



CHAPTER FOUR

Climate Action & Environment

CLIMATE ACTION VISION

The Town is a leader in mitigating climate change and in increasing resilience to climate change impacts for both residents and the environment by incorporating creative system-wide changes, as opposed to siloed actions. The Town prioritizes strategies to increase the resilience of Black, Indigenous, and People of Color (BIPOC), low-income, and other residents who are disproportionately impacted by climate change.

CLIMATE ACTION KEY FINDINGS

- 1. In August 2021, the Intergovernmental Panel on Climate Change released a report confirming that human actions have caused climate change.** Additionally, it confirms previous reports of impacts of climate change and that 1.5°C and 2°C rise in temperature will happen in the 21st century unless drastic reductions in greenhouse gas (GHG) emissions are achieved globally.¹
- 2. The 2017 Community Climate Action Plan (CCAP) recommended the Town adopt the goal of a 50% reduction per capita GHG emissions by 2025.** In 2020, the CCAP and the 2014 Energy and Climate Protection Plan (ECP) goals were updated to an 80% community reduction of 2010 GHG levels by 2030. The Town has not yet fully budgeted implementation of these plans and requires additional funding sources.
- 3. Due to actions thus far, the Town has achieved a reduction of ~ 14% in Green House Gas (GHG) emissions as of March 2019.** The Town has set out comprehensive strategies to meet its goals, referring to a systems-wide approach of both redesigning the built environment to incorporate transportation, and improved standards and retrofits to support shifting community and municipal emissions.
- 4. From 2000 to 2009, extreme heat was the leading cause of weather-related deaths in the U.S. Extreme heat degrades air quality.** Additionally, by the end of the century, the annual number of days with extreme precipitation (3 inches or more) is projected to increase by up to 115% under the lower scenario, and 200% under the higher scenario

¹ IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press. Retrieved from https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

in the Piedmont Region of North Carolina.² Though the Town was not specifically redlined by federal agencies, housing patterns in the area may leave some populations more vulnerable to the effects of climate change.

RACE AND EQUITY AND CLIMATE ACTION

Race and Equity:

The climate action and environmental/ecosystem strategies and projects have been designed to advance race and equity in the town through:

- Increasing financial access to renewable energy, energy efficiency, and green stormwater infrastructure by subsidizing programs.
- Considering how renters and homeowners can receive benefits of efficiency measures.
- Shifting and expanding the Town's community engagement initiatives to improve residents' ability to participate in decision-making around climate initiatives.
- Assessing the impacts of stormwater variances cumulatively, as opposed to individually.

Climate Action:

The climate action and environmental/ecosystem strategies and projects aim to advance the Town's Climate Action Plan and Energy and Climate Action Plan through:

- Drawing attention to a system's wide approach to be resilient to climate change highlighting changes to construction/retrofits and ecosystem preservation.
- Suggesting how land use, transportation, policymaking process, energy, stormwater management, and water ecosystems decisions can be used to achieve Carrboro's climate action vision.

Some strategies are identified in the other chapters and are directly related to advancing equity and climate action for both current and prospective residents of the Town.

CLIMATE ACTION DRAFT METRICS

1. Achieve 80% reduction in per capita greenhouse gas emissions by 2030, as compared to 2010 levels.
2. Achieve 80% reduction in municipal emissions by 2030, as compared to 2010 levels.
3. Due to environmental injustice/disparate impacts of climate change, increase the number of BIPOC and low-income residents who participate in public engagement strategies.
4. X% percentage of budget requested to enact climate change actions is allocated over next 10 years.

² Kunkel, K.E., Easterling, D.R., Ballinger, A., Bililign, S., Champion, S.M., Corbett, D.R., Dello, K.D., Dissen, J., Lackmann, G.M., Luettich Jr., R.A., Perry, L.B., Robinson, W.A., Stevens, L.E., Stewart, B.C., & Terando, A.J. (2020). North Carolina Climate Science Report, North Carolina Institute for Climate Studies. Retrieved from https://ncics.org/pub/nccsr/NC%20Climate%20Science%20Report_FullReport_Final_March2020.pdf

CLIMATE ACTION GOALS, STRATEGIES, AND PROJECTS

Goal 1: Achieve 80% reduction in per capita greenhouse gas emissions by 2030, as compared to 2010 levels (Town Council, Community Climate Action Plan, updated October 2020)

The goal refers to community-wide greenhouse gas emissions, not only emissions due to municipal operations.

