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Check Point Survey Report for Salton Sea 2021 Aerial LiDAR

For

Dewberry Engineers Inc.

January 2022

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1. Introduction

1.1 Project Summary:

Aero-Graphics Inc. is under contract to Dewberry Engineers to provide surveyed ground check points to support the acquisition of aerial lidar around the Salton Sea in southern California. The survey field work was conducted November 19, 2021, thru December 20, 2021. The check point locations were selected by Dewberry and distributed across the project areas as evenly as the terrain would allow.

Existing NGS control points were located and surveyed as part of the field work to verify the accuracy of survey. The results are shown in section 2.4 of this report.

As a verification of field procedures, 50% of the check points surveyed were re-observed with the results shown in section 5 of this report.

The final horizontal coordinates are referenced to NAD83(2011) UTM Zone 11 meters, EPSG Code 6340. The final vertical elevations are referenced to NAVD88 meters using Geoid model 2018 (Geoid18).

1.2 Surveyor:

Questions regarding this report can be addressed to:

Karl Jensen, PLS, CP
Surveying Manager
Aero-Graphics, Inc
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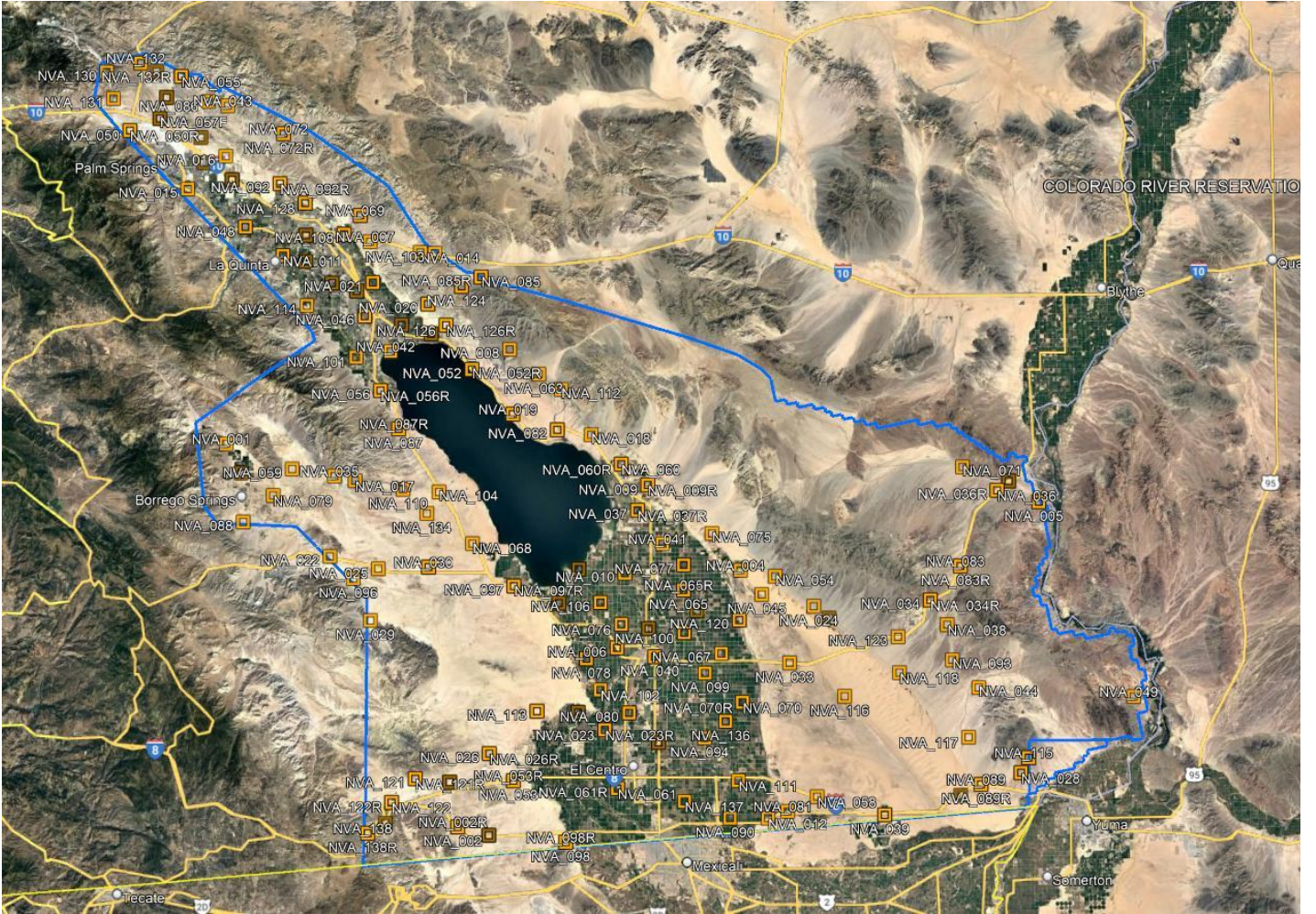
Utah Licensed Professional Land Surveyor #7643406, exp date 3/31/2023

Colorado Licensed Professional Land Surveyor #PLS-0038527, exp date 10/31/2023

ASPRS Certified Photogrammetrist, exp date 9/17/2023

1.3 Project Area:

Salton Sea NVA Points



Salton Sea VVA Points



2. Project Details

2.1 Survey Equipment

The equipment listed below was used to survey the ground points for this LiDAR project.

TOPCON Dual Frequency/ Dual Constellation GNSS Receivers:

| | |
|---------------------------|---------------------------|
| HiPER Ga, S/N: 498-00418 | HiPER Ga, S/N: 457-02513 |
| HiPER SR, S/N: 1064-16270 | HiPER SR, S/N: 1209-11478 |
| HiPER SR, S/N: 1209-10832 | HiPER SR, S/N: 1209-14758 |
| HiPER SR, S/N: 1209-18284 | HiPER SR, S/N: 1209-18273 |

Spectra Precision Ranger 3 Data Collector

Two meter fixed height range pole for each Topcon GNSS HiPER receiver with attached bipod legs for stability.

2.2 Surveyed Point Details

The 240 ground check points were well distributed throughout the project areas. Five (5) photographs were taken of each point, looking north, east, south, west, and close on the occupied point\nail. A paint mark, mag nail, or spike was set at each location where possible.

Check point locations are detailed in the “Check Point Documentation Report” sheets attached to this report.

2.3 Surveyed Point Network

Multiple methods were used during the field survey to observe the check points. Each method is detailed below.

LiDAR identifiable features were observed as NVA check points where available.

STATIC:

Static (or Rapid-Static) Surveying is a method that Aero-Graphics has employed for many years to collect ground check points. A base station location is selected, usually at one or more control locations, and a GNSS receiver is left there for the duration of the day to complete the survey. The other GNSS receivers are then used as rovers to survey the other point locations.

The duration of the rover receivers will vary depending upon the distance from the base receiver. Normally the rover will not be further than 10 km from the base. The greater the distance the rover is from the base receiver, the longer the recording duration of the rover needs to be. Each rover location is surveyed for a minimum of 20 minutes or greater.

Static Surveying was used to collect the check points.

The individual point locations are post-processed after the field survey is completed. The GNSS data collected by the receivers is downloaded and processed in NovaTel's Waypoint GravNET software. The base station coordinates are used to differentially correct the other point's locations.

The NGS Online Positioning User Service (OPUS) was used to process the base station location data. A minimum of 2+ hours of GNSS data was collected for base stations to be processed through OPUS.

HEXAGON SMARTNET (VRS):

The HxGN SmartNet Virtual Reference Station (VRS) was used to survey check points where a cell phone data signal was available to provide the necessary real-time correction. The field surveyor's data collector and roving GNSS receiver utilized the real-time broadcast positional correction to observe and survey the points.

The maximum baseline restriction for the roving receiver is 70km while using this method.

2.4 Field Procedures and Analysis

All check points were observed once and 50% of the locations were surveyed a second time on a different day or with 4 hours between observations. Each observation for static surveying occupied the point for a minimum of 20 minutes in duration. Each observation with the VRS occupied the points for a minimum of sixty (60) seconds in duration.

Seven (7) NGS monuments or other benchmarks were surveyed as part of the field procedures for this project. Monuments were researched and located prior to field work commencing. While the highest order of monuments was preferred for surveying, it is not always possible to find and use them. Monuments that were surveyed were chosen for accessibility and probable

existence. Although all results are shown below, some are less than desirable due to imprecise data from the NGS datasheets.

The NGS monuments were occupied to provide a QC\QA for the survey methods used. Five (5) of the monuments were occupied twice or more. The observed values and data sheet values are shown below along with the differences. The latitude and longitude from the data sheets were converted to UTM zone 11 meters.

