



TOWN OF CARRBORO

Stormwater Advisory Commission

301 West Main Street, Carrboro, North Carolina 27510

R E C O M M E N D A T I O N

THURSDAY, APRIL 9, 2020

Review of Discussion at the February 13th RainReady Presentation

Motion was made by Dickson and seconded by Paul that the Stormwater Advisory Commission of the Town of Carrboro has reviewed the community discussion at the February 13th RainReady presentation and provides the report presented below.

VOTE:

AYES: (Cox, Dickson, Joca, O'Connor, Paul)

ABSENT/EXCUSED: ()

NOES: ()

ABSTENTIONS: ()

Randall C Dodd 4/11/2020
(for Chair) (Date)

Summary of Comments at CNT Presentation in their Toms Creek Neighborhood Survey

This is a summary of comments made by town residents at a public meeting, together with responses prepared by the Town of Carrboro Stormwater Advisory Commission (SWAC). The Carrboro SWAC was established 2 years ago and is composed of volunteer fellow Carrboro residents with expertise and/or interest in helping guide the Town's Stormwater Program. We present this summary and response in the spirit of collaboration, as fellow citizens similarly concerned about controlling stormwater runoff and its effect on our community and its natural resources.

The public meeting was held on February 13, 2020 to review and accept comments on work by a consultant. The Center for Neighborhood Technology (CNT) has been retained by the Town to engage residents residing in the upper Toms Creek watershed (above Main Street) and to explore understanding and interest on lot level solutions regarding localized flooding. Although upper Toms Creek was selected as the project focus, the intent is to apply results and lessons learned throughout Carrboro. CNT provided a presentation focusing on scope of their work and the results of a survey of neighborhood residents in the study area. The lot level solutions being explored by CNT are part of a broader plan to address stormwater runoff throughout the Town of Carrboro. The Town has been developing, and will continue to develop, stormwater solutions for streets, roads, parking lots, and the other public properties within its domain. The development of the Stormwater Utility will continue to help position the Town to improve stormwater management town-wide, including in the Toms Creek neighborhood. However, the SWAC wants to emphasize that stormwater is everyone's responsibility. Often, a substantial amount of stormwater runoff comes from our own personal property (e.g., roofs, driveways, compacted lawns, etc.). CNT was asked to address what individual lot owners can do to reduce the impacts they are experiencing as well as their contribution to broader challenges, while the Town continues its own efforts with its own property. This is only one example of the many ways in which the Town is helping to solve stormwater problems.

Audience members had many questions and comments about CNT's work following the February 13th presentation by CNT staff on a resident survey regarding interest in lot level stormwater solutions. The meeting was videotaped to capture both the presentation and ensuing discussion. CNT is using information gathered to further inform the report they are preparing for the Town regarding these lot level solutions.

However, many comments were made at the meeting that were outside the scope of CNT's work. Responding to these comments would likely have resulted in long discussions that did not relate to the work undertaken by CNT. Because the time for CNT to answer questions was limited, an effort was made to simply note comments that were beyond CNT's scope. Members of the Carrboro SWAC have reviewed the video made of the meeting, as well as contemporaneous notes made during the meeting, to try to capture all of the comments and questions posed by attendees that were not addressed during the audience follow up.

Below is a summary of these comments, together with discussion prepared by the Carrboro SWAC. There were nine commenters. Comments from various commenters have been grouped together for simplicity of discussion/response into the following categories: Location of flooding, historic causes, factors contributing to flooding, climate change, development, solution funding and homeowner assistance, solution scale, and specific solutions.

Location of flooding

Is flooding only happening in Toms Creek? Are there other basins in Carrboro similarly affected by runoff, or is this unique to Toms Creek? (RES9)

Flooding is a concern throughout Carrboro, including further downstream along Toms Creek and in the Bolin Creek and Morgan Creek watersheds. Flooding has been an issue to some degree in cities and towns throughout North Carolina. Up until passage of the National Flood Insurance Act of 1968, there were limited regulations on development in floodplains, and houses were built without regard to either location within the floodplain or finished floor elevation with respect to the elevation for the 100-year flood. After passage of the Act, local governments were required to prohibit development in the floodway, and to require structures to be elevated with the finished floor at least two feet above the elevation of the 100-year flood. Carrboro joined the National Flood Insurance Program in 1976.

Certainly, other factors contribute to changes in flooding over time. Some of the more important of these factors are briefly discussed further below.

