

# ***GROUND CONTROL SURVEY REPORT***

**GPS SURVEY  
FOR LIDAR CONTROL**

**VERNON COUNTY, WI WROC LIDAR SURVEY**

**VERNON COUNTY, WISCONSIN**

*Services provided by:*

**AYRES**  

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**ASSOCIATES**

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## **ABSTRACT**

This report documents the GPS ground surveys conducted in support of FEMA accuracy testing of the lidar data collection for Vernon County, Wisconsin, in 2010. Surveys were conducted at 5 sites utilizing the base stations established in the static network. These surveys established “ground truth” data at each site on different surface types, including bare earth, low grass, brush lands, low trees, forest, high grass, weeds, crops, 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.

## **SAMPLE POINTS/TEST POINTS**

The ground survey test points were distributed and categorized into sites as shown in the Test Survey Locations map on the next page.

## **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.

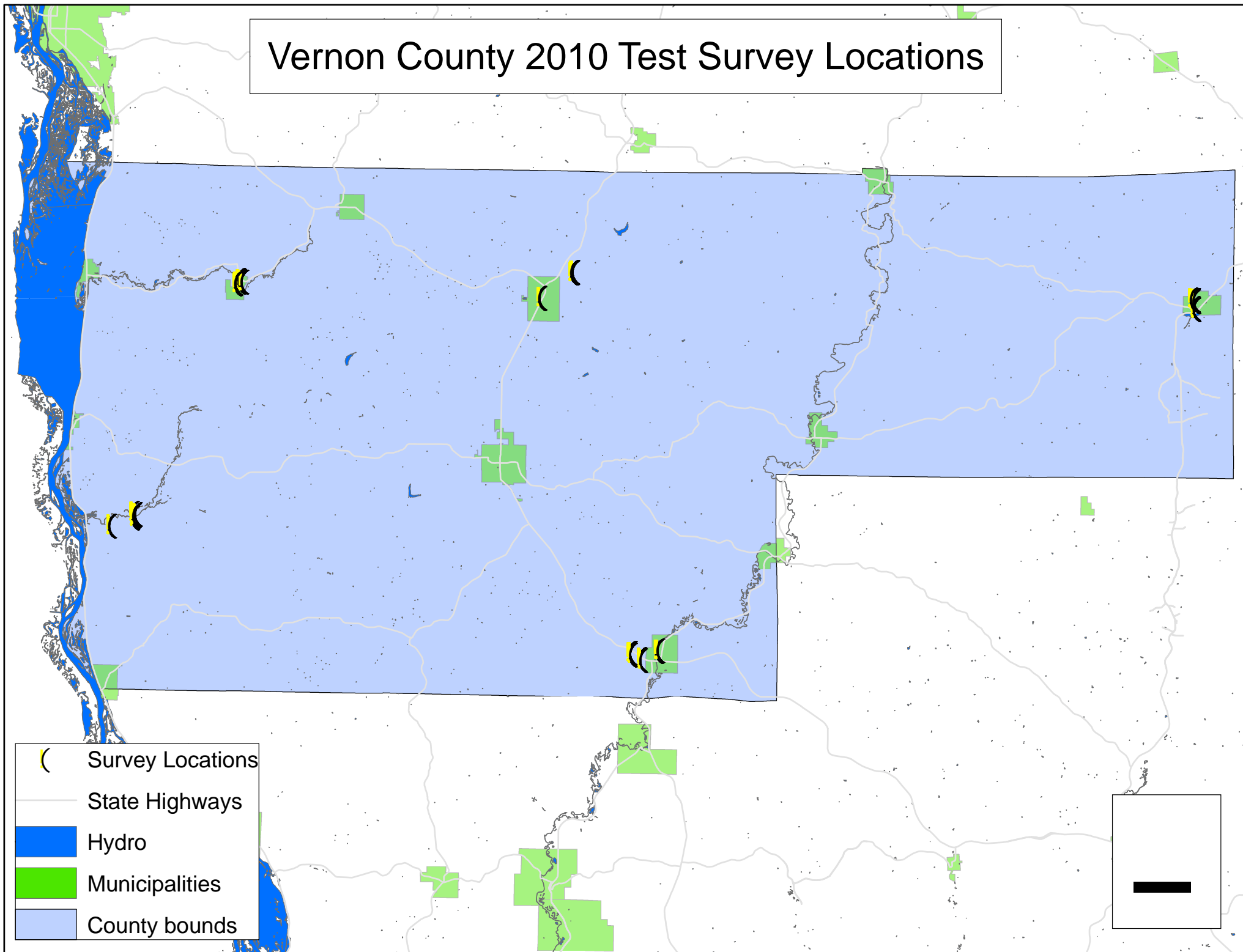
The ground control survey results were imported into an ESRI Pointz shapefile with each point’s information as attributes. The utility then accessed the lidar and generated a triangulated irregular network (TIN), which is a continuous digital terrain surface, using the bare-earth lidar points and the 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 ground survey versus lidar model values indicates a vertical root mean square error (RMSEz) of 0.299 feet. This is within the FEMA specified vertical accuracy tolerance of 0.6. This RMSEz equates to a tested 0.586 feet vertical accuracy at 95% confidence level.

# Vernon County 2010 Test Survey Locations



**GROUND TRUTH ANALYSIS**  
Comparison of Lidar Points to Ground-Truth Points  
Vernon County Coordinate System WISCRS  
NAD 83 HARN / NAVD 88, survey feet

Field definitions

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

X, Y, and Z – The coordinates that describe the point's horizontal and vertical location within the Vernon County WISCRS Coordinate System. The X and Y values are shared between the ground control points and lidar comparison points. The Z 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

Delta Z Squared – The value of squaring Delta Z

Land Cover – The predominant land cover category at the location of the survey point

Statistic definitions

Sum – The sum of the analysis' Delta Z Squared values

Average – The average of the analysis' Delta Z Squared values

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

Accuracyz – The product of multiplying the RMSE with 1.96, a conversion between the RMSE value and a value with a 95% confidence level

Name	X	Y	Z	Delta Z	Delta Z Squared	Classification
20011	847063.340	184431.250	1000.670	-0.131	0.017	bare earth and low grass
20012	847061.990	184429.740	1000.690	-0.070	0.005	bare earth and low grass
20013	847060.400	184427.990	1000.660	-0.106	0.011	bare earth and low grass
20014	847062.570	184426.640	1000.710	-0.036	0.001	bare earth and low grass
20015	847063.910	184429.130	1000.730	-0.036	0.001	bare earth and low grass
20016	847059.820	184424.250	1000.560	-0.147	0.022	bare earth and low grass
20017	847058.040	184422.220	1000.570	0.095	0.009	bare earth and low grass
20018	847055.060	184423.850	1000.510	-0.086	0.007	bare earth and low grass
20019	847059.070	184419.980	1000.420	-0.213	0.045	bare earth and low grass
20020	847060.980	184422.090	1000.590	-0.114	0.013	bare earth and low grass
20021	847062.720	184424.220	1000.590	-0.167	0.028	bare earth and low grass
20022	847064.480	184426.300	1000.690	-0.019	0.000	bare earth and low grass
20023	847065.850	184428.060	1000.820	0.091	0.008	bare earth and low grass
20024	847067.800	184425.960	1000.760	-0.093	0.009	bare earth and low grass
20025	847066.130	184424.100	1000.680	0.010	0.000	bare earth and low grass
20026	847064.640	184422.170	1000.590	-0.013	0.000	bare earth and low grass
20027	847063.120	184420.370	1000.580	-0.069	0.005	bare earth and low grass
20028	847061.590	184418.550	1000.450	-0.157	0.025	bare earth and low grass
20029	847063.450	184417.140	1000.470	-0.080	0.006	bare earth and low grass
20030	847065.430	184418.870	1000.530	0.019	0.000	bare earth and low grass
20031	847067.030	184420.940	1000.630	-0.055	0.003	bare earth and low grass
20032	847068.480	184422.900	1000.690	-0.107	0.011	bare earth and low grass
20033	847070.010	184424.920	1000.780	-0.075	0.006	bare earth and low grass
20034	847208.780	184109.020	985.320	0.100	0.010	urban
20035	847210.390	184107.430	985.210	-0.044	0.002	urban
20036	847211.890	184106.040	985.200	0.000	0.000	urban
20037	847213.370	184104.350	985.230	0.148	0.022	urban
20038	847215.020	184102.880	985.160	0.049	0.002	urban
20039	847216.850	184104.910	985.290	0.102	0.010	urban
20040	847215.040	184106.600	985.310	0.099	0.010	urban
20041	847213.410	184107.980	985.320	0.029	0.001	urban
20042	847211.860	184109.340	985.400	0.033	0.001	urban
20043	847210.320	184110.690	985.420	0.116	0.013	urban
20044	847212.020	184112.350	985.520	0.020	0.000	urban
20045	847213.960	184110.490	985.470	0.057	0.003	urban
20046	847215.520	184109.040	985.400	0.037	0.001	urban
20047	847217.100	184107.660	985.370	0.086	0.007	urban
20048	847218.820	184106.170	985.330	0.032	0.001	urban
20049	847220.280	184107.820	985.520	0.199	0.040	urban
20050	847218.680	184109.330	985.540	0.093	0.009	urban
20051	847216.990	184110.630	985.540	0.001	0.000	urban
20052	847215.450	184111.960	985.550	0.037	0.001	urban
20053	847213.860	184113.250	985.660	0.097	0.009	urban
20054	847207.420	184106.550	985.130	0.029	0.001	urban
20055	847209.410	184105.100	985.070	-0.042	0.002	urban
20056	847212.170	184103.060	985.120	-0.117	0.014	urban
20057	847214.070	184101.600	985.070	0.019	0.000	urban
20058	847215.770	184099.870	985.030	-0.004	0.000	urban
35001	847107.390	186110.010	970.480	-0.122	0.015	high grass, weeds, and crops
35002	847104.880	186109.970	970.440	-0.065	0.004	high grass, weeds, and crops
35003	847102.420	186110.380	970.410	-0.071	0.005	high grass, weeds, and crops
35004	847100.100	186110.470	970.280	-0.187	0.035	high grass, weeds, and crops
35005	847097.870	186110.740	970.290	-0.275	0.076	high grass, weeds, and crops
35006	847097.500	186107.920	970.170	-0.209	0.044	high grass, weeds, and crops
35007	847100.230	186107.720	970.200	-0.169	0.029	high grass, weeds, and crops
35008	847103.030	186107.770	970.240	0.054	0.003	high grass, weeds, and crops
35009	847105.150	186107.980	970.330	0.072	0.005	high grass, weeds, and crops
35010	847107.780	186108.290	970.400	-0.051	0.003	high grass, weeds, and crops

