

**USDA Service Center Agencies  
Geospatial Data Management Team  
Data Management Plan For**

**Common Land Unit Data**

**February 2005**

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**I. Purpose and Scope (business case)**

***A. Purpose***

The Farm Service Agency (FSA) has federal responsibility and leadership for the geospatial Common Land Unit (CLU) data layer. In order for the FSA to administer their programs, they must know specific acreage values, location, and other land use information. The CLU dataset provides FSA with a digitized vector dataset, comprised of farm, tract, and field boundaries with associated attribute data. This CLU attribute dataset contains information such as the calculated acreage for each CLU polygon, which is used extensively in FSA programs and day to day field office activities.

FSA defines farm field boundaries as agricultural land that is delineated by natural and man-made boundaries such as roadways, tree lines, waterways, fence lines, etc. Most field boundaries are visible features that can be identified and delineated on aerial photography and digital imagery. Tract boundaries are defined by FSA as sets of contiguous fields under single ownership. Farm boundaries are made up of tract and field boundaries or just tract boundaries as mentioned above. These boundaries make up the CLU which is used to administer USDA farm commodity support and conservation programs in a GIS environment.

Using rectified photomaps that have been maintained by FSA Service Centers as a reference, tract and field boundaries were heads-up digitized, using a custom designed tool bar. Digitizing was done at a scale of 1:4800 with digital orthophotography as the base map. Each of the boundaries of the CLU was digitized to a tolerance of three meters (approximately 10 feet) from ground features visible on the digital orthophotography.

The base orthoimagery used during the CLU digitizing effort was produced by mosaicing digital orthophoto quarter quads (MDOQs) into a seamless county image. The mosaic process eliminates or minimizes any offset that would normally be present between standard USGS quarter quadrangles. These datasets were projected in the UTM coordinate system, NAD 83. For those counties which span two UTM zones, the CLU dataset was projected into the predominant zone, as determined by the FSA Aerial Photography Field Office (APFO).

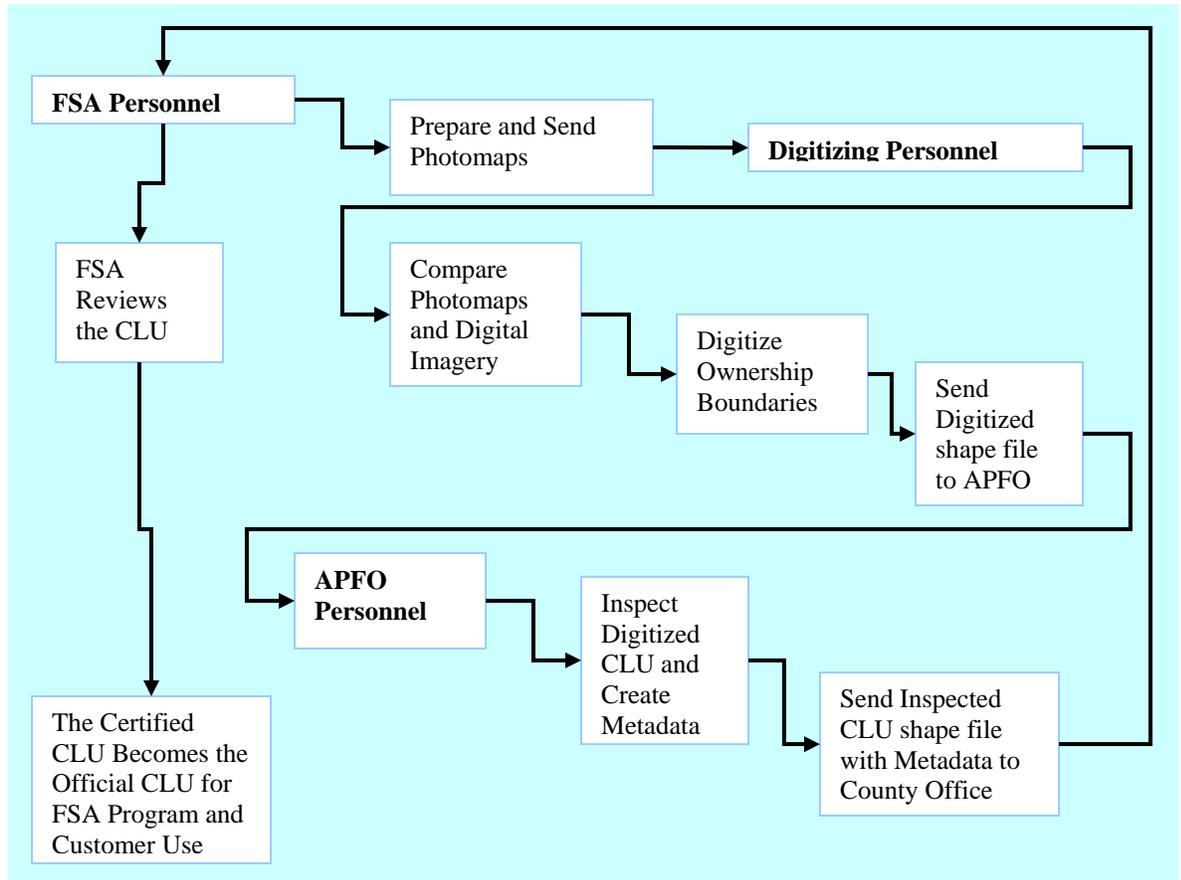
This CLU data will aid County Service Centers in identifying and manipulating farm, tract, and field boundaries, along with related attributes, as they administer USDA programs for their customers.

