

DPH-11 Report on Absolute Vertical Accuracy

The USGS Lidar Base Specification 2022 rev. A states: "Absolute vertical accuracy of the lidar data and the derived DEM will be assessed and reported in accordance with ASPRS (2014). Vegetated and nonvegetated land cover types shall be assessed for absolute vertical accuracy. Federal Emergency Management Agency (2003) identifies seven land cover types; National Digital Elevation Program (2004) and ASPRS (2004) reiterate the first five of those types. The way in which each of the seven classes was reported under the previous standards and how they are reported under the new ASPRS standards and by this specification are shown in table 3. Four absolute accuracy values shall be assessed and reported:

1. NVA for the point data
2. VVA for the point data
3. NVA for the DEM
4. VVA for the DEM

The minimum NVA and VVA requirements for all data, using the ASPRS methodology, are listed in table 4. Both the NVA and VVA required values shall be met. NVA for the point data shall be assessed by comparing check points surveyed for NVA assessment to a triangulated irregular network (TIN) constructed from ground-classified lidar points in those areas. VVA for the point data shall be assessed by comparing check points surveyed for VVA assessment to a triangulated irregular network (TIN) constructed from ground-classified lidar points in those areas. NVA and VVA for the DEM are assessed by comparing check points to the final bare-earth surface. The minimum required thresholds for absolute and relative accuracy may be increased by the USGS–NGP when any of the following conditions are met:

- A demonstrable, substantial, and prohibitive increase in cost is needed to obtain this accuracy, which is often the case in heavily vegetated project areas.
- An alternate specification is needed to conform to previously contracted phases of a single larger overall collection effort such as for multiyear statewide collections
- The USGS–NGP agrees that the use of an alternate specification is reasonable and in the best interest of all stakeholders."

Table 4. Absolute vertical accuracy for light detection and ranging data and digital elevation models.

[QL, quality level, $RMSE_z$, root mean square error in the z direction; NVA, nonvegetated vertical accuracy; VVA, vegetated vertical accuracy; m, meter; \leq , less than or equal to]

Quality level	$RMSE_z$ (nonvegetated) (m)	NVA at the 95-percent confidence level (m)	VVA at the 95th percentile (m)
QL0	≤ 0.050	≤ 0.098	≤ 0.15
QL1	≤ 0.100	≤ 0.196	≤ 0.30
QL2	≤ 0.100	≤ 0.196	≤ 0.30
QL3	≤ 0.200	≤ 0.392	≤ 0.60

The purpose of this section is to report on the absolute vertical accuracy of the lidar data and DEMs generated from it by testing for NVA (Nonvegetated Vertical Accuracy) and VVA (Vegetated Vertical Accuracy) against surveyed ground check points.

DPH-11 Report on Absolute Vertical Accuracy - continued

[Data Source - D:\00_ISGS_East\Client_Shapes\IL_MidNorth_B3_51NVA_37VVA_IL_East.shp](#)

Units: Meter (/US Survey Feet)

Vertical Accuracy Class tested: 10-cm

Check Points in defined project area (DPA):	88
Check Points with Lidar Coverage	88
Check Points with Lidar Coverage (NVA)	51
Check Points with Lidar Coverage (VVA)	37
Average Z Error (NVA)	-0.008/-0.025
Maximum Z Error (NVA)	0.119/0.390
Median Z Error (NVA)	-0.013/-0.042
Minimum Z Error (NVA)	-0.104/-0.340
Standard deviation of Vertical Error (NVA)	0.045/0.149
Skewness of Vertical Error (NVA)	0.524
Kurtosis of Vertical Error (NVA)	-0.180
Non-vegetated Vertical Accuracy (NVA) RMSE(z) ¹	0.046/0.150 PASS
Non-vegetated Vertical Accuracy (NVA) at the 95% Confidence Level +/- ¹	0.089/0.293 PASS
FGDC/NSSDA Vertical Accuracy at the 95% Confidence Level +/-	0.089/0.293
Non-vegetated Vertical Accuracy (NVA) RMSE(z) (DEM) ²	0.046/0.150 PASS
Non-vegetated Vertical Accuracy (NVA) at the 95% Confidence Level (DEM) +/- ²	0.089/0.089 PASS
Vegetated Vertical Accuracy (VVA) at the 95th Percentile (TIN) +/- ¹	0.162/0.530 PASS
Vegetated Vertical Accuracy (VVA) at the 95th Percentile (DEM) +/- ²	0.174/0.572 PASS

This data set was tested to meet ASPRS Positional Accuracy Standard for Digital Geospatial Data (2014) for a 10-cm RMSEz Vertical Accuracy Class. Actual NVA accuracy was found to be RMSEz = 4.6cm, equating to +/- 8.9cm at the 95% confidence level. Actual VVA accuracy was found to be +/- 17.4cm at the 95th percentile.

¹ This value is calculated from TIN-based testing of the lidar point cloud data.

² This value is calculated from RAM-based grid testing of the lidar data. The grid cells are sized according to the Quality Level selected, and are defined in the USGS NGP Lidar Base Specification 2022 rev. A (Table 6).

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The purpose of this section is to report the results of measuring the lidar point cloud data against surveyed ground NVA (nonvegetated vertical accuracy) check points. All XY coordinates and Z values reported are in the selected data units.

