

DPH-11 Report on Absolute Vertical Accuracy

The USGS Lidar Base Specification Version 1.3 states: "Absolute vertical accuracy of the lidar data and the derived DEM will be assessed and reported in accordance with the ASPRS (2014). Two broad land cover types shall be assessed: vegetated and nonvegetated. Three absolute accuracy values shall be assessed and reported: (1) NVA for the point data, (2) NVA for the DEM, and (3) 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."

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 - Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Production\Final_Client_Deliverables\Lot10_utm13\metadata\shapefiles\TX_WestTexas_Lot10_84NVA_69VVA_pts_u13.shp](#)

Units: Meter (/Feet)

Vertical Accuracy Class tested: 10-cm

Check Points in defined project area (DPA):	153
Check Points with Lidar Coverage	153
Check Points with Lidar Coverage (NVA)	84
Check Points with Lidar Coverage (VVA)	69
Average Z Error (NVA)	0.010/0.033
Maximum Z Error (NVA)	0.176/0.578
Median Z Error (NVA)	0.003/0.010
Minimum Z Error (NVA)	-0.062/-0.204
Standard deviation of Vertical Error (NVA)	0.039/0.129
Skewness of Vertical Error (NVA)	1.155
Kurtosis of Vertical Error (NVA)	2.398
Non-vegetated Vertical Accuracy (NVA) RMSE(z) ¹	0.040/0.133 PASS
Non-vegetated Vertical Accuracy (NVA) at the 95% Confidence Level +/- ¹	0.079/0.260 PASS
FGDC/NSSDA Vertical Accuracy at the 95% Confidence Level +/-	0.079/0.260
Non-vegetated Vertical Accuracy (NVA) RMSE(z) (DEM) ²	0.040/0.130 PASS
Non-vegetated Vertical Accuracy (NVA) at the 95% Confidence Level (DEM) +/- ²	0.078/0.255 PASS
Vegetated Vertical Accuracy (VVA) at the 95th Percentile (DEM) +/- ²	0.224/0.735 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 = 4.0cm, equating to +/- 7.9cm at the 95% confidence level. Actual VVA accuracy was found to be +/- 22.4cm 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 Version 1.3 (page 24, 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
1001	779478.574	3426955.801	Yes	764.918	764.894	-0.024	764.891	764.908	764.919	3363	-3156	1,1,1		
1003	758892.899	3377690.85	Yes	929.572	929.566	-0.006	929.559	929.568	929.576	4887	103	1,1,1		
1008	740111.35	3403724.149	Yes	1001.908	1001.882	-0.026	1001.872	1001.876	1001.886	2490	951	1,1,1		
1010	706679.585	3429078.297	Yes	854.59	854.592	0.002	854.589	854.592	854.597	8523	310	1,1,1		
1019	769800.22	3421190.862	Yes	859.158	859.177	0.019	859.161	859.193	859.21	10524	1188	1,1,1		
1025	767402.939	3365416.17	Yes	817.79	817.785	-0.005	817.776	817.784	817.787	8500	2298	1,1,1		
1048	752914.349	3361900.546	Yes	939.524	939.564	0.040	939.556	939.575	939.576	1671	2767	1,1,1		
1051	681662.734	3422237.176	Yes	923.347	923.391	0.044	923.387	923.392	923.405	4347	-1548	1,1,1		
1062	695960.906	3359341.766	Yes	1267.491	1267.495	0.004	1267.483	1267.491	1267.502	7361	-77	1,1,1		
1065	769259.313	3391577.211	Yes	808.535	808.513	-0.022	808.494	808.497	808.54	5800	-2896	1,1,1		
1079	705099.091	3379034.642	Yes	1242.435	1242.409	-0.026	1242.386	1242.422	1242.453	9234	2361	1,1,1		
1084	756730.236	3420549.721	Yes	788.681	788.742	0.061	788.718	788.755	788.77	10354	-1293	1,1,1		
1096	676078.771	3351031.87	Yes	1304.978	1304.97	-0.008	1304.967	1304.969	1304.975	4149	-2	1,1,1		
1102	685416.576	3347635.846	Yes	1274.32	1274.37	0.050	1274.365	1274.365	1274.392	7701	1313	1,1,1		
1103	722836.25	3415045.912	Yes	885.777	885.746	-0.031	885.738	885.76	885.769	10986	617	1,1,1		
1104	698878.888	3372862.608	Yes	1331.272	1331.245	-0.027	1331.227	1331.244	1331.28	3882	544	1,1,1		
1109	720561.073	3361015.507	Yes	1141.588	1141.584	-0.004	1141.579	1141.582	1141.605	6876	-2844	1,1,1		
1113	671413.716	3422463.904	Yes	936.047	936.119	0.072	936.065	936.07	936.124	4095	-2026	1,1,1		
1124	669851.707	3375900.963	Yes	1253.532	1253.537	0.005	1253.518	1253.523	1253.55	8439	-85	1,1,1		
1126	769774.975	3404372.179	Yes	913.191	913.195	0.004	913.186	913.193	913.227	2737	2646	1,1,1		
1137	737200.398	3431554.828	Yes	773.15	773.167	0.017	773.158	773.181	773.19	9529	916	1,1,1		
1137A	683978.231	3459091.706	Yes	792.828	792.849	0.021	792.839	792.845	792.86	9122	2702	1,1,1		
1140	656145.228	3397409.422	Yes	1052.081	1052.257	0.176	1052.255	1052.256	1052.27	2871	-1409	1,1,1		
