North Carolina Department of Environment and Natural Resources
Division of Water Quality

Beverly Eaves Perdue
Governor

Coleen H. Sullins
Director

Dee Freeman
Secretary

October 1, 2009

Norwood Dail
Backwoods Nursery #1 & #2
407 Maready Rd
Chinquapin, NC 28521

Subject: Certificate of Coverage No. AWS310764
Backwoods Nursery #1 & #2
Swine Waste Collection, Treatment,
Storage and Application System
Duplin County

Dear Norwood Dail:

In accordance with your renewal request, we are hereby forwarding to you this Certificate of Coverage (COC) issued to Norwood Dail, authorizing the operation of the subject animal waste management system in accordance with General Permit AWG100000.

This approval shall consist of the operation of this system including, but not limited to, the management and land application of animal waste as specified in the facility's Certified Animal Waste Management Plan (CAWMP) for the Backwoods Nursery #1 & #2, located in Duplin County, with a swine animal capacity of no greater than the following annual averages:

Wean to Finish:	Feeder to Finish:	Boar/Stud:
Wean to Feeder: **5200**	Farrow to Wean:	Gilts:
Farrow to Finish:	Farrow to Feeder:	Other:

If this is a Farrow to Wean or Farrow to Feeder operation, there may be one boar for each 15 sows. Where boars are unnecessary, they may be replaced by an equivalent number of sows. Any of the sows may be replaced by gilts at a rate of 4 gilts for every 3 sows.

The COC shall be effective from the date of issuance until September 30, 2014, and shall hereby void Certificate of Coverage Number AWS310764 that was previously issued to this facility. Pursuant to this COC, you are authorized and required to operate the system in conformity with the conditions and limitations as specified in the General Permit, the facility's CAWMP, and this COC. An adequate system for collecting and maintaining the required monitoring data and operational information must be established for this facility. Any increase in waste production greater than the certified design capacity or increase in number of animals authorized by this COC (as provided above) will require a modification to the CAWMP and this COC and must be completed prior to actual increase in either wastewater flow or number of animals.

Please carefully read this COC and the enclosed State General Permit. Please pay careful attention to the record keeping and monitoring conditions in this permit. Record keeping forms are unchanged with this General Permit. Please continue to use the same record keeping forms.

1636 Mail Service Center, Raleigh, North Carolina 27699-1636
Location: 2728 Capital Blvd., Raleigh, North Carolina 27604
Phone: 919-733-3221 \ FAX: 919-715-0588 \ Customer Service: 1-877-623-6748
Internet: www.ncwaterquality.org
An Equal Opportunity \ Affirmative Action Employer

If your Waste Utilization Plan (WUP) has been developed based on site-specific information, careful evaluation of future samples is necessary. Should your records show that the current WUP is inaccurate you will need to have a new WUP developed.

The issuance of this COC does not excuse the Permittee from the obligation to comply with all applicable laws, rules, standards, and ordinances (local, state, and federal), nor does issuance of a COC to operate under this permit convey any property rights in either real or personal property.

Per 15A NCAC 2T .0105(h) a compliance boundary is provided for the facility and no new water supply wells shall be constructed within the compliance boundary. Per NRCS standards a 100-foot separation shall be maintained between water supply wells and any lagoon, storage pond, or any wetted area of a spray field.

Please be advised that any violation of the terms and conditions specified in this COC, the General Permit or the CAWMP may result in the revocation of this COC, or penalties in accordance with NCGS 143-215.6A through 143-215.6C including civil penalties, criminal penalties, and injunctive relief.

If you wish to continue the activity permitted under the General Permit after the expiration date of the General Permit, then an application for renewal must be filed at least 180 days prior to expiration.

This COC is not automatically transferable. A name/ownership change application must be submitted to the Division prior to a name change or change in ownership.

If any parts, requirements, or limitations contained in this COC are unacceptable, you have the right to apply for an individual permit by contacting the Animal Feeding Operations Unit for information on this process. Unless such a request is made within 30 days, this COC shall be final and binding.

In accordance with Condition II.22 of the General Permit, waste application shall cease within four (4) hours of the time that the National Weather Service issues a Hurricane Warning, Tropical Storm Warning, or a Flood Watch associated with a tropical system for the county in which the facility is located. You may find detailed watch/warning information for your county by calling the Newport/Morehead City, NC National Weather Service office at (252) 223-5737, or by visiting their website at: www.erh.noaa.gov/er/mhx/

This facility is located in a county covered by our Wilmington Regional Office. The Regional Office Aquifer Protection Staff may be reached at (910) 395-3900. If you need additional information concerning this COC or the General Permit, please contact the Animal Feeding Operations Unit staff at (919) 733-3221.

Sincerely,

for Coleen H. Sullins

Enclosure (General Permit AWG100000)
cc: (Certificate of Coverage only for all ccs)
Wilmington Regional Office, Aquifer Protection Section
Duplin County Health Department
Duplin County Soil and Water Conservation District
APS Central Files (Permit No. AWS310764)
AFO Notebooks
Murphy-Brown, LLC

Nutrient Management Plan For Animal Waste Utilization
11-20-2018

This plan has been prepared for:

Backwoods 1 & 2 (31-764)
Double D Farm LLC
P.O. Box 430
Beulaville, NC 28518
910-298-5521

This plan has been developed by:

Ronnie G. Kennedy Jr.
Agriment Services, Inc.
PO Box 1096
Beulaville, NC 28518
252-568-2648

Developer Signature

Type of Plan: **Nitrogen Only with Manure Only**

Owner/Manager/Producer Agreement

I (we) understand and agree to the specifications and the operation and maintenance procedures established in this nutrient management plan which includes an animal waste utilization plan for the farm named above. I have read and understand the Required Specifications concerning animal waste management that are included with this plan.

Double D Farm LLC
By Keith Dail

Signature (owner)

11-20-18
Date

Signature (manager or producer)

Date

This plan meets the minimum standards and specifications of the U.S. Department of Agriculture - Natural Resources Conservation Service or the standard of practices adopted by the Soil and Water Conservation Commission.

