Booker Creek Working Group

Overview of Preliminary Votes on Recommendations

Updated September 13, 2022

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Recommendation 1: Advancement of green infrastructure

(draft received from Michael Dupree July 23)

1. Summary of the recommendation:

A new program to deliver residential green stormwater infrastructure and flood resilience assessment and installation services to interested residents. The goal of the program is to support and empower homeowners to pursue stormwater and flood resilience-related improvements to their homes or lots. This would be accomplished by providing professional, technical assistance and cost share agreements to assist landowners with the cost of the installation of green infrastructure on private property. A small percentage of the stormwater utility fee would be allocated to provide these new services.

2. Program operation and benefits:

Green Infrastructure has been an effective tool to reduce or eliminate stormwater runoff in municipalities around the country. Green Infrastructure improves water quality, protects property values by reducing erosion, protects streams by reducing sediment delivery and reduces the quantity of water in the streams during storm events by providing retention and detention of stormwater on site.

All Green Infrastructure practices would be designed and installed according to the Minimum Design Criteria listed https://deq.nc.gov/about/divisions/energy-mineral-and-land-resources/stormwater/stormwater-program/stormwater-design.

In October of 2021, The Booker Creek Neighborhood Protection Alliance (BCNPA) recommended 29 practices that are currently being used in municipalities around the country. Some of the practices are recommended in the North Carolina Stormwater Manual. A few of the practices that Chapel citizens have expressed an interest in installing include:

Down Spout Disconnection/Disconnect Impervious Surface
https://deq.nc.gov/media/17544/download

Cisterns and Rain Water Harvesting
https://deq.nc.gov/media/17541/download

Rain Gardens and Bioretention Cell
https://deq.nc.gov/media/17536/download

3. How implementation of this recommendation would be different from the Current Chapel Hill Town operations:
The Town does not have a program to provide technical assistance and cost share services to assist with green infrastructure installation on private property. This project will further expand the level of service that Town staff have been able to provide and more broadly be an important component of efforts to create a more flood resilient community and a better steward of the Jordan Lake regional water resource.

4. Who benefits? Who bears the cost?
Green Infrastructure practices benefit the landowner and the community.

Landowners/Occupants Benefits- The Environmental Protection Agency (EPA) has outlined the strategies to protect structures and indoor air quality. Too often, landowners are not aware of these guiding principles, and over time the structures have failed or fallen into disrepair. Improper management of rooftop runoff can lead to several serious problems such as poor indoor air quality, respiratory illness affecting the occupants' health, creates opportunities for mold and invasive insects to infect dwellings, which degrade structures and the quality of life for the residents who reside therein. Often, professional contractors who install green infrastructure can address these drainage principles while installing green infrastructure practices. In addition to the benefits listed above, green infrastructure reduces or eliminates erosion of the land protecting the balance of natural systems and providing a healthier landscape and increased value of the home.

Community Benefits-Green Infrastructure improves water quality, reduces sediment and nutrient delivery to streams protecting stream biodiversity, provides retention and detention of stormwater reducing the quantity of water in the stream during storm events and help address the issues of climate and flood-resilient communities.

Who bears the cost?
Most often the poorest people in the community suffer the consequences of stormwater runoff as a result of the lack of management of runoff upstream. The installation of green infrastructure that is concentrated in sub-watersheds upstream of areas that have flooding can have a dramatic impact on the quality of life of those individuals downstream.

Several local governments in North Carolina offer cost share assistance to landowners to install green infrastructure. These programs offer 75% to 100% of the cost of the installation of the practices. In Raleigh, the Rain Water Rewards program will cover 90% of the cost of practices. In Durham County, the Impaired Stream Improvement Program will cover 100% of the cost of practice installation for landowners who self-certify that they have income below the poverty level. In Mecklenburg County, practices are cost shared at 75%.

5. Supporting documentation:

In the state of North Carolina there are multiple programs that are being implemented.

