AIRBORNE LIDAR TASK ORDER REPORT



UNITED STATES GEOLOGICAL SURVEY NRCS LAUREL MS 0.7 NPS LIDAR

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PROJECT REPORT

USGS LAUREL MS 0.7M NPS LIDAR PROCESSING

WOOLPERT PROJECT #73741

For:

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SECTION 1: OVERVIEW

PROJECT NAME: USGS-NRCS LAUREL MS 0.7 NPS LIDAR

WOOLPERT PROJECT #73741

This report contains a comprehensive outline of the Laurel MS Lidar Processing task order for the United States Geological Survey (USGS). This task order requires lidar data to be acquired in two separate AOI's over 10 counties in Mississippi; Attala, Leake, Lexington, Montgomery, Scott, Smith, Webster Counties and a portion of Carroll, Choctaw and Jasper Counties and two counties in Alabama; Washington and Choctaw. The combined area of both AOI's is approximately 7,400 square miles. The lidar was collected and processed to meet a maximum Nominal Post Spacing (NPS) of 0.7 meters. The NPS assessment is made against single swath, first return data located within the geometrically usable center portion (typically ~90%) of each swath.

The data was collected using a Leica ALS70 and an Optech ALTM Gemini lidar sensor. Both sensors collect up to four returns (echo) per pulse, as well as intensity data, for the first three returns. If a fourth return was captured, the system does not record an associated intensity value. The aerial lidar was collected at the following sensor specifications:

ALS70 SPECIFICATIONS

Post Spacing (Minimum):	2.3 ft / 0.7m
AGL (Above Ground Level) average flying height:	6,500 ft / 1,981 m
MSL (Mean Sea Level) average flying height:	variable
Average Ground Speed:	150 knots / 173 mph
Field of View (full):	40 degrees
Pulse Rate:	272 kHz
Scan Rate:	42.3 Hz
Side Lap (Average):	25%

OPTECH ALTM GEMINI SPECIFICATIONS

Post Spacing (Minimum): AGL (Above Ground Level) average flying height: MSL (Mean Sea Level) average flying height: Average Ground Speed: Field of View (full): Pulse Rate: Scan Rate:	2.3 ft / 0.7m 5,000 ft / 1,524 m variable 130 knots / 149 mph 24 degrees 125 kHz 46 Hz
Scan Rate:	46 Hz
Side Lap (Average):	30%

The lidar data for this AOI was processed and projected in UTM, Zone 16N, North American Datum of 1983 (2011) in units of meters. The vertical datum used for the task order was referenced to NAVD 1988, GEOID12A, in units of meters.





SECTION 2: ACQUISITION

The existing lidar data was acquired with a Leica ALS70 500 kHz Multiple Pulses in Air (MPiA) lidar sensor system, on board a Cessna 404 and Cessna 310 aircraft. The ALS70 lidar system, developed by Leica Geosystems of Heerbrugg, Switzerland, includes the simultaneous first, intermediate and last pulse data capture module, the extended altitude range module, and the target signal intensity capture module. The system software is operated on an OC50 Operation Controller aboard the aircraft.

Table 2.1: ALS70 Lidar System Specifications

The ALS70 500 kHz Multiple Pulses in Air (MPiA) Lidar System has the following specifications:

	Specification
Operating Altitude	200 - 3,500 meters
Scan Angle	0 to 75° (variable)
Swath Width	0 to 1.5 X altitude (variable)
Scan Frequency	0 - 200 Hz (variable based on scan angle)
Maximum Pulse Rate	500 kHz (Effective)
Range Resolution	Better than 1 cm
Elevation Accuracy	7 - 16 cm single shot (one standard deviation)
Horizontal Accuracy	5 - 38 cm (one standard deviation)
Number of Returns per Pulse	7 (infinite)
Number of Intensities	3 (first, second, third)
Intensity Digitization	8 bit intensity + 8 bit AGC (Automatic Gain Control) level
MPiA (Multiple Pulses in Air)	8 bits @ 1nsec interval @ 50kHz
Laser Beam Divergence	0.22 mrad @ 1/e ² (~0.15 mrad @ 1/e)
Laser Classification	Class IV laser product (FDA CFR 21)
Eye Safe Range	400m single shot depending on laser repetition rate
Roll Stabilization	Automatic adaptive, range = 75 degrees minus current FOV
Power Requirements	28 VDC @ 25A
Operating Temperature	0-40°C
Humidity	0-95% non-condensing
Supported GNSS Receivers	Ashtech Z12, Trimble 7400, Novatel Millenium

Table 2.2: Optech ALTM Gemini Lidar System Specifications

The ALTM Gemini Multiple Pulses in Air (MPiA) Lidar System has the following specifications:

Specification				
Operating Altitude	150 - 4,000m AGL nominal, 10% reflective target			
Scan Angle	0 to 50° (variable)			
Swath Width	0 to 1.5 X altitude (variable)			
Scan Frequency	0 - 70 Hz (variable based on scan angle)			
Maximum Pulse Rate	167kHz			
Range Resolution	Better than 1 cm			
Elevation Accuracy	5 - 35 cm single shot (one standard deviation)			
Horizontal Accuracy	1/5,500 x altitude (m AGL)			
Number of Returns per Pulse	4 (first, second, third, last)			
Number of Intensities	3 (first, second, third)			
Intensity Digitization	12 bit dynamic measurement range			
Laser Beam Divergence	Dual Divergence: .25 mrad (1/e) and 0.8 mrad(1/e) nominal			
Laser Classification	Class IV laser product (FDA CFR 21)			
Eye Safe Range	400m single shot depending on laser repetition rate			
Roll Compensation	±5° at full FOV			
Power Requirements	28 VDC @ 35A			
Operating Temperature	0-40°C			
Humidity	0-95% non-condensing			

Prior to mobilizing to the project site, Woolpert flight crews coordinated with the necessary Air Traffic Control personnel to ensure airspace access.

Woolpert survey crews were onsite, operating multiple Global Navigation Satellite System (GNSS) Base Stations for the airborne GPS support.

The lidar data was collected in forty-one (41) separate missions, flown as close together as the weather permitted, to ensure consistent ground conditions across the project area.

An initial quality control process was performed immediately on the lidar data to review the data coverage, airborne GPS data, and trajectory solution. Any gaps found in the lidar data were relayed to the flight crew, and the area was re-flown.



Figure 2.1: Lidar Flight Layout: Laurel MS 0.7m NPS Lidar

Airborne Lidar Acquisition Flight Summary			
Date of Mission	Lines Flown	Mission Time (UTC) Wheels Up/ Wheels Down	Mission Time (Local = EDT) Wheels Up/ Wheels Down
January 7, 2014 - SensorOP108	1-12 Alabama	20:24-1:51	3:24PM-7:51PM
January 8, 2014 - SensorOP108_A	13-24 Alabama	15:15 - 20:37	10:15AM-3:24PM
January 8, 2014 - SensorOP108_B	25-26 Alabama	22:14-23:43	5:14PM - 6:43PM
January 9, 2014 - SensorOP108_A	27-28 Alabama	15:35 - 17:14	10:35AMPM - 12:14PM
January 9, 2014 - SensorOP108_B	28-39 Alabama	22:04 - 03:13	5:04PM - 10:13PM
January 11, 2014 - SensorOP108	40-51 Alabama	20:00 - 03:00	3:00PM - 10:00PM
January 12, 2014 - SensorOP108_A	52-63 Alabama	15:11 - 20:10	10:11AM - 3:10PM
January 12, 2014 - SensorOP108_B	8, 64-74 Alabama	21:15 - 02:04	4:15PM - 9:04PM
January 12, 2014 - SensorALS-7177	224-227,1-17 Mississippi	16:01 - 22:30	11:01AM - 6:30PM
January 14, 2014 - SensorOP108_A	75-86 Alabama	13:00 - 17:35	8:00AM - 12:35PM
January 14, 2014 - SensorOP108_B	87-102 Alabama	18:20 - 23:30	1:20PM - 6:30PM
January 14, 2014 - SensorALS-7177	17-36 Mississippi	15:46 - 23:01	10:46AM - 6:01PM
January 15, 2014 - SensorOP108	103-122,39 Alabama	20:10 - 01:15	3:10PM - 8:15PM
January 15, 2014 - SensorALS7177_A	37-44 Mississippi	15:37 - 18:30	10:37AM - 1:30PM
January 15, 2014 - SensorALS_7177_B	44 Mississippi	15:37 - 18:30	10:37AM - 1:30PM
January 16, 2014 - SensorOP108_A	103-106 Mississippi	15:55 - 18:15	10:55AM - 1:15PM
January 16, 2014 - SensorOP108_B	107-126 Mississippi	19:50 - 00:40	2:50PM - 7:40PM
January 17, 2014 - SensorOP108_A	127-140, 102-100 Mississippi	14:10 - 18:56	8:10AM - 12:56PM
January 17, 2014 - SensorOP108_B	99-92 Mississippi	20:12 - 23:55	3:12PM - 6:55PM
January 17, 2014 - SensorALS-7177	44-61 Mississippi	15:58 - 23:02	10:58AM - 6:02PM

Table 2.3: Airborne Lidar Acquisition Flight Summary

Airborne Lidar Acquisition Flight Summary			
Date of Mission	Lines Flown	Mission Time (UTC) Wheels Up/ Wheels Down	Mission Time (Local = EDT) Wheels Up/ Wheels Down
January 18, 2014 - SensorOP108_A	91-83 Mississippi	15:00 - 19:10	10:00AM - 2:10PM
January 18, 2014 - SensorOP108_B	82-76 Mississippi	19:50 - 23:30	2:50PM - 6:30PM
January 18, 2014 - SensorALS- 7108_A	61-55,31-53 Alabama	15:17 - 22:26	10:17AM - 5:26PM
January 18, 2014 - SensorALS- 7108_B	30-23 Alabama	15:17 - 22:26	10:17AM - 5:26PM
January 18, 2014 - SensorALS-7177	62-76 Mississippi	15:53 - 22:55	10:53AM - 5:55PM
January 19, 2014 - SensorOP108_A	75-65 Mississippi	14:15 - 19:30	9:15AM - 2:30PM
January 19, 2014 - SensorOP108_B	64-59 Mississippi	20:00 - 23:10	3:00PM - 6:10PM
January 19, 2014 - SensorALS-7108	22-1 Alabama	15:00 - 22:55	10:00AM - 5:55PM
January 19, 2014 - SensorALS-7177	77-95 Mississippi	16:13 - 22:50	11:13AM - 5:40PM
January 20, 2014 - SensorOP108	58-49 Mississippi	14:40 - 19:45	9:40AM - 2:45PM
January 20, 2014 - SensorALS-7108	111-129 Mississippi	16:51 - 21:58	11:51AM - 4:58PM
January 20, 2014 - SensorALS-7177	96-110,226 Mississippi	16:57 - 20:46	11:57AM - 3:46PM
January 21, 2014 - SensorOP108_A	103,48-38 Mississippi	14:20 - 19:55	9:20AM - 2:55PM
January 21, 2014 - SensorOP108_B	156,141-154,37-35,155 Mississippi	20:35 - 01:00	3:35PM - 8:00PM
January 21, 2014 - SensorALS-7108	130-146 Mississippi	15:12 - 20:46	10:12AM - 3:46PM
January 21, 2014 - SensorALS-7177	149-173,157 Mississippi	16:14 - 21:40	11:14AM - 4:40PM
January 22, 2014 - SensorALS-7177	174-175,228 Mississippi	19:52 - 21:06	2:52PM - 4:06PM
January 25, 2014 - SensorALS- 7108_A	42-44,123 Mississippi	17:12 - 19:12	12:12PM - 2:12PM
January 25, 2014 - SensorALS- 7108_B	44,4,1 Alabama	20:44 - 21:50	3:44PM - 4:50PM
February 15, 2014 - SensorOP108_A	1-18,36-34	18:02 - 22:53	1:02PM - 5:53PM
February 15, 2014 - SensorOP108_B	19-33 Mississippi	00:27 - 04:00	7:27PM - 11:00PM

SECTION 3: LIDAR DATA PROCESSING

APPLICATIONS AND WORK FLOW OVERVIEW

 Resolved kinematic corrections for three subsystems: inertial measurement unit (IMU), sensor orientation information and airborne GPS data. Developed a blending post-processed aircraft position with attitude data using Kalman filtering technology or the smoothed best estimate trajectory (SBET).

Software: POSPac Software v. 5.3, IPAS Pro v.1.35.

- Calculated laser point position by associating the SBET position to each laser point return time, scan angle, intensity, etc. Created raw laser point cloud data for the entire survey 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.
 Software: ALS Post Processing Software v.2.75 build #25, Dashmap v5, Proprietary Software, TerraMatch v. 14.01.
- 3. Imported processed LAS point cloud data into the task order tiles. Resulting data were 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.
 Software: TerraScan v.14.011.
- The LAS files were evaluated through a series of manual QA/QC steps to eliminate remaining artifacts from the ground class.
 Software: TerraScan v.14.011.

GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS)-INERTIAL MEASUREMENT UNIT (IMU) TRAJECTORY PROCESSING

EQUIPMENT

Flight navigation during the lidar data acquisition mission is 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.

The aircraft are all configured with a NovAtel Millennium 12-channel, L1/L2 dual frequency Global Navigation Satellite System (GNSS) receivers collecting at 2 Hz.

All Woolpert aerial sensors are equipped with a Litton LN200 series Inertial Measurement Unit (IMU) operating at 200 Hz.

A base-station unit was mobilized for each acquisition mission, and was operated by a member of the Woolpert acquisition team. Each base-station setup consisted of one Trimble 4000 - 5000 series dual frequency receiver, one Trimble Compact L1/L2 dual frequency antenna, one 2-meter fixed-height tripod, and essential battery power and cabling. Ground planes were used on the base-station antennas. Data was collected at 1 or 2 Hz.

