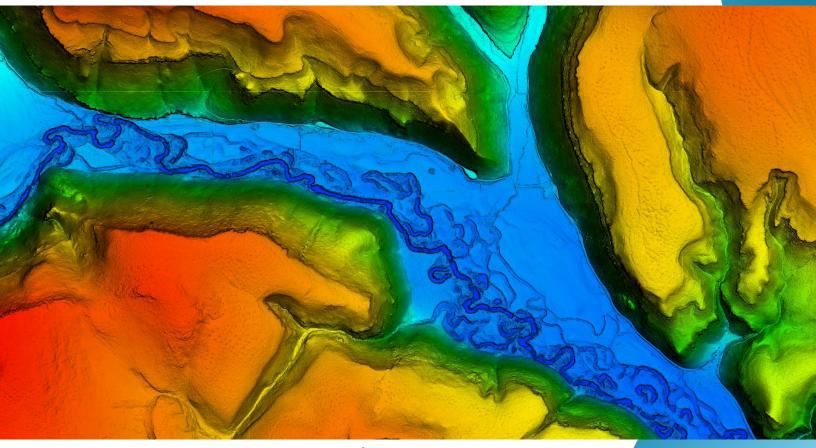
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OR_NRCSUSGS_2019_D19 LIDAR PROCESSING REPORT

Work Package: 183621 Work Unit: 219333 2020

Submitted: June 23, 2021

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Contents

1. Summary / Scope	1
1.1. Summary	1
1.2. Scope	1
1.3. Coverage	1
1.4. Duration	1
1.5. Issues	
2. Planning / Equipment	4
2.1. Flight Planning	
2.2. LiDAR Sensor	4
2.3. Aircraft	7
2.4. Time Period	_
3. Processing Summary	9
3.1. Flight Logs	9
3.2. LiDAR Processing	
3.3. LAS Classification Scheme	
3.4. Classified LAS Processing	
3.5. Hydro-Flattened Breakline Processing	12
3.6. Hydro-Flattened Raster DEM Processing	12
3.7. Intensity Image Processing	12
4. Project Coverage Verification	14
5. Ground Control and Check Point Collection	
5.1. Calibration Control Point Testing	
5.2. Point Cloud Testing	
5.3. Digital Elevation Model (DEM) Testing	
6. Geometric Accuracy	
6.1. Horizontal Accuracy	
6.2. Relative Vertical Accuracy	22
Processing Report Appendices	xxiii
Appendix A	xxiv



List of Figures

Figure 1. Work Unit Boundary	3
Figure 2. Planned Flight Lines	
Figure 3. Optech Galaxy Prime and Optech Orion H300 Lidar Sensors	
Figure 4. Some of Quantum Spatial's Planes	
Figure 5. Lidar Tile Layout	13
Figure 6. Lidar Coverage	15
Figure 7. Calibration Control Point Locations	
Figure 8. QC Checkpoint Locations - NVA	
Figure 9. QC Checkpoint Locations - VVA	20
List of Tables	
Table 1. Originally Planned LiDAR Specifications	1
Table 2. LiDAR System Specifications	6
Table 3. LAS Classifications	

List of Appendices

Appendix A: Flight Logs



1. Summary / Scope

1.1. Summary

This report contains a summary of the OR_NRCSUSGS_2019_D19, Work Unit 219333 LiDAR acquisition task order, issued by USGS under their Contract G16PC00016 on September 12, 2019. The work unit yielded an area covering approximately 1,934 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 ²	2085 m	58.5°	55%	≤ 10 cm	

1.3. Coverage

The work unit covers approximately 1,934 square miles over Oregon. Project extents are shown in Figure 1.

1.4. Duration

LiDAR data was acquired from October 30, 2019 to July 29, 2020 in twenty-five total lifts. See "Section: 2.4. Time Period" for more details.

1.5. Issues

There were no major issues to report for this project.



OR_NRCSUSGS_2019_D19 Work Unit 219333 Projected Coordinate System: Oregon Statewide Lambert

Horizontal Datum: NAD83(2011) Vertical Datum: NAVD88 (GEOID 12b)

	Units: International Feet
Lidar Point Cloud	Classified Point Cloud in .LAS 1.4 format
Rasters	 3-foot Hydro-flattened Bare Earth Digital Elevation Model (DEM) in GeoTIFF format 3-foot Intensity images in GeoTIFF format
Vectors	Shapefiles (*.shp) • Project Boundary • LiDAR Tile Index Geodatabase (*.gdb) • Continuous Hydro-flattened Breaklines
Reports	Reports in PDF format • Focus on Delivery • Processing Report • Survey Report
Metadata	XML Files (*.xml) • Breaklines • Classified Point Cloud • DEM • Intensity Imagery



OR_NRCSUSGS_2019_D19 Work Unit 219333 Boundary

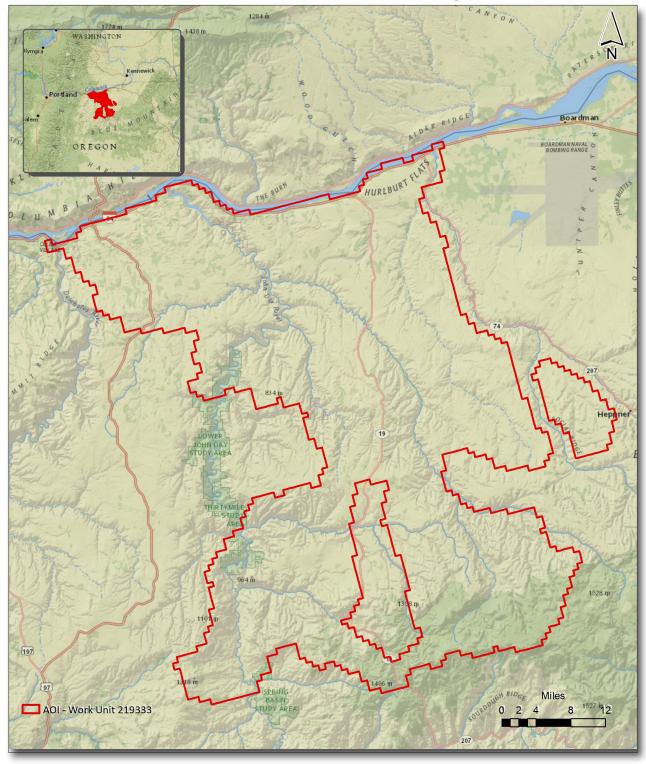


Figure 1. Work Unit Boundary



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 FMS Planner planning software. Planned flight lines are shown in Figure 2.

2.2. LiDAR Sensor

NV5 Geospatial utilized the following lidar sensors (Figure 3) for data acquisition:

- Optech Orion H-300
- · Optech Galaxy Prime

The Optech Galaxy Prime systems are capable of collecting data at a maximum frequency of 550 kHz. These systems utilize a Multi-Pulse in the Air option (MPIA). These sensors are also equipped with the ability to measure up to 8 returns per outgoing pulse

The Optech Orion H-300 is an ultra-compact system that has a range capture of up to 4 range measurements (including 1st, 2nd, 3rd, and last returns) and an intensity capture of up to 4 intensity returns for each pulse. The laser repetition rate is programmable from 35-300 kHz and the scan frequency is programmable from 0-90 Hz.

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



OR_NRCSUSGS_2019_D19 Work Unit 219333 Planned Flight Lines

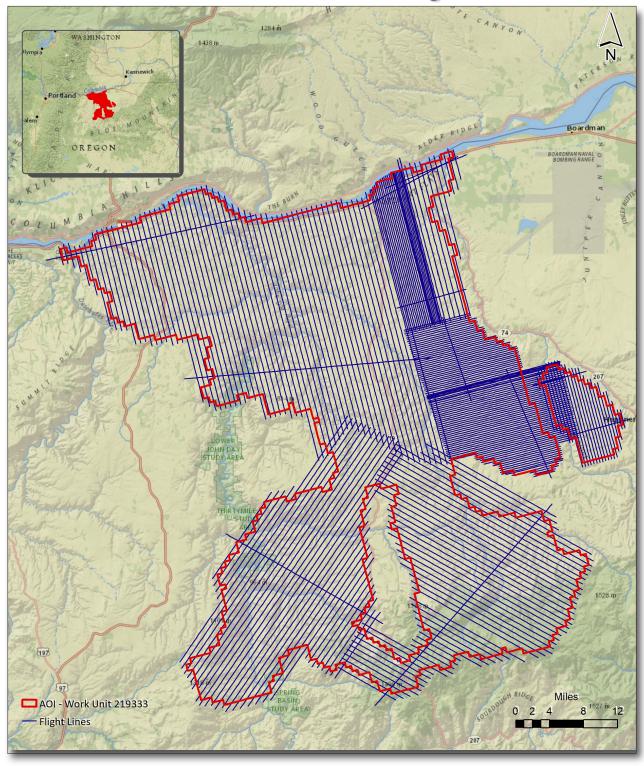


Figure 2. Planned Flight Lines



Table 2. LiDAR System Specifications

		Optech Galaxy Prime	Optech Orion H300
Terrain Flying Height		2300 m	1500 m
Aircraft Scanner	Recommended Ground Speed	130 kts	120 kts
Cooppos	Field of View	50°	28°
Scanner	Scan Rate Setting Used	70 Hz	62 Hz
Laser	Laser Pulse Rate Used	800 kHz	275 kHz
Laser	Multi Pulse in Air Mode	yes	2PiA
Coverage	Full Swath Width	2145 m	748 m
Coverage	Line Spacing	858 m	300 m
Point Spacing	Average Point Spacing	0.35 m	0.35
and Density	Average Point Density	8 pts / m²	8 pts / m²

Figure 3. Optech Galaxy Prime and Optech Orion H300 Lidar Sensors







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

- Cessna 310 (twin-piston), Tail Number: N777Q
- Cessna Centurion (piston-single), Tail Number: N777JK

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 NV5 Geospatial's operating aircraft can be seen in Figure 4 below.

quantum SPATIAL

Figure 4. Some of Quantum Spatial's Planes



2.4. Time Period

Project specific flights were conducted between October 30, 2019 and July 29, 2020. Twenty-five aircraft lifts were completed. Accomplished lifts are listed below.