Strategy 1.1 Increase the use of renewable energy sources, e.g., solar for all residents, including low-income residents. (CCAP)

Replacing fossil fuels with renewable energy sources will reduce Carrboro's greenhouse gas emissions. To meet equity goals, low-income residents should be able to access and afford renewable energy.

- a) Advocate for more expansive renewable energy County and State legislation, ordinances, and policies. (Carrboro Connects Task Force)
 - Examples include 1.) Enabling innovative financing to increase the affordability of renewable energy; 2) State funding allocated to subsidize renewable energy for low- and moderate-income households; 3) Streamlining community solar facility requirements for utilities and other enabling policies that allow access to solar energy for residents who aren't able to install rooftop solar.
- b) Explore partnerships with public agencies or organizations to increase opportunities to access renewable energy (CCAP).
 - The town of Carrboro is currently part of the [North Carolina Cities Initiative](#) which can be a forum to learn how to increase access to renewable energy. Additionally, seek a partnership with a community development financial institution (CDFI) or other non-profit to implement a community-based solar project. The partnership should seek to increase community awareness of renewable energy benefits and provide accessible program opportunities that lower or eliminate upfront installation costs for low- and moderate-income. Community education programs should continue to prioritize outreach to BIPOC residents and other traditionally underserved populations. The Town should also work with Duke Energy to explore other options to increase access to renewable energy.
- c) Continue to evaluate the potential to integrate renewable energy infrastructure during the review of development permits. (Carrboro Connects Task Force and Popup)
 - Seek authority and effective ways to make buildings "solar ready" or ready for other renewables during development and permit reviews so that future installation is more affordable and achievable. New affordable housing development should be a priority for this strategy, as on-site

renewable energy can lower energy costs for low- and moderate-income tenants. Continue to follow rise of new technology to create an energy positive building.

Strategy 1.2 Integrate Climate Action with the Local Living Economy (CCAP)

In 2012, 93% of Carrboro's greenhouse gas emissions were due to community activities (residents and businesses).³ To reduce community emissions, local businesses need to be able to implement climate action policies and processes.

Projects:

- a) Expand the Worthwhile Investments Save Energy (WISE) Program and Energy Efficiency Revolving Loan Fund (EERLF).
 - Funding for EERLF continues to be available. Pursue sustainable, long-term funding opportunities or budget allocation for these programs, with processes updated as needed to increase loan accessibility for low-and moderate-income households and BIPOC business owners.

³ Agudelo-Frankel, David, Brian Beaman, Grace Marshall, and Jessica Myers. "2012 Greenhouse Gas Emission Inventory for the Town of Carrboro, NC." Carrboro, NC: Town of Carrboro, April 2015. <http://www.townofcarrboro.org/DocumentCenter/View/2788/2012-GHG-Emission-Inventory-Final>.



Energy efficiency programs could be combined with rehabilitation initiatives to improve weatherization and reduce monthly energy costs, especially to low- and moderate-income households

- b) Collect and communicate data to the public and decision-makers on food-related greenhouse gas emissions for dining facilities and households in Carrboro (CCAP).
- Continue data collection on household food choice behavior (Note: The Food Choice Survey has been completed and report is anticipated in Fall 2021. Also, a new Environmental Planner has been added in FY 2021-22 budget to assist staff with CCAP). Partner with academic and community organizations to collect data on energy food footprint of dining facilities in Carrboro. Include data in Food Choice Module and other public awareness campaigns related to climate action and local food options.

“Carrboro is known for its farmers’ markets. I think it should be celebrated more, along with regenerative farming movement. That’s important for taking care of our soil. Additionally, if the supply chains might be interrupted, we’ll be dependent on local, sustainable farms, not using industrial inputs.” – Community Member



Carrboro's farmers market sources all food within 50 miles, reducing greenhouse gas emissions. The farmers market and local food establishments are examples of efforts to grow and source food within a local market area

- c) Improve access to healthy food options such as fresh fruits and vegetables to all community members.
 - Analyze future community garden sites, such as one for the residents of southern Carrboro near Berry Hill Dr & Rose Walk Ln. Partner with local organizations to educate residents on how-to increase plant use in diets.
- d) Promote the green economy including local innovators and low-impact industries. (See Economic Sustainability Strategy 5.2)

Goal 2: Achieve 80% reduction in municipal emissions by 2030 (Energy and Climate Protection Plan, updated October 2020).

The goal refers to greenhouse gas emissions due to municipal operations.

Refer to Public Services chapter to view relevant strategies/ projects already underway.

