

# Green Building and Environmental Sustainability Element

## CONTENTS

<b>Introduction</b>	2
<b>Vision</b>	3
<b>Summary of Goals</b>	3
<b>Core Topics</b>	4
<b>Climate Change</b>	4
<b>Green Building</b>	5
<b>Energy</b>	7
<b>Land Use &amp; Mobility</b>	9
<b>Water</b>	10
<b>Open Space &amp; Landscapes</b>	12
<b>Related Documents and Glossary</b>	15

*Note: The Planning Board views the adoption of this new Element of the Princeton Community Master Plan as a precursor to creating a fully updated, contemporary, user-friendly Master Plan that reflects, in every element, Princeton's strong commitment to sustainability and climate resilience. This element shall be used as a guide when updating the balance of the Master Plan, to ensure inclusion of these priorities throughout.*

*With a keen awareness of the extraordinary demands on municipal staff and Council, the Board urges our colleagues to undertake as quickly as possible the important work of updating municipal ordinances and practices, especially those that govern zoning and stormwater management, to reflect the goals, objectives and recommended actions herein.*

## Introduction

Incorporating green building and sustainability into Princeton's Community Master Plan and into Princeton planning policies and practices in general is critical to the community's ongoing work to create a more sustainable and resilient town and planet. Responsible, intelligent planning, with clear goals and specific guidance, is essential to the community's ability to meet our collective desire and obligation to live sustainably.

In 1987, the United Nations Brundtland Commission defined sustainability as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

As Princeton and surrounding communities continue to grow, and as the climate continues to change, incorporating principles and specific recommendations related to green building, sustainability and climate resilience into the Community Master Plan is imperative.

In August 2008, New Jersey's Municipal Land Use Law (MLUL) was amended to include the Green Building and Environmental Sustainability Element in the list of permitted Master Plan Elements. The MLUL describes the Element as follows:

“A green buildings and environmental sustainability plan element ... shall provide for, encourage, and promote the efficient use of natural resources and the installation and usage of renewable energy systems; consider the impact of buildings on the local, regional and global environment; allow ecosystems to function naturally; conserve and reuse water; treat stormwater on-site; and optimize climatic conditions through site orientation and design.”

This Green Building and Environmental Sustainability Element reflects and builds upon tools and resources that Princeton utilizes to advance green principles: the green building checklist (for development applicants); state stormwater regulations and new thinking about best practices; land use ordinances that reinforce smart growth; open space preservation; and the work of the Princeton Environmental Commission, including its careful review of development projects. This element addresses how sustainability should guide land use and development decisions; related policies, resolutions, and ordinances; and municipal capital improvement planning and design. In so doing, its goals, objectives and recommended actions also reflect Princeton's commitment to social justice, equity and expanding housing and carbon-free lifestyle options for people of all incomes.

### Relationship to the Princeton Climate Action Plan

In July 2019, Princeton Council adopted a resolution in support of the Princeton Climate Action Plan. The resolution affirms the Mayor and Council's commitment to:

- Reducing greenhouse gas emissions and prioritizing climate change resiliency interventions through implementation of Princeton's Climate Action Plan; and

- Adopting a goal to reduce community greenhouse gas emissions 80% by 2050 based on 2010 levels, with interim goals of 50% by 2030 and 65% by 2040, and to pursue efforts towards the aim of reducing emissions 100% by 2050.

The plan identifies 82 actions in five categories: Energy, Land Use & Transportation, Natural Resources, Materials Management, and Resiliency. The actions include associated co-benefits: Promotes Equity, Fosters Economic Sustainability, Improves Local Environmental Quality, Enhances Public Safety and Health, and Builds Resilience. Progress on the plan actions will be reported every three years and updated every nine years.

The Green Building and Environmental Sustainability Element affirms and reinforces the Climate Action Plan's mitigation and resiliency visions, objectives and actions as they relate to municipal governance, and provides an essential planning foundation that enables Princeton to take steps imperative to meeting its emission reduction goals.