Plan Approved By:

Technical Specialist Signature

11-20-2018
Date

Nutrients applied in accordance with this plan will be supplied from the following source(s):

Commercial Fertilizer is not included in this plan.

S5	Swine Nursery Lagoon Liquid waste generated 993,200 gals/year by a 5,200 animal Swine Nursery Lagoon Liquid operation. This production facility has waste storage capacities of approximately 180 days.				
Estimated Pounds of Plant Available Nitrogen Generated per Year					
Broadcast	1790				
Incorporated	2148				
Injected	2148				
Irrigated	1790				
	Max. Avail. PAN (lbs)*	Actual PAN Applied (lbs)	PAN Surplus/ Deficit (lbs)	Actual Volume Applied (Gallons)	Volume Surplus/ Deficit (Gallons)
Year 1	1,790	2964	-1,174	1,644,094	-650,894

Note: In source ID, S means standard source, U means user defined source.

* Max. Available PAN is calculated on the basis of the actual application method(s) identified in the plan for this source.

Narrative

11/20/2018
This plan is to change all pasture to hay.

The table shown below provides a summary of the crops or rotations included in this plan for each field. Realistic Yield estimates are also provided for each crop in the plan. In addition, the Leaching Index for each field is shown, where available.

Planned Crops Summary

Tract	Field	Total Acres	Useable Acres	Leaching Index (LI)	Soil Series	Crop Sequence	RYE
7961	1	1.80	1.74	N/A	Autryville	Small Grain Overseed	1.0 Tons
						Hybrid Bermudagrass Hay	5.5 Tons
7961	2	1.50	1.45	N/A	Autryville	Small Grain Overseed	1.0 Tons
						Hybrid Bermudagrass Hay	5.5 Tons
7961	3	1.95	1.89	N/A	Autryville	Small Grain Overseed	1.0 Tons
						Hybrid Bermudagrass Hay	5.5 Tons
7961	4	2.70	2.61	N/A	Autryville	Small Grain Overseed	1.0 Tons
						Hybrid Bermudagrass Hay	5.5 Tons
7961	5	1.65	1.60	N/A	Autryville	Small Grain Overseed	1.0 Tons
						Hybrid Bermudagrass Hay	5.5 Tons
7961	6	2.40	2.32	N/A	Autryville	Small Grain Overseed	1.0 Tons
						Hybrid Bermudagrass Hay	5.5 Tons
PLAN TOTALS:		12.00	11.61				

LI	*Potential Leaching*	*Technical Guidance*
< 2	Low potential to contribute to soluble nutrient leaching below the root zone.	None
>= 2 & <= 10	Moderate potential to contribute to soluble nutrient leaching below the root zone.	Nutrient Management (590) should be planned.
> 10	High potential to contribute to soluble nutrient leaching below the root zone.	Nutrient Management (590) should be planned. Other conservation practices that improve the soils available water holding capacity and improve nutrient use efficiency should be considered. Examples are Cover Crops (340) to scavenge nutrients, Sod-Based Rotations (328), Long-Term No-Till (778), and edge-of-field practices such as Filter Strips (393) and Riparian Forest Buffers (391).

NOTE: Symbol * means user entered data.

The Waste Utilization table shown below summarizes the waste utilization plan for this operation. This plan provides an estimate of the number of acres of cropland needed to use the nutrients being produced. The plan requires consideration of the realistic yields of the crops to be grown, their nutrient requirements, and proper timing of applications to maximize nutrient uptake.

This table provides an estimate of the amount of nitrogen required by the crop being grown and an estimate of the nitrogen amount being supplied by manure or other by-products, commercial fertilizer and residual from previous crops. An estimate of the quantity of solid and liquid waste that will be applied on each field in order to supply the indicated quantity of nitrogen from each source is also included. A balance of the total manure produced and the total manure applied is included in the table to ensure that the plan adequately provides for the utilization of the manure generated by the operation.

Waste Utilization Table **Year 1**

Tract	Field	Source ID	Soil Series	Total Acres	Use. Acres	Crop	RYE	Applic. Period	Nitrogen PA Nutrient Req'd (lbs/A) N	Comm. Fert. Nutrient Applied (lbs/A) N	Res. (lbs/A) N	Applic. Method	Manure PA NutrientApplied (lbs/A) N	Liquid ManureApplied (acre) 1000 gal/A	Solid Manure Applied (acre) Tons	Liquid Manure Applied (Field) 1000 gals	Solid Manur Applied (Field) tons
7961	1	S5	Autryville	1.80	1.74	Small Grain Overseed	1.0 Tons	10/1-3/31	50	0	0	Irrig.	50	27.74	0.00	48.27	0.00
7961	1	S5	Autryville	1.80	1.74	Hybrid Bermudagrass Hay	5.5 Tons	3/1-9/30	269	0	0	Irrig.	269	149.24	0.00	259.67	0.00
7961	2	S5	Autryville	1.50	1.45	Small Grain Overseed	1.0 Tons	10/1-3/31	50	0	0	Irrig.	50	27.74	0.00	40.22	0.00
7961	2	S5	Autryville	1.50	1.45	Hybrid Bermudagrass Hay	5.5 Tons	3/1-9/30	269	0	0	Irrig.	269	149.24	0.00	216.39	0.00
7961	3	S5	Autryville	1.95	1.89	Small Grain Overseed	1.0 Tons	10/1-3/31	50	0	0	Irrig.	50	27.74	0.00	52.43	0.00
7961	3	S5	Autryville	1.95	1.89	Hybrid Bermudagrass Hay	5.5 Tons	3/1-9/30	269	0	0	Irrig.	269	149.24	0.00	282.06	0.00
7961	4	S5	Autryville	2.70	2.61	Small Grain Overseed	1.0 Tons	10/1-3/31	50	0	0	Irrig.	50	27.74	0.00	72.40	0.00
7961	4	S5	Autryville	2.70	2.61	Hybrid Bermudagrass Hay	5.5 Tons	3/1-9/30	269	0	0	Irrig.	269	149.24	0.00	389.51	0.00
7961	5	S5	Autryville	1.65	1.60	Small Grain Overseed	1.0 Tons	10/1-3/31	50	0	0	Irrig.	50	27.74	0.00	44.38	0.00
7961	5	S5	Autryville	1.65	1.60	Hybrid Bermudagrass Hay	5.5 Tons	3/1-9/30	269	0	0	Irrig.	269	149.24	0.00	238.78	0.00
7961	6	S5	Autryville	2.40	2.32	Small Grain Overseed	1.0 Tons	10/1-3/31	50	0	0	Irrig.	0	0.00	0.00	0.00	0.00
7961	6	S5	Autryville	2.40	2.32	Hybrid Bermudagrass Hay	5.5 Tons	3/1-9/30	269	0	0	Irrig.	0	0.00	0.00	0.00	0.00