Goal 3: Expand equitable and inclusive community participation in the decision-making and implementation of climate change goals and policies. (Town Council, Carrboro Connects Task Force)

Equity requires that all individuals, especially marginalized populations, can meaningfully contribute to the creation and implementation of community goals and policies. Inclusive community participation works towards co-creation, not just reaction to drafts of policy. Inclusion of marginalized voices reduces the potential for negative unintended consequences for these community members.

Refer to the *Public Services and Communications* chapter to see projects to improve community engagement in the implementation of climate change goals and policies.

Goal 4: Enable lower-income residents and small business owners to participate and benefit from climate resiliency programs. (Climate Action Plan, RainReady Carrboro)

Ensure financial accessibility of climate resilience programs to lower-income residents and small business owners to center equity in climate actions and policies, e.g., provide income-eligible grants or low-cost loans.

Strategy 4.1 Increase participation of rental properties in energy, drinking water, and climate resiliency building programs. (Carrboro Connects Task Force)

While property owners have sole authority to participate in building programs, some or all of the benefits of program participation accrue to renters who pay utility bills and replace personal property after severe weather damage. For this reason, some owners are not incentivized to pursue programs.

- a) Establish a Rental Property Task Force and Process (CCAP).
 - The Town can partner with a community organization to develop and facilitate a task force comprised of compensated stakeholders, tasked with identifying strategies to increase participation of rental properties in energy, drinking water, and climate resiliency building programs.

CCAP 2020

“Most emissions in Carrboro come from buildings, a very high percentage of buildings are for housing and about two-thirds of housing in Carrboro is rental property. For progress towards Carrboro’s Climate Action Goal, it is imperative that emissions reductions efforts address rental property. It is recommended that the Town commission a Task Force to bring forward policy recommendations for how to align landlord and renter interests towards improved energy efficiency in rental units.”

- b) Establish a certificate program and public database for the energy performance of rental housing (CCAP).
 - This program and database would make it easier for renters to find energy efficient and climate resilient rental listings. Incorporate feedback from interested stakeholders in program design.

CCAP 2020

“Buildings Recommendation #5: Create Rental Property Registry/Certification

The basis for this recommendation is identical for the above building recommendations. The essence of this recommendation is that, as part of making rental properties more energy efficient, a program be created

that makes it easy for those in the rental market to find energy efficient rental listings."



Energy efficiency certificates can better inform renters about additional costs of potential housing locations.

Strategy 4.2 Expand access to weatherization, energy efficiency, and continue water conservation measures for all, especially lower-income residents and small business owners, in new and existing buildings (CCAP).

Weatherization refers to building improvements that enhance occupant comfort during severe weather. Energy efficiency improvements reduce building energy consumption. Water conservation measures reduce household water use. For Carrboro, OWASA has a robust [water conservation program](#) that water bill payers can access. All of these measures reduce utility costs associated with the building.

- a) Pursue compliance with voluntary section of building code or request specific energy performance rating/measures as a part of land use and/or building permit, especially for affordable housing units/projects (CCAP).
 - Identify voluntary sections of building code that call for increased energy efficiency, weatherization, and water conservation measures. Publicize these sections to developers, especially for affordable housing projects. Explore requiring energy performance ratings in new developments in order to obtain a land use and/or building permit.
- b) Incentivize energy efficiency and green building to exceed minimum standards with special designations and recognition programs and meet climate change demands (Economic Sustainability Plan).



New construction of housing often includes energy efficiency updates.

- c) Develop and promote technical assistance programs for small businesses owners and income-qualified homeowners and renters to install weatherization, energy efficient, and water conservation measures (CCAP).
 - Continue to partner with regional and local jurisdictions to develop and provide technical assistance programs to small business owners and income-qualified homeowners and renters. For example, continue the partnership with OWASA on the water conservation programs at free or reduced cost and encourage OWASA to investigate ways to offer reduced water costs for income-eligible families. Participate in stakeholder meetings to assist with developing new programs for weatherization and energy efficiency. Stakeholder meeting should be systemwide including program funders, administrators, practitioners, and households.
- d) Develop a free or low-cost financing program for weatherization, energy efficient, renewable energy/community generation, and water conservation projects (adapted from CCAP and Economic Sustainability Plan).
 - These opportunities may require partnering with other organizations, applying to grants, or advocating for additional funding from the state level. For example, Carrboro can work with OWASA to provide grants for fixture replacement to income-eligible households.

ENVIRONMENT/ECOSYSTEM VISION

Preserve, protect, and restore natural areas and ecologically sensitive and productive areas through all feasible means (Carrboro Vision 2020, Small Area Plan for Carrboro's Northern Study Area). Plans and policies will improve equity by increasing the community's access to experiencing natural places, especially for those who currently have less access.

