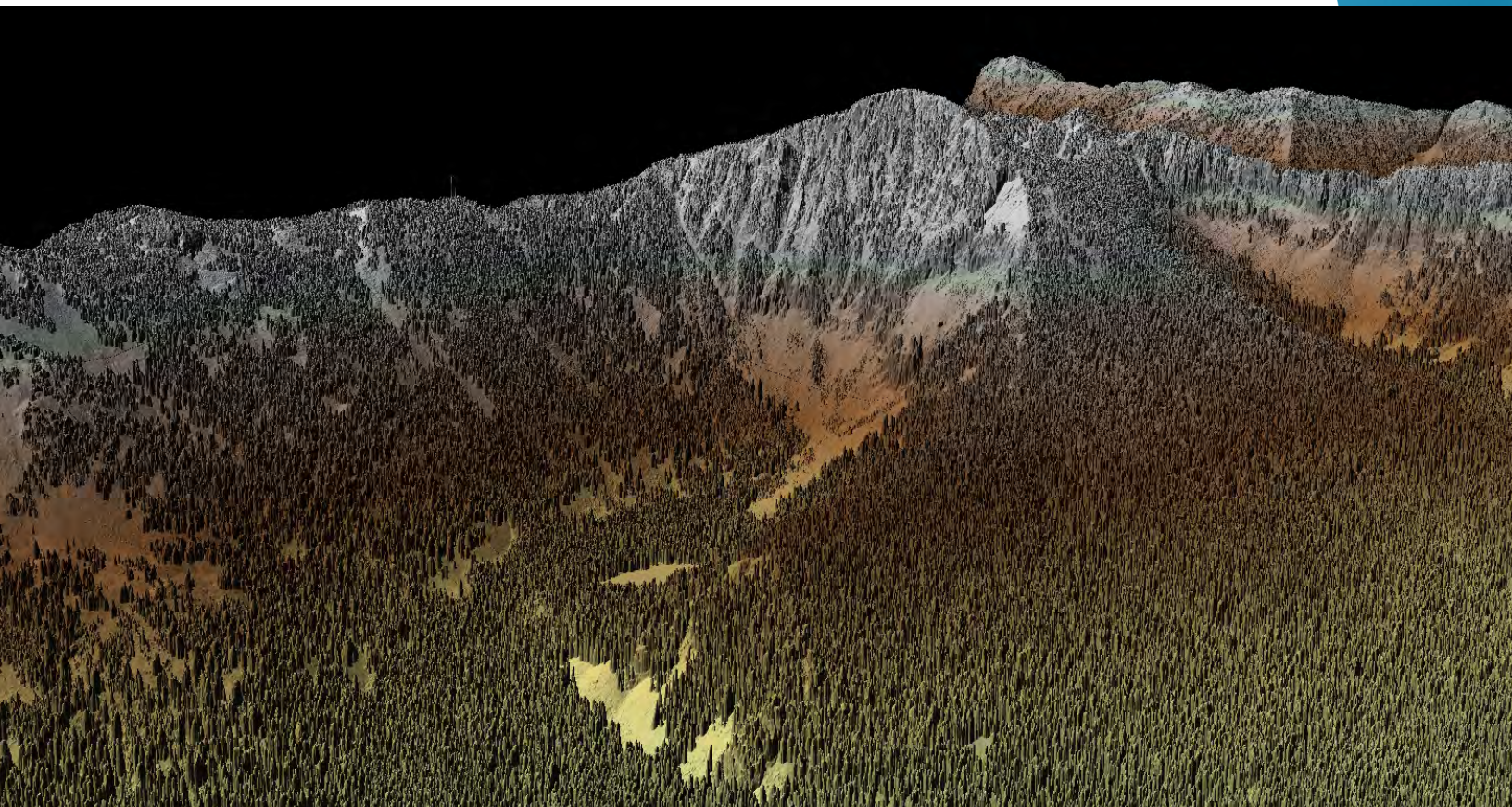




quantum  
SPATIAL

AN NV5 COMPANY



WALLOWA-WHITMAN NATIONAL FOREST  
LIDAR PROCESSING REPORT

2020

Submitted: December 4, 2020

Prepared for:



Prepared by:



523 Wellington Way, Suite 375  
Lexington, KY 40503

859.277.8700

# Contents

1. Summary / Scope .....	1
1.1. Summary.....	1
1.2. Scope.....	1
1.3. Coverage.....	1
1.4. Duration.....	1
1.5. Issues .....	1
2. Planning / Equipment .....	4
2.1. Flight Planning .....	4
2.2. LiDAR Sensor.....	4
2.3. Aircraft.....	8
2.4. Time Period.....	9
3. Processing Summary .....	10
3.1. Flight Logs.....	10
3.2. LiDAR Processing.....	11
3.3. LAS Classification Scheme .....	12
3.4. Classified LAS Processing .....	12
4. Project Coverage Verification .....	16
5. Ground Control and Accuracy.....	19
5.1. Vertical Accuracy Accuracy Assessment .....	19
Project Report Appendices.....	xxi
Appendix A .....	xxii

## List of Figures

Figure 1. Work Unit Boundary.....	3
Figure 2. Planned Flight Lines.....	5
Figure 3. Planned Flight Lines.....	6
Figure 4. Riegl VQ1560i LiDAR Sensor.....	7
Figure 5. Some of Quantum Spatial's Planes.....	8
Figure 6. Lidar Tile Layout.....	14
Figure 7. Lidar Tile Layout.....	15
Figure 8. Lidar Coverage.....	17
Figure 9. Lidar Coverage.....	18
Figure 10. QC Checkpoint Locations - NVA.....	20

## List of Tables

Table 1. Originally Planned LiDAR Specifications.....	1
Table 2. LiDAR System Specifications.....	7
Table 3. LAS Classifications.....	12

## List of Appendices

Appendix A: Survey Report

# 1. Summary / Scope

## 1.1. Summary

This report contains a summary of the Wallowa-Whitman, Lidar acquisition task order, issued by USDA under their Contract 1205M619C0019 on September 27, 2019 . The task order yielded a project area covering approximately 684 square miles over Oregon. The intent of this document is only to provide specific validation information for the data acquisition/collection, processing, and production of deliverables completed as specified in the task order.

## 1.2. Scope

Aerial topographic LiDAR was acquired using state of the art technology along with the necessary surveyed ground control points (GCPs) and airborne GPS and inertial navigation systems. The aerial data collection was designed with the following specifications listed in Table 1 below.

Table 1. Originally Planned LiDAR Specifications

Average Point Density	Flight Altitude (AGL)	Field of View	Minimum Side Overlap	RMSEz
8 pts / m <sup>2</sup>	1950 m	58.5°	50%	≤ 10 cm

## 1.3. Coverage

The project boundary covers approximately 684 square miles over Oregon and includes Morgan Nesbit, Baker City Watershed, Sheep Creek, and HJ Andrews Experimental Forest . A buffer of 100 meters was created to meet task order specifications. Project extents are shown in Figure 1.

## 1.4. Duration

LiDAR data was acquired from July 11, 2020 to July 23, 2020 in 11 total lifts. See “Section: 2.4. Time Period” for more details.

## 1.5. Issues

There were no major issues to report for this project.



<b>Wallowa-Whitman National Forest                      Projected Coordinate System: USFS R6 Albers                      Horizontal Datum: NAD 1983                      Vertical Datum: NAVD88 (GEOID 12b)                      Units: Meters</b>	
<b>Lidar Point Cloud</b>	<b>Classified Point Cloud in .LAS 1.4 format</b>
<b>Rasters</b>	<ul style="list-style-type: none"> <li>• 0.5-meter Hydro-flattened Bare Earth Digital Elevation Model (DEM) in IMG format</li> <li>• 0.5-meter Intensity images in GeoTIFF format</li> <li>• 0.5-meter First Return Digital Surface Model (DEM) in IMG format</li> </ul>
<b>Vectors</b>	<b>Shapefiles (*.shp)</b> <ul style="list-style-type: none"> <li>• Project Boundary</li> <li>• LiDAR Tile Index</li> </ul>
<b>Reports</b>	<b>Reports in PDF format</b> <ul style="list-style-type: none"> <li>• Focus on Delivery</li> <li>• Focus on Accuracy</li> <li>• Survey Report</li> <li>• Processing Report</li> </ul>
<b>Metadata</b>	<b>XML Files (*.xml)</b> <ul style="list-style-type: none"> <li>• DSM</li> <li>• Classified Point Cloud</li> <li>• DEM</li> <li>• Intensity Imagery</li> </ul>

# Wallowa-Whitman National Forest Project Boundary

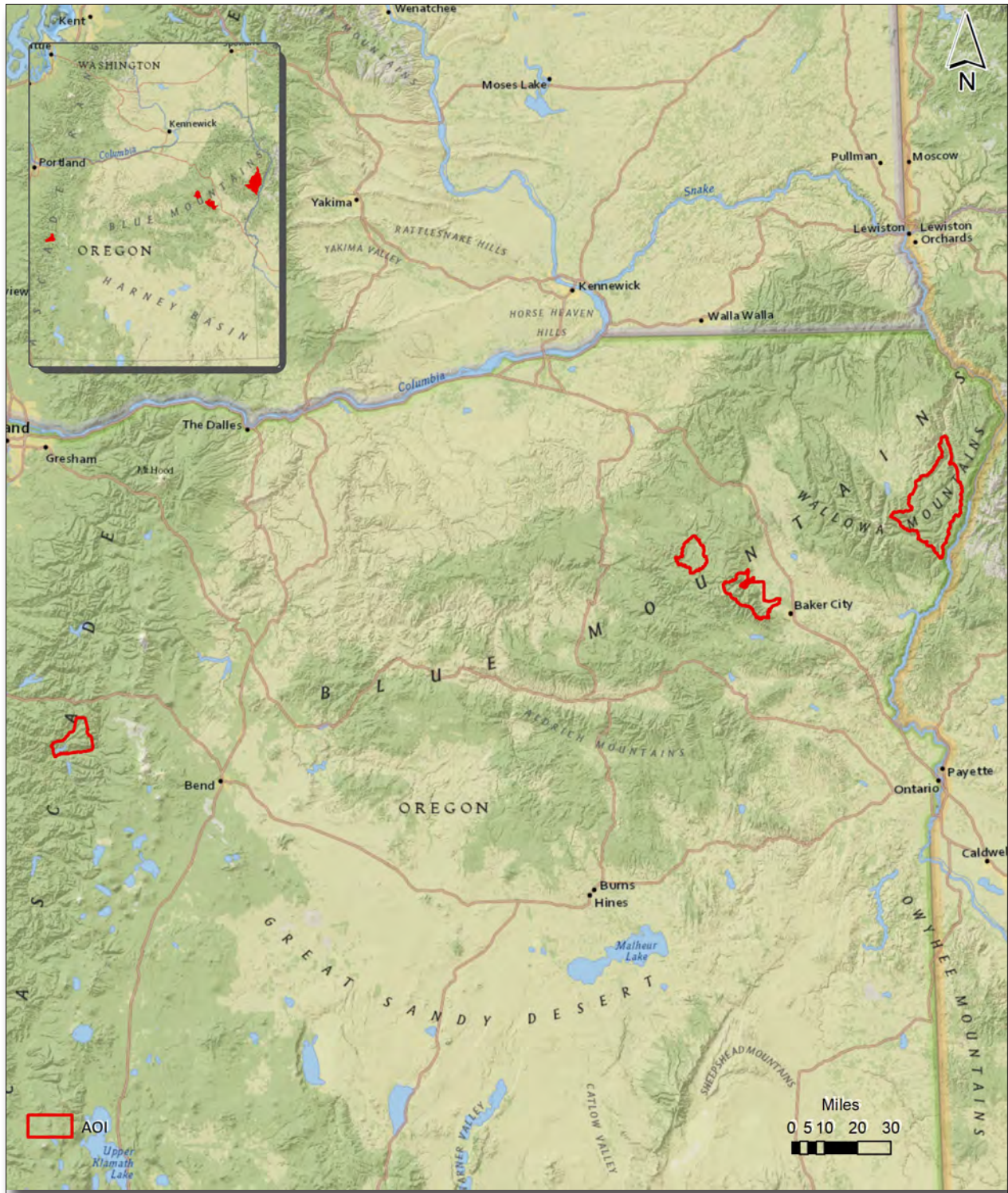


Figure 1. Work Unit Boundary

## 2. Planning / Equipment

### 2.1. Flight Planning

Flight planning was based on the unique project requirements and characteristics of the project site. The basis of planning included: required accuracies, type of development, amount / type of vegetation within project area, required data posting, and potential altitude restrictions for flights in project vicinity.

Detailed project flight planning calculations were performed for the project using RiPARAMETER planning software. Planned flight lines are shown in Figures 2-3.

### 2.2. LiDAR Sensor

Quantum Spatial utilized Riegl VQ1560i LiDAR sensors (Figure 4), serial numbers 4040 and 4046 for lidar data collection.