- 10302019A (H-300-Orion,N777Q)
- 11012019A (H-300-Orion,N777Q)
- 11022019A (H-300-Orion,N777Q)
- 11062019A (H-300-Orion,N777Q)
- 11082019A (H-300-Orion,N777Q)
- 11202019A (H-300-Orion,N777Q)
- 01032020A (Prime,N777JK)
- 02122020A (Prime,N777JK)
- 02192020A (Prime,N777JK)
- 02252020A (Prime,N777JK)
- 02282020A (Prime,N777JK)
- 02282020B (Prime,N777JK)
- 03012020A (Prime,N777JK)
- 03042020A (Prime,N777JK)
- 03052020A (Prime,N777JK)
- 03052020B (Prime,N777JK)
- 03052020C (Prime,N777JK)
- 03122020A (Prime,N777JK)
- 03212020A (Prime,N777JK)
- 03212020B (Prime,N777JK)
- 04072020A (Prime,N777JK)
- 04102020A (Prime,N777JK)
- 04102020B (Prime,N777JK)
- 07292020A (Prime,N777JK)



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 Optech LMS 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
Applanix + POSPac	8.6
Optech LMS	4.4
GeoCue	2020.1.22.1
Global Mapper	19.1;20.1
TerraModeler	21.008
TerraScan	21.016
TerraMatch	21.007



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:

	Classification Name	Description					
1	Processed, but Unclassified	Laser returns that are not included in the ground class, or any other project classification					
2	2 Bare earth Laser returns that are determined to be gathered and manual cleaning algorithms.						
7	Low Noise	Laser returns that are often associated with scaterring from reflective surfaces, or artificial points below the ground surface					
9	Water	Laser returns that are found inside of hydro features					
17	Bridge Deck	Laser returns falling on bridge decks					
18	High Noise	Laser returns that are often associated with birds or artificial points above the ground surface					
20	Ignored Ground	Ground points that fall within the given threshold of a collected hydro feature.					

3.4. Classified LAS Processing

The bare earth surface is then manually reviewed to ensure correct classification on the Class 2 (Ground) points. After the bare- earth surface is finalized; it is then used to generate all hydrobreaklines through heads-up digitization.

All ground (ASPRS Class 2) LiDAR data inside of the Lake Pond and Double Line Drain hydro flattening breaklines were then classified to water (ASPRS Class 9) using TerraScan macro functionality. A buffer of 3 feet was also used around each hydro flattened feature to classify these ground (ASPRS Class 2) points to Ignored ground (ASPRS Class 20). All Lake Pond Island and Double Line Drain Island features were checked to ensure that the ground (ASPRS Class 2) points were reclassified to the correct classification after the automated classification was completed.

Any noise that was identified either through manual review or automated routines was classified to the appropriate class (ASPRS Class 7 and/or ASPRS Class 18) followed by flagging with the withheld bit.



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. NV5 Geospatial'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. Hydro-Flattened Breakline Processing

Class 2 LiDAR was used to create a bare earth surface model. The surface model was then used to heads-up digitize 2D breaklines of Inland Streams and Rivers with a 100 foot nominal width and Inland Ponds and Lakes of 2 acres or greater surface area.

Elevation values were assigned to all Inland streams and rivers using NV5 Geospatial's proprietary software.

All ground (ASPRS Class 2) LiDAR data inside of the collected inland breaklines were then classified to water (ASPRS Class 9) using TerraScan macro functionality. A buffer of 3 feet was also used around each hydro flattened feature. These points were moved from ground (ASPRS Class 2) to Ignored Ground (ASPRS Class 20).

The breakline files were then translated to Esri file geodatabase format using Esri conversion tools.

Breaklines are reviewed against lidar intensity imagery to verify completeness of capture. All breaklines are then compared to TINs (triangular irregular networks) created from ground only points prior to water classification. The horizontal placement of breaklines is compared to terrain features and the breakline elevations are compared to lidar elevations to ensure all breaklines match the lidar within acceptable tolerances. Some deviation is expected between breakline and lidar elevations due to monotonicity, connectivity, and flattening rules that are enforced on the breaklines. Once completeness, horizontal placement, and vertical variance is reviewed, all breaklines are reviewed for topological consistency and data integrity using a combination of Esri Data Reviewer tools and proprietary tools.

3.6. Hydro-Flattened Raster DEM Processing

Class 2 LiDAR in conjunction with the hydro breaklines were used to create a 3-foot Raster DEM. Using automated scripting routines within proprietary software, a GeoTIFF 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.

3.7. Intensity Image Processing

GeoCue software was used to create the deliverable intensity images. All withheld points 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 3-foot were then provided as the deliverable for this dataset requirement.



OR_NRCSUSGS_2019_D19 Work Unit 219333 Tile Layout

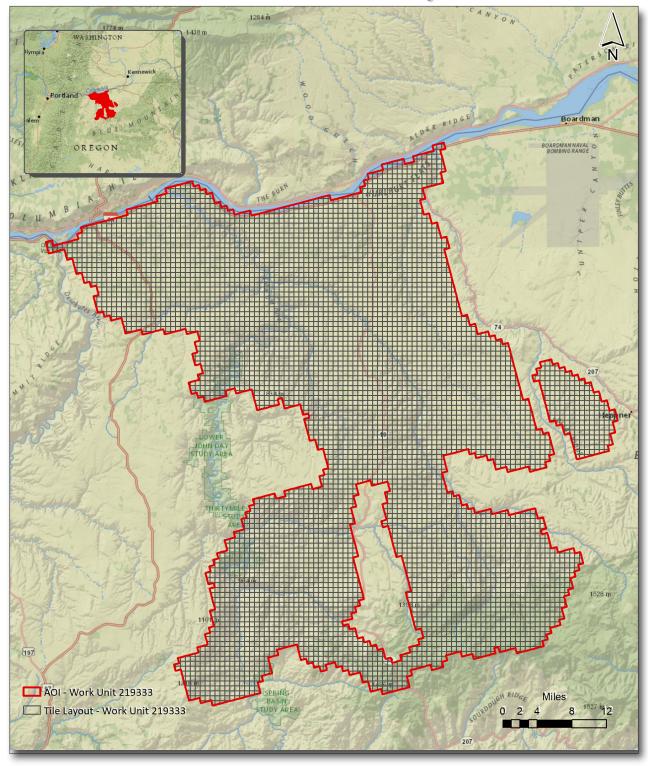


Figure 5. Lidar Tile Layout



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 Figure 6.



OR_NRCSUSGS_2019_D19 Work Unit 219333 Lidar Coverage

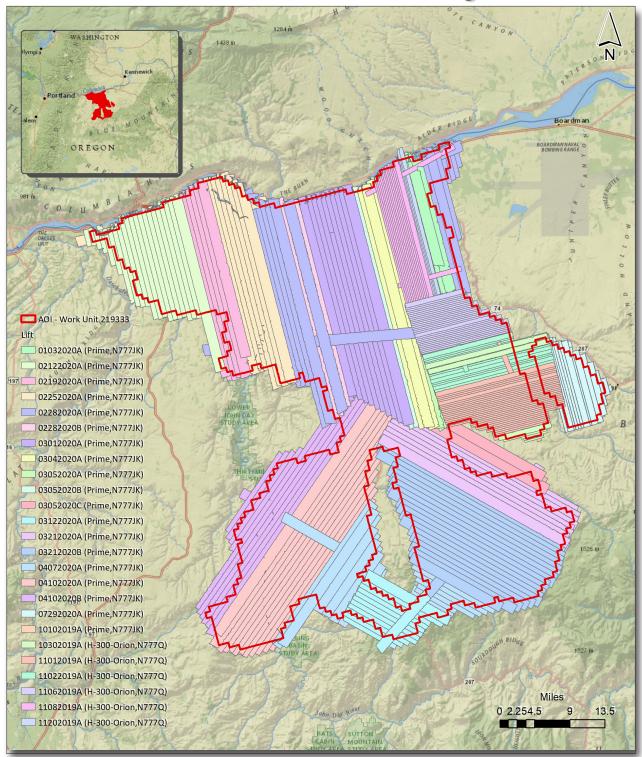


Figure 6. Lidar Coverage



5. Ground Control and Check Point Collection

NV5 Geospatial completed a field survey of 172 ground control (calibration) points along with 272 blind QA points in Non-Vegetated and Vegetated land cover classifications as an independent test of the accuracy of this project.

The required accuracy testing was performed on the lidar dataset (both the lidar point cloud and derived DEM's) according to the USGS Lidar Base Specification Version 1.3. See the "Survey Report of Lidar Calibration & Quality Control Points" for more information.

5.1. Calibration Control Point Testing

Figure 7 shows the location of each bare earth calibration point for the project area. TerraScan was used to perform a quality assurance check using the lidar bare earth calibration points. The results of the surface calibration are not an independent assessment of the accuracy of these project deliverables, but the statistical results do provide additional feedback as to the overall quality of the elevation surface.

