

**Orange Water & Sewer Authority  
Meadow Crest South Property  
Orange County, North Carolina**

**Forest Stewardship Plan**



**Prepared by David Halley  
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**[www.truenorthforestry.biz](http://www.truenorthforestry.biz)**

**September 10, 2020**

**FOREST STEWARDSHIP PLAN  
FOR THE  
ORANGE WATER & SEWER AUTHORITY (OWASA)  
MEADOW CREST NORTH**

**400 Jones Ferry Road  
Carrboro, North Carolina 27510**

Phone: 919-537-4276

**Examined by:** David Halley, Registered Forester/ Certified Forester®.

**Location:** The property is located on the south side of Teer Road west of Orange Grove Road in Orange County, North Carolina. Meadow Crest Drive bisects the property. From Carrboro, take Highway 54 west; turn right onto Orange Grove Road. After 2.5 miles, turn left on Teer Road. After two miles you will see Meadow Crest Drive on your left. Turn on to Meadow Crest Drive. The property is accessed from this road and there is a locked gate about halfway down Meadow Crest Road that restricts access. Most of this property is not located within the Cane Creek Reservoir Watershed. All but the northern end of this property is part of the Collins Creek Watershed.

**Access:** Access is excellent. There are multiple access points. The north and east sides of the property are accessible from Meadow Crest Drive, off either Teer Road on the north end or Orange Grove Road on the east end. Meadow Crest Drive starts from Teer Road and goes through the property and then exits into Orange Grove Road. The portion of Meadow Crest Drive that goes through Meadow Crest South property is gated at both ends and is locked with an OWASA lock. This connector road is well maintained and graveled. The southern portion of the property can be accessed via Berry Andrews Road, off Orange Grove Road.

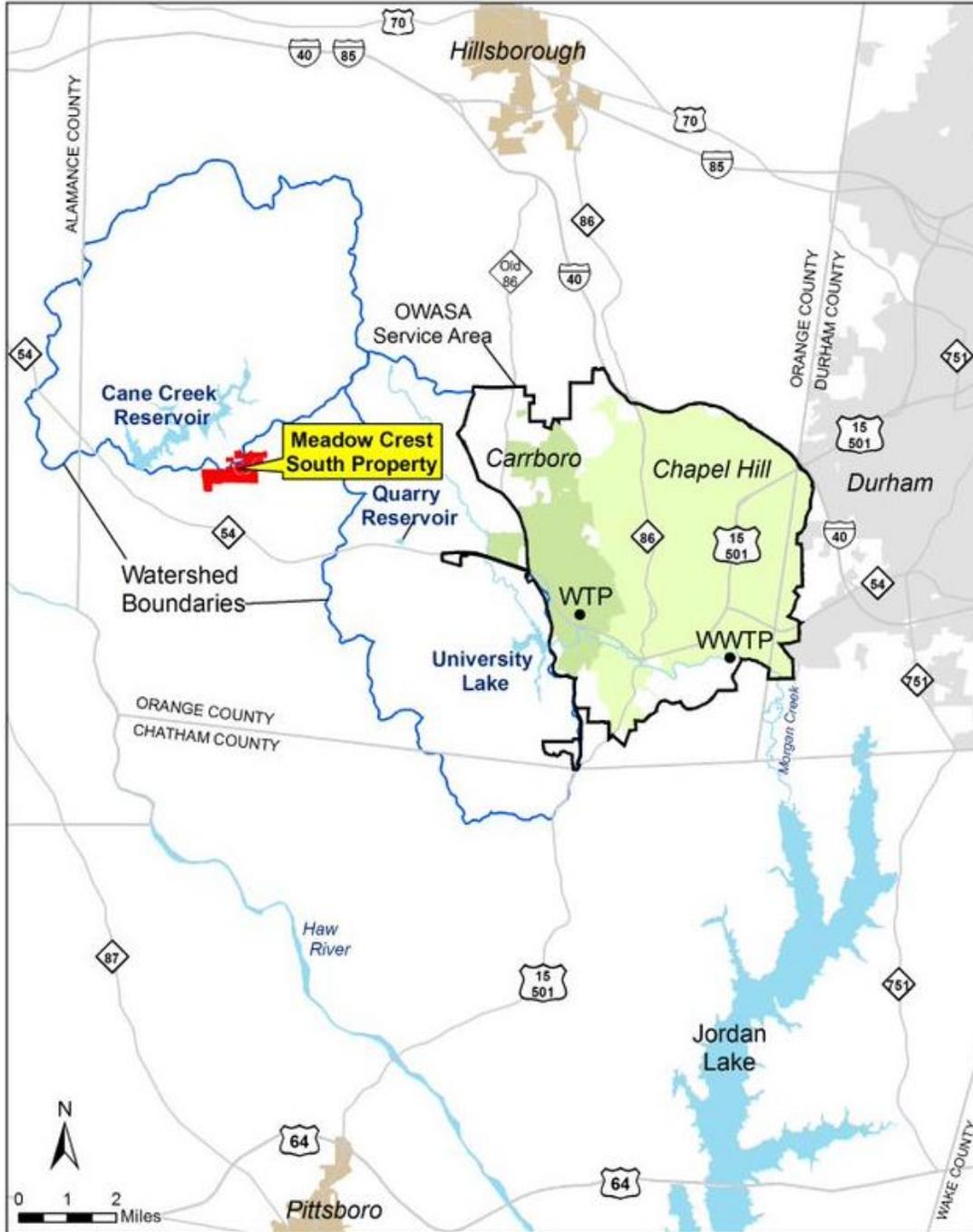
**Ownership Details:** The Meadow Crest South Land is a ± 364-acre property owned by the Orange Water and Sewer Authority (OWASA). Most of the property was purchased in 1993 by OWASA for the purpose of the beneficial reuse of biosolids on agricultural land. Currently 11% of the property is cleared for biosolids, and OWASA does not anticipate needing to clear additional land on this property for biosolids over the next ten years. However, if additional cleared land is required to meet operational needs, OWASA will modify this Plan and inform the community of the change.

The title and plat map for the property is listed in the Register of Deeds office, Orange County Book 1160, Page 549 (PIN #: 973960792, 9830800714, 9830709294, 9739890784, 973989539, 9739990682, 9739995569, 9749090631, 9749093682, 9749096856, 9840007305, 9840100719, 9840018362, 9840113398, 9840128118, 9840120175, 9840024123, 9840010975, 9830919565, 9830919140, 9830908625, 9830901439, 9830819048,

9830910918, 9830829481, and 9830810781) under the name of Orange Water & Sewer Authority.

**Special Conservation Easement:** There are no special conservation easements or Clean Water Management Trust Fund easements on this property.

**General Property Location**



## INTRODUCTION

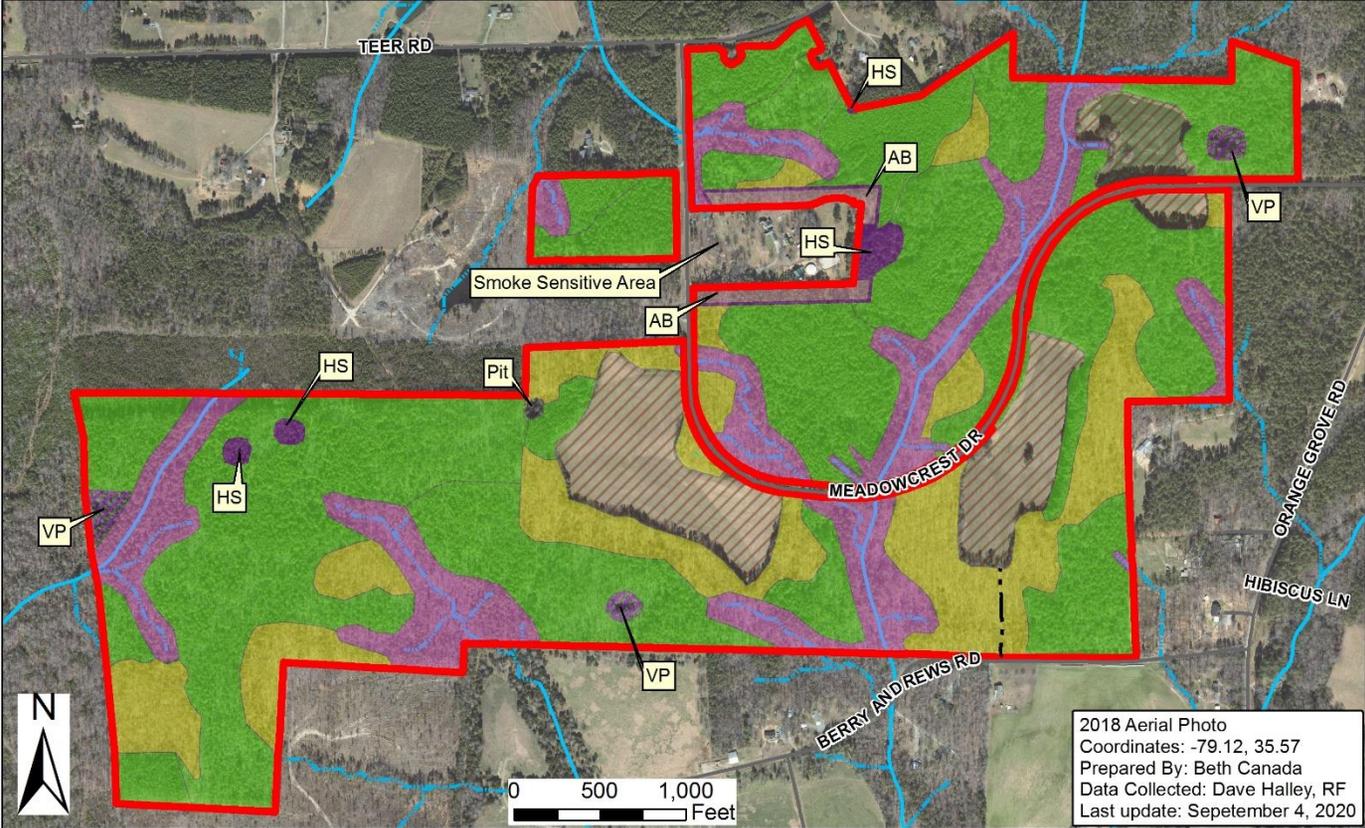
This Forest Stewardship Plan is prepared to assist OWASA in developing a set of action steps to protect and enhance the natural resources of their property. This Plan's intent is to ensure that the forest management of the property is done in a manner that protects water quality now and for the future generations by following science-based principles to manage their forest lands so they are healthy, diverse, resilient, and sustainable.

This Plan covers the examination of approximately 335 acres of forestland on the property. Approximately 40 acres of the property are in agricultural fields. Based on forest-timber type, age of trees, and/or management recommendations the property has been divided into nine separate management units. Complete descriptions and management recommendations are provided for each of the Management Units. The boundaries and acreages of these Management Units are only estimates and have been derived from aerial photographs.

Here is the general breakdown of the different forest cover types identified on the Meadow Crest South property:

<b>Forest Type</b>	<b>Acreage</b>	<b>% of Property</b>
<b>Natural Pine</b>	198.5	53%
<b>Upland Hardwood</b>	62	16%
<b>Riparian Forest Buffer</b>	64.5	17%
<b>Historic Sites</b>	3	<1%
<b>Aesthetic Buffer</b>	5	1%
<b>Vernal Pools</b>	3	<1%
<b>Agricultural Field</b>	40	11%
<b>TOTAL</b>	<b>376</b>	<b>100 %</b>

### Meadow Crest South - Existing Forest Cover Type



2018 Aerial Photo  
 Coordinates: -79.12, 35.57  
 Prepared By: Beth Canada  
 Data Collected: Dave Halley, RF  
 Last update: Sepetember 4, 2020

**Legend**

- - - Forest Road/Trail
- Named Road
- Drainages
- USGS Streams
- ▭ Meadow Crest South Boundary

**Existing Forest Type**

- ▭ Natural Pine
- ▭ Upland Hardwood
- ▭ Riparian Buffer
- ▭ Aesthetic Buffer (AB)
- ▭ Historic Site (HS)
- ▭ Vernal Pool (VP)
- ▭ Field
- ▭ Pit

Maps of the property with general locations of each management unit are located at the beginning of the Forest Stewardship Plan (pages 17-19). Please refer to the maps as you read the Plan. This Plan also includes proposed timetables for specific management activities on each management unit (located on pages 69-71). However, it should be recognized that the actual timing and sequence of management activities will be different from that shown in this plan due to several factors, such as: available resources; weather conditions; and market conditions. The timetable and prescriptions should be flexible and adaptive to meet the needs and objectives of the landowners. Although the Plan scope covers projects beyond 10 years, this Plan should be reviewed and revised in about 10 years (2030). We have tried to estimate expenses for some of the conservation practices recommended in the Plan, but these too may vary depending on availability of contractors, timing, and material costs. Cost-share assistance can be obtained from State and Federal cost-share programs for many of the recommended forest management measures we have described in this Plan.



**Gate on Meadow Crest Drive, the one closest to Orange Grove Road**

This Plan has been specifically developed to match OWASA's ownership objectives with good land management practices. The plan contains a detailed description of the natural resources of the property along with specific management recommendations for consideration. To maximize your understanding of the terms used in this draft stewardship plan we recommend reviewing the "Glossary of Forestry Management Terms" that the North Carolina Forest Service has developed. This brochure should be helpful in looking up unfamiliar terms used in the proposal. A copy of the glossary is available at:

<https://www.ncforestservice.gov/publications/Forestry%20Leaflets/FM01.pdf>

**Topography:** The topography of the property ranges from gently to moderately sloping (2 to 15% slopes). Topographic maps of the area show that the elevation of the property ranges from the high of 590 feet to just under 520 feet above sea level in a main creek. This piedmont terrain is characterized by a series of broad ridges that generally run north to south and are divided by narrow drainages. These drainages flow into intermittent and perennial streams that eventually flow into Collins Creek. Collins Creek eventually flows into the Haw River, on the border of Alamance and Chatham County. The Haw River is part of the Cape Fear River Basin and the main tributary to Jordan Lake.

**Cultural, Historical, and Archeological Resources:** Portions of the property were once farmed, where the terrain and gentle slopes were most conducive to farming. Most of the agricultural activities ceased on the property around the early 1950's and many of the fields reverted to woodland. OWASA still maintains three fields totaling 40 acres in agriculture for the beneficial reuse of biosolids. We located four historic sites on the property and labeled them as Historic Sites (HS) on the maps. They are remnants of the past farming days and include two old homesites, barn and a small house. Some are younger in construction and still standing, while others are older and a little more than a stone chimney, with a wooden foundation. These old homesites should be maintained to provide a look back in history. The property also has numerous manmade ditches that bisect several areas on the property.



**Old Homesite**

We recommend that a buffer be placed around each of these historic sites. These areas should be protected during any timber harvesting activity adjacent to them. No active management is recommended to occur within these areas at this time.

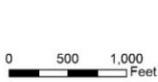
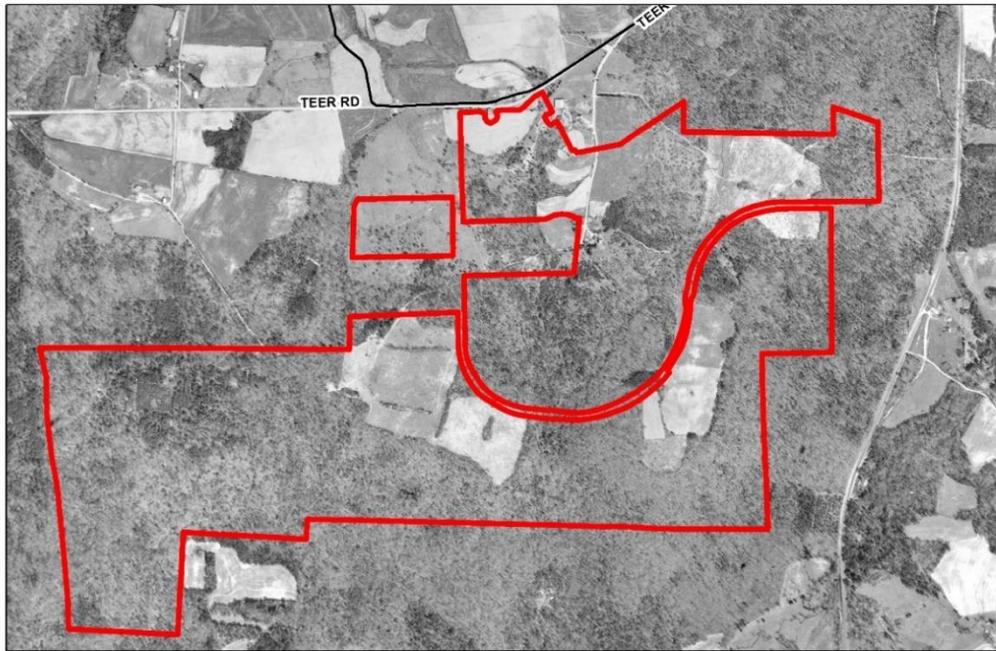
For each area, a buffer should be flagged around it and referred to it as a “no entry” area for timber harvest. This is to make sure harvesting equipment does not enter these buffers.