Waste Utilization Table

Year 1

Tract	Field	Source ID	Soil Series	Total Acres	Use. Acres	Crop	RYE	Applic. Period	Nitrogen PA Nutrient Req'd (lbs/A) N	Comm. Fert. Nutrient Applied (lbs/A) N	Res. (lbs/A) N	Applic. Method	Manure PA NutrientApplied (lbs/A) N	Liquid ManureApplied (acre) 1000 gal/A	Solid Manure Applied (acre) Tons	Liquid Manure Applied (Field) 1000 gals	Solid Manur Applied (Field) tons
															Total Applied, 1000 gallons	1,644.09	
															Total Produced, 1000 gallons	993.20	
															Balance, 1000 gallons	-650.89	
															Total Applied, tons		0.00
															Total Produced, tons		0.00
															Balance, tons		0.00

Notes: 1. In the tract column, ~ symbol means leased, otherwise, owned. 2. Symbol * means user entered data.

The Irrigation Application Factors for each field in this plan are shown in the following table. Infiltration rate varies with soils. If applying waste nutrients through an irrigation system, you must apply at a rate that will not result in runoff. This table provides the maximum application rate per hour that may be applied to each field selected to receive wastewater. It also lists the maximum application amount that each field may receive in any one application event.

Irrigation Application Factors

Tract	Field	Soil Series	Application Rate (inches/hour)	Application Amount (inches)
7961	1	Autryville	0.60	1.0
7961	2	Autryville	0.60	1.0
7961	3	Autryville	0.60	1.0
7961	4	Autryville	0.60	1.0
7961	5	Autryville	0.60	1.0
7961	6	Autryville	0.60	1.0

NOTE: Symbol * means user entered data.

The following Lagoon Sludge Nitrogen Utilization table provides an estimate of the number of acres needed for sludge utilization for the indicated accumulation period. These estimates are based on average nitrogen concentrations for each source, the number of animals in the facility and the plant available nitrogen application rates shown in the second column.

Lagoon sludge contains nutrients and organic matter remaining after treatment and application of the effluent. At clean out, this material must be utilized for crop production and applied at agronomic rates. In most cases, the priority nutrient is nitrogen but other nutrients including phosphorous, copper and zinc can also be limiting. Since nutrient levels are generally very high, application of sludge must be carefully applied.

Sites must first be evaluated for their suitability for sludge application. Ideally, effluent spray fields should not be used for sludge application. If this is not possible, care should be taken not to load effluent application fields with high amounts of copper and zinc so that additional effluent cannot be applied. On sites vulnerable to surface water moving to streams and lakes, phosphorous is a concern. Soils containing very high phosphorous levels may also be a concern.

Lagoon Sludge Nitrogen Utilization Table

Crop	Maximum PA-N Rate lb/ac	Maximum Sludge Application Rate 1000 gal/ac	Minimum Acres 5 Years Accumulation	Minimum Acres 10 Years Accumulation	Minimum Acres 15 Years Accumulation
Swine Nursery Lagoon Sludge - Standard					
Corn 120 bu	150	14.69	11.86	23.72	35.58
Hay 6 ton R.Y.E.	300	29.38	5.93	11.86	17.79
Soybean 40 bu	160	15.67	11.12	22.24	33.36

The Available Waste Storage Capacity table provides an estimate of the number of days of storage capacity available at the end of each month of the plan. Available storage capacity is calculated as the design storage capacity in days minus the number of days of net storage volume accumulated. The start date is a value entered by the user and is defined as the date prior to applying nutrients to the first crop in the plan at which storage volume in the lagoon or holding pond is equal to zero.

Available storage capacity should be greater than or equal to zero and less than or equal to the design storage capacity of the facility. If the available storage capacity is greater than the design storage capacity, this indicates that the plan calls for the application of nutrients that have not yet accumulated. If available storage capacity is negative, the estimated volume of accumulated waste exceeds the design storage volume of the structure. Either of these situations indicates that the planned application interval in the waste utilization plan is inconsistent with the structure's temporary storage capacity.

Available Waste Storage Capacity

Source Name	Swine Nursery Lagoon Liquid	**Design Storage Capacity (Days)**
Start Date	9/1	180
Plan Year	Month	Available Storage Capacity (Days) *
1	1	89
1	2	80
1	3	114
1	4	160
1	5	180
1	6	180
1	7	180
1	8	180
1	9	180
1	10	163
1	11	152
1	12	135

* Available Storage Capacity is calculated as of the end of each month.

