

# Check Point Survey Report

**“South Dakota - Missouri River LiDAR FY 2016”**

**USGS Contract: G16PC00020**

**Task Order Number: G16PD00482**

**Prepared for:**

***United States Geological Survey (USGS)***



Prepared By:

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	Including: a) Point Documentation Report & Photos of Survey Points	
	b) Final Coordinate List in Excel Format	
	c) NGS Data Sheets for Project Controls	

# 1. INTRODUCTION

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## 1.1 *Project Summary*

Dewberry Consultants LLC is under contract to the United States Geological Survey to provide 301 Check Points in the State of South Dakota. Under the above referenced USGS Task Order, Dewberry is tasked to complete the quality assurance of LiDAR products. As part of this work Dewberry staff will complete Check Point surveys that will be used to evaluate vertical and horizontal accuracy. The ground survey was conducted May 13 thru May 26, 2016.

Existing NGS Control Points were located and surveyed to check the accuracy of the RTK/GPS survey equipment with the results shown in Section 2.4 of this Report.

As an internal QA/QC procedure and to verify that the Check Points meet the 95% confidence level approximately 50% of the points were re-observed and are shown in Section 5 of this report.

Final horizontal coordinates are referenced to UTM, Zone 14, NAD83 (2011) in meters. Final Vertical elevations are referenced to NAVD88 in meters using Geoid model 2012B (Geoid12B).

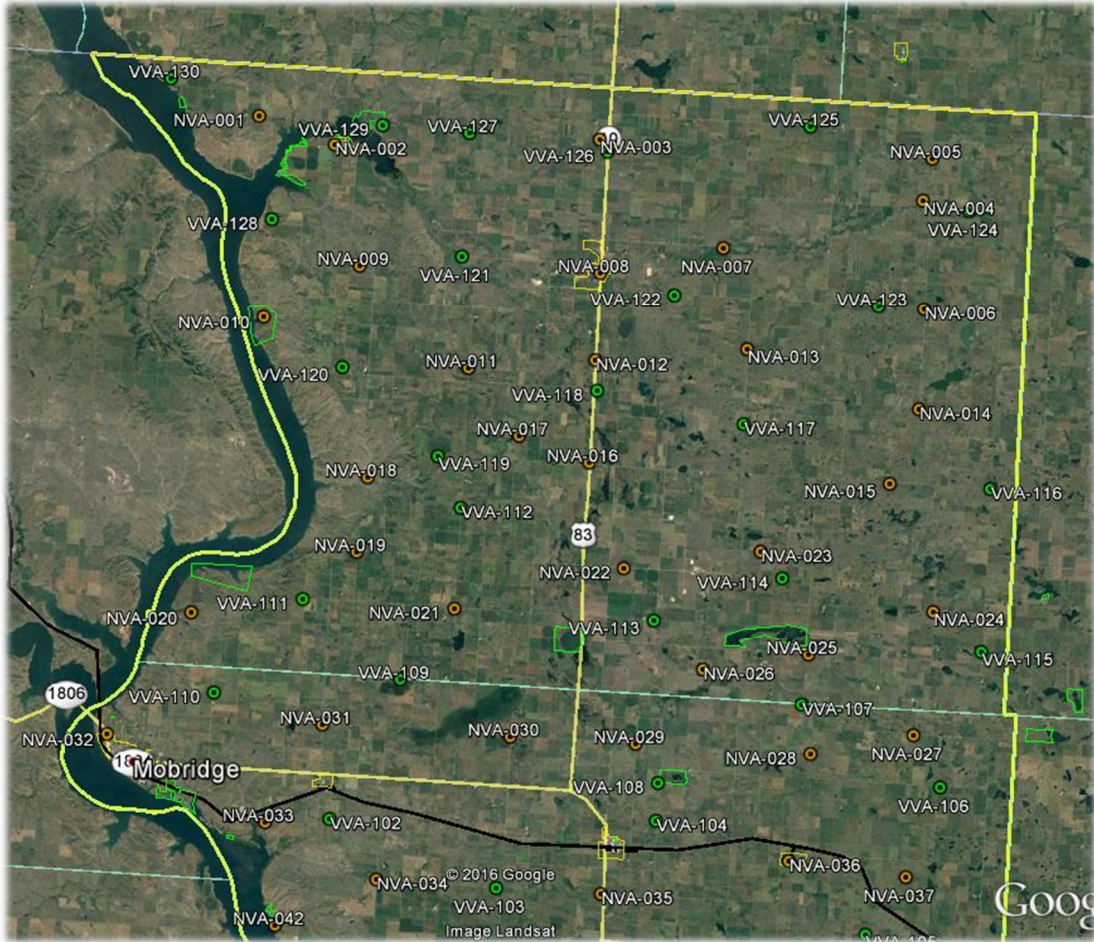
## 1.2 *Points of Contact*

Questions regarding the technical aspects of this report should be addressed to:

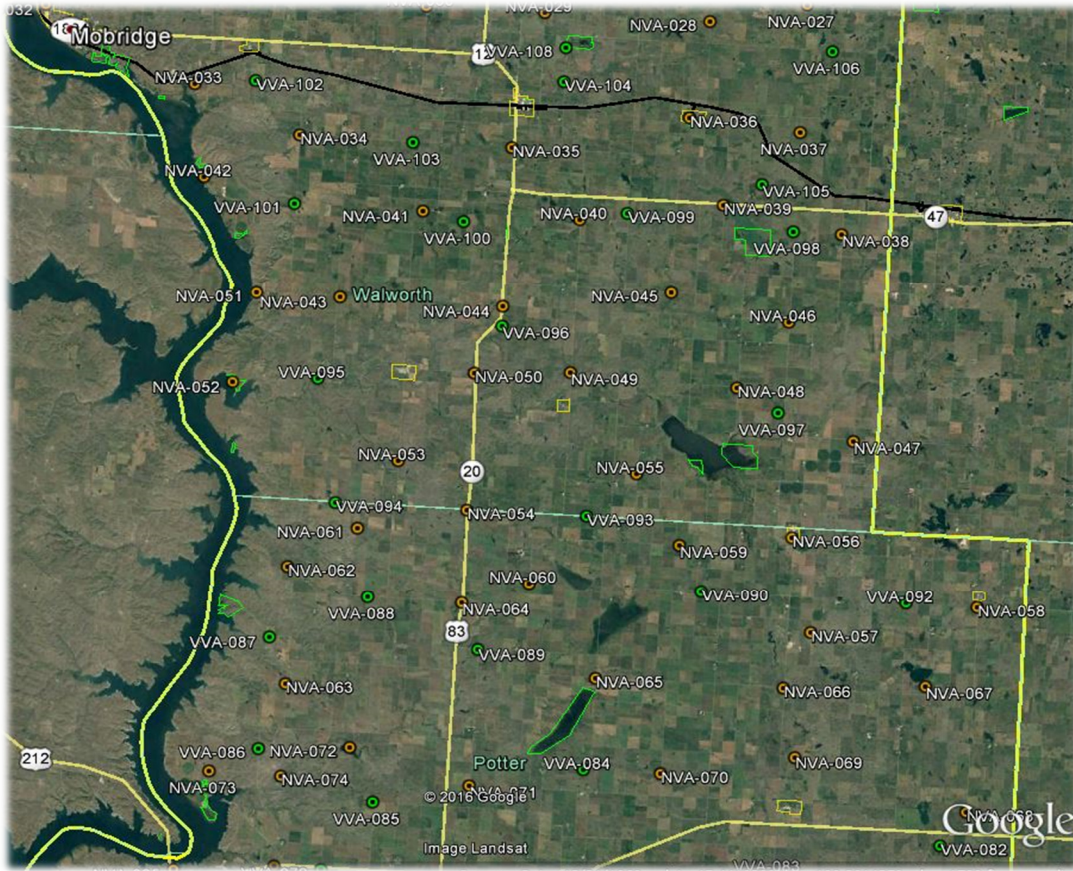
### **Dewberry Consultants LLC**

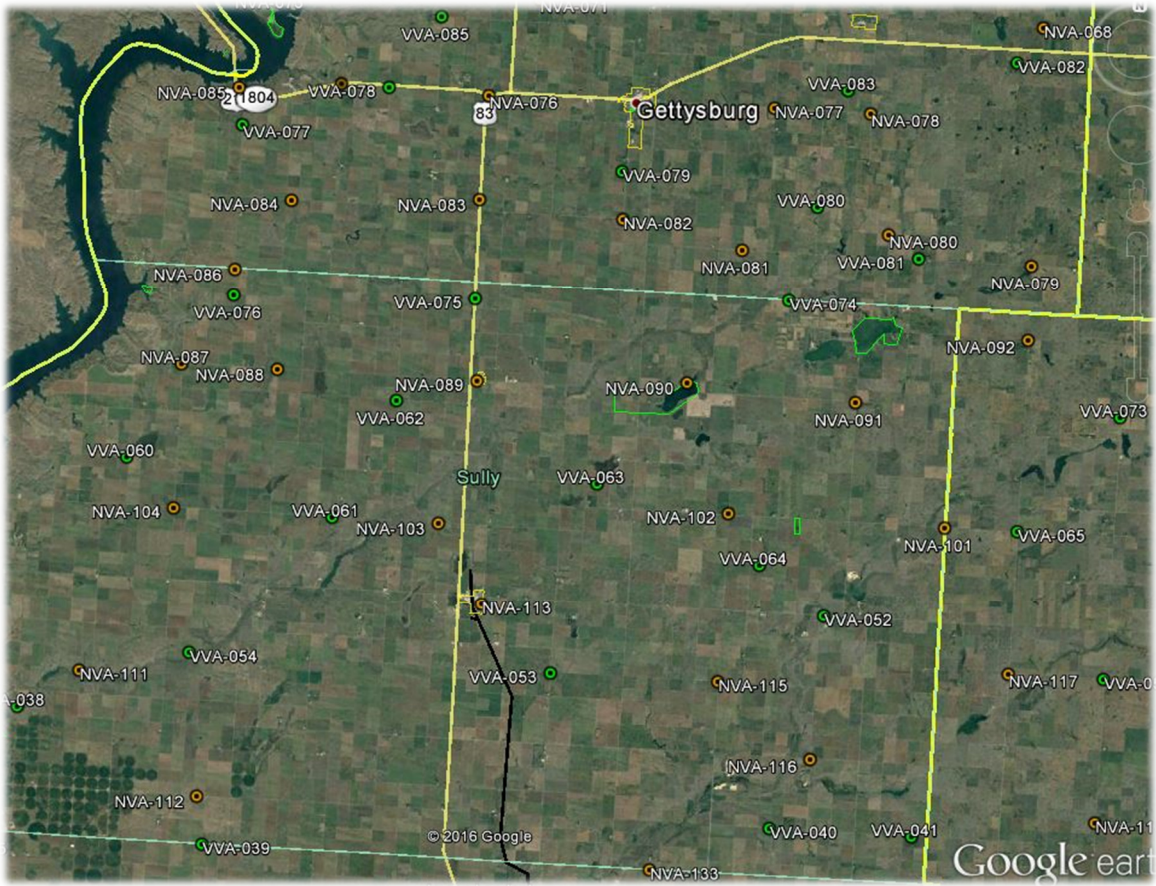
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### 1.3 Project Area

