

MEETING NOTES
of the
STORMWATER STAKEHOLDER ADVISORY COMMITTEE (SSAC)
Lexington-Fayette Urban County Government (LFUCG)

Meeting: December 1, 2023
Time of Meeting: 9:00 a.m.
Location of Meeting: Phoenix Building – 3rd Floor Conference Room

Attendees:

COMMITTEE MEMBERS

Doug Burton – LFUCG Division of Engineering
Jennifer Carey – LFUCG Division of Environmental Services
Jim Conner – Cane Run Watershed At-Large
Ken Cooke – Friends of Wolf Run
Steve Garland – East Hickman Watershed At-Large
Jim Griggs – Boone Creek Watershed At-Large
Don Hill – Fayette County Neighborhood Council
Charlie Martin – LFUCG Division of Water Quality
Malissa McAlister – Kentucky Water Resources Institute (for Steve Evans)
Richard McClure – University of Kentucky (for Kevin Lewis)
Elizabeth McGee Lewis – Friends of McConnell Springs
Mary Murray – Federal Facilities, Lexington VHA Medical Center
Hunter Pace – Kentucky Transportation Cabinet District 7
Amy Sohner – Chair, Bluegrass Greensource
Russ Turpin – Wolf Run Watershed At-Large
Tracy Wade – LFUCG Division of Planning (for Jim Duncan)
Jerry Weisenfluh – Kentucky River Watershed Watch

LFUCG STAFF AND REPRESENTATIVES

Denice Bullock – LFUCG Division of Water Quality
Sarah Donaldson – LFUCG Division of Environmental Services
Jason Drew – LFUCG Division of Water Quality
Jared Gabbard – LFUCG Division of Water Quality
Mac Hall – Third Rock Consultants, LFUCG MS4 Program Management
Brian Hayes – LFUCG Division of Engineering
Gabe Hensley – LFUCG Division of Water Quality
Becky Irwin – LFUCG Division of Water Quality
Demetria Kimball-Mehlhorn – LFUCG Division of Environmental Services
Greg Lubeck – LFUCG Division of Water Quality
Frank Mabson – LFUCG Division of Water Quality
Craig Morgan – LFUCG Division of Water Quality
Jennifer Myatt – LFUCG Division of Environmental Services
Lindsie Nicholas – LFUCG Division of Water Quality
Mark Sanders – LFUCG Division of Water Quality
Abby Terry – Tetra Tech, LFUCG MS4 Program Management
Richard Walker – Tetra Tech, LFUCG MS4 Program Management
Heather Wilson – LFUCG Division of Environmental Services

OTHER ATTENDEES

Jerry Davis – Friends of Wolf Run
Hunter Dockery – University of Kentucky, Lewis Honors College
Audrey Ernstberger – Kentucky Resources Council
Ken Johnson – Citizen/Volunteer
Nathan Krebs – Stantec
Sam Lee – Stantec
Cooper Samuelson – University of Kentucky, Lewis Honors College
Kenton Sena – University of Kentucky, Lewis Honors College
Lesley Snead – Kentucky Resources Council
John Steinmetz – Banks Engineering
Brian Stephens – Ball Homes

Bailee Young – Prime AE

Opening Remarks

Amy Sohner opened the December meeting at 9:00 a.m. and asked those in attendance to introduce themselves and their organization when speaking.

Approval of 09/08/23 Minutes

Ms. Sohner asked if there were any additions or corrections to the September minutes. There were none.

A motion was made by Mary Murray, seconded by Jim Conner, and carried unanimously to approve the minutes of the September 8, 2023, meeting.

Effects of Conservation Activities on Riparian Soil Health

Kenton Sena, Cooper Samuelson, and Hunter Dockery with Lewis Honors College, University of Kentucky presented a PowerPoint presentation on the Effects of Conservation Activities on Riparian Soil Health.

Kenton Sena said their research interest is in riparian buffers in urban areas for several reasons including the idea of the “Urban Stream Syndrome.” He explained that urban streams are affected by altered hydrology, channel erosion/downcutting, and impaired water quality, all of which are related to various aspects or mechanisms associated with urban development, primarily the addition of impervious surfaces.

One of the questions being investigated is whether the riparian buffers that have been established in Lexington as part of the Reforest the Bluegrass Program have any effect on the water quality of the associated streams. The analysis is ongoing, but the preliminary results show that riparian conservation and restoration activities can significantly improve stream water quality in streams that are affected by urban development.

This was investigated by evaluating riparian buffer soils compared to the soils under mowed grass. The study focuses on whether conservation activities in the riparian buffer areas can improve infiltration rates and capture overland surface flow before sediment and other pollutants can enter the stream. The study is also interested in discovering whether the riparian buffer shows any markers of improved soil health such as microbial community development.

Cooper Samuelson illustrated the Hickman Creek Tributary and stated that six (6) plots were created to mark the areas where samples would be taken. Three (3) plots were within the planted riparian zone and three (3) plots were in the standard mowed zone. A double-ring infiltrometer was used to measure the rate of water infiltration in the soil; a large tip penetrometer was used to determine soil compaction, and each sample was sent to the University of Kentucky Regulatory Service to analyze the soil chemistry. There were five (5) subsamples taken on each plot to obtain a clearer picture of what was happening in the soil. The samples were split between depths of 0-10cm; 10-20 cm; 20-30cm and 30-40cm. The soil samples are also being tested for microbial communities.

Several slides were presented showing a significant difference between the riparian buffer soils as compared to the soils under mowed grass at several of the locations including Allendale Drive, Alumni East, Alumni West, Hickman Tributary, Killrush Drive, Masterson Station Park, Ribbon Park, Roanoke Road, and West Hickman.

The riparian buffers demonstrated improved infiltration compared to adjacent mowed sites, with exceptions; soil organic matter content was elevated in riparian buffer sites, near-surface soils in riparian buffers tended to be less compacted than soils in adjacent mowed sites, and higher concentrations of some metals were found in buffer sites than in adjacent mowed sites.

Questions and comments – Ken Cooke commented that the stream buffer restoration of the Roanoke Drive Greenway started in 2006, Allendale Greenway started in 2010, and Killrush Greenway started in 2023.

Mr. Samuelson said that the Killrush Greenway was the worst in terms of a remnant buffer zone right next to the stream. The normal area that they would have taken samples from the mowed zone was infeasible. Anytime they tried to dig past 10 cm they immediately hit rock. It was impossible to obtain soil samples or drive the infiltrometer into the ground because of the rock present, likely due to gravel that was left from construction projects over the years and the area not being properly restored. Thus, the sample collection for this site had to be further away from the desired location.

Mr. Sena noted that Killrush Greenway was an interesting site because of the remnant construction activity and the extensive gravel in the mowed zone. The mowed sample was so far away from its paired buffer sample, that it practically violated the assumptions of their sampling.

To summarize the study, Mr. Sena commented that across all sites they observed lower compaction in the buffer samples than in the mowed samples. Soil organic matter analysis is ongoing, but preliminary results show higher organic matter in the buffer samples than the mowed samples across all sites. Copper also showed consistently higher levels in the buffer samples than in the mowed samples.

Referencing the *Soil Strength (Compaction)* slide, Lindsie Nicholas observed that the Alumni Drive buffer area is less compacted which is contrary to the assumption presented earlier. Mr. Sena said there is soil texture data from all sites and they will look at texture as well to attempt to interpret the infiltration data. He indicated that the Alumni Drive Stream Restoration data might not be clear due to other contributing factors that are present. He said that the compaction assessment that they are doing is a near-surface assessment so it will not help to understand the interflow in deeper soils, but the activities of channel reconstruction compact the macro pores in the subsoil. Mr. Sena explained that he was not aware of the type of surface treatment used. Still, there may have been a decrease in compaction at the surface that didn't necessarily come through to the deeper soil levels to have a meaningful impact on the infiltration at this point. He indicated that Alumni Drive is a recent construction and the water quality data is positive.

Russ Turpin commented that the age of buffers could also be a factor. Mr. Sena agreed.

Mr. Sena replied to Mary Murphy and said they used a paired sampling approach with one sample in the buffer zone and one immediately adjacent in the mowed zone to minimize the potential of different land uses. (Mary Murphy's response was inaudible).

Mr. Samuelson replied to Jason Drew and said they are not currently looking for a particular species of bacteria or fungi. They are analyzing the sequencing data to see if there is a correlation between the nitrate and copper levels among the bacteria living in the soil to identify sequestering and filtering of contaminants. Mr. Sena added that the microbial analysis is a soil DNA-based analysis where DNA is extracted from the samples and then amplified using PCR for a specific region of the strand. The samples were sent for sequencing and they are now working with the sequence data to determine community diversity, richness, and so on. This will be a community-wide analysis to identify similarities or differences across the sites and between the mowed zone and buffer zone.

Demetria Kimball-Mehlhorn asked what time of the year the samples were collected. Mr. Dockery replied in the summer.

Ms. Kimball-Mehlhorn then asked if the soil saturation was taken into consideration. Mr. Dockery replied affirmatively. Mr. Sena explained that four (4) tests were completed with the infiltrometer and the first test result was dropped. The second through fourth test results remained steady and were selected for use. This does not necessarily represent saturated soil conductivity conditions, but it is consistent across the paired samples. If testing were to be completed now, there might be lower infiltration rates that are more normal as a function of the soil being more saturated.

Mr. Sena replied to Russ Turpin and said that *E. coli* is coming from wastewater overflows. It would not be expected for a riparian buffer to stop wastewater overflow. It might attenuate some of the overflows, but he has seen some overflows on the stream bank. Even a healthy buffer may not necessarily protect against that.

Mr. Sena replied to Ken Cooke that pet waste could be a significant contributor to *E. coli* and a buffer would certainly improve infiltration and capture. For their analysis, they were not trying to identify different sources of *E. coli* but it is an area of abundant research and he could imagine a future project to evaluate whether a buffer might help reduce *E. coli* levels.

Tree Equity Score by American Forests

Heather Wilson, Division of Environmental Services, presented on the American Forest Foundation and the Tree Equity Score as well as PlanIT Geo and Tree Plotter tools. She explained that the Tree Plotter tool is a program hosted by the LFUCG that is accessible to the city and residents to help visualize how we should manage the forest moving forward.

Ms. Wilson said that the American Forest Foundation is one of the oldest nonprofit organizations with a focus on trees. The goal of the American Forest Foundation is to conserve, preserve, and reforest. Historically, the American Forest Foundation's focus was naturalized forests, but for the past 15 years the focus has been on urban forests and the benefits they provide.

The American Forest Foundation works with smaller communities and groups to plant trees in urban areas and forests as well as provide support for or recommendation of particular causes or policies in Washington, DC. The foundation also has many resources/partnerships to provide trees in cities.

The American Forest Tree Equity Score is a metric that helps cities assess how well they are delivering equitable tree canopy cover to all residents. Generally, as cities are developed the number of people with higher levels of education and incomes will increase and the populations with more monetary accessibility will have more forested areas. In return, the developed areas have more benefits from the trees such as lower urban heat island effect and fewer runoff problems. Historically, areas that did not have an established urban forest have had lower income levels, more impervious areas, and fewer tree canopies.

The American Forest Tree Equity Score reviews cities to see where the urban forests are located and how trees could be planted in areas that need them the most. The factors that make up a Tree Equity Score include tree canopy cover, climate, demographic data, and socioeconomic data. Ms. Wilson gave a brief explanation of the Tree Equity Score for Lexington, Kentucky found at <https://www.treeequityscore.org/>.

PlanIT Geo is a global urban forestry consulting and software development firm (<https://planitgeo.com/>) that developed the LFUCG Tree Canopy Assessment in 2022. The PlanIT Geo data currently uses NAIP Aerial Imagery (2020) and will be updated as new imagery is available. The Tree Plotter Canopy can be utilized by the public and includes the View, Plan, and Grow tools.

There are many other tools, with different parameters, that can be used to help grow urban canopies within the city including i-Tree (<https://www.itreetools.org/>) which is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban and rural forestry analysis and benefits assessment tools.

Questions and comments – Ken Cooke asked what programs are available to help residents identify planting areas. Ms. Wilson replied Lexington's canopy coverage is about 36 percent on publicly owned properties and 87 percent of plantable space is on privately owned properties. The city hosts events that residents can participate in such as Reforest the Bluegrass and soon Lex Grow Trees. There are local nonprofit organizations that can help.

Mr. Cooke then asked how specific areas can be identified for tree plantings. Ms. Wilson replied that the Tree Equity Score and the PlanIT Geo - Tree Plotter tools would be a good starting point, but the best way would be an on-the-ground assessment. LFUCG staff can help by advising property owners on the best locations to plant. There are also nonprofit organizations that have resources that can help.

Russ Turpin commented, as a tree advocate, these are good tools to have and it is fascinating to see the different ways in which the dots are being connected through health, wellness, social equity, and the different issues that can occur.

Mr. Turpin asked if the Division of Planning is using these tools to address historical problems in Lexington. Traci Wade, Division of Planning, and a member of the Tree Board, said that this data allows the staff to see the zone of the land that is being developed and whether or not there are deficiencies. There is a Text Amendment that now requires developers to plant trees in an industrial zone. The developer can group the trees at the edge of the property to get closer to the canopy goal. She added that the Urban Forester also works with developers monthly to review any information they have submitted for planning purposes. Ms. Wilson commented that the data was used in developing the Comprehensive Plan as well.

Mr. Turpin then asked if there are any tools that distinguish ownership between LFUCG parks and greenspaces and private ownership. Ms. Wilson replied that there currently was not.

Jason Drew asked if trees supplied were native trees. Ms. Wilson replied the trees come from the Division of Forestry so the trees are 100% native to Kentucky and almost 100% native to the inner Bluegrass. The city also works with OneTree.org through Green Forests Work who supply seedlings for events like Reforest at Home.

MS4 Program Update and Year in Review

Lindsie Nicholas, P.E., Division of Water Quality, presented the MS4 Program Update and Year in Review for 2022.

Lexington-Fayette County has nine (9) watersheds, seven (7) of which fall within the Urban Service Area. Downtown Lexington is located in the middle of the county on a hill, so all of our streams flow away from the downtown area.

MS4 stands for Municipal Separate Storm Sewer System meaning our storm sewers are separate from sanitary sewers. She explained that the sanitary sewers flow to the wastewater treatment plants, while the storm sewers flow straight to the creeks without treatment. The City of Lexington has an MS4 Permit administered by the KY Division of Water. This permit authorizes Lexington to discharge stormwater from our separate system into the Waters of the Commonwealth with a focus on water quality. The City of Lexington and the City of Louisville are the only Large, or Phase I, MS4s in the State of Kentucky with individual permits, while the smaller communities in the State of Kentucky with a population of 10,000 or more fall under the Phase II MS4 general permit.

The MS4 Permits have a duration of five (5) years. The City of Lexington's permit expired on May 31, 2020, but the staff is hopeful a new permit will be issued in the next few years. The Stormwater Stakeholder Advisory Committee (SSAC) was created as part of the MS4 program. In the past, the SSAC has had open discussions regarding sanitary sewers, storm sewers, trees, and so forth. However, the different components of the MS4 program, how they play into the SSAC, and what will be asked from the members have not been discussed in a while. The compliance of the permit revolves around meeting the objectives of ten (10) Program Elements which are defined in our Stormwater Quality Management Program (SWQMP). In Lexington, we are continually optimizing how we manage stormwater for quality and quantity, reviewing policies and procedures for effectiveness, and implementing changes as necessary as the program moves forward.

Why does the program matter? A watershed is an area of land that drains to a common body of water. Anything on the ground such as fertilizer, pet waste, litter, oil, and grease is susceptible to being picked up by the next rain event and carried off to our storm sewer system and into our creeks and streams. The purpose of the MS4 Program is to reduce the quantity of pollutants that stormwater picks up and carries into the MS4 during storm events with the hope of maintaining or even improving the quality of our waterways. Any increases in runoff and pollutants can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies for people downstream, and make recreational areas unsafe and unpleasant.

The MS4 Permit has ten (10) program elements that fall into three (3) main categories:

Public Engagement

- Public Education and Outreach
- Public Involvement and Participation

Pollution Prevention

- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Runoff Control
- Post-Construction Stormwater Management
- Pollution Prevention for Municipal Operations
- Industrial Facility Stormwater Pollution Prevention

Monitoring and Reporting

- Water Quality Monitoring
- Reporting and Recordkeeping
- Total Maximum Daily Loads and Impaired Waters

Each element has a series of objectives and milestones that need to be met for the current permit to remain in compliance. There are 186 measurable goals as part of this program that touch many different divisions/departments in the LFUCG. In August of this year, the MS4 Program underwent an inspection from the State of Kentucky for six (6) of the ten (10) program elements which identified no deficiencies or violations. This is a sign of the positive efforts across many of the divisions within Environmental Quality and Public Works.

The MS4 Program is funded through the Water Quality Management Fee. Approximately \$7.7 million was spent in 2022 to meet the goals and objectives of the Stormwater Quality Management Program. One thing to note, the Pollution Prevention elements (IDDE/CS/PC/PPMO/IN) account for a large portion (>80%) when it comes to funding and where the money is spent.

Ms. Nicholas touched on the 2022 MS4 Program Year in Review and said that one of our program elements is Public Involvement and the Stormwater Stakeholder Advisory Committee is one of the main tools for engaging and involving the public in the program. The SSAC meetings are held quarterly and each meeting has very active participation from watershed and neighborhood groups, public agencies, as well as the LFUCG.

