



# LiDAR Quality Assessment Report

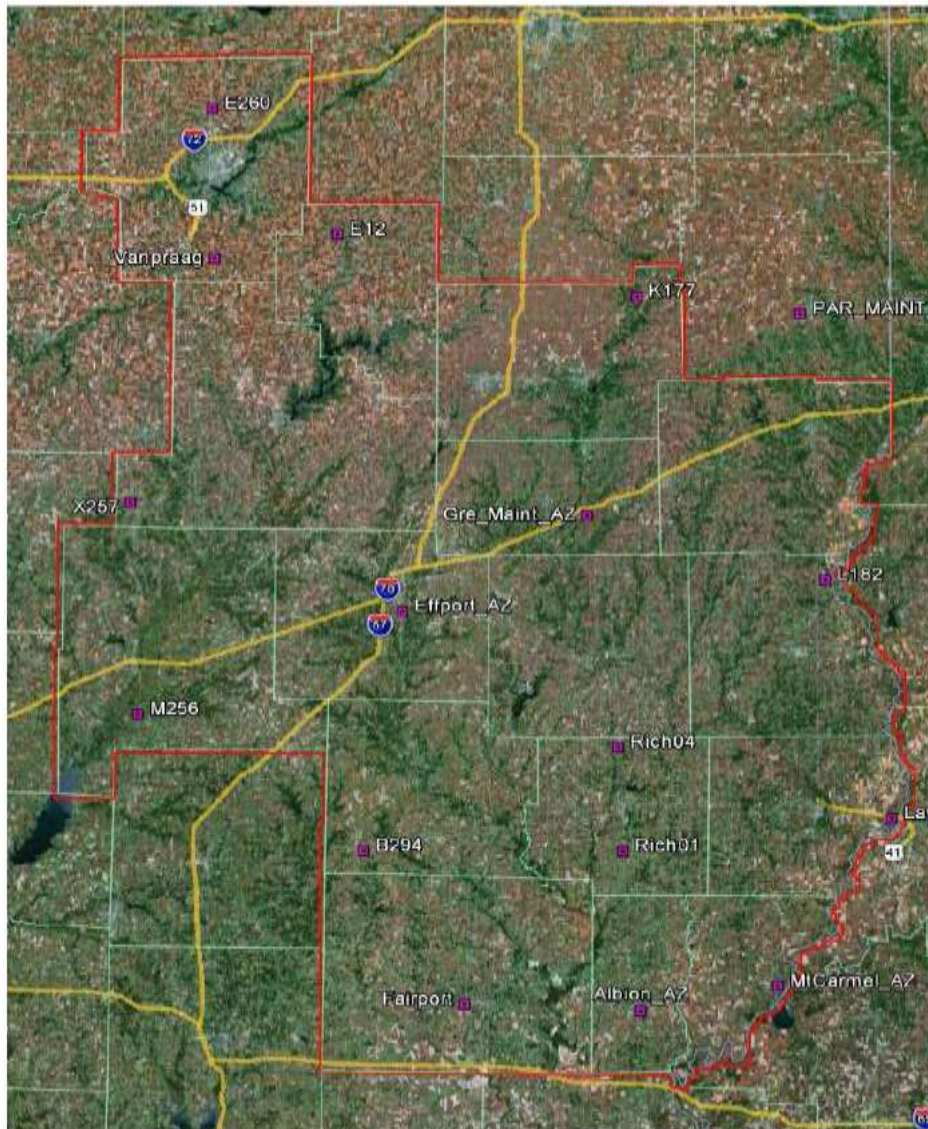
The USGS National Geospatial Technical Operations Center, Data Operations Branch is responsible for conducting reviews of all Light Detection and Ranging (LiDAR) point-cloud data and derived products delivered by a data supplier before it is approved for inclusion in the National Elevation Dataset. The USGS recognizes the complexity of LiDAR collection and processing performed by the data suppliers and has developed this Quality Assessment (QA) procedure to accommodate USGS collection and processing specifications with flexibility. The goal of this process is to assure LiDAR data are of sufficient quality for database population and scientific analysis. Concerns regarding the assessment of these data should be directed to the Chief, Data Operations Branch, 1400 Independence Road, Rolla, Missouri 65401.

## IL DOT District 7 LiDAR

NGTOC

2015-04-02

Robert Swain and Sarah Klaas



# Project Information

Project:

Contractor:

Project Type:  
Contributed

Applicable Specification:  
NGP LiDAR Base Specification Draft V13

Project Points of Contact:

Name:	Type:	Email:
Shelley Silch	NGP Liaison	ssilch@usgs.gov

## REPORT QUALIFICATION SUMMARY:

Project Delivery Lots: Select...

<p><b>Metadata:</b></p> <p>0 of 1 Reviews Accepted</p> <p><b>1</b> Reviews Not Accepted</p>
<p><b>Vertical Accuracy:</b></p> <p>1 of 1 Reviews Accepted</p> <p>0 Reviews Not Accepted</p>
<p><b>Swath/Raw LAS:</b></p> <p>1 of 1 Reviews Accepted</p> <p>0 Reviews Not Accepted</p>
<p><b>Tiled/Classified LAS:</b></p> <p>0 of 1 Reviews Accepted</p> <p><b>1</b> Reviews Not Accepted</p>
<p><b>Breakline:</b></p> <p>1 of 1 Reviews Accepted</p> <p>0 Reviews Not Accepted</p>
<p><b>DEM(s):</b></p> <p>0 of 1 Reviews Accepted</p> <p><b>1</b> Reviews Not Accepted</p>
<p><b>NED Review:</b></p> <p>0 of 1 DEM tile reviews recommended for NED 1/3rd</p> <p>0 of 1 DEM tile reviews recommended for NED 1/9th</p>

Dates Collected Range:

Collection Start:

Collection End:

Project Aliases:

Licensing:

Public Domain

Project Description:

This task order is for planning, acquisition, processing, and derivative products of LiDAR data to be collected for areas of Illinois. LiDAR data and derivative products produced in compliance with this task order are part of the data to be obtained under Job Number P-95-052-11.

Specifications listed below are "PRELIMINARY" based on the U.S. Geological Survey National Geospatial Program Base LiDAR Specification, Version 13.

LiDAR data was collected for the Illinois Department of Transportation. The Illinois Department of Transportation LiDAR Acquisition project is to acquire high accuracy bare-earth processed LiDAR data; to produce vector collection of water and drainage features, DAT files and Triangulated Integrated Network (TIN) files. **The data was collected as one project including all counties of Illinois District 7.** LiDAR data was placed into a tile layout and later divided by county boundaries. The project consists of airborne acquisition, post-processing, classification of LiDAR data, collection of water and drainage and creation of final deliverable products. All areas are collected at a nominal pulse spacing (NPS) of 1.0 meters based on UTM16, related to the North American Datum of 1983 HARN. Vertical accuracy is to achieve a RMSE of 0.61 feet or better in the "Open Terrain" land cover category. This report covers IL DOT District 7 which includes 16 counties which includes sixteen counties; Clay, Clark, Coles, Crawford, Cumberland, Edwards, Effingham, Fayette, Jasper, Lawrence, Macon, Moultrie, Richland, Shelby, Wabash and Wayne. The area was defined and by Illinois Department of Transportation, Aerial Survey Section and is approximately 7753.9 sq. miles.



## Review Information

Reviewer:

Date:

Delivered:

3rd Party QA

Date:

Performed:

Assigned:

Action To Contractor Date:	Issue Description:	Return Date:
4/2/2015	<p><b>Why is there not DEM grids????</b></p> <p><b><u>DTM errors:</u></b></p> <p>16 counties were reviewed as one project. All errors are contained in one error shapefile.</p> <p><b><u>LAS error:</u></b></p> <p>las tile 1034_1122.las in Douglas county has class 0. Please correct and re-deliver.</p> <p><b><u>Metadata errors and inconsistencies:</u></b></p> <p>It is not clear as to what LiDAR specification IL District 5 has been collected and processed. Preliminary data and Job Number P-95-052-11 suggests v13. Section 1.8 and 2.13.1 on vertical and positional accuracy of the QAQC reports for each county suggest version 1.0. <b>Which version is it?</b></p> <p>xml metadata reports FVA to meet 1.19 U.S. feet @ 95% confidence level. V13 and Version 1.0 require FVA &lt;= .804 U.S. feet or 24.5cm.</p> <p>The Final QAQC report for each county says FVA is to meet or exceed 24.5cm which = .804 U.S. feet. <b>Which accuracy requirement is correct for this project????</b></p> <p>All county dtm.xml metadata and reports for each county are preliminary except the QAQC Final report for each county. Only one metadata (dtm.xml) file per county was delivered. Please deliver all missing xml metadata.</p> <p><b>Please deliver all final xml metadata and final reports for IL DOT District 5</b></p> <p><b>DTM xml metadata for each county parsed with errors:</b></p> <p>DeWitt, Douglas, Mclean, and Piatt Co parsed with 16 errors each</p>	

Edgar and Vermilion parsed with 15 errors each  
**absres and ordres** should be 2.5 feet  
**gridsyn** does not contain all coordinate system information  
**ldrinfo** is not populated in xml metadata.  
**ldrinfo** should be populated in project, swath and las.xml  
**lidar specification** is not documented in xml metadata

**Missing metadata:**

swath, classified las, breakline and project.xml

**Vertical Accuracy and base specification reporting:**

Each county (preliminary.pdf) verifies base specification to be v13 and vertical accuracy to meet 0.61 feet RMSEz which is equal to 18.5cm RMSEz and required to meet 1.19 feet NSSDA.

Each county QAQC report verifies base specification 1.0 and vertical accuracy to meet 12.5cm RMSEz and 24.5cm NSSDA.

Which specification and which accuracy is correct for District 5 data?

**FYI**

**DEM data Notes:**

The DEM format is DTM and is not tiled. Each county was delivered with one county wide DTM grid. Tile scheme cannot be verified for DEM.

**Review Complete:**

4/2/2015

Dates Project Worked:

Start:	2/25/2015
End:	4/2/2015

## Project Materials Received

All project deliverables must be supplied according to collection and processing specifications. The USGS will postpone the QA process when any of the required deliverables are missing. When deliverables are missing, the Contracting Officer Technical Representative (COTR) will be contacted by the Elevation Section supervisor and informed of the problem. Processing will resume after the COTR has coordinated the deposition of remaining deliverables.

