Nutrient Management Plan

For Van Berkum Dairy LLC

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GENERAL INFORMATION

Operation Information for Van Berkum Dairy LLC

Calendar Year: Plan **Reporting period:** January 1 through December 31

Name:	Kyler Van Berkum		
Business	Van Berkum Dairy LLC		
Mailing	P.O. 100, Vale, OR, 97918		
Facility	1741 Hale Rd., Vale, OR 97918	**County:**	Malheur
Telephone	(360)661-7724	**Cell Phone**	null
E-mail	vanberkumdairy@gmail.com		

Permitted and Actual number of animals by type at the CAFO averaged over the year [S4.D.2(a)/S4.D.2(a)(ii) of

Animal Type	Average Weight (Lbs)	Days on Farm		Permitted	Actual
		Start Month	End Month		
Calf	350	01/01	12/31	1625	400
Dairy Heifers	970	01/01	12/31	1625	600
Milker - Dry	1300	01/01	12/31	375	240
Milker - Holstein	1300	01/01	12/31	2100	960
			Total Animals -	5,725	2,200
			Manure Solids Generated (CF) -	2,323,814	973,980
			Bedding Generated (CF) -	479,975	479,975
			Imported Solids (CF) -	0	0
			Total Solids Generated (CF) -	2,803,789	1,453,955
			Total Solids to Store based on a Volume Reduction Factor of 0.5 (CF) -	1,401,896	726,979
			Manure Liquids Generated (CF) -	258,202	108,220
			Rainfall-Evaporation on Storage plus Runoff Generated (CF) -	-57,154	-57,154
			Process Water Generated (CF) -	9,748	9,748
			Imported Liquids (CF) -	0	0
			Total Liquids to Store (CF) -	210,795	60,814
			Liquids Applied to Land (CF) -		155,554
			Solids Applied to Land (CF) -		72,776
			Grazing Manure Applied to Land (CF) -		52,815
			Liquids Exported (CF) -		55,241
			Solids Exported (CF) -		2,731,000
			Solids Recycled for Bedding (CF) -		0
			Acres of Land for Land Application Covered by NMP -		98.8 AC
			Acres of Land Under Operator Control Used for Manure Applications -		98.8 AC

GENERAL INFORMATION

Storage Facilities for Van Berkum Dairy LLC

Facility Name	Description	Type	Storage Period (days)	Diameter (ft)	Top Length (ft)	Top Width (ft)	Depth (ft)	Side slope Z	Free board (ft)	Volume (CF)	Uncovered Surface Area (SF)
Dairy Solids Storage	Solids Storage	Solid	105		340	269	6	1	0	527,124	91,460
Heifer Solids Storage	Solids Storage	Solid	260		730	308	6	1	0	1,311,960	224,840
Lagoon 1	Wastewater Storage	Liquid	207		290	64	13	2	1	92,340	18,560
Lagoon 2	Wastewater Storage	Liquid	92		318	42	8	2	1	41,050	13,356
Lagoon 3	Wastewater Storage	Liquid	50		342	31	6	2	1	22,164	10,602
Reception Tank	Wastewater Storage	Liquid	16		70	11	10	0	0	7,315	770

GENERAL INFORMATION

Storage Period Calculations for Van Berkum Dairy LLC

Solids Storage

Storage Unroofed Surface Area, SF	316300	Volume Reduction Factor =	0.5
Available Storage, CF =	1839084	Solids Storage Period, Days =	365

Month	Number Of Days	Manure Lost In Grazing	Filtered Solids (CF)	Bedding (CF)	Solids Removal Factor (Pct)	Imported Solids (CF)	Solids To Store (CF)	Storage Volume Needed, CF
October	31	8898	78750	40765	90	0	59758	59758
November	30	0	83960	39450	90	0	61705	121463
December	31	0	86759	40765	90	0	63762	185225
January	31	0	86759	40765	90	0	63762	248987
February	28	0	78363	36820	90	0	57591	306578
March	31	0	86759	40765	90	0	63762	370340
April	30	0	83960	39450	90	0	61705	432045
May	31	8898	78750	40765	90	0	59758	491803
June	30	8611	76210	39450	90	0	57830	549633
July	31	8898	78750	40765	90	0	59758	609391
August	31	8898	78750	40765	90	0	59758	669149
September	30	8611	76210	39450	90	0	57830	726979
Annual	**365**	**52815**	**973980**	**479975**	**90**	**0**	**726979**	

Liquids Storage

Climate Station: MALHEUR BRANCH EXP S

Storage Unroofed Surface Area, SF =	43288	25Yr-24Hr Storm Precip, In =	2	Total 25Yr-24Hr Storm Storage Needed, CF	53,938
Available Liquid Storage, CF =	162869	25Yr-24H4 Storm Runoff, CF =	0	Storage Period without 25yr-24hr Storm =	365
Unroofed Runoff Area, SF =	0	25Yr-24Hr Storm on Unroofed Storages, CF =	53,938	Storage Period with 25yr-24hr Storm =	180

Month	Number Of Days	Rainfall (Inches)	Evaporation (Inches)	Rain-Evap on Storages (CF)	Rainfall Runoff (CF)	Manure (CF)	Process Water (CF)	Imported Liquids (CF)	Monthly Liquids to Store (CF)	Total Storage Volume Needed (CF)
October	31	0.65	1.98	-4798	0	8750	828	0	4780	4780
November	30	1.19	0.5	20676	0	9329	801	0	30806	35586
December	31	1.38	0.71	20077	0	9640	828	0	30545	66131
January	31	1.29	0.74	16481	0	9640	828	0	26949	93080
February	28	1.04	1.09	-180	0	8707	748	0	9275	102355
March	31	1.08	2.06	-3535	0	9640	828	0	6933	109288
April	30	0.84	3.79	-10642	0	9329	801	0	-512	108776
May	31	0.98	5.12	-14934	0	8750	828	0	-5356	103420
June	30	0.76	6.08	-19191	0	8468	801	0	-9922	93497
July	31	0.36	7.62	-26189	0	8750	828	0	-16611	76886
August	31	0.38	6.51	-22113	0	8750	828	0	-12535	64351
September	30	0.48	4.03	-12806	0	8468	801	0	-3537	60814
Annual	**365**	**10.43**	**40.23**	**-57154**	**0**	**108220**	**9748**	**0**	**60814**	

GENERAL INFORMATION

Annual Nutrient Balance for Van Berkum Dairy LLC

Nutrient Concentrations:	Nitrogen (Total N)	Phosphorus (P_2O_5)	Potassium (K_2O)	Units
Liquid Manure -	2.40	2.80	4.80	lbs/1000 Gal
Solid Manure -	19.14	9.06	12.58	lbs/Ton

Nutrients Generated:	N Generated	P_2O_5 Generated	K_2O Generated
Liquid Manure -	3784 lbs	4415 lbs	7568 lbs
Solid Manure -	965961 lbs	457242 lbs	634890 lbs
Grazing Manure -	17222 lbs	5524 lbs	8336 lbs
Total -	**986968 lbs**	**467181 lbs**	**650794 lbs**

Exported Nutrients:	N Exported	P_2O_5 Exported	K_2O Exported
Liquid Manure -	992 lbs	505 lbs	1646 lbs
Solid Manure -	940884 lbs	194400 lbs	513201 lbs
Total -	**941876 lbs**	**194905 lbs**	**514847 lbs**

Crop Nutrient Removal:	N Utilized	P_2O_5 Utilized	K_2O Utilized
Total -	**56640 lbs**	**20997 lbs**	**47452 lbs**

Annual Nutrient Budget:	Nitrogen (N)	Phosphate (P_2O_5)	Potassium (K_2O)
Nutrients Generated -	986968 lbs	467181 lbs	650794 lbs
Nutrients Removed by Crop and Exported -	998516 lbs	467525 lbs	667843 lbs
Net Annual Nutrient Balance -	**-11548 lbs**	**-345 lbs**	**-17049 lbs**

Note: Total nutrients generated are computed from analytical data by taking the total volume of material applied times the nutrient analysis of the material. The total nutrients utilized are computed using the crop yield data times the crop uptake of nutrients.

GENERAL INFORMATION

Background And Site Information

Animal Feeding Operation: Large Tier 1 Concentrated CAFO
Type & Size: Dairy – 5,725 Animals
Latitude/Longitude: N44.01370, W117.25250

Van Berkum Dairy is located approximately a 4.7 miles northwest of Vale, Oregon in Malheur County, Oregon. It is located in the Willow Creek watershed (HUC170501190603) which drains to the Malheur River.

Van Berkum Dairy is owned and managed by Kyler Van Berkum who is planning to have dairy livestock at this facility consisting of 2,475 milk and dry cows and 3,250 heifers and calves. Currently Van Berkum Dairy is permitted for 1,200 milk and dry cows and 1,000 heifers and calves. A request for modification of permitted animal numbers from a maximum of 2,200 to 5,725 dairy animals is located in Section 5.

All of the animals on Van Berkum Dairy are confined to the livestock barns and out on lot areas for varying times throughout the year as weather conditions permit. The animals will spend more time in the livestock barns and less time on the lot areas in the winter months and more time on the lot areas in the spring, summer and fall months and less time in the livestock barns.

Van Berkum Dairy consists of two facilities which will be used, in conjunction with one another to best manage the dairy animal housing needs at various growth stages and the fields at those facilities for maximizing forage composition and yield. The dairy facility houses the milking operation, milk cows, dry cows and some calves. The heifer farm houses the heifers and calves.

Mortalities that occur during the year on the Van Berkum Dairy are removed and disposed by a rendering service. Other approved methods of disposal may be used.

Manure Handling
All of the process wastewater is generated by the dairy facilities and stored in the lagoons until it is evaporated. If process wastewater stored in the lagoons cannot be evaporated due to weather conditions, wastewater is applied to fields at agronomic rates by a tank wagon.

Solids containing manure, bedding and wasted feed is generated by the dairy and heifer farm and is contained in the livestock barns, lot areas and calf hutches. This manure will be stored onsite until weather conditions allow application to the fields at agronomic rates or exported off farm. Some of the manure collected is composted and used for bedding.

Forage
Van Berkum Dairy owns 153.8 acres for the dairy farm facilities described above and the hay land fields used to produce forage for the dairy livestock. These acres consist of 55.0 acres for the dairy and heifer farm facilities, shops and houses and 98.8 acres of irrigated hay land used to produce forage for the dairy livestock. The crop rotation for the Van Berkum Dairy consists of sorgum, annual field corn for silage and grass pasture. The estimated yields are 25 tons per acre at 30% dry matter for irrigated field corn, 6 tons per acre of dry matter for the sorgum crop and 5 tons per acre of dry matter for the grass pasture.

Nutrient Management
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 test values will guide application rates. Actual yield varies from year to year depending upon weather conditions and specific field management. Fields are well managed and in good condition.

The soil concentration of phosphorus ranges from medium to excessive in the Van Berkum Dairy crop, hay and pasture land fields. The phosphorus index in Section 4 shows there is a low chance of phosphorus runoff from the fields so applications of wastewater and solids containing manure can be made on a nitrogen basis on all fields. The soil phosphorus concentrations will be monitored on all fields using soil tests. It is estimated that the dairy produces enough manure to meet the nutrient demand for the crop, 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.

Emergency Response Plan

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

Implement the following first containment steps:

Stop all other activities to address the spill.
Stop the flow. For example, use skid loader or tractor with blade to contain or divert spill or leak.
Call for help and excavator if needed.
Complete the clean-up and repair the necessary components.
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:

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

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

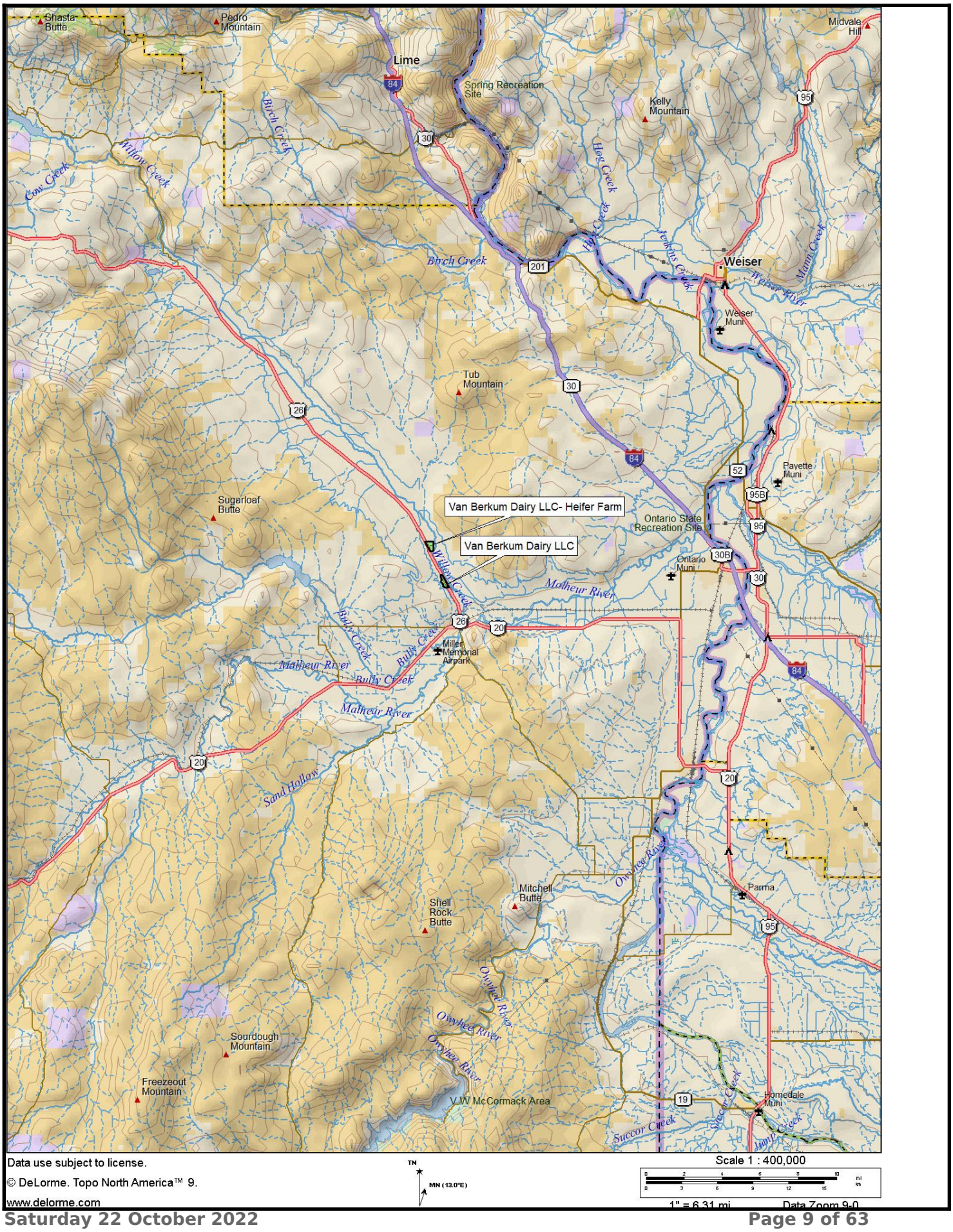
Organization	**Phone Number**
Oregon Department of Agriculture Natural Resources Division TTD 635 Capitol St., N.E. Salem, OR 97301-2532	(503) 986-4699 (503) 986-4762
Oregon Emergency Response (System OERS)	(800) 452-0311

Be prepared to provide the following information:

Your name and contact information.
Farm location (driving directions) and other pertinent information.
Description of emergency.
Estimate of the amounts, area covered, and distance traveled.
Whether manure has reached surface waters or major field drains. Include the name of the surface water source that manure reached. Contact the Oregon Emergency Response System if manure entered a drinking water source.
Whether there is any obvious damage: employee injury, fish kill, or property damage.
If a grab sample of the discharge was taken.
Current status of containment efforts.

