

# CAFOs

Concentrated Animal Feeding Operations

## ENVIRONMENTAL ISSUES

## Using the Web Soil Survey to Investigate Potential Concentrated Animal Feeding Operation Locations



**P.R. Owens**

*Agronomy*

**B.C. Joern**

*Agronomy*

**B.D. Lee**

*Agronomy*

**L.C. Bowling**

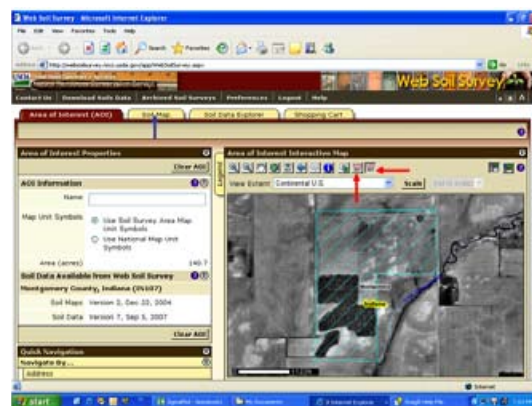
*Agronomy*

### Introduction

In Indiana, a Concentrated Animal Feeding Operation (CAFO) permit application requires a location description that includes USDA-NRCS Soil Survey data. In some Indiana Counties, a printed soil survey can be obtained from County NRCS offices. In addition to the state or local offices of the USDA's Natural Resources Conservation Service (NRCS), libraries, soil conservation district offices, and county agricultural extension offices keep copies of local soil surveys that can be used for reference. Recently, the Web Soil Survey (WSS) has been developed by the USDA-NRCS to provide online access to soils information.

### What Is Web Soil Survey?

Web Soil Survey (WSS) is an online tool that provides agricultural producers, agencies, Technical Service Providers and others electronic access to relevant soil information to make land-use and management decisions. There are many advantages of the WSS over traditional printed maps because the WSS eliminates the publishing backlog, provides the most current soils information and provides viewable maps with many other enhancements. Additionally, the WSS allows a user to select only the area of interest, e.g. a specific farm, and get tailored soil maps and interpretations for the defined area. A description of how to use the WSS will be described later in the document.



*Figure 1. Screen illustrating selection of area of interest (red arrows) and soil map (blue arrow) leads to the soil maps and interpretations.*

### What Is a Soil Survey?

A soil survey consists of a soil map for a land area, descriptions of the soils, and interpretations (predictions) of their potential uses or limitations as both construction material and structural support. Information contained in a soil survey is useful for identifying general soil limitations you may expect to encounter in siting a Concentrated Animal Feeding Operation (CAFO) — for example, high seasonal water tables, slow permeability, low bearing strength, corrosive to metal and concrete, or high shrink/swell capacity. Permit complications, cost overruns or construction failures can be avoided in many cases by consulting a soil survey first.

### How Are Soil Surveys Made?

Soil surveys are the product of the National Cooperative Soil Survey, a nationwide, coordinated effort by federal and state

This publication is one title in the *Concentrated Animal Feeding Operations* series.

To view the entire series, visit <<http://www.ansc.purdue.edu/CAFO/>>.



Figure 2. Screen illustrating soil map and the associated table of soil series.



Figure 3. Illustration of soil suitability for a sewage lagoon. The red color indicates poor suitability and the yellow indicates moderate suitability.

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (rating values)	Acres in AOI	Percent of AOI
CbA	Camden silt loam, 0 to 2 percent slopes	Somewhat limited	Camden (100%)	Seepage (0.53)	7.1	5.1%
CBB	Camden silt loam, 2 to 6 percent slopes	Somewhat limited	Camden (100%)	Seepage (0.53) Slope (0.32)	20.3	14.4%
Ck	Cohoctah loam, frequently flooded	Very limited	Cohoctah (100%)	Flooding (1.00) Seepage (1.00) Depth to saturated zone (1.00)	2.2	1.6%
C2	Cyclone silty clay loam	Very limited	Cyclone (100%)	Depth to saturated zone (1.00) Ponding (1.00) Seepage (0.53)	30.8	21.9%
FdA	Fincastle silt loam, 0 to 2 percent slopes	Very limited	Fincastle (90%)	Depth to saturated zone (1.00)	30.4	27.3%

Figure 4. Table indicating the soil series, soil rating, and reasons for ratings for a sewage lagoon.

agencies, universities, and professional societies to deliver scientifically based soil information. Professional soil scientists working for the USDA-NRCS examine soil properties and record landscape features such as vegetation, rocks, slopes, streams, drainage-ways and lakes, as well as man-made features such as roads, railroads, dams, and gravel pits.

