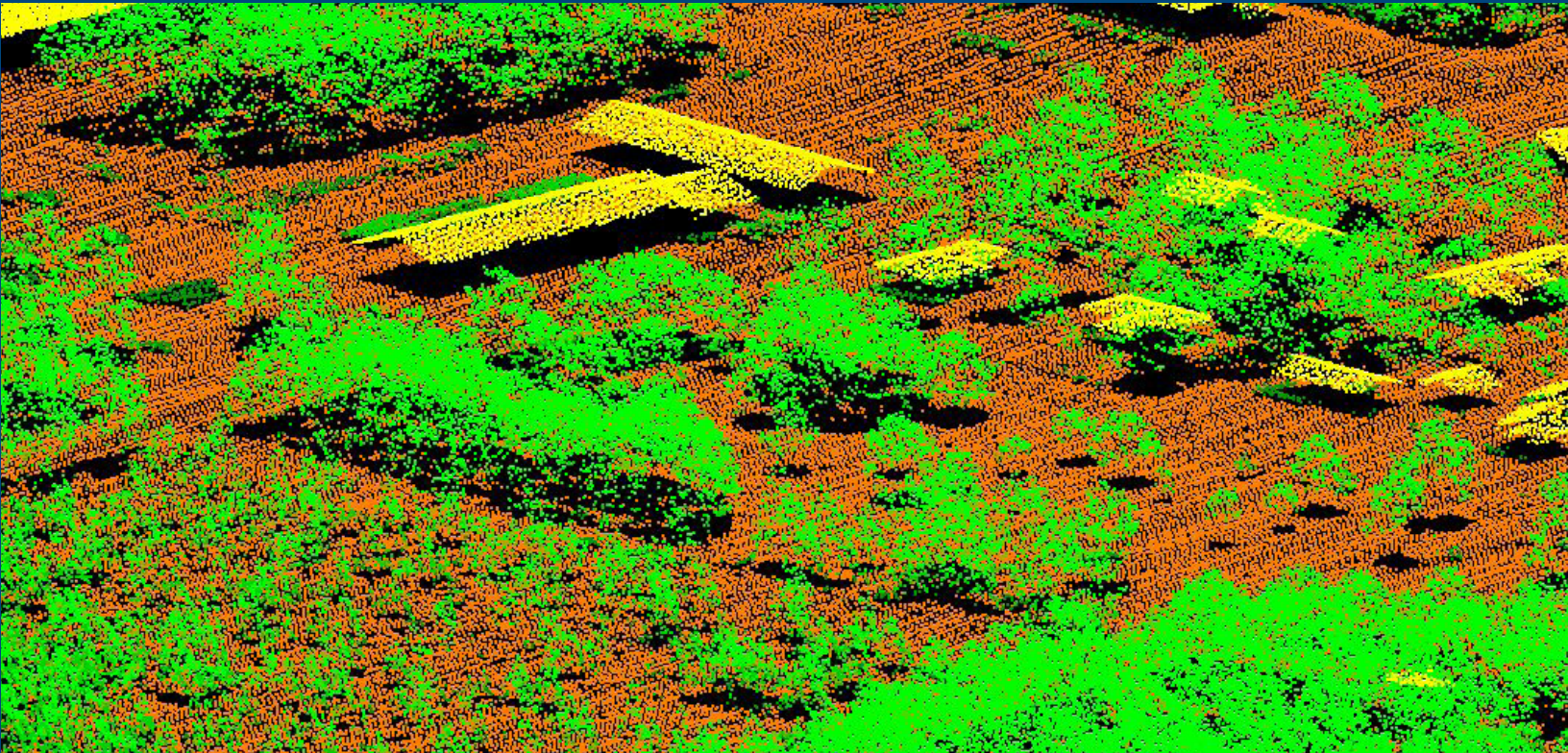


LIDAR GROUND CONTROL REPORT



NSSDA Ground Truth Survey Results: 2014 St. Croix County LiDAR Project

Geospatial services provided by Ayres Associates

Report date: December 17, 2014

AYRES
ASSOCIATES

Abstract

This report documents the GPS ground surveys conducted in support of FEMA accuracy testing of the lidar data collection for St. Croix County in 2014. Surveys were conducted at various sites utilizing the base stations established in the static network. These surveys established “ground truth” data at each site on different surface types, including low grass, high grass, low trees, high trees and urban areas. Statistical comparisons were made between ground truth points collected from the ground survey and the elevation at the associated horizontal coordinates represented on the lidar-derived digital terrain model.

Data Analysis

To qualify as an acceptable accuracy test, the lidar data must be compared with a dataset of higher accuracy – in this instance, ground survey. To develop a comparable dataset of points from the lidar dataset, a utility from proprietary software was used.

The ground control survey results were imported into an ESRI PointZ shapefile with each point’s information as attributes. The utility then accessed the lidar and generated a triangulated irregular network (TIN), which is a continuous digital terrain surface, using the bare-earth lidar points and the compiled breaklines. The utility probed the TIN surface to determine its elevations at each of the survey point’s horizontal locations.

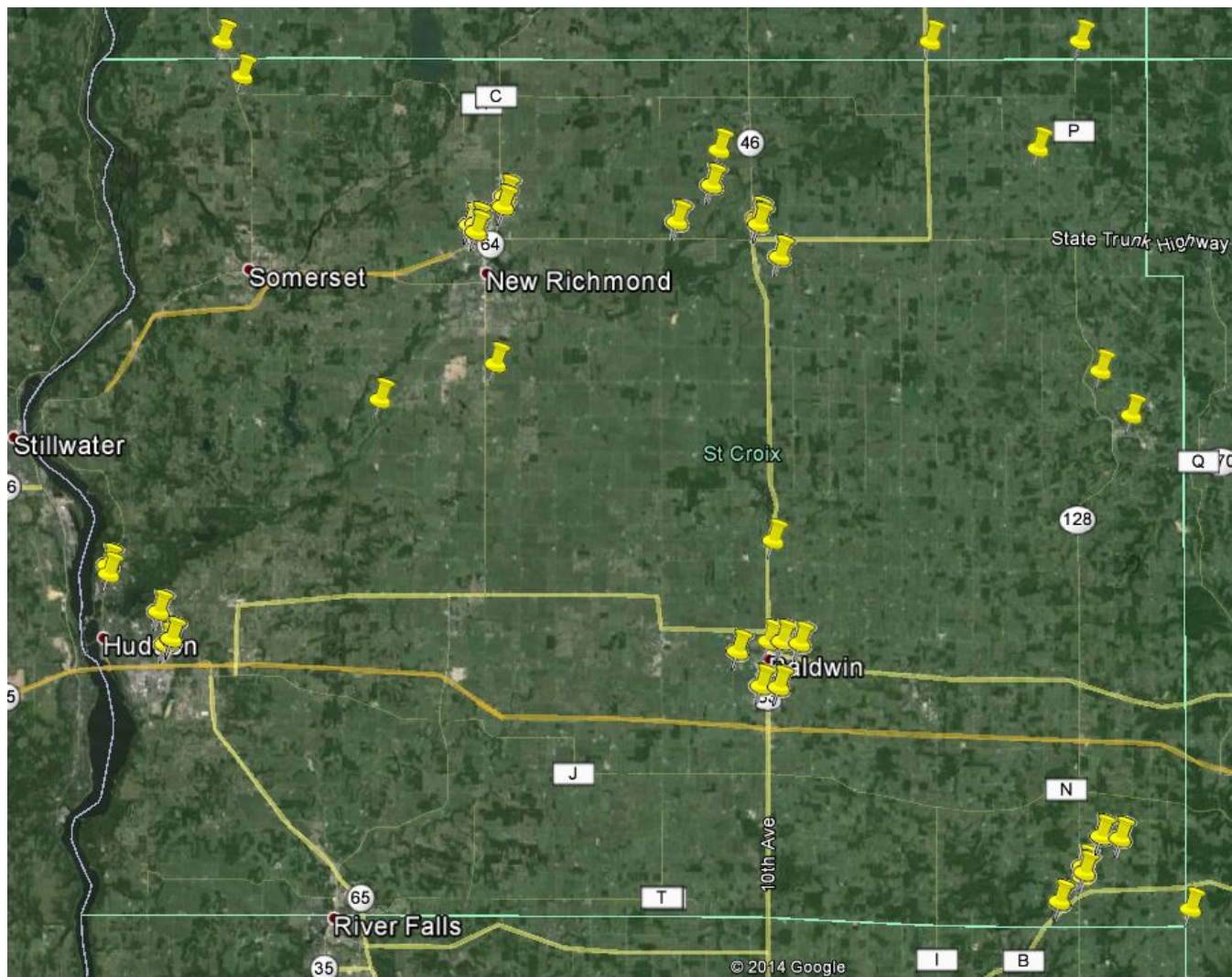
The elevation was then appended as a field to the PointZ shapefile; the attributes for each point were exported to a database and then statistical analysis was performed. The results can be seen on the following pages.

