REGION 3

Pampanga Floodplain:

DREAM LiDAR Data Acquistion and Processing Report

TRAINING CENTER FOR APPLIED GEODESY AND PHOTOGRAMMETRY

2015

Published by the UP Training Center for Applied Geodesy and Photogrammetry (TCAGP)
College of Engineering
University of the Philippines Diliman
Quezon City
1101 PHILIPPINES

This research work is supported by the Department of Science and Technology (DOST) Grants-in-Aid Program and is to be cited as:

UP-TCAGP (2015), DREAM LiDAR Data Acquisition and Processing for Pampanga River Floodplain, Disaster Risk and Exposure Assessment for Mitigation (DREAM) Program, DOST Grants-In-Aid Program, 162pp.

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National Library of the Philippines
ISBN: 978-621-9695-05-9

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Abbreviations

ALTM	Airborne Laser Terrain Mapper
DAC	Data Acquisition Component
DEM	Digital Elevation Model
DSM	Digital Surface Model
DTM	Digital Terrain Model
DVC	Data Validation Component
FOV	Field of View
FTP	File Transfer Protocol
GPS	Global Positioning System
GNSS	Global Navigation Satellite System
POS	Position Orientation System
PRF	Pulse Repetition Frequency
NAMRIA	National Mapping and Resource Information Authority

Introduction

Introduction

1.1 About the DREAM Program

The UP Training Center for Applied Geodesy and Photogrammetry (UP TCAGP) conducts a research program entitled "Nationwide Disaster Risk and Exposure Assessment for Mitigation (DREAM) Program" funded by the Department of Science and Technology (DOST) Grants-in-Aid Program. The DREAM Program aims to produce detailed, up-to-date, national elevation dataset for 3D flood and hazard mapping to address disaster risk reduction and mitigation in the country.

The DREAM Program consists of four components that operationalize the various stages of implementation. The Data Acquisition Component (DAC) conducts aerial surveys to collect Light Detecting and Ranging (LiDAR) data and aerial images in major river basins and priority areas. The Data Validation Component (DVC) implements ground surveys to validate acquired LiDAR data, along with bathymetric measurements to gather river discharge data. The Data Processing Component (DPC) processes and compiles all data generated by the DAC and DVC. Finally, the Flood Modeling Component (FMC) utilizes compiled data for flood modeling and simulation.

Overall, the target output is a national elevation dataset suitable for 1:5000 scale mapping, with 50 centimeter horizontal and vertical accuracies. These accuracies are achieved through the use of state-of-the-art airborne Light Detection and Ranging (LiDAR) technology and appended with Synthetic-aperture radar (SAR) in some areas. It collects point cloud data at a rate of 100,000 to 500,000 points per second, and is capable of collecting elevation data at a rate of 300 to 400 square kilometers per day, per sensor.

1.2 Objectives and Target Output

The program aims to achieve the following objectives:

a) To acquire a national elevation and resource dataset at sufficient resolution to produce information necessary to support the different phases of disaster management,

b) To operationalize the development of flood hazard models that would produce updated and detailed flood hazard maps for the major river systems in the country,

c) To develop the capacity to process, produce and analyze various proven and potential thematic map layers from the 3D data useful for government agencies,

d) To transfer product development technologies to government agencies with geospatial information requirements, and,

e) To generate the following outputs

1) flood hazard map
2) digital surface model
3) digital terrain model and
4) orthophotograph

1.3 General Methodological Framework

The methodology employed to accomplish the project's expected outputs are subdivided into four (4) major components, as shown in Figure 1. Each component is described in detail in the following sections.

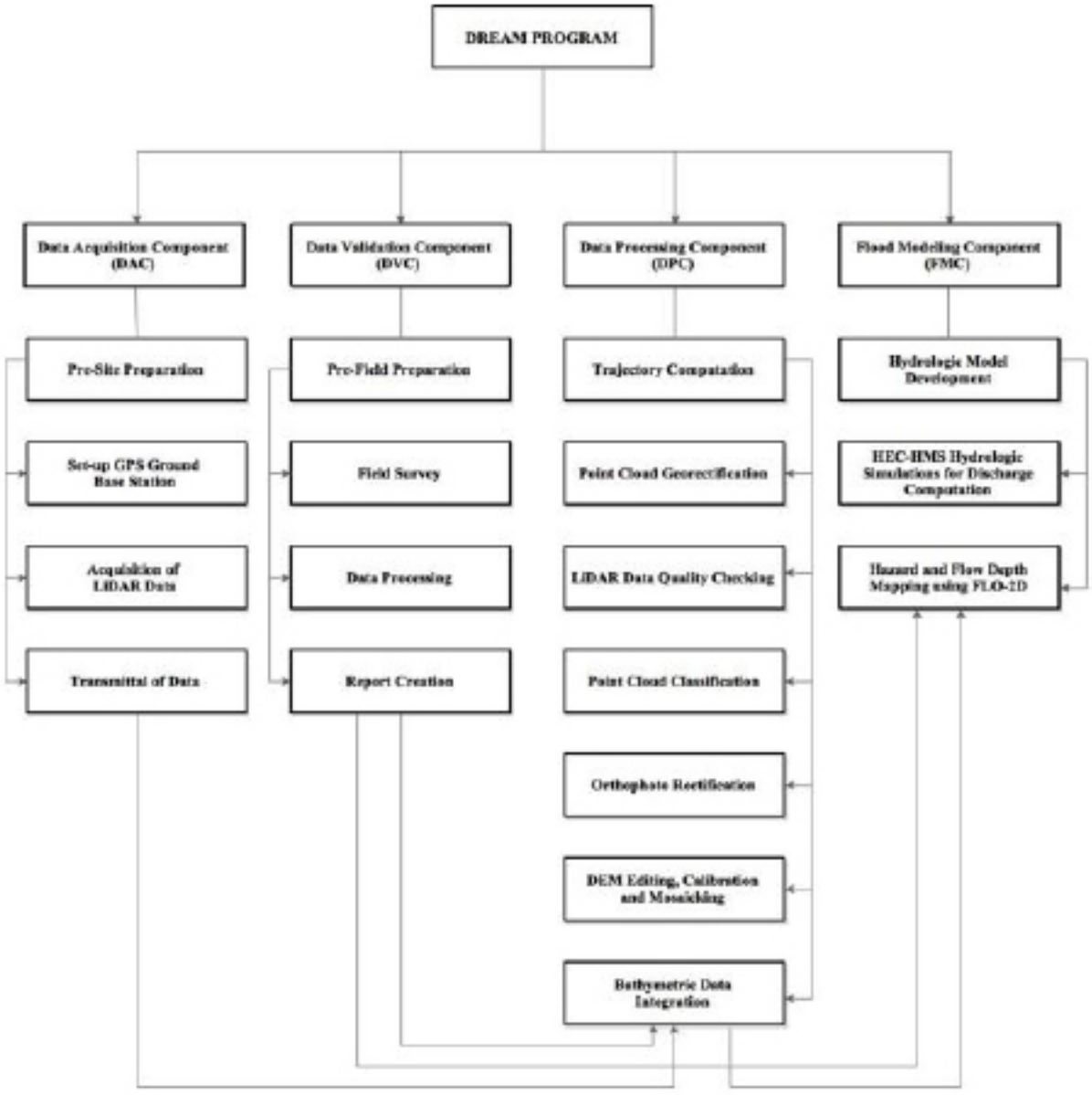


Figure 1. The General Methodological Framework of the Program

Study Area

Study Area

The Pampanga River Basin is located in the Central Luzon Region. The Pampanga River Basin is considered as the fourth largest river basin in the Philippines. It is also considered as the second largest of Luzon's catchments, next to Cagayan River. It has an estimated basin area of 9,759 square kilometers. The location of Pampanga River Basin is as shown in Figure 2.

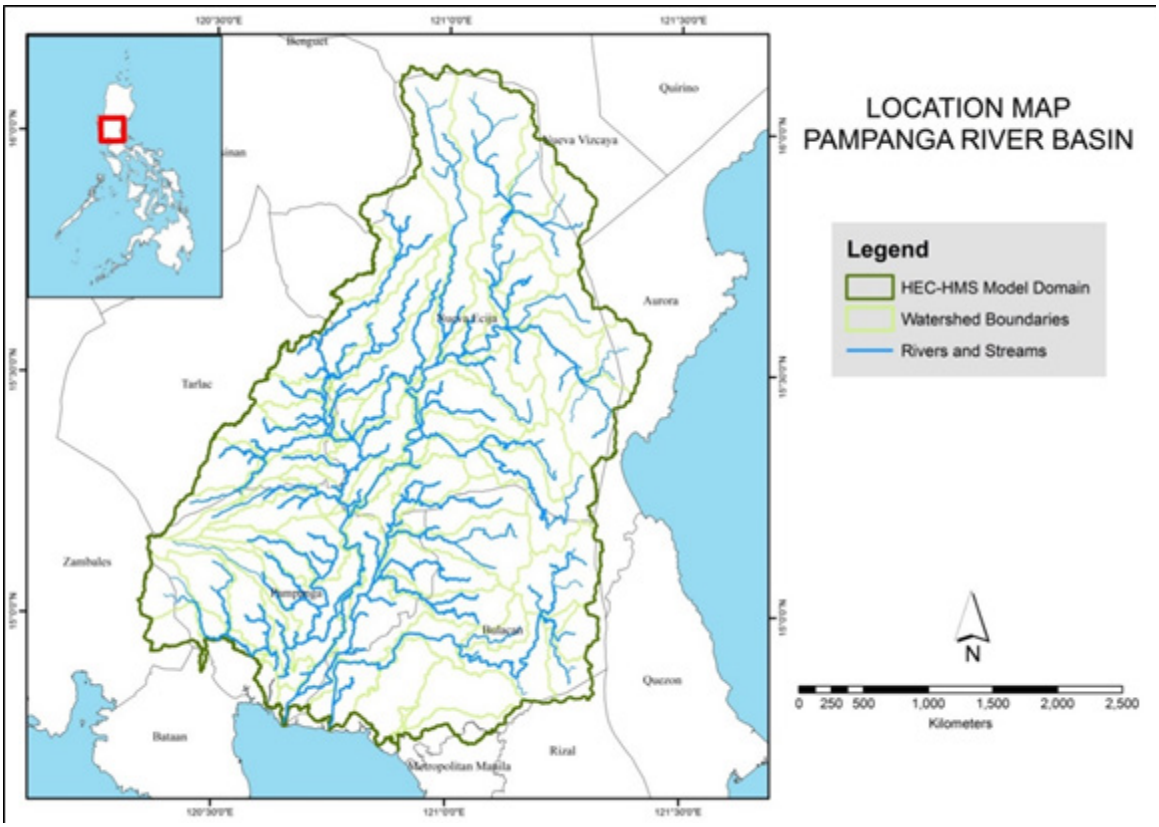


Figure 2. Pampanga River Basin Location Map

It traverses from the southern slopes of Caraballo Mountains, range of Sierra Madre, Central Plain of the Luzon Island to its mouth in Manila Bay via the Lanbangan Channel. It is supported by four tributaries namely: Penaranda River, Coronel-Santor River, Rio Chico River and Bagbag River. The river basin encompasses parts of the following provinces: Aurora, Bataan, Bulacan, Nueva Ecija, Nueva Vizcaya, Pampanga, Pangasinan, Rizal and some parts of the national capital region including Valenzuela, Caloocan, and Quezon City. The Pampanga River Basin serves as a source of water supply for the irrigation of Nueva Ecijia.

The land and soil characteristics are important parameters used in assigning the roughness coefficient for different areas within the river basin. The roughness coefficient, also called Manning's coefficient, represents the variable flow of water in different land covers (i.e. rougher, restricted flow within vegetated areas, smoother flow within channels and fluvial environments).

The shape files of the soil and land cover were taken from the Bureau of Soils, which is under the Department of Environment and Natural Resources Management, and National Mapping and Resource Information Authority (NAMRIA). The soil and land cover of the Pampanga River Basin are shown in Figures 3 and 4, respectively.

Study Area

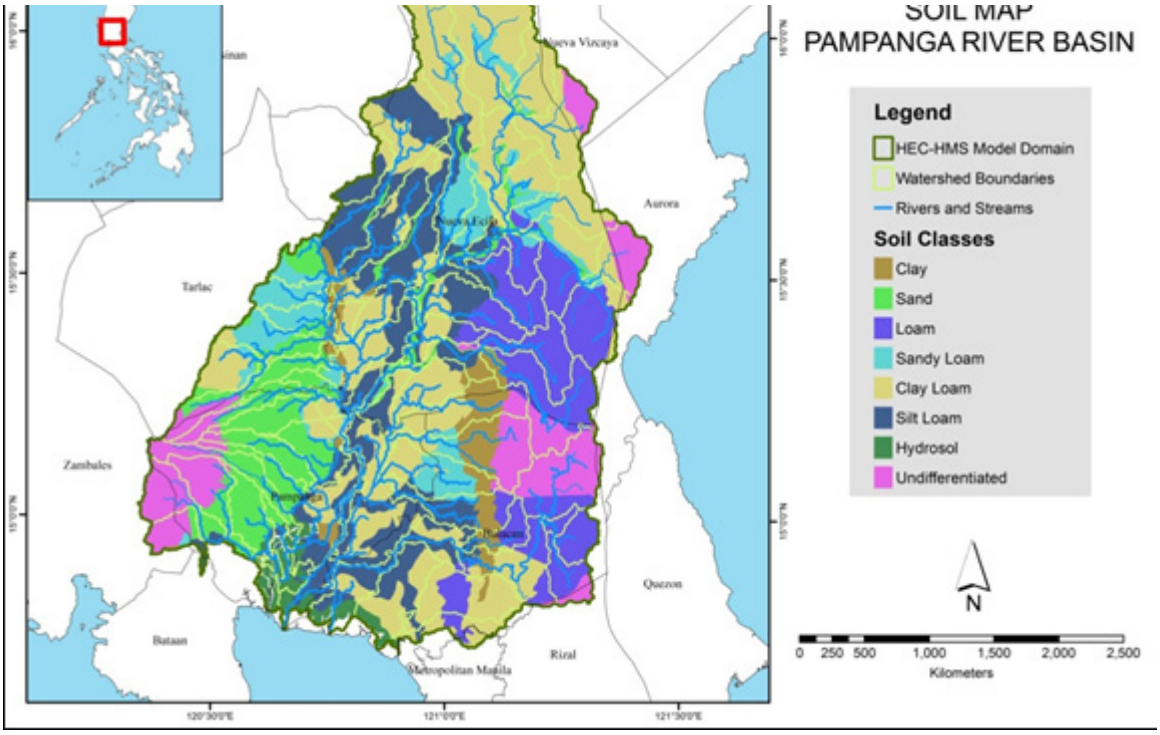


Figure 3. Pampanga River Basin Soil Map

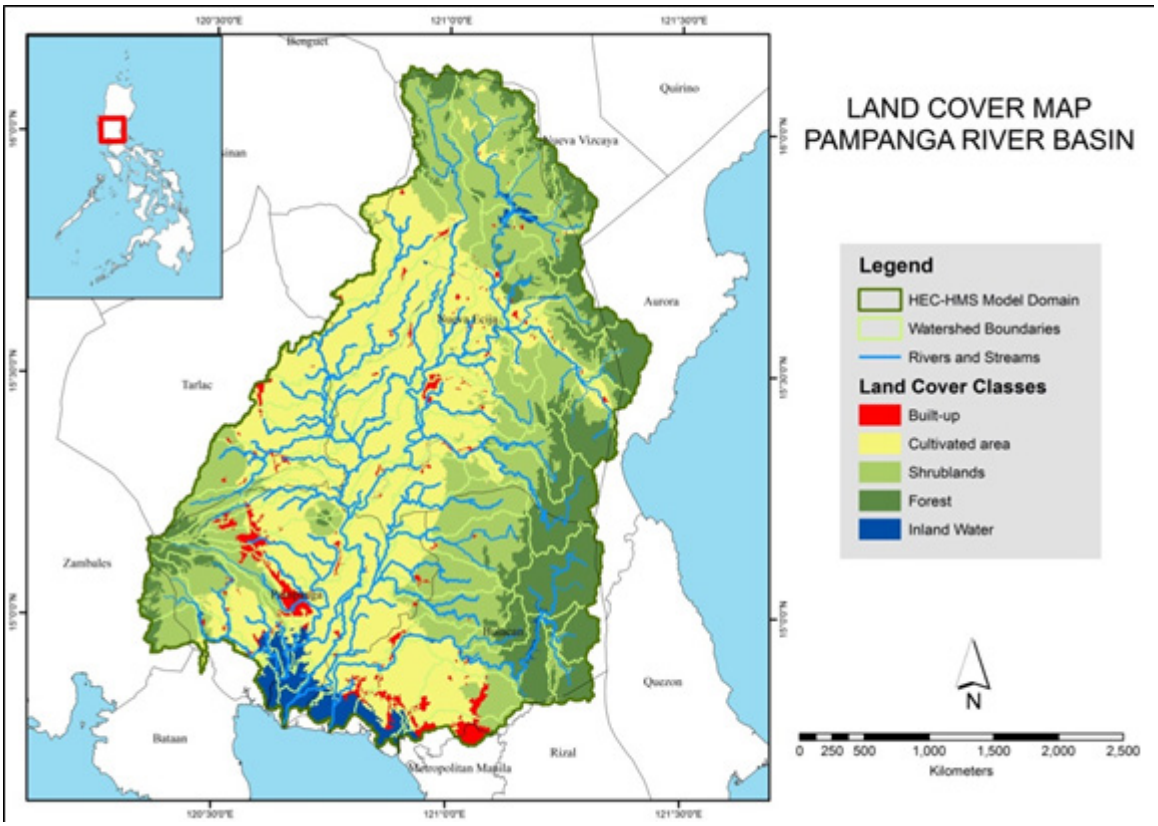


Figure 4. Pampanga River Basin Land Cover Map

Methodology

Methodology

3.1 Aquisition Methodology

The methodology employed to accomplish the project's expected outputs are subdivided into four (4) major components, as shown in Figure 5. Each component is described in detail in the following sections.