City of Charlotte/Urban Cost Share Program
https://www.mecknc.gov/LUESA/WaterandLandResources/Conservation/Pages/UCSP.aspx

City of Raleigh/ Rain Water Rewards Program
https://raleighnc.gov/projects/content/PWksStormwater/Articles/StormwaterQualityCostShareProgram.html

North Carolina Division of Soil & Water/Community Conservation Assistance Program
http://www.ncagr.gov/SWC/costshareprograms/CCAP/index.html

Recommendation 2 (March 14)
A stream stabilization project

(draft received from Michael Dupree July 23)

1. Summary of the recommendation:
The Dixon report identified sites that are in need of Streambank Stabilization. The recommendation is to provide private landowners with funding to repair and protect streambanks using streambank stabilization techniques developed by the North Carolina Division of Soil and Water Conservation, Charlotte & Mecklenburg Stormwater and the North Carolina Cooperative Extension Service. Links to these design tools are in section 5 below.

2. Program operation and benefits:
Streambank stabilization is the use of vegetation to stabilize and protect banks of streams, lakes, estuaries or excavated channels against scour and erosion. This practice should be used to prevent the loss of land or damage to utilities, roads, buildings or other facilities adjacent to the banks, to maintain the capacity of the channel, to control channel meander that would adversely affect downstream facilities, to reduce sediment load causing downstream damages and pollution or to improve the stream for recreation or fish and wildlife habitat.

This practice is very efficient and is a cost-effective requiring minimal design and permitting requirements from state and federal agencies. This practice does not disturb or alter the stream channel and focuses on streambank reshaping and revegetation.

3. How implementation of this recommendation would be different from the Current Chapel Hill Town operations:
This practice would be one of the Green Infrastructure tools that are part of recommendation 1, Advancement of Green Infrastructure. By stabilizing the banks of streams, the Town of Chapel Hill will save money on cleanup efforts after major storm events. Stormwater delivers sediment and organic materials down-stream clogging infrastructure which can cause flood damage by backing up water. Streambank erosion is the number one source of sediment during a storm.

Properly designed, streambank stabilization increases the capacity of the stream by 25% to 35% thereby reducing downstream peak flows. This is the most economical practice that increases flood resiliency for down-stream landowners as well as reducing the amount of sediment and debris during a storm.

4. Who benefits? Who bears the cost?
Landowners that have streams that cross their property soon discover that it is against the law an individual to impede or alter the natural flow of water. Streams are regulated by government agencies. The stream bed is regulated by the federal agency, the United States

Army Corp of Engineers and the streambank is regulated by the state agency, the Department of Water Quality. This is important to state since most local governments view the stream as the responsibility of the private landowner who has to bear the cost of cleanup or damage to their property after a storm event.

Often the streams that are impacted the most by streambank erosion are in the older neighborhoods, often affecting the lower income households. These individuals are less likely to have the financial resources necessary to improve or repair the stream. In Durham County, the County created the Impaired Stream Improvement Program to address this inequity. The landowner applies for streambank stabilization funding and the County staff hire an environmental contractor to provide bank reshaping and revegetation practices as defined in the state manual.

Streams are highly regulated and it is in the Town's best interest to stabilize streambanks which will reduce sediment delivery down-stream, reduce the cost of cleanup efforts by public works staff after storms events and reduce the damage to utilities and infrastructure in proximity of the stream.

5. Supporting documentation:

North Carolina Division of Soil & Water Conservation
https://www.ncagr.gov/SWC/costshareprograms/CCAP/documents/Chapter11StreambankandShorelineProtection.pdf

Charlotte Mecklenburg Stormwater Services
https://charlottenc.gov/StormWater/SurfaceWaterQuality/Pages/StreamandWetlandRestoration.aspx

North Carolina Cooperative Extension
https://www.bae.ncsu.edu/workshops-conferences/wp-content/uploads/sites/3/2017/07/Small-scale-Solutions-to-Eroding-Streambanks.pdf

Recommendation 3 (April 4)
Cost Effective Flood Damage Reduction

1. Cost Effective Flood Damage Reduction Program

A program to reduce flood damages to structures by identifying specific structures with flood risk, assigning a quantitative risk factor to each, evaluating a wide range of mitigation measures to determine which is most cost effective in each particular case, and setting a priority list for capital budgeting based on selecting the most cost effective projects to implement with available funds.