Overall Accuracy

A comparison of the ground survey versus lidar model values indicates a vertical root mean square error (RMSEz) of 0.417 feet. This is within the FEMA specified vertical accuracy tolerance of 0.61 feet. This RMSEz equates to a tested 0.817 feet vertical accuracy at 95% confidence level.

Ground Truth Survey Locations

The ground survey test points were distributed and categorized into sites as shown in the map below:



Ground Truth Analysis Reference Information

Coordinate System – Wisconsin Coordinate Reference System (WISCRS) – St. Croix County

Horizontal Datum – NAD83 (11)

Vertical Datum – NAVD88 (Geoid 12A), survey feet

Field Definitions

Number – The designation given to the ground survey point to identify it with its coordinates and land cover type.

Easting, Northing and KnownZ – The coordinates that describe the point’s horizontal and vertical location within the St. Croix County WISCRS Coordinate System. The Easting and Northing values are shared between the ground control points and lidar comparison points. The KnownZ field shows the elevation of the survey number. The lidar comparison point’s elevation is implicit in the analysis’ Delta Z.

Delta Z – The error, the difference between the elevation at a horizontal location as determined by ground survey and as determined by the lidar dataset.

Laser Z – The elevation at a horizontal location as determined by the lidar dataset.

Landcover Types – The predominant land cover category at the location of the survey point.

<i>Land Cover Type</i>	<i>Description</i>
Low Grass	Lawns, golf courses, plowed fields
Tall Grass	High grass, weeds, crop fields
Low Trees	Brush, shrubs
Tall Trees	Fully forested (hardwood, evergreens, mixed forests)
Urban	Asphalt, concrete

Statistical Definitions

RMSEz – The root mean squared error, the square root of the average of the squared errors.

Average Delta Z – The average of the Delta Z squared values.

Minimum Delta Z – The minimum of the Delta Z squared values.

Maximum Delta Z – The maximum of the Delta Z squared values.

Accuracy Z – The product of multiplying the RMSEz with 1.96, a conversion between the RMSEz.

Statistical Results

Summary of Results	
Number of Points	650
RMSEz	0.417 US Feet
Average Delta Z	-0.292 US Feet
Minimum Delta Z	-1.572 US Feet
Maximum Delta Z	0.932 US Feet
Accuracy Z	0.817 US Feet

Number	Easting	Northing	Known Z	Laser Z	Delta Z	Landcover Type
103	339356.3	609190.6	1123.242	1123.119	0.121	Ctrl Point
104	374893.7	551388.1	946.673	946.597	0.076	Ctrl Point
105	372843	662963.8	1075.137	1075.071	0.069	Ctrl Point
106	427938.5	527806.9	933.407	934.221	-0.814	Ctrl Point
107	428081.3	655251.6	1195.808	1196.105	-0.295	Ctrl Point
108	401314	607241.5	1063.089	1063.232	-0.142	Ctrl Point
109	349033.2	511011.3	740.096	740.015	0.081	Ctrl Point
900	350246.1	510836.8	747.568	746.994	0.574	Ctrl Point
901	350275.2	510916.2	746.923	746.298	0.625	Ctrl Point
902	403483.3	569618.3	991.838	992.177	-0.339	Ctrl Point
903	403425	569674.9	991.956	992.117	-0.161	Ctrl Point
904	401416.3	595584.4	1082.718	1083.301	-0.581	Ctrl Point
905	401413.2	595442.9	1080.072	1080.568	-0.498	Ctrl Point

Number	Easting	Northing	Known Z	Laser Z	Delta Z	Landcover Type
906	332788.8	608017.4	1129.918	1129.876	0.044	Ctrl Point
907	332873.6	607875	1124.355	1124.436	-0.086	Ctrl Point
908	301017.6	652477	1137.018	1136.897	0.123	Ctrl Point
909	300917.4	652329.2	1137.395	1137.474	-0.074	Ctrl Point
1000	411888.8	601685.4	1088.38	1089.397	-1.017	Ctrl Point
1001	412197.7	648998.5	1233.196	1233.666	-0.466	Ctrl Point
1002	427960.2	632976.1	1139.678	1140.779	-1.099	Ctrl Point
1003	379369.5	658362.8	1232.574	1232.99	-0.42	Ctrl Point
1004	304569.9	655950.6	1213.01	1212.646	0.364	Ctrl Point
1005	354216	609836.3	1144.845	1144.937	-0.097	Ctrl Point
1006	380226.8	568543.2	1001.743	1002.049	-0.309	Ctrl Point
1007	422743	530768.8	941.653	942.207	-0.554	Ctrl Point
2000	400935.5	565617.1	989.361	989.444	-0.082	Low Grass
2001	400939.9	565617.3	989.345	989.536	-0.191	Low Grass
2002	400944.6	565617.4	989.364	989.694	-0.33	Low Grass
2003	400949.3	565617.6	989.398	989.642	-0.244	Low Grass
2004	400954.3	565617.6	989.385	989.587	-0.202	Low Grass
2005	400954	565612.7	989.347	989.617	-0.27	Low Grass
2006	400949.2	565612.8	989.368	989.729	-0.361	Low Grass
2007	400945.2	565612.3	989.379	989.709	-0.33	Low Grass
2008	400940.7	565612.2	989.274	989.618	-0.344	Low Grass
2009	400935.3	565610.8	989.262	989.588	-0.326	Low Grass
2010	400935.8	565605.6	989.307	989.668	-0.361	Low Grass
2011	400940.6	565605	989.252	989.579	-0.327	Low Grass
2012	400944.3	565605.1	989.298	989.618	-0.32	Low Grass
2013	400948.3	565605	989.322	989.576	-0.254	Low Grass
2014	400952	565605	989.329	989.58	-0.251	Low Grass
2015	400952	565601.2	989.29	989.646	-0.356	Low Grass
2016	400946.6	565601.8	989.259	989.623	-0.364	Low Grass
2017	400942.4	565601.7	989.232	989.628	-0.396	Low Grass
2018	400938.3	565601.8	989.177	989.602	-0.425	Low Grass
2019	400934.2	565601	989.166	989.609	-0.443	Low Grass
2020	400934.6	565595.8	989.127	989.455	-0.328	Low Grass
2021	400939.5	565595.6	989.171	989.417	-0.246	Low Grass
2022	400943.4	565595.2	989.174	989.457	-0.283	Low Grass
2023	400947.3	565595.2	989.179	989.604	-0.425	Low Grass
2024	400951.2	565595.3	989.18	989.518	-0.338	Low Grass
2025	399733.8	565595	987.655	988.037	-0.382	Urban
2026	399729.2	565595.2	987.672	987.886	-0.214	Urban
2027	399724.8	565595.5	987.693	987.826	-0.133	Urban
2028	399720.9	565595.8	987.614	987.834	-0.22	Urban
2029	399717	565595.7	987.604	987.789	-0.185	Urban
2030	399717.3	565600.5	987.623	987.895	-0.272	Urban
2031	399722.2	565599.8	987.706	988.037	-0.331	Urban
2032	399726.7	565599.7	987.742	988.164	-0.422	Urban
2033	399730.9	565599.9	987.711	988.313	-0.602	Urban
2034	399733.9	565600	987.67	988.155	-0.485	Urban
2035	399733.3	565605	987.823	988.155	-0.332	Urban
2036	399729	565604.9	987.776	987.974	-0.198	Urban
2037	399725.2	565604.8	987.747	987.758	-0.011	Urban
2038	399721.5	565605	987.754	987.876	-0.122	Urban

