Case Study 3
Marion County Farm

Location: Marion County, zip code 97381
Approx. 1 mile west of Silverton, Oregon 97381

Description: Closed barn dairy and farming operation with irrigated cropland

General:
- 500 total acres
- Dairy herd 2,100 Holstein
  - 1,600 Milkers
  - 500 Dry Cows
  - Produces 112,000 pounds of milk per day

- Dairy Headquarters consist of 6 buildings
- 90 % of the cropland is within one mile of the animal operation and is irrigated with dairy wastewater and fresh water.
- Main county road - Hazelgreen Road runs through the Dairy
- Feed storage and mixing areas easy access from Hazelgreen
- Incandescent lights in milking parlor
- Overhead fans in the milking parlor
- Propane is used for all sources of heating; otherwise electricity is used

Manure Handling:
- Manure from milk cows & dry cows, plus wash water is collected in liquid manure storage, where it goes to a below ground tank for holding and is then pumped (electric pump – 75 HP) through a separator and into 90 acre foot pond at the main complex. A 60 acre foot pond is located at the dry barn complex. The separated solids are composted on-site.

Cropland:
- Approximately 200 acres of corn silage and 200 acres of orchard grass with conventional tillage. These crops are used as feed for the dairy operation.
- Typical corn silage yield is 15 tons per acre
- Typical orchard grass yield is 6 tons per acre
- Nitrogen is applied as 30% UAN at a rate of 7 lb per ton for corn silage and 8 lb per ton for orchard grass
- Nitrogen is applied in the spring. No fall application occurs.

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Irrigation:

- There are two types of systems used for approximately 400 acres cropland. Each system is powered by a separate diesel pump to generate electricity.
    - First system (200 acres of corn silage)
        - Linear Irrigation System (sprinkler system with drops that extend to the ground)
        - Gauge Pressure 18 psi
    - Second system (200 acres of Orchard grass)
        - Big Gun system with pressure of 80psi

Landowner Objective:

- Farmer is interested in saving energy on his dairy and cropland due to the increasing energy prices.
- Farmer has had good luck energy-wise and odor-wise with the Linear Irrigation System that was installed in 2005 using EQIP funding.
- Farmer is interested in developing some carbon credits.
- Farmer is interested in developing a CNMP that includes air emissions.
- Farmer has received odor complaints and would like to address this issue.

Additional Information:

- The dairy has been in operation for many years, but the town of Silverton is expanding and developments are locating very close to the operation. The new neighbors are not necessarily inclined to "enjoy the fragrance of the dairy." There is even an elementary school and baseball field immediately adjacent to some of the dairy's fields.

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Energy Exercise Directions

1. Considering the landowner's objectives and concerns, identify the activities on the operation that use significant amounts of energy.

2. Identify alternatives to the above activities that can help the landowner save energy.

3. Run the respective -- dairy, tillage, nitrogen, and irrigation (both systems) -- energy awareness tools to estimate energy use and potential savings for each of these type of activities.

4. Identify renewable energy opportunities for this farm.

5. Summarize your recommendations in a report for the group.

Air Quality and Atmospheric Change
Airshed and On-Farm Assessment Steps

1. Airshed Assessment: Meteorology/Climatology/Topography/Landscape:
   - Briefly describe the topography and landscape characteristics of the farm in question (see topo sites on web reference handout sheet, or others). Get a rough sense about the area of the farm and regions outside the farm, at various scales—familiarize yourself with the farm situation with regard to potential airsheds and watersheds
   - Briefly describe the possible weather and climate factors that may influence the air quality impacting the farm. At a minimum this should include:
     - Examine the relevant wind roses for at least several months
     - Examine a temperature, humidity and precipitation summary for a nearby location, including information on inversion potential

2. Airshed Assessment: Pollutant Formation and Sources, and Resource Concerns
   - Briefly review and document the potential agricultural air emissions of importance (as presented in class)
   - Briefly review NRCS AQAC resource concern components and quickly hypothesize about how each may be relevant to this farm situation
   - Briefly examine the emissions sources outside the farm that may affect the farm's management of air emissions, and describe how these relate to NRCS AQAC resource concerns. Emission sources nearby and those at distance that may be of concern

3. Airshed Assessment: Relevant Regulations and Receptors
   - Is the farm in a nonattainment area for a criteria pollutant? If so, identify and document these
   - Are there any nearby federally-protected Class I Areas? If so, identify and document these
   - Are there any federal, state, regional, and/or local air quality regulations of concern to this operation? If so, identify and document these.
   - Examine the nearby area for receptors of concern and document these (include schools, hospitals, residences, retail, roads, others?)