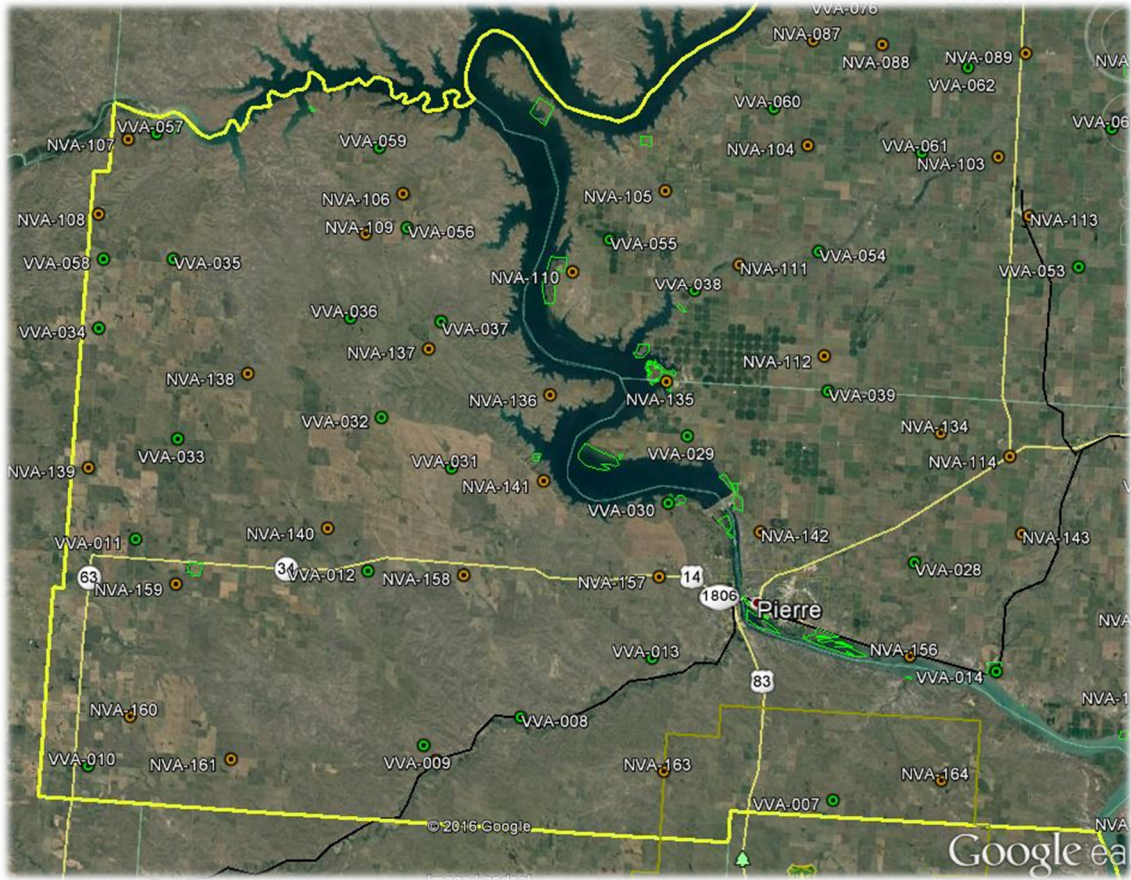


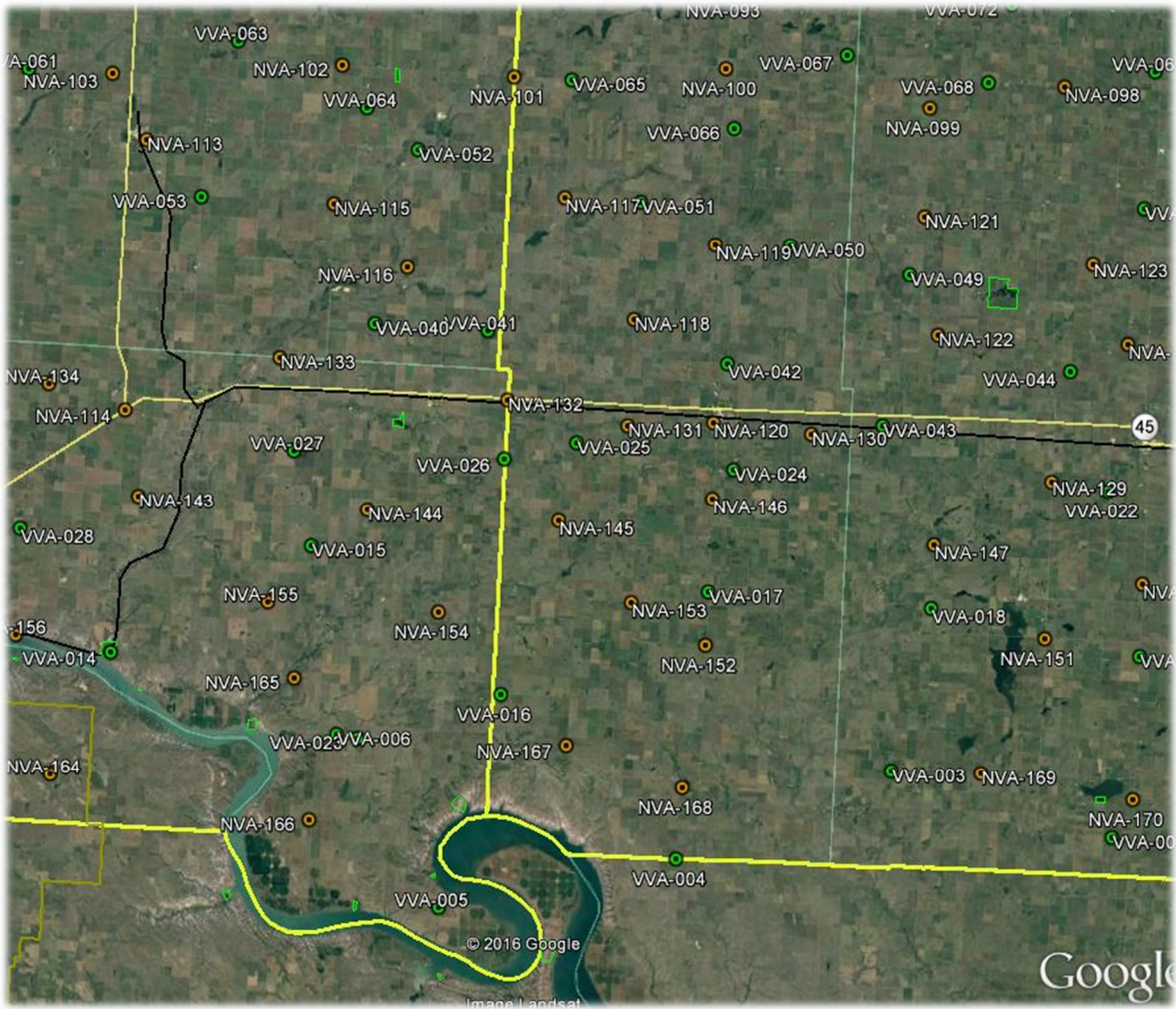




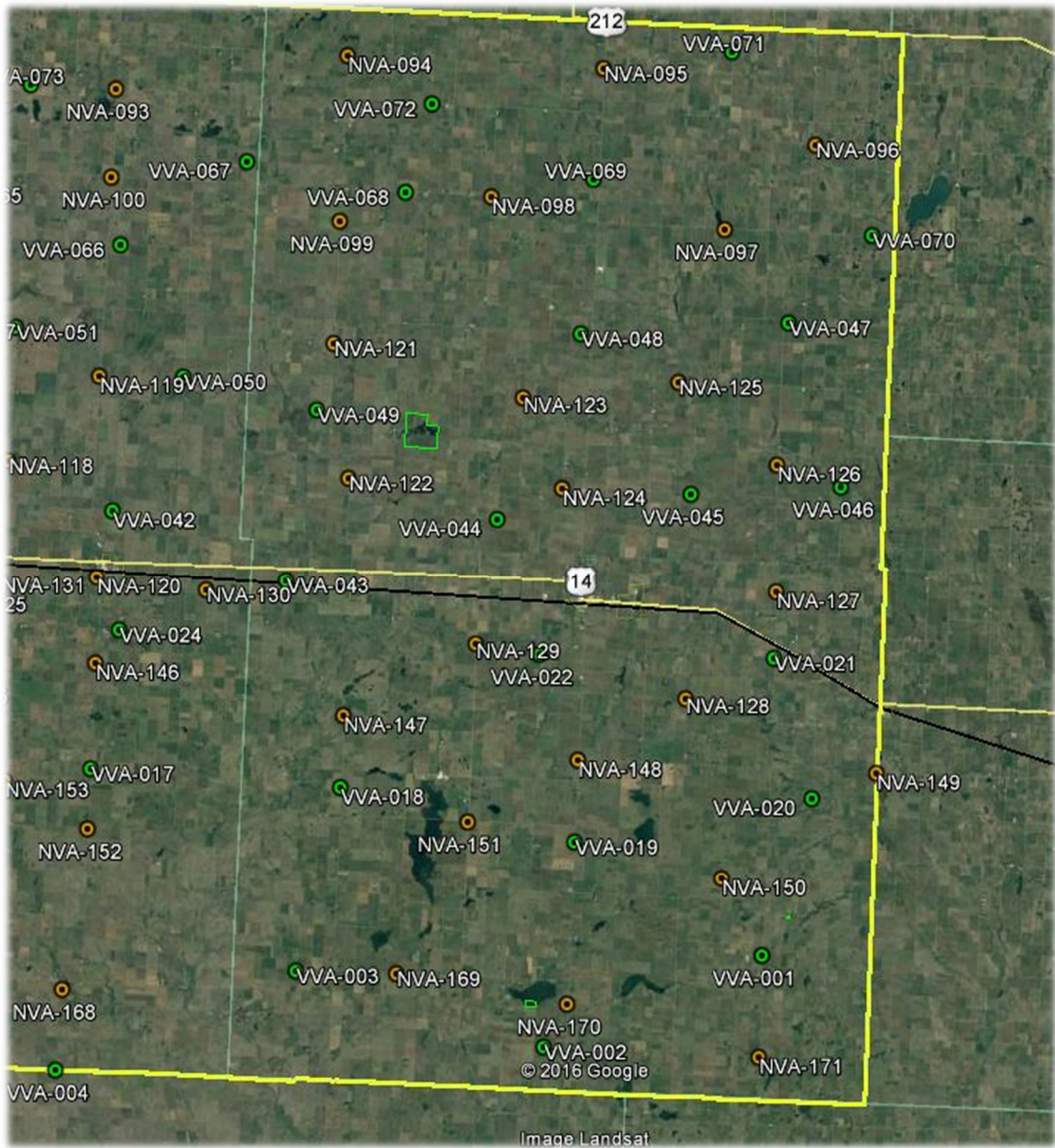












## PROJECT DETAILS

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### **2.1 *Survey Equipment***

In performing the GPS observations Trimble R-10 GNSS receiver/antenna attached to a two meter fixed height pole with a Trimble TSC3 Data Collector to collect GPS raw data were used to perform the field surveys.

### **2.2 *Survey Point Detail***

The 301 LiDAR Check Points were well distributed throughout the project area.

A sketch was made for each location and a nail was set at the point where possible or at an identifiable point. The Check Point locations are detailed on the “Check Point Documentation Report” sheets attached to this report.

### **2.3 *Network Design***

The GPS survey performed by Dewberry Consultants LLC office located in Lanham, MD was tied to a Real Time Network operated by Midstates VRS. The network is a series of “real-time” continuously operating, high precision GPS reference stations. All of the reference stations have been linked together using Trimble GPSNet software, creating a Virtual Reference Station System (VRS).

The Trimble NetR5 Reference Station is a multi-channel, multi-frequency GNSS (Global Navigation Satellite System) receiver designed for use as a stand-alone reference station or as part of a GNSS infrastructure solution. Trimble R-Track technology in the NetR5 receiver supports the modernized GPS L2C and L5 signals as well as GLONASS L1/L2 signals.

## 2.4 Field Survey Procedures and Analysis

Dewberry field surveyors used Trimble R-10 GNSS receivers, which is a geodetic quality dual frequency GPS receiver, to collect data at each surveyed location.