The CLU's are initially digitized either at an FSA digitizing center or are contracted to private companies to be digitized. The three methods currently used to capture the digitized CLU are:

1. FSA Digitizing Centers
2. Contracted Vendors
3. FSA Service Centers – In House

Once the CLU is initially digitized, each digitizing agent (FSA Digitizing Center, Contracted Vendor, FSA Service Center) is responsible for distributing county based CLU shape files to APFO in Salt Lake City, UT for inspection and quality assurance (QA). Once inspected by APFO, the CLU shape files are made available to the Service Center for review. This activity is monitored through personnel in the National FSA Headquarter office.

The following generalized diagram illustrates the CLU digitizing work flow from digitizing agent through APFO quality control and on to the FSA County Office for use with GIS based toolsets.



### Digitizing Workflow Description:

- FSA personnel prepare official 24X24 photomaps for digitizing and send the maps to digitizing locations.
- Digitizing personnel use customized tools and heads up digitizing methods to capture the farm, tract, and field line work along with attribute data to create the CLU.
- CLU data created by contracted vendors is sent to APFO personnel where it is inspected and either accepted or rejected. If accepted, a copy is then sent to the state office for distribution to the county or counties where it will be reviewed. If rejected it is returned to the contractor for correction and subsequent re-inspection by APFO.
- CLU data that has been created by one of the FSA digitizing centers is minimally inspected and if accepted is archived at APFO. The FSA digitizing centers distribute the CLU data to the appropriate state or county offices for review.
- Once APFO has inspected and accepted the contractor produced CLU it is generally sent to the state FSA office for distribution to the individual County Service Centers. The CLU will then be shipped to the USDA Service Center office on a CD-ROM or other media that can be installed on their equipment.
- All CLUs accepted by APFO will have metadata created by APFO and updated as needed by the FSA Service Center.
- The CLU will reside in the Service Center where FSA shall conduct a certification process prior to official program use.
- During the FSA certification process, along with the review by service centers, owners and operators comments are solicited for accuracy purposes and changes are made accordingly.
- The FSA Service Center maintains the official certified CLU for their county or area of responsibility and uses the data for official Service Center programs. A copy is sent to APFO for archiving.
- Every 30 days a copy of the CLU is sent from the Service Center to APFO to be archived and used for public requests.

