



# 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 and the Center for LiDAR Information Coordination and Knowledge. 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 or NGTOCooperations@usgs.gov.

Materials Received:

2/14/2013

Project Type: Partnership

Project ID:

ME\_SouthernAreas\_2012

Project Description:

This lidar project, ME\_SouthernAreas\_2012, is part of three, non-contiguous areas as part of the Maine Statewide Lidar and Orthoimagery project. This report reflects the lower two areas, also known as Mid-Coastal Cleanup. The third area is ME\_ARoostook\_2012 and has its own separate report.

Project Alias(es):

ME\_MidCoastalCleanup\_2012

FVA was calculated utilizing all three areas, thus the FVA values for this report will be the same for the Aroostook region.

Year of Collection: 2012

Lot 1 of 1 lots.

Project Extent:

Project Extent image?



Project Tiling Scheme:

Project Tiling Scheme image?



Contractor:

Woolpert, Inc.

Applicable Specification:

V13

Licensing Restrictions:

Third Party Performed QA?

Project Points of Contact:

POC Name	Type	Primary Phone	E-Mail
Dan Walters	NSDI Liaison	207-622-8201 x128	danwalters@usgs.gov

# Project Deliverables

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/Orthoimagery Section supervisor and informed of the problem. Processing will resume after the COTR has coordinated the deposition of remaining deliverables.

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Collection Report              | <input type="checkbox"/> Project Shapefile/Geodatabase                  |
| <input type="checkbox"/> Survey Report                             | <input checked="" type="checkbox"/> Project Tiling Scheme Shapefile/Gdb |
| <input checked="" type="checkbox"/> Processing Report              | <input checked="" type="checkbox"/> Control Point Shapefile/Gdb         |
| <input checked="" type="checkbox"/> QA/QC Report                   | <input checked="" type="checkbox"/> Breakline Shapefile/Gdb             |
| <input checked="" type="checkbox"/> Control and Calibration Points | <input type="checkbox"/> Project XML Metadata                           |

## Multi-File Deliverables

File Type	Quantity
<input checked="" type="checkbox"/> Swath LAS Files <input checked="" type="checkbox"/> Required? <input checked="" type="checkbox"/> XML Metadata?	159
<input type="checkbox"/> Intensity Image Files <input type="checkbox"/> Required?	1
<input checked="" type="checkbox"/> Tiled LAS Files <input checked="" type="checkbox"/> Required? <input checked="" type="checkbox"/> XML Metadata?	1,752
<input checked="" type="checkbox"/> Breakline Files <input checked="" type="checkbox"/> Required? <input checked="" type="checkbox"/> XML Metadata?	2
<input checked="" type="checkbox"/> Bare-Earth DEM Files <input checked="" type="checkbox"/> Required? <input checked="" type="checkbox"/> XML Metadata?	1,752

## Additional Deliverables

Item
<input checked="" type="checkbox"/> Flight line shapes

Errors, Anomalies, Other Issues to document?  Yes  No

None.

# Project Geographic Information

Areal Extent:

1511.8

Sq Mi

Grid Size:

1  
meters  
Tile Size:  
1500 x 1500  
meters  
Nominal Pulse Spacing:  
1.5  
meters  
Vertical Datum: NAVD88 meters  
Horizontal Datum: NAD83 (NSRS2007) meters

Project Projection/Coordinate Reference System: NAD83 / UTM19 North meters.

This Projection Coordinate Reference System is consistent across the following deliverables:

- |   |  |
|---|--|
| <input type="checkbox"/> Project Shapefile/Geodatabase                  | <input checked="" type="checkbox"/> Breaklines XML Metadata File     |
| <input checked="" type="checkbox"/> Project Tiling Scheme Shapefile/Gdb | <input checked="" type="checkbox"/> Bare-Earth DEM XML Metadata File |
| <input checked="" type="checkbox"/> Checkpoints Shapefile/Geodatabase   | <input type="checkbox"/> Swath LAS Files                             |
| <input checked="" type="checkbox"/> Project XML Metadata File           | <input checked="" type="checkbox"/> Classified LAS Files             |
| <input checked="" type="checkbox"/> Swath LAS XML Metadata File         | <input checked="" type="checkbox"/> Breaklines Files                 |
| <input checked="" type="checkbox"/> Classified LAS XML Metadata File    | <input checked="" type="checkbox"/> Bare-Earth DEM Files             |

Project Shapefile/Geodatabase CRS

Swath LAS Files CRS

UTM Zone 19 / WGS84 / meters

# Review Cycle

This section documents who performed the QA Review on a project as well as when QA reviews were started, actions passed, received, and completed.

Reviewer:

T. Jerris

Review Start Date:

3/26/2013

Action to Contractor Date	Issue Description	Return Date
5/2/2013	<p>Please fix the following errors:</p> <ul style="list-style-type: none"><li>- Some Swath files have unknown coordinate systems</li><li>- Swath with coordinate systems are WGS84 (..should be NAD83)</li><li>- Provide Project-Level metadata</li><li>- Control points contain elevation errors</li><li>- 1 @ bridge removal</li><li>- 3 @ return roadway above culverts</li><li>- 15 @ high water surface elevations</li><li>- 1 @ missing data</li><li>- 1 @ waterbody not flattened (breaklines have been provided for this waterbody)</li><li>- 3 @ areas of waterbodies not flattened</li><li>- 1 @ waterbody w/ irregular elevation break</li></ul> <p>**None of the errors have been fixed with this dataset (10/18/2013)</p> <p>**12/5/2013</p>	9/19/2013

Review Complete:

## Metadata Review

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.

The Project XML Metadata file parsed without errors.

The Swath LAS XML Metadata file parsed without errors.

The Classified LAS XML Metadata file parsed without errors.

The Breakline XML Metadata file parsed without errors.

The Bare-Earth DEM XML Metadata file parsed without errors.



# Project QA/QC Report Review

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.

