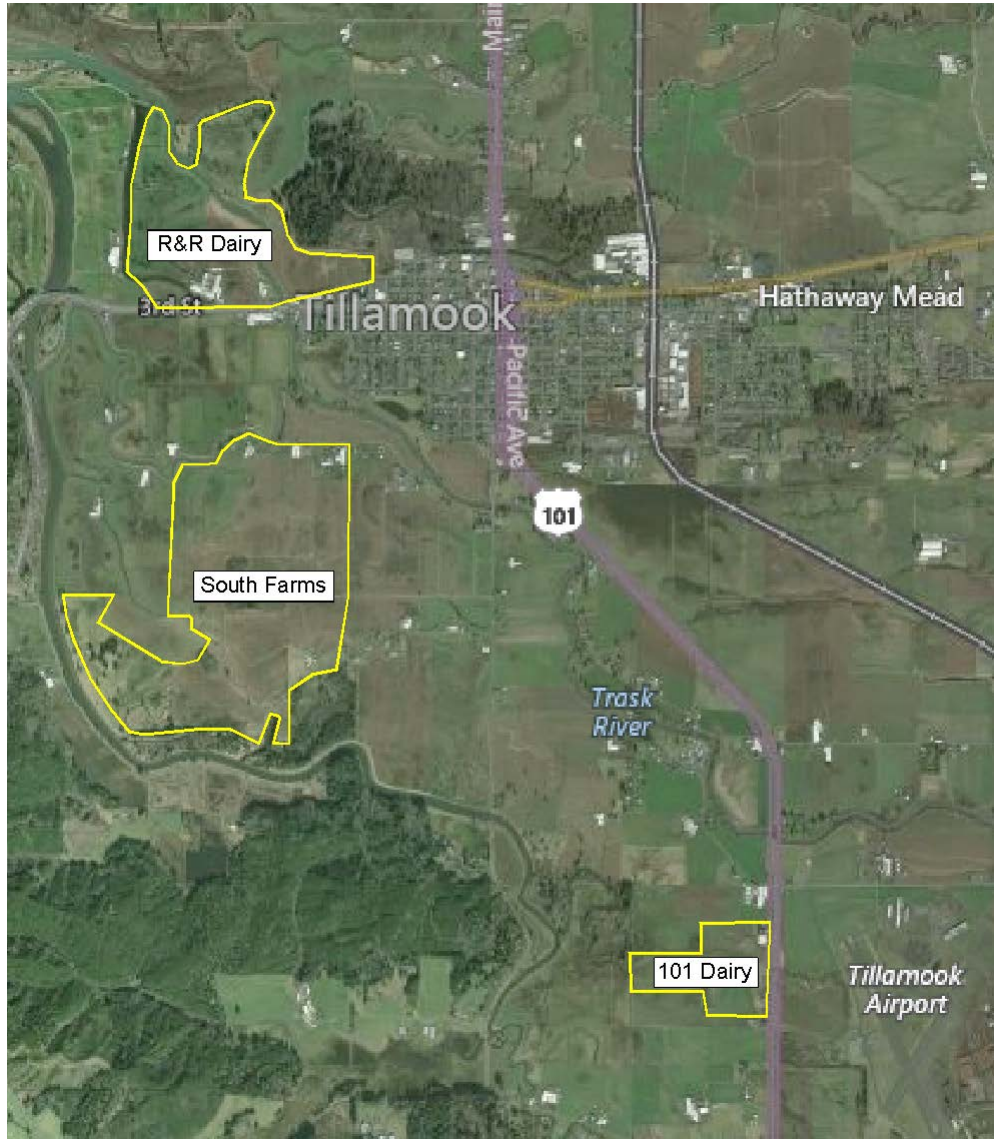


Animal Waste Management Plan for **R&R Dairy**

c/o Joe Rocha
510 3rd Street
Tillamook, OR 97141
(503) 842-5539



Prepared by:
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Northwest Ag Consulting
Dallas, OR
(503) 510-3883

**R&R
Dairy
2017**

***Animal Waste
Management Plan***

**R&R
Dairy
2017**

***Animal Waste
Management Plan***

GENERAL INFORMATION

**Oregon Department of Agriculture
CAFO Division
Animal Waste Management Plan
Signature Sheet**

ODA USE ONLY

MA# 121258AWMP# 18010Approved Date 3/6/19Received Date 2/5/18Facility Name: R&R DairyFacility Address: 510 3rd StreetTillamook, OR 97141Operated by: Joe RochaMailing Address: 510 3rd StreetTillamook, OR 97141*Complete if different than the Operator*Owned by: Joe RochaMailing Address: 510 3rd StreetTillamook, OR 97141

☒ As the Operator of R&R Dairy, I agree to manage this facility in accordance with the existing Animal Waste Management Plan (AWMP) # 18010 on file with ODA and maintain those practices as described in the plan. This signed AWMP is incorporated into the CAFO NPDES General Permit by reference (Permit Condition S3.A.2.).

☐ If changes are made to the animal population, facilities and/or management of the CAFO, a new AWMP must be submitted to ODA for approval at least 45 days before the modification is implemented unless a different schedule is allowed by ODA in writing (Permit Condition S3.D.1 and 2).

Operator's Signature

Date

Operator's Name (Please Print)

Joe Rocha

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GENERAL INFORMATION

Oregon Department of Agriculture CAFO Division Animal Waste Management Plan Signature Sheet	ODA USE ONLY MA# _____ AWMP# _____ Approved Date _____ Received Date _____
Facility Name: <u>R&R Dairy</u>	
Facility Address: <u>510 3rd Street</u> <u>Tillamook, OR 97141</u>	
Operated by: <u>Joe Rocha</u>	
Mailing Address: <u>510 3rd Street</u> <u>Tillamook, OR 97141</u>	
<i>Complete if different than the Operator</i> Owned by: <u>Joe Rocha</u>	
Mailing Address: <u>510 3rd Street</u> <u>Tillamook, OR 97141</u>	
☐ As the Operator of <u>R&R Dairy</u> , I agree to manage this facility in accordance with the existing Animal Waste Management Plan (AWMP) # _____ on file with ODA and maintain those practices as described in the plan. This signed AWMP is incorporated into the CAFO NPDES General Permit by reference (Permit Condition S3.A.2.). ☐ If changes are made to the animal population, facilities and/or management of the CAFO, a new AWMP must be submitted to ODA for approval at least 45 days before the modification is implemented unless a different schedule is allowed by ODA in writing (Permit Condition S3.D.1 and 2).	
Operator's Signature	Date
Operator's Name (Please Print) Joe Rocha	

GENERAL INFORMATION

GENERAL INFORMATION

BACKGROUND AND SITE INFORMATION

Animal Feeding Operation: Large Concentrated CAFO

Type & Size: Dairy – 9 Facilities with 2,750 animals (See Table Below)

Latitude/Longitude: N45.457713⁰, W123.864979⁰

R & R Dairy is owned and operated by Joe Rocha. The dairy is located at 510 Third Street, Tillamook, OR 97141 about one mile west of town. The dairy is currently permitted for a total of 1,059 animals (630 mature and 429 young) at the Dairy Facility with an additional 560 animals (400 mature and 60 heifers and 100 kid goats) at the South Farm facilities. Additional animals are permitted for the Matejeck /101 facilities (350 mature and 250 young).

The dairy seeks an increase to a maximum of 2,750 animals allocated as shown below operating under one ODA Permit and managed under one Animal Waste Management Plant (AWMP). An application for modification of animal numbers is located in Section 5.

Facility	Acres	Milkers	Dry Cows	Heifers	Calves	Total Animals
R & R Dairy	71.6	1050	100	0	250	1400
Ryans	74.9	0	0	300	0	300
Flat Barn	34	0	0	850	0	850
Aufdermauer	63.5	0	0	0	0	0
Marolf	32.3	0	0	0	0	0
Vallinga	72.8	0	0	0	0	0
Matejeck	166	0	0	0	0	0
101	58.5	0	0	0	0	0
Dairy Goats	4.9	100	0	0	100	200
Totals-	578.8	1150	100	1150	350	2,750

As noted above, the operation consists of many facilities which will be used, in conjunction with one another to best manage the cows housing needs at various growth stages and the fields at those facilities for maximizing forage composition and yield. The Coastal climate allows for a base forage production level of approximately 6 tons/acre of DM per year based on minimal management. With an intensive level of management, the fields may produce as much as 8-10 ton/acre DM annually. Additionally, silage corn will be grown on some acres and is expected to yield 20 ton/acre or more, depending on the year. However, this is only an estimate and depends upon intensive management coupled with favorable weather conditions.

GENERAL INFORMATION

Dairy Facility

R & R Dairy is the milking and calf rearing operation. The milk cows are allowed to graze for about 180 days based on weather conditions, livestock health, economic conditions, and forage production during the year. Dry cows are house at the dairy. Calves are kept until 5 months of age then moved to the South Farms.

The milking cows are bedded with wood shavings and manure is scraped to an underground liquid collection. Wastewater from the holding pen and milking facility is also piped to this tank. The contents of the tank then flows through a screw press separator with the separated solids falling to the solid manure storage area and the liquid portion piped to the 60x16 roofed AGT. A 250x16 foot AGT is being built to the NW of the dairy facility and will receive liquid manure from the roofed AGT to greatly expand days of storage. Wastewater stored in the AGT is applied to fields during the spring and summer months to utilize the nutrients and organics for forage production. Wastewater is applied using a liquid tank wagon or drag system. A system of buried underground mainlines and laterals allows irrigation or wastewater application.

Waste feed and calf bedding is collected and directly transferred to the solids storage areas for later export off farm. All solid manure is exported to Tillamook Compost Inc (TCI).

All livestock barns are guttered, down-spouted and outletted in an area free of manure. Any rainfall runoff from paved areas containing manure and the solids storage area drain to the underground collection tank.

The dairy owns 71.6 acres of cropland and leases to own an additional 32.3 acres at the Marolf place, and leases 63.5 acres of cropland at the Aufdermauer place. Both the Marolf and Aufdermauer do not regularly house animals, but may be used if needed.

South Farms-

The Ryan Facility receives calves of 5 months age until they are about 12 months age then moved to the Flat Barn facility. Bred heifers are transferred back to the Dairy at about 22 months of age.

Manure, bedding and wasted feed are handled as solids and scraped to roofed storage areas at each facility. As shown on the HQ maps, each facility has an underground tank to receive any leachate from manure storage. The facilities are all connected to an underground mainline for field irrigation that also allows liquid manure transfer between tanks. The Flat Barn facility receives any liquid manure from the other facilities for storage until it is land applied.

All livestock barns are guttered, down-spouted and outletted in an area free of manure. Any rainfall runoff from paved areas containing manure and the solids storage area drain to the underground collection tank.

The Flat Barn facility also has two large silage pits that are used for corn silage and have liquid runoff sumps at each end that is pumped to the AGT for storage.

GENERAL INFORMATION

The combined South Farm fields have a total of 186.6 acres of cropland that is used for ryegrass winter cover and corn silage. Buried mainlines and risers allow all portions of the fields to be covered for manure and/or water applications.

101 Dairy

This facility houses no animals and only the cropland is being used now. In the near future, the owners wish to tear down the existing parlor area and replace it with a covered solid manure storage area. This would allow some animals to be housed in the freestall barn if needed.

Matejeck

This facility houses no animals and is used strictly for cropping. Due to the low-lying nature of the property and frequent susceptibility to flooding, the main crop grown would be perennial grasses for forage harvest. All manure applied to these acres is with a tractor pulled wagon or tanker.

Irrigation Water Management

Fields are irrigated as needed based on the amount of wastewater used and the season.

Animal Mortality Management

Animal mortalities are disposed of by an animal removal service that is available to members of Tillamook County Creamery Association.

Nutrient Management

Soil and manure testing is used to allocate nutrients based on crop and time of year.

All solid manures from both facilities are exported off farm to Tillamook Compost Inc.

Performance based nutrient management will be employed to insure nutrient balance on all fields. Forage yield will be tracked annually and used to determine the rate of manure application on a per field basis. Manure will be tested annually and tested values will guide application rates. Actual yield varies from year to year depending upon weather conditions and specific field management. Pastures are well managed and in good condition.

Applications of wastewater and solids containing manure are planned on a nitrogen basis on all fields based on the fields having a low phosphorus index rating. The soil phosphorus concentrations in the crop, hay and pasture fields will be monitored using soil tests. It is estimated that the dairy produces enough manure to meet the nutrient demand for the hay and pasture land fields. Supplemental nutrient applications to the crop, hay and pasture land fields should be based on soil tests and fertilizer guides to prevent excess soil nutrient concentrations.

GENERAL INFORMATION

MANURE STORAGE AND NUTRIENT BALANCE SUMMARY

Manure Storage-

Storage Type:	Capacity	Estimated Storage Period
Waste Storage Tanks-	827,952 CF	>365 Days
Solids Storage-	121,152 CF	50 Days

Nutrient Balance-

Nutrients Generated:	N Generated (lbs) after Losses	P ₂ O ₅ Generated (lbs) after Losses
Solid Manure-	76,947 lbs	56,899 lbs
Liquid Manure-	29,885 lbs	21,319 lbs
Pasture Manure-	122,901 lbs	82,445 lbs
Total-	229,733 lbs	160,664 lbs

Exported Nutrients:	N Exported (lbs) after Losses	P ₂ O ₅ Exported (lbs) after Losses
Solid Manure-	76,947 lbs	56,899 lbs
Liquid Manure-	0 lbs	0 lbs
Total-	76,947 lbs	56,899 lbs

Crop Nutrient Removal:	N Utilized (lbs)	P ₂ O ₅ Utilized (lbs)
Total-	175,020 lbs	64,155 lbs

Net Nutrients:	Nutrients Generated after Losses(lbs.)	Nutrients Removed by Crop and Exported after Losses (lbs)	Net Nutrient Balance after Losses (lbs)
Nitrogen (N)-	229,733 lbs	251,967 lbs	-22,234 lbs
Phosphate (P ₂ O ₅)-	160,664 lbs	121,055 lbs	39,609 lbs

System Losses:	Nutrients Generated (lbs)	Nutrients Remaining after Losses (lbs)	Nutrients Lost in System (lbs)
Nitrogen (N)-	451,229 lbs	229,733 lbs	221,495 lbs
Phosphate (P ₂ O ₅)-	170,748 lbs	160,664 lbs	10,084 lbs

GENERAL INFORMATION

EMERGENCY RESPONSE PLAN

In Case of an Emergency Storage Facility Spill, Leak or Failure

Implement the following first containment steps:

- a. Stop all other activities to address the spill.
- b. Stop the flow. For example, use skid loader or tractor with blade to contain or divert spill or leak.
- c. Call for help and excavator if needed.
- d. Complete the clean-up and repair the necessary components.
- e. Assess the extent of the emergency and request additional help if needed.

In Case of an Emergency Spill, Leak or Failure during Transport or Land Application

Implement the following first containment steps:

- a. Stop all other activities to address the spill and stop the flow.
- b. Call for help if needed.
- c. If the spill posed a hazard to local traffic, call for local traffic control assistance and clear the road and roadside of spilled material.
- d. Contain the spill or runoff from entering surface waters using straw bales, saw dust, soil or other appropriate materials.
- e. If flow is coming from a tile, plug the tile with a tile plug immediately.
- f. Assess the extent of the emergency and request additional help if needed.

Contacts to be made by the owner or operator within 24 hours

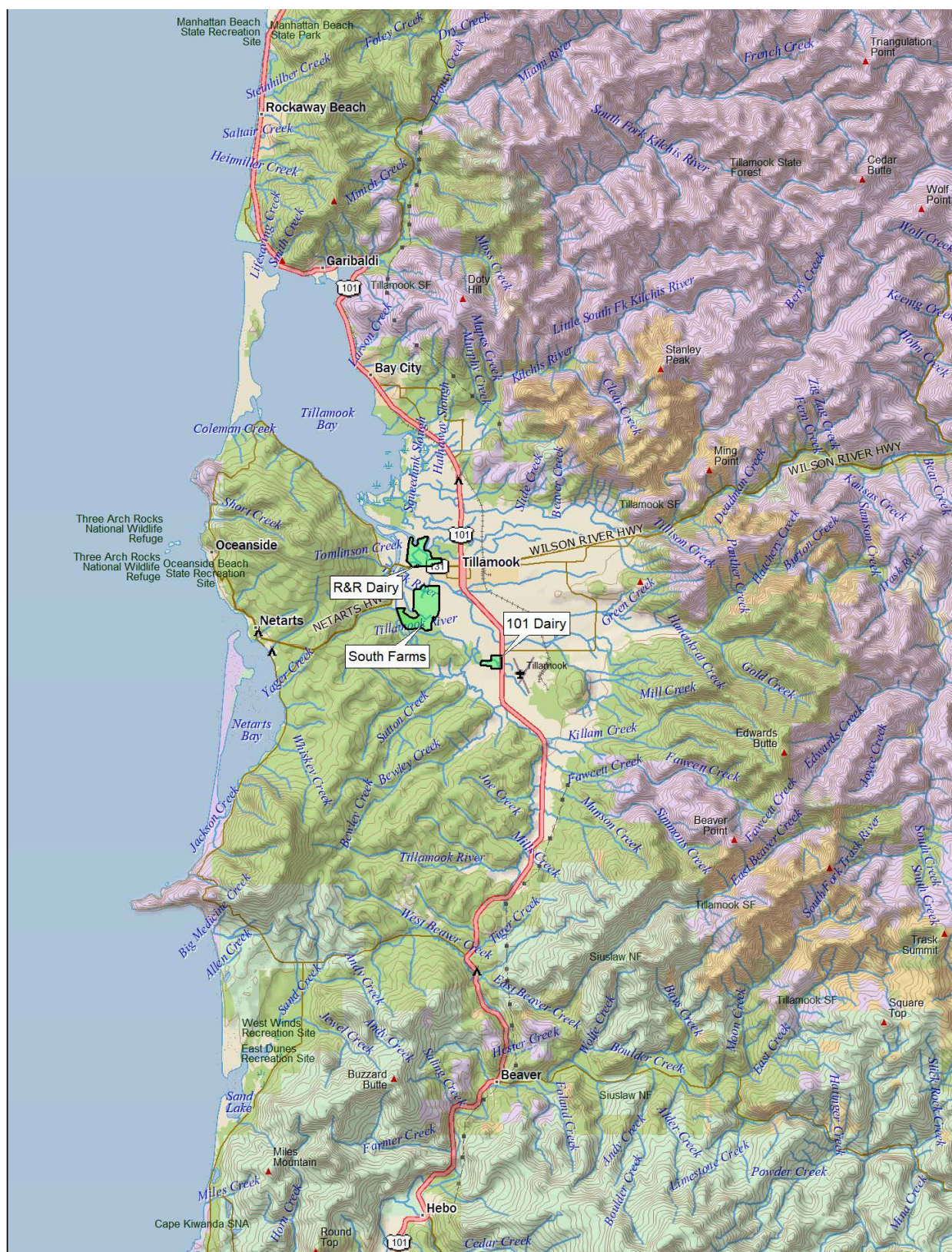
Organization	Phone Number
Oregon Dept. of Agriculture Natural Resources Division 635 Capitol St., N.E. Salem, OR 97301-2532	(503) 986-4700 TTD (503) 986-4762
Oregon Emergency Response System (OERS)	(800) 452-0311
County Environmental Health Department	(503) 842-3943
County Roads Department	(503) 842-3419

Be prepared to provide the following information:

- a. Your name and contact information.
- b. Farm location (driving directions) and other pertinent information.
- c. Description of emergency.
- d. Estimate of the amounts, area covered, and distance traveled.
- e. Whether manure has reached surface waters or major field drains.
- f. Whether there is any obvious damage: employee injury, fish kill, or property damage.
- g. Current status of containment efforts.

GENERAL INFORMATION

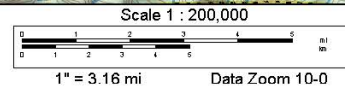
LOCATION MAP FOR R&R DAIRY



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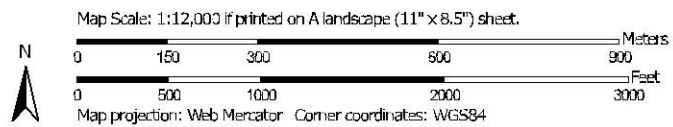
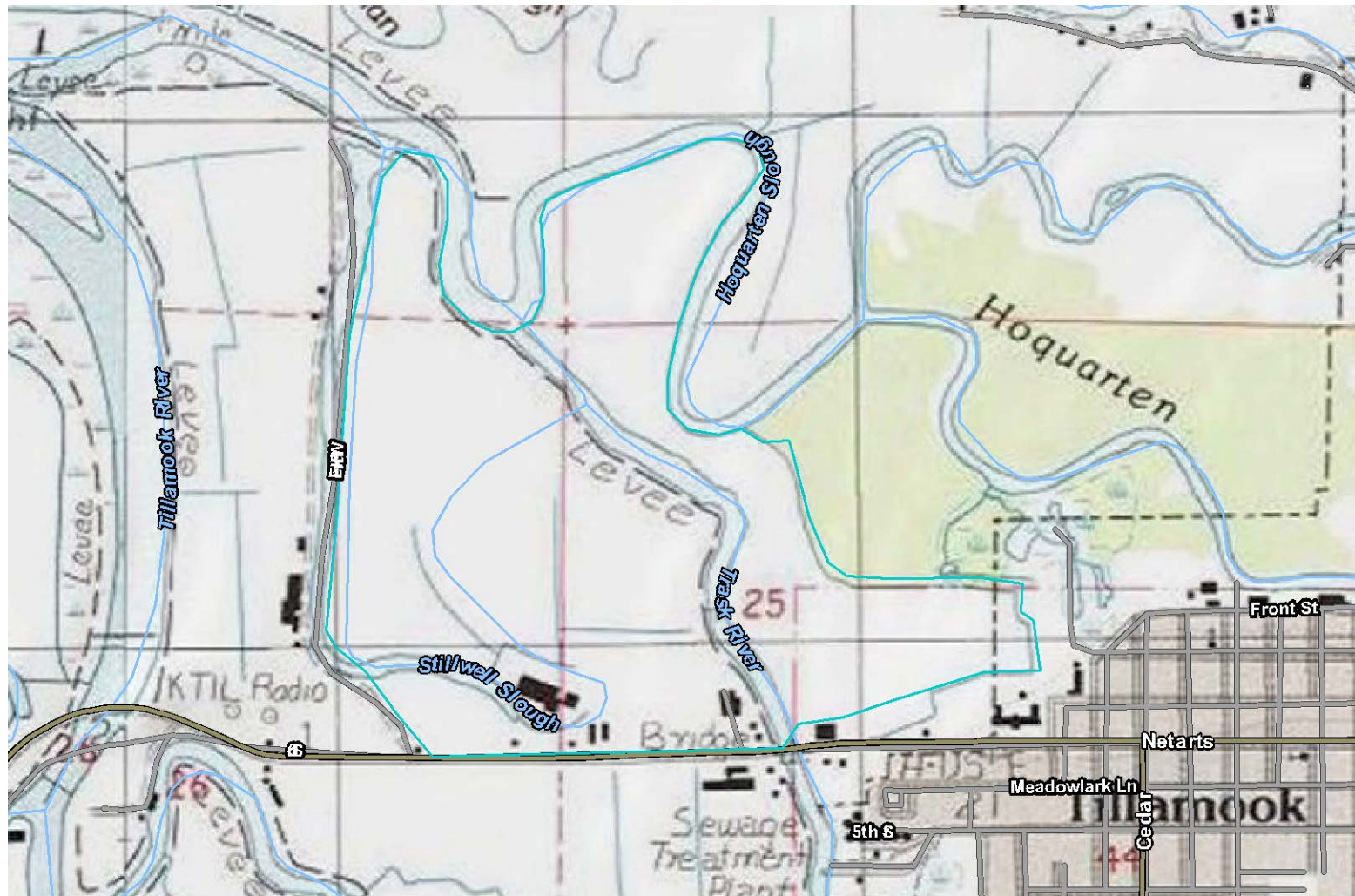
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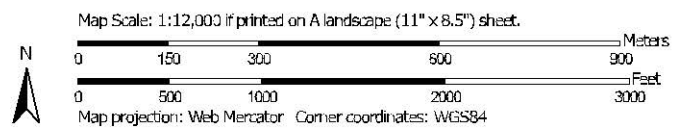
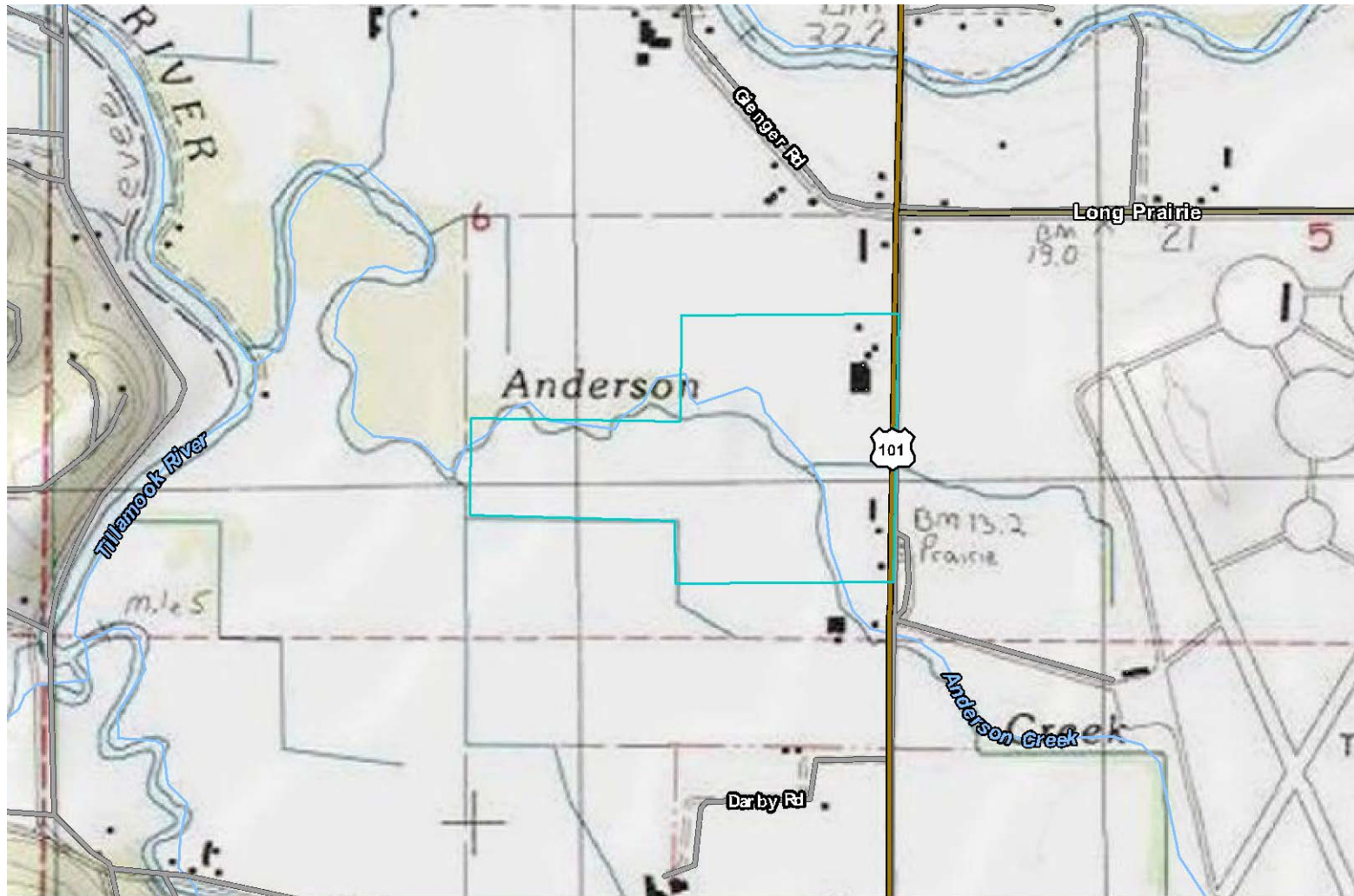
GENERAL INFORMATION