### **B. Scope**

The scope of the CLU dataset includes the United States and territories serviced by FSA. The dataset will ultimately include all farm fields, rangeland, and pastureland as identified by land owners/operators who participate in FSA programs. The map extent for a CLU dataset can be a single county, but may include field boundaries that exist in one or more counties adjacent to the primary county or beyond. A CLU dataset consists of the digital vector data, attribute data, and Federal Geographic Data Committee (FGDC) compliant metadata.

## II. Acquisition

### A. Data Source

#### 1. Producer Information

##### a. Name

The CLU data originates and is maintained locally in each FSA Service Center. Each Service Center has responsibility to work cooperatively with individual producers and operators to update and maintain the CLU layer. The CLU data set is stored locally at each Service Center either in an ESRI ArcSDE enabled database or as ESRI shape files.

##### b. Location of Headquarters

USDA Farm Service Agency  
1400 Independence Avenue Southwest  
Washington, DC 20250

##### c. Internet Address

<http://www.fsa.usda.gov/>

#### 2. Publisher Information

##### a. Name

The county office in the county where a specific CLU is administered and maintained would be considered the primary publisher of the CLU data.

##### b. Location of Headquarters

USDA Farm Service Agency  
1400 Independence Avenue Southwest  
Washington, DC 20250

##### c. Internet Address

<http://www.fsa.usda.gov/>

#### 3. Acquisition Information

##### a. Delivery Media

The CLU is managed locally within each Field Service Center, and as such is not acquired or delivered from an outside vendor or other source.

##### b. Download URL

N/A

##### c. Data Availability

N/A

## **B. Standards Information**

### **1. Geospatial Data Standard**

#### a. Standard Name and Steward Information

United States Department of Agriculture (USDA) Service Center Agencies (SCA)  
Standard For Geospatial Data

#### b. Standard Version

SCI Std 003-02  
October 15, 2003

#### c. Standard URL

<http://www.itc.nrcs.usda.gov/scdm/docs/SPG-GeospatialDataStandard.pdf>

### **2. Metadata Standard**

#### a. Standard Name and Steward Information

Metadata are compliant with:  
Federal Geographic Data Committee (FGDC)  
Content Standard for Digital Geographic Metadata FGDC  
STD-001-1998 Version 2 revised June 1998

And:

United States Department of Agriculture (USDA) Service Center Agencies (SCA)  
Standard For Geospatial Dataset Metadata  
SCI Std 003-02 October 15, 2003

<http://www.itc.nrcs.usda.gov/scdm/docs/SPG-GeospatialDatasetFileMetadata.pdf>

The CLU metadata Contact is:

USDA Farm Service Agency  
Aerial Photography Field Office  
2222 West 2300 South  
Salt Lake City, UT 84119-2020 USA

#### b. Description of Metadata Captured

The metadata captured includes the geographic extent of the CLU, and the associated attributes such as the Service Center Point of Contact, digitizing parameters, attribute data captured, and edits to geometry or attributes. The metadata attributes will change on a regular basis due to the constant changes in CLU geometry and attribute values. The metadata also contains information regarding the base imagery used to capture the CLU, including the date of the photography, accuracy requirements, and scale. This metadata meets the FGDC standards set for metadata. A forthcoming template will address the specific standards captured. APFO shall provide a copy of the metadata to all Service Centers for each CLU they are administering.

#### c. Metadata Accuracy and Completeness Assessment

The metadata will be as accurate as the source documents. Each county will have the information listed in 2.b captured via custom programming at APFO to ensure stability and accuracy.

## **C. Acquired Data Structure**

### **1. Geospatial Data Format**

- a. Format (raster, vector, etc.)

Polygon Vector.

- b. Format Name

FSA county offices maintain the CLU dataset in either ESRI shape files or ESRI ArcSDE vector layers.

- c. Data Extent

All CLU polygons are administered by a Service Center which is primarily county based administration. Each county environment may incorporate out-of-county polygons from surrounding counties and beyond if necessary.

- d. Horizontal and Vertical Resolution

The CLU has a standard of being within three meters of the visible physical feature on the digital base map in the easting or X direction.

- e. Absolute Horizontal and Vertical Accuracy

The CLU has a standard of being within three meters of the visible physical feature on the digital base map in the northing (Y) and easting (X) directions.