1144	731590.23	3414524.552	Yes	860.791	860.76	-0.031	860.754	860.76	860.766	4602	-1095	1,1,1		
1146	706608.305	3373847.79	Yes	1258.017	1257.993	-0.024	1257.989	1257.991	1258.035	7988	-2131	1,1,1		
1149	676404.333	3405619.52	Yes	1029.466	1029.46	-0.006	1029.457	1029.46	1029.46	10136	-1136	1,1,1		
1151	754951.358	3458217.801	Yes	743.925	743.863	-0.062	743.857	743.86	743.881	5989	2973	1,1,1		
1154	681148.669	3401403.797	Yes	1009.824	1009.796	-0.028	1009.785	1009.787	1009.8	9648	190	1,1,1		
1158	774317.035	3369327.544	Yes	807.319	807.306	-0.013	807.304	807.324	807.326	11066	2848	1,1,1		
1159	735785.439	3391863.844	Yes	991.841	991.846	0.005	991.831	991.841	991.854	10879	427	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
1160	752056.77	3474667.875	Yes	788.252	788.298	0.046	788.294	788.297	788.303	3839	1667	1,1,1		
1163	745950.289	3356695.41	Yes	963.455	963.542	0.087	963.511	963.543	963.546	2459	629	1,1,1		
1179	684494	3437703.847	Yes	867.86	867.853	-0.007	867.85	867.86	867.863	6398	3007	1,1,1		
1180	744188.743	3443078.396	Yes	707.93	707.924	-0.006	707.908	707.912	707.929	9270	3077	1,1,1		
1182	685480.371	3474564.991	Yes	753.998	754.063	0.065	754.036	754.064	754.075	7992	135	1,1,1		
1183	739892.055	3395745.196	Yes	997.031	997.056	0.025	997.053	997.054	997.065	3319	-1633	1,1,1		
1185	759699.025	3383354.849	Yes	848.926	848.927	0.001	848.926	848.927	848.927	5156	137	1,1,1		
1188	731396.615	3386029.646	Yes	1004.139	1004.159	0.020	1004.153	1004.156	1004.161	7239	-469	1,1,1		
1192	674723.961	3437894.53	Yes	868.42	868.414	-0.006	868.41	868.414	868.42	8875	915	1,1,1		
1194	702733.226	3472789.593	Yes	752.491	752.47	-0.021	752.465	752.471	752.49	5932	-2070	1,1,1		
1196	697303.852	3387393.441	Yes	1144.678	1144.654	-0.024	1144.622	1144.652	1144.669	3896	-131	1,1,1		
1204	723228.856	3468054.512	Yes	735.02	735.074	0.054	735.069	735.103	735.109	8614	-2835	1,1,1		
1206	726087.819	3457167.804	Yes	722.123	722.128	0.005	722.124	722.128	722.136	2936	-988	1,1,1		
1218	700337.089	3419177.386	Yes	922.76	922.8	0.040	922.795	922.799	922.814	3424	1627	1,1,1		
1221	747073.194	3383084.684	Yes	932.589	932.639	0.050	932.628	932.642	932.649	11278	-1988	1,1,1		
1229	748556.935	3420310.38	Yes	776.689	776.66	-0.029	776.655	776.658	776.666	12786	-262	1,1,1		
1230	774192.987	3433352.309	Yes	681.998	681.969	-0.029	681.966	681.97	681.987	11010	-220	1,1,1		
1233	671145.639	3394149.997	Yes	1054.172	1054.216	0.044	1054.214	1054.216	1054.233	10020	-174	1,1,1		
1238	716833.61	3473000.471	Yes	757.462	757.544	0.082	757.507	757.551	757.569	2467	-592	1,1,1		
1239	712184.134	3440145.217	Yes	780.83	780.842	0.012	780.836	780.845	780.85	7074	-827	1,1,1		
1240	732614.712	3441652.96	Yes	743.15	743.213	0.063	743.202	743.213	743.217	3568	386	1,1,1		
1243	751249.614	3433927.02	Yes	756.931	756.949	0.018	756.944	756.955	756.958	12922	2109	1,1,1		
1246	712243.573	3459713.192	Yes	737.399	737.369	-0.030	737.366	737.368	737.373	9099	-3180	1,1,1		
1251	668764.371	3470278.189	Yes	782.716	782.771	0.055	782.767	782.768	782.776	9639	385	1,1,1		
1257	657012.256	3381465.112	Yes	1125.146	1125.156	0.010	1125.15	1125.163	1125.165	2237	-2376	1,1,1		
1260	737183.052	3374793.641	Yes	1037.861	1037.87	0.009	1037.844	1037.851	1037.872	2511	-1971	1,1,1		
1267	757518.691	3417467.792	Yes	808.8	808.868	0.068	808.866	808.866	808.871	10941	-1041	1,1,1		
1270	721107.885	3396522.015	Yes	1054.643	1054.634	-0.009	1054.63	1054.636	1054.637	4847	1566	1,1,1		
1277	762882.555	3353669.986	Yes	804.288	804.243	-0.045	804.234	804.243	804.243	9267	454	1,1,1		
1282	674882.007	3396688.718	Yes	1039.581	1039.616	0.035	1039.616	1039.616	1039.617	8018	2346	1,1,1		
1283	710201.921	3448976.275	Yes	764.099	764.097	-0.002	764.085	764.092	764.105	5772	-2826	1,1,1		
1284	707034.838	3365592.001	Yes	1298.002	1297.984	-0.018	1297.965	1297.981	1297.988	7374	-2474	1,1,1		
1307	742711.709	3419008.237	Yes	820.106	820.207	0.101	820.205	820.207	820.208	9671	1469	1,1,1		
1309	699650.671	3402602.1	Yes	1093.056	1093.026	-0.030	1093.012	1093.021	1093.046	3916	-2432	1,1,1		
1312	701242.912	3438358.021	Yes	820.565	820.532	-0.033	820.529	820.541	820.543	3040	-2542	1,1,1		