NGS Monuments

| POINT | | OBSERVED VALUES | | | DATASHEET VALUES | | | DIFFERENCE | | |
|------------|----------|-----------------|------------|-----------|------------------|------------|-----------|------------|---------|-----------|
| ID | NGS PID | NORTHING | EASTING | ELEVATION | NORTHING | EASTING | ELEVATION | NORTHING | EASTING | ELEVATION |
| SDPR12 | AF9883 | 3679901.067 | 555955.385 | 233.430 | 3679900.808 | 555955.660 | 233.442 | 0.259 | -0.275 | -0.012 |
| SDPR12-1 | AF9883-1 | 3679901.056 | 555955.384 | 233.372 | 3679900.808 | 555955.660 | 233.442 | 0.248 | -0.276 | -0.070 |
| 119 | AH9140 | 3731453.174 | 557183.677 | 69.126 | 3731454.293 | 557182.293 | 69.136 | -1.119 | 1.384 | -0.010 |
| 119-1 | AH9140-1 | 3731453.208 | 557183.662 | 69.064 | 3731454.293 | 557182.293 | 69.136 | -1.085 | 1.369 | -0.072 |
| 119-2 | AH9140-2 | 3731453.204 | 557183.646 | 69.097 | 3731454.293 | 557182.293 | 69.136 | -1.089 | 1.353 | -0.039 |
| PLS 4152 | AH9143 | 3731247.965 | 556558.494 | 76.116 | 3731246.680 | 556557.081 | 76.169 | 1.285 | 1.413 | -0.053 |
| PLS 4152-1 | AH9143-1 | 3731247.961 | 556558.508 | 76.136 | 3731246.680 | 556557.081 | 76.169 | 1.281 | 1.427 | -0.033 |
| CO J 3 | DB1219 | 3631566.922 | 653256.703 | -1.242 | 3631566.942 | 653256.666 | -1.212 | -0.020 | 0.037 | -0.030 |
| CLR B | DF4133 | 3666743.423 | 638376.775 | -56.322 | 3666743.940 | 638375.950 | -55.770 | -0.517 | 0.825 | -0.552 |
| A517 | DX0609 | 3714769.995 | 584836.354 | -58.966 | 3714769.606 | 584836.408 | -58.765 | 0.389 | -0.054 | -0.201 |
| A517-1 | DX0609-1 | 3714770.035 | 584836.414 | -58.776 | 3714769.606 | 584836.408 | -58.765 | 0.429 | 0.006 | -0.011 |
| G1299 | DX3552 | 3714770.839 | 582360.352 | -55.545 | 3714771.054 | 582345.394 | -55.426 | -0.215 | 14.958 | -0.119 |
| G1299-1 | DX3552-2 | 3714770.874 | 582360.365 | -55.445 | 3714771.054 | 582345.394 | -55.426 | -0.180 | 14.971 | -0.019 |

NGS Monuments



2.5 Data Processing Procedures

The data from the data collector for the points that were surveyed with VRS was downloaded each day and emailed to the office. The data from the static GNSS receivers was downloaded each day and a copy was uploaded to the office FTP server.

Base station observations were uploaded to OPUS only after the rapid ephemeris was available for processing. Whether the base station was located on an NGS monument or at a new point location, all GNSS data sets with a duration longer than two (2) hours were processed through OPUS.

The static surveyed points were post-processed using NovaTel's Waypoint software. Some of the static check point observations of less than two (2) hours in duration were processed with OPUS Rapid Static (OPUS-RS) as a QA\QC on the static post processing.

After receiving the check points surveyed with the VRS system from the field crew, the points were converted to UTM Zone 11 meters coordinates and merged with the static surveyed control points.

3. Final Coordinates

| POINT ID | NAD83(2011) UTM11 NORTHING Meter | NAD83(2011) UTM11 EASTING Meter | ORTHO HGT (Geoid18) Meter |
|------------|--|---------------------------------------|---------------------------------|
| NVA | | | |
| NVA_001 | 3689840.486 | 556061.893 | 275.889 |
| NVA_002 | 3616929.610 | 601719.765 | 122.361 |
| NVA_002R | 3616929.631 | 601719.782 | 122.342 |
| NVA_003 | 3666791.611 | 624391.191 | -66.915 |
| NVA_003R | 3666791.423 | 624391.299 | -66.902 |
| NVA_004 | 3667024.882 | 655572.761 | 34.770 |
| NVA_005 | 3680983.434 | 713001.514 | 95.265 |
| NVA_005R | 3680983.446 | 713001.502 | 95.238 |
| NVA_006 | 3651767.217 | 631978.961 | -36.211 |
| NVA_006R | 3651767.154 | 631979.011 | -36.205 |
| NVA_007 | 3729058.448 | 583230.880 | 144.297 |
| NVA_008 | 3708771.588 | 610486.890 | 20.472 |
| NVA_009 | 3683131.713 | 637472.817 | -15.341 |
| NVA_009R | 3683131.723 | 637472.82 | -15.334 |
| NVA_010 | 3666118.230 | 633294.177 | -59.547 |
| NVA_011 | 3726202.869 | 566383.265 | 11.768 |
| NVA_011R | 3726202.890 | 566383.250 | 11.842 |
| NVA_012 | 3619444.721 | 661593.437 | 12.460 |
| NVA_013 | 3719580.190 | 580742.328 | -43.963 |
| NVA_013R | 3719580.240 | 580742.298 | -43.797 |
| NVA_014 | 3727078.697 | 592984.803 | 474.499 |
| NVA_015 | 3738774.953 | 547730.508 | 99.176 |
| NVA_016 | 3745184.858 | 554970.754 | 146.662 |
| NVA_017 | 3683123.152 | 581038.751 | 269.796 |
| NVA_018 | 3692610.316 | 626420.792 | -47.288 |
| NVA_019 | 3696350.356 | 611245.284 | -58.043 |
| NVA_019R | 3696350.359 | 611245.290 | -58.075 |
| NVA_020 | 3717239.523 | 594560.891 | 91.764 |
| NVA_020R | 3717239.510 | 594560.898 | 91.783 |
| NVA_021 | 3721249.381 | 583832.666 | -26.299 |
| NVA_021R | 3721249.283 | 583832.633 | -26.427 |
| NVA_022 | 3668519.946 | 576371.258 | 131.969 |
| NVA_023 | 3636001.111 | 629867.029 | -17.097 |
| NVA_023R | 3636001.104 | 629867.062 | -17.097 |
| NVA_024 | 3660325.227 | 669817.134 | 82.785 |
| NVA_025 | 3666301.137 | 585719.841 | 26.399 |
| NVA_026 | 3631107.609 | 607637.429 | 21.084 |
| NVA_026R | 3631107.640 | 607637.377 | 21.118 |

| | | | |
|----------|-------------|------------|---------|
| NVA_027 | 3658095.992 | 672808.175 | 80.741 |
| NVA_028 | 3628844.595 | 710357.575 | 107.265 |
| NVA_028R | 3628844.543 | 710357.565 | 107.223 |
| NVA_029 | 3656339.543 | 584329.465 | 67.553 |
| NVA_030 | 3666753.571 | 595407.791 | 14.847 |
| NVA_030R | 3666753.568 | 595407.814 | 14.837 |
| NVA_031 | 3615410.600 | 607741.745 | 95.533 |
| NVA_031R | 3615410.636 | 607741.789 | 95.510 |
| NVA_032 | 3625514.190 | 600052.620 | 81.088 |
| NVA_032R | 3625514.020 | 600051.942 | 81.915 |
| NVA_033 | 3649365.788 | 665312.395 | 30.280 |
| NVA_034 | 3661857.803 | 692233.619 | 310.397 |
| NVA_034R | 3661857.759 | 692233.629 | 310.489 |
| NVA_035 | 3683961.624 | 577033.576 | 257.075 |
| NVA_036 | 3683072.187 | 704868.580 | 159.246 |
| NVA_036R | 3683072.194 | 704868.569 | 159.233 |
| NVA_037 | 3678250.204 | 635564.143 | -58.375 |
| NVA_037R | 3678250.203 | 635564.143 | -58.356 |
| NVA_038 | 3657136.861 | 695603.348 | 245.035 |
| NVA_039 | 3620388.866 | 684135.285 | 41.662 |
| NVA_039R | 3620388.834 | 684135.307 | 41.626 |
| NVA_040 | 3650179.485 | 639293.822 | -38.486 |
| NVA_040R | 3650179.426 | 639293.879 | -38.497 |
| NVA_041 | 3671863.813 | 640454.029 | -50.446 |
| NVA_042 | 3708063.568 | 587491.986 | -64.469 |
| NVA_043 | 3754841.688 | 555317.685 | 428.704 |
| NVA_044 | 3645147.252 | 701896.280 | 201.852 |
| NVA_045 | 3662423.447 | 659728.816 | 35.331 |
| NVA_046 | 3714778.534 | 582370.913 | -55.568 |
| NVA_046R | 3714778.394 | 582371.029 | -55.559 |
| NVA_047 | 3655555.424 | 638028.413 | -53.293 |
| NVA_047R | 3655555.362 | 638028.494 | -53.285 |
| NVA_048 | 3731620.689 | 559000.783 | 62.346 |
| NVA_048R | 3731620.568 | 559000.941 | 62.262 |
| NVA_049 | 3643792.410 | 731978.133 | 115.557 |
| NVA_050 | 3749842.722 | 536403.920 | 283.328 |
| NVA_050R | 3749842.707 | 536403.908 | 283.312 |
| NVA_051 | 3633725.965 | 640263.748 | -20.644 |
| NVA_051R | 3633725.993 | 640263.691 | -20.652 |
| NVA_052 | 3704819.588 | 603200.418 | -60.383 |
| NVA_052R | 3704819.584 | 603200.407 | -60.373 |
| NVA_053 | 3625957.507 | 612350.590 | 9.314 |
| NVA_053R | 3625957.500 | 612350.573 | 9.320 |
| NVA_054 | 3665962.044 | 662299.404 | 77.731 |
| NVA_055 | 3760403.420 | 546194.954 | 449.189 |