2. Program Operation and Benefits

This program will directly address reducing flood damages to homes and businesses by a systematic, quantitative method so that program expenditures can be evaluated for cost effectiveness. Specific structures at risk of flood damage will be identified and given a quantitative risk rating. For each structure, a wide range of damage mitigation measures will be evaluated. These measures, successfully used and proven in practice around the country, include property acquisition and demolition, property acquisition and relocation, elevation of structures, abandonment of basements, dry and wet floodproofing, small floodwalls to protect one or more structures, elevating HVAC equipment, and others. The next step is to determine the most cost-effective mitigation measure for each structure, then to set priorities considering both cost effectiveness and community factors such as public safety. The mitigation measures are then selected in priority order for the government unit's capital budget. Town staff can then report to the Town Council how much quantitative reduction in potential flood damages has been achieved by public expenditures each year.

3. Differences from Current Chapel Hill Approach

The recommended new approach will shift the Town's goal from preventing flooding to preventing flood damages. Chapel Hill now relies mainly on controlling flood waters, partly through regulation of new development and increasingly on flood water detention in the proposed flood storage projects. The Town Council has disapproved the six unbuilt flood storage projects because of their high cost, negative environmental impacts, and adverse climate effects. A better approach to protecting structures from flood damage is to focus on structures at risk and to consider a wide range of mitigation measures to choose the most cost effective one for each structure. The result will be more targeted reduction in flood damages with less cost and less environmental damage. Unlike the proposed flood storage projects, the benefits of public expenditures will be clearly quantified.

4. Supporting Documentation

The most fully developed and proven program in North Carolina for reducing flood damages is in Mecklenburg County. Here is David Kroening's presentation to the working group on the Mecklenburg program:

David Kroening: Charlotte-Mecklenburg Storm Water Services

Here is a consultant report for Mecklenburg on flood damage reduction:

https://charlottenc.gov/StormWater/Flooding/Documents/Flood_RARR_Plan-Final.pdf

Recommendation 4 (April 25)
Preserving and protecting bottomland forests and natural stream corridors in Chapel Hill

1. **Recommendation to permanently protect and expand the Town's bottomland Forests and Stream Corridors**.

Recognizing the bottomland forest ecosystem's contribution to reducing the impact of climate change, protecting clean drinking water in Jordan Lake, providing wildlife habitat and enhancing biodiversity, moderating peak stream flows and many other "Ecosystem Services", **we recommend permanently protecting and expanding valuable bottomland forests and aquatic ecosystems in Chapel Hill**.

2. **Effects in practice and benefits of these recommendations**.

This recommendation would protect existing town- owned bottomlands, streams and other aquatic ecosystems by placing a conservation easement on the properties and by acquiring additional flood plain properties with the goal of creating unbroken forested corridors. In addition to easements and land purchases, protection of targeted bottomlands can be supported by land use planning and appropriate rules to limit development that would encroach on these areas. These recommendations will have the following benefits:

- The Mitigation of Stormwater and Flooding

The value of bottomland forests and stream corridors cannot be over emphasized. Forested bottomlands and riparian areas naturally mitigate flooding by intercepting floodwaters and reducing velocity after storms. The forests' irregular natural topography, presence of organic debris and pervious soils impede and absorb floodwaters. The trees, shrubs and other natural vegetation intercept and take up vast amounts of water from the soil and vegetation through interception, transpiration and evaporation. Bottomland forests are our best stormwater and flooding mitigation systems and they operate for free! For this reason alone, they should be protected and expanded as a high priority for Chapel Hill.

- Ecosystem Services

Bottomland forest and natural stream corridors have many other functions and values that are noteworthy including carbon sequestration, wildlife habitat, and travel corridors, cool microclimates compared to open areas, habitat for fish, amphibians and reptiles and places for human meditation and escape from the developed world. These are "Ecosystem Services" and are critical to life itself since they include production of oxygen through photosynthesis and clean water.

- Increased Opportunities for Recreation

Acquisition of more land in these corridors can have the added benefit to the Town of providing green space, walking trails, wildlife observation opportunities, improved aesthetics plus other social benefits. Increasing protected forested green space will have long-term benefits for Chapel Hill. Chapel Hill currently has below average percentage of lands in this category compared to other towns of similar size. Our recommendations could change this for the long-term benefit to the Town.

3. How implementation of these recommendations would be different from current Town operations.

Chapel Hill does not currently have a plan to permanently protect the town owned bottom land forest from being removed. We are losing our forests and the percentage of land in natural forests compared to non - forested areas is rapidly declining. We need to permanently protect our bottomland forests as well as the land in the flood zones.

