

STP Land Application Site Suitability and Selection Considerations in Montana



What do I look for besides
a willing landowner?

So you want to land apply septage, eh?



Courtesy: Michigan DEQ – Water Bureau, Septage Program

Are you sure?



Courtesy: Michigan DEQ – Water Bureau, Septage Program

If so, first we'll learn how to select a site



Site Suitability and Selection Considerations

- ❖ **Seasonal High and Regional Depth to Ground Water**
- ❖ **Topography – maximum slope exceedances**
- ❖ **Soils and Geology**
- ❖ **Distance to Surface Water – includes intermittent**
- ❖ **Site Setbacks and Restrictions**
- ❖ **Crop Nitrogen Requirement and AAR**

Site Suitability and Selection Considerations

Seasonal High and Regional Depth to Groundwater

Considerations for initial site screening:

- Depth to groundwater – including historical highs and lows
- Estimate of groundwater flow patterns
- Groundwater vulnerability

Site Suitability and Selection Considerations

Seasonal High and Regional Depth to Groundwater

➤ *Rules require minimum 6 ft to groundwater*

➤ *Source of groundwater information:*

On-site wells

GWIC website - <http://mbmggwic.mtech.edu/>

County Extension Office - NRCS

County Health Department

Site Suitability and Selection Considerations

Topography – Slope Considerations

Rapid runoff can transport pumpings to drainages

Slope limits to avoid runoff and ponding:

Summer – no greater than 6%

Winter – no greater than 3%

Site Suitability and Selection Considerations

Soils and Geology

Soil texture and parent geologic material are two of the most important aspects of site selection