Woolpert's acquisition team was on site, operating GNSS base stations, along with utilizing CORS stations.

The GNSS base station operated during the lidar acquisition missions are listed below:

Station	Latitude	Longitude	Ellipsoid Height (L1 Phase center)
Name	(DMS)	(DMS)	(Meters)
4R3 Airport	31°28'34.80705"	87°53'39.08557"	-16.355
1R8 Airport	30°52'19.57915"	87°49'09.05563"	40.204
ALCH CORS	31°27'03.54641"	88°11'45.15525"	24.221
5A6 Airport	33°28'09.84531"	89°43'43.51209"	84.366
MSBS CORS	31°58'11.97847"	89°15'53.56820"	94.128
LUL Airport	31°39'59.15016"	89°10'11.99644"	44.466
ALBU CORS	32°04'53.89579"	88°13'59.33200"	18.285
MEI Airport	32°20'08.32408"	88°44'36.30917"	60.643
MPE Airport	32°48'03.00580"	89°07'30.38851"	106.937
MSDC CORS	32°26'22.97118"	89°06'44.44342"	120.008

Table 3.1: GNSS Base Station

DATA PROCESSING

All airborne GNSS and IMU data was post-processed and quality controlled using Applanix MMS software. GNSS data was processed at a 1 and 2 Hz data capture rate and the IMU data was processed at 200 Hz.

TRAJECTORY QUALITY

The GNSS Trajectory, along with 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).

Combined Separation

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

Woolpert's goal is to maintain a Combined Separation Difference of less than ten (10) centimeters. In most cases we achieve results below this threshold.





Estimated Positional Accuracy

The 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.

Woolpert's goal is to maintain an Estimated Positional Accuracy of less than ten (10) centimeters, often achieving results well below this threshold.





PDOP

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

Woolpert's goal is 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.



Figure 3.3: PDOP, Day01814 SH7177_A

LIDAR DATA PROCESSING

When the sensor calibration, data acquisition, and GPS processing phases were complete, the formal data reduction processes by Woolpert lidar specialists included:

- Processed individual flight lines to derive a raw "Point Cloud" LAS file. Matched overlapping flight lines, generated statistics for evaluation comparisons, and made the necessary adjustments to remove any residual systematic error.
- 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 client specified classes.
- Once all project data was imported and classified, survey ground control data was imported and calculated for an accuracy assessment. As a QC measure, Woolpert has developed a routine to generate accuracy statistical reports by comparisons against the TIN and the DEM using surveyed ground control of higher accuracy. The lidar is adjusted accordingly to meet or exceed the vertical accuracy requirements.
- The lidar tiles were reviewed using a series of proprietary QA/QC procedures to ensure it fulfills the task order requirements. A portion of this requires a manual step to ensure anomalies have been removed from the ground class.
- The lidar LAS files are classified into the Default (Class 1), Ground (Class 2), Noise (Class 7), Water (Class 9), Ignored Ground (Class 10), Overlap default (Class 17), and Overlap Ground (Class 18) classifications.
- FGDC Compliant metadata was developed for the task order in .xml format for the final data products.

SECTION 4: HYDROLOGIC FLATTENING

HYDROLOGIC FLATTENING OF LIDAR DEM DATA

Laurel MS 0.7m NPS Lidar Processing task order required the compilation of breaklines defining water bodies and rivers. The breaklines were used to perform the hydrologic flattening of water bodies, and gradient hydrologic flattening of double line streams and rivers. Lakes, reservoirs and ponds, at a minimum size of 2-acres or greater, were compiled as closed polygons. The closed water bodies were collected at a constant elevation. Rivers and streams, at a nominal minimum width of 30.5 meters (100 feet), were compiled in the direction of flow with both sides of the stream maintaining an equal gradient elevation.

LIDAR DATA REVIEW AND PROCESSING

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. Woolpert used the newly acquired lidar data to manually draw 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. Woolpert utilizes an integrated software approach 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. The lakes, reservoirs and ponds, at a minimum size of 2-acres or greater and streams at a minimum size of 30.5 (100 feet) nominal width, were compiled to meet task order requirements. Figure 4.1 illustrates an example of 30.5 meters (100 feet) nominal streams identified and defined with hydrologic breaklines. The breaklines defining rivers and streams, at a nominal minimum width of 30.5 meters (100 feet), were draped with both sides of the stream maintaining an equal gradient elevation.
- 4. All ground points were reclassified from inside the hydrologic feature polygons to water, class nine (9).
- 5. All ground points were reclassified from within a buffer along the hydrologic feature breaklines to buffered ground, class ten (10).
- 6. The lidar ground points and hydrologic feature breaklines were used to generate a new digital elevation model (DEM).

Figure	4.	1
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Figure 4.2 reflects a DEM generated from original lidar bare earth point data prior to the hydrologic flattening process. Note the "tinning" across the lake surface.

Figure 4.3 reflects a DEM generated from lidar with breaklines compiled to define the hydrologic features. This figure illustrates the results of adding the breaklines to hydrologically flatten the DEM data. Note the smooth appearance of the lake surface in the DEM.



Figure 4.2



Terrascan was used to add the hydrologic breakline vertices and export the lattice models. The hydrologically flattened DEM data was provided to USGS in ERDAS .IMG format at a 1-meter cell size.

The hydrologic breaklines compiled as part of the flattening process were provided to the USGS as an ESRI shapefile. The breaklines defining the water bodies greater than 2-acres were provided as a PolygonZ file. The breaklines compiled for the gradient flattening of all rivers and streams at a nominal minimum width of 30.5 meters (100 feet) were provided as a PolylineZ file.

DATA QA/QC

Initial QA/QC for this task order was performed in Global Mapper v15, by reviewing the grids and hydrologic breakline features. Additionally, ESRI software and proprietary methods were used to review the overall connectivity of the hydrologic breaklines.

Edits and corrections were addressed individually by tile. If a water body breakline needed to be adjusted to improve the flattening of the DEM data, the area was cross referenced by tile number, corrected accordingly, a new DEM file was regenerated and reviewed.

SECTION 5: FINAL ACCURACY ASSESSMENT

FINAL VERTICAL ACCURACY ASSESSMENT

The vertical accuracy statistics were calculated by comparison of the unclassified lidar points to the ground surveyed quality check points.

Average error	0.041	meters
Minimum error	-0.030	meters
Maximum error	0.270	meters
Root mean square	0.066	meters
Standard deviation	0.053	meters

Table 5.1: Overall Vertical Accuracy Statistics

Table 5.2: Raw Swath Quality Check Point Analysis, FVA, UTM 16N, NAD83, NAVD88 GEOID12A, Laurel MS 0.7m NPS Lidar

Point ID	Easting (UTM meters)	Northing (UTM meters)	TIN Elevation (meters)	Dz (meters)
2001_L	303439.704	3734859.479	110.52	0.02
2002_L	246562.823	3727902.498	73.74	0.02
2003_L	294922.5	3713919.212	116.87	0.03
2004_L	257408.832	3706067.984	109	0
2005_L	231647.344	3709304.136	119.53	-0.03
2006_L	286614.346	3680362.94	153.04	0.01
2007_L	258256.386	3662957.391	142.1	0
2007A_L	256397.023	3666577.374	118.9	0.02
2008_L	230705.65	3681103.782	145.85	0.06
2009_L	279017.611	3650420.885	166.4	0
2010_L	241528.435	3647772.477	99.53	0.04
2011_L	204897.545	3654972.458	99.46	0.06
2012_L	281350.962	3631289.485	111.5	0.02
2013_L	247537.118	3624814.959	107.64	0.01
2014_L	274740.202	3591838.477	126.23	0.07

Point ID	Easting (UTM meters)	Northing (UTM meters)	TIN Elevation (meters)	Dz (meters)
2015_L	250112.856	3594119.722	117.93	0.02
2016_L	245943.822	3552314.921	134.68	0.27
2018_L	277691.214	3534868.249	153.91	0.08
2019_L	313913.619	3538389.159	159.99	0.08
2020_L	309576.888	3561458.768	127.06	0.07
2021_L	273311.232	3558039.802	124.29	0.04
2022_L	260785.236	3607149.882	129.1	0.02
2023_L	276310.321	3686447.209	121.62	0.04
2024_L	251168.148	3582597.08	137	0.02
2025_L	286712.792	3550493.374	129.6	0.1
2026_L	312578.262	3529550.615	97.82	0.07
2001	368089.536	3568114.547	89.1	0
2002	390036.497	3570689.537	58.9	0
2003	400814.934	3564100.128	32.76	0.02
2004	398080.761	3555444.935	21.77	0.03
2005	384497.796	3550719.731	48.23	0.01
2006	365629.448	3551122.583	137.44	-0.01
2007	367801.678	3530211.962	39.29	0.02
2008	388635.305	3527667.466	21.58	0.01
2009	362780.723	3517086.477	85.09	-0.02
2010	391686.72	3513444.089	12.91	0.01
2011	367337.925	3498877.614	88.36	0.17
2012	390391.504	3498030.015	56.78	0.04
2013	407588.463	3485507.863	40.4	0.09
2014	386318.273	3480204.269	47.14	0.06
2015	365544.26	3481537.506	71.79	0.01
2016	369979.798	3463943.949	71.28	0.1

Point ID	Easting (UTM meters)	Northing (UTM meters)	TIN Elevation (meters)	Dz (meters)
2017	388933.675	3467724.287	44.78	0.01
2018	401850.159	3461427.878	17	0.02
2019	403641.656	3451551.948	18.54	-0.02
2020	387795.12	3450774.119	67.66	0.13
2021	365661.039	3446049.96	86.85	0.11
2022	379147.276	3560097.131	52.82	0.07
2023	363545.509	3476263.145	74.88	0.05
2024	399539.257	3490376.998	77.95	-0.02

VERTICAL ACCURACY CONCLUSIONS

LAS Raw Swath Fundamental Vertical Accuracy (FVA) Tested 0.129 meters fundamental vertical accuracy at a 95 percent confidence level, derived according to NSSDA, in open terrain using (RMSEz) x 1.96000 as defined by the National Standards for Spatial Data Accuracy (NSSDA); assessed and reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the TIN.

Bare-Earth DEM Fundamental Vertical Accuracy (FVA) Tested 0.137 meters fundamental vertical accuracy at a 95 percent confidence level, derived according to NSSDA, in open terrain using (RMSEz) x 1.96000 as defined by the National Standards for Spatial Data Accuracy (NSSDA); assessed and reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the DEM.

SUPPLEMENTAL VERTICAL ACCURACY ASSESSMENTS

Point ID	Easting (UTM meters)	Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
3001_L	248777.249	3724603.693	77.97	0.073
3002_L	247726.178	3724482.791	86.88	0.019
3003_L	302755.607	3713181.712	130.26	0.029
3004_L	289456.596	3713561.763	119.1	0.015
3005_L	245827.762	3708774.519	121.9	0.005

Table 5.3: Quality Check Point Analysis, Urban, UTM 16N, NAD83, NAVD88 GEOID12A, Laurel MS 0.7m NPS Lidar

Point ID	Easting (UTM meters)	Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
3006_L	297814.105	3687770.204	159.2	0.039
3007_L	258322.255	3660690.1	144.96	0.071
3008_L	233640.403	3663164.053	80.84	0.021
3009_L	260335.080	3660136.585	120.87	0.031
3010_L	222327.603	3642560.168	72.35	0.083
3011_L	221703.411	3643385.436	78.51	0.109
3012_L	263674.687	3624855.686	110.72	0.084
3013_L	261196.542	3623890.581	108.61	0.106
3014_L	280206.771	3605823.661	125.76	0.025
3015_L	249676.268	3582547.791	147.85	0.091
3016_L	261805.576	3546962.095	164.46	0.065
3017_L	258463.897	3528675.999	88.39	0.011
3018_L	283474.118	3540301.91	133.15	0.097
3019_L	284641.463	3540444.121	131.16	0.07
3020_L	311726.630	3558115.168	117.09	0.088
3021_L	266432.284	3582265.408	149.22	0.042
3022_L	266805.673	3585062.094	140.85	0.063
3023_L	276384.329	3686416.905	123.94	0.05
3024_L	251116.883	3582600.852	138.31	0.031
3025_L	286698.702	3550426.482	128.52	0.143
3026_L	312393.692	3529804.691	102.48	0.065
3001	368101.266	3568144.701	90.71	0.234
3002	390024.011	3570724.245	59.2	0.058
3003	400800.797	3564099.93	32.46	0.005
3004	386135.359	3551013.767	39.34	0.008
3005	384500.105	3550695.187	48	0.055
3006	373863.446	3539852.887	49.3	0.133

Point ID	Easting (UTM meters)	Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
3007	362172.386	3533557.104	108.39	0.024
3008	374936.374	3527679.251	38.55	0.16
3009	374229.958	3515178.761	71.8	0.125
3010	391492.705	3513388.219	13.43	0.052
3011	367376.446	3498780.614	88.17	0.091
3012	391236.672	3501847.732	46.59	0.097
3013	407604.429	3485512.57	40.12	0.001
3014	402102.664	3478944.034	19.95	0.075
3015	380887.347	3481667.774	56.66	0.187
3016	369994.420	3463929.718	71.35	0.012
3017	383284.780	3469569.293	63.25	0.07
3018	401846.128	3459502.247	14.06	0.03
3019	404004.327	3451247.159	15.13	0.064
3020	386289.641	3449462.335	91.51	0.105
3021	380084.422	3446190.195	66.56	0.032
3022	379158.071	3560122.642	52.82	0.171
3023	380980.133	3482268.692	49.72	0.203
3024	399614.844	3490347.417	78.6	0.052