35011	847107.570	186105.800	970.320	0.024	0.001	high grass, weeds, and crops
35012	847105.080	186105.570	970.170	-0.078	0.006	high grass, weeds, and crops
35013	847102.730	186105.590	970.090	-0.159	0.025	high grass, weeds, and crops
35014	847099.200	186105.520	970.060	-0.343	0.118	high grass, weeds, and crops
35015	847095.880	186105.220	970.120	-0.215	0.046	high grass, weeds, and crops
35016	847092.860	186105.160	970.080	-0.363	0.132	high grass, weeds, and crops
35017	847092.410	186102.640	970.080	-0.328	0.108	high grass, weeds, and crops
35018	847095.100	186102.550	970.050	-0.286	0.082	high grass, weeds, and crops
35019	847097.530	186102.220	970.050	-0.334	0.112	high grass, weeds, and crops
35020	847100.480	186102.750	970.060	-0.396	0.157	high grass, weeds, and crops
35021	847103.380	186102.840	970.060	-0.402	0.162	high grass, weeds, and crops
35022	847107.680	186102.720	970.270	-0.162	0.026	high grass, weeds, and crops
35023	847107.660	186099.380	970.030	-0.268	0.072	high grass, weeds, and crops
35024	847104.170	186099.410	969.950	-0.336	0.113	high grass, weeds, and crops
35025	847100.440	186099.380	969.980	-0.245	0.060	high grass, weeds, and crops
35026	847083.000	185869.240	971.420	-0.072	0.005	brush lands and low trees
35027	847082.890	185871.710	971.560	0.175	0.031	brush lands and low trees
35028	847082.710	185874.850	971.670	0.163	0.027	brush lands and low trees
35029	847082.620	185876.950	971.740	0.265	0.070	brush lands and low trees
35030	847082.770	185880.070	971.750	0.303	0.092	brush lands and low trees
35031	847080.210	185879.640	971.950	0.126	0.016	brush lands and low trees
35032	847080.370	185877.460	971.740	-0.011	0.000	brush lands and low trees
35033	847080.440	185874.450	971.700	-0.089	0.008	brush lands and low trees
35034	847080.570	185871.200	971.660	-0.120	0.014	brush lands and low trees
35035	847081.250	185868.270	971.580	-0.148	0.022	brush lands and low trees
35036	847081.270	185864.520	971.430	-0.147	0.022	brush lands and low trees
35037	847079.230	185865.790	971.600	-0.201	0.040	brush lands and low trees
35038	847078.540	185868.630	971.630	-0.252	0.064	brush lands and low trees
35039	847078.340	185871.490	971.750	-0.207	0.043	brush lands and low trees
35040	847079.540	185873.100	971.850	-0.084	0.007	brush lands and low trees
35041	847077.620	185877.170	971.940	-0.126	0.016	brush lands and low trees
35042	847077.210	185880.030	972.020	-0.151	0.023	brush lands and low trees
35043	847079.080	185881.410	972.010	0.041	0.002	brush lands and low trees
35044	847081.320	185881.440	972.200	0.560	0.314	brush lands and low trees
35045	847082.480	185873.570	971.660	0.145	0.021	brush lands and low trees
35046	847082.560	185871.900	971.510	0.062	0.004	brush lands and low trees
35047	847079.740	185872.280	971.580	-0.352	0.124	brush lands and low trees
35048	846575.210	186216.410	1018.740	0.021	0.000	forest
35049	846572.460	186217.680	1018.770	-0.179	0.032	forest
35050	846569.900	186219.170	1018.960	-0.142	0.020	forest
35051	846567.140	186220.770	1019.100	-0.027	0.001	forest
35052	846564.550	186222.150	1019.290	-0.039	0.002	forest
35053	846565.650	186224.450	1019.330	0.029	0.001	forest
35054	846568.150	186223.100	1019.170	-0.014	0.000	forest
35055	846571.060	186221.400	1019.000	-0.034	0.001	forest
35056	846574.030	186219.650	1018.870	-0.148	0.022	forest
35057	846576.410	186218.140	1018.720	-0.036	0.001	forest
35058	846577.840	186220.150	1018.740	-0.072	0.005	forest
35059	846575.890	186221.490	1018.870	-0.067	0.004	forest
35060	846573.530	186222.900	1018.970	-0.031	0.001	forest
35061	846571.290	186224.410	1019.110	0.009	0.000	forest
35062	846568.610	186225.910	1019.310	-0.046	0.002	forest
35063	846563.290	186217.950	1019.200	-0.038	0.001	forest
35064	846566.270	186215.970	1018.980	-0.089	0.008	forest
35065	846568.790	186214.250	1018.830	0.061	0.004	forest
35066	846571.590	186212.380	1018.700	0.431	0.186	forest
35067	846574.200	186210.740	1018.620	0.512	0.262	forest
35068	846572.940	186207.590	1018.560	0.202	0.041	forest
35069	846570.200	186209.220	1018.660	0.287	0.082	forest

35070	846568.170	186210.630	1018.860	0.207	0.043	forest
35071	846565.840	186212.340	1018.960	-0.098	0.010	forest
35072	846563.510	186214.050	1019.100	-0.177	0.031	forest
50002	710251.100	184342.190	1294.880	0.249	0.062	urban
50003	710248.250	184343.690	1294.930	0.205	0.042	urban
50004	710245.320	184345.120	1294.910	0.209	0.044	urban
50005	710242.210	184346.760	1294.920	0.192	0.037	urban
50006	710239.310	184348.220	1294.910	0.314	0.099	urban
50007	710237.640	184345.700	1294.900	0.349	0.122	urban
50008	710240.200	184344.150	1294.920	0.288	0.083	urban
50009	710242.620	184343.150	1294.920	0.208	0.043	urban
50010	710245.170	184342.160	1294.900	0.224	0.050	urban
50011	710247.700	184341.150	1294.920	0.362	0.131	urban
50012	710246.840	184338.590	1294.930	0.155	0.024	urban
50013	710244.560	184339.550	1294.920	0.122	0.015	urban
50014	710241.860	184340.390	1294.880	0.172	0.030	urban
50015	710239.170	184341.270	1294.880	0.263	0.069	urban
50016	710236.270	184342.520	1294.840	0.354	0.125	urban
50017	710234.720	184340.530	1294.830	0.270	0.073	urban
50018	710237.850	184339.010	1294.900	0.247	0.061	urban
50019	710241.010	184337.570	1294.910	0.186	0.035	urban
50020	710243.890	184336.380	1294.940	0.205	0.042	urban
50021	710246.640	184335.120	1294.950	0.258	0.067	urban
50022	710245.910	184332.550	1294.950	0.229	0.052	urban
50023	710243.020	184333.000	1294.920	0.354	0.125	urban
50024	710239.890	184334.080	1294.890	0.282	0.080	urban
50025	710236.500	184335.990	1294.900	0.231	0.053	urban
50026	710233.690	184337.830	1294.870	0.341	0.116	urban
50027	710232.320	184291.650	1295.200	0.253	0.064	urban
50028	710234.950	184290.450	1295.200	0.180	0.032	urban
50029	710237.790	184289.140	1295.190	0.209	0.044	urban
50030	710240.610	184287.930	1295.170	0.231	0.053	urban
50031	710242.440	184287.030	1295.140	0.164	0.027	urban
50032	710230.750	184289.710	1295.180	0.281	0.079	urban
50033	710233.420	184288.190	1295.220	0.333	0.111	urban
50034	710236.320	184286.850	1295.220	0.398	0.158	urban
50035	710239.420	184285.290	1295.210	0.349	0.122	urban
50036	710241.240	184284.250	1295.190	0.272	0.074	urban
50037	710238.490	184282.100	1295.190	0.282	0.080	urban
50038	710235.880	184283.030	1295.210	0.371	0.138	urban
50039	710233.190	184284.260	1295.220	0.309	0.095	urban
50040	710230.740	184285.450	1295.200	0.291	0.085	urban
50041	710228.180	184286.970	1295.220	0.279	0.078	urban
50042	710226.700	184284.260	1295.220	0.200	0.040	urban
50043	710229.280	184282.940	1295.250	0.268	0.072	urban
50044	710231.920	184282.020	1295.250	0.283	0.080	urban
50045	710234.410	184280.810	1295.260	0.329	0.108	urban
50046	710237.240	184279.430	1295.240	0.277	0.077	urban
50047	710235.720	184276.690	1295.230	0.211	0.045	urban
50048	710233.240	184277.670	1295.260	0.316	0.100	urban
50049	710230.880	184278.950	1295.280	0.217	0.047	urban
50050	710228.200	184280.350	1295.250	0.159	0.025	urban
50051	710225.530	184281.920	1295.260	0.207	0.043	urban
50054	647489.880	186840.560	732.930	0.014	0.000	urban
50055	647486.820	186843.290	733.000	0.198	0.039	urban
50056	647492.970	186837.900	732.910	0.128	0.016	urban
50057	647495.980	186834.780	732.970	0.315	0.099	urban
50058	647498.680	186832.600	732.900	0.174	0.030	urban
50059	647496.300	186830.210	732.860	0.153	0.023	urban