Ms. Nicholas briefly explained the chart below and said the breadth of the MS4 Program is apparent through the number of inspections completed every year. In 2022, the number of inspections completed across 5 of our 10 program elements reached over 13,000.

Types of inspections conducted by LFUCG staff:	Total 2022 Inspections
Active Construction Sites	6,138
Targeted Construction Sites	402
Critical Drainage Culverts	705
Stormwater Retention Ponds	1,232
Water Quality Control Devices (Inserts, filters, infiltration areas)	1,129
Water Quality Control Devices – City-Owned	384
Underground Detention Facilities	128
Detention Basins Round 1 & 2	2,470
Dry Weather Screening of Stormwater Discharge Outfalls	196
Industrial and High-Risk Commercial Facilities	35
Illicit Discharge/Spill Investigations	212
Municipal Operation Stormwater Inspections	54
Total	13,085

Ms. Nicholas referenced the table below and touched on the state of water quality in Lexington. As part of our routine quarterly monitoring in 2022, samples were collected for both wet weather and dry weather sampling across seven (7) watersheds along the edge of the Urban Service Boundary. She explained the percentage of water quality results that met regulatory benchmarks and non-regulatory reference points for each of the watersheds shown.

TABLE 15
PERCENTAGE OF 2022 WATER QUALITY RESULTS THAT MET
BENCHMARK OR REFERENCE POINT

PARAMETER	UNIT	LIMIT	% MEETING BENCHMARK / REFERENCE POINT						
			CR-S2	EH-S9	NE-S3	SE-S1	TB-S3	WH-S0	WR-S2
Specific Conductance	uS/cm	500	11%	63%	22%	30%	20%	38%	20%
Dissolved Oxygen	mg/L	4	100%	100%	100%	100%	100%	100%	100%
Water Temp.	°C	31.7	100%	100%	100%	100%	100%	100%	100%
pH	SU	< 9, > 6	100%	100%	100%	100%	100%	100%	100%
Total Susp. Solids	mg/L	80	89%	100%	67%	90%	60%	63%	90%
E. coli	CFU/100mL	240	33%	25%	44%	30%	10%	25%	30%
Phosphorus, Dissolved	mg/L	0.5	100%	100%	100%	100%	10%	100%	100%
Phosphorus, Total	mg/L	0.5	78%	88%	67%	80%	10%	63%	90%
Ammonia-N	mg/L	1	100%	100%	100%	100%	100%	100%	100%
Total Kjeldahl Nitrogen-N	mg/L	2	89%	88%	100%	90%	40%	63%	90%
Nitrate-N + Nitrite-N	mg/L	2	78%	100%	100%	100%	10%	100%	100%

As part of the Water Quality Monitoring and IDDE Program elements, the Watershed-Focused Monitoring Program is another proactive and much more comprehensive monitoring program. The program has been a massive data collection and public engagement campaign including volunteer samplers. Ms. Nicholas explained that in 2022, Town Branch reporting was completed, North Elkhorn monitoring was completed, and Wolf Run monitoring, the final watershed of this program, is now being wrapped up and soon there will be baseline water quality data for all seven urban watersheds in the Lexington-Fayette County area. The data collected will help water quality improvement by identifying needs/hotspots/priority areas, as well as pollutants of concern. This information will allow for a review of the success of the MS4 Program, and fine-tune BMP implementation and future programming, as well as direct capital investment through the Stormwater Quality Projects Incentive Grant Program.

As we look to the future of the MS4 Program, post Consent Decree, the objective is to improve the watershed perspective and vision. In Fayette County, there are approved Watershed Plans for the Cane Run, West Hickman, and Wolf Run watersheds. Watershed planning opens the door to federal funding which will allow the city to focus efforts on improving water quality.

We touched on what is in the water, but we also need to consider the stream itself and restoring the urban stream habitats on a watershed scale. This is the other piece of the puzzle when looking to move the needle on hydrologic restoration; it should be used as an approach to watershed planning.

Ms. Nicholas explained that a fairly typical urban stream cross-section in Lexington consists of 3 to 5-foot vertical banks, evidence of erosion, silted in bed with not much substrate, and honeysuckle along the edge of the stream. This type of streambank erosion leads to stream deepening and widening, water quality and biological disturbances, and loss of land and damaged infrastructure. When talking about moving the needle on water quality, we also need to focus on how water is being attenuated within the land before it reaches the streams and rivers. She explained that flow is a measure of volume over time; critical flow is the flow that moves particles on the streambed, or the flow that causes erosion. The streambed erosion threshold, or $Q_{critical}$, is a key metric for managing the hydrology of the system and mitigating stream degradation. Currently, in Lexington, there are quality and quantity requirements that require runoff reduction and treatment for the smaller rainfall events and flood protection for the large events. The middle flow is where channel erosion often begins, and those rainfall depths typically fall between the two sets of regulations that are in place. By reducing the frequency, magnitude, and durations of discharges that exceed $Q_{critical}$ through tailored stormwater interventions, we can mitigate excess streambed erosion.

When a community starts to manage $Q_{critical}$ (or the streambed erosion threshold) through updating policies or retrofitting existing basins, then there will be a shift in the stream from channel degradation and enlargement (Stage 3) to aggradation (Stage 4) to equilibrium (Stage 5), which is the return of meandering streams with a low-flow channel with vegetated benches and stable banks.

Ms. Nicholas said the equilibrium of a stream can be achieved through updating existing policies for new development or retrofitting the 1,241 basins that exist in Lexington. There are endless ways to retrofit a basin. It can be done by plating existing orifices, inserting flow restriction devices, or adding a riser to an existing box structure. Retrofitting a basin can also be much more complex by involving earthmoving equipment to regrade or expand a basin's volume or installation of native plants. Retrofits can help accelerate habitat recovery from Stage 3 to Stage 5 and create a healthy ecosystem and improved water quality. The city of Lexington has initiated a pilot program to retrofit a basin in the South Elkhorn Watershed in Shillito Park. The pilot program will allow the staff to test their theory and hopefully see a positive impact downstream that will move the program forward in 2024.

Ms. Nicholas gave the following update on our Stormwater Quality Projects Incentive Grant Program (SQPIGP):

- 10% of the annual Water Quality Management Fee revenue earmarked for this program;
- \$1.5-1.6 million in projects/year going back to the community;
- Public Engagement – The Program provides the private industry with the opportunity to decrease their impervious footprint and have an impact on water quality in the community;
- Watershed-based plans would be an asset to this program as well – directing the private sector in priority areas, target pollutants, preferred BMPs, etc.;
- Great projects from stream buffer stewardship programs to permeable paver parking lot retrofits.

Ms. Nicholas indicated that the 900 Block of N Limestone Stormwater Retrofit Project recently won the American Society of Landscape Architecture (ASLA) National Design Award of Excellence for residential design, and the UK Alumni Drive Stream Restoration/Bioswale project is providing hands on experience to students.

At any given time, there are between 40 to 50 active grant projects and the team has been working on ways to improve grant and program management. The staff recently completed the Grant Tracker Application to streamline grant management and increase access to project details and requests for reimbursement. The staff also completed a project to map all Incentive Grants from 2011 to the present and create an annual inspection program for installed infrastructure. These needed advances in our program are a testament to the years of dedication and success this program has seen.

Ms. Nicholas said that as we move forward, we want to continue to hone the watershed vision by:

- Continuing the compliance work in all Program Element categories in the MS4 Permit – (Released from the stormwater side of the U.S. District Court Clean Water Act Consent Decree in 2021);
- Continue to promote and administer the Stormwater Quality Projects Incentive Grant Program (10% Water Quality Management Fee);
- Focus on methods to further transition the Watershed-Focused Monitoring Program from data collection to an action plan;
- Explore critical flow in Lexington to protect our streams from further degradation; and
- Maintain our partnerships with stormwater management stakeholders.

Questions – Steve Garland commented that Qcritical is the 2-year, 24-hour storm event. Ms. Nicholas disagreed and replied that the intent would be to replace the channel protection requirements with the Qcritical requirements.

Ms. Nicholas replied to Ken Cooke and said that stream erosion is happening in areas like East Hickman where there is newer development. She indicated that Frank Mabson, Program Manager, Sr. of the Stormwater Quality Projects Incentive Grant Program has been getting calls about grant projects for the streams in this area.

Ms. Nicholas said that they are trying to be strategic and intentional so there is room for conversation as these discussions continue.

Mr. Cooke asked what the permit requirements are for trend analysis on the monitoring results. Ms. Nicholas replied a trend analysis was completed in 2020 and probably submitted with the 2020 annual report which would have been posted in 2021.

Mr. Cooke then asked if the trend analysis was only completed for the 7 monitoring stations. Ms. Nicholas replied affirmatively. She said that since the Watershed Focus Monitoring is almost complete one of the goals would be to look at how the data collection for that program can be reviewed.

Russ Turpin noted that there are great tools out there and asked if the staff has seen an overlap in some of the topics discussed such as trees and water quality. Ms. Nicholas indicated that she noticed the stormwater reduction section in Ms. Wilson's presentation and it would be great if there was something similar for water. She said that she expects the maintenance issue of green infrastructure would be coming up.

Approval of Meeting Dates for 2024

- March 1st
- June 7th
- September 6th
- December 6th

A motion was made by Ms. Carey; seconded by Mr. Vogel, and carried unanimously to accept the 2024 meeting dates.

Potential Topics for the Next Meeting

Lindsie Nicholas opened the discussion for potential topics for the next Stormwater Stakeholder Advisory Committee.

Mr. Cooke proposed a discussion regarding stormwater management in creeks. He added that comparing how we managed it in the 1996 – 1998 period versus what is being done with the new program would be an interesting discussion.

Amy Sohner indicated that she would be happy to discuss Bluegrass Greensource and the successes that they have had with their incentive grants. Ms. Nicholas replied that would be great because it ties into buffers and BMPs.

Announcements

- November 24th – On Black Friday, we collected 585 gallons of cooking oil at the Gobble Grease Toss, our biggest year yet! (This event is an opportunity to educate the public about proper waste disposal, such as not pouring cooking oil down drains or outside.)
- Thanks to everyone who visited the Art by Nature gallery at the Living Arts and Science Center. We had over 100 pieces of art representing creeks throughout Lexington.
- December 8th – Workshop with the Engineering, Development, and Construction Industry
- March 1st – Next SSAC Meeting
- March 18th - 25th – Fifth Annual Water Week

- Thank you for a wonderful 2 years - Lindsie Nicholas' last day is December 8th.

Adjournment

The meeting concluded at 11:05 a.m.

Approved

STORMWATER STAKEHOLDER ADVISORY COMMITTEE

December 1, 2023



LEXINGTON



LEXINGTON

Meeting Agenda

1. Approval of 9/8/2023 Minutes
2. Effects of Conservation Activities on Riparian Soil Health – *Kenton Sena, Cooper Samuelson, and Hunter Dockery, Lewis Honors College, University of Kentucky*
3. Tree Equity Score by American Forests – *Demetria Kimball Mehlhorn, Division of Environmental Services*
4. MS4 Program Update and Year in Review – *Lindsie Nicholas, Division of Water Quality*
5. Approval of Meeting Dates for 2024
6. Potential Topics for Next Meeting
7. Announcements



Approval of Meeting Dates for 2024

- March 1
- June 7
- September 6
- December 6



Potential Topics for Next Meeting

- ...



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- March 18-25 – Fifth Annual Water Week
- Thank you for a wonderful 2 years!



Evaluating Effects of Riparian Buffers on Soil Health

Kenton Sena, Cooper Samuelson, and Hunter
Dockery

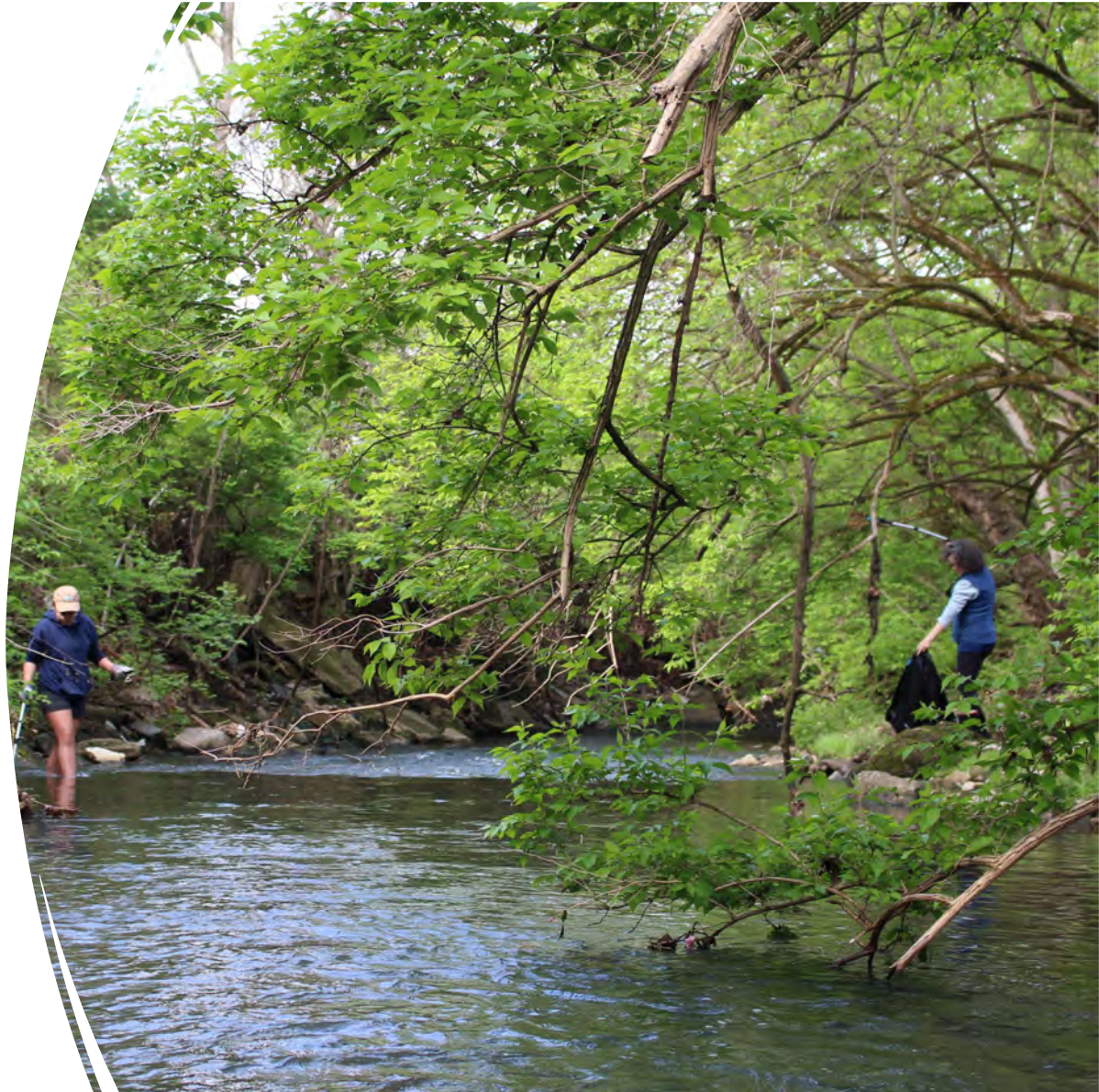
Lewis Honors College
University of Kentucky



Urban Stream Syndrome: An introduction

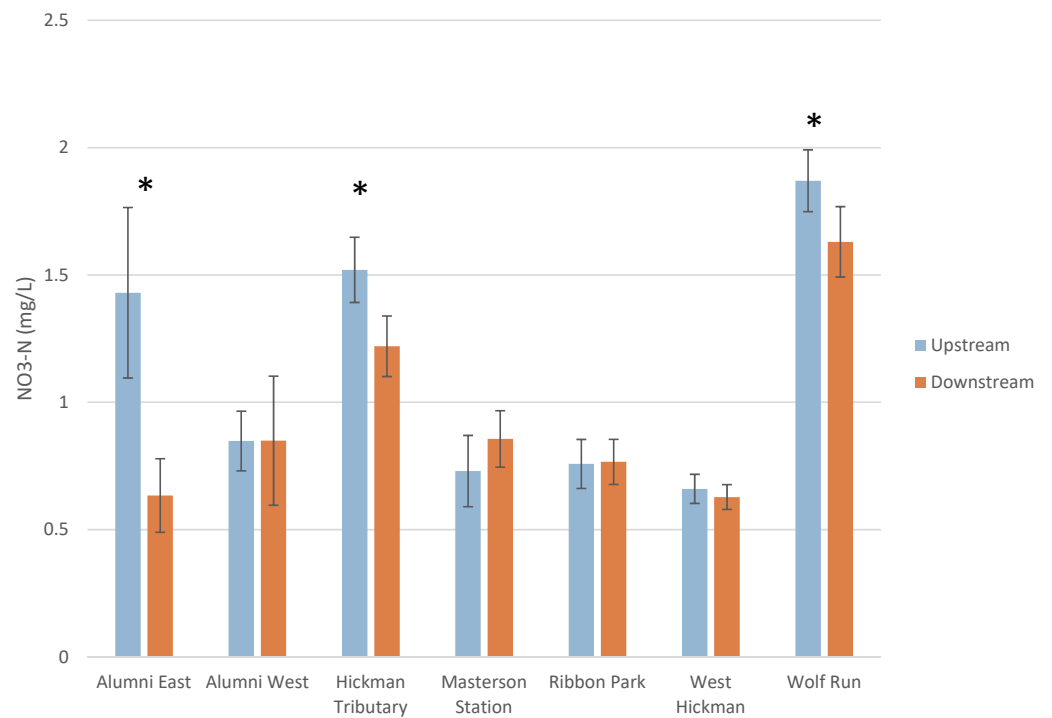
Urban development drives:

- Altered hydrology (flashy hydrograph)
- Channel erosion/downcutting
- Impaired water quality



Can Riparian Buffers Help?