NVA (lidar data)

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Minimum Z	Median Z	Maximum Z	Intensity	Scan Angle Rank	Returns	Description	Comments
5001	868878.36	1234248.85	Yes	690.11	689.963	-0.147	689.854	689.959	690.005	659	3081	1,1,1		
5006	877542	1378312.67	Yes	865.29	865.165	-0.125	865.107	865.166	865.205	835	-682	1,1,1		
5008	947072.71	1156693.48	Yes	681.79	682.18	0.390	682.131	682.141	682.21	420	-2846	1,1,1		
5014	935976.22	1291459.61	Yes	727.42	727.306	-0.114	727.246	727.259	727.344	725	-1910	1,1,1		
5023	842273.69	1311968.25	Yes	795.46	795.506	0.046	795.405	795.52	795.579	603	-1888	1,1,1		
5026	927797.74	1420954.32	Yes	777.57	777.615	0.045	777.59	777.62	777.672	839	1171	1,1,1		
5028	761102.75	1427487.92	Yes	769.65	769.504	-0.146	769.474	769.474	769.664	433	-725	1,1,1		
5033	918170.34	1185941.69	Yes	684.4	684.435	0.035	684.405	684.428	684.47	603	-1738	1,1,1		
5035	903643.05	1485279.83	Yes	708.33	708.19	-0.140	708.151	708.227	708.263	755	3142	1,1,1		
5036	827261.36	1452375.06	Yes	741.11	741.076	-0.034	741.012	741.062	741.124	397	1193	1,1,1		
5042	921216.34	1252602.63	Yes	698.99	698.844	-0.146	698.801	698.84	698.906	604	-1221	1,1,1		
5045	873781.09	1173543.58	Yes	728.34	728.152	-0.188	728.092	728.197	728.207	451	-3031	1,1,1		
5049	896965.07	1306414.13	Yes	730.32	730.32	0.000	730.202	730.31	730.386	949	-3205	1,1,1		
5050	812351.28	1398252.85	Yes	798.05	798.258	0.208	798.164	798.22	798.283	480	-1605	1,1,1		
5055	865429.91	1338608.01	Yes	768.39	768.475	0.085	768.45	768.502	768.555	601	-1301	1,1,1		
5055A	856171.74	1344356.63	Yes	796.32	796.414	0.094	796.353	796.36	796.527	392	793	1,1,1		
5061	930653.54	1338429.85	Yes	789.58	789.552	-0.028	789.434	789.496	789.578	599	-2560	1,1,1		
5066	838227.54	1259784.6	Yes	729.2	729.158	-0.042	729.113	729.159	729.175	284	-520	1,1,1		
5066A	856083.86	1273761.45	Yes	731.48	731.407	-0.073	731.386	731.399	731.488	668	1410	1,1,1		
5068	803118.33	1328587.7	Yes	740.17	740.357	0.187	740.356	740.356	740.386	667	-1498	1,1,1		
5072	773985.17	1250409.73	Yes	650.09	649.75	-0.340	649.733	649.759	649.818	1137	-1392	1,1,1		
5073	801272.11	1435859.71	Yes	760.99	761.222	0.232	761.101	761.114	761.281	453	-1335	1,1,1		
5073A	799719.49	1451463.34	Yes	737.65	737.759	0.109	737.705	737.761	737.856	796	453	1,1,1		
5074	766616.77	1347501.26	Yes	699.21	699.304	0.094	699.201	699.221	699.395	699	1617	1,1,1		
5080	836541.89	1358280.8	Yes	794.8	795.046	0.246	795.008	795.054	795.061	846	2183	1,1,1		
5091	911564.56	1140726.97	Yes	674.51	674.617	0.107	674.562	674.664	674.664	560	1187	1,1,1		
5094	916318.12	1223648.38	Yes	663.91	663.969	0.059	663.919	663.949	664.044	391	174	1,1,1		
5095	877460.22	1295658.45	Yes	736.65	736.55	-0.100	736.452	736.573	736.616	137	-58	1,1,1		
5095A	875689.49	1286237.64	Yes	701.4	701.237	-0.163	701.203	701.229	701.301	758	-1858	1,1,1		
5099	878166.26	1484725.49	Yes	712.08	711.921	-0.159	711.856	711.957	711.987	766	-691	1,1,1		

Check Points Vertical Accuracy - continued

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Minimum Z	Median Z	Maximum Z	Intensity	Scan Angle Rank	Returns	Description	Comments
5099A	802057.9	1419137.99	Yes	833.18	833.22	0.040	833.197	833.197	833.397	788	-3431	1,1,1		
5104	906134.2	1420596.25	Yes	749.18	749.105	-0.075	749.073	749.1	749.129	682	149	1,1,1		
5105	856625.64	1448742.2	Yes	733.53	733.347	-0.183	733.312	733.352	733.378	187	335	1,1,1		
5106	738003.12	1373370.04	Yes	678.21	678.034	-0.176	678.014	678.04	678.043	931	-931	1,1,1		
5117	801299.68	1375514.67	Yes	853.87	854.046	0.176	854.014	854.024	854.08	1042	-2027	1,1,1		
5121	750707.83	1329823.43	Yes	711.36	711.374	0.014	711.285	711.363	711.406	824	3025	1,1,1		
5122	933157.34	1375084.15	Yes	855.83	855.648	-0.182	855.622	855.691	855.753	992	-1142	1,1,1		
5142A	933007.04	1270926.98	Yes	706.06	706.02	-0.040	706.006	706.029	706.042	480	-736	1,1,1		
5143	803920.68	1272172.87	Yes	717.18	717.02	-0.160	717.003	717.049	717.052	729	124	1,1,1		
5145	897832.05	1281667.81	Yes	724.73	724.559	-0.171	724.533	724.598	724.602	737	-2257	1,1,1		
5145A	890697.61	1281679.81	Yes	724.99	725.169	0.179	725.09	725.189	725.212	784	2196	1,1,1		
5152	825910.18	1367562.89	Yes	886.41	886.442	0.032	886.419	886.448	886.468	816	1656	1,1,1		
5154	826480.64	1421092.85	Yes	778.89	779.063	0.173	778.949	779.024	779.093	747	1677	1,1,1		
5156	901253.7	1378141.37	Yes	884.39	884.198	-0.192	884.158	884.231	884.231	1253	847	1,1,1		
5159	873911.71	1218409.3	Yes	688.25	688.165	-0.085	688.165	688.165	688.171	542	-3142	1,1,1		
5161	948972.3	1193362.36	Yes	679.07	678.863	-0.207	678.831	678.926	678.942	511	-1200	1,1,1		
5162	763055.82	1302298.21	Yes	725.28	725.328	0.048	725.281	725.359	725.373	441	-1741	1,1,1		
5165	937442.33	1252810.25	Yes	717.8	717.616	-0.184	717.518	717.594	717.633	249	-2031	1,1,1		
5172	772753.02	1395424.02	Yes	788.86	788.758	-0.102	788.742	788.745	788.765	775	-1688	1,1,1		
5173	890814.73	1446994.93	Yes	743.61	743.518	-0.092	743.483	743.516	743.555	439	1170	1,1,1		
5174	898107.94	1260372.18	Yes	698.36	698.266	-0.094	698.22	698.348	698.361	912	-1713	1,1,1		

DPH-11 Report on Absolute Vertical Accuracy - continued

The purpose of this section is to report the results of measuring the lidar point cloud data against surveyed ground VVA (vegetated vertical accuracy) check points. All XY coordinates and Z values reported are in the selected data units.