ACCURACY CONCLUSIONS

Urban Land Cover Classification Supplemental Vertical Accuracy (SVA) Tested 0.180 meters supplemental vertical accuracy at the 95th percentile in the Urban supplemental class reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the DEM. Urban Errors larger than 95th percentile include:

- Point 3001, Easting 368101.266, Northing 3568144.701, Z-Error 0.234 meters
- Point 3015, Easting 380887.347, Northing 3481667.774, Z-Error 0.187 meters
- Point 3023, Easting 380980.133, Northing 3482268.692, Z-Error 0.203 meters

Point ID	Easting (UTM meters)	Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
4001_L	303327.610	3734838.39	107.15	0.071
4002_L	247422.981	3726151.797	73.26	0.227
4002A_L	246615.768	3727846.769	73.42	0.024
4003A_L	269081.813	3703435.077	111.41	0.043
4003B_L	266728.979	3715608.755	117.19	0.034
4004A_L	268099.397	3705578.789	137.1	0.013
4004B_L	266576.699	3715586.457	118.52	0.045
4005_L	237197.603	3709130.496	103.57	0.095
4006_L	287354.029	3679709.811	142.45	0.075
4007_L	256377.618	3666063.477	108.26	0.085
4008_L	234113.293	3681027.214	104.98	0.019
4008A_L	236212.075	3677383.818	96.45	0.135
4009_L	277665.536	3651539.52	126.2	0.233
4010_L	230557.462	3648026.57	71.3	0.162
4011_L	202468.568	3655675.715	91.11	0.094
4012_L	281240.988	3631096.637	111.67	0.182
4013_L	246845.261	3624062.573	111.1	0.147
4014_L	274615.600	3591869.807	128.22	0.022
4015_L	250613.906	3592817.883	113.71	0.13
4016_L	246263.854	3551630.203	134.88	0.073
4017_L	256725.310	3528148.662	95.8	0.079
4018_L	279103.015	3535699.708	159.43	0.114
4019_L	309962.506	3541580.214	141.53	0.015
4020_L	309604.552	3561410.337	126	0.01
4021_L	272337.649	3558114.573	107.41	0.197

Table 5.4: Quality Check Point Analysis, Tall Weeds and Crops, UTM 16N, NAD83, NAVD88 GEOID12A, Laurel MS 0.7m NPS Lidar

Point ID	Easting (UTM meters)	Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
4021A_L	272323.720	3558085.331	107.04	0.117
4022_L	260753.668	3607133.379	128.71	0.081
4022A_L	261318.261	3606408.96	130.6	0.037
4023_L	274979.027	3686821.975	125.74	0.018
4024_L	254173.177	3583047.568	136.96	0.064
4025_L	286564.647	3552524.954	120.7	0.086
4026_L	313130.321	3529475.8	110.25	0.094
4001	369724.506	3568534.522	77.54	0.002
4002	390071.966	3569730.448	68.3	0.015
4003	398897.922	3564256.573	30.27	0.229
4004	396114.986	3554671.666	29.61	0.1
4005	379397.161	3559277.653	45.71	0.055
4006	369738.887	3549431.742	140.98	0.111
4007	367797.864	3530230.235	40.25	0.054
4008	388652.741	3527649.201	20.56	0.166
4009	366783.731	3515982.458	113.87	0.094
4010	388213.408	3515021.756	52.07	0.088
4011	375725.565	3498792.409	37.87	0.081
4012	390420.134	3498038.278	57.17	0.271
4013	408316.707	3485203.171	41.03	0.036
4014	390001.107	3479283.368	44.42	0.068
4015	365537.187	3481501.331	71.4	0.027
4016	369576.329	3464425.521	58.84	0.001
4017	389326.717	3465509.308	39.4	0.047
4018	403535.209	3461374.033	15.4	0.05
4019	403648.756	3451572.748	18.57	0.045
4020	387811.630	3450791.855	68.08	0.056

Point ID	Easting (UTM meters)	Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
4021	365653.672	3446063.363	86.98	0.092
4022	379181.231	3560131.956	52.36	0.139
4023	363570.772	3476239.093	74.78	0.117
4024	397710.399	3489710.133	59.46	0.014

ACCURACY CONCLUSIONS

Tall Weeds/Crops Land Cover Classification Supplemental Vertical Accuracy (SVA) Tested 0.228 meters supplemental vertical accuracy at the 95th percentile in the Tall Weeds/Crops supplemental class reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the DEM. Tall Weeds/Crops Errors exceeding the 95th percentile include:

- Point 4009_L, Easting 277665.536, Northing 3568144.701, Z-Error 0.234 meters
- Point 4003, Easting 398897.922, Northing 3481667.774, Z-Error 0.187 meters
- Point 4012, Easting 390420.134, Northing 3498038.278, Z-Error 0.271 meters

Point ID	Easting (UTM meters)	Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
5001_L	303026.991	3734881.394	102.05	0.263
5002_L	247396.877	3726227.672	73.22	0.112
5003_L	266892.277	3715563.682	117.64	0.189
5004_L	256186.394	3706936.427	108.45	0.123
5005_L	231744.925	3709351.004	122.12	0.05
5006_L	288219.914	3680826.513	160.44	0.12
5007_L	256389.516	3666095.384	108.27	0.146
5008_L	233098.173	3678392.168	129.49	0.011
5009_L	279009.398	3650435.773	166.93	0.077
5010_L	232181.004	3646762.15	73.31	0.123
5011_L	209363.221	3659081.165	106.5	0.147
5012_L	281217.550	3631071.627	111.88	0.286
5013_L	248473.698	3628986.53	108.51	0.211
5014_L	273326.071	3591231.546	137.79	0.043
5015_L	250613.607	3592773.882	113.87	0.185
5016_L	249133.467	3551442.083	120.27	0.166
5017_L	255260.338	3528145.793	117.46	0.206
5018_L	277147.838	3533893.776	142.77	0.177
5020_L	308760.760	3561424.798	131.47	0.203
5022A_L	264437.031	3607395.117	129.56	0.107
5022B_L	262731.178	3607655.407	140.98	0.138
5023_L	278400.841	3686273.114	139.95	0.04
5024_L	248005.657	3581706.067	132	0.14
5025_L	286976.751	3551625.547	123.02	0.112
5026_L	313095.834	3529484.282	110.28	0.036

Table 5.5: Quality Check Point Analysis, Brush Lands and Trees, UTM 16N, NAD83, NAVD88 GEOID12A, Laurel MS 0.7m NPS Lidar

Point ID	Easting (UTM meters)	Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
5001	366200.872	3568910.69	87.34	0.083
5002	389061.077	3567189.377	33.41	0.202
5004	398094.570	3555442.825	22.14	0.258
5005	388897.208	3551609.402	47.61	0.218
5006	371059.168	3553361.15	159.27	0.019
5007	367813.348	3530211.778	39.89	0.12
5008	388521.879	3527477.337	20.8	0.206
5009	366006.825	3515383.929	103.95	0.203
5010	388269.617	3515056.362	50.44	0.149
5011	375429.518	3499324.122	32.06	0.116
5012	391201.869	3501916.629	46.03	0.06
5013	407565.293	3485521.564	40.77	0.046
5014	386062.118	3479520.236	39.86	0.109
5015	370096.502	3484591.46	78.98	0.012
5016	369598.520	3464414.577	58.85	0.185
5017	389315.233	3465498.69	39.58	0.17
5018	403601.752	3461363.039	15.49	0.1
5019	403741.015	3451201.172	16.26	0.085
5020	387811.945	3450802.806	68.56	0.34
5021	366680.087	3446224.603	82.43	0.047
5022	379149.387	3560079.858	52.74	0.025
5023	363610.185	3476263.687	75.72	0.072
5024	398257.743	3489673.403	62.22	0.173

ACCURACY CONCLUSIONS

Brush Lands and Trees Land Cover Classification Supplemental Vertical Accuracy (SVA) Tested 0.261 meters supplemental vertical accuracy at the 95th percentile in the Brush Lands and Trees supplemental class reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the DEM. Brush Lands and Trees Errors larger than 95th percentile include:

- Point 5001_L, Easting 303026.991, Northing 3734881.394, Z-Error 0.263 meters
- Point 5012_L, Easting 281217.550, Northing 3631071.627, Z-Error 0.286 meters
- Point 5020, Easting 387811.945, Northing 3450802.806, Z-Error 0.340 meters

Point ID	Easting (UTM meters)	Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
6001_L	302217.644	3734837.491	106.56	0.136
6001A_L	302190.769	3734826.501	107.32	0.104
6002_L	245437.321	3729566.014	70.36	0.08
6002A_L	245414.554	3729548.367	70.47	0.089
6003_L	266587.139	3715548.307	118.48	0.011
6003A_L	266597.758	3715523.901	118.64	0.033
6004_L	254920.787	3706873.821	124.39	0.122
6004A L	254891.924	3706870.396	123.01	0.021
 6005 L	234605.468	3709329.845	84.69	0.104
 6005A L	234584.414	3709301.872	84.07	0.077
 6006 L	286579.418	3680783.384	157.93	0.017
	286582.584	3680849.827	160.77	0.036
6007 I	256334.953	3666687.256	121.89	0.003
6007A I	256340 267	3666716 046	121.43	0 168
6008 1	234608 084	3680942 249	116.2	0 117
6008A	234576 342	3680944 354	115 95	0.052
6009_L	277591.481	3651503.581	126.01	0.041

Table 5.6: Quality Check Point Analysis, Forested and Fully Grown, UTM 16N, NAD83, NAVD88 GEOID12A, Laurel MS 0.7m NPS Lidar

Point ID Easting (UTM meters)		Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
6009A_L	277595.195	3651531.439	126.11	0.062
6010_L	239754.883	3647164.907	88.03	0.061
6010A_L	239704.817	3647158.983	83.65	0.06
6011_L	206607.283	3656881.312	96.72	0.048
6011A_L	206607.106	3656863.495	96.13	0.061
6012_L	281206.815	3631099.982	110.76	0.157
6012A_L	281194.304	3631090.392	110.53	0.137
6013_L	247530.437	3624896.433	108.42	0.154
6013A_L	247541.195	3624945.269	108.66	0.189
6014_L	275504.473	3591686.032	120.59	0.016
6014A_L	275477.827	3591693.693	120.78	0.016
6015_L	250681.555	3592073.592	117.92	0.034
6015A_L	250676.739	3592105.736	118.12	0.052
6016_L	245100.077	3551459.905	103.74	0.017
6016A_L	245072.949	3551457.469	103.32	0.024
6017_L	258474.476	3528725.342	87.33	0.084
6017A_L	258510.404	3528709.648	87.4	0.129
6018_L	279988.157	3537778.142	152.29	0.123
6018A_L	280002.176	3537816.032	152.93	0.119
6019_L	309875.768	3541112.196	140.74	0.085
6019A_L	309865.410	3541082.318	140.87	0.143
6020_L	308893.558	3561479.256	128.78	0.073
6020A_L	308911.038	3561467.709	129.17	0.008
6021_L	274216.300	3558004.478	115.2	0.131
6021A_L	274226.814	3557974.613	114.86	0.028
6022_L	263947.380	3607296.019	133.53	0.153
6022A_L	263932.559	3607299.362	133.99	0.046

Point ID	Easting (UTM meters)	Northing (UTM meters)	DEM Elevation (meters)	Abs. Dz (meters)
6023_L	275536.568	3688667.023	136.29	0.037
6023A_L	275518.477	3688685.033	135.28	0.109
6024_L	254154.213	3582998.192	136.2	0.008
6024A_L	254206.183	3582955.973	136.09	0.11
6025_L	286369.986	3551405.958	126.74	0.011
6025A_L	286348.670	3551405.734	126.83	0.117
6026_L	312615.481	3529525.573	97.17	0.058
6027_L	312645.444	3529503.154	97.02	0.003
6001	367355.247	3568278.384	87.95	0.11
6002	390072.041	3570686.571	60.73	0.031
6003	401093.577	3563976.868	31.23	0.168
6004	398050.811	3555450.069	22	0.256
6005	388835.820	3551646.5	49.08	0.083
6006	364575.470	3550905.419	134.87	0.029
6008	388989.254	3527941.344	16.32	0.166
6010	390818.651	3511492.364	18.76	0.072
6011	367434.936	3498202.006	86.41	0.163
6012	383202.660	3500319.592	42.1	0.054
6013	408299.033	3485205.947	40.3	0.044
6014	386108.670	3479452.618	37.07	0.016
6015	370891.269	3484267.338	72.24	0.036
6016	370201.838	3463792.518	70.03	0.153
6017	390342.176	3463128.882	26.07	0.044
6018	401864.056	3461377.485	16.66	0.552
6019	403633.812	3451178.561	17.39	0.026
6022	380157.268	3561213.373	40.82	0.287
6022	380104.337	3561232.519	41.17	0.025

Point ID	Easting	Northing	DEM Elevation	Abs. Dz	
	(UTM meters)	(UTM meters)	(meters)	(meters)	
6023	365504.188	3481500.449	71.88	0.011	

ACCURACY CONCLUSIONS

Forested and Fully Grown Land Cover Classification Supplemental Vertical Accuracy (SVA) Tested 0.177 meters supplemental vertical accuracy at the 95th percentile in the Forested/Fully Grown supplemental class reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the DEM. Forested/Fully Grown Errors larger than 95th percentile include:

- Point 6013A_L, Easting 247541.195, Northing 3624945.269, Z-Error 0.189 meters
- Point 6004, Easting 398050.811, Northing 3555450.069, Z-Error 0.256 meters
- Point 6018, Easting 401864.056, Northing 3461377.485, Z-Error 0.552 meters
- Point 6022, Easting 380157.268, Northing 3561213.373, Z-Error 0.287 meters

CONSOLIDATED VERTICAL ACCURACY ASSESSMENT

ACCURACY CONCLUSIONS

Consolidated Vertical Accuracy (CVA) Tested 0.207 meters consolidated vertical accuracy at the 95th percentile level; reported using National Digital Elevation Program (NDEP)/ASPRS Guidelines and tested against the DEM. CVA is based on the 95th percentile error in all land cover categories combined.