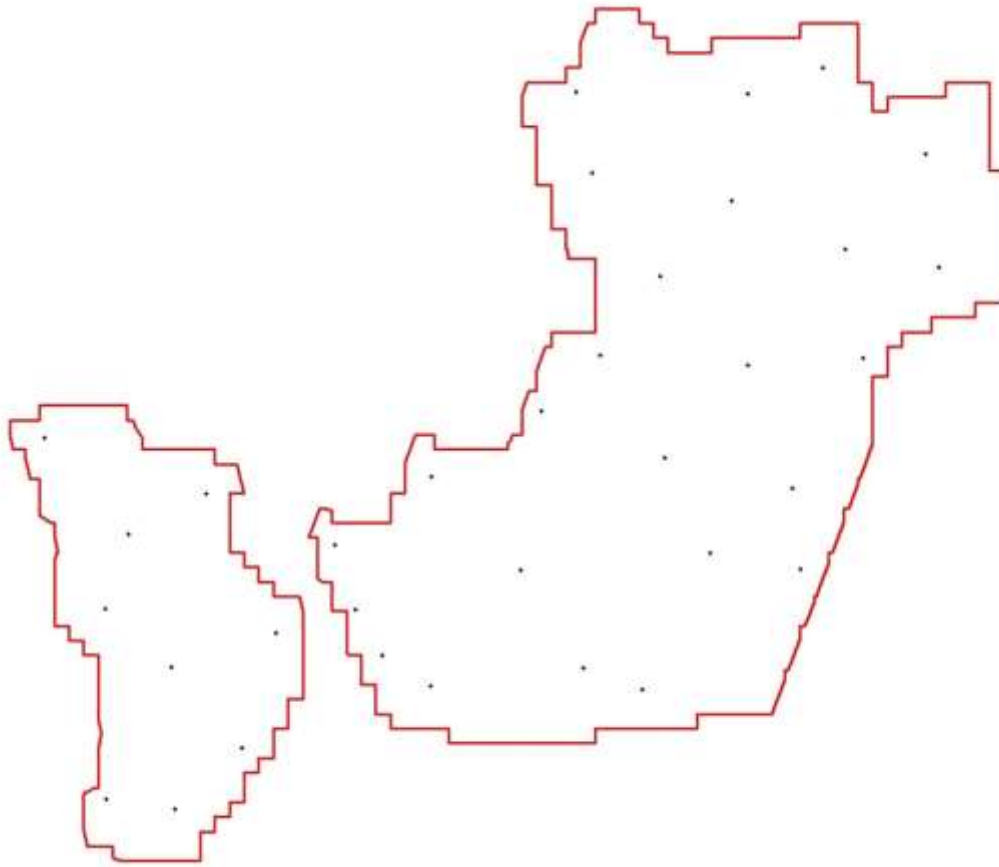
NSSDA and ASPRS require that a minimum of twenty checkpoints (thirty is preferred) are collected for each major land cover category represented in the LiDAR data. Checkpoints should be selected on flat terrain, or on uniformly sloping terrain in all directions from each checkpoint. They should not be 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.

Checkpoint Shapefile or Geodatabase:

Checkpoint Distribution Image?





The following land cover classes are represented in this dataset (uncheck any that do not apply):

- Bare Earth
- Tall Weeds and Crops
- Brush Lands and Low Trees
- Forested Areas Fully Covered by Trees
- Urban Areas with Dense Man-Made Structures

There are a minimum of 20 checkpoints for each land cover class represented. Points within each class are uniformly distributed throughout the dataset. USGS was able to locate independent checkpoints for this analysis. USGS accepts the quality of the checkpoint data for these LiDAR datasets.

Errors, Anomalies, Other Issues to document?  Yes  No

Image?

	A	B	C	D	E	F	G	H	I	J
1	X	Y	ATTR_1	ATTR_2	Contractor Elevation	X	Y	Elev_Z	NGTOC Elevation	
2	420186.467	4903813.145	QC1	GRASS	7.017	4903813.15	420186.467	7.017	70.176	
3	424515.888	4890254.328	QC2	GRASS	9.769	4890254.33	424515.888	9.769	97.705	
4	424940.489	4875746.338	QC3	PACKED GRAV	5.546	4875746.34	424940.489	5.546	55.496	
5	467739.959	4940648.326	QC4	GRASS	8.786	4940648.33	467739.959	8.786	87.789	
6	501964.294	4942597.278	QC5	GRASS	8.473	4942597.28	501964.294	8.473	84.681	
7	493731.658	4932884.132	QC6	GRASS	1.040	4932884.13	493731.658	1.040	104.006	
8	474714.767	4930118.181	QC7	GRASS	1.468	4930118.18	474714.767	1.468	146.749	
9	495506.088	4921822.142	QC8	GRASS	4.861	4921822.14	495506.088	4.861	48.497	
10	462534.362	4916402.877	QC9	GRASS	1.418	4916402.88	462534.362	1.418	141.763	
11	475165.554	4911619.984	QC10	PACKED GRAV	1.035	4911619.98	475165.554	1.035	103.457	
12	489155.98	4900203.644	QC11	GRASS	1.284	4900203.64	489155.98	1.284	128.255	
13	451234.654	4909724.739	QC12	GRASS	7.791	4909724.74	451234.654	7.791	77.775	

Contractor elevations for check-points are off by one decimal point in some instances. In others, the decimal point is off by two. Therefore, a simple calculation can not be applied to the Contractor Elevations column and arriving at the proper values. It would appear, therefore, the QC points have an inherent error associated with the contractor elevation values. Examples are highlighted.

The correct values have been interpreted in a spreadsheet and have been applied to compute FVA values.

\*\*Corrected by contractor.

Accuracy values are reported in terms of Fundamental Vertical Accuracy (FVA), Supplemental Vertical Accuracy(s) (SVA), and Consolidated Vertical Accuracy (CVA).

Accuracy values are reported in:

Required FVA Value is  centimeters or less.  
 Target SVA Value is  centimeters or less.  
 Required CVA Value is  centimeters or less.

The reported FVA of the LAS Swath data is  centimeters.

The reported FVA of the Bare-Earth DEM data is  centimeters.  
 SVA are required for each land cover type present in the data set with the exception of bare-earth. SVA is calculated and reported as a 95th Percentile Error.

Land Cover Type	SVA Value	Units
Tall Weeds and Crops	<input type="text" value="1"/>	N/A
Brush Lands and Low Trees	<input type="text" value="1"/>	N/A
Forested Areas Fully Covered by Trees	<input type="text" value="1"/>	N/A
Urban Areas with Dense Man-Made Structu...	<input type="text" value="1"/>	N/A

The reported CVA of this data set is:  centimeters.