VVA (lidar data)

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Minimum Z	Median Z	Maximum Z	Intensity	Scan Angle Rank	Returns	Description	Comments
6001	873967.99	1219194.46	Yes	689.42	689.729	0.309	689.664	689.716	689.874	560	-2968	2,1,1		
6006	877524.36	1378971.74	Yes	865.73	865.269	-0.461	865.215	865.244	865.336	1515	-681	1,1,1		
6008	945339.98	1143468.88	Yes	663.71	663.78	0.070	663.762	663.762	663.85	982	-1021	1,1,2		
6014	937258.55	1290608.17	Yes	727.55	727.375	-0.175	727.371	727.377	727.377	1378	1534	1,1,1		
6023	806657.1	1272162.9	Yes	702.27	702.431	0.161	702.397	702.413	702.466	237	3148	2,2,1		
6026	925644.92	1420924.09	Yes	767.81	768.327	0.517	768.273	768.322	768.348	825	3111	2,1,2		
6028	763399.7	1426743.25	Yes	763.19	763.559	0.369	763.499	763.525	763.575	592	-2849	2,2,2		
6033	916221.26	1188092.27	Yes	685.97	685.961	-0.009	685.914	685.986	686.032	1189	395	1,2,1		
6035	902493.52	1485316.36	Yes	700.25	700.196	-0.054	700.172	700.195	700.202	1447	1510	1,1,1		
6036	819019.04	1454903.49	Yes	737.1	737.218	0.118	737.102	737.141	737.321	1201	2425	1,1,1		
6042	922509.43	1239287.34	Yes	671.77	671.499	-0.271	671.426	671.482	671.701	629	221	1,1,2		
6045	872381.76	1175144.09	Yes	740.22	740.663	0.443	740.569	740.668	740.671	1707	-1571	1,1,1		
6049	898950.79	1305228.14	Yes	722.36	722.208	-0.152	722.161	722.17	722.216	1455	-1250	1,1,1		
6050	808906.69	1394971.98	Yes	797.05	797.186	0.136	797.088	797.223	797.285	289	2144	3,3,2		
6055	868657.63	1338708.77	Yes	773.37	773.259	-0.111	773.243	773.263	773.345	1243	2236	1,1,1		
6055A	856138.65	1344289.09	Yes	794.47	795.126	0.656	795.041	795.051	795.294	940	686	1,2,1		
6061	929963.07	1337659.3	Yes	791.35	791.416	0.066	791.275	791.337	791.481	404	-1764	3,3,1		
6061A	901874.94	1377277.68	Yes	875.71	875.758	0.048	875.704	875.763	875.828	1652	1534	1,1,1		
6066	856070.86	1273741.09	Yes	730.98	730.942	-0.038	730.904	730.96	730.966	726	1359	2,1,1		
6066A	869347.94	1281136.31	Yes	731.87	732.143	0.273	732.029	732.216	732.23	1179	3292	1,1,1		
6068	797577.85	1328405.91	Yes	705.31	704.966	-0.344	704.385	705.156	705.159	213	1531	3,3,4		
6072	774000.01	1250343.09	Yes	649.75	649.368	-0.382	649.297	649.372	649.379	736	-1379	1,2,1		
6073	801331.65	1434407.25	Yes	769.77	769.794	0.024	769.562	769.792	770.008	684	-1601	2,2,1		
6073A	799756.14	1451475.27	Yes	736.04	736.424	0.384	736.357	736.422	736.544	1018	417	1,1,1		
6074	766618.62	1349249.4	Yes	698.56	698.281	-0.279	698.197	698.299	698.329	901	1545	2,2,1		
6080	835535.21	1358551.79	Yes	798.53	798.304	-0.226	798.279	798.296	798.361	934	2772	1,1,1		
6091	912301.38	1140686.97	Yes	672.22	672.252	0.032	672.197	672.282	672.321	1635	1941	1,1,1		
6094	917146.64	1228305.75	Yes	668.68	668.243	-0.437	668.224	668.234	668.302	1085	-740	1,1,1		
6095	875698.78	1286282.8	Yes	702.68	702.167	-0.513	702.144	702.144	702.413	1483	-1804	1,1,1		
6095A	897665.03	1281736.21	Yes	720.67	720.914	0.244	720.891	720.898	720.989	1246	-2421	1,1,1		