- Slow surface runoff
- Filter sediment and other contaminants



Buffer effects on soil?

- Do riparian conservation activities improve infiltration rates?
- Do riparian conservation activities improve riparian soil health in other ways?



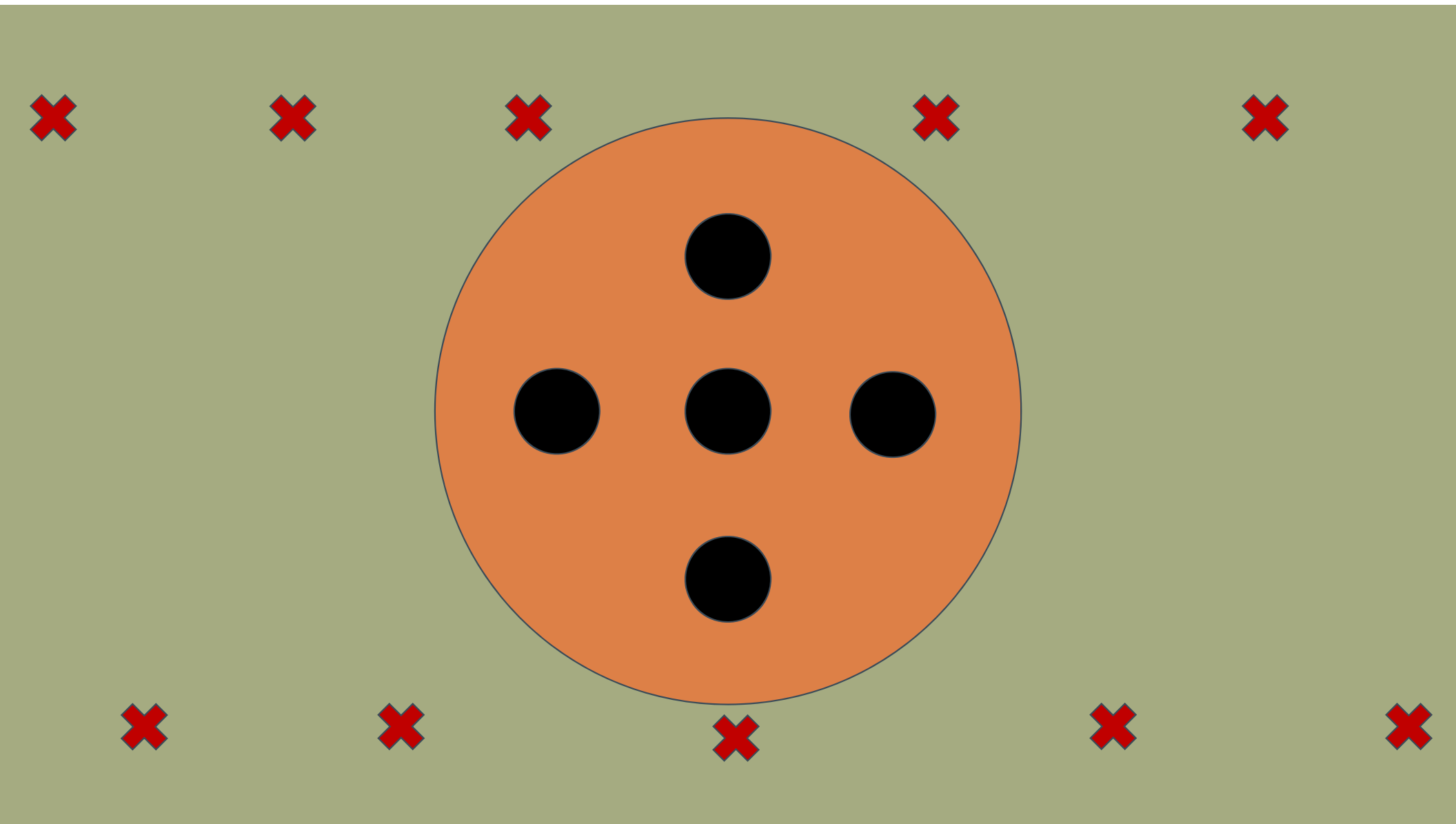
Project Methods: Sites

- Water sampling sites:
 - o Ribbon Park
 - o Hickman Tributary
 - o West Hickman
 - o Alumni Drive East and West
 - o Masterson Station Park
 - o Wolf Run
 - o Town Branch
 - o Raven Run
 - o Steele's Branch
 - o Elk Lick (Floracliff)
- Soil sampling and physical data:
 - o Ribbon Park
 - o Hickman Trib
 - o West Hickman
 - o Alumni Drive East and West
 - o Masterson Station Park
 - o Kilrush Drive
 - o Roanoke Road
 - o Allendale Drive
 - o Steele's Branch

Sampling Scheme (Hickman Trib)



Riparian	Transect 1	Transect 2	Transect 3
Mowed			



Project Methods: Infiltration

- Double Ring Infiltrometer
- 5 min calibration period
- 3 repetitions per sampling point (6 total per transect)



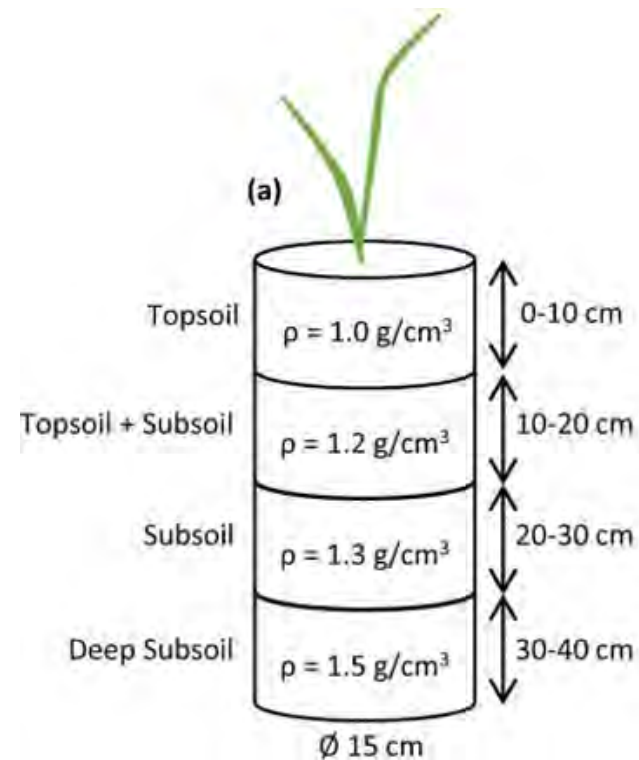
Project Methods: Soil Compaction

- Large tip penetrometer
- 10 samples taken per plot
- 5 taken by each student per plot



Project Methods: Soil Chemistry

- Took five subsamples at each plot
- Split between 0-10 cm and 10-20 cm layer
- Homogenized subsamples respective to depth
- Samples sent to UK Regulatory Services

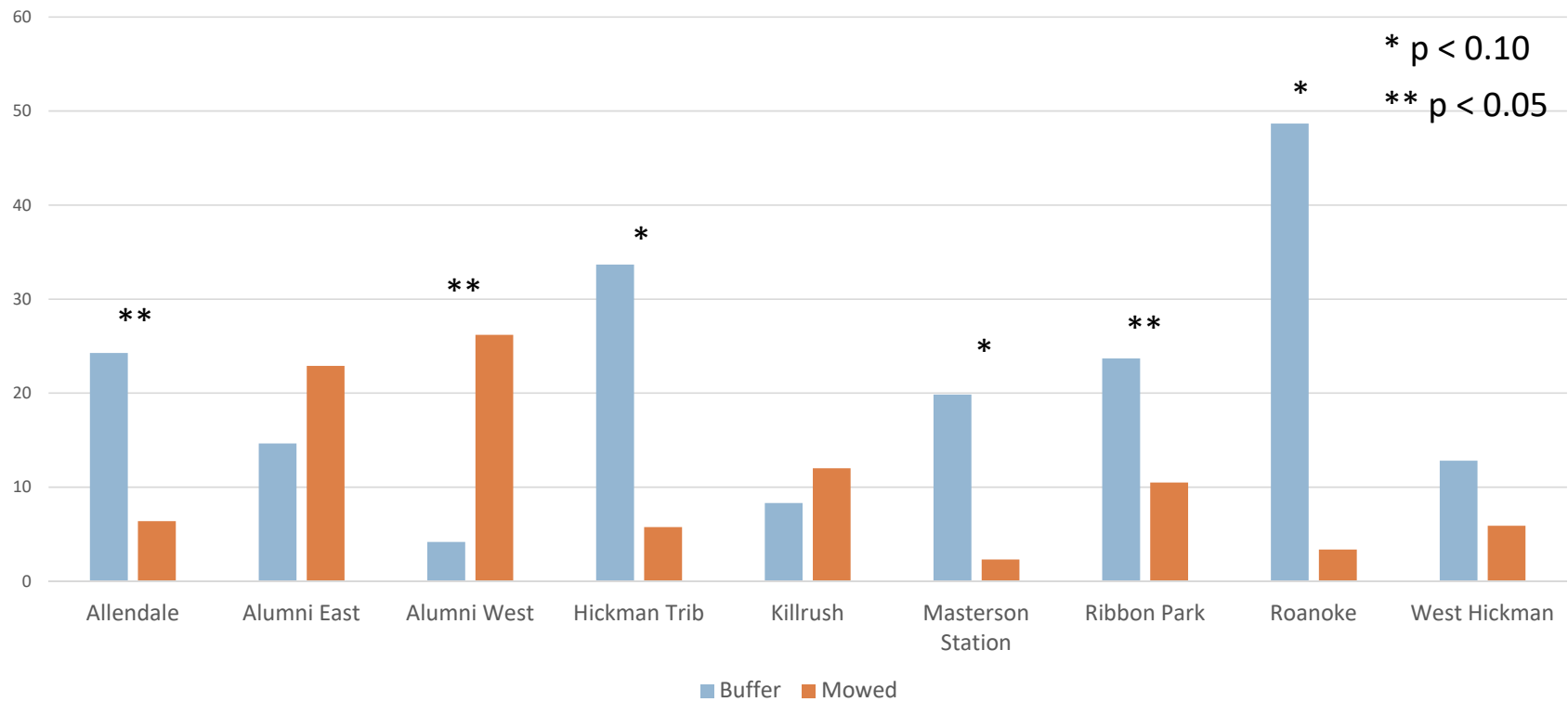


Celestina et al. (2019)

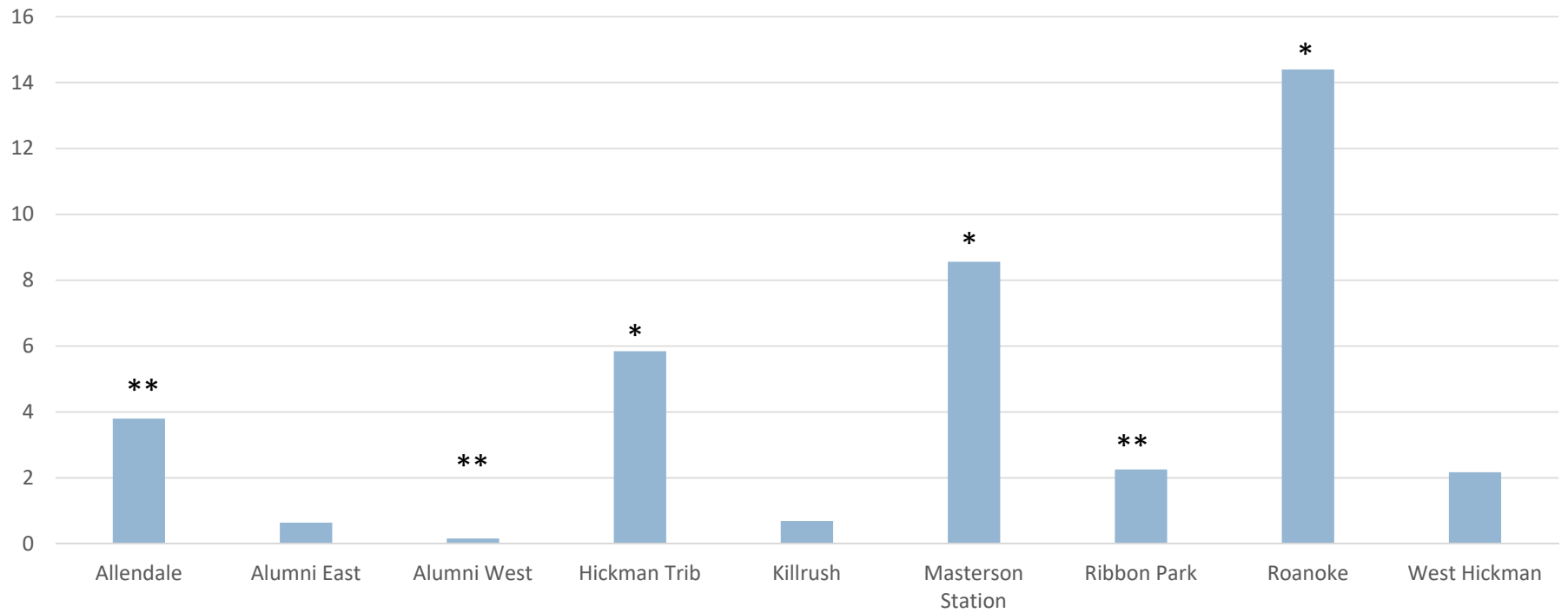
Project Methods: Soil Microbial Community

