



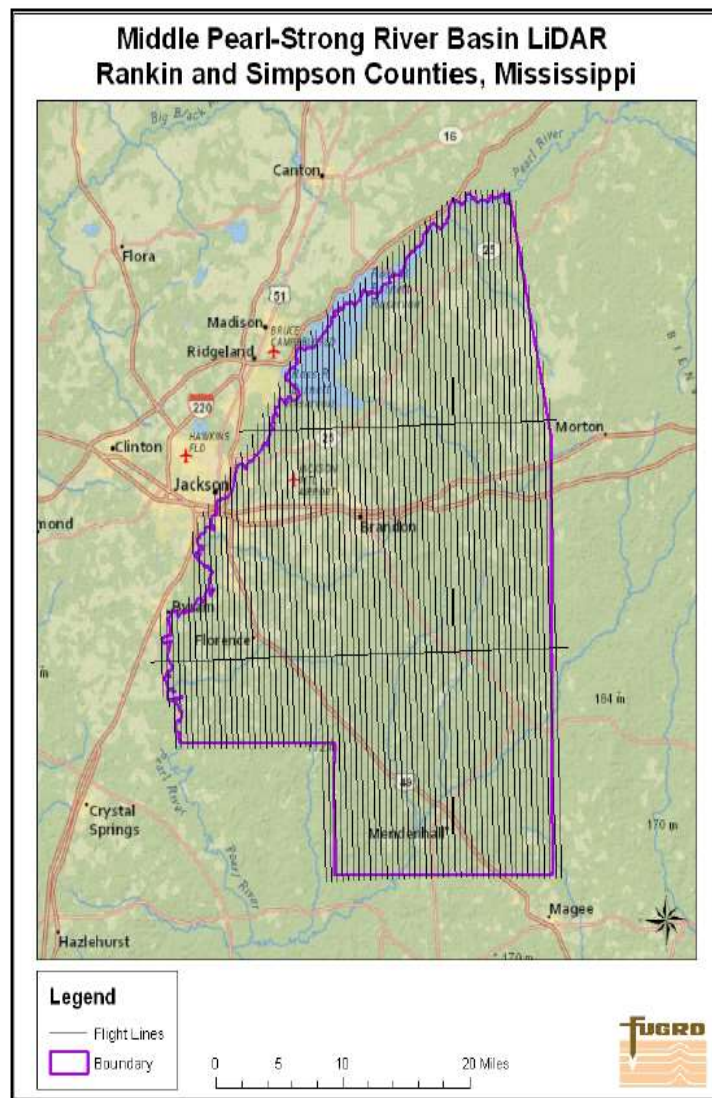
# LiDAR Quality Assessment Report

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.

**MS\_RankinSimpson\_2013**

NGTOC

Hannah Boggs



# Project Information

Project:

Contractor:

Project Type:  
Contributed

Applicable Specification:  
Other

Project Points of Contact:

Name:	Type:	Email:
George Heleine	NSDI Liaison	gheleine@usgs.gov

## REPORT QUALIFICATION SUMMARY:

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

Project Delivery Lots: Lots

List Lots:

- 1

of:

Dates Collected Range:

Collection Start:

Collection End:

Project Aliases:

Licensing:

Public Domain

Project Description:

Fugro EarthData, Inc., as a subconsultant to MGI, LLC was authorized to undertake this project, as a part of Work Order No. 112, dated November 1, 2012, issued to MGI, LLC in accordance with the terms and conditions of the Professional Services Agreement between MGI, LLC and the Mississippi Department of Environmental Quality, dated February 17, 2004. This Light Detection and Ranging (LiDAR) dataset is a survey of the Middle Pearl-Strong River Basin in Rankin and Simpson Counties, Mississippi. The project area consists of approximately 976 square miles. The project design of the LiDAR data acquisition was developed to support a nominal post spacing of 1 meter. Fugro EarthData, Inc. acquired 73 flight lines in six lifts on January 6, 7, 31, and February 1, 2013. The data was divided into 5000 by 5000 foot cells that serve as the tiling scheme. LiDAR data collection was performed with a Cessna 310 twin-piston aircraft, utilizing a Leica ALS60 MPiA sensor, collecting multiple return x, y, and z as well as intensity data. LiDAR data is remotely sensed high-resolution elevation data collected by an airborne collection platform. This data of the Middle Pearl-Strong River Basin was collected at sufficient resolution to provide a nominal point spacing of 1 meter for collected points. Up to 4 returns were recorded for each pulse in addition to an intensity value. Products delivered to MGI include

**the following: 1) classified point cloud data in LAS v.1.2 format; 2) LiDAR intensity data in GeoTIFF format; 3) hydro-flattened breaklines in ESRI shapefile format; 4) bare earth LiDAR data in GeoTIFF raster format; 5) tile index in shapefile format; and 6) LiDAR project report in PDF format.**

---

## Review Information

Reviewer:

Date Delivered:

3rd Party QA

Date Assigned:

Performed:

Assigned:

Action To Contractor Date:	Issue Description:	Return Date:
2/12/2014	Reviewer requests units in project level xml metadata be updated to reflect the correct units used throughout the project. Reviewer requests corrections to classified las headers if possible. Reviewer also requests delivery of swath las, swath las xml metadata, and classified las xml metadata files if possible. Any corrections to delivered xml metadata files that did not successfully parse without errors would be greatly appreciated. Please see Metadata Review section below for additional information.	

