

# Web-Based Tools for Environmental Planning

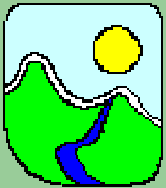
Chris Barnett

Center for Agricultural, Resource and Environmental Systems (CARES)

University of Missouri – Columbia

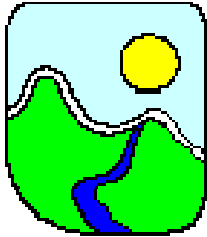
Water Quality Short Course

Columbia, Missouri    April 11, 2007



CARES

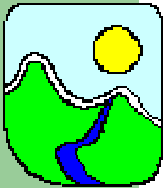
# Center for Agricultural, Resource and Environmental Systems (CARES)



Promote understanding of resource issues  
using information technologies

- Geographic Information Systems (GIS)
- Remote Sensing
- Environmental Modeling
- Web Technologies

→ <http://cares.missouri.edu>



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# CARES – Home Page

CARES - GIS & Internet Mapping at the University of Missouri - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www.cares.missouri.edu/ Go

current projects | interactive maps | contact

**CARES**  
Center for Agricultural, Resource  
and Environmental Systems

home about CARES projects map room search

**Welcome**

CARES is a research and service center within the College of Agriculture, Food and Natural Resources at the University of Missouri - Columbia.

We use geographic information systems (GIS), remote sensing, environmental modeling, and internet mapping to help better address resource, environmental and socio-economic issues.

Visit our [Map Room](#) and [Project area](#) for data, maps and research findings.

[more about CARES »](#)

**enter the MAP ROOM**  
Utilize CARES internet mapping software and rich database to build custom interactive maps.  
[» Internet mapping projects](#)

**initatives and PROJECTS**  
Access information developed through ongoing research between the staff at CARES and outside organizations.

**about CARES**  
Learn about CARES, the people behind the scenes, our technology, and our programs.

**New @ CARES**

4/1/07 - Michelle Flenner moves to a regular GIS Specialist position at CARES. Congratulations, Michelle.  
[more »](#)

4/1/07 - James Cutts joins the soils survey project team at CARES. Welcome, James.  
[more »](#)

3/7/07 - CARES/CIRC staff will attend and present at the [Fifth International Conference on Community Indicators](#) in Jacksonville, FL.  
[more »](#)

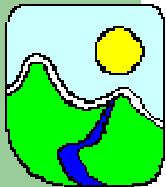
[more news & events »](#)

home | [about CARES](#) | [projects](#) | [map room](#)

**M** UNIVERSITY OF MISSOURI - COLUMBIA

(573) 882 - 7458  
130 Mumford Hall, Columbia, MO 65211  
Division of Applied Social Sciences  
College of Agriculture, Food and Natural Resources

http://maproom.missouri.edu/ Internet



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# CARES – Map Room

Map Room - Microsoft Internet Explorer

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| people | facility | programs | affiliated centers | organization | presentations | related links |

## CARES Map Room

Create customized interactive maps from a wide range of economic, demographic, physical and cultural data. Or check out our other internet mapping applications.

**Interactive Maps**

- » [Missouri](#)
- » [United States](#)
- » [More Mapping Projects](#)
- » [Browser Requirements](#)
- » [Help](#)

**More Applications:**

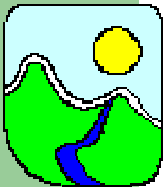
[Animated Maps](#) [Assessment Tools](#) [Atlas Maps](#)

home | [about CARES](#) | [projects](#) | [map room](#)

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# CARES – Watershed Map

Hydrologic Unit Location Map

14 Digit Hydrologic Units: 10280103080004



Watershed Location Map - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home

home about CARES projects

**Missouri Watershed Location Map**

[8-digit HU](#) | [11-digit HU](#) | [14-digit HU](#) | [AqNF](#)