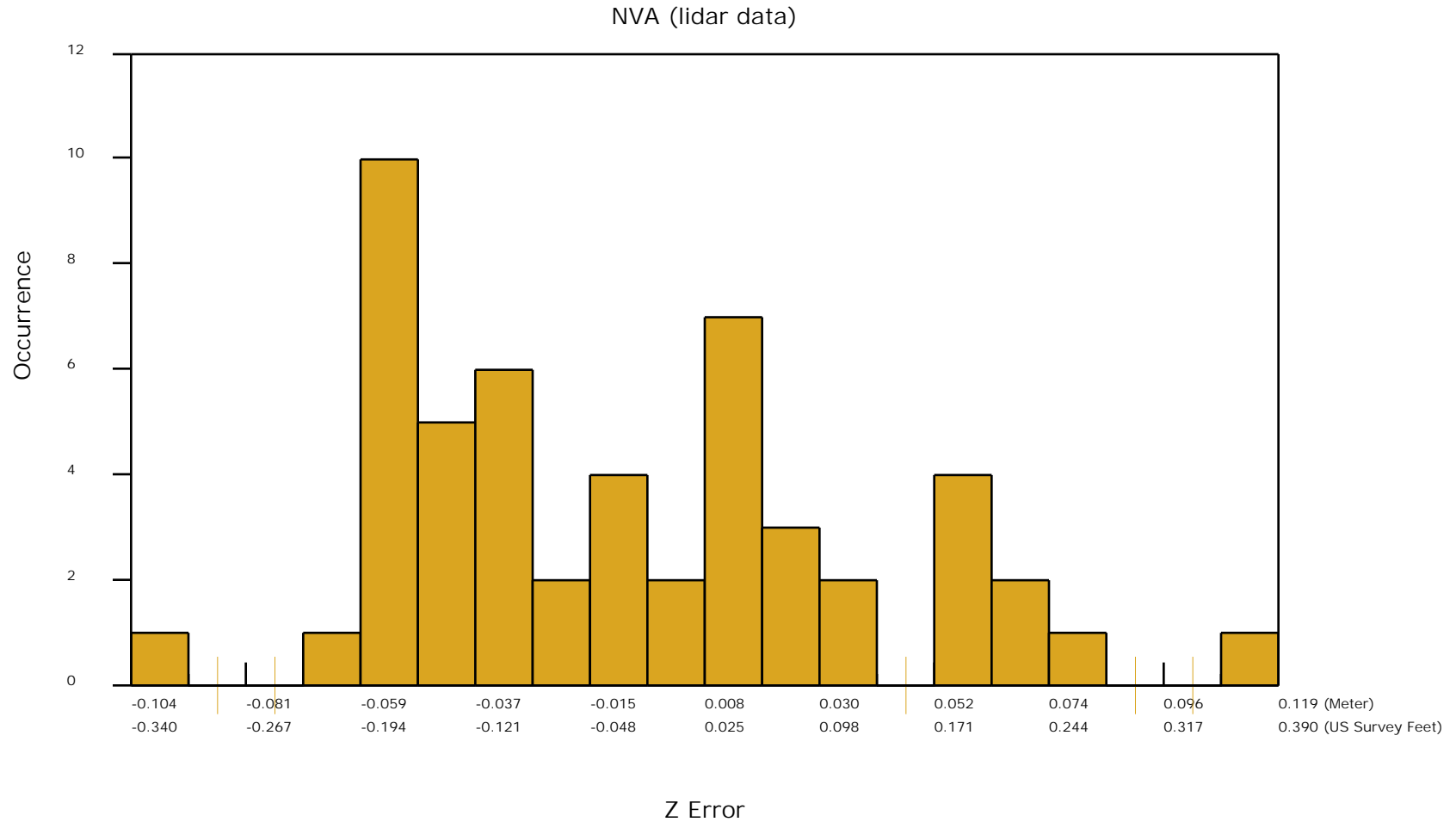
Check Points Vertical Accuracy - continued

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Minimum Z	Median Z	Maximum Z	Intensity	Scan Angle Rank	Returns	Description	Comments
6099	877974.65	1485037.99	Yes	711.21	711.047	-0.163	710.983	711.006	711.222	272	-877	4,3,2		
6104	906495.29	1421563.56	Yes	755.79	755.696	-0.094	755.691	755.691	755.868	221	-219	2,3,2		
6105	861276.49	1450410.59	Yes	739.57	739.731	0.161	739.703	739.756	739.756	1324	392	1,1,1		
6106	737231.88	1372188.77	Yes	668.7	668.118	-0.582	668.073	668.092	668.132	1275	-146	1,1,1		
6117	802416.11	1384591.96	Yes	824.62	824.916	0.296	824.877	824.893	825.149	1171	-2800	1,1,1		
6121	749458.84	1329719.72	Yes	716.19	716.066	-0.124	715.924	716.042	716.111	994	-1678	1,1,1		
6122	930380.26	1364508.7	Yes	777.58	777.686	0.106	777.61	777.702	777.83	1201	-2133	1,1,1		

DPH-11 Report on Absolute Vertical Accuracy - continued

The purpose of this section is to show a frequency distribution chart of the non-vegetated vertical accuracy (NVA) of the lidar point cloud data measured against surveyed ground check points.