- Point 3001, Easting 368101.266, Northing 3568144.701, Z-Error 0.234 meters
- Point 4003, Easting 398897.922, Northing 3564256.573, Z-Error 0.229 meters
- Point 4012, Easting 390420.134, Northing 3498038.278, Z-Error 0.271 meters
- Point 5004, Easting 398094.570, Northing 3555442.825, Z-Error 0.258 meters
- Point 5005, Easting 388897.208, Northing 3551609.402, Z-Error 0.218 meters
- Point 5020, Easting 387811.945, Northing 3450802.806, Z-Error 0.340 meters
- Point 6004, Easting 398050.811, Northing 3555450.069, Z-Error 0.256 meters
- Point 6022, Easting 380157.268, Northing 3561213.373, Z-Error 0.287 meters
- Point 4002_L, Easting 247422.981, Northing 37626151.797, Z-Error 0.227meters
- Point 4009_L, Easting 277665.536, Northing 3651539.520, Z-Error 0.233 meters
- Point 5001_L, Easting 303026.991, Northing 3734881.394, Z-Error 0.263 meters
- Point 5012_L, Easting 281217.550, Northing 3631071.627, Z-Error 0.286 meters
- Point 5013_L, Easting 248473.698, Northing 3628986.530, Z-Error 0.211 meters
- Point 6018, Easting 401864.056, Northing 3461377.485, Z-Error 0.552 meters

Approved By:			
Title	Name	Signature	Date
Associate Lidar Specialist Certified Photogrammetrist #1281	Qian Xiao	Q:	December 2014

SECTION 6: FLIGHT LOGS

FLIGHT LOGS

Flight logs for the project are shown on the following pages.

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figned		14	044	Real For		Aug. Day.		04.49	Line Farms		
	130	- 1 M.	5000	200 m				d	A CONTRACTOR		
Sec.P	Dir.	Mission IDP	Line Drd Time	Time On Line	- 90	HDOP	7009	Live N	iotes/Comments		
Test	4/4	100 - 100		1/2	3/2	1/2	n/a	GPS Began Logging At	2		
1	5	20:58:32	21-16:23	0.17:51	-	-	Vertite S-Tam	Sefors Minion	No Y I St		
2	N	21:20:13	21:38:20	0:18:07	-	1	a	-			
3	s	21:41:39	21:59:53	0:18:14	2.11	1.000		-			
4	N	22:04:17	22:22:27	0:18:10		· · · · · · ·					
5	5	22:25:46	22:43:55	0:18:09	P	1.000	10.00				
6	N	22:48:10	23:06:13	0:18:03	h		1.000				
7	5	23:10:12	23:28:14	0:18:02	1	1.	1	1.00			
8	N	23:33:06	23:51:06	0:18:00	8 (-		<	1			
9	S	23:55:03	0:13:27	************	ģ						
10	N	0:17:58	0:36:04	0:18:06							
11	S	0:39:42	0:57:33	0:17:51	-	1	· · · ·				
12	N	1:02:19	1:20:15	0:17:56	-	-					
-	-	-		0:00:00	-	-	-	(
		-		0:00:00	-	-		-			
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					Wo	olpe	ert				
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Optes	ch LIDA		1/8/2014	Der si Tarr	79741	-	7	-	USQS W	Propel Name	
	Director			Read.	10100 014		Long Long	Gan	Harded Tree		_
	SHORENCE.			N11971	2056.5	-	9:15:0	0	15:15:00	WOOLPE	IT PAN
-	The		~	Cambri 198	HING DE		Load Red		Sale and The		-
and Dir Se		Valbillar	Colley.	Greed Co	and Tama	Elew Point	Breat		Hans/Res/Cloud	The local division of	-
360	@5	10 5	M C	LR	1964 B 197 B 19	-		_		Article	
Traquer	er) Ha	-Augle	System Pil	F Roll	Divergence	Wultigadae	-	A8	-10	Digenzas.	-
			1	Compensation	Made	1	DIF X	ON	Range Gata	Threathaid	
46	8 3	12	125	ON X	wol o		SAMP		1000	Later Trigger Ligs	
1.20	1.00	2.1.1	10.00	041	NO X IN	X.	BOUNDA	-	1	1PPS adge	
Ir Speed	100	-	14	000	14		Art. Day.		04.10	Size Farme	
The st	130	-	- 100	5000	Time On Line		NO.	-	-	a Balan Kananata	
201	-	Mask	a ite	Link Litz rate	inter de case.		noor		CPS Barren Londo	At-	-
		ID	Internet a	TRIP/ MIST	-	44.		Vertite S-Turn	a Lefors Minister	The Y	100
13	S	15:4	6:19	16:03:50	0:17:31		1		10.000		100
14	N	16:0	7:37	16:25:36	0:17:59	-	1	P	P		
15	S	16:2	9:52	16:47:40	0:17:48	$\mathcal{T} \to \mathcal{A}$	10 - m - 4	P = 0	1		
16	N	16:5	1:12	17:09:08	0:17:56	-	· · · · · · · ·	10 mm			
17	S	17:1	3:22	17:31:45	0:18:23		10 million (10)	C			
18	N	17:3	5:34	17:54:33	0:18:59	Access of	a	1.00	10-		
19	5	18:0	0:04	18:17:52	0:17:48	-			1.00		
20	N	18:2	1:58	18:39:52	0:17:54			$\leq - <$	1.1		_
21	S	18:4	4:20	19:02:23	0:18:03	-	-	-			-
22	N S	19:0	6:01	19:25:46	0:17:59	-	-				-
24	N	19:4	0.02	20:07:36	0:17:52	-	-		1.1		-
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Optes	ch LIDA		1/8/2314		75741		1	1	USQS Weat	ingloe County, AL
-	Canado and			An (CDA)	10014	-	Intel Cont		72-14-00	WOODERT DE
_	Mag	-		Tanaar Type	REAL	-	Loaine	line i	See her film	ND ND
-	SWAN		Optio	d-Ganini 108	20025	1	17:43:0	0	22:42:00	
250		Visibility	Collog	Ored Cr	ser'S Tens	Dana Point	Free	-	Figs/Res/Osse	Departing 40
300	@ >	10 Sh	Section P	LK Ral	Divergence 1 M	-	_	4.65	10.	Arriving 40
		-	-	Compensatio	n Made	_	-		1	
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Igead			10		12	-	Aus. Der.		104.101	Max James
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See 2	Dir.	Matio	n ID#	Line Did Time	Time On Line	30	HDOP	POOP	Live	Votes/Converts
145	4/8	170	the antipod	m Salu / Gibt I	1/2	1/2	10	Nettle 2-Tam	GPS Before Longing A:	De Y Dat
25	S	23:3	8:16	22:56:15	******	-	14)	
26	N	23:0	0:28	23:17:30	0:17:02	1			1	
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	SHORE		-	N1.070		2043		-	\$15.9	0	1	15:25:00	-	0065	
-	SWAN	-	Opto	di- Garpin	100	2064		-	TI-Ged	10m	-	17:14:00	-	ALMO	
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in famal		-		097		NO X	F05 X	4	SOUNDA	UT .		14.14	1795.	-	1
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28	3	10.27	.02	10.3	1.40	0.10.4	0	-	-	-	maa	o nne; aborter	1 21 mil	es muco mus	- 0
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Opted	h LIDA	R 1/0/2014	1	73741		1	1 A	USQS Wanting	gine County, 4	
	Circuitor:	_	ALISTO .	2064.1		Long Darf	0	22-54.00	60	5
_	764		Inner Type	HORD DOC	-	Logital Int	-	50 Int The		
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nd Dis See	R.	Valtity Cally	Ored Con	ar S. Tana	Serv Point	Press	121	Figs/Res/Osse	Departing	- 18
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ind	-	10		12	-	Ave. Car.		04,401	Glas James	-
Sea P	54.	Mission IDP	Line Ind Time	Time On Line	- 90	HDOP	700P	Line No.	tes/Converts	
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28	N	22:45:37	23:02:54	0:17:17	-	-				
29	S	23:07:06	23:24;24	#VALUE!	1	-				-
30	N	23:28:08	23:45:06	0:16:58		-	-			
31	S	23:49:05	0:06:10	************	-	-	-			_
32	N	0:09:56	0:27:08	0:17:12		-	1 m m			
33	2	0:31:26	00;48:2/	#VALUE!	-	-	-			
34	N	0.51,59	1:30:44	0:17:25	-	-	-			
36	N	1:34:46	1:51:44	0:16:58		-				
37	S	1:55:17	2:12:16	0:16:59			· · · · · ·			
38	N	2:15:55	2:32:41	0:16:46	-		1	5		
39	5	2:36:25	2:52:00	0:15:35	1000	Q	16 ()			
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Times	entered	are Zulu / GMT 🛧		Page	-	1		Varily 5-Turns After Miss	ion Tes x	No
-				Additional Comme	attr.	_				Drive #

Opto	ch i me	History and	Dep of face	Popula	T	Time I	-	frag	al Auros
A Party	- Constant	1/11/2014	11	73741	_	2	-	USQS Wanha	agtor County, AL
-	SIMMONS		N11870	2069.1		14:00:	90	25-16-00	CORS
-	164		Same Type	1080 192	-	Logither	(line	Sale and Time	ME .
Bei Die Ro	SWAN	Op	Cont Cont	2073.2	Day Daird	21:00:	10	250050	ADA
					-				Arriving 18
Tragger	a T R	al-Angle System	Ref Roll	Divergence N	-	- L	118	-10	DIGITIZER
			Compensation	Made		000 X	ON	Parge Gata	Threathold
			OM X	WO 04		SAMP			er Triger Lige
-	1.0	-	QFF	NO X FO	X	SOUND	ART C		1PP5 adge
Cand		a.			-	Ave. Car.	_	04.10	Sint Parent
Sea #		Mission IDP	Line End Time	Time On Line	30	HDOP	FOOP	Line N	ntes/Comments
Test	4/4	1		-1/2	2/2	1/2	a/a	GPS Began Logging At:	
	_	These and and	an Sala / Mart		-		Vertica-Der	na Tertora Milanian	Net Y I Set
40	N	22:27:39	22:45:15	0:17:36	-	_	-	strong winds out	t of the NW on all li
41	5	22:49:18	23:06:25	0:17:07	-	-	-	-	
42	N	23:10:30	23.28.12	0:17:42	_	-	-		
40	3	23.31.31	25.46.42	0.17.11	-	-	-		
45	5	0:14:35	0:31:02	0:16:27	1	-		-	
46	N	0:34:38	0:51:50	0:17:12					
47	5	0:55:00	1:11:52	0:16:52	•Q		$\sim - +$	+ -	
48	N	1:15:40	1:33:04	0:17:24	1.00			1	
49	S	1:36:16	1:53:19	0:17:03	-				
50	N	1:58:02	2:15:33	0:17:31	-	r	1 0	0	
51	5	2:18:27	2:35:05	0:16:38	-		1-1-1-1		
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	entered	are Zulu / GMT 个		Page	-	1		Varily S-Turns After Mis	ulon Tes X No

				Wo	olpe	ert.			
Opter	ch LIDA	R 1/12/2014	12	79741	-	10001		LISES Went	ingine County, AL
	Disease	-	Abual	10100 014	-	Long Dart	-	Inter Stat True	1 10
	SIMMONS		N11970	2073.8	-	\$11.0	0	15:11:00	0.045
-	SWAR		tack-Genter 208	2078.5	-	14-10-	10	20:10:00	ALMO
The Die Bo	and 1	Value Call	Canad Core	r.S. Terrs	Dere Point	Frei	101	Haza/Rea/Cloud	Departing 199
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in fame		10	O41	MR X FO	X	SOUNDA	GIT .	0.4.63	1.PPS adge
				75			_	-	
Sec.P		Mitalian IDP	Line Ind Time	Time On Line	90	HDOP	POOP	Live	Notes/Comments
Test	4/4	1		1/2	2/2	1/2	n/a	GPS Began Logging A	
52	N	15:41:54	15-50-00	0:17:06		-	Vertite 2-Terr	Gefore Window	Mar Y I St
53	5	16:03:07	16:20:31	0:17:24	-	-			
54	N	16:23:39	16:40:27	0:16:48		1.00		-	
55	S	16:43:57	17:00:58	0:17:01			1 million (1997)		
56	N	17:04:34	17:21:23	0:16:49	1	4	1 (1	
57	S	17:24:39	17:41:45	0:17:06	1		1 m		
58	N	17:45:01	18:02:17	0:17:16			· · · · ·	1.00	
59	5	18:05:56	18:23:38	0:17:42			~ -0	1.	
60	N	18:27:06	18:44:11	0:17:05			-		
61	S	18:48:22	19:05:37	0:17:15	-	-			
63	S	19:08:42	19:47:24	0:17:31	-	-	1.0	(1 m)	
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65	N	22:19:28	22:36:37	0:17:02	-	-		-	
66	S	72:40:53	22:57:53	0:17:00	-	-			
67	N	23:01:21	23:18:24	0:17:03		-			
68	5	23:22:17	23:39:10	0:16:53	1	Sec. 1			
69	N	23:42:48	23:59:46	0:16:58					
70	5	0:03:53	0:20:36	0:16:43					
71	N	0:24:01	0:40:52	0:16:51	1.1.1		· · · ·	1	
72	S	0:44:32	1:01:34	0:17:02	-		C		
73	N	1:05:33	1:22:15	0:16:42	-	r	1		
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† Times	entered	are Zulu / GMT 个		Page		1		Varily 5-Turns After	Mission Tes x No

