

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

Ortho Imagery-National Agricultural Imagery Program

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I. Purpose and Scope (business case)

A. Purpose

These products are used for CLU digitizing and boundary maintenance, Farm Program administration, conservation planning and Soil Survey production.

NAIP acquires digital ortho imagery for agricultural regions in the U.S. on an annual basis during the summer crop growing season, or “leaf on”. NAIP acquires both 1 meter ground sample distance (GSD) and 2 meter GSD products. Together, both the 1 and 2 meter NAIP products will cover all cropland on an annual basis. The annual proportion of NAIP coverage will be approximately 20% one meter and 80% two meters. The one meter product is produced to within 3 meters of the mosaicked digital ortho photo quarter quads (MDOQs) used to digitize CLU and other SCA datasets. The one meter product is intended to provide an updated ortho base with planned acquisition on a 3-5 year cycle. The two meter product is produced to within 10 meters of MDOQs and is intended to be used for aerial compliance and other programs that do not require high spatial accuracy. Only the one meter NAIP product is considered part of the ortho imagery theme.

B. Scope

The scope of the dataset is the United States and territories serviced by FSA.

For a NAIP 2004 status map see: <http://www.apfo.usda.gov/statusmaps/naip04coverage.pdf>

II. Acquisition

A. Data Source

1. Producer Information

a. Name

USDA Farm Service Agency

b. Location of Headquarters

USDA Farm Service Agency
14th and Independence
Washington, D.C. 20250

c. Internet Address

www.usda.fsa.gov

2. Publisher Information

a. Name

NAIP products are available through the Aerial Photography Field Office (APFO).

b. Location of Headquarters

USDA APFO
2222 west 2300 south
Salt Lake City, Utah 84119

c. Internet Address

www.apfo.usda.gov

3. Acquisition Information

a. Delivery Media

NAIP products are available on CDROM, DVD, DLT 320 tape, and Firewire/USB2 disk drives.

b. Download URL

NAIP compressed county mosaics can be downloaded from the Resource Data Gateway:

www.datagateway.nrcs.usda.gov

c. Projected Data Availability Schedule

NAIP is an annual program with imagery acquired during the growing season, with products available for distribution within 30 days of acquisition.

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>

- b. Description of Metadata Captured
- c. Metadata Accuracy and Completeness Assessment

C. Acquired Data Structure

1. Geospatial Data Format

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

Raster

- b. Format Name

Quads are Geotiff. County Mosaics are MrSID.

- c. Data Extent

Continental United States

- d. Horizontal and Vertical Resolution

Horizontal resolution is one meter.

- e. Absolute Horizontal and Vertical Accuracy

Accuracy of one meter NAIP products is plus/minus three meters of DOQs/MDOQs used to digitize the common land unit.

- f. Nominal Scale

1:12,000

- g. Horizontal and Vertical Datum

The datum is North American Datum 1983 for all appropriate areas (UTM zone 3 through 22) and World Geodetic System 1984 elsewhere. The vertical datum is mean sea level.

- h. Projection

Universal Transverse Mercator (UTM)

- i. Coordinate Units

Metes

- j. Average Data Set Size

The average three band NAIP quarter quad is 144 megabytes.

k. Symbology

None

2. Attribute Data Format

a. Format Name

Raster data sets with no attribute information.

b. Database Size

Not Applicable to raster data sets.

3. Data Model

a. Geospatial Data Structure

NAIP full resolution quarter quads are available in Geotiff format.
NAIP county mosaics are MrSID.

b. Attribute Data Structure

Not Applicable to raster data sets.

c. Database Table Definition

Not Applicable to raster data sets.

d. Data Relationship Definition

Not Applicable to raster data sets.

e. Data Dictionary

Not Applicable to raster data sets.

D. Policies

1. Restrictions

a. Use Constraints

Ortho imagery used to develop critical USDA datasets shall meet USDA Geospatial data standards. Service Center Standards require register with SCA data sets, such as CLU.

One meter NAIP ortho imagery is not certified for CLU digitizing or editing until it has gone through the APFO quality assurance process.

b. Access Constraints

None. Ortho imagery for the service center is in the public domain. FGDC guidelines for data acquisition and sharing apply. The maps must be made available to the public. Any NRI imagery is an exception.

c. Certification Issues

Compressed county mosaics (CCMs), metadata text file, and projection file (.aux) and index shape and metadata files are delivered from vendor on CD to APFO. Two sets for each county deliverable are provided to APFO. After a cursory inspection that checks for proper projection, no missing data, etc, a CD is sent to cost share partners as well as FSA state offices

The CCM is delivered as soon as possible to Service Centers for use in aerial compliance. The full resolution tiles are delivered from contractors later in the acquisition process for a full inspection process, storage in GDW and as source material for any rework.