**METADATA**

<i>Deliverables</i>	<i>Delivered</i>	<i>XML Metadata</i>	<i>Required</i>	<i>Format</i>	<i>Quantity</i>	<i>Additional Details</i>

Collection Report:	<input type="checkbox"/>		<input type="checkbox"/>	Select...	6	
Survey Report:	<input type="checkbox"/>		<input type="checkbox"/>	Select...		
Processing Report:	<input type="checkbox"/>		<input type="checkbox"/>	Select...	6	
QA/QC Report:	<input type="checkbox"/>		<input type="checkbox"/>	Select...	6	
Project Level XML Metadata:	<input type="checkbox"/>		<input type="checkbox"/>	XML		not delivered
Project Extent:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Select...		not delivered
Tile Scheme:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Select...		
Control (Calibration) Points:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Select...		
Check (Validation) Points:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Select...	6	
Additional Comments:	all reports and metadata are preliminary the QAQC report appears to be final					

**LIDAR DATA**

Deliverables	Delivered	XML Metadata	Required	Format	Quantity	Additional Details
Swath Data:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	.las	671	
Classified/ Tiled Data:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	.las	29,968	
Additional Comments:	the DEM was not delivered tiled so a tile scheme cannot be verified.					

**DERIVED DELIVERABLES**

Deliverables	Delivered	XML Metadata	Required	Format	Quantity	Additional Details
DEM Tiles:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Select...	6	Format DTM
Breaklines:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	.shp	12	

<i>Additional Comments:</i>	The DEM data is in DTM format. The DTM metadata is preliminary and not in xml format
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**OTHER**

<i>Additional Comments:</i>	
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**Geographic Information**

Area Extent:  Sq. Miles

Tile Size:  Select...

DEM/DTM Grid Spacing:  U.S. Feet

Coordinate Reference System:

Projection:

Horizontal Datum:   Meters  
 U.S. Feet  
 Int'l Feet

Vertical Datum:   Meters  
 U.S. Feet  
 Int'l Feet

**THIS PROJECTION COORDINATE REFERENCE SYSTEM IS CONSISTENT ACROSS THE FOLLOWING DELIVERABLES**

- Project Tile Scheme
- Tiled/Classified LiDAR
- Checkpoints
- Swath/Raw LiDAR
- DEM(s)
- DEM XML Metadata
- Breakline(s)

*Additional Comments:*

**Collection Information**

**Quality Level: 3**

**Configured Nominal Pulse Spacing:**

Meters

**Additional Comments:**

## Metadata Review **Not Accepted**

Vendor provided metadata files have been parsed using 'mp' metadata parser. Any errors generated by the parser are documented below for reference and/or corrective action.

Parser can be found @ <http://geo-nsdi.er.usgs.gov/validation/>

### *The DEM XML Metadata parsed with errors.*

#### **Clark Co xml metadata errors:**

Error (line 119): Unknown extension element ignored: cordsysn  
 Error (line 119): Unknown extension element ignored: projcsn  
 Warning (line 176): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 192): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 192): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISstyle  
 Warning (line 192): Discarding text found in unknown extension ArcGISstyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 192): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 192): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 192): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 202): Unknown extension element ignored: dsoverv  
 Warning (line 202): Discarding text found in unknown extension dsoverv  
 Error (line 4): Ending\_Date is required in Range\_of\_Dates/Times  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 119): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 168): Improper value for Semi-major\_Axis  
 11 errors: 9 missing, 2 bad\_value

#### **Clay Co xml metadata errors:**

Error (line 119): Unknown extension element ignored: cordsysn  
Error (line 119): Unknown extension element ignored: projcsn  
Warning (line 176): Discarding text found in unknown extension projcsn  
Error (line 2): Unknown extension element ignored: Esri  
Error (line 2): Unknown extension element ignored: CreaDate  
Warning (line 192): Discarding text found in unknown extension CreaDate  
Error (line 2): Unknown extension element ignored: CreaTime



Warning (line 192): Discarding text found in unknown extension CreaTime  
Error (line 2): Unknown extension element ignored: ArcGISStyle  
Warning (line 192): Discarding text found in unknown extension ArcGISStyle  
Error (line 2): Unknown extension element ignored: SyncOnce  
Warning (line 192): Discarding text found in unknown extension SyncOnce  
Error (line 2): Unknown extension element ignored: DataProperties  
Error (line 2): Unknown extension element ignored: itemProps  
Error (line 2): Unknown extension element ignored: itemLocation  
Error (line 2): Unknown extension element ignored: linkage  
Warning (line 192): Discarding text found in unknown extension linkage  
Error (line 2): Unknown extension element ignored: protocol  
Warning (line 192): Discarding text found in unknown extension protocol  
Error (line 2): Unknown extension element ignored: copyHistory  
Error (line 2): Unknown extension element ignored: copy  
Error (line 202): Unknown extension element ignored: dsoverv  
Warning (line 202): Discarding text found in unknown extension dsoverv  
Error (line 4): Ending Date is required in Range of Dates/Times  
Error (line 6): Improper value for West Bounding Coordinate  
Error (line 6): Improper value for East Bounding Coordinate  
Error (line 6): Improper value for North Bounding Coordinate  
Error (line 6): Improper value for South Bounding Coordinate  
Error (line 37): Originator is required in Citation Information  
Error (line 37): Publication Date is required in Citation Information  
Error (line 37): Originator is required in Citation Information  
Error (line 37): Publication Date is required in Citation Information  
Error (line 37): Originator is required in Citation Information  
Error (line 37): Publication Date is required in Citation Information  
Error (line 37): Originator is required in Citation Information  
Error (line 37): Publication Date is required in Citation Information  
Error (line 119): Improper value for Grid Coordinate System Name  
Error (line 168): Improper value for Semi-major Axis  
15 errors: 9 missing, 6 bad value

**Cole Co XML metadata errors:**

Error (line 118): Unknown extension element ignored: cordsysn  
Error (line 118): Unknown extension element ignored: geogcsn  
Warning (line 175): Discarding text found in unknown extension geogcsn  
Error (line 2): Unknown extension element ignored: Esri  
Error (line 2): Unknown extension element ignored: CreaDate  
Warning (line 191): Discarding text found in unknown extension CreaDate  
Error (line 2): Unknown extension element ignored: CreaTime  
Warning (line 191): Discarding text found in unknown extension CreaTime  
Error (line 2): Unknown extension element ignored: ArcGISStyle  
Warning (line 191): Discarding text found in unknown extension ArcGISStyle  
Error (line 2): Unknown extension element ignored: SyncOnce  
Warning (line 191): Discarding text found in unknown extension SyncOnce  
Error (line 2): Unknown extension element ignored: DataProperties  
Error (line 2): Unknown extension element ignored: itemProps  
Error (line 2): Unknown extension element ignored: itemLocation  
Error (line 2): Unknown extension element ignored: linkage  
Warning (line 191): Discarding text found in unknown extension linkage  
Error (line 2): Unknown extension element ignored: protocol  
Warning (line 191): Discarding text found in unknown extension protocol

Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 201): Unknown extension element ignored: dsoverv  
 Warning (line 201): Discarding text found in unknown extension dsoverv  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 118): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 167): Improper value for Semi-major\_Axis  
 10 errors: 8 missing, 2 bad\_value

**Crawford Co XML Metadata errors:**Info: process time = 12:46:34

Error (line 118): Unknown extension element ignored: cordsysn  
 Error (line 118): Unknown extension element ignored: projcsn  
 Warning (line 175): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 191): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 191): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISstyle  
 Warning (line 191): Discarding text found in unknown extension ArcGISstyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 191): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 191): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 191): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 201): Unknown extension element ignored: dsoverv  
 Warning (line 201): Discarding text found in unknown extension dsoverv  
 Error (line 4): Ending\_Date is required in Range\_of\_Dates/Times  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 118): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 167): Improper value for Semi-major\_Axis  
 11 errors: 9 missing, 2 bad\_value

**Cumberland Co XML Metadata errors:**

Error (line 121): Unknown extension element ignored: cordsysn  
 Error (line 121): Unknown extension element ignored: projcsn  
 Warning (line 178): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 194): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 194): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISStyle  
 Warning (line 194): Discarding text found in unknown extension ArcGISStyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 194): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 194): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 194): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 204): Unknown extension element ignored: dsoverv  
 Warning (line 204): Discarding text found in unknown extension dsoverv  
 Error (line 6): Ending\_Date is required in Range\_of\_Dates/Times  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 121): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 170): Improper value for Semi-major\_Axis  
 11 errors: 9 missing, 2 bad\_value

**Edwards Co XML errors:**

Error (line 119): Unknown extension element ignored: cordsysn  
 Error (line 119): Unknown extension element ignored: projcsn  
 Warning (line 176): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 192): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 192): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISStyle  
 Warning (line 192): Discarding text found in unknown extension ArcGISStyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 192): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties

Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 192): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 192): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 202): Unknown extension element ignored: dsoverv  
 Warning (line 202): Discarding text found in unknown extension dsoverv  
 Error (line 4): Ending\_Date is required in Range\_of\_Dates/Times  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 119): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 168): Improper value for Semi-major\_Axis  
 11 errors: 9 missing, 2 bad\_value

#### **Effingham Co XML Errors**

Error (line 119): Unknown extension element ignored: cordsysn  
 Error (line 119): Unknown extension element ignored: projcsn  
 Warning (line 176): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 192): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 192): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISStyle  
 Warning (line 192): Discarding text found in unknown extension ArcGISStyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 192): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 192): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 192): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 202): Unknown extension element ignored: dsoverv  
 Warning (line 202): Discarding text found in unknown extension dsoverv  
 Error (line 4): Ending\_Date is required in Range\_of\_Dates/Times  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information

Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 119): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 168): Improper value for Semi-major\_Axis  
 11 errors: 9 missing, 2 bad\_value

#### **Fayette Co XML Errors**

Error (line 117): Unknown extension element ignored: cordsysn  
 Error (line 117): Unknown extension element ignored: projcsn  
 Warning (line 174): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 190): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 190): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISstyle  
 Warning (line 190): Discarding text found in unknown extension ArcGISstyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 190): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 190): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 190): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 200): Unknown extension element ignored: dsoverv  
 Warning (line 200): Discarding text found in unknown extension dsoverv  
 Error (line 2): Ending\_Date is required in Range\_of\_Dates/Times  
 Error (line 35): Originator is required in Citation\_Information  
 Error (line 35): Publication\_Date is required in Citation\_Information  
 Error (line 35): Originator is required in Citation\_Information  
 Error (line 35): Publication\_Date is required in Citation\_Information  
 Error (line 35): Originator is required in Citation\_Information  
 Error (line 35): Publication\_Date is required in Citation\_Information  
 Error (line 35): Originator is required in Citation\_Information  
 Error (line 35): Publication\_Date is required in Citation\_Information  
 Error (line 117): Improper value for Process\_Date  
 Error (line 117): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 166): Improper value for Semi-major\_Axis  
 12 errors: 9 missing, 3 bad\_value