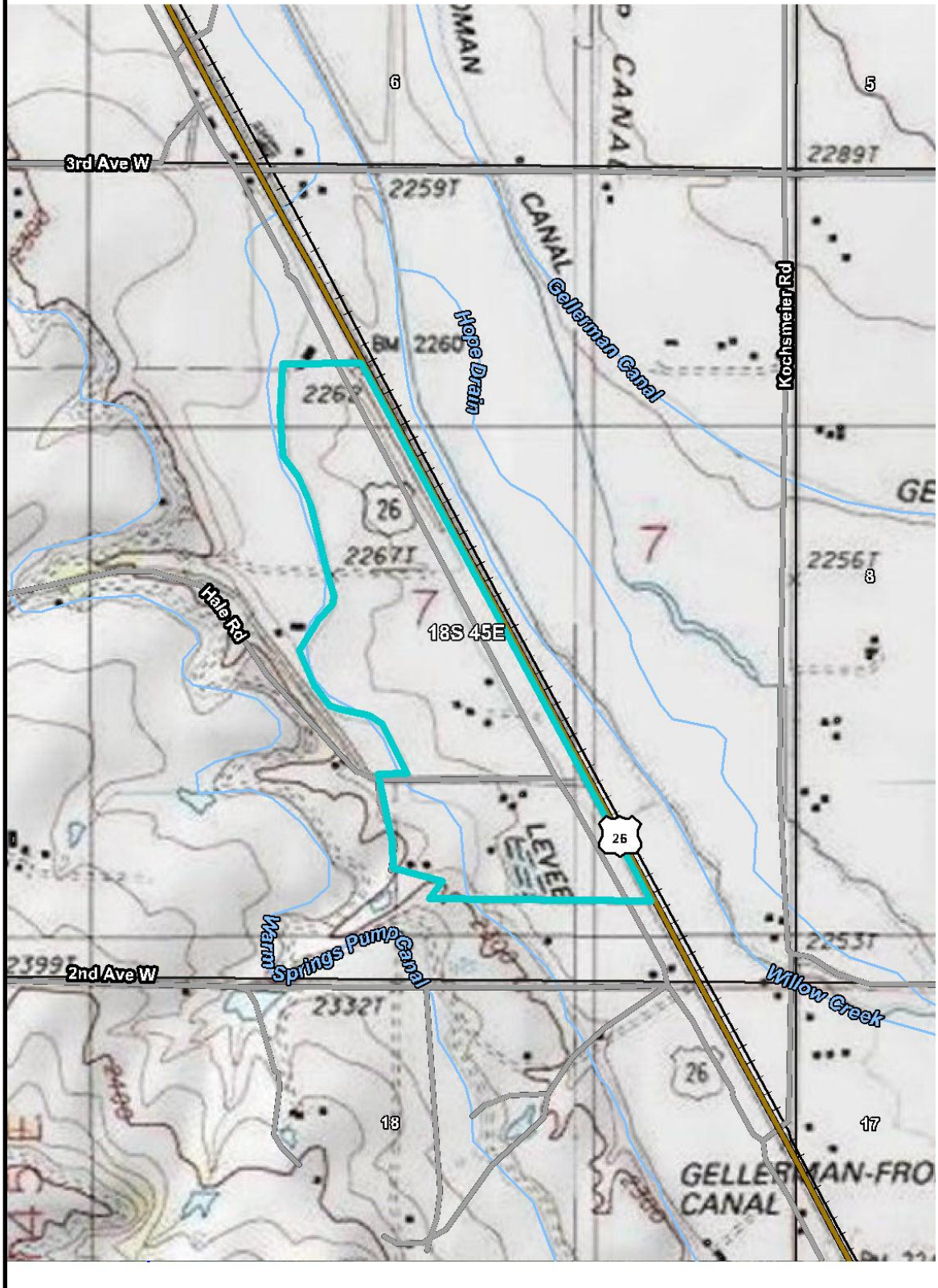
GENERAL INFORMATION

Location Maps for Van Berkum Dairy LLC



Topographical Maps for Van Berkum Dairy LLC

Topography Map—Malheur County, Oregon, Northeastern Part
(Van Berkum Dairy LLC)



Map Scale: 1:12,000 if printed on A portrait (8.5" x 11") sheet.

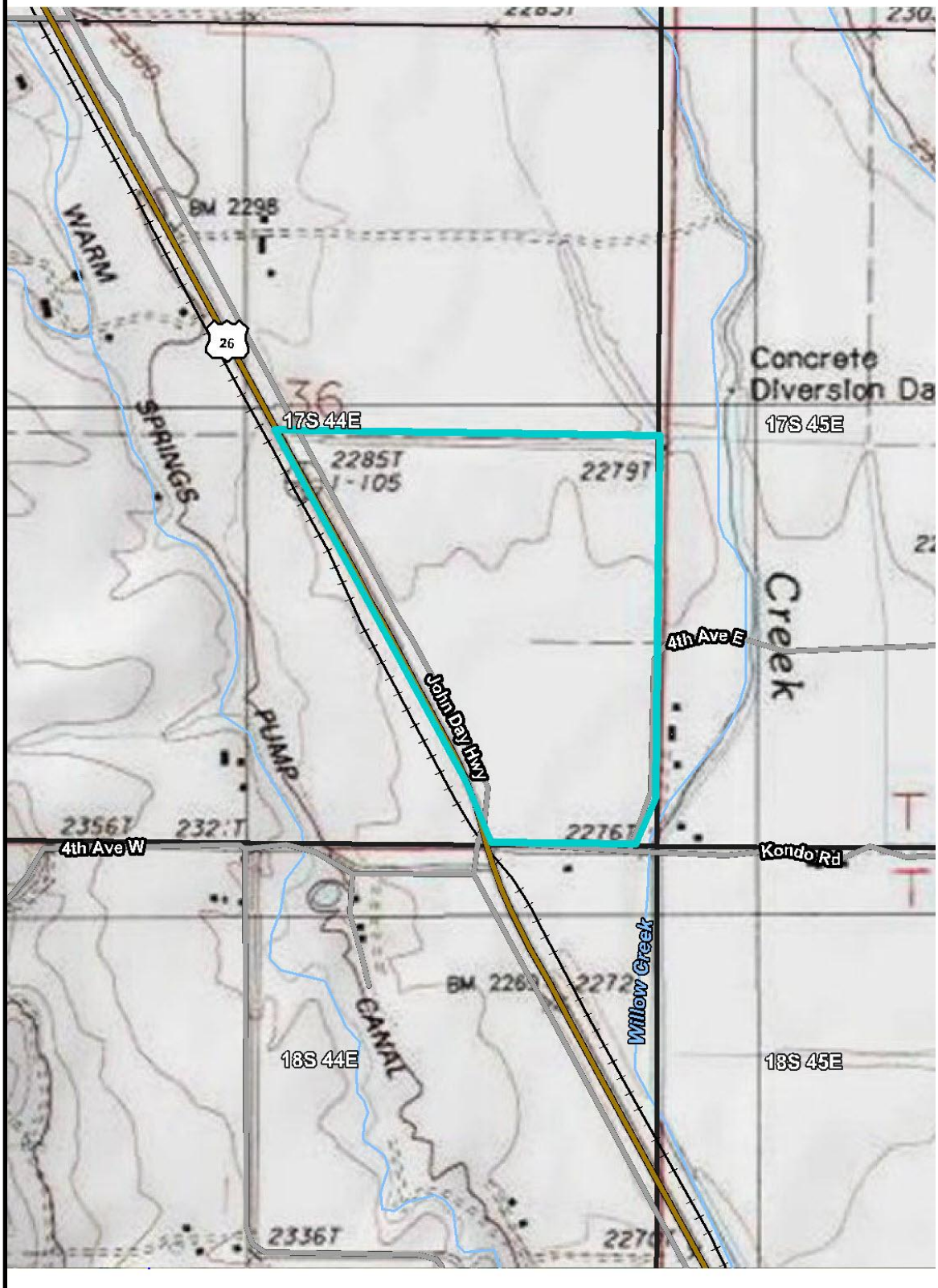
N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84

Topography Map—Malheur County, Oregon, Northeastern Part
(Van Berkum Dairy LLC- Heifer Farm)



Map Scale: 1:12,000 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84

Animal Mortality

To decrease non-point source pollution of surface and ground water resources, reduce the impact of odors that result from improperly handled animal mortality, and decrease the likelihood of the spread of disease or other pathogens, approved handling and utilization methods shall be implemented in the handling of normal mortality losses.
Animal mortalities must be handled in accordance to ORS 601.140 to prevent the discharge of pollutants to state waters. Animal mortalities will be managed to ensure that they are not disposed of in a liquid manure, storm water, process waste water storage or treatment system, or that is not specifically designed to treat animal mortalities.
Under no circumstances are animal mortalities to be disposed of in any type of liquid manure storage facility.

Guidance for Proper Management of Dead Animals
Refer to Plan for Catastrophic Animal Mortality Handling for guidance on what steps to take for a catastrophic animal mortality event. 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.

Acceptable methods and guidance for animal mortality disposal are:
Composting- Composting animal mortalities requires a composting plan be prepared and submitted to the Oregon Department of Agriculture, Natural Resources Division. A composting plan consists of a site plan drawing of the composting facility, a description of how any runoff from the facility will be contained, a description of the composting process to be used and how the compost will be used. The composting facility for animal mortalities must have a concrete floor or similar impervious surface to prevent nutrient leaching. A roof covering the animal mortality composting facility is recommended to control moisture added by rainfall and rainfall runoff. Assistance to develop a composting plan is available from the Natural Resources Division of the Oregon Department of Agriculture, (503) 986-4700. A permit is also needed from the Department of Environmental Quality (DEQ) if animal mortalities will be imported from other farms for composting.
Rapid composting of dead animals occurs when the carbon to nitrogen (C:N) ratio of the compost mix ranges between 10 and 20 to 1. To achieve the recommended C:N ratio, build the initial compost pile by placing 18 inches of sawdust or other bulking agent on the floor of the composting area. The bulking agent should extend beyond the perimeter of the animal to be composted by at least 2 feet. If using a compost bin the bulking material should extend at least 1 foot beyond the perimeter of the animal being composted. Using a bulking agent such as sawdust will absorb any liquids as the animal decomposes during the composting process.
Once the bulking agent has been placed on the floor of the composting area, place the animal carcass on top. To decrease composting time and prevent bloating the body cavity should be cut open. Cover the carcass with 1 to 3 feet of separated manure solids or other material that has a moisture content between 30 to 60 percent and a C:N ratio of not more than 30 to 1. Use 1 foot of material for small carcasses and 3 feet for large carcasses such as cattle. Be careful not to add material that is to wet as it will hinder the composting

process and cause odors. Small animals can be layered in a compost pile by placing 12 inches of the bulking agent between layers as shown in the figure below. Be sure the total height of the compost pile does not exceed 7 feet in height as it may spontaneously combust causing a fire.
The first heating or primary composting cycle will take approximately 15 to 90 days depending on the size of the animal being composted. Refer to the table below for estimated primary composting times. Check pile temperature using thermometer probe on a daily basis. The pile temperature should be checked at multiple points around the compost pile and at a point approximately 3 feet into the pile. The temperature of the compost pile should reach 130 degrees Fahrenheit (F) within a few days. Temperatures should peak between 130 and 150 degrees F in 3 to 4 days. When the temperature of the compost pile falls below 130 degrees F, the compost needs to be aerated by turning or other means. Be sure carcasses remain covered with the bulking agent after being aerated. It is important to maintain a temperature above 130 degrees F for at least 7 days during the primary composting cycle as failure to do so may result in the incomplete destruction of pathogens and can cause fly and odor problems. After aerating the compost pile, the secondary composting times will be similar to the first.
CAUTION: It is unclear whether prions that are the proteins that cause Bovine Spongiform Encephalitis (BSE or Mad Cow Disease) are destroyed in the composting process. Animals showing signs of Mad Cow Disease and those with anthrax should not be composted and must be reported to the Oregon Department of Agriculture, Animal Health and Identification Division at (503) 986-4680 for guidance on disposal.
After aerating the compost pile by turning or other means, be sure to check the moisture content and add water if necessary being careful not to add to much water. The compost pile should feel moist to the touch but you should not be able to squeeze any water out of it.
Odors given off by the composting operation is a good indicator of how the compost operation is proceeding. Foul odors may mean that the process has turned from aerobic to anaerobic. Anaerobic conditions are the result of insufficient oxygen in the compost. This may be caused by excessive moisture in the compost or the need for turning or aerating of the compost pile.
After the composting process is finished, it may be used as a bulking agent for a new compost pile. A rule of thumb is to use 50 percent of the composted material for a bulking agent but you may want to use more or less depending on how degraded the bulking agent is in the finished compost. Using finished compost in a new compost pile reduces the amount of bulking agent needed for the new pile and provides microbial inoculants to get the composting process started.
Finished compost can also be applied to crop and pasture land fields for utilization of the nutrients and organics in the composted material. Compost from animal mortalities should not be applied to crops that will be consumed directly by humans. The nutrient content of the composted material should be determined and application equipment calibrated to ensure nutrients contained in the composted material are not over applied.