50060	647493.030	186832.410	732.930	0.364	0.132	urban
50061	647490.290	186834.690	732.860	0.244	0.060	urban
50062	647487.450	186836.880	732.970	0.196	0.038	urban
50063	647484.910	186839.270	732.920	0.171	0.029	urban
50064	647482.440	186837.120	732.990	0.347	0.120	urban
50065	647484.730	186834.150	732.920	0.353	0.125	urban
50066	647487.310	186831.890	732.870	0.176	0.031	urban
50067	647490.070	186829.470	732.800	0.168	0.028	urban
50068	647492.150	186826.450	732.750	0.347	0.120	urban
50069	647491.020	186823.220	732.560	0.120	0.014	urban
50070	647488.120	186825.650	732.620	0.076	0.006	urban
50071	647485.150	186827.820	732.580	0.239	0.057	urban
50072	647482.550	186829.710	732.580	0.051	0.003	urban
50073	647479.700	186832.400	732.610	0.038	0.001	urban
50074	647500.310	186819.060	732.540	0.068	0.005	urban
50075	647504.080	186822.570	732.770	0.115	0.013	urban
50076	647507.010	186825.820	732.860	-0.450	0.203	urban
50077	647507.970	186821.920	732.780	-0.062	0.004	urban
50078	647505.840	186819.520	732.700	0.070	0.005	urban
50079	647503.700	186816.750	732.560	0.118	0.014	urban
50080	647310.080	186698.190	726.750	0.107	0.011	urban
50081	647306.640	186698.310	726.680	0.076	0.006	urban
50082	647303.000	186698.540	726.650	0.087	0.008	urban
50083	647299.160	186698.620	726.640	0.036	0.001	urban
50084	647295.120	186698.700	726.590	0.050	0.003	urban
50085	647295.110	186695.450	726.650	0.183	0.033	urban
50086	647297.640	186695.390	726.720	0.182	0.033	urban
50087	647300.690	186695.320	726.790	0.077	0.006	urban
50088	647303.060	186695.040	726.740	0.003	0.000	urban
50089	647305.970	186694.840	726.750	0.044	0.002	urban
50090	647309.080	186692.110	726.830	0.296	0.088	urban
50091	647305.900	186692.320	726.820	0.192	0.037	urban
50092	647302.820	186692.430	726.870	0.157	0.025	urban
50093	647299.290	186692.470	726.890	0.091	0.008	urban
50094	647296.080	186692.420	726.890	0.307	0.094	urban
50095	647298.160	186689.710	726.870	0.232	0.054	urban
50096	647301.040	186689.430	726.890	0.281	0.079	urban
50097	647303.820	186689.090	726.860	0.227	0.052	urban
50098	647307.140	186688.730	726.870	0.273	0.075	urban
50099	647310.280	186688.380	726.910	0.276	0.076	urban
50100	647312.660	186685.010	726.990	0.175	0.031	urban
50101	647309.440	186685.290	726.970	0.372	0.138	urban
50102	647305.970	186685.470	726.930	0.175	0.031	urban
50103	647302.490	186685.780	726.880	0.169	0.029	urban
50104	647298.920	186686.000	726.910	0.105	0.011	urban
50105	647215.480	187004.450	733.240	-0.067	0.004	bare earth and low grass
50106	647213.700	187007.470	733.150	-0.092	0.008	bare earth and low grass
50107	647211.580	187011.530	733.160	0.072	0.005	bare earth and low grass
50108	647209.680	187014.940	733.170	-0.037	0.001	bare earth and low grass
50109	647207.820	187018.470	733.180	0.002	0.000	bare earth and low grass
50110	647205.110	187017.320	733.080	-0.066	0.004	bare earth and low grass
50111	647206.330	187014.670	733.080	-0.088	0.008	bare earth and low grass
50112	647207.230	187012.600	733.100	-0.316	0.100	bare earth and low grass
50113	647208.670	187010.350	733.060	-0.157	0.025	bare earth and low grass
50114	647210.090	187007.530	733.100	-0.044	0.002	bare earth and low grass
50115	647208.140	187006.160	733.120	-0.057	0.003	bare earth and low grass
50116	647206.510	187009.070	733.160	-0.108	0.012	bare earth and low grass
50117	647205.200	187011.710	733.170	-0.083	0.007	bare earth and low grass
50118	647203.890	187014.100	733.180	0.131	0.017	bare earth and low grass



50119	647202.830	187016.440	733.240	0.128	0.016	bare earth and low grass
50120	647200.340	187014.860	733.280	0.154	0.024	bare earth and low grass
50121	647201.650	187012.170	733.240	0.220	0.048	bare earth and low grass
50122	647203.290	187009.360	733.290	0.207	0.043	bare earth and low grass
50123	647205.110	187006.330	733.280	0.158	0.025	bare earth and low grass
50124	647206.660	187004.090	733.210	0.048	0.002	bare earth and low grass
50125	647204.530	187002.520	733.210	0.090	0.008	bare earth and low grass
50126	647202.460	187004.880	733.220	0.073	0.005	bare earth and low grass
50127	647200.890	187007.140	733.180	0.027	0.001	bare earth and low grass
50128	647199.220	187009.870	733.200	0.015	0.000	bare earth and low grass
50129	647197.690	187012.200	733.170	0.149	0.022	bare earth and low grass
50130	647195.300	187010.800	733.260	0.184	0.034	bare earth and low grass
50131	647197.050	187008.620	733.310	0.127	0.016	bare earth and low grass
50132	647198.220	187005.980	733.360	0.146	0.021	bare earth and low grass
50133	647199.700	187003.980	733.340	0.141	0.020	bare earth and low grass
50134	647201.320	187001.470	733.310	0.234	0.055	bare earth and low grass
50135	647849.590	186646.750	729.660	0.059	0.003	urban
50136	647852.020	186645.440	729.660	0.130	0.017	urban
50137	647854.330	186644.450	729.590	0.056	0.003	urban
50138	647856.810	186642.960	729.600	0.201	0.040	urban
50139	647860.180	186641.120	729.630	0.319	0.102	urban
50140	647859.580	186638.330	729.540	0.186	0.035	urban
50141	647856.620	186639.730	729.620	0.253	0.064	urban
50142	647853.780	186641.220	729.670	0.329	0.108	urban
50143	647850.800	186642.900	729.700	0.384	0.147	urban
50144	647847.710	186644.540	729.770	0.317	0.100	urban
50145	647846.130	186642.370	729.680	0.271	0.073	urban
50146	647848.650	186640.860	729.730	0.365	0.133	urban
50147	647851.080	186639.570	729.720	0.347	0.120	urban
50148	647853.590	186638.170	729.630	0.273	0.075	urban
50149	647856.080	186636.800	729.620	0.177	0.031	urban
50150	647855.420	186634.020	729.550	0.148	0.022	urban
50151	647853.210	186635.340	729.580	0.318	0.101	urban
50152	647850.830	186636.760	729.600	0.198	0.039	urban
50153	647848.170	186638.240	729.620	0.228	0.052	urban
50154	647845.860	186639.640	729.680	0.507	0.257	urban
50155	647844.440	186637.400	729.580	0.308	0.095	urban
50156	647846.900	186635.990	729.610	0.328	0.108	urban
50157	647849.360	186634.950	729.610	0.110	0.012	urban
50158	647852.380	186633.220	729.560	0.428	0.183	urban
50159	647855.180	186631.920	729.480	0.220	0.048	urban
50162	620980.500	135193.970	693.640	0.333	0.111	bare earth and low grass
50163	620980.370	135197.520	693.520	0.259	0.067	bare earth and low grass
50164	620980.470	135201.590	693.460	0.315	0.099	bare earth and low grass
50165	620980.610	135205.660	693.440	0.300	0.090	bare earth and low grass
50166	620980.620	135209.300	693.390	0.334	0.112	bare earth and low grass
50167	620984.010	135209.270	693.330	0.334	0.112	bare earth and low grass
50168	620984.030	135206.040	693.340	0.309	0.095	bare earth and low grass
50169	620983.920	135202.650	693.410	0.354	0.125	bare earth and low grass
50170	620984.500	135199.220	693.440	0.320	0.102	bare earth and low grass
50171	620984.890	135195.980	693.460	0.387	0.150	bare earth and low grass
50172	620985.430	135192.270	693.560	0.346	0.120	bare earth and low grass
50173	620988.310	135192.420	693.550	0.364	0.132	bare earth and low grass
50174	620988.400	135195.700	693.470	0.378	0.143	bare earth and low grass
50175	620987.980	135199.160	693.340	0.193	0.037	bare earth and low grass
50176	620988.040	135202.870	693.400	0.316	0.100	bare earth and low grass
50177	620987.800	135206.700	693.300	0.249	0.062	bare earth and low grass
50178	620993.840	135198.580	693.360	0.304	0.092	bare earth and low grass
50179	620994.020	135195.670	693.410	0.288	0.083	bare earth and low grass