#### **Jasper Co XML Errors**

Error (line 119): Unknown extension element ignored: cordsysn  
 Error (line 119): Unknown extension element ignored: projcsn  
 Warning (line 176): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 192): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 192): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISstyle  
 Warning (line 192): Discarding text found in unknown extension ArcGISstyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 192): Discarding text found in unknown extension SyncOnce

Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 192): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 192): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 202): Unknown extension element ignored: dsoverv  
 Warning (line 202): Discarding text found in unknown extension dsoverv  
 Error (line 4): Ending\_Date is required in Range\_of\_Dates/Times  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 37): Publication\_Date is required in Citation\_Information  
 Error (line 37): Originator is required in Citation\_Information  
 Error (line 119): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 168): Improper value for Semi-major\_Axis  
 11 errors: 9 missing, 2 bad\_value

#### **Lawrence Co XML Errors**

Error (line 120): Unknown extension element ignored: cordsysn  
 Error (line 120): Unknown extension element ignored: projcsn  
 Warning (line 177): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 193): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 193): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISStyle  
 Warning (line 193): Discarding text found in unknown extension ArcGISStyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 193): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 193): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 193): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 203): Unknown extension element ignored: dsoverv  
 Warning (line 203): Discarding text found in unknown extension dsoverv  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 120): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 169): Improper value for Semi-major\_Axis  
 10 errors: 8 missing, 2 bad\_value

**Macon Co XML Errors**

Error (line 120): Unknown extension element ignored: cordsysn  
 Error (line 120): Unknown extension element ignored: projcsn  
 Warning (line 177): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 193): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 193): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISStyle  
 Warning (line 193): Discarding text found in unknown extension ArcGISStyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 193): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 193): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 193): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 203): Unknown extension element ignored: dsoverv  
 Warning (line 203): Discarding text found in unknown extension dsoverv  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 120): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 169): Improper value for Semi-major\_Axis  
 10 errors: 8 missing, 2 bad\_value

**Moultrie Co XML Errors**

Error (line 120): Unknown extension element ignored: cordsysn  
 Error (line 120): Unknown extension element ignored: projcsn  
 Warning (line 177): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 193): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 193): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISStyle  
 Warning (line 193): Discarding text found in unknown extension ArcGISStyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 193): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 193): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 193): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 203): Unknown extension element ignored: dsoverv

Warning (line 203): Discarding text found in unknown extension dsoverv  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 120): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 169): Improper value for Semi-major\_Axis  
 10 errors: 8 missing, 2 bad\_value

#### **Richland Co XML Errors**

Error (line 120): Unknown extension element ignored: cordsysn  
 Error (line 120): Unknown extension element ignored: projcsn  
 Warning (line 177): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 193): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 193): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISStyle  
 Warning (line 193): Discarding text found in unknown extension ArcGISStyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 193): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 193): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 193): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 203): Unknown extension element ignored: dsoverv  
 Warning (line 203): Discarding text found in unknown extension dsoverv  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 120): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 169): Improper value for Semi-major\_Axis  
 10 errors: 8 missing, 2 bad\_value

#### **Shelby Co XML Errors**

Error (line 120): Unknown extension element ignored: cordsysn  
 Error (line 120): Unknown extension element ignored: projcsn  
 Warning (line 177): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 193): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 193): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISStyle



Warning (line 193): Discarding text found in unknown extension ArcGISStyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 193): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 193): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 193): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 203): Unknown extension element ignored: dsoverv  
 Warning (line 203): Discarding text found in unknown extension dsoverv  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 120): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 169): Improper value for Semi-major\_Axis  
 10 errors: 8 missing, 2 bad\_value

**Wabash Co XML Errors**

Error (line 120): Unknown extension element ignored: cordsysn  
 Error (line 120): Unknown extension element ignored: projcsn  
 Warning (line 177): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 193): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 193): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISStyle  
 Warning (line 193): Discarding text found in unknown extension ArcGISStyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 193): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 193): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 193): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 203): Unknown extension element ignored: dsoverv  
 Warning (line 203): Discarding text found in unknown extension dsoverv  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 120): Improper value for Grid\_Coordinate\_System\_Name

Error (line 169): Improper value for Semi-major\_Axis  
 10 errors: 8 missing, 2 bad\_value

**Wayne Co XML Errors**  
 mp 2.9.30 - Peter N. Schweitzer (U.S. Geological Survey)  
 Info: input file = phpkjbjba.xml  
 Info: process date = 20150409  
 Info: process time = 13:37:01

Error (line 120): Unknown extension element ignored: cordsysn  
 Error (line 120): Unknown extension element ignored: projcsn  
 Warning (line 177): Discarding text found in unknown extension projcsn  
 Error (line 2): Unknown extension element ignored: Esri  
 Error (line 2): Unknown extension element ignored: CreaDate  
 Warning (line 193): Discarding text found in unknown extension CreaDate  
 Error (line 2): Unknown extension element ignored: CreaTime  
 Warning (line 193): Discarding text found in unknown extension CreaTime  
 Error (line 2): Unknown extension element ignored: ArcGISStyle  
 Warning (line 193): Discarding text found in unknown extension ArcGISStyle  
 Error (line 2): Unknown extension element ignored: SyncOnce  
 Warning (line 193): Discarding text found in unknown extension SyncOnce  
 Error (line 2): Unknown extension element ignored: DataProperties  
 Error (line 2): Unknown extension element ignored: itemProps  
 Error (line 2): Unknown extension element ignored: itemLocation  
 Error (line 2): Unknown extension element ignored: linkage  
 Warning (line 193): Discarding text found in unknown extension linkage  
 Error (line 2): Unknown extension element ignored: protocol  
 Warning (line 193): Discarding text found in unknown extension protocol  
 Error (line 2): Unknown extension element ignored: copyHistory  
 Error (line 2): Unknown extension element ignored: copy  
 Error (line 203): Unknown extension element ignored: dsoverv  
 Warning (line 203): Discarding text found in unknown extension dsoverv  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 39): Originator is required in Citation\_Information  
 Error (line 39): Publication\_Date is required in Citation\_Information  
 Error (line 120): Improper value for Grid\_Coordinate\_System\_Name  
 Error (line 169): Improper value for Semi-major\_Axis  
 10 errors: 8 missing, 2 bad\_value

Check if 'Best Use' metadata for NED:

Additional  
Comments:

**Metadata errors and inconsistencies:**

xml metadata reports FVA to meet 1.19 U.S. feet @ 95% confidence level. V13 and Version 1.0 require FVA <= .804 U.S. feet or 24.5cm.

The Final QAQC report for each county says FVA is to meet or exceed 24.5cm which = .804 U.S. feet.  
**Which accuracy requirement is correct for this project???**

All county dtm.xml metadata and reports for each county are preliminary except the QAQC Final report for each county.  
 Only one metadata (dtm.xml) file per county was delivered. Please deliver all missing xml metadata.

**Please deliver all final xml metadata and final reports for IL DOT District 5**

**DTM xml metadata for each county parsed with errors:**

DeWitt, Douglas, Mclean, and Piatt Co parsed with 16 errors each  
Edgar and Vermilion parsed with 15 errors each

**absres and ordres** should be 2.5 feet

**gridsysn** does not contain all coordinate system information

**ldrinfo** is not populated in xml metadata.

**ldrinfo** should be populated in project, swath and las.xml

**lidar specification** is not documented in xml metadata

**Missing metadata:**

swath, classified las, breakline and project.xml

**Based on this review, the USGS does not accept the xml metadata provided.**

End of Metadata Review

### Vertical Accuracy Review Accepted

ASPRS recommends that checkpoint surveys be used to verify the vertical accuracy of LiDAR data sets. Checkpoints are to be collected by an independent survey firm licensed in the particular state(s) where the project is located. While subjective, checkpoints should be well distributed throughout the dataset. National Standards for Spatial Data Accuracy (NSSDA) guidance states that checkpoints may be distributed more densely in the vicinity of important features and more sparsely in areas that are of little or no interest. Checkpoints should be distributed so that points are spaced at intervals of at least ten percent of the diagonal distance across the dataset and at least twenty percent of the points are located in each quadrant of the dataset.

NSSDA and ASPRS require that a minimum of twenty checkpoints (thirty is preferred) are collected for each major land cover category represented in the LiDAR data. Checkpoints should be selected on flat terrain, or on uniformly sloping terrain in all directions from each checkpoint. They should not be selected near severe breaks in slope, such as bridge abutments, edges of roads, or near river bluffs. Checkpoints are an important component of the USGS QA process. There is the presumption that the checkpoint surveys are error free and the discrepancies are attributable to the LiDAR dataset supplied.

For this dataset, USGS checked the spatial distribution of checkpoints with an emphasis on the bare-earth (open terrain) points; the number of points per class; the methodology used to collect these points; and the relationship between the data supplier and checkpoint collector. When independent control data are available, USGS has incorporated this into the analysis.

### Required Vertical Accuracy

Yes  No

#### REQUIRED FUNDAMENTAL VERTICAL ACCURACY FOR SWATH AND DEM FILES

Confidence Interval Required:  th % CI

Required Unit:

Required # of checkpoints:

Required RMSEz:

Required Vertical Accuracy (RMSEz \* .%)

C1)

**REQUIRED SUPPLEMENTAL VERTICAL ACCURACY FOR DEM FILES**

SVA Statistic Required: Percentile

SVA Confidence Level/Percentile Required:

Class	# of Checkpoints	SVA Required 95 th Percentile	
Forested Areas Fully Covered by Trees	<input type="text" value="20"/>	<input type="text" value="36.3"/>	<input type="text" value="Centimeters"/>
Tall Weeds & Crops	<input type="text" value="20"/>	<input type="text" value="36.3"/>	<input type="text" value="Centimeters"/>
Vegetation	<input type="text" value="20"/>	<input type="text" value="36.3"/>	<input type="text" value="Centimeters"/>
Urban Areas with Dense Man Made Structures	<input type="text" value="20"/>	<input type="text" value="36.3"/>	<input type="text" value="Centimeters"/>

**REQUIRED CONSOLIDATED VERTICAL ACCURACY FOR DEM FILES**

CVA Statistic Required: Percentile

CVA Confidence Level/Percentile Required:

Total number of checkpoints:

Required CVA:   at the 95 th Percentile

Additional Required  
Vertical Accuracy  
Information:

**Reported Vertical Accuracy**

Yes  No

**REPORTED FUNDAMENTAL VERTICAL ACCURACY FOR SWATH LIDAR FILES**

Confidence Interval Reported:  th % CI

Reported Unit:

Reported # of checkpoints:

Reported RMSEz:

Reported Vertical Accuracy (RMSEz \* .% CI)

**REPORTED FUNDAMENTAL VERTICAL ACCURACY FOR DEM FILES**

Confidence Interval Reported:  th % CI

Reported Unit:

Reported # of checkpoints:

Reported RMSEz:

Reported Vertical Accuracy (RMSEz \* .% CI)

C1)

**REPORTED SUPPLEMENTAL VERTICAL ACCURACY FOR DEM FILES**

SVA Statistic Reported: Percentile

SVA Confidence Level/Percentile Reported:

Class	# of Checkpoints	SVA Reported 95 th Percentile	
Forested Areas Fully Covered by Trees	33	0.680	U.S. Feet
Tall Weeds & Crops	32	1.15	U.S. Feet
Vegetation	30	1.02	U.S. Feet
Urban Areas with Dense Man Made Structures	25	0.471	U.S. Feet

**REPORTED CONSOLIDATED VERTICAL ACCURACY FOR DEM FILES**

CVA Statistic Reported: Percentile

CVA Confidence Level/Percentile Reported:

Total number of checkpoints:

Reported CVA:  U.S. Feet at the 95 th Percentile

Additional Reported Vertical Accuracy Information:

The above reported accuracy is XXX Co. Individual Accuracy reports are available for each county. All other accuracy reports meet or exceed Mclean Co. accuracies.