- Soil samples also analyzed for microbial communities
- Work is ongoing

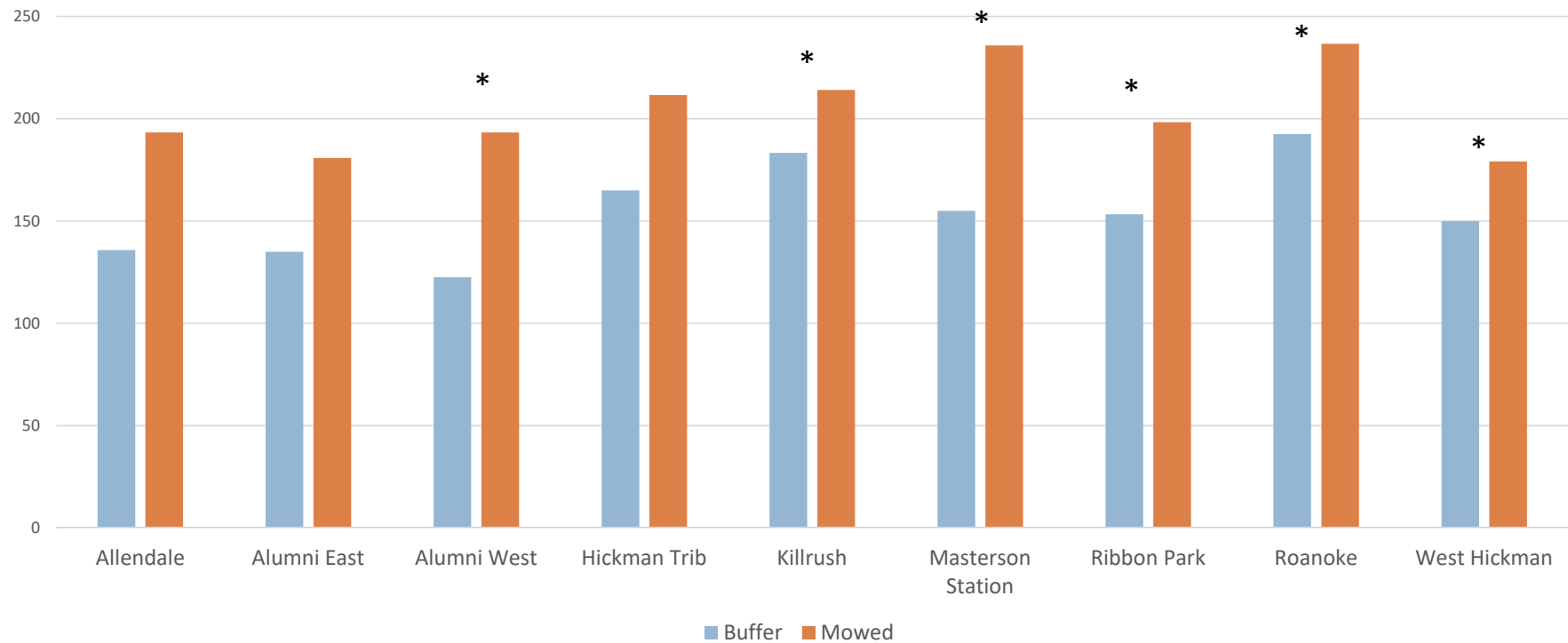
Infiltration



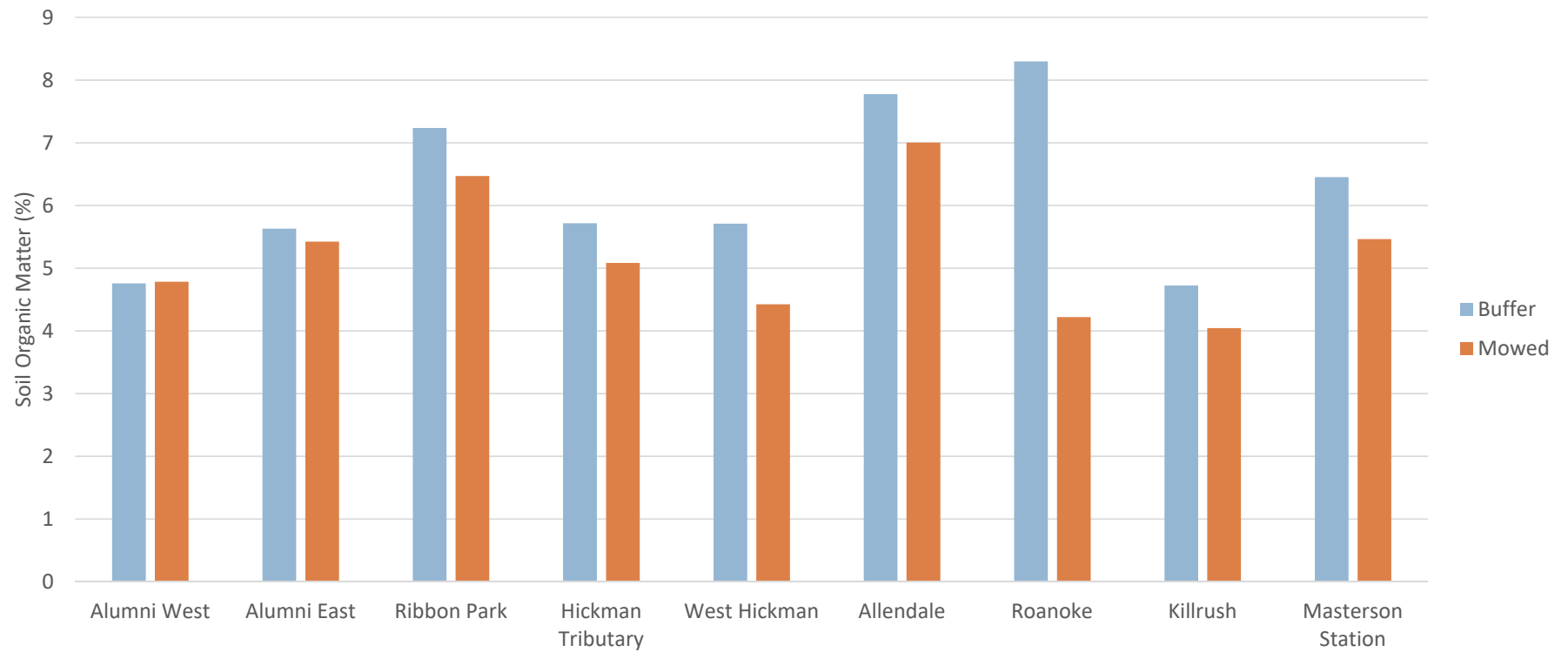
Infiltration: Response Ratios



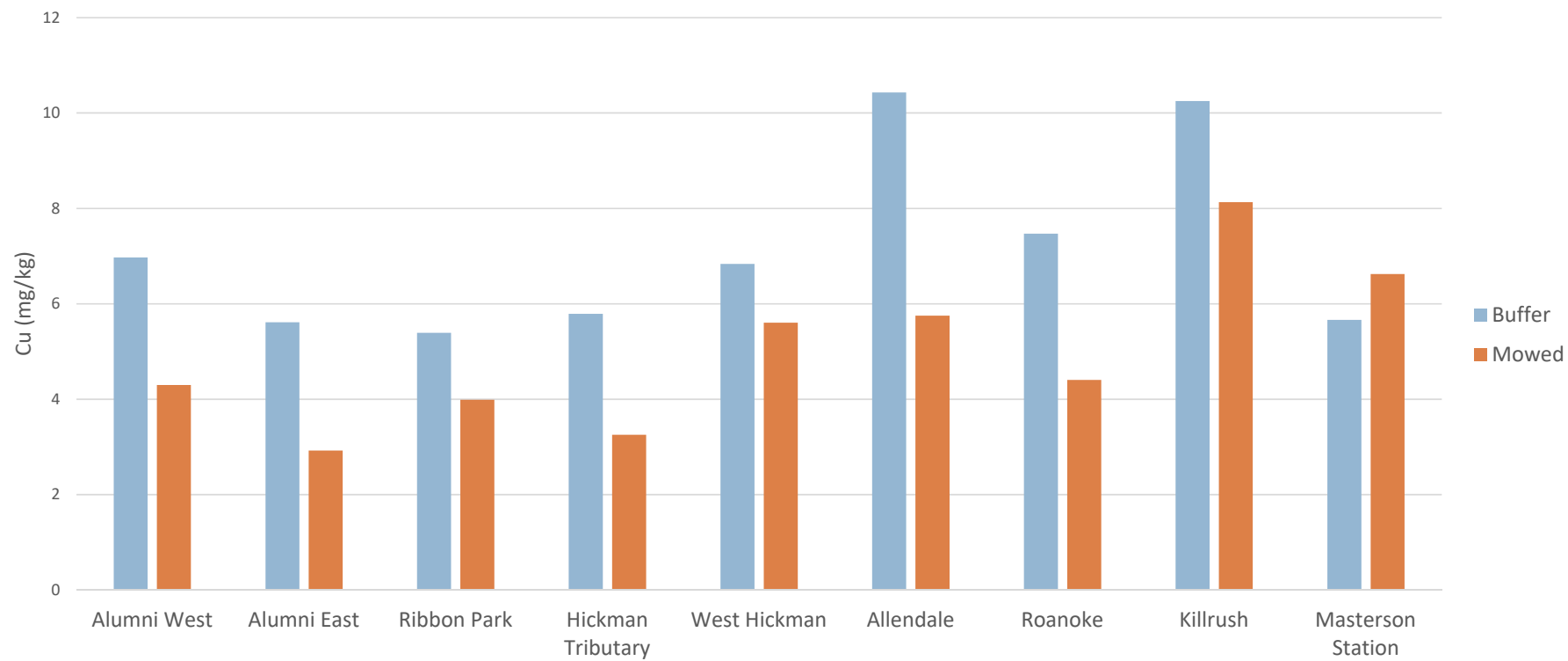
Soil Strength (Compaction)



Soil Organic Matter (0 – 10 cm)



Copper (0 – 10 cm)



Conclusions



Riparian buffers demonstrated improved infiltration compared to adjacent mowed sites, with exceptions



Near-surface soils in riparian buffers tended to be less compacted than soils in adjacent mowed sites



Soil organic matter content was elevated in riparian buffer sites



Higher concentrations of some metals were found in buffer sites than in adjacent mowed sites

Acknowledgments



Funding from LFUCG Water Quality Incentive Grant (via Friends of Wolf Run), KWRRI, and UK CURATE program



UK Regulatory Services



Millie Hamilton (UK Forestry)

AMERICAN FORESTS: TREE EQUITY SCORE & PLANIT GEO: TREE PLOTTER CANOPY

TOOLS TO UNDERSTAND OUR URBAN FOREST AND DIRECT
EQUITABLE GROWTH

Stormwater Stakeholder Advisory Committee

Friday, December 1, 2023



LEXINGTON

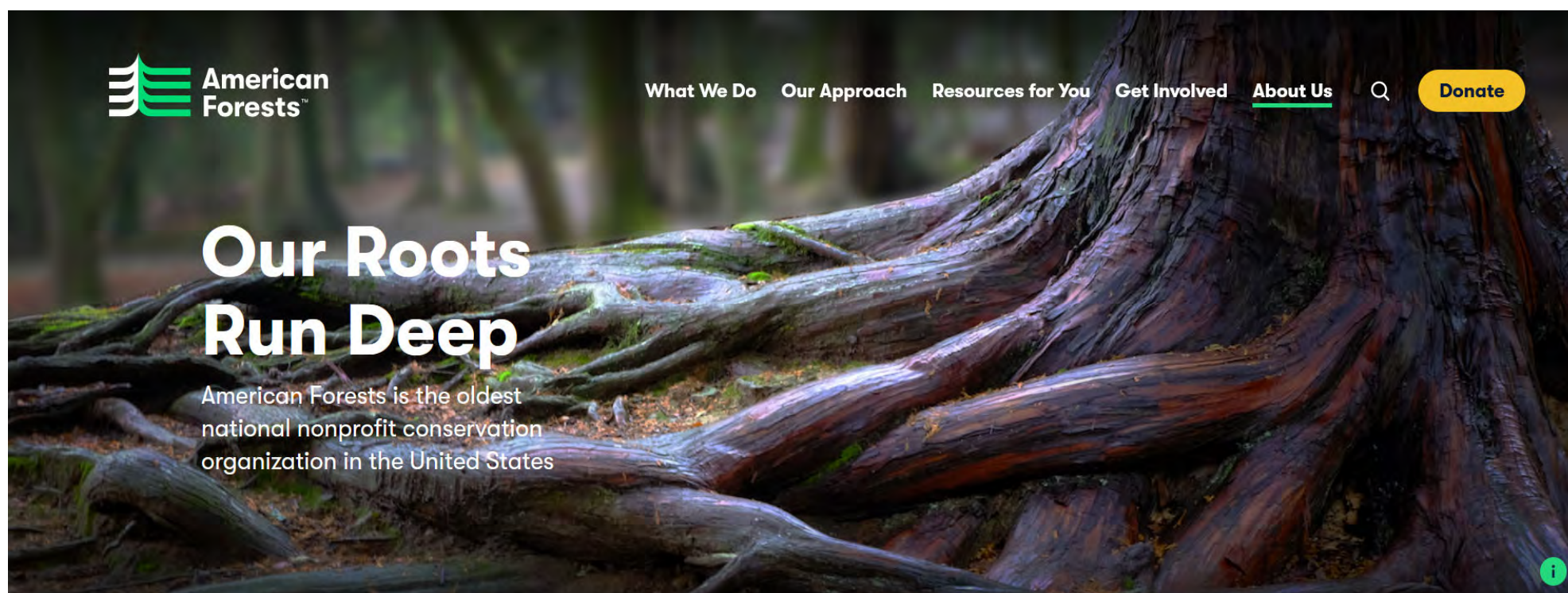
Agenda

- Introduction
 - American Forests
 - Tree Equity Tool
- LFUCG Tree Canopy Assessment
- Introduction
 - PlanIT Geo
 - Tree Plotter Tool
- Questions & Comments



American Forests Tree Equity Score

- Who is American Forests (<https://www.americanforests.org/>)



American Forests Tree Equity Score

- What is a Tree Equity Score (<https://www.treeequityscore.org/>)
“[A] metric that helps cities assess how well they are delivering equitable tree canopy cover to all residents.”
- What factors make up a Tree Equity Score
 - Tree canopy cover
 - Climate
 - Demographic data
 - Socioeconomic data
- How this tool can be useful

American Forests Tree Equity Score & PlanIT Geo Tree Plotter Canopy



LEXINGTON



**TREE
EQUITY
SCORE**

National Explorer

lexington

1 Find your score.

- Search a location or address, or browse the map of nearly 200,000 Tree Equity Scores.

2 Uncover the hidden story behind where trees are in your community.

- Click or tap the shaded areas on the map to discover more information.
- Toggle map layers to explore patterns.
- Identify areas with the greatest need for investment.

3 Make the case with data and reports.

- Compare neighborhood information.
- Customize dynamic reports for any locality, county, congressional district or state.
- Set targets and calculate tree planting need and the potential benefit to health, economy and environment.



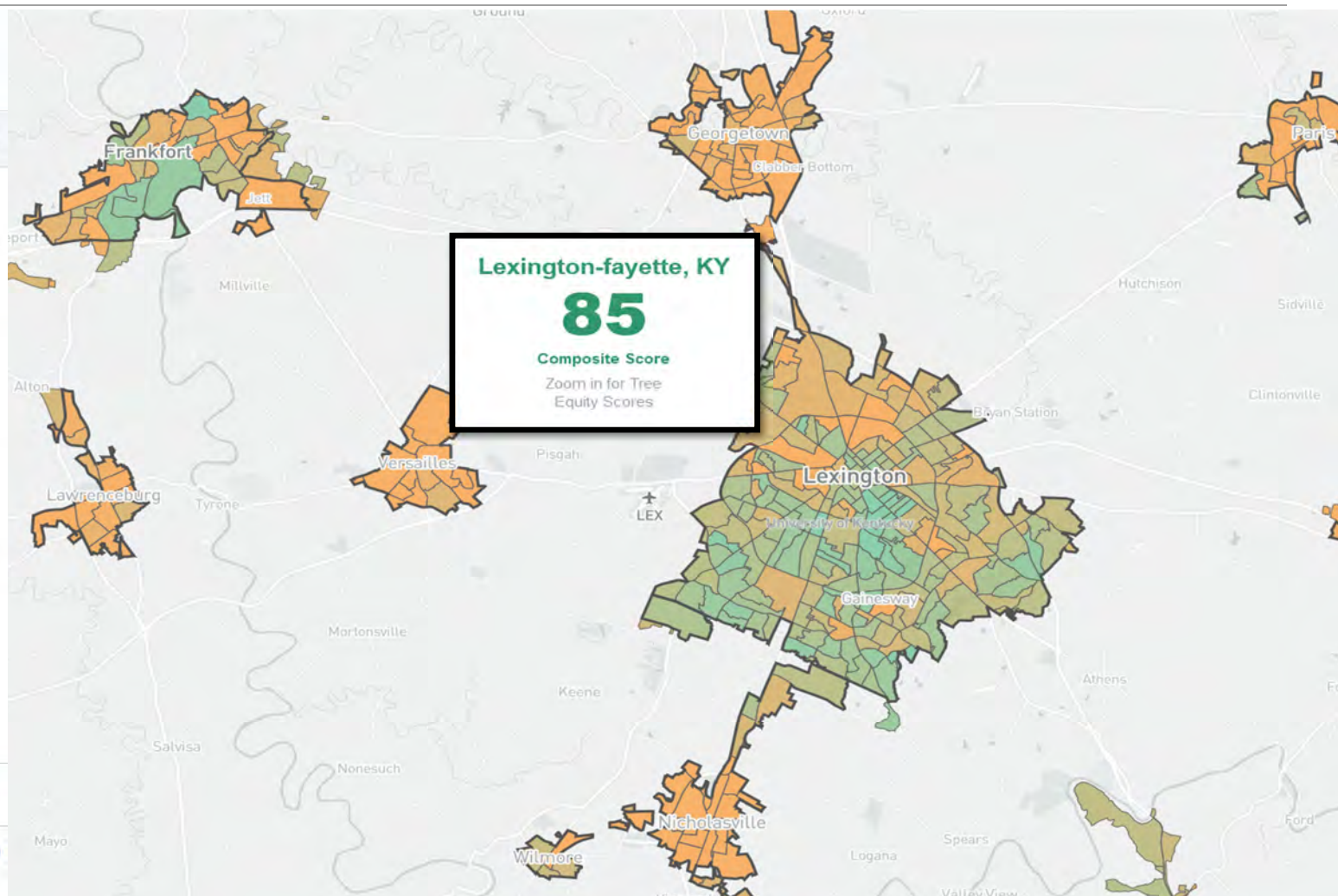
**American
Forests™**

Layers

Filters

<70 100

Tree Equity Score



American Forests Tree Equity Score & PlanIT Geo Tree Plotter Canopy



LEXINGTON



TREE
EQUITY
SCORE

National Explorer

lexington

Census Block Group 211130606003

Population: 173

Jessamine County, KY

KY Congressional District 2

Filters

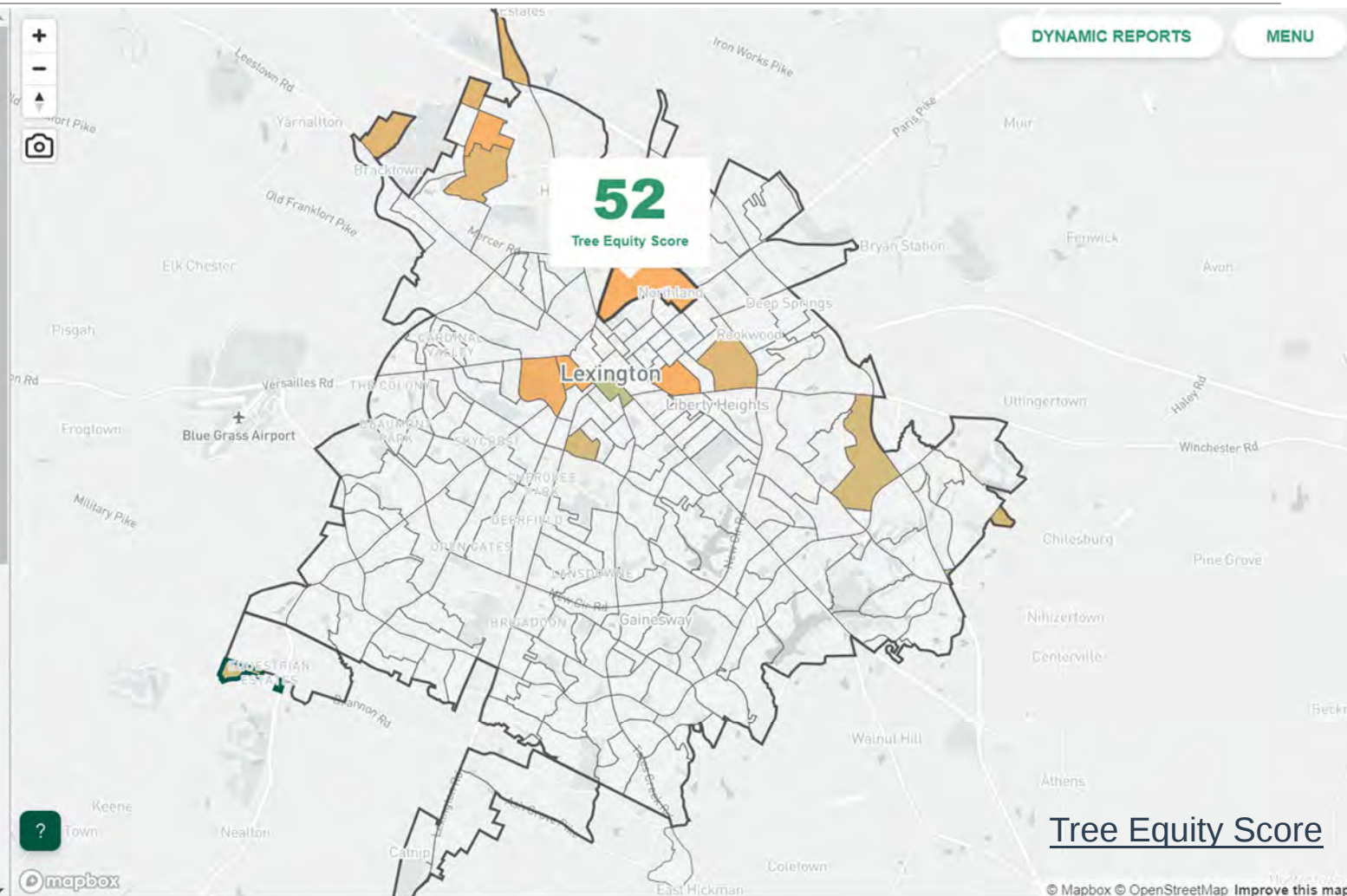
Reset

Close

- Tree Equity Score 0 100
- Tree canopy cover 0 15
- Tree canopy gap 0 100
- Priority Index 0 1
- People in poverty 0 100
- People of color 0 100
- Children and seniors 0 100
- Unemployment 0 100
- Linguistic isolation 0 100
- Health burden index 0 100
- Heat disparity -30 30
- Redlining Any