Check Points Vertical Accuracy - continued

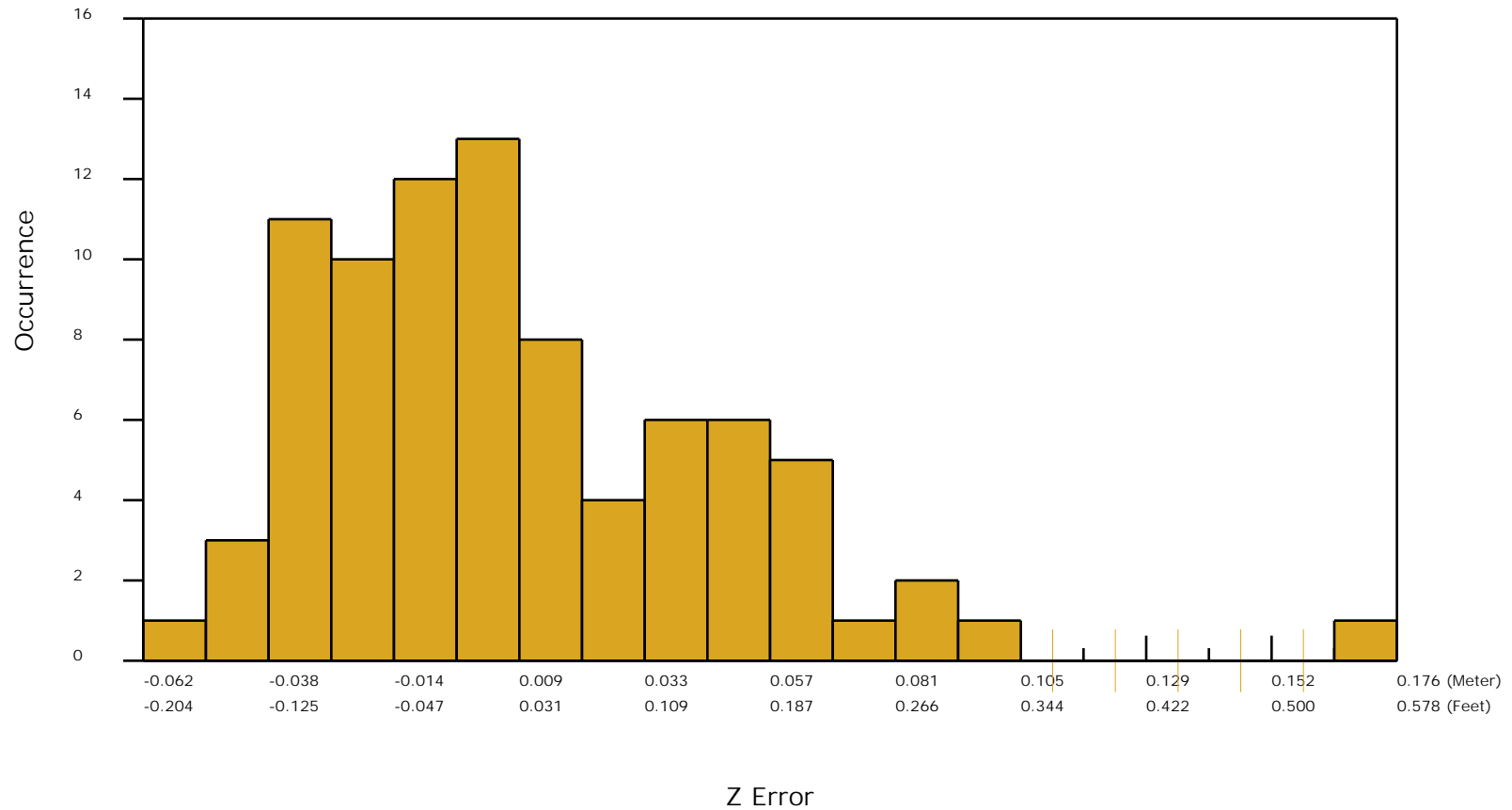
ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Minimum Z	Median Z	Maximum Z	Intensity	Scan Angle Rank	Returns	Description	Comments
1315	731777.368	3475270.204	Yes	751.409	751.428	0.019	751.424	751.426	751.43	8355	1555	1,1,1		
1325	724785.825	3365445.608	Yes	1101.917	1101.872	-0.045	1101.861	1101.889	1101.91	7912	-548	1,1,1		
1328	719110.464	3448185.959	Yes	744.383	744.383	0.000	744.367	744.388	744.394	6367	-2769	1,1,1		
1330	700908.177	3452186.641	Yes	771.372	771.354	-0.018	771.348	771.376	771.384	7931	-2076	1,1,1		
1333	707486.984	3462800.721	Yes	735.421	735.402	-0.019	735.375	735.404	735.404	5392	-3092	1,1,1		
1334	719189.721	3376109.089	Yes	1123.993	1124.045	0.052	1124.038	1124.044	1124.054	9412	1241	1,1,1		
1337	717400.498	3419616.033	Yes	871.41	871.375	-0.035	871.366	871.371	871.379	4123	-2147	1,1,1		
1340	697979.825	3459752.222	Yes	762.282	762.271	-0.011	762.264	762.265	762.279	6506	654	1,1,1		
1341	751094.764	3400845.059	Yes	976.573	976.609	0.036	976.607	976.609	976.619	2974	-1543	1,1,1		
1347	764617.9	3434400.419	Yes	698.885	698.888	0.003	698.863	698.894	698.901	2799	2724	1,1,1		
1351	718945.946	3355648.337	Yes	1165.123	1165.11	-0.013	1165.105	1165.11	1165.11	8588	1991	1,1,1		
1352	690263.489	3362211.371	Yes	1290.55	1290.554	0.004	1290.514	1290.535	1290.561	3268	-1380	1,1,1		
821005	764883.524	3356009.068	Yes	850.748	850.7	-0.048	850.693	850.7	850.703	9002	-653	1,1,1		
821006	774982.192	3358434.581	Yes	833.552	833.559	0.007	833.545	833.556	833.563	9869	542	1,1,1		
841005	712424.146	3370217.04	Yes	1280.629	1280.611	-0.018	1280.601	1280.62	1280.624	8688	1402	1,1,1		
921001	656813.676	3391238.704	Yes	1071.327	1071.357	0.030	1071.347	1071.358	1071.363	7045	2014	1,1,1		
1099	787328.8861053402610.59684326			852.06	852.088	0.028	852.072	852.082	852.089	12999	-722	1,1,1		
1122	788467.7024660382081.17115803			690.057	690.084	0.027	690.07	690.083	690.09	14033	2437	1,1,1		
1310	787789.9241003972174.51673824			747.02	747.082	0.062	747.057	747.088	747.094	48932	-1668	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.

