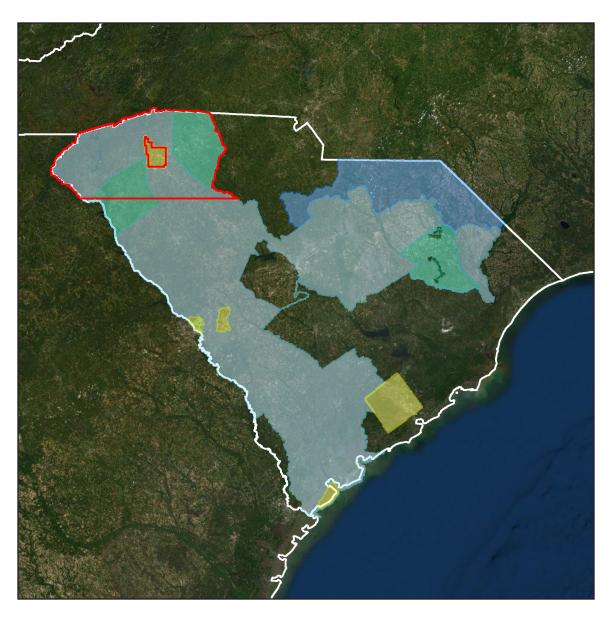
SC Savannah Pee Dee 2019 B19

Lot 6 Airborne Lidar Report

September 2020





Contract # G16PC00022

Task Order # 140G0219F0339



Contractor Woolpert Project # 80495

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1. Overview

About

This project contains a comprehensive outline of the 140G0219F0339 SC Savannah Pee Dee 2019 B19 task order issued by the United States Geological Survey's National Geospatial Technical Operations Center (USGS-NGTOC). This task order called for the acquisition and processing of QL1 and QL2 data over eight blocks covering approximately 21,453 square miles in across South Carolina.

This report encompasses the Lot 6 QL2 area of interest. This AOI totals approximately 3,583 square miles and includes the following counties:

Data coverage includes the following counties:

- Anderson
- Cherokee
- Greenville
- Laurens
- Newberry

- Oconee
- Pickens
- Spartanburg
- Union

Purpose

This project will support the 3DEP mission, the Natural Resources Conservation Service (NRCS) high resolution elevation enterprise program, and the Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment and Planning (MAP) program, as well as many South Carolina state and local agencies.

Specifications

Data for this task order was acquired and produced to meet USGS Lidar Base Specification 1.3 standards and the American Society of Photogrammetry and Remote Sensing (ASPRS) Positional Accuracy Standards for Digital Geospatial Data (Edition 1, Version 1.0).

Spatial Reference

Geospatial data products were produced using the following horizontal and vertical spatial data reference system.

Table 1-1. Spatial Reference System

Horizontal	EPSG Code	6570
	Datum	NAD83 (2011)
	Projection	State Plane South Carolina (FIPS 3900)
	Units	International Feet
Vertical	Datum	NAVD88
	Geoid	GEOID18
	Units	US Survey Feet
	Height Type	Orthometric

Task Order Deliverables

All data products produced as part of this task order are listed below. All tiled deliverables had a tile size of 5,000-Int'l. feet x 5,000-Int'l. feet. Tile names are derived from the provided South Carolina tiling schema.

Table 1-2. Deliverables

Lidar Data	
Classified lidar point cloud data	Tiles in .las v1.4 format Classes • 1 – Processed, not Classified • 2 – Ground • 7 – Noise • 9 – Water • 10 – Ignored Ground • 17 – Bridge Decks • 18 – High Noise • 20 – Ignored Ground
Breaklines used for hydro- flattening	 Lake and River features as feature classes in an Esri file geodatabase Water bodies greater than 2 acres as polygon features Rivers 30.5 meters / 100 feet and greater in width as polyline features Bridges used in DEM generation as point features in Esri shapefile format
Hydro-flattened bare earth digital elevation model (DEM)	2-foot pixel size, 32-bit floating-point; no bridges or overpass structures GeoTIFF format
Intensity Imagery	2-foot pixel size, 8-bit gray-scale (linear rescaling from 16-bit intensity) GeoTIFF format
Flight Line Index	Polygon features in an Esri file geodatabase
Control Data	
Lidar calibration points	Esri shapefile format
Lidar NVA checkpoints	Esri shapefile format
Lidar VVA checkpoints	Esri shapefile format
Other Data	
Tile Index	Esri shapefile format
Inter-swath and intra- swath results	Esri shapefile format
Height Separation Raster	GeoTIFF format

Metadata and Reports	
Metadata	Project-level FGDC CSDGM/USGS MetaParser Compliant metadata in .xml format
Lidar Project Report	Project report with flight logs in .pdf format
Survey Report	Survey report in .pdf format

Figure 1-1. Project Area

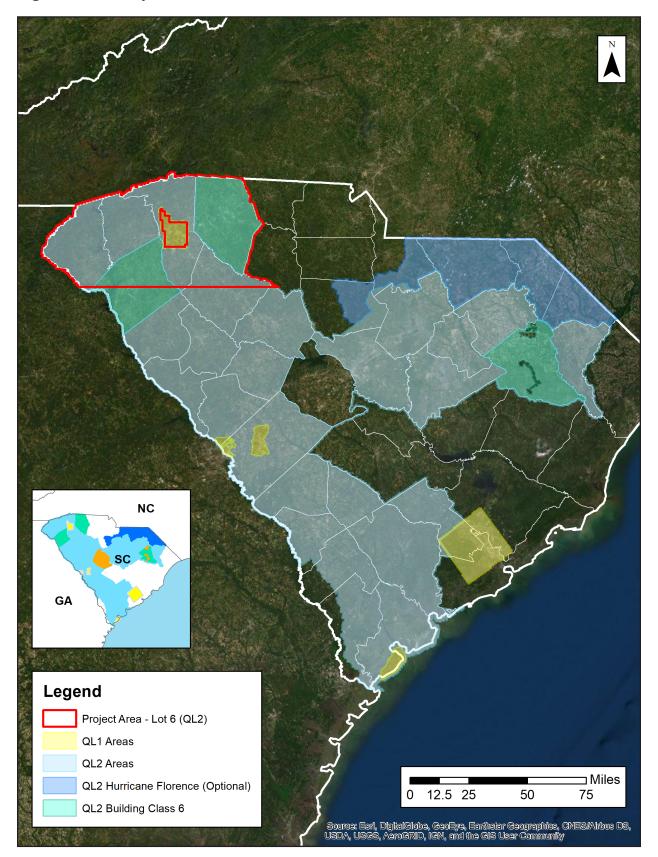
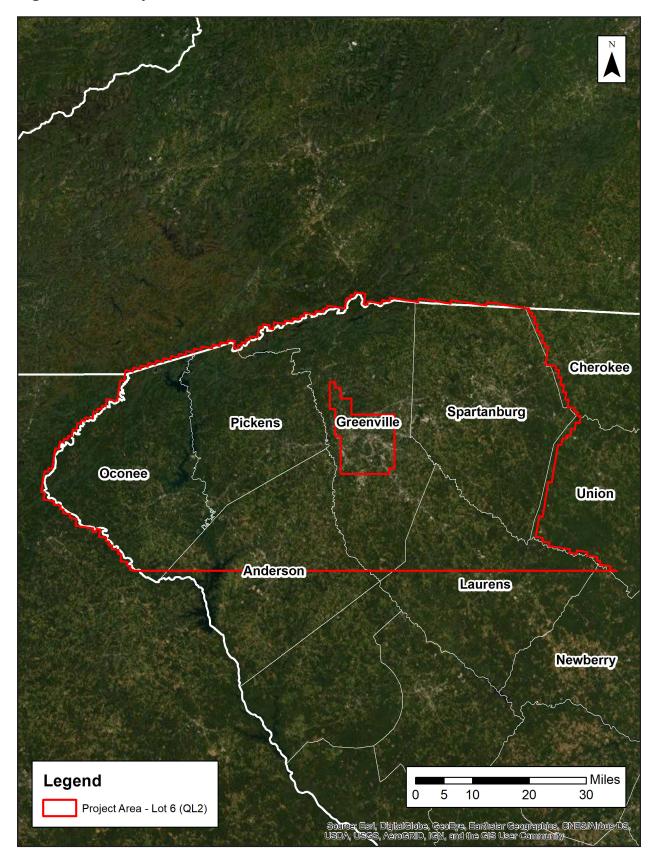


Figure 1-2. Project Area - Lot 6



2. Acquisition

Flight Planning

Aerial lidar data for this project was collected using the specifications listed below.

Table 2-1. Acquisition Requirements

Specification	Target
Resolution	 8 (QL1) or 2 (QL2) points per square meter 0.35-meter (QL1) or 0.71-meter (QL2) nominal point spacing
Overlap	At contractor's discretion, but enough to ensure there are no data gaps between usable portions of the swath and nominal point density is achieved
Acquisition Window	Fall 2019 / Spring 2020 leaf-off window (through March 15, 2020)
Data Voids	Not allowed except • Where caused by water bodies • Where caused by areas of low near infra-red (NIR) reflectivity (i.e. asphalt or composition roofing) • Where caused by lidar shadowing from buildings or other features • Where appropriately filled-in by another swath
Acquisition Conditions	 Cloud and fog-free between the aircraft and ground Ground is snow free; very light undrafted snow may be acceptable in special cases, with prior approval Ground has no unusual flooding or inundation, except in cases where the goal of the collection is to map the inundation Preference of vegetation is leaf-off Time of day is not of concern
Control	Airborne Global Positioning System (ABGPS) and Inertial Measurement Unit (IMU) data to be used along with differentially-corrected GPS ground control points.

Lidar Sensor Information

Aerial lidar data was acquired for the Lot 6 AOI using the Leica TerrainMapper lidar sensor system. A total of 173 flight lines were collected for this AOI.