4. Equity Framework who benefits, who bears the cost.

Many of the bottomland forests and stream corridors are located along greenway trails. The preservation of these mature forests along the trails will ensure that heat islands are not created. In a time of extended periods of high temperature due to climate change the trees reduce the cost of cooling in the homes and apartments that surround them. Some of the existing forests along stream corridors are located near more affordable housing. Many families from all walks of life play in the steam corridors and use them for transportation during the very hot summer days.

When prioritizing the preservation of the forests, the town should take into consideration the accessibility of the property to housing that is more affordable while ensuring that the forests are accessible to all residents.

The taxpayers will bear the relatively low cost of preserving the forests. Grants could be applied for to offset the cost.

4. Sources:

Emerging EPA guidelines recognize the importance of targeted pollutant reduction: "Traditional stormwater management approaches that rely on peak flow storage have generally not targeted pollutant reduction and can exacerbate problems associated with changes in hydrology and hydraulics." The benefits of effective stormwater runoff management can include: protection of wetlands and aquatic ecosystems.

Will Harman – Hierarchy of Stream Functions and Restoration

Recommendation 5 (June 6)

Modification to the land use management ordinance (LUMO) to address the 100 year storm event in Chapel Hill

1. Recommendation to update the Land Use Management Ordinance to address the 100-year storm event.
   Recognizing the impact of climate change to the strength, duration, and occurrence of storm events as well as the increased reduction in permeable land there is a need to implement stormwater ordinances that address the 100-year storm event.

2. What adopting this recommendation would mean in practice and what benefits they would have?
   The Town of Chapel Hill is working on a rewrite of the LUMO which will be a multiyear process. It is not necessary to wait for the entire LUMO to be updated to implement this change. The Town Council can implement this change to the existing LUMO with a public hearing and a vote. Implementing this quickly will impact the mitigation of stormwater and flooding as we continue to build in Chapel Hill.

3. How would implementation of this recommendations be different from current Town operations?
   Chapel Hill currently has stormwater management ordinances to address a 25-year storm event.

4. Equity Framework who benefits, who bears the cost.
   As Chapel Hill continues to build and the storms continue to intensify more citizens will experience flooding. Making sure that new development does not add to the existing problem will be critical especially to citizens that are not able to afford remediation and to the roads that everyone must use. The cost of this program will primarily be an incremental cost to the developer of the property.

5. Sources:
   https://nrcsolutions.org/mapping-planning-regulation-regulatory-and-policy-approaches-to-address-hazards/

Recommendation 6 (June 6)
Community and Staff Engagement in Stormwater Policy Improvement

Summary
The Mayor's Booker Creek Working Group is preparing recommendations to go to the Council in the fall. The charge to the Working Group is to develop general policy recommendations for stormwater management to substitute for the construction of six flood water storage projects now disapproved by the Council. The small Working Group has operated without a close working partnership with the Town's technical staff and without interaction with a range of stakeholders. For these reasons the Working Group has not been able to go beyond broad recommendations to redirect some parts of the Town's stormwater program. After receiving the Working Group recommendations, the Town can carry the effort further by assigning responsibility for stormwater program improvement leadership within the Town staff and engaging a wide range of stakeholders to work directly with Town staff members to develop detailed program changes and action plans. The Town of Cary has provided an example of how this broader effort can be very effective. Chapel Hill could choose to follow their example as adapted to meet our needs.

Initiation and Operation of a Community Effort
The Cary initiative began with strong leadership by the Town Manager. The town established three objectives for stormwater management improvements: restoration of open space, flood mitigation, and reduction of flood losses. To pursue these objectives, the Town established six committees:

Steering Committee
Stakeholders
Basin Modeling
Town Ordinances
Open Space
Maintenance

On most of these committees Town staff members from several departments worked closely with such stakeholders as home and business owners and developers. Having staff members work directly with stakeholders built mutual understanding and led to recommendations that had consensus support.

The Committee recommendations have led to many specific policy and program improvements. Some examples are:

—Changing Town ordinances to require mitigation of the 100 year flood and making grants to help developers meet this standard.