All locations were occupied once with approximately 50% of the locations being re-observed. All re-observations matched the initially derived station positions within the allowable tolerance of  $\pm 5\text{cm}$  or within the 95% confidence level. Each occupation which utilized the VRS network was occupied for approximately three (3) minutes in duration and measured to 180 epochs.

Each occupation which utilized OPUS (if used) was occupied between 20 and 30 minutes.

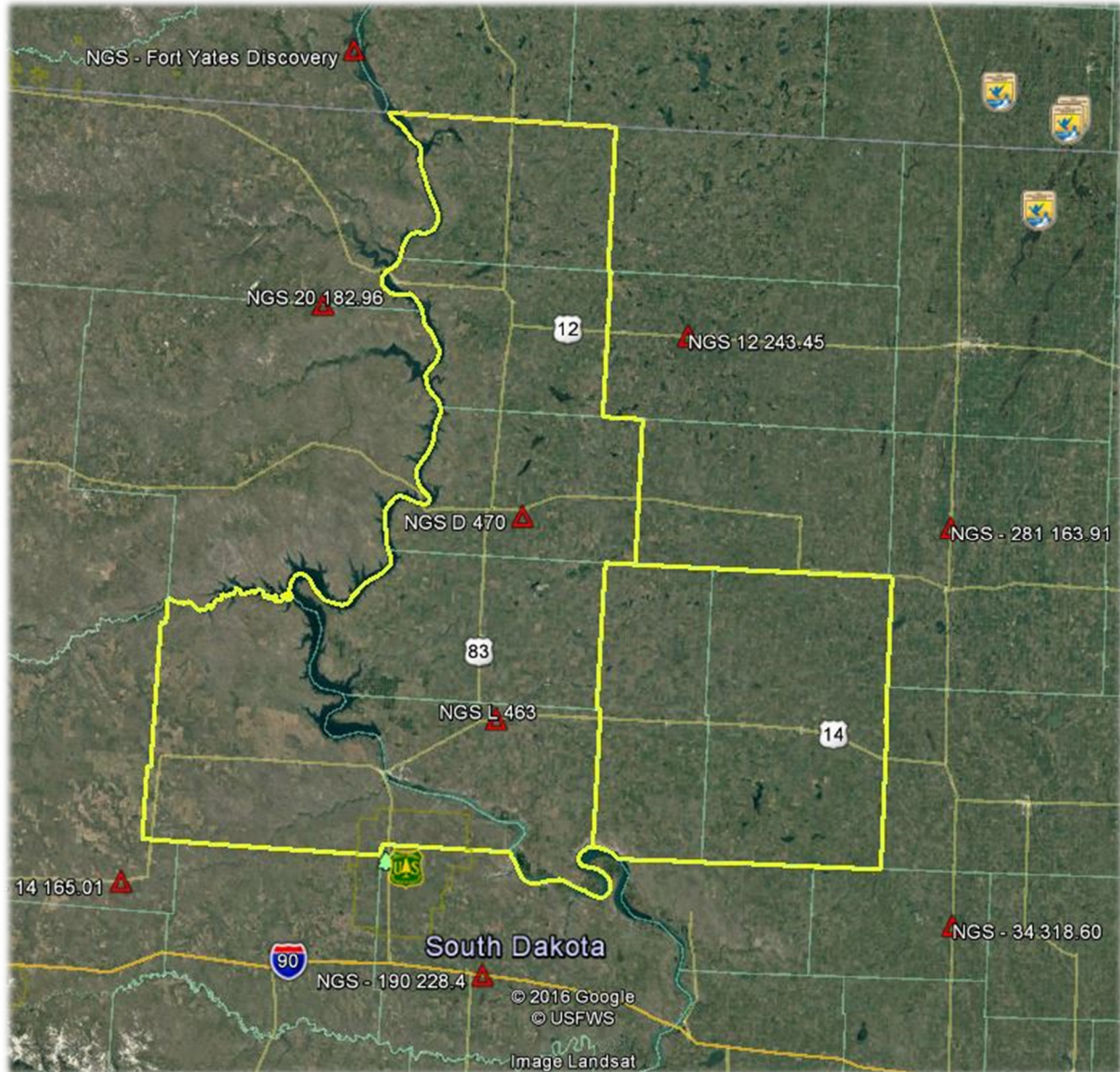
Field GPS observations are detailed on the “Check Point Documentation Reports” submitted as part of this report.

Nine (9) existing NGS monument listed in the NSRS database were located as an additional QA/QC method to check the horizontal and vertical accuracy of the VRS network as well as being the primary project control monuments designated as AC7947, OS0803, AB9017, AC7878, AE4105, AD8931, AE9763, AC7917 and AC7971. The results are as follows:

PT. #	Observed Values			Data Sheet Values			$\Delta X$	$\Delta Y$	$\Delta Z$
	NORTHING	EASTING	ELEVS.	NORTHING	EASTING	ELEVS.			
14 165.01	4881254.318	321650.493	585.643	4,881,254.368	321,650.511	585.6	0.050	0.018	-0.043
I90 228.4	4860915.485	419142.545	545.163	4,860,915.570	419,142.568	545.129	0.085	0.023	-0.034
L 463	4929245.929	419778.082	530.351	4,929,245.943	419,778.089	530.355	0.014	0.007	0.004
34 318.6	4879486.026	543858.237	425.944	4,879,486.019	543,858.243	426.0	-0.007	0.006	0.056
D 470	4983284.107	424333.706	628.889	4,983,284.109	424,333.714	628.871	0.002	0.008	-0.018
281 163.91	4985349.570	538346.019	394.481	4,985,349.582	538,346.032	394.483	0.012	0.013	0.002
12 243.45	5032877.015	466136.295	557.683	5,032,876.977	466,136.255	557.717	-0.038	-0.040	0.034
20 182.96	5036951.738	368669.234	660.554	5,036,951.763	368,669.251	660.558	0.025	0.017	0.004
FORT YATES DISCOVERY II	5105263.498	373675.687	495.974	5,105,263.551	373,675.682	496.0	0.053	-0.005	0.026

The above results indicate that the VRS network is providing positional values within the 5cm parameters for this survey.