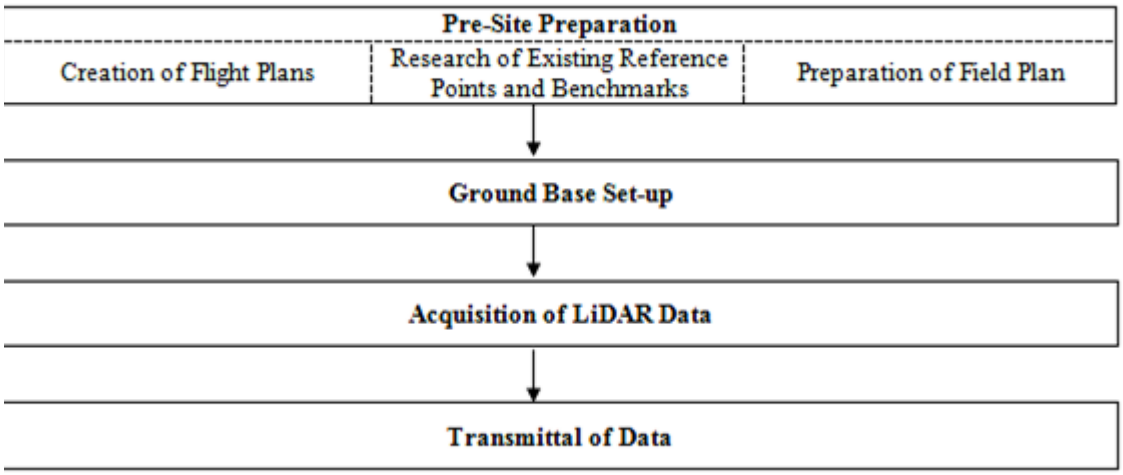


Figure 5. Flowchart of Project Methodology

3.1.1 Pre-Site Preparations

3.1.1.1 Creation of Flight Plans

Flight planning is the process of configuring the parameters of the aircraft and LiDAR technology (i.e., altitude, angular field of view (FOV)), speed of the aircraft, scans frequency and pulse repetition frequency) to achieve a target of two points per square meter point density for the floodplain. This ensures that areas of the floodplain that are most susceptible to floods will be covered. LiDAR parameters and their computations are shown in Table 1.

The parameters set in the LiDAR sensor to optimize the area coverage following the objectives of the project and to ensure the aircraft's safe return to the airport (base of operations) are shown in Table 1. Each flight acquisition is designed for four operational hours. The maximum flying hours for Cessna 206H is five hours.

Methodology

Table 1. Computation of LiDAR parameter

SW (Swath Width)		SW = 2 * H * tan (θ/2)	H – altitude Θ – angular FOV
Pointing Space	ΔXacross	ΔXacross = (Θ * H) / (Ncos2(Θ/2))	ΔXacross – point spacing across the flight line H – altitude Θ – angular FOV N – number of points in one scanning line
	ΔXalong	ΔXalong = v / fsc	ΔXalong- point spacing along the flight line v – forward speed (m/s) fsc – scanning rate or scan frequency
Point density, dmin		dmin = 1 / (ΔXacross * ΔXalong)	ΔXacross, ΔXalong point spacings
Flight line separation, e		e = SW * (1 – overlapping factor)	SW – swath width

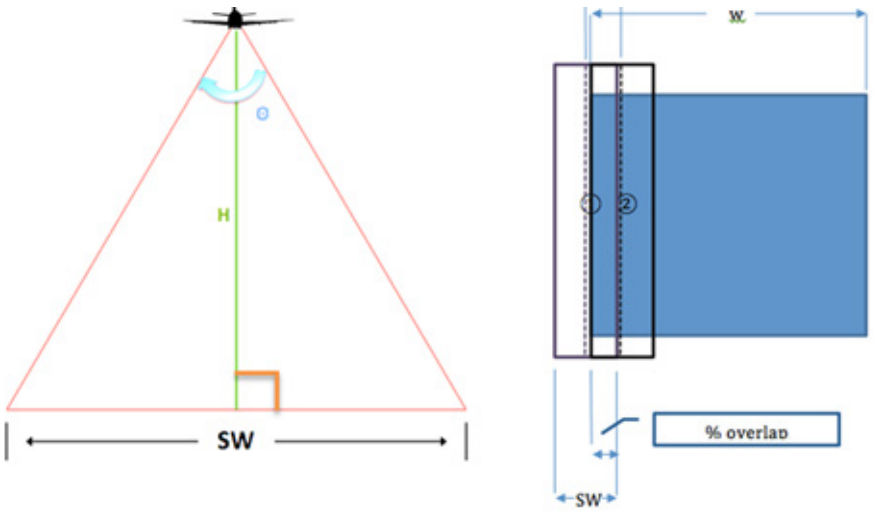


Figure 6. Concept of LiDAR data acquisition Parameters

The relationship among altitude, swath, and FOV is show in Figure 6. Given the altitude of the survey (H) and the angular FOV, the survey coverage for each pass (swath) can be calculated by doubling the product of altitude and tangent of half the field of view.

3.1.1.2 Collection of Existing Reference Points and Benchmarks

Collection of pertinent technical data, available information, and coordination with the National Mapping and Resource Information Authority (NAMRIA) is conducted prior to the surveys. Reference data collected includes locations and descriptions of horizontal and vertical control (elevation benchmarks) points within or near the project area. These control points are used as base stations for the aerial survey operations. Base stations are observed simultaneously with the acquisition flights.

3.1.1.3 Preparation of Field Plan

In preparation for the field reconnaissance and actual LiDAR data acquisition, a field plan is prepared by the implementation team. The field plan serves as a guide for the actual fieldwork and included personnel, logistical, financial, and technical details. Three major factors are included in field plan preparation: priority areas for the major river basin system; budget; and accommodation and vehicle rental.

LiDAR data are acquired for the floodplain area of the river system as per order of priority based on history of flooding, loss of lives, and damages of property. The order of priority in which LiDAR data surveys are conducted by the team for the floodplain areas of the 18 major river systems and 3 additional systems is shown in Table 2.

Methodology

Table 2. List of Target River Systems

	Target River System	Location	Area of the River System (km^2)	Area of the Flood Plain (km^2)	Area of the Watershed (km^2)
1	Cagayan de Oro	Mindanao	1,364	25	1,338.51
1.1	Iponan	Mindanao	438	33	404.65
2	Mandulog	Mindanao	714	7	707.41
2.1	Iligan	Mindanao	153	7	146.38
2.2	Agus	Mindanao	1,918	16	1,901.60
3	Pampanga	Luzon	11,160	4458	6702
4	Agno	Luzon	6,220	1725	4495
5	Bicol	Luzon	3,173	585	2,587.79
6	Panay	Visayas	2,442	619	1823
7	Jalaur	Visayas	2,105	713	1,392
8	Ilog Hilbangan	Visayas	2,146	179	1967
9	Magasawang Tubig	Luzon	1,960	483	1,477.08
10	Agusan	Mindanao	11,814	262	11,551.62
11	Tagoloan	Mindanao	1,753	30	1,722.90
12	Davao	Mindanao	1,609	54	1555
13	Tagum	Mindanao	2,504	595	1,909.23
14	Buayan	Mindanao	1,589	201	1,388.21
15	Mindanao	Mindanao	20,963	405	20,557.53
16	Lucena	Luzon	238	49	189.31
17	Infanta	Luzon	1,029	90	938.61
18	Boracay	Visayas	43.34	43.34	N/A
19	Cagayan	Luzon	28,221	10386	17,835.14

3.1.2 Ground Base Set-up

A reconnaissance is conducted one day before the actual LiDAR survey for purposes of recovering control point monuments on the ground and site visits of the survey area set in the flight plan for the floodplain. Coordination meetings with the Airport Manager, regional DOST office, local government units and other concerned line government agencies are also held.

Ground base stations are established within 30-kilometer radius of the corresponding survey area in the flight plan. This enables the system to establish its position in three-dimensional (3D) space so that the acquired topographic data will have an accurate 3D position since the survey required simultaneous observation with a base station on the ground using terrestrial Global Navigation Satellite System (GNSS) receivers.

3.1.3 Acquisition of Digitial Elevation Data (LiDAR Survey)

Acquisition of LiDAR data is done by following the flight plans. The survey uses a LiDAR instrument mounted on the aircraft with its sensor positioned through a specially modified peep hole on the belly of the aircraft. The pilots are guided by the flight guidance software which uses the data out of the flight planning program with a mini-display at the pilot's cockpit showing the aircraft's real-time position relative to the current survey flight line. The reference points established by NAMRIA are also monitored and used to calibrate the data.

As the system collected LiDAR data, ranges and intensities are recorded on hard drives dedicated to the system while the images are stored on the camera hard drive. Position Orientation System (POS) data is recorded on the POS computer inside the control rack. It can only be accessed and downloaded via file transfer protocol (ftp) to the laptop computer. GPS observations were downloaded each day for efficient data management.

3.1.4 Transmittal of Acquired LiDAR Data

All data surrendered are monitored, inspected and re-checked by securing a data transfer checklist signed by the downloader (Data Acquisition Component) and the receiver (Data Processing Component). The data transfer checklist shall include the following: date of survey, mission name, flight number, disk size of the necessary data (LAS, LOGS, POS, Images, Mission Log File, Range, Digitizer and the Base Station), and the data directory within the server. Figure 7 shows the arrangement of folders inside the data server.

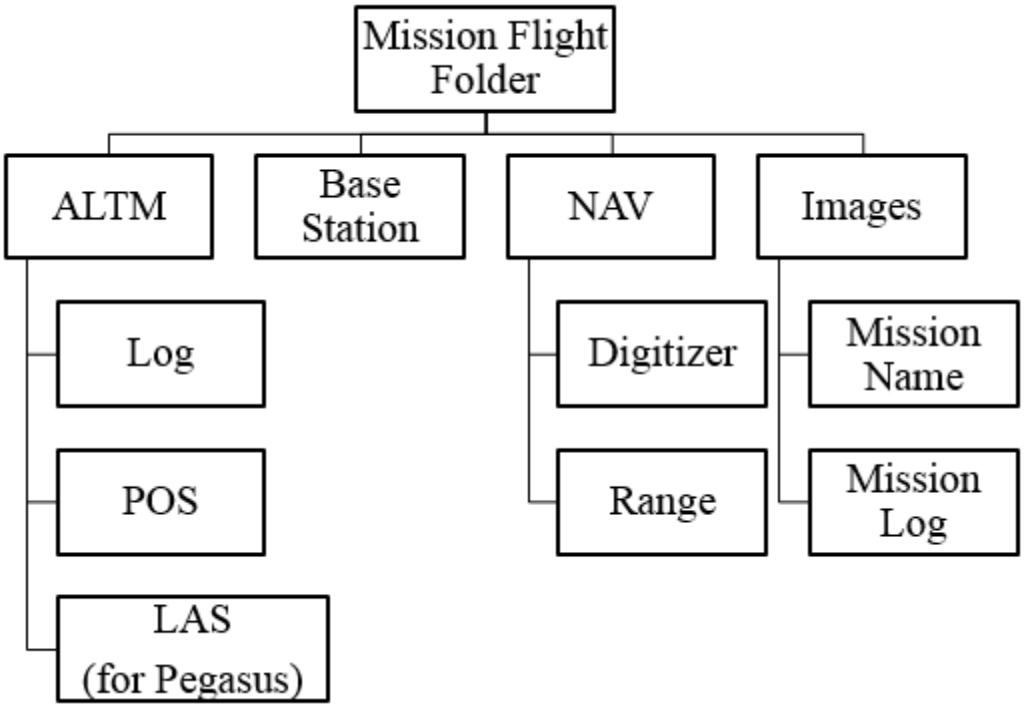


Figure 7. LiDAR Data Management for Transmittal

3.1.5 Equipment

3.1.5.1 ALTM Pegasus

The ALTM Pegasus (Optech, Inc) is a laser based system suitable for topographic survey (Figure 8). It has a dual output laser system for maximum density capability. The LiDAR system is equipped with an Inertial Measurement Unit (IMU) and GPS for geo-referencing of the acquired data (Annex A contains the technical specification of the system).

The camera of the Pegasus sensor is tightly integrated with the system. It has a footprint of 8,900 pixels across by 6,700 pixels along the flight line (Annex B contains the technical specification of the D-8900 aerial digital camera).

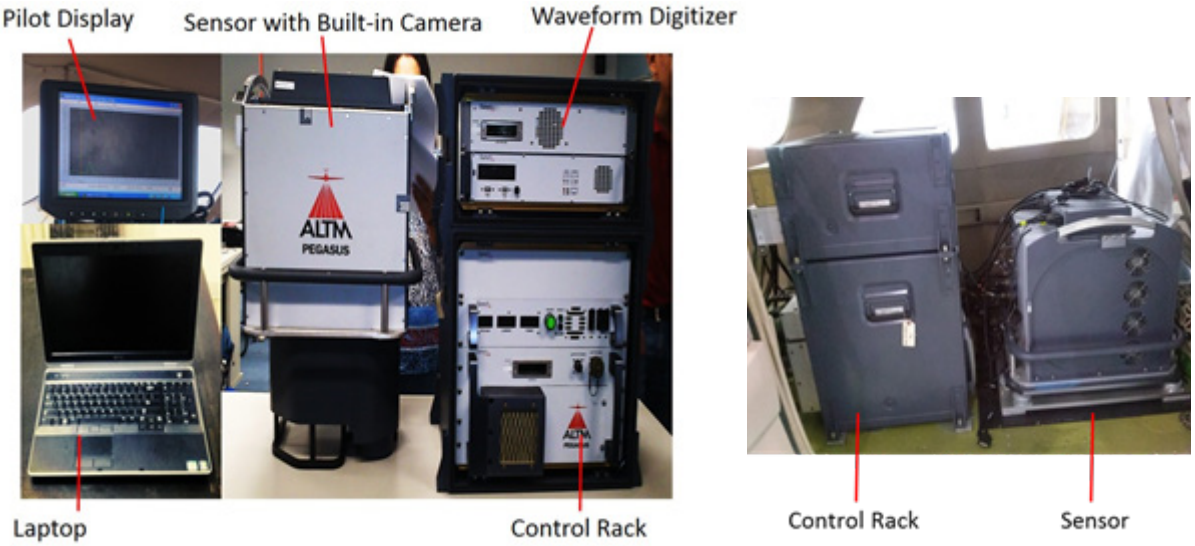


Figure 8. The ALTM Pegasus System: a) parts of the Pegasus system, b) the system as installed in Cessna T206H

3.1.5.1 ALTM Gemini

The ALTM Gemini is a laser based system suitable for topographic survey especially in high altitude areas with 16 kHz of effective laser rate. It has integrated camera and waveform digitizer. Image footprint has 8,900 pixels by 6,700 pixels along the flight line.

Figure 9. ALTM Gemini System

3.2 Processing Methodology

The schematic diagram of the workflow implemented by the Data Processing Component (DPC) is shown in Figure 10. The raw data collected by the Data Acquisition Component (DAC) is transferred to DPC. Pre-processing of this data starts with the computation of trajectory and georectification of point cloud, in which the coordinates of the LiDAR point cloud data are adjusted and checked for gaps and shifts, using POSPac, LMS, LAStools and Quick Terrain (QT) Modeler software.

The unclassified LiDAR data then undergoes point cloud classification, which allows cleaning of noise data that are not necessary for further processing, using TerraScan software. The classified point cloud data in American Standard Code for Information Interchange (ASCII) format is used to generate a data elevation model (DEM), which is edited and calibrated with the use of validation and bathymetric survey data collected from the field by the Data Validation and Bathymetry Component (DVBC). The final DEM is then used by the Flood Modeling Component (FMC) to generate the flood models for different flooding scenarios.

