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State Forester

COMMONWEALTH of VIRGINIA

Department of Forestry

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August 17, 2020

Tract Number: RCB 19044

VMI – Lackey Tract

Col. Dale Brown

Institute Planning Officer

303 Smith Hall

Lexington, Va. 24450

Greetings Dale:

Please find within your *Virginia State-Owned Lands Management Plan* for your agency's property located in Rockbridge County. It was my pleasure to prepare this plan for you knowing that you have a true interest in the good stewardship and active management of the natural resources.

The management plan is based upon your agency objectives for managing the property. All of the recommendations within this plan are for consideration, but I believe that they will help you achieve both long- and short-term goals for the property. This plan should be reviewed and updated every 10 years.

I trust that you will find this plan to be informative and useful as you actively manage your agency's natural resources. If you have any questions or comments please feel free to contact me at any time.

Sincerely,

Patti Nylander – Senior Area Forester
Mountain Valley Area
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Virginia State-Owned Lands Management Plan

ABOUT THIS PLAN

This State-Owned Lands Management Plan was developed to help guide you in the active management of the natural resources on the property. The plan is based upon the objectives you identified as being important to the agency. All of the management recommendations are for consideration. The stand data table figures in this plan are for planning purposes ONLY and not intended for making economic decisions where more detailed information would be required.

PRIMARY GOALS THAT WERE IDENTIFIED FOR MANAGING THE PROPERTY

1. Maintenance of a Healthy Forest
2. Protect Water Quality
3. Improved habitat for native wildlife species
4. Utilize area for training and field exercises for VMI cadets
5. Maintenance of a scenic forest

INTRODUCTION

This multiple-use forest management plan covers the examination of approximately 45.1 acres of forestland in Rockbridge County, Virginia. The management recommendations, given on the following pages, were developed for each specific parcel on the property. Boundaries and acres are only estimates derived from aerial photographs. The tract map is attached, allowing you to see the map as you read through the plan.

TRACT LOCATION

On the west side of Route 11, just south of Interstate I-64 next to Rockbridge County High School.

PROPERTY OVERVIEW

The Lackey Tract is a sizeable-forested property that sits inside a lot of development just north of the City of Lexington. Rockbridge County High School sits to the north, Route 11 makes up the eastern boundary, and residential neighborhoods surround the western half. The property also includes VMI's Hinty Hall and Physical Plant, and an open area that is used by VMI's Grounds Crews. Earlier this year, approximately 12 acres of forestland was cleared to build a new parking garage for VMI cadets.

The Lackey Tract is used by VMI as a training area for cadets, developing skills in land navigation and exercises focusing on teamwork and strategy.

STAND A

Descriptions and Recommendations:	**Consider thinning to improve spacing and overall health**
Acres:	16.4
Forest Type:	Mature Planted Pine
Species Present:	Planted Eastern White Pine, Loblolly Pine
Age:	Approximately 36 years old.
Stand History:	This area used to be open and was planted with a mixture of Eastern White Pine seedlings and Loblolly Pine seedlings in the early 1980's. Approximately 11 acres was clearcut in the spring of 2020 in order to clear the land for a future parking garage for VMI students. The rest of the stand has not been thinned or cut.
Size:	The average diameter of the trees is 11", which is considered saw timber size for pine.
Tree Quality:	Quality refers to form of the individual trees and the potential products that can be harvested from them. High quality trees tend to be straight, have few limbs or defects, and a healthy crown. They have potential use as veneer logs or high grade lumber. Poor quality trees tend to have more defects (old wounds, knots, galls, etc) they may be crooked, have multiple limbs, and are usually utilized for low grade lumber products such as pulpwood, pallets, and fuelwood. Species is also a factor when determining quality. High quality lumber includes species such as Northern Red Oak, White Oak, Black Walnut, Yellow Poplar. Low quality lumber tends to be Hickory, Red Maple, Black Locust, Blackgum, Scarlet Oak, and some Chestnut Oak. Based on the species composition and overall form, the quality in this stand is good.
Stocking/Density:	Stocking refers to stand density and the proportion of the area in the stand actually being utilized by the trees. It is measured in several ways (stems per acre, basal area, crown closure). Stocking strongly influences diameter growth of individual trees. High stocking levels slow diameter growth due to increased competition between trees. Poor stocking levels mean the site is not fully utilized, and valuable growing space is being wasted. The average basal area is 230 ft^2/ac, which is considered over-stocked.

Growth Rate & Vigor: Some areas are experiencing signs of over-stocking; I did observe evidence of White Pine adelgid activity, and some of the Loblolly Pine trees have also died. Wooly adelgids are a native pest that feed on the sap of trees, and are visible as a fuzzy white covering on the main trunk of the tree. Adelgids typically do not kill White Pines, but heavy infestations can reduce overall health and vigor, which can make the trees more susceptible to other infestations or disease. Some of the Loblloly Pine trees have also died, but I did not observe any evidence of bark beetle activity, which is a common forest pest in over-stocked stands of yellow pines.

Site Quality & Soils: Soils in this parcel are in the Shottower fine sandy loam complex. This soil is derived from alluvial material made up of limestone, sandstone, and shale. This soil type is prone to erosion due to the loamy texture; maintaining vegetative cover on exposed soils will minimize this risk. This soil is moderately suited for road construction and off-road trails, is well suited for growing trees, and will support species such as Yellow Poplar.

Aspect & Topography: The larger portion of this parcel is generally flat and easy to access from the Physical Plant. The area close to the athletic fields has a moderate north-facing slope, and can be accessed from the gravel road off Route 11.

Water Resources: None in this parcel.

Invasive Species: There is a fair amount of Autumn Olive in the understory and along the forest edge of this parcel. Autumn Olive is an invasive woody shrub that produces an abundance of berries that is eaten by birds, deer, and turkey. The berries are spread by wildlife, which is why this shrub is so prolific in the landscape. If the area is harvested, the bushes will take advantage of the increased sunlight and will grow even more, reducing the growth potential for native forbs and trees. A combination of mechanical and herbicide treatments tends to be the most effective strategy for reducing the impact of this invasive plant. Managing the Autumn Olive will have to be considered when managing the mature trees in this stand. I have included recommendations for controlling this pesky shrub.

Wildlife Habitat: Excellent. Mature pine trees provide excellent insulative cover for a variety of wildlife. Turkeys and other raptors also roost in pine trees, and ground-nesting birds may also use this area to build their nests.

Recreation/Aesthetics:	Excellent. The existing forest roads provide opportunities for walking and wildlife viewing. The mature trees provide a beautiful backdrop to the neighborhoods that border the property. The pine stands also provide a nice forested view from the high school and the football field
Cultural Resources:	None observed during my visit.
T&E Species Present:	None observed during my visit.
Fire Risk:	There are many factors that determine the risk of fire spreading in your woods, such as the forest type, what species are present, how close other landowners or people are to the forest, and weather factors. Pine stands tend to have a higher fire risk because the fuels are more combustible making the fire burn faster and with more intensity, whereas a fire in a hardwood stand will tend to spread slowly and burn with less intensity. The number one cause of fire in Virginia is debris burning. Whether carelessly or maliciously, people cause many wildland fires, either through burning brush piles, dumping wood stove ashes, or even intentionally setting them. Forests that are remote or not accessible to the public are at a lower risk of catching fire. Based on the fuel type and location, the risk of fire is moderate.
Unique Natural Features:	None observed during my visit.
Recommendations:	In order to improve the overall spacing and health of this stand, I recommend performing a commercial thinning in two to three years. Some of the mortality and pine adelgid I observed are early signs that the stand is over-stocked and susceptible to forest pests, which could cause widespread mortality in the stand. A commercial harvest will increase the growing space for residual trees and allow more sunlight to reach the forest floor. Following the harvest, the Autumn Olive will have to be controlled using a combination of herbicide and mechanical treatments. A commercial thinning will keep the forest intact, and continue to provide training opportunities for VMI cadets as well as maintain the aesthetic value of the property for the surrounding neighborhoods. Along the northern edge of the property, there are several houses that are within 100' of the boundary. One concern with performing a commercial thinning is for 3-5 years after the harvest, the residual trees are susceptible to wind throw and ice damage. The houses and additional sheds could be damaged by falling trees both during and after a thinning.

