Homeowner's Watershed and Stormwater Handbook

A Homeowner's Guide to Carrboro's Watersheds, Creeks, and Stormwater Management

September 2020

Prepared by the Carrboro Public Works Department, Stormwater Division and Stormwater Advisory Commission

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INTRODUCTION

This handbook provides information on local watersheds, why and how stormwater is managed in Carrboro and the responsibilities of residential property owners and the Town. One goal is to convey the collective impact of many distributed and similar activities on the larger watershed, its aquatic ecosystems, and other residents. Another is to communicate that drainage and flooding problems in and around your home can be costly and damaging, and potentially create problems for your neighbors.

The guidelines below could remedy many drainage or flooding problems you may encounter and help you design residential landscapes that are friendlier to local creeks and other residents. If you have an unusual problem or specific question that isn't addressed, reach out to the Town stormwater staff[1]. See Appendix 1 for more detailed contact information.

These four points are explored in this manual:

1) Residential lots exist within a nested series of watersheds. Since Carrboro's land use is predominately residential, homeowners and residents affect our local creeks' and communities' capacity for resilience in a time of more frequent and intense storms.
2) Carrboro regulates stormwater within its jurisdiction and is also regulated by state and federal agencies.
3) Drainage, flooding and floodplains, runoff, stormwater, creeks, watersheds, buffers, drainage easements, and other terms are interrelated but not synonymous. Better understanding of these terms and the concepts they refer to will facilitate better communication in the community.
4) This manual includes responses to many of the most frequent questions and requests the Town receives from residents and property owners.

CARRBORO'S STORMWATER MISSION STATEMENT

Our mission is to protect and restore local and downstream surface waters and support resilience and quality of life and place in relation to rainfall and runoff.

WATERSHEDS

What Is a Watershed?

A watershed is all the land, surface water (lakes, streams, reservoirs, and wetlands) and underlying groundwater that drains to a given point (Figure 1). The word "watershed" can be used interchangeably with "drainage basin" or "catchment." A watershed can be as small as a few square feet draining into a creek; or it could be large enough to encompass all the land that drains into a major river, estuary, bay or the ocean. Watersheds are like Russian nesting dolls – small watersheds that feed the smallest streams are part of larger watersheds that feed large rivers. For example, the Toms Creek Watershed is a subwatershed of the Morgan Creek Watershed, which is part of the Jordan Lake Watershed, which is part of the Cape Fear Watershed.

[1] https://www.townofcarrboro.org/287/Stormwater or stormwater@townofcarrboro.org

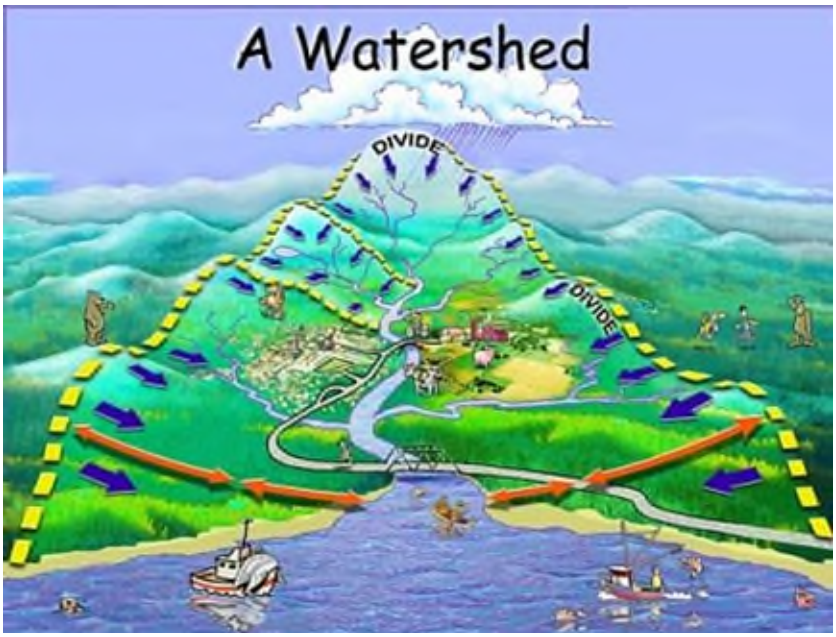

Figure 1 What is a Watershed?[2]

For this reason, the water quality of a receiving water body is directly related to its watershed and the streams that drain it. The streamflow and water quality of the surface waters, and sometimes groundwater, are affected by what is happening, human-induced or not, in the watershed.

Each Carrboro resident lives in a watershed that flows to a local creek. See Appendix 2 for maps of local watersheds.

What Is a Water Supply Watershed?

A Water Supply Watershed contains surface waters used for domestic water supply, to be protected by specific development and water quality standards.

The University Lake Watershed is one of two water supply watersheds for Carrboro, Chapel Hill, and UNC. (Cane Creek, located farther west, is the other.) University Lake is fed by several streams that comprise the upper Morgan Creek watershed. Its water is pumped to the OWASA water treatment plant in Carrboro and then distributed.

The Jordan Lake Watershed is a Water Supply Watershed for several other communities. All of Carrboro drains into this much larger watershed that comprises the headwaters of the Cape Fear River Basin. It's a regional water resource providing flood protection, water supply, and recreational benefits to people, and habitat for many aquatic and terrestrial species.

See Appendix 2 for maps of local watersheds.

[2] Source: http://www.clarkcountynv.gov/water-quality/Pages/KidsCorner.aspx

What Watershed Do I Live In?

Carrboro contains the headwaters of the Bolin Creek watershed and is located near the headwaters of several other watersheds:

1. Morgan Creek to our west;
2. The New Hope Creek watershed to our north and east;
3. The Booker Creek watershed to our east in Chapel Hill joins Bolin Creek to form Little Creek.

Every Carrboro stream and its tributaries have their own watersheds. These include Morgan Creek and Bolin Creek, and tributaries like Toms Creek, Jones Creek, Buckhorn Branch, Jolly Branch, Dry Gulch, and Tanbark Branch (Appendix 2). New Hope Creek, Little Creek and Morgan Creek all join at the upper end of Jordan Lake, a reservoir formed by the damming of the Haw and New Hope Rivers.

Bolin Creek has been listed as an impaired waterbody by the State of North Carolina and the United States Environmental Protection Agency (EPA) since the early 2000s. This means the stream is not meeting its water quality standards and is failing to support its intended uses. Local, state and EPA government partners created the Bolin Creek Watershed Restoration Team to develop and execute a strategy for improving water quality and creek conditions. Since the land use in Bolin Creek is heavily residential, the collective actions many homeowners take on their lots have a big impact on the creek.

STREAMS AND CREEKS

What Is a Stream?

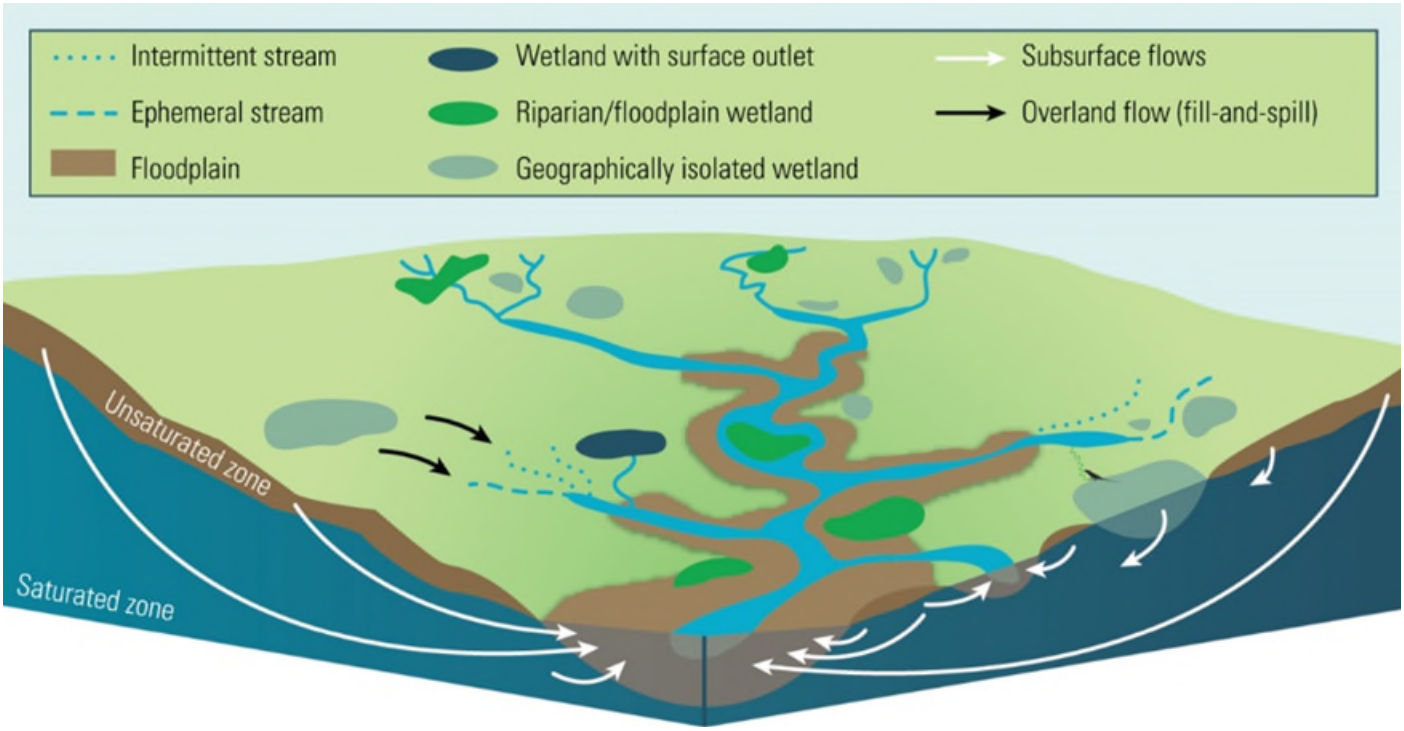

Figure 2 Stream Systems

A stream or creek is a body of water with surface water flowing within the bed and banks of a channel. Flow is controlled by surface and subsurface inputs, which can vary widely seasonally and between periods of rainfall. There are three types of streams (See Figure 3):

- **Perennial** streams, the largest type, have water flowing year-round
- **Intermittent** streams experience seasonal flows
- **Ephemeral** streams flow only during and immediately after rain events

You can follow the flow of water from its origins upstream. Just as a tree's structure can "flow" from smaller twigs to larger branches, creeks function similarly with smaller tributaries (twigs) joining together to form larger creeks and streams (branches). See Figure 2 to get a better idea of how flows relate to each other in a stream system.

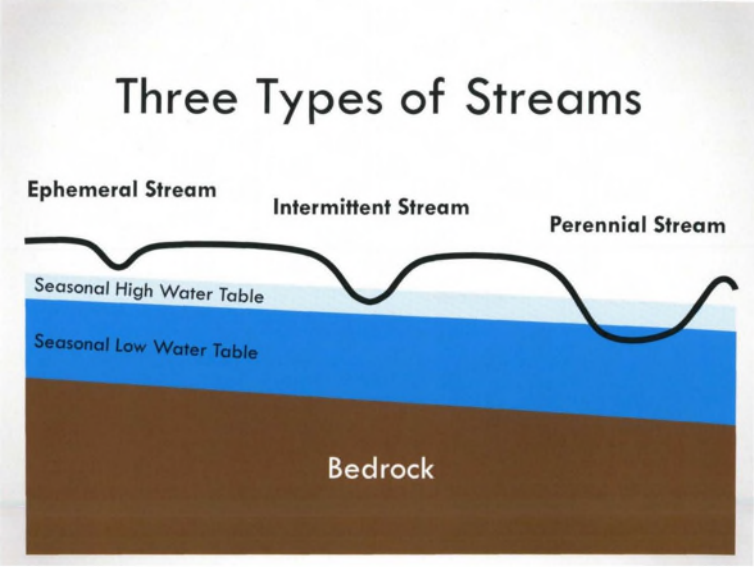

Figure 3 Types of Streams

Who Regulates Streams?

Ephemeral streams are the only type of creek solely regulated by the Town.

All intermittent and perennial streams are regulated under federal law and administered by both the **United States Army Corps of Engineers** (USACE) and the **North Carolina Department of Environmental Quality** (NCDEQ). The water quality is protected by the Clean Water Act as administered by the **Environmental Protection Agency** (EPA**)** and the State. Stream floodplains are regulated by the **Federal Emergency Management Agency** (FEMA) with support from the State and Town.

The riparian area adjacent to streams is also regulated by the State and implemented through the Town to protect Jordan Lake. The EPA and the State regulate the water quality of Jordan Lake and its entire watershed, in part by setting limits on the amount of nitrogen and phosphorus entering the creeks that feed the lake. The Jordan Lake Rules were in development for a number of years before being adopted in 2007 and have since been undergoing further review.

Why Are Streams Regulated?

This question could be answered from a legal perspective, which would get into 70 years or more of legislation and regulations! But the simple answer is that streams are regulated because prior to regulation, waterways were severely polluted. This interfered with the water cycle (Figure 4), and contributed to flooding, sediment build-up, erosion and run-off. These impacts have an adverse effect on people, plants and animals – the entire ecosystem.