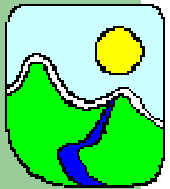
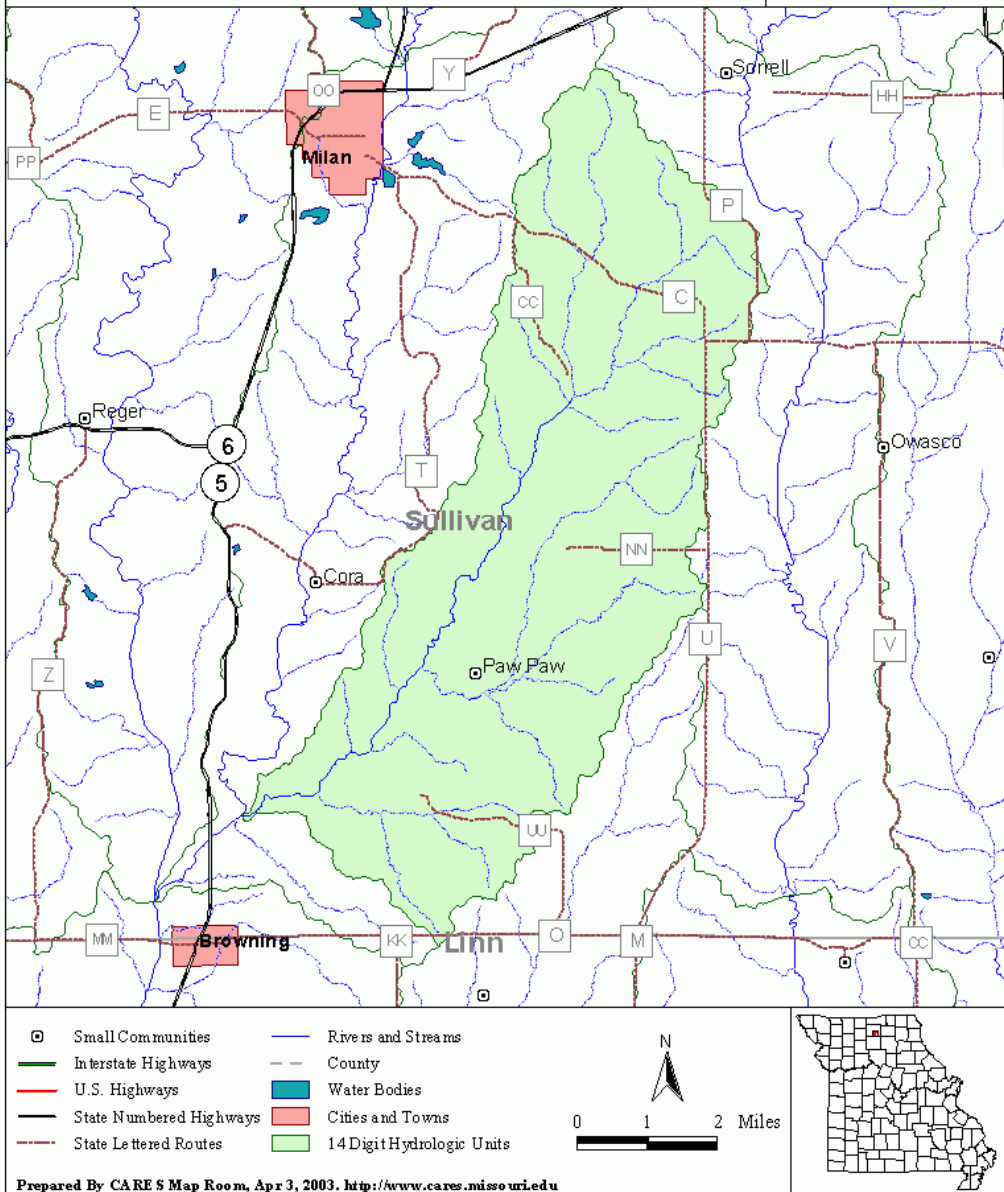
14-Digit Hydrologic Unit: 10280103080004