## LAS Swath File Review

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. The following was determined for LAS swath data for this project:

### LAS Version

- LAS 1.2     
  LAS1.3     
  LAS 1.4

### Swath File Characteristics

- Separate folder for LAS swath files  
 Each swath files <= 2GB  
 \*If specified, \*.wdp files for full waveform have been provided

The reported FVA of the LAS swath data is 17.0 centimeters.

Based on this review, the USGS accepts the LAS swath file data.

Errors, Anomalies, Other Issues to document?  Yes  No

Image?

Table

PointCloudStats\_RawSwath

FID	Shape	ID	FName	SRS	FileSrcID	GlobalFnc	ProjGSD	Version	SystemID
0	Polygon	1	S1C1_002.las	WGS 84 / UTM zone 18N	2	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
1	Polygon	2	S1C1_003.las	WGS 84 / UTM zone 18N	3	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
2	Polygon	3	S1C1_004.las	WGS 84 / UTM zone 18N	4	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
3	Polygon	4	S1C1_005.las	WGS 84 / UTM zone 18N	5	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
4	Polygon	5	S1C1_006.las	WGS 84 / UTM zone 18N	6	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
5	Polygon	6	S1C1_007.las	WGS 84 / UTM zone 18N	7	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
6	Polygon	7	S1C1_008.las	WGS 84 / UTM zone 18N	8	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
7	Polygon	8	S1C1_009.las	WGS 84 / UTM zone 18N	9	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
8	Polygon	9	S1C1_010.las	WGS 84 / UTM zone 18N	10	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
9	Polygon	10	S1C1_011.las	WGS 84 / UTM zone 18N	11	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
10	Polygon	11	S1C1_012.las	WGS 84 / UTM zone 18N	12	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
11	Polygon	12	S1C1_013.las	WGS 84 / UTM zone 18N	13	1	{00000000-0000-0000-0000-000000000000}	1.2	ALTM System (c) Optech
12	Polygon	13	S1C1_014_a.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
13	Polygon	14	S1C1_014_b.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
14	Polygon	15	S1C1_015_a.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
15	Polygon	16	S1C1_015_b.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
16	Polygon	17	S1C1_003_a.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
17	Polygon	18	S1C1_003_b.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
18	Polygon	19	S1C1_004_a.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
19	Polygon	20	S1C1_004_b.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
20	Polygon	21	S1C1_005_a.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
21	Polygon	22	S1C1_005_b.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
22	Polygon	23	S1C1_006_a.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
23	Polygon	24	S1C1_006_b.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
24	Polygon	25	S1C1_007_a.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
25	Polygon	26	S1C1_007_b.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
26	Polygon	27	S1C1_008_a.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
27	Polygon	28	S1C1_008_b.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
28	Polygon	29	S1C1_009_a.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
29	Polygon	30	S1C1_009_b.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10
30	Polygon	31	S1C1_010_a.las	Unknown Coordinate System	0	0	{00000000-0000-0000-0000-000000000000}	1.2	NARS10

Some Swath files have an unknown coordinate system, others are WGS84/UTM 19N; Classified LAS, however, is in NAD83/UTM 19N. Other Swath files delivered with this project not within the project boundary; those files prefix begins with LDR120430\_...

\*\*Corrected by contractor

## LAS Tile File Review

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. The following was determined for classified LAS files for this project:

### Classified LAS Tile File Characteristics

- Separate folder for Classified LAS tile files
- 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
- Classified LAS tile files have no points classified as '12'

- Point classifications are limited to the standard values listed below:

Code	Description
1	Processed, but unclassified
2	Bare-earth ground
7	Noise (low or high, manually identified, if needed)
9	Water
10	Ignored ground (breakline proximity)
11	Withheld (if the "Withheld" bit is not implemented in processing software)

- Buy up?

Based on this review, the USGS accepts the classified LAS tile file data.

Errors, Anomalies, Other Issues to document?  Yes  No

None.

## Breakline File Review

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

### Breakline File Characteristics

- Separate folder for breakline files
- All breaklines captured as PolylineZ or PolygonZ features
- No missing or misplaced breaklines

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

Errors, Anomalies, Other Issues to document?  Yes  No

None.

## Bare-Earth DEM Tile File Review

The derived bare-earth DEM file receives a review of the vertical accuracies provided by the data supplier, vertical accuracies calculated by USGS using supplied and independent checkpoints, and a manual check of the appearance of the DEM layer.

Bare-Earth DEM files provided in the following format: ArcGrid

### Bare-Earth DEM Tile File Characteristics

- Separate folder for bare-earth DEM files
- DEM files conform to Project Tiling Scheme
- Quantity of DEM files conforms to Project Tiling Scheme
- DEM files do not overlap
- DEM files are uniform in size
- DEM files properly edge match
- Independent check points are well distributed

All accuracy values reported in centimeters.

### Reported Accuracies

	<u>Fundamental Vertical Accuracy</u>		
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Land Cover Category	# of Points	@95% Confidence Interval (Accuracy <sub>z</sub> ) Required FVA = <input type="text" value="24.5"/> or less.	Supplemental Vertical Accuracy @95th Percentile Error Target SVA = <input type="text"/> or less.	Consolidated Vertical Accuracy @95th Percentile Error Required CVA = <input type="text"/> or less.
Open Terrain	<input type="text" value="20"/>	<input type="text" value="12.0"/>		
Tall Weeds and Crops	<input type="text"/>		<input type="text"/>	
Brush Lands and Low Trees	<input type="text"/>		<input type="text"/>	
Forested Areas Fully Covered by Trees	<input type="text"/>		<input type="text"/>	
Urban Areas with Dense Man-Made Structures	<input type="text"/>		<input type="text"/>	
Consolidated	<input type="text" value="20"/>			

QA performed Accuracy Calculations?