ENVIRONMENT/ECOSYSTEM KEY FINDINGS

1. Historical practices of development and agriculture have weakened the resiliency of Carrboro's natural ecosystems. However, the Town is committed to improving ecosystem quality, recognizing the dual benefits for quality of life and climate change resiliency and its importance to town identity. In 1995, the land use ordinance required that 40% of open space be preserved in all new developments. In 2014, the tree canopy coverage standards were updated to include at least 40% canopy coverage on residential land.
2. Between 2002 and 2010, Carrboro lost approximately 4% of its tree canopy,⁴ which negatively affects native pollinator populations.
3. Future development decisions may heavily consider retrofitting older developments which are inadequately prepared for predicted impacts of future climate change. For example, a portion of development in Carrboro, particularly near downtown, was completed prior to the implementation of floodplain management regulations.

ENVIRONMENT/ECOSYSTEM DRAFT METRICS

1. Calculate the acreage of native plantings in Carrboro and increase by X%.
2. Calculate the acreage of tree canopy in Carrboro and increase by Y%

ENVIRONMENT/ECOSYSTEM GOALS, PROJECTS, AND STRATEGIES

Goal 2: Conserve and restore watersheds, ecosystems, and native species (Eno-Haw Hazard Mitigation Draft Plan, Carrboro Vision 2020, Little Creek Watershed Assessment, Morgan Creek Local Watershed Plan, Bolin Creek Watershed Restoration Plan).

Steward all living things in the Town's local environment. This requires saving and repairing the damage done to the local watersheds and ecosystems.

Strategy 2.1 Support native plantings throughout town (Land Use Ordinance).

Native plants originated and adapted to the local environment, contributing to the ecosystem's overall health. Due to development and property practices, native plants have historically been removed. Disrupting native plantings gave rise to invasive species, harmed

⁴ Town of Carrboro. (2017). Community Climate Action Plan. Retrieved from <https://townofcarrboro.org/DocumentCenter/View/4116/Community-Climate-Action-Plan>

local food chains, and damage the ecosystem overall. The Town can intentionally choose to replant native species.

- a) Work with local groups and organizations to support and expand a native pollinators program that provides technical assistance on native planting for Carrboro residents (renters and homeowners) and business owners (CCAP).

"In residential communities, we use chemical for lawn care. We can move people away from lawns and move them to pollinator friendly plantings. We can go to a strategy of native plantings [...and] educate people on how to care for the lawn." – Task Force Member



Example of native plantings around Carrboro.

- b) Continue to provide education to Public Works and Planning staff, Advisory Commission members, and interested community members in native plant establishment and maintenance along with tree preservation (Stormwater Advisory Commission).
 - Identify greenspaces in town with potential for high density of native plants and trees. Concurrently, partner with nonprofit partners and research groups to learn best practices for preservation and support the Environmental Advisory Board's formation of an independent, community-led tree and native plants coalition that can perform educational

outreach and advocacy for the community forest (as suggested in the CCAP). Focus on participation from and/or benefits to low-income communities and communities of color that may have less time or resources to volunteer (Stormwater Advisory Council).



Potential spaces for native plantings and increased tree canopy.

- c) Establish and protect stabilizing vegetation in stream channel restoration projects. (Little Creek Watershed)
 - Assess the health of vegetation in prioritized stream channel restoration projects. Plant additional native vegetation to support the ecosystem. Educate the public on the current and long-term benefits of these plants for ecosystem health and stormwater management.

“Provide people with information about how they can participate in protecting the environment—help them understand their impact so they are conscious and can take better choices” – Community Member

- d) Work with OWASA and Town of Chapel Hill to improve riparian vegetation condition along sanitary sewer rights of ways and greenways (Little Creek Watershed).
 - The Town has ongoing agreements and work regarding this project. Continue to prioritize sanitary sewer rights-of-ways and greenways based on the condition of riparian vegetation and ecosystem health. Work with OWASA and Town of Chapel Hill to install and maintain plantings in these areas. Educate the public on the benefits of these plantings. Also, pursue invasive species removal project (CCAP). Educate the public on invasive

species in Carrboro. Organize community members to remove invasive species on project days and build environmental stewardship.



Riparian (river) vegetation can be managed by reducing disturbances to ensure health of waterways.