Table 2-3. Leica Terrain Mapper Sensor Info

Sensor Specifications	
Operating Altitude (m AGL)	300 - 5,500 at 10% reflective target
Maximum Measurement Rate (kHz)	2,000
Scan Angle	20 - 40
Scan Width	Up to 70% of flight altitude
Scan Frequency	Programmable up to 125 Hz (7,500 RPM), 250 scan lines per second
Number of Returns	15
Number of intensity measurements	15
Pulse Mode(s)	Up to 35 pulses in air
Laser Specifications	
Laser Beam Divergence	0.25 mrad (1/e)
Laser Classification	Class 4 laser product
Accuracy	
Range Resolution	< 1 cm RMS
Elevation Accuracy	< 5 cm 1 σ
Horizontal Accuracy	< 13 cm 1 σ
Physical Specifications	
Size (cm), Weight (kg) • Scanner • Control Electronics	• 37 W x 68 L x 26 H cm, 47 kg • 45 W x 47 D x 25 H cm, 33 kg
Operating Temperature • Scanner • Control Electronics	• 0 - 40°C cabin-side temperature • 0 - 40°C
Flight Management	Leica FlightPro
Power Consumption	922 W @ 22.0 – 30.3 VDC

Source: Leica TerrainMapper Data Sheet

 $https://leica-geosystems.com/en-US/products/airborne-systems/topographic-lidar-sensors/leica-terrainmapper \ and \ are the sensor of the control of the co$

GNSS and IMU Equipment

Prior to mobilizing to the project site, flight crews coordinated with the necessary air traffic control personnel to ensure airspace access. Crews were on-site, operating a Global Navigation Satellite System (GNSS) Base Station for the airborne GPS support.

Flight navigation during acquisition was performed using IGI CCNS (Computer Controlled Navigation System). The pilots are skilled at maintaining their planned trajectory, while holding the aircraft steady and level. If atmospheric conditions are such that the trajectory, ground speed, roll, pitch and/or heading cannot be properly maintained, the mission is aborted until suitable conditions occur.

Base stations were set by acquisition staff and was used to support the aerial data acquisition. See the table below for stations operated during acquisition for this project.

Table 2-3. GNSS Base Stations

Station Name	Latitude (DMS)	Longitude (DMS)	Ellipsoid Height L1 Phase Center (Meters)
COLA_CORS	34° 04' 51.55792"	81° 07' 18.01522"	83.061
GAAE_CORS	33° 35' 38.05166"	82° 04' 04.04365"	125.833
GACC_CORS	33° 32' 44.70609"	81° 08' 01.70043"	99.946
NCLU_CORS	34° 37' 36.33614"	79° 04' 39.69488"	15.891
NCMR_CORS	34° 58' 54.77677"	80° 31' 25.79018"	144.41
NCPO_CORS	34° 59' 33.17291"	80° 10' 37.85773"	84.998
NCRO_CORS	34° 57' 51.98789"	79° 47' 47.74094"	91.939
NCSL_CORS	33° 58' 57.20137"	78° 23' 24.30672"	-9.935
NCWH_CORS	34° 16' 49.59009"	78° 42' 59.33174"	-2.274
P779_CORS	35° 12' 06.96421"	82° 52' 20.92282"	880.18
SCGP_CORS	34° 56' 15.68837"	82° 13' 57.26865"	279.47
SCHY_CORS	33° 56' 23.73657"	78° 44' 06.88299"	-15.97
SCSR_CORS	33° 55' 22.01095"	80° 20' 26.57980"	36.625
SCUN_CORS	34° 45' 58.60562"	81° 38' 55.69929"	169.798

Timeline

Lidar data for Lot 6 was collected from January 1, 2020 through February 3, 2020. Acquisition specifications are listed in the table below. An initial quality control process was immediately performed on to review the data coverage, airborne GPS data, and trajectory solution.

For more information, see the Flight Logs in Appendix 1.

Table 2-4. Project Acquisition Specifications

Settings	Leica TerrainMapper
Max. Number of Returns	15
Nominal Point Spacing	2 m
Nominal Point Density	0.71 ppsm
Flying Height Above Ground Level	2,500 m
Flight Speed	150 knots
Scan Angle	40°
Scan Rate Used	90 Hz
Pulse Rate Used	600 kHz
Multi-Pulse in Air	Enabled
Swath Width	1,820 m
Swath Overlap	25%

Acquisition Quality Assurance

Woolpert developed a quality assurance and validation plan to ensure the acquired lidar data meets the USGS Base Specification Version 1.3. For quality assurance purposes, the lidar data was processed immediately following acquisition to verify the coverage has appropriate density, distribution, and no unacceptable data voids. Accompanying GPS data was post processed using differential and Kalman filter algorithms to derive a best estimate of trajectory. The quality of the solution was verified to be consistent with the accuracy requirements of the task order. Any required re-flights were scheduled at the earliest opportunity.

The spatial distribution of the geometrically usable first return lidar points was reviewed for density requirements as well as regular and uniform point distribution - verifying the lidar data is spaced so that 90% of the cells in a 2*NPS grid placed over the data contain at least one lidar point. The NPS assessment is made against single swath, first return data located within the geometrically usable center portion (typically ~90%) of each swath. Additionally, the data was reviewed for unacceptable data voids – verifying no area greater than or equal to $(4 \times ANPS)^2$ exhibited data coverage gaps.

3. Processing

Processing Summary

Once the lidar data passed initial QC, the dataset was corrected for aircraft orientation and movement. This process used airborne inertial, orientation, and GPS data collected during acquisition along with ground-based GPS data. The data went through a geometric calibration that further corrected each laser point. This calibrated data set was used to create the LAS point cloud. The LAS point data was initially classified into "ground" and "non-ground", then further refined using the classes specified in this task order. Breaklines were drawn to denote hydrological features. After the hydro-flattening process, the final deliverables products were created.

GNSS-IMU Trajectory Processing

Kinematic corrections for the aircraft position were resolved using aircraft GPS and static ground GPS (1-Hz) for each geodetic control (base station) for three subsystems: inertial measurement unit (IMU), sensor orientation information, and airborne GPS data.

Post-processing of the IMU system data and aircraft position with attitude data was completed to compute an optimally accurate, blended navigation solution based on Kalman filtering technology, or the smoothed best estimate of trajectory (SBET).

Software: POSPac Software v. 5.3, IPAS Pro v.1.35., Novatel Inertial Explorer v8.60.6129

Trajectory Quality

The GNSS trajectory and high-quality IMU data are key factors in determining the overall positional accuracy of the final sensor data. Within the trajectory processing, there are many factors that affect the overall quality, but the most indicative are the combined separation, the estimated positional accuracy, and the positional dilution of precision (PDOP).

Combination Separation

Combined separation is a measure of the difference between the forward-run and the backward-run solution of the trajectory. The Kalman filter was processed in both directions to remove the combined directional anomalies. In general, when these two solutions match closely, an optimally accurate and reliable solution is achieved.

The data for this task order was processed with a goal to maintain a combined separation difference of less than ten (10) centimeters.

Estimated Positional Accuracy

Estimated positional accuracy plots the standard deviations of the east, north, and vertical directions along a time scale of the trajectory. It illustrates loss of satellite lock issues, as well as issues arising from long baselines, noise, and/or other atmospheric interference.

PDOP

The PDOP measures the precision of the GPS solution in regard to the geometry of the satellites acquired and used for the solution.

The data for this task order was processed with a goal to maintain an average PDOP value below 3.0. Brief periods of PDOP over 3.0 are acceptable due to the calibration and control process if other metrics are within specification.

Geometric Calibration

After the initial phase was complete, a formal reduction process was performed on the data. Laser point position was calculated by associating the SBET position to each laser point return time, scan angle, intensity, etc. Raw laser point cloud data was created for the whole project area in LAS format. Automated line-to-line calibrations were then performed for system attitude parameters (pitch, roll, heading), mirror flex (scale) and GPS/IMU drift. Statistical reports were generated for comparison and used to make the necessary adjustments to remove any residual systematic error.

Software: Proprietary Software, TerraMatch v20, Leica CloudPro 1.2.4

Lidar Data Classification

LAS data was classified as ground and non-ground points with additional filters created to meet the task order classification specifications. Statistical absolute accuracy was assessed via direct comparisons of ground classified points to ground RTK survey data. Based on the statistical analysis, the lidar data was then adjusted to reduce the vertical bias when compared to the survey ground control of higher accuracy.

Calibrated LAS files were imported into the task order tiles and initially filtered to create a ground and non-ground class. Then additional classes were filtered as necessary to meet the following client-specified classes:

- Class 1 Default / Processed, but not Classified
- Class 2 Bare Earth Ground
- Class 7 Low Noise
- Class 9 Water
- Class 17 Bridge Decks
- Class 18 High Noise
- Class 20 Ignored Ground

Classified LAS files were evaluated through a series of manual QA/QC steps as well as a peer-based review to eliminate remaining artifacts from the ground class. This included a review of the DEM surface to remove artifacts and ensure topographic quality.

Software: Proprietary Software, TerraScan v20

Hydrologic Flattening

The lidar task order required compilation of breaklines defining the following types of water body features:

Lakes, reservoirs, ponds	Minimum of 2-acres or greater
	Compiled as closed polygons, collected at a constant elevation
Rivers, streams	Nominal width of 30.5 meters / 100 feet
	Compiled in direction of flow, with both sides maintaining an equal elevation gradient
Bridge breaklines	Breaklines used to enforce a logical terrain surface below a bridge

Woolpert utilized the following steps to hydrologically flatten the water bodies and for gradient hydrologic flattening of the double line streams within the existing lidar data:

- 1. The newly acquired lidar data was utilized to manually compile the hydrologic features in a 2D environment using the lidar intensity and bare earth surface. Open Source imagery was used as reference when necessary.
- 2. An integrated software approach was applied to combine the lidar data and 2D breaklines. This process "drapes" the 2D breaklines onto the 3D lidar surface model to assign an elevation. A monotonic process is performed to ensure the streams are consistently flowing in a gradient manner. A secondary step within the program verifies an equally matching elevation of both stream edges. The breaklines that characterize the closed water bodies are draped onto the 3D lidar surface and assigned a constant elevation at or just below ground elevation.
- 3. All classified ground points from inside the hydrologic feature polygons were reclassified to water, class nine (9).
- 4. All classified ground points were reclassified from within a buffer along the hydrologic feature breaklines to buffered ground, class twenty (20). The buffer distance was approximately the task order designed nominal pulse spacing distance.
- 5. Breaklines used for bridge removal during the hydrologic flattening were included with the hydrologic breakline geodatabase deliverable. The purpose of these breaklines is for a more aesthetically pleasing DEM appearance.
- 6. The lidar ground points and breaklines were used to generate a digital elevation model (DEM).
- 7. QA/QC for this task was performed by reviewing the hydrologically flattened DEM and hydrologic breakline features. Additionally, a combined approach utilizing commercial off the shelf software and proprietary methods were used to review the overall connectivity of the hydrologic breaklines.