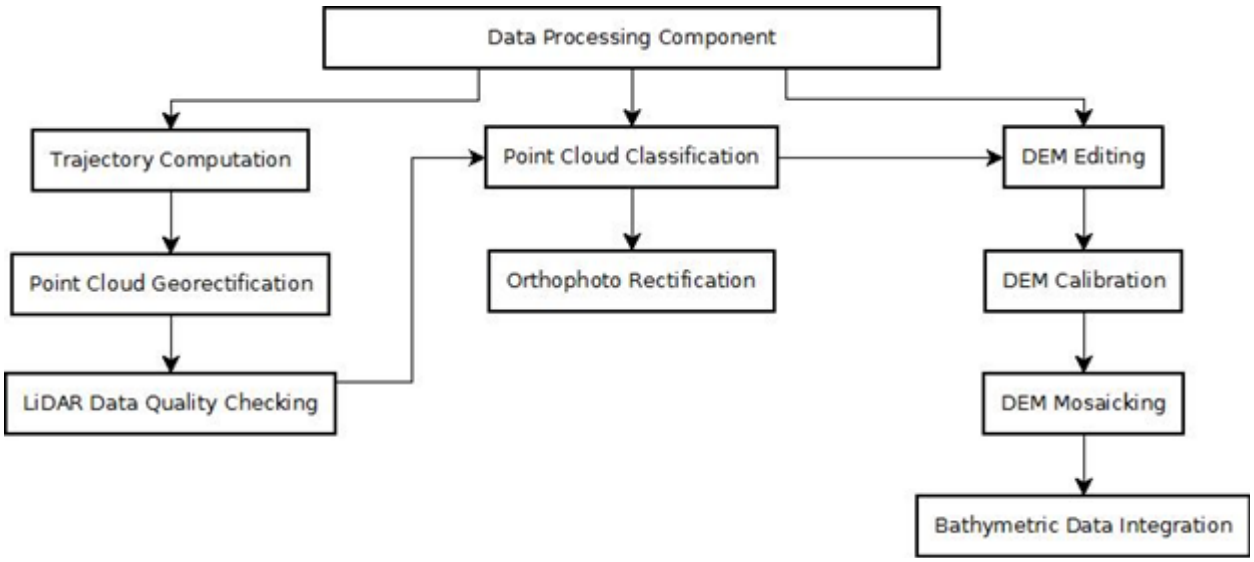


Figure 10. Schematic diagram of the data processing

3.2.1 Data Transfer

The Pampanga mission, named 2P3C2005A, was flown with the Airborne LiDAR Terrain Mapper (ALTM™ Optech Inc.) by Gemini system on January 18, 2013. The Data Acquisition Component (DAC) transferred 14.0 Gigabytes of Range data, 265 Megabytes of POS data, 7.38 Megabytes of GPS base station data, and 36.8 Gigabytes of raw image data to the data server on May 29, 2014.

3.2.2 Trajectory Computation

The trajectory of the aircraft is computed using the software POSPac MMS v6.2. It combines the POS data from the integrated GPS/INS system installed on the aircraft, and the Rinex data from the GPS base station located within 25 kilometers of the area. It then computes the Smoothed Best Estimated Trajectory (SBET) file, which contains the best estimated trajectory

of the aircraft, and the Smoothed Root Mean Square Estimation error file (SMRMSG), which contains the corresponding standard deviations of the position parameters of the aircraft at every point on the computed trajectory.

The key parameters checked to evaluate the performance of the trajectory are the Solution Status parameters and the Smoothed Performance Metrics parameters. The Solution Status parameters characterize the GPS satellite geometry and baseline length at the time of acquisition, and the processing mode used by POSPac. The acceptable values for each Solution Status parameter are shown in Table 3.

The Smoothed Performance Metrics parameters describe the root mean square error (RMSE) for the north, east and down (vertical) position of the aircraft for each point in the computed trajectory. A RMSE value of less than 4 centimeters for the north and east position is acceptable, while a value of less than 8 centimeters is acceptable for the down position.

Table 3. Solution Status Parameters in POSPac MMS v6.2.

Parameter	Optimal Values
Number of satellites	More than 6 satellites
Position Dilution of Precision	Less than 3
Baseline Length	Less than 30 km
Processing mode	Less than or equal to 1, however short bursts of values greater than 1 are acceptable

3.2.3 LiDAR Point Cloud Rectification

The trajectory file (SBET) and its corresponding accuracy file (SMRMSG) generated in POSPac are merged with the Range file to compute the coordinates of each individual point. The coordinates of points within the overlap region of contiguous strips vary due to small deviations in the trajectory computation for each strip. These strip misalignments are corrected by matching points from overlapping laser strips. This is done by the Lidar Mapping Suite (LMS) software developed by Optech.

LMS is a LiDAR software package used for automated LiDAR rectification. It has the capability to extract planar features per flight line and to form correspondence among the identical planes available in the overlapping areas (illustrated in Figure 11). In order to produce geometrically correct point cloud, the redundancy in the overlapping areas of flight lines is used to determine the necessary corrections for the observations.

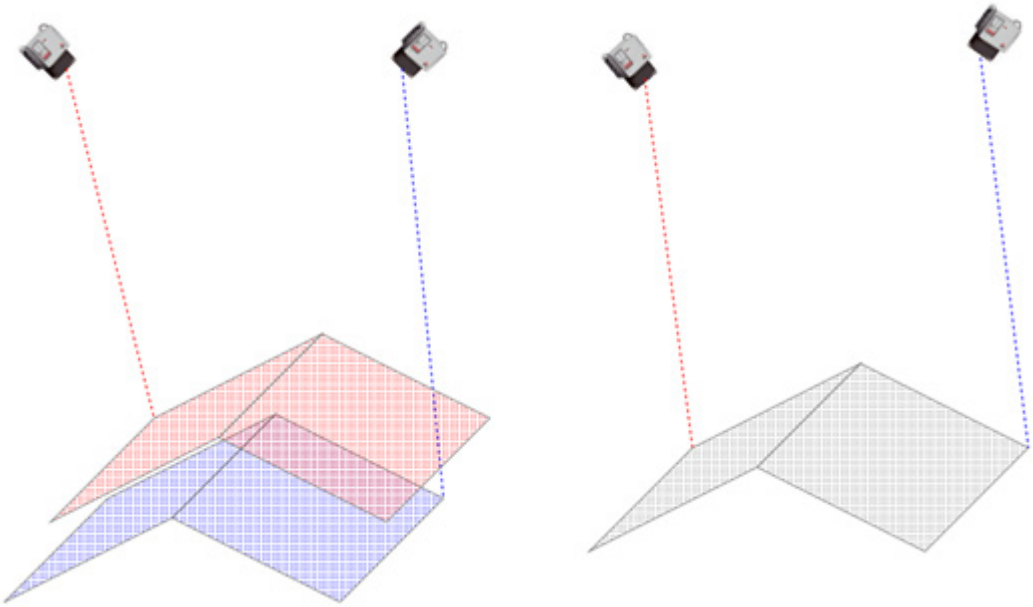


Figure 11. Misalignment of a single roof plane from two adjacent flight lines, before rectification (left). Least squares adjusted roof plane, after rectification (right).

The orientation parameters are corrected in LMS by using least squares adjustment to obtain the best-fit parameters and improve the accuracy of the LiDAR data. The primary indicators of the LiDAR rectification accuracy are the standard deviations of the corrections of the orientation parameters. These values are seen on the Boresight corrections, GPS position corrections, and IMU attitude corrections, all of which are located on the LMS processing summary report. Optimum accuracy is obtained if the Boresight and IMU attitude correction standard deviations are less than 0.001°, and if the GPS position standard deviations are below 0.01 m.

3.2.4 LiDAR Data Quality Checking

After the orientation parameters are corrected and the point cloud coordinates are computed, the entire point cloud data undergoes quality checking, to see if: (a) there are remaining horizontal and vertical misalignments between contiguous strips, and; (b) to check if the density of the point cloud data reach the target density for the site. The LAStools software is used to compute for the elevation difference in the overlaps between strips and the point cloud density. It is a software package developed by Rapidlasso GmbH for filtering, tiling, classifying, rasterizing, triangulating and quality checking Terabytes of LiDAR data, using robust algorithms, efficient I/O tools and memory management. LAStools can quickly create raster representing the computed quantities, which provide guiding images in determining areas where further quality checks are necessary. The target requirements for floodplain acquisition, computed by LAStools, are shown in Table 4.

Table 4. Parameters investigated during quality checks

Criteria	Requirement
Minimum per cent overlap	25%
Average point cloud density per square meter	2.0
Elevation difference between strips (on flat areas)	0.20 meters

LAStools can provide guides where elevation differences probably exceed the 20 centimeters limit. An example of LAStools output raster visualizing points in the flight line overlaps with a vertical difference of +/- 20 centimeters (displayed as dense red/blue areas) is shown in Figure 12.

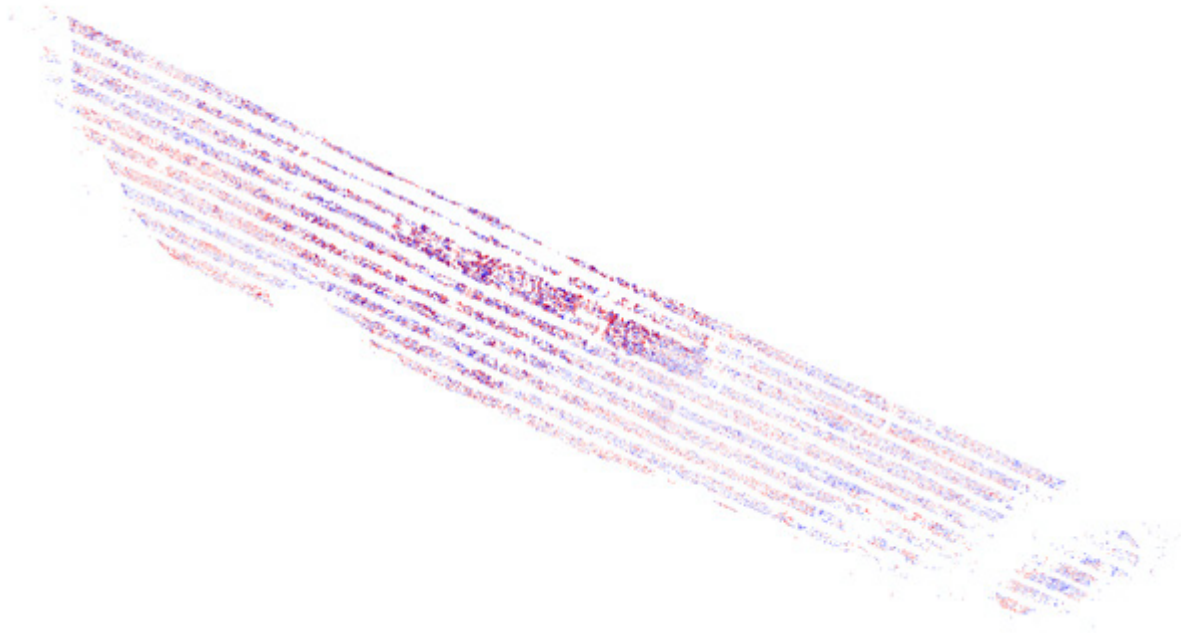


Figure 12. Elevation difference between flight lines generated from LAStools

To investigate the occurrences of elevation differences in finer detail, the profiling tool of Quick Terrain Modeler software is used. Quick Terrain Modeler (QT Modeler) is a 3D point cloud and terrain visualization software package developed by Applied Imagery, Inc. The profiling capability of QT Modeler is illustrated in Figure 13.

Methodology

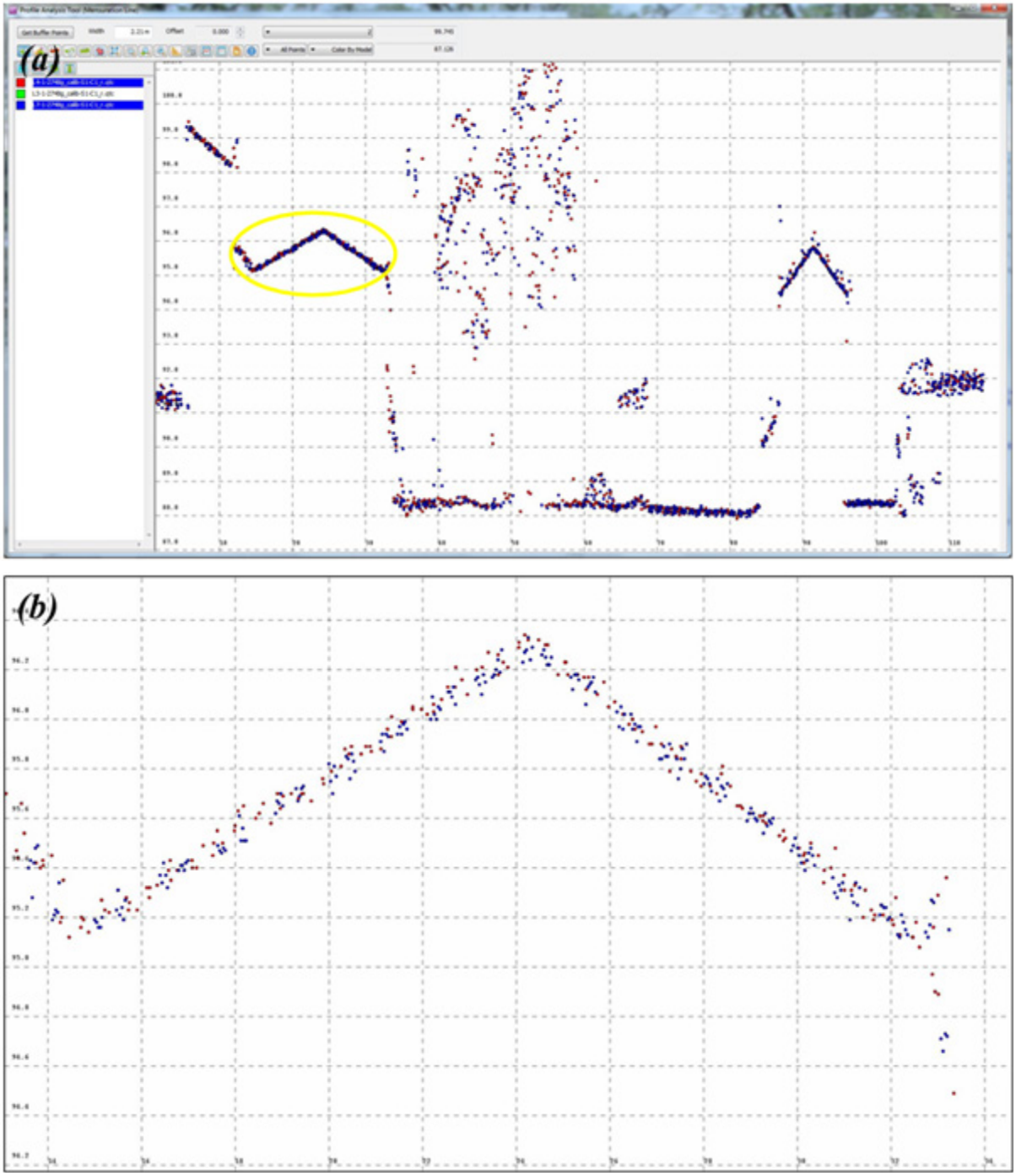


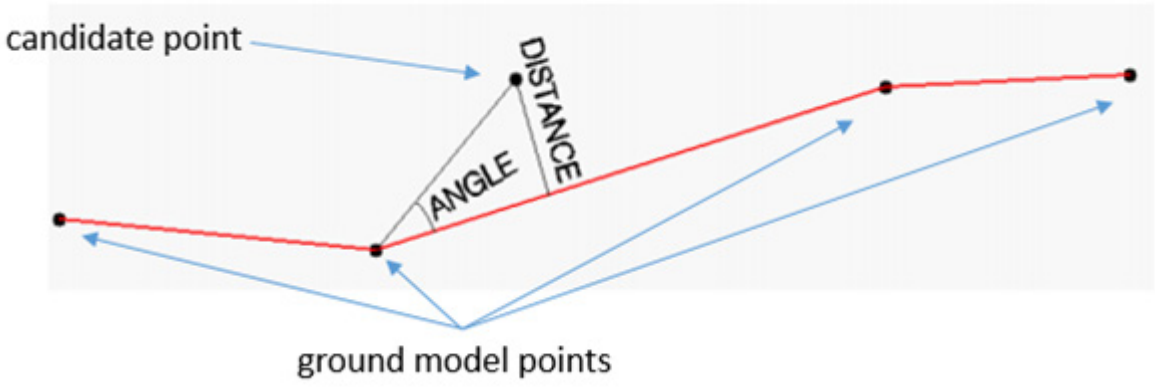
Figure 13. Profile over roof planes (a) and a zoomed-in profile on the area encircled in yellow

The profile (e.g., over a roof plane) shows the overlapping points from different flight lines which serve as a good indicator that the correction applied by LMS for individual flight lines is good enough to attain the desired horizontal and vertical accuracy requirements. Flight lines that do not pass quality checking are subject for reprocessing in LMS until desired accuracies are obtained.

3.2.5 LiDAR Point Cloud Classification and Rasterization

Point cloud classification commences after the point cloud data has been rectified. TerraScan is a TerraSolid LiDAR software suite used for the classification of point clouds. It can read airborne and vehicle-based laser data in raw laser format, LAS, TerraScan binary or other ASCII-survey formats. Its classification and filtering routines are optimized by dividing the whole data into smaller geographical datasets called blocks, to automate the workflow and increase efficiency. In this study, the blocks were set to 1 kilometer by 1 kilometer with a 50 m buffer zone to prevent edge effects.

The process includes the classification of all points into Ground, Low Vegetation, Medium Vegetation, High Vegetation and Buildings. The classifier tool in TerraScan first filters air points and low points by finding points that are 5 standard deviations away from the median elevation of a search radius, which is 5 meters by default. It then divides the region into 60m by 60m search areas (the maximum area where at least one laser point hits the ground) and assigns the lowest points in these areas as the initial ground points from which a triangulated ground model is derived. The classifier then iterates through all the points and adds the points to the ground model by testing if it is (a) within the maximum iteration angle of 4° by default from a triangle plane, and (b) if it is within the maximum iteration distance (1.2 m by default) from a triangle plane. The ground plane is continuously updated from these iterations. The ground classification technique is illustrated in Figure 14. It is apparent that the smaller the iteration angle, the less eager the classifier is to follow changes in the point cloud (small undulations in terrain or hits on low vegetation). An angle close to 4° is used in flat terrain areas while an angle of 10° is used in mountainous or hilly terrains.