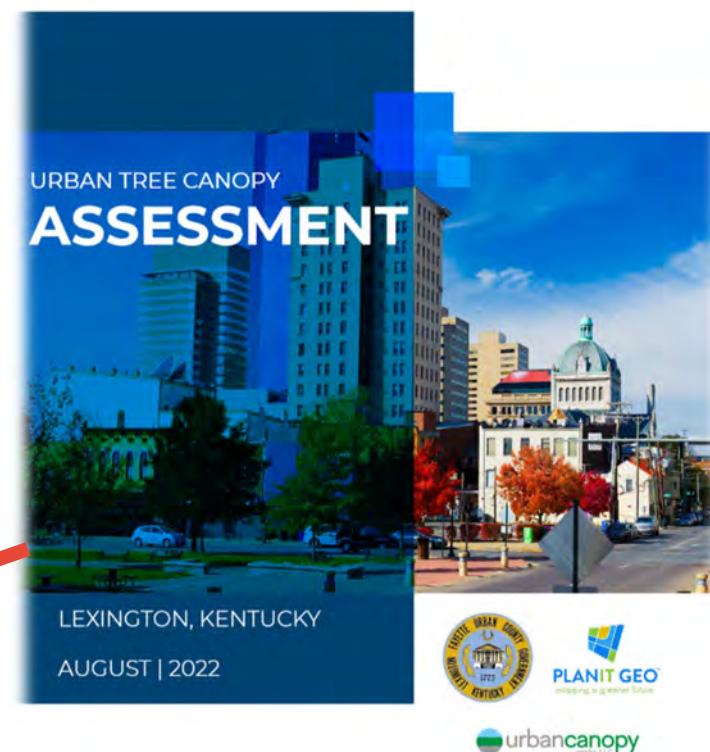
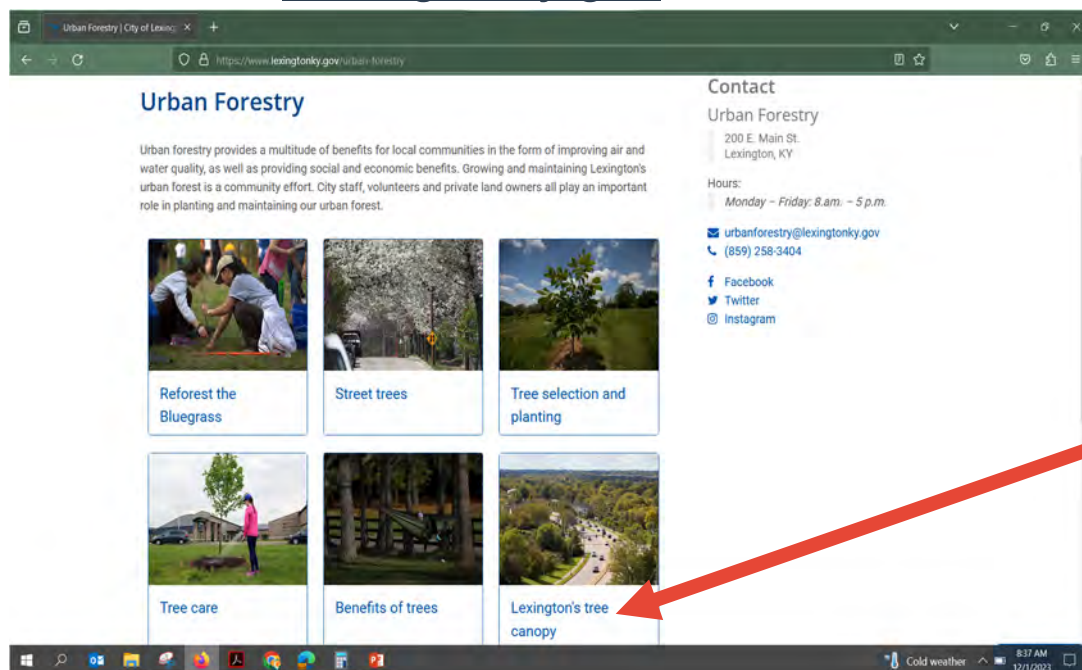
<70 100

Tree Equity Score



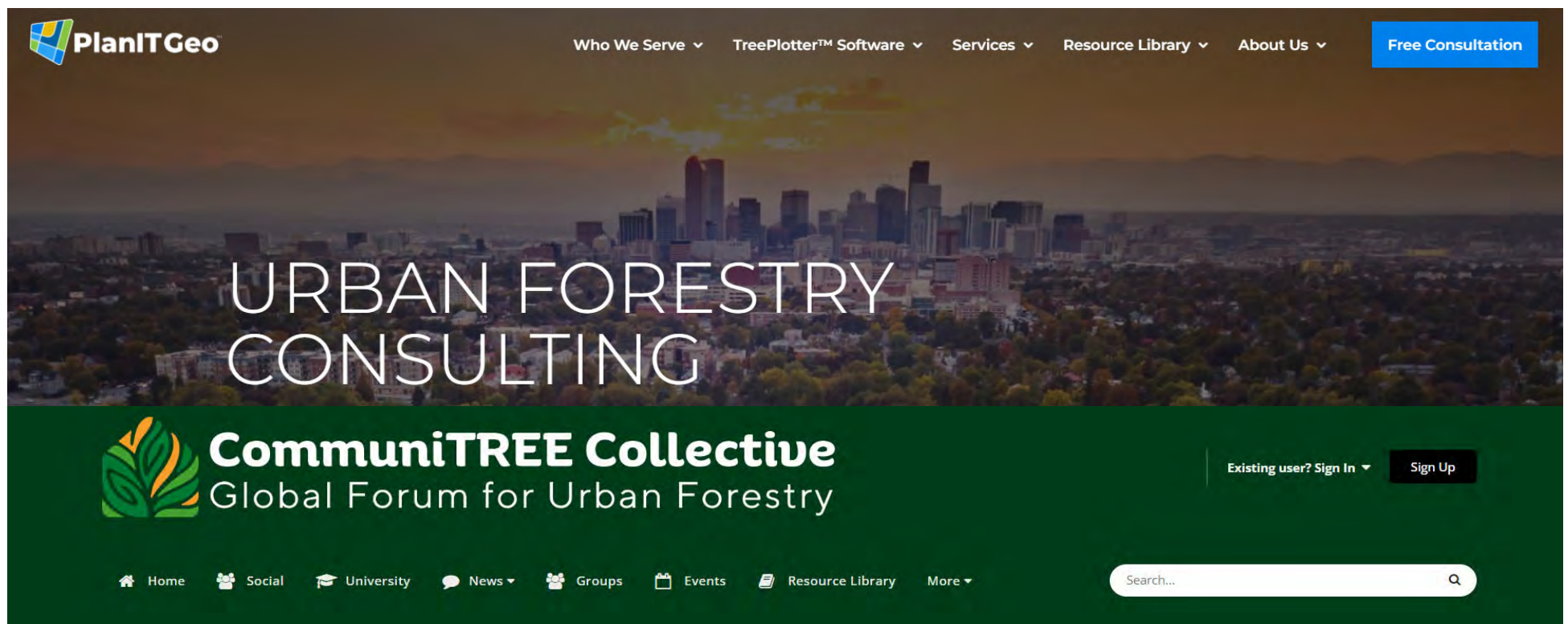
LFUCG Tree Canopy Assessment - 2022

- Procured in 2022 by PlanIT Geo
- Publically accessible
- Found on [Lexingtonky.gov](https://www.lexingtonky.gov/urban-forestry)



PlanIT Geo – Tree Plotter Canopy

- Who is PlanIT Geo (<https://planitgeo.com/>)



The screenshot shows the PlanIT Geo website. The top navigation bar includes links for 'Who We Serve', 'TreePlotter™ Software', 'Services', 'Resource Library', and 'About Us', along with a blue 'Free Consultation' button. The main banner features a city skyline at sunset with the text 'URBAN FORESTRY CONSULTING'. Below this is a green section for the 'CommuniTREE Collective', described as the 'Global Forum for Urban Forestry', with links for 'Sign In' and 'Sign Up'. The footer contains a horizontal menu with icons and labels for 'Home', 'Social', 'University', 'News', 'Groups', 'Events', 'Resource Library', and 'More', followed by a search bar.

PlanITGeo

Who We Serve ▾ TreePlotter™ Software ▾ Services ▾ Resource Library ▾ About Us ▾ [Free Consultation](#)

URBAN FORESTRY
CONSULTING

 **CommuniTREE Collective**
Global Forum for Urban Forestry

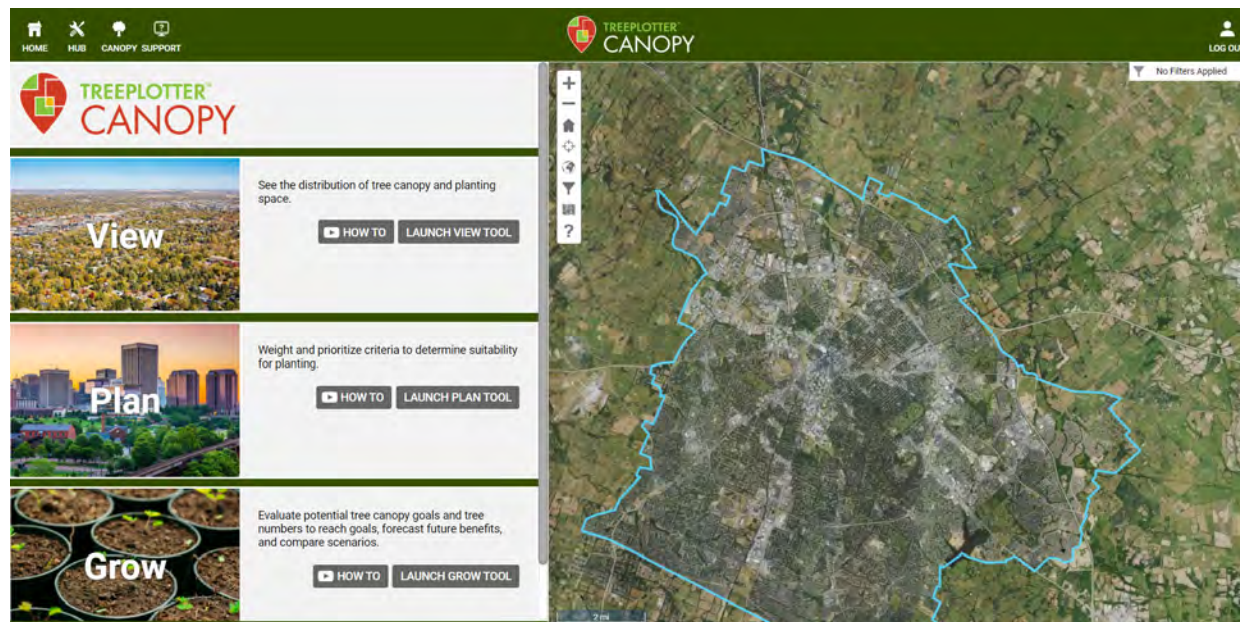
Existing user? [Sign In](#) ▾ [Sign Up](#)

 Home  Social  University  News ▾  Groups  Events  Resource Library [More](#) ▾

Search... 

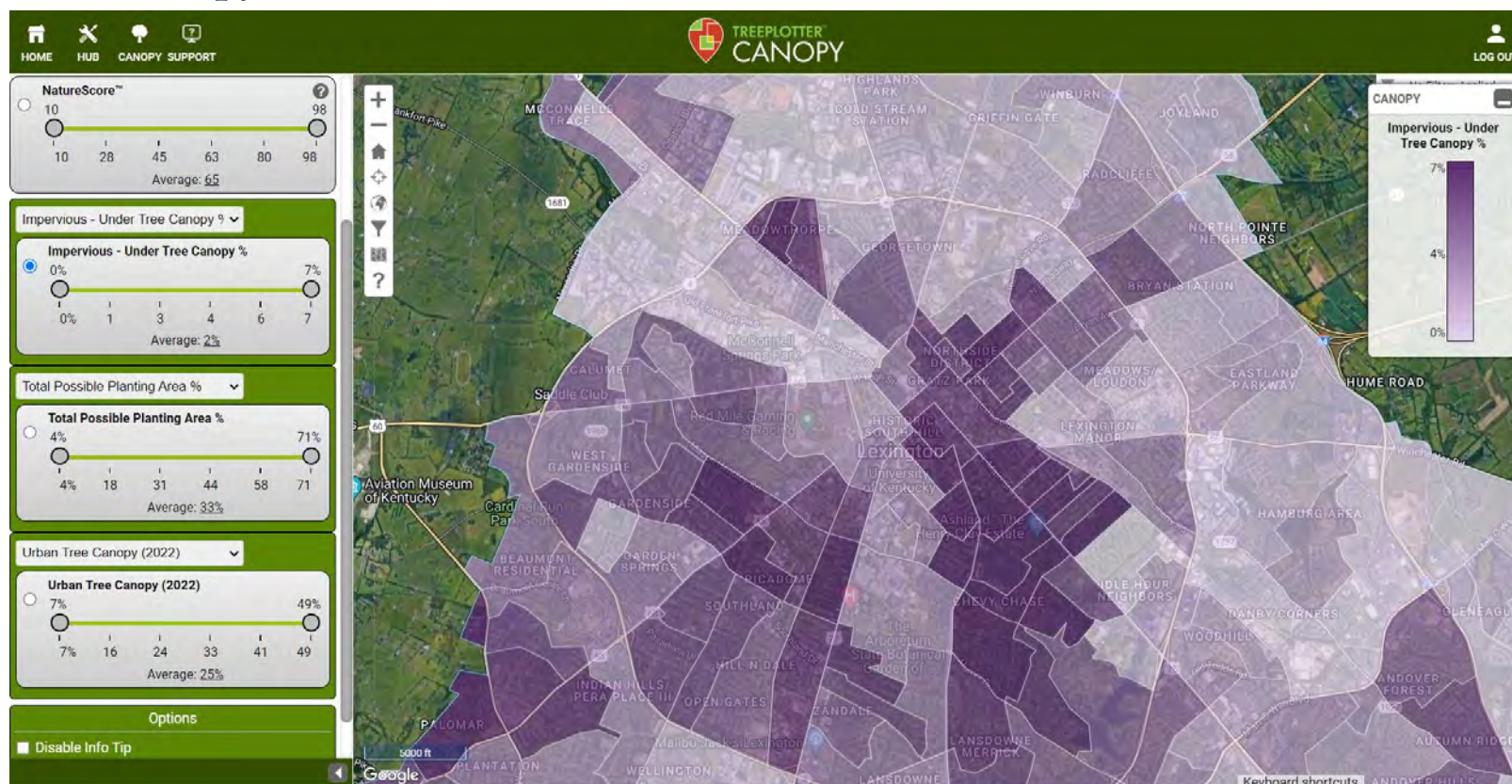
PlanIT Geo – Tree Plotter

- What is PlanIT Geo – Tree Plotter Canopy
- Data Derived from NAIP Aerial Imagery (2020)
- Will have updated NAIP Aerial Imagery in our subscription
- What can we, and the public, do with Tree Plotter Canopy
 - View
 - Plan
 - Grow