<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2039	399717.6	565604.9	987.682	987.89	-0.208	Urban
2040	399717.5	565609.2	987.727	987.979	-0.252	Urban
2041	399722	565608.7	987.791	987.896	-0.105	Urban
2042	399725.4	565608.9	987.772	987.907	-0.135	Urban
2043	399729.4	565608.8	987.766	988.167	-0.401	Urban
2044	399732.9	565608.9	987.802	988.019	-0.217	Urban
2045	399732.8	565613.9	987.82	988.235	-0.415	Urban
2046	399728.7	565613.5	987.802	988.013	-0.211	Urban
2047	399724.8	565613.6	987.854	987.939	-0.085	Urban
2048	399721.4	565613.3	987.841	987.962	-0.121	Urban
2049	399717.6	565613.1	987.78	987.988	-0.208	Urban
2050	400780.5	564684.6	973.185	973.981	-0.796	Tall Grass
2051	400781	564680.9	972.916	973.832	-0.916	Tall Grass
2052	400781.4	564676.9	972.811	973.736	-0.925	Tall Grass
2053	400782	564672.1	972.841	973.673	-0.832	Tall Grass
2054	400781.8	564668.1	972.874	973.503	-0.629	Tall Grass
2055	400776.9	564667.8	972.992	973.516	-0.524	Tall Grass
2056	400776.7	564672.7	972.986	973.787	-0.801	Tall Grass
2057	400776.5	564677	972.823	973.565	-0.742	Tall Grass
2058	400776.2	564681	972.789	973.426	-0.637	Tall Grass
2059	400776.1	564684.7	973.119	973.889	-0.77	Tall Grass
2060	400771.2	564684.3	972.702	973.537	-0.835	Tall Grass
2061	400771.6	564679.1	972.79	973.596	-0.806	Tall Grass
2062	400771.5	564674.7	972.973	973.531	-0.558	Tall Grass
2063	400771.3	564670.6	973.104	973.81	-0.706	Tall Grass
2064	400771.4	564666.6	972.941	973.662	-0.721	Tall Grass
2065	400766.4	564666.8	973.145	973.668	-0.523	Tall Grass
2066	400766.1	564671.9	973.201	973.911	-0.71	Tall Grass
2067	400766.3	564676.4	973.021	973.759	-0.738	Tall Grass
2068	400765.9	564680.7	972.82	973.437	-0.617	Tall Grass
2069	400765.4	564685.3	972.862	973.414	-0.552	Tall Grass
2070	400760.6	564685.2	972.785	973.529	-0.744	Tall Grass
2071	400760.9	564680.3	972.914	973.582	-0.668	Tall Grass
2072	400761	564676.4	973.079	973.998	-0.919	Tall Grass
2073	400761.1	564672	973.235	973.699	-0.464	Tall Grass
2074	400761.1	564667.9	973.142	973.753	-0.611	Tall Grass
2075	405015.7	569941.1	994.846	995.214	-0.368	Low Trees
2076	405015.4	569936.6	994.52	995.189	-0.669	Low Trees
2077	405015.1	569932.4	994.584	994.997	-0.413	Low Trees
2078	405015.4	569928.3	994.496	994.953	-0.457	Low Trees
2079	405015.5	569923.8	994.412	994.852	-0.44	Low Trees
2080	405011.1	569923.1	994.465	994.815	-0.35	Low Trees
2081	405009.8	569928.3	994.641	994.973	-0.332	Low Trees
2082	405009	569932.8	994.624	995.177	-0.553	Low Trees
2083	405007.6	569936.3	994.751	995.302	-0.551	Low Trees
2084	405007	569941.2	995.095	995.212	-0.117	Low Trees
2085	405002	569941.6	994.817	995.165	-0.348	Low Trees
2086	405002.5	569936.7	994.526	995.23	-0.704	Low Trees
2087	405003.2	569932.3	994.482	995.107	-0.625	Low Trees
2088	405004.5	569927.9	994.491	995.15	-0.659	Low Trees
2089	405005.1	569924.2	994.489	995.054	-0.565	Low Trees

<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2090	405000.6	569923	994.426	994.947	-0.521	Low Trees
2091	404999.7	569928	994.476	994.99	-0.514	Low Trees
2092	404999.2	569932	994.504	994.998	-0.494	Low Trees
2093	404997.5	569935	994.702	995.145	-0.442	Low Trees
2094	404997.8	569940.3	994.733	995.213	-0.48	Low Trees
2095	404993.2	569940	994.86	995.285	-0.425	Low Trees
2096	404992.5	569934.2	994.652	995.177	-0.525	Low Trees
2097	404994.3	569930.3	994.639	995.093	-0.454	Low Trees
2098	404994	569925.1	994.577	995.094	-0.517	Low Trees
2099	404994.7	569921.9	994.515	994.879	-0.364	Low Trees
2100	401829.2	607296.8	1066.723	1067.235	-0.515	Low Trees
2101	401829.2	607292.4	1067.005	1067.376	-0.366	Low Trees
2102	401829	607287.1	1066.727	1067.353	-0.623	Low Trees
2103	401828.7	607283.2	1066.766	1067.392	-0.622	Low Trees
2104	401828.1	607277.8	1067.062	1067.476	-0.416	Low Trees
2105	401823.6	607277.8	1067.187	1067.585	-0.395	Low Trees
2106	401823.5	607282.1	1066.913	1067.603	-0.693	Low Trees
2107	401823.5	607286.1	1066.816	1067.261	-0.441	Low Trees
2108	401823.4	607290.9	1066.785	1067.333	-0.543	Low Trees
2109	401824.5	607296.8	1066.72	1067.098	-0.378	Low Trees
2110	401819	607297.7	1066.874	1067.344	-0.474	Low Trees
2111	401818.1	607292.1	1066.8	1067.41	-0.61	Low Trees
2112	401818	607286.5	1066.79	1067.236	-0.446	Low Trees
2113	401817.8	607280.9	1067.002	1067.534	-0.534	Low Trees
2114	401818.2	607276.3	1067.268	1067.719	-0.449	Low Trees
2115	401814.2	607275.7	1067.159	1067.764	-0.604	Low Trees
2116	401813.6	607279.4	1067.108	1067.565	-0.455	Low Trees
2117	401813.5	607284.5	1066.918	1067.253	-0.333	Low Trees
2118	401813.5	607289.3	1066.908	1067.445	-0.535	Low Trees
2119	401813	607292.7	1066.917	1067.682	-0.762	Low Trees
2120	401808	607293.1	1067.009	1067.661	-0.651	Low Trees
2121	401807.4	607287.8	1066.948	1067.461	-0.511	Low Trees
2122	401808.2	607283.7	1067.01	1067.592	-0.582	Low Trees
2123	401807.2	607279.6	1067.073	1067.686	-0.616	Low Trees
2124	401806.3	607274.4	1067.208	1067.747	-0.538	Low Trees
2125	400924.1	607577.4	1054.435	1054.734	-0.294	Urban
2126	400923.9	607582.3	1054.351	1054.759	-0.409	Urban
2127	400924.7	607587.1	1054.311	1054.563	-0.253	Urban
2128	400925.1	607591.3	1054.191	1054.508	-0.318	Urban
2129	400925.3	607595.1	1054.123	1054.6	-0.48	Urban
2130	400929.8	607594.9	1054.126	1054.53	-0.4	Urban
2131	400929.5	607590.6	1054.171	1054.57	-0.4	Urban
2132	400929.2	607586.2	1054.284	1054.602	-0.322	Urban
2133	400929.1	607581.6	1054.389	1054.784	-0.394	Urban
2134	400929.1	607577.4	1054.391	1054.67	-0.28	Urban
2135	400933.8	607577.3	1054.358	1054.606	-0.246	Urban
2136	400934.6	607581.7	1054.315	1054.704	-0.394	Urban
2137	400934.5	607585.3	1054.302	1054.558	-0.258	Urban
2138	400935.2	607589.7	1054.232	1054.641	-0.411	Urban
2139	400935	607593.4	1054.114	1054.456	-0.346	Urban
2140	400939.5	607593.2	1054.108	1054.283	-0.173	Urban

