



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:

12/3/2012

Project Type: GPSC

Project ID:

VA-MD-WV FEMA-LIDAR-R3Lot5 2012

Project Description:

This task order is for Planning, Acquisition, processing, and derivative products of lidar data to be collected at a nominal pulse spacing (NPS) of 1.0 meters. Specifications listed below are based on the *“U.S. Geological Survey National Geospatial Program Base Lidar Specification, Version 13 (ILMF)”*, of which sections I through IV are incorporated by reference to this task order. This specification may be viewed at [http://lidar.cr.usgs.gov/USGS-NGP Lidar Guidelines and Base Specification v1 \(ILMF\).pdf](http://lidar.cr.usgs.gov/USGS-NGP_Lidar_Guidelines_and_Base_Specification_v1(ILMF).pdf). *These lidar specifications are required baseline specifications. In addition to the requirements listed below, variations from the specifications will be shown and noted below. For any item which is not specifically addressed, the referenced Version 13 specifications will be the required specification authority. This task is for a **high resolution data set of lidar** of approximately 2,815 square miles in portions of Virginia, West Virginia, and Maryland. The location and square miles are outlined in Attachment’s A and B.*
This task order is amended to include ALL of Frederick, Washington, and Allegany County MD, all of Morgan and Jefferson County, WV, and all of Fauquier and Loudoun County, VA at the same

Project Alias(es):

FEMA Region3 VA LiDAR

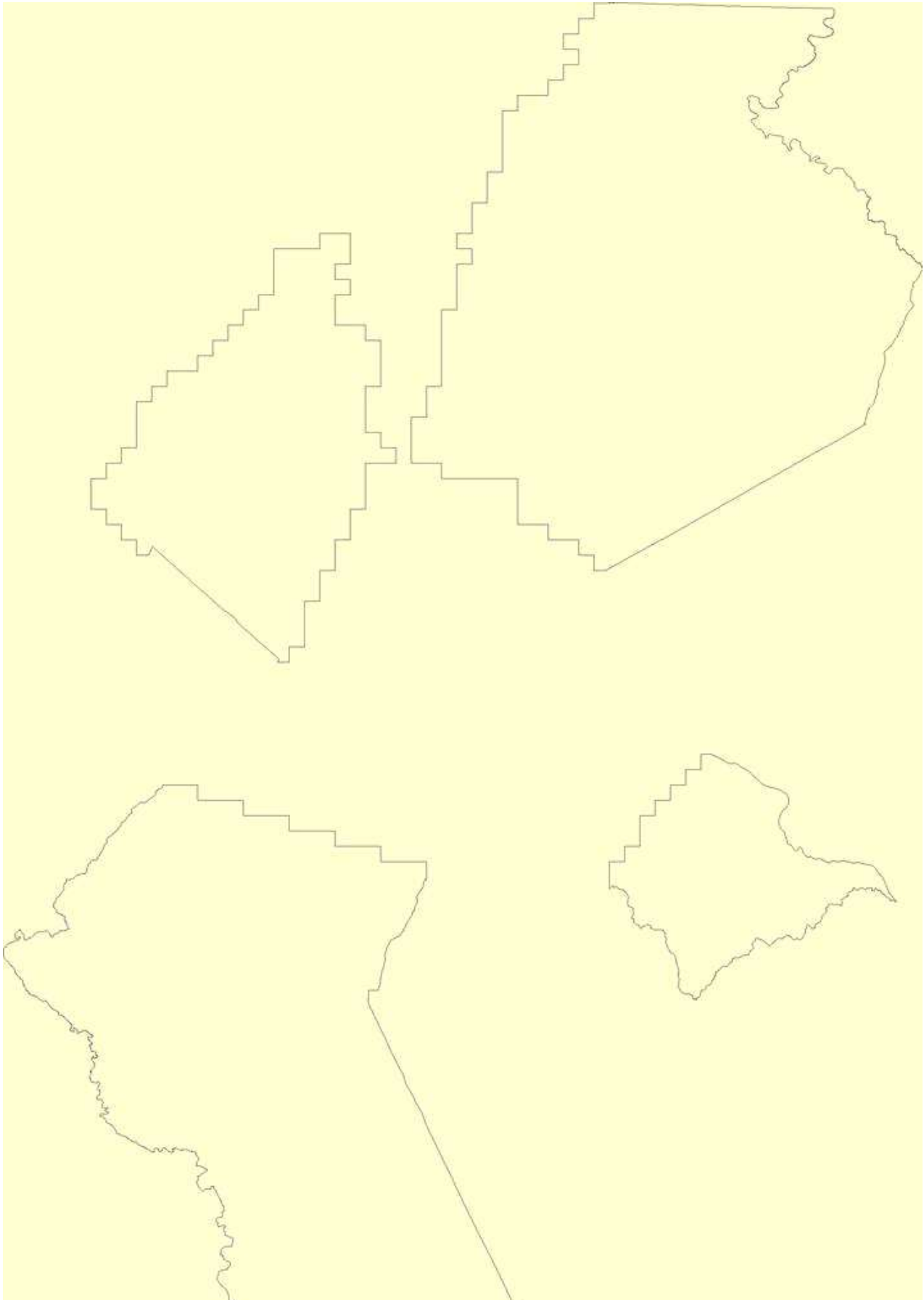
specifications outlined in this task order. This amendment is adding an additional 1,127 sq mi bringing the task order total to 3,942 sq mi. Included in Attachment A, is an updated project diagram.

Year of Collection: 2012

Lot 5 of 5 lots.

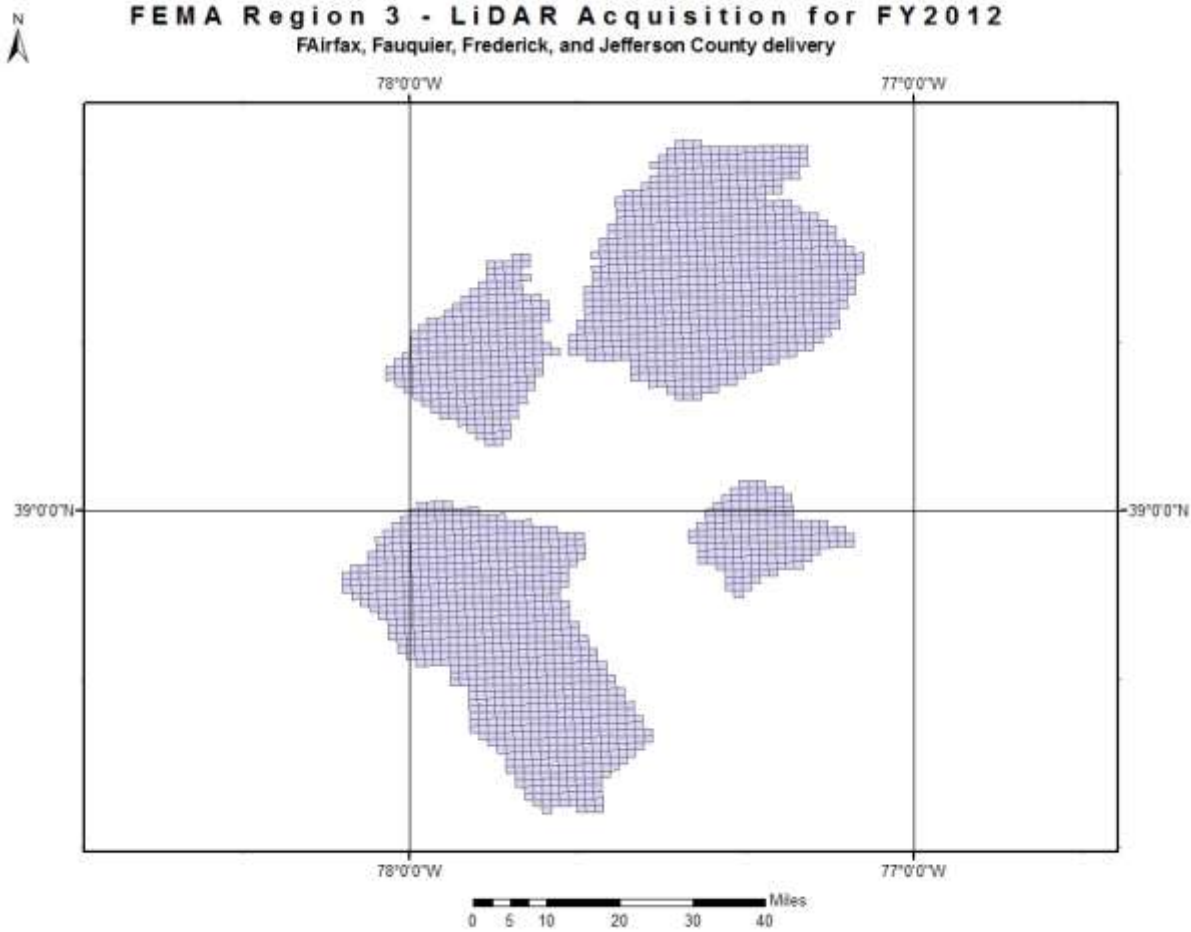
Project Extent:

Project Extent image?



Project Tiling Scheme:

Project Tiling Scheme image?



Contractor:

Dewberry

Applicable Specification:

V13

Licensing Restrictions:

none

Third Party Performed QA?

Project Points of Contact:

POC Name	Type	Primary Phone	E-Mail
Pat Emmett	CPT	573-308-3587	pemmett@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.

- Collection Report
- Survey Report
- Processing Report
- QA/QC Report
- Control and Calibration Points
- Project Shapefile/Geodatabase
- Project Tiling Scheme Shapefile/Gdb
- Control Point Shapefile/Gdb
- Breakline Shapefile/Gdb
- 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?	680
<input checked="" type="checkbox"/> Intensity Image Files <input checked="" type="checkbox"/> Required?	2150
<input checked="" type="checkbox"/> Tiled LAS Files <input checked="" type="checkbox"/> Required? <input checked="" type="checkbox"/> XML Metadata?	2150
<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?	2150

Additional Deliverables

Errors, Anomalies, Other Issues to document? Yes No

None.

Project Geographic Information

Areal Extent:

1730

Sq Mi

Grid Size:

1.0

meters

Tile Size:

1500x1500

meters

Nominal Pulse Spacing:

0.5

meters

Vertical Datum: [Select...](#)

Horizontal Datum: [Select...](#)

Project Projection/Coordinate Reference System: meters.

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

- | | |
|---|--|
| <input checked="" 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 checked="" 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 |

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:

H. Boggs

Review Start Date:

12/13/2012

Action to Contractor Date	Issue Description	Return Date
1/10/2013	Multiple corrections requested	2/8/2013
2/21/2013	Requested corrections and re-delivery of swath las and classified las files. Please see "LAS Swath File Review" and "LAS Tile File Review" sections below for details.	2/26/2013

Review Complete: 2/28/2013

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.

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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?