***NGS Monuments Utilized for this Project***

## **2.5    *Adjustment***

The survey data was collected using Virtual Reference Stations (VRS) methodology within a Virtual Reference System (VRS).

The system is designed to provide a true Network RTK performance, the RTKNet software enables high-accuracy positioning in real time across a geographic region. The RTKNet software package uses real-time data streams from the Midstates VRS system user and generates correction models for high-accuracy RTK GPS corrections throughout the network. Therefore, corrections were applied to the points as they were being collected, thus negating the need for a post process adjustment.

## **2.6    *Data Processing Procedures***

After field data is collected the information is downloaded from the data collectors into the office software. The Software program used is called TBC or Trimble Business Center.

Downloaded data is run through the TBC program to obtain the following reports; points report, point comparison report and a point detail report. The reports are reviewed for point accuracy and precision.

After review of the point data an “ASCII” or “txt” file which is the industry standard is created. Point files are loaded into our CADD program (Carlson Survey 2014) to make a visual check of the point data (Pt. #, Coordinates, Elev. and Description). The data can now be imported into the final product.

### 3. FINAL COORDINATES

SOUTH DAKOTA – CHECK POINTS			
POINT ID	NORTHING (m)	EASTING (m)	ELEV. (m)
<b>NVA CHECK POINTS</b>			
NVA-001	5085427.439	394713.973	519.623
NVA-002	5083835.417	399634.686	503.543
NVA-003	5084881.040	416562.775	526.470
NVA-004	5081692.407	437394.251	554.267
NVA-005	5084643.394	437870.401	601.384
NVA-006	5074948.963	437795.547	566.291
NVA-007	5078307.523	424766.163	531.938
NVA-008	5076368.177	416979.816	514.064
NVA-009	5076135.343	401593.230	594.741
NVA-010	5072519.071	395651.327	496.359
NVA-011	5069839.597	408842.634	599.516
NVA-012	5070722.960	416922.741	519.079
NVA-013	5071870.935	426584.032	551.824
NVA-014	5068519.102	437751.131	553.362
NVA-015	5063665.960	436093.594	563.938
NVA-016	5064168.173	416818.869	527.432
NVA-017	5065672.156	412297.608	555.748
NVA-018	5062585.150	402760.686	525.652
NVA-019	5057828.553	402244.601	600.224
NVA-020	5053445.704	391834.740	516.015
NVA-021	5054451.885	408643.048	565.424
NVA-022	5057506.091	419347.424	530.872
NVA-023	5058970.143	428042.274	545.708
NVA-024	5055608.723	439261.270	537.522
NVA-025	5052475.862	431391.864	536.037
NVA-026	5051220.705	424699.002	546.944
NVA-027	5047643.827	438333.886	613.496
NVA-028	5046139.570	431821.279	604.989
NVA-029	5046281.165	420603.485	530.373
NVA-030	5046367.525	412584.568	523.884
NVA-031	5046609.848	400554.054	526.086
NVA-032	5045382.826	386794.401	511.123
NVA-033	5040200.756	397159.406	505.685
NVA-034	5037066.839	405954.446	605.743
NVA-035	5036621.956	418851.740	589.891
NVA-036	5039262.125	430740.840	639.829



NVA-037	5038559.799	438251.031	652.938
NVA-038	5031459.015	441354.919	602.233
NVA-039	5033212.537	433301.645	602.513
NVA-040	5031717.500	423654.421	619.190
NVA-041	5031867.496	413019.276	594.529
NVA-042	5033648.646	398083.446	509.711
NVA-043	5025511.373	407719.117	577.548
NVA-044	5025335.963	418712.878	626.031
NVA-045	5026810.890	430049.368	629.269
NVA-046	5025085.951	438097.114	588.787
NVA-047	5016884.748	442845.222	586.207
NVA-048	5020206.979	434824.857	597.120
NVA-049	5020866.913	423502.883	587.656
NVA-050	5020568.760	417016.413	592.355
NVA-051	5025564.834	402000.105	537.313
NVA-052	5019194.788	400664.831	498.369
NVA-053	5014150.535	412144.355	581.679
NVA-054	5010907.579	416946.172	635.548
NVA-055	5013948.400	428280.202	611.112
NVA-056	5010096.726	438998.629	582.147
NVA-057	5003263.274	440579.240	589.438
NVA-058	5005547.497	451759.873	595.411
NVA-059	5009045.962	431404.504	588.621
NVA-060	5005887.444	421341.022	619.697
NVA-061	5009276.155	409601.352	593.952
NVA-062	5006343.056	404995.339	568.269
NVA-063	4998025.126	405262.379	566.751
NVA-064	5004319.512	416889.449	613.103
NVA-065	4999382.845	426158.719	594.901
NVA-066	4999256.009	438917.971	589.165
NVA-067	4999773.671	448514.279	583.996
NVA-068	4989491.934	453376.686	603.101
NVA-069	4994389.810	439902.503	591.228
NVA-070	4993265.203	430869.992	624.044
NVA-071	4991439.304	417987.589	619.461
NVA-072	4993753.973	409796.817	563.914
NVA-073	4991667.198	400336.523	530.986
NVA-074	4991659.350	403553.401	517.070
NVA-075	4985153.701	405042.044	576.545
NVA-076	4984807.294	414899.924	594.230
NVA-077	4984817.349	433978.970	628.985

NVA-078	4984736.455	440381.129	625.822
NVA-079	4974976.440	451579.612	592.826
NVA-080	4976657.078	441923.939	581.610
NVA-081	4975204.317	432237.348	581.158
NVA-082	4976947.303	423968.567	601.282
NVA-083	4977791.681	414592.474	595.093
NVA-084	4977282.123	402261.746	566.116
NVA-085	4984629.912	398257.566	517.860
NVA-086	4972492.759	398410.231	553.543
NVA-087	4965819.016	395245.484	558.783
NVA-088	4965738.564	401655.890	573.008
NVA-089	4965558.884	414981.891	563.356
NVA-090	4966111.798	428993.561	553.835
NVA-091	4965254.063	440264.589	585.452
NVA-092	4968510.020	451741.842	583.938
NVA-093	4965011.127	464408.951	564.890
NVA-094	4968168.191	481719.334	584.227
NVA-095	4968152.672	500967.700	447.622
NVA-096	4963327.254	517153.899	415.760
NVA-097	4956900.380	510576.085	422.175
NVA-098	4958465.696	492966.879	479.952
NVA-099	4956180.184	481679.036	509.303
NVA-100	4958586.776	464371.408	551.016
NVA-101	4957107.973	446599.049	549.229
NVA-102	4957440.111	429338.913	591.050
NVA-103	4955899.251	412845.092	574.752
NVA-104	4956135.428	395167.616	575.050
NVA-105	4951364.311	382195.125	598.452
NVA-106	4950001.991	357987.120	606.582
NVA-107	4953871.846	332336.197	563.578
NVA-108	4946839.703	329943.578	630.556
NVA-109	4946152.373	354698.743	620.364
NVA-110	4943524.929	373960.422	545.202
NVA-111	4944901.926	389342.535	521.887
NVA-112	4936763.225	397321.116	536.200
NVA-113	4950605.405	415915.003	572.049
NVA-114	4928335.518	415171.945	547.022
NVA-115	4946052.724	431953.069	528.243
NVA-116	4941095.744	438355.466	514.084
NVA-117	4947415.092	451309.119	541.413
NVA-118	4937723.558	458349.089	546.635

NVA-119	4944096.416	464128.083	521.636
NVA-120	4929503.633	464614.199	581.294
NVA-121	4947260.701	481625.299	497.943
NVA-122	4937549.149	483172.644	498.839
NVA-123	4943953.676	496053.929	469.773
NVA-124	4937830.145	499291.392	457.644
NVA-125	4945611.869	507619.478	429.745
NVA-126	4939982.691	515287.492	426.826
NVA-127	4930743.710	515645.068	446.349
NVA-128	4922683.912	506003.033	508.292
NVA-129	4925936.757	493277.182	539.970
NVA-130	4928970.044	472893.806	562.694
NVA-131	4929367.767	456881.206	551.835
NVA-132	4930589.596	447248.730	548.884
NVA-133	4933197.985	427968.932	512.745
NVA-134	4930193.286	408647.642	559.101
NVA-135	4933751.834	383131.897	506.935
NVA-136	4932057.962	372405.234	559.716
NVA-137	4935770.965	361016.404	654.440
NVA-138	4932746.083	344428.610	586.938
NVA-139	4923453.978	330138.510	649.479
NVA-140	4918904.493	352435.805	613.197
NVA-141	4924142.000	372177.792	594.634
NVA-142	4920291.985	392457.049	543.345
NVA-143	4921283.672	416619.177	552.335
NVA-144	4921042.933	435945.132	568.828
NVA-145	4920880.656	451998.724	608.900
NVA-146	4923301.045	464836.263	595.938
NVA-147	4920305.728	483643.818	621.236
NVA-148	4917871.502	501316.274	539.610
NVA-149	4917921.819	523772.766	436.977
NVA-150	4909811.001	512651.295	560.405
NVA-151	4913039.405	493265.323	601.824
NVA-152	4911230.199	464809.010	658.115
NVA-153	4914426.757	458386.456	623.069
NVA-154	4912914.582	442272.412	562.185
NVA-155	4913082.748	427768.310	511.816
NVA-156	4909458.456	406805.053	442.541
NVA-157	4915822.741	383240.583	536.477
NVA-158	4915155.262	365199.086	586.045
NVA-159	4913147.206	338672.293	611.364