The Riegl 1560i system has a laser pulse repetition rate of up to 2 MHz resulting in more than 1.3 million measurements per second. The system utilizes a Multi-Pulse in the Air option (MPIA). The sensor is also equipped with the ability to measure up to an unlimited number of targets per pulse from the laser.

A brief summary of the aerial acquisition parameters for the project are shown in the LiDAR System Specifications in Table 2.



# Wallowa-Whitman National Forest Morgan-Nesbit, Sheep Creek, Baker City Watershed Planned Flight Lines

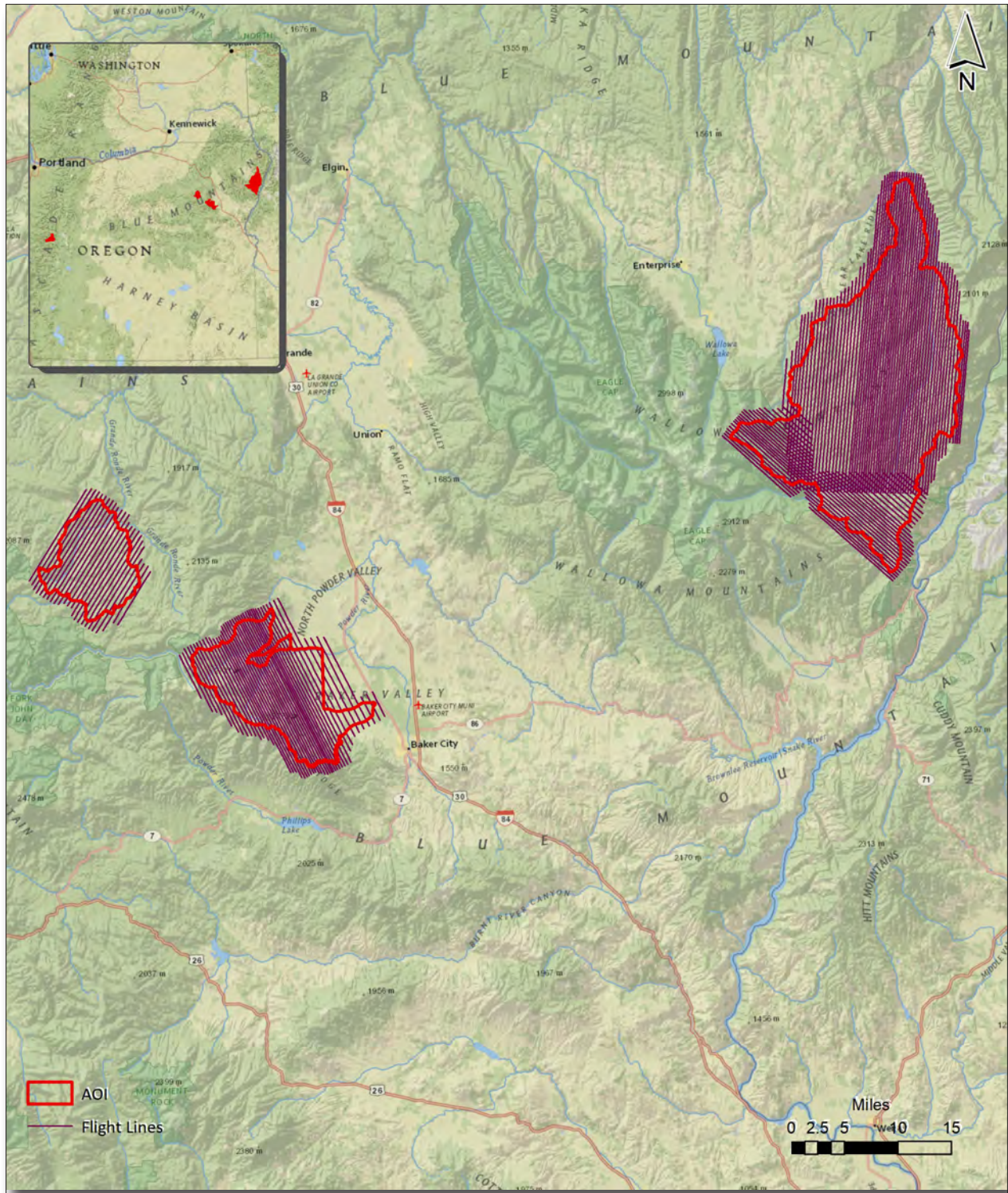


Figure 2. Planned Flight Lines



# Wallowa-Whitman National Forest HJ Andrews Experimental Forest Planned Flight Lines

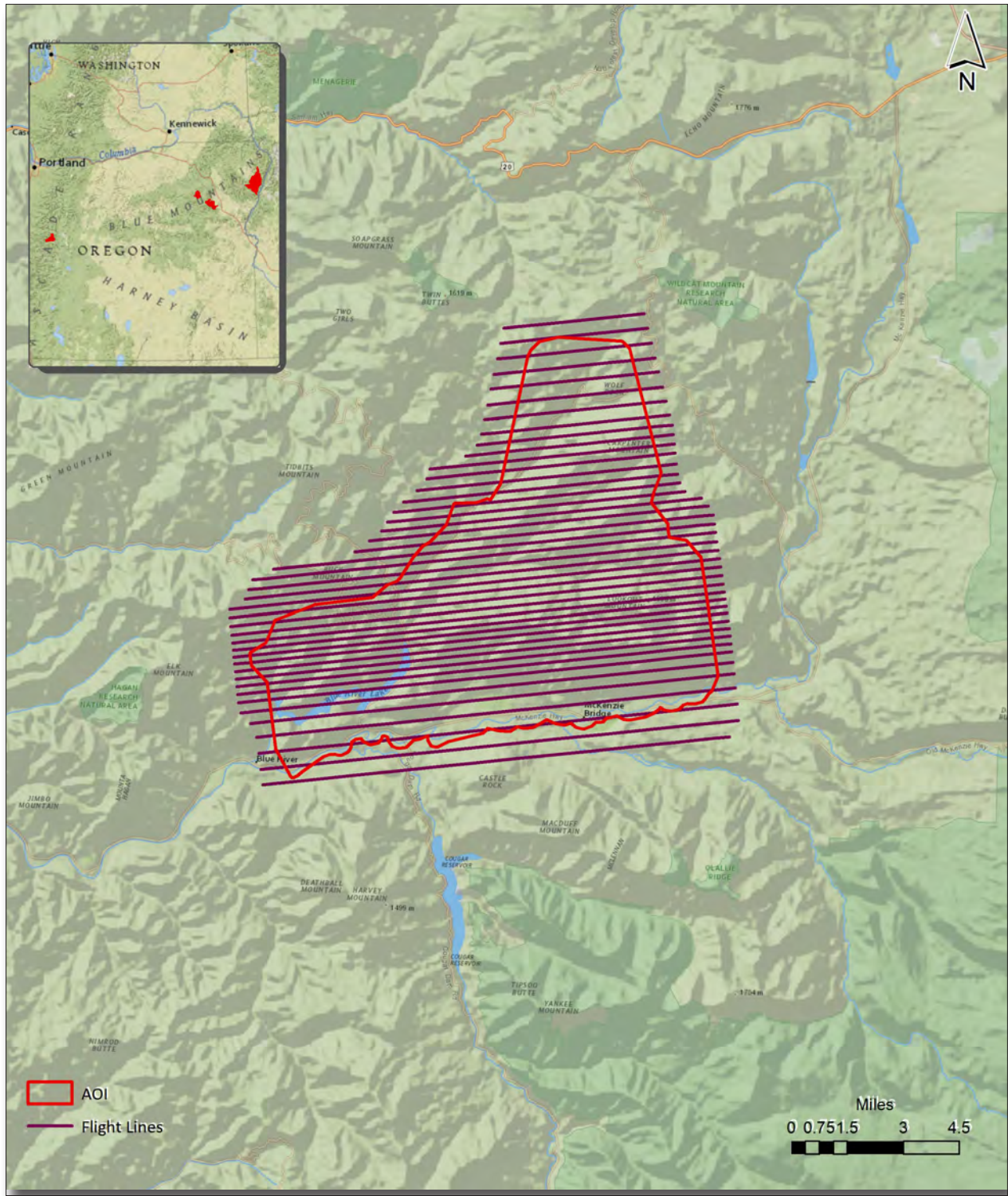


Figure 3. Planned Flight Lines

**Table 2. LiDAR System Specifications**

		Riegl VQ1560i
<b>Terrain and Aircraft Scanner</b>	Flying Height	1950 m
	Recommended Ground Speed	145 kts
<b>Scanner</b>	Field of View	58.5°
	Scan Rate Setting Used	102 lines per second
<b>Laser</b>	Laser Pulse Rate Used	593 kHz
	Multi Pulse in Air Mode	yes
<b>Coverage</b>	Full Swath Width	2185 m
	Line Spacing	983 m
<b>Point Spacing and Density</b>	Average Point Spacing	0.35 m
	Average Point Density	8 pts / m <sup>2</sup>

**Figure 4. Riegl VQ1560i LiDAR Sensor**




## 2.3. Aircraft

All flights for the project were accomplished through the use of customized planes. Plane type and tail numbers are listed below.

### LiDAR Collection Planes

- Piper Navajo (twin-piston), Tail Number: N22GE
- Cessna Caravan (single-turboprop), Tail Number: N604MD

These aircraft provided an ideal, stable aerial base for LiDAR acquisition. These aerial platforms have relatively fast cruise speeds, which are beneficial for project mobilization / demobilization while maintaining relatively slow stall speeds, proving ideal for collection of high-density, consistent data posting using a state-of-the-art Riegl VQ1560i LiDAR system. Some of Quantum Spatial's operating aircraft can be seen in Figure 4 below.

Figure 5. Some of Quantum Spatial's Planes



## 2.4. Time Period

Project specific flights were conducted between July 11, 2020 and July 23, 2020. Eleven aircraft lifts were completed. Accomplished lifts are listed below.

- 07112020A (SN4040,N22GE)
- 07132020A (SN4040,N22GE)
- 07142020A (SN4040,N22GE)
- 07142020B (SN4040,N22GE)
- 07152020A (SN4040,N22GE)
- 07152020B (SN4040,N22GE)
- 07162020A (SN4040,N22GE)
- 07162020B (SN4040,N22GE)
- 07182020A (SN4040,N22GE)
- 07182020B (SN4040,N22GE)
- 07232020A (SN4046,N604MD)



## 3. Processing Summary

### 3.1. Flight Logs

Flight logs were completed by LIDAR sensor technicians for each mission during acquisition. These logs depict a variety of information, including:

- Job / Project #
- Flight Date / Lift Number
- FOV (Field of View)
- Scan Rate (HZ)
- Pulse Rate Frequency (Hz)
- Ground Speed
- Altitude
- Base Station
- PDOP avoidance times
- Flight Line #
- Flight Line Start and Stop Times
- Flight Line Altitude (AMSL)
- Heading
- Speed
- Returns
- Crab

Notes: (Visibility, winds, ride, weather, temperature, dew point, pressure, etc).

## 3.2. LiDAR Processing

Applanix + POSPac software was used for post-processing of airborne GPS and inertial data (IMU), which is critical to the positioning and orientation of the LiDAR sensor during all flights. Applanix POSPac combines aircraft raw trajectory data with stationary GPS base station data yielding a “Smoothed Best Estimate Trajectory” (SBET) necessary for additional post processing software to develop the resulting geo-referenced point cloud from the LiDAR missions.

During the sensor trajectory processing (combining GPS & IMU datasets) certain statistical graphs and tables are generated within the Applanix POSPac processing environment which are commonly used as indicators of processing stability and accuracy. This data for analysis include: max horizontal / vertical GPS variance, separation plot, altitude plot, PDOP plot, base station baseline length, processing mode, number of satellite vehicles, and mission trajectory.

Point clouds were created using RiPROCESS software. The generated point cloud is the mathematical three dimensional composite of all returns from all laser pulses as determined from the aerial mission. The point cloud is imported into GeoCue distributive processing software. Imported data is tiled and then calibrated using TerraMatch and proprietary software. Using TerraScan, the vertical accuracy of the surveyed ground control is tested and any bias is removed from the data. TerraScan and TerraModeler software packages are then used for automated data classification and manual cleanup. The data are manually reviewed and any remaining artifacts removed using functionality provided by TerraScan and TerraModeler.

DEMs and Intensity Images are then generated using proprietary software. In the bare earth surface model, above-ground features are excluded from the data set. Global Mapper is used as a final check of the bare earth dataset.

Finally, proprietary software is used to perform statistical analysis of the LAS files.

Software	Version
RiPROCESS	1.8.6
Applanix + POSPac	8.4
GeoCue	2017.1.14.1
Global Mapper	19.1;20.1
TerraModeler	20.004
TerraScan	20.011
TerraMatch	20.004

### 3.3. LAS Classification Scheme

The classification classes are determined by the USGS Version 1.3 specifications and are an industry standard for the classification of LIDAR point clouds. All data starts the process as Class 1 (Unclassified), and then through automated classification routines, the classifications are determined using TerraScan macro processing.