[Data Source - Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Production\Final_Client_Deliverables\Lot10_utm13_point_cloud\tilecls](#)

NVA (lidar data)



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
1001	779478.574	3426955.801	Yes	764.918	764.906	-0.012		
1003	758892.899	3377690.85	Yes	929.572	929.563	-0.009		
1008	740111.35	3403724.149	Yes	1001.908	1001.896	-0.012		
1010	706679.585	3429078.297	Yes	854.59	854.595	0.005		
1019	769800.22	3421190.862	Yes	859.158	859.194	0.036		
1025	767402.939	3365416.17	Yes	817.79	817.788	-0.002		
1048	752914.349	3361900.546	Yes	939.524	939.568	0.044		
1051	681662.734	3422237.176	Yes	923.347	923.386	0.039		
1062	695960.906	3359341.766	Yes	1267.491	1267.494	0.003		
1065	769259.313	3391577.211	Yes	808.535	808.542	0.007		
1079	705099.091	3379034.642	Yes	1242.435	1242.407	-0.028		
1084	756730.236	3420549.721	Yes	788.681	788.726	0.045		
1096	676078.771	3351031.87	Yes	1304.978	1304.974	-0.004		
1102	685416.576	3347635.846	Yes	1274.32	1274.366	0.046		
1103	722836.25	3415045.912	Yes	885.777	885.731	-0.046		
1104	698878.888	3372862.608	Yes	1331.272	1331.270	-0.002		
1109	720561.073	3361015.507	Yes	1141.588	1141.597	0.009		
1113	671413.716	3422463.904	Yes	936.047	936.093	0.046		
1124	669851.707	3375900.963	Yes	1253.532	1253.536	0.004		
1126	769774.975	3404372.179	Yes	913.191	913.187	-0.004		
1137	737200.398	3431554.828	Yes	773.15	773.159	0.009		
1137A	683978.231	3459091.706	Yes	792.828	792.845	0.017		
1140	656145.228	3397409.422	Yes	1052.081	1052.255	0.174		
1144	731590.23	3414524.552	Yes	860.791	860.770	-0.021		
1146	706608.305	3373847.79	Yes	1258.017	1257.999	-0.018		
1149	676404.333	3405619.52	Yes	1029.466	1029.460	-0.006		
1151	754951.358	3458217.801	Yes	743.925	743.863	-0.062		
1154	681148.669	3401403.797	Yes	1009.824	1009.790	-0.034		
1158	774317.035	3369327.544	Yes	807.319	807.297	-0.022		
1159	735785.439	3391863.844	Yes	991.841	991.837	-0.004		

Check Points Vertical Accuracy - continued

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Description	Comments
1160	752056.77	3474667.875	Yes	788.252	788.295	0.043		
1163	745950.289	3356695.41	Yes	963.455	963.529	0.074		
1179	684494	3437703.847	Yes	867.86	867.854	-0.006		
1180	744188.743	3443078.396	Yes	707.93	707.926	-0.004		
1182	685480.371	3474564.991	Yes	753.998	754.043	0.045		
1183	739892.055	3395745.196	Yes	997.031	997.078	0.047		
1185	759699.025	3383354.849	Yes	848.926	848.929	0.003		
1188	731396.615	3386029.646	Yes	1004.139	1004.159	0.020		
1192	674723.961	3437894.53	Yes	868.42	868.421	0.001		
1194	702733.226	3472789.593	Yes	752.491	752.476	-0.015		
1196	697303.852	3387393.441	Yes	1144.678	1144.623	-0.055		
1204	723228.856	3468054.512	Yes	735.02	735.097	0.077		
1206	726087.819	3457167.804	Yes	722.123	722.135	0.012		
1218	700337.089	3419177.386	Yes	922.76	922.802	0.042		
1221	747073.194	3383084.684	Yes	932.589	932.636	0.047		
1229	748556.935	3420310.38	Yes	776.689	776.656	-0.033		
1230	774192.987	3433352.309	Yes	681.998	681.985	-0.013		
1233	671145.639	3394149.997	Yes	1054.172	1054.214	0.042		
1238	716833.61	3473000.471	Yes	757.462	757.549	0.087		
1239	712184.134	3440145.217	Yes	780.83	780.843	0.013		
1240	732614.712	3441652.96	Yes	743.15	743.220	0.070		
1243	751249.614	3433927.02	Yes	756.931	756.942	0.011		
1246	712243.573	3459713.192	Yes	737.399	737.376	-0.023		
1251	668764.371	3470278.189	Yes	782.716	782.768	0.052		
1257	657012.256	3381465.112	Yes	1125.146	1125.157	0.011		
1260	737183.052	3374793.641	Yes	1037.861	1037.851	-0.010		
1267	757518.691	3417467.792	Yes	808.8	808.870	0.070		
1270	721107.885	3396522.015	Yes	1054.643	1054.639	-0.004		
1277	762882.555	3353669.986	Yes	804.288	804.236	-0.052		
1282	674882.007	3396688.718	Yes	1039.581	1039.616	0.035		
1283	710201.921	3448976.275	Yes	764.099	764.084	-0.015		
1284	707034.838	3365592.001	Yes	1298.002	1297.971	-0.031		
1307	742711.709	3419008.237	Yes	820.106	820.207	0.101		
1309	699650.671	3402602.1	Yes	1093.056	1093.023	-0.033		
1312	701242.912	3438358.021	Yes	820.565	820.531	-0.034		