NVA-160	4900686.919	334946.324	621.774
NVA-161	4897163.539	344486.215	627.898
NVA-162	4897895.449	363444.821	493.612
NVA-163	4897853.506	384515.040	576.032
NVA-164	4898150.922	410220.477	548.620
NVA-165	4907073.170	430643.935	496.499
NVA-166	4895357.180	432132.543	516.520
NVA-167	4902507.295	453457.216	627.801
NVA-168	4899564.275	463292.431	562.003
NVA-169	4901764.826	488413.991	583.273
NVA-170	4900139.950	501309.090	547.541
NVA-171	4896941.442	515855.809	580.496
<b>VVA CHECK POINTS</b>			
VVA-001	4904278.149	515768.174	536.691
VVA-002	4897268.315	498859.161	565.799
VVA-003	4901593.654	480773.321	572.764
VVA-004	4893494.142	463009.763	528.691
VVA-005	4890386.508	443010.699	442.712
VVA-006	4926520.322	483397.902	569.106
VVA-007	4895883.813	400274.590	542.468
VVA-008	4902206.389	371149.949	476.699
VVA-009	4899275.032	362183.375	550.156
VVA-010	4895960.586	331303.770	637.163
VVA-011	4916877.018	334756.734	622.014
VVA-012	4915148.606	356305.050	582.525
VVA-013	4908237.890	382543.349	538.936
VVA-014	4908369.339	414970.100	439.352
VVA-015	4917862.601	431284.785	534.018
VVA-016	4906444.523	447845.200	619.315
VVA-017	4916832.262	464797.558	632.369
VVA-018	4915093.835	483586.689	605.228
VVA-019	4912513.854	501269.957	565.139
VVA-020	4916260.848	520210.131	459.001
VVA-021	4925916.315	515677.269	458.047
VVA-022	4925941.570	498401.445	497.117
VVA-023	4902295.478	435925.489	520.043
VVA-024	4925763.852	466525.459	566.397
VVA-025	4925934.328	451991.673	571.888
VVA-026	4925735.903	446468.944	582.235
VVA-027	4925698.848	429561.833	533.214
VVA-028	4918184.424	406820.648	526.580

VVA-029	4928860.887	385249.255	532.326
VVA-030	4922636.903	383780.167	511.876
VVA-031	4924982.082	363620.462	591.521
VVA-032	4929274.974	356921.245	641.137
VVA-033	4926475.379	338237.410	643.929
VVA-034	4936291.344	330493.323	630.282
VVA-035	4943067.387	337048.541	608.647
VVA-036	4938305.024	353657.120	602.129
VVA-037	4936298.168	362490.575	635.472
VVA-038	4942133.541	385321.623	499.704
VVA-039	4933562.508	398092.630	539.821
VVA-040	4936346.493	435912.159	510.136
VVA-041	4936193.121	444962.028	532.265
VVA-042	4934358.167	465575.763	546.390
VVA-043	4929869.168	478849.807	537.144
VVA-044	4935817.417	494451.706	475.607
VVA-045	4937547.106	508932.603	442.131
VVA-046	4938769.695	520160.492	424.854
VVA-047	4950387.616	515179.393	414.151
VVA-048	4948792.623	500117.198	463.440
VVA-049	4942399.132	480602.806	499.580
VVA-050	4944254.942	470435.325	511.091
VVA-051	4947374.557	457737.877	531.424
VVA-052	4951030.290	439710.031	513.830
VVA-053	4946072.144	420761.523	547.424
VVA-054	4946415.243	396637.533	536.365
VVA-055	4946648.754	377239.517	549.073
VVA-056	4946871.328	358517.277	625.417
VVA-057	4954536.554	334942.100	552.115
VVA-058	4942727.793	330598.222	645.039
VVA-059	4954139.518	355604.322	606.755
VVA-060	4959421.129	391951.246	557.220
VVA-061	4955988.526	405618.115	559.447
VVA-062	4964004.185	409691.057	575.150
VVA-063	4959040.113	423204.468	564.195
VVA-064	4955603.618	434503.908	569.448
VVA-065	4957086.701	451479.383	565.508
VVA-066	4952543.198	464215.744	526.285
VVA-067	4960214.281	474490.160	541.448
VVA-068	4958412.623	486503.676	504.517
VVA-069	4957055.852	521677.397	415.927

VVA-070	4960104.338	501420.779	456.031
VVA-071	4969826.959	510545.701	421.509
VVA-072	4964976.154	488437.118	513.880
VVA-073	4964951.349	461264.252	568.992
VVA-074	4971908.083	435409.923	565.159
VVA-075	4971005.475	414599.297	576.405
VVA-076	4968292.988	398456.231	562.712
VVA-077	4982114.464	398617.109	581.702
VVA-078	4985082.719	408231.493	582.518
VVA-079	4980630.676	424246.719	618.515
VVA-080	4978333.100	437165.444	598.107
VVA-081	4975065.727	444066.134	576.131
VVA-082	4988231.502	450098.088	607.901
VVA-083	4986363.673	438816.249	613.680
VVA-084	4992923.578	425604.090	627.169
VVA-085	4990010.621	411510.110	609.302
VVA-086	4993391.936	403577.536	564.907
VVA-087	5001285.275	404503.802	561.590
VVA-088	5004443.578	410486.943	601.577
VVA-089	5001048.245	418128.245	608.287
VVA-090	5005845.300	433009.710	578.010
VVA-091	4999226.659	443035.128	592.890
VVA-092	5005632.125	446938.666	588.817
VVA-093	5010800.855	425027.622	634.606
VVA-094	5011013.118	408034.239	562.526
VVA-095	5019714.446	406437.009	517.371
VVA-096	5023833.102	418728.751	612.421
VVA-097	5018668.152	437656.882	589.845
VVA-098	5031551.298	437974.416	611.856
VVA-099	5032327.302	426823.448	622.060
VVA-100	5030223.015	415573.775	599.284
VVA-101	5031957.459	404324.572	612.445
VVA-102	5040596.934	401274.216	539.377
VVA-103	5036781.052	412082.614	569.363
VVA-104	5041432.951	422108.932	586.767
VVA-105	5034758.951	436068.824	634.205
VVA-106	5044341.776	439548.867	629.631
VVA-107	5049216.966	431047.258	571.878
VVA-108	5043857.112	422154.661	554.088
VVA-109	5049719.747	405366.387	535.318
VVA-110	5048338.882	393542.950	579.525



VVA-111	5054625.434	398953.999	589.019
VVA-112	5062554.072	408723.284	578.232
VVA-113	5054274.373	421391.311	547.720
VVA-114	5057300.873	429510.333	530.753
VVA-115	5053412.936	442470.634	536.171
VVA-116	5065239.049	442568.694	569.825
VVA-117	5067036.461	426570.249	538.702
VVA-118	5068775.292	417163.993	517.103
VVA-119	5064117.949	407134.465	617.984
VVA-120	5069543.586	400796.940	608.969
VVA-121	5077020.060	408117.944	503.810
VVA-122	5075124.689	421795.655	540.801
VVA-123	5075023.630	434825.975	565.904
VVA-124	5081370.605	440522.503	555.318
VVA-125	5086340.923	430009.698	615.696
VVA-126	5084199.030	417110.181	535.061
VVA-127	5084943.149	408228.429	520.812
VVA-128	5078890.493	395824.869	515.163
VVA-129	5085170.895	402663.282	502.180
VVA-130	5087594.556	388975.293	495.459

#### 4. GPS OBSERVATIONS

NVA					
POINT ID	OBSERV. DATE	JULIAN DATE	TIME OF DAY (AST)	RE-OBSERV. DATE	RE-OBSERV. TIME
NVA-001	5/23/2016	144	15:03	5/24/2016	12:46
NVA-002	5/22/2016	143	17:43	N/A	N/A
NVA-003	5/23/2016	144	12:54	N/A	N/A
NVA-004	5/23/2016	144	17:40	N/A	N/A
NVA-005	5/23/2016	144	17:56	5/24/2016	10:11
NVA-006	5/24/2016	145	15:44	N/A	N/A
NVA-007	5/23/2016	144	16:58	5/24/2016	9:16
NVA-008	5/23/2016	144	11:42	N/A	N/A
NVA-009	5/22/2016	143	16:44	5/24/2016	14:11
NVA-010	5/22/2016	143	15:59	N/A	N/A
NVA-011	5/22/2016	143	14:49	5/24/2016	14:41
NVA-012	5/23/2016	144	9:46	N/A	N/A
NVA-013	5/24/2016	145	14:44	5/25/2016	12:39
NVA-014	5/24/2016	145	13:47	N/A	N/A
NVA-015	5/24/2016	145	13:25	5/25/2016	15:02
NVA-016	5/23/2016	144	9:03	5/24/2016	8:21
NVA-017	5/23/2016	144	8:21	N/A	N/A
NVA-018	5/22/2016	143	13:41	N/A	N/A
NVA-019	5/22/2016	143	13:16	N/A	N/A
NVA-020	5/21/2016	142	18:12	N/A	N/A
NVA-021	5/22/2016	143	12:24	5/24/2016	16:13
NVA-022	5/24/2016	145	10:10	5/25/2016	11:48
NVA-023	5/24/2016	145	10:31	5/25/2016	12:11
NVA-024	5/24/2016	145	11:23	5/25/2016	15:21
NVA-025	5/21/2016	142	13:25	5/24/2016	7:18
NVA-026	5/24/2016	145	9:07	N/A	N/A
NVA-027	5/21/2016	142	12:03	N/A	N/A
NVA-028	5/21/2016	142	13:55	5/24/2016	6:29
NVA-029	5/21/2016	142	14:35	N/A	N/A
NVA-030	5/21/2016	142	16:25	5/25/2016	11:10
NVA-031	5/21/2016	142	17:18	N/A	N/A
NVA-032	5/21/2016	142	13:55	N/A	N/A
NVA-033	5/21/2016	142	15:22	N/A	N/A
NVA-034	5/23/2016	144	12:31	5/24/2016	17:43