## Vision

This Element of the Master Plan envisions a truly sustainable Princeton where all new development and redevelopment is constructed and operates in an environmentally sensitive and green fashion; that is carbon neutral or negative, and is prepared for climate hazards such as extreme heat, flooding, and power outages; where buildings and transportation methods are energy efficient, all energy comes from renewable sources; where there is appropriate density to support a strong local non-auto dependent economy and vibrant downtown, with ample affordable housing for the local workforce; where residents are able to walk, bike or take public transit to every destination; where the drinking water is clean and stormwater is managed properly, using or mimicking the natural water cycle; where open space is preserved.

## Summary of Goals

- Follow green building practices
- Avoid, then minimize and mitigate adverse impact on the landscape and environment.
- Minimize landfill waste
- Become carbon neutral or negative
- Prepare for climate change
- Become more energy efficient
- Use renewable energy and battery energy storage
- Modernize the energy system to promote resilience, conservation, and zero carbon goals
- Follow smart growth principles
- Promote diverse alternative transportation options
- Promote electric vehicle (EV) usage
- Protect and improve water quality with the goal that all of Princeton's waters will meet state and federal water quality standards.
- Manage stormwater with green practices that reduce flooding and pollution
- Plan for droughts

- Protect and increase the amount of natural open space to provide environmental, social, recreational, psychological, public health and economic benefits.
- Protect and enhance the presence of native species to support biodiversity and the health of native flora and fauna
- Protect, expand and replenish our tree canopy
- Use landscape for passive solar and summer shading
- Promote soil health to maximize carbon sequestration and maintain healthy ecosystems.
- Utilize the landscape to capture stormwater and enhance water quality.
- Ensure all residents have walkable access to parks and public open space

## Core Topics

Core topic areas of the Green Building and Environmental Sustainability Element are Green Building, Climate Change, Energy, Land Use & Mobility, Water, and Open Space & Landscapes.

Each topic section features a brief description and overview as well as goals, objectives, and recommended strategies. In many cases, goals and strategies may span between core topics. In those instances, readers will be referred to other relevant core topics for additional information.

## Climate Change

Climate change will fundamentally alter how we live globally and locally. Immense and sustained community effort and leadership is necessary to dramatically reduce greenhouse gas emissions and adapt to climate change impacts such as increased temperatures and extreme weather.

Because climate change is an overarching, existential issue, some of the strategies below are also found elsewhere in this element. Climate change considerations, anticipated impacts and resilience should be incorporated into all elements of the Master Plan and should be central to virtually all land use planning, zoning and decision making.

### Climate Change Mitigation & Adaptation Goals and Objectives

1. Become carbon neutral or carbon negative.
2. Prepare for climate change.
  - a. Build more resilient infrastructure.
  - b. Adapt public buildings to assist displaced residents affected by extreme weather events.

### Strategies

1. Support energy efficiency measures and use of renewable energy such as solar and geothermal in buildings.

2. Support the use of battery energy storage and electric vehicles.
3. Transition to underground utility lines.
4. Explore the feasibility of town-center microgrids to improve resiliency.
5. Implement microgrids at Princeton's critical facilities, e.g., police and fire stations to ensure continuous power and climate control in the event of power interruptions.
6. Map, model and study Princeton's sewer and stormwater system and develop recommendations on how to adapt to more extreme storm events.
7. Reduce the amount of impervious surface to reduce stormwater runoff.
8. Manage stormwater with green infrastructure practices that supplement existing gray infrastructure, to reduce flooding and pollution.
9. Retrofit existing stormwater management systems to meet current green infrastructure standards.
10. Ensure adequate maintenance of existing stormwater systems.
11. Establish community-wide public/private support systems and procedures to provide a coordinated response in the event of extreme climate impacts.
12. Proactively maintain street trees to minimize road closures and power outages due to downed trees and/or lost tree limbs, and budget for replacement of street trees lost to disease or storm damage.
13. Use natural features and systems to support climate resilience; for example, to mitigate heat island effect and sequester carbon, replace lost street trees and other large trees with large, urban-appropriate native species, requiring adequate space for healthy root systems.
14. Support the preservation of additional open spaces to enhance carbon sequestration, to help cool and clean the air, and to mitigate flooding.
15. Refer to the Water and Open Space sections of this element for additional goals and strategies.

