

# 2025 Green Acres Application – Implementing the Duke Farms Land Stewardship Plan: A Model for Nature Positive, Carbon Negative Land Stewardship

## About Duke Farms

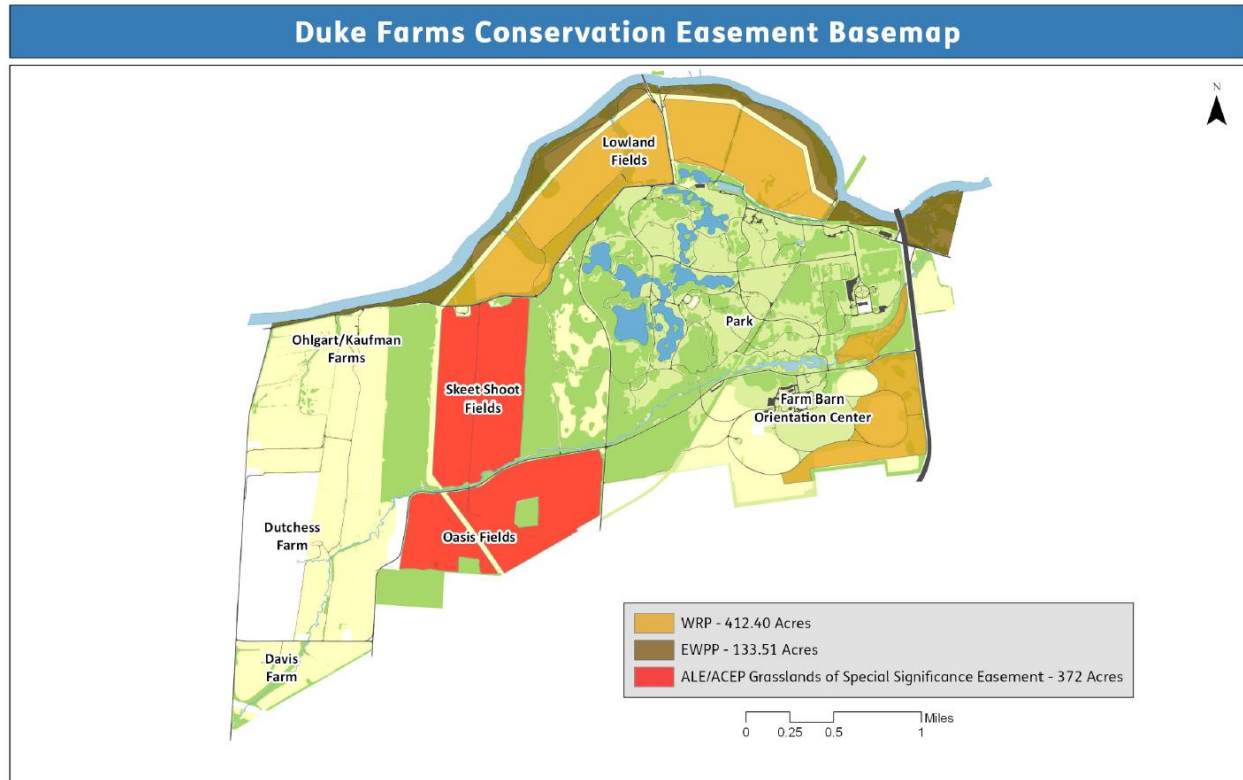
Duke Farms, a 2,700-acre center of the Doris Duke Foundation, is in the Piedmont region and Raritan River watershed of central New Jersey, was once the estate of J.B. Duke and his daughter, Doris Duke. Today, it hosts 150,000 visitors annually and is emerging as a world-class center for applied conservation and sustainability.

Situated in a peri-urban environment—where dense urban centers meet rural landscapes—Duke Farms operates within a landscape shaped by fragmented habitats, complex land-use patterns, and the competing demands of development and environmental protection. Working within these conditions, Duke Farms leverages its assets and opportunities to:

- **Restore nature and ecosystem services in fragmented suburban landscapes:** Manage lands and develop science-informed practice to maximize biodiversity, implement natural climate solutions and address global conservation priorities.
- **Demonstrate nature-positive and equitable climate transition strategies as a model climate-positive campus:** Decarbonize energy and operations and connect these practices to key audiences leading the climate transition.
- **Engage leaders with the wonder of nature and the power to spark change:** Become a premier destination for conferences, convenings and in-person programming to address the most significant national and global threats and opportunities for restoring nature and addressing climate change.

The 2,700 –acre property features a wide variety of natural and built environments. Approximately 50 percent of the site has significant grassland, agricultural and agroecological cover, and there are 1,000 acres (35% cover) of natural habitats (forest, woodland, shrubland and meadow). Most of the forest cover at Duke Farms is “closed” (defined as > 50% canopy cover) as opposed to “open” (canopy cover >10% and <50%, often defined as “woodland”). The

property also features two natural water ways (Duke Brook and the Raritan River), 11 man-made lakes/ponds and approximately 100 buildings, including the public orientation center, farm barn and hay barn, and an orchid greenhouse. There is a total of 14 miles of publicly accessible trails that traverse the property. The property contains three primary conservation easement areas:



**Wetland Reserve Program Easement:** The purpose of this conservation easement is to restore, protect, manage maintain and enhance the functional values of wetlands, and other lands, and for the conservation of natural values including fish and wildlife and their habitat, water quality improvement, flood water retention, ground water recharge, open space, aesthetic values, and environmental education. This conservation easement applies to two different sections of the property, the area designated lowland fields and the area designated Farm Barn. The combined easement area covers 412.4 acres. These easements were secured through the Wetland Reserve Program sponsored by the US Department of Agriculture Natural Resources Conservation Service (NRCS). (Filed Somerset County 2/11/2024 - Deed Book – OPR 6301; Pages 1064-1089)

**Emergency Watershed Protection Program:** The purpose of this conservation easement is to restore, protect, manage and maintain and enhance the functional values of floodplains, wetlands, riparian areas and other lands; and for the conservation of natural values including fish and wildlife and their habitat, water quality improvement, flood water retention, ground

water recharge, open space, aesthetic values, and environmental education; and to safeguard lives and property from floods, drought and products of erosion. This conservation easement applies to sections of the property with wetland trees and shrubs along the southerly bank of the Raritan River. The easement area covers 133.51 acres. The easement was granted through the Emergency Watershed Protection Program sponsored by the US Department of Agriculture Natural Resources Conservation Service (NRCS). ((Filed Somerset County 2/11/2010 - Deed Book – OPR 6301; Pages 1090-1110.

Agricultural Conservation Easement Program: The purpose of this agricultural land easement is to protect agricultural use, including grazing uses and related conservation values and resource concerns. The conservation easement applies to sections of the property designated as the Skeet Shoot Fields and Oasis Fields containing highly erodible cropland and grassland. The easement area covers 372.61 acres. The easement was granted through Somerset County and funded in part through the US Department of Agriculture National RCS Agricultural Conservation Easement Program. Filed Somerset County 12/19/2018 - Deed Book – OPR 7090; Pages 658-694

## Project Description

### Vision and Project Overview

Duke Farms envisions becoming a world-class center for addressing critical gaps in knowledge and practice related to restoring nature and ecosystem services. Our focus is on maximizing biodiversity and implementing natural climate solutions in "peri-urban" environments—areas that transition between dense urban centers and rural landscapes.

The Farm Barn Campus Restoration Project will restore 90 acres within the Farm Barn Campus management unit, aiming to maximize biodiversity and habitat quality while improving public access and building on prior ecological investments on land protected under a 2010 NRCS Wetlands Reserve Program easement. Previous efforts included recontouring topography, removing drainage systems, creating vernal pools, and seeding native wildflowers to support early successional habitats.

### Project Objectives

Key activities include:

- *Invasive Species Removal and Replanting:* Enhancing habitat quality through targeted removal of invasive species and replanting native shrubs and plants.

- *Deer Fencing Installation*: Protecting restored areas through the installation of deer fencing, essential to accelerating restoration efforts and ensuring long-term success.
- *Improved Public Access*: Enhancing trail systems and accessibility, including educational signage to increase public engagement and awareness.

### **Advancing Public Access and Conservation Impact**

The project integrates ecological restoration with improved public access for education, interpretation, and programming. These efforts specifically benefit habitats critical to species such as the Northern harrier and American woodcock, advancing key land stewardship objectives for native wetlands, shrublands, and upland habitats.

### **Leveraging Green Acres Funding for Broader Impact**

This project also seeks to serve as a model for how Green Acres stewardship funds can support impactful conservation. By collaborating with peer organizations and demonstrating successful use of these grants, we can inform program refinements and encourage broader participation statewide, leading to better conservation outcomes across New Jersey.

This project will advance priority stewardship activities from the Duke Farms Land Stewardship Plan, while expanding the plan's focus on climate resilience over a 2–5-year period.

## **Primary Project: Farm Barn Area Restoration Initiative**

The Farm Barn area, covering 90 acres within the WRP Easement, needs the restoration of the landscape by removing invasive plants such as Japanese Aralia, Callery Pear, Common Buckthorn, European Alder, Bush Honeysuckle, and Phragmites.

- **Objective**: Removal of invasive species and restoration with emphasis on native shrubs to create critical early successional shrubland habitat. Improve accessibility within this important natural habitat area. Establish fencing to protect the restored area from the impacts of the region's deer population.
- **Scope**: 52 acres of heavily infested areas and 38 acres of less infested areas, based on aerial assessments. (Block 142; Lot 9)
- **Project Phases**:
  - **Phase 1: Site Assessment and Planning**
    - Map the distribution and density of invasive species.

- Develop a comprehensive plan outlining the methods for invasive species removal, native shrub planting schemes, and necessary site preparations.
- Phase 2: Invasive Removal
  - Remove invasive species, targeting areas with heaviest density first, to create suitable planting sites for native shrubs.
- Phase 3: Fencing Improvements
  - Purchase and install deer fencing on the perimeter of the Farm Barn area to protect the native shrubbery to be installed and existing natural cover from the area's deer population.
- Phase 4: Planting and Initial Establishment
  - Plant native trees, shrubs and herbs.
- Phase 5: Accessibility Improvements
  - Evaluate current trails for accessibility improvements.
  - Install improvements in the designated locations.

## Future Stewardship Projects

The following outlines potential future projects that could be pursued with additional funding. These initiatives are designed to address pressing ecological stewardship challenges at Duke Farms while simultaneously generating scalable insights and actionable strategies that can be readily applied by other landowners and public land managers, fostering broader impact across New Jersey.

### Invasive Species Management Tool Development /Enhance Monitoring Techniques/Expand Monitoring Program

Duke Farms is not unique in facing challenges tied to legacy practices and external pressures that have shaped its landscape and biodiversity. Like many properties, it reflects the historical norms and standards of its era, including widespread planting of non-native species that were once considered desirable. Compounding these legacy impacts are external factors such as massive deer overpopulation, which exacerbate ecological imbalance. This unique confluence of challenges positions Duke Farms as a distinct leader in addressing invasive species impacts and ecosystem restoration. Duke Farms combines cutting-edge science, rigorous research, and the development of science-informed best practices to craft adaptive stewardship plans and approaches. These strategies are designed to respond to rapidly changing ecological conditions while maintaining a focus on long-term resilience. In doing so, Duke Farms serves as a living laboratory and a hub for innovation, offering transferable knowledge and actionable solutions for landowners, public land managers, and organizations facing similar challenges. This

transformation of historical disadvantages into a platform for progress underscores Duke Farms' commitment to advancing impactful, scalable ecological stewardship.

Duke Farms prepared an Invasive Species Management Plan in 2008 and a more expansive Stewardship Plan in 2012. The data assembled in both plans was primarily collected utilizing traditional non-automated observation and data collection techniques. Over the past decade technological advances have created new options for enhancing invasive species management and ecological monitoring. The technology also allows for a more expansive monitoring program.

**Objective:** To identify and integrate new technology for use in support of invasive species management, develop advanced ecological monitoring programs and expand these programs to cover the entire preserved area of the property. Specifically, the effort will focus on multi-spectral drone surveys, Autonomous Recording Units (ARUs) for bird species detection, invertebrate eDNA studies, and hydrology studies in floodplains.

**Scope:** Technology to be utilized to monitor the over 900-acres of preserved area on the Duke Farms property. (Block 142; Lot 9, Block 144; Lot 2, Block 48: Lots 1, 2, and 3, Block 48.01; Lot 1, Block 49; Lots 1, 2, and 3, Block 50; Lot 1)

**Phases:**

- Phase 1: Install Autonomous Recording units (ARUs) in pre-determined locations before any stewardship work begins. The information collected by the ARUs would serve as baseline data for the various stewardship projects planned for the area.
- Phase 2: Focused eDNA surveys of waterways and vernal pools in easements (EWPP, WRP, ACEP) to track migratory species (American eel, American shad/river herrings, striped bass), amphibians/reptiles and invasive species (giant pond mussel, etc.). Surveys would match with phenology of target species, with quantitative surveys using eDNA and other methods to see how obstructions on Duke's Brook inhibit passage of eels. Also use eDNA on grassland birds to assess dietary habits in ACEP Skeet fields for comparative analysis with Kaufman field area.
- Phase 3: Utilize multispectral drone surveys to track invasives and native plant species in successional areas and shrublands. Conduct samples of ground verified vegetation targets before initiating drone surveys to enhance the aerial imagery's analytical value.
- Phase 4: Conduct hydrology studies in the area's floodplains and waterways utilizing water monitoring stations, observation wells and other technological

resources. Data collected could be coupled with Rutgers University studies on carbon flows in soils such as soil topographic index (STI)

## Institute Invasive Plant Management Activities in ACEP Skeet Field Area

The Skeet Field Area is the highest quality grassland habitat present on the Duke Farms property. This area was utilized as an unrestricted hayfield until 2002 when delayed mowing was implemented to improve grassland bird habitat. The field is known to be home to several habitat sensitive and threatened bird species including the American kestrel, Bobolink, dickcissel, Eastern meadowlark, Grasshopper sparrow, Henslow's sparrow, and Short eared owl. In 2011/12 restoration efforts were initiated, including the seeding of native grasses and wildflowers. However, since that time invasive vegetation has returned and become an increasing problem in this habitat. This project will remove the invasive plants from the area and establish an on-going maintenance program to promote the protection of native grassland species and deter the reemergence of invasive species.

Objective: Removal of invasive species and restoration of the field area to facilitate and sustain the growth of native grasslands and flowers to foster a better bird habitat and resist future invasive plant growth.

Scope: Focus of the management activities will be on the 179-acre Skeet Field area. (Block 144; Lot 2)

Phases:

- Phase 1: Invasive Removal
  - Remove invasive species, targeting areas with heaviest density first, to create suitable planting sites for native vegetation.
- Phase 2: Planting and Initial Establishment
  - Reestablish native warm season grasses and herbaceous material.
- Phase 3: Protective Action/Monitoring-Mitigation Program
  - Initiate protective measures to ensure native species grow/thrive.
  - Establish monitoring-mitigation program to maintain the re-established native habitat.

## Install Interpretative Signage/Implement Trail Improvements to Enhance Accessibility (WRP & ACEP Areas)

Expand the accessibility improvements established in the Farm Barn area in the first phase of this project, including a loop trail in the Farm Barn area and other accessibility improvements throughout the preserved areas of the Duke Farms property.

Objective: Equip trails in the WRP and ACEP areas with interpretative signage and enhanced accessibility in these areas with trail improvements that allow controlled public access aligning with deer management and breeding bird phenology.

Scope: The improvements will be focused on the trail areas within the 545+ acres that comprise the WRP and ACEP areas. (Block 142; Lot 9, Block 48; Lots 1, 2, and 3, Block 48.01, Lot 1, Block 49, Lots 1, 2 and 3, Block 50, Lot 1)

Phases:

- Phase 1: Evaluate current trails for accessibility improvements.
- Phase 2: Install improvements in the designated locations.

### Fencing Installation (WRP & ACEP Areas)

Expand the fencing improvements established in the Farm Barn area in the first phase of this project to other preserved areas of the Duke Farms property. See project map.

Objective: Purchase and install deer fencing on the perimeter of the preserved areas to protect native vegetation from the area's deer population.

Scope: The improvements will be focused on the perimeter of the 780+ acres which comprise the WRP and ACEP areas. (Block 144; Lot 2, Block 48; Lots 1, 2, and 3, Block 48.01, Lot 1, Block 49; Lots 1, 2, and 3, Block 50; Lot 1)

Phases:

- Phase 1: Purchase deer fencing.
- Phase 2: Install deer fencing on the perimeter of the WRP and ACEP areas to protect the newly installed native plantings and existing natural cover from the area's deer population.

### Development of Stewardship Tool for Public Lands Management Throughout New Jersey

Duke Farms will support a project development team to scope and potentially design accessible, online tools aimed at facilitating the creation of stewardship plans for public lands. This initiative could build on existing resources, such as Rowan University's NJMap tool, which offers a wealth of datasets applicable to public land stewardship planning. By leveraging these tools and partnerships, the project aims to empower non-profits, municipal, and county governments to craft informed stewardship plans, which could serve as guides for applications to programs like the Green Acres stewardship grant program. Objective: Scope and develop an online user-



friendly interface that streamlines the process of creating stewardship plans for a diversity of land managers, fostering science informed decision making and adaptive planning. By integrating standardized, data-informed approaches into stewardship planning, this initiative could greatly benefit not only the Green Acres program, other public and private funding programs their grantees and the communities and public they serve. An online tool designed to streamline the development of stewardship plans would ensure consistency in the quality and format of applications, simplifying the process for land managers and enabling funders to more effectively evaluate proposals.

Standardized frameworks would also allow for a more cohesive approach to tracking and reporting on outcomes, providing funders with clear metrics to assess the success and impact of stewardship investments. These improvements could reduce administrative burdens, enhance accountability, and ensure that limited resources are directed toward the most impactful projects.

Moreover, by aligning planning tools with the requirements of multiple funding streams, the tool would enable grantees to leverage diverse funding opportunities while maintaining consistency in their stewardship goals. This approach would not only strengthen programs like Green Acres but also create a ripple effect across the broader field of conservation, fostering collaboration and innovation in land stewardship across public, private, and nonprofit sectors.

### **Phase 1: Network Building and Pilot Design**

- Convene project partners, including Rowan University, New Jersey Conservation Foundation, Ecological Solutions, LLC, Garden State Preservation Trust, NJ Green Acres, and other collaborators, to establish a shared vision, clarify roles, and define the tool's goals.
- Identify pilot regions or organizations to test the tool, ensuring a diverse representation of users (e.g., municipalities, non-profits, counties).
- Conduct research to integrate key datasets and ecological criteria, aligning the tool with funding requirements and stewardship best practices.
- Draft a roadmap for pilot implementation, outlining objectives, timelines, and measurable outcomes.

### **Phase 2: Tool Development and Testing**

- Develop a functional prototype of the tool, focusing on user-friendly interfaces and essential features needed for stewardship plan creation.

- Test the prototype with pilot participants, gathering feedback on usability, functionality, and relevance to funding applications.
- Refine the tool based on user feedback, ensuring it meets the practical needs of land managers and aligns with grant requirements.

### **Phase 3: Pilot Launch and Initial Application**

- Roll out the tool to pilot participants, providing training through workshops, webinars, and detailed guides to ensure successful adoption.
- Support pilot participants in using the tool to create stewardship plans and submit grant applications to Green Acres and other funding programs.
- Monitor the pilot's progress, collecting data on tool usage, feedback from participants, and outcomes of grant applications.

### **Phase 4: Evaluation and Scalability Planning**

- Evaluate the pilot's success by analyzing user feedback, application outcomes, and the tool's effectiveness in streamlining the planning process.
- Identify areas for improvement and prioritize features for future updates.
- Develop a plan for scaling the tool beyond the pilot phase, including outreach to additional users and potential integration with other funding programs.

This phased approach ensures a focused pilot implementation, emphasizing collaboration, feedback-driven refinement, and preparation for broader impact.