It will be important to reach out to these landowners and discuss with them any current concerns they may have related to the property, and the trees near their homes. Establishing a relationship with the landowners before any harvesting takes place will reduce the potential for conflict down the road. It is possible a buffer may need to be left where no trees are harvested. Another option is that all of the trees are harvested in order to prevent trees from falling on these properties, with plans to replant trees that are desirable and better suited for growing in smaller spaces.

There is a storm water retention area between this parcel and the Physical Plant, so a different access point may have to be used. Establishing an access to get the timber out may be through the cleared area where the proposed parking lot will be. The Department of Forestry will provide assistance in developing a Pre-Harvest Plan as well as setting up the timber sale for any planned harvest.

STAND B

Descriptions and Recommendations:	**Consider thinning to remove mature pine and release desirable hardwoods**
Acres:	11.2
Forest Type:	Mixed Pine/Hardwoods
Species Present:	Eastern White Pine, Loblolly Pine, Black Cherry, Black Walnut, Yellow Poplar, and Ailanthus
Age:	Even-aged, trees are roughly 35 years old.
Stand History:	This area was planted with a mixture of White Pine and Loblolly Pine around the same time as Parcel A in the early 1980's. The survival was a little lower, which allowed more hardwood species to enter the stand.
Size:	The average diameter is 13", which is considered saw timber size for both hardwood and pine.
Tree Quality:	Based on the species and overall form, the quality is good.
Stocking/Density:	The average basal area is 160 ft^2/ac, which is considered over-stocked.
Growth Rate & Vigor:	Growth rate is fair. Some of the White pine trees have died, but I did not observe any evidence of forest pathogens at the time of my visit. However, the high stocking rates can lead to forest health problems, mainly bark beetle infestations.
Site Quality & Soils:	Soils in this parcel are the same as in Parcel A. In the parcel on the west end of the property, the soil transitions to the Needmore-Opequon complex. This soil is similar in productivity to the soils in the rest of the property, but the steeper terrain increases the risk of erosion on exposed areas. Maintaining vegetative cover to reduce erosion will help protect the soil resources on the property.
Aspect & Topography:	The terrain varies in each portion of the parcel. The area at the northern end is mainly flat and can be accessed from Greenhouse Road. The area at the southern end is a moderate south facing slope with a dry drainage that flows toward Route 11. The area on the west end of the property is a steeper western facing slope that is best accessed from the woods road through Parcel A. The terrain is too steep down to Greenhouse Road on this side of the property. Overall, the terrain is gentle enough that equipment use would not be limited in any of these areas, although there is a significant cut-bank down to Greenhouse Road on the west end of the property, so that

	would have to be considered for any potential forest road construction.
Water Resources:	None in this parcel.
Invasive Species:	I did observe some ailanthus and Autumn Olive in these areas. Ailanthus is an invasive tree that commonly occurs in forested areas. This tree propagates through seeds and through root shoots; it puts out a chemical in the soil to prevent other trees and plants from growing near it. Herbicide treatments are the most effective management strategy. If the area is harvested, any large trees should be removed at that time.
Wildlife Habitat:	Good. The mature pine trees provide good roosting sites for turkeys, vultures, and other birds of prey. The understory is thicker, providing good cover for small mammals and birds.
Recreation/Aesthetics:	Fair. Several trees have died and fallen over, particularly in the south section of this parcel. The northern section provides an excellent buffer for the high school football field and stadium lights. The terrain is gentle enough for easy walking and the areas can be accessed from several areas.
Cultural Resources:	No known features, none observed during my visit.
T&E Species Present:	None observed during my visit.
Fire Risk:	Based on the species composition and the location of these areas, the risk of fire is moderate.
Unique Natural Features:	None in this stand
Recommendations:	In order to improve the species composition and overall health of the stand, I recommend removing the mature pine and lower quality hardwood trees to release the more desirable and better quality hardwoods in two of the areas. The area next to the stadium should be left alone to continue to serve as a buffer for the stadium. This area should be harvested at the same time as Parcel A; doing so will make the timber sale more attractive to loggers because it will increase the harvest acreage.

STAND C

Descriptions and Recommendations: Maintain roads and trails, leave as buffer

Acres:	7.8
Forest Type:	Mature Mixed Hardwoods
Species Present:	Yellow Poplar, Black Walnut, Red Cedar, and Box Elder are all present. Other species include some Black Cherry, grapevines, and Hackberry.
Age:	Uneven-aged. Trees range in age from 15-40 years old.
Stand History:	These areas were likely open at one time, and have reverted back to a forested setting. They were not planted and allowed to regenerate naturally.
Size:	The average size of trees ranges from 6-14" DBH.
Tree Quality:	Based on the species composition and overall form of the trees, the quality of this stand is poor.
Growth Rate & Vigor:	Growth rate is poor to fair, although I did not observe any forest health related concerns during my visit.
Site Quality & Soils:	The soils in this parcel are the same as in Parcels A and B.
Aspect & Topography:	This area sits on an eastern facing slope, extends down toward a drainage, and then climbs back up to meet Route 11. There is an access road from Route 11 that passes through this area and extends down to the athletic fields and up to the open area on the property. This road is well-maintained and was used as a logging road for the recent harvest.
Water Resources:	While not a defined stream channel, water does flow through this area, mainly as a form of runoff.
Invasive Species:	Ailanthus and autumn olive are present; I have already provided management strategies for these invasive species.
Wildlife Habitat:	Good. The thick brush provides excellent cover for a variety of wildlife, and the grapevines and other forbs are an excellent food source.
Recreation/Aesthetics:	Good. The woods roads provide opportunities for hiking and wildlife viewing. Some of the thicker areas are difficult to walk through, but likely serve as good training exercise sites.
Cultural Resources:	No known features and none observed during my visit.

T&E Species Present:	None observed during my visit, although it is possible the drainage area in this parcel may provide adequate habitat for an endangered snail known as the Rubble Coil endemic to Rockbridge County.
Fire Risk:	Based on the species composition, the risk of fire in this area is low.
Unique Natural Features:	None observed during my visit.
Recommendations:	Leave this area as it is. This stand provides a good buffer from Route 11 and some of the houses near the property. The thicker areas may also provide good sites for VMI cadets who periodically use the property for training.

STAND D

Descriptions and Recommendations:	**Leave as a buffer, consider CTR in 5-7 years**
Acres:	2.6
Forest Type:	Mixed Pine
Species Present:	Virginia Pine and Eastern Red Cedar are most prevalent. Other species include some Black Walnut, Dogwood, and some Redbud.
Age:	Even-aged, approximately 15-20 years old.
Stand History:	This area used to be open and was a hilly field, and has reverted back to a forested setting. Cedars are typically the first "pioneer" species to establish in a fallow setting.
Size:	The average diameter is 8", which is considered too small for traditional commercial lumber products.
Tree Quality:	Based on the species composition and overall form of the trees, the quality of this stand is poor to fair. The walnut have the potential to be good quality, but they are being suppressed by the abundance of cedars and pines.
Stocking/Density:	The average basal area is 130ft^2/ac, which is considered over-stocked.
Growth Rate & Vigor:	Growth rate is fair, but I did not observe any forest health concerns during my field visit.
Site Quality & Soils:	Soils in this parcel are in the Needmore-Opequon complex. This soil is derived from the weathered products of limestone and shale. This soil is prone to erosion due to the steeper terrain, and poorly suited for trails and forest roads. This soil is shallow and low in fertility.
Aspect & Topography:	This area sits on a western facing slope that is moderately steep, and extends down to Greenhouse Road. This area is best accessed from walking in from Parcel B or C, it is very steep coming up from the road.
Water Resources:	None in this parcel.
Invasive Species:	None observed.
Wildlife Habitat:	Excellent. The thick cedars provide excellent insulative cover for deer, turkey, and bear.
Recreation/Aesthetics:	Fair. The thick cedars and pines are difficult to walk through and there are no defined trails in this parcel. However, the forested hillside does provide a nice view for the houses on the western side of Greenhouse Road.