## Green Building

As the name of the element indicates, Green Building is one of the central aspects of the Green Building and Environmental Sustainability Element. Most buildings consume vast resources for construction and require large amounts of energy when used. As of 2019, approximately 30% of the world's resources go toward the construction of buildings. Buildings also account for 40% of the total energy use, 72% of total electricity consumption, and produce 39% of carbon emissions in the United States<sup>1</sup>. To become more sustainable and address climate change, green building should be required for all municipal renovations or new construction and should be required or highly encouraged for all private development within the constraints imposed by state law.

The US Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) is the industry standard for green building. Therefore, building to meet LEED certification standards should be strongly encouraged in Princeton.

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<sup>1</sup> "Buildings and Climate Change", *US Green Building Council*, <https://www.eesi.org/files/climate.pdf>.

Other green building frameworks/certification such as SITES, WELL, Passive House, Energy Star and Living Building Challenge that provide frameworks for sustainable development also should be strongly encouraged.

### **Key Green Building Practices**

- Set performance targets for energy, water, and waste.
- Evaluate street and building orientation for solar access.
- Evaluate sites for high-value ecological services or ecologically sensitive areas such as wetlands, steep slopes, diabase geology.
- Evaluate sites for carrying capacity to preserve ecologically sensitive areas.
- Reduce or eliminate disturbance to natural stormwater systems and use green infrastructure best management practices (BMPs).
- Eliminate the use of potable water for irrigation.
- Design infrastructure to support non-fossil fuel transportation.
- Protect and remediate sites' ecological biodiversity including native and adapted vegetation.
- Design building envelope to reduce heating, cooling, lighting and ventilation loads.
- Use passive and active renewable energy to meet energy loads.
- Optimize indoor environmental quality by preventing construction contamination, selecting materials that reduce toxins, and providing adequate fresh air.
- Provide daylight autonomy (building can function in the daytime without artificial lighting).
- Select water-efficient plumbing fixtures and appliances, incorporate graywater systems and rainwater harvesting to reduce potable water use.
- Design indoor and outdoor space for separation of waste including compost, recycling, and landfill.
- Select materials that are local or regional, non-toxic, have low embodied energy and are durable.
- Reduce and recycle demolition and construction waste.
- Engage in building commissioning to ensure that buildings fully meet all requirements set by the owner and Princeton.

### **Green Building Goals and Objectives**

1. Follow green building practices
  - a. Renovations or construction of any municipal building should be LEED certified or built to a recognized green building standard.
  - b. Every municipal building should aim to achieve Net Zero or Net Zero Ready certification.
  - c. Consider total life-cycle operating costs when evaluating financial impacts of any municipal construction project.
  - d. Encourage green building and LEED certification for all private development and redevelopment.
  - e. Encourage Net Zero and Net Zero Ready certification for all private development and redevelopment.
  - f. Require life-cycle operating cost analysis as part of Green Building checklist.

2. Avoid, then minimize and mitigate adverse impact on the landscape and environment.
3. Minimize landfill waste.

### **Strategies**

1. Site buildings in the least environmentally impactful/most environmentally friendly way.
2. Retrofit existing municipal buildings to be green and build green when new development occurs.
3. Encourage green building in the site plan application and review process.
4. Support and encourage historic preservation and adaptive re-use of existing structures to conserve embodied energy in existing structures.
5. Encourage site plan applicants to meet early with the Princeton Environmental Commission.
6. Require green building practices, to the extent permitted by law, in Princeton's zoning ordinance.
7. Provide incentives for green building such as expedited review, variances, and tax incentives.
8. Adopt policies and programs to ensure new buildings in the community achieve near-zero/net energy/fossil fuel-free performance.
9. Encourage or, if possible, require that all suitable products and materials be reused, and that 90% of construction waste be recycled.
10. Require an environmental impact analysis that considers long term impacts of development on environmental resources (waterways, wetlands and forests) of changing site hydrology.