5.2. Point Cloud Testing

The project specifications require that only Non-Vegetated Vertical Accuracy (NVA) be computed for raw lidar point cloud swath files. 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 136 checkpoints located in bare earth and urban (non-vegetated) areas. These check points 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 check point. 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) x 1.9600 as defined by the National Standards for Spatial Data Accuracy (NSSDA); assessed and reported using National Digital Elevation Program (NDEP)/ASRPS Guidelines.

5.3. Digital Elevation Model (DEM) Testing

The project specifications require the accuracy (ACCz) of the derived DEM be calculated and reported in two ways:

1. The required NVA 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. This is a required accuracy. The NVA was tested with 136 checkpoints located in bare earth and urban (non-vegetated) areas. See Figure 8.



2. Vegetated Vertical Accuracy (VVA): VVA shall be reported for "brushlands/low trees" and "tall weeds/crops" land cover classes. The target VVA is: 29.4 cm at the 95th percentile, derived according to ASPRS Guidelines, Vertical Accuracy Reporting for Lidar Data, i.e., based on the 95th percentile error in all vegetated land cover classes combined. This is a target accuracy. The VVA was tested with 116 checkpoints located in tall weeds/crops and brushlands/low trees (vegetated) areas. The checkpoints were distributed throughout the project area and were surveyed using GPS techniques. See Figure 9.

AccuracyZ has been tested to meet 19.6 cm or better Non-Vegetated Vertical Accuracy at 95% confidence level using RMSE(z) x 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.

	Target	Measured	Point Count
Raw NVA	0.196 m	0.08242 m	136
NVA	0.196 m	0.0820 m	136
VVA	0.294 m	0.1671 m	116



OR_NRCSUSGS_2019_D19 Calibration Points

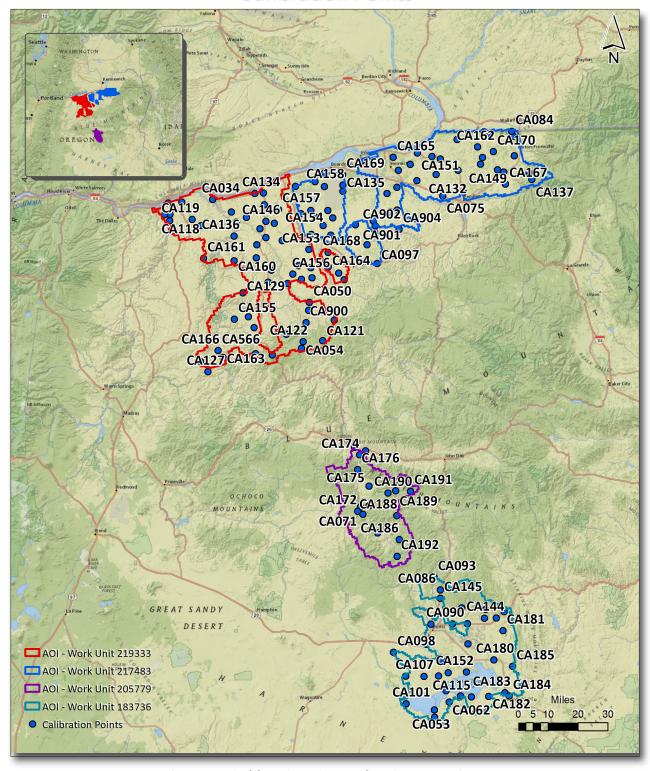


Figure 7. Calibration Control Point Locations



OR_NRCSUSGS_2019_D19 NVA Points

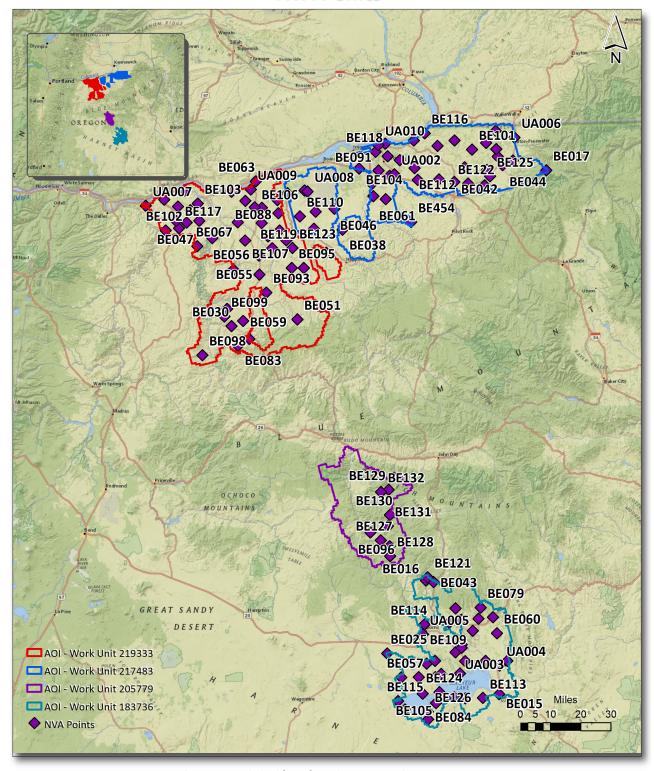


Figure 8. QC Checkpoint Locations - NVA



OR_NRCSUSGS_2019_D19 VVA Points

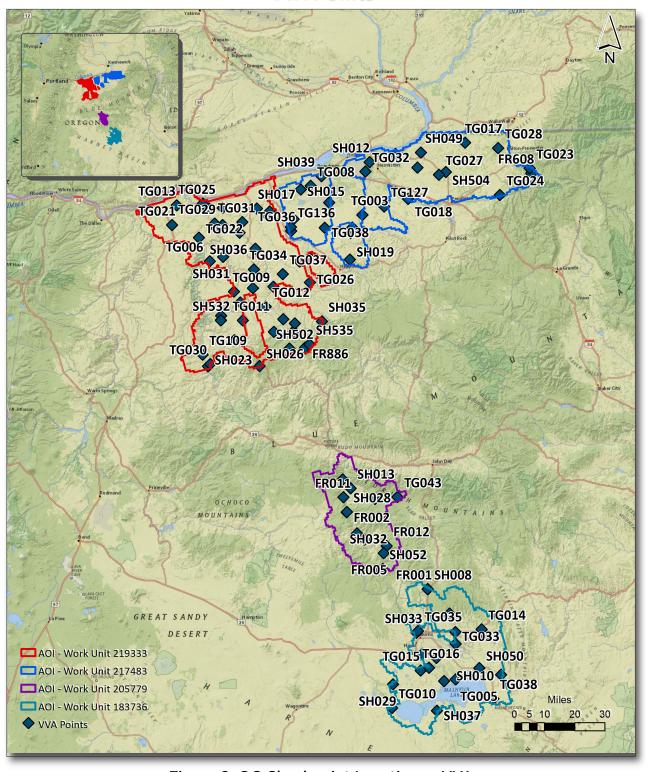


Figure 9. QC Checkpoint Locations - VVA



6. Geometric Accuracy

6.1. Horizontal Accuracy

Lidar horizontal accuracy is a function of Global Navigation Satellite System (GNSS) derived positional error, flying altitude, and INS derived attitude error. The obtained RMSE, value is multiplied by a conversion factor of 1.7308 to yield the horizontal component of the National Standards for Spatial Data Accuracy (NSSDA) reporting standard where a theoretical point will fall within the obtained radius 95% of the time. Based on a flying altitude of 2300 meters, an IMU error of 0.002 decimal degrees, and a GNSS positional error of 0.015 meters, this project was compiled to meet 0.25 meter horizontal accuracy at the 95% confidence level. A summary is shown below.

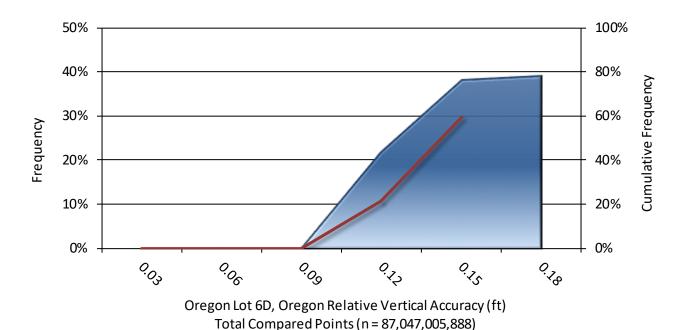
Horizontal Accuracy						
DMSE	0.14 m					
RMSE,	0.47 ft					
ACC	0.25 m					
ACC _r	0.82 ft					



6.2. Relative Vertical Accuracy

Relative vertical accuracy refers to the internal consistency of the data set as a whole: the ability to place an object in the same location given multiple flight lines, GPS conditions, and aircraft attitudes. When the lidar system is well calibrated, the swath-to-swath vertical divergence is low (<0.10 meters). The relative vertical accuracy was computed by comparing the ground surface model of each individual flight line with its neighbors in overlapping regions. The average (mean) line to line relative vertical accuracy for the OR_NRCSUSGS_2019_D19 project was 0.144 feet (0.044 meters). A summary is shown below.

Relative Vert	ical Accuracy				
Sample	301 flight line surfaces				
Avorago	0.144 ft				
Average	0.044 m				
Median	0.145 ft				
Median	0.044 m				
RMSE	0.141 ft				
RMSE	0.043 m				
Standard Deviation (15)	0.020 ft				
Standard Deviation (1σ)	0.006 m				
1060	0.040 ft				
1.96σ	0.012 m				





Processing Report Appendices

The following section contains the appendices as listed in the OR_NRCSUSGS_2019_D19 Lidar Processing Report.