**Calculated Accuracies**

Land Cover Category	# of Points	Fundamental Vertical Accuracy @95% Confidence Interval (Accuracy <sub>z</sub> ) Required FVA = <input type="text" value="24.5"/> or less.	Supplemental Vertical Accuracy @95th Percentile Error Target SVA = <input type="text"/> or less.	Consolidated Vertical Accuracy @95th Percentile Error Required CVA = <input type="text"/> or less.
Open Terrain	<input type="text" value="20"/>	<input type="text" value="13.1"/>		
Tall Weeds and Crops	<input type="text"/>		<input type="text"/>	
Brush Lands and Low Trees	<input type="text"/>		<input type="text"/>	
Forested Areas Fully Covered by Trees	<input type="text"/>		<input type="text"/>	
Urban Areas with Dense Man-Made Structures	<input type="text"/>		<input type="text"/>	
Consolidated	<input type="text" value="20"/>			<input type="text"/>

Based on this review, the USGS recommends the bare-earth DEM files for inclusion in the 1/3 Arc-Second National Elevation Dataset.

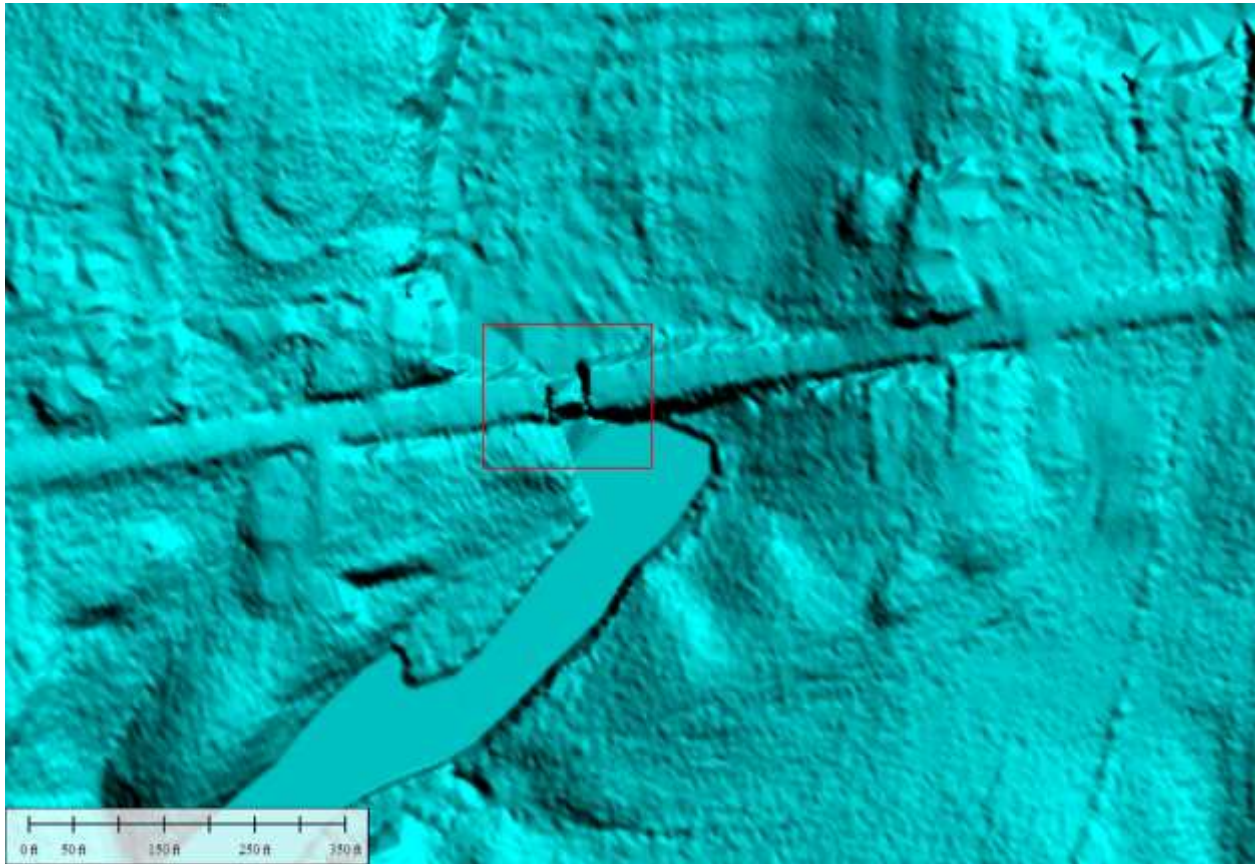


Based on this review, the USGS accepts the bare-earth DEM files.

### Bare-Earth DEM Anomalies, Errors, Other Issues

Errors, Anomalies, Other Issues to document?  Yes  No

Image?