—Developing a dynamic flood model to allow flood damages to individual structures to be evaluated. Consideration of a range of measures determined the most cost-effective method to reduce damages in each case. In some cases the Town has bought structures with repeated flood damages and converted the sites to open space.

—Setting priorities for acquiring Town owned open space to meet both recreation and flood damage reduction purposes.

—Higher standards for floodplain management to reduce future flood losses and to give residents lower rates on flood insurance through entry into the FEMA Community Rating System.

—An innovative program that can pay developers to install stormwater management improvements with significant public benefits as a part of their own construction contracts. The Town benefits by getting quicker construction and lower costs.

Differences from the Current Chapel Hill Approach

Under this recommendation, the Town staff would work directly with stakeholders and outside experts in committees with specific assignments, such as improving Town ordinances and using basin models to find the most cost effective flood damage reduction measures. Collaboration between the staff and stakeholders would build mutual respect and understanding and produce consensus recommendations with a good chance of adoption. Leadership by the Town Manager would guide follow up and implementation.

Supporting Documentation

Cary's Adaptive Stormwater Journey

Adaptive Stormwater 5.1.18

The Path to the Community Rating System

Recommendation 7 (June 27)
Standards for Approving Major Stormwater projects

1. Summary of the recommendation
The mission statement developed by the Booker Creek Working Group appointed by Mayor Hemminger sets out principles and standards to assure that our recommendations meet a high standard of cost effectiveness, minimization of environmental damage, and equity. The Working Group recommends that significant Town stormwater management projects meet these same standards.

2. Effects of the strengthened principles and standards on Town projects
Town stormwater projects of significant cost and potential environmental impacts should meet the following standards:

—Costs should be estimated by including all foreseeable types of cost and using the best available data. Benefits should be estimated for specific types of results, such as avoiding street flooding during storms of specified frequency or reducing property damages to houses and businesses. In the case of structural flood damage, an estimated depth damage curve should be developed to determine estimated monetary benefits. Benefits should exceed costs for any project to be approved. If project costs increase greatly above amounts approved by the Council during project design, the project should be resubmitted to the Council for review and reconsideration.

—Environmental damages related to a proposed project should be described using available quantitative data. All negative impacts such as loss of forest stands and associated climate benefits, damage to riparian and aquatic habitat, and loss of wetlands should be considered.

—Projects should be reviewed for equity considering all income and demographic groups in the project area.

—A summary of project benefits and costs, environmental impacts, and equity considerations should be presented to the Council before a decision on project approval and funding.

3. Differences from the Current Chapel Hill Approach
The seven proposed flood water storage projects can be used as an example. The WK Dickson study and other Town materials do not estimate the benefits of the projects in terms of reduced flood damages to houses and businesses. The Town did not do an additional modeling step that would allow depth damages curves to be estimated. A long table in the Dixon report shows potential reductions in flood elevations at many different addresses in the Bolin Creek watershed. But the Town used remote sensing data to estimate depth of flooding based on the

lowest adjacent grade, which does not have the usefulness of data on lowest finished floor elevation. The Town did not determine whether flood damage was actually occurring at these addresses or whether the proposed projects would significantly reduce damages. Therefore project benefits cannot be compared to project costs.

On the cost side, the cost of the Elliott project increased from $1,140,000 to $2,645,000 after consideration and approval by the Council (not counting additional funds added for recreation features). As a result of these deficiencies in both cost and benefit information, the Council was not able to make an informed judgment about whether the proposed projects were economically justified.

The Dickson report did not include an environmental assessment documenting the loss of mature forests and associated climate benefits or the significant loss of wildlife and aquatic habitat that would result from the clearing of riparian forests and the excavation of floodplain topsoil. This information was therefore not available to be weighed by the Council when the projects were approved.

4. Supporting documentation

See the information provided by Mecklenburg County and the Town of Cary for earlier Working Group meetings.

Recommendation 8: For Chapel Hill to Enter the FEMA Community Rating System (September 12)

(draft received from Jeanette Bench July 26)

1. Recommendation to enter the FEMA Community Rating System (CRS)

The Community Rating System provides incentives to a community to implement new flood protections. The incentive takes the form of reduced flood insurance premiums for the community's property owners.