- f. Nominal Scale

The CLU will be digitized at a base (nominal) scale of no less than 1-inch equals 400 feet (1:4,800) and no more than 1 inch equals 200 feet (1:2,400). This will allow for tight digitizing specifications and accurate data capture.

- g. Horizontal and Vertical Datum

The datum is North American Datum 1983 for all appropriate areas and World Geodetic System 1984 elsewhere. The vertical datum is mean sea level.

- h. Projection

The projection of the CLU is Universal Transverse Mercator (UTM). When a UTM zone splits the county, the CLU shall be captured and maintained in the predominant zone. This is the same method that is used in the base imagery from which the CLU is derived.

- i. Coordinate Units

Meters

- j. Average Data Set Size

The size depends on the spatial extent of the service center and complexity of the farm and field pattern. An average sized shape file set is about 4-15 megabytes.

k. Symbology

A solid line will notate farm, field and tract boundaries.

## 2. Attribute Data Format

a. Format Name

The CLU attributes are maintained within the ESRI shape files or ESRI ArcSDE layers.

b. Database Size

County shape files average 5MB to 8MB in size.

## 3. Data Model

a. Geospatial Data Structure

ESRI shape file or ESRI ArcSDE vector layer.

b. Attribute Data Structure

ESRI shape file or ESRI ArcSDE vector layer.

c. Database Table Definition

ESRI shape file:

As defined in FSA handbook 8-CM Par. 162 and Exhibit 17. In addition, there is a *Shape* attribute field generated by the software. A *Comments* attribute field exists under the basis that it may or may not be removed upon completion of certifying all CLUs in the Nation. In some cases a *CRP* attribute field may exist solely for the purpose of labeling and may or may not be added as a standard attribute in the CLU.

ESRI ArcSDE vector layer:

Refer to the FSA ArcGIS CLU Maintenance Tool Physical Data Model document.

d. Data Relationship Definition

Refer to the FSA ArcGIS CLU Maintenance Tool Physical Data Model document

e. Data Dictionary

ESRI shape file:

FSA handbook 8-CM Par. 162 and Exhibit 17 provide references that describe the tables, attributes, indexes, relationships, and domains for the CLU data layer. Par. 281 and Exhibit 22 in the same handbook also cover the metadata standards that shall accompany the CLU data. Contact the National Data Steward (pg. 8) for information on obtaining a copy of the manual.

ESRI ArcSDE vector layer:

Refer to the FSA ArcGIS CLU Maintenance Tool Physical Data Model document.

## **D. Policies**

### **1. Restrictions**

#### a. Use Constraints

Only USDA FSA Service Center personnel have access to edit the CLU data set in the Service Center.

#### b. Access Constraints

Only USDA FSA Service Center personnel have access to edit the CLU data set in the Service Center.

#### c. Certification Issues

As identified through user groups assigned upon log in.

### **2. Maintenance**

#### a. Temporal Information

The CLU is a very dynamic dataset. Updates occur daily in most service centers.

#### b. Average Update Cycle

Daily

## **E. Acquisition Cost**

### **1. Cooperative Agreement**

#### a. Description of Agreement

Since the CLU is managed internal to FSA, no agreement with outside providers is required.

#### b. Status of Agreement

N/A

### **2. Cost to Acquire Data**

N/A

### III. Integration

#### A. Value Added Process

##### 1. Benefit to the Service Center

The need to centrally locate and nationally integrate the CLU data sets residing in each county office has been identified as a requirement by FSA in order to provide for the long term vision of the CLU data set in support of program delivery.