### **Energy**

As noted earlier, one of the most direct ways to reduce carbon emissions and become more sustainable/resilient is to transition to low carbon and renewable energy sources. The current energy system is inefficient, uses large amounts of fossil fuels, and relies on centralized distribution and non-transmitting analog metering. Princeton should support, encourage, and promote energy efficiency, use of carbon-free renewable energy in buildings, local energy production, local battery energy storage and electric vehicle usage.

### **Energy Goals and Objectives**

1. Become more energy efficient.
2. Use renewable energy and battery energy storage.
3. Modernize the energy system to promote resilience, conservation, and zero-carbon goals.
4. Electrify buildings and the transportation sector.

## Strategies

1. The municipality should practice active energy management on all municipal properties.
2. All municipal buildings should be retrofitted to be as sustainable as possible and, ideally, to conform with Passive House and/or zero-energy/net-zero energy standards.
  - a. Apply for available incentives through New Jersey's Clean Energy Program
  - b. Consider an Energy Saving Plan and participate in an Energy Savings Improvement Program (ESIP) for municipal facilities.
  - c. Consider heat pumps (geothermal and/or air source), and other energy efficient strategies for municipal buildings.
  - d. Use electricity from 100% renewable sources rather than natural gas, propane or fuel oil.
  - e. Install solar photovoltaic panels on as many municipal buildings as possible
  - f. Explore smart battery energy storage in municipal buildings.
  - g. Install Electric Vehicle Supply Equipment (EVSE) on all municipal properties.
3. Adopt policies and programs to ensure new buildings in the community achieve near-zero/net energy/fossil fuel-free performance.
4. Transition the municipal fleet to zero-emissions vehicles.
5. Encourage and promote energy efficiency and carbon-free energy sources for all existing buildings and private development.
  - a. Accelerate residential and commercial participation in federal, state, and utility energy efficiency programs.
  - b. Explore options to accelerate the affordable electrification of building energy systems.
6. Encourage and promote the use of solar on private structures and land (excluding preserved lands and environmentally sensitive lands).
  - a. Support through solar-friendly zoning and permitting.
  - b. Promote through municipal avenues of communications.
  - c. Encourage during site plan review.
  - d. Establish a community-led solar program.
  - e. Support distributed energy production and community solar and ensure the maximum participation of low- and moderate-income households.
7. Encourage and promote smart battery energy storage paired with solar.
8. Amend zoning ordinances to explain what EVSE is and allow it in all zones as a permitted use.
9. Establish design standards for EVSE.
10. Require all new development to provide electric vehicle charging infrastructure in appropriate locations.
11. Work with existing businesses and multifamily property owners to install EVSE.
12. Encourage, advocate for and support the transition to smart metering, distributed energy resources (DER) and smart grid technologies.
13. Update the Utility Element to reflect this section.
14. Refer to the Green Building section of this element for additional goals and strategies.



## Land Use & Mobility

Another major way to reduce greenhouse gas emissions and promote sustainability (and to enhance public health and quality of life) is to focus development where people can walk, bike or use public transportation as well as improve and create proper infrastructure/facilities for alternative transportation such as transit stops, sidewalks/walking paths and bike lanes. Carbon emissions can be substantially decreased by using alternative modes of transportation, a strategy endorsed by the new Circulation Element of the Master Plan adopted in 2017 which states, “It is the policy of this Master Plan to entice people out of their cars and to promote using mass transit, bicycles or walking as their primary means of travel.” Also, people with a more urban lifestyle, who live in smaller homes and are less auto-dependent, often have less than half the carbon footprint than their suburban auto-dependent counterparts<sup>2</sup>. Therefore, enabling more people to live close to downtown and near public transit is critical.