4. On-Farm Assessment:
   - Trust your senses, especially sight and smell. Observe not only existing air quality issues, but also situations which could lead to or indicate a potential air quality problem. Record these observations.
   - Identify and evaluate on-farm sources of air emissions of concern
   - Location, location, location. How does this affect this operation?
   - Use the AQAC On-Farm Assessment Checklists to evaluate potential sources and emissions
   - Use appropriate AQAC tools to evaluate emissions, options, etc. (COMET-VR, SNAP, others)

- If interested in carbon sequestration in soils and vegetation, evaluate predicted carbon storage with current management using COMET-VR, then make an additional run to predict changes on carbon storage with changes in land management
- Rank these emissions and sources by their importance relative to conservation and regulatory goals (manage to be "out of control"): Prioritize actions!
- Design conservation activities/practices/systems to specifically address these actions and outcomes. Consider specific practice standards that may be relevant Look for synergies – be efficient!
- Think about how these conservation activities/practices/systems may impact other resources (i.e., SWAPA+H and Energy?)
- Review and recommend specific NRCS Programs to implement AQAC practices/activities

Reference material:

- Website References for AQAC Information
- AQAC Definitions and Acronyms
- AQAC Activity-Practice List
- AQAC Practice Standards Air Check
- AQAC On-Farm Assessment Checklists


Google earth
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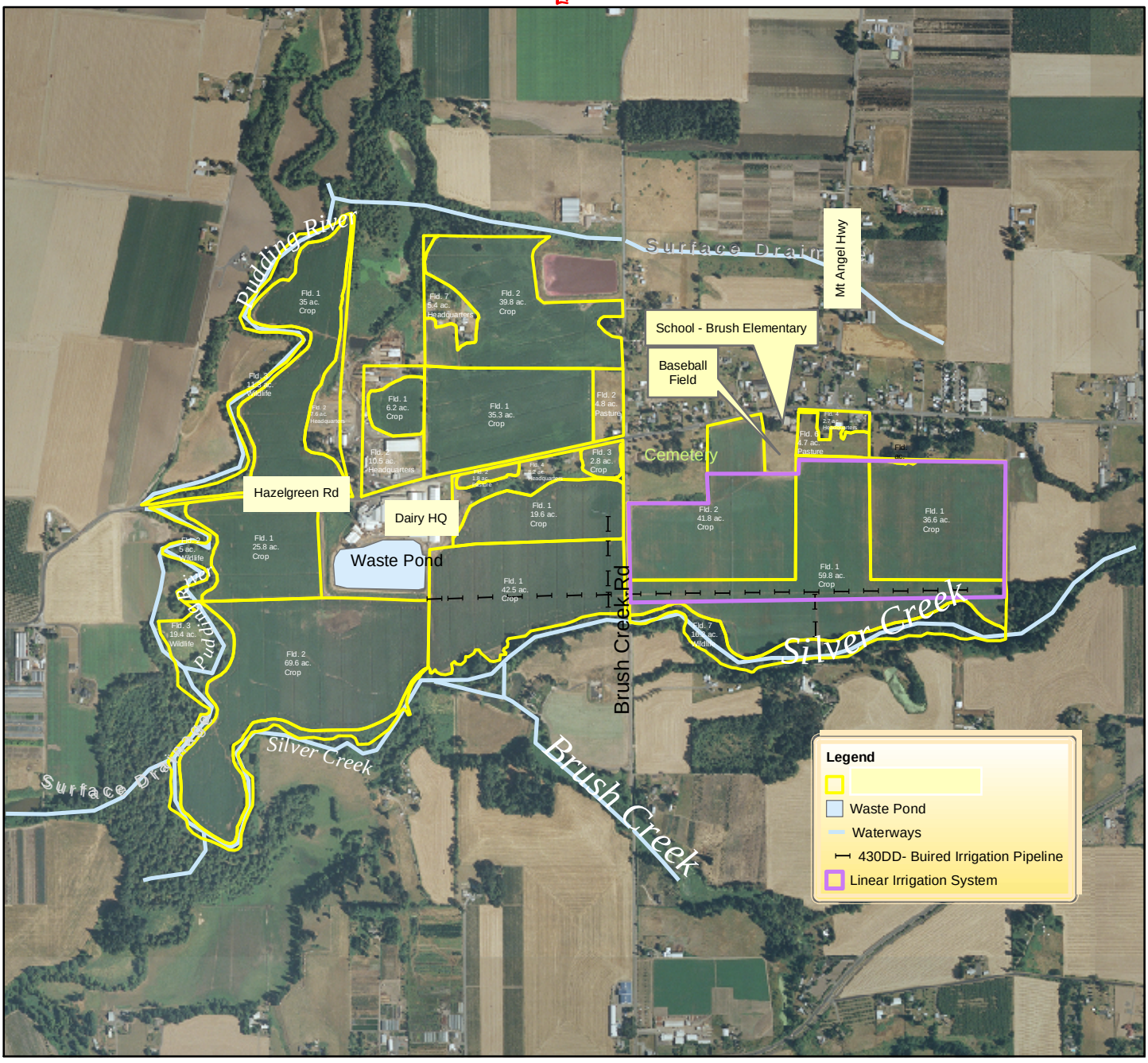
Field Office: SALEM SERVICE CENTER
Agency: USDA-NRCS
State and County: OR, MARION