Review Complete:

Dates Project Worked:

Start:	<input type="text" value="2/5/2014"/>
End:	<input type="text" value="2/12/2014"/>

## 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"/>	MiddlePearl-StrongBasin_FinalReport
Survey Report:	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	PDF	<input type="text" value="1"/>	Middle_Pearl-StrongQAQC_checkpoint_survey
Processing Report:	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	PDF	<input type="text" value="1"/>	MiddlePearl-StrongBasin_FinalReport
QA/QC Report:	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	PDF	<input type="text" value="1"/>	MiddlePearl_QA_REPORT
Project Level XML Metadata:	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	XML	<input type="text" value="1"/>	MiddlePearl-StrongRiverBasin_Metadata

<i>Project Extent:</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>.shp</u>	<input type="text" value="1"/>	Revised_boundary_9735s qML_SP_NAD83_NSRS201 1_Ft_Final.shp
<i>Tile Scheme:</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>.shp</u>	<input type="text" value="1"/>	Revised_MiddlePear_Lay out_SP_NAD83_NSRS2011 _Ft.shp
<i>Control (Calibration) Points:</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>.shp</u>	<input type="text" value="1"/>	Control.shp
<i>Check (Validation) Points:</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>.shp</u>	<input type="text" value="1"/>	MIDDLE_PEARL_STRONG_ QAQC_W.shp
<i>Additional Comments:</i>						

**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 type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Select...	<input type="text" value="0"/>	Not delivered to NGTOC
<i>Classified/ Tiled Data:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<u>.las</u>	<input type="text" value="1,177"/>	No XML Metadata
<i>Additional Comments:</i>	Swath not delivered to NGTOC. Swath las data requested 2/12/14. Swath las xml metadata requested 2/12/14. Classified las xml metadata requested 2/12/14.					

**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"/>	<u>TIF</u>	<input type="text" value="1,177"/>	
<i>Breaklines:</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>.shp</u>	<input type="text" value="2"/>	Lakes; Rivers
<i>Additional Comments:</i>						

**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 type="checkbox"/>	<input checked="" type="checkbox"/>	<u>.tif</u>	<input type="text" value="1,177"/>	
West Rankin LiDAR	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>.xyz</u>	<input type="text" value="238"/>	

West Rankin LiDAR	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	.dwg	232	
Rankin City Tiles	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	.shp	1	RankinCityTiles.shp
WestRankin Final Report	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	.doc	1	WESTRANKINfinalreport.doc

Additional Comments:

## Geographic Information

Area Extent:  Sq. Miles

Tile Size:  Feet

DEM/DTM Grid Spacing:  U.S. Feet

Coordinate Reference System:

Projection:

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

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

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

- Project Extent
- Project Extent XML Metadata
- Project Tile Scheme
- Project Tile Scheme XML Metadata
- Control Points
- Control Points XML Metadata
- Checkpoints
- Checkpoint XML Metadata
- Project Level XML Metadata
- Tiled/Classified LiDAR
- DEM(s)
- DEM XML Metadata
- Breakline(s)
- Breakline XML Metadata

Additional Comments:

## Collection Information

Configured Project Nominal Pulse Spacing:  Meters

Sensor Information:  
Sensor Type:

Aerial

Sensor Used:

Leica ALS60

Configured Scan Angle ± from nadir:

34 Degrees

**Additional Comments:**

## Metadata Review 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 Project Level XML Metadata parsed without errors.**

Check if 'Best Use' metadata for NED:

**The Project Extent XML Metadata parsed with errors.**

### mp 2.9.26 - Peter N. Schweitzer (U.S. Geological Survey)

20 errors: 1 misplaced, 19 missing

Type	Description or line numbers	Li (or
Severity 5: Misplaced elements		
Error	<a href="#">Lineage (2.5)</a> is not permitted in <a href="#">Metadata (0)</a>	2
Severity 3: Missing elements		
Error	<a href="#">Attribute_Definition (5.1.2.2)</a> is required in <a href="#">Attribute (5.1.2)</a>	2 2 2 2
Error	<a href="#">Attribute_Definition_Source (5.1.2.3)</a> is required in <a href="#">Attribute (5.1.2)</a>	2 2 2 2
Error	<a href="#">Attribute_Domain_Values (5.1.2.4)</a> is required in <a href="#">Attribute (5.1.2)</a>	2 2 2 2
Error	<a href="#">Direct_Spatial_Reference_Method (3.2)</a> is required in <a href="#">Spatial_Data_Organization_Information (3)</a>	2
Error	<a href="#">Entity_Type_Definition (5.1.1.2)</a> is required in <a href="#">Entity_Type (5.1.1)</a>	2
Error	<a href="#">Entity_Type_Definition_Source (5.1.1.3)</a> is required in <a href="#">Entity_Type (5.1.1)</a>	2
Error	<a href="#">Identification_Information (1)</a> is required in <a href="#">Metadata (0)</a>	2
Error	<a href="#">Metadata_Reference_Information (7)</a> is required in <a href="#">Metadata (0)</a>	2
Error	<a href="#">Point_and_Vector_Object_Information (3.3)</a> requires one of <a href="#">SDTS_Terms_Description (3.3.1)</a> or <a href="#">VPF_Terms_Description (3.3.2)</a>	2
Error	<a href="#">Process_Step (2.5.2)</a> is required in <a href="#">Lineage (2.5)</a>	2

Check if 'Best Use' metadata for NED:

**The Project Tile Scheme XML Metadata parsed *with* errors.**

**mp 2.9.26 - Peter N. Schweitzer (U.S. Geological Survey)**

41 errors: 1 misplaced, 40 missing

Type	Description or line numbers	Line (or)
Severity 5: Misplaced elements		
Error	<a href="#">Lineage</a> (2.5) is not permitted in <a href="#">Metadata</a> (0)	2
Severity 3: Missing elements		
Error	<a href="#">Attribute_Definition</a> (5.1.2.2) is required in <a href="#">Attribute</a> (5.1.2)	(11
	2, 2, 2, 2, 2, 2, 2, 2, 2, 2	
Error	<a href="#">Attribute_Definition_Source</a> (5.1.2.3) is required in <a href="#">Attribute</a> (5.1.2)	(11
	2, 2, 2, 2, 2, 2, 2, 2, 2, 2	
Error	<a href="#">Attribute_Domain_Values</a> (5.1.2.4) is required in <a href="#">Attribute</a> (5.1.2)	(11
	2, 2, 2, 2, 2, 2, 2, 2, 2, 2	
Error	<a href="#">Direct_Spatial_Reference_Method</a> (3.2) is required in <a href="#">Spatial_Data_Organization_Information</a> (3)	2
Error	<a href="#">Entity_Type_Definition</a> (5.1.1.2) is required in <a href="#">Entity_Type</a> (5.1.1)	2
Error	<a href="#">Entity_Type_Definition_Source</a> (5.1.1.3) is required in <a href="#">Entity_Type</a> (5.1.1)	2
Error	<a href="#">Identification_Information</a> (1) is required in <a href="#">Metadata</a> (0)	2
Error	<a href="#">Metadata_Reference_Information</a> (7) is required in <a href="#">Metadata</a> (0)	2
Error	<a href="#">Point_and_Vector_Object_Information</a> (3.3) requires one of <a href="#">SDTS_Terms_Description</a> (3.3.1) or <a href="#">VPF_Terms_Description</a> (3.3.2)	2
Error	<a href="#">Process_Step</a> (2.5.2) is required in <a href="#">Lineage</a> (2.5)	2
Severity 0: Informative warnings and upgrade notes		

Check if 'Best Use' metadata for NED:

**The Control Point XML Metadata parsed *with* errors.**

--



**mp 2.9.26 - Peter N. Schweitzer (U.S. Geological Survey)**

52 errors: 1 misplaced, 51 missing

Type	Description or line numbers
Severity 5: Misplaced elements	
Error	<a href="#">Lineage (2.5)</a> is not permitted in <a href="#">Metadata (0)</a>
Severity 3: Missing elements	
Error	<a href="#">Access_Constraints (1.7)</a> is required in <a href="#">Identification_Information (1)</a>
Error	<a href="#">Altitude_Datum_Name (4.2.1.1)</a> is required in <a href="#">Altitude_System_Definition (4.2.1)</a>
Error	<a href="#">Altitude_Distance_Units (4.2.1.3)</a> is required in <a href="#">Altitude_System_Definition (4.2.1)</a>
Error	<a href="#">Altitude_Resolution (4.2.1.2)</a> is required in <a href="#">Altitude_System_Definition (4.2.1)</a>
Error	<a href="#">Attribute_Definition_Source (5.1.2.3)</a> is required in <a href="#">Attribute (5.1.2)</a>
	2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2
Error	<a href="#">Attribute_Domain_Values (5.1.2.4)</a> is required in <a href="#">Attribute (5.1.2)</a>
	2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2
Error	<a href="#">Contact_Address (10.4)</a> is required in <a href="#">Contact_Information (10)</a>
Error	<a href="#">Direct_Spatial_Reference_Method (3.2)</a> is required in <a href="#">Spatial_Data_Organization_Information (3)</a>
Error	<a href="#">Distribution_Liability (6.3)</a> is required in <a href="#">Distribution_Information (6)</a>
Error	<a href="#">Distributor (6.1)</a> is required in <a href="#">Distribution_Information (6)</a>
Error	<a href="#">Entity_Type_Definition (5.1.1.2)</a> is required in <a href="#">Entity_Type (5.1.1)</a>
Error	<a href="#">Entity_Type_Definition_Source (5.1.1.3)</a> is required in <a href="#">Entity_Type (5.1.1)</a>
Error	<a href="#">Lineage (2.5)</a> is required in <a href="#">Data_Quality_Information (2)</a>
Error	<a href="#">Metadata_Contact (7.4)</a> is required in <a href="#">Metadata_Reference_Information (7)</a>
Error	<a href="#">Metadata_Security_Classification_System (7.10.1)</a> is required in <a href="#">Metadata_Security_Information (7.10)</a>
Error	<a href="#">Metadata_Security_Handling_Description (7.10.3)</a> is required in <a href="#">Metadata_Security_Information (7.10)</a>
Error	<a href="#">Place_Keyword_Thesaurus (1.6.2.1)</a> is required in <a href="#">Place (1.6.2)</a>
Error	<a href="#">Planar (4.1.2)</a> requires one of <a href="#">Map_Projection (4.1.2.1)</a> or <a href="#">Grid_Coordinate_System (4.1.2.2)</a> or <a href="#">Local_Planar (4.1.2.3)</a>
Error	<a href="#">Planar_Coordinate_Information (4.1.2.4)</a> requires one of <a href="#">Coordinate_Representation (4.1.2.4.2)</a> or <a href="#">Distance_and_Bearing_Representati</a>
Error	<a href="#">Point_and_Vector_Object_Information (3.3)</a> requires one of <a href="#">SDTS_Terms_Description (3.3.1)</a> or <a href="#">VPF_Terms_Description (3.3.2)</a>
Error	<a href="#">Process_Step (2.5.2)</a> is required in <a href="#">Lineage (2.5)</a>
Error	<a href="#">Security_Classification_System (1.12.1)</a> is required in <a href="#">Security_Information (1.12)</a>
Error	<a href="#">Security_Handling_Description (1.12.3)</a> is required in <a href="#">Security_Information (1.12)</a>

Check if 'Best Use' metadata for NED:

**The Check Point XML Metadata parsed with errors.**

**mp 2.9.26 - Peter N. Schweitzer (U.S. Geological Survey)**

32 errors: 1 misplaced, 31 missing

Type	Description or line numbers	Li (or)
Severity 5: Misplaced elements		
Error	<a href="#">Lineage (2.5)</a> is not permitted in <a href="#">Metadata (0)</a>	1
Severity 3: Missing elements		
Error	<a href="#">Access_Constraints (1.7)</a> is required in <a href="#">Identification_Information (1)</a>	1
Error	<a href="#">Attribute_Definition_Source (5.1.2.3)</a> is required in <a href="#">Attribute (5.1.2)</a>	1 1 1 1 1 1 1 1
Error	<a href="#">Attribute_Domain_Values (5.1.2.4)</a> is required in <a href="#">Attribute (5.1.2)</a>	1 1 1 1 1 1 1 1
Error	<a href="#">Contact_Address (10.4)</a> is required in <a href="#">Contact_Information (10)</a>	1
Error	<a href="#">Direct_Spatial_Reference_Method (3.2)</a> is required in <a href="#">Spatial_Data_Organization_Information (3)</a>	1
Error	<a href="#">Distribution_Liability (6.3)</a> is required in <a href="#">Distribution_Information (6)</a>	1
Error	<a href="#">Distributor (6.1)</a> is required in <a href="#">Distribution_Information (6)</a>	1
Error	<a href="#">Entity_Type_Definition (5.1.1.2)</a> is required in <a href="#">Entity_Type (5.1.1)</a>	1
Error	<a href="#">Entity_Type_Definition_Source (5.1.1.3)</a> is required in <a href="#">Entity_Type (5.1.1)</a>	1
Error	<a href="#">Lineage (2.5)</a> is required in <a href="#">Data_Quality_Information (2)</a>	1
Error	<a href="#">Metadata_Security_Classification_System (7.10.1)</a> is required in <a href="#">Metadata_Security_Information (7.10)</a>	1
Error	<a href="#">Metadata_Security_Handling_Description (7.10.3)</a> is required in <a href="#">Metadata_Security_Information (7.10)</a>	1
Error	<a href="#">Place_Keyword_Thesaurus (1.6.2.1)</a> is required in <a href="#">Place (1.6.2)</a>	1
Error	<a href="#">Point_and_Vector_Object_Information (3.3)</a> requires one of <a href="#">SDTS_Terms_Description (3.3.1)</a> or <a href="#">VPF_Terms_Description (3.3.2)</a>	1
Error	<a href="#">Process_Step (2.5.2)</a> is required in <a href="#">Lineage (2.5)</a>	1
Error	<a href="#">Security_Classification_System (1.12.1)</a> is required in <a href="#">Security_Information (1.12)</a>	1
Error	<a href="#">Security_Handling_Description (1.12.3)</a> is required in <a href="#">Security_Information (1.12)</a>	1