TerraScan was used to add the hydrologic breakline vertices and export the lattice models.

Breaklines defining the water bodies greater than 2-acres were provided as polygon features. Rivers and streams with a nominal minimum width of 30.5 meters (100 feet) were provided as polyline features. All lake and river breaklines compiled as part of the flattening process were provided in an Esri file geodatabase.

Breaklines used for DEM generation were provided as point features in Esri shapefile format.

Software: TerraScan v20, TerraModeler v20, Esri ArcMap v10.7, LP360 v2019.1.30.4

Digital Elevation Model

TerraScan was used to add the hydrologic breakline vertices and export the lattice models. Class 2 (ground) lidar points in conjunction with the hydro breaklines and bridge breaklines were used to create 2-foot hydro-flattened bare-earth raster DEM files. Using automated scripting routines within ArcMap, a 32-bit floating point raster GeoTIFF file was created for each tile. Files were clipped to the data extent. Each surface is reviewed using Global Mapper to check for any surface anomalies or incorrect elevations found within the surface.

Software: TerraScan v20, Esri ArcMap v10.7, Global Mapper v20.0

Intensity Imagery

Lidar intensity data derived from the acquired lidar data was linearly rescaled from 16-bit intensity and provided as 2-foot pixel, 8-bit, 256 gray scale GeoTIFF format intensity imagery files. Files were clipped to the data extent.

Software: TerraScan v20, Esri ArcMap v10.7

Metadata

FGDC CSDGM/USGS MetaParser-compliant metadata was produced in XML format. The metadata includes a complete description of the task order client information, contractor information, project purpose, lidar acquisition and ground survey collection parameters, lidar acquisition and ground survey collection dates, spatial reference system information, data processing including acquisition quality assurance procedures, GPS and base station processing, geometric calibration, lidar classification, hydrologic flattening, intensity imagery development, and final product development.

Other metadata deliverables included Esri shapefiles of the ground control and QA/QC points and delivery tile index. A georeferenced, polygonal representation of the detailed extents of each acquired lidar swath was produced as a polygon feature class in an Esri file geodatabase. A height separation raster was produced in GeoTIFF format. Inter-swath and intra-swath test results were provided in Esri shapefile format.

4. Accuracy Assessment

Horizontal Accuracy

The data sets was produced to meet ASPRS "Positional Accuracy Standards for Digital Geospatial Data" (2014) for a 18.6 cm RMSEx / RMSEy Horizontal Accuracy Class which equates to Positional Horizontal Accuracy = +/- 45.5 cm at a 95% confidence level.

Raw Lidar Swath Testing

This project required the lidar point cloud swath to be produced to meet a Non-Vegetated Vertical Accuracy (NVA) value of 19.6 cm at a 95% confidence level using an RMSEz target value of 10 cm x 1.9600.

Digital Elevation Model Testing

This project required DEM data to be produced to meet a Non-Vegetated Vertical Accuracy (NVA) value of 19.6 cm at a 95% confidence level using an RMSEz target value of 10 cm x 1.9600 and a Vegetated Vertical Accuracy (VVA) value of 0.30 cm at the 95th percentile error.

Appendix 1: Flight Logs

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95	N		18:11:00	18:1	.8:00	00:0	7:00	1	.7	1.3							
94	S		18:20:00	18:2	7:00	00:0	7:00	1	.7	1.2							
93	N		18:30:00		7:00	00:0		1	.7	1.2							
92	S		18:40:00		6:00	00:0			.7	1.5							
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Crew Pilot LaRocque Operator Kennedy Wind Dir (°) 280 Air Speed (k 150 Point Spacing (m 0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	ue cor dy (kts) (m) Po Direction	Vind Speed (kts) 4 Altitude 8,2 Point Density (pp on Start Time (UTC) 14:32:00	rcraft Make Cessna 404 T nsor Make / eica Terrain N Visibility 10 AGL (ft) cosm) Sca End Time (UTC) 14:49:00	ment / Model / Ta itan - N7079 Model / Ser Mapper - 905 (mi) Ceil	iil # F ial # 513 Conditio ing (ft) C e MSL (ft) .652 Setting V (°) Sc	Hobbs St 2498.2 Hobbs E 2503.8 loud Cover Clear Airfield Ele 1,0 s an Frequency 90	Time art Local Company	e al Start :09:00 cal End :47:00 Dew se Rate (UTC Start 14:09:00 UTC End 19:47:00 Point (°C) -3	Pr	Departing GMU Arriving GMU ressure ("Hg) 30.22
Pilot LaRocque Operator Kennedy Wind Dir (°) 280 Air Speed (k 150 Point Spacing (m 0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	ue dy Win (kts) Direction	Vind Speed (kts) 4 Altitude 8,2 Point Density (pp on (UTC) 14:32:00	rcraft Make Cessna 404 T nsor Make / eica Terrain N Visibility 10 AGL (ft) 200 End Time (UTC) 14:49:00	/ Model / Ta itan - N7079 Model / Ser Mapper - 905 (mi) Ceil Altitud 8 an Angle/FO 40 Time On-Line	Condition ing (ft) Condition in Co	2498.2 Hobbs E 2503.8 oud Cover Clear Airfield Ele 1,0 s an Frequency 90	Temp. (°C 0 evation (ft) 0 (Hz) Pu	al Start :09:00 :47:00 Dew	14:09:00 UTC End 19:47:00 Point (°C) -3	Pr	Departing GMU Arriving GMU ressure ("Hg) 30.22
LaRocque Operator Kennedy Wind Dir (°) 280 Air Speed (k 150 oint Spacing (m 0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	we dy Windows (kts) (m) Population S	Vind Speed (kts) 4 Altitude 8,2 Point Density (pp on (UTC) 14:32:00	Cessna 404 T nsor Make / eica Terrain N Visibility 10 AGL (ft) 200 Sca End Time (UTC) 14:49:00	Model / Ser Mapper - 905 (mi) Ceil Altitud 8 an Angle/FO 40 Time On-Line	Condition ing (ft) Condition in Co	2498.2 Hobbs E 2503.8 oud Cover Clear Airfield Ele 1,0 s an Frequency 90	2 09 nd Lo 3 14 Temp. (°C 0 evation (ft) 048	:09:00 cal End :47:00) Dew se Rate (14:09:00 UTC End 19:47:00 Point (°C) -3	Pr	GMU Arriving GMU ressure ("Hg) 30.22
Operator Kennedy	(kts) Oirection	Vind Speed (kts) 4 Altitude 8,2 Point Density (pp on (UTC) 14:32:00	Visibility 10 AGL (ft) cosm) Sca	Model / Ser Mapper - 905 (mi) Ceil Altitud 8 an Angle/FO 40 Time On-Line	Conditioning (ft) Conditioning	Hobbs E 2503.8 ns oud Cover Clear Airfield Ele 1,0 s an Frequency 90	Temp. (°C 0 evation (ft) 048	cal End :47:00 Dew se Rate (UTC End 19:47:00 Point (°C) -3	Laser	Arriving GMU ressure ("Hg) 30.22 Power (%)
Wind Dir (°) 280 Air Speed (k 150 260	(kts) (m) Population	Vind Speed (kts) 4 Altitude 8,2 Point Density (pp on Start Time (UTC) 14:32:00	Visibility 10 AGL (ft) 200 End Time (UTC) 14:49:00	(mi) Ceil Altitud 8 an Angle/FO 40 Time On-Line	Condition (ft) Condit	2503.8 ns loud Cover Clear Airfield Ele 1,0 s an Frequency 90	Temp. (°C 0 evation (ft) 048 (Hz) Pu	:47:00) Dew se Rate (19:47:00 Point (°C) -3	Laser	GMU ressure ("Hg) 30.22 Power (%)
Wind Dir (°) 280 Air Speed (k 150 Point Spacing (m 0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	(kts) (m) Po	Vind Speed (kts) 4 Altitude 8,2 Point Density (pp on Start Time (UTC) 14:32:00	Visibility 10 AGL (ft) 200 Scale End Time (UTC) 14:49:00	(mi) Ceil Altitud 8 an Angle/FO 40 Time On-Line	Conditioning (ft) Conditioning	Clear Airfield Ele 1,0 S an Frequency	Temp. (°C 0 evation (ft) 048 (Hz) Pu	Dew se Rate (Point (°C) -3	Laser	ressure ("Hg 30.22 Power (%)
Wind Dir (°) 280 Air Speed (k 150 coint Spacing (m 0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	(kts) (m) Po	Vind Speed (kts) 4 Altitude 8,2 Point Density (pp on Start Time (UTC) 14:32:00	Visibility 10 AGL (ft) 200 Scale End Time (UTC) 14:49:00	(mi) Ceil Altitud 8 an Angle/FO 40 Time On-Line	Conditioning (ft) Conditioning	Clear Airfield Ele 1,0 S an Frequency	Temp. (°C 0 evation (ft) 048 (Hz) Pu	Dew se Rate (Point (°C) -3	Laser	ressure ("Hg 30.22 Power (%)
280 Air Speed (k 150 Point Spacing (m 0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	(kts) (m) Po	Altitude 8,2 Point Density (pp on Start Time (UTC) 14:32:00	10 AGL (ft) 200 End Time (UTC) 14:49:00	Altitud 8 an Angle/FO 40 Time On-Line	e MSL (ft) 652 Setting V (°) Sc	Clear Airfield Ele 1,0 S an Frequency 90	0 evation (ft) 048 (Hz) Pu	se Rate (-3	Laser	30.22 Power (%)
280 Air Speed (k 150 Point Spacing (m 0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	(kts) (m) Po	Altitude 8,2 Point Density (pp on Start Time (UTC) 14:32:00	10 AGL (ft) 200 End Time (UTC) 14:49:00	Altitud 8 an Angle/FO 40 Time On-Line	e MSL (ft) .652 Setting V (°) Sc	Clear Airfield Eld 1,0 s an Frequency 90	0 evation (ft) 048 (Hz) Pu	se Rate (-3	Laser	30.22 Power (%)
Air Speed (k 150 Point Spacing (m 0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	(m) Po	Point Density (pp Start Time (UTC) 14:32:00	AGL (ft) 200 Sem) Sca End Time (UTC) 14:49:00	an Angle/FO 40 Time On-Line	Setting V (°) So	Airfield Eld 1,0 S an Frequency 90	evation (ft) 048 (Hz) Pu	600	kHz)		Power (%)
78	(m) Po	Point Density (pp Start Time (UTC) 14:32:00	End Time (UTC) 14:49:00	an Angle/FO 40 Time On-Line	Setting V (°) So	an Frequency	(Hz) Pu	600			
Point Spacing (m 0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	Direction	Point Density (pp on Start Time (UTC) 14:32:00	End Time (UTC) 14:49:00	an Angle/FO 40 Time On-Line	Setting V (°) So	an Frequency 90	(Hz) Pu	600			
0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	Direction	on Start Time (UTC) 14:32:00	End Time (UTC) 14:49:00	40 Time On-Line	V (°) Sc	90		600			
0.7 Line # Dir 78 77 76 75 74 73 72 71 70 69 68 67 66 65	Direction	on Start Time (UTC) 14:32:00	End Time (UTC) 14:49:00	40 Time On-Line		90		600			
78 77 76 75 74 73 72 71 70 69 68 67 66 65	S	(UTC) 14:32:00	(UTC) 14:49:00	Time On-Line	Satellite		Verify		efore Missi		100
78 77 76 75 74 73 72 71 70 69 68 67 66 65	S	(UTC) 14:32:00	(UTC) 14:49:00	On-Line	Satellite	PDOP	Verity	5-Turns B	setore Missi		
78 77 76 75 74 73 72 71 70 69 68 67 66 65	S	(UTC) 14:32:00	(UTC) 14:49:00	On-Line	Satellite	PDOP				UII	Yes
77 76 75 74 73 72 71 70 69 68 67 66 65				00.17.00		1 . 50.		Line	e Notes/Cor	nment	s
76 75 74 73 72 71 70 69 68 67 66 65	N	14:52:00		1 55.17.00	18	1.3					
75 74 73 72 71 70 69 68 67 66 65	• •		15:09:00	00:17:00	17	1.3					
74 73 72 71 70 69 68 67 66 65	S	15:12:00	15:29:00	00:17:00	21	1.2					
73 72 71 70 69 68 67 66 65	N	15:31:00	15:48:00	00:17:00	19	1.7					
72 71 70 69 68 67 66 65	S	15:51:00	16:07:00	00:16:00	19	1.3					
71 70 69 68 67 66 65	N S	16:10:00 16:29:00	16:27:00 16:45:00	00:17:00	22	1.1					
70 69 68 67 66 65		16:48:00	17:05:00	00:16:00	23	1.1					
69 68 67 66 65	S	17:08:00	17:24:00	00:17:00	20	1.1	so	ne overs	peeding nea	ar midd	lle of line
68 67 66 65		17:27:00	17:43:00	00:16:00	18	1.2	30	ne overs	pecanig nec	1111100	iic or iiiic
66 65	S	17:46:00	18:02:00	00:16:00	20	1.2					
65	N	18:05:00	18:21:00	00:16:00	19	1.4					
	S	18:24:00	18:39:00	00:15:00	19	14					
64	N	18:42:00	18:58:00	00:16:00	21	1.2					
	S	19:01:00	19:16:00	00:15:00	21	1.1					
63	N	19:19:00	19:35:00	00:16:00	18	1.3					
					+						
					1						
					+						
					+	 					
					Page 1		Verify	S-Turns A	After Missio	n	Yes