**Log home or shed**

Here is a historic aerial photograph taken of the property in 1955 which compares it to a 2018 aerial photograph of the same property.

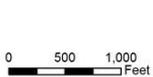
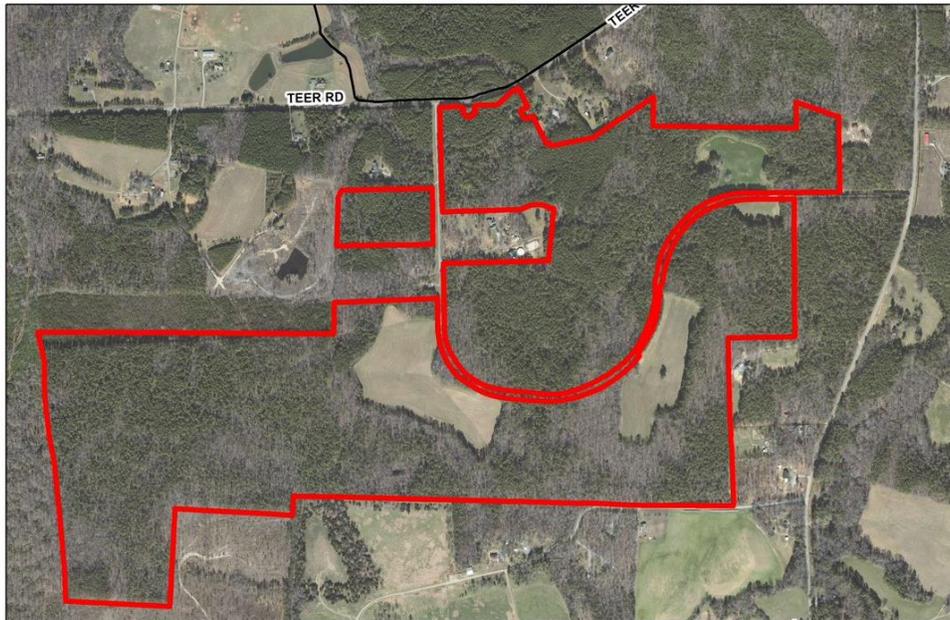
Meadow Crest South - 1955 Aerial Photo



1955 Aerial Photo  
Coordinates: -79.12, 35.57  
Prepared By: Beth Canada  
Data Collected: Dave Halley, RF  
Last update: May 29, 2020

 Meadow Crest South Boundary  
 Meadow Crest North Boundary

Meadow Crest South - 2018 Aerial Photo



2018 Aerial Photo  
Coordinates: -79.12, 35.57  
Prepared By: Beth Canada  
Data Collected: Dave Halley, RF  
Last update: May 29, 2020

 Meadow Crest South Boundary  
 Meadow Crest North Boundary

**Threatened and Endangered Species:** During the examination of property no endangered species were encountered or are known to exist within OWASA's property boundaries. A cooperative publication called *Threatened and Endangered Species in Forests of North Carolina* listed several species as endangered/threatened in Orange County. The publication lists Michaux's sumac (*Rhus michauxii*), small whorled pogonia (*Isotria medeoloides*), and smooth coneflower (*Echinacea laevigata*) as plant species of concern, threatened, or endangered; but their populations are historical, and no known populations currently exist in Orange County.

After submitting the boundaries of the property to the North Carolina Natural Heritage Program's Natural Heritage Data Explorer a report was produced listing the occurrences on the property or within two miles of the property's boundaries. That report identified the occurrence of a North Carolina Threatened mussel (Squawfoot/Creeper – *Strophitus undulates*), and a North Carolina Endangered mussel (Carolina Creekshell – *Villosa vaughaniana*) within two miles of property.



**Carolina Creekshell**

Following North Carolina Best Management Practices for forestry operations should help avoid negative impacts on the mollusks and their habitat. With our riparian forest buffer plan and a “no harvest” 50 to 150-foot riparian buffer zone on all streams, we should have more than enough undisturbed buffer to avoid sedimentation from soil disturbance and pesticide applications from forestry operations that might occur near them.

For additional information on these species or other state-listed threatened and endangered species in North Carolina contact the North Carolina Wildlife Resources Commission (919-707-0050) or the North Carolina Natural Heritage Program (919-733-4181). OWASA will continue to follow or exceed all applicable Best Management Practices related to Water Quality for North Carolina.

**Forests of Recognized Importance:** Based on American Forest Foundation criteria, there are no Forests of Recognized Importance (FORI) known to exist on the property.

**Exotic, Invasive Species:** Based on our field visits, OWASA does have some populations of exotic (non-native), invasive species on the property. The primary exotic invasives on the property are Tree-of-Heaven (*Ailanthus altissima*) and Autumn olive (*Elaeagnus umbellata*). These aggressive non-native scrubs occur in patches and isolated areas throughout the property and will continue to be a problem if not addressed. Other species we ran across, but not in such large numbers or populations, were Japanese stilt grass (*Microstegium vinineum*), Chinese privet (*Ligustrum sinense*) and multi-floral rose (*Rosa multiflora*).

The disturbances created by a timber harvest could rapidly promote the expansion of invasive exotic species on the property, so monitoring and control will be important. Of particular note is Tree-of-Heaven (*Ailanthus altissima*), which the NC Department of Agriculture has identified as important to the life cycle of an emerging threat – the invasive exotic spotted lanternfly (*Lycorma delicatula*), which has been a very destructive pest in other states. Tree-of-Heaven appears to be the preferred host for late stage nymphs and adults.



**Spotted Lanternfly**

Here are two links to information on spotted lanternfly:

<https://caldwell.ces.ncsu.edu/2019/07/spotted-lanternfly/>

<https://www.ncagr.gov/PLANTINDUSTRY/plant/entomology/documents/SpottedLanternflyPestWatch.pdf>

Further management will involve monitoring and eradicating populations of exotic, invasive species we find, if biologically possible and economically feasible. A good resource for identification and control and these species is the U.S. Department of Agriculture's publication called *Nonnative Invasive Plants of Southern Forests: Field Guide for Identification and Control* (GTR SRS-62).



**Tree-of-Heaven**

**Property Lines:** The property lines on the property are fairly well marked but should be a priority by OWASA staff to refresh them. It is important that these property lines be repainted and maintained on a regular basis, every five to eight years. Defining these property lines has helped to establish the boundary between OWASA and their neighbors. It should also help to reduce trespass, encroachment, timber theft, and recreational liability. Even more importantly it will help with our forest management work and kept us from encroaching onto adjacent properties during our management activities.



**Property corner**

## Key Protection Measures:

Several key management measures will be common throughout the entire tract and are essential for minimizing impacts on the environment and adjacent landowners. These are:

### 1. Protection of Water Quality

**Water quality protection is OWASA's highest priority on managed lands.** All plans developed will outline what strategies or measures are being utilized to protect water quality during land disturbing activities. They will describe or require the use of best practices to minimize soil disturbance, erosion, and sedimentation. At a minimum OWASA will follow or exceed North Carolina Forest Service Forest Practices Guidelines Related to Water Quality and follow or exceed the appropriate state watershed buffer rules.

Protection of riparian buffer areas on the tract will be an essential component of OWASA's water quality protection objective. Through field investigation and review of high-resolution topographic maps, we identified riparian buffer areas in which timber removal should either not occur or only be conducted if essential to control disease, insect damage, etc. Our investigation identified about 65 acres of buffer area for this property that should be protected, which includes riparian buffers along about 8,000 linear feet of perennial streams. The riparian buffer widths will be a minimum of 50 feet; however, OWASA has voluntarily adopted a strategy of creating 150-foot buffers along perennial streams and 100-foot wide buffers along intermittent streams. **Riparian forest buffers have been designated for roughly 20% of this property.**

Our recommended riparian buffer areas are significantly greater than that required under the State's Jordan Lake Watershed Riparian Buffer Rules, which require a 50-foot wide buffer area along perennial and intermittent streams. Our plan is to flag, paint and carefully monitor the riparian buffer areas to ensure that they are protected during timber harvesting activities on the property.

### 2. Reduce the Risk of Wildfires

The Plan recommends the use of prescribed burning to reduce the risk of damaging wildfires, to aid in forest regeneration, and to improve the biological diversity and restoration on-site. These burning events will be carefully planned and tightly controlled by trained experts to significantly reduce the chance of fire spreading and to minimize the impacts from smoke. Controlled burns will be closely coordinated with the North Carolina Forest Service, and advanced notice will be provided to surrounding property owners. The intention of the periodic prescribed burns is to reduce understory fuel levels that will reduce the impact and intensity of a possible wildfire.

A network of access roads within this property will be designed and located to complement our wildfire risk management objective, such as maintenance of fire breaks and ensuring timely access for fire-fighting equipment. A network of roads and firebreaks will also serve as another line of defense against wildfire spread. Where possible, and can be done safely, streams and wet drainages should be utilized as natural fire breaks during prescribed burns. This will help to avoid or minimize the potential soil erosion problems that can occur from the soil disturbance created from heavy equipment blading or plowing fire lines. Where possible low-intensity prescribed fire should be allowed to creep through these riparian forest buffers or burned outward from the stream. A study done by the North Carolina Forest Service and the U.S. Forest Service in an adjoining county showed no negative water quality impacts when this practice is implemented. The study also showed that soil disturbance from fire lines created within the transitional ecotone of the riparian corridor creates a potential soil erosion problem and a wildlife barrier. Also, where appropriate, hand dug lines or hand fire lines created with leaf-blowers and hand rakes, can help to minimize soil disturbance.



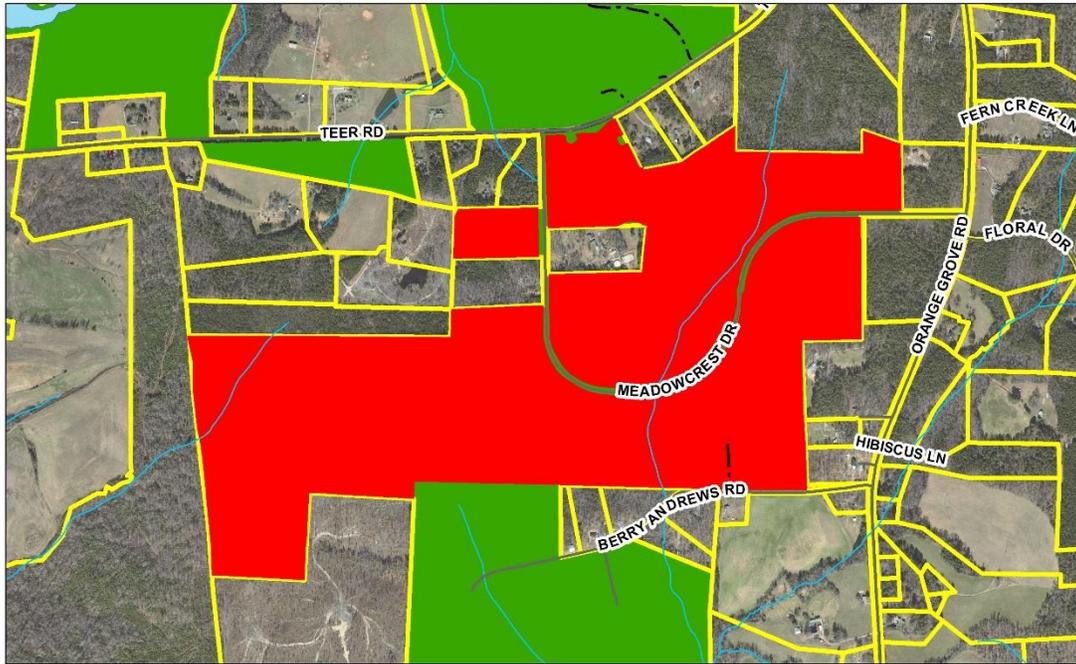
**NC Forest Service on prescribed burn at OWASA's Cane Creek Mitigation Tract: April 2018**

### **3. Mitigate Adverse Impacts on Neighbors and Surrounding Community.**

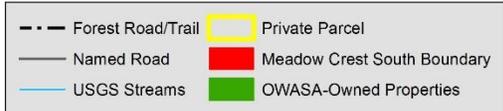
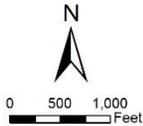
As part of their management objectives OWASA will strive to mitigate any adverse impacts forest management activities may have on their neighbors. This objective involves providing neighbors with opportunities to review the draft Forest Stewardship Plans near their properties and to provide them opportunities to

provide input, share their concerns, and where applicable, suggest how OWASA might mitigate any adverse impacts to their neighbors while still being able to meet its management needs. All plans will also address and design aesthetic or viewshed buffers where appropriate. OWASA staff will keep adjacent landowners and other interested parties informed of their efforts and the schedule of forest management activities at those properties.

### Meadow Crest South



2018 Aerial Photo  
 Coordinates: -79.12, 35.57  
 Prepared By: Beth Canada  
 Data Collected: Dave Halley, RF  
 Last update: May 29, 2020



## **OWASA'S MISSION**

**We are a community-owned utility providing our customers high quality and reliable water, wastewater, and reclaimed water services through responsible and creative stewardship of the resources we manage.**

## **FOREST MANAGEMENT VISION STATEMENT**

Protect water quality now and for future generations by following science-based principles to manage our forest lands so they are healthy, diverse, resilient, and sustainable.

## **LANDOWNER OBJECTIVES**

The primary objectives OWASA has identified for management of its forest resources are:

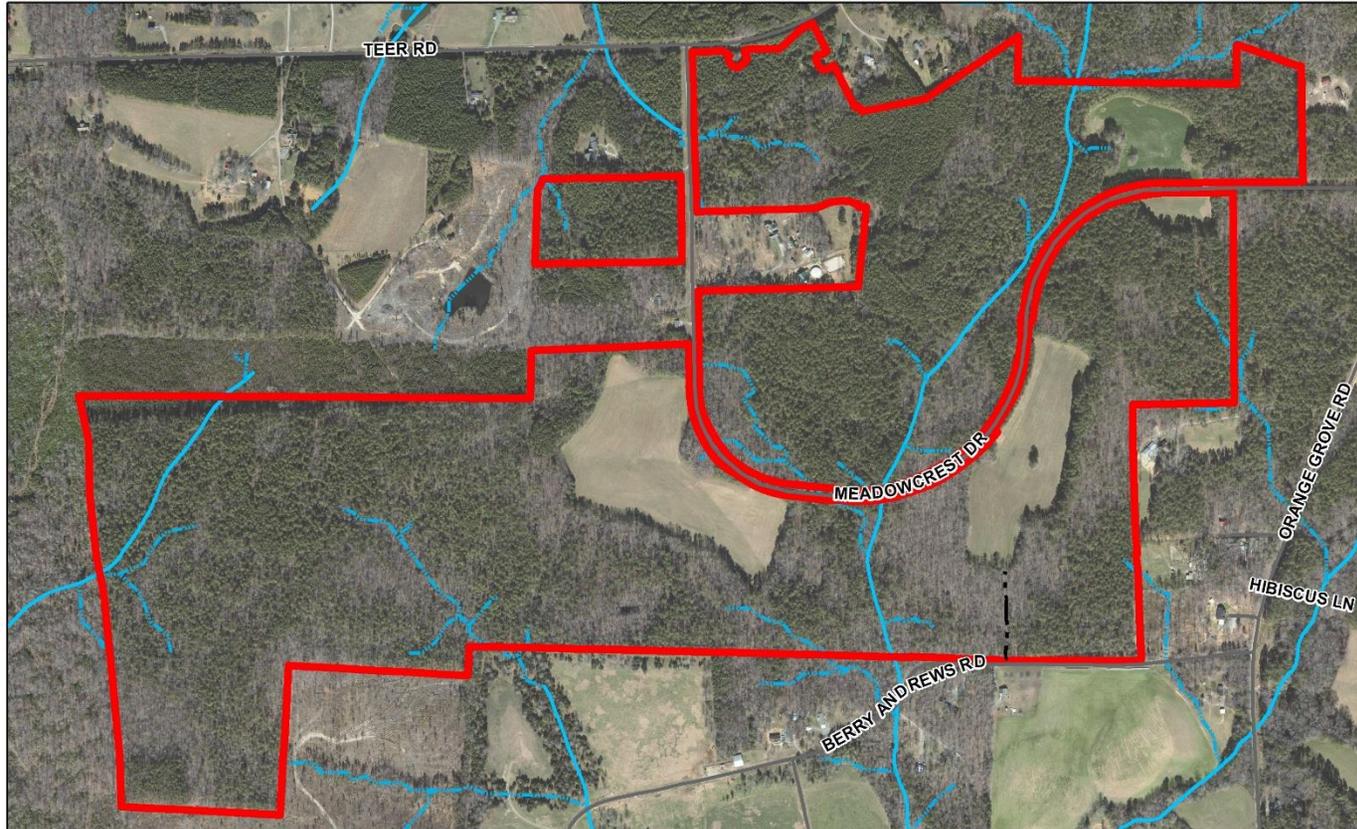
- To protect water quality, OWASA's highest priority.
- To improve ecological health of forested lands.
- To reduce the risk of wildfires.
- To improve wildlife habitat and species diversity.
- To sustainably manage OWASA's resources.
- To engage the community and partner organizations.
- To minimize the adverse impacts on neighbors and surrounding community.