Flooding is occurring upstream (along the channel) and is not just an issue of upstream runoff impacting downstream property owners. (RES1)

This comment followed a question by a member of the SWAC about how to engage residents who are not being impacted by flooding but whose runoff is contributing to impacts. The main channel of Toms Creek, including the upper end of the channel, is being fed by small tributaries, flow through ditches, swales, and pipes, and overland flow from land that is upslope from the channel. Lot level practices at these upslope properties can slow runoff and reduce the volume of runoff.

Houses that are away from the channel may be at a high enough elevation to experience only localized ponding from uneven drainage. The homeowner might choose to address that ponding using lot level practices that retain and infiltrate the runoff, but they may also simply regrade to release the water faster, exacerbating downstream flooding. Even at the upper end of the Toms Creek, the manner in which stormwater is addressed at contributing properties impacts downstream flooding.

Ultimately, the entire community benefits from proper stormwater management, whether you live right on a creek or not, because proper management: helps our neighbors, sets an example for the communities upstream of OUR drinking water to protect that water quality, protects our common downstream water resources (e.g., Jordan Lake and ultimately coastal North Carolina), and protects the common town resources (roads, bridges, etc.) that our tax dollars support.

Historic causes

One hundred years ago, Plantation Acres would not have had any trees, that is why it is “Plantation” Acres. (The land) was likely plowed continuously, and the topsoil has been eroded off these high areas. In my yard on a rainy day if you dig six inches down you get to dry clay, so the neighborhood that we live in is prone to runoff. (RES9)

We see this in our yards as well. The process of soil loss began in the Colonial period when virtually the entire area east of the Appalachians was logged for shipbuilding and other purposes. On top of the loss of forest cover, early farming practices resulted in a massive loss of topsoil throughout the United States with drastic consequences (e.g. dust bowl), eventually leading to efforts to educate and support farmers’ efforts to control soil loss (e.g. establishment of Soil and Water Conservation Districts).

Maintaining forest cover is one of the best things we can do to help, but natural processes take an extraordinarily long time to achieve recovery. Areas on clay soil that are maintained in forest cover for more than fifty years have been shown to still have fairly

shallow topsoil, indicating that much longer timelines may be required for natural processes to reestablish a deep soil horizon.

This is a concern in many areas of the country. Research is underway to explore various ways of amending soils to improve water retention and infiltration.

Preventing soil loss is essential for restoring topsoil so that they can act as sponges to absorb rainwater. Homeowners that are experiencing erosion can request guidance from professionals with expertise in stormwater management and ecosystem restoration.

Factors contributing to flooding

Trees/lawns: She has lived in her house for 40 years and while there have been some issues with runoff and flooding in the past, it was not bad until the last 10 years. Concerned that waters coming from more places, she has a friend on Mary Street and they're getting runoff from Phipps and Simpson that they never had until the last ten years. There are new people coming in and cutting down trees on their lot in order to have lawn. Lawns are not appropriate for this watershed; we need to have a better ethic and have people leave trees on their property. (RES7)

Trees and forests have many benefits including improved air quality, reduced air temperatures in summer, reduced heating and cooling costs, increased property values, habitat for wildlife, and recreation and aesthetic value.

Trees also have a major impact on reducing runoff. Anyone who has stood under a tree to avoid getting wet at the beginning of a heavy summer rain shower has experienced the ability of tree canopy to intercept rainfall, a portion of which never reaches the ground. Tree roots and leaf litter both help to break up heavy soils and create soil conditions that promote the infiltration of rainwater into the soil. In forests, trees take up much of the rainwater, releasing it into the atmosphere through evapotranspiration. Trees reduce the amount of runoff, and they also help to slow down and temporarily store runoff, which further promotes infiltration, and decreases flooding and erosion downstream.

Maintaining tree canopy and understory vegetation are necessary to promote natural processes that will restore natural watershed function. The Town is developing guidance for homeowners to promote the care, preservation, and retention of trees, among other practices. The Town cannot prevent people from removing trees on private property, but a widespread educational campaign about the benefits of trees (especially native canopy trees and especially compared to turf) could prevent, or at least decrease, the practice of trading out trees for lawn.