TOPOGRAPHY MAP FOR R&R DAIRY



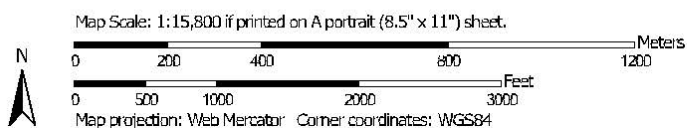
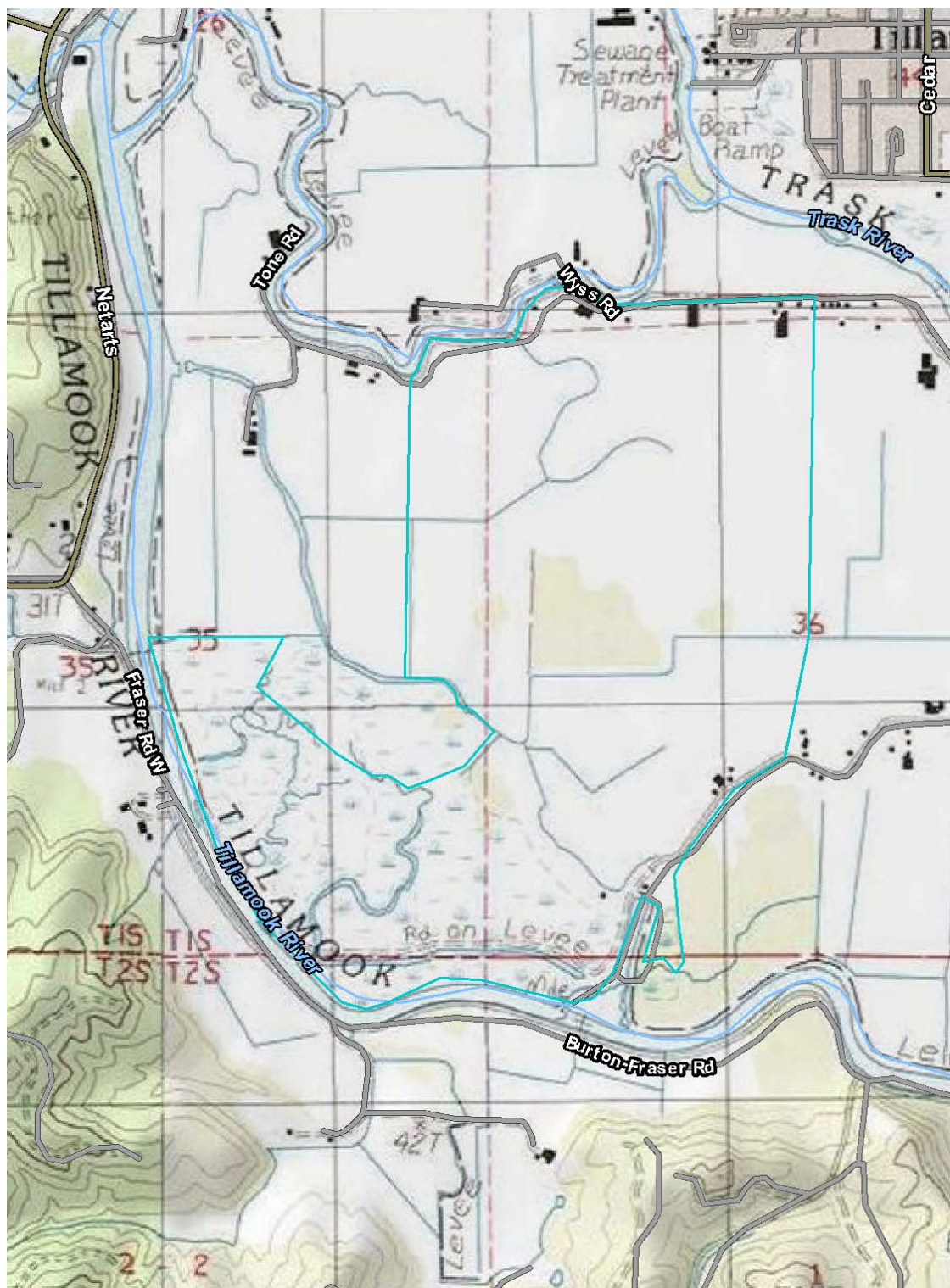
GENERAL INFORMATION

TOPOGRAPHY MAP FOR R&R DAIRY- 101 DAIRY



GENERAL INFORMATION

TOPOGRAPHY MAP FOR R&R DAIRY- SOUTH FARMS



GENERAL INFORMATION

HEADQUARTERS AREA

ANIMAL NUMBERS

The dairy is currently permitted for a total of 1,059 animals (630 mature and 429 young) at the Dairy Facility with an additional 560 animals (400 mature and 60 heifers and 100 kid goats) at the South Farm facilities. Additional animals are permitted for the Matejeck /101 facilities (350 mature and 250 young). A request to for modification of permitted animal numbers is located in Section 5.

This plan was written based on the 2,750 animals and land base described herein.

ANIMAL MORTALITY MANAGEMENT

Currently animal mortalities for the R&R Dairy are being disposed of by an animal removal service that is available to members of Tillamook County Creamery Association. Other approved methods of dealing with mortalities may be employed by R&R Dairy as needed.

Having dead animals sent to an acceptable disposal site is the best method to deal with animal mortalities. A list of landfills and phone numbers can be found on the internet at <http://www.deq.state.or.us/lq/sw/disposal/permittedfacilities.html>. If a local landfill is not permitted to accept animal carcasses, the Oregon Department of Environmental Quality (DEQ) may grant an exception. Phone numbers to local DEQ offices can be found in most phone books or on the internet at <http://www.deq.state.or.us/about/locations.html>.

Under no circumstances are animal mortalities to be disposed of in any type of liquid manure storage facility.

COLLECTION OF MANURE, PROCESS WATER AND RUNOFF

Manure, bedding and wasted feed is collected in the barns. The estimated volume of Manure bedding and wasted feed that will be collected annually was generated using the ORAWM workbook located in Section 5.

Leachate and rainfall runoff from the silage and solids storage areas is directed to catch basins that drain to wastewater collection facilities via underground pipelines. The estimated volumes of leachate and rainfall runoff from the silage and solid storage areas that will be collected annually were generated using the ORAWM workbook located in Section 5.

Rainfall runoff from paved and unpaved areas that comes into contact with animal manure is directed to catch basins that drain to the wastewater collection facilities. The estimated volume of rainfall runoff that will be collected annually was generated using the ORAWM workbook located in in Section 5. Rainfall runoff from roofs is collected using gutters and downspouts and directed to drainage ditches using underground pipelines.

All process water from the dairy operation is directed to catch basins that drain to wastewater collection facilities. The estimated volume of process water that will be collected annually was generated using the ORAWM workbook located in Section 5.

HEADQUARTERS AREA

TREATMENT FACILITIES

A screw type of separator liquid/solid separator will be used to separate solids from the wastewater produced from this operation. The separated solids are composted and recycled for bedding or exported off farm.

STORAGE FACILITIES

The wastewater collection and storage facilities are shown on the Headquarters Area Maps starting on page 2-8. Capacities and estimate volumes to store for the waste storage facilities can be found on the Manure Storage and Nutrient Balance Summary on page 1-6.

TRANSFER OF MANURE, PROCESS WATER AND RUNOFF

Wastewater, manure, bedding and wasted feed from the livestock barns is directed to the central collection facility where it is pumped to the separation facility to separate solids from the wastewater. Wastewater from the separation facility is directed to the main wastewater storage facility and separated solids are transferred to the solids storage area shown on the Headquarters Area Maps starting on page 2-8.

Wastewater stored in the main wastewater storage facility is pumped to the hay, pasture and crop land fields using underground pipelines to be utilized as a source of nutrients. Traveling big gun irrigation systems are used to apply the wastewater to the crop land fields.

Solids stored in the solids storage area are hauled to the crop land fields and applied using a solids spreader to be utilized as a source of nutrients.

HEADQUARTERS AREA

OPERATION AND MAINTENANCE CONSIDERATIONS

WASTEWATER RECEPTION AND STORAGE TANKS-

The wastewater reception and storage tanks shown on the Headquarters Area Maps starting on page 2-8 are used to store wastewater containing manure generated by the R&R Dairy. The storage capacity and estimated storage period for the wastewater reception and storage tanks is shown on the Manure Storage and Nutrient Balance Summary on page 1-6. Emptying of the wastewater reception and storage tanks should begin in the spring and continue through the spring and summer months as weather conditions permit applying wastewater in accordance with the guidance given in Section 3, Manure Utilization. To function properly and have the greatest management flexibility, the wastewater reception and storage tanks must be as empty as possible in the fall before the fall and winter rainy season begins. Any annual buildup of solids in the wastewater reception and storage tanks must be removed to maintain design capacity and applied to land application areas in accordance with guidance given in Section 3, Manure Utilization.

Inspect all tanks weekly to insure structural integrity. If the structural integrity of a tank is compromised, immediately empty the tank to determine the cause and make necessary repairs before putting the tank back into service.

Inspect all uncovered tanks on a biweekly basis to insure at least 6 inches of freeboard is being maintained to accommodate excess rainfall such as a 25 year-24hour storm and prevent overtopping of the tank.

Keep pumps, agitators, piping, valves and all other electrical and mechanical equipment in good condition by following the manufacturer's recommendations. Maintain grounding rods and wiring for all electrical equipment in good condition. Immediately remove all foreign debris within the structure that may cause damage to pumps or agitators.

Pump the wastewater storage tanks completely empty during the summer months and cleanout any debris and other solid materials that may have accumulated in the tanks. Inspect the tanks for structural damage and if structural damage to a tank is discovered seek the services of a qualified engineer to assess the damage and recommend necessary repairs before putting the tank back into service. Follow the guidance given in Section 3, Manure Utilization, when applying wastewater to fields.

Do not dispose of animal carcasses in any wastewater storage tank. It is against the law to do so.

Maintain all fences, railings, and/or warning signs to provide warning and/or prevent unauthorized human or livestock entry. Immediately repair vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances. Maintain lids, grates and shields on openings.

Provide proper ventilation before entering the tank, for any reason what so ever. Provide and use self - contained breathing apparatus (scuba) equipment when entering a tank. No persons should enter the tank unless safety ropes are used and someone else capable of providing rescue assistance is outside the tank.

Do not assume any tank, including open top tanks, are well ventilated. Do not assume any tank, including open top tanks, are well ventilated.

HEADQUARTERS AREA

SOLIDS STORAGE FACILITY-

The solids storage facilities shown on the Headquarters Area Maps starting on page 2-8 is used to store solids containing manure generated by the R&R Dairy. The storage capacity and estimated storage period for the solids storage facilities are shown on the Manure Storage and Nutrient Balance Summary on page 1-6. Emptying of the solids storage facilities should begin in the spring and continue through the spring and summer months. To function properly and have the greatest management flexibility, the solids storage facility must be as empty as possible in the fall before the fall and winter rainy season begins.

Periodically inspect concrete and asphalt slabs, walls and curbs and repair or replace broken sections as needed. Cleanup any spillage of manure and organics from outside of the solids storage area and place them back in the solids storage facility.

Maintain all fences, railings, and/or warning signs to provide warning and/or prevent unauthorized human or livestock entry. Immediately repair vandalism, vehicular or livestock damage to the structure, earthen areas surrounding the structure, or any appurtenances.

BUILDING ROOFS-

Inspect building roofs annually as a minimum. Repair and/or replace all rusted sections and secure loose sections as needed. Immediately replace all broken trusses, rafters, beams, poles as needed. Immediately determining the cause and necessary modification(s) to prevent reoccurring structural failure is essential.

FENCES-

Do not allow livestock access to open water courses and drainageways. Provide off stream watering facilities where possible and limit access to designated watering areas.

Inspect fences periodically and repair or replace broken or decayed posts and tighten sagging wire as needed. Broken wire can be spliced or replaced. Replace broken or missing insulators on electric fences as needed and repair or replace inoperative electric fence controllers.

Insure gates and other appurtenances are in good working order. Replace or repair components as needed.

IRRIGATION SYSTEMS-

Maintain sprinkler irrigation systems in accordance with the manufacturer's recommendations to help ensure trouble free operation. Prevent livestock access to equipment during operation.

Clean plugged nozzles and replace if worn or defective.

Promptly repair all leaks by replacing valves, fittings, gaskets, worn or damaged parts.

Prompt repair or replacement of damaged or worn components is necessary. Check to make sure all application components i.e. water control structures, gates, valves, ditches, etc. are functional and are in good operating condition.

HEADQUARTERS AREA

Maintain screening and filtering facilities.

Maintain vigorous vegetative growth where applicable.

LIVESTOCK STREAM CROSSINGS-

Periodically remove accumulated manure from crossing and apply to manure utilization areas or place in the solids storage area.

Maintain crossing, appurtenances and associated fence and make repairs as necessary.

Periodically grade and reshape crossing to maintain original dimensions.

Add surface materials as necessary to prevent erosion and rutting from animal traffic.

LIVESTOCK WATERING FACILITIES-

Check all above ground connections, valves, gates, rodent guards, inlets and outlets to make sure they are functioning properly. Check troughs and tanks for leaks or cracks and repair or replace immediately, if necessary.

Make certain the area adjacent to the trough is well protected with gravel, paving, or good cover. Be sure that the outlet pipe has a free outlet and is not causing any serious erosion problems. Check periodically to see if debris has fallen into the trough or tank which may restrict inflow or planned functions of the outflow system.

Clean the entire system periodically and remove moss, algae growth, and/or sludge. Chemicals such as copper sulfate and chlorine can be used to prevent moss and algae growth. Local rules and regulations are to be followed when using chemicals to make sure they are safe for animals.

Where necessary maintain coverings and insulation to prevent damage by freezing.

Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

Immediately repair any vandalism, vehicular or livestock damage.

PIPELINES-

Flush pipelines used for liquid waste applications with clean water following waste application, or as needed, to prevent particle buildup.

Drain the pipeline and components in areas that are subject to freezing. If parts of the pipeline cannot be drained, a non-toxic antifreeze solution may be added.

Check to make sure all valves and air vents are set at the proper operating condition so they can provide protection to the pipeline.

Inspect pipelines for signs of failure. Inspect risers and valves periodically for leaks or worn gaskets. Repair or replace pipeline, risers and valves as needed.

Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

HEADQUARTERS AREA

PUMPS-

Operate and maintain pumps in accordance with good judgment and manufacture's manuals and recommendations.

Drain liquid manure from pumps during cold weather to prevent freezing. If parts of the system cannot be drained, a non-toxic antifreeze solution may be added.

Inspect pumps periodically and remove debris wrapped around shafts and impellers. Maintain foot valves and check valves for proper operation.

For proper operation of electric motors and controls, maintain lubrication for all bearings, keep electric panel free from obstructions and debris. Maintain electrical safety devices, assure all electrical contacts are tight, and lock main electrical switch to "OFF" position during non-use season. Maintain adequate shade and ventilation for pump motors.

For proper operation of pumps, maintain lubrication for all bearings and pump shafts, assure belts are adjusted properly, maintain safety covering devices on open shafts and belt drives, check to make sure all safety valves and devices are set at proper operating conditions so they may provide protection to the pump and power unit. For centrifugal pumps, periodically measure tolerance between pump impeller and pump casing (i.e. wearing) and replace wear ring as needed to help restore new pump operating characteristics.

Use portable pressure gauge (preferably a liquid filled gauge) to monitor pump performance.

Operate and maintain agitators in accordance with the manufacture's manual and recommendations. Inspect all plumbing annually as a minimum.

Replace, tighten, or repair broken or loose connections and lines as needed.

SOLID/LIQUID SEPARATION FACILITY-

Inspect the solid/liquid separation facility daily to ensure the facility is operating properly and there has been no damage to structural components. Clean screens and outlets if they have become clogged or their capacity is not adequate for proper operation of the facility.

Prevent any spillage or leakage onto roadways when transferring solids from the solid/liquid separation facility to the solids storage area and to utilization areas.

HEADQUARTERS AREA

WELL(S)-

Protect the area immediately surrounding the well from being damaged by agriculture machinery, vehicles, or livestock.

All fences, railings, and/or warning signs shall be maintained to provide warning and/or prevent unauthorized human or livestock entry.

Do not allow any foreign debris to accumulate and maintain soil and vegetative covering in the immediate vicinity of the well.

Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

Check metal surfaces for rust and other damage especially sections in contact with earthfill and with other materials. Repair or replace damaged section and apply paint as a protective covering.

Keep all surface water from entering or accumulating at the immediate vicinity of the well site.

Immediately repair any vandalism, vehicular, or livestock damage.

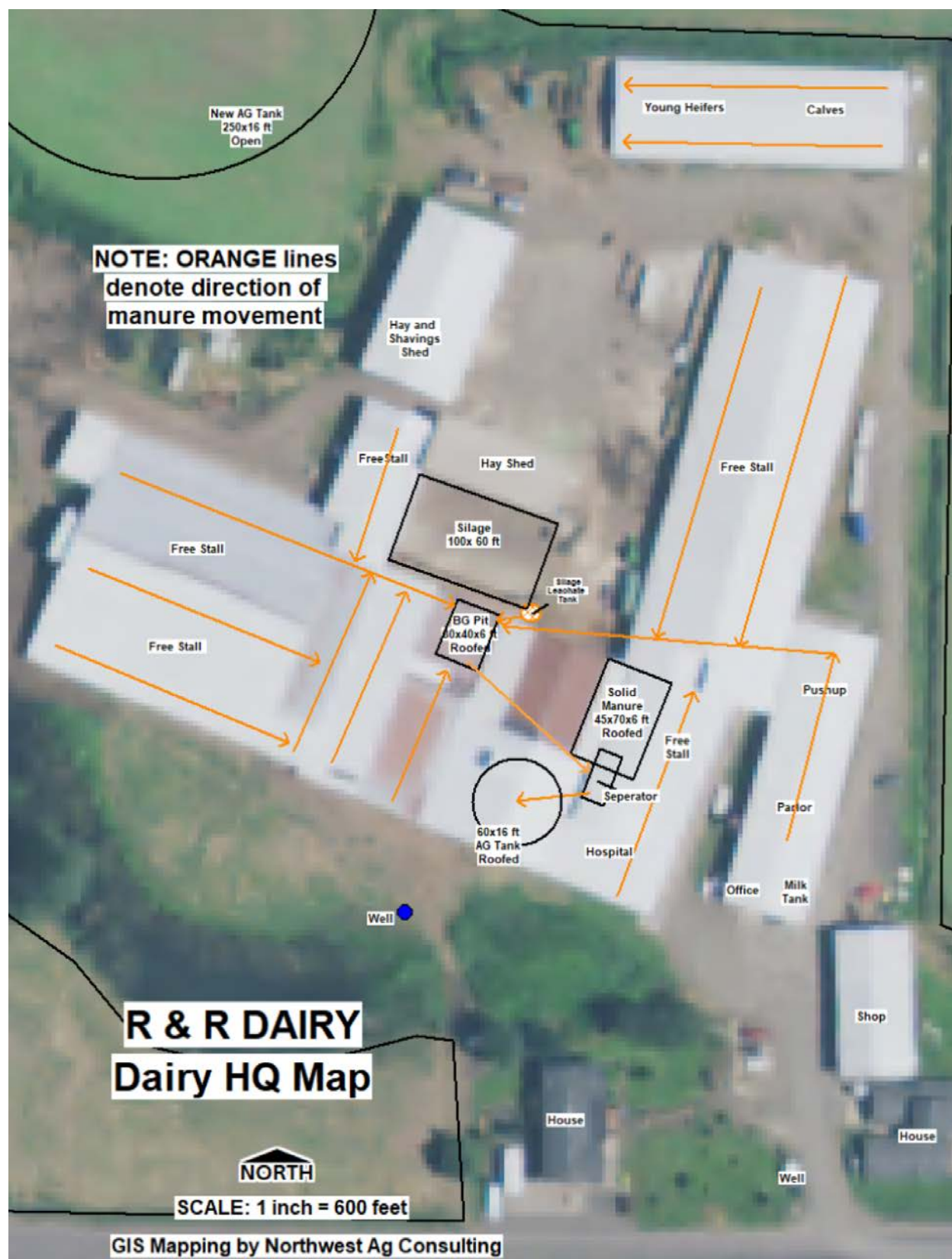
CHEMICAL HANDLING CHECKLIST-

The following measures shall be taken to prevent chemicals from contaminating process water or storm water storage and treatment systems:

1. Make sure all chemicals are stored in proper containers. Expired chemicals and empty containers are to be properly disposed of in accordance with state and federal regulations. Pesticides and associate refuse are to be disposed of in accordance with the FIFRA label.
2. Chemical storage areas are to be self-contained with no drains or other pathways that will allow spilled chemicals to exit the storage area.
3. Chemical storage areas are to be covered to prevent chemical contact with rain or snow.
4. Emergency procedures and equipment are to be in place to contain and clean up chemical spills.
5. Chemical handling and equipment wash areas are to be designed and constructed to prevent contamination of surface waters, waste water, and storm water storage and treatment systems.

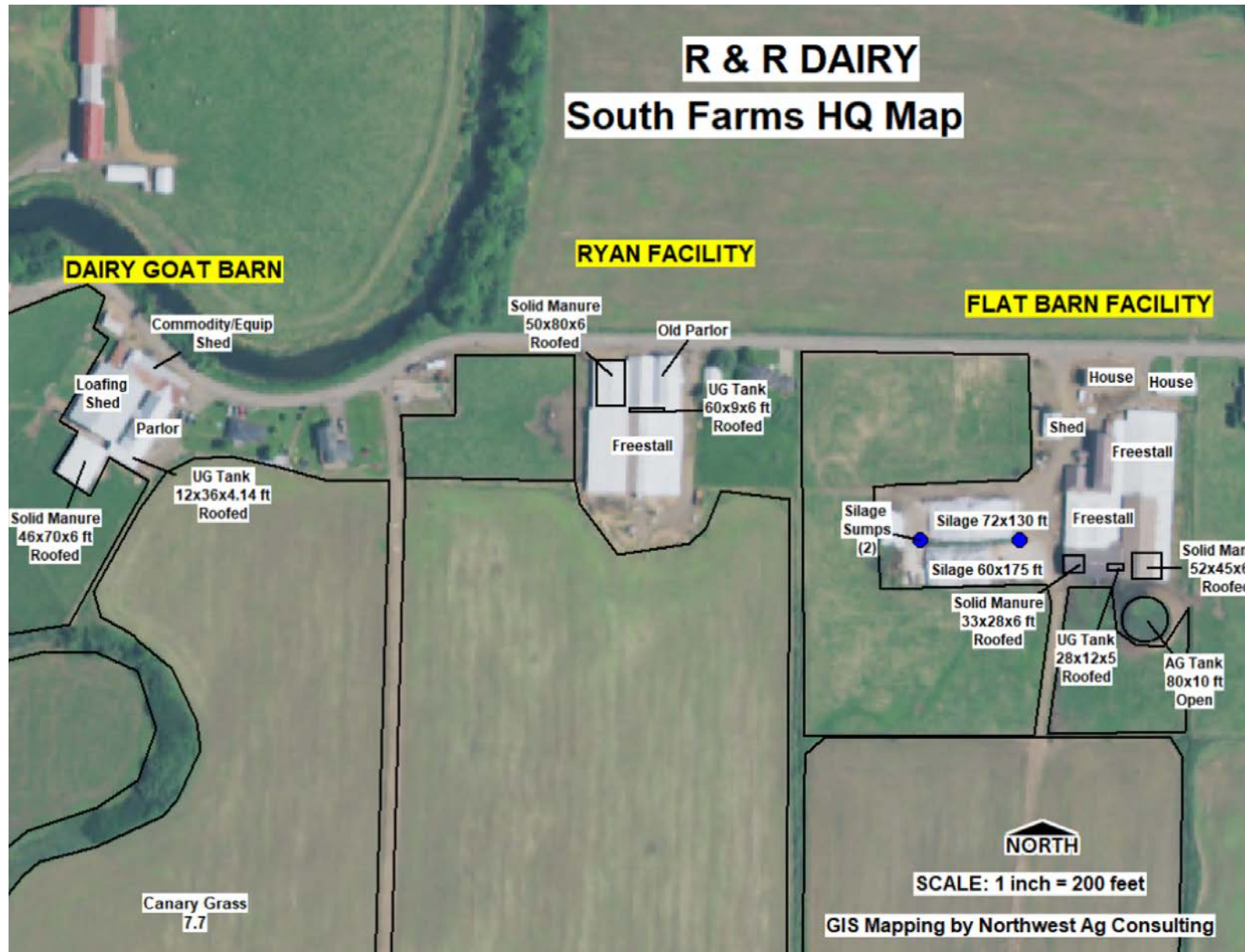
HEADQUARTERS AREA

HEADQUARTERS AREA MAP FOR R&R DAIRY



HEADQUARTERS AREA

HEADQUARTERS AREA MAP FOR R&R DAIRY- SOUTH FARMS



HEADQUARTERS AREA

HEADQUARTERS AREA

HEADQUARTERS AREA MAP FOR R&R DAIRY- 101 DAIRY



HEADQUARTERS AREA

MANURE UTILIZATION

CROPPING SYSTEM

The acres of hay, pasture and crop land area available for utilization of the nutrients and organics contained in the wastewater and solids produced from the R&R Dairy is shown on the utilization worksheet in ORAWM located in Section 5. Yield data and nutrient utilization rates for the crops grown are also shown on the inventory worksheet in ORAWM located in Section 5.

Irrigated and nonirrigated crop yield data from the Natural Resources Conservation Service Soil Survey referenced in Section 5 indicates the yield data used in developing this plan is within the range of the given crop yields for R&R Dairy.

Traveling big gun irrigation systems are used to irrigate and apply wastewater containing manure and other organics produced from the R&R Dairy to the crop land fields. These systems use single large sprinkler nozzles usually mounted on a cart with wheels that is attached to a high density polyethylene pipeline that is rolled up on a large reel that provides a constant travel speed for the sprinkler. These systems apply water depending on the nozzle size, operating pressure and travel used and have an efficiency of 65 to 75 percent. Traveling big gun sprinkler systems must be well managed to prevent excess percolation, surface runoff, wind drift and evaporation losses.

Other types of irrigation systems that will be used to irrigate crops must be well managed to prevent excess percolation, surface runoff and erosion, wind drift and evaporation losses.

