

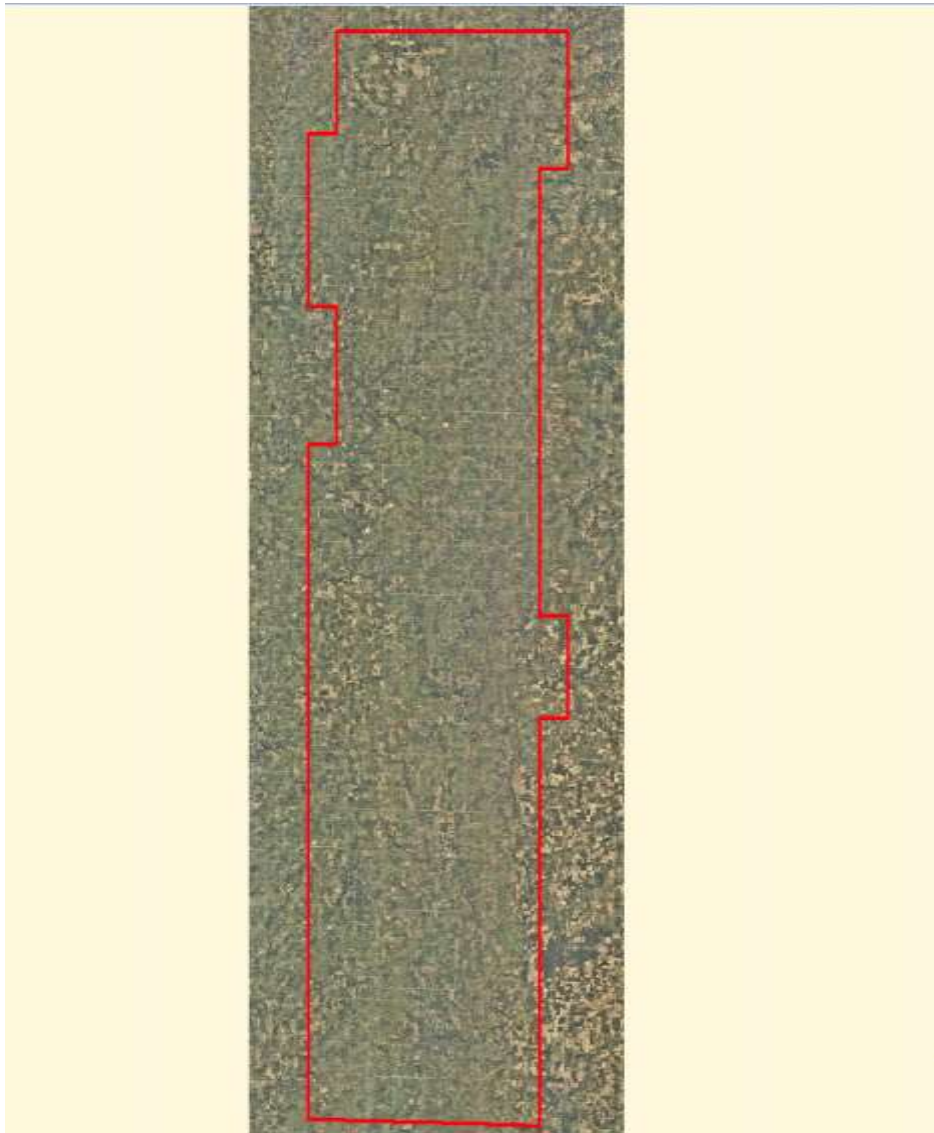


LiDAR Quality Assessment Report

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.

KS_Area1-Eastern_2013

NGTOC



Project Information

Project:

Contractor:

Project Type:
Partnership

Applicable Specification:
NGP LiDAR Base Specification Draft V13

Project Points of Contact:

Name:	Type:	Email:
Ingrid Landgraf	NSDI Liaison	imlandgraf@usgs.gov

REPORT QUALIFICATION SUMMARY:

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

Project Delivery Lots:

Dates Collected Range:

Collection Start:

Collection End:

Project Aliases:

Licensing:

Public Domain

Project Description:

The project Area 1 Kansas includes Anderson, Allen, Neosho, and Labette counties. Areas were defined and supplied by Kansas Department of Administration and includes approximately 2250 square miles for analysis.

Review Information

Reviewer: Date

Delivered:

3rd Party QA Date

Performed:

Assigned:

Action To Contractor Date:	Issue Description:	Return Date:
3/25/2014	<p>Missing metadata files for Classified las and DEM; no project metadata; checkpoint shapefile not delivered in UTM15 for vertical accuracy assessment on DEM; Check that all vertical accuracy match between reports and metadata; Swath delivered in UTM14 and assessed; check breakline files for consistency; Several DEM errors exist that need to be corrected.</p> <p>*** Complete metadata redelivered *** Checkpoint shapefile redelivered in UTM15 *** Breakline files redelivered, but still contain several errors *** Majority of DEM errors corrected, some remain *** Boundary shapefile does not match extent of data</p>	

Review Complete:

Dates Project Worked:

Start:	<input type="text" value="2/12/2014"/>	<input type="text" value="4/28/2014"/>	<input type="text" value="5/27/2014"/>
End:	<input type="text" value="3/25/2014"/>	<input type="text" value="5/7/2014"/>	<input type="text"/>

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

Deliverables	Delivered	XML Metadata	Required	Format	Quantity	Additional Details
Collection Report:	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	PDF	<input type="text" value="1"/>	<input type="text" value="also delivered as .doc"/>
Survey Report:	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	PDF	<input type="text" value="1"/>	<input type="text" value="also delivered as .doc"/>
Processing Report:	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	PDF	<input type="text" value="1"/>	<input type="text" value="also delivered as .doc"/>
QA/QC Report:	<input type="checkbox"/>		<input type="checkbox"/>	Select...	<input type="text"/>	<input type="text"/>