Natural Disposal- To allow nature to take its course the dead animal needs to be transported to a location at least ½ mile from any off-farm dwelling and at least ¼ mile from any water way in accordance with ORS 601.140. Once this criteria is met the carcass can be left to degrade naturally with the help of scavengers. This method is not an acceptable means of disposal for a large number of animal mortalities or for byproducts generated during butchering.

Landfill- Dead animals may be transported to a permitted landfill that accepts animal carcasses for disposal. Be sure to call the chosen landfill first to insure a landfill will accept your animal carcasses. Refer to the website given previously for permitted landfills to call. Contact the landfill operator and the DEQ at (800) 452-4011 if the landfill you would like to use is not a permitted facility to see if an exception may be granted for the disposal of animal carcasses.

Incineration- Dead animals may be burned as a method of disposal and as a method to control diseases. The economics of incineration and availability of incineration units usually make this option undesirable. A permit is needed from the Oregon Department of Environmental Quality (DEQ) Air Quality program to operate an incineration unit. Contact your DEQ at (800) 452-4011 for guidance on incineration of animal carcasses.

Burial- Dead animals may be buried in accordance with ORS 601.090(7) as a method of disposal. Large animals such as an adult cow will require a hole approximately 2 feet by 7 feet by 8 feet deep. Be sure to select a site that doesn't have a water table to insure the bottom of the hole will be dry. The animal carcass should be covered with hydrated lime and covered with at least 4 feet of soil mounded 2 feet above the natural ground line to allow for settling as the carcass decomposes. Burial sites should be located at least 500 feet down slope from surface waters or wells.
Burial is not an acceptable method of disposal for animal byproducts generated from butchering. Burial of large numbers of animal mortalities is not acceptable unless performed in accordance with a Catastrophic Animal Mortality Management Plan. Burial of imported animal mortalities is subject to disposal regulations and the Oregon Department of Environmental Quality (DEQ), the Oregon Department of Agriculture (ODA) and the local land use planning authority should be contacted.

Plan for Catastrophic Animal Mortality Handling

The following information describes how you plan to manage catastrophic loss of animals in a manner that protects surface and ground water quality. You must follow all national, state and local laws, regulations and guidelines that protect soil, water, air, plants, animals and human health.

Guidance in the event of a catastrophic animal mortality event:
Remove animal mortalities from the livestock production area and place in an area designated for mortality storage to be determined at the time of the catastrophic event.

Contact the state veterinarian if animal death is suspicious or animal displayed unusual symptoms before death.
If it is determined that a disease outbreak may be eminent, implement procedures as directed by the State Veterinarian. This may include killing exposed animals, burning carcasses and burial of ashes in a predetermined catastrophic mortality burial areas.
Refer to state guidance regarding appropriate catastrophic animal mortality handling methods.

Contact Information-

Organization	**Phone Number**
Oregon Department of Agriculture Natural Resources Division 635 Capitol St. NE Salem, OR 97301-2532	(503) 986-4699 TTD- (503) 986-4762
Oregon Emergency Response System (OERS)	(800) 452-0311
Oregon State Veterinarian USDA APHIS 530 Center Street NE, Suite 335 Salem, OR 97301	(503) 378-4710 (503) 399-5871 Fax- (503) 399-5607

Operation and Maintenance Considerations

WASTEWATER COLLECTION TANK-

The wastewater collection tank shown on the Production Area Map is used to collect and temporarily store wastewater and solids containing manure generated by the farm. Wastewater and solids temporarily stored in the wastewater collection tank is periodically pumped to the lagoons. Any annual buildup of solids in the wastewater collection tank must be removed to maintain design capacity and applied to land application areas in accordance with guidance given in Section 3, Utilization Area.

Inspect the collection tank weekly to insure structural integrity. If the structural integrity of the tank is compromised, immediately empty the tank to determine the cause and make necessary repairs before putting the tank back into service. For tanks that develop minor seeps or leaks visible on the exterior, the leaks must be repaired to maintain the structural stability of the tank. Hydraulic Cement may be a viable, alternate repair method. Hydraulic Cement must be applied according to the directions provided by the cement manufacturer. Hydraulic Cement may be applied to either the inside (preferred) or outside of the tank. If repair(s) are made to the inside of the tank, the permittee should photo document the repair since it may be submerged by liquid during an inspection. If future inspections show minor leaks are still present after a repair is made using Hydraulic Cement, consult an engineer for other potential repair options. Do not allow equipment that exceeds the design limit of the tanks on or within 20 feet of the structure.

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 collection tank completely empty during the summer months and cleanout any debris and other solid materials that may have accumulated in the tank. Inspect the tank 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, Utilization Area, when applying wastewater to fields.

Do not dispose of animal carcasses in the wastewater collection 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.

WASTEWATER STORAGE LAGOONS-

The wastewater storage lagoons shown on the Production Area Map are used to store wastewater containing manure generated by the farm. The storage capacity and estimated storage period for the wastewater storage lagoons are shown on the Summary pages.

Emptying of the wastewater storage lagoons 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 storage lagoons

must be as empty as possible in the fall before the fall and winter rainy season begins. Any annual sludge buildup in the wastewater storage lagoons must be removed to maintain design capacity and applied to land application areas in accordance with guidance given in Section 3, Utilization Area.
Inspect the wastewater storage lagoons weekly to insure structural integrity and that at least 1 foot-6 inches of freeboard is being maintained to accommodate excess rainfall such as a 25 year-24hour storm and prevent overtopping embankment. If the structural integrity of a wastewater storage lagoon embankment is found to be compromised, immediately draw the liquid level down below the damaged area to determine the cause. Seek the services of a qualified engineer to assess the damage and recommend necessary repairs before allowing wastewater levels above the damaged area.
Pump the wastewater storage lagoons to the lowest level possible during the summer months and inspect the embankments for structural damage. If structural damage to the embankment of a wastewater storage lagoon is discovered, seek the services of a qualified engineer to assess the damage and recommend necessary repairs before allowing wastewater levels above the damaged area. Follow the guidance given in Section 3, Utilization Area, when applying wastewater to fields.
Do not permit livestock access to the lagoons or on the lagoon embankments. Control undesirable vegetation growth by spraying or mowing. Control rodents as necessary. Check elevations of earthfills periodically and restored to grade and shape as necessary. Fill and reseed eroded embankment areas or repair with well graded rock riprap. Safety features such as signs and fences should be kept in good repair.
Do not dispose of animal carcasses in any wastewater storage facility. It is against the law to do so.

SOLIDS STORAGE AREAS-

The solids storage areas shown on the Production Area Map is used to store solids containing manure generated by the farm. The storage capacity and estimated storage period for the solids storage areas are shown on the Summary pages. Emptying of the solids storage areas should begin in the spring and continue through the spring and summer months as weather conditions permit applying solids in accordance with the guidance given in Section 3, Utilization Area. To function properly and have the greatest management flexibility, the solids storage areas 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 area.
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.
Inspect rain gutters, downspouts, pipelines, trash guards, pumps, structures and appurtenances for proper operation. Keep them free of all foreign material, weeds and sediment. Repair or replace any damaged component as needed.
Keep downspouts and outlets free flowing. Repair or replace broken rodent guards as needed. If the hydraulic capacity is insufficient, replace gutters (and downspouts if needed or make provisions for the waste management system to handle the extra water.

Protect downspouts from damage by livestock and equipment and repair any damaged components as needed.
Keep gutters, downspouts, pumps, conveyance pipelines and ditches and appurtenances in good operating condition with O & M performed as per site specific recommendations for each component.

COMPOSTING AREAS-
The composting areas shown on the Production Area Map are used to compost solids containing manure and store compost until it can be recycled for bedding, exported or applied to the crop land fields. Emptying of the composting facility should begin as soon as possible in the spring after the composting process has been completed and the compost has been allowed to complete the curing process. Emptying should continue throughout the spring and summer months exporting or applying the composted solids to the crop land fields in accordance with the guidance given in Section 3, Utilization Area. To function properly and have the greatest management flexibility, the composting ares must be as empty as possible in the fall before the rainy season begins.
The cause for any excess leachate from the composting process during the seasonal composting process performed in farm fields will be determined the operator and take immediate corrective action such as turning the windrow pile(s) and inspecting the feedstock and compost for the presence of excess leachate.
Guidance for the composting process-
Take a representative sample of the raw compost mixture and have a laboratory determine the moisture content, pH, and the carbon and nitrogen content.
The carbon to nitrogen ratio should range between 25 and 40 to 1. Make adjustments as needed to the ingredients of the raw compost mixture as necessary to achieve a carbon to nitrogen ratio within the acceptable range.
The moisture content should be between 40 and 60 percent. Add water or drier material to adjust the moisture content. Care must be taken to see that the carbon to nitrogen ratio of the mix is still in the 25 – 40 to 1 range after adjusting the moisture content.
The pH preferably should range between 6.5 and 8 however composting may be achieved between a pH of 5.5 and 9.0.
Check pile temperature using thermometer probe on a daily basis. The pile temperature should be checked at a point one-third the distance from the outside of the pile to the center of the mass. Initially it will take approximately 2 to 3 days for the compost to get above 105 degrees F. Compost temperatures should peak between 130 and 140 degrees F in 5 to 7 days. When the temperature of the compost material falls below 110 degrees F the compost needs to be aerated by turning or other means. Failure to achieve the desired temperatures may result in the incomplete destruction of pathogens and weed seeds and can cause fly and odor problems.
Odors given off by the composting operation is a good indicator of how the compost operation is proceeding. Foul odors may mean that the process has turned from aerobic to anaerobic. Anaerobic conditions are the result of insufficient oxygen in the compost. This may be caused by excessive moisture in the compost or the need for turning or aerating of the compost material.
For a well managed windrow or static pile composting operation, the composting time during the summer months should range from 14 days to a month. To ensure a finished compost, observe that the composted material has little or no trace of the original raw material and has little odor. The material should be black to brown in color. Particle size should be consistent and soil-like in texture.
All materials that are not considered feedstocks for the composting process (i.e. plastic ear tags, plastic gloves, etc…) are to be collected and transported to a permitted landfill by a garbage collection service or other means. It is anticipated that there will be no other material that will require offsite disposal.

PRODUCTION AREA

Periodically inspect concrete and asphalt slabs, walls and curbs and repair or replace broken sections as needed. Cleanup any spillage of composted material from outside of the composting area and place them back in the composting area.
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.

LIVESTOCK PENS-
Maintaining a firm, dry livestock pen surface is an important factor in maintaining a good environment that promotes good animal health.
Maintain diversions and drainageways so they direct clean water runoff away from the livestock pens and holding areas. Stormwater runoff from the livestock pens should be directed to storage or treatment areas.
Manure shall be contained in the livestock pens until it can be transferred to a storage area or applied to the fields for utilization of nutrients and organics. Manure accumulations created for bedding mounds shall be managed such that manure does not create a potential pollution hazard.
Take care to maintain the compacted layer when removing excess manure from the livestock pens.

DIKES AND BERMS-
Periodically check elevations of earthfills and restore to grade and shape, if necessary. All settlement or cracks in the dike should be investigated to determine the cause and immediately repaired.
Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization, and application of herbicides when necessary. Fertilize the established stand with at least 200 pounds of 21-0-0 per acre or equivalent annually or as needed to maintain a uniform vigorous stand. Avoid excess travel and uncontrolled grazing on any portion of the dike system that will harm or destroy vegetative cover. Periodic mowing or controlled grazing may also be needed to control height.
Maintain installed fences to prevent unauthorized human access or uncontrolled grazing of dike surfaces. Livestock can be used to control vegetation height, providing grazing is controlled to short periods of time when damage to the dike surface and vegetation will not result.
Check all erosion control sections for accelerated weathering and displacement of materials. Replace to original shape and grade if necessary.
Immediately repair any vandalism, vehicular, or livestock damage to the dike or other appurtenance.
Eradicate or otherwise remove all rodents or burrowing animals and repair any damage caused by their activity.

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.

CULVERTS-
Culverts should be inspected at least once annually. Inspect culverts after large rainfall

events to insure no damage has been done to the culvert that would prevent it from functioning as intended. Remove any debris that may affect the culverts capacity. Any damage to the culvert and surrounding area should be repaired as soon as possible.

HEAVY USE AREAS-

Periodically inspect concrete and asphalt slabs and curbs and repair or replace broken sections as needed. Prevent manure from building up next to the curbs or over topping them.

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-

Apply irrigation water and wastewater in accordance with Irrigation Water Management guidance in Section3.

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.

Maintain screening and filtering facilities.

Maintain vigorous vegetative growth where applicable.

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 wastewater applications with clean water following an 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.
Annually inspect underground pipelines for proper operation. Check fields for signs of positive pressure (blow holes) or negative pressure (sink holes) in underground pipelines. Repair or replace damaged or broken pipelines as needed maintaining designed depth of cover.
For free draining underground pipelines, keep outlets free of vegetation and sediment. Correct and prevent erosion at outlets by installing riprap or other measures. Repair or replace damaged or broken rodent guards as needed.
Avoid travel over underground pipelines with heavy equipment when the soil is saturated except at crossings designed for this purpose.
Avoid any subsoiling operation that may disturb the underground pipeline.
Eradicate or otherwise remove all rodents and/or burrowing animals that have or can potentially damage any part of the system. Immediately repair any damage caused by their activity.
Immediately repair any damage due to vandalism, vehicular or livestock.

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.