Strategy 2.2 Expand stormwater management measures as part of ecosystem enhancement, watershed restoration, climate resilience, and quality of place improvements. (Interviews)

Mismanaged stormwater can lead to pollution of ecosystems and watersheds and negatively impact human life via flooding during storms. Manage stormwater with appropriate practices that use nature-based solutions to benefit the ecosystem.

Refer to the transportation, green infrastructure, water, and energy chapter for additional, relevant projects.

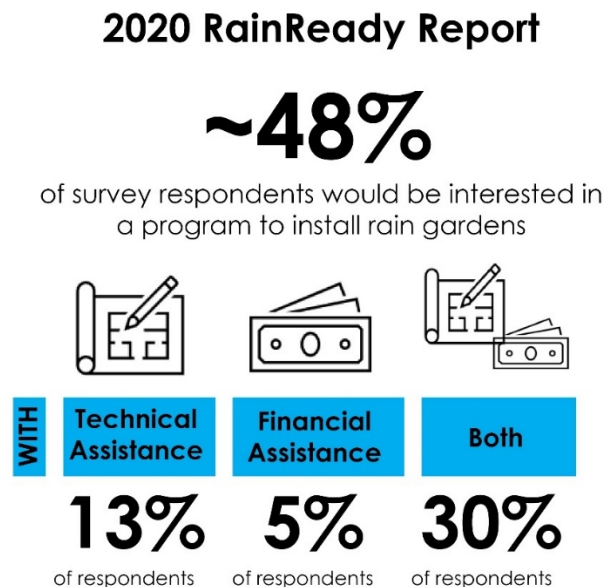
- a) Review and revise the provisions in the Land Use Ordinance as they relate to stormwater and development to provide better protection to streams and riparian areas.

- In the review, consider that older developments' stormwater management practices are outdated and do not match current drainage needs due to increased development and climate change impacts. Also, reassess mechanism that allows developers to submit a fee in lieu of mitigating the development's impact on stormwater runoff and management.
- b) Continue to identify and prioritize opportunities for water quality retrofit projects from previous endeavors (Bolin Creek Watershed Restoration Plan, Morgan Creek Local Watershed Plan, CCAP, NDPEs Phase II).
- Stormwater Utility staff time and funds are already directed towards making improvements related to existing development. For example, the Public Works facility stream restoration and Broad Street culvert replacement are examples of projects focused on improving stormwater issues from pre-existing development.
- c) Implement bioengineering/restoration methods to protect and/or restore riparian and aquatic habitats (Morgan Creek Local Watershed Plan, Bolin Creek Watershed Restoration Plan, CCAP).
- Prioritize stream geomorphic instability. Provide training to planning staff, the Environmental Advisory Board, and interested community members on the danger aquatic habitats face due to climate change and the basics of bioengineering and restoration methods. Identify the best fit bioengineering and restoration methods. Allocate budget to implement these methods.



Example of aquatic environment to consider how development and climate change may impact quality.

- d) Offer technical and financial assistance to renters and homeowners for residential installation of green infrastructure, with an ability to offer priority to more flood prone and lower income residents (RainReady).
- Green infrastructure can help mitigate flooding issues by slowing down the movement of surface rainwater. Educate residents on the types of green infrastructure and support them in installation protocols. Green infrastructure requires regular maintenance to ensure benefits, and thus residents require information, tools, and financing to implement green infrastructure on their private property. Proper education may require the efforts of cross departmental task force.



- e) A Racial Equity Impact Assessment can be used to evaluate and prioritize projects.
- A Racial Equity Impact Assessment is a set of questions used to identify benefits and issues with policies and projects, with a specific focus on the impact on Black, Indigenous, and People of Color communities. REIAs can be used to prioritize projects for funding and implementation and minimize the potential for negative unintended consequences.

Strategy 2.3 Create strategic initiatives to overcome historic soil quality degradation and determine ways to protect and restore soil quality as a crucial component of ecosystem and community enhancement (Public Works Staff).

The health and quality of soil greatly impacts the quality and quantity of life that can be sustained in an ecosystem. Historical developmental practices have stripped many nutrients from soil, destroying the ecosystem at a micro and macro level.