			1	<u>Wo</u>	<u>olp</u>	<u>ert</u>	Lid	<u>ar <i>F</i></u>	4cq	<u>uisitio</u>	n Lo	og					
				Pro	ject li	nfo								C	ate		
Project #			Project	Name	:				U	nique ID		Flight	: Date ((UTC)	Day o	f Year	Flight
80495		SC	Savannah Pe	e Dee	2019 B	19			Day	008_90513		01,	/08/20	20	00	08	
Cre	ew				Equip	ment						Time				Ai	rports
Pil	lot		Ai	rcraft I	Make ,	/ Mode	el / Tai	l #		Hobbs S	tart	Local	Start	UTC	Start	De	parting
Cost	anzo			Cessna	404 T	itan - N	17079F			2505.	3	11:5	2:00	16:52	2:00	(3MU
Oper	rator		Sei	nsor M	lake /	Model	/ Seria	al#		Hobbs E	ind	Loca	l End	UTC	End	Aı	riving
Kenr	nedy		Le	eica Te	rrain N	/lapper	- 9051	L3		2505.	2	15:4	9:00	20:49	9:00	(3MU
							C	onditi	ions								
Wind Dir	(°)	Wind	Speed (kts)	Visi	bility (mi)	Ceilir	ng (ft)	Clo	ud Cover	Temp	o. (°C)	Dew	Point	(°C)	Press	ure ("Hยู
270			11		10					Clear	1	.1		-6		3	0.34
Air Spe	ed (kts)	Altitude	AGL (f	t)	A	 ltitude	MSL (f	ft)	Airfield El	evation	ı (ft)					
15			8,2		•			552			048						
			- /-					Settin	gs								
Point Spacin	ng (m)	Poir	nt Density (pp	sm)	Sca	n Ang	le/FOV			n Frequency	(Hz)	Pulse	Rate ((kHz)	Las	er Pov	ver (%)
0.7	3 ()		/ (1-1-	,			0	•		90	· ,		600			100	
											Ve	rifv S-1	Turns B	efore	Missio		Yes
Line #	Direc	tion	Start Time	End ⁻		Tir	ne	Sate	llite	PDOP			Line No				
	2	,	(UTC)	(U	•	_	Line			. 50.							
62	S		17:15:00	17:3			7:00		8	1.1	_						rspeed
61	N		17:36:00	17:5			9:00		8	1.2	_						structed
60 59	S		17:58:00 18:16:00		2:00 5:00		4:00 9:00		8	1.2	(overspe	eeding,	start i	acetra	acking	iines
58	S		18:38:00		0:00		2:00	1		1.2			Racetr	ack so	uth fli	ght	
58	N		18:55:00		2:00		7:00		9	1.2				ight 58			
57	S	5	19:15:00	19:2			3:00	1	8	1.4			Racetr				
57	N	1	19:31:00	19:4	9:00	00:1	8:00	1	6	1.5			Refl	ight 57	7 nortl	h	
56	S		19:52:00	20:0			3:00	ļ	8	1.1			Racetr				
56	N		20:09:00	20:2	6:00	00:1	7:00		8	1.2	-			ight 56			
55	S	5	20:29:00					1	8	1.2		Line	e abort	ed, en	gine p	roblen	า
											+						
											\vdash						
												DO	60 NO	RTH AT	END	OF DA	Y
											-						
								Page	1		V	erify S-	Turns	After I	∕lissio	n	Yes

QL2 Block 1

Turbulence on all lines

			1	Woo	olp	ert	Lid	ar A	/cq	uisitio	n Lo	og					
				Pro	ject li	nfo								[Date		
Project #			Project	Name					U	nique ID		Flight	Date	(UTC)	Day o	f Year	Flight #
80495		SC	Savannah Pe	e Dee 2	019 B	19			Day	009_90513		01,	/09/20	20	00)9	
Cro	ew				Equip	ment			-	_		Time				Ai	rports
Pil	lot		Ai	rcraft N			l / Tai	l #		Hobbs S	tart	_	Start	UTC :	Start		parting
Cost	anzo			Cessna						2509.	2	09:2	0:00	14:2			GMU
One	rator			nsor Ma						Hobbs I		Loca		UTC			riving
•	nedy			eica Ter			-			2517.			5:00	22:2			GMU
Kem	icuy			ica ici	i dili iv	паррег		onditi	ons	2317.	<u> </u>	17.2	5.00	22.2	5.00	`	31410
Wind Dir	(° \	Wind	Speed (kts)	Vicik	oility (mil		ng (ft)		oud Cover	Tomi	o. (°C)	Dow	Point	(°C)	Drocc	ure ("Hg
50	()	wiiiu	10	VISIL	10	,,,,,,	Ceiiii	ig (it)	Cit	Clear		9	Dew	-2	()		30.6
	1 /1-4 -1			A C1 / (4				DACL //	· . \		1	_		-2			30.6
Air Spe		<u> </u>	Altitude)	Ai		MSL (f	π)	Airfield El		1 (π)					
15	50	8,200 8,652 1,048															
	, , ,			, ,			1- -	Settin				I			_		4
Point Spacin	ng (m)	Poir	nt Density (pp	sm)	Sca	n Angl	e/FOV	′ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las		wer (%)
0.7		40 90											600			100	
								-			Ve	rify S-1	Turns E	Before	Missi	on	Yes
Line #	Direc	tion	Start Time	End T	ime	Tin	ne	Sate	llite	PDOP			line N	otes/C	`omme	onts	
2	500		(UTC)	(UT	C)	On-l	Line	Juic		. 50.				0100, 0			
60	N		14:51:00	15:06		00:1		2		1.1		r	reflight	of day	/ 008 f	light	
55	S		15:09:00	15:25		00:1		1		1.4							
54	N		15:28:00	15:43		00:1		2		1.4							
53	S		15:49:00	16:05		00:1		2		1							
52	N		16:08:00	16:22		00:1		2		1.2	-						
51	S		16:27:00	16:42		00:1		2		1.1	-						
50	N		16:45:00	16:59		00:1		2		1.1							
49	S		17:04:00	17:19		00:1		1		1.3							
48	N		17:22:00	17:37		00:1		1		1.2							
47	S		17:41:00	17:56		00:1		1		1.2	-						
46 45	N		17:58:00 18:16:00	18:12 18:32		00:1 00:1		1	9	1.2	+						
45	S N		18:16:00	18:49		00:1		2		1.3	+						
43	S		18:53:00	19:08		00:1		1		1.2	+						
42	N		19:10:00	19:24		00:1		1		1.5	+						
41	S		19:29:00	19:44		00:1		1		1.5							
40	N		19:47:00	20:01		00:1		1		1.3							
39	S		20:05:00	20:20		00:1		2		1.1	+						
38	N		20:23:00	20:37		00:1		1		1.3	1						
37	S		20:41:00	20:56		00:1		2		1.4							
36	N		20:58:00	21:12		00:1		2		1.5							
35	S		21:15:00	21:30		00:1			0	1.2	İ						
34	N		21:33:00	21:46	5:00	00:1	3:00	2	0	1.2							
33	S		21:50:00	22:05	:00	00:1	5:00	2	0	1.2							
																	_
								Page	1		V	erify S-	Turns	After I	Missio	n	Yes