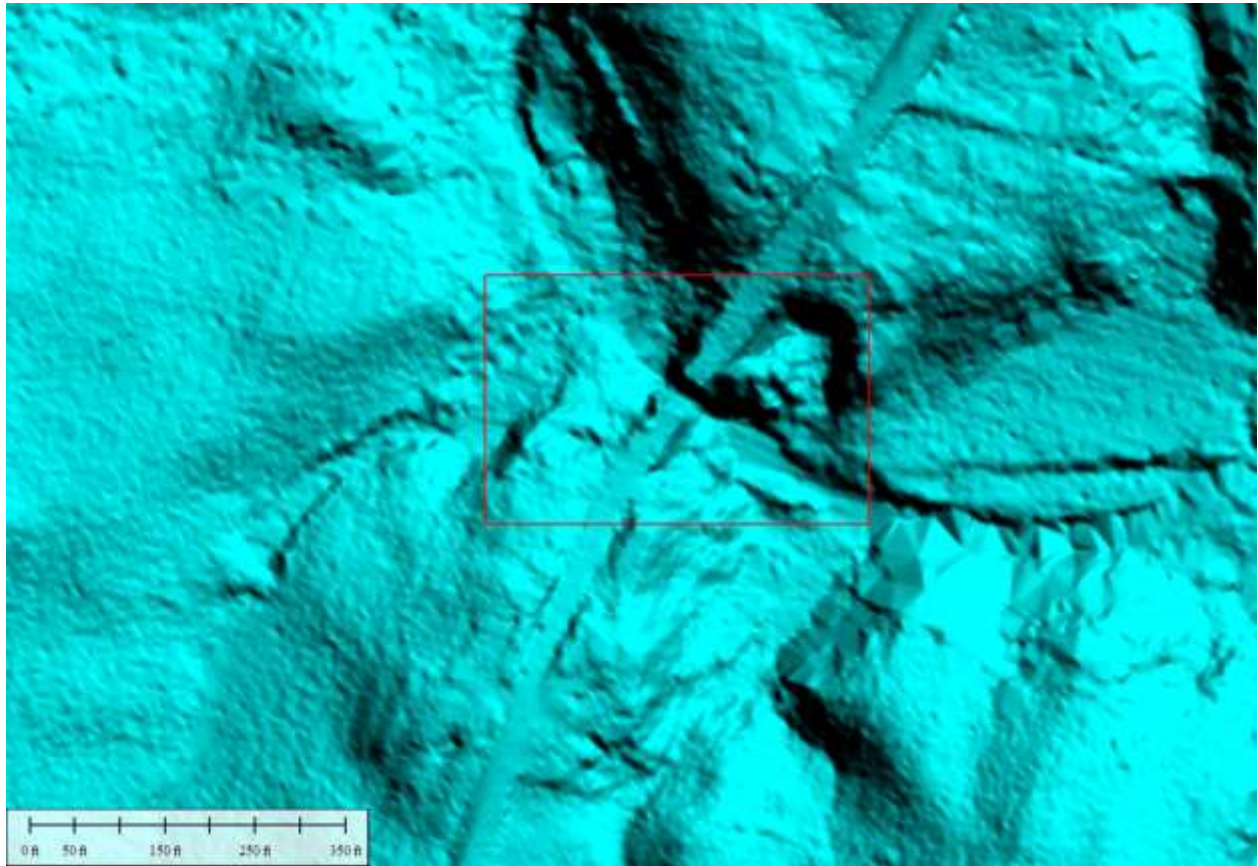


bridge\_1: Roadway identified as a bridge was not removed from the DEM; there is only one of this error-type.

\*\*Corrected by contractor.

Image?

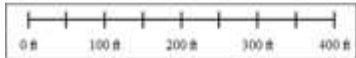
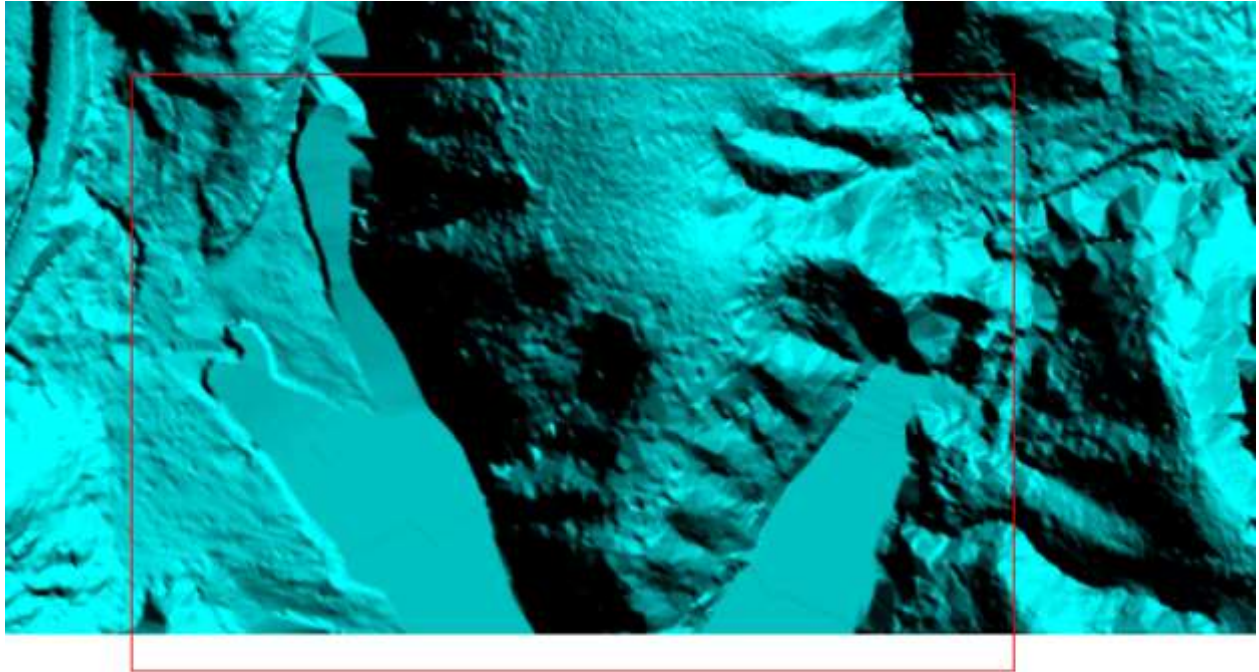




culvert\_1: Imagery suggests roadway above the stream is a culvert; there are three of this error-type.

\*\*All culvert-errors (3@) corrected by contractor.