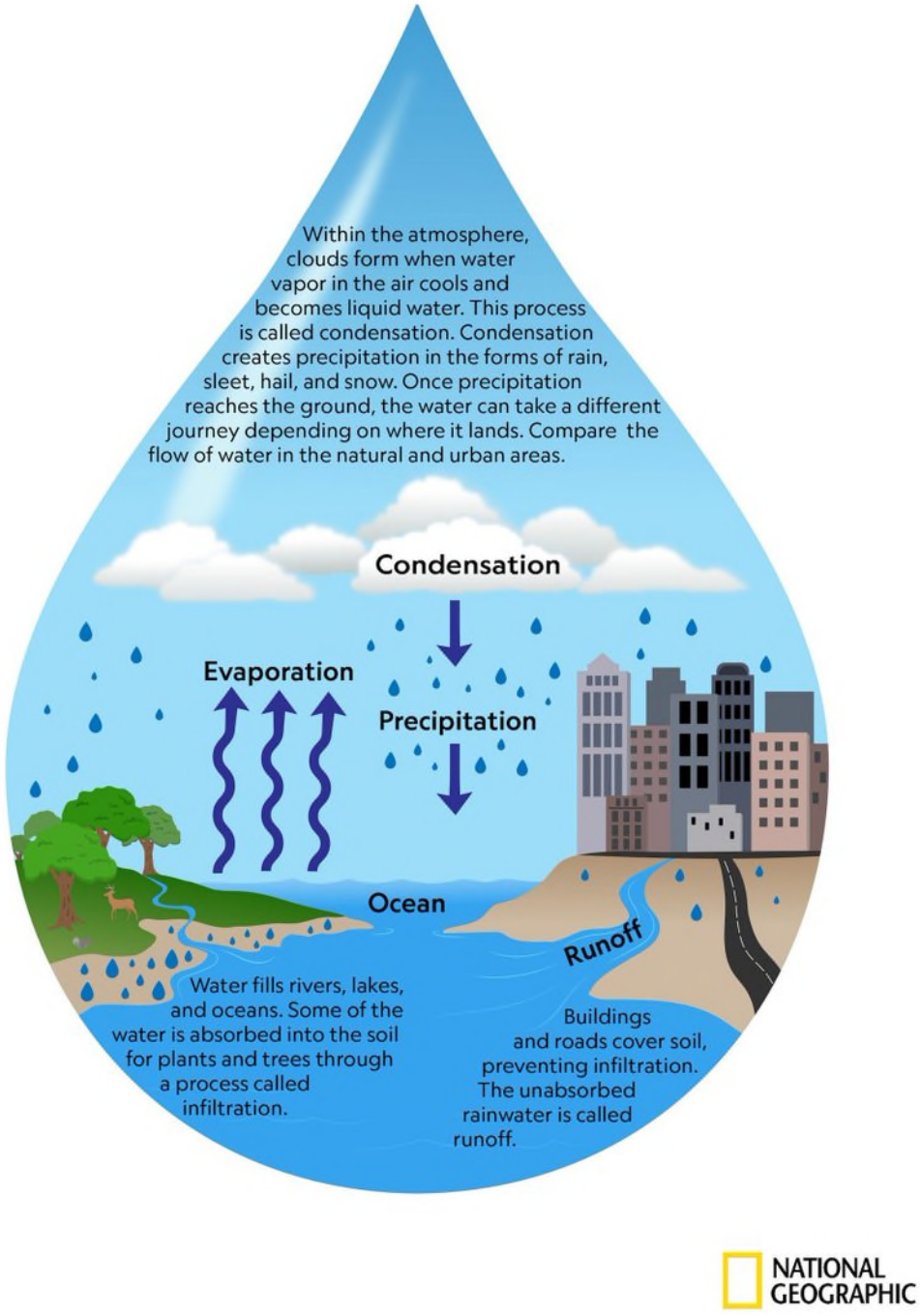

Figure 4 Water Cycle

How Do I Care For a Stream on My Property?

Though any stream flowing through your property and the larger creek or watershed is regulated by federal, state and local governments, **the care of the creek channel and its buffer is your responsibility as the property owner.**

A common concern for property owners is woody debris, the trunks, limbs and branches in a waterway. Larger accumulations are referred to as large woody debris (LWD).

Under normal conditions, LWD is a natural and important part of aquatic ecosystems and is not a problem. It provides food and cover for fish and insects that become food for larger animals, and it creates pools that are desirable habitats. LWD also offers erosion control and adds physical structure to banks and channel bottoms. In many cases, LWD can and should be left alone.

However, when too much woody debris accumulates, it can collect trash, alter how water flows, and present an obstacle for recreational enjoyment. When LWD disrupts flow patterns, increases erosion, poses a hazard or blocks structures such as culverts or bridges, property owners should:

- Determine if you need a permit to do the work. You don't need a permit to manage floating debris and logs that aren't embedded in the stream bottom or banks. Felling trees along a creek bank or removing embedded debris may require a permit from the NC Department of Environmental Quality and the Army Corps of Engineers. The Town's Stormwater Team can help you determine what approvals you need.
- Minimize disturbance of the surrounding habitat areas.
- Remove just enough debris to address the issue or concern and maintain the benefits provided.
- Utilize the debris when appropriate to benefit the stream, including re-orienting the wood or anchoring it to the bank or within the channel.
- If debris needs to be relocated, move it high enough and far enough away from the channel so it won't re-enter with high flows.
- Be mindful of surrounding habitat and minimize disturbance of these areas while conducting needed maintenance.

STREAM BUFFERS

What Is a Stream Buffer?

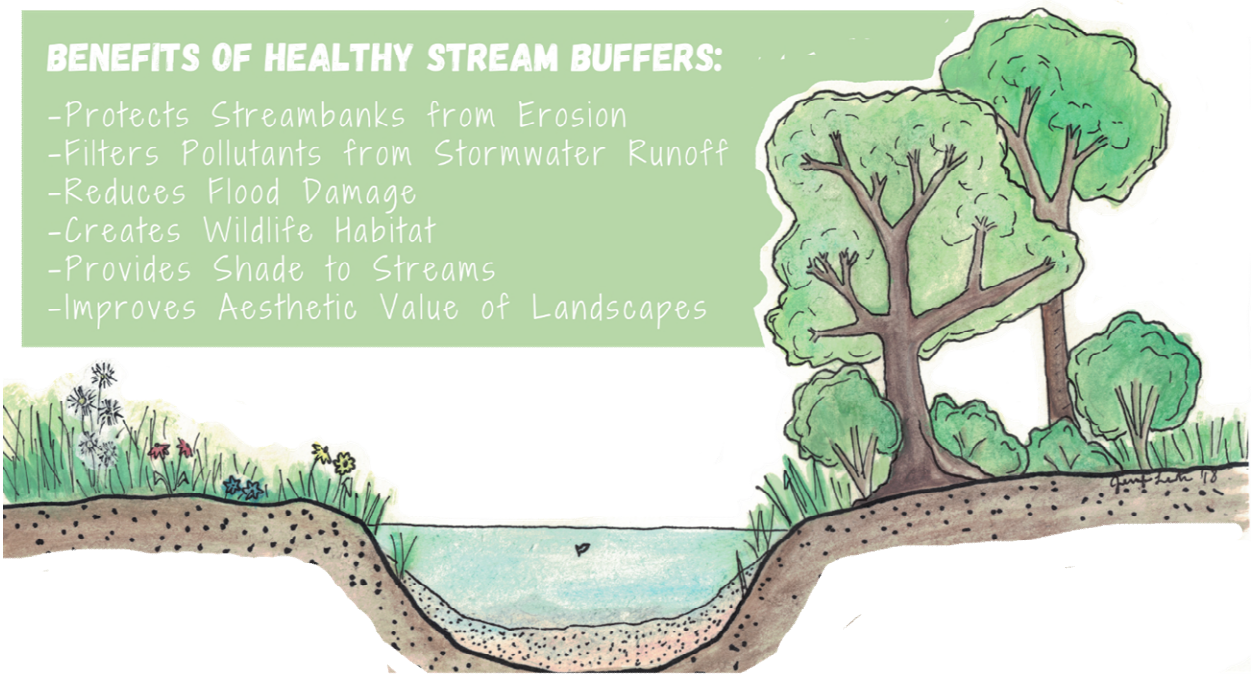

Figure 5 Benefits of Healthy Stream Buffers

A stream buffer is the undeveloped area parallel and adjacent to a stream that protects and enhances water quality. To be effective, a buffer should harbor abundant native woody vegetation that helps slow down, store and infiltrate runoff. These actions lower the likelihood of erosion, gullying, and downstream flooding (See Figure 5). Buffers should not have channels or pipes concentrating flow or experience much disturbance from transportation or utility corridors, structures, grading, or other human uses. These activities may compromise the ability of the buffer to serve its purpose.

How Do I Know if I Have a Stream Buffer on My Property?

Visit the Town's online Geographic Information System (GIS)[3] to determine if there is a stream buffer on your property. Click on the "Development Constraints" layer to see the buffers. Note that the data shown in the GIS does not represent surveyed data, and is, therefore, an approximation, and may need to be field verified. Stormwater and/or Planning staff are available to field questions. Contact information is available in Appendix 1 and at the Town's Directory[4]. Figure 6 shows a stream with its surrounding stream buffers. Zone 1 buffers, which begin at the top of the stream bank and extend for 30 feet, must remain undisturbed; Zone 2 buffers, which extend for 20 feet beyond Zone 1, must be vegetated, but certain additional uses are allowed.

[3] www.townofcarrboro.org/142/Geographic-Information-Systems
[4] www.townofcarrboro.org/Directory

Figure 6 Zones 1 and 2 Stream Buffers

How Do I Maintain a Stream Buffer on My Property?

Natural debris from outside the stream buffer, like bucked and or split logs, grass clippings, collected leaf piles, garden trimmings, etc., should not be stored within stream buffers. This material can clog storm drains and impact water quality. Naturally occurring downed trees and vegetative debris from within the buffer itself should be left to complete the natural decomposition cycle. More technical advice on streams and buffers is available from the Stormwater Division of Public Works upon request. Contact the Stormwater Division at Stormwater@townofcarrboro.org for more information or to arrange a visit.

What Is Allowed and Prohibited Within a Stream Buffer?

The Town enforces Water Quality Buffers as part of the Land Use Ordinance, Article XVI, Section 15-269.5, which outlines allowed and regulated activities. *If a particular activity or use is not specified, it is prohibited.*

The following is not intended to specifically interpret or substitute for these provisions but provides generalizations about managing vegetation in the buffer. Vegetation management within the Water Quality Buffer is allowable in these situations:

- Conducting emergency fire control measures provided that the buffer is restored
- Mowing and harvesting of plants in Zone 2 only
- Planting to enhance the riparian buffer
- Pruning without compromising the health and function of the forest vegetation
- Removing individual trees which are dead, diseased, or damaged; are in danger of causing damage to dwellings, other structures or human life; or are imminently endangering the stability of the streambank
- Taking out poison ivy and invasive exotic vegetation as defined by the NCDENR[5].

[5] Source: Smith, Cherri L., 1998 Exotic Plant Guidelines. DENR, Division of Parks and Recreation. Raleigh, N.C. Guideline #30.

Learn more about the role of stream buffers and how to restore or enhance them from the Clean Water Partnership[6]. Technical and regulatory guidance can be found in the Land Use Ordinance Article XVI[7].

How Do Easements Affect Activity on My Property?

An easement allows property owners to grant use of some amount of their land to others while retaining ownership and full access to the area. Most easements include a prohibition on building in or blocking the easement. Easements are recorded with the Orange County Register of Deeds. There are 3 types of easements in Carrboro:

Public Easements for Stormwater include drainage easements that allow the Town to maintain stormwater infrastructure on private property. They are generally granted and recorded to the Town.

Utility Easements are designated for overhead and underground electric, water, sewer, gas, telephone, and cable lines. The property owner may maintain the easement area but may limit use dependent on the easement holder's requirements. For more information on utility easements, please see the following websites:

- Duke Energy Easements: https://www.duke-energy.com/community/trees-and-rights-of-way/what-is-a-right-of-way
- Dominion Energy Easements: https://www.dominionenergy.com/company/safety/public-safety/right-of-way-use
- Piedmont Electric Easements: https://pemc.coop/about-my-co-op/right-of-way/
- OWASA (Orange Water and Sewer Authority) https://www.owasa.org/wastewater/

OWASA manages all easements it holds separately from local governments. For more information on OWASA-held easements, please contact OWASA directly at info@owasa.org or 919-968-4421.

Private Easements are restricted to and benefit a limited number of persons or a specific person. Examples are the right to use a driveway to access land, an HOA-owned drainage easement, or an access point to perform repairs or maintenance to a private stormwater infrastructure.

You can find out if there is an easement on your property by doing a plat/deed search with the Orange County Register of Deeds in person at the Orange County Courthouse (228 Churton St. in Hillsborough) or online[8]. Once you have determined the holder of the easement, please contact them for direction on what is allowable.

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[6] https://nc-cleanwater.com/2017/02/24/how-natural-vegetation-creates-stream-buffers-to-protect-waterbodies-from-stormwater-pollution-and-how-you-can-help-build-one/
[7] www.townofcarrboro.org/DocumentCenter/View/698/Article-XVI-Floodways-Floodplains-Drainage-and-Erosion-PDF
[8] https://rod.orangecountync.gov/orangenc/

The Town does not have municipal authority or jurisdiction to undertake any work on private property unless an easement has been offered to and accepted by the Town. This includes but is not limited to private drainage easements and private drainage structures.

STORMWATER

What Is Stormwater?

For the purposes of this manual, stormwater is water running off the land in an urban environment. In a natural Piedmont landscape without development, nearly 90% of precipitation is absorbed into the ground, taken up by plants, or returned to the atmosphere through evaporation (Figure 7). This gives needed water to flora and fauna, replenishes surface and groundwater reserves, and delivers water slowly to the stream via groundwater. In a developed urban landscape, more precipitation falls onto impervious surfaces that don't absorb water, like roads, sidewalks, rooftops, parking lots, or construction sites. As a result, the falling water is swept across these surfaces as runoff. This depletes groundwater and results in rapid transport of stormwater to the stream – causing more frequent and higher magnitude floods.

Figure 7 depicts the changes for a highly developed landscape like an urban core or downtown. The change isn't as great in less densely developed residential areas, but the general pattern is similar.

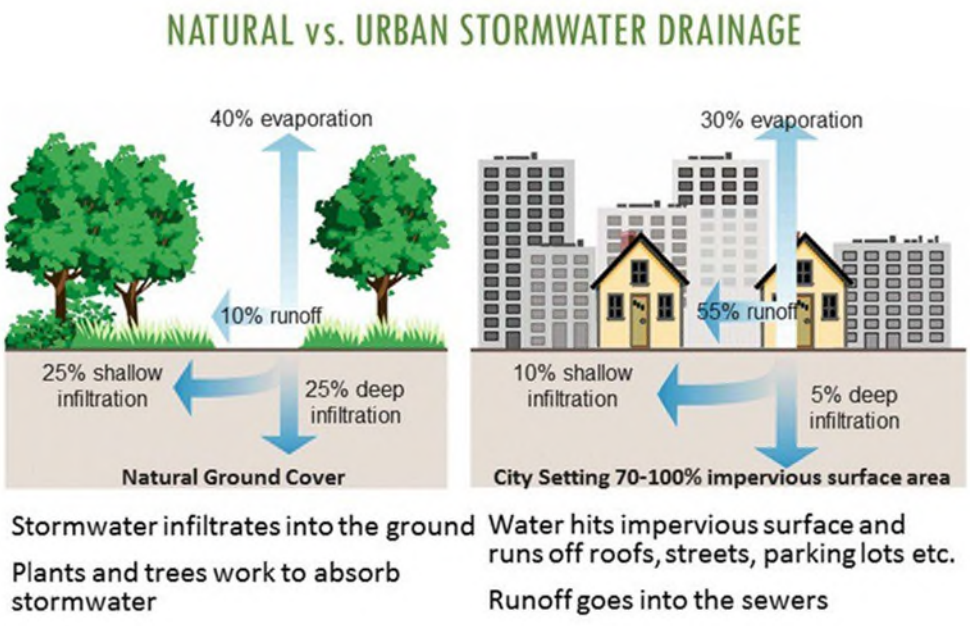

Figure 7 Impact of Urbanization on Stormwater Runoff

How Can Stormwater Runoff Be a Problem?

