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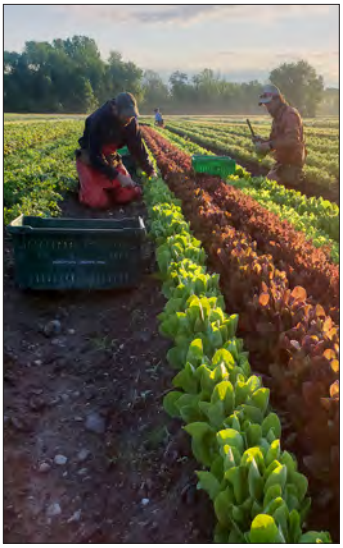
Agricultural Management Guidelines
Martin Van Buren National Historic Site



"The Whigs would hardly believe that a much larger portion of my time is taken up with devising ways & means to multiply the quantity & improve the quality of manure than in forming political plans or any such matter."
— Martin Van Buren, 1843

Agricultural Management Guidelines

Martin Van Buren National Historic Site

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The Olmsted Center for Landscape Preservation
National Park Service, Boston, Massachusetts, 2018

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Boston, MA 02109
www.nps.gov/oclp/

Library of Congress Cataloging-in-Publication Data

Names: Bieberstein, Alexandra von, author. | United States. National Park Service. | Olmsted Center for Landscape Preservation (U.S.)
Title: Agricultural management guidelines, Martin van Buren National Historic Site / prepared by Alexandra von Bieberstein, Historical Landscape Architect, Margie Coffin Brown, Historical Landscape Architect, Jennifer Hanna, Historical Landscape Architect.
Description: Boston, Massachusetts : The Olmsted Center for Landscape Preservation, National Park Service, 2018. | Includes bibliographical references.
Identifiers: LCCN 2018037776
Subjects: LCSH: Van Buren, Martin, 1782-1862--Homes and haunts. | Agriculture--Environmental aspects--New York (State)--Martin Van Buren National Historic Site. | Farm management--New York (State)--Martin Van Buren National Historic Site. | Martin Van Buren National Historic Site (N.Y.)
Classification: LCC S589.757.N7 B54 2018 | DDC 630.6809747/39--dc23
LC record available at https://lccn.loc.gov/2018037776

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Cover Image Source: Olmsted Center for Landscape Preservation
Title Page Image Source: Roxbury Farm

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Foreword

In 1839 President Martin Van Buren, in the midst of a tumultuous presidential term, purchased an agricultural estate near the town of his youth, Kinderhook, New York. He named the 220-acre landscape of rolling fields and woodland, "Lindenwald", envisioning it as a place where he could pursue his interest in progressive agriculture. But "Lindenwald" was more than a gentleman's farm. At a time when the country was debating slavery, Van Buren used the estate to demonstrate that progressive agriculture techniques, such as soil fertility preservation and crop rotation, could support financial sustainability with free labor. He believed that progressive farming could make a positive impact on society and was critical to the future of American democracy. The distinctive character of the "Lindenwald" landscape, its rolling hills, narrow farm roads and swaths of dense woodland, is grounded in its historic association with the farming practices of President Van Buren.

This report facilitates active and productive farming of the landscape of "Lindenwald" as a crucial element in preserving the inherent character of Martin Van Buren's "Lindenwald." The Agricultural Management Guidelines for the Martin Van Buren National Historic Site outlines a strategy that protects resources, supports meaningful visitor experiences, and helps to perpetuate successful farm operations.

These guidelines are the product of a fruitful collaboration by staff of the Martin Van Buren National Historic Site and the Northeast Region's Olmsted Center for Landscape Preservation, as well as Roxbury Farm Inc. They are offered as a helpful tool, assisting current and future managers to navigate future issues and decisions so that environmentally responsible, active agricultural operations may continue as a defining feature of this cultural landscape.

Megan O'Malley
Superintendent
Martin Van Buren National Historic Site

Prologue

Between 2009 and 2012, I had the privilege of working on an Ethnographic Landscape Study for Martin Van Buren National Historic Site. This was part of a well-constructed sequence of studies supporting the park's ongoing shift from interpreting Van Buren's Lindenwald estate as essentially a historic house to recognizing it as a dynamic participant in the past and present farming economy of the Hudson Valley. My study was built in large part on a 2004 Cultural Landscape Report produced by the Olmsted Center that documented the agricultural uses of Lindenwald's fields over many centuries. These and other projects in turn supported the development of the 2016 Treatment Plan whose supplemental guidelines for agricultural management are contained in this volume.

Both painstaking and remarkably quick, the process of reenvisioning Lindenwald has presented an extraordinary opportunity to integrate landscape preservation, historic interpretation, and contemporary use of land as a resource for food production. This effort is exciting in itself for the way that it addresses long-standing concerns in historic preservation about relevance and the relationship of past and present. But it takes on added urgency in a moment when many park publics and stakeholders are "connecting the dots" among a host of issues that food and farming are linked to: the rapidly changing climate, our continued dependence on fossil fuels, widening economic disparity, increasingly polarized ideas about the role of government in American life, and much more. Food and farming are not necessarily central to all of these questions, but they do provide an exceptionally accessible entry-point for considering the tangle of problems that we face in the present while helping to ground present-day debates in the longer trajectories and broader contexts that historic places and narratives can give us.

That labor of grounding is not a simple one. It requires confronting some of the big contradictions in our food system and our economy—for example, how the combination of agricultural overproduction and low food prices make it nearly impossible for most farmers to recover their costs of operation, or how a system that produces such abundance also contributes to disparities and deficiencies that leave many Americans hungry on a daily basis. For great majority of us who are not farmers, tackling these questions means entering into issues that were once familiar to most people but are now like a foreign language.

I admit that when I began to wrestle with this task myself, I did not expect the little-known eighth President of the United States to be such a useful guide. But Martin Van Buren's story turns out to be an exceptional starting-point for

unpacking these paradoxes and complexities. Far from being a bucolic retreat from partisan politics, Van Buren's farming was a direct extension of his career, which was rooted in both a Jacksonian attempt to democratize political life and a Jeffersonian belief in land ownership and farming as cornerstones of the republic. Van Buren's own single-term Presidency foundered largely on the economic panic caused by one of the first major crashes of the still-young market economy, a harbinger of the volatility that has created intractable dilemmas for farmers. In addition to serving as the base for Van Buren's two subsequent Presidential campaigns—the final one on the Free Soil Party ticket in 1848—Lindenwald was a test site for ideas about soil improvement and farm productivity that Van Buren was eagerly absorbing from the agricultural press of his day. Those ideas were linked in turn with concerns about the viability of farming in the industrializing northeast, where rural areas were losing population to growing cities and an expanding, contested western frontier. The soil of this old Dutch farm, whose fields had likely been cultivated by indigenous farmers long before Europeans arrived, was literally remade—in ways that we now think of as "sustainable" or "regenerative"—by a gentleman farmer who was urgently trying to articulate a vision for his country's future.

The potential for illuminating this piece of the American past is enormously enhanced by the present-day contexts in which the park sits. Enthusiasm for locally- and sustainably-grown food continues to increase, and the Hudson Valley, with its rich farmland and proximity to the huge urban consumer base in New York City, is an important node in what is sometimes termed "the food movement." As in Van Buren's day, contemporary concerns about food and farming intersect with hotly contested ideas about health, labor, land ownership, economic disparity and volatility, and the proper relationship of private enterprise and public oversight of agriculture and the resources we depend on for food and water. These questions are not simply similar to those of the mid-nineteenth century: in many cases they are exactly the same debates, which have never been fully resolved.

Martin Van Buren's Lindenwald gives us a site where we can begin to grasp what has been at stake in those debates over almost the entire trajectory of the nation's history, and where we can see—and see ourselves as participants in—contemporary attempts to address the challenges of farming in a market-oriented economy. The land under our feet at Lindenwald is literally a record and an artifact of those efforts over time, right up to and including the present day. The project of preserving, interpreting, and cultivating these fields presents a remarkable opportunity to bring visitors, neighbors, partners, and stakeholders into experiences that are at once civic, educational, and deeply personal, embedded and embodied in a richly resonant place.

The agricultural guidelines that follow are an innovative effort to stabilize

this ambitious vision in management policy. The vision itself is for a seamless integration of land management, stewardship, and interpretation, but of course there are inevitably gaps in the seams where the differing demands of historic preservation, working agriculture, and civically-engaged interpretation make themselves felt. In recent years, the National Park Service has experimented with ways of closing those gaps at some of the many other parks and heritage areas that include agricultural land, and this new document builds on those initiatives in many ways. But it also goes beyond them in its exceptionally detailed, thoughtful approach to spelling out precisely what this kind of integration might mean on the ground—and in the ground.

Those at the park and the Olmsted Center who have been involved in creating the guidelines recognize this as an ongoing process rather than a final word—and indeed that is one of the most exciting aspects of what may appear at first to be a rather workaday manual for helping park managers understand the needs of an agricultural partner. By embracing an open-ended, dynamic, collaborative model for land management, these guidelines help to frame the stories of Martin Van Buren and Lindenwald as part of the much longer, ongoing history of food, farming, and all that they connect to—an unfinished story which concerns and involves us all.

Cathy Stanton, PhD
Senior Lecturer, Tufts University

Introduction

Perpetuating agriculture as an active and productive use of the landscape is key to preserving the inherent character of Martin Van Buren's "Lindenwald." Martin Van Buren's political beliefs emphasized the importance of agriculture to the future of American democracy. Therefore, supporting sustainable active farming on the Lindenwald landscape is vital to the preservation and interpretation of the Martin Van Buren National Historic Site.

The *Agricultural Management Guidelines for the Martin Van Buren National Historic Site* outlines a strategy to protect resources, to support meaningful visitor experiences, and to help ensure successful farm operations. Within the approximately 285 acres of the Martin Van Buren National Historic Site legislative boundary, only 44.77 acres are held in fee simple by the National Park Service. Roxbury Farm, a biodynamic farm operated as a community supported agricultural facility, currently leases 23.46 acres of this National Park Service owned land for agricultural purposes. Roxbury Farm also owns approximately 171 acres within the park boundary. Of the land owned by Roxbury Farm, 101.89 acres of farmland are protected by a conservation easement currently held by the Open Space Institute, which intends to donate the easement to the National Park Service at a future date. The remaining parcels within the park legislative boundary, totaling about 70 acres, are privately held, except for a one-fourth acre parcel held by the Town of Kinderhook.

Within this milieu of land ownership and interests, the guidelines serve as a tool to help park managers perpetuate the historic integrity of Martin Van Buren National Historic Site through support of agricultural pursuits by collaborative organizations, including Roxbury Farm. Recognizing that the goals of historic preservation do not always reconcile easily with the agricultural processes impacted by climate, pests, and market demand, this document integrates best agricultural management practices with national standards for the management of cultural properties. This document has been developed through collaboration by agricultural, nonprofit, and cultural resource professionals, who understand that the requirements and expectations of park visitors must be considered when defining the responsibilities of land owners and those engaged in agriculture on public land. Specifically, the guidelines are intended to:

- Serve as a platform for communication and collaboration for present and future land stewards.
- Present an approach for integrating best management practices for sustainable

agriculture with the preservation of the historic setting of a nationally significant presidential home and farm property.

- Articulate a shared vision, recognizing the challenges of balancing resource preservation and active agriculture.
- Define historic farmland features and describe associated best practices for sustainable agriculture.
- Identify opportunities to expand visitor experience and understanding through partnerships and programs.

Perpetuating agriculture at "Lindenwald" is central to resource management and visitor experience goals at as articulated in the *General Management Plan* (2015) and the *Cultural Landscape Report*: *Volume II Updated Treatment Plan and Record of Treatment for the Martin Van Buren National Historic Site* (2016). Actively farmed acreage within the Martin Van Buren National Historic Site includes lands owned in fee simple by the National Park Service, lands under agricultural easement, and lands owned by others unencumbered by conservation easement. While the guidelines included in this document could be applied to any actively farmed land within the park boundary, the primary focus is on National Park Service lands and interests in lands under short-term special use permits, long-term agricultural leases, or conservation easements *(DO-53, 10.4: Agricultural Use)*.

SETTING

Lindenwald was the home of Martin Van Buren (1782-1862), the nation's eighth president. Upon acquiring the property in 1839, President Van Buren managed it as a working, experimental farm. Continuing active farming within the park is key to effectively meeting park resource management goals and preserving the historic landscape character and historic setting surviving from the time of President Van Buren's occupancy (1841 - 1862). Martin Van Buren National Historic Site is located twenty miles south of Albany and two miles east of the Hudson River in Kinderhook, New York. Located in the rolling farmland of Columbia County, the park lies between the Berkshire Mountains to the east and the Catskill Mountains to the west (Figure 0.1).

This document focuses on the agricultural lands under National Park Service fee-simple ownership, and land owned by Roxbury Farm Inc. subject to an conservation easement. All lands within this spectrum of legal interests fall within the authorized boundary of the Martin Van Buren National Historic Site. The National Park Service preserves President Van Buren's two-and-a-half-story brick mansion and surrounding acreage including a semicircular tree-lined entry drive. Roxbury Farm utilizes the surrounding fields, most of which are actively farmed.

METHODOLOGY

This document builds upon the 2015 *General Management Plan for the Martin Van Buren National Historic Site,* as well as the *Cultural Landscape Report for Martin Van Buren National Historic Site , Volume II: Updated Treatment Plan and Record of Treatment* published in 2016. The management guidelines are a product of multiple conversations with park staff and collaborators. Workshops attended by staff from the National Park Service's Northeast Regional Office's Olmsted Center for Landscape Preservation, the Martin Van Buren National Historic Site, and the owners of Roxbury Farm Inc. have been instrumental in defining sustainable agriculture and best practices. A major component of initial research involved the identification and analysis of relevant case studies, to better understand best management practices and to build off those employed by Roxbury Farm. In addition, information was gathered from various reference materials, as well as the reports and manuals of other National Park Service sites, educational institutions, and federal and state agencies involved with active agricultural management. To address the successful integration of park operations with agricultural operations, this document identifies the significance of the agricultural portion of the property, appropriate interface with park visitors, and recommends specific landscape management practices related to cultural resources, natural resources, visitor experience, interpretation, and recreation.

The report is organized into six sections. The first two sections provide an overview of the agricultural history and significance of Martin Van Buren's historic farm within the context of the Hudson Valley region. The Existing

Figure 0.1. Active farming of the agricultural landscape contributes to the preservation and interpretation of the landscape's historic significance (MAVA, 2014).

Conditions section describes the ecological systems present on site. The Agricultural Management Framework section describes the legal and regulatory basis of the guidelines, and outlines the agricultural management philosophy of the National Park Service and its multiple collaborators to align the cultural and natural resource management goals of a national park with the requirements of actively farmed land. The Best Management Practices section describes sustainable farming techniques and methodologies within the context of a National Park Service historic site. The final section of this document identifies agricultural features, both historic and non-historic, and cross-references the management of those features to related best agricultural management practices.

This document was developed specifically for the collaborative management of the historic Lindenwald farmland, therefore specific guidance found here may not be applicable elsewhere. However, the collaborative and multidisciplinary approach used to develop the guidance may serve as a useful example to those involved in perpetuating sustainable agriculture.

HISTORICAL OVERVIEW

Prior to European settlement the Mahicans, part of the Eastern Algonquian, occupied the Hudson River Valley. In the 1600s, Dutch and English settlers transformed the Kinderhook landscape into a patchwork of working farms. The land that would later become Lindenwald was part of the Powell Patent of 1664, a portion of which was acquired by the Van Alstynes in the 1600s. The Van Alstynes constructed a stone house on the terrace above Kinderhook Creek. Peter Van Ness purchased 260 acres from the Van Alstynes in 1780 and seventeen years later constructed a Federal-style brick house on the upper terrace by the Old Post Road (Figure 1.1). The property passed to the two sons of Van Ness, who in turn sold 137 acres to President Martin Van Buren in 1839, a Kinderhook native who was then serving as the nation's eighth president.

Van Buren named his estate "Lindenwald" and envisioned it as a place to pursue his interest in agriculture, as well as a place to receive dignitaries, politicians, and other guests. After a tumultuous term as President, including the Financial Panic of 1837 and an extended economic depression, Van Buren lost his bid for reelection in 1840, forcing an early return to Lindenwald in 1841. As a figure of national importance, Van Buren sought recognition for his progressive management of Lindenwald as a model country estate and farm, emulating Thomas Jefferson's Monticello and Andrew Jackson's Hermitage. Van Buren chose Lindenwald for its highly visible location on the Old Post Road and for its

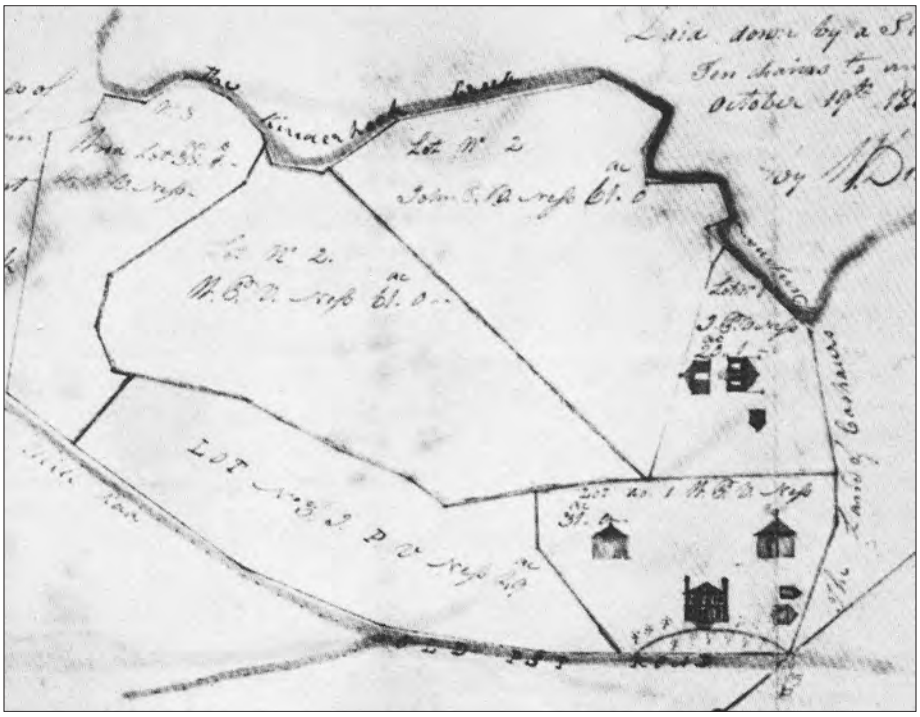

Figure 1.1. The 1805 drawing on the 1762 Voorman Map of Kinderhook depicts the location of several buildings on what was to become the Van Buren property, including the mansion, outbuildings, and the Old Stone House in the lower terrace (MAVA).

distinction as the former home of Peter Van Ness, a member of an established New York family.

While serving as president in Washington, D.C., Van Buren began improving the deteriorated property immediately after acquiring it by issuing directives to his foreman in Kinderhook. Stables, wood houses, fish ponds, and a hothouse were added in the early years, and improvements to the estate continued after his return to Kinderhook. He increased the size of the farm to approximately 220 acres by 1845 with the purchase of adjacent parcels, and built two large barns and a dwelling for his farm foreman. Intending the farm to be self-sufficient, Van Buren planted field crops, predominantly potatoes, hay, rye, corn, and oats, and tree fruits including pear and apple, to sell at market.

In creating a prosperous working farm, Van Buren's property did not assume the highly designed and manicured appearance inspired by the popularity of Andrew Jackson Downing and Alexander Jackson Davis's adaptations of English pastoral landscape structures and garden designs. However, Van Buren did hope to portray the refined appearance of a country gentleman, fitting his station in life (Figure 1.2).[1]

Van Buren launched two unsuccessful campaigns to regain the presidency in 1844 and 1848. Throughout this time and the 1850s, Van Buren relished being "a farmer in my native town," and kept busy managing the farm, writing his memoirs, and entertaining at Lindenwald until his death in 1862. He willed the property to his three surviving sons, although none chose to live at Lindenwald. His second eldest son, John, purchased the estate shares owned by his brothers in 1863 but did not occupy or improve the estate. After less than a year, John sold the financially burdensome property to Leonard Jerome.[2]

Figure 1.2. Circa 1849 Richard Upjohn rendering of the mansion, showing the 1850 improvements that altered the Georgian-Federal style home to an Italianate villa during Van Buren ownership, (Columbia Avery Library/ MAVA).

Over the next ten years, the property changed hands numerous times and suffered from absentee owners. This ended with the Wagoner brothers' purchase of the 220-acre estate in 1874 and their subsequent forty-three year ownership. Known locally as industrious and successful farmers, the Wagoners maintained the property well and managed the area immediately surrounding the home as mowed turf with a scattering of informally placed trees. They farmed the property intensively, as evidenced by their use of a portion of the front lawn as a corn field. Along with several new buildings erected by the Wagoners, many of Van Buren's farm buildings west of the main house remained in use during this period.

In 1917, the Wagoners sold the property in two parcels. They first sold 185 acres to Dr. Bascom Birney, retaining 36 acres on the southern end of the property. The Birney family, of Yonkers, New York, purchased the farm as an investment but later occupied the property full-time. Several members of the Birney family held title to the property, but the longest term owner was Clementine Birney deProsse, who lived on the site with her family from 1930 to 1957. The Birneys and deProsses farmed the land throughout the 1920s and 1930s during a difficult economic period. Many of the aging agricultural buildings fell into disrepair at this time but the main house remained well-tended thanks to Clementine's appreciation of the property's historical significance (Figure 1.3).

Early in the tenure of the deProsse family, Clementine encouraged the federal and state government to acquire the property as a memorial to Van Buren, unsuccessfully proposing that the state use it as a summer residence for the Governor of New York.

During the 1930s and 1940s enormous change occurred in the landscape. In 1930, the alignment of the Old Post Road was altered by the construction of Route 9H.

Figure 1.3. In this photograph dating from the Wagoner ownership, circa 1913, the entrance of the mansion is visible (MAVA).

The new road bed was located just east of Old Post Road, leaving a new triangular piece of land buffering the northeastern portion of the property. During the later years of the deProsse tenure, less care was given to the vegetation around the mansion, and shrubs, grass, and trees became overgrown. Deterioration of farm buildings, limited maintenance of orchards, and loss of old trees somewhat changed the property's character. The deProsse family sold the farmland in 1946 to local farmer Dudley Ray Meyer, Jr., retaining thirteen acres and the mansion, where they resided until 1957.

Using farm tractors and earth-moving machines, Meyer made substantial changes to the farm to modernize the fields, orchards, fences, and buildings that had deteriorated over the previous twenty years. He removed hedge rows, cut down orchards, burned unstable buildings, enlarged drainage ditches, altered topography, and built new farm roads and barns. Meyer transformed his farmland, which until this time retained many character defining features from the nineteenth century. In 1957, Ken Campbell purchased the mansion and the surrounding thirteen acres from the deProsse family. There he operated an antique business out of the historic south gatehouse and new shop building located near the gatehouse.

In 1973, the National Park Foundation purchased the approximate thirteen-acre Martin Van Buren mansion property from Campbell (Figure 1.4). The remainder of the Van Buren's historic estate was then owned by two separate local farmers, and some acreage had been developed as a residential subdivision. A year later, the Martin Van Buren National Historic Site was established and the National Park Service obtained the property from the National Park Foundation. The

Figure 1.4. Aerial photograph of the mansion and upper terrace farmland, 1978 (MAVA).