The classes used in the dataset are as follows and have the following descriptions:

Table 3. LAS Classifications

	Classification Name	Description
1	Processed, but Unclassified	Laser returns that are not included in the ground class, or any other project classification
2	Bare earth	Laser returns that are determined to be ground using automated and manual cleaning algorithms
7	Low Noise	Laser returns that are often associated with scattering from reflective surfaces, or artificial points below the ground surface
18	High Noise	Laser returns that are often associated with birds or artificial points above the ground surface
21	Snow	Ground points that fall on snow, where identifiable

### 3.4. Classified LAS Processing

The bare earth surface is then manually reviewed to ensure correct classification on the Class 2 (Ground) points.

All overlap data was processed through automated functionality provided by TerraScan to classify the overlapping flight line data to approved classes by USGS. The overlap data was identified using the Overlap Flag, per LAS 1.4 specifications.

All data was manually reviewed and any remaining artifacts removed using functionality provided by TerraScan and TerraModeler. Global Mapper is used as a final check of the bare earth dataset. GeoCue was then used to create the deliverable industry-standard LAS files for all point cloud data. Quantum Spatial's proprietary software was used to perform final statistical analysis of the classes in the LAS files, on a per tile level to verify final classification metrics and full LAS header information.

### 3.5. Raster DTM Processing

Class 2 LiDAR were used to create a 0.5-meter Raster DTM. Using automated scripting routines within proprietary software, an IMG file was created for each tile. Each surface is reviewed using Global Mapper to check for any surface anomalies or incorrect elevations found within the surface.

## 3.6. Intensity Image Processing

GeoCue software was used to create the deliverable intensity images. All overlap classes were ignored during this process. This helps to ensure a more aesthetically pleasing image. The GeoCue software was then used to verify full project coverage as well. GeoTIFF files with a cell size of 0.5-meter were then provided as the deliverable for this dataset requirement.

## 3.7. First Return DSM Processing

First return LiDAR points were used to create a 0.5-meter first-return raster DSM. Using automated scripting routines within proprietary software, IMG files were created for each tile. Each surface is reviewed using Global Mapper to check for any surface anomalies or incorrect elevations found within the surface.



# Wallowa-Whitman National Forest Morgan-Nesbit, Sheep Creek, Baker City Watershed Tile Layout

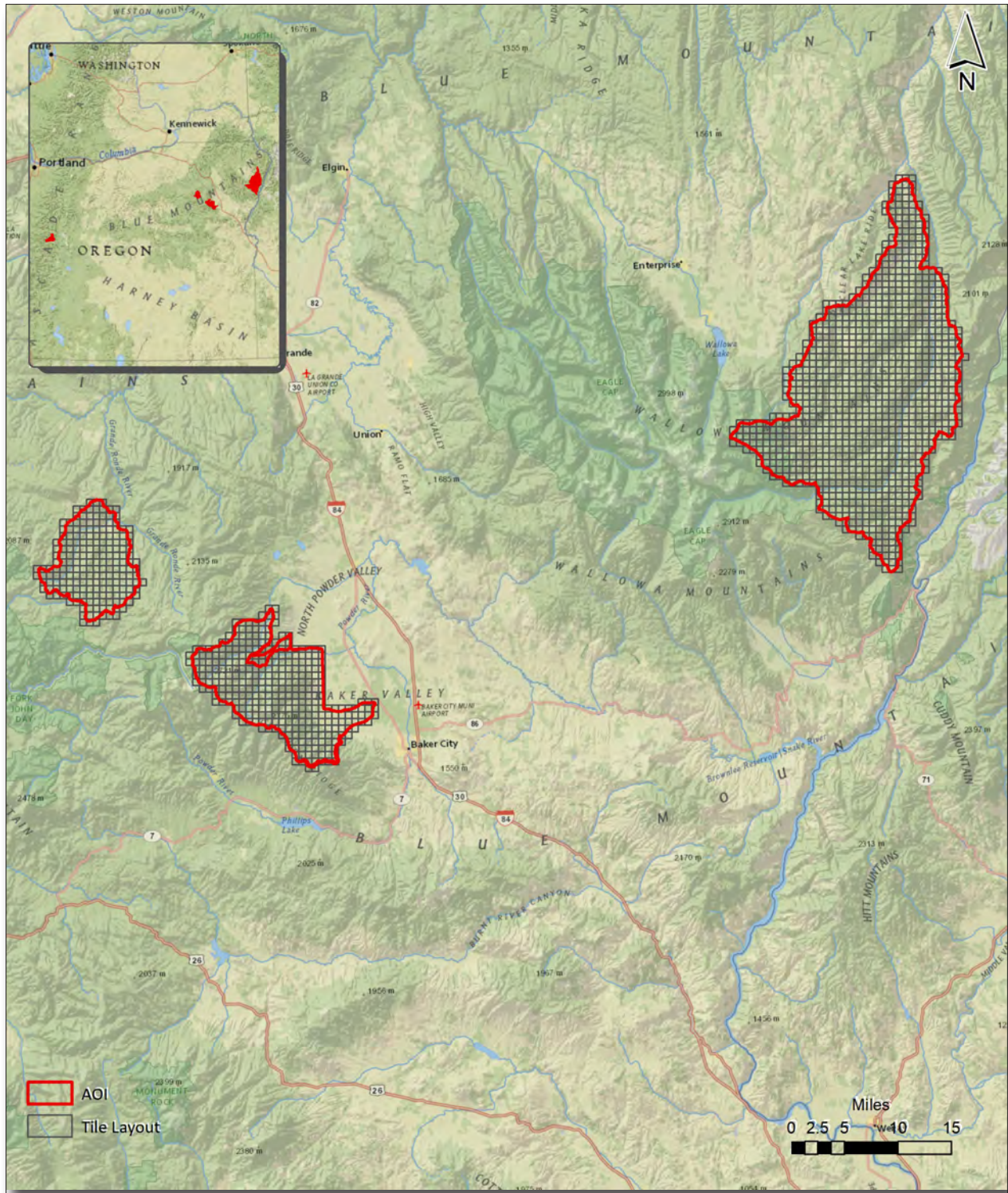


Figure 6. Lidar Tile Layout



# Wallowa-Whitman National Forest HJ Andrews Experimental Forest Tile Layout

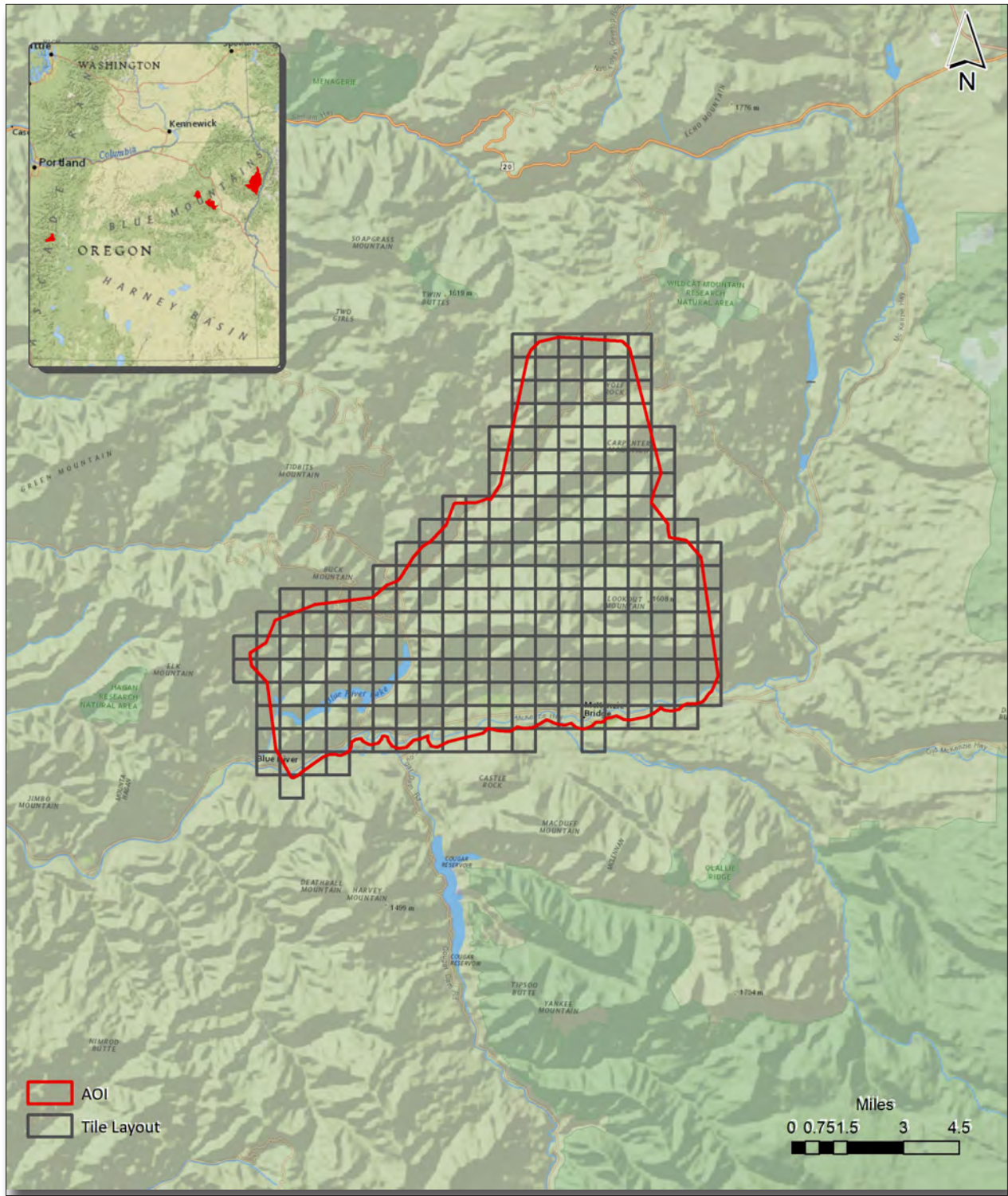


Figure 7. Lidar Tile Layout

## 4. Project Coverage Verification

Coverage verification was performed by comparing coverage of processed .LAS files captured during project collection to generate project shape files depicting boundaries of specified project areas. Please refer to Figures 8-9.