**\*\*Edgar and Vermilion reported Bare Earth FVA only. \*\***

**\*\*Swath FVA is reported in section 2.13.1 Report on Positional Accuracy Validation. \*\* of the McLean County Final QAQC Report Summary.pdf**

**Reviewed Vertical Accuracy**

Yes  No

**CHECKPOINT REVIEW**

- Checkpoints are well distributed?
- Enough checkpoints for task order?
- Checkpoints meet USGS LiDAR base-spec in quantity and quality?

**REVIEWED FUNDAMENTAL VERTICAL ACCURACY FOR SWATH LIDAR FILES**

Confidence Interval Reviewed:  th % CI

Reviewed Unit:

Reviewed # of checkpoints:

Reviewed RMSEz:

Reviewed Vertical Accuracy (RMSEz \* .% CI)

**REVIEWED FUNDAMENTAL VERTICAL ACCURACY FOR DEM FILES**

Confidence Interval Reviewed:  th % CI  
 Reviewed Unit:   
 Reviewed # of checkpoints:   
 Reviewed RMSEz:   
 Reviewed Vertical Accuracy (RMSEz \* .% CI):

**REVIEWED SUPPLEMENTAL VERTICAL ACCURACY**

SVA Statistic Reviewed: Percentile

SVA Confidence Level/Percentile Reviewed:

Class	# of Checkpoints	SVA Reviewed	
		95 th Percentile	
Forested Areas Fully Covered by Trees	23	0.650	U.S. Feet
Tall Weeds & Crops	45	0.629	U.S. Feet
Urban Areas with Dense Man Made Structures	22	1.00	U.S. Feet
Brushlands & Low Trees	22	1.169	U.S. Feet

**REVIEWED CONSOLIDATED VERTICAL ACCURACY**

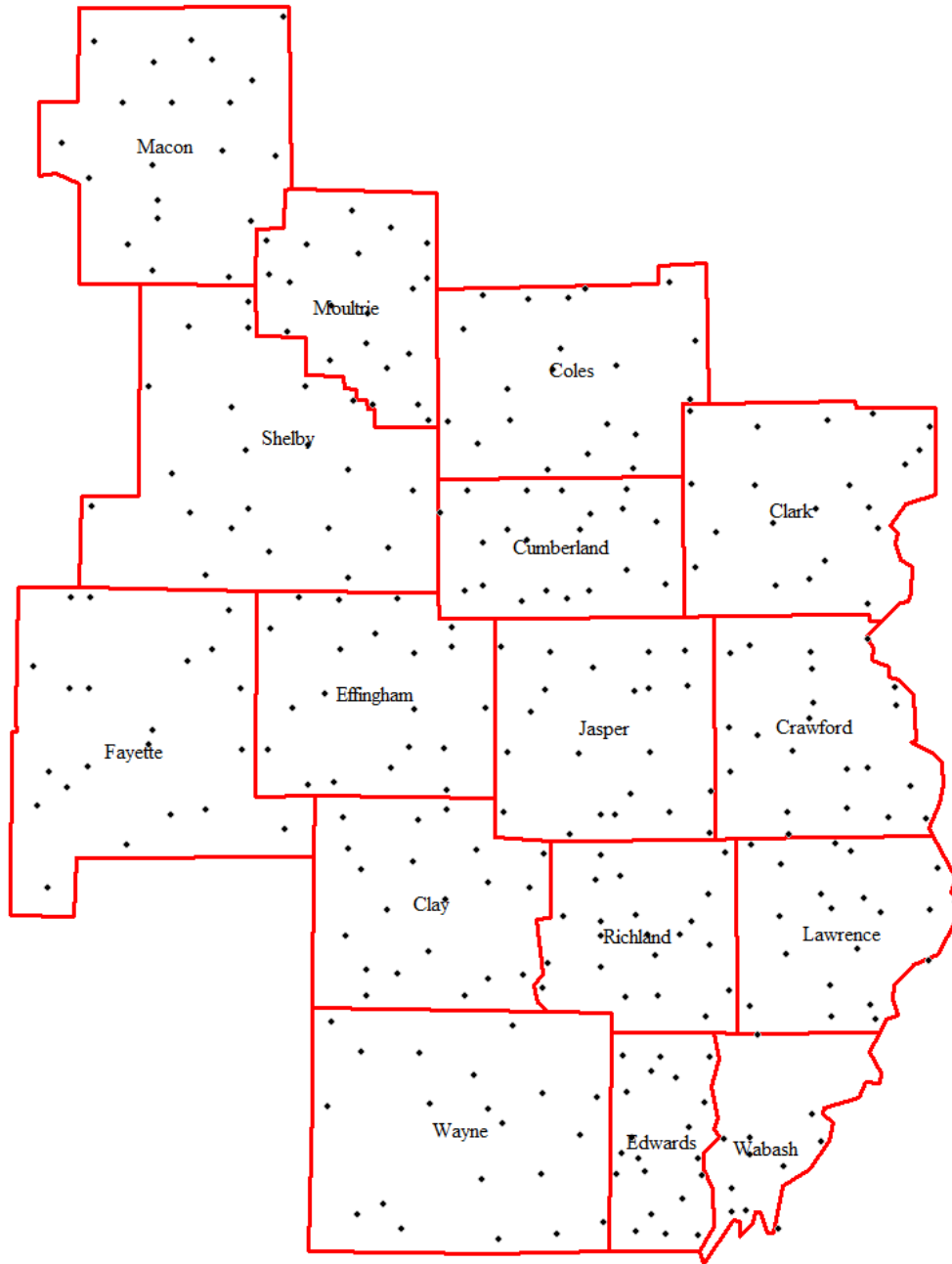
CVA Statistic Reviewed: Percentile

CVA Confidence Level/Percentile Reviewed:

Total number of checkpoints:

Reviewed CVA:   at the 95 th Percentile

Checkpoint Distribution Image



Vertical Accuracy Results:

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Additional Reviewed Vertical Accuracy Information:

Above reviewed DEM FVA, SVA and CVA are for Edwards County, which was the highest overall in RMSE and 95% CI. Dataset was too large to process for project wide vertical accuracy. Accuracy reports are available for each county individually.

321/329 checkpoints used to calculate swath FVA. Using all checkpoints resulted in an FVA of nearly one meter. All removed points were found to be under trees. Here are what was removed and vertical offset:

- Wayne Co.

FID # 38/39 (these are the same point with identical elevation values, different FID)  
 $\Delta z = -23.954$  ft

- **Edwards Co.**  
FID # 32  
 $\Delta z = -17.566$  ft

FID # 4  
 $\Delta z = -8.585$  ft

-**Jasper Co.**  
FID # 133  
 $\Delta z = -38.666$  ft

- **Crawford Co.**  
FID # 128  
 $\Delta z = -15.633$  ft

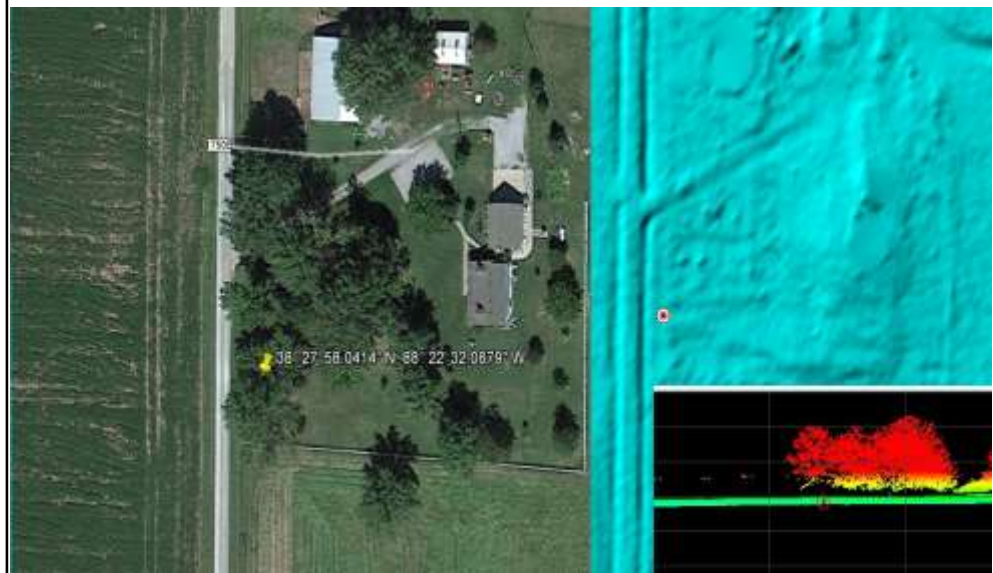
- **Shelby Co**  
FID # 223  
 $\Delta z = -9.295$  ft

FID # 258  
 $\Delta z = -6.258$  ft

The removal of these points from calculation of the swath FVA allows it to fall under required values.

Wabash county has 11 checkpoints, and after removal of bad checkpoints, Edwards co has 18 and Wayne co has 18

Pictures:



The rest of the 'bare earth and low grass' checkpoints are pretty much like this - in trees.

Based on this review, the USGS accepts the vertical accuracy.

End of Vertical Accuracy Review

### Raw-Swath LiDAR Review Accepted

LAS swath files or raw unclassified LiDAR data are reviewed to assess the quality control used by the data supplier during collection. Furthermore, LAS swath data are checked for positional accuracy. The data supplier should have



calculated the Fundamental Vertical Accuracy using ground control checkpoints measured in clear open terrain (see Vertical Accuracy Review Section).