Check if 'Best Use' metadata for NED:

The DEM XML Metadata parsed with errors.

**mp 2.9.26 - Peter N. Schweitzer (U.S. Geological Survey)**

25 errors: 23 unrecognized, 2 missing

Type	Description or line numbers
Severity 5: Misplaced elements	
Error	No element recognized in "<HistItem>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<Histograms>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<Metadata>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<PAMDataset>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<PAMRasterBand>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<Approximate>0</Approximate>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<BucketCount>256</BucketCount>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<HistCounts>8 32 133 413 771 1359 62004 1722 766 563 439 400 325 337 320 328 362 344 354 328 331 326 309 325 301 305 268 253 249 ..."; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<HistItem>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<HistMax>311.427001953125</HistMax>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<HistMin>295.6910095214844</HistMin>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<Histograms>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<IncludeOutOfRange>1</IncludeOutOfRange>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<MDI key='PyramidResamplingType'>NEAREST</MDI>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<MDI key='STATISTICS_MAXIMUM'>311.42700195313</MDI>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<MDI key='STATISTICS_MEAN'>298.33920273174</MDI>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<MDI key='STATISTICS_MINIMUM'>295.69100952148</MDI>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<MDI key='STATISTICS_STDDEV'>3.46540503046</MDI>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<Metadata (0) domain='ESRI'>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<Metadata>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<PAMDataset>"; text is not permitted in <a href="#">Metadata</a> (0)
Error	No element recognized in "<PAMRasterBand band='1'>"; text is not permitted in <a href="#">Metadata</a> (0)
Severity 3: Missing elements	
Error	<a href="#">Identification_Information</a> (1) is required in <a href="#">Metadata</a> (0)
Error	<a href="#">Metadata_Reference_Information</a> (7) is required in <a href="#">Metadata</a> (0)

Check if 'Best Use' metadata for NED:

The Breakline XML Metadata parsed with errors.

**mp 2.9.26 - Peter N. Schweitzer (U.S. Geological Survey)**

11 errors: 1 misplaced, 10 missing

Type	Description or line numbers	Line (or)
Severity 5: Misplaced elements		
Error	<a href="#">Lineage</a> (2.5) is not permitted in <a href="#">Metadata</a> (0)	2
Severity 3: Missing elements		
Error	<a href="#">Attribute_Definition</a> (5.1.2.2) is required in <a href="#">Attribute</a> (5.1.2)	2
Error	<a href="#">Attribute_Definition_Source</a> (5.1.2.3) is required in <a href="#">Attribute</a> (5.1.2)	2
Error	<a href="#">Attribute_Domain_Values</a> (5.1.2.4) is required in <a href="#">Attribute</a> (5.1.2)	2
Error	<a href="#">Direct_Spatial_Reference_Method</a> (3.2) is required in <a href="#">Spatial_Data_Organization_Information</a> (3)	2
Error	<a href="#">Entity_Type_Definition</a> (5.1.1.2) is required in <a href="#">Entity_Type</a> (5.1.1)	2
Error	<a href="#">Entity_Type_Definition_Source</a> (5.1.1.3) is required in <a href="#">Entity_Type</a> (5.1.1)	2
Error	<a href="#">Identification_Information</a> (1) is required in <a href="#">Metadata</a> (0)	2
Error	<a href="#">Metadata_Reference_Information</a> (7) is required in <a href="#">Metadata</a> (0)	2
Error	<a href="#">Point_and_Vector_Object_Information</a> (3.3) requires one of <a href="#">SDTS_Terms_Description</a> (3.3.1) or <a href="#">VPF_Terms_Description</a> (3.3.2)	2
Error	<a href="#">Process_Step</a> (2.5.2) is required in <a href="#">Lineage</a> (2.5)	2
Severity 0: Informative messages and warnings		