Cultural Resources:	No known features, none observed
T&E Species Present:	None observed during my visit
Fire Risk:	Based on the species composition and terrain, the risk of fire is moderately high. A fire starting on the side of the road will move uphill quickly, and cedar trees can ignite quickly. Cedar trees tend to retain their lower limbs, which can act as ladder fuels, moving a ground fire into the crowns, making suppression efforts much more difficult. Fire crews would likely have to access a fire in this part of the property from the driveway of the adjoining houses.
Unique Natural Features:	No known features.
Recommendations:	In order to protect the soil resources on this steeper hillside, leave this area as it is. If you wanted to improve the species composition, you may consider performing a practice known as Crop Tree Release in the next 5-7 years. Crop Tree Release focuses on releasing individual trees that have been selected to produce benefits consistent with the objectives of the property; maintaining the health and aesthetic value of this area. To determine which trees must be removed to release a crop tree, simply look up into the crown, and cut any trees that are adjacent and touching the crown of the desired crop tree. This will provide full sunlight, which will improve the vigor and growth rate of the crop trees in addition to improving the overall quality of the stand. Wildlife benefit by increased food production on vigorously growing trees and more soft mast, browse, and cover result from increased sunlight reaching the forest floor. Trees can be marked with the help of Department of Forestry. Trees that are removed can be left on the ground, or stacked into brush piles for wildlife. Using herbicide as a hack and squirt method is also very effective and all it requires is a hand ax and a spray bottle with herbicide. It also removes the risk of cutting trees and eliminates the work of piling the cut trees into brush piles. Performing Crop Tree Release work in the woods is considered an "intermediate treatment" in that this sort of "forest thinning" is done in between a larger-scale harvest that will yield revenue when it is performed. While no revenue may be generated, performing Crop Tree Release work will remove some trees and release the desirable trees, and the area will continue to provide aesthetic value and protect the soil resources.

STAND E

Descriptions and Recommendations:	**Leave to grow, maintain trails and keep as buffer**
Acres:	1.8
Forest Type:	Mature Mixed Hardwoods
Species Present:	White Oak, Black Oak, Chestnut Oak and Yellow Poplar are all present. The understory is fairly open, and consists of some Red Maple, Black gum, and some oak; there is not a lot of oak regeneration present.
Age:	Even-aged. This area is 70-80+ years old.
Stand History:	There are some woods roads that are maintained through this parcel, but there is no evidence of any recent management activity.
Size:	The average diameter is 16", which is considered saw timber size.
Tree Quality:	Based on the species composition and overall form, the quality of this stand is good.
Stocking/Density:	The average basal area is 120ft^2/ac, which is considered over-stocked.
Growth Rate & Vigor:	Growth rate is fair, I did not observe any forest health concerns during my field visit.
Site Quality & Soils:	Soils in this area are the same as in Parcel A.
Aspect & Topography:	This area sits on a southwest facing slope that leads down to the edge of the property. This parcel can be accessed from an existing road that leads down from the open area in the center of the property.
Water Resources:	None in this area.
Invasive Species:	There is some Autumn Olive present both in the understory and along the forest edge.
Wildlife Habitat:	Excellent. The mature oak trees provide an important food source in the form of acorns. Acorns are an important food source for deer, turkey, bear, and squirrels because they are filled with crude protein, which is a key component in the diet of wildlife species. A diet high in protein in the fall and early winter, will give wildlife species the "bulk" they need to survive through the winter months when food is more scarce. It is always important to have a variety of oak species in the forest for acorn production. White oak trees produce acorns every year, while Red Oaks produce acorns

	every two years. By maintaining a diversity of oak species, you will have more consistent acorn production in your forest, which benefit wildlife and promotes natural regeneration.
Recreation/Aesthetics:	Excellent. This is the only area on the property that is a representation of a mature hardwood forest. The existing road/trail provides opportunities for hiking and wildlife viewing.
Cultural Resources:	No known features, none observed during my field visit
T&E Species Present:	None observed
Fire Risk:	Based on the species composition, the risk of fire in this area is low.
Unique Natural Features:	No known features, none observed during my field visit
Recommendations:	Leave this area as it is to serve as a buffer, particularly once the student parking garage is built.

CULTURAL AND HISTORIC RESOURCES

Cultural resources refer to landscapes, structures, archeological artifacts and vegetation that represent a culture or society of historic value. Federal and state laws protect some archeological, cultural and historic sites from disturbances, destruction or removal. It is critical to understand where such sites may be located prior to ground-disturbing forest management activities.

Historic and cultural resources are a vital link to past land-use practices in Virginia. While no sites were identified during my visits, old records for the area may exist. The Department of Historic Resources offers programs which survey, catalog and encourage the preservation of historic resources. This Department maintains records of historic sites and these records are available to the general public. More information can be found at www.dhr.virginia.gov or by calling their office at (804) 367-2323.

THREATENED OR ENDANGERED SPECIES

Utilizing the Virginia Department of Wildlife Resources database for tracking threatened and endangered species, there are some species of concern that are known to exist within a two mile radius of the property. The Rubble Coil is a State Endangered small snail endemic to Rockbridge County. Its habitat consists of the toeslope of rock and limestone hillsides. Is it possible some of the hillsides may provide adequate habitat for this endangered species.
Information in this plan concerning the presence of Threatened and Endangered (T&E) species has been determined through observation and/or review of T&E species maps. This information does not substitute for a through exam completed by trained T&E specialists.

FOREST HEALTH AND PROTECTION

A healthy forest is a forest that possesses the ability to sustain the unique species composition and processes that exist within it. Active management of the forest helps to maintain and improve its productive capacity, taking into account all the factors that influence the resource elements addressed in the State-Owned Lands Management Plan. Silviculture harvest practices and the use of prescribed fire as a tool can reduce risk from wildfire, pests and invasive species, and ensure long-term forest health and vigor. Forest health protection issues are often directly related to the active management of insects and diseases, invasive plants and wildfire. Annual inspections for signs of insects, diseases or invasive plant infestations should be completed by the landowner.

I did observe evidence of White Pine adelgid, mainly caused by over-stocking within some of the pine stands. Continued monitoring is the best preventative measure to ensuring forest health. If any unusual problems are found, please contact the Virginia Department of Forestry.

FIRE

Prescribed fire, also known as "controlled burn," refers to the controlled application of fire by a team of fire experts under specified weather conditions that help restore health to fire-adapted environments to obtain specific management objectives. Prescribed burning is a critical management tool that enhances and benefits forests, grasslands and wildlife habitats. Prescribed fire is an effective tool in site preparing harvested areas for replanting tree seedlings as well as reducing excessive amounts of hazardous fuel build up and catastrophic damage of wildfire on our lands and surrounding communities. Prescribed fire is one of the most effective tools we have in preventing the outbreak and spread of wildfires.

Protection of your property from wildfire is essential. Wildfire rapidly destroys valuable timber, wildlife and property. From February 15 through April 30, open air fires are not permitted within 300 feet of woodland, brushland or field containing dry grass or other flammable material between midnight and 4:00 p.m.

CARBON CYCLE

All forest plants and soils "store" carbon, so active forest management influences the natural cycles of that storage in both living and dead plant material. The removal of carbon from the atmosphere is the process called carbon sequestration. Carbon sequestration is the process by which atmospheric carbon dioxide is consumed by trees, grasses and other plants through photosynthesis and stored as carbon in biomass (trunks, branches, foliage and roots) and soils. Sustainable forestry practices can increase the ability of forests to sequester atmospheric carbon while enhancing other ecosystem services, such as improved soil and water quality. Planting new trees and improving forest health through thinning and prescribed burning are some of the ways to increase forest carbon in the long run. Harvesting and regenerating forests can also result in net carbon sequestration in wood products and new forest growth.

WETLANDS

Wetlands include areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. Wetlands are also highly diverse and productive ecosystems with emphasis on supporting timber production, water quality protection, wildlife habitat and more. It is important for you to be aware of and understand the laws and regulations related to forestry practices before engaging in wetland management activities on your land.

BIOLOGICAL DIVERSITY

Biodiversity is the variety of life (including diversity of species, genetic diversity and diversity of ecosystems) and the processes that support it. Landowners can contribute to the conservation of biodiversity by providing diverse habitats. It is important to select management options that offer the greatest opportunities for promoting wildlife habitats

and conserving biodiversity while fulfilling other land management objectives. Some of these options include, but are not limited to, the conservation of wildlife habitats and biodiversity by:

1. Managing stand-level habitat features.
2. Promoting aquatic and riparian areas.
3. Managing landscape features.
4. Conserving rare species and communities.
5. Protecting special features and sites.