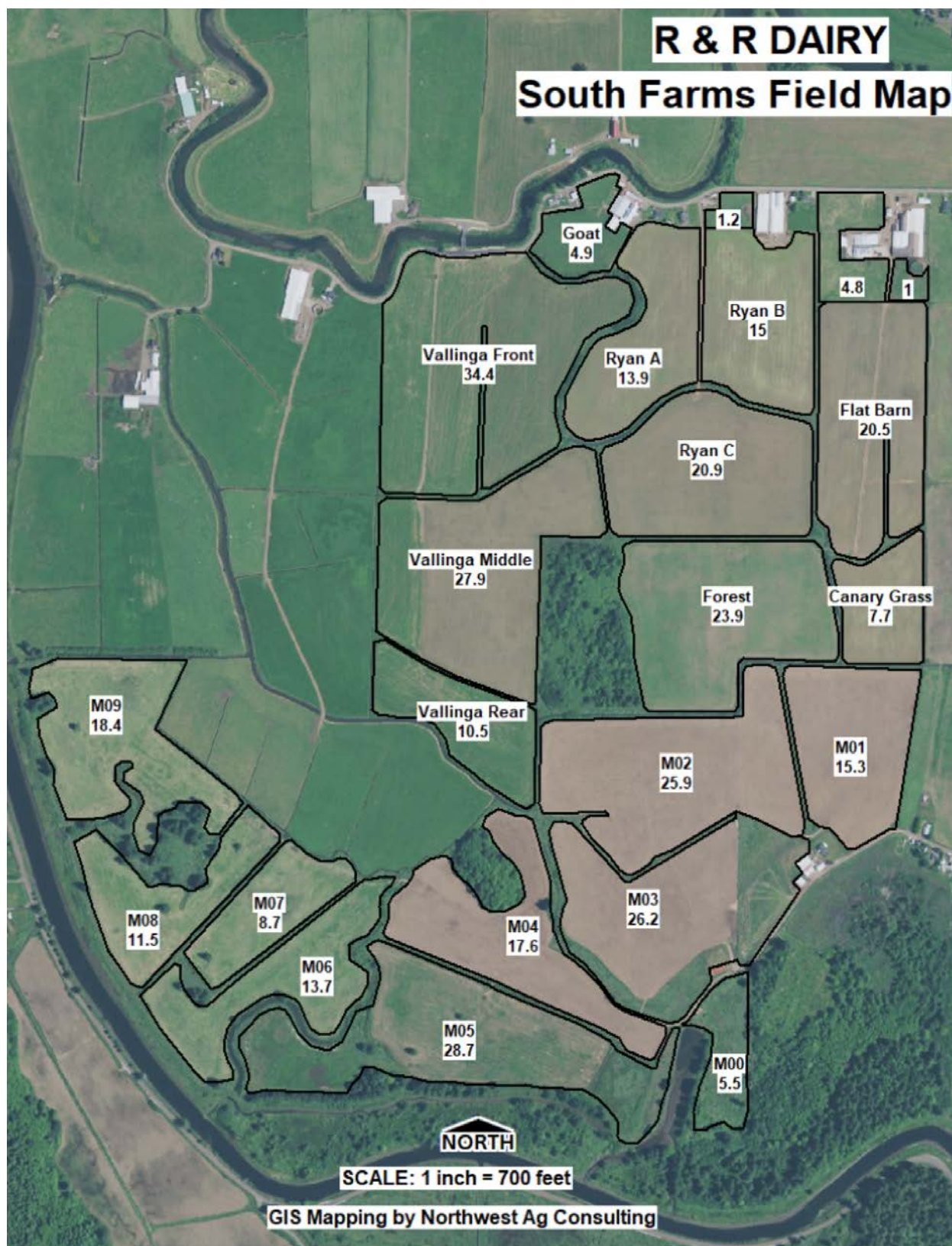
The amount of irrigation water to apply based on the net irrigation requirements for the crop being grown can be found in the tables starting on page 3-31.

MANURE UTILIZATION

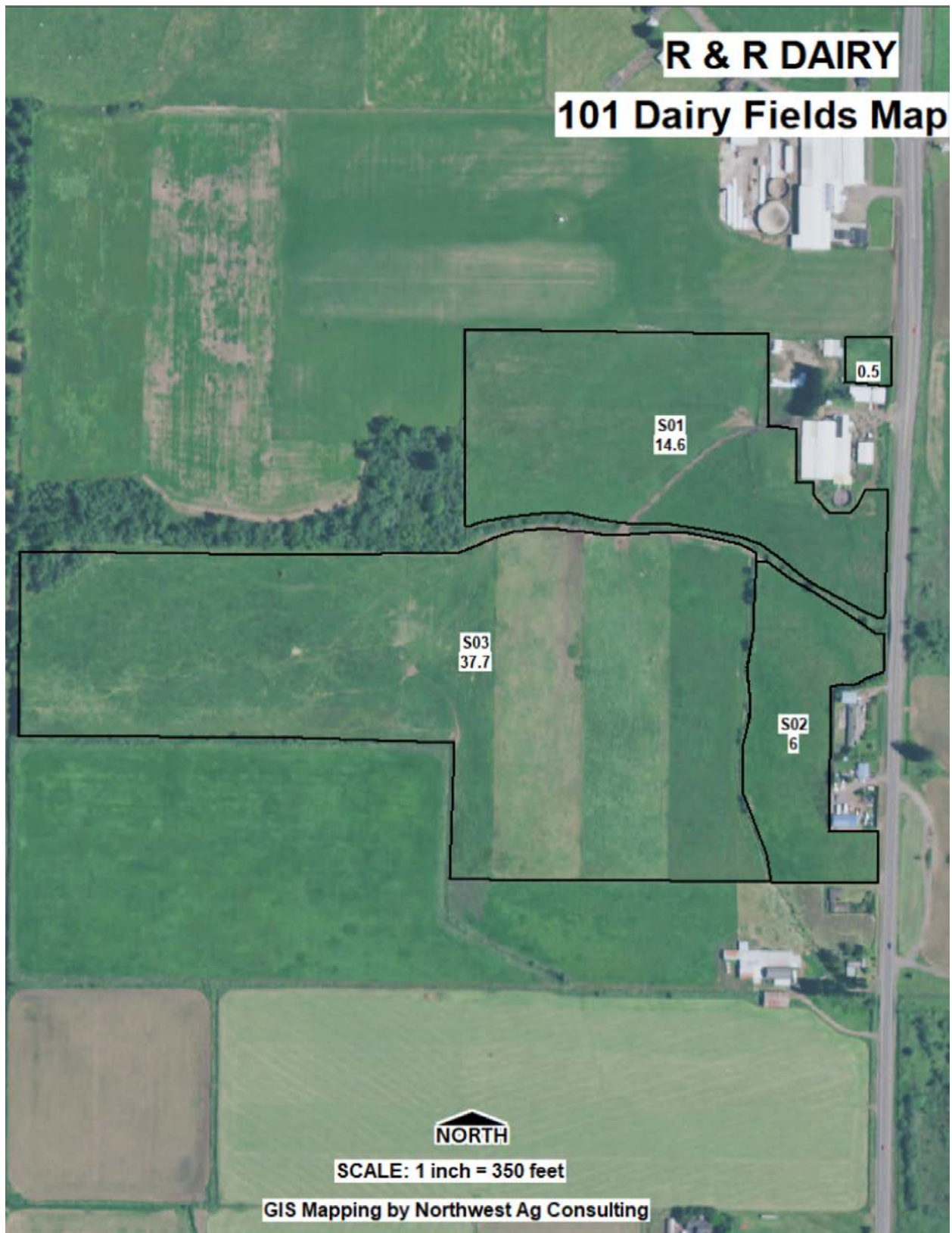
FIELD MAP(S)



MANURE UTILIZATION



MANURE UTILIZATION



MANURE UTILIZATION

APPLICATION

The manure and irrigation application systems will be calibrated in accordance with guidance starting on page 3-5 to insure the applications of manure, bedding and runoff from the waste storage facilities are in accordance with agronomic rates.

No application of wastewater or solids containing manure is to be made to the field setback areas shown on the Setback Map on page 3-8. Applications of wastewater and solids containing manure should be made in accordance with guidance starting on page 3-5 to reduce the risk of contaminated runoff to surface water sources and leaching of contaminants to ground water sources.

The phosphorus runoff rating for each of the farm fields is based on the Western Oregon Phosphorus Index and is shown in the table on page 4-51. Wastewater, solids and commercial fertilizer for any field with a medium or high runoff rating must be applied on a phosphorus basis. Wastewater, solids and commercial fertilizer for any field with a low runoff rating can be applied on a nitrogen basis. No applications of manure or commercial fertilizer containing phosphorus are to be made on a field with a zero out phosphorus runoff rating.

GENERAL CONSIDERATIONS FOR MAKING MANURE APPLICATIONS

Manure applications may be made at any time of the year provided certain factors have been considered. However, the overriding factor one should use in considering whether or not to apply nutrients to a crop, irrespective of the nutrient source, is the agronomic need of the crop at the time of application. The following guidelines are to be considered once the decision has been made to make a manure application.

- **Consider using T-Sum 200 to determine when manure applications are to begin** as long as you can comply with all other permit and AWMP requirements. Calculations for T-Sum 200 are outlined in OSU Extension Fertilizer Guide for Pastures (OSU FG63, 2000). T-Sum 200 is based on accumulated heat units and is an accurate guide to estimate plant activity. Research has shown that T-Sum 200 is the earliest date when plant roots begin to grow in the spring and thus are receptive to applied nutrients.

Surface air temperature is monitored and the daily minimum and maximum air temperatures are summed and divided by two to get the average daily air temperature then converted to centigrade (F degrees minus 32 times 0.556). Manure applications may begin once 200 heat units have been accumulated. The average date of T-Sum 200 for R&R Dairy is February 7th based on the Oregon State University Degree-Day Calculator. However, one must still apply manure at agronomic rates based on the estimated growth potential of the crop and anticipated climatic events.

Based on crop nutrient uptake patterns, manure applications should stop when the crop is done growing for the year and before the first significant rainfall event that is expected to result in saturated soils or surface runoff.

MANURE UTILIZATION

- **Fields that are subsurface (TILE) drained require additional precautions** when manure is applied. Any pre-application tillage should leave as much residue as possible on the soil surface. Water control structures installed in subsurface drainage systems should be managed to prevent discharge of manure and wastewater during periods of application.
- **Be aware of the location of sensitive areas, concerns of neighbors or concerns of the public**, which require special application procedures. To reduce odor problems, apply wastewater and solids containing manure in mid-morning when temperatures are warming and air is rising rather than in the afternoon or evening when air is cooling and settling. Avoid applications during periods of fog.
- **Calibrate application equipment** to insure uniform distribution and accurate application rates in accordance with guidance given in the Considerations for Manure Applications starting on page 3-6. Refer to page 3-19 for guidance on the calibration of application equipment.
- **Maintain setbacks for manure application from any surface waters.** The management goal is not to allow manure to enter surface waters at any time. The following table shows minimum setback requirements for manure applications:

Manure type	Application Equipment	Season	
		Wet	Dry
Liquid	Big gun	100 feet	35 feet
Liquid	Dragline	100 feet	35 feet
Liquid	Tank Wagon	100 feet	35 feet
Solid	Spreader	100 feet	35 feet

Note:

- Setbacks are the distance between open waterways and manure application area.
 - Setback requirements will generally increase for manures which are applied aerially (such as a traveling big gun) versus manures applied lower to the ground (such as a splash bar) due to potential for drift from wind or splashing.
- **Record applications, transfers or exports of nutrients (manure and fertilizer)** and maintain them for at least 5 years. The CAFO Recordkeeping Calendar or the tools and forms referenced in Section 5 may be used to record this information.

MANURE UTILIZATION

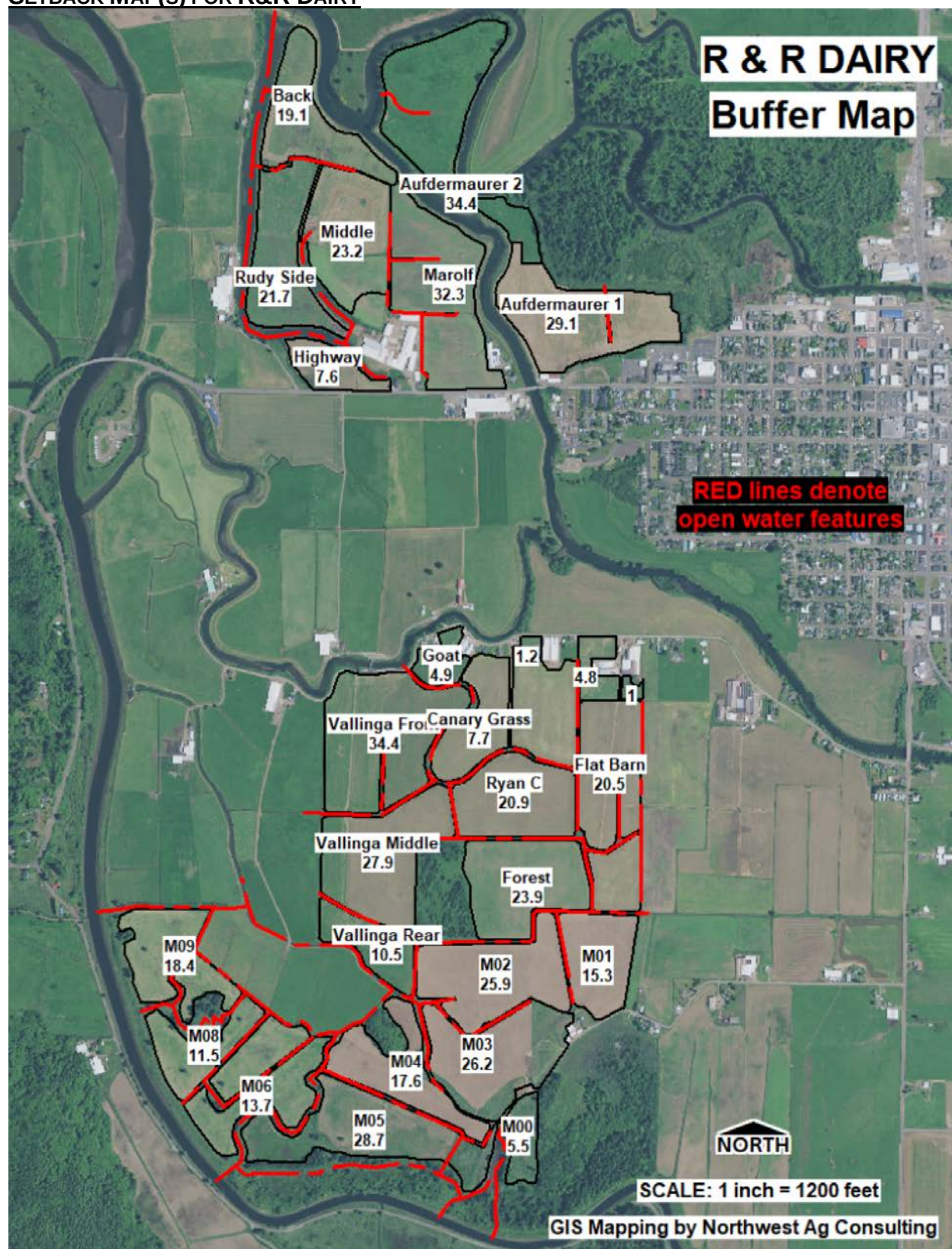
CONSIDERATIONS FOR DRY SEASON MANURE APPLICATIONS:

Apply wastewater and solids containing manure at **agronomic rates** shown on the table on page 3-23 using the following guidelines:

- Consider using T-Sum 200 as a guideline to begin making manure applications.
- Apply to land being prepared for crops. Till manure into soil within 3 days of application if possible or apply to actively growing crops such as grass, clover or alfalfa after cutting.
- **Do not apply** during rainfall events that are expected to result in saturated soils or surface runoff.
- **Maintain the setback distances** described on page 3-6 and shown on the Setback Map on page 3-8 when making applications of liquids or solids containing manure.
- **Record applications, transfers or exports** of nutrients (manure and fertilizer) and maintain them for at least 5 years. The CAFO Recordkeeping Calendar or the tools and forms referenced in Section 5 may be used to record this information.

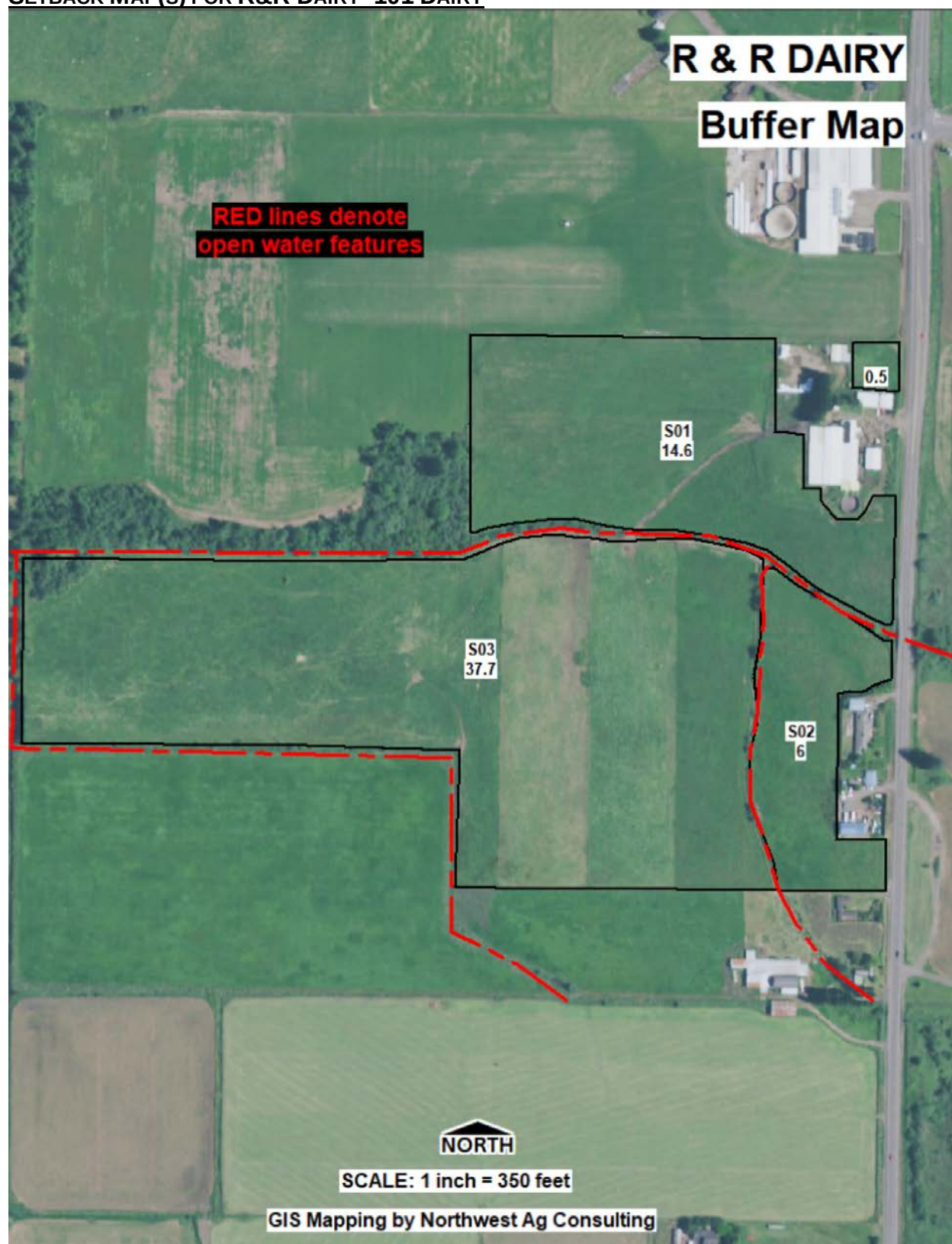
MANURE UTILIZATION

SETBACK MAP(S) FOR R&R DAIRY



MANURE UTILIZATION

SETBACK MAP(S) FOR R&R DAIRY- 101 DAIRY



MANURE UTILIZATION

CONSIDERATIONS FOR WET SEASON MANURE APPLICATIONS:

Only apply manure during this time period if the following guidelines CAN be met. Call the ODA CAFO Program at (503) 986-4700 for guidance if a manure application is needed and the following guidelines CAN NOT be met:

- Apply manure only to actively growing crops such as grass, clover or alfalfa.
- Minimize application rates by using the maximum travel rates for the application equipment.
- **Maintain the setback distances** described in the table on page 3-6 and shown on the Setback Map on page 3-8 when making applications of liquids or solids containing manure.
- **Do not apply** during rainfall events that are expected to result in saturated soils or surface runoff.
- **Do not apply** to saturated or flooded soils. It is recommended that application(s) be limited to soils (areas) where the flooding frequency class rating is None, Very Rare or Rare.
- **Do not apply** to slopes greater than 5%. See the Soil Map in Section 4 for the location of soil map units with slopes greater than 5%.
- **Applications of wastewater or solids containing manure to frozen soils should be avoided.** Do the following if an application of wastewater or solids containing manure is to be made to frozen soils:
 - Apply only enough wastewater or solids containing manure to address storage limitations until suitable soil conditions for application are available.
 - Minimize applications to 5 wet tons per acre or less of solids containing manure and 6,788 gallons (0.25 inches) per acre or less of wastewater.
 - Apply to alternating strips to reduce the risk of contaminated runoff reaching surface water sources.
 - Apply to fields of established hay, pasture or fields containing at least 90% cover and are the furthest from open water sources.
 - Do not apply wastewater or solids containing manure within 200 feet of surface water sources, drainageways, wells, or inlets to subsurface drainage systems.
 - Runoff control systems such as earthen dikes must be in place where applications will be made to fields with slopes greater than 5%.
- **Record applications, transfers or exports** of nutrients (manure and fertilizer) and maintain them for at least 5 years. The CAFO Recordkeeping Calendar or the tools and forms referenced in Section 5 may be used to record this information.
- **Do not apply** manure or commercial fertilizer to fields receiving applications unless the nutrients applied in the manure are less than the annual application of nutrients planned in the nutrient budget for the fields.

MANURE UTILIZATION

MANURE AND SOIL SAMPLING FREQUENCY

Sample liquids and solids containing manure during applications in early spring **annually** and have each sample analyzed for Total Nitrogen (TKN), Ammonium Nitrogen (NH₄-N), Phosphorus (P) and Potassium (K) plus percent moisture. Ask the lab to report results in pounds per ton for the solids containing manure and in pounds per thousand gallons for liquids containing manure. Analyses of solids and liquids containing manure should be performed by a laboratory that meets the requirements and performance standards of the Manure Testing Laboratory Certification Program (MTLCP), <http://www.mda.state.mn.us/licensing/pestfert/manurelabs.htm>.

Collect soil samples from all fields receiving solids or liquids containing manure **within a 5 year period** in the fall (September 15-October 15) in accordance with **Pacific Northwest (PNW) Extension publication 570-E, “Monitoring Soil Nutrients Using a Management Unit Approach”** referenced in Section 5. Have the soil samples analyzed for Total Nitrogen (TKN) and Phosphorus (P) and ask the lab to report results in parts per million (ppm). Soil test analyses should be performed by laboratories that meet the requirements and performance standards of the North American Proficiency Testing Program (NAPT) Proficiency Assessment Program (PAP); <http://www.naptprogram.org/pap/>.

HOW TO SAMPLE LIQUID MANURE

Obtain a composite following one of the procedures listed below and thoroughly mix. Using a plunger, an up-and-down action works well for mixing liquid manure in a five-gallon bucket. Fill a one-quart plastic bottle not more than three-quarters full with the composite sample. Store sample in freezer if not delivered to the lab immediately.

Procedure 1. Sampling from storage- Agitate storage facility thoroughly before sampling. Collect at least five samples from the storage facility or during loading using a five-gallon bucket. Place a sub sample of the composite sample in a one-quart plastic container. Sampling a liquid manure storage facility without proper agitation (2-4 hrs. minimum) is not recommended due to nutrient stratification, which occurs in liquid systems. If manure is sampled from a lagoon that was not properly agitated, typically the nitrogen and potassium will be more concentrated in the top liquid, while the phosphorus will be more concentrated in the bottom solids.

Procedure 2. Sampling during application- Place buckets around field to catch manure from spreader or irrigation equipment. Combine and mix samples into one composite sub sample in a one-quart plastic container.

MANURE UTILIZATION

HOW TO SAMPLE SOLID MANURE

Collect a composite sample by following one of the procedures listed below. A method for mixing a composite sample is to pile the manure and then shovel from the outside to the inside of the pile until well mixed. Fill a one-gallon plastic heavy-duty zip lock bag approximately one-half full with the composite sample, squeeze out excess air, close and seal. Store sample in freezer if not delivered to the laboratory immediately.

Procedure 1. Sampling while loading - Recommended method for sampling from a stack or bedded pack. Take at least ten samples while loading several spreader loads and combine to form one composite sample. Thoroughly mix the composite sample and take an approximately one pound sub sample using a one-gallon plastic bag. Sampling directly from a stack or bedded pack is not recommended.

Procedure 2. Sampling during spreading - Spread a tarp in field and catch the manure from one pass. Sample from several locations and create a composite sample. Thoroughly mix the composite sample together and take a one-pound sub sample using a one-gallon plastic bag.

Procedure 3. Sampling daily haul - Place a five-gallon bucket under the barn cleaner 4-5 times while loading a spreader. Thoroughly mix the composite sample together and take a one-pound sub sample using a one-gallon plastic bag. Repeat sampling 2-3 times over a period of time and test separately to determine variability.

Procedure 4. Sampling poultry in-house - Collect 8-10 samples from throughout the house to the depth the litter will be removed. Samples near feeders and waterers may not be indicative of the entire house and sub samples taken near here should be proportionate to their space occupied in the whole house. Mix the samples well in a five-gallon pail and take a one-pound sub sample, place it in a one-gallon zip lock bag.

Procedure 5. Sampling stockpiled litter - Take ten sub samples from different locations around the pile at least 18 inches below the surface. Mix in a five-gallon pail and place a one-pound composite sample in a gallon zip lock bag.

Sample Identification and Delivery

Identify the sample container with information regarding the farm, animal species and date. This information should also be included on the sample information sheet along with application method, which is important in determining first year availability of nitrogen.

Keep all manure samples frozen until shipped or delivered to a laboratory. Ship early in the week (Mon.-Wed.) and avoid holidays and weekends.

MANURE UTILIZATION

MANURE TESTS

R&R Dairy	LIQUID MANURE ANALYSIS
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ORAWM Estimate

Year Lab #	Date	Sample I.D.	Lbs/1,000 gallons				%	%
			Total N	P ₂ O ₅	K ₂ O	NH ₄ -N	Moisture	Solids
2017								
ORAWM	11/08/2017	Wastewater	9.10	4.24	7.13	4.50	NA	NA

R&R Dairy	SOLID MANURE ANALYSIS
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ORAWM Estimate

Year Lab #	Date	Sample I.D.	Lbs/Ton				%	%
			Total N	P ₂ O ₅	K ₂ O	NH ₄ -N	Moisture	Solids
2017								
ORAWM	11/08/2017	Solids Stack	8.54	3.85	6.13	4.25	NA	NA

Manure analyses should be performed by a laboratory that meets the requirements and performance standards of the Manure Testing Laboratory Certification Program (MTLCP), <http://www.mda.state.mn.us/licensing/pestfert/manurelabs.htm>.