| | | | |
|----------|-------------|------------|---------|
| NVA_055R | 3760403.260 | 546195.058 | 449.225 |
| NVA_056 | 3700522.657 | 585636.475 | -34.357 |
| NVA_056R | 3700522.647 | 585636.499 | -34.365 |
| NVA_057 | 3752303.700 | 542105.262 | 233.809 |
| NVA_057R | 3752303.495 | 542105.365 | 233.763 |
| NVA_058 | 3623721.468 | 671006.870 | 29.782 |
| NVA_059 | 3685203.080 | 568831.144 | 207.516 |
| NVA_060 | 3687043.903 | 632287.291 | -39.381 |
| NVA_060R | 3687043.903 | 632287.296 | -39.345 |
| NVA_061 | 3624733.471 | 632473.824 | -6.895 |
| NVA_061R | 3624733.478 | 632473.818 | -6.900 |
| NVA_062 | 3721049.787 | 575948.866 | -32.995 |
| NVA_062R | 3721049.712 | 575948.900 | -33.084 |
| NVA_063 | 3704079.482 | 616167.970 | 21.627 |
| NVA_064 | 3684893.837 | 707101.511 | 134.095 |
| NVA_064R | 3684893.851 | 707101.509 | 134.079 |
| NVA_065 | 3663063.849 | 644664.458 | -42.510 |
| NVA_065R | 3663063.818 | 644664.506 | -42.546 |
| NVA_066 | 3711539.699 | 595245.259 | -51.270 |
| NVA_066R | 3711539.686 | 595245.271 | -51.270 |
| NVA_067 | 3650987.328 | 652132.896 | -18.846 |
| NVA_068 | 3671387.871 | 603827.494 | 3.219 |
| NVA_069 | 3734101.860 | 581227.116 | 168.192 |
| NVA_069R | 3734101.889 | 581227.126 | 168.200 |
| NVA_070 | 3641669.381 | 656337.271 | -6.222 |
| NVA_070R | 3641669.362 | 656337.291 | -6.202 |
| NVA_071 | 3687472.827 | 698128.858 | 191.942 |
| NVA_072 | 3749566.449 | 566223.693 | 416.659 |
| NVA_072R | 3749566.436 | 566223.680 | 416.685 |
| NVA_073 | 3684299.181 | 558974.695 | 198.486 |
| NVA_074 | 3725146.868 | 570784.390 | -5.246 |
| NVA_074R | 3725146.895 | 570784.390 | -5.240 |
| NVA_075 | 3673992.416 | 649976.866 | 31.478 |
| NVA_076 | 3656309.806 | 632750.241 | -45.776 |
| NVA_076R | 3656309.756 | 632750.301 | -45.757 |
| NVA_077 | 3667874.357 | 644605.288 | -42.062 |
| NVA_077R | 3667874.376 | 644605.335 | -42.080 |
| NVA_078 | 3649594.340 | 626113.855 | -31.657 |
| NVA_078R | 3649594.418 | 626113.791 | -31.646 |
| NVA_079 | 3680073.892 | 565224.024 | 161.268 |
| NVA_080 | 3639317.978 | 634493.522 | -23.131 |
| NVA_080R | 3639317.987 | 634493.511 | -23.132 |
| NVA_081 | 3620807.713 | 665388.072 | 17.215 |
| NVA_082 | 3693461.761 | 619878.774 | -60.403 |
| NVA_082R | 3693461.777 | 619878.795 | -60.447 |

| | | | |
|----------|-------------|------------|---------|
| NVA_083 | 3668451.852 | 697975.523 | 324.175 |
| NVA_083R | 3668451.845 | 697975.531 | 324.159 |
| NVA_084 | 3740692.210 | 556267.152 | 68.271 |
| NVA_084R | 3740692.182 | 556267.121 | 68.214 |
| NVA_085 | 3722486.483 | 604794.373 | 368.628 |
| NVA_085R | 3722486.393 | 604794.410 | 368.590 |
| NVA_086 | 3755640.681 | 551553.606 | 358.871 |
| NVA_087 | 3693196.183 | 589262.431 | -24.437 |
| NVA_087R | 3693196.166 | 589262.428 | -24.448 |
| NVA_088 | 3674910.656 | 559520.048 | 205.210 |
| NVA_089 | 3626504.741 | 702654.509 | 69.454 |
| NVA_089R | 3626504.711 | 702654.483 | 69.484 |
| NVA_090 | 3619356.060 | 654263.296 | 9.043 |
| NVA_091 | 3761285.699 | 541366.534 | 435.122 |
| NVA_092 | 3740021.659 | 565613.363 | 44.629 |
| NVA_092R | 3740021.677 | 565613.349 | 44.763 |
| NVA_093 | 3650384.623 | 696697.733 | 192.433 |
| NVA_094 | 3634712.125 | 649129.621 | -17.512 |
| NVA_095 | 3639275.642 | 624659.605 | -17.130 |
| NVA_095R | 3639275.624 | 624659.590 | -17.124 |
| NVA_096 | 3664345.652 | 580908.211 | 38.177 |
| NVA_097 | 3663349.027 | 611933.923 | -52.339 |
| NVA_097R | 3663349.025 | 611933.912 | -52.331 |
| NVA_098 | 3614324.827 | 622644.081 | 24.390 |
| NVA_098R | 3614324.839 | 622644.101 | 24.350 |
| NVA_099 | 3647185.203 | 649038.757 | -26.899 |
| NVA_100 | 3654870.870 | 644917.969 | -39.616 |
| NVA_100R | 3654870.850 | 644918.004 | -39.600 |
| NVA_101 | 3706863.170 | 580807.995 | -33.223 |
| NVA_102 | 3643649.698 | 628897.911 | -20.568 |
| NVA_103 | 3726967.270 | 595846.096 | 508.664 |
| NVA_104 | 3681208.259 | 597223.750 | -37.505 |
| NVA_105 | 3659143.842 | 647269.202 | -35.237 |
| NVA_106 | 3660431.213 | 628665.593 | -58.137 |
| NVA_106R | 3660431.142 | 628665.604 | -58.150 |
| NVA_107 | 3743898.098 | 550768.690 | 106.537 |
| NVA_108 | 3730480.999 | 578110.926 | -2.343 |
| NVA_108R | 3730480.981 | 578110.960 | -2.332 |
| NVA_109 | 3617508.272 | 587800.133 | 445.538 |
| NVA_110 | 3681604.283 | 590285.719 | 78.518 |
| NVA_111 | 3626594.778 | 655760.096 | 2.904 |
| NVA_112 | 3701204.135 | 620555.912 | 19.334 |
| NVA_113 | 3639389.493 | 616717.587 | 10.603 |
| NVA_113R | 3639389.541 | 616717.564 | 10.593 |
| NVA_114 | 3716671.516 | 571155.563 | -9.321 |

| | | | |
|----------|-------------|------------|---------|
| NVA_115 | 3631776.141 | 711798.727 | 139.257 |
| NVA_115R | 3631776.086 | 711798.734 | 139.224 |
| NVA_116 | 3643102.102 | 676030.305 | 85.621 |
| NVA_117 | 3635553.220 | 700099.202 | 116.463 |
| NVA_118 | 3647792.349 | 686545.210 | 118.813 |
| NVA_119 | 3624332.912 | 698765.153 | 52.672 |
| NVA_120 | 3657454.177 | 655479.021 | -1.219 |
| NVA_120R | 3657454.155 | 655479.056 | -1.167 |
| NVA_121 | 3626091.522 | 593417.631 | 122.543 |
| NVA_121R | 3626091.516 | 593417.643 | 122.532 |
| NVA_122 | 3621483.413 | 588935.337 | 268.215 |
| NVA_122R | 3621483.462 | 588935.333 | 268.222 |
| NVA_123 | 3654681.833 | 686147.394 | 165.353 |
| NVA_124 | 3720671.602 | 601040.395 | 285.314 |
| NVA_124R | 3720671.600 | 601040.402 | 285.381 |
| NVA_125 | 3713197.173 | 589525.208 | -47.491 |
| NVA_125R | 3713197.038 | 589525.330 | -47.498 |
| NVA_126 | 3713251.469 | 598114.709 | 16.601 |
| NVA_126R | 3713251.395 | 598114.820 | 16.873 |
| NVA_127 | 3730182.703 | 570743.955 | 3.603 |
| NVA_127R | 3730182.682 | 570743.949 | 3.609 |
| NVA_128 | 3736360.867 | 570513.730 | 19.491 |
| NVA_128R | 3736360.929 | 570513.632 | 19.366 |
| NVA_129 | 3748726.979 | 550095.981 | 228.872 |
| NVA_130 | 3761031.548 | 531783.844 | 672.306 |
| NVA_131 | 3755998.941 | 533073.020 | 490.644 |
| NVA_132 | 3762830.953 | 538347.091 | 555.279 |
| NVA_132R | 3762830.879 | 538347.095 | 555.315 |
| NVA_133 | 3756351.533 | 543367.085 | 310.292 |
| NVA_133R | 3756351.523 | 543367.090 | 310.274 |
| NVA_134 | 3677043.749 | 594946.672 | -2.329 |
| NVA_135 | 3660213.106 | 620640.802 | -63.007 |
| NVA_135R | 3660213.113 | 620640.811 | -63.006 |
| NVA_136 | 3637961.001 | 653153.498 | -13.286 |
| NVA_136R | 3637961.000 | 653153.531 | -13.269 |
| NVA_137 | 3622452.127 | 645432.152 | 3.120 |
| NVA_138 | 3615606.683 | 584477.049 | 665.726 |
| NVA_138R | 3615606.689 | 584477.049 | 665.754 |

