



CHAPTER FOUR

Climate Action & Environment

Vision: Climate Action

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. 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.



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. 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 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.

3. 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 to further climate justice goals. The Town requires additional funding sources to fully fund implementation of these plans. Note: as detailed in the Climate Action Issues and Opportunities Report completed as part of this process, as of 2012 roughly 93% of Carrboro's emissions come from the community as a whole (i.e. residents) while just 7% comes from local government operations.

4. 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. The Town also acknowledges the interdependencies between systems, and the need to have clean energy across the board (i.e. electric vehicles are only as clean as their energy source).

► *The largest source of greenhouse gas emissions from human activities in the United States is from burning fossil fuels for electricity, heat, and transportation. Source: U.S. EPA*

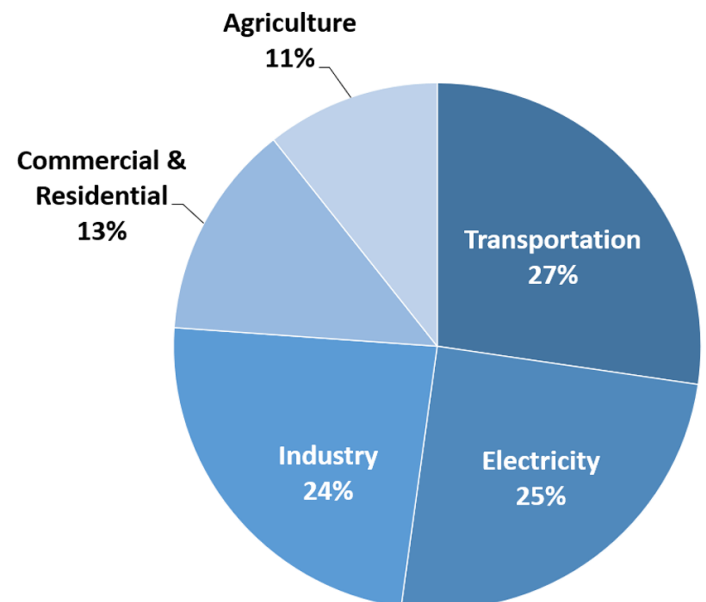
5. From 2009 to 2019, Carrboro's greatest emissions come from electricity and gas, and the emissions from transportation are increasing. The town has seen a 14% reduction in emissions since 2012 from electricity and gas, 56% reduction since 2012 from solid waste, and a 23% increase in emissions from transportation.³

6. Given the Town's extensive work on climate action, the projects detailed in this plan are intended to further (and not replace) existing climate action plans and Town Council resolutions that provide direction on how to achieve Carrboro's climate action goals. Projects should be prioritized through the context of carbon reduction impact and climate justice.

7. Carrboro has already committed to and made progress on many climate action and environmental strategies, which are reinforced and expanded upon in this plan. Some of these include: the Community Climate Action Plan (CCAP) 2020, Energy and Climate Protection Plan (ECP) 2020, and Economic Sustainability Plan.

Note: Endnote references can be found at the end of this chapter.

Total U.S. Greenhouse Gas Emissions by Economic Sector in 2020



Race & Equity and Climate Action

Race and Equity

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

- Increasing access to renewable energy, energy efficiency, and green stormwater infrastructure by providing financial subsidies.
- Exploring how renters and homeowners can receive benefits of efficiency measures.
- Shifting and expanding the Town's community engagement initiatives to improve all residents' ability to participate in decision-making around climate initiatives and access to natural areas.

Climate Action

The climate action and environmental 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.

What We Will Measure

1. Per capita greenhouse gas emissions
2. Municipal emissions
3. The number of BIPOC and low-income residents who participate in climate change-related public engagement
4. Percentage of budget allocated to enact climate change actions over the next 10 years

CLIMATE ACTION

Goals, Strategies, and Projects

Goal 1: Achieve 80% reduction in per capita greenhouse gas emissions by 2030, as compared to 2010 levels. This 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.

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 Develop 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 is 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-profits 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.

The Town can encourage residents to pursue solar energy by revamping the Solarize Carrboro program of 2014-2015 where residents received free solar assessments and discounted installments from town-vetted local solar installers.

Engage in conversations with state-wide environmental groups like Sierra Club and Southeastern Law Center to understand the possibilities of solar microgrids distributed within municipal jurisdictions.

B Continue evaluation of the potential to integrate renewable energy infrastructure during the review of development permits.

Seek authority from the state 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. Educate developers on how renewable energy infrastructure is financially beneficial. New affordable housing development should be a priority for this strategy, as on-site renewable energy can lower energy costs for tenants. Continue to follow rise of new technology to create an energy positive building and incorporate in development permit reviews to advise developers on how to improve building designs before approving permits.