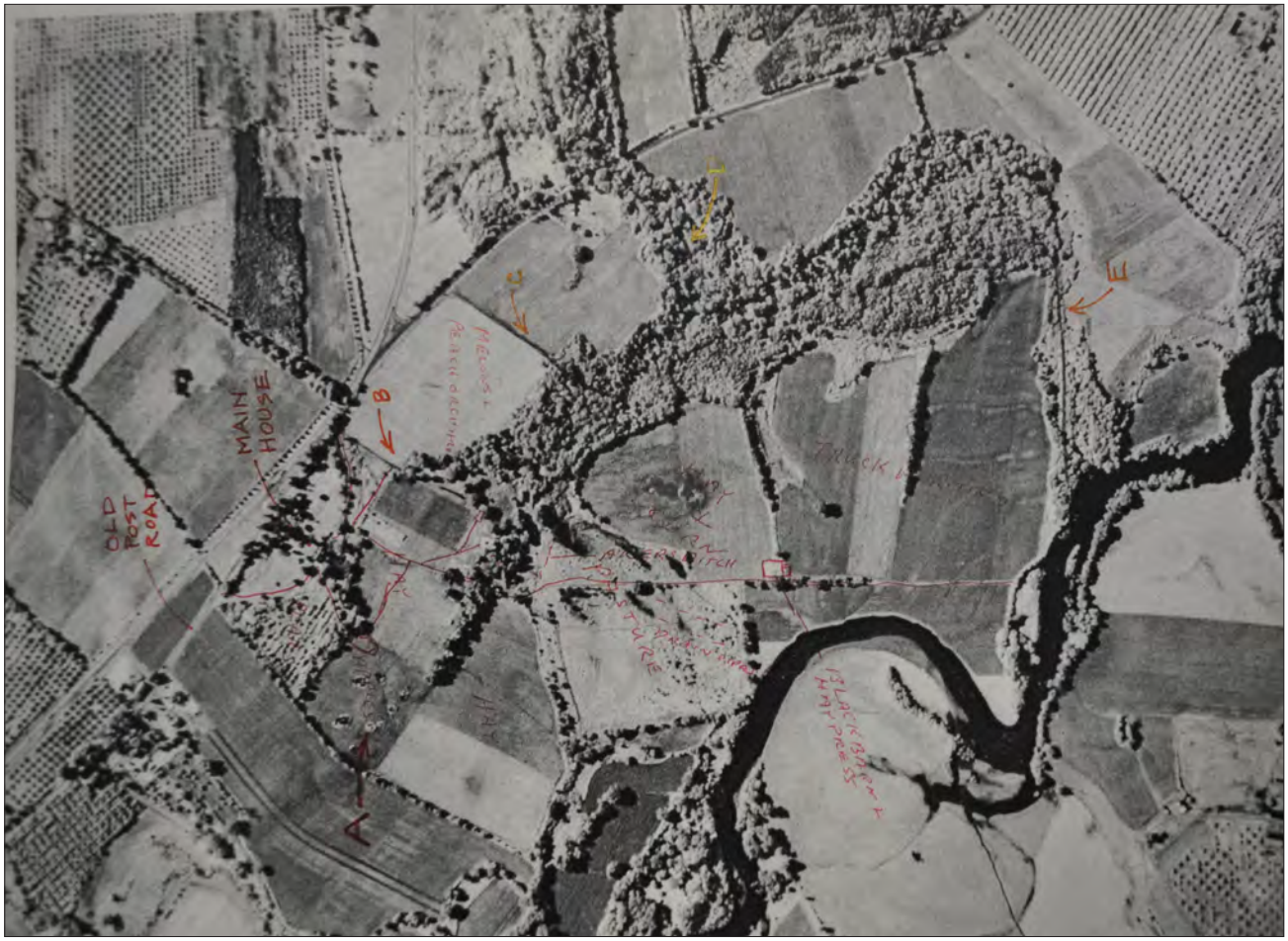

Figure 1.5. Aerial photograph of the farmlands and meadowlands encompassing the historic site, 1948 (MAVA).

National Park Service emphasized the importance of the agricultural legacy for the Martin Van Buren property in its early plans to protect and interpret the property. Prior to National Park Service acquisition, Director George Hartzog noted the importance of preserving the agricultural land and the site's scenic viewsheds, and preventing inappropriate development along Route 9H. Following establishment, the park completed landscape projects including the restoration of the formal entry drive and locust allée, replacement of aged white pines along the Old Post Road trace, and installation of screening plants around the visitor parking lot and park office temporary structure. During the 1990s, the National Park Service prepared two cultural landscape reports on the mansion property, and one in 2004 that focused on historic agricultural acreage. [3]

Following a boundary adjustment study in 2003 and the Omnibus Public Land Management Act of 2009, the park authorized boundary expanded from 40 to approximately 285 acres to allow for the acquisition of lands that would facilitate protection of the surrounding property that was once part of the historic farm, and to protect the park's western viewshed (Figure 1.5). Within the enlarged authorized boundary, approximately 44 acres remain owned in fee simple by National Park Service; 18.24 acres are held in conservation easements; 171.21 acres are owned by Roxbury Farm Inc, with 101.89 acres protected under a conservation easement held by the Open Space Institute which is to be donated to

the National Park Service at a future date. In addition, approximately 70 acres are privately held of which 7.64 acres are under conservation easement. A one-fourth acre parcel is owned by the Town of Kinderhook.

Within the expanded park administrative boundary, the former Van Buren property supports the missions of several organizations, notably the National Park Service, Open Space Institute, and Roxbury Farm.

Historical Significance Overview

The Lindenwald Mansion and thirteen surrounding acres became a National Historic Landmark in 1961 and was administratively listed without documentation in the National Register of Historic Places in 1966 with the passage of the National Historic Preservation Act. Documentation for the historic site was accepted by the Keeper of the National Register on February 8, 1980.

As described previously, Congress approved the expansion of the park's authorized boundary in 2009 to include an additional 261 acres of land encompassing all of President Van Buren's historic farmland northwest of New York State Highway Route 9H and Albany Avenue (County Road 25) and additional lands intended to provide protection for its setting. On July 11, 2012, the Keeper accepted an amendment to the National Register documentation evaluating all resources within the expanded boundary. The amendment identified historic significance for a portion of the property, a 176.95-acre historic district under National Register Criteria A, B, C, and D in the areas of politics/government, architecture, and archeology.

The historic district derives its primary significance under Criterion A and B at the national level in the area of politics/government for its association with President Martin Van Buren (1782–1862) and his political career during the years between 1841 and 1848. During that period, Van Buren, who moved to Lindenwald after his single term as President of the United States (1837–1841), launched two unsuccessful but historically important campaigns to regain the presidency in 1844 and 1848.

The district is also significant under Criterion B as the only surviving property associated with the life of Martin Van Buren. Lindenwald, the only home that Van Buren ever owned, represents the culmination of a remarkable political career that saw him rise from meager beginnings as a Kinderhook tavern-keeper's son to become the eighth President of the United States. His subsequent development of Lindenwald into a country estate and working farm reflected his Jeffersonian beliefs in the value and virtue of agriculture to a democratic society.

Lindenwald is locally significant under Criterion C in the area of architecture as an important example of a Federal-style mansion that was redesigned by architect Richard Upjohn in the Italianate-style of the mid-nineteenth century. The district is significant under Criterion D in the area of archeology and the subcategories "Prehistoric" and "Historic-Non Aboriginal" as a property that has yielded, or may be likely to yield, information important in prehistory or history. Surveys

and excavations conducted on the property to date have identified four sites that address substantive research questions regarding Native American usage of the land, Van Buren's occupancy of Lindenwald, and development of the property by previous and subsequent owners.

The physical integrity of the landscape is evaluated by comparing landscape characteristics and features present during the two historic periods of significance (1797, 1839–1862) with current conditions. Many of the landscape's historic characteristics and features remain intact. The spatial organization of the formal mansion grounds, with the imposing home, semi-circular lawn, and gracefully curved entry drive, is still distinct from the open farmland west of the mansion. Vegetation patterns remain similar through the restored black locust allée, mowed turf lawn, and cultivated acreage of the farm fields. The Italianate-style mansion has been restored and remains the focus of the historic core, as it was during Van Buren's time, and the extant south gatehouse contributes to the presentation of historic conditions. The Van Ness monument is still visible in the field to the west of the mansion, and one of the fish ponds remains. Importantly, the historic setting is largely intact due to the retention of views of the Catskill Mountains and the preservation of actively farmed land in the park's viewshed. However, much has changed since 1862. Notably, many of the historic structures known to Van Buren are no longer extant, including all of the barns, the farm office, and the north gatehouse. This alters the spatial arrangement of the area behind the mansion that was once the center of the working farm. Other key features such as the orchards and formal garden are gone, further altering the character around the mansion. Additionally, the dense north wooded area, once Van Buren's north orchard, encroaches on the formerly open yet organized landscape.

A more detailed summary of the property's significance and integrity with respect to the National Register is contained in the 2012 National Register documentation for the property by the Public Archeology Lab.[1]

Existing Conditions

Martin Van Buren National Historic Site, including farmland owned in fee simple by the National Park Service and land owned by Roxbury Farm, comprises the majority of the former historic extents of the Lindenwald property. The remaining approximately seventy acres are privately held of which about eight acres are under conservation easement. A one-fourth acre parcel is owned by the Town of Kinderhook.

The historic site is located twenty miles south of Albany and two miles east of the Hudson River in Kinderhook, Columbia County, New York. Less than thirty miles east of the Catskill Mountains and adjacent to Kinderhook Creek, the historic Lindenwald property features fertile soils, striking scenery, and a variety of habitats along a riparian corridor.

The landscape continues to be defined by its historically rural Hudson Valley setting, upper and lower river terrace topography, and the distant Catskill Mountains visible in the park's western viewshed. The surrounding woodland and farmland within the park's nearly 300-acre authorized boundary remains undeveloped and actively farmed.

The park continues to preserve much of the original Van Buren estate within its boundary. Resources include the Lindenwald mansion, South Gatehouse, North Gatehouse foundation, Farm Cottage, and the Farm Office site. A semi-circular driveway lined with locust trees leads to the 2.5-story brick Lindenwald mansion built in 1797 and enlarged by Van Buren in 1849 – 1850. A remnant segment of the Old Post Road is located near the east edge of the property. A portion of the circular front garden has been restored near the front entrance to Lindenwald. Specimen trees continue to dot a well-manicured law as they did during the historic period. Remnants of Van Buren's fish ponds remain. The approximate site of the carriage barn, located northwest of the mansion is marked with scattered foundation stones. In addition to cultural features, Lindenwald also possesses natural systems and features which influence the management of the agricultural lands. The following paragraphs describe these systems and features.

GEOLOGY AND SOILS

The geomorphology of the site is illustrative of the last Ice Age, when the area was flooded by the glacial Lake Albany. The lake drained about 13,500 years ago, leaving behind terraces and lake shore delta deposits of sandy loam in the Kinderhook area. The Lindenwald property consists of two steps, a lower terrace

Figure 3.1. Since Van Buren's era, the farmland has been supported by natural and constructed water features, including the Lower Pond, (MAVA, 2014).

along the creek and an upper terrace surrounding the mansion and extending to the Old Post Road. The lowest elevations of the lower terrace consist of muck filled swamp areas and seasonally wet meadows. The Kinderhook soils are deep and fertile due to the alluvial floodplains, which are replenished by periodic spring flooding. Germantown shale, conglomerate, and limestone lay to the north, east and west of Lindenwald, resulting in calcareous soils. East of the upper terrace, the land continues to rise, and the fertility of the soil diminishes.

WATER COURSES AND PONDS

Water courses generally flow southwest toward the Hudson River. Numerous tributaries including Kline Run, Valatie Kill, and Stuyvesant Brook flow into Kinderhook Creek before it winds along the western edge of the Lindenwald property. A network of non-historic constructed ditches within the lower terrace of Lindenwald drain the wet meadows into swamps that seep into Kinderhook Creek. Kinderhook Creek continues southwest to Stockport Creek, which flows into the tidal Hudson River. Within the Lindenwald property, five ponds hold water for most of the year. Upper Pond and Lower Pond, both part of a Van Buren area fish pond, are historic and contributing. The remaining ponds, collectively called the Lower Farm Complex Ponds, were constructed by Meyer after the period of significance.

HABITATS, FLORA, AND FAUNA

Due to its fertile soils paired with wet areas, the Lindenwald property contains of a mix of habitats. These include a predominance of upland meadow, some upland forest, an edge of hardwood swamp, pockets of wet meadows, vestiges of shrubby oldfield in transition between meadow and young forest, ponds, and sandbars.

Ongoing agricultural use of the property preserves the upland meadow habitat, which supports a mosaic of flora and fauna (Figure 3.1). [1]

Plants inventoried on the property are a mix of native and introduced, naturalized and cultivated, non-invasive and invasive. A complete list is contained in Hudsonia's biological survey. Common plant species associated with the upland meadow include grasses and forbs, such as orchard grass, tall oatgrass, timothy, Queen Anne's lace, and goldenrods. Trees found in the upland deciduous forest include black locust, black cherry, white ash, white pine, elm, and eastern hemlock.

A patch of forest by the southern swamp also contains bitternut, pignut, and shagbark hickories, plus American beech, black oak, and bladdernut. The swamp contains trees tolerant of flooding including red maple, green ash, slippery elm, yellow birch, black willow. Wet meadow areas too wet for cultivation contain purple loosestrife, goldenrod, and path rush. The shrubby oldfield area contains cottonwood, staghorn sumac, hawthorn, and multiflora rose. The constructed ponds contain abundant floating plants, such as watermeal and common duckweed.

The sandbar in Kinderhook Creek supports species such as silver maple, boxelder, sycamore, and black locust. Wetland areas contain plants typically associated with limestone formations and calcareous or circumneutral soils in the Hudson Valley, such as pale jewelweed (Impatiens pallida) and lakeside sedge (Carex lacustris). A number of regionally and statewide rare plants in wetland areas including sedges (Carex squarrosa, lacustris, trichocarpa, grayii, and davisii), ostrich fern (Matteuccia struthiopteris), false-mermaid (Floerkea proserpinacoides), and pale St. Johnswort (Hypericum ellipticum).

Figure 3.2. Goats contribute to weed or invasive species management (MAVA, 2014).

Mammals observed on and near the Lindenwald property include white-tailed deer, striped skunk, river otter, long-tailed weasel, raccoon, red fox, coyote, muskrat, American beaver, woodchuck, meadow vole, star-nosed mole, eastern cottontail, gray squirrel, and eastern chipmunk. Additional mammal species likely on the property but not fully documented include opossum and several species of bat, shrew, mouse, vole, and squirrels. In addition, domesticated animals form an integral part of the agricultural experience on the farm. (Figure 3.2).

Numerous fish species reside in Kinderhook Creek. Amphibians recorded at Lindenwald include four species of salamander, seven species of frogs and toads, snapping turtle, painted turtle, plus two species of snakes. Most were seen in and around wetland areas, though frogs and snakes are infrequently seen in the window wells of the mansion.

The open fields, water sources, coniferous shelter-belts, ditches, hedgerows support an array of bird species typically associated with fields, woodlots, thickets, swamps, and forest edges. The survey by Hudsonia between 2002 and 2004 documented 78 bird species as common, uncommon, or rare. Examples of common bird species include mallard duck, mourning dove, American crow, black-capped chickadee, American robin, gray catbird, European starling, common yellowthroat, song sparrow, and American goldfinch. Uncommon species observed include Canada goose, northern flicker, red-eyed vireo, blue jay, American tree sparrow, and chipping sparrow. Rarely seen species include great blue heron, green heron, great egret, American black duck, wood duck, osprey, American woodcock, spotted sandpiper, least sandpiper, and many more bird species. Twenty of the species observed on the property demonstrated breeding activities including singing, carrying nesting material, and carrying food for young.

The diversity and abundance of invertebrates is not fully documented for the Lindenwald property. Species observed during the 2002-2004 biological survey included the American rubyspot, a rare damselfly; the checkered skipper, a regionally rare butterfly; a snout, another rare butterfly; tiger beetles; and phantom crane fly, an uncommon species that is locally distributed in the Hudson Valley that is associated with the wet, organic, calcarious or circumneutral soils.

AGRICULTURAL MANAGEMENT FRAMEWORK

This chapter describes the management framework that has guided the development of the *Agricultural Management Guidelines for the Martin Van Buren National Historic Site*. The management framework articulates the legal and regulatory foundation upon which the management of the short and long-term care of the cultural landscape of the Martin Van Buren National Historic Site is based. It describes the management zones defined in the *General Management Plan for the Martin Van Buren National Historic Site* (2015), as well as the organizations and agencies that work with the National Park Service in the management of the agricultural lands. Finally, it outlines a strategy to facilitate effective communication and collaboration among organizations.

The agricultural management framework addresses agricultural land within three management zones, as defined in the *General Management Plan for the Martin Van Buren National Historic Site*. The Historic Transition Zone, which encompasses the upper terrace fields and the Meyer Farm Complex, is owned in fee simple by the National Park Service. The Natural Resource Zone includes the riparian corridor along Kinderhook Creek, the Vegetated Escarpment, and wooded areas bordering the Upper and Lower Terraces. Land within the Natural Resource Zone is owned by Roxbury Farm, and subject to a conservation easement held by the Open Space Institute. Finally the agricultural management framework addresses land within the Agricultural Zone in which the National Park Service currently possesses a legal interest, or may acquire a legal interest in the future. These management zones are addressed further on pages 20 and 21.

The National Park Service and its partners will continue to manage Van Buren's agricultural fields in environmentally sustainable cultivation, utilizing present-day techniques, materials, cultivars, and breeds. The type and variety of crops or agricultural products grown will be determined by the farm operator, in response to market demand. Cultivation of this historic land will preserve historic hedgerows, fencelines, and field patterns characteristic of the mid-nineteenth-century agricultural landscape of the Hudson Valley. Surviving outbuildings and portions of farm roads surviving from the historic period will be preserved, reflecting the formerly interconnected infrastructure present during the historic period. Missing outbuildings present during the historic period will be indicated, but need not be rebuilt unless it is practical, desirable and feasible to do so. Reconstructed outbuildings will be consistent with the scale and form of those present during the historic period, but need not replicate historic construction methods. Sites of non-extant historic structures that are not to be reconstructed

will be protected archaeological sites.

Establishing clear and consistent lines of communication between the National Park Service and its partners is critical to successful implementation of these guidelines. Farm operations are subject to the life-cycle of plants and animals, involving sowing, weeding, pest control and harvesting operations that are sometimes not conducive to public visitation. National Park Service sites are, by mission and legislation, open to the public. In order to facilitate coordinated farm operations and park visitor services, the National Park Service, in close consultation with the farm operator and other land management collaborators, will prepare a detailed calendar indicating the anticipated timing of specific agricultural practices, as well as park operations and anticipated special events. It is projected that this calendar will be the product of an annual winter coordination meeting attended by all partners involved in the stewardship of the Lindenwald landscape.

LEGISTATION, POLICY, AND PLANNING

The primary purpose of managing the agricultural landscape of the Martin Van Buren National Historic Site is to preserve the integrity of the surviving historic characteristics and features, while ensuring the viability of appropriate agricultural pursuits by others. This purpose reflects the conservation mission of the National Park Service, defined in the Organic Act of 1916. The application of this mission to historic preservation (cultural resources) is articulated in *The Secretary of the Interior's Standards for the Treatment of Historic Properties*, which in turn informs a hierarchy of National Park Service regulations and policies that comply with the National Historic Preservation Act of 1966. The application of these regulations and policies to cultural landscapes is contained within *National Park Service Management Policies (2006), Director's Order #28: Cultural Resource Management, and NPS-28 Cultural Resource Management Guidelines*. Resource management guidelines also include *Natural Resource Management Reference Manual #77: National Park Service Integrated Pest Management Manual, NPS-77 Agriculture,* and *Directors Order #53: Special Use Permits*.

The leasing of park real property to third parties is governed by *RM 38 -Leasing Reference Manual for 36 CFR Part 18,* which provides guidance to the authority provided under regulation 36 CFR Part 18, NPS Management Policies 2006, and Director's Order-38. According to RM-38, the regulation specifically of agricultural leases is further addressed under Section 8.6.7 of Management Policies 2006, and DO-53, Special Park Uses.

The agricultural management framework is also aligned with objectives described in the *General Management Plan for the Martin Van Buren National Historic Site* (2015) which specifically recognizes the cultural landscape of the Martin Van

Buren National Historic Site as nationally significant for its association with the agricultural pursuits of Martin Van Buren. In the *General Management Plan*'s preferred alternative, the cultural landscape will be restored and rehabilitated to reflect its appearance in the mid 1800s, to coincide with the ownership and occupancy of Martin Van Buren from 1839 to 1862. Treatment will perpetuate ongoing agricultural operations and allow visitors to tour the historic core of the property and explore edges of the historic farmland. The *General Management Plan* recognizes that "the continuity of agriculture at Lindenwald, the surrounding farmland provides a context for interpreting the history of progressive farming, from Van Buren's time to the present day operations of Roxbury Farm." Moreover, the agricultural soil is recognized as a cultural and important resource.[2]

The *Cultural Landscape Report for Martin Van Buren National Historic Site, Volume II: Updated Treatment Plan and Record of Treatment* (2016) further emphasizes the significance of active agriculture in the preservation of the integrity of the Martin Van Buren National Historic Site through a program of recommendations and tasks to preserve what survives of the historic landscape, restore key features, and rehabilitate the landscape characteristics to both recapture the landscape's former character to the greatest extent possible and support park and farm operations. Recommended actions within the *Cultural Landscape Report for Martin Van Buren National Historic Site, Volume II: Updated Treatment Plan and Record of Treatment* (2016) seek to enhance parallels between Van Buren's experimental and scientific agricultural practices and contemporary sustainable farming techniques. Specific treatment tasks address the issues associated with the restoration of historic vegetation patterns, management of a maturing landscape and viewsheds, enhancement of visitor experience and access, connections to agricultural practices, and interpretation of missing historic features. As a companion to the *Cultural Landscape Report*, the *Agricultural Management Guidelines* document identifies significant features to be preserved, and describes appropriate farming methodologies, processes, and techniques.

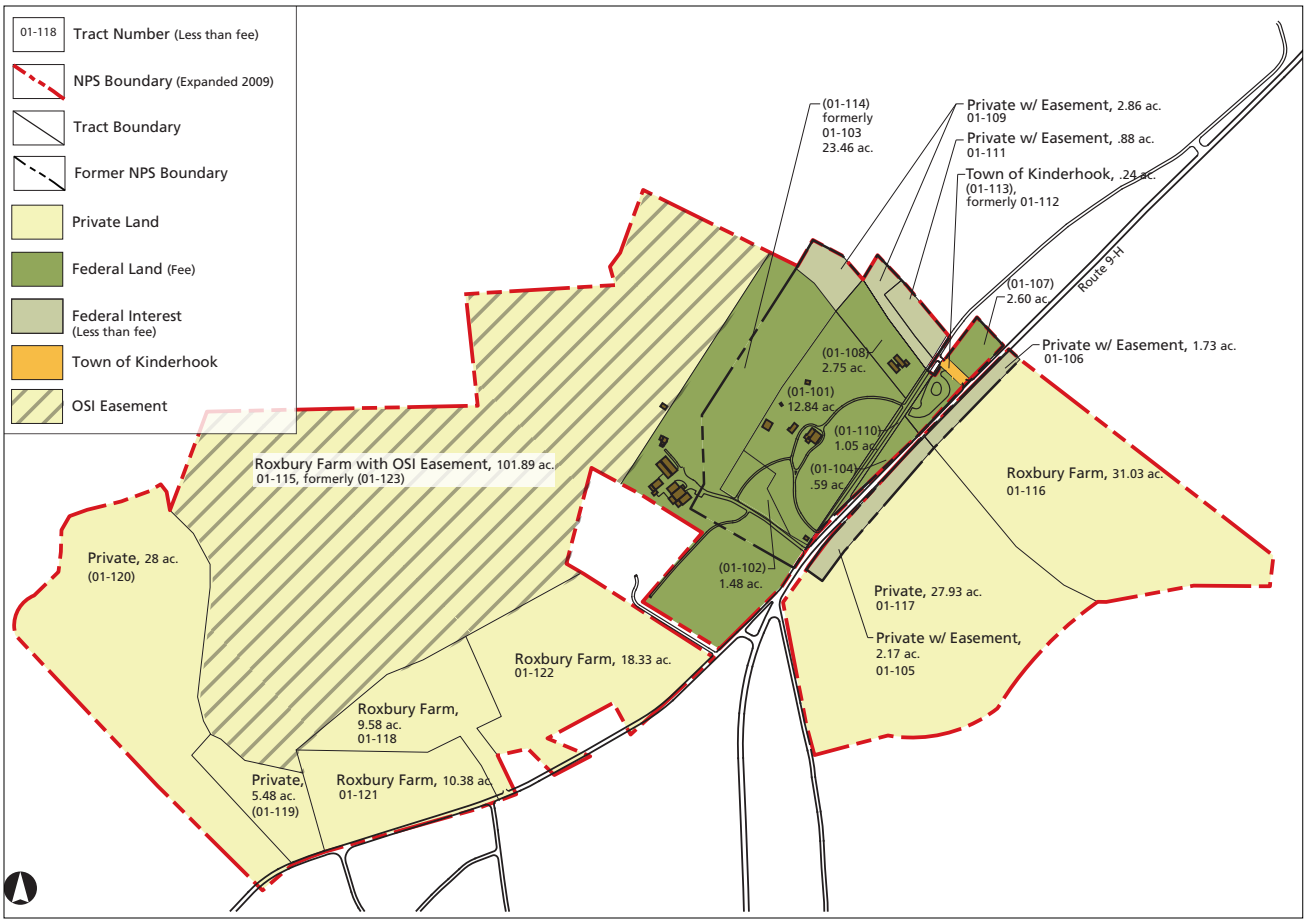

Figure 4.1. The majority of the land within the park boundary is not owned by the National Park Service, but by private individuals and organizations, including Roxbury Farm and the nonprofit organization The Open Space Institute. Land not owned by the National Park Service is shown in yellow (OCLP 2018, adapted from GMP 2015).

MANAGEMENT ZONES

The park's *General Management Plan* and the *Cultural Landscape Report for the Martin Van Buren Historic Site, Volume II* provide management direction for land acquired in fee-simple and for land under easement within the expanded National Park Service boundary. The National Park Service is required to develop management zones for national parks. All management zones are located within the park boundary and represent an important management tool to help managers prioritize park funding and staffing. The *General Management Plan* defines five management zones for the Martin Van Buren National Historic Site. For the purposes of the guidelines, areas within the Agricultural Zone are further divided by ownership status (Figure 4.1).

NATIONAL PARK SERVICE ADMINISTRATIVE ZONE

This zone includes land on the east and west sides of the Old Post Road, primarily in the north field, an area outside of Van Buren's historic property boundary. It includes the visitor center and visitor parking lot, and is owned in fee simple.