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	Dente		Boost .	800122	-	Last	of the	-	10.0		1 Aug
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art	n/s	15:39:10	15:59:22	1/5	n/s	x/x	4/1	GPS Began Li	ogging At	nion Ver	15:23:30
24	N	16:01:25	16:13:28	9:02:18	14	0.7	13	9:29am/	15:29z		
25	5	16:24:09	16:38:09	0:00:00	14	0.8	1.4	Flight-Lie	nes 1-124	, 224-2	27 6634
27	N	16:48:21	16:50:47	0:00:00	13	0.8	14	15:38:11	-15:42:1	1 over	base
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27	N	17:28:46	17:44:30	0:00:00	17	0.7	1.2	-		-	-
1	E	17:47:35	17:50:04	0:00:00	18	0.6	1.1	Standing	Water in	n proje	ct area from
2	w	17:53:36	18:03:07	0:00:00	18	0.6	- 11	heavy ra	ins		
3	E	18:06:02	18:15:07	0:00:00	18	0.6	11				_
4	w	18:19:00	18:28:39	0.00.00	19	0.0	11	100			
6	w	18-44-02	18-53-10	0:00:00	19	0.6	12	_			
7	E	19-01-33	19-16-14	0:00:00	18	0.7	14	-			-
8	w	19:14:47	19:34:35	0:00:00	17	0.7	1.4	-			
9	E	19:38:04	19:52:49	0:00:00	17	0.6	12	-			-
10	w	19:56:16	21:11:27	0:00:00	18	0.6	12	1			
11	E	20:14:50	20:30:53	0:00:00	19	0.6	12				
12	w	20:34:22	20:50:37	0:00:00	20	0.6	12				5.0
13	E	20:54:11	21:10:24	0:00:00	18	0.6	1				
14	W	21:13:19	21:29:49	0:00:00	19	0.6	1	-			
15	E	21:33:19	21:50:05	0:00:00	19	0.6	1.1	-			
10	W	21:53:48	22:10:36	0:00:00	16	0.6	1.4	TOC	6 X 4 4 4 4		
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Honel Co	in and in a	- com, some T		raş	-	-				_	Drive #
		AT	OC data Witch timeou	d error due to no mer	n ruftch signal	on I/O Aus 1 cor	ntection on TDC/				70-2 #

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	-Director-	4.44.000	Asiat	HORE DAR		Long Lord	-	Horist In-	1
	SHOWING	1	N11870	2082.3	-	7:50.0	0	13:68:00	085
-	SWAN		Same: Type	HOME 1985	-	Loather	20	200 Hol The 17-15-00	ALMO
The Die Die	and 1	Valbility Call	to David Con	erS Tamp	Dane Point	Pres	101	Haza/Fira/Cloud	Departme 185
1.11	5		12 A.C. 17	14 1. 10 10	1.1.1	- C	-		Arriving 198
Trequent	ay Ha	di-Angle System	PRF Roll	Divergence M	a figular		ABF .	- 1	DISTRIZIO.
			Congression	OF		OFF X	ON	Pasge Gata	Threated
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in Connect			OFF	NO X FO	X	BOUNDA	ALT	1	1795 sign
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Test	4/4	i vinal		1/2	n/a	2/2	n/s	GPS Began Logging At	and the second
75	N	12:30:22	12-31-20	0:01:05		-	Varity S-Tu	CHUTTED WAS C	IOSED, ABORTED LIA
75	N	13:27:45	13:44:40	0:16:55	-	-		SHOTTER WAS C	LOJED, ADDRIED LIN
76	S	13:48:17	14:04:49	0:16:32				SPEED WAS HIGH	AT THE START OF LU
77	N	14:08:24	14:25:33	0:17:09	-		1		
78	5	14:29:14	14:46:26	0:17:12	1	-	1.00		
79	N	14:50:10	15:07:02	0:16:52	N.C. 11	1.00	1	1.	
80	5	15:11:04	15:27:38	0:16:34		1.00	1	1.00	
81	N	15:31:05	15:48:05	0:17:00	- 1	S. 199	≤ -1		
82	S	15:51:47	16:08:42	0:16:55	1000	-	1	1.2	
83	N	16:11:57	16:28:37	0:16:40	-	-	100		
85	2	16:51:53	17:05:52	0:18:42	-	-	-		
86	5	17:09:19	17:23:17	0:13:58			-		
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	SIMMONS		N11870	2017.7		12-20-0	90	18-28:00	0.62
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	1.2		OM X	WD DN		SAMP	•	1.000	Later Triger Tage
the Canad		-	O41	Ma X FO	X.	BOUNDA	ART	04.65	1.PPS adge
				75		-	-		
Des #		Mission ID#	Line Ind Time	Time On Line	30	HDOP	PDOP	1	ne Notas/Comments
Test	4/4	1. mar. 1.		*/*	2/2	1/2	n/a	GPS Began Logging	[At:
87	N	18:41:02	18-55-53	0:14:51	-	-	Varity Selling	a Sefora Ministr	No Y I Sel
88	S	19:00:74	19:15:20	0:14:56	-	-	-	-	
89	N	19:20:39	19:35:06	0:14:27		1.00			
90	S	19:37:49	19:52:08	0:14:19					
91	N	19:55:26	20:09:33	0:14:07	1	1	1.5.0	17.1	
92	s	20:12:41	20:26:20	0:13:39	1	1.000		1	
93	5	20:29:23	20:42:50	0:13:27			(1.00	
94	N	20:46:39	21:00:08	0:13:29			~ -0	1.1	
95	S	21:03:47	21:17:25	0:13:38		-		1.2	
96	S	21:20:19	21:33:36	0:13:17			1000		
97	s I	21:52:35	22:49:10	0:12:32	-	-	1	(1 W	
99	s	22:07:51	22:20:19	0:12:28	· · · · ·		-	5	
100	N	22:23:12	22:35:19	0:12:07	-		1		
101	5	22:38:30	22:50:46	0:12:16			1000	-	
102	5	22:55:36	23:15:00	0:19:24	-	1.11	1	(*************************************	
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Lance	Denter	1/14/0	Assar	м				Last file	line .	-	Course, Made	méte	Kasa .
1	TALAMINOS	1.11	NADACP	2, 110	2948.5	KC D	1	9:463	00	15	00:20	14	WOOLPERT PIN
	GERHART		M.S-7177		2956.0			5:01:	100	22	01-00		546/7/40 em
What De		Value	Calley	Chevel	Come N. Tana		- Nia		Plants	-	Wes/Chul	Depart	KGW
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Scatt A	agle (FOV)	Scam Fr	etnest (jiz)	7.4	ns Rate (Idiz)	b	aur Power %	-	Fixed Gain			ods	Threshold Vel
-	40		12.3	0.0	272	-	100	1	Gain - Fine/Dow	m 12	Mult	x	. 1
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-	Die.	Line Start Tim	u line	End Time	Time On Line		/s H0	100	PDOP	-	Line N	ietas/Come	senia
last	n/s	15:33:17	15	33:32	2/2		/e	(h	44	GPS Began	Logging At	12	15:18:10
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10	E W	15.06.77	10	74-09	0.00.00	-	4 0	7	14	0	Barrit	47-10-4	2
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20	w	16-47-11	10	05-37	0-00-00		4 0	8	14	henne	Nine	as proje	actarea tron
21	E	17-08-37	17	26:30	0:00:00	1	5 0	7	12	incavy i	uil0		-
22	W	17-29-00	17	48-14	0:00:00	1	7 0	.6	12	-	-		
23	E	17:51:32	18	09:23	0:00:00	1	9 0	.6	1	-			-
24	w	18-12-47	18	32:08	0:00:00	1	9 0	.6	11	1			
25	E	18:34:55	18	53:05	0:00:00	1	8 0	.7	1.3				
26	w	18:56:18	19	16:18	0:00:00	1	8 0	.7	13				
27	E	19:19:00	19	37:27	0:00:00	1	9 0	.6	12				
28	w	19:40:26	i 20:	00:26	0:00:00	1	9 0	.6	1	1			_
29	E	20:03:17	20:	21:13	0:00:00	1	8 0	.6	11	1			
30	W	20:24:15	i 20:	44:26	0:00:00	2	0 0	.5	1	1 (C			
31	E	20:46:50	21	05:48	0:00:00	2	0 0	.6	1	1.00			
32	w	21:09:10	21	29:56	0:00:00	- 1	8 0	.6	1.1	-			
33	E	21:32:59	21	51:57	0:00:00	1	8 0	.7	1.2	-			
34	w	21:55:16	5 22	15:52	0:00:00	1	6 0	.8	14	-			_
35	E	22:18:38	22	37:56	0:00:00	1	0 0	./	12	-			
50	W	22:42:34	23	01:08	0:00:00	1	5 0	./	12	+	-		-
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-	Mail		Same Type	10163 102	-	Local Red		Sile had then		100
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that Dis Bes	and	Validay Colle	Creed Co	erS Tens	Rent Point	Pres	121	Haza/Rea/Cloud	Dep	arting 18
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Test	4/1		and the second second	1/2	3/2	2/2	n/s	GPS Began Logg	ing At	-
103	N	20:28:17	20:40:46	0:12:29	1.0	V	thun 2-14			
104	5	20:44:19	20:56:38	0:12:19	1		P	1		
105	N	20:59:30	21:12:00	0:12:30	1 I	1.00	$1 \le 0$			
106	S	21:16:03	21:28:27	0:12:24	1.3	· · · · ·	1.1			
107	N	21:31:33	21:44:20	0:12:47	1	1.000	3C F ()			
108	5	21:46:55	21:58:40	0:11:45	1		1.	1.1		
109	N	22:03:30	22:14:20	0:10:50				1.00		
110	5	22:17:31	22:27:27	0:09:56	1.00		< - c	1		
112	S	22:30:44	22:41:41	0:10:57	-	-	-	-		-
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114	S	23:05:35	23:12:54	0:07:19			10-10-C	2.1		
115	N	23:15:58	23:23:08	0:07:10	h	a	· · · · · ·	2.5		
116	5	23:26:09	23:32:52	0:06:43		h	1-1	-		
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109	W	20:31:17	20:41:40	0:10:23		-	-		
110	E	20:44:02	20:53:10	0:09:08	-	-			
111	W	20.56:25	21.00.55	0:10:32	-	-		-	
112	E	21:10:05	21.19.23	0:10:45	-	-			
114	F	21:22:45	21:46:01	0:09:21		-	-		
115	w	21:49:26	21:59:33	0:10:07		-	-		
116	E	22:02:21	22:11:44	0:09:23			· · · · · · · · · · · · · · · · · · ·		
117	w	22:15:00	22:25:12	0:10:12	-	P	P) — — — — — — — — — — — — — — — — — — —	
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122	E	23:19:26	23:29:09	0:09:43		1	1.1.1	~~~~~	
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124	E	23:44:26	23:53:51	0:09:25		×	1.1	-	
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44 W	15:58:28	16:06:37	8:39:30	15	0.7	12	UL 002 Partial Pat	ch
45 E	16:09:52	16:29:38	0:00:00	14	0.8	1.1	8:16am/1416z tak	coff 1st time
40 W	16:32:55	16:55:37	0:00:00	15	0.8	11	TDC ERRORS, TDC	won't initialize
4/ E	10:58:23	17:18:51	0:00:00	10	0.7	11	Replaced with old	board
40 W	17:21:00	18-07-24	0.00.00	10	0.0	- 11	9:51am/1551z 2n	a ume
50 W	18:10:52	18-34:04	0:00:00	20	0.6	11	Standing Water in	project area from
51 E	18:36:48	18:57:05	0:00:00	19	0.6	11	heavy mins	project area not
52 W	19:00:35	19:23:28	0:00:00	17	0.7	1.4	includy instrum	
53 E	19:26:05	19:46:42	0:00:00	19	0.7	13	-	_
54 W	19:49:46	20:13:06	0:00:00	18	0.8	13		
55 E	20:15:42	20:35:29	0:00:00	20	0.6	1		
56 W	20:38:41	21:00:35	0:00:00	20	0.6	11	A 1.1 M	
57 E	21:04:20	21:24:31	0:00:00	19	0.6	11	slightly low at end	d of line
58 W	21:27:35	21:51:09	0:00:00	17	0.7	1.3	111	
59 E	21:53:44	22:14:14	00:00:00	16	0.7	13	-	
60 W	22:17:23	22:40:52	0.00.00	15	0.7	13	-E-Lab. Last	
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90	E	15:54:07	15:54:07	0:00:00	1	-		-	
89	w	16:17:04	16:17:04	0:00:00	1.00	1.000		-	
88	E	16:39:26	16:39:26	0:00:00	-	· · · · · ·	10 mm		
87	W	17:02:36	17:02:36	0:00:00	1	6 - 10 - 10	10.00		
86	E	17:25:44	17:25:44	0:00:00	1	A	· · · ·	1.	
85	W	17:48:57	17:48:57	0:00:00		1.	1		
84	E	18:11:58	18:11:58	0:00:00			<	1.	
83	W	18:35:43	18:35:43	0:00:00	-	-	-	1	
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59	5	15:49:00	15:51:00	0:00:00	15	0.7	12		
58	0	15:53:00	15:56:00	0:00:00	15	0.7	12		
57	5	15:58:00	16:00:00	0:00:00	14	0.7	1.4		
56	n	16:03:00	16:05:00	0:00:00	14	0.7	14		
55	5	16:08:00	16:09:00	0:00:00	14	0.7	1.4		
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35	n	10:40:00	10:58:00	0.00.00	1/	0.7	11		
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54	п	18:29:00	18:30:00	0:00:00	19	0.7	1.1		
41	n	18:33:00	18:39:00	0:00:00	19	0.7	1.1		
42	5	18:42:00	18:48:00	0:00:00	17	0.7	15		
43	п	18:51:00	18:56:00	0:00:00	18	0.7	1.5		
44	5	18:59:00	19:03:00	0:00:00	18	0.7	13		
45	п	19:06:00	19:10:00	0:00:00	19	0.7	1.2		
46	5	19:12:00	19:16:00	0:00:00	19	0.7	12		
47	п	19:20:00	19:21:00	0:00:00	19	0.7	12		
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-	Denter		Intel.	setting	-	Land D	al time		line.
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who the		Cadata a	Calley Das	Comerts Tang	Des Pas	-	Phone in the second	Na, New Color	Artising
San A	agle (FOV)	Scan Fraques	cy (Itz) Pr	dan Kata (Miz)	Laner Pr	ower%.	Fixed Gain	Mo	de Threahold Val
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Inspeed	_	ARE .	MGL		Wayeform L	het	Waveform Made		Pre-Siterat Dist.
×		-	R	R	1	2		@	145
Line #	Die:	Line Start Time	Line End Time	Time On Line	90	1009	PROP	Line No.	tax/Comments
N.	a/s	S		2/0		s/k	s/s	GPS Degree Logging At:	34 J.C.
30	5	19:49:00	20:03:00	16:27:00	20	0.7	11	Vertic S-Turne Bettern M	ston Had _ Hall
29	0	20:06:00	20:21:00	0:00:00	20	0.7	1		
28	5	20:23:00	20:38:00	0:00:00	19	0.7	11		
27		20:41:00	20:56:00	0:00:00	20	0.7	1		
26	5	20:58:00	21:13:00	0:00:00	17	0.7	14		
25	п	21-15:00	21:30:00	0:00:00	18	0.7	12		
24	5	21:32:00	21:47:00	0:00:00	16	0.7	14	1	
23	0	21:50:00	22:04:00	0:00:00	15	0.7	1.4		
	1	A construct of		0:00:00			1-10-1		
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-				0:00:00	-	-			
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			1	0:00:00	-	1.1.1		-	-
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t Timer	entered	THE ZIEL / CANT A	2	Day		1	2	Verify 3-Thirms After M	mice w
ulational Co	ommenia:	and another and the		Fag	-	1			Drive #