Climate change:

Flooding has increased in the last 15 years. (RES1)

She has lived in her house for 40 years and while there have been some issues with runoff and flooding in the past, it was not bad until the last 10 years. Concerned that waters coming from more places, she has a friend on Mary Street and they're getting runoff from Phipps and Simpson that they never had until the last ten years. (RES7)

Concerned that it seems we've been having greater (than 100-year) floods (RES7)

It should be understood that we live in a time period where we have been experiencing a lot more rain with more frequent and heavier storms. (RES9)

In my neighborhood in Plantation Acres the houses were built in the 1970s, the neighborhood is largely built out, and there are areas where rain is coming not from the street but from behind houses and flowing in-between houses, trenching over and overflowing streets, and that is coming

from impervious surfaces, it is from increased rainfall. This goes to the point you (CNT) made earlier about urban flooding, localized flooding versus stream overbank flow. (RES9)

Because of the increase in rainfall and the changes in rain patterns, the retention ponds may not be working as well as they have in the past. (RES9)

The 15-year period began with two major droughts that occurred between 2005 to 2007. Annual rainfall during this early period was 13 to 57% below the 30-year average.

*For the last six years of this 15-year period, annual rainfall has been **above** the 30-year average. Even more significant than average rainfall, the **frequency** of major storms has been more than double the average. However, the most significant change from 15 years ago is that the **intensity** of major storms has increased.*

The increase in storm intensity means more rain is falling in a shorter period of time. The higher average rainfall results in wetter overall conditions, with soil more often being saturated and therefore unable to absorb more water. The increase in the frequency of major storms means all of this is happening more often.

Eastern North Carolina has experienced even more severe conditions, with locations experiencing storms that exceed a 1,000-year recurrence interval, based on current standards.

Design standards currently in use throughout the state have been established based on long-term records. Local governments and researchers have acknowledged the urgent need to update statewide design standards to reflect recent data, particularly rainfall data from the last nine years.

Development

Town did two things in the last 15 years that increased flooding. One was to install sidewalks in the neighborhood, which increased runoff. (RES1)

Sidewalks provide for pedestrian safety. Sidewalks are located within the corridor of existing roadways, and the additional impervious area is relatively small. In some locations, a ditch may have been piped as part of the sidewalk construction. The cumulative impact of these changes is likely to be small compared to the impact of changes in storm frequency and intensity.

Municipal projects are undertaken based on available knowledge at the time. Certainly, if the project were initiated today, additional measures would have been considered during planning and design.

Town also allowed a forest to be developed (15 houses) that produced twice as much runoff. Going forward Council is allowing new commercial development (Lloyd Farms property). Don't keep taking out green; don't keep allowing development. (RES1)

It is a misconception that the Town "allowed" development. Property owners have a right to develop their property in accordance with existing zoning and applicable development codes.

The residential development in question was required by code to manage stormwater runoff so as not to increase peak flow for the 1-year, 2-year, 5-year, 10-year, and 25-year design storm events. The commercial property at Lloyd Farm had a right to develop that property to meet this same set of standards; however, because the developer wanted to rezone part of the property, the Town was able to negotiate the inclusion of a requirement to also manage peak flow from the 100-year storm. Given the alternative of developing to

a lower standard under existing zoning, the SWAC supported the rezoning with the condition of managing the peak flow for the 100-year design storm.

Ask developers at the Shops at Lloyd's farm to include permeable pavement and to include rain gardens, bioswales, and similar measures? I'm very concerned about their ability to actually mitigate runoff for the hundred-year flood as they are planning to do. (RES7)

The site does not have the appropriate topography to store runoff from the 100-year storm in a detention pond. The engineered alternative would be to use underground storage of stormwater in chambers underneath parking areas. Underground storage is one of the most expensive approaches to stormwater management and is even more expensive when it is in a location that must also be designed for traffic loading. During the review of the rezoning request, SWAC recommended, and the developer's design engineer agreed to consider, including cisterns and/or blue/green roofs, rain gardens, permeable pavement, and other green practices. Use of the recommended green practices is likely to reduce costs, as well as improve performance.

Concerned about the development that has been approved across from McDougale School in the Hollow that is in this watershed. (RES7)

This project drains mostly or at least in part to Bolin Creek.

General concern about the sewer line running along the creek. (RES5)

Many sewer lines have been built close to creeks in urban areas. Over the last few decades we have learned about ways of protecting water quality and restoring aquatic life in our streams. One of the most important and cost-effective measures for such protection is through stream buffers: maintaining stream-side zones in an unmanaged, natural state with trees and shrubby/woody vegetation that help to filter runoff and to anchor the creek banks against erosion.

The goal of establishing vegetated stream buffers conflicts with the regulatory requirement that sewer easements be maintained in a manner that allows the utility to inspect, maintain, and repair the sewer line. Maintenance of sewer easements is typically done by mowing and/or removal of trees and other woody vegetation.