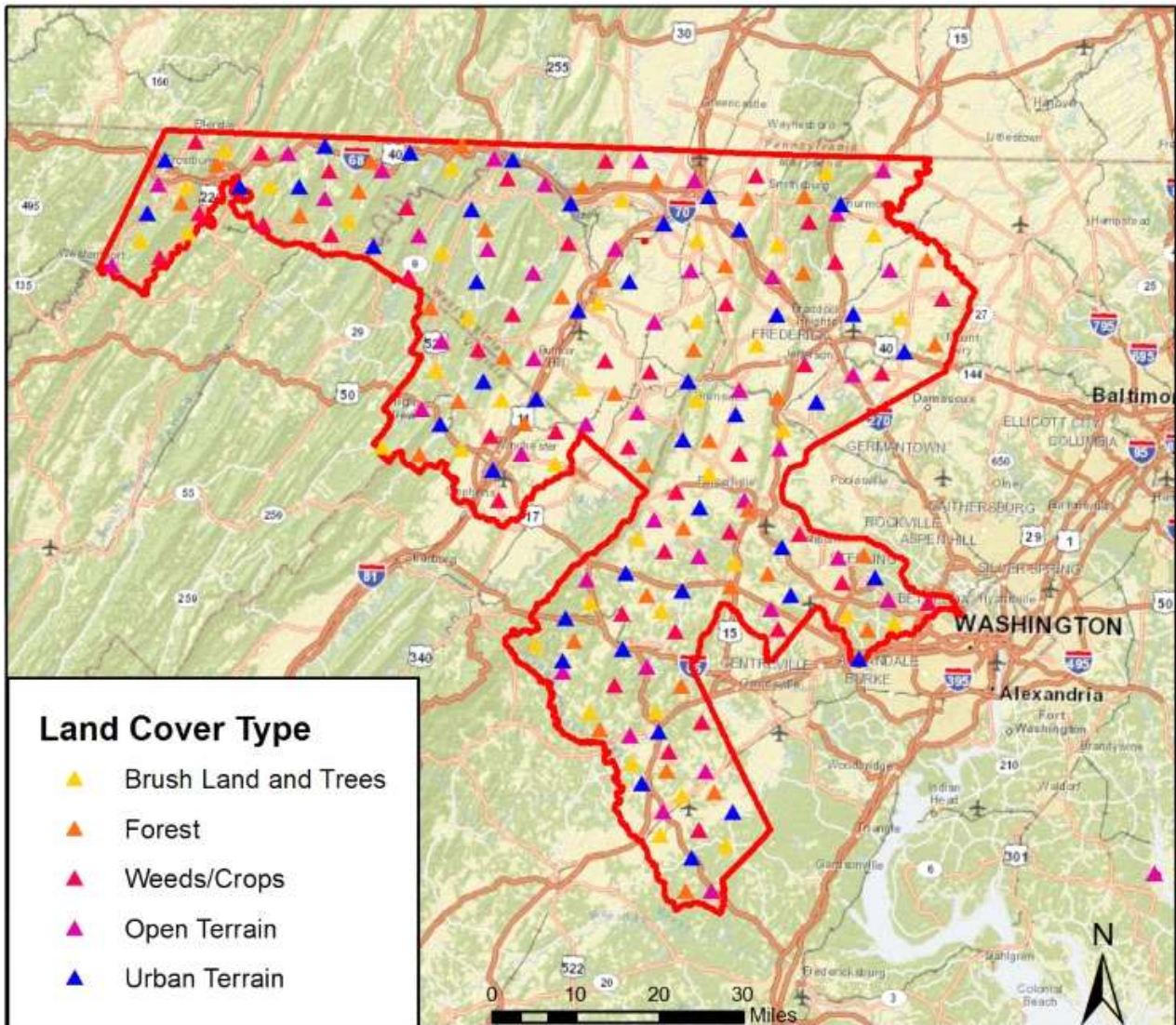


Figure 2 – Checkpoint Map shows that checkpoints are well distributed throughout project area.

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?

Vertical accuracy testing and reporting was performed on the entire FEMA Region 3 project area which includes multiple previous lots (lots 1-5).

Image?

Page 8 of Task Order G10PC00013 details vertical accuracy testing and reporting requirements. It is required that FVA be tested and reported for the raw swath las data and derived bare earth DEMs, while SVA and CVA are required to be tested and reported only for derived DEMs. The Project Report submitted by Dewberry includes FVA, SVA and CVA testing and reporting for classified las data which is not required.

Image?

The LIDAR data was also tested by Geodigital to 0.1207 m vertical accuracy at the 95% confidence level based on consolidated RMSEz when compared to 100 GPS static checkpoints.

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 or less.

Target SVA Value is or less.

Required CVA Value is or less.

The reported FVA of the LAS Swath data is .

The reported FVA of the Bare-Earth DEM data is .

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="0.26"/>	<input type="text" value="meters"/>
Brush Lands and Low Trees	<input type="text" value="0.26"/>	<input type="text" value="meters"/>
Forested Areas Fully Covered by Trees	<input type="text" value="0.21"/>	<input type="text" value="meters"/>
Urban Areas with Dense Man-Made Structu...	<input type="text" value="0.16"/>	<input type="text" value="meters"/>

The reported CVA of this data set is: .

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 .

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

Errors, Anomalies, Other Issues to document? Yes No

Image?

	FName	SRS
1	001_S1C1_o112070a_17001.las	NAD83 / UTM zone 18N
2	001_S1C1_o112070b_17031.las	NAD83 / UTM zone 18N
3	001_S1C1_o112071b_17131.las	NAD83 / UTM zone 18N
4	001_S1C1_o112072b_17251.las	NAD83 / UTM zone 18N
5	001_S1C1_o112082a_18201.las	NAD83 / UTM zone 18N
6	001_S1C1_o112083a_18301.las	NAD83 / UTM zone 18N
7	001_S1C1_o112086a_18601.las	NAD83 / UTM zone 18N
8	001_S1C1_o112092a_19201.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
9	001_S1C1_o112093a_19301.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
0	001_S1C1_o112093b_19331.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
1	001_S1C1_o112093c_19361.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
2	001_S1C1_o112094a_19401.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
3	001_S1C1_o112094b_19431.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
4	001_S1C1_o112094c_19441.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
5	001_S1C1_o112095a_19501.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
6	001_S1C1_o112095b_19531.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
7	001_S1C1_o112096a_19601.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
8	001_S1C1_o112101a_10101.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
9	001_S1C1_o112103a_10301.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
0	001_S1C1_o112103b_10331.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
1	001_S1C1_o112104a_10401.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
2	001_S1C1_o112104b_10431.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
3	001_S1C1_o112105a_10501.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
4	001_S1C1_o212094a_29401.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
5	001_S1C1_o212095a_29501.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
6	001_S1C1_o212096a_29601.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
7	001_S1C1_o212096b_29631.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
8	002_S1C1_o112070a_17002.las	NAD83 / UTM zone 18N
9	002_S1C1_o112070b_17032.las	NAD83 / UTM zone 18N
0	002_S1C1_o112071a_17102.las	NAD83 / UTM zone 18N
1	002_S1C1_o112071b_17132.las	NAD83 / UTM zone 18N
2	002_S1C1_o112072b_17252.las	NAD83 / UTM zone 18N
3	002_S1C1_o112082a_18202.las	NAD83 / UTM zone 18N
4	002_S1C1_o112083a_18302.las	NAD83 / UTM zone 18N
5	002_S1C1_o112086a_18602.las	NAD83 / UTM zone 18N
6	002_S1C1_o112092a_19202.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
7	002_S1C1_o112092a_19202_edit.las	NAD83(NSRS2007) / UTM zone 18N, NAVD
8	002_S1C1_o112093a_19302.las	NAD83(NSRS2007) / UTM zone 18N, NAVD

Projection information contained in swath las headers is inconsistent. This does not meet task order requirements and must be re-delivered. Corrections delivered 2/8/13, however, reviewer unable to load in ArcMap or in standalone LP360. Please see image at end of LAS Swath File Review section of report. Telecon on 2/26/13, discussed downgrade of LP360 responsible for error, all swath las files accepted 2/28/13.

Image?

	FID	Shape	ID	FName	FileSrcID	GlobalEnc	
	72	Polygo	73	003_S1C1_o112094d_19463.las	19463	0	{000000
	73	Polygo	74	003_S1C1_o112095a_19503.las	19503	0	{000000
	74	Polygo	75	003_S1C1_o112095b_19533.las	19533	0	{000000
	75	Polygo	76	003_S1C1_o112096a_19603.las	19603	0	{000000
	76	Polygo	77	003_S1C1_o112096b_19633.las	19633	1	{000000
	77	Polygo	78	003_S1C1_o112097a_19703_Part1.LAS	19703	1	{000000
	78	Polygo	79	003_S1C1_o112097a_19703_Part2.LAS	19703	1	{000000
	79	Polygo	80	003_S1C1_o112097b_19733_Part1.LAS	19733	1	{000000
	80	Polygo	81	003_S1C1_o112097b_19733_Part2.LAS	19733	1	{000000
	81	Polygo	82	003_S1C1_o112101a_10103.las	10103	1	{000000
	82	Polygo	83	003_S1C1_o112103a_10303.las	10303	1	{000000
	83	Polygo	84	003_S1C1_o112103b_10333.las	10333	1	{000000
	84	Polygo	85	003_S1C1_o112104a_10403.las	10403	1	{000000
	85	Polygo	86	003_S1C1_o112104b_10433.las	10433	1	{000000
	86	Polygo	87	003_S1C1_o112105a_10503.las	10503	1	{000000
	87	Polygo	88	003_S1C1_o212094a_29403.las	29403	0	{000000
	88	Polygo	89	003_S1C1_o212095a_29503.las	29503	0	{000000
	89	Polygo	90	003_S1C1_o212097b_29733_Part1.LAS	29733	0	{000000
	90	Polygo	91	003_S1C1_o212097b_29733_Part2.LAS	29733	0	{000000
	91	Polygo	92	004_S1C1_o112070a_17004.las	17004	0	{000000
	92	Polygo	93	004_S1C1_o112070b_17034.las	17034	0	{000000
	93	Polygo	94	004_S1C1_o112071b_17134.las	17134	1	{000000
	94	Polygo	95	004_S1C1_o112072b_17254.las	17254	0	{000000
	95	Polygo	96	004_S1C1_o112073a_17304.las	17304	1	{000000
	96	Polygo	97	004_S1C1_o112082a_18204.las	18204	0	{000000
	97	Polygo	98	004_S1C1_o112083a_18304.las	18304	0	{000000
	98	Polygo	99	004_S1C1_o112086a_18604.las	18604	1	{000000
	99	Polygo	10	004_S1C1_o112092a_19204.las	19204	0	{000000
	100	Polygo	10	004_S1C1_o112093a_19304.las	19304	0	{000000
	101	Polygo	10	004_S1C1_o112093b_19334.las	19334	0	{000000
	102	Polygo	10	004_S1C1_o112093c_19364.las	19364	0	{000000
	103	Polygo	10	004_S1C1_o112094a_19404.las	19404	0	{000000
	104	Polygo	10	004_S1C1_o112094b_19434.las	19434	0	{000000
	105	Polygo	10	004_S1C1_o112094c_19444.las	19444	0	{000000
	106	Polygo	10	004_S1C1_o112094d_19464.las	19464	0	{000000
	107	Polygo	10	004_S1C1_o112095a_19504.las	19504	0	{000000
	108	Polygo	10	004_S1C1_o112095b_19534.las	19534	0	{000000
	109	Polygo	11	004_S1C1_o112096a_19604.las	19604	0	{000000
	110	Polygo	11	004_S1C1_o112096b_19634.las	19634	1	{000000
	111	Polygo	11	004_S1C1_o112097a_19704_Part1.LAS	19704	1	{000000
	112	Polygo	11	004_S1C1_o112097a_19704_Part2.LAS	19704	1	{000000
	113	Polygo	11	004_S1C1_o112097b_19734_Part1.LAS	19734	1	{000000
	114	Polygo	11	004_S1C1_o112097b_19734_Part2.LAS	19734	1	{000000
	115	Polygo	11	004_S1C1_o112098a_19804_Part1.LAS	19804	1	{000000

Task order references USGS Base Spec v13 which requires each swath file be assigned a unique file source ID. Reviewer realizes that the highlighted files above have been split from long swaths (greater than 2GB) into smaller swath files. The resulting swath files that are smaller than 2 GB must also be assigned unique file source IDs to meet task order requirements. Pat Emmett notified reviewer on 2/21/13 that he had previously agreed to same ID for swath containing different parts. Will be accepted as-is, no corrections required.