# Wallowa-Whitman National Forest Morgan-Nesbit, Sheep Creek, Baker City Watershed Lidar Coverage

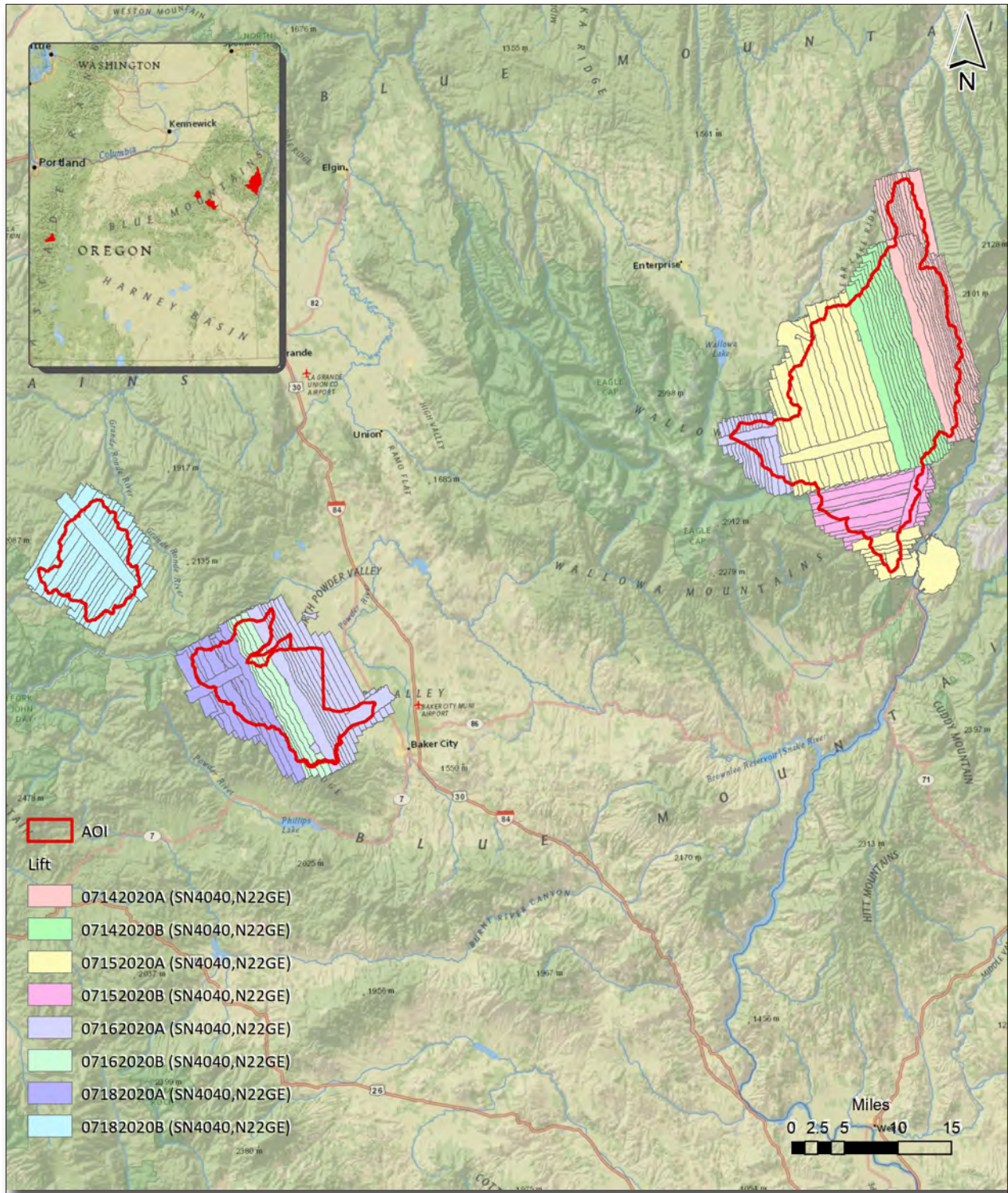


Figure 8. Lidar Coverage



# Wallowa-Whitman National Forest HJ Andrews Experimental Forest Lidar Coverage

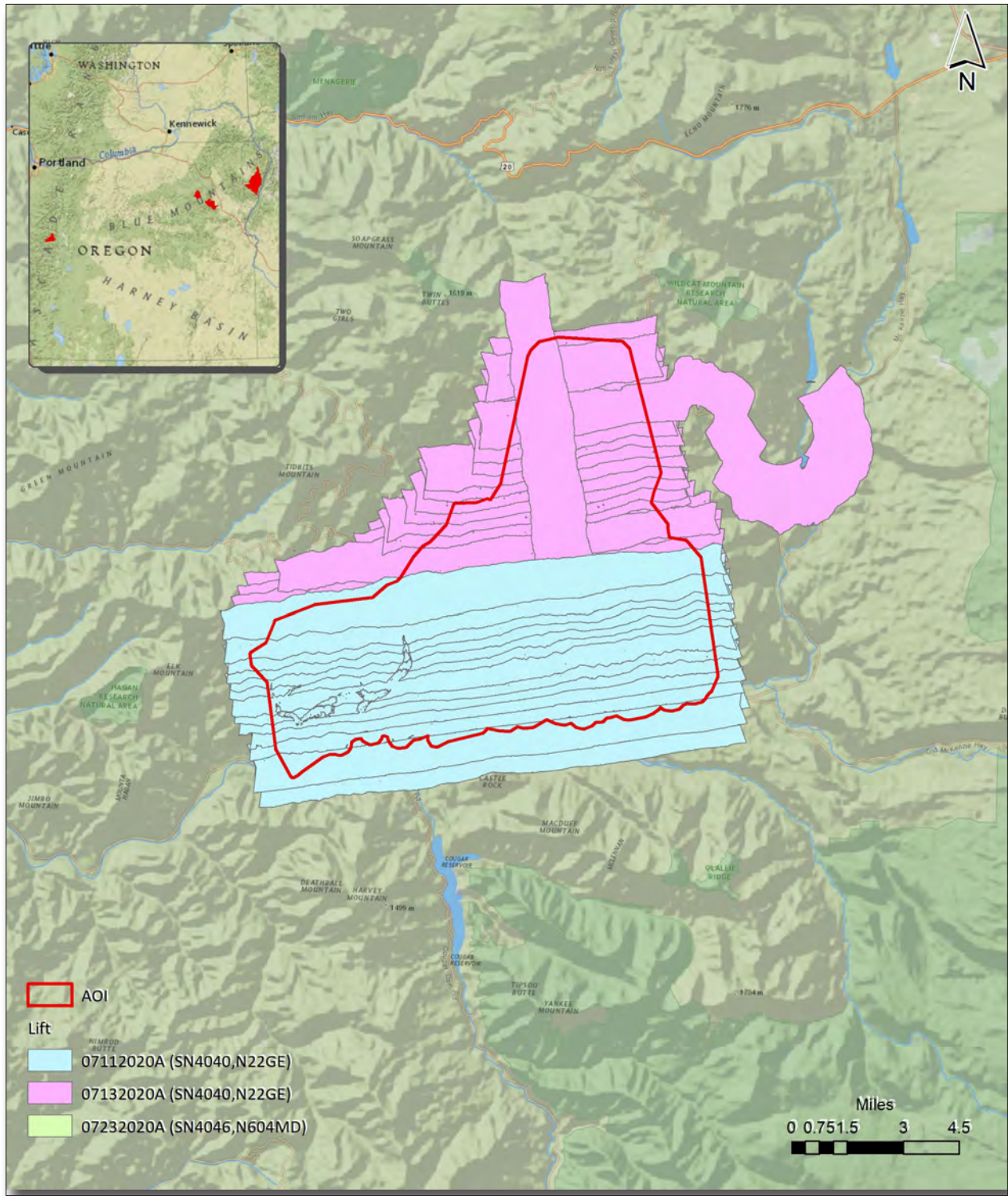


Figure 9. Lidar Coverage

## 5. Ground Control and Accuracy

Survey information can be found in the Survey Report in Appendix A.

### 5.1. Vertical Accuracy Accuracy Assessment

Non-Vegetated Vertical Accuracy (NVA) was calculated on the Ground LAS and DEM. The required accuracy (ACCz) is: 19.6 cm at a 95% confidence level, derived according to NSSDA, i.e., based on RMSE of 10 cm in the “bare earth” and “urban” land cover classes. The NVA was tested with 27 checkpoints located in bare earth and urban (non-vegetated) areas. These checkpoints were not used in the calibration or post processing of the lidar point cloud data. The checkpoints were distributed throughout the project area and were surveyed using GPS techniques. See survey report for additional survey methodologies.

Elevations from the unclassified lidar surface were measured for the x,y location of each checkpoint. Elevations interpolated from the lidar surface were then compared to the elevation values of the surveyed control points. AccuracyZ has been tested to meet 19.6 cm or better Non-Vegetated Vertical Accuracy at 95% confidence level using  $RMSE(z) \times 1.9600$  as defined by the National Standards for Spatial Data Accuracy (NSSDA); assessed and reported using National Digital Elevation Program (NDEP)/ASRPS Guidelines.

A brief summary of results are listed below. For more detailed information, see the Focus on Accuracy report.

	Target	Measured	Point Count
Raw NVA	0.196	0.0533 m	27
NVA	0.196	0.0525 m	27



# Wallowa-Whitman National Forest NVA Points

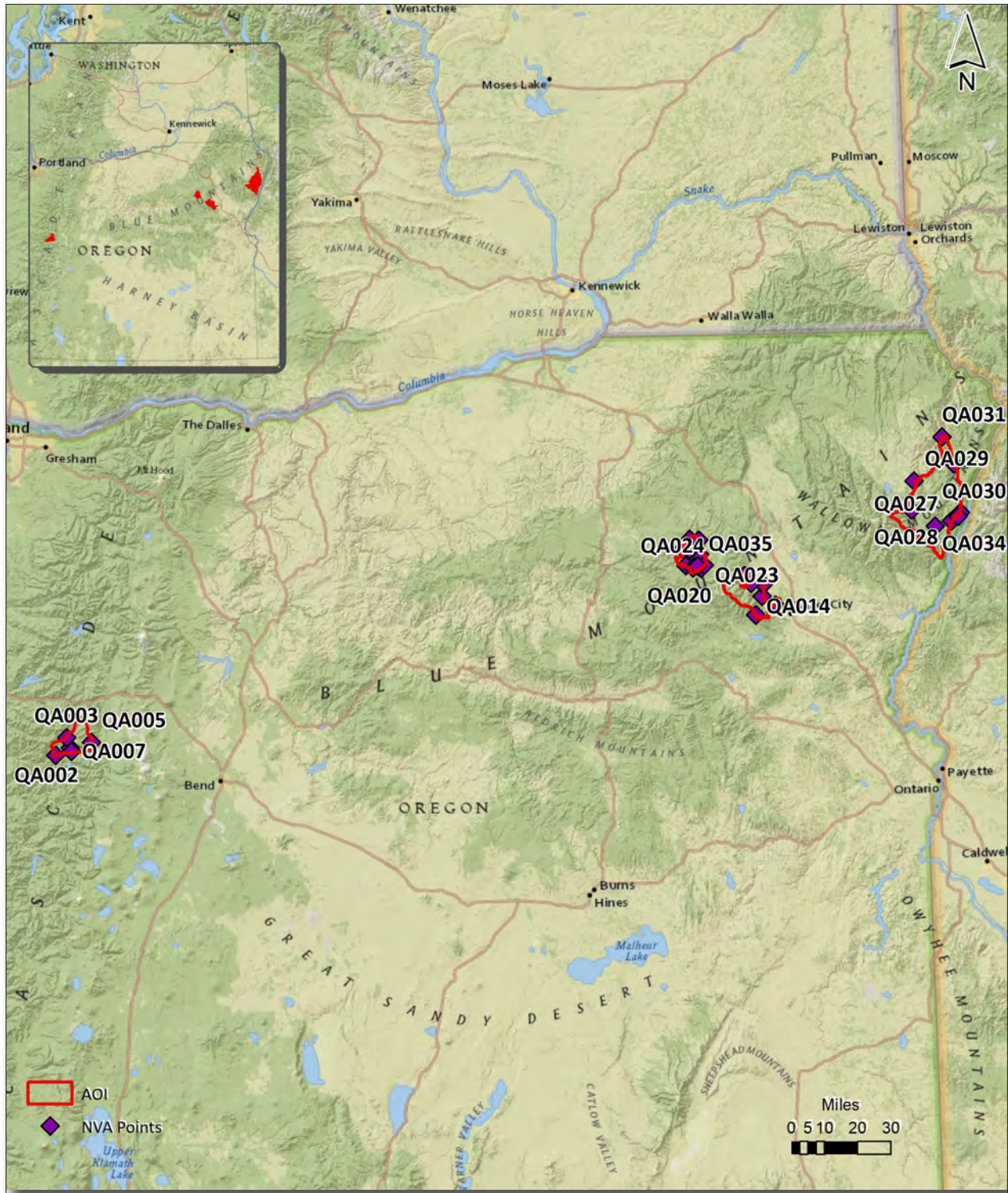


Figure 10. QC Checkpoint Locations - NVA

## Project Report Appendices

The following section contains the appendices as listed in the Wallowa-Whitman National Forest LiDAR Project Report.

## Appendix A

# Survey Report



September 3, 2020

**Survey Report** of  
LiDAR Calibration & Quality Control Points

USDA FS Contract: 1205M619C0019

Leaf-On/Off Airborne Near-Infrared LiDAR  
Data Acquisition Project

Wallowa-Whitman National Forest  
Morgan Nesbit AOI  
Baker City Watershed AOI and Sheep Creek AOI  
H.J. Andrews Experimental Forest AOI

Presented to:



Presented By:





# CONTENTS OF REPORT

<b>PROJECT PROCEDURE SUMMARY.....</b>	<b>1</b>
<b>AREA OF INTEREST &amp; POINT LOCATION MAPS.....</b>	<b>4</b>
• <b>TEMPORARY BASE STATION POINTS.....</b>	<b>5</b>
• <b>CALIBRATION POINT CLUSTERS.....</b>	<b>6</b>
• <b>QUALITY ASSURANCE POINTS.....</b>	<b>7</b>
<b>FINAL POINT COORDINATES.....</b>	<b>8</b>
• <b>TEMPORARY BASE STATION POINTS (UTM 10).....</b>	<b>9</b>
• <b>QUALITY ASSURANCE POINTS (UTM 10).....</b>	<b>10</b>
• <b>TEMPORARY BASE STATION POINTS (UTM 1 1).....</b>	<b>11</b>
• <b>QUALITY ASSURANCE POINTS (UTM 1 1).....</b>	<b>12</b>
<b>POINT LOCATION &amp; ACCURACY DATA SHEETS.....</b>	<b>13</b>
• <b>TEMPORARY BASE STATION POINTS.....</b>	<b>14</b>
• <b>QUALITY ASSURANCE POINTS.....</b>	<b>25</b>