QL2 Block 1

Turbulence on all lines

				Wo	olp	ert	Lid	ar A	\cq	uisitio	n Lo	og					
				Pro	oject li	nfo								[Date		
Project #			Project	Name	•				U	nique ID		Flight	Date	(UTC)	Day o	f Year	Flight #
80495		SC	Savannah Pe	e Dee	2019 B	19			Day0	12 90511 A		01	/12/20	20	0	12	A
Cre	ew				Equip	ment			•			Time				Ai	ports
Pil	ot		Ai	rcraft		/ Mode	/ Tai	l #		Hobbs S	tart	Local	Start	UTC	Start		oarting
Gibi						itan - N				7485.	5		6:00	14:0			CAE
Oper						Model /				Hobbs I		Loca		UTC			riving
Naro						/lapper				7491.		_	5:00	20:1			CAE
INdic	ione		Lt	eica re	II alli iv	napper		onditi	000	7491.	0	05.1	.5.00	20.1	5.00	r	CAE
Min d Din	(0)	\ / ? l	C	\ /:-	· - • • • • • • • • • • • • • • • • •						T	- (96)	D		(96)	D	/!!!!=\
Wind Dir	(°) V	vina	Speed (kts)	VIS	ibility (mı)		ng (ft)		oud Cover	_	o. (°C)	Dew	/ Point	(°C)		ure ("Hg)
230			4		6			000		Broken		.9		1.8		3	0.24
Air Spe			Altitude		ft)	Alt		MSL (1	ft)	Airfield E		ո (ft)					
15	50		8,5	10				200		3	310						
								Settin	gs								
Point Spacin	ıg (m)	Poin	t Density (pp	sm)	Sca	ın Angle	/FOV	/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las	ser Pov	ver (%)
0.7						40)			90			600			100)
											Ve	rify S-	Turns E	3efore	Missi	on	
			Start Time	End	Time	Tim	ie										
Line #	Direction	on	(UTC)	(U	TC)	On-L	ine	Sate	llite	PDOP			Line N	otes/C	omm	ents	
17	N		14:44:00	14:5	2:00	00:08	3:00	2	4	1.1							
16	S		14:56:00	15:0	1:00	00:05	5:00	2	2	1.4							
15	N		15:07:00	15:1	4:00	00:07	7:00	2	2	1.4							
14	S		15:18:00	15:2	5:00	00:07	7:00	2	1	1.4							
13	N		15:29:00	15:3	6:00	00:07	7:00	2	2	1.2							
12	S		15:39:00	15:4	6:00	00:07	7:00	2	5	1.1							
11	N		15:51:00		9:00	00:08	3:00	2	3	1.2							
10	S		16:02:00		0:00	00:08			4	1.1							
9	N		16:13:00		1:00	00:08		2		1.1	 						
8	S		16:25:00		3:00	00:08			2	1.3	_						
7	N	_	16:36:00		3:00	00:07		2		1.2	+						
6	S		16:48:00	16:5		00:06			0	1.2	+-						
5 4	N S		16:57:00 17:08:00		3:00 4:00	00:06		1		1.3	+						
3	5 N		17:08:00		3:00	00:06		_	9 8	1.3	+-						
2	S		17:17:00		2:00	00:06			<u>8</u>	1.3	+						
1	N	\dashv	17:35:00		0:00	00:05		1		1.2	+						
18	S		17:46:00		4:00	00:18			0	1.2	+						
19	N		18:07:00		4:00	00:17			2	1	+						
20	S		18:27:00		5:00	00:18			1	1.1	+						
21	N		18:48:00		6:00	00:18			0	1.4							
22	S		19:09:00		7:00	00:18			8	1.5		System	froze.	. Senso	r thre	w an e	ror.
58	N		19:33:00	19:3	9:00	00:06	5:00	2	0	1.4		Flying to	shorter	lines in	case of	another	error
59	S		19:42:00	19:4	6:00	00:04	1:00	2	4	1.1		System	ı froze.	. Senso	r thre	w an e	ror.
								Page	1		٧	erify S	Turns	After I	Missio	n	

				Wo	olp	ert	Lid	ar A	Acq	uisitio	n Lo	og					
				Pro	oject li	nfo								[Date		
Project #			Project	Name	<u>, </u>				U	nique ID		Flight	t Date	(UTC)	Day o	f Year	Flight #
80495		SC	Savannah Pe	e Dee	2019 B	19			Day0	12 90511 B		01	/12/20	20	0	12	В
Cr	ew				Equip	ment			<u>, , , , , , , , , , , , , , , , , , , </u>			Time				Ai	rports
	lot		Ai	rcraft		/ Mode	l / Tai	l #		Hobbs S	tart	T	Start	UTC	Start		parting
	laro					itan - N				7485.			6:00	14:0			(CAE
	rator					Model /				Hobbs E		Loca		UTC			riving
-	done					/lapper				7491.			.5:00	20:1			CAE
IVal	Jone		Lt	eica re	II alli iv	napper		onditi		7491.	0	05.1	.5.00	20.1	5.00	ľ	CAE
Min d Din	/0\ \\	A /: al	C d /l.t.s\	\/:-	: h. : l : 4 /	/:\				and Carran	T	- (%C)	Davi	. Daint	1001	Dunna	(!!!!=\
Wind Dir	(*)	wina	Speed (kts)	VIS	ibility (mı)		ng (ft)		oud Cover	+ -	o. (°C)	Dew	/ Point	(°C)		ure ("Hg)
230			4		6			000		Broken		.9		1.8	_	3	0.24
	ed (kts)		Altitude		t)	Alt		MSL (f	t)	Airfield El		ı (ft)					
1.	50		8,5	10				200		3	10						
								Settin	gs								
Point Spacir	ıg (m)	Poin	t Density (pp	sm)	Sca	n Angle	e/FOV	′ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las		ver (%)
0.7						40)			90			600			100)
											Ve	rify S-	Turns E	3efore	Missi	on	
Line #	Directi	ion	Start Time	End	Time	Tim	ie	Sate	llite	PDOP			Line N	otes/C	`omm	onts	
Lille #	Directi	1011	(UTC)	(U	TC)	On-L	ine	Jaco	inte	FDOF			LIIIE IN	otes/ c	.01111111	EIILS	
17	N		14:44:00	14:5	2:00	90:08	3:00	2	4	1.1							
16	S		14:56:00		1:00	00:05	5:00		2	1.4							
15	N		15:07:00		4:00	00:07		2	2	1.4							
14	S		15:18:00		5:00	00:07		2		1.4	<u> </u>						
13	N	-	15:29:00		6:00	00:07		2		1.2	-						
12	S		15:39:00		6:00	00:07		2		1.1	-						
11	N	-	15:51:00		9:00	00:08		2		1.2	-						
10 9	S N	-	16:02:00 16:13:00		0:00	00:08		2	4	1.1	+						
8	S		16:25:00		3:00	00:08		2		1.3							
7	N	-	16:36:00		3:00	00:07		2		1.2							
6	S	\dashv	16:48:00		4:00	00:06			0	1.2	+						
5	N		16:57:00		3:00	00:06		1		1.3							
4	S		17:08:00	17:1	4:00	00:06		1	9	1.3							
3	N		17:17:00	17:2	3:00	00:06	5:00	1	8	1.3							
2	S		17:26:00	17:3	2:00	00:06		1	8	1.3							
1	N		17:35:00		0:00	00:05		1	9	1.2							
18	S		17:46:00		4:00	00:18			0	1.2							
19	N		18:07:00		4:00	00:17			2	1	-						
20	S		18:27:00		5:00	00:18			1	1.1	1						
21	N		18:48:00		6:00	00:18			0	1.4	-	Ca.t	. . .	C =	الحي		
22 58	S N		19:09:00 19:33:00		7:00 9:00	00:18			8 0	1.5 1.4	_					w an e	
58 59	S	-	19:33:00		6:00	00:06			4	1.4						w an e	
<u></u>	3	-	19.42.00	15.4	0.00	00.04	F.UU		-	1.1		System	111026.	. JE1150	, une	vv all e	101.
								Page	1		V	erify S-	-Turns	After I	Missin	n	
								. 450	_		· ·	y J	1 (1113	,		•••	