### Land Use & Mobility Goals and Objectives

1. Follow smart growth principles.
  - a. Make it possible for people of all income levels who work in Princeton to live in Princeton.
  - b. Focus more density in town and near public transit.
  - c. Protect and preserve environmentally sensitive land.
  - d. Build housing, including affordable housing, near public transit.
  - e. Create multiple walkable, bikeable mixed-use nodes.
2. Promote diverse alternative transportation options.
  - a. Offer enhanced public transportation options.
  - b. Make all appropriate streets complete streets.
  - c. Expand and maintain integrated pedestrian and bike networks throughout Princeton, including safe walking and bicycling routes to schools.
3. Promote electric vehicle (EV) usage.

### Strategies

1. Prepare plans and update zoning regulations in selected areas to build mixed-use, transit-oriented and location-efficient development: e.g., Lower Alexander Road, the S2 Zone, Clifftown Center, Princeton Shopping Center, Nassau North, Lower Witherspoon and other areas near transit routes.
2. Increase university student and local workforce housing close to the university and downtown.
3. Increase density in and near downtown and areas served by public transit through planning, zoning, and site plan review.
4. Increase the affordable and mid-priced housing stock.

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<sup>2</sup> Sanders, Robert. “Suburban Sprawl Cancels Carbon-Footprint Savings of Dense Urban Cores.” *Berkeley News*, 6 Jan. 2014, <http://news.berkeley.edu/2014/01/06/suburban-sprawl-cancels-carbon-footprint-savings-of-dense-urban-cores/>.

5. Enact changes to zoning and municipal practices to allow for more flexible living arrangements such as renting rooms, building duplexes, and encouraging accessory dwelling units throughout Princeton.
6. Shift to a “parking credit” system for determining parking requirements for new development and redevelopment.
7. Provide for reliable, affordable, rapid, modern transit service between Princeton and the Princeton Junction train station.
8. Work with regional partners to plan for transit and traffic management in the U.S. 1 corridor and neighboring municipalities.
9. Improve and add more sidewalks and pedestrian infrastructure and signage.
10. Create more and better cycling infrastructure in keeping with the Bicycle Mobility Plan found in the Circulation Element of the Master Plan.
11. Promote alternatives to car ownership such as car sharing, ride sharing and bike sharing.
12. Promote car sharing by adding reserved spaces on municipal streets, multi-family, commercial, and institutional properties.
13. Implement curbside management locations for the staging and loading of passengers to support the shift to ridesharing.
14. Support and encourage more EV charging infrastructure (EVSE) and designated parking spaces for electric vehicles.
15. Ensure the potential transition to autonomous vehicles increases public safety, serves the mobility disadvantaged and leads to a reduction in vehicle miles traveled and emissions.
16. Update the Land Use, Housing, and Circulation Elements to reflect these goals and recommended actions.

## Water

A majority of New Jersey’s streams, lakes and rivers are impaired and do not meet water quality standards<sup>3</sup>; Princeton is no exception. Moreover, climate change is bringing more intense rain events interspersed with periods of prolonged drought<sup>4</sup>, such that Princeton must plan for both flooding and drought. Drinking water quality is also a legitimate concern.