- a) Examine Carrboro's soil quality conditions and how soil quality improvements can contribute to climate change resiliency.
 - Explore new approaches and tools for soil quality protection, both to decrease soil quality depletion and increase soil quality. Consider the feasibility of demonstration projects to test these approaches.
- b) Recognize and promote the importance of soil organic carbon content. Coordinate with efforts to expand composting program (adapted from CCAP).
 - Healthy soil can help sequester carbon from the atmosphere. The sequestration of carbon can also promote the growth of vegetation, which is especially important for native plants. Soil organic carbon content can be improved with the addition of compost, which means that organics waste collection in the Town can be used to support soil health in local ecosystems. Fund staff time to facilitate a community-led initiative in developing the possibility of an organics collection and compost initiative.
- c) Develop new outreach and technical assistance to accelerate access to information on soil quality and pursuit of soil restoration projects.
 - Support public education through community-led initiatives about the importance of soil quality and how individual homes or collective blocks can improve soil quality. Support educational project days to provide information on how to improve community behaviors, lawn practices, and natural area restoration.



Measuring soil organic matter content, organic matter respiration, and loss-on-ignition tests can be used to measure Carrboro's soil quality.

Goal 3: Promote policies to ensure equitable distribution of environmental burdens and access to natural areas and ecosystems to be equitable across race, income, and ability, especially in neighborhoods that have been denied and historically underserved. (Town Council)

Historical development practices have resulted in inequitable access to natural areas.

Strategy 3.1 Ensure environmental policies and tools do not have disparate impacts based on race and income, and undo harm from historical policies and zoning.

Reviewing previously established polices and zoning to identify historical harms to BIPOC and other traditionally underserved populations will help the Town work towards this goal. Co-develop new policies and tools with impacted communities to undo past harms and create more equitable outcomes.

- a) Evaluate individual permits within a broader context of cumulative burden to ensure that stormwater impacts do not burden flood-prone neighborhoods, especially for low-income residents. (Community Workshop)
 - Assess if there is a disproportionate experience of flood burden on marginalized identities (BIPOC, low-income, immigrant, etc.) within Carrboro. Analyze current application of stormwater requirements and thresholds to assess whether they appropriately identify and address the problem of flooding and respond to community concerns of flooding.

Matrix to consider context of individual permit	
<i>This matrix provides questions that can be helpful to evaluate individual permits in context of Carrboro's current stormwater experiences. The questions ask the evaluator to consider the location of the permit request, what are the current stormwater experiences downstream of the location, and who else may be impacted by the permit's approval. Development of matrix by Center for Neighborhood Technology for Carrboro was informed by review of Stormwater Impact Assessments by Hawaii Coastal Zone Management from Hawaii State Office of Planning.</i>	
Permit Details	<ul style="list-style-type: none"> • Permit Requestor • Location of permit area • Currently stormwater retained required • Is there a request for an in lieu of fee?
Number of permits in area	<ul style="list-style-type: none"> • Staff or SWAC to determine scale of area based on water flow/water shed maps
Conditions of area	<ul style="list-style-type: none"> • Permit conditions: Older permits will have stormwater mitigation requirements less than required for current context • Best practices used • Monitoring of current permits in area • Current peak flow and run off volume in area • Pollutants from area • Upstream of which neighborhoods?
Characteristics of downstream neighborhoods	<ul style="list-style-type: none"> • Demographics • Financial vulnerability to flooding

<p>Current flooding impacts experienced by downstream neighborhoods</p>	<ul style="list-style-type: none"> • Number of flooding instances • Which storms led to flooding • Financial costs (direct – repair costs/insurance payouts & indirect – lost work days, etc.)
<p>Future impacts of approving stormwater permit</p>	<ul style="list-style-type: none"> • Consider land use and land cover data as well as previous columns

- b) Investigate land use planning and flood mitigation approaches to better address impacts to already burdened properties.
- These approaches can seek to address flood plain concerns, flooding due to stormwater runoff from infill and redevelopment, the increased frequency of intense storms, and total precipitation. Geographically include, but do not limit investigation to, the upper Toms Creek watershed.



The Town of Carrboro is already implementing stormwater projects in this low-lying neighborhood that experiences flooding.

- c) Train Stormwater Advisory Council Members, Racial Equity Commission members, and Public Works staff to conduct Racial Equity Impact Assessments on ordinances and actions taken thus far on any policy.
- Racial Equity Impact Assessments are systematic evaluations of possible actions to consider potential unintended consequences and cumulative impacts of any ordinance or action. These help to identify and rectify harmful stormwater policies and variances.

RELATED STRATEGIES AND PROJECTS IN OTHER CHAPTERS

Transportation, Green Infrastructure, Energy, and Water

- Encourage non-automobile use in the community, reduce vehicle miles travelled through land use decisions and pursue or enhance existing developments that lends itself to public transit use (such as denser mixed-use nodes).
- Create safe streets for pedestrians, bike riders, and transit riders (
- Explore approaches to apply green stormwater infrastructure assets in transportation plans and projects that will result in dual benefits.
- Update stormwater management practices to improve water quality
- Address the effect of development on stormwater management
- Develop programs and policies to support homeowners' and business owners' ability to generate renewable energy, with consideration for low-income owners and financially benefit the town
- Expand access to retrofit existing stormwater infrastructure and add new green stormwater infrastructure on private property for greater lot, neighborhood, and watershed scale resilience and environmental quality as well as community enjoyment of outdoor spaces.