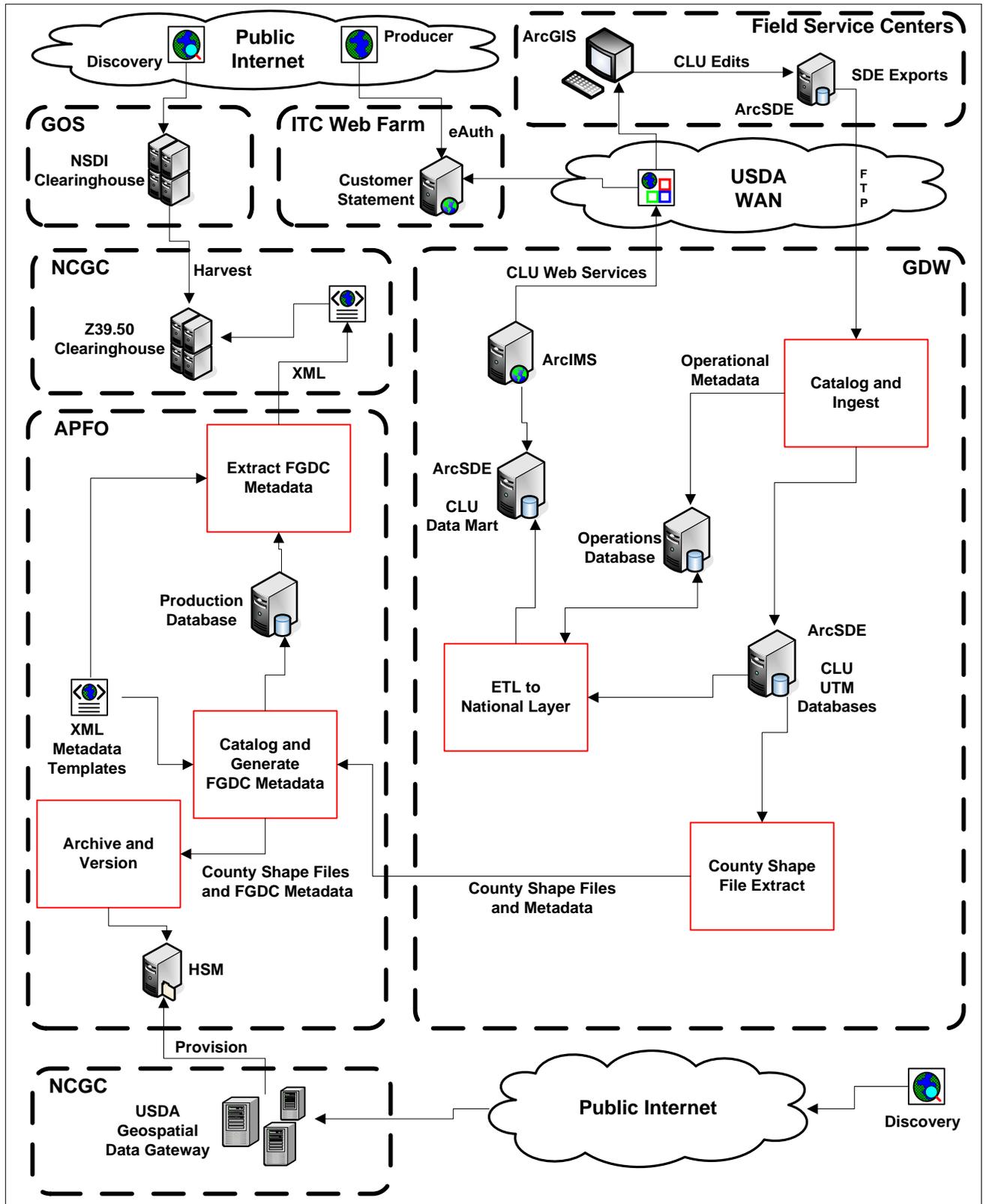
Current CLU integration occurs on a county by county basis within the USDA Geospatial Data Warehouse (GDW). Once centrally housed within the GDW, the CLU can be made available, via web services, to applications such as the FSA Customer Statement, and to other USDA personnel. General public distribution layer will contain CLU attribute data fields as determined releasable in accordance with the Privacy Act and Freedom of Information Act (FOIA).

##### 2. Process Description

###### a. Flow Diagram

The following diagram illustrates the data management process for the CLU dataset.