In a natural system, the soil ecosystem including plant root zones filter pollutants as water infiltrates and moves through the ground. Without infiltration, water flows across the ground as stormwater runoff, causing erosion and picking up pollutants and carrying them into local creeks, rivers and lakes, where they may eventually be transported to the ocean.

The most pervasive pollutant in Carrboro is sediment, not only from construction sites, but from overland runoff that sweeps away and displaces soil, gullys, and streambank erosion. Other important pollutants include:

- Pet Waste
- Automotive Fluids
- Yard Waste
- Fertilizer, Herbicides and Pesticides
- Trash and Litter

These pollutants can affect the water where we swim, play and get our drinking water. They also impact other species that live in and rely on creeks and other bodies of water. Runoff can also cause localized flooding when storm drains take on too much water and degradation of stream channels and reduced replenishment of groundwater

Most runoff from older development is conveyed directly to nearby streams, rivers, or other water bodies without treatment. Runoff from newer developments requires treatment via Stormwater Control Measures (SCMs) before entering streams. SCMs are designed to mimic the services provided by natural infiltration, slowing down the flow and removing pollutants.

By working together, we can reduce runoff and positively impact our creeks and keep them clean for everyone and all species to enjoy.

What Are the Components of the Stormwater Infrastructure in Carrboro? Who is Responsible for Taking Care of It?

Carrboro's stormwater infrastructure supports two main functions:

Stormwater conveyance refers to the network of above- and below-ground infrastructure that collects and moves runoff from its upstream origins until it reaches a stream (Figure 8). This includes ditches, swales, inlets (in yards, parking lots, along curbs), catch basins, junction boxes and pipes, including culverts.

Stormwater treatment refers to the management of runoff to reduce stormwater quantity and improve its quality using SCMs. Some SCMs are specifically designed for flood mitigation, for infiltration or filtration, or reuse of rainfall. Others are multifunctional and can also be integrated into a landscape for non-stormwater related benefits (e.g., aesthetics, pollinator support, carbon sequestration, etc.).

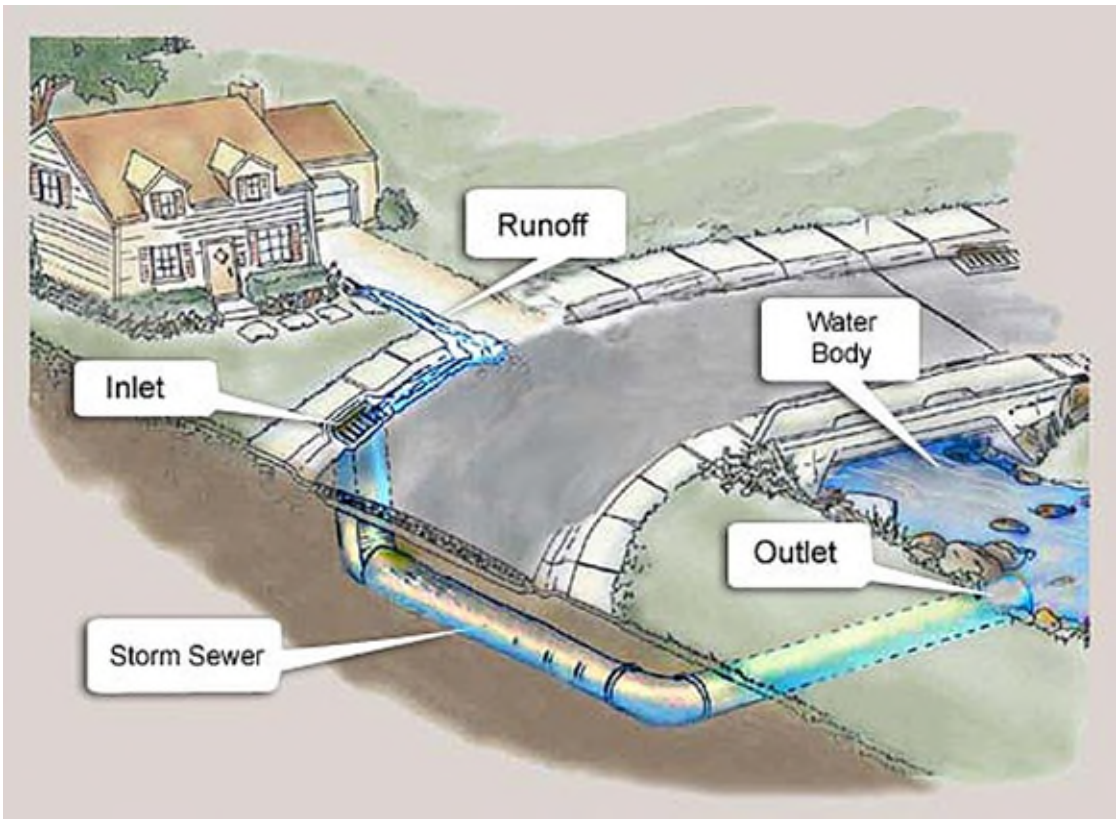

Figure 8 Swales, gutters, inlets, and pipes are all part of a Stormwater Conveyance System.

Figure 9 Bioretention Cells and Rain Gardens can remove runoff pollutants.

Carrboro relies on guidance from the State[9] for the approved types and design of SCMs, including:

- Green Roofs
- Level Spreaders
- Permeable Pavement
- Rain Gardens (aka, "bioretention cells" – see Figure 9.)
- Rainwater Harvesting
- Stormwater Wetlands
- Underground Detention Systems
- Wet Ponds and Dry Ponds

SCMs are most often built in conjunction with new development, but in some circumstances have been "retrofitted" into older developments. Once constructed, stormwater infrastructure requires on-going maintenance to ensure it continues to perform as intended. Maintenance of storage or flood mitigation SCMs typically includes removing accumulated sediment and debris, routine mowing, and minor repairs to the structures managing the inflow and outflow. Management of some SCMs, such as those that provide additional water quality benefits, can be more complex. These may require more intensive vegetation management, maintenance of flow control features, and restoration or replacement of filter media.

Public Stormwater Infrastructure

In Carrboro, almost all public stormwater facilities are the responsibility of the Public Works Department or the NCDOT for state-owned and maintained roads. The system is regularly inspected by both organizations. In Public Works, staff from the Landscaping and Grounds, Solid Waste, Streets, Engineering, and Stormwater Divisions are all involved.

Most of our public infrastructure is for conveyance. More recently, the Town has been pursuing water quality treatment projects. The Town's Land Use Ordinance focuses on new development, including treatment requirements for large storms; older development predates the ordinance.

Private Stormwater Infrastructure

Two principal types of private stormwater infrastructure in Carrboro are residential and commercial. For both, the design and construction of stormwater infrastructure are the responsibility of the developer; Town staff review and approve plans and construction. Long-term operation and maintenance are the responsibility of the property owner, including homeowner's associations. Private landowners are responsible for maintaining vegetation and clearing debris to ensure ditches and swales are not obstructed.

What Are Carrboro's Responsibilities?

The Town holds a National Pollution Discharge Elimination System/Municipal Separate Storm Sewer System (MS4) permit. This requires comprehensive stormwater management to reduce pollutants in runoff to the maximum extent possible. The permit is required by EPA under the Clean Water Act and

[9] Stormwater Design Manual, available at https://deq.nc.gov/sw-bmp-manual.

is administered in North Carolina by the state Department of Environmental Quality. Under the permit, the Town must implement the following minimum measures:

- Public Education and Outreach
- Public Involvement and Participation
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Controls
- Post-Construction Site Runoff Controls
- Pollution Prevention and Good Housekeeping for Municipal Operations

Public Works staff are initiating an inspection program for permitted commercial and residential Stormwater Control Measures under the Post-Construction measure to assure proper maintenance is occurring.

Public Education and Outreach

An informed and engaged community is crucial to the success of our overall Stormwater Program. The Town's public education activities include:

- Creating and updating the Town's stormwater webpages.
- Creating and distributing informational brochures and documents.
- Staffing booths and tables at public events.
- Leading educational programs at Carrboro schools and other events.
- Publishing a staff-curated newsletter and social media posts.

You can request a Stormwater staff presentation at your event or meeting! See Appendix 1 for contact information.

Public Involvement and Participation

The public contributes valuable input and assistance to stormwater management efforts. Residents are encouraged to get involved by:

- Attending public meetings of the resident-led Stormwater Advisory Commission (SWAC) on the second Thursday of each month.
- Participating in grassroots, community- and Town-organized clean-ups and networking.
- Labeling storm drains.
- Adopting a creek and/or watershed.

If you wish to get involved, please contact us (see Appendix 1).

Illicit Discharge Detection and Elimination

The EPA defines an illicit discharge as, "any discharge into a storm drain system that is not composed entirely of stormwater." This means anything other than the water that falls from the sky. The most prevalent kinds of discharge are pouring or washing wastes into stormwater conveyances and leaking sewer lines. Pollutants frequently included in illicit discharges include: hazardous household products like paint, yard care products including pesticides and fertilizers, pet waste, automotive fluids, car wash detergents and sewage.

Figure 10 Carrboro's Stormwater Hotline

To identify, confirm and manage illicit discharges, the Town:

- Maintains a mapped inventory of the Town's stormwater conveyance system.
- Enforces an ordinance prohibiting non-stormwater discharges into the stormwater conveyance and streams (Town Code Sections 5-32 and 5-33, see Appendix 3).
- Conducts stream walks and outfall inspections to look for discharges.
- Delivers educational outreach for staff and the public on illegal discharges and improper disposal of waste.
- Staffs a hotline for reporting Stormwater violations and issues (Figure 10).

Please be cautious about what washes off your property and call the local stormwater hotline if you see or suspect illicit discharges in your area. They are illegal and can directly affect you and others.

For more information, please contact us (see Appendix 1).

Construction Site Runoff Controls

Sediment from construction sites needs to be properly managed to avoid impacts to streams and is regulated under the State Sediment Pollution Control Act. The resulting contribution of sediments and other pollutants from construction sites can cause physical, chemical, and biological harm to our waters. If not properly managed, construction site runoff can contribute more sediment to streams during a short period of time than can be deposited naturally during several decades.

Figure 11 Example of Construction Site Runoff Controls: silt fence, sediment pond

Construction projects are required to have temporary and permanent erosion and sediment control measures incorporated into their design (Figure 11). Sediment can be controlled using silt fences, coir logs, sediment traps, check dams, and sandbag barriers. Erosion can be prevented using existing vegetation, mulch, sod, and geotextiles. In addition, sites should be free from loose trash and debris.

The Town's construction site runoff controls are handled by the Orange County Erosion Control Division. If you witness sediment leaving a site or have any questions regarding the program, contact that office at 919-245-2586 or visit their webpage[10]. The NC Department of Environmental Quality also maintains a hotline at 1-866-STOP-MUD (1-866-786-7683).

Post-Construction Site Runoff Controls

Runoff from developed areas can significantly affect nearby waterbodies. Studies indicate that the most cost-effective approach to stormwater quality management is to incorporate prior planning. Designing sites to control the flow rate, total volume and pollutant load in stormwater discharge can prevent two substantial impacts of post-construction runoff:

Increased volume of water and rate of runoff. Impervious surfaces, like parking lots, driveways, and rooftops, interrupt water's natural and gradual percolation through vegetation and soil. Instead, water runs off of surfaces like rooftops, asphalt and concrete and is routed to drainage systems. Large volumes of runoff quickly flow to the nearest receiving water and cause downstream flooding, streambank scouring, loss of aquatic life and property damage.

Increased pollutants in stormwater runoff. As runoff flows over areas altered by development, it picks up harmful sediment and chemicals such as oil and grease, pesticides, heavy metals and nutrients (e.g., nitrogen and phosphorus). These pollutants often become suspended in runoff and are carried to

[10] https://www.orangecountync.gov/1303/Erosion-Control

streams, ponds and lakes. On those waterbodies, pollutants enter the food chain, eventually ending up in the tissues of fish and humans.

The Town Land Use Ordinance, Section 15-263.1[11] requires the implementation of post-construction run off controls. The Stormwater Division performs inspections to ensure property owners are providing long-term maintenance of these controls.

Pollution Prevention and Good Housekeeping for Municipal Operations

To ensure our municipal operations minimize contamination of stormwater runoff, the Town has implemented—and is inspecting and maintaining—control measures to reduce or eliminate pollutant discharge from roads, parking lots, and maintenance yards. Our controls and sites are reviewed regularly to determine if additional measures need to be taken. We also train staff to perform their duties with pollution prevention and good housekeeping in mind.

What Is the Stormwater Utility Fee?

Carrboro assesses a stormwater fee to residential and commercial properties. The Town's stormwater utility fee generates dedicated revenue to the Stormwater Program. It applies to non-exempt properties (almost all properties with at least 500 square feet of impervious surfaces) and is based on the square footage of impervious surfaces, a common practice in North Carolina and beyond. More information on the fees and rate structure is available on the Stormwater Utility Fee webpage[12].

The Stormwater utility fee supports:

Stormwater Community Services – education, outreach and technical advice; creating public participation opportunities; coordinating with the Clean Water Education Partnership (CWEP); assisting with federal flood mitigation grant applications; and supporting the development and implementation of a residential assistance program.

Infrastructure Services – maintenance and improvements of the Town-owned stormwater system (including inlets, catch basins, pipes, ditches and SCMs); street sweeping; and design and construction of public stormwater infrastructure (including "green" infrastructure) projects, stormwater retrofits, and restoration projects on Town-maintained land.

Field Services – inspections of SCMs issued under a Town land use permit or owned by the Town, illicit discharge detection and elimination activities, stream determinations, and stream monitoring.

Strategic Planning – review of new development proposals and construction, updating of the Land Use Ordinance, and other support for planning activities.

Utility Administration – developing the stormwater program, data management, regulatory tracking and reporting, issuing enforcement, contract and grant administration, staffing the Stormwater

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[11] http://www.townofcarrboro.org/DocumentCenter/View/698/Article-XVI-Floodways-Floodplains-Drainage-and-Erosion-PDF

[12] http://www.townofcarrboro.org/1138/Stormwater-Utility-Rate-Structure

Advisory Commission, and program integration with Town administration (e.g., operating budget and CIP).

What Is the Stormwater Advisory Commission?