<i>Project Level XML Metadata:</i>	<input type="checkbox"/>		<input checked="" type="checkbox"/>	XML	<input type="text"/>	<input type="text"/>
<i>Project Extent:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	.shp	1	delivered as gdb
<i>Tile Scheme:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	.shp	1	delivered as gdb
<i>Control (Calibration) Points:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	.shp	1	shapefile
<i>Check (Validation) Points:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	.shp	1	shapefile

Additional Comments:

LIDAR DATA

<i>Deliverables</i>	<i>Delivered</i>	<i>XML Metadata</i>	<i>Required</i>	<i>Format</i>	<i>Quantity</i>	<i>Additional Details</i>
<i>Swath Data:</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	.las	136	UTM14
<i>Classified/ Tiled Data:</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	.las	256	

Additional Comments:

DERIVED DELIVERABLES

<i>Deliverables</i>	<i>Delivered</i>	<i>XML Metadata</i>	<i>Required</i>	<i>Format</i>	<i>Quantity</i>	<i>Additional Details</i>
<i>DEM Tiles:</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	IMG	256	
<i>Breaklines:</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	.shp	2	delivered in gdb

Additional Comments:

OTHER

<i>Additional Deliverables</i>	<i>Delivered</i>	<i>XML Metadata</i>	<i>Required</i>	<i>Format</i>	<i>Quantity</i>	<i>Additional Details</i>
Intensity Images	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	.tif	256	

UTM15 First Return DEM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	.IMG	256	
UTM15 Hydro Polygon Breakline	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	.gdb	1	
UTM14 Hydro Aera 1 Anderson Allen Neosho Labette_20131114 .gdb	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	.gdb	1	
UTM14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			See below

Additional Comments: Entire project delivery in UTM14 - DEM, Classified .las, First Return DEM, Breaklines, Intensity, Metadata, Swath
*****Project redelivery in UTM15 - Breaklines, DEM, Classified .las, Metadata**

Geographic Information

Area Extent: Sq. Miles

Tile Size: Meters

DEM/DTM Grid Spacing: Meters

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

- | | |
|---|---|
| <input checked="" type="checkbox"/> Project Extent | <input checked="" type="checkbox"/> Tiled/Classified XML Metadata |
| <input checked="" type="checkbox"/> Project Tile Scheme | <input checked="" type="checkbox"/> Tiled/Classified LiDAR |
| <input checked="" type="checkbox"/> Control Points | <input type="checkbox"/> Swath/Raw LiDAR XML Metadata |
| <input checked="" type="checkbox"/> Checkpoints | <input type="text" value="UTM14"/> |
| | <input type="checkbox"/> Swath/Raw LiDAR |
| | <input type="text" value="UTM14"/> |
| | <input checked="" type="checkbox"/> DEM(s) |
| | <input checked="" type="checkbox"/> DEM XML Metadata |
| | <input checked="" type="checkbox"/> Breakline(s) |
| | <input checked="" type="checkbox"/> Breakline XML Metadata |

Additional Comments:

Collection Information

Configured Project Nominal Pulse Spacing:

1.25 Meters

Sensor Information:

Sensor Type:

Aerial

Sensor Used:

Optech Orion H300

Configured Scan Angle \pm from nadir:

20 Degrees

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 Swath XML Metadata parsed without errors.

Check if 'Best Use' metadata for NED:

The Classified XML Metadata parsed without errors.

Check if 'Best Use' metadata for NED:

The DEM XML Metadata parsed without errors.

Check if 'Best Use' metadata for NED:

The Breakline XML Metadata parsed without errors.

Check if 'Best Use' metadata for NED:

Additional
Comments:

According to version 13 one metadata file for classified, project and DEM is required. Classified and DEM metadata delivered by tile basis only. Project metadata missing. The parser was run on the tiled metadata for the classified and DEM at this time.

***Metadata files for all files were redelivered: DEM, Classed LAS, First Return, Hydro Breaklines, Intensity, Project.

***New metadata files do not exactly reflect data delivery; for example: Metadata states "Tall Grass," shapefile attribute table refers to "Long Grass"; the metadata also list extra classes not found in the point cloud: **23 Overlap - noise**.

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

End of Metadata Review

Vertical Accuracy Review Not 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 FILES

Confidence Interval Required: th % CI

Required Unit:

Required # of checkpoints:

Required RMSEz:

Required Vertical Accuracy (RMSEz * .% CI)

REQUIRED FUNDAMENTAL VERTICAL ACCURACY FOR DEM FILES

Confidence Interval Required: th % CI

Required Unit:

Required # of checkpoints:

Required RMSEz:

Required Vertical Accuracy (RMSEz * .% CI)

REQUIRED SUPPLEMENTAL VERTICAL ACCURACY FOR DEM FILES

SVA Statistic Required: Percentile

SVA Confidence Level/Percentile Required:

Class	# of Checkpoints	SVA Required	
		95 th Percentile	
Low Grass	<input type="text" value="20"/>	<input type="text" value="36.3"/>	<input type="text" value="Centimeters"/>
Tall Grass	<input type="text" value="20"/>	<input type="text" value="36.3"/>	<input type="text" value="Centimeters"/>
Forest	<input type="text" value="20"/>	<input type="text" value="36.3"/>	<input type="text" value="Centimeters"/>
Urban	<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)

REPORTED SUPPLEMENTAL VERTICAL ACCURACY FOR DEM FILES

SVA Statistic Reported: Percentile

SVA Confidence Level/Percentile Reported:

Class	# of Checkpoints	SVA Reported 95 th Percentile	
Low Grass	<input type="text" value="22"/>	<input type="text" value="0.117"/>	<input type="text" value="Meters"/>
Tall Grass	<input type="text" value="22"/>	<input type="text" value="0.098"/>	<input type="text" value="Meters"/>
Forest	<input type="text" value="22"/>	<input type="text" value="0.153"/>	<input type="text" value="Meters"/>
Urban	<input type="text" value="24"/>	<input type="text" value="0.133"/>	<input type="text" value="Meters"/>

REPORTED CONSOLIDATED VERTICAL ACCURACY FOR DEM FILES

CVA Statistic Reported: Percentile

CVA Confidence Level/Percentile Reported:

Total number of checkpoints:

Reported CVA: Meters at the 95 th Percentile

Additional Reported Vertical Accuracy Information:

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	
Long Grass	<input type="text" value="22"/>	<input type="text" value="7.9"/>	Meters
Urban	<input type="text" value="24"/>	<input type="text" value="12.7"/>	Meters
Forest	<input type="text" value="22"/>	<input type="text" value="15.1"/>	Meters

REVIEWED CONSOLIDATED VERTICAL ACCURACY

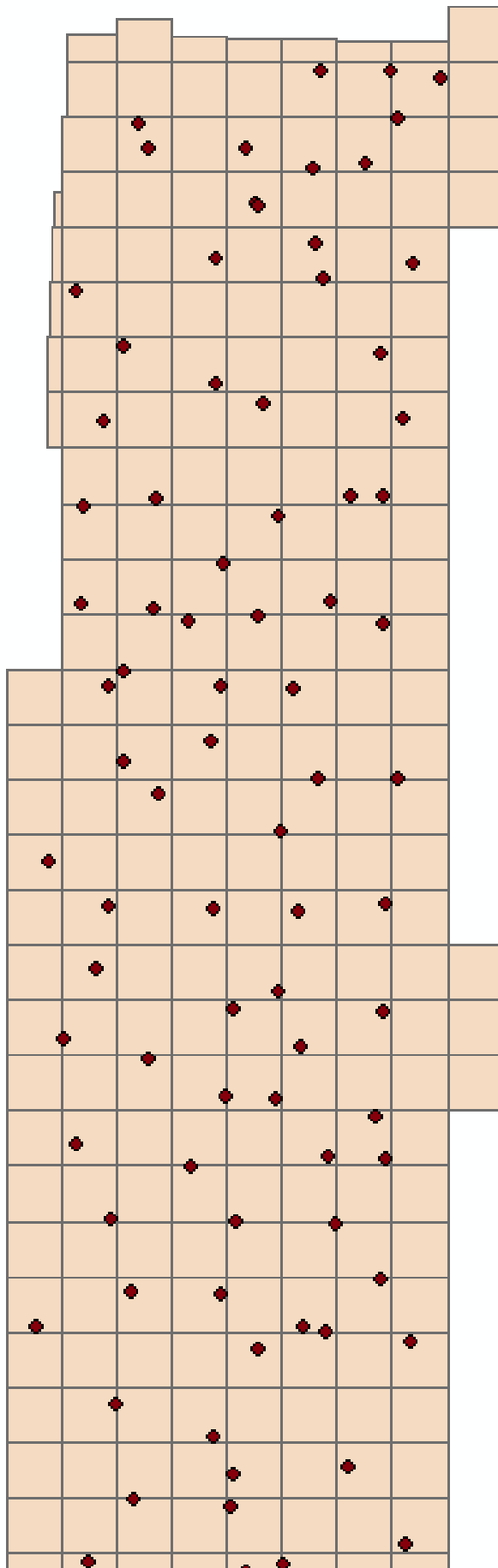
CVA Statistic Reviewed: Percentile

CVA Confidence Level/Percentile Reviewed:

Total number of checkpoints: 90

Reviewed CVA: 13.7 Centimeters at the 95 th Percentile

Checkpoint Distribution Image



Vertical Accuracy Results:

<p><i>Additional Reviewed Vertical Accuracy Information:</i></p>	<p>Reviewer could not assess DEM vertical accuracy at this time. The checkpoints shapefile was delivered in UTM14 only and per liaison " USGS will want to use the UTM 15 data to match the existing tiles surrounding the project and be in the correct zone". DEM review was completed on data using UTM15. Since swath data delivered only in UTM14, reviewer was able to assess vertical accuracy using checkpoints delivered.</p> <p>Check to ensure that all reported vertical accuracies for swath and DEM are consistent across metadata and reports.</p> <p>***Short grass is used for FVA testing. Long Grass is referred to in the Metadata as "Tall Grass."</p>
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Based on this review, the USGS **does not accept** 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:

Swath for the project was delivered as UTM14N while rest of project is UTM15N. Since this is the only swath deliverable it was assessed by reviewer.

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

End of Swath/Raw LiDAR Review

Tiled/Classified LiDAR Review 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
- 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 checked="" type="checkbox"/>
2	Bare-earth/Ground	<input checked="" type="checkbox"/>
7	Noise(low or high, manually identified, if needed)	<input checked="" type="checkbox"/>
8	Model key points	<input type="checkbox"/>
9	Water	<input checked="" type="checkbox"/>
10	Ignored ground (breakline proximity)	<input checked="" type="checkbox"/>
11	Withheld (if the "Withheld Bit" is not implemented in the processing software)	<input type="checkbox"/>

Additional Classes:

Class	Description
17	Overlap -- Unclassified
18	Overlap -- Bare-Earth
23	Overlap -- Noise
24	Overlap -- Water
25	Overlap -- Ignored Ground

Additional comments:

Final_1112109_Kansas_Report_1_27_2014 PDF Report states class 23 (Overlap Noise) will be used in classification scheme, however it is not listed in the point cloud statistics.

Based on this review, the USGS accepts classified/tiled LiDAR data.