50180	620994.000	135192.300	693.490	0.313	0.098	bare earth and low grass
50181	620993.880	135188.770	693.570	0.333	0.111	bare earth and low grass
50182	620996.720	135189.530	693.520	0.360	0.130	bare earth and low grass
50183	620996.830	135193.050	693.440	0.294	0.086	bare earth and low grass
50184	620996.650	135196.380	693.390	0.332	0.110	bare earth and low grass
50185	620999.990	135196.530	693.360	0.336	0.113	bare earth and low grass
50186	621000.410	135193.330	693.440	0.366	0.134	bare earth and low grass
50187	621000.660	135189.520	693.540	0.398	0.158	bare earth and low grass
50188	620988.920	135156.540	694.280	0.455	0.207	urban
50189	620989.170	135153.460	694.290	0.439	0.193	urban
50190	620989.150	135150.200	694.260	0.415	0.172	urban
50191	620989.160	135147.080	694.220	0.514	0.264	urban
50192	620989.310	135143.420	694.280	0.580	0.336	urban
50193	620986.170	135144.070	694.150	0.425	0.181	urban
50194	620985.720	135147.220	694.140	0.398	0.158	urban
50195	620985.280	135150.330	694.210	0.413	0.171	urban
50196	620985.020	135153.870	694.140	0.328	0.108	urban
50197	620984.870	135157.180	694.120	0.343	0.118	urban
50198	620981.590	135156.940	694.130	0.428	0.183	urban
50199	620981.540	135153.630	694.090	0.398	0.158	urban
50200	620981.560	135150.540	694.120	0.441	0.194	urban
50201	620981.210	135146.840	694.110	0.451	0.203	urban
50202	620981.020	135143.650	694.030	0.479	0.229	urban
50203	620977.460	135143.550	693.980	0.397	0.158	urban
50204	620976.920	135146.460	693.990	0.401	0.161	urban
50205	620976.630	135149.640	694.010	0.353	0.125	urban
50206	620976.440	135153.400	694.040	0.373	0.139	urban
50207	620976.240	135156.330	694.010	0.370	0.137	urban
50208	620972.280	135155.890	693.970	0.424	0.180	urban
50209	620972.160	135152.600	693.970	0.355	0.126	urban
50210	620972.370	135149.450	693.950	0.327	0.107	urban
50211	620972.470	135146.320	693.940	0.354	0.125	urban
50212	620972.310	135142.740	693.890	0.455	0.207	urban
50215	732419.500	109088.860	749.120	0.418	0.175	bare earth and low grass
50216	732420.870	109091.150	749.190	0.448	0.201	bare earth and low grass
50217	732422.340	109093.910	749.200	0.353	0.125	bare earth and low grass
50218	732423.830	109096.490	749.230	0.370	0.137	bare earth and low grass
50219	732425.350	109098.910	749.360	0.536	0.287	bare earth and low grass
50220	732422.700	109100.560	749.380	0.534	0.285	bare earth and low grass
50221	732421.180	109097.970	749.300	0.396	0.157	bare earth and low grass
50222	732419.590	109095.270	749.210	0.429	0.184	bare earth and low grass
50223	732417.960	109092.750	749.240	0.567	0.321	bare earth and low grass
50224	732416.540	109089.930	749.140	0.492	0.242	bare earth and low grass
50225	732414.360	109091.170	749.180	0.507	0.257	bare earth and low grass
50226	732415.710	109093.830	749.170	0.407	0.166	bare earth and low grass
50227	732417.030	109096.200	749.230	0.511	0.261	bare earth and low grass
50228	732418.270	109098.850	749.330	0.459	0.211	bare earth and low grass
50229	732419.700	109101.430	749.320	0.408	0.166	bare earth and low grass
50230	732417.140	109103.050	749.440	0.444	0.197	bare earth and low grass
50231	732415.540	109100.410	749.380	0.510	0.260	bare earth and low grass
50232	732414.150	109097.850	749.330	0.428	0.183	bare earth and low grass
50233	732412.470	109094.550	749.330	0.512	0.262	bare earth and low grass
50234	732410.950	109091.710	749.170	0.513	0.263	bare earth and low grass
50235	732408.590	109093.210	749.180	0.520	0.270	bare earth and low grass
50236	732409.950	109095.750	749.300	0.490	0.240	bare earth and low grass
50237	732411.200	109098.120	749.290	0.344	0.118	bare earth and low grass
50238	732412.520	109100.640	749.320	0.410	0.168	bare earth and low grass
50239	732413.960	109103.050	749.350	0.535	0.286	bare earth and low grass
50240	732607.570	108849.350	753.180	0.501	0.251	urban

50241	732605.920	108845.920	753.110	0.481	0.231	urban
50242	732604.130	108842.560	752.990	0.475	0.226	urban
50243	732602.370	108839.260	752.880	0.562	0.316	urban
50244	732600.960	108836.310	752.790	0.511	0.261	urban
50245	732599.240	108833.290	752.680	0.582	0.339	urban
50246	732601.900	108831.980	752.790	0.608	0.370	urban
50247	732603.360	108835.500	752.900	0.560	0.314	urban
50248	732604.750	108838.630	753.020	0.613	0.376	urban
50249	732606.280	108842.170	753.110	0.462	0.213	urban
50250	732607.420	108845.680	753.240	0.527	0.278	urban
50251	732608.880	108848.380	753.250	0.505	0.255	urban
50252	732611.470	108846.860	753.290	0.504	0.254	urban
50253	732609.930	108843.900	753.200	0.405	0.164	urban
50254	732608.580	108840.820	753.130	0.533	0.284	urban
50255	732607.290	108837.830	753.030	0.575	0.331	urban
50256	732605.610	108834.440	752.960	0.584	0.341	urban
50257	732604.210	108831.600	752.850	0.645	0.416	urban
50258	732607.440	108830.070	752.810	0.598	0.358	urban
50259	732608.610	108832.980	752.910	0.565	0.319	urban
50260	732609.740	108835.690	753.020	0.641	0.411	urban
50261	732610.960	108838.790	753.100	0.653	0.426	urban
50262	732612.140	108841.640	753.180	0.481	0.231	urban
50263	732613.240	108844.750	753.250	0.477	0.228	urban
50264	735952.000	110844.550	754.100	0.379	0.144	urban
50265	735952.110	110841.440	754.110	0.374	0.140	urban
50266	735952.220	110838.710	754.090	0.347	0.120	urban
50267	735952.110	110835.670	754.110	0.403	0.162	urban
50268	735952.080	110833.020	754.110	0.379	0.144	urban
50269	735949.880	110833.120	754.100	0.326	0.106	urban
50270	735949.820	110835.750	754.120	0.388	0.151	urban
50271	735949.600	110838.290	754.140	0.355	0.126	urban
50272	735949.560	110841.750	754.140	0.345	0.119	urban
50273	735949.920	110844.880	754.120	0.392	0.154	urban
50274	735947.260	110844.810	754.150	0.325	0.106	urban
50275	735947.260	110841.950	754.160	0.307	0.094	urban
50276	735946.920	110839.060	754.180	0.377	0.142	urban
50277	735946.770	110836.270	754.170	0.431	0.186	urban
50278	735946.800	110833.240	754.140	0.391	0.153	urban
50279	735944.460	110833.320	754.180	0.392	0.154	urban
50280	735944.460	110836.720	754.180	0.456	0.208	urban
50281	735944.570	110839.740	754.200	0.424	0.180	urban
50282	735944.840	110842.600	754.190	0.460	0.212	urban
50283	735944.620	110845.270	754.190	0.465	0.216	urban
50284	735942.320	110845.300	754.160	0.338	0.114	urban
50285	735942.380	110842.290	754.140	0.392	0.154	urban
50286	735942.430	110839.250	754.120	0.324	0.105	urban
50287	735942.310	110835.960	754.140	0.318	0.101	urban
50288	735942.250	110832.640	754.110	0.252	0.064	urban
50289	736132.420	110915.430	755.980	0.374	0.140	urban
50290	736135.780	110915.780	756.010	0.346	0.120	urban
50291	736139.180	110915.980	756.050	0.369	0.136	urban
50292	736142.710	110916.250	756.090	0.280	0.078	urban
50293	736146.200	110916.340	756.150	0.318	0.101	urban
50294	736146.430	110913.390	756.200	0.291	0.085	urban
50295	736143.220	110912.900	756.080	0.258	0.067	urban
50296	736140.020	110912.860	756.080	0.306	0.094	urban
50297	736137.050	110912.750	756.000	0.317	0.100	urban
50298	736133.870	110912.510	755.970	0.347	0.120	urban
50299	736134.500	110909.450	756.010	0.391	0.153	urban