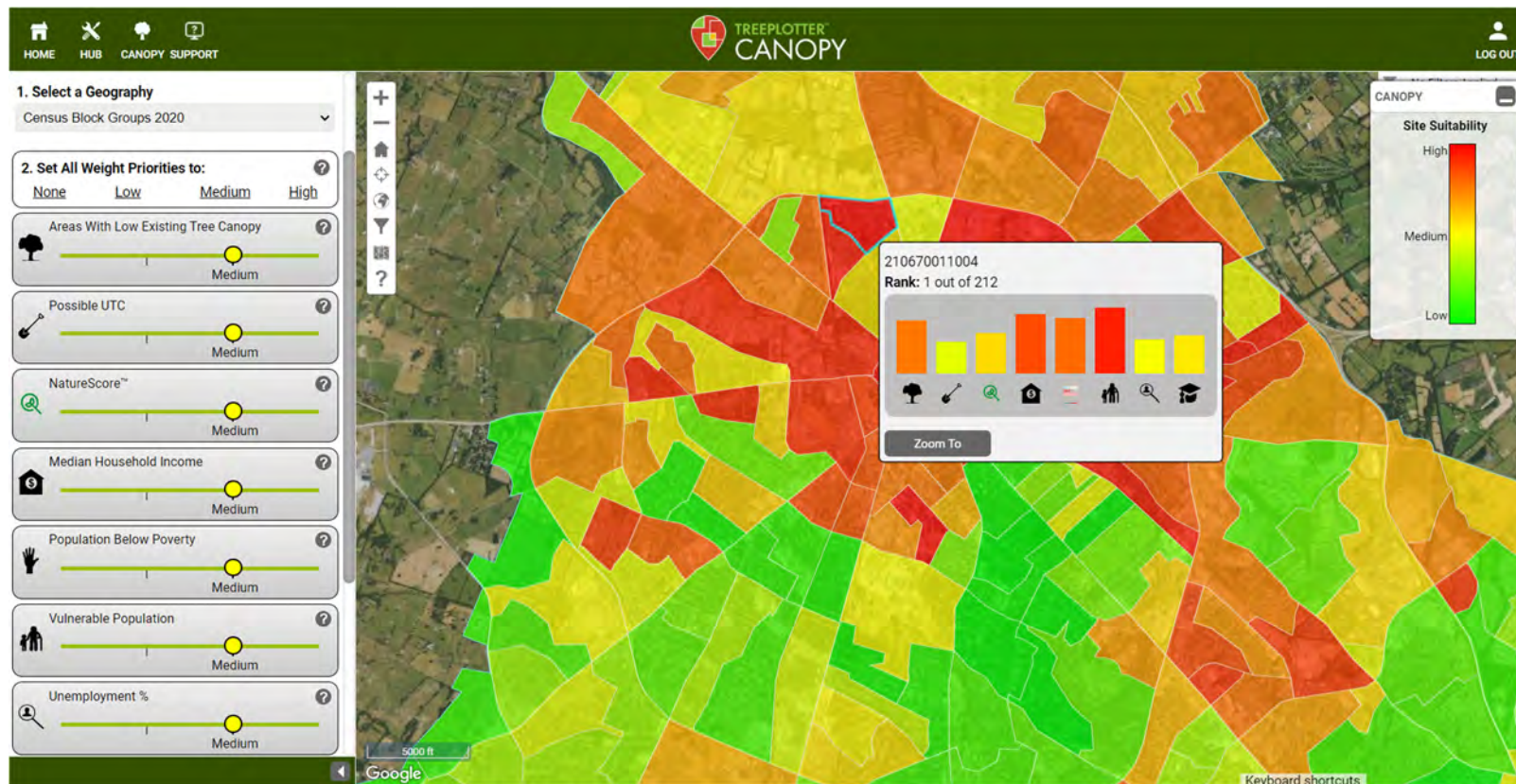
PlanIT Geo – Tree Plotter

Tree Plotter Canopy – View



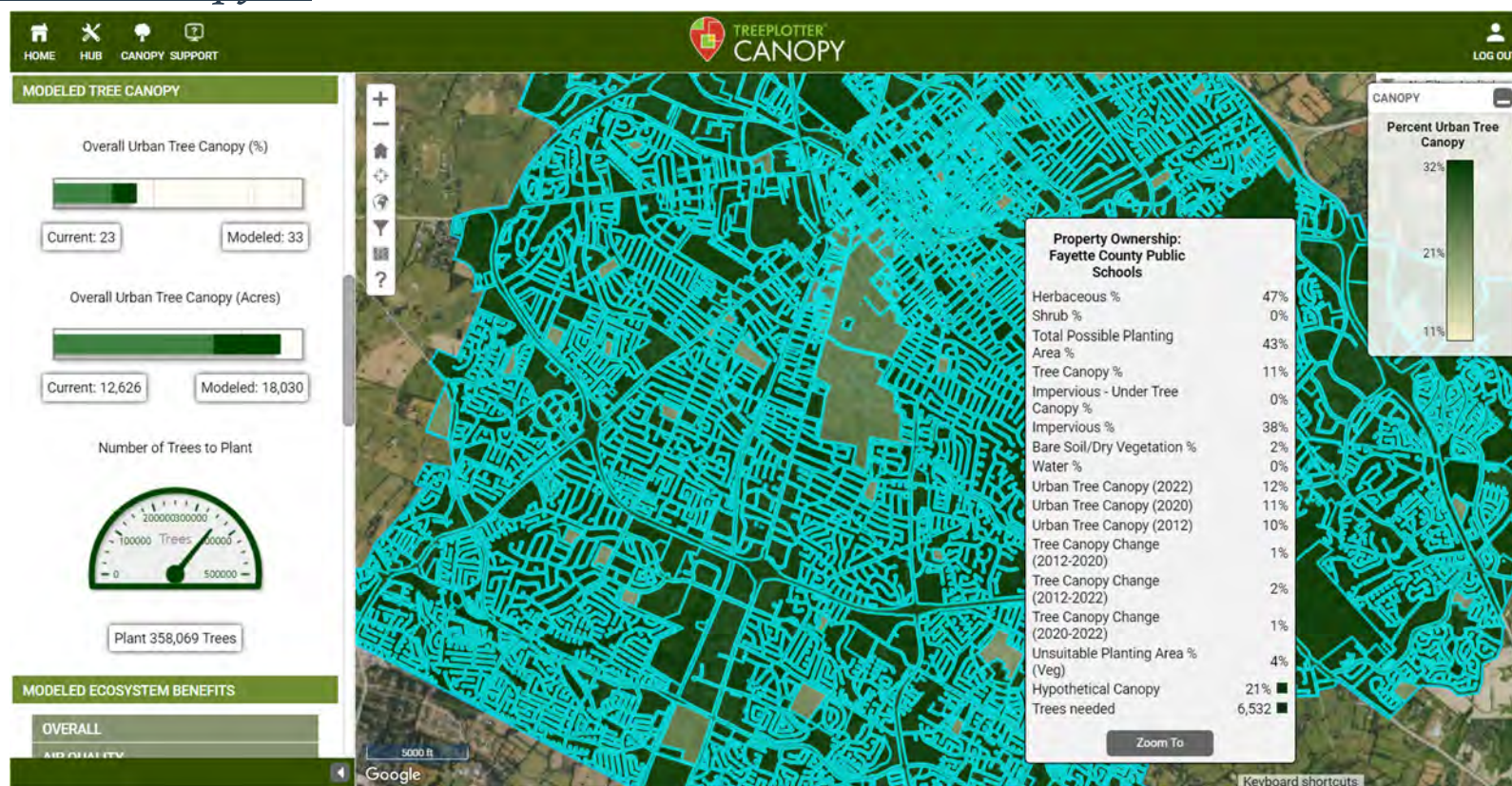
PlanIT Geo – Tree Plotter

Tree Plotter Canopy – Plan



PlanIT Geo – Tree Plotter

Tree Plotter Canopy – Grow





Questions?



LEXINGTON

i-Tree

What is i-Tree?

i-Tree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban and rural forestry analysis and benefits assessment tools. The i-Tree tools can help strengthen forest management and advocacy efforts by quantifying forest structure and the environmental benefits that trees provide.

Since the initial release of the i-Tree Tools in August 2006, thousands of communities, non-profit organizations, consultants, volunteers and students [around the world](#) have used i-Tree to report on individual trees, parcels, neighborhoods, cities, and even entire states. By understanding the local ecosystem services that trees provide, i-Tree users can link forest management activities with environmental quality and community livability. Whether your interest is a single tree or an entire forest, i-Tree provides data that you can use to demonstrate value and set priorities for more effective decision-making. We invite you to explore this site to learn more about how i-Tree can make a difference in your community or forest.

Get started at the [Tools](#) page for a full listing of analysis tools and utility programs.

Developed by USDA Forest Service and numerous cooperators, i-Tree Tools are freely available. The [U.S. Forest Service](#), [Davey Tree Expert Company](#), [The Arbor Day Foundation](#), [Urban and Community Forestry Society](#), [International Society of Arboriculture](#), and [Casey Trees](#) have entered into a cooperative partnership to further develop, disseminate and provide technical support for the suite.



**Tools for Assessing and Managing
Forests & Community Trees**

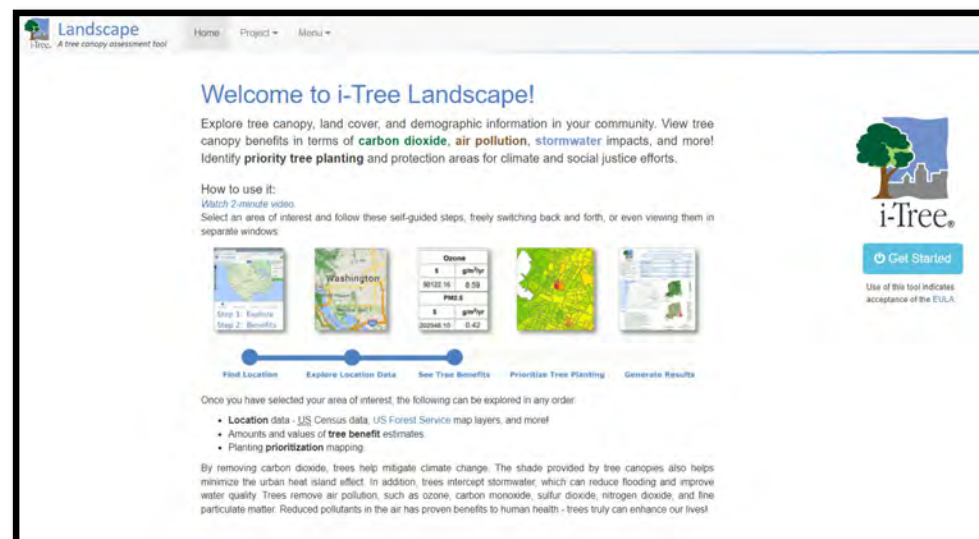
i-Tree

Core Tools - Individual

- MyTree
- i-Tree Design
- i-Tree Eco

Core Tools – Canopy Assessments

- OurTrees
- i-Tree Canopy
- i-Tree Landscape



American Forests Tree Equity Score, Nature Score & Tree Plotter



LEXINGTON



Landscape

A tree canopy assessment tool

[Home](#)[Project ▼](#)[Menu ▼](#)

Start on **Main**, then explore the map layer tabs.

[Main](#)[Canopy
& Land](#)[Forest
Risk](#)[Health
Risk](#)[Future
Climate](#)

Forest Cover

☒ Tree Canopy

Transparency 19 %

☐ Plantable Space

☐ Total Basal Area

☐ Forest Type

☐ Urban National Forests

Equity

☒ CEJST

Transparency 58 %

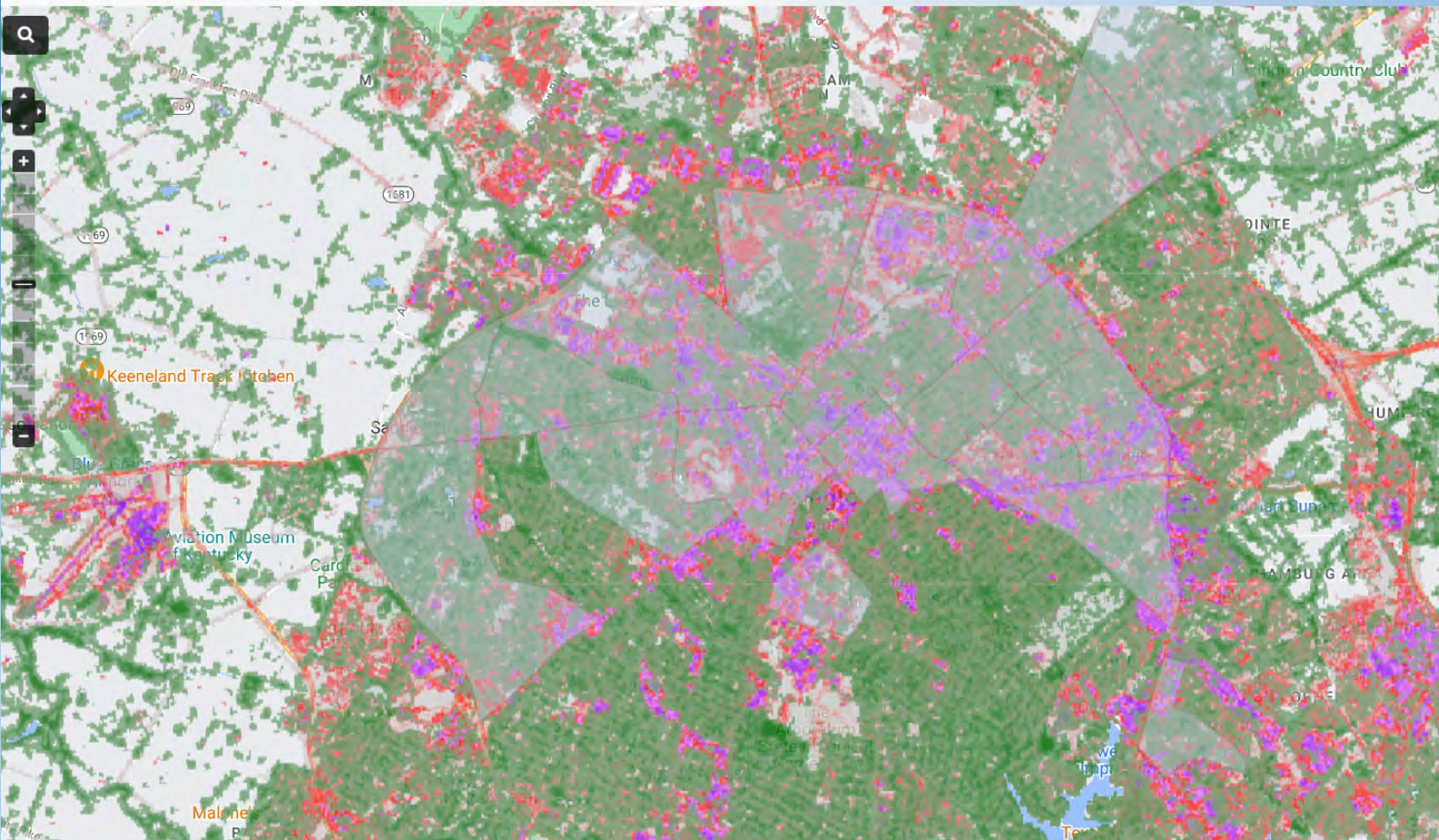
☐ Tribal Land

Other Land Cover

☒ Impervious

Transparency 17 %

☐ Land Cover



i-Tree

- What suite of tools are available
 - Core tools (individual trees)
 - o MyTree
 - o i-Tree Design
 - o i-Tree Eco
 - Core tools (tree canopy assessments)
 - Tree Planting tools (i-Tree Planting)
 - i-Tree Species (right tree right place)
 - i-Tree Database
 - Tree Compensation Calculator
 - i-Tree Hydro Plus (to simulate interception by tree canopy)
 - o i-Tree Hydro (hydrology models)
 - o i-Tree Cool Air (air temp models)
 - o i-Tree Cool river (river temp models)



Tree Compensation Calculator



Discount Rate 0.03

Removed Tree:

Species (Crown Size of an old Tree) Large ▼
 Dbh 10 inches
 Growth Rate 0.3 in/yr
 Life Span of the Tree (Years to Death) Mod. long-lived (2% mortality rate) ▼
 Years to Death = 48 years

Net Present Value (Removed Tree) 88,276.08 ft² leaf area

Replanted Tree:

Species (Crown Size of an old Tree) Large ▼
 Dbh at planting 2 inches
 Growth Rate 0.2 in/yr
 Life Span of the Tree (Years to Death) User Defined ▼
 Enter number of years 50
 Years to Death = 50 years

Net Present Value (Replanted Tree) 23,070.43 ft² leaf area

Number of Replanted Trees Required 3.8 Trees
 Planting Cost per Tree \$285
 Replacement Value \$1,091



Tree Replacement Calculator

Developed by:

David J. Nowak, US Forest Service, Syracuse, NY

Tim Aevermann, Federal Institute for Population Research, Wiesbaden, Germany

Note: Use of this tool indicates that you accept our [EULA](#)

i-Tree

- What is a Tree Equity Score (<https://www.treeequityscore.org/>)
“[A] metric that helps cities assess how well they are delivering equitable tree canopy cover to all residents.”
- What factors make up a Tree Equity Score
 - Tree canopy cover
 - Climate
 - Demographic data
 - Socioeconomic data



TREE
EQUITY
SCORE

National Explorer

lexington



1 Find your score.

- Search a location or address, or browse the map of nearly 200,000 Tree Equity Scores.