New sewer easements are now required to be located further away from streams, such that the area mowed to maintain access is outside a zone adjacent to the streambank that is required to be maintained in woody vegetation (trees and shrubby plants). The regulations that now protect stream buffers also provide that existing sewer easements and other existing uses are grandfathered, unless and until they are significantly modified/replaced.

It is anticipated that over time, vegetated buffers can become established along the banks of Toms Creek. Certainly, if any efforts were undertaken to modify the channel, federal and state permits to authorize the work would include requirements to establish a vegetated woody buffer to the extent practicable.

Solution funding and homeowner assistance

Consider asking a survey question about whether people are willing to pay higher fees in order to do large projects (e.g. replacing culverts and building retention ponds) as part of the solution. (RES8)

Housing affordability is a major problem, the possibility of financial assistance is huge, and we're pleased that it is being mentioned. The assistance should be needs-based. Because the meeting is on a Thursday night, the people most likely to need financial assistance may not have been able to attend (i.e. don't assume lack of interest in assistance based on attendance). (RES2)

SWAC members agree that equity, affordability and environmental justice need to be considered where appropriate throughout the development of the stormwater program. Affordability is a high priority especially in the development of Stormwater Utility rates and in development of a residential assistance program.

The SWAC also acknowledges that additional funding will be needed as the program develops over time to address all of the regulatory requirements and community priorities envisioned for the stormwater program. The Stormwater Utility is still relatively new, but the program needs to develop in a measured way. In 2019, Town Council identified additional priorities for the stormwater program that included flooding. The SWAC supported these priorities and also supported the recent increase in Stormwater Utility rates to begin addressing them.

The rate increase included development of rates for a high tier for residential lots with larger amounts of impervious cover. The SWAC had wanted to include more tiers in the residential rate structure during the initial establishment of the utility, but concerns over the quality of lot level data did not allow it at that time. Town staff have made it a priority to verify and correct data so that over time additional residential tiers can be added, and the residential rate structure can become more progressive.

Similarly, when a residential assistance program is developed, the SWAC recognizes the importance of supporting the needs of low- and middle-income families.

Solution scale

All these lot level solutions that you're coming up with are wonderful but just doing these is not going to fix the problem. (RES1)

The (CNT) study is only about individual measures that people could take and does not consider bigger solutions. (RES5)

There's a constellation of challenges here, it is individual, lot level, neighborhood level, subdivision level, town level - this is an ecosystem problem. I appreciate that the purview for this study was at the lot level and you've come up with some interesting things to look at that have not been talked about before. (RES2)

The SWAC acknowledges that lot level solutions will not eliminate flooding in Toms Creek. Flooding problems in urban areas were not created overnight and these problems are not going to be solved overnight. A comprehensive program will be required, involving measures taken at many scales, including individual, lot level, neighborhood level, and watershed. The higher the level, the higher the cost, and the longer the timeline for implementation.

The intent of the CNT study is to explore strategies at the lot level so that progress can begin right away, not only in upper Toms Creek, but throughout Carrboro. Appropriate lot level practices that address issues a homeowner is having with local drainage can also begin to reduce downstream impacts as well. It is important to promote and implement lot level measures throughout the watershed, particularly in upland areas as discussed above. The preponderance of single family residential land use in Carrboro (and in upper Toms Creek) requires attention at a lot level

Specific Solutions

My neighborhood is already very green. It is a very green neighborhood with plantings and gardens, etc., you should see the gardens. (RES1) This is a very green neighborhood. (RES5)

Gardening and green stormwater practices are not the same. Many people would say a neighborhood looks “green” simply because it has abundant lawns and large trees. A truly “green” neighborhood is one in which large canopy trees and native perennials thrive, stormwater runoff is captured and cleaned, plant and animal pests are controlled by other plants and animals instead of herbicides and pesticides, and leaves are left in place to protect soil, return nutrients to the trees and shrubs that shed them, and provide insect habitat. We see many “green” neighborhoods that fit that description in color only, not in practice.

That said, experience has taught us that avid gardeners are our BEST audience to target for adopting green stormwater practices. They take great enjoyment out of nature and growing things. They care about protecting the environment. If they use fertilizers, they use only organic, slow-release types, and they never apply phosphorus unless a soil test shows a deficiency. They pay attention to any areas of bare soil, providing seed and mulch to prevent erosion.

Gardeners will better understand the need to select an appropriate lot level solution for their soils and their problem. Gardeners will better understand the need to prevent soil erosion, and that a rain garden can be clogged and ruined if located downslope of eroding clay soils.