<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2141	400939.1	607588.7	1054.147	1054.545	-0.395	Urban
2142	400938.9	607585.1	1054.204	1054.618	-0.418	Urban
2143	400938.6	607581.4	1054.315	1054.793	-0.482	Urban
2144	400938.1	607577.3	1054.318	1054.737	-0.417	Urban
2145	400943.5	607577.2	1054.235	1054.663	-0.433	Urban
2146	400943.7	607581.3	1054.19	1054.578	-0.388	Urban
2147	400944.1	607585.2	1054.166	1054.618	-0.448	Urban
2148	400944.4	607589.5	1054.084	1054.404	-0.324	Urban
2149	400944.3	607593.1	1054.064	1054.231	-0.171	Urban
2150	406704.4	600573.6	1047.442	1048.138	-0.698	Tall Grass
2151	406704.6	600578.2	1047.538	1047.945	-0.405	Tall Grass
2152	406705	600583	1047.411	1048.019	-0.609	Tall Grass
2153	406705.2	600586.9	1047.313	1047.95	-0.639	Tall Grass
2154	406705.3	600591.1	1047.142	1047.889	-0.749	Tall Grass
2155	406709.9	600591.5	1047.487	1047.979	-0.489	Tall Grass
2156	406710.2	600586.4	1047.405	1048.087	-0.677	Tall Grass
2157	406709.6	600580.7	1047.634	1048.191	-0.561	Tall Grass
2158	406708.9	600575.8	1047.455	1048.093	-0.643	Tall Grass
2159	406709.3	600571.3	1047.468	1048.166	-0.696	Tall Grass
2160	406714.5	600570.5	1047.922	1048.477	-0.557	Tall Grass
2161	406715.3	600575.6	1047.699	1048.423	-0.723	Tall Grass
2162	406715.7	600579.7	1047.809	1048.591	-0.781	Tall Grass
2163	406716.1	600584.1	1047.571	1048.196	-0.626	Tall Grass
2164	406715.9	600588.9	1047.469	1048.062	-0.592	Tall Grass
2165	406720.5	600589.7	1047.448	1048.226	-0.776	Tall Grass
2166	406721.4	600585.1	1047.705	1048.364	-0.664	Tall Grass
2167	406721.6	600580.5	1047.729	1048.622	-0.892	Tall Grass
2168	406721.4	600575.9	1047.681	1048.414	-0.734	Tall Grass
2169	406721.9	600571.1	1047.953	1048.544	-0.594	Tall Grass
2170	406726.9	600571.2	1047.988	1048.749	-0.759	Tall Grass
2171	406726.9	600575.8	1048.046	1048.603	-0.553	Tall Grass
2172	406726.9	600580.2	1047.963	1048.564	-0.604	Tall Grass
2173	406727.2	600584.7	1047.843	1048.59	-0.751	Tall Grass
2174	406726.7	600588.8	1047.814	1048.406	-0.596	Tall Grass
2175	396086.4	610711.6	1049.519	1049.946	-0.426	Low Grass
2176	396085.9	610706.4	1049.655	1050.056	-0.396	Low Grass
2177	396086.2	610700.6	1049.659	1050.079	-0.419	Low Grass
2178	396086.2	610695.2	1049.701	1050.022	-0.322	Low Grass
2179	396085.5	610689.9	1049.631	1049.915	-0.285	Low Grass
2180	396089.1	610690.1	1049.808	1050.173	-0.363	Low Grass
2181	396088.7	610695.1	1049.741	1050.101	-0.361	Low Grass
2182	396090.4	610700.3	1049.749	1050.134	-0.384	Low Grass
2183	396089.5	610705	1049.73	1050.026	-0.296	Low Grass
2184	396090.6	610709.6	1049.584	1049.911	-0.331	Low Grass
2185	396093.3	610709.7	1049.668	1049.975	-0.305	Low Grass
2186	396093.5	610705.2	1049.625	1050.049	-0.419	Low Grass
2187	396093	610699.9	1049.65	1050.191	-0.541	Low Grass
2188	396092.7	610694.4	1049.688	1050.161	-0.471	Low Grass
2189	396093.4	610690.1	1049.783	1050.055	-0.275	Low Grass
2190	396098.6	610690.5	1049.681	1050.032	-0.352	Low Grass
2191	396099	610695	1049.619	1050.076	-0.456	Low Grass

<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2192	396098.4	610699.6	1049.638	1049.993	-0.353	Low Grass
2193	396098.4	610705.4	1049.586	1049.807	-0.217	Low Grass
2194	396098.5	610711.1	1049.507	1050.02	-0.51	Low Grass
2195	396102.3	610711	1049.411	1049.791	-0.381	Low Grass
2196	396101.9	610705.1	1049.454	1049.767	-0.317	Low Grass
2197	396101.7	610699.4	1049.586	1050.051	-0.461	Low Grass
2198	396101.5	610694.5	1049.983	1049.914	0.066	Low Grass
2199	396101.7	610690.4	1049.575	1049.924	-0.354	Low Grass
2200	339336.5	611178.7	1135.993	1135.919	0.071	Low Grass
2201	339331.7	611178.9	1135.884	1135.783	0.097	Low Grass
2202	339327.6	611178.9	1135.838	1135.78	0.06	Low Grass
2203	339323.5	611178.9	1135.738	1135.736	0.004	Low Grass
2204	339319.8	611179.1	1135.676	1135.746	-0.066	Low Grass
2205	339320	611183.3	1135.765	1135.835	-0.065	Low Grass
2206	339324.7	611182.9	1135.797	1135.868	-0.068	Low Grass
2207	339327.9	611183.2	1135.868	1135.881	-0.011	Low Grass
2208	339331.5	611183.1	1135.902	1135.886	0.014	Low Grass
2209	339335.4	611183.4	1136.024	1136.013	0.007	Low Grass
2210	339335.8	611188.2	1136.059	1136.076	-0.016	Low Grass
2211	339331.6	611188	1136.01	1135.965	0.045	Low Grass
2212	339327.6	611188.4	1135.94	1135.891	0.049	Low Grass
2213	339323.5	611187.9	1135.893	1135.699	0.191	Low Grass
2214	339319.5	611187.8	1135.802	1135.747	0.053	Low Grass
2215	339319.2	611192.1	1135.816	1135.84	-0.021	Low Grass
2216	339323.7	611191.5	1135.935	1135.746	0.194	Low Grass
2217	339327.8	611191.8	1135.994	1136.006	-0.016	Low Grass
2218	339331.1	611192.1	1136.023	1135.991	0.029	Low Grass
2219	339334.5	611192.4	1136.05	1136.07	-0.02	Low Grass
2220	339336.2	611197	1136.089	1136.012	0.078	Low Grass
2221	339331.9	611196.9	1136.068	1136.01	0.06	Low Grass
2222	339327.9	611197.1	1135.964	1135.92	0.04	Low Grass
2223	339324.2	611197	1135.956	1135.756	0.204	Low Grass
2224	339320.5	611196.7	1135.889	1135.676	0.214	Low Grass
2225	339069.7	613800.7	1141	1141.136	-0.136	Urban
2226	339065.4	613801.1	1140.925	1140.723	0.207	Urban
2227	339061.1	613801.2	1140.842	1140.937	-0.097	Urban
2228	339056.6	613801.4	1140.767	1140.659	0.111	Urban
2229	339052.6	613801.6	1140.685	1140.508	0.182	Urban
2230	339052.8	613806.2	1140.797	1140.702	0.098	Urban
2231	339057.2	613806.1	1140.877	1140.866	0.014	Urban
2232	339061.2	613806.2	1140.97	1140.935	0.035	Urban
2233	339065.4	613805.9	1141.043	1141.001	0.039	Urban
2234	339069.8	613805.8	1141.167	1140.966	0.204	Urban
2235	339070	613810.7	1141.277	1141.335	-0.055	Urban
2236	339064.9	613811	1141.188	1141.065	0.125	Urban
2237	339060.7	613811.1	1141.12	1141.103	0.017	Urban
2238	339057.1	613811.1	1141.019	1141.026	-0.006	Urban
2239	339053.3	613811.2	1140.944	1140.822	0.118	Urban
2240	339053.8	613815.4	1141.033	1140.996	0.034	Urban
2241	339058.2	613815.2	1141.149	1141.185	-0.035	Urban
2242	339062.2	613815.3	1141.24	1141.295	-0.055	Urban