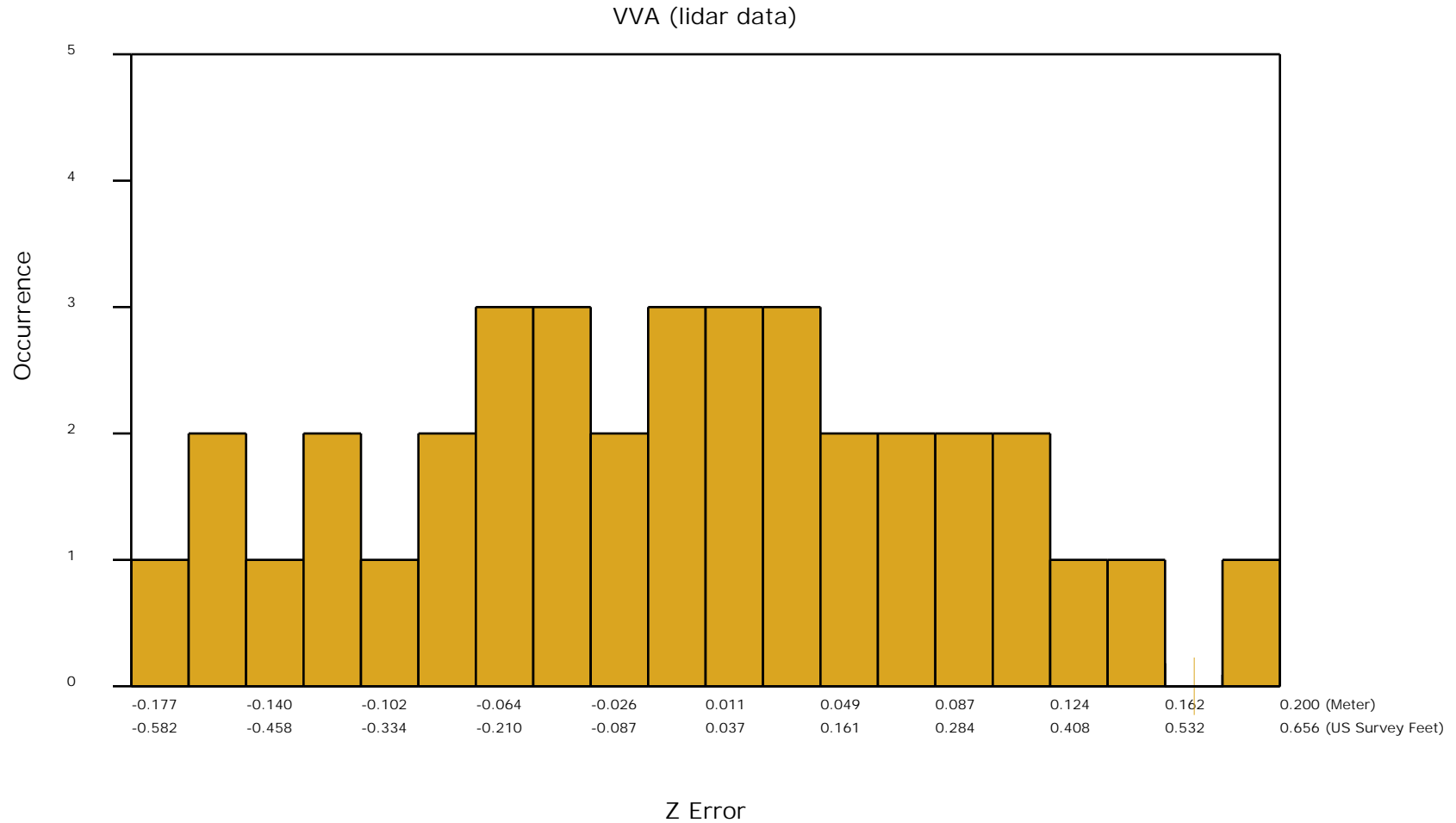
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DPH-11 Report on Absolute Vertical Accuracy - continued

The purpose of this section is to show a frequency distribution chart of the vegetated vertical accuracy (VVA) of the lidar point cloud data measured against surveyed ground check points.

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DPH-11 Report on Absolute Vertical Accuracy - continued

The purpose of this section is to report the results of measuring the DEM data against surveyed ground NVA (nonvegetated vertical accuracy) check points. All XY coordinates and Z values reported are in the selected data units.

NVA (DEM)

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Description	Comments
5001	868878.36	1234248.85	Yes	690.11	690.007	-0.103		
5006	877542	1378312.67	Yes	865.29	865.150	-0.140		
5008	947072.71	1156693.48	Yes	681.79	682.174	0.384		
5014	935976.22	1291459.61	Yes	727.42	727.256	-0.164		
5023	842273.69	1311968.25	Yes	795.46	795.484	0.024		
5026	927797.74	1420954.32	Yes	777.57	777.611	0.041		
5028	761102.75	1427487.92	Yes	769.65	769.473	-0.177		
5033	918170.34	1185941.69	Yes	684.4	684.398	-0.002		
5035	903643.05	1485279.83	Yes	708.33	708.222	-0.108		
5036	827261.36	1452375.06	Yes	741.11	741.084	-0.026		
5042	921216.34	1252602.63	Yes	698.99	698.877	-0.113		
5045	873781.09	1173543.58	Yes	728.34	728.177	-0.163		
5049	896965.07	1306414.13	Yes	730.32	730.396	0.076		
5050	812351.28	1398252.85	Yes	798.05	798.268	0.218		
5055	865429.91	1338608.01	Yes	768.39	768.454	0.064		
5055A	856171.74	1344356.63	Yes	796.32	796.368	0.048		
5061	930653.54	1338429.85	Yes	789.58	789.665	0.085		
5066	838227.54	1259784.6	Yes	729.2	729.146	-0.054		
5066A	856083.86	1273761.45	Yes	731.48	731.434	-0.046		
5068	803118.33	1328587.7	Yes	740.17	740.369	0.199		
5072	773985.17	1250409.73	Yes	650.09	649.726	-0.364		
5073	801272.11	1435859.71	Yes	760.99	761.186	0.196		
5073A	799719.49	1451463.34	Yes	737.65	737.796	0.146		
5074	766616.77	1347501.26	Yes	699.21	699.262	0.052		
5080	836541.89	1358280.8	Yes	794.8	795.081	0.281		
5091	911564.56	1140726.97	Yes	674.51	674.601	0.091		
5094	916318.12	1223648.38	Yes	663.91	664.005	0.095		
5095	877460.22	1295658.45	Yes	736.65	736.491	-0.159		
5095A	875689.49	1286237.64	Yes	701.4	701.224	-0.176		
5099	878166.26	1484725.49	Yes	712.08	711.881	-0.199		