Both influence permeability, infiltration, and drainage properties

Moderately-drained soil

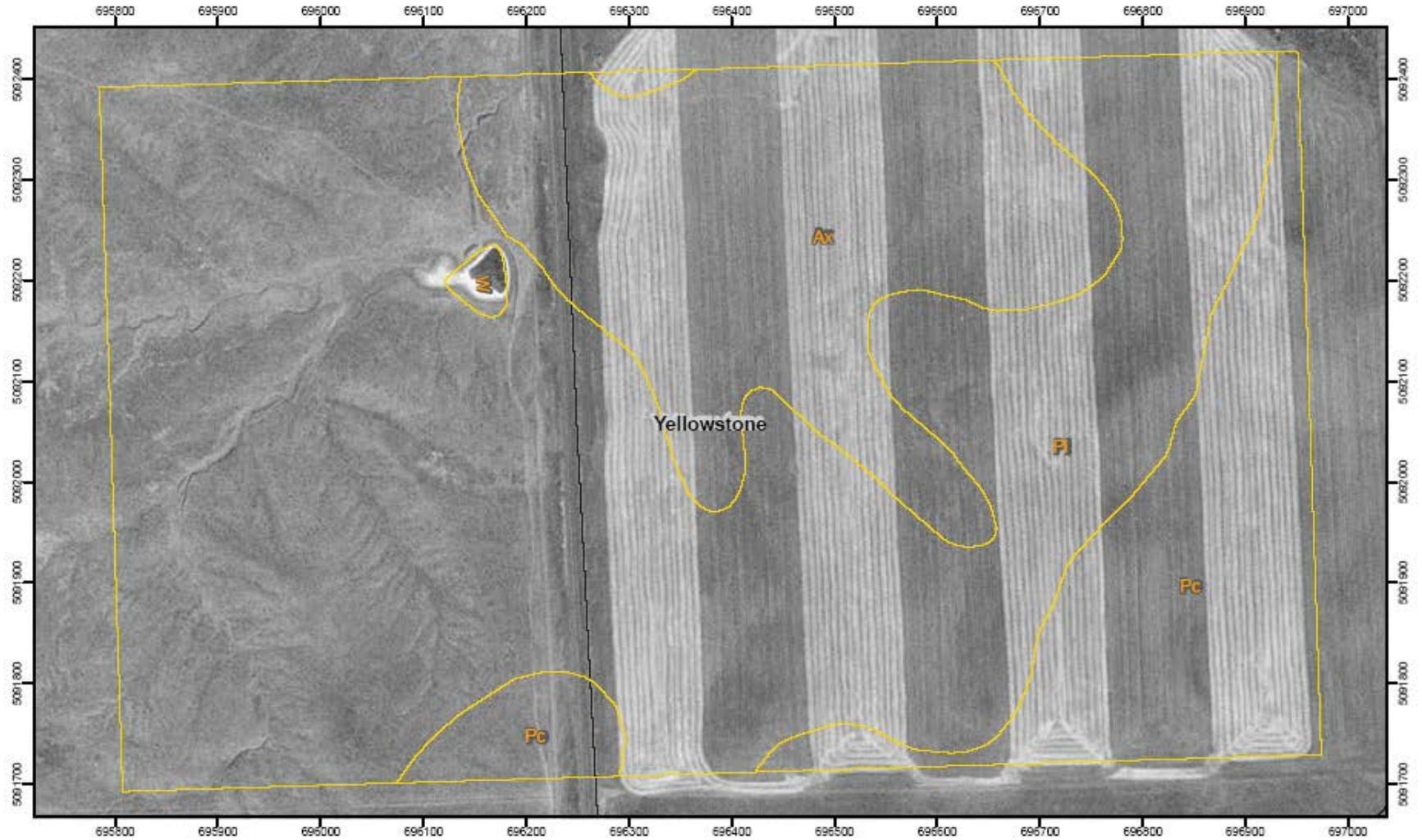
e.g., Loam or silt loam

Thick soil profile

Source of soils information → NRCS Soil Survey

SOIL SURVEY OF YELLOWSTONE COUNTY, MONTANA

Yellowstone County, Montana



0 50 100 200 Meters

0 150 300 600 900 1,200 Feet

Sewage Disposal

Yellowstone County, Montana

[The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
Ax:					
Arvada	60	Very limited Slow water movement	1	Not rated	
Bone	30	Very limited Slow water movement	1	Not rated	
Pc:					
Pierre	80	Very limited Slow water movement Depth to bedrock	1 1	Not rated	
Pi:					
Pierre	55	Very limited Slow water movement Depth to bedrock Slope	1 1 0.04	Not rated	
Lismas	35	Very limited Depth to bedrock Slope	1 0.84	Not rated	
W:					
Water	100	Not rated		Not rated	

Agricultural Disposal of Manure, Food-Processing Waste, and Sewage Sludge

Yellowstone County, Montana

[The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge	