NATIONAL PARK SERVICE HISTORIC ZONE

This zone includes the land immediately surrounding the Martin Van Buren Mansion. It does not include agricultural land. It is owned in fee simple by the National Park Service.

HISTORIC TRANSITION ZONE

This zone encompasses the upper terrace lands which are used for agriculture. This land includes the Meyer Farm Complex and is owned in fee simple by the National Park Service.

NATURAL RESOURCE ZONE

This zone includes the riparian corridor along Kinderhook Creek, the Vegetated Escarpment, and wooded areas bordering the Upper and Lower Terraces. This land is owned by Roxbury Farm, subject to a preservation easement held by the Open Space Institute.

AGRICULTURAL ZONE

This zone includes all agricultural land owed by the National Park Service and under easement by Roxbury Farm. The Agricultural Zone is further divided up into the following areas based on ownership, as seen in the accompanying diagram.

a. Roxbury Farm Fee Simple with Open Space Institute Easement

b. Roxbury Farm Fee Simple, No conservation easement

c. East of 9H-Roxbury Farm Fee Simple, No conservation easement

COLLABORATIVE ORGANIZATIONS

The purpose of the Martin Van Buren National Historic Site is to preserve Lindenwald so present and future generations of visitors may learn about the life and public career of President Martin Van Buren and find meaning in the issues facing America during the formative years of the republic through the turbulent decades leading up to the Civil War. The Park is located within the boundary of the Hudson River Valley National Heritage Area. Park management cultivates relationships with numerous community organizations, including but not limited to, the Friends of Lindenwald, Open Space Institute, Columbia Land Conservancy, Stockbridge Munsee Community-Band of Mohican Society, Kinderhook Stockport Stuyvesant Trail Committee, Friends of Kinderhook Trails, Landmarks Visitor Collaborative of Columbia County Historic Sites and Tourism Agencies, and the Center for Applied Historical Research of the Department of History at the University at Albany, State University of New York. The following paragraphs describe primary collaborators of the National Park Service at Lindenwald.

ROXBURY FARM, INC.

Roxbury Farm Inc is a community supported agricultural enterprise, operating on several discontiguous properties in Kinderhook, that grows vegetables, herbs, and grass fed pork, lamb, and beef. Part of this company's extended operations occupy a 375-acre farm, a portion of which falls within the authorized boundary of the Martin Van Buren National Historic Site. Of the 44.7 acres of owned by the National Park Service within the authorized park boundary, Roxbury Farm leases for agricultural purposes approximately 18 acres. Under NPS RG-38, the lessee/lessor relationship between the National Park Service and Roxbury Farm must remain non prejudicial to outside parties. Though the agricultural activity undertaken by Roxbury Farm perpetuates the integrity of the historic landscape of Lindenwald through a continuance of historic use, Roxbury should not be considered a "partner" under the technical National Park Service definition of the term. Under NPS policy, partners are limited to governmental and nonprofit organizations.

Shareholders of Roxbury Farm, a for-profit organization, represent more than twelve-hundred families in four communities including Columbia County, the Capital Region, Westchester County, and Manhattan. Jean-Paul Courtens, a Dutch immigrant, started Roxbury Farm in Claverack, NY in 1989. His farming practices were based on the principles of organic and biodynamic farming. In 1990, Jean-Paul and a group of customers started the first community supported agriculture (CSA) relationship in New York City. In 1991 the CSA concept spread to customers in Albany, NY and locally at the farm. Jody Bolluyt joined the farm in 2000 when the farm moved to its present location in Kinderhook, NY. With

the move to new land Roxbury Farm gained long term land security. Through partnerships with Roxbury Farm CSA members and friends, Equity Trust, Inc. and the Open Space Institute Roxbury Farm now is a steward of 375 acres of farmland, woods, and pasture. Keri Latiolais joined the farm in 2012 as part of the management team. Currently the farm is managed by Jean-Paul, Jody, and Keri along with a dedicated team of crew members. Due to the agricultural and historic value of the property, the Open Space Institute retains a conservation easement on the property requiring the preservation of its historic characteristics and features, and its use for agriculture in perpetuity. The historic characteristics and features of the landscape to be preserved and protected are identified in the conservation easement and reiterated in this document.

For the past four decades, the National Park Service has cared for the core of the Martin Van Buren property, undertaking improvements consistent with National Park Service policies and guidelines, as well as park management objectives. In 2009, the park expanded its boundary to encompass all of Van Buren's former farmland. The 44.70 acres of land of the Martin Van Buren National Historic Site owned in fee-simple by the National Park Service adjoins the 101.89-acre property currently held by Roxbury Farm and under easement by a conservation nonprofit, the Open Space Institute. The primary purpose of the conservation easement is to enable the property to remain in agricultural use by preserving and protecting its agricultural soils and agricultural viability and productivity while also ensuring that the property's open space, natural, historic, recreation, habitat and scenic values will be conserved in perpetuity. The easement requires provisions for limited public recreational access, including a reserved right to construct a public trail on the property near Kinderhook Creek. The *Agricultural Management Guidelines for the Martin Van Buren National Historic Site* will help the owners of the lands under conservation easement to preserve the historic integrity of the landscape while engaging in environmentally and financially sustainable agriculture.

In the management of the Martin Van Buren National Historical Site, the National Park Service works in cooperation with many governmental and nonprofit organizations to perpetuate sustainable agriculture, preserve historic landscape character, and expand opportunities for collaborative programing to connect people to the landscape and agriculture on the site. The Martin Van Buren National Historic Site and the primary organizations with which it collaborates are described below.

THE OPEN SPACE INSTITUTE

The Open Space Institute protects scenic, natural and historic landscapes to provide public enjoyment, conserve habitat and working lands and sustain communities. Founded in 1974 to protect significant landscapes in New York

State, the Open Space Institute (OSI) has since become a leader in environmental conservation. The Open Space Institute has partnered in the protection of nearly 2.2 million acres in North America, from Alabama up the spine of the Appalachians to southeastern Canada. All of OSI's work is directed by a consistent strategy emphasizing permanent protection on a landscape-level scale. Each discrete transaction, such as buying a conservation easement on a family farm in the Hudson River Valley or helping fund the purchase of 100,000 acres in Maine, represents an effort to align the pieces of the landscape puzzle and prevent habitat fragmentation. Much of OSI's work in New York State is accomplished through the Open Space Land Trust, Inc. The Open Space Institute currently holds an easement on 101 acres within the authorized boundary of the Martin Van Buren National Historic Site.

TOWN OF KINDERHOOK

The town of Kinderhook is located in the northern part of Columbia County. With a population of 8,498 people (2010 census), it is the most populous municipality in the county. The town of Kinderhook owns a .24 acre parcel of property, a narrow strip of land including the entrance drive off of Route 9H, into the Martin Van Buren National Historic Site.

COLUMBIA COUNTY AGRICULTURAL AND FARMLAND PROTECTION BOARD

The Columbia County Agricultural and Farmland Protection Board is a quasi-governmental body located in Hudson, New York consisting of eleven members who hold the authority to advise the Columbia County Board of Supervisors on matters related to the proposed establishment, modification, continuation, or termination of any state certified Article 25AA agricultural district. As such the property addressed by the guidelines falls within their purview.

NEW YORK STATE SOIL AND WATER CONSERVATION COMMITTEE

The mission of the New York State Soil and Water Conservation Committee is to advance comprehensive natural resources management through the support of local Soil and Water Conservation Districts. Agricultural Environmental Management (AEM) is a cooperative, interagency program providing one-on-one help to farmers to identify environmental risks on their farms. Once these risks are identified, farmers receive planning, design and help obtaining financial assistance to correct existing problems and prevent future ones. The State Committee develops policy for the statewide AEM program and administers programs through staff and various groups associated with the interagency AEM Steering Committee.

AGRICULTURAL MANAGEMENT PHILOSOPHY

The National Park Service with its collaborators, including Roxbury Farm Inc. and the Open Space Institute, will perpetuate sustainable agriculture, improve historic landscape character, and expand opportunities for collaborative programing to connect people to the landscape and agriculture on the lands of the former Lindenwald property. The landscape will continue to provide an appropriate setting to interpret Van Buren's progressive farming methods within a broad platform of agricultural and regional history, and highlight parallels between Van Buren's practices and contemporary sustainable agricultural production.

Implementation of the guidance provided in the guidelines supports continued development of a mutually beneficial relationship between the National Park Service and farming collaborators. The guidelines provide an overall context for enhancing historic character and for perpetuating the characteristics and features that convey historic significance while balancing contemporary needs associated with active agricultural use and park operations. The guidelines may be used by both present and future land stewards and park managers to facilitate communication and collaboration between numerous stakeholders. Through clear language and relevant examples, the guidelines describe appropriate ways of addressing challenges through prioritization of both agricultural and visitor access and activity scheduling.

The historic Lindenwald landscape has a distinctive character based on its physical attributes as a Hudson Valley estate and working farm, and its historic association with President Van Buren This document articulates the essential qualities of the landscape that convey its significance and are consistent with broad principles derived from the preferred management alternative identified in the park's General Management Plan Alternative C: "In the Footsteps of Martin Van Buren," as well as the Preferred Treatment identified in the *Cultural Landscape Report for the Martin Van Buren National Historic Site, Volume II*.

Van Buren's agricultural fields west of the mansion will remain in active agricultural production, providing an opportunity to tell the story of nearly three hundred years of continual farming. Hedgerows and fence lines characteristic of the mid-1800s agricultural landscape will be retained in order to evoke the character of the Van Buren agricultural landscape. Several outbuildings and portions of farm roads from the historic period remain, and relate to the interconnected network of barns, sheds, and greenhouses present during the historic period. Locations of missing outbuildings that date to the historic period will be preserved. The landscape will be managed for historic character, allowing modification of historic features when necessary to address other resource values, park operations, or agricultural operations, provided the changes are subordinate to the historic landscape characteristics. As such, the primary purpose of this document is to guide preservation of the characteristics and features that convey

historic significance, while balancing contemporary needs associated with active, sustainable agricultural use and meaningful visitor experience.

COMMUNICATION AND COLLABORATION STRATEGY

Positive communication and collaboration between the National Park Service and its many partners is critical to the successful preservation of the historic agricultural landscape of Lindenwald. Working together the National Park Service and its partners will perpetuate sustainable agriculture, improve historic landscape character, and expand opportunities for collaborative programing. The landscape will continue to provide an appropriate setting to interpret Van Buren's progressive farming methods within a broad platform of agricultural and regional history, and highlight parallels between Van Buren's practices and contemporary sustainable agricultural production.

Acknowledging that modern farming practices are inherently dynamic, tied to a changing climate and marketplace, flexible solutions are necessary to ensure a sustainable agricultural enterprise. Collaboration on leases should be long-term where possible, for short-term agricultural leases limit the return on investment of lessees in maintenance and capital improvements. In addition, planning for succession and a smooth transition to future generations of farmers will be critical to preventing production loss and ecological facility degradation.

Planning for operational and capital improvement needs should be organized through shared calendars identifying critical agricultural and public event dates. Regular communication between partners, facilitated through annual meetings and shared calendars, will help to resolve issues in a timely and positive manner. Collaboration between partners, in the context of resource preservation and agricultural stainability and visitor safety, contributes to the goals of community integration and education.

The farm is a learning institution where the relevance of Martin Van Buren's life and contributions can be clearly understood. Interpretative materials such as signs, booklets, lectures, and mobile apps provide visitors with a layered understanding of the place and its activities. Interpretive programs should include experiential or hands-on learning opportunities where visitors have the opportunity to engage in agricultural practices. Through such programs people connect with the land and deepen their understanding.

Best Management Practices

Best Management Practices, as articulated in this chapter, provide the management of Martin Van Buren National Historic Site with a useful reference to the multifaceted and complex profession of sustainable agriculture. Information in this chapter is by no means exhaustive, but rather provided at a depth necessary to provide National Park Service management with the knowledge, language, and understanding necessary to make informed decisions regarding agricultural operations on the Van Buren lands. Best practices are articulated under the broad topics of soil management, water management, infrastructure and storage, pest management, farm access control, operations, and resource management (Figure 5.1). Each broad topic is described and divided into related subtopics. Best management practices, including preferred methodologies, are included under each topic and subtopic. Sections on special considerations and evaluation processes and procedures are also included under agricultural subtopics where applicable to the subject.

This chapter is consistent with National Park Service policy and supports direction outlined in park planning documents developed for Martin Van Buren National Historic Site. Legal obligations and recommendations are articulated

Figure 5.1. A matrix for sustainable agriculture provides a spectrum of actions and mindsets towards long term management and preservation of resources (Plant and Life Sciences Publishing, Cornell University, 1999).

* Adapted with permission from *Sustainable Vegetable Production from Start-Up to Market* (NRAES-104). Natural Resource, Agriculture, and Engineering Service, (NRAES), PO Box 4557, Ithaca, NY 14852-4557, www.nraes.org.

Production Practices for Sustainable Vegetable/Crop Enterprises *

Less Sustainable Practices →			More Sustainable Practices
Crop Rotation			
Monoculture (same crop in same field each year)	Two years between the same crop planted in the same field	Three years between the same crop planted in the same field	Four years between the same crop planted in the same field
Organic Matter Maintenance			
Add crop residues only	Add animal manures + crop residues	Add cover crops, animal manures, + crop residues	Add compost, cover crops, + crop residues to soil
Nitrogen Fertilization			
Broadcast bagged fertilizer in fall	Broadcast bagged fertilizer in spring	band and sidedress fertilizer to match timing of crop uptake	Rely on N from organic residues, in addition to timely fertilization
Insect Management			
Calendar spray insecticides (on predetermined schedule)	Scout for insect pests, then spray non-selective insecticide	Scout for insect pests, then spray selective, least-toxic pesticide	Use cultural practices and beneficial insects to control pests
Weed Management			
Apply herbicides as primary weed control tool	Apply reduced rates of herbicide and cultivate	Cultivate to remove weeds	Use allelopathy, smother crops, and mulches to suppress weeds
Disease Management			
Apply fungicide on a predetermined schedule	Use disease modeling to time fungicide applications as needed	Employ cultural practices that prevent disease	Plant disease-resistant cultivars

in National Park Service resource management guidelines including *Natural Resource Management Reference Manual #77, National Park Service Integrated Pest Management Manual; NPS-28 Cultural Resource Management Guidelines; National Park Service Management Policies 2006; Directors Order 53: Special Use Permits* and *RM-38 Leasing Reference Manual*. The Best Management Practices outlined here are consistent with objectives articulated in the *General Management Plan* (2015) and the *Cultural Landscape Report for Martin Van Buren National Historic Site, Volume II: Updated Treatment Plan and Record of Treatment* (2016).

SIX PRIMARY GOALS OF BEST MANAGEMENT PRACTICES

To enhance historic character and perpetuate the characteristics and features that convey historic significance while balancing contemporary needs associated with active sustainable agricultural use and park operations, the National Park Service and its collaborators will work to achieve the following six goals.

- Articulate parallels between National Park Service management objectives for the Van Buren farm land, soil health, and the cultural landscape setting with the objectives of modern sustainable agricultural operations that value park soil health and the perpetuation of soil fertility and farming operations.
- Provide direction intended to transcend changes in National Park Service management, as well as the tenure of individual managers and owners of lands under easement (Figure 5.2).
- Provide agricultural management staff with a resource clearly articulating the National Park Service philosophy and methodology behind cultural resource stewardship on public lands.
- Provide National Park Service staff and management, especially those without a background in agriculture, with a resource that articulates the basic concepts of best practices for sustainable agricultural production.
- Recognize the long-term investment required on the part of farm partners in order to sustain and improve soil health in perpetuity.
- Support communication between the National Park Service and farm partners working towards the achievement of mutual goals.

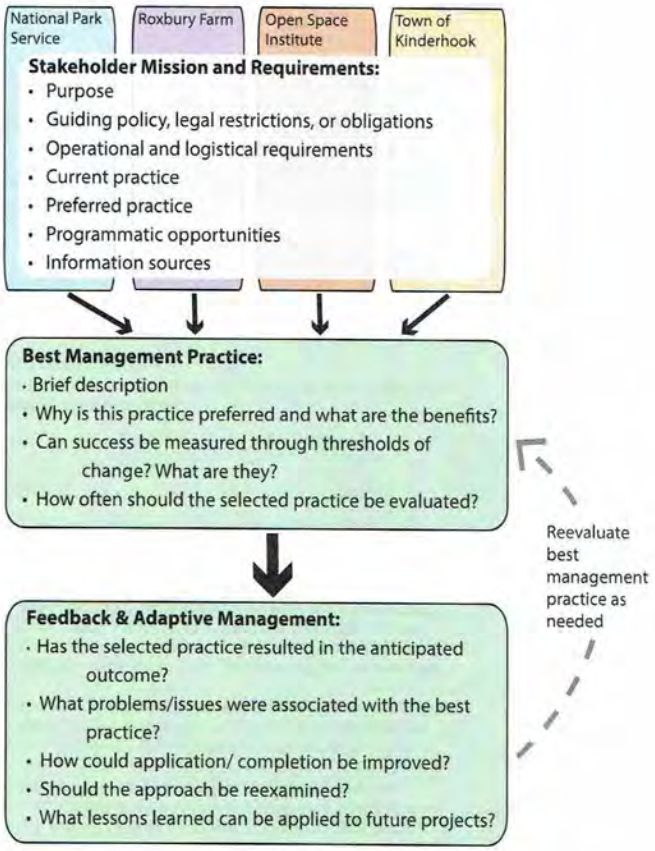

Figure 5.2. A flow chart illustrating the process of aligning stakeholder missions with best management practices including the continual re-evaluation of best management practices within a framework of adaptive management (OCLP, 2015).

SOIL MANAGEMENT

The agricultural soil at Martin Van Buren National Historic Site is identified as an important cultural resource in the park's recently completed *General Management Plan*.[1] The soil in the historic Van Buren agricultural fields has been continually managed for centuries and reflects a long history of human intervention. At Martin Van Buren National Historic Site, proper stewardship of the agricultural soil is essential for sound management, crop production, and long-term ecosystem health. The quality and quantity of crops produced is directly linked to soil health as the foundation of sustainable agriculture. Healthy agricultural soil takes decades to develop. The benefits of good soil health reach beyond crop field boundaries, extending to protect local and regional water quality.[2] Cooperative management and co-stewardship of the Van Buren agricultural soil, regardless of specifics of land ownership, is essential to perpetuating sustainable agriculture within Van Buren's historic fields. Best practices for soil management and the emphasis on soil health parallel Van Buren's dedication to soil "improvement," a hallmark of progressive agriculture.[3]

The following provides an overview of general soil management best practices. Specific practices are expanded upon in individual sections below.

- Use practices that add organic material to the soil including animal manures, composts, leaves and cover crops. Supplemental fertility sources should match crop uptake needs and align with long-term soil management goals (Figure 5.3).[4]
- Manage soil to provide a sufficient supply of soil nutrients and optimal pH levels for crops without resulting in water pollution.[5]
- Utilize cover crops and/or surface residue (mulches).[6]
- Minimize the loss of native soil organic matter.[7]
- Preserve soil structure by minimize tillage and other soil disturbances including compaction from field equipment.[8]

SOIL HEALTH AND FERTILITY

Soil health and fertility is a long-term objective of sustainable agriculture with the intent to perpetuate optimal crop production and economic viability. Soil health and fertility is measured by intermittent monitoring of physical, biological, and chemical characteristics. Soil health and fertility is directly related to the capacity of soil to provide nutrients for plant growth and support a healthy ecosystem.

Special Considerations

According to the park *General Management Plan* management practices should be developed that 'promote active farming and the sustainable productivity of the soil. The Van Buren agricultural soils will continue to be managed as a cultural resource in perpetuity, including efforts to return their nutrient balance, health, and fertility, prior to their alteration by conventional farming practices in the 1950s. Recognizing that improving soil health and fertility is a long-term process, requiring years of investment by a farmer in the form of time, labor, and monetary resources, leases should be pursued for the longest term feasible

Figure 5.3. Soil Management: Adding compost to crop soil promotes health and fertility (Roxbury Farm, 2014).

Figure 5.4. Soil Management: Soil sampling and analysis should be conducted annually to monitor health and fertility (OCLP, 2014).

(minimum 60 year term recommended, 99 year term preferred). Soil analysis conducted in 1999, 2002, and 2016 revealed the upper terrace fields have very high levels of phosphorus. High phosphorus levels present unique management needs and necessitates the use of low phosphorus fertilizers, requiring additional expenditure by farmers.

Best Practices

The farm manager will care for the Van Buren agricultural soil with the long-term objective of improving soil health and fertility. Soil health and fertility will, at minimum, be maintained throughout the length of the lease term. Per regulations established in NPS-77, sampling and analysis of soil conditions will be accomplished by the farmer on an annual basis as part of a monitoring program to track soil health and fertility. Testing should including micro and macro nutrients, pH, and cation-exchange capacity. A copy of test results will be kept on file by farmers and a designated park resource manager. It should be noted that soil sample analysis results are not an absolute indicator of soil health and fertility, and results may fluctuate based on a variety of factors. Testers should strive for consistency in testing parameters. Testing should be used as part of a program to monitor long-term trends, nutrient deficiencies, and change over time. Testing should be accompanied with documentation describing specific practices and methodologies undertaken with the objective of improving soil health and fertility (Figure 5.4).[9]

Biological and physical aspects of soil fertility are managed primarily by adding organic residues via cover crops, manures, compost, and compost residues. Additionally, soil fertility management practices prevent erosion, compaction, salinization and accumulation of toxins. Management of the chemical aspects of

Figure 5.5. Soil Management: Tilling and other soil management techniques help maintain a balanced soil structure (Roxbury Farm, 2014).

soil fertility is primarily focused on assessing crop nutrient needs and applying fertilizers appropriately.[10] Given the current high levels of phosphorus present in the Van Buren soils, low phosphorus fertilizers should be used. The farmer should develop, and submit for approval, a periodic soil testing program utilizing a soil penetrometer to evaluate organic matter and water holding capacity.[11]

SOIL, STRUCTURE, AND TILLAGE

Soil structure is the physical condition of the soil, including porosity, compaction, and arrangement of soil solids into aggregates (sand, silt, clay and organic matter). Compaction of soil can destroy soil structure and reduce naturally formed voids in soil. Soil structure should be preserved to the extent possible (Figure 5.5).

Tillage involves mechanical manipulation of soil and is practiced to reduce compaction or loosen the soil, create a seed-bed, control weeds or to incorporate soil amendments. Primary tillage (moldboard plowing, chiseling) is a more rigorous practice, primarily for loosening soil and incorporating amendments. Secondary tillage (disking, harrowing) is a less rigorous practice, which creates a seedbed containing fine aggregates ideal for the germination and growth of seedlings.

Soil is composed of distinct horizontal layers known as horizons. There are five classifications of horizons O, A, E, B, and C. R is used to denote bedrock. A Horizon soil forms at the surface and is also known as topsoil. This soil is typically rich with organic matter and is where agricultural crops grow.

Best Practices

Proper timing and tillage techniques are essential to the preservation and

improvement of soil structure. A stable structure will have equal distribution between mineral particles and pores so that roots can penetrate, with good capacity to hold water and drain excess water.[12] Tillage will be performed at a point of optimum soil moisture to reduce soil compaction and degradation of soil structure. Agricultural lessees will note the unique qualities and characteristics of each of the Van Buren fields, including microclimates and soil types which affect soil moisture. While minimizing tillage is an important practice in sustainable agriculture, vegetable production requires tillage for incorporation of organic matter. Deep tillage (20-24") should only occur when necessary to counteract the development of a sub-surface hardpan or impervious layer. Shallow tillage (9-12") is a preferred method to incorporate organic materials into soil. Specialized equipment, like a chisel plow or spading machine, minimizes the breakdown of healthy soil structure. Equipment like roto-tillers and roto-vators degrade soil structure rapidly and should not be used. Tillage equipment employing the action similar to a hand-fork is preferred because it fractures the soil at its natural breaking points.[13]

Sustainable practices include:

- Planting cover crops without tilling the soil through the use of specialised equipment, such as grain drills.[14]
- Incorporate 'harvest lanes' to avoid compaction of agricultural soils.[15]
- Use the correct tire equipment. Wider tires and lower tire pressure distributes weight evenly while establishing a planting bed or cover crop, where narrow tires minimize impact to established planting beds.[16]
- Use ballast weights on tractors to minimize wheel slippage as needed.[17]
- Lay mulch (straw or hay) for weed control rather than cultivating when feasible.[18]

CROP ROTATION AND SELECTION

Crop rotation is the systematic alternation or rotation of crops within a field or system of fields to support optimal soil health, crop yields, and economic profit in perpetuity. Crop selection encompasses the general category of crops produced (vegetable, animal, tree), individual crops grown, and specific genetic varieties.

Best Practices

Crop rotation is an integral component of sustainable agriculture and is used to manage weeds, pests, and diseases while promoting soil health. As articulated in NPS-77, 'crop and breed selection should be consistent not only with needs identified in the park's cultural landscape report but also with maintenance of a sound environment. As NPS-77 explains, many historic varieties have fallen out of favor because of their intolerance to pests or diseases. From the cultural landscape

Figure 5.6. Soil Management: Crop rotation should be implemented based on soil type and growing conditions (Roxbury Farm, 2014).

preservation perspective, the emphasis falls on preservation of the general character of the agricultural fields as Van Buren cultivated them rather than any particular singular crop(s). The section on Resource Management details the relationship between agriculture and cultural landscape preservation in detail.