The map is available in GIF and PDF

- Click the thumbnail image to view the map.
- [Click here to open or download the map.](#)

**Contact for questions and comments:**

Yan Barnett  
130 Mumford Hall  
University of Missouri - Columbia  
Columbia, MO 65211



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# CARES – Map Room

Map Room - Microsoft Internet Explorer

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| people | facility | programs | affiliated centers | organization | presentations | related links |

## CARES Map Room

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**Interactive Maps**

- » [Missouri](#)
- » [United States](#)
- » [More Mapping Projects](#)
- » [Browser Requirements](#)
- » [Help](#)

**More Applications:**

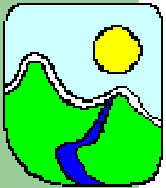
- [Animated Maps](#)
- [Assessment Tools](#)
- [Atlas Maps](#)

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# CARES Interactive Maps

Step 1 - County List - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Address http://ims.missouri.edu/moims/step1.aoi/countylist.asp Go

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## Missouri Interactive Maps

Step 1. Specify Area of Interest Step 2. Select Data Layers Step 3. Verify Selections

**ADMINISTRATIVE:**

- County
- City
- School District
- Zip Code
- Township/Range/Section

**POLITICAL:**

- US Congressional District
- State Senate District
- State House District

**POINT LOCATION:**

- Address Search
- Latitude & Longitude

**OTHER:**

- River Basin ( 8-digit HUC )
- USGS 7.5-Min Quadrangle

Select your area of interest. Click Step 2 above to proceed.

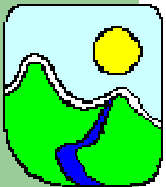
**Select a County:**

STATEWIDE  
Adair  
Andrew  
Atchison  
Audrain  
Barry  
Barton  
Bates  
Benton  
Bollinger

The Map Room uses temporary Cookies, JavaScripts and pop-up windows. If you are a first time user, please read the [minimum requirements](#).

Step 2. Select Data Layers

Done Internet



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# CARES – Area of Interest

minimum requirements.' A button for 'Step 2. Select Data Layers' is located at the bottom right of the main content area."/>

Step 1 - County List - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Address http://ims.missouri.edu/moims/step1.aoi/countylist.asp Go

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## Missouri Interactive Maps

Step 1. Specify Area of Interest Step 2. Select Data Layers Step 3. Verify Selections

**ADMINISTRATIVE:**

- County
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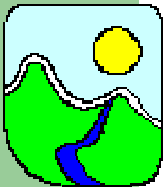
Select your area of interest. Click Step 2 above to proceed.

**Select a County:**

- Atchison
- Audrain
- Barry
- Barton
- Bates
- Benton
- Bollinger
- Boone
- Buchanan
- Butler

The Map Room uses temporary Cookies, JavaScripts and pop-up windows. If you are a first time user, please read the [minimum requirements](#).

Step 2. Select Data Layers



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# CARES – Select Data

Step 2 - Select Data Layers - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://ims.missouri.edu/moims/step2.Data/common.asp?STATUS=new

home about CARES projects map room search

## Missouri Interactive Maps

Step 1. Specify Area of Interest Step 2. Select Data Layers Step 3. Verify Selections

**DATA CATEGORY**

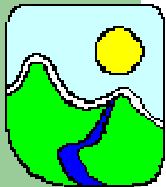
- Common Data
- Administrative
- Agricultural
- Base Map
- Census 2000
- Cultural
- Drinking Water
- Facility
- Floodplain
- Geology
- Hydrography
- Imagery
- Land Cover
- Political
- Soil
- Topography
- Transportation
- Water Quality
- Watershed
- Wetland