		Rating class and limiting features	Value	Rating class and limiting features	Value
Ax:					
Arvada	60	Very limited		Very limited	
		Slow water movement	1	Slow water movement	1
		Sodium content	1	Sodium content	1
		Runoff	0.4		
		Salinity	0.01		
Bone	30	Very limited		Very limited	
		Slow water movement	1	Slow water movement	1
		Salinity	1	Sodium content	1
		Sodium content	1	Salinity	0.5
		Droughty	0.4	Droughty	0.4
		Runoff	0.4		
Pc:					
Pierre	80	Very limited		Very limited	
		Slow water movement	1	Slow water movement	1
		Runoff	0.4	Low adsorption	1
		Depth to bedrock	0.35	Depth to bedrock	0.35
		Droughty	0.33	Droughty	0.33
PI:					
Pierre	55	Very limited		Very limited	
		Slow water movement	1	Slow water movement	1
		Runoff	0.4	Low adsorption	1
		Depth to bedrock	0.35	Depth to bedrock	0.35
		Droughty	0.33	Droughty	0.33
		Slope	0.04	Slope	0.04
Lismas	35	Very limited		Very limited	
		Slow water movement	1	Droughty	1

Site Suitability and Selection Considerations

Based on the Yellowstone County site information, would the site be suitable for land application of septage?