End of Tiled/Classified LiDAR Review

Breakline Review Not 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: Meters

- 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 Monotonic
 Required.

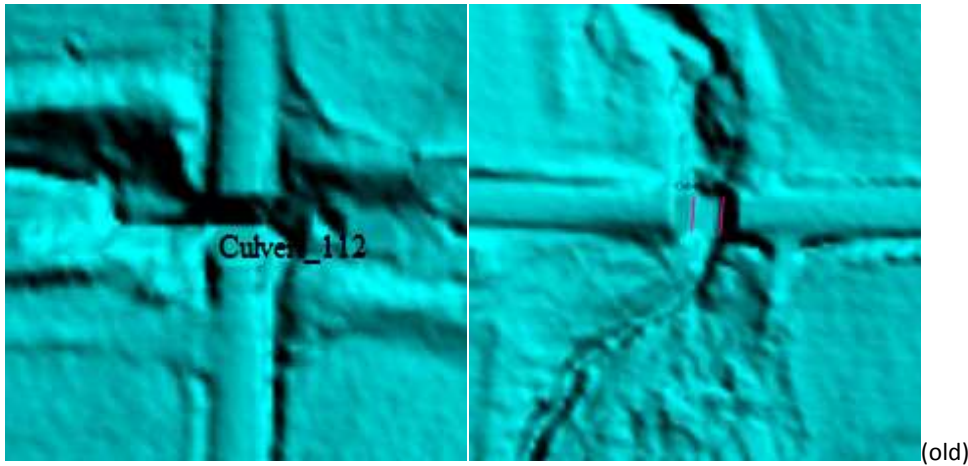
Single Line Breaklines.

Lines are:
 Single Line Streams
 Bridge Cuts
 Culvert Connectors
Downstream SLS Flow is Monotonic

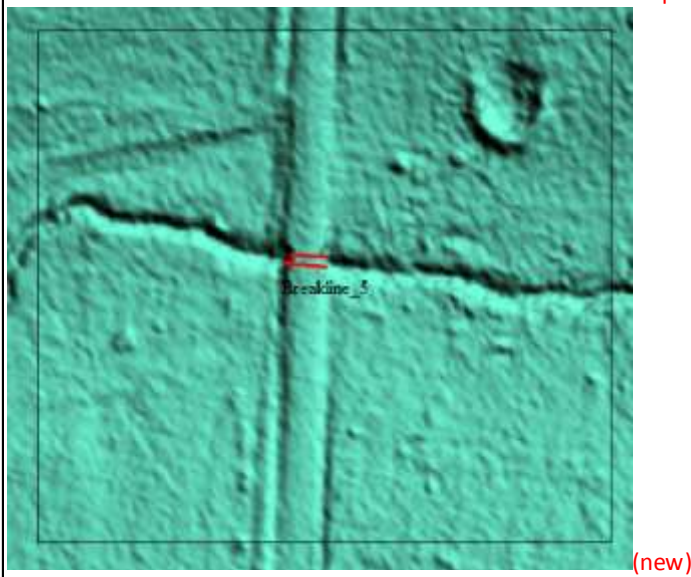
No missing or misplaced breaklines.

ADDITIONAL COMMENTS, ERRORS, ANOMALIES, OR OTHER ISSUES:

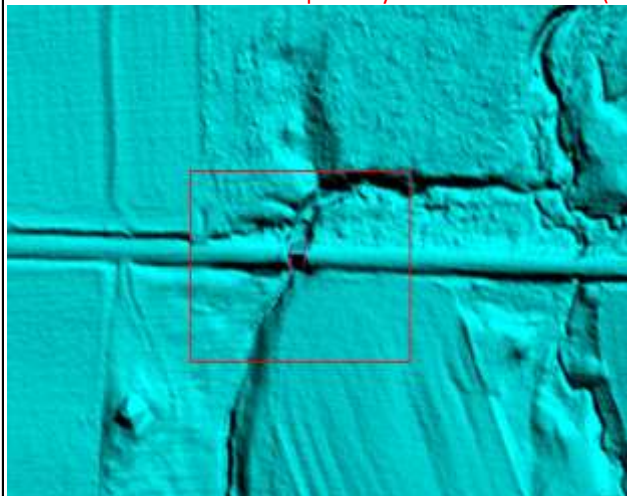
- During QA review, reviewer noted that some rivers in the DEM have been hydro-flattened that appear to be under fifty feet bank to bank, while others have not. Please review/comment. **Corrected by vendor.**
- Breaklines shapefile appears to be incomplete as some hydro-flattened water features are missing breaklines. Re-delivery of breakline file needed. **Corrected by vendor.**
- Some bridges and culverts had breaklines while others did not (as shown below). Please comment. **This problem still exists in some locations.**



*****some breaklines still exist where culverts have been replaced (image below)



***some breaklines still at partially removed culverts? (image below)



Based on this review, the USGS does not accept 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: IMG

Raster Cell Size: 1 Meters

Tile bit depth/pixel Type: 32_BIT_FLOAT

Interpolation or Resampling Technique: Unknown

- DEM tiles do not overlap
- DEM tiles conform to Project Tiling Scheme
- Quantity of DEM files conforms to Project Tiling Scheme
- DEM tiles are uniform in size
- DEM tiles properly edge match and free of edge artifacts