50300	736138.220	110909.530	756.100	0.434	0.188	urban
50301	736141.720	110909.780	756.130	0.421	0.177	urban
50302	736145.300	110909.790	756.220	0.402	0.162	urban
50303	736148.940	110909.930	756.270	0.617	0.381	urban
50304	736148.960	110906.730	756.220	0.574	0.329	urban
50305	736145.410	110906.330	756.110	0.447	0.200	urban
50306	736142.270	110906.100	756.080	0.534	0.285	urban
50307	736138.970	110906.100	756.050	0.539	0.291	urban
50308	736135.870	110906.000	755.930	0.376	0.141	urban
50309	736136.220	110902.900	755.870	0.408	0.166	urban
50310	736139.560	110902.710	756.010	0.566	0.320	urban
50311	736143.370	110902.820	756.010	0.532	0.283	urban
50312	736147.020	110903.050	756.100	0.629	0.396	urban
50313	736150.070	110903.100	756.160	0.537	0.288	urban
55001	716885.130	189915.420	1202.460	0.328	0.108	forest
55002	716887.730	189916.480	1202.570	0.449	0.202	forest
55003	716891.110	189917.300	1202.550	0.444	0.197	forest
55004	716893.620	189918.250	1202.610	0.224	0.050	forest
55005	716895.920	189919.060	1202.660	-0.044	0.002	forest
55006	716896.220	189915.750	1202.580	0.150	0.022	forest
55007	716893.710	189914.600	1202.480	0.186	0.035	forest
55008	716890.600	189913.920	1202.480	0.316	0.100	forest
55009	716887.560	189913.400	1202.390	0.209	0.044	forest
55010	716884.660	189912.440	1202.400	0.241	0.058	forest
55011	716884.970	189910.180	1202.330	0.126	0.016	forest
55012	716888.060	189910.750	1202.320	0.065	0.004	forest
55013	716891.010	189911.280	1202.380	-0.199	0.040	forest
55014	716893.870	189911.840	1202.410	-0.286	0.082	forest
55015	716896.520	189912.530	1202.540	-0.150	0.023	forest
55016	716896.050	189909.510	1202.410	-0.433	0.187	forest
55017	716893.350	189908.690	1202.300	-0.416	0.173	forest
55018	716889.650	189907.970	1202.180	-0.007	0.000	forest
55019	716886.420	189907.600	1202.230	-0.058	0.003	forest
55020	716882.670	189906.770	1202.210	-0.194	0.038	forest
55021	716883.340	189903.900	1202.140	-0.134	0.018	forest
55022	716886.320	189904.140	1202.120	-0.160	0.026	forest
55023	716889.750	189905.330	1202.190	0.014	0.000	forest
55024	716893.210	189906.450	1202.240	-0.033	0.001	forest
55025	716896.080	189907.040	1202.310	-0.480	0.230	forest
55026	716972.060	189800.710	1195.680	-0.777	0.604	high grass, weeds, and crops
55027	716974.370	189800.670	1195.570	-0.919	0.845	high grass, weeds, and crops
55028	716976.590	189800.800	1195.490	-0.803	0.645	high grass, weeds, and crops
55029	716979.420	189800.820	1195.390	-0.519	0.269	high grass, weeds, and crops
55030	716981.400	189800.740	1195.340	-0.468	0.219	high grass, weeds, and crops
55031	716981.650	189798.090	1195.390	-0.367	0.135	high grass, weeds, and crops
55032	716980.050	189797.770	1195.500	-0.399	0.159	high grass, weeds, and crops
55033	716977.810	189797.350	1195.610	-0.405	0.164	high grass, weeds, and crops
55034	716974.920	189797.250	1195.740	-0.366	0.134	high grass, weeds, and crops
55035	716973.090	189796.990	1195.920	-0.512	0.262	high grass, weeds, and crops
55036	716973.050	189794.430	1195.790	-0.706	0.498	high grass, weeds, and crops
55037	716976.230	189795.230	1195.750	-0.506	0.256	high grass, weeds, and crops
55038	716979.000	189795.930	1195.640	-0.460	0.212	high grass, weeds, and crops
55039	716980.960	189797.190	1195.520	-0.325	0.106	high grass, weeds, and crops
55040	716983.390	189798.190	1195.360	-0.375	0.141	high grass, weeds, and crops
55041	716983.860	189796.090	1195.320	-0.232	0.054	high grass, weeds, and crops
55042	716980.810	189795.150	1195.420	-0.532	0.283	high grass, weeds, and crops
55043	716978.670	189795.130	1195.620	-0.544	0.296	high grass, weeds, and crops
55044	716976.680	189794.440	1195.680	-0.552	0.305	high grass, weeds, and crops
55045	716974.140	189793.230	1195.770	-0.639	0.408	high grass, weeds, and crops

55046	716974.970	189791.170	1195.680	-0.347	0.120	high grass, weeds, and crops
55047	716977.350	189792.420	1195.680	-0.614	0.377	high grass, weeds, and crops
55048	716979.740	189792.930	1195.580	-0.739	0.546	high grass, weeds, and crops
55049	716982.760	189792.410	1195.480	-0.414	0.171	high grass, weeds, and crops
55050	716984.640	189793.330	1195.380	-0.211	0.045	high grass, weeds, and crops
55051	717034.820	189763.930	1193.680	-0.571	0.326	brush lands and low trees
55052	717037.370	189762.110	1193.580	-0.519	0.269	brush lands and low trees
55053	717039.520	189761.010	1193.490	-0.253	0.064	brush lands and low trees
55054	717042.350	189759.400	1193.430	-0.180	0.032	brush lands and low trees
55055	717045.160	189757.610	1193.370	-0.077	0.006	brush lands and low trees
55056	717046.490	189760.570	1193.280	-0.467	0.218	brush lands and low trees
55057	717043.000	189762.030	1193.440	-0.350	0.122	brush lands and low trees
55058	717040.150	189763.570	1193.460	-0.713	0.508	brush lands and low trees
55059	717037.390	189764.100	1193.530	-0.921	0.848	brush lands and low trees
55060	717035.300	189765.040	1193.650	-0.686	0.471	brush lands and low trees
55061	717035.830	189767.070	1193.640	-0.376	0.141	brush lands and low trees
55062	717037.650	189766.280	1193.560	-0.691	0.477	brush lands and low trees
55063	717039.920	189765.010	1193.480	-0.735	0.540	brush lands and low trees
55064	717042.200	189764.000	1193.470	-0.368	0.135	brush lands and low trees
55065	717043.610	189762.380	1193.540	-0.385	0.148	brush lands and low trees
55066	717044.580	189765.870	1193.770	-0.279	0.078	brush lands and low trees
55067	717042.120	189766.930	1193.400	-0.453	0.205	brush lands and low trees
55068	717041.100	189767.940	1193.530	-0.242	0.059	brush lands and low trees
55069	717038.680	189768.690	1193.580	-0.211	0.045	brush lands and low trees
55070	717037.240	189770.850	1193.650	-0.261	0.068	brush lands and low trees
55071	717040.640	189771.660	1193.330	-0.283	0.080	brush lands and low trees
55072	717042.620	189769.380	1193.360	-0.205	0.042	brush lands and low trees
55073	717117.010	189908.780	1196.320	-0.124	0.015	bare earth and low grass
55074	717113.440	189908.530	1196.390	-0.091	0.008	bare earth and low grass
55075	717110.080	189908.260	1196.370	-0.148	0.022	bare earth and low grass
55076	717107.160	189908.000	1196.370	-0.130	0.017	bare earth and low grass
55077	717103.230	189907.650	1196.360	-0.067	0.004	bare earth and low grass
55078	717103.110	189904.730	1196.310	-0.137	0.019	bare earth and low grass
55079	717105.530	189904.940	1196.290	-0.138	0.019	bare earth and low grass
55080	717108.250	189904.900	1196.290	-0.220	0.048	bare earth and low grass
55081	717110.770	189904.970	1196.290	-0.202	0.041	bare earth and low grass
55082	717113.340	189905.230	1196.360	0.016	0.000	bare earth and low grass
55083	717113.470	189902.090	1196.210	-0.038	0.001	bare earth and low grass
55084	717110.270	189901.830	1196.280	-0.152	0.023	bare earth and low grass
55085	717107.650	189901.790	1196.290	-0.142	0.020	bare earth and low grass
55086	717104.310	189901.590	1196.210	-0.108	0.012	bare earth and low grass
55087	717101.580	189901.490	1196.210	-0.256	0.066	bare earth and low grass
55088	717101.420	189898.920	1196.180	-0.277	0.077	bare earth and low grass
55089	717103.830	189898.950	1196.180	-0.100	0.010	bare earth and low grass
55090	717106.260	189898.940	1196.160	-0.096	0.009	bare earth and low grass
55091	717108.530	189898.900	1196.180	-0.149	0.022	bare earth and low grass
55092	717110.750	189898.960	1196.190	-0.166	0.028	bare earth and low grass
55093	717111.030	189896.210	1196.140	-0.093	0.009	bare earth and low grass
55094	717108.600	189895.820	1196.110	-0.076	0.006	bare earth and low grass
55095	717105.190	189895.970	1196.140	0.035	0.001	bare earth and low grass
55096	717101.980	189895.980	1196.160	-0.280	0.078	bare earth and low grass
55097	717098.750	189896.020	1196.210	-0.172	0.030	bare earth and low grass
55098	716801.450	189697.440	1202.540	-0.029	0.001	urban
55099	716801.020	189694.470	1202.590	0.053	0.003	urban
55100	716800.640	189691.270	1202.640	0.021	0.000	urban
55101	716800.250	189688.130	1202.690	-0.062	0.004	urban
55102	716799.810	189684.960	1202.730	-0.211	0.045	urban
55103	716799.910	189682.660	1202.750	-0.008	0.000	urban
55104	716797.500	189682.870	1202.750	-0.008	0.000	urban