| POINT ID | NAD83(2011) UTM11 NORTHING Meter | NAD83(2011) UTM11 EASTING Meter | ORTHO HGT (Geoid18) Meter |
|-----------------|---|--|--|
| VVA | | | |
| VVA_001 | 3620981.189 | 691532.928 | 47.755 |
| VVA_002 | 3686191.437 | 709793.073 | 98.593 |
| VVA_002R | 3686191.432 | 709793.057 | 98.570 |
| VVA_003 | 3665616.124 | 592211.422 | 5.416 |
| VVA_003R | 3665616.099 | 592211.439 | 5.418 |
| VVA_004 | 3691332.664 | 618623.060 | -67.003 |
| VVA_004R | 3691332.676 | 618623.111 | -67.039 |
| VVA_005 | 3678085.657 | 647034.920 | 31.599 |
| VVA_006 | 3708700.358 | 612945.518 | 30.535 |
| VVA_007 | 3625749.567 | 586767.900 | 241.973 |
| VVA_007R | 3625749.575 | 586767.889 | 241.977 |
| VVA_008 | 3666033.563 | 604006.561 | -37.710 |
| VVA_008R | 3666033.582 | 604006.566 | -37.688 |
| VVA_009 | 3723388.379 | 577506.973 | -34.796 |
| VVA_010 | 3682692.465 | 585276.697 | 157.361 |
| VVA_011 | 3631803.025 | 708090.201 | 134.602 |
| VVA_012 | 3751626.883 | 560579.290 | 377.858 |
| VVA_013 | 3681257.634 | 555474.369 | 224.331 |
| VVA_014 | 3617063.221 | 615174.215 | 44.115 |
| VVA_014R | 3617063.209 | 615174.225 | 44.108 |
| VVA_015 | 3669578.060 | 650899.553 | 7.177 |
| VVA_016 | 3684794.822 | 561265.613 | 190.665 |
| VVA_017 | 3614842.966 | 603309.360 | 116.381 |
| VVA_017R | 3614843.001 | 603309.381 | 116.355 |
| VVA_018 | 3693003.396 | 613986.239 | -60.466 |
| VVA_018R | 3693003.368 | 613986.266 | -60.453 |
| VVA_019 | 3696835.801 | 622520.650 | -38.771 |
| VVA_019R | 3696835.838 | 622520.622 | -38.786 |
| VVA_020 | 3728040.798 | 589394.611 | 400.473 |
| VVA_021 | 3626229.523 | 662679.556 | 8.808 |
| VVA_022 | 3652473.355 | 643076.390 | -42.688 |
| VVA_023 | 3685433.181 | 702929.408 | 158.456 |
| VVA_023R | 3685433.187 | 702929.403 | 158.467 |
| VVA_024 | 3622403.565 | 651370.603 | 10.831 |
| VVA_025 | 3710048.954 | 585546.404 | -66.665 |
| VVA_025R | 3710048.770 | 585546.497 | -66.544 |
| VVA_026 | 3716170.869 | 577524.173 | -46.004 |
| VVA_026R | 3716170.840 | 577524.127 | -45.996 |
| VVA_027 | 3726144.432 | 582302.220 | 1.774 |
| VVA_027R | 3726144.433 | 582302.233 | 1.763 |
| VVA_028 | 3673168.785 | 698920.427 | 287.793 |

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|----------|-------------|------------|---------|
| VVA_028R | 3673168.768 | 698920.431 | 287.783 |
| VVA_029 | 3621102.047 | 679226.351 | 39.590 |
| VVA_029R | 3621102.030 | 679226.337 | 39.457 |
| VVA_030 | 3702139.738 | 606478.311 | -61.238 |
| VVA_030R | 3702139.726 | 606478.337 | -61.222 |
| VVA_031 | 3695863.814 | 588283.336 | -51.380 |
| VVA_031R | 3695863.821 | 588283.355 | -51.384 |
| VVA_032 | 3632943.196 | 633923.185 | -16.648 |
| VVA_032R | 3632943.186 | 633923.222 | -16.643 |
| VVA_033 | 3745511.458 | 545646.294 | 142.402 |
| VVA_034 | 3636458.037 | 615216.857 | -6.422 |
| VVA_034R | 3636457.948 | 615216.884 | -6.405 |
| VVA_035 | 3716993.021 | 599135.192 | 201.239 |
| VVA_036 | 3668486.762 | 579205.221 | 86.731 |
| VVA_037 | 3719527.328 | 571469.959 | -23.659 |
| VVA_037R | 3719527.162 | 571470.092 | -23.685 |
| VVA_038 | 3665716.890 | 600610.024 | -19.593 |
| VVA_038R | 3665716.875 | 600610.043 | -19.598 |
| VVA_039 | 3709799.786 | 602506.979 | 23.903 |
| VVA_039R | 3709799.774 | 602506.982 | 23.897 |
| VVA_040 | 3703015.169 | 586992.838 | -67.912 |
| VVA_040R | 3703016.820 | 586994.692 | -67.932 |
| VVA_041 | 3753436.619 | 553286.974 | 341.135 |
| VVA_042 | 3675781.687 | 562451.323 | 149.726 |
| VVA_043 | 3737155.161 | 558834.698 | 85.776 |
| VVA_044 | 3661871.373 | 616385.250 | -59.322 |
| VVA_044R | 3661871.330 | 616385.224 | -59.292 |
| VVA_045 | 3717833.665 | 590501.392 | 41.925 |
| VVA_045R | 3717833.657 | 590501.400 | 41.937 |
| VVA_046 | 3672056.571 | 607094.547 | -40.660 |
| VVA_047 | 3640316.985 | 701101.633 | 159.479 |
| VVA_048 | 3741991.623 | 561992.046 | 89.096 |
| VVA_049 | 3758022.136 | 538323.595 | 445.483 |
| VVA_049R | 3758022.016 | 538323.609 | 445.421 |
| VVA_050 | 3687877.556 | 629417.461 | -60.507 |
| VVA_050R | 3687877.556 | 629417.465 | -60.522 |
| VVA_051 | 3620940.833 | 597234.882 | 90.214 |
| VVA_051R | 3620940.824 | 597234.868 | 90.195 |
| VVA_052 | 3654703.908 | 677341.030 | 92.142 |
| VVA_053 | 3709854.580 | 577603.405 | 18.687 |
| VVA_054 | 3657435.014 | 619131.707 | -42.915 |
| VVA_054R | 3657434.994 | 619131.717 | -42.904 |
| VVA_055 | 3627568.108 | 605160.631 | 53.327 |
| VVA_055R | 3627567.965 | 605160.228 | 53.567 |
| VVA_056 | 3735465.563 | 552104.620 | 82.705 |

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|----------|-------------|------------|---------|
| VVA_057 | 3657355.241 | 663795.822 | 36.779 |
| VVA_058 | 3631086.113 | 621528.260 | -14.172 |
| VVA_058R | 3631086.136 | 621528.240 | -14.149 |
| VVA_059 | 3649496.594 | 669496.764 | 34.571 |
| VVA_060 | 3676250.141 | 600804.986 | -29.903 |
| VVA_061 | 3664199.477 | 664551.969 | 85.483 |
| VVA_062 | 3685114.420 | 571990.805 | 251.251 |
| VVA_063 | 3616341.920 | 641922.098 | 1.819 |
| VVA_064 | 3634844.539 | 660017.675 | 4.713 |
| VVA_064R | 3634844.537 | 660017.705 | 4.729 |
| VVA_065 | 3636033.322 | 702303.342 | 135.554 |
| VVA_066 | 3613652.145 | 584499.196 | 885.904 |
| VVA_067 | 3641947.022 | 734466.797 | 72.003 |
| VVA_068 | 3741324.098 | 551732.500 | 105.956 |
| VVA_069 | 3671659.550 | 629108.768 | -69.601 |
| VVA_070 | 3643000.708 | 644325.237 | -37.654 |
| VVA_071 | 3655296.813 | 683518.924 | 147.146 |
| VVA_072 | 3625619.662 | 637783.316 | -8.484 |
| VVA_072R | 3625619.627 | 637783.270 | -8.484 |
| VVA_073 | 3625871.830 | 710441.849 | 87.309 |
| VVA_073R | 3625871.811 | 710441.917 | 87.293 |
| VVA_074 | 3616618.427 | 629987.815 | -5.785 |
| VVA_074R | 3616618.454 | 629987.839 | -5.821 |
| VVA_075 | 3656230.291 | 628995.874 | -49.184 |
| VVA_075R | 3656230.368 | 628995.804 | -49.159 |
| VVA_076 | 3662789.924 | 695218.707 | 303.392 |
| VVA_076V | 3662789.968 | 695218.708 | 303.361 |
| VVA_077 | 3745418.909 | 567833.319 | 334.620 |
| VVA_077R | 3745418.868 | 567833.294 | 334.705 |
| VVA_078 | 3678768.302 | 699077.004 | 239.703 |
| VVA_078R | 3678768.301 | 699076.987 | 239.685 |
| VVA_079 | 3684469.537 | 596500.804 | -30.338 |
| VVA_080 | 3664846.517 | 652795.531 | -5.491 |
| VVA_080R | 3664846.494 | 652795.577 | -5.458 |
| VVA_081 | 3662032.131 | 582762.323 | 19.522 |
| VVA_082 | 3639401.337 | 639321.054 | -40.201 |
| VVA_082R | 3639401.327 | 639321.047 | -40.248 |
| VVA_083 | 3688645.201 | 556946.969 | 253.191 |
| VVA_084 | 3620716.253 | 674055.202 | 33.722 |
| VVA_085 | 3658737.318 | 640390.858 | -47.077 |
| VVA_085R | 3658737.297 | 640390.911 | -47.016 |
| VVA_086 | 3702337.889 | 584482.759 | -46.077 |
| VVA_086R | 3702337.875 | 584482.766 | -46.094 |
| VVA_087 | 3646501.272 | 632885.903 | -25.506 |
| VVA_087R | 3646501.277 | 632885.904 | -25.489 |