After a full inspection of quarter quads and any resulting rework, a new CMM is produced and distributed to the SC and all cost share partners. Rework can also result from feedback and requests from Service Centers. Delivery options include CD/DVD, DLT7000, and Firewire/USB2 hard drives.

Ortho imagery stored on local servers should be synchronized with ortho imagery in the USDA Geospatial GDW for critical applications. Users accessing ortho imagery via GDW Internet Mapping Services (IMS) should have the same view as users accessing the imagery from local storage in a Field Service Center. Certified ortho imagery will be hosted in the GDW raster data mart to support IMS applications. Non-standard or un-certified imagery will not be hosted on the GDW IMS.

2. Maintenance

a. Temporal Information

For NAIP products, the image acquisition and production dates are contained in the FGDC style metadata file. In addition, a county based index of quarter quads with attributes including NAIP image acquisition dates, is available.

b. Average Update Cycle

Together, both the one and two meter NAIP products will cover all cropland on an annual basis. The annual proportion of NAIP coverage will be approximately 20% one meter and 80% two meters.

E. Acquisition Cost

1. Cooperative Agreement

a. Description of Agreement

NAIP is managed by USDA and acquired through cooperative funding partnerships.

b. Status of Agreement

Partnerships for NAIP are ongoing.

2. Cost to Acquire Data

NAIP quarter quads and compressed county mosaics are available at no cost to USDA Service Center Agencies and at a nominal cost to all others.

III. Integration

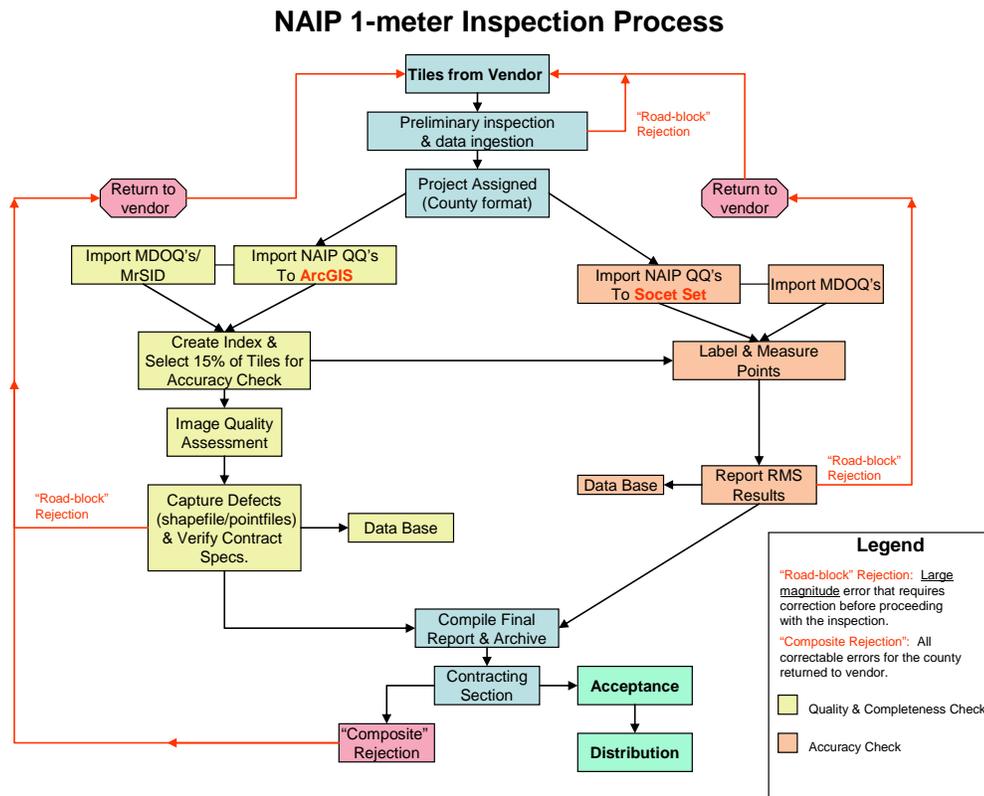
A. Value Added Process

1. Benefit to the Service Center

The integration process benefits the service center by providing and ensuring that digital ortho imagery made available to Service Centers meet SCA standards. Rework on NAIP ortho imagery is supported. Custom requests are supported as resources permit.