Economic Sustainability

- Promote the green economy including local innovators and low-impact industries.

Land Use Chapter

- Support development patterns that advance climate action goals and environmental protection
- Pursue development provisions that preserve and maintain natural areas by incorporating environmentally-sensitive development and building practices.

Recreation, Parks, and Cultural Resources

- Ensure all people in Carrboro have safe, equitable, and connected access to parks and open space facilities.

Public Services and Communications

- Increase the energy efficiency of municipal buildings
- Reduce greenhouse gas emissions due to municipal fleet operations
- Value members as advisors in community engagement processes.
- Support neighborhood organizing efforts and outreach to neighborhoods, seeking to strengthen local government, to meaningfully engage traditionally underrepresented community members in environmental decision-making.

APPENDIX – GLOSSARY OF TERMS

Adaptation: Adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects (ECPP 2020, p 25)

Bioretention: Use of plants and soils for removal of pollutants from stormwater runoff via adsorption, filtration, sedimentation, volatilization, ion exchange, and biological decomposition ([NCDENR Stormwater SCM Manual](#))

Climate Change: Increasing quantity of greenhouse gases (GHGs) in the atmosphere is causing temperatures to rise and increasing the frequency and severity of extreme weather events, and that human activities are the primary cause (CCAP 2020, p 2).

Green Stormwater Infrastructure: Nature-based stormwater management methods that mitigate flooding, improve the ecosystem's health, and provide additional benefits to the community.

Geomorphic instability: When the slopes of landscape, rivers or streams, and hills are less stable, often due to erosion.

Community plan/actions: Broader plan to address activities that: expands the focus to include energy saving activities across the jurisdiction (residential, commercial, industrial, transportation, and other sectors) of the broader community; recognizes that, while local government actions can greatly influence, energize, and leverage effective activities in the broader community, the government has less direct control over these activities in comparison to a government-only plan (CCAP 2020, p 6-7).

Energy Positive Building: When a building creates more energy than it uses.

Feeder System: Smaller bodies of water that join into a larger body water.

Mitigation: Activities that avoid or decrease the release of greenhouse gas (GHG) emissions, or decrease atmospheric GHG concentrations, e.g., carbon storage in forests or soils (ECPP 2020, p 25).

Municipal plan/actions: A focus on government buildings, facilities, infrastructure, and transportation; concentrates on activities for which the government has direct influence – e.g., personnel, planning, and budgeting – which means tighter control over implementation (CCAP 2020, p 6).

Resilience: Closely related to the concept of adaptation is climate resilience (ECPP 2020, p 25). The capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover from a disruption ([U.S. Climate Resilience Toolkit](#))

APPENDIX - ADDITIONAL RESOURCES

CA: 1.1.d

ECPP 2020

“To be financially competitive, “renewables” take advantage of federal and state tax credits, renewable energy credits and accelerated depreciation. As a municipality, Carrboro cannot take advantage of these incentives alone. As a pilot project to investigate alternatives, the Town partnered with Carrboro Community Solar in 2012 for a small-scale (5kW) solar electric system at the Town Commons.

Side Bar: 203 Project Analysis: When the Town was discussing designs for the 203 Project, staff discussed the possibility of an energy positive building. However, the multi-story design of the building meant that it had a greater footprint, which would require more solar panels. There are current technological limitations, such as geothermal sources cannot be put under a building. For multi-story buildings, current technologies require a larger site to achieve positive energy status.