ROOF GUTTERS AND DOWNSPOUTS-
Periodically check gutters, downspouts and all above ground pipelines, trash guards, pumps, structures, and appurtenances for proper operation. Repair or replace if needed.
Periodically remove debris from gutters, downspouts and outlet facilities.
Protect downspouts from damage by livestock and equipment. Repair or replace damaged components as needed.
Keep gutters, downspouts, pumps, conveyance pipelines and ditches and appurtenances in good operating condition with O & M performed as per site specific recommendations for each component.

PRODUCTION AREA

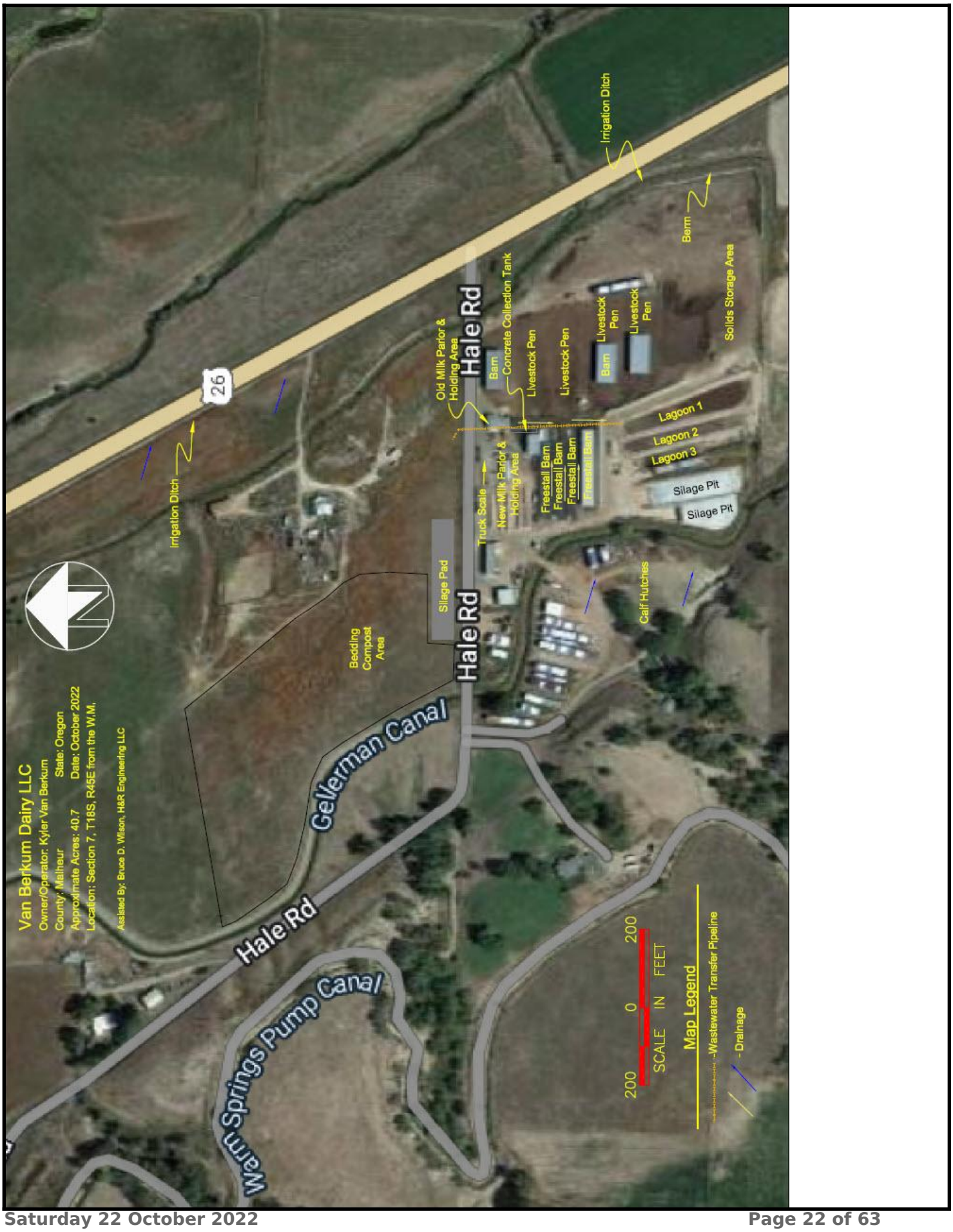
UNDERGROUND OUTLET(S)-
Check all above ground connections, valves, gates, trash racks, rodent guards, inlets and outlets to make sure they are functioning properly.
Maintain design depth of cover on all pipelines and structures.
Avoid operation of tillage and subsoiling equipment that could damage any component of the system.
Remove all foreign debris that hinders system operation.
Limit traffic over pipeline to designated sections that were designed for traffic loads.
Maintain vigorous growth of vegetative coverings. This includes reseeding, fertilization and application of herbicides when necessary. Periodic mowing may also be needed to control growth.
Eradicate of otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.

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.

PRODUCTION AREA

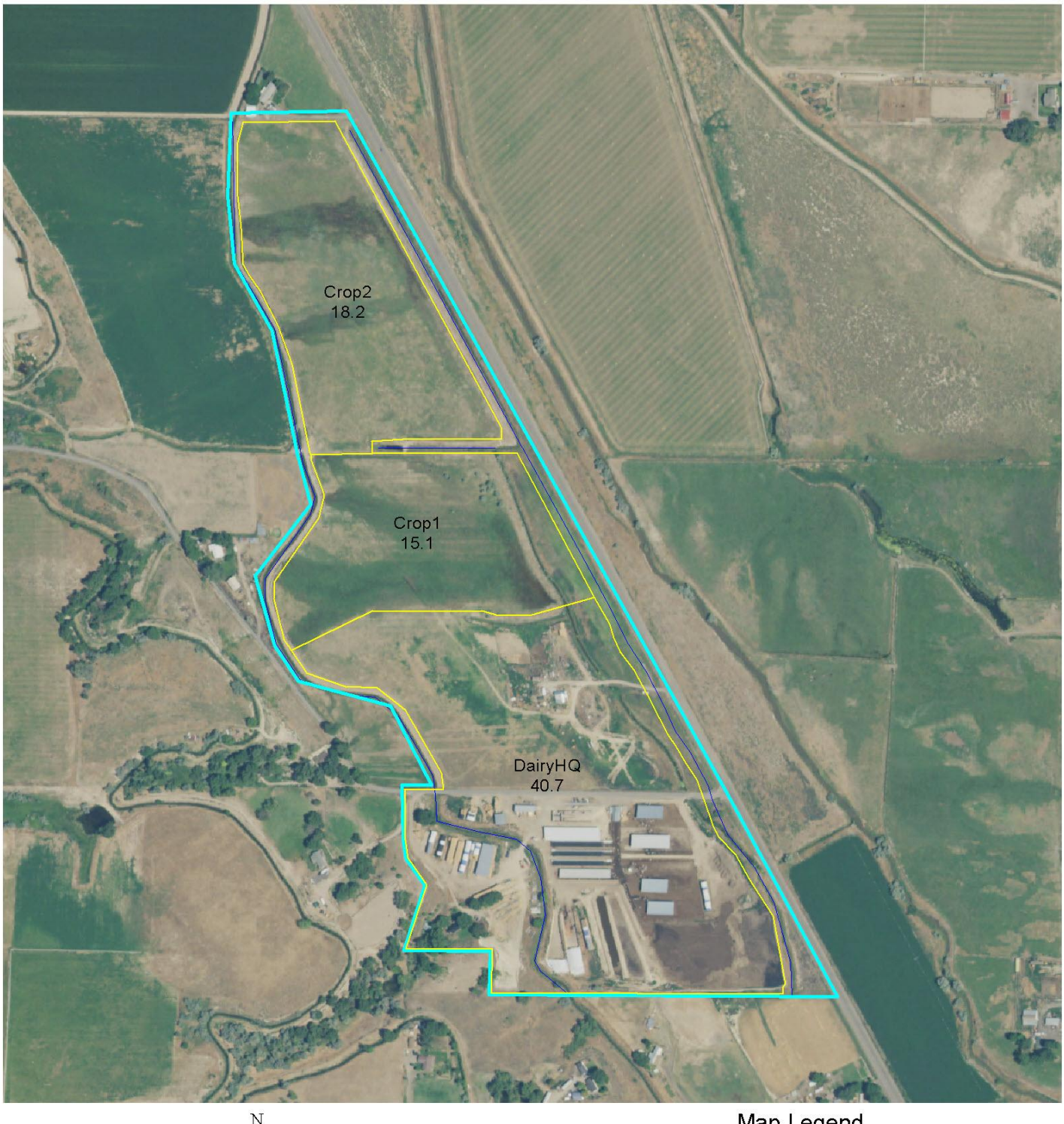
Production Area Maps for Van Berkum Dairy LLC



PRODUCTION AREA

Field Maps for Van Berkum Dairy LLC

Van Berkum Dairy



N
W E
S

Scale 0 500 1000 1500 Feet

Map Legend

Field Name
Acres - Field Boundary, Field Name, Acres

Van Berkum Dairy-Heifer Farm

N
W E
S

Scale 0 500 1000 1500 Feet

Map Legend

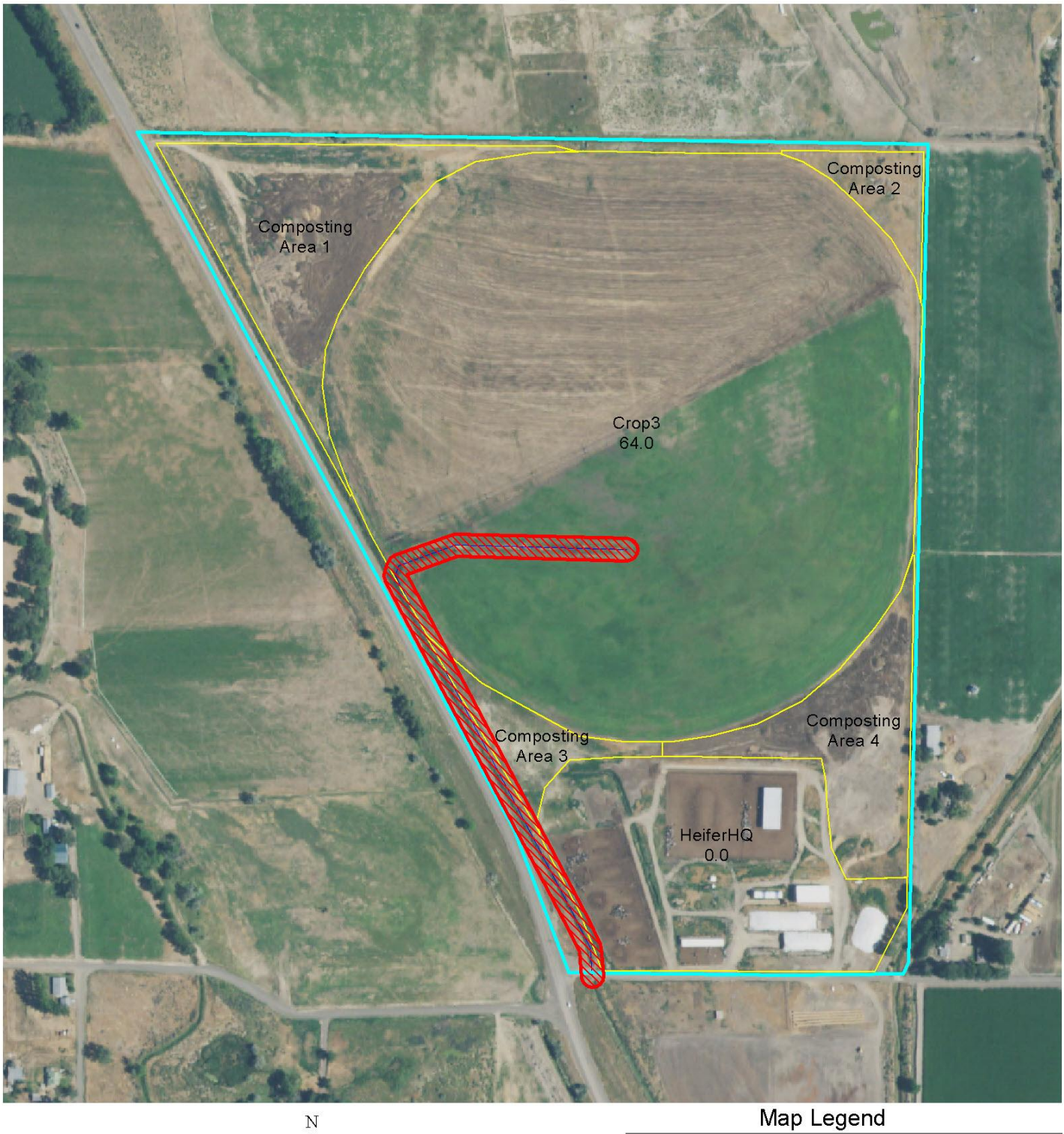
Field Name
Acres - Field Boundary, Field Name, Acres

UTILIZATION AREA

Setback Maps for Van Berkum Dairy LLC

UTILIZATION AREA

Van Berkum Dairy-Heifer Farm



N
W E
S

Scale 0 500 1000 1500 Feet

Map Legend

Field Name
Spreadable Acres - Field Boundary, Field Name, Spreadable Acres

- Setback Areas

Application Considerations

The manure and irrigation application systems will be calibrated in accordance with guidance in this section 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 buffer areas shown on the Setback Map in Section 3-2. Applications of wastewater and solids containing manure should be made in accordance with guidance in this section 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 Oregon Natural Resources Conservation Service Phosphorus Index and is shown in the table in Section 4-3. Wastewater, solids and commercial fertilizer for any field with a LOW runoff rating can be applied on a nitrogen basis. Wastewater, solids and commercial fertilizer for any field with a MEDIUM or HIGH runoff rating must be applied on a phosphorus basis. No applications of manure or commercial fertilizer containing phosphorus are to be made on a field with a ZERO OUT phosphorus runoff rating.

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.

T-Sum 200 is determined by monitoring surface air temperature and summing the daily minimum and maximum air temperatures and dividing the sum by two to get the average daily air temperature then converting that to centigrade (F degrees minus 32 times 0.556). Manure applications may begin once 200 heat units have been accumulated. 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.