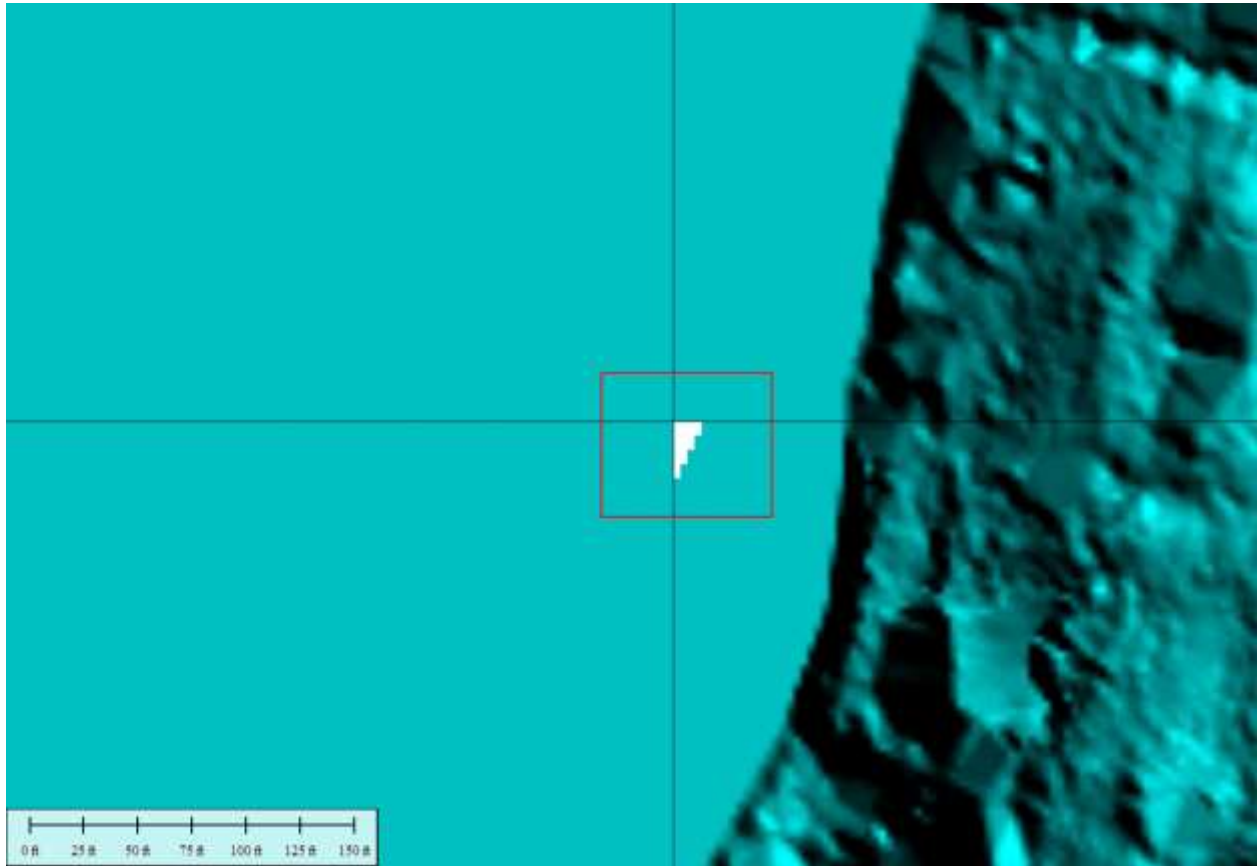
Image?



high\_water\_2: Portions of the waterbody has a surface elevation higher than the shoreline; 15 of this error-type have been identified in the DEM.

\*\*All high-water errors (15@) corrected by contractor.

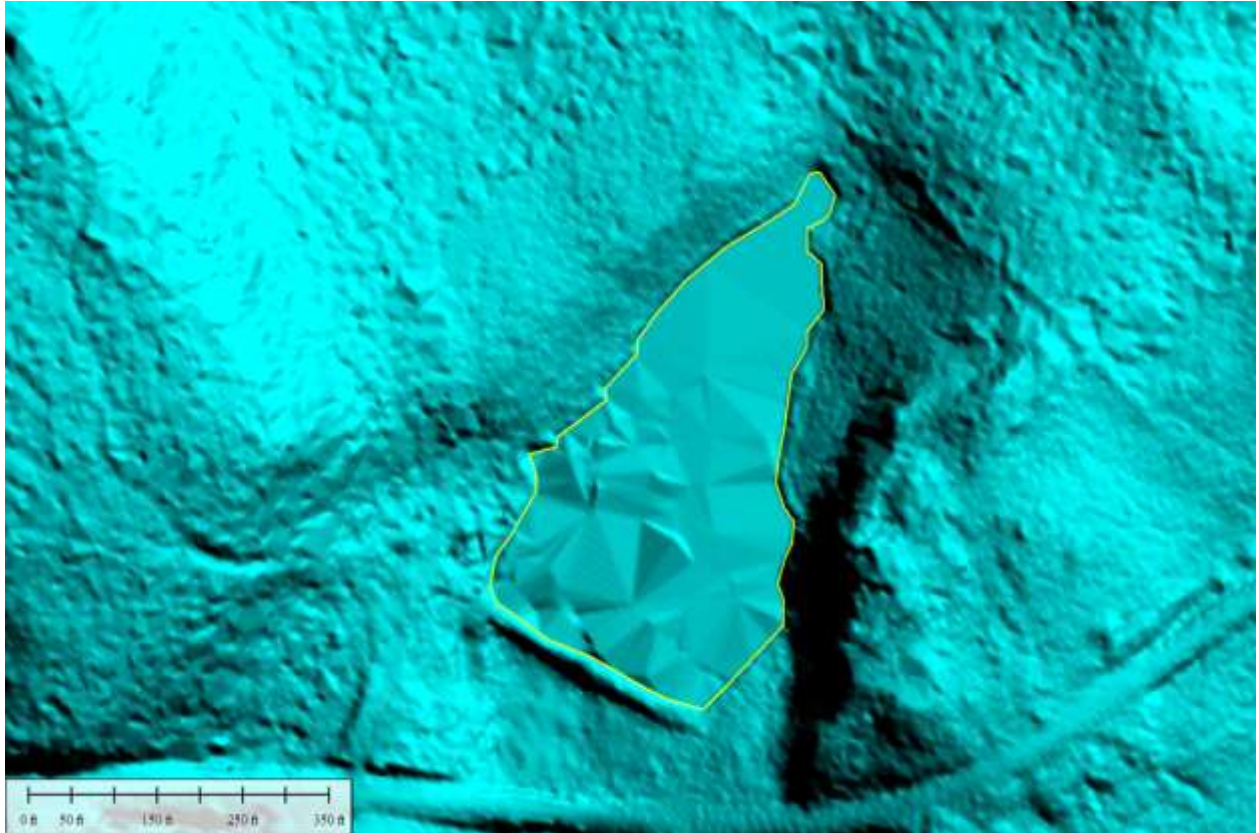
Image?



missing\_data\_1: Data is missing at the intersection of four DEM tiles; there is only one of this error-type.

\*\*Corrected by contractor.

Image?