The parameters for ground classification routines used in floodplain and watershed areas are listed in Table 5.

Methodology

Table 5. Ground classification parameters used in Terrascan for floodplain and watershed areas

Classification maximums	Floodplain (default)	Watershed (adjusted)
Iteration angle (degrees)	4	8
Iteration distance (meters)	1.20	1.50

The comparison between the produced DTM using the default parameters versus the adjusted is shown in Figure 15. The default parameters may fail to capture the sudden change in the terrain, resulting to less points being classified as ground that makes the DTM interpolated (Figure 15a). The adjusted parameters works better in these spatial conditions as shown in Figure 15b. Statistically, the number of ground points and model key points correctly classified can increase by as much as 50% when using the adjusted parameters.

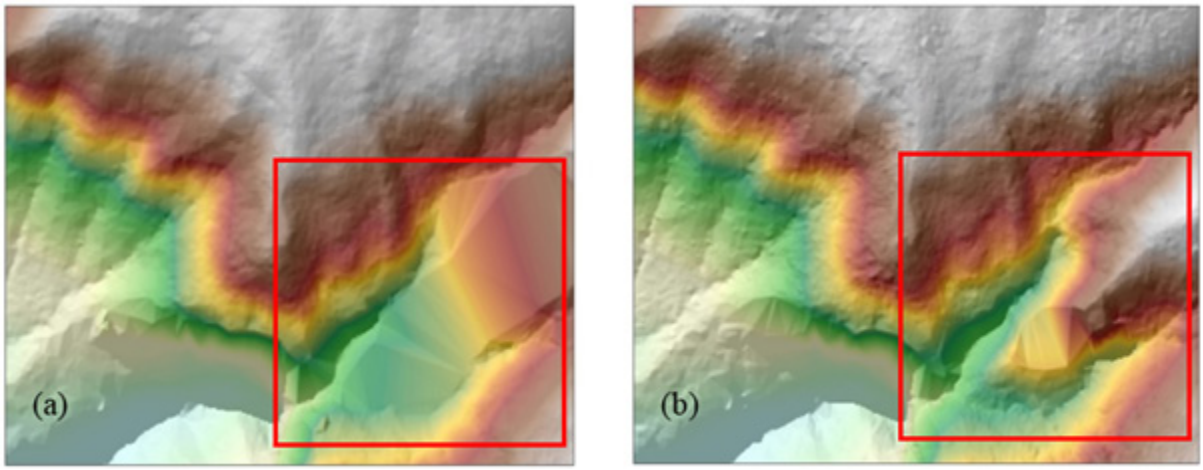


Figure 15. Resulting DTM of ground classification using the default parameters (a) and adjusted parameters (b)

The classification to Low, Medium and High vegetation is a straightforward testing of how high a point is from the ground model. The range of elevation values and its corresponding classification is shown in Table 6.

Table 6. Classification of vegetation according to the elevation of points

Elevation of points (meters)	Classification
0.05 to 0.15	Low Vegetation
0.15 to 2.50	Medium Vegetation
2.50 to 50.0	High Vegetation

The classification to Buildings routine tests points above 2 meters if they only have one echo, and if they form a planar surface of at least 40 square meters with points adjacent to them. Minimum size and Z tolerance are the parameters used in the classify buildings routine as shown in Figure 16.

Methodology

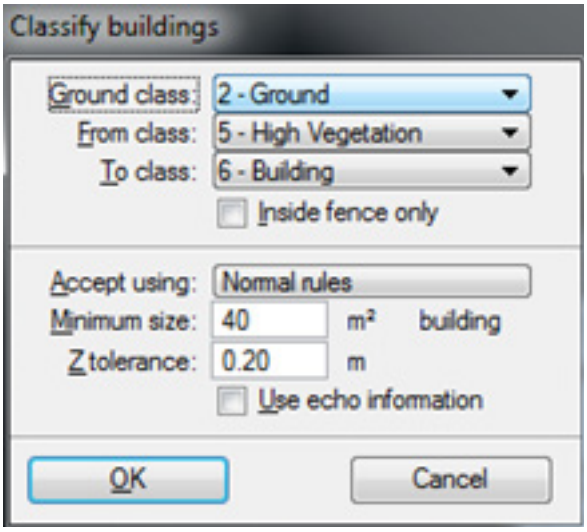


Figure 16. Default TerraScan building classification parameters

Minimum size is set to the smallest building footprint size of 40 square meters while the Z tolerance of 20 centimeters is the approximate elevation accuracy of the laser points.

The point cloud data are examined for possible occurrences of air points which are to be deleted manually in the TerraScan window. Air points are defined as groups of points which are significantly higher or lower from the ground points. The different examples of air points are shown in Figure 17.

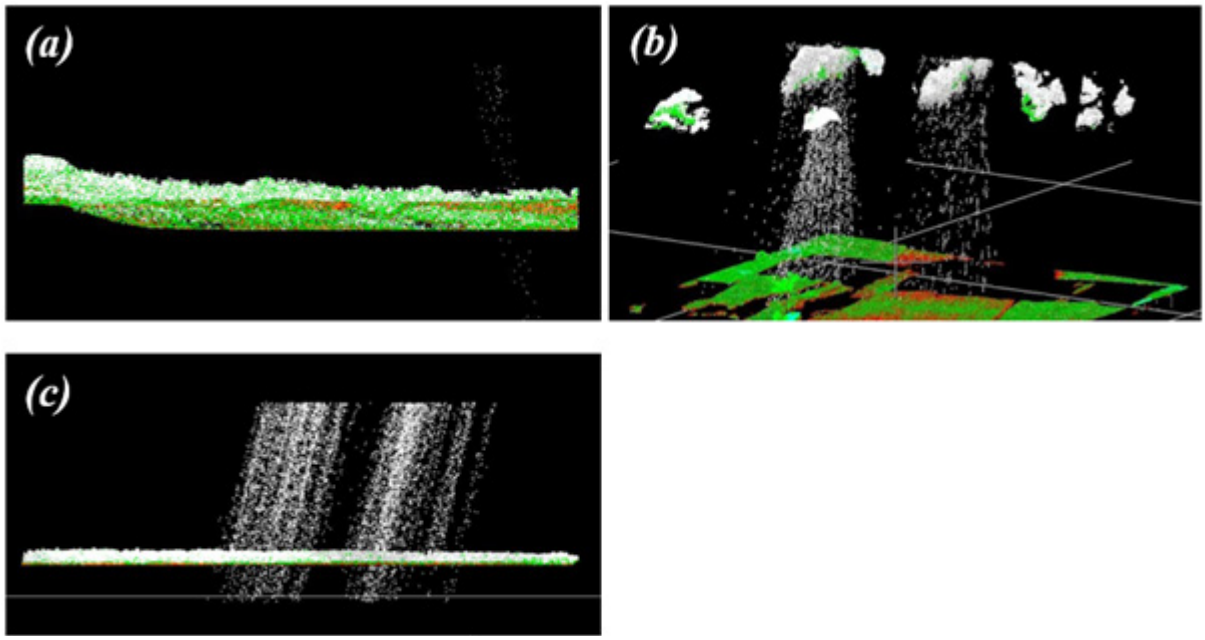


Figure 17. Different examples of air points manually deleted in the TerraScan window

The noise data can be as negligible as shown in Figure 17a or can be as severe as the one shown in Figure 17c. A combination of cloud points and shower of short ranges is displayed in Figure Figure 17b. Shower of short ranges are caused by signal interference from the radio transmission of the tower and the aircraft. During every transmission on a specific frequency (around 120 MegaHertz), the signal is getting distorted due to the interference causing showers of short ranges in the output LAS.

Classified LiDAR point clouds that are free of air points, noise and unwanted data are processed in TerraScan to produce Digital Terrain Model (DTM) and the corresponding first and last return Digital Surface Models (DSM). These ground models are produced in ASCII format.

DTMs are produced by rasterizing all points classified to ground and model key points in a 1 m by 1 m grid. The last return DSMs are produced by rasterizing all last returns from all classifications (Ground, Model Key Points, Low, Medium, High Vegetation, Buildings and Default) in a 1 m by 1 m grid. The first return DSMs on the other hand are produced by rasterizing all first returns from all classifications. Power lines are usually included in this model. All of these ground models are used in the mosaicking, manual editing and hydro correction of the topographic dataset, in preparation for the floodplain hydraulic modelling.

3.2.6 DEM Editing and Hydro-correction

Even though the parameters of the classification routines are optimized, various digital elevation models (DTM, first and last return DSM) that are automatically produced may still display minor errors that still need manual correction to make the DEMs suitable for fine-scale flood modelling. This is true especially for features that are under heavy canopy. Natural embankments on the side of the river might be flattened or misrepresented because no point pierced the canopy on that area. The same difficulty might also occur on smaller streams that are under canopy. The DTM produced might have discontinuities on these channels that might affect the flood modelling negatively. Manual inspection and correction is still a very important part of quality checking the LiDAR DEMs produced.

To correctly portray the dynamics of the flow of water on the floodplain, the river geometry must also be taken into consideration. The LiDAR data must be made consistent to the topographic surveys done for the area, and the bathymetric data must be "burned" into the DEM to make the dataset suitable for hydraulic analyses. For more information on how the topographic and bathymetric data was obtained and processed, the reader is referred to DREAM technical report entitled "Report on the Profile, Cross Section, Bathymetric Surveys and Flow Measurements in Pampanga River", which was prepared by the DREAM Data Validation Component.

Results and Discussion

4.1 LiDAR Acquisition in Pampanga Floodplains

4.1.1 Flight Plans

Plans were made to acquire LiDAR data within the floodplains. Each flight mission had an average of ten to twelve (10-12) flight lines and ran for at most 4 hours including take-off, landing and turning time. The parameter used in the LiDAR system for acquisition is found in Table 7.

Table 7. Parameters used in LiDAR System during Flight Acquisition

Fixed Variables	Values		
Flying Height (AGL – Above Ground Level) (m)	750	1000	1200
Overlap	30 %	30 %	30 %
Max. field of View (θ)	50	50	50
Speed of Plane (kts)	130	130	130
Turn around minutes	5	5	5
Swath (m)	661.58m	882m	1058.53m

The parameters that set in the LiDAR sensor to optimize the area coverage following the objectives of the project and to ensure the aircraft's safe return to the airport (base of operations) are shown in Table 7. Each flight acquisition is designed for four operational hours. The maximum flying hours for Cessna 206H is five hours.

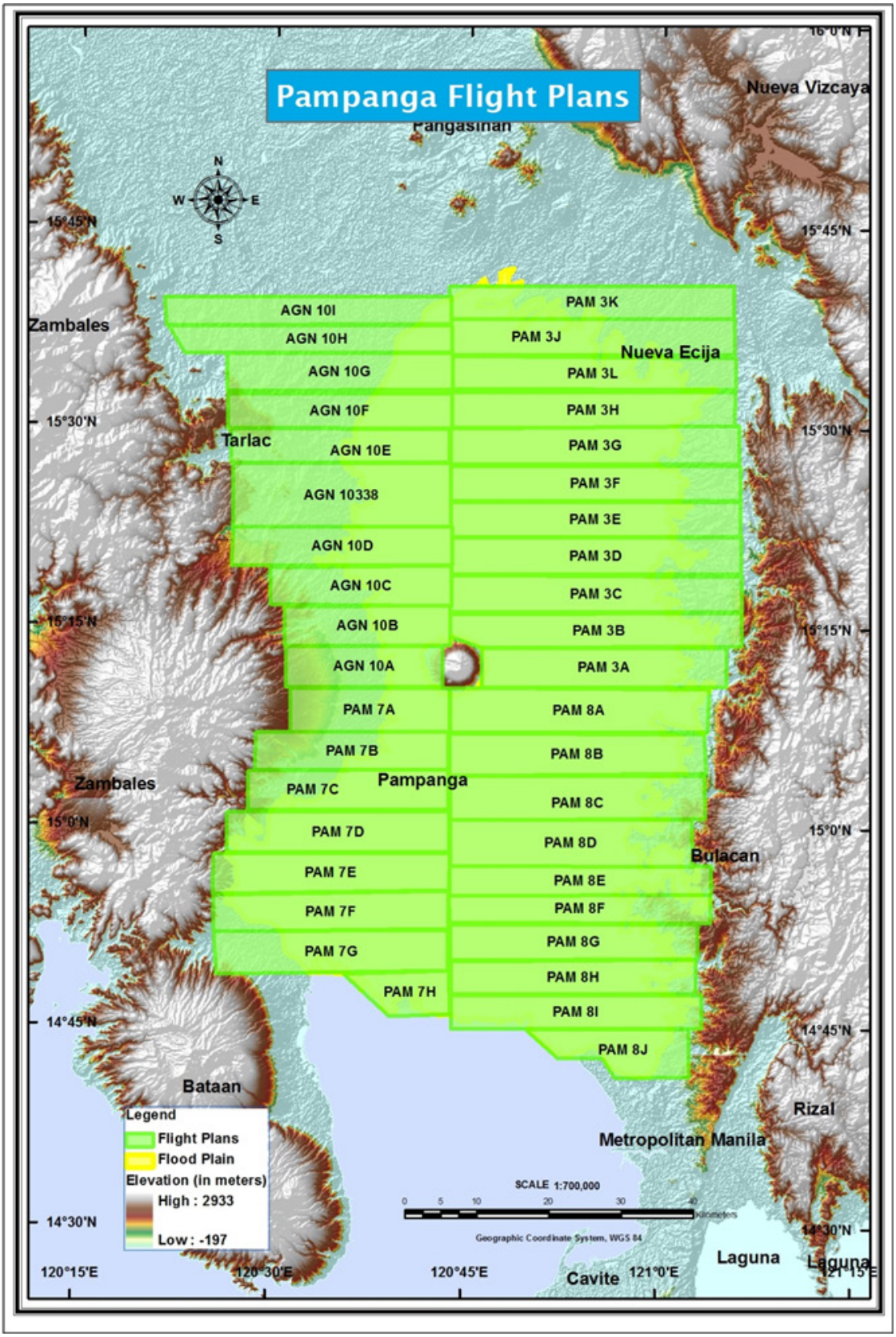


Figure 18. Pampanga floodplain flight plans

4.1.2 Ground Base Station

The project team was able to recover four (4) NAMRIA control stations; TRC-1 with first (1st) order and NEJ-3060, NEJ-3332 and PMG-3148 with fourth (4th) order accuracies. The team also established four ground control points, namely, FMC-1, AAC-1, BM-5A and PAM 7-1. The ground control point (GCPs) was used as reference point during flight operations using TRIMBLE SPS R8, a dual frequency GPS receiver.

Table 8. Details of TRC-1 used as base station for the LiDAR acquisition

Station Name	TRC- 1	
Order of Accuracy	1st	
Relative Error (horizontal positioning)	1 in 100,000	
Geographic Coordinates, Philippine Reference of 1992 Datum (PRS 92)	Latitude	15° 28' 44.13765"
	Longitude	120° 35' 52.67202"
	Ellipsoidal height	46.89100 meters
Grid Coordinates, Philippine Transverse Mercator Zone 5 (PTM Zone 5 PRS 92)	Easting	456,859.89 meters
	Northing	1,711,833.357 meters
Geographic Coordinates, World Geodetic System 1984 Datum (WGS 84)	Latitude	15° 28' 38.48550" North
	Longitude	120° 35' 57.49329" East
	Ellipsoidal height	88.90220 meters
Grid Coordinates, Universal Transverse Mercator Zone 51 North (UTM 51N WGS 1984)	Easting	242,278.30 meters
	Northing	1,712,636.20 meters

Results and Discussion

Table 9. Details of PMG-3148 used as base station for the LiDAR acquisition

Station Name	PMG-3148	
Order of Accuracy	4th	
Relative Error (horizontal positioning)	1 in 100,000	
Geographic Coordinates, Philippine Reference of 1992 Datum (PRS 92)	Latitude	15° 1' 19.45298"
	Longitude	120° 51' 27.34493"
	Ellipsoidal height	11.08000 meters
Grid Coordinates, Philippine Transverse Mercator Zone 5 (PTM Zone 5 PRS 92)	Easting	484,686.479 meters
	Northing	1,661,251.527 meters
Geographic Coordinates, World Geodetic System 1984 Datum (WGS 84)	Latitude	15° 1' 13.92611" North
	Longitude	120° 51' 31.20370" East
	Ellipsoidal height	53.05900 meters
Grid Coordinates, Universal Transverse Mercator Zone 51 North (UTM 51N WGS 1984)	Easting	269,649.32 meters
	Northing	1,661,781.75 meters

Table 10. Details of NEJ-3332 used as base station for the LiDAR acquisition.