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 and with 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	Month and Setback Distance in Feet [a, b, d]											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Liquid	Big gun	100	100	100	35	35	35	35	35	35	100	100	100
Liquid	Spreader Bar	100	100	35	35	35/15[c]	15	15	15	35	100	100	100
Liquid	Tank Wagon	100	100	35	35	35/15[c]	15	15	15	35	100	100	100
Liquid	Tanker Truck	100	100	35	35	35/15[c]	15	15	15	35	100	100	100
Solid	Spreader	100	100	35	35	35/15[c]	15	15	15	35	100	100	100

Note:

a. Setbacks are the distance between open waterways and manure application area.
b. 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.
c. This is a floating date and should be evaluated based on current weather conditions and forecast information.
d. Fifteen (15) feet is the suggested setback distance during summer months, however larger and/or smaller distances may be set depending on conversations with the ODA.

Record applications, transfers or exports of nutrients (manure and fertilizer) and maintain them for at least 5 years. The CAFO Recordkeeping Calendar or other acceptable record keeping systems can be used to record this information.

CONSIDERATIONS FOR DRY SEASON MANURE APPLICATIONS:

Apply wastewater and solids containing manure at agronomic rates using the following guidelines:
-Consider using T-Sum 200 as a guideline to begin making manure applications.
-Do not apply to soils immediately before or during rainfall events that are expected to result in saturated soils or surface runoff.
-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.
-Maintain the setback buffer distances described in this section and shown on the Setback Map 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 other acceptable record keeping systems can be used to record this information.

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 CANNOT 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 buffer distances described in this section and shown on the Setback Map when making applications of liquids or solids containing manure.
- Do not apply to soils immediately before or 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 4-1 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 other acceptable record keeping systems can 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.

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.

UTILIZATION AREA

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	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	27,152
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).
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.

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.

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 sq ft per acre divided by 2,000 lbs/ton).
The factor for converting square feet to acres = 43,560 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:
Desired manure application rate based on soil and manure tests,
Width of the manure spread, and
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.

AMOUNT OF MANURE TO APPLY FOR CROPS GROWN

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 Yield Units per Acre X actual percent (%) dry matter (DM) of harvested crop/percent (%) dry matter (DM) from table

Total P_2O_5 to apply in pounds = P in pounds per yield unit from the table for the crop grown X Yield Units per Acre X 2.291 P_2O_5/P X actual percent (%) dry matter (DM) of harvested crop/percent (%) dry matter (DM) from table

Total K_2O to apply in pounds = K in pounds per yield unit from the table for the crop grown X Yield Units per Acre X 1.205 K_2O/K X actual percent (%) dry matter (DM) of harvested crop/percent (%) dry matter (DM) from table

Example- for a field with 5 tons per acre of grass/legume hay harvested at 90% dry matter:

Total N to apply in pounds per acre = (33.92 lb N / ton) X (5 tons / acre) X (90%DM / 100% DM) = 153 lbs N / acre

UTILIZATION AREA

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

FRUIT OR VEGETABLES				**Nutrient Removal (lb/yield unit)**		
	Yield Unit	**lb/Unit**	**% DM**	**N**	**P**	**K**
Beans, dry edible	cwt	100	100	3.13	0.45	0.85
Blueberries	ton	2000	100	13.93	1.30	11.57
Caneberries	ton	2000	100	11.43	7.42	11.43
Corn, Sweet	ton	2000	100	20.67	5.60	13.66
Grapes	ton	2000	100	11.39	1.07	20.43
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	30.0	5.45	47.27
Squash	ton	2000	100	21.33	6.80	11.40

GRAIN, SEED OR OIL CROPS				**Nutrient Removal (lb/yield unit)**		
	Yield Unit	**lb/Unit**	**% DM**	**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	1.97	0.20	2.00
Fescue, seed (Fine or Tall)	lb	1	100	1.47	0.31	1.67
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 & Stems Removed	ton	2000	100	87.23	36.80	57.80
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	1.67	0.27	1.42
Ryegrass Seed, Straw Removed	ton	2000	100	30.00	18.80	37.60
Ryegrass, Perennial seed	lb	1	100	0.02	0.002	0.004
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

UTILIZATION AREA

HAY AND PASTURE CROPS				Nutrient Removal (lb/yield unit)		
	Yield Unit	**lb/Unit**	**% DM**	**N**	**P**	**K**
Alfalfa, Hay	ton	2000	100	54.40	6.83	35.70
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	27.00	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
Sorghum-Sudan Haylage	ton	2000	100	54.40	6.40	58.00
Tall Fescue Hay/Pasture	ton	2000	100	39.40	4.00	40.00
Vetch Hay	ton	2000	100	51.93	7.20	44.76

SILAGE AND HAYLAGE CROPS				Nutrient Removal (lb/yield unit)		
	Yield Unit	**lb/Unit**	**% DM**	**N**	**P**	**K**
Alfalfa/Grass Haylage	ton	2000	100	15.60	1.02	6.84
Corn for Silage	ton	2000	100	25.00	4.00	20.00
Crimson Clover forage	ton	2000	100	40.00	4.48	33.28
Field Pea, Forage	ton	2000	100	73.60	8.00	18.00
Mustard, White	ton	2000	100	38.55	0.0	0.0
Oat haylage	ton	2000	100	26.0	10.2	14.8
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	17.40
Triticale Haylage	ton	2000	100	49.00	6.80	11.40
Vetch Haylage	ton	2000	100	59.67	6.57	50.00
Wheat Haylage	ton	2000	100	41.30	5.00	57.30
Wheatgrass Hay/Pasture	ton	2000	100	49.59	6.21	68.76

OTHER CROPS				Nutrient Removal (lb/yield unit)		
	Yield Unit	**lb/Unit**	**% DM**	**N**	**P**	**K**
Filberts	ton	2000	100	41.70	7.30	39.29
Hops, Cones	bale	200	100	9.00	0.96	5.00
Natural Area (Trees & 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
Hemp/Cannabis	ton	2000	100	31.09	3.37	36.23

Note: Nutrient uptake values are taken from the NRCS National Agricultural Waste Management Field Handbook and updated with more current information from the Extension Service when available. When nutrient uptake values are not available from NRCS or Extension references, then nutrient uptake data from the NRCS Plant Database or other approved data sources is used.

Nutrient Applications

Nutrient Applications Report

Van Berkum Dairy LLC

Vale

Crop1

Date	Source	Equipment Used	% of Field	Amount Applied	N lbs/ac	P_2O_5 lbs/ac	K_2O lbs/ac
03/10	Lagoon 1	Tank Wagon	100	92,340 CF	110	128	220
05/01	Grazing activity	Milker - Dry	100	370 CF	192	141	93
06/01	Grazing activity	Milker - Dry	100	358 CF	186	137	90
10/01	Grazing activity	Milker - Dry	100	370 CF	192	141	93
				Crop1 Totals:	680	547	496

Crop2

Date	Source	Equipment Used	% of Field	Amount Applied	N lbs/ac	P_2O_5 lbs/ac	K_2O lbs/ac
03/24	Lagoon 2	Tank Wagon	100	41,050 CF	40	47	81
04/07	Lagoon 3	Tank Wagon	100	22,164 CF	22	25	44
07/01	Grazing activity	Milker - Dry	100	370 CF	159	117	77
08/01	Grazing activity	Milker - Dry	100	370 CF	159	117	77
09/01	Grazing activity	Milker - Dry	100	358 CF	154	113	75
				Crop2 Totals:	535	420	354

Crop3

Date	Source	Equipment Used	% of Field	Amount Applied	N lbs/ac	P_2O_5 lbs/ac	K_2O lbs/ac
05/05	Heifer Solids Storage	Solids Spreader	100	36,388 CF	191	91	126
10/06	Heifer Solids Storage	Solids Spreader	100	36,388 CF	191	91	126
				Crop3 Totals:	383	181	252

Sampling Guidance

Manure and Soil Sampling Frequency

For large concentrated animal feeding operations, sample liquids and solids containing manure during applications in early spring annually and have each sample analyzed for Total Nitrogen (TKN), Ammonium Nitrogen (NH_4-N), Phosphorus (P_2O_5) and Potassium (K_2O) 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), https://www.mda.state.mn.us/licensing/licensetypes/mapprogram.aspx.

For small and medium animal feeding operations, if no samples of liquids and solids containing manure have been taken, take a sample of liquids and solids during applications in early spring once a year for three consecutive years to develop a cumulative manure analysis history as a basis for nutrient allocation to the fields. If there is a sampling history of liquids and solids containing manure, take a sample of liquids and solids during applications in early spring once every 5 years or whenever a significant change in animal numbers or in the manure handling system occurs. Have each sample analyzed for Total Nitrogen (TKN), Ammonium Nitrogen (NH_4-N), Phosphorus (P_2O_5) and Potassium (K_2O) 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), https://www.mda.state.mn.us/licensing/licensetypes/mapprogram.aspx.

Large CAFO's are required to test a minimum of 20 percent of their fields annually which would result in all of the fields being tested once every 5 years. Small and Medium CAFO's are only required to test all of their fields once every 5 years. However, from a management standpoint, more frequent soil testing offers good information on the nutrient status of your soils.

Collect soil samples from 20 percent of the fields receiving solids or liquids containing manure **annually** in the fall after harvest or before rains begin(typically September 15-October 15) in accordance with **Pacific Northwest (PNW) Extension publication 570-E, "Monitoring Soil Nutrients Using a Management Unit Approach",** https://catalog.extension.oregonstate.edu/pnw570. 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.

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.

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"**, https://catalog.extension.oregonstate.edu/pnw570. **Oregon State University Extension publication EC1478, "Soil Test Interpretation Guide",** https://catalog.extension.oregonstate.edu/ec1478 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"**, https://catalog.extension.oregonstate.edu/pnw570, for guidance on how to evaluate nutrient applications and crop uptake of nutrients.

Manure Tests

Nutrient Analysis Report

Van Berkum Dairy LLC

Vale

Sample Date	Storage Name	Units	Total N	P_2O_5	K_2O	NH_4-N	NO_3-N	Org N	Density Lbs/CF
04/12/2022	Dairy Solids Storage	lbs/Ton	19.14	9.06	12.58	10.0	0.0	9.14	36.0
04/12/2022	Heifer Solids Storage	lbs/Ton	19.14	9.06	12.58	10.0	0.0	9.14	36.0
04/12/2022	Lagoon 1	lbs/1000gal	2.4	2.8	4.8	1.0	0.0	1.4	63.0
04/12/2022	Lagoon 2	lbs/1000gal	2.4	2.8	4.8	1.0	0.0	1.4	63.0
04/12/2022	Lagoon 3	lbs/1000gal	2.4	2.8	4.8	1.0	0.0	1.4	63.0
04/12/2022	Reception Tank	lbs/1000gal	2.4	2.8	4.8	1.0	0.0	1.4	63.0

Soil Tests

Soils Testing Report

Van Berkum Dairy LLC

1741 Hale Rd., Vale

Crop1

Test Date	Lab #	Sample ID	Depth	pH	BpH	SS (ppm)	OM %	Ex Carb	Bray P	Olsen P	K (ppm)	Mg	Ca	Na	NO3-N	NH4-N	S (ppm)	B (ppm)	Zn (ppm)	Mn (ppm)	Cu (ppm)	Fe (ppm)	Al (ppm)	Cl (ppm)
12/15/2021	44948	Dairy Pasture	12.0	7.6		0.68	5.3			48.0	979.0	429.0 ppm	3251.0 ppm	486.0 ppm	14.0 ppm	3.0 ppm	100.0	1.1	0.9	5.0	0.5	11.0		

Crop2

Test Date	Lab #	Sample ID	Depth	pH	BpH	SS (ppm)	OM %	Ex Carb	Bray P	Olsen P	K (ppm)	Mg	Ca	Na	NO3-N	NH4-N	S (ppm)	B (ppm)	Zn (ppm)	Mn (ppm)	Cu (ppm)	Fe (ppm)	Al (ppm)	Cl (ppm)
12/15/2021	44948	Dairy Pasture	12.0	7.6		0.68	5.3			48.0	979.0	429.0 ppm	3251.0 ppm	486.0 ppm	14.0 ppm	3.0 ppm	100.0	1.1	0.9	5.0	0.5	11.0		

Crop3

Test Date	Lab #	Sample ID	Depth	pH	BpH	SS (ppm)	OM %	Ex Carb	Bray P	Olsen P	K (ppm)	Mg	Ca	Na	NO3-N	NH4-N	S (ppm)	B (ppm)	Zn (ppm)	Mn (ppm)	Cu (ppm)	Fe (ppm)	Al (ppm)	Cl (ppm)
4/12/2022	3544	Feedlot #2	12.0	9.4		0.78	4.78			78.0	2978.0	799.0 ppm	4709.0 ppm	4069.0 ppm	47.0 ppm	3.0 ppm	239.0	11.3	1.3	3.0	1.7	8.0		

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/

Nutrient Balances

Nutrient Balances Report

Van Berkum Dairy LLC

Vale

Field	Acres	Crop	Yield	Nutrient Uptake (lbs/ac)			Nutrient Applied (lbs/ac)			Nutrient Balance (lbs/ac)		
				N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Crop1	15.1	Grass Hay/Pasture	12 Ton	695	220	577	680	547	496	(-15)	328	(-82)
Crop2	18.2	Grass Hay/Pasture	9.3 Ton	538	170	447	535	420	354	(-3)	250	(-94)
Crop3	65.5	Corn, Silage / Sorgum	15 Ton	555	223	467	383	181	252	(-172)	(-41)	(-215)

Transferred Nutrients

Transfers Report

Van Berkum Dairy LLC

Vale

Exported from	Date Transferred	Quantity	Analysis Available	Total N lbs	P_2O_5 lbs	K_2O lbs	Exported to
Dairy Solids Storage	08/04	5,462 Ton	Yes	104,542.68	21,600.05	57,022.38	Neighboring Farms
Dairy Solids Storage	09/08	5,462 Ton	Yes	104,542.68	21,600.05	57,022.38	Neighboring Farms
Dairy Solids Storage	10/06	5,462 Ton	Yes	104,542.68	21,600.05	57,022.38	Neighboring Farms
Heifer Solids Storage	02/03	5,462 Ton	Yes	104,542.68	21,600.05	57,022.38	Neighboring Farms
Heifer Solids Storage	03/03	5,462 Ton	Yes	104,542.68	21,600.05	57,022.38	Neighboring Farms
Heifer Solids Storage	04/07	5,462 Ton	Yes	104,542.68	21,600.05	57,022.38	Neighboring Farms
Heifer Solids Storage	05/05	5,462 Ton	Yes	104,542.68	21,600.05	57,022.38	Neighboring Farms
Heifer Solids Storage	06/02	5,462 Ton	Yes	104,542.68	21,600.05	57,022.38	Neighboring Farms
Heifer Solids Storage	07/07	5,462 Ton	Yes	104,542.68	21,600.05	57,022.38	Neighboring Farms
Lagoon 1	10/22	55,241 CF	Yes	991.69	505.01	1,645.95	Neighboring Farms
	Sub Totals:	2,786,241 CF		941,875.8	194,905.48	514,847.33	

Imported from	Date Transferred	Quantity	Analysis Available	Total N lbs	P_2O_5 lbs	K_2O lbs	Imported to
No Imports.				0	0	0	
	Sub Totals:	CF		0	0	0	
	Totals:	2,786,241 CF		941,876	194,905	514,847	

Cropping History

Cropping Report

Van Berkum Dairy LLC

Vale

Planted	Field	Acres	Crop	Yield	Nutrient Uptake (lbs/ac) N	P_2O_5	K_2O
01/01	Crop1	28.3	Grass Hay/Pasture	2 Ton	58	18	48
	Crop1 Totals:				58	18	48
01/01	Crop2	18.2	Grass Hay/Pasture	1 Ton	58	18	48
	Crop2 Totals:				58	18	48
01/01	Crop3	65.5	Sorgum	6 Ton	55	23	42
05/12	Crop3	65.5	Corn, Silage	9 Ton	25	9	24
	Crop3 Totals:				80	33	66

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.