Why?

Site Suitability and Selection Considerations

Surface Water - Drainages

Location of all drainages in relation to land application area – including intermittent drainages, wetlands, and drainage swales

Setbacks must be maintained

ARM 17.50.809 states:

“A person may not apply pumpings to land within 150-feet of any state surface water, including ephemeral or intermittent drainages and wetlands. The department or local health officer or the health officer’s designated representative may require greater distances where slopes or other factors may increase the likelihood of runoff from the land application area.”

Site Suitability and Selection Considerations

Site Setbacks and Restrictions

Additional setback requirements:

- *500-feet from any occupied or inhabitable building*
- *100-feet from any State, Federal, or County maintained road*
- *100-feet from any drinking water supply source*

Site Suitability and Selection Considerations

Given the siting and setback requirements, you need to ask yourself if there remains enough acreage to land apply.....

If so, let's see how we determine how much you can apply

Site Suitability and Selection Considerations

AAR

What is it?

Agronomic Application Rate

It is the septage application rate that:

provides the amount of nitrogen needed by the food crop, feed crop, cover crop, or vegetation grown on the land and minimizes the amount of nitrogen in the septage that passes below the root zone of the crop or vegetation grown on the land and into the groundwater.

Site Suitability and Selection Considerations

AAR Calculation **Nitrogen requirement needed**

There are a few basic things you need to know before you determine nitrogen requirement:

Identify Crop Type

Determine Crop Yield

Determine Nitrogen Requirement

Site Suitability and Selection Considerations

AAR Calculation

Sources of information on crop nitrogen requirements:

Seed Supplier

Soil Sample

**“Fertilizer Guidelines for Montana Crops” – MSU
*Extension Service Publication #EB161***

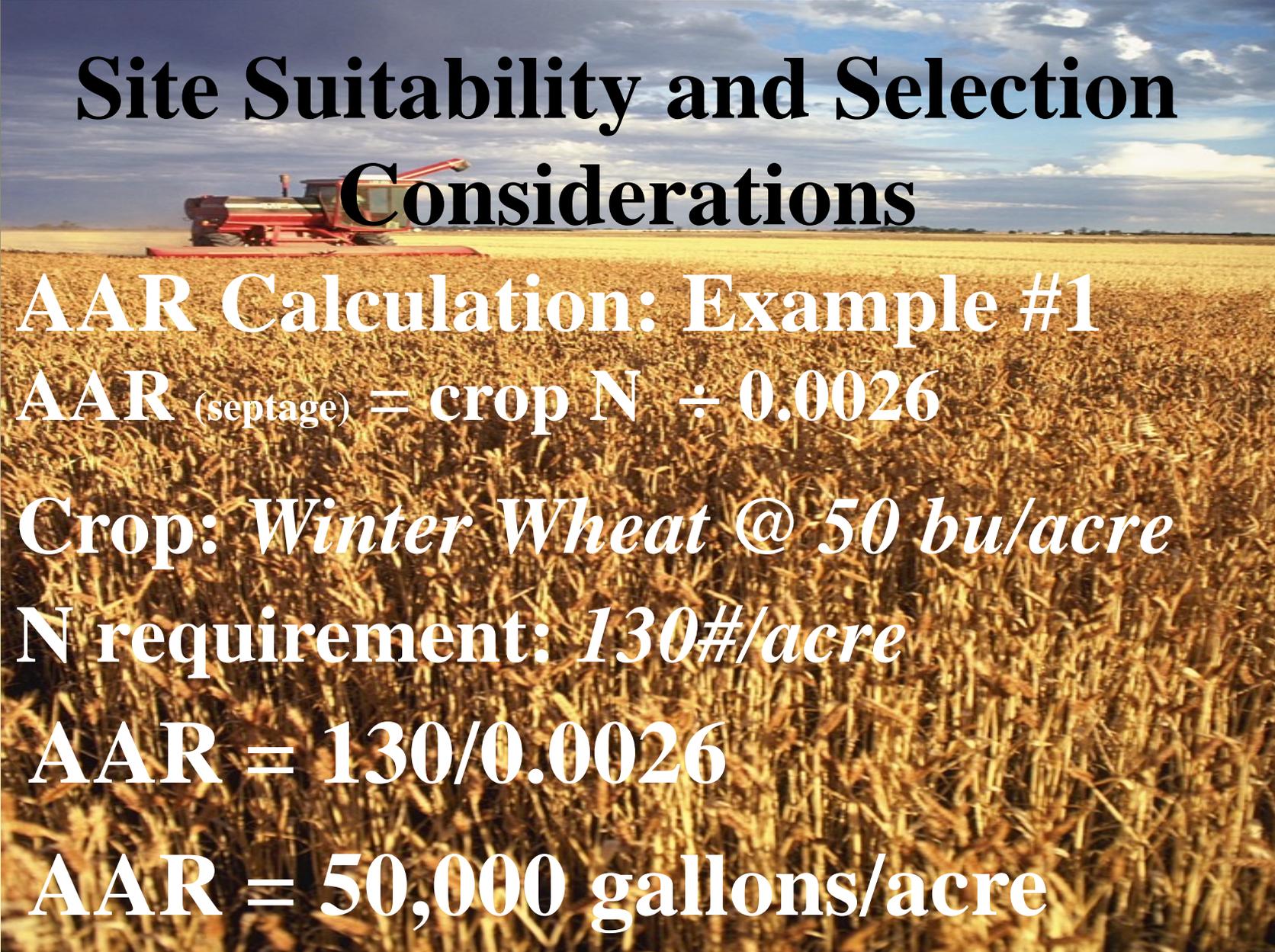
Site Suitability and Selection Considerations