Appendix A

Flight Logs

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ircra	10	HOU	GRD N/		nt: Short	_					1200	14	
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age:		01		7 .									
LT ine	DIR	Start Time	End Time	Altitude (AMSL)	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range	Collection Notes (Job#, Flight plan, conditions, clos	ıds, etc.)
SI	6	18:42	18-43	8900								local dropout ca	meed
51	6	18:45	18:45	8700								11 05	BED
51	F	18:48	18:48	8400								370 drop PDOPIS	
0	S	18:56	19:03	7953	111							wavy rt edge Tross	line
	W	19:08	19:09	8402	115							0	
2	E	19:12	19:12	8379	1							of line - aborted	X
2	E	19:17	19:18		115								
3	W	19:23	19:24	8343	Address address address								
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7	W	20:33	20:41		107								PDOP.
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						FINE							
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	/POS:		18:0	Time / 1	VIAO	1	4=20	KE	75			F	NS NAV OU
OR	117.00 Fue		-						71.7	1			OS Files OS Log File
OR													AR Drive agery Drive
Othe	er Not	es:											npleted

Λ.	
ALC:	# 7A
	VA.

GeoTerra, Inc — Lidar + PhaseOne Flight Log

1300 A 1000				
Date: 11/1/	2019	Sensor: Prop # 266	Take Off #1: 1741 / UNO	Land #1: 1608 KDLS
Crew: TVH /	ICL		Take Off #2: 1625 / DLS	Land #2: 1653 UAO
Aircraft: N1776)	Mount: Short Double Other	Take Off #3:	Land #3:
AGPS: PPP CORS	GRD N/A	Flight/Equipment Notes:		Flight Time: 5.6 + 0.5
Page: of	2	# 19 4455 - NACS L	IFT 3 - AREA 2 SONTH	Max Speed: 6.

FLT Line	DIR	Start Time	End Time	Altitude (AMSL)	Ground Spd (kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range	Collection Notes (Job#, Flight plan, conditions, clouds, etc.)
19	S	1835	1841	7953		Cro	SSLIF	عد				HIGH SCATTERED, SMOOTH, LT HATE 16 SATS, POS , S-TURNS
6			1850									
7			1855									
8			1901									Pas / OTA/
q	2	1903	1906	8235	121							5
10	E		1911	1	ŧ							\
71	W	1913	1917	8169	121							POS , QTA
12	E	1919	1922	8143	121							.*
13		or a few professions	1928	1								
14	E	1934	1935	8084	119							Pos , QTR / 10
15	-		1942	8074	117							POS / QTR / 10 Creek/statem and EAST SIDE
16	E	1944	1949	8045	117							
17	W	195)	1956	8025	119							4
18	E		2003		T							pos / ata/
19	W	2005	2012	7966	115							15
24	E	2014	2021	7946	115							
21	W	2022	2429	793\$								POSV, QTR
22	E	2031	2038	7930	115							
23	W	2039	2446	7910	121							A A A A A A A A A A A A A A A A A A A
24			2054									POS / WTR / START? 20
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29		the second contract of the second	2139	. 61		The second of the second of the						. 25
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31			2154									27

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			 							S:	COR:
CORS:										5:	COR

<u>Deliverables:</u> __"AsFlown" Folder

__FMS NAV Out, __POS Files

__POS Log File

__ LIDAR Drive __ Imagery Drive

__Completed Flight Log

Other Notes:

Г	ate:	11/1	120	G	eoTer ensor: (ra, In	c — 1	idər	. 5:						
—	'ew:	11/	2210	S	ensor: (Omputer:	ORIOP	# *	711	+ Pha	seO	ne Fli	ght L	og		A 4
_	craft:		4/16	- Co	Omputer: Ount: Sh	DELL	6	520	Take Off	#1: 5	ref	A Rings	Land #1:	Seel	
_	-		778	1 Mr	ount CL		Name of Street, or other Persons and Perso	ther T	ake Off	#2:	X		Land #2:		3/-
AU	P3: /	COR.	S GRD I	AU LUIG	ıht/Equipi	ment No	tes:	raiei [1	ake Off :	#3:			Land #3:		/
Pag	e:	<u> </u>	f <u>Z</u>	_]									Flight Time		
FLT	DIR	Start	End	Altitude	Ground								Max Speed		
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32	E	2155	2202	7697	119									, 2.# SAT	
33		2204		7671	122								,	, 24 300	*
34	E 7 E	22/3	2219	7654	117										
35	W	2221	2228	7635	124			14.				Pos	OTR	, IBSATS	
36		10 Table 1 Table 1 Table 1	2237	1	117								7 3 1 1 1	1 1 10 10 11 11	5
37	W	2238	2245	7695								POS V	, QTR.	/	***************************************
															
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CORS	:													P09	Log File
Other	Note	s:												LIDAR Image	
														Comp Flight	

GeoTerra, Inc - Lidar + PhaseOne Flight Log Land #1: 15:27 Take Off #1: (9=40/ U A) Sensor: DPION Date: 06 Land #2: \\ \(\alpha \) \\ \(\alpha \) Take Off #2: 15:43 Computer: Crew: Land #3: Take Off #3: Mount: Short Double Other Aircraft: #190455 OR NRCS Flight Time: 10.5 Flight/Equipment Notes: AGPS/ PPP CORS GRD N/A (CIFT 4) AREA 2-SOUTH Max Speed: D800 of Page: **Collection Notes** Shuttr F-stop Start End Sun ISO Altitude Ground Start FIT (Job#, Flight plan, conditions, clouds, etc.) DIR Angle Range Range Range Spd(kts) Counter Counter (AMSL) Time Time Line OTR=BAD LAYER COKE" (\$ 150 7:30 STR VOK 7922 15 17:45 FMS lost communication 7935 r: b4 18:02 SAISE 113 7935 PPOPE 1.39 ME 125% drive CROSSLINE 7935 124 7572 GTR-V 11:55 7569 atrv 122 5A11=16 POUPE1.24 atrv 7552 19:06 19:13 atk 🗸 7539 115 19:14 17:22 10 QTR1 19:23 7523 19:30 117 QTR. 7513 115 19:32 19:39 W JATS # 19 OTRI POSV PPOP=1.27 121 19:41 9:48 7493 atr V 7497 119 19:56 anr v 122 Lean-40 20:05 7487 19:58 OIR V 7474 115 20:13 W 20:07 SATS = 19 OTR V POS 7441 124 POOP =1.18 20:22 20215 119 OTR V 7441 20:31 20:24 20:32 QTRY 20:39 7425 QIR \cdot 20:41 742/ 20:4B 111 W JAT5 = 19 20:57 742/ 1 2.J POOP=1-120 areas. 20:SO aTR 20:59 21:06 7415 121 21:07 21:14 7418 QTR V Entrance speed 21:18 142 HEDRIEO 7484 W too fast GALITO START LASER OFF LATE 21: 20 21:25 7484 117 55 W SATS = 18 DOP = 1. 7133 121 71:31 QTRV ATR 1240 5lø QTR JUIST COVERAGE OVER EAST END FROM 1as **# SATELLITES / NOTES Deliverables:** END START **ABGPS** _"AsFlown" Folder 17:33 Bad data 10:55 PPP/POS: _ FMS NAV Out. 18=210 __ POS Files 8.4 FMS Comm LOST 540 CORS: DOP#2 17:43 a site __ PQS Log File

22:28

CORS:

Other Notes:

THIS ONE

_ LIDAR Drive _ Imagery Drive

> . Completed Flight Log

		12/20	10	Sanco	r noi	ΛN	— Lida # 260	Take	Off #1	09:46	Ind W	MO	Land #1:	15:27	DLS
w:		IH/EL		Comp		<i>\(\frac{\fin}}}}}{\frac}\fire}{\frac{\frac}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\fir}}}}}}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\fi</i>	A. 20 V	Take	Off #2	15:43	/DL	5	Land #2:		IAD
w. cra		310	· &			Dou	ble Oth						Land #3:		
		Otto.	GRD N/A								CS		Flight Time:		
je:	- Torac		2	-	, ==		-3-6	المستركة المستركة	<i>.</i>				Max Speed:		
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۲	W	21:45	4:50	121	,							ark	<u> </u>	ß	ATS= 17 >OP= 1.
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[ate:	11/10	1	G	eoTeri	ra, Ind	: — Li	dar	DI.	_					
-	ew:	TVH	10011	Se	ensor: O	2101	# 2	Golo T	Pha	seOn	e Fli	ght Lo	g		A
-	craft:	4	-	W Co	mputer:	DELL	6531	TO V	ake OII	#1:	52/1	LAD	Land #1: (032me/ 11	40
-	-		0	Mo	ount: Sho	ort Dou	/		ake Off ake Off #		The second secon		Land #2:		10
AG		PPP COR.	S GRD I	N/A Flig	ht/Equipr	***************************************	-		ike OII 7	F3:	- 100 miles		Land #3:		AND THE PERSON NAMED IN COLUMN TWO
Pag	e: _		of	_ D7	ØØ		A	QIA	301	Sou	CS TH		Flight Time:	4.7	
FLT	DIR	Start	End	Altitude	Ground	Ctout			diser	300	111		Max Speed:		
Line	E	20:05	20:05	(AMSL)	Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range		Collectio Flight plan, con	ditions, clouds,	
TEST	E	-	20:35	7161	135							GTRV		PDOP SATS	= 159
TEST	E		20:37	1	124	Cho	22-11	Y &	1		The La	QTR-	ordy sep	arating (2	corne
20	5	20:41	20:45	7133		200		1-	-	Ų.		OTRY		-	
60	E	20:50	20:55	7375	122	CRO	SSL/1	IE		N.		atri	1	PPOP = SATS	1.51
61	W	20:56			124						4	atr 1	POSV		5
62	E	21:03		7359	124					M	(65)	QTRV	7		
10000	-		21:09	7349	119			1			1.1	RTRV			
63	W	21:10	21:16	7343	124							QTRV			
64	E	21:17		7310	111							QTRV	,	PDOF SATS	=18
65	W	21:24	21:30	7283	130							QTRV			10
66	E	24:31	21:36	7267	113	/640						OTRV	POSV		
67	W	24:38	2/:43	7254	124							atrv	,		
68	E	21:45	24:50	7247	115							QTRV			
69	W	21:52	21:57	7238	128							QTRV	,	PPOF SATS	= 18
70	E	21:58	-	7221	117							QTRV	1		15
71	W	22:05	22:10	7-205	122							QTRV	P05V		
72	E	22:11	22:16	7185	113							QTR/			
73	W	22:18	22:22	7178	126						1	RTRV	/	Anne Com Bhille (All Anne Anne Anne Anne Anne Anne Anne	
74	E	22:24	22:29	7156	109							QTR V	<i></i>	PDOP = SATS=	17
75	W	22:30	22:35	7133	128							atry	POSV		20
76	E	22:36	22:41	7156	111							QTR V			
77	W	22:42	22:46	7126	122							atr V	1		
78	E	22:48	22:52	7100	107							QTR V			
79	W	22:54	22:57	7077	126							arr	y	PDOP = SATS =	0.9.7
80	E	22:59	23:03	7057	124							atr 1	Pos		25
81	W	23:05	23:09	7031	,							QTR V	/		
82	E	23:10	23:14	6998	113							QTR V			27
	ABG	iPS		START	Periods School of the Control of the		EI	ND			# SATE	LLITES /	NOTES	Deliverabl	es:
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-	Note	s:						a and a section of the section of th	htter facilities estat statistical land					LIDAR Drive Imagery Dr Completed Flight Log	ive

FLT	DIR	START	TIME	ALT	GROUND	NOTES	
83	W		23:20	6972	128	QTR V	
84	E	23:22	23:25	6955	111	QTR / Pr	DOP = 1.08
85	\mathcal{W}	23:27	23:31	6946	119	atr Post	1.0 18
86	E	23:32	23:36	6932	115	QTR-	
87	W	23:38	23:41	6916	122	QTR V	
88	E	23:43	23:47	6900	117	QTR V	
89	W	23:48	23:52	6877	124	QTR / pas/ pool	OP = 1.33 TS = 16

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				<i>*</i> a	Geo	Terra,	Inc -	– Lida	ar + F	hase	One	Fligh	t Log		AO
Charles and a second	Date:	11	181	2019		or: OA		NAME OF TAXABLE PARTY.		e Off #1	11	28/	UAO	Land #1: 165	to/uno
-	Crew		TVH/	KL.	Com	puter:	ELL	653	ϕ Tak	e Off #2				Land #2:	
-	Aircra	aft:	V777	Q	Moui	nt: Shor	t Doub	le Oth	er Tak	e Off #3	:			Land #3:	
or a factor of the same of the	AGPS	: PP	P CORS	GRD N/										Flight Time: 5.	5
-	Page:		of		#1	9945	5 N	RCS	ORIOR	310	ANZA	2		Max Speed:	
	FLT Line	DIR	Start Time	End Time	Altitude (AMSL)	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range		Collection N Flight plan, conditi	ons, clouds, etc.)
The same and other Designation of the last	139	E	2019	2013	6686	126							DO (/	QTRV , LT	HAZE ISSA
-	140	W	2\$21	2027	6286	121							69% D	LOPE EAST END	- RIVER/FIFO.
	138	5	2029	20	6562	117							1 Dass	PONED-R	NE
		make owners the second space	CONTRACTOR OF THE PROPERTY OF		parameter substitution and substitution of the	THE UNIVERSAL BLACK OF THE PARTY OF THE PART	Distriction of the Party of the	Managari and Association of the Party of the	a serienceani montre para en			National and an extension	REST LOST	GRATION MUNICATIO	DURING UNE
													* No Po	s onecred -	AFTER 9 MINS.
	139	E	2113	2116	6686	122							19 SATS	, POSV, QTRV	
	140		2124	-	6286						31.0 M/M/JOHNSON TO BE SHOWN		RIVER	CE END	
	133	S	1	1	6562	122								e e m	
	137	N	2142			113					and an inches of the control of the			e(A)	
	136	5	2152	2159	6585										10
	135		2201	2209		1/1					aggagga-gagyagatan agatan Amerika		1		deregenen er det personen ut ut ut en propriet er de propriet er de fan de
	134	S	2211	2219	6568						MANAGEMENT, NEWSTRAND PROCESS				
	133	N		2229		113									
	132		THE PERSON NAMED IN COLUMN	2239							garjusta istorios provincionis (1999)		1 L-	T. TURB, pos	✓
	13/	N	2241			121									15
	130	5	-	22.59		1					aylandayay zaranani cind min				
	129	1	1	2349	-	I CONTRACTOR OF THE PARTY OF TH									adakan mengangkan penganakan di Palang (1900) pengangan pendangan pendangan pendangan pendangan pendangan penda
	123	5	2311	23/9	6453	122									
	127	N	2321	2329	6476	115							The same of the sa	anterioria prima de la coloción de comercio en entre en comercio de cidad de la coloción de la c	
	126	5	2331	2339	6503	126							1		20
	125	N	2341	2349	6516	-119									
-	124	5	2351	2359	6519	126								S-Turns Po	s
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		AB	GPS		START				END			# SAT	ELLITES	/ NOTES	Deliverables:
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GeoTerra, Inc - Lidar + PhaseOne Flight Log



Control of the contro			a
Date: 11/20/2019	Sensor: ORION # 266	Take Off #1: ()9:51 / UAO	Land #1: 14-04 / UAD
Crew: TVH / EW	Computer: DELL 6536	Take Off #2:	Land #2:
Aircraft 310	Mount: Short Double Other	Take Off #3:	Land #3:
AGPS: PPP CORS GRD N/A	Flight/Equipment Notes:		Flight Time: 4.5
Page: 1 of	HIGHES NIRCE		Max Speed:

FLT Line	DIR	Start Time	End Time	Altitude (AMSL)	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range	Collection Notes (Job#, Flight plan, conditions, clouds, etc.)
KST	Đ	18:03	14:04	7538	150							OTRX layer cake ERROR?
1851	E	19:12	18:12	7362	130							QTRX worse layer cake "
136	E	19:44	18:48	5190	128	CRO	SLIA	ECA	1)			#190455 - NRESV POOP=1.26 QTR / POSV SATS=18
135	W	18:57	18:58	5794	128	CRO	SLIN	E(()			Pilot display error ABORT
136	W	M:02	11:02		128	fi		1/				douds@ALT ABONJED
135	W	19:05	19:07	5230	130	fe		4				flew ~500ft lower be close
134	N	19:10	19=18	5190	119							anev
133	S	19:20	19:28		124							OTR POSV PROP= 1.W
132	N	19:30	19:38		105							atr
13/	5	19:40	19:48		122							QTRY 10
130	N	19:51	19:59		97							QTRV
129	S	20:05	20:06									Tzero drob - LINE STRA
129	5	20:08	20:09									11 27
129	S	20:11	20:20		130						Г	manually Started line early
128	N	20:23	20:31		121							atry post 0 - 13
127	S	20:32	20:41									W //

ABGPS	START	END	# SATELLITES / NOTES
PPP/POS:	17-59 / Milwaukie	22:05 / MAO	
CORS:	21:14/10412	21:58/1412	16 SATS
CORS:			

Deliverables:

_'AsFlown' Folder _ FMS h.AV Out. _ POS Files _ POS Log File

_ LIDAR Drive _ Imagery Drive

__Completed Flight Log

Other Notes:

*	76	2			Geo	Terra,	Inc -	– Lida					nt Log			A O
Da	ite:		13/	20	Sens	or: 6A	1	#35	-	e Off #1		nimbanijani	40	Land #1: 12	22/D	15
Cr	ew:	¥	NB/8	EW	Com	puter: [DELL	2018	Tak	te Off #2	: 13:2	1/0	LS	Land #2: 0 : 0	09/UA	Ò
Aiı	rcra	-	2100) K	Mou	nt: Shor	t Douk	ole Oth	ner Tak	e Off #3				Land #3:	SSOUND PROPERTY OF THE PROPERT	
AG	SPS	: (PE	CORS	GRD N/	A Fligh	t/Equipm	ent Note	es:						Flight Time:	5.4	nikomanednasedskapismi skimica savennikowa
Pa	ge:		of		中	10455	OK	NRC	5-1	SAL	NOF	RTH	"rest	Max Speed:		
FL'		DIR	Start Time	End Time	Altitude (AMSL)	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range	(Job#	Collection Flight plan, con	ditions, clou	
3	51	W	19:35	19:36	8100								QTR-	POSV	£	PARSE
7	9	E	19:39	19:39	8428	134	CRO	SSLI	VE				about	ted-no	-	upt
7	9	E	19:49	19:49			u		11				Alper	ted tope	valter	Vefter
NAME OF STREET	9	E	20:02	20:03			11		11					ted -> offl		
											MATERIAL STATES OF THE STATES					C
-	\forall											<u> </u>	+1900	455 OR NRI	SERAR	vd in ain
(F	1		21:36	21:37	6395	183	0				PIL	SPLAY	Pred	icted traje oc POSV	S PPOF	= 0.93
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-	7	Ge i	21:514		ilot d	Splace	spe			12564	>n	ereo	range	normal	LOVE to	ail Wil
1	2	W	21:53	21:58		95?	CONTRACTOR OF THE PARTY OF	of DIS	PLAY?				-	drop ATR	4	4-7
1	_	_				ground	speed	MEAR	nina -		ange			rorked (a		
12	_	5	22:06	22-15	8875	111	119	beyon	nalse	torge	rash	2970	68900	trop onenty	1 200 r	st
		V	22:15				crit	cal-	ENOS	1 Rec	aver:	Quer	Sym	ctimeou		00 00
l)	N	22:20	22:27	8871	140	*-tar	et an	2:20 918 M	Parni	ngt	1-30	NA(KH)	140~ 80% = 140~ 80%	ropove	rwafer
12	2	S	22:31	22:37	8789	101	* tare	# Wa	onine	@ 22	:35		91700	= 109-113 ran loop over we south of riv	ges 1 200	rest P
18	0	S	22:38	22:40		115	* tave	et w	amin	@22	:38		aTRV 2% dy	south of ri	ver pos	7
9	7	N	22:44	22:52	8806	132		et wa					POSE =	0.98 Sats = 2 rap most 990	20	
10)	S	22:54	23:01	8789		109		U				*PAT	CHI range v	<u> </u>	
8	7	S			88Y2								3 400	rop raige v	non-proportion of the State Asia County and a section of the	
G	+					 									***************************************	20
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essencia	\dashv			26, 27												
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	\Box															enter care a ferro de proposition e
sterdaysts																27
		ABO	GPS		START				END			# SAT	ELLITES	/ NOTES	Deliv	erables:
		POS:		19:24	D	ALLES		0:44	-	MLES			A, 1997		FM	wn" Folder S NAV Out.
***********	ORS	(CANADA CONTRACTOR		21:27	- / DA	LES	0	1: []	/ UA	0						S Files S Log File
CC	ORS	5:													LIDAF	R Drive
		Note														ery Drive
Λ	04	2	DOWNER	OV -	mu	Failur	e in	POSV	iew.	+ NO	005	dese	11 Cts	ht in Ems	Comp	

-	Date:	2	/12/	20	Senso	or: 64	rL	#35	Tak	e Off #1	11:42	YMA	Land #1: (5:38 / DLS
	Crew:		VH/E	W	Comp	outer:	DELL	18	Tak	e Off #2	16-0	4/ DL	S Land #2: 14:39/UAD
	Aircra	ıft:	2100	K	Mour	nt: Short	Doub	le Oth	er Tak	e Off #3		7	Land #3:
	AGPS	: (PP	P CORS	GRD N/		t/Equipm	ent Note	s: #	904	155	OR	NR	Flight Time: 4.8
-	Page:	w	of		D8	300							Max Speed:
-	FLT Line	DIR	Start Time	End Time	Altitude (AMSL)	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range	Collection Notes (Job#, Flight plan, conditions, clouds, etc.)
	rest	E	1956	1956	8500	128							OTR 1170 drop Range
	79	W	2032	2042	9224	130	CRO	SSUN	18				DROP 4590 OVER OVER QTR
	78	5	2046	2047	8337	142							CATE V SATS 23
-	77	N	2049	2050	8120	124							QTRV 3990 drop river
ľ	76	5	2052	2053	7851	132	*Tare	ret ar	igle v			053	OTRI 66 Todrop"
of the state of th	75	N	2055	2057	8117	128				4/-	300		RTRV 98% " "
The second second	74	S	2058	2/00	8461	134							atr 942 " "
	73	N	2102	2105	8609	121							ATR / 44% 11 11
ľ	72	S	2106	2111	8698	138							QTRV 49020 " "
-	71	N	2/13	2/17	8711	122-							QTRV, 90% "
- 1-	70	S	2119	2124	8757	134							POSV PDOP 0.84 SATS 24 BTRV 94% ""
Ì	69	N	2/26	2131	8825	122	* Tar	get a	ngle	warr	ing:	127	
- Contractor	68	5	2/32	2138	8921	132					300		aTR√
Ì	67	N	2140	2145	8927	130							atr 97 06 " "
	66	5	2147	2152	8914	136							QTR 100% "
	45	N	2154	2200	8930	124							POS V PDOP 0.9 SATS 23 QTR V 9276 "
	64	S	2202	2208	8934	138	* Tar	get a	gle v	sami	ng 2	207	DTRV 83°20 " "
-	63	N	2210	2216	8914	124				+/-		4.34	QTR 802" "
Ì	62	S	2217	2223	8868	138					4.	1	QTR 93% " "
department	61	N	2225	2231	8868	126							OTR / 8476
gitterates	60	S	2233	2239	8865	134							POST PDOP 0.915 ATT 24 OTR 800, "
Section 1	59	N	2241	2247	8878	132	,			4/2	50°		BOTR / 9190 " "
-	58	5	2249	2258	9121	136	* Tar	yet a	ngle	warn	ing 20	57	atr/
Ì	80	E	2301	2313	9226	136	* Tai	4	ngle	Mari	ung:	T	ATR 1870" " CROS.
-								0	0	1t/-	300		
						<i>N</i>			*	6,			
	A MANAGEMENT OF THE STATE OF TH								3				
The second second		AB	GPS		START				END			# SAT	TELLITES / NOTES Deliverables:
-	PPP/	POS:		19:5	4/1	outde	ale 2	3:40	1 D	LS			"AsFlown" Folde FMS NAV Ou
The Assessment of the Party of	COR	-	eyepenesis de destronte forme de l'anne de l'anne										POS Files POS Log File
	COR	S:			acceptable and the second of the second								LIDAR Drive

/19/20

MB/EW

2100K

Date:

Crew:

Aircraft:

GeoTerra, Inc — Lidar + PhaseOne Flight Log

OR NIRGS

Sensor: GAL #351 Take Off #1: 8:48/U AO Land #1: 11: 20 Computer: DELL 2018 Take Off #2: 12-37/DLS 5:39 Land #2: Mount: Short Double Other Take Off #3: Land #3: AGPS: PPP CORS GRD N/A Flight/Equipment Notes: KUFBLER + AVERY PIT+ Flight Time: 6.2

Page	<u>: _</u>	of	of <u>2</u>	_ D8	00		OF	2 NIR	Colon	Contract of the last of the la		Max Speed:	
FLT Line	DIR	Start Time	End Time	Altitude (AMSL)			End Counter	Sun Angle	ISO Range	F-stop Range			
KS	15	100	1201		106	10?	12					CANBY PI TEST	
	5	1706	1908	1842	126	13	19		1600	8	1000	0 RTR / PDOP 0.94 SATS 21	
								-					
1	5	1723	1724	6083	1							KNEBLER 190522 DIRVI	1.0
2	N	1730	1731	6129								ATRV 5	
3	5	1737	1739	6198	1 2							QTR V	
4	N	1744	1745	1234	119							BIRV	
5	5	1751	1752	6194	119							atri range >20?	
6	E	1754	1757	4047	122	CAU		1	CRO	SSLI	NE		
												10	
851						20	31	>30	1600	8/	11000	AVERY PIT 200032 2.	.0
	-	1839	1839	6155	144	32	38					ABORTED - OFFLIATE	
The same of the sa	E	1846	1847		140	39	45					GIRV 45% drop over river	
2	W	1951	1852	6/68	146	46	52					GTRV 37% drago" "	
3	E	1857	1857	6437	138	53	59					OTR 17% drop 15	
4	S	1902	1903	6155	138		200-		CRO	SUN		STRV 100% drop" "	
48	E	20:				# E9E	SAFE	- XY/2)	FAIR	01		NO NIGIC LADUSE	~
-	5 6	2112	2113	9226	130	1431		-	Parcon	ear a	in line		Las
-	W	2113	2122	& Lotter ME	136	CRO	SSU	NE				PILOT FELL OFF LINE	
(7)	-	2/28		9094		* TAR	OETA		WARN	11116	71.0	HOPPED BACK ON GTRY	
			1	9/24	1 0-53	411	50	2144	1		1 mg	die 11 10 prolo over una	
4.4		2149	2149	71 Soul	124	-		2147				GTR SUR " DIGHTEN OFF LINE	
56	5	2153	2137	$\overline{}$	128	* 11	"	11.2			-	Mistire	
	N	-	-	9137	122	* /1		1263				QTRV	
-	-	-	22-27	9147	THE RESERVE OF THE PARTY OF THE	at to						QTR 74 96 11 25	
- Total	/			-	100	* 11		249				atr/	
130	N	Pr-1	2242	1011	130	1	9	231				892 4 1 27	

ABGPS	START	END	# SATELLITES / NOTES
PPP/POS:	16:84 / CANBU	19:23 me/14025	
CORS:	18:29 / TOLS	19:13 / TDLS	
CORST PPP	20:42/KDLS	23.41 / WAD	