Manure should be analyzed annually for a minimum of three (3) consecutive years to develop a cumulative manure analysis history as a basis for nutrient allocation to the fields.

MANURE UTILIZATION

MANURE UTILIZATION

HOW TO SAMPLE SOILS

Current soil tests must be used in the development and editing of nutrient management plans. A current soil test is one that is no older than 5 years that is used to represent the nutrient status of the entire field. Soil analysis must be performed by laboratories successfully meeting the requirements and performance standards of the North American Proficiency Testing Program-Performance Assessment Program (NAPT-PAP). Results of these analysis will be used to determine application rates for manure, litter, and process wastewater. Guidance for soil sampling can be found in the Pacific Northwest (PNW) Extension publication 570-E, “Monitoring Soil Nutrients Using a Management Unit Approach”. Oregon State University Extension publication EC1478, “Soil Test Interpretation Guide” provides guidance on how to determine soil nutrient concentrations and how to adjust soil pH to improve nutrient availability.

Field Area. A composite soil sample should represent a uniform field area. Each area should have similar crop and fertility history. Soil characteristics (color, slope, texture, drainage) should be similar. Exclude small areas within a field that are obviously different. The field area represented by a single composite sample should represent no more than 40 irrigated acres or 100 dry land acres.

Sampling Depth. Laboratory tests are calibrated to specific depths. It is vital to collect samples from appropriate depths. Sampling depth for most soils is the rooting depth in 6-inch intervals. In Oregon, as a minimum, soil samples should be collected from the 0-12” depth. The 0-6” surface soil samples are normally used for conventional tests of organic matter, nitrogen, phosphorus, potassium, pH and salt levels. Additionally, subsurface samples from the 6-24” depth are needed to estimate nitrogen availability for crops grown in dry land areas.

Post Harvest Soil Testing for Evaluating Nutrient Applications. Refer to Pacific Northwest (PNW) Extension publication 570-E, “Monitoring Soil Nutrients Using a Management Unit Approach” in Section 5 for guidance on how to evaluate nutrient applications and crop uptake of nutrients.

MANURE UTILIZATION

MANURE UTILIZATION

SOIL TESTS

R&R Dairy		SOIL TEST RESULTS											
Testing performed by AgSource Laboratory, Umatilla, Oregon													
Report	Test Date	Field	Depth	NO3-N ppm	NH4-N ppm	P ppm	K ppm	Ca meq	Mg meq	S ppm	pH	SMP	OM %
2016													
S2779	10/26/2016	Highway	12"	17	11	23	1200	22.1	22.1	54	5.2	5.6	NA
S2779	10/26/2016	Rudy Side	12"	22	11	8	836	27.0	27.0	70	5.3	5.5	NA
S2779	10/26/2016	Back	12"	17	11	23	1200	22.1	22.1	54	5.2	5.6	NA
S2779	10/26/2016	Middle	12"	22	11	8	836	27.0	27.0	70	5.3	5.5	NA
S2779	10/26/2016	Marolf	12"	28	14	21	910	23.6	23.6	111	4.9	5.4	NA
S2779	10/26/2016	Aufdermauer 1	12"	25	11	59	1008	32.4	32.4	39	5.7	5.8	NA
S2779	10/26/2016	Aufdermauer 2	12"	25	11	59	1008	32.4	32.4	39	5.7	5.8	NA
S2779	10/26/2016	Goat	12"	17	11	23	1200	22.1	22.1	54	5.2	5.6	NA
S2779	10/26/2016	Vallinga Front	12"	32	20	14	962	7.7	7.7	173	4.5	4.7	NA
S2779	10/26/2016	Vallinga Middle	12"	20	11	4	637	6.8	6.8	151	4.6	4.8	NA
S2779	10/26/2016	Vallinga Rear	12"	32	20	14	962	7.7	7.7	173	4.5	4.7	NA
S2779	10/26/2016	Ryan	12"	28	14	21	910	23.6	23.6	111	4.9	5.4	NA
S2779	10/26/2016	Ryan A	12"	20	14	8	567	10.9	10.9	95	4.8	5.0	NA
S2779	10/26/2016	Ryan B	12"	20	14	8	567	10.9	10.9	95	4.8	5.0	NA
S2779	10/26/2016	Ryan C	12"	20	14	8	567	10.9	10.9	95	4.8	5.0	NA
S2779	10/26/2016	Flat Barn 1	12"	19	16	7	844	9.4	9.4	98	4.7	5.1	NA
S2779	10/26/2016	Flat Barn 2	12"	19	16	7	844	9.4	9.4	98	4.7	5.1	NA
S2779	10/26/2016	Flat Barn	12"	19	16	7	844	9.4	9.4	98	4.7	5.1	NA
S2779	10/26/2016	Forest	12"	32	20	14	962	7.7	7.7	173	4.5	4.7	NA
S2779	10/26/2016	Canary Grass	12"	20	11	4	637	6.8	6.8	151	4.6	4.8	NA
S2779	10/26/2016	M00	12"	32	20	14	962	7.7	7.7	173	4.5	4.7	NA
S2779	10/26/2016	M01	12"	20	11	4	637	6.8	6.8	151	4.6	4.8	NA
S2779	10/26/2016	M02	12"	32	20	14	962	7.7	7.7	173	4.5	4.7	NA
S2779	10/26/2016	M03	12"	20	11	4	637	6.8	6.8	151	4.6	4.8	NA
S2779	10/26/2016	M04	12"	32	20	14	962	7.7	7.7	173	4.5	4.7	NA
S2779	10/26/2016	M05	12"	20	11	4	637	6.8	6.8	151	4.6	4.8	NA
S2779	10/26/2016	M06	12"	32	20	14	962	7.7	7.7	173	4.5	4.7	NA
S2779	10/26/2016	M07	12"	20	11	4	637	6.8	6.8	151	4.6	4.8	NA
S2779	10/26/2016	M08	12"	32	20	14	962	7.7	7.7	173	4.5	4.7	NA

MANURE UTILIZATION

R&R Dairy

SOIL TEST RESULTS

Testing performed by AgSource Laboratory, Umatilla, Oregon

Report	Test Date	Field	Depth	NO3-N ppm	NH4-N ppm	P ppm	K ppm	Ca meq	Mg meq	S ppm	pH	SMP	OM %
2016													
S2779	10/26/2016	M09	12"	20	11	4	637	6.8	6.8	151	4.6	4.8	NA
S2779	10/26/2016	S00	12"	32	20	14	962	7.7	7.7	173	4.5	4.7	NA
S2779	10/26/2016	S01	12"	20	11	4	637	6.8	6.8	151	4.6	4.8	NA
S2779	10/26/2016	S02	12"	32	20	14	962	7.7	7.7	173	4.5	4.7	NA
S2779	10/26/2016	S03	12"	20	11	4	637	6.8	6.8	151	4.6	4.8	NA

Soil test analyses should be performed by laboratories that meet the requirements and performance standards of the North American Proficiency Testing Program (NAPT) Proficiency Assessment Program (PAP); <http://www.naptprogram.org/pap/>.

MANURE UTILIZATION

HOW TO CALIBRATE APPLICATION EQUIPMENT

Calibration of application equipment is a critical part of nutrient management. Calibration should be completed at least annually to insure manure and fertilizer will be uniformly applied. There are two basic approaches for calibrating a manure spreader – the load area and the weight area methods. The load area method is more accurate and can be used for both liquid and solid manure. The weight area method works only with solid or semi-solid manure.

Irrigation System Calibration

Place 3-5 buckets throughout the irrigation spray pattern and collect samples while operating the pump at a given rpm and pressure (for a traveling gun record the travel speed also). At the end of the planned sample period measure the amount of liquid collected in inches (average the samples). The following chart shows how many gallons per acre applied per inch of liquid applied:

Inches Liquid Manure Applied via Irrigation:	Gallons per Acre:
0.20	5,431
0.30	8,146
0.40	10,862
0.50	13,577
0.75	20,366
1.00	27,154
1.25	33,943
1.50	40,731

Soft Hose Injection System with Irrigation Hose:

Alternative 1. Use a flow meter mounted on the injector system and calculate the distance and width to determine amount applied over a measured area. Example the flow meter measures 1,000 gallons over a distance of 600 feet and 10 feet wide.

Formula:

Application Rate (7,260 gallons/acre) = (Gallons Applied (1,000 gal) X 43,560 sq. ft/acre) divided by (Distance traveled (600 ft) X Application width (10 ft))

Alternative 2. (Requires a 10-20 gallon graduated measuring container)

Step 1) In the field, measure the flow out of one injector for 5 seconds into the graduated measuring container and record gallons, repeat three (3) times and average the results.

Step 2) Multiply the average amount collected from one injector by the number of injectors (equals amount applied for the whole system for 5 seconds).

Step 3) Multiply the results of Step 2 times 12 to get gallons per minute.

Step 4) Place the injector in the soil at the planned depth and operating speed and record the distance traveled in 1 minute (average 3 different measurements).

Step 5) Determine the effective application width (number of injectors X injector spacing in feet).

MANURE UTILIZATION

Step 6) Multiply the effective width times the distance traveled in 1 minute (this gives the square feet covered in 1 minute).

Step 7) Divide the result of Step 6 by 43,560 (this gives the acres covered in 1 minute).

Step 8) Divide the results of Step 3 (gallons per minute) by the results of Step 7 (acres covered in 1 minute) - (this gives the gallons applied per acre.

For example:

Step 1) Collect an average of 6 gallons from one injector for 5 seconds.

Step 2) Applicator has 8 injectors (8 injectors X 6 gallons per injector = 48 gallons for 5 seconds)

Step 3) 48 gallons in 5 seconds X 12 = 576 gallons/minute applied

Step 4) Average distance covered in 1 minute was 250 feet

Step 5) Average width of the applicator is 12 feet.

Step 6) 12 feet wide X 250 feet long = 3000 square feet

Step 7) 3000 square feet divided by 43,560 square feet/acre = .0688 acres covered in 1 minute

Step 8) 576 gallons/minute divided by .0688 acres/minute = 8,372 gallons/acre.

Manure Spreader/Tanker Calibration

There are several methods that can be used to calibrate the application rate of a manure spreader. The two best methods are the load-area method and the weight-area method. It is desirable to repeat the calibration procedure 2 to 3 times and average the results to establish a more accurate calibration.

Before calibrating a manure spreader, the spreader settings such as splash plates should be adjusted so that the spread is uniform. Most spreaders tend to deposit more manure near the middle than at the edge of the spread pattern. Overlapping can make the overall application more uniform. Calibrating application rates when overlapping is involved requires measuring the width of two spreads and dividing by two to get the effective spread width.

Calibration should take place annually or whenever manure is being applied from a different source or consistency.

MANURE UTILIZATION

Load-Area Method:

The load-area method is the most accurate and can be used for both liquid and solid manure. The load area method is a 3-step process:

Step 1) Determine the amount of manure in the spreader. The most accurate way to determine the amount of manure in a spreader is weighting the spreader when it is empty and again when it is full. For a reliable estimate of spreader capacity, weigh several representative loads (at least five) to determine the average gross weight. Subtract the empty spreader weight. Then, calculate the average net loaded weight.

Step 2) Determine the area of spread using the method at the right. Width measurements near the beginning and end of the spread pattern should be avoided because the spreader may not be operating at full capacity.

Step 3) Calculate the application rate. The application rate is calculated using the formula for either liquid or solid manure.

Formula for Solid Manure Equals Tons/Acre

(Average Loaded Weight (lbs) x 21.81) divided by (Distance Traveled (ft) x Width of Spread (ft))

Formula for Liquid Manure Equals Gal/Acre

(Tank Volume (gal) x 43,560) divided by (Distance Traveled (ft) x Width of Spread (ft))

Weight-Area Method:

The weight-area method can only be used with solid or semi-solid manure. When a scale is not available, the application rate of a box spreader can be determined by collecting manure on a tarp or piece of heavy material. The weight area method is less accurate than the load area method.

This method consists of eight steps:

Step 1) Prepare/cut three 56-inch square tarps or pieces of heavy material (this size equals 1/2,000 of an acre). The pounds of manure collected on 56 inches square equals tons applied per acre.

Step 2) Weigh one of the clean tarps and a large bucket on a platform scale. Record the weight.

Step 3) Anchor the three tarps in the field ahead of the spreader near the beginning, middle, and end of the area that will be spread with one load.

Step 4) Drive over the three tarps at a normal speed to collect a representative manure sample.

Step 5) Fold and place the first tarp into the empty bucket without spilling the manure. Weigh the bucket, tarp, and manure. Subtract the weight of the clean tarp and bucket recorded in step 2.

MANURE UTILIZATION

Step 6) Repeat the process for each of the two remaining tarps.

Calculate the average weight (pounds) of the manure collected. This value equals tons of manure applied per acre.

Factor for converting pounds to tons and square feet to acres ($21.8 = 43,560 \text{ sq ft per acre divided by } 2,000 \text{ lbs/ton}$).

The factor for converting square feet to acres = $43,560 \text{ sq ft per acre}$.

Step 7) Determining Area of Spread.

The “area of spread” is the length and width of the ground covered with one load of manure. The area of spread is affected by speed and equipment settings. Spreaders discharge manure at varying rates depending on travel and PTO speed, gear box settings, and discharge openings. It is important to adjust the spreader so the pattern is as uniform as possible. Accurately measuring the length and width of this area is essential. To determine width, measure two adjacent spreads and divide by two to find the “effective” spread width. This accounts for overlap, which is often needed for a more uniform application. The length of spread is determined using the following three values:

1. Desired manure application rate based on soil and manure tests,
2. Width of the manure spread, and
3. Manure spreader holding capacity (weight and/or volume).

From these values, calculate the distance or lengths of spread using these formulas:

Formula: Solid Manure Equals Feet/Load

(Average Load Weight (lbs) x 21.81) divided by (Spread Width (ft) x App. Rate (tons/ac))

Formula: Liquid Manure Equals Feet/Load

(Tank Volume (gal) x 43,560) divided by (Spread Width (ft) x Desired App. Rate (gal/ac))

Step 8) Spread a load. If the distance traveled does not equal the calculated distance, adjust the speed or equipment settings.

MANURE UTILIZATION

AMOUNT OF MANURE TO APPLY FOR CROPS GROWN

The timing and frequency of applications of wastewater and solids containing manure for utilization by crops shown in the table below are based on information provided in Oregon State University Extension publications listed in Section 5.

The formulas for determining the total nutrient application rate per unit yield for each crop shown in the table below are as follows:

Total N to apply in pounds = N in pounds per yield unit from the table for the crop grown X percent (%) dry matter (DM) of harvested crop/100 X planned or measured yield per yield unit

Total P₂O₅ to apply in pounds = P in pounds per yield unit from the table for the crop grown X 2.291 P₂O₅/P X percent (%) dry matter (DM) of harvested crop/100 X planned or measured yield per yield unit

Total K₂O to apply in pounds = K in pounds per yield unit from the table for the crop grown X 1.205 K₂O/K X percent (%) dry matter (DM) of harvested crop/100 X planned or measured yield per yield unit

The following tables show the crops that may be grown on this farm:

FRUIT OR VEGETABLES	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/yield unit)		
				N	P	K
Beans, dry edible	cwt	100	100	3.13	0.45	0.85
Blueberries	ton	2000	100	2.14	0.20	3.54
Caneberries	ton	2000	100	11.43	7.42	11.43
Corn, Sweet	ton	2000	100	17.80	4.8	11.6
Mixed Vegetables & Fruit	ton	2000	100	8.33	2.08	10.20
Onions	cwt	100	100	0.18	0.04	0.13
Orchard, Fruit	ton	2000	100	13.00	2.00	16.00
Pea, edible	ton	2000	100	73.60	8.00	18.00
Potatoes	ton	2000	100	6.60	1.20	10.33
Squash	ton	2000	100	3.2	1.02	1.71

MANURE UTILIZATION

GRAIN, SEED OR OIL CROPS	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/yield unit)		
				N	P	K
Barley	bushels	48	100	0.87	0.16	0.21
Beets, sugar	ton	2000	100	4.00	0.60	2.78
Bluegrass, Seed	cwt	100	100	2.88	0.43	1.98
Canola	ton	2000	100	70.00	12.00	18.00
Corn, grain shelled	bushels	56	100	0.90	0.16	0.22
Crimson Clover seed	lb	1	100	0.05	0.01	0.02
Fescue Seed, Straw Removed	cwt	100	100	10.03	1.08	8.33
Fescue, seed (Fine or Tall)	lb	1	100	0.02	0.00	0.00
Oats, grain	bushels	32	100	0.62	0.11	0.16
Orchardgrass seed	lb	1	100	0.016	0.002	0.004
Peppermint for Oil	ton	2000	100	4.20	1.80	2.80
Peppermint for Oil, Leaves and Stems Removed	ton	2000	100	87.2	36.8	57.8
Pumpkins	ton	2000	100	4.00	1.40	6.60
Rapeseed	bushels	50	100	1.38	0.30	0.30
Red Clover seed	cwt	100	100	4.55	1.00	2.00
Ryegrass Seed	cwt	100	100	7.5	0.94	1.88
Ryegrass Seed, Straw Removed	Ton	2000	100	30.0	18.8	37.6
Ryegrass, Perennial Seed	lb	1	100	0.02	0.002	0.004
Triticale, Haylage	ton	2000	100	14.7	2.04	3.42
Wheat, Soft White for grain	bushels	60	100	1.00	0.24	0.21
Wheat, Soft White Straw Removed	ton	2000	100	43.40	8.90	20.90
Wheat, Hard Red for grain	bushels	60	100	1.60	0.37	0.31
Wheat, Hard Red Straw Removed	ton	2000	100	53.36	10.96	23.76

MANURE UTILIZATION

HAY AND PASTURE CROPS	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/yield unit)		
				N	P	K
Alfalfa, Hay	ton	2000	100	54.4	6.8	35.7
Alfalfa, Seed	cwt	100	100	6.12	0.70	2.34
Alta Fescue Hay/Pasture	ton	2000	100	32.98	6.88	37.60
Grass Legume Hay/Pasture	ton	2000	100	33.92	5.30	7.56
Meadow Fescue Hay/Pasture	ton	2000	100	41.56	8.70	47.43
Oats Hay/Pasture	ton	2000	100	26.01	10.20	14.79
Orchardgrass Hay/Pasture	ton	2000	100	53.21	8.58	18.62
Perennial Grass Hay/Pasture	ton	2000	100	58.00	8.00	40.00
Reed Canary Grass	ton	2000	100	27.03	3.57	41.57
Ryegrass Hay	ton	2000	100	33.41	5.44	28.39
Ryegrass, Perennial Pasture	ton	2000	100	58.00	8.00	48.00
Tall Fescue Hay/Pasture	ton	2000	100	39.40	4.00	40.00

SILAGE AND HAYLAGE CROPS	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/yield unit)		
				N	P	K
Alfalfa/Grass Haylage	ton	2000	100	15.60	1.02	6.84
Corn for Silage	ton	2000	100	7.50	1.20	6.00
Crimson Clover forage	ton	2000	100	40.00	4.41	32.98
Field Pea, Forage	ton	2000	100	73.60	8.00	18.00
Oat haylage	ton	2000	100	12.8	2.24	7.44
Oats & Peas/ Green Beans	ton	2000	100	32.03	5.58	18.65
Perennial Grass Haylage	ton	2000	100	15.00	2.40	12.78
Red Clover forage	ton	2000	100	40.00	4.41	32.98
Ryegrass Haylage	ton	2000	100	15.00	2.40	12.78
Sorghum-Sudan Haylage	ton	2000	100	16.32	1.92	17.4
Triticale Haylage	ton	2000	100	14.70	2.04	3.42
Wheatgrass Hay/Pasture	ton	2000	100	49.59	6.21	68.76

MANURE UTILIZATION

OTHER CROPS	Yield Unit	lb/Unit	% DM	Nutrient Removal (lb/yield unit)		
				N	P	K
Filberts	ton	2000	100	41.7	7.30	39.29
Hops, Cones	bale	200	100	9.00	0.96	5.00
Natural Area (Trees and Grass)	ton	2000	100	10.52	1.56	9.20
Nursery Stock	ton	2000	100	8.33	2.08	10.20
Poplars, Pulpwood	ton	2000	100	0.30	0.09	0.12

MANURE UTILIZATION

R&R Dairy

SOLID MANURE APPLICATION CHART

		ORAWM Estimate (lb/ton)			
		Total N	NH ₄ -N	P ₂ O ₅	K ₂ O
Test Date:	11/08/17	8.54	4.25	3.85	6.13
Source:	Solids Pile				
		Manure Nutrient Content			
Thickness to apply (in)	Manure Applied (T/A)	Total N (lb/A)	Available N (lb/A)	P ₂ O ₅ (lb/A)	K ₂ O (lb/A)
0.013	1.00	9	4	4	6
0.026	2.00	17	9	8	12
0.039	3.00	26	13	12	18
0.052	4.00	34	17	15	25
0.066	5.00	43	21	19	31
0.079	6.00	51	26	23	37
0.092	7.00	60	30	27	43
0.105	8.00	68	34	31	49
0.118	9.00	77	38	35	55
0.131	10.00	85	43	39	61
CUSTOM:					
Spreader 1	12.1	104	52	47	74
Spreader 2	18.2	156	77	70	112
Spreader 3	36.4	311	155	140	223

SOLID MANURE SPREADER 2 CALIBRATION

SPREADER VOLUME AND WEIGHT CALCULATIONS

Stack height above sideboard = 1 ft

Length = 15.3 ft

Depth = 2 ft

Width = 5.4 ft

Spreader Volume = 231 ft³

Weight of Manure = 12,543 lbs

MANURE DENSITY CALCULATIONS

BUCKET

Top Diam 11 Height 13.75 Volume 0.756 ft³

Weight 41 lbs

Manure Density = 54 lbs/ft³

SPREAD AREA CALCULATIONS

Spread Width = 15 ft

Application Area

Spread Length = 1,000 ft

Area Spread = 15,000 ft² or 0.34 acre

Manure Rate Spread = 0.84 lbs/ft²
36,424 lbs/acre
18.2 ton/acre

SOLID MANURE SPREADER 1 CALIBRATION

SPREADER VOLUME AND WEIGHT CALCULATIONS

Stack height above sideboard = 1 ft

Length = 15.3 ft

Depth = 2 ft

Width = 5.4 ft

Spreader Volume = 231 ft³

Weight of Manure = 12,543 lbs

MANURE DENSITY CALCULATIONS

BUCKET

Top Diam 11 Height 13.75 Volume 0.756 ft³

Weight 41 lbs

Manure Density = 54 lbs/ft³

SPREAD AREA CALCULATIONS

Spread Width = 15 ft

Application Area

Spread Length = 1,500 ft

Area Spread = 22,500 ft² or 0.52 acre

Manure Rate Spread = 0.56 lbs/ft²
24,283 lbs/acre
12.1 ton/acre

SOLID MANURE SPREADER 3 CALIBRATION

SPREADER VOLUME AND WEIGHT CALCULATIONS

Stack height above sideboard = 1 ft

Length = 15.3 ft

Depth = 2 ft

Width = 5.4 ft

Spreader Volume = 231 ft³

Weight of Manure = 12,543 lbs

MANURE DENSITY CALCULATIONS

BUCKET

Top Diam 11 Height 13.75 Volume 0.756 ft³

Weight 41 lbs

Manure Density = 54 lbs/ft³

SPREAD AREA CALCULATIONS

Spread Width = 15 ft

Application Area

Spread Length = 500 ft

Area Spread = 7,500 ft² or 0.17 acre

Manure Rate Spread = 1.67 lbs/ft²
72,848 lbs/acre
36.4 ton/acre

MANURE UTILIZATION

R&R Dairy

LIQUID MANURE APPLICATION CHART

ORAWM Estimate
(lb/1000 gal)

	Total N	NH ₄ -N	P ₂ O ₅	K ₂ O
Test Date: 11/08/17	9.10	4.50	4.24	7.13

Source: Tank

Manure Nutrient Content

Thickness to apply (inch)	Manure Applied (gallons)	Total N (lb/A)	Available N (lb/A)	P ₂ O ₅ (lb/A)	K ₂ O (lb/A)
0.25	6,789	62	31	29	48
0.50	13,577	124	61	58	97
0.75	20,366	185	92	86	145
1.00	27,154	247	122	115	194
1.25	33,943	309	153	144	242
1.50	40,731	371	183	173	290
1.75	47,520	432	214	201	339
2.00	54,308	494	244	230	387

CUSTOM:

Tank Wagon	3,630	33	16	15	26
Big Gun	12,144	111	55	51	87
Spreader Bar	20,364	185	92	86	145

EQUIPMENT CALIBRATION CALCULATIONS

TANK WAGON MANURE SPREADER CALIBRATION

Volume of Wagon = 3,000 gallons OR 401 ft³

Spread Length = 600 ft

Spread Width = 60 ft

Application Area

Area Spread = 36,000 ft² OR 0.83 acre

NOTE: Area spread is the total area covered by the tank wagon application.

APPLICATION RATE = 3,630 gal/acre OR 0.13 inch/acre

NOTE: Inch/acre should be close to amount collected in a rain gauge or pan

BIG GUN TRAVELOR APPLICATION RATE CALCULATIONS

Nozzle Diameter = 1.00 inch Wetted Dia = 330 feet

Pump Pressure = 80 psi Flow Rate = 230 gpm

Hose Speed = 24 sec/foot

= 2.5 feet/minute

= 150 feet/hour

Spread Width = 330 ft

Application Area

Length of Pull = 1,200 ft

Area Spread = 396,000 ft² OR 9.09 acre

NOTE: Area spread is the total area covered by the big gun application.

APPLICATION RATE = 12,144 gal/acre OR = 0.45 inch/acre

NOTE: Inch/acre should be close to amount collected in a rain gauge or pan

SPREADER BAR APPLICATION RATE CALCULATIONS

Spreader Bar Width = 12 ft

Flowrate = 279 gpm

Time to Apply = 5 Hrs

Spread Width = 120 ft

Application Area

Spread Length = 1,492 ft

Area Spread = 179,040 ft² OR 4.11 acre

NOTE: Area spread is the total area covered by the spreader bar application.

APPLICATION RATE = 20,364 gal/acre OR = 0.75 inch/acre

NOTE: Inch/acre should be close to amount collected in a rain gauge or pan

MANURE UTILIZATION

IRRIGATION WATER MANAGEMENT

The application of Irrigation Water Management to the irrigated fields as shown on the Field Map will manage soil moisture to promote the desired crop response, optimize the available water supplies, minimize irrigation induced erosion, decrease non-point source pollution of surface and groundwater sources, manage salts in the crop root zone and manage the crop micro climate. Irrigation water is supplied by wells and surface water sources using pumps through an underground pvc pipelines to sprinkler irrigation systems. The average amount of irrigation water to be applied per application and total annual amount needed for irrigated crops with guidance on when and how much irrigation water to apply can be found starting on page 3-31.