55105	716797.710	189686.350	1202.700	-0.051	0.003	urban
55106	716798.090	189689.850	1202.650	-0.009	0.000	urban
55107	716798.400	189692.860	1202.620	0.043	0.002	urban
55108	716798.620	189695.570	1202.590	0.041	0.002	urban
55109	716799.170	189698.480	1202.520	-0.065	0.004	urban
55110	716796.430	189698.800	1202.540	-0.079	0.006	urban
55111	716795.870	189695.500	1202.570	0.039	0.002	urban
55112	716795.510	189692.240	1202.600	0.007	0.000	urban
55113	716795.120	189689.620	1202.630	0.055	0.003	urban
55114	716794.520	189686.980	1202.680	0.070	0.005	urban
55115	716794.330	189683.780	1202.760	-0.083	0.007	urban
55116	716792.070	189683.730	1202.770	-0.014	0.000	urban
55117	716792.210	189686.760	1202.680	0.032	0.001	urban
55118	716792.510	189689.960	1202.630	0.025	0.001	urban
55119	716793.210	189692.990	1202.580	-0.127	0.016	urban
55120	716793.660	189694.720	1202.490	-0.151	0.023	urban
55121	716793.780	189700.140	1202.440	-0.082	0.007	urban
55122	716795.090	189703.270	1202.340	-0.130	0.017	urban
55123	646624.820	186467.590	676.770	-0.467	0.218	brush lands and low trees
55124	646622.520	186467.400	676.560	-0.593	0.352	brush lands and low trees
55125	646621.900	186465.730	676.830	-0.375	0.141	brush lands and low trees
55126	646621.350	186463.500	677.130	-0.229	0.052	brush lands and low trees
55127	646620.360	186460.530	677.090	-0.156	0.024	brush lands and low trees
55128	646619.270	186457.480	677.170	-0.027	0.001	brush lands and low trees
55129	646618.080	186454.450	677.150	-0.081	0.007	brush lands and low trees
55130	646620.700	186453.770	677.070	-0.266	0.071	brush lands and low trees
55131	646621.460	186455.770	677.410	-0.014	0.000	brush lands and low trees
55132	646622.640	186458.160	677.050	-0.384	0.147	brush lands and low trees
55133	646623.300	186460.370	677.210	-0.138	0.019	brush lands and low trees
55134	646624.490	186463.290	677.190	-0.195	0.038	brush lands and low trees
55135	646625.220	186465.730	677.220	-0.074	0.005	brush lands and low trees
55136	646627.930	186465.040	677.180	-0.213	0.045	brush lands and low trees
55137	646623.600	186456.130	677.060	-0.267	0.071	brush lands and low trees
55138	646623.150	186453.820	676.940	-0.384	0.147	brush lands and low trees
55139	646626.040	186452.870	677.100	-0.244	0.060	brush lands and low trees
55140	646626.590	186455.340	677.110	-0.028	0.001	brush lands and low trees
55141	646629.040	186453.420	677.440	0.315	0.099	brush lands and low trees
55142	646628.570	186450.840	677.490	0.077	0.006	brush lands and low trees
55143	646630.560	186456.420	677.310	0.038	0.001	brush lands and low trees
55144	646628.280	186448.310	677.500	-0.072	0.005	brush lands and low trees
55145	646625.220	186449.420	677.440	-0.025	0.001	brush lands and low trees
55146	646629.980	186404.550	678.570	0.049	0.002	high grass, weeds, and crops
55147	646630.910	186407.590	678.520	-0.019	0.000	high grass, weeds, and crops
55148	646631.110	186410.930	678.500	-0.126	0.016	high grass, weeds, and crops
55149	646630.720	186413.210	678.480	0.003	0.000	high grass, weeds, and crops
55150	646631.600	186413.600	678.780	0.211	0.045	high grass, weeds, and crops
55151	646628.150	186417.100	678.230	-0.163	0.027	high grass, weeds, and crops
55152	646627.680	186414.280	678.200	-0.288	0.083	high grass, weeds, and crops
55153	646627.540	186411.560	678.360	0.010	0.000	high grass, weeds, and crops
55154	646626.950	186409.210	678.470	0.101	0.010	high grass, weeds, and crops
55155	646626.570	186407.050	678.460	0.064	0.004	high grass, weeds, and crops
55156	646624.910	186407.410	678.400	0.073	0.005	high grass, weeds, and crops
55157	646625.240	186409.650	678.450	0.155	0.024	high grass, weeds, and crops
55158	646625.650	186411.990	678.260	0.004	0.000	high grass, weeds, and crops
55159	646625.930	186414.360	678.170	-0.184	0.034	high grass, weeds, and crops
55160	646626.220	186416.770	678.080	-0.224	0.050	high grass, weeds, and crops
55161	646624.390	186417.420	677.990	-0.126	0.016	high grass, weeds, and crops
55162	646624.040	186414.430	678.050	-0.129	0.017	high grass, weeds, and crops
55163	646623.610	186412.400	678.150	-0.006	0.000	high grass, weeds, and crops

55164	646623.710	186411.510	678.330	0.148	0.022	high grass, weeds, and crops
55165	646623.040	186407.180	678.340	0.047	0.002	high grass, weeds, and crops
55166	646620.650	186407.810	678.180	0.007	0.000	high grass, weeds, and crops
55167	646621.060	186409.930	678.180	0.066	0.004	high grass, weeds, and crops
55168	646621.310	186412.180	678.140	0.061	0.004	high grass, weeds, and crops
55169	646621.510	186414.410	678.000	0.091	0.008	high grass, weeds, and crops
55170	646621.910	186416.840	677.800	-0.138	0.019	high grass, weeds, and crops
55171	646511.250	186278.290	677.910	0.229	0.052	forest
55172	646512.910	186280.780	677.700	0.169	0.029	forest
55173	646513.950	186283.720	677.570	-0.075	0.006	forest
55174	646514.870	186286.520	677.570	-0.174	0.030	forest
55175	646516.240	186289.630	677.540	0.126	0.016	forest
55176	646518.770	186289.050	677.380	0.122	0.015	forest
55177	646517.770	186286.440	677.500	0.097	0.009	forest
55178	646516.620	186284.420	677.610	-0.092	0.008	forest
55179	646515.570	186282.450	677.710	-0.169	0.029	forest
55180	646514.490	186279.040	677.880	-0.025	0.001	forest
55181	646516.600	186277.440	677.930	-0.230	0.053	forest
55182	646517.760	186279.500	677.860	-0.022	0.000	forest
55183	646518.970	186282.170	677.750	0.113	0.013	forest
55184	646520.170	186284.770	677.660	0.027	0.001	forest
55185	646521.440	186287.670	677.450	0.000	0.000	forest
55186	646523.560	186287.280	677.620	0.099	0.010	forest
55187	646523.360	186284.170	677.730	-0.058	0.003	forest
55188	646522.520	186282.230	677.720	0.012	0.000	forest
55189	646521.470	186279.650	677.750	-0.007	0.000	forest
55190	646520.330	186277.100	677.790	0.084	0.007	forest
55191	646522.050	186275.390	677.800	0.094	0.009	forest
55192	646523.060	186278.700	677.750	-0.013	0.000	forest
55193	646524.230	186281.190	677.630	-0.195	0.038	forest
55194	646525.180	186283.730	677.590	-0.095	0.009	forest
55195	646525.980	186285.860	677.500	-0.085	0.007	forest
55196	625739.890	138015.400	639.560	0.370	0.137	urban
55197	625740.200	138012.430	639.540	0.334	0.112	urban
55198	625740.640	138008.700	639.520	0.302	0.091	urban
55199	625741.110	138004.870	639.500	0.327	0.107	urban
55200	625741.420	138000.410	639.460	0.291	0.085	urban
55201	625744.790	138000.520	639.490	0.289	0.084	urban
55202	625744.550	138003.940	639.520	0.313	0.098	urban
55203	625744.120	138007.620	639.540	0.305	0.093	urban
55204	625743.750	138011.010	639.570	0.221	0.049	urban
55205	625743.330	138013.540	639.590	0.304	0.092	urban
55206	625746.600	138013.830	639.620	0.274	0.075	urban
55207	625747.000	138010.070	639.570	0.183	0.033	urban
55208	625747.300	138006.400	639.540	0.222	0.049	urban
55209	625747.560	138002.690	639.520	0.248	0.062	urban
55210	625747.670	137998.940	639.490	0.303	0.092	urban
55211	625750.600	137998.880	639.430	0.329	0.108	urban
55212	625750.240	138001.990	639.460	0.252	0.064	urban
55213	625749.930	138004.910	639.490	0.265	0.070	urban
55214	625749.480	138008.150	639.520	0.258	0.067	urban
55215	625748.940	138011.200	639.560	0.176	0.031	urban
55216	625752.370	138011.820	639.500	0.166	0.028	urban
55217	625752.660	138008.390	639.460	0.308	0.095	urban
55218	625753.180	138004.460	639.410	0.340	0.116	urban
55219	625753.660	138000.490	639.350	0.390	0.152	urban
55220	625754.080	137995.900	639.310	0.259	0.067	urban
55246	626106.260	137445.200	634.840	0.268	0.072	forest
55247	626108.270	137442.730	634.840	0.325	0.106	forest