Review Required:  Yes  No

**RAW-SWATH LIDAR FILE CHARACTERISTICS**

Separate folder for swath/raw LiDAR files

LAS Version: 1.2

Point Record Format: 1

- Each swath file ≤ 2 GB and properly segmented
- Correct and properly formatted georeference information is included in all LAS file headers
- Adjusted GPS time used with the global encoder id set to 1
- Scan Angles conform to USGS base-spec recommendations
- All points set to class '0' (not classified)

Additional comments:

**Based on this review, the USGS accepts the swath/raw LiDAR data.**

End of Swath/Raw LiDAR Review

**Tiled/Classified LiDAR Review Not Accepted**

Classified LAS tile files are used to build digital terrain models using the points classified as ground. Therefore, it is important that the classified LAS are of sufficient quality to ensure that the derivative product accurately represents the landscape that was measured. Classified LAS Tiles are comprised as follows, "all project swaths, returns, and collected points, fully calibrated, adjusted to ground, and classified and cut, by tiles, excluding calibration swaths, cross-ties, and other swaths not used, or intended to be used, in product generation".

Review Required:  Yes  No

**CLASSIFIED LIDAR TILE CHARACTERISTICS**

Separate folder for classified/tiled LiDAR files

LAS Version: 1.2

Point Record Format: 1

Classified LAS tile files conform to project tiling scheme

tiling scheme could not be verified

Quantity of classified LAS tile files conforms to project tiling scheme

- Classified LAS tile files do not overlap
- Classified LAS tile files are uniform in size
- Correct and properly formatted georeference information is included in all LAS file headers
- Adjusted GPS time used with the global encoder id set to 1
- Classified LAS tile files have no points classified as '12' (Overlap)
- Point classifications are limited to the standard values listed below:

Code	Description	Used
1	Processed, but unclassified	<input type="checkbox"/>
2	Bare-earth/Ground	<input type="checkbox"/>
7	Noise(low or high, manually identified, if needed)	

8	<i>Model key points</i>	☐
9	<i>Water</i>	☐
10	<i>Ignored ground (breakline proximity)</i>	☐
11	<i>Withheld (if the "Withheld Bit" is not implemented in the processing software</i>	☐

**Additional Classes:**

Class	Description
0	<i>cumberland county only</i>
6	<i>Building - cumberland only</i>
29	<i>cumberland county only</i>
30	<i>cumberland county only</i>

*Additional comments:*

A handy chart comparing the classes used and/or defined between metadata, QA/QC report, and point cloud statistics, by county.

County	Classes stated as used in metadata	Classes stated as used in report	Classes used in classifi
Clark	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Clay	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Cole	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Crawford	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Cumberland	1,2,3,4,5,6,8,9	0,1,2,6,7,8,9,10,126,157,193	0,1,2,6,7,8,9,10,29
Edwards	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Effingham	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Fayette	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Jasper	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Lawrence	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Macon	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Moultrie	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Richland	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Shelby	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Wabash	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10
Wayne	1,2,3,4,5,6,8,9	1,2,7,9,10	1,2,7,9,10

As you can plainly see, most counties use classes 1,2,7,9,10. Classes 7 and 10 are NOT defined in the metadata, which DOES define 2,3,4,5 and 6, which are not actually used.

Cumberland - uses class 0 (which specifications mandate against). Classes 29 and 30 are seen in point cloud statistics, but are not found to be defined anywhere. The QA/QC report for this county shows las files under classes 126, 157, 193, which aren't even things, much less defined things.

Global encoder is set to 0 for the following counties:

- Cole - 1050\_1064.las
- Cumberland - 958\_968.las, 960\_968.las
- Lawrence - 2837 las files

Moultrie - 932\_1064.las

In point cloud statistics, Scan angle minimum ranges from -16,857 to 9952.0  
Scan angle maximum ranges from -14202680.66 to 16857.

Elevation minimum ranges from 1.000 to 4000000. Several have no value.  
Elevation maximum ranges from 4001620.0308 to 0.0445. Several have no value.

Other min/max attributes have similar extremes.

**Based on this review, the USGS does not accept classified/tiled LiDAR data.**

*End of Tiled/Classified LiDAR Review*

### Breakline Review Accepted

Breaklines are vector feature classes that are used to hydro-flatten the bare earth Digital Elevation Models.

Review Required:  Yes  No

#### BREAKLINE FILE CHARACTERISTICS:

Separate folder for breakline files.

Breaklines contain elevation values.

Elevation values stored in Geometry (ZEnabled)

Units: U.S. Feet

Waterbody Breaklines.

Polyline  Polygon

Single elevation value per waterbody feature.

Required.

Waterbody Elevations were created via Unknown waterbody level techniques.

Double Line Stream Breaklines (Streams Approximately > 100 ft).

Polyline  Polygon

Downstream DLS Flow is Proprietary

Required.

Single Line Breaklines.

No missing or misplaced breaklines.

**Based on this review, the USGS accepts the breakline files.**

*End of Breakline Review*

### DEM Review Not Accepted

The derived bare-earth file(s) receive a review of the vertical accuracies provided by the data supplier, vertical accuracies calculated by the USGS using supplied and independent checkpoints (*see the prior Vertical Accuracy Review Section*), and a thorough visual review for any anomalies or inconsistencies in assessing the quality of the DEM(s).

#### BARE-EARTH DEM TILE CHARACTERISTICS:

Separate folder for bare-earth DEM files

Raster File Type: Select...

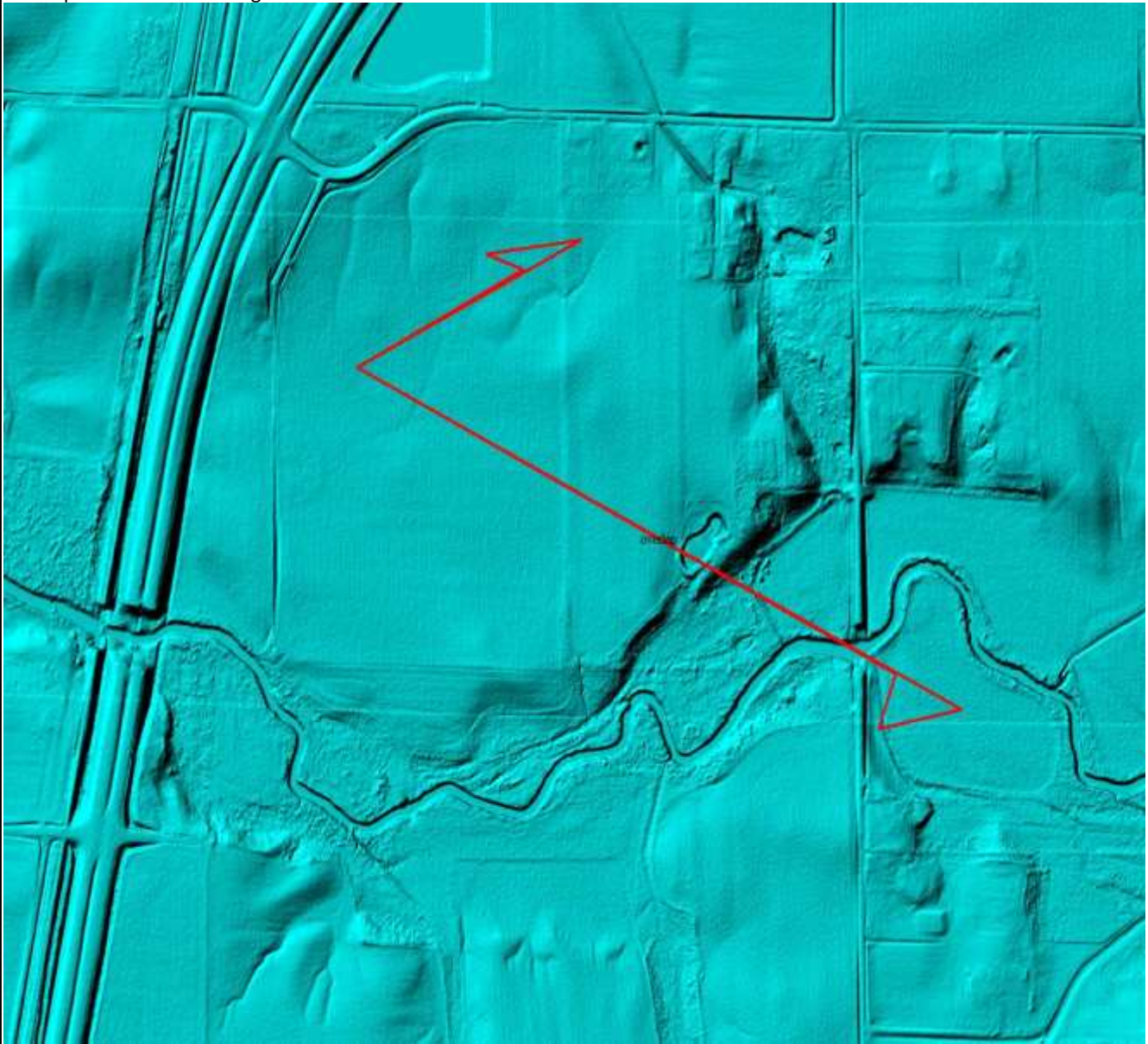
Raster Cell Size:  U.S. Feet

Tile bit depth/pixel Type:

Interpolation or Resampling Technique: Unknown

DEM tiles do not overlap

Overlap errors found throughout entire dataset



DEM tiles conform to Project Tiling Scheme

DTM grids are not tiled.