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|----------|-------------|------------|---------|
| VVA_088 | 3628913.235 | 612722.476 | -1.248 |
| VVA_088R | 3628913.220 | 612722.472 | -1.235 |
| VVA_089 | 3753923.083 | 546231.757 | 249.658 |
| VVA_090 | 3630620.483 | 711122.333 | 123.530 |
| VVA_090R | 3630620.422 | 711122.312 | 123.496 |
| VVA_091 | 3644783.028 | 652388.153 | -21.753 |
| VVA_091R | 3644782.983 | 652388.171 | -21.693 |
| VVA_092 | 3622794.158 | 627656.057 | -16.821 |
| VVA_092R | 3622794.142 | 627656.054 | -16.893 |
| VVA_093 | 3630654.856 | 646889.132 | -15.853 |
| VVA_094 | 3688162.991 | 593283.794 | -27.244 |
| VVA_095 | 3731890.955 | 563932.184 | 44.811 |
| VVA_096 | 3737724.404 | 576236.691 | 100.430 |
| VVA_097 | 3646037.273 | 673642.839 | 74.182 |
| VVA_098 | 3643502.161 | 691447.172 | 123.098 |
| VVA_098S | 3643502.044 | 691447.199 | 122.976 |
| VVA_099 | 3651102.890 | 682735.451 | 112.237 |
| VVA_100 | 3622943.730 | 695992.665 | 65.514 |
| VVA_101 | 3652765.593 | 696288.774 | 211.449 |
| VVA_102 | 3702327.633 | 619109.928 | 21.298 |

4. GNSS Observations

| POINT ID | DATE SURVEYED | JULIAN DATE | SURVEY METHOD |
|------------|-------------------|-------------|---------------|
| NVA | | | |
| NVA_001 | December 9, 2021 | 343 | Static |
| NVA_002 | December 16, 2021 | 350 | OPUS |
| NVA_002R | December 18, 2021 | 352 | Static |
| NVA_003 | December 12, 2021 | 346 | Static |
| NVA_003R | December 19, 2021 | 353 | Static |
| NVA_004 | December 17, 2021 | 351 | OPUS |
| NVA_005 | December 15, 2021 | 349 | Static |
| NVA_005R | December 18, 2021 | 352 | Static |
| NVA_006 | December 12, 2021 | 346 | Static |
| NVA_006R | December 17, 2021 | 351 | OPUS |
| NVA_007 | November 22, 2021 | 326 | Static |
| NVA_008 | December 4, 2021 | 338 | OPUS-RS |
| NVA_009 | December 10, 2021 | 344 | Static |
| NVA_009R | December 20, 2021 | 354 | Static |
| NVA_010 | December 12, 2021 | 346 | Static |
| NVA_011 | November 23, 2021 | 327 | VRS |
| NVA_011R | December 1, 2021 | 335 | VRS |
| NVA_012 | December 12, 2021 | 346 | VRS |
| NVA_013 | November 30, 2021 | 334 | VRS |
| NVA_013R | December 1, 2021 | 335 | VRS |
| NVA_014 | November 22, 2021 | 326 | VRS |
| NVA_015 | November 20, 2021 | 324 | VRS |
| NVA_016 | November 20, 2021 | 324 | OPUS |
| NVA_017 | December 8, 2021 | 342 | OPUS |
| NVA_018 | December 4, 2021 | 338 | Static |
| NVA_019 | December 3, 2021 | 337 | Static |
| NVA_019R | December 4, 2021 | 338 | Static |
| NVA_020 | December 1, 2021 | 335 | OPUS |
| NVA_020R | December 2, 2021 | 336 | OPUS |
| NVA_021 | November 30, 2021 | 334 | VRS |
| NVA_021R | December 1, 2021 | 335 | VRS |
| NVA_022 | December 8, 2021 | 342 | Static |
| NVA_023 | December 13, 2021 | 347 | OPUS-RS |
| NVA_023R | December 17, 2021 | 351 | OPUS-RS |
| NVA_024 | December 17, 2021 | 351 | OPUS |
| NVA_025 | December 7, 2021 | 341 | Static |
| NVA_026 | December 14, 2021 | 348 | OPUS-RS |
| NVA_026R | December 18, 2021 | 352 | OPUS-RS |
| NVA_027 | December 17, 2021 | 351 | VRS |

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|----------|-------------------|-----|---------|
| NVA_028 | December 13, 2021 | 347 | VRS |
| NVA_028R | December 18, 2021 | 352 | OPUS |
| NVA_029 | December 8, 2021 | 342 | OPUS |
| NVA_030 | December 6, 2021 | 340 | Static |
| NVA_030R | December 7, 2021 | 341 | Static |
| NVA_031 | December 16, 2021 | 350 | Static |
| NVA_031R | December 18, 2021 | 352 | OPUS |
| NVA_032 | December 15, 2021 | 349 | Static |
| NVA_032R | December 18, 2021 | 352 | OPUS |
| NVA_033 | December 16, 2021 | 350 | VRS |
| NVA_034 | December 14, 2021 | 348 | VRS |
| NVA_034R | December 18, 2021 | 352 | Static |
| NVA_035 | December 9, 2021 | 343 | OPUS |
| NVA_036 | December 15, 2021 | 349 | Static |
| NVA_036R | December 18, 2021 | 352 | OPUS |
| NVA_037 | December 10, 2021 | 344 | Static |
| NVA_037R | December 20, 2021 | 354 | Static |
| NVA_038 | December 14, 2021 | 348 | Static |
| NVA_039 | December 12, 2021 | 346 | VRS |
| NVA_039R | December 13, 2021 | 347 | VRS |
| NVA_040 | December 12, 2021 | 346 | Static |
| NVA_040R | December 17, 2021 | 351 | Static |
| NVA_041 | December 10, 2021 | 344 | Static |
| NVA_042 | December 2, 2021 | 336 | VRS |
| NVA_043 | November 20, 2021 | 324 | VRS |
| NVA_044 | December 14, 2021 | 348 | Static |
| NVA_045 | December 17, 2021 | 351 | VRS |
| NVA_046 | December 2, 2021 | 336 | VRS |
| NVA_046R | December 7, 2021 | 341 | OPUS |
| NVA_047 | December 12, 2021 | 346 | OPUS |
| NVA_047R | December 17, 2021 | 351 | Static |
| NVA_048 | November 21, 2021 | 325 | VRS |
| NVA_048R | December 7, 2021 | 341 | OPUS |
| NVA_049 | December 13, 2021 | 347 | VRS |
| NVA_050 | November 19, 2021 | 323 | VRS |
| NVA_050R | November 21, 2021 | 325 | VRS |
| NVA_051 | December 13, 2021 | 347 | OPUS-RS |
| NVA_051R | December 17, 2021 | 351 | OPUS-RS |
| NVA_052 | December 3, 2021 | 337 | Static |
| NVA_052R | December 4, 2021 | 338 | Static |
| NVA_053 | December 14, 2021 | 348 | OPUS-RS |
| NVA_053R | December 18, 2021 | 352 | OPUS-RS |
| NVA_054 | December 17, 2021 | 351 | OPUS |
| NVA_055 | November 21, 2021 | 325 | VRS |
| NVA_055R | December 7, 2021 | 341 | OPUS |