<b>Term</b>	<b>Explanation</b>
ETL	Short for extract, transform, and load three database functions that are combined into one tool to pull data out of one database and place it into another database.
FGDC	Federal Geographic Data Committee
FTP	File Transfer Protocol is the protocol for exchanging files over the Internet.
GOS	Geospatial One-Stop is a Federal government initiative that will create, among other things, and Internet portal for data discovery and exchange.
HSM	Hierarchical Storage Management is a data storage system that automatically moves data between high-cost and low-cost storage media.
IMS	IP Multimedia Subsystem is a standardized reference architecture that consists of session control, connection control and an application services framework along with subscriber and services data.
ITC	Information Technology Center (NRCS – Ft Collins, CO)
NCGC	National Cartography Geospatial Center (NRCS – Ft Worth, TX)
NSDI	National Spatial Data Infrastructure encompasses policies, standards, and procedures for organizations to cooperatively produce and share geographic data.
SDE	The ESRI Spatial Database Engine provides an enterprise wide repository for spatial and attribute data within a Relational Data Base Management System.
WAN	Wide Area Network is a computer network that spans a relatively large geographical area.
XML	Extensible Markup Language allows designers to create their own customized tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations.



b. Process Description

- FSA personnel perform edits against the CLU ArcSDE layer geometry and associated attributes as part of normal office activities.
- Once a week, SDE exports of the CLU changes are extracted from the county's database and shipped, via FTP, to the GDW. The extracts from the Service Centers will occur over a staggered weekly schedule, to distribute the arrival of the CLU exports over a five day period.
- When the CLU SDE export files are received at GDW, a nightly process to catalog the CLU and apply the CLU edits occurs. All CLU received are cataloged along with operational metadata in the GDW Operations Database. The CLU edits are then applied to the ArcSDE enabled CLU databases which are partitioned by UTM zone.
- Once the updates for a specific nightly cycle have been applied to the CLU databases, the GDW ingestion component is considered complete, and the CLU will then follow two temporally separate, but functionally integrated paths through the remainder of the data management process.

Update CLU Data Mart:

- A weekly ETL of the UTM based CLU layers will populate the GDW CLU Data Mart with national CLU layers.
- ArcIMS based CLU web services will make available the newest CLU layers to users and applications within the USDA network. Users in the Service Centers will be able to include these web services into their ArcGIS applications. Additionally, the USDA Customer Statement, hosted at the ITC web farm, will incorporate CLU boundaries via these CLU web services.

Provide Updated CLU to GOS and USDA Geospatial Data Gateway:

- A monthly extract of all updated CLUs from the GDW will occur to create county based shape files for delivery via the USDA distribution portal. This general public distribution layer will contain CLU attribute data fields as determined releasable in accordance with the Privacy Act and Freedom of Information Act (FOIA). Synchronization of these updates with the creation and update of the associated FGDC compliant metadata will also occur. FGDC metadata will be distributed via the Gateway with all delivery requests, and additionally, the FGDC metadata will also be pushed to the USDA Clearinghouse node at NCGC where it can be harvested by the Geospatial One Stop.
- The extracted CLU shape files and associated operational metadata from the GDW will be moved to a file system where they can be accessed by existing APFO routines which will catalog the CLU shape files in the APFO production database and generate FGDC compliant metadata.
- Once the shape files have been cataloged and the metadata has been generated, the CLUs will moved to the APFO tape library system for archival and

versioning. The Geospatial Data Gateway will then provision the CLU shape files from the HSM when a delivery request arrives.

- To synchronize the updated CLU postings to the Gateway with Geospatial One Stop, appropriate FGDC metadata will be extracted in XML format to be passed to NCGC for uploading into the Z39.50 Clearinghouse node. Once uploaded, the CLU metadata will be harvested by the NSDI Clearinghouse and made available for discovery via the Geospatial One Stop portal.

### 3. Technical Issues

#### a. Tiling

Tiling occurs at the county level. When ingested into the GDW, adjoining counties will experience typical topological issues associated with integrating a distributed data set. Overlaps, slivers, and duplicate polygons will occur.