The Town Code (Section 3-24.15) presents the purpose of the Carrboro Stormwater Advisory Commission[13] to: investigate and advise the Town Council on policies, ordinances, best management practices, ordinance provisions and administrative procedures regarding stormwater management; review the Town's Stormwater Management Program and Plan, stormwater compliance activities, and other stormwater related plans and reports, and make recommendations to prioritize or adjust activities; investigate and provide recommendations regarding stormwater runoff for new development and re-development projects; and fulfill the Town's requirements under its National Pollution Discharge Elimination System (NPDES) Phase II stormwater permit for citizens' input of stormwater management activities.

The Commission is formed of seven citizen volunteers appointed by the Town Council. The Commission meets monthly. All meetings are open public meetings. Agendas are advertised, and minutes are kept to document the Commission's deliberations. Seats on the Commission are advertised and filled annually. To apply for open commission positions submit this form[14].

What Can I Do to Limit My Impact on Stormwater Runoff?

Avoiding and Minimizing Harmful Chemicals

A lush lawn, beautiful flowers, and bountiful crops are every gardener's goal. Regrettably, some achieve these by applying pesticides and fertilizers that often wind up washing right into our streams and creeks. Excess nutrients from these chemicals can cause drinking water contamination, undesirable algal blooms, and fish kills; contamination from pesticides can result in waters that are not fishable or drinkable.

Here are a few tips to help minimize the effect of chemicals on our water resources:

- **Read labels carefully.** If you must apply, pay attention to the label. Look for the words slow-release, time-release fertilizer with water-insoluble or slowly available soluble nitrogen. Avoid using combination fertilizer/herbicide/pesticide products, which have excess chemicals that can pollute our water.
- **Pay attention to where and when you work.** Avoid using fertilizers or pesticides near wellheads or within 75 feet of waterways. Check the weather forecast, and don't apply fertilizers or pesticides when there is rain predicted and the likelihood of runoff is high.
- **Fertilize sparingly; use organic/low impact practices.** Apply fertilizers and pesticides as directed. The Cooperative Extension Service has recommendations for application rates if you decide to use inorganic products. Using less is good for the water supply and will save you money, too! If you use a lawn care company, ask them about environmentally friendly options and certifications.

[13] http://www.townofcarrboro.org/1119/Stormwater-Advisory-Commission
[14] https://townofcarrboro.org/FormCenter/Town-Clerks-Office-25/Advisory-Board-Application-97

- **Cover or store items that may contain pollutants.** Avoid leaving any items outside that could release pollutants into the stormwater system or nearby waterways. This includes machinery and equipment, paints and stains, cleaning solutions, etc.
- **Practice low-impact yard care.** Mow high and leave grass clippings on the lawn**,** which supports health and quality and reduces the need for fertilizer. Hand-pick weeds whenever possible. If you must use herbicides or pesticides, spot treat rather than dousing the entire lawn.
- **Replace part or all of your lawn with native vegetation.** Native plants increase water infiltration due to their deeper roots and provide habitat for native pollinators and other animals. Replacing part (or even all!) of your grass lawn with native shrubs, herbaceous plants and flowers can be one of the most beautiful ways to manage stormwater on your property.

Leaf Litter and Landscaping Debris

Leaf litter from stream buffers is natural in streams and is an important source of nutrients and energy to stream food webs. However, too much of a good thing can be bad. Because Carrboro's streams and creeks drain into Jordan and University Lakes, we are regulated to limit the nutrients draining from our watershed into these water supplies. Excess urban leaf litter from yards that is directly deposited on streets can enter the stormwater system, significantly raising the nutrient load (by up to 80%[15]). This decreases water quality and can be detrimental to aquatic life. Leaves can also clog or block drains and pipes, leading to flooding, excess standing water, damage to system components, safety issues and threats to properties. Please do not place your leaves in ditches and swales or directly on the street!

The Town provides roadside leaf collection not only as a service to residents and source of mulch but also to limit the nutrients that reach creeks and Jordan Lake. Composted leaves are made available for free to the public. For more information on our compost program you can visit the Solid Waste Department's Yard Waste page[16].

Property owners can also compost at home and adopt green landscaping techniques to further reduce the risk of overloading our storm drains and creeks with leaf litter. Residents interested in alternative lawn, vegetation and landscaping options for environmental benefits should reach out to the Town's Environmental Sustainability Coordinator or Stormwater staff for more information. See Appendix 1 for contact details.

Pet Waste

Pet waste is a problem for the health of our waterways; it can contain bacteria, viruses, and parasitic worms that harm aquatic life and transmit diseases to humans. In Carrboro, stormwater does not pass through a sanitary sewer treatment facility. Anything on or in the ground may eventually end up in nearby streams, rivers and lakes where people recreate. When high levels of bacteria are found in a body of water, swimming, fishing and shellfish harvesting must be restricted. Pet waste also contains

[15] *Source: "Using leaf collection and street cleaning to reduce nutrients in urban stormwater", Upper Midwest Water Science Center, 2016*
[16] https://townofcarrboro.org/2230/Yard-Waste-Loose-Leaf-Collection

nutrients that cause weeds and algae to grow more rapidly than normal, changing the balance of the ecosystem.

You limit pet waste's impact on stormwater and our streams when you:

- **Pick up after your pet.** Whether at home or out and about, pet waste needs to be scooped. Long handled "pooper scoopers" make it easy to pick up after your dog without bending over. Bring plastic bags with you when you walk your dog. A map of public pet waste stations is available at [*map under development*]. Wherever you scoop, tie the bags securely and toss in the trash.
- **Double-bag kitty litter.** Cat waste is an issue, too, so double-bag the litter, tie the bags closed and place in the garbage.
- **Avoid flushing pet waste down the toilet.** Septic systems and wastewater treatment plants are not designed to treat dog or cat waste.
- **Compost pet waste with great care.** The disease-causing organisms in pet waste are *not* killed by backyard composting.
- **Watch what you feed your pet.** The type of food affects the quantity of pet waste you must deal with. Consult your vet if you have any questions.

Figure 12. Carrboro's Pet Waste Initiative

For more information on pet waste and its effect on stormwater please see visit the Stormwater Division's Pet Waste webpage[17] or contact us as shown in Appendix 1.

[17] https://www.townofcarrboro.org/2312/Pet-Waste

Pools and Spas

Discharging wastewater from swimming pools and spas into the stormwater system or surface waters is against the law because it can be hazardous to the environment and public health (Figure 13). Common pollutants associated with pool and spa draining include chlorine, bromine, copper, salt, hydrogen peroxide, and acids.

Figure 13 Improper Discharge of Pool Wastewater

Pool and Spa Maintenance

Plastering, grouting, guniting, acid washing and other activities generate wastewater that cannot be discharged into the storm drain system. Do not wash out equipment and tools used for maintenance work in an area that discharges to the storm drain system. Collect and store the wastewater and contact an environmental waste company regarding treatment and disposal. Contact OWASA[18] regarding their rules for disposal into the sanitary sewer system.

Filtering Backwash

Discharge filter backwash onto a landscaped area, not into the storm drain system, and put filter material and collected debris in the trash. Rinse filters over your lawn or landscaped area. This allows for clean, dechlorinated water to re-enter our local water systems without damaging our drinking water supply or impacting the ecosystem surrounding Carrboro.

Pool and Spa Draining

Clean, dechlorinated water may be drained to your yard or landscaped area if and only if:

- It does not cause flooding or other nuisance conditions on adjacent properties (notify your neighbors first!)

[18] https://www.owasa.org/contact-owasa-1

- You drain at slow rate, allowing the water to percolate into the ground, to prevent soil erosion and discharge into the storm drain system or creek.

This may be difficult to do because most properties are designed to drain off site. If discharge into a storm drain or water conveyance is needed, contact the Carrboro Stormwater Division[19] for guidance in advance of work.

Vehicle Maintenance

Routine vehicle maintenance is a leading contributor to stormwater pollution. Runoff from rain carries pollutants like detergents, soaps, oil, antifreeze, gas, transmission fluid and other products into local waterways. These pollutants are harmful to people and the natural aquatic ecosystem. You can reduce the impact of vehicle maintenance and protect local waterways with these practices:

- Perform vehicle maintenance in an area where chemicals and fluids won't be washed into a storm drain.
- Check all vehicles, including motorcycles, watercraft and outdoor recreational vehicles for fluid leaks. Use drip pans to capture leaks until they can be addressed.
- Immediately clean up any chemical leaks and spills with an absorbent material such as cat litter. Do not hose down.
- Cover dirty or leaky vehicles to keep rain from falling on them and creating runoff.
- Change vehicle fluids carefully, using a funnel and drip pan to contain spills. Drain fluids from vehicles and parts before storing.
- Wash vehicles at a car wash where used water is recycled and does not generate runoff.
- If you wash vehicles at home, park them on the lawn so rinse water is absorbed into the grass. Use a trigger- or twist-style hose nozzle to prevent unnecessary water use. Choose waterless car cleaning products or phosphate-free, biodegradable soap.
- Dispose of household hazardous waste and electronics properly. Please visit the Carrboro Hazardous Waste[20] or Orange County Hazardous Waste[21] websites for more information.

Reducing Runoff

In addition to pollutants in runoff, the excess volume and flowrate of urban stormwater is also a problem. The shared goal for the Town and residents is to improve the quality of runoff and reduce the quantity and velocity of the water running off property – to lower and slow the flow. Luckily, there are many ways homeowners can contribute:

Replace impervious surfaces. Take a look at the hard surfaces around your home that don't absorb water, like your roof, driveway, patio, or deck. Since the rain can't soak into the soil as it would in a natural system, the result is more runoff. You can alleviate runoff by replacing these surfaces with permeable materials, directing roof flows to pervious surfaces, and disconnecting downspouts from

[19] Phone number: 919-918-7426 or stormwater@townofcarrboro.org
[20] http://townofcarrboro.org/2274/Hazardous-Waste
[21] http://www.orangecountync.gov/954/Hazardous-Household-Waste-Drop-off

the stormwater conveyance system (i.e. allow water from your downspouts to flow across a vegetated area, like your lawn).

Improve soils to increase infiltration. Many yards have heavy and compacted soils with little organic matter and very shallow root zones. Soil improvement is one of the best and most applicable watershed-friendly practices that homeowners can pursue. This can be achieved by adding organic materials, such as compost and leaf mulch, to topsoil. You can also replace shallow-rooted turf grass with deeper-rooted native perennial and woody vegetation. In some cases, compacted soils need to be physically loosened to allow plants to establish and thrive.

Manage roof runoff. Capturing roof runoff during a storm reduces the amount of water running off and the destructive erosion caused by the volume and velocity of flowing water in an urban environment. You can store roof runoff in cisterns or rain barrels and reuse it, or simply allow it to slowly drain into the ground; create swales that direct water to a rain garden, landscaped area, or stream buffer; or install dissipaters or splash pads at the outlet of downspouts. Please note that roof drains should not be directly connected to the roadside public drainage system.

Create a rain-friendly yard. A rain garden is an easy and attractive way to capture runoff, especially when paired with gutters and downspouts. These shallow areas can be planted with herbaceous and woody vegetation that helps infiltrate and filter water into the ground. This helps to replenish the aquifer and slow the flow to local waterways.

Choose native plants. Adapted to the local climate, native plants are more drought- and flood-tolerant than their non-native counterparts and often require less fertilizer and pest control. Many native plants have deeper and more efficient root systems that can better absorb rainwater and control erosion. The NC State Cooperative Extension maintains a list of suppliers of native pollinator plants on their website[22].

Investigate earth-shaping. Regrading or earth-shaping may be necessary for some runoff issues. A system of swales (small dips in the ground) and berms (areas of raised earth) can slow the flow and prevent runoff. Terracing, a system of gradual steps across a slope, helps reduce erosion. Dry stream beds can be created as an alternative to a swale. Major earthworks projects like adding a retaining wall or disturbing a large area may require a permit or engineering plans, so contact the Planning, Zoning and Inspections Department[23] to learn more. See Appendix 1 for contact information.

Maintain a buffer. If your property borders a body of water, use native plants to create a buffer along the waterway that can remain undisturbed. This area supports filtration and lowers the concentration of pollutants and other harmful substances entering the waterway.

Water flowing over yards, driveways, and streets during storms carries everything it comes in contact with – eroded soil, pesticides, fertilizers, oil and grease, leaves, and litter – into storm drains and streams. Even small rainstorms can wash pollutants into waterways. Small changes in yards across town add up to a big impact on both the quantity and quality of our stormwater runoff.

[22] https://growingsmallfarms.ces.ncsu.edu/growingsmallfarms-pollinatornurseries/
[23] http://www.townofcarrboro.org/133/Planning-Zoning-Inspections

Home Maintenance

Here are some easy, proactive steps property owners can take to address and even ease potential stormwater issues:

- **Do not dump or throw anything into swales or streams**. Dumping grass clippings, leaves, trash, yard debris, etc., can accumulate and clog swales, culverts, and channels. This is a violation of Town regulations subject to enforcement action. Keep all swales clear of brush and debris.
- **Property alterations may require permitting.** Before you build on, alter, re-grade, or add fill material to your property check with the Zoning Division in the Planning Department. Staff can determine if your project needs a permit and may be able to advise if it may make your or your neighbor's property more susceptible to flooding.
- **Remove or secure items that can be carried by water flow or the wind.** Toys, sports equipment, pots, yard décor, and outdoor furniture often make their way into stormwater conveyances and waterways. This can clog stormwater flow, contribute to pollution and cause damage and drainage issues.
- **Make your property unfriendly to mosquitos.** It only takes about or even less than a week for mosquito eggs to hatch from standing water. Reduce mosquitoes and bites by dumping standing water around your yard once a week and placing fine mesh screens over rain barrel openings. Don't use treatments that may kill mosquito predators as well. For more information on mosquito control visit the Orange County Mosquito Control webpage[24].

FLOODING AND FLOODPLAIN MANAGEMENT

A floodplain is the land next to creeks, streams or rivers that is naturally susceptible to inundation. Carrboro has been involved in floodplain management since 1976, when the Town joined the National Flood Insurance Program.

Historically, residents along Toms Creek have been the most impacted by flooding; Town staff has helped several property owners in this area apply for federal flood mitigation grants. The Town has also held public meetings, completed neighborhood walkabouts, and most recently, contracted with the Center for Neighborhood Technology to complete a study, with the Toms Creek watershed as a focus area, to guide a future residential floodplain assistance program. The final report is available on the Stormwater Division website, under the Tom's Creek tab[25].

Since its inception in 2017, Carrboro's Stormwater Program has supported our community's resilience to the increasing frequency and intensity of storms. The Stormwater Utility is making progress, despite constraints related to private property rights, legal and jurisdictional issues, and limited capital reserves and capacity at this early stage of the Program.

[24] https://www.orangecountync.gov/407/Mosquitoes
[25] http://www.townofcarrboro.org/1227/Toms-Creek

What Can I Do to Decrease Flooding and Drainage Problems?