Image?

FileSrcID	FileSrcID	PSCnt	PSCnt_429	PSCnt_0	PSCnt_265	PSCnt_416	PSCnt_6675	PSCnt_1674	PSCnt_1700	R
10432	1	1	0	0	0	0	0	0	0	0
10433	1	1	0	0	0	0	0	0	0	0
10434	1	1	0	0	0	0	0	0	0	0
10435	1	1	0	0	0	0	0	0	0	0
10501	1	1	0	0	0	0	0	0	0	0
10502	1	1	0	0	0	0	0	0	0	0
10503	1	1	0	0	0	0	0	0	0	0
10504	1	1	0	0	0	0	0	0	0	0
10505	1	1	0	0	0	0	0	0	0	0
17001	1	7	1844115	1843971	1844112	1856662	1844259	1856805	1844303	
17002	1	7	867003	866862	0	0	0	873049	867113	
17003	0	7	9464154	9464154	0	0	0	9528683	9464399	
17004	0	7	9503694	9503553	0	0	0	9568493	9503918	
17005	0	0	0	0	0	0	0	0	0	
17006	0	7	10655292	1065515	0	0	0	10727925	10655437	
17031	1	7	955638	949323	0	0	0	955781	0	
17032	1	7	700602	0	700455	0	0	705365	0	
17033	1	7	574091	0	570171	0	0	574092	0	
17034	0	7	10322778	0	0	0	0	10393001	0	
17035	0	7	5408366	0	5371818	0	0	5408509	0	
17035	0	7	5371965	0	0	5371821	0	5408509	0	
17036	0	7	5295969	0	0	0	0	5331996	0	
17036	0	7	5295969	0	0	0	0	5331996	0	
17102	1	7	705	0	0	0	0	705	592	0
17103	1	7	74446	0	0	0	0	74589	0	
17131	1	7	64827	65267	64680	0	0	65267	0	
17132	1	7	1435014	1444775	1434867	0	0	1444775	0	
17133	1	7	1159536	1167426	0	0	0	1167569	0	
17134	1	7	405963	0	403218	0	0	405964	0	
17135	0	7	10367846	0	0	0	0	10367972	0	
17136	0	7	5865094	0	5825460	0	0	5865237	0	
17136	0	7	5865094	0	0	0	0	5865237	0	
17251	1	7	1488666	1498650	0	0	0	1498711	0	
17252	1	7	1029735	1036742	0	0	0	1036885	0	
17253	0	7	2776923	0	0	0	0	2776924	0	
17254	0	7	3584739	0	3584592	0	0	3609031	0	
17255	0	7	2748900	2749044	0	0	0	2767745	0	
17303	1	7	4198758	4198617	0	0	0	4227469	0	
17304	1	7	3865510	3865365	0	0	0	3891808	0	
17305	0	7	3691475	3691464	0	0	0	3716723	0	
18201	1	7	765458	0	0	0	0	0	0	
18202	0	7	4079323	0	0	0	0	0	0	
18203	0	7	3619043	0	3594565	0	0	0	0	
18204	0	7	4197141	0	0	0	0	0	0	
18205	0	7	4844823	0	0	0	0	0	0	
18301	1	7	502152	0	0	0	0	0	0	
18302	1	7	2470920	0	0	0	0	0	0	

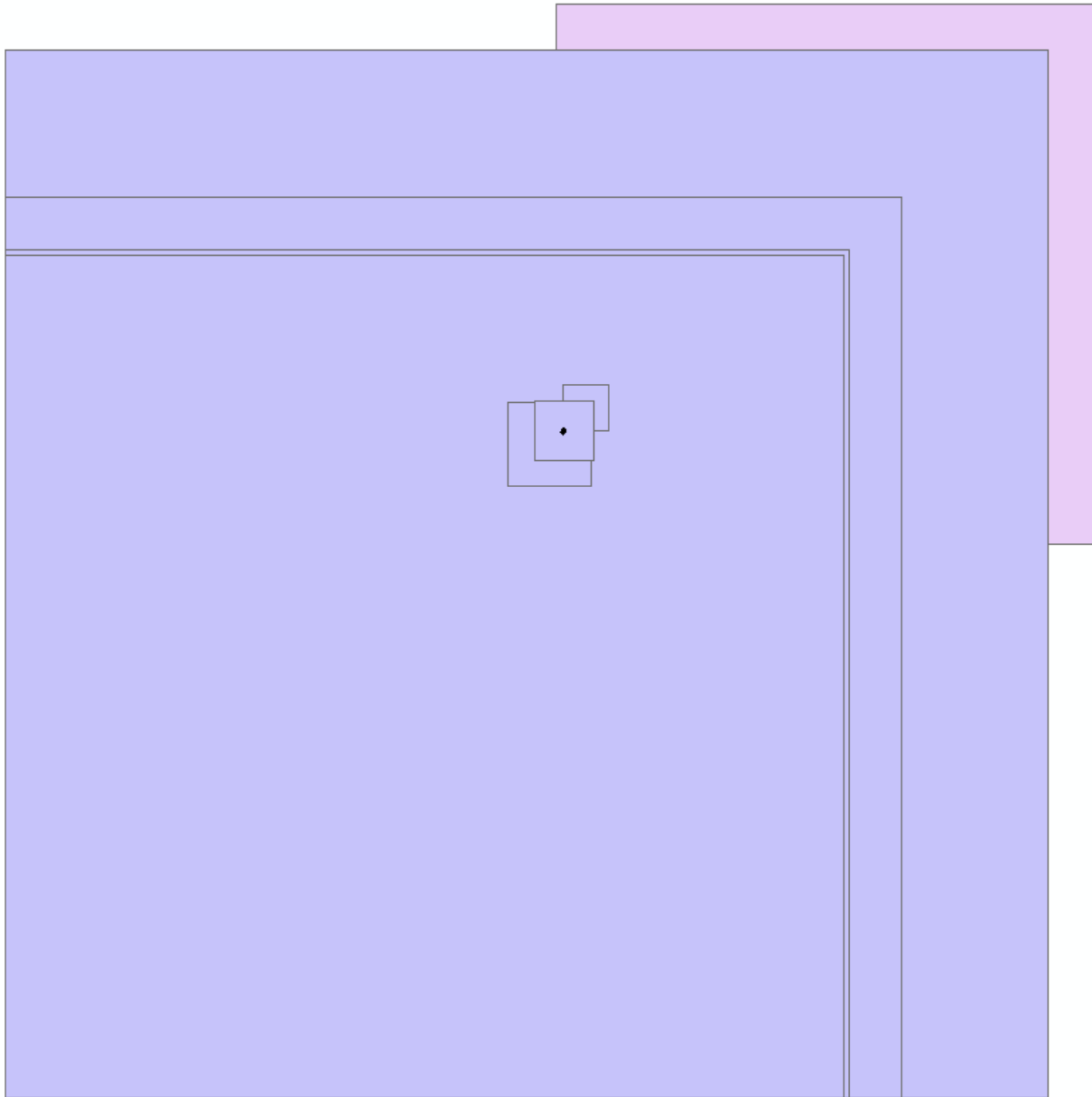
Task order references USGS Base Spec v13 which requires the Point Source ID field for each point within each swath file be set equal to the File Source ID prior to any processing of the data. Corrections delivered 2/8/13, however, reviewer unable to load in ArcMap or in standalone LP360. Please see image at end of LAS Swath File Review section of report. Telecon on 2/26/13, discussed downgrade of LP360 responsible for error, all swath las files accepted 2/28/13.

Image?

RNCnt_0	RNCnt_1	RNCnt_2	RNCnt_3	RNCnt_4
1900724	9503918	9503842	0	95683
0	0	0	0	
2131058	2131058	0	1065544	10723
2854028	70	1898677	1	9550
2106277	1401155	0	0	14050
1714475	1710591	0	0	5740
3096790	2071576	1032263	0	10390
1078032	5372056	4	1074378	10780
1615215	5371861	39	1074379	54080
5295826	1062806	0	0	53310
0	1588783	5295836	8	10660
2203	60	733	8	
148529	38	74119	74097	1480
194627	64916	9	129550	650
2879642	2869977	1	1435015	14440
2327104	81	2319219	0	23260
1212470	806543	0	0	8090
4126148	1029789	0	0	10360
1751615	1165095	5825608	0	58650
1751601	5825589	41	6	58650
2987377	2977131	11	1488520	29870
2006400	2050567	6	4	40360

USGS Base Spec v13 requires multiple discrete returns per pulse. Header information contained in swath las files delivered to reviewer at NGTOC shows millions of returns for return number zero. Corrections delivered 2/8/13, however, reviewer unable to load in ArcMap or in standalone LP360. Please see image at end of LAS Swath File Review section of report. Telecon on 2/26/13, discussed downgrade of LP360 responsible for error, all swath las files accepted 2/28/13.