Required Specifications For Animal Waste Management

1. **Animal waste shall not reach surface waters of the state by runoff, drift, manmade conveyances, direct application, or direct discharge during operation or land application. Any discharge of waste that reaches surface water is prohibited.**

2. **There must be documentation in the design folder that the producer either owns or has an agreement for use of adequate land on which to properly apply the waste. If the producer does not own adequate land to properly dispose of the waste, he/she shall provide evidence of an agreement with a landowner, who is within a reasonable proximity, allowing him/her the use of the land for waste application. It is the responsibility of the owner of the waste production facility to secure an update of the Nutrient Management Plan when there is a change in the operation, increase in the number of animals, method of application, receiving crop type, or available land.**

3. **Animal waste shall be applied to meet, but not exceed, the nitrogen needs for realistic crop yields based upon soil type, available moisture, historical data, climatic conditions, and level of management, unless there are regulations that restrict the rate of applications for other nutrients.**

4. **Animal waste shall be applied to land eroding less than 5 tons per acre per year. Waste may be applied to land eroding at more than 5 tons per acre per year but less than 10 tons per acre per year provided grass filter strips are installed where runoff leaves the field (see USDA, NRCS Field Office Technical Guide Standard 393 - Filter Strips).**

5. **Odors can be reduced by injecting the waste or by disking after waste application. Waste should not be applied when there is danger of drift from the land application field.**

6. **When animal waste is to be applied on acres subject to flooding, waste will be soil incorporated on conventionally tilled cropland. When waste is applied to conservation tilled crops or grassland, the waste may be broadcast provided the application does not occur during a season prone to flooding (see "Weather and Climate in North Carolina" for guidance).**

7. Liquid waste shall be applied at rates not to exceed the soil infiltration rate such that runoff does not occur offsite or to surface waters and in a method which does not cause drift from the site during application. No ponding should occur in order to control odor and flies.

8. Animal waste shall not be applied to saturated soils, during rainfall events, or when the soil surface is frozen.

9. Animal waste shall be applied on actively growing crops in such a manner that the crop is not covered with waste to a depth that would inhibit growth. The potential for salt damage from animal waste should also be considered.

10. Nutrients from waste shall not be applied in fall or winter for spring planted crops on soils with a high potential for leaching. Waste/nutrient loading rates on these soils should be held to a minimum and a suitable winter cover crop planted to take up released nutrients. Waste shall not be applied more than 30 days prior to planting of the crop or forages breaking dormancy.

11. Any new swine facility sited on or after October 1, 1995 shall comply with the following: The outer perimeter of the land area onto which waste is applied from a lagoon that is a component of a swine farm shall be at least 50 feet from any residential property boundary and canal. Animal waste, other than swine waste from facilities sited on or after October 1, 1995, shall not be applied closer that 25 feet to perennial waters.

12. Animal waste shall not be applied closer than 100 feet to wells.

13. Animal waste shall not be applied closer than 200 feet of dwellings other than those owned by the landowner.

14. Waste shall be applied in a manner not to reach other property and public right-of-ways.

15. Animal waste shall not be discharged into surface waters, drainageways, or wetlands by a discharge or by over-spraying. Animal waste may be applied to prior converted cropland provided the fields have been approved as a land application site by a "technical specialist". Animal waste shall not be applied on grassed waterways that discharge directly into water courses, and on other grassed waterways, waste shall be applied at agronomic rates in a manner that causes no runoff or drift from the site.

16. Domestic and industrial waste from washdown facilities, showers, toilets, sinks, etc., shall not be discharged into the animal waste management system.

17. A protective cover of appropriate vegetation will be established on all disturbed areas (lagoon embankments, berms, pipe runs, etc.). Areas shall be fenced, as necessary, to protect the vegetation. Vegetation such as trees, shrubs, and other woody species, etc., are limited to areas where considered appropriate. Lagoon areas should be kept mowed and accessible. Berms and structures should be inspected regularly for evidence of erosion, leakage, or discharge.

18. If animal production at the facility is to be suspended or terminated, the owner is responsible for obtaining and implementing a "closure plan" which will eliminate the possibility of an illegal discharge, pollution, and erosion.

19. Waste handling structures, piping, pumps, reels, etc., should be inspected on a regular basis to prevent breakdowns, leaks, and spills. A regular maintenance checklist should be kept on site.

20. Animal waste can be used in a rotation that includes vegetables and other crops for direct human consumption. However, if animal waste is used on crops for direct human consumption, it should only be applied pre-plant with no further applications of animal waste during the crop season.

21. Highly visible markers shall be installed to mark the top and bottom elevations of the temporary storage (pumping volume) of all waste treatment lagoons. Pumping shall be managed to maintain the liquid level between the markers. A marker will be required to mark the maximum storage volume for waste storage ponds.

22. **Waste shall be tested within 60 days of utilization and soil shall be tested at least annually at crop sites where waste products are applied. Nitrogen shall be the rate-determining nutrient, unless other restrictions require waste to be applied based on other nutrients, resulting in a lower application rate than a nitrogen based rate. Zinc and copper levels in the soils shall be monitored and alternative crop sites shall be used when these metals approach excessive levels. pH shall be adjusted and maintained for optimum crop production. Soil and waste analysis records shall be kept for a minimum of five years. Poultry dry waste application records shall be maintained for a minimum of three years. Waste application records for all other waste shall be maintained for five (5) years.**

23. **Dead animals will be disposed of in a manner that meets North Carolina regulations.**

Crop Notes

The following crop note applies to field(s): 1, 2, 3, 4, 5, 6

Bermudagrass Coastal Plain, Mineral Soil, Moderately Well Drained.