Other Notes: GRING P1 HD1

Deliverables: __"AsFlown" Folder

__FMS NAV Out.

__ POS Files

_ POS Log File

__ LIDAR Drive __ Imagery Drive

__ Completed

Flight Log

)ate:	2	119/2	10	Sens	or: C	AL	# 35	Tak	e Off #1	:		Land #1:	stine k Alasa
rew	HORIZON PROPERTY AND A STATE OF THE STATE OF	nyen	markshall and a state of the same of the s		puter:		SECTION AND PROPERTY OF THE PERSON NAMED IN COLUMN 1	AND COMMON DESIGNATION OF THE PERSON NAMED IN	e Off #2				5:39
ircr	******	2100			nt: Shor		-		e Off #3			Land #3:	
GPS	-		GRD N		t/Equipm					Transferride (Transferride Control of Contro	arcontroles essimentendes controles con	Flight Time:	
age		2 of		0.8	100							Max Speed:	
FLT .ine	DIR	Start Time	End Time	Altitude (AMSL)	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range	Collection (Job#, Flight plan, cond	
52	5	21:46	4:57		126	* (1)		148	95	9-	95		np Last Pun
, –		21. 110	4-07	1110	140	考》。	rical	1 7 1		. 60	CD	or sel	(LED
							809 C				1	0.0	
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	PO TOTAL PORT OF THE PARTY OF T							111	rie()	4.8			
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	ocreteres established												15
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	genis reggiorente resultiv												
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	ABO	3PS		START			ı	END			# SATE	LLITES / NOTES	Deliverables:
PPP/	POS:			i lanc a la	labon		UTCTime	e / Locati	un .				*AsFlown" Folder FMS NAV Out.
COR	5:												POS Files POS Log File

Other Notes:

__ LIDAR Drive __ Imagery Drive

__Completed Flight Log

				Geo'	Terra,	Inc -	– Lida	ır + 1	Phase	One	Fligh	t Log			
Date:	,	2/25	12924	Senso	or: G	71	# 35	Tal	ce Off #1	: //:	P6/	UNO	Land #1:	1514	+ /DLS
Crew:		MB/1	4		outer: [ALL PROPERTY OF THE PARTY OF TH		Tal	ce Off #2	: 15	148	/DLS	Land #2:	162	8 June
Aircra	aft:	NATT	JK	Mou	nt: Short	t Doub	ole Oth	er Tal	ce Off #3	:			Land #3:		
AGPS	: PP	P CORS	GRD N/		t/Equipm								Flight Tim		
Page:		of_		一类	: 1901	422 -	or	NCRY	- RE	ST GA	PLAKY	wate	Max Spee	d: 4.3 +	P.9=5
FLT Line	DIR	Start Time	End Time	Altitude (AMSL)	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range	1	Flight plan		clouds, etc.)
79	E	1947	1957	8429	13P	CR	055L1	NE.	FUL	L		HIGH :	CHITERLE	LEVEL S	MRS 0-65 TAIL WARDING GHER, HER
80	2	2407	24/2	9226	13\$	CR	OSSLIN	06-	PART	IAL		GOOD.	FOR 37	No co	GHER HE
51	N	2020	2031	8953	124									/ QTR	
2¢	5	2438	2945	3885	134								OTR		
49	2	2049	2052	3842	124	PAR	TIAL					23 SA	TS PARI	IAL - De	IFTED OFF
49	N	2055	2055	8842			ED AP	PRO	ACH -	Auto	START			*	
49	N	2456	2056				ED A								
49	N	2116	2/26	8842	134					1		ADDROS	tch was	OFF, so	AUTO-STAG
48	_	2130	2141	8754	122							SUDDE	y tall wi	mb e st	ant of th
47	-	1	2200									QTR	-		7 (
46		-	2217	-								24 SA	75 ,005	1,00	950-75
45	N	2221	2232	3391	130								7	,	
44	-	1	2248	The same of the sa	-60										
					7								ACCEPTANT ACCEPTANT OF THE PARTY OF THE PART		nggaranggan kasanang pantantan da namba kasantan antan
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MARION DE L'AMBRE															
iumium annu i n a ntic															
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AU I SIN SIN SIN SIN SIN SIN SIN SIN SIN S															nancasanin melinga kapa melebahan kapan dengan pengan pengan pengan pengan pengan pengan pengan pengan pengan
areka e sempjemot u familie									1						2
N (m) A value (A cine or A cine				<u> </u>		-				 					
	<u> </u>			 						<u> </u>			CHANGE AND		
								<u> </u>	1				MARKAN PARKANAN TOWN PROPERTY.		
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NO CONTRACTOR OF THE PARTY.	 								 						
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	ABO	GPS		START				END			# SAT	ELLITES	/ NOTES		Deliverables:
PPP/			1924		HOOD	2	315		TAXI	/				1	"AsFlown" Folder
COR	S:							,							FMS NAV Out. PQS Files
COR	S:														POS Log File LIDAR Drive
Othe	r Note	es:												-	Imagery Drive

A ()			GeoTe	rṛa, In	c — L	idar	+ Pha	ase O ı	ne Fli	ght Log	3		
Date:	7	2/23,	12024	Sensor:	GAL	#	351	Take O	ff #1:	1018	Juno	Land #	1: 141	4 /DLS
Crew:		TVH	/KL	Compute	er: 01	= al 29	18	Take O	ff #2:	144	P/OLS	Land #	2: 171	2/40
Aircra	ft:	N777	-JK	Mount:	Single (Double	Other	Take O	ff #3:			Land #	3:	
AGPS: Page:	PPF	CORS	GRD N/A		uipment 1 94 55		rcs	REST	GALA	XY N	ORTH	Flight T		; = 6.7
FLT Line	DIR	Start Time	End Time	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range		ht plan, sl		s, haze, turb, etc.)
79	E	1352	1902	142	cros	SLINE	-				HIGH OC	- FLAP	5 27 = 5	BATS, POSVOS
13	E	1908	1912	14\$	CROS	SLINZ	F							POS QTR I
1	2	1917	1919	132							RIVERC	@ E	UD = 99	% bases OTR.
2	5	1921	19 23	122										90S 018 .
3	7	1925	1927						ACA PRINCIPLE AND THE OPEN DATE OF THE OPEN DESIGNATION OF THE OPEN DESIGNATIO		Accessor of the State of the St	naki kaunataine ini siderii savata kuurini neetoi.	enticement and in their visit and risk re-ways are as call classed	POS OTR
4	S	1929	1931	134							Z3 SATS			POS
5	N	1935	1940	128										POS
6	5	1942	and and a second and a second and a second	122										POS
7	2	1951	1958	134					mentpersonne Atendoré (mon microsonne					POS A
B	5	2000	2908	134									1	POS ATB
DOMOTORIO A DE KARANTORIO DE											- FINICH	ED Roo	O Nea Gay	SECTIONOTE
34	W	2010	2022	126	10011	406					LT. Hoz		16-78 har alan	POS
52	S	2025	-	121	-	AL RE	- 5. 6	1.4	PATC		CINMINE	- C) managananananananananananananananananana		POS
43	N	2031	2041	132	1 1710-11	10 14	PER	J. (1200	<u> </u>	LT. Tury	7		POS
42	S	MINISTRAL PROPERTY AND ADDRESS OF THE PARTY AN	2054	126	Medica Administrativa variativa vene				ACTION OF STREET		21 SATS	пульта и подости не причина причина подости (п.		POS -
41	2		2106	134							CI Shis			POS
40	5	2108	-	13 ф				######################################	dentiferenten en e					POS
39	N	2122	2134	138										QTR S POS
38	5	2137	1	136								,		POS
			-7.10	750	MANAGEMENT OF THE PROPERTY OF						F)	1 POS
8P	E	2311	2319	119	(0.00	SUNE	- 00	RTH	f		HIGH OC 24 SATS	Mob.Tu	LIFT eB, UT.	HAZE POS
37	MOTION PROPERTY AND ADDRESS OF THE PARTY AND A	2325	The second secon	139	Cipos	30170	175	ICI MY	Martin San Andrews		24 SATS	1005.		QIR + POS
AND THE PERSON NAMED IN	5	-					districtive and another new o		***************************************			Marie acides aci		QTR \ POS
36 35	2	2340	2351	130	NEW DOCKS AND ADDRESS OF THE SECOND S						00 0 -1	Neon die feste de la constant de la constant de la contra		QTR • POS \
34	5	2353 4007		156						1	22 SATS			QTR V POS
31	2	ΨΨΨΊ	0410											QTR \ POS
assupkasaranaranen arykenas Unsajalimbookusludeli asuorun	ABGI	oc T		TART			END			1	CATELLETEC	/Norr		Dalizandian
PPP/P		3	1831/	procession and the second	uAo	2215	Bilano/Branconsistances eleval		x l	Ħ.	SATELLITES	/ NUTE		<u>Deliverables:</u> "AsFlown" Folder
CORS	-		Contract of the Contract of th		DIS	P113	B.	O TA						FMS NAV Out. POS Files
CORS														POS Log File LIDAR Drive
Other	Notes	~ 184	\$ SE-161	LE TUR	B WHI	LE PAS	SING	M.C.	GOD				***************************************	LIDAR Drive Imagery Drive