2. Process Model

a. Flow Diagram



b. Process Description

NAIP quarter quads are mosaicked into a color balanced, compressed county mosaic in a single UTM zone using Lizardtech's MrSID compression software.

Rework on NAIP ortho imagery is supported. Problem reports and requests must be reported to the NAIP Data Steward. To ensure that most current version tiles are used, The Data Steward will send data center production staff a shape file and table containing the quarter quads tiles required for reworking the compressed county mosaic (CCM). NAIP imagery is warranted up to the end of the calendar year of acquisition. Data Center production staff will preform rework.

3. Technical Issues

a. Tiling

NAIP quarter quads are tiled to the Quarter Quad.

b. Compression

A 50:1 target compression ratio is employed on color and color infrared NAIP compressed county mosaics.

c. Scale

Map accuracy for the CCMs and quarter quads applies to a display scale of 1:12,000.

d. Tonal Matching

Color balancing standards for NAIP CCMs is subjective. The region for collecting statistics for producing color balancing is a county.

e. Edge-matching

NAIP quarter quads are contracted to register to within three meters of the MDOQ mosaic used to digitize CLU boundaries. The MDOQ mosaics themselves are specified to edge match to within three meters. It is possible that the total misregistration between NAIP quarter quads could total six meters.

4. Quality Control

a. Procedures

The interim NAIP CCM goes through a cursory inspection that ensures the file opens, is in the correct projection, the file is named correctly, and the metadata from the contractor is correct.

The quality assurance process for NAIP 1 meter ortho imagery consists of a visual inspection of 100% of the quarter quads. The tiles are inspected for defects and subjective image quality characteristics. 15% of the tiles are checked for horizontal accuracy by measuring control points and comparing them to the corresponding MDOQ. The tiles are also checked for cloud coverage. Tiles are checked for the correct projection and completeness of the metadata.

b. Acceptance Criteria

Tiles that contain greater than 10% cloud cover are rejected. Tiles where less than 90% of measured points fail to meet the three meter horizontal accuracy specification, as measured against the MDOQ mosaic, are rejected.

5. Data Steward

a. Name and Organization

POC to be determined
USDA APFO
2222 west 2300 south
Salt Lake City, UT 84119

b. Responsibilities

The Data Steward for NAIP imagery will:

1. Act as the designated authority and point of contact for all business-area decisions concerning the database. Responsibilities include obtaining the needs/requirements from the users, and coordinating with the Data Team on metadata and other data management issues.
2. Establish and maintain business rules and consistent definitions for data elements, identify data domains and relationships, establish data quality and certification standards associated with the contents of the database, and recommend availability, security and access authority for the data
3. Ensure that metadata is collected, approved, and certified for release according to the adopted industry, Federal and USDA metadata and data management standards.
4. Ensure the validity, accuracy and completeness of the physical data and supporting metadata; certify that data meets quality standards; and certify that data is ready for release for internal and/or public use.
5. Provide training within the Data Steward's business area on data management roles and responsibilities.

B. Integrated Data Structure

1. Geospatial Data Format

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

Raster

- b. Format Name

MrSID with world file.

- c. Data Extent

Individual county

- d. Horizontal and Vertical Resolution

One meter.

- e. Absolute Horizontal and Vertical Accuracy

Same as source data.

- f. Nominal Scale

Same as source data.

- g. Horizontal and Vertical Datum

Same as source data.

- h. Projection

Same as source data. Image tiles in counties covering two UTM zones will be converted to the predominant zone.

- i. Coordinate Units

Same as source data.

- j. Symbology

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

2. Attribute Data Format

- a. Format Name

Not Applicable to raster data sets.

- b. Database Size

Not Applicable to raster data sets.

3. Data Model

- a. Geospatial Data Structure

Compressed county mosaic with world file.

- b. Attribute Data Structure

Not Applicable to raster data sets.

- c. Database Table Definition

Not Applicable to raster data sets.

- d. Data Relationship Definition

Not Applicable to raster data sets.

- e. Data Dictionary

Not Applicable to raster data sets.

C. Resource Requirements

1. Hardware and Software

QA of NAIP imagery is performed on ArcGIS running on Dell workstations.