Permits: Under Oregon law all water is publicly owned and anyone planning to store or divert surface or groundwater for the purpose of irrigation must obtain a permit or water right from the Oregon Water Resources Department. These permits or water rights must be obtained prior to the use of the water. It is the responsibility of the Farmer to file for the necessary permits or water rights.

Permits or water rights are not needed to apply wastewater as a nutrient source.

MANURE UTILIZATION

Irrigation Water Flows, Volumes, and Relationships

Equation 1-

$$Q \times T = D \times A$$

where:

Q = flow rate (acre-in/hr or cfs)

T = time (hr)

D = gross depth applied (in)

A = area (acres)

Equation 2-

$$Q = \frac{453 \times A \times D}{F \times H}$$

where:

Q = flow rate (gpm)

A = area (acres)

D = gross application depth (in)

F = irrigation period (days)

H = hours of operation per day

Water Flow Rates:

1 cubic foot per second (cfs)

= 448.8 gallons per minute

1 cfs for 1 hour = 0.99 acre-inch

1 cfs for 24 hr = 1.98 acre-ft

1,000 gpm = 2.23 cfs

1,000 gpm for 24 hr = 4.42 ac-ft

1 gpm/acre = 0.053 ac-in/ac/day

1 cfs = 40 miner's inches in OR, No CA

1 cfs = 50 miner's inches in ID, WA

1 miner's inch = 11.22 gpm in OR

1 miner's inch = 9 gpm in ID, WA

1 cfs = 28.32 liters/sec

1 cubic meter/sec = 35.3 cfs

1 liter/sec = 15.85 gpm

Q x T = D x A where:

Q = cfs, T = hr; D = inches depth; A = acres

Gpm for 5 ft/s velocity in PVC pipe:

6"	8"	10"	12"	14"
480	800	1250	1750	2150



Natural Resources
Conservation Service

Water Volumes & Weights:

1 cubic foot = 7.48 gallons

= 62.4 lb = 28.3 liters

1 acre-foot = 43,560 cubic feet

(1 acre covered 1 ft deep)

12 acre-in = 1 acre-ft = 325,829 gal

1 million gallons = 3.07 acre-ft

1 acre-ft = 1,234 cubic meters

1 cu meter = 1,000 liters = 35.3 cu ft

Pressure and Pressure Head:

1 psi = 2.31 ft of pressure head

1 atmosphere (sea level)

= 14.7 psi = 33.9 ft of head

Lengths and Areas:

1 mile = 5,280 ft = 1.61 km

1 meter = 3.28 ft = 39.37 inches

1 acre = 43,560 square ft

1 hectare = 2.47 acres

Pump Power Requirement

$$\text{Horsepower} = \frac{\text{Pump Head in ft} \times \text{gpm}}{39.6 \times \% \text{ Pump Efficiency}}$$

MANURE UTILIZATION

SOILS-

Based on the Natural Resources Conservation Service National Engineering Handbook, Part 652, National Irrigation Guide, the irrigated soils on this farm have an average water holding capacity of 0.19 to 0.60 inches per inch of soil depth and a soil intake rate of 0.40 to 0.45 inches per hour.

CROPS-

CROP	MATURE ROOT DEPTH (INCHES)	MAXIMUM ALLOWED DEPLETION	CRITICAL PERIOD
Grass Hay/Pasture	30	50%	July
Corn Silage	48	50%	July

Above data are from EM8713, *Western Oregon Irrigation Guides*, June 1998, OSU: Corvallis, OR and NRCS *Irrigation Guide (National Engineering Handbook, Part 652)*.

IRRIGATION WATER SUPPLY-

Description of Oregon Water Right:	Claim GR2089, Claim GR3593, Cert 19606, Cert 21596, Cert 63690
Description of Irrigation Water Supply (Well, Stream, Irrigation District, etc.):	Well and Surface Water Sources
Supply Flowrate (gpm or cfs):	1,266 gpm or 2.83 cfs
Annual Volume Available (Acre-ft.):	565 Acre Feet
Water Delivery Schedule:	On Demand
Method(s) of Water Measurement:	NA

IRRIGATION SYSTEM-

System	System Capacity (gpm)	Nozzle Size (in)	Pressure (psi)	Spacing (ft)	Application Rate (in/hr)	System Efficiency (%)
Traveling Big Gun Sprinkler	335	1.1	80 to 90	180 to 240	0.4 to 0.5	65

MANURE UTILIZATION

Irrigation Water Management Worksheet						
Crop Name:	Hay/Pasture Land					
Managed Rooting Depth (inches):	30					
Management Allowed Depletion, MAD:	50%					
Irrigated Acres:	226					
Soil Name:	Brenner, Coquille, Nehalem, Nestucca, Lebam					
Soil Depth (inches):	60					
Available Water Capacity (in/in):	0.20					
Soil Intake Rate (in/hr) :	0.40					
IRRIGATION REQUIREMENT HOW MUCH water to apply?	Month					
	April	May	June	July	August	Sept
Total Plant Available Water Capacity (in): Soil or Root Depth * Available Water Capacity	6.0	6.0	6.0	6.0	6.0	6.0
Net Irrigation Application (in): Total Plant Available Water Capacity * MAD	3.0	3.0	3.0	3.0	3.0	3.0
Irrigation System Application Rate (in/hr): Determined based on the type of Irrigation System	0.38	0.38	0.38	0.38	0.38	0.38
IRRIGATION TIMING WHEN to apply water?						
Net Irrigation Water Requirement (in): (From OSU Extension Miscellaneous Pub 8530, 1992)	0.35	2.17	2.64	3.70	3.03	2.09
Average Daily Crop Water Use (in/day):	0.01	0.07	0.09	0.12	0.10	0.07
Irrigation Frequency (days): Net Irrigation Application / Daily Crop Water Use	30	31	30	25	31	30
Irrigation System Set Time (hours):	7.5	7.5	7.5	7.5	7.5	7.5
Actual Net Irrigation Application (in): Gross Application * System Application Efficiency	1.85	1.85	1.85	1.85	1.85	1.85
Actual Irrigation Frequency (days): Actual Net Irrigation Application / Daily Crop Water Use	30	26	21	16	19	27
IRRIGATION SYSTEM CAPACITY						
System Application Efficiency (%): Water Required / Water Applied	65%	65%	65%	65%	65%	65%
Gross Irrigation Application (in): System Application Rate * System Set Time	2.85	2.85	2.85	2.85	2.85	2.85
Volume of Water per Irrigation (acre-in): Gross Irrigation Application * Irrigated Acres	644	644	644	644	644	644
Irrigation System Operation (hours/day):	16	16	16	16	16	16
Required System Flow Rate (gpm): (Equation 2)	608	689	866	1,175	962	686
Compare Required system flow rate with Measured flow noted on Irrigation Application Record						

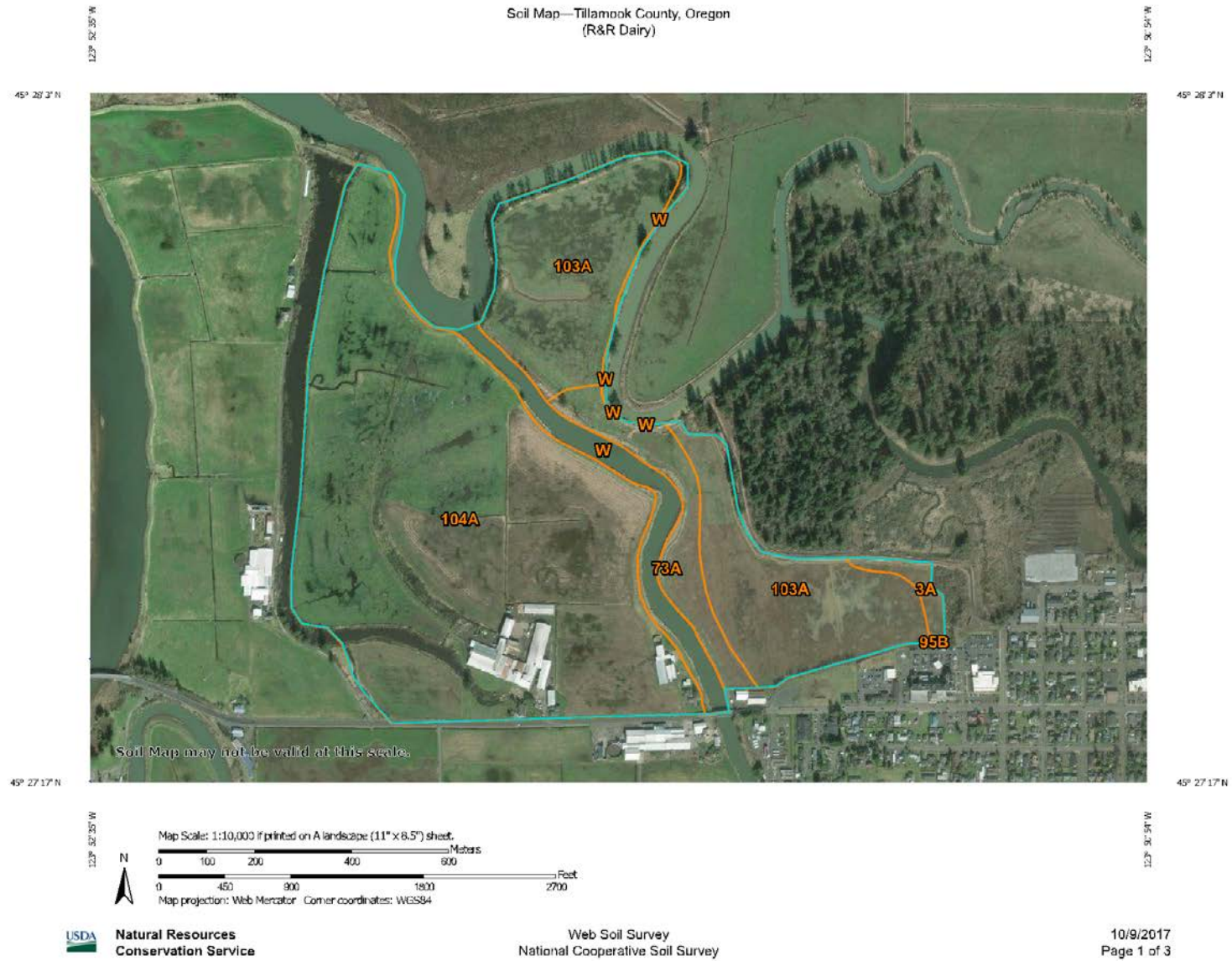
MANURE UTILIZATION

Irrigation Water Management Worksheet						
Crop Name:	Corn Silage					
Managed Rooting Depth (inches):	48					
Management Allowed Depletion, MAD:	50%					
Irrigated Acres:	226					
Soil Name:	Brenner, Coquille, Nehalem, Nestucca, Lebam					
Soil Depth (inches):	60					
Available Water Capacity (in/in):	0.20					
Soil Intake Rate (in/hr) :	0.40					
IRRIGATION REQUIREMENT HOW MUCH water to apply?	Month					
	April	May	June	July	August	Sept
Total Plant Available Water Capacity (in): Soil or Root Depth * Available Water Capacity	9.6	9.6	9.6	9.6	9.6	9.6
Net Irrigation Application (in): Total Plant Available Water Capacity * MAD	4.8	4.8	4.8	4.8	4.8	4.8
Irrigation System Application Rate (in/hr): Determined based on the type of Irrigation System	0.38	0.38	0.38	0.38	0.38	0.38
IRRIGATION TIMING WHEN to apply water?						
Net Irrigation Water Requirement (in): (From OSU Extension Miscellaneous Pub 8530, 1992)	0.00	0.04	1.42	3.98	3.35	1.18
Average Daily Crop Water Use (in/day):	0.00	0.00	0.05	0.13	0.11	0.04
Irrigation Frequency (days): Net Irrigation Application / Daily Crop Water Use	30	31	30	31	31	30
Irrigation System Set Time (hours):	7.5	7.5	7.5	7.5	7.5	7.5
Actual Net Irrigation Application (in): Gross Application * System Application Efficiency	1.85	1.85	1.85	1.85	1.85	1.85
Actual Irrigation Frequency (days): Actual Net Irrigation Application / Daily Crop Water Use	30	31	30	14	17	30
IRRIGATION SYSTEM CAPACITY						
System Application Efficiency (%): Water Required / Water Applied	65%	65%	65%	65%	65%	65%
Gross Irrigation Application (in): System Application Rate * System Set Time	2.85	2.85	2.85	2.85	2.85	2.85
Volume of Water per Irrigation (acre-in): Gross Irrigation Application * Irrigated Acres	644	644	644	644	644	644
Irrigation System Operation (hours/day):	16	16	16	16	16	16
Required System Flow Rate (gpm): (Equation 2)	608	588	608	1,264	1,064	608
Compare Required system flow rate with Measured flow noted on Irrigation Application Record						

MANURE UTILIZATION

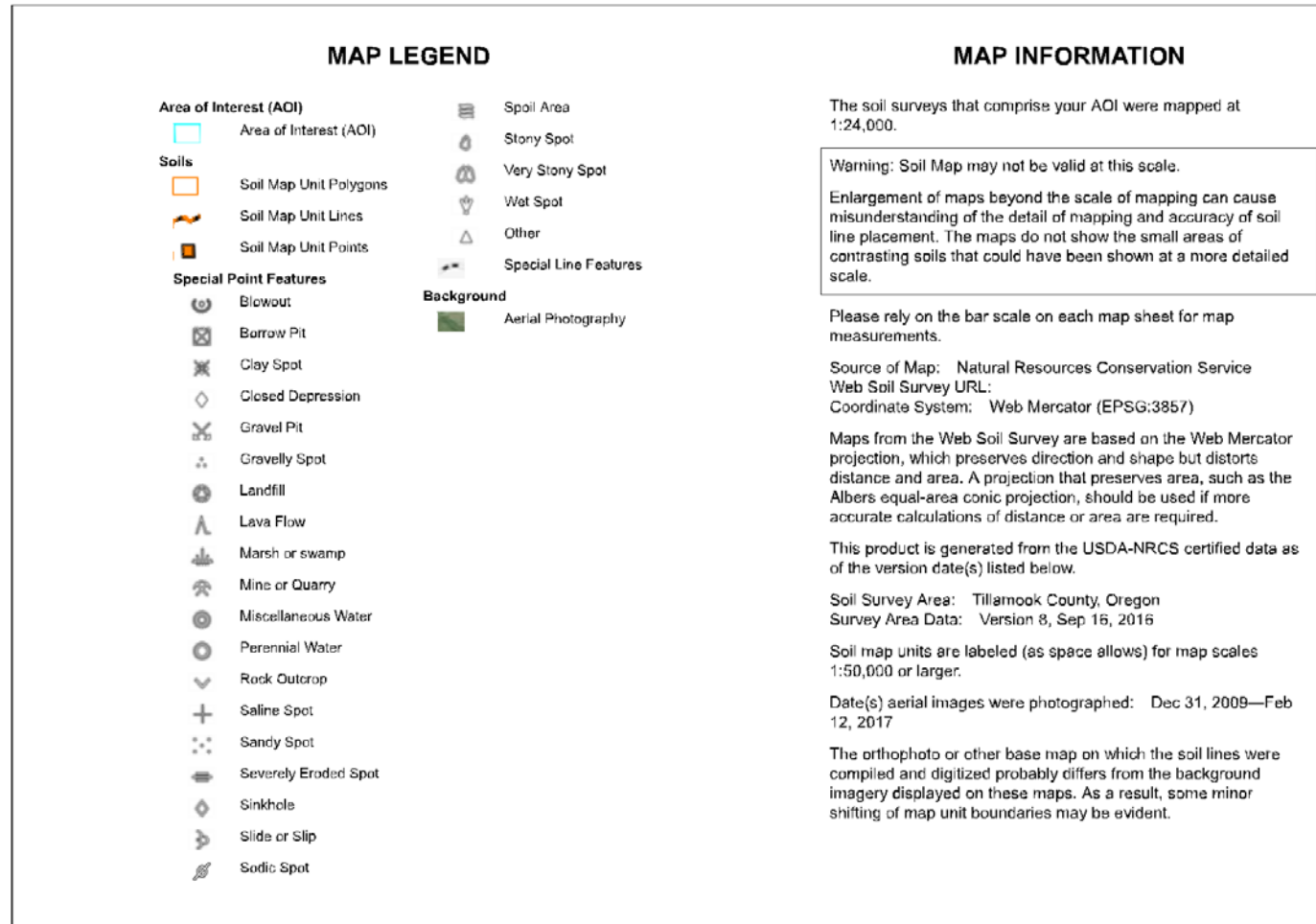
SOIL AND RISK ASSESSMENT

SOIL MAP(S)



SOIL AND RISK ASSESSMENT

Soil Map—Tillamook County, Oregon
(R&R Dairy)



SOIL AND RISK ASSESSMENT

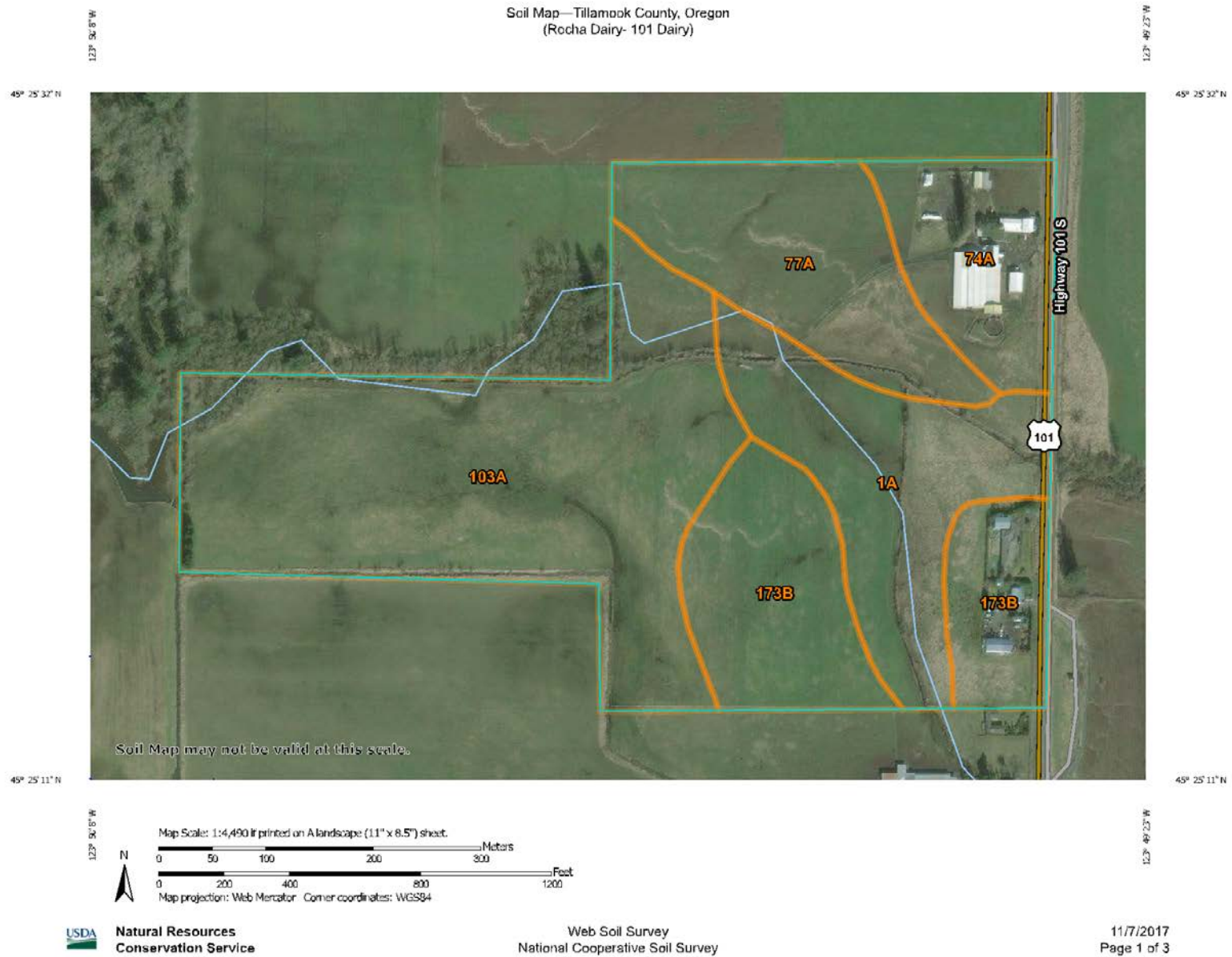
Soil Map—Tillamook County, Oregon

R&R Dairy

Map Unit Legend

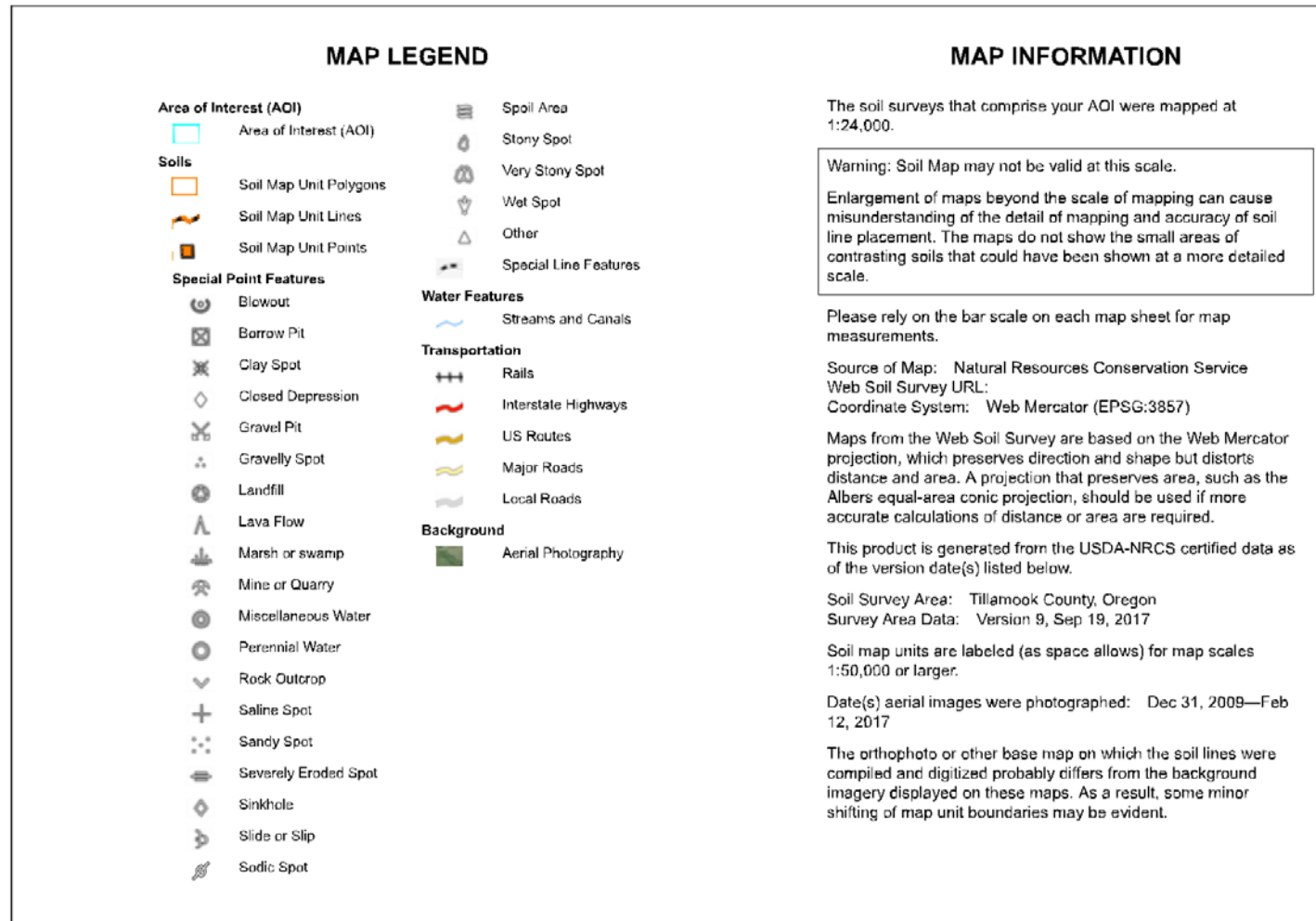
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3A	Coquille silt loam, 0 to 1 percent slopes	2.5	1.1%
73A	Nehalem silt loam, 0 to 3 percent slopes, frequently flooded	12.2	5.5%
95B	Urban land-Quillamook complex, 0 to 7 percent slopes	0.0	0.0%
103A	Coquille silt loam, 0 to 1 percent slopes, diked	59.1	25.8%
104A	Coquille-Brenner-Nehalem association, 0 to 3 percent slopes, protected	134.1	60.5%
W	Water	13.8	6.2%
Totals for Area of Interest		221.7	100.0%

SOIL AND RISK ASSESSMENT



SOIL AND RISK ASSESSMENT

Soil Map—Tillamook County, Oregon
(Rocha Dairy- 101 Dairy)