AGROFORESTRY/SILVOPASTURE

Agroforestry intentionally combines agriculture and forestry to create integrated and sustainable land-use systems. Agroforestry takes advantage of the interactive benefits from combining trees and shrubs with crops and/or livestock. In the United States, agroforestry is commonly divided into five main practices: Windbreaks, Alley Cropping, Silvopasture, Riparian Forest Buffers and Forest Farming.

Silvopasture combines trees with forage and livestock production. The trees are managed for high-value saw logs while providing shade and shelter for livestock and forage, reducing stress and sometimes increasing forage production. Silvopasture is increasingly popular in the southeastern region of the United States as a way to supplement timber income on small pine plantations and some hardwood stands. However, there can be problems with combining the two management schemes if it is not done correctly or actively managed. This management system requires active rotational grazing to avoid damage to the standing trees and allowing the forage to recover.

HIGH CONSERVATION VALUE FORESTS

These are forests of outstanding and critical importance due to their environmental, social, biodiversity, or landscape values. High Conservation Value Forests are considered critically important because they contain a unique combination of values. These can be social, cultural, biodiversity and environmental values.

Social or cultural values are aspects of a forest that are critical to the surrounding community's identity. They can range from significant historical features, such as sacred sites or burial grounds, to the forest's role within the community – for example, whether local residents have traditionally depended on the forest for berries, firewood or other products.

Biodiversity values are critical to preserving local flora and fauna. Such values could include rare ecosystems or habitats, or unusual communities of plant or animal species. Keep in mind that these ecosystems and species need not be on state or Federal Threatened or Endangered Species lists – they may just be considered rare regionally or locally.

Environmental values can benefit the whole community. Some examples are forests whose presence helps protect local watersheds or prevent erosion in vulnerable areas.

When forestry professionals and other experts evaluate a forest as a potential HCVF, they look at the entire landscape – not just a single stand of trees – and consider all of these values.

Places that combine and contain these features are rare, so it's especially important to protect them. *(American Forest Foundation)*

INTEGRATED PEST MANAGEMENT

A pest control strategy may use a variety of complementary strategies including mechanical devices, physical devices, genetic, biological or cultural management and chemical management. *(U.S. EPA)*

Integrated Pest Management (IPM) combines several appropriate pest control tactics into a single plan to reduce pests and their damage to an acceptable level. Using many different tactics to control a pest problem causes the least disruption to the living organisms and non-living surroundings at the treatment site. Relying only on pesticides for pest control can cause pests to develop resistance to pesticides, can cause outbreaks of other pests, and can harm surfaces and non-target organisms. With some types of pests, using only pesticides achieves very poor control.

To solve pest problems, first:

- Identify the pest or pests and determine whether control is warranted for each,
- Determine pest control goals,
- Know what control tactics are available,
- Evaluate the benefits and risks of each tactic or combination of tactics,
- Choose the most effective strategy that causes the least harm to people and the environment,
- Use each tactic in the strategy correctly, and
- Observe local, state and Federal regulations that apply to the situation.

The best strategy for each situation depends on the pest and the control needed.

(Michael J. Weaver, Patricia A. Hipkins, Virginia Tech Pesticides Program, 2013)

10-YEAR RECOMMENDED SCHEDULE OF MANAGEMENT ACTIVITIES

Year	Parcel	Activity	*Possible Cost Share	Future Stand Conditions		
				Year	Stocking	Species
2022	A	Consider harvest within Pine stands, contact nearby landowners to discuss options for management near boundary line				Eastern White Pine, Loblolly Pine
2023	A	If total harvest is performed, replant area with Shortleaf Pine or Pitch-Loblolly Pine			500 TPA	Shortleaf Pine or Pitch-Loblolly Pine
2024-5	A	Inspect Planting, determine if release spraying is needed to improve growth of planted pine trees				
2022	B	Remove overstory pine to promote hardwood growth and natural regeneration			30-40 Basal Area	Oak, Hickory, Yellow Poplar
On-going	C	Maintain existing trails and roads, monitor for invasives and treat if necessary	State Lands Funds			Box Elder, Cedar, Black Cherry, Walnut
2026	D	Consider CTR to improve spacing and species composition				Redbud, Walnut, Oaks, Cedar
On-going	E	Maintain existing trail, monitor for invasives and treat if necessary	State Lands Funds			
2030	All parcels	Review plan and property objectives, update				

This schedule may need to be adjusted depending on financial needs, timber markets, timing of actual harvest and availability of contractors.

State Lands - VMI Lackey Tract
State Lands Plan - 45.1 acres

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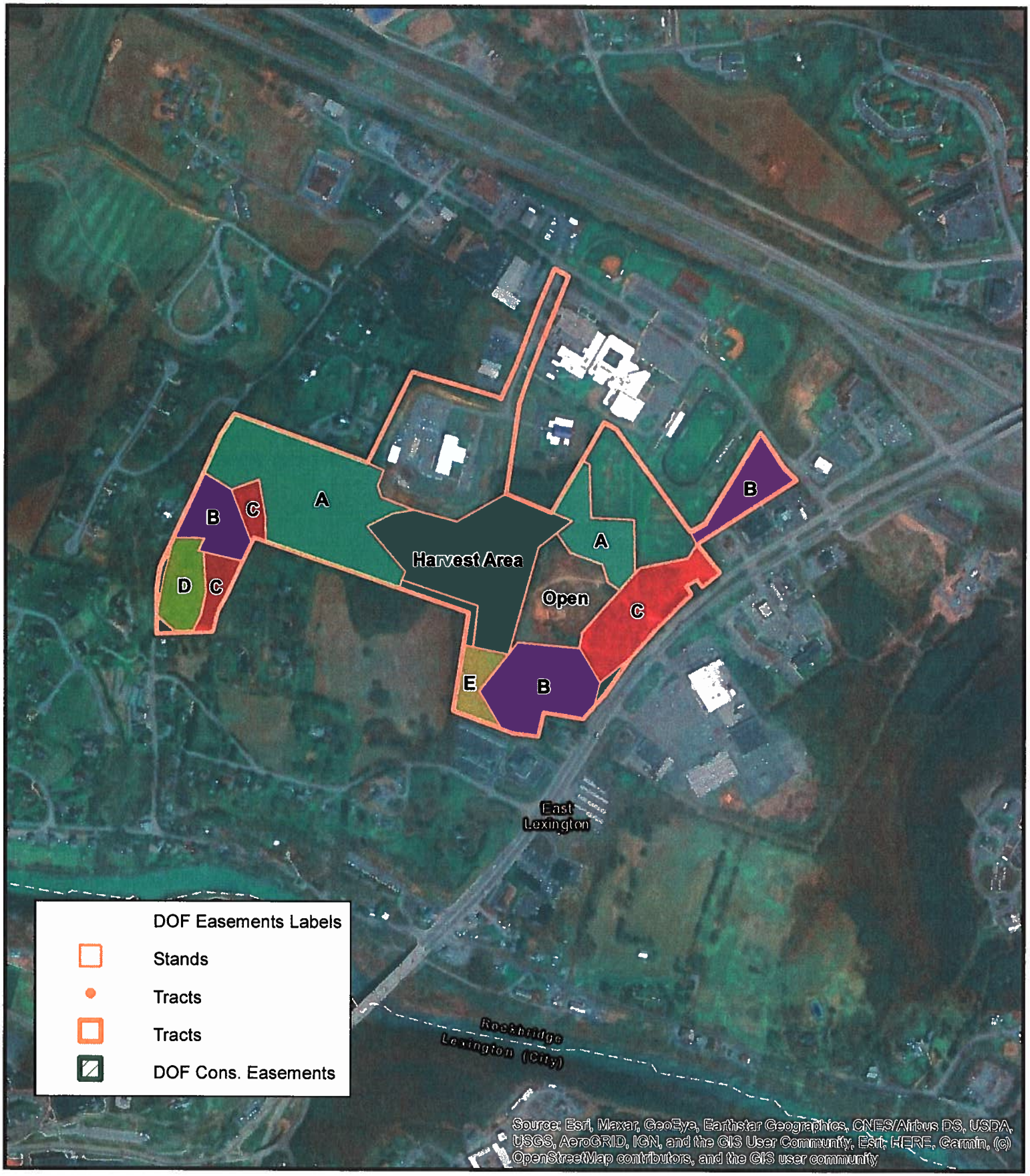
8/17/2020