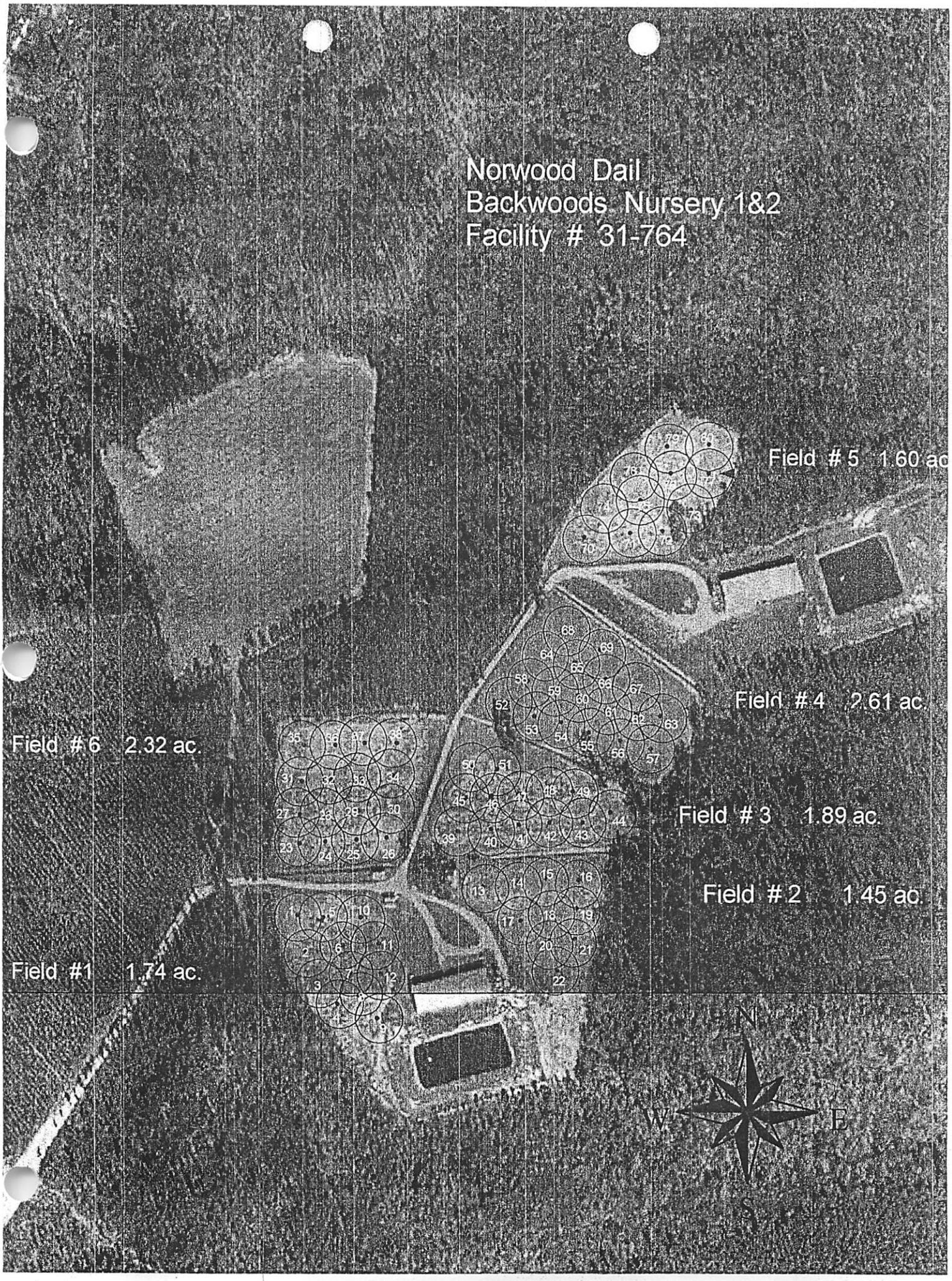
Adaptation: Well-adapted.

In the Coastal Plain, hybrid bermudagrass sprigs can be planted Mar. 1 to Mar. 31. Cover sprigs 1" to 3" deep (1.5" optimal). Sprigs should be planted quickly after digging and not allowed to dry in sun and wind. For Coastal and Tifton 78 plant at least 10 bu/ac in 3' rows, spaced 2' to 3' in the row. Generally a rate of 30 bu/ac is satisfactory to produce full groundcover in one or two years under good growing conditions. Tifton 44 spreads slowly, so use at least 40 bu/ac in 1.5' to 2' rows spaced 1' to 1.5' in row. For broadcast/disked-in sprigs use about 60 bu/ac. Soil test for the amounts of lime, phosphorus, potassium and micronutrients to apply preplant and for annual maintenance. Apply 60 to 100 lb/ac N in the establishment year in split applications in April and July. For established stands apply 180 to 240 lb/ac N annually in split applications, usually in April and following the first and second hay cuts. Reduce N rates by 25% for grazing. Refer to NCSU Technical Bulletin 305 Production and Utilization of Pastures and Forages in North Carolina for more information or consult your regional agronomist or extension agent for assistance.

The following crop note applies to field(s): 1, 2, 3, 4, 5, 6

Small Grain: CP, Mineral Soil, medium leachable

In the Coastal Plain, oats and barley should be planted from October 15-October 30; and rye from October 15-November 20. For barley, plant 22 seed/drill row foot and increase the seeding rate by 5% for each week seeding is delayed beyond the optimum time. See the seeding rates table for applicable seeding rate modifications in the current NCSU "Small Grain Production Guide". Also, increase the initial seeding rate by at least 10% when planting no-till. Oats should be planted at 2 bushels/acre and rye at 1-1 1/2 bushels/acre. Plant all these small grains at 1-1 1/2" deep. Adequate depth control is essential. Review the NCSU Official Variety "green book" and information from private companies to select a high yielding variety with the characteristics needed for your area and conditions. Apply no more than 30 lbs/acre N at planting. Phosphorus and potash recommended by a soil test can also be applied at this time. The remaining N should be applied during the months of February-March.


Norwood Dail
Backwoods Nursery 1&2
Facility # 31-764
Field # 5 1.60 ac
Field # 4 2.61 ac.
Field # 6 2.32 ac.
Field # 3 1.89 ac.
Field # 2 1.45 ac.
Field #1 1.74 ac.
N
W
E

WETTABLE ACRES

IRRIGATION SYSTEM DESIGN PARMATERS
and
COMPUTATIONAL WORKSHEET SUMMARY

Landowner / Operator Name	Norwood Dale	Backwoods Nursery	County	Duplin
Adress	407 Maready Road	1 & 2		
	Chinquapin NC 28521		Date	5/22/01
Telephone	910-285-3830		Facility #	31-764

TABLE 6. Irrigated Area Allowances for Stationary Sprinklers System based on 70 percent wetted diameter

Tract Number	Hydrant or field (1) Number	wetted diameter feet (A)	net wetted area of an interior sprinkler (acres) (B,C)	number of sprinklers	total wetted acres	tables	Soil Type	Slope (%)	Crop(s)	Maximun Application Rate (3) (in/hr)	Maxiumn Application per Irrigation cycle (3) (inches)
7961	f-1	115	0.145	12	1.74	6	AUB	0-5	bermuda / small grain	0.5	1
7961	f-2	115	0.145	10	1.45	6	AUB	0-5	bermuda / small grain	0.5	1
7961	f-3	115	0.145	13	1.885	6	AUB	0-5	bermuda / small grain	0.5	1
7961	f-4	115	0.145	18	2.61	6	AUB	0-5	bermuda / small grain	0.5	1
7961	f-5	115	0.145	11	1.595	6	AUB	0-5	bermuda / small grain	0.5	1
7961	f-6	115	0.145	16	2.32	6	AUB	0-5	bermuda / small grain	0.5	1

1 see attached map.