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3 Make the case with data and reports.

- Compare neighborhood information.
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- Set targets and calculate tree planting need and the potential benefit to health, economy and environment.

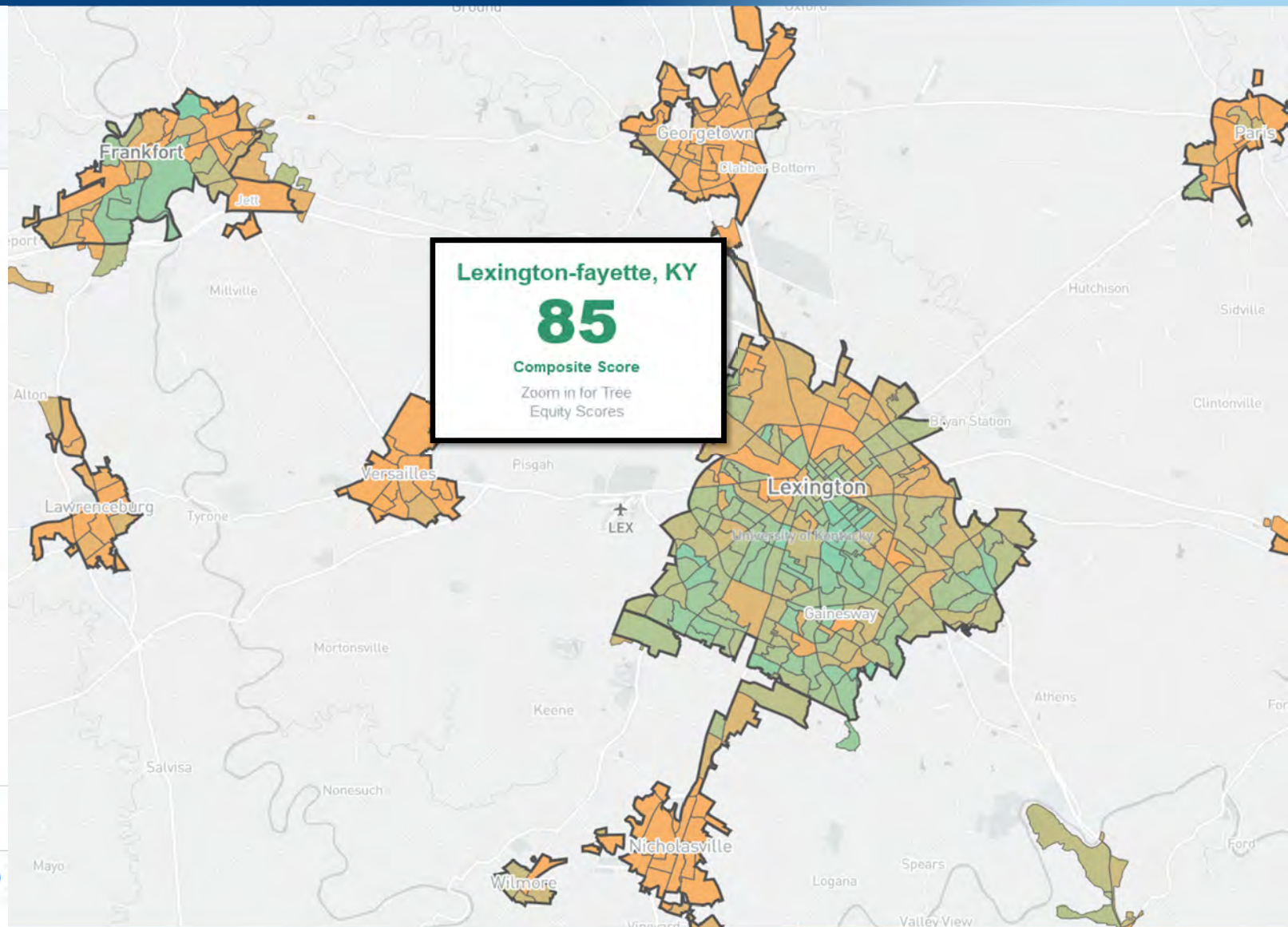


Layers

Filters

<70 100

Tree Equity Score





TREE
EQUITY
SCORE

National Explorer

lexington

Census Block Group 211130606003

Population: 173

Jessamine County, KY
KY Congressional District 2

Filters

Reset

Close

Tree Equity Score 0 100

Tree canopy cover 0 15

Tree canopy gap 0 100

Priority index 0 1

People in poverty 0 100

People of color 0 100

Children and seniors 0 100

Unemployment 0 100

Linguistic isolation 0 100

Health burden index 0 100

Heat disparity -30 30

Redlining Any

<70 100

Tree Equity Score



mapbox

DYNAMIC REPORTS

MENU

52

Tree Equity Score

Lexington

<https://www.treeequityscore.org/Lexington>

© Mapbox © OpenStreetMap Improve this map

Summary of Proposal

- A summary of the proposed changes are as follows:
 - Add the Division of Environmental Services to the list of enforcement agents of the Zoning Ordinance.
 - Repeal and remove references to any landscape corridor ordinances, including the Downtown Street Tree Ordinance, and insert language to incorporate by reference the city's Planting Manual.
 - Update zone-to-zone landscape perimeter requirements to match Vehicular Use Area requirements.
 - Insert language to support low impact landscaping and native species plantings.
 - Update landscaping plan requirements.
 - Update Article 26's (Tree Protection Standards) purpose to include language about the beneficial impacts of trees on human physical and mental health.
 - Update guidelines for significant tree designations; including adding tree species to the current list for protection and lowering the current diameter at breast height (BDH) from 36" inches to 24" inches.
 - Update tree protection plan requirements, including that the plan be conducted by an ISA Certified Arborist or registered Landscape Architect.
 - Replace gender-specific language with gender neutral language.

ZOTA Proposal: Landscape Ordinances

- Repeal and remove references to any landscape corridor ordinances and insert language to incorporate by reference the city's Planting Manual or related master plans.
- There are seven landscape corridor areas highlighted by Lexington-Fayette County ordinances:
 - Downtown Corridor
 - Georgetown Road
 - Harrodsburg Road
 - Man O' War Boulevard
 - Newtown Pike
 - Old Frankfort Pike
 - Richmond Road

ZOTA Proposal: Commercial Landscape Materials and Requirements

- Update zone-to-zone landscape perimeter requirements to match current Vehicular Use Area requirements.
- Insert language to support low impact landscaping and native species plantings.
- Update landscaping plan requirements.

ZOTA Proposal: Mitigation Fund

ZOTA Proposal: Significant Tree Designation and Tree Protection Standards

- Update Article 26's (Tree Protection Standards) purpose to include language about the beneficial impacts of trees on human physical and mental health.
- Update guidelines for significant tree designations; including adding tree species to the current list for protection and lowering the current diameter at breast height (BDH) from 36" inches to 24" inches.
- Update tree protection plan requirements, including that the plan be conducted by an ISA Certified Arborist or registered Landscape Architect.

Workgroup Detail – Thank You

- Workgroup met on BLANK occasions.
- Staff:
 - Director Jennifer Carey (DES), Director James Duncan (Planning), Ben Cornett (DES), Valerie Friedmann (Planning), Autumn Goderwis (Planning), Michael LeMaster (DES), Demetria Kimball-Mehlhorn (DES), Eve Miller (DES), Boyd Sewe (Planning), Evan Thompson (Law), Traci Wade (Planning), Heather Wilson (DES).
- Feedback from:
 - Corridors Commission
 - Tree Board

Next Steps

- Feedback and Approval from Planning Commission
- Urban County Council Review
 - Environmental Quality and Public Works Committee
- Public Input
- Urban County Council Approval

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) UPDATE 2023 LEXINGTON'S STORMWATER QUALITY PROGRAM YEAR IN REVIEW

Stormwater Stakeholder Advisory Committee

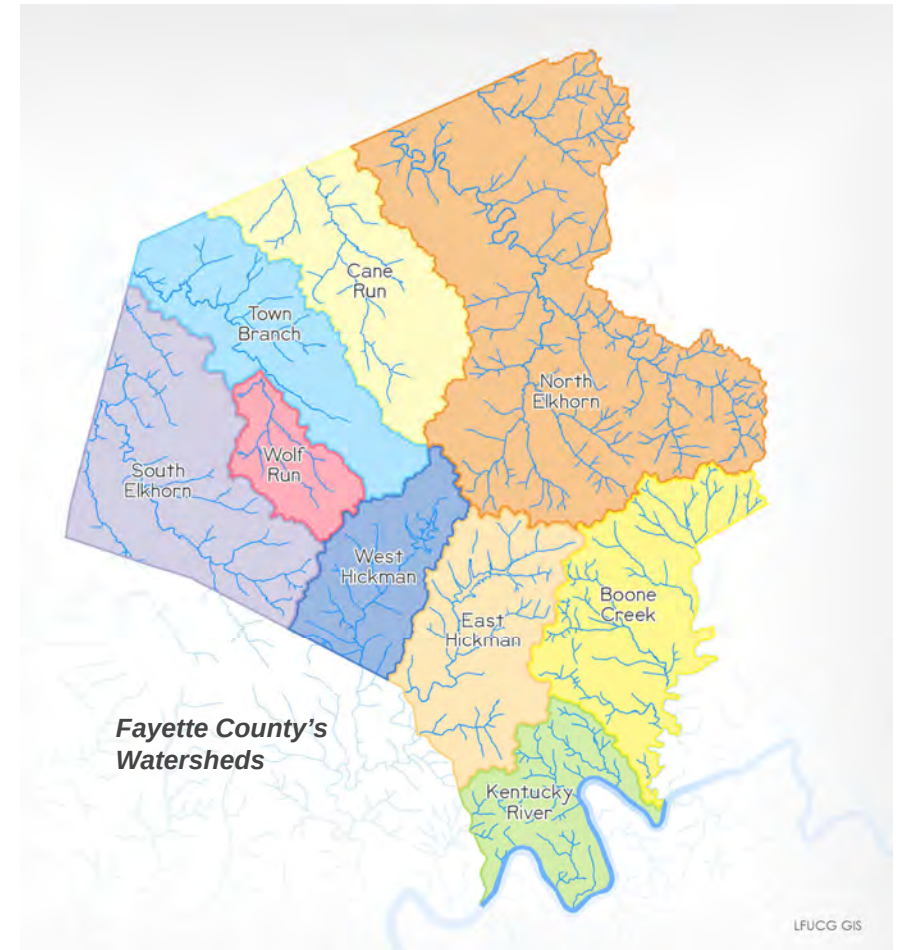
December 1, 2023



LEXINGTON

Agenda

- What is a MS4 and Why does it Matter?
- Year in Review 2022
- Watershed Planning & Qcritical
- Moving Forward
- Questions





MS4 Defined

- Municipal Separate Storm Sewer System
- KRS 224 authorizes a community like Lexington to discharge stormwater runoff from its MS4 into “Waters of the Commonwealth”
- Lexington is issued a stormwater discharge permit by the Kentucky Department for Environmental Protection
- Permit requirements contained in federal law are applicable to “large MS4s” (Pop. 250,000 or greater) like Lexington


ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
14 RELLY ROAD
FRANKFORT, KENTUCKY 40601-1190
www.kentucky.gov

STEVEN L. BESHEAR
GOVERNOR

LEONARD K. PETERS
SECRETARY

FACT SHEET

**KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT TO DISCHARGE FROM A LARGE MUNICIPAL SEPARATE STORM SEWER SYSTEM
INTO WATERS OF THE COMMONWEALTH**

KPDES No.: KYS000002 Permit Writer: Abigail Rains Date: May 1, 2015
AI No.: 74551

1. **SYNOPSIS OF APPLICATION**

a. Name and Address of Applicant
Lexington-Fayette Urban County Government
200 East Main Street
Lexington, Kentucky 40507

b. Description of Applicant's Operation
The applicant operates a large municipal separate storm sewer system through such controls as legal authority, source identification, discharge characterization, management program, assessment of controls, and fiscal analysis.

2. **PERMIT DURATION**
Five (5) years

3. **THE ADMINISTRATIVE RECORD**
The Administrative Record, including application, draft permit, fact sheet, public notice, comments received, and additional information is available for review at the Division of Water at 200 Fair Oaks Lane, Frankfort, Kentucky 40601.

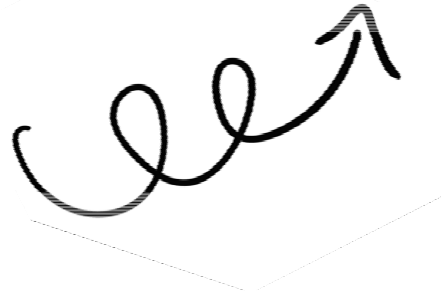
4. **CONTACT**
Abigail Rains
KPDES Permit Writer
(502) 564-3410, extension 4891

KentuckyUnbridledSpirit.com  An Equal Opportunity Employer M/F/D

Individual MS4 Permit – KYS000002

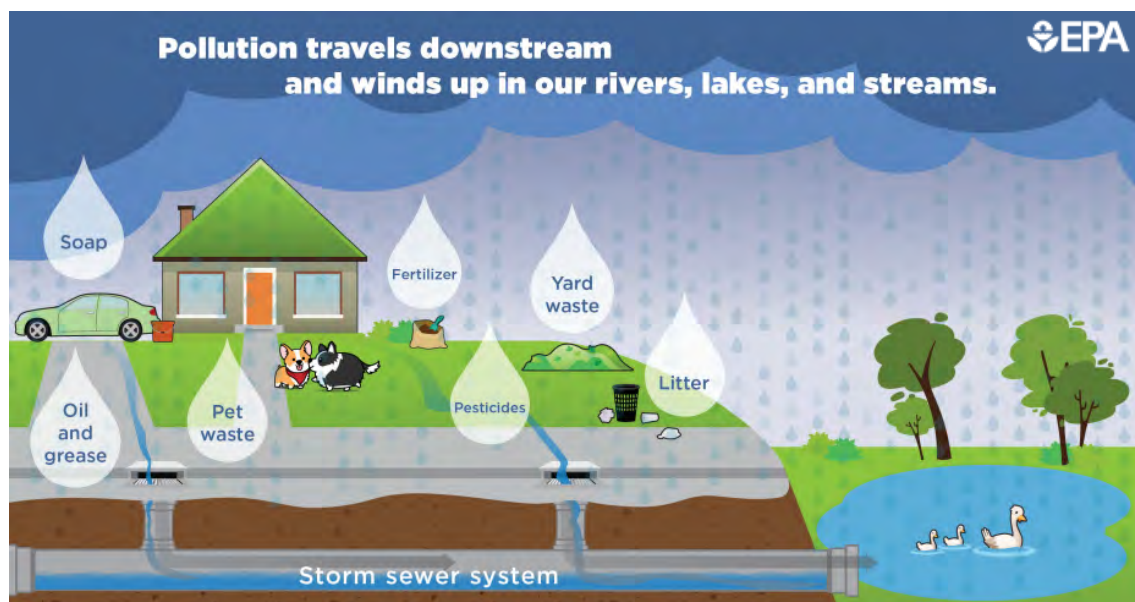
- Five years in duration, last permit expired May 31, 2020, renewal pending
- Current Permit Administratively Continued
- Compliance revolves around meeting the objectives of ten (10) specific Program Elements – Narrative Best Management Practices or BMPs
- Program Element objectives further defined in the Stormwater Quality Management Program (SWQMP) document

Required to implement a program that continually optimizes stormwater management in Lexington



Why it Matters

Program intended to maintain and improve the quality of the state's waterways by *reducing the quantity of pollutants that stormwater picks up and carries into the MS4 during storm events*



MS4 Permit – Program Elements

Public Engagement

- 1 Public Education and Outreach
- 2 Public Involvement and Participation

Pollution Prevention

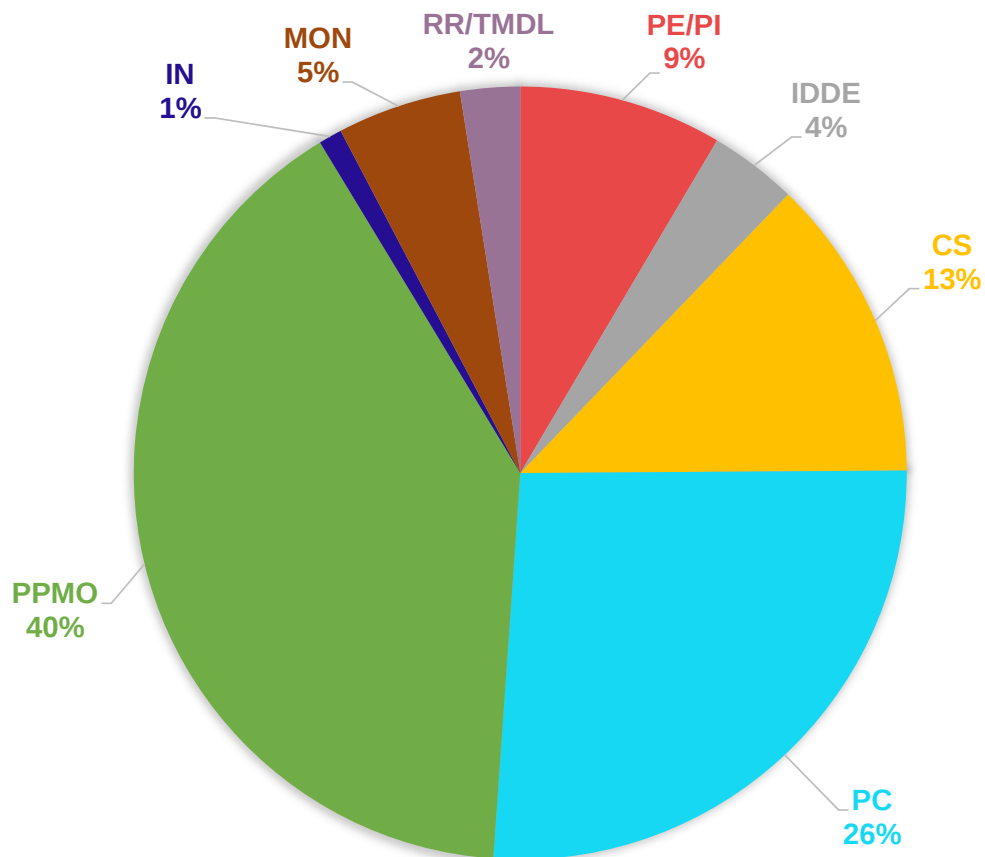
- 3 Illicit Discharge Detection and Elimination
- 4 Construction Site Stormwater Runoff Control
- 5 Post-Construction SW Management
- 6 Pollution Prevention for Municipal Operations
- 7 Industrial Facility SW Pollution Prevention