N

Feet
0 325 650 1,300

STAND DATA SUMMARY

Stand	Forest Type	Acres	Year Estab.	Age	Site Index	Avg. DBH	Stocking/ Density	Stand Quality	Annual Growth	Other Important Stand Attributes (nat. regen., invasive plants, etc.)
A	Planted Pine	16.4	1984	36	>80 YP	11"	230 ft^2/ac	Good	Poor-Fair	Autumn Olive in understory
B	Mixed Pine/Hardwood	11.2	1984	36	>80 YP	13"	160 ft^2/ac	Fair-Good	Fair	
C	Mature Mixed Hardwoods	7.8		15-40	>80 YP	6-14"	Variable	Poor		Invasives present
D	Mixed Pine	2.6		15-20	>80 YP	8"	130 ft^2/ac	Poor	Poor	
E	Mature Mixed Hardwoods	1.8		70-80	>80 YP	16"	120 ft^2/ac	Good	Fair	

Parcel: Identifying letter or number for each parcel
Forest Type: **Pine** – by primary species
Pine/Hardwood – by primary species or major species group
Upland Hardwood – by pure species or major species group
Bottomland Hardwood – by pure species or major species group

Site Index: For dominant species present, indicate base age
Stocking/Density: Basal area or trees per acre
Other Important Stand Attributes: Is natural regeneration present?
Are there invasive plant species present?
(species and level of presence – heavy, moderate, low)

Non-Native Invasive Plant Species Control Treatments

Timing, Methods and Herbicide Rates

This is a list of management tactics for major invasive plants, not a comprehensive control plan. For recommendations specific to your property, consult a professional forester or land resource manager. Follow all label prohibitions, precautions and safety requirements during herbicide transport, storage, mixing and application.

	INVASIVE PLANT	CONTROL TIMING	CONTROL METHOD	HERBICIDE RATES	NOTES
GRASSES	Japanese Stiltgrass	Prior to seed maturity	Manual – hand pull		Remove all roots
		Prior to seed maturity	Mechanical – mow/cut repeatedly		To reduce seed formation
		Early summer	Foliar spray	Glyphosate 0.1%	Several years needed to control seed bank
		Late spring – late summer	Foliar spray	Sethoxydim 1.5% or Glyphosate 0.5%-2%	Several years needed to control seed bank
	Wavyleaf Grass	Prior to seed maturity	Manual – pull small areas		Follow-up treatment required
		Late spring – fall	Foliar spray	Glyphosate 2%	Several years (as needed)
		April – June	Foliar spray	Sethoxydim or Clethodim 1%	Several years (as needed); inconsistent control
HERBS/FORBS	Garlic Mustard	Late spring – early summer, prior to any seedpods maturing to brown	Manual – hand pull and remove taproot		Do not leave flowering plants on ground, seeds will form; bag/ remove flowering plants
		March – June, before seedpods	Mechanical – mow or cut		To reduce seed formation
		Late fall – winter is best, but susceptible any time	Foliar spray on evergreen leaves	Glyphosate or Triclopyr 2%	Dormant season timing protects many other species
VINES	Gen. Recommendations for All Vines	All year when soil is moist	Manual – hand pull small vines		Remove as many roots as possible to prevent resprouts
		Any	Manual or mechanical – cut to "treatable" height		Follow-up with foliar herbicide applied to resprouts
		June – October, through winter for evergreen species	Foliar spray	Glyphosate 2%-3% or Triclopyr 2%-5%	Several years (as needed)
		June – February	Basal spray	Triclopyr ester 20%-25%	Follow-up usually required
		June – August	Foliar spray	Metsulfuron 2-4 oz./acre	Several years (as needed)
		June – February, late summer – fall ideal	Cut stump	Glyphosate or Triclopyr ester 20%-25%	Follow-up usually required; highly selective and uses minimal herbicide
	Japanese Honeysuckle	Before seed formation	Foliar spray	Glyphosate 2%-3% or Triclopyr 2%-5%	Treat evergreen leaves on warm days in winter

Non-Native Invasive Plant Species Control Treatments

	INVASIVE PLANT	CONTROL TIMING	CONTROL METHOD	HERBICIDE RATES	NOTES
VINES, continued	Porcelain-berry	June to October, late summer – early fall ideal	Foliar spray	Triclopyr 2%-3%	Manual ineffective due to extensive root system
	Oriental Bittersweet	All year, late summer – fall ideal	Injection or hack-n-squirt	Triclopyr amine or Glyphosate undiluted	Vines more than 1 inch in diameter
	Mile-a-Minute	May – October	Manual/mechanical – hand pull, mow or cut repeatedly		Protect skin from thorns
		May – July	Foliar spray	Glyphosate 1% or Triclopyr 1%-2%	Likely to injure other plants
	Kudzu	All year	Manually remove all root crowns		
		All year	Mechanical – mow and cover with plastic sheeting		Leave sheeting in place two years
		July – September	Mechanical – cut or mow to ground		Many, many years needed
		June – October	Foliar spray	Picloram 3%	*Restricted use pesticide
		June – October	Foliar spray	Metsulfuron 3-4 oz./acre, Triclopyr 4%, Clopyralid 1.3 pt./acre, Aminopyralid 7 oz./acre	Repeat in successive years
		June – February	Basal spray	Triclopyr ester 20%	Woody stems
		June – February	Injection or hack-n-squirt	Imazapyr, Triclopyr amine or Glyphosate undiluted	Vines more than 1 inch in diameter
SHRUBS	Gen. Recommendations for All Shrubs	When soil is moist	Manual – hand pull small plants		Roots left in ground resprout
		When fruit is not present	Mechanical – cut or mow		Follow-up treatment required
		June – February	Foliar spray	Imazapyr or Dicamba 1% or Triclopyr 2%	Several years (as needed)
		June – February	Cut stump	Imazapyr 5%-10% or Glyphosate 20%	Selective, minimal herbicide
		June – February	Basal spray	Triclopyr ester 20%	
	Multiflora Rose	See General Recommendations for all shrubs			
		June – October	Foliar spray	Glyphosate 2%-4% or Triclopyr 1%	
	Autumn Olive	See General Recommendations for All Shrubs			
	Chinese Privet	See General Recommendations for All Shrubs			
TREES	Gen. Recommendations for All Trees	June-February	Injection or hack-n-squirt	Triclopyr or Imazapyr undiluted	Small to large trees
		July – February	Basal spray	Triclopyr ester 20%-25%	Saplings
	Tree-of-Heaven	See General Recommendations for All Trees			Follow-up usually required
		Summer – fall	Foliar spray	Triclopyr 2%	Seedlings, saplings, resprouts

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VDOF FT0031; 03/2017

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Rockbridge County, Virginia

State Land - VMI Lackey Tract

January 24, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:5,340 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rockbridge County, Virginia
Survey Area Data: Version 7, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 5, 2019—Feb 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
43E	Needmore-Opequon complex, 15 to 35 percent slopes	7.2	12.4%
58C	Shottower fine sandy loam, 8 to 15 percent slopes	23.0	39.8%
58D	Shottower fine sandy loam, 15 to 25 percent slopes	26.1	45.2%
71	Udorthents, smoothed-Urban land complex	1.5	2.7%
Totals for Area of Interest		**57.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Rockbridge County, Virginia

43E—Needmore-Opequon complex, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2qdc2
Mean annual precipitation: 29 to 41 inches
Mean annual air temperature: 53 to 56 degrees F
Frost-free period: 144 to 186 days
Farmland classification: Not prime farmland

Map Unit Composition

Needmore and similar soils: 55 percent
Opequon and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Needmore

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Mountaintop, mountainflank, interfluve, nose slope, side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from limestone and/or calcareous shale and/or siltstone

Typical profile

H1 - 0 to 5 inches: silt loam
H2 - 5 to 21 inches: clay
H3 - 21 to 33 inches: channery silty clay loam
H4 - 33 to 43 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Opequon

Setting

Landform: Hills, mountains

Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Mountainflank, mountaintop, side slope, interfluve, nose slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from limestone and/or calcareous shale and/or siltstone

Typical profile

H1 - 0 to 2 inches: silty clay loam
H2 - 2 to 14 inches: clay
H3 - 14 to 24 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: 12 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Hydric soil rating: No