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|----------|-------------------|-----|---------|
| NVA_056 | December 5, 2021 | 339 | Static |
| NVA_056R | December 6, 2021 | 340 | OPUS |
| NVA_057 | November 19, 2021 | 323 | VRS |
| NVA_057R | December 7, 2021 | 341 | OPUS |
| NVA_058 | December 12, 2021 | 346 | VRS |
| NVA_059 | December 9, 2021 | 343 | Static |
| NVA_060 | December 10, 2021 | 344 | OPUS |
| NVA_060R | December 20, 2021 | 354 | OPUS |
| NVA_061 | December 13, 2021 | 347 | Static |
| NVA_061R | December 18, 2021 | 352 | Static |
| NVA_062 | December 1, 2021 | 335 | VRS |
| NVA_062R | December 2, 2021 | 336 | VRS |
| NVA_063 | December 4, 2021 | 338 | OPUS-RS |
| NVA_064 | December 15, 2021 | 349 | Static |
| NVA_064R | December 18, 2021 | 352 | Static |
| NVA_065 | December 11, 2021 | 345 | VRS |
| NVA_065R | December 19, 2021 | 353 | Static |
| NVA_066 | December 2, 2021 | 336 | OPUS-RS |
| NVA_066R | December 3, 2021 | 337 | Static |
| NVA_067 | December 11, 2021 | 345 | VRS |
| NVA_068 | December 8, 2021 | 342 | Static |
| NVA_069 | November 21, 2021 | 325 | VRS |
| NVA_069R | November 30, 2021 | 334 | VRS |
| NVA_070 | December 11, 2021 | 345 | VRS |
| NVA_070R | December 19, 2021 | 353 | Static |
| NVA_071 | December 15, 2021 | 349 | Static |
| NVA_072 | November 21, 2021 | 325 | VRS |
| NVA_072R | November 22, 2021 | 326 | VRS |
| NVA_073 | December 9, 2021 | 343 | VRS |
| NVA_074 | November 23, 2021 | 327 | VRS |
| NVA_074R | December 1, 2021 | 335 | VRS |
| NVA_075 | December 17, 2021 | 351 | Static |
| NVA_076 | December 12, 2021 | 346 | Static |
| NVA_076R | December 17, 2021 | 351 | Static |
| NVA_077 | December 11, 2021 | 345 | VRS |
| NVA_077R | December 19, 2021 | 353 | Static |
| NVA_078 | December 11, 2021 | 345 | Static |
| NVA_078R | December 17, 2021 | 351 | Static |
| NVA_079 | December 9, 2021 | 343 | VRS |
| NVA_080 | December 13, 2021 | 347 | OPUS-RS |
| NVA_080R | December 17, 2021 | 351 | OPUS |
| NVA_081 | December 12, 2021 | 346 | VRS |
| NVA_082 | December 3, 2021 | 337 | Static |
| NVA_082R | December 4, 2021 | 338 | Static |
| NVA_083 | December 14, 2021 | 348 | Static |

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|----------|-------------------|-----|---------|
| NVA_083R | December 18, 2021 | 352 | OPUS |
| NVA_084 | November 20, 2021 | 324 | VRS |
| NVA_084R | November 21, 2021 | 325 | VRS |
| NVA_085 | December 1, 2021 | 335 | VRS |
| NVA_085R | December 2, 2021 | 336 | Static |
| NVA_086 | November 19, 2021 | 323 | VRS |
| NVA_087 | December 5, 2021 | 339 | Static |
| NVA_087R | December 6, 2021 | 340 | Static |
| NVA_088 | December 9, 2021 | 343 | VRS |
| NVA_089 | December 13, 2021 | 347 | VRS |
| NVA_089R | December 18, 2021 | 352 | Static |
| NVA_090 | December 12, 2021 | 346 | VRS |
| NVA_091 | November 19, 2021 | 323 | VRS |
| NVA_092 | November 22, 2021 | 326 | VRS |
| NVA_092R | November 23, 2021 | 327 | VRS |
| NVA_093 | December 14, 2021 | 348 | OPUS |
| NVA_094 | December 12, 2021 | 346 | VRS |
| NVA_095 | December 14, 2021 | 348 | OPUS |
| NVA_095R | December 19, 2021 | 353 | OPUS |
| NVA_096 | December 8, 2021 | 342 | OPUS |
| NVA_097 | December 11, 2021 | 345 | Static |
| NVA_097R | December 19, 2021 | 353 | OPUS |
| NVA_098 | December 16, 2021 | 350 | OPUS-RS |
| NVA_098R | December 18, 2021 | 352 | OPUS-RS |
| NVA_099 | December 11, 2021 | 345 | VRS |
| NVA_100 | December 11, 2021 | 345 | VRS |
| NVA_100R | December 19, 2021 | 353 | Static |
| NVA_101 | December 5, 2021 | 339 | VRS |
| NVA_102 | December 12, 2021 | 346 | OPUS |
| NVA_103 | November 22, 2021 | 326 | VRS |
| NVA_104 | December 6, 2021 | 340 | OPUS |
| NVA_105 | December 11, 2021 | 345 | VRS |
| NVA_106 | December 11, 2021 | 345 | Static |
| NVA_106R | December 19, 2021 | 353 | Static |
| NVA_107 | November 20, 2021 | 324 | VRS |
| NVA_108 | November 22, 2021 | 326 | VRS |
| NVA_108R | November 23, 2021 | 327 | VRS |
| NVA_109 | December 15, 2021 | 349 | OPUS |
| NVA_110 | December 8, 2021 | 342 | Static |
| NVA_111 | December 12, 2021 | 346 | VRS |
| NVA_112 | December 4, 2021 | 338 | Static |
| NVA_113 | December 14, 2021 | 348 | OPUS |
| NVA_113R | December 19, 2021 | 353 | Static |
| NVA_114 | December 1, 2021 | 335 | VRS |
| NVA_115 | December 13, 2021 | 347 | VRS |

| | | | |
|----------|-------------------|-----|---------|
| NVA_115R | December 18, 2021 | 352 | Static |
| NVA_116 | December 16, 2021 | 350 | VRS |
| NVA_117 | December 14, 2021 | 348 | VRS |
| NVA_118 | December 16, 2021 | 350 | VRS |
| NVA_119 | December 13, 2021 | 347 | Static |
| NVA_120 | December 11, 2021 | 345 | VRS |
| NVA_120R | December 19, 2021 | 353 | Static |
| NVA_121 | December 15, 2021 | 349 | Static |
| NVA_121R | December 18, 2021 | 352 | Static |
| NVA_122 | December 15, 2021 | 349 | OPUS |
| NVA_122R | December 18, 2021 | 352 | OPUS |
| NVA_123 | December 16, 2021 | 350 | VRS |
| NVA_124 | December 1, 2021 | 335 | Static |
| NVA_124R | December 2, 2021 | 336 | Static |
| NVA_125 | December 2, 2021 | 336 | VRS |
| NVA_125R | December 3, 2021 | 337 | OPUS-RS |
| NVA_126 | December 2, 2021 | 336 | VRS |
| NVA_126R | December 3, 2021 | 337 | OPUS |
| NVA_127 | November 23, 2021 | 327 | VRS |
| NVA_127R | December 1, 2021 | 335 | VRS |
| NVA_128 | November 22, 2021 | 326 | VRS |
| NVA_128R | November 23, 2021 | 327 | VRS |
| NVA_129 | November 20, 2021 | 324 | OPUS |
| NVA_130 | November 19, 2021 | 323 | Static |
| NVA_131 | November 19, 2021 | 323 | Static |
| NVA_132 | November 19, 2021 | 323 | VRS |
| NVA_132R | November 21, 2021 | 325 | VRS |
| NVA_133 | November 19, 2021 | 323 | VRS |
| NVA_133R | November 21, 2021 | 325 | VRS |
| NVA_134 | December 8, 2021 | 342 | Static |
| NVA_135 | December 11, 2021 | 345 | OPUS |
| NVA_135R | December 19, 2021 | 353 | OPUS |
| NVA_136 | December 12, 2021 | 346 | VRS |
| NVA_136R | December 19, 2021 | 353 | OPUS |
| NVA_137 | December 12, 2021 | 346 | VRS |
| NVA_138 | December 15, 2021 | 349 | OPUS |
| NVA_138R | December 18, 2021 | 352 | OPUS |

| POINT ID | DATE SURVEYED | JULIAN DATE | SURVEY METHOD |
|------------|-------------------|-------------|---------------|
| VVA | | | |
| VVA_001 | December 13, 2021 | 347 | OPUS |
| VVA_002 | December 15, 2021 | 349 | Static |
| VVA_002R | December 18, 2021 | 352 | Static |
| VVA_003 | December 6, 2021 | 340 | Static |
| VVA_003R | December 7, 2021 | 341 | OPUS |
| VVA_004 | December 3, 2021 | 337 | OPUS |
| VVA_004R | December 4, 2021 | 338 | Static |
| VVA_005 | December 17, 2021 | 351 | VRS |
| VVA_006 | December 4, 2021 | 338 | OPUS-RS |
| VVA_007 | December 15, 2021 | 349 | Static |
| VVA_007R | December 18, 2021 | 352 | Static |
| VVA_008 | December 6, 2021 | 340 | Static |
| VVA_008R | December 7, 2021 | 341 | OPUS |
| VVA_009 | November 23, 2021 | 327 | VRS |
| VVA_010 | December 8, 2021 | 342 | Static |
| VVA_011 | December 13, 2021 | 347 | VRS |
| VVA_012 | November 21, 2021 | 325 | VRS |
| VVA_013 | December 9, 2021 | 343 | VRS |
| VVA_014 | December 16, 2021 | 350 | OPUS |
| VVA_014R | December 18, 2021 | 352 | OPUS-RS |
| VVA_015 | December 11, 2021 | 345 | VRS |
| VVA_016 | December 9, 2021 | 343 | VRS |
| VVA_017 | December 16, 2021 | 350 | Static |
| VVA_017R | December 18, 2021 | 352 | Static |
| VVA_018 | December 3, 2021 | 337 | Static |
| VVA_018R | December 4, 2021 | 338 | OPUS |
| VVA_019 | December 3, 2021 | 337 | Static |
| VVA_019R | December 4, 2021 | 338 | OPUS |
| VVA_020 | November 22, 2021 | 326 | VRS |
| VVA_021 | December 12, 2021 | 346 | VRS |
| VVA_022 | December 11, 2021 | 345 | VRS |
| VVA_023 | December 15, 2021 | 349 | Static |
| VVA_023R | December 18, 2021 | 352 | Static |
| VVA_024 | December 12, 2021 | 346 | VRS |
| VVA_025 | December 2, 2021 | 336 | VRS |
| VVA_025R | December 3, 2021 | 337 | OPUS |
| VVA_026 | December 1, 2021 | 335 | VRS |
| VVA_026R | December 2, 2021 | 336 | VRS |
| VVA_027 | November 30, 2021 | 334 | VRS |
| VVA_027R | December 1, 2021 | 335 | VRS |
| VVA_028 | December 14, 2021 | 348 | Static |
| VVA_028R | December 18, 2021 | 352 | Static |