C Demand for more expansive renewable energy County and State legislation, ordinances, and policies.

Examples include:

1. Enabling financing opportunities 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.

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. -EPCC 2020

Strategy 1.2 Integrate Climate Action with the Local Living Economy.

In 2012, 93% of Carrboro's greenhouse gas emissions were due to community activities (residents and businesses).⁴ To reduce community emissions, local businesses need to be able to implement climate action policies and processes.

A Expand the Worthwhile Investments Save Energy (WISE) Program and Energy Efficiency Revolving Loan Fund (EERLF).

Leverage available EERLF funding to 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.

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.

Continue data collection on household food choice behavior. 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'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 local healthy food options such as fresh fruits and vegetables to all community members.

Local food production reduces carbon emissions due to the reduction in transportation. Analyze future community garden sites, such as one for the residents of southern Carrboro near Berryhill 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)

"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. We should be dependent on local, sustainable farms, not using industrial inputs." -Resident Idea



▲ 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.

Goal 2: Achieve 80% reduction in municipal emissions by 2030. *As this goal refers to greenhouse gas emissions due to municipal operations, refer to Public Services & Communications Chapter to view relevant strategies/ projects already underway.*

Strategy 2.1: Budget for implementing the Town's climate action plans (both community and municipal) in accordance with the June 25, 2019 Resolution.

Strategy 2.2: At a minimum, 20% of the budget required to meet the Town's climate action goals is funded over the next 10 years.

Goal 3: Expand equitable and inclusive community participation in the decision-making and implementation of climate change goals and policies.

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 & Communications Chapter to see projects to improve community engagement in the implementation of climate change goals and policies.

Net Zero Definition for Town Buildings

Together with the Environmental Advisory Board (EAB), Town Council issued a resolution in February 2021 to adopt the following definition:

"Net Zero Buildings shall be evaluated using greenhouse gas emissions (GHG) as the accounting metric. Renewable energy can be generated off-site to offset GHG emissions from nonrenewable energy consumption."

Town Council and the EAB also agree that the approach to any Net Zero Buildings project will be to first conserve as much as possible through energy efficiency measures, then to make up the balance through renewable energy generation.

Goal 4: Enable lower-income residents and small business owners to be able to financially participate and benefit from climate resiliency programs.

Strategy 4.1 Increase participation of rental properties in energy, drinking water, and climate resiliency building programs.

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, owners may not be incentivized to pursue programs.

A Establish a Rental Property Task Force and Process.

The Town can partner with a community organization to develop and facilitate a task force comprised of stakeholders (building owners, renters, relevant program managers) who are paid for their time (either through their work or if they are resident, through the town), tasked with identifying strategies to increase participation of rental properties in energy, drinking water, and climate resiliency building programs.

B Establish a certificate program and public database for the energy performance of rental housing.

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

“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.”



▲ 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 construction and retrofits to existing buildings.

OWASA has a [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.

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 to obtain a land use and/or building permit.

B Incentivize energy efficiency and green building with special designations and recognition programs to exceed minimum standards and meet climate change demands.

The North Carolina Building Performance Association (NCBPA) has submitted comments over the past several years to the North Carolina Housing Finance Agency to increase standards. Carrboro can explore ways to advocate with NCBPA. Look to examples from Charlotte, NC (density bonuses for LEED Gold developments and those in transit-oriented corridors with a LEED Silver certification or similar) and Greensboro, NC (permit fee rebates based on energy-efficient construction or inclusion of energy-efficient appliances). See American Council for an Energy-Efficient Economy (ACEEE) State and Local Policy Database for more.

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.

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.

Work with OWASA to provide free fixture replacement to income-eligible households. 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 which can be an addition to affordable home rehabilitation programs.

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. The Town can work with the Orange County Home Preservation Coalition to support home weatherization and leverage affordable housing funding through the Weatherization Assistance Program and Home Repair Consortium. The goal is to keep people in their homes as climate change occurs, and more support may be necessary for older homes, like those in the Transition Areas.



▲ *New construction of housing often includes energy efficiency updates.*

Vision: Environment

Preserve, protect, and restore natural areas and ecologically sensitive and productive areas through all feasible means. Plans and policies will improve equity by increasing the community's access to experiencing natural places, especially for those who currently have less access.

What We Will Measure

1. Increase in various measures of ecosystem health: native plantings, tree canopy, pollinators, air pollution, biodiversity, water quality

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. Since 1995, the land use ordinance has 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, which negatively affects native pollinator populations.⁵

3. Future development decisions may evaluate the impact of 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.

4. Many of the goals, strategies, and projects in this chapter originated from public input and previous planning efforts and studies. Some of these include: Community Climate Action Plan (CCAP) 2020, Energy and Climate Protection Plan (ECP) 2020, RainReady, Bolin Creek Watershed Restoration Plan, Morgan Creek Local Watershed Plan, NDPE Phase II, Little Creek Watershed 2003 Assessment.