### Common Data

<input checked="" type="checkbox"/>	County Boundaries	<a href="#">more info</a>
<input type="checkbox"/>	Cities and Towns	<a href="#">more info</a>
<input type="checkbox"/>	Roads and Highways	
<input checked="" type="checkbox"/>	2004 Aerial Photos (DOQQs) (Color)	
<input type="checkbox"/>	2003 Aerial Photos (DOQQs) - Color Infrared	
<input type="checkbox"/>	2003 Aerial Photos (DOQQs) - Black & White	
<input type="checkbox"/>	1994-2000 Aerial Photos (DOQQs)	<a href="#">more info</a>
<input type="checkbox"/>	30 Meter Shaded Relief	

Step 3. Verify Selections

Done Internet



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# CARES Verify Selections

The screenshot shows a web browser window titled "Step 3. Verify Selections - Microsoft Internet Explorer". The address bar shows the URL: <http://ims.missouri.edu/moims/step3.Verify/makemap.asp?STATUS=new>. The page has a navigation menu with links for "home", "about CARES", "projects", "map room", and a search box. The main content area is titled "Missouri Interactive Maps" and features three tabs: "Step 1. Specify Area of Interest", "Step 2. Select Data Layers", and "Step 3. Verify Selections". Below the tabs, there is a text block: "Check your selections of geographic area and data layer listed below. Click 'Map Map' to start your interactive map. An interactive map allows you to change colors, label items, utilize tools, and make printable maps (HTML or PDF format)." A blue button labeled "MAKE MAP" is circled in red. Below this, the "Geographic Area:" section shows "Boone" selected, with a "CHANGE" button next to it. The "Data Layer Selections:" section lists five items, each with a "DELETE" button: "County Boundaries", "2004 Aerial photos (DOQQs)", "FEMA 100/500 Year Floodplain", "Cities and Towns", and "Roads and Highways". A note at the bottom states: "Note: Our new mapping interface was implemented on 01/10/2006. Click here to use the old version." The footer contains navigation links: "home | about CARES | projects | map room".

Step 3. Verify Selections - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Address <http://ims.missouri.edu/moims/step3.Verify/makemap.asp?STATUS=new> Go

home about CARES projects map room search

## Missouri Interactive Maps

Step 1. Specify Area of Interest Step 2. Select Data Layers Step 3. Verify Selections

Check your selections of geographic area and data layer listed below. Click "Map Map" to start your interactive map. An interactive map allows you to change colors, label items, utilize tools, and make printable maps (HTML or PDF format).

**MAKE MAP**

**Geographic Area:**  
Boone [CHANGE](#)

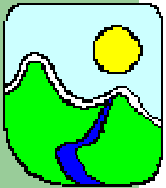
**Data Layer Selections:**

County Boundaries	<a href="#">DELETE</a>
2004 Aerial photos (DOQQs)	<a href="#">DELETE</a>
FEMA 100/500 Year Floodplain	<a href="#">DELETE</a>
Cities and Towns	<a href="#">DELETE</a>
Roads and Highways	<a href="#">DELETE</a>

**Note:** Our new mapping interface was implemented on 01/10/2006.  
[Click here to use the old version.](#)

home | about CARES | projects | map room

Internet



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# CARES – The Map!

CARES Interactive Maps - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Address http://ims.missouri.edu/maproom/missouri/viewer.htm?JS=layerparam12820625131&DATA=\_ad1\_bm10 Go

CARES Home | Map Room | Missouri Interactive Maps |

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File View Selection Tools Help

Active Tool: Zoom In

Map Scale = 1:18418  
0 0.27mi  
cares.missouri.edu

Map: 550897.42 , 4312554.42; Screen coordinate: 538, 329

Internet

**Display map legend**

**Layer and label controls**

**Introduction**

Welcome to CARES Missouri Interactive Maps. We have recently changed the map interface. All functions are still available and organized as below:

**File:**

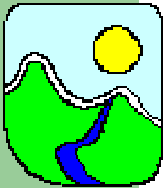
- Print Map
- Extract Data

**View:**

- Show/Hide Inset Map
- Set Map Scale
- Add/Remove Layers
- Change Legend
- Transparency Setting
- Refresh Map
- Stop Drawing

**Selection:**

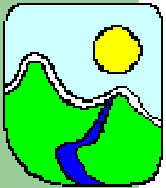
- Buffer Features
- Find Features
- Query Features



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# Example:

- “Sludge ‘R Us”



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# Measure

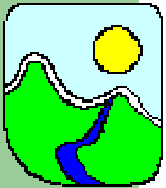
The screenshot displays the CARES Interactive Maps web application in a Microsoft Internet Explorer browser window. The browser's address bar shows the URL: `http://ims.missouri.edu/maproom/missouri/viewer.htm?JS=layerparam12820625131&DATA=_ad1_ad2_tr1`. The application header features the CARES logo (Center for Agricultural, Resource and Environmental Systems) and navigation links for CARES Home, Map Room, and Missouri Interactive Maps. The main interface includes a menu (File, View, Selection, Tools, Help) and a toolbar with various map navigation icons. The active tool is set to "Measure Area".

The central map area shows an aerial view of a rural landscape with a red polygon outlining a specific area. A scale bar at the bottom left indicates a map scale of 1:11111, with a distance of 0.16 miles. The URL `cares.missouri.edu` is visible at the bottom of the map area.

On the right side, the "Area Measurement" panel is active, displaying the following data:

Unit	Value
Sq Miles:	0.25
Acres:	160.5
Sq KM:	0.65
Hectares:	65

Below the measurement data is a blue "RESTART" button. The application also includes options for "Display map legend" and "Layer and label controls". The status bar at the bottom of the browser window shows the map coordinates: "Map: 413680.26, 4266715.97; Screen coordinate: 263, 160".



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# Query Data

Reason 2: Thickest layer (0.00)

20	Construction Materials; Topsoil	Rating: Good (1.00)
21	Daily Cover for Landfill	Rating: Very limited (1.00) Reason 1: Too clayey (1.00)
22	Dwellings W/O Basements	Rating: Somewhat limited (0.00 - 0.50 - 1.00) Reason 1: Shrink-swell (0.00 - 0.50 - 1.00)
23	Dwellings With Basements	Rating: Very limited (1.00) Reason 1: Shrink-swell (1.00)
24	Lawn, Landscape, Golf Fairway	Rating: Not limited (0.00)
25	Local Roads and Streets	Rating: Very limited (1.00) Reason 1: Low strength (1.00) Reason 2: Shrink-swell (0.00 - 0.50 - 1.00)
26	Sanitary Landfill (Area)	Rating: Not limited (0.00)
27	Sanitary Landfill (Trench)	Rating: Very limited (1.00) Reason 1: Too clayey (1.00)
28	Septic Tank Absorption Fields	Rating: Very limited (1.00) Reason 1: Slow water movement (1.00)
29	Septic Tank Absorption Fields Potential (M0)	Rating: Moderate Limitation (0.50 - 0.65 - 0.65) Reason 1: Permeability: 0.06-0.6: Increase size of lateral field and/or pressure dosed system (0.35 - 0.35 - 0.50)
30	Sewage Lagoons	Rating: Somewhat limited (0.00 - 0.50 - 1.00) Reason 1: Seepage (0.00 - 0.50 - 1.00) Reason 2: Slope (0.00 - 0.32 - 0.68)
31	Shallow Excavations	Rating: Somewhat limited (0.10 - 0.10 - 0.13) Reason 1: Cutbanks cave (0.10) Reason 2: Too clayey (0.00 - 0.03 - 0.13)
32	Small Commercial Buildings	Rating: Somewhat limited (0.00 - 0.50 - 1.00) Reason 1: Shrink-swell (0.00 - 0.50 - 1.00)
<b>(FOR) - Forestry and Silviculture</b>		
33	Black Walnut Suitability Index (M0)	Not rated (- Not rated -) Not rated 0 - Not rated 0
34	Conservation Tree/Shrub Groups	Rating: CTSG 4C (0.42) Reason 1: CTSG 4C (1.00) Reason 2: CTSG 3 (0.70)

m12820625131&DATA=\_ad1\_ad2.tr1 Go

Map Room | Missouri Interactive Maps |



Display map legend

Layer and label controls

Layers:

SSURGOII Soil Outlines 2007

1 record found

SSURGOII Soil Outlines 2007

- Newtonia silt loam, 2 to 5 percent slopes, 40078
 

Map Unit Name	Newtonia silt loam, 2 to 5 percent slopes
Map Unit	40078
Symbol	
Map Unit ID	08340078
Map Unit Key	886917
Acres	47

Note: Click on a Map Unit Key to display the soil properties.

SHOW/HIDE ATTRIBUTE

DOWNLOAD DATA



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Map Scale = 1:11111  
0 0.16mi

cares.missouri.edu

Map: 413833.14 , 4266689.51; Screen coordinate: 315, 169

# Overlay

http://ims.missouri.edu - Summary Output - Microsoft Internet Explorer

## SSURGOII Soil Outlines 2007

**To summarize another data layer within the current summary area, select from the drop-down list:**

SSURGOII Soil Outlines 2007

**Summary Area:** 157.75 Acres  
**Total Features Summarized:** 8

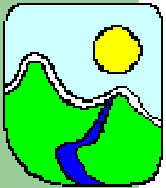
Rec	% in Summary Area	% of Summary Area	Map Unit Name	Map Unit Symbol	Map Unit ID	Map Unit Key	Acres
1	10.1%	26.5%	Deepwater silt loam, 5 to 9 percent slopes, eroded	40056	08340056	<a href="#">886899</a>	41.8294
2	0.2%	5.0%	Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded	46005	08346005	<a href="#">886935</a>	7.85660
3	6.7%	7.4%	Deepwater silt loam, 2 to 5 percent slopes, eroded	40054	08340054	<a href="#">886897</a>	11.63328
4	60.3%	23.9%	Snead silty clay, 5 to 14 percent slopes, eroded	40106	08340106	<a href="#">886929</a>	37.66864
5	76.6%	11.0%	Summit silty clay loam, 5 to 9 percent slopes, eroded	40094	08340094	<a href="#">886933</a>	17.40436
6	66.9%	20.0%	Newtonia silt loam, 2 to 5 percent slopes	40078	08340078	<a href="#">886917</a>	31.58068
7	50.3%	2.7%	Barco loam, 2 to 5 percent slopes	40034	08340034	<a href="#">886875</a>	4.27775
8	78.7%	3.5%	Deepwater silt loam, 5 to 9 percent slopes, eroded	40056	08340056	<a href="#">886899</a>	5.49577
Summary:	N/A	100.0%	N/A	N/A	N/A	N/A	157.74648

**Note:** Click on a Map Unit Key to display the soil properties.

[SHOW/HIDE ATTRIBUTE](#)   
 [DOWNLOAD DATA](#)   
 [CLOSE WINDOW](#)

Done    Internet

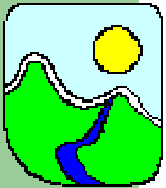
Map: 413224.57, 4266668.93; Screen coordinate: 108, 176    Internet



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# CARES Interactive Map

- Lots of tools and data for generic applications
- Not tailored for specific needs or functions
- An engine for information access



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# CARES – Map Room

Animated Maps - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://maproom.missouri.edu/assessment.html> Go

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## Assessment Tools

[Animal Feeding Operation \(AFO\) Site Assessment Tool](#)

An educational tool designed to help producers understand and manage their potential community and environmental impacts by producing a site-specific report for an animal feeding operation.