#### b. Compression

None

#### c. Scale

1:4800 or less

All CLU data will be accurate within three meters of the physically detectable features on the digital base imagery. (i.e. Fence line, ditch, property boundary, roadside, etc...)

#### d. Tonal Matching

None

#### e. Edge-matching

When ingested into the GDW, adjoining counties will experience typical edge matching issues associated with integrating a distributed data set.

Most USDA Field Service Center's will assist cooperators in the adjoining counties. These cooperators, for the most part, have CLU that exists within a 1-mile buffer of the county boundary. Some CLU's administered by a Service Center are more than 1 mile outside of the county boundary.

### 4. Quality Control

#### a. Procedures

All CLU's ingested into the GDW will be catalogued and tracked to enable temporal tracking and other statistical analysis.

#### b. Acceptance Criteria

N/A

## 5. Data Steward

### a. Name and Organization

The national data steward is:  
Sandy Bryant  
USDA Farm Service Agency  
1400 Independence Avenue South West  
RM 3643  
Washington, DC 20250

### b. Responsibilities

The National Data Steward is a business area expert who is assigned responsibility by the National Executive Sponsor for the content of the data and database. The Data Steward establishes definitions and domains for data elements; sets the procedures for collecting and certifying data and metadata; and manages the overall storage, maintenance, and distribution of the data and metadata. Certain data steward responsibilities may be re-delegated to state and local data stewards who are responsible for portions or copies of a data set.

The National Data Steward(s) will

- Act as the designated authority and point of contact for all business-area decisions concerning the data.
- Establish and maintain business rules and consistent definitions for data elements, including data quality and certification standards.
- Establish standards to ensure the validity, accuracy, and completeness of the physical data and supporting metadata, to include:
  - A process for the creation, storage, and dissemination of data sets and associated metadata.
  - A process and monitoring system to certify that the data meets quality standards.
- Provide for the security of the data assets, to include:
  - Coordinate with agency security officers.
  - Recommend availability, security, and access authority for the data.
  - Identify security requirements under the Freedom of Information Act, and for data that must be protected under the Privacy Act.

## ***B. Integrated Data Structure***

### 1. Geospatial Data Format

#### a. Format (raster, vector, etc.)

Polygon Vector.

#### b. Format Name

ESRI ArcSDE vector layer.

c. Data Extent

Conterminous United States

d. Horizontal and Vertical Resolution

The CLU has a standard of being within three meters of the visible physical feature on the digital base map in the easting or X direction.

e. Absolute Horizontal and Vertical Accuracy

The CLU has a standard of being within three meters of the visible physical feature on the digital base map in the northing (Y) and easting (X) directions.

f. Nominal Scale

The CLU will be digitized at a base (nominal) scale of no less than 1-inch equals 400 feet (1:4,800) and no more than 1 inch equals 200 feet (1:2,400). This will allow for tight digitizing specifications and accurate data capture.

g. Horizontal and Vertical Datum

The datum is North American Datum 1983 for all appropriate areas and World Geodetic System 1984 elsewhere. The vertical datum is mean sea level.

h. Projection

The projection of the CLU is Universal Transverse Mercator (UTM). When a UTM zone splits the county, the CLU shall be captured and maintained in the predominant zone. This is the same method that is used in the base imagery from which the CLU is derived.

i. Coordinate Units

Meters

j. Symbology

<http://www.itc.nrcs.usda.gov/scdm/docs/SPG-StandardforGeospatialSymbology.pdf>

## 2. Attribute Data Format

a. Format Name

ESRI ArcSDE vector layer

b. Database Size

Conterminous US coverage of CLU will equate to approximately 13 GB of ArcSDE enabled database space.

## 3. Data Model

a. Geospatial Data Structure

ESRI ArcSDE vector layer.

- b. Attribute Data Structure

ESRI ArcSDE vector layer.

- c. Database Table Definition

Same as Acquired Data Structure.

- d. Data Relationship Definition

Same as Acquired Data Structure.

- e. Data Dictionary

Same as Acquired Data Structure.