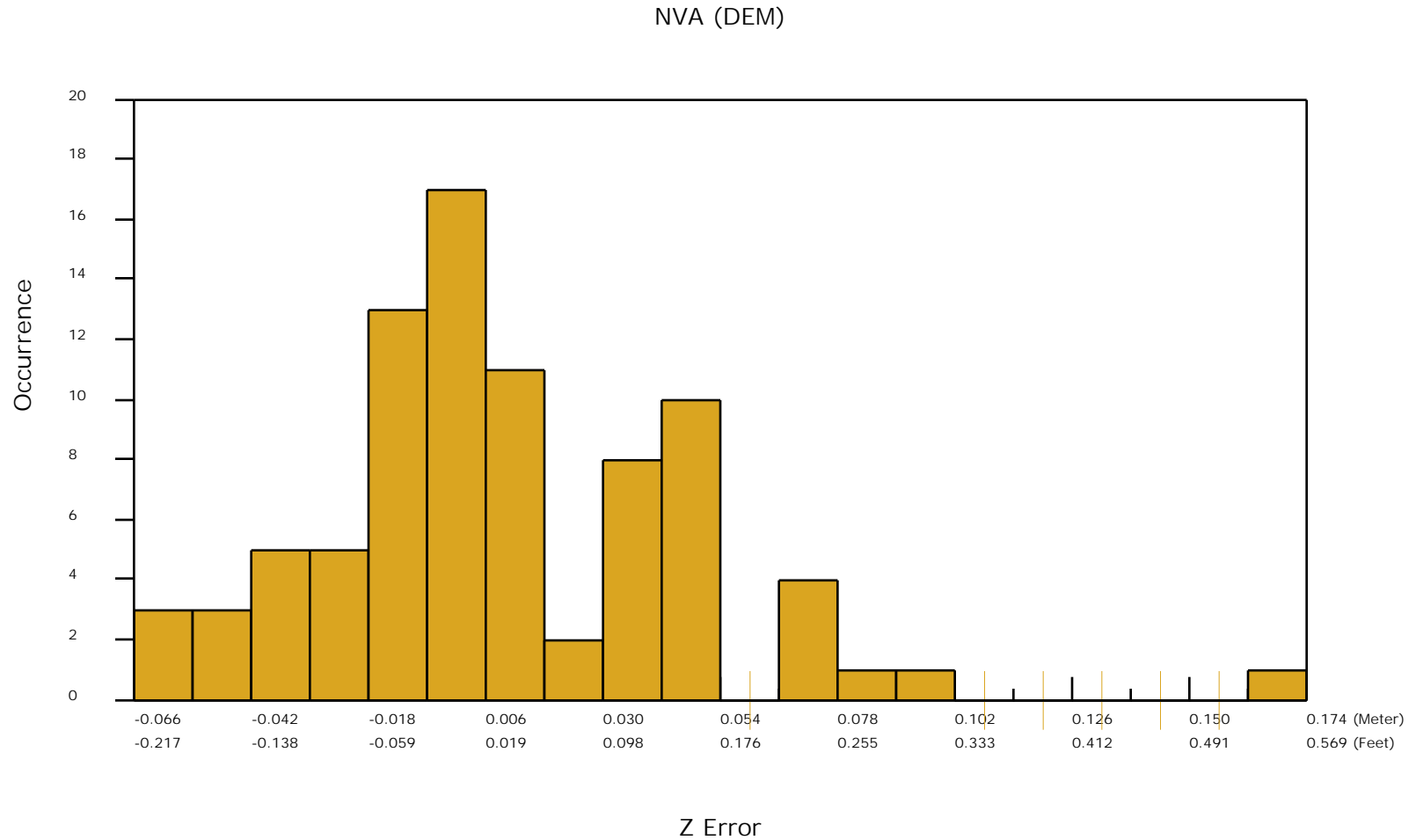
Check Points Vertical Accuracy - continued

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Description	Comments
1315	731777.368	3475270.204	Yes	751.409	751.425	0.016		
1325	724785.825	3365445.608	Yes	1101.917	1101.851	-0.066		
1328	719110.464	3448185.959	Yes	744.383	744.376	-0.007		
1330	700908.177	3452186.641	Yes	771.372	771.375	0.003		
1333	707486.984	3462800.721	Yes	735.421	735.399	-0.022		
1334	719189.721	3376109.089	Yes	1123.993	1124.035	0.042		
1337	717400.498	3419616.033	Yes	871.41	871.361	-0.049		
1340	697979.825	3459752.222	Yes	762.282	762.285	0.003		
1341	751094.764	3400845.059	Yes	976.573	976.607	0.034		
1347	764617.9	3434400.419	Yes	698.885	698.882	-0.003		
1351	718945.946	3355648.337	Yes	1165.123	1165.109	-0.014		
1352	690263.489	3362211.371	Yes	1290.55	1290.549	-0.001		
821005	764883.524	3356009.068	Yes	850.748	850.734	-0.014		
821006	774982.192	3358434.581	Yes	833.552	833.564	0.012		
841005	712424.146	3370217.04	Yes	1280.629	1280.662	0.033		
921001	656813.676	3391238.704	Yes	1071.327	1071.362	0.035		
1099	787328.886105367	3402610.59684326	Yes	852.06	852.079	0.019		
1122	788467.702466038	3352081.17115803	Yes	690.057	690.069	0.012		
1310	787789.924100497	3412174.51673624	Yes	747.02	747.007	-0.013		