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|----------|-------------------|-----|---------|
| VVA_029 | December 12, 2021 | 346 | VRS |
| VVA_029R | December 13, 2021 | 347 | VRS |
| VVA_030 | December 3, 2021 | 337 | Static |
| VVA_030R | December 4, 2021 | 338 | OPUS |
| VVA_031 | December 5, 2021 | 339 | Static |
| VVA_031R | December 6, 2021 | 340 | OPUS |
| VVA_032 | December 13, 2021 | 347 | OPUS-RS |
| VVA_032R | December 17, 2021 | 351 | OPUS |
| VVA_033 | November 20, 2021 | 324 | VRS |
| VVA_034 | December 14, 2021 | 348 | Static |
| VVA_034R | December 19, 2021 | 353 | OPUS |
| VVA_035 | December 1, 2021 | 335 | OPUS |
| VVA_036 | December 8, 2021 | 342 | Static |
| VVA_037 | December 2, 2021 | 336 | VRS |
| VVA_037R | December 7, 2021 | 341 | OPUS |
| VVA_038 | December 6, 2021 | 340 | Static |
| VVA_038R | December 7, 2021 | 341 | Static |
| VVA_039 | December 3, 2021 | 337 | OPUS |
| VVA_039R | December 4, 2021 | 338 | OPUS |
| VVA_040 | December 5, 2021 | 339 | OPUS |
| VVA_040R | December 6, 2021 | 340 | OPUS-RS |
| VVA_041 | November 20, 2021 | 324 | VRS |
| VVA_042 | December 9, 2021 | 343 | VRS |
| VVA_043 | November 21, 2021 | 325 | VRS |
| VVA_044 | December 11, 2021 | 345 | Static |
| VVA_044R | December 19, 2021 | 353 | Static |
| VVA_045 | December 1, 2021 | 335 | OPUS-RS |
| VVA_045R | December 2, 2021 | 336 | OPUS |
| VVA_046 | December 8, 2021 | 342 | Static |
| VVA_047 | December 14, 2021 | 348 | VRS |
| VVA_048 | November 22, 2021 | 326 | OPUS |
| VVA_049 | November 19, 2021 | 323 | VRS |
| VVA_049R | November 21, 2021 | 325 | VRS |
| VVA_050 | December 10, 2021 | 344 | Static |
| VVA_050R | December 20, 2021 | 354 | OPUS |
| VVA_051 | December 16, 2021 | 350 | Static |
| VVA_051R | December 18, 2021 | 352 | Static |
| VVA_052 | December 17, 2021 | 351 | VRS |
| VVA_053 | December 5, 2021 | 339 | VRS |
| VVA_054 | December 11, 2021 | 345 | Static |
| VVA_054R | December 19, 2021 | 353 | Static |
| VVA_055 | December 14, 2021 | 348 | OPUS-RS |
| VVA_055R | December 18, 2021 | 352 | OPUS |
| VVA_056 | November 20, 2021 | 324 | OPUS |
| VVA_057 | December 17, 2021 | 351 | VRS |

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|----------|-------------------|-----|---------|
| VVA_058 | December 14, 2021 | 348 | Static |
| VVA_058R | December 19, 2021 | 353 | Static |
| VVA_059 | December 16, 2021 | 350 | VRS |
| VVA_060 | December 8, 2021 | 342 | OPUS |
| VVA_061 | December 17, 2021 | 351 | VRS |
| VVA_062 | December 9, 2021 | 343 | Static |
| VVA_063 | December 12, 2021 | 346 | VRS |
| VVA_064 | December 12, 2021 | 346 | VRS |
| VVA_064R | December 19, 2021 | 353 | Static |
| VVA_065 | December 14, 2021 | 348 | VRS |
| VVA_066 | December 15, 2021 | 349 | Static |
| VVA_067 | December 13, 2021 | 347 | VRS |
| VVA_068 | November 20, 2021 | 324 | VRS |
| VVA_069 | December 12, 2021 | 346 | OPUS |
| VVA_070 | December 12, 2021 | 346 | VRS |
| VVA_071 | December 16, 2021 | 350 | VRS |
| VVA_072 | December 13, 2021 | 347 | Static |
| VVA_072R | December 17, 2021 | 351 | Static |
| VVA_073 | December 13, 2021 | 347 | VRS |
| VVA_073R | December 18, 2021 | 352 | Static |
| VVA_074 | December 16, 2021 | 350 | OPUS |
| VVA_074R | December 18, 2021 | 352 | OPUS |
| VVA_075 | December 11, 2021 | 345 | Static |
| VVA_075R | December 17, 2021 | 351 | Static |
| VVA_076 | December 14, 2021 | 348 | Static |
| VVA_076V | December 14, 2021 | 348 | VRS |
| VVA_077 | November 21, 2021 | 325 | VRS |
| VVA_077R | November 22, 2021 | 326 | VRS |
| VVA_078 | December 15, 2021 | 349 | Static |
| VVA_078R | December 18, 2021 | 352 | Static |
| VVA_079 | December 8, 2021 | 342 | OPUS |
| VVA_080 | December 11, 2021 | 345 | VRS |
| VVA_080R | December 19, 2021 | 353 | Static |
| VVA_081 | December 8, 2021 | 342 | Static |
| VVA_082 | December 14, 2021 | 348 | OPUS |
| VVA_082R | December 17, 2021 | 351 | Static |
| VVA_083 | December 9, 2021 | 343 | VRS |
| VVA_084 | December 12, 2021 | 346 | VRS |
| VVA_085 | December 11, 2021 | 345 | VRS |
| VVA_085R | December 19, 2021 | 353 | Static |
| VVA_086 | December 5, 2021 | 339 | Static |
| VVA_086R | December 6, 2021 | 340 | OPUS |
| VVA_087 | December 12, 2021 | 346 | OPUS-RS |
| VVA_087R | December 17, 2021 | 351 | OPUS-RS |
| VVA_088 | December 14, 2021 | 348 | OPUS-RS |

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|----------|-------------------|-----|---------|
| VVA_088R | December 18, 2021 | 352 | OPUS-RS |
| VVA_089 | November 19, 2021 | 323 | VRS |
| VVA_090 | December 13, 2021 | 347 | VRS |
| VVA_090R | December 18, 2021 | 352 | Static |
| VVA_091 | December 11, 2021 | 345 | VRS |
| VVA_091R | December 19, 2021 | 353 | Static |
| VVA_092 | December 16, 2021 | 350 | OPUS-RS |
| VVA_092R | December 18, 2021 | 352 | OPUS-RS |
| VVA_093 | December 12, 2021 | 346 | VRS |
| VVA_094 | December 6, 2021 | 340 | Static |
| VVA_095 | November 22, 2021 | 326 | VRS |
| VVA_096 | November 21, 2021 | 325 | VRS |
| VVA_097 | December 16, 2021 | 350 | VRS |
| VVA_098 | December 16, 2021 | 350 | VRS |
| VVA_098S | December 16, 2021 | 350 | OPUS-RS |
| VVA_099 | December 16, 2021 | 350 | VRS |
| VVA_100 | December 13, 2021 | 347 | Static |
| VVA_101 | December 14, 2021 | 348 | VRS |
| VVA_102 | December 4, 2021 | 338 | Static |