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. More information about Oregon water rights can be found at http://www.oregon.gov/owrd/Pages/wr/index.aspx.

The irrigation system used to irrigate crops should be adapted for site conditions (soil, slope, crop grown, climate, water quantity and quality, etc.) and capable of applying water and wastewater to meet the consumptive use of the crop. The following table shows the estimated Available Water Holding Capacity (AWHC) and sprinkler intake rates by soil texture that should be considered in the design of the irrigation system.1/

Symbol	Soil Texture	AWHC Range (in/in)	Sprinkler Intake Rate Range (in/hour)
COS	Coarse Sand	0.01-0.03	1.0+
S	Sand	0.01-0.03	0.5+
FS	Fine Sand	0.05-0.07	0.5+
VFS	Very Fine Sand	0.05-0.07	0.5+
LCOS	Loamy Coarse Sand	0.06-0.08	1.0+
LS	Loamy Sand	0.06-0.08	0.4-1.5
LFS	Loamy Fine Sand	0.09-0.11	0.4-1.5
LVFS	Loamy Very Fine Sand	0.10-0.12	0.3-1.25
COSL	Coarse Sandy Loam	0.10-0.12	0.3-1.25
SL	Sandy Loam	0.11-0.13	0.3-1.25
FSL	Fine Sandy Loam	0.13-0.15	0.3-1.0
VFSL	Very Fine Sandy Loam	0.15-0.17	0.3-1.0
L	Loam	0.16-0.18	0.6-0.7
SIL	Silt Loam	0.19-0.21	0.5-0.7
SI	Silt Loam	0.16-0.18	0.5-0.7
SCL	Sandy Clay Loam	0.14-0.16	0.1-0.5
CL	Clay Loam	0.19-0.21	0.1-0.5
SICL	Silty Clay Loam	0.19-0.21	0.1-0.4
SC	Sandy Clay	0.15-0.17	0.1-0.4
SIC	Silty Clay	0.15-0.17	0.1-0.2
C	Clay	0.14-0.16	0.1-0.2

1/ Values in this table are taken from the Natural Resources Conservation Service National Engineering Handbook, Part 652, Irrigation Guide and are estimates based on soil texture and should only be used where local data is unavailable.

Irrigation water management requires knowledge, skills, and desire to determine when irrigation water should be applied. The main factors influencing IWM are irrigation interval (time between irrigations), irrigation set time (time water is applied), and application rate (rate at which water is applied). These parameters define the timing and duration of irrigation and the amount of water applied. System design and maintenance are also important factors influencing irrigation water management.

UTILIZATION AREA

Guidance given in the irrigation water requirements worksheets was developed based on Oregon State University Extension Miscellaneous 8530, Oregon Crop Water Use and Irrigation Requirements publication. For additional information on irrigation water management contact a professional with the required knowledge and skill. The following average monthly evapotranspiration and precipitation graphs can be used to estimate when to irrigate and how much to apply:

UTILIZATION AREA

Irrigation Water Flows, Volumes, and Relationships

Equation 1 -

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

wher

Q = flow rate (acre-in/hr or cfs)
T = time (hr)
D = gross depth applied (in)
A = area (acres)

Equation 2 -

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

wher

Q = flow rate (acre-in/hr or cfs)
A = area (acres)
D = gross depth applied (in)
F = irrigation period (days)
H = Hours of operation per

Water Flow

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 where:

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

Gpm for 5 ft/s velocity in PVC pipe:

6"	8"	10"	12"	14"
480	800	125	175	215

Water Volumes & Weights:

1 cubic foot = 7.48 gallons
= 62.4 lbs = 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

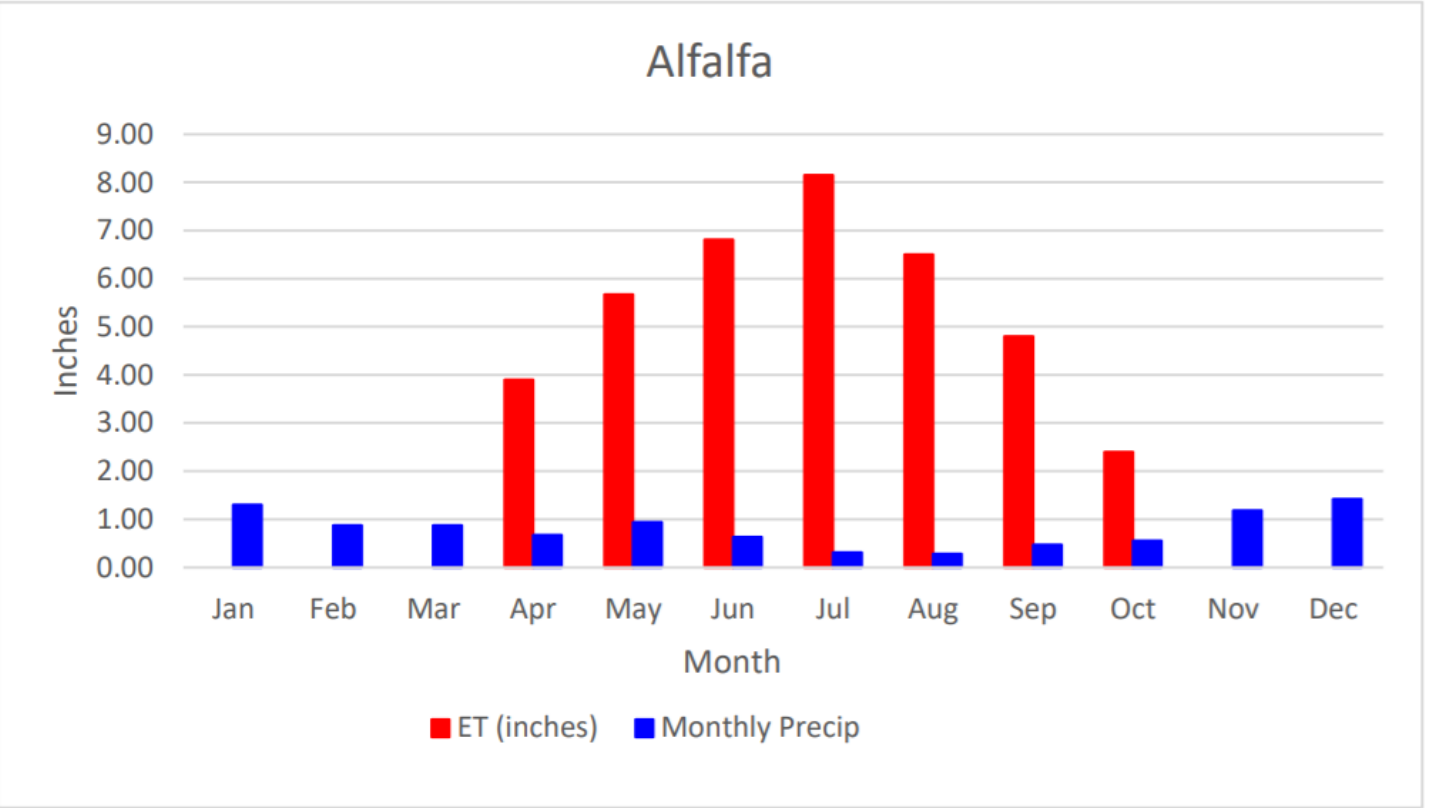
Pump Power Requirement

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

UTILIZATION AREA

Crop- Alfalfa
Region- Southeast

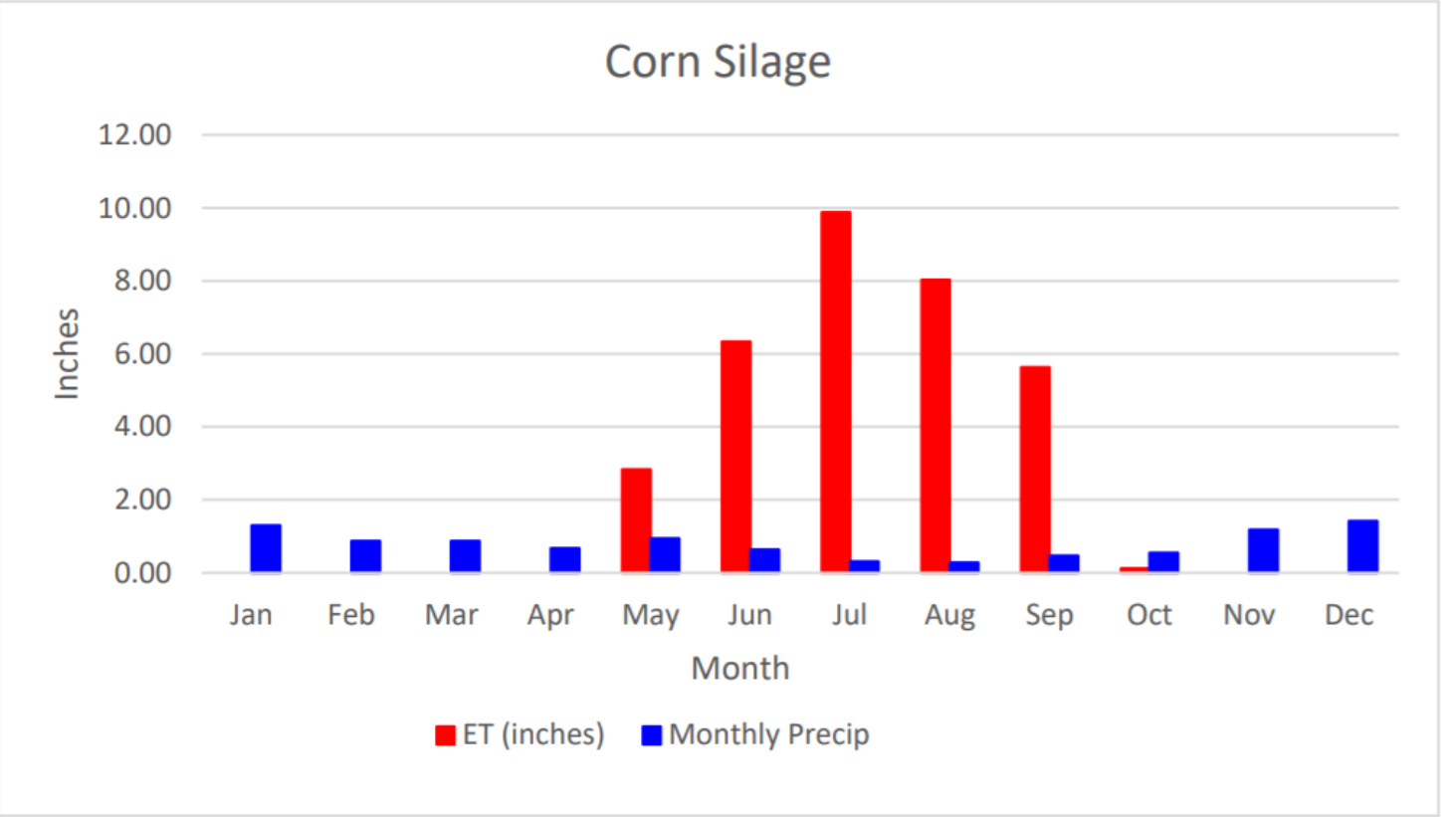
Total Seasonal Evapotranspiration-	38.23	Inches
Peak Evapotranspiration Rate-	0.27	Inches/Day
Maximum Allowed Depletion-	50	%
Critical Moisture Deficit Period-	Jul	