Active and sustainable management of the forest resources on the property will be key to achieving these objectives. Forest management efforts should reflect a multiple-use approach and specific efforts should focus on protecting water quality, improving wildlife habitat, enhancing forest health, reducing wildfire risk, protecting aesthetics, and protecting soil productivity. The goal should be to create a mosaic of interconnected management units that are bound by good land stewardship and sustainability. By adhering to this management philosophy, the land will become more productive and land management goals will be successfully met.

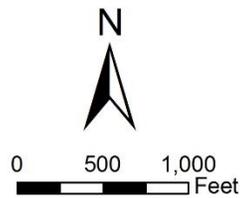
The OWASA Board of Directors approved a vision, guiding principles along with strategies for its Forest Management Program in September 2019. These can be found on their website at:

[https://www.owasa.org/wp-content/uploads/2020/04/OWASA-Forest-Mngt-Program\\_Vision-Guiding-Principles.pdf](https://www.owasa.org/wp-content/uploads/2020/04/OWASA-Forest-Mngt-Program_Vision-Guiding-Principles.pdf)

# Meadow Crest South



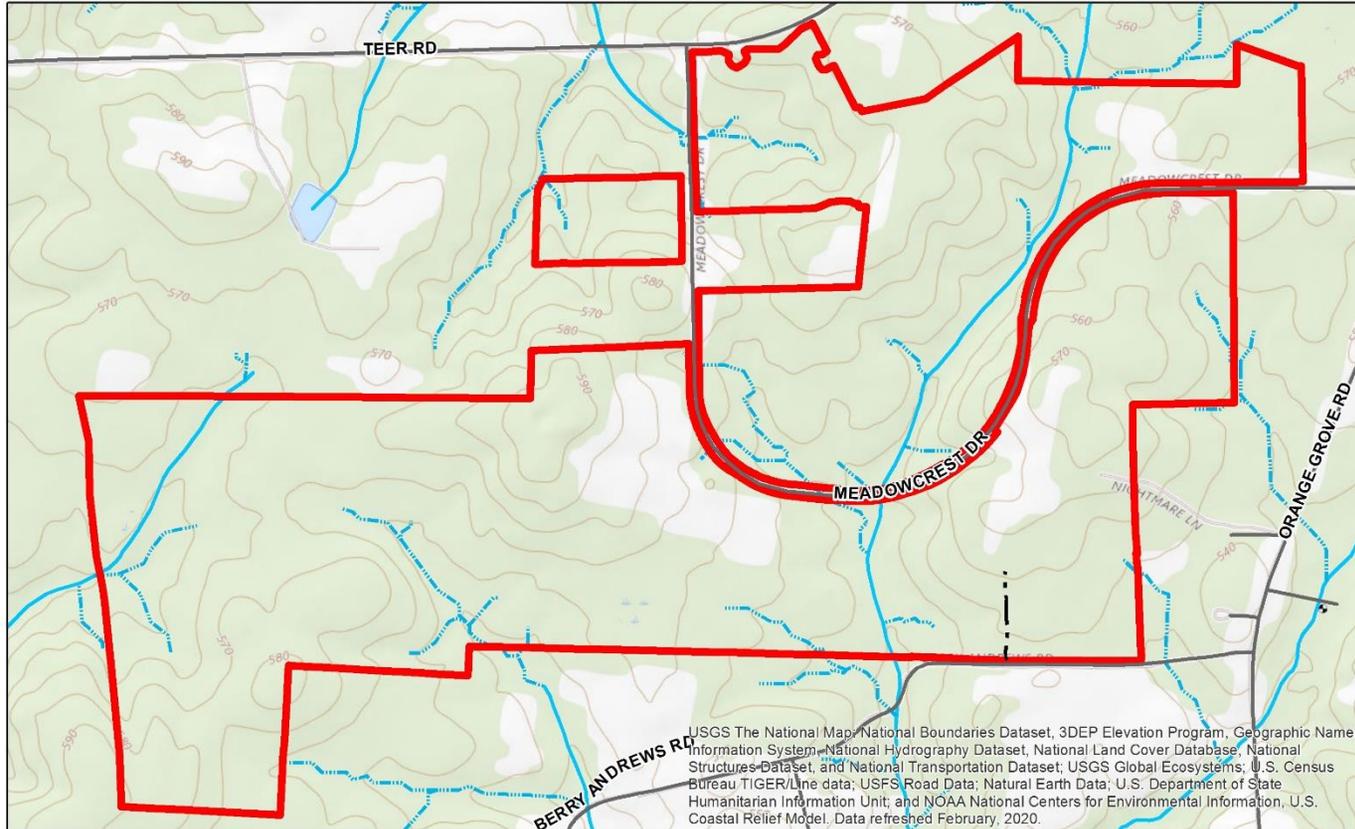
2018 Aerial Photo  
Coordinates: -79.12, 35.57  
Prepared By: Beth Canada  
Data Collected: Dave Halley, RF  
Last update: May 29, 2020



**Legend**

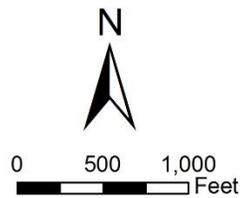
- - - Forest Road/Trail
- Named Road
- ..... Drainages
- USGS Streams
- ▭ Meadow Crest South Boundary

### Meadow Crest South



USGS The National Map, National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model, Data refreshed February, 2020.

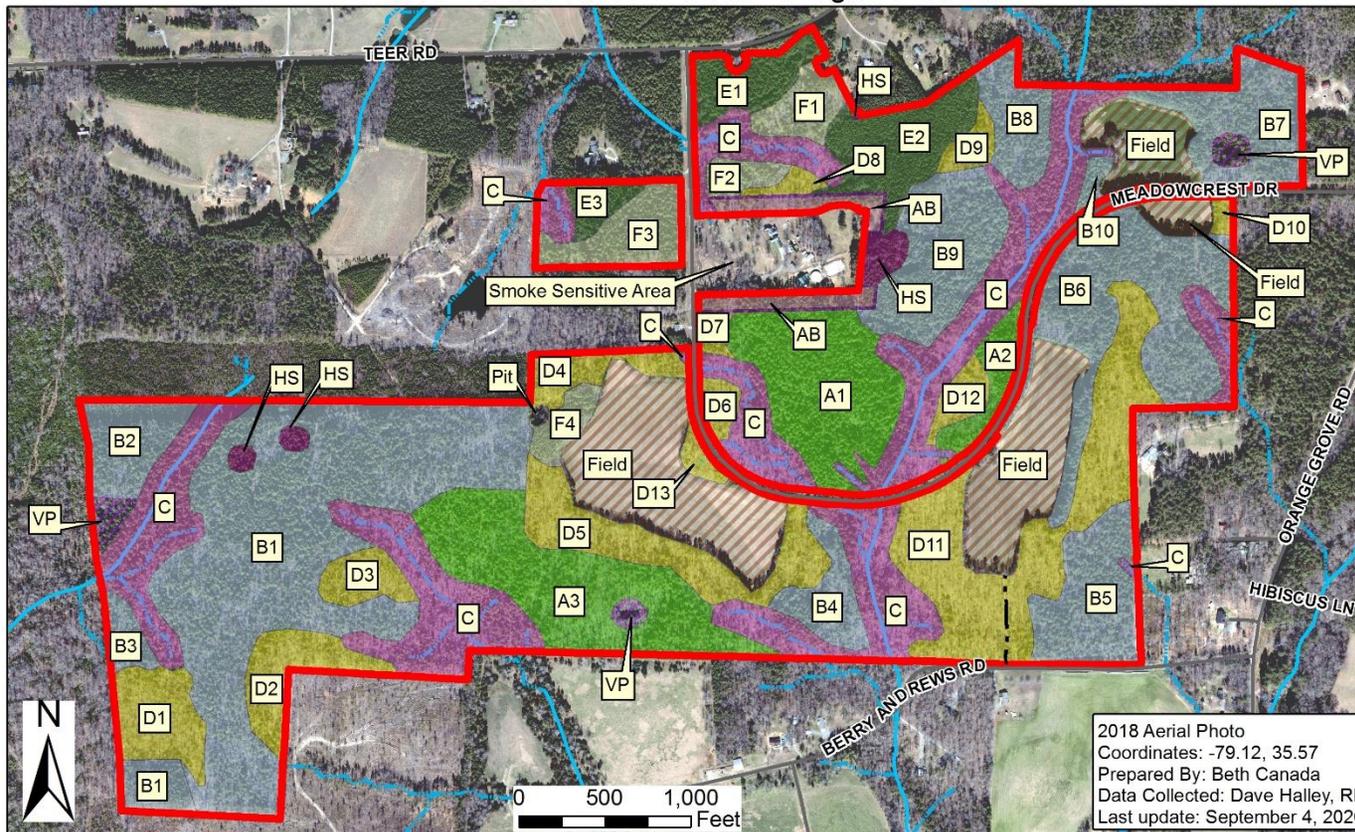
Topographic Quad: White Cross  
 Coordinates: -79.12, 35.57  
 Prepared By: Beth Canada  
 Data Collected: Dave Halley, RF  
 Last update: May 29, 2020



**Legend**

- - - Forest Road/Trail
- Named Road
- Drainages
- USGS Streams
- ▭ Meadow Crest South Boundary

### Meadow Crest South - Forest Management Units



2018 Aerial Photo  
 Coordinates: -79.12, 35.57  
 Prepared By: Beth Canada  
 Data Collected: Dave Halley, RF  
 Last update: September 4, 2020

Legend	
---	Forest Road/Trail
—	Named Road
▭ (Red)	Meadow Crest South Boundary
⋯	Drainages
— (Blue)	USGS Streams

STAND	ACRES	COVER TYPE
A	41	NATURAL PINE
B	127	NATURAL PINE
C	64.5	RIPARIAN FOREST BUFFER
D	62	UPLAND HARDWOOD
E	16	NATURAL PINE
F	14	NATURAL PINE
AB	5	AESTHETIC BUFFER
HS	3	HISTORIC SITE
VP	3	VERNAL POOL
FIELD	40	FIELD

OWASA completed a prioritization of all their forest lands and Meadow Crest South ranked one of the highest on the priority list for active management to ensure the forest remains healthy and water quality is sustained. There are nine separate Management Units on the Meadow Crest South Property. Here are the descriptions and recommendations for each of the management units on Meadow Crest South property:

## **MANAGEMENT UNIT A**

### **DESCRIPTION**

<b>Acres (Map Color):</b>	40.5 (Light Green) A1 = 16.3 ac, A2 = 3.6 ac and A3=20.6 ac
<b>Landcover Type:</b>	Natural Pine
<b>Dominant Species Present:</b>	Mostly loblolly pine with some Virginia pine and shortleaf pine.
<b>Understory Species:</b>	Not much understory vegetation. Some red maple, sweetgum, red cedar, and sourwood.
<b>Age (Established):</b>	70-80 years (1940-50)
<b>Size:</b>	12 to 26 inches DBH (DBH: Diameter at breast height. Breast height is 4.5 feet above ground)
<b>Stocking:</b>	Overstocked (100 to 180 square feet of basal area per acre). The basal area per tree is the cross-sectional area of each tree at breast height. Breast height is 4.5 feet above the ground. Basal area per acre is the sum of these cross-sectional areas for all trees in an acre.
<b>Quality:</b>	Very good
<b>Growth Rate:</b>	Very slow, significant decrease in last ten years
<b>Soil/Water:</b>	Mostly Herndon silt loam (HrB). Well drained. For detailed description and location of soil types see the Soils Section at the end of the plan.
<b>Topography:</b>	Gently sloping (2 to 6 percent slopes)

**Management Unit History:** These are the oldest pine stands on the property. These pine stands originated from old farm fields that were abandoned between 1940 to early 1950's. There is no evidence of any active management or thinning in these forests since they were established. Despite their advanced age, they are still extremely dense forests. Over time the trees have slowly thinned themselves out through competition induced mortality, but they are still quite dense. This tree density or stocking is reflected in the extremely slow growth, especially over the last ten years. On several pine trees that we measured; the trees had barely grown 1/6" in the last ten years. This stand would have certainly benefited health-wise from thinning to correct the overstocked conditions earlier in its development. The forest floor is now littered with smaller pine trees that have succumbed to competition induced mortality and have fallen to the ground. There are some blown down trees from storm damage and some evidence of bark beetle, but nothing too big in size and there is no active beetle activity currently. We attribute much of the longevity of these mature pines to the deep rich moist soil conditions and gentle sloping topography.

This understory of this unit is quite sparse due to the dense shade from the overstory pines and thick layer of needles.



**Management Unit A**

## RECOMMENDATIONS (Management Unit A)

With its slow growth and low vigor, this 70 to 80-year-old pine forest is starting to show signs of senescing. We are recommending a **final harvest** on about 40% of this management unit within the next three years. We are recommending that Management Unit A1 (17 acres) be harvested, with a couple of modifications. First, this unit (A1) is adjacent to a privately owned horse farm. So, to avoid a view of the final harvest from that farm we are recommending a 100-foot non-cut aesthetic buffer be maintained along the property line with the horse farm. Second, we recommend that a flagged out narrow buffer of uncut trees be left to break this final harvest into at least two smaller harvest areas. The tree buffer that splits this harvest area should be thinned to improve spacing between trees to improve health and vigor. We can flag out and mark this buffer area for thinning. This buffer of trees will also provide a corridor for wildlife to travel and will provide some critical edge habitat (transition area between young and old forest).

On Management Unit A2 (4 acres) and Unit A3 (21 acres) we are recommending that we try to maintain these older pine forests as a **“Legacy Forest”**. The treatment for these areas will be to try to maintain them long-term with some intermediate treatments to help maintain their health and vigor. We are recommending some light thinning in these “Legacy Forests” to remove suppressed, damaged, and diseased trees, but maintain as much of the overstory canopy trees as possible. In these “Legacy Forests” we would also like to reintroduce prescribed burning. The goal of repeated understory burns beneath these older pine stands is to create a lush grass/forb understory with a canopy of mature overstory trees.



**Management Unit A: Current lack of understory vegetation**

We recommend incorporating in-stand **understory burning** through these “Legacy Forests”, following the light thinning, on a cycle of every three to four years. Prescribed burning will significantly improve and benefit wildlife habitat and reduce wildfire risk. We would like to see you start these periodic prescribed burns a couple years following their thinning. The overall objective of repeated understory burning will be to promote herbaceous ground-level vegetation to improve browse and concealment for forest animals. Prescribed burning is probably one of the most cost-effective and essential management tools for improving wildlife habitat and forest health. The biggest benefit of controlled burning is that it will reduce and knock back the hardwood midstory and understory. Once hardwood trees get above five feet, they are too high to be eaten by most wildlife and they shade out the understory and block needed sunlight for germination of native grasses, legumes, and forbs.

Fire can change that ground level shading by controlling these midstory species. Prescribed burning is highly effective at controlling midstory species such as sweetgum, yellow poplar, and red maple because they are thinned barked and cannot tolerate heat of fire. These thin-barked hardwoods are usually only “top-killed”, but this will allow sunlight to reach the ground. This increased sunlight will promote, along with the bare ground conditions, the germination of native legumes and forbs important for winter food for wildlife. “Top-killed” means the fire gets hot enough to kill the portion of the tree above the ground, but not hot enough to damage the root system. The following spring “top-killed” hardwoods will usually re-sprout from their roots and provide lush vegetation close to the ground for animals to browse on.