2 Total field acreage minus required buffer areas.

3 Refer to N.C. Irrigation guide, Field Office Technical Guide, Section II G. Annual application must not exceed the agronomic rates for the soil and crop used.

Wettable Acre Computational Worksheet Completed by: Johnny Lanier Date 4/20/01

WETTABLE ACRES

IRRIGATION SYSTEM DESIGN PARMATERS
and
COMPUTATIONAL WORKSHEET SUMMARY

Landowner / Operator Name	Norwood Dale	Backwoods Nursery	County	Duplin
Adress	407 Maready Road	1 & 2		
	Chinquapin NC 28521		Date	5/22/01
Telephone	910-285-3830		Facility #	31-764

TABLE 6. Irrigated Area Allowances for Stationary Sprinklers System based on 70 percent wetted diameter

Tract Number	Hydrant or field (1) Number	wetted diameter feet (A)	net wetted area of an interior sprinkler (acres) (B,C)	number of sprinklers	total wetted acres	tables	Soil Type	Slope (%)	Crop(s)	Maximun Application Rate (3) (in/hr)	Maxiumn Application per Irrigation cycle (3) (inches)
7961	f-1	115	0.145	12	1.74	6	AUB	0-5	bermuda / small grain	0.5	1
7961	f-2	115	0.145	10	1.45	6	AUB	0-5	bermuda / small grain	0.5	1
7961	f-3	115	0.145	13	1.885	6	AUB	0-5	bermuda / small grain	0.5	1
7961	f-4	115	0.145	18	2.61	6	AUB	0-5	bermuda / small grain	0.5	1
7961	f-5	115	0.145	11	1.595	6	AUB	0-5	bermuda / small grain	0.5	1
7961	f-6	115	0.145	16	2.32	6	AUB	0-5	bermuda / small grain	0.5	1

1 see attached map.

2 Total field acreage minus required buffer areas.

3 Refer to N.C. Irrigation guide, Field Office Technical Guide, Section II G. Annual application must not exceed the agronomic rates for the soil and crop used.

Wettable Acre Computational Worksheet Completed by: Johnny Lanier Date 6/20/01

Agriment Services Inc.

Irrigation Equipment Calibration

DATE	6/26/24
TIME	10:00 am
WEATHER CONDITIONS	Clear
FLOW METER SN	Dynasonics Ultrasonic Flow Meter 18197

FARM INFO.	
FACILITY #	31 – 764 (BACKWOODS NURSERY 1&2)
IRR. SYS. #	#1 & #2
OWNER	Keith Dail
ADDRESS	106 Arabian Circle Beulaville, NC 28518
PHONE	(919) 658-9784

REEL INFO. AND/OR PIPE INFO.			
MAKE	(Backwoods #1)	(Backwoods #2)	Test Location
MODEL			Suction Pipe
HOSE TYPE			PVC
HOSE LENGTH			-
HOSE INSIDE DIA			2.067"
HOSE OUTSIDE DIA			2.375"
HOSE WALL THICKNESS			0.154"
TRANSDUCER SPACING			3.56"(W)

GUN/SPRINKLER INFO.		
MAKE	Senninger	Senninger
MODEL	5023	5023
NOZZLE TYPE	#18 Purple	#18 Purple
MFR NOZZLE SIZE	9/32 (0.281")	9/32 (0.281")
MSR NOZZLE SIZE	-	-
NOZZLE SIZE VARIANCE	-	-

PUMP INFO.	
MAKE	
MODEL	5 HP

TEST INFO.								
Scenario	Reel PSI	Gun PSI	Expected GPM	Measured GPM	GPM Variance	Expected Wetted Dia.	Measured Wetted Dia.	Wetted Dia. Variance
(1) 5 sprinklers	-	-	49.5 gpm	46 gpm	7 %	450 ft. all	-	-
(2) 5 sprinklers	-	-	49.5 gpm	46 gpm	7 %	450 ft. all	-	-
(1) 1 sprinkler	avg	20 psi	9.9 gpm	9.2 gpm	7 %	90 ft.	88 ft.	13 %
(2) 1 sprinkler	avg	20 psi	9.9 gpm	9.2 gpm	7 %	90 ft.	89 ft.	13 %

*If GPM variance is greater than 10% and/or wetted dia. variance is greater the 15%, then contact a technical specialist or irrigation specialist for assistance.

Calibrator: _____ _____

(Print) (Signature)

Agriment Services, Inc.

Appendix 1. Lagoon Sludge Survey Form **Revised August 2008**

A. Farm Permitor DWQ Identification Number: → **Keith Dail (31-764)**

B. Lagoon Identification: → **Backwoods Nurs #1**

C. Person(s) taking Measurements: → **Jonathan Miller**

D. Date of Measurements: → **7/15/2021**

E. Methods/Devices Used for Measurement of:

a. Distance from the lagoon liquid surface to the top of the sludge layer: → **Sonar Boat**

b. Distance form the lagoon liquid surface to the bottom soil of lagoon: → **Range Pole**

c. Thickness of the sludge layer if making a direct measurement with "core sampler": **n/a**

F. Lagoon Surface Area (using dimensions at inside to of bank): → **0.60**
(Draw a sketch of the lagoon on separate sheet, list dimensions and calculate surface area. **The lagoon may have been built different than designed, so measurements should be made.)**

G. Estimate number of sampling points:

a. Less than 1.33 acre, use 8 points: → **8**

b. If more than 1.33 acre, surface area acres x 6 = sampling points, with a maxium of 24: →

(Using sketch and dimensions, develop a uniform grid that has the same number of intersection as the estimated number of sampling points needed. Number the intersection points on the lagoon grid so that data recorded at each can be easily matched.)