CA 1.1.e

B1GCZ General Business- Conditional Zoning District

“Section 15-141.4 (f) Notwithstanding the foregoing, in approving a rezoning to a B-1(g) CZ zoning district, the Board of Aldermen may authorize the property so zoned to be developed at a higher level of residential density than that otherwise permissible in B-1(g) zoning districts under Section 15-182 if the rezoning includes conditions that provide for site and building elements that will create a more vibrant and successful community. Site and building elements are intended to be selected from at least three of the following seven areas: stormwater management, water conservation, energy conservation, on-site energy production, alternative transportation, provision of affordable housing, and the provision of public art and/or provision of outdoor amenities for public use. Conditions that may be included to meet the above stated objective include but shall not be limited to the following: (AMENDED 11/9/11) [...] g. Specific energy saving features, including but not limited to the following, are encouraged. i. Use of shading devices and high performance glass for minimizing heating and cooling loads ii. Insulation beyond minimum standards; iii. Use of energy efficient motors/HVAC; iv. Use of energy efficient lighting; v. Use of energy efficient appliances vi. LED or LED/Solar parking lot lighting (50-100% more efficient). vii. Active and passive solar features. (3) Provision of onsite facilities (e.g. solar, wind, geothermal) that will provide 5% of electricity demand associated with the project. [...] (13) Provision of affordable housing in accordance with Town policy) Continue to pursue renewable energy supply portfolios and microgrid creation opportunities.

CA 4.2.b

[North Carolina Building Performance Association](#) has submitted comments over the past several years to the North Carolina Housing Finance Agency to increase standards. The Town of Carrboro can explore ways to advocate with the North Carolina Building Performance Association to increase standards.

Charlotte, NC: According to the [American Council for an Energy Efficient Economy](#), The city provides density bonuses to developments with LEED Gold certification, and for those in transit oriented corridors with a LEED Silver certification or similar. ([Municipal code: Sec. 54-299.32. - Incentive options](#))

Greensboro, NC: According to the [American Council for an Energy Efficient Economy](#), Greensboro provides permit fee rebates based on energy efficient construction or inclusion of energy efficient appliances. ([Municipal Code: Sec. 6-3. - Energy efficiency rebates.](#))

CA 5

“BE IT FURTHER RESOLVED that the Carrboro Board of Aldermen directs the Town Manager to charge staff to update cost estimations of current and proposed projects and activities, and develop a 10 year annual climate emergency budget proposal for implementing updated climate action plan goals and related activities and projects for consideration by the Carrboro Board of Aldermen beginning in the FY 2020-21 budget cycle, and annually thereafter.

BE IT FURTHER RESOLVED the Board of Aldermen will assess the recommended climate plan updates and budget based by cost, ability to reduce greenhouse gas emissions per the Town's carbon reduction goals, and implications for race and equity and climate justice for final inclusion in the Town's FY 2020-21 budget and annually thereafter.

BE IT FURTHER RESOLVED the Board of Alderman directs the Town Manager to charge staff to leverage resources from Orange County, the State of North Carolina and the Federal government, when these are available, for helping achieve the Town's goals and for offsetting costs when possible.” (June 25, 2019 [Resolution](#))

EE 1.1.b

[Carolina North Land Stewardship Policy](#) 2015 from UNC Chapel Hill Stewardship Vision Principles and Goals: “The University is committed to responsibly stewarding the open spaces and natural areas within the Conservation Areas and Limited Development Areas (subject to the 100 year and 50-year periods) of the CN property. The University will protect and preserve the physical and biological integrity of the environment, maximize ecosystem services inherent in those areas, and provide opportunities for education, research, and recreation.”

EE 1.1.c

Resources on Tree Preservation in Developments

- NC State Extension: [*Protecting and Retaining Trees: A Guide for Municipalities and Counties in North Carolina*](#) includes ordinance provisions and responses to common issues communities face (like clearcutting).
- Sustainable Development Code: [*Ch. 1.3 Sensitive Lands and Wildlife Habitat, Tree Canopy Cover*](#) includes Charlotte, NC as an example of how to protect urban trees.

EE 2.1.c

Little Creek Watershed 2003 Assessment

"Activities should be implemented in conjunction with stormwater retrofit BMPs, in order to improve aquatic habitat. Priority areas include: the entire mainstem of Little Creek within the study area; Bolin Creek below East Franklin Street; Booker Creek below Old Oxford Road; and the 500- foot reach of Booker Creek below the Lake Ellen spillway (a total channel length of approximately 3.2 miles). Smaller sections of upstream channel may also benefit from restoration."

"Many areas have limited bank protection but may be eroding only slowly due to the cohesive soils often comprising the lower banks and the stabilizing influence of roots associated with the mature woody vegetation that is frequently present"

"Identify wetland and riparian restoration projects or other watershed based efforts to mitigate for post-construction stormwater impacts (from both new and existing development) that will not otherwise be controlled."

EE 2.3.c

Resources for Soil Health:

- <https://content.ces.ncsu.edu/soil-health-what-does-it-mean-in-north-carolina>
- <https://www.nrcs.usda.gov/wps/portal/nrcs/main/nc/soils/health/>
- <https://soilhealthinstitute.org/>