55248	626110.210	137439.930	634.840	0.181	0.033	forest
55249	626111.670	137438.220	634.920	0.276	0.076	forest
55250	626113.480	137440.850	634.930	0.236	0.056	forest
55251	626111.490	137443.460	634.980	0.213	0.045	forest
55252	626109.480	137445.850	634.870	0.087	0.008	forest
55253	626107.880	137448.160	635.080	0.329	0.108	forest
55254	626106.110	137449.910	634.850	0.088	0.008	forest
55255	626108.700	137451.690	634.980	0.326	0.106	forest
55256	626110.440	137449.670	634.910	0.189	0.036	forest
55257	626112.550	137447.190	634.930	0.159	0.025	forest
55258	626114.310	137445.000	634.920	0.147	0.022	forest
55259	626116.120	137443.040	634.900	0.166	0.028	forest
55260	626118.200	137440.530	634.980	0.302	0.091	forest
55261	626119.760	137441.820	634.960	0.294	0.086	forest
55262	626117.780	137443.840	634.930	0.234	0.055	forest
55263	626115.800	137446.260	634.950	0.170	0.029	forest
55264	626114.060	137448.460	635.010	0.234	0.055	forest
55265	626112.380	137450.650	635.020	0.095	0.009	forest
55266	626117.140	137449.310	635.030	-0.230	0.053	forest
55267	626119.070	137446.780	635.040	0.222	0.049	forest
55268	626120.420	137444.640	634.960	0.216	0.047	forest
55269	626123.350	137442.040	635.010	0.193	0.037	forest
55270	626124.800	137438.260	635.100	0.309	0.095	forest
55271	626390.180	137655.420	635.300	0.374	0.140	high grass, weeds, and crops
55272	626387.630	137656.410	635.250	0.212	0.045	high grass, weeds, and crops
55273	626385.280	137657.180	635.310	0.213	0.045	high grass, weeds, and crops
55274	626382.610	137658.080	635.260	0.126	0.016	high grass, weeds, and crops
55275	626379.710	137659.160	635.230	0.061	0.004	high grass, weeds, and crops
55276	626381.540	137662.040	635.200	0.186	0.035	high grass, weeds, and crops
55277	626384.190	137661.030	635.230	0.214	0.046	high grass, weeds, and crops
55278	626386.530	137660.070	635.220	0.195	0.038	high grass, weeds, and crops
55279	626389.280	137658.970	635.200	0.206	0.042	high grass, weeds, and crops
55280	626391.760	137657.800	635.250	0.350	0.123	high grass, weeds, and crops
55281	626392.760	137660.140	635.240	0.259	0.067	high grass, weeds, and crops
55282	626390.530	137660.950	635.290	0.305	0.093	high grass, weeds, and crops
55283	626387.630	137662.100	635.370	0.371	0.138	high grass, weeds, and crops
55284	626385.000	137662.990	635.280	0.234	0.055	high grass, weeds, and crops
55285	626382.000	137663.950	635.270	0.216	0.047	high grass, weeds, and crops
55286	626383.630	137666.730	635.280	0.215	0.046	high grass, weeds, and crops
55287	626386.230	137665.500	635.270	0.228	0.052	high grass, weeds, and crops
55288	626388.800	137664.330	635.330	0.338	0.114	high grass, weeds, and crops
55289	626391.010	137663.040	635.240	0.229	0.052	high grass, weeds, and crops
55290	626393.520	137661.610	635.290	0.287	0.082	high grass, weeds, and crops
55291	626395.780	137660.530	635.240	0.169	0.029	high grass, weeds, and crops
55292	626397.570	137663.520	635.030	0.124	0.015	high grass, weeds, and crops
55293	626395.460	137664.410	635.220	0.290	0.084	high grass, weeds, and crops
55294	626392.820	137666.040	635.300	0.261	0.068	high grass, weeds, and crops
55295	626390.630	137666.890	635.300	0.275	0.076	high grass, weeds, and crops
55296	626387.560	137668.710	635.280	0.269	0.072	high grass, weeds, and crops
55297	626006.920	137325.610	634.600	0.260	0.068	brush lands and low trees
55298	626005.530	137328.320	634.660	0.309	0.095	brush lands and low trees
55299	626003.930	137331.290	634.680	0.473	0.224	brush lands and low trees
55300	626002.610	137333.950	634.590	0.290	0.084	brush lands and low trees
55301	626001.290	137336.960	634.590	0.259	0.067	brush lands and low trees
55302	625998.480	137335.530	634.610	0.169	0.029	brush lands and low trees
55303	625999.680	137332.680	634.490	0.238	0.057	brush lands and low trees
55304	625999.920	137329.230	634.580	0.381	0.145	brush lands and low trees
55305	626000.160	137326.130	634.710	0.469	0.220	brush lands and low trees
55306	626001.970	137322.400	634.610	0.355	0.126	brush lands and low trees



55307	625998.310	137321.100	634.570	0.260	0.068	brush lands and low trees
55308	625997.310	137323.380	634.590	0.279	0.078	brush lands and low trees
55309	625995.170	137325.470	634.560	0.287	0.082	brush lands and low trees
55310	625993.890	137328.410	634.510	0.104	0.011	brush lands and low trees
55311	625992.420	137331.480	634.470	0.176	0.031	brush lands and low trees
55312	625989.030	137331.400	634.490	0.273	0.075	brush lands and low trees
55313	625990.260	137328.820	634.700	0.412	0.170	brush lands and low trees
55314	625991.150	137324.790	634.560	0.178	0.032	brush lands and low trees
55315	625992.490	137321.670	634.600	0.335	0.112	brush lands and low trees
55316	625996.500	137319.770	634.640	0.330	0.109	brush lands and low trees
55317	625993.450	137316.100	634.510	0.220	0.048	brush lands and low trees
55318	625990.780	137319.510	634.360	-0.052	0.003	brush lands and low trees
55319	730428.680	110294.440	764.500	0.132	0.017	brush lands and low trees
55320	730427.560	110292.030	764.500	0.194	0.038	brush lands and low trees
55321	730426.540	110290.480	764.340	0.139	0.019	brush lands and low trees
55322	730424.750	110288.300	764.230	0.187	0.035	brush lands and low trees
55323	730423.050	110286.460	764.170	0.216	0.047	brush lands and low trees
55324	730421.070	110287.530	764.060	0.237	0.056	brush lands and low trees
55325	730422.480	110289.850	764.230	0.242	0.059	brush lands and low trees
55326	730424.460	110292.310	764.310	0.093	0.009	brush lands and low trees
55327	730426.630	110294.160	764.510	0.035	0.001	brush lands and low trees
55328	730427.880	110296.170	764.510	0.116	0.013	brush lands and low trees
55329	730425.190	110297.630	764.580	0.305	0.093	brush lands and low trees
55330	730422.880	110296.100	764.450	0.335	0.112	brush lands and low trees
55331	730421.200	110294.390	764.160	0.167	0.028	brush lands and low trees
55332	730418.840	110292.340	764.050	0.162	0.026	brush lands and low trees
55333	730417.340	110290.730	763.980	0.210	0.044	brush lands and low trees
55334	730415.880	110291.820	763.950	0.226	0.051	brush lands and low trees
55335	730417.380	110294.200	764.070	0.147	0.022	brush lands and low trees
55336	730418.990	110296.980	764.220	0.194	0.038	brush lands and low trees
55337	730420.250	110298.980	764.450	0.325	0.106	brush lands and low trees
55338	730421.490	110300.390	764.550	0.276	0.076	brush lands and low trees
55339	730429.840	110289.830	764.460	0.297	0.088	brush lands and low trees
55340	730427.830	110287.890	764.450	0.379	0.144	brush lands and low trees
55341	730426.130	110286.000	764.130	0.129	0.017	brush lands and low trees
55342	730424.100	110283.860	764.160	0.253	0.064	brush lands and low trees
55343	730421.940	110282.390	763.960	0.246	0.061	brush lands and low trees
55344	730265.480	110321.690	761.920	0.105	0.011	high grass, weeds, and crops
55345	730262.550	110321.870	762.010	0.266	0.071	high grass, weeds, and crops
55346	730260.060	110321.810	761.940	0.167	0.028	high grass, weeds, and crops
55347	730257.140	110321.820	761.840	0.055	0.003	high grass, weeds, and crops
55348	730254.510	110321.570	761.820	0.142	0.020	high grass, weeds, and crops
55349	730254.780	110324.410	761.860	0.026	0.001	high grass, weeds, and crops
55350	730257.500	110324.160	762.030	0.193	0.037	high grass, weeds, and crops
55351	730260.230	110324.200	761.980	0.162	0.026	high grass, weeds, and crops
55352	730263.190	110324.250	761.990	0.189	0.036	high grass, weeds, and crops
55353	730266.230	110324.160	762.120	0.360	0.130	high grass, weeds, and crops
55354	730266.650	110327.100	762.020	0.251	0.063	high grass, weeds, and crops
55355	730263.940	110327.670	762.160	0.349	0.122	high grass, weeds, and crops
55356	730261.170	110327.730	762.020	0.125	0.016	high grass, weeds, and crops
55357	730259.170	110327.950	762.070	0.209	0.044	high grass, weeds, and crops
55358	730256.500	110328.250	762.010	0.038	0.001	high grass, weeds, and crops
55359	730257.290	110330.760	761.990	-0.011	0.000	high grass, weeds, and crops
55360	730260.130	110330.580	762.060	0.095	0.009	high grass, weeds, and crops
55361	730262.690	110329.930	762.070	0.111	0.012	high grass, weeds, and crops
55362	730265.310	110329.510	762.160	0.237	0.056	high grass, weeds, and crops
55363	730267.910	110329.470	762.160	-0.002	0.000	high grass, weeds, and crops
55364	730268.480	110332.390	762.150	-0.079	0.006	high grass, weeds, and crops
55365	730265.190	110332.540	762.250	-0.041	0.002	high grass, weeds, and crops

