a centerpiece of the school's "educational odyssey."

"Amazing – just amazing," was the judgment of one parent. "The stream was a long, narrow, poison ivy covered trickle of water," said Ann Evans, administrator of MMSK. Funding from the LFUCG Stormwater Quality Incentive Grant Program transformed it into a naturalized stream. Now, seventh and eighth graders put on their boots and head to the stream daily to observe wildlife, test water quality, and learn about natural systems as part of a hands-on approach to problem solving, social responsibility, and ecological balance.

The curriculum at MMSK already included unique elements such as organic gardening, micro-economy business ventures, care of chickens and bees, and water studies. But when the property, located on Stone Road just inside New Circle Road, was first acquired by the school, opportunities to study water quality in the field were severely limited. A small tributary to South Elkhorn Creek flowed through the property, but it was so deeply eroded it was difficult to access.



Water quality improvements implemented at the Montessori Middle School of Kentucky property, located inside New Circle Road on Stone Road, as a result of Stormwater Quality Incentive Grant funding by the Lexington-Fayette Urban County Government.

Scientists from the University of Louisville, who monitored the stream in 2011, predicted that nearly 25 tons of sediment were eroding from the banks annually. The eroded soil contained high levels of phosphorus and nitrogen, pollutants blamed for the poor health of South Elkhorn Creek.

Under natural conditions, rainfall soaks into the ground and slowly drains to streams. However, the 245 acres that drain into the MMSK's stream are mostly covered by impervious surfaces, such as parking lots, rooftops, and roads, so much of the rain no longer absorbs into the ground. Rather, it quickly flows off these surfaces as stormwater runoff into the stream with such force that it was washing away as much as 4 inches of the stream bank each year in some locations. MMSK needed a solution to this problem.

Lexington's Stormwater Quality Incentive Grant Program was developed to address these types of issues. The program was developed through collaboration with Lexington's business, development, education, and neighborhood communities to fund projects that reduce stormwater runoff, improve water quality, or provide an educational benefit in areas or to populations that need it the most. Each year by ordinance, 10% of the Water Quality Management Fee (approximately $1.2 million) is set aside by the city for the grant program.

In 2010, MMSK applied for a grant with the goal of meeting all three of the program's objectives. With the support of a diverse team of consultants, scientists, educators, and other partners – including EcoGro,

Ridgewater, Vision Engineering, the University of Louisville, and the University of Kentucky – the school proposed grants to study the stream and design improvements and then to fund construction. To date, MMSK has been awarded two grants totaling over $430,000, helping to transform the property into a natural sanctuary within an urban environment.

To reduce stormwater runoff, a 5,000 gallon tank was installed to capture runoff from the school building. This water is filtered and used to irrigate organic raised-bed gardens maintained by students. Runoff from the school parking lot is directed to a bioswale, which filters out pollutants and supports a variety of wildflowers. Then it flows to a stormwater wetland, which captures runoff from Stone Road as well as large parking lots south of New Circle Road. The wetland improves water quality, and provides a home for a large turtle. Runoff from Ark Royal Way now flows into a swale where it slowly infiltrates into the soil. MMSK has plans to use this water to irrigate nut and fruit trees that will be managed by the students.

Large boulders in restored tributary to South Elkhorn at Montessori Middle School of Kentucky slow down the stormwater, preventing erosion.

The stream has been designed to reduce bank erosion by over 95%, and has proven its hardiness by surviving several intense rainfalls without signs of erosion. Huge boulders installed near the culvert by Big Run Road slow down the water and spread it over a 60-foot wide floodplain. The stream banks bordering the meandering channel are gently sloped, resembling a natural setting. Increased infiltration promotes longer dry-season flows, providing better habitat for fish. There are now deep pools where mallards swim and muskrats nest. Sticks and logs have been added to the stream to provide homes for aquatic insects, and standing dead trees along the banks provide roosts for hawks and other birds. Within the stream bed, beneficial bacteria helps to remove nitrate pollution.

Educational signs developed by the students at MMSK educate visitors to the stream on the purpose and benefits of stream restoration.

MMSK students have been involved in all aspects of the project. They collect water samples and host demonstrations to educate the community on the ecology of the stream, the problems, and the solutions. The students designed educational signs along trails on the property, which also serves as a site for stream restoration research.

Lexington's Stormwater Quality Incentive Grant program has awarded a total of 86 grants, including the MMSK project, since its inception in 2010. For more information about the Incentive Grant Program, please visit the website (www.lexingtonky.gov/incentives), call LexCall at 311 or (859) 425-CALL, or email Christopher Dent, the Incentive Grant Program Administrator, at cdent@lexingtonky.gov.