				Wo	olp	ert	Lid	ar A	\cq	uisitio	n Lo	og					
				Pro	ject li	nfo								[Date		
Project #			Project	Name	?				U	nique ID		Flight	Date	(UTC)	Day o	f Year	Flight #
80495		SC	Savannah Pe	e Dee 2	2019 B	19			Day0:	12_90513_A		01,	/12/20)20	01	L2	A
Cr	ew				Equip	ment			,			Time	•			Ai	rports
Pi	lot		Ai	rcraft I		/ Mode	el / Tai	l #		Hobbs St	art	Local	Start	UTC	Start		parting
N	ico					itan - N	-			2517.3		09:2			9:00		SMU
	rator					Model				Hobbs E		Loca			End		riving
•	/an					/lapper				2522		13:2			8:00		MU
ivy	ran		LC	ica re	i i a ii i iv	паррет		onditi	ions	2322		15.2	0.00	10.2	0.00	,	JIVIO
Wind Dir	. /º\	\\/ind	Speed (kts)	Vici	bility (mil		ng (ft)		ud Cover	Tomr	o. (°C)	Dov	/ Point	(°C)	Drocc	ure ("Hg)
210	()	vviiiu	4	VISI	10	,,,,,		00		cattered	_	.2	Dew	10	()		3024
	od (1:40)			ACI /6	_	Δ1			_					10			5024
-	ed (kts)	'	Altitude		r)	Al		MSL (1	11)	Airfield Ele		1 (11)					
1.	50		8,2	.UU			8,6			1,0	048						
Daile C	(-)	<u> </u>	+ D ' '					Settin			/1.1_\	D. 1	D-:	/L.L.			10()
Point Spacin	ng (m)	Poir	nt Density (pp	ism)	Sca	n Angl		(')	Sca	n Frequency	(HZ)	Pulse	Rate	(KHZ)	Las		ver (%)
0.7						4	0			90	_		600	_		100	
	-										Ve	rify S-1	Turns l	Before	Missic	on	Yes
Line #	Direc	tion	Start Time (UTC)	End 1 (U1		Tin On-I		Sate	llite	PDOP			Line N	otes/0	Comme	ents	
32	S		14:29:00	14:4	_	00:1		2	0	1.1							
31	N		14:47:00	15:0		00:1			0	1.3							
30	S		15:04:00	15:1		00:1		2		1.4							
29	N		15:21:00	15:3	4:00	00:1	3:00	2	1	1.4							
28	S		15:37:00	15:5	1:00	00:1	4:00	2	4	1.1							
27	N		15:54:00	16:0		00:1		2	2	1.2							
26	S		16:10:00	16:2		00:1		2		1.1							
25	N		16:26:00	16:3		00:1		2		1.3							
24	S		16:42:00	16:5		00:1		2		1.2							
23	N		16:58:00	17:1		00:1		1		1.3							
22 21	S N		17:12:00 17:27:00	17:2 17:3		00:1 00:1			9 8	1.2							
20	S		17:42:00	17:5		00:1		2		1.2							
19	N		17:55:00		4:00	00:0			0	1.1							
18	S		18:07:00		7:00	00:1			0	1.2							
17	N		18:20:00	18:2		00:0	8:00	2	0	1							
											 						
	 																
											-						
								Page	1		V	erify S-	Turns	After	Missio	n	Yes

				Wo	olp	ert	Lid	ar A	\cq	uisitio	n Lo	og					
				Pro	oject li	nfo									Date		
Project #			Project	Name	•				U	nique ID		Flight	Date	(UTC)	Day o	f Year	Flight #
80495		SC	Savannah Pe	e Dee	2019 B	19			Day0:	12_90513_B		01	/12/20	020	0:	12	В
Cre	ew				Equip	ment			,			Time	•			Ai	rports
Pi	lot		Ai	rcraft		/ Mode	el / Tai	l #		Hobbs St	art	Local	Start	UTC	Start		parting
Ni	со					itan - N	-			2522			5:00		5:00		GMU
	rator					Model				Hobbs E	nd		l End	ļ	End		riving
•	an					/lapper	-			2525.1			7:00		7:00		3MU
Т	an		L	ica ic	i i a ii i iv	паррет		onditi	ons	2323.	<u>.</u>	17.5	7.00	22.5	7.00	<u> </u>	31010
Wind Dir	(°)	Wind	Speed (kts)	Vic	ibility (mil		ng (ft)		oud Cover	Tomi	o. (°C)	Dov	/ Point	· (°C)	Drocc	ure ("Hg)
250	()	vviiiu	9	VIS	10	,1111,		00		cattered	_	21	Dew	9	. (C)		3023
	ad (lata)			ACI //		Λ.			_					9			3023
Air Spe		1	Altitude		IJ	Al		MSL (L)	Airfield Eld		1 (11)					
	50		8,2	UU				552		1,0	048						
Datat C	- ()	- ·	+ D ' '			0		Settin			/1.1-\	D. 1	D.:	/L.t. \			(c/)
Point Spacir	ig (m)	Poir	nt Density (pp	sm)	Sca	n Angl		(')	Sca	n Frequency	(HZ)	Pulse	Rate	(KHZ)	Las		ver (%)
0.7						4	0			90			600			100	
											Ve	rify S-	Turns l	Before	Missi	on	Yes
Line #	Direc	tion	Start Time (UTC)		Time TC)	Tir On-l		Sate	llite	PDOP			Line N	otes/0	Comm	ents	
16	S		20:35:00		5:00	00:1	0:00	2	1	1.4							
15	N		20:48:00	20:5	6:00	00:0	8:00	2	1	1.4							
14	S		21:00:00	21:0	8:00	00:0	8:00	2	1	1.2							
13	N		21:12:00		9:00	00:0	7:00	2		1.2							
12	S		21:22:00		0:00		8:00	2		1.2							
11	N		21:33:00		0:00	00:0		1		1.2							
10	S		21:44:00		1:00		7:00	2		1.1							
9	N S		21:54:00		0:00	00:0		2 1		1.2							
- 8 7	N		22:04:00 22:14:00		0:00	00:0		1		1.2							
6	S		22:14:00		9:00	00:0			8	1.3							
5	N		22:38:00		7:00		9:00	1		1.2							
4	S						-				N.	G. Sens	or erro	r/ Lase	r not co	mmuni	cating
													Reboo	ted/er	nded fl	ight	
										<u> </u>							
								Page	1		V	erify S	-Turns	After	Missio	n	Yes
Additional C	ommen	its															

				Wo	olp	ert	Lid	ar A	\cq	uisitio	n Lo	og					
				Pro	ject li	nfo								[Date		
Project #			Project	Name	•				U	nique ID		Flight	Date	(UTC)	Day o	f Year	Flight #
80495		SC	Savannah Pe	e Dee	2019 B	19			Day0:	16_90513_A		01,	/16/20)20	0	16	Α
Cr	ew				Equip	ment						Time				Ai	rports
Pi	lot		Ai	rcraft	Make /	′ Mode	l / Tai	l #		Hobbs St	art	Local	Start	UTC	Start	De	parting
Ni	со			Cessna	404 T	itan - N	17079F	:		2525.2	L	12:0	4:00	17:0	4:00	(3MU
Ope	rator		Sei	nsor N	lake / I	Model	/ Seria	al#		Hobbs E	nd	Loca	l End	UTC	End	Aı	riving
Ry	an		Le	eica Te	rrain N	1apper				2532		12:2	7:00	17:2	7:00	(3MU
								ondit									
Wind Dir	(°)	Wind	Speed (kts)	Vis	ibility (mi)	Ceilir	g (ft)	Clo	oud Cover	Temp	o. (°C)	Dew	/ Point	(°C)		ure ("Hg)
101			8		10		10	00	S	cattered	1	8		7		3	3030
-	ed (kts)		Altitude	AGL (1	t)	Al	titude	MSL (ft)	Airfield El	evation	(ft)					
1.	50		8,2	.00				552		1,0	048						
								Settin									
Point Spacir	ng (m)	Poin	t Density (pp	sm)	Sca	n Angl		' (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las		ver (%)
0.7						4	0			90			600			100	
	1										Ve	rify S-1	Turns l	Before	Missi	on	Yes
Line #	Direct	tion	Start Time (UTC)	•	ГС)	Tir On-	Line	Sate	ellite	PDOP			Line N	otes/C	Comm	ents	
4	S		17:04:00		8:00	00:0			8	1.2							
3	N		17:11:00	17:1		00:0			8	1.2							
2	S N		17:17:00 17:24:00	17:2 17:2		00:0			9	1.2							
	- 14		17.24.00	17.2	7.00	00.0	3.00			1.1							
		-															
		$\neg \neg$															
		-															
								Page	1		V	erify S-	-Turns	After I	Missio	n	Yes
Additional C	ommen	ts									-						

		•	Woo	olpe	ert	Lida	ar A	Acq	uisitio	n Lo	og					
			Pro	ject In	fo								[Date		
Project #		Project	Name					U	nique ID		Flight	Date	(UTC)	Day o	f Year	Flight #
80495		SC Savannah Pe	e Dee 2	2019 B1	L9			Day0	16_90511_A		01,	/16/20)20	0:	16	Α
Cr	ew			Equip							Time					rports
	lot		rcraft N				#		Hobbs St			Start				parting
	ilaro		Cessna						7491.8			5:00	13:3			CAE
	rator		nsor Ma						Hobbs E		Loca		UTC			riving
Naro	done	Le	eica Ter	rain M	apper				7498.8	3	03:3	6:00	20:3	6:00	ŀ	CAE
	(0)			/			onditi		1.0		(0.0)			(0.0)		/!!
Wind Dir	(°) Wi	ind Speed (kts)	Visit	bility (r	nı)	Ceiling			oud Cover		o. (°C)	Dew	/ Point	(°C)		ure ("Hg)
250	l (lata)	5	ACI /64	10		15,0			Broken		5		18	_		30.1
-	ed (kts) 50	Altitude	10	r)	Al	titude I 8,20		t)	Airfield Eld	evation 10	ι (π.)					
1.	30	0,3	510				Settin	σc	3	10			_	_	_	
Point Spacir	ng (m) P	oint Density (pp	sm)	Scar	n Angl	e/FOV		_	n Frequency	(Hz)	Pulse	Rate	(kHz)	las	ser Pov	ver (%)
0.7			,	3 001	4		` /	500	90	··-/	. 3.50	600	()	Luc	100	
										Ve	rify S-1		Before	Missi		
Line #	Direction	Start Time (UTC)	End T (UT		Tin On-l		Sate	ellite	PDOP		-		otes/C			
1	N	14:07:00	14:24	4:00			2	3	1.1			Cloud	ls Miles	3 23-3	5 In	
				\Box		-										
				+												
				$\overline{}$		\rightarrow										
				\longrightarrow		\rightarrow										
				\rightarrow		\rightarrow										
				$\overline{}$		\rightarrow										
							Doco	1		17	orifi. C	Tures	After I	Missis	<u> </u>	
Additional C	ommonto						Page	1		V	erriy 3-	-rurns	Aiteri	v115510	11	
Additional C	omments															