UTILIZATION AREA

Crop- Corn Silage
Region- Southeast

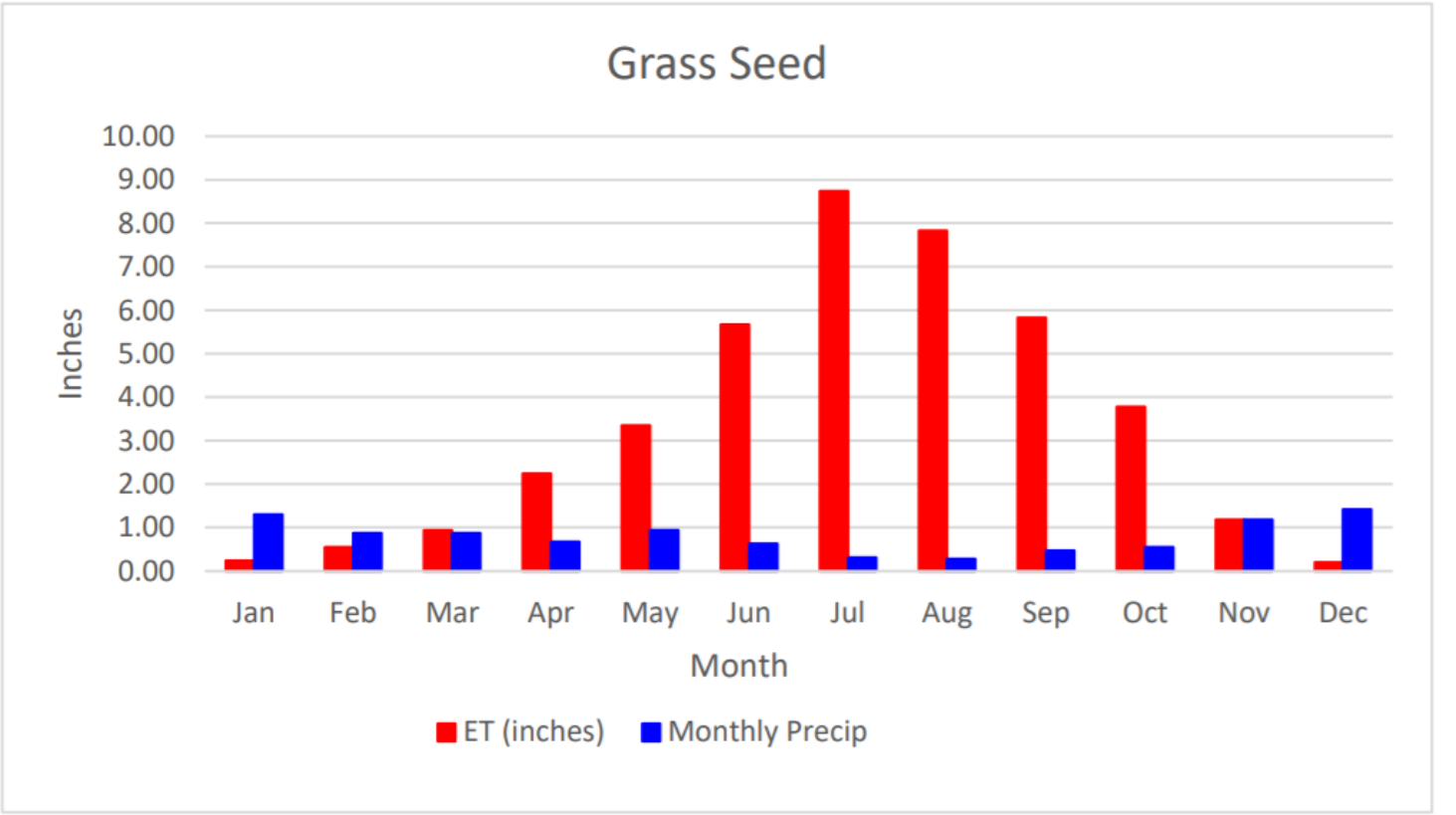
Total Seasonal Evapotranspiration-	32.83	Inches
Peak Evapotranspiration Rate-	0.33	Inches/Day
Maximum Allowed Depletion-	50	%
Critical Moisture Deficit Period-	Jul	



UTILIZATION AREA

Crop- Grass Seed
Region- Southeast

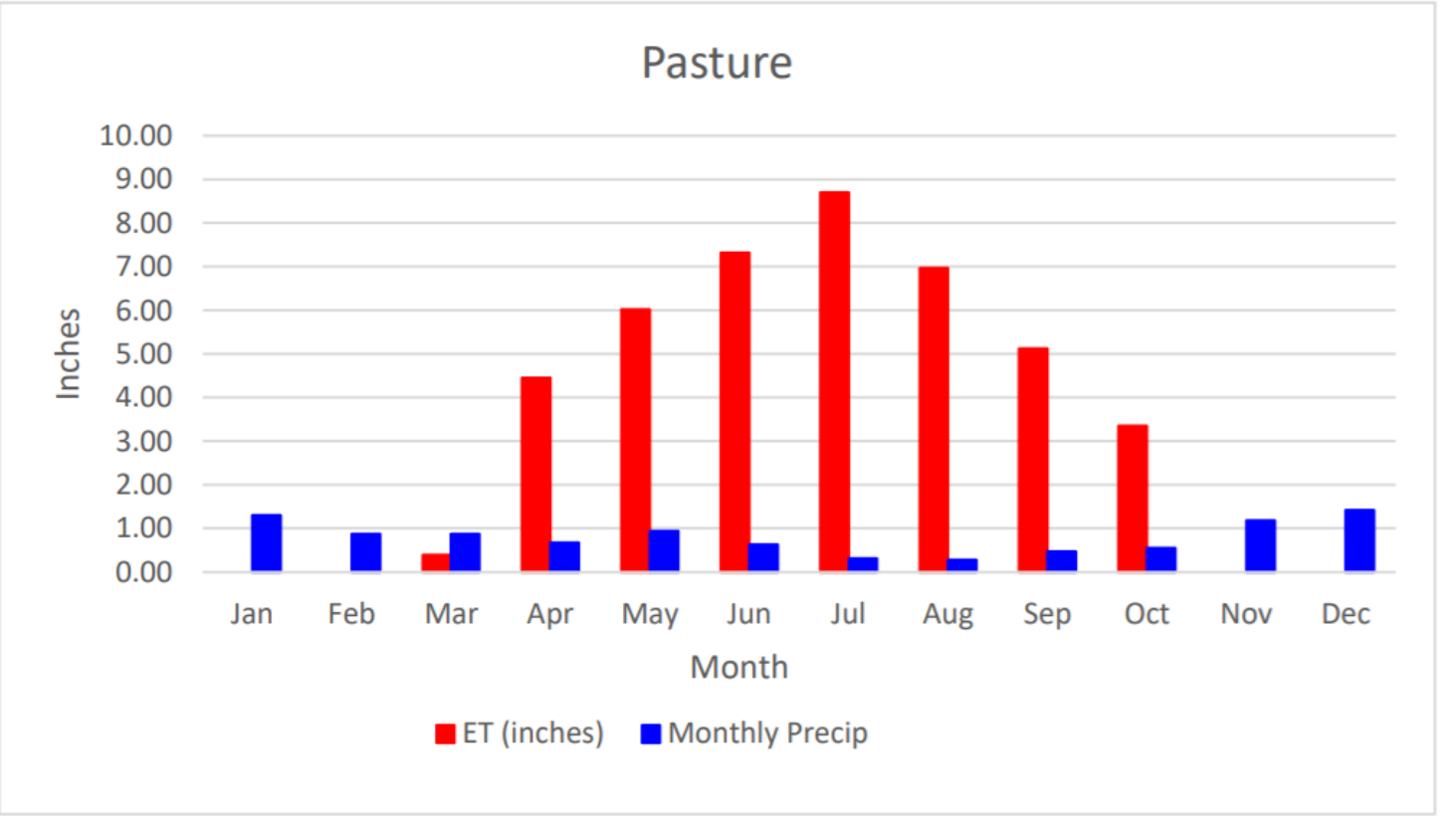
Total Seasonal Evapotranspiration-	40.55	Inches
Peak Evapotranspiration Rate-	0.29	Inches/Day
Maximum Allowed Depletion-	50	%
Critical Moisture Deficit Period-	Jul	



UTILIZATION AREA

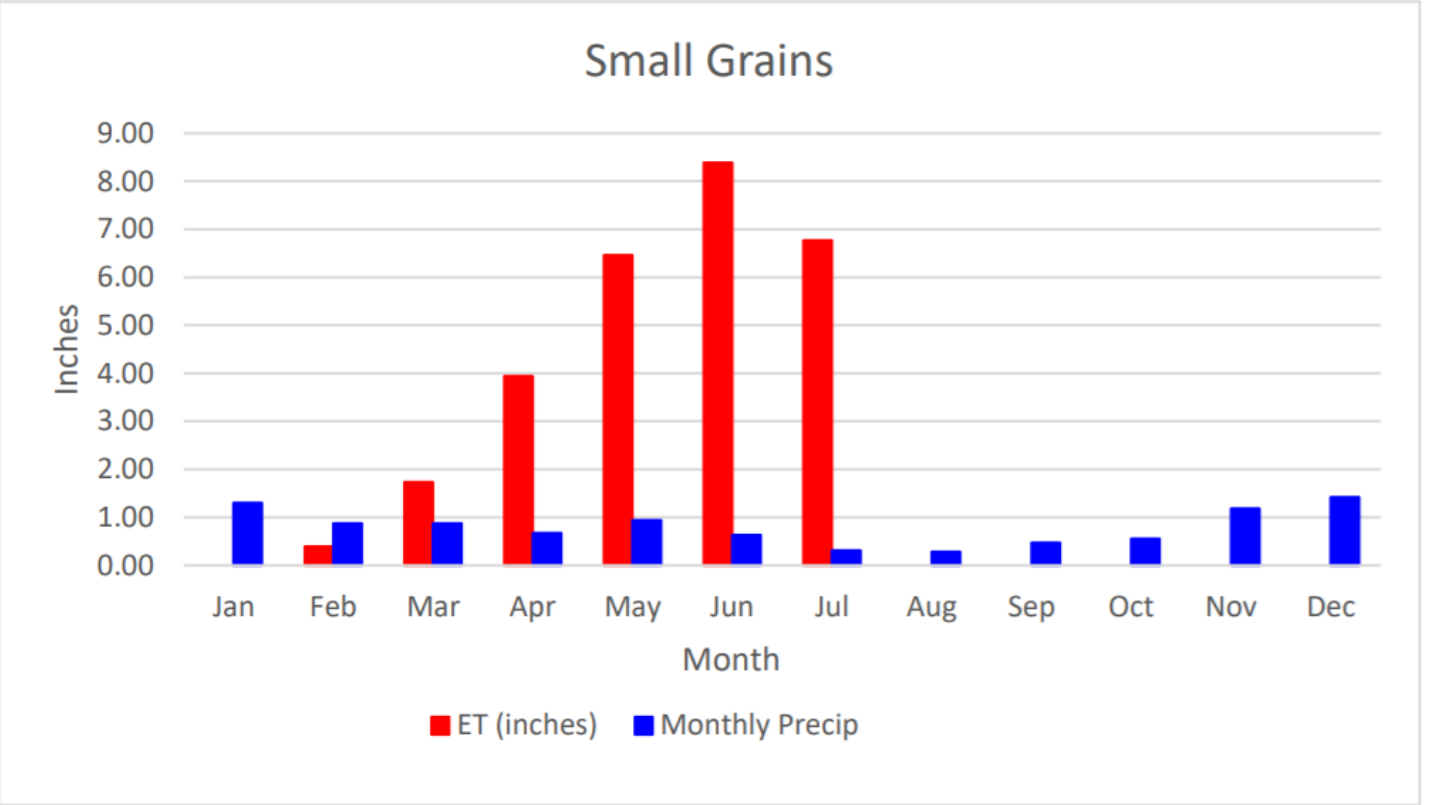
Crop- Pasture
Region- Southeast

Total Seasonal Evapotranspiration-	42.32	Inches
Peak Evapotranspiration Rate-	0.29	Inches/Day
Maximum Allowed Depletion-	50	%
Critical Moisture Deficit Period-	Jul	



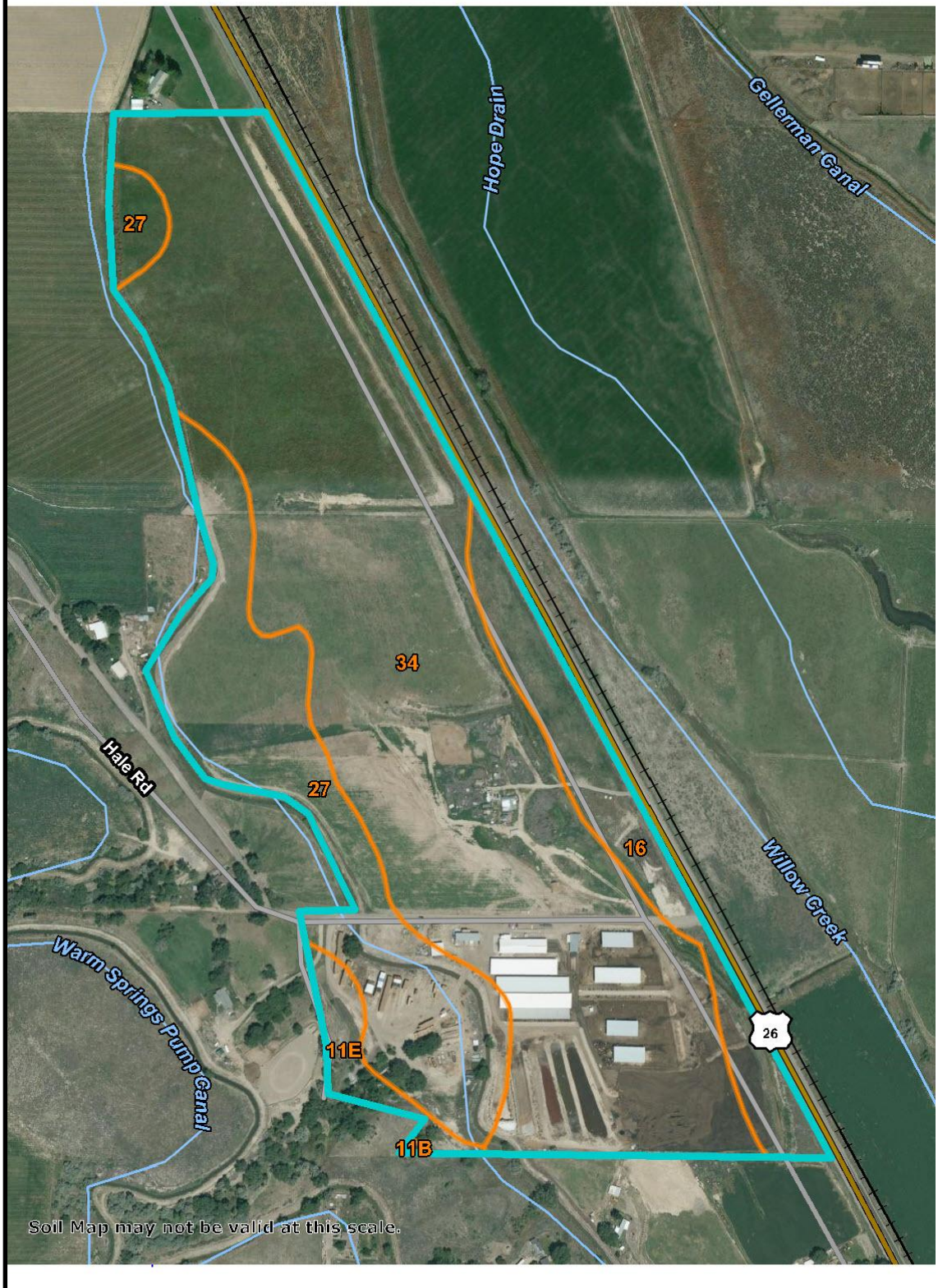
UTILIZATION AREA

Crop-	Small Grains	
Region-	Southeast	
Total Seasonal Evapotranspiration-	27.68	Inches
Peak Evapotranspiration Rate-	0.28	Inches/Day
Maximum Allowed Depletion-	50	%
Critical Moisture Deficit Period-	Jun	



