



North Carolina Department of Public Safety

Emergency Management North Carolina Geodetic Survey

Roy Cooper, Governor
Erik A. Hooks, Secretary

Michael A. Sprayberry, Director

LiDAR Quality Control Report – Statewide LiDAR Project Phases Four (4) and Five (5)

The North Carolina Geodetic Survey performed a vertical quality control (QC) survey in Phases 4 and 5 of the statewide LiDAR elevation project. The purpose of the survey was to test the elevation points contained in a dataset that was obtained by utilizing airborne Light Detection And Ranging (LiDAR) technology. The attached report contains the results of the vertical QC survey.

The QC test points were collected utilizing the North Carolina Real Time Network (NCRTN), and with conventional survey methods in areas unsuitable for GNSS observations.

The field survey data that was used to generate the attached report was performed by the North Carolina Geodetic Survey (NCGS) under the supervision of James Gay (L-3851). The review of the field data and the generation of the final QC report were performed under the supervision of Gary W. Thompson (L-2694).

The GNSS portion of the survey (performed by NCGS) was performed to the following parameters:

Class of survey:	Class B
Positional accuracy:	Vertical 0.04 USft Horizontal 0.02 USft
Type of field procedure used:	NCRTN, OPUS, and traditional trigonometric leveling
Dates of survey:	Phase Four:4/19/2016-6/27/2018, Phase Five:12/3/2019-4/3/2019
Horizontal datum/epoch	North American Datum 83(2011) epoch 2010.0
Vertical datum/epoch	North American Vertical Datum of 1988 (NAVD88)
Published fixed control used:	North Carolina Continuously Operating Reference Station (CORS) Network and NCRTN
Geoid model:	Geoid 12B
Combined grid factor:	See control datasheets
Units:	US Survey Feet

Trigonometric leveling was performed to Class C (56.1605) standards at any QC point that was in a location not suitable for GNSS observations.

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2018 Phase 5 NC LiDAR Independent Quality Control Summary - LAS Data

Non-Vegetated Area

County	NVA Type	NVA Minimum DZ	NVA Maximum DZ	NVA Mean DZ	NVA Mean Magnitude DZ	NVA Observations	NVA Standard Deviation DZ	NVA RMSE Z	95% Confidence Level Z
Ashe	2U, 2B	-0.542	0.706	0.059	0.404	62	0.207	0.213	0.418
Avery	2U, 2B	-0.577	0.642	0.063	0.451	61	0.248	0.254	0.498
Buncombe	2U, 2B	-0.450	0.972	0.086	0.439	102	0.246	0.259	0.508
Burke	2U, 2B	-0.638	0.789	0.057	0.446	57	0.278	0.282	0.552
Caldwell	2U, 2B	-0.426	0.520	0.026	0.357	73	0.164	0.165	0.323
Cherokee	2U, 2B	-0.839	0.684	0.126	0.477	86	0.259	0.287	0.562
Clay	2U, 2B	-0.299	0.785	0.241	0.519	91	0.186	0.304	0.597
Graham	2U, 2B	-0.484	0.526	-0.003	0.387	78	0.201	0.200	0.392
Haywood	2U, 2B	-0.855	0.579	0.022	0.473	71	0.277	0.276	0.541
Henderson	2U, 2B	-0.404	0.672	0.149	0.484	89	0.245	0.286	0.560
Jackson	2U, 2B	-0.463	0.461	-0.002	0.453	72	0.244	0.243	0.475
Macon	2U, 2B	-0.733	0.436	-0.203	0.510	68	0.243	0.315	0.618
Madison	2U, 2B	-0.415	0.593	-0.017	0.438	34	0.243	0.240	0.470
Mcdowell	2U, 2B	-0.540	0.367	0.000	0.378	58	0.185	0.184	0.360
Mitchell	2U, 2B	-0.669	0.860	-0.018	0.475	60	0.285	0.284	0.556
Polk	2U, 2B	-0.344	0.774	0.126	0.424	73	0.201	0.236	0.462
Rutherford	2U, 2B	-0.474	0.499	0.170	0.468	62	0.200	0.261	0.511
Swain	2U, 2B	-0.709	0.571	-0.058	0.477	65	0.297	0.301	0.589
Transylvania	2U, 2B	-0.483	0.493	0.105	0.474	80	0.249	0.269	0.527
Watauga	2U, 2B	-0.822	0.684	0.076	0.437	61	0.258	0.267	0.523
Yancey	2U, 2B	-0.733	0.688	-0.136	0.466	61	0.261	0.292	0.573

Vegetated Area

County	VVA Class	VVA Minimum DZ	VVA Maximum DZ	VVA Mean DZ	VVA Mean Magnitude DZ	VVA Observations	VVA Standard Deviation DZ	VVA RMSE Z	95th Percentile
Ashe	2L, 2M, 2H	-0.902	1.541	0.185	0.531	82	0.325	0.372	0.690
Avery	2L, 2M, 2H	-0.871	0.856	0.175	0.539	87	0.313	0.357	0.740
Buncombe	2L, 2M, 2H	-0.743	0.988	0.160	0.513	100	0.308	0.345	0.721
Burke	2L, 2M, 2H	-0.580	0.892	0.148	0.498	86	0.283	0.318	0.611
Caldwell	2L, 2M, 2H	-0.549	0.799	0.153	0.464	86	0.223	0.270	0.549
Cherokee	2L, 2M, 2H	-0.905	0.914	0.242	0.576	85	0.343	0.418	0.860
Clay	2L, 2M, 2H	-0.317	0.998	0.497	0.717	73	0.251	0.556	0.883
Graham	2L, 2M, 2H	-0.735	0.955	0.062	0.509	85	0.325	0.329	0.614
Haywood	2L, 2M, 2H	-0.613	0.921	0.169	0.588	86	0.388	0.421	0.842
Henderson	2L, 2M, 2H	-0.358	0.866	0.294	0.581	84	0.262	0.393	0.690
Jackson	2L, 2M, 2H	-0.849	1.065	0.087	0.612	85	0.446	0.452	0.813
Macon	2L, 2M, 2H	-0.610	0.777	-0.083	0.497	85	0.290	0.300	0.548
Madison	2L, 2M, 2H	-0.794	1.125	0.029	0.563	31	0.428	0.422	0.794
Mcdowell	2L, 2M, 2H	-0.452	0.733	0.085	0.460	86	0.259	0.271	0.550
Mitchell	2L, 2M, 2H	-0.933	0.857	0.030	0.562	83	0.385	0.383	0.738
Polk	2L, 2M, 2H	-0.739	0.985	0.236	0.557	77	0.298	0.378	0.739
Rutherford	2L, 2M, 2H	-1.111	0.883	0.271	0.581	92	0.302	0.405	0.701
Swain	2L, 2M, 2H	-0.983	1.217	-0.022	0.537	84	0.377	0.375	0.723
Transylvania	2L, 2M, 2H	-0.474	0.957	0.435	0.680	84	0.280	0.516	0.837
Watauga	2L, 2M, 2H	-0.728	0.990	0.155	0.533	84	0.323	0.356	0.700
Yancey	2L, 2M, 2H	-0.650	0.639	-0.044	0.451	90	0.263	0.265	0.555

All values except observations in US Feet

Phase 5 Overall Results	
Non-Vegetated Area	Vegetated Area
Minimum DZ: -0.855	Minimum DZ: -1.111
Maximum DZ: 0.972	Maximum DZ: 1.541
Mean DZ: 0.051	Mean DZ: 0.156
Mean Magnitude DZ: 0.453	Mean Magnitude DZ: 0.552
Observations: 1464	Observations: 1735
Standard Deviation DZ: 0.257	Standard Deviation DZ: 0.346
RMSE Z: 0.262	RMSE Z: 0.380
95% Confidence Level Z: 0.514	95th Percentile: 0.748

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: ashe_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

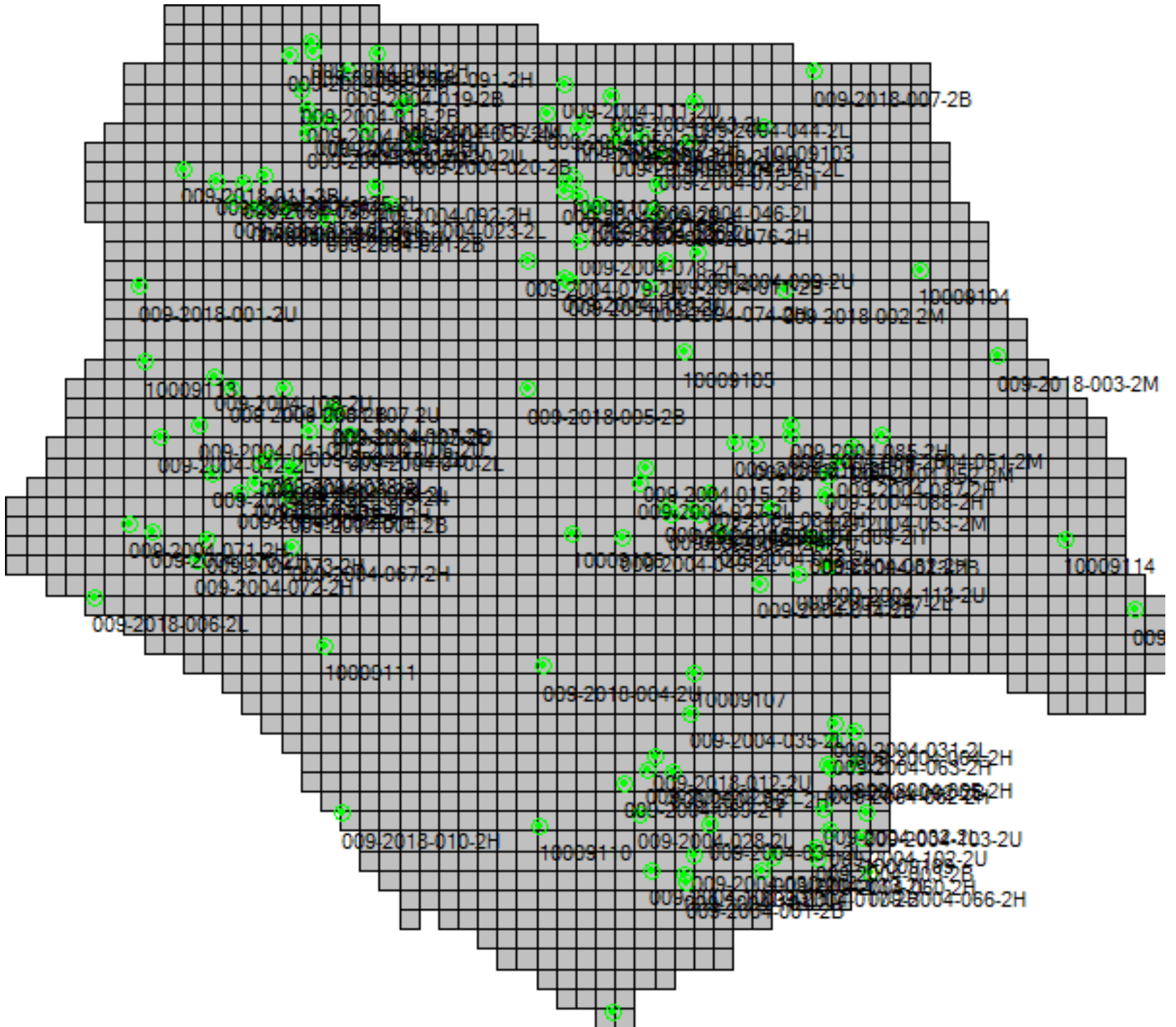
Tile Index Attribute: las_tile

Data Filename: QL1

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	24	0.498		
2H	41		0.810	
2L	30		0.551	
2M	11		1.541	
2U	38	0.359		
Total	144			

Units: US Survey Feet

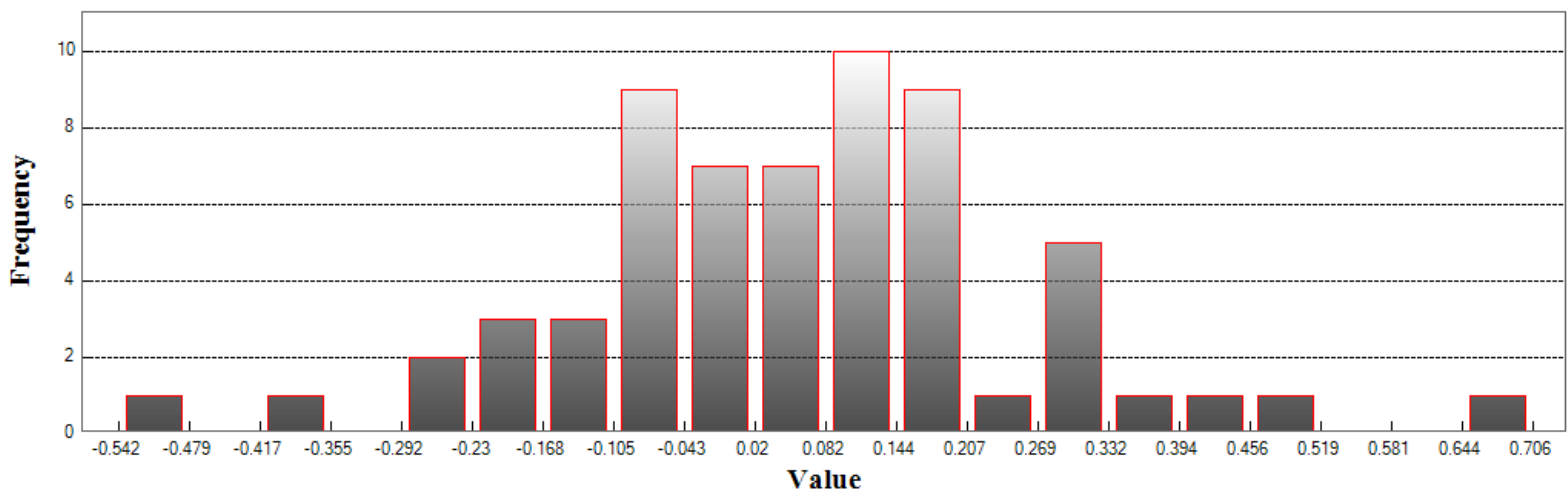


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.542
Maximum DZ: 0.706
Mean DZ: 0.059
Mean Magnitude DZ: 0.404
Number Observations: 62
Standard Deviation DZ: 0.207
RMSE Z: 0.213
95% Confidence Level Z: 0.418
Units: US Survey Feet

Histogram



Min: -0.542
Max: 0.706
Number Of Bins: 20
Bin Interval: 0.062

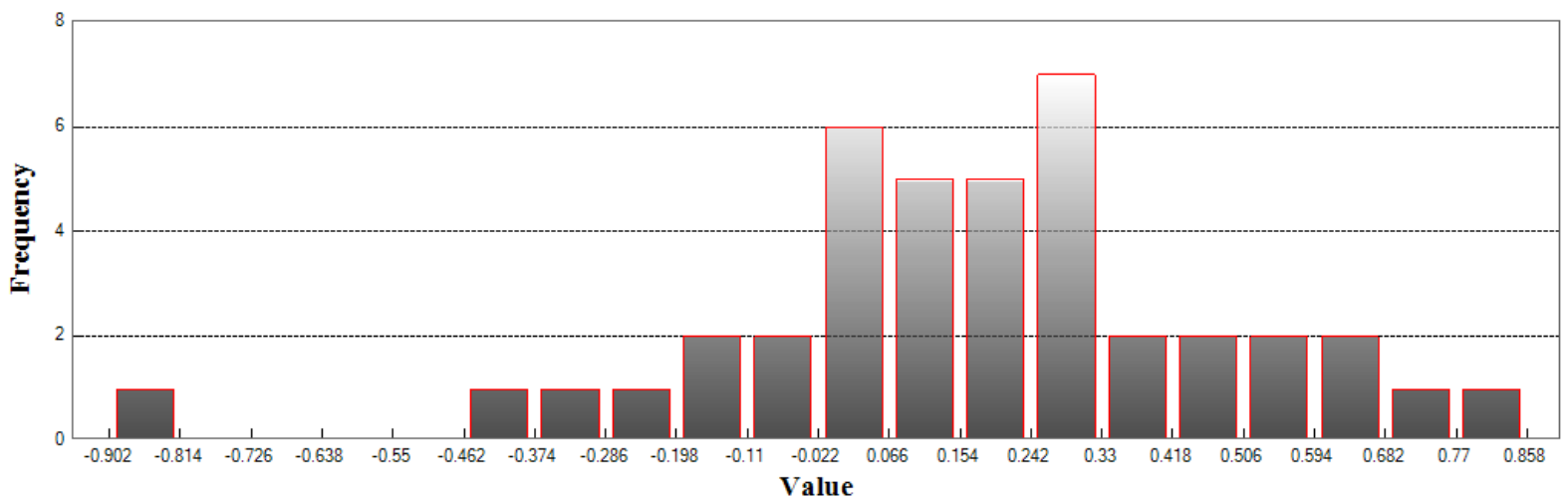


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.902
Maximum DZ: 0.858
Mean DZ: 0.168
Mean Magnitude DZ: 0.532
Number Observations: 41
Standard Deviation DZ: 0.326
RMSE Z: 0.363
95th Percentile: 0.81
Units: US Survey Feet

Histogram



Min: -0.902
Max: 0.858
Number Of Bins: 20
Bin Interval: 0.088

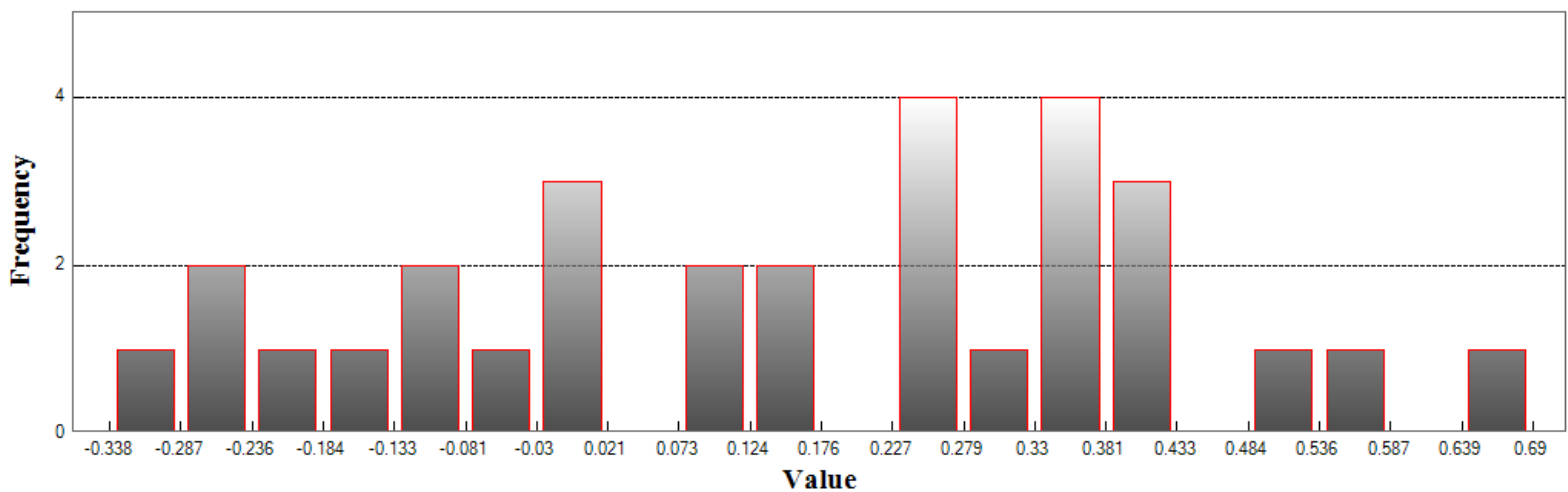


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.339
Maximum DZ: 0.69
Mean DZ: 0.156
Mean Magnitude DZ: 0.508
Number Observations: 30
Standard Deviation DZ: 0.266
RMSE Z: 0.304
95th Percentile: 0.551
Units: US Survey Feet

Histogram



Min: -0.339

Max: 0.69

Number Of Bins: 20

Bin Interval: 0.051

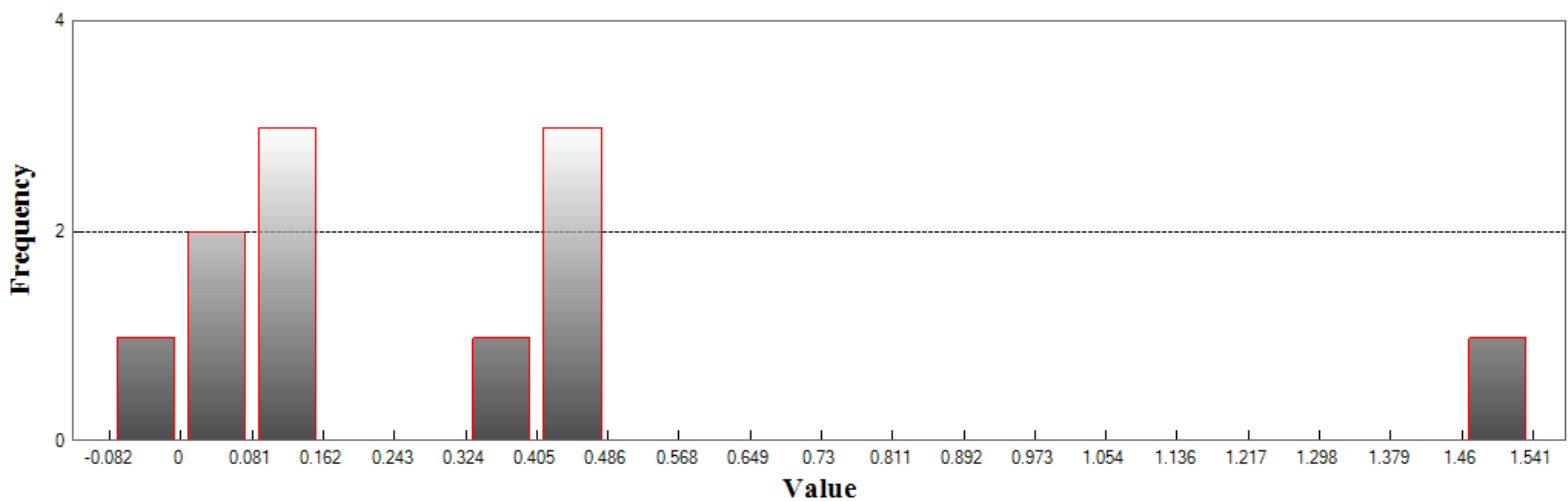


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.082
Maximum DZ: 1.541
Mean DZ: 0.331
Mean Magnitude DZ: 0.588
Number Observations: 11
Standard Deviation DZ: 0.444
RMSE Z: 0.537
95th Percentile: 1.541
Units: US Survey Feet

Histogram



Min: -0.082
Max: 1.541
Number Of Bins: 20
Bin Interval: 0.081

NORTH CAROLINA GEODETIC SURVEY

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4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: avery_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute: las_tile

Data Filename: QL1

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	22	0.619		
2H	43		0.740	
2L	22		0.615	
2M	22		0.555	
2U	39	0.414		
Total	148			

Units: US Survey Feet

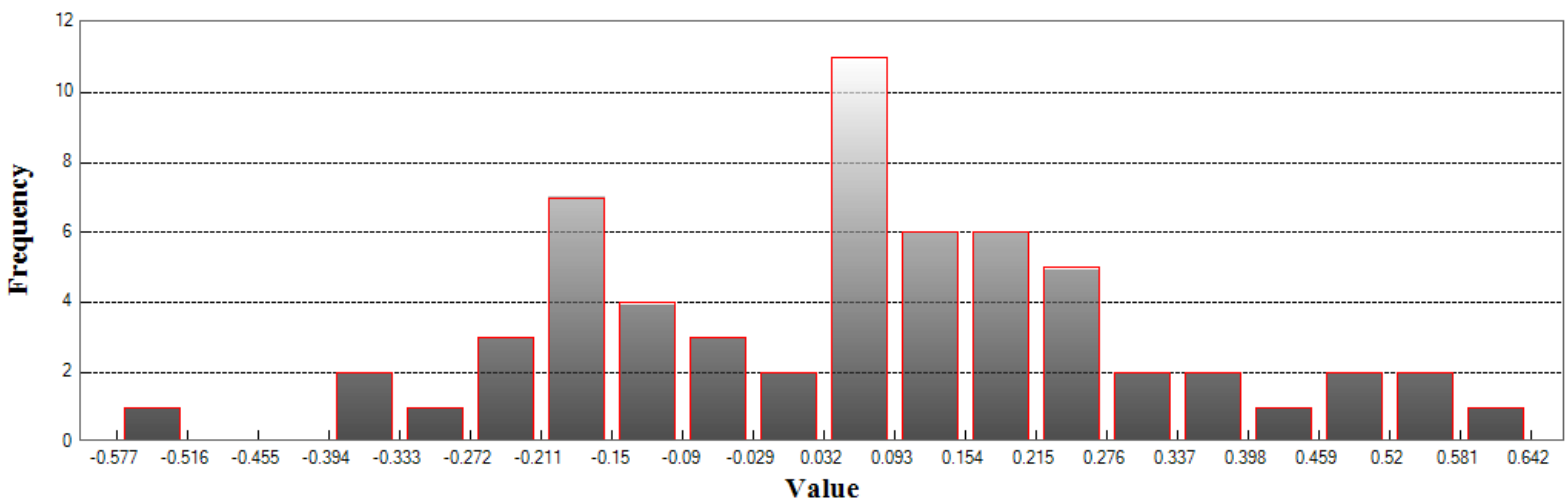


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.577
Maximum DZ: 0.642
Mean DZ: 0.063
Mean Magnitude DZ: 0.451
Number Observations: 61
Standard Deviation DZ: 0.248
RMSE Z: 0.254
95% Confidence Level Z: 0.498
Units: US Survey Feet

Histogram



Min: -0.577
Max: 0.642
Number Of Bins: 20
Bin Interval: 0.061

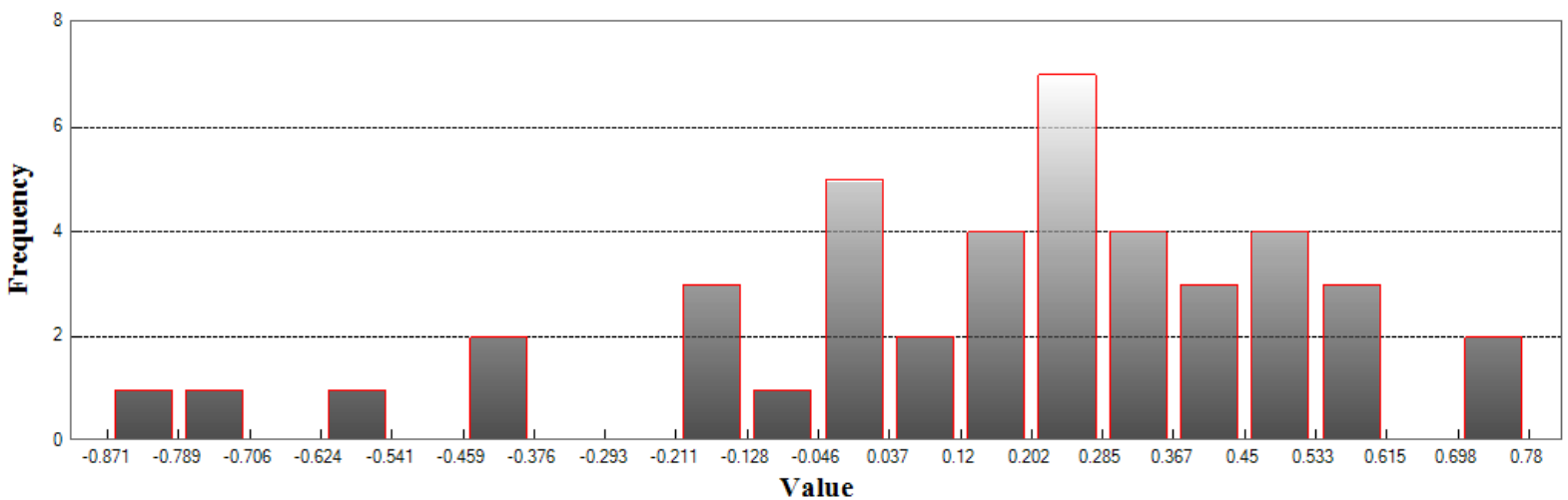


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.871
Maximum DZ: 0.781
Mean DZ: 0.151
Mean Magnitude DZ: 0.568
Number Observations: 43
Standard Deviation DZ: 0.367
RMSE Z: 0.393
95th Percentile: 0.74
Units: US Survey Feet

Histogram



Min: -0.871

Max: 0.781

Number Of Bins: 20

Bin Interval: 0.083

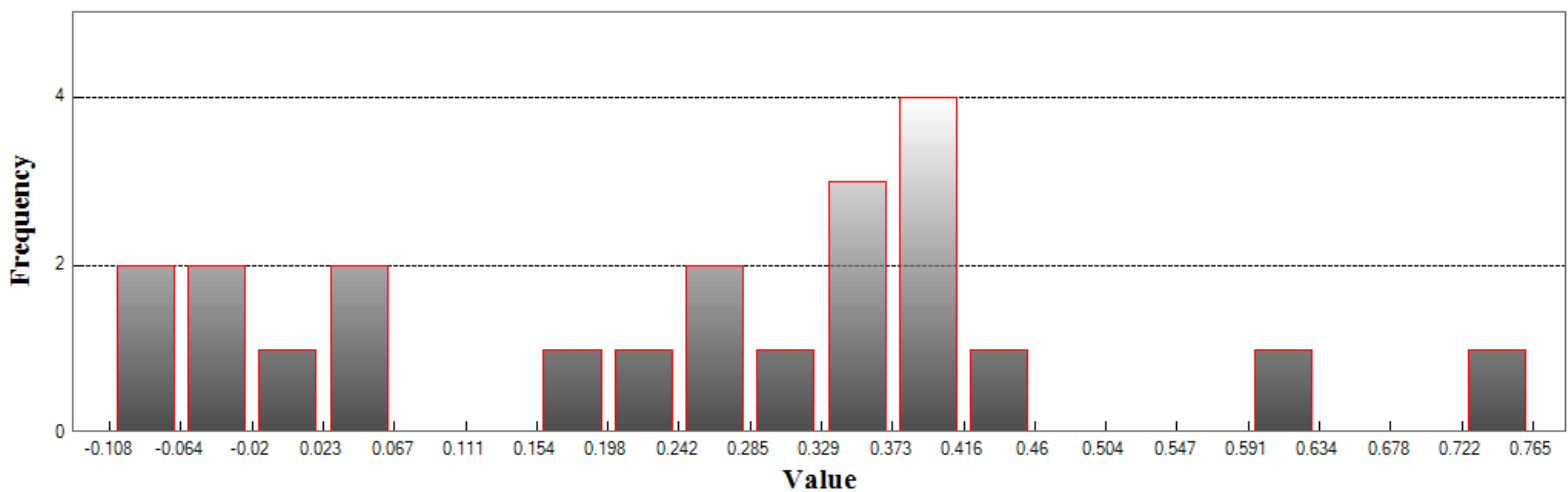


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.108
Maximum DZ: 0.765
Mean DZ: 0.247
Mean Magnitude DZ: 0.526
Number Observations: 22
Standard Deviation DZ: 0.233
RMSE Z: 0.336
95th Percentile: 0.615
Units: US Survey Feet

Histogram



Min: -0.108

Max: 0.765

Number Of Bins: 20

Bin Interval: 0.044

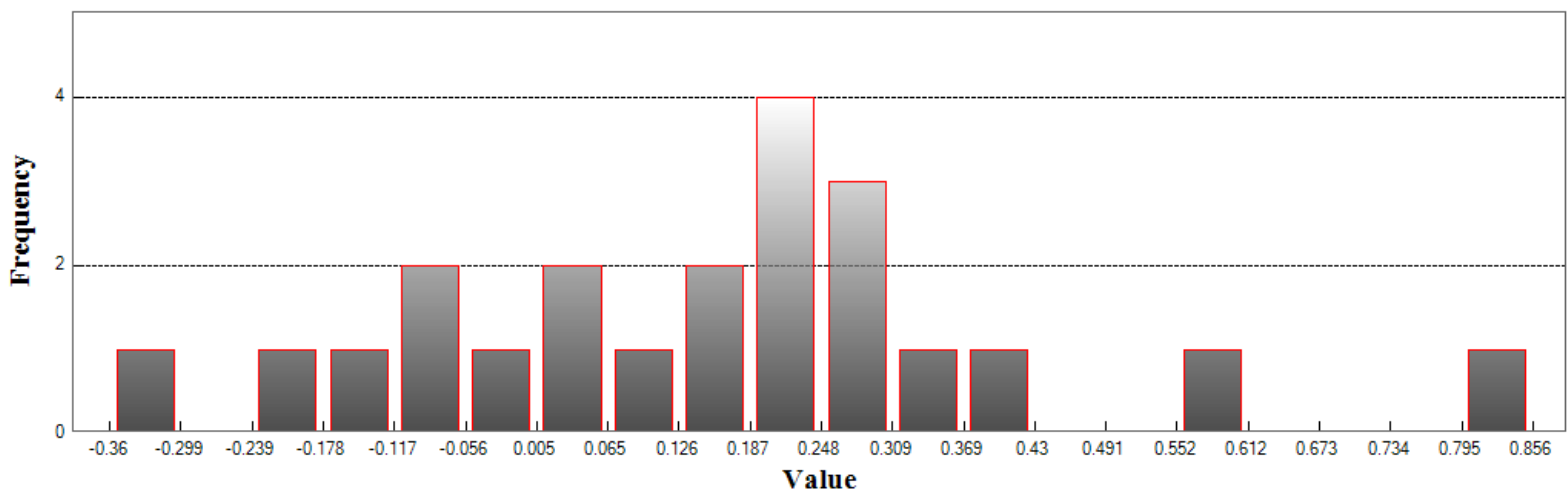


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.36
Maximum DZ: 0.856
Mean DZ: 0.151
Mean Magnitude DZ: 0.491
Number Observations: 22
Standard Deviation DZ: 0.268
RMSE Z: 0.302
95th Percentile: 0.555
Units: US Survey Feet

Histogram



Min: -0.36

Max: 0.856

Number Of Bins: 20

Bin Interval: 0.061

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Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: buncombe_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

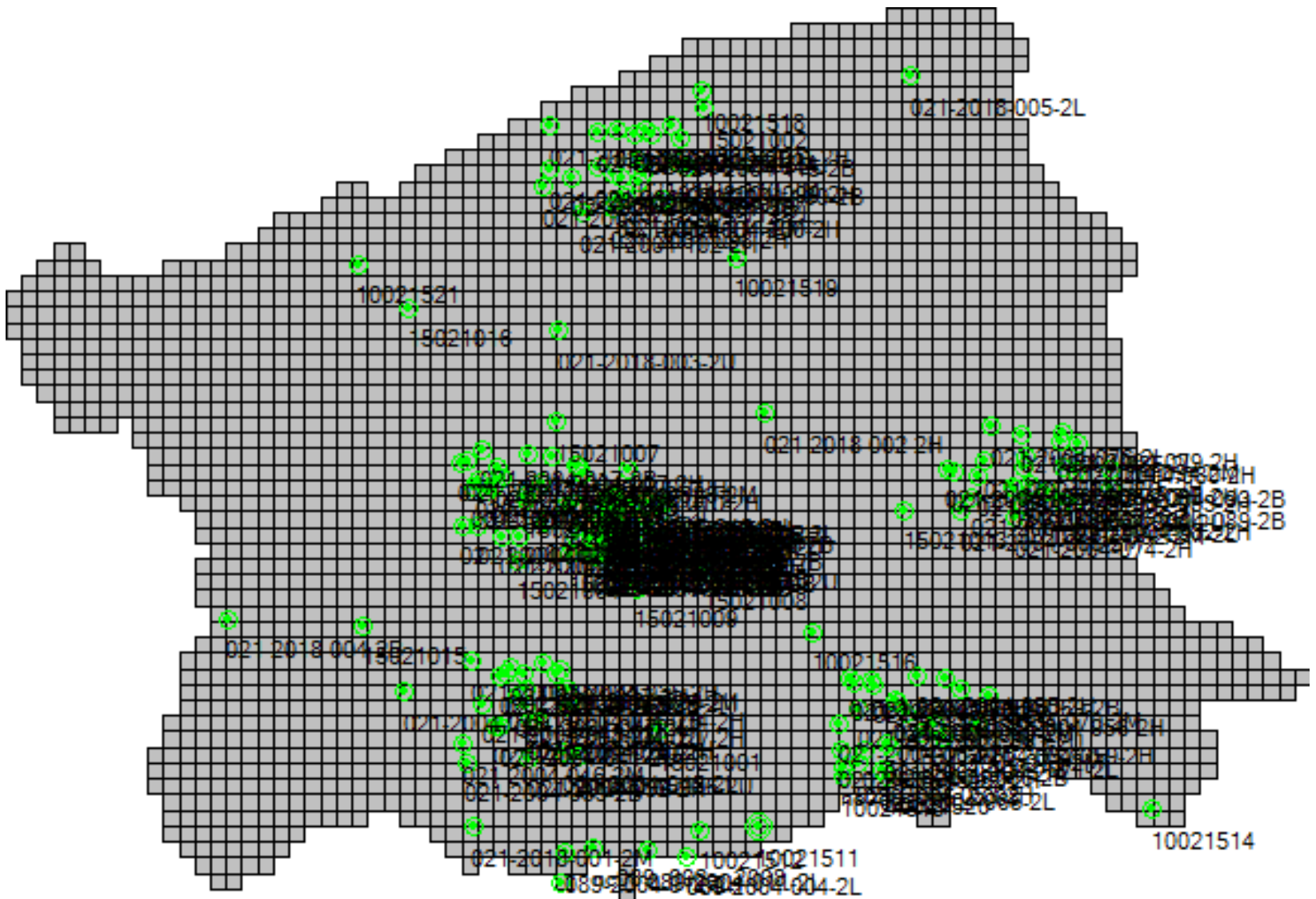
Tile Index Attribute: las_tile

Data Filename: Masspoints

Number of Data Files Matching Attribute: 2153 out of 2153



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	39	0.639		
2H	47		0.721	
2L	26		0.566	
2M	27		0.743	
2U	63	0.406		
Total	202			

Units: US Survey Feet

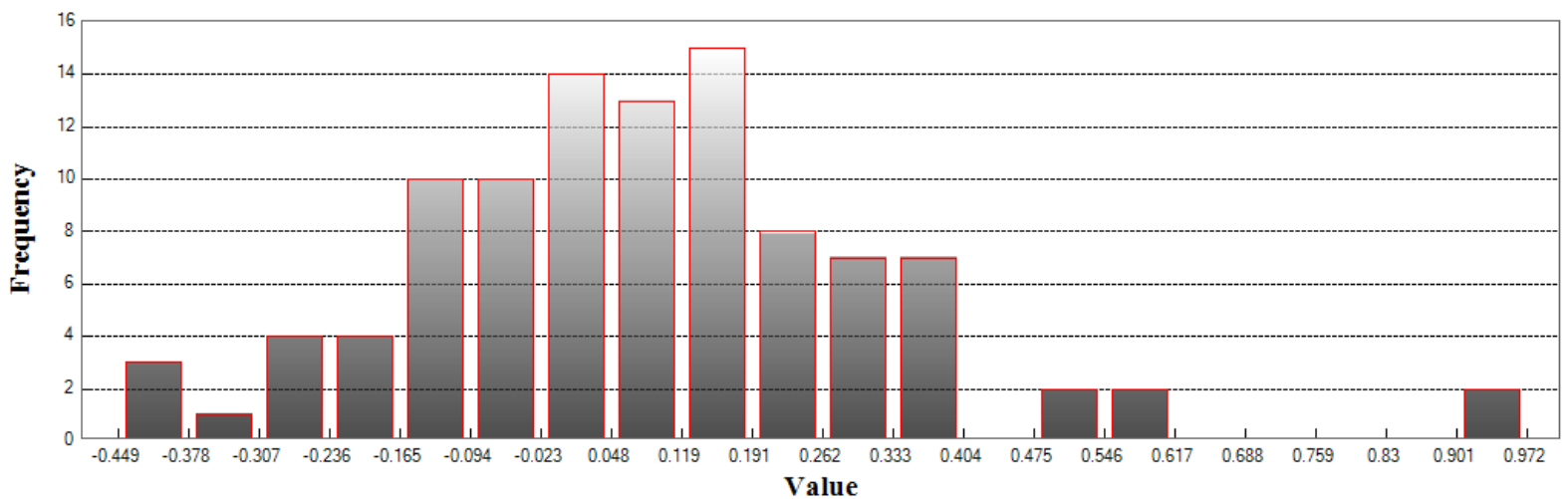


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.45
Maximum DZ: 0.972
Mean DZ: 0.086
Mean Magnitude DZ: 0.439
Number Observations: 102
Standard Deviation DZ: 0.246
RMSE Z: 0.259
95% Confidence Level Z: 0.508
Units: US Survey Feet