2. What adopting this recommendation would mean in practice and what benefits they would have?

a) Reduction of Flood Premium rates for property owners. Rate reduction for high hazard area from 5 to 45%. Rate reduction for low hazard areas from 5 to 10%
b) Increased Public Information concerning flooding including real estate disclosure to prospective buyers.
c) Mapping and Regulations including guaranteeing that currently open public or private floodplain parcels will be kept free from development.
d) Flood Damage Reduction to existing development including a flood hazard mitigation plan, floodproofing, elevating, acquisition and drainage system maintenance.
e) Flood preparedness including a system for recognizing the treat of dam failure, practicing emergency responses and coordinating with operators of critical facilities.

3. How would implementation of this recommendations be different from current Town operations?

Chapel Hill currently practices many of the activities outlined by this program. The activities need to be documented and enhanced to participate in the program and receive the reduced flood insurance rates. Reduced rates have the potential to impact homeowners, businesses, UNC and all town owed properties. Additional benefits include enhanced public knowledge and flood preparedness as well as less property damage.

4. Equity Framework who benefits, who bears the cost.

The FEMA activities include real estate disclosures. Chapel Hill should enhance the notification requirement to include all landlords of residences and business. When a property that floods is rented or changes ownership the new residents should be connected to the town early warning system.

The Eastwood Lake dam is approx. 90 years old. A failure of this dam would cause loss of life. Recognizing the threat of dam failure and practicing emergency responses would benefit all people in its path.

5. Sources:

a) A short FEMA document that describes the program: https://www.fema.gov/floodplain-management/community-rating-system
b) Link to the Booker Creek Working Group's April 25, 2022 presentation that was given by the Stormwater Staff in Cary: https://chapelhill.granicus.com/MediaPlayer.php?clip_id=5656
c) FEMA's new methodology (Risk 2.0) for determining flood insurance rates which results in higher rates for high risk properties. https://www.fema.gov/flood-insurance/risk-rating

Recommendation 9: To Set Priorities for the Maintenance of Existing Stormwater Facilities in Chapel Hill (September 12)

(draft received from Jeanette Bench, Sept 2, 2022)

1. Recommendation to set priorities and annually report to the Town Council the maintenance of existing stormwater facilities including storm basins. Reporting to include a status of town owned facilities, DOT owned facilities, and facilities that were built on private property as part of a development agreement.
    a. Ongoing maintenance is critical to the performance of every stormwater system. Without regular maintenance, the system will eventually fail due to buildup and structural issues, and routine upkeep can prevent costly rehabilitative and restorative repairs. Maintenance plans should include Inspection of all structures, removal of trash and debris, sediment control, structural maintenance (stabilizing poor coverage and erosion), vegetation management (mowing grass, removing nuisance or invasive growth, managing beneficial species).

2. **What adopting this recommendation would mean in practice and what benefits they would have?**
    a. Culverts that have filled in with silt and debris cause urban flooding. A maintenance plan which includes annual reporting to the council will prioritize maintenance within the stormwater department.
    b. The culverts that are under DOT maintained roads are currently not maintained by town staff. Failing to maintenance these culverts can lead to flooding of the town's major artery roads and the surrounding area. Town staff needs to ensure that the DOT road culverts remain free of silt and debris either by following up with the DOT to complete the work or completing the work within the department.
    c. The new Elliot Road Storage Basin (Booker Creek Basin Park) does not have a maintenance plan. Creating and funding a plan to remove invasive growth and ensure that the replacement trees survive is critical to the functioning of the Basin.
    d. New developments are responsible for maintaining their stormwater infrastructure. Requirements for annual reporting and the issuing of an Evergreen Letter of Credit for maintenance security should be instituted. See below for an example of this program in Cary.

3. **How would implementation of this recommendations be different from current Town operations?**
    a. The Town does not require Evergreen Letters of Credit of private developers or on public projects.
    b. The new Booker Creek Basin does not have an ongoing maintenance plan.
        i. The invasive species in the wetland area were not removed when the basin was created. There is no plan (other than a one-year warranty to replace plantings) to ensure that the replacement trees will survive. The loss of native vegetation will impact the water quality and increase the water flow rate.
        ii. The town needs to follow the maintenance practice that is required of private citizens. When the Lake Forest Association created a forebay for Eastwood Lake they were required by the permit to have a five-year maintenance plan on the section of the creek that they restored as a tradeoff for being permitted to create the forebay. This included an annual review by town stormwater staff and replanting all items that did not survive. A formal report was created and executed for five years. The town Stormwater Department is not holding itself to the same standard.
        iii. As stated in the Dickson Watershed study, all basins require ongoing maintenance for them to be effective.