Approximate Acres: 512.4

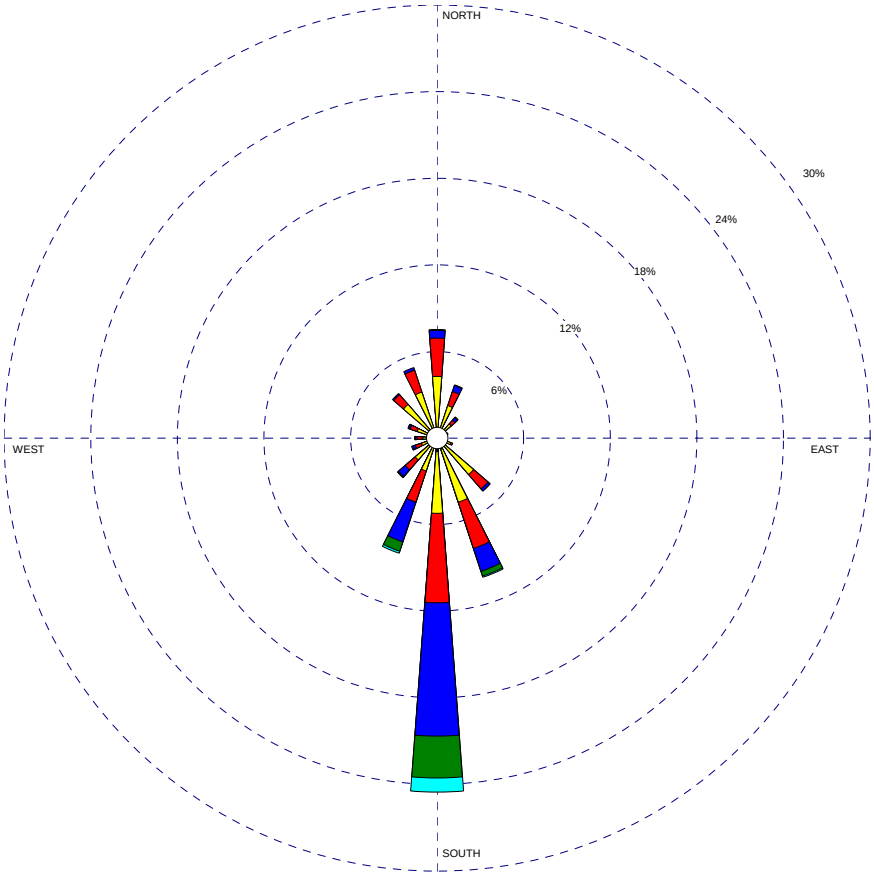


District: MARION SOIL & WATER CONSERVATION DISTRICT

January Wind Rose for Salem

WIND ROSE PLOT

Station #24232 - SALEM/MCNARY FIELD, OR



Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

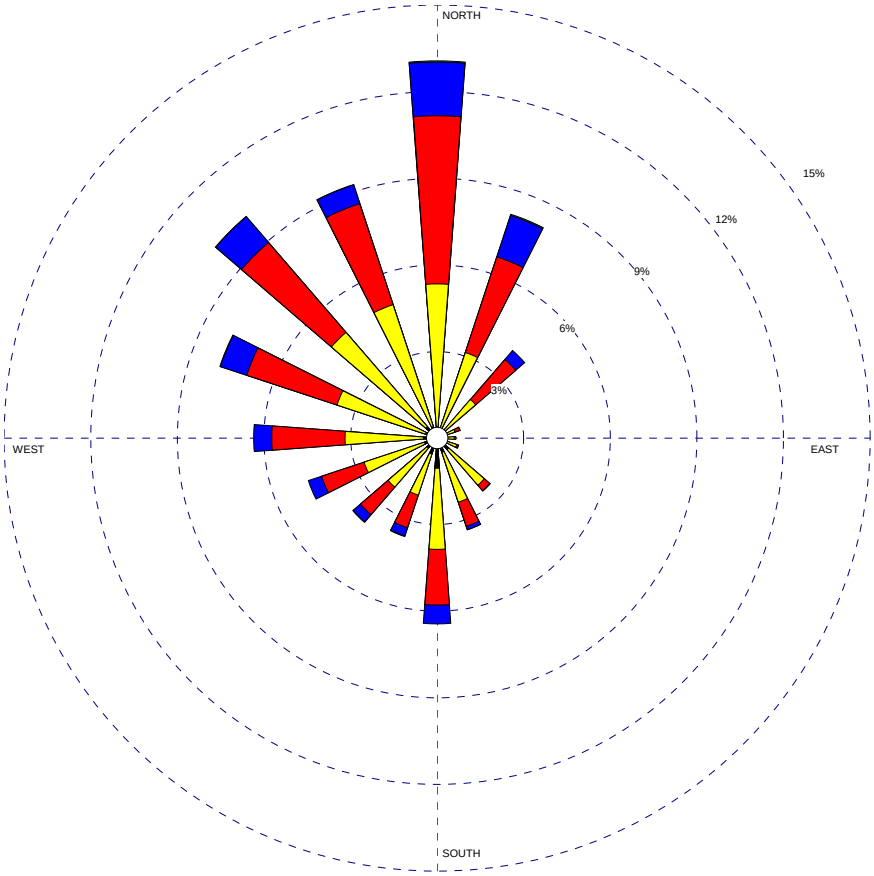
MODELER **Sara West**	DATE **9/5/2002**	COMPANY NAME **USDA-ARS**
DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
AVG. WIND SPEED **4.27 m/s**	CALM WINDS **17.69%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Jan 1 - Jan 31** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

July Wind Rose for Salem

WIND ROSE PLOT

Station #24232 - SALEM/MCNARY FIELD, OR



Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
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- 1.80 - 3.34
- 0.51 - 1.80

MODELER **Sara West**	DATE **9/5/2002**	COMPANY NAME **USDA-ARS**	
DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS	
AVG. WIND SPEED **3.53 m/s**	CALM WINDS **14.43%**		
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Jul 1 - Jul 31** **Midnight - 11 PM**		

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