In each county mapped, soil scientists traverse the landscape boring holes to describe many soil characteristics of a soil. A soil profile is a vertical section of soil that shows the sequence of natural layers, or horizons, which are distinguished by color, texture, structure and other characteristics. USDA-NRCS soil scientists examine several thousand soils in each mapped county to create the soil survey. After the soil profile is compared with other soil descriptions in the area, the soils are classified and named according to a national system of soil taxonomy and then plotted on aerial photographs. Each soil is then interpreted to determine how it will support various uses and management. Soils that are very similar make up a soil series. Their horizons are similar in thickness and arrangement, as well as in their physical, chemical, and mineralogical makeup.

Each soil series is named for a town or geographic landmark near the location where the soil was first observed. Soils within a series can, however, differ in texture of the surface soil, slope, stoniness or other characteristics that affect how the soil is used or managed. These differences divide the series into soil phases. The name of the phase includes the feature of the soil that affects its use. For example, “Crider silt loam, 12 to 18 percent slopes, severely eroded” is a phase of the Crider series.

## How to Use Web Soil Survey

Web Soil Survey is accessed via the link <http://websoilsurvey.nrcs.usda.gov/app/>. Once at the homepage, click the green “Start WSS” button. Once you are directed to the mapping page, you must select an area of interest (AOI) to view the soils information. The AOI can be determined by street address, county and state, soil survey area, latitude and longitude, section, township and range, federal land boundaries, and hydrologic unit. You can also just click on the United States map and continue drilling down to locate your farm. As seen in Figure 1, there are two ways to define the AOI for soils information. The red arrows on

Figure 1 indicate the icons that are available: One for rectangular areas and the other allows for the selection of irregularly shaped areas. In the example, the irregular shaped field icon was selected.

Once the AOI is defined by the red outline, you must select the tabs for the information you want. The “Soil Map” (indicated by a blue arrow in Figure 1) tab allows you to view the soil series mapped on the property (Figure 2). The associated table lists the soil series names and the acres of each series mapped. You can select the soil series (highlighted in blue) within the table and a list of properties will appear that provides information about the texture, depth to limiting layer and other features about the soil.

The “Soil Data Explorer” tab provides information about land use suitability and limitations (Figure 3). The first tab that opens allows you to see definitions of soil terms that may be useful. For example, if you want to know what a soil horizon is, check the box and a definition will appear. The second tab is titled “Suitabilities and Limitations for Use”. Several categories that would apply to using property for a CAFO are: Building Site Development, Construction Materials, Disaster Recovery Planning, Land Classification, Land Management, and Sanitary Facilities. As an example, clicking on Sanitary Facilities will provide more options such as “Sewage Lagoons.” Once “Sewage Lagoons” are selected, there will be two options: “View Description” and “View Rating”. The description provides a text based description of the properties and the “View Rating” provides a visual map with associated tables listing the areas which would be problematic for a lagoon (Figure 3 and 4). The value in parentheses is a relative value that ranges from 0 to 1 where 1 is the worst and 0 is the best. Using the ratings and values, you may be able to more accurately locate the operation to minimize environmental impact and regulatory restrictions.

The next tab to the right is titled “Soil Properties and Qualities” and includes information about soil chemical properties, soil erosion factors, soil physical properties, soil quality and features and water features. The “Soil Quality” and “Water Features” would be the most helpful tabs for locating the CAFO site. The soil quality

selection has information about depth to restrictive layers, drainage class and unified soil classification. These are all important for consideration of the CAFO permit. Additionally, the water features tab gives information about the depth to water tables, flooding and ponding. For more information about water features, see Purdue Extension publication Karst Terrain and Seasonal High Water Tables: Their Importance for Siting Concentrated Feeding Operations, (<http://www.extension.purdue.edu/extmedia/ID/cafo/ID-368-W.pdf>).

The last tab to the right is titled “Soil Reports” and allows you to select the particular land use issue and develop a map and report. Soil reports are listed by category and allow you to select a soil feature or land use issue to develop a complete report in a printable version. If, after reviewing the soil survey report, you still have unanswered questions about the survey or the soil on your construction site, you can contact the nearest NRCS or conservation district office.

If you need additional information on how to use the WSS go to the “How to use the Web Soil Survey” link from the WSS homepage.

### Soil Survey Limitations

While the soil survey is clearly a valuable and sometimes indispensable tool to speed site selection for CAFO location, it does have certain limitations that should be noted. For example, the soil map units may have inclusions of up to two acres that do not fit within the use and limitations for the series that is labeled. This is due to the scale at which the maps were created. Onsite soil examination and testing are therefore necessary to determine soil suitability for intensive use of small areas. Despite these caveats, the relatively low investment of time required to review a soil survey is more than offset by the benefits of using the right soil for the right purpose or understanding the possible soil limitations prior to site planning, development, and construction above ground or below ground.

For more science based information about Confined Animal Feeding Operations, visit the Purdue University Extension Web site at: <http://www.ces.purdue.edu/extmedia/ansci.htm#3a>.