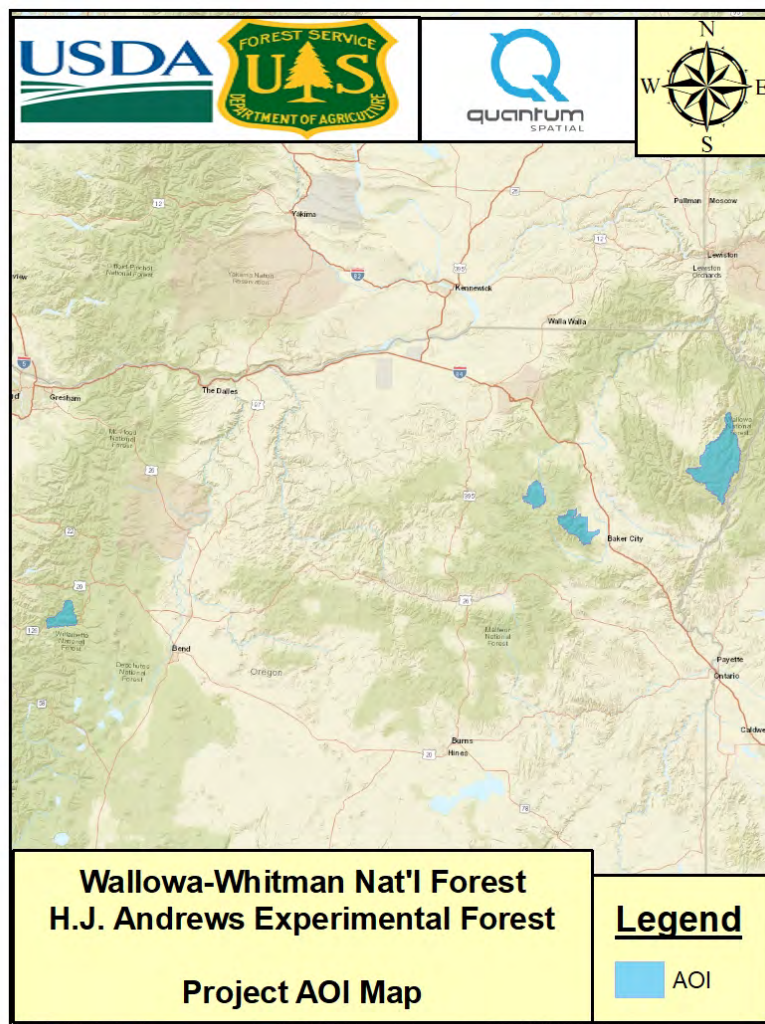


## Introduction

Quantum Spatial, Inc. was contracted by USDA FS under task order 1205M619C0019 to survey LiDAR calibration and quality control points in support of the Leaf-On/Off Airborne Near-Infrared LiDAR Data Acquisition project based in the Wallowa Whitman National Forest and the H.J. Andrews Experimental Forest in the state of Oregon. The project area included the Morgan Nesbit, Baker City Watershed, Sheep Creek AOI's in the Wallowa Whitman National Forest and H.J. Andrews Experimental Forest AOI. This is the report of the technical approach used and detail of each point surveyed.

## Project Area

The Project Area, shown in the figure below, consist of approximately 577 square miles.







---

## Technical Approach to Land Cover Validation Point Selection

---

Per the contract, at least 30 ground control points (GCPs) that were not clustered were required for the verification of the vertical accuracy of the project area.

To calibrate the LiDAR data, clusters of GCPs were strategically distributed throughout the project area. The clusters were typically made up of 30 or more GCPs.

---

## Survey Accuracy Requirements

---

Given that the survey accuracy of calibration and quality control check points should be 3 times more accurate than the required accuracy of the data set, Quantum Spatial requires that calibration and quality assurance points are better than 1.5 centimeters RMSE, both horizontally. The surveyed accuracy of each point must be determined through redundant measurements and/or network adjustment using procedures and methodologies that reliably and consistently result in the aforementioned accuracies.

Due to variances in reference control accuracy and adjustment, Quantum Spatial requires that the survey methodology used be explained, so that it can be repeated if necessary.

---

## Field Survey Methodology

---

Date Range: June 20, 2020 – August 1, 2020

Equipment Used:

Field crews used Trimble R7 and R8 dual frequency GNSS receivers as base stations and rovers.

GNSS Methodology:

A combination of fast static and RTN/RTK/PPK GNSS surveying methods were used during this project. RTN observations used the Oregon Real-Time GNSS Network. Temporary marks were established and used as base stations for RTK/PPK surveys.



Temporary marks were tied to the NGS CORS stations through the NGS OPUS-Projects program. The fast static GPS method consisted of collecting a minimum 15 minutes of static data. The data was downloaded and baselines processed to NGS CORS base stations. The network was adjusted holding the CORS as control.

All the GNSS information was downloaded, processed and analyzed using the NGS OPUS-Projects program and Trimble Business Center processing software. A network was formed and adjusted.

---

### Overall Project Accuracy Statement

---

All point coordinates have been reported in the North American Datum of 1983 (2011). Universal Transverse Mercator Zones 10 and 11 (UTM10 and UTM11) coordinates in meters horizontally. Elevations are relative to the North American Vertical Datum of 1988 (NAVD 88) which were derived using the Geoid 18 model and are reported in meters.

#### Calibration Points

Average Horizontal RMSE is 0.006 meter.

Average Elevation RMSE is 0.007 meter.

Average 3 dimensional RMSE is 0.010 meter.

#### Quality Assurance Points

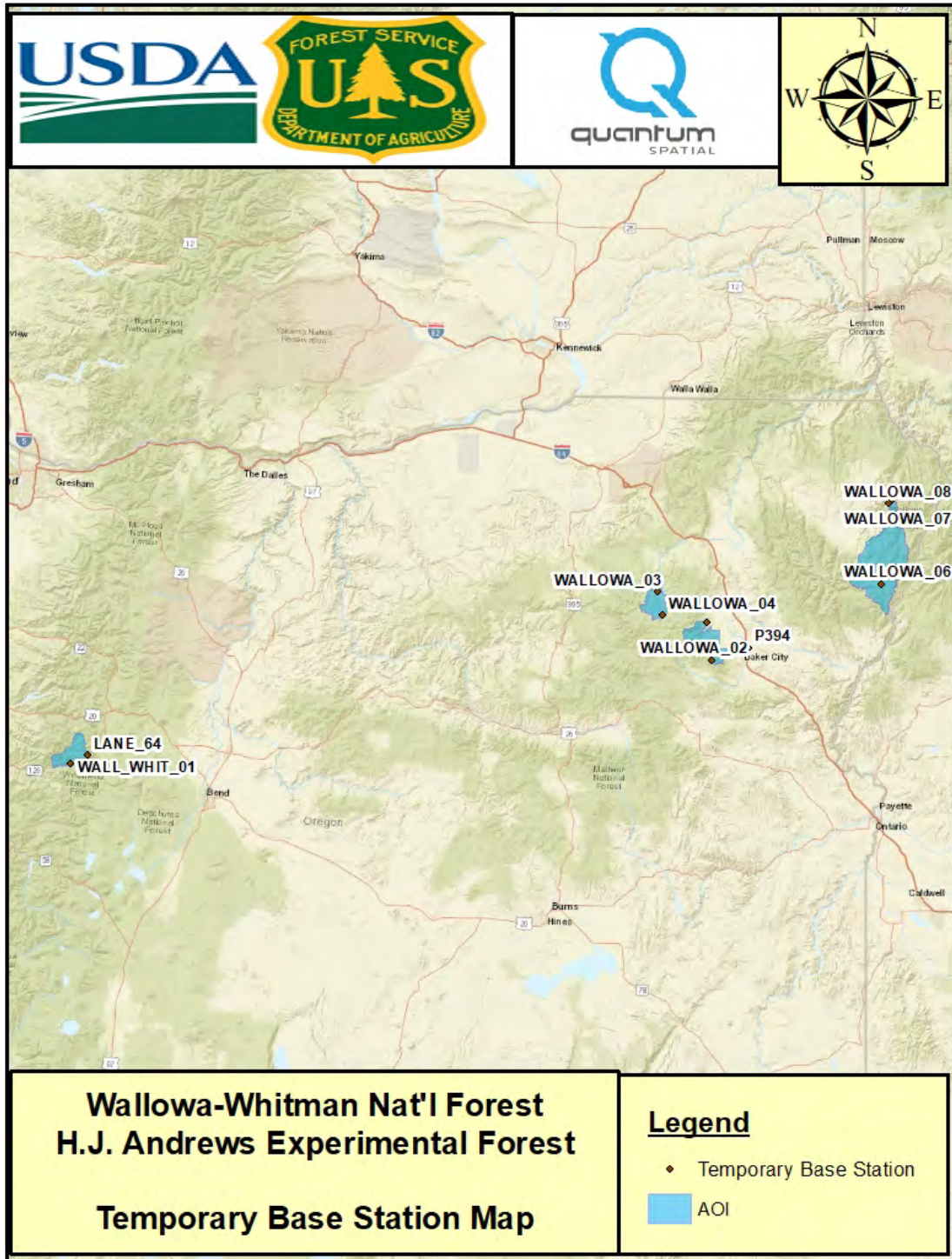
Average Horizontal RMSE is 0.007 meter.

Average Elevation RMSE is 0.013 meter.

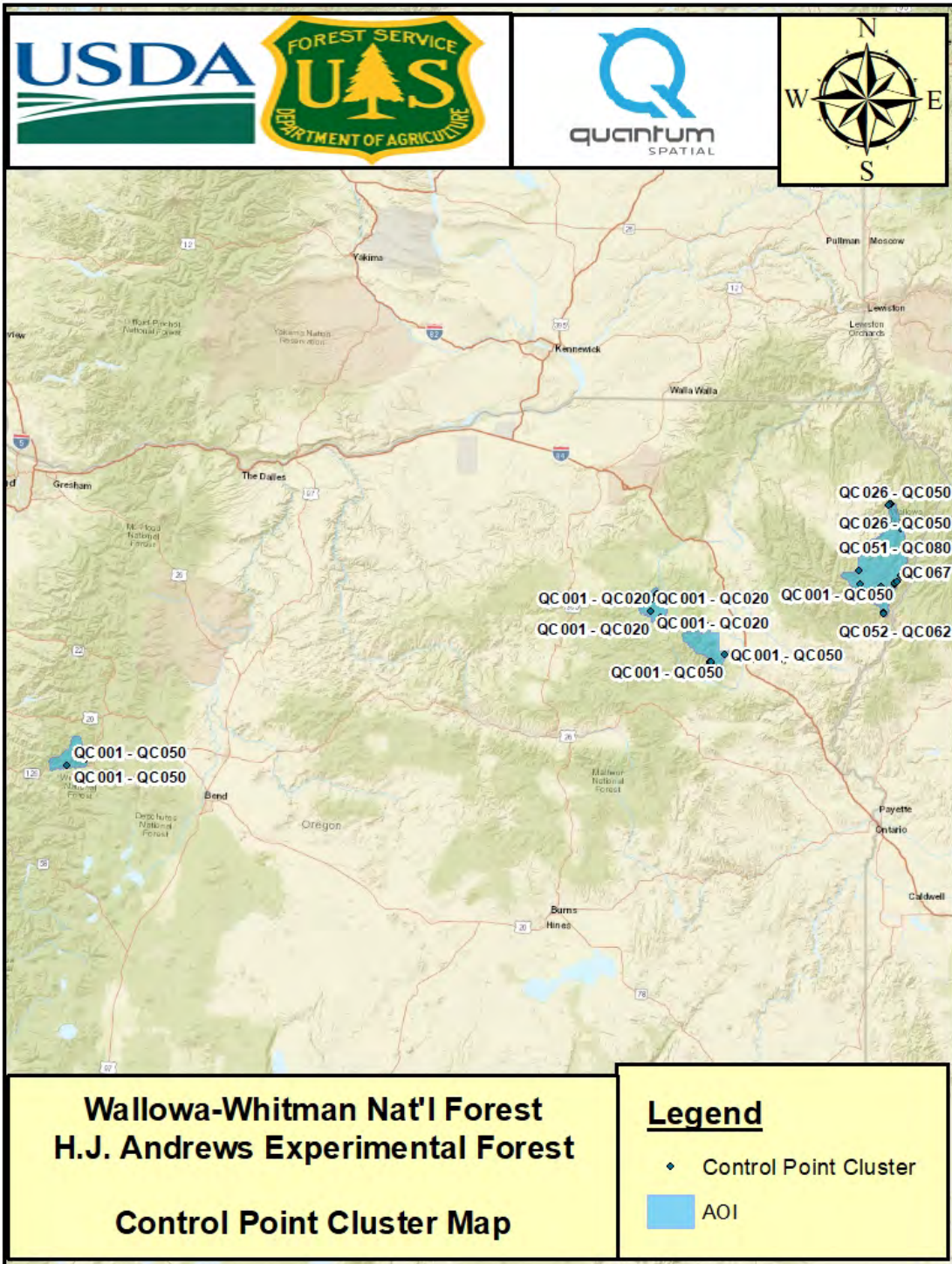
Average 3 dimensional RMSE is 0.015 meter.