The greenest gardeners install cisterns to collect rooftop runoff to use in their gardens. They address issues with ponding by using rain gardens or bioswales, both of which include extensive soil amendment to promote water retention and infiltration. If they live along a stream channel, they may have live-staked the stream bank to establish woody vegetation to anchor the bank against the erosive power of storm flow.

Why can't we do permeable pavement? What are the trade-offs? Durability, cost versus what we're doing today? (RES6)

We agree that permeable pavement should be used more widely. Permeable pavement is generally placed over granular material that can store rainwater. This means that when permeable pavement is used on low permeability soils, it can still store and slowly release stormwater runoff. Regardless of the underlying soil, location is extremely important. Permeable pavement is most suitable and cost-effective for areas where traffic is less frequent and where traffic wheel loading is limited (e.g. do garbage trucks or dump trucks use the road?), with ideal locations being overflow areas in parking lots, and residential driveways. When located on frequently used areas of parking lots, permeable pavement must be designed to a higher traffic loading standard, and it must be maintained much more frequently. When used on public roadways the design must meet still higher standards.

Another aspect of location that must be considered is the potential hazard from clogging due to soil tracked on vehicle wheels or carried by stormwater runoff. Clay in local soils increases the hazard from clogging. Maintenance involves street sweeping with a vacuum sweeper as frequently as every two months, and running the sweeper very close to the pavement and at very slow speeds. Power washing has been shown to restore heavily clogged pavement under some conditions and may be required periodically.

Permeable pavement is part of the solution, but it is not a panacea. It is generally impractical to adopt permeable pavement for wide use in roadway construction in the Piedmont region of North Carolina, where the benefit is limited by the low permeability of underlying soils, and where clay soil carried on tires (track out) or by stormwater runoff will quickly clog the permeable spaces (interstices) within the pavement. However, with

appropriate location and design permeable pavement can be an effective component of efforts to mitigate the impacts of stormwater runoff in our area.

How about digging the creek deeper, wider? (RES1)

The (CNT) survey does not consider things like culverts, detention ponds and larger efforts that previous comments from the community have discussed. (RES5)

We agree with the need to consider large-scale measures, in addition to others discussed above. These will be expensive. To be cost-effective, large scale measures need to be planned carefully, coordinated with other measures likely to be taken, and implemented as part of a comprehensive systems approach. Some of the large-scale measures mentioned would be considered as part of such a systems approach.

However, it should be recognized that some of the specific measures mentioned are not likely to be considered. For example, dredging, straightening, and widening the creek would result in permanent environmental damage. Dredging is neither “green” nor consistent with Carrboro’s responsibility and desire to restore and protect the environment.

In the 1950s and earlier, it was common to dig creeks wider and deeper to get rid of water more quickly. This practice is more formally referred to as “stream channelization.” The US Army Corps of Engineers used to implement these projects with congressional authorization. With increasing awareness of the impacts of pollution generally, and the adverse impacts of channelization specifically, the mission of the Corps has changed to one of environmental protection. Even work on short sections of stream channel require permits from the Corps; before the Corps can issue a permit, state regulators must certify that the project will not harm water quality.

Straightening and dredging a stream channel permanently damages aquatic habitat and permanently reduces the potential for aquatic life support. For example, Ellerbe Creek in Durham was channelized in the late 1950s. Over the last two decades the city and state have implemented multiple projects on segments of Ellerbe Creek, spending millions to implement stream restoration projects to restore a more natural channel, and help improve water quality and aquatic life support.

Similarly, enlarging culverts at road crossings simply moves the flooding problem downstream. For Carrboro homeowners to be eligible to buy flood insurance, the Federal Emergency Management Agency requires the Town to provide documentation to state and federal regulators for any project or work on streams and stream culverts demonstrating that the project will NOT make downstream flooding worse.

As indicated by one commenter, flooding in Toms Creek is an ecosystem or watershed scale problem. Many different approaches at different scales will be needed to address existing issues.

Members of the Town of Carrboro Stormwater Citizens Advisory Commission understand that residents who did not experience flooding 15 years ago are frustrated at the increase in flooding in Toms Creek. The Town is pursuing funding from the Federal Emergency Management Agency to either elevate, or buy and remove, houses that are experiencing costly damage from repeated flooding. However, many properties along Toms Creek are experiencing flooding that does not reach the foundation of the home, but which nevertheless may affect homeowners in other ways such as their ability to enter and leave their property during a storm. The Town cannot fix these watershed-wide problems alone; it needs to work in partnership with homeowners and at a lot level to have successful, long term solutions to flooding issues. The SWAC supports development and

promotion of these lot level solutions as well as stormwater solutions for streets, roads, parking lots, and other public property.