<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2243	339066.2	613815.2	1141.314	1141.248	0.062	Urban
2244	339070.1	613815.4	1141.387	1141.205	0.185	Urban
2245	339070.3	613820	1141.52	1141.345	0.175	Urban
2246	339065.7	613820.4	1141.438	1141.485	-0.045	Urban
2247	339061.6	613820.5	1141.35	1141.364	-0.014	Urban
2248	339057.8	613820.5	1141.279	1141.417	-0.137	Urban
2249	339053.8	613820.5	1141.218	1141.095	0.125	Urban
2250	332572.2	610713.3	1144.464	1145.06	-0.6	Tall Grass
2251	332572.1	610708.2	1144.575	1144.924	-0.354	Tall Grass
2252	332572.7	610704.3	1144.41	1144.568	-0.158	Tall Grass
2253	332572.8	610699.7	1144.374	1144.758	-0.388	Tall Grass
2254	332574	610695.9	1144.42	1144.611	-0.191	Tall Grass
2255	332578.1	610695.3	1144.324	1144.768	-0.448	Tall Grass
2256	332578.3	610700.6	1144.494	1144.805	-0.315	Tall Grass
2257	332578.1	610706.1	1144.489	1144.839	-0.349	Tall Grass
2258	332577.8	610710.5	1144.653	1144.962	-0.312	Tall Grass
2259	332577.8	610715.7	1144.71	1145.119	-0.409	Tall Grass
2260	332581.2	610716.4	1144.74	1144.961	-0.221	Tall Grass
2261	332581.3	610711.7	1144.478	1145.035	-0.555	Tall Grass
2262	332582	610706.7	1144.543	1144.798	-0.258	Tall Grass
2263	332582.6	610701.3	1144.763	1144.988	-0.228	Tall Grass
2264	332583.1	610697.5	1144.478	1144.64	-0.16	Tall Grass
2265	332587.9	610697.8	1144.416	1144.977	-0.557	Tall Grass
2266	332588.1	610702.7	1144.23	1144.589	-0.359	Tall Grass
2267	332588.5	610708.3	1144.421	1144.894	-0.474	Tall Grass
2268	332588.3	610713.3	1144.686	1145.005	-0.315	Tall Grass
2269	332588.8	610718.4	1144.795	1145.214	-0.414	Tall Grass
2270	332592.7	610719	1145.113	1145.353	-0.243	Tall Grass
2271	332593.8	610714.5	1144.882	1145.024	-0.144	Tall Grass
2272	332594.6	610710.9	1144.701	1144.739	-0.039	Tall Grass
2273	332594.9	610706.3	1144.52	1144.927	-0.407	Tall Grass
2274	332594.8	610701.6	1144.306	1145.106	-0.796	Tall Grass
2275	337864.7	604586.4	1099.54	1099.824	-0.284	Low Trees
2276	337864.5	604582.2	1099.533	1099.957	-0.427	Low Trees
2277	337864	604577.6	1099.491	1099.763	-0.273	Low Trees
2278	337863.8	604572.8	1099.354	1099.731	-0.381	Low Trees
2279	337863.7	604568.5	1099.535	1099.616	-0.076	Low Trees
2280	337858.7	604568.2	1099.603	1099.7	-0.1	Low Trees
2281	337859.3	604573.1	1099.529	1099.551	-0.021	Low Trees
2282	337859.1	604576.6	1099.55	1099.764	-0.214	Low Trees
2283	337859.7	604580.4	1099.695	1099.845	-0.155	Low Trees
2284	337859.1	604584.9	1099.726	1100.011	-0.281	Low Trees
2285	337854.4	604585.6	1099.732	1100.118	-0.388	Low Trees
2286	337854.2	604581.6	1099.823	1100.091	-0.272	Low Trees
2287	337853.9	604577.6	1099.653	1099.925	-0.275	Low Trees
2288	337853.5	604574.2	1099.693	1100.062	-0.372	Low Trees
2289	337853.3	604569.5	1099.634	1099.825	-0.195	Low Trees
2290	337847.8	604569.8	1099.864	1100.061	-0.201	Low Trees
2291	337848.2	604574.1	1099.753	1100.031	-0.281	Low Trees
2292	337848.1	604577.9	1099.864	1100.258	-0.398	Low Trees
2293	337847.7	604581.3	1099.88	1100.34	-0.46	Low Trees

<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2294	337847.7	604584.9	1099.9	1100.482	-0.582	Low Trees
2295	337843	604585.6	1099.993	1100.388	-0.398	Low Trees
2296	337842.5	604582.4	1100.031	1100.326	-0.296	Low Trees
2297	337841.8	604577.6	1099.917	1100.429	-0.509	Low Trees
2298	337841.2	604573.3	1099.814	1100.164	-0.354	Low Trees
2299	337840.8	604568.2	1099.832	1100.058	-0.228	Low Trees
2300	338626.4	519482.8	859.25	859.527	-0.277	Urban
2301	338628.4	519479.7	859.202	859.242	-0.04	Urban
2302	338630.4	519476.3	859.189	859.452	-0.263	Urban
2303	338632.6	519473.4	859.195	859.446	-0.251	Urban
2304	338634.7	519469.9	859.237	859.331	-0.094	Urban
2305	338638.2	519472.1	859.396	859.566	-0.17	Urban
2306	338636.3	519475.1	859.353	859.564	-0.211	Urban
2307	338634.5	519477.9	859.358	859.405	-0.047	Urban
2308	338632.4	519480.9	859.35	859.552	-0.202	Urban
2309	338630.1	519484.5	859.248	859.58	-0.332	Urban
2310	338633.3	519487.4	859.413	859.623	-0.21	Urban
2311	338635.1	519484.6	859.426	859.456	-0.03	Urban
2312	338637	519481.5	859.454	859.673	-0.219	Urban
2313	338639	519478.4	859.537	859.762	-0.225	Urban
2314	338641.5	519474.8	859.514	859.781	-0.267	Urban
2315	338644.9	519477.2	859.637	859.827	-0.19	Urban
2316	338643.2	519480.4	859.643	859.872	-0.229	Urban
2317	338641.1	519483.5	859.632	859.846	-0.214	Urban
2318	338639	519486.8	859.616	859.746	-0.13	Urban
2319	338637	519490	859.58	859.927	-0.347	Urban
2320	338640.4	519491.8	859.743	859.863	-0.12	Urban
2321	338642.7	519489.4	859.751	859.903	-0.152	Urban
2322	338644.7	519486.2	859.752	859.877	-0.125	Urban
2323	338646.9	519482.8	859.78	860.033	-0.253	Urban
2324	338649.3	519479.1	859.812	859.941	-0.129	Urban
2325	339475.2	520390.6	871.142	871.339	-0.197	Tall Grass
2326	339477.4	520391	871.218	871.334	-0.116	Tall Grass
2327	339480.7	520391.5	871.146	871.3	-0.154	Tall Grass
2328	339483.8	520392	871.019	871.226	-0.207	Tall Grass
2329	339487.1	520392.7	871	871.125	-0.125	Tall Grass
2330	339487.9	520389.9	871.148	871.359	-0.211	Tall Grass
2331	339484.8	520389.2	871.028	871.221	-0.193	Tall Grass
2332	339481.7	520388.9	871.087	871.261	-0.174	Tall Grass
2333	339478.3	520388.4	871.159	871.391	-0.232	Tall Grass
2334	339475.1	520388	871.058	871.262	-0.204	Tall Grass
2335	339475.8	520384.5	871.133	871.17	-0.037	Tall Grass
2336	339479.4	520385.3	871.235	871.387	-0.152	Tall Grass
2337	339482.5	520385.7	871.077	871.262	-0.185	Tall Grass
2338	339485.8	520386.1	871.067	871.124	-0.057	Tall Grass
2339	339489.4	520386.6	871.089	871.381	-0.292	Tall Grass
2340	339490.1	520383.3	871.095	871.383	-0.288	Tall Grass
2341	339486.9	520382.8	871.087	871.303	-0.216	Tall Grass
2342	339483.3	520382.4	871.007	871.102	-0.095	Tall Grass
2343	339480.2	520381.8	871.064	871.221	-0.157	Tall Grass
2344	339477	520381.5	871.137	871.225	-0.088	Tall Grass

<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2345	339478.5	520378.1	870.997	871.067	-0.07	Tall Grass
2346	339481.3	520378.6	871.005	871.2	-0.195	Tall Grass
2347	339484.4	520379.5	871.023	871.089	-0.066	Tall Grass
2348	339487.4	520379.7	871.014	871.23	-0.216	Tall Grass
2349	339491.1	520379.7	871.093	871.389	-0.296	Tall Grass
2350	339274.2	520399.4	869.233	869.499	-0.266	Low Trees
2351	339275.5	520402.4	869.309	869.431	-0.122	Low Trees
2352	339277.1	520405.8	869.257	869.538	-0.281	Low Trees
2353	339278	520409.2	869.191	869.63	-0.439	Low Trees
2354	339279.2	520411.9	869.149	869.644	-0.495	Low Trees
2355	339277.2	520412.9	869.235	869.857	-0.622	Low Trees
2356	339275.6	520409.9	869.187	869.835	-0.648	Low Trees
2357	339274.3	520407.2	869.284	869.757	-0.473	Low Trees
2358	339272.6	520403.8	869.254	869.443	-0.189	Low Trees
2359	339270.7	520400.6	869.298	869.494	-0.196	Low Trees
2360	339267.9	520400.8	869.25	869.555	-0.305	Low Trees
2361	339270.3	520404.5	869.243	869.632	-0.389	Low Trees
2362	339271.9	520407.2	869.398	870.243	-0.845	Low Trees
2363	339273	520410.1	869.364	870.347	-0.983	Low Trees
2364	339274.5	520412.3	869.294	870.206	-0.912	Low Trees
2365	339272	520412.8	869.172	870.744	-1.572	Low Trees
2366	339270.6	520410.9	869.448	870.912	-1.464	Low Trees
2367	339269.7	520408.8	869.3	870.547	-1.247	Low Trees
2368	339267.6	520406.6	869.324	870.172	-0.848	Low Trees
2369	339266.3	520402.8	869.209	869.648	-0.439	Low Trees
2370	339262.7	520403.1	869.285	869.784	-0.499	Low Trees
2371	339264.5	520405.9	869.38	870.091	-0.711	Low Trees
2372	339265.6	520411	869.819	870.15	-0.331	Low Trees
2373	339267.1	520413.2	869.57	870.261	-0.691	Low Trees
2374	339267.9	520415.7	869.727	870.357	-0.63	Low Trees
2375	343482.4	518470.2	887.563	887.669	-0.106	Low Grass
2376	343479.7	518470.5	887.66	887.451	0.209	Low Grass
2377	343476.4	518470.8	887.65	887.69	-0.04	Low Grass
2378	343472.9	518471	887.665	887.654	0.011	Low Grass
2379	343469.3	518470.9	887.616	887.674	-0.058	Low Grass
2380	343469.1	518467.5	887.534	887.625	-0.091	Low Grass
2381	343472.1	518467.6	887.657	887.652	0.005	Low Grass
2382	343475.4	518467.4	887.611	887.703	-0.092	Low Grass
2383	343478.9	518467.5	887.66	887.598	0.062	Low Grass
2384	343482.3	518467.5	887.576	887.643	-0.067	Low Grass
2385	343482.7	518464	887.546	887.554	-0.008	Low Grass
2386	343479.2	518464	887.6	887.51	0.09	Low Grass
2387	343476.2	518463.8	887.571	887.552	0.019	Low Grass
2388	343472.7	518463.7	887.63	887.489	0.141	Low Grass
2389	343469.2	518463.5	887.581	887.578	0.003	Low Grass
2390	343469.1	518459.9	887.586	887.574	0.012	Low Grass
2391	343472.2	518459.9	887.623	887.631	-0.008	Low Grass
2392	343475.4	518460	887.614	887.615	-0.001	Low Grass
2393	343478.9	518460	887.584	887.626	-0.042	Low Grass
2394	343482.5	518460	887.595	887.665	-0.07	Low Grass