55366	730262.900	110332.610	762.230	0.059	0.003	high grass, weeds, and crops
55367	730260.270	110332.720	762.190	0.164	0.027	high grass, weeds, and crops
55368	730258.300	110332.860	762.060	0.044	0.002	high grass, weeds, and crops
55369	730414.180	110010.350	758.920	0.459	0.211	forest
55370	730414.650	110014.210	758.820	0.564	0.318	forest
55371	730414.860	110016.850	758.830	0.449	0.202	forest
55372	730415.570	110020.820	758.950	0.435	0.189	forest
55373	730416.040	110023.310	759.010	0.430	0.185	forest
55374	730418.090	110022.700	759.020	0.483	0.233	forest
55375	730417.350	110020.320	758.870	0.480	0.230	forest
55376	730416.390	110017.490	759.010	0.589	0.347	forest
55377	730415.630	110014.690	758.870	0.571	0.326	forest
55378	730414.280	110011.950	758.860	0.484	0.234	forest
55379	730416.900	110011.270	758.880	0.462	0.213	forest
55380	730417.410	110014.290	759.000	0.584	0.341	forest
55381	730417.870	110017.290	759.180	0.850	0.722	forest
55382	730418.670	110020.150	758.860	0.591	0.349	forest
55383	730419.110	110023.420	758.950	0.295	0.087	forest
55384	730419.790	110025.870	759.080	0.333	0.111	forest
55385	730422.440	110025.200	759.070	0.410	0.168	forest
55386	730421.970	110023.090	758.900	0.314	0.099	forest
55387	730421.450	110020.740	758.850	0.283	0.080	forest
55388	730421.380	110018.070	758.850	0.378	0.143	forest
55389	730421.150	110015.200	758.910	0.447	0.200	forest
55390	730423.060	110014.780	758.880	0.468	0.219	forest
55391	730423.340	110017.700	759.030	0.345	0.119	forest
55392	730423.390	110020.750	758.930	0.132	0.017	forest
55393	730423.920	110023.420	759.020	0.356	0.127	forest
55394	730424.410	110026.440	758.980	0.357	0.127	forest

Sum	71.162 feet
Average	0.090 feet
RMSE	0.299 feet
Accuracyz	0.586 feet

Tested 0.59 feet vertical accuracy at 95% confidence level

## **FIELD NOTES**

Project FEMA ground survey notes

Contains point number and descriptions

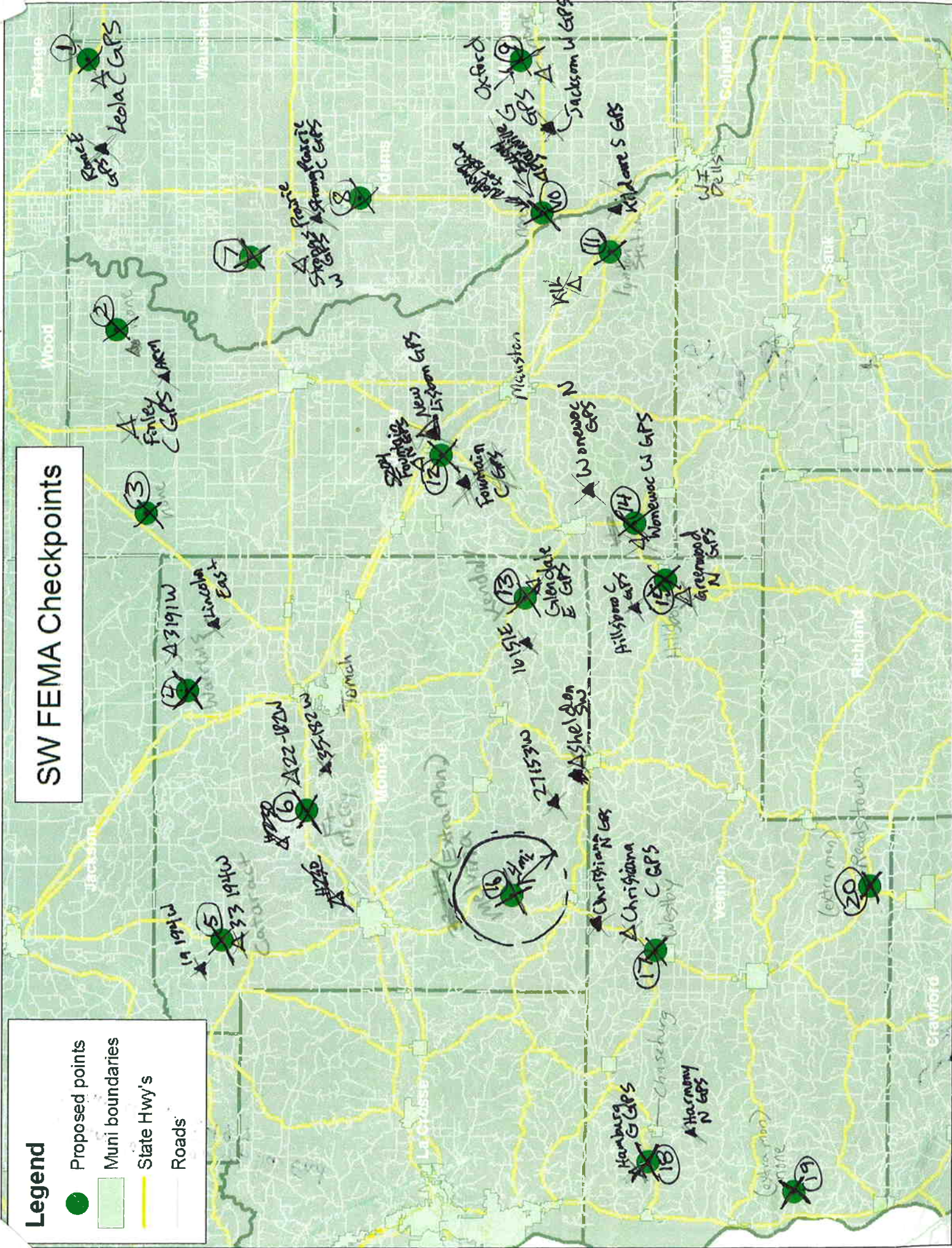
Includes Control and Check Points left out of statistical analysis



# Legend

- Proposed points
- Muni boundaries
- State Hwy's
- Roads

## SW FEMA Checkpoints





# Verdon County Ground-Truthing Control Pt. Setups

Face  
Vegeta

## Location #15:

\* Base @ PID "DH5081" (Greenwood N GPS)

\* Checked into PID "DH5137" (Hilgerson C GPS)

- Vertical within 0.05' ✓

Mowed Grass: Pts 20,034 - 20,033

Concrete: Pts 20,034 - 20,058

Tall Grass/Woods: Pts 35,001 - 35,025

Brush/Low Trees: Pts 35,026 - 35,047

Tree Cover: Pts 35,048 - 35,072

## Location #17:

\* Base setup @ PID "DH5085" (Christiana C GPS)

\* Checked into PID "DH5086" (Christiana N GPS)

- Vertical within 0.05' ✓

Asphalt: Pts 50,002 - 50,026

Concrete: Pts 50,027 - 50,051

Tree Cover: Pts 55,001 - 55,025

Tall Grass/Woods: Pts 55,026 - 55,050

Brush/Low Trees: Pts 55,051 - 55,072

Mowed Grass: Pts 55,073 - 55,097

Gravel: Pts 55,098 - 55,121

## Location #18:

\* Base setup @ PID "DH4972" (Hamburg GPS)

\* Checked into PID "DH5064" (Hambury N GPS)

- Vertical within 0.05' ✓

Asphalt: Pts 50,054 - 50,079

Concrete: Pts 50,080 - 50,104

Mowed Grass: Pts 50,105 - 50,134

Gravel: Pts 50,135 - 50,159

Brush/Low Trees: Pts 55,123 - 55,145

Tall Grass/Woods: Pts 55,146 - 55,170

Tree Cover: Pts 55,171 - 55,195

## Location #19:

\* Base setup @ PID "DH5438" (Genoa W GPS)

\* Checked into PID "DH5176" (Genoa GPS)

- Vertical within 0.05' ✓

Mowed Grass: Pts 50,162 - 50,187

Gravel: Pts 50,188 - 50,212

Asphalt: Pts 55,196 - 55,220

Concrete: Pts 55,221 - 55,245

Tree Cover: Pts 55,246 - 55,270

Tall Grass/Woods: Pts 55,271 - 55,296

Brush/Low trees: Pts 55,297 - 55,318

## Vernon County Ground-Truthing

CP Setups Continued

Tree  
Vegeter

Location # 20 =

\* Base Setup @ PID "DH5065" (Kilapoo C GPS)

\* Checked into PID "DH5157" (Kilapoo W GPS)

-Vertical within 0.05'

Mowed Grass: Pts 50, 215 - 50, 239

Gravel: Pts 50, 240 - 50, 263

Concrete: Pts 50, 264 - 50, 288

Asphalt: Pts 50, 289 - 50, 313

Brush/low trees: Pts 55, 319 - 55, 343

Tall Grass/weeds: Pts 55, 344 - 55, 368

Tree Cover: Pts 55, 369 - 55, 394