**Prescribed burn in pine**

Fire also breaks down seed coats of hard-seeded legumes and other food plants through heat scarification, which increases the germination of these species the following spring. The fire will also release nutrients and minerals and create a fertilizer effect. By removing the heavy layer of litter and reducing hardwood brush, understory burning will encourage the growth of young, succulent plants, and significantly improve the conditions for wildlife.

Prescribed burning for this type of woodland is usually conducted during the cool season (December through March). But to get the full benefit of the understory burning, it should be repeated every 3 to 4 years. By removing the heavy layer of litter, the fuel present on the forest floor is reduced, thereby reducing the risk of an uncontrolled wildfire damaging the forest or surrounding properties. With time we may consider a growing season burn (April – May). Growing season burns are much more effective at controlling understory and midstory vegetation but require more advanced planning and timing to do correctly.

Because of the advanced age of these “Legacy Forests” we will need to monitor and check on them more frequently to ensure they remain healthy. Overtime, single trees will die naturally and fall out of the overstory. They will normally be replaced with understory hardwood trees that have readied themselves to take advantage of the sunlight created from these small canopy openings. Overtime these pine forests will slowly revert to a more mixed pine/hardwood forest.

In the final harvest areas, we recommend replanting back in loblolly pine. Shortleaf pine is an option, but we are recommending shortleaf pine restoration on other more appropriate sites. Following harvest, we will need to evaluate the site, develop a specific site preparation treatment, and schedule the cutover for tree planting.

Our forest management prescription is as follows:

**Forest Management Schedule (Mgt. Unit A1)**

Acres	Final Harvest	Reforest to Loblolly Pine
17	2021-23	2022-24

**Forest Management Schedule (Mgt. Units A2 & A3)**

Acres	Marked and Conduct Light Thinning	Start Prescribed Burning
24	2021-23	2022-23 2027-28 2031-32

## MANAGEMENT UNIT B

### DESCRIPTION

<b>Acres (Map Color):</b>	127 (Light Blue) B1= 55 acres, B2= 6 acres, B3= 2 acres, B4= 4.5 acres, B5= 10 acres, B6= 20.5 acres, B7 = 10 acres, B8 = 5.5 acres, B9 = 12 acres, and B10 = 1 acre
<b>Landcover Type:</b>	Natural Pine
<b>Dominant Species Present:</b>	Mostly loblolly pine (70%), with some Virginia pine and shortleaf pine (30%). Scattered red and white oak.
<b>Understory Species:</b>	Red maple, blackgum, flowering dogwood, sweetgum, red cedar, sourwood, white oak, red oak, willow oak, Christmas fern, and hickory.
<b>Age (Established):</b>	50 to 65 years (1955-1970)
<b>Size:</b>	12" to 24" DBH (DBH: Diameter at breast height. Breast height is 4.5 feet above ground)
<b>Stocking:</b>	Overstocked (110 to 190 square feet of basal area per acre).
<b>Quality:</b>	Good
<b>Growth Rate:</b>	Fair to slow
<b>Soil/Water:</b>	Lignum silt loam (Lg), Herndon silt loam (HrB), and Georgeville silt loam (GeC). Well drained. For detailed description and location of soil types see the Soils Section at the end of the plan.
<b>Topography:</b>	2 to 10 percent slopes
<b>Management Unit History:</b>	This Management Unit represents another natural pine forest. We also believe that these pines established in old agricultural fields or pasture fields that were abandoned and allowed to grow up in trees. There are numerous man-made ditches, old homesites and road traces through these stands that support this theory. There are also several vernal pools of water (that

we plan to protect) located within this management unit that we believe were watering holes for cattle or used for irrigating crops. Again, no evidence of any harvests or treatments have been made on these forests in the past. There has been some recent mortality from competition and several trees have blown down in recent storms.



**Management Unit B**

## **RECOMMENDATIONS (Management Unit B)**

We are recommending three different treatments for the management of this natural pine unit. The main forest management objective for this unit will be to enhance or restore shortleaf pine back on areas we believe are most appropriate. Shortleaf pine forests and associated habitats once covered a vast area of the continent, but in the last 30 years, this extensive ecosystem has lost over 50% of its former acreage. On the Meadow Crest South property, we hope to enhance and restore this imperiled ecosystem.

First step will be to locate existing shortleaf pine trees or grouping of shortleaf pine trees within this management unit. Based on initial visits we tended to find more native shortleaf pine on the drier sites. Our goal for this management unit will be to retain these individual trees or clumps of trees. With this information in hand we

plan to utilize a **retention-based approach** so that these trees can be enhanced and used to help restore a shortleaf pine ecosystem.

The first option for this management unit will be to designate small uncut patches or islands of **Intact Forest** to leave. We would just leave them to grow. We would just let these stands develop and change naturally. We recommend that 25% of this management unit be designated as “**Intact Forest- Leave to Grow**” and they should be widely distributed throughout this unit. These “Intact Forests” will provide for continuity in elements of structure, function, and composition different from areas we disturb with thinning or harvesting. These areas will also serve as refuges for plants and animals that may be displaced or disturbed by thinning or harvesting. It will also improve connectivity for biota in the post-harvest forest. These Intact Forest areas will provide structural retention that will not exist in treated stands. They will provide hiding cover and will most likely result in more rapid return of some displaced species (such as raptors) that require such structures. Standing dead trees (snags) and large downed logs on the forest floor should be maintained or created within these Intact Forests for species that depend on them, such as woodpeckers. These Intact Forests can also significantly reduce visual and ecological impacts of harvest units.

The second approach will be to designate blocks of natural pine for a **Restoration Thinning**. We would like to designate 35% of this unit for Restoration Thinning. This selective technique will require marking and leaving trees for natural reseeding purposes. Areas we will initially target for this treatment are areas that have existing shortleaf pine in the overstory. The intensity of the Restoration Thinning will be as heavy or as light as the existing shortleaf pine overstory. In some areas it may resemble a seed tree harvest with 8 to 20 seed bearing pine trees per acre (10-12 square feet of basal area per acre). In other areas it may look more like a Shelterwood method with 30 to 50 shortleaf pine trees per acre (30-40 square feet of basal area per acre). We will also look to leave mature hardwood trees in conjunction with the shortleaf pine, especially oak. The goals of these treatment will be to stimulate growth or development of our leave trees, but also to enhance the conditions for shortleaf pine restoration. The primary goal will be to encourage natural shortleaf pine regeneration, but we may have to supplement natural reseeding with tree planting. Unfortunately, shortleaf pine seed fall normally only occurs every 4 to 10 years, and they only disperse seeds about 200 to 300 feet down wind and 75 to 100 feet in other directions. Supplemental planting will most likely be necessary.

To keep more aggressive species, such as loblolly pine, red maple, sweetgum, and yellow poplar from dominating these Restoration Thinning areas we recommend using prescribed burning, herbicides or mechanical method, or a combination of all three for competition control. These blocks should be no larger than 5 to 8 acres in size and if possible, the widest portion of the thin should be perpendicular to the prevailing wind direction (Southwest). When herbicides are needed and species richness and diversity are the goal, the spraying should be

done with backpack sprayers utilizing selective herbicides with no ground activity and sprayed just on target species for control. Broadcast spraying of herbicides in these areas would be inconsistent with creating and maintaining a complex, species rich stage. Leaving mature pine trees will also help provide sufficient pine needle fall to sustain planned prescribed burns.



**Management Unit B**

The heavier Shelterwood method does have some advantages over using a seed tree technique for natural regeneration and tends to be a more successful system for naturally regenerating shortleaf pine. The Shelterwood trees if numerous enough can retard the development of competing hardwoods. The added overstory also provides more visual appeal, and the quantity of logging slash is reduced. Since natural reseeding of shortleaf pine is less frequent than loblolly pine, we may consider supplementing natural reseeding by planting shortleaf pine in the understory of these Restoration Thinning treatments. In areas we are trying to restore shortleaf pine we may also have to come in around age six to eight years and hand fell the natural loblolly pine that will most likely naturally reseed back in these harvest areas. Shortleaf pine is also more adapted to fire than loblolly so utilizing prescribed fire during the early development of these shortleaf pine restoration areas can help tip the scales in shortleaf pines favor.

In areas where shortleaf pine does not exist, we may choose to utilize the same Restoration Thinning method but leave overstory loblolly pine instead. Loblolly

pine has a more frequent seed fall frequency (every two to three years) so it is a more reliable seed source following thinning. But it will most likely seed too thickly and will need a thinning (cutting down and leaving on the ground) before age seven years to reduce the overall stocking to about 400 trees per acre.

The final approach will be to identify and harvest areas with a traditional final harvest. We would designate about 40% of the stand for **final harvest** in a series of small (7 to 10 acre) blocks that will be well scattered throughout the stand. Following harvest, we would replant in either loblolly pine or shortleaf pine. The size of harvest, its location, and soil productivity will help us determine which pine species is best suited for reforestation following harvest. Shortleaf pine restoration is best suited for smaller, inaccessible sites, or areas with poor to moderate soil productivity. Shortleaf pine will grow on good deep upland sites, but loblolly and many other species will grow much faster than shortleaf pine on these sites. Instead of where it can grow, we will focus on where it has the best chance to achieve dominance over its competitors. The portions of this management unit on the west side of the property (B1) seem to be better suited for shortleaf pine restoration. These natural pine stands are growing mostly on a **Lignum silt loam (Lg)** soil type, which has a lower soil productivity than the portion of this management unit growing on the east side. This east side of the property is mostly a **Herndon sit loam (HeB & HeC)** soil types, which has a higher soil productivity. The property is doing a good job of showing us where shortleaf ought to be growing. There tends to be a higher percentage of shortleaf pine in the overstory on the west side of the property than the east side. We will also target the poorly stocked and poorest quality stands first to harvest in these final harvest blocks. We will also target the removal of Virginia pine dominated sites for final harvest due to their poorer quality and lower life span.

Loblolly pine restoration will be better suited for larger, more accessible sites, with moderate to high soil productivity. Larger and more accessible sites have more to do with getting them thinned operationally when they get older. Our staff will work to evaluate and delineate the most appropriate blocks to harvest and what species would be best to restore to following harvest.

An herbicide release or site prep treatment will almost certainly be necessary for the final harvests (clearcuts) and Rehabilitation Thinning areas to ensure the young pine seedlings are free to grow from hardwood and herbaceous competition. A selective herbicide would be selected that will retard the growth of these species just long enough to allow the young pine to establish dominance. Hand spraying target species will also allow us to maintain hardwood species we would like to keep such as oak and hickory, and soft mast species such as dogwood, blackgum, sourwood and American holly. Treating large stump sprouts and seedlings of red maple, yellow poplar, and sweetgum will help keep these species from dominating the site.

Following a final harvest, we will need to evaluate each harvest block, develop a specific site preparation treatment, and schedule the cutover for tree replanting to shortleaf pine or loblolly pine. When it comes to shortleaf pine, containerized seedlings have shown a much higher survival rate than bare seedlings. So, any shortleaf planting should be done with containerized seedlings.

Depending on location and soil conditions we may also just let some final harvest areas grow back naturally. Growing back naturally will normally regenerate a mixed pine/hardwood forest. Hardwoods most likely to regenerate in final natural pine harvests are red maple, yellow poplar, and sweetgum. We expect that very little oak and hickory would successfully regenerate on these sites, except from stump sprouts. Oak just does not regenerate successfully back in cutovers without them already growing and of sufficient size in the understory of these stands before they are cut. Volunteer pine will also naturally reseed back in the harvest blocks we let grow back naturally too.



**Management Unit B**

Being able to mix and match these three different techniques will allow us to design a harvest system that will minimize the negative visual of a large final harvest. If the final harvests are kept small, scattered, and buffered by Restoration Thinning and “Intact Forests”, the resulting forest will be a nice mosaic of young vigorous forests intermixed with mature canopy trees. This will require treatments to be mapped, flagged and trees marked on the ground accordingly. Early successional vegetative wildlife habitat will be mixed with mature forests. Irregular shaped harvest areas will also maximize “edge effect” and wildlife suitability.

At this time, we do not know exactly where the three different management activities would apply in this management area. However, when more detailed field work is completed, we will develop a more detailed map and share it with the community.

Based on this timetable our forest management prescription is as follows:

### Forest Management Schedule (Mgt. Unit B)

Acres	Final Harvest	Restoration Thinning	Leave Intact Forests	Tree Planting	Thinning Overstocked Pine
<b>127</b>	<b>2021-24 (51 ac)</b>	<b>2021-24 (44 ac)</b>	<b>2021-24 (32 ac)</b>	<b>2022-25 (51-95 ac)</b>	<b>2026-28</b>



**Management Unit B**

# MANAGEMENT UNIT C

## DESCRIPTION

<b>Acres (Map Color):</b>	64.5 (Pink)
<b>Landcover Type:</b>	Riparian Forest Buffer
<b>Dominant Species Present:</b>	Yellow poplar, sweetgum, loblolly pine, hickory, black walnut, green ash, hackberry, willow oak, and white and red oak.
<b>Understory Species:</b>	Sweetgum, red maple, boxelder, dogwood, green ash, eastern hophornbeam, and American hornbeam.
<b>Age:</b>	25 to 80 years
<b>Size:</b>	8 to 26 inches in diameter (DBH)
<b>Stocking:</b>	Adequate
<b>Quality:</b>	Fair to good
<b>Growth Rate:</b>	Excellent
<b>Soil/Water:</b>	Mostly Chewacla (Ch), and Herndon silt loam (HrB & HrC). Well drained to somewhat poorly drained. See Custom Soils Report for detailed location and description of soil types.
<b>Topography:</b>	0 to 10 percent slopes

**Management Unit History:** This Management Unit represents all the riparian forest buffers adjacent to creeks and major drainages on the property.

## RECOMMENDATIONS (Management Unit C)

We have designated this area of the property as a Riparian Forest Buffer. We recommend that no timber harvesting occur within the boundaries of these buffers and that they should be left undisturbed. If any riparian buffer area poses a risk for a major wildfire, endangerment, or damage to structures, we may consider working within the boundaries of these riparian forests to improve their overall quality. At this time we should concentrate our efforts on the upland forests. These riparian forest buffers provide water quality protection, species diversity and wildlife habitat.

Leaving these riparian buffers undisturbed will allow them to act as an effective natural filtering system. The forest soils along these streams and drainages will act as natural "sponges" to intercept, store, and slowly release water into streams. At the same time, nitrogen, phosphorus, and other nutrients will be taken up by tree roots and converted into plant parts. As a result, your streams will be of higher quality if the riparian forests protect them. Trees in the riparian buffer also provide shade on the streams, which help moderate water temperatures.

These riparian forests also supply food, cover, and water for a large diversity of animals on the property and serve as migration routes and stopping points between habitats for a variety of wildlife. The diverse plant communities within these riparian forests are important in attracting and maintaining diverse species of wildlife including streamside bird communities. Area-sensitive and forest interior species, including many Neotropical migrants, can be accommodated in these riparian forests. Some neotropical migrants frequently associated with riparian habitats include the Acadian flycatcher, Louisiana waterthrush, northern waterthrush, prothonotary warbler, northern parula, hooded warbler, Kentucky warbler, and blue-gray gnatcatcher.



**Creek**

The increased humidity of riparian forests also makes them important habitat for amphibians, snakes, and turtles. This area will also provide a corridor for wildlife to travel as they move through adjacent cover types. There are also several dead

snags and den trees in the drainage that should be maintained to provide homes for tree nesting animals such as squirrels, raccoons, woodpeckers, and some tree-nesting waterfowl such as wood ducks.



**Riparian forest buffer**

During future thinnings and harvests these riparian buffer areas should be flagged out prior to any harvesting. Most of the site can be accessed without the need for a ream crossing; the exception is to management area B2, which is approximately 6 acres. OWASA's near-term management of this small area is to monitor it, but if management is needed, a new stream crossing will be required. The location of the crossing will be designed and constructed to comply with Best Management Practice Guidelines.

True North proposes the following recommendations be considered regarding riparian forest buffer areas on the property:

1. Areas designated as riparian forest buffer be excluded from active forest management. That little or no timber harvesting occurs within the boundaries of these riparian forest buffers except essential to control disease and insect damage, provide required access, or control non-native, invasive species.