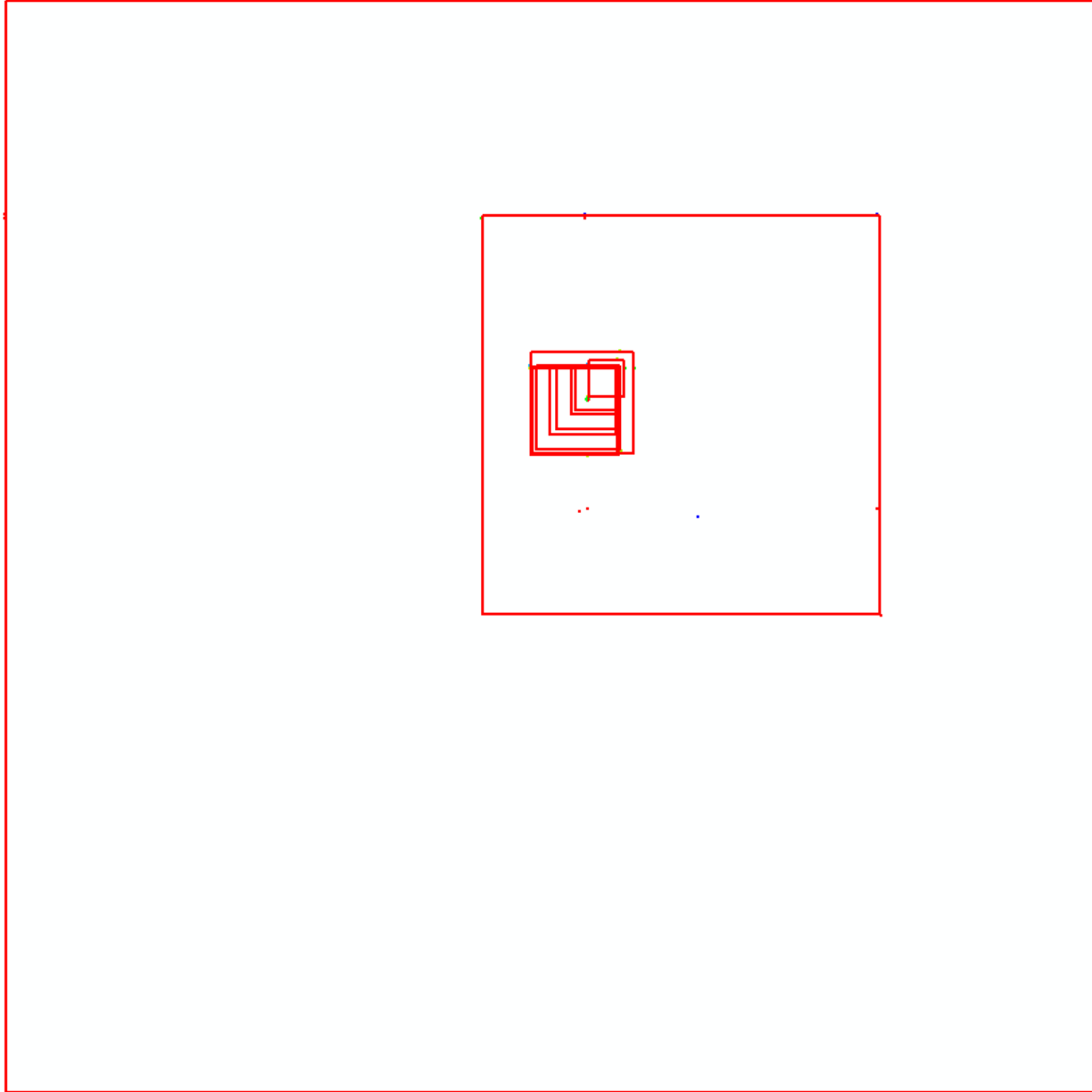
Image?



Extents of swath las files do not match extent of project boundary shapefile (shown above as black dot in center of swath file extents). Corrections delivered 2/8/13, however, reviewer unable to load in ArcMap or in standalone LP360. Please see

image at end of LAS Swath File Review section of report. Telecon on 2/26/13, discussed downgrade of LP360 responsible for error, all swath las files accepted 2/28/13.

Image?



When loaded into LP360 or ArcMap, the swath las points do not appear in the display area. The bounding boxes defining the extent of the swath las files does appear. Corrections delivered 2/8/13, however, reviewer unable to load in ArcMap or in standalone LP360. Please see image at end of LAS Swath File Review section of report. Telecon on 2/26/13, discussed downgrade of LP360 responsible for error, all swath las files accepted 2/28/13.

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

- Image?

The following classified las tiles contain points classified as 12:

18STH3597.las
18STJ3415.las
18STJ3517.las
18STJ2805.las
18STJ4642.las
18STJ8575.las
18STJ9250.las
18STJ6409.las

18STJ8262.las

18STJ8996.las

Page eight of Contract Number G10PC00013 requires that data processing and handling meet requirements specified in the USGS Base Spec v13, Section II. Number 12 on Page 6 of the USGS Base Spec v13 explicitly prohibits the use of class 12. These classified las tiles are not acceptable at this time and require corrections. Corrections delivered 2/8/13, however, reviewer unable to load in ArcMap or in standalone LP360. Please see image at end of LAS Tile File Review section of report. Telecon on 2/26/13, discussed downgrade of LP360 responsible for error, all classified las files accepted 2/28/13.

Image?

Page 11 of the "Project Report for the Fauquier, Fairfax, Frederick, and Jefferson County Acquisition and Classification for FEMA Region 3 FY 12 VA Lidar" reports the classification scheme as 1, 2, 7, 9, 10, and 11 however the following classified las tiles contain points classified as 15:

18STJ8995.las

18STJ9192.las

18STH5872.las

18STH6184.las

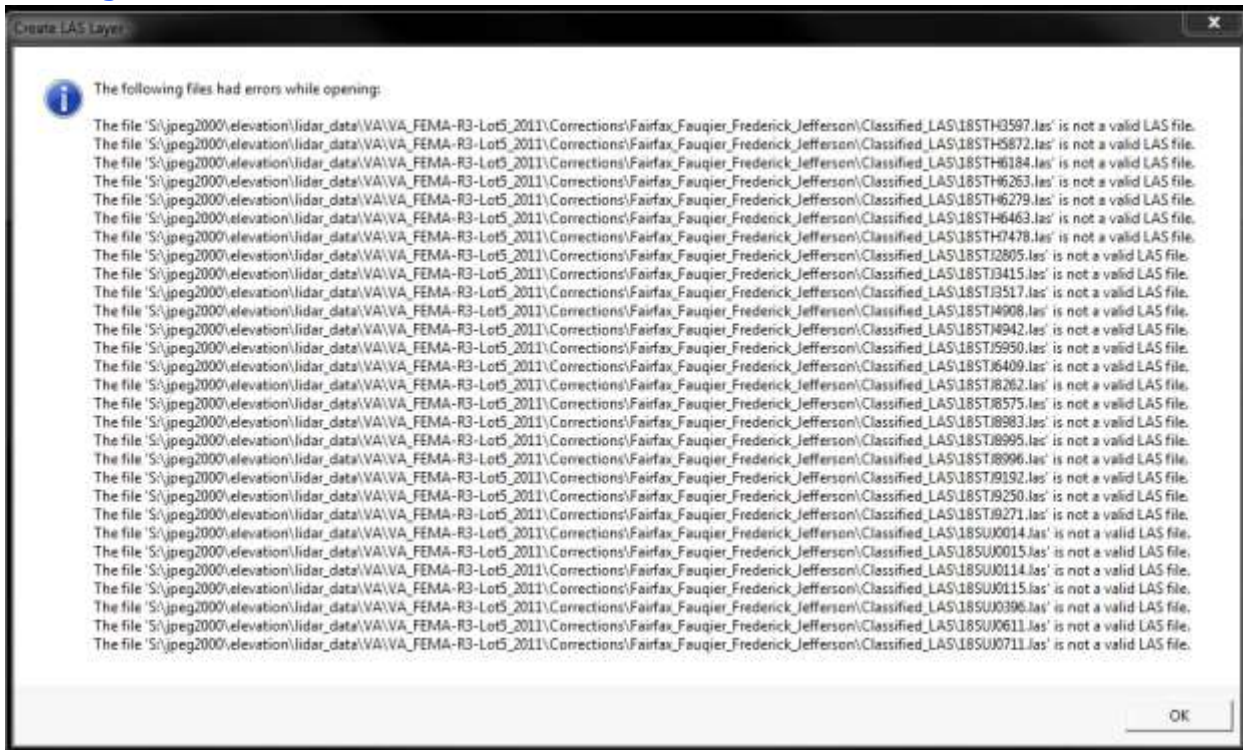
Corrections delivered 2/8/13, however, reviewer unable to load in ArcMap or in standalone LP360. Please see image at end of LAS Tile File Review section of report. Telecon on 2/26/13, discussed downgrade of LP360 responsible for error, all classified las files accepted 2/28/13.

Image?

Classified las tiles 18STH7478.las and 18STJ8983.las were not able to pyramid in LP360. The following error message was displayed, "File to pyramid is too small based on header". Both tiles must be corrected and redelivered. Corrections delivered 2/8/13, however, reviewer unable to load in ArcMap or in standalone LP360. Please see image at end of LAS Tile File Review section of report. Telecon on 2/26/13, discussed downgrade of LP360 responsible for error, all classified las

files accepted 2/28/13.

Image?



Corrections delivered 2/8/13, however, reviewer unable to load any delivered LAS Tile Files (Classified LAS) into either ArcMap or standalone LP360. Corrections required, please re-deliver. Telecon on 2/26/13, discussed downgrade of LP360 responsible for error, all classified las files accepted 2/28/13.

Breakline File Review

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

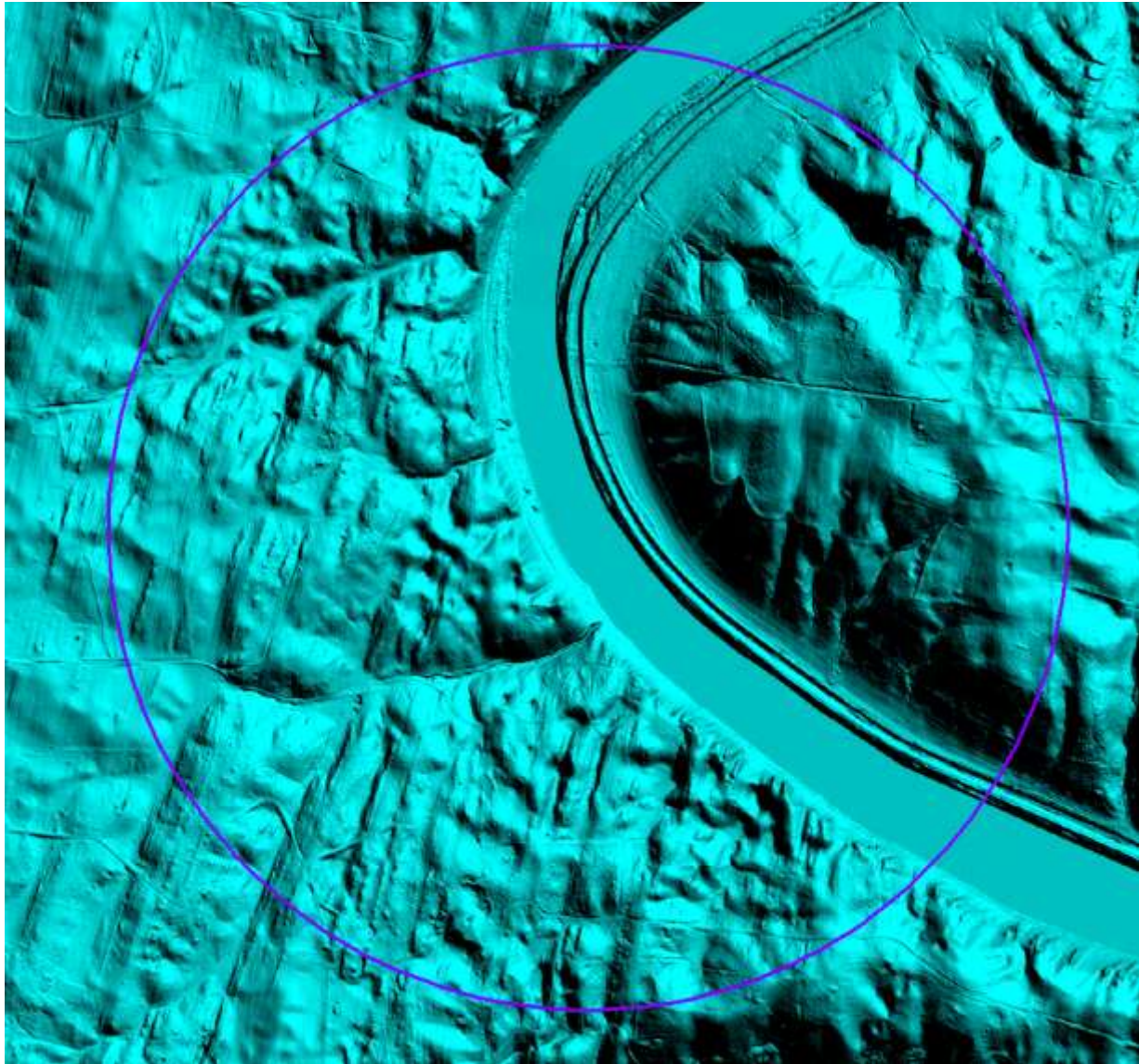
Breakline File Characteristics

- 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.