### **C. Resource Requirements**

#### **1. Hardware and Software**

Hardware and software requirements associated with integrating the CLU into the GDW are managed as part of the GDW Task Order – ITC-2002-34.

#### **2. Staffing**

GDW and APFO personnel will provide the staffing for the integration effort.

### **D. Integration Cost**

#### **1. Hardware and Software**

Hardware and software costs associated with integrating the CLU into the GDW are implicitly included in the GDW Task Order – ITC-2002-34.

#### **2. Staffing**

Staffing costs associated with integrating the CLU into the GDW are implicitly included in the GDW Task Order – ITC-2002-34.

## IV. Delivery

### A. Specifications

#### 1. Delivery Portal

Delivery of county based CLU shape files occurs via the USDA Geospatial Data Gateway:

<http://datagateway.nrcs.usda.gov/>

County based CLU shape files are extracted on a regular basis from the GDW and made available to USDA Gateway portal.

This general public distribution layer will contain CLU attribute data fields as determined releasable in accordance with the Privacy Act and Freedom of Information Act (FOIA).

#### 2. File Naming Convention

This data will be delivered via the Gateway in ESRI shape file format containing the following files for each county based delivery:

```
clu_<type>_<FIPS>_<UTM>_<InspectDate>_<VersionDate>.shp
clu_<type>_<FIPS>_<UTM>_<InspectDate>_<VersionDate>.dbf
clu_<type>_<FIPS>_<UTM>_<InspectDate>_<VersionDate>.shx
clu_<type>_<FIPS>_<UTM>_<InspectDate>_<VersionDate>.prj
clu_<type>_<FIPS>_<UTM>_<InspectDate>_<VersionDate>.txt
clu_<type>_<FIPS>_<UTM>_<InspectDate>_<VersionDate>.xml
```

Where:

- *type* is either 'c' or 'n' for certified or non-certified
- *FIPS* refers to the five digit FIPS code for the county
- *UTM* refers to the primary UTM for the county
- *InspectDate* refers to the date the county was inspected/received at APFO in *yyyymmdd*
- *VersionDate* refers to the unique date that the CLU was placed on the APFO file systems and made available to the Geospatial Data Gateway in *yyyymmdd*

Example:

```
clu_c_31031_14_20041123_20050126.shp
```

### B. User Information

#### 1. Accuracy Assessment

##### a. Alignment with Other Theme Geospatial Data

The CLU should align with the base ortho-image from which it is derived.

These data that represent the Common Land Unit area captured at various scales, not to exceed a scale of 1:4800. FSA maps typically display data at a 1:7920 but may vary depending on the extent of the data being viewed.

b. Content

Each field and tract boundary that is captured represents the best representation of the features as they were drawn on the original photomaps used for initial digitizing or as described by the owner/operator during updates of the boundaries.

## 2. Appropriate Uses of the Geospatial Data

a. Display Scale

FSA maps typically display data at a 1:7920 but may vary depending on the extent of the data being viewed. Not to exceed 1:7920.

b. Plot Scale

FSA maps typically display data at a 1:7920 but may vary depending on the extent of the data being viewed. Not to exceed 1:7920.

c. Area Calculations

As accurate as the source data, capture scale, and the algorithm used in the ArcGIS software.

d. Decision Making

None

## C. Maintenance and Updating

### 1. Recommendations and Guidelines

a. Original data location and structure

N/A – Internal Gateway processing.

b. Update Cycle

CLU updates will be posted to the USDA Geospatial Data Gateway approximately every 30 days.

c. Availability

The USDA Geospatial Data Gateway provides access to CLU data 24 hours a day, 7 days a week.

The following link shows the status of the base imagery and FSA Service Center CLU certification process and subsequent CLU availability.

<http://fsagis.usda.gov/CLUtracking/>

d. Change Control

Changes to the structure of the CLU format, ie attribute table fields, will need to go through a Change Control Board, Database Management Office (DBMO), and Enterprise Data Management and Services Office (EDMSO).

Changes to topology or owner/operator records can occur without the change control process.