Good crop rotation practices for sustainable vegetable production include not only rotation within plant families of vegetables but also rotation of grasses and legume plantings. Crops will be chosen to match soil conditions and rotated on 3-4 year cycles. For example, at the Martin Van Buren National Historic Site, the well-drained soils of the upper terrace field can be worked earlier in the spring, while low-lying areas subject to intermittent flooding are ill suited for high value crops. Large rocks, steep slopes, or poor drainage makes certain areas inappropriate for vegetable crop production. Sequencing of crops with rotation cycles will be managed to meet nutrient needs (Figure 5.6).

Characteristics of prime land for vegetable crops include:

- A high weight-bearing capacity (soil structure suitable to carry the weight of equipment without creating irreversible compaction)[19]
- Good drainage [20]
- Access to irrigation water [21]
- A deep A horizon (topsoil), free from stones [22]
- Less than a 2% slope [23]
- Long season micro climate [24]
- Full exposure to sunlight [25]

- Good air drainage (fields not restricted by physical barriers such as belts of trees or buildings which can trap cold air trap cold air) to avoid late season frosts [26]
- Easy access to farm roads [27]
- High cation-exchange capacity (CEC), an inherent soil characteristic that influences soil's capacity to hold nutrients.[28]

EROSION AND CONSERVING AGRICULTURAL SOILS

Erosion is the wearing away of soil by runoff water (water erosion), wind shear (wind erosion), or tillage (tillage erosion). Erosion occurs when an erosive force (wind, water, or gravity) interacts with a susceptible soil.

Best Practices

Soil erosion occurs when a susceptible soil is impacted by water, wind, or tillage. Healthy soils and sustainable agricultural practices reduce susceptibility to erosion. Susceptibility is determined by soil texture, aggregation, and water conditions. Under no circumstances should soil erosion rates exceed tolerable levels established for the site or soil by the Natural Resources Conservation Service.[29] Reduced tillage systems, crop rotation, and cover crops are effective methods to control soil erosion.[30]

The following additional practices will reduce erosion and perpetuate conservation of agricultural soils at Martin Van Buren National Historic Site (Figure 5.7).

- Steep slopes, such as areas along the escarpment, will be kept in permanent cover to prevent erosion [31]
- Avoid tilling steep erodible slopes [32]
- Field edges will continue to be buffered by vegetation including previously

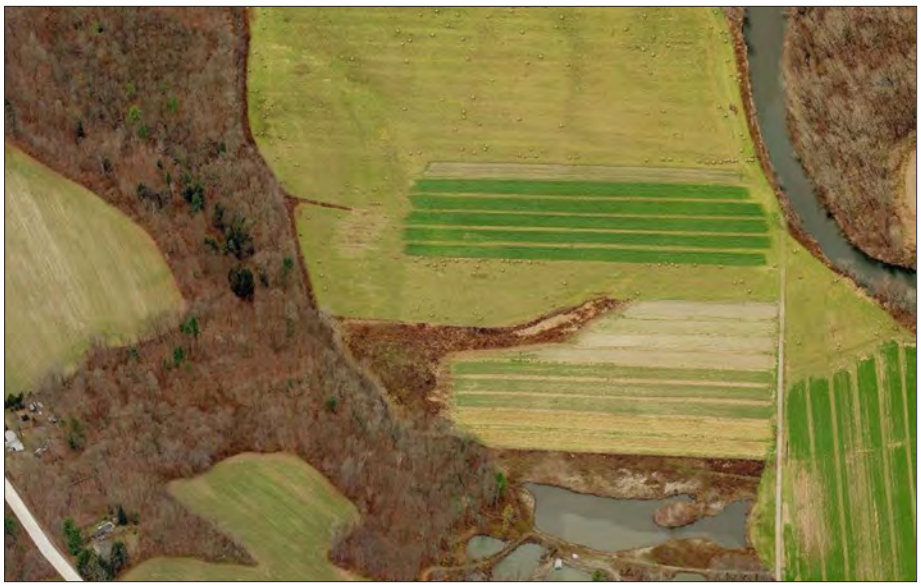

Figure 5.7. Soil Management: Efforts to mitigate soil erosion, such as buffer plantings along the Kinderhook Creek, should be utilized throughout the property (Bing, 2014).

established grass strips and hedgerows [33]

- Continue building soil health and maintaining soil structure (minimize compaction) to increase water infiltration capacity [34]
- Increase soil organic matter [35]
- Retain vegetative buffers along the creek corridor to help to reduce creek sedimentation[36]

PREFERRED METHODOLOGY AND BENEFITS

The practices place an emphasis on long-term management of soil health and fertility within the historic Van Buren fields. This methodology recognizes the lengthy span of time necessary to improve soil health, and the necessity of a long-term leasing program in meeting soil health goals.

Best practices for soil management and tillage preserve natural soil aggregates and water-conducting channels that are typically degraded by conventional plowing and disking. Reduced tillage and the use of mulches and cover crops makes soil less susceptible to wind and water erosion.[37]

The use of crop rotation andselection of pest resistant varieties is a best practice to manage crop weeds, pests, diseases. Rotation between the vegetable families, grasses, and legumes promotes long-term soil health and nutrient cycling.

Practices to reduce erosion and conserve agricultural soils support National Park Service goals, objectives of sustainable farm operations, and the local and regional community. Additionally, reducing erosion of the Van Buren farm land will reduce run-off and sediment in Kinderhook Creek. The best practices outlined above align with policy established in NPS-77.

Thresholds for action include measurable increases or decreases over multiple years in phosphorous, soil health and fertility, and crop production.

Evaluation

Specific soil health and fertility practices should be evaluated annually based on a mutually agreeable schedule and process. Soil testing will be done annually as mandated by NPS-77. It is understood test results can reflect variations based on a variety of factors. Both soil sample results and an evaluation of the cultural practices used to improve overall soil health and composition should be used to examine long-term trends. When conducting evaluation, the following questions might be asked.

- What specific agricultural practices were used to care for and improve soil health and fertility?
- Are any long-term trends documented by soil samples?
- What types of fertilizers were used?

- What types of crops were planted? How has crop rotation been utilized?
- Have soil erosion prevention methods been effective? Should practices be revised?

WATER MANAGEMENT

Water management practices include methods of conserving water, irrigating crops, coping with flooding, draining fields as necessary, and managing on site surface water such as farm ponds and wells. Water management systems benefit farmers and consumers, by promoting a more consistent yield and a more stable food supply. They typically minimize water use and protect natural resources. Water management practices are specific to the circumstances of each farm and are based on microclimates and regional location, crops produced, land and soil characteristics, size of the farm, it's infrastructure and goals.[38]

Special Considerations

There is no National Park Service owned water source for the upper terrace fields. At Martin Van Buren National Historic Site irrigation of the upper terrace fields requires physical access to Kinderhook Creek across privately owned land. Underground irrigation pipes in the upper terrace field are supplied by pipes within the privately owned lower terrace. Irrigation of the upper terrace field, necessary for water dependent vegetable crops, requires water access. Farmers using Kinderhook Creek for irrigation must file an annual report with New York State Department of Environmental Conservation (DEC). The average annual quantity of water used by the land owner of the lower terrace fields and current lessee of the upper terrace fields has been grandfathered into any future state level restrictions on agricultural water use. Any lessee of the upper terrace field will be responsible for acquiring their own water access and complying with DEC regulations and processes.

WATER CONSERVATION

Conservation of water resources reduces the amount of water pumped from surface water sources or wells. During times of drought efficient use of water resources is especially important.

Best Practices

The physical characteristics of soils influence their individual capacity to hold water. Agricultural irrigation requirements are directly affected by climate and weather patterns. The demand for irrigation fluctuates from week to week and year to year. Successful vegetable crop production in the northeast United States requires irrigation, although certain crops require consistent irrigation while others are more drought tolerant. The water needs of crops should be taken into

account when selecting planting locations. Water requirements of vegetable crops are also influenced by the current life cycle stage of specific crops[39]

The following practices should be implemented to conserve water resources at Martin Van Buren National Historic Site:

- Monitor soil conditions and adjust irrigation rates based on the capacity of the soil/field to hold water, water loss through evaporation, absorption, and percolation. Management Allowable Depletion (MAD), the maximum amount of soil water the irrigation manager allows the crop to extract from the active rooting zone between irrigations will vary by crop, lifecycle stage, previous and potential rainfall, and the soils water holding capacity.[40]
- Do not over apply water, which strains water sources and requires unnecessary energy expenditure to 'lift' water into an irrigation system via pumps. Over application of irrigation water may foster germination of weed seeds that may have otherwise remained dormant. Other consequences of over irrigation include nutrient leaching, groundwater contamination, and soil compaction. [41]

IRRIGATION

Irrigation is the application of water to soil to provide optimal moisture conditions supporting crop growth. Effective irrigation can increase crop yields and quality, conserve water, and protect natural resources. Irrigation is necessary for successful vegetable crop production in the northeast United States because crops need a consistent water source and rainfall is unpredictable (Figure 5.8).[42] Micro-irrigation (including drip, trickle, and microsprinklers) applies localized water at low rates through small tubes and emitters and generally conserves water.

Figure 5.8. Water Management: Crop varieties and crop locations should be selected based on drought tolerance and proximity to resources (OCLP, 2014).

Best Practices

Irrigation is necessary for successful vegetable crop production. The primary irrigation source for the Van Buren farm land is Kinderhook Creek. The gravelly soil of the upper terrace field drains quickly, making irrigation essential. Vegetable crops grown in the upper terrace field require approximately ¾" of supplemental water applied via the irrigation system weekly, although this amount fluctuates in response to weather conditions and the growth phase of the crop (Figure 5.9).[43].

Factors that influence frequency and volume of irrigation include:

- Climate: Including air temperature (evapotranspiration), precipitation, humidity, and wind.[44]
- Soil Type: Sandy soils drain rapidly and do not hold water well; silty soils drain slowly and hold water well; clay soil drains slowly and hold water; loam soils drain excess water well and hold moisture well; agricultural soil improved with organic matter maintain good drainage and moisture retention.[45]
- Crop state development/ individual crop type needs: Crop life cycle dictates water requirements; while some crops are notorious as 'water loving' throughout their lifecycle while others are known as drought-tolerant.[46]

Sustainable irrigation practices currently in place on the upper terrace fields are summarized in the following list:

- A privately-owned small-scale irrigation system pumps water directly out of Kinderhook Creek and has limited environmental impacts. [47]
- Water is applied via a combination of drip irrigation and overhead systems.
- The upper terrace fields at Martin Van Buren National Historic Site are irrigated primarily via a drip irrigation system, which must be removed at the

Figure 5.9. Water Management: Irrigation techniques should be adapted to suit various crops and locations, while conserving water (OCLP, 2014).

end of each season and installed at the start of each season. Drip irrigation allows water to be applied close to plant roots and minimizes water lost to evaporation.

- The irrigation system of the upper terrace is fed directly by a network of underground water pipes sourcing water from Kinderhook Creek.
- The water quality of all farm ponds within the park is unknown and therefore the ponds should not be used for irrigation. Any further action regarding using the farm ponds will be in response to water quality testing results.

PREFERRED METHODOLOGY AND BENEFITS

The best practices for water management will produce a high quality crop yield with minimal environmental implications. Water application methods will conserve water and energy as feasible. Impact to neighboring surface water and ground water will be limited. The methodology will perpetuate soil health while promoting high yields of good quality produce.

A threshold for action includes a measurable increase or decrease in the amount of water necessary for irrigation. Attempt should be made to track water volume on a long term basis to supplement data related to shifting weather patterns and climate change.

Evaluation

Specific water management practices should be evaluated annually on a mutually agreeable schedule. Questions to raise in discussions might include:

- What irrigation practices were used to provide water support healthy crops?
- Have these practices shifted since the previous year?
- How did/will weather patterns and climate change influence the need for irrigation?
- Are improvements to irrigation infrastructure necessary?

INFRASTRUCTURE

Agricultural infrastructure and storage including barns, outbuildings, greenhouses, storage facilities, power sources and utilities are central to the logistical and economic viability of agricultural operations on the Van Buren farm land. Vegetable production, in particular, is dependent on infrastructure and storage facilities.

Special Considerations

At Martin Van Buren National Historic Site, National Park Service management

and farm partners are presented with a unique challenge regarding the ongoing leasing of the National Park Service owned barn complex constructed in the mid-twentieth century. There is a considerable maintenance backlog and numerous infrastructure problems with the farm complex buildings. The park plans to conduct a condition assessment and determine an accurate estimate of funds necessary to address deferred maintenance needs (Figure 5.10). Necessary improvements could be used to offset rental rates. There has been no Facility Management Software System (FMSS) assessment and evaluation of the buildings.

While leasing of the upper terrace fields supports park management goals to enhance soil health, preserve the cultural landscape, and perpetuate views west to agricultural fields and the Catskill Mountains, active agriculture on National Park Service land requires supporting infrastructure including barns, greenhouse, and storage facilities. Vegetable production is particularly dependent on buildings for operational needs including washing, packing, and storing. Production of multiple varieties of vegetables within the upper terrace field perpetuates a landscape supporting cultural landscape preservation goals. Production of high quality organic vegetables as part of a community supported agriculture (CSA) program is an economically viable use of the Van Buren farm land and supports National Park Service management objectives and environmental values. Vegetables could not be profitably grown in the upper terrace field without infrastructure. The agricultural buildings are indivisible from the actively managed farm land.

AGRICULTURAL BUILDINGS, STRUCTURES AND SERVICE AREAS

Farm infrastructure encompasses the buildings, structures, and facilities necessary to support agricultural operations. Vegetable farming requires more supporting infrastructure than other agricultural products.

Figure 5.10. Infrastructure: Buildings and structure supporting agricultural activities should be maintained, including affordable staff housing (OCLP, 2014).

Figure 5.11. Infrastructure: Sufficient fencing should be incorporated or maintained to control livestock (OCLP, 2018).

Best Practices

Sustainable farming operations within the Van Buren farm land require access to agricultural buildings. Required infrastructure includes barn(s), greenhouse(s), washing/ packing shed for vegetables, facilities to store equipment and supplies, and a farm office. On-site employee housing is preferred. Affordable employee housing is essential to agricultural operations. An adequate power source and wiring system is necessary for agricultural operations. The amount of electricity needed varies by operation. A new well should be dug to serve the farm cottage and barn.

FARM FENCING AND GATES

Figure 5.12. Infrastructure: Farm roads should be maintained to allow access to the farmlands without impacting the fields. (OCLP, 2014).

Fencing and gates are important infrastructure used to keep livestock in and pests out. Fences and gates can also be used for security or to restrict vehicular access.

Best Practices

Well maintained fences and gates are essential for containing livestock (Figure 5.11). Fences and gates can also be used for security purposes and restricting access. Fences can also be used as barrier to pests. At present, all farm fencing and gates within the upper terrace field at Martin Van Buren National Historic Site are owned by the current lessee.

If used to contain livestock, fences and gates must be of sufficient construction to avoid breakouts. High tensile fencing is recommended for larger animals like cows. Any electric fencing should be posted as such.

FARM ROADS

Farm roads provide a designated travel lane for farm vehicles, concentrating traffic and soil compaction in a designated travel lane.

Best Practices

Established farm roads will continue to be used. No new surfaced roads will be established. Portions of extant farm roads date to the Van Buren era and their alignment and subsurface structure should be preserved. Within agricultural fields, established harvest lanes will continue to be used to preserve soil health and avoid compaction (Figure 5.12).

PREFERRED METHODOLOGY AND BENEFITS

The best practices for infrastructure management will produce a high quality crop yield with minimal environmental implications. Access to the necessary facilities and supporting infrastructure including barns, greenhouses and storage facilities supports the economic viability of agricultural operations within Martin Van Buren National Historic Site. Soil management goals and the nature of vegetable crops necessitate farm infrastructure. National Park Service efforts to address the maintenance backlog of the existing infrastructure will benefit park management goals for soil health and cultural landscape preservation while supporting the economic viability of farming operations within park boundaries.

In addition, farm fences and gates are an important component of a farming operation with livestock. Livestock can play an important role in the on-farm ecosystem and nutrient cycling. Proper construction will keep animals from escaping. Signage on electric fencing is important to inform visitors.

Evaluation

Infrastructure needs should be assessed annually as part of the annual meeting. Questions to address in the evaluation might include:

- What infrastructure improvements have been made in the past year?
- What infrastructure improvements are needed? How can they be prioritized?
- What infrastructure improvements are planned for the coming year?
- Is the current fencing system adequate for livestock?
- What condition are farm roads in? Is resurfacing needed?

STORAGE AND HANDLING OF FERTILIZER, CHEMICALS, AND FUELS

Safe storage and handling of fertilizers, chemicals, and fuel is essential for safe agricultural operations. Fertilizer, chemicals and fuels must be stored in a secure areas. Effective and safe application of chemicals, including pesticides, requires appropriate tools and techniques to minimize run-off and drift.

CHEMICALS AND FERTILIZER HANDLING

Best Practices

Chemicals and fertilizers will be stored in a secure manner to protect the environment and human safety. All chemicals should be stored in a lockable storage cabinet that complies with Occupational Safety and Health Standards (OSHA) regulations. Material Safety Data Sheets (MSDs), which provide information of the safe use and potential hazards of a particular chemical should be available for reference in close proximity to chemical storage facilities. The following list provides recommendations for chemical and fertilizer storage:

- Follow current recommendations and label instructions when using fertilizers or sprays.
- Utilize the most effective application tools and techniques to minimize the drift of chemicals or fertilizers beyond the intended target.
- Store all equipment and materials associated with the application of fertilizers, chemicals, or fuel storage in a secure area.
- Calibrate equipment carefully to ensure spray pressure, nozzle type, dilution rate, and application speed are most effective and the intended amount of the active ingredient is applied.
- Time application of chemicals and fertilizers to maximum effectiveness and reduce the risk of run-off or contamination.
- Select equipment for effective and efficiently delivery of spray to target areas.

- Properly clean equipment after use.

Defined by the Federal Insecticide, Fungicide and Rodenticide Act, a pesticide is any substance or mixture of substances "intended for preventing, destroying, repelling, or mitigating any pest . . ." a definition which includes antimicrobials, herbicides, plant growth regulators, defoliants, and nitrogen stabilizers.[49] Safe storage of pesticides and other chemicals is critical to protecting people, animals, and the environment. The following guidelines should be adhered to:

- Store pesticides and chemicals in a designated location.[50]
- Store pesticides and chemicals in their original containers with original labeling, including application and disposal, directions, ingredient names, and emergency information.[51]
- Store pesticides and chemicals in a lockable area that children and animals cannot access.[52]
- Store away from food, feed, flames, and water sources.[53]
- Store in a location that avoids temperature extremes which can alter material chemistry and damage containers.[54]
- Keep inventory as low as feasible.[55]
- Safely dispose of unwanted pesticides rather than storing them long-term.[56]

For lands owned in fee simple by the National Park Service, all prospective users of pesticides are required to submit a pesticide use request to the Integrated Pest Management (IPM) Coordinator. Use logs for all pesticides, biological control agents, and GMOs, proposed and or used in the calendar year by the National Park Service or on lands owned in fee simple by the National Park Service, must be completed and entered into PUPS by January 31 of the following year. The Park IPM Coordinator, designated by the Park Superintendent, is responsible for completing use logs.

PETROLEUM AND FUEL HANDLING

Because of the danger of combustability, leakage and other contamination, careful storage and handling of petroleum is essential for safe agricultural operations and is required under state and federal law.

Best Practices

Petroleum and other fuels will continue to be stored carefully and securely. Depending on the size of the operation, New York State law may require "bulk storage of petroleum products- gasoline, heating and lubricating oil- and hazardous chemicals, like ammonia, in above-ground or under-ground tanks . . . per requirements as a registered Petroleum Bulk Storage Facility-regulated facility" Fuel is currently stored in above ground tanks under a canopy structure.

PREFERRED METHODOLOGY AND BENEFITS

Careful storage and handling will protect environmental and human health while complying with state and federal requirements (Figure 5.13).

- Are chemicals, fertilizers, and fuels stored effectively?

PEST MANAGEMENT

Pest management encompasses control of insect pests, weed pests (annual and perennial), plant diseases, and vertebrate pests. An organism is considered an agricultural pest when it damages crops or diminishes yields.

National Park Service regulations and policies regarding pest management on park land are articulated in *Management Policies (2006)* and *Natural Resource Reference Manual #77 (NPS 77)*. According to *Management Policies* Section 4.4.5.3 Pesticide Use, all prospective users of pesticides in National Parks on lands owned by the National Park Service in fee simple, are required to submit a pesticide use request to the Integrated Pest Management (IPM) coordinator. Requests are reviewed on a case-by-case basis, evaluating environmental effects, cost and staffing, and other relevant considerations. Pest management with chemical methods will be minimized to the extent possible to align with National Park Service rules and regulations and the mission of neighboring organic farming operations. Use logs for all pesticides, biological control agents, and GMOs, proposed and or used in the calendar year by the National Park Service or on lands owned by the National Park Service, must be completed and entered into PUPS by January 31 of the following year.

National Park Service *Natural Resource Reference Manual #77* (NPS-77) provides guidance for agricultural use on National Park Service land. The document states, 'Agricultural practices and techniques, including the use of pesticides and other bio-control agents such as genetically modified or engineered organisms, should be specified in an approved resource management plan, and are subject to review and approval by the NPS integrated pest management (IPM) program manager. . . . In general, agricultural activities should be conducted in accordance with accepted best management practices.'[57]

NPS-77 provides the following guidelines regarding an acceptable pest management strategy:

- Site sensitivity and resource significance should be considered before action is taken.[58]
- Park employees, cooperators, and visitors should be notified before pesticides are used.[59]
- Areas where pesticides have been applied must be posted as specified on the pesticide label, or if no posting specifications are present treated areas subject

Figure 5.13. Storage and Handling: Equipment, chemicals, and petroleum should be appropriately stored (OCLP, 2014).

to visitation should be posted until dry.[60]

- The use of pesticides on predetermined schedules is discouraged.[61]
- The use of agricultural practices such as crop rotation and the use of disease and insect resistant crop varieties can greatly decrease the incidence of pests in a particular planting and are strongly encouraged.[62]

Special Considerations

The National Park Service is aware that use of chemical pesticides within the historic core of the property has the ability to impact adjacent farm land and interfere with crop production and growing standards. Use of pesticides on the upper terrace field of Martin Van Buren National Historic Site by a lessee has potential to impact visitor use of the historic core and agricultural operations on privately owned land in the lower terrace. Any use of pesticides in park-owned agricultural land and in park-owned land within a 25 to 50 foot buffer of neighboring agricultural land will only occur after consultation with and consent from fellow co-stewards of the historic Van Buren farm land.

INSECT PEST MANAGEMENT

Insect pests cause direct and indirect damage to crops by feeding on foliage, fruit, roots, stems, bulbs, and/ or seeds. Direct damage affects the marketable portion of the crop, while indirect damage to non-marketable portions of a crop reduces yield or quality. Insects can also spread plant diseases.

Best Practices

Best practices for management of insects requires the control of pest species and the conservation of beneficial species.[69] The preferred method to control insect

pests depends on many factors including the type of insect, extent of the infestation, crops involved, weather, and crops stage. The follow provides general guidance for sustainable pest management.

- Crop-rotation to a non-host crop depletes the insect's food source and is an excellent way to manage insect populations.[63]
- Select crops (as feasible by market demand) that are resistant to insect pests.[64]
- Use physical barriers, including floating row covers, greenhouse screens, mulches, and trenches, as appropriate.[65]
- Promote natural predators of pests (like birds and bats or released predatory wasps) by conserving surrounding habitat (Figure 5.14).[66]
- Use certified organic products and bio-insecticides, such as *Bacillus thuringiensis,* rather than conventional insecticides.[67]
- Time plantings to avoid peak pest populations.[68]
- Plant companion species to deter pest colonization of the main crop.[69]
- Plant trap crops (when appropriate) to keep pests off of the main crop or to concentrate before spraying.[70]
- Use of flame to remove exposed insects on flame-tolerant crops.[71]

The following is a list of the primary insect pest commonly found in the Van Buren farm land.[72]

- European Corn Borer
- Leaf Hopper
- Flea Beetle
- Aphids

Figure 5.14. Pest Management: Integrated pest management requires adapting control efforts to the type of pest and plant (OCLP, 2014.)

Figure 5.15. Pest Management: Low-impact weed control efforts should be used wherever possible (Roxbury Farm, 2014).

- Imported Cabbageworm
- Thrips

WEED MANAGEMENT

Maintain sustainable weed management practices including mulching pesticides, mulching, mowing, intercropping, concentration of resources, crop rotation, and tillage.

Best Practices

Weed management will be conducted using sustainable practices that effectively control weeds in crop fields and surrounding areas including field edges, farm roads, roadways, and hedgerows (Figure 5.15). The preferred weed management practice will depend on multiple factors including the type of weed, density of the weed population, crops affected, and crop lifecycle stage. The following list provides general guidance for sustainable weed management.