Number	Easting	Northing	Known Z	Laser Z	Delta Z	Landcover Type
2395	343482.9	518456.3	887.653	887.564	0.089	Low Grass
2396	343479.6	518456	887.659	887.598	0.061	Low Grass
2397	343476.2	518455.6	887.612	887.562	0.05	Low Grass
2398	343473	518455.4	887.645	887.596	0.049	Low Grass
2399	343469.4	518455.5	887.558	887.575	-0.017	Low Grass
2400	350350.2	510872	743.293	742.933	0.36	Tall Trees
2401	350347.4	510873.8	743.274	743.36	-0.086	Tall Trees
2402	350344.2	510875.7	743.3	743.464	-0.164	Tall Trees
2403	350341.4	510877.6	743.336	743.357	-0.021	Tall Trees
2404	350337.9	510879.5	743.368	743.25	0.118	Tall Trees
2405	350336.5	510877.3	743.503	743.274	0.229	Tall Trees
2406	350339.4	510875.6	743.396	743.366	0.03	Tall Trees
2407	350342.6	510874.1	743.326	743.46	-0.134	Tall Trees
2408	350345.4	510872.9	743.351	743.492	-0.141	Tall Trees
2409	350349	510872	743.219	743.201	0.018	Tall Trees
2410	350347.3	510869.3	743.361	743.216	0.145	Tall Trees
2411	350344.7	510871	743.374	743.599	-0.225	Tall Trees
2412	350341.9	510872.7	743.5	743.493	0.007	Tall Trees
2413	350338.9	510874.6	743.469	743.378	0.091	Tall Trees
2414	350336.2	510876.7	743.462	743.28	0.182	Tall Trees
2415	350332.2	510874.7	743.633	743.269	0.364	Tall Trees
2416	350334.8	510874	743.547	743.281	0.266	Tall Trees
2417	350337.5	510871.8	743.547	743.483	0.064	Tall Trees
2418	350340.9	510870.1	743.518	743.598	-0.08	Tall Trees
2419	350344.7	510867.5	743.428	743.735	-0.307	Tall Trees
2420	350343.8	510865.2	743.601	743.731	-0.13	Tall Trees
2421	350341	510866.6	743.828	743.333	0.495	Tall Trees
2422	350337.7	510868.3	743.81	742.878	0.932	Tall Trees
2423	350334.6	510870.3	743.544	743.112	0.432	Tall Trees
2424	350331.5	510872.3	743.644	743.343	0.3	Tall Trees
2425	403539.1	569630.3	991.935	992.242	-0.307	Tall Trees
2426	403536.2	569629.3	991.929	992.299	-0.37	Tall Trees
2427	403532.9	569627.9	991.979	992.388	-0.409	Tall Trees
2428	403529.7	569626.9	991.751	992.482	-0.731	Tall Trees
2429	403526.3	569625.9	991.843	992.563	-0.72	Tall Trees
2430	403527.1	569624.5	991.881	992.429	-0.548	Tall Trees
2431	403529.6	569625.2	991.749	992.399	-0.65	Tall Trees
2432	403533.4	569626.2	991.951	992.429	-0.478	Tall Trees
2433	403536.7	569627.3	992.08	992.328	-0.248	Tall Trees
2434	403540.4	569628.6	991.924	992.019	-0.095	Tall Trees
2435	403541.2	569626.6	991.959	992.374	-0.415	Tall Trees
2436	403537.5	569625.5	991.87	992.412	-0.542	Tall Trees
2437	403534.5	569624.5	991.855	992.471	-0.616	Tall Trees
2438	403531.2	569623.9	991.826	992.339	-0.513	Tall Trees
2439	403527.2	569621.8	991.766	992.365	-0.599	Tall Trees
2440	403528.6	569620.1	991.911	992.489	-0.578	Tall Trees
2441	403532	569621.2	991.894	992.66	-0.766	Tall Trees
2442	403535	569622.4	992.165	992.434	-0.269	Tall Trees
2443	403538	569624	991.99	992.483	-0.493	Tall Trees
2444	403540.7	569624.1	992.2	992.39	-0.19	Tall Trees
2445	403541.5	569620.5	992.201	992.736	-0.535	Tall Trees

<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2446	403538.1	569620.2	992.116	992.602	-0.486	Tall Trees
2447	403535.5	569618.4	992.118	993.032	-0.914	Tall Trees
2448	403532.2	569618.4	991.836	992.844	-1.008	Tall Trees
2449	403530.2	569617	991.86	992.418	-0.558	Tall Trees
2450	401273.5	595460.4	1070.562	1071.661	-1.101	Tall Trees
2451	401276.4	595460.8	1070.813	1071.924	-1.114	Tall Trees
2452	401279.7	595461	1071	1071.917	-0.917	Tall Trees
2453	401283	595461.3	1071.228	1071.711	-0.481	Tall Trees
2454	401286.5	595461.5	1071.455	1072.263	-0.813	Tall Trees
2455	401286.5	595458.9	1071.386	1072.376	-0.986	Tall Trees
2456	401283.3	595458.7	1071.252	1071.966	-0.716	Tall Trees
2457	401279.7	595458.4	1070.966	1071.645	-0.675	Tall Trees
2458	401276.4	595458.7	1070.859	1071.544	-0.684	Tall Trees
2459	401273.8	595457.7	1070.664	1071.156	-0.496	Tall Trees
2460	401273.6	595454.9	1070.652	1071.433	-0.783	Tall Trees
2461	401276.7	595454.8	1070.848	1071.361	-0.511	Tall Trees
2462	401279.6	595454.9	1071.006	1071.435	-0.425	Tall Trees
2463	401283.1	595455	1071.084	1071.408	-0.328	Tall Trees
2464	401286.6	595454.9	1071.377	1071.78	-0.4	Tall Trees
2465	401286.9	595452.7	1071.282	1071.883	-0.603	Tall Trees
2466	401283.8	595452.6	1071.076	1071.661	-0.581	Tall Trees
2467	401279.8	595453.5	1070.905	1071.44	-0.53	Tall Trees
2468	401276.6	595453.9	1070.753	1071.453	-0.703	Tall Trees
2469	401273.2	595453.2	1070.626	1071.576	-0.946	Tall Trees
2470	401273.2	595450.5	1070.568	1071.695	-1.125	Tall Trees
2471	401276.5	595450.4	1070.727	1071.853	-1.123	Tall Trees
2472	401280.2	595449.4	1070.879	1071.593	-0.713	Tall Trees
2473	401283.8	595449.9	1071.004	1071.798	-0.798	Tall Trees
2474	401287.5	595449.8	1071.167	1072.269	-1.099	Tall Trees
2475	332743.6	608070.8	1134.574	1134.901	-0.331	Tall Trees
2476	332745.7	608067.9	1134.75	1135.123	-0.373	Tall Trees
2477	332747.5	608065.7	1134.598	1134.824	-0.224	Tall Trees
2478	332749.4	608063.5	1133.971	1134.547	-0.577	Tall Trees
2479	332751.4	608061.7	1133.948	1134.267	-0.317	Tall Trees
2480	332752.8	608063	1133.69	1134.37	-0.68	Tall Trees
2481	332750.8	608065.7	1134.263	1134.638	-0.378	Tall Trees
2482	332748.2	608068.7	1134.787	1134.986	-0.195	Tall Trees
2483	332746.3	608071.2	1134.87	1135.038	-0.168	Tall Trees
2484	332744.4	608073.5	1134.449	1134.886	-0.436	Tall Trees
2485	332747	608075.1	1134.661	1135.143	-0.483	Tall Trees
2486	332748.8	608073	1134.899	1135.276	-0.376	Tall Trees
2487	332750.8	608070.3	1134.869	1135.063	-0.193	Tall Trees
2488	332753	608067.5	1134.136	1134.214	-0.074	Tall Trees
2489	332755.1	608063.8	1133.755	1133.97	-0.21	Tall Trees
2490	332757.4	608065.2	1133.629	1133.884	-0.254	Tall Trees
2491	332755.5	608068.9	1133.987	1134.299	-0.309	Tall Trees
2492	332753.2	608072	1134.95	1134.899	0.051	Tall Trees
2493	332750.8	608075.1	1135.011	1135.323	-0.313	Tall Trees
2494	332748.5	608078	1135.188	1135.118	0.072	Tall Trees
2495	332751.1	608078.6	1135.19	1135.293	-0.103	Tall Trees
2496	332753.1	608075.9	1135.125	1135.629	-0.499	Tall Trees