Princeton should work to improve stormwater management, water quality and drinking water quality and security. Princeton’s watersheds are included in a Total Maximum Daily Load (TMDL) plan for the Raritan Basin. This plan calls for the reduction of stormwater water pollution. As of 2017, 14.4% of Princeton’s acreage is covered with impervious surfaces<sup>5</sup>. To improve water quality and mitigate flooding, Princeton should strive to reduce impervious cover below 10%. This can be achieved even as Princeton continues to grow, since redevelopment offers the opportunity, through green infrastructure best practices, to make the built

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<sup>3</sup> New Jersey Department of Environmental Protection, New Jersey 2014 Integrated Water Quality Assessment Report, Feb. 16, 2016, [https://www.state.nj.us/dep/wms/bears/2016\\_integrated\\_report.htm](https://www.state.nj.us/dep/wms/bears/2016_integrated_report.htm)

<sup>4</sup> “Third National Climate Assessment.” U.S. Global Change Research Program, (2014, May), <https://nca2014.globalchange.gov/>

<sup>5</sup> Waltman, Jim. “Managing Stormwater: Addressing Flooding and Water Pollution.” *Watershed Institute*, (2017, Jan) <https://www.princetonnj.gov/meeting-archive/council-meeting-archive>

environment more absorbent and substantially reduce stormwater runoff from properties that currently are at or near 100% impervious cover.

### **Water Goals and Objectives**

1. Protect and improve water quality with the goal that all of Princeton's waters meet state and federal water quality standards.
2. Manage stormwater with green practices that reduce flooding and pollution
  - a. Integrate green stormwater infrastructure into appropriate municipal projects.
  - b. Require the use of green infrastructure in development and redevelopment private projects.
  - c. Protect, preserve and restore natural open space including stream corridors, wetlands, meadows and forests.
  - d. As land uses change and redevelopment occurs, look for opportunities to "daylight" buried or piped streams to restore natural drainage systems and reduce flooding.
3. Plan for droughts.

### **Strategies**

1. Retrofit municipal properties with green infrastructure to retain stormwater on-site from the two-year storm (defined as 3.3" of stormwater in 24 hours).
2. Develop a multi-layer map of Princeton's stormwater system including storm drains, outfalls, flooding zones, etc.
3. Adopt best practices for stormwater management to mitigate flooding from the two-year storm and below.
4. Require green infrastructure for all private development.
5. Update stormwater management ordinance to apply to redevelopment.
6. Decrease the current impervious cover percentage of Princeton from 14.4% to 10% or below.
7. Require all private development and redevelopment projects to retain the first 1.25 inches of rainfall onsite.
8. Provide incentives for exceeding green infrastructure minimum requirements.
9. Update Princeton's Complete Streets Policy to include green streets, such that green stormwater infrastructure BMPs manage runoff within the right of way.
10. Map and model hydrological systems to identify high flood risk areas, as well as areas and factors (such as blocked storm sewer inlets and blockages in streams) that contribute to flooding, to inform comprehensive flood mitigation recommendations.
11. Develop a maintenance plan to ensure that stormwater drains are kept free of debris that clogs grates, resulting in flooding in unanticipated places.
12. Provide green infrastructure training to key municipal personnel including Public Works, Engineering, Planning and Parks and Recreation to ensure proper installation and maintenance of green infrastructure on public property.
13. Develop a system for better understanding and predicting when and where storms will trigger flooding.
14. Study historic maps to determine where streams have been buried or piped, to identify opportunities for stream daylighting.

15. Explore the feasibility of a stormwater utility to provide stable funding for flood mitigation projects and stormwater infrastructure maintenance.
16. Develop a Stormwater Mitigation Plan.
17. Conserve water by planting native species and/or irrigating with graywater.
18. Reduce water use in buildings by installing low-flow fixtures and innovative wastewater and graywater systems including composting toilets.
19. Periodically investigate Princeton's water quality with a science-based, credible third party.
20. Evaluate the risks of the current water supply system and consider alternative sources of drinking water.
21. Upgrade water distribution and filtration infrastructure, especially in schools.
22. Work with neighboring municipalities to review and address stormwater pollution and flooding.
23. Refer to the Climate Change & Open Space & Landscapes sections of this element for additional goals and strategies.