			1	Wo	olp	ert	Lid	ar A	\cq	uisitio	n Lo	og					
				Pro	oject I	nfo								l	Date		
Project #			Project	Name	•				U	nique ID		Flight	t Date	(UTC)	Day o	f Year	Flight #
80495		SC	Savannah Pe	e Dee	2019 E	319			Day0	16_90511_B		01,	/16/20)20	0	16	В
Cr	ew				Equip	ment						Time				Ai	rports
Pi	lot		Ai	rcraft	Make	/ Model	/ Tai	l #		Hobbs S	tart	Local	Start	UTC	Start		 parting
Gib	ilaro					itan - N				7491.	8	08:3	5:00		5:00		CAE
One	rator					Model /				Hobbs I		Loca			End		riving
•	done					/Japper				7498.		_	6:00	_	6:00		CAE
ivar	done			cica ic	TTGIIT I	ларрсі		onditi	ions	7430.		05.5	0.00	20.5	0.00		CAL
Wind Dir	. /0\	Mind	Speed (kts)	Vic	ibility	(mi)		g (ft)		oud Cover	Tom	p. (°C)	Dov	/ Point	· (°C)	Droce	ure ("Hg)
250	()	VVIIIU		VIS	10	(1111)				Broken		9. (C) 35	Dew	18	. ()		
			5	401.4				000				_		10	_		30.1
Air Spe)	Altitude		τ)	Alt		MSL (1	π)	Airfield El		n (π)					
1.	50		8,5	10			8,2] 3	310						
								Settin				I					
Point Spacir	ng (m)	Poir	nt Density (pp	osm)	Sca	an Angle		' (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las		wer (%)
0.7						40)			90	_		600			100)
											Ve	erify S-	Turns l	Before	Missi	on	
Line #	Direc	ction	Start Time (UTC)		Time TC)	Tim On-L	_	Sate	ellite	PDOP			Line N	otes/0	Comm	ents	
63	9	5	14:32:00	,	5:00			2	2	1.4							
62	N	1	14:45:00		6:00			2		1.4							
61	9	5	14:50:00	14:5	2:00	00:02	2:00	2	1	1.4							
60	N	J	14:56:00	14:5	9:00	00:03	3:00	2	1	1.4							
59	9	5	15:03:00	15:0	7:00	00:04	1:00	2	5	1.1							
58	N	J	15:10:00		5:00	00:05		2	5	1.1							
57	5		15:19:00		2:00	00:13		2		1	 						
56	N		15:36:00		0:00	00:14		2		1.2	-						
55	5		15:54:00		9:00	00:15		2		1	-						
54 53	N 9		16:12:00		8:00	00:16		2		1.1	+	System	Frozo	and k	المط ما	atiro n	
55	3	•	16:31:00	10:4	7:00	00:16	.00		<u> </u>	1.1	+	system		o CC ar		itire po	- Jwei
64	5	<u> </u>	17:03:00	17:0	5:00	00:02	2:00	2	1	1.2	+			o cc ai			
65	N		17:18:00		0:00	00:02			0	1.2	+-						
66	5		17:23:00		5:00	00:02		2		1.1	1						
67	N	ı	17:29:00		1:00	00:02		2		1.1	1						
68	5	5	17:34:00	17:3	6:00	00:02	2:00	2	0	1.4							
69	N		17:40:00		2:00	00:02		2	0	1.4							
70	5		17:45:00		7:00	00:02		2		1.2							
71	١		17:50:00		2:00	00:02		2		1.2							
72	5		17:55:00		6:00	00:01		2		1.2	1						
73	N		17:59:00		0:00	00:01			3	1.2	-						
74	5		18:04:00		5:00	00:01			3	1	+						
75	N	N .	18:08:00	18:0	9:00	00:01	.:00	2	4	1	+	SEE PA	GE 2 F		ספ בי	ICHT I	INIES
								Dage	1		_	erify S					INEO
								Page	1		V	erny 3	- rurns	Aiter	14112210	11	

			•	Wo	olp	ert	Lid	ar A	\cq	uisitio	n Lo	og					
				Pro	oject Ir	nfo			_						ate		
Project #			Project	Name	е				U	nique ID		Flight	Date	(UTC)	Day o	f Year	Flight #
80495		SC	Savannah Pe	e Dee	2019 B	19			Day0	16_90511_B		01	/16/20	20	1	.6	В
Cr	ew				Equip	ment						Time				Ai	rports
Pi	lot		Ai	rcraft	Make /	Mode Mode	el / Tai	l #		Hobbs S	tart	_	Start	UTC S		De	parting
Gib	laro				a 404 Ti					7491.		08:3	5:00	13:3			KCAE
•	rator				/lake / I		-			Hobbs E	ind	Loca	l End	UTC		Α	riving
Nar	done		Le	eica Te	errain N	1apper				7498.	8	03:3	6:00	20:3	6:00		KCAE
								onditi									
Wind Dir	(°) V	Vind	Speed (kts)	Vis	ibility (mi)		ng (ft)		oud Cover	_	o. (°C)	Dew	/ Point	(°C)		ure ("Hg)
250			5		0,010			000		Broken	_	5		18			30.1
	ed (kts)		Altitude		ft)	Α		MSL (f	t)	Airfield El		າ (ft)					
1.	50		8,5	10				200		0,	310						
								Settin				I					4-13
Point Spacir	ıg (m)	Poin	t Density (pp	sm)	Sca		le/FOV	/ (°)	Sca	n Frequency	(Hz)	Pulse	Rate	(kHz)	Las		ver (%)
0.7				_		4	10		_	90			600			10)
		_	- ·		1						Ve	erity S-	Turns I	Before	Missi	on	
Line #	Directi	on	Start Time (UTC)		Time TC)		me Line	Sate	llite	PDOP			Line N	otes/C	omm	ents	
52	N		18:15:00	_	33:00		8:00	2	2	1.2							
51	S	-	18:36:00		54:00		18:00	2		1.3							
50	N		18:57:00		L4:00		7:00	2		1.1							
49	S		19:17:00		34:00		7:00	2		1.2							
48	N		19:37:00	19:5	4:00	00:1	7:00	2	4	1.1							
47	S		19:57:00	20:1	L4:00	00:1	17:00	2	4	1.1							
		\dashv															
		\dashv															
											-						
		\dashv															
		-									-						
		-															
		\dashv															
								Page	2		٧	erify S	-Turns	After I	Vissio	n	
Additional C	omment	s									_						-

		,	Wool	pert	Lid	ar A	Acq	uisitio	n Lo	og					
			Projec	t Info								[Date		
Project #		Projec	t Name				U	nique ID		Flight	t Date	(UTC)	Day o	f Year	Flight #
80495		SC Savannah Pe	e Dee 201	9 B19			Day0	 17_90511_A			/17/20	-		17	A
Cre	ew		Equ	uipment						Time				Ai	rports
Pil	ot	Ai	ircraft Mal	e / Mod	el / Tai	l #		Hobbs St	art	Local	Start	UTC	Start	De	parting
Gibi	laro		Cessna 40	1 Titan - N	N404CP)		7498.8	3	08:3	88:00	13:3	8:00	ŀ	CAE
Opei	rator	Se	nsor Make	/ Model	l / Seria	al#		Hobbs E	nd	Loca	l End	UTC	End	Aı	riving
Naro			eica Terrai	•	-			7505.8	3	03:4	10:00	20:4	0:00		CAE
						ondit	ions								
Wind Dir	(°) Wi	nd Speed (kts)	Visibili	ty (mi)		ng (ft)		oud Cover	Temp	o. (°C)	Dew	/ Point	(°C)	Press	ure ("Hg)
340	· ·	12	10			000	S	cattered				-9			30.59
Air Spe	ed (kts)		AGL (ft)		ltitude			Airfield El	evation	(ft)					
	50		510	 ``		200	,		10	. ()					
1,	,,,	0,5	710			Settir	nge		10						
Point Spacin	g (m) D	oint Density (pr	nsm)	Scan Ang				n Frequency	(Hz)	Pulea	e Rate	(kH2)	Lac	er Pov	wer (%)
0.7	18 (111)	mit Density (p	33111)		10	()	Jea	90	(112)	ruise	600	(KI12)	Las	100	
0.7				4	+0			90	\/o	rify C		Before	Missi		,
		Chart Time	Ford Time						Ve	111y 3-	iuiiisi	belule	IVIISSI	UII	
Line #	Direction	Start Time (UTC)	End Time (UTC)		me ·Line	Sate	ellite	PDOP			Line N	otes/C	Comm	ents	
22	N	14:16:00	14:33:00		L7:00		:3	1.1							
23	S	14:36:00	14:54:00	00:1	18:00		!1	1.4							
24	N	14:57:00	45.20.00	2 00 4	17.00		1	1.1			Syste	m Froz	ze on I	ine	
24 25	N S	15:22:00 15:42:00	15:39:00 15:59:00		L7:00 L7:00		.2 .9	1 1							
26	N	16:02:00	16:20:00		18:00		.9 !1	1.1							
27	S	16:23:00	16:40:00		17:00		11	1.1		Pull c	off line	last tw	o mile	es. traf	fic.
30	N	16:54:00	17:11:00		17:00		20	1.1						20, 0. 0	
31	S	17:15:00	17:33:00		18:00		.8	1.2							
32	N	17:36:00	17:53:00	00:1	17:00	1	.8	1.3							
33	S	17:56:00	18:13:00		L7:00		.0	1.1							
34	N	18:17:00	18:34:00		L7:00		!1	1.1							
35	S	18:37:00	18:54:00		17:00		1	1.4							
36 37	N S	18:57:00 19:18:00	19:14:00 19:35:00		L7:00 L7:00		.4 .4	1.1							
38	N	19:18:00	19:55:00		17:00		. 4 !3	1.1							
39	S	19:58:00	20:15:00		L7:00		.5 .4	1.2							
-					-										
		+		+											
		+		+											
						Page	1	l .	\/.	erifv S.	-Turne	After I	Missin	n	
Additional C	omments					. 450	_			, 5					