58C—Shottower fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2qdcr
Mean annual precipitation: 29 to 41 inches
Mean annual air temperature: 53 to 56 degrees F
Frost-free period: 144 to 186 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Shottower and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Shottower

Setting

Landform: Stream terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear

Parent material: Old alluvium derived from limestone, sandstone, and shale and/or siltstone and/or dolomite

Typical profile

H1 - 0 to 7 inches: fine sandy loam
H2 - 7 to 15 inches: clay loam
H3 - 15 to 31 inches: clay
H4 - 31 to 50 inches: gravelly clay
H5 - 50 to 62 inches: very gravelly clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Forage suitability group: Moist, Fertile Soils (G128XM001VA)
Hydric soil rating: No

58D—Shottower fine sandy loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2qdcs
Mean annual precipitation: 29 to 41 inches
Mean annual air temperature: 53 to 56 degrees F
Frost-free period: 144 to 186 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Shottower and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Shottower

Setting

Landform: Stream terraces
Landform position (three-dimensional): Riser, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old alluvium derived from limestone, sandstone, and shale and/or siltstone and/or dolomite

Typical profile

H1 - 0 to 7 inches: fine sandy loam
H2 - 7 to 15 inches: clay loam
H3 - 15 to 31 inches: clay
H4 - 31 to 50 inches: gravelly clay
H5 - 50 to 62 inches: very gravelly clay

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Forage suitability group: Moist, Fertile Soils (G128XM001VA)
Hydric soil rating: No

71—Udorthents, smoothed-Urban land complex

Map Unit Setting

National map unit symbol: 2qddh
Mean annual precipitation: 29 to 41 inches
Mean annual air temperature: 50 to 56 degrees F
Frost-free period: 125 to 186 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 50 percent
Urban land: 45 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fill material

Properties and qualities

Slope: 0 to 35 percent
Depth to restrictive feature: More than 80 inches
Runoff class: Medium

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Description of Urban Land

Setting

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pavement

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Unranked

Minor Components

Holly

Percent of map unit: 1 percent
Landform: Backswamps on flood plains, depressions on flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Other vegetative classification: Wetlands (W3)
Hydric soil rating: Yes

Purdy

Percent of map unit: 1 percent
Landform: Depressions on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Maurertown

Percent of map unit: 1 percent
Landform: Depressions on stream terraces, backswamps on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Management

Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

Construction Limitations for Haul Roads and Log Landings (State Land - VMI Lackey Tract)

For limitations affecting the construction of haul roads and log landings, the ratings are based on slope, flooding, permafrost, plasticity index, the hazard of soil slippage, content of sand, the Unified classification of the soil, rock fragments on or below the surface, depth to a restrictive layer that is indurated, depth to a water table, and ponding.

The ratings are both verbal and numerical. Rating class terms indicate the degree to which the soils are suited to this aspect of forestland management. The limitations are described as slight, moderate, or severe. A rating of "slight" indicates that no significant limitations affect construction activities. "Moderate" indicates that one or more limitations can cause some difficulty in construction. "Severe" indicates that one or more limitations can make construction very difficult or very costly.

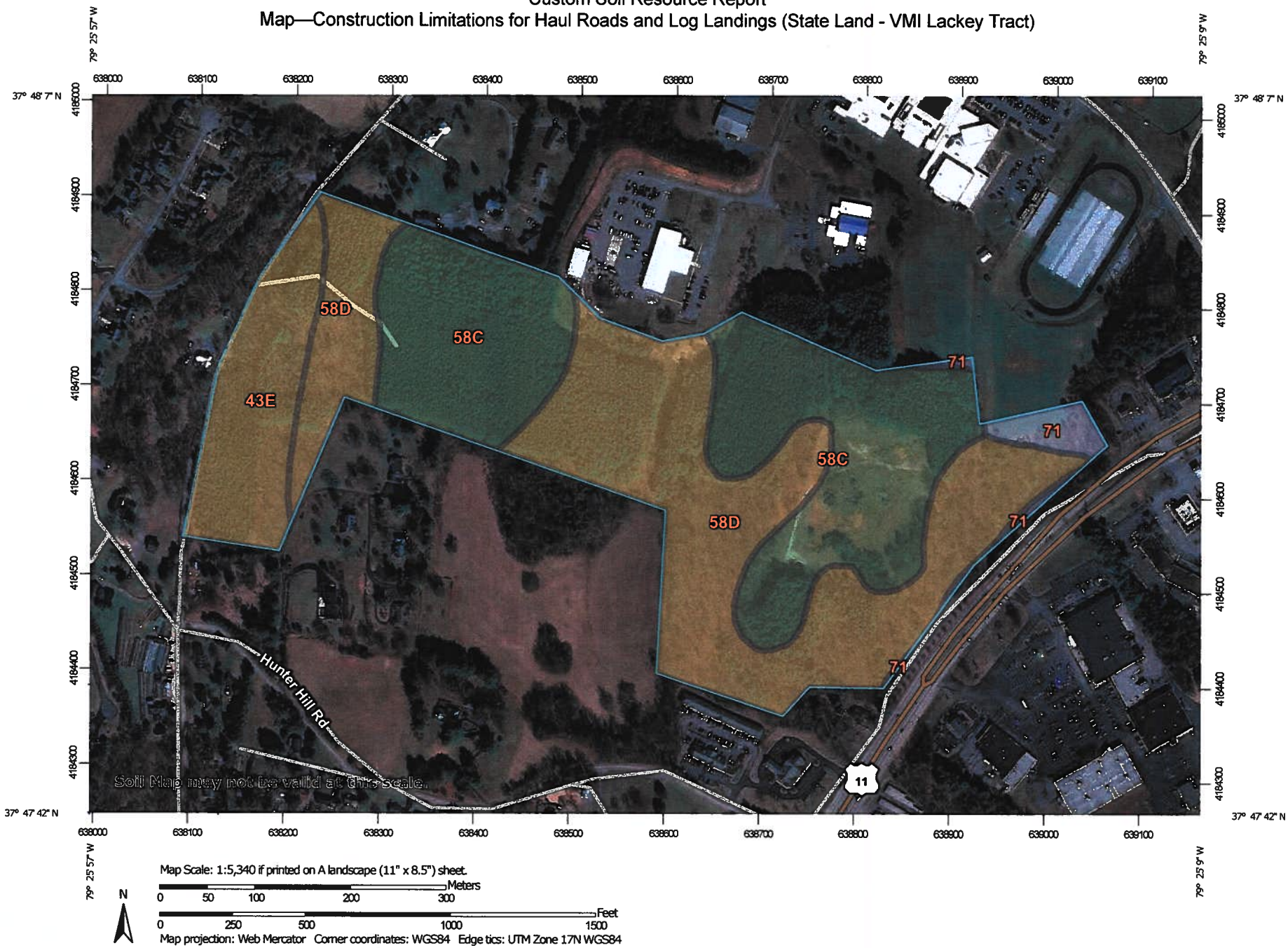
Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Custom Soil Resource Report

Map—Construction Limitations for Haul Roads and Log Landings (State Land - VMI Lackey Tract)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Background
- Aerial Photography

Soils

Soil Rating Polygons
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Lines
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Points
- Severe
- Moderate
- Slight
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rockbridge County, Virginia
Survey Area Data: Version 7, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 5, 2019—Feb 25, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Tables—Construction Limitations for Haul Roads and Log Landings (State Land - VMI Lackey Tract)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
43E	Needmore-Opequon complex, 15 to 35 percent slopes	Moderate	Needmore (55%)	Slope (0.50) Dusty (0.12)	7.2	12.4%
58C	Shottower fine sandy loam, 8 to 15 percent slopes	Slight	Shottower (90%)	Dusty (0.06)	23.0	39.8%
58D	Shottower fine sandy loam, 15 to 25 percent slopes	Moderate	Shottower (85%)	Slope (0.50) Dusty (0.06)	26.1	45.2%
71	Udorthents, smoothed-Urban land complex	Not rated	Udorthents (50%) Urban land (45%)		1.5	2.7%
Totals for Area of Interest					**57.9**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Moderate	33.3	57.6%
Slight	23.0	39.8%
Null or Not Rated	1.5	2.7%
Totals for Area of Interest	**57.9**	**100.0%**

Rating Options—Construction Limitations for Haul Roads and Log Landings (State Land - VMI Lackey Tract)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Recreational Development

Recreational Development interpretations are tools designed to guide the user in identifying and evaluating the suitability of the soil for specific recreational uses. Example interpretations include camp areas, picnic areas, playgrounds, paths and trails, and off-road motorcycle trails.