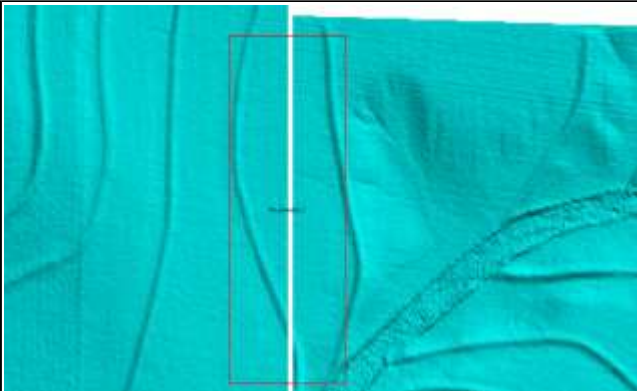
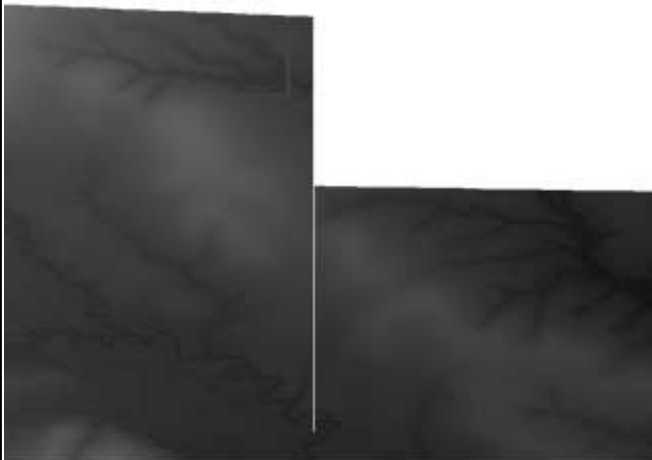


Image from Global Mapper showing tile mismatch (above) and ArcMap (below). **Corrected by vendor.**

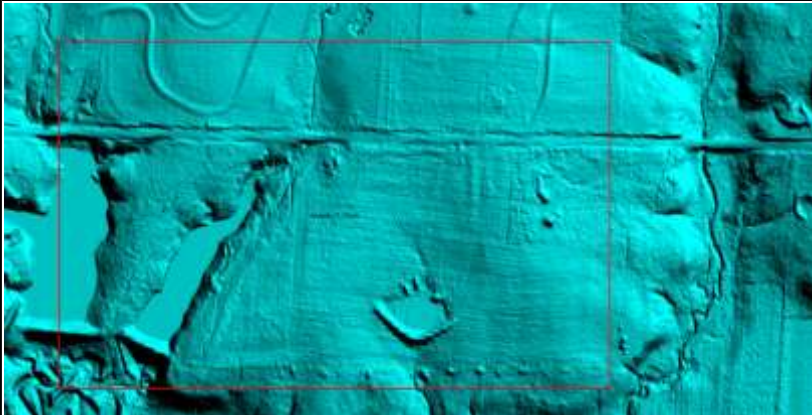


Tile mismatch between DEM tiles BE_15STC8550 and BE_15STC9050. **Corrected by vendor.**

Other issue found:

******Boundary shapefile does not conform to data extent (just follows the boundary of the tile extent)**

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

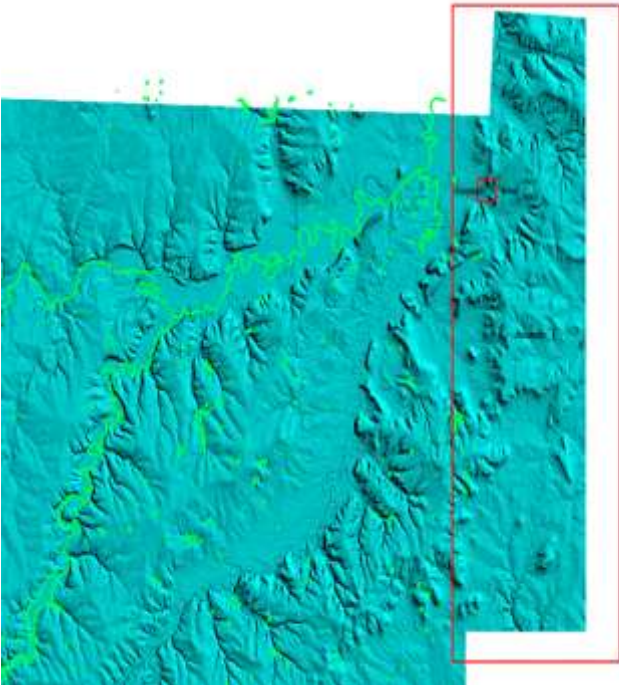


Anomalous error (Anomaly_9) showing different data resolution. Location: 37° 34' 18.9748" N, 95° 06' 11.3445" W
*******Not corrected. Please recheck this.**