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 - Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Production\Final_Client_Deliverables\Lot10_utm13_point_cloud\tilecls](#)



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
2002	758882.034	3377557.114	Yes	932.472	932.496	0.024		
2007	740101.393	3403746.515	Yes	1002.259	1002.327	0.068		
2009	706668.272	3429091.553	Yes	854.406	854.457	0.051		
2018	769823.641	3421187.218	Yes	858.108	858.243	0.135		
2024	767608.749	3365509.131	Yes	814.711	814.801	0.090		
2045	752892.8	3361916.762	Yes	940.053	940.184	0.131		
2048	681764.37	3422220.677	Yes	924.44	924.572	0.132		
2059	696061.123	3359425.109	Yes	1265.302	1265.441	0.139		
2061	769258.583	3391603.332	Yes	808.328	808.348	0.020		
2074	705105.875	3379029.264	Yes	1242.017	1242.108	0.091		
2079	756745.199	3420549.357	Yes	788.41	788.511	0.101		
2091	676195.208	3351077.027	Yes	1305.173	1305.360	0.187		
2097	685420.931	3347628.268	Yes	1274.208	1274.322	0.114		
2098	722845.882	3415060.35	Yes	885.488	885.474	-0.014		
2099	698885.706	3372766.338	Yes	1331.089	1331.137	0.048		
2104	720542.454	3360987.517	Yes	1142.353	1142.434	0.081		
2108	671513.093	3422441.815	Yes	936.823	936.887	0.064		
2119	669864.85	3375887.485	Yes	1253.764	1253.834	0.070		
2121	769821.393	3404461.914	Yes	912.328	912.482	0.154		
2129	737214.038	3431560.655	Yes	773.066	773.055	-0.011		
2132	683961.731	3459067.732	Yes	792.257	792.396	0.139		
2135	656146.487	3397390.739	Yes	1052.308	1052.458	0.150		
2139	731575.442	3414525.899	Yes	860.743	860.796	0.053		
2141	706499.764	3373815.302	Yes	1259.785	1259.949	0.164		
2144	676516.201	3405793.226	Yes	1027.654	1027.876	0.222		
2145	755085.565	3457903.458	Yes	743.522	743.529	0.007		
2148	681147.843	3401390.367	Yes	1009.96	1010.028	0.068		
2152	752064.664	3474686.318	Yes	788.196	788.246	0.050		
2155	746042.83	3356124.526	Yes	953.854	954.296	0.442		
2169	684490.959	3437686.588	Yes	868.047	868.108	0.061		

Check Points Vertical Accuracy - continued

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Description	Comments
2170	744538.56	3442895.438	Yes	706.557	706.602	0.045		
2172	685461.474	3474579.149	Yes	754.261	754.345	0.084		
2177	730984.984	3386304.817	Yes	1001.076	1001.136	0.060		
2181	674478.856	3438068.36	Yes	867.901	867.959	0.058		
2183	702738.452	3472803.722	Yes	752.604	752.648	0.044		
2185	697295.15	3387401.402	Yes	1143.745	1143.846	0.101		
2192	723209.308	3468080.409	Yes	734.405	734.632	0.227		
2194	726037.477	3457170.151	Yes	722.021	722.048	0.027		
2206	700335.129	3419156.465	Yes	922.828	922.928	0.100		
2209	747233.531	3383007.468	Yes	933.433	933.612	0.179		
2217	748538.773	3420316.706	Yes	776.698	776.804	0.106		
2218	774192.184	3433361.582	Yes	681.97	682.003	0.033		
2221	671206.445	3394214.207	Yes	1054.17	1054.214	0.044		
2226	716828.028	3472981.895	Yes	757.502	757.623	0.121		
2227	712177.776	3440114.252	Yes	780.752	780.842	0.090		
2274	759779.866	3383484.715	Yes	847.516	847.570	0.054		
821002	762703.283	3353304.934	Yes	798.145	798.247	0.102		
821004	764863.048	3356011.1	Yes	850.588	850.608	0.020		
821008	774956.061	3358412.007	Yes	833.315	833.339	0.024		
841003	719207.451	3376105.266	Yes	1123.62	1123.739	0.119		
841004	712425.084	3370196.627	Yes	1280.104	1280.427	0.323		
851004	707035.904	3365599.119	Yes	1297.808	1297.941	0.133		
851006	718959.498	3355658.172	Yes	1165.299	1165.390	0.091		
861002	721093.594	3396548.049	Yes	1054.372	1054.596	0.224		
861004	717373.203	3419630.353	Yes	870.448	870.610	0.162		
861006	742758.148	3419020.586	Yes	820.44	820.515	0.075		
861007	757511.349	3417470.615	Yes	808.993	809.099	0.106		
861010	778314.765	3427546.558	Yes	750.496	750.526	0.030		
861012	751235.771	3433931.759	Yes	756.958	757.064	0.106		
871002	732376.875	3441744.2	Yes	742.056	742.175	0.119		
871004	719116.379	3448173.981	Yes	744.555	744.649	0.094		
871007	697958.099	3459752.42	Yes	762.489	762.510	0.021		
871008	712225.44	3459716.985	Yes	737.496	737.482	-0.014		
871010	731792.118	3475280.06	Yes	751.637	751.809	0.172		
881001	701245.986	3438351.021	Yes	820.463	820.510	0.047		