__ Completed Flight Log

AC				SeoTer	ra, In	c — Li	dar	+ Pha	aseOr	ne Fli	ght Loc	J		
Date:	3	11/20	DZD	Sensor:	61	L # :	351	Take O	ff #1:	1134	14HO	Land #1:	1540	. 1
Crew:	Person	TUH/1	4	Compute	r: De	XL 2	418	Take O	ff #2:	1616	bus	Land #2:	1657	-/uto
Aircraf	t: /	1777	TK	Mount:	Single	Double	Other	Take O	ff #3:	mayonay sa ana sa kasa ka		Land #3:		
AGPS:	PPP	CORS G	RD N/A	Flight/Eq	uipment	Notes:			۸		1	Flight Time		
Page:		of _		#10	1945	55 N	PCS	- AL	A KES	T GIAL	NORTH	14-4+	0-+	= 5.1
FLT Line	DIR	Start Time	End Time	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range		ht plan, sky co	on Notes anditions, h	naze, turb, etc.)
30	V	2031	2437	132	Cross	UrE-	PAR	TIAL			CLEAR, 23 SATS	SMOOTH S-THEA	15	
33	N	2442	2452	132										OTR V
32	5	2454	2104	138										PON
31	h	2106	2/17	134										PUS OTR 1
30	S	2119	2130	134										CTR -
29	2	2132	2143	140							ZI SATS			STO A
13	5	2144	2 56	13P		En Chin	22.36	1-17	BLACK		Co	1200	CTUI MAS	4 GREEN.
27	N	2158	227	134	FMS MAN	says u	ST COL	MEG. F		1	PARTIAL	LINE/STATI	~5 15 STIL	LUPTONG
27	2	2212	2215	130										OTR -
26	5	2217	2223	1										OTR -
25	N	2230	2242	123	- Constitution of the Cons								tion and the color resources and color and the color and t	OÎR - POS
24	5	The same of the sa	2257	132			ļ.,					pagaranta, interviene per est armene est apagaranta est de catal		QTR M
23	N	2258		140						-				QIR +
22	5	2312	2325	130			-						engeren av van de verde verde stelle	
							-	-						QTR PQS
9230100000000000000000000000000000000000							-			-				O1R POS
									-					Q1R POS
														209
														Q1R POS
strije (vinopumore	-													QIR POS
					-		1	_						Q'R POS
0,022,002,05644,05788469										-				QTR PQS
			-							+			nasgasuktatakkan mateka hari kalkuktatak kalkata	PCS
escuration de l'action de l'ac			-				-	-						20S
www.comensection	-				-		+	+		-				90S
	1						l les	D			SATELLITE	C / NOTES		Deliverables:
PPP/ COR	5.	PS		START (E)	F VAO	235	EN D		x/	7	JAIELLITE	3 / IQUIE3	-	_"AsFlown" Folder FMS NAV Out. POS Files POS Log File
COR	5:	Curar	-m 00W	ened o	op Fa	om	0016	- O	P46	To 1	WAITE 1	APDU LO	6	LIDAR Drive Imagery Drive
Othe	r Note		E TO T		DAIV	6- SE	ND *	tu be	as to	Det	GCH RE:	FMSNAU		_ Completed Flight Log

				SeoTe r	ra, In	c — Li	dar -	+ Pha	seOr	ne Fli	ght Log	
Date:	3	14/2	PZP	Sensor:		# 1	STREET, SQUARE, SQUARE				/40 Land #1: 14/8	ANDUS
Crew:	r	NB/K	4		THE RESERVE AND ADDRESS OF THE PARTY OF					1449	1 / bus Land #2: 1528	/UAO
Aircra		N777		Mount:			And the contract of the last o	AND THE RESERVE OF THE PARTY OF	Assessed to the Party of the Pa		Land #3:	
AGPS:	PPP	CORS C	RD N/A)	Flight Time: $3.6 + 0.8 =$	44
Page:	l	of _		77199	0427.	NRCS	pes	7 GAL	AXY	NORT	7 7.04 0.0	- (
FLT Line	DIR	Start Time	End Time	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range	Collection Notes (Job#, Flight plan, sky conditions, haz	re, turb, etc.)
80	6	1935	1939	136	Cros	SLINE.	PAR	TIAL			LOW SCATTERED (S) OF AO, LT. 23 SATS, S-TURN - ABORT	FORTELOU
80	W	1959	2493	142	Cross	UNE	PAR	[IA-L	egetetismin periodici			QTR
22		2004	2004								ANTO-START MISFIRE	POS QTR
15	N	2021	2035	124							ANTO-START MISFIRE VERY THIN GLOUDS @ 5-	TART POS OIR
16	5	2039	20,52	130							144145	POS (. QTR •
17	N	2057	2119	130							24 5875	POS O
18	S	2114	2127	-								POS CI QTR —
19	N	2132	2146	132							18min ~/to	QTR
				and the second s					and the Salana and Salana and Salana and Salana	No. of Concession, Name of Street, or other Designation, Name of Street, Name	- END LIFT 15	POST
												POS TO
	T											POS : QTR :
												POS I QTR :
												POS TO
												POS OTR
	 											POS OTR
	-											POS
	_											POS :
	+											POS 1
MANAGEMENT AND	+											POS OTR
							+					POS OTR
	-						1			1		POS OTR
	-						-					POS QTR
						-	T					POS CO
							1					POS POTE
									1			POS L. OTR
	-						1					POS .
	ABG	DS I		START			ENI)		#	SATELLITES / NOTES	QTR Deliverables:
PPP/			1904		KAMAS	221		DLS T	4×1			sFlown" Folder
COR				·								FMS NAV Out.
COR	S:											POS Log File IDAR Drive
Othe	r Note	s:									lr	nagery Drive completed light Log

				GeoTe	rra, In	с — Li	dar	+ Pha	așeOı	ne Fli	ght Log	especially such that the supplement of the suppl		
Date:	3	/12/2	2724	Sensor:	GAL	#	351	Take O	ff #1: 1	0944	/WAO	Land #1:	1/14	
Crew:		MB/K		Compute			And Area Street, and the second	Take O		1246	> /DLS	Land #2:	1608	3 hurs
Aircra	ft:	N777	-JK	Mount:	Single	Double	Other	Take O	ff #3:			Land #3:		
AGPS:	PPP	CORS C	GRD N/A)	1	Flight Tim		
Page:		of _		#19	<i>Ф</i> 453	5- N	CRS	REST	-GAL	AXY	SonTH	1-7+	3.5=	5.2
FLT Line	DIR	Start Time	End Time	Ground Spd(kts)	Start Counter	End Counter	Sun Angle	ISO Range	F-stop Range	Shuttr Range	(Job#, Flight		ion Notes	i haze, turb, etc.
13	NW	1737	1740	126	CROS	SLINE	- PA	RTIA	۷		LOW SCATT	,		
							Marian Maria Salah		Bertagen and State of		Too	MANY	Puffs	ALLS-OR
162	SW	2425	2023	126	CR 05	SLINE	- PA	RTIAL			GOOD T	s LINE	: 154	ONDS/25 POS OTR 0 NO KESS
161	SE	2\$37	2040	134							STRUNG	TAILWINI	-100' L	OTR
16P	NW	2945	2049	126										POS QTR
159	SE	2053	2057	142							THILMIND			POS QTR
158		2102	2106	124							ShowING	Down 1	ion Den	SITY POS
157	-	2114	2/14	142							TAILWIN .			POS QTR
	-		2123	124										N GROUNDS
-	SE		2/32	130							SNOW S			POS QTR
		2136	2141	126										POS QTF
	-	2144	2148	142							THILMIND	>		POS QTF
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GeoTerra, Inc — Lidar + PhaseOne Flight Log 014 /UAO 2020 # 351 Take Off #1: Date: Sensor: GIAL Land #1: DB/KL Computer: DELL 2919 Take Off #2: 1452/959 Land #2: 1549 Crew: NATTIL Mount: Single Double Other Take Off #3: Aircraft: Land #3: PPP CORS GRD Flight/Equipment Notes: PHASEDNE ON GRABHOLN AGPS: N/A Flight Time: 4 Im AGES SAVED TO DROGON 4.2+1.0=5.2 2 Page: FLT Start Ground Start Shuttr **Collection Notes** DIR Time Spd(kts) Counter Range Line Time Counter Angle Range Range (Job#, Flight plan, sky conditions, haze, turb, etc.) LOW SCATTERED, ET. HAZE, 6.3-300-3 1000 1451 17-28 121 #19PSSI-GRASHORN U 17-29 REFORM CROSSLINIE 1731 121 4 1732 cro BSLINE 1934 01 17-34 124 HR 1037 HZ 16 121 10 1737 1040 23 12 1740 1740 HR END GRACHORN/START NACST SE 1837 113 1837 Choss LINE+ PARTIAL Sw \$199455 NICS REST SECT. HIGH SUATREMED, LT. MAZE, 162 SW 1843 132 1845 CROSS LINE-PARTIAL 50 SECT. SMOOTH 1853 150 Nh 1850 13 P STILL SOME SNOW ON GROUND 1857 149 SE 1855 136 148 859 Nh 1902 128 10 147 19 07 SE 1904 132 146 NW 1913 1909 123 CHOW PATCHES CE END 19 132 145 SE 1915 SECTIOND -19 26 123 END OF SE 144 1921 NW 80 123 STARTOF SW 1928 SECTION . 1932 LINE MANUALLY EXTENDED TO 128 NE 1934 1939 MEET W/ CROSS LINE 82 SW 1947 1942 13 0 NE 1949 1953 130 84 1955 2000 134 83 2002 132 NE 2006 86 2000 2009 SW MISSED APPROACH DELETE 21 BOTH 88 2409 7009 MISSED APPROACH 23 8 2014 2020 22 2727 95 NE 2022 132 Deliverables: _"AsFlown" Folder _ FMS NAV Out.

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STATETED @ 083; ALSO #DOD IS ONE BIG FILE, SIMILAR TO WHAT MAPPENED WITH #999

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Flight Log

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