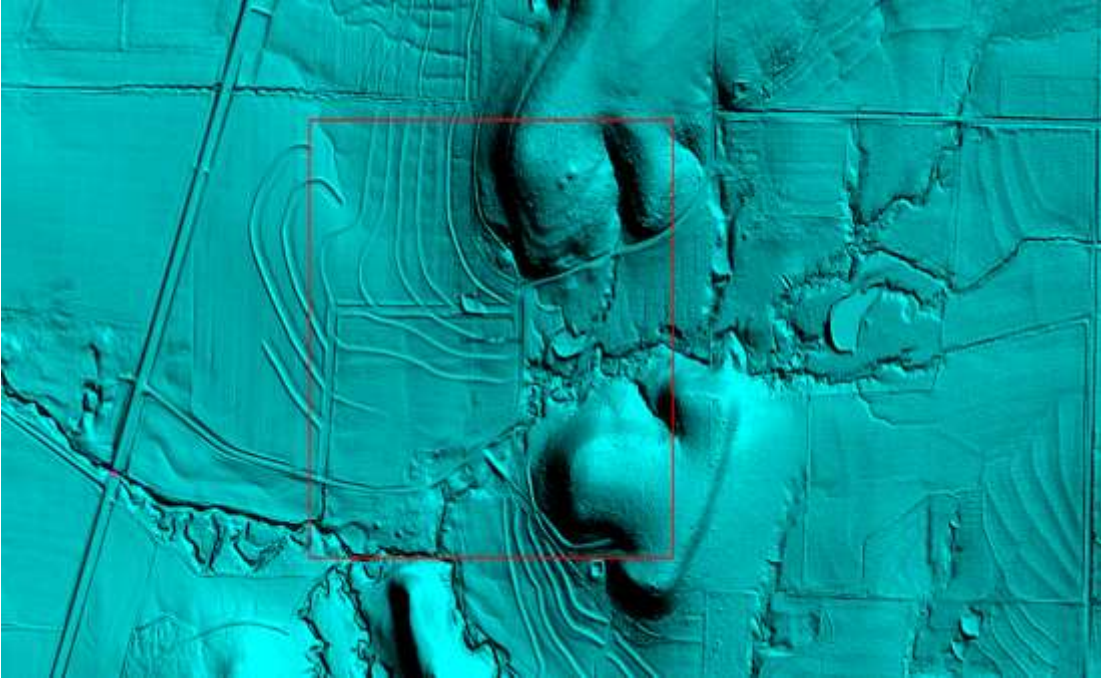


Global Mapper error image (above) ArcMap image

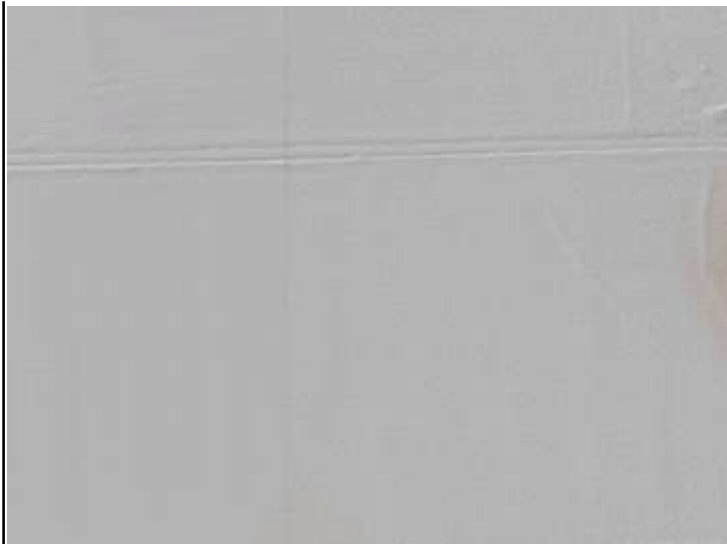
*******This errors still exist. It seems to be endemic throughout the north-eastern corner of the dataset. Please recheck (see new error images below and in error shapefile).**



(new)



(new)

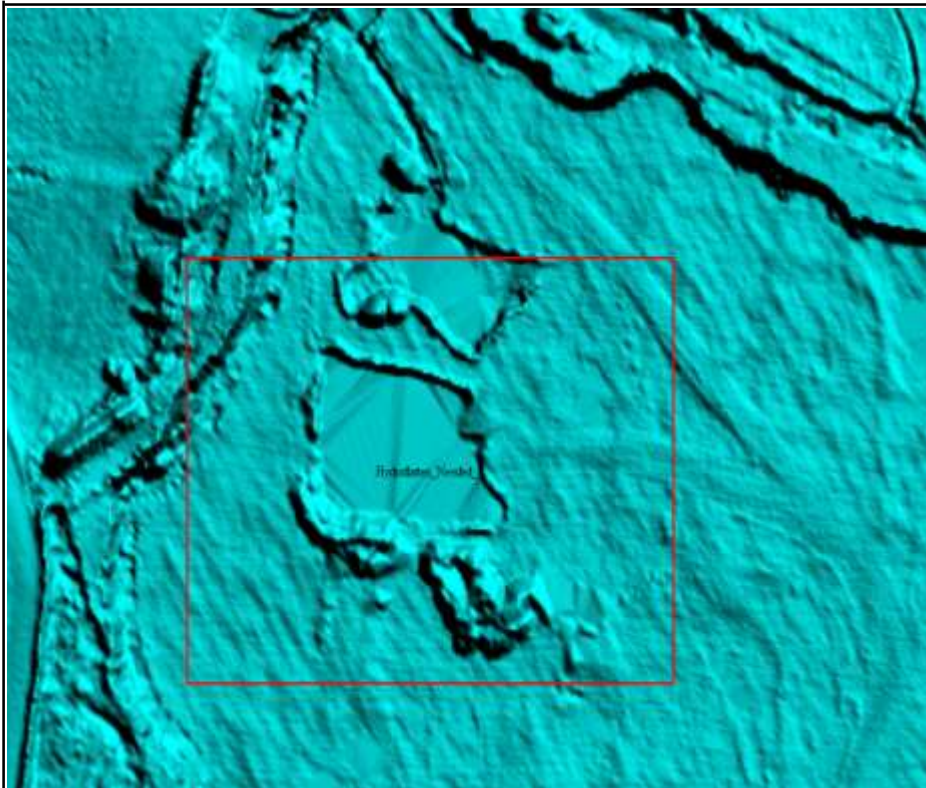


(old)

Error identified along entire eastern edge of DEM. Location: 37° 57' 1.2367" N, 95° 07' 50.7476" W *****Not corrected