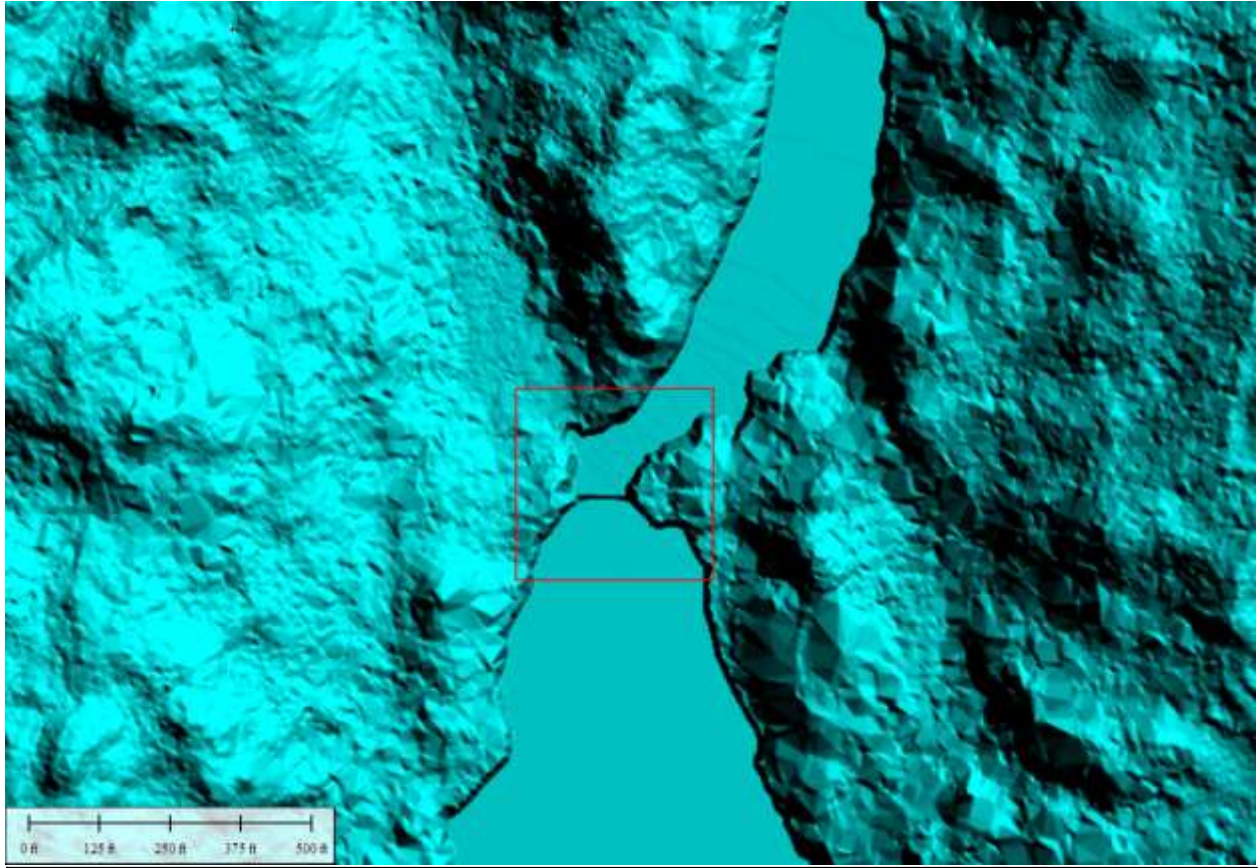


unflattened\_water\_1: This waterbody has not been flattened though breaklines have been provided for it (yellow line); there is only one of this error-type.

\*\*Corrected by contractor.

Image?





water\_2: Waterbody has a break in elevation; possible elevation difference due to rapids. See image below for 'image' detail.

\*\*Corrected by contractor.

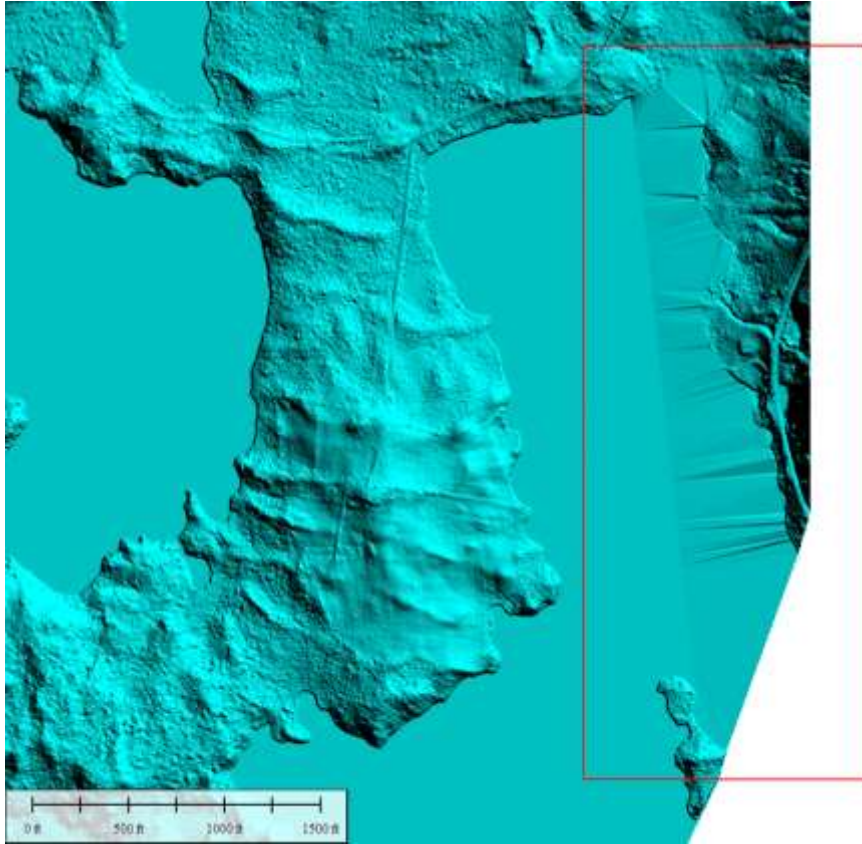
Image?



water\_2\_NAIP: This NAIP image is the same area as the DEM image above. The above DEM image shows a break in waterbody surface elevation.

\*\*Corrected by contractor; see previous image above.

Image?