4. **Equity Framework who benefits, who bears the cost.**
    a. Chapel Hill is currently in the process of expanding the housing supply. The Evergreen Letters of Credit would cost the developers as well as allocating staff time to oversee the program. Ensuring that the stormwater facilities continue to perform as designed will benefit the residents of the housing as well as the town as whole in terms of the flooding of roads and neighbors. The Stormwater Staff needs to be particularly vigilant on the affordable housing that is currently being constructed.

5. **Sources:**
    a. The Town of Carly's program to ensure maintenance of stormwater facilities on new developments including the Evergreen Letter of Credit for maintenance security https://www.townofcary.org/services-publications/water-sewer/stormwater-management/watershed-protection-and-nitrogen-control/stormwater-bmp-paperwork

b. Culvert under Franklin Street (DOT owned Road) near the Starbucks at Eastgate. The right side is filled with silt.

c. The Lower Booker Creek Watershed Study: Draft Report Comments 01/13/2017 Pages 22 and 24 http://bookercreekplan.org/lower-booker-creek/
    i. Community input from Paul Jansen on 11/15/2016:
    ii. Restoration and Maintenance: From experience, the construction is easy compared to the restoration and maintenance required to keep these detention basins functional. Plantings have to be timed in very tight planting windows and then irrigated to make sure they take. Once the protective canopy and forest root system is removed storms will wash away soil and plants before they root and take. Invasive plants and weeds need to be removed on a regular basis and replacements made for plants that don't survive. These public detention areas are routinely neglected. By contrast, the natural wetland system that currently exists appears to be working in the New Parkside and ML King areas.
    iii. Response (Restoration and Maintenance): We agree that the **maintenance of all stormwater infrastructure is critical to its success.**

Recommendation 10: Utilize existing water bodies for flood storage (September 12)

(draft received from Pamela Schultz, Sept 9, 2022)

1. Summary of the recommendation:

This recommendation supports the use of existing water bodies for flood mitigation projects. The two primary projects of interest are Lake Ellen & Eastwood Lake. Lake Ellen is a 7-acre lake in the Booker Creek headwaters. Eastwood Lake is a 50-acre lake further down in the watershed. Both are privately owned lakes that are formed by dams on Booker Creek. These lakes were built for recreation and aesthetic reasons, but they were not designed for

flood management. We recommend the town form private-public partnerships to utilize existing water bodies for flood mitigation.

Both of these lakes have a tremendous benefit in that they are already existing water storage facilities. As stated in the Booker Creek report, Eastwood Lake is the “largest potential floodplain storage facility in the Booker Creek watershed”.

2. Program operation and benefits:

Using existing water bodies for flood storage can be achieved by lowering the permanent water level below the current level maintained by the dams. The difference between the current water level and the lowered level would provide flood storage. This may require modification to existing structures (dams), as well as, some stabilization of the shoreline. A permanent lowering has the benefit of providing flood storage whenever it is needed. Another possible source of flood storage is to lower the water level seasonally or in anticipation of a storm. These approaches require more active management than the permanent lowering of the water level, but may also provide additional storage.

3. How is his recommendation different from the current Chapel Hill Town operations:

The town of Chapel Hill has already been pursuing Lake Ellen as a possible flood storage project and we support the town continuing to pursue this project.

Eastwood lake was not identified as a possible flood storage project in the past; however, members of the Eastwood Lake community have shown recent interest in working with local officials to explore how the lake could be useful for both recreation and flood storage.

4. Who benefits? Who bears the cost?

These projects have the potential to be a significant win-win-win. There are benefits to the residents at these private facilities to have the support of the town in maintaining the water bodies' infrastructure. There is a benefit to downstream residents to increase the flood storage capacity of the watershed. The final win is for the environment, as these projects utilize existing water bodies, thereby limiting environmental impact.

Private-Public partnerships can be challenging to negotiate; however, based on the significant benefits of these projects we support the town working with these communities to make the most of the existing town infrastructure. This could require seeking grants or consulting mediators with experience in negotiating similar agreements.