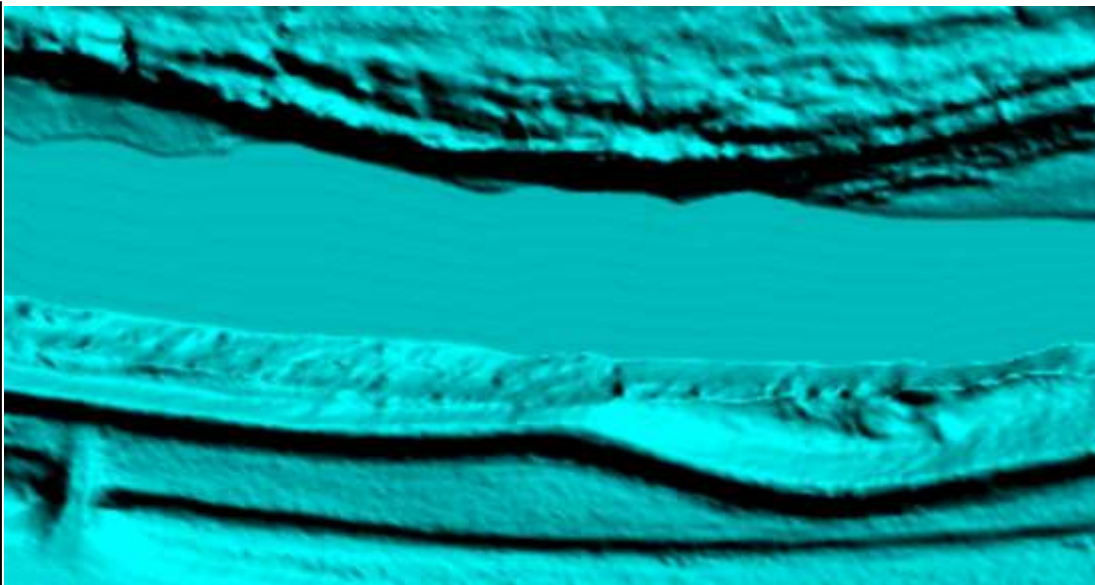
DEM tiles are properly Hydro Flattened Yes No

Waterbodies or greater are flattened



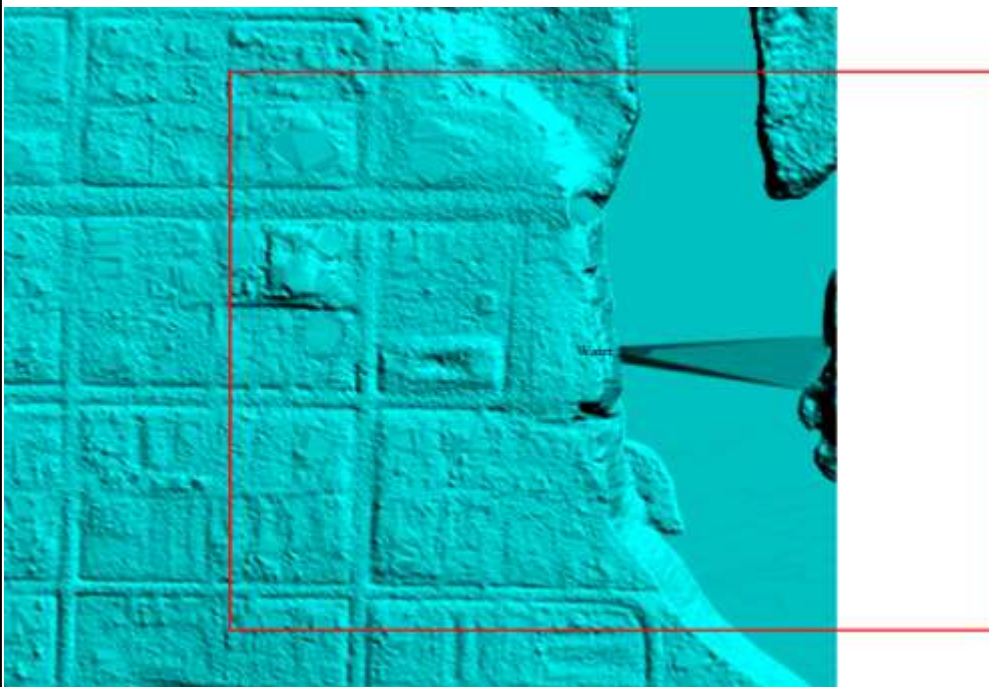
Hydro-flattening error (Hydroflatten_Needed_5). Location: 37° 45' 54.2384" N, 95° 26' 20.3021" W. Three similar errors exist. *****Corrected by vendor

Streams or greater are flattened in a downstream manner



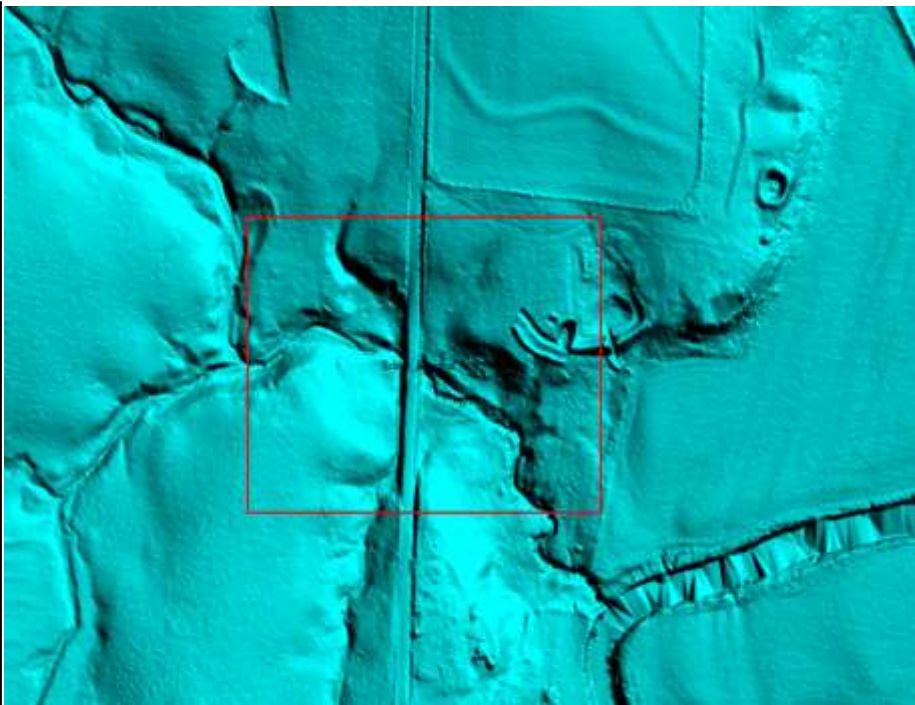
Several hydro-flattening errors exist within the streams. Image above is representative (Water_Issue_11). 15 of these error types exist; please review river system where errors exist.