NVA-035	5/21/2016	142	9:18	N/A	N/A
NVA-036	5/21/2016	142	10:40	5/24/2016	6:01
NVA-037	5/21/2016	142	10:55	N/A	N/A
NVA-038	5/20/2016	141	10:15	N/A	N/A
NVA-039	5/20/2016	141	9:30	N/A	N/A
NVA-040	5/20/2016	141	8:45	N/A	N/A
NVA-041	5/19/2016	140	8:30	N/A	N/A
NVA-042	5/19/2016	140	9:09	5/20/2016	17:06
NVA-043	5/19/2016	140	10:00	5/20/2016	16:36
NVA-044	5/20/2016	141	8:22	5/23/2016	13:37
NVA-045	5/20/2016	141	9:12	5/23/2016	14:15
NVA-046	5/20/2016	141	14:45	5/23/2016	15:13
NVA-047	5/20/2016	141	12:45	5/23/2016	18:22
NVA-048	5/20/2016	141	15:00	5/23/2016	12:23
NVA-049	5/23/2016	144	10:34	N/A	N/A
NVA-050	5/23/2016	144	12:34	N/A	N/A
NVA-051	5/19/2016	140	9:30	5/20/2016	16:16
NVA-052	5/19/2016	140	11:10	5/20/2016	15:53
NVA-053	5/19/2016	140	11:40	5/20/2016	14:56
NVA-054	5/23/2016	144	11:24	N/A	N/A
NVA-055	5/20/2016	141	16:23	5/23/2016	12:59
NVA-056	5/20/2016	141	15:35	5/23/2016	17:20
NVA-057	5/22/2016	143	17:01	N/A	N/A
NVA-058	5/22/2016	143	15:12	5/25/2016	8:08
NVA-059	5/23/2016	144	10:00	N/A	N/A
NVA-060	5/23/2016	144	11:47	5/25/2016	7:20
NVA-061	5/19/2016	140	12:15	5/20/2016	14:03
NVA-062	5/19/2016	140	12:48	5/20/2016	13:09
NVA-063	5/19/2016	140	14:43	5/20/2016	12:43
NVA-064	5/23/2016	144	11:05	N/A	N/A
NVA-065	5/23/2016	144	9:07	5/25/2016	6:43
NVA-066	5/22/2016	143	16:40	5/25/2016	8:59
NVA-067	5/22/2016	143	16:04	N/A	N/A
NVA-068	5/22/2016	143	14:25	5/25/2016	9:37
NVA-069	5/22/2016	143	17:20	N/A	N/A
NVA-070	5/22/2016	143	17:56	N/A	N/A
NVA-071	5/23/2016	144	8:12	N/A	N/A
NVA-072	5/19/2016	140	16:50	5/20/2016	12:15
NVA-073	5/19/2016	140	16:00	5/20/2016	11:44



NVA-074	5/19/2016	140	16:20	N/A	N/A
NVA-075	5/22/2016	143	11:44	N/A	N/A
NVA-076	5/22/2016	143	12:11	N/A	N/A
NVA-077	5/22/2016	143	12:46	5/25/2016	10:21
NVA-078	5/22/2016	143	13:13	5/25/2016	10:07
NVA-079	5/21/2016	142	10:53	N/A	N/A
NVA-080	5/21/2016	142	11:31	N/A	N/A
NVA-081	5/21/2016	142	12:23	N/A	N/A
NVA-082	5/21/2016	142	13:13	5/23/2016	8:31
NVA-083	5/21/2016	142	13:52	5/23/2016	8:03
NVA-084	5/21/2016	142	14:53	5/23/2016	7:42
NVA-085	5/22/2016	143	11:29	N/A	N/A
NVA-086	5/21/2016	142	16:00	N/A	N/A
NVA-087	5/19/2016	140	10:11	N/A	N/A
NVA-088	5/24/2016	145	11:18	N/A	N/A
NVA-089	5/24/2016	145	11:47	N/A	N/A
NVA-090	5/24/2016	145	13:36	N/A	N/A
NVA-091	5/24/2016	145	13:18	N/A	N/A
NVA-092	5/20/2016	141	15:53	N/A	N/A
NVA-093	5/20/2016	141	15:15	N/A	N/A
NVA-094	5/20/2016	141	10:39	N/A	N/A
NVA-095	5/19/2016	140	16:28	5/22/2016	12:49
NVA-096	5/19/2016	140	15:07	5/22/2016	11:26
NVA-097	5/19/2016	140	12:15	N/A	N/A
NVA-098	5/19/2016	140	17:22	N/A	N/A
NVA-099	5/20/2016	141	9:45	5/22/2016	14:08
NVA-100	5/20/2016	141	15:04	5/22/2016	14:41
NVA-101	5/20/2016	141	16:46	5/22/2016	15:30
NVA-102	5/24/2016	145	12:57	N/A	N/A
NVA-103	5/24/2016	145	12:07	5/23/2016	6:03
NVA-104	5/19/2016	140	9:10	5/23/2016	5:46
NVA-105	5/18/2016	139	10:54	N/A	N/A
NVA-106	5/20/2016	141	8:37	N/A	N/A
NVA-107	5/19/2016	140	17:15	N/A	N/A
NVA-108	5/16/2016	137	19:35	N/A	N/A
NVA-109	5/16/2016	137	15:47	N/A	N/A
NVA-110	5/18/2016	139	12:10	N/A	N/A
NVA-111	5/18/2016	139	12:37	5/20/2016	7:11
NVA-112	5/18/2016	139	13:30	N/A	N/A

NVA-113	5/18/2016	139	15:03	5/20/2016	8:13
NVA-114	5/18/2016	139	14:50	N/A	N/A
NVA-115	5/18/2016	139	13:53	5/20/2016	8:59
NVA-116	5/18/2016	139	13:34	5/20/2016	9:18
NVA-117	5/20/2016	141	14:24	5/22/2016	5:36
NVA-118	5/20/2016	141	13:33	N/A	N/A
NVA-119	5/20/2016	141	13:51	N/A	N/A
NVA-120	5/17/2016	138	8:43	N/A	N/A
NVA-121	5/20/2016	141	9:27	N/A	N/A
NVA-122	5/20/2016	141	8:53	N/A	N/A
NVA-123	5/19/2016	140	18:47	5/22/2016	8:31
NVA-124	5/19/2016	140	19:20	N/A	N/A
NVA-125	5/19/2016	140	18:32	5/22/2016	9:13
NVA-126	5/19/2016	140	10:09	N/A	N/A
NVA-127	5/19/2016	140	9:32	N/A	N/A
NVA-128	5/19/2016	140	9:01	N/A	N/A
NVA-129	5/16/2016	137	15:35	5/19/2016	9:11
NVA-130	5/16/2016	137	19:13	5/19/2016	9:46
NVA-131	5/19/2016	140	7:54	N/A	N/A
NVA-132	5/17/2016	138	16:43	5/19/2016	13:51
NVA-133	5/18/2016	139	12:26	5/19/2016	8:13
NVA-134	5/18/2016	139	14:47	5/19/2016	7:21
NVA-135	5/18/2016	139	10:03	5/20/2016	6:13
NVA-136	5/16/2016	137	12:55	N/A	N/A
NVA-137	5/16/2016	137	14:41	5/19/2016	15:36
NVA-138	5/16/2016	137	18:18	5/19/2016	14:06
NVA-139	5/19/2016	140	18:26	N/A	N/A
NVA-140	5/17/2016	138	10:04	N/A	N/A
NVA-141	5/16/2016	137	10:39	N/A	N/A
NVA-142	5/16/2016	137	7:33	5/19/2016	5:42
NVA-143	5/18/2016	139	15:43	N/A	N/A
NVA-144	5/18/2016	139	11:28	N/A	N/A
NVA-145	5/17/2016	138	15:58	N/A	N/A
NVA-146	5/17/2016	138	9:11	N/A	N/A
NVA-147	5/16/2016	137	18:14	N/A	N/A
NVA-148	5/16/2016	137	14:48	N/A	N/A
NVA-149	5/16/2016	137	8:41	N/A	N/A
NVA-150	5/16/2016	137	11:06	N/A	N/A
NVA-151	5/16/2016	137	15:55	N/A	N/A