			•	Wo	olp	ert	Lid	ar A	\cq	uisitio	n Lo	og					
				Pro	oject li	nfo									ate		
Project #			Project	t Name	•				U	nique ID		Flight	t Date	(UTC)	Day o	f Year	Flight #
80495		SC	Savannah Pe	e Dee	2019 B	19			Day0	17_90511_B		01	/17/20)20	0	17	В
Cro	ew				Equip	ment						Time		·		Aiı	rports
Pi	ot		Ai	rcraft	Make /	/ Mode	l / Tai	l #		Hobbs S	tart	Local	Start	UTC	Start	De	parting
Gibi	laro			Cessna	404 T	itan - N	1404CF)		7498.	8	08:3	8:00	13:3	8:00		CAE
Ope	rator		Sei	nsor N	lake /	Model	/ Seria	al#		Hobbs E	nd	Loca	l End	UTC	End	Ar	riving
•	done				rrain N		-			7505.	 8		0:00	20:4			CAE
								onditi	ons		_						
Wind Dir	(°)	Wind	Speed (kts)	Vis	ibility (mi)		ng (ft)		oud Cover	Tem	p. (°C)	Dew	/ Point	(°C)	Press	ure ("Hg)
340	`		12		10	,		000		cattered	_	7		-9	· -,		0.59
Air Spe	ed (kts	١	Altitude	AGI (ΔΙ		MSL (1		Airfield El							.0.55
15		,		510	,			200	,		10	(10)					
	,,,		0,5	,10				Settin	ac		10						
Point Spacir	(m)	Doir	nt Density (pp	ncm)	Sec	n Angl				n Frequency	/U-\	Dulce	Rate	(LU-)	Lac	or Dov	ver (%)
0.7	ig (III)	POII	it Delisity (pp)5111)	36			()	Sca		(п2)	Puise	600	(KIIZ)	Las		
0.7		_				4	U			90		:£ C .		Pofoso	Missi	100	,
			a =:								V	erify S-	Turns	beiore	IVIISSI	on	
Line #	Direc	tion	Start Time (UTC)		Time TC)	Tir On-	_	Sate	ellite	PDOP			Line N	otes/C	omm	ents	
22	N	I	14:16:00	14:3	3:00	00:1	7:00	2	3	1.1							
23	S	;	14:36:00	14:5	4:00	00:1	8:00		1	1.4							
24	Ν		14:57:00						1	1.1			Syste	m Froz	e on I	ine	
24	N		15:22:00		9:00	00:1			2	1							
25	S		15:42:00		9:00	00:1			9	1							
26 27	N S		16:02:00 16:23:00		0:00	00:1 00:1			1	1.1 1.1		Dulle	off line	lact tu	o mile	es, traff	Fi.c.
30			16:54:00		1:00	00:1			0	1.1		Pull C	JII IIIIe	iasi iw	O IIIII	25, tran	IC.
31	S		17:15:00		3:00	00:1			8	1.2							
32	N		17:36:00		3:00	00:1			8	1.3							
33	S	<u> </u>	17:56:00		3:00	00:1		2	0	1.1							
34	Ν		18:17:00		4:00	00:1		2	1	1.1							
35	S		18:37:00		4:00	00:1			1	1.4							
36	N		18:57:00		4:00	00:1			4	1.1	-						
37	S		19:18:00		5:00	00:1			4	1.2	+						
38 39	N S		19:38:00 19:58:00		5:00 .5:00	00:1 00:1			3	1.1	-						
33	3	•	15.36.00	20.1	.5.00	00.1	7.00		4	1.2							
											_						
														A.C			
Additional C								Page	1		V	erify S	- i urns	After I	VIISSIO	n	

				Wo	olp	ert	Lid	ar A	\cq	uisitio	n Lo	og								
Project Info													Date							
Project #			Project	Name					U	nique ID		Flight Date (UTC) Day of Year Flight								
80495		SC	Savannah Pe	e Dee 2	2019 B	19			Day	021_90513	01/21/2020 021									
Cr	ew				Equip	ment							Time Airports							
Pilot Aircraft Make / Mode								l #		Hobbs St	art	Local	Start	UTC :	Start	art Departing				
Ni	со		-	Cessna 404 Titan - N7079F								16:2	2:00	21:2	2:00	GMU				
Ope	rator		Sei	nsor M	ake / I	Model	/ Seria	al # Hobbs			nd 21		:22 UTC End		End	Arriving				
Ry	an		Le	eica Te	rrain N	1apper				2550.3	3	18:0	2:00	2:00	(SMU .				
								onditi												
Wind Dir	(°)	Wind	Speed (kts)	eed (kts) Visibility (mi) C				g (ft)	Clo	oud Cover	Temp	o. (°C)	Dew	/ Point						
350			6	10						Clear		3		-11		3	3038			
-	ed (kts)		Altitude AGL (ft)			Al		MSL (ft)	Airfield Ele	ı (ft)									
1:	50		8,2	.00			8,5			1,0	048									
								Settin												
Point Spacir	ıg (m)	Poin	t Density (pp	sm)	sm) Scan Angle/FO			(°) Scan Freque			(Hz) Pulse				ser Power (%)					
0.7						40				90			600			100				
		_									Ve	rify S-	Turns l	Before	Missi	on	Yes			
Line #	e # Direction		Start Time (UTC)	End Time (UTC)		Time On-Line		Satellite		PDOP			Line N	otes/C	Commo	ents				
28			21:22:00	21:39:00		00:17:00		21		1.2										
29 44	N S		21:42:00	21:59:00 22:22:00		00:17:00 00:16:00		20 21		1.2 1.1										
45	N		22:06:00 22:25:00	22:42:00		00:17:00		19		1.5										
46	S		22:46:00	23:02:00		00:16:00		21		1.3										
			•					Page	1		V	erify S	-Turns	After I	Vissio	n	Yes			
Additional C	ommen	ts																		

				Wo	olp	ert	Lid	ar A	A cq	uisitio	on L	og								
Project Info												Date								
Project #			Project		•				U	nique ID		Flight Date (UTC) Day of Year Flight #								
80495		SC	Savannah Pe	e Dee	2019 B	19			Day	026_90513	01/26/2020 026									
Cr						Time Airp														
Pi	lot		Ai	rcraft Make / Model / Tail				il # Hobbs St			Start	Local	Start UTC Start			De	parting			
Cost	anzo			Cessna	404 T	itan - N	17079F	2558.3			3.3	3 09:2		:00 14:24:00		k	CAE			
Ope	rator		Sei	Sensor Make / Model / Seria						al # Hobbs En				l End UTC End		Ar	riving			
Nard	done		Le	eica Te	rrain N	/lapper	· - 9051	13 2562.7			2.7	7 01:48		3:00 18:48:00		k	CAE			
							C	onditi	ons											
Wind Dir	(°)	Wind	Speed (kts)	Visi	ibility ((mi)	Ceilir	ng (ft)	Clo	ud Cover	Tem	p. (°C)	Dew	/ Point	(°C)	Press	ure ("Hg)			
280			4		10		25,	000	So	cattered		2		0		3	0.04			
Air Spe	ed (kts)	Altitude	AGL (f	t)	A	ltitude	MSL (1	ft)	Airfield	Elevatio	n (ft)								
1!	50		8,2	.00			8,5	510			310									
								Settin	gs											
Point Spacir	ng (m)	Poir	nt Density (ppsm) Sca			an Angle/FOV (°)			Sca	n Frequenc	y (Hz)	Pulse	Rate	(kHz) Las		ser Power (%)				
0.7							40			90			600	100)			
											V	erify S-	Turns E	Before	Missi	on				
Line #	Direction Start Time (UTC)				Tir On-	■ Satellite		ellite	PDOP		Line Notes/Comments									
43	43 N		14:53:00	15:11:00		00:18:00		24		1										
42			15:15:00	15:31:00		00:16:00		20		12										
41	N S		15:34:00 15:56:00	15:53:00 16:12:00		00:19:00				1.2	_									
40] 3)	15.56.00	16.12.00		00.16.00		20		1.2										
											_									
											+									
											_									
											+									
											_									
											_									
											+									
								Page	1		1	/erify S-	-Turns	After N	/lissio	n				
Additional C	ommer	nts						0,				, -								

Nardone

				<u>W</u> o	olp	ert	<u>Lid</u>	ar A	<u> 1cq</u>	uisitio	n Lo	og								
Project Info												Date								
Project #	Project Name								U	nique ID		Flight Date (UTC) Day of Year Flig								
80495		SC	Savannah Pe	e Dee	2019 B	19			Day	034_90511		02/03/2020 034								
Crew Equipment												Time Airp								
Pil	ot			Aircraft Make / Model / Tail						Hobbs Start							parting			
Fi					404 Ti					7547.					9:00	CAE				
•	rator			Sensor Make / Model / Seria						Hobbs E	nd Loca									
Ry	an		Le	eica Te	rrain N	1apper				7552.	3	13:1	9:00	18:1	9:00		CAE			
	(0)							onditi				(0.5)			(0.5)	_	/!!			
Wind Dir	(*)	Wind	Speed (kts)	Vis	ibility (mi)		ng (ft)		oud Cover	_	o. (°C)	Dew		Point (°C)		Pressure ("Hg			
0	1/1. \	. 1	0	101/	10			5				9 4		4		3	3006			
Air Spe		<u>'</u>	Altitude AGL (ft) 8,200			Al		MSL (π)		Airfield Elevation (1									
1:	50		8,2	.00				84 Sottin	are.	2	36									
Point Spacir	g (m)	Poin	t Density (ppsm) Sca			Setting an Angle/FOV (°)				n Frequency	(H ₂)	Pulce	Pulse Rate (kHz)		lac	ver (%)				
0.7	16 (111)	1011	int Density (ppsin)		300	40		() Scal		90	(112) Fuise		600		100					
0.7				40 9								rify S-1		Before	Missi		Yes			
Line # Direction			Start Time	End Time		Time		Satellite		PDOP		Line Notes/Comments								
Line # Direction			(UTC) (UTC)			On-Line														
27	7 N 14:49:00		15:08:00		00:1	0:19:00		21 1.1		BLOCK 2 reflight										
24	S 15:48:00		15:48:00	16:15:00		00.5	00:27:00		2	1.1			BLO	CK 10	refligh	ts				
23		N 16:19:00		16:43:00		00:24:00		18		1.5										
22	S		16:47:00	17:13:00		00:26:00		19		1.1	ŀ	heavy smoke half way/very small area					area			
7	S		18:10:00	18:19:00		00:09:00		20		1.1										
											_									
								Page	1		V	erify S-	-Turns	After	Missio	n	Yes			
Additional C	ommen	ıts						0-	=			, -				•				

QL2 Block 2 and 10