## **PROJECT AOI & POINT LOCATION MAPS**







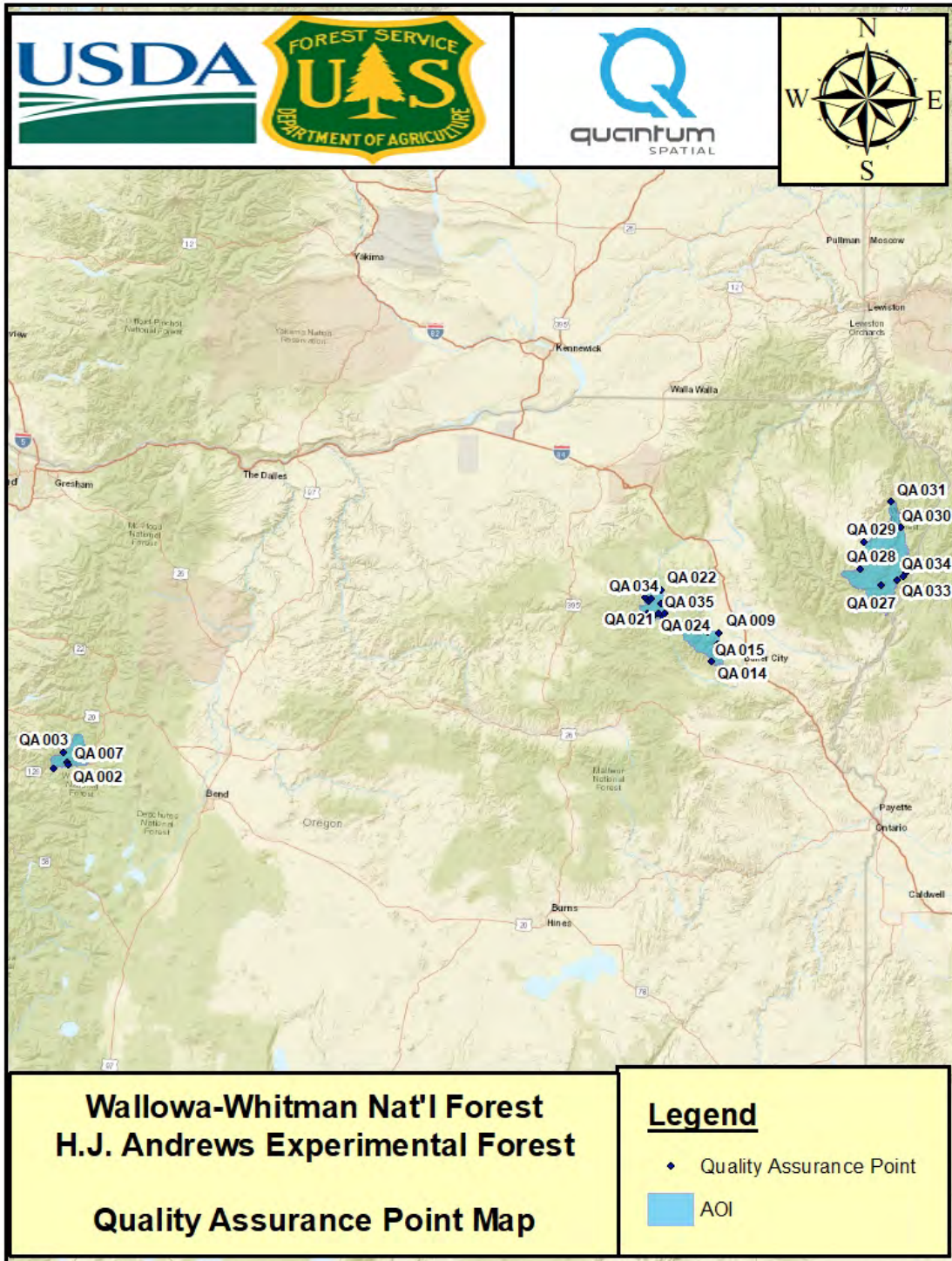
**Wallowa-Whitman Nat'l Forest  
H.J. Andrews Experimental Forest**

**Control Point Cluster Map**

**Legend**

◆ Control Point Cluster

■ AOI





## FINAL POINT COORDINATES



### TEMPORARY BASE STATION COORDINATES

Horizontal Datum - NAD83(2011)  
UTM ZONE 10  
Vertical Datum - NAVD 88  
Geoid - GEOID18  
Units – Meters

Point ID	Northing (m)	Easting (m)	Elev. (m)
LANE_64	4896512.259	571590.259	1504.828
WALL_WHIT_01	4891628.088	563168.832	390.353
Wallowa_01	3719186.630	133993.440	4281.790
Wallowa_02	3653845.490	142327.620	7535.120
Wallowa_03	3770722.300	50492.140	4167.090
Wallowa_04	3731125.220	58301.050	5971.460
Wallowa_05	3810132.390	395691.680	6087.220
Wallowa_06	3783297.740	433919.090	5663.620
Wallowa_07	5059654.046	979466.736	667.923
Wallowa_08	5058324.032	978291.538	718.712



**QUALITY ASSURANCE POINT COORDINATES**

Horizontal Datum - NAD83(2011)  
UTM ZONE 10  
Vertical Datum - NAVD 88  
Geoid - GEOID18  
Units – Meters

Point ID	Northing (m)	Easting (m)	Elev. (m)
QA001A	4889145.910	554688.443	326.250
QA002	4893044.244	561565.034	549.630
QA003	4897938.283	559575.868	583.430
QA005	4896174.734	571807.914	1479.760
QA007	4891389.242	562244.327	380.060
QA008	4978898.837	894769.481	1184.655
QA009	4984620.349	895145.326	1054.655
QA010	4974897.220	901540.344	1042.251
QA011	4988584.257	885866.545	1414.699
QA014	4969748.098	892185.062	2299.726
QA015	4984888.268	889333.140	1262.800
QA016	4992258.919	857215.234	1697.736
QA017	4998058.904	863753.123	1475.009
QA018	5005235.601	858697.221	1436.123
QA019	5000549.350	855351.778	1615.854
QA020	4991264.417	864742.259	1821.985
QA021	4998492.310	857508.843	1352.530
QA022	5005017.032	863119.531	1262.874
QA023	4992896.663	866189.979	1960.180
QA024	4991325.066	860684.192	1710.106
QA026	5018889.584	985700.829	1714.431
QA027	5016120.996	977852.200	1728.455
QA028	5023418.680	966183.154	1872.801
QA029	5037670.941	966731.176	1543.141
QA030	5046549.297	985905.006	824.404
QA031	5059624.999	979476.171	668.629
QA033	5023212.697	989886.316	1868.917
QA034	5000284.703	858631.582	1378.918
QA034	5021274.328	988784.927	1812.897
QA035	4992343.899	863051.932	1885.187



### TEMPORARY BASE STATION COORDINATES

Horizontal Datum - NAD83(2011)  
UTM ZONE 11  
Vertical Datum - NAVD 88  
Geoid - GEOID18  
Units – Meters

Point ID	Northing (m)	Easting (m)	Elev. (m)
LANE_64	4896512.259	571590.259	1504.828
WALL_WHIT_01	4891628.088	563168.832	390.353
Wallowa_01	3719186.630	133993.440	4281.790
Wallowa_02	3653845.490	142327.620	7535.120
Wallowa_03	3770722.300	50492.140	4167.090
Wallowa_04	3731125.220	58301.050	5971.460
Wallowa_05	3810132.390	395691.680	6087.220
Wallowa_06	3783297.740	433919.090	5663.620
Wallowa_07	5059654.046	979466.736	667.923
Wallowa_08	5058324.032	978291.538	718.712

**QUALITY ASSURANCE POINT COORDINATES**

Horizontal Datum - NAD83(2011)  
UTM ZONE 11  
Vertical Datum - NAVD 88  
Geoid - GEOID18  
Units – Meters

Point ID	Northing (m)	Easting (m)	Elev. (m)
QA001A	4902677.200	74867.110	326.250
QA002	4906070.420	82025.250	549.630
QA003	4911107.310	80395.460	583.430
QA005	4908449.330	92490.730	1479.760
QA007	4904366.670	82583.070	380.060
QA008	4967234.047	420676.321	1184.655
QA009	4972901.692	421472.519	1054.655
QA010	4962751.765	427121.073	1042.251
QA011	4977532.722	412528.353	1414.699
QA014	4958315.324	417429.381	2299.726
QA015	4973597.371	415706.498	1262.800
QA016	4983308.690	384271.976	1697.736
QA017	4988600.869	391211.471	1475.009
QA018	4996121.732	386708.118	1436.123
QA019	4991702.678	383029.540	1615.854
QA020	4981761.957	391693.977	1821.985
QA021	4989494.506	385025.420	1352.530
QA022	4995576.503	391095.665	1262.874
QA023	4983280.271	393256.214	1960.180
QA024	4982122.292	387657.460	1710.106
QA026	5000298.467	514099.461	1714.431
QA027	4998126.995	506089.658	1728.455
QA028	5006249.691	495025.743	1872.801
QA029	5020383.736	496629.232	1543.141
QA030	5027786.376	516356.876	824.404
QA031	5041267.290	510938.599	668.629
QA033	5004286.736	518581.697	1868.917
QA034	4991196.346	386276.144	1378.918
QA034A	5002441.075	517342.849	1812.897
QA035	4982961.827	390090.575	1885.187





## **POINT DATA AND ACCURACY LOG SHEETS**



## TEMPORARY BASE STATION LOG SHEETS



Point ID	Lane_64
Project No.	R035989
Project Name	Wallowa-Whitman Nat'l Forest
State	Oregon
County	Lane
Quad	Belknap Springs

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

Coordinate System	
NAD83(2011)	
UTM10	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4896512.259	571590.259	1504.828

Operator	GR
Receiver Model	Trimble R7
Receiver S/N	3076
Antenna Height	2.0m

Date (MM-DD-YYYY)	06-20-2020
RMSE Hz	0.002
RMSE Z	0.010
GPS Method	OPUS-Projects

**Control Ties:**

CORS	Latitude	Longitude	Height(meters)
LPSB	44 03 04.40906 N	123 05 24.24852 W	118.092
NWBG	45 18 00.17211 N	122 58 31.85079 W	42.928
P063	44 55 21.78463 N	120 56 46.09304 W	965.831
P376	44 56 28.31584 N	123 06 08.09945 W	181.240
REDM	44 15 35.14663 N	121 08 52.31515 W	920.328

**Description:**

From the junction of HWY 126 and Blue River res rd (FS Rd 15) Take FS rd 15 Northeast for 3.4 miles. Right on FS rd 1506 and continue for 12.4 miles. Monument is on the east side of intersection of 1506 and 625. 22" west of wood stake. 47' NE of HWY 126 - 17 miles" sign. 4' E of PK nail. Aluminum cap mounted on 30 inch rebar stamped "WSI CONTROL 2014 LANE 64."

**PHOTOS:**



Note: LANE\_64



Note: LANE\_64



Note: LANE\_64



Note: LANE\_64





Point ID	WALL_WHIT_01
Project No.	R035989
Project Name	Wallowa-Whitman Nat'l Forest
State	Oregon
County	Lane
Quad	McKenzie Bridge

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

Coordinate System	
NAD83(2011)	
UTM10	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4891628.088	563168.832	390.353

Operator	GR
Receiver Model	Trimble R7
Receiver S/N	2572
Antenna Height	2.0m

Date (MM-DD-YYYY)	06-20-2020
RMSE Hz	0.007
RMSE Z	0.016
GPS Method	OPUS-Projects

**Control Ties:**

CORS	Latitude	Longitude	Height(meters)
LPSB	44 03 04.40906 N	123 05 24.24852 W	118.092
NWBG	45 18 00.17211 N	122 58 31.85079 W	42.928
P063	44 55 21.78463 N	120 56 46.09304 W	965.831
P376	44 56 28.31584 N	123 06 08.09945 W	181.240
REDM	44 15 35.14663 N	121 08 52.31515 W	920.328
WDBN	45 10 15.09658 N	122 52 12.13068 W	40.179

**Description:**

RTK only monument. 9" MAG spike marked with pink flagging. Located near the "Rainbow" sign in the right of way of a clear cut on north side of hwy 126

**PHOTOS:**



Note: WALL\_WHIT\_01



Note: WALL\_WHIT\_01



Note: WALL\_WHIT\_01



Note: WALL\_WHIT\_01





Point ID	Wallowa_01
Project No.	R035989
Project Name	Wallowa-Whitman Nat'l Forest
State	Oregon
County	Baker
Quad	Rock Creek

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

Coordinate System	
NAD83(2011)	
UTM11	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4978205.714	414771.368	1306.302

Operator	KB
Receiver Model	Trimble R7
Receiver S/N	4672
Antenna Height	2.0m

Date (MM-DD-YYYY)	07-14-2020
RMSE Hz	0.007
RMSE Z	0.012
GPS Method	OPUS-Projects

**Control Ties:**

CORS	Latitude	Longitude	Height(meters)
P023	44 53 54.34228 N	116 06 10.76378 W	1522.127
P372	45 25 41.27773 N	117 15 05.91019 W	1208.811
P386	44 24 10.16321 N	118 58 04.08514 W	1103.987
P394	44 50 05.55473 N	117 47 58.63995 W	1011.198
PDTN	45 39 57.39175 N	118 45 24.88263 W	394.915

**Description:**

From Haines, OR drive west on Anthony Lakes Hwy/Rock Creek Rd for 1.2 miles. Take a slight right (N) onto Pocahontas Rd, drive 2.3 miles. Take a slight left (W) on Muddy Creek Ln and drive 2.6 mi. Take a slight right (N) turn to continue onto Foothill Rd, drive 1.0 mi. Turn left (W) onto Bulger Flat Ln and drive 1.9 mi. Monument is located on the left (S) side of the road on the east side of a barbed wire gate approx 7' north of a yellow and red "NO CAMPFIRE" sign. RTK only monument. 6" MAG nail with washer, flagging, and a flagged wooden stake. PFIRE" sign. Monument is a 6" Mag nail marked with orange flagging and a flagged wooden stake.