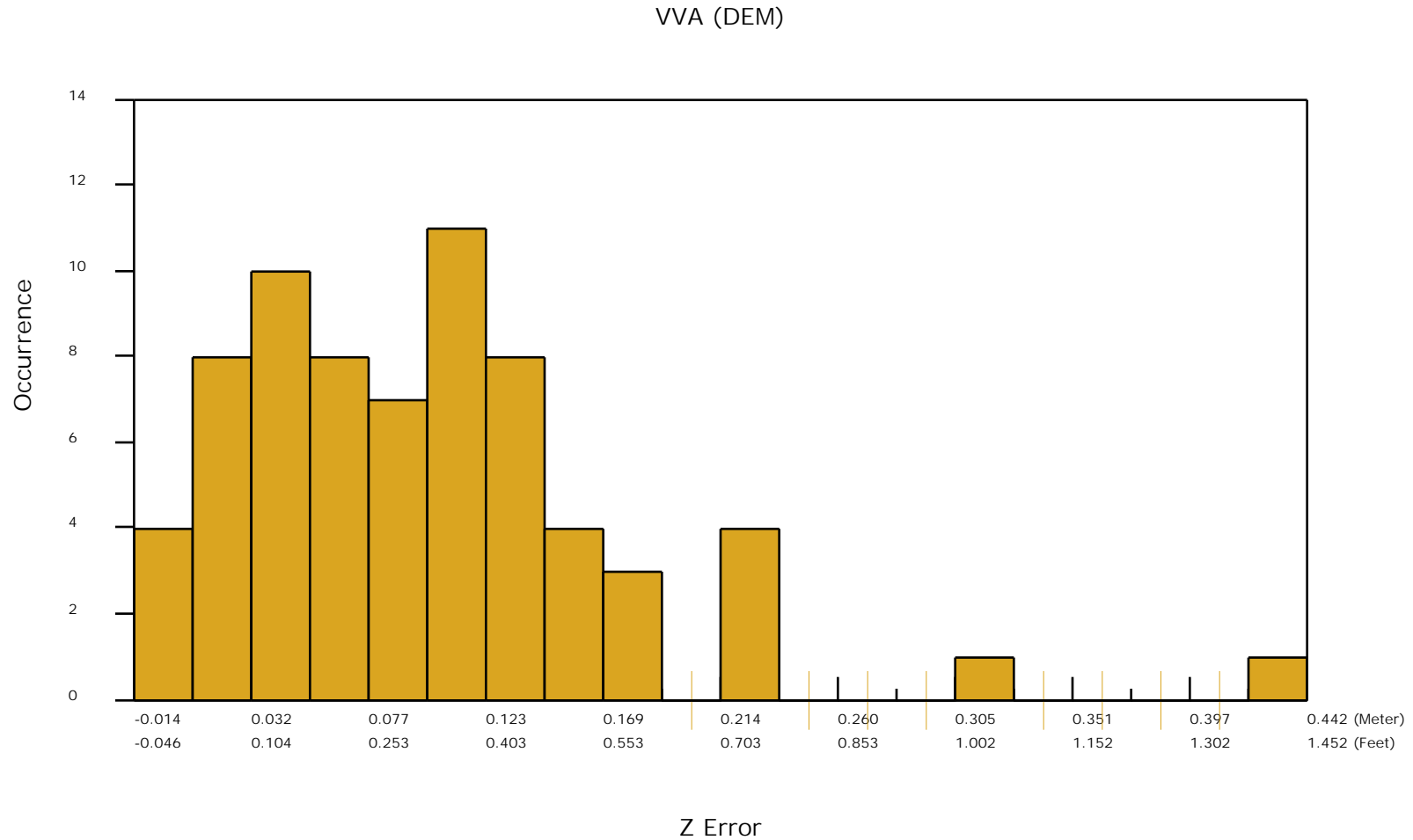
Check Points Vertical Accuracy - continued

ID	X	Y	Coverage	Z	Z From Lidar	Z Error	Description	Comments
921002	656832.74	3391244.839	Yes	1070.674	1070.807	0.133		
921003	656835.43	3391232.58	Yes	1070.822	1070.838	0.016		
2094	787336.016232309	3402630.76327542	Yes	852.132	852.275	0.143		
2117	788818.569121737	3352216.939971	Yes	705.989	706.213	0.224		

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 - Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Production\Final_Client_Deliverables\Lot10_utm13_point_cloud\tilecls](#)