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Leica	LIDAR	1/18/2014	Inter State	79741		1		Laural, Missis	leal
	Dente		Assist.	100000	_	Last	al line	201003104	Law .
	Fail	_	New York	HORE DO		-		an in the	WULLEPERI PIR
100	TRAFET		NJS-7177	2981.5	100	45	5.00	22:55:50	SAL
What Di		Value	Calley Cla	dition to the state	Des Pak		1011	Hose/Hee/Close	Departing KGW
Scan A	unte trovs	Scan Fragues	cy (Hz)	V -3	Lang	own's	SU22 Flast Gain	Mer	Arrising KGW
	40	47.3		272	1	00	Gala-Course/	P 5 Sugh	A 1 1
Gand	40	42.5	150	212	Waveform		Gain - Rins/Dos	va 12 Multi	X B 1
10	50	6500		6634 P	2			0	
	~	0,00	<u>^</u>	00.54	\$	2 .	1	e	145
line #	Die	Line Start Time	Line End Time	Time On Uks	9/1	IDOP	PDOP	Line No.	as/Commenta
Tart	n/s	15:39:07	15:39:34	2/2	n/s	s/k	a/a	GPS Degas Logging At:	15:23:58
62	w	15-53-02	16-17-31	9-00-07	15	07	12	Takeoff 1529=/9	29 am
63	E	16-20-00	16:40-07	0:00:00	13	0.8	15	Overfly base: 15	37:33
64	w	16:43:09	17:06:06	0:00:00	17	0.6	1	Standing Water in	project area from
65	F	17:08-52	17:28-48	0:00:00	17	0.6	11	heavy rains	project area ir of
66	w	17:31:49	17:55:45	0:00:00	18	0.7	11	in the second second	
67	E	17:58:30	18:17:49	0:00:00	19	0.6	11		
68	W	18:21:06	18:45:12	0:00:00	19	0.6	11		
69	E	18:47:51	19:07:21	0:00:00	17	0.8	1.5		
70	W	19:10:44	19:34:48	0:00:00	19	0.6	1.2		
71	E	19:37:36	19:56:35	0:00:00	18	0.7	12		1 mm 1
72	W	19:59:40	20:13:46	0:00:00	20	0.5	1	TDC ERROR Over	y base 20:22:00
72	w	20:07:01	21:21:47	0:00:00	17	0.7	reflight	GPS Began Loggin	g At: 20:34
73	E	21:24:30	21:45:53	0:00:00	17	0.7	1.3	Overfly Base: 20:	38:56
74	w	21:45:04	22:07:38	0:00:00	16	0.8	1.4		~
75	E	22:10:36	22-28:18	00:00:00	15	0.7	12	-	
76	w	22:31:39	22:55:04	0:00:00	15	0.7	1.2	1	
1				0:00:00	1000	1.1		1	
- 14		V	1	0:00:00		1.1.1	1	-	
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				0:00:00	-	-	-		_
-	1.1	2 - V	5	0:00:00	1-	1		Overfly Base: 23	11:01
	1.1	-		0:00:00	1			Wheels Down	
	1.1	r	7	0:00:00	10.1	12.1	1	Landing: 5:20pm	
1.10	1.1	1.1.1.1.1	0	0:00:00				Static: N/A	
3.7	1.11			0:00:00					1
Times	entered a	re Zulu / GMT 🛧	5	Par	e	1 12 1 1	1	Verify S-Turns After Mi	ation w X No
(Bional C	onineriti:	AT	OC data Nobel Street	out arror due to no men	n safish signal	on 1/O Aus 1 cor	anaction on TDQ	· · · ·	ALS 70

				Wo	olpe	irt				
Opt	ach LIDAI	1/75/2014	in the second	75741	-	Real J			September 1995	
15	Distanta	- A retained	Note	HOUSE BAR		Long Last	-	House Inc.		_
-	SHORE		K11970	2125.6	-	14:00:0	90	2020	WOOLFER	(PM)
-	SWAN		Tanan Type Red-Gamini 208	7085	-	17:18:	10	20:100 Tex	10	-
What Die 2	loand B	ALLEN CAR	Canad Core	rS Terrs	Dere Point	Free	10	Figst/Res/Case	Departing	LUR.
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64	269.6	20:23:50	20-23:50	0.00:00			Vertite Solution	Reform Mitmiss	Mar Y I	
63	89.63	20:47:44	20:47:44	0:00:00	-	-		-		_
62	269.6	21:12:31	21:12:31	0:00:00			1.0	-		_
61	89.63	21:36:58	21:36:58	0:00:00		· · · · ·	1. A.			
60	269.6	22:00:55	22:00:55	0:00:00		1.000	10 - 10 C	1.1		
59	269.6	22:25:01	22:25:01	0:00:00	h	a				
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T Time	s entered a	re Zulu / GMT 个		Page	_	1		verty 3-turns After	Million Tes X	No.

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-	SHORE		K11970	2125.6	-	14:00:0	90	2020	WOOLFER	(PM)
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Leica	LIDAR	L/1a/2014	Die of fair	750017	T	Plant.	-1-	Ating Se	-	-
	Denter	dedente	Bistel	-	-	Lavel		States way	14	
	SMITH	-	MORCE THE	4562.8	-	94		15:00:00		
	RADER		AUS-7308	K.CT25	-	45	15:00	22:55:00		
who the	m	10	Calley Ches	Comerts. Tamp	Deer Fain	-	3018	Harak/Hen/Chant	Departing	me
Scan A	agie (FOV)	Scan Fraguns	er (Hz) Pa	dam Rate (Mtz)	Laner P	ower's	Fiand Gain		lods Thrash	ald W
1	40	42.3	8 a. 3 ke	272	10	00	Gain - Course/Up Gain - Fine/Down	6 Sign	x .	P
Speed	_	AGL.	1581		Waveform D	and .	Waveform Mode		Pre-Triuger Di	it.
15	50	6500	R	6500 R	And A	2 x	1	@	145	Π.
Line Ø	Die:	Line Start Time	Line End Time	Time On Line	9/5	HOOP	PBOP	Line N	letas/Commenta	
Test	n/s	C		n/n	n/s	s/a	a/a	GPS degree Logging At:	14:53	1:00
22	5	15:25:00	15:40:00	7:41:00	14	0.7	14	VALUE & DATA BALLER	Multin Tail Y No.	-
21	n	15:42:00	15:59:00	0:00:00	15	0.7	12			_
20	5	16:01:00	16:16:00	0:00:00	14	0.7	13			_
19	0	16:19:00	16:36:00	0:00:00	14	0.7	1.4			_
18	5	16:38:00	16:53:00	0:00:00	17	0.7	1.1			_
17	n	16:55:00	17:12:00	0:00:00	16	0.7	13			
16	5	17:14:00	17:29:00	0:00:00	17	0.7	1.2			
15	n	17:32:00	17:48:00	0:00:00	19	0.7	11			
14	5	17:50:00	18:06:00	0:00:00	19	0.7	11			
13	n	18:08:00	18:24:00	0:00:00	18	0.7	1.1			
12	5	18:26:00	18:41:00	0:00:00	19	0.7	11			
11	n	18:43:00	18:59:00	0:00:00	17	0.7	15			_
10	5	19:01:00	19:16:00	0:00:00	19	0.7	12			_
9	n	19:18:00	19:33:00	0:00:00	19	0.7	12			_
8	5	19:36:00	19:51:00	0:00:00	18	0.7	12			_
5		20-10-00	20:08:00	0:00:00	20	0.7	11	tdr error rebon		_
6	-	20:44:00	20-59-00	0:00:00	17	0.7	11	COLICITOR TEDOO		_
5		21-01-00	21-16-00	0:00:00	18	07	11			-
4	5	21-18-00	21-31-00	0:00:00	17	0.7	12			_
3	n	21:33:00		0:00:00	16	0.7	13	tdc error reboo	t	_
3		22:00:00	22-11:00	0:00:00	15	0.7	1.4			_
2	5	22:13:00	22:22:00	0:00:00	15	0.7	1.3			
1	n	22:24:00	1	0:00:00	15	0.7	12	tdc error reboo	t	
1	n	22:37:00	22:44:00	0:00:00	15	0.7	12			
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			-		W	pol	pert					
Leica	LIDAR	1/15/2014	1914	710	41		flast 1		_	Inursi, Miss	lasippi	
-	Desta		Asial	-	1962		Land	al line		Call Time	Ë.	tau .
	Pat	_	name Tran	100	1.5		14				-	PLOLPER PIN
1.111	RESINANT		NJS-7177	290	9.1	1	21	0:00	22	50:50		546/
020	90	10 (lear (Constitution N. 1	6	-3	-	3025	-	Wey/Chul	Departs	KGW
Scan A	agle (FOV)	Scan Fraguna	cy (Hz)	Pulsa Rate (Idiz)	T	Laner Po	ower %	Rand Gain			ods .	Threshold Vel
	40	42.3	2.1.0	272	1	10	0	Gala-Course/U	F 6	Sign		
Speed	-	AGE	100		Way	atora U	had	Waveform Mode	1 12		Pa	-Trigger Dist.
15	50	6500	R	6634	R		2 x		6	0		
ine d	Dir.	Line Start Time	Line End Tim	Time On L		20	HDOP	PDOP	1	Line	star/Comm	eria
Test	0/2	16:04:08	16-04-7	3 1/2	-	n/s	= =	1/1	CPS Barrow	Loging At-	1	15-36-00
-		2. Trues entered a	manha / citat a		_	-			Varth S	urna Berlara I	disks. No.	V No
77	E	16:13:24	16:31:41	9:29:3	0	13	0.8	14	Takeof	f. 1541Z/	9:41am	-
78	W	16:34:54	16:54:30	5 0:00:0	0	16	0.7	1.1	Overfly	base: 15	:50:50	-
79	E	16:57:46	17:17:19	9 0:00:0	0	16	0.7	11	Standin	g Water	in proje	ct area from
80	W	17:20:15	17:39:4	7 0:00:0	0	17	0.6	12	heavy	ains	10.00	
81	E	17:42:42	18:01:30	0:00:0	0	18	0.6	11	-			
82	W	18:04:30	18:23:3	0:00:0	0	20	0.6	11	-			_
84	C W	18-40-05	10:40:20	0:00:0	0	17	0.0	15	-			
85	F	19-11-36	19-31-30	5 0.00-0	0	19	0.0	12	-	-		-
86	w	19-34-36	19-54-13	3 0.00-0	0	18	0.5	12	-			-
87	E	19:56:57	20:15:55	5 0:00:0	0	20	0.6	11	1			
88	w	20:18:49	20:36:52	2 0:00:0	0	20	0.6	1.1				
89	E	20:39:29	20:57:14	4 0:00:0	0	18	0.6	1.1	-			
90	w	20:59:49	21:17:05	5 0:00:0	0	18	0.6	. 11	2			
91	E	21:19:26	21:36:31	1 0:00:0	0	17	0.7	13	S			
92	w	21:39:29	21:55:45	5 0:00:0	0	16	0.7	13	1			
93	E	21:58:08	22:14:00	0:00:0	0	16	0.8	1.3	-			
94	w	22:16:56	22:32:30	6 0:00:0	0	15	0.8	13	-			_
95	E	22:35:07	22:50:04	4 0:00:0	0	15	0.8	- 11	-			-
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		2		0:00:0	0							
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	1.00	-		0:00:0	0		10.00		Wheels	Down:	i:17 pm	(
1.1	1.1	5	7	0:00:0	0		22.1.2		-			
1.15	101.1	1.1.1.1.1	2	0:00:0	0	-	1.000		Static	N/A		
			-	0:00:0	0		-		-	-		ET T
Times	entered a	re Zulu / GMT 🕈			Page			1	Varify 5-1	urns After I	Alusion %	X No
		AT	OC data Witch the	neout arror due to re	PART PART	di signal i	on 1/O Aus I con	usection on TDC/				