Note: Endnote references can be found at the end of this chapter.



▲ Example of tree canopy in Carrboro's Anderson Park

ENVIRONMENT

Goals, Strategies, and Projects

Goal 1: Conserve and restore watersheds, ecosystems, and native species.

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 1.1 Support native plantings throughout town.

Native plants and trees originated and adapted to the local environment contribute to the ecosystem's overall health. Due to development and property practices, native plants and trees have historically been removed. Disrupting native plantings gave rise to invasive species, harmed local food chains, and damaged the overall ecosystem. The Town can intentionally choose to replant native species to mitigate stormwater concerns and urban heat island effect.

A Conduct a heat study of Carrboro to identify urban heat islands to determine where native planting programs can be strategically located. Establish parameters within the Land Use Ordinance to mitigate the urban heat island effects in priority areas.

Partner with nonprofit partners and research groups to learn best practices for preservation and determine how and where to plant and maintain native trees and plants to create greenspaces for shading and additional environmental and mental benefits. While identifying priority areas, incorporate data of energy burden on households or businesses, because these buildings will benefit from natural shading.

Parameters in the land use ordinance can include maintaining and increasing existing canopy. Revisit identification of priority areas as development and plantings occur.

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

B 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.

C 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.

Support the Environmental Advisory Board's formation of an independent, community-led tree and native plants coalition that can perform educational outreach, engagement around maintenance concerns, 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.

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.



▲ Example of native plantings around Carrboro.



▲ Potential spaces for native plantings and increased tree canopy.

D Establish and protect native vegetation in riparian and stream channel restoration projects.

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.



E Continue to work with OWASA and Town of Chapel Hill to improve riparian vegetation condition along sanitary sewer rights of ways and greenways.

Continue to prioritize sanitary sewer rights-of-ways and greenways based on the condition of riparian vegetation and ecosystem health in the Transition Areas, ETJ, and in the Town of Carrboro. 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. Educate the public on invasive species in Carrboro. Organize community members to remove invasive species on project days and build environmental stewardship.

“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” – Resident Idea

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

Strategy 1.2 Expand nature-based stormwater solutions as part of ecosystem enhancement, watershed restoration, climate resilience, and quality of place improvements.

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 GSI, Water, & Energy Chapter for additional relevant projects.

A Review and revise the provisions in the Land Use Ordinance related to stormwater and development to provide better protection to streams and riparian areas.

As part of review, consider how older developments' stormwater management practices are outdated and do not match current drainage needs due to increased development and climate change impacts. Revised provisions may also re-assess the mechanism that allows developers to submit a fee in lieu of mitigating the impacts on stormwater runoff and management.

B Continue to identify and prioritize opportunities for water quality retrofit projects from previous endeavors.

C Implement bioengineering/restoration methods to protect and/or restore riparian and aquatic habitats.

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.

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.

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.

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.

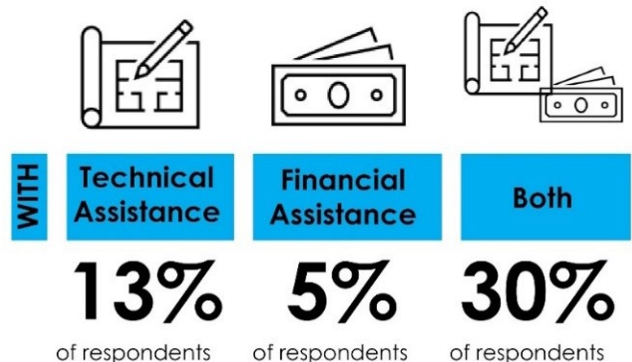
E A Racial Equity Impact Assessment can be used to evaluate and prioritize projects.

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.

2020 RainReady Report

~48%

of survey respondents would be interested in a program to install rain gardens



Strategy 1.3 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.

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. Investigate 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.