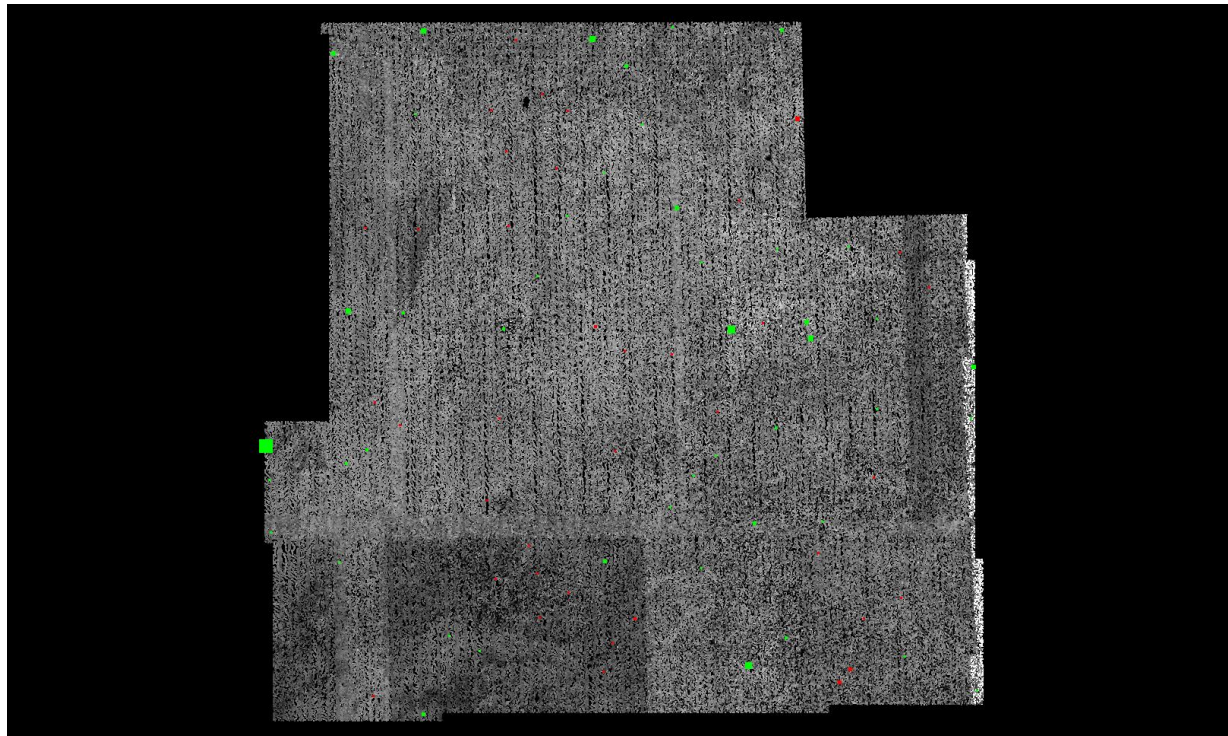


DPH-11 Report on Absolute Vertical Accuracy - continued

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 - Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Production\Final_Client_Deliverables\Lot10_utm13\point_cloud\tilecls](Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Production\Final_Client_Deliverables\Lot10_utm13\point_cloud\tilecls)

[Result Path - Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Admin\OA_OC\Lot10\DPH_11\ColorByIntensity_CheckPoints_NVA.jpg](Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Admin\OA_OC\Lot10\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).

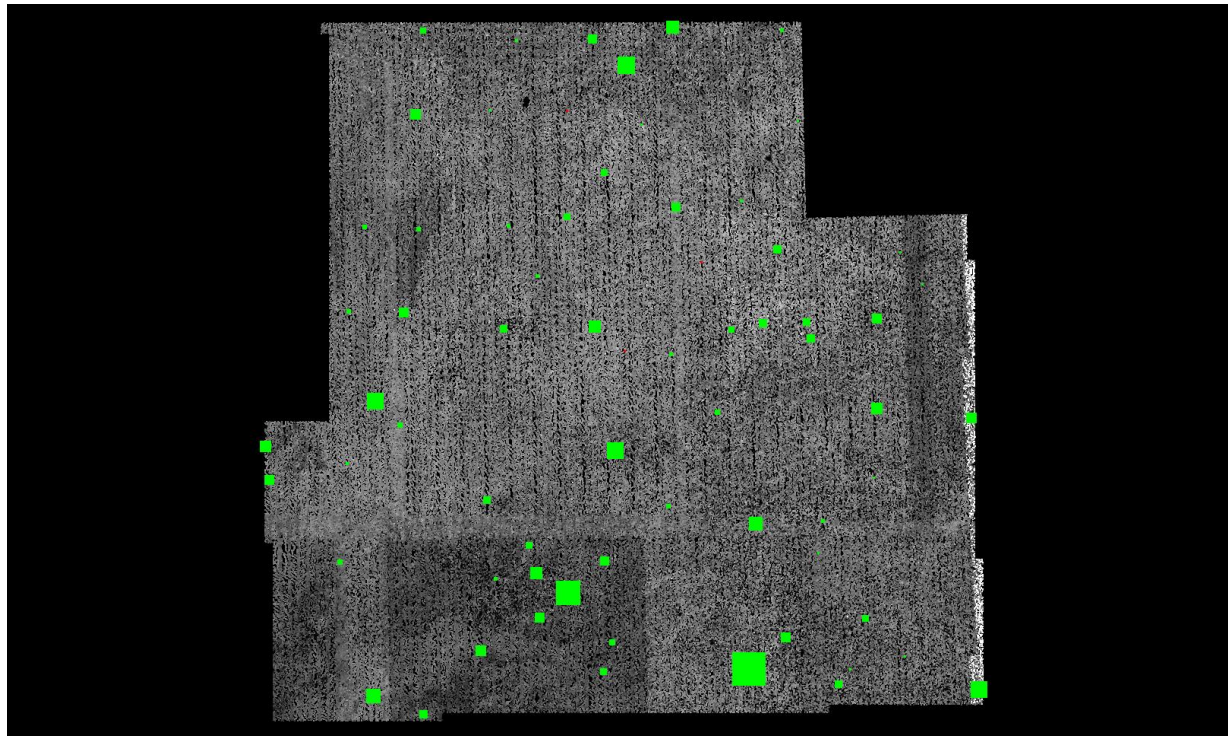
The size of the square symbol represents the absolute value magnitude of error.

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 - Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Production\Final_Client_Deliverables\Lot10_utm13\point_cloud\tilecls](Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Production\Final_Client_Deliverables\Lot10_utm13\point_cloud\tilecls)

[Result Path - Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Admin\QA_OC\Lot10\DPH_11\ColorByIntensity_CheckPoints_VVA.jpg](Y:\Mapping\Projects\65220171_USGS-TX_West_Texas\Admin\QA_OC\Lot10\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.