-			Bry officer	T Appli		Real	-	-	al form
the	ach LIDAI	1/20/2014	25	75741	100	1	1	1565	Laurel, MS
	SIMMONS		KLUPU	2128.5		4.40.0		14-42-00	WDQLFERT PAG
-	-	-	Same Type	1080 112	-	Logal Red	-	50 147 Um	10
	SWAN	0	And-Gamini 108	710.2		11-654	90	38:45:00	
and Divis	igend 1	Alter Call	Clead Cor	ar S Tana	Bree Point	Pres		Figs/Fig/Ciss	Departing LL
Instant	-	Unit I Setter		I Observation I II	- Finder	_	-		Arriving LU
			Compensation	Made	_	-		1	
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ir (mad	-	- 14		12		Arr. Car.		04.49	Max Barris
-	_		_	1000	-	-			1 1 2 2
See.9	B .	Mission IDP	Line Ind Time	Time On Line	30	HOOP	FOOP	Live	lotas/Conversts
Test	4/8	I Treas antenno	are Sale / Shit 1	1/2	1/2	1/2	n/a Vertile S-Terms	GPS Began Logging At	
58	89.63	15:14:24	15:14:24	0:00:00	100	1000			
57	89,63	15:39:19	15:39:19	0:00:00	-	8-10-10			
56	269.6	16:03:19	16:03:19	0:00:00	$T \to 0$	1.000	1 - 1	1	
55	89.63	16:28:23	16:28:23	0:00:00		fr	S	-	
54	269.6	16:52:23	16:52:23	0:00:00	1	1 10.00	$r \sim 0$		
53	89.63	17:17:56	17:17:56	0:00:00	1	4		-	
52	269.6	17:41:57	17:41:57	0:00:00	_	1.	-	1.00	
51	89.63	18:06:33	18:06:33	0:00:00			5		
50	269.6	18:50:46	18:50:46	0:00:00	-	-	-	-	
43	205.0	10.00.01	10.00.01	0:00:00	-	-			
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-	SMITH		MADACP	4571.0		1001	51500	1651-00	lu
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why D	index.	Visitility	Calling Class	ESTE 2	Descha	25	Plante.	21:52:50 Mate/May/Chan	Describe mo
21	0/4	10	10 million (1997)	10	1		3011	- C u	Arriving mp
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-	40	42.3		272	10	00	Gain - Rne/Do	wa 12 Mutt	x s
1	50	6500	R	var R	3	2 x	Wavenorm Mape		Pre-organization.
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_		2 Trust entered	TO MINI OF MINI OF		-	-		Winter Come Street	Minion Red w 1 No.1
111	w	17:14:00	17:23:00	11:01:00	18	0.6	11		
112	e	17:26:00	17:35:00	0:00:00	19	0.6	11	-	
113	w	17:37:00	17:46:00	0:00:00	18	0.6	11		
115	•	18-00-00	18-00-00	0.00.00	19	0.0	1	+	
116	w	18:00:00	18:09:00	0.00.00	10	0.0	1		
117		19-72-00	18-20-00	0.00.00	10	0.0	12	-	
118		18-34-00	18-43-00	0.00.00	17	0.0	14	-	
119		18-45-00	18-54-00	0.00.00	17	0.6	14		
120		18:57:00	19:05:00	0:00:00	19	0.6	12	1	_
121	w	19:08:00		0:00:00	19	0.6	12	tdc error-rebon	t
121	w	19:36:00	19:45:00	0:00:00	18	0.6	12		
122		19:48:00	19:57:00	0:00:00	19	0.6	11	1	
123	w	19:59:00	20:08:00	0:00:00	19	0.6	1.1		
124	e .	The state of	The Part of	0:00:00	1		1.0.0	tdc error-reboo	t
124	w	20:38:00	20:47:00	0:00:00	18	0.6	1.1		
125	e	20:49:00	20:58:00	0:00:00	18	0.6	11	1	
126	w	21:01:00	21-11:00	0:00:00	18	0.6	12	3	
127		21:13:00	21:23:00	0:00:00	17	0.6	13		
128	w	21:25:00	21:35:00	0:00:00	16	0.6	1.4	1	
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ditional C	onments:								Drive #

10/16/12

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Leica	LIDAR	1/20/2014	2014	73741		1	-	Laural, Mit	ninippi	
	Denter		Restal.	2001	-	Lase		States and	-	-
	Fel	-	NALACY NALACY	House Inc.	-	-	aradi Inf Time	and a second	WILLP	IKI PIN
10.1	TRAFET		WS-7177	2992.4	-	21	46:00	201466-000	54	4
What De		Value,	tally the	Constant Temp	Des Pak		2007	Non/Her/Child	Departing	KGW
Scan A	agin (FOV)	Scan Fraguna	cy (Hz)	Pulas Rate (Miz)	Laner	ower's.	Rawl Gain	1 1 1	Mode The	KGW
	40	42.3	2.5.15	272	1	00	Gais-Course/	ap 6 Suga		
peed	-	AGL	SEL		Waveform L	hed	Gain - Rea/Dou Waveform Made	M 12 Muts	Pre-Trigge	e Dist.
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	-	line Short Time	Une Fiel Time	Time On the	-	1000	Ince		NS Notes	_
	-		100 100 1000			-	riser alt		and a state of the	-
	4,4	2 Times entered a	re July / GMT 1	1/1	1/1	eja	iyi.	GPS Segan Logging At	Minist Fed y	No
96	W	16:57:43	17:12:46	10:44:49	17	0.7	12	Takeoff: 16:28	2/10:28	
97	E	17:15:26	17:29:23	0:00:00	19	0.6	1.1	Overfly base: 1	6:23:31	
98	W	17:32:16	17:46:11	0:00:00	18	0.6	11	Standing Wate	r in project ar	ea fron
99	E	17:51:23	18:00:21	0:00:00	19	0.6	1.2	heavy rains	1.00	
00	W	18:03:45	18:12:49	0:00:00	21	0.6	1	1. 1. 1. 1. 1.		
01	E	18:15:46	18:24:44	0:00:00	19	0.6	12	2 C		
02	W	18:27:49	18:36:47	0:00:00	19	0.6	12	-		
03	E	18:39:44	18:48:38	0:00:00	17	0.6	1.4			_
04	w	18:51:47	19:01:00	0:00:00	19	0.7	12	-		_
105	E	19:03:43	19:12:34	0:00:00	19	0.6	12	-		
100	E	19:13:44	19:24:37	0.00.00	19	0.0	12			_
108	w	19-40-08	19.30.33	0.00.00	18	0.0	12			_
109	E	19-51-40	20-00-21	0.00.00	18	0.6	11	3 6		_
110	w	20:03:35	20:12:40	0:00:00	19	0.7	11	1		
226	N	20:31:34	20:46:28	0:00:00	19	0.6	1	~		
	-	100 million (100 million)		0:00:00		111				
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tional C	comenta:			-		-			_	Drive #
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Option	ach LIDAI	1/21/201	4 23	75741		1	1	uses	Laurel, MS
	Constant of the		Addied .	1000 010	-	Long Dark		No. of Concession, Name	
-	760		Lanaut Type	HORE INC	-	Logited	-	States and the	MODUPARI PAN
1	SWAN	0	placis- Genetici 108	7138.4	1	19:554	90	10:55:00	
maph 8	icend 1	Alter Cal	David Co	ser'S Tens	Date Point	Pres	121	Haza/Res/Cloud	Departing LU
1	-		10 mil 1	24			_	H	Arriving LU
Frages	nay its	Magie System	Compenantio	Olivergence M Mode	tu tigadae	1.00	AR	1	DIGITIZA
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fr Sund		14	044	NO X I IO	-	Are. Car.		104.101	Line fame
	5				-				A Contraction
Den #	B .	Mission IDP	Line Ind Time	Time On Line	30	HDOP	FOOP	Line N	iotes/Comments
Test	4/6	the state of		1/2	2/2	2/2	n/s	GPS Bagan Logging At	1
103	269.6	14:38:53	14:38:53	0:00:00		1.1.1.1	Vertite S-Dama	Sefun Ministr	reflight
48	269.6	14:58:56	14:58:56	0:00:00	1				
47	89.62	15:22:42	15:22:42	0:00:00	1.00	1.000			
46	269.6	15:48:18	15:48:18	0:00:00		10000	10 mm		
45	89.62	16:12:31	16:12:31	0:00:00	1	6	1.0		
44	269.6	16:38:21	16:38:21	0:00:00	1	a	1		
43	89.62	17:02:56	17:02:56	0:00:00		1.000		A self	
42	269.6	17:27:56	17:27:56	0:00:00			<	1.	
41	89.62	17:52:23	17:52:23	0:00:00		-	-	-	
40	209.5	18:16:58	18:16:58	0:00:00	-	-			
38	89.62	10:06:00	19:05:09	0:00:00	-	-			
30		15.00.05	10.00.05	0:00:00	· · · · ·				
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& Time	s entered a	re Zulu / GMT 4		Page	-	1		arity 5-Turns After Mit	ulon tes x No

				Wo	olpe	ert				
Opte	sch LIDAA	1/21/2014	23	75741	-	19444) 2		15	Angent Name OS Laurel, MS	
-	Disease	-	Assist	101001544	-	Long Bart	5m -	Interfect from	1	
	SIMMONS		DIST	2132.4	-	14:15:	80	20-11-04	WOOD	ALLET PAN
	SWAN	0	Nech-Geraini 108	2142.5		19:00:	10	1:00:00	1	
ma phá	cend 1	Ability Call	Ored Con	ar S Tanu	Erry Point	Pres	121	Haza/Thra/Cloud	Departing	tu
	1		1.00	14 A. T. A.					Arriving	w
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			1	04		Dist X	ON	Parte Cata	Thread	10
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in land		- 14	O41	MA X FO		Ave. Day.	WIT .	0.4.40	1 PPS adge	
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Sec.P	. DR:	Mitalian ID#	Line Ind Time	Time On Line	30	HDOP	P009	14	n Notas/Comments	
Test	4/4	11 Y		1/2	3/2	2/2	n/s	GPS Began Logging	At	1000
156	358.9	20:49:21	20:49:21	0:00:00	-		vatite 2-Dam	Serior Ministr	No. Y	No.
141	309.7	21:04:23	21:04:23	0:00:00	-	1	-	1		-
142	129.7	21:12:41	21:12:41	0:00:00	1.00	1.000		-		
143	309.7	21:21:00	21:21:00	0:00:00		· · · · · ·	1			
144	129.7	21:29:39	21:29:39	0:00:00	1.00	1.000	10 million (* 1			
145	309.7	21:37:42	21:37:42	0:00:00	h	a	· · · · ·			
146	129.7	21:47:00	21:47:00	0:00:00		1.	1	1.00		
147	309.7	21:55:11	21:55:11	0:00:00	4. juni - 1	-C	$\leq - 0$	-		
148	129.7	22:04:17	22:04:17	0:00:00		-				
149	309.7	22:12:33	22:12:33	0:00:00						
150	129.7	22:21:55	22:21:53	0:00:00	-	1	1			
151	120 7	22:29:54	22.29.34	0:00:00	-	-	-			
153	309.7	22:38:00	22:34:58	0:00:00	-	-	-			-
154	309.7	22:52:05	22:52:05	0:00:00		-		-		
37	89.62	23:08:39	23:08:39	0:00:00		1.000	1.1			
36	269.6	23:32:11	23:32:11	0:00:00	-	P		1		_
35	269.6	23:57:10	23:57:10	0:00:00	< C 3	6	1.00	S		
155	178:7	0:27:07	0:27:07	0:00:00			t = t			
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1.200				Additional Comment		-	-		and the second	Delan 4

				1	Nool	pert			
Leica	LIDAR	1/21/2014	21	73741	1	Bast	-	Frank Sec	
-	SMITH	-	MADACP	4576.2	=	21	and these	15:12:00	tu.
_	- Paul	_	and has	NOR INC.	=	-	id tim	2019/20	
What IS	RADER .	Visibility 1	Calley Char	estila Terre	Destruction	24	Presson and Presso	20-66:00	Department in a second
320	/12	10	100 million (100 million)	9	-3		3005	- Culture - 1	Arthing m
Scan A	agia (FOV)	Scan Freque	ncy (Hz) 7	ulas Rate (Miz)	Laser P	ower %	Fixed Gain Gain - Course A	5 6 See	ode Threshold V
	40	42.3	3	272	10	00	Gain - Fine/Dow	m 12 Mutt	X B
15	50	FM 6500	R	var B	2	2 x	Waveform Mode		Pre-Englist Dat.
-		Line Short Time	Une End Time	Time On Line	> 20	ince	8008	in the second	MS Comments
Test	0/4			1/2	n/s	= =		GPS Degree Longing At	15:00:0
		2 Treat antared	are Auto / Gilling			-		Vertir Schurne Methors In	mion Fast y I No.
130	w	15:24:00	15:36:00	7:28:00	14	0.7	13		and an other states
131	e	15:39:00	15:49:00	0:00:00	15	0.7	12		
132	w	15:52:00	16:04:00	0:00:00	14	0.7	1.4		
133	e	16:07:00	16:16:00	0:00:00	14	0.7	14	-	
134	w	16:19:00	16:31:00	0:00:00	16	0.7	11	clds wp 22,21,12	
135	e	16:34:00	16:43:00	0:00:00	16	0.7	1.1		
136	W	16:47:00	16:58:00	0:00:00	16	0.7	1.2	_	
137	e	17:01:00	17:10:00	0:00:00	17	0.7	12	-	
138	w	17:13:00	17:24:00	0:00:00	18	0.6	. 11	-	
139	e	17:27:00	17:36:00	0:00:00	18	0.6	1.1		
140	w	17:39:00	17:50:00	0:00:00	19	0.6	11	_	
141	e	17:53:00	18:02:00	0:00:00	20	0.6	1	-	
142	w	18:05:00	18:15:00	0:00:00	18	0.6	1.1		
143	•	18:18:00	18:27:00	0:00:00	19	0.6	11	-	
144	w	18:30:00	18:40:00	0:00:00	1/	0.7	14	11	
145	e	18:43:00	10:02:00	0.00.00	10	0.7	13	cids wp 33 ,34	
140	w	16.33.00	19.03.00	0.00.00	19	9.7	13	tds wp 32,2	
147		10-35-00	10-44-00	0:00:00	10	0.6	11	tuc entri-reboot	
148		19-47-00	19-56-00	0.00.00	19	0.6	11	-	
146	w	19:58:00	19:59:00	0:00:00	19	0.0	11	refit wn 32 31	
145		20:04:00	20:05:00		20	0.6	1	refit wp 33.34	
134	w	20:11:00	20:15:00		20	0.6	1	reflt wp 22.21.1	2
146	e	20:25:00	20:26:00		19	0.6	11	refit wp 2	
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ditional C	ornmants:								Drives