2. All perennial streams have at least a 150-foot no-cut buffer designated on both sides of the stream, and that the buffer be expanded when necessary to accommodate wildlife, aesthetics, and water quality objectives.
3. All intermittent streams have at least a 100-foot no-cut buffer designated on both sides of the stream, and that the buffer be expanded when necessary to accommodate wildlife, aesthetics, and water quality objectives.



**Intermittent stream/drainage**

4. Additional riparian forest buffers be designated on ephemeral channels, groundwater recharge areas, and vernal pools, and other areas where it is determined to be appropriate to protect water quality or wildlife habitat.
5. Application of pesticides (herbicides) and fertilizers should be prohibited in the riparian forest buffer, except as may be needed for buffer restoration (i.e., invasive species control). The use of approved herbicides should only be applied to upland areas with adequate buffers designated adjacent to the treatment area to prevent any drift or movement of the herbicide into the riparian forest buffer that would risk loading of these chemicals and cause adverse effects to water quality. Every effort should be made to identify alternative methods of pest control.

6. Riparian buffer widths meet or exceed the minimum regulations of the guidelines established by the North Carolina Forestry Best Management Practices (BMP) Manual and comply with the statewide mandatory Forest Practices Guidelines Related to Water Quality.
7. All riparian buffers will be clearly marked (flagged, painted, or signed) on the ground prior to commencing any active forestry management measures adjacent to them so that operators can easily see them.
8. A written pre-harvest plan map be developed prior to any timber harvesting activity scheduled on the property. At a minimum, the pre-harvest map will locate streams, designate riparian forest buffers, designate aesthetic buffers, show road access and layout, designate possible stream crossings, and preferred deck locations.



**Perennial Creek**

9. All riparian forest buffers will be clearly delineated on all maps and addressed in all forestry related contracts.

10. Riparian forest buffers only be crossed when access cannot reasonably be gained any other way. Any required stream crossings will be developed in a manner that meets or exceeds applicable Best Management Practice Guidelines for stream crossings and mandatory Forest Practices Guidelines Related to Water Quality. If required, the stream crossing should only be done with portable temporary bridge mats. These have proven to have the least impact on streams.
  
11. The North Carolina Forest Service work cooperatively with OWASA by conducting regular on-site inspections while any forestry operations are undertaken at the property to evaluate any site-specific issues related to proper use and compliance of Forestry Best Management Practices and NC Forest Practices Guidelines Related to Water Quality.
  
12. Riparian forest buffers be inspected regularly by ground or by air to evaluate forest health, identify possible insect or disease problems, and insure adequate buffer protection.

By following these recommendations, we expect to keep erosion to natural rates to prevent sediment build up in streams and protect water quality.

## MANAGEMENT UNIT D

<b>Acres (Map Color):</b>	62 (Yellow) D1 = 6 acres, D2 = 6 acres, D3 = 3 acres, D4 = 4 acres, D5 = 11 acres, D6 = 1.5 acres, D7 = 1 acre, D8 = 1 acre, D9 = 1.5 acres, D10 = 1 acre, D11 = 23 acres, D12 = 2 acres, and D13 = 1 acre.
<b>Landcover Type:</b>	Upland Hardwood
<b>Dominant Species Present:</b>	White oak, red oak, southern red oak, post oak, hickory, southern red oak, red maple, yellow poplar and scattered loblolly, Virginia, and shortleaf pine.
<b>Understory Species:</b>	Red maple, sweetgum, blackgum, American holly, sourwood, flowering dogwood, yellow poplar, mixed oaks, American beech, and eastern red cedar.
<b>Age (Established):</b>	60 to 80 years (1940-1960)
<b>Size:</b>	12 to 26 inches in diameter (DBH)
<b>Stocking:</b>	Adequate to overstocked
<b>Quality:</b>	Fair to very good
<b>Growth Rate:</b>	Good
<b>Soil/Water:</b>	Mostly Herndon silt loam (HrB). See Custom Soil Report for detailed description and location of soil types.
<b>Topography:</b>	2 to 10 percent slopes

**Mgt. Unit History:** This is all the upland hardwood stands on the property. They represent a critical portion of the property for species diversity. Except for the hardwoods in the riparian forest buffer and scattered in natural pine stands this management unit represents the only upland hardwood forests on the property.

## RECOMMENDATIONS (Management Unit D)

To help maintain species diversity on the property we would like to maintain these upland hardwood forests. This management unit has a high percentage of red and white oak trees in its main canopy. Pine, hickory, yellow poplar, red maple, and sweetgum make up a smaller component of the canopy of this management unit. These mature upland hardwoods have an abundance of acorn and nut producing trees, which are providing excellent feeding areas and winter food sources of food for wild turkeys, squirrels, and deer. During the late fall and winter, this is where we would expect you all to find a lot of turkey sign (scratching) because they are looking for acorns.



**Management Unit D**

The only forest management we might consider for this management unit at this time is **a light Hardwood Improvement Cut**. This could be accomplished during the thinnings of the adjacent pine stands. Low value, poor quality trees could be marked and removed to make room for more wildlife and timber valued trees such as oak, poplar and hickory. With the abundance of pine on most of the other units, we would recommend that you remove the merchantable pine from this area. If there are shortleaf pine present, we would recommend leaving them. Shortleaf pine has a much longer life span than loblolly pine and does well in mixed oak

stands. We would recommend that you have us mark the trees that should be retained or harvested during the improvement cut.

An Improvement Cut is best regarded as one whose primary emphasis is placed on the removal of upper-crown-class trees of undesirable species or form. The primary objective of an improvement cut is to promote growth, improve stand structure and regulate species composition. Improvement cuts are generally hard to market because the wood removed from the improvement cut is not high grade or high value. However, completing the hardwood improvement cut in conjunction with the adjacent pine thinnings should provide an opportunity to implement this portion of the forest stewardship plan.

The types of vegetation that would be removed in an improvement cut would be:

- Crooked, limby or poorly formed trees
- Trees damaged by fungi, insects, or storms (except standing dead trees)
- Inferior or short-lived species
- Trees growing too close to each other
- All the pine, except shortleaf pine.

We would look for and leave trees with hollows and dead snags for wildlife den and bugging trees.



**Type of low value trees marked and harvested during an Improvement Cut**

We would recommend that only about 15 - 20 % of the overstory trees be removed in the improvement cut done on this management unit. The target will be to maintain 70 to 80 square feet of basal area and no less than 50 square feet of basal area to maintain quality stems. Too heavy an improvement cut will cause excessive branching on the remaining oaks, poplar, and hickories. An

improvement cut that removes more than 30% of the stand may do more harm than good. To be done correctly we recommend that you have us mark the stand. The trees we marked in paint are trees that should be retained in an improvement cut. The long-term goal of the improvement cut will be to remove inferior trees to increase the overall quality, genetics, and vigor of the residual hardwood stand. Trees with good form, good vigor, and well-developed crowns would be left. With your multiple objectives, trees will be favored that have good timber, wildlife, and aesthetic value. A mixture of species will also be favored due to its greater potential for producing multiple benefits.



**Example of a Hardwood Improvement Cut**

The other advantage of this type of improvement cut is that the filtered light to the understory will help to improve the advanced regeneration of desirable trees such as oak, hickory, and yellow poplar. These species do not do well in full shade and require full or filtered sunlight to establish successfully in the understory. So, in addition to mature canopy trees removed during the improvement cut, some mid-story species such as sweetgum, red maple, sourwood, and beech should also be harvested to improve the understory growing conditions (increased sunlight) to promote the advanced regeneration of more desirable timber and wildlife trees. The removal of the mid-story is also one of the initial phases of what is call an oak Shelterwood system, used to establish advanced regeneration of oak.



**Regeneration of oak a year following an Improvement Cut**

Prescribed burning at moderate to high (growing season) intensity and moderate frequency is recommended for this management unit. Fire will help promote regeneration of oaks and shortleaf pine in the canopy gaps we create or that are created by natural causes (storms, ice, or mortality of large trees). Future burns on adjacent management units should be allowed to carry through this unit.

**Forest Management Schedule (Mgt. Unit D)**

Acreage	Marked Hardwood Improvement Thinning	Start Prescribed Burns
62	2021-24	2027

## MANAGEMENT UNIT E

### DESCRIPTION

<b>Acres (Map Color):</b>	16 (Dark Green) E1 = 5 acres, E2 = 9 acres and E3=2 acres
<b>Landcover Type:</b>	Natural Pine
<b>Dominant Species Present:</b>	Mostly loblolly pine with some Virginia pine and shortleaf pine.
<b>Understory Species:</b>	Not much understory vegetation. Some red maple, sweetgum, wild cherry, red cedar, and sourwood.
<b>Age (Established):</b>	30 years (1990)
<b>Size:</b>	6 to 13 inches DBH (DBH: Diameter at breast height. Breast height is 4.5 feet above ground), some 14 to 16" DBH in less dense areas.
<b>Stocking:</b>	Very overstocked (170 to 200 square feet of basal area per acre).
<b>Quality:</b>	Good
<b>Growth Rate:</b>	Starting to slow down
<b>Soil/Water:</b>	Mostly Herndon silt loam (HrB) with some Georgeville silt loam (GeB). Well drained. For detailed description and location of soil types see the Soils Section at the end of the plan.
<b>Topography:</b>	Gently sloping (2 to 6 percent slopes)

**Management Unit History:** These are farm fields that grew up in pine. These pine stands are the youngest on the property. This stand has not been thinned and is naturally thinning itself.



**Management Unit E**

## **RECOMMENDATIONS (Management Unit E)**

This management unit is past due for its first thinning. Normally pine forests are thinned a first time when they reach 18 to 20 years old or when their average diameter is between six to eight inches. This pine forest is now thirty years old and its average diameter is 9 to 12 inches. Growth is now starting to slow down due to overcrowding and competition for sunlight. An active thinning program is essential to maintain a healthy pine forest. Removing trees that are of poor form or defect and/or ones growing too closely together will help to eliminate the overcrowding and competition for sunlight among the pine trees in the stand. Thinning will give more space, water, sunlight, and nutrients to the trees that remain, increasing their growth rate and improving the overall forest habitat and health.

A **first thinning** of pine is mainly just a row thinning. In pine plantations every fourth or fifth row is normally removed in a first thinning. In natural pine stands like this one, with no defined rows, the logger cuts a row of trees out every fifty to sixty feet to provide access into the stand. Then they remove small diameter, poor quality trees along the access rows to reduce the overall stocking. In this type of thinning the stand is usually not marked, which means the cutter establishes the rows and then selects and removes trees along the rows without them being marked.

Therefore, it is important to work with an operator with first thinning experience and a reputation for good work.



**Example of first pine thinning**

Approximately eight to ten years following the first thinning (2028-30), a **second follow up thinning** will likely be recommended. A second thinning will do a much better job of thinning and reducing the stocking of trees between the rows. This will greatly improve the growing conditions of the entire stand, not just the trees adjacent to the rows that were cut out during the first thinning. This second thinning should reduce the density to about 80 to 90 square feet of basal area per acre or leave about 200 to 250 trees per acre. In some areas we may go as low as 50-60 square feet of basal area per acre for the added wildlife habitat benefit, especially along the Management Unit that border fields or are along forest roads. When you conduct this second thinning, we recommend that you have us mark the thinning by painting the trees to keep or remove. The thinning crew would only remove trees that have been painted or not painted, depending on how it was marked. This way you have the benefit of a professional forester walking through the stand ahead of time and marking the stand to provide the optimal growing conditions between each tree.

Seldom are pine thinnings done as a lump sum sale. Therefore, we will have to negotiate with a timber company to pay you on a per-ton-per-product-class of wood removed. In this type of payment method, they will pay you as the wood is cut. For each thinning True North can assist you finding a reputable thinning crew, negotiating an acceptable per unit timber price, and assist you in writing a timber sale contract. We can also assist in monitoring the thinning operation to ensure the

proper extraction and protection of your residual stand and to ensure they adhere to Best Management Practices designed to protect the land and the watershed.



**Example of a marked thinning after completion  
(In this stand we marked the trees to keep)**

Prior to any thinning and final harvest, we will need to flag out riparian and aesthetic forest buffers we deem necessary to protect water quality and aesthetics. These will need to be identified on the ground and flagged out to protect them during harvesting.

All the thinnings of this and other Management Units should be done during a dry period. Thinning the property when it is dry will keep from rutting and compacting soils and damaging the productivity of the soil for forest growth. This Management Unit should be thinned during the drier months of the year, which is usually the spring through early fall (April – October).

The thinning of these dense stands of loblolly pine will increase the amount of sunshine able to reach the forest floor. This effect of this increased understory sunlight will promote the abundance of herbaceous and woody stem growth in the understory. This will provide additional food and escape cover for many species of wildlife such as wild turkey, northern bobwhite, eastern cottontail, white-tailed deer, and a variety of songbirds. This benefit will gradually decline as the crowns of the pines start to close again.

This restored pine forest, following a first and second thinning, will probably benefit bird species such as: northern flicker, red-headed woodpecker, brown-headed nuthatch, summer tanager, eastern wood-pewee, yellow-throated and blue-headed vireo, yellow-throated warbler, whip-poor-will, chuck-will's widow, and of course the pine warbler.



**Management Unit E: Current lack of understory vegetation**

Incorporating in-stand **understory burning** through these stands, following the first thinning, every three to four years will also significantly improve and benefit wildlife habitat and reduce wildfire risk. We would like to see you start a periodic prescribed burning program in this loblolly pine stand following the first thinning. The overall objective of repeated understory burning will be to promote herbaceous ground-level vegetation to improve browse for herbivores and provide nesting/brooding/escape habitat for forest animals. Prescribed burning is probably one of the most cost-effective and essential management tools for improving wildlife habitat and forest health. The biggest benefit of controlled burning is that it will reduce and knock back the hardwood midstory and understory. Once hardwood trees get above five feet, they are too high to be eaten by most wildlife and they shade out the understory and block needed sunlight for germination of native legumes and forbs. Advantages of prescribed burning are further described in Management Unit A.

Prescribed burning for this type of woodland is usually conducted during the cool season (December through March). But to get the full benefit of the understory burning, it should be repeated every 3 to 4 years. By removing the heavy layer of litter, the fuel present on the forest floor is reduced, thereby reducing the risk of an uncontrolled wildfire damaging the forest or surrounding properties.

Prior planning and preparation are crucial to a successful prescribed burn program. It will require the establishment of additional trails and firebreaks throughout the stand, which are normally developed just prior to commencing the burn.



**Understory burn next to firebreak**

All controlled burns on your property can be coordinated by True North and the North Carolina Forest Service. It may be possible to have the North Carolina Forest Service perform the prescribed burning with their forces. Their 2020 rate for development of fire lines (bladed line) and conducting the burn for a flat \$30/acre fee. The Orange County Ranger has confirmed their willingness to assist OWASA with these efforts.

Special care will be taken to provide advance notice to surrounding property owners. These prescribed burns will be well planned and tightly controlled to significantly reduce the chance of the fire spreading and to minimize adverse off-site impacts from smoke. Fire weather data (wind speed and direction, relative humidity, fuel moisture, temperature, etc.) will be evaluated and monitored prior to any controlled burn to determine the safest and most efficient burning times and conditions. During the controlled burning operation all the necessary fire

suppression equipment will be on site, so that in the unlikely event of a breakover, the situation can be quickly controlled with equipment already on site.

Keeping firebreaks open and accessible is essential to responsible forest management. For this reason, it is recommended that bladed, not plowed lines, be established. Bladed lines are much easier to maintain and provide multiple benefits, serving as firebreaks and providing access for other management activities. These revegetated bladed areas also serve as wildlife corridors and as feeding areas for wildlife.

In the future we will evaluate our final harvest and regeneration options for this management unit. Prior to a recommendation for a final harvest and stabilization, each potential harvest area should be analyzed to determine the desired timing and reforestation plan. Loblolly and shortleaf pine can certainly be grown for 60 to 80 years without any major health issues. If we choose to maintain some or all this pine stand longer, we will need to keep a close eye on the health and vigor of these stands with more periodic site visits. As they get older, they are more susceptible to insect infestation due to lower vigor. They will eventually start to succumb to natural mortality. So, at some point if natural mortality, insect infestation, or storm damage becomes excessive, we should look at going ahead with a final harvest and regenerating it back to new vigorous forest.

We think it is important to keep a good mix of both pine and hardwood forests on the property to maintain a variety of habitat types. Wildlife and songbird species are adapted to and prefer both types of forests. Keeping a mix will be important long term. The goal is not to create more pine stands. Pine stands represent a high percentage of this property, so it will be important to maintain the current hardwoods sites on this property. Because of their shorter timber rotations, multiple income producing events (thinnings), and higher productivity levels pine forests can also serve as an economic driver to provide the necessary periodic income producing events to properly steward the property.