## Open Space & Landscapes

Open Space and landscapes provide a wide variety of community benefits and services, from recreation, wildlife habitat and biodiversity, to food production, flood mitigation and pollution prevention. Open spaces capture and filter stormwater and help to cool and clean the air, mitigating the heat island effect. Human health is connected to the health of our landscapes<sup>6</sup>.

The municipality should do as much as possible to ensure access of all residents to nearby green spaces and to protect and enhance open space and landscapes by minimizing the development of ecologically sensitive land and promoting regenerative management practices. The geology underlying parts of Princeton results in less infiltration and higher rates of stormwater runoff, making these areas more environmentally sensitive and less suitable for development. Properties in these areas should be high priorities for preservation, with new development channeled to downtown and other walkable locations near services and public transit. Princeton can meet its goals for responsible growth, including housing, without sacrificing the benefits of preserving additional open space.

Princeton's Open Space Inventory includes a wide variety of open spaces: public and privately owned lands; permanently preserved and unpreserved (potentially buildable) lands; built-upon and natural lands; etc. Many of these properties contribute to climate resiliency – that is, carbon capture, flood control, biodiversity, water quality, and “heat island” mitigation.

To become more climate resilient, Princeton should diligently and strategically pursue all opportunities for permanent preservation and protection of natural and agricultural lands. Targets for preservation should include properties of any size that contribute to climate resilience, public health and safety, sustainable local food, and quality of life. Types of uses include but should not be limited to pocket parks, resiliency parks that incorporate stormwater management features, community gardens, riparian and stream corridors, wooded tracts, critical

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<sup>6</sup> <https://www.healthypeople.gov/2020/topics-objectives/topic/environmental-health>

habitat, land that connects existing open spaces, and property suitable for restoration as forest, wetland or managed meadow.

### **Open Space & Landscapes Goals and Objectives**

1. Protect and increase the amount of natural open space to provide environmental, social, recreational, psychological, public health and economic benefits.
2. Protect and enhance the presence of native species to support biodiversity and the health of native flora and fauna.
3. Protect, expand and replenish our tree canopy.
4. Use landscape for passive solar and summer shading.
5. Promote soil health to maximize carbon sequestration and maintain healthy ecosystems.
6. Promote home gardening and local agriculture.
7. Utilize the landscape to capture stormwater and enhance water quality.
8. Ensure all residents have walkable access to parks and public open space.

### **Strategies**

1. Update Princeton's Environmental Resource Inventory.
2. Update Princeton's Open Space Inventory and include information on preservation status: i.e., preserved, deed restricted, not preserved.
3. Minimize development on ecologically sensitive areas including wetlands, steep slopes, and diabase geology.
  - a. Utilize Cluster Development ordinance effectively.
  - b. Consider a Transfer of Development Rights ordinance.
  - c. Encourage the creation of conservation easements and donation of land.
  - d. Create a conservation overlay over sensitive lands.
4. Use native plants for municipal projects and avoid plants included in the New Jersey Invasive Species Strike Team Do Not Plant list. Require private developers to do the same.
5. Limit site disturbance and encourage amendment and restoration of soils that have been compacted.
6. Ensure a minimum 1:1 tree re-planting ratio for public trees. Develop and fund a detailed plan for replacing, as needed, street trees and other public trees.
7. Ensure existing trees are protected during the development process. Encourage the planting of new native trees as appropriate.
  - a. Discourage clearcutting forested land.
  - b. Manage the impact of the emerald ash borer, spotted lantern fly, and other pests and diseases that threaten Princeton's trees.
8. Protect and promote local food production.
  - a. Support and promote community gardens and home gardening.
  - b. Make agriculture a permitted use in most zones.
  - c. Explore additional opportunities for local food production through partnerships with schools and other nonprofits.
9. Encourage lawn and garden care practices that reduce or eliminate the use of herbicides, pesticides, and fertilizers. Encourage on-site leaf composting.