Station Name	NEJ-3332	
Order of Accuracy	4th	
Relative Error (horizontal positioning)	1 in 100,000	
Geographic Coordinates, Philippine Reference of 1992 Datum (PRS 92)	Latitude	15° 32' 42.98257"
	Longitude	120° 49' 9.35425"
	Ellipsoidal height	27.14780 meters
Grid Coordinates, Philippine Transverse Mercator Zone 5 (PTM Zone 5 PRS 92)	Easting	480,612.682 meters
	Northing	1,719,141.792 meters
Geographic Coordinates, World Geodetic System 1984 Datum (WGS 84)	Latitude	15° 32' 77.33289" North
	Longitude	120° 49' 14.16885" East
	Ellipsoidal height	67.50000 meters
Grid Coordinates, Universal Transverse Mercator Zone 51 North (UTM 51N WGS 1984)	Easting	266,107.50 meters
	Northing	1,719,725.18 meters

Results and Discussion

Table 11. Details of NEJ-3060 used as base station for the LiDAR acquisition

Station Name	NEJ-3060	
Order of Accuracy	4th	
Relative Error (horizontal positioning)	1 in 100,000	
Geographic Coordinates, Philippine Reference of 1992 Datum (PRS 92)	Latitude	15° 19' 32.78238"
	Longitude	120° 53' 29.45676"
	Ellipsoidal height	21.54500 meters
Grid Coordinates, Philippine Transverse Mercator Zone 5 (PTM Zone 5 PRS 92)	Easting	488,350.739 meters
	Northing	1,694,850.752 meters
Geographic Coordinates, World Geodetic System 1984 Datum (WGS 84)	Latitude	15° 19' 27.18854" North
	Longitude	120° 53' 34.28956" East
	Ellipsoidal height	62.72000 meters
Grid Coordinates, Universal Transverse Mercator Zone 51 North (UTM 51N WGS 1984)	Easting	273,621.71 meters
	Northing	1,695,355.91 meters

Table 12. Details of established Ground Control Points by Data Acquisition Component for LiDAR survey in Pampanga Floodplain

Point Name	Location	WGS '84 Coordinates		Ellipsoidal height (in meters)
		Latitude	Longitude	
AAC-1	AAC Hangar, Clark, Pampanga	15° 11' 21.26316	120° 32' 50.12046	187.627
BM 5A	Guagua, Pampanga	14° 52' 47.37638	120° 35' 44.23254	47.642
FMC-1	FMC Hospital, Pulilan, Bulacan	14° 54' 23.45769	120° 52' 09.88011	54.87
PAM 7-1	Porac, Pampanga	15° 03' 43.45809	120° 37' 58.66334	86.681

Figure 19. Ground Base Station Observation at FMC-1 established in front of F.M. Cruz Orthopedic Hospital in Pulilan, Bulacan

Figure 20. Ground Base Station Observation at AAC-1 established inside Asian Aerospace Corporation Hangar at Clark International Airport in Pampanga

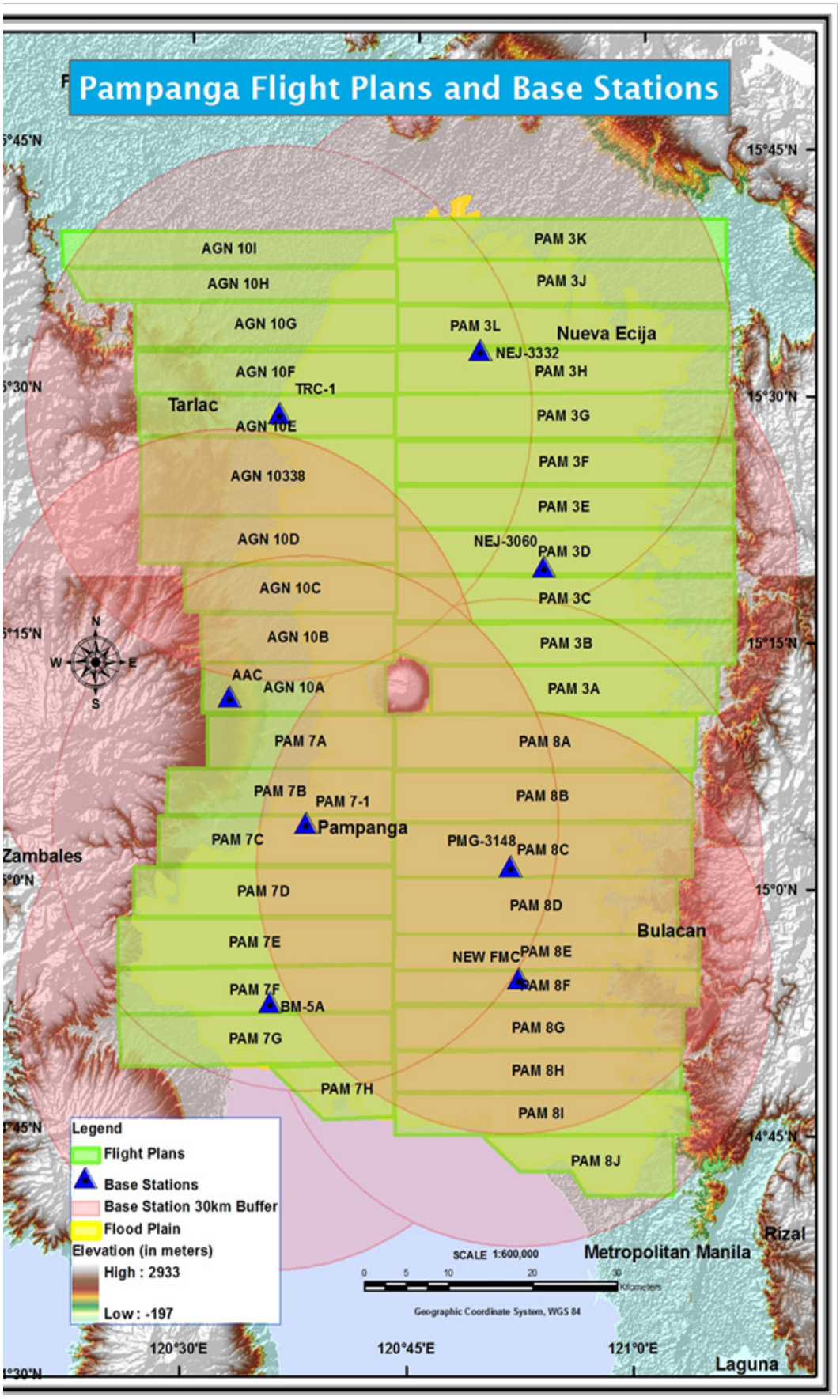


Figure 21. Pampanga Floodplain Flight Plans and Base Stations

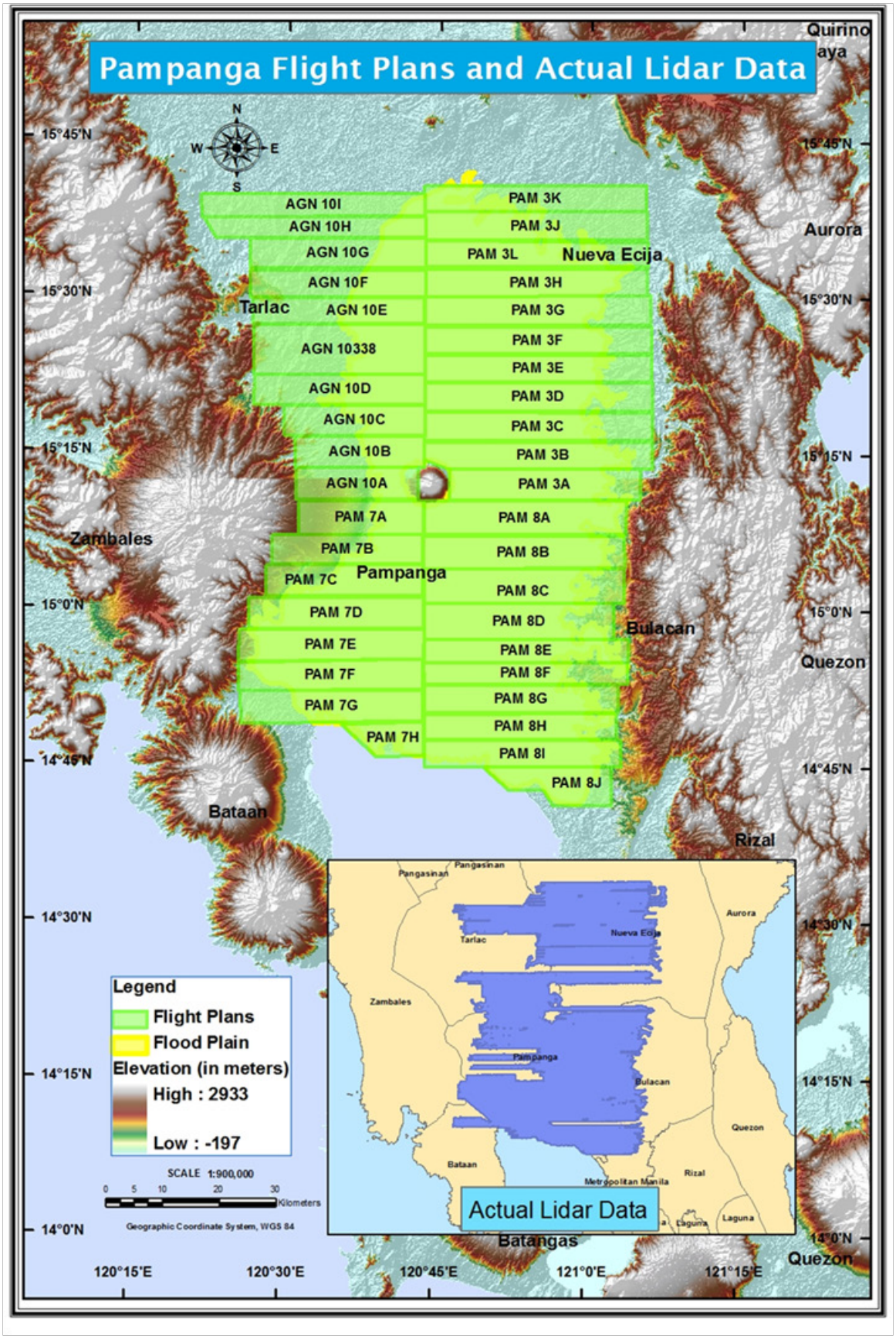


Figure 22. Pampanga Floodplain Data Acquisition Coverage

Results and Discussion

Table 13. Flight Missions for LiDAR Data Acquisition in Pampanga Floodplain

Date Surveyed	Name	Flight Plan Area (km2)	Surveyed Area (km2)	Area Surveyed within the River Systems (km2)	Area Surveyed Outside the River Systems (km2)	No. of Images (Frames)	Flying Hours	
							Hours	Mins
Nov 29,2012	Pam 8A	226.61	237.52	237.52	0	746	3	12
Nov 30,2012						256	2	4
Feb 20,2013	Pam 8AS					no data	3	34
Dec 1, 2012	Pam 8B	217.16	223.16	223.16	0	no camera data	3	40
Feb 20,2013	Pam 8BS					no data	3	5
Dec 6,2012	Pam 8C	227	205.56	205.56	0	no data	1	44
Dec 10,2012						973	3	19
Dec 10,2012						no data	1	44
Dec 13,2012						409	3	13
Dec 11,2012	Pam 8D	228.51	235.86	235.86	0	no data	2	48
Dec 11,2012						no camera data	3	41
Feb 25,2013	Pam 8CS (Pam8D)					527	3	0
Feb 25,2013	Pam 8CS (Pam8D)					510	2	43
Dec 15,2012	Pam 8E	139.9	141.68	141.68	0	561	2	45
Dec 17,2012	Pam 8F	153.03	158.11	158.11	0	201	2	10
Dec 20,2012						770	3	20
Dec 13,2012	Pam 8G1	184.1	182.67	182.67	0	642	3	9
Dec 14,2012	Pam 8G2					783	3	45
Feb 25,2013	Pam 8DS (Pam 8G)					559	2	55
Dec 14,2012	Pam 8H1	175.14	126.92	126.92	0	no camera data	3	25
Dec 15,2012	Pam 8H2					696	3	12

Table 13, cont'd

Date Surveyed	Name	Flight Plan Area (km2)	Surveyed Area (km2)	Area Surveyed within the River Systems (km2)	Area Surveyed Outside the River Systems (km2)	No. of Images (Frames)	Flying Hours	
							Hours	Mins
Dec 20,2012	Pam 3A		163.41	163.41	0	792	3	0
Jan 5,2013	Pam 3A					824	3	37
Feb 27,2013	Pam 3DS (Pam 3A)					no data	4	0
Dec 21,2012	Pam 3B		95.138	95.138	0	no data	2	0
Jan 2,2013	Pam 3B					948	1	0
Jan 3,2013	Pam 3B					758	3	20
Dec 21,2012	Pam 3C1	215.98	234.19	234.19	0	1,182	3	16
Jan 5,2013	Pam 3C2				0	611	3	16
Jan 2,2013	Pam 3D		219.22	219.22	0	88	4	6
Feb 27,2013	Pam 3CS (Pam 3D)					28	1	30
Jan 4,2013	Pam 3E	209.17	131.06	131.06	0	782	4	0
Jan 5,2013	Pam 3E					376	2	37
Dec 21,2012	Pam 3F	209.13	228.19	228.19	0	no data	4	20
Feb 27,2013	Pam 3BS (Pam 3F)					449	3	5
Dec 28,2012	Pam 3G1	227.33	245.76	245.76	0	889	3	1
Dec 29,2012	Pam 3G2					no camera data	1	28
Jan 5,2013	Pam 3G2					no data	1	40
Jan 7,2013	Pam 3G2					no data	0	20
Jan 8,2013	Pam 3G2					889	2	55
Dec 29,2012	Pam 3H	207.41	221.31	221.31	0	no data	2	15
Dec 29,2012	Pam 3H					no camera data	3	0
Feb 27,2013	Pam 3AS (Pam 3H)					685	3	18

Results and Discussion

Table 13, cont'd

Date Surveyed	Name	Flight Plan Area (km2)	Surveyed Area (km2)	Area Surveyed within the River Systems (km2)	Area Surveyed Outside the River Systems (km2)	No. of Images (Frames)	Flying Hours	
							Hours	Mins
Jan 7,2013	Pam 3I1	184.34	190.48	190.48	0	904	3	3
Jan 8,2013	Pam 3I2					1,476	3	11
Jan 7,2013	Pam 3J	211.92	233.48	233.48	0	781	3	45
Jan 8,2013	Pam 3K	198.94	196.36	196.36	0	865	3	55
Feb 12,2013	Pam 7A1	140.69	156.98	156.98	0	452	3	5
Feb 14,2013	Pam 7A2				0	356	2	55
Feb 14,2013	Pam 7B1	148.6	106.54	106.54	0	444	3	20
Feb 15,2013	Pam 7B2				0	402	3	24
Feb 13,2013	Pam 7C	163.22	110.99	110.99	0	354	2	20
Feb 13,2013	Pam 7C					no camera data	1	18
Feb 16,2013	Pam 7C					113	1	34
Feb 18,2013	Pam 7C					414	2	45
Jan 8,2013	Pam 7D	183.78	117.88	117.88	0	447	2	48
Feb 16,2013	Pam 7E	195.48	194.35	194.35	0	687	3	7
Jan 9,2013	Pam 7F1	194.3	159.54	159.54	6.97	314	2	33
Jan 9,2013	Pam 7F2					418	2	51
Feb 18,2013	Pam 7G	208.47	194.57	194.57	71.7	702	3	5
Jan 9,2013	Pam 7H	94.991	76.081	76.081	20.08	621	3	40
Dec 3,2012	Agno 10 338	242.88	35.526	35.526	0	187	2	6
Dec 3,2012	Agno 10 338					592	2	36
Feb 15,2013	Agno 10A	127.16	137.82	137.82	0	522	2	55
Feb 15,2013	Agno 10B	136.13	146.63	146.63	0	477	2	53
Feb 14,2013	Agno 10C	141.64	142.22	142.22		496	2	55
Feb 15,2013	Agno 10 D1	172.82	123.32	123.32	0	379	2	53
Jan 10,2013	Agno 10E	139.07	18.618	18.618	0	1,062	4	6
Jan 10,2013	Agno 10F	155.56	160.71	63.744	96.966	no camera data	2	38

Results and Discussion

Table 13, cont'd

Date Surveyed	Name	Flight Plan Area (km2)	Surveyed Area (km2)	Area Surveyed within the River Systems (km2)	Area Surveyed Outside the River Systems (km2)	No. of Images (Frames)	Flying Hours	
							Hours	Mins
Jan 10,2013	Agno 10 G1	171.27	197.4	47.059	150.341	713	2	35
Jan 10,2013	Agno 10 G2					no camera data	2	40
Jan 11,2013	Agno 10H	159.99	150.1	28.18	121.92	no camera data	2	40
Feb 18,2013	Agno 10l1	177.4	171.32	11.258	160.062	728	3	0
Jan 11,2013	Agno 10l2					no camera data	3	19
Mar 4,2013	Mt. Arayat	87.817	0	0	0	no data	2	0
Feb 20,2013	No Area	0	0	0	0	no data	0	20
						Total flying hours	227.77 hrs	

Eighty (80) missions were conducted to complete the LiDAR Data Acquisition in Pampanga floodplain, for a total of two hundred twenty eight hours (228) of flying time for RP-C9022 and RP-C9122. All missions were acquired using both the Pegasus and Gemini LiDAR System. The total area to be surveyed according to the flight plan and the total area of actual coverage per mission is shown in Table 13.

Pampanga floodplain with a total of four thousand four hundred fifty eight (4,458) square kilometers was surveyed from December 3, 2013-February 28, 2013 by James Novilla, Iro Roxas, Christopher Cruz, Lovely Gracia Acuna, Mark Gregory Ano and Jasmine Alviar as shown in Table 14.