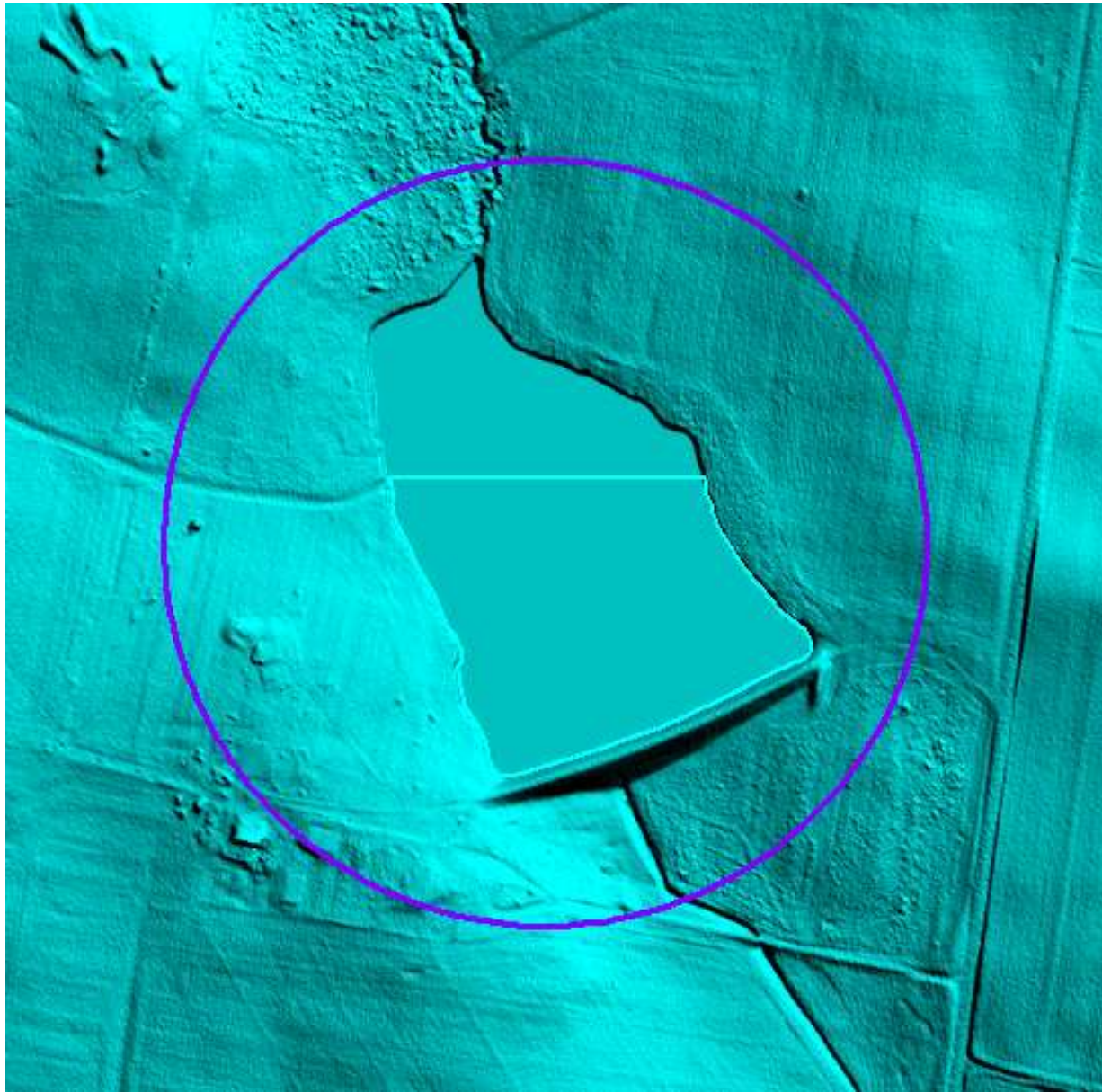
Errors, Anomalies, Other Issues to document? Yes No

Image for error?



No breaklines delivered to reviewer at NGTOC for this water feature which has been correctly hydroflattened. This is acceptable as the DEM requirements were adhered to. This anomaly is documented in a shapefile created by the reviewer at the NGTOC documenting the geographic locations of errors and anomalies identified during DEM review named DEM_errors.shp. Corrections received 2/8/13, accepted 2/28/13..

Image for error?



Misplaced breakline, however, feature has been correctly hydroflattened. This is acceptable as the DEM requirements were adhered to. This anomaly is documented in a shapefile created by the reviewer at the NGTOC documenting the geographic locations of errors and anomalies identified during DEM review named DEM_errors.shp. Corrections received 2/8/13, accepted 2/28/13.

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:

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 .

Reported Accuracies

Land Cover Category	# of Points	Fundamental Vertical Accuracy @95% Confidence Interval (Accuracy _z) Required FVA = <input type="text" value="0.245"/> or less.	Supplemental Vertical Accuracy @95th Percentile Error Target SVA = <input type="text" value="0.363"/> or less.	Consolidated Vertical Accuracy @95th Percentile Error Required CVA = <input type="text" value="0.363"/> or less.
Open Terrain	<input type="text" value="42"/>	<input type="text" value="0.19"/>		
Tall Weeds and Crops	<input type="text" value="40"/>		<input type="text" value="0.26"/>	
Brush Lands and Low Trees	<input type="text" value="41"/>		<input type="text" value="0.26"/>	
Forested Areas Fully Covered by Trees	<input type="text" value="41"/>		<input type="text" value="0.21"/>	
Urban Areas with Dense Man-Made Structures	<input type="text" value="42"/>		<input type="text" value="0.16"/>	
Consolidated	<input type="text" value="206"/>			<input type="text" value="0.23"/>

- QA performed Accuracy Calculations?

Calculated Accuracies

Land Cover Category	# of Points	Fundamental Vertical Accuracy @95% Confidence Interval (Accuracy _z) Required FVA = <input type="text" value="0.245"/> or less.	Supplemental Vertical Accuracy @95th Percentile Error Target SVA = <input type="text" value="0.363"/> or less.	Consolidated Vertical Accuracy @95th Percentile Error Required CVA = <input type="text" value="0.363"/> or less.

Open Terrain	42	0.19		
Tall Weeds and Crops	41		0.25	
Brush Lands and Low Trees	40		0.26	
Forested Areas Fully Covered by Trees	41		0.20	
Urban Areas with Dense Man-Made Structures	42		0.15	
Consolidated	206			0.23

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.

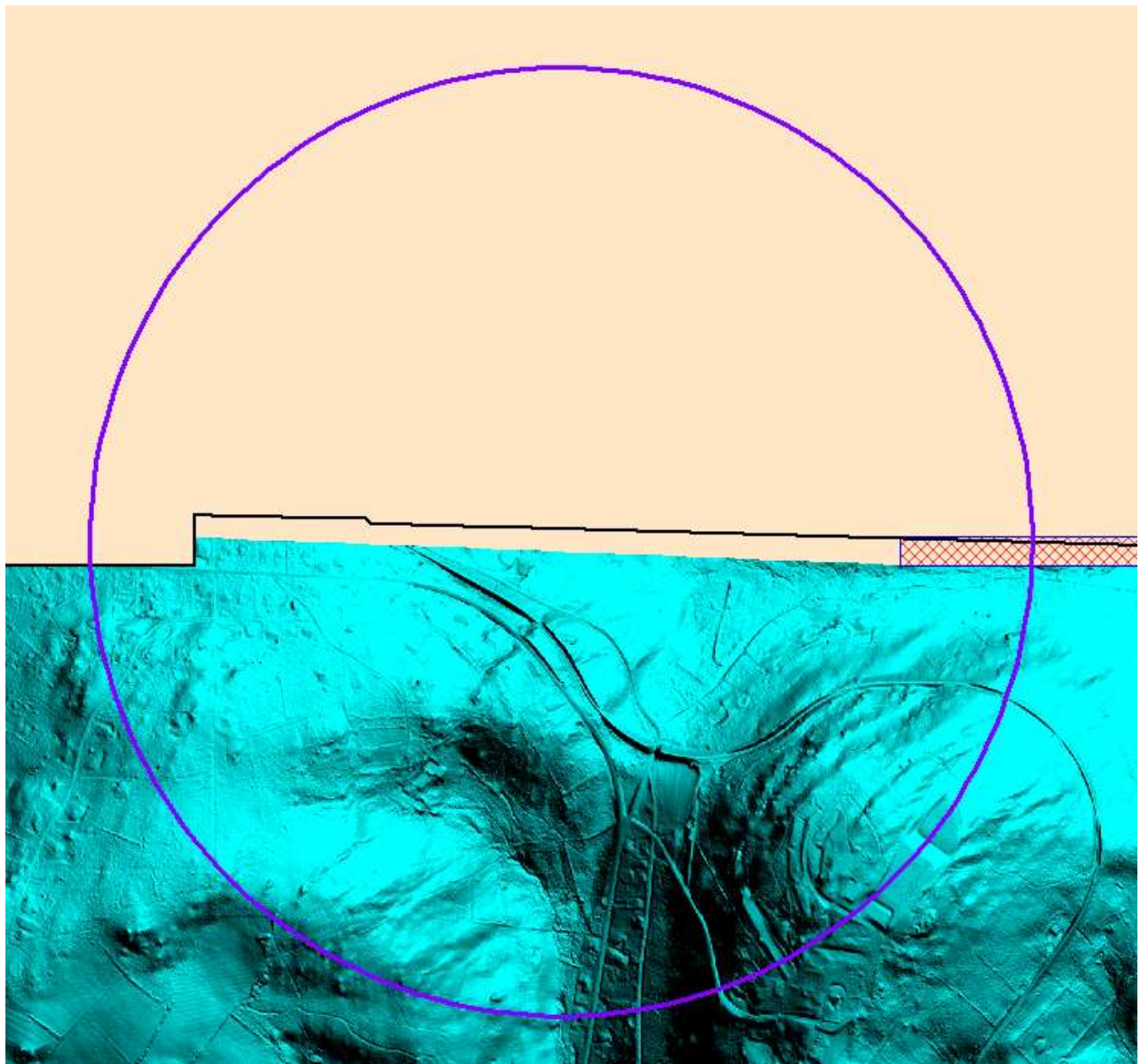
Bare-Earth DEM Anomalies, Errors, Other Issues

Errors, Anomalies, Other Issues to document? Yes No

Image?