SOIL AND RISK ASSESSMENT

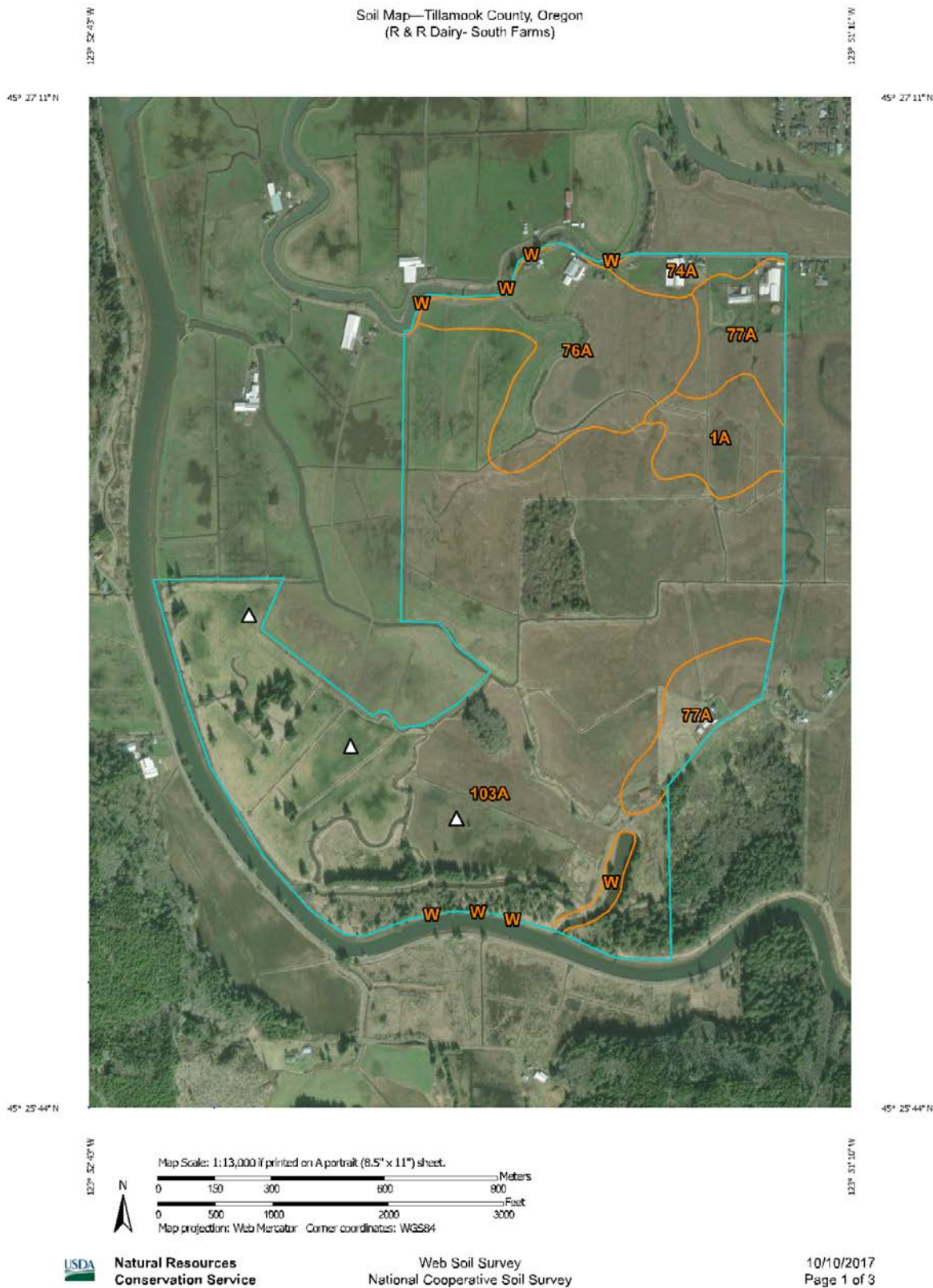
Soil Map—Tillamook County, Oregon

Rocha Dairy- 101 Dairy

Map Unit Legend

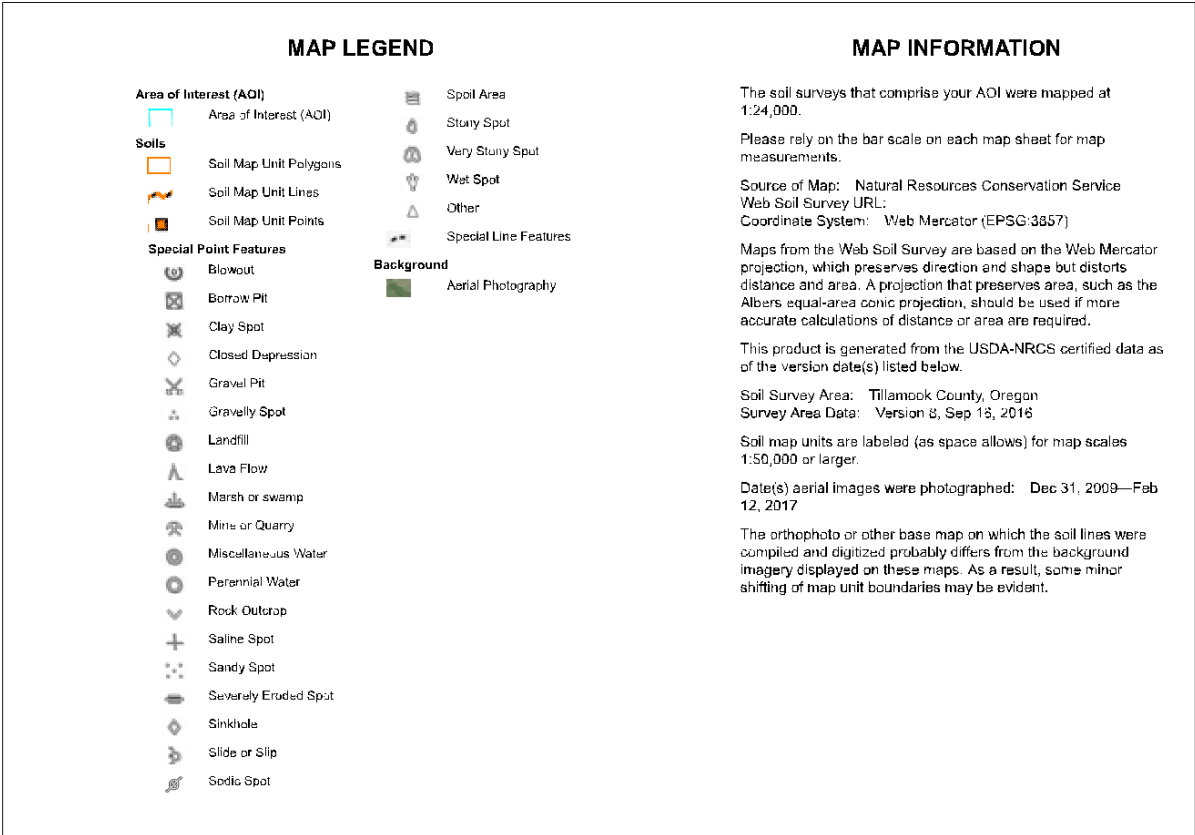
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1A	Brenner silt loam, 0 to 1 percent slopes	12.0	17.0%
74A	Nehalem silt loam, 0 to 3 percent slopes	6.9	9.8%
77A	Nestucca-Brenner silt loams, 0 to 3 percent slopes	10.6	14.9%
103A	Coquille silt loam, 0 to 1 percent slopes, diked	28.6	40.3%
173B	Tillamook-Ginger medial silt loams, 0 to 7 percent slopes	12.8	18.0%
Totals for Area of Interest		70.9	100.0%

SOIL AND RISK ASSESSMENT



SOIL AND RISK ASSESSMENT

Soil Map—Tillamook County, Oregon
(R & R Dairy- South Farms)



SOIL AND RISK ASSESSMENT

Soil Map—Tillamook County, Oregon

R & R Dairy- South Farms

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1A	Brenner silt loam, 0 to 1 percent slopes	20.0	4.2%
74A	Nehalem silt loam, 0 to 3 percent slopes	8.1	1.7%
76A	Nestucca silt loam, 0 to 3 percent slopes	55.7	11.7%
77A	Nestucca-Brenner silt loams, 0 to 3 percent slopes	38.1	8.0%
103A	Coquille silt loam, 0 to 1 percent slopes, diked	347.8	73.2%
W	Water	5.2	1.1%
Totals for Area of Interest		474.9	100.0%



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SOIL AND RISK ASSESSMENT

SOIL REPORTS

Map Unit Description—Tillamook County, Oregon

R&R Dairy

Map Unit Description

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

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

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

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

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



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R&R Dairy

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

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

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

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

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

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

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description

Tillamook County, Oregon

3A—Coquille silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 27z2

Elevation: 10 to 20 feet



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R&R Dairy

Mean annual precipitation: 80 to 100 inches
 Mean annual air temperature: 49 to 52 degrees F
 Frost-free period: 180 to 300 days
 Farmland classification: Not prime farmland

Map Unit Composition

Coquille and similar soils: 85 percent
 Minor components: 10 percent
 Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Coquille

Setting

Landform: Tidal marshes, estuaries
 Landform position (three-dimensional): Talf
 Down-slope shape: Linear
 Across-slope shape: Linear
 Parent material: Estuarine deposits

Typical profile

A - 0 to 6 inches: silt loam
 C1 - 6 to 14 inches: silt loam
 C2 - 14 to 34 inches: silty clay loam
 2Cg1 - 34 to 49 inches: silty clay loam
 2Cg2 - 49 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
 Depth to restrictive feature: More than 80 inches
 Natural drainage class: Very poorly drained
 Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.20 in/hr)
 Depth to water table: About 0 to 6 inches
 Frequency of flooding: Very frequent
 Frequency of ponding: Frequent
 Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
 Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
 Land capability classification (nonirrigated): 5w
 Hydrologic Soil Group: C/D
 Other vegetative classification: Very Poorly Drained
 (G004AY019OR), Sitka spruce/salmonberry-wet (903)
 Hydric soil rating: Yes

Minor Components

Brenner

Percent of map unit: 5 percent
 Landform: Flood plains
 Other vegetative classification: Poorly Drained (G004AY018OR)



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R&R Dairy

Hydric soil rating: Yes

Histosols

Percent of map unit: 5 percent

Landform: Tidal marshes

Hydric soil rating: Yes

73A—Nehalem silt loam, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 27z4

Elevation: 10 to 200 feet

Mean annual precipitation: 80 to 100 inches

Mean annual air temperature: 49 to 52 degrees F

Frost-free period: 160 to 260 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Nehalem, frequent flooding, and similar soils: 75 percent

Minor components: 8 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nehalem, Frequent Flooding

Setting

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam

A - 9 to 16 inches: silt loam

Bw - 16 to 48 inches: silt loam

BC - 48 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat):

Moderately high to high (0.20 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: Frequent

Frequency of ponding: None

Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R&R Dairy

Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B
Other vegetative classification: Well Drained <15% Slopes
 (G004AY014OR), Sitka spruce/salmonberry-wet (903)
Hydric soil rating: No

Minor Components

Brenner

Percent of map unit: 8 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G004AY018OR)
Hydric soil rating: Yes

95B—Urban land-Quillamook complex, 0 to 7 percent slopes

Map Unit Setting

National map unit symbol: 12gz4
Elevation: 20 to 200 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 160 to 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 55 percent
Quillamook and similar soils: 30 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Quillamook

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

Ap - 0 to 8 inches: medial silt loam
A1 - 8 to 17 inches: medial silt loam



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R&R Dairy

A2 - 17 to 28 inches: medial silt loam
Bw1 - 28 to 47 inches: medial silty clay loam
Bw2 - 47 to 60 inches: medial silty clay loam

Properties and qualities

Slope: 0 to 7 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat):
 Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Other vegetative classification: Well Drained <15% Slopes
 (G004AY014OR), Sitka spruce/salmonberry-wet (903)
Hydric soil rating: No

Minor Components

Hebo

Percent of map unit: 5 percent
Landform: Depressions on stream terraces
Other vegetative classification: Poorly Drained (G004AY018OR)
Hydric soil rating: Yes

103A—Coquille silt loam, 0 to 1 percent slopes, diked

Map Unit Setting

National map unit symbol: 27zc
Elevation: 10 to 20 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Coquille, diked, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Coquille, Diked

Setting

Landform: Tidal marshes
Landform position (three-dimensional): Talf
Down-slope shape: Linear



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R&R Dairy

Across-slope shape: Linear
Parent material: Estuarine deposits

Typical profile

A - 0 to 6 inches: silt loam
C1 - 6 to 14 inches: silt loam
C2 - 14 to 34 inches: silty clay loam
2Cg1 - 34 to 49 inches: silty clay loam
2Cg2 - 49 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Other vegetative classification: Very Poorly Drained
 (G004AY019OR), Sitka spruce/wet non-forest (991)
Hydric soil rating: Yes

Minor Components

Histosols

Percent of map unit: 10 percent
Landform: Tidal marshes
Hydric soil rating: Yes

Brenner

Percent of map unit: 5 percent
Landform: Flood plains
Other vegetative classification: Poorly Drained (G004AY018OR)
Hydric soil rating: Yes

104A—Coquille-Brenner-Nehalem association, 0 to 3 percent slopes, protected

Map Unit Setting

National map unit symbol: 2814
Elevation: 10 to 20 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 180 to 300 days



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R&R Dairy

Farmland classification: Farmland of statewide importance

Map Unit Composition

Coquille, protected, and similar soils: 50 percent

Brenner, protected, and similar soils: 30 percent

Nehalem, protected, and similar soils: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Coquille, Protected

Setting

Landform: Tidal marshes, estuaries

Landform position (three-dimensional): Dip

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Estuarine deposits

Typical profile

A - 0 to 6 inches: silt loam

C1 - 6 to 14 inches: silt loam

C2 - 14 to 34 inches: silty clay loam

2Cg1 - 34 to 49 inches: silty clay loam

2Cg2 - 49 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat):

Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 to 6 inches

Frequency of flooding: Rare

Frequency of ponding: Frequent

Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): 4w

Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: C/D

Other vegetative classification: Very Poorly Drained

(G004AY019OR), Sitka spruce/salmonberry-wet (903)

Hydric soil rating: Yes

Description of Brenner, Protected

Setting

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Concave

Across-slope shape: Concave



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R&R Dairy

Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 7 inches: silt loam
A - 7 to 12 inches: silty clay loam
Bw1 - 12 to 18 inches: silty clay loam
Bw2 - 18 to 26 inches: silty clay loam
BC - 26 to 40 inches: silty clay loam
Cg1 - 40 to 55 inches: silty clay
Cg2 - 55 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 0 to 7 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Other vegetative classification: Poorly Drained (G004AY018OR),
 Sitka spruce/salmonberry-wet (903)
Hydric soil rating: Yes

Description of Nehalem, Protected

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
A - 9 to 16 inches: silt loam
Bw - 16 to 48 inches: silt loam
BC - 48 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat):
 Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R&R Dairy

Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 2c
Land capability classification (nonirrigated): 2c
Hydrologic Soil Group: B
Other vegetative classification: Well Drained <15% Slopes
 (G004AY014OR), Sitka spruce/salmonberry-wet (903)
Hydric soil rating: No

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Data Source Information

Soil Survey Area: Tillamook County, Oregon
 Survey Area Data: Version 8, Sep 16, 2016



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National Cooperative Soil Survey

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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R & R Dairy- South Farms

Map Unit Description

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

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

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

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

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

SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R & R Dairy- South Farms

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

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

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

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

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

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

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description

Tillamook County, Oregon

1A—Brenner silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 27z0

Elevation: 10 to 200 feet



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R & R Dairy- South Farms

Mean annual precipitation: 80 to 100 inches
 Mean annual air temperature: 49 to 52 degrees F
 Frost-free period: 160 to 300 days
 Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Brenner

Setting

Landform: Flood plains
 Landform position (three-dimensional): Tread
 Down-slope shape: Linear
 Across-slope shape: Linear
 Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 7 inches: silt loam
 A - 7 to 12 inches: silty clay loam
 Bw1 - 12 to 18 inches: silty clay loam
 Bw2 - 18 to 26 inches: silty clay loam
 BC - 26 to 40 inches: silty clay loam
 Cg1 - 40 to 55 inches: silty clay
 Cg2 - 55 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent
 Depth to restrictive feature: More than 80 inches
 Natural drainage class: Poorly drained
 Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.57 in/hr)
 Depth to water table: About 0 to 7 inches
 Frequency of flooding: Frequent
 Frequency of ponding: Frequent
 Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
 Land capability classification (nonirrigated): 4w
 Hydrologic Soil Group: B/D
 Other vegetative classification: Poorly Drained (G004AY018OR),
 Sitka spruce/salmonberry-wet (903)
 Hydric soil rating: Yes

74A—Nehalem silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 27z5
 Elevation: 10 to 200 feet



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R & R Dairy- South Farms

Mean annual precipitation: 80 to 100 inches
 Mean annual air temperature: 49 to 52 degrees F
 Frost-free period: 160 to 260 days
 Farmland classification: Farmland of statewide importance

Map Unit Composition

Nehalem, occasional flooding, and similar soils: 80 percent
 Minor components: 3 percent
 Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nehalem, Occasional Flooding

Setting

Landform: Flood plains
 Landform position (three-dimensional): Tread
 Down-slope shape: Linear
 Across-slope shape: Linear
 Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
 A - 9 to 16 inches: silt loam
 Bw - 16 to 48 inches: silt loam
 BC - 48 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
 Depth to restrictive feature: More than 80 inches
 Natural drainage class: Well drained
 Capacity of the most limiting layer to transmit water (Ksat):
 Moderately high to high (0.20 to 1.98 in/hr)
 Depth to water table: More than 80 inches
 Frequency of flooding: Occasional
 Frequency of ponding: None
 Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 2w
 Land capability classification (nonirrigated): 2w
 Hydrologic Soil Group: B
 Other vegetative classification: Well Drained <15% Slopes
 (G004AY014OR), Sitka spruce/salmonberry-wet (903)
 Hydric soil rating: No

Minor Components

Brenner

Percent of map unit: 3 percent
 Landform: Depressions on flood plains
 Other vegetative classification: Poorly Drained (G004AY018OR)
 Hydric soil rating: Yes

SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R & R Dairy- South Farms

76A—Nestucca silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 27z7
 Elevation: 10 to 200 feet
 Mean annual precipitation: 80 to 100 inches
 Mean annual air temperature: 49 to 52 degrees F
 Frost-free period: 160 to 260 days
 Farmland classification: Farmland of statewide importance

Map Unit Composition

Nestucca and similar soils: 90 percent
 Minor components: 5 percent
 Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nestucca

Setting

Landform: Flood plains
 Landform position (three-dimensional): Tread
 Down-slope shape: Linear
 Across-slope shape: Linear
 Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 6 inches: silt loam
 A - 6 to 14 inches: silt loam
 Bw - 14 to 41 inches: silty clay loam
 C - 41 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
 Depth to restrictive feature: More than 80 inches
 Natural drainage class: Somewhat poorly drained
 Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.57 in/hr)
 Depth to water table: About 14 to 41 inches
 Frequency of flooding: Frequent
 Frequency of ponding: None
 Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
 Land capability classification (nonirrigated): 3w
 Hydrologic Soil Group: B/D
 Other vegetative classification: Somewhat Poorly Drained
 (G004AY017OR), Sitka spruce/salmonberry-wet (903)
 Hydric soil rating: No



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R & R Dairy- South Farms

Minor Components

Brenner

Percent of map unit: 5 percent
Landform: Depressions on flood plains
Other vegetative classification: Poorly Drained (G004AY018OR)
Hydric soil rating: Yes

77A—Nestucca-Brenner silt loams, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 27wj
Elevation: 10 to 200 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 160 to 260 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Nestucca and similar soils: 55 percent
Brenner and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nestucca

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 6 inches: silt loam
A - 6 to 14 inches: silt loam
Bw - 14 to 41 inches: silty clay loam
C - 41 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 14 to 41 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: High (about 11.6 inches)



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R & R Dairy- South Farms

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: B/D

Other vegetative classification: Somewhat Poorly Drained
(G004AY017OR), Sitka spruce/salmonberry-wet (903)

Hydric soil rating: No

Description of Brenner

Setting

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Concave

Across-slope shape: Linear

Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 7 inches: silt loam

A - 7 to 12 inches: silty clay loam

Bw1 - 12 to 18 inches: silty clay loam

Bw2 - 18 to 26 inches: silty clay loam

BC - 26 to 40 inches: silty clay loam

Cg1 - 40 to 55 inches: silty clay

Cg2 - 55 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat):

Moderately low to moderately high (0.06 to 0.57 in/hr)

Depth to water table: About 0 to 7 inches

Frequency of flooding: Frequent

Frequency of ponding: Frequent

Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: B/D

Other vegetative classification: Poorly Drained (G004AY018OR),
Sitka spruce/salmonberry-wet (903)

Hydric soil rating: Yes

103A—Coquille silt loam, 0 to 1 percent slopes, diked

Map Unit Setting

National map unit symbol: 27zc

Elevation: 10 to 20 feet

Mean annual precipitation: 80 to 100 inches



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

R & R Dairy- South Farms

Mean annual air temperature: 49 to 52 degrees F
 Frost-free period: 180 to 300 days
 Farmland classification: Farmland of statewide importance

Map Unit Composition

Coquille, diked, and similar soils: 85 percent
 Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Coquille, Diked

Setting

Landform: Tidal marshes
 Landform position (three-dimensional): Talf
 Down-slope shape: Linear
 Across-slope shape: Linear
 Parent material: Estuarine deposits

Typical profile

A - 0 to 6 inches: silt loam
 C1 - 6 to 14 inches: silt loam
 C2 - 14 to 34 inches: silty clay loam
 2Cg1 - 34 to 49 inches: silty clay loam
 2Cg2 - 49 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
 Depth to restrictive feature: More than 80 inches
 Natural drainage class: Very poorly drained
 Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.20 in/hr)
 Depth to water table: About 0 to 6 inches
 Frequency of flooding: Frequent
 Frequency of ponding: Frequent
 Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
 Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
 Land capability classification (nonirrigated): 4w
 Hydrologic Soil Group: C/D
 Other vegetative classification: Very Poorly Drained
 (G004AY019OR), Sitka spruce/wet non-forest (991)
 Hydric soil rating: Yes

Minor Components

Histosols

Percent of map unit: 10 percent
 Landform: Tidal marshes
 Hydric soil rating: Yes



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SOIL AND RISK ASSESSMENT

Map Unit Description---Tillamook County, Oregon

R & R Dairy- South Farms

Brenner*Percent of map unit:* 5 percent*Landform:* Flood plains*Other vegetative classification:* Poorly Drained (G004AY018OR)*Hydric soil rating:* Yes**W—Water****Map Unit Composition***Water:* 100 percent*Estimates are based on observations, descriptions, and transects of the mapunit.***Data Source Information**

Soil Survey Area: Tillamook County, Oregon

Survey Area Data: Version 8, Sep 16, 2016

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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

Rocha Dairy- 101 Dairy

Map Unit Description

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

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

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

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

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

SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

Rocha Dairy- 101 Dairy

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

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

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

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

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

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

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description

Tillamook County, Oregon

1A—Brenner silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 27z0

Elevation: 10 to 200 feet



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

Rocha Dairy- 101 Dairy

Mean annual precipitation: 80 to 100 inches
 Mean annual air temperature: 49 to 52 degrees F
 Frost-free period: 160 to 300 days
 Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Brenner

Setting

Landform: Flood plains
 Landform position (three-dimensional): Tread
 Down-slope shape: Linear
 Across-slope shape: Linear
 Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 7 inches: silt loam
 A - 7 to 12 inches: silty clay loam
 Bw1 - 12 to 18 inches: silty clay loam
 Bw2 - 18 to 26 inches: silty clay loam
 BC - 26 to 40 inches: silty clay loam
 Cg1 - 40 to 55 inches: silty clay
 Cg2 - 55 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent
 Depth to restrictive feature: More than 80 inches
 Natural drainage class: Poorly drained
 Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.57 in/hr)
 Depth to water table: About 0 to 7 inches
 Frequency of flooding: Frequent
 Frequency of ponding: Frequent
 Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
 Land capability classification (nonirrigated): 4w
 Hydrologic Soil Group: B/D
 Other vegetative classification: Poorly Drained (G004AY018OR),
 Sitka spruce/salmonberry-wet (903)
 Hydric soil rating: Yes

74A—Nehalem silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 27z5
 Elevation: 10 to 200 feet



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

Rocha Dairy- 101 Dairy

Mean annual precipitation: 80 to 100 inches
 Mean annual air temperature: 49 to 52 degrees F
 Frost-free period: 160 to 260 days
 Farmland classification: Farmland of statewide importance

Map Unit Composition

Nehalem, occasional flooding, and similar soils: 80 percent
 Minor components: 3 percent
 Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nehalem, Occasional Flooding

Setting

Landform: Flood plains
 Landform position (three-dimensional): Tread
 Down-slope shape: Linear
 Across-slope shape: Linear
 Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
 A - 9 to 16 inches: silt loam
 Bw - 16 to 48 inches: silt loam
 BC - 48 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
 Depth to restrictive feature: More than 80 inches
 Natural drainage class: Well drained
 Capacity of the most limiting layer to transmit water (Ksat):
 Moderately high to high (0.20 to 1.98 in/hr)
 Depth to water table: More than 80 inches
 Frequency of flooding: Occasional
 Frequency of ponding: None
 Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 2w
 Land capability classification (nonirrigated): 2w
 Hydrologic Soil Group: B
 Other vegetative classification: Well Drained <15% Slopes
 (G004AY014OR), Sitka spruce/salmonberry-wet (903)
 Hydric soil rating: No

Minor Components

Brenner

Percent of map unit: 3 percent
 Landform: Depressions on flood plains
 Other vegetative classification: Poorly Drained (G004AY018OR)
 Hydric soil rating: Yes



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

Rocha Dairy- 101 Dairy

77A—Nestucca-Brenner silt loams, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 27wj
 Elevation: 10 to 200 feet
 Mean annual precipitation: 80 to 100 inches
 Mean annual air temperature: 49 to 52 degrees F
 Frost-free period: 160 to 260 days
 Farmland classification: Farmland of statewide importance

Map Unit Composition

Nestucca and similar soils: 55 percent
 Brenner and similar soils: 40 percent
 Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nestucca

Setting

Landform: Flood plains
 Landform position (three-dimensional): Tread
 Down-slope shape: Linear
 Across-slope shape: Linear
 Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 6 inches: silt loam
 A - 6 to 14 inches: silt loam
 Bw - 14 to 41 inches: silty clay loam
 C - 41 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
 Depth to restrictive feature: More than 80 inches
 Natural drainage class: Somewhat poorly drained
 Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.57 in/hr)
 Depth to water table: About 14 to 41 inches
 Frequency of flooding: Frequent
 Frequency of ponding: None
 Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w
 Land capability classification (nonirrigated): 3w
 Hydrologic Soil Group: B/D
 Other vegetative classification: Somewhat Poorly Drained
 (G004AY017OR), Sitka spruce/salmonberry-wet (903)
 Hydric soil rating: No

SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

Rocha Dairy- 101 Dairy

Description of Brenner

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 7 inches: silt loam
A - 7 to 12 inches: silty clay loam
Bw1 - 12 to 18 inches: silty clay loam
Bw2 - 18 to 26 inches: silty clay loam
BC - 26 to 40 inches: silty clay loam
Cg1 - 40 to 55 inches: silty clay
Cg2 - 55 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: About 0 to 7 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Other vegetative classification: Poorly Drained (G004AY018OR),
 Sitka spruce/salmonberry-wet (903)
Hydric soil rating: Yes

103A—Coquille silt loam, 0 to 1 percent slopes, diked

Map Unit Setting

National map unit symbol: 27zc
Elevation: 10 to 20 feet
Mean annual precipitation: 80 to 100 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 180 to 300 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Coquille, diked, and similar soils: 85 percent
Minor components: 15 percent



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

Rocha Dairy- 101 Dairy

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Coquille, Diked

Setting

Landform: Tidal marshes
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Estuarine deposits

Typical profile

A - 0 to 6 inches: silt loam
C1 - 6 to 14 inches: silt loam
C2 - 14 to 34 inches: silty clay loam
2Cg1 - 34 to 49 inches: silty clay loam
2Cg2 - 49 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Other vegetative classification: Very Poorly Drained
 (G004AY019OR), Sitka spruce/wet non-forest (991)
Hydric soil rating: Yes

Minor Components

Histosols

Percent of map unit: 10 percent
Landform: Tidal marshes
Hydric soil rating: Yes

Brenner

Percent of map unit: 5 percent
Landform: Flood plains
Other vegetative classification: Poorly Drained (G004AY018OR)
Hydric soil rating: Yes



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SOIL AND RISK ASSESSMENT

Map Unit Description—Tillamook County, Oregon

Rocha Dairy- 101 Dairy

173B—Tillamook-Ginger medial silt loams, 0 to 7 percent slopes

Map Unit Setting

National map unit symbol: 27zg
 Elevation: 20 to 200 feet
 Mean annual precipitation: 80 to 100 inches
 Mean annual air temperature: 49 to 52 degrees F
 Frost-free period: 160 to 260 days
 Farmland classification: Farmland of statewide importance

Map Unit Composition

Tillamook and similar soils: 45 percent
 Ginger and similar soils: 40 percent
 Minor components: 5 percent
 Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tillamook