Quantity of DEM files conforms to Project Tiling Scheme

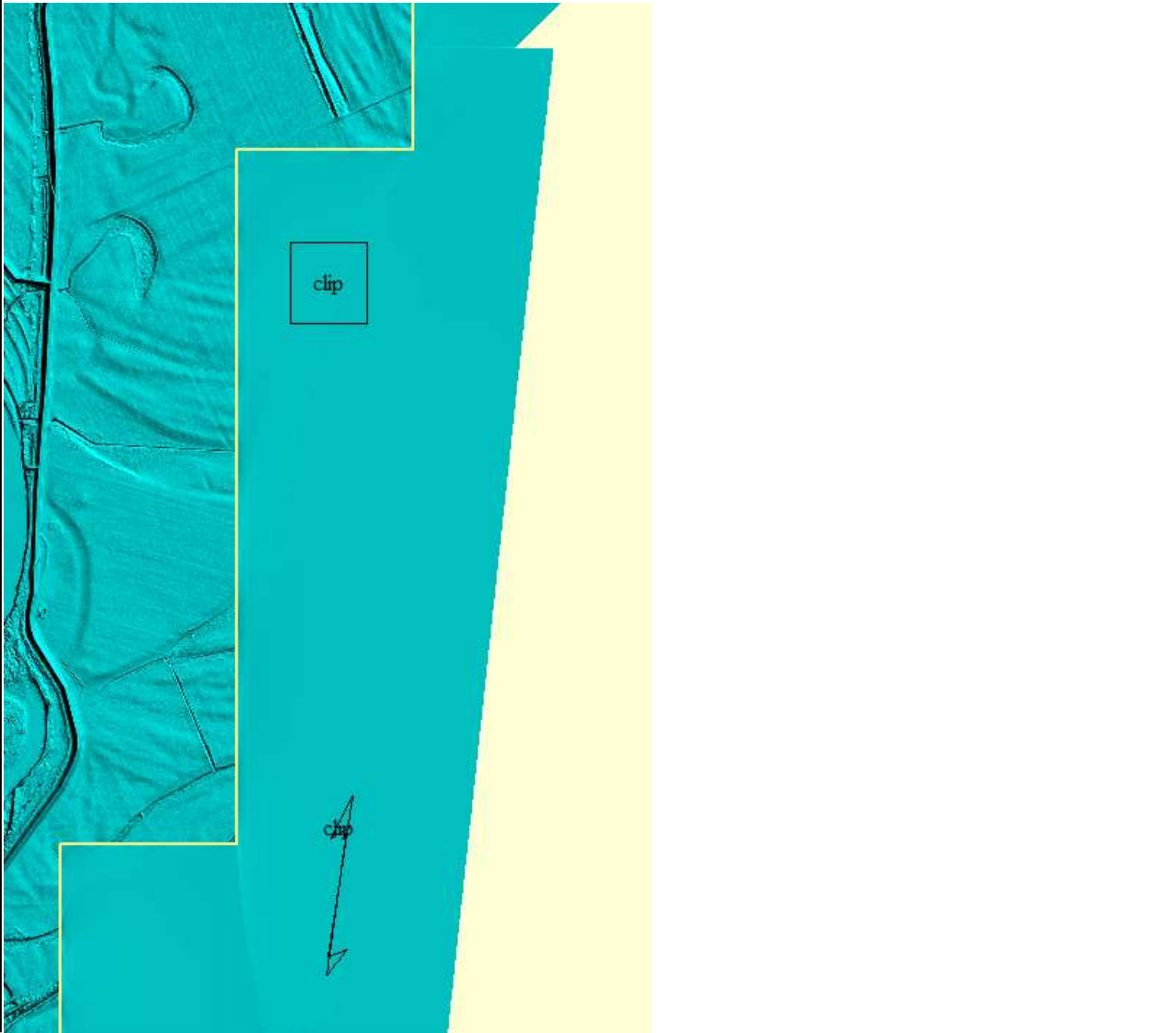
DTM grids are not tiled.

DEM tiles are uniform in size

DTM grids are not tiled.

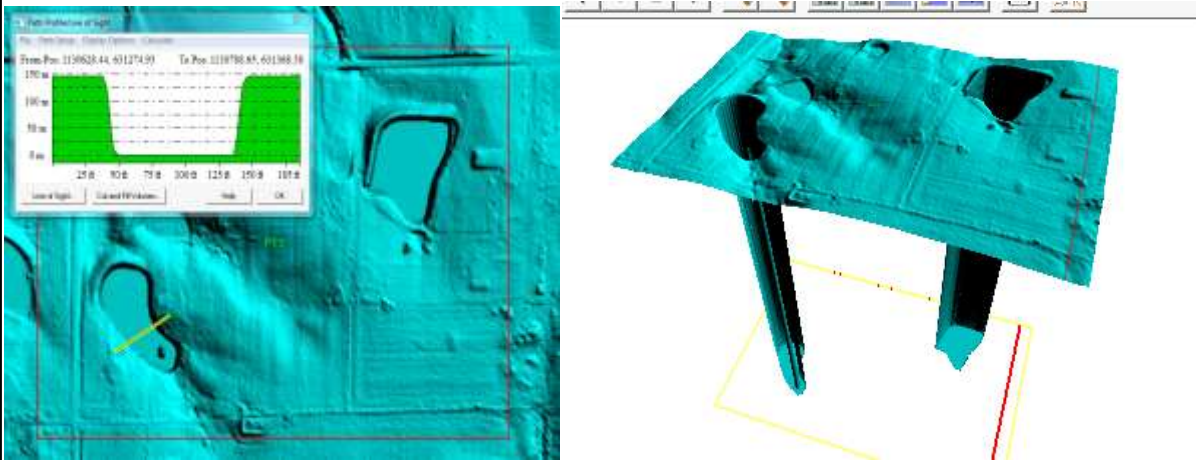
DEM tiles properly edge match and free of edge artifacts

6 clip errors. needs clipping around project boundary line

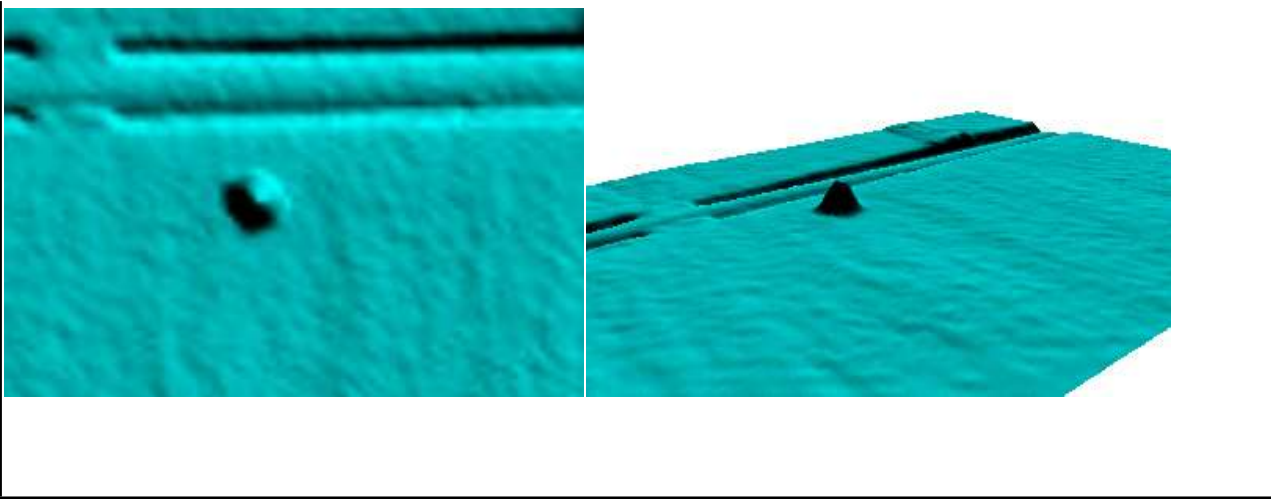


Tiles are free from Spikes and Pits

6 pits found

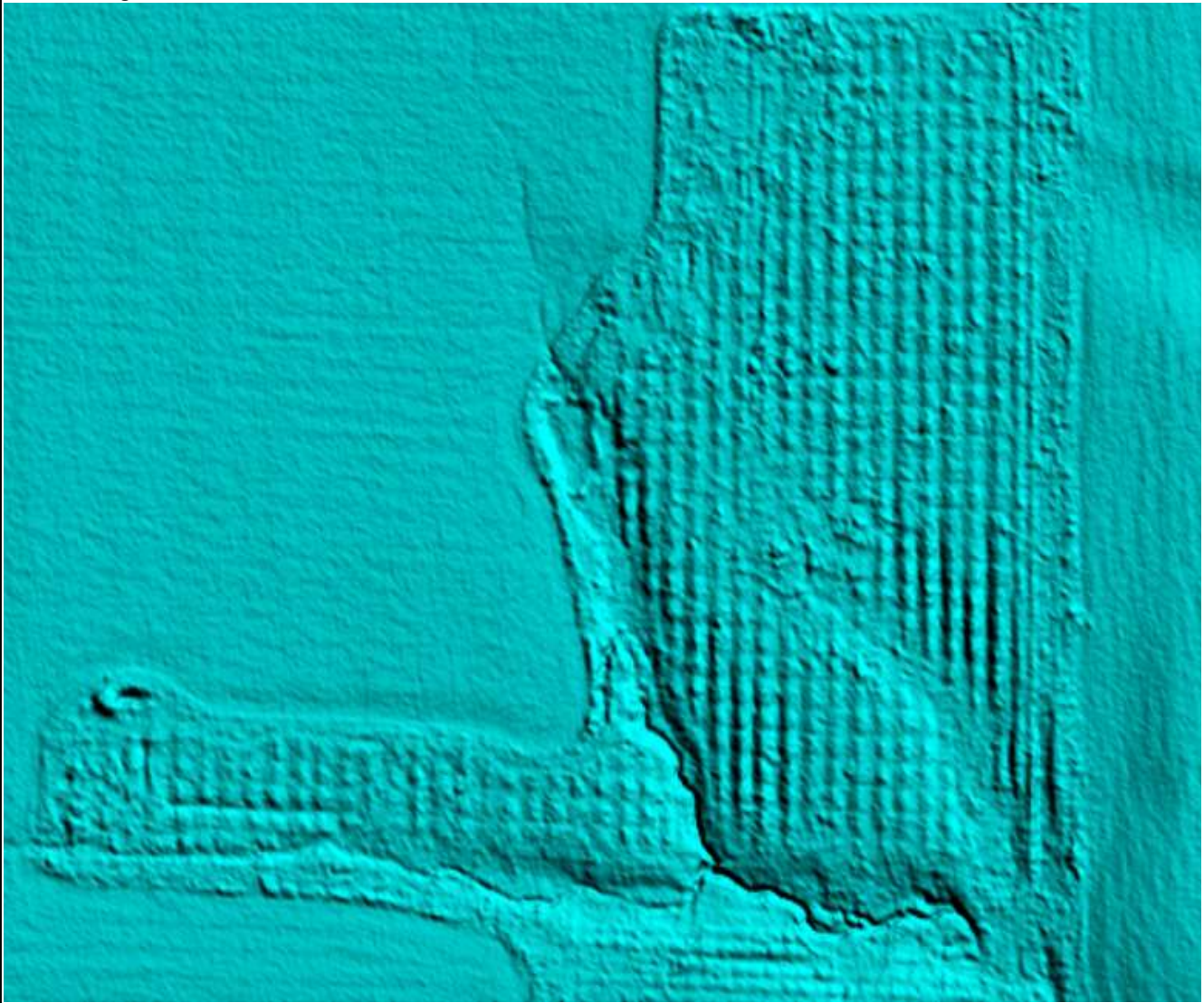


4 spikes found



- Tiles are free from Data Holidays (*voids due to processing or collection errors*)
- Tiles do not exhibit systematic sensor error or comrowing