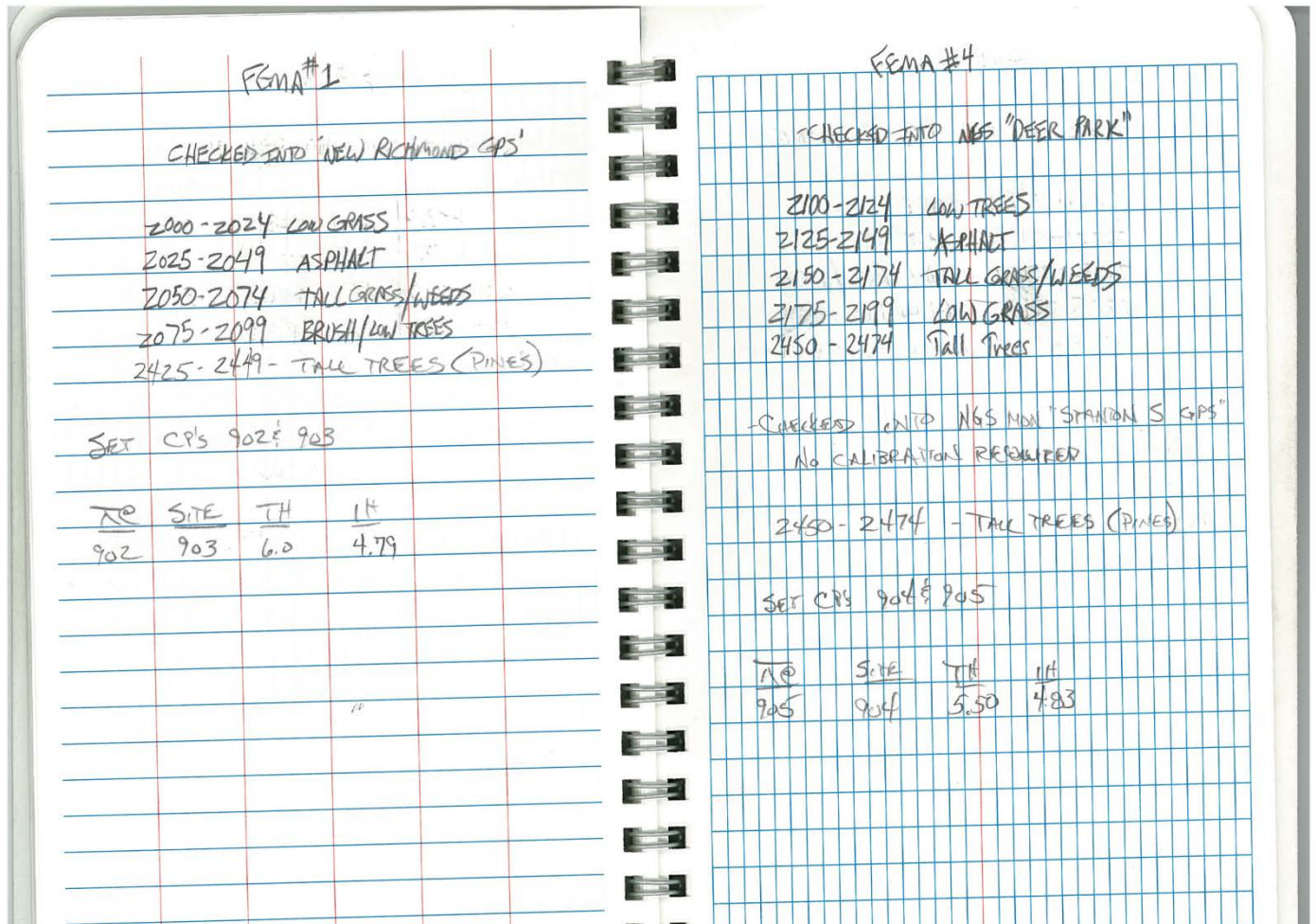
<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2497	332755.2	608073.1	1135.032	1134.913	0.117	Tall Trees
2498	332757.9	608070.4	1134.05	1134.364	-0.314	Tall Trees
2499	332760.4	608066.8	1133.703	1134.008	-0.308	Tall Trees
2500	305296.9	656131.2	1226.638	1226.545	0.095	Low Trees
2501	305299.9	656131.3	1226.481	1226.451	0.028	Low Trees
2502	305303.5	656130.8	1226.263	1226.234	0.026	Low Trees
2503	305307.1	656130.9	1226.252	1225.978	0.272	Low Trees
2504	305310.6	656131	1226.08	1225.758	0.322	Low Trees
2505	305309.8	656128.2	1226.049	1225.889	0.161	Low Trees
2506	305307.9	656127.6	1226.074	1226.064	0.006	Low Trees
2507	305304.8	656126.9	1226.214	1226.182	0.028	Low Trees
2508	305301.3	656126.3	1226.388	1226.369	0.021	Low Trees
2509	305298	656125.8	1226.509	1226.428	0.082	Low Trees
2510	305298.7	656122.7	1226.637	1226.528	0.112	Low Trees
2511	305301.1	656123	1226.486	1226.425	0.065	Low Trees
2512	305304.3	656123.2	1226.342	1226.278	0.062	Low Trees
2513	305307.5	656123.4	1226.239	1226.179	0.061	Low Trees
2514	305310	656123.7	1226.156	1226.176	-0.016	Low Trees
2515	305310.4	656121.2	1226.018	1226.031	-0.011	Low Trees
2516	305307.2	656120.6	1225.962	1226.082	-0.122	Low Trees
2517	305304.2	656120.7	1226.231	1226.377	-0.147	Low Trees
2518	305300.9	656120.4	1226.531	1226.553	-0.023	Low Trees
2519	305297.8	656120.2	1226.798	1226.64	0.16	Low Trees
2520	305297.4	656118.1	1226.857	1226.712	0.148	Low Trees
2521	305300.7	656118	1226.509	1226.43	0.08	Low Trees
2522	305303.7	656118.3	1226.245	1226.374	-0.134	Low Trees
2523	305307.4	656118.5	1226.033	1226.09	-0.06	Low Trees
2524	305310.6	656118.8	1225.849	1225.895	-0.045	Low Trees
2525	306252.7	656006.4	1179.608	1179.834	-0.224	Urban
2526	306249.8	656006.5	1179.642	1179.733	-0.093	Urban
2527	306246.5	656006.5	1179.691	1179.81	-0.12	Urban
2528	306243	656006.7	1179.79	1179.771	0.019	Urban
2529	306239.5	656006.6	1179.898	1180.031	-0.131	Urban
2530	306239.3	656009.4	1179.987	1180.249	-0.259	Urban
2531	306242.2	656009.5	1179.901	1180.127	-0.227	Urban
2532	306245.1	656009.3	1179.802	1179.983	-0.183	Urban
2533	306248.2	656009.4	1179.758	1179.885	-0.125	Urban
2534	306251.2	656009.1	1179.685	1179.893	-0.203	Urban
2535	306253.7	656008.7	1179.662	1179.794	-0.134	Urban
2536	306254.4	656011.8	1179.735	1179.697	0.033	Urban
2537	306251.5	656012.4	1179.813	1179.81	0	Urban
2538	306248.5	656012.9	1179.866	1179.745	0.125	Urban
2539	306245.5	656013.5	1179.947	1179.908	0.042	Urban
2540	306242.3	656014.6	1180.075	1180.125	-0.055	Urban
2541	306242.3	656017.1	1180.135	1180.151	-0.011	Urban
2542	306245.4	656016.8	1180.083	1180.189	-0.109	Urban
2543	306248.3	656016.3	1180.007	1180.156	-0.146	Urban
2544	306251.4	656016.1	1179.943	1180.085	-0.145	Urban
2545	306254	656015.9	1179.901	1180.065	-0.165	Urban
2546	306254.9	656018.9	1179.997	1180.212	-0.212	Urban
2547	306251.9	656020	1180.053	1180.068	-0.018	Urban