There are several things you can do to help prevent or minimize drainage problems:

- **Clear the gutters on your house**. Blockages can cause runoff to pond in your yard, or cause damage to your home. Similarly, keep the roadside ditch/swale and any inlets free from obstructions.
- **Consider property and landscaping alterations** that decrease runoff and increase infiltration, such as: rain gardens, rainwater harvesting, permeable hardscaping, soil amendments, restoration of stream buffers, impervious disconnection, etc.
- **Rake or remove materials that can block drains, swales and culverts** such as roadside leaves, branches, litter, and weeds. Vegetative debris in this area is a primary cause of storm drain problems.
- **Keep the floodplain on your property clear** of grass clippings, leaf piles, other vegetative debris, tires, toys, yard items, branches, signs, etc. that can be carried by water flows and block culverts.
- **Check the path of water flow in the floodplain during a storm** and once it's safe to do so, remove any debris from that area. This helps prevent materials from causing blockages.
- **Call Public Works at 919-918-7425 about assistance for issues in the public right of way** or defects in or around the public drainage system like broken concrete, holes in the ground over pipes or around structures and severe erosion. Keep the area easily accessible in case repairs or maintenance is required.
- **Do not alter drainage easements, stream buffers, or floodplains** by placing sheds or other structures in them or filling them in without first getting permission from the Town.
- **Identify drainage impacts to nearby properties** before starting improvements on your property. Installing or extending downspouts and constructing raised driveways, fences and landscape beds can block the natural flow of runoff, create standing water and have other impacts on your neighbor's property.

See Appendix 4 for a list of flooding-related resources.

HOW TO GET INVOLVED

Are you looking for a way to get involved with Stormwater? If you wish to participate in a clean-up or volunteer at outreach events, check out the Stormwater website[26] or contact the Stormwater Division[27]. Here are some great volunteer opportunities:

[26] https://townofcarrboro.org/2361/How-to-Get-Involved
[27] Phone number: 919-918-7426 or stormwater@townofcarrboro.org

NC Stream Watch Program

Are you looking for a local stewardship opportunity? Do you enjoy picking up trash or water quality monitoring? If so, you should join NC Stream Watch (Figure 14)!

Figure 14 NC Stream Watch Key Information

NC Stream Watch[28] is a state-wide community science engagement program created by North Carolina Department of Environmental Quality (NCDEQ). NC Stream Watch showcases the wide diversity of watersheds across the Mountains, Piedmont and Coastal Plains regions of North Carolina while giving folks an opportunity to engage with their local waterways. Any interested group can participate in Stream Watch, including scout troops, church volunteers, key clubs, or school programs. The minimum requirements are to do two trash cleanups per year and take a photo and GPS location of your stream site.

[28] https://deq.nc.gov/about/divisions/water-resources/water-resources-training/public-involvement/stream-watch-home-page

Park Clean Ups

The Carrboro Recreation, Parks, & Cultural Resources Department runs the parks clean-ups[29]. For more volunteer information contact them at 919-918-7364.

Clean Jordan Lake

Figure 15 Clean Jordan Lake

Clean Jordan Lake is a nonprofit, community-driven organization that removes trash from the shoreline of Jordan Lake and works to prevent its recurrence. It exists to inform, inspire and coordinate cleanups and raise public awareness of the importance of watershed-wide, good stewardship (Figure 15).

To volunteer, adopt or donate, visit them at cleanjordanlake.org.

Stormwater Volunteer Events

Figure 16 Carrboro Residents taking part in a clean-up project

Carrboro's Stormwater Staff hold an annual joint clean up[30] with Chapel Hill's Stormwater Staff, typically on the first Saturday of March (Figure 16). Contact us[31] to be added to the contact list for this and other Stormwater Division volunteer events[32].

[29] https://townofcarrboro.org/1076/Other-Opportunities
[30] https://townofcarrboro.org/2322/Annual-Joint-Creek-Clean-Up
[31] Phone number: 919-918-7426 or stormwater@townofcarrboro.org
[32] https://townofcarrboro.org/2321/Volunteer-Events

APPENDIX 1: TOWN STAFF CONTACTS

To report a stormwater issue please call **919-913-2999**, email stormwater@townofcarrbor.org, and/or use the online form[33] or scan the QR Code above. **For emergencies contact 911.**

Stormwater Staff

https://www.townofcarrboro.org/287/Stormwater

Division email address: stormwater@townofcarrboro.org

Stormwater Utility Manager	Randy Dodd	rdodd@townofcarrboro.org	919-918-7341
Stormwater Specialist	Heather Holley	hholley@townofcarrboro.org	919-918-7426
Stormwater Administrator	Emily Cochran	ecochran@townofcarrboro.org	919-918-7435

Other Public Works Staff

https://www.townofcarrboro.org/123/Public-Works

Public Works Director	Joe Guckavan	jguckavan@townofcarrboro.org	919-918-7425
Asst. to the Public Works Director	Kristen Benoit	kbenoit@townofcarrboro.org	919-918-7428
Public Works Superintendent	Daniel Snipes	dsnipes@townofcarrboro.org	919-918-7432

[33] https://townofcarrboro.org/FormCenter/Public-Works-Department-23/Stormwater-Service-Request-134

Public Works Administrative Assistant	Lakisha White-Kelly	lwhite-kelly@townofcarrboro.org	919-918-7425
Capital Projects Manager	Ben Schmadeke	bschmadeke@townofcarrboro.org	919-918-7424
Engineer	Khadijah Hassan	khassan@townofcarrboro.org	919-918-7436
Solid Waste Supervisor	Chris Clark	cclark@townofcarrboro.org	919-918-7433
Landscaping/Grounds Supervisor	Bobby Horton	bhorton@townofcarrboro.org	919-918-7431
Streets Supervisor	Dillon Dispennette	ddispennette@townofcarrboro.org	919-918-7434

Planning and Zoning Staff

https://www.townofcarrboro.org/133/Planning-Zoning-Inspections

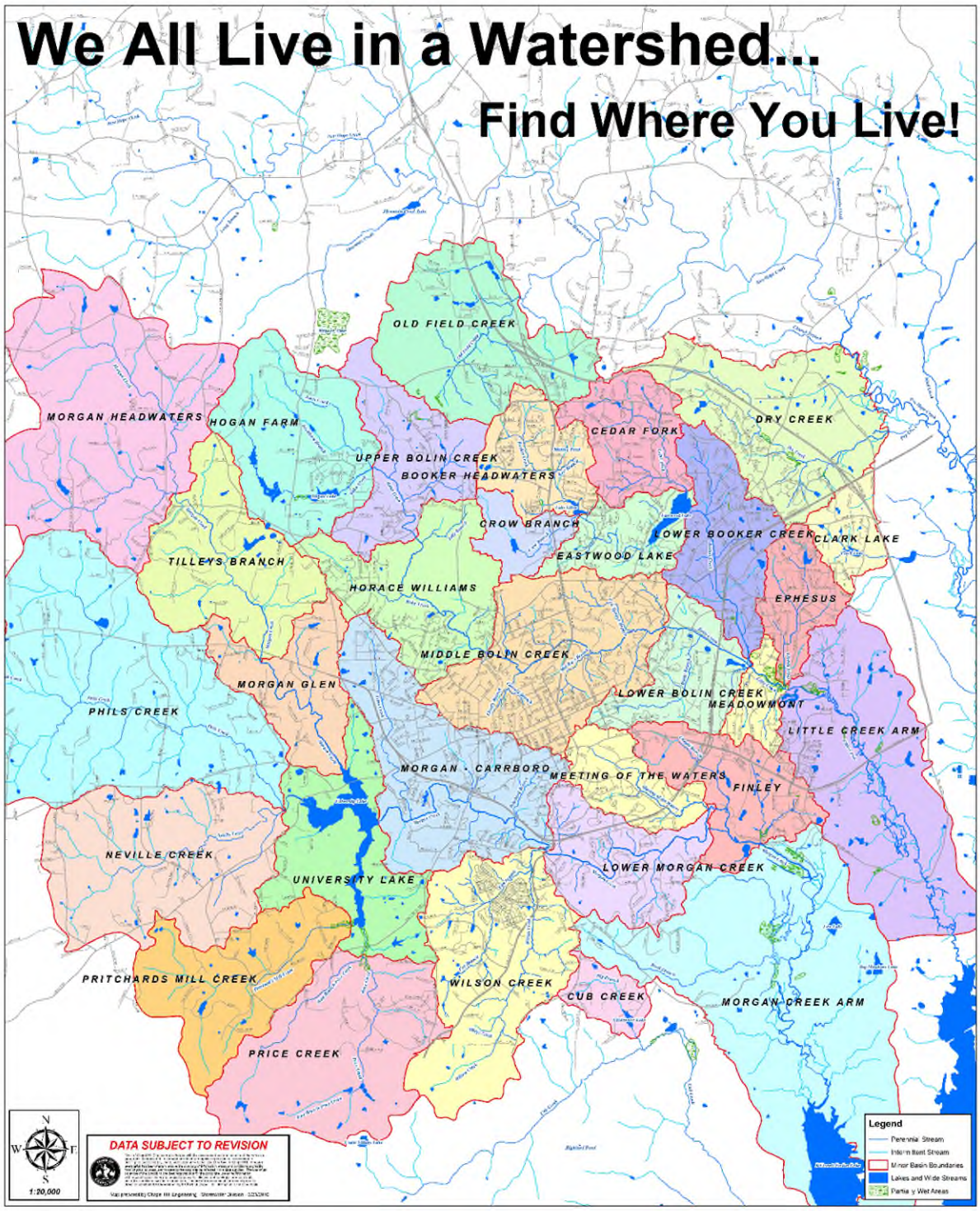
Planning Director	Trish McGuire	pmcguire@townofcarrboro.org	919-918-7327
Permit Technician	Dorian McLean	dmclean@townofcarrboro.org	919-918-7336
Code Enforcement Supervisor	Rick Wade	rwade@townofcarrboro.org	919-918-7339
Planning Administrator	Tina Moon	cmoon@townofcarrboro.org	919-918-7325
Development Review Administrator	Marty Roupe	mroupe@townofcarrboro.org	919-918-7333
Zoning Specialist	James Thomas	jthomas@townofcarrboro.org	919-918-7335
Zoning Specialist	Vacant		

Other Town Staff

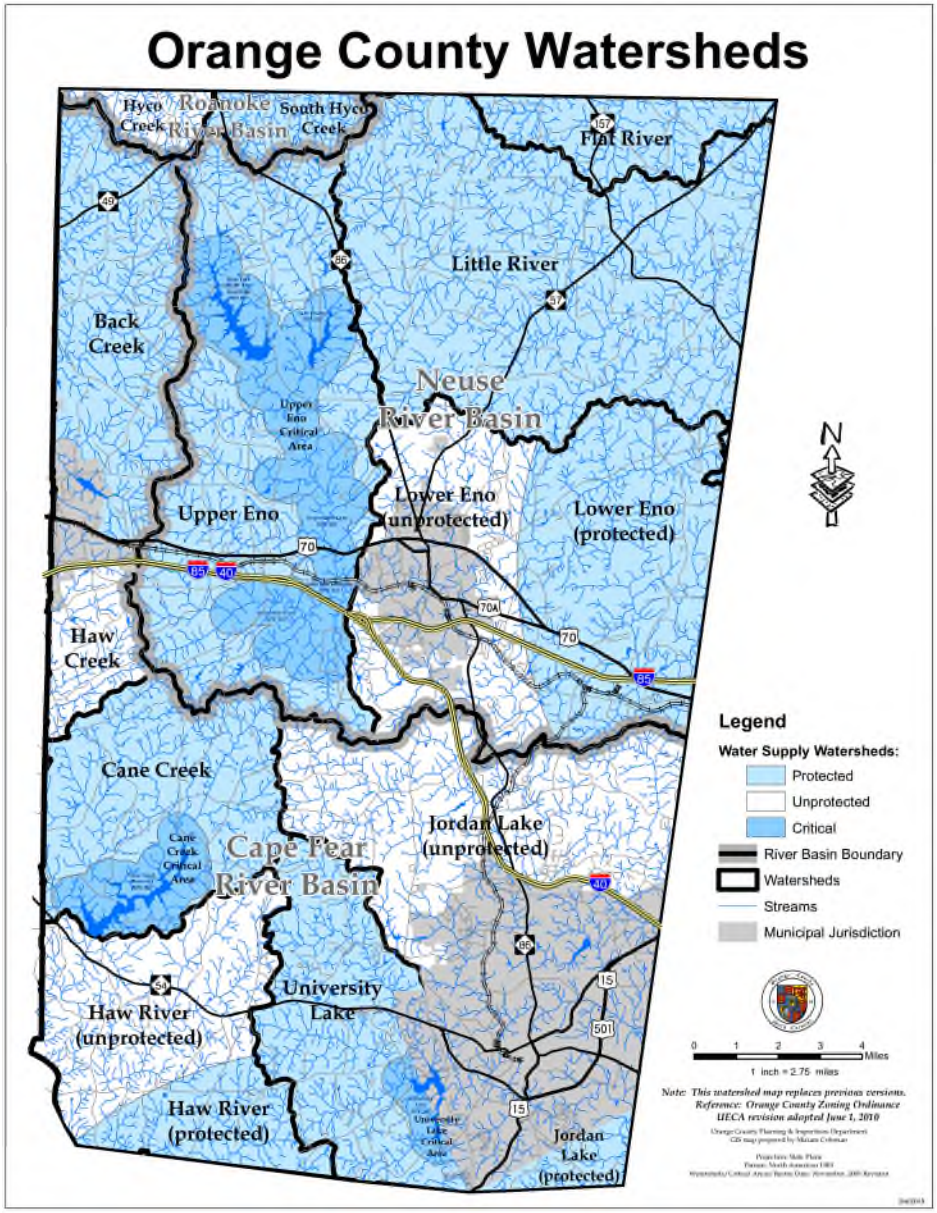
https://townofcarrboro.org/Directory

Communications Manager	Catherine Lazorko	clazorko@townofcarrboro.org	919-918-7314
Facilities Administrator	Wendell Rodgers	wrodgers@townofcarrboro.org	919-918-7371
Recreation Administrator	Charles Harrington	charrington@townofcarrboro.org	919-918-7377
Environmental Sustainability Coordinator	Laura Janway	ljanway@townofcarrboro.org	919-918-7342