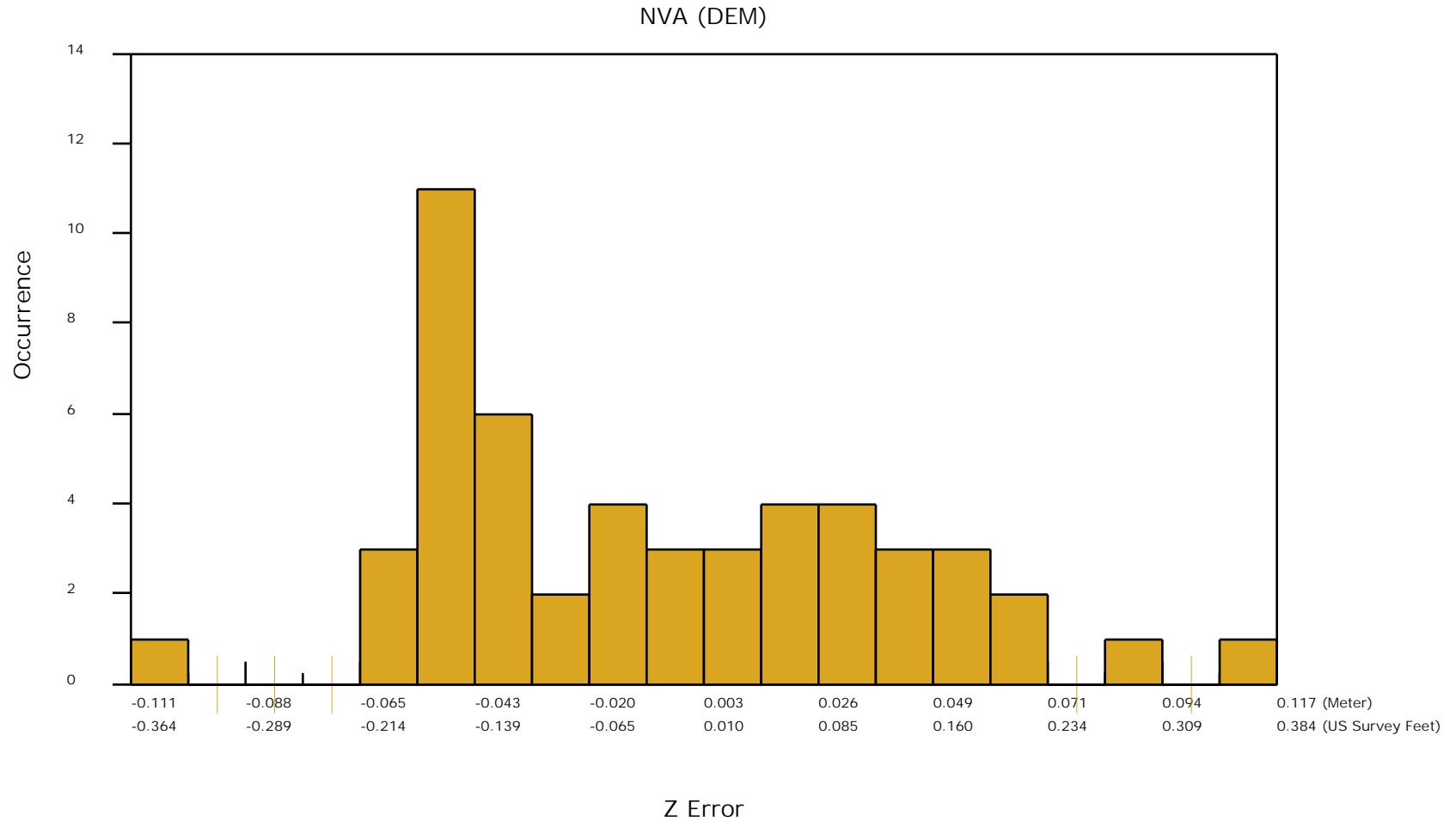
Check Points Vertical Accuracy - continued

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Description	Comments
5099A	802057.9	1419137.99	Yes	833.18	833.322	0.142		
5104	906134.2	1420596.25	Yes	749.18	749.075	-0.105		
5105	856625.64	1448742.2	Yes	733.53	733.352	-0.178		
5106	738003.12	1373370.04	Yes	678.21	678.096	-0.114		
5117	801299.68	1375514.67	Yes	853.87	854.030	0.160		
5121	750707.83	1329823.43	Yes	711.36	711.366	0.006		
5122	933157.34	1375084.15	Yes	855.83	855.655	-0.175		
5142A	933007.04	1270926.98	Yes	706.06	706.019	-0.041		
5143	803920.68	1272172.87	Yes	717.18	717.017	-0.163		
5145	897832.05	1281667.81	Yes	724.73	724.573	-0.157		
5145A	890697.61	1281679.81	Yes	724.99	725.177	0.187		
5152	825910.18	1367562.89	Yes	886.41	886.426	0.016		
5154	826480.64	1421092.85	Yes	778.89	779.024	0.134		
5156	901253.7	1378141.37	Yes	884.39	884.224	-0.166		
5159	873911.71	1218409.3	Yes	688.25	688.159	-0.091		
5161	948972.3	1193362.36	Yes	679.07	678.924	-0.146		
5162	763055.82	1302298.21	Yes	725.28	725.372	0.092		
5165	937442.33	1252810.25	Yes	717.8	717.644	-0.156		
5172	772753.02	1395424.02	Yes	788.86	788.809	-0.051		
5173	890814.73	1446994.93	Yes	743.61	743.508	-0.102		
5174	898107.94	1260372.18	Yes	698.36	698.254	-0.106		

DPH-11 Report on Absolute Vertical Accuracy - continued

The purpose of this section is to show a frequency distribution chart of the non-vegetated vertical accuracy (NVA) of the DEM data measured against surveyed ground check points.

[Data Source - D:\00_ISGS_East\Client_LAS](#)



DPH-11 Report on Absolute Vertical Accuracy - continued

The purpose of this section is to report the results of measuring the DEM data against surveyed ground VVA (vegetated vertical accuracy) check points. All XY coordinates and Z values reported are in the selected data units.