**mp 2.9.26 - Peter N. Schweitzer (U.S. Geological Survey)**

20 errors: 1 misplaced, 19 missing

Type	Description or line numbers	Lin (or
Severity 5: Misplaced elements		
Error	<a href="#">Lineage (2.5)</a> is not permitted in <a href="#">Metadata (0)</a>	2
Severity 3: Missing elements		
Error	<a href="#">Attribute_Definition (5.1.2.2)</a> is required in <a href="#">Attribute (5.1.2)</a>	2 2 2 2
Error	<a href="#">Attribute_Definition_Source (5.1.2.3)</a> is required in <a href="#">Attribute (5.1.2)</a>	2 2 2 2
Error	<a href="#">Attribute_Domain_Values (5.1.2.4)</a> is required in <a href="#">Attribute (5.1.2)</a>	2 2 2 2
Error	<a href="#">Direct_Spatial_Reference_Method (3.2)</a> is required in <a href="#">Spatial_Data_Organization_Information (3)</a>	2
Error	<a href="#">Entity_Type_Definition (5.1.1.2)</a> is required in <a href="#">Entity_Type (5.1.1)</a>	2
Error	<a href="#">Entity_Type_Definition_Source (5.1.1.3)</a> is required in <a href="#">Entity_Type (5.1.1)</a>	2
Error	<a href="#">Identification_Information (1)</a> is required in <a href="#">Metadata (0)</a>	2
Error	<a href="#">Metadata_Reference_Information (7)</a> is required in <a href="#">Metadata (0)</a>	2
Error	<a href="#">Point_and_Vector_Object_Information (3.3)</a> requires one of <a href="#">SDTS_Terms_Description (3.3.1)</a> or <a href="#">VPF_Terms_Description (3.3.2)</a>	2
Error	<a href="#">Process_Step (2.5.2)</a> is required in <a href="#">Lineage (2.5)</a>	2
Severity 0: Informative messages and upgrade notes		

Check if 'Best Use' metadata for NED:

Additional Comments:

Dataset is contributed, therefore it is accepted, however project level xml file states units are in meters. Incorrect, corrections requested 2/12/14. Delivery of xml metadata files able to successfully parse through the USGS Online Metadata Parser requested 2/12/14.

**Based on this review, the USGS accepts the xml metadata provided.**

End of Metadata Review

### Vertical Accuracy Review Accepted

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

NSSDA and ASPRS require that a minimum of twenty checkpoints (thirty is preferred) are collected for each

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

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

### Required Vertical Accuracy

Yes  No

There are no required vertical accuracy conditions for this project.

### 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	
High Grass	<input type="text" value="21"/>	<input type="text" value="0.426"/>	<input type="text" value="U.S. Feet"/>
Brushlands & Low Trees	<input type="text" value="22"/>	<input type="text" value="0.457"/>	<input type="text" value="U.S. Feet"/>
Forested Areas Fully Covered by Trees	<input type="text" value="16"/>	<input type="text" value="0.445"/>	<input type="text" value="U.S. Feet"/>
Urban Areas with Dense Man Made Structures	<input type="text" value="22"/>	<input type="text" value="0.410"/>	<input type="text" value="U.S. Feet"/>

**REPORTED CONSOLIDATED VERTICAL ACCURACY FOR DEM FILES**

CVA Statistic Reported: Percentile

CVA Confidence Level/Percentile Reported:

Total number of checkpoints:

Reported CVA:   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	
High Grass	21	0.498	U.S. Feet
Brushlands & Low Trees	22	0.456	U.S. Feet

Forested Areas Fully Covered by Trees	16	0.448	U.S. Feet
Urban Areas with Dense Man Made Structures	22	0.382	U.S. Feet

**REVIEWED CONSOLIDATED VERTICAL ACCURACY**

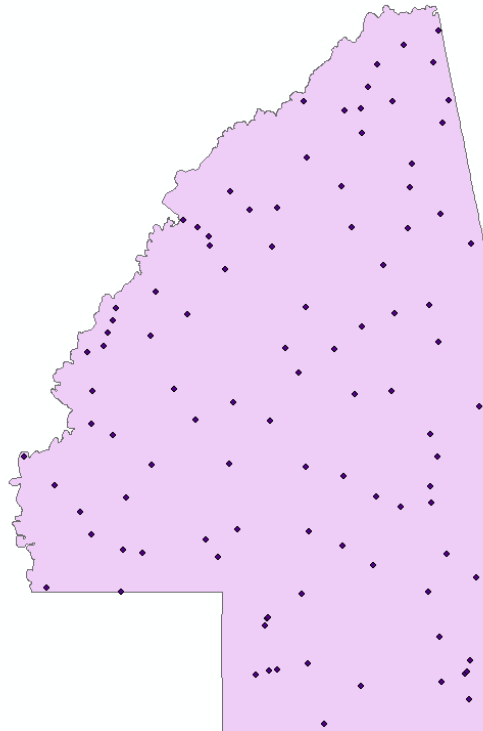
CVA Statistic Reviewed: Percentile

CVA Confidence Level/Percentile Reviewed: 95

Total number of checkpoints: 100

Reviewed CVA: 0.411 U.S. Feet at the 95 th Percentile

Checkpoint Distribution Image



Vertical Accuracy Results:



19 control points were tested for the Bare Earth class

The Minimum change in Z of the Bare Earth class is -0.347009003162 U.S. Survey Feet

The Maximum change in Z of the Bare Earth class is 0.101995997131 U.S. Survey Feet

The Range of the change in Z for the Bare Earth class is 0.449005000293 U.S. Survey Feet

The Average change in Z for the Bare Earth class is -0.154474726633 U.S. Survey Feet

The Standard Deviation of the change in Z distribution for the Bare Earth class is 0.114001519999 U.S. Survey Feet

The Skew of the change in Z distribution for the Bare Earth class is 0.443521808744

The Kurtosis of the change in Z distribution for the Bare Earth class is -0.220913454085

The RMSEz of the Bare Earth class is 0.190196649676 U.S. Survey Feet

The NSSDA AccuracyZ (=RMSEz\*1.96) of the Bare Earth points is 0.372785433365 U.S. Survey Feet at the 95% Confidence Level

The 95th Percentile Value for the Bare Earth class is 0.305603608489 U.S. Survey Feet

21 control points were tested for the High Grass class

The Minimum change in Z of the High Grass class is -0.497996985912 U.S. Survey Feet

The Maximum change in Z of the High Grass class is 0.591997027397 U.S. Survey Feet

The Range of the change in Z for the High Grass class is 1.08999401331 U.S. Survey Feet

The Average change in Z for the High Grass class is -0.00242970715321 U.S. Survey Feet

The Standard Deviation of the change in Z distribution for the High Grass class is 0.221324514316 U.S. Survey Feet

The Skew of the change in Z distribution for the High Grass class is 0.522904149533

The Kurtosis of the change in Z distribution for the High Grass class is 1.28969351847

The RMSEz of the High Grass class is 0.216004213773 U.S. Survey Feet

The NSSDA AccuracyZ (=RMSEz\*1.96) of the High Grass points is 0.423368258995 U.S. Survey Feet at the 95% Confidence Level

The 95th Percentile Value for the High Grass class is 0.497996985912 U.S. Survey Feet

22 control points were tested for the Brush class

The Minimum change in Z of the Brush class is -0.164996996522 U.S. Survey Feet

The Maximum change in Z of the Brush class is 0.531994998455 U.S. Survey Feet

The Range of the change in Z for the Brush class is 0.696991994977 U.S. Survey Feet

The Average change in Z for the Brush class is 0.134138940574 U.S. Survey Feet

The Standard Deviation of the change in Z distribution for the Brush class is 0.187583228791 U.S. Survey Feet

The Skew of the change in Z distribution for the Brush class is 0.335083374522

The Kurtosis of the change in Z distribution for the Brush class is -0.527975904155

The RMSEz of the Brush class is 0.227115230128 U.S. Survey Feet

The NSSDA AccuracyZ (=RMSEz\*1.96) of the Brush points is 0.44514585105 U.S. Survey Feet at the 95% Confidence Level

The 95th Percentile Value for the Brush class is 0.455550688505 U.S. Survey Feet

16 control points were tested for the Forested class

The Minimum change in Z of the Forested class is -0.689987003803 U.S. Survey Feet

The Maximum change in Z of the Forested class is 0.367985010147 U.S. Survey Feet

The Range of the change in Z for the Forested class is 1.05797201395 U.S. Survey Feet

The Average change in Z for the Forested class is -0.0181873979745 U.S. Survey Feet

The Standard Deviation of the change in Z distribution for the Forested class is 0.276583778839 U.S. Survey Feet

The Skew of the change in Z distribution for the Forested class is -0.70059345616

The Kurtosis of the change in Z distribution for the Forested class is 0.0325387269169

The RMSEz of the Forested class is 0.268417971898 U.S. Survey Feet

The NSSDA AccuracyZ (=RMSEz\*1.96) of the Forested points is 0.526099224919 U.S. Survey Feet at the 95% Confidence Level

The 95th Percentile Value for the Forested class is 0.448485508561 U.S. Survey Feet

22 control points were tested for the Urban class

The Minimum change in Z of the Urban class is -0.392996013165 U.S. Survey Feet

The Maximum change in Z of the Urban class is 0.301970988512 U.S. Survey Feet

The Range of the change in Z for the Urban class is 0.694967001677 U.S. Survey Feet

The Average change in Z for the Urban class is -0.170544532472 U.S. Survey Feet

The Standard Deviation of the change in Z distribution for the Urban class is 0.16846390719 U.S. Survey Feet

The Skew of the change in Z distribution for the Urban class is 1.07772945826

The Kurtosis of the change in Z distribution for the Urban class is 0.724508997721