3 comrowing errors



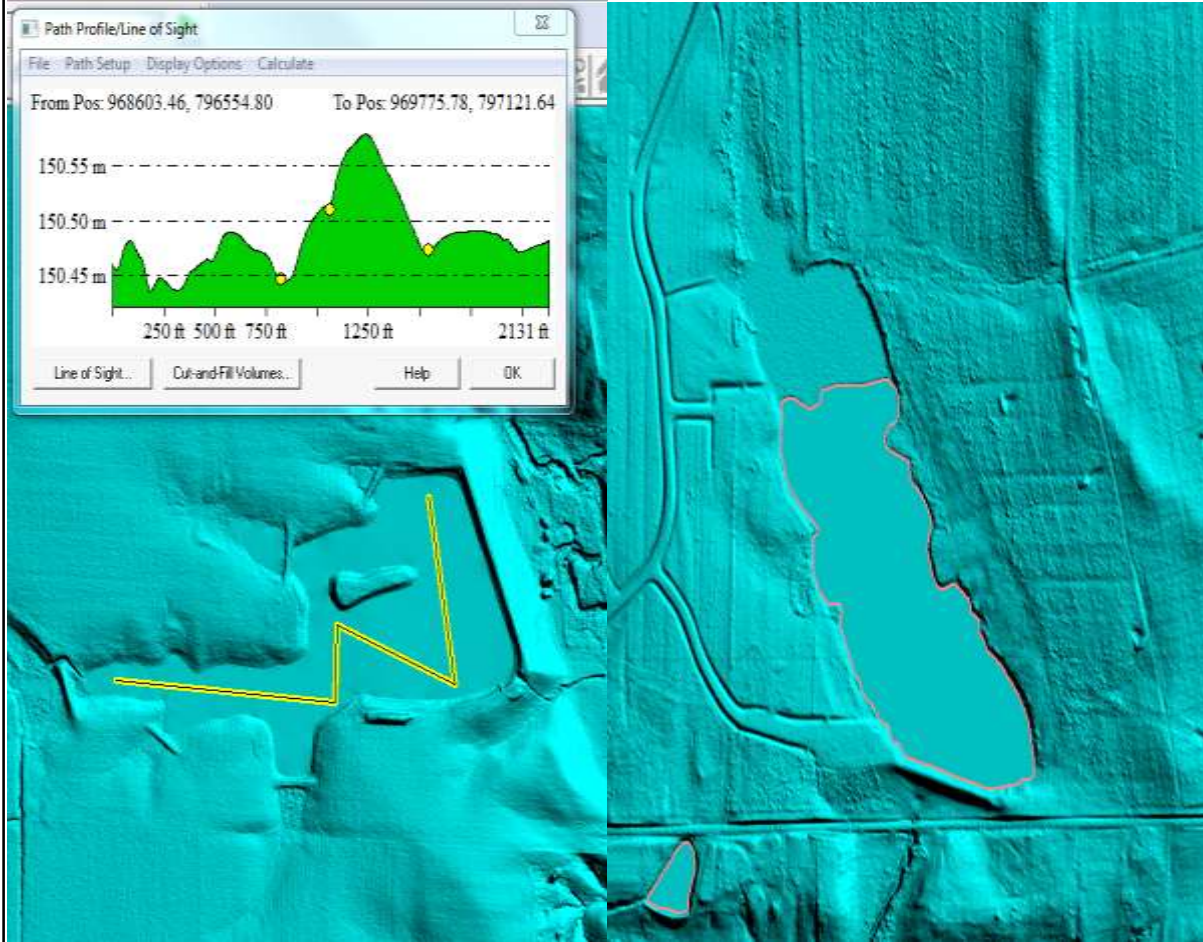
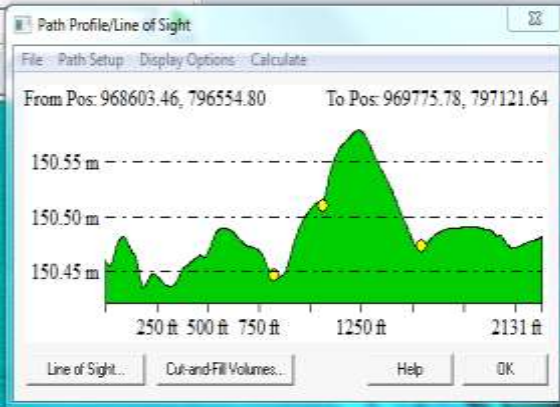
Hydro Treatment:hydro-flattened

DEM tiles are properly Hydro Flattened  Yes  No

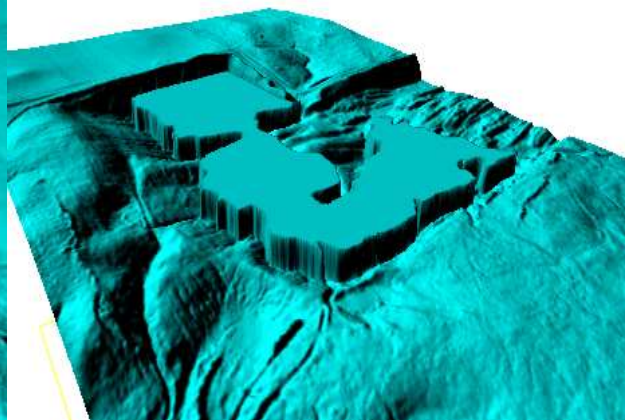
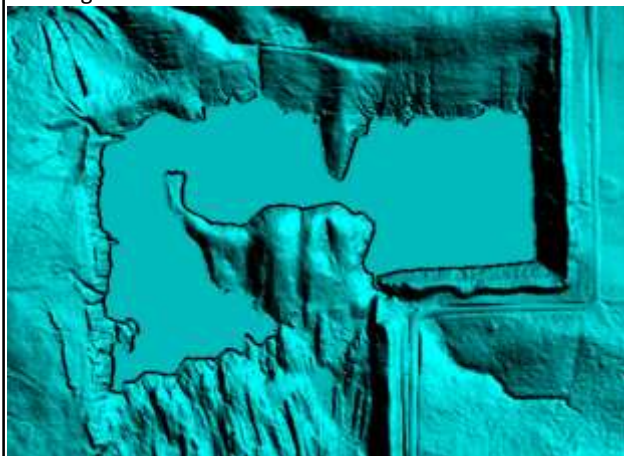
Waterbodies  or greater are flattened

Water bodies in many counties were not hydroflattened or not covering entire water body. 92 total hydroflattening related error found throughout 16 counties.

Several counties were not hydroflattened, including Clay, Cumberland, Jasper and Lawrence.