### Forest Management Schedule (Management Unit E)

Acres	1 <sup>st</sup> Thin (Row)	Understory Burning	2 <sup>nd</sup> Thin (Marked)	Understory Burning
16	2021-24	2023-24 2026-27	2029-30	2031-32 2034-35

## MANAGEMENT UNIT F

### DESCRIPTION

<b>Acres (Map Color):</b>	14 (Light Green) F1 = 3.5 acres, F2 = 2 acres, F3 = 6 acres, and F4 = 2.5 acres
<b>Landcover Type:</b>	Natural Pine
<b>Dominant Species Present:</b>	Mostly loblolly pine and shortleaf pine with some Virginia pine. Also present is sweetgum, red oak, hickory and white oak
<b>Understory Species:</b>	Not much understory vegetation. Some red maple, sweetgum, red cedar, and sourwood.
<b>Age (Established):</b>	60-70 years (1950-60)
<b>Size:</b>	12 to 20 inches DBH (DBH: Diameter at breast height. Breast height is 4.5 feet above ground)
<b>Stocking:</b>	Overstocked (120 square feet of basal area per acre). The basal area per tree is the cross- sectional area of each tree at breast height. Breast height is 4.5 feet above the ground. Basal area per acre is the sum of these cross- sectional areas for all trees in an acre.
<b>Quality:</b>	Very good to good. Some diseased trees (fusiform rust)
<b>Growth Rate:</b>	Very slow, significant decrease in last ten years
<b>Soil/Water:</b>	Mostly Herndon silt loam (HrB). Well drained. For detailed description and location of soil types see the Soils Section at the end of the plan.
<b>Topography:</b>	Gently sloping (2 to 6 percent slopes)

**Management Unit History:** These older pine stands originated from old farm fields that were abandoned between 1950 and early 1960's. There is no evidence of any active management or thinning in these forests since they were established.



**Management Unit F**

## **RECOMMENDATIONS (Management Unit F)**

These are the stands we would like to create a **Shortleaf Pine Savannah**. Savannah are typically thought of as transition landscapes between forest and prairie, containing a sparse overstory and well-developed herbaceous understory of grasses, wildflowers, and occasional understory scrub. This open-forest canopy and rich understory vegetation was historically maintained through low-intensity fires. Although savannahs were once widely distributed across much of the eastern U.S., they are now rare due to fire exclusion. Many plant and animal species thrive in these open conditions and represent some of the richest and diverse natural forest communities.

We would like to experiment with this management unit to create a “modified” Shortleaf Pine Savannah. There are enough natural shortleaf in these stands to leave as to create a sparse overstory. Shortleaf pine is also a fire-tolerant species. We recommend marking and leaving all the existing shortleaf pine in these stands, along with any mature oak and hickory. We can also mark mid and understory species that benefit wildlife such as dogwood, sourwood, cherry, blackgum and red cedar. Then we recommend harvesting the remaining overstory and midstory of the stand. Following harvest, we recommend treating the regrowth

with a selective herbicide that favors native grasses. Products like Garlon and Milestone VM can be utilized to control hardwood and pine regrowth without harming native grasses. These products also do not have any ground activity, so they are safe to treat around existing pines and hardwoods that we leave. Surfactants, used with herbicides to improve effectiveness, can have a negative impact on certain groups of amphibians so careful consideration should be given to the selection of products with safe surfactants to ensure the lowest impact possible.

Following herbicide treatment, we would like to start frequent **prescribed burning** beneath these thinned stands with the goal of promoting herbaceous ground-level vegetation to improve browse and concealment for forest animals. To create the savannah type understory prescribed burning would have to be done at least every one to two years, especially initially. Prescribed burning will help to keep hardwoods and pines from reestablishing in the understory and would favor native grasses, wildflowers, and forbs to dominant the understory. To supplement natural regrowth, we can also consider supplementing understory vegetation by planting or seeding native grasses and wildflowers.

The herbaceous response to this treatment will most likely result in native weedy species such as broomsedge (*Andropogon virginicus*) dog fennel (*Eupatorium capillifolium*), and blackberry (*Rubus rosaceae*). Native woodland prairie grasses such as big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*) and Indian grass (*Sorghastrum nutans*) are not present here, and will not naturally reseed with this treatment. Supplemental seeding of this species would have to be done. The creation and maintenance of this “Shortleaf Pine Savannah” will be challenging and labor-intensive.



**Shortleaf Pine Savannah in Oklahoma; Photo Credit: Clarence Coffey**

The development of this lush understory would provide excellent foraging, bedding and cover areas for wildlife that use the area. Quail and some songbirds that depend on shrub-scrub habitat like eastern towhee, common yellowthroat, and indigo bunting will also use the understory for nesting, foraging and cover. Seeds from forbs and grasses that grow back or are seeded in will be available for winter food and cover for mourning doves and various songbirds, and the exposed soil will allow birds to find grit. Wildflowers will also benefit local bee populations.



**Management Unit F**

**Forest Management Schedule (Management Unit F)**

Acres	Marked Thinning	Herbicide Treatment	Understory Burning
<b>14</b>	<b>2021-24</b>	<b>2022-25</b>	<b>2022-24 2026-27</b>

# MANAGEMENT UNIT AB

## DESCRIPTION

**Acres (Map Color):** 5 (Pink with Purple Outline)

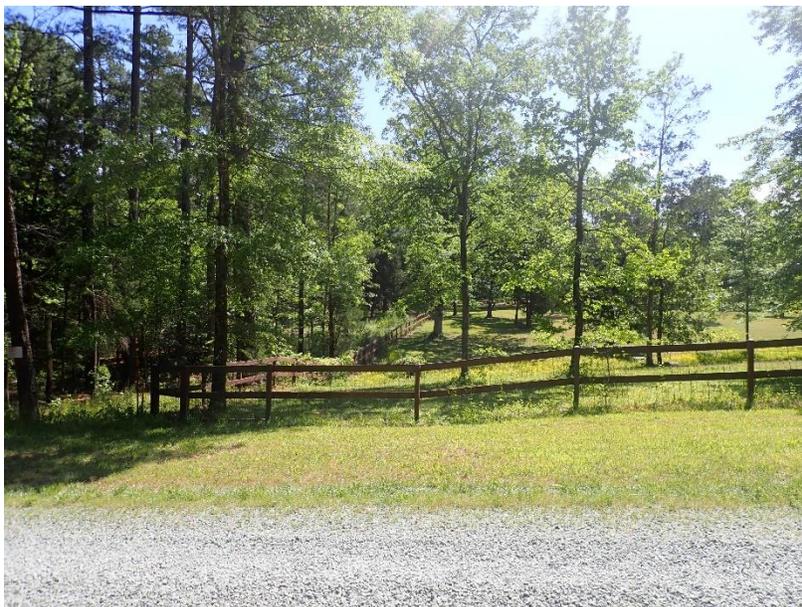
**Landcover Type:** Aesthetic Buffers

**Management Unit History:** This Management Unit represents a forest buffer adjacent or near occupied homes near the property boundaries.

## RECOMMENDATIONS (Management Unit AB)

We will work to protect adjacent property views by carefully planning and providing aesthetic buffer (no cut) zones for homes located adjacent to the property. In upland areas where clear-cutting is recommended, and if the area can be viewed from an adjacent home, we plan to implement a minimum 100-foot no-cut buffer. If tree thinning is to be conducted, we may not choose to provide a buffer. Contracts for timber services will include specific liability provisions in event of damage to adjoining property.

True North will continue to work closely with OWASA staff to keep adjacent landowners and other interested parties informed as to our efforts and the schedule of forest management activities on the Meadow Crest South tract.



**Adjoining horse farm**

### Meadow Crest South - Aesthetic Buffer Area



**Legend**

- - - Forest Road/Trail
- Named Road
- ▭ Meadow Crest South Boundary
- Drainages
- USGS Streams

STAND	ACRES	COVER TYPE
A	41	NATURAL PINE
B	127	NATURAL PINE
C	64.5	RIPARIAN FOREST BUFFER
D	62	UPLAND HARDWOOD
E	16	NATURAL PINE
F	14	NATURAL PINE
AB	5	AESTHETIC BUFFER
HS	3	HISTORIC SITE
VP	3	VERNAL POOL
FIELD	40	FIELD

## MANAGEMENT UNIT HS

**Acres (Map Color):** 3 (Purple)

**Landcover Type:** Historic Sites

**Management Unit History:** This Management Unit represents the four historic homesites we located on the property. On these four old home sites there are remnants of homes, sheds, and barns, and they are usually surrounded by older trees that were maintained when the property was a farm.



**Stone chimney**

### RECOMMENDATIONS (Management Unit HS)

No active management will occur within these four small historic areas. Some minor clearing and pruning may be acceptable to keep the appearance of the site. These sites will be protected from prescribed burning.



**Barn**



**Shed**

## MANAGEMENT UNIT VP

**Acres (Map Color):** 3 (Pink Hatched)

**Landcover Type:** Vernal Pools

**Management Unit History:** This Management Unit represents the three small standing water pools that we located on the property. We speculate that they may have been watering holes for livestock or utilized to irrigate crops when the property was a working farm. They are now shallow water impoundments with trees growing in and around them.



**Small vernal pool**

### RECOMMENDATIONS (Management Unit VP)

No active management will occur within these three small vernal pools. Small vernal pools and the wet areas near them should be identified and protected during logging activity. These shallow pools, because they do not have fish living in them that would eat their eggs, are critical habitat for salamanders and frogs. They should be flagged out and protected during any forest management activity near them.

Most salamanders inhabit floodplain forests near swampy areas or upland forests near bodies of water that they can use as breeding grounds. Adult salamanders will mate and lay eggs between September and March. Terrestrial adults usually reproduce between October and March. Males and females will migrate to breeding pools (bodies of water with no fish) to mate. The females will lay anywhere from 200 to 700 eggs and attach them to aquatic vegetation in these vernal pools. These small vernal pools are critical to their survival and will be protected.



**Vernal pool**

The North Carolina Wildlife Resources Commission recommends a 150-foot buffer to protect wetland habitats. The following document from the NCWRC is a good source of information on conserving terrestrial habitat and species:

<https://www.ncwildlife.org/Portals/0/Conserving/documents/ConservingTerrestrialHabitatsandSpecies.pdf>

## **Meadow Crest South Stewardship Plan and OWASA's Forest Management Program**

The focus of OWASA's forest stewardship plans is to provide the proper care of their forests so they stay healthy and vigorous and continue to provide them with the benefits of a well-managed forest. Each plan developed must be consistent with the established objectives and guiding principles they have developed for their Forest Management Program. This plan is a prioritization of actions that should be undertaken to make that happen. OWASA wants to be good stewards of the forests under their care. They want to leave a positive legacy for the next generation and contribute to a more sustainable community. They understand that our forests are high value assets, and not just in terms of dollars and forest products. Connecting those values to timber harvesting is a leap for many people, but what we have come to appreciate, is that forestry practices, if done in a sustainable and in an ecological way, will not only protect, but will actually enhance almost all other values. We understand that forest management requires deliberate human intervention ranging from actions aimed at safeguarding and maintaining the forest ecosystem and functions, to favoring specific socially or economically valuable species or groups of species for improved production of goods and services. But, as good stewards, and under the guidance of experts in natural resources management, OWASA wants to use their forests in a way, and at a rate, that conserves biological diversity, maintains the productive capacity of our forest ecosystems, maintains forest health and vitality, conserves soil and water resources, improves access and that does not cause damage to other ecosystems. Sustainable forest management principles will guide them and will help to ensure that the values they derive from their forests now will not be compromised in the future.

Here is a summary of how their objectives and guiding principles have been applied:

### **Soil and Water Protection:**

The protection and enhancement of soils is an important part of forest management and imperative to meet OWASA's highest ownership objective to protect water quality. This is especially critical during harvest operations when construction or disturbance of roads, skid trails and decks will cause the removal of the protective litter layer and expose the soil to the direct impact of rain. This will cause the dislocation of soil particles (sediment) and their movement by running water. The initial soil removed will be the most fertile topsoil causing a loss in the productivity of the site. The movement of soil particles (erosion) by running water will flow to low areas, usually a small stream or drainage, eventually impacting water quality to streams and rivers they drain into. Planning will be the key to minimize these impacts. Much of that will be done during the pre-harvest planning designed to eliminate or minimize soil disturbance and water quality impacts. We will include practices in our management to eliminate, or at least minimize, these

impacts on site productivity and water quality. We will follow or exceed Best Management Practice (BMP's) Guidelines to insure we comply with North Carolina's Forest Practices Guidelines Related to Water Quality.

Maintenance of these BMP's will also be important. For example, turn outs on logging roads will need to be periodically rebuilt or cleaned out to allow proper stormwater drainage off the road and into vegetative areas. Eroded sections of the road will need to be reshaped and stabilized. Mowing of roads will need to be done annually to maintain our vegetative cover (grasses) and prevent them from growing up in trees. Additional gravel may need to be put down during active logging to protect roads and crossings from logging traffic.

### **Forest Practice Guidelines Related to Water Quality:**

All the forestry site disturbance activities on-site will have to comply with Forest Practices Guidelines Related to Water Quality. FPG's are a set of nine performance standards that must be followed on all forestry activities to maintain the forestry exemption under the NC Sedimentation Pollution Control Act. Failure to follow these performance standards will result in a loss of the forestry exemption and referral to the appropriate enforcement agency. As your forestry consultants, we will design and implement practices to follow FPG's. Since most of the performance standards are related to stream protection, our aggressive Riparian Forest Buffer design should all but eliminate any risk of not meeting performance standards.

### **Forestry Best Management Practices (BMP's):**

Forestry BMP's are a collection of practices recommended to minimize soil erosion and stream sedimentation to help meet the performance standards of FPG's. The manual's purpose is to inform and educate forest harvesters on proper BMP use and the technical specifications for use. The BMP Manual is available on the NC Forest Service website at:

[https://www.ncforestservice.gov/water\\_quality/bmp\\_manual.htm](https://www.ncforestservice.gov/water_quality/bmp_manual.htm)

The manual is a comprehensive source of water quality related issues as they affect forestry management practices in North Carolina. Using this manual will help us find solutions to water quality issues that we need to address during the harvesting and reforestation of the property. For example, the manual should be helpful in designing and communicating proper forest road construction, stabilization, and maintenance. Another helpful guide from the USFS is their publication "Environmentally Sensitive Maintenance Practices for Dirt and Gravel Roads". It is available at:

<http://www.fs.fed.us/t-d/pubs/pdf/11771802.pdf>

## **Healthy Forests are Critical to Our Water Quality:**

Clean, safe, and sustainable water resources are essential to a healthy economy, environment, and quality of life. Maintaining healthy, well-managed forests are critical in securing clean, affordable drinking water for our future. Through the Southern Group of State Foresters, a series of seven short high-quality videos were created to highlight that healthy forests are critical to the future of our drinking water. Topics covered in these videos include connection between forests and water, the importance of source water protection, and the forest landowner and water utility roles in protecting water quality. These videos can be viewed on YouTube linked at:

[https://www.youtube.com/playlist?list=PLjo3SljzmracxvVEeyBlm\\_pBcXLhxLP50](https://www.youtube.com/playlist?list=PLjo3SljzmracxvVEeyBlm_pBcXLhxLP50)

## **Forest Roads:**

Research and experience have shown that the mere cutting of trees is not the cause of erosion damage in the forest. The potential erosion in the forest is from the roads and skid trails used to remove the forest products. Poorly planned and installed roads can contribute to tremendous amounts of sediment and debris into nearby streams.



**Forest road seeded with switch grass at OWASA's  
Cane Creek Mitigation Property**

It will be important to plan road systems that can provide permanent and efficient access throughout the property without damaging the watershed value of the

forest. Unfortunately, there are no inexpensive “shortcuts” when building roads. It will require enough funds, especially during active logging, to build and keep a good road.

The following are a set of recommendations for control of erosion on your roads:

1. Avoid logging during wet seasons or wet periods.
2. Avoid the need for crossing riparian forest buffers; where stream crossings cannot be avoided, they will be designed, constructed, and maintained to minimize erosion.
3. Keep skid trails and haul roads on grades of less than 10%; with steeper grades not exceeding 200 feet in length.
4. Utilize a bulldozer instead of a skidder to construct roads.
5. Gravel areas where soil types or wet conditions prevent proper drainage or poor traction.
6. Allow for proper drainage of rain off road into vegetated areas. Install water diversion ditches on steeper sections of the road to divert water off the road and into protected areas.
7. Remove overstory trees adjacent to main haul roads to remove heavy shade to “day light” roads. Increased sunlight to roads will help to dry them more quickly following wet periods.
8. Inspect the roads frequently during logging to ensure drainage structures are maintained.
9. Upon completion of logging, stabilize and seed all roads, main skid trails, and deck sites.