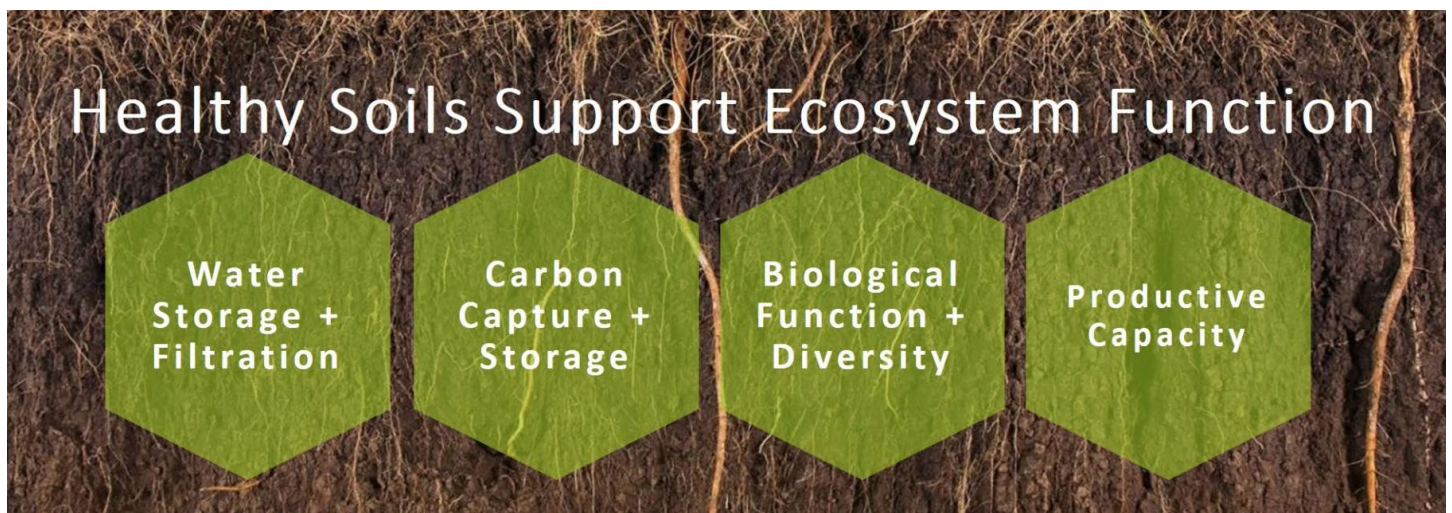
Fund staff time to facilitate a community-led initiative in developing the possibility of an organics collection and compost initiative. Healthy soil can help sequester carbon from the atmosphere. The sequestration of carbon can also promote the growth of vegetation, which is especially important for 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.

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.

Resources for Soil Health

- [NC State Extension “Soil Health: What Does it Mean in North Carolina?”](#)
- [USDA Natural Resources Conservation Service](#)
- [Soil Health Institute](#)



▲ *Measuring soil organic matter content, organic matter respiration, and loss-on-ignition tests can be used to measure Carrboro’s soil quality. (Source: Ecological Landscape Alliance)*

Goal 2: Promote policies to ensure 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.

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

Strategy 2.1 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 policies 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 or low-income residents.

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.

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.

C Train Stormwater Advisory Commission 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 related to stormwater.

Racial Equity Impact Assessments are systematic evaluations of possible actions to unearth potential unintended consequences and cumulative impacts of any ordinance or action. These help to identify and rectify harmful stormwater policies and variances.

ENDNOTES

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
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4. 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>.
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Examining Equity in Environmental Burdens

This matrix provides a guide to the information that should be compiled and reviewed when evaluating individual permits in the context of Carrboro's current stormwater management. The permit evaluator should 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.

Matrix to Examine Context of Individual Permits (Strategy 2.1A)

Permit Details	<ul style="list-style-type: none"> • Permit Requestor • Location of permit area • Currently stormwater retained required
Number of permits in area	<ul style="list-style-type: none"> • Determine size and scale of the impact area to evaluate potential magnitude of stormwater impacts, using water flow/watershed 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 management practices (BMPs) used • Monitoring of current permits in area • Current peak flow and run off volume in impact area • Pollutants from area • Identify neighborhoods that are downstream
Characteristics of downstream neighborhoods	<ul style="list-style-type: none"> • Demographics • Financial vulnerability to flooding based on household income (also consider home values, flood insurance)
Current flooding impacts experienced by downstream neighborhoods	<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.)
Future impacts of approving stormwater permit	<ul style="list-style-type: none"> • Evaluate land use and land cover data as well as previous rows

Matrix developed by Center for Neighborhood Technology (CNT) for Carrboro, informed by review of Stormwater Impact Assessments by Hawaii Coastal Zone Management from Hawaii State Office of Planning.

Related Strategies & Projects in Other Chapters

Transportation and Mobility

- Encourage non-automobile use in the community
- Reduce vehicle miles travelled through land use decisions
- 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
- Increase bus frequency and extend bus routes
- Ensure at least one micro-mobility option in all neighborhoods
- Explore approaches to apply green stormwater infrastructure assets in transportation plans and projects that will result in dual benefits.

Green Stormwater Infrastructure, Water, & Energy

- 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

- 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 Culture

- 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.