VVA (DEM)

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Description	Comments
6001	873967.99	1219194.46	Yes	689.42	689.648	0.228		
6006	877524.36	1378971.74	Yes	865.73	865.267	-0.463		
6008	945339.98	1143468.88	Yes	663.71	663.787	0.077		
6014	937258.55	1290608.17	Yes	727.55	727.372	-0.178		
6023	806657.1	1272162.9	Yes	702.27	702.427	0.157		
6026	925644.92	1420924.09	Yes	767.81	768.369	0.559		
6028	763399.7	1426743.25	Yes	763.19	763.529	0.339		
6033	916221.26	1188092.27	Yes	685.97	685.968	-0.002		
6035	902493.52	1485316.36	Yes	700.25	700.195	-0.055		
6036	819019.04	1454903.49	Yes	737.1	737.168	0.068		
6042	922509.43	1239287.34	Yes	671.77	671.553	-0.217		
6045	872381.76	1175144.09	Yes	740.22	740.675	0.455		
6049	898950.79	1305228.14	Yes	722.36	722.190	-0.170		
6050	808906.69	1394971.98	Yes	797.05	797.353	0.303		
6055	868657.63	1338708.77	Yes	773.37	773.265	-0.105		
6055A	856138.65	1344289.09	Yes	794.47	795.148	0.678		
6061	929963.07	1337659.3	Yes	791.35	791.420	0.070		
6061A	901874.94	1377277.68	Yes	875.71	875.734	0.024		
6066	856070.86	1273741.09	Yes	730.98	730.940	-0.040		
6066A	869347.94	1281136.31	Yes	731.87	732.166	0.296		
6068	797577.85	1328405.91	Yes	705.31	705.035	-0.275		
6072	774000.01	1250343.09	Yes	649.75	649.379	-0.371		
6073	801331.65	1434407.25	Yes	769.77	769.849	0.079		
6073A	799756.14	1451475.27	Yes	736.04	736.448	0.408		
6074	766618.62	1349249.4	Yes	698.56	698.293	-0.267		
6080	835535.21	1358551.79	Yes	798.53	798.340	-0.190		
6091	912301.38	1140686.97	Yes	672.22	672.274	0.054		
6094	917146.64	1228305.75	Yes	668.68	668.272	-0.408		
6095	875698.78	1286282.8	Yes	702.68	702.194	-0.486		
6095A	897665.03	1281736.21	Yes	720.67	720.903	0.233		

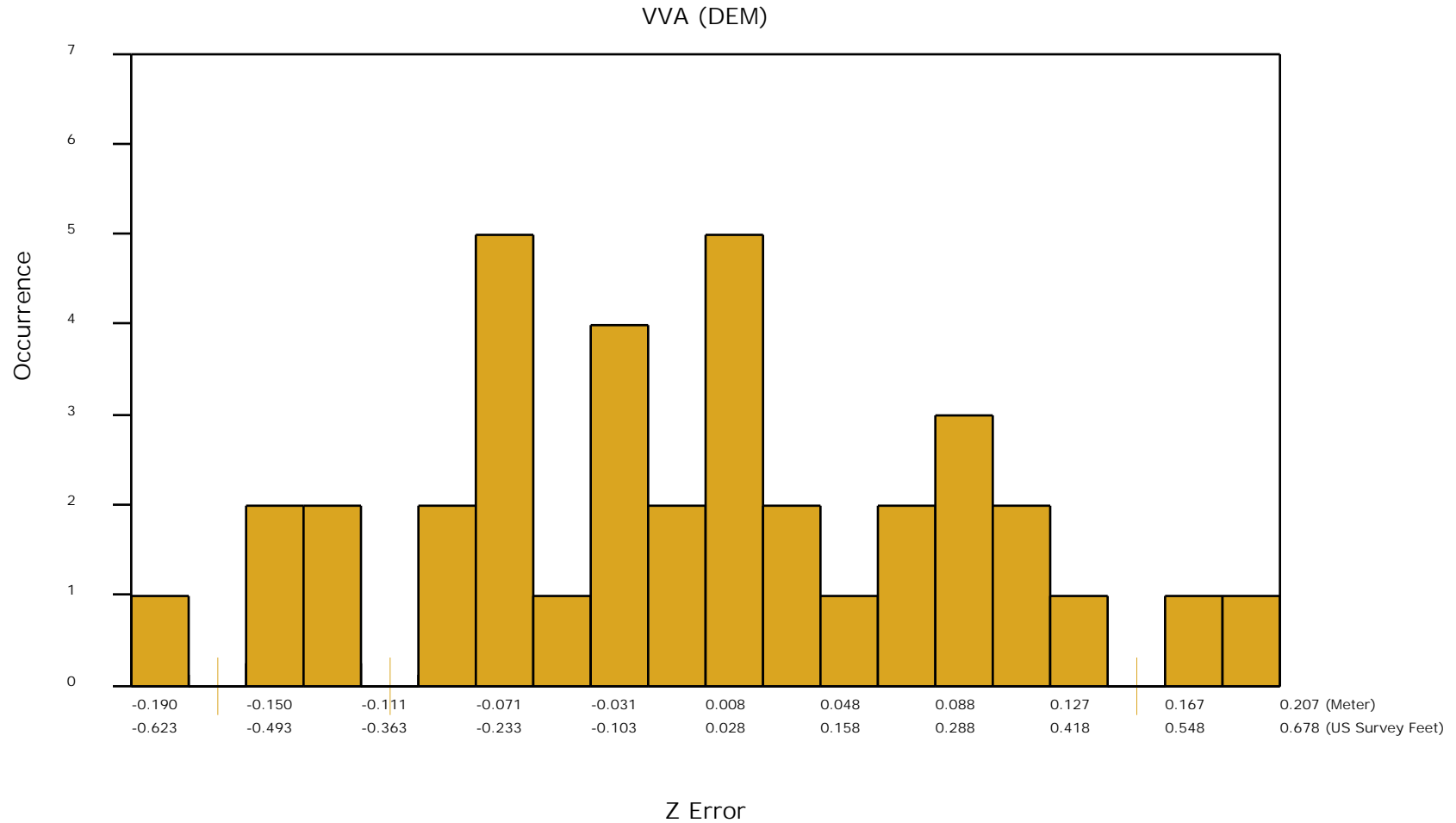
Check Points Vertical Accuracy - continued

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Description	Comments
6099	877974.65	1485037.99	Yes	711.21	711.030	-0.180		
6104	906495.29	1421563.56	Yes	755.79	755.703	-0.087		
6105	861276.49	1450410.59	Yes	739.57	739.741	0.171		
6106	737231.88	1372188.77	Yes	668.7	668.077	-0.623		
6117	802416.11	1384591.96	Yes	824.62	825.019	0.399		
6121	749458.84	1329719.72	Yes	716.19	716.097	-0.093		
6122	930380.26	1364508.7	Yes	777.58	777.700	0.120		

DPH-11 Report on Absolute Vertical Accuracy - continued

The purpose of this section is to show a frequency distribution chart of the vegetated vertical accuracy (VVA) of the DEM data measured against surveyed ground check points.