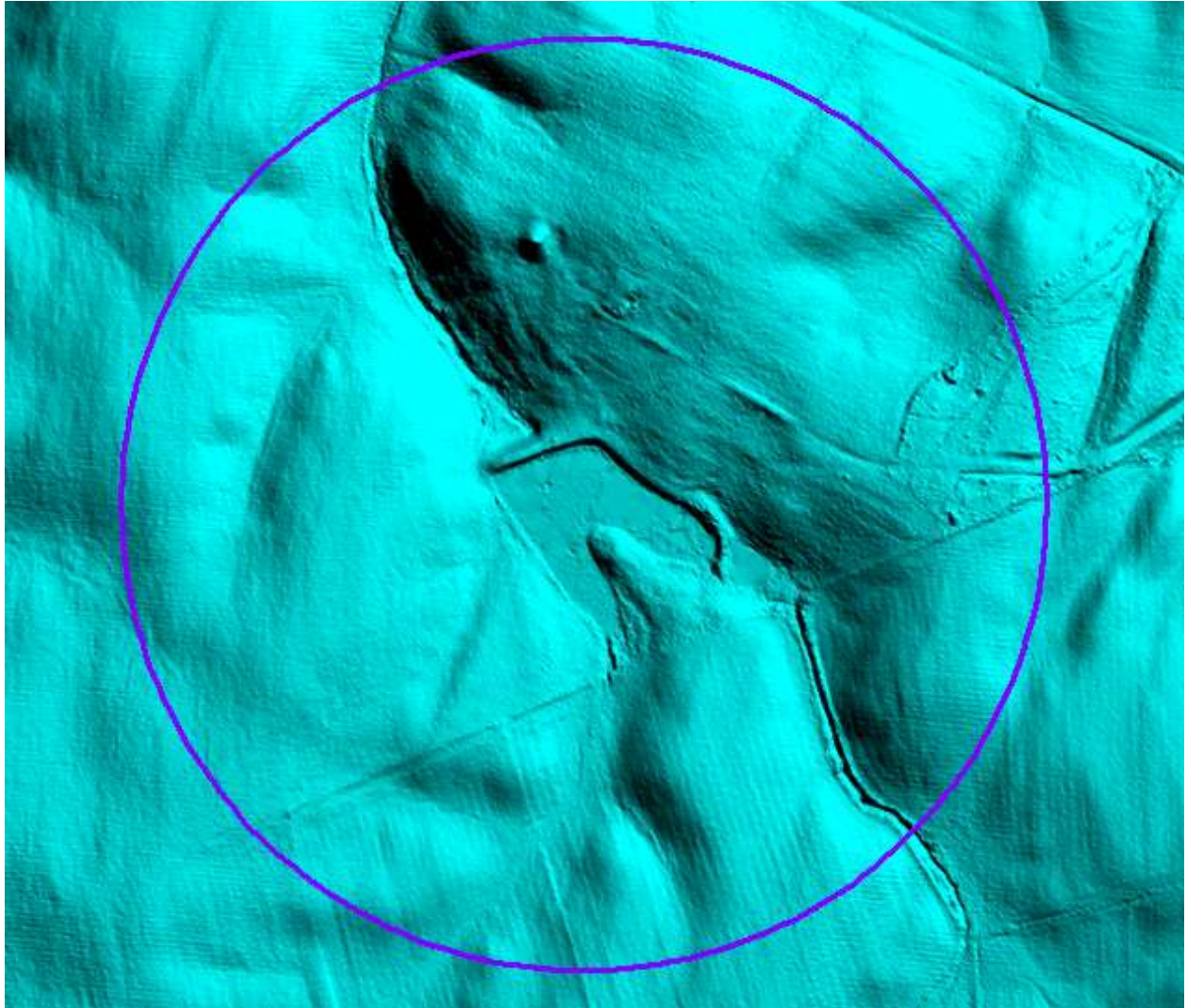
It is important to note that the reviewer performed accuracy calculations on the ENTIRE FEMA R3 PROJECT AREA. The numbers reported in the blue box above pertain to the ENTIRE FEMA R3 PROJECT AREA. THE ENTIRE FEMA R3 PROJECT AREA MEETS VERTICAL ACCURACY TESTING REQUIREMENTS.

Image?



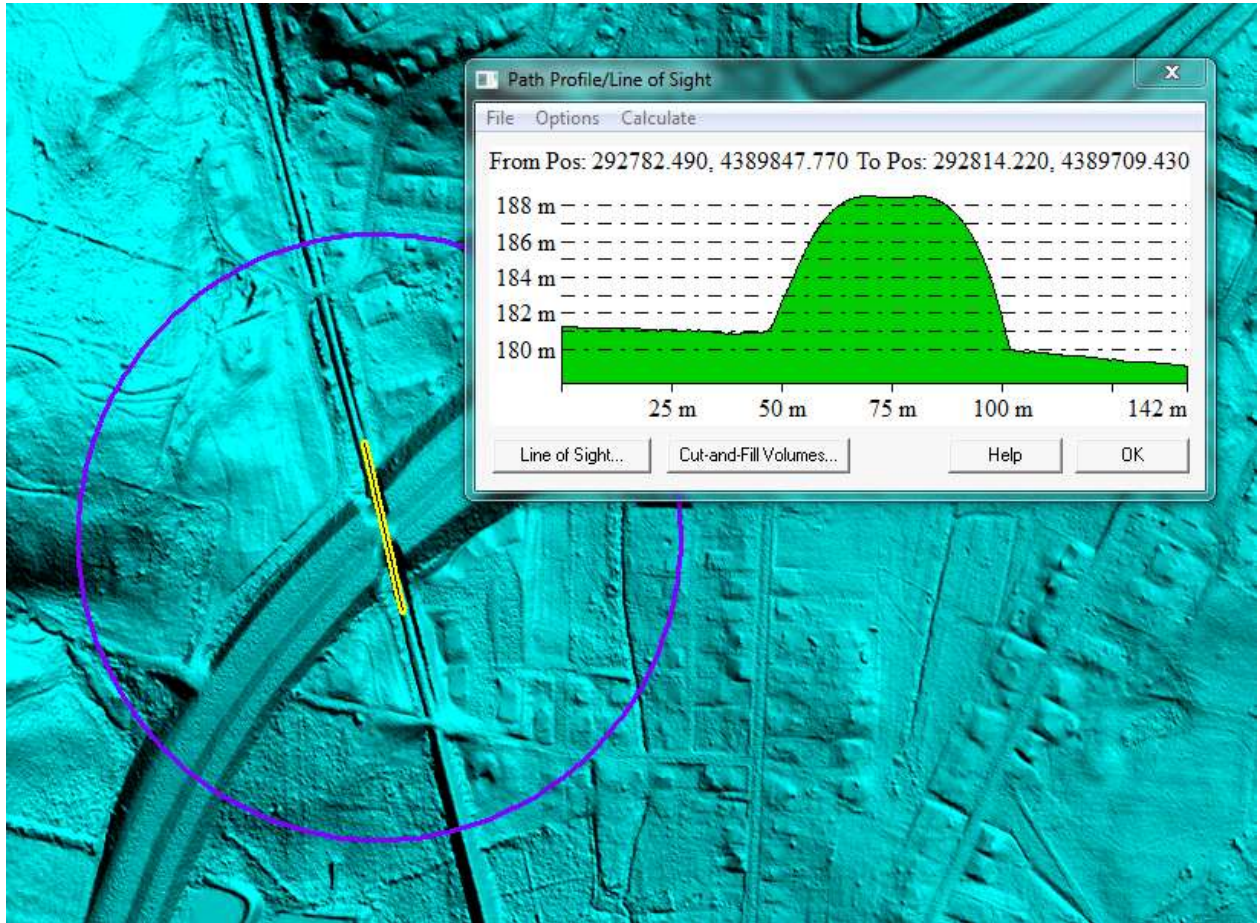
No data within project boundary, DEM tile 18STK8801.img. Scale 1: 12220. Reviewer at NGTOC created a shapefile documenting the geographic location of errors identified during DEM review. The file is named DEM_errors.shp and is located in the NED-Errors folder. Corrections received 2/8/13, accepted 2/28/13.

Image?



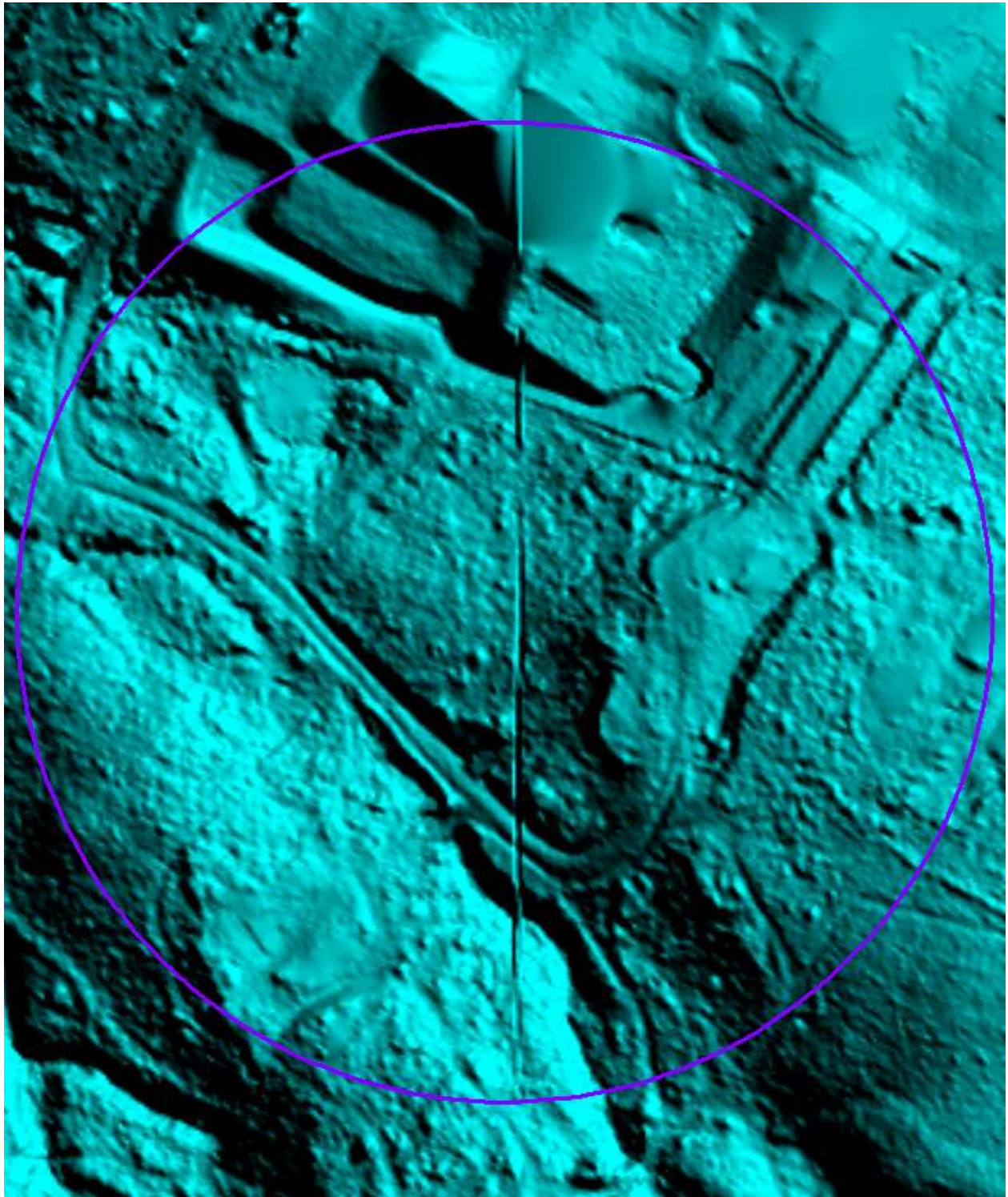
Waterbody greater than 2 acres in area not hydroflattened. Task order requires hydroflattening of all waterbodies greater than 2 acres in area. Scale 1:4568. Reviewer at NGTOC created a shapefile documenting the geographic location of errors identified during DEM review. The file is named DEM_errors.shp and is located in the NED-Errors folder. Corrections received 2/8/13, accepted 2/28/13.