Setting

Landform: Stream terraces
 Landform position (three-dimensional): Tread
 Down-slope shape: Linear
 Across-slope shape: Linear
 Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 8 inches: medial silt loam
 A1 - 8 to 20 inches: medial silt loam
 A2 - 20 to 25 inches: medial silt loam
 2Bw1 - 25 to 35 inches: silty clay loam
 2Bw2 - 35 to 52 inches: silty clay loam
 2BC - 52 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 7 percent
 Depth to restrictive feature: More than 80 inches
 Natural drainage class: Moderately well drained
 Capacity of the most limiting layer to transmit water (Ksat):
 Moderately high (0.20 to 0.57 in/hr)
 Depth to water table: About 25 to 35 inches
 Frequency of flooding: None
 Frequency of ponding: None
 Available water storage in profile: Very high (about 17.0 inches)

Interpretive groups

Land capability classification (irrigated): 3e
 Land capability classification (nonirrigated): 2e
 Hydrologic Soil Group: C



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SOIL AND RISK ASSESSMENT

Map Unit Description---Tillamook County, Oregon

Rocha Dairy- 101 Dairy

Other vegetative classification: Moderately Well Drained <15%
Slopes (G004AY016OR), Sitka spruce/salmonberry-wet (903)
Hydric soil rating: No

Description of Ginger

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Alluvium derived from igneous and sedimentary rock

Typical profile

Ap - 0 to 8 inches: medial silt loam
A - 8 to 17 inches: medial silt loam
2BA - 17 to 20 inches: silty clay loam
2Bg1 - 20 to 28 inches: silty clay
2Bg2 - 28 to 38 inches: silty clay
2Bg3 - 38 to 52 inches: silty clay
3C - 52 to 60 inches: extremely gravelly sandy loam

Properties and qualities

Slope: 0 to 7 percent
Depth to restrictive feature: 40 to 60 inches to strongly contrasting textural stratification
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat):
 Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 17 to 20 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 12.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Other vegetative classification: Somewhat Poorly Drained
 (G004AY017OR), Sitka spruce/salmonberry-wet (903)
Hydric soil rating: No

Minor Components

Hebo

Percent of map unit: 5 percent
Landform: Depressions on stream terraces
Other vegetative classification: Poorly Drained (G004AY018OR)

SOIL AND RISK ASSESSMENT

Map Unit Description---Tillamook County, Oregon

Rocha Dairy- 101 Dairy

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Tillamook County, Oregon
Survey Area Data: Version 9, Sep 19, 2017

SOIL AND RISK ASSESSMENT

PREDICTED SOIL EROSION



RUSLE2 Worksheet Erosion Calculation Record

Info:

<i>Owner name</i>	<i>Tract #</i>	<i>Field name</i>
R&R Dairy		Highway, Rudy Side, Back, Middle, Marolf

<i>Location</i>	<i>Soil</i>	<i>T value, t/ac/yr</i>	<i>Slope length (horiz), ft</i>	<i>Avg. slope steepness, %</i>
Oregon\Tillamook County\OR_Tillamook_R80-90	104A Coquille-Brenner-Nehalem association, 0 to 3 percent slopes, protected\Coquille silt loam 50%	5.0	900	3.0

Alternatives:

<i>Description</i>	<i>Management</i>	<i>Contouring</i>	<i>Strips / barriers</i>	<i>Diversion/terrace, sediment basin</i>	<i>Cons. plan. soil loss</i>	<i>Soil conditioning index (SCI)</i>	<i>STIR value</i>	<i>Wind & irrigation- induced erosion for SCI, t/ac/yr</i>	<i>Equiv. diesel use, gal/ac</i>	<i>Energy use, BTU/ac</i>	<i>Fuel cost, US\$/ac</i>
Erosion on Grass Haylage	c.Other Local Mgt Records\Grass Haylage, yr1 fall plant; manure appl., Z71	a. rows up-and- down hill	(none)	(none)	1.5	0.90	94.9	0	15	2000000	43.8
Erosion on Corn Silage	a.Single Year/Single Crop Templates\Corn, silage; clean till, spr. mb plow, Z71	a. rows up-and- down hill	(none)	(none)	2.1	0.67	171	0	6.4	890000	19.3

SOIL AND RISK ASSESSMENT

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

SOIL AND RISK ASSESSMENT



RUSLE2 Worksheet Erosion Calculation Record

Info:

<i>Owner name</i>	<i>Tract #</i>	<i>Field name</i>
R&R Dairy		Aufdermaurer 1, Aufdermaurer 2, Vallinga Front, Vallinga Middle, Vallinga Rear, Ryan C, Forest, Canary Grass, M00-09, S03

<i>Location</i>	<i>Soil</i>	<i>T value, t/ac/yr</i>	<i>Slope length (horiz), ft</i>	<i>Avg. slope steepness, %</i>
Oregon\Tillamook County\OR_Tillamook_R80-90	103A Coquille silt loam, 0 to 1 percent slopes, diked\Coquille silt loam 85%	5.0	900	1.0

Alternatives:

<i>Description</i>	<i>Management</i>	<i>Contouring</i>	<i>Strips / barriers</i>	<i>Diversion/terrace, sediment basin</i>	<i>Cons. plan. soil loss</i>	<i>Soil conditioning index (SCI)</i>	<i>STIR value</i>	<i>Wind & irrigation-induced erosion for SCI, t/ac/yr</i>	<i>Equiv. diesel use, gal/ac</i>	<i>Energy use, BTU/ac</i>	<i>Fuel cost, US\$/ac</i>
Erosion on Grass Haylage	c.Other Local Mgt Records\Grass Haylage, yr1 fall plant; manure appl., Z71	a. rows up-and-down hill	(none)	(none)	0.49	0.98	94.9	0	15	2000000	43.8
Erosion on Corn Silage	a.Single Year/Single Crop Templates\Corn, silage; clean till, spr. mb plow, Z71	a. rows up-and-down hill	(none)	(none)	0.72	0.78	171	0	6.4	890000	19.3

SOIL AND RISK ASSESSMENT

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

SOIL AND RISK ASSESSMENT



RUSLE2 Worksheet Erosion Calculation Record

Info:

Owner name	Tract #	Field name
R&R Dairy		Goat, Ryan A, Ryan B

<i>Location</i>	<i>Soil</i>	<i>T value, t/ac/yr</i>	<i>Slope length (horiz), ft</i>	<i>Avg. slope steepness, %</i>
Oregon\Tillamook County\OR_Tillamook_R80-90	76A Nestucca silt loam, 0 to 3 percent slopes\Nestucca silt loam 90%	5.0	900	3.0

Alternatives:

<i>Description</i>	<i>Management</i>	<i>Contouring</i>	<i>Strips / barriers</i>	<i>Diversion/terrace, sediment basin</i>	<i>Cons. plan. soil loss</i>	<i>Soil conditioning index (SCI)</i>	<i>STIR value</i>	<i>Wind & irrigation- induced erosion for SCI, t/ac/yr</i>	<i>Equiv. diesel use, gal/ac</i>	<i>Energy use, BTU/ac</i>	<i>Fuel cost, US\$/ac</i>
Erosion on Grass Haylage	c.Other Local Mgt Records\Grass Haylage, yr1 fall plant; manure appl., Z71	a. rows up-and- down hill	(none)	(none)	1.2	0.93	94.9	0	15	2000000	43.8
Erosion on Corn Silage	a.Single Year/Single Crop Templates\Corn, silage; clean till, spr. mb plow, Z71	a. rows up-and- down hill	(none)	(none)	1.6	0.71	171	0	6.4	890000	19.3

SOIL AND RISK ASSESSMENT

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

SOIL AND RISK ASSESSMENT



RUSLE2 Worksheet Erosion Calculation Record

Info:

<i>Owner name</i>	<i>Tract #</i>	<i>Field name</i>
R&R Dairy		Ryan, S00

<i>Location</i>	<i>Soil</i>	<i>T value, t/ac/yr</i>	<i>Slope length (horiz), ft</i>	<i>Avg. slope steepness, %</i>
Oregon\Tillamook County\OR_Tillamook_R80-90	74A Nehalem silt loam, 0 to 3 percent slopes\Nehalem silt loam 80%	5.0	900	3.0

Alternatives:

<i>Description</i>	<i>Management</i>	<i>Contouring</i>	<i>Strips / barriers</i>	<i>Diversion/terrace, sediment basin</i>	<i>Cons. plan. soil loss</i>	<i>Soil conditioning index (SCI)</i>	<i>STIR value</i>	<i>Wind & irrigation- induced erosion for SCI, t/ac/yr</i>	<i>Equiv. diesel use, gal/ac</i>	<i>Energy use, BTU/ac</i>	<i>Fuel cost, US\$/ac</i>
Erosion on Grass Haylage	c.Other Local Mgt Records\Grass Haylage, yr1 fall plant; manure appl., Z71	a. rows up-and- down hill	(none)	(none)	1.5	0.90	94.9	0	15	2000000	43.8
Erosion on Corn Silage	a.Single Year/Single Crop Templates\Corn, silage; clean till, spr. mb plow, Z71	a. rows up-and- down hill	(none)	(none)	2.1	0.67	171	0	6.4	890000	19.3

SOIL AND RISK ASSESSMENT

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

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SOIL AND RISK ASSESSMENT



RUSLE2 Worksheet Erosion Calculation Record

Info:

<i>Owner name</i>	<i>Tract #</i>	<i>Field name</i>
R&R Dairy		Flat Barn 1, Flat Barn 2, S01

<i>Location</i>	<i>Soil</i>	<i>T value, t/ac/yr</i>	<i>Slope length (horiz), ft</i>	<i>Avg. slope steepness, %</i>
Oregon\Tillamook County\OR_Tillamook_R80-90	77A Nestucca-Brenner silt loams, 0 to 3 percent slopes\Nestucca silt loam 55%	5.0	900	3.0

Alternatives:

<i>Description</i>	<i>Management</i>	<i>Contouring</i>	<i>Strips / barriers</i>	<i>Diversion/terrace, sediment basin</i>	<i>Cons. plan. soil loss</i>	<i>Soil conditioning index (SCI)</i>	<i>STIR value</i>	<i>Wind & irrigation- induced erosion for SCI, t/ac/yr</i>	<i>Equiv. diesel use, gal/ac</i>	<i>Energy use, BTU/ac</i>	<i>Fuel cost, US\$/ac</i>
Erosion on Grass Haylage	c.Other Local Mgt Records\Grass Haylage, yr1 fall plant; manure appl., Z71	a. rows up-and- down hill	(none)	(none)	1.2	0.93	94.9	0	15	2000000	43.8
Erosion on Corn Silage	a.Single Year/Single Crop Templates\Corn, silage; clean till, spr. mb plow, Z71	a. rows up-and- down hill	(none)	(none)	1.6	0.71	171	0	6.4	890000	19.3

SOIL AND RISK ASSESSMENT

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

SOIL AND RISK ASSESSMENT



RUSLE2 Worksheet Erosion Calculation Record

Info:

Owner name	Tract #	Field name
R&R Dairy		Flat Barn, S02

Location	Soil	T value, t/ac/yr	Slope length (horiz), ft	Avg. slope steepness, %
Oregon\Tillamook County\OR_Tillamook_R80-90	1A Brenner silt loam, 0 to 1 percent slopes\Brenner silt loam 85%	5.0	900	1.0

Alternatives:

Description	Management	Contouring	Strips / barriers	Diversion/terrace, sediment basin	Cons. plan. soil loss	Soil conditioning index (SCI)	STIR value	Wind & irrigation- induced erosion for SCI, t/ac/yr	Equiv. diesel use, gal/ac	Energy use, BTU/ac	Fuel cost, US\$/ac
Erosion on Grass Haylage	c.Other Local Mgt Records\Grass Haylage, yr1 fall plant; manure appl., Z71	a. rows up-and- down hill	(none)	(none)	0.50	0.98	94.9	0	15	2000000	43.8
Erosion on Corn Silage	a.Single Year/Single Crop Templates\Corn, silage; clean till, spr. mb plow, Z71	a. rows up-and- down hill	(none)	(none)	0.72	0.78	171	0	6.4	890000	19.3

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

SOIL AND RISK ASSESSMENT

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

SOIL AND RISK ASSESSMENT

OREGON PHOSPHORUS INDEX

FIELD SUMMARY & WESTERN OREGON P INDEX

Enter data in gray cells and select best choice from drop down menus.
Cells with blue font are completed automatically.

Grower:	R&R Dairy
Application Plan by:	Tom Thomson, NW Agricultural Consulting
Date:	November 22, 2017

Field Acres	Highway 7.6	Rudy Side 21.6	Back 19.1	Middle 23.2	Marolf 32.3	Aufdermaurer 1 29.1	Aufdermaurer 2 34.3	Goat 4.9
Soil	104A, Coquille-Brenner-H	104A, Coquille-Brenner-H	104A, Coquille-Brenner-H	104A, Coquille-Brenner-H	104A, Coquille-Brenner-H	103A, Coquille	103A, Coquille	76A, Nestucca
Soil test date	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016
Bray 1 P (ppm)	23	8	23	8	21	59	59	23
Acetate K (ppm)	1,200	836	1,200	836	910	1,008	1,008	1,200
pH	5.2	5.3	5.2	5.3	4.9	5.7	5.7	5.2
SMP	5.6	5.5	5.6	5.5	5.4	5.8	5.8	5.6
TRANSPORT FACTORS								
Sheet & rill erosion (tons/ac-yr)	4-6	4-6	4-6	4-6	4-6	1-3	1-3	1-3
Irrigation erosion (tons/ac-yr)	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff
Runoff Class	medium	medium	medium	medium	medium	low	low	medium
Flooding Frequency	frequent	frequent	frequent	frequent	frequent	rare	rare	frequent
Distance to stream (ft)	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft
Buffers	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.
Drainage	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles
SOURCE FACTORS								
Commercial P2O5 rate (lbs/ac)	0	0	0	0	0	0	0	0
Commercial P2O5 method	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Commercial P2O5 timing	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Organic P2O5 rate (lbs/ac)	178	178	178	178	178	178	178	178
Organic P2O5 method	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days
Organic P2O5 timing	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible
SCORE								
P RUNOFF RISK RATING	20.3 Low	20.3 Low	20.3 Low	20.3 Low	20.3 Low	17.5 Low	17.5 Low	18.8 Low

COMMENTS

SOIL AND RISK ASSESSMENT

FIELD SUMMARY & WESTERN OREGON P INDEX

Enter data in gray cells and select best choice from drop down menus.
Cells with blue font are completed automatically.

Grower:

Application Plan by:

Date:

R&R Dairy
Tom Thomson, NW Agricultural Consulting
November 22, 2017

Field Acres	Vallinga Front	Vallinga Middle	Vallinga Rear	Ryan	Ryan A	Ryan B	Ryan C	Flat Barn 1
	34.4	27.9	10.5	1.2	13.9	15.0	20.9	4.8
Soil	103A, Coquille	103A, Coquille	103A, Coquille	74A, Nehalem	76A, Nestucca	76A, Nestucca	103A, Coquille	77A, Nestucca
Soil test date	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016
Bray 1 P (ppm)	14	4	14	21	8	8	8	7
Acetate K (ppm)	962	637	962	910	567	567	567	844
pH	4.5	4.6	4.5	4.9	4.8	4.8	4.8	4.7
SMP	4.7	4.8	4.7	5.4	5	5	5	5.1
TRANSPORT FACTORS								
Sheet & rill erosion (tons/ac-yr)	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3
Irrigation erosion (tons/ac-yr)	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff
Runoff Class	low	low	low	low	medium	medium	low	medium
Flooding Frequency	rare	rare	rare	occasional	frequent	frequent	rare	frequent
Distance to stream (ft)	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft
Buffers	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.
Drainage	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles
SOURCE FACTORS								
Commercial P2O5 rate (lbs/ac)	0	0	0	0	0	0	0	0
Commercial P2O5 method	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Commercial P2O5 timing	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Organic P2O5 rate (lbs/ac)	178	178	178	178	178	178	178	178
Organic P2O5 method	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days
Organic P2O5 timing	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible
SCORE								
P RUNOFF RISK RATING	15.6	15.6	15.6	16.3	18.8	18.8	15.6	18.8
	Low	Low	Low	Low	Low	Low	Low	Low

COMMENTS

SOIL AND RISK ASSESSMENT

FIELD SUMMARY & WESTERN OREGON P INDEX

Enter data in gray cells and select best choice from drop down menus.
Cells with blue font are completed automatically.

Grower:

Application Plan by:

Date:

R&R Dairy

Tom Thomson, NW Agricultural Consulting

November 22, 2017

Field Acres	Flat Barn 2	Flat Barn	Forest	Canary Grass	M00	M01	M02	M03
	1.0	20.5	23.9	7.7	5.5	15.3	25.9	26.2
Soil	77A, Brenner	1A, Brenner	103A, Coquille	103A, Coquille	103A, Coquille	103A, Coquille	103A, Coquille	103A, Coquille
Soil test date	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016
Bray 1 P (ppm)	7	7	14	4	14	4	14	4
Acetate K (ppm)	844	844	962	637	962	637	962	637
pH	4.7	4.7	4.5	4.6	4.5	4.6	4.5	4.6
SMP	5.1	5.1	4.7	4.8	4.7	4.8	4.7	4.8
TRANSPORT FACTORS								
Sheet & rill erosion (tons/ac-yr)	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3
Irrigation erosion (tons/ac-yr)	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff
Runoff Class	medium	medium	low	low	low	low	low	low
Flooding Frequency	frequent	frequent	rare	rare	rare	rare	rare	rare
Distance to stream (ft)	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft
Buffers	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.
Drainage	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles
SOURCE FACTORS								
Commercial P2O5 rate (lbs/ac)	0	0	0	0	0	0	0	0
Commercial P2O5 method	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Commercial P2O5 timing	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Organic P2O5 rate (lbs/ac)	178	178	178	178	178	178	178	178
Organic P2O5 method	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days
Organic P2O5 timing	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible
SCORE								
P RUNOFF RISK RATING	18.8	18.8	15.6	15.6	15.6	15.6	15.6	15.6
	Low	Low	Low	Low	Low	Low	Low	Low

COMMENTS

SOIL AND RISK ASSESSMENT

FIELD SUMMARY & WESTERN OREGON P INDEX

Enter data in gray cells and select best choice from drop down menus.
Cells with blue font are completed automatically.

Grower:

Application Plan by:

Date:

R&R Dairy
Tom Thomson, NW Agricultural Consulting
November 22, 2017

Field Acres	M04 17.6	M05 28.7	M06 13.7	M07 8.7	M08 11.5	M09 18.4	S00 0.5	S01 14.6
Soil	103A, Coquille	103A, Coquille	103A, Coquille	103A, Coquille	103A, Coquille	103A, Coquille	74A, Nehalem	77A, Nestucca
Soil test date	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016	October 26, 2016
Bray 1 P (ppm)	14	4	14	4	14	4	14	4
Acetate K (ppm)	962	637	962	637	962	637	962	637
pH	4.5	4.6	4.5	4.6	4.5	4.6	4.5	4.6
SMP	4.7	4.8	4.7	4.8	4.7	4.8	4.7	4.8
TRANSPORT FACTORS								
Sheet & rill erosion (tons/ac-yr)	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3
Irrigation erosion (tons/ac-yr)	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff	no irrig. runoff
Runoff Class	low	low	low	low	low	low	low	medium
Flooding Frequency	rare	rare	rare	rare	rare	rare	occasional	frequent
Distance to stream (ft)	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	<100 ft	>500 ft	<100 ft
Buffers	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.	> 30 ft or NRCS spec.
Drainage	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles
SOURCE FACTORS								
Commercial P2O5 rate (lbs/ac)	0	0	0	0	0	0	0	0
Commercial P2O5 method	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Commercial P2O5 timing	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Organic P2O5 rate (lbs/ac)	178	178	178	178	178	178	178	178
Organic P2O5 method	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days	Not incorp. in 5 days
Organic P2O5 timing	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible	All months possible
SCORE	15.6	15.6	15.6	15.6	15.6	15.6	16.3	18.8
P RUNOFF RISK RATING	Low	Low	Low	Low	Low	Low	Low	Low

COMMENTS

SOIL AND RISK ASSESSMENT

FIELD SUMMARY & WESTERN OREGON P INDEX

Enter data in gray cells and select best choice from drop down menus.
Cells with blue font are completed automatically.

Grower:

Application Plan by:

Date:

R&R Dairy

Tom Thomson, NW Agricultural Consulting

November 22, 2017

Field Acres	S02 6.0	S03 37.7						
Soil	1A, Brenner	103A, Coquille	TILLAMOOK COUNTY	TILLAMOOK COUNTY	TILLAMOOK COUNTY	TILLAMOOK COUNTY	TILLAMOOK COUNTY	TILLAMOOK COUNTY
Soil test date	October 26, 2016	October 26, 2016						
Bray 1 P (ppm)	14	4						
Acetate K (ppm)	962	637						
pH	4.5	4.6						
SMP	4.7	4.8						
TRANSPORT FACTORS								
Sheet & rill erosion (tons/ac-yr)	1-3	1-3	<1	<1	<1	<1	<1	<1
Irrigation erosion (tons/ac-yr)	no irrig. runoff	no irrig. runoff	not irrigated	not irrigated	not irrigated	not irrigated	not irrigated	not irrigated
Runoff Class	medium	low	none	none	none	none	none	none
Flooding Frequency	frequent	rare	none	none	none	none	none	none
Distance to stream (ft)	<100 ft	<100 ft	>500 ft	>500 ft	>500 ft	>500 ft	>500 ft	>500 ft
Buffers	>30 ft or NRCS spec.	>30 ft or NRCS spec.	>30 ft or NRCS spec.	>30 ft or NRCS spec.	>30 ft or NRCS spec.	>30 ft or NRCS spec.	>30 ft or NRCS spec.	>30 ft or NRCS spec.
Drainage	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles	no tiles
SOURCE FACTORS								
Commercial P2O5 rate (lbs/ac)	0	0	0	0	0	0	0	0
Commercial P2O5 method	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Commercial P2O5 timing	None applied	None applied	None applied	None applied	None applied	None applied	None applied	None applied
Organic P2O5 rate (lbs/ac)	178	178	0	0	0	0	0	0
Organic P2O5 method	Not incorp. in 5 days	Not incorp. in 5 days	None applied	None applied	None applied	None applied	None applied	None applied
Organic P2O5 timing	All months possible	All months possible	None applied	None applied	None applied	None applied	None applied	None applied
SCORE								
P RUNOFF RISK RATING	18.8 Low	15.6 Low	0.0 Low	0.0 Low	0.0 Low	0.0 Low	0.0 Low	0.0 Low

COMMENTS

SOIL AND RISK ASSESSMENT

SOIL AND RISK ASSESSMENT

Oregon Phosphorus Index Risk Interpretation

P Index rating	Interpretation	Recommended Nutrient Limitation
West PI Score ≤ 25 East PI Score < 100	The site has a LOW potential for P movement from the site. If farming practices are maintained at current levels, the probability of an adverse impact to surface water resources from P losses from this site are low. Phosphorus can be applied at rates greater than crop requirement	Nitrogen
West PI Score 25.1-50 East PI Score 100.1-400	The site has a MEDIUM potential for P movement from the site. The probability for an adverse impact to surface water resources is greater than that from a LOW vulnerability rated site. Some remedial action should be taken to lessen the probability of P movement. Phosphorus can be applied not to exceed the crop requirement rate.	Phosphorus
West PI Score > 50.1-75 East PI Score > 400.1-600	The site has a HIGH potential for P movement from the site. There is a high probability for an adverse impact to surface water resources unless action is taken to reduce the risk of P movement and probable water quality degradation. Phosphorus can be applied not to exceed the crop removal rate if the following requirements are met: - o A soil phosphorus drawdown strategy has been implemented, and - o A site assessment for nutrients and soil loss has been conducted to determine if mitigation practices are required to protect water quality.	Phosphorus
West PI Score > 75 East PI Score > 600	ZERO OUT- The environmental threshold above which the risk of P loss from a field is too great to warrant the application of P for plant production.	No manure

SOIL AND RISK ASSESSMENT

REFERENCES

PUBLICATIONS AND SOFTWARE

Crop Fertilizer Recommendations

Nutrient Requirements for Dairy Cattle 7th Ed, 2001 Natl. Research Council
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Field Corn, Eastern Oregon-East of the Cascades, FG 71, January 2000
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Manure Application Rates for Forage Production, OSU EM 8585-E, July 2007
<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/20536/em8585-e.pdf>

Monitoring Soil Nutrients Using a Management Unit Approach, PNW 570-E, October 2003,
<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/20762/pnw570-e.pdf>

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<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/20221/em8832-e.pdf>

Silage Corn, Western Oregon, EM 8978-E, June 2009
<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/20610/em8978-e.pdf>

Soil Test Interpretation Guide, OSU EC 1478, August 1999
<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/22023/ec1478.pdf>

Feed Management

Feed Management, A tool for balancing nutrients on dairies and other livestock operations, EM 8913-E, July 2006
<http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/20501/em8913-e.pdf>

Manure Application Setback Features/Distances

CAFO General Permit #1
http://oregon.gov/ODA/NRD/docs/pdf/cafo_gnlpmt.pdf

Manure Nutrient Availability

Waste Utilization Jobsheet 633 OR-JS, Oregon USDA-NRCS, May 2003
<http://efotg.sc.egov.usda.gov/references/public/OR/633js042707.pdf>

REFERENCES

Phosphorus Assessment

Interim Agronomy Technical Note No. 26: The Phosphorus Index, Oregon NRCS, June 2013
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Agricultural Phosphorus Management Using the Oregon/Washington Phosphorus Indexes
<http://eesc.orst.edu/agcomwebfile/edmat/em8848-e.pdf>

Practice Standards

Oregon NRCS Nutrient Management Standard (590), May 2008
<https://efotg.sc.egov.usda.gov/treemenu.aspx#>

Record Keeping

Online Decision making And Record Keeping, October 2015
<http://www.odark.org>

Oregon ODA CAFO Recordkeeping Calendar, January 2015
<http://www.oregon.gov/ODA/NRD/pages/cafoprodocs.aspx>

Water Quality/Quantity

Oregon NRCS Water Quality Technical Note No. 1: Water Quality Indicator Tools, October 2000,
ftp://ftp-fc.sc.egov.usda.gov/OR/Technical_Notes/Water%20Quality/WaterQual01.pdf

Software

Revised Universal Soil Loss Equation, RUSLE2 version 1.26.6.4, October 2006
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

Oregon Animal Waste Management Planning Tool, ORAWMv5.2, July 2016
<http://www.oregon.gov/ODA/NRD/pages/cafoprodocs.aspx>