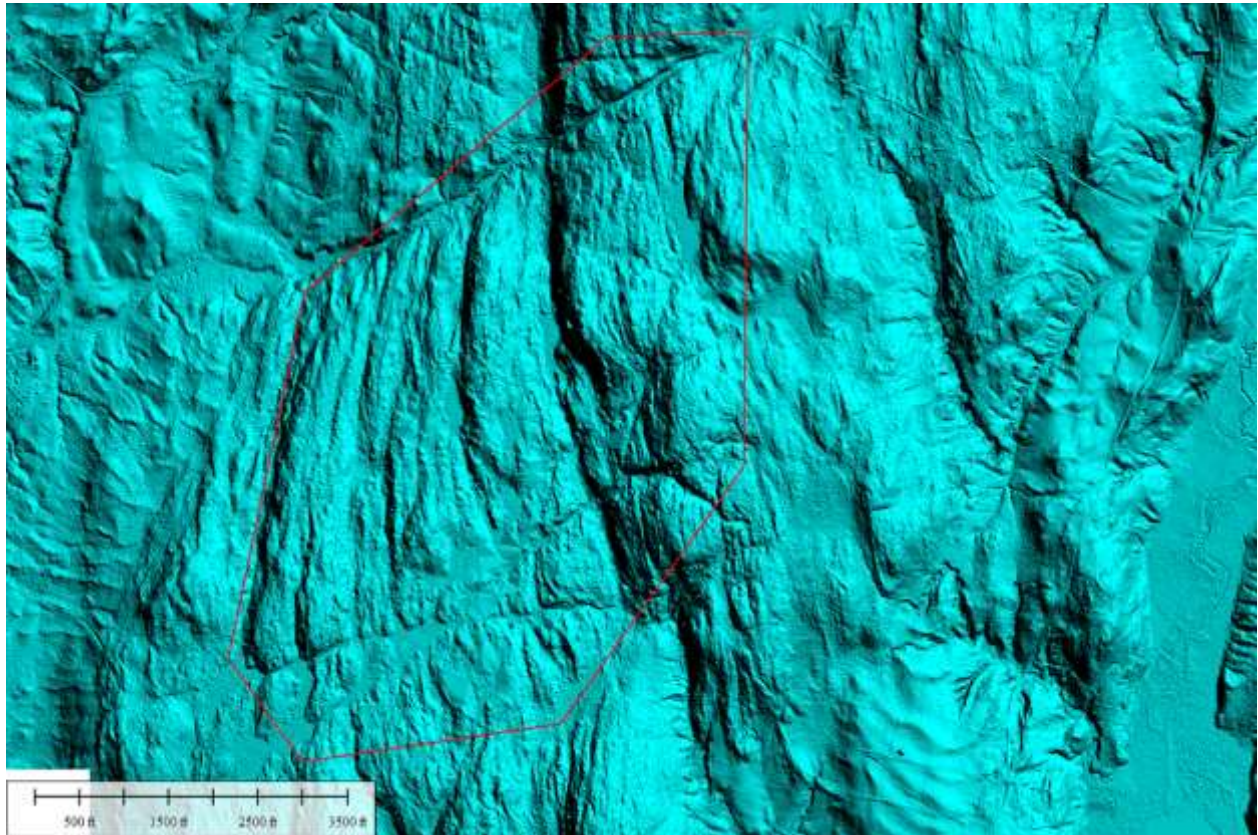


water\_3: This waterbody is not completely hydroflattened; there are three of this error-type.

\*\*Corrected by contractor.

Image?





TIN\_1: The area bounded in the red polygon shows an error that is partially TIN'd.  
This is not an error; this region is just being pointed out.

Internal Note:

Summary of Errors:

- LAS (swath) in different datum (...classified is in NAD83, swath is in WGS84)
- LAS (swath) contains no projection information for some files (...unknown coordinate system)
- No Project-Level metadata provided for project (\*\*corrected)
- Control checkpoints contain error in Contractor Elevation column
- 1 @ bridge not removed over river/stream (\*\*corrected)
- 3 @ roadway removed over culverts (\*\*corrected)
- 15 @ waterbodies with surface elevation above shoreline (\*\*corrected)
- 1 @ missing data (small area) (\*\*corrected)
- 1 @ waterbody not flattened though breaklines provided (\*\*corrected)
- 3 @ areas of waterbodies not flattened (\*\*corrected...but correction created another error)
- 1 @ waterbody with an irregular elevation break (\*\*corrected)

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\*\*None of the errors (see above) have been fixed (10/18/2013)

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\*\*All of the errors were corrected by vendor (12/5/2013)

\*\*Upon fixing some water errors, the contractor classified ground as water in a few areas (on the eastern edge of project), thus affecting the topography. The NGTOC-created footprint removed those areas from the DEM. The Final-to-NED was created from the loaded (new) DEMs with the other, existing DEM tiles.

None of the re-delivered tiles (DEMs) were altered.

\*\*Footprint was created by NGTOC personnel. Footprint (shapefile) was then altered to cut-off bad raster areas (...TIN in some areas).

5/12/2014: Editing team has corrected some errors found in the dataset after acceptance. There was tile mismatch resulting in a void area and raised area in the water feature. Also some water elevations were corrected. A QA of the mosaic dataset was done after the editing was completed. The mosaic was placed in the be\_rasters folder while the old DEMs (original and replacement) were placed in the "Other" folder. The Edited\_Breaklines were also placed in "Other" folder. There are only a couple of lakes edited, so this is not a complete breakline file.

One note of concern for this reviewer is seen in the smaller dataset with the waterway and breaklines beginning at 44° 16' 40.7193" N, 69° 53' 8.0826" W. There is a series of polygon/polyline breaklines. By all accounts, the elevation goes downhill/downstream and there are impoundments along the way. The vendor has created polyline features along the river sections that flow downhill and polygons along the wider sections that maintain a constant elevation. There are two dams located along the waterway in this stretch. Per the specs (v 13 and 1.0) under Inland Ponds and Lakes, "long impoundments such as reservoirs, inlets, and fjords, whose water surface elevations drop when moving downstream, are required to be treated as rivers". There have been varied opinions on the matter and editing did not work in this area except to correct small areas of water elevation errors.

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**This is the end of the report.**

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