**PHOTOS:**







Point ID	Wallowa_02
Project No.	R035989
Project Name	Wallowa-Whitman Nat'l Forest
State	Oregon
County	Baker
Quad	Elkhorn Peak

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM11
NAVD88
GEOID12B
Meters

<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
4958307.349	417392.323	2298.031

Operator	KB
Receiver Model	Trimble R7
Receiver S/N	4988
Antenna Height	2.0m

Date (MM-DD-YYYY)	07-15-2020
RMSE Hz	0.009
RMSE Z	0.009
GPS Method	OPUS-Projects

**Control Ties:**

CORS	Latitude	Longitude	Height(meters)
P023	44 53 54.34228 N	116 06 10.76378 W	1522.127
P372	45 25 41.27773 N	117 15 05.91019 W	1208.811
P386	44 24 10.16321 N	118 58 04.08514 W	1103.987
P394	44 50 05.55473 N	117 47 58.63995 W	1011.198
PDTN	45 39 57.39175 N	118 45 24.88263 W	394.915

**Description:**

From McEwen, OR drive north on Larch Cr Rd for 3.5 miles. Take a left onto NF-7240 and drive 0.9 miles. Turn left, following USFS sign to "Lime Quarry" and continue approx 5.8 miles on the best road to a pass. Monument is located on the west side of the pass at the WSW side of a gravel parking area, approx 2' at 45 NE from a flagged wooden stake, approx 66' at 225 SW from USFS "Marble Pass Trailhead" sign, approx 90' at 225 SW from "Restricted Area Baker City Watershed" sign on the SE side of a cattle guard. RTK only monument. 6" MAG nail with washer, flagging, and a flagged wooden stake.

**PHOTOS:**



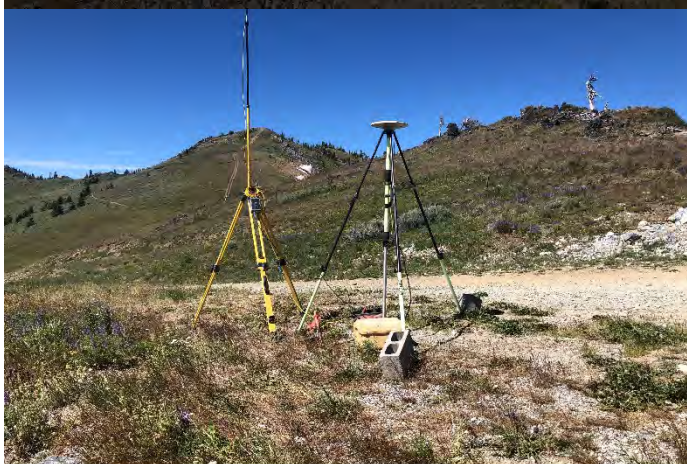
WALLOWA\_02

7/15/20



WALLOWA\_02

7/15/20



WALLOWA\_02

7/15/20



WALLOWA\_02

7/15/20





Point ID	Wallowa_03
Project No.	R035989
Project Name	Wallowa-Whitman Nat'l Forest
State	Oregon
County	Union
Quad	Fly Valley

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM11
NAVD88
GEOID12B
Meters

<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
4993803.221	389265.923	1271.330

Operator	EG
Receiver Model	Trimble R7
Receiver S/N	1100
Antenna Height	2.0m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.008
RMSE Z	0.001
GPS Method	OPUS-Projects

**Control Ties:**

CORS	Latitude	Longitude	Height(meters)
P372	45 25 41.27773 N	117 15 05.91019 W	1208.811
P386	44 24 10.16321 N	118 58 04.08514 W	1103.987
P394	44 50 05.55473 N	117 47 58.63995 W	1011.198
PDTN	45 39 57.39175 N	118 45 24.88263 W	394.915
PLNA	44 07 55.42132 N	119 58 00.38256 W	1110.675

**Description:**

From the intersection of Hwy 244 and NF-5160 head S on NF-5160 for 14.8 miles to the monument site on the left (E) shoulder of the road near a small culvert. Monument is a 6" Mag nail with an orange plastic survey disc and flagging and is 6' SE of a Mag nail set near the edge of the pavement.

**PHOTOS:**







Point ID	Wallowa_04
Project No.	R035989
Project Name	Wallowa-Whitman Nat'l Forest
State	Oregon
County	Grant
Quad	Crawfish Lake

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

Coordinate System	
NAD83(2011)	
UTM11	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4981748.389	391694.760	1821.423

Operator	EG
Receiver Model	Trimble R7
Receiver S/N	7587
Antenna Height	2.0m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.007
RMSE Z	0.004
GPS Method	OPUS-Projects

**Control Ties:**

CORS	Latitude	Longitude	Height(meters)
P372	45 25 41.27773 N	117 15 05.91019 W	1208.811
P386	44 24 10.16321 N	118 58 04.08514 W	1103.987
P394	44 50 05.55473 N	117 47 58.63995 W	1011.198
PDTN	45 39 57.39175 N	118 45 24.88263 W	394.915
PLNA	44 07 55.42132 N	119 58 00.38256 W	1110.675

**Description:**

From the intersection of NF-52 and NF-51, head N on NF-51 for 3.6 miles. Turn right (E) on NF-7325 and bear left at the fork. Continue 0.1 miles to a gravel pit. Monument is on the S side of the gravel area where the trees are thin/short, just NE of a 4 wheeler path. Monument is a 6" Mag nail with an orange plastic survey marker disc and is marked with flagging.

**PHOTOS:**







Point ID	Wallowa_05
Project No.	R035989
Project Name	Wallowa-Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Lick Creek

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM11
NAVD88
GEOID12B
Meters

<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
5006245.204	494393.010	1856.733

Operator	KB
Receiver Model	Trimble R7
Receiver S/N	1100
Antenna Height	2.0m

Date (MM-DD-YYYY)	07-19-2020
RMSE Hz	0.003
RMSE Z	0.008
GPS Method	OPUS-Projects

**Control Ties:**

CORS	Latitude	Longitude	Height(meters)
LWST	46 22 23.42490 N	117 00 08.24687 W	427.599
P023	44 53 54.34228 N	116 06 10.76378 W	1522.127
P372	45 25 41.27773 N	117 15 05.91019 W	1208.811
P394	44 50 05.55473 N	117 47 58.63995 W	1011.198
PDTN	45 39 57.39175 N	118 45 24.88263 W	394.915

**Description:**

From the junction of Inmaha Hwy (350) and Wallowa Mountain Road, head S on Wallowa Mountain Road. Drive 9.8 miles then turn left (E) into the "Salt Creek Summit Sno Park." Monument is located at the NE corner of the parking lot in a bare patch approx 8' past the edge of the gravel lot. RTK only monument. 6" MAG nail with orange plastic survey washer and flagged wooden stake.

**PHOTOS:**







Point ID	Wallowa_06
Project No.	R035989
Project Name	Wallowa-Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Gumboot Butte

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM11
NAVD88
GEOID12B
Meters

<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
5006245.204	494393.010	1856.733

Operator	KB
Receiver Model	Trimble R7
Receiver S/N	7587
Antenna Height	2.0m

Date (MM-DD-YYYY)	07-19-2020
RMSE Hz	0.006
RMSE Z	0.001
GPS Method	OPUS-Projects

**Control Ties:**

CORS	Latitude	Longitude	Height(meters)
LWST	46 22 23.42490 N	117 00 08.24687 W	427.599
P023	44 53 54.34228 N	116 06 10.76378 W	1522.127
P372	45 25 41.27773 N	117 15 05.91019 W	1208.811
P394	44 50 05.55473 N	117 47 58.63995 W	1011.198
PDTN	45 39 57.39175 N	118 45 24.88263 W	394.915

**Description:**

From the junction of Inmaha Hwy (350) and Wallowa Mountain Road, head S on Wallowa Mountain Road. Drive 15.6 miles then take a sharp right (S) onto Coverdale Rd. Drive 7.1 miles, then turn left (N) onto NF-115 (the center road in a three-way intersection). Drive 4.1 miles, then monument is located inside (W of) an acute angle intersection of two USFS roads. Monument is approx 4' at 225 SW from a flagged wooden stake, approx 9' at 140 SE from a nail with washer and flagging in the S side of the N road, and approx 30' at 215 SW from the inside corner of the acute intersection. RTK only monument. 6" MAG nail with orange plastic survey washer.

**PHOTOS:**



WALLOWA\_06

7/19/20



WALLOWA\_06

7/19/20



WALLOWA\_06

7/19/20



WALLOWA\_06

7/19/20





Point ID	Wallowa_07
Project No.	R035989
Project Name	Wallowa-Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Imnaha

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

Coordinate System	
NAD83(2011)	
UTM11	
NAVD88	
GEOID12B	
Meters	

<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
5041296.877	510931.384	667.923

Operator	KB
Receiver Model	Trimble R7
Receiver S/N	7587
Antenna Height	2.0m

Date (MM-DD-YYYY)	07-19-2020
RMSE Hz	0.003
RMSE Z	0.011
GPS Method	OPUS-Projects

**Control Ties:**

CORS	Latitude	Longitude	Height(meters)
LWST	46 22 23.42490 N	117 00 08.24687 W	427.599
P023	44 53 54.34228 N	116 06 10.76378 W	1522.127
P372	45 25 41.27773 N	117 15 05.91019 W	1208.811
P394	44 50 05.55473 N	117 47 58.63995 W	1011.198
P422	46 47 52.29832 N	116 58 46.80311 W	844.198

**Description:**

From Imnaha, OR head SW on Imnaha Hwy/Little Sheep Creek Hwy and drive 2.9 miles. Monument is on the left (E side) of the road in a wide gravel shoulder, approx 20' E of a PK nail set in the fog line and approx 20' W of a flagged metal fence post. RTK only monument. RTK only monument. 6" MAG nail with orange plastic survey marker washer.

**PHOTOS:**







Point ID	Wallowa_08
Project No.	R035989
Project Name	Wallowa-Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Findley Buttes

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

Coordinate System	
NAD83(2011)	
UTM11	
NAVD88	
GEOID12B	
Meters	

<b>Northing</b>	<b>Easting</b>	<b>Elevation</b>
5040061.966	509663.580	718.712

Operator	EG
Receiver Model	Trimble R7
Receiver S/N	1100
Antenna Height	2.0m

Date (MM-DD-YYYY)	08-01-2020
RMSE Hz	0.005
RMSE Z	0.002
GPS Method	OPUS-Projects

**Control Ties:**

CORS	Latitude	Longitude	Height(meters)
LWST	46 22 23.42490 N	117 00 08.24687 W	427.599
P023	44 53 54.34228 N	116 06 10.76378 W	1522.127
P372	45 25 41.27773 N	117 15 05.91019 W	1208.811
P394	44 50 05.55473 N	117 47 58.63995 W	1011.198
P422	46 47 52.29832 N	116 58 46.80311 W	844.198
PDTN	45 39 57.39175 N	118 45 24.88263 W	394.915

**Description:**

From Imnaha, OR head SW on Imnaha Hwy/Little Sheep Creek Hwy and drive 4.1 miles to the monument site on the left (S) shoulder of the road in a wide gravel area next to a drydocked boat. Monument is a 6" Mag nail with an orange survey marker disc and flagging. Monument is 27' SE of a Mag nail set near the edge of the pavement.