H. Conduct sludge survey and record data on "Sludge Survey Data Sheet" (Appendix 2). **Also, at the location of the pump intake, take measurement of distance from liquid surface to top of sludge layer and record it on the Data Sheet (last row); this must be at least 2.5 ft. when irrigating.**

I. At time of sludge survey, also measure the distance from the Maximum Liquid Level to the Present Liquid Level (measure at the lagoon gage pole): → **1.73**

J. Determine distance from top of bank to the Maximum Liquid Level (use lagoon management plan or other lagoon records): → **1.60**

K. Determine distance from Maximum Liquid Level to Minimum Liquid Level (use lagoon management plan or other lagoon records): → **1.70**

L. Calculate distance from present liquid surface level to Minimum Liquid Level (**Item K - Item I**, assuming present liquid level is below Max. Liq. Level): → **-0.03**

M. Record from sludge survey data sheet the distance from the present liquid surface level to the lagoon bottom (average for all the measurement points): → **6.67**

N. Record from sludge survey data sheet the distance from the present liquid surface level to the top of the sludge layer (average for all the measurement points): → **4.42**

O. Record from sludge survey data sheet the average thickness of the Sludge Layer: → **2.25**

P. Calculate the thickness of the existing Liquid Treatment Zone (**Item N - Item L**): → **4.45**

Q. **If Item O is greater than Item P, proceed to the Worksheet for Sludge Volume and Treatment Volume. If Item O is equal to or less than Item P, you do not have to determine volumes.**

Completed by: **Ronnie G. Kennedy** (Print Name) _____ (Signature)

Agriment Services, Inc.

Appendix 2. Sludge Survey Data Sheet **Revised August 2008**

Lagoon Identification: **Backwoods Nurs #1** Date: **7/15/2021**

Completed by: **Ronnie G. Kennedy** (Print Name) (Signature)

(A) Grid Point No.	(B) Distance from liquid surface to top of sludge	(C) Distance from liquid surface to lagoon bottom (soil)	(C) - (B) Thickness of sludge layer
	Feet (tenths)	Feet (tenths)	Feet (tenths)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
# of points with readings	**311**	**x**	**x**
Average of points	**4.42**	**6.67**	**2.25**
At pump intake	**4.00**	**x**	**x**

*All Grid Points and corresponding sludge layer thickness must be show on a sketch attached to this Sludge Survey Data Sheet.

Agriment Services, Inc.

Appendix 3. Worksheet for sludge volume and treatment volume **Revised August 2008**

The average thickness of the sludge layer and the thickness of the existing liquid (sludge-free) treatment zone (are determined from information on the Lagoon Sludge Survey Form (Item O and P, respectively). **If the lagoon has a designed sludge storage volume, see notes at end of the worksheet.** The dimensions of the lagoon as measured and the side slope are needed for calculations of sludge volume and of total treatment volume. If the lagoon is a standard geometric shape, the sludge volume and treatment volume in the lagoon can be estimated by using standard equations. For approximate volumes of rectangular lagoons with constant side slope, calculate length and width at the midpoint of the layer, and multily by layer thickness to calculate layer volume. For irregular shapes, convert the total surface area to a square or rectangular shape. For exact volumes for lagoons with constant side slope, the "Prismoidal Equations" may be used.

	Lagoon
1 Average Sludge Layer Thickness *(T)*:	**2.25 ft.**
2 Depth of lagoon from top of bank to bottom soil surface *(D)*:	**9.50 ft.**
3 Slope = horizontal/vertical side slope *(S)*:	**3.00**
4 Length at top inside bank *(L)*:	**220.00 ft.**
5 Width at top inside bank *(W)*:	**118.00 ft.**
6 Length at midpoint of sludge layer *(Lm) = L - 2 S (D - (T/2))*:	**169.75 ft.**
7 Width at midpoint of sludge layer *(Wm) = W - 2 S (D - (T/2))*:	**67.75 ft.**
8 Volume of sludge *(Vs) = Lm Wm T*:	**25,876.27 ft³**
9 Volume in gallons *Vsg = V (7.5 gal./ft³)*:	**194,071.99 gal.**
10 Thickness of existing liquid tmt. zone (Y)	**4.45 ft.**
11 Thickness of total treatment zone (Z) = T + Y	**6.70 ft.**
12 Length at midpoint of total tmt. zone Lz = L - 2(S)(D-(Z/2)	**183.11 ft.**
13 Width at midpoint of total tmt. Zone Wz = W - 2(S) (D -(Z/2)	**81.11 ft.**
14 Volume of total treatment zone (Vz) = Lz Wz Z	**99,558.26 ft³**
15 Ratio (R) of sludge layer volume to total Treatment volume R = Vs/Vz	**0.26**

If the ratio exceeds 50%, than a sludge Plan of Action may be required. Check with DWQ for information on filing the Plan of Action.

Note: If the lagoon has a designed sludge storage volume (DSSV), subtract that volume from both the volume of sludge (Vs) (Item 8) and from the volume of total treatment zone (Vz) (Item 14), and take the ratio:

16 Design sludge storage volume (DSSV)	**ft³**
17 Ratio (R) of sludge layer volume to treatment volume adjusted for (DSSV).	**0.26**

Lagoon Identification: **Backwoods Nurs #1** Date: **7/15/2021**

Completed by: **Ronnie G. Kennedy** (Print Name) (Signature)

Agriment Services, Inc.