Off-Road Motorcycle Trails (State Land - VMI Lackey Tract)

Off-road motorcycle trails are intended primarily for recreational use. They require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely.

The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

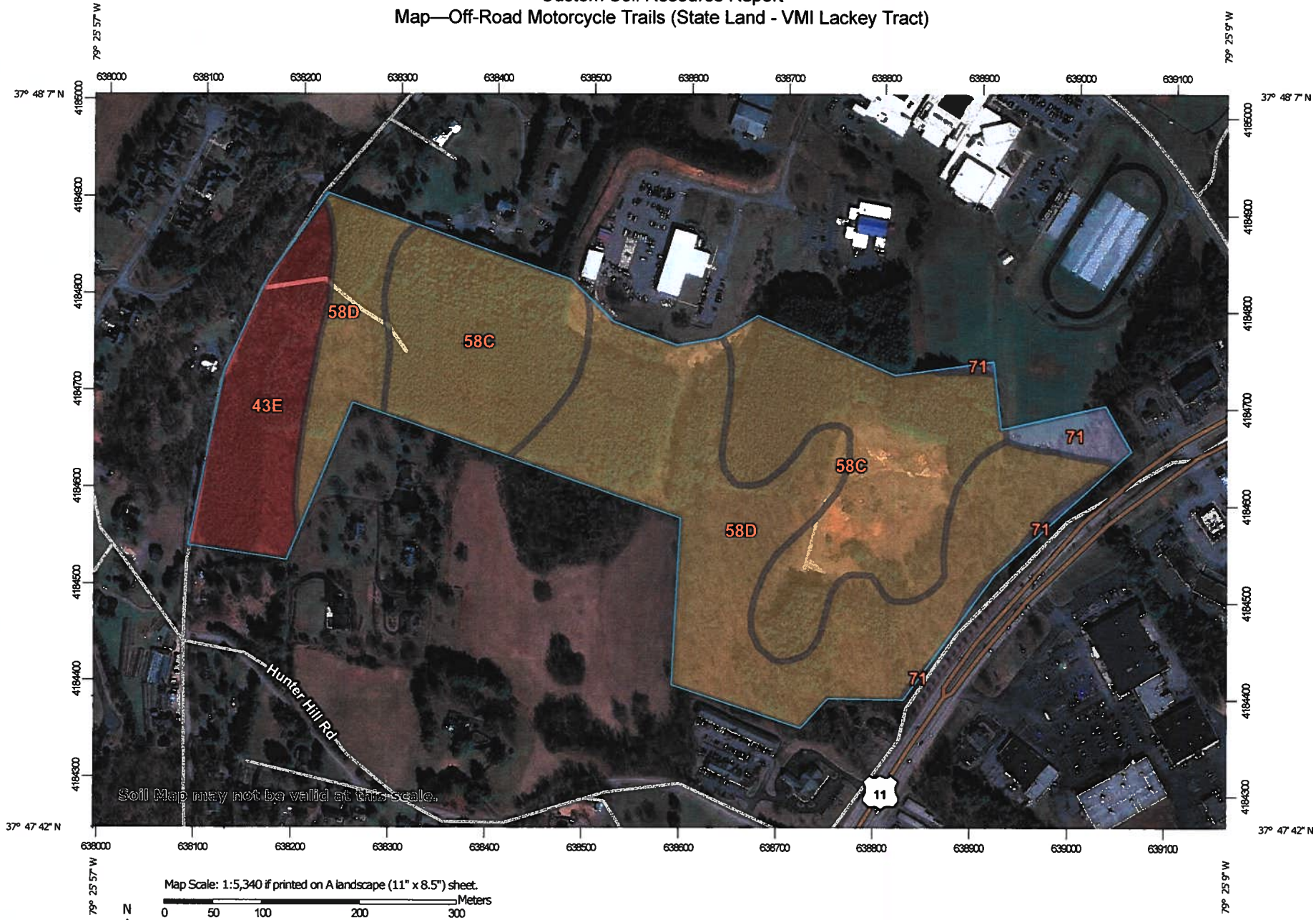
The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Custom Soil Resource Report
Map—Off-Road Motorcycle Trails (State Land - VMI Lackey Tract)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Background
- Aerial Photography

Soils

Soil Rating Polygons
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Lines
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Points
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Tables—Off-Road Motorcycle Trails (State Land - VMI Lackey Tract)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
43E	Needmore-Opequon complex, 15 to 35 percent slopes	Very limited	Needmore (55%)	Water erosion (1.00)	7.2	12.4%
				Dusty (0.12)		
58C	Shottower fine sandy loam, 8 to 15 percent slopes	Somewhat limited	Shottower (90%)	Dusty (0.06)	23.0	39.8%
58D	Shottower fine sandy loam, 15 to 25 percent slopes	Somewhat limited	Shottower (85%)	Dusty (0.06)	26.1	45.2%
71	Udorthents, smoothed-Urban land complex	Not rated	Udorthents (50%)		1.5	2.7%
			Urban land (45%)			
Totals for Area of Interest					**57.9**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Somewhat limited	49.1	84.9%
Very limited	7.2	12.4%
Null or Not Rated	1.5	2.7%
Totals for Area of Interest	**57.9**	**100.0%**

Rating Options—Off-Road Motorcycle Trails (State Land - VMI Lackey Tract)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Vegetative Productivity

Vegetative productivity includes estimates of potential vegetative production for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture and rangeland. In the underlying database, some states maintain crop yield data by individual map unit component. Other states maintain the data at the map unit level. Attributes are included for both, although only one or the other is likely to contain data for any given geographic area. For other land uses,

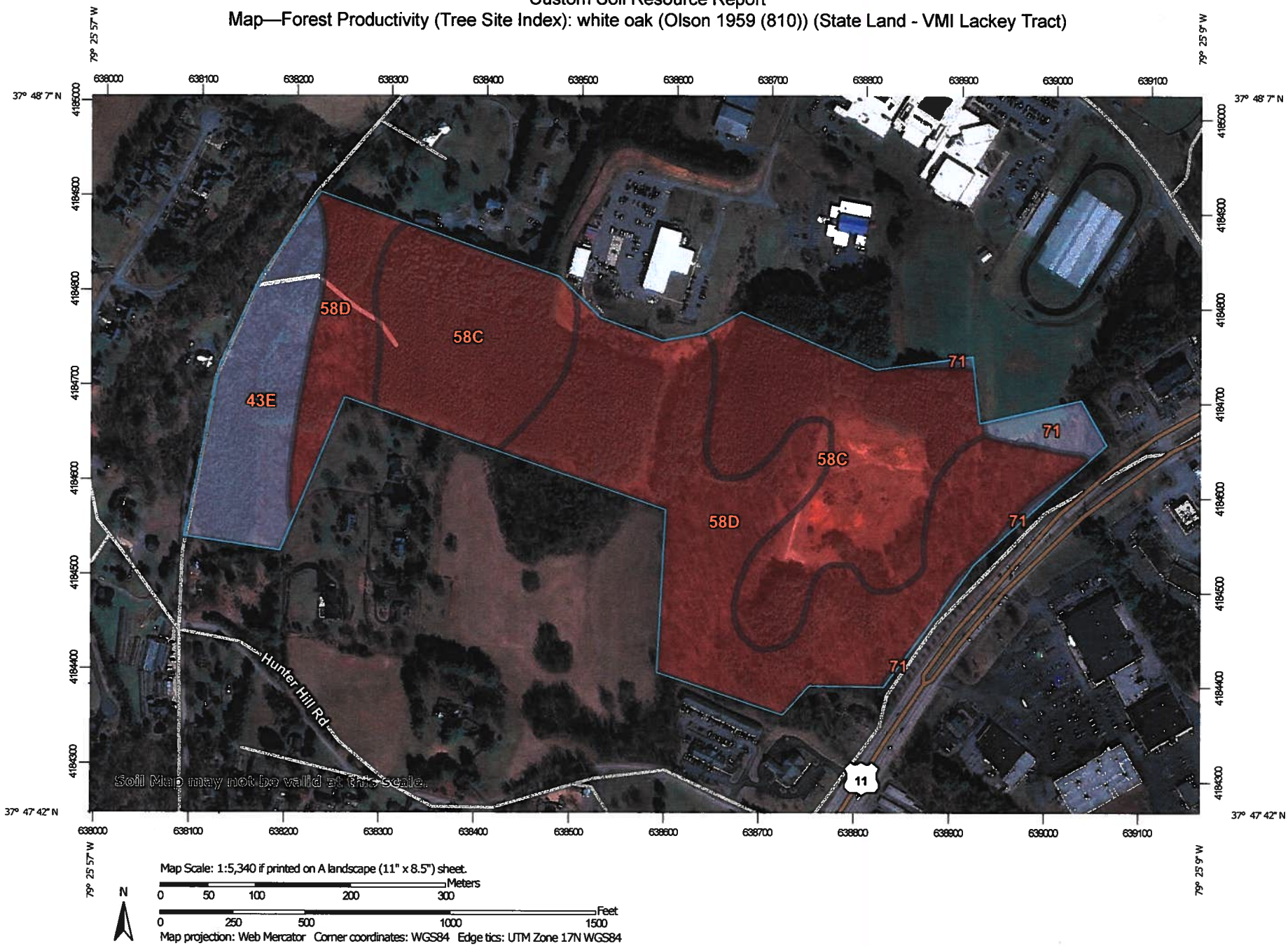
productivity data is shown only at the map unit component level. Examples include potential crop yields under irrigated and nonirrigated conditions, forest productivity, forest site index, and total rangeland production under of normal, favorable and unfavorable conditions.