During initial harvesting we should also look for opportunities to “day light” the existing roads. We may remove a row or two of trees along the road or thin them heavier to improve the amount of sunlight allowed to reach the road. This will allow the road to dry out more quickly following rainfall. The cleared edge of these roads will also revegetate in early successional species that will improve habitat for wildlife. This should also be considered around agricultural fields, especially those areas of forest that have slowly grown into the field. Removing this narrow strip of forests will improve sunlight conditions for crops and create some early successional habitat and escape cover along field edges. These areas are also areas of higher levels of invasive species and this may aid in controlling them.

### **Possible Adverse Impacts to Neighbors:**

Another one of OWASA land objectives is to mitigate any adverse impacts to neighbors or surrounding communities. There are neighbors along Meadow Crest Road, Berry Andrews Road, Teer Road, and potentially Orange Grove Road who may be impacted by management activities.

The proposed pine thinnings and harvests may have some negative visual impacts, but for the most part will improve the overall appearance of the woods,

especially if thinned. We have recommended aesthetic buffers around or near homes adjacent to the property. We are also proposing that the size of final harvests be kept small (7-12 acres) and broken up into smaller blocks with buffers.

Access to the property will require driving through Meadow Crest Drive and possibly Berry Andrews Road, but no formal access agreement is necessary, except that these roads must be kept in a good or better shape than before we start management activities. The property has direct access from both roads and Meadow Crest Drive is an excellent road through the middle of the property.

A negative impact to neighbors may be logging equipment noise and the temporary added traffic on Meadow Crest Drive, Orange Grove Road, and Teer Road. Based on an estimate of volume to remove during initial thinning and harvesting operation the logging operation should not last more than two or three months with good weather.

There is prescribed burning planned for this property in the future. Burning, especially smoke created from the burning can have a temporary adverse impact on neighbors, if not planned properly. Burn plans will be developed prior to the burn to identify the most ideal burning conditions to achieve objectives the burn, identify fire lines needed to properly contain the fire, and how to best manage and direct the smoke created from the burn. The notification of neighbors about the burn will also be part of the planning process.

OWASA staff met with neighbors to share the draft of this plan and listen to concerns, and where applicable, developed measures or conditions to mitigate those concerns.

### **Improving Wildlife Habitat and Species Diversity:**

Your wildlife objective is to enhance forest conditions for wildlife health and species diversity and abundance by creating a forest of diverse habitat types and conditions. Active forest management will improve wildlife habitat by creating early successional habitat, increase age diversity, promote wildlife friendly oak-hickory forests, maintain undisturbed riparian corridors, and increase the amount of understory herbaceous plants and grasses for cover and browse.

Some management activities designed to benefit wildlife habitat and diversity on this property include:

- Thinning pine and hardwood woods will allow more sunlight to reach the forest floor, which will promote more herbaceous and native species in the understory for cover and food sources for wildlife.
- Harvesting stands will promote more age diversity and provide more diverse habitat types and conditions, especially early successional habitat.

- Promoting the development of mature oak/hickory forests and natural pine forests will provide acorns/nuts/seeds which are a critical winter food source for deer, turkey, and squirrels.
- Conducting understory burns to manipulate understory vegetation to be more beneficial to wildlife.
- Maintaining soft mast species in the understory and midstory for food sources for songbirds and wildlife.
- Creating and protecting riparian forest buffers wide enough to accommodate and enhance habitat for terrestrial and aquatic wildlife, and protect critical travel corridors for deer and migratory songbirds. Creating and protecting “Intact Forests” will maintain structure, connectivity and refugia for plants and animals displaced by harvesting and thinning areas.
- Creating wider than typical riparian forest buffers to create an undisturbed travel corridor wide enough to accommodate wildlife such as deer and migratory songbirds.
- Protecting vernal ponds and wetland areas for amphibians and reptiles.
- Establishing native grasses along roadways and in logging decks will provide cover and nesting areas for songbirds and wild turkey, and escape cover for small mammals.
- Daylighting roads will improve understory light conditions for development of understory vegetation and grasses planted in roadways. This added light will promote a thicker layer of understory vegetation for escape cover, nesting habitat and source of food for wildlife and songbirds.
- Maintaining and creating dead snags will provide bugging habitats for songbirds and woodpeckers, roosting locations for turkey, and homes for cavity-dwelling wildlife like raccoons and owls.

A helpful wildlife reference are the newsletters called the *Upland Gazette* published by the North Carolina Wildlife Resources Commission. This newsletter is an excellent reference for improving wildlife habitat and summarizing how different forestry practices can benefit piedmont wildlife species. The library of publications can be found at <https://www.ncwildlife.org/Conserving/Upland-Gazette>

## **Improving Ecological Health of Forested Land:**

True North has recommended restoration thinning of the upland forests to help maintain their vitality and vigor. Maintaining forest vitality and vigor will make your forests less vulnerable to insect infestation and disease impacts. By thinning we will reduce crowding and redistribute the growth potential to the most desirable trees on site and improve the overall health, vigor, and growth of the remaining stand. By thinning we are also able to avoid some of the potential mortality by harvesting selected trees. By removing or controlling invasive species, where practical, we help improve the growing conditions of native plants and vegetation. By conducting hardwood improvement harvests we will help to maintain and restore a native oak-hickory forests. By retaining “Intact Forests” and riparian forest buffers we seek to preserve and enhance the long-term ecological integrity of a diverse forest landscape. Through restoration treatments we will help to restore rare or imperiled species and communities, such as shortleaf pine and shortleaf pine savannahs.

## **Reduce the Risk of Wildfires:**

By creating fire breaks, thinning dense stands, and conducting regular understory burns we will reduce the excessive accumulated forest fuel present and reduce the risk of uncontrolled wildfires.

Prior planning and preparation are crucial to a successful prescribed burn program. It will require the establishment of additional trails and firebreaks throughout the stand, which are normally developed just prior to commencing the burn. Improving interior roads will also allow them to double as firebreaks and improve access for wildfire suppression equipment.



**Firebreak**

Special care will be taken to provide advance notice to surrounding property owners. These prescribed burns will be well planned and tightly controlled to significantly reduce the chance of the fire spreading and to minimize adverse off-site impacts from smoke. Fire weather data (wind speed and direction, relative humidity, fuel moisture, temperature, etc.) will be evaluated and monitored prior to any controlled burn to determine the safest and most efficient burning times and conditions. During the controlled burning operation all the necessary fire suppression equipment will be on site, so that in the unlikely event of a breakover, the situation can be quickly controlled with equipment already on site.

Keeping firebreaks open and accessible is essential to responsible forest management. For this reason, it is recommended that bladed, not plowed lines, be established. Bladed lines are much easier to maintain and provide multiple benefits, serving as firebreaks and providing access for other management activities. These revegetated bladed areas also serve as wildlife corridors and as feeding areas for wildlife.

### **Sustainably Manage OWASA's Resources:**

Income from timber harvests can be used to pay for stewardship activities on the property such as boundary line maintenance, understory burning, invasive species control, tree planting, fire breaks, road development and road maintenance.

### **Engage the Community and Partner Agencies:**

We have invited partner agencies to review drafts of this forest stewardship plan and have incorporated their feedback into this Forest Stewardship Plan. We recognize that our partners provide expertise in managing lands for different purposes. For all forest stewardship plans we will request their expert guidance as we develop and implement our plans; partner with them to use our land for demonstration, education, and training opportunities; and work with them to evaluate the ecological and cultural resources on our land and to study and document the outcomes of our forest management program.

We will protect important natural heritage areas identified by the North Carolina Natural Heritage Program (NHP) and work with NHP to register them or protect them through conservation easements or NHP registry agreements where appropriate. We will also work closely with the NC Wildlife Resources Commission and NC Audubon to perform before and after species surveys where they deem the surveys an effective use of their staff time.

We will share information with neighboring landowners, the public, and others about why and how we manage our forest land. We will do this through a variety of methods that may include meetings, tours, website updates, and email. We will also provide meaningful and varied opportunities for the community to provide

feedback on our Forest Management Program, our Forest Stewardship Plans, and the implementation of those plans.

We have tried to develop a management proposal that reflects a multiple-use approach to ensure several different objectives can be achieved simultaneously. Our intent is to create a mosaic of interconnected management units that are bound by good land stewardship. By adhering to this management philosophy, the land should become more productive and your objectives can be successfully met. This plan will have to be adaptive. Through periodic review and evaluation of our work we will revise the plan as necessary to ensure our objectives are being met and will continue to be met.

Submitted by:

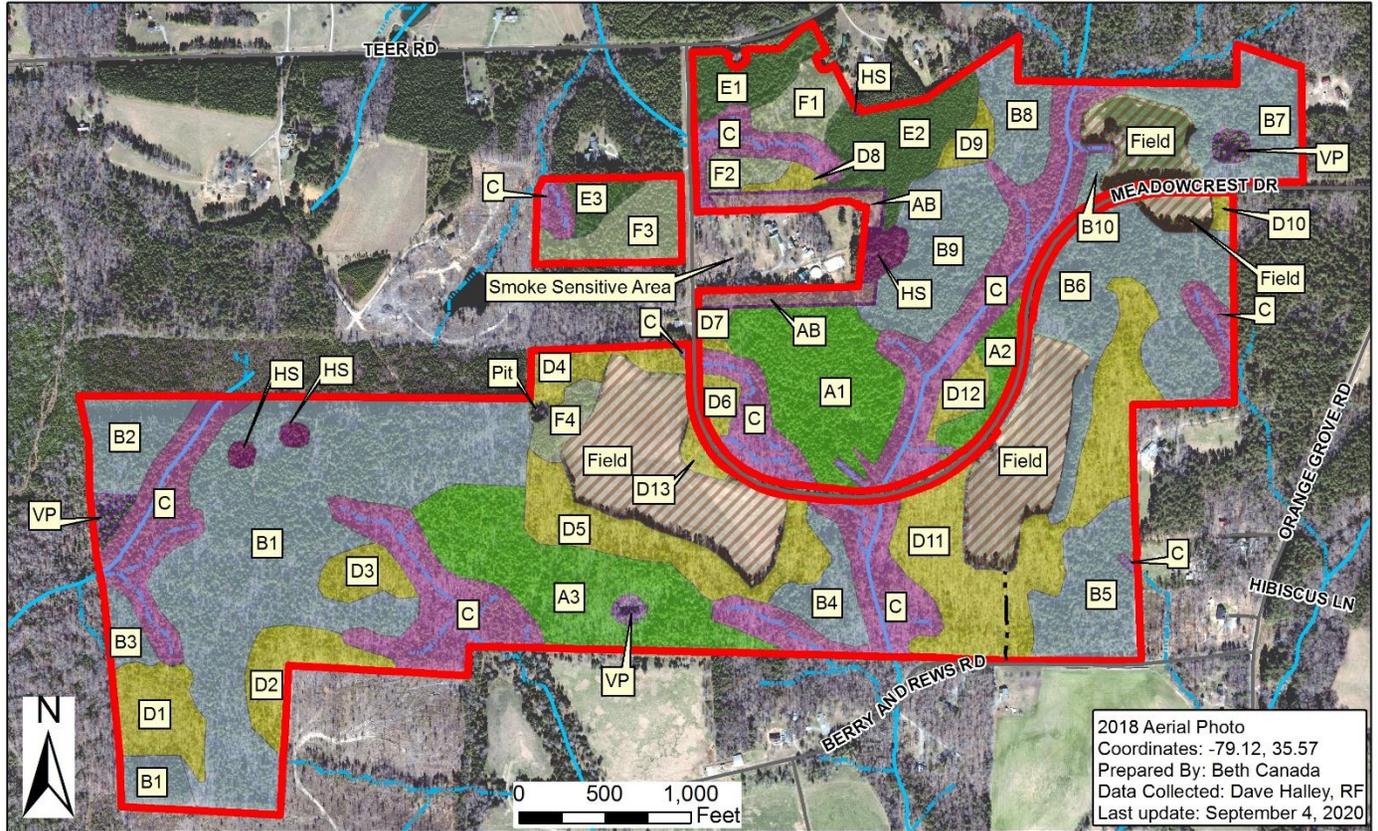
*David P. Halley*

**David P. Halley**

Registered Forester/Certified Forester  
True North Forest Management Services  
4713 Salem Ridge Road  
Holly Springs, NC 27540  
Phone: 919-552-4109



### Meadow Crest South - Forest Management Units



2018 Aerial Photo  
 Coordinates: -79.12, 35.57  
 Prepared By: Beth Canada  
 Data Collected: Dave Halley, RF  
 Last update: September 4, 2020