- Non-herbicide control strategies for weed prevention and removal will utilize a combination of cultivation, mulches (synthetic and/ or traditional), mowing, smothercrops, or hand-pulling as necessary through the growing season.
- Use crop rotation and tillage to reduce weed populations.
- Crop nutrients (water and fertilizers) will be concentrated as closely to crops as possible rather than broadcast widely, when feasible.
- The use of synthetic herbicides is not preferred, however in the event that conditions necessitate its use within park boundaries, all prospective use requires submittal of a use request to a designated integrated pest management specialist.

- Select herbicides or cultivation tools according to their ability to control predominant weed species.

DISEASE PEST MANAGEMENT

Prevention rather than treatment is fundamental to disease pest management of crops. Disease pests can effect above or below ground portions of plants. Disease can reduce profitability of vegetable crops by reducing plant vigor, yields, quality, marketability and shelf life.[73]

Best Practices

Disease pest management practices address one or more of the three conditions necessary for plant pathogens to effect crops. The first condition, a susceptible host plant, can be mitigated in many instances by planting resistant or tolerant cultivars or using crop rotation. The second condition is the presence of inoculum (a disease pathogen), which can be reduced by sanitation. The third is environmental conditions conducive to the development of a disease. Environmental conditions can be mitigated though cultural practices, which are outlined below. Identification of crop diseases is a critical first step to stopping the spread and treating a disease .[74]

The following list provides an overview of practices that reduce the likelihood of a crop disease outbreak.

- Use crop rotation to reduce plant disease beds/sources.[75]
- Use specialized plantings like sorghum, sudangrass, and mustard to help control diseases in the soil.[76]
- Ensure that planting stock or seeds are disease-free. Purchased stock should be certified disease-free. Self-propagated planting material should be inspected for disease.[77]
- Select resistant and disease tolerant varieties, if available and appropriate to market demands.[78]
- Remove and dispose of diseased plants properly (composing, burial, or burning depending on the type of material and disease).[79]
- Time plantings appropriately to reduce the likelihood of a disease outbreak.[80]
- Space planting rows appropriately to allow foliage to dry.[81]
- Time overhead irrigation application to avoid extending the leaf-wetting period or drip irrigation can be used.[82]
- Incorporate tile drainage and/or raised beds to reduce the risk of plant and soil disease in poorly drained soils.[83]
- Apply fungicide sprays to ensure good coverage.[84]
- Protect new growth by appropriate timing of spray applications.[85]

- Use sustainable and natural products, such as copper rich products, to treat diseases where possible.[86]

VERTEBRATE PESTS (LARGE PESTS)

Vertebrate pests are mammals which cause damage to crops by eating, thereby impacting the productive value of the field crops. Vertebrate pests include deer, birds, raccoons, rabbits, and woodchucks.

Best Practices

Vertebrate pests will be managed as necessary to protect crops and control pest populations. Visitor and employee health and safety are important considerations in any pest management program. Best practices include physical exclusion, habitat modification, repellents, and hunting, trapping and removal.

Physical Exclusion

Use of barriers, including fencing or netting, is the most effective method of reducing crop damage from wildlife. Physical exclusion systems are often more costly initially than short-term controls but are typically more effective and offer the best long term results (Figure 5.16). Physical barriers can be used to keep deer, raccoons, and rabbits away from crops, although the style of fencing recommended varies.[87]

Habitat Modification

Alterations to the surrounding environment can be used to reduce vertebrate pest populations. Eliminating overgrown areas or piles of brush can help to reduce local rodent populations. Understanding which fields face the greatest

Figure 5.16. Pest Management: Barriers can prevent large pests from damaging crops (OCLP, 2014).

deer pressure (likely those with nearby woodland cover) can help growers to avoid planting the crops most palatable to deer in those fields.[88] Other alternatives include using propane cannons and screech boxes to frighten birds away. Farm dogs can be used to deter deer.[89]

Repellents

Use of non-toxic repellents that pests find distasteful can reduce the impact of pests on crops. "Contact" repellents are applied directly to plants and "area" repellents are applied near plants. Many of these products contain ingredients such as ammonium soaps, rotten eggs, and capsaicin. Only materials directly labeled for use on crops should be applied to crops.[90]

Hunting, Trapping & Removal

Hunting can be used to control deer populations.[91] Woodchuck burrows can be fumigated, although this is often only a short term solution as the holes are soon reoccupied.[92] Nuisance permits can be obtained from New York State Department of Environmental Conservation (DEC) to extend hunting and trapping seasons on agricultural land.

PREFERRED METHODOLOGY AND BENEFITS

Best practices for pest management will perpetuate sustainable agricultural practices and protect natural resources while producing high quality and quantity crops. Successful pest management practices will control insect, weed, disease, and vertebrate populations. The best practices outlined above comply with recommendations and restrictions identified in USDA Organic Regulations, National Park Service's *Management Policies* 2006, *Natural Resource Management Reference Manual #77*.

Thresholds for action might include measurable increases/decreases in pest population, yield, crop quality, invasives, and economic profit.

Evaluation

Best management practices for insects, weeds, diseases, and vertebrate pests should be evaluated on an annual basis. Weed populations within crop fields and surrounding area should be evaluated at regular intervals throughout the growing season. Questions asked during evaluation may include:

- Has the selected best practice effectively controlled insect, weed, disease and vertebrate pests in agricultural fields?
- How has the selected best practice impacted pest populations within surrounding areas including field edges, farm roads, roadways, and hedgerows? Was the outcome as expected?
- Have there been changes in practices used to manage pest populations on

Figure 5.17. Control of Farm Access: Restricting the access of National Park Service visitors appropriately wil be critical in agricultural infrastructure (OCLP, 2014).

adjoining land? How has this effected pest populations within the upper terrace field at Martin Van Buren National Historic Site?

- How could application/ completion be improved next time? Should the approach to the best management practice be reexamined? Should/ How can practices be modified for the following season?

CONTROL OF FARM ACCESS

Farm access control, important to all agricultural operations, is especially important to the discussion of the Van Buren farm land. The Van Buren farm land encompass land owned privately and by the National Park Service. The direct proximity of the farm land to the publicly accessible historic core of the national park necessitates restrictions on visitor access (Figure 5.17). Subtopics under the Control of Farm Access section include Food Safety and Human Safety.

An easement on the lower terrace field allows for construction of a pedestrian trail through the lower terrace. The easement is held by the Open Space Institute (OSI) and expected to transfer to the National Park Service in the near future. When/ if action is taken to develop a trail through the farm land, visitor access and safety will become an especially critical management issue.

FOOD SAFETY

Food safety is overseen by the Food and Drug Administration to protect public health and prevent food safety problems. Federal regulations establish benchmarks for food and human safety with which farms must comply.

Best Practices

Food safety standards are regulated by the Food and Drug Administration (FDA) via the Food Safety and Modernization Act (FSMA), which was passed in 2011. Specifically the FSMA defines standards for produce production and safety measures for facilities that process food for human consumption. All operations on the Van Buren farm land will comply with federal standards including required testing of water for irritation and vegetable washes.[94]

HUMAN SAFETY

Human safety is the top priority for the National Park Service. Active agricultural operations on and surrounding National Park Service land present a unique challenge requiring management to integrate with or exclude visitors from agricultural operations.

Best Practices

Human safety is critical. With the potential for increased public access to the Van Buren farm land, open and frequent dialogue between the National Park Service and farm operators will be necessary. Visitor access to the farm land should not disrupt agricultural operations, therefore during planting, harvesting and other agricultural operations visitors must be restricted from entering farm land (Figure 5.18).

- All rules and guidelines for visitor access will be clearly posted.
- All visitors will be required to sign in and out.
- All effort will be made to educate visitors to stay on a designated trail or route.
- No dogs, leashed or unleashed, will be allowed in the farm land.

Figure 5.18. Access Control: Clear interpretive and directional signs prevent visitors from wandering into the active farmland (OCLP, 2014.)

PREFERRED METHODOLOGY AND BENEFITS

The best practice will ensure proper farm access control methods are established and enforced. Upholding federally regulated food safety standards is essential to the economic viability of the lessee's agricultural operation and the safe and comfortable working conditions of employees. Best practices for human and public safety will ensure a positive visitor experience while fostering good neighbor relations between the National Park Service, the public, and the lessee. Enforcement of best practices for human and public safety is critical to perpetuating agricultural operations on the leased land.

Evaluation

Best management practices should be evaluated annually. Concerns regarding visitor access or health and human safety should be brought to the attention of a designated National Park Service representative immediately. Questions to ask during evaluation might include:

- Has the established best practice for human safety been effective?
- Are additional rules, regulations, or stronger enforcement necessary?

OPERATIONS

Operations include the planning and management of the fields, livestock and resources associated with agriculture. Subtopics under operations include harvesting of vegetable crops and hay, and the raising of livestock for meat, milk, eggs and other products.

HARVESTING

Timely and efficient harvesting is critical to profitable vegetable production. Care must be taken to timing harvesting according to maturity/life cycle, intended markets, and upcoming weather.

Best Practices

Harvesting will be done in a manner consistent with food safety guidelines. Proper handling and storage conditions are essential to retain marketability of crops. The unique requirements for each crop during harvest and storage should be considered. A combination of mechanized and hand harvesting techniques should be employed based on crop requirements and the farmers discretion.

The use of harvest lanes allows for efficient harvesting of crops while protecting soil health and concentrating compaction. The use of established harvest lanes is a best practice for soil management; however it reduces the productive area of the field by approximately fifteen percent, a factor which should be taken into account when determining the rental rate (Figure 5.19).[93]

Figure 5.19. Operations: Harvest lanes can encourage sustainable harvesting efforts while protecting the soil (Johannes Courtens, 2014).

LIVESTOCK

Livestock encompasses all animals raised for meat, milk,eggs, or other products.

Best Practices

Livestock within National Park Service owned land will be managed to support cultural landscape preservation and soil health objectives. Livestock require a water source and protection from the elements via a shade structure. The following guidance provides a general overview of a sustainable livestock program:

- Protect and enhance soil quality (physical and biological): Keep permanent pasture in place and manage it with *intensive rotational grazing*- ex: move each group of animals every 24-48 hours, allowing animals to graze the pasture down to 6" height and then enter a rest period before animals are introduced to the area again.[95]
- Provide a humane and healthy environment for livestock, including adequate water supply, shelter, and rotation of animals to reduce parasite and disease risk.[96]
- Protect water quality through vegetation buffers.[97]

PREFERRED METHODOLOGY AND BENEFITS

The best practices for operations including harvesting and livestock production will ensure a high quality vegetable and meat product while perpetuating sustainable agricultural practices and minimizing environmental impact. Responsible harvesting practices including the use of harvest lanes will promote long-term soil health goals. Best practices for livestock production will minimize environmental impact, protect water quality, and support soil health goals.

Evaluation

Best practices for harvesting and livestock management should be evaluated annually. Harvesting techniques will be adapted to meet the need of the lessee, in response to weather, and according to crop lifecycle. Livestock health should be evaluated at a regular interval year round.

RESOURCE MANAGEMENT

Natural and cultural resources within and surrounding the Van Buren farm land should be protected. Cultural and natural resources within National Park Service owned lands are protected under federal law. Cultural resources within the farm land include archeological sites and historic road segments. Natural resources include woodlots and riparian buffers within the farm land ecosystem.

The National Park Service is working with the State University of New York-College of Environmental Science and Forestry on a Natural Resource Condition Assessment (NRCA) for the Martin Van Buren National Historic Site. Findings are forthcoming.

Perpetuation of sustainable agriculture directly supports cultural resource goals identified in the park's *General Management Plan* and further articulated in the recently completed *Cultural Landscape Report for Martin Van Buren National Historic Site, Volume II: Treatment and Record of Treatment*. Active farm land has played a role in the Hudson Valley ecosystem for centuries. The patterns of working agricultural fields, woodland, and edges are important habitat for wildlife. As described in *Natural Resource Reference Manual NPS #77*, "agricultural operations typically hold plant succession at an early stage, benefiting some species of wildlife, known as farm game, and harming species that favor climax vegetation. These impacts should be analyzed and documented prior to making decisions on agricultural programs."[98]

CULTURAL RESOURCE MANAGEMENT

The Van Buren fields should remain in agricultural production in perpetuity, providing an appropriate context and landscape for Lindenwald. As stated in the *Cultural Landscape Report for Martin Van Buren National Historic Site, Volume II*, "The agricultural fields at Martin Van Buren National Historic Site, continually farmed since the 1700s, are a critical component of the park cultural landscape and setting. The variety of crops and sustainable methods used today reflect the diversity of crops and practices of Van Buren's tenure. Active agriculture is a continuation of a historic uses and allows the park to maintain an appropriate cultural landscape . . .sustainable agricultural practices should continue to build nutrient rich soil."[99]

The following list section present general guidance for reducing impact to cultural resources from agricultural operations. Additional detail is provided in the Farm Features chapter.

- Identify, evaluate, document, and understand cultural resources through inventories and planning documents.[100]
- Minimize tillage and soil disturbance.[101]
- Keep soil in permanent cover with crop residues and mulches to protect soil from erosion. [109]

NATURAL RESOURCE MANAGEMENT

The following list presents general best management practices to protect of natural resources at Martin Van Buren National Historic Site. Consultation with biologists or other resource experts may provide additional useful information.

- Protect and restore wetlands- agricultural actives should not impinge upon wetland protection. Wetlands should be identified via Natural Resource Conservation Service (NRCS) soils maps, U.S. Fish and Wildlife Service, or the Army Corps of Engineers wetland maps or other references.[102]
- Protect, maintain, and restore riparian buffers around ponds and along the Kinderhook Creek corridor. All agricultural projects should be in compliance with state and federal lands while being designed to protect and/or enhance riparian vegetation and the natural buffers they create.[103]
- Screen all plant materials and seeds to prevent the introduction of invasive and/or non-native plants that might compromise existing native vegetation.[104]
- Manage farm woodlots for ecosystem health.[105]
- Reduce water pollution risks.[106]
- Use best practices that improve soil.[107]
- Use practices that control invasive and unwanted plants.[108]

PREFERRED METHODOLOGY AND BENEFITS

The best practices resource management ensures protection of the park's cultural and natural resources. Responsible resource management including the use of harvest lanes will promote long-term soil health goals. Best practices for livestock production will minimize environmental impact, protect water quality, and support soil health goals.

Evaluation

Best practices for resource management should be evaluated annually. Risks and potential impacts to resources should be identified annually. Impacts to resources should be brought to the attention of a designated park representative.

AGRICULTURAL FEATURE GUIDELINES

This chapter guides the management of farm features within the historic Van Buren agricultural landscape. Within the historic farmland many contributing characteristics and features remain intact preserving the integrity of the landscape. These characteristics and features provide opportunities for the National Park Service to interpret direct connections between Van Buren's day-to-day operations at Lindenwald as an experimental farmer and ongoing sustainable agricultural operations on adjacent property. The preservation of contributing cultural resources such as historic farm roads, views and archeological sites within an active agricultural landscape requires special consideration. In addition to historic features, the landscape includes many non-historic features which are critical to agricultural operations and/or facilitate visitor use. Please refer to the feature map at the end of this chapter where farm features are addressed.

As in the contributing features section of the *Cultural Landscape Report for the Martin Van Buren National Historical Park*, V*olume II Updated Treatment and Record of Treatment,* the agricultural feature guidelines section is organized according to the following landscape characteristics: circulation systems, constructed water systems, buildings and structures, vegetation, views, small-scale features, and archeological sites. Corresponding features, identified as historic or non-historic, are listed under the appropriate landscape characteristic. In addition, the following subsections are included under each feature: existing conditions, historic conditions, and treatment guidance. Treatment guidance, which includes a list of associated best practices where applicable, are described in more detail in the previous section. Finally, management considerations related to features are included where applicable.

CIRCULATION SYSTEMS

Circulation systems encompass the formal and informal routes established for the movement of people, animals, vehicles, and equipment through the landscape. During the historic period a variety of circulation systems consisting primarily of regional roadways and farm roads were present within the Lindenwald landscape. These systems, or portions thereof, persist today helping to convey how Van Buren, his family, and farmhands moved through the landscape accomplishing daily tasks. The primary circulation system of the Van Buren era agricultural landscape consisted of two farm roads which arced west from the mansion and linked the formal mansion and landscape to the agricultural landscape. The roads connected agricultural fields, orchards, barns and outbuildings including the

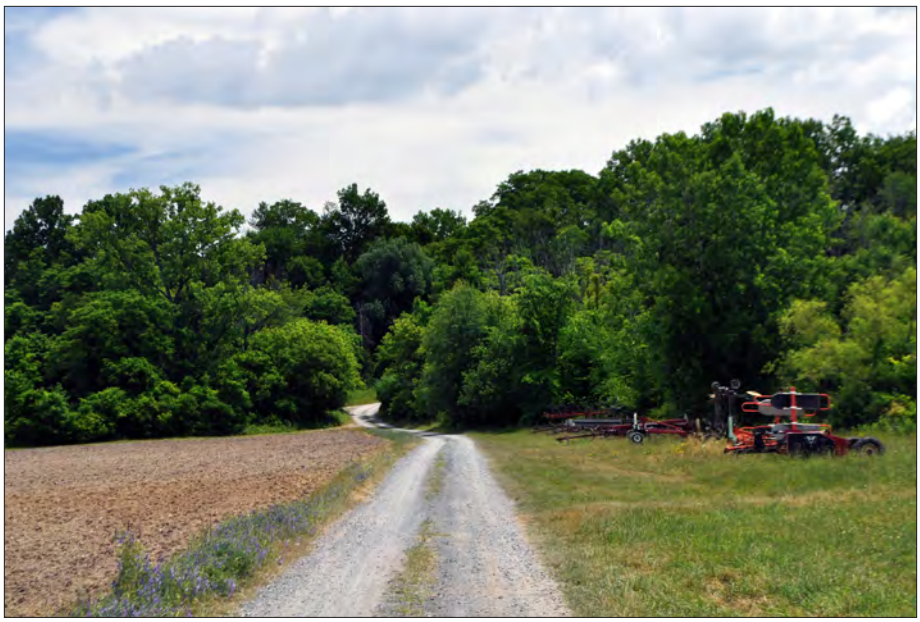

Figure 6.1. View of the Historic Lower Farm Road looking southeast (OCLP 2018).

carriage barn, farm cottage, garden, and greenhouse. Since the close of the historic period, portions of these roads were altered and in some instances removed. For example, in the 1940s and 50s when Meyer constructed the large Barn Complex and access road, fields were combined so that farmers could use large mechanized equipment on the fields which altered some farm roads.

LOWER FARM ROAD

HISTORIC / CONTRIBUTING

Historic Conditions: During Van Buren's ownership two farm roads, known as the north and south farm roads, extended west from the mansion through the fields on the lower terrace to Kinderhook Creek. A portion of the south farm road is encompassed by the existing Lower Farm Road. During the historic period the south farm road began at the rear of the mansion and extended west across the upper terrace in the direction of the Red Hillside Barn before it dropped down the escarpment and continued west through the lower terrace past the Black Hay Barn to Kinderhook Creek. During the Meyer period the section of the road bisecting the upper terrace was abandoned and the roadway was incorporated into the upper terrace agricultural field.[1]

Existing Conditions: The Lower Farm Road is an unpaved vehicle tract which descends from the Vegetated Escarpment between the non-historic shed and the historic Foundation of the Red Hillside Barn and continues southwest between the approximately sixteen acre middle field and the 48.6-acre southern most field to the bank of Kinderhook Creek. The road is surfaced in gravel and used exclusively by Roxbury Farm to access the lower terrace (Figures 6.1 and 6.2).

Treatment Guidance: The Lower Farm Road is a contributing feature and should be protected and its alignment preserved. This roadway is central to Roxbury

Farm's agricultural operations and this use should be continued.

Associated Best Practices:

- Control of Farm Access
- Infrastructure - Farm Roads

Management Considerations: The proposed Kinderhook Creek Trail and National Park Service interpretive trail in the lower terrace may utilize portions of this roadway for visitor access. Active agricultural operations will need to be carefully balanced with visitor access.

UPPER FARM ROAD

NON-HISTORIC / NON-CONTRIBUTING

Historic Conditions: The Upper Farm Road, the access road between Route 9H and the Meyer Barn Complex, was not present during the historic period. The road was constructed by Meyer in the early 1950s. Construction of the road altered the drainage of the area, and resulted in creation of a small pond opposite the upper pond (north of the new access road).

Existing Conditions: This road provides access for vehicles and machinery from Route 9H to the Barn Complex and Farm Cottage. This road is used by employees of Roxbury Farm and the National Park Service. The road is paved with asphalt between Route 9H and the bridge. West of the bridge the road is gravel.

Treatment Guidance: The Upper Farm Road is a non-contributing feature. It is the primary means of access to the Meyer Barn Complex and is essential for Roxbury Farm's agricultural operations. This road should continue to be used as an access road. Visitor access to this roadway will be discouraged, as pedestrian traffic on the roadway would conflict with the primary purpose of this roadway. The sight

Figure 6.2. View of the Historic Lower Farm Road bisecting farmland managed by Roxbury Farm in the lower terrace (OCLP 2014).

Figure 6.3. View of the non-historic Upper Farm Road to the Meyer Farm Complex looking northwest. The access road is heavily used for farm operations and by NPS staff (OCLP 2014).

lines and clearance necessary for safe operation of farm equipment on this road should be maintained, free of infringing vegetation (Figure 6.3).

Associated Best Practices:

- Control of Farm Access
- Infrastructure - Farm Roads

Management Considerations: Screening between the formal mansion landscape and the non-historic access road is recommended in the *Cultural Landscape Report for Martin Van Buren National Historic Site Volume II: Updated Treatment Plan and Record of Treatment*. Implementation of screening should take into account sight lines along the roadway and width and height clearance requirements for farm machinery.

A proposed interpretive garden in the southwest corner of the formal mansion landscape could result in an increase of visitors in proximity to this roadway. Should development of the interpretive garden proceed additional buffering between the garden and access roadway should be considered.

Where overhead utility lines crossing the formal Lindenwald lawn and upper terrace field are relocated alternative locations will be examined. One option may be to run them along the access road corridor.

CONSTRUCTED WATER SYSTEMS

Constructed water systems are built features that use water for aesthetic or utilitarian functions in a landscape. During Van Buren's tenure and in the decades that followed, the natural hydrological systems of surface and subsurface water

including streams and springs were manipulated for aesthetic and functional purpose. Van Buren constructed the upper and lower ponds shortly after taking ownership of the property. Meyer constructed a series of irrigation ponds below the farm cottage during his tenure. Numerous natural springs in the area feed the upper and lower ponds. Drainage ditches installed during the Van Buren era are discussed in the archeology section.

UPPER POND

HISTORIC / CONTRIBUTING

Historic Conditions: The Upper Pond was constructed by Van Buren in 1840. Water flow from the Upper Pond to the Lower Pond via a the ravine was regulated by a fieldstone dam and a wooden sluice at the west end of the pond. The Upper Pond was described in 1938 as "24,000 sq. feet, fed by natural springs, has stone retaining wall and Picturesque ravine, all surrounded by trees."[3] Meyer removed the dam and sluiceway when he enlarged the pond for irrigation storage in the 1950s. Construction of the new access road between Route 9H and the Meyer Barn complex altered the drainage of the upper terrace and created a small pond opposite the upper pond to the north of the new access road.[4]

Existing Conditions: The Upper Pond continues to reflect alterations made by Meyer in the 1950s. Algae is prevalent in the pond (Figure 6.4).

Treatment Guidance: The Upper Pond is a contributing resource and should be protected. Analysis of water quality in the pond is recommended.

Associated Best Practices:

- Water Management - Farm Ponds
- Resource Management - Cultural Resource Management

Figure 6.4. The Historic Upper Pond was constructed by Van Buren and reflects alterations made by Meyer in the 1950s (OCLP, 2014).

- Resource Management -Natural Resource Management

Management Considerations: The interpretative potential of the Upper Pond should be explored further.

LOWER POND

HISTORIC / CONTRIBUTING

Historic Conditions: Van Buren created the Lower Pond in 1840 by building a dam on a natural spring.[5] The Van Buren era Lower Pond was altered by Meyer between 1948 and 1959 when the new farm road connecting Route 9H to the Barn Complex was constructed. The Lower Pond was partially filled during the Meyer era as the ravine between the Upper and the Lower ponds became a dumping area for Meyer's construction projects. [6]

Existing Conditions: Conditions of the Lower Pond currently reflect changes made by Meyer, including his reconfiguring of the lower pond and created several new ponds regrading the area with heavy equipment (Figure 6.5).

Treatment Guidance: The historic Lower Pond is a contributing resource and should be preserved.

Associated Best Practices:

- Water Management - Farm Ponds
- Resource Management - Cultural Resource Management
- Natural Resource Management

LOWER FARM COMPLEX PONDS

NON-HISTORIC / NON-CONTRIBUTING

Figure 6.5. Historic Lower Pond (OCLP, 2018).

Historic Conditions: The Lower Farm Complex Ponds, located near the historic Farm Cottage were not present during the historic period. During the historic period the area of the ponds was unexcavated wetland. Meyer excavated in the area to form five ponds between 1967 and 1994.

Existing Conditions: Currently, the Lower Farm Complex Ponds reflect the man-made form created by Meyer. The ponds are surrounded by rough earthen berms (Figure 6.6).

Treatment Guidance: The Lower Ponds below Farm Cottage are non-contributing features.