The RMSEz of the Urban class is 0.237013747749 U.S. Survey Feet  
 The NSSDA AccuracyZ (=RMSEz\*1.96) of the Urban points is 0.464546945589 U.S. Survey Feet at the 95% Confidence Level  
 The 95th Percentile Value for the Urban class is 0.382094751298 U.S. Survey Feet

100 total control points were tested

The Minimum change in Z of all control points is -0.689987003803 U.S. Survey Feet

The Maximum change in Z of all control points is 0.591997027397 U.S. Survey Feet

The Range of the change in Z for all control points is 1.2819840312 U.S. Survey Feet

The Average change in Z for all control points -0.0407796504558 U.S. Survey Feet

The Standard Deviation for all control points is 0.225277800135 U.S. Survey Feet

The Skew for all control points is 0.324307533469

The Kurtosis for all control points is 0.264004120556

The RMSEz for all control points is 0.227827932257 U.S. Survey Feet

The NSSDA AccuracyZ (=RMSEz\*1.96) for all control points is 0.446542747224 U.S. Survey Feet at the 95% Confidence Level

The Consolidated Vertical Accuracy (CVA) at the 95th percentile for the dataset is 0.411445301771 U.S. Survey Feet

*Additional Reviewed  
 Vertical Accuracy  
 Information:*

Reviewer unable to test the vertical accuracy of swath las data as swath not delivered to NGOTC. Delivery of swath las files requested 2/12/14.

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

End of Vertical Accuracy Review

## Raw-Swath LiDAR 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 (see *Vertical Accuracy Review Section*).

Review Required:  Yes  No  Not Delivered

## 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

Georeference information not included in classified las headers delivered to NGOTC, corrections requested 2/12/14.

ID	FName	SRS
1	LAS_0599.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
2	LAS_0001.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
3	LAS_0002.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
4	LAS_0003.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
5	LAS_0004.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
6	LAS_0005.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
7	LAS_0006.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
8	LAS_0007.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
9	LAS_0008.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
10	LAS_0009.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
11	LAS_0010.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
12	LAS_0011.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
13	LAS_0012.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
14	LAS_0013.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
15	LAS_0014.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
16	LAS_0015.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
17	LAS_0016.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
18	LAS_0017.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet
19	LAS_0018.las	Unknown Coordinate System, NAVD88 - Geoid12A (Feet

- Adjusted GPS time used with the global encoder id set to 1
- Classified LAS tile files have no points classified as '12' (Overlap)

Classified las tile LAS\_0803.las includes points classified into 32 unique classes, 0-31. Class 12 was used.

Point classifications are limited to the standard values listed below:

Code	Description	Used
1	Processed, but unclassified	<input type="checkbox"/>
2	Bare-earth/Ground	<input type="checkbox"/>
7	Noise(low or high, manually identified, if needed)	<input type="checkbox"/>
8	Model key points	<input type="checkbox"/>
9	Water	<input type="checkbox"/>
10	Ignored ground (breakline proximity)	<input type="checkbox"/>
11	Withheld (if the "Withheld Bit" is not implemented in the processing software)	<input type="checkbox"/>

**Additional Classes:**

Class	Description
-------	-------------

*Additional comments:*

Classified las tile LAS\_0803.las includes points classified into 32 unique classes, 0-31. Class 12 was used.

Dataset is contributed therefore it is accepted as-is, however reviewer requested corrections to classified las headers on 2/12/14.

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

*End of Tiled/Classified LiDAR Review*

**Breakline Review Accepted**

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

Review Required:  Yes  No

### BREAKLINE FILE CHARACTERISTICS:

- Separate folder for breakline files.
- Breaklines contain elevation values.

Elevation values stored in Geometry (ZEnabled)

Units: U.S. Feet

- Waterbody Breaklines.

Polyline  Polygon

- Single elevation value per waterbody feature.
- Required.

Waterbody Elevations were created via Proprietary waterbody level techniques.

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

Polyline  Polygon

Downstream DLS Flow is Proprietary

- Required.

- Single Line Breaklines.

- No missing or misplaced breaklines.

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

End of Breakline Review

## DEM Review 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: TIF

Raster Cell Size:  U.S. Feet

Tile bit depth/pixel Type:

Interpolation or Resampling Technique: Nearest Neighbor

- 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
- 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 crowding

DEM tiles are properly Hydro Flattened  Yes  No

- Waterbodies  or greater are flattened
- Streams  or greater are flattened in a downstream manner
- Tidal Boundaries/Shorelines are flattened
  
- No missing islands  or larger
- Bridges/Overpasses are properly removed
- Culverts are maintained (Not Hydro Enforced)
- Depressions, Sinks, are not filled in (Not Hydro Conditioned)
- Vegetation properly removed
- Manmade structures properly removed

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

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

**Based on this review, the USGS accepts the DEM tiles.**

End of DEM Review

**INTERNAL COMMENTS**

END OF REPORT (v2.1.1)