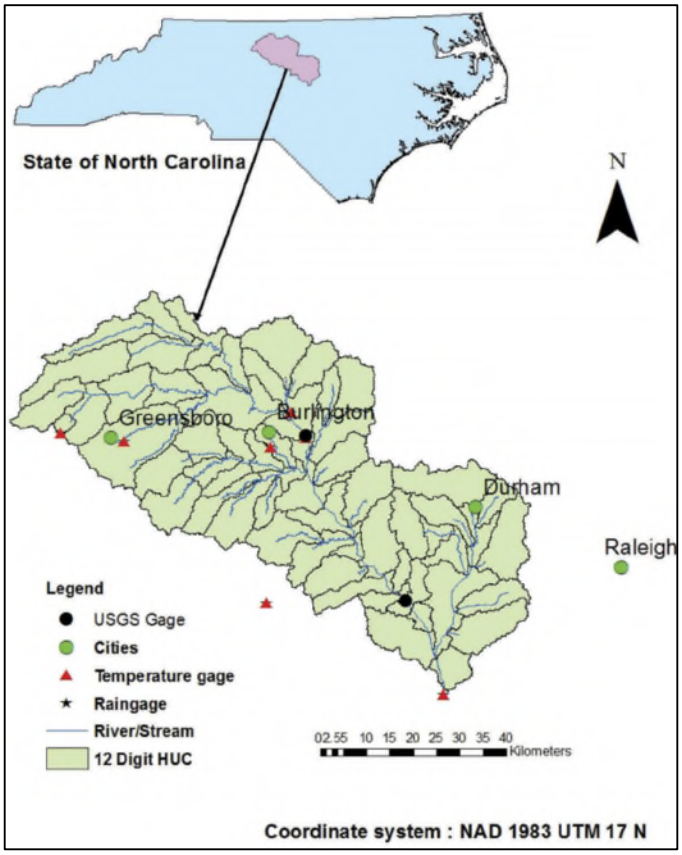
APPENDIX 2: LOCAL WATERSHEDS



Local Watersheds

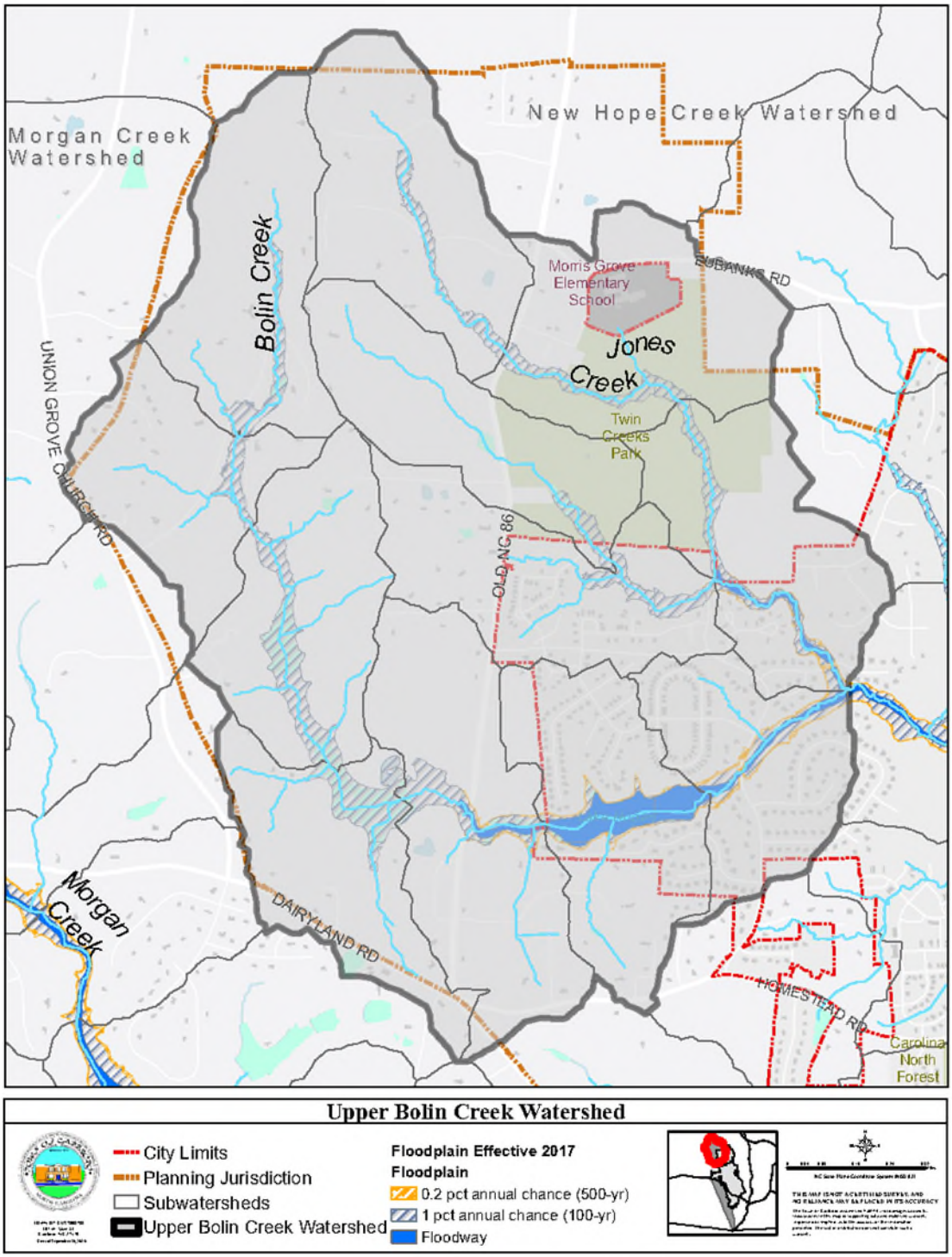


Orange County Watersheds

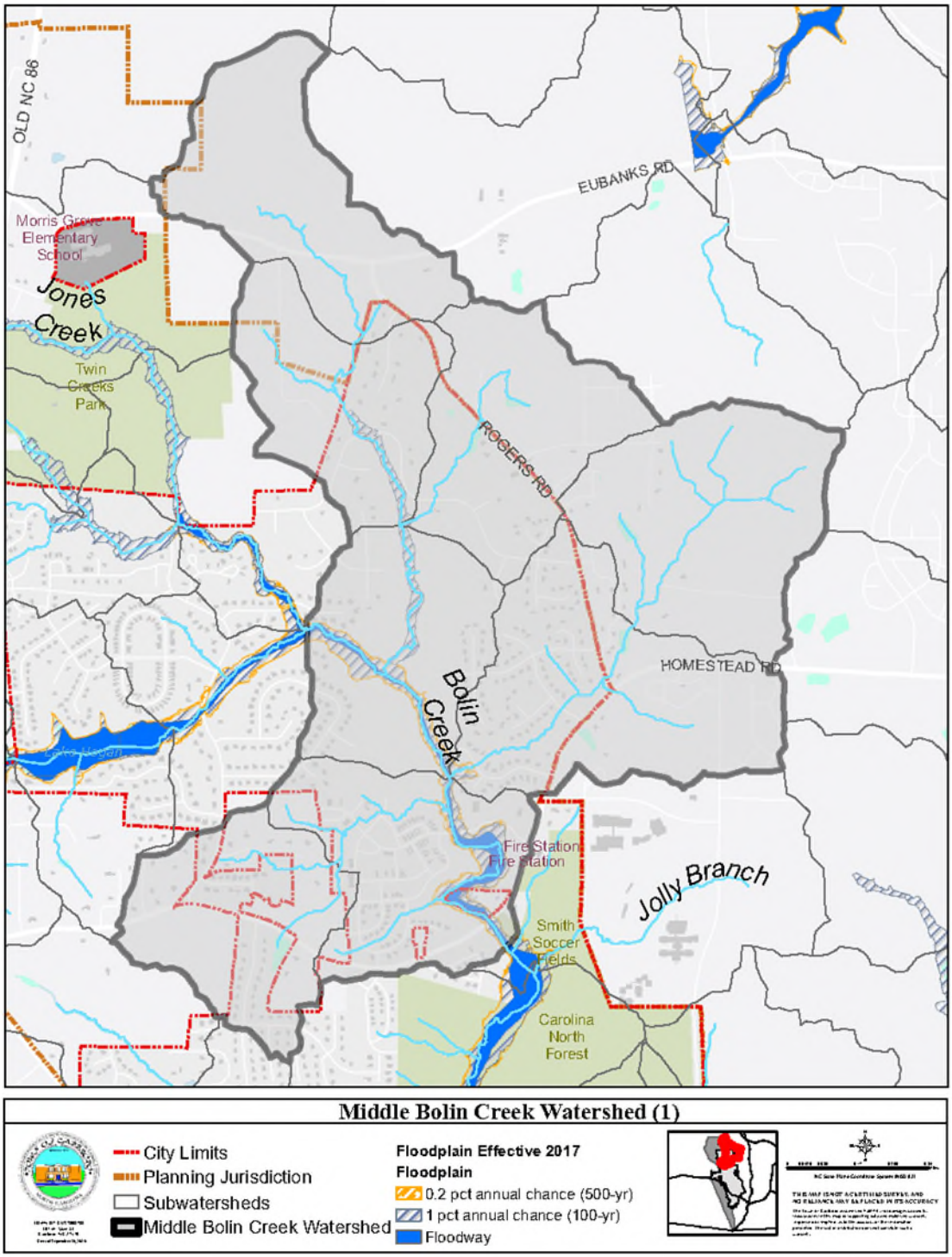


Haw River Watershed

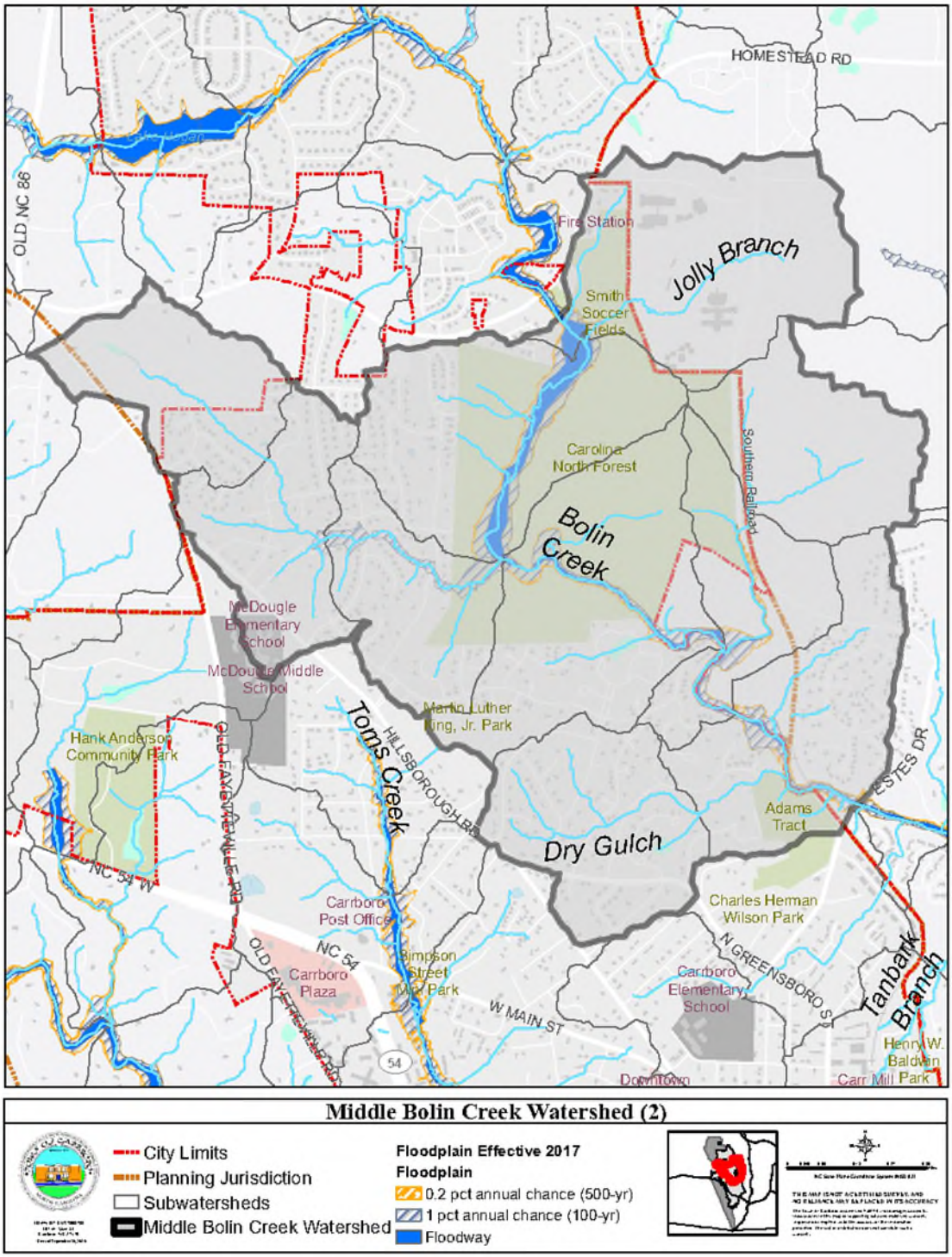
Cape Fear River Basin



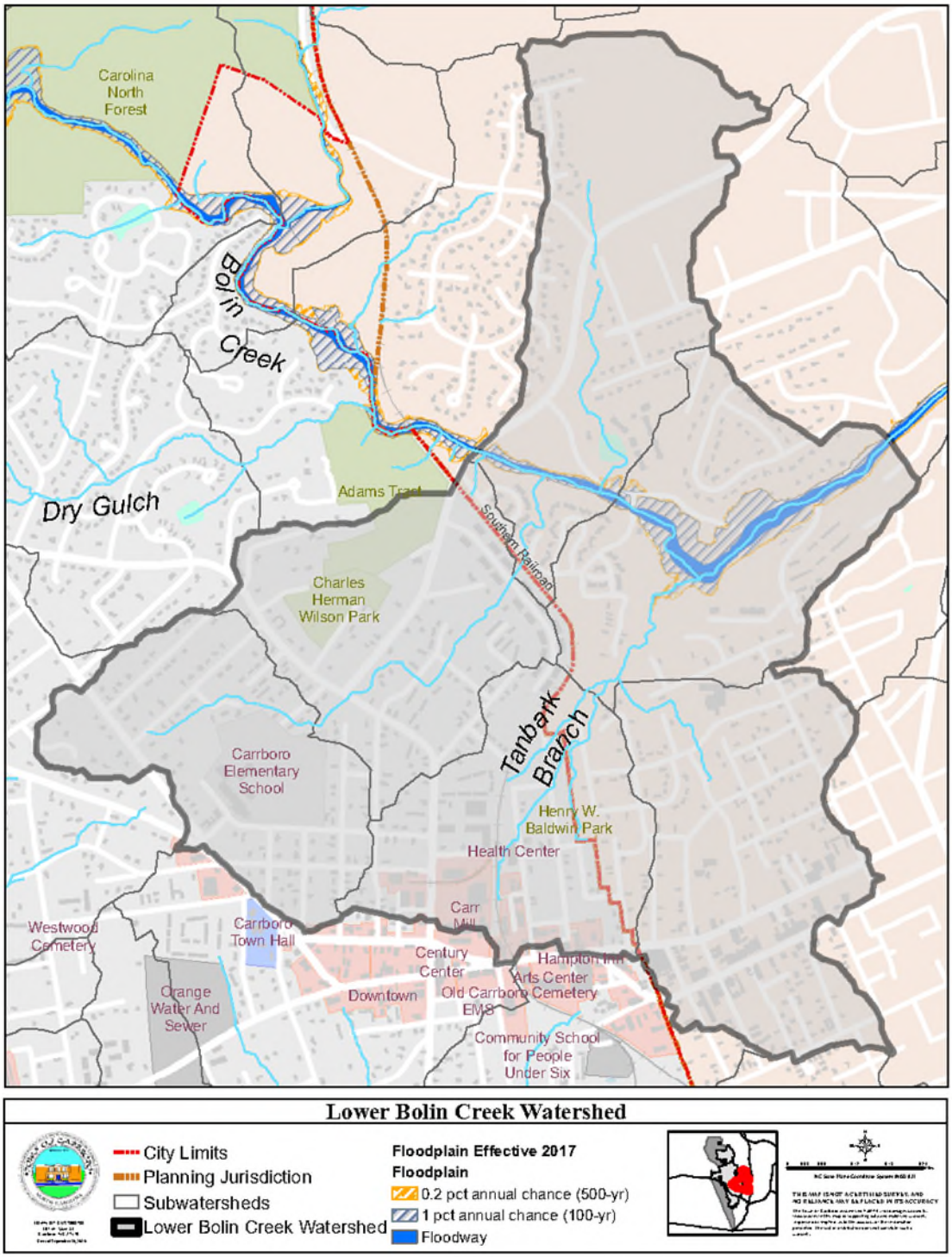
Upper Bolin Creek Watershed



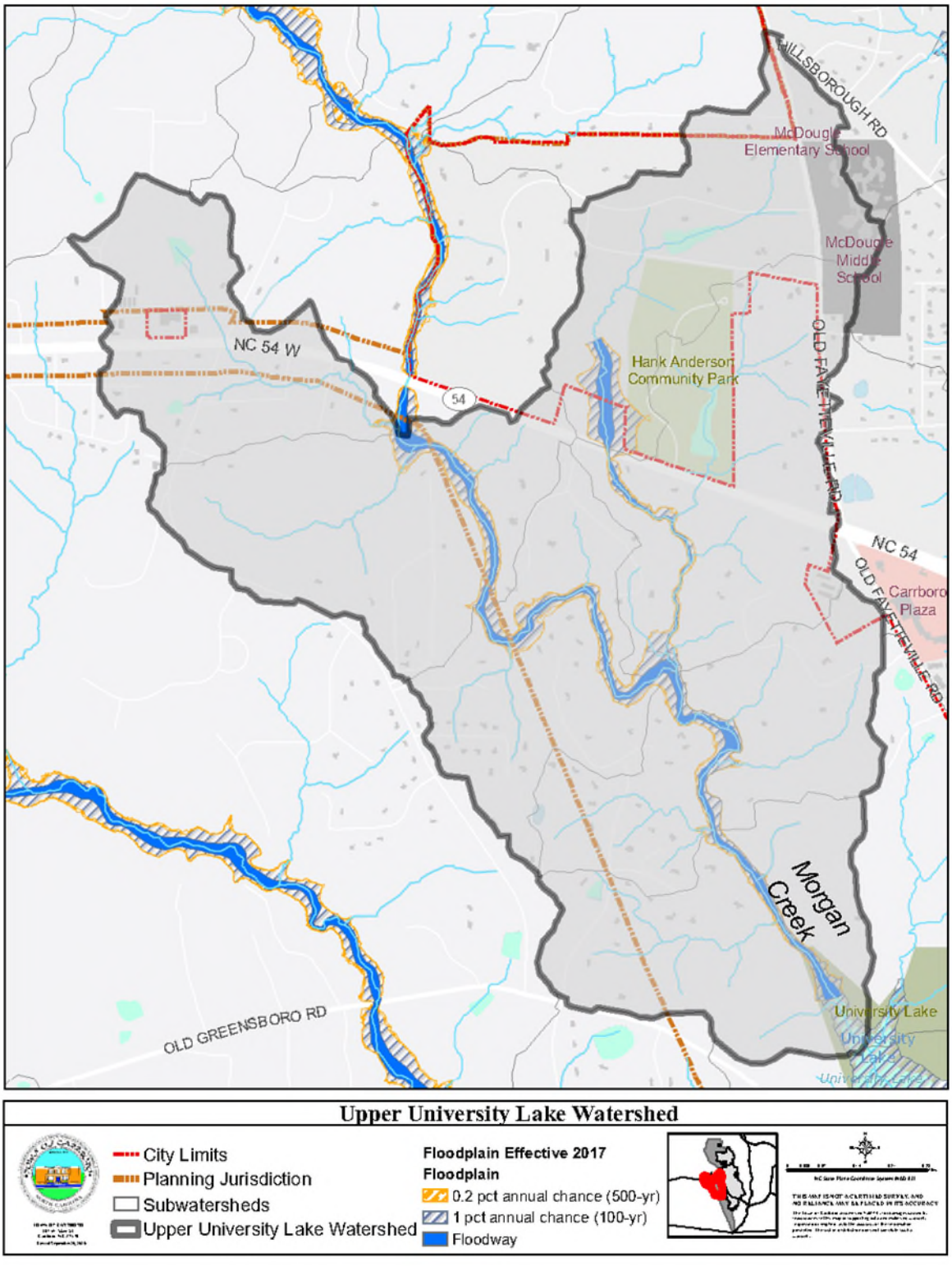
Middle Bolin Creek Watershed (1)