Associated Best Practices:

- Water Management - Farm Ponds
- Resource Management - Natural Resource Management

KINDERHOOK CREEK BANK TREATMENT

NON-HISTORIC / NON-CONTRIBUTING

Historic Conditions: The existing Kinderhook Creek bank stabilization treatment was not present during the period of significance.

Existing Conditions: Between 1965 and 1994, Meyer struggled to combat gradual erosion of the east bank of Kinderhook Creek. Prior to Meyer's tenure, the course of Kinderhook Creek continually shifted. Changes in the creek channel are documented in historic maps and photographs.

By 1994 the creek had cut off a large section of the lower terrace field, forming an island from a triangular piece of land which had previously jutted into the

Figure 6.6. The Non-Historic Lower Farm Complex Ponds consist of five ponds constructed by Meyer between the 1970s and 1990s. Only one of the Lower Farm Complex Ponds falls within the park legislative boundary (OCLP 2014).

Figure 6.7. The course of the Kinderhood Creek has changed over time, from both natural and artificial causes. The course change impacted the lower terrace farmland primarily (OCLP, 2014).

creek. As a result Meyer lost approximately six acres of farmland to the creek. He combatted creek erosion in the late 1990s by dumping slabs of concrete and shale on the east bank to stabilize the soil loss. Many of the pieces of concrete , reused from a bridge in Valatie, contained rebar and other metal pieces. Crushed shale was used to fill the voids between the concrete pieces.

Treatment Guidance: The Kinderhook Creek bank treatment is non-contributing. Without stabilization measures on the east bank, the soil will erode (Figure 6.7).

Associated Best Practices:

- Water Management - Irrigation
- Soil Management - Erosion and Conserving Agricultural Soils
- Resource Management - Natural Resource Management

EXTANT DITCHES

NON-HISTORIC / NON-CONTRIBUTING

Historic Conditions: The existing ditches were not present during the historic period, but were constructed by Meyer between 1959 and 1967. It is possible, however, that the modern ditches follow the alignment of Wagoner or Van Buren era ditches (Figure 6.8).[12]

The existing traces of Van Buren-era ditches are historic contributing resources and are discussed in the archeological sites section.

Existing Conditions: In the second half of the twentieth century Meyer revived Van Buren's battle against wet cropland, and drained the wet pasture area below the escarpment and red barn. Using dynamite, Meyer and an associate were able to "blow a ditch across the southeast end of the swamp, at the bottom of the hill behind the farmhouse and further south . . . to collect water from 2 or 3 streams

Figure 6.8. Non-historic field drainage ditch (OCLP 2018).

that were coming down the hill . . . put in drainage pipes from the ditch across the swampy pasture to the creek . . .”[9] Meyer efforts allowed the land to become arable again, although intermittent wet spots persisted. Meyer reports uncovering some of Van Buren’s clay pipe drainage structures that had clogged. Intermittent pools in this area are documented in the 1948 aerial, but are no longer visible in 1959 aerials when this area was incorporated into crop fields. By 1994, Meyer had dug ponds in almost the exact location of the original swamp and pools on the lower fields.[10]

Meyer connected the ponds he had dug with culverts to the drainage ditch, which he had cleared and widened. This ditch parallels the border between the northeastern-most field on the property and the field to the west of it. Meyer also installed six-inch plastic piping in the ground in several places to irrigate fields with water from Kinderhook Creek. Some of this piping remained on the site after it was no longer used, for example along the boundary between the two lower terrace fields to the north of the farm road.[11]

Treatment Guidance: The existing ditches are non-contributing features, however it is likely that Meyer’s alterations make the farmland less susceptible to flooding.

Associated Best Practices:

- Soil Management- Erosion and Conserving Agricultural Soils

- Water Management - Irrigation

LITTLE POND

UNDETERMINED

Historic Conditions: The exact date of the origin of Little Pond is undetermined, but it may pre-date the Meyer era, and may represent an expansion of a naturally occurring spring (Figure 6.9). The spring or pond in this area could date from the Wagoner period or earlier. A "walled spring" on the slope, roughly in line with Van Buren's mansion and in the location of this pond, is mentioned in the Wagoner-Birney deed.[7]

The small pond was enlarged by Meyer between 1946 and 1999, likely when he expanded a drainage ditch along the border between the field in the northeast corner of the property and that immediately to its west.[8]

Existing Conditions: The Little Pond is located on the slope north of Lower Farm Road.

Treatment Guidance: Whether the Little Pond is historic and contributing is undetermined. It does, however, facilitate agricultural use of the property.

Figure 6.9. The Little Pond lies north of the non-historic Upper Farm Road to the non-historic Meyer Farm Complex (OCLP, 2018).

Associated Best Practices:

- Water Management - Farm Ponds
- Resource Management - Cultural and Natural Resource Management, until determined
- Soil Management - Erosion and Conserving Agricultural Soils/riparian buffer

BUILDINGS AND STRUCTURES

FARM COTTAGE

HISTORIC / CONTRIBUTING

Historic Conditions: The Farm Cottage was constructed by Martin Van Buren in 1844 and was home to Van Buren's farm foreman.. The cottage was renovated by Meyer in 1946.

Existing Conditions: The Farm Cottage is currently used to house Roxbury Farm employees. Its appearance reflects the changes made by Meyer (Figure 6.10).

Treatment Guidance: The Farm Cottage is a contributing feature that must be preserved.

Associated Best Practices:

- Infrastructure - Agricultural Buildings, Structures and Service Areas
- Resource Management - Cultural Resource Management

Figure 6.10. View west toward the Historic Farm Cottage, currently used to house Roxbury Farm employees, (2014 OCLP).

SHED ON LOWER FARM ROAD

NON-HISTORIC / NON-CONTRIBUTING

Historic Conditions: The date of construction of this shed, located on historic Lower Farm Road road, but according the National Register documentation it post-dates the period of significance.

Existing Conditions: The shed is currently an open-fronted storage shed located on the north side of the historic Lower Farm Road opposite the historic foundation of the Red Hillside Barn.

Treatment Guidance: The Shed on Lower Farm Road is a non-contributing feature (Figure 6.11).

Associated Best Practices:

- Infrastructure - Agricultural Buildings, Structures and Service Areas

MEYER FARM COMPLEX

NON-HISTORIC / NON-CONTRIBUTING

Historic Conditions: The buildings and structures within the Farm Complex were not present during the historic period, and thus do not contribute individually to the historic significance of the property

Within the Farm Complex three silos, one large barn, seven garages and sheds, one hothouse, and one greenhouse were constructed during the Meyer period of ownership.[13] In addition, Meyer built an open-fronted metal and wood barn in the 1960s and three greenhouses around 1975. He also constructed two fifteen-foot tall metal silos south of the concrete-block building between 1969 and 1994. He used these facilities to raise vegetables, as well as to store farm equipment,

Figure 6.11. The non-historic Shed is located west of the Lower Farm Road (OCLP, 2018).

Figure 6.12. View of the non-historic Meyer Farm Complex looking northwest, connected to 9H by non-historic Upper Farm Road (OCLP, 2014).

crops, and chemicals. In addition, from the mid to late 1980s Meyer ran a farm market and retail produce stand on the property from this area.[14]

Existing Conditions: Currently, these buildings contain the Roxbury Farm Office and house facilities to wash and store vegetables, equipment and supplies (Figures 6.12 and 6.13). The greenhouses are used in germination.

Treatment Guidance: These non-historic structures are central to the daily operations of Roxbury Farm. As recommended in the *Cultural Landscape Report for Martin Van Buren National Historic Site Volume II: Updated Treatment and Record of Treatment*, the visual impact of these non-historic buildings should be minimized with screening. The National Park Service and Roxbury Farm should not encourage unsupervised visitor access to this working area of the farm..

Associated Best Practices

- Infrastructure - Agricultural Buildings, Structures and Service Areas
- Storage and Handling of Fertilizers, Chemicals and Fuels
- Control of Farm Access

VEGETATION

Vegetation includes the cropped and hay agricultural fields, as well as the vegetated escarpment.

AGRICULTURAL FIELDS

HISTORIC / CONTRIBUTING

Historic Conditions: During the Van Buren Era the lower terrace and a portion of

Figure 6.13. Greenhouse within the non-historic Meyer Farm Complex (OCLP, 2018). .

the upper terrace were maintained as agricultural fields. Van Buren maintained the bulk of the estate in crops or hay. Van Buren grew a variety of crops including rye, corn, oats, and potatoes.[16]

Current Conditions: Roxbury Farm uses both the lower terrace fields and the upper terrace fields for a variety of vegetable crop production.

Treatment Guidance: A diverse crop production contributes to the historic character of the property, by reflecting the diverse character of the agricultural landscape present during Van Buren's ownership (Figure 6.14).

Associated Best Practices:

- Soil Management - Soil Health and Fertility/Structure and Tillage
- Soil Management - Crop Rotation and Selection

Figure 6.14. Single fields can contain a variety of crops. (OCLP, 2014)

Figure 6.15. Although the size and species that cover the Historic Vegetated Escarpment have changed over time, the topography of the escarpment remains (OCLP, 2018).

- Pest Management
- Operations

VEGETATED ESCARPMENT

HISTORIC / CONTRIBUTING

Historic Conditions: While it is probable that the species of trees, as well as the shape and size of the woodland on the escarpment changed over time, a woodland was located in this area during the period of significance.[17] It may have been a managed woodlot during the Van Buren period.

Existing Conditions: The vegetated escarpment is a partially wooded slope along the eastern edge of the approximately thirteen-acre northernmost field. It extends southward across the Historic Lower Farm Road (Figure 6.15).

Treatment Guidance: The historic Vegetated Escarpment is a contributing feature and should be protected.

Associated Best Practices:

- Resource Management - Cultural Resource Management
- Resource Management - Natural Resource Management

FIELD BOUNDARY/HEDGEROW VEGETATION

HISTORIC / CONTRIBUTING

Historic Conditions: During the historic period hedgerows formed the boundaries of fields. The majority of these hedgerows were removed by Meyer in the 1940s and 1950s to increase field sizes and allow for more efficient use of agricultural equipment. The location of hedgerows prior to their removal is documented in historic photographs.

While most boundary vegetation was removed in the 1940s and 1950s to enlarge field size, some historic field edges remain visible through existing vegetation. These field boundaries include the north field boundary, among others.

Existing Conditions: Although individual plants dating to the historic period are no longer extant, existing vegetation, including black cherry, black locust, and multiflora rose along the northern boundary, mark the some historic field edges.

Treatment Guidance: Though existing vegetation does not date from the period of significance, some existing vegetation marks traditional historic field edges. Therefore vegetation along the borders of fields, where it exists today, contributes to the legibility of the historic field and use patterns, and should be preserved (Figure 6.16). In addition, hedgerows can help minimize soil erosion.

Associated Best Practices:

- Resource Management - Natural Resource Management
- Resource Management - Cultural Resource Management

SPRUCE AND FIR PLANTINGS NEAR MEYER FARM COMPLEX

NON-HISTORIC / NON-CONTRIBUTING

Historic Conditions: The spruce and fir near the Meyer Farm Complex were not present during the historic period. The trees were planted by Meyer between 1978 and 1993.

Meyer planted blue spruce (*Picea pungens)* in front of the Farm Cottage and a row of firs (*Abies spp.)* to the north of the Farm Cottage, around the upper terrace pond, and between the upper terrace pond and the farm office building.

Figure 6.16. Field Boundary Vegetation: Vegetation marking field boundaries contributes to the legibility of historic field areas and thus is considered a contributing feature of the landscape (OCLP, 2014).

Figure 6.17. Non-historic spruce and fir plantings near the Meyer Farm Complex (OCLP, 2018).

Existing Conditions: The non-historic spruce and fir plantings currently screen non-historic features.. When standing on within the terraces west of the main house, the non-historic spruces and fir plantings screen the non-historic buildings of the Meyer Farm Complex. The area near the spruce and fir plantings is currently used for equipment storage (Figure 6.17).

Treatment Guidance: The spruce and fir near the Meyer Farm Complex are non-contributing. However, they serve to screen the non-historic Meyer Farm Complex and should be maintained.

Associated Best Practices:

- Resource Management - Natural Resource Management

POPLARS ALONG ESCARPMENT

NON-HISTORIC / NON-CONTRIBUTING

Historic Conditions: During Meyer's tenure he planted a small stand of poplars along the escarpment. The poplars were not present during the historic period.

Existing Conditions: Currently a small stand of poplars grows along the escarpment (Figure 6.18).

Treatment Guidance: These poplars growing along the escarpment are non-historic and non-contributing.

Figure 6.18. Non-historic poplars along escarpment (OCLP, 2014).

Associated Best Practices:

- Resource Management - Natural Resource Management

VIEWS

VIEW TO CATSKILL MOUNTAINS FROM UPPER TERRACE OF MANSION

HISTORIC / CONTRIBUTING

Historic Conditions: During the Van Buren era the Catskill Mountains were visible from the rear of the main house and upper terrace.

Existing Conditions: Currently, the Catskill Mountains are not visible from the rear of the main house or the upper terrace due to the growth of vegetation. The mountains are visible from the northern boundary of the park, near the upper terrace field and north woodlot.

Treatment Guidance: According to the recommendations of the *The Cultural Landscape Report for Martin Van Buren National Historic Site Volume II: Record of Treatment* , the reestablishment of views from the main house to the Catskill Mountains would improve the integrity of the property. Guidance to reestablish the historic views is outlined through treatment tasks in the CLR. Implications for agriculture in re-establishing the views may need to be re-examined.

Associated Best Practices

- Resource Management - Natural Resource Management
- Resource Management - Cultural Resource Management

VIEW TO FARMLAND FROM MANSION

HISTORIC / CONTRIBUTING

Historic Conditions: During the Van Buren era, views from the mansion and terraces to farmland were expansive. Though the now non-extant north and south orchards may have screened some views of farmland beyond the property line historically.

Existing Conditions: Currently farmland is partially visible from the rear of the mansion. Views are impacted by contemporary park maintenance buildings and non-historic hedgerows and woodland. The Van Buren farmland and the Catskills beyond are visible from the northern end of the upper terrace field (Figure 6.19).

Treatment Guidance: As the views to historic farmland from the mansion contribute to the historic integrity of the property, the re-establishment of these views is desirable. Guidance for the restoration of these views to the extent possible is provided in the *Cultural Landscape Report for Martin Van Buren National Historic Site Volume II: Treatment and Record of Treatment*. Implementation of this treatment guidance may require alterations in current agricultural practices.

VIEWS TO SURROUNDING FARM LAND

HISTORIC / CONTRIBUTING

Historic Conditions: During the historic period the landscape surrounding Lindenwald was agricultural. Lindenwald retains its rural agricultural setting

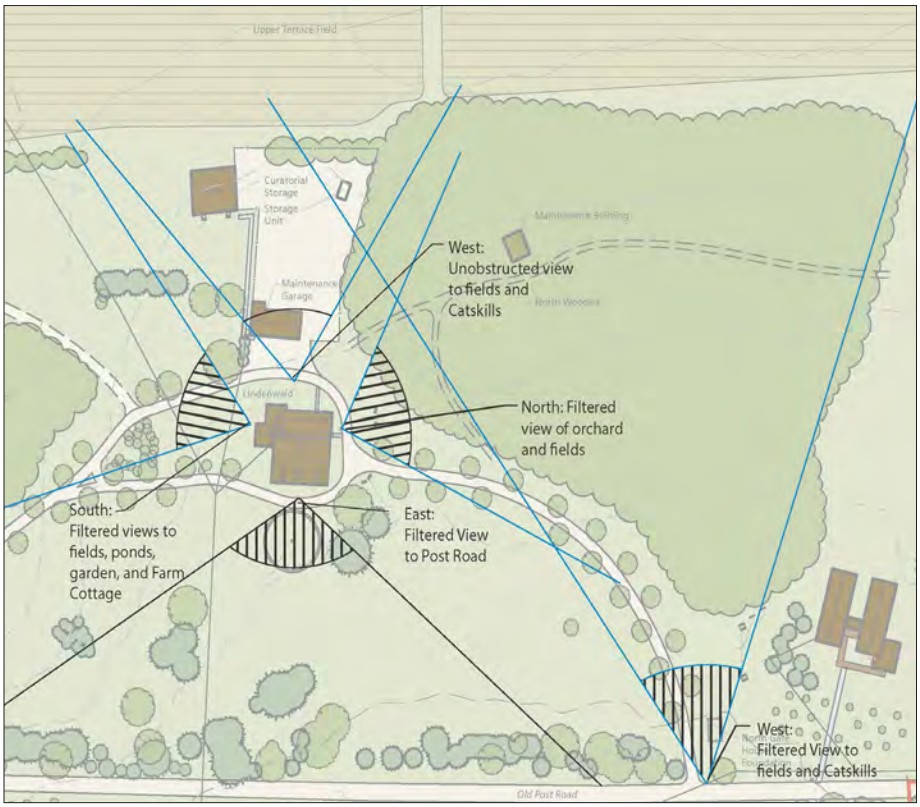

Figure 6.19. Drawing showing the views from the mansion to the upper and lower terrace farmland (OCLP CLR 2016).

Figure 6.20. HIstoric views of farmland from the mansion terrace and from within other farm fields contribute to the significance of the property (Roxbury Farm, 2014).

although residential development and Route 9-H have encroached on the historic setting.

Existing Conditions: Non-historic vegetation, including the north woodlot and the south woodlot, obscures views to surrounding farmland.

Treatment Guidance: Views to the surrounding farmland are contributing and should be preserved (Figure 6.20).

Associated Best Practices:

- Resource Management - Natural Resource Management
- Resource Management - Cultural Resource Management

SMALL SCALE FEATURES

Small Scale Features are the elements which provide detail and diversity for both functional needs and aesthetic concerns in the landscape.

VAN NESS MONUMENT

HISTORIC / CONTRIBUTING

Historic Conditions: The Van Ness Monument was placed at the western edge of the upper terrace in 1847 and marks the grave of Peter Van Ness.

Existing Conditions: The Van Ness Monument is in its original location surrounded by turf (Figure 6.21).

Figure 6.21. Photograph of the Van Ness monument in context behind the farmlands northeast of the mansion (Roxbury Farm, 2014).

Treatment Guidance: The Van Ness Monument is a contributing resource and must be protected. Farmers should keep an adequate buffer around this object during agricultural activities.

Associated Best Practices:

- Resource Management - Cultural Resource Management
- Operations

UTILITY POLES AND LINES

NON-HISTORIC / NON-CONTRIBUTING

Historic Conditions: The utility poles and lines were not present during the historic period.

Existing Conditions: The lines that bisect the historic core and upper terrace

Figure 6.22. Utility poles and electric lines were added in the 1940s and detract from the historic character of the farmland (Roxbury Farm, 2016).

field were installed in the late 1940s. The utility lines provide power to the Farm Complex. There are two utility poles located in the house lot and one in the upper terrace field (Figure 6.22).

Treatment Guidance: The power lines and poles are non-contributing and should be removed. Removal of the power lines that bisect the Lindenwald formal landscape and upper terrace field is contingent upon providing utility access to the Meyer Farm Complex.

Roxbury Farm should continue to exercise caution when operating farm equipment in the vicinity of utility poles within the actively farmed upper terrace field.

Associated Best Practices:

- Infrastructure

NATIONAL PARK SERVICE WAYSIDES AND DIRECTIONAL SIGNAGE

NON-HISTORIC / NON-CONTRIBUTING

Historic Conditions: National Park Service waysides and signs were not present during the historic period.

Existing Conditions: The National Park Service uses signs and waysides to interpret the history of the property and direct visitors. At present the majority of park signage is located in the historic core. In addition, a wayside at the northeast corner of the upper terrace field provides details about Van Buren's tenure.

Treatment Guidance: Additional National Park Service signs should be installed as necessary to provide visitor direction or interpret the cultural landscape or agricultural practices, in a manner that does not impact agricultural operations.

Associated Best Practices:

- Control of Farm Access

Management Considerations: As visitor access to the Van Buren agricultural fields is expanded via an interpretive trail or tours, additional signage is recommended to provide direction to visitors, make them aware of restricted areas, and interpret the agricultural landscape linking current agricultural methods on site with practices during Martin Van Buren's tenure (Figure 6.23).

ARCHEOLOGICAL FEATURES

Archeological sites are the ruins, traces, or deposited artifacts in the landscape, evidenced by the presence of either surface or subsurface features. Examples of features associated with archeological resources include road traces, structural

Figure 6.23. Interpretive wayside exhibits describe historic farmland and enhance visitors' experience (OCLP, 2015).

ruins, irrigation system ruins, and reforested field or orchards. The former Van Buren farmland contains extensive archeological sites that should be protected from disturbance until proper documentation and further treatment planning is developed. These features include portions of the farm road system pre-dating and developed by Van Buren, sites of outbuildings including the Carriage Barn, Red Hillside Barn, Black Hay Barn, and traces of Van Buren era drainage ditches and the lower pond. During the 1940s and 1950s, many of these road sections were abandoned when the landowner combined fields to maximize agricultural production and capitalize on the efficiency offered by larger machinery. During the same time period many of the outbuildings that had supported Van Buren's farming operations were removed from the site.

Archeological investigation is recommended to locate and document former roads, building sites, and irrigation features.

DITCH TRACES

HISTORIC / CONTRIBUTING

Historic Conditions: In 1841 Van Buren constructed ditches, to make "into good meadows the moist lands covered with useless bushes."[19] In 1847 Van Buren commenced a second round of ditch digging and developed clay drain systems. The exact location of ditches installed by Van Buren is unknown, but aerial photographs taken in 1948 provide some clues, including evidence of two or three drainage routes across the lower terrace field (Figure 6.24). An open ditch draining to Kinderhook Creek is visible along the wooded ridge on the south end of the same field. This perimeter ditch may have been altered ten years after Van Buren's death and re-dug in the twentieth century. [20]

Existing Conditions: Currently the historic Ditch Trace is comprised of a lineal depression forming a u-shape within the 48.6-acre southernmost field southeast of

Figure 6.24. This overlay drawing shows the location of historic ditch traces constructed within the lower terrace (BING, OCLP CLR, 2016).

the historic Lower Farm Road.

Treatment Guidance: Archeological investigation of the area may be considered to determine if further evidence of this historic ditch trace, and others, exists. As a contributing resource this feature should be preserved, provided that normal agricultural field work and regular field maintenance over and across the historic Ditch Trace is not prevented (Figure 6.24).

Associated Best Practices:

- Resource Management - Cultural Resource Management

FOUNDATION OF THE RED HILLSIDE BARN

HISTORIC / CONTRIBUTING

Historic Conditions: Van Buren constructed the Red Hillside Barn in 1849. The structure was built into the escarpment behind the Farm Cottage. Van Buren used this agricultural outbuilding for crop storage and housing animals.

Current Conditions: The historic foundation of the Red Hillside Barn is located on the south side of the historic Lower Farm Road. The area is overgrown with brambles and scrub vegetation.

Treatment Guidance: The Red Hillside Barn site, as well as subterranean archeological resources, are contributing features and must be protected. Additional study of this area is recommended.

Associated Best Practices:

- Resource Management - Cultural Resource Management

Management Considerations: If visitor access to the farmlands is expanded, the Red Hillside Barn Foundation would be an excellent site to interpret (Figure 6.25).

VICINITY OF BLACK HAY BARN FOUNDATION

HISTORIC / CONTRIBUTING

Historic Conditions: Martin Van Buren constructed the Black Hay Barn in the spring of 1844 for storage of hay, animals, and grain. The large barn was constructed on the lower terrace near Kinderhook Creek.

Existing Conditions: Although the Black Hay Barn is no longer extant, the location of this former structure is known and is a contributing archeological feature that must be protected. In 1948, Ray Meyer burned the Black Hay Barn. After removing the structural remains, Meyer dumped some of the building's foundation stones along the bank of Kinderhook Creek, while others were left in place.[23] The site is located within the southern portion of the lower terrace field. The Black Hay Barn Site is east of the historic Lower Farm Road and approximately 250 feet east of Kinderhook Creek. A slight topographic rise distinguishes the Black Hay Barn site from the surrounding agricultural field.

Figure 6.25. Vicinity of Red Hillside Barn Foundation (OCLP, 2018).

Figure 6.26. Black Hay Barn Foundation discovered in Roxbury Farm Fields (Roxbury Farm, 2017).

Treatment Guidance: The Black Hay Barn site is an archeological site and should be protected.(Figure 6.26) Likely additional foundation stones and artifacts remain subterranean. Treatment of this area should follow guidelines established in the Conservation Easement specifically that "the Grantor shall not disturb soils in the area [of subsurface resources] deeper than twenty-four inches and shall notify the Grantee if foundation stones are discovered."

Associated Best Practices:

- Resource Management - Cultural Resource Management

Management Considerations: This site is near the Farm Road. If a regional trail corridor or interpretive trail is developed in the lower terrace, the Black Hay Barn site should be referenced in interpretive waysides and other media (Figure 6.26).

OLD STONE HOUSE

HISTORIC / CONTRIBUTING

Historic Conditions: The Old Stone House was built on the lower terrace during the tenure of Van Alstyne. The date of the removal of the Old Stone House is unknown.

Existing Conditions: The Old Stone House is an area with subsurface remains located within the lower terrace (Figure 6.27).

Treatment Guidance: As an identified area of subsurface remains, the soil in this area should not be disturbed by deeper than twenty-four inches. The National Park Service should be notified if foundation stones are discovered.