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Leica	LIDAR	1/21/2014	2114	73741	14000	1	T1 01	Lin	ural, Mississip	api i	
G	ALANIBOS	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	NADACP	2993.8		100	14:00	16:14:	10e 20	w	COLFERT PIN
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What Day		Value	tailing the	Court Tana	Des Pala	-	Plants	max/W	e/Chuit	Departs	KGW
350 11	pg 26	10 0	Clear	0 4	-6	-1	3018	- Cu		Artista	KGW
Scan Au	igle (FOV)	Scan Preques	sty (Hz) P	ulas Rate (M/z)	Laser P	OWER N.	Rand Gain Gain - Course/		Mode		Threshold Ve
4	40	42.3	100	272	10	00	Gain - Rea/Dou	MI 12	Mutt	x	. 1
d E	0	AGL CEOD	MEL	6624 B	Waveform U	a	Waveform Mode		-		Drigger Dist.
15	u.	0000	A	0034 R	3	2 X	1	@		NS	
	Dk:	Line Start Time	Line End Time	Time On Line	9/1	HDOP	PDOP	-	Line Note	(Comm	enia .
last .	n/s	-		1/2	n/s	s/s	n/a	GPS Began Log	ging At		15:11:25
49	W	16:14:24	16:24:32	9:04:10	15	0.7	11	Takeoff: 1	1517z/ 9:	17am	Y I NO
50	E	16:27:35	16:36:35	0:00:00	17	0.6	1	Overfly b	ase: 15:2	6:18/	overfly MP
51	w	16:39:23	16:49:23	0:00:00	15	0.7	12	Standing	Water in	proje	t area from
52	E	16:52:10	17:01:05	0:00:00	17	0.8	1.1	heavy rais	ns		A. 11
53	W	17:04:34	17:14:35	0:00:00	16	0.7	12				_
54	E	17:17:18	17:26:06	0:00:00	19	0.6	1				
155	w	17:29:47	17:39:42	0:00:00	18	0.6	11	0.0	_	-	_
156	E	17:42:28	17:51:03	0:00:00	19	0.6	1,1	1			
157	w	17:54:06	18:03:40	0:00:00	19	0.7	1.1	Offline w	pt 26		
58	E	18:06:30	18:15:15	0:00:00	18	0.6	11				
59	W	18:08:17	18:28:04	0:00:00	19	0.6	11	-			-
160	E	18:30:44	18:59:11	0:00:00	17	0.7	14	0100			_
167	W E	18:42:24	10:03:35	0.00.00	17	0.7	13	+			
163	w	10-06-30	10-15-54	0.00.00	10	0.7	13	-			-
64	F	19-18-27	19-26-58	0.00.00	19	0.6	13	-			-
165	W	19:29:54	19:39:08	0:00:00	19	0.8	1				
166	E	19:41:44	19:50:44	0:00:00	18	0.6	1	-			-
167	w	19:53:42	20:02:51	0:00:00	20	0.6	11	1			
68	E	20:05:34	20:14:27	0:00:00	20	0.6	1				
169	W	20:17:00	20:26:08	0:00:00	20	0.6	1				
170	E	20:29:11	20:37:44	0:00:00	20	0.6	1	1			
71	W	20:40:31	20:49:32	0:00:00	18	0.6	11				
172	E	20:52:00	21:09:04	0:00:00	17	0.7	1.4	1			
73	W	21-12:02	21-29:37	0:00:00	17	0.7	1.4	-			
57	W	21:35:32	21:40:06	0:00:00	17	0.7	1.4	Reflight -	Patch	_	
-	-		-	0.00.00	-	-	-	Owners	MADE	71.57	-84
-			-	0:00:00	-	-	-	Whenly D	ase. Wirt	20/4-7	20mm
-+				0:00:00	-			Static N/	A	20/42	opin
-	-	-		0.00-00	-	-	-				
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and the second sec				1.05	-	-	-				Debus d

						W	00	pert							
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100	TRANSIT	DAR BOUDULAS Use 24 1/22/2014 2214 MAR 1/22/2014 2214 MAR Market Market 10 Clear Add MAR 42.3 Market MAR 6500 R MAR 10:52:40 20:09:4 S 20:13:32 20:33:4 S 20:47:34 21:06:1 MAR	1	300	2.5	1	2	56:00		21:0	6:50		601	-	
What De	-	Value	any	Chevel		-	Des Pair		Plants	-	14.04	Ne/Chil	Depar	94	KGW
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peed		NO.27 NO.27 Image: Sec. Sec. Sec. Sec. Sec. Sec. Sec. Sec.	NGL .		W	vetore D	het	Waveform Ma	/Down de	- 12	Mut	X	-Trigger I	Sec.	
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74	E	19:52:40	20:09	:47	16:47:	20	20	0.5	1	T	skeoff.	1848z/	12:46	m	
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2.6	5	20:47:34	21:06	:59	0:00:0	0	18	0.6	1.6	SI	anding	Water	in proje	ect area	a tron
	-		-	-	0:00:0	0	-	-	-	0	wrfly R	ase: 110	21-14-	30	-
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and .	-	Adt	-	SL.		-	Waveford	n Uand		Waveform M	inde	1 12	-	Pa	Trianger Dist.
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3	w	18:03:00	18:26:	00	0:00	00	19		0.6	13	-	refit wo	10-1		-
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	5	21:14:00	21:03	7:00	18:4	1:00	16	0.7	1	-	refit	13-9		-
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Optes	ch LIDA	R 2/15/20	14 45	73741	1.15	1		USGS hope	-			
-	Can and the Can		All STOR	10100 Day	-	Energy and		16-12-00				
	-		Taman' Type	HORD INC	-	Local Red	-	Sale and Taxa	HOLD'S			
	SHELTOW		Optaci- Gamini 308	2151.5		4.53-9	0	22:53:00	LUL A	LUL Aliport		
d Dir/Se		Valuery Ca	Give Cleard C	over S Tama	Date Point	Pres	121	Haza/Fira/Cloud	Departing	ITC/U		
310) 4	10	Clear	0 9	0	<u></u>	3022	M	Arriving	tut		
Frequenc	CY RL	st-Angle System	n PBF Roll Compensatio	Made N	Autopulae	1.00	ARS		DISTILZER			
46		12 12	25 94		BOC	SAMP		Range Gata Laur	Threshold Trigger Edge 1795 edge			
	130		5000	5260		and set.	250	-	- Contraction			
ing #	Die,	Mission ID#	Line Ind Time	Time On Line	5/1	HDOP	PDOP	Line No	tas/Committe			
Test	1/4	18:01:10	18:01:29	7/2	3/2	1/2	n/s	GPS Bagan Logging At:	17	:00:00		
	F	19:03:40	12-12-01	0:10:13	1 34	0.0	Verthe S-Turn	a Before Milmion	Net V	Fee		
2	E W	10:02:48	18:13:01	0.10.15	21	0.9	1.40	Late St	art a miles	-		
3	F	18:31:26	18:27:24	0:05:10	22	0.8	1.41	TIDN OF	F FOD TRAFE	ic.		
3	E	18:41-50	18:49:43	0.06:13	22	0.0	1.44	Continuation	of flight li	no 2		
4	W	18:51:12	10:40.12	0:11:10	22	0.8	1.44	continuatio	a or algored	ue 5		
5	F	19:06:19	19:17:15	0:10:56	19	0.8	14			-		
6	W	19:20:04	19:31:23	0:11:19	19	0.8	15			-		
7	E	19:34:23	19:45:36	0:11:13	18	0.9	1.6					
8	W	19:48:31	20:03:23	0:14:52	17	11	1.9					
9	E	20:03:41	20:15:28	0:11:47	17	11	2	21.2				
10	W	20:18:14	20:30:10	0:11:56	17	1	2)				
11	E	20:33:00	20:43:52	0:10:52	18	0.9	1.7					
12	W	20:46:54	20:58:31	0:11:37	17	1	1.7	west en	d light smok	e		
13	E	21:01:36	21:12:29	0:10:53	17	0.9	1.8	-		-		
14	W	21:15:32	21:26:54	0:11:22	17	0.9	1.8	(-		
15	E	21.29.37	21.40.43	0:10:53	17	0.9	1.8			-		
10	F	21:58:08	21.33.23	0:11:03	17	0.6	1.4			-		
18	W	22:30.00	72:09:11	011:23	17	0.8	14	-				
1	F	22:26:33	22:28:36	0:02:03	17	0.8	14	Fill in gar	at beginnin	e		
36	5	22:33:00	22:38:28	0:05:28	17	0.8	1.4	Cro	ss Flight	-d		
34	W	22:41:39	22:46:52	0:05:13	18	0.8	1.5	1				
35	E	22:49:34	22:52:30	0:02:56	18	0.8	1.5					
	100			0:00:00			1000	Landing 2	3:01z/5:01p	m		
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1	1.1			0:00:00	-	1.77						
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		-		0:00:00		16.5	2677 0	2.7				
		100 L 10		0:00:00	-							
Times	entered	are Zulu / GMT	T	Page	-	1	T	Verify 5-Turns After Miss	ION THE X	No		

					Wo	olpe	art.							
Optes	ch LIDA	8	2/15/2014	AL AL	71741 2				USQS Japper County, MS					
	Research Keller				10000 004		total Red	-	contail free to the					
-	GALAMBOS	-		011070	2151.9	-	6:27:0	0	8:27:58	WDOLPERT PAN				
	SHELTON	The second	Opted	- Germini 108	2053.8		10-00-0	10	004:00	LUL Aliport				
Ind Die Se	and _	Valbitav	Cellos	Ored Core	ar S Tana	Dane Point	Press	121	Haza/Hea/Close	Departing Kill				
Cal	Im	10	C	ir O	10	1	1.1	3015	0	Arriving Kill				
Frequen	ey Ha	d-Angle	System PRF	Roll	Olivergence M Modie	a tipular		AR	-	DIGETIZER.				
ar	1.1	12	100	1000	OR		Dee X	ON	Range Gata	Threshold				
40	1	12	125	ON X	WD ON		SAMP	. 🗖	Late	er Trigger Rige				
r frand	1	-	101	OFF	MR Y FO	Y	BOUNDA	URY	04.40	1 PPS adge				
1.11	130		5	000	5260	1.11	1000	250		A Longer				
See #	Dir.	Matio	n IDP	Line End Time	Time On Line	571	HDOP	P009	Line No.	tau/Comments				
Test	n/s	1.1			1/2	2/2	n/a	n/s	GPS Began Logging At	0:58:47				
19	F	0.27	10	0:38-31	0:11:21	22	0.8	1.3	Takeoff 6	17pm/00 17z				
20	W	0:41	:45	0:53:30	0:11:45	22	0.8	1.3	Landing: 0	4:12z/10:12pm				
21	E	0:56	:35	1:07:37	0:11:02	22	0.8	1.3						
22	w	1:11	:03	1:22:44	0:11:41	22	1.2	1.4	-					
23	E	1:25	:45	1:36:47	0:11:02	21	1,1	2						
24	W	1:40	:12	1:51:52	0:11:40	22	1	1.6						
25	E	1:54	:44	2:05:47	0:11:03	21	0.9	1.5						
26	W	2:09	:12	2:21:07	0:11:55	22	0.8	1.5	1.2					
27	E	2:23	:59	2:35:02	0:11:03	25	0.8	1.5	-					
20	F	2:58	115	3:04:20	0.11:45	25	0.8	1.5	-					
30	w	3:07	133	3:19:30	0:11:57	23	0.8	15						
31	E	3:22	:56	3:33:22	0:10:26	23	0.8	1.5						
32	W	3:39	:04	3:49:09	0:10:05	23	0.7	1.4						
33	E	3:51	:39	3:59:34	0:07:55	22	0.8	1,3	5, a.					
	1	A	10		0:00:00	-	·	100						
1.1	1.1.1	1	1		0:00:00	1.00	A	1	Static	: 04:15:16				
	1	-	-		0:00:00					11. T				
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SECTION 7: FINAL DELIVERABLES

FINAL DELIVERABLES

The final lidar deliverables are listed below.

- LAS v1.2 classified point cloud
- LAS v1.2 raw unclassified point cloud flight line strips no greater than 2GB. Long swaths greater than 2GB will be split into segments)
- Hydrologically flattened Polygon z and Polyline z shapefiles
- Hydrologically flattened bare earth 1-meter DEM in ERDAS .IMG format
- 8-bit gray scale intensity images
- Tile layout and data extent provided as ESRI shapefile
- Control points provided as ESRI shapefile
- FGDC compliant metadata per product in XML format
- LiDAR processing report in pdf format
- Survey report in pdf format