NVA-152	5/17/2016	138	10:31	N/A	N/A
NVA-153	5/17/2016	138	9:56	N/A	N/A
NVA-154	5/17/2016	138	15:04	5/19/2016	12:31
NVA-155	5/18/2016	139	10:34	N/A	N/A
NVA-156	5/18/2016	139	8:06	N/A	N/A
NVA-157	5/16/2016	137	8:10	5/19/2016	9:27
NVA-158	5/17/2016	138	7:46	5/19/2016	16:13
NVA-159	5/17/2016	138	15:38	5/19/2016	13:09
NVA-160	5/17/2016	138	15:05	5/19/2016	12:23
NVA-161	5/17/2016	138	19:06	5/19/2016	12:09
NVA-162	5/17/2016	138	20:12	5/19/2016	11:16
NVA-163	5/18/2016	139	12:27	5/19/2016	9:59
NVA-164	5/18/2016	139	15:40	N/A	N/A
NVA-165	5/17/2016	138	13:25	N/A	N/A
NVA-166	5/18/2016	139	9:37	N/A	N/A
NVA-167	5/17/2016	138	12:21	N/A	N/A
NVA-168	5/17/2016	138	10:53	5/19/2016	11:26
NVA-169	5/16/2016	137	16:17	5/19/2016	8:10
NVA-170	5/16/2016	137	12:30	N/A	N/A
NVA-171	5/16/2016	137	11:53	N/A	N/A
<b>VVA</b>					
<b>POINT ID</b>	<b>OBSERV. DATE</b>	<b>JULIAN DATE</b>	<b>TIME OF DAY (AST)</b>	<b>RE-OBSERV. DATE</b>	<b>RE-OBSERV. TIME</b>
VVA-001	5/16/2016	137	11:29	5/19/2016	6:30
VVA-002	5/16/2016	137	13:22	5/19/2016	7:32
VVA-003	5/16/2016	137	16:32	N/A	N/A
VVA-004	5/17/2016	138	11:15	N/A	N/A
VVA-005	5/17/2016	138	14:09	N/A	N/A
VVA-006	5/16/2016	137	18:35	5/19/2016	12:12
VVA-007	5/18/2016	139	15:06	5/19/2016	16:33
VVA-008	5/24/2016	145	8:33	N/A	N/A
VVA-009	5/17/2016	138	19:40	N/A	N/A
VVA-010	5/17/2016	138	14:12	5/19/2016	12:43
VVA-011	5/17/2016	138	11:12	N/A	N/A
VVA-012	5/17/2016	138	9:20	N/A	N/A
VVA-013	5/18/2016	139	9:08	N/A	N/A
VVA-014	5/18/2016	139	8:21	5/19/2016	15:15
VVA-015	5/18/2016	139	13:10	5/19/2016	12:53
VVA-016	5/17/2016	138	14:42	N/A	N/A



VVA-017	5/17/2016	138	9:30	5/19/2016	10:21
VVA-018	5/16/2016	137	17:59	5/19/2016	8:36
VVA-019	5/16/2016	137	14:29	N/A	N/A
VVA-020	5/16/2016	137	10:39	5/19/2016	5:42
VVA-021	5/19/2016	140	9:21	N/A	N/A
VVA-022	5/16/2016	137	15:19	N/A	N/A
VVA-023	5/17/2016	138	12:59	N/A	N/A
VVA-024	5/17/2016	138	8:57	N/A	N/A
VVA-025	5/17/2016	138	17:14	5/19/2016	14:09
VVA-026	5/17/2016	138	16:18	N/A	N/A
VVA-027	5/18/2016	139	11:46	5/19/2016	13:13
VVA-028	5/18/2016	139	15:30	5/19/2016	6:14
VVA-029	5/18/2016	139	10:43	N/A	N/A
VVA-030	5/16/2016	137	10:05	5/19/2016	17:31
VVA-031	5/16/2016	137	11:21	N/A	N/A
VVA-032	5/16/2016	137	17:21	5/19/2016	15:10
VVA-033	5/17/2016	138	10:43	5/19/2016	13:30
VVA-034	5/16/2016	137	18:50	N/A	N/A
VVA-035	5/16/2016	137	19:55	5/19/2016	14:26
VVA-036	5/16/2016	137	15:03	N/A	N/A
VVA-037	5/24/2016	145	9:56	N/A	N/A
VVA-038	5/18/2016	139	10:30	N/A	N/A
VVA-039	5/18/2016	139	13:48	5/19/2016	6:51
VVA-040	5/18/2016	139	12:46	N/A	N/A
VVA-041	5/20/2016	141	17:51	N/A	N/A
VVA-042	5/19/2016	140	8:15	5/22/2016	6:21
VVA-043	5/16/2016	137	18:54	N/A	N/A
VVA-044	5/20/2016	141	8:21	5/22/2016	7:59
VVA-045	5/19/2016	140	9:51	5/22/2016	9:33
VVA-046	5/19/2016	140	10:25	5/22/2016	9:59
VVA-047	5/19/2016	140	11:44	N/A	N/A
VVA-048	5/19/2016	140	18:17	5/22/2016	8:51
VVA-049	5/20/2016	141	9:17	5/22/2016	7:22
VVA-050	5/20/2016	141	12:45	N/A	N/A
VVA-051	5/20/2016	141	14:08	N/A	N/A
VVA-052	5/24/2016	145	12:06	N/A	N/A
VVA-053	5/18/2016	139	14:44	N/A	N/A
VVA-054	5/19/2016	140	8:30	5/20/2016	7:29
VVA-055	5/18/2016	139	11:32	5/20/2016	6:46

VVA-056	5/20/2016	141	8:05	N/A	N/A
VVA-057	5/19/2016	140	17:30	N/A	N/A
VVA-058	5/19/2016	140	18:02	N/A	N/A
VVA-059	5/20/2016	141	9:42	N/A	N/A
VVA-060	5/19/2016	140	9:49	N/A	N/A
VVA-061	5/24/2016	145	12:25	N/A	N/A
VVA-062	5/23/2016	144	11:30	N/A	N/A
VVA-063	5/24/2016	145	13:00	N/A	N/A
VVA-064	5/24/2016	145	12:25	N/A	N/A
VVA-065	5/20/2016	141	16:27	5/22/2016	15:13
VVA-066	5/20/2016	141	14:50	N/A	N/A
VVA-067	5/20/2016	141	11:50	5/22/2016	14:21
VVA-068	5/19/2016	140	17:37	N/A	N/A
VVA-069	5/19/2016	140	12:34	5/22/2016	13:21
VVA-070	5/19/2016	140	17:02	5/22/2016	11:11
VVA-071	5/19/2016	140	15:28	5/22/2016	12:19
VVA-072	5/20/2016	141	10:08	5/22/2016	13:46
VVA-073	5/20/2016	141	15:30	5/22/2016	14:59
VVA-074	5/21/2016	142	12:09	5/22/2016	16:16
VVA-075	5/21/2016	142	14:05	5/23/2016	6:46
VVA-076	5/21/2016	142	16:19	5/23/2016	7:18
VVA-077	5/21/2016	142	15:13	N/A	N/A
VVA-078	5/22/2016	143	11:58	N/A	N/A
VVA-079	5/21/2016	142	13:28	N/A	N/A
VVA-080	5/21/2016	142	11:51	5/22/2016	16:31
VVA-081	5/21/2016	142	11:07	N/A	N/A
VVA-082	5/22/2016	143	13:58	N/A	N/A
VVA-083	5/22/2016	143	13:26	N/A	N/A
VVA-084	5/22/2016	143	18:17	N/A	N/A
VVA-085	5/19/2016	140	17:37	5/23/2016	10:10
VVA-086	5/19/2016	140	15:35	N/A	N/A
VVA-087	5/19/2016	140	13:54	N/A	N/A
VVA-088	5/19/2016	140	14:20	5/20/2016	13:38
VVA-089	5/23/2016	144	9:20	5/25/2016	7:03
VVA-090	5/23/2016	144	9:43	5/25/2016	7:49
VVA-091	5/22/2016	143	16:24	5/25/2016	8:43
VVA-092	5/22/2016	143	15:43	N/A	N/A
VVA-093	5/23/2016	144	10:16	5/25/2016	7:33
VVA-094	5/19/2016	140	11:55	5/20/2016	14:30

VVA-095	5/19/2016	140	10:55	5/20/2016	15:30
VVA-096	5/23/2016	144	11:15	N/A	N/A
VVA-097	5/20/2016	141	15:12	5/23/2016	12:10
VVA-098	5/20/2016	141	10:00	5/23/2016	14:51
VVA-099	5/20/2016	141	8:57	N/A	N/A
VVA-100	5/19/2016	140	8:16	N/A	N/A
VVA-101	5/19/2016	140	8:55	N/A	N/A
VVA-102	5/21/2016	142	15:40	N/A	N/A
VVA-103	5/23/2016	144	12:32	N/A	N/A
VVA-104	5/21/2016	142	10:25	N/A	N/A
VVA-105	5/20/2016	141	9:43	N/A	N/A
VVA-106	5/21/2016	142	11:40	5/23/2016	6:53
VVA-107	5/21/2016	142	13:40	N/A	N/A
VVA-108	5/21/2016	142	14:25	5/23/2016	5:36
VVA-109	5/21/2016	142	16:48	5/23/2016	16:36
VVA-110	5/21/2016	142	17:35	5/23/2016	17:03
VVA-111	5/22/2016	143	11:59	N/A	N/A
VVA-112	5/22/2016	143	12:53	5/24/2016	15:51
VVA-113	5/24/2016	145	9:37	5/25/2016	11:36
VVA-114	5/24/2016	145	10:46	N/A	N/A
VVA-115	5/21/2016	142	13:12	N/A	N/A
VVA-116	5/24/2016	145	12:55	5/25/2016	14:43
VVA-117	5/24/2016	145	14:27	5/25/2016	12:29
VVA-118	5/23/2016	144	9:22	5/24/2016	8:50
VVA-119	5/22/2016	143	14:17	N/A	N/A
VVA-120	5/22/2016	143	15:19	N/A	N/A
VVA-121	5/23/2016	144	12:05	5/24/2016	13:50
VVA-122	5/24/2016	145	15:00	N/A	N/A
VVA-123	5/24/2016	145	15:23	5/25/2016	13:31
VVA-124	5/23/2016	144	18:39	5/24/2016	10:31
VVA-125	5/23/2016	144	18:15	5/24/2016	9:43
VVA-126	5/23/2016	144	12:37	N/A	N/A
VVA-127	5/23/2016	144	13:11	5/24/2016	13:15
VVA-128	5/22/2016	143	17:03	N/A	N/A
VVA-129	5/23/2016	144	14:39	N/A	N/A
VVA-130	5/23/2016	144	15:22	5/24/2016	12:26