Figure 6.27. Vicinity oF Old Stone House site (OCLP, 2014).

DINGMAN FENCE

HISTORIC / CONTRIBUTING

Historic Conditions: Historically the Dingman fence separated Van Buren's house lot and orchard from Dingham's land to the northeast. The extant to which this fence extended west is unknown.

Existing Conditions: The existence of scattered remnants of a fence along the boundary is documented in Cultural Landscape Report for Martin Van Buren National Historic Site, Volume I: Site History, Existing Conditions, and Analysis (1995).

Treatment Guidance: The evidence of the Dingman Fence, as a contributing feature of the landscape, should be preserved (Figure 6.28).

Associated Best Practices:

- Resource Management - Cultural Resource Management

ORIGINAL POST ROAD ALONG EDGE OF LOWER TERRACE

UNDETERMINED

Historic Conditions: Prior to the Van Buren period the Post Road ran through the property's lower terrace. By Van Buren's ownership of the property, the Post Road had been relocated eastward to its present location in front of the mansion.[18]

Existing Conditions: No evidence of the original Post Road is visible above ground.

Figure 6.28. View west from northwest corner of the upper terrace field along the north boundary of the historic Van Buren property in the area of the Historic Dingman Fence. Remnants of a hedgerow are visible in the landscape today. Documentation indicates the historic boundary with the Dingham property was delineated with a fence. It is likely that a volunteer hedgerow was present during the hstoric period, a pattern in the landscape that persists today (OCLP 2014).

Treatment Guidance: Archeological investigation of the area is recommended to determine if subsurface evidence of the original Post Road remains.

NORTHERN FARM ROAD

UNDETERMINED

Historic Conditions: This road was present during the Van Buren period and was abandoned during the Meyer period.

Existing Conditions: No evidence of the original Northern Farm Road is visible above ground.

Treatment Guidance: Archeological investigation of the area is recommended to determine if subsurface evidence of the original Northern Farm Road remains

SOUTHERN FARM ROAD

UNDETERMINED

Historic Conditions: The Southern Farm Road was present during Van Buren period and abandoned during Meyer period.

Existing Conditions: No evidence of the original Southern Farm Road remains above ground, except where it is incorporated into the historic Lower Farm Road.

Treatment Guidance: Archeological investigation of the area is recommended to determine if subsurface evidence of the original Southern Farm Road remains.

VICINITY OF THE CARRIAGE BARN

UNDETERMINED

Historic Conditions: The Carriage Barn, once located to the northwest of the mansion, was built by Van Ness. Van Buren used the carriage barn throughout his

tenure at the property. In the DeProsse period in the early 1900s, the barn stabled horses and stored carriages. Meyer burned down the Carriage Barn in 1947.[21]

Existing Conditions: Though no above ground evidence of the Carriage Barn remains, the barn's approximate historic location has been determined through analysis of historic maps.

Treatment Guidance: This approximate location should be preserved and protected. Agricultural activity in this area should be minimized.

FENCING

UNDETERMINED

Historic Conditions: The exact location and style of fencing used by Van Buren is unknown, although the existence of fencing through the estate is documented in historic records.

Existing Conditions: Except for the Dingman Fence, no remnants of historic fences exist on the property.

Treatment Guidance: Archaeological investigation of areas where fences were located historically is necessary to locate the remains, if any, of historic fencing. If found, these archeological remains would contribute to the significance of the property, and help to establish the location and type of fencing used on the property during the period of significance.

ORCHARD SITES

NON-EXTANT

Historic Conditions: Van Buren planted orchards on the Lindenwald property, however no Van Buren era orchards remain. The north orchard extended along the north portion of the house lot and was divided into two sections. The front section (nearer the mansion) contained pear trees and the rear section contained apple trees. The rear portion of the orchard extended down the escarpment and into the present day lower terrace field. The south apple orchard, less than half the size of the north orchard, was located at the west end of the garden. Both the north and south orchards were removed by subsequent land owners.

Existing Conditions: The front portion of the north orchard, now known as the north woodlot, is a mixture of woodland tree species. The locations of the rear and south orchards are now cultivated farmland.

Treatment Guidance: Van Buren's orchards were once an important feature in the Lindenwald landscape. However, the only orchard site extant is not subject to agricultural lease or easement. The area is currently under easement is used for agricultural and should remain so.

Agricultural Management Guidelines

Martin Van Buren National Historic Site

Kinderhook, New York

Agricultural Features

National Park Service
Olmsted Center for Landscape Preservation

www.nps.gov/oclp

SOURCES

1. Orthophotos, NYS GIS Clearinghouse
2. NPS GIS data, Nigel Shaw 2003
3. Martin Van Buren NHS CLR Volume I & II, David Uschold, 1995, 1997
4. Preservation Maintenance Plan for Martin Van Buren NHS, Britzel et. all, 1996
5. General Management Plan for Martin Van Buren NHS, 2015
6. Site visits, field notes, photography, 2014- 2018.

LEGEND

- Turf
- Gravel Roadway
- Building
- Bituminous Concrete
- Cultivated Field
- Water Feature
- NPS Boundary
- Woodland
- Land Parcel Boundaries

NOTES

1. All features shown in approximate scale and location.

0′ 125′ 250′ 500′

Drawing 1

Endnotes

HISTORICAL OVERVIEW

1. Alexandra von Bieberstein and Margie Brown, *Cultural Landscape Report for Martin Van Buren National Historic Site, Volume II: Updated Treatment Plan and Record of Treatment. 2016, 5-6.*

2. von Bieberstein, 5-6.

3. von Bieberstein, 5-6.

HISTORICAL SIGNIFICANCE OVERVIEW

1. Public Archeology Lab, "National Register of Historic Places Nomination for the Martin Van Buren National Historic Site." 2012.

EXISTING CONDITIONS

1. Please note, this section on Habitats, Flora and Fauna is based on the findings of the 2004 Biological Survey by Hudsonia Ltd.

AGRICULTURAL MANAGEMENT FRAMEWORK

1. Conservation Easement (in appendices), 2004

2. "Martin Van Buren National Historic Site: General Management Plan, Environmental Assessment (GMP)." National Park Service, 2015, p.18.

3. National Park Service, 2015, p. 18

BEST MANAGEMENT PRACTICES

1 The National Park Service identifies fundamental resources and important resources in General Management Plans. Fundamental resources are features, systems, processes, experiences, stories, scenes, sounds, smells and other attributes that warrant primary consideration during planning and management because they are critical to achieving the park's purpose and maintaining its significance. Fundamental resources must be owned and managed by the National Park Service (GMP, 14-15). Important resources are other resources and values that are not fundamental to the purpose of the park and may be unrelated to its significance, but are considered to be important in the planning process. These resources are important in the operation and management of the park and warrant special consideration in park planning.

2 NPS-77: Natural Resource Management Reference Manual #77 (Washington, D.C.: *National Park Service*, 2004).

3 "Martin Van Buren National Historic Site: General Management Plan, Environmental Assessment (GMP)." National Park Service, 2015, p. 18.

4 Magdoff, Fred and Harold Van Es, *Building Soils for Better Crops: Sustainable Soil Management*,Waldorf, MD, 2009, p. 7; see also Jody Bolluyt and Keri Latiolais. "OCLP, MAVA, and Roxbury Farm Workshop," Workshop by Olmsted Center for Landscape Preservation. 2/3/17.

5 Magdoff and Van Es, 2009, p. 7.

6 Magdoff and Van Es, 2009, p. 7.

7 Magdoff and Van Es, 2009, p. 7.

8 Magdoff and Van Es, 2009, p. 7.

9 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

10 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

11 Grubinger, Vernon P. "*Sustainable Vegetable Production from Start-Up to Market.*" Ithaca, New York, 1999), p. 46.

12 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

13 Courtens, Jean- Paul, "Fertility Management at Roxbury Farm." 2010, p. 5.

14 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

15 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

16 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

17 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

18 "Whole Farm Approach to Plant and Soil Health at Roxbury Farm", Slide 21.

19 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

20 Courtens, 2010, 4.

21 Courtens, 2010.

22 Courtens, 2010.

23 Courtens, 2010.

24 Courtens, 2010.

25 Courtens, 2010.

26 Courtens, 2010.

27 Courtens, 2010.

28 Courtens, 2010.

29 Courtens, 2010.

30 NPS-77; Please note, the Natural Resource Conservation Service can prepare conservation plans that assist in controlling soil erosion, at no cost to the park.

31 NPS-77.

32 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

33 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

34 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

35 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

36 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

37 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

38 Magdoff and Van Es, 2009, pp. 26-27.

39 Magdoff and Van Es, 2009, p. 188.

40 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/17.

41 Brown, Martha, Jan Perez, and Albie Miles. *"Teaching Organic Farming & Gardening."* University of California, 2015, pp. 209-213.

42 Brown, Martha et al., pp. 213-214.

43 Grubinger, 1999, p. 112.

44 OCLP, MAVA, and Roxbury Farm Workshop, 2/3/2017.

45 Brown, Martha, Jan Perez and Albie Miles, 2015, pp. 205-216.

46 Magdoff and Van Es, 2009, 189; OCLP, MAVA, and Roxbury Farm Workshop, 2/3/2017.

47 7 U.S.C. United States Code, 2013 edition, Title 7- Agriculture, Chapter 6, Insecticides and Environmental Pesticide Control, Subchapter II- Environmental Pesticide Control, Sec. 136.

48 National Pesticide Information Center, http://npic.orst.edu/health/storage.html, accessed 2/15/17.

49 National Pesticide Information Center, http://npic.orst.edu/health/storage.html, accessed 2/15/17.

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53 National Pesticide Information Center, http://npic.orst.edu/health/storage.html, accessed 2/15/17.

54 National Pesticide Information Center, http://npic.orst.edu/health/storage.html, accessed 2/15/17.

55 The National Park Service Integrated Pest Management Manual provides descriptions of the biology and management of twenty-one species or categories of pests.

56 NPS-77.

57 NPS-77.

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APPENDICES

APPENDIX A: GLOSSARY OF TERMS

Agricultural

Agricultural connotes activity having to do with farming or land cultivation. Agrarian means actively promoting the interests of farmers, especially by advocating for more equitable bases of land ownership, sometimes including redistribution of lands held by wealthy owners.

Ballasting Tractors

Ballasting a tractor is the process of adding weight to a tractor's driving wheels in order to increase its tire friction. If tire slippage is lower than 10%, ballast should be removed in order to prevent fuel waste and excessive soil compaction. If tire slippage is higher than 20%, ballast should be added to prevent fuel waste and premature tire wear.

Biodynamic

Biodynamic relates to a system of farming that follows a sustainable, holistic approach which uses only organic, usually locally-sourced materials for fertilizing and soil conditioning, views the farm as a closed, diversified ecosystem, and often bases farming activities on lunar cycle

Calendar spray

Calendar spray describes the application of pesticides on a regular time interval, e.g., weekly, regardless of need.

Composting

The managed decomposition of organic residues to produce a biologically stable material.

Conservation tillage

All tillage methods that leave more than 30% of soil covered in crop residue. Includes no-till, mulch-till, and ridge-till.

Corridor

A corridor is an elongated patch that may connect other patches together. A corridor may be meandering or straight, narrow or wide, and connected or disconnected. Corridors are often major conduits for the movement of wildlife,

water, and other living and nonliving elements.

Cover crop

A cover crop is grown to protect and improve the soil, rather than to provide income.

Crop rotation

Crop rotation is the systematic alternation of crops on the same field or farm over time

Department of Environmental Conservation (DEC), New York State

New York State's environmental protection and regulatory agency

Drip Tape

Drip tape is a type of drip irrigation system, a plastic or rubber hose with small holes that allow water to slowly drip out

Ecological Services (or Ecosystem Services)

A positive benefit that wildlife and/or ecosystems provide for humans. These benefits may be on a large or small scale, and either direct or indirect.

Fallow

Farmland that is temporarily not being used to produce cash crops. Letting farmland become fallow for two to three weeks or more allows the soil to rest and thereby can enhance soil quality for future production.

Fence Rows

A narrow strip of woody vegetation separating two upland meadows marking a former or extant fence line, stone wall or drainage ditch

Fundamental Resource

A fundamental Resource is a resource which, based on the park's enabling legislation or presidential proclamation, contributes to the core significance, values, and primary interpretive themes.

General Management Plan (GMP)

This is a broad umbrella document that sets the long-term goals for the park based on the foundation statement. The general management plan (1) clearly defines the desired natural and cultural resource conditions to be achieved and maintained over time; (2) clearly defines the necessary conditions for visitors to understand, enjoy, and appreciate the park's significant resources, and (3) identifies the kinds and levels of management activities, visitor use, and development that are

appropriate for maintaining the desired conditions; and (4) identifies indicators and standards for maintaining the desired conditions.

Green Manure Crops

Fast-growing plants used increase soil nutrients and organic matter by covering bare soil, preventing soil erosion, and bringing up nutrients through their roots.

Habitat

A habitat is the natural environment that meets a species' specific requirements for (1) cover from weather and predators, (2) food and water, and (3) courtship and reproduction

Habitat Fragmentation

Habitat Fragmentation is the process by which large areas of intact habitat patches are converted into fewer, smaller, and more disconnected habitat patches. Habitat fragmentation may occur due to human activities such as the construction of new roads and fences, or natural processes such as the widening of a stream. This results in a loss of habitat and a higher probability of wildlife becoming isolated from critical resources.

Intensive-till

All tillage methods that leave less than 15% of soil covered in crop residue.

Intercropping

Intercropping is a method of planting two or more crops of differing characteristics in close proximity to reduce weeds; to encourage plant diversity in order to avoid insect and pest infestation; and to provide shade, nitrogen fixation, and to increase the yield of a given piece of land.

Integrated Pest Management (IPM)

Integrated pest management (IPM) is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

No-till

In no-till soil management, no tilling of the soil occurs between harvest time (usually in the fall) until planting (usually in the spring). In a no-till approach,

more than thirty percent of the soil remains covered in crop residue to minimize soil erosion and maximize the percentage of organic matter incorporated into the soil.

Organic

Organic is used to describe a product grown and produced without the use of artificial chemicals.

Organic Materials Review Institute (OMRI)

The Organic Materials Review Institute (OMRI) is an international nonprofit organization that determines which input products are allowed for use in organic production and processing.

Paddock

A paddock is a small enclosed field for pasturing animals.

Patch

A patch is a discrete land area that is different from its surroundings and has a definite size, shape, and composition. A patch may be defined as an area with a particular resource that does not exist in the surrounding area.

Pests

Pests are living organisms that interfere with the purposes or management objectives of a specific site or that jeopardize human health or safety.

Preservation

Preservation is defined as the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction.

Reduced-till

In reduced-till cultivation, between fifteen and thirty percent of soil remains covered in crop residue after harvest.

Rehabilitation

Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.

Reconstruction

Reconstruction is defined as the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.

Restoration

Restoration is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period.

Rotational grazing

In rotational grazing, livestock graze in one small paddock for a limited amount of time before they are moved to a different paddock. Rotational grazing gives vegetation in previously grazed pastures time to rest and regrow before being grazed again. It also has been shown to improve the nesting success of grassland birds.

Silviculture

Silviculture is the art and science of controlling the establishment, growth, composition, health and quality of woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.

Spatial Scale

Spatial Scale is the distance between habitat patches relative to the dispersal distance of the organism.

Temporal Scale

Temporal Scale is habitat lifespan relative to the generation time of the organism.

Tilling

Tilling is to dig into and break up soil in order to prepare it for seeding.

United States Department of Agriculture (USDA)

The USDA provides leadership on issues related to food, agriculture, and natural resources, including energy, based on sound public policy, the best available science, and efficient management. USDA focuses on further developing alternative markets for agricultural products and activities, providing financing to expand job opportunities and improve housing, utilities, and infrastructure in rural America. The Department also works to enhance food safety, protect and manage land, improve nutrition and health, and support international agricultural and economic development.

APPENDICES

APPENDIX B: RELEVANT CASE STUDIES

The case studies below provide examples of different approaches to the management and documentation of agricultural pursuits at sites within the National Park Service.

Booker T. Washington National Monument, Virginia, www.nps.gov/BOWA

Booker T. Washington National Monument works in conjunction with the Smith Mountain Lake Rotary Club to provide fresh vegetables and fruits to low-income individuals and families in the area.

Civil War Defenses of Washington, Washington, D.C., www.nps.gov/CWDW

Within the Civil War Defenses of Washington, the Fort Dupont Community Gardens provide over two hundred plots allowing area residents the opportunity to grow their own vegetables for more than thirty years. All gardeners must attend an orientation session and agree not to use chemical fertilizers or pesticides. In 2010 a NPS partner, The Neighborhood Farm Initiative, began a program to train new gardeners in organic practices.

Essex National Heritage Area, Massachusetts, www.essexheritage.org

In 2005 the Essex National Heritage Commission worked in partnership with Massachusetts State Department of Conservation Resources to conduct a Heritage Landscape Inventory which included many of the region's more than two hundred family-owned farmsteads.

Freedom's Way National Heritage Area, Massachusetts, www.freedomsway.org

Staff at Freedom's Way National Heritage Area collected oral histories of local farmers through a program entitled "Saving Voices: Saving Farms". There are one hundred and fifty five farms within the Heritage Area and twenty-eight farmers markets.

Gateway National Recreation Area, New Jersey & New York, www.nps.gov/GATE

Gateway National Recreation Area has an active community gardening program offering education workshops on a wide variety of subjects including composting and canning.

Gettysburg National Military Park, Pennsylvania, www.nps.gov/GETT

At Gettysburg National Military Park allows visitors to gather fruit for personal use from more than thirty orchards in the park. Their deer management program contributes all of the venison harvested to area food banks.

Hampton National Historic Site, Maryland, www.nps.gov/HAMP

Hampton National Historic Site offers interpretive programs celebrating spring and fall harvests, including children's programming. In addition annual event celebrate food, including Dairy Day and a Wine Tasting

Hopewell Furnace National Historic Site, Pennsylvania, www.nps.gov/HOFU

Hopewell Furnace National Historic Site raises sheep which are sold at auction in the fall, as well as holding an annual sheep shearing. A dye and herb garden on site is managed by Master Gardener volunteers and students in a local high school horticultural program. They also allow visitors to harvest apples.

Marsh-Billings-Rockefeller National Historical Park, Vermont, www.nps.gov/MABI

The Marsh-Billings-Rockefeller National Historical Park uses Cow Power to full the Full Circle Trolley in the park. Cow Power is run through Central Vermont Public Service's Cow Power Program, which uses methane digesters to turn waste into enters. Treks to Taste, a series of events made possible through a partnerships that make connections between healthy lifestyles, national parks, community walking trails, and local food grown by regional area farms. Dishes made from local food, prepared by volunteers, are sampled by groups of walker at various trail destinations throughout the park.

The Sustainability and Leadership Institute is run through partnerships with State government and a local school. The program offers student participants for-credit classes on energy conservation, alternative transportation, and sustainable agriculture. Students conduct regular public presentations sharing knowledge with parents and community members

Minute Man National Historical Park, Massachusetts, www.nps.gov/MIMA

Through a partnerships with nonprofit farm-based educational organization, The Farm School of Athol, Massachusetts, the Park allows students to graze heritage animals on park lands and offers educational programs based on sustainability, historical methods, environmental stewardship, healthy food, and outdoor experience. The program Battle Roads Farm hosts young apprentice farmers

National Colonial Farm (Piscataway Park),Maryland, www.nps.gov/PISC

At National Colonial Farm (Piscataway Park) a partnership with the Accokeek Foundation makes open-to-the-public agriculture programs possible. A partnership with Ecosystem Farm supports the training of two or three apprentice farmers a year. A CSA program at the park has about seventy member families.

Rock Creek Park, Washington, D.C. www.nps.gov/ROCR

Rock Creek Park has nine community gardens, overseen by individual community garden associations. In addition,members of the Fort Totten neighborhood revitalized part of the Mamie D. Lee Garden through a partnership with the Neighborhood Farm Initiative, where teens now learn about organic vegetable gardening.

Roosevelt-Vanderbilt National Historic Site, New York, www.nps.gov/ROVA

At the Roosevelt-Vanderbilt National Historic Site a Forest Management Plan was developed in partnership with SUNY-ESF. In addition, agricultural based teaching lessons, created through "Teaching the Hudson Valley", a Hudson River Valley National Heritage Area program are managed by ROVA.

Saratoga National Historical Park, New York, www.nps.gov/SARA

At Saratoga National Historical Park,through the Viewshed Art Program artists paint and exhibit various views of lands in the Viewshed Protection Plan. The Park also runs a program, "Tour de Farm" were bike riders tour conserved farms and Battlefield sites.

Weir Farm National Historic Site, Connecticut, www.nps.gov/WEFA

At Weir Farm National Historic Site, Groundwork Bridgeport, a local youth organization, harvests apples and presses them to make cider at the park.

Wheeling National Heritage Area, West Virginia www.nps.gov/WHEE

The East Wheeling Community Gardens are located in the Wheeling National Heritage Area and are supported by a grant program.

Cuyahoga Valley National Park/Cuyahoga Valley Countryside Conservancy Ohio, www.nps.gov/CUVA and www.cvcountryside.org

Established in 1974, Cuyahoga Valley National Park preserves the rural landscape along a 20 mile segment of the meandering Cuyahoga River between Cleveland and Akron, Ohio. To aid in preserving the working farms within the park, a new non-profit formed in 1999 to advance privately supported, economically viable, and environmentally friendly approaches to agricultural practices within an agricultural setting. The non-profit, the Cuyahoga Valley Countryside Conservancy (CVCC) supports the ten working farms within the park and sponsors activities to engage farmers and the community.

Cuyahoga Valley Countryside Conservancy mission is to connect people, food, and land by increasing public awareness of how food and farming impact personal, community, and environmental health, and by inspiring personal commitment to building a resilient, sustainable food culture.

The programs of the CVCC promote living, working farms in the Cuyahoga Valley National Park because they represent the rural heritage of the Cuyahoga Valley and protect the park's resources. Examples of activities facilitated by the CVCC include: The CVCC assisted in managing sixty-year leases by helping to select farm and field sites to be rehabilitated, recruiting potential farmers, providing agricultural expertise, and finding resources needed to help both the farmers and the park succeed. The nonprofit aids in agricultural business planning and marketing. They also provide educational components, including organizing farm tours where the farmer is compensated for their time. The Cuyahoga Valley Countryside Conservancy and Cuyahoga National Park were recently featured in a National Geographic article entitled, " "National Park Offers Farmland of the People, by the People, for the People." See, http://theplate.nationalgeographic.com/2015/02/11/national-park-offers-farmland-of-the-people-by-the-people-for-the-people/

Grant-Kohrs Ranch, Montana, www.nps.gov/GRKO

At Grant-Kohrs Ranch visitors observe key livestock operations including cattle moving, branding and calving. Story telling about farming shares the perspectives of American Indians, pioneers, cowboys, emigrants, entrepreneurs and cattle barons. Each year GRKO hosts a three-day teacher workshop designed to adapt and develop curricula focusing on how ranching fits within ecosystem management. Community education and land ethic development: Institutional memory is handed down to our younger generations, and shared within our local and regional community through two college education and on-site programs.

Point-Reyes National Seashore, California, www.nps.gov/PORE

The Point Reyes Ranches Historic District includes more than 22,000 acres on the coastal plain, highlighting the origin of ranching in west Marin, and emphasizing the history of the Shafter / Howard dairy enterprise (1857–1939), also known as the "alphabet ranches", and its contribution to the development of industrial-scale dairy in California. Many of the existing ranches are operated by descendents of the early Point Reyes dairies. The park offers interpretative programming about the dairying and ranching enterprises. It also has an ongoing leasing and agricultural management program.

APPENDICES

APPENDIX C: AGRICULTURAL CONSERVATION EASEMENT

Plans are underway to transfer this easement, with some modification, from the Open Spate Institute (OSI) to the National Park Service. At present, OSI holds, or manages, a version of this easement with Roxbury Farm.

This Conservation Easement is granted on this 2nd day of April, 2004, by

JEAN-PAUL COURTENS and JODY LYNN BOLLUYT,

Residing at 2501 Route 9H, PO Box 388, Kinderhook, New York 12106 (the"Grantor"), to

OPEN SPACE CONSERVANCY, INC.,

a New York Not-For-Profit corporation with a principal place of business at c/o Open Space Institute, Inc., 1350 Broadway, Room 201, New York, New York, 10018 (the "Grantee").

WITNESS THAT:

A. The Grantor is the owner in fee of approximately 101.89 acres of property (the "Property") described in Exhibit A, attached to and made a part of this Conservation Easement, located in the Town of Kinderhook, County of Columbia, and State of New York.

B. The Property has significant agricultural and historic value as formerly being part of President Martin Van Buren's retirement estate. Its conservation and protection, including the continuation of farming activities, will help provide visitors to the nearby Martin Van Buren National Historic Site ("MVBNHS") with a sense of the local landscape as it existed in Van Buren's day. Such farming activities will also help perpetuate the centuries-old traditional use of the land. It is also an integral part of a larger historic setting that includes the nearby Luykas Van Alen House and the many historic structures located in the Village of Kinderhook.