Image?



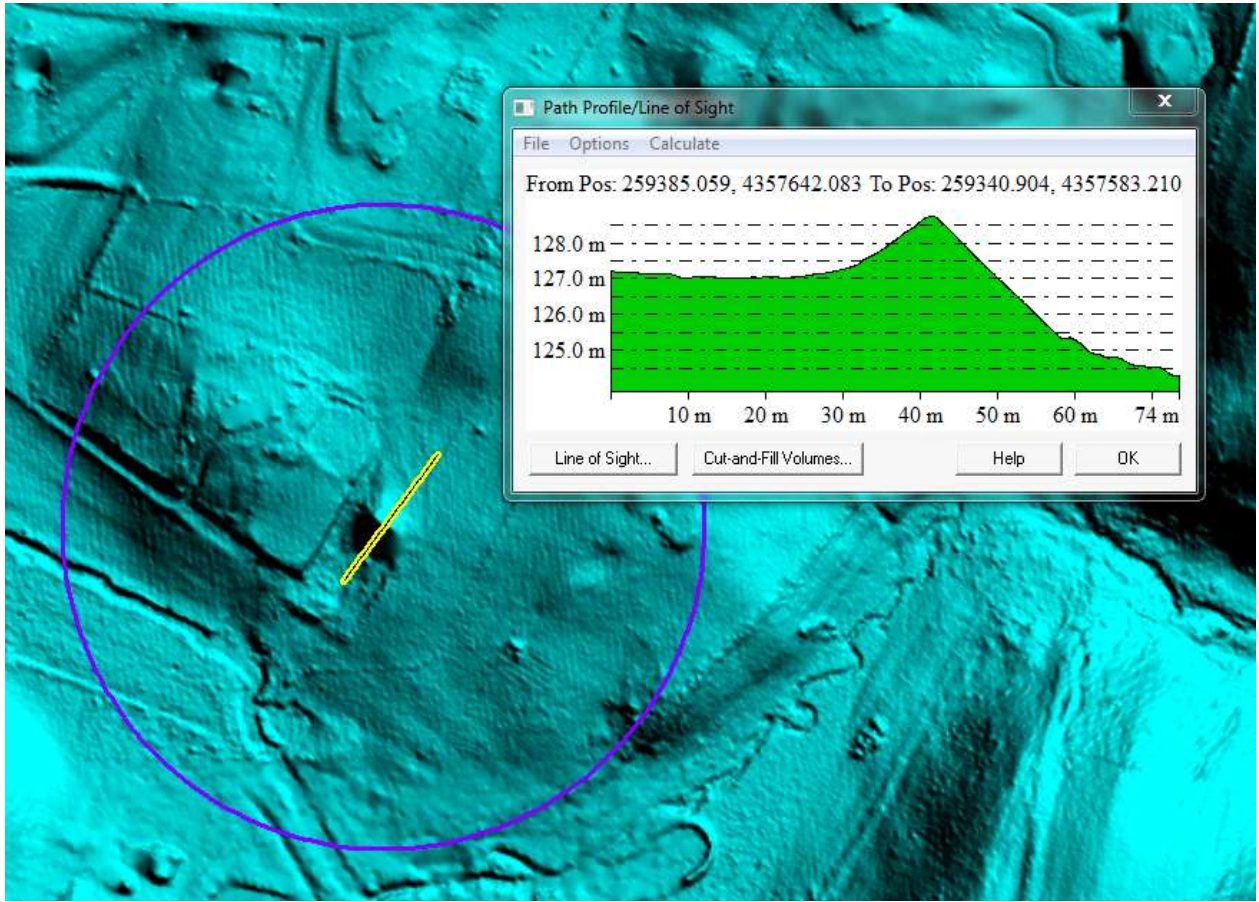
Bridge not completely removed from bare earth surface. Scale 1:10438. Reviewer at NGTOC created a shapefile documenting the geographic location of errors identified during DEM review. The file is named DEM_errors.shp and is located in the NED-Errors folder. Corrections received 2/8/13, accepted 2/28/13.

Image?



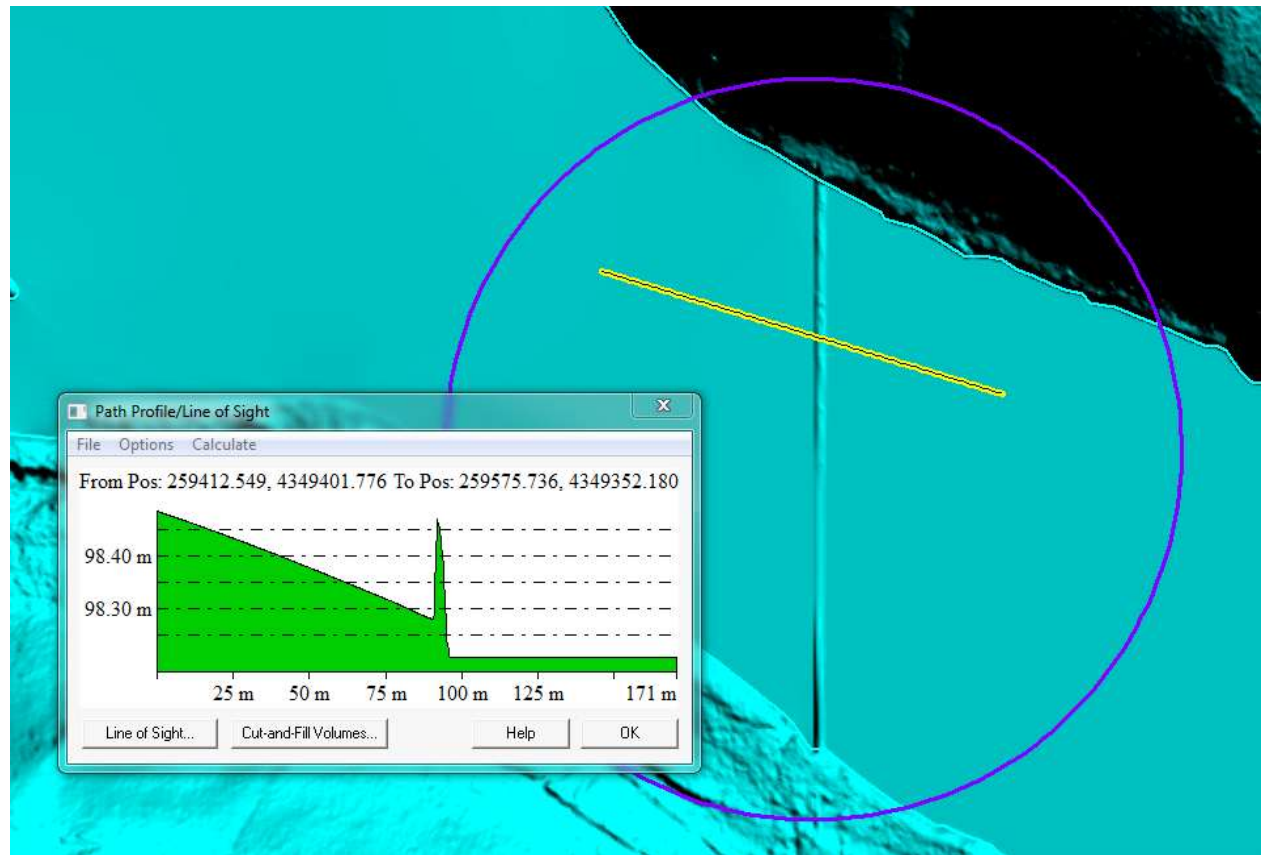
Artifact, acceptable anomaly. Scale 1:1609. Reviewer at NGTOC created a shapefile documenting the geographic location of errors and anomalies identified during DEM review. The file is named DEM_errors.shp and is located in the NED-Errors folder. Corrections received 2/8/13, accepted 2/28/13.

Image?