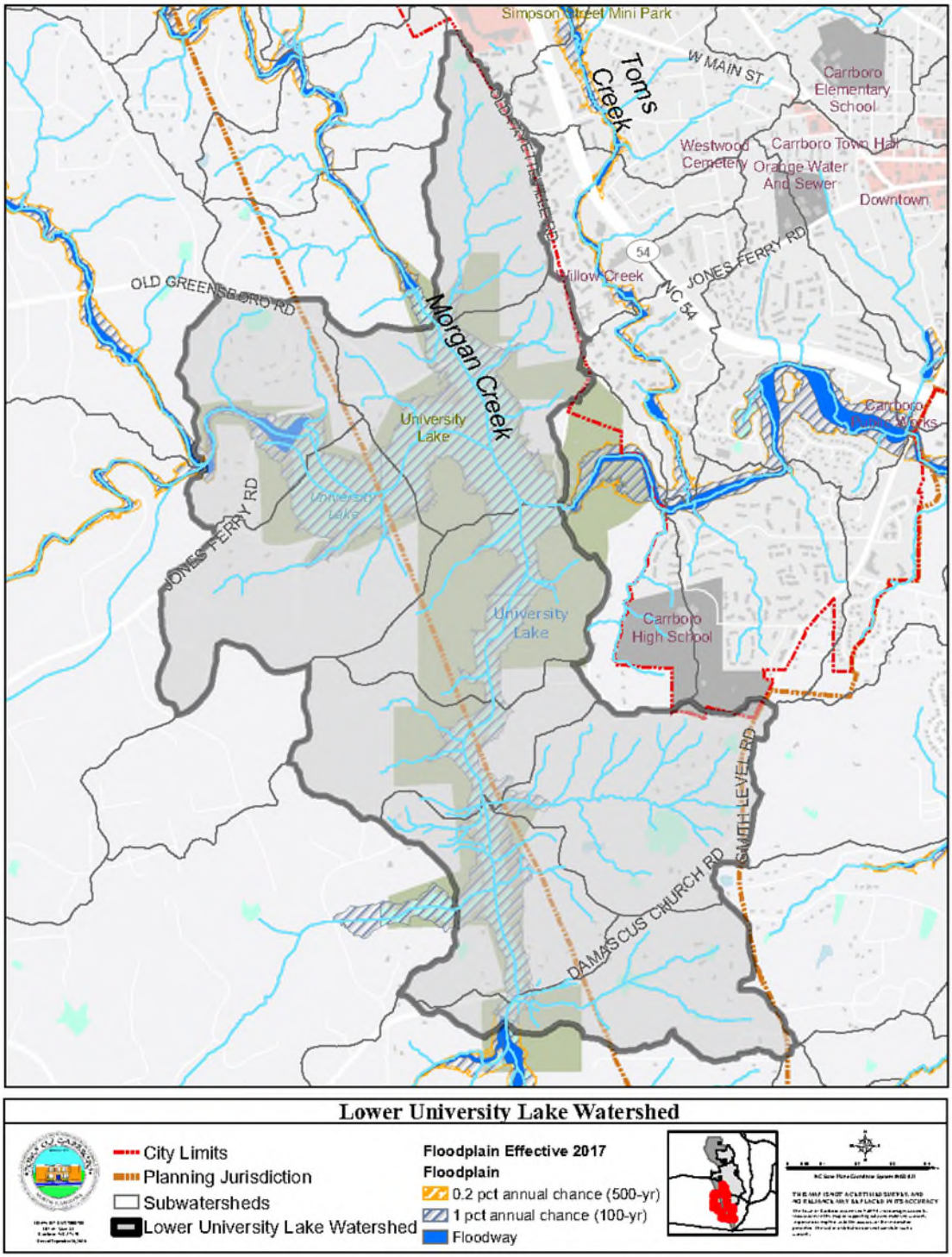
Middle Bolin Creek Watershed (2)



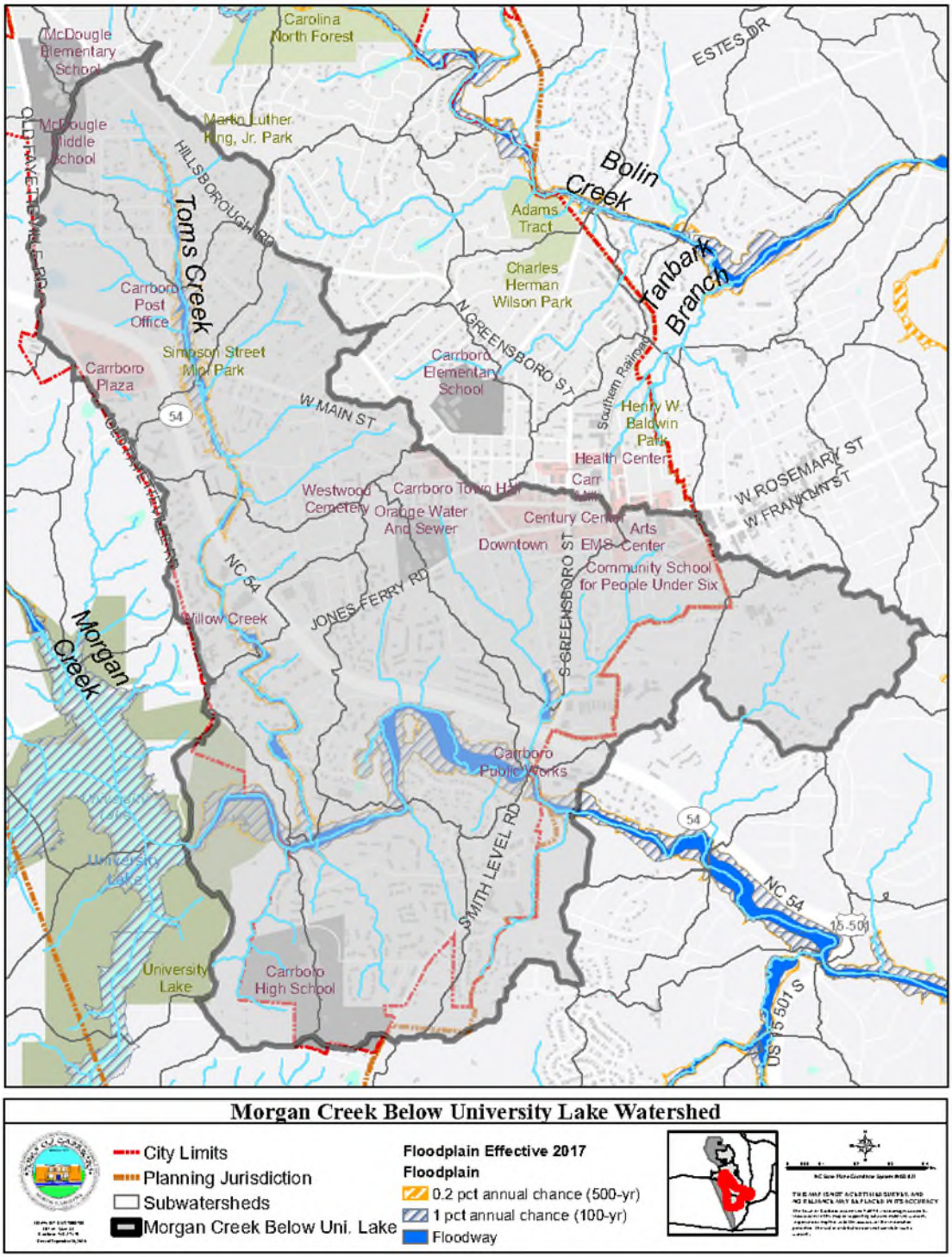
Lower Bolin Creek Watershed



Upper University Lake Watershed



Lower University Lake Watershed



Morgan Creek Below University Lake Watershed

APPENDIX 3: REFERENCE

The full Town's Ordinances can be found online at https://nc-carrboro.civicplus.com/139/Carrboro-Town-Code.

Illicit Discharge Ordinance

Section 5-32. Illicit Discharges Prohibited.