10. Encourage conversion of public and privately owned lawn areas to more natural, wooded landscapes to capture carbon, intercept and absorb stormwater, and increase Princeton's tree canopy.
11. Protect the natural hydrologic cycle, including evapotranspiration, sheet flow, infiltration, groundwater recharge.
  - a. Require the use of green infrastructure in new development and redevelopment.
  - b. Integrate stormwater management best practices into appropriate municipal projects.
  - c. Adopt an ordinance to require improvements in stormwater management when sites are redeveloped.
12. Protect and expand connective corridors between habitats and open spaces and expand no-mow/low-maintenance areas.
13. Reduce emissions from public and private lawn maintenance equipment.
14. Limit ecosystem stressors such as deer population and invasive species.
15. Protect and steward natural open space with a focus on stream corridors, wetlands, natural meadows, and forests to achieve clean water goals and maximize carbon sequestration.
16. Implement policies and plans that ensure all residents have walkable access to a park or public open space.
17. Update the Open Space & Recreation and Conservation Elements to reflect this section.
18. Consider creating a Landscape Systems Element.
19. Refer to the Climate Change & Water sections of this element for additional goals and strategies.

## Related Documents

[Princeton's Community Master Plan](#)

[Princeton's Sustainable Community Plan](#)

[Princeton's Environmental Resource Inventory](#)

[Princeton's Climate Action Plan](#)

## Glossary

**Building Envelope:** All of the elements of the outer shell that maintain a dry, heated, or cooled indoor environment and facilitate its climate control.

**Carbon Neutrality:** Achievement of net-zero carbon emissions by balancing the amount of carbon released with an equivalent amount through sequestration or offset.

**Carbon Sequestration:** A natural or artificial process by which carbon dioxide is removed from the atmosphere and held in solid or liquid form.

**Community Solar:** A community solar farm or garden is a solar power installation that accepts capital from and provides output credit and tax benefits to individuals and/or other investors.

**Complete Streets:** Streets designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities.

**Embodied Energy:** The sum of all the energy required to produce any goods or services, considered as if that energy was incorporated or 'embodied' in the product or structure itself.

**Geothermal:** Geothermal energy is heat derived below the earth's surface which can be harnessed to generate clean, renewable energy.

**Gray Infrastructure:** Types of stormwater management systems constructed with pipes and concrete, as opposed to vegetated systems and other practices that infiltrate stormwater or capture it for re-use.

**Green Infrastructure:** Green infrastructure comprises stormwater management strategies that enable stormwater and melting snow to soak into soils near where they fall, or to be captured for a beneficial re-use such as irrigation or flushing toilets.

**Green Street:** A stormwater management approach that incorporates green infrastructure practices (e.g., bioretention, tree trenches and pervious pavements) within the road right-of-way to slow, filter and cleanse stormwater runoff from streets and sidewalks. These green

infrastructure practices are designed to enhance the streetscape and contribute to pedestrian and bike safety.

**Greenhouse Gas:** Any gas that absorbs infrared radiation in the atmosphere. Examples of GHGs include carbon dioxide, methane, nitrous oxide and fluorinated gases.

**Heat Island Effect:** Refers to the tendency of urban areas to be warmer than rural areas owing to the higher percentage of heat-absorbing impervious surfaces.

**Net Zero building:** Residential or commercial building with greatly reduced energy needs through efficiency gains such that the balance of energy needs can be supplied with renewable technologies – also known as net-zero – energy building.

**Photovoltaic solar:** A technology that generates electricity from sunlight.

**Resilience:** A capability to anticipate, prepare for, respond to and recover from significant multi-hazard threats with minimum damage to social well-being, the economy and the environment. Commonly used to refer to a community's ability to manage the local changes of the climate.

**Smart Growth:** A planning approach that considers social, economic and environmental factors in community design. Co-locates housing and transportation near jobs, social services, stores and schools.

**Stormwater Management:** Practices that minimize water pollution, flooding and damage to the natural and built environment from water.

**Tree Canopy:** The above-ground branches and foliage of a tree that intercept rainfall and provide cover from the sun.