**Legend**

- - - Forest Road/Trail
- Named Road
- Meadow Crest South Boundary
- ~~~~~ Drainages
- USGS Streams

STAND	ACRES	COVER TYPE
A	41	NATURAL PINE
B	127	NATURAL PINE
C	64.5	RIPARIAN FOREST BUFFER
D	62	UPLAND HARDWOOD
E	16	NATURAL PINE
F	14	NATURAL PINE
AB	5	AESTHETIC BUFFER
HS	3	HISTORIC SITE
VP	3	VERNAL POOL
FIELD	40	FIELD

## Understory Burning Schedule (As of September 2020)

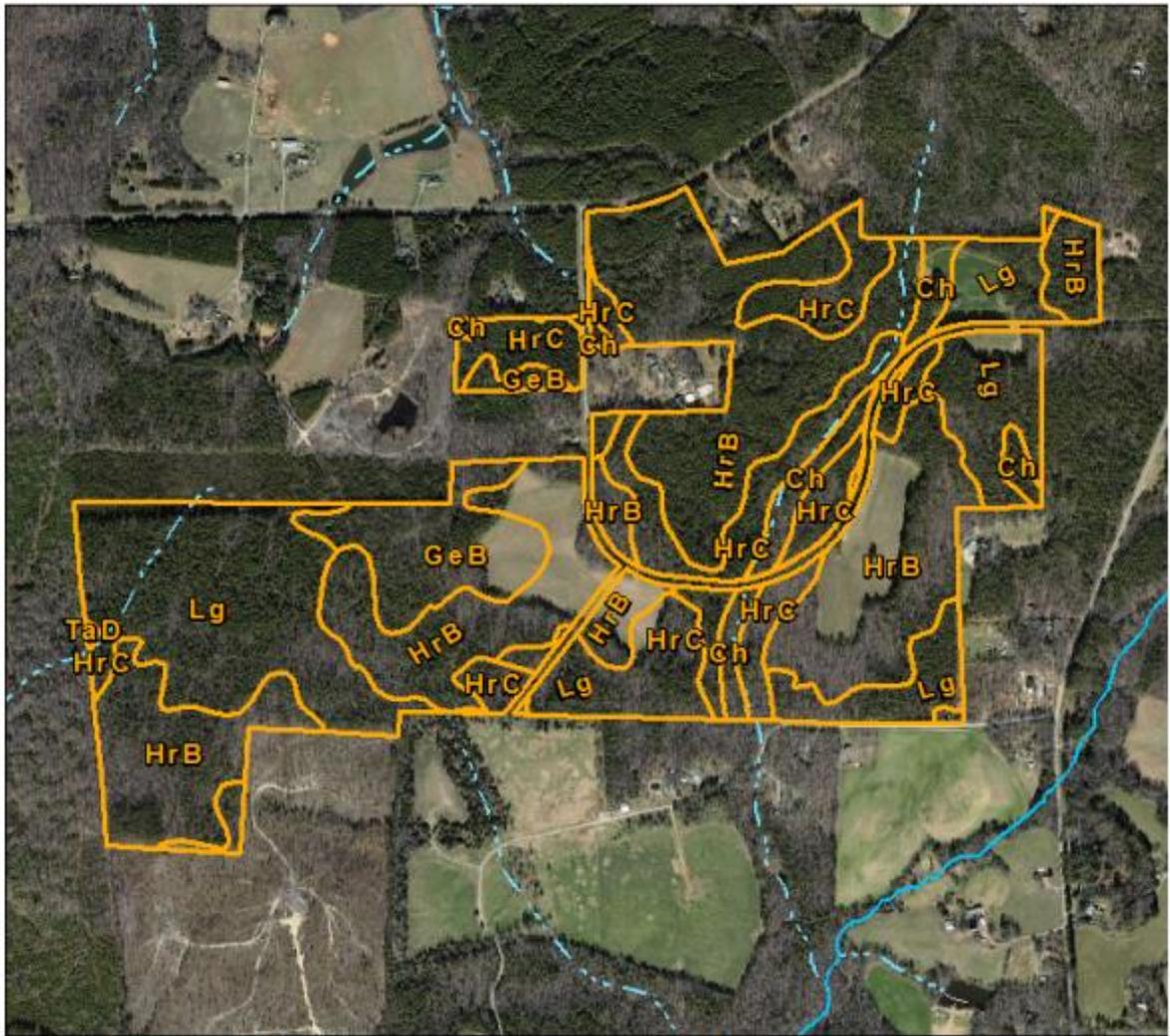
W: Winter    S: Spring    U: Summer    F: Fall

Year	Season	Acres	Mgt. Unit	Activity*
2022-24	F-W	25	A2 & A3	Cool season burn*
2022-24	F-W	16	E	Cool season burn*
2022-24	F-W	44 + 32	B	Cool season burn in thinned and Intact Forest areas*
2022-24	F-W	13	F	Cool season burn*
2022-24	F-W	20	C	Cool season burn*
2027-28	F-W	25	A2 & A3	Cool season burn*
2027-28	F-W	44 + 32	B	Cool season burn*
2026-27	F-W	16	E	Cool season burn*
2026-27	S-U	33	F & C	Growing season burn*
2031-32	F-W	25	A2 & A3	Cool season burn*
2031-32	F-W	16	E	Cool season burn*
2031-32	F-W	44 + 32	B	Cool season burn*
2031-32	S-U	13	F	Growing season burn*

\*A financial incentive program may cover the activities starred above. Please contact the North Carolina Forest Service for specific advice and availability of cost-share funds. Once approved contact NCFS before starting practices so they can check for cost-share compliance.

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

# SOIL MAP



USGS 1:24k Streams      Perennial Intermittent Ephemeral

Map Unit Symbol	Map Unit Description	Map Unit Symbol	Map Unit Description
Lg	Lignum silt loam, 0 to 3 percent slopes, Moderately well drained	GeB	Georgeville silt loam, 2 to 6 percent slopes, Well drained
HrB	Herndon silt loam, 2 to 6 percent slopes, Well drained	HrC	Herndon silt loam, 6 to 10 percent slopes, Well drained
TaD	Tarrus silt loam, 8 to 15 percent slopes, Well drained	Ch	Chewacla loam, 0 to 2 percent slopes, frequently flooded, Somewhat poorly drained



# Forest Preharvest Planning

## Detailed Soils Report

### Tract Mapunit Suitability Summary

<b>Common Harvest Activity</b>	<b>Most Favorable Rating</b>	<b>Most Favorable Soil Map Unit(s)</b>	<b>BMP Awareness</b>
Construction Limitations for Haul Roads and Log Landings	<u>Moderate</u>	Lg: Lignum silt loam, 0 to 3 percent slopes; GeB: Georgeville silt loam, 2 to 6 percent slopes; HrB: Herndon silt loam, 2 to 6 percent slopes; HrC: Herndon silt loam, 6 to 10 percent slopes; TaD: Tarrus silt loam, 8 to 15 percent slopes	Additional BMP Installation, Monitoring, and Maintenance May Be Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Keep Grade Below 10% Where Possible.
Harvest Equipment Operability	<u>Moderately Suited</u>	Lg: Lignum silt loam, 0 to 3 percent slopes; GeB: Georgeville silt loam, 2 to 6 percent slopes; HrB: Herndon silt loam, 2 to 6 percent slopes; HrC: Herndon silt loam, 6 to 10 percent slopes; TaD: Tarrus silt loam, 8 to 15 percent slopes; Ch: Chewacla loam, 0 to 2 percent slopes, frequently flooded	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Erosion Hazard: Off-Road Off-Trail	<u>Slight</u>	Lg: Lignum silt loam, 0 to 3 percent slopes; GeB: Georgeville silt loam, 2 to 6 percent slopes; HrB: Herndon silt loam, 2 to 6 percent slopes; HrC: Herndon silt loam, 6 to 10 percent slopes; Ch: Chewacla loam, 0 to 2 percent slopes, frequently flooded	Follow BMP's. Minimize Area of Disturbed Soils.
Erosion Hazard: Road/Trail	<u>Slight</u>	Lg: Lignum silt loam, 0 to 3 percent slopes; Ch: Chewacla loam, 0 to 2 percent slopes, frequently flooded	Follow BMPs. Minimize Area of Disturbed Soils. Apply Slash/Laps on Skid Trails. Keep Grade Below 10% Where Possible.
Soil Rutting Hazard	<u>Severe</u>	Lg: Lignum silt loam, 0 to 3 percent slopes; GeB: Georgeville silt loam, 2 to 6 percent slopes; HrB: Herndon silt loam, 2 to 6 percent slopes; HrC: Herndon silt loam, 6 to 10 percent slopes; TaD: Tarrus silt loam, 8 to 15 percent slopes; Ch: Chewacla loam, 0 to 2 percent slopes, frequently flooded	Have a Back-Up Plan for When to Stop Logging. Only Use Logging Equipment and Methods Suited for the Site Conditions: Low-Ground-Pressure, High Lead, Shovel Logging are examples.
Suitability for Log Landings	<u>Moderately Suited</u>	Lg: Lignum silt loam, 0 to 3 percent slopes; GeB: Georgeville silt loam, 2 to 6 percent slopes; HrB: Herndon silt loam, 2 to 6 percent slopes; HrC: Herndon silt loam, 6 to 10 percent slopes; TaD: Tarrus silt loam, 8 to 15 percent slopes	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Suitability for Roads on Natural Surface	<u>Moderately Suited</u>	Lg: Lignum silt loam, 0 to 3 percent slopes; GeB: Georgeville silt loam, 2 to 6 percent slopes; HrB: Herndon silt loam, 2 to 6 percent slopes; HrC: Herndon silt loam, 6 to 10 percent slopes; TaD: Tarrus silt loam, 8 to 15 percent slopes	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.



# Forest Preharvest Planning

## Detailed Soils Report

Map Unit **Georgeville silt loam, 2 to 6 percent slopes** represents **7.1%** of the tract, and the dominant soil component of the Map Unit is **Georgeville** which makes up **90%** of the Map Unit.

Tract ID:	439061	Tract Name:	OWASA
Mapunit Symbol:	GeB	Drainage Class:	Well drained
Mapunit Name:	Georgeville silt loam, 2 to 6 percent slopes	Flooding Frequency:	None
		Horizon A (Surface):	Silt loam
Mapunit Major Component:	Georgeville	Horizon B (Sub-layer):	Silty clay loam
Taxonomic Class:	Fine, kaolinitic, thermic Typic Kanhapludults		
Frost Free Days:	215	Hydric Rating:	Nonhydric

### **Common Harvest Activity**

### **Rating**

### **BMP Awareness**

Construction Limitations for Haul Roads and Log Landings	<u>Moderate</u>	Additional BMP Installation, Monitoring, and Maintenance May Be Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Keep Grade Below 10% Where Possible.
Harvest Equipment Operability	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Erosion Hazard: Off-Road Off-Trail	<u>Slight</u>	Follow BMP's. Minimize Area of Disturbed Soils.
Erosion Hazard: Road/Trail	<u>Moderate</u>	Additional BMP Installation, Monitoring, and Maintenance May Be Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Keep Grade Below 10% Where Possible.
Soil Rutting Hazard	<u>Severe</u>	Have a Back-Up Plan for When to Stop Logging. Only Use Logging Equipment and Methods Suited for the Site Conditions: Low-Ground-Pressure, High Lead, Shovel Logging are examples.
Suitability for Log Landings	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Suitability for Roads on Natural Surface	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.



Soil conditions indicate additional planning or professional advice may be needed to ensure water quality is sufficiently protected during harvest operations. We recommend that you contact the N.C. Forest Service for technical assistance.

### Mapunit Soil Characteristics and Ratings

Map Unit **Herndon silt loam, 2 to 6 percent slopes** represents **45.1%** of the tract, and the dominant soil component of the Map Unit is **Herndon** which makes up **90%** of the Map Unit.

Tract ID:	439061	Tract Name:	OWASA
Mapunit Symbol:	HrB	Drainage Class:	Well drained
Mapunit Name:	Herndon silt loam, 2 to 6 percent slopes	Flooding Frequency:	None
		Horizon A (Surface):	Silt loam
Mapunit Major Component:	Herndon	Horizon B (Sub-layer):	Silty clay loam
Taxonomic Class:	Fine, kaolinitic, thermic Typic Kanhapludults		
Frost Free Days:	225	Hydric Rating:	Nonhydric

#### Common Harvest Activity

#### Rating

#### BMP Awareness

Construction Limitations for Haul Roads and Log Landings	<u>Moderate</u>	Additional BMP Installation, Monitoring, and Maintenance May Be Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Keep Grade Below 10% Where Possible.
Harvest Equipment Operability	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Erosion Hazard: Off-Road Off-Trail	<u>Slight</u>	Follow BMP's. Minimize Area of Disturbed Soils.
Erosion Hazard: Road/Trail	<u>Moderate</u>	Additional BMP Installation, Monitoring, and Maintenance May Be Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Keep Grade Below 10% Where Possible.
Soil Rutting Hazard	<u>Severe</u>	Have a Back-Up Plan for When to Stop Logging. Only Use Logging Equipment and Methods Suited for the Site Conditions: Low-Ground-Pressure, High Lead, Shovel Logging are examples.
Suitability for Log Landings	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Suitability for Roads on Natural Surface	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.



Soil conditions indicate additional planning or professional advice may be needed to ensure water quality is sufficiently protected during harvest operations. We recommend that you contact the N.C. Forest Service for technical assistance.

## Mapunit Soil Characteristics and Ratings

Map Unit **Herndon silt loam, 6 to 10 percent slopes** represents **14.5%** of the tract, and the dominant soil component of the Map Unit is **Herndon** which makes up **80%** of the Map Unit.

Tract ID:	439061	Tract Name:	OWASA
Mapunit Symbol:	HrC	Drainage Class:	Well drained
Mapunit Name:	Herndon silt loam, 6 to 10 percent slopes	Flooding Frequency:	None
		Horizon A (Surface):	Silt loam
Mapunit Major Component:	Herndon	Horizon B (Sub-layer):	Silty clay loam
Taxonomic Class:	Fine, kaolinitic, thermic Typic Kanhapludults		
Frost Free Days:	215	Hydric Rating:	Nonhydric

### Common Harvest Activity

### Rating

### BMP Awareness

Construction Limitations for Haul Roads and Log Landings	<u>Moderate</u>	Additional BMP Installation, Monitoring, and Maintenance May Be Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Keep Grade Below 10% Where Possible.
Harvest Equipment Operability	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Erosion Hazard: Off-Road Off-Trail	<u>Slight</u>	Follow BMP's. Minimize Area of Disturbed Soils.
Erosion Hazard: Road/Trail	<u>Moderate</u>	Additional BMP Installation, Monitoring, and Maintenance May Be Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Keep Grade Below 10% Where Possible.
Soil Rutting Hazard	<u>Severe</u>	Have a Back-Up Plan for When to Stop Logging. Only Use Logging Equipment and Methods Suited for the Site Conditions: Low-Ground-Pressure, High Lead, Shovel Logging are examples.
Suitability for Log Landings	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Suitability for Roads on Natural Surface	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.



Soil conditions indicate additional planning or professional advice may be needed to ensure water quality is sufficiently protected during harvest operations. We recommend that you contact the N.C. Forest Service for technical assistance.

### Mapunit Soil Characteristics and Ratings

Map Unit **Tarrus silt loam, 8 to 15 percent slopes** represents **0.1%** of the tract, and the dominant soil component of the Map Unit is **Tarrus** which makes up **75%** of the Map Unit.

Tract ID:	439061	Tract Name:	OWASA
Mapunit Symbol:	TaD	Drainage Class:	Well drained
Mapunit Name:	Tarrus silt loam, 8 to 15 percent slopes	Flooding Frequency:	None
		Horizon A (Surface):	Silt loam
Mapunit Major Component:	Tarrus	Horizon B (Sub-layer):	Clay loam
Taxonomic Class:	Fine, kaolinitic, thermic Typic Kanhapludults		
Frost Free Days:	215	Hydric Rating:	Nonhydric

**Common Harvest Activity**

**Rating**

**BMP Awareness**

Construction Limitations for Haul Roads and Log Landings	<u>Moderate</u>	Additional BMP Installation, Monitoring, and Maintenance May Be Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Keep Grade Below 10% Where Possible.
Harvest Equipment Operability	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Erosion Hazard: Off-Road Off-Trail	<u>Moderate</u>	Additional BMP Installation, Monitoring, and Maintenance May Be Needed. Keep Grade Below 10% Where Possible.
Erosion Hazard: Road/Trail	<u>Severe</u>	Additional BMP Installation, Monitoring, and Maintenance Are Expected - Plan Accordingly. Higher Risk and Costs Are Possible. Engineering Expertise May Be Needed. Keep Grade Below 10% Where Possible. Where Possible, Cover Bare Soil With Slash/Laps During Operations. Establish Groundcover Immediately As Needed.
Soil Rutting Hazard	<u>Severe</u>	Have a Back-Up Plan for When to Stop Logging. Only Use Logging Equipment and Methods Suited for the Site Conditions: Low-Ground-Pressure, High Lead, Shovel Logging are examples.
Suitability for Log Landings	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Suitability for Roads on Natural Surface	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.



Soil conditions indicate additional planning or professional advice may be needed to ensure water quality is sufficiently protected during harvest operations. We recommend that you contact the N.C. Forest Service for technical assistance.

### Mapunit Soil Characteristics and Ratings

Map Unit **Chewacla loam, 0 to 2 percent slopes, frequently flooded** represents **4.0%** of the tract, and the dominant soil component of the Map Unit is **Chewacla** which makes up **90%** of the Map Unit.

Tract ID:	439061	Tract Name:	OWASA
Mapunit Symbol:	Ch	Drainage Class:	Somewhat poorly drained
Mapunit Name:	Chewacla loam, 0 to 2 percent slopes, frequently flooded	Flooding Frequency:	Frequent
		Horizon A (Surface):	Loam
Mapunit Major Component:	Chewacla	Horizon B (Sub-layer):	Sandy clay loam
Taxonomic Class:	Fine-loamy, mixed, active, thermic Fluvaquentic Dystrudepts		
Frost Free Days:	225	Hydric Rating:	Predominantly Nonhydric

**Common Harvest Activity**

**Rating**

**BMP Awareness**

Construction Limitations for Haul Roads and Log Landings	<u>Severe</u>	Additional BMP Installation, Monitoring, and Maintenance Are Expected - Plan Accordingly. Higher Risk and Costs Are Possible. Engineering Expertise May Be Needed. Keep Grade Below 10% Where Possible. Where Possible, Cover Bare Soil With Slash/Laps During Operations. Establish Groundcover Immediately As Needed.
Harvest Equipment Operability	<u>Moderately suited</u>	Extra BMP Installation, Monitoring, and Maintenance Are Needed. Install BMPs to Divert Runoff and Catch Sediment. Stabilize Bare Soil Promptly. Stay Away From Streams. Keep Grade Under 10%.
Erosion Hazard: Off-Road Off-Trail	<u>Slight</u>	Follow BMP's. Minimize Area of Disturbed Soils.
Erosion Hazard: Road/Trail	<u>Slight</u>	Follow BMPs. Minimize Area of Disturbed Soils. Apply Slash/Laps on Skid Trails. Keep Grade Below 10% Where Possible.
Soil Rutting Hazard	<u>Severe</u>	Have a Back-Up Plan for When to Stop Logging. Only Use Logging Equipment and Methods Suited for the Site Conditions: Low-Ground-Pressure, High Lead, Shovel Logging are examples.
Suitability for Log Landings	<u>Poorly suited</u>	Additional BMP Installation, Monitoring, and Maintenance Are Expected - Plan Accordingly. Higher Risk and Costs Are Possible. Engineering Expertise May Be Needed. Keep Grade Below 10% Where Possible.
Suitability for Roads on Natural Surface	<u>Poorly suited</u>	Additional BMP Installation, Monitoring, and Maintenance Are Expected - Plan Accordingly. Higher Risk and Costs Are Possible. Engineering Expertise May Be Needed. Keep Grade Below 10% Where Possible.



Soil conditions indicate additional planning or professional advice may be needed to ensure water quality is sufficiently protected during harvest operations. We recommend that you contact the N.C. Forest Service for technical assistance.