Results and Discussion

Table 14. Area of Coverage of the LiDAR Data Acquisition in Pampanga floodplain

Location	Date Surveyed	Operator	Mission Name	Floodplain Surveyed Area (km²)	Total Floodplain Area (km²)	Water-shed Suveyed Area (km²)	Total Water-shed Area (km²)
PAMPANGA	Nov 30,2012	JAMES NOVILLA	PAM8A	203.696	4,458	33.824	6,702
	Nov 30,2012	JAMES NOVILLA	PAM8A				
	Feb 20,2013	IRO ROXAS	2P8AS051A				
	Dec 1,2012	IRO ROXAS	PAM8B	188.462		34.698	
	Dec 6, 2012	CHRISTOPHER CRUZ	1P8C3342A	168.987		36.573	
	Dec 10, 2012	LOVELY ACUÑA	2P8C345A				

Table 14, cont'd

PAMPANGA	Dec 10, 2012	JAMES NOVILLA	2P8C345B	168.987	4,458	36.573	6,702
	Dec 13, 2012	JAMES NOVILLA	2P8C348A				
	Feb 25, 2013	MARK GREGORY AÑO	1P8C056A				
	Feb 25, 2013	JASMINE ALVIAR	1P8C056B				
	Dec 11, 2012	CHRISTOPHER CRUZ	1P8D346A	176.487		59.373	
	Dec 11, 2012	JAMES NOVILLA	2P8D346A				
	Feb 25, 2013	MARK GREGORY AÑO	1P8CS056A				
	Feb 25, 2013	JASMINE ALVIAR	1P8CS056B				
	Dec 15, 2012	CHRISTOPHER CRUZ	1P8E350B	114.569		27.111	
	Dec 17, 2012	CHRISTOPHER CRUZ	1P8F352A	105.599		52.511	
	Dec 20, 2012	MARK GREGORY AÑO	1P8F355A				
	Dec 13, 2012	LOVELY ACUÑA	2P8GI348B	146.16		36.51	
	Dec 14, 2012	JAMES NOVILLA	2P8G349A				
	Feb 25, 2013	LOVELY ACUÑA	2P8DS056A				
	Dec 14, 2012	IRO ROXAS	2P8H349B	101.323		25.597	
	Dec 15, 2012	IRO ROXAS	2P8h2350A				
	Dec 17, 2012	IRO ROXAS	2P81352B	151.208		26.242	
	Dec 19, 2013	IRO ROXAS	2P8I1354B				
	Feb 25, 2013	IRO ROXAS	2P8FS056B				
	Dec 20, 2013	JAMES NOVILLA	2P8J355A	71.237		0	
	Jan 5, 2013	MARK GREGORY AÑO	1P3AN005A	126.874		36.536	

Results and Discussion

Table 14, cont'd

Location	Date Surveyed	Operator	Mission Name	Floodplain Surveyed Area (km²)	Total Floodplain Area (km²)	Water-shed Suveyed Area (km²)	Total Water-shed Area (km²)
PAMPANGA	Dec 21, 2012	CHRISTOPHER CRUZ	1P3B356B	85.092	4,458	10.046	6,702
	Jan 2, 2013	CHRISTOPHER CRUZ	1P3B002B				
	Jan 3, 2013	JASMINE ALVIAR	1P3B003A				
	Dec 21, 2012	JAMES NOVILLA	2P3C356B	157.602		76.588	
	Jan 5, 2013	IRO ROXAS	2P3C2005A				
	Jan 2, 2013	MARK GREGORY AÑO	1P3D002A	158.003		61.217	
	Feb 27, 2013	IRO ROXAS	2P3D058A				
	Feb 27, 2013	JASMINE ALVIAR	1P3CS058A	98.501		32.559	
	Jan 4, 2013	IRO ROXAS	1P3E004A				
	Jan 5, 2013	JASMINE ALVIAR	1P3E005B				
	Dec 21, 2012	MARK GREGORY AÑO	1P3F363A	171.891		56.299	
	Feb 27, 2013	LOVELYN ASUNCION	2P3BS058B				
	Dec 28, 2012	IRO ROXAS	2P3G1B	180.945		64.815	
	Dec 29, 2012	LOVELY ACUÑA	2Pam3G2				
	Jan 5, 2013	CHRISTOPHER CRUZ	1P3G2005B				
	Jan 7, 2013	CHRISTOPHER CRUZ					
	Jan 8, 2013	LOVELY ACUÑA	2P3G2008B				
	Dec 29, 2012	CHRISTOPHER CRUZ	1P3H364A	179.324		41.986	
	Dec 29, 2012	IRO ROXAS	1P3H364B				
	Feb 27, 2013	MARK GREGORY AÑO	1P3AS058B	137.96		52.52	
	Jan 7, 2013	LOVELY ACUÑA					
	Jan 8, 2013	IRO ROXAS	2P3I2008A				

Results and Discussion

Table 14, cont'd

Location	Date Surveyed	Operator	Mission Name	Floodplain Surveyed Area (km²)	Total Flood-plain Area (km²)	Water-shed Suveyed Area (km²)	Total Water-shed Area (km²)
PAMPANGA	Jan 7, 2013	JASMINE ALVIAR	1P3J007A	105.74	4,458	127.74	6,702
	Jan 8, 2013	MARK GREGORY AÑO	1P3K008A	48.478		147.882	
	Feb 12, 2013	IRO ROXAS	2P7A1043A	51.624		105.356	
	Feb 14, 2013	IRO ROXAS	2P7A2045A				
	Feb 14, 2013	LOVELY ACUÑA	2P7B1045B	39.735		66.805	
	Feb 15, 2013	IRO ROXAS	2P7B2046A				
	Feb 13, 2013	JASMINE ALVIAR	1P7C044A	78.314		32.676	
	Feb 13, 2013	MARK GREGORY AÑO	1P7C044A				
	Feb 16, 2013	MARK GREGORY AÑO	1P7C047B				
	Feb 18, 2013	MARK GREGORY AÑO	1P7C049B				
	Jan 8, 2013	CHRISTOPHER CRUZ	PAM7D	99.792		18.088	
	Feb 16, 2013	JASMINE ALVIAR	1P7E047A	169.479		24.871	
	Jan 9, 2013	LOVELY ACUÑA	2P7F1009A	152.57		0	
	Jan 9, 2013	IRO ROXAS	2P7F2009A				
	Feb 18, 2013	JASMINE ALVIAR	1P7G049A	122.87		0	
	Jan 9, 2013	MARK GREGORY AÑO	1P7H009A	56.001		0	
	Dec 3, 2012	LOVELY ACUÑA	AGN10338A	35.526		0	
	Dec 3, 2012	CHRISTOPHER CRUZ	AGN10338B				
	Feb 15, 2013	MARK GREGORY AÑO	1A10A046B	137.82		8.81	
	Feb 15, 2013	JASMINE ALVIAR	1A10B046A	57.458		84.762	

Results and Discussion

Table 14, cont'd

Location	Date Surveyed	Operator	Mission Name	Floodplain Surveyed Area (km²)	Total Floodplain Area (km²)	Water-shed Suveyed Area (km²)	Total Water-shed Area (km²)
PAMPANGA	Feb 14, 2013	MARK GREGORY AÑO	1A10C045B	66.157	4,458	76.063	6,702
	Feb 15, 2013	LOVELY ACUÑA	2AG-N10D1046B	58.418		31.877	
	Jan 10, 2013	JASMINE ALVIAR	IA10E10A	18.618		0	
	Jan 10, 2013	MARK GREGORY AÑO	1A10F10B	63.744		0	
	Jan 10, 2013	IRO ROXAS	2AG-N10G1010A	47.059		0	
	Jan 10, 2013	JAMES NOVILLA	2AG-N10G010B				
	Jan 11, 2013	MARK GREGORY AÑO	1A10H11A	28.18		0	
	Feb 18, 2013	IRO ROXAS	2AGNI1049B	11.258		0	
	Jan 11, 2013	LOVELY ACUÑA	2AG-N10I2011A				
	Mar 4, 2013	IRO ROXAS	Mt Arayat				

Supplementary flights were conducted to cover the data voids due to clouds and weather condition during the initial survey last November 2012 to February 2013. DPC had to cut flight lines with void data for processing good survey lines. Upon the commencement of the LiDAR acquisition (after the LiDAR training in December), the team always encountered loss communication problem with FMS NAV - the operator interface with the Pegasus LiDAR System. Because reflights are based on the processed data from DPC, DAC had to coordinate with DPC regarding the delineation of area for reflights. Hence, DAC generated flight plans to cover these data voids. Aside from data voids, there are also special cases wherein DPC cannot process the data because of its corrupted range while ANGNO10ER has 13 sets of range data which made it impossible to be processed. Seven (7) flight plans are created to cover the data voids in Pampanga floodplain.

Results and Discussion

Table 15. Flight Missions for Supplementary LiDAR Data Acquisition in Pampanga Floodplain

Date Surveyed	Name	Flight Plan Area (km²)	Surveyed Area (km²)	Area Surveyed within the River Systems (km²)	Area Surveyed Outside the River Systems (km²)	No. of Images (Frames)	Flying Hours	
							Hrs	Mins
Aug 29,2013	Pam 8H	117.40	170.64	170.64	0	no camera images	3	15
Aug 30,2013	Pam 3BR (Pam 3B)	98.0	231.14	231.14	0	no camera images	3	5
Aug 30,2013	Pam 3ER (Pam 3E)	181.25	149.92	124.674	0	no camera images	2	50
Aug 31,2013	Agno 10338 Agno 10D	103.26 84.54	244.2	71.264	52.42	no camera images	2	50
Aug 31,2013	Agno 10E	127.05	149.01	135.762	53.444	no camera images	4	0
Sep 1,2013	Pam 7B Pam 7C Pam 7D	48.87 58.27 84.54	265.071	265.071	0	no camera images	4	0