Appendix 1. Lagoon Sludge Survey Form **Revised August 2008**

A. Farm Permitor DWQ Identification Number: → **Keith Dail (31-764)**

B. Lagoon Identification: → **Backwoods Nurs #2**

C. Person(s) taking Measurements: → **Jonathan Miller**

D. Date of Measurements: → **7/7/2022**

E. Methods/Devices Used for Measurement of:

a. Distance from the lagoon liquid surface to the top of the sludge layer: → **Sonar Boat**

b. Distance form the lagoon liquid surface to the bottom soil of lagoon: → **Range Pole**

c. Thickness of the sludge layer if making a direct measurement with "core sampler": **n/a**

F. Lagoon Surface Area (using dimensions at inside to of bank): → **0.55**
(Draw a sketch of the lagoon on separate sheet, list dimensions and calculate surface area. **The lagoon may have been built different than designed, so measurements should be made.)**

G. Estimate number of sampling points:

a. Less than 1.33 acre, use 8 points: → **8**

b. If more than 1.33 acre, surface area acres x 6 = sampling points, with a maxium of 24: →

(Using sketch and dimensions, develop a uniform grid that has the same number of intersection as the estimated number of sampling points needed. Number the intersection points on the lagoon grid so that data recorded at each can be easily matched.)

H. Conduct sludge survey and record data on "Sludge Survey Data Sheet" (Appendix 2). **Also, at the location of the pump intake, take measurement of distance from liquid surface to top of sludge layer and record it on the Data Sheet (last row); this must be at least 2.5 ft. when irrigating.**

I. At time of sludge survey, also measure the distance from the Maximum Liquid Level to the Present Liquid Level (measure at the lagoon gage pole): → **0.65**

J. Determine distance from top of bank to the Maximum Liquid Level (use lagoon management plan or other lagoon records): → **1.60**

K. Determine distance from Maximum Liquid Level to Minimum Liquid Level (use lagoon management plan or other lagoon records): → **1.70**

L. Calculate distance from present liquid surface level to Minimum Liquid Level (**Item K - Item I**, assuming present liquid level is below Max. Liq. Level): → **1.05**

M. Record from sludge survey data sheet the distance from the present liquid surface level to the lagoon bottom (average for all the measurement points): → **7.75**

N. Record from sludge survey data sheet the distance from the present liquid surface level to the top of the sludge layer (average for all the measurement points): → **3.96**

O. Record from sludge survey data sheet the average thickness of the Sludge Layer: → **3.79**

P. Calculate the thickness of the existing Liquid Treatment Zone (**Item N - Item L**): → **2.91**

Q. **If Item O is greater than Item P, proceed to the Worksheet for Sludge Volume and Treatment Volume. If Item O is equal to or less than Item P, you do not have to determine volumes.**

Completed by: **Ronnie G. Kennedy** (Print Name) _____ (Signature)

Agriment Services, Inc.

Appendix 2. Sludge Survey Data Sheet **Revised August 2008**

Lagoon Identification: **Backwoods Nurs #2** Date: **7/7/2022**

Completed by: **Ronnie G. Kennedy** (Print Name) (Signature)

(A) Grid Point No.	(B) Distance from liquid surface to top of sludge	(C) Distance from liquid surface to lagoon bottom (soil)	(C) - (B) Thickness of sludge layer
	Feet (tenths)	Feet (tenths)	Feet (tenths)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
# of points with readings		x	x
Average of points	**3.96**	**7.75**	**3.79**
At pump intake	**2.50**	**x**	**x**

*All Grid Points and corresponding sludge layer thickness must be show on a sketch attached to this Sludge Survey Data Sheet.

Agriment Services, Inc.

Appendix 3. Worksheet for sludge volume and treatment volume **Revised August 2008**

The average thickness of the sludge layer and the thickness of the existing liquid (sludge-free) treatment zone (are determined from information on the Lagoon Sludge Survey Form (Item O and P, respectively). **If the lagoon has a designed sludge storage volume, see notes at end of the worksheet.** The dimensions of the lagoon as measured and the side slope are needed for calculations of sludge volume and of total treatment volume. If the lagoon is a standard geometric shape, the sludge volume and treatment volume in the lagoon can be estimated by using standard equations. For approximate volumes of rectangular lagoons with constant side slope, calculate length and width at the midpoint of the layer, and multily by layer thickness to calculate layer volume. For irregular shapes, convert the total surface area to a square or rectangular shape. For exact volumes for lagoons with constant side slope, the "Prismoidal Equations" may be used.

	Lagoon
1 Average Sludge Layer Thickness *(T)*:	**3.79 ft.**
2 Depth of lagoon from top of bank to bottom soil surface *(D)*:	**9.70 ft.**
3 Slope = horizontal/vertical side slope *(S)*:	**3.00**
4 Length at top inside bank *(L)*:	**170.00 ft.**
5 Width at top inside bank *(W)*:	**140.00 ft.**
6 Length at midpoint of sludge layer *(Lm) = L - 2 S (D - (T/2))*:	**123.17 ft.**
7 Width at midpoint of sludge layer *(Wm) = W - 2 S (D - (T/2))*:	**93.17 ft.**
8 Volume of sludge *(Vs) = Lm Wm T*:	**43,493.09 ft³**
9 Volume in gallons *Vsg = V (7.5 gal./ft³)*:	**326,198.16 gal.**
10 Thickness of existing liquid tmt. zone (Y)	**2.91 ft.**
11 Thickness of total treatment zone (Z) = T + Y	**6.70 ft.**
12 Length at midpoint of total tmt. zone Lz = L - 2(S)(D-(Z/2)	**131.90 ft.**
13 Width at midpoint of total tmt. Zone Wz = W - 2(S) (D -(Z/2)	**101.90 ft.**
14 Volume of total treatment zone (Vz) = Lz Wz Z	**90,052.09 ft³**
15 Ratio (R) of sludge layer volume to total Treatment volume R = Vs/Vz	**0.48**

If the ratio exceeds 50%, than a sludge Plan of Action may be required. Check with DWQ for information on filing the Plan of Action.

Note: If the lagoon has a designed sludge storage volume (DSSV), subtract that volume from both the volume of sludge (Vs) (Item 8) and from the volume of total treatment zone (Vz) (Item 14), and take the ratio:

16 Design sludge storage volume (DSSV)	**ft³**
17 Ratio (R) of sludge layer volume to treatment volume adjusted for (DSSV).	**0.48**

Lagoon Identification: **Backwoods Nurs #2** Date: **7/7/2022**

Completed by: **Ronnie G. Kennedy** (Print Name) (Signature)