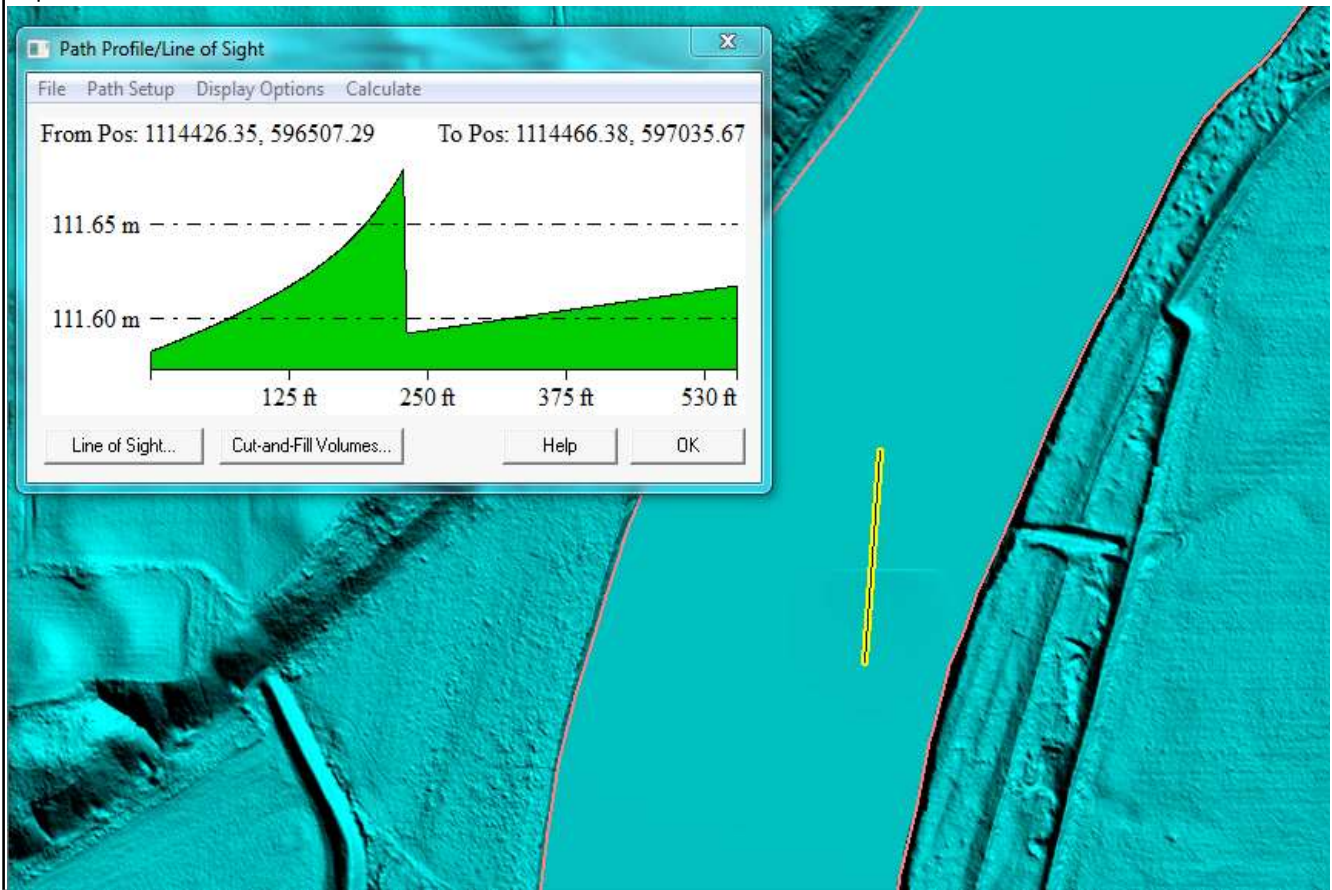


Floating water



Streams  or greater are flattened in a downstream manner

oops



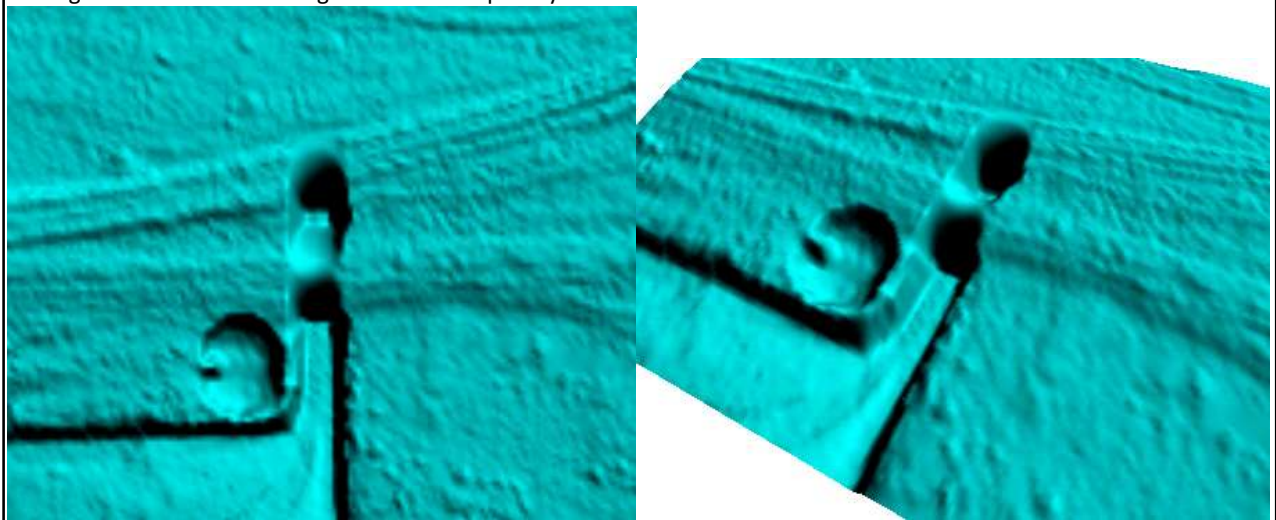
Tidal Boundaries/Shorelines are flattened

N/A

No missing islands  or larger

Bridges/Overpasses are properly removed

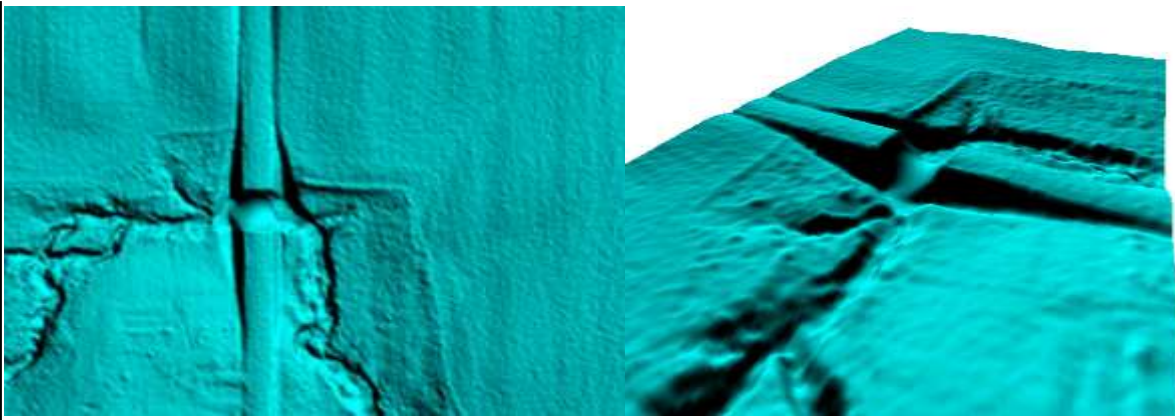
6 bridge removal errors. bridges are not completely removed.



Culverts are maintained (Not Hydro Enforced)

57 culvert errors. culverts have been removed

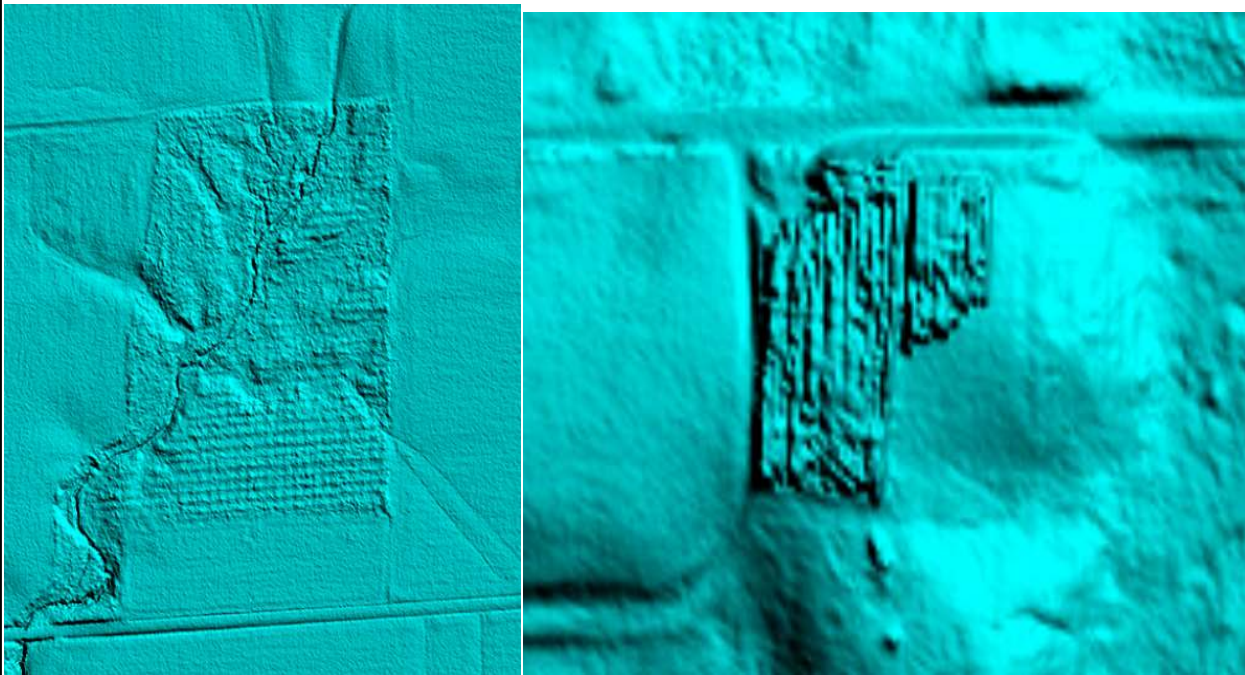




Depressions, Sinks, are not filled in (Not Hydro Conditioned)

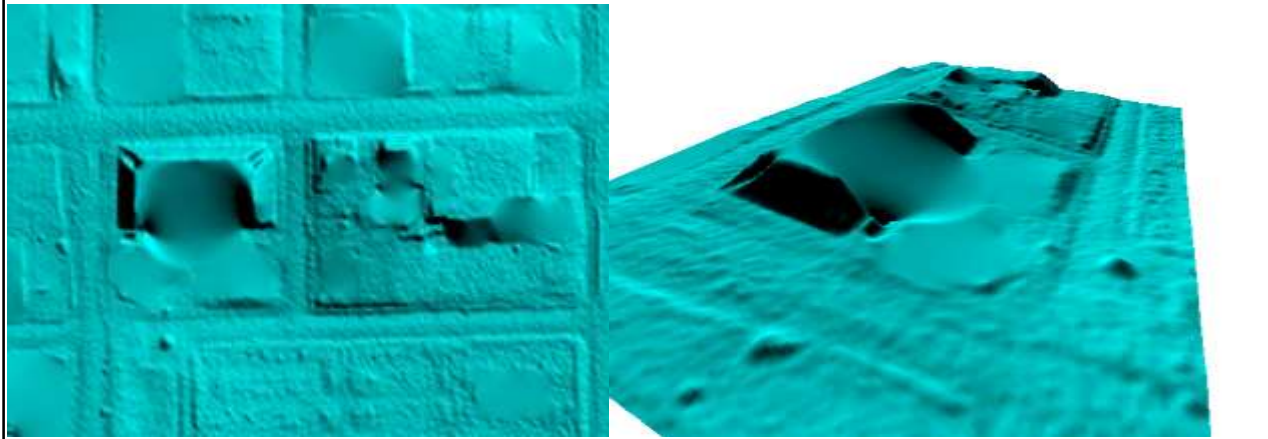
Vegetation properly removed

Anomalies found on DEM, 13 total.



Manmade structures properly removed

6 building removal errors. Buildings not properly removed.



ADDITIONAL COMMENTS, ERRORS, ANOMALIES, OR OTHER ISSUES:

Inconsistencies abound when reporting checkpoints from various reports and actual shapefiles sent. FVA/RMSE reported values are identical across 12 counties. Two other counties are duplicates with other values.

COUNTY	Number of Open Terrain checkpoints reported				FVA (ft)	RMSE (ft)
	from shapefile	from metadata	from QA/QC report	from HTML doc		
Clark	122	433	0	426	0.467	0.238
Clay	124	433	N/A	427	0.467	0.238
Cole	123	433	0	433	0.467	0.238
Crawford	120	433	526	426	0.467	0.238
Cumberland	121	433	525	424	0.467	0.238
Edwards	121	419	525	419	0.392	0.200
Effingham	121	433	0	433	0.499	0.255
Fayette	121	504	0	504	0.421	0.215
Jasper	123	433	N/A	512	0.499	0.255
Lawrence	124	433	551	442	0.467	0.238
Macon	122	433	530	429	0.467	0.238
Moultrie	120	433	N/A	423	0.467	0.238
Richland	127	433	N/A	433	0.467	0.238
Shelby	123	433	N/A	430	0.467	0.238
Wabash	64	433	0	426	0.467	0.238
Wayne	189	433	766	426	0.467	0.238

\*\* Table placed here since it does not fit in the vertical accuracy section.

Tiles recommended for NED 1/3rd:  Yes.  No.

Tiles recommended for NED 1/9th:  Yes.  No.

Tiles recommended for NED 1 Meter:  Yes.  No.

LAS dataset recommended for distribution: tile classified

**Based on this review, the USGS does not accept the DEM tiles.**

End of DEM Review

**INTERNAL COMMENTS**

END OF REPORT (v2.3.0)