Forest Productivity (Tree Site Index): white oak (Olson 1959 (810)) (State Land - VMI Lackey Tract)

The "site index" is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this attribute, only the representative value is used.

Map—Forest Productivity (Tree Site Index): white oak (Olson 1959 (810)) (State Land - VMI Lackey Tract)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

= 70

Not rated or not available

Soil Rating Lines

= 70

Not rated or not available

Soil Rating Points

= 70

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Forest Productivity (Tree Site Index): white oak (Olson 1959 (810)) (State Land - VMI Lackey Tract)

Map unit symbol	Map unit name	Rating (feet)	Acres in AOI	Percent of AOI
43E	Needmore-Opequon complex, 15 to 35 percent slopes		7.2	12.4%
58C	Shottower fine sandy loam, 8 to 15 percent slopes	70	23.0	39.8%
58D	Shottower fine sandy loam, 15 to 25 percent slopes	70	26.1	45.2%
71	Udorthents, smoothed-Urban land complex		1.5	2.7%
Totals for Area of Interest			**57.9**	**100.0%**

Rating Options—Forest Productivity (Tree Site Index): white oak (Olson 1959 (810)) (State Land - VMI Lackey Tract)

Units of Measure: feet

Tree: white oak

Site Index Base: Olson 1959 (810)

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

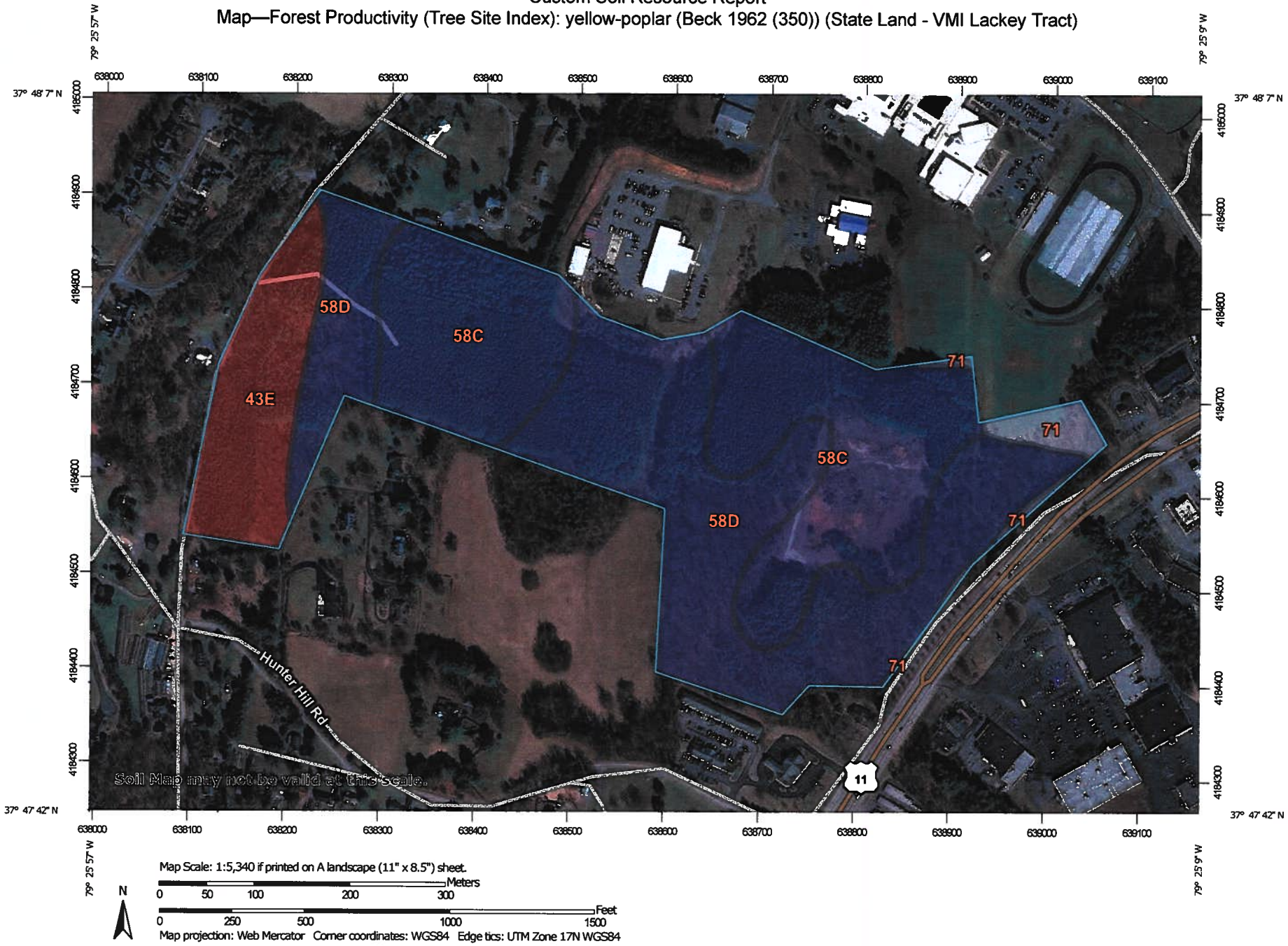
Interpret Nulls as Zero: No

Forest Productivity (Tree Site Index): yellow-poplar (Beck 1962 (350)) (State Land - VMI Lackey Tract)

The "site index" is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this attribute, only the representative value is used.

Map—Forest Productivity (Tree Site Index): yellow-poplar (Beck 1962 (350)) (State Land - VMI Lackey Tract)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

<= 80

> 80 and <= 90

Not rated or not available

Soil Rating Lines

<= 80

> 80 and <= 90

Not rated or not available

Soil Rating Points

<= 80

> 80 and <= 90

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Forest Productivity (Tree Site Index): yellow-poplar (Beck 1962 (350)) (State Land - VMI Lackey Tract)

Map unit symbol	Map unit name	Rating (feet)	Acres in AOI	Percent of AOI
43E	Needmore-Opequon complex, 15 to 35 percent slopes	80	7.2	12.4%
58C	Shottower fine sandy loam, 8 to 15 percent slopes	90	23.0	39.8%
58D	Shottower fine sandy loam, 15 to 25 percent slopes	90	26.1	45.2%
71	Udorthents, smoothed-Urban land complex		1.5	2.7%
Totals for Area of Interest			**57.9**	**100.0%**

Rating Options—Forest Productivity (Tree Site Index): yellow-poplar (Beck 1962 (350)) (State Land - VMI Lackey Tract)

Units of Measure: feet

Tree: yellow-poplar

Site Index Base: Beck 1962 (350)

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

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