C. The Property includes frontage on the Kinderhook Creek, which is a tributary of the Hudson River. The Creek is an important source of water for agricultural use of the Property as well as being a local recreational resource for fishing,

swimming, paddling, and similar activities. An existing farm road through the Property provides access to the Creek from State Route 9H.

D. The primary purpose of this Conservation Easement is to enable the Property to remain in agricultural use by preserving and protecting its agricultural soils and agricultural viability and productivity, while also: ensuring that the Property's open space, natural, historic, recreational, habitat and scenic values will be conserved in perpetuity; providing for limited public recreational access as provided herein; and ensuring that uses of the Property that are inconsistent with these conservation purposes will be prevented or corrected.

E. The agricultural and other characteristics of the Property, its current use and state of improvement are described in a Present Conditions Report acknowledged by the Grantor and the Grantee to be complete and accurate as of the date of this Conservation Easement. Both the Grantor and Grantee have copies of the Present Conditions Report and will keep it on file. It will be used by the Grantee to ensure that any future changes in the use of the Property will be consistent with the terms of this Conservation Easement.

F. The parties agree that the current agricultural uses of the Property shall be permitted and are consistent with the conservation purposes of this Conservation Easement. However, this paragraph shall not be construed so as to preclude future agricultural uses of the Property that are otherwise permitted by this Conservation Easement.

G. The Grantee is a "qualified conservation organization", as defined by the Internal Revenue Code, and accepts the responsibility of enforcing the terms of this Conservation Easement and upholding its conservation purposes.

H. The Grantor owns the entire fee simple interest in the Property, including the entire mineral estate.

NOW, THEREFORE, for the reasons given, and in consideration of their mutual promises and covenants, the Grantor voluntarily grants and conveys to the Grantee, and the Grantee voluntarily accepts, a perpetual Conservation Easement over the Property, an immediately vested interest in real property defined by Article 49, Title 3, of the New York State Environmental Conservation Law ("ECL"), of the nature and character described in this Conservation Easement and to the extent hereinafter set forth.

1. Rights Retained by Grantor

The Grantor retains the right to perform any act and engage in all uses of the Property that are not specifically prohibited or limited by this Conservation Easement. These ownership rights include, but are not limited to, the right to

exclude any member of the public from trespassing on the Property, it being acknowledged and agreed that except for the Trail Easement described below, no right of access by the general public to any portion of the Property is conveyed by this Conservation Easement.

Subject to the restrictions and limitations contained in this Conservation Easement, the Grantor expressly reserves the right to engage in any and all agricultural practices as that term is defined in the State Agriculture and Markets Law and any amendments thereto, in accordance with the Conservation Plan described in Paragraph 4 below. It is understood that the term "agricultural practices" shall include but not be limited to the breeding, raising, pasturing and grazing of any type of livestock and that appropriate and necessary fencing shall be allowed. Such term shall also include but not be limited to the planting, raising, harvesting and producing agricultural, aquacultural, and horticultural and forestry products of every nature and description.

2. Prohibited Acts

Grantor promises to not perform, nor allow others to perform by permission, acquiescence, or failure to prevent, any act on or affecting the Property that is inconsistent with the covenants set forth below. Grantor also authorizes the Grantee to enforce these covenants in the manner described below. However, unless otherwise specified below, nothing in this Conservation Easement shall require the Grantor to take any action to restore the condition of the Property after any Act of God or other event over which Grantor had no control. Grantor understands that nothing in this Conservation Easement relieves Grantor of any obligation or restriction on the use of the Property imposed by law.

(a) Protection of Historic Landscape Characteristics and Features – Certain features (hereinafter the "Historic Features") within the Property contribute to the historic landscape documented in a report entitled, "A Farmer in His Native Town: Cultural Landscape Report for Martin Van Buren Farmland," produced by the National Park Service (NPS). A copy of said report is included in the Present Conditions Report for the Property. The general locations of the Historic Features, to the extent known, are shown on a map prepared by NPS and included in the Present Conditions Report. Table 6 of said report, "Summary of Landscape Characteristics and Features for Van Buren Farmland," (pp. 150-155) is included in the Present Conditions Report.

The Grantor shall avoid any act or omission that could be detrimental to the Historic Features, nor shall the Grantor alter, modify, relocate, remove, damage, or destroy said features without prior written approval by the Grantee. In the event that any Historic Feature is degraded by act or omission of the Grantor without prior written approval by the Grantee, the Grantor shall restore said feature to its previous condition to the greatest practical extent. Upon request by

the Grantor, the NPS may provide technical assistance at no cost to the Grantor in connection with protecting or restoring said features, provided that funds have been appropriated and are available to the NPS for that purpose.

Feature 1 – Shed – an existing open-fronted storage shed on the north side of the Historic Lower Farm Road (Feature 4) opposite the foundation of the Red Hillside Barn (Feature 5).

Feature 2 – Historic Ditch Trace – a lineal depression forming a u-shape within the ±48.6-acre southernmost field southeast of the Historic Lower Farm Road (Feature 4); provided, however, that this covenant shall not prevent normal agricultural field work or regular maintenance over and across the Historic Ditch Trace.

Feature 3 – Vegetated Escarpment – a partially vegetated slope along the eastern edge of the ±13-acre northernmost field and extending southward across the Historic Lower Farm Road (Feature 4); notwithstanding Section 6 of this easement entitled, "Timber Harvesting," the Grantor shall not alter or remove vegetation from the Vegetated Escarpment except that selective tree cutting may be allowed with prior written approval by the Grantee to control insects and disease, prevent personal injury and property damage, or for firewood and other domestic uses, including construction of permitted fences on the Property.

Feature 4 – Historic Lower Farm Road – an unpaved vehicle track that descends the Vegetated Escarpment (Feature 3) between the Shed (Feature 1) and the Foundation of the Red Hillside Barn (Feature 5), and continues southwest between the ±16-acre middle field and the ±48.6-acre southernmost field to the bank of Kinderhook Creek.

Feature 5 – Foundation of the Red Hillside Barn – a stone foundation on the south side of the Historic Lower Farm Road (Feature 4) opposite the Shed (Feature 1).

Feature 6 – Vicinity of the Old Stone House – an area with subsurface remains; the Grantor shall not disturb soils in this area deeper than 24 inches and shall notify the Grantee if foundation stones are are discovered.

Feature 7 – Vicinity of the Black Hay Barn – an area with subsurface remains; the Grantor shall not disturb soils in this area deeper than 24 inches and shall notify the Grantee if foundation stones are discovered.

(b) New Construction and Alterations

(i) Subject to Grantee's prior approval of written plans, which approval shall not be unreasonably withheld, Grantor may make pursue new construction and alterations as described below (ii – v). New construction and alterations shall be consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for the Treatment of Cultural Landscapes

(more specifically the section within entitled Guidelines for Rehabilitating Cultural Landscapes).

(ii) Two new barns may be constructed on the Property in support of ongoing agricultural operations as replacements for two 19th century barns destroyed during the mid-20th century. The design of the two new replacement barns is to be consistent with the standards referenced above (i) respecting building form, massing and roofline geometries of the new structures to be compatible with the form, massing and roofline geometry of similar structures of the region during the 19th century and compatible with, but not replicating, structures that would have existed on the property during the Van Buren tenure. The two new replacement barns may incorporate modern construction materials, methods, finishes and utility or mechanical systems wherever these will not detract from the historic rural character and visual qualities of the historic landscape setting.> One barn shall have a maximum footprint of 50 feet by 75 feet and a maximum height of 35 feet and the second barn shall have a maximum footprint of 50 feet by 50 feet and a maximum height of 35 feet, height being measured from average finished grade to peak of roof. Provided, however, that if the archeological survey reveals a footprint of the barns larger than indicated herein, Grantor shall be permitted to build to the size of the barn foundation actually revealed, with no maximum height change. Materials, appearance and construction techniques shall conform to those of the Martin Van Buren era to the greatest practical extent. The locations of such barns shall not be directly on the foundations of barns from the Van Buren era identified above as Feature 5 and Feature 7, with the precise locations to be approved by Grantee. <The new barn locations may be located in the vicinity of the former barn structures, or otherwise may be located well beyond the vicinity of the former buildings so as to best accommodate present day agricultural operations and to minimize conflicts with park visitation.> Subject to available funding, MVBNHS may provide technical assistance to Grantor at no cost to Grantor regarding the location, design and construction of such structures.

(ii) Prior to beginning any subsurface disturbance for constructing buildings or other structures, or for any other purpose, the Grantor shall provide the NPS a reasonable opportunity, at no cost to the Grantor, to conduct archeological research at the proposed site(s). The Grantor shall also allow the NPS to monitor any excavations for evidence of archeological resources and agrees to halt subsurface disturbance in the event significant archeological resources are uncovered to allow the NPS a reasonable opportunity, at no cost to the Grantor, to conduct further research at that site. A “reasonable opportunity” will allow the NPS at least 60 days to plan, contract and conduct said research. This period may

be longer if necessary to allow site work to be conducted during a viable time of the year. Grantee and/or NPS shall provide Grantor with a copy of any report or findings made in connection with this provision.

(iii) Notwithstanding the foregoing, Grantor may repair, maintain, rebuild, or replace the existing shed described above as Feature 1 in its present location, provided, however, that such shed may not be enlarged without Grantee's prior approval, which approval shall not be unreasonably withheld. Materials, appearance and construction techniques shall conform to those of the original structure to the greatest practical extent.

(iv) Grantor may run electrical power to the above described barns and shed via an underground line in order to operate machinery and provide interior lighting. No light fixtures shall be installed on the exterior of such structures or elsewhere on the Property.

(v) Grantor may construct ponds or impoundments and install two wells, one each in the immediate vicinity of the barn locations set forth above, for use in the agricultural operations.

(vi) Grantee approval of the above construction and alterations may, in some cases, be subject to federal environmental compliance which would be completed by the NPS (if the NPS is the approving party). Environmental compliance requirements would be completed as timely as possible to not unduly burden planned activities by the Grantor.

(c) Subdivision

The Property may be subdivided into up to three (3) lots or parcels of no less than twenty (20) acres. Provided, however, that such lots or parcels may only be sold to an adjoining landowner or landowners. In addition, in the event the boundary of the MVBNHS is expanded to include the Property and federal funds are appropriated for acquisition purposes, Grantor may subdivide and convey a portion of the Property to the United States of America ("USA"), acting through NPS, for trail or other purposes.

(d) Mining

The mining or extraction of soil, sand, gravel, rock, oil, natural gas, fuel or any other mineral substance, using any method, is prohibited. Provided, however, that Grantor may use existing gravel for maintaining the existing road on the Property and/or in connection with the construction of roadways and structures allowed by this Conservation Easement.

(e) Paving and Road Construction

No portion of the Property shall be paved or otherwise be covered with concrete,

asphalt, or any other impervious paving material, nor shall any road for access or other purposes be constructed without the advance written permission of the Grantee.

(f) Trash

The dumping or accumulation of any kind of trash or refuse on the Property, other than compostable materials (the end product of which is intended to be used exclusively on the Property or other property owned or leased by the Grantor for agricultural production purposes), is prohibited. However, this shall not prevent the storage or application of agricultural products and byproducts, or the composting of compostable materials, on the Property, so long as it is done in accordance with all applicable government laws and regulations.

(g) Notwithstanding any provision to the contrary, Grantor has the right to maintain the existing underground irrigation piping, and is permitted to install new underground irrigation piping, including under all the farm roads and the Trail Easement on the Property, at such locations and in such quantity as is necessary to carry out the agricultural purposes of this Conservation Easement. Grantor shall provide Grantee and/or NPS with ten (10) days' prior written notice of intent to install new irrigation piping, including a sketch of the approximate location of such installation, and Grantee and/or NPS shall be permitted a reasonable opportunity to observe the excavation associated with such installation.

3. Trail Easement.

(a) Grant of Trail Easement.

(i) The Grantor grants forever to the Grantee and its successors and assigns a trail easement (the "Trail Easement") for the general public to use a designated trail that may in the future be constructed on the Property (the "Trail").

(ii) The Trail Easement shall be a twenty-five (25) foot wide corridor to be located by consultation among Grantor, Grantee and NPS. However, it is the intention of the parties that the Trail Easement shall be located, to the greatest extent practicable, along the Kinderhook Creek and along the western most and northern most boundaries of the Property. The Trail shall be located, designed and constructed so as to minimize to the greatest practical extent any interference with Grantor's agricultural use of the Property.

(iii) The Trail Easement shall not be construed as permission for the general public to enter upon any portion of the Property other than the Trail. The Grantor expressly reserves the right to cross the Trail Easement to draw water from the Kinderhook Creek for irrigation and other purposes related to its use and ownership of the Property, provided that the means of such drawing of water shall accommodate the public's use of the Trail Easement to the greatest practicable

extent. The Trail Easement shall run with the land and bind the heirs, successors and assigns of the Grantor and shall inure to the benefit of the Grantee. Grantee may assign its rights and obligations under the Trail Easement to a third party such as USA, acting through NPS, subject to such assignee providing liability protection to the Grantor in an amount and manner reasonably acceptable to the Grantor.

(iv) In the event that the boundary of the MVBNHS is enlarged to include the Property and subject to available funding, NPS may provide interpretive services and Park Ranger patrol services in connection with the Trail.

(b) Permitted Uses of Trail. If constructed, the general public may use the Trail from dawn until dusk for the specific purposes of walking, hiking, jogging, snowshoeing, cross country skiing, horseback riding, and other forms of non-motorized recreation. Grantee and/or its designee(s) may only use motorized vehicles and/or equipment within the Trail Easement for administrative purposes including trail construction, trail maintenance, and enforcement.

(c) Maintenance of Trail. Grantee expressly accepts said Trail Easement in "as is" condition, and agrees that the Grantor will not be responsible for the maintenance, upkeep, or repair of any portion of the Trail Easement and/or Trail after the time in which the Grantee first begins to enter the Trail Easement to construct or create said Trail. If the Grantee or its successor or assignee elects to construct the Trail, it shall build, repair, rebuild, mark, and maintain the Trail at its sole cost and expense. Any construction or creation of the Trail shall include appropriate signage, fencing and/or markings for and along said Trail to delineate the location of the Trail, inform the general public of the nature and terms of the Trail Easement, and notify the public of any hazardous conditions existing on the Trail. Maintenance of the Trail will include upkeep, repair and replacement of the Trail's signage, fencing and markings, clearing brush and vegetation from the Trail, and keeping the Trail in good repair and condition. If the Grantee or its successor or assignee elects not to maintain the Trail as described above, it shall close the Trail to public use. The Grantee may delegate the exercise of its rights hereunder to a third party including, without limitation, USA, acting through NPS, and/or the Town of Kinderhook.

(d) Liability and Indemnification. The Grantee hereby expressly assumes any and all risks or liabilities associated with or related to the use and/or occupancy of the Trail Easement and/or Trail. The Grantee further hereby remises, releases and forever discharges the Grantor from and against any and all claims, actions, suits, causes of action, or legal proceedings whatsoever, in law or equity, by reason of Grantee's use and/or occupation of the Trail Easement and Trail, including any claim for property damage, property loss or personal injury of any employee or representative of the Grantee or any guests, invitees, or visitors of same, including members of the general public. The Grantee shall indemnify and reimburse the Grantor for these payments, as well as for reasonable attorney's fees and expenses

of defending itself. Provided, however, that the foregoing shall not apply to the extent the Grantor or any of its agents committed a willful or negligent act that is determined by a court to have contributed to the injury or damage.

(e) Insurance. The Grantee agrees to secure and keep in force from and after the commencement of the Trail Easement, at Grantee's sole cost and expense, general liability insurance with a minimum limit of liability of One Million ($1,000,000.00) Dollars (or the commercially reasonable limits applicable at the time) which shall contain (1) contractual liability covering all written contracts including this easement and (2) personal injury and real and personal property damage liability. The Grantor shall be named as an additional insured party on such insurance policy and shall be provided a Certificate of Insurance. The Grantee shall be solely responsible to insure any and all personal property it maintains on the Trail Easement and/or Trail, even if such property is incorporated into any structure as a permanent fixture.

4. Development Rights

Grantor hereby grants to Grantee all development rights that are now or hereafter allocated to, implied, reserved or inherent in the Property and the parties agree that such rights are terminated and extinguished, and may not be used on or transferred to any portion of the Property as it now or hereafter may be bounded or described, or to any other property adjacent or otherwise, nor used for the purpose of calculating permissible lot yield of the Property or any other property.

5. Conservation Practices

All agricultural operations on the Property shall be conducted in a manner consistent with a conservation plan prepared by a qualified conservation professional. Such plan shall be updated periodically, and in any event any time the basic type of agricultural operation on the Property changes or ownership of the Property changes, and shall provide for management of the Property in a manner consistent with "best management practices", as those practices may be identified from time to time by appropriate governmental educational institutions, and in a manner not wasteful of soil resources or detrimental to water quality or conservation. A copy of such plan shall be provided to Grantee.

6. Timber Harvesting

Trees may be selectively cut to control insects and disease, to prevent personal injury and property damage, and for firewood and other domestic uses, including construction of permitted fences on the Property. Subject to the prior written approval of the Grantee, trees and other vegetation may also be cut to clear land for agricultural use. Subject to the prior written approval of the Grantee, commercial timber harvesting on the Property may be conducted on a sustainable yield basis and in substantial accordance with a forest management plan prepared

by the New York State Department of Environmental Conservation or by a forester certified by the Society of American Foresters.

7. Responsibilities of Grantor and Grantee Not Affected

Other than as specified herein, this Conservation Easement is not intended to impose any legal or other responsibility on the Grantee or in any way to affect any existing obligation of the Grantor as owner of the Property. Among other things, this shall apply to:

(a) Taxes -- The Grantor shall continue to be solely responsible for payment of all taxes and assessments levied against the Property. If the Grantee is ever required to pay any taxes or assessments on its interest in the Property, the Grantor will provide reimbursement for the same.

(b) Upkeep and Maintenance – Except for the Trail Easement described above, Grantor shall continue to be solely responsible for the upkeep and maintenance of the Property, to the extent it may be required by law. The Grantee shall have no obligation for the upkeep or maintenance of the Property except that, for the said Trail Easement, the Grantee shall have the right but not the obligation to construct and maintain said Trail pursuant to subsection 3(c) above.

(c) Liability and Indemnification – Except as expressly set forth in Paragraph 3 above, if the Grantee is ever required by a court to pay damages for any personal injury or property damage resulting from an incident that occurs on the Property after the closing on the Property, the Grantor shall indemnify and reimburse the Grantee for these payments, as well as for reasonable attorney's fees and other expenses of defending itself, except to the extent the Grantee or any of its agents committed a willful or negligent act that is determined by a court to have contributed to the injury or damage. In addition, Grantor warrants that Grantee is an additional insured party on Grantor's general liability insurance policies covering the Property.

8. Enforcement

(a) The Grantee (and its directors, officers, employees, agents and independent contractors, who for purposes of this paragraph 8 shall be referred to as the "Grantee") and, if the boundary of MVBNHS is extended to include the Property and the easement is assigned to NPS, the United States of America, acting through the National Park Service, shall have the right to prevent and correct violations of the terms of this Conservation Easement in law or in equity pursuant to the provisions of Article 49, Title 3 of the ECL.

(b) With reasonable advance notice to the Grantor, the Grantee may enter the Property for the purpose of inspecting for violations. If the Grantee finds what it

believes is a violation, it may at its discretion take appropriate legal action. Except when an ongoing or imminent violation could irreversibly diminish or impair the agricultural productivity, open space character, wildlife habitat or scenic qualities of the Property, the Grantee shall give the Grantor written notice of the violation and thirty (30) days to correct it, before filing any legal action, and the Grantee shall not commence any such legal action so long as Grantor commences to correct such violation within said 30 day period and continues thereafter to diligently complete the correction of such violation. If a court with jurisdiction determines that a violation may exist or has occurred, the Grantee may obtain an injunction to stop it, temporarily or permanently. A court may also issue an injunction requiring the Grantor to restore the Property to its condition prior to the violation.

(c) The failure of the Grantee to enforce a prior violation or to discover a violation or to take immediate legal action shall not bar it from doing so at a later time.

9. Transfer of Easement

The Grantee shall have the right to transfer the easement created by this Conservation Easement to any public agency or private nonprofit organization that, at the time of transfer, is a "qualified organization" under paragraph 170 (h) of the U.S. Internal Revenue Code, and under Art. 49, Title 3, NY ECL, and only if the agency or organization expressly agrees to assume the responsibility imposed by this Conservation Easement.

If the Grantee ever ceases to exist or no longer qualifies under paragraph 170 (h) or applicable state law, this easement shall be transferred without consideration to USA, acting by and through NPS, subject to available appropriated funds for acquisition work, valid title, and an approved Environmental Site Assessment or waiver thereof. If USA is unable or refuses to accept such transfer, then a court with jurisdiction shall transfer this easement to another qualified organization having similar purposes that agrees to assume the responsibility.

In the event the Grantee or its assignee transfers the easement created by this Conservation Easement to USA, USA expressly agrees to assume the responsibility imposed by this Conservation Easement provided that, notwithstanding any other provision of said easement: (i) USA shall not be required to assume any liability, provide any indemnification, or hold any insurance; (ii) USA shall hold said easement without any restraint on alienation; (iii) no provision of said easement shall be construed as binding the USA or the NPS to expend in any one fiscal year any sum in excess of appropriations made by Congress or administratively allocated for the purposes of said easement for that fiscal year; (iv) the Conservation Easement, if held by USA, will not be terminable by judicial action; and (v) the USA, acting by and through the NPS, shall have a reasonable opportunity to prepare all responses to requests for

approvals or permissions required by said easement or prepare and contract for archaeological research and/or monitoring allowed by said easement including sufficient time to allow the National Park Service to comply with all statutory and regulatory requirements. If it is necessary to amend this Conservation Easement to add, delete or modify terms to facilitate transfer to USA, Grantor shall not unreasonably withhold consent to such an amendment; however, such change or amendment shall not change in practical or material form any of the terms or conditions of this Conservation Easement, including but not limited to terms or conditions pertaining to the construction of buildings or the agricultural practices allowed on the Property.

10. Transfer of Property

If at any time the Property, or any interest in it, is transferred by the Grantor to any third party, the Grantor shall notify the Grantee in writing prior to the transfer of the Property, and the document of conveyance shall expressly refer to this Conservation Easement. Grantor's, and each of Grantor's successors', liability under this Conservation Easement shall terminate upon the transfer of such party's title to the Property, except that liability for acts or omissions occurring prior to such transfer shall survive such transfer of title.

11. Amendment of Easement

This Easement may be amended only with the written consent of Grantee and Grantor. Any such amendment (i) shall be consistent with the purposes of this Conservation Easement and with the Grantee's easement amendment policies, (ii) shall comply with Section 170 (h) of the Internal Revenue Code, or any regulations promulgated in accordance with that section, and (iii) shall comply with Article 49, Title 3, of the ECL or any regulations promulgated pursuant to that law.

12. Termination of Easement

If a court with jurisdiction determines that conditions on or surrounding the Property change so much that it becomes impossible to fulfill its conservation purposes, such court may terminate this Conservation Easement. If condemnation of a part of the Property or of the entire Property by public authority renders it impossible to fulfill any of these conservation purposes, this Conservation Easement may be terminated through condemnation proceedings. If this Conservation Easement is terminated and the Property is sold or taken for public use, then, as required by paragraph 1.170A-14 (g) (6) of the IRS regulations or its successor, the Grantee shall be entitled to a percentage of the gross sale proceeds or condemnation award equal to the ratio of the appraised value of this easement to the unrestricted fair market value of the Property, as these values are determined on the date of this Conservation Easement. The Grantor and the Grantee agree that such percentage shall be sixty nine (69%) percent, in

accordance with an appraisal of the Property by First Pioneer Farm Credit dated February 28, 2002. The Grantee shall use the proceeds consistently with the conservation purposes of this Conservation Easement as set forth in the recitals contained herein.

13. Interpretation

This Conservation Easement shall be interpreted under the laws of New York, resolving any ambiguities and questions of the validity of specific provisions so as to give maximum effect to its conservation purposes.

14. Perpetual Duration

This Conservation Easement shall be a servitude running with the land in perpetuity. Every provision of this Conservation Easement that applies to the Grantor or Grantee shall also apply to their respective agents, heirs, executors, administrators, assigns, and all other successors as their interests may appear, including any party entitled to possession or use of the Property.

15. Notices

Any notices required by this Conservation Easement shall be in writing and shall be personally delivered or sent by first class mail to the addresses indicated on Page 1 of this Conservation Easement, unless a party has been notified by the other of a change of address.

16. Subsequent Liens on Property

No provisions of this Conservation Easement should be construed as impairing the ability of Grantor to use the Property as collateral for subsequent borrowing, provided that any mortgage or lien arising from such a borrowing would be subordinated to this Conservation Easement.

17. Further Acts

Each party shall perform any further acts and execute and deliver any documents, including amendments to this Conservation Easement which may be reasonably necessary to carry out the provisions of this Conservation Easement or which are necessary to qualify this instrument as a conservation easement under Article 49, Title 3, of the ECL or any regulations promulgated pursuant thereto.

18. Acceptance

As attested by the signature of its authorized officer, the Grantee hereby accepts without reservation the rights and responsibilities conveyed by this Conservation Easement. To have and to hold, this Conservation Easement unto the Grantee, its successors and assigns, forever.

National Park Service
U.S. Department of the Interior

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