5. Check Point Comparison

| | | N DELTA | E DELTA | Z DELTA |
|----------|----------|---------|---------|---------|
| POINT ID | POINT ID | meter | meter | meter |
| NVA_002 | NVA_002R | -0.021 | -0.017 | 0.019 |
| NVA_003 | NVA_003R | 0.188 | -0.108 | -0.013 |
| NVA_005 | NVA_005R | -0.012 | 0.012 | 0.027 |
| NVA_006 | NVA_006R | 0.063 | -0.050 | -0.006 |
| NVA_009 | NVA_009R | -0.010 | -0.003 | -0.007 |
| NVA_011 | NVA_011R | -0.021 | 0.015 | -0.074 |
| NVA_013 | NVA_013R | -0.050 | 0.030 | -0.166 |
| NVA_019 | NVA_019R | -0.003 | -0.006 | 0.032 |
| NVA_020 | NVA_020R | 0.013 | -0.007 | -0.019 |
| NVA_021 | NVA_021R | 0.098 | 0.033 | 0.128 |
| NVA_023 | NVA_023R | -0.004 | -0.030 | -0.020 |
| NVA_026 | NVA_026R | -0.031 | 0.052 | -0.034 |
| NVA_028 | NVA_028R | 0.052 | 0.010 | 0.042 |
| NVA_030 | NVA_030R | 0.003 | -0.023 | 0.010 |
| NVA_031 | NVA_031R | -0.036 | -0.044 | 0.023 |
| NVA_032 | NVA_032R | 0.170 | 0.678 | -0.827 |
| NVA_034 | NVA_034R | 0.044 | -0.010 | -0.092 |
| NVA_036 | NVA_036R | -0.007 | 0.011 | 0.013 |
| NVA_037 | NVA_037R | 0.001 | 0.000 | -0.019 |
| NVA_039 | NVA_039R | 0.032 | -0.022 | 0.036 |
| NVA_040 | NVA_040R | 0.059 | -0.057 | 0.011 |
| NVA_046 | NVA_046R | 0.140 | -0.116 | -0.009 |
| NVA_047 | NVA_047R | 0.062 | -0.081 | -0.008 |
| NVA_048 | NVA_048R | 0.121 | -0.158 | 0.084 |
| NVA_050 | NVA_050R | 0.015 | 0.012 | 0.016 |
| NVA_051 | NVA_051R | 0.017 | -0.003 | 0.006 |
| NVA_052 | NVA_052R | 0.004 | 0.011 | -0.010 |
| NVA_053 | NVA_053R | 0.007 | 0.017 | -0.006 |
| NVA_055 | NVA_055R | 0.160 | -0.104 | -0.036 |
| NVA_056 | NVA_056R | 0.010 | -0.024 | 0.008 |
| NVA_057 | NVA_057R | 0.205 | -0.103 | 0.046 |
| NVA_060 | NVA_060R | 0.000 | -0.005 | -0.036 |
| NVA_061 | NVA_061R | -0.007 | 0.006 | 0.005 |
| NVA_062 | NVA_062R | 0.075 | -0.034 | 0.089 |
| NVA_064 | NVA_064R | -0.014 | 0.002 | 0.016 |
| NVA_065 | NVA_065R | 0.031 | -0.048 | 0.036 |
| NVA_066 | NVA_066R | 0.013 | -0.012 | 0.000 |
| NVA_069 | NVA_069R | -0.029 | -0.010 | -0.008 |
| NVA_070 | NVA_070R | 0.019 | -0.020 | -0.020 |
| NVA_072 | NVA_072R | 0.013 | 0.013 | -0.026 |

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|---------|----------|--------|--------|--------|
| NVA_074 | NVA_074R | -0.027 | 0.000 | -0.006 |
| NVA_076 | NVA_076R | 0.050 | -0.060 | -0.019 |
| NVA_077 | NVA_077R | -0.019 | -0.047 | 0.018 |
| NVA_078 | NVA_078R | -0.078 | 0.064 | -0.011 |
| NVA_080 | NVA_080R | -0.011 | -0.010 | -0.022 |
| NVA_082 | NVA_082R | -0.014 | -0.018 | 0.008 |
| NVA_083 | NVA_083R | 0.007 | -0.008 | 0.016 |
| NVA_084 | NVA_084R | 0.028 | 0.031 | 0.057 |
| NVA_085 | NVA_085R | 0.090 | -0.037 | 0.038 |
| NVA_087 | NVA_087R | 0.017 | 0.003 | 0.011 |
| NVA_089 | NVA_089R | 0.030 | 0.026 | -0.030 |
| NVA_092 | NVA_092R | -0.018 | 0.014 | -0.134 |
| NVA_095 | NVA_095R | 0.018 | 0.015 | -0.006 |
| NVA_097 | NVA_097R | 0.002 | 0.011 | -0.008 |
| NVA_098 | NVA_098R | -0.012 | -0.020 | 0.040 |
| NVA_100 | NVA_100R | 0.020 | -0.035 | -0.016 |
| NVA_106 | NVA_106R | 0.071 | -0.011 | 0.013 |
| NVA_108 | NVA_108R | 0.018 | -0.034 | -0.011 |
| NVA_113 | NVA_113R | -0.048 | 0.023 | 0.010 |
| NVA_115 | NVA_115R | 0.055 | -0.007 | 0.033 |
| NVA_120 | NVA_120R | 0.022 | -0.035 | -0.052 |
| NVA_121 | NVA_121R | 0.006 | -0.012 | 0.011 |
| NVA_122 | NVA_122R | -0.049 | 0.004 | -0.007 |
| NVA_124 | NVA_124R | 0.002 | -0.007 | -0.067 |
| NVA_125 | NVA_125R | 0.135 | -0.122 | 0.007 |
| NVA_126 | NVA_126R | 0.074 | -0.111 | -0.272 |
| NVA_127 | NVA_127R | 0.021 | 0.006 | -0.006 |
| NVA_128 | NVA_128R | -0.062 | 0.098 | 0.125 |
| NVA_132 | NVA_132R | 0.074 | -0.004 | -0.036 |
| NVA_133 | NVA_133R | 0.010 | -0.005 | 0.018 |
| NVA_135 | NVA_135R | -0.007 | -0.009 | -0.001 |
| NVA_136 | NVA_136R | 0.001 | -0.033 | -0.017 |
| NVA_138 | NVA_138R | -0.006 | 0.000 | -0.028 |

| | | N DELTA | E DELTA | Z DELTA |
|-----------------|-----------------|----------------|----------------|----------------|
| POINT ID | POINT ID | meter | meter | meter |
| VVA_002 | VVA_002R | 0.005 | 0.016 | 0.023 |
| VVA_003 | VVA_003R | 0.025 | -0.017 | -0.002 |
| VVA_004 | VVA_004R | -0.012 | -0.048 | 0.020 |
| VVA_007 | VVA_007R | -0.008 | 0.011 | -0.004 |
| VVA_008 | VVA_008R | -0.019 | -0.005 | -0.022 |
| VVA_014 | VVA_014R | 0.012 | -0.010 | 0.007 |
| VVA_017 | VVA_017R | -0.035 | -0.021 | 0.026 |
| VVA_018 | VVA_018R | 0.028 | -0.027 | -0.013 |
| VVA_019 | VVA_019R | -0.037 | 0.028 | 0.015 |
| VVA_023 | VVA_023R | -0.006 | 0.005 | -0.011 |
| VVA_025 | VVA_025R | 0.184 | -0.093 | -0.121 |
| VVA_026 | VVA_026R | 0.029 | 0.046 | -0.008 |
| VVA_027 | VVA_027R | -0.001 | -0.013 | 0.011 |
| VVA_028 | VVA_028R | 0.017 | -0.004 | 0.010 |
| VVA_029 | VVA_029R | 0.017 | 0.014 | 0.133 |
| VVA_030 | VVA_030R | 0.012 | -0.026 | -0.016 |
| VVA_031 | VVA_031R | -0.007 | -0.019 | 0.004 |
| VVA_032 | VVA_032R | -0.001 | -0.018 | -0.006 |
| VVA_034 | VVA_034R | 0.089 | -0.027 | -0.017 |
| VVA_037 | VVA_037R | 0.166 | -0.133 | 0.026 |
| VVA_038 | VVA_038R | 0.015 | -0.019 | 0.005 |
| VVA_039 | VVA_039R | 0.012 | -0.003 | 0.006 |
| VVA_040 | VVA_040R | -1.666 | -1.836 | 0.020 |
| VVA_044 | VVA_044R | 0.043 | 0.026 | -0.030 |
| VVA_045 | VVA_045R | 0.008 | -0.008 | -0.012 |
| VVA_049 | VVA_049R | 0.120 | -0.014 | 0.062 |
| VVA_050 | VVA_050R | 0.000 | -0.004 | 0.015 |
| VVA_051 | VVA_051R | 0.009 | 0.014 | 0.019 |
| VVA_054 | VVA_054R | 0.020 | -0.010 | -0.011 |
| VVA_055 | VVA_055R | 0.143 | 0.403 | -0.240 |
| VVA_058 | VVA_058R | -0.023 | 0.020 | -0.023 |
| VVA_064 | VVA_064R | 0.002 | -0.030 | -0.016 |
| VVA_072 | VVA_072R | 0.035 | 0.046 | 0.000 |
| VVA_073 | VVA_073R | 0.019 | -0.068 | 0.016 |
| VVA_074 | VVA_074R | -0.027 | -0.024 | 0.036 |
| VVA_075 | VVA_075R | -0.077 | 0.070 | -0.025 |
| VVA_076 | VVA_076R | -0.044 | -0.001 | 0.031 |
| VVA_077 | VVA_077R | 0.041 | 0.025 | -0.085 |
| VVA_078 | VVA_078R | 0.001 | 0.017 | 0.018 |
| VVA_080 | VVA_080R | 0.023 | -0.046 | -0.033 |
| VVA_082 | VVA_082R | 0.010 | 0.007 | 0.047 |
| VVA_085 | VVA_085R | 0.021 | -0.053 | -0.061 |
| VVA_086 | VVA_086R | 0.014 | -0.007 | 0.017 |

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|---------|----------|--------|--------|--------|
| VVA_087 | VVA_087R | -0.005 | -0.001 | -0.017 |
| VVA_088 | VVA_088R | 0.015 | 0.004 | -0.013 |
| VVA_090 | VVA_090R | 0.061 | 0.021 | 0.034 |
| VVA_091 | VVA_091R | 0.045 | -0.018 | -0.060 |
| VVA_092 | VVA_092R | 0.016 | 0.003 | 0.072 |
| VVA_098 | VVA_098R | 0.117 | -0.027 | 0.122 |

6. Deliverables

Along with this report, the deliverables to Dewberry Engineers include the Check Point Documentation Report sheets and an Excel Spreadsheet including all check point data.