Histogram



Min: -0.45
Max: 0.972
Number Of Bins: 20
Bin Interval: 0.071

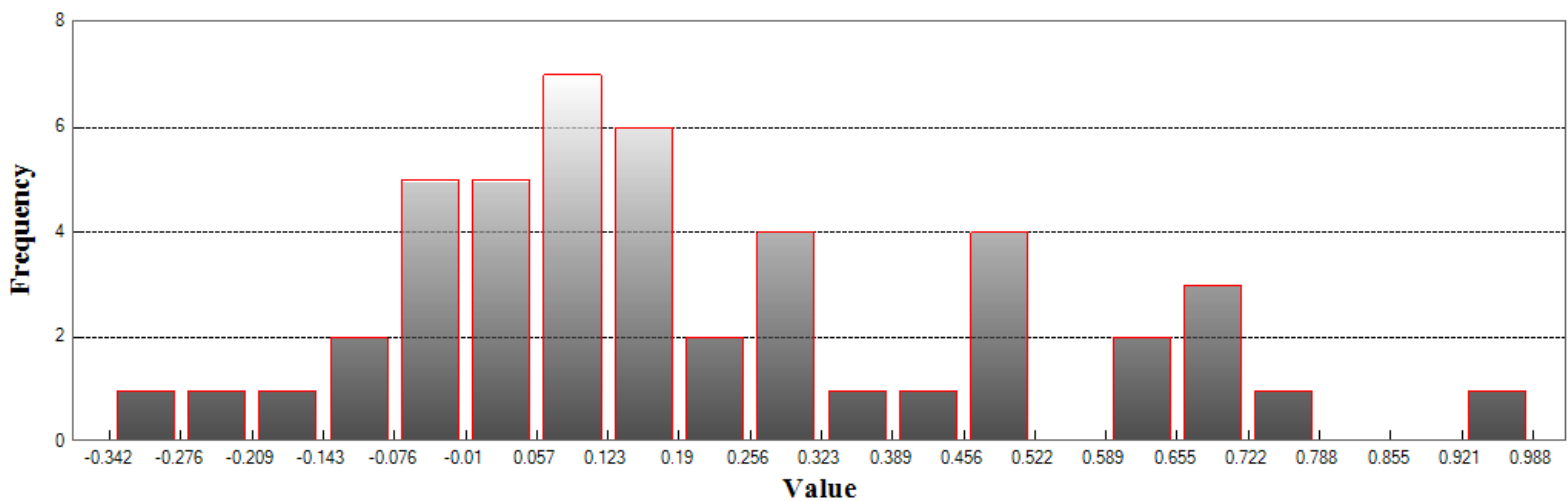


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.342
Maximum DZ: 0.988
Mean DZ: 0.212
Mean Magnitude DZ: 0.51
Number Observations: 47
Standard Deviation DZ: 0.287
RMSE Z: 0.355
95th Percentile: 0.721
Units: US Survey Feet

Histogram



Min: -0.342

Max: 0.988

Number Of Bins: 20

Bin Interval: 0.066

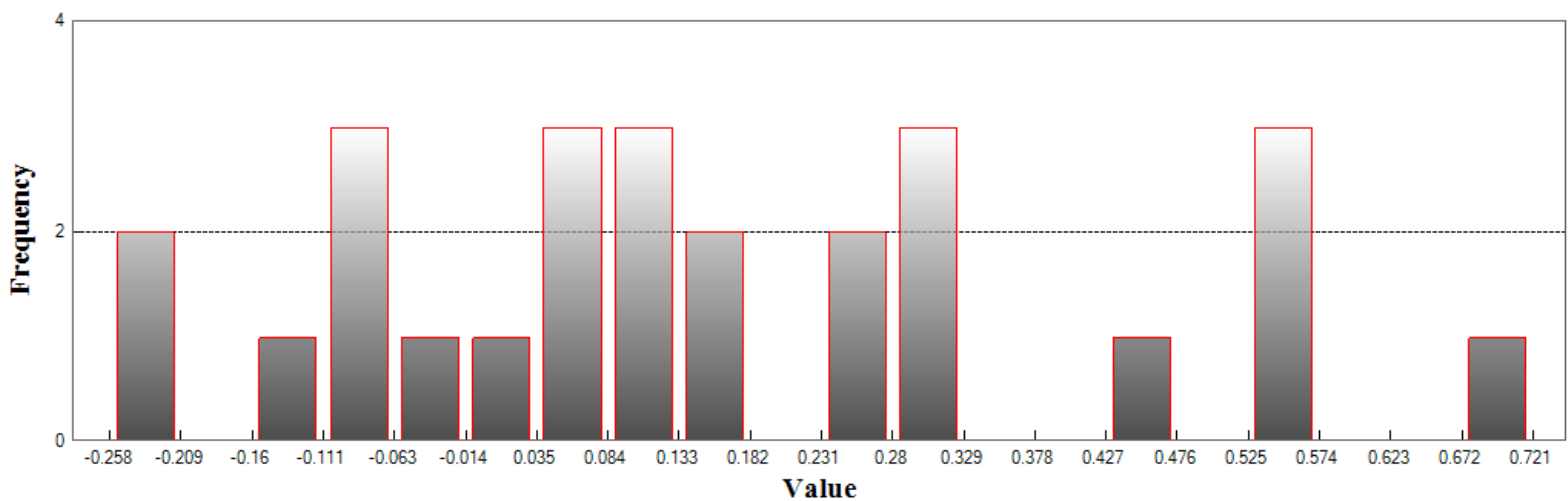


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.258
Maximum DZ: 0.721
Mean DZ: 0.162
Mean Magnitude DZ: 0.479
Number Observations: 26
Standard Deviation DZ: 0.253
RMSE Z: 0.297
95th Percentile: 0.566
Units: US Survey Feet

Histogram



Min: -0.258

Max: 0.721

Number Of Bins: 20

Bin Interval: 0.049

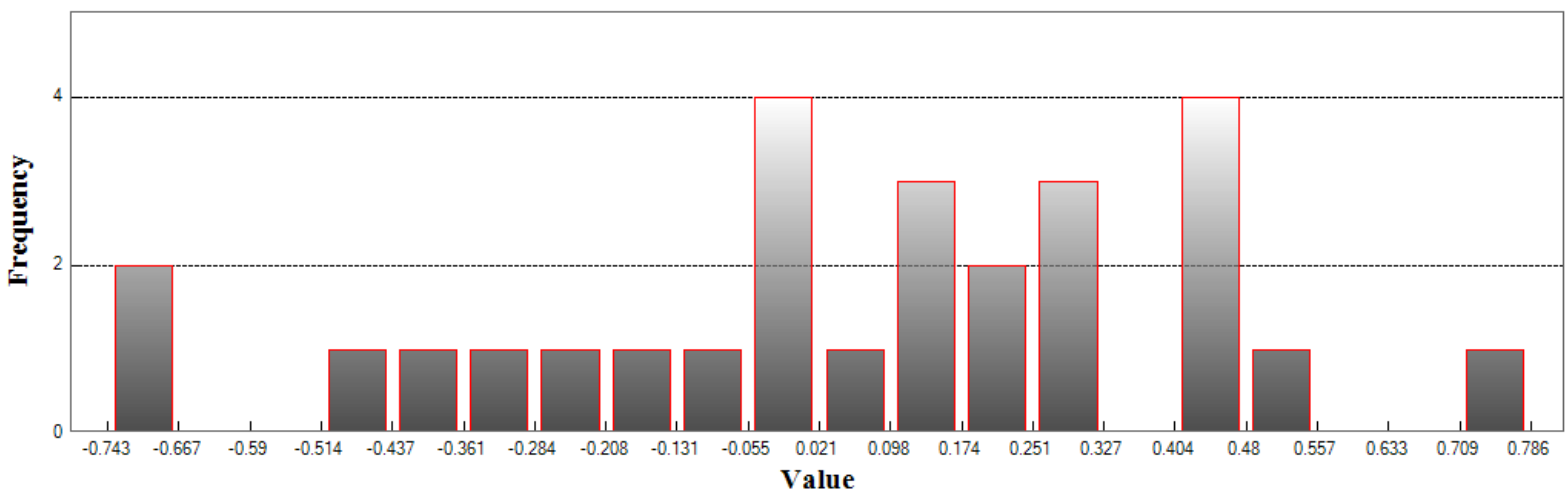


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.743
Maximum DZ: 0.786
Mean DZ: 0.066
Mean Magnitude DZ: 0.549
Number Observations: 27
Standard Deviation DZ: 0.372
RMSE Z: 0.371
95th Percentile: 0.743
Units: US Survey Feet

Histogram



Min: -0.743

Max: 0.786

Number Of Bins: 20

Bin Interval: 0.076

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4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: burke_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

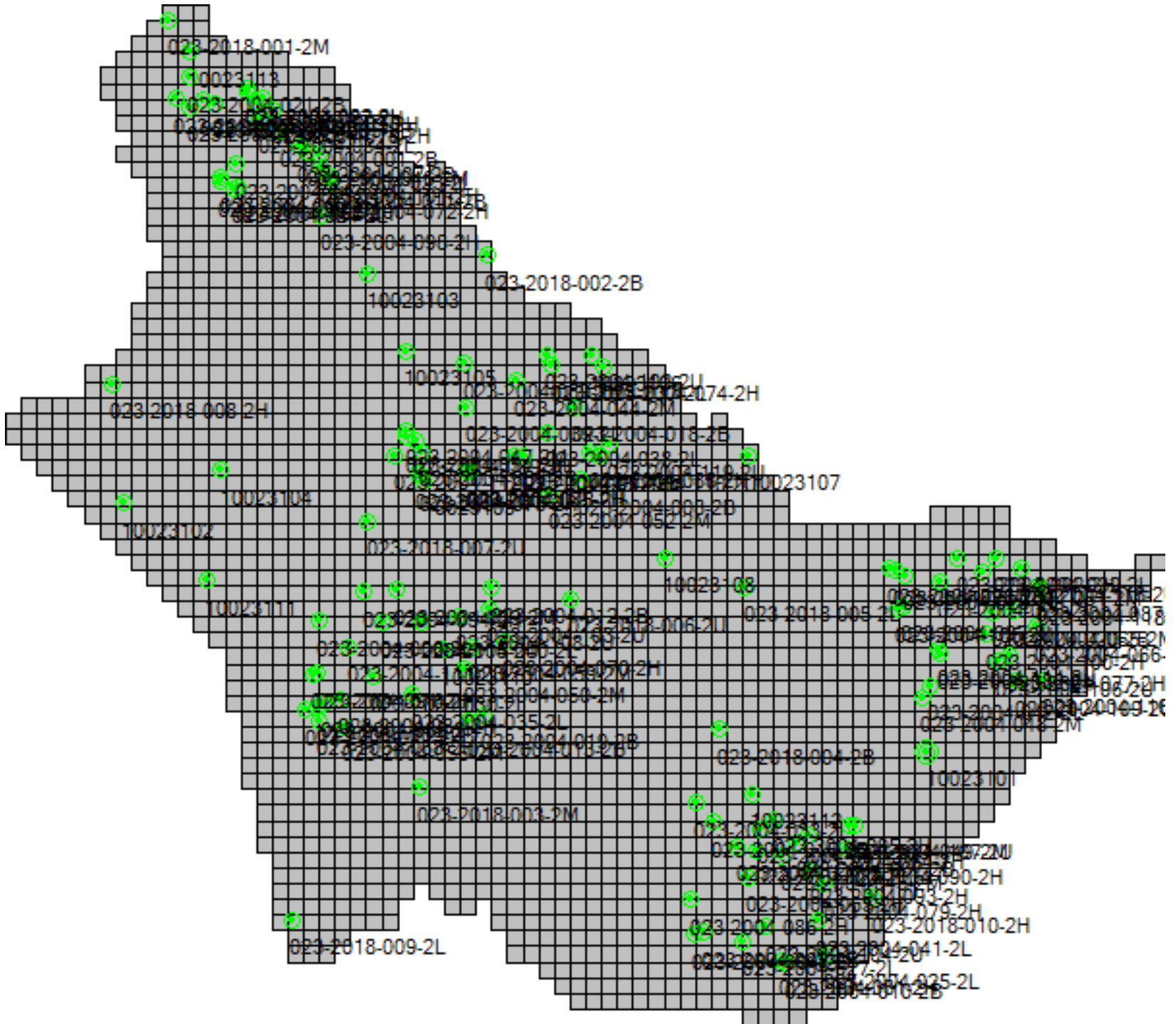
Tile Index Attribute: las_file

Data Filename: Masspoints

Number of Data Files Matching Attribute: 2333 out of 2333



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA
LAS			
2B	23	0.658	
2H	42		0.689
2L	23		0.460
2M	21		0.752
2U	34	0.468	
Total	143		

Units: US Survey Feet

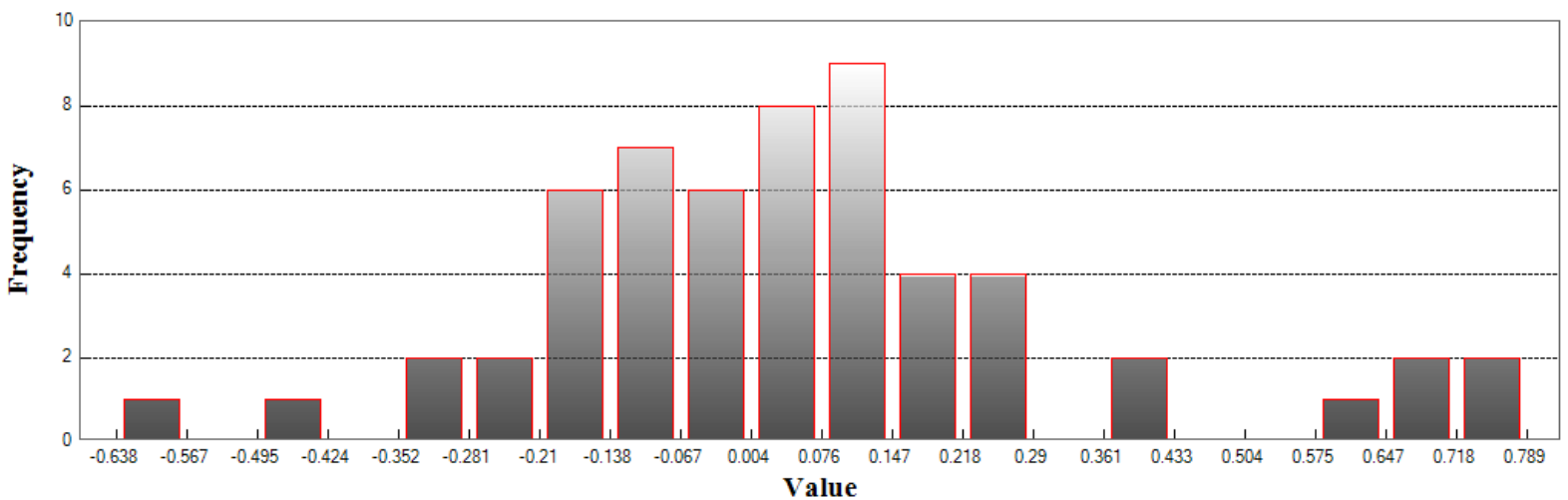


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.638
Maximum DZ: 0.789
Mean DZ: 0.057
Mean Magnitude DZ: 0.446
Number Observations: 57
Standard Deviation DZ: 0.278
RMSE Z: 0.282
95% Confidence Level Z: 0.552
Units: US Survey Feet

Histogram



Min: -0.638
Max: 0.789
Number Of Bins: 20
Bin Interval: 0.071

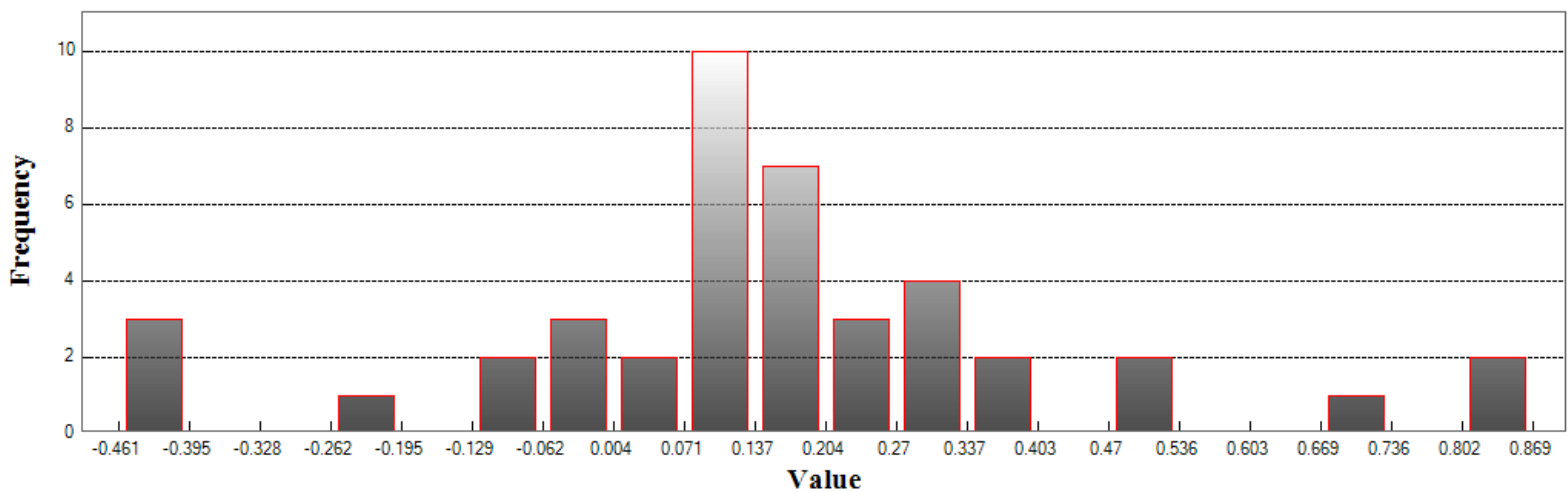


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.461
Maximum DZ: 0.869
Mean DZ: 0.156
Mean Magnitude DZ: 0.492
Number Observations: 42
Standard Deviation DZ: 0.279
RMSE Z: 0.317
95th Percentile: 0.689
Units: US Survey Feet

Histogram



Min: -0.461

Max: 0.869

Number Of Bins: 20

Bin Interval: 0.066

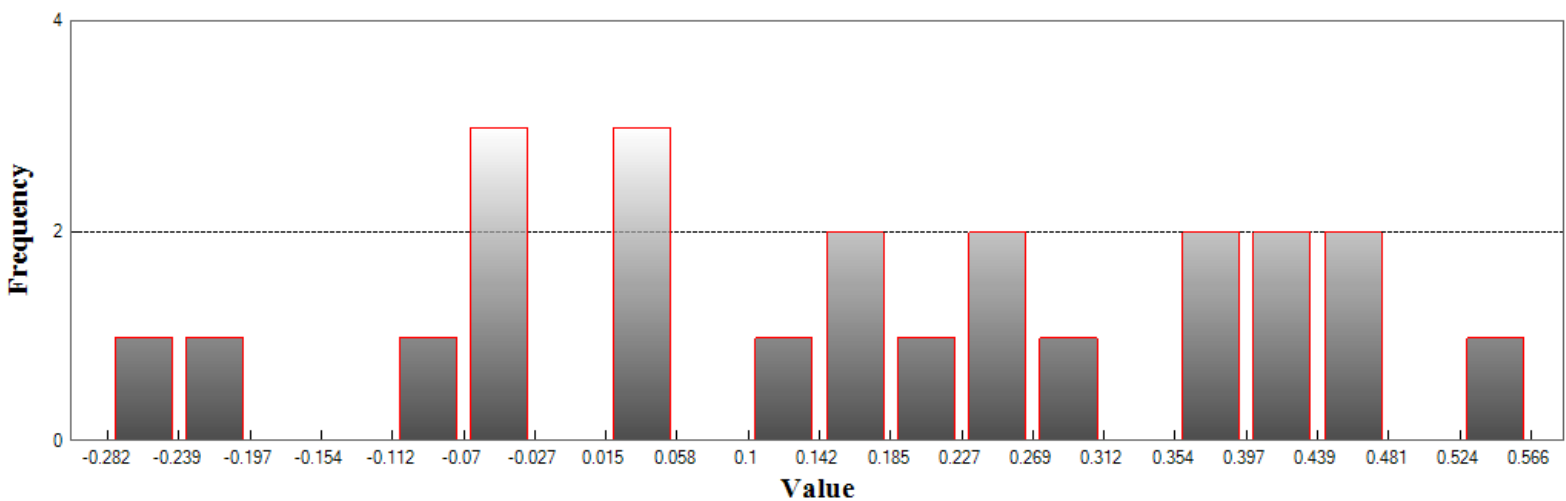


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.281
Maximum DZ: 0.566
Mean DZ: 0.169
Mean Magnitude DZ: 0.484
Number Observations: 23
Standard Deviation DZ: 0.232
RMSE Z: 0.283
95th Percentile: 0.46
Units: US Survey Feet

Histogram



Min: -0.281

Max: 0.566

Number Of Bins: 20

Bin Interval: 0.042

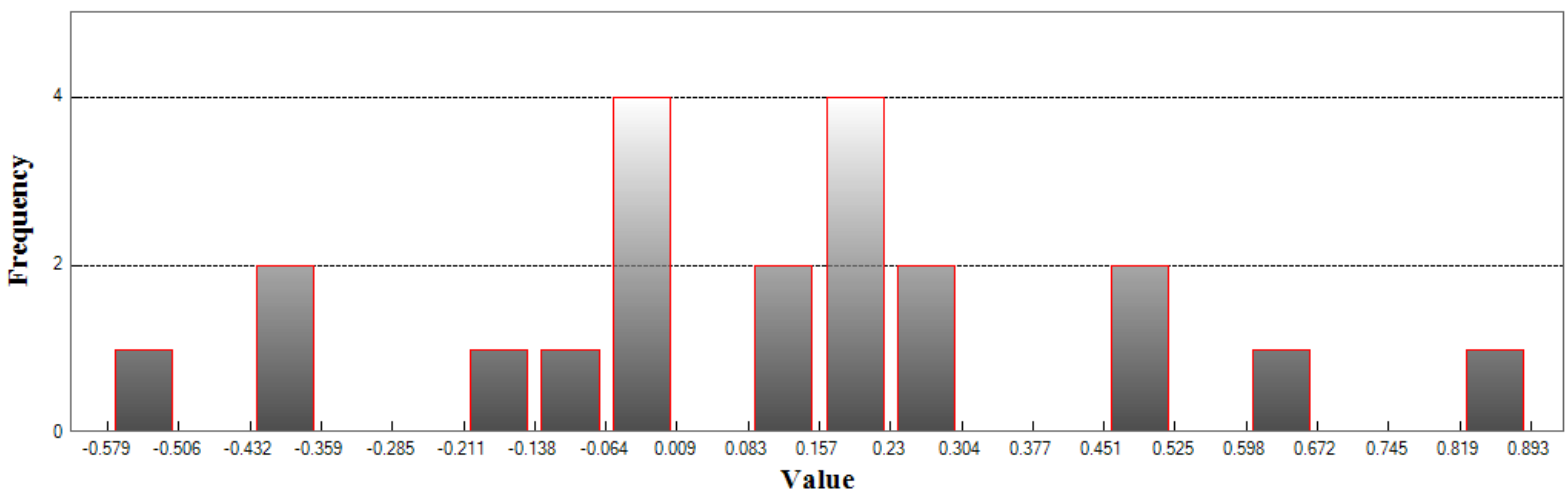


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.58
Maximum DZ: 0.892
Mean DZ: 0.11
Mean Magnitude DZ: 0.525
Number Observations: 21
Standard Deviation DZ: 0.346
RMSE Z: 0.356
95th Percentile: 0.752
Units: US Survey Feet

Histogram



Min: -0.58

Max: 0.892

Number Of Bins: 20

Bin Interval: 0.074

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: caldwell_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

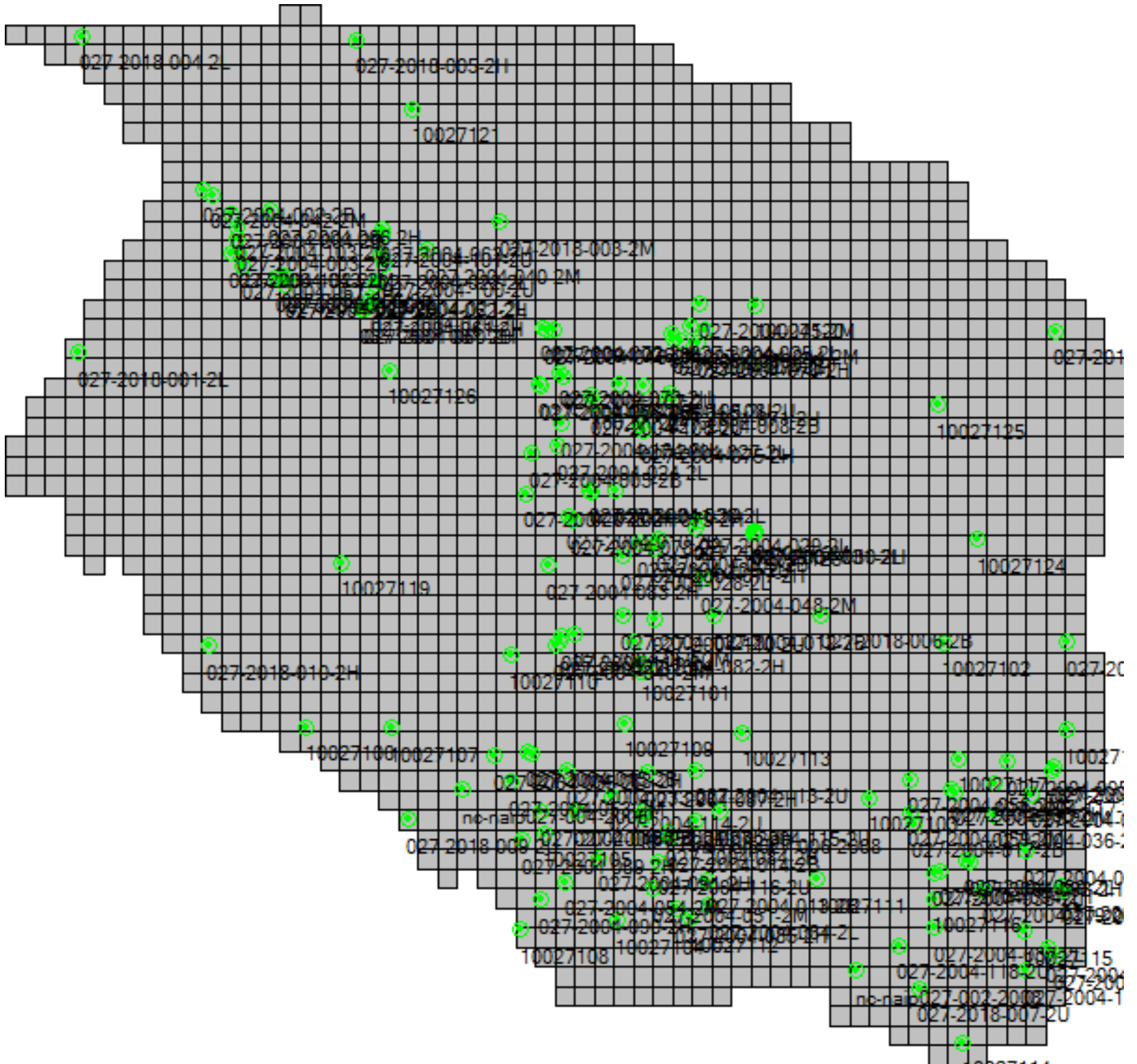
Tile Index Attribute: las_tile

Data Filename: Masspoints

Number of Data Files Matching Attribute: 2153 out of 2153



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	21	0.461		
2H	42		0.549	
2L	22		0.330	
2M	22		0.585	
2U	52	0.246		
Total	159			

Units: US Survey Feet

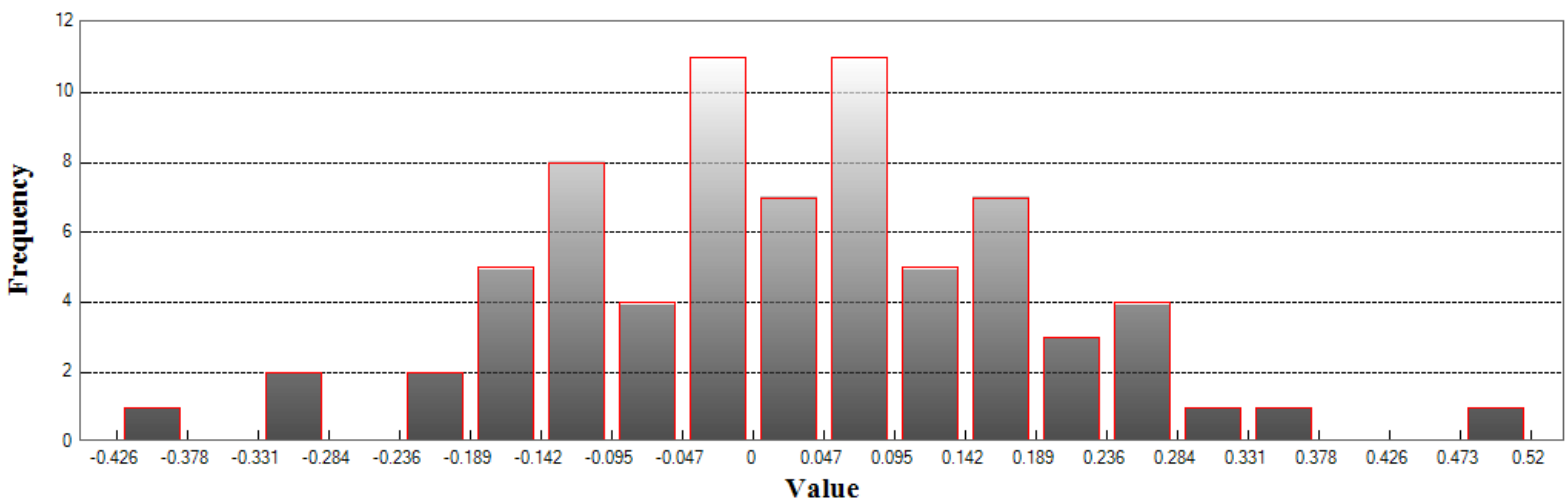


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.426
Maximum DZ: 0.52
Mean DZ: 0.026
Mean Magnitude DZ: 0.357
Number Observations: 73
Standard Deviation DZ: 0.164
RMSE Z: 0.165
95% Confidence Level Z: 0.323
Units: US Survey Feet

Histogram



Min: -0.426

Max: 0.52

Number Of Bins: 20

Bin Interval: 0.047

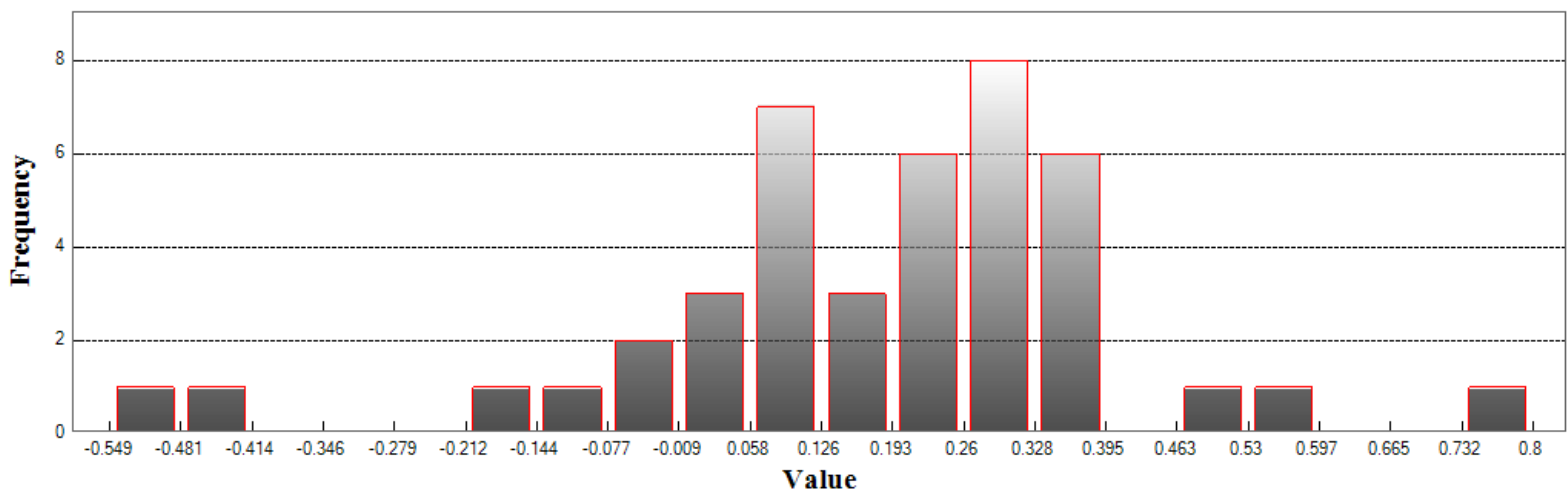


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.549
Maximum DZ: 0.799
Mean DZ: 0.179
Mean Magnitude DZ: 0.493
Number Observations: 42
Standard Deviation DZ: 0.235
RMSE Z: 0.293
95th Percentile: 0.549
Units: US Survey Feet

Histogram



Min: -0.549

Max: 0.799

Number Of Bins: 20

Bin Interval: 0.067

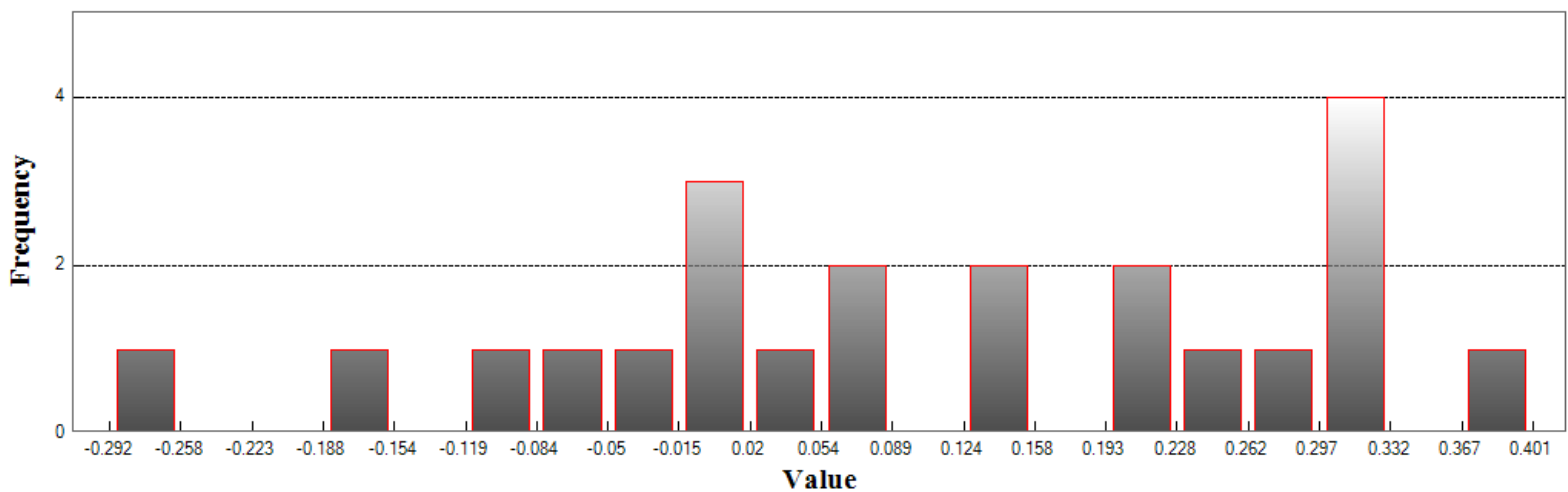


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.292
Maximum DZ: 0.402
Mean DZ: 0.114
Mean Magnitude DZ: 0.414
Number Observations: 22
Standard Deviation DZ: 0.182
RMSE Z: 0.211
95th Percentile: 0.33
Units: US Survey Feet

Histogram



Min: -0.292

Max: 0.402

Number Of Bins: 20

Bin Interval: 0.035

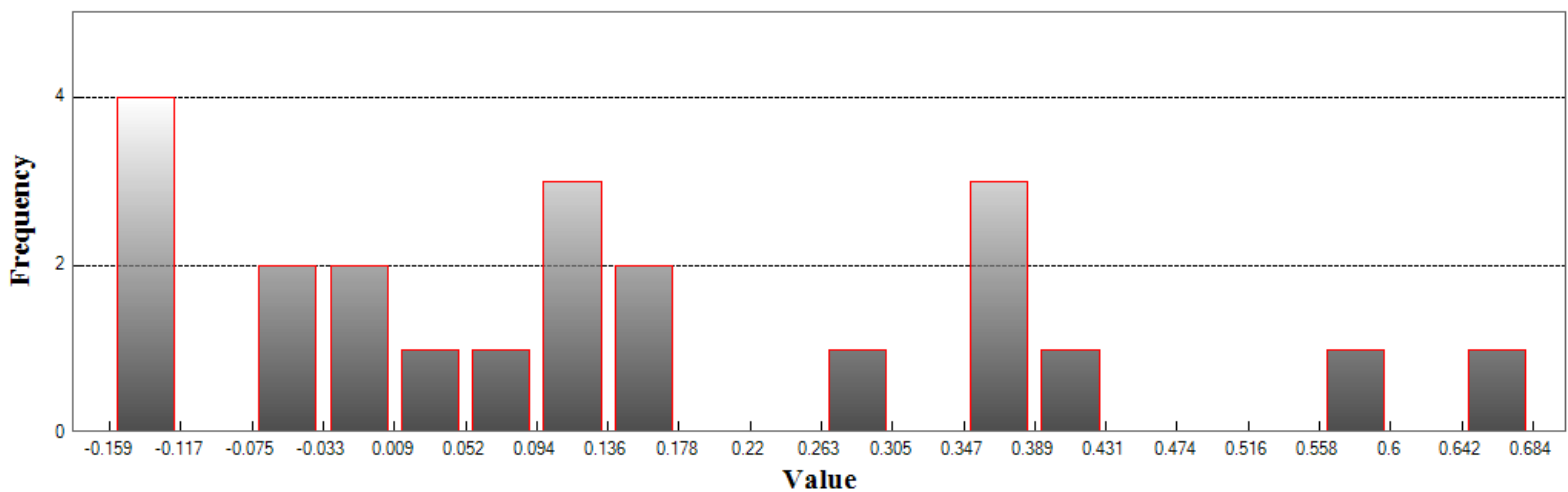


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.159
Maximum DZ: 0.685
Mean DZ: 0.144
Mean Magnitude DZ: 0.455
Number Observations: 22
Standard Deviation DZ: 0.24
RMSE Z: 0.276
95th Percentile: 0.585
Units: US Survey Feet

Histogram



Min: -0.159

Max: 0.685

Number Of Bins: 20

Bin Interval: 0.042

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: cherokee_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

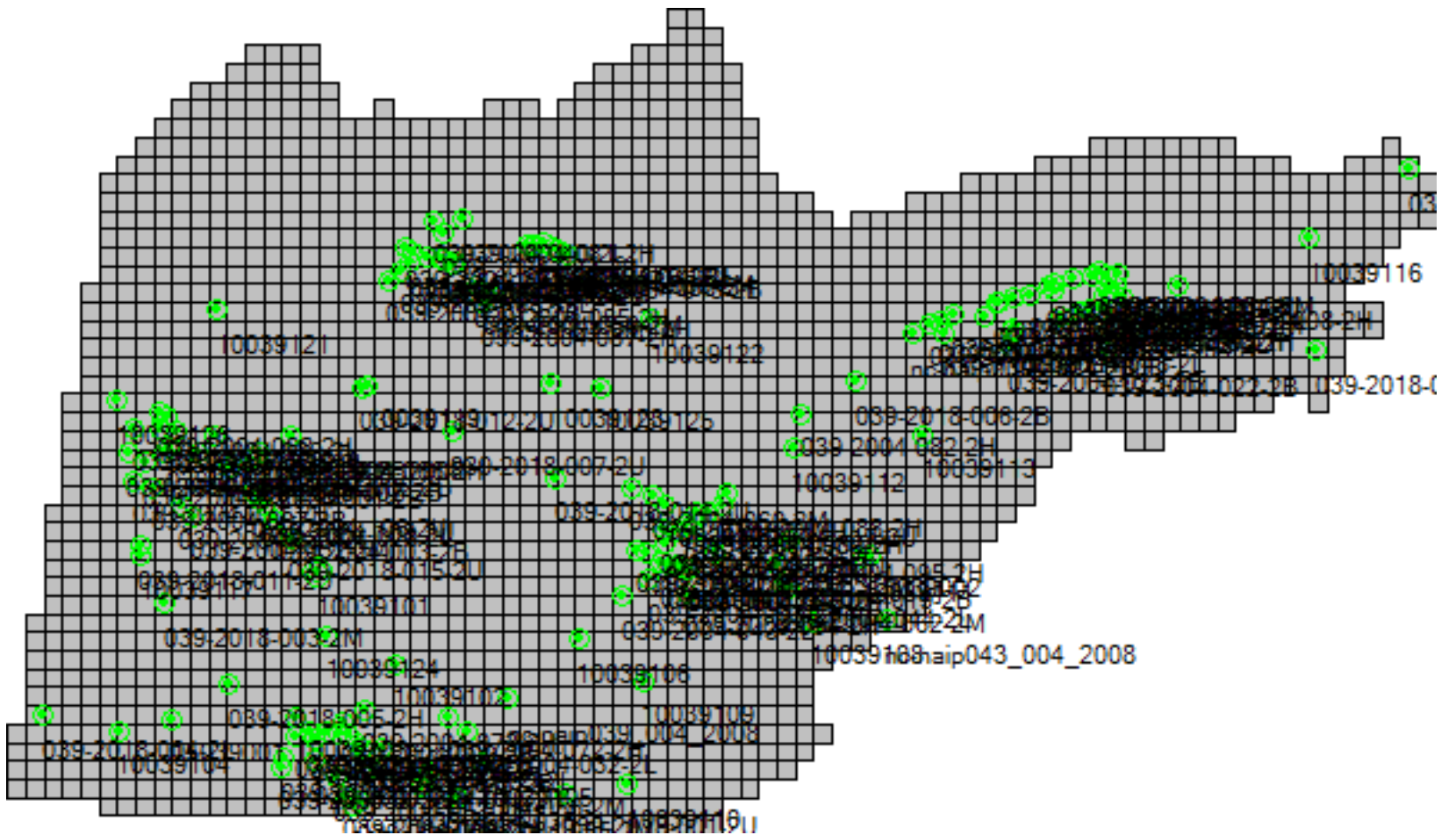
Tile Index Attribute: las_tile

Data Filename: QL1

Number of Data Files Matching Attribute: 1749 out of 1749



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	28	0.507		
2H	42		0.876	
2L	25		0.829	
2M	18		0.782	
2U	58	0.586		
Total	171			

Units: US Survey Feet

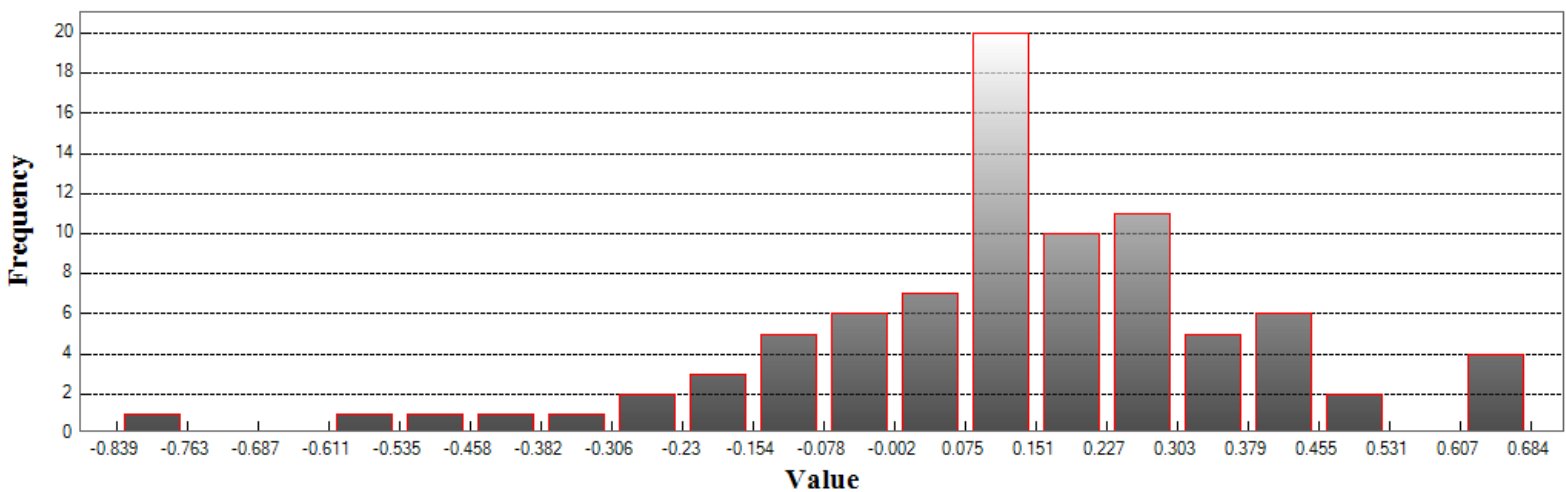


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.839
Maximum DZ: 0.684
Mean DZ: 0.126
Mean Magnitude DZ: 0.477
Number Observations: 86
Standard Deviation DZ: 0.259
RMSE Z: 0.287
95% Confidence Level Z: 0.562
Units: US Survey Feet

Histogram



Min: -0.839
Max: 0.684
Number Of Bins: 20
Bin Interval: 0.076

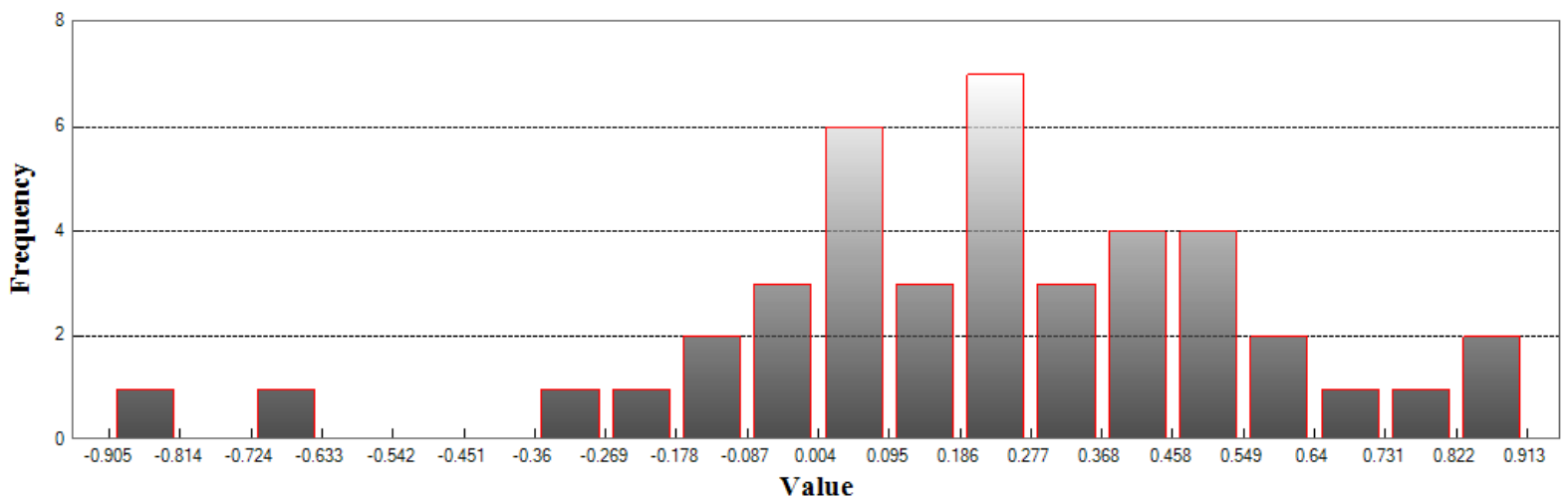


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.905
Maximum DZ: 0.914
Mean DZ: 0.21
Mean Magnitude DZ: 0.574
Number Observations: 42
Standard Deviation DZ: 0.364
RMSE Z: 0.416
95th Percentile: 0.876
Units: US Survey Feet

Histogram



Min: -0.905
Max: 0.914
Number Of Bins: 20
Bin Interval: 0.091

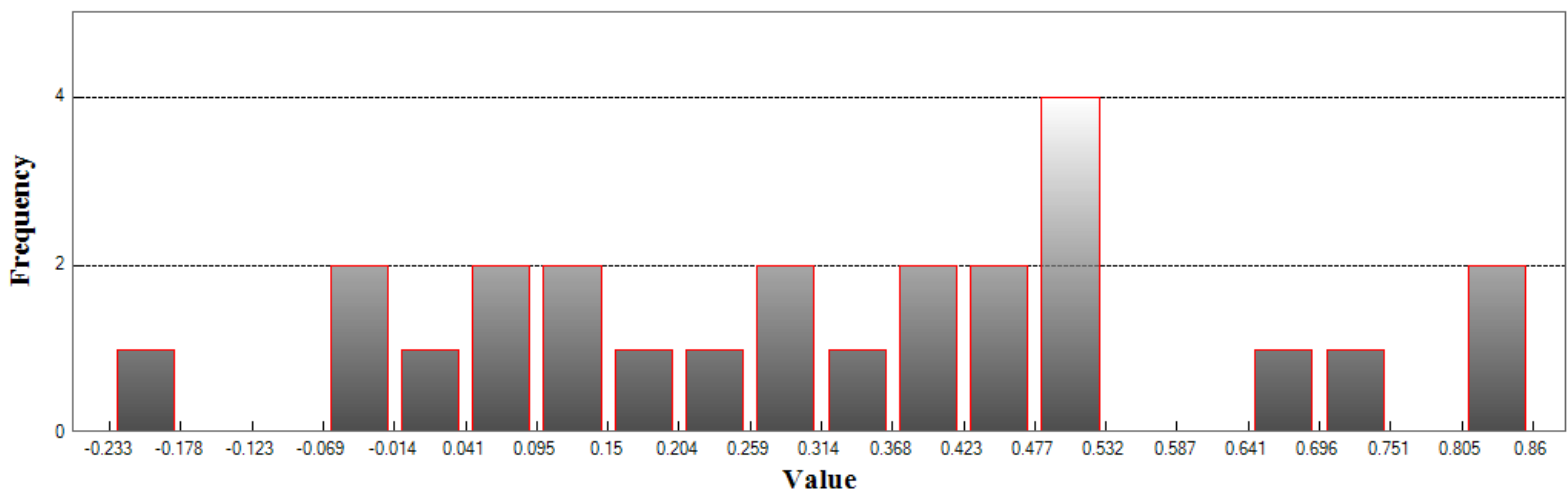


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.232
Maximum DZ: 0.86
Mean DZ: 0.333
Mean Magnitude DZ: 0.597
Number Observations: 25
Standard Deviation DZ: 0.283
RMSE Z: 0.433
95th Percentile: 0.829
Units: US Survey Feet

Histogram



Min: -0.232

Max: 0.86

Number Of Bins: 20

Bin Interval: 0.055

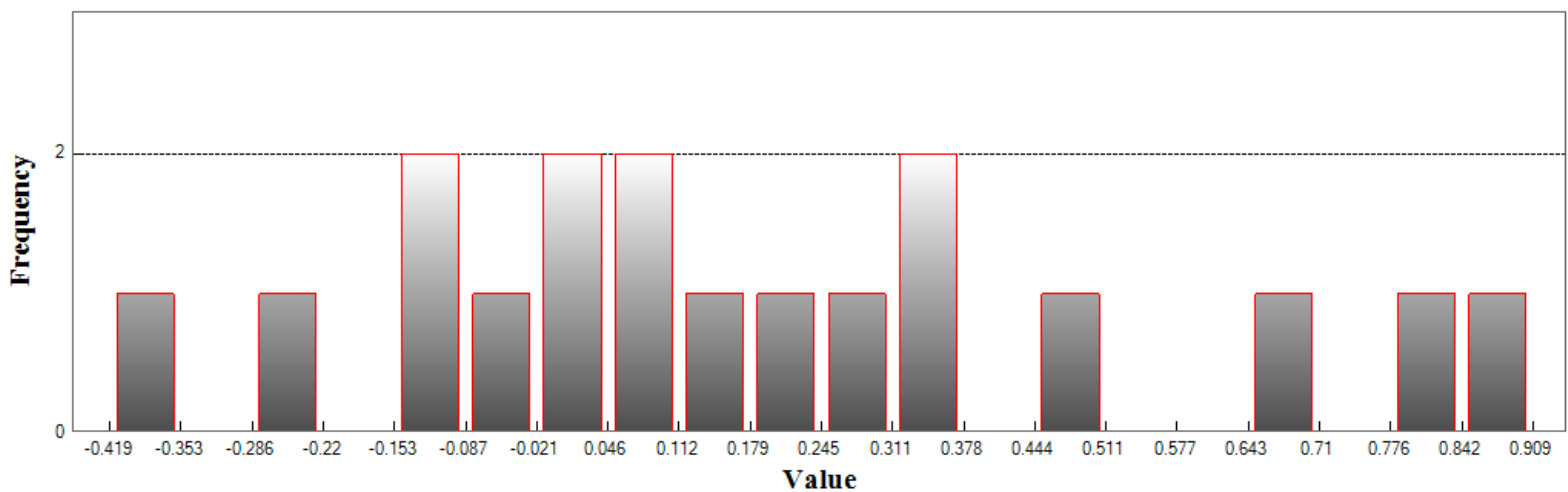


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.419
Maximum DZ: 0.909
Mean DZ: 0.19
Mean Magnitude DZ: 0.55
Number Observations: 18
Standard Deviation DZ: 0.361
RMSE Z: 0.399
95th Percentile: 0.782
Units: US Survey Feet

Histogram



Min: -0.419

Max: 0.909

Number Of Bins: 20

Bin Interval: 0.066

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: clay_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

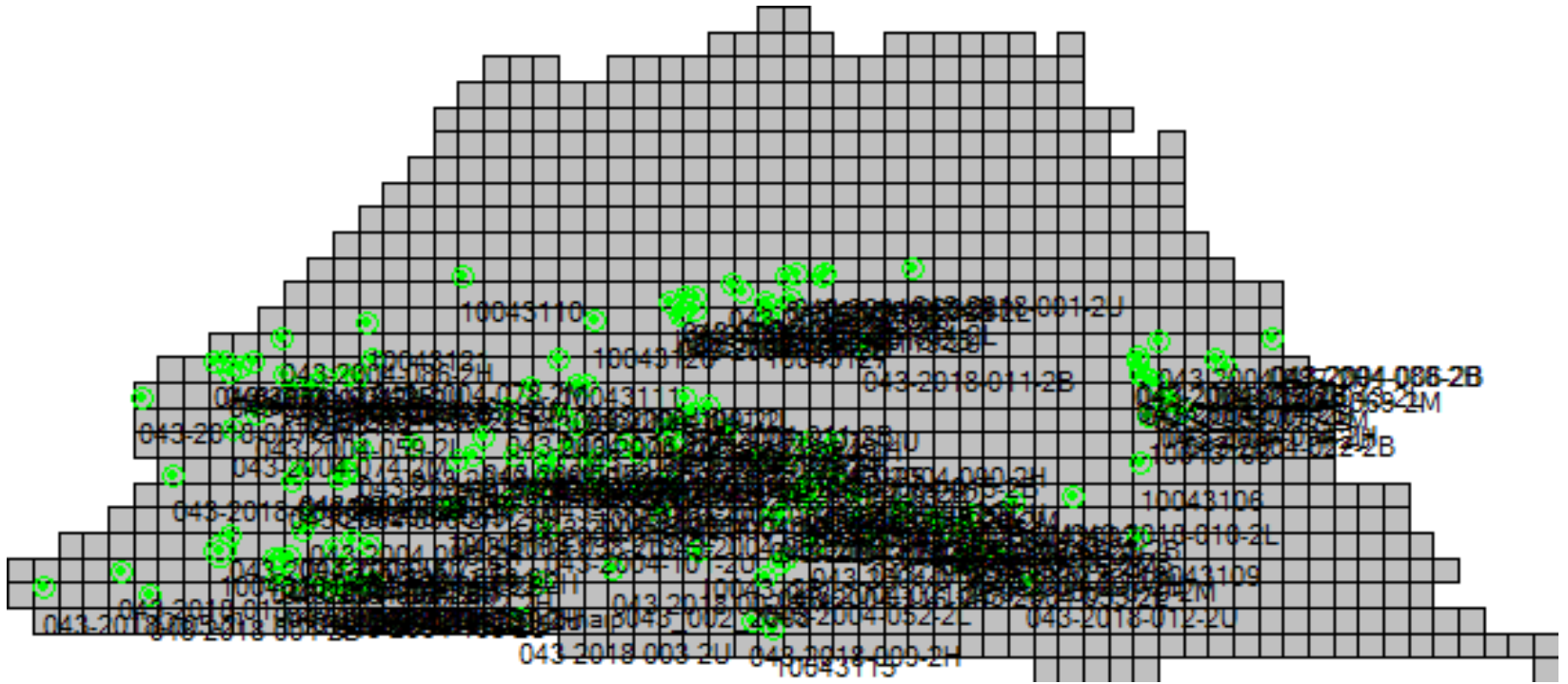
Tile Index Attribute: las_tile

Data Filename: QL1

Number of Data Files Matching Attribute: 1749 out of 1749



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	34	0.657		
2H	21		0.887	
2L	33		0.640	
2M	19		0.943	
2U	57	0.558		
Total	164			

Units: US Survey Feet

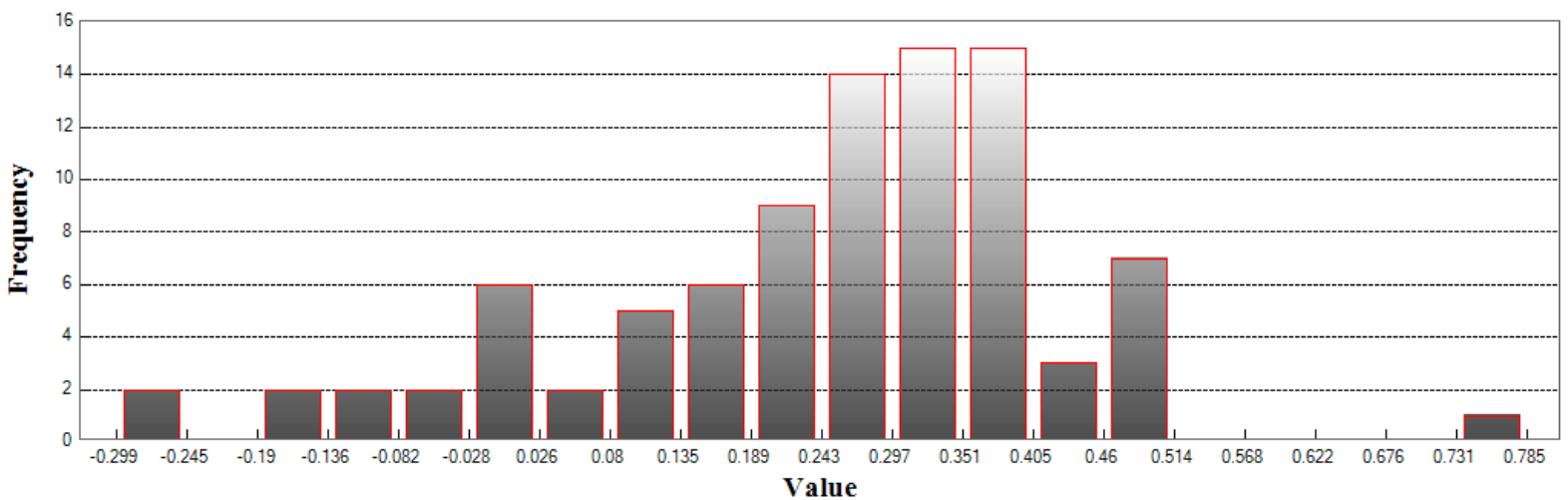


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.299
Maximum DZ: 0.785
Mean DZ: 0.241
Mean Magnitude DZ: 0.519
Number Observations: 91
Standard Deviation DZ: 0.186
RMSE Z: 0.304
95% Confidence Level Z: 0.597
Units: US Survey Feet

Histogram



Min: -0.299
Max: 0.785
Number Of Bins: 20
Bin Interval: 0.054

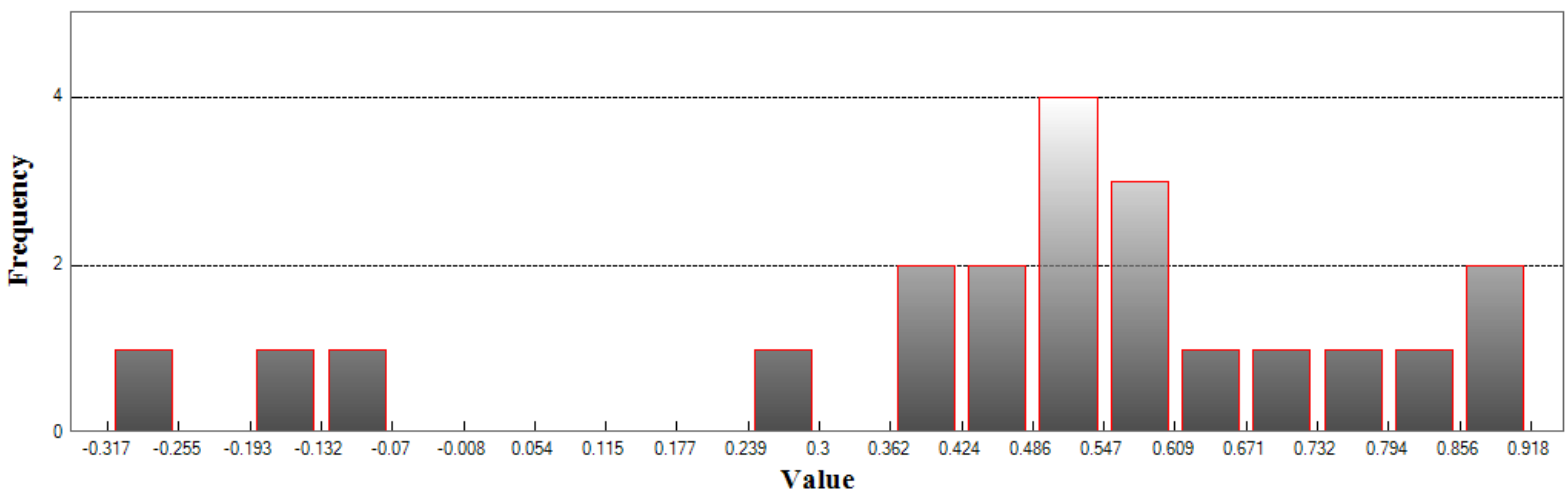


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.317
Maximum DZ: 0.917
Mean DZ: 0.468
Mean Magnitude DZ: 0.722
Number Observations: 21
Standard Deviation DZ: 0.319
RMSE Z: 0.562
95th Percentile: 0.887
Units: US Survey Feet

Histogram



Min: -0.317

Max: 0.917

Number Of Bins: 20

Bin Interval: 0.062

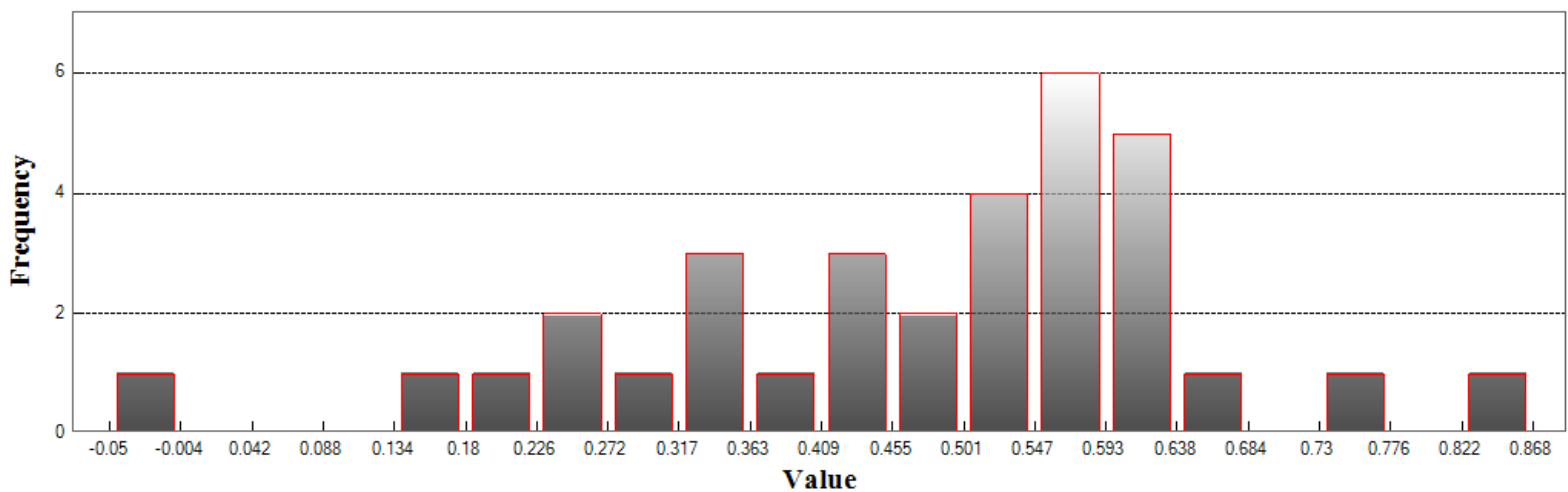


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.05
Maximum DZ: 0.868
Mean DZ: 0.472
Mean Magnitude DZ: 0.69
Number Observations: 33
Standard Deviation DZ: 0.183
RMSE Z: 0.506
95th Percentile: 0.64
Units: US Survey Feet

Histogram



Min: -0.05

Max: 0.868

Number Of Bins: 20

Bin Interval: 0.046

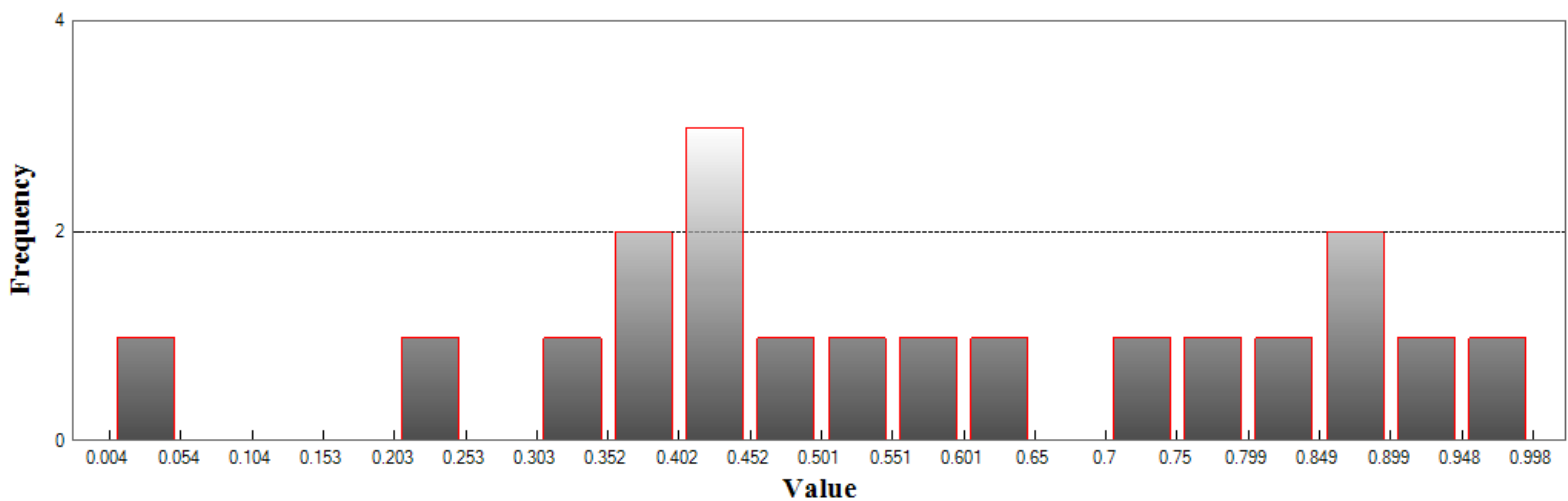


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: 0.004
Maximum DZ: 0.998
Mean DZ: 0.573
Mean Magnitude DZ: 0.757
Number Observations: 19
Standard Deviation DZ: 0.267
RMSE Z: 0.629
95th Percentile: 0.943
Units: US Survey Feet

Histogram



Min: 0.004

Max: 0.998

Number Of Bins: 20

Bin Interval: 0.05

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: graham_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

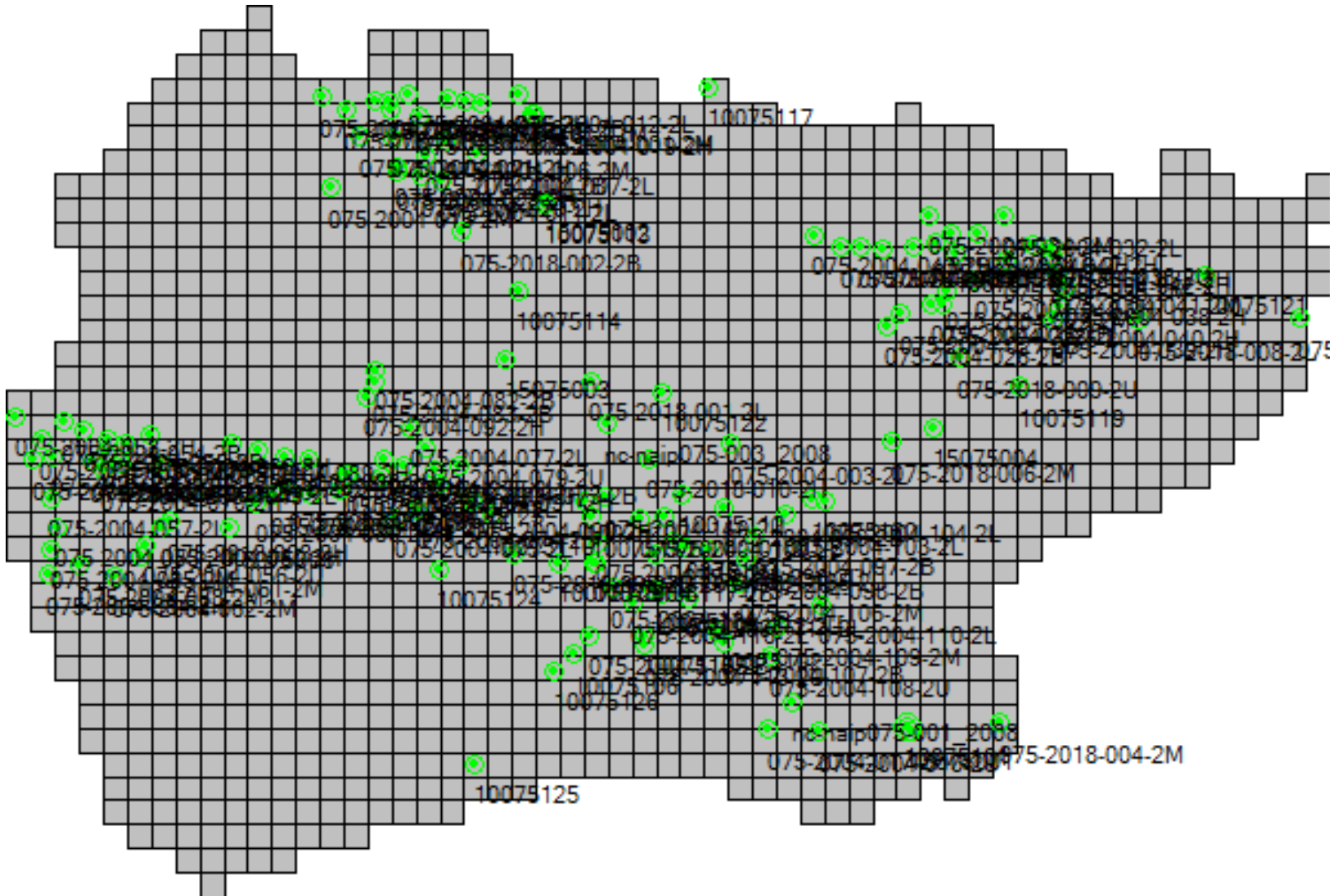
Tile Index Attribute: las_tile

Data Filename: Masspoints

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	22	0.356		
2H	41		0.718	
2L	22		0.332	
2M	22		0.613	
2U	56	0.405		
Total	163			

Units: US Survey Feet

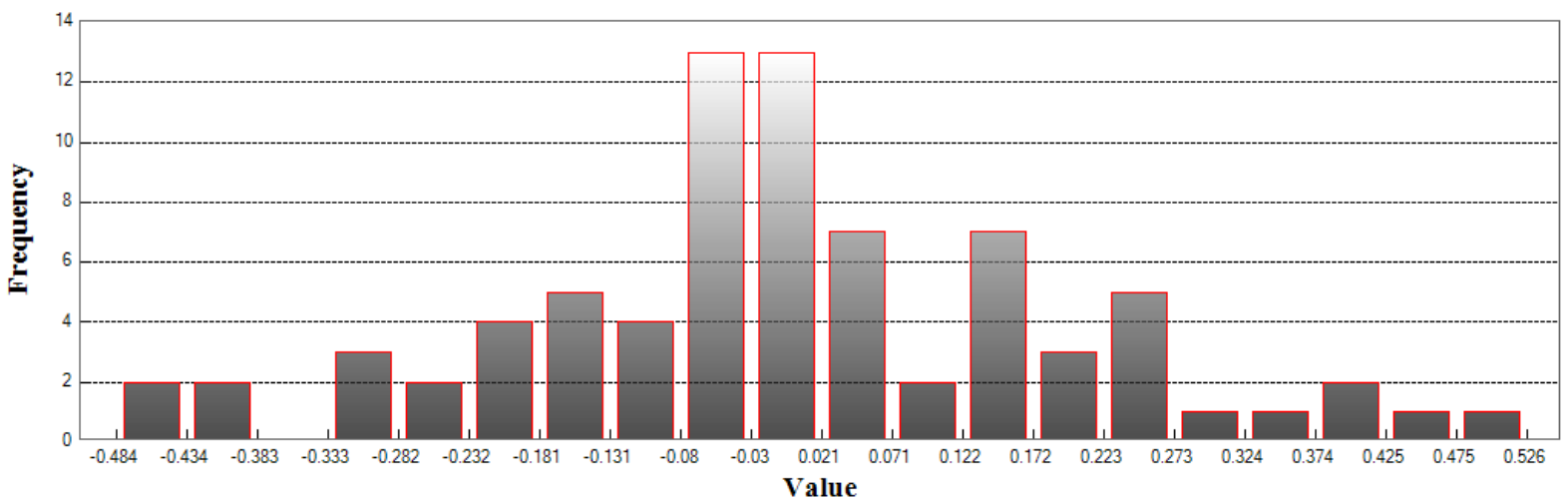


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.484
Maximum DZ: 0.526
Mean DZ: -0.003
Mean Magnitude DZ: 0.387
Number Observations: 78
Standard Deviation DZ: 0.201
RMSE Z: 0.2
95% Confidence Level Z: 0.392
Units: US Survey Feet

Histogram



Min: -0.484
Max: 0.526
Number Of Bins: 20
Bin Interval: 0.051

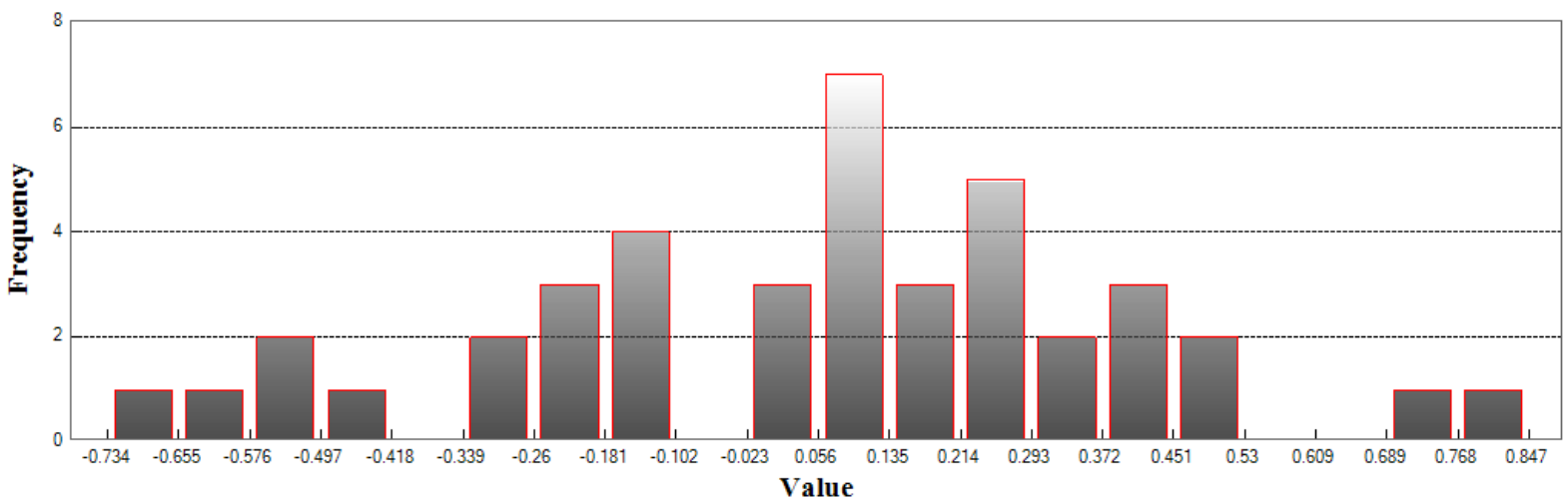


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.735
Maximum DZ: 0.846
Mean DZ: 0.058
Mean Magnitude DZ: 0.54
Number Observations: 41
Standard Deviation DZ: 0.354
RMSE Z: 0.355
95th Percentile: 0.718
Units: US Survey Feet

Histogram



Min: -0.735

Max: 0.846

Number Of Bins: 20

Bin Interval: 0.079

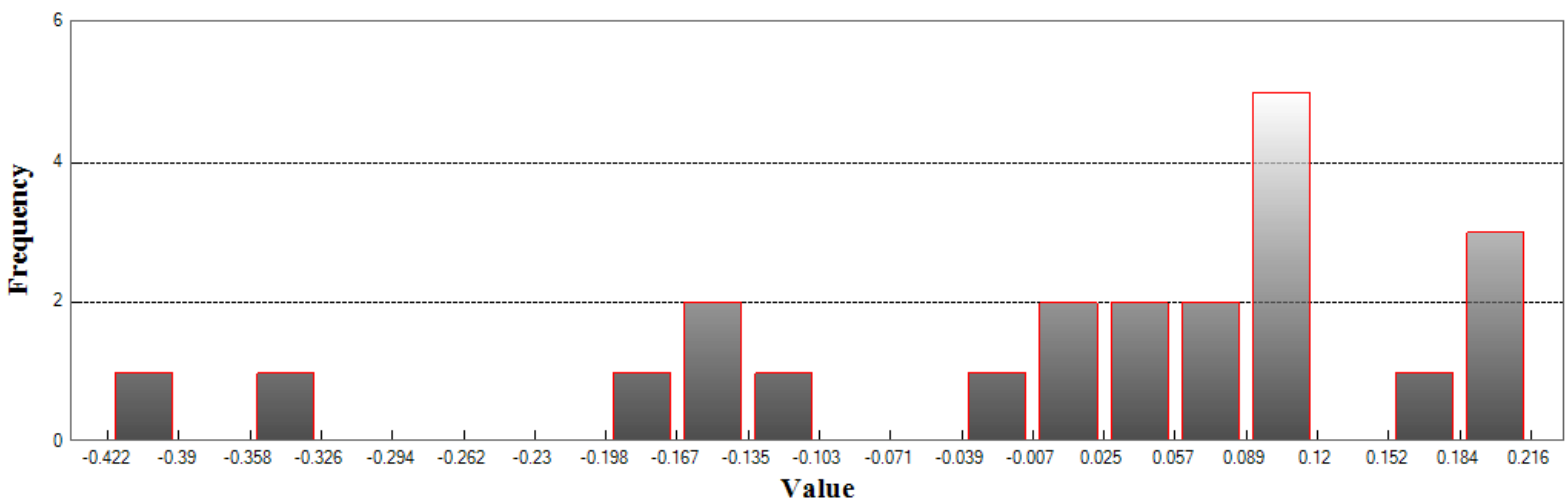


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.422
Maximum DZ: 0.216
Mean DZ: 0.009
Mean Magnitude DZ: 0.363
Number Observations: 22
Standard Deviation DZ: 0.168
RMSE Z: 0.165
95th Percentile: 0.332
Units: US Survey Feet

Histogram



Min: -0.422

Max: 0.216

Number Of Bins: 20

Bin Interval: 0.032

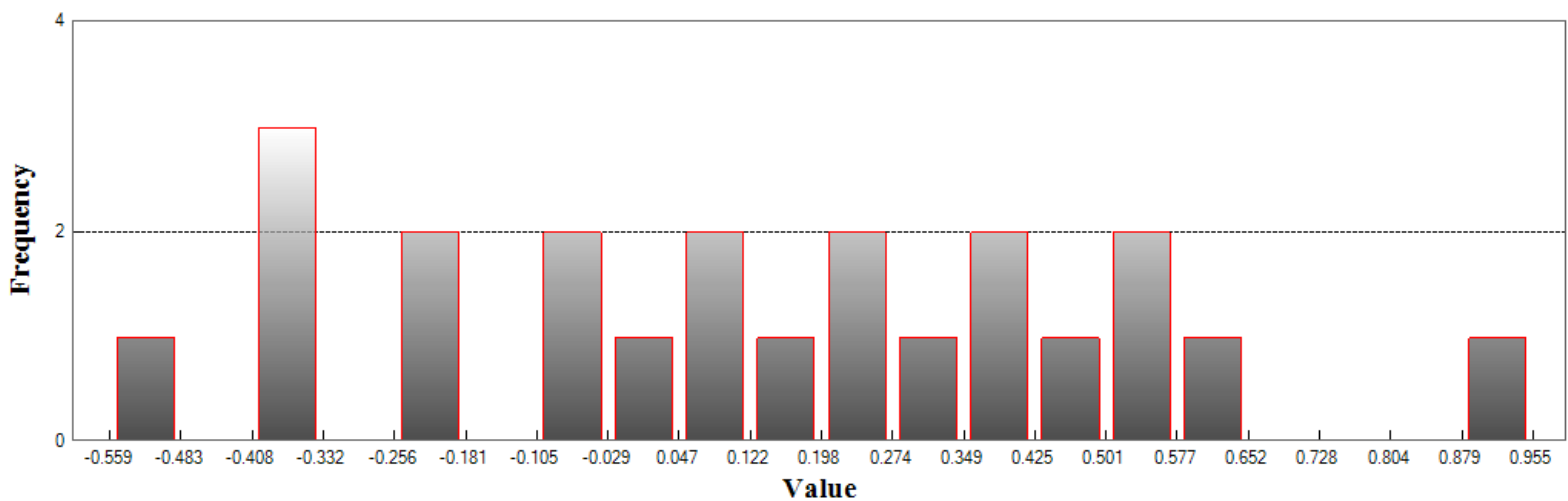


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.559
Maximum DZ: 0.955
Mean DZ: 0.124
Mean Magnitude DZ: 0.571
Number Observations: 22
Standard Deviation DZ: 0.384
RMSE Z: 0.395
95th Percentile: 0.613
Units: US Survey Feet

Histogram



Min: -0.559

Max: 0.955

Number Of Bins: 20

Bin Interval: 0.076

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: haywood_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute: las_file

Data Filename: QL1

Number of Data Files Matching Attribute: 2498 out of 2498



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	22	0.605		
2H	42		0.872	
2L	22		0.681	
2M	22		0.461	
2U	49	0.510		
Total	157			

Units: US Survey Feet



LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.855

Maximum DZ: 0.579

Mean DZ: 0.022

Mean Magnitude DZ: 0.473

Number Observations: 71

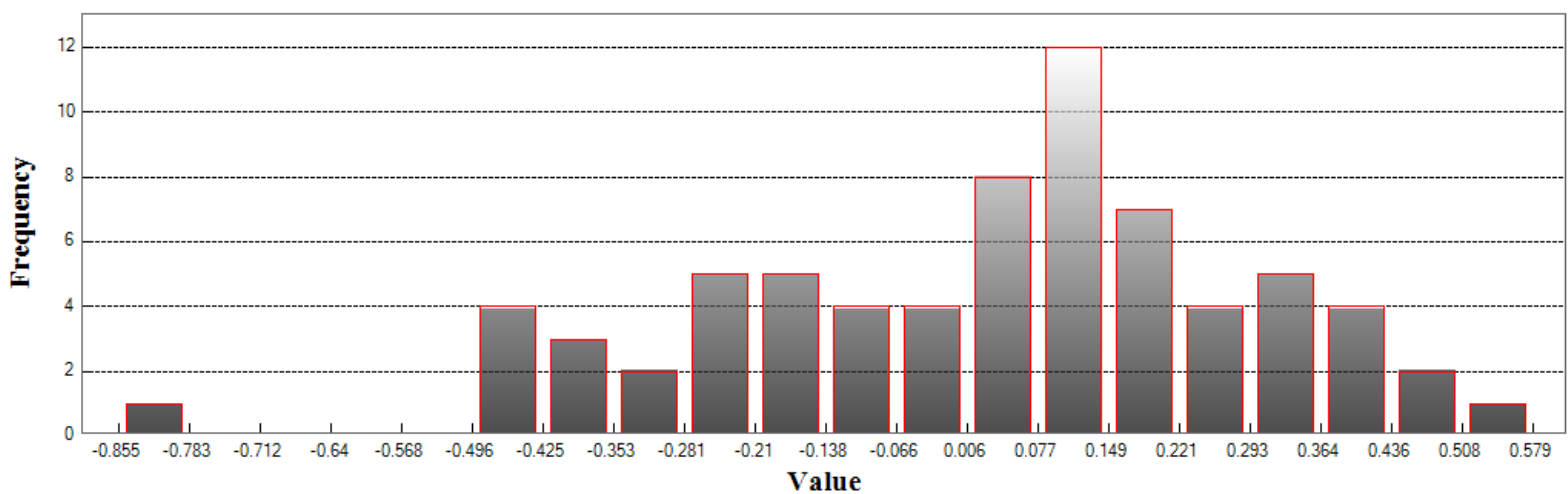
Standard Deviation DZ: 0.277

RMSE Z: 0.276

95% Confidence Level Z: 0.541

Units: US Survey Feet

Histogram



Min: -0.855

Max: 0.579

Number Of Bins: 20

Bin Interval: 0.072

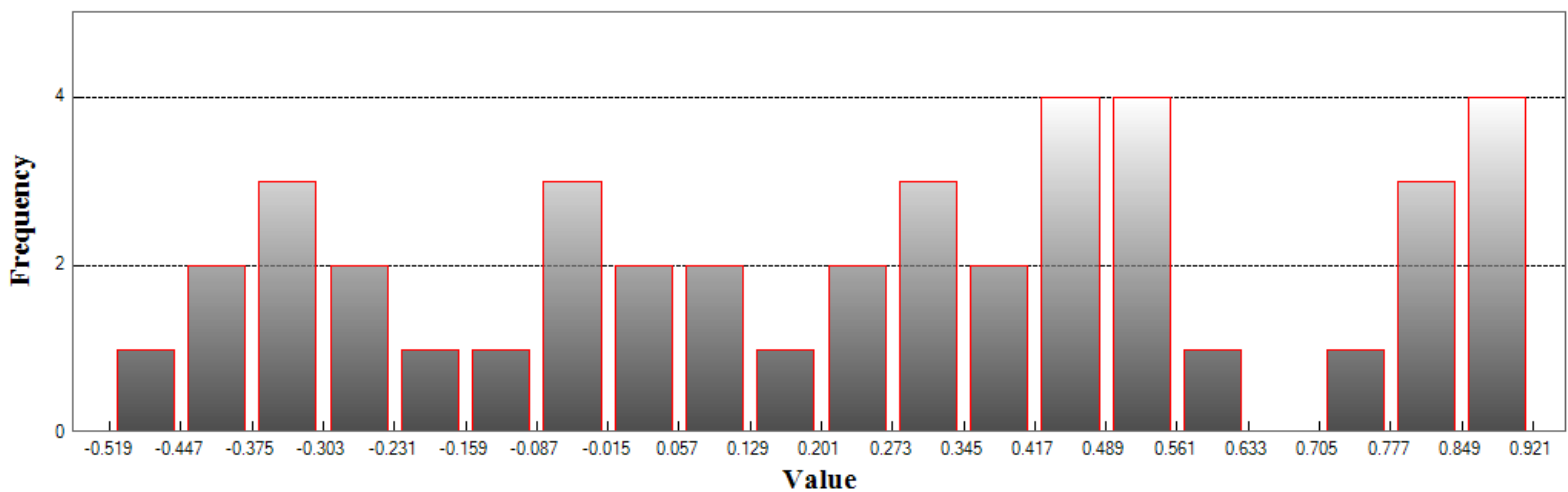


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.519
Maximum DZ: 0.921
Mean DZ: 0.251
Mean Magnitude DZ: 0.644
Number Observations: 42
Standard Deviation DZ: 0.427
RMSE Z: 0.491
95th Percentile: 0.872
Units: US Survey Feet

Histogram



Min: -0.519

Max: 0.921

Number Of Bins: 20

Bin Interval: 0.072

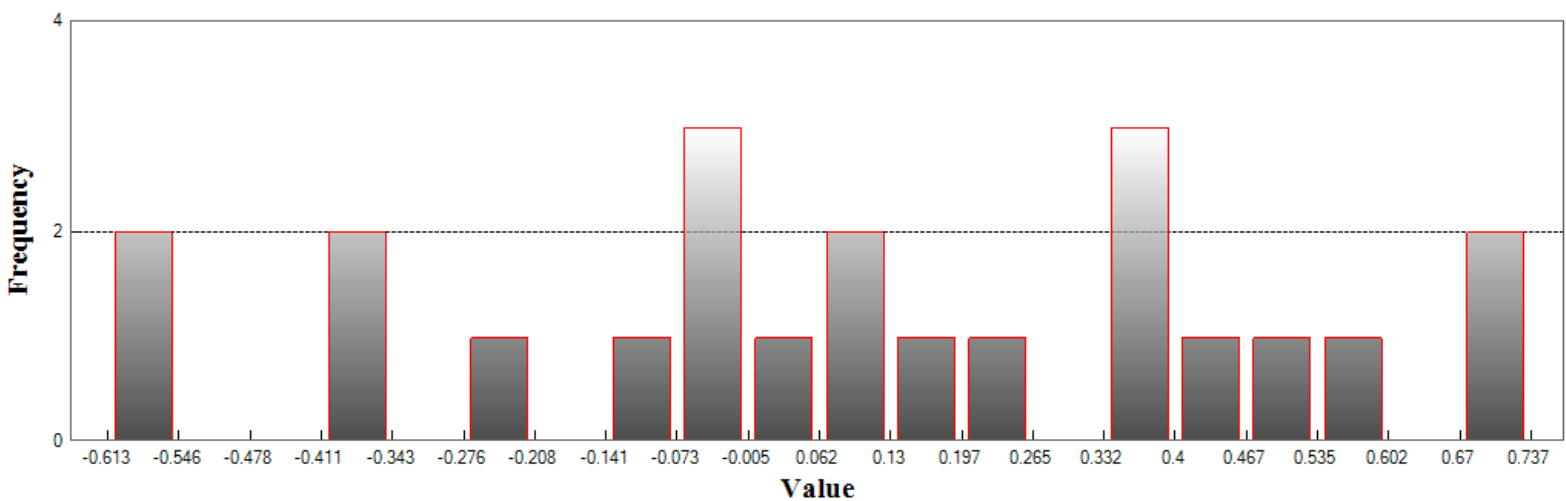


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.613
Maximum DZ: 0.737
Mean DZ: 0.103
Mean Magnitude DZ: 0.559
Number Observations: 22
Standard Deviation DZ: 0.38
RMSE Z: 0.385
95th Percentile: 0.681
Units: US Survey Feet

Histogram



Min: -0.613

Max: 0.737

Number Of Bins: 20

Bin Interval: 0.068

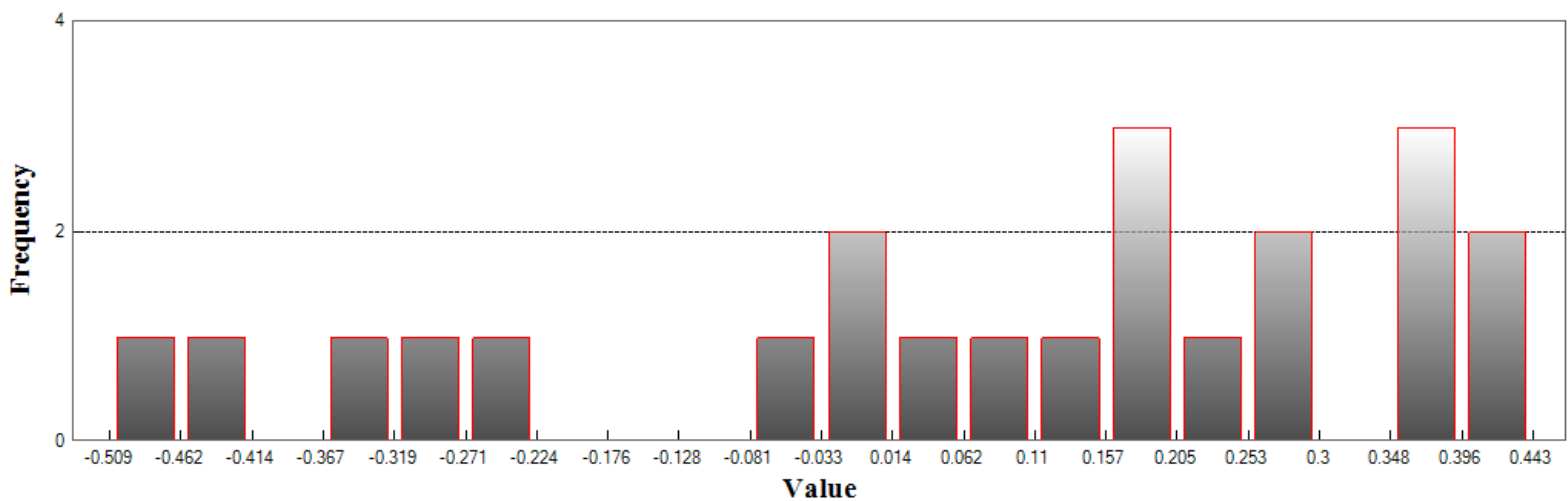


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.51
Maximum DZ: 0.443
Mean DZ: 0.076
Mean Magnitude DZ: 0.5
Number Observations: 22
Standard Deviation DZ: 0.284
RMSE Z: 0.288
95th Percentile: 0.461
Units: US Survey Feet

Histogram



Min: -0.51

Max: 0.443

Number Of Bins: 20

Bin Interval: 0.048

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: henderson_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute: las_tile

Data Filename: Masspoints

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	22	0.705		
2H	42		0.690	
2L	21		0.678	
2M	21		0.691	
2U	67	0.503		
Total	173			

Units: US Survey Feet

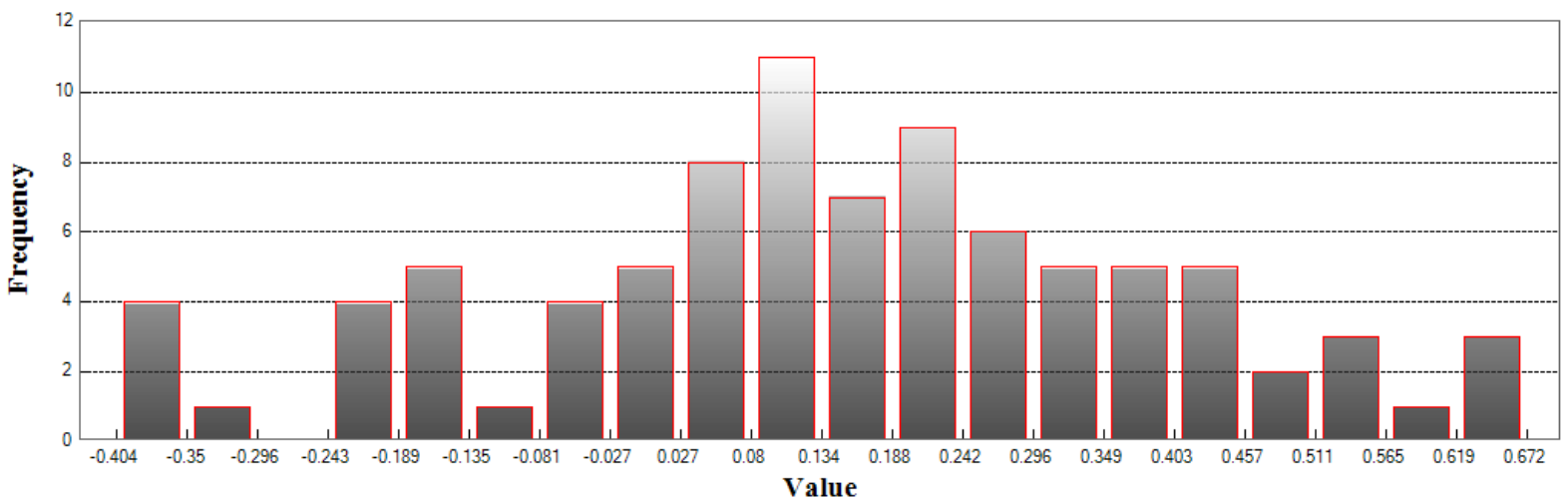


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.404
Maximum DZ: 0.672
Mean DZ: 0.149
Mean Magnitude DZ: 0.484
Number Observations: 89
Standard Deviation DZ: 0.245
RMSE Z: 0.286
95% Confidence Level Z: 0.56
Units: US Survey Feet

Histogram



Min: -0.404
Max: 0.672
Number Of Bins: 20
Bin Interval: 0.054

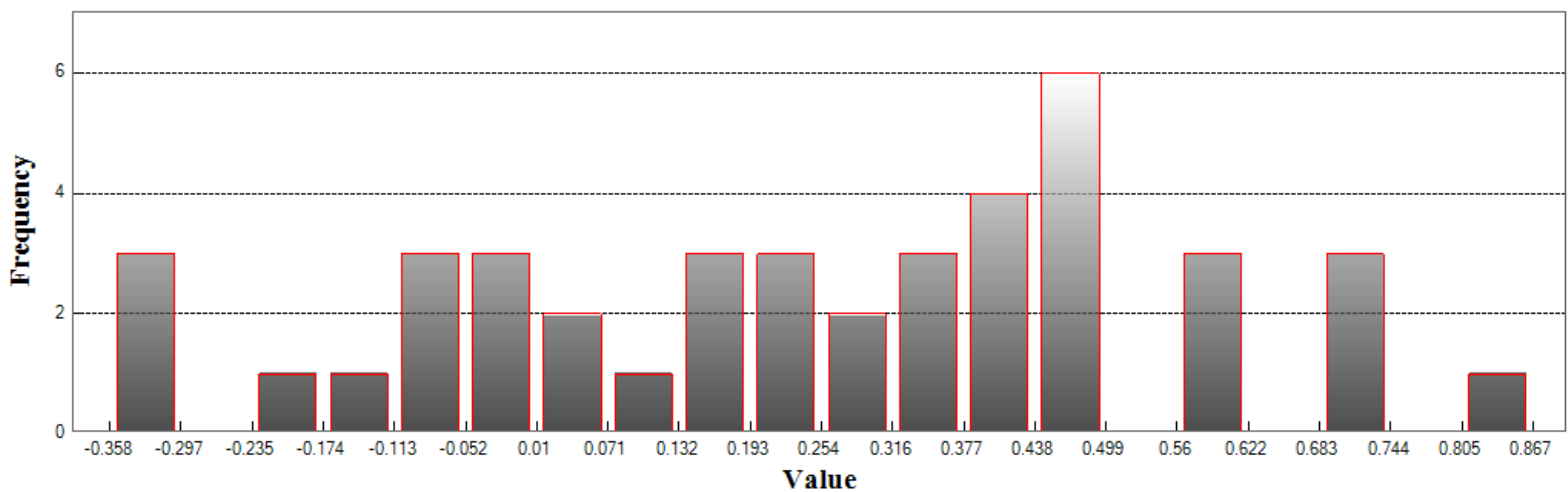


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.358
Maximum DZ: 0.866
Mean DZ: 0.251
Mean Magnitude DZ: 0.573
Number Observations: 42
Standard Deviation DZ: 0.304
RMSE Z: 0.391
95th Percentile: 0.69
Units: US Survey Feet

Histogram



Min: -0.358

Max: 0.866

Number Of Bins: 20

Bin Interval: 0.061

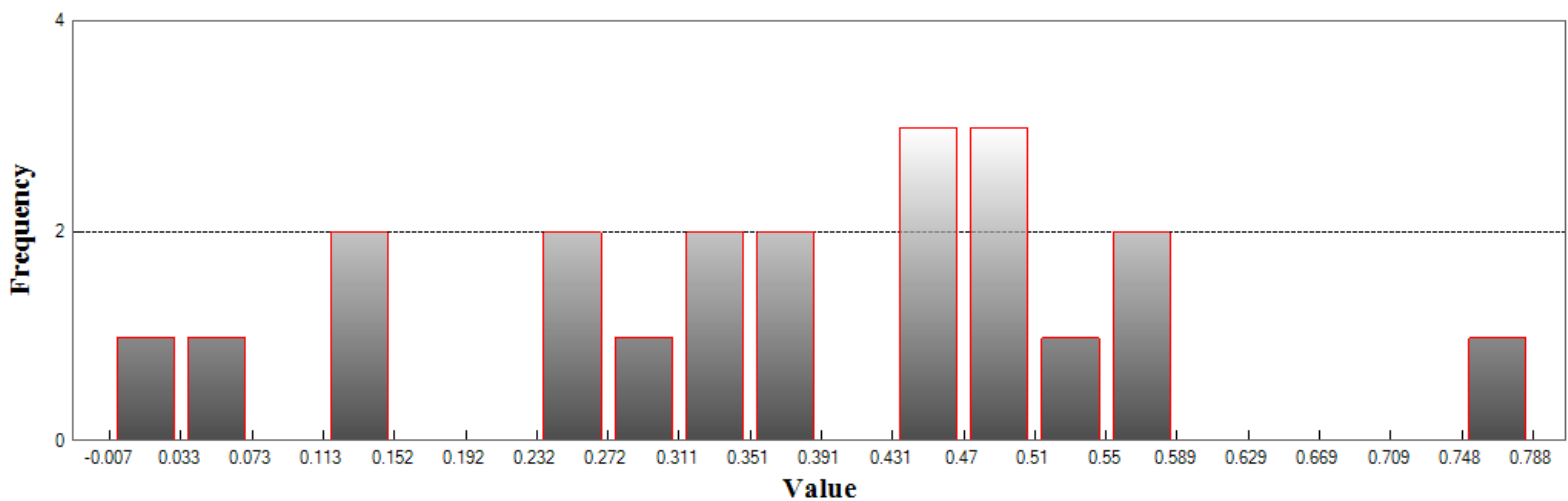


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.007
Maximum DZ: 0.788
Mean DZ: 0.368
Mean Magnitude DZ: 0.607
Number Observations: 21
Standard Deviation DZ: 0.192
RMSE Z: 0.413
95th Percentile: 0.678
Units: US Survey Feet

Histogram



Min: -0.007

Max: 0.788

Number Of Bins: 20

Bin Interval: 0.04

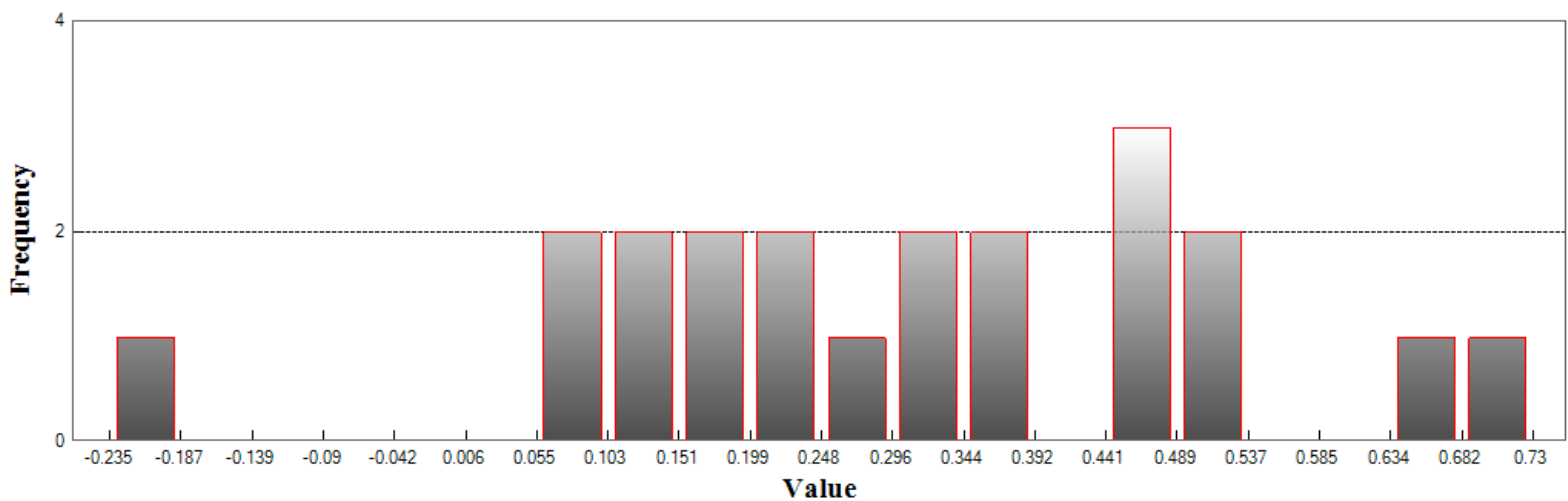


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.235
Maximum DZ: 0.73
Mean DZ: 0.305
Mean Magnitude DZ: 0.572
Number Observations: 21
Standard Deviation DZ: 0.224
RMSE Z: 0.375
95th Percentile: 0.691
Units: US Survey Feet

Histogram



Min: -0.235

Max: 0.73

Number Of Bins: 20

Bin Interval: 0.048

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: jackson_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

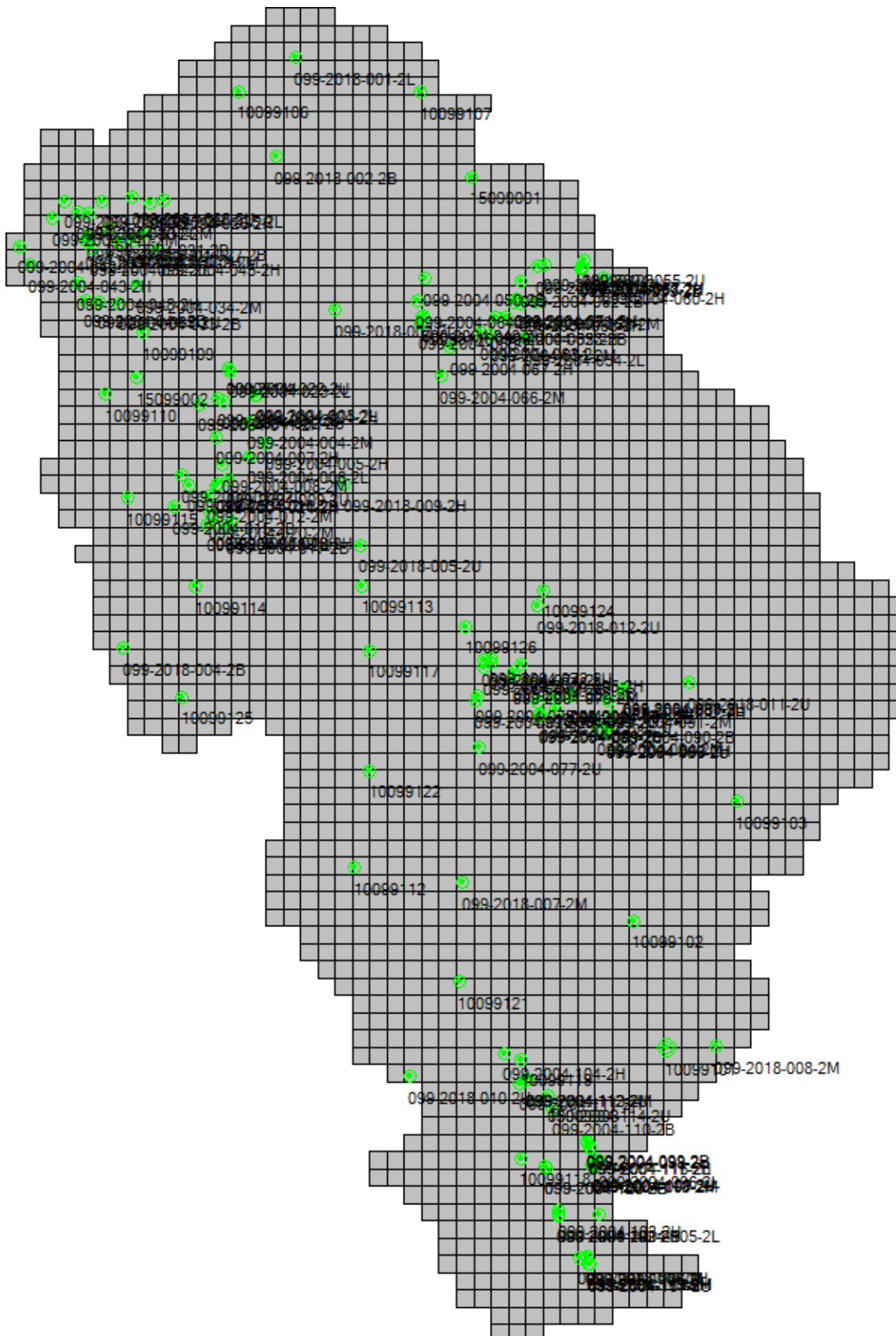
Tile Index Attribute: las_file

Data Filename: QL1

Number of Data Files Matching Attribute: 2221 out of 2221



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	22	0.472		
2H	42		0.849	
2L	21		0.677	
2M	22		0.755	
2U	50	0.477		
Total	157			

Units: US Survey Feet

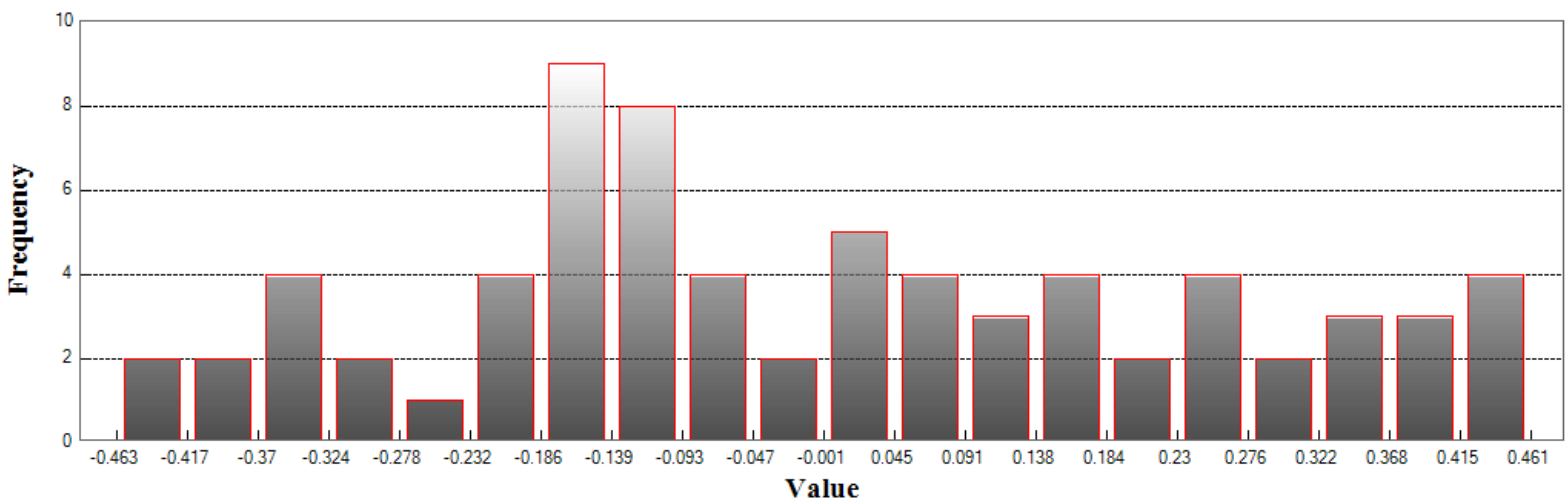


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.463
Maximum DZ: 0.461
Mean DZ: -0.002
Mean Magnitude DZ: 0.453
Number Observations: 72
Standard Deviation DZ: 0.244
RMSE Z: 0.243
95% Confidence Level Z: 0.475
Units: US Survey Feet

Histogram



Min: -0.463
Max: 0.461
Number Of Bins: 20
Bin Interval: 0.046

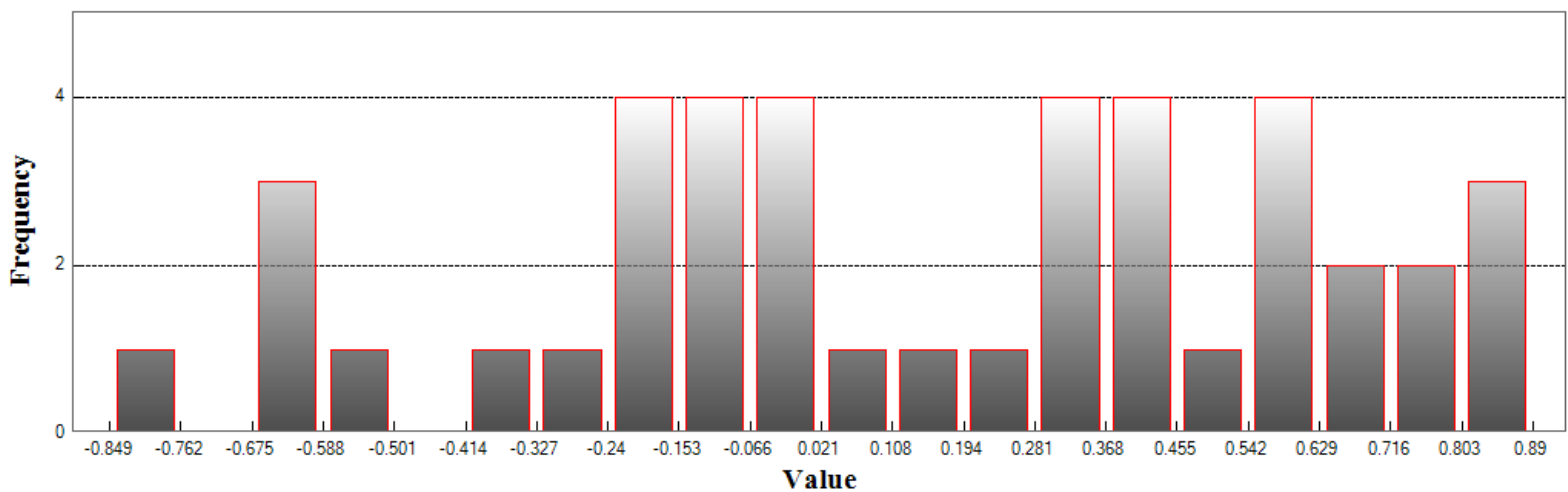


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.849
Maximum DZ: 0.891
Mean DZ: 0.156
Mean Magnitude DZ: 0.636
Number Observations: 42
Standard Deviation DZ: 0.463
RMSE Z: 0.483
95th Percentile: 0.849
Units: US Survey Feet

Histogram



Min: -0.849
Max: 0.891
Number Of Bins: 20
Bin Interval: 0.087

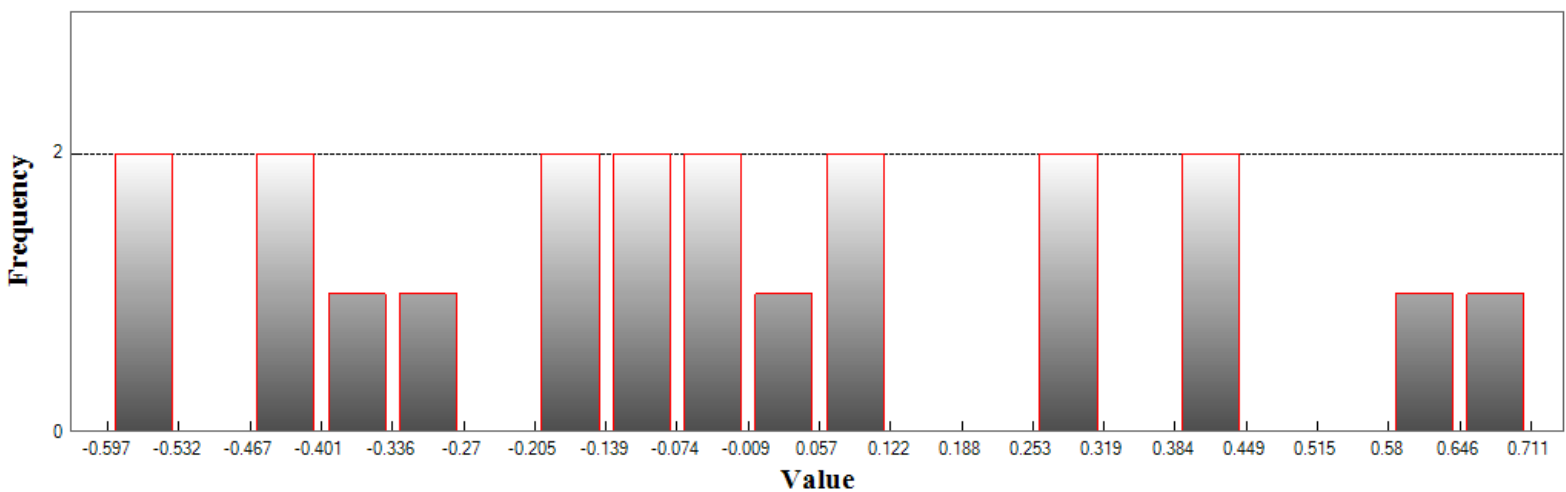


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.598
Maximum DZ: 0.711
Mean DZ: -0.017
Mean Magnitude DZ: 0.555
Number Observations: 21
Standard Deviation DZ: 0.379
RMSE Z: 0.37
95th Percentile: 0.677
Units: US Survey Feet

Histogram



Min: -0.598

Max: 0.711

Number Of Bins: 20

Bin Interval: 0.065

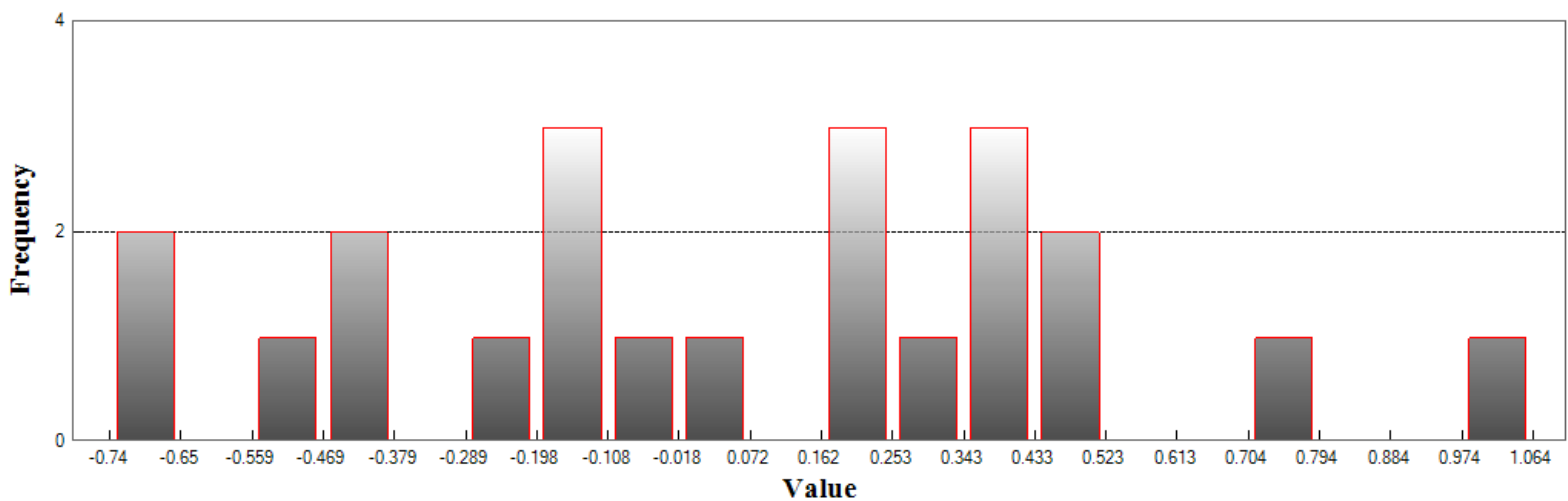


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.74
Maximum DZ: 1.065
Mean DZ: 0.055
Mean Magnitude DZ: 0.619
Number Observations: 22
Standard Deviation DZ: 0.468
RMSE Z: 0.461
95th Percentile: 0.755
Units: US Survey Feet

Histogram



Min: -0.74

Max: 1.065

Number Of Bins: 20

Bin Interval: 0.09

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: macon_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

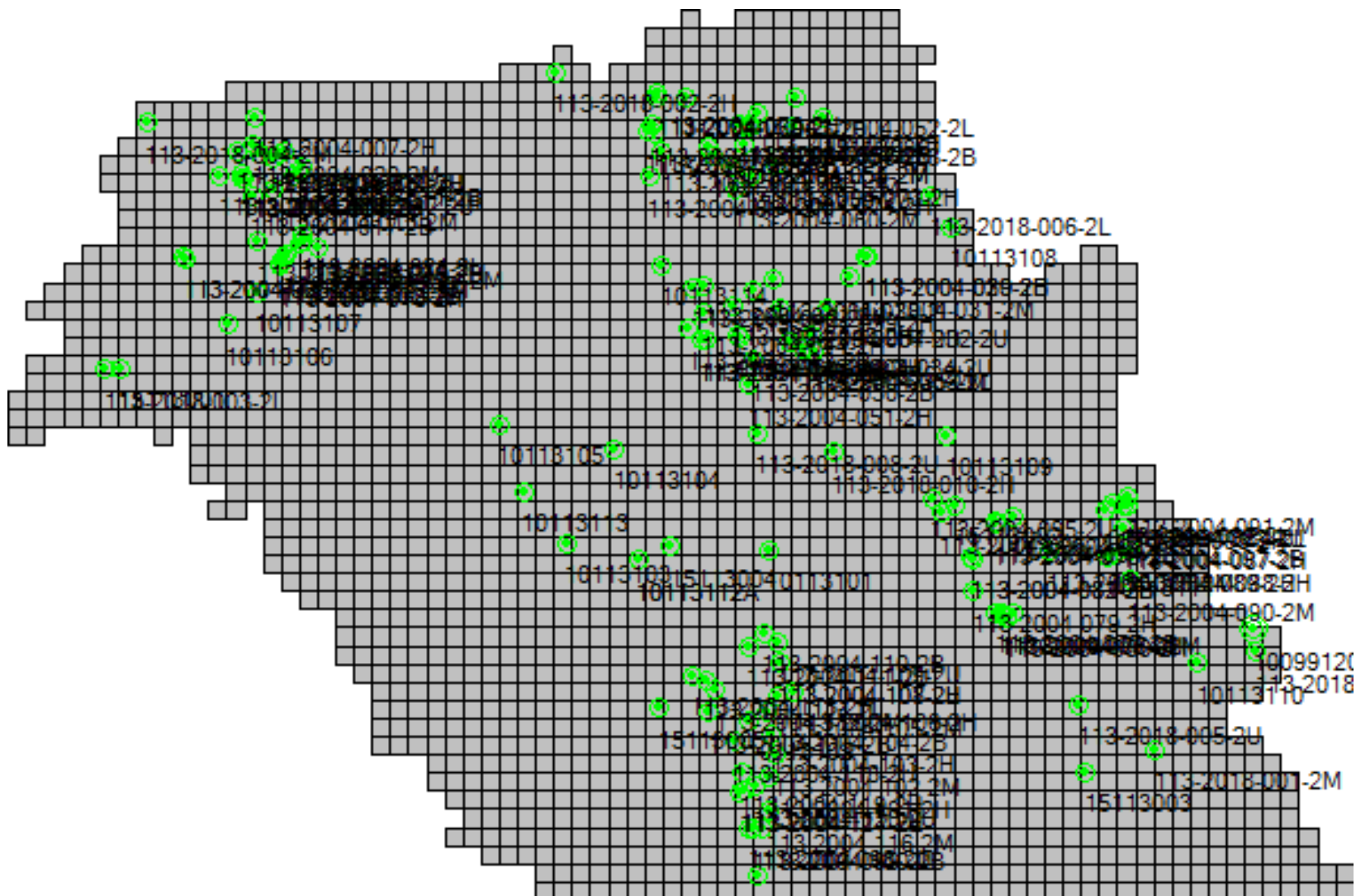
Tile Index Attribute: las_tile

Data Filename: Masspoints

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	24	0.641		
2H	39		0.438	
2L	22		0.522	
2M	24		0.611	
2U	44	0.605		
Total	153			

Units: US Survey Feet

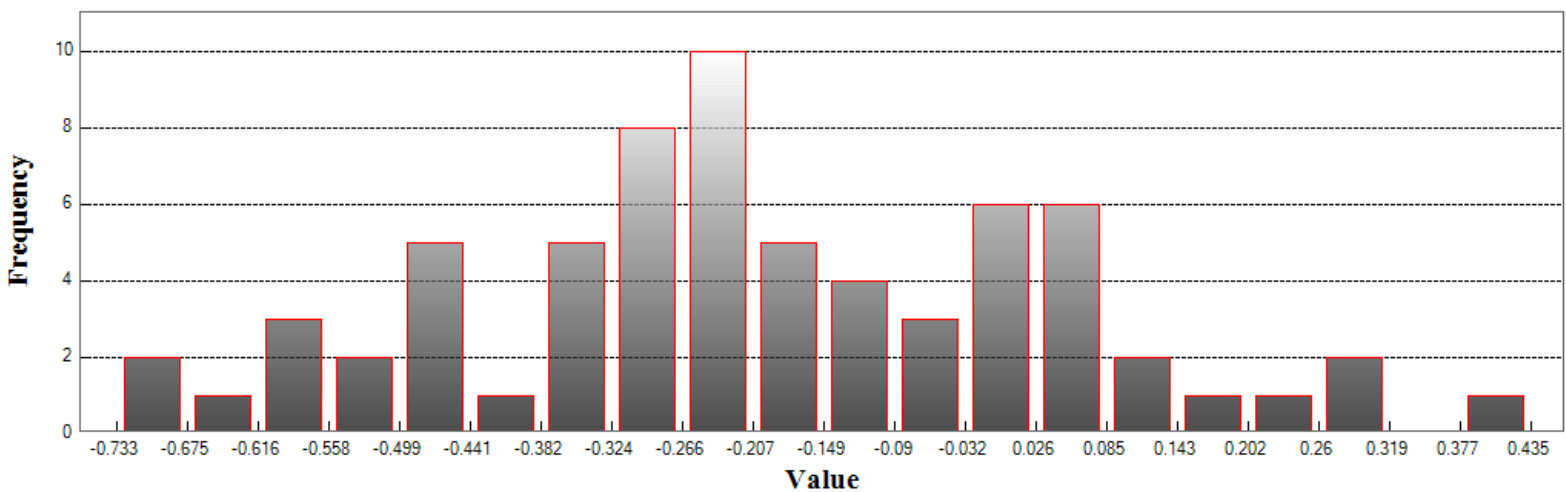


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.733
Maximum DZ: 0.436
Mean DZ: -0.203
Mean Magnitude DZ: 0.51
Number Observations: 68
Standard Deviation DZ: 0.243
RMSE Z: 0.315
95% Confidence Level Z: 0.618
Units: US Survey Feet

Histogram



Min: -0.733
Max: 0.436
Number Of Bins: 20
Bin Interval: 0.058

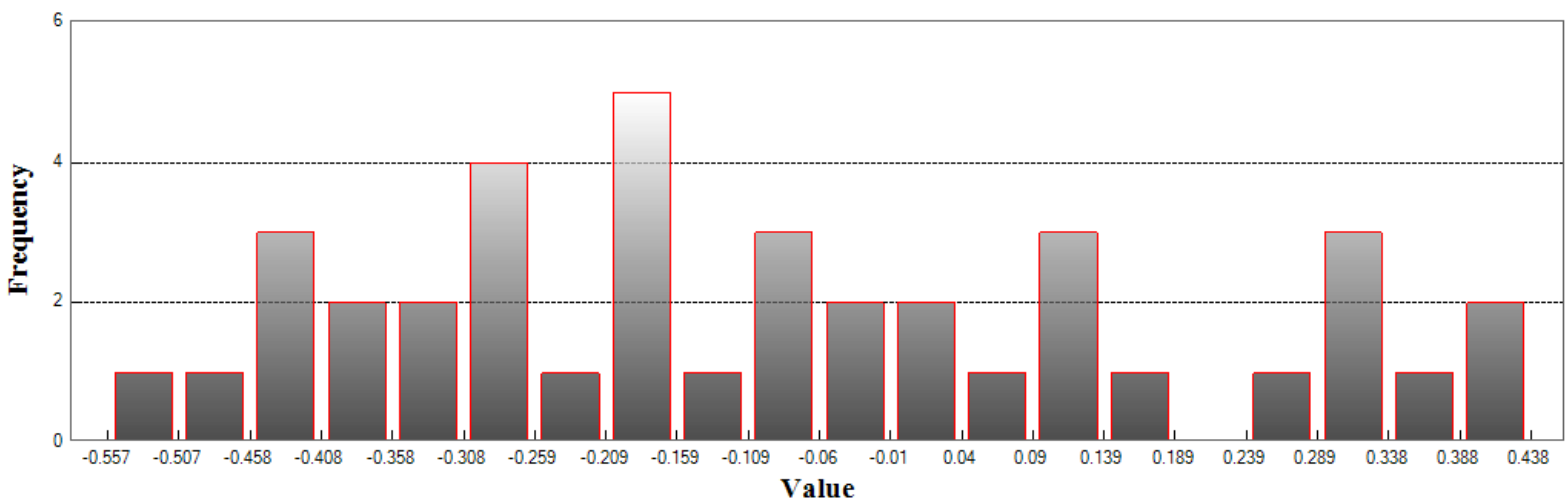


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.557
Maximum DZ: 0.438
Mean DZ: -0.088
Mean Magnitude DZ: 0.493
Number Observations: 39
Standard Deviation DZ: 0.272
RMSE Z: 0.283
95th Percentile: 0.438
Units: US Survey Feet

Histogram



Min: -0.557

Max: 0.438

Number Of Bins: 20

Bin Interval: 0.05

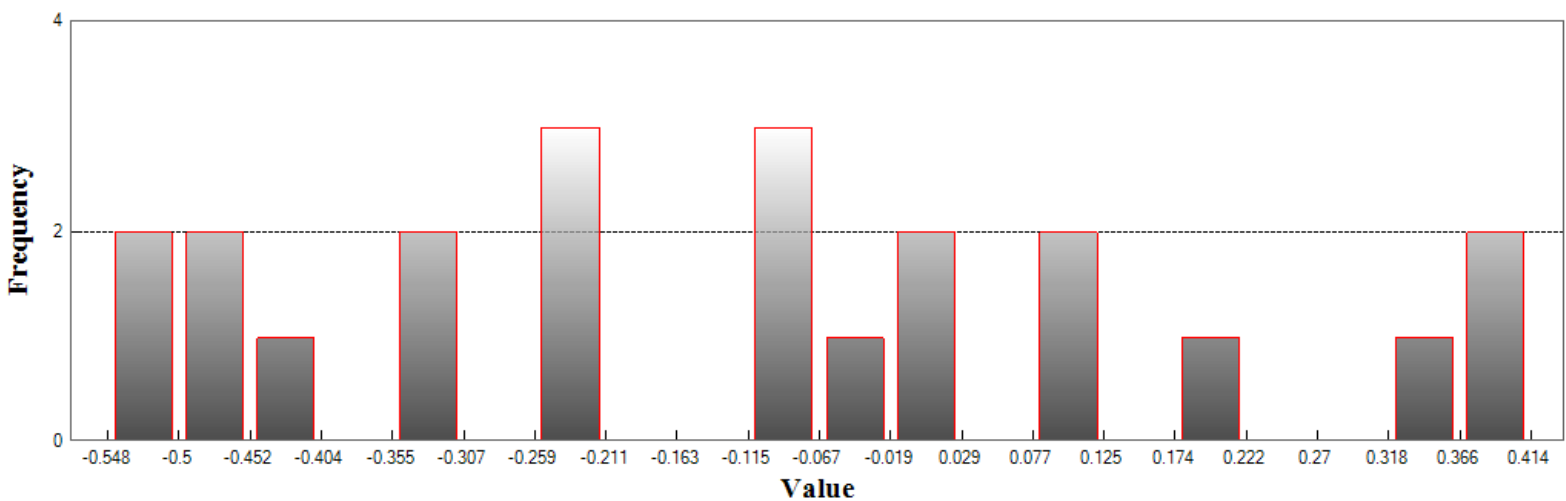


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.548
Maximum DZ: 0.414
Mean DZ: -0.116
Mean Magnitude DZ: 0.502
Number Observations: 22
Standard Deviation DZ: 0.29
RMSE Z: 0.306
95th Percentile: 0.522
Units: US Survey Feet

Histogram



Min: -0.548

Max: 0.414

Number Of Bins: 20

Bin Interval: 0.048

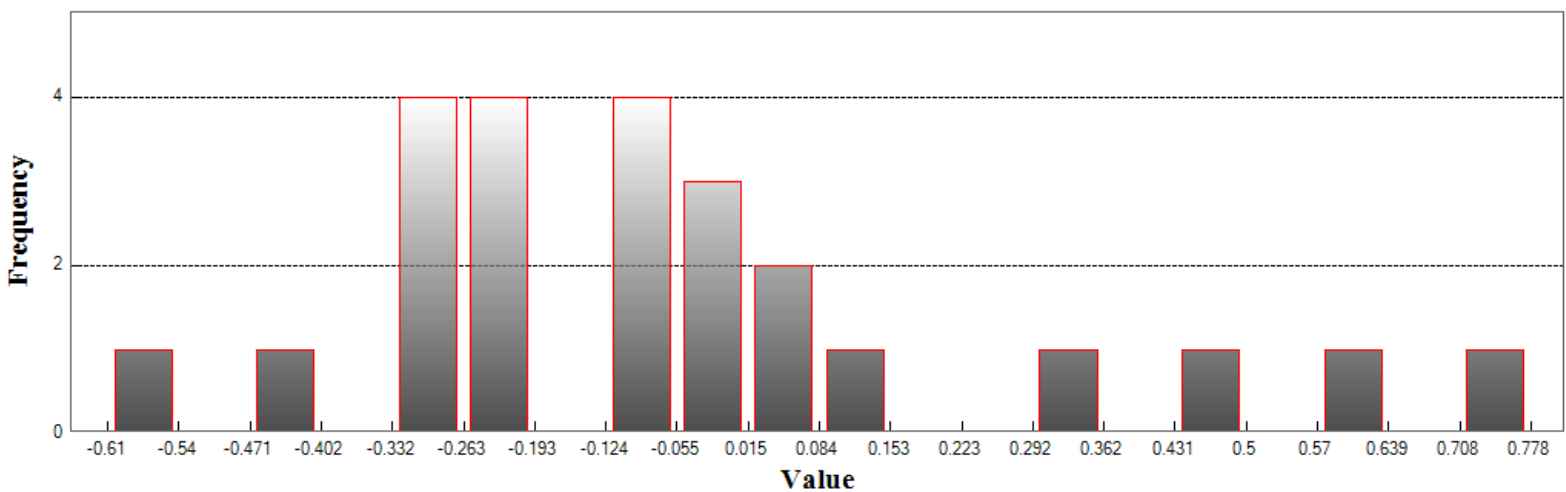


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.61
Maximum DZ: 0.777
Mean DZ: -0.045
Mean Magnitude DZ: 0.498
Number Observations: 24
Standard Deviation DZ: 0.325
RMSE Z: 0.322
95th Percentile: 0.611
Units: US Survey Feet

Histogram



Min: -0.61

Max: 0.777

Number Of Bins: 20

Bin Interval: 0.069

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: madison_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

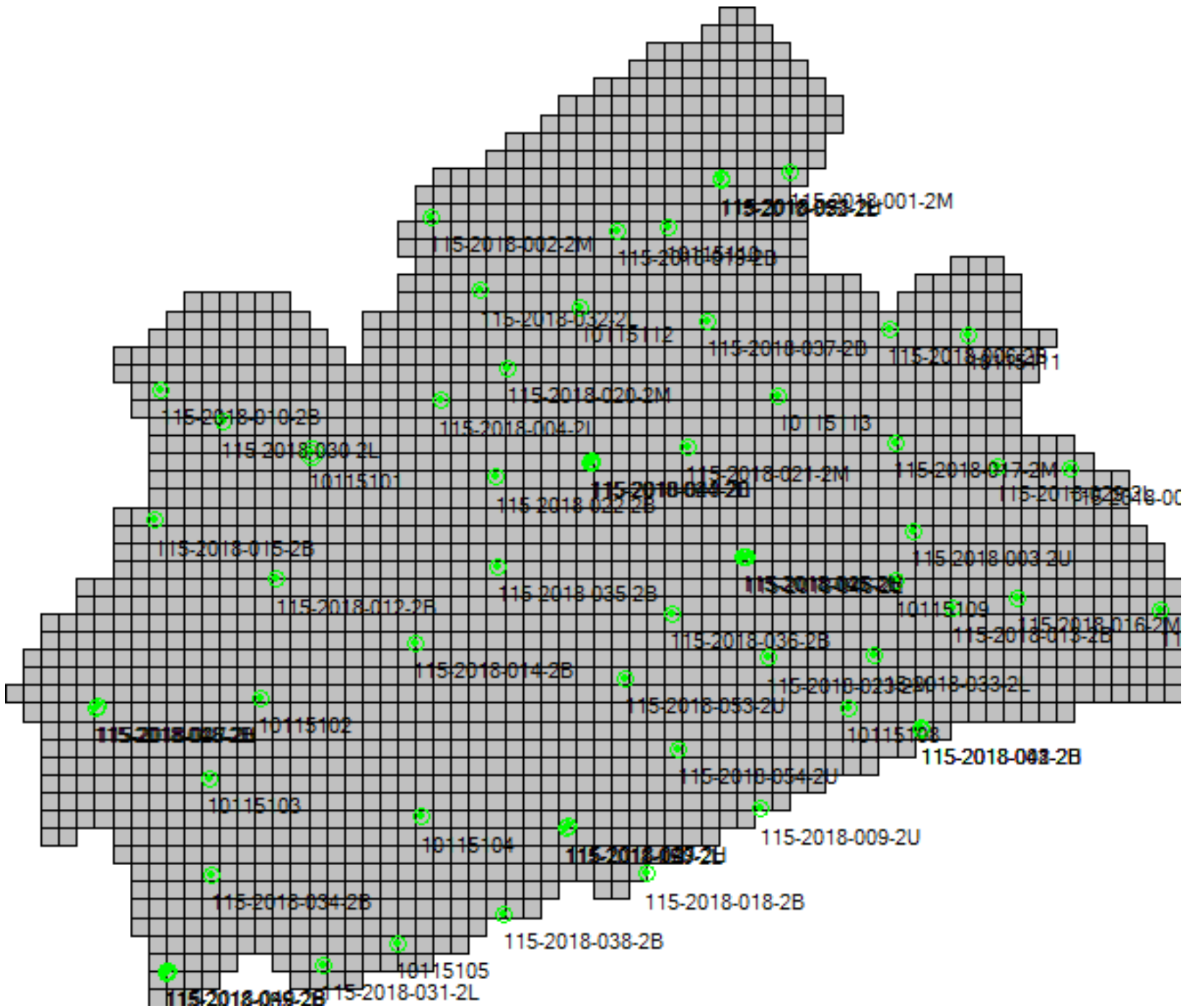
Tile Index Attribute: las_file

Data Filename: QL1

Number of Data Files Matching Attribute: 2097 out of 2097



Tiled-Data Area



NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	19	0.464		
2H	7		1.064	
2L	17		0.345	
2M	7		1.125	
2U	15	0.478		
Total	65			

Units: US Survey Feet



LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.415

Maximum DZ: 0.593

Mean DZ: -0.017

Mean Magnitude DZ: 0.438

Number Observations: 34

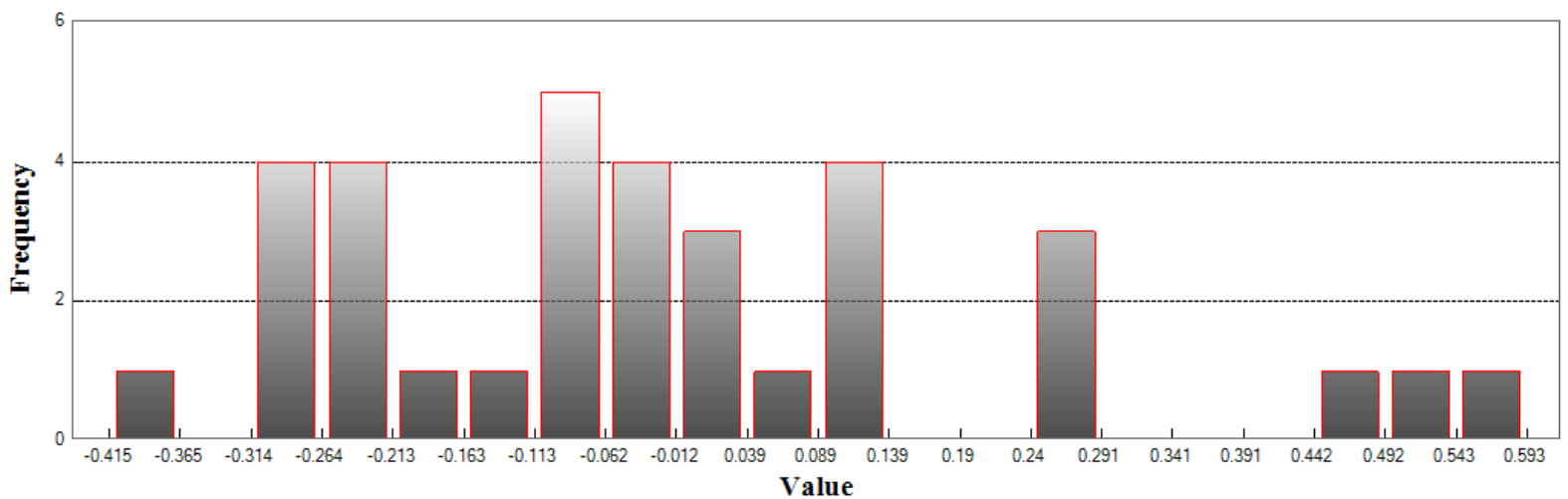
Standard Deviation DZ: 0.243

RMSE Z: 0.24

95% Confidence Level Z: 0.47

Units: US Survey Feet

Histogram



Min: -0.415

Max: 0.593

Number Of Bins: 20

Bin Interval: 0.05

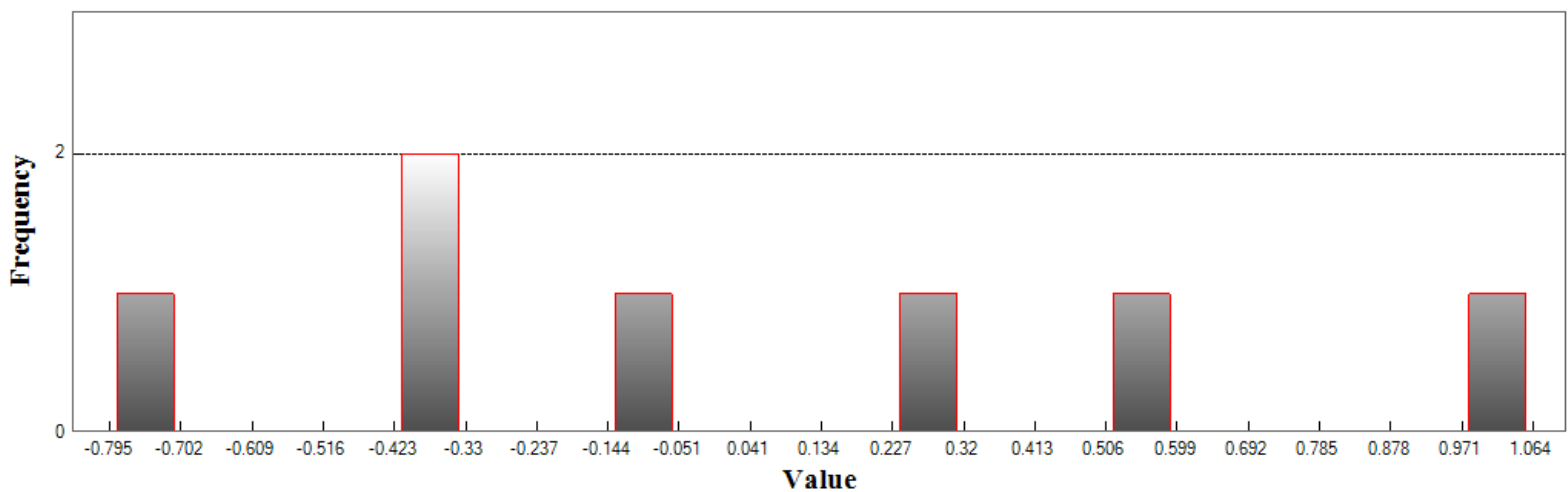


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.794
Maximum DZ: 1.064
Mean DZ: 0.04
Mean Magnitude DZ: 0.714
Number Observations: 7
Standard Deviation DZ: 0.641
RMSE Z: 0.594
95th Percentile: 1.064
Units: US Survey Feet

Histogram



Min: -0.794

Max: 1.064

Number Of Bins: 20

Bin Interval: 0.093

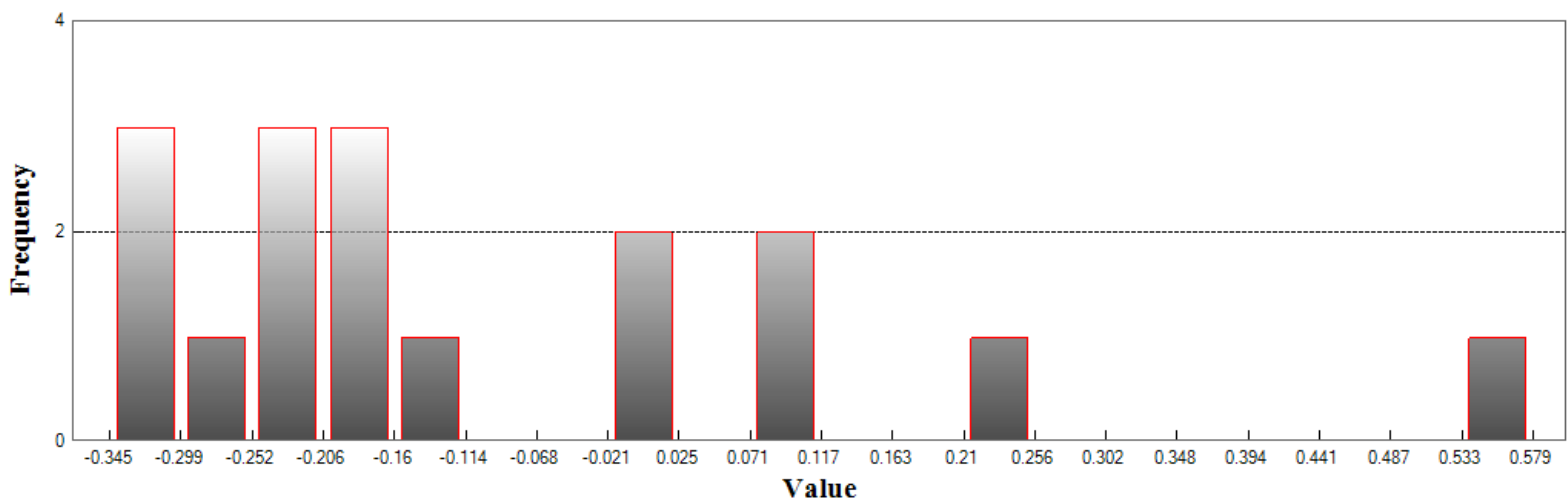


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.345
Maximum DZ: 0.579
Mean DZ: -0.093
Mean Magnitude DZ: 0.459
Number Observations: 17
Standard Deviation DZ: 0.238
RMSE Z: 0.249
95th Percentile: 0.345
Units: US Survey Feet

Histogram



Min: -0.345

Max: 0.579

Number Of Bins: 20

Bin Interval: 0.046

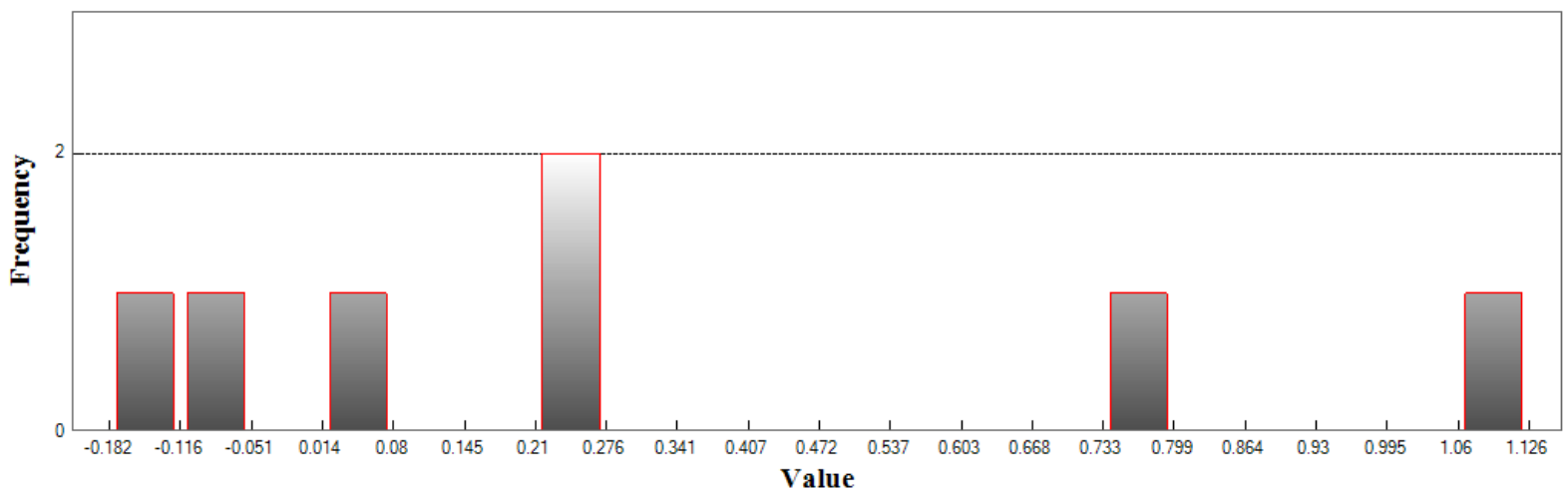


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.182
Maximum DZ: 1.125
Mean DZ: 0.311
Mean Magnitude DZ: 0.62
Number Observations: 7
Standard Deviation DZ: 0.468
RMSE Z: 0.534
95th Percentile: 1.125
Units: US Survey Feet

Histogram



Min: -0.182

Max: 1.125

Number Of Bins: 20

Bin Interval: 0.065

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: mcdowell_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

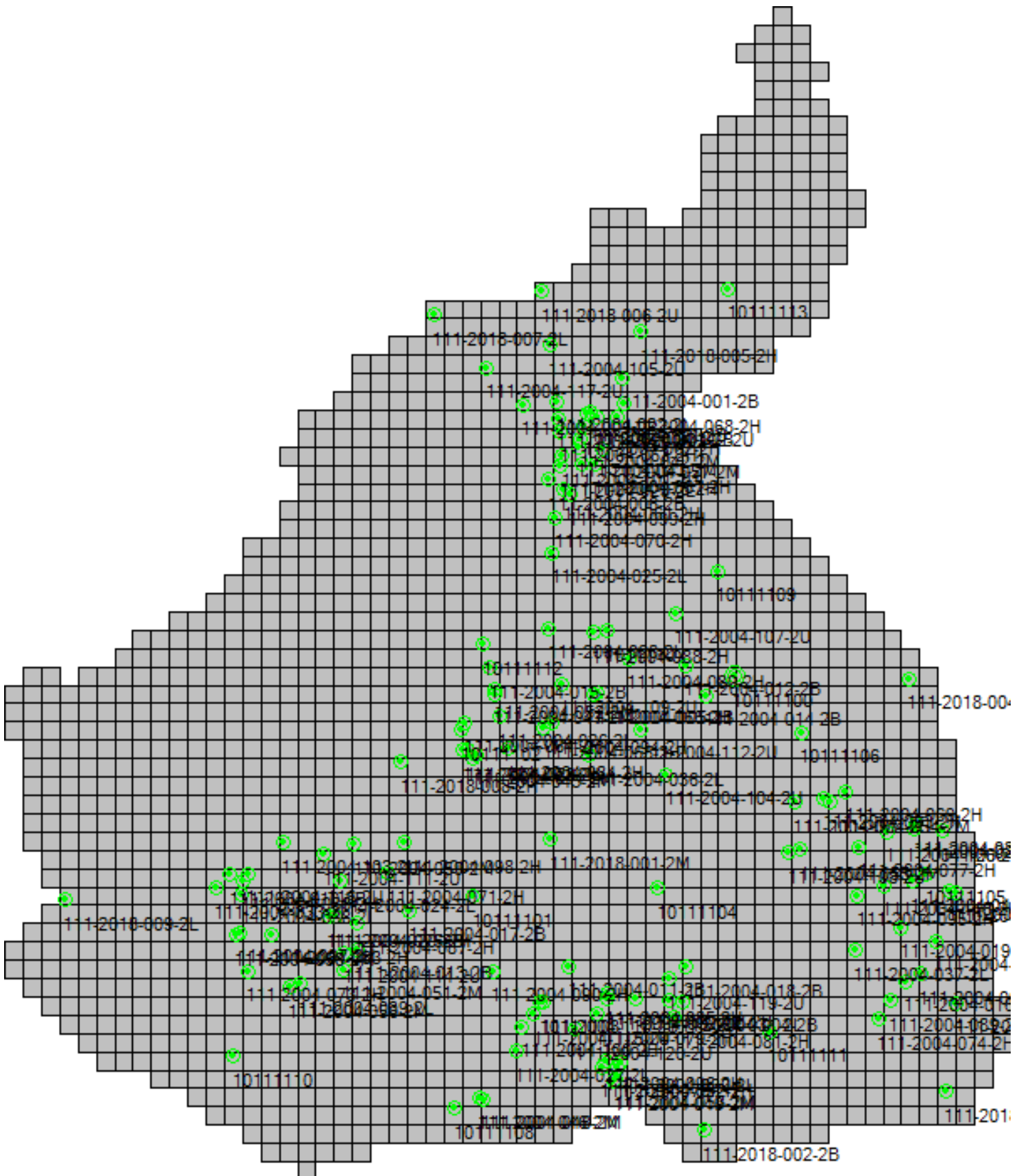
Tile Index Attribute: las_tile

Data Filename: Masspoints

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	23	0.370		
2H	42		0.550	
2L	22		0.479	
2M	22		0.440	
2U	35	0.354		
Total	144			

Units: US Survey Feet

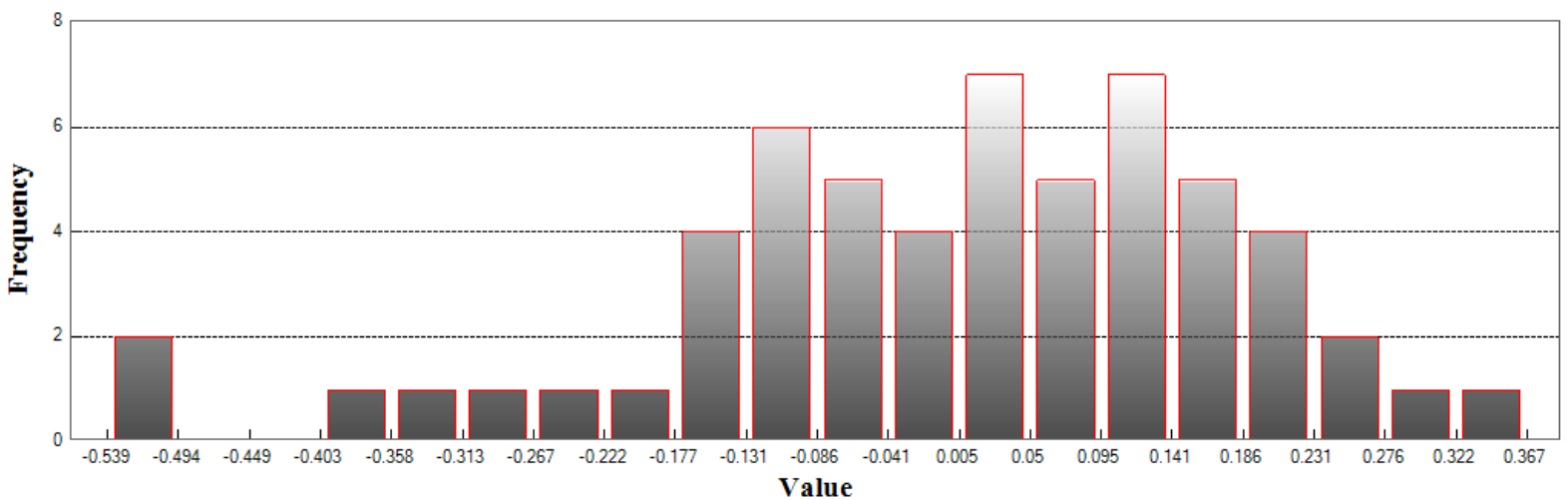


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.54
Maximum DZ: 0.367
Mean DZ: 0
Mean Magnitude DZ: 0.378
Number Observations: 58
Standard Deviation DZ: 0.185
RMSE Z: 0.184
95% Confidence Level Z: 0.36
Units: US Survey Feet

Histogram



Min: -0.54
Max: 0.367
Number Of Bins: 20
Bin Interval: 0.045

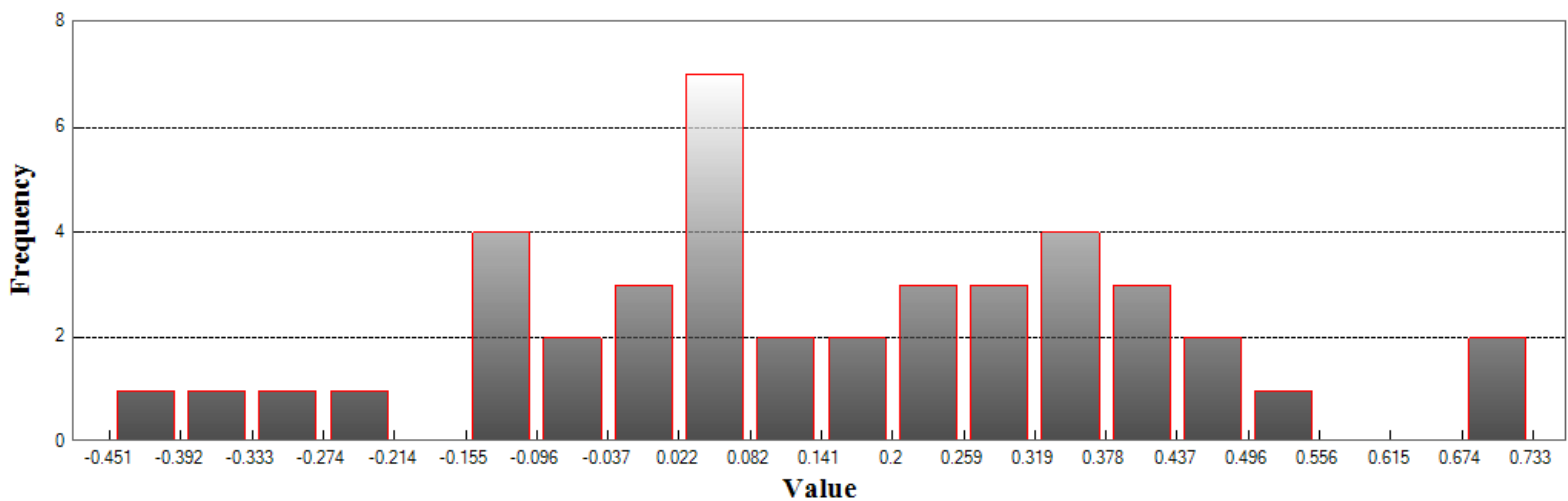


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.452
Maximum DZ: 0.733
Mean DZ: 0.138
Mean Magnitude DZ: 0.489
Number Observations: 42
Standard Deviation DZ: 0.271
RMSE Z: 0.301
95th Percentile: 0.55
Units: US Survey Feet

Histogram



Min: -0.452

Max: 0.733

Number Of Bins: 20

Bin Interval: 0.059

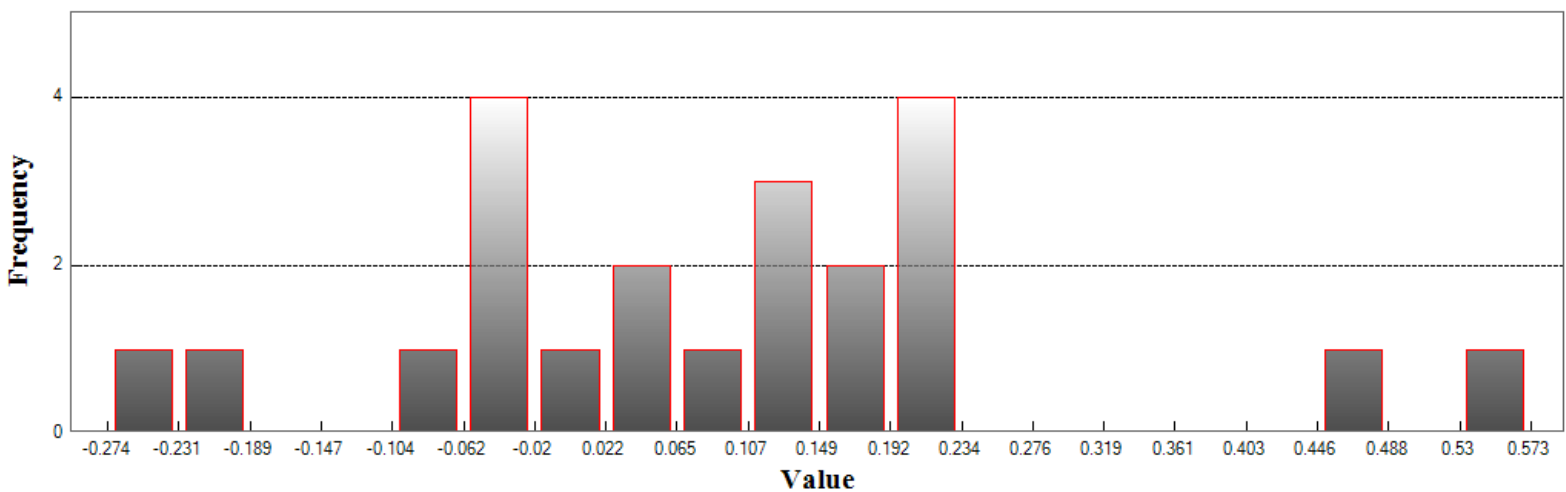


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.274
Maximum DZ: 0.573
Mean DZ: 0.098
Mean Magnitude DZ: 0.406
Number Observations: 22
Standard Deviation DZ: 0.196
RMSE Z: 0.215
95th Percentile: 0.479
Units: US Survey Feet

Histogram



Min: -0.274

Max: 0.573

Number Of Bins: 20

Bin Interval: 0.042

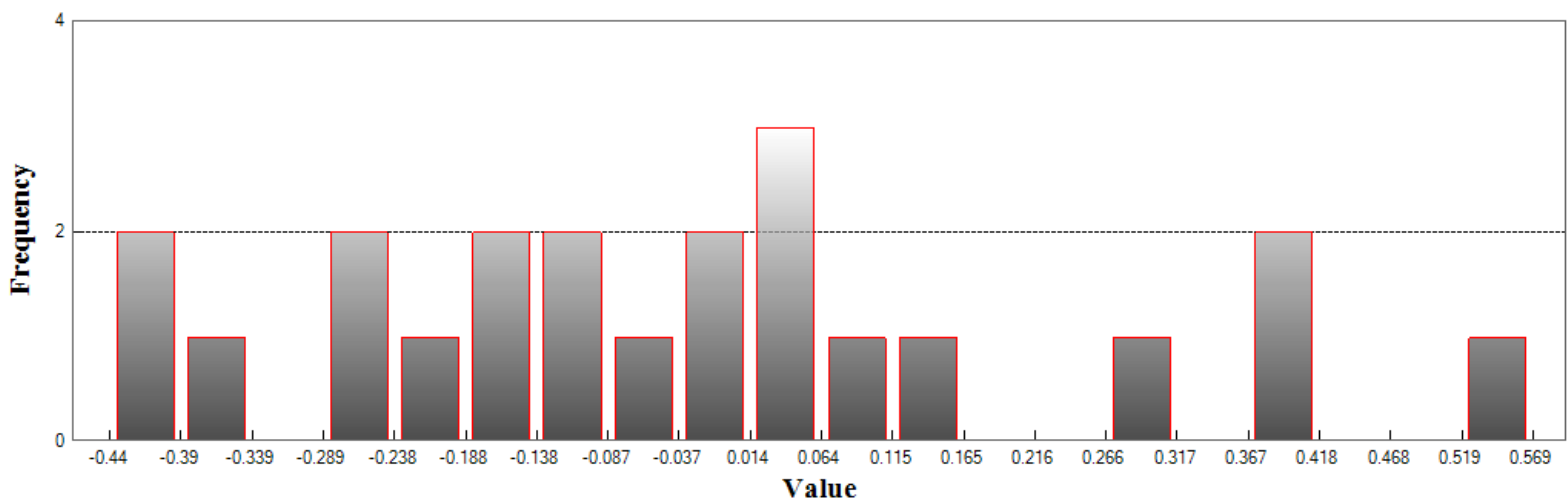


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.44
Maximum DZ: 0.569
Mean DZ: -0.03
Mean Magnitude DZ: 0.453
Number Observations: 22
Standard Deviation DZ: 0.266
RMSE Z: 0.261
95th Percentile: 0.44
Units: US Survey Feet

Histogram



Min: -0.44
Max: 0.569
Number Of Bins: 20
Bin Interval: 0.05

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: mitchell_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

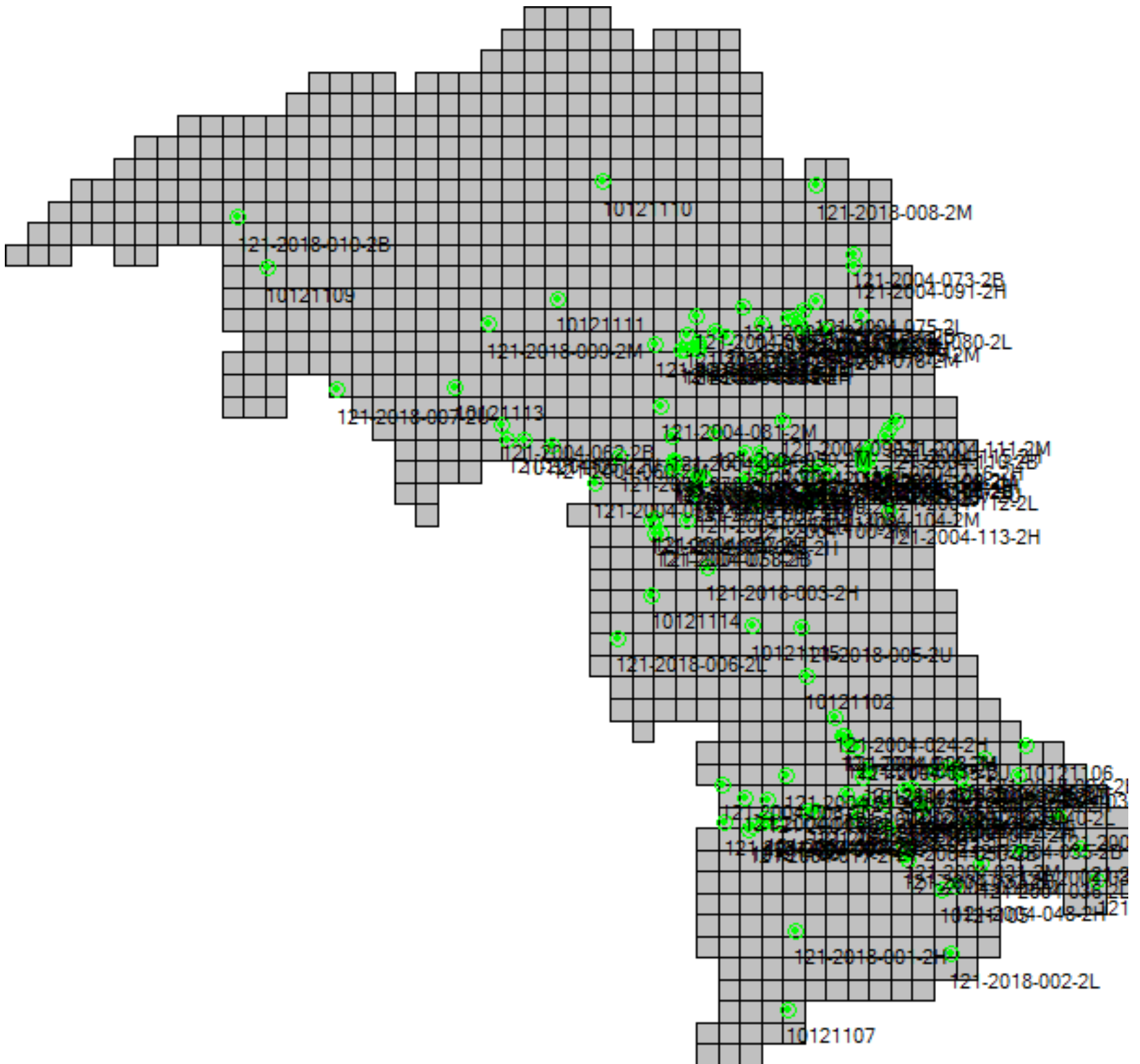
Tile Index Attribute: las_file

Data Filename: QL1

Number of Data Files Matching Attribute: 1025 out of 1025



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	21	0.559		
2H	42		0.857	
2L	20		0.456	
2M	21		0.785	
2U	39	0.554		
Total	143			

Units: US Survey Feet

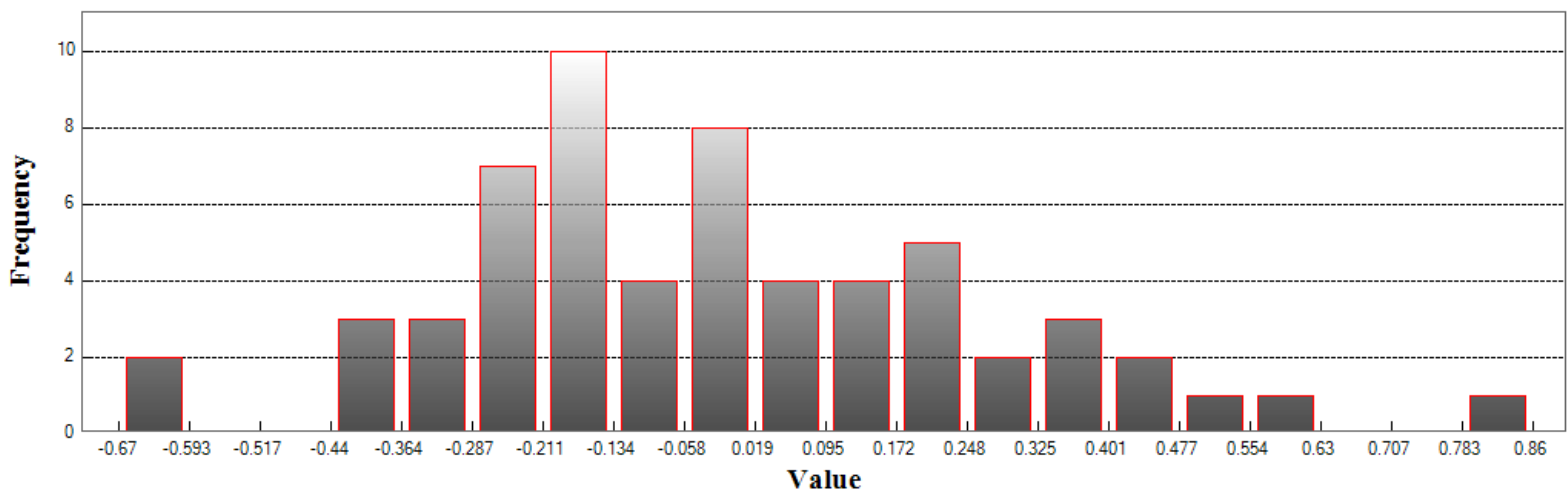


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.669
Maximum DZ: 0.86
Mean DZ: -0.018
Mean Magnitude DZ: 0.475
Number Observations: 60
Standard Deviation DZ: 0.285
RMSE Z: 0.284
95% Confidence Level Z: 0.556
Units: US Survey Feet

Histogram



Min: -0.669
Max: 0.86
Number Of Bins: 20
Bin Interval: 0.076

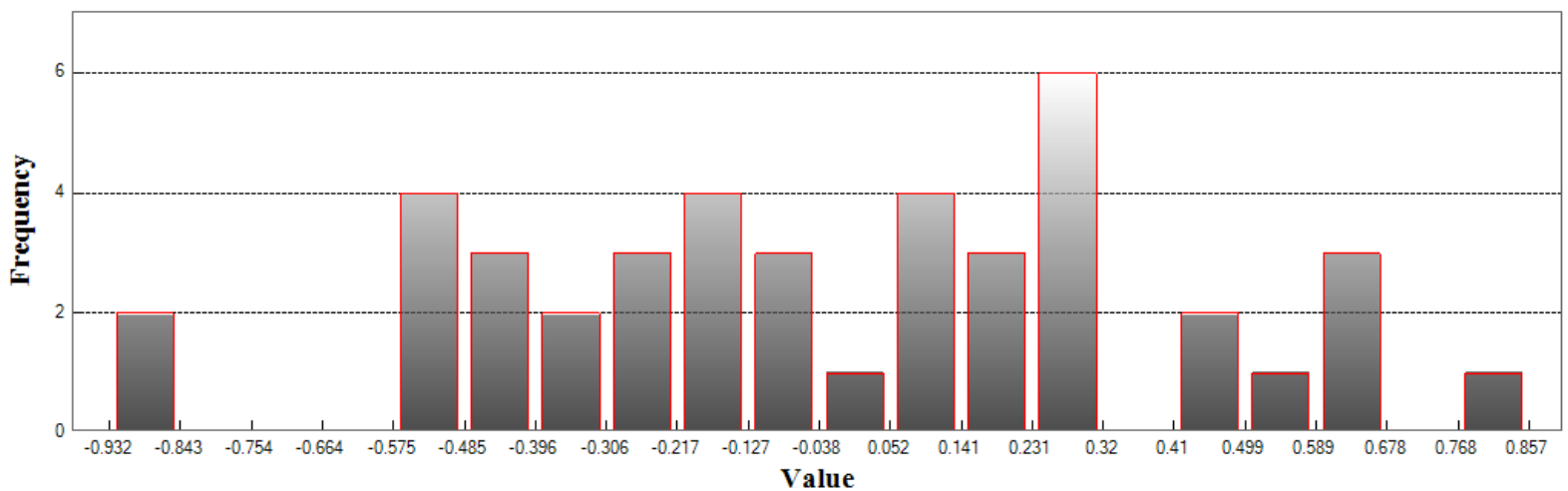


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.933
Maximum DZ: 0.857
Mean DZ: -0.024
Mean Magnitude DZ: 0.587
Number Observations: 42
Standard Deviation DZ: 0.42
RMSE Z: 0.416
95th Percentile: 0.857
Units: US Survey Feet

Histogram



Min: -0.933
Max: 0.857
Number Of Bins: 20
Bin Interval: 0.089

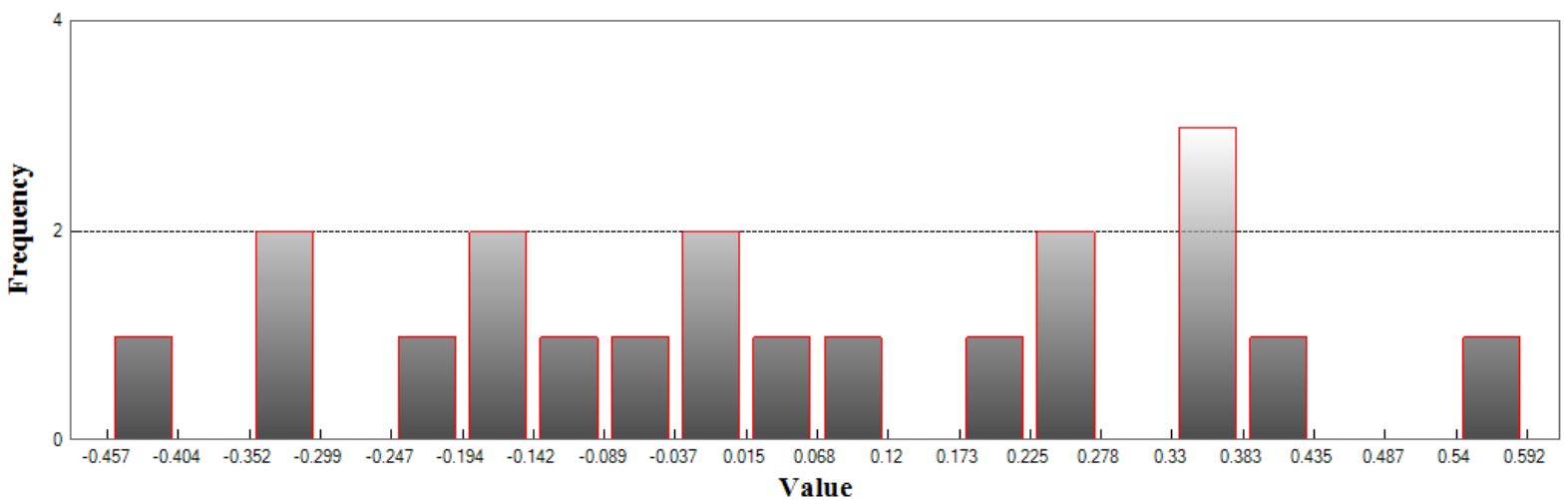


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.456
Maximum DZ: 0.593
Mean DZ: 0.051
Mean Magnitude DZ: 0.489
Number Observations: 20
Standard Deviation DZ: 0.286
RMSE Z: 0.284
95th Percentile: 0.456
Units: US Survey Feet

Histogram



Min: -0.456
Max: 0.593
Number Of Bins: 20
Bin Interval: 0.052

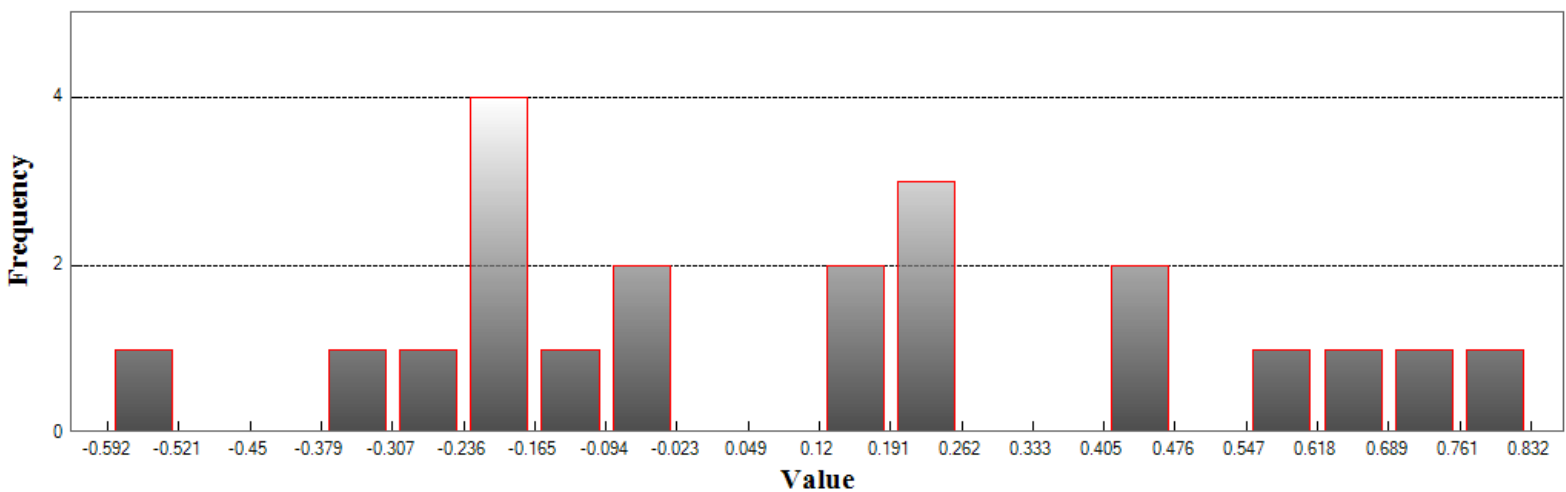


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.593
Maximum DZ: 0.831
Mean DZ: 0.116
Mean Magnitude DZ: 0.574
Number Observations: 21
Standard Deviation DZ: 0.391
RMSE Z: 0.399
95th Percentile: 0.785
Units: US Survey Feet

Histogram



Min: -0.593

Max: 0.831

Number Of Bins: 20

Bin Interval: 0.071

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: polk_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

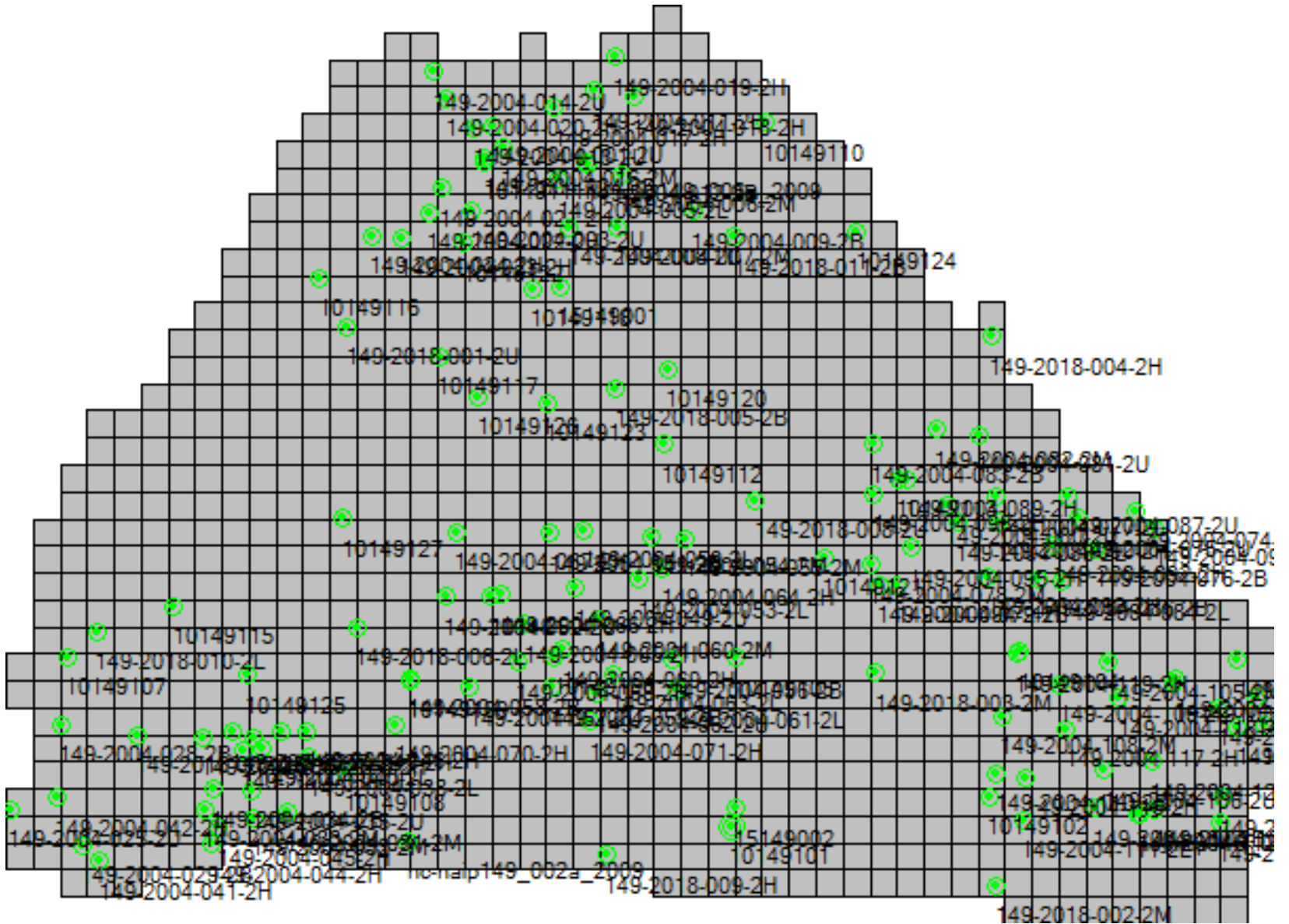
Tile Index Attribute: las_tile

Data Filename: Masspoints

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA
LAS			
2B	20	0.592	
2H	40		0.576
2L	18		0.739
2M	19		0.858
2U	53	0.403	
Total	150		

Units: US Survey Feet

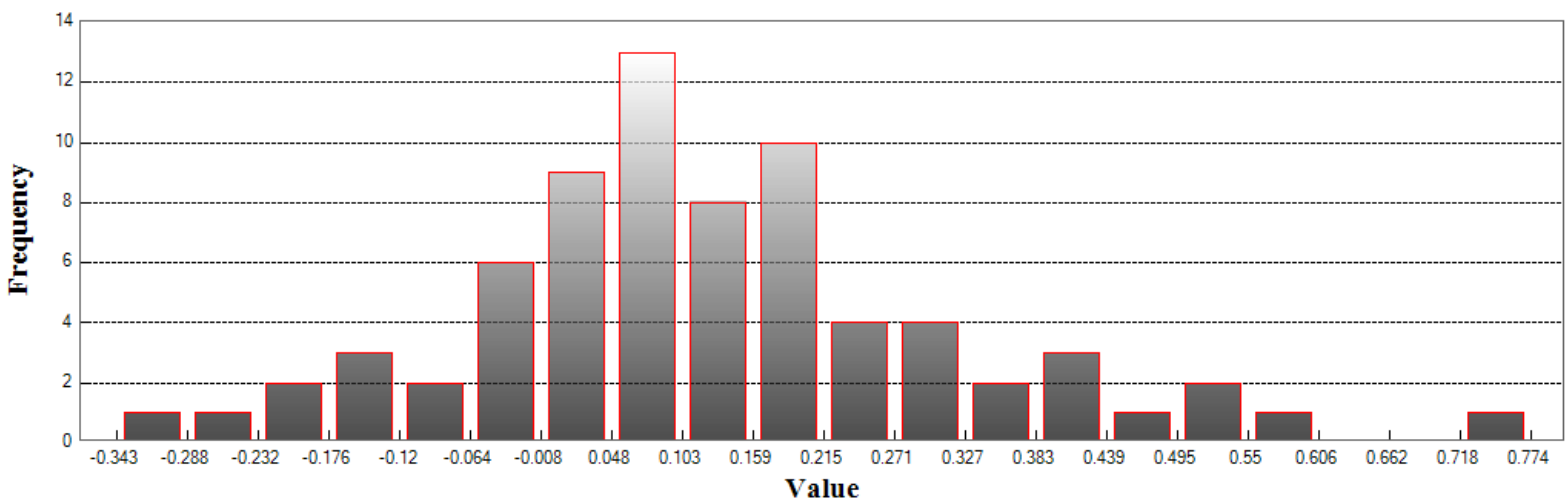


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.344
Maximum DZ: 0.774
Mean DZ: 0.126
Mean Magnitude DZ: 0.424
Number Observations: 73
Standard Deviation DZ: 0.201
RMSE Z: 0.236
95% Confidence Level Z: 0.462
Units: US Survey Feet

Histogram



Min: -0.344
Max: 0.774
Number Of Bins: 20
Bin Interval: 0.056

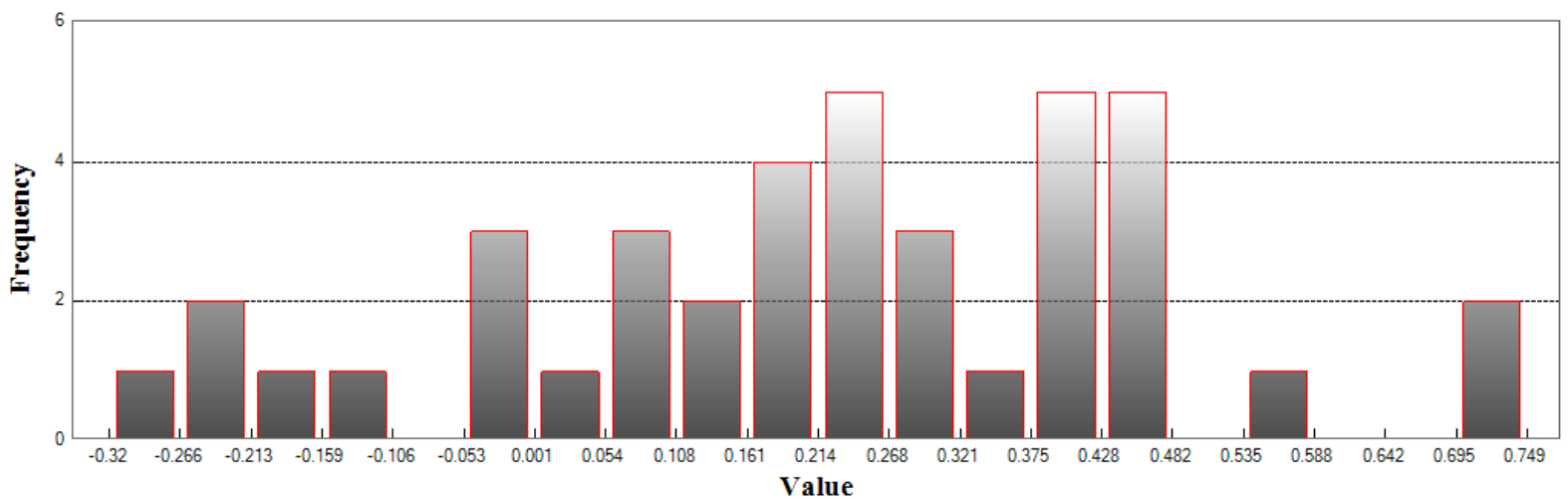


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.32
Maximum DZ: 0.748
Mean DZ: 0.219
Mean Magnitude DZ: 0.527
Number Observations: 40
Standard Deviation DZ: 0.248
RMSE Z: 0.328
95th Percentile: 0.576
Units: US Survey Feet

Histogram



Min: -0.32

Max: 0.748

Number Of Bins: 20

Bin Interval: 0.053

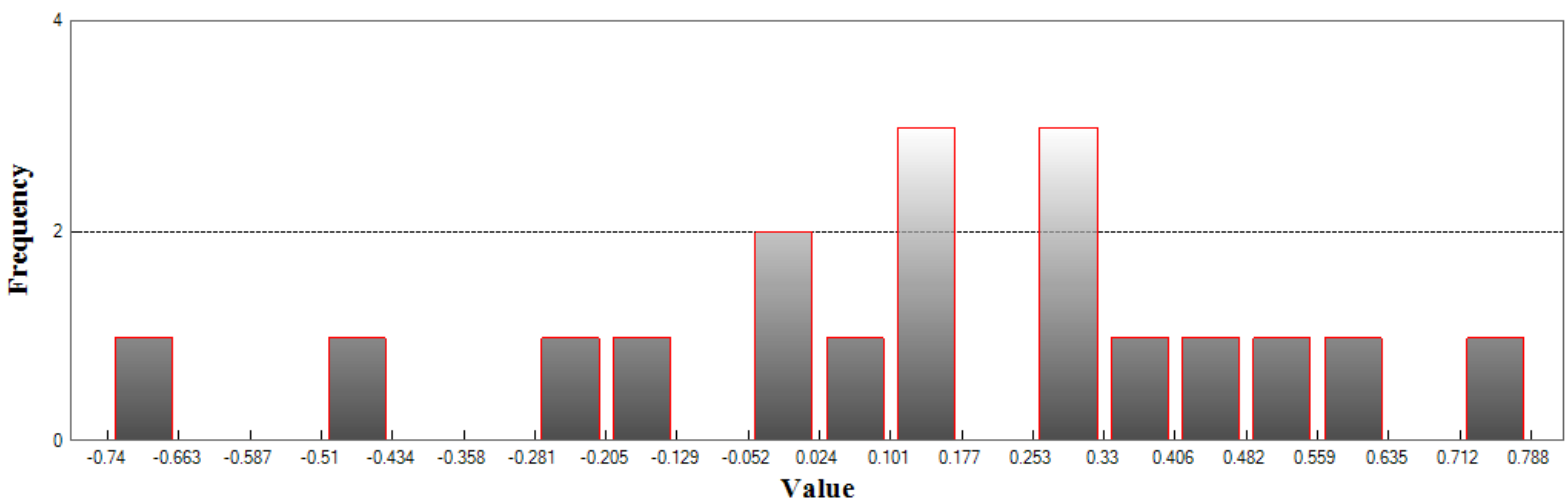


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.739
Maximum DZ: 0.788
Mean DZ: 0.126
Mean Magnitude DZ: 0.561
Number Observations: 18
Standard Deviation DZ: 0.376
RMSE Z: 0.387
95th Percentile: 0.739
Units: US Survey Feet

Histogram



Min: -0.739

Max: 0.788

Number Of Bins: 20

Bin Interval: 0.076

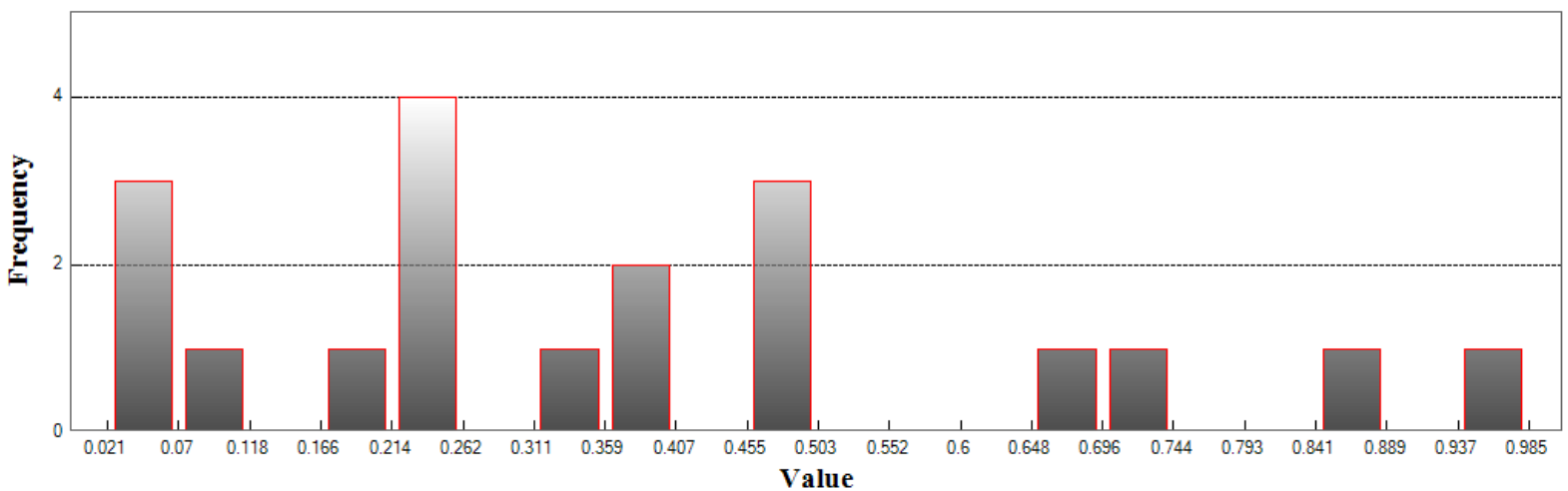


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: 0.021
Maximum DZ: 0.985
Mean DZ: 0.375
Mean Magnitude DZ: 0.613
Number Observations: 19
Standard Deviation DZ: 0.275
RMSE Z: 0.461
95th Percentile: 0.858
Units: US Survey Feet

Histogram



Min: 0.021

Max: 0.985

Number Of Bins: 20

Bin Interval: 0.048

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: rutherford_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

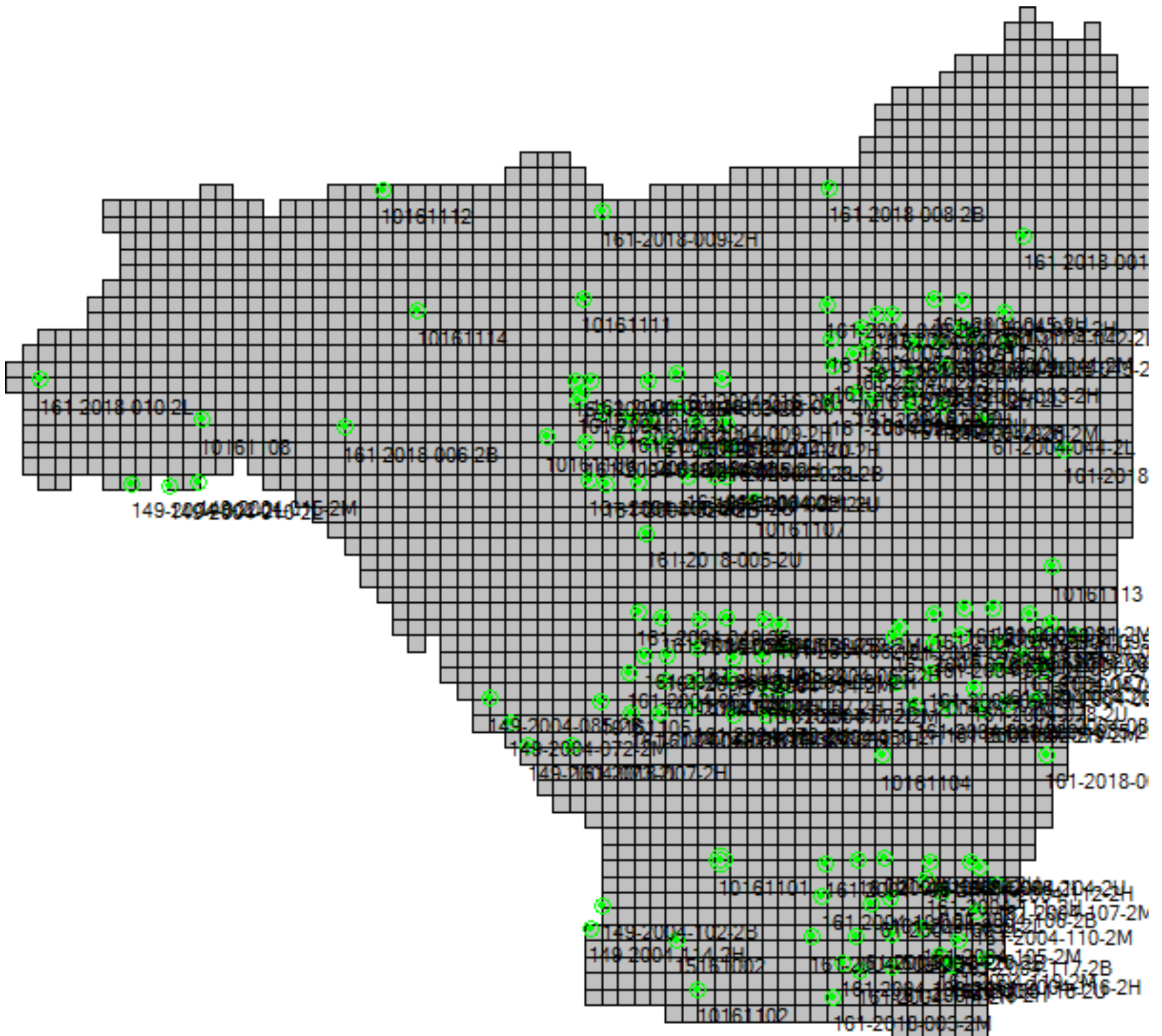
Tile Index Attribute: las_tile

Data Filename: Masspoints

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	24	0.535		
2H	43		0.712	
2L	25		0.582	
2M	24		0.708	
2U	38	0.496		
Total	154			

Units: US Survey Feet



LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.474

Maximum DZ: 0.499

Mean DZ: 0.17

Mean Magnitude DZ: 0.468

Number Observations: 62

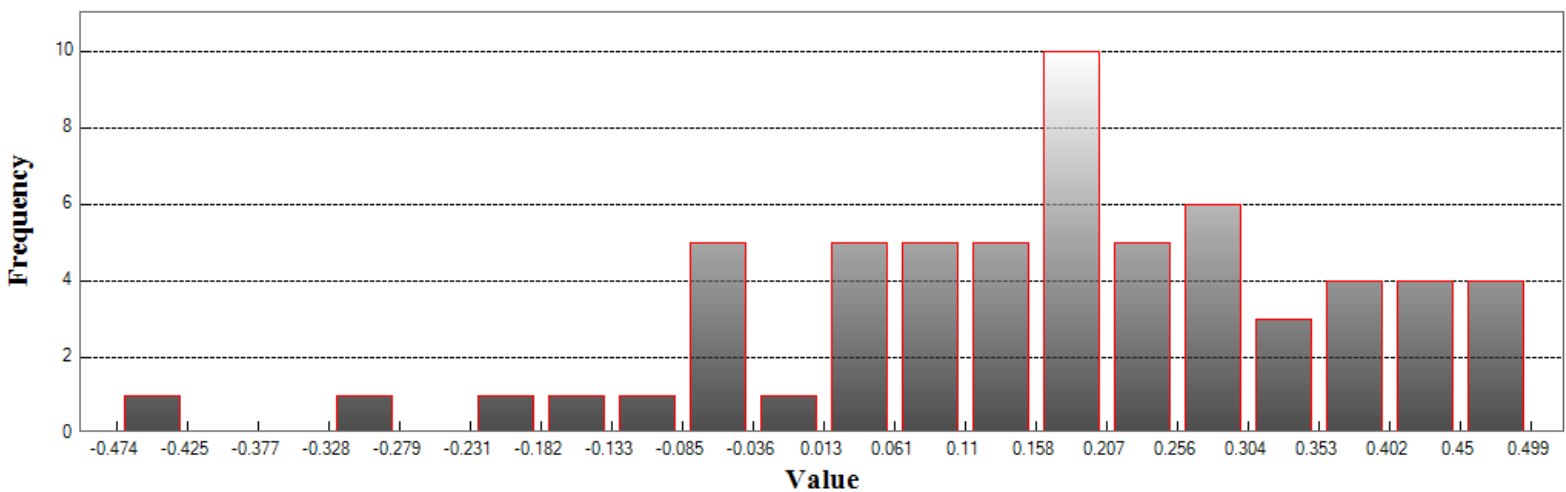
Standard Deviation DZ: 0.2

RMSE Z: 0.261

95% Confidence Level Z: 0.511

Units: US Survey Feet

Histogram



Min: -0.474

Max: 0.499

Number Of Bins: 20

Bin Interval: 0.049

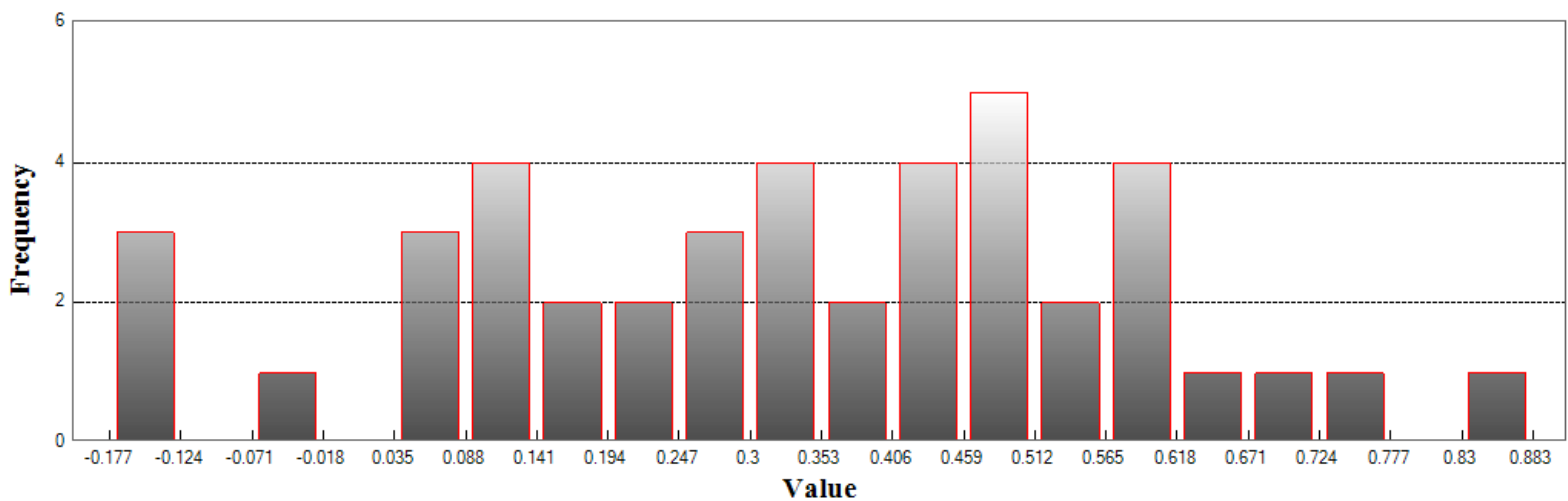


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.178
Maximum DZ: 0.883
Mean DZ: 0.335
Mean Magnitude DZ: 0.599
Number Observations: 43
Standard Deviation DZ: 0.248
RMSE Z: 0.416
95th Percentile: 0.712
Units: US Survey Feet

Histogram



Min: -0.178

Max: 0.883

Number Of Bins: 20

Bin Interval: 0.053

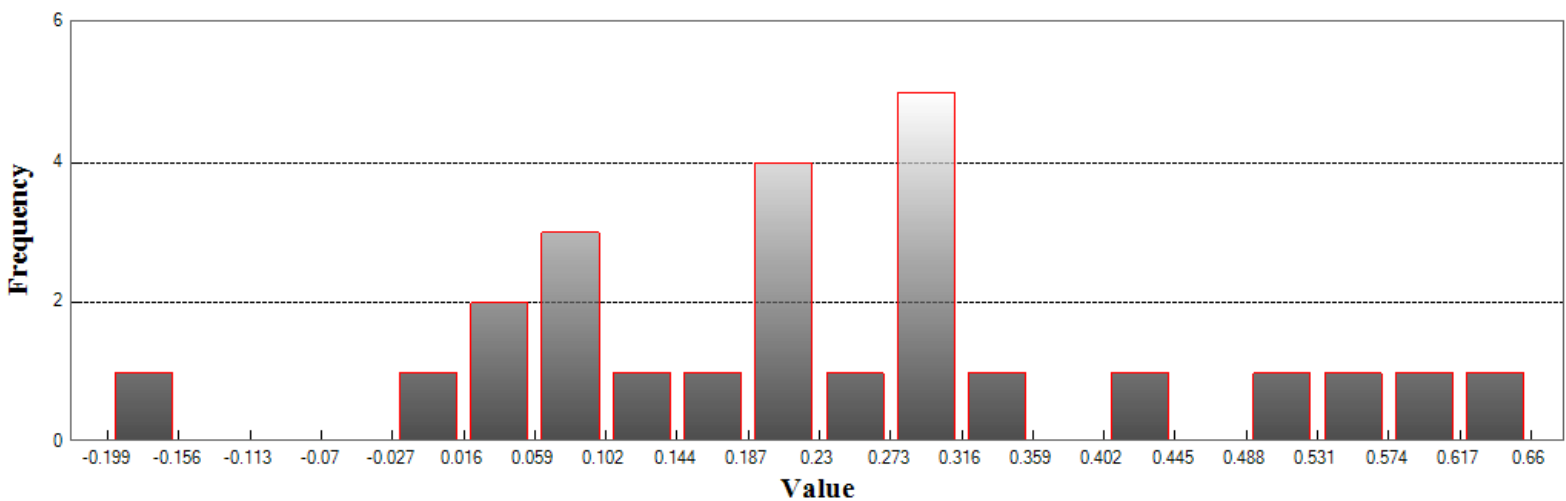


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.198
Maximum DZ: 0.66
Mean DZ: 0.24
Mean Magnitude DZ: 0.508
Number Observations: 25
Standard Deviation DZ: 0.201
RMSE Z: 0.311
95th Percentile: 0.582
Units: US Survey Feet

Histogram



Min: -0.198

Max: 0.66

Number Of Bins: 20

Bin Interval: 0.043

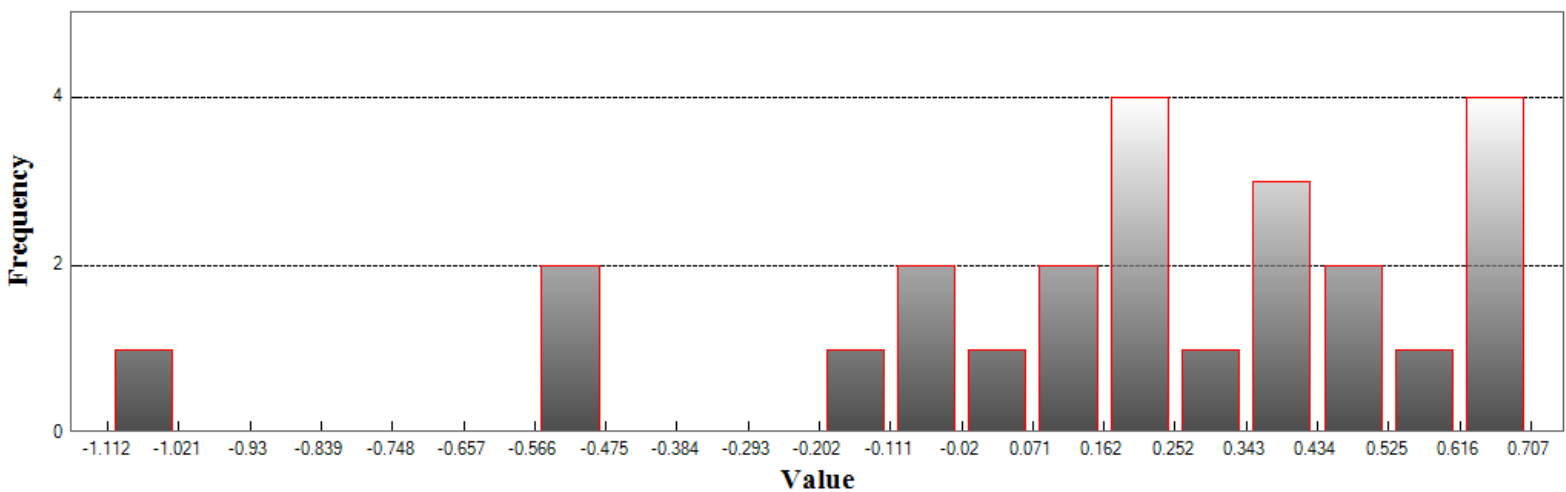


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -1.111
Maximum DZ: 0.708
Mean DZ: 0.189
Mean Magnitude DZ: 0.62
Number Observations: 24
Standard Deviation DZ: 0.437
RMSE Z: 0.467
95th Percentile: 0.708
Units: US Survey Feet

Histogram



Min: -1.111

Max: 0.708

Number Of Bins: 20

Bin Interval: 0.091

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: swain_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

Tile Index Attribute: las_tile

Data Filename: Masspoints

Number of Data Files Matching Attribute: Not Specified



LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	22	0.605		
2H	42		0.867	
2L	22		0.480	
2M	20		0.716	
2U	43	0.581		
Total	149			

Units: US Survey Feet

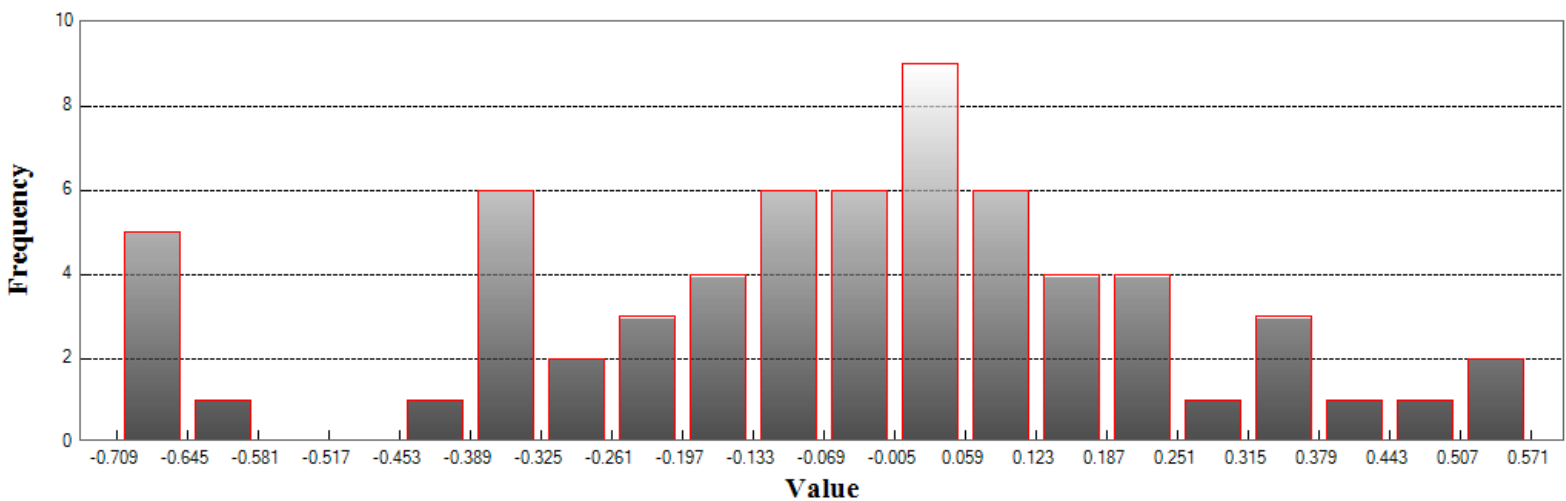


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.709
Maximum DZ: 0.571
Mean DZ: -0.058
Mean Magnitude DZ: 0.477
Number Observations: 65
Standard Deviation DZ: 0.297
RMSE Z: 0.301
95% Confidence Level Z: 0.589
Units: US Survey Feet

Histogram



Min: -0.709
Max: 0.571
Number Of Bins: 20
Bin Interval: 0.064

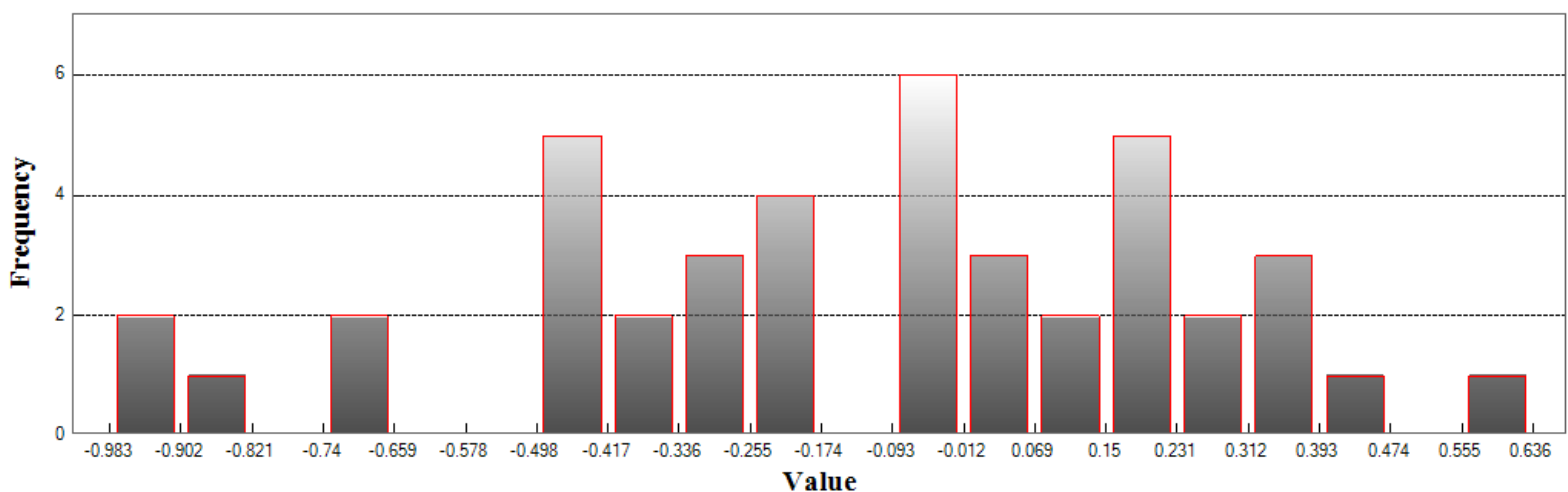


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.983
Maximum DZ: 0.636
Mean DZ: -0.122
Mean Magnitude DZ: 0.558
Number Observations: 42
Standard Deviation DZ: 0.383
RMSE Z: 0.398
95th Percentile: 0.867
Units: US Survey Feet

Histogram



Min: -0.983

Max: 0.636

Number Of Bins: 20

Bin Interval: 0.081

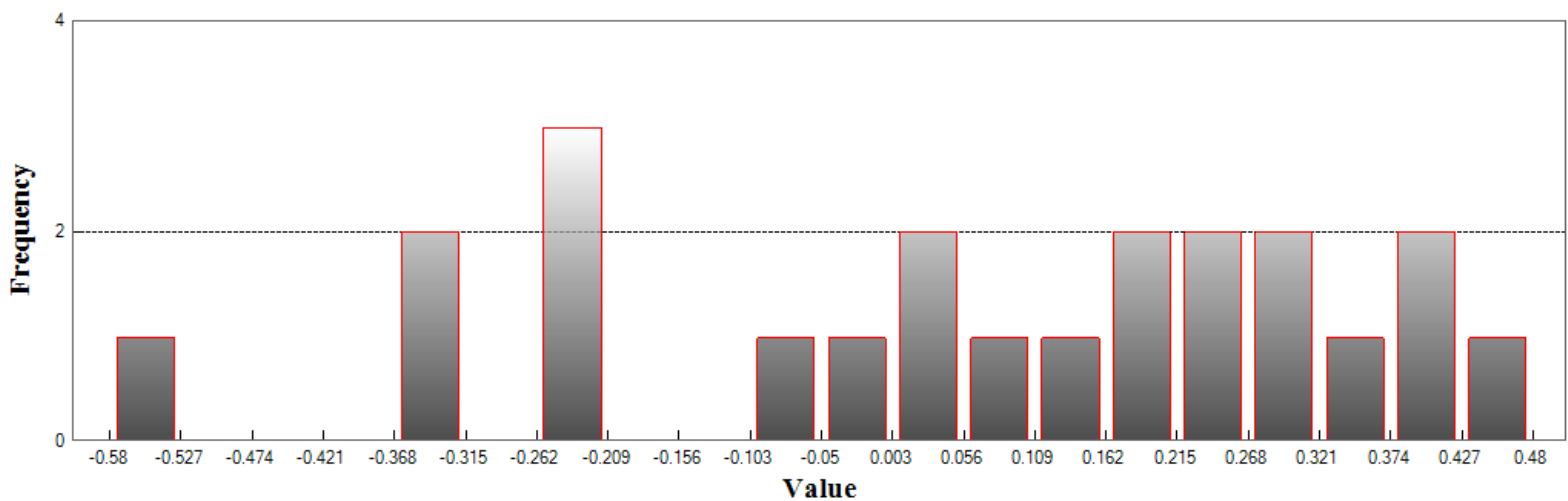


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.581
Maximum DZ: 0.48
Mean DZ: 0.058
Mean Magnitude DZ: 0.496
Number Observations: 22
Standard Deviation DZ: 0.285
RMSE Z: 0.285
95th Percentile: 0.48
Units: US Survey Feet

Histogram



Min: -0.581

Max: 0.48

Number Of Bins: 20

Bin Interval: 0.053

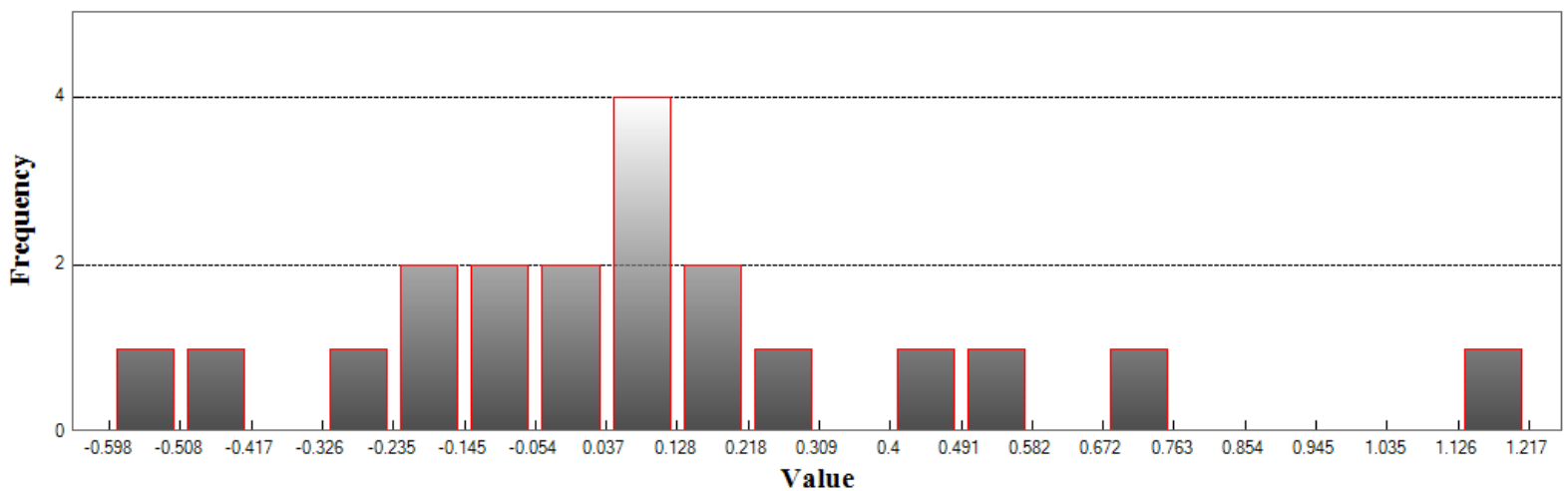


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.598
Maximum DZ: 1.217
Mean DZ: 0.098
Mean Magnitude DZ: 0.537
Number Observations: 20
Standard Deviation DZ: 0.411
RMSE Z: 0.412
95th Percentile: 0.716
Units: US Survey Feet

Histogram



Min: -0.598

Max: 1.217

Number Of Bins: 20

Bin Interval: 0.091

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: transylvania_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

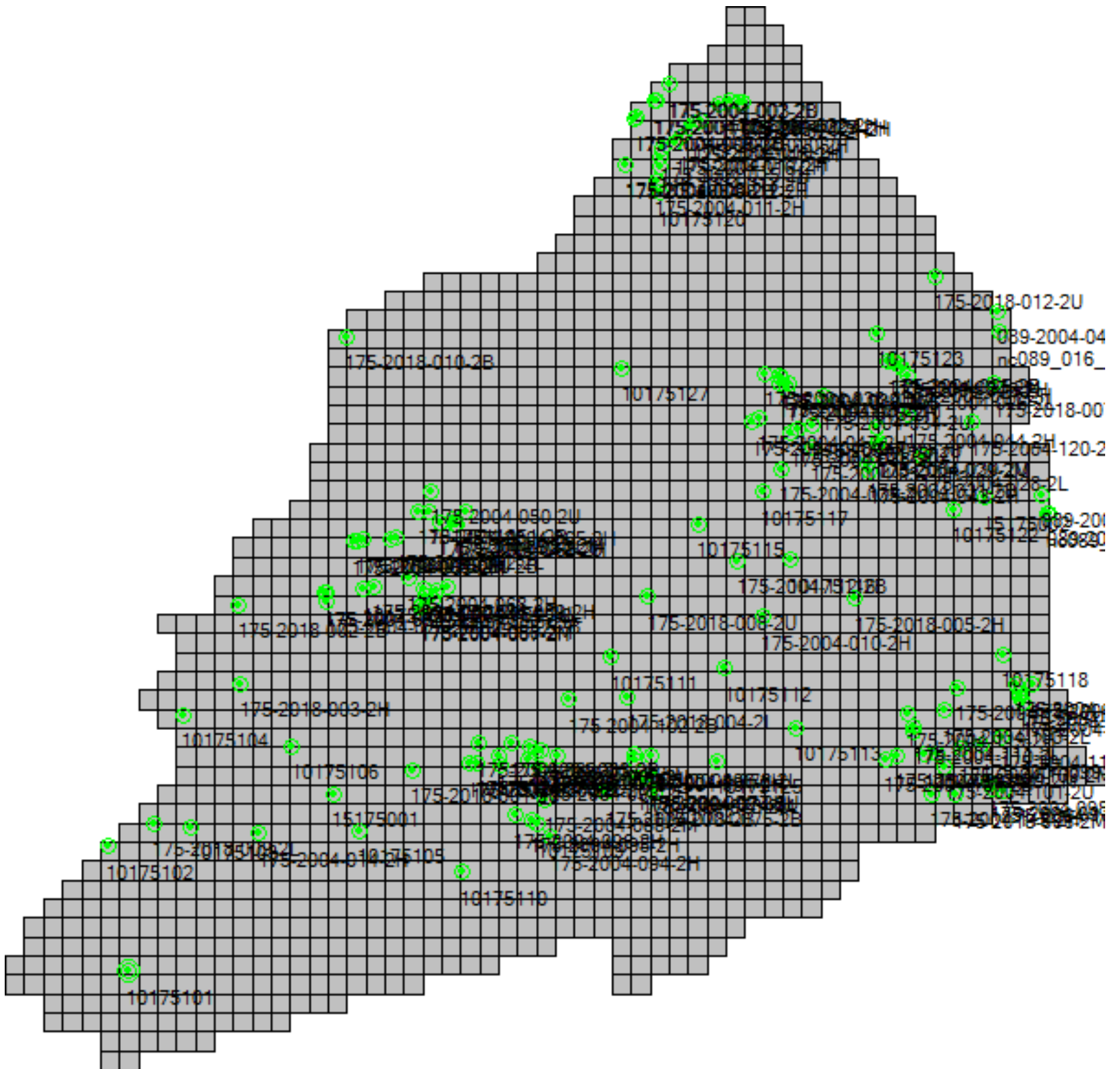
Tile Index Attribute: las_tile

Data Filename: QL1

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA	
LAS				
2B	24	0.592		
2H	49		0.866	
2L	19		0.767	
2M	16		0.686	
2U	56	0.497		
Total	164			

Units: US Survey Feet



LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U

Minimum DZ: -0.483

Maximum DZ: 0.493

Mean DZ: 0.105

Mean Magnitude DZ: 0.474

Number Observations: 80

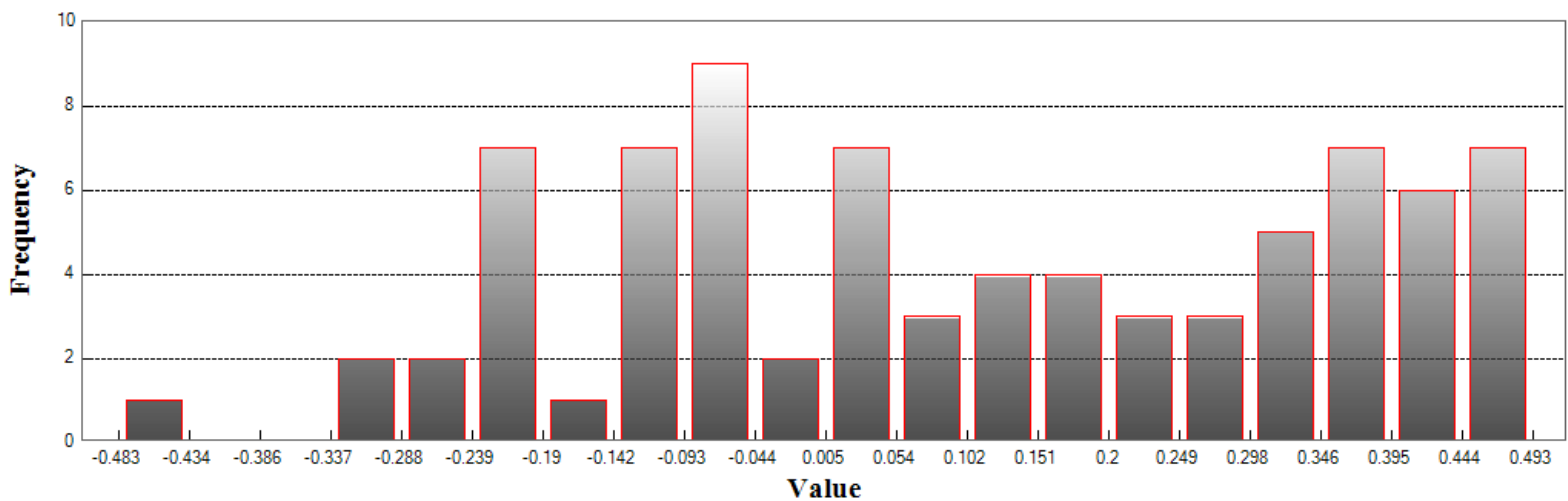
Standard Deviation DZ: 0.249

RMSE Z: 0.269

95% Confidence Level Z: 0.527

Units: US Survey Feet

Histogram



Min: -0.483

Max: 0.493

Number Of Bins: 20

Bin Interval: 0.049

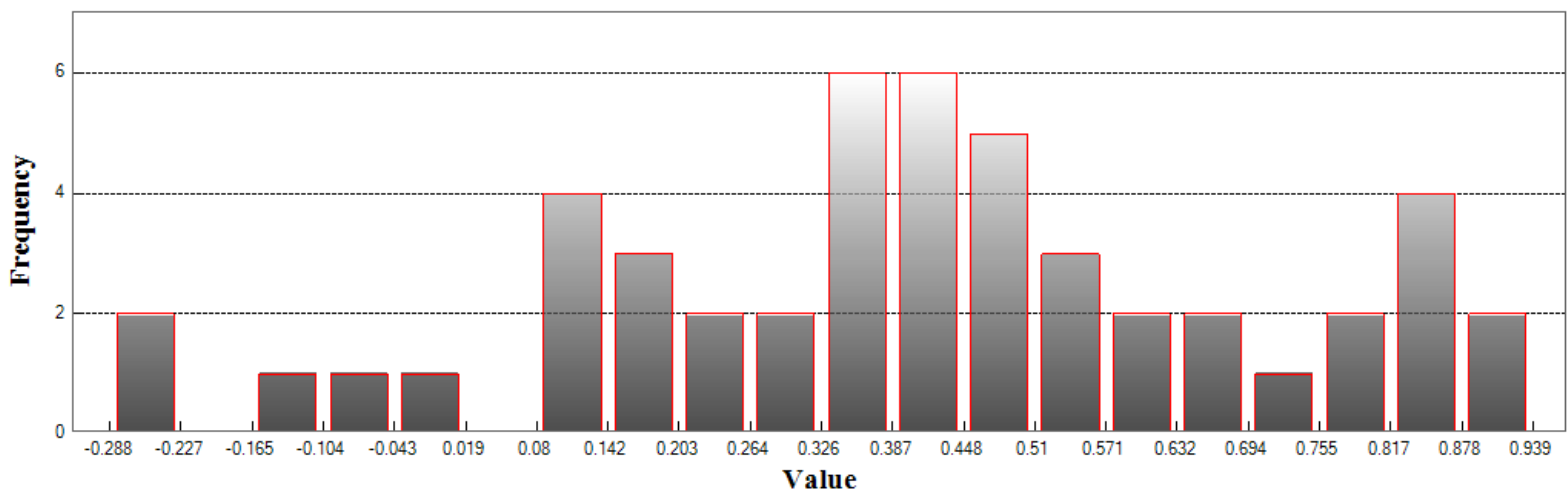


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.288
Maximum DZ: 0.939
Mean DZ: 0.41
Mean Magnitude DZ: 0.662
Number Observations: 49
Standard Deviation DZ: 0.294
RMSE Z: 0.502
95th Percentile: 0.866
Units: US Survey Feet

Histogram



Min: -0.288

Max: 0.939

Number Of Bins: 20

Bin Interval: 0.061

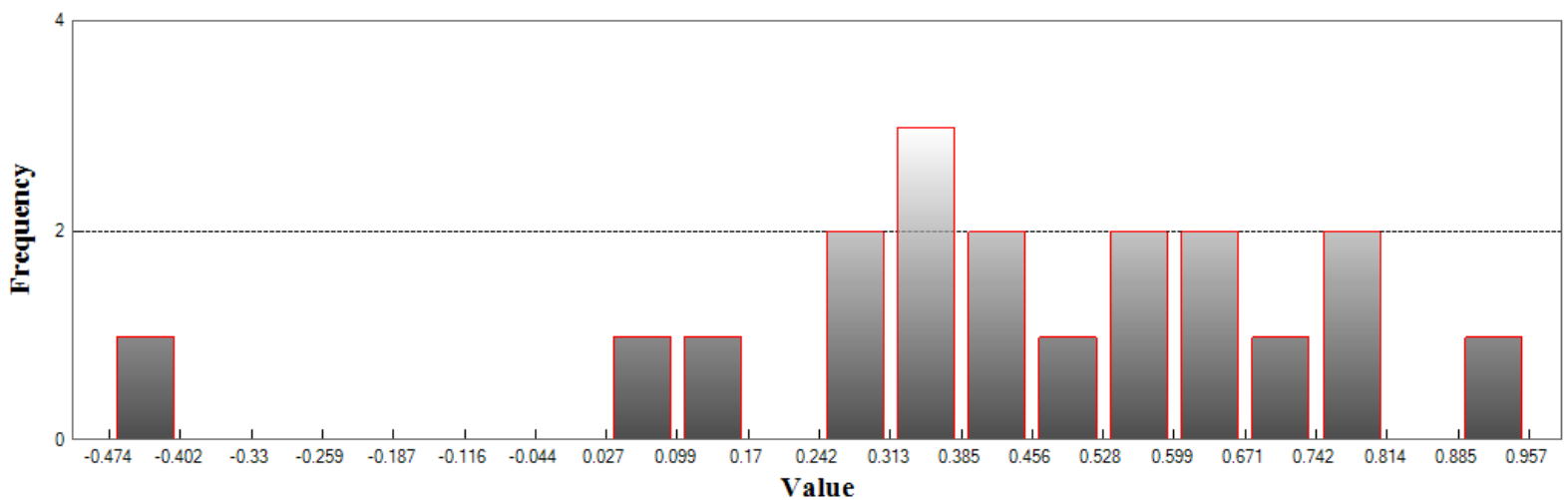


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.474
Maximum DZ: 0.957
Mean DZ: 0.442
Mean Magnitude DZ: 0.702
Number Observations: 19
Standard Deviation DZ: 0.313
RMSE Z: 0.537
95th Percentile: 0.767
Units: US Survey Feet

Histogram



Min: -0.474

Max: 0.957

Number Of Bins: 20

Bin Interval: 0.072

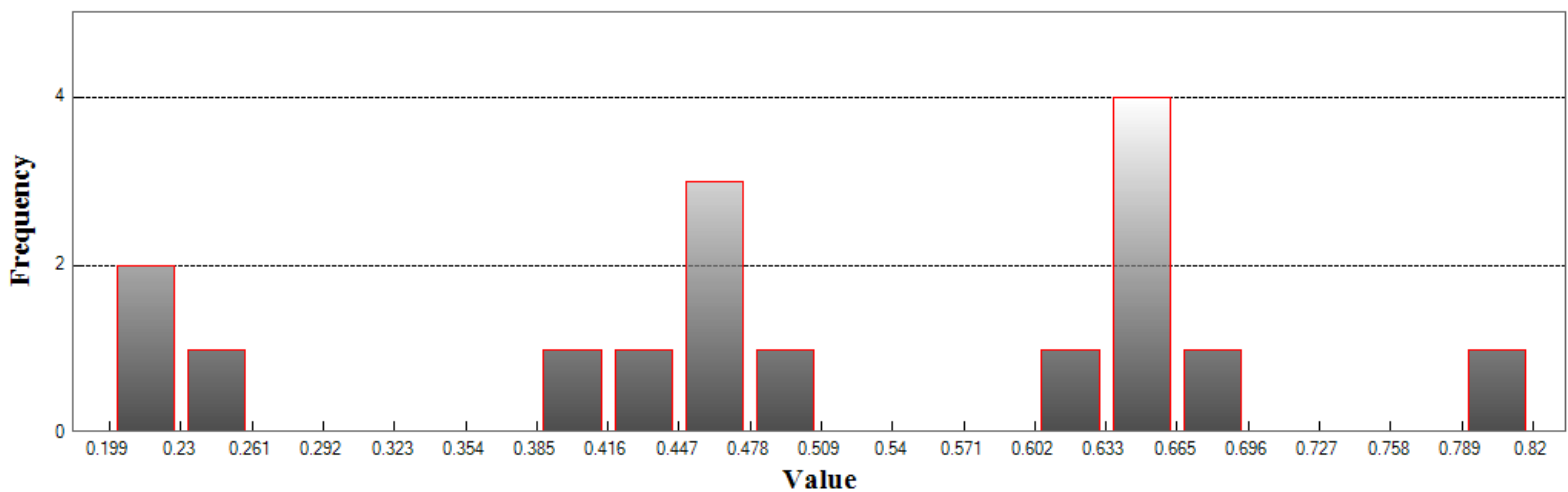


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: 0.198
Maximum DZ: 0.819
Mean DZ: 0.503
Mean Magnitude DZ: 0.709
Number Observations: 16
Standard Deviation DZ: 0.18
RMSE Z: 0.532
95th Percentile: 0.686
Units: US Survey Feet

Histogram



Min: 0.198

Max: 0.819

Number Of Bins: 20

Bin Interval: 0.031

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: watauga_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

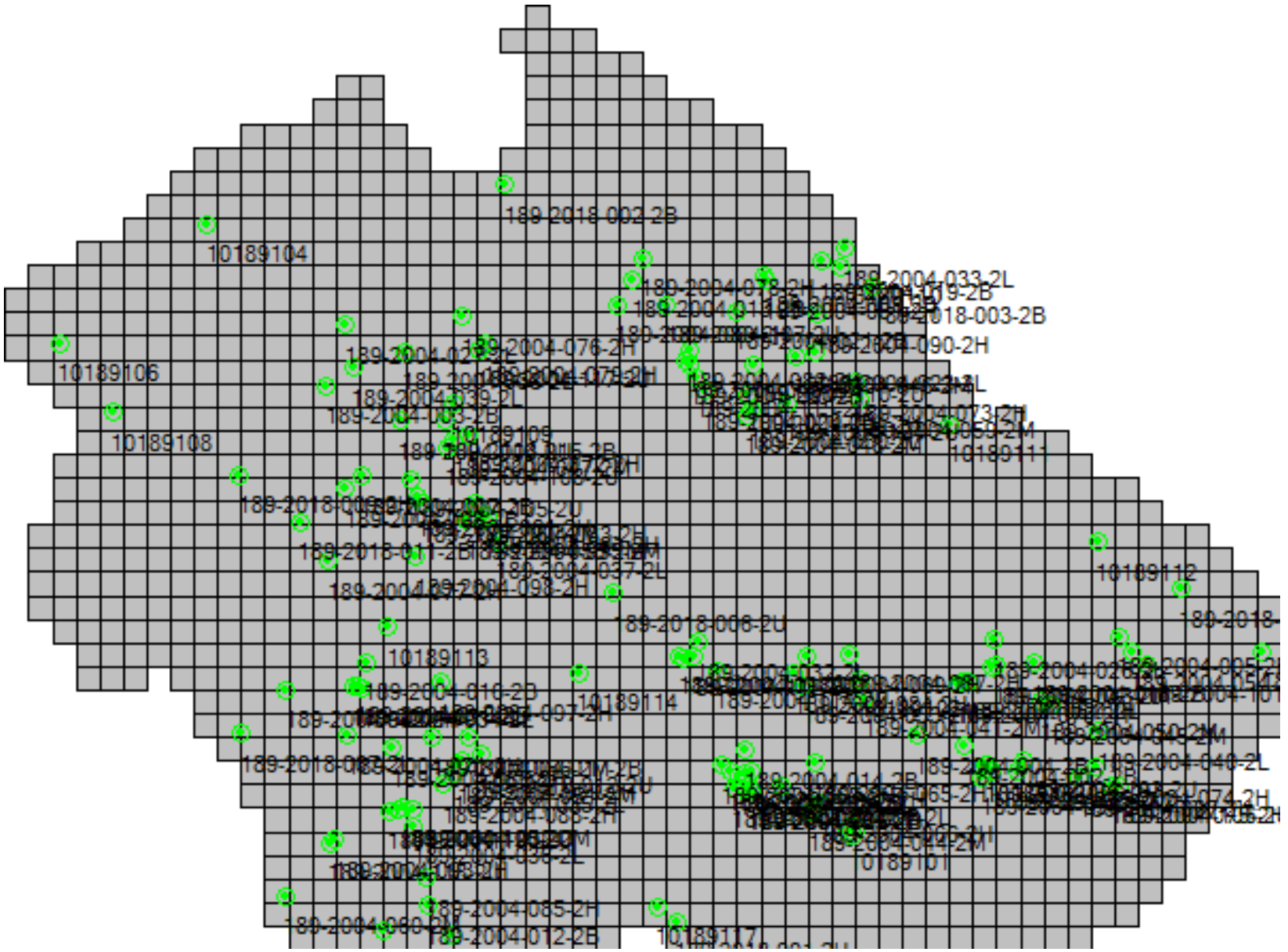
Tile Index Attribute: las_tile

Data Filename: QL1

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA
LAS			
2B	24	0.384	
2H	41		0.554
2L	21		0.851
2M	22		0.633
2U	37	0.597	
Total	145		

Units: US Survey Feet

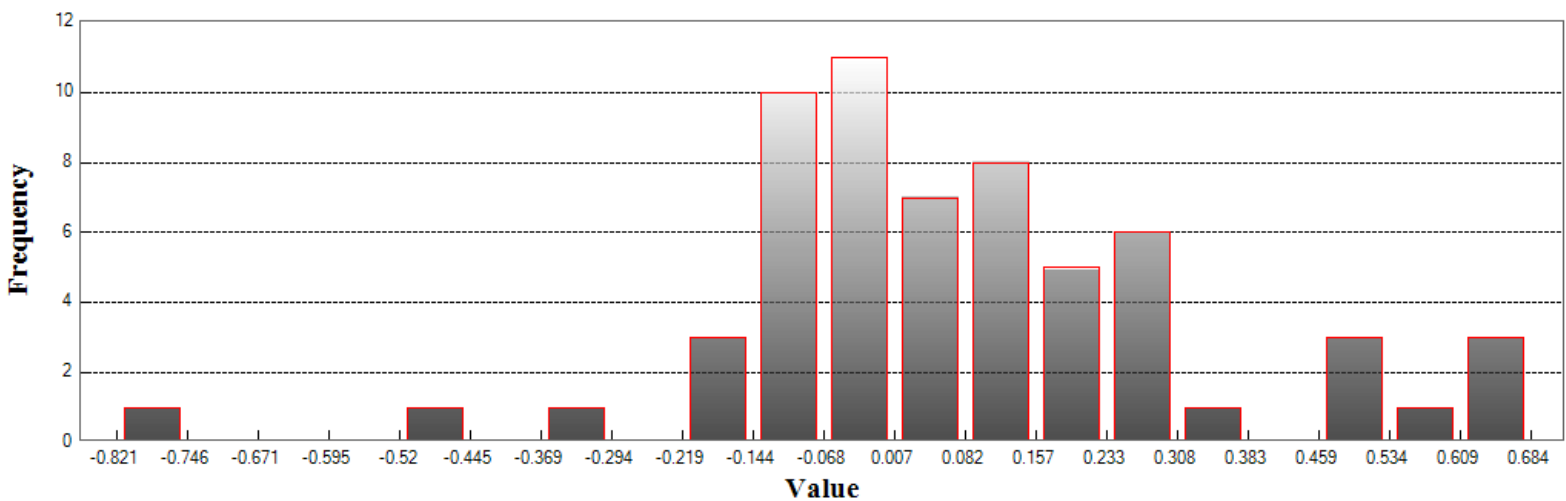


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.822
Maximum DZ: 0.684
Mean DZ: 0.076
Mean Magnitude DZ: 0.437
Number Observations: 61
Standard Deviation DZ: 0.258
RMSE Z: 0.267
95% Confidence Level Z: 0.523
Units: US Survey Feet

Histogram



Min: -0.822
Max: 0.684
Number Of Bins: 20
Bin Interval: 0.075

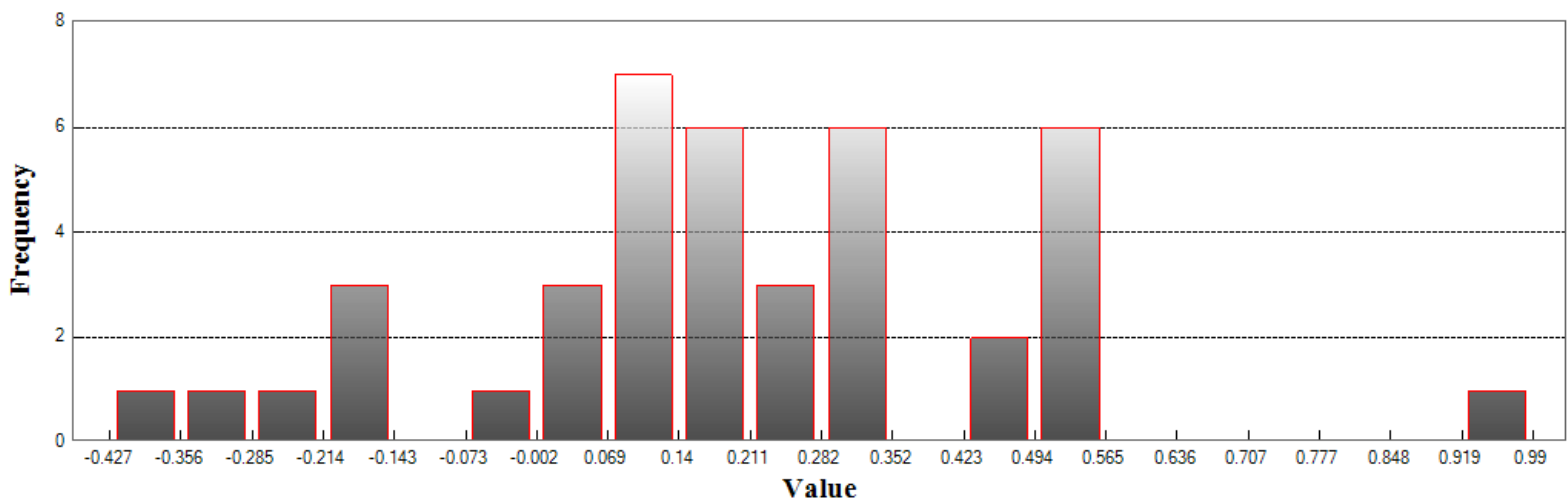


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.426
Maximum DZ: 0.99
Mean DZ: 0.197
Mean Magnitude DZ: 0.521
Number Observations: 41
Standard Deviation DZ: 0.273
RMSE Z: 0.334
95th Percentile: 0.554
Units: US Survey Feet

Histogram



Min: -0.426

Max: 0.99

Number Of Bins: 20

Bin Interval: 0.071

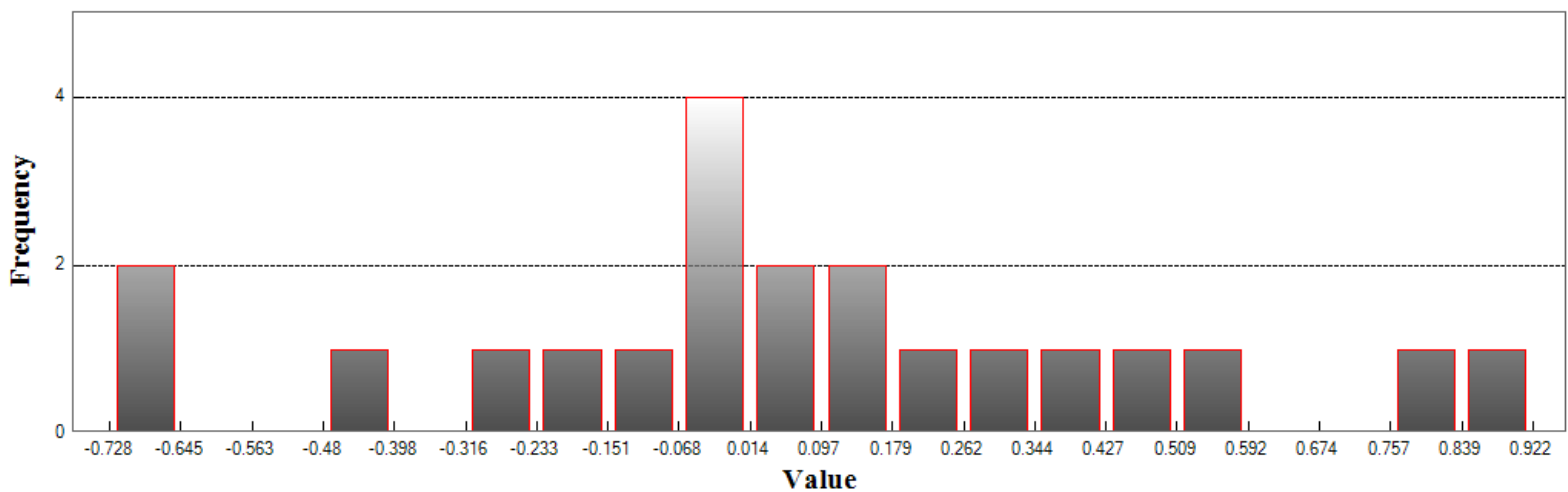


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.728
Maximum DZ: 0.922
Mean DZ: 0.071
Mean Magnitude DZ: 0.56
Number Observations: 21
Standard Deviation DZ: 0.419
RMSE Z: 0.415
95th Percentile: 0.851
Units: US Survey Feet

Histogram



Min: -0.728

Max: 0.922

Number Of Bins: 20

Bin Interval: 0.082

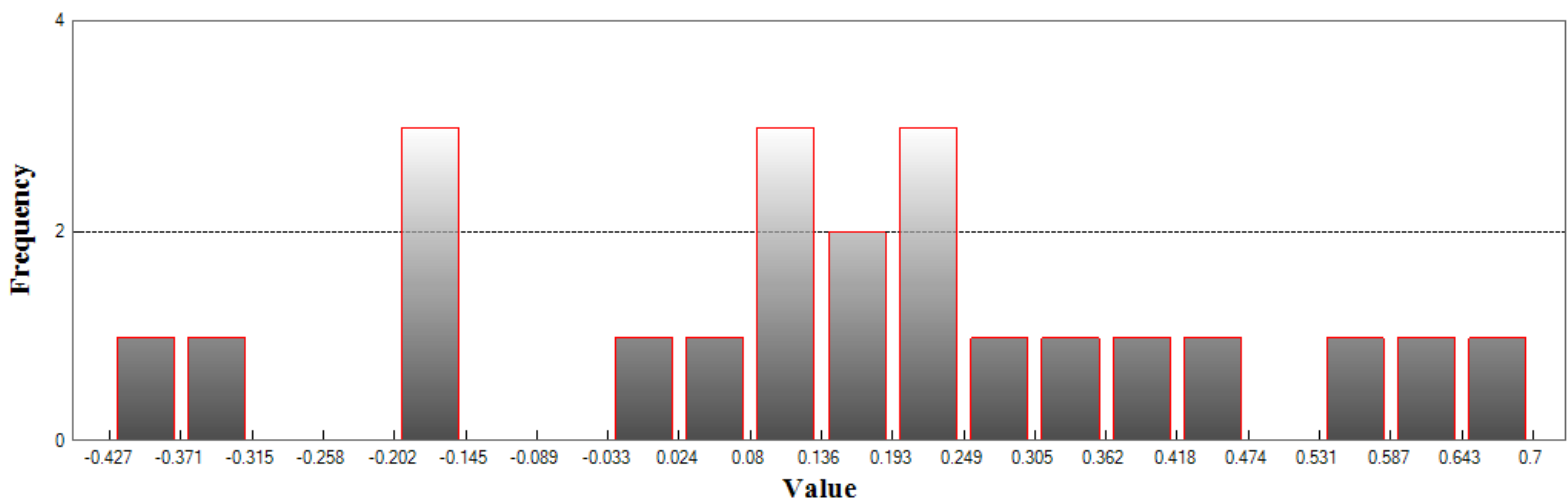


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.427
Maximum DZ: 0.7
Mean DZ: 0.157
Mean Magnitude DZ: 0.526
Number Observations: 22
Standard Deviation DZ: 0.301
RMSE Z: 0.334
95th Percentile: 0.633
Units: US Survey Feet

Histogram



Min: -0.427

Max: 0.7

Number Of Bins: 20

Bin Interval: 0.056

NORTH CAROLINA GEODETIC SURVEY

Claude T Bowers Building
4105 Reedy Creek Road
Raleigh, North Carolina 27607
(919)733-3836



Project Information

Prepared By: Watson Ross
Project Name: 2018 Phase 5 LiDAR QC
Sensor Info: GmAPD Geiger-mode
Required Nominal Pulse Spacing: 0.35
Vendor Name: NA
Units: US Survey Feet
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 8/17/2018 Finish: 8/17/2018

Metadata Information

Tile Index:

Filename: yancey_tiles.shp

Number of Polys: 0

Intensity:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

DEM:

Tile Index Attribute: Not Specified

Data Filename: Not Specified

Number of Data Files Matching Attribute: Not Specified

LAS:

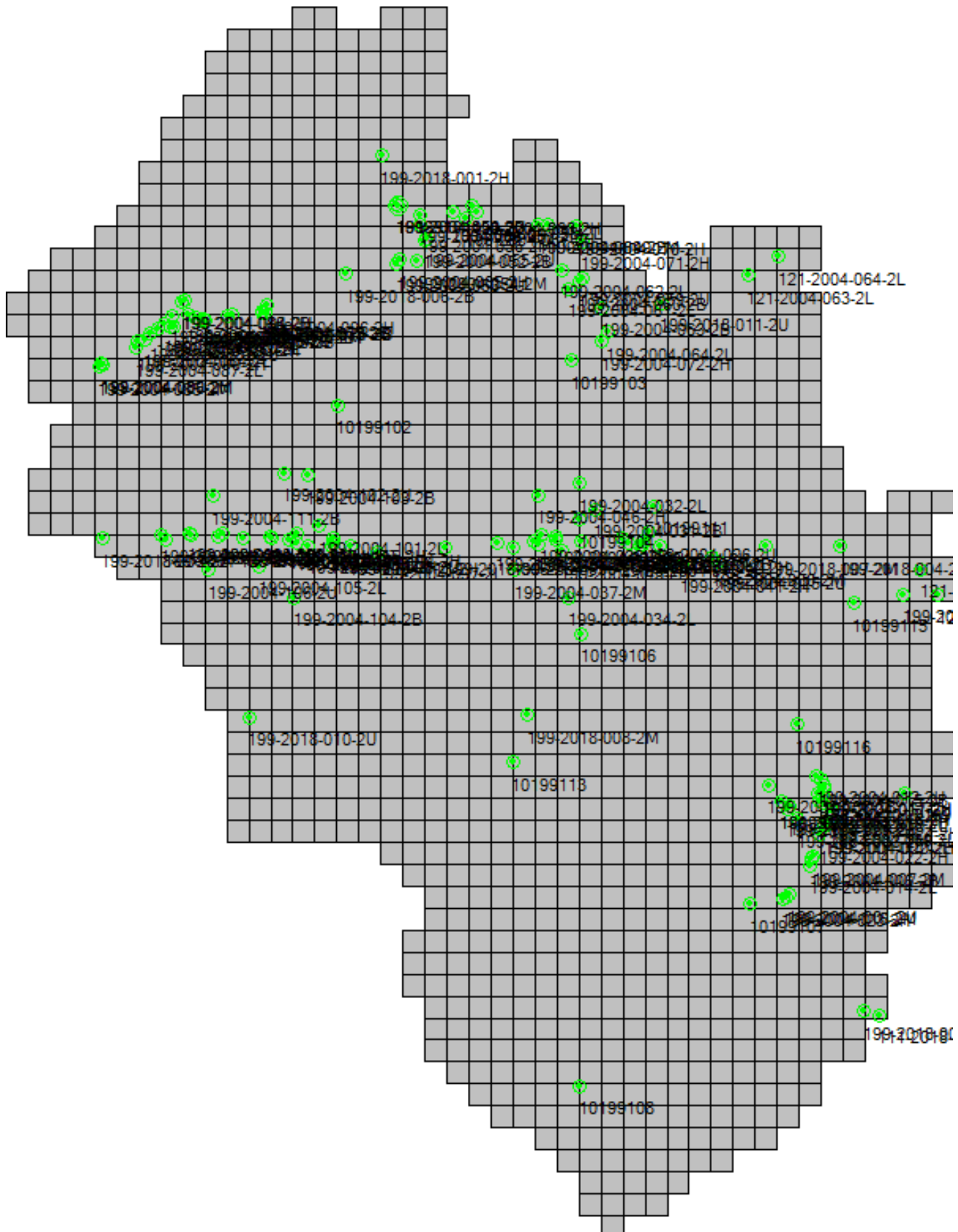
Tile Index Attribute: las_file

Data Filename: QL1

Number of Data Files Matching Attribute: Not Specified



Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# of Points	NVA	VVA
LAS			
2B	24	0.572	
2H	42		0.554
2L	25		0.469
2M	23		0.639
2U	37	0.573	
Total	151		

Units: US Survey Feet

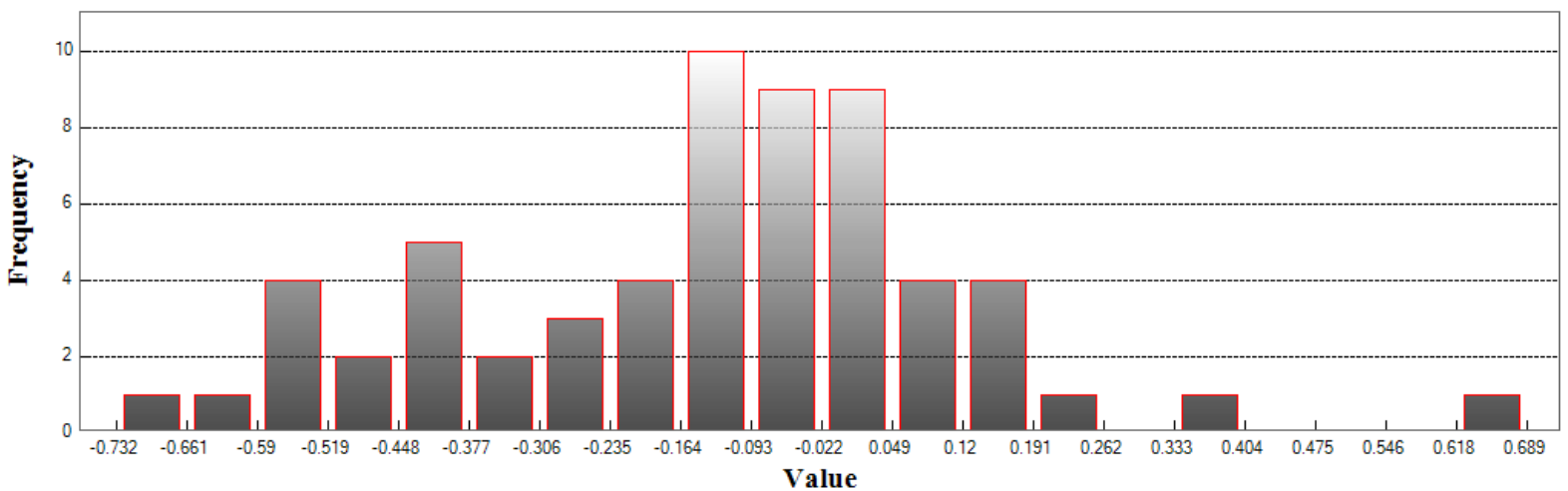


LAS

Nonvegetated Vertical Accuracy

LandCover Type: 2B, 2U
Minimum DZ: -0.733
Maximum DZ: 0.688
Mean DZ: -0.136
Mean Magnitude DZ: 0.466
Number Observations: 61
Standard Deviation DZ: 0.261
RMSE Z: 0.292
95% Confidence Level Z: 0.573
Units: US Survey Feet

Histogram



Min: -0.733
Max: 0.688
Number Of Bins: 20
Bin Interval: 0.071

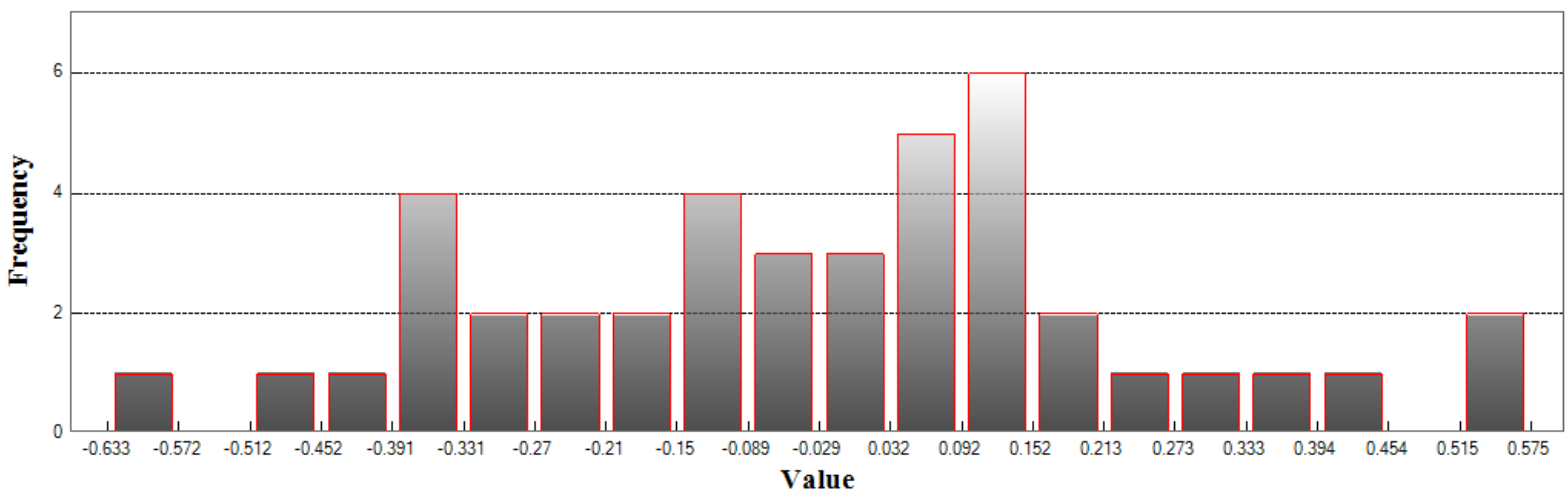


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2H
Minimum DZ: -0.633
Maximum DZ: 0.575
Mean DZ: -0.03
Mean Magnitude DZ: 0.461
Number Observations: 42
Standard Deviation DZ: 0.271
RMSE Z: 0.269
95th Percentile: 0.554
Units: US Survey Feet

Histogram



Min: -0.633

Max: 0.575

Number Of Bins: 20

Bin Interval: 0.06

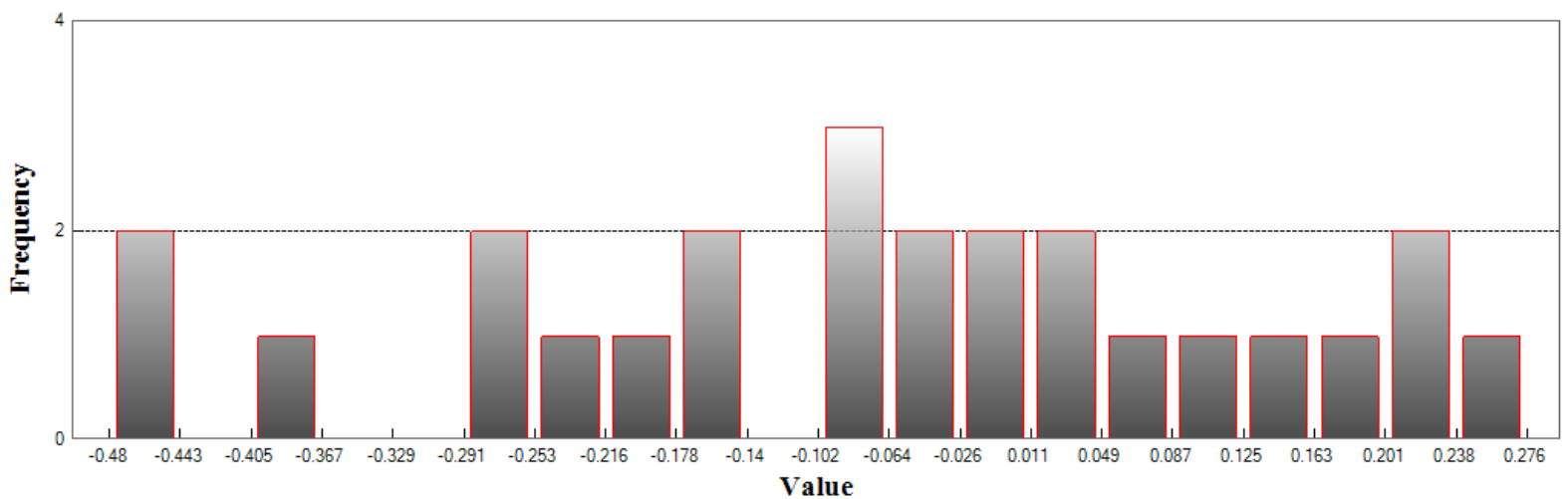


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2L
Minimum DZ: -0.48
Maximum DZ: 0.276
Mean DZ: -0.069
Mean Magnitude DZ: 0.414
Number Observations: 25
Standard Deviation DZ: 0.21
RMSE Z: 0.217
95th Percentile: 0.469
Units: US Survey Feet

Histogram



Min: -0.48

Max: 0.276

Number Of Bins: 20

Bin Interval: 0.038

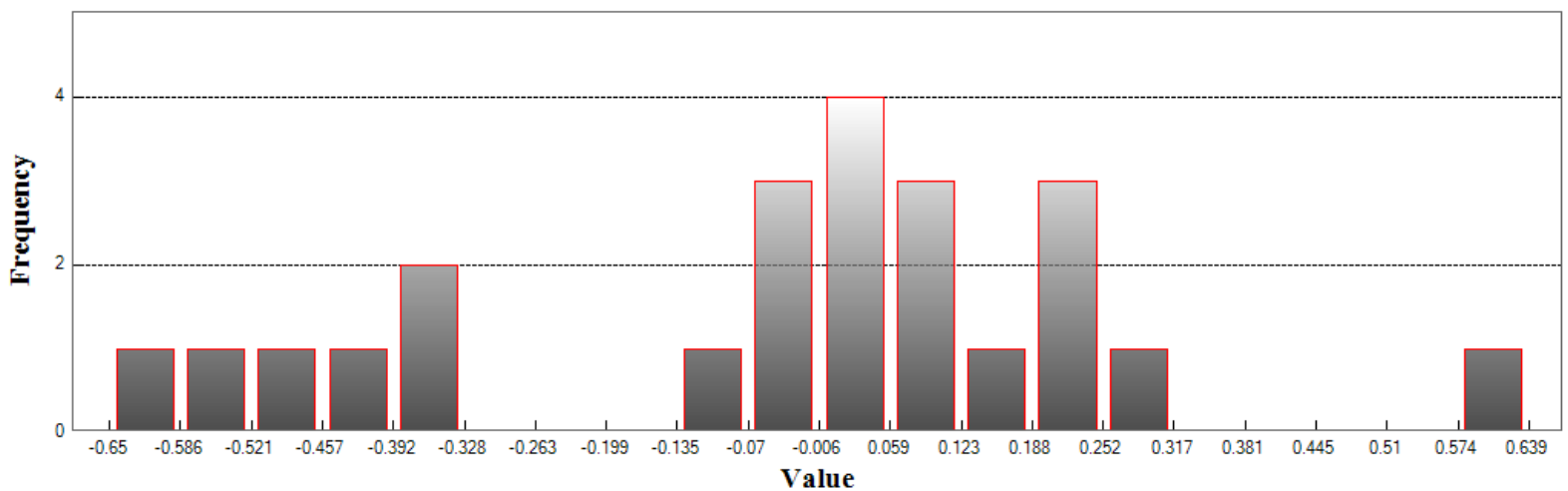


LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: 2M
Minimum DZ: -0.65
Maximum DZ: 0.639
Mean DZ: -0.044
Mean Magnitude DZ: 0.472
Number Observations: 23
Standard Deviation DZ: 0.306
RMSE Z: 0.302
95th Percentile: 0.639
Units: US Survey Feet

Histogram



Min: -0.65

Max: 0.639

Number Of Bins: 20

Bin Interval: 0.064

Station Name	PID	NAVD88			NAD83(2011) Epoch 2010.0			SPC Combined Factor
		Ellipsoid Height (m)	Orthometric Height (m)	Latitude DMS	Longitude DMS	SPC North (m)	SPC East (m)	
ALBEMARLE CORS ARP	DG5755	112.630	142.970	35 20 17.30339 N	080 12 48.52476 W	176846.600	499299.251	0.99985604
ASHEBORO 2 CORS ARP	DL6900	210.381	240.790	35 37 49.38501 N	079 45 53.75304 W	208859.939	540319.797	0.99986134
ASU-BOONE CORS ARP	DF4365	957.907	989.120	36 12 50.84473 N	081 40 54.64789 W	276616.959	368477.452	0.99986327
BEAUFORT CORS ARP	DK7561	-27.858	9.650	34 43 08.50895 N	076 40 18.99140 W	109995.822	822811.707	0.99991989
BODIE ISLAND CORS ARP	DO2877	-33.046	5.940	35 50 44.35730 N	075 33 48.94199 W	237848.248	919957.886	0.99993139
BRYSON CITY CORS ARP	DL2762	566.148	594.790	35 22 21.56251 N	083 30 23.37131 W	189293.916	200277.527	0.99978597
BURLINGTON CORS ARP	DF9213	173.401	203.610	36 05 29.58604 N	079 26 12.17620 W	259845.465	570271.809	0.99995269
BURNSVILLE 2007 CORS ARP	DL6201	748.693	778.830	35 54 29.30454 N	082 20 49.87834 W	244501.699	307532.708	0.99982060
BUXTON CORS ARP	DM5409	-25.445	13.270	35 15 58.08197 N	075 33 06.82885 W	173632.372	923246.647	0.99987661
CARTHAGE CORS ARP	DG5938	149.613	181.000	35 20 30.04880 N	079 23 05.08515 W	176632.942	574629.599	0.99985034
CASTLE HAYNE 2007 CORS ARP	DK7086	-22.806	13.900	34 20 40.22860 N	077 52 29.89892 W	66537.627	713112.699	1.00000500
CEDAR ISLAND CORS ARP	DL3071	-30.613	7.250	35 01 03.76013 N	076 18 55.28490 W	143939.877	854565.507	0.99988569
CLINTON CORS ARP	DK4041	23.862	58.490	34 59 25.65387 N	078 21 31.47816 W	137793.395	668139.845	0.99987918
CONCORD CORS ARP	DF7471	154.382	184.820	35 22 35.24392 N	080 33 51.11399 W	181542.684	467489.138	0.99985072
CRESWELL CORS ARP	DK7747	-28.220	8.918	35 54 56.93091 N	076 28 25.29176 W	243161.208	837585.924	0.99994407
DOBSON CORS ARP	DF5767	340.642	373.920	36 25 31.51455 N	080 43 11.71069 W	298143.588	455359.078	1.00002904
DUCK 3 CORS ARP	DK3334	-24.775	14.110	36 10 54.01098 N	075 45 04.79522 W	274539.934	901788.896	1.00000811
DURHAM COOP CORS ARP	DG9328	117.466	148.790	35 59 46.12942 N	078 53 58.03641 W	249177.805	618666.816	0.99993843
ELIZABETH CITY CORS ARP	DL6896	-29.750	7.600	36 20 28.79075 N	076 15 29.27386 W	290874.906	855730.326	1.00005810
ELIZABETHTOWN CORS ARP	DI1680	-9.537	25.460	34 39 13.60147 N	078 31 11.73447 W	100363.878	653606.669	0.99992817
FAYETTEVILLE 2006 CORS ARP	DH9594	16.914	50.450	35 02 02.48998 N	078 52 14.73160 W	142444.626	621393.108	0.99987712
FORT FISHER CORS ARP	DM3521	-29.165	8.320	33 57 38.26113 N	077 56 18.76581 W	23891.297	707718.933	1.00012861
FRANKLIN CORS ARP	DG4257	620.895	649.270	35 11 30.68622 N	083 23 41.74673 W	168802.916	209516.356	0.99977570
GASTON CORS ARP	DE8425	213.712	245.140	35 18 39.79151 N	081 11 19.54124 W	175361.640	410593.642	0.99983959
GATESVILLE CORS ARP	DL6898	-20.472	15.650	36 26 12.65517 N	076 43 16.51658 W	300420.808	813921.941	1.00008983
GOLDSBORO CORS ARP	DK5550	14.068	48.900	35 25 16.86892 N	078 03 30.57562 W	185808.939	695094.939	0.99987475
GREENVILLE NC CORS ARP	DL7337	4.907	40.810	35 36 18.30987 N	077 21 55.47952 W	207005.628	757690.324	0.99989078
HAYWOOD CORS ARP	DE8228	809.314	838.220	35 31 35.39633 N	082 55 30.12730 W	204104.221	253736.164	0.99975705
HENDERSONVILLE CORS ARP	DK7853	654.472	684.850	35 21 21.89173 N	082 30 03.99653 W	183772.967	291488.002	0.99977154
HICKORY CORS ARP	DM3523	326.299	358.470	35 44 31.01014 N	081 18 30.93483 W	223397.889	400811.751	0.99985789
HIGH POINT CORS ARP	AI4198	267.948	299.220	35 57 56.48686 N	080 00 48.93737 W	246260.723	518178.455	0.99990805
I77 WELCOME CNTR CORS ARP	DF6318	157.556	187.950	35 07 21.25422 N	080 54 58.46768 W	153944.753	434964.997	0.99985039
JACKSON NC CORS ARP	DH7133	13.257	47.680	36 24 30.56335 N	077 26 15.30879 W	296031.384	749749.096	1.00007439
JACKSONVILLE CORS ARP	DK6239	-26.125	10.950	34 44 46.81575 N	077 27 11.71789 W	111628.027	751216.799	0.99991534
JORDAN LAKE CORS ARP	DL3891	45.996	77.430	35 46 52.49646 N	079 02 03.92766 W	225330.877	606489.109	0.99990797
KENANSVILLE CORS ARP	DI1071	15.560	51.360	34 56 30.49763 N	077 58 49.94532 W	132685.360	702719.518	0.99988470
KINSTON CORS ARP	DM3989	-3.126	32.790	35 19 18.56728 N	077 36 49.27040 W	175242.563	735637.711	0.99987383
LEXINGTON CORS ARP	DG5757	194.102	225.340	35 48 53.14318 N	080 13 46.20206 W	229736.512	498497.891	0.99989030
LILLINGTON 2004 CORS ARP	DG5759	25.706	58.730	35 25 12.54674 N	078 48 40.33946 W	185286.626	626745.253	0.99987286
LUMBERTON CORS ARP	DI1682	15.824	49.560	34 37 36.33605 N	079 04 39.69481 W	97263.238	602477.201	0.99992918

Note: Published positional informaton of published Continuous Operating Reference Stations (CORS) are denoted in meters (m).

Station Name	PID	NAVD88			NAD83(2011) Epoch 2010.0		SPC North (m)	SPC East (m)	SPC Combined Factor
		Ellipsoid Height (m)	Orthometric Height (m)	Latitude DMS	Longitude DMS				
MARION CORS ARP	DE8230	366.984	398.800	35 39 13.38510 N	081 57 16.17206 W	215162.325	342120.619	0.99983954	
MARSHALL CORS ARP	DG7400	560.633	590.850	35 48 47.31356 N	082 41 22.67321 W	235064.443	276250.707	0.99983251	
MONROE CORS ARP	DF5880	144.332	174.600	34 58 54.77687 N	080 31 25.79009 W	137720.671	470484.517	0.99986097	
MOORESVILLE CORS ARP	DH3838	266.205	297.570	35 34 46.87707 N	080 48 12.53662 W	204453.424	446161.276	0.99984714	
MORGANTON CORS ARP	DH7137	344.831	377.000	35 42 27.07386 N	081 39 23.99857 W	220367.093	369236.777	0.99985003	
MURPHY CORS ARP	DL1890	476.123	504.800	35 04 06.77760 N	083 57 59.36142 W	157594.804	156842.278	0.99980296	
NASHVILLE CORS ARP	DK7576	34.500	68.960	35 58 09.06797 N	078 01 11.34161 W	246618.195	698006.712	0.99994546	
NCSA SALISBURY CORS ARP	DN5840	174.906	206.250	35 42 41.69212 N	080 25 55.99488 W	218535.902	480015.188	0.99987726	
NCSO SWANQUARTER2 CORS ARP	DQ9090	-29.912	8.020	35 23 40.93853 N	076 19 31.76835 W	185719.856	852514.443	0.99988038	
NEW BERN NCGS CORS ARP	DN8739	-16.105	21.070	35 06 45.99769 N	077 06 14.29783 W	152823.201	782416.342	0.99987805	
NEWLAND 2007 CORS ARP	DM3991	1124.527	1155.410	36 04 39.95811 N	081 54 40.29398 W	262073.985	347419.061	0.99979994	
NORTH WILKESBORO CORS ARP	DK4047	270.426	303.570	36 09 59.27542 N	081 07 57.22423 W	270132.288	417741.217	0.99985750	
PARI_OBS_NC_2008 CORS ARP	DM6192	880.094	909.630	35 12 06.96417 N	082 52 20.90284 W	167939.378	257095.138	0.99973486	
PEA ISLAND CORS ARP	DG5313	-31.109	7.780	35 41 02.04056 N	075 28 56.35040 W	220170.749	927930.973	0.99990584	
PITTSBORO CORS ARP	DE8234	102.804	133.850	35 43 11.21331 N	079 10 38.62673 W	218525.196	593551.641	0.99988974	
POLKTON CORS ARP	DG7402	84.929	115.530	34 59 33.17297 N	080 10 37.85763 W	138473.153	502143.744	0.99986944	
RALEIGH CORS ARP	AJ2913	142.997	175.910	35 47 12.85298 N	078 38 19.41118 W	226017.117	642259.673	0.99989367	
RALEIGH DOT CORS ARP	DG4687	51.789	85.400	35 45 49.50795 N	078 34 44.39448 W	223469.874	647669.715	0.99990429	
REIDSVILLE CORS ARP	DM3525	234.815	266.700	36 21 42.71489 N	079 39 56.54007 W	289954.707	549851.005	1.00002348	
ROBBINSVILLE CORS ARP	DM3993	606.659	635.150	35 19 15.69235 N	083 47 48.68948 W	184808.885	173646.886	0.99977812	
ROCKINGHAM CORS ARP	DM3995	91.872	122.950	34 57 51.98780 N	079 47 47.74087 W	135010.039	536859.244	0.99987067	
ROXBORO CORS ARP	DM3527	194.654	225.650	36 23 28.05620 N	078 59 54.41890 W	293001.606	609740.318	1.00003983	
SANFORD CORS ARP	AM7024	95.450	127.140	35 28 24.67784 N	079 09 28.98436 W	191202.330	595258.352	0.99986507	
SHALLOTTE CORS ARP	DK3336	-10.002	25.750	33 58 57.20129 N	078 23 24.30664 W	25972.444	665965.745	1.00011715	
SHELBY CORS ARP	DG7404	264.465	296.210	35 16 53.64241 N	081 29 28.11569 W	172739.799	383023.692	0.99983123	
SMITHFIELD CORS ARP	DK6525	24.469	58.660	35 33 49.60980 N	078 20 10.80495 W	201405.073	669760.307	0.99988353	
SPARTA CORS ARP	DL1707	839.991	871.970	36 29 51.90632 N	081 06 52.93270 W	306852.726	420130.758	0.99997742	
SPINDALE CORS ARP	DK4043	302.765	334.650	35 21 55.83430 N	081 54 57.34807 W	183099.887	344671.752	0.99982704	
STATESVILLE CORS ARP	DK7549	228.842	261.190	35 51 19.72891 N	080 50 55.47790 W	235120.895	442629.732	0.99989208	
SW COMMUNITY COLL CORS ARP	DH3874	645.113	673.650	35 20 52.40748 N	083 12 23.38897 W	185353.255	227392.744	0.99977276	
SWANNANOVA CORS ARP	DG5311	659.842	689.830	35 35 46.03847 N	082 25 24.22964 W	210140.053	299464.372	0.99978706	
SWANQUARTER CORS ARP	DL1892	-30.398	7.510	35 23 40.86368 N	076 19 33.37884 W	185716.456	852473.883	0.99988046	
TARBORO CORS ARP	DK7578	-0.513	34.830	35 52 56.96198 N	077 34 21.39610 W	237489.266	738477.556	0.99993315	
TROY CORS ARP	DK4045	144.044	174.590	35 22 01.84517 N	079 52 12.77094 W	179740.437	530528.389	0.99985200	
WALNUT COVE CORS ARP	DL1894	276.319	309.540	36 22 19.68806 N	080 11 05.62514 W	291528.706	503266.558	1.00002046	
WARRENTON CORS ARP	DM3529	76.208	109.530	36 23 41.68571 N	078 10 13.74958 W	293732.691	684023.061	1.00005974	
WASHINGTON 2007 CORS ARP	DK7551	-25.416	11.220	35 33 34.78484 N	077 03 31.44193 W	202467.748	785569.672	0.99989097	
WASHINGTON CORS ARP	AJ2915	-25.317	11.260	35 33 34.80249 N	077 03 31.54255 W	202468.242	785567.128	0.99989095	
WEST JEFFERSON CORS ARP	DL2082	934.802	966.060	36 23 34.94821 N	081 28 42.26843 W	295989.718	387260.230	0.99992435	
WHITEVILLE CORS ARP	DJ8943	-2.342	32.360	34 16 49.59006 N	078 42 59.33169 W	58881.567	635708.028	1.00001544	
WILLIAMSTON 2 CORS ARP	DN8741	-21.901	14.180	35 49 49.75739 N	077 02 06.20973 W	232550.205	787120.808	0.99992694	
WILLIAMSTON CORS ARP	DF8715	-20.544	15.530	35 49 48.75037 N	077 02 04.93157 W	232519.811	787153.494	0.99992667	
WILMINGTON CORS ARP	AJ2917	-24.775		34 14 09.45795 N	077 55 45.16083 W	54442.078	708252.321	1.00003228	
WILSON CORS ARP	DK7563	11.179	46.030	35 42 26.29637 N	077 55 57.08393 W	217645.964	706192.128	0.99990236	
WINSTON SALEM CORS ARP	DH5853	254.046	286.560	36 04 15.67829 N	080 13 37.75017 W	258164.236	499061.500	0.99993484	

Note: Published positional informaton of published Continuous Operating Reference Stations (CORS) are denoted in meters (m).

Acronyms, Abbreviations, and Definitions

ARP – Antenna Reference Point

CORS – Continuous Operating Reference Station

DMS – Degrees Minutes Seconds

m – Meter

PID – Permanent Identifier

SPC – State Plane Coordinates

Statistical Definitions:

Nonvegetated Vertical Accuracy (NVA) – The vertical accuracy at the 95-percent confidence level in nonvegetated open terrain, where errors should approximate a normal distribution.

Supplemental Vertical Accuracy (SVA) – Term for reporting the vertical accuracy at the 95th percentile in each separate land cover category where vertical errors may not follow a normal error distribution.

Vegetated Vertical Accuracy (VVA) – An estimate of the vertical accuracy, based on the 95th percentile, in vegetated terrain where errors do not necessarily approximate a normal distribution.

Minimum DZ – This statistic represents the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The minimum of each simply represents the smallest value out of all of the analyzed locations. This component of the statistics can be used to show which locations most closely correspond to the surveyed points.

Maximum DZ – This statistic represents the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The maximum value of each represents the largest value out of all of the analyzed locations. Maximum values can be used to show which locations most closely correspond to the surveyed points.

Mean DZ - The statistic of the mean DZ is intended to show the average values of the DZ. These statistics show the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The mean values can be used to show the average off-sets of all of the analyzed locations

Mean Magnitude DZ - The statistic of the mean DZ is intended to show the average values of the DZ. These statistics show the change in value between the Z-coordinate location based on LiDAR and Z-coordinate location in the survey. The mean values can be used to show the average off-sets of all of the analyzed locations.

Number Observations – Number of observations

Standard Deviation DZ - A measure of spread or dispersion of a sample of errors around the sample mean error. It is a measure of precision, rather than accuracy; the standard deviation does not account for uncorrected systematic errors.

RMSE Z - The square root of the average of the set of squared differences between dataset coordinate values and coordinate values from an independent source of higher accuracy for identical points. The RMSE is used to estimate the absolute accuracy of both horizontal and vertical coordinates when standard or accepted values are known, as with GPS-surveyed check points of higher accuracy than the data being tested. In the United States, the independent source of higher accuracy is expected to be at least three times more accurate than the dataset being tested. RMSE Z measures RMSE in the Z direction only.

95th Percentile – A measure used in statistics indicating the value below which a given percentage of observations (absolute values of errors) in a group of observations fall. For example, the 95th percentile is the value (or score) below which 95 percent of the observations may be found.