Monitoring and Reporting

- 8 Water Quality Monitoring
- 9 Reporting and Recordkeeping
- 10 Total Maximum Daily Loads/ Impaired Waters



Funding by MS4 Program Element



\$7.7 Million
Spent in 2022

Year in Review

Stormwater Stakeholder Advisory Committee (SSAC)

Stormwater Stakeholder Advisory Committee	
1  LFUCG Division of Engineering	1  Hickman Creek Conservancy
1  LFUCG Division of Environmental Services	1  Bluegrass Greensource
1  LFUCG Division of Planning	1  University of Kentucky
1  LFUCG Division of Water Quality	1  Kentucky Water Resources Research Institute
1  LFUCG Planning Commission	1  Kentucky River Watershed Watch
1  LFUCG Urban County Council	1  Kentucky Transportation District 7
1  Fayette County Public Schools	1  Kentucky American Water Company
1  Fayette Alliance	1  Building Industry Association of Central Kentucky
1  Fayette County Neighborhood Council	1  Lexington-Bluegrass Association of Realtors
1  Friends of Wolf Run	1  Federal Facilities
1  Friends of Cane Run	6  Commerce Lexington
1  Friends of McConnell Springs	9  Watershed At-large Representatives
1  Neighbors United for South Elkhorn Creek	

- Interest Groups
- Business community
- Other Public Agencies
- Watershed At-Large Representatives

Meets Quarterly
(March, June, Sept, Dec)

Next Meeting, Friday December 1, 2023

2022 Inspections – Key to Compliance

Types of inspections conducted by LFUCG staff:	Total 2022 Inspections
Active Construction Sites	6,138
Targeted Construction Sites	402
Critical Drainage Culverts	705
Stormwater Retention Ponds	1,232
Water Quality Control Devices (Inserts, filters, infiltration areas)	1,129
Water Quality Control Devices – City Owned	384
Underground Detention Facilities	128
Detention Basins Round 1 & 2	2,470
Dry Weather Screening of Stormwater Discharge Outfalls	196
Industrial and High-Risk Commercial Facilities	35
Illicit Discharge/ Spill Investigations	212
Municipal Operation Stormwater Inspections	54
Total	13,085

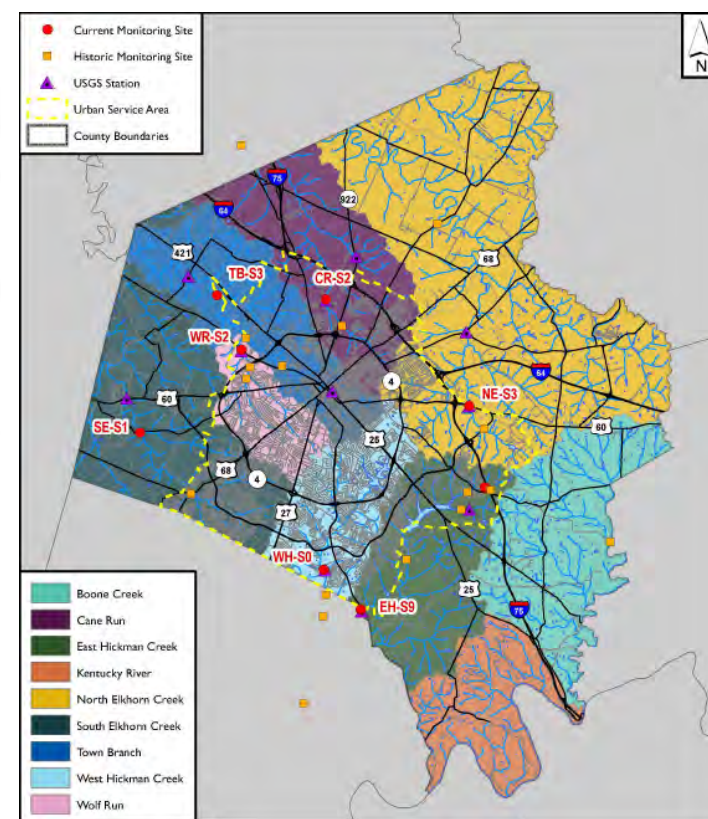
Summary of Water Quality Conditions

TABLE 15
PERCENTAGE OF 2022 WATER QUALITY RESULTS THAT MET BENCHMARK OR REFERENCE POINT

PARAMETER	UNIT	LIMIT	% MEETING BENCHMARK / REFERENCE POINT						
			CR-S2	EH-S9	NE-S3	SE-S1	TB-S3	WH-S0	WR-S2
Specific Conductance	uS/cm	500	11%	63%	22%	30%	20%	38%	20%
Dissolved Oxygen	mg/L	4	100%	100%	100%	100%	100%	100%	100%
Water Temp.	°C	31.7	100%	100%	100%	100%	100%	100%	100%
pH	SU	< 9, > 6	100%	100%	100%	100%	100%	100%	100%
Total Susp. Solids	mg/L	80	89%	100%	67%	90%	60%	63%	90%
<i>E. coli</i>	CFU/100mL	240	33%	25%	44%	30%	10%	25%	30%
Phosphorus, Dissolved	mg/L	0.5	100%	100%	100%	100%	10%	100%	100%
Phosphorus, Total	mg/L	0.5	78%	88%	67%	80%	10%	63%	90%
Ammonia-N	mg/L	1	100%	100%	100%	100%	100%	100%	100%
Total Kjeldahl Nitrogen-N	mg/L	2	89%	88%	100%	90%	40%	63%	90%
Nitrate-N + Nitrite-N	mg/L	2	78%	100%	100%	100%	10%	100%	100%

TABLE 17
SUMMARY OF 2022 MACROINVERTEBRATE SAMPLING RESULTS BY SITE

METRIC	CR-S2	EH-S9	NE-S3	SE-S1	TB-S3	WH-S0	WR-S2
MBI Score	16.3	61.9	25.0	50.0	41.8	47.2	38.7
MBI Rating ²	Very Poor	Good	Poor	Fair	Fair	Fair	Poor
WAH Use Support	Non	Full	Non	Partial	Partial	Partial	Non



Watershed-Focused Monitoring Program

- Town Branch report in 2022 MS4 Permit Annual Report
- North Elkhorn Monitoring Year in 2022
- Wolf Run Phase I Screening Year in 2022



TABLE 2 – PROJECT SCHEDULE BY WATERSHED

Watershed	Screening Year	Monitoring Year	Reporting Year
Cane Run	2016	2017	2018
South Elkhorn Creek	2017	2018	2019
West Hickman Creek	2018	2019	2020
East Hickman Creek	2019	2020	2021
Town Branch	2020	2021	2022
North Elkhorn Creek	2021	2022	2023
Wolf Run	2022	2023	2024

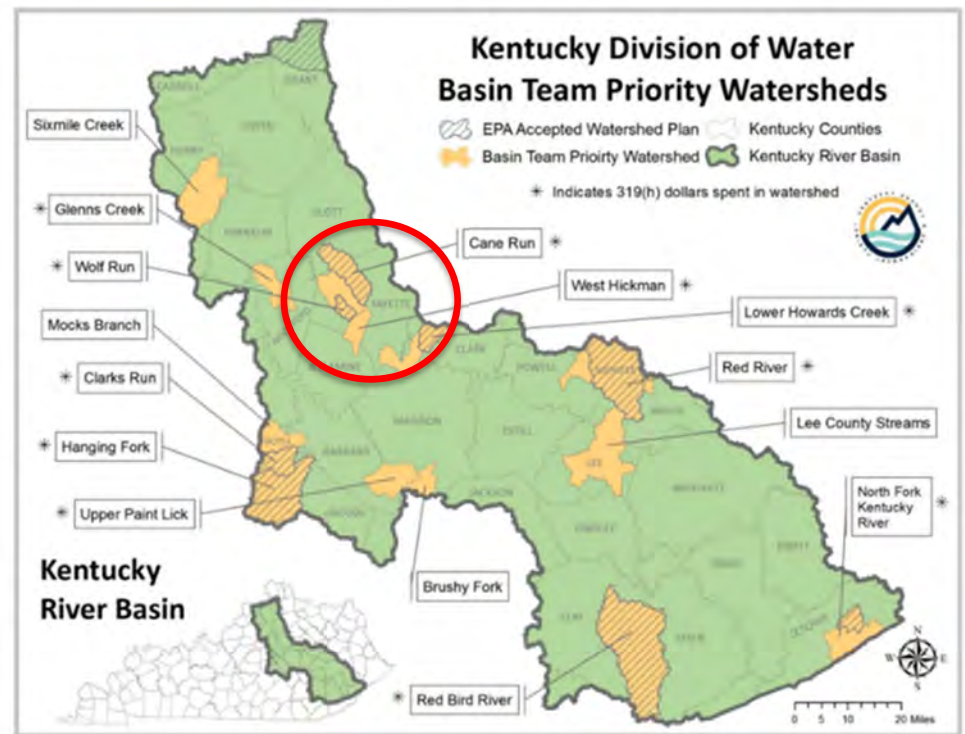
Watershed Planning and Implementation

Watersheds with approved Watershed Management Plans in Lexington:

- Cane Run 2019
- West Hickman 2023
- Wolf Run 2013 (Update 23/24)

What's next?

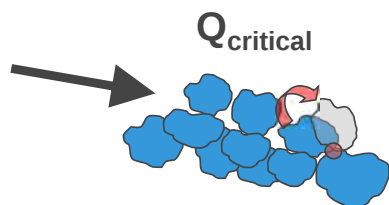
Taking a closer look at our urban streams - hydrologic restoration as an approach to watershed planning



Q_{critical} and Typical Streambank Erosion in Lexington, KY

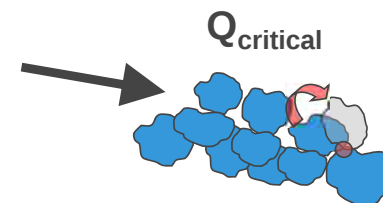
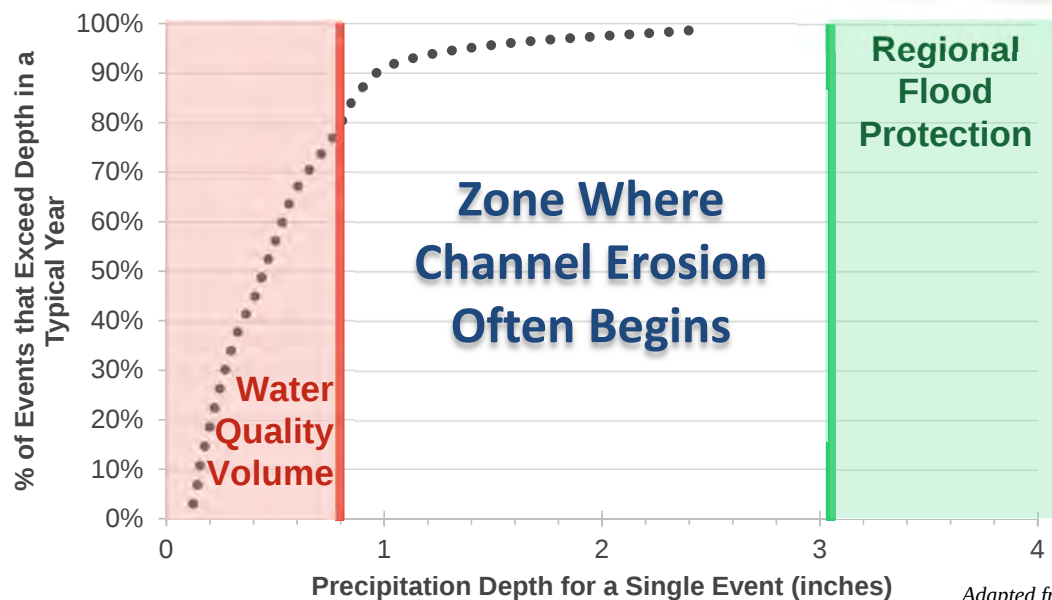
- Stream Deepening and Widening
- Water Quality Impacts
- Biological Disturbance
- Loss of Land/ Damaged Infrastructure

Critical Flow = flow that moves particles on the streambed



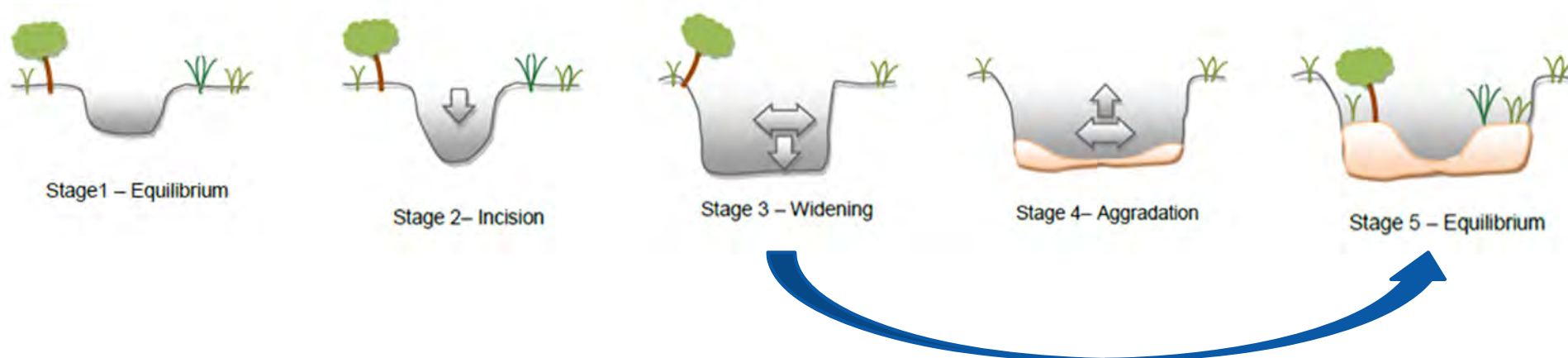
UT of South Elkhorn Creek in Shillito Park

Stormwater Management Optimization



- Make sure new development isn't making the problem worse
- Consider working with large developments for "over control" opportunities

Habitat Recovery in Urban Streams



Channel Evolution Sequence in Response to Increased Flows from Urbanization, Adapted from Schumm et al. (1984) and Hawley et al. (2012)

What are Basin Retrofits?

Retrofit existing stormwater basins to hold back water so the flow does not exceed the critical discharge

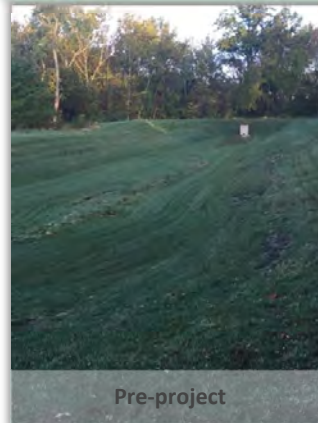
- Green Infrastructure is great but capacity still matters
- Control streambank erosion
- Accelerate habitat recovery and create healthy ecosystems and improved water quality

**Potential Pilot Project 2023/2024
in South Elkhorn Watershed/
Shillito Park (D9)**

Simple Retrofits



Stream/Wetland Complex



Stormwater Quality Projects Incentive Grant Program

Incentive Grants Awarded in 2022		
Grant Class	Amount Awarded	Number of Projects
FY23 Class A Neighborhood Grants	\$411,118.59	7
FY23 Class B Education Grants	\$88,446.00	4
FY23 Class B Infrastructure Grants	\$1,934,050.80	8
	\$2,433,615.39	19



FY20 900 Block of North Limestone Stormwater Retrofit – Pervious Pavement, Rain Gardens, Bioswale, Water Walk Complete (ASLA Award of Excellence)

FY18 UK Alumni Drive (Across from Arboretum) UT to Hickman Creek Stream Restoration, Bio-infiltration Swale Project Complete



Moving Forward

- Continue compliance work in all Program Element categories per MS4 Permit with the State – Released from the stormwater side of the U.S. District Court Clean Water Act Consent Decree in 2021
- Continue to promote and administer the Stormwater Quality Projects Incentive Grant Program (10% Water Quality Management Fee)
- Focus on methods to further transition the Watershed-Focused Monitoring Program from data collection to an action plan
- Explore Critical Flow in Lexington to protect our streams from further degradation
- Maintain our partnerships with stormwater management stakeholders



Questions?



LEXINGTON