2. Staffing

Unknown

D. Integration Cost

1. Hardware and Software

Unknown

2. Staffing

Unknown

IV. Delivery

A. Specifications

1. Directory Structure

The different versions of ortho imagery are all stored in the imagery/ortho_imagery subfolder. The exception is the initial NAIP compressed county mosaic delivered for use in aerial compliance. The initial NAIP CCM is named with a “naip” prefix and shall be loaded into the geodata/imagery/fsa_compliance directory.

The final NAIP version will follow the same file naming convention but contain an “ortho” prefix. The final version should be placed in the geodata/ortho_imagery directory. This only refers to the one meter NAIP imagery. Two meter NAIP remains in the fsa_compliance sub folder. The interim version can be removed from the fsa_compliance sub folder and renamed to the file naming standard for the complete file name.

a. Folder Theme Data is Stored In

Interim NAIP one and two meter in:	F:\ geodata/imagery/fsa_compliance
Final approved one meter in:	F:\geodata\ ortho_imagery
NAIP quarter quads in:	F:\geodata\ ortho_imagery

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

2. File Naming Convention

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

a. List of Theme Files and The File Naming Convention

Quarter quads	<a><nnnnnnn>_<qd>_<r>_<yyyymmdd>
County mosaics	ortho_<x-x>_1<n>_<f>_<stnnn>_<yyyy><v>

A. User Information

1. Accuracy Assessment

a. Alignment with Other Theme Geospatial Data

90% of well defined points are within three meters of compressed county mosaic used to digitize CLU boundaries.

b. Content

The data is ortho-rectified digital imagery.

2. Appropriate Uses of the Geospatial Data

a. Display Scale

The resolution of the NAIP and DOQ compressed county mosaics allow them to be displayed at scales substantially larger than the accuracy specifications to which they were produced. It should be noted that while “heads up” digitizing at display scales larger than 1:12,000 may allow for more accuracy of the digitized data in a relative sense, i.e., digitized line work may more accurately follow features visible on the ortho image, it will not necessarily lead to an improvement in absolute horizontal

accuracy. Similar consideration should be given when using the compressed county mosaics for map revision.

b. Plot Scale

Hardcopy plots of the compressed county ortho mosaics can be horizontally accurate to NMAS specifications for 1:12,000 maps. Consideration should be given to the dimensional stability of the plot media as well as the geometric accuracy of the plotting device.

c. Area Calculations

The compressed county ortho mosaics and the full resolution images from which they were produced are an orthographic projection; i.e. they represent a vertical perspective of all ground features on the image. Relatively flat surfaces can be measured with accuracy that matches the source data. Area calculations of relatively steep surfaces must consider the effects of the vertical perspective.

d. Decision Making

The final NAIP one meter compressed county mosaic and the enhanced MDOQ mosaic from APFO, are the officially approved products for all service center applications. Other USDA versions of DOQ mosaics may also be used as needed.

B. Maintenance and Updating

1. Recommendations and Guidelines

a. Original data location and structure

The permanent database is at APFO. The most current version of ortho imagery for each year shall be kept on-line at the service center. Older versions shall not be maintained on the server at the service center.

b. Update Cycle

NAIP one-meter ortho imagery is projected to be updated on a five year cycle.

c. Availability

Ortho imagery that meets Service Center standards will be loaded and managed in the Geospatial Data Warehouse (GDW). Ortho imagery is stored uncompressed at one-meter resolution.

d. Change Control

The most current version of standard ortho image data is managed in the GDW in SDE databases. The databases consist of full resolution quarter quads mosaicked into one degree x one degree raster catalog. There is a separate database for color and color infrared (CIR) NAIP, panchromatic (black and white) MDOQs, and CIR MDOQs.

The SDE image data base component of the GDW provides the authoritative source for populating data marts and internet mapping services. The on-line imagery is replicated between APFO and NCGC to provide a fail-over capability.

The original full resolution image tiles are stored on high speed tape under a Hierarchical Storage Management (HSM) system in a robotic tape silo. This means that all versions of the imagery will be maintained and can be accessed and retrieved from tape upon request for delivery.

Service Center servers should maintain the most current copy of all imagery in the proper f:\geodata folder for daily use. As new imagery becomes available Service Centers should replace the daily working copies in the f:\geodata folder with the newer imagery and move the older set to an archive folder (as yet unidentified). Any previous versions of the imagery should be moved off the server for a historical local archive and onto other media, such as CD, DVD, or tape.