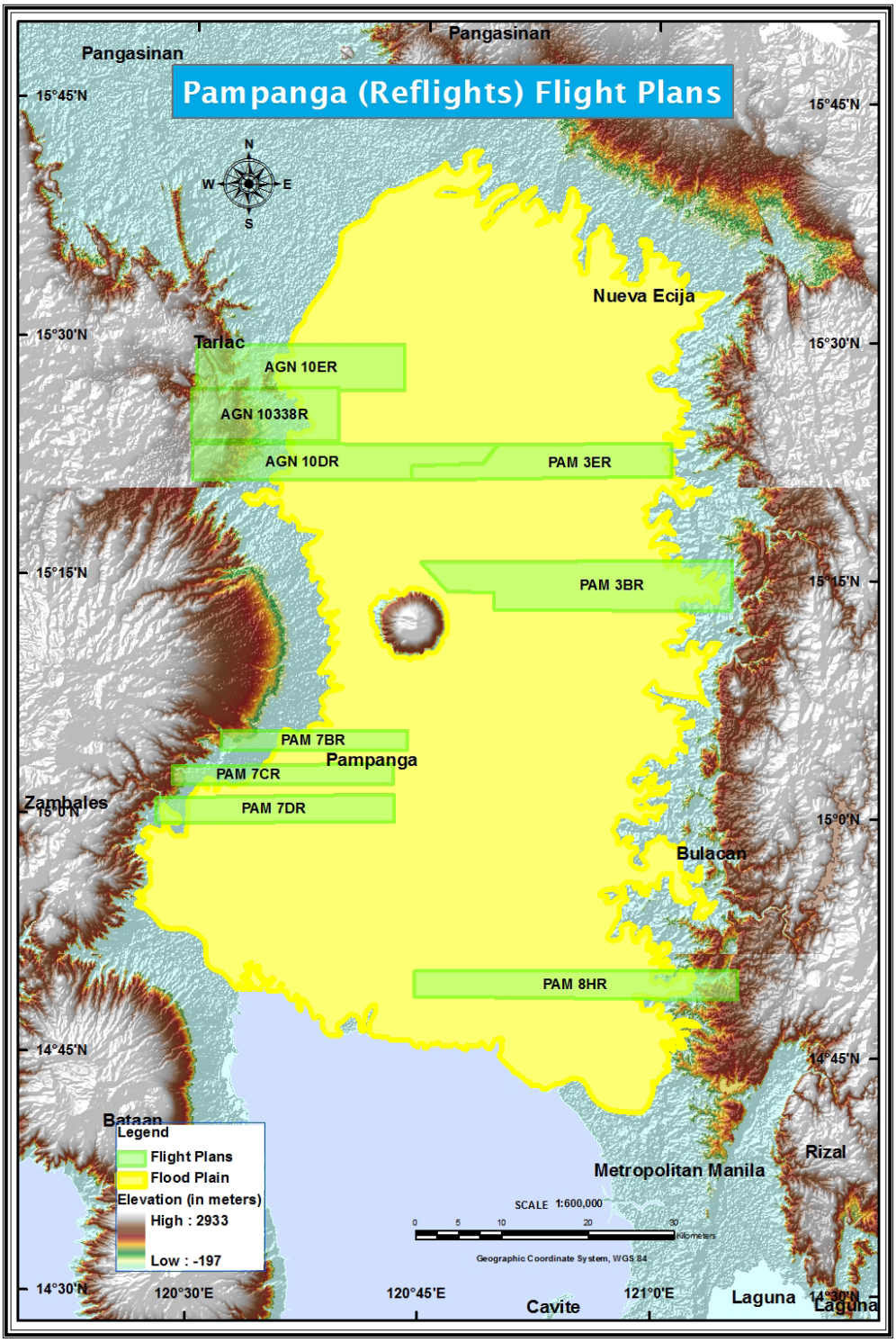


Figure 15. Flight plans for Pampanga Floodplain reflights

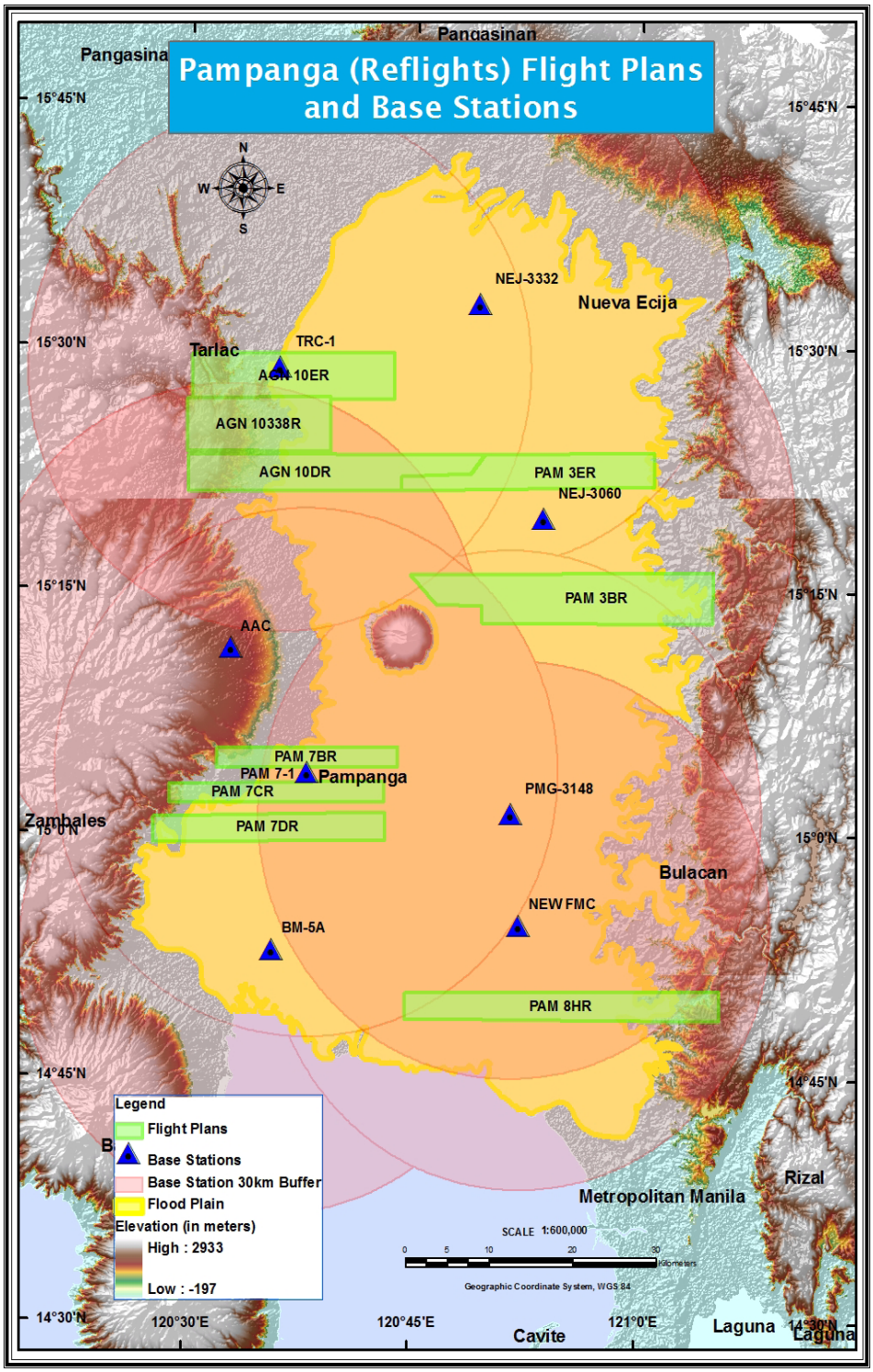


Figure 24. Base stations for Pampanga Floodplain reflights

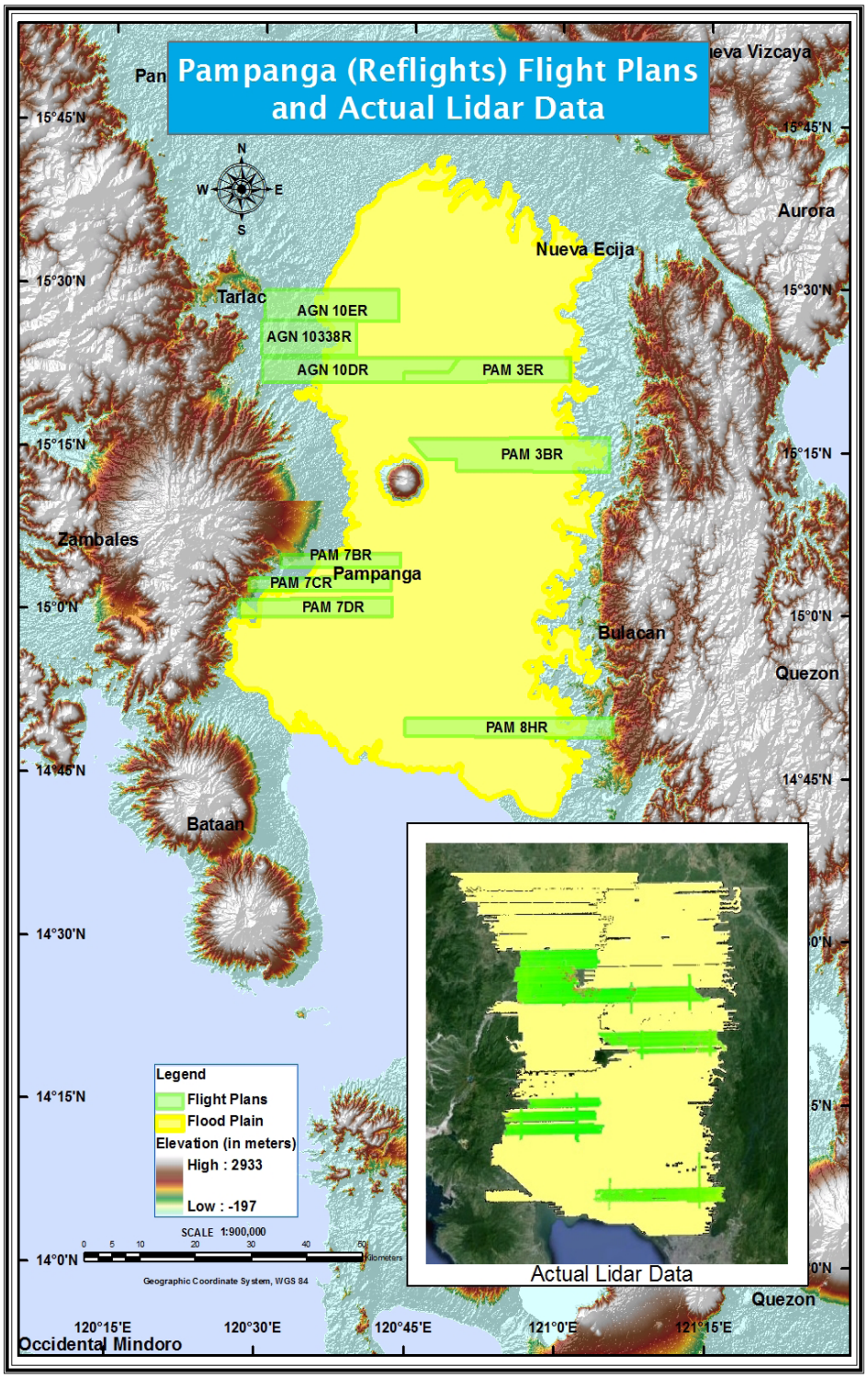


Figure 25. Pampanga reflights flight plans and actual LiDAR data

Table 16. Area of Coverage (km²) of the Supplementary LiDAR Data Acquisition Reflights in Pampanga floodplain

Date Surveyed	Operator	Mission Name	Flood-plain Surveyed Area (km²)	Total Flood-plain Area (km²)	Watershed Surveyed Area (km²)	Total Watershed Area (km²)
Aug 29,2013	M. Ano	1P8HR240A	126.814	4,458	43.826	6,702
Aug 30,2013	C. Joaquin	1PAM3AR242A	192.007		39.133	
Aug 30,2013	M. Funtilon	1PAM3BR242B	137.297		12.623	
Aug 31,2013	M. Ano	1AG-NO338243A	105.312		86.468	
Aug 31,2013	C. Joaquin	1AGN10E243B	88.942		6.624	
Sep 1,2013	M. Ano	1PAM7C244A	191.408		73.663	

4.2 LiDAR Data Processing

4.2.1 Trajectory Computation

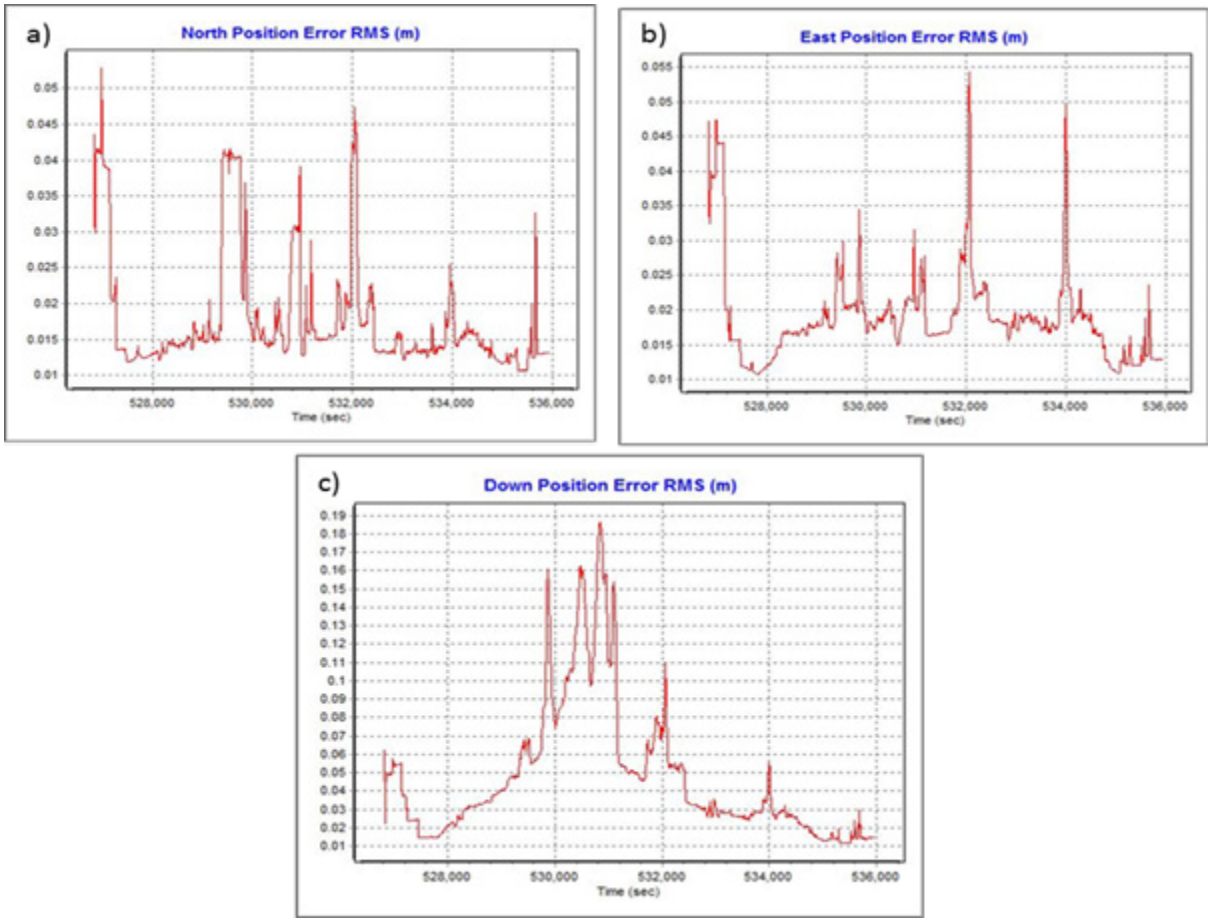
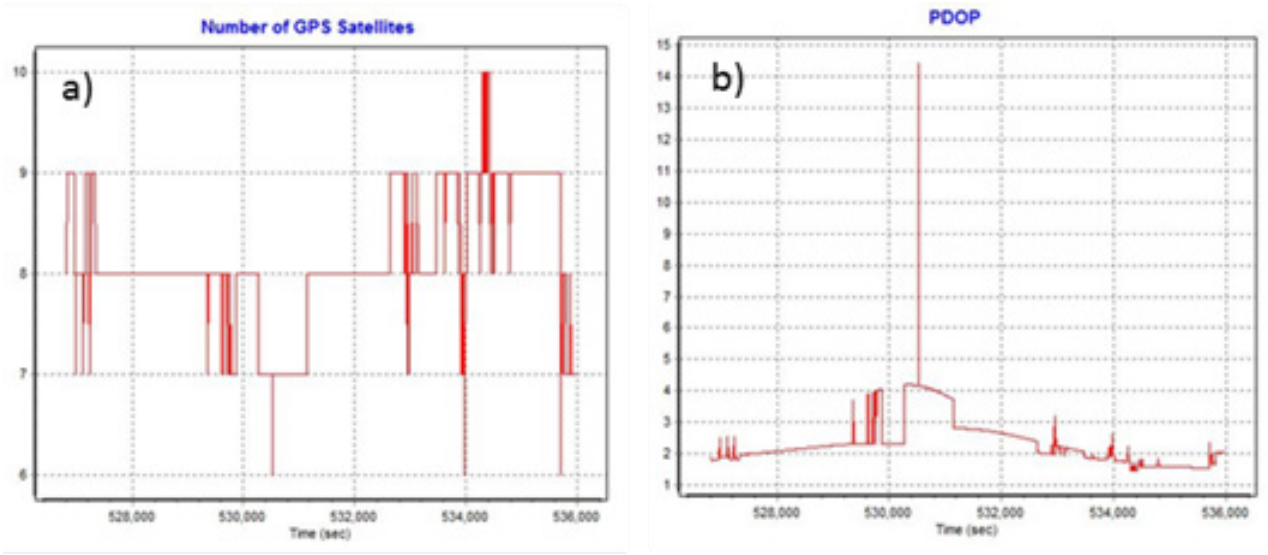


Figure 26. Smoothed Performance Metric Parameters of Pampanga flight

Results and Discussion

The Smoothed Performance Metric parameters of the Pampanga flight are shown in Figure 26. The x-axis is the time of flight, which is measured by the number of seconds from the midnight of the start of the GPS week. The y-axis is the RMSE value for a particular aircraft position with respect to GPS survey time. The North (Figure 26a) and east (Figure 26b) position RMSE values fall within the prescribed accuracy of 4 centimeters, and all Down (Figure 26c) position RMSE values fall within the prescribed accuracy of 8 centimeters.



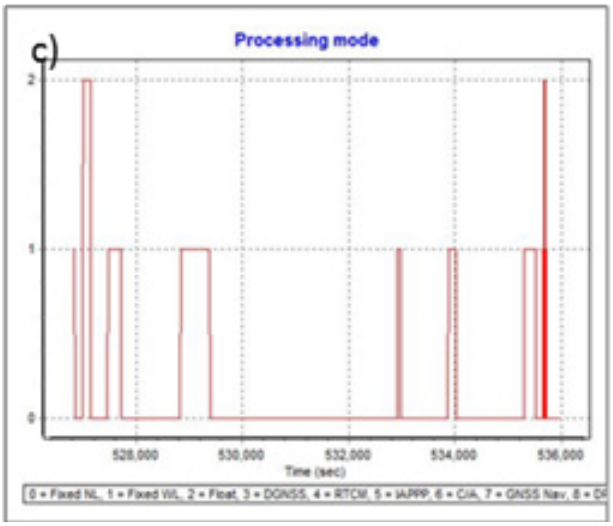


Figure 27. Solution Status Parameters of Pampanga flight

The Solution Status parameters of the computed trajectory for Pampanga flight, which are the number of GPS satellites, Positional Dilution of Precision (PDOP), and the GPS processing mode used are shown in Figure 27. The processing mode (Figure 27a) stays at a value of 0, which corresponds to a Fixed, Narrow-Lane mode, which indicates an optimum solution for trajectory computation by POSPac MMS v6.2. The PDOP (Figure 27b) value does not exceed the value of 3, indicating optimal GPS geometry. The number of GPS satellites (Figure 27c) graph indicates that the number of satellites during the acquisition was between 6 and 10. All of the parameters satisfied the accuracy requirements for optimal trajectory solutions as indicated in the methodology.

4.2.2 LiDAR Point Cloud Computation

The LAS data output contains 8 flight lines, with each flight line containing one channel, a feature of the Gemini system. The result of the boresight correction standard deviation values for the channel is better than the prescribed 0.001°. The position of the LiDAR system is also accurately computed since all GPS position standard deviations are less than 0.0017m. The attitude of the LiDAR system passed accuracy testing since the standard deviation of the corrected roll and pitch values of the IMU attitudes are less than 0.001°.

4.2.3 LiDAR Data Quality Checking

The LAS boundary of the LiDAR data on top of the SRTM elevation data is shown in Figure 28. The map shows gaps in the LiDAR coverage that are attributed to cloud cover present during the survey.

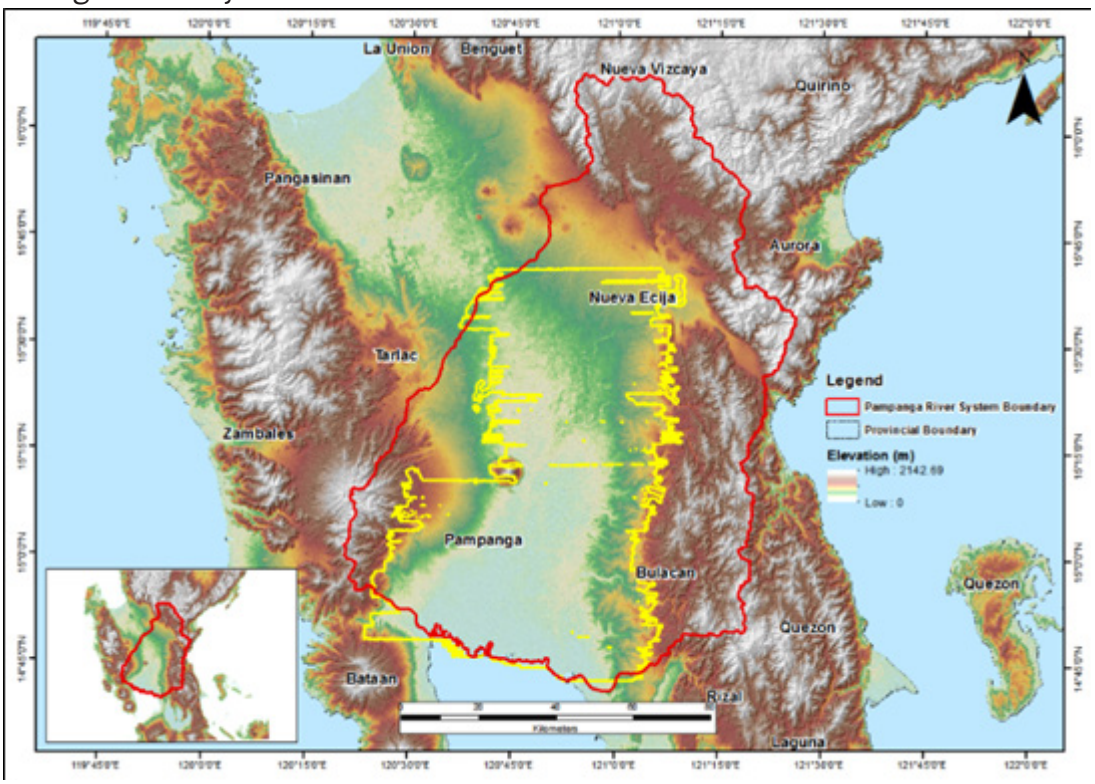


Figure 28. Coverage of LiDAR data for the Pampanga mission

The overlap data for the merged LiDAR data showing the number of channels that pass through a particular location is shown in Figure 29. Since the Gemini system employs one channel, an average value of 2 (blue) for areas where there are only two overlapping flight lines, and a value of 3 (yellow) or more (red) for areas with three or more overlapping flight lines, are expected. The average data overlap for Pampanga is 30.75%.