**PHOTOS:**





## **QUALITY ASSURANCE POINT LOG SHEETS**





Point ID	QA001A
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Lane
Quad	Blue River

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 10N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4889145.910	554688.443	326.250

Operator	GR
Receiver Model	Trimble R8 Model 2
Receiver S/N	7337
Antenna Height	2.000 m

Date (MM-DD-YYYY)	06-21-2020
RMSE Hz	0.010 m
RMSE Z	0.014 m
GPS Method	RTK

PHOTOS







Point ID	QA002
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Lane
Quad	McKenzie Bridge

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 10N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4893044.244	561565.034	549.630

Operator	GR
Receiver Model	Trimble R8 Model 2
Receiver S/N	7337
Antenna Height	2.000 m

Date (MM-DD-YYYY)	06-21-2020
RMSE Hz	0.007 m
RMSE Z	0.012 m
GPS Method	PPK

PHOTOS







Point ID	QA003
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Lane
Quad	Blue River

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
UTM 10N
NAD83(2011)
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4897938.283	559575.868	583.430

Operator	GR
Receiver Model	Trimble R8 Model 2
Receiver S/N	7337
Antenna Height	2.000 m

Date (MM-DD-YYYY)	06-20-2020
RMSE Hz	0.009 m
RMSE Z	0.020 m
GPS Method	RTK

PHOTOS







Point ID	QA005
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Lane
Quad	Belknap Springs

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 10N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4896174.734	571807.914	1479.760

Operator	GR
Receiver Model	Trimble R8 Model 2
Receiver S/N	7337
Antenna Height	2.000 m

Date (MM-DD-YYYY)	06-20-2020
RMSE Hz	0.010 m
RMSE Z	0.015 m
GPS Method	RTK

PHOTOS







Point ID	QA007
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Lane
Quad	McKenzie Bridge

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 10N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4891389.242	562244.327	380.060

Operator	GR
Receiver Model	Trimble R8 Model 2
Receiver S/N	7337
Antenna Height	2.000 m

Date (MM-DD-YYYY)	06-21-2020
RMSE Hz	0.008 m
RMSE Z	0.013 m
GPS Method	RTK

PHOTOS







Point ID	QA008
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Baker
Quad	Elkhorn Peak

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4967234.047	420676.321	1184.655

Operator	KB
Receiver Model	Trimble R8 Model 2
Receiver S/N	3666
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-14-2020
RMSE Hz	0.008 m
RMSE Z	0.015 m
GPS Method	RTK

PHOTOS







Point ID	QA009
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Baker
Quad	Haines

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4972901.692	421472.519	1054.655

Operator	KB
Receiver Model	Trimble R8 Model 2
Receiver S/N	3666
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-14-2020
RMSE Hz	0.007 m
RMSE Z	0.012 m
GPS Method	RTK

PHOTOS







Point ID	QA010
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Baker
Quad	Wingville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4962751.765	427121.073	1042.251

Operator	KB
Receiver Model	Trimble R8 Model 2
Receiver S/N	3666
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-14-2020
RMSE Hz	0.009 m
RMSE Z	0.015 m
GPS Method	RTK

PHOTOS







Point ID	QA011
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Baker
Quad	Rock Creek

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4977532.722	412528.353	1414.699

Operator	KB
Receiver Model	Trimble R8 Model 2
Receiver S/N	3666
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-14-2020
RMSE Hz	0.009 m
RMSE Z	0.015 m
GPS Method	RTK

PHOTOS



QA011

7/14/20



QA011

7/14/20



QA011

7/14/20



QA011

7/14/20





Point ID	QA014
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Baker
Quad	Elkhorn Peak

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

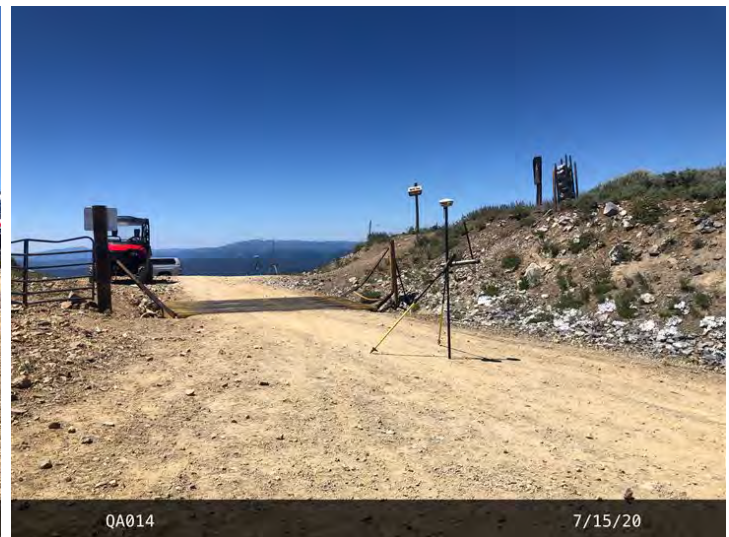
Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4958315.324	417429.381	2299.726

Operator	KB
Receiver Model	Trimble R8 Model 2
Receiver S/N	3666
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-15-2020
RMSE Hz	0.007 m
RMSE Z	0.011 m
GPS Method	RTK

PHOTOS







Point ID	QA015
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Baker
Quad	Rock Creek

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4973597.371	415706.498	1262.800

Operator	KB
Receiver Model	Trimble R8 Model 2
Receiver S/N	3666
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-14-2020
RMSE Hz	0.010 m
RMSE Z	0.018 m
GPS Method	RTK

PHOTOS







Point ID	QA016
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Grant
Quad	Trout Meadows

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4983308.690	384271.976	1697.736

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-25-2020
RMSE Hz	0.003 m
RMSE Z	0.008 m
GPS Method	PPK

PHOTOS







Point ID	QA017
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Union
Quad	Fly Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4988600.869	391211.471	1475.009

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.003 m
RMSE Z	0.005 m
GPS Method	PPK

PHOTOS







Point ID	QA018
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Union
Quad	Fly Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4996121.732	386708.118	1436.123

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.010 m
RMSE Z	0.018 m
GPS Method	RTK

PHOTOS







Point ID	QA019
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Union
Quad	Fly Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4991702.678	383029.540	1615.854

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.009 m
RMSE Z	0.014 m
GPS Method	RTK

PHOTOS







Point ID	QA020
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Grant
Quad	Crawfish Lake

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4981761.957	391693.977	1821.985

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.006 m
RMSE Z	0.010 m
GPS Method	RTK

PHOTOS







Point ID	QA021
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Union
Quad	Fly Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4989494.506	385025.420	1352.530

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.006 m
RMSE Z	0.010 m
GPS Method	PPK

PHOTOS







Point ID	QA022
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Union
Quad	Fly Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4995576.503	391095.665	1262.874

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.007 m
RMSE Z	0.013 m
GPS Method	RTK

PHOTOS







Point ID	QA023
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Union
Quad	Crawfish Lake

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4983280.271	393256.214	1960.180

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.004 m
RMSE Z	0.006 m
GPS Method	PPK

PHOTOS







Point ID	QA024
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Union
Quad	Trout Meadows

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4982122.292	387657.460	1710.106

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.004 m
RMSE Z	0.008 m
GPS Method	PPK

PHOTOS







Point ID	QA026
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Puderbaugh Ridge

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
5000298.467	514099.461	1714.431

Operator	KB
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-20-2020
RMSE Hz	0.006 m
RMSE Z	0.011 m
GPS Method	RTK

PHOTOS



QA026 7/20/20



QA026 7/20/20



QA026 7/20/20



QA026 7/20/20





Point ID	QA027
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Gumboot Butte

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4998126.995	506089.658	1728.455

Operator	KB
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-20-2020
RMSE Hz	0.006 m
RMSE Z	0.008 m
GPS Method	RTK

PHOTOS







Point ID	QA028
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Lick Creek

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

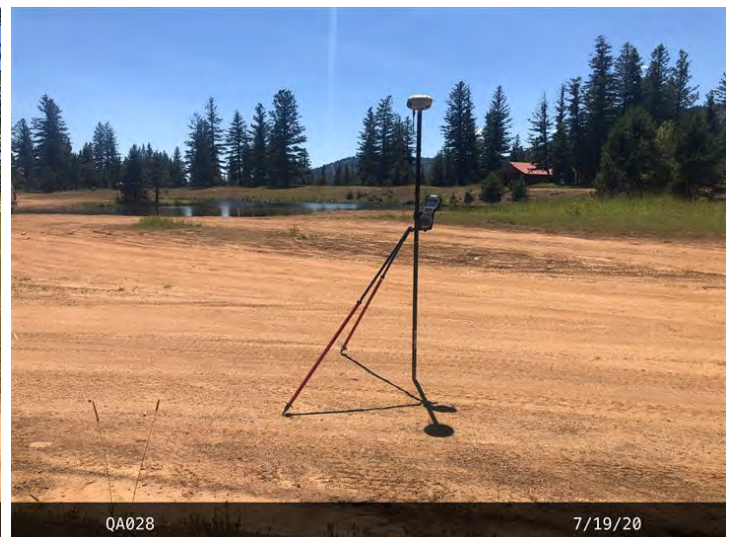
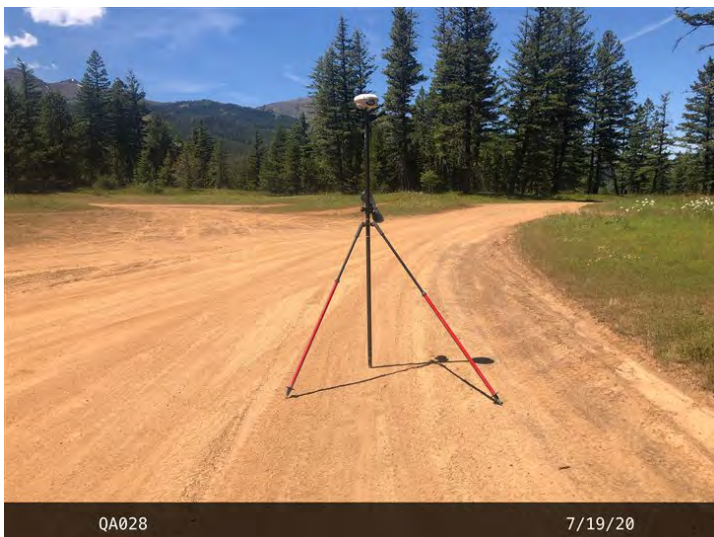
Coordinate System
UTM 11N
NAD83(2011)
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
5006249.691	495025.743	1872.801

Operator	KB
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-19-2020
RMSE Hz	0.005 m
RMSE Z	0.010 m
GPS Method	RTK

PHOTOS







Point ID	QA029
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Kinney Lake

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
5020383.736	496629.232	1543.141

Operator	KB
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-18-2020
RMSE Hz	0.010 m
RMSE Z	0.018 m
GPS Method	PPK

PHOTOS







Point ID	QA030
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Sheep Creek Divide

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
5027786.376	516356.876	824.404

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	08-01-2020
RMSE Hz	0.007 m
RMSE Z	0.019 m
GPS Method	PPK

PHOTOS







Point ID	QA031
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Imnaha

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
5041267.290	510938.599	668.629

Operator	KB
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-18-2020
RMSE Hz	0.013 m
RMSE Z	0.017 m
GPS Method	RTK

PHOTOS







Point ID	QA033
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Puderbaugh Ridge

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
UTM 11N
NAD83(2011)
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
5004286.736	518581.697	1868.917

Operator	KB
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-21-2020
RMSE Hz	0.008 m
RMSE Z	0.012 m
GPS Method	RTK

PHOTOS







Point ID	QA034
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Union
Quad	Fly Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4991196.346	386276.144	1378.918

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.008 m
RMSE Z	0.014 m
GPS Method	RTK

PHOTOS







Point ID	QA034A
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Wallowa
Quad	Puderbaugh Ridge

	Aerial Target
	LiDAR Ground Control
	LiDAR QC Point
X	New Control
	Photo ID
	Published Control

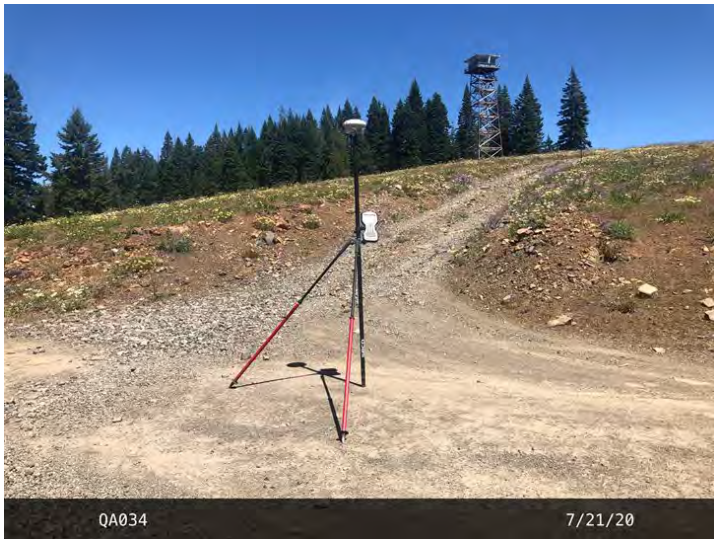
Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
5002441.075	517342.849	1812.897

Operator	KB
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-21-2020
RMSE Hz	0.008 m
RMSE Z	0.014 m
GPS Method	RTK

PHOTOS







Point ID	QA035
Project No.	35989
Project Name	USDA FS - Wallowa Whitman Nat'l Forest
State	Oregon
County	Union
Quad	Trout Meadows

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System	
UTM 11N	
NAD83(2011)	
NAVD88	
GEOID12B	
Meters	

Northing	Easting	Elevation
4982961.827	390090.575	1885.187

Operator	EG
Receiver Model	Trimble R8 Model 3
Receiver S/N	0435
Antenna Height	2.000 m

Date (MM-DD-YYYY)	07-24-2020
RMSE Hz	0.007 m
RMSE Z	0.010 m
GPS Method	RTK

PHOTOS