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REFERENCES

ORAWM WORKBOOK

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

11/22/2017

Version 5.2

CLIENT: **R & R DAIRY**ASSISTED BY: **Northwest Ag Consulting - Tom Thomson**

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

ANIMAL INVENTORY

Type of Animal	Number of Animals	Average Weight (lbs.)	Animal Units (1,000 lb.)	Milk Production in Pounds/Cow/Day= 65						Manure CF/D/AU	Annual					
				Nutrient Production									Days Confined	Days Grazed	Days Off Farm	
				(lbs./day/1000 lb. Animal Unit)			(lbs./day)				K					
				N	P	K	N	P								
MILKER (Jersey)	750	1,100	825.0	0.82	0.14	0.47	680.21	114.10	390.68	1.88	194	171	0			
MILKER (Holstein)	300	1,200	360.0	0.69	0.12	0.32	248.40	42.26	113.98	1.67	194	171	0			
MILKER (DRY)	100	1,200	120.0	0.30	0.04	0.10	36.00	5.04	12.00	0.92	194	171	0			
HEIFERS (12-24 Months)	850	800	680.0	0.27	0.05	0.12	180.88	30.94	81.60	0.90	151	214	0			
CALVES (1-12 Months)	300	500	150.0	0.42	0.05	0.11	63	8.10	16.50	1.34	151	214	0			
CALVES (1-12 Months)	250	200	50.0	0.42	0.05	0.11	21.00	2.70	5.50	1.34	365	0	0			
GOATS (DOE)	100	100	10.0	0.45	0.07	0.30	4.50	0.70	3.00	0.63	365	0	0			
GOATS (KID)	100	50	5.0	0.45	0.07	0.30	2.25	0.35	1.50	0.63	365	0	0			
Totals/Averages	2,750	644	2,200.0	0.56	0.09	0.28	1,236.2	204.2	624.8	1.4						

GRAZING PERIOD

Type of Animal	Percent of Month and Number of Animals Grazing												
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AU-YR.
MILKER (Jersey)	80%	0%	0%	0%	0%	0%	80%	80%	80%	80%	80%	80%	
	750	750	750	750	750	750	750	750	750	750	750	750	4,620
MILKER (Holstein)	80%	0%	0%	0%	0%	0%	80%	80%	80%	80%	80%	80%	
	300	300	300	300	300	300	300	300	300	300	300	300	2,016
MILKER (DRY)	80%	0%	0%	0%	0%	0%	80%	80%	80%	80%	80%	80%	
	100	100	100	100	100	100	100	100	100	100	100	100	672
HEIFERS (12-24 Months)	100%	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%	100%	
	850	850	850	850	850	850	850	850	850	850	850	850	4,760
CALVES (1-12 Months)	100%	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%	100%	
	300	300	300	300	300	300	300	300	300	300	300	300	1,050
CALVES (1-12 Months)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	250	250	250	250	250	250	250	250	250	250	250	250	0
GOATS (DOE)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	100	100	100	100	100	100	100	100	100	100	100	100	0
GOATS (KID)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
	100	100	100	100	100	100	100	100	100	100	100	100	0
													0
													0
Total AUM's Available>	0	0	0	0	0	0	0	0	0	0	0	0	0
Total AUM's Needed>>>	1,874	0	0	0	0	0	1,874	1,874	1,874	1,874	1,874	1,874	13,118
Total AUM's>>>>>>>>>>>>	-1,874	0	0	0	0	0	-1,874	-1,874	-1,874	-1,874	-1,874	-1,874	-13,118

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ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

TILLAMOOK 1 W

WEATHER STATION		PRECIPITATION		
Month	25Yr-24Hr	6.00	Lot Runoff Factors as a Percent of Monthly Precipitation	
	RCN=	95.00		
	Average Monthly Inches			
	Precipitation	Evaporation	Paved	Unpaved
October	7.16	1.42	50%	20%
November	13.71	0.75	60%	25%
December	13.94	0.60	60%	25%
January	13.09	0.48	60%	25%
February	10.79	0.78	50%	25%
March	9.90	1.26	45%	15%
April	6.81	1.90	40%	15%
May	4.84	3.22	40%	10%
June	3.41	3.40	35%	10%
July	1.64	3.91	30%	0%
August	1.42	3.52	40%	10%
September	3.68	2.54	45%	15%
Annual	90.39	23.78		

[illegible]

Type of Water Use	Number of Animals	Number of Washes per Day	Gallons of Water Used per Wash-Day	Total Water Use per Day, Gallons	Total Water Use per Day, Cubic Feet
Animal Washwater	750	2	0.10	150	20.1
Equipment Wash		2	900.00	1800	240.6
Flushwater		2	0.00	0	0.0
Miscellaneous		2	50.00	100	13.4
				2050	274.1

CROP DATA		Crop	▼	Percent Dry Matter (DM)	Yield Units	Target Yield	Nutrients Removed in Pounds per Acre		
Field Number	Acres						Nitrogen N	Phosphorous P ₂ O ₅	Potassium K ₂ O
CORN	583.4	Grass Haylage	▼	20%	Ton	15.00	150	55	154
ARG	583.4	Corn, Silage	▼	30%	Ton	20.00	150	55	145
			▼						
			▼						
			▼						
			▼						
			▼						
			▼						
			▼						
Off Farm			▼						
Total Acres-	583.4								

11/22/2017

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ASSISTED BY: **Northwest Ag Consulting - Tom Thomson**

ANIMAL WASTE MANAGEMENT SYSTEM INVENTORY

BEDDING VOLUME							
Type of Animal	Type of Bedding Facility	Bedding Material	Unit Weight Lbs/CF	Amount Needed Lbs/Day/AU	Volume CF/Day/AU	Total Volume CF/Day	Total Weight Lbs/Day
MILKER (Jersey)	Free Stall	▼ Wood Shavings ▼	9.00	2.78	0.31	255	2,294
MILKER (Holstein)	Free Stall	▼ Wood Shavings ▼	9.00	2.78	0.31	112	1,001
MILKER (DRY)	Free Stall	▼ Loose Straw ▼	2.50	7.93	3.17	381	952
HEIFERS (12-24 Months)	Free Stall	▼ Loose Straw ▼	2.50	5.21	2.08	1414	3,543
CALVES (1-12 Months)	Free Stall	▼ Loose Straw ▼	2.50	3.17	1.27	190	476
CALVES (1-12 Months)	Confined	▼ Loose Straw ▼	2.50	6.00	2.40	120	300
GOATS (DOE)	Free Stall	▼ Loose Straw ▼	2.50	2.60	1.04	10	26
GOATS (KID)	Free Stall	▼ Loose Straw ▼	2.50	2.60	1.04	5	13
		▼					
		▼					

[illegible]

REFERENCES

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM) Version 5.2

11/22/2017

CLIENT: **R & R DAIRY**
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ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY VOLUMES

Month	Runoff in Cubic Feet				Facility Water Use Cubic Feet	Manure		Bedding		Solids Separated		Solids in Liquids		Total Solids	Total Liquids
	Roof Area Square Feet	Paved Slab Area Square Feet	Unpaved Lot Area Square Feet	Silage Pit Surface Area, SF		Solids	Liquids	Cubic Feet	Pounds	Cubic Feet	Pounds	Cubic Feet	Pounds	Cubic Feet	Cubic Feet
	0	0	0	0		Cubic Feet	Cubic Feet								
October	0	0	0	0	8,828	2,080	14,322	8,835	36,834	18,705	673,390	6,532	235,169	18,705	15,360
November	0	0	0	0	8,543	12,369	82,213	74,618	258,096	137,591	4,953,292	31,609	1,137,915	137,591	40,152
December	0	0	0	0	8,828	12,782	84,953	77,105	266,699	142,178	5,118,402	32,662	1,175,845	142,178	41,490
January	0	0	0	0	8,828	12,782	84,953	77,105	266,699	142,178	5,118,402	32,662	1,175,845	142,178	41,490
February	0	0	0	0	7,973	11,545	76,732	69,644	240,890	128,419	4,623,072	29,501	1,062,054	128,419	37,475
March	0	0	0	0	8,828	12,782	84,953	77,105	266,699	142,178	5,118,402	32,662	1,175,845	142,178	41,490
April	0	0	0	0	8,543	2,013	13,860	8,550	35,645	18,102	651,668	6,322	227,583	18,102	14,865
May	0	0	0	0	8,828	2,080	14,322	8,835	36,834	18,705	673,390	6,532	235,169	18,705	15,360
June	0	0	0	0	8,543	2,013	13,860	8,550	35,645	18,102	651,668	6,322	227,583	18,102	14,865
July	0	0	0	0	8,828	2,080	14,322	8,835	36,834	18,705	673,390	6,532	235,169	18,705	15,360
August	0	0	0	0	8,828	2,080	14,322	8,835	36,834	18,705	673,390	6,532	235,169	18,705	15,360
September	0	0	0	0	8,543	2,013	13,860	8,550	35,645	18,102	651,668	6,322	227,583	18,102	14,865
Annual	0	0	0	0	103,937	76,618	512,674	436,571	1,553,354	821,670	29,580,133	204,192	7,350,928	821,670	308,130
Annual Gallons	0	0	0	0	777,450	573,101	3,834,799	3,265,554		6,146,094		1,527,359		6,146,094	2,304,809

DAILY NUTRIENT PRODUCTION

Type of Animal	Pounds/Day of Nutrients from LIQUIDS			Pounds/Day of Nutrients from SOLIDS			Pounds/Day of Nutrients from GRAZING			Grazing Manure	Confined Manure
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	Gallons/Yr	Cubic Feet/Yr
MILKER (Jersey)	238.07	91.49	164.77	442.14	169.91	306.00	680.21	261.40	470.77	1,987,969	300,856
MILKER (Holstein)	86.94	33.89	48.07	161.46	62.94	89.27	248.40	96.83	137.34	768,960	116,373
MILKER (DRY)	12.60	4.04	5.06	23.40	7.51	9.40	36.00	11.55	14.46	141,376	21,396
HEIFERS (12-24 Months)	0.00	0.00	0.00	180.88	70.88	98.33	180.88	70.88	98.33	979,641	92,412
CALVES (1-12 Months)	0.00	0.00	0.00	63.00	18.56	19.88	63.00	18.56	19.88	321,745	30,351
CALVES (1-12 Months)	0.00	0.00	0.00	21.00	6.19	6.63	0.00	0.00	0.00	0	24,455
GOATS (DOE)	0.00	0.00	0.00	4.50	1.60	3.62	0.00	0.00	0.00	0	2,300
GOATS (KID)	0.00	0.00	0.00	2.25	0.80	1.81	0.00	0.00	0.00	0	1,150
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
Total-										4,199,691	589,291

REFERENCES

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM) Version 5.2

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CLIENT: **R & R DAIRY**
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ANIMAL WASTE MANAGEMENT SYSTEM PRODUCTION

MONTHLY NUTRIENT PRODUCTION

Month	Pounds of Nutrients from LIQUIDS			Pounds of Nutrients from SOLIDS			Pounds of Nutrients from GRAZING			Total Pounds of Nutrients from ALL SOURCES		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
October	2,093	802	1,351	4,748	1,757	2,883	31,483	11,943	19,104	38,324	14,502	23,338
November	10,128	3,883	6,537	26,959	10,151	16,048	0	0	0	37,087	14,034	22,585
December	10,466	4,012	6,755	27,857	10,490	16,583	0	0	0	38,324	14,502	23,338
January	10,466	4,012	6,755	27,857	10,490	16,583	0	0	0	38,324	14,502	23,338
February	9,453	3,624	6,101	25,162	9,475	14,978	0	0	0	34,615	13,098	21,079
March	10,466	4,012	6,755	27,857	10,490	16,583	0	0	0	38,324	14,502	23,338
April	2,026	777	1,307	4,594	1,700	2,790	30,467	11,558	18,488	37,087	14,034	22,585
May	2,093	802	1,351	4,748	1,757	2,883	31,483	11,943	19,104	38,324	14,502	23,338
June	2,026	777	1,307	4,594	1,700	2,790	30,467	11,558	18,488	37,087	14,034	22,585
July	2,093	802	1,351	4,748	1,757	2,883	31,483	11,943	19,104	38,324	14,502	23,338
August	2,093	802	1,351	4,748	1,757	2,883	31,483	11,943	19,104	38,324	14,502	23,338
September	2,026	777	1,307	4,594	1,700	2,790	30,467	11,558	18,488	37,087	14,034	22,585
Annual	65,430	25,082	42,229	168,467	63,221	100,673	217,332	82,445	131,881	451,229	170,748	274,783

MONTHLY IMPORTS INTO STORAGE FACILITIES

Month	Liquids		Solids	
	Cubic Feet	Gallons	Cubic Feet	Tons
October	0	0	0	0
November	0	0	0	0
December	0	0	0	0
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	0	0	0	0
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
Totals-	0	0	0	0

REFERENCES

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

Version 5.2

11/22/2017

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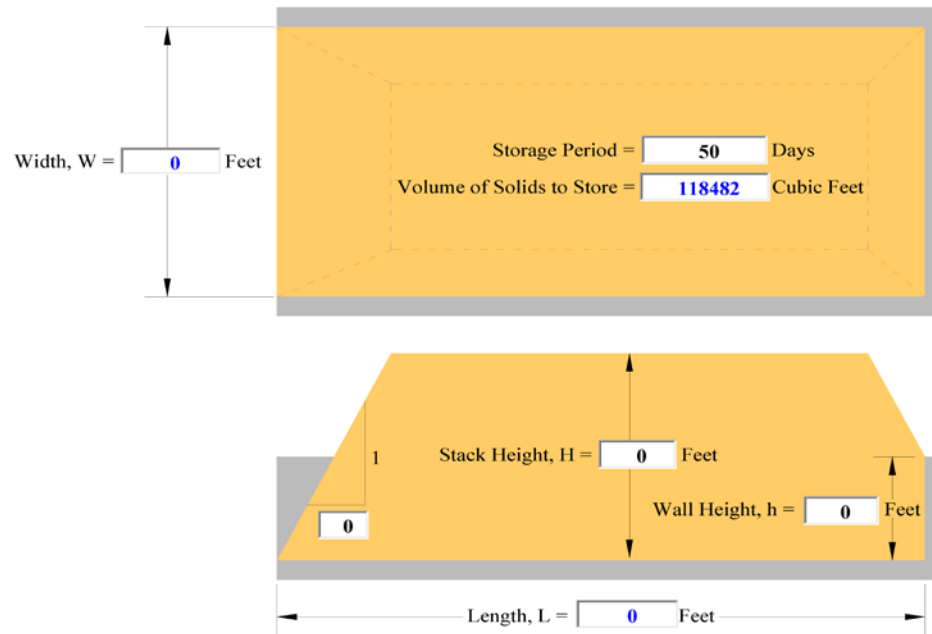
ASSISTED BY: Northwest Ag Consulting - Tom Thomson

ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

SOLIDS STACKING FACILITY

VOLUME OF MONTHLY SOLIDS STACKED IN FACILITY

Solids Storage Facility Parameters	Value	Month	Number of Days	Manure CF	Bedding CF	Solids to Store CF	Solids to Store Tons	Normal Runoff CF
Storage Period, Days=	50	October	31	11,491	7,214	9,353	337	2,410
Stacking Width, W in Feet=	0	November	30	70,818	66,774	68,796	2,477	5,767
Stacking Height, H in Feet=	0.00	December	31	73,178	69,000	71,089	2,559	5,864
Wall Height, h in Feet=	0.00	January	31	73,178	69,000	71,089	2,559	5,507
Stack Side Slope (X:1)=	0.00	February	28	66,096	62,322	64,209	2,312	4,539
Existing Storage, Cubic Feet=	121,152	March	31	73,178	69,000	71,089	2,559	2,499
Surface Area of Existing Storage, SF=	20,192	April	30	11,120	6,982	9,051	326	1,719
25 Year-24 Hour Storm Runoff, CF=	9,103	May	31	11,491	7,214	9,353	337	814
Volume Needed, Cubic Feet=	118,482	June	30	11,120	6,982	9,051	326	574
Design Volume, Cubic Feet=	0	July	31	11,491	7,214	9,353	337	0
Is Facility Covered? YES	▼	August	31	11,491	7,214	9,353	337	239
Volume Reduction Factor=	0.50	September	30	11,120	6,982	9,051	326	929
		Annual	365	435,773	385,897	410,835	14,790	30,860



REFERENCES

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM)

Version 5.2

11/22/2017

CLIENT: R & R DAIRY

ASSISTED BY: Northwest Ag Consulting - Tom Thomson

ANIMAL WASTE MANAGEMENT SYSTEM STORAGE

TANK

MONTHLY INFLOWS INTO TANK

Tank Parameters	Value	Month	Number of days	Rain-Evap on Tank CF	Rain-Evap on Existing Storage, CF	Normal Runoff CF	Washwater CF	Solids CF	Imported Liquids CF	Waste to Store CF	Waste to Store Gallons
Storage Period, Days=	365	October	31	0	28,759	2,410	8,828	6,532	0	46,528	348,057
Tank Diameter, Feet=	0	November	30	0	64,933	5,767	8,543	31,609	0	110,852	829,228
		December	31	0	66,837	5,864	8,828	32,662	0	114,191	854,206
Existing Storage, Cubic Feet=	827,952	January	31	0	63,179	5,507	8,828	32,662	0	110,176	824,171
Surface Area of Existing Storage, SF=	60,123	February	28	0	50,153	4,539	7,973	29,501	0	92,166	689,452
25 Year-24 Hour Storm Runoff, CF=	9,103	March	31	0	43,289	2,499	8,828	32,662	0	87,277	652,879
Volume Needed, Cubic Feet=	733,781	April	30	0	24,600	1,719	8,543	6,322	0	41,184	308,075
Design Volume, Cubic Feet=	0	May	31	0	8,117	814	8,828	6,532	0	24,291	181,710
Is Tank Covered? NO	▼	June	30	0	50	574	8,543	6,322	0	15,488	115,861
Tank Dimensions? Circular	▼	July	31	0	-11,373	0	8,828	6,532	0	3,987	29,823
		August	31	0	-10,522	239	8,828	6,532	0	5,077	37,982
		September	30	0	5,712	929	8,543	6,322	0	21,505	160,869
		Annual	365	0	333,733	30,860	103,937	204,192	0	672,722	5,032,314

6 Inches
 Depth = 0 Feet
 Minimum Freeboard = 6 Inches
 25Yr-24Hr Storm Precipitation = 6 Inches
 25Yr-24Hr Storm Runoff = 9103 Cubic Feet
 365 Day Precip - Evap = 70.98 Inches
 Runoff from Normal Precipitation = 30860 Cubic Feet
 Washwater = 103937 Cubic Feet
 Manure = 153518 Cubic Feet
 Diameter = 0 Feet

REFERENCES

OREGON ANIMAL WASTE MANAGEMENT DESIGN AID (ORAWM) Version 5.2

11/22/2017

CLIENT: **R & R DAIRY**
 ASSISTED BY: Northwest Ag Consulting - Tom Thomson

ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

NUTRIENTS AVAILABLE AFTER STORAGE

Nutrient Source	Type of Operation	Pounds of Nutrients Available			Percent Nutrients Retained After Storage			Pounds of Nutrients Retained After Storage		
	Type of Storage Facility	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Liquids	Tank (Uncovered)	65,430	25,082	42,229	70%	85%	85%	45,801	21,319	35,895
Solids	Solids Storage Facility (Roofed)	168,467	63,221	100,673	75%	90%	90%	126,350	56,899	90,606
Grazing	NONE	217,332	82,445	131,881	100%	100%	100%	217,332	82,445	131,881

NUTRIENTS AVAILABLE AFTER APPLICATION

Nutrient Source	Type of Application System	Pounds of Nutrients Available			Percent Nutrients Retained After Application			Pounds of Nutrients Retained After Application		
		N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Liquids	Sprinkling	45,801	21,319	35,895	75%	100%	100%	34,351	21,319	35,895
Solids	Broadcast (Incorporated 7 or more days after application)	126,350	56,899	90,606	70%	100%	100%	88,445	56,899	90,606
Grazing	Grazing	217,332	82,445	131,881	65%	100%	100%	141,266	82,445	131,881

NUTRIENTS AVAILABLE AFTER DENITRIFICATION

Nutrient Source	Location	Pounds of Nutrients Available			Percent Nutrients Retained After Denitrification			Pounds of Nutrients Retained After Denitrification		
	Coast	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Liquids	Well Drained	34,351	21,319	35,895	87%	100%	100%	29,885	21,319	35,895
Solids	Well Drained	88,445	56,899	90,606	87%	100%	100%	76,947	56,899	90,606
Grazing	Well Drained	141,266	82,445	131,881	87%	100%	100%	122,901	82,445	131,881
TOTAL-								229,733	160,664	258,381

Version 5.2

11/22/2017

CLIENT: **R & R DAIRY**
ASSISTED BY: **Northwest Ag Consulting - Tom Thomson**

ANIMAL WASTE MANAGEMENT SYSTEM UTILIZATION

NITROGEN, N

			LIQUIDS			SOLIDS			GRAZING		
Field Number	Acres	Crop	Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients	Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients	Percent to be Applied	Pounds of Nutrients to be Applied	Acres Needed for Utilization of Nutrients
CORN	583.4	Grass Haylage	50%	14,942	100	0%	0	0	50%	61,451	410
ARG	583.4	Corn, Silage	50%	14,942	100	0%	0	0	50%	61,451	410
Off Farm			0%	0		100%	126,350		0%	0	
TOTALS-	583.4		100%	29,885	199	100%	126,350	0	100%	122,901	819

[illegible]

REFERENCES

REFERENCES

OREGON DEPARTMENT OF AGRICULTURE MODIFICATION OF ANIMAL NUMBERS National Pollutant Discharge Elimination System (NPDES PERMIT)

Statutory Authority
Oregon Revised Statutes (ORS) 468B.050 When permit required
ORS 468B.210 Maximum numbers of animals based on ability to contain, treat, hold and dispose of wastes as necessary to comply with all conditions of the permit.

A. General Information

Master Address #AG-P0121258CAFG EPA#ORG010104
#AG-P0063384CAFG EPA#ORG010102
#AG-P0175055CAFG EPA#ORG010105

Name or Business Name – R&R Dairy

Facility Location Address – 510 3rd Street

City – Tillamook, OR

Zip Code 97141

County - Tillamook

B. Livestock Type: Circle the item that best represents your operation.

1. Beef Feedlot (Fattening) 2. Beef Cattle (Cow/calf) 3. Hogs 4. Sheep and Goats
5. Dairy Farm, Heifer Replacement Farm 6. Poultry/Broiler 7. Poultry/Eggs
7. Mink/Rabbits 8. Horses and Other Equine 9. Other _____

C. Current Permitted Animal Numbers: In the space below please describe your number of animals by herd composition or class.

R&R Dairy is a Medium Confined CAFO currently permitted for 1,059 dairy animals- 630 Milking and Dry Cows and 429 Heifers and Calves. R&R Flatt Barn is a Medium Confined CAFO currently permitted for 560 dairy animals- 400 Milking and Dry Cows and 60 Heifers and Calves and 100 kid goats. R&R Dairy Bewley Creek is a Medium Confined CAFO currently permitted for 450 Calves.

D. Current Permitted CAFO Designation: Circle one. See reverse side for table.

Small Confined Medium Confined Small Concentrated Medium Concentrated Large Concentrated

E. Proposed change in permitted animal numbers: In the space below please describe your proposed animal numbers by herd composition or class.

R&R Dairy is requesting that the three permits listed above be combined into one Large Concentrated permit and to be permitted for 2,750 dairy and goat animals- 1,150 Milking and Dry Cows, 1,400 Heifers and Calves and 200 Goat Does and Kids.

F. New CAFO Designation based on increase / decrease in animal numbers. Circle one. See reverse side for table.

Small Confined Medium Confined Small Concentrated Medium Concentrated Large Concentrated

G. Certification:

I understand that an approved animal waste management plan is required prior to permit increase. I agree to prepare and implement an animal waste management plan in accordance with the requirements and timelines specified in the permit.

Signature (operator or owner)

Date

Joe Rocha
Print Name

Signature (operator or owner)

Date

Print Name

REFERENCES

Definition of Legally Authorized Representative: See 40 CFR 122.22 for more detail. Please also provide the information requested in brackets []	
◆	Corporation — President, secretary, treasurer, vice-president, or any person who performs principal business functions; or a manager of one or more facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million that is authorized in accordance to corporate procedure to sign such documents
◆	Partnership — General partner <i>[list of general partners, their addresses, and telephone numbers]</i>
◆	Sole Proprietorship — Owner(s) <i>[each owner must sign the application]</i>
◆	City, County, State, Federal, or other Public Facility — Principal executive officer or ranking elected official
◆	Limited Liability Company — Member <i>[articles of organization]</i>
◆	Trusts — Acting trustee <i>[list of trustees, their addresses, and telephone numbers]</i>

SEND THIS FORM TO:

Oregon Department of Agriculture
 Natural Resources Division
 635 Capitol Street NE
 Salem, Oregon 97301-2532

ANIMAL MODIFICATION REQUEST INSTRUCTIONS

A. GENERAL INFORMATION:

1. Enter the legal name.
2. Enter the common name of the facility or operation, if different than the legal name.
3. Enter the facility's physical address (physical location), including city, state, zip code and telephone number.

B. CIRCLE THE APPROPRIATE LIVESTOCK TYPE OF YOUR OPERATION.

- C. Self-explanatory
 D. Self-explanatory
 E. Describe your proposed animal increase by herd composition or class
 F. Self-explanatory
 G. Signature

CAFO Designation by Size Threshold (used for items D and F)

	Confined		Concentrated		
	Confines more than one animal for more than 4 months on prepared surface		Stabled or confined and fed or maintained for total of 45 days or more in any 12-month period Crops, vegetation, forage growth, or post-harvest residues not sustained in normal growing season in lot or facility		
	<i>Small Confined</i> Waste water control facility or disposal system for wet wastes	<i>Medium Confined</i> Waste water control facility or disposal system for wet or dry wastes	<i>Small Concentrated</i> Significant contributor of pollutants to waters of the U.S. Designated by director [40CFR §122.23(b)(9)]	<i>Medium Concentrated</i> Discharging pollutants to waters of the U.S. [40 CFR §122.23(b)(6)]	<i>Large Concentrated</i> [40 CFR §122.23(b)(4)]
Animal sector	Small Confined	Medium Confined	Small Concentrated	Medium Concentrated	Large Concentrated
Mature dairy cows ¹	<200	200-699	<200	200-699	≥700
Veal calves	<300	300-999	<300	300-999	≥1,000
Cattle ²	<300	300-999	<300	300-999	≥1,000
Swine > 55 lbs	<750	750-2,499	<750	750-2,499	≥2,500
Swine < 55 lbs	<3,000	3,000-9,999	<3,000	3,000-9,999	≥10,000
Horses	<150	150-499	<150	150-499	≥500
Sheep or lambs	<3,000	3,000-9,999	<3,000	3,000-9,999	≥10,000
Turkeys	<16,500	16,500-54,999	<16,500	16,500-54,999	≥55,000
Chickens, including laying hens or broilers w/wet waste system manure handling system)	<9,000	9,000-29,999	<9,000	9,000-29,999	≥30,000
Laying hens w/dry waste system	NA	25,000-81,999	<25,000	25,000-81,999	≥82,000
Broiler chickens w/dry waste system	NA	37,500-124,999	<37,500	37,500-124,999	≥125,000
Ducks w/other than wet waste system	<10,000	10,000-29,999	<10,000	10,000-29,999	≥30,000
Ducks w/wet waste system	<1,500	1,500-4,999	<1,500	1,500-4,999	≥5,000
Other animal type	As determined by ODA. ³		Designated by director.	NA	NA

¹ Whether milked or dry.

² Other than mature dairy cows or veal calves; cattle includes but is not limited to heifers, steers, bulls and cow/calf pairs.

³ To determine the number of animals that require permit coverage, ODA will compare the operation to the most similar animal type in the table.