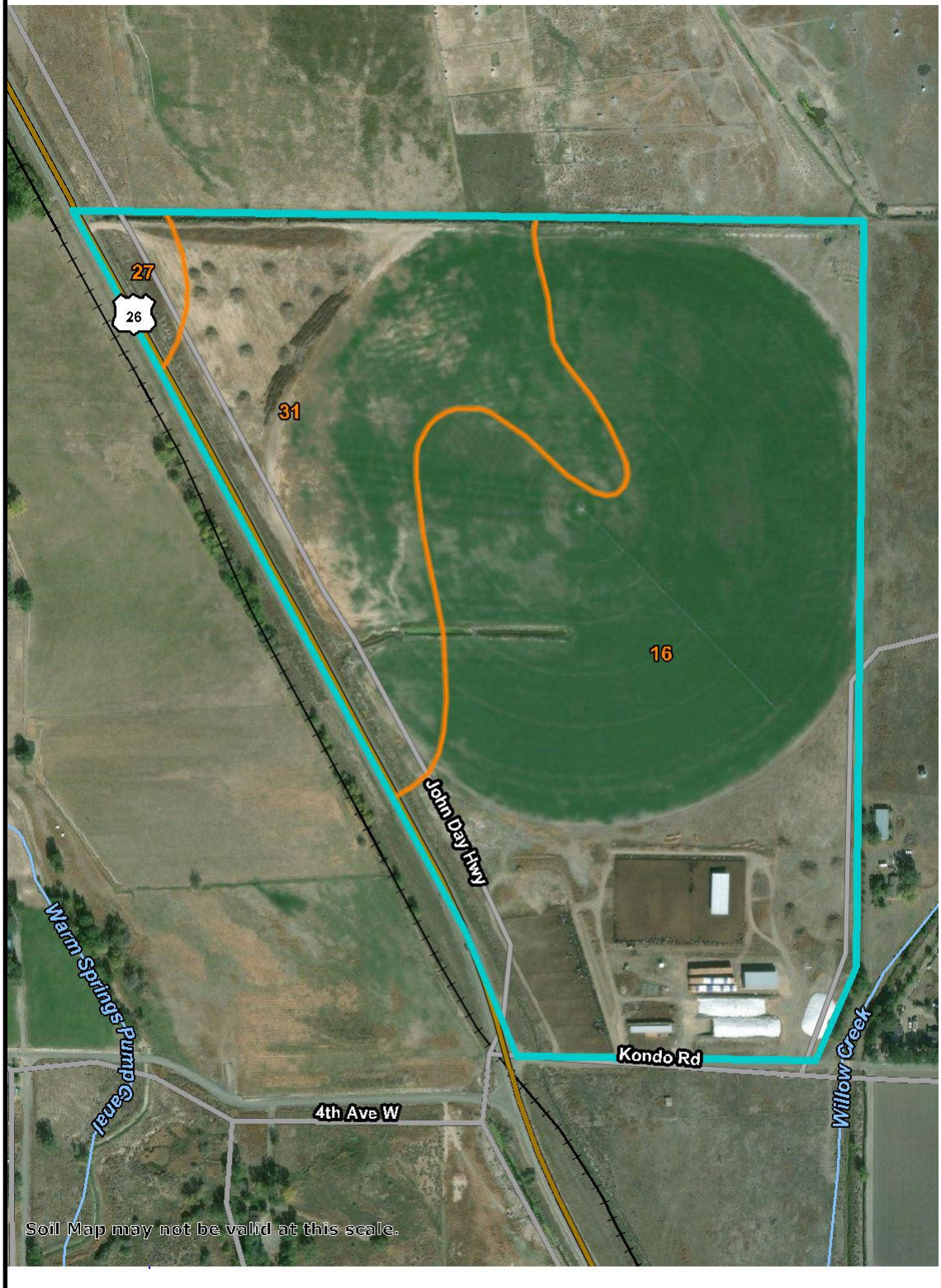
Soil Maps for Van Berkum Dairy LLC

Soil Map—Malheur County, Oregon, Northeastern Part
(Van Berkum Dairy LLC)



Map Scale: 1:6,170 if printed on A portrait (8.5" x 11") sheet.
Meters
0 50 100 200 300
Feet
0 250 500 1000 1500
Map projection: Web Mercator Corner coordinates: WGS84

Soil Map—Malheur County, Oregon, Northeastern Part
(Van Berkum Dairy LLC- Heifer Farm)



Map Scale: 1:5,840 if printed on A portrait (8.5" x 11") sheet.
Meters
0 50 100 200 300
Feet
0 250 500 1000 1500
Map projection: Web Mercator Corner coordinates: WGS84

Soil Reports

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, soils that are similar to the named components, and some minor components that differ in use and management from the major soils.

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.
An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a soil series. 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
Malheur County, Oregon, Northeastern Part

11B—Frohman silt loam, 2 to 5 percent slopes
Map Unit Setting
National map unit symbol: 23bf
Elevation: 2,100 to 2,600 feet
Mean annual precipitation: 9 to 11 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Farmland of statewide importance
Map Unit Composition
Frohman and similar soils:93 percent
Estimates are based on observations, descriptions, and transects of the mapunit.
Description of Frohman
Setting
Landform:Terraces
Landform position (three-dimensional):Tread
Down-slope shape:Linear
Across-slope shape:Linear
Parent material:Alluvium and lacustrine deposits
Typical profile
H1 - 0 to 12 inches: silt loam
H2 - 12 to 18 inches: cemented material
H3 - 18 to 36 inches: silt loam
H4 - 36 to 42 inches: cemented material
Properties and qualities

Slope:2 to 5 percent
Depth to restrictive feature:10 to 20 inches to duripan; 20 to 40 inches to duripan
Drainage class:Well drained
Capacity of the most limiting layer to transmit water (Ksat):Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table:More than 80 inches
Frequency of flooding:None
Frequency of ponding:None
Calcium carbonate, maximum content:5 percent
Maximum salinity:Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)
Interpretive groups
Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R011XY018OR - SHALLOW LOAM 8-11 PZ
Hydric soil rating: No

11E—Frohman silt loam, 12 to 20 percent slopes
Map Unit Setting
National map unit symbol: 23bj
Elevation: 2,100 to 2,600 feet
Mean annual precipitation: 9 to 11 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 130 to 170 days
Farmland classification: Farmland of statewide importance
Map Unit Composition
Frohman and similar soils:96 percent
Estimates are based on observations, descriptions, and transects of the mapunit.
Description of Frohman
Setting
Landform:Terraces
Landform position (three-dimensional):Riser
Down-slope shape:Linear
Across-slope shape:Linear
Parent material:Alluvium and lacustrine deposits
Typical profile
H1 - 0 to 12 inches: silt loam
H2 - 12 to 18 inches: cemented material
H3 - 18 to 36 inches: silt loam
H4 - 36 to 42 inches: cemented material
Properties and qualities
Slope:12 to 20 percent
Depth to restrictive feature:10 to 20 inches to duripan; 20 to 40 inches to duripan
Drainage class:Well drained
Capacity of the most limiting layer to transmit water (Ksat):Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table:More than 80 inches
Frequency of flooding:None
Frequency of ponding:None
Calcium carbonate, maximum content:5 percent
Maximum salinity:Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)
Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R011XY020OR - SOUTH SLOPES 8-11 PZ
Hydric soil rating: No

16—Harana silty clay loam, alkali
Map Unit Setting
National map unit symbol: 23br
Elevation: 2,200 to 2,600 feet
Mean annual precipitation: 9 to 11 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 130 to 160 days
Farmland classification: Farmland of statewide importance
Map Unit Composition
Harana, alkali, and similar soils:75 percent
Estimates are based on observations, descriptions, and transects of the mapunit.
Description of Harana, Alkali
Setting
Landform:Terraces
Landform position (three-dimensional):Tread
Down-slope shape:Linear
Across-slope shape:Linear
Parent material:Alluvium
Typical profile
H1 - 0 to 21 inches: silty clay loam
H2 - 21 to 64 inches: silty clay loam
Properties and qualities
Slope:0 to 2 percent
Depth to restrictive feature:More than 80 inches
Drainage class:Somewhat poorly 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 48 to 60 inches
Frequency of flooding:NoneRare
Frequency of ponding:None
Calcium carbonate, maximum content:20 percent
Maximum salinity:Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum:25.0
Available water supply, 0 to 60 inches: High (about 11.2 inches)
Interpretive groups
Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: R010XY007OR - SODIC BOTTOM
Hydric soil rating: No

27—Powder silt loam
Map Unit Setting
National map unit symbol: 23cn
Elevation: 2,100 to 2,600 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 130 to 170 days

Farmland classification: Prime farmland if irrigated
Map Unit Composition
Powder and similar soils:85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.
Description of Powder
Setting
Landform:Terraces, fans
Landform position (three-dimensional):Tread
Down-slope shape:Linear
Across-slope shape:Linear
Parent material:Alluvium
Typical profile
H1 - 0 to 13 inches: silt loam
H2 - 13 to 33 inches: silt loam
H3 - 33 to 60 inches: silt loam
Properties and qualities
Slope:0 to 2 percent
Depth to restrictive feature:More than 80 inches
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:About 48 to 72 inches
Frequency of flooding:NoneRare
Frequency of ponding:None
Available water supply, 0 to 60 inches: Very high (about 13.2 inches)
Interpretive groups
Land capability classification (irrigated): 2c
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: R010XY005OR - LOAMY BOTTOM
Hydric soil rating: No

31—Stanfield silt loam
Map Unit Setting
National map unit symbol: 23cy
Elevation: 2,100 to 2,600 feet
Mean annual precipitation: 9 to 11 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 120 to 170 days
Farmland classification: Farmland of statewide importance
Map Unit Composition
Stanfield and similar soils:83 percent
Minor components:2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.
Description of Stanfield
Setting
Landform:Terraces
Landform position (three-dimensional):Tread
Down-slope shape:Linear
Across-slope shape:Linear
Parent material:Alluvium
Typical profile
H1 - 0 to 12 inches: silt loam
H2 - 12 to 22 inches: silt loam

H3 - 22 to 32 inches: cemented material
H4 - 32 to 60 inches: silt loam
Properties and qualities
Slope:0 to 2 percent
Depth to restrictive feature:20 to 40 inches to duripan
Drainage class:Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat):Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table:About 18 to 72 inches
Frequency of flooding:None
Frequency of ponding:None
Maximum salinity:Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.5 inches)
Interpretive groups
Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: R010XY007OR - SODIC BOTTOM
Hydric soil rating: No
Minor Components
Aquepts, poorly drained
Percent of map unit:2 percent
Landform:Flood plains
Hydric soil rating: Yes

34—Umapine silt loam
Map Unit Setting
National map unit symbol: 23d5
Elevation: 2,100 to 2,600 feet
Mean annual precipitation: 9 to 11 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 120 to 170 days
Farmland classification: Farmland of statewide importance
Map Unit Composition
Umapine and similar soils:85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.
Description of Umapine
Setting
Landform:Terraces
Landform position (three-dimensional):Tread
Down-slope shape:Linear
Across-slope shape:Linear
Parent material:Alluvium
Typical profile
H1 - 0 to 11 inches: silt loam
H2 - 11 to 60 inches: silt loam
Properties and qualities
Slope:0 to 2 percent
Depth to restrictive feature:More than 80 inches
Drainage class:Somewhat poorly 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:About 24 to 48 inches
Frequency of flooding:NoneRare

Frequency of ponding:None
Calcium carbonate, maximum content:20 percent
Maximum salinity:Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum:20.0
Available water supply, 0 to 60 inches: High (about 11.9 inches)
Interpretive groups
Land capability classification (irrigated): 3w
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: C
Ecological site: R010XY007OR - SODIC BOTTOM
Hydric soil rating: No

Data Source Information
Soil Survey Area: Malheur County, Oregon, Northeastern Part
Survey Area Data: Version 17, Oct 27, 2021

Phosphorus Index Report

Van Berkum Dairy LLC -

Vale

Field	Acres	Soil	Soil Test Date	Bray P (ppm)	Olsen (ppm)	K (ppm)	pH	TFS	SFS	Score	Rating
Crop3	65.5	16, Harana	04/12/2022		78.0	2978.0	9.4	3.5	17.42	60.98	Low
Crop2	18.2	34, Umapine	12/15/2021		48.0	979.0	7.6	3.5	19.20	67.23	Low
Crop1	15.1	34, Umapine	12/15/2021		48.0	979.0	7.6	3.5	21.74	76.1	Low

PI Interpretations

P-Index Rating	Interpretation for Oregon	Recommended Nutrient Limitation
West PI Score<=25 or 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 to 50 or East PI Score 100.1 to 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 for phosphorus.	Phosphorus
West PI Score 50.1 to 75 or East PI Score 400.1 to 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 of phosphorus if the following requirements are met: A soil phosphorus drawdown strategy has been implemented, and 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 or 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 phosphorus for plant production.	No Manure