<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2548	306249	656020.9	1180.126	1180.157	-0.027	Urban
2549	306245.5	656021.4	1180.222	1180.244	-0.024	Urban
2550	310662.4	658580.1	1178.733	1178.759	-0.029	Low Grass
2551	310663.3	658582.8	1178.776	1178.94	-0.16	Low Grass
2552	310664.4	658586.1	1178.821	1179.007	-0.187	Low Grass
2553	310665.4	658589.4	1178.777	1178.876	-0.096	Low Grass
2554	310666.5	658592.7	1178.8	1178.784	0.016	Low Grass
2555	310663.9	658593.9	1178.617	1178.735	-0.115	Low Grass
2556	310663.1	658590.8	1178.66	1178.682	-0.022	Low Grass
2557	310662.2	658587.5	1178.765	1178.894	-0.124	Low Grass
2558	310661.4	658584.2	1178.622	1178.878	-0.258	Low Grass
2559	310660.6	658580.8	1178.652	1178.73	-0.08	Low Grass
2560	310657.4	658580.8	1178.458	1178.634	-0.174	Low Grass
2561	310657.5	658584.4	1178.466	1178.487	-0.017	Low Grass
2562	310657.9	658587.7	1178.54	1178.601	-0.061	Low Grass
2563	310658.6	658590.7	1178.596	1178.579	0.021	Low Grass
2564	310659.4	658594.5	1178.577	1178.692	-0.112	Low Grass
2565	310656	658595.1	1178.42	1178.598	-0.178	Low Grass
2566	310655.4	658592.2	1178.4	1178.475	-0.075	Low Grass
2567	310655	658588.9	1178.38	1178.393	-0.013	Low Grass
2568	310653.8	658585.3	1178.335	1178.499	-0.169	Low Grass
2569	310652.9	658581.7	1178.353	1178.491	-0.141	Low Grass
2570	310649.5	658582.3	1178.077	1178.244	-0.164	Low Grass
2571	310649.7	658585.5	1178.118	1178.279	-0.159	Low Grass
2572	310650	658588.8	1178.119	1178.362	-0.242	Low Grass
2573	310650	658592	1178.138	1178.324	-0.184	Low Grass
2574	310650	658595.5	1178.159	1178.354	-0.194	Low Grass
2575	310344	661410.7	1129.015	1129.126	-0.106	Tall Grass
2576	310345.3	661413.5	1128.964	1129.024	-0.064	Tall Grass
2577	310346.6	661416.6	1128.814	1128.991	-0.181	Tall Grass
2578	310347.6	661419.8	1128.762	1128.873	-0.113	Tall Grass
2579	310348.6	661422.9	1128.78	1128.891	-0.111	Tall Grass
2580	310345.7	661424	1128.569	1128.671	-0.101	Tall Grass
2581	310344.4	661420.6	1128.626	1128.594	0.036	Tall Grass
2582	310343.1	661417.5	1128.755	1128.843	-0.083	Tall Grass
2583	310342.3	661414.3	1128.818	1128.9	-0.08	Tall Grass
2584	310340.7	661410.5	1129.081	1129.163	-0.083	Tall Grass
2585	310338.1	661410.5	1129.173	1129.267	-0.097	Tall Grass
2586	310339	661413.6	1128.865	1128.999	-0.139	Tall Grass
2587	310340.4	661416.7	1128.702	1128.953	-0.253	Tall Grass
2588	310341.5	661420.2	1128.75	1128.808	-0.058	Tall Grass
2589	310342.8	661423.6	1128.616	1128.693	-0.073	Tall Grass
2590	310340.2	661425.4	1128.545	1128.726	-0.176	Tall Grass
2591	310337.9	661423	1128.625	1128.655	-0.025	Tall Grass
2592	310336	661420.4	1128.675	1128.813	-0.133	Tall Grass
2593	310333.6	661417.6	1128.927	1129.1	-0.17	Tall Grass
2594	310331.1	661414.9	1129.137	1129.351	-0.211	Tall Grass
2595	310328.3	661415.9	1128.953	1129.399	-0.449	Tall Grass
2596	310329.5	661419.1	1129.094	1129.175	-0.085	Tall Grass
2597	310330.8	661422.2	1128.795	1128.944	-0.144	Tall Grass
2598	310332.6	661425.3	1128.461	1128.599	-0.139	Tall Grass

<i>Number</i>	<i>Easting</i>	<i>Northing</i>	<i>Known Z</i>	<i>Laser Z</i>	<i>Delta Z</i>	<i>Landcover Type</i>
2599	310334.2	661428.6	1128.28	1128.427	-0.147	Tall Grass
2600	300936.3	652528.8	1135.945	1136.547	-0.607	Tall Trees
2601	300938.9	652527.5	1135.897	1136.44	-0.54	Tall Trees
2602	300941.8	652526.8	1135.836	1136.042	-0.202	Tall Trees
2603	300945.1	652525.3	1135.493	1135.706	-0.216	Tall Trees
2604	300947.9	652524.1	1135.302	1135.521	-0.221	Tall Trees
2605	300946.8	652521.3	1134.884	1135.27	-0.39	Tall Trees
2606	300944	652523.2	1135.221	1135.539	-0.319	Tall Trees
2607	300940.5	652524.8	1135.504	1135.974	-0.474	Tall Trees
2608	300937.8	652526.1	1135.728	1136.401	-0.671	Tall Trees
2609	300935.1	652527	1135.9	1136.66	-0.76	Tall Trees
2610	300934	652525	1135.587	1136.309	-0.719	Tall Trees
2611	300936.6	652523.7	1135.444	1136.192	-0.753	Tall Trees
2612	300938.9	652522.3	1135.222	1135.896	-0.676	Tall Trees
2613	300941.8	652520.7	1134.867	1135.416	-0.546	Tall Trees
2614	300944.5	652519.2	1134.721	1135.13	-0.41	Tall Trees
2615	300943.2	652517.1	1134.484	1135.011	-0.531	Tall Trees
2616	300940	652518.9	1134.716	1135.236	-0.516	Tall Trees
2617	300937.4	652520.1	1134.876	1135.422	-0.542	Tall Trees
2618	300933.9	652522.2	1135.269	1135.551	-0.281	Tall Trees
2619	300931.4	652523.4	1135.408	1136.019	-0.608	Tall Trees
2620	300930.3	652521.1	1135.144	1135.644	-0.504	Tall Trees
2621	300933.2	652519.9	1134.971	1135.383	-0.413	Tall Trees
2622	300936	652518.8	1134.831	1135.386	-0.556	Tall Trees
2623	300939.3	652517.1	1134.571	1135.064	-0.494	Tall Trees
2624	300941.9	652516.4	1134.489	1134.949	-0.459	Tall Trees

Field Notes

Project FEMA ground survey notes
 Contains point number and descriptions
 Includes Control and Check Points not included in statistical analysis



FEMA #2				FEMA #3			
- CHECKED INTO NSS "BALDWIN GPS"				- CHECKED INTO NGS MON "HUDSON GPS"			
- PERFORMED 1 PT VERTICAL CALIBRATION							
2200-2224	LOW GRASS			2300-2324	ASPHALT		
2225-2249	ASPHALT			2325-2349	TALL GRASS/WEEDES		
2250-2274	TALL GRASS/WEEDES			2350-2374	LOW TREES/BRUSH		
2275-2299	BRUSH/LOW TREES			2375-2399	MOWED GRASS		
2475-2499	TALL TREES (PINES)			2400-2424	TALL TREES/PINES		
SET CP'S 906 & 907				- SET CP'S 900 & 901			
NO	SITE	TH	IH	NO	SITE	TH	IH
906	907	6.0	4.77	901	900	6.0	5.02

FEMA #5			
- CHECKED INTO NGS MON "SPRING VALLEY GPS"			
- NO CALIBRATION REQUIRED			
2500-2524	LOW TREES		
2525-2549	ASPHALT		
2550-2574	MOWED GRASS		
2575-2599	TALL GRASS/WEEDES		
2600-2624	TALL TREES (PINES)		
SET CP'S 908 & 909			
NO	SITE	TH	IH
908	909	6.00	4.62

Field Photos

Identify land cover types present at each survey location





FEMA Location #1 - Low Trees



FEMA Location #1 - Tall Trees



FEMA Location #1 - Tall Grass



FEMA Location #2 - Urban







FEMA Location #3 - Urban



FEMA Location #3 - Low Trees











FEMA Location #5 - Urban



FEMA Location #5 – Tall Trees