**5. POINT COMPARISON**

<b>LiDAR QA - NVA</b>				
<b>POINT ID</b>	<b>POINT CK</b>	<b>DELTA NORTH (m)</b>	<b>DELTA EAST (m)</b>	<b>VERT. DIFF (m)</b>
NVA-001	NVA-001CK	-0.006	-0.011	0.000
NVA-005	NVA-005CK	0.004	0.004	0.009
NVA-007	NVA-007CK	0.005	-0.001	-0.010
NVA-009	NVA-009CK	-0.001	0.000	-0.007
NVA-011	NVA-011CK	0.003	-0.002	-0.003
NVA-013	NVA-013CK	-0.002	0.002	0.003
NVA-015	NVA-015CK	-0.005	-0.002	0.003
NVA-016	NVA-016CK	0.000	0.002	-0.004
NVA-021	NVA-021CK	-0.008	-0.007	-0.036
NVA-022	NVA-022CK	-0.003	-0.005	0.022
NVA-023	NVA-023CK	-0.002	-0.003	-0.010
NVA-024	NVA-024CK	0.005	0.003	-0.007
NVA-025	NVA-025CK	-0.001	-0.002	-0.001
NVA-028	NVA-028CK	0.009	0.005	-0.023
NVA-030	NVA-030CK	-0.001	0.003	-0.001
NVA-034	NVA-034CK	0.001	-0.005	-0.007
NVA-036	NVA-036CK	-0.004	0.007	0.001
NVA-042	NVA-042CK	0.002	-0.003	0.010
NVA-043	NVA-043CK	-0.004	0.002	-0.003
NVA-044	NVA-044CK	0.002	-0.001	-0.003
NVA-045	NVA-045CK	-0.005	0.001	-0.006
NVA-046	NVA-046CK	-0.003	-0.006	0.009
NVA-047	NVA-047CK	0.002	0.001	-0.005
NVA-048	NVA-048CK	0.004	0.007	0.007
NVA-051	NVA-051CK	-0.004	0.003	0.010
NVA-052	NVA-052CK	-0.001	-0.002	-0.006
NVA-053	NVA-053CK	0.008	0.002	0.014
NVA-055	NVA-055CK	0.002	-0.001	0.003
NVA-056	NVA-056CK	-0.007	-0.006	-0.004
NVA-058	NVA-058CK	0.007	-0.002	-0.004
NVA-060	NVA-060CK	0.000	0.001	-0.011
NVA-061	NVA-061CK	0.007	0.001	0.028
NVA-062	NVA-062CK	-0.006	0.000	0.002
NVA-063	NVA-063CK	0.009	0.001	-0.004
NVA-065	NVA-065CK	0.002	0.001	0.009



NVA-066	NVA-066CK	-0.002	-0.006	0.021
NVA-068	NVA-068CK	-0.001	0.007	0.015
NVA-072	NVA-072CK	-0.002	0.007	-0.002
NVA-073	NVA-073CK	-0.006	0.002	0.004
NVA-077	NVA-077CK	0.001	0.000	0.008
NVA-078	NVA-078CK	0.008	0.002	-0.001
NVA-082	NVA-082CK	0.002	0.000	-0.012
NVA-083	NVA-083CK	0.002	0.003	0.002
NVA-084	NVA-084CK	0.000	0.002	-0.002
NVA-095	NVA-095CK	-0.002	0.002	-0.001
NVA-096	NVA-096CK	0.002	0.000	-0.001
NVA-099	NVA-099CK	0.000	-0.001	0.001
NVA-100	NVA-100CK	-0.002	-0.001	-0.002
NVA-101	NVA-101CK	-0.004	-0.002	-0.002
NVA-103	NVA-103CK	0.005	0.001	0.000
NVA-104	NVA-104CK	0.000	-0.002	-0.008
NVA-111	NVA-111CK	0.004	0.005	0.008
NVA-113	NVA-113CK	-0.005	0.001	-0.003
NVA-115	NVA-115CK	0.000	0.003	-0.003
NVA-116	NVA-116CK	0.003	-0.002	0.013
NVA-117	NVA-117CK	-0.005	0.006	-0.009
NVA-123	NVA-123CK	0.005	0.002	-0.014
NVA-125	NVA-125CK	-0.001	0.001	0.010
NVA-129	NVA-129CK	-0.001	0.005	-0.010
NVA-130	NVA-130CK	-0.003	-0.001	-0.001
NVA-132	NVA-132CK	0.000	-0.003	0.003
NVA-133	NVA-133CK	-0.002	0.004	0.001
NVA-134	NVA-134CK	-0.006	-0.002	-0.008
NVA-135	NVA-135CK	0.003	-0.001	0.006
NVA-137	NVA-137CK	0.000	0.002	0.005
NVA-138	NVA-138CK	-0.003	-0.004	-0.002
NVA-142	NVA-142CK	0.000	0.001	-0.005
NVA-154	NVA-154CK	-0.006	-0.007	-0.008
NVA-157	NVA-157CK	-0.001	-0.005	0.001
NVA-158	NVA-158CK	0.005	-0.002	-0.008
NVA-159	NVA-159CK	0.003	0.006	0.004
NVA-160	NVA-160CK	0.001	0.001	-0.002
NVA-161	NVA-161CK	0.000	-0.004	0.001
NVA-162	NVA-162CK	0.000	-0.005	-0.012

NVA-163	NVA-163CK	0.005	0.004	0.022
NVA-168	NVA-168CK	0.001	0.003	-0.014
NVA-169	NVA-169CK	0.000	0.003	-0.010

<b>LiDAR QA - VVA</b>				
<b>POINT ID</b>	<b>POINT CK</b>	<b>DELTA NORTH (ft)</b>	<b>DELTA EAST (ft)</b>	<b>VERT. DIFF (ft)</b>
VVA-001	VVA-001CK	0.016	-0.012	-0.032
VVA-002	VVA-002CK	0.004	0.009	0.011
VVA-006	VVA-006CK	-0.003	0.000	-0.008
VVA-007	VVA-007CK	-0.002	0.001	-0.002
VVA-010	VVA-010CK	0.000	-0.003	0.011
VVA-014	VVA-014CK	0.000	0.003	0.011
VVA-015	VVA-015CK	0.003	0.003	-0.008
VVA-017	VVA-017CK	-0.001	0.000	0.004
VVA-018	VVA-018CK	-0.006	0.007	0.001
VVA-020	VVA-020CK	0.004	-0.002	0.007
VVA-025	VVA-025CK	-0.002	0.004	0.007
VVA-027	VVA-027CK	0.002	-0.001	-0.007
VVA-028	VVA-028CK	0.012	0.009	-0.013
VVA-030	VVA-030CK	0.003	-0.002	0.005
VVA-032	VVA-032CK	-0.013	0.009	0.010
VVA-033	VVA-033CK	0.016	0.003	-0.019
VVA-035	VVA-035CK	-0.010	0.004	0.007
VVA-039	VVA-039CK	0.002	-0.001	0.000
VVA-042	VVA-042CK	-0.001	0.000	-0.005
VVA-044	VVA-044CK	0.000	0.001	0.005
VVA-045	VVA-045CK	0.005	0.002	-0.018
VVA-046	VVA-046CK	-0.006	0.000	0.030
VVA-048	VVA-048CK	0.005	0.006	0.008
VVA-049	VVA-049CK	0.004	0.006	0.008
VVA-054	VVA-054CK	0.016	0.009	0.016
VVA-055	VVA-055CK	0.006	0.000	0.002
VVA-065	VVA-065CK	0.000	0.003	-0.008
VVA-067	VVA-067CK	0.001	0.001	0.002
VVA-069	VVA-069CK	0.014	0.000	0.021
VVA-070	VVA-070CK	-0.005	-0.007	-0.013
VVA-071	VVA-071CK	-0.003	-0.002	0.003
VVA-072	VVA-072CK	-0.001	0.003	0.003
VVA-073	VVA-073CK	0.005	0.001	-0.002

VVA-074	VVA-074CK	-0.002	0.001	0.005
VVA-075	VVA-075CK	0.009	0.003	-0.014
VVA-076	VVA-076CK	-0.002	0.000	0.006
VVA-080	VVA-080CK	-0.004	0.004	-0.006
VVA-085	VVA-085CK	0.007	0.001	0.005
VVA-088	VVA-088CK	-0.005	-0.002	0.020
VVA-089	VVA-089CK	0.002	-0.001	-0.005
VVA-090	VVA-090CK	-0.004	-0.001	0.001
VVA-091	VVA-091CK	0.003	-0.011	-0.002
VVA-093	VVA-093CK	0.007	-0.003	-0.031
VVA-094	VVA-094CK	0.001	-0.005	0.004
VVA-095	VVA-095CK	0.007	-0.002	0.014
VVA-096	VVA-096CK	0.007	0.007	-0.003
VVA-097	VVA-097CK	0.003	-0.002	-0.002
VVA-098	VVA-098CK	-0.003	0.003	-0.003
VVA-106	VVA-106CK	0.005	0.001	-0.004
VVA-108	VVA-108CK	-0.008	-0.019	0.065
VVA-109	VVA-109CK	-0.003	-0.007	-0.024
VVA-110	VVA-110CK	-0.001	0.002	0.005
VVA-112	VVA-112CK	-0.004	-0.003	0.010
VVA-113	VVA-113CK	0.001	-0.001	-0.013
VVA-116	VVA-116CK	-0.001	0.004	-0.005
VVA-117	VVA-117CK	0.024	0.009	-0.018
VVA-118	VVA-118CK	0.024	0.009	-0.018
VVA-121	VVA-121CK	0.002	-0.002	-0.017
VVA-123	VVA-123CK	0.0070	0.0090	0.0000
VVA-124	VVA-124CK	-0.009	-0.020	0.004
VVA-125	VVA-125CK	0.002	-0.008	-0.003
VVA-127	VVA-127CK	-0.001	-0.002	0.006
VVA-130	VVA-130CK	-0.012	0.007	-0.009