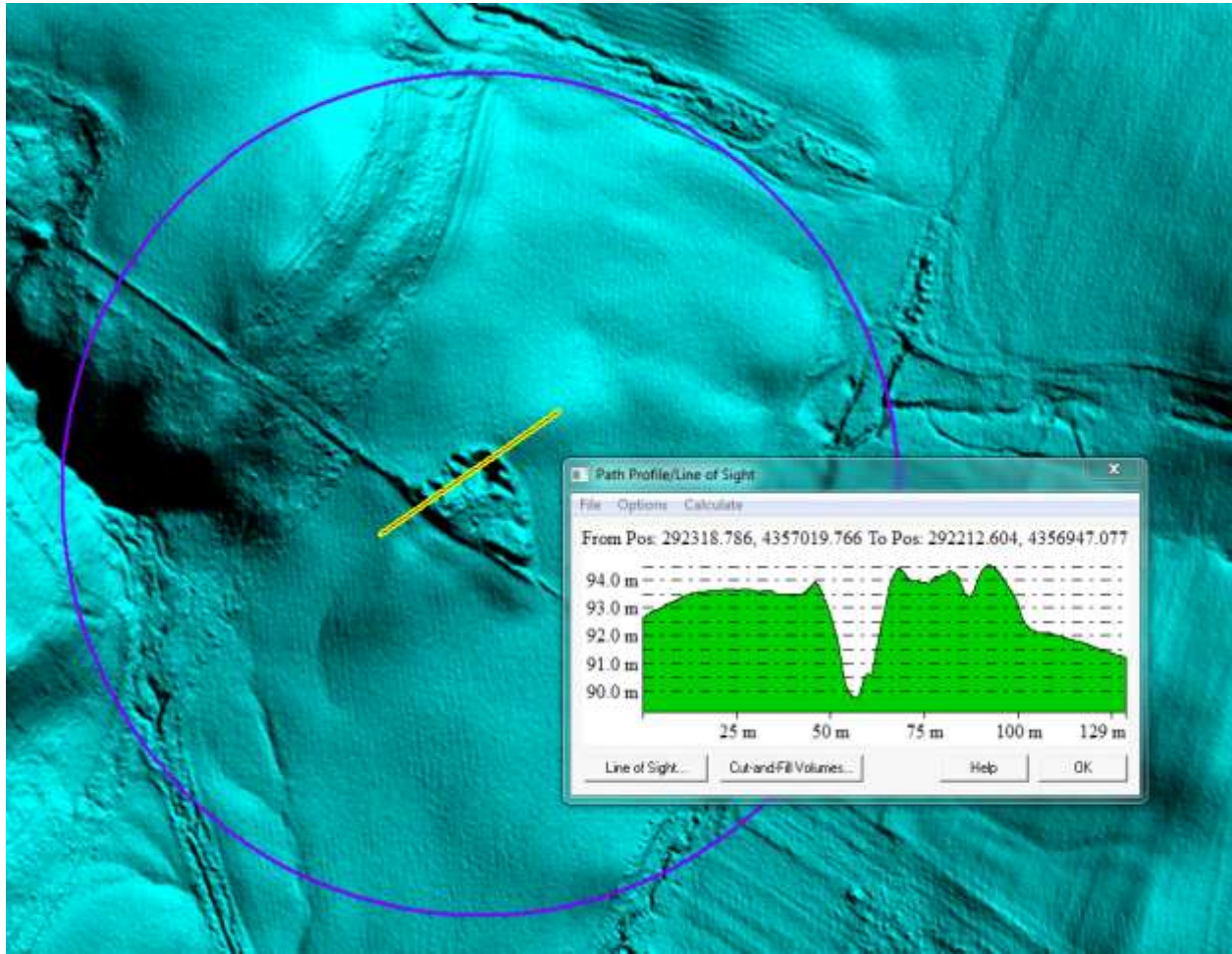
Building not properly removed from bare earth surface. Scale 1:2529. Reviewer at NGTOC created a shapefile documenting the geographic location of errors and anomalies identified during DEM review. The file is named DEM_errors.shp and is located in the NED-Errors folder. Corrections received 2/8/13, accepted 2/28/13.

Image?



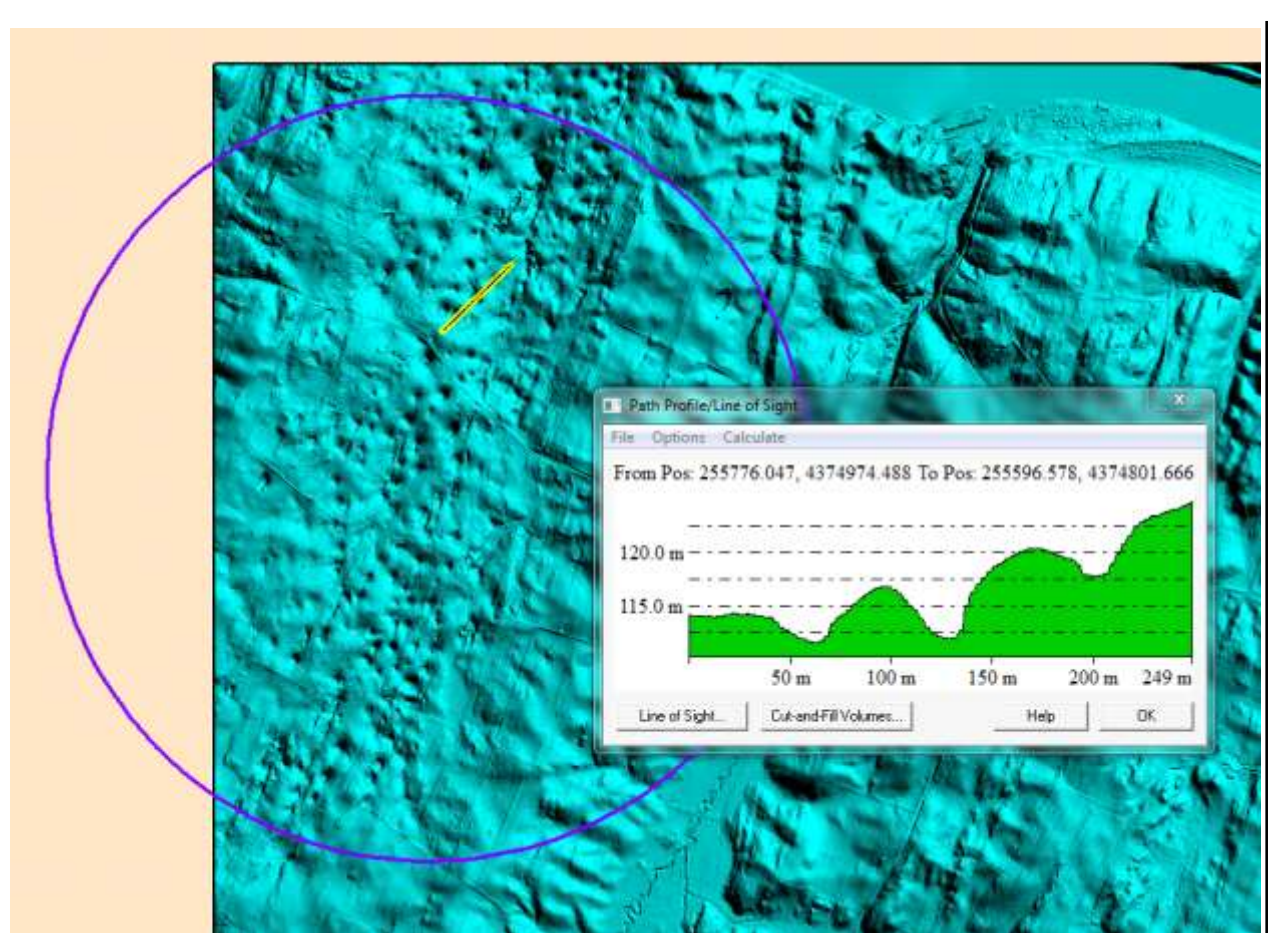
Double line stream not adequately hydroflattened. Downstream constraint not maintained. Scale 1:2016. Reviewer at NGTOC created a shapefile documenting the geographic location of errors and anomalies identified during DEM review. The file is named DEM_errors.shp and is located in the NED-Errors folder. Corrections received 2/8/13, accepted 2/28/13.

Image?



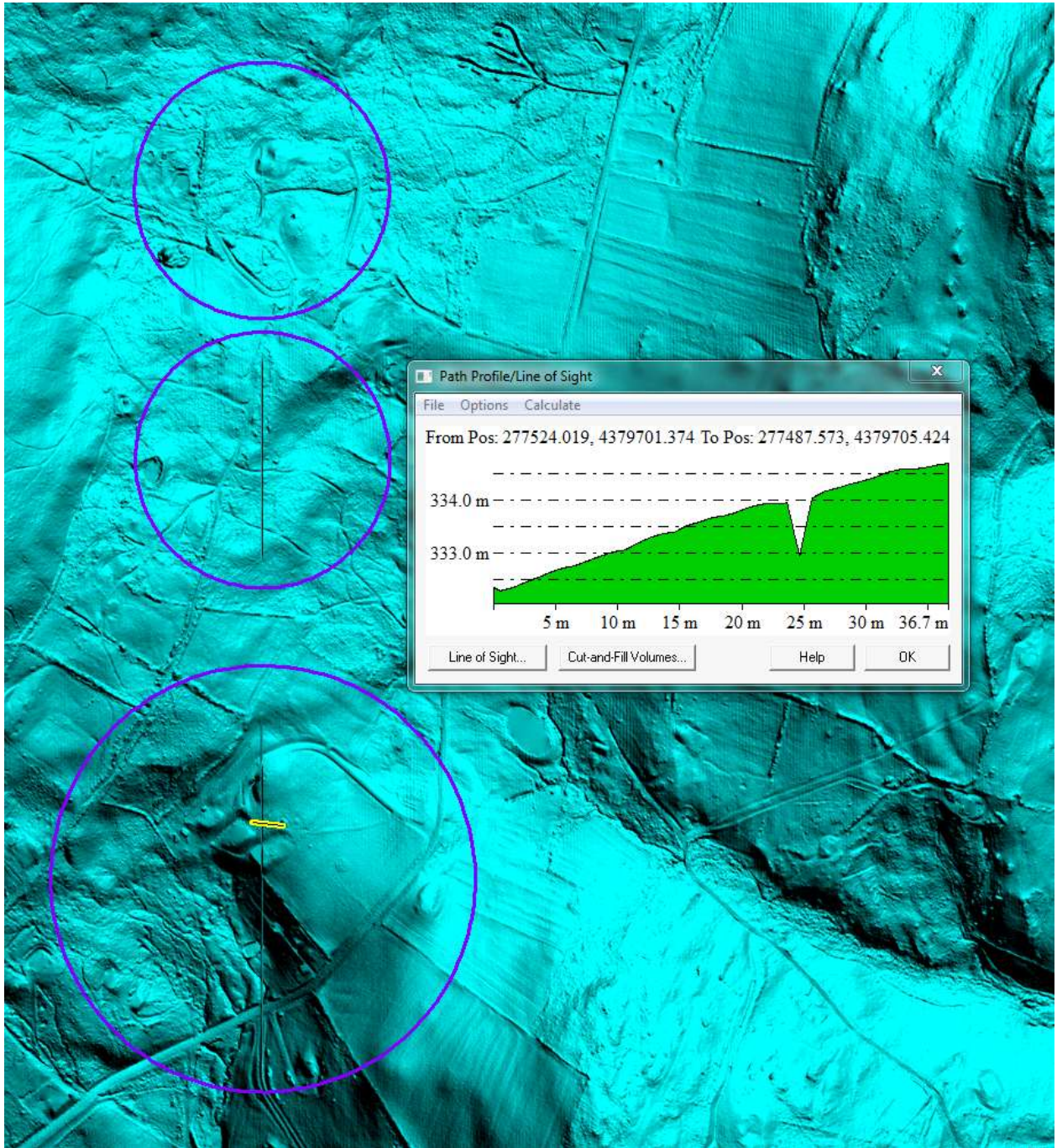
Over-removal of vegetation points resulting in pit rather than bare earth. Scale 1:2693. Reviewer at NGTOC created a shapefile documenting the geographic location of errors and anomalies identified during DEM review. The file is named DEM_errors.shp and is located in the NED-Errors folder. Corrections received 2/8/13, accepted 2/28/13.

Image?



Unexplained pits near project boundary. Scale 1:12560. Reviewer at NGTOC created a shapefile documenting the geographic location of errors and anomalies identified during DEM review. The file is named DEM_errors.shp and is located in the NED-Errors folder. Corrections received 2/8/13, accepted 2/28/13.

Image?



Seam line between DEM tiles 18SJT7681.img and 18STJ7781.img. Scale 1:5102. Reviewer at NGTOC created a shapefile documenting the geographic location of errors and anomalies identified during DEM review. The file is named DEM_errors.shp and is located in the NED-Errors folder. Corrections received 2/8/13, accepted 2/28/13.

Based on this review, the deliverables provided meet the Task Order requirements.

Internal Note:

"Bridge Saddling" observed throughout the entire project area.

This is the end of the report.

QA Form V1.4 12OCT11.xsn