AAR Calculation:

$$\text{AAR}_{(\text{septage})} = \text{crop N reqm't.} \div 0.0026$$

$$\text{AAR}_{(\text{porta-potty waste})} = \text{crop N reqm't.} \div 0.0052$$

Site Suitability and Selection Considerations



AAR Calculation: Example #1

$$\text{AAR}_{(\text{septage})} = \text{crop N} \div 0.0026$$

Crop: *Winter Wheat @ 50 bu/acre*

N requirement: *130#/acre*

$$\text{AAR} = 130/0.0026$$

$$\text{AAR} = 50,000 \text{ gallons/acre}$$

Site Suitability and Selection Considerations

AAR Calculation: Example #2

AAR (septage) = crop N ÷ 0.0026

Crop: Alfalfa (1st planting) @ 3 tpa

N requirement: 20#/acre

$$\text{AAR} = 20 / 0.0026$$

$$\text{AAR} = 7,692 \text{ gal/acre}$$



Site Suitability and Selection Considerations

AAR Calculation: Example #3

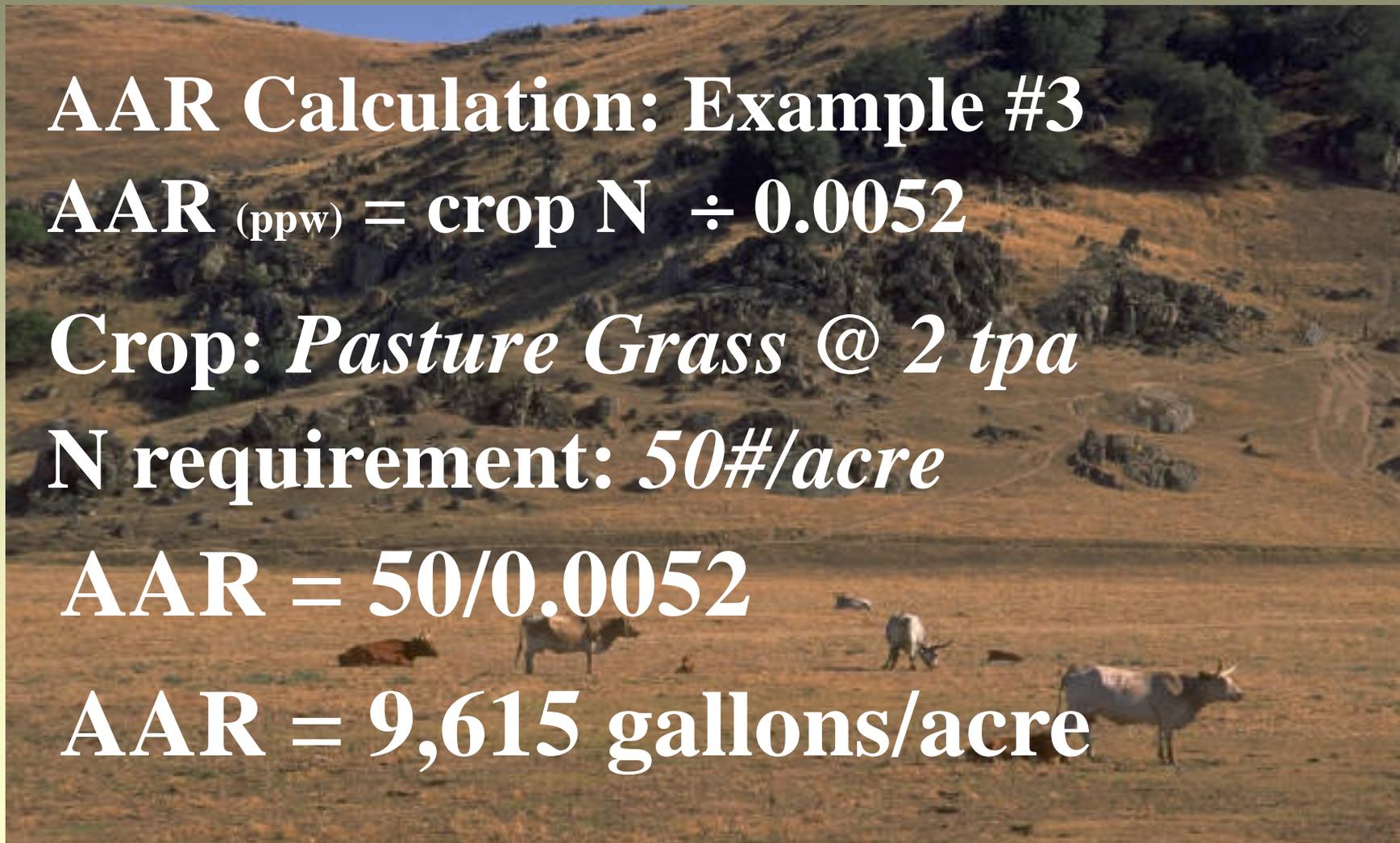
$$\text{AAR}_{(\text{ppw})} = \text{crop N} \div 0.0052$$

Crop: *Pasture Grass @ 2 tpa*

N requirement: *50#/acre*

$$\text{AAR} = 50/0.0052$$

$$\text{AAR} = 9,615 \text{ gallons/acre}$$



Site Suitability and Selection Considerations

Now that you've selected a suitable site, what's next?

Landowner approval required and must include certification that they are aware that:

- **Use of the site is restricted**
- **Land application rate limited by AAR**
- **VAPR must be followed**
- **Landowner required to allow inspections**

Site Suitability and Selection Considerations

Now that you've selected a suitable site, what's next?

County Health Officer/Sanitarian provides final site approval

- **Typically includes site visit**
- **May charge a fee for County site assessment**

Counties may impose additional restrictions and requirements based on ordinances

State prepares checklist EA based on information provided

Site Suitability and Selection Considerations

Site may **NOT** be used until checklist EA completed and published and licensee has been notified by State that the site has been approved and added to license file