[BERM - Business Environmental Risk Management website](#)

Uses internet-based GIS to evaluate environmental risk on your farm.

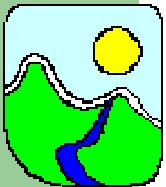
[Missouri Interactive Maps, CARES Map Room](#)

A gateway to internet-based GIS, providing access to a wide-range of geospatial data and mapping tools.

[Missouri Watershed Inventory and Assessment Project \(MOWIAP\) Ranking Tool](#)

A framework for prioritizing 14-digit Hydrologic Units (HU) in Missouri using multiple criteria generated by state and federal agencies.

Done Internet



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## Missouri Animal Feeding Operation Site Assessment (AFO site)



# BERM

Business

Environmental

Risk Management

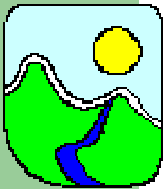
Information for Managing the Effect of Agriculture on the Environment

Understand and manage potential environmental risk.

- Interactive mapping
- Pre-formatted reports
- Educational material

→ <http://cares.missouri.edu/afosite>

→ <http://cares.missouri.edu/berm>




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# AFO Site / BERM

Locate by Section - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://ims.missouri.edu/berm/ASP/sectionlist.asp?T=40&R=R27W> Go



Business Environmental Risk Management

Information for Managing the Effect of Agriculture on the Environment

**BERM Analysis Area Selection**

Select your location, then click the **Make Map** button to proceed.

**SELECT LOCATION CATEGORY:**

- County
- Township/Range/Section
- Zip Code

**Public Land Survey System:**

Township: T40N

Range: R27W


Section: Sec 5

**Make Map**

For more information contact [Ray Massey](#) at the Commercial Agriculture Program

This website hosted by the [Center for Agricultural, Resource and Environmental Systems \(CARES\)](#)

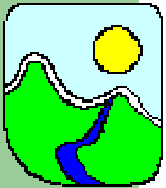
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Division of Applied Social Sciences, College of Agriculture, Food and Natural Resources

Internet




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# AFO Site / BERM

http://ims.missouri.edu - Site Evaluation Report - Microsoft Internet Explorer


File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites



## Missouri Animal Feeding Operation Site Evaluation Report

Report Prepared 4/11/2007



---

### Geographic Summary

Evaluation Site Area:	154.6 Acres
County(s):	Henry
Legal Description (Central Section):	Sec. 5, T40N, R27W, 5th PM
Center of Site Latitude/Longitude (Degrees):	38° 17' 14.8" N 93° 56' 19.0" W
Center of Site Latitude/Longitude (Decimal Degrees):	38.2874 N -93.9386 W

---

### Community Concerns Summary [LEARN MORE...>](#)

**Population:**

Distance	Total Persons	Persons per Square Mile
Within 1 mile	8	2.6
Within 5 miles	858	10.9

**Community Sites Within 5 Miles:**

Incorporated Areas	Parks (Public Lands)	Schools	Enrollment	Churches
1) Montrose	1) Montrose Conservation Area	3	153	2
2) La Due	2) Ladue Bottoms Conservation Area			

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### Biosecurity Concerns Summary [LEARN MORE...>](#)

**Concentrated Animal Feeding Operations within 5 Miles:**

Facility Class	Animal Type	Distance from Site Center (miles)
No Concentrated Animal Feeding Operations within 5 miles of the evaluation area.		

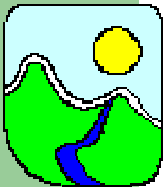
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### Hydrologic Summary

**Streams [LEARN MORE...>](#)**

Total Stream (ft)	Perennial (ft)	Intermittent (ft)	Canal or Ditch (ft)	Other Stream (ft)
931	0	931	0	0

Done Internet



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# Web-Based Tools for Environmental Planning

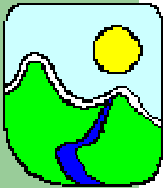
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