(a) No person may discharge or cause to be discharged, or allow to be discharged from property under such person's control, any pollutant directly or indirectly into the storm sewer system or into surface waters. (1) A direct discharge occurs when a pollutant is discharged within the physical limits of the storm sewer system or within the banks of a stream or inside the mean high-water level of a pond or lake. (2) An indirect discharge occurs when a pollutant is discharged outside the physical limits of the storm sewer system or outside the banks of a stream or beyond the mean high water level of a pond or lake but takes place in such a manner or location that the pollutant is carried into the storm sewer system or surface water in some way other than by action of the wind or stormwater. By way of illustration without limitation, an indirect discharge would occur if water from a commercial car wash is discharged onto the area where the cars are washed and allowed to drain into a public street. (3) An indirect discharge also occurs when a pollutant is discharged (i) outside the physical limits of the storm sewer system or outside the banks of a stream or beyond the mean high water level of a pond or lake, but (ii) with the specific intent that the pollutant be disposed of by being carried (by the wind or stormwater or otherwise) into the storm sewer system or a surface water, and (iii) the pollutant or some part or portion thereof does reach the storm sewer system or surface water. By way of illustration without limitation, dumping used oil near the edge of a stream with the intent that the next rain carry the oil into the stream constitutes an indirect discharge within the meaning of this subsection. (b) Notwithstanding the other provisions of this article, the following shall not be regarded as constituting an illicit discharge: (1) Water line or hydrant flushing; (2) Landscape or garden irrigation or lawn watering; (3) Diverted stream flows; (4) Rising ground waters; (5) Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(20)); (6) Uncontaminated pumped ground water; (7) Discharges from potable water sources; (8) Foundation drains; (9) Air conditioning condensation; (10) Springs; (11) Water from crawl space pumps; 5-26 (12) Footing drains; (13) Individual residential car washing or charity car washing; (14) Flows from riparian habitats and wetlands; (15) Dechlorinated swimming pool discharges; (16) Street wash water; (17) Flows from fighting fires (18) Other non-stormwater discharges for which a valid NPDES discharge permit has been approved and issued by the State of North Carolina.

Section 5-33. Illicit Connections Prohibited

(a) No person may cause, suffer, or permit on property under such person's control any illicit connection to the storm sewer system, including without limitation connections of drains or lines that convey sewage, process wastewater, wastewater from washing machines, wash water from commercial vehicle washing or steam cleaning, or water from indoor sinks or floor drains. (b) Subject to subsection (c), if, on the effective date of this article, an illicit connection as defined in this article exists, then such situation shall not be considered a violation of this article until ninety (90) days after the town mails by first class mail written notice to the owner (according to the most recent property records) of the property where the condition exists, informing such owner of the nature of the violation and what must be done to correct it. (c) The ninety day grace period provided for in subsection (b) of this section shall not apply if the administrator concludes that an illicit connection: (1) Is likely to result in the discharge of hazardous materials or otherwise pose an immediate threat to health or safety, or is likely to result in immediate injury to real or personal property, natural resources, wildlife, or habitat; or (2) Was made in violation of any applicable statute, regulation, or ordinance.

APPENDIX 4: FAQS AND RESOURCES

What Can I Do to Be Prepared for Floods?

(This information is available at www.townofcarrboro.org/1227/Toms-Creek)

Use the *My RainReady* online tool (www.cnt.org/rainready/my-rainready) to assess your property and get recommendations/options tailored to your conditions.

Investigate if you qualify for FEMA programs, i.e.: The National Flood Insurance Program, Hazard Mitigation Assistance, etc. (www.fema.gov)

Review FEMA's:

- "Homeowner's Guide to Retrofitting" [34]
- "Reducing Damage from Localized Flooding" [35]
- "How to Prepare for a Flood" [36]

Review EPA's "Soak Up the Rain" campaign for information and how-to guides for residents. (www.epa.gov/soakuptherain)

Know your flood risks. (flood.nc.gov/ncflood)

Plan ahead for disasters. (www.ready.gov)

Sign up to receive alerts from Carrboro (www.townofcarrboro.org/list) and Orange County. (https://member.everbridge.net/index/4530030856117 68#/signup)

View stream gauges and sign up to receive alerts on the Flood Inundation Mapping and Alert Network. (fiman.nc.gov)

Review the Flood Risk Information System. (fris.nc.gov/fris)

Sign up for USGS Water Alert. (maps.waterdata.usgs.gov/mapper/wateralert)

View the Town floodplain map. (gis.ci.carrboro.nc.us/Carrboro/Floodplain)

View the Town flooding event map. (https://tocgis.ci.carrboro.nc.us/Carrboro/FloodEvents)

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[34] https://www.fema.gov/media-library-data/1404148604102-f210b5e43aba0fb393443fe7ae9cd953/FEMA_P-312.pdf
[35] https://www.fema.gov/media-library-data/20130726-1446-20490-0539/FEMA511-complete.pdf
[36] https://www.fema.gov/media-library-data/1409002852888-3c5d1f64f12df02aa801901cc7c311ca/how_to_prepare_flood_033014_508.pdf

What Kind of Public Oversight Does the Stormwater Utility Have?

In addition to oversight from the Town Council, Town Manager and Public Works Director, Carrboro has established a Stormwater Advisory Commission[37] (SWAC) that provides this function.

How Can I Stay Informed About Stormwater?

- View stormwater updates, information, links, and data on the Town's Stormwater webpages[38]
- Follow Stormwater Advisory Commission meetings, currently scheduled for the second Thursday of each month.
- The Stormwater Utility presents a monthly report to the Town Council. Check the Council agendas for these reports[39]
- Sign up for the Town's Newsletter and Newsflashes at https://townofcarrboro.org/list.aspx.
- Follow the Town the Stormwater program on Social Media:
    - Instagram: @townofcarrborostormwater, @townofcarrbro
    - Facebook: @CarrboroTownGov
    - Twitter: @CarrboroTownGov

How Can I Provide Input?

- Report Flooding Events (https://tocgis.ci.carrboro.nc.us/Carrboro/FloodReport/)
- Request Stormwater Services or Report Illicit Discharges[40]
- Apply[41] to become a member of the Stormwater Advisory Commission
- Contact Town's Stormwater Staff at stormwater@townofcarrboro.org or 919-918-7435

[37] http://www.townofcarrboro.org/1119/Stormwater-Advisory-Commission
[38] https://townofcarrboro.org/287/Stormwater
[39] https://www.townofcarrboro.org/248/Town-Council
[40] https://townofcarrboro.org/FormCenter/Public-Works-Department-23/Stormwater-Service-Request-134
[41] https://townofcarrboro.org/FormCenter/Town-Clerks-Office-25/Advisory-Board-Application-97

GLOSSARY OF TERMS

Aquifer: An underground layer of permeable rock containing groundwater in a quantity great enough to be extracted for human purposes.

Berm: A constructed barrier of compacted, raised earth used to prevent and slow the flow of runoff.

Bioretention Cell: A landscaped depression designed to remove pollutants from stormwater runoff through infiltration.

Buffer: The vegetated area between a water body and adjacent land uses; provides soil stability, slows the flow of runoff, and improves water quality by filtering out pollutants.

Catch Basin: The underground pit beneath a storm grate that collects rainwater from streets and serves as an entry point to the storm drain system.

Channel: The natural path of water and sediment flowing within stream banks.

Cistern: A storage tank located above or below ground that holds rainwater for beneficial reuse.

Clean Water Act (1972): The federal environmental law governing water pollution, establishing goals to ensure that surface waters will meet the chemical, physical and biological water quality standards for their intended uses.

Culvert: A tunnel, pipe or other structure that allows water to flow under a roadway, railroad or other obstruction.

Detention: Temporarily collecting and holding stormwater runoff while slowly draining to another location.

Discharge: 1. A flow of liquids from a source; can be made up of washwater, sewage, stormwater, wastes, tap water, spring water or other sources. 2. A measurement of the volumetric rate of water flow over a period of time, usually expressed as cubic feet per second.

Downspout: A typically vertical pipe that carries rainwater from a roof gutter to the ground level.

Drainage: The natural or artificial process of removing excess surface and sub-surface water.

Drainage Basin: All the land, surface water, and underlying groundwater that drains to a given point; also known as a watershed.

Dry Pond: A depression that temporarily holds stormwater and releases it at a slower rate until it enters a stream or collection system. Also known as a "detention pond."

Easement: A right to use and/or enter a specified area of land owned by somebody else; granted to utilities or municipal governments to maintain equipment or infrastructure, or to other private parties for a specified use.

EPA: United States Environmental Protection Agency, a federal agency with the directive to protect human health and the environment.

Ephemeral: Flowing only during or immediately after precipitation.

Erosion: The process of detaching and moving soil from one location to another; caused by the action of wind, water, or other forces working on the earth's surface.

FEMA: Federal Emergency Management Agency, a federal agency designated to coordinate the response to disasters that overwhelm the resources of state and local authorities.

Flooding: The rising and overflowing of a body of water, submerging land that is usually dry.

Floodplain: An area of land adjacent to a stream or river channel that is susceptible to natural flooding during periods of high discharge.

Grading: The cutting, filling or other alteration of the land surface to a desired slope or elevation.

Green Roof: A roof partially or completely covered with vegetation, designed to absorb and filter rainwater and provide other environmental benefits.

Groundwater: Water stored beneath the earth's surface in soil pore spaces and fractures of rock formations, accessible for human use when stored in aquifers, and recharged from surface infiltration.

Habitat: The natural environment in which a particular type of plant or animal lives and grows.

Hardscaping: Man-made features used in landscape architecture, such as paved areas, retaining walls, and stairs.

Headwaters: The source of a stream, or point farthest upstream from the mouth or downstream confluence.

Illicit Connection: Any connection to the storm drain system that is not permitted, or any legitimate connection that is used for illegal discharge.

Illicit Discharge: The release of any material into the stormwater conveyance system which is not authorized by the regulating body and/or contains pollutants or pathogens.

Impaired Waterbody: A body of water that fails to meet one or more water quality standards, such as pollutant concentration or loading.

Impervious Surface: A hard surface that prevents or slows the entry of water into underlying soil, or causes water to run off the surface in greater quantities or rates of flow as compared to natural conditions prior to development.

Infiltration: The process of water soaking into the ground from the surface, commonly referred to as percolation.

Infrastructure: The set of fundamental facilities, systems, and equipment serving an area for public benefit, such as roads, pipes, and buildings.

Inlet: A point where stormwater enters a stormwater conveyance system, such as a catch basin.

Intermittent: Generally maintaining flow seasonally, rather than year-round (perennial) or only after rain events (ephemeral).

Large Woody Debris (LWD): Large accumulations of logs, branches, and other wood that falls into streams or rivers and can influence the flow or shape of the stream channel.

Level Spreader: An erosion control device, such as a concrete lip, designed to mitigate the impact of high-velocity stormwater runoff by evenly distributing flow.

MS4: Municipal Separate Storm Sewer Systems, a collection of structures designed to gather stormwater and convey it to local streams or rivers.

Native Plants: Plants that occurred naturally in a region or habitat without human introduction.

NCDEQ: North Carolina Department of Environmental Quality, a state agency whose purpose is to protect North Carolina's environment and natural resources.

NPDES: National Pollutant Discharge Elimination System, part of the Clean Water Act which requires permits for surface water pollution. In North Carolina, these permits are issued and enforced by NCDEQ.

Nuisance Flooding: Flooding which causes inconvenience, but little or no property damage.

Nutrient Load: The total input of nutrients into the ecosystem from human and non-human sources, which can become stressful to aquatic ecosystems in excess.

Outfall: A point where collected storm water runoff is discharged from an underground piped system or above ground conveyance into a receiving water body.

Peak Flow Rate: The maximum flow of water during a storm event, usually expressed in CFS (cubic feet per second).

Perennial: Streams, generally flowing year round, rather than seasonally or only after rain events.

Permeable: Having pores or openings that permit liquids to pass through, also known as "pervious".

Rain Barrel: A storage device that collects stormwater, usually from a roof surface, which can be reused for irrigation, washing vehicles, or other uses not involving human consumption.

Rain Garden: A bowl-shaped area in the landscape planted with native shrubs and flowers, where rain water collects and is absorbed back into the soil.

Rainwater Harvesting: The collection and storage of rainwater in a container or planted area, preventing excess runoff and redirecting the water for beneficial use.

Receiving Water: Any water body that receives stormwater outflow, either from natural or man-made systems.

Restoration: Work conducted to repair creeks and creek-side areas damaged by erosion and/or sedimentation, to improve water quality, stabilize banks, and enhance habitat for aquatic life.

Retention Basin: An artificial pond where surface and stormwater runoff is collected and continuously stored. See "wet pond".

Retrofit: The modification of equipment or structures to add new technology; in stormwater, typically refers to the addition or modification of SCMs in older developments.

Riparian: Related to or adjacent to the banks of rivers and streams, and sometimes also wetlands, lakes, or tidewater.

Runoff: The flow of water across the ground surface when stormwater cannot infiltrate the soil rapidly enough.

Sedimentation: The process of depositing soil, clay, sand or other sediments that were moved by the flow of water.

Septic System: An underground, typically domestic, wastewater collection and treatment system.

Sewer System: The system of pipes and pump stations that collect and transport wastewater from homes and businesses to a wastewater treatment plant.

Stormwater: Water originating from rain, snow, ice melt, and other precipitation.

Stormwater Control Measure (SCM): Physical structures that are designed and constructed to remove pollutants from stormwater runoff, provide flood control, reduce downstream erosion, and/or promote groundwater recharge; common examples include bioretention cells, wet ponds, and stormwater wetlands.

Stormwater Conveyance: The network of above- and below-ground infrastructure that collects, conveys, stores or treats surface and stormwater runoff.

Stormwater Wetlands: Constructed systems that mimic the functions of natural wetlands and use physical, chemical, and biological processes to treat stormwater pollution.

Stream Buffer: The undeveloped, vegetated area parallel and adjacent to a stream that protects and enhances water quality.

Subwatershed: An area of land, surface waters and groundwater that drains to a particular point, designated as part of a larger watershed.

Surface Water: Water found on the surface of the earth such as a river, stream, lake, wetland, or ocean.

Swale: A broad, shallow, gently sloped, open channel that conveys stormwater runoff.

Toxic: Poisonous, carcinogenic, or otherwise directly harmful to life.

Tributary: A river, stream, or creek flowing into a larger river or lake.

Underground Detention Systems: Vaults constructed under parking lots, roads, or existing greenspaces to store (and sometimes treat) excess stormwater.

USACE: United States Army Corp of Engineers, an engineering part of the U.S. Army whose mission, among others, is to "deliver vital public and military engineering services" by planning, designing, and constructing civil works projects and administering several federal clean water programs.

USGS: United States Geological Survey, a science organization that provides impartial information on the health of ecosystems and the environment.

Water Quality Buffer: Buffers in which construction or development are specifically prohibited in order to maintain water quality of the stream or receiving water body. More or less synonymous with "stream buffer".

Water Quality / Illicit Discharge Ordinance: The code prohibiting the discharge any contaminant into surface and storm water or ground water, through spills, illicit connections, contaminated stormwater runoff, etc.

Water Supply Watershed: A watershed whose receiving water body provides drinking/domestic water to the public, and therefore is subject to more stringent development and water quality standards.

Watershed: All the land, surface water, and underlying groundwater that drains to a given point; also known as a drainage basin.

Wet Pond: Drainage facilities for water quality treatment that contain a permanent pool of water, designed to optimize water quality by providing long retention times, allowing metals and other particles to settle out and biologic activity to occur that metabolizes nutrients and organic pollutants.

Wetland: A type of ecosystem that is flooded, permanently or seasonally, where oxygen-free processes occur; common examples are marshes, swamps, and bogs.