Results and Discussion

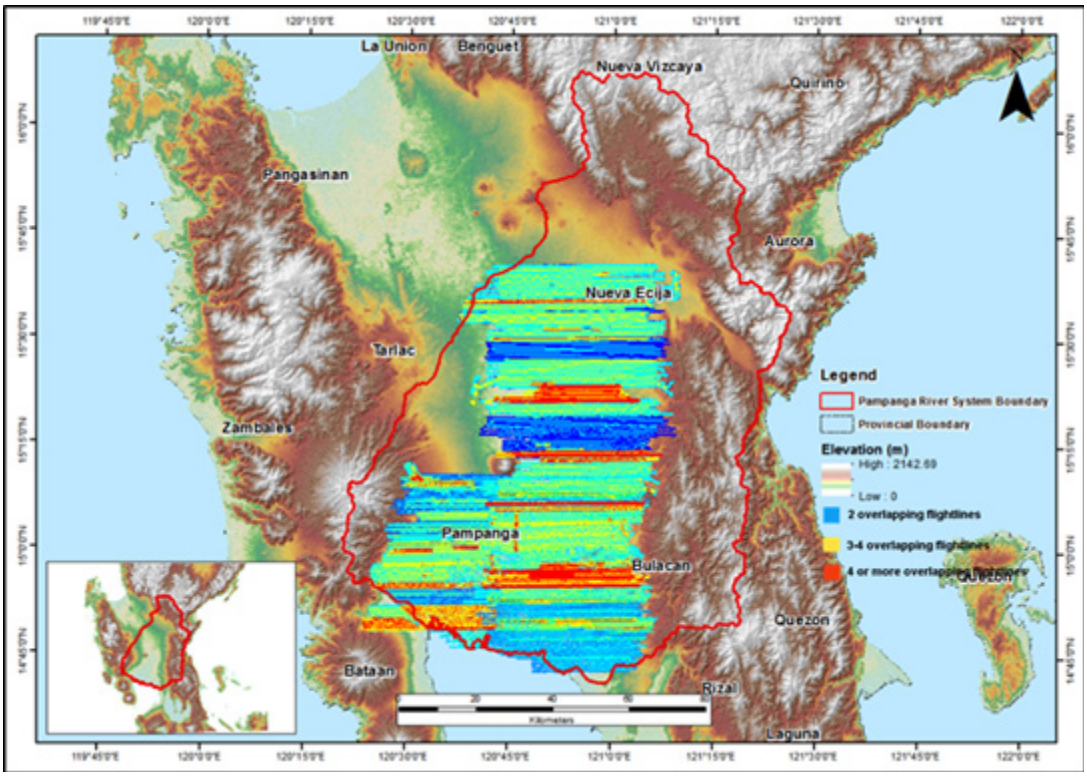


Figure 29. IImage of data overlap for the Pampanga mission

The density map for the merged LiDAR data, with the red areas showing the portions of the data that satisfy the 2 points per square meter requirement, is shown in Figure 30. It was determined that 81.22% of the total area satisfied the point density requirement, and the average density for the entire survey area is 2.6 points per square meter.

Results and Discussion

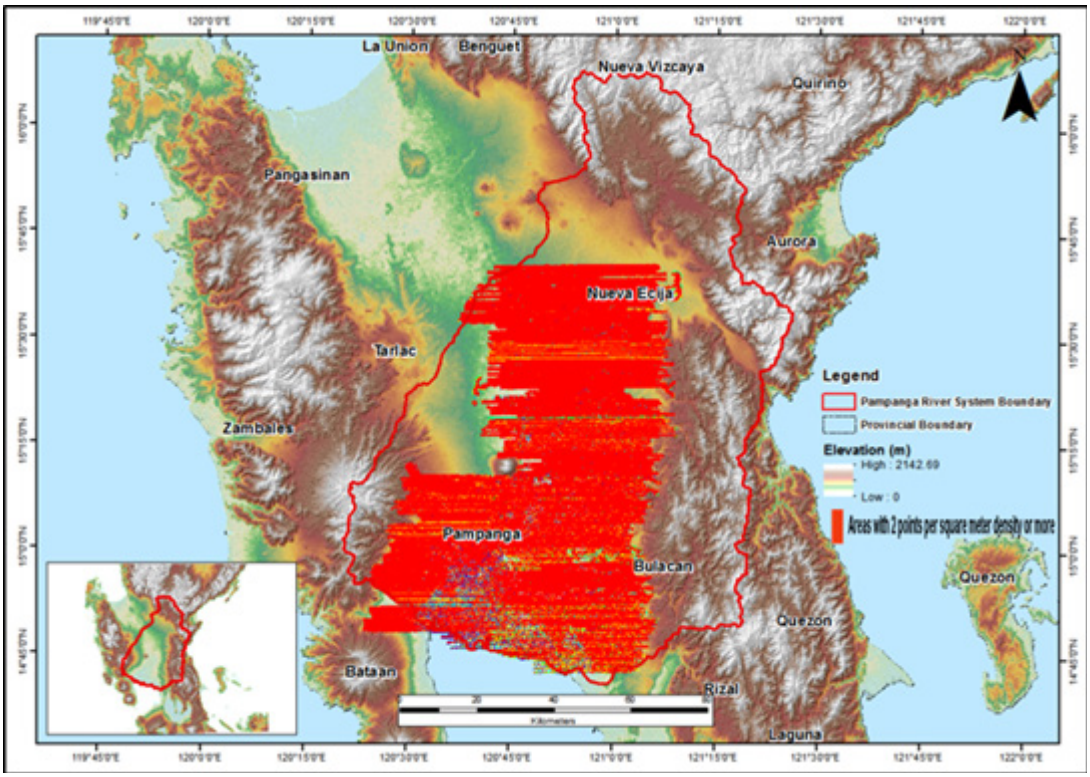


Figure 30. Density map of merged LiDAR data for the Pampanga mission

The elevation difference between overlaps of adjacent flight lines is shown in Figure 31. The default color range is from blue to red, where bright blue areas correspond to a -0.20 m difference, and bright red areas correspond to a +0.20 m difference. Areas with bright red or bright blue need to be investigated further using QT Modeler.

Results and Discussion

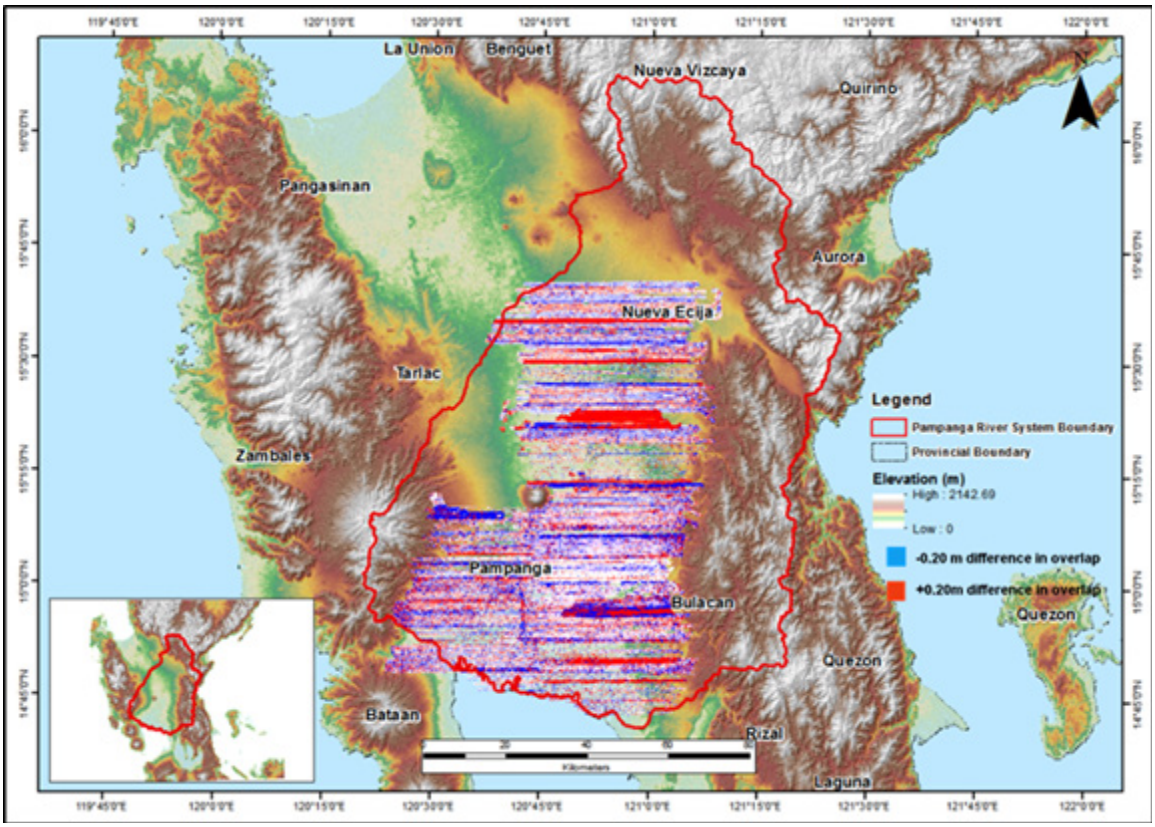


Figure 31. Elevation difference map between flight lines

A screen capture of the LAS data loaded in QT Modeler is shown in Figure 32a. A line graph showing the elevations of the points from all of the flight strips traversed by the profile in red line is shown in Figure 32b. It is evident that there are differences in elevation, but the differences do not exceed the 20-centimeter mark. No reprocessing was necessary for this LiDAR dataset.

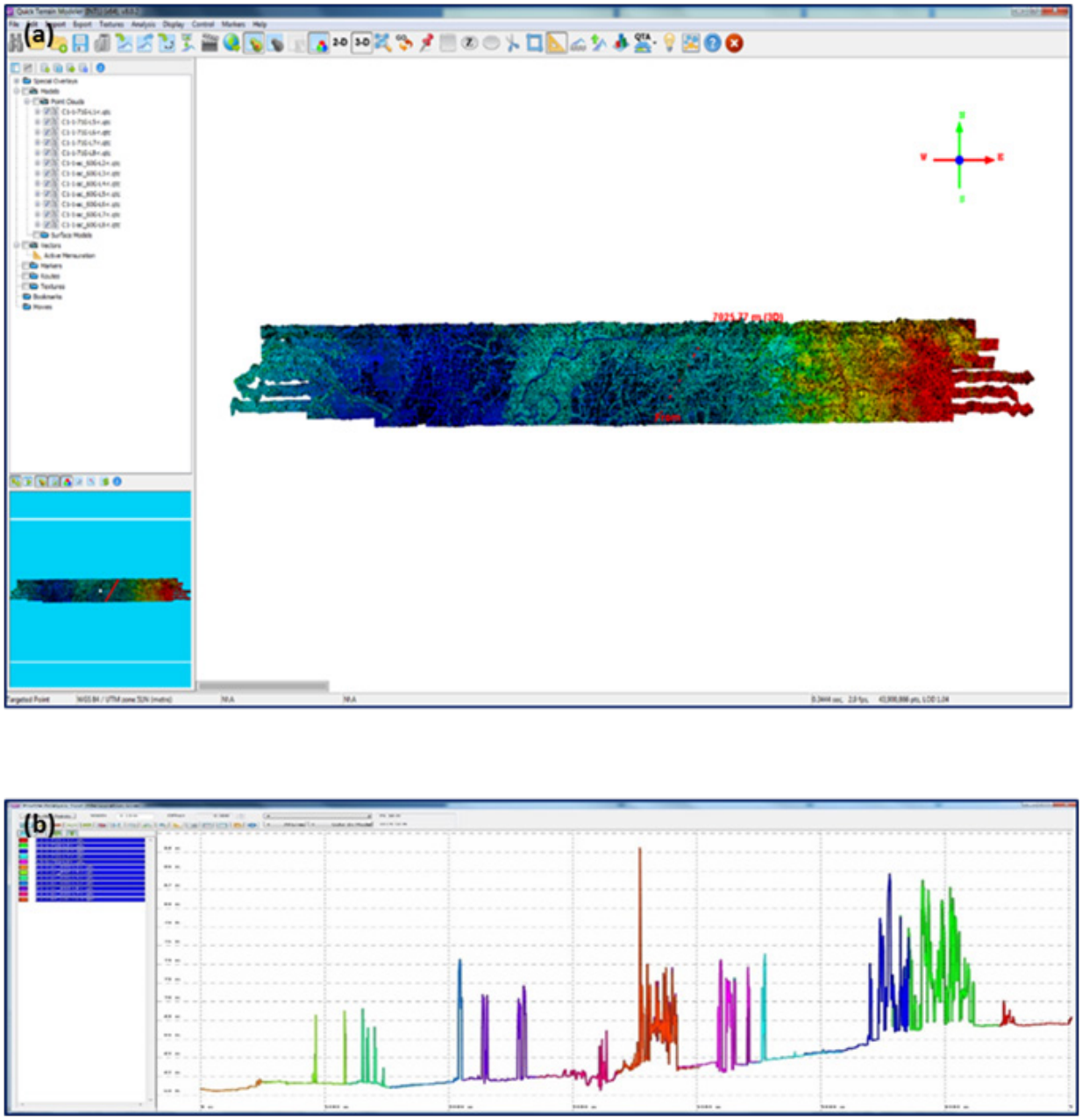


Figure 32. Quality checking with the profile tool of QT Modeler

4.2.4 LiDAR Point Cloud Classification and Rasterization

The block system that TerraScan employed for the LiDAR data is shown in Figure 33a generated a total of 3458 1 kilometer by 1 kilometer blocks. The final classification of the point cloud for a mission in the Pampanga floodplain is shown in Figure 33b. The number of points classified to the pertinent categories along with other information for the mission is shown in Table 17.

Results and Discussion

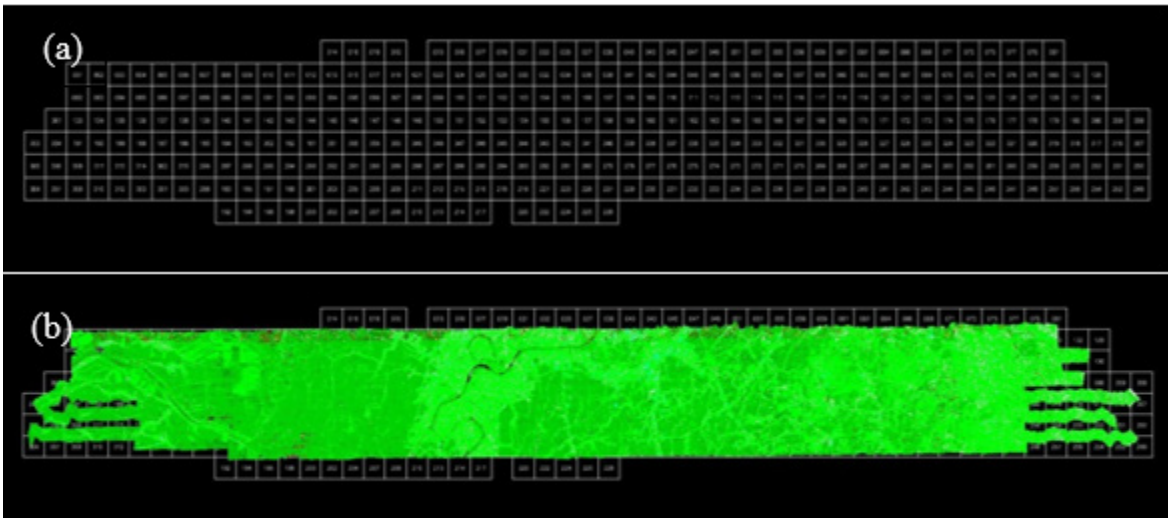


Figure 33. (a) Pampanga floodplains and (b) Pampanga classification results in TerraScan

Table 17. Pampanga floodplain point cloud classification results

Pertinent Class	Count
Ground	1,416,332,051
Low Vegetation	1,985,408,028
Medium Vegetation	2,070,817,103
High Vegetation	1,744,801,076
Building	99,194,577
Number of 1km x 1km blocks	3,458
Maximum Height	705.94 m
Minimum Height	48.65 m

An isometric view of an area before (a) and after (b) running the classification routines for the mission is shown in Figure 34. The ground points are in brown, the vegetation is in different shades of green, and the buildings are in cyan. It can be seen that residential structures adjacent or even below canopy are classified correctly, due to the density of the LiDAR data.

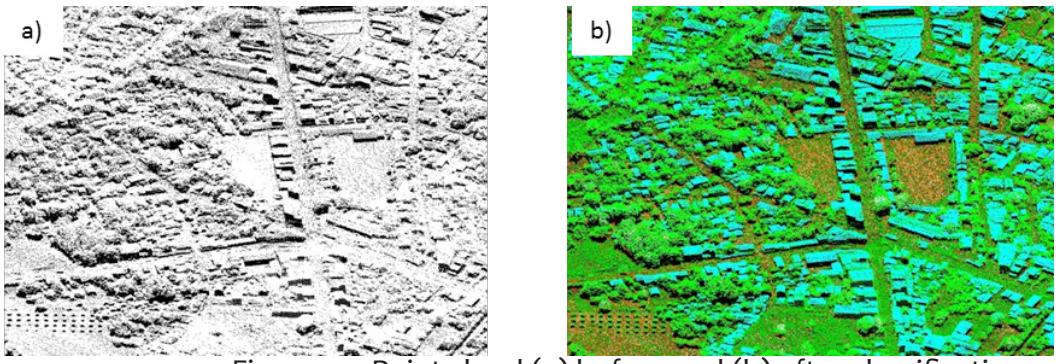


Figure 34. Point cloud (a) before and (b) after classification

4.2.5 DEM Editing and Hydro-correction

Portions of DTMs before and after manual editing are shown in Figure 35. It shows that the embankment might have been drastically cut by the classification routine in Figure 35a and clearly needed to be retrieved to complete the surface as in Figure 35b to allow to hydrologically correct flow of water. A small stream suffers from discontinuity of flow due to an existing bridge in Figure 35c. The bridge is removed also in order to hydrologically correct the flow of water through the river in Figure 35d.