***River errors corrected by vendor



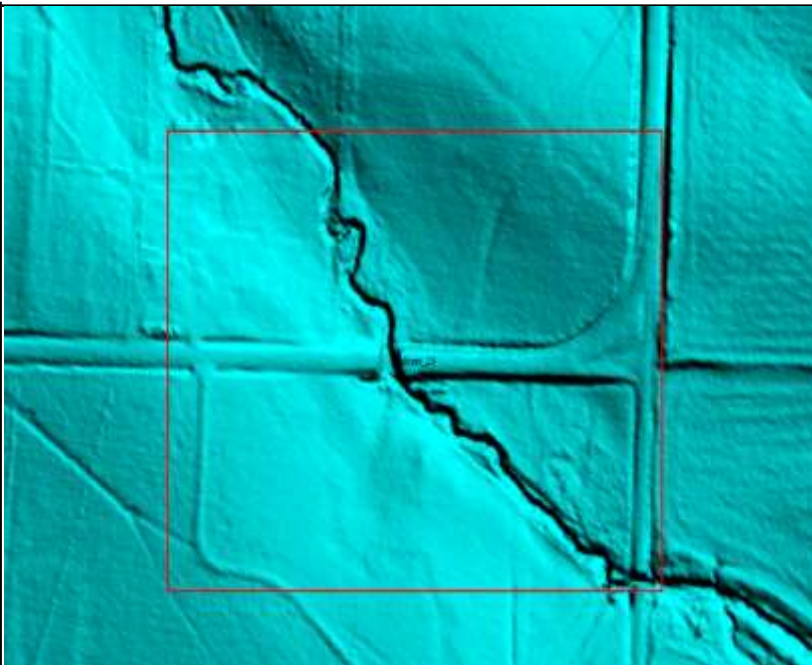
***Water issue beneath bridge.

- Tidal Boundaries/Shorelines are flattened
- No missing islands or larger
- Bridges/Overpasses are properly removed



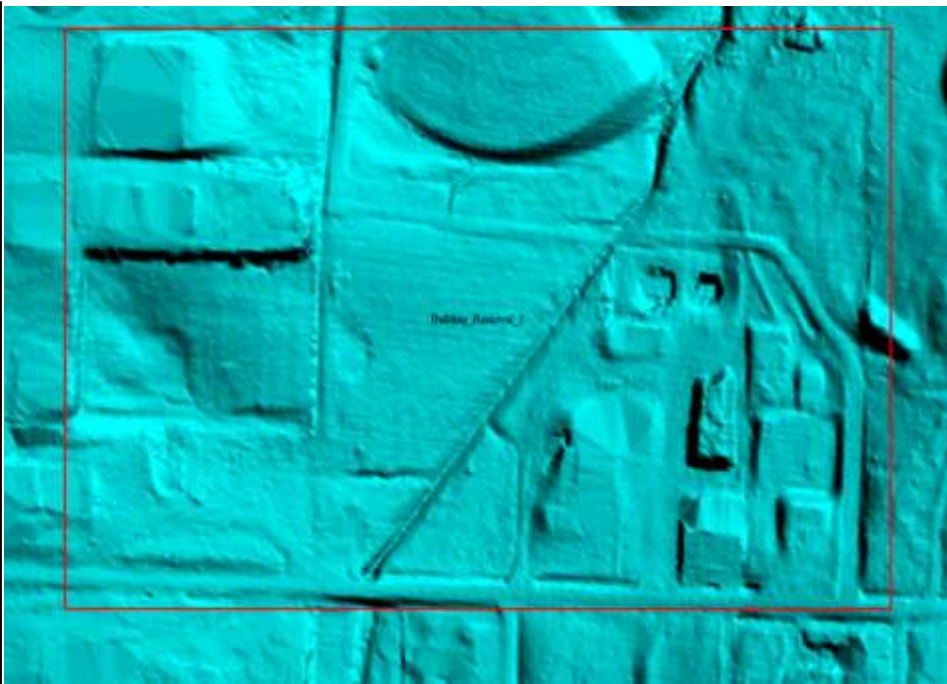
Several errors exist where bridges were not removed from DEM. Above image is representative (Bridge_Removal_6). Location: 37° 34' 39.3071" N, 95° 08' 34.2986" W ***Corrected by vendor

Culverts are maintained (Not Hydro Enforced)



Culvert errors in which culverts were removed from DEM and need to be added back in. Above image is representative (Culvert_29) Location: 37° 52' 41.9722" N, 95° 25' 45.0572" W. 97 of this error type exist. ***Corrected by vendor

- Depressions, Sinks, are not filled in (Not Hydro Conditioned)
- Vegetation properly removed
- Manmade structures properly removed



Buildings not removed from DEM. The above image is representative of this error type (Building_Removal_1). Location: 38° 17' 21.8901" N, 95° 14' 43.5772" W. 4 of this error type exist. *****OK, thanks for info.**

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

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

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

End of DEM Review

Based on this review, the provided delivery Select... the Contract and/or Task Order requirements.

Additional Comments:

INTERNAL COMMENTS

END OF REPORT (v2.1.1)