[Data Source - D:\00_ISGS_East\Client_LAS](#)

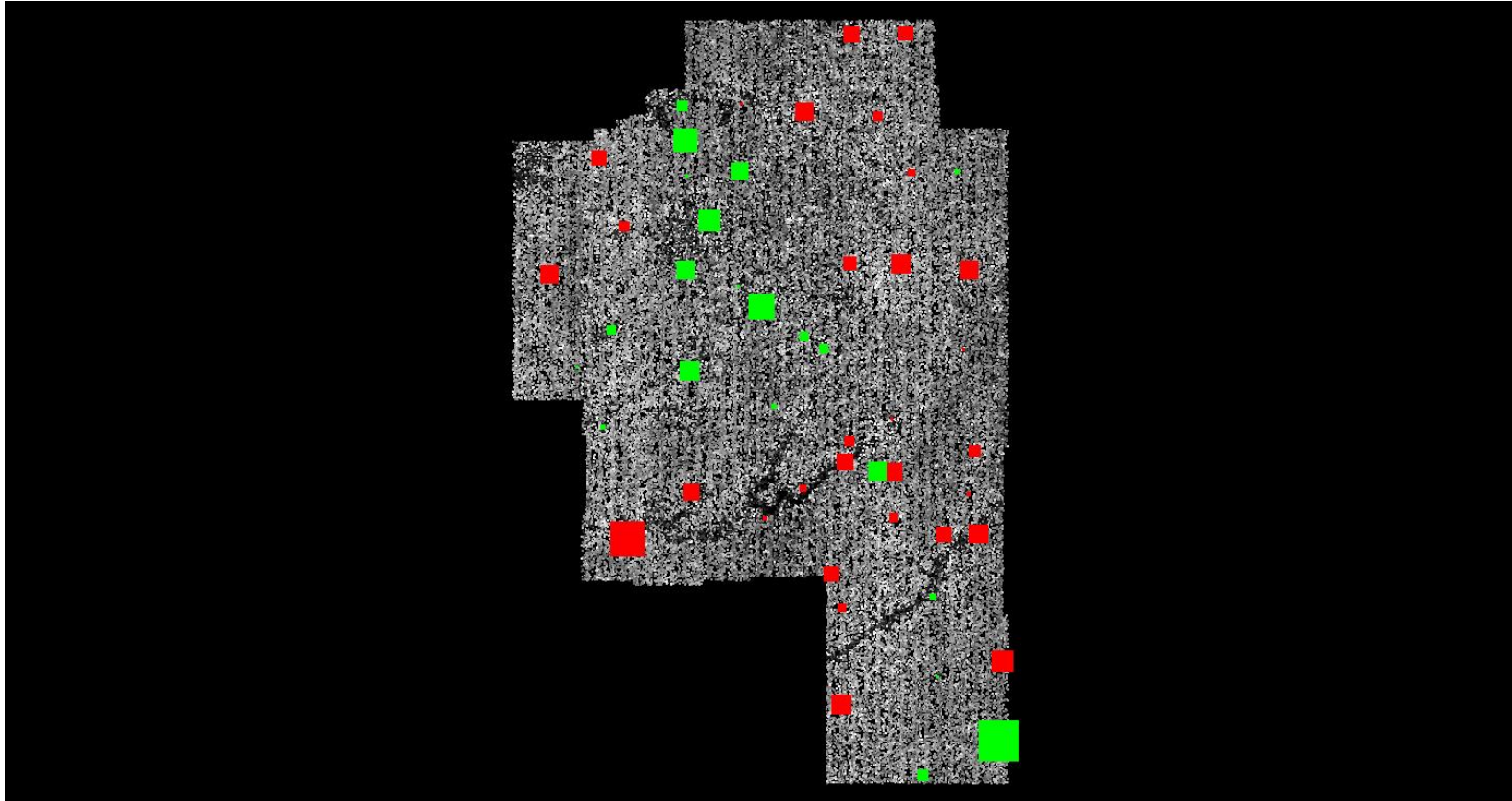


DPH-11 Report on Absolute Vertical Accuracy - continued

The purpose of this section is to show a graphic of lidar data points colored by intensity with NVA check points rendered "thematically" showing the green and red squares sized by Z error.

[Data Source - D:\00_ISGS_East\Client_LAS](#)

[Result Path - D:\00_ISGS_East\IL_MidNorth_3_D22_300136_QC1\DPH_11\ColorByIntensity_CheckPoints_NVA.jpg](#)



■ Green represents where the lidar surface is above the check point (positive elevation error).

■ Red represents where the lidar surface is below the check point (negative elevation error).

The size of the square symbol represents the absolute value magnitude of error.

DPH-11 Report on Absolute Vertical Accuracy - continued

The purpose of this section is to show a graphic of lidar data points colored by intensity with VVA check points rendered "thematically" showing the green and red squares sized by Z error.

[Data Source - D:\00_ISGS_East\Client_LAS](#)

[Result Path - D:\00_ISGS_East\IL_MidNorth_3_D22_300136_QC1\DPH_11\ColorByIntensity_CheckPoints_VVA.jpg](#)



■ Green represents where a DEM of the lidar surface is above the check point (positive elevation error).

■ Red represents where a DEM of the lidar surface is below the check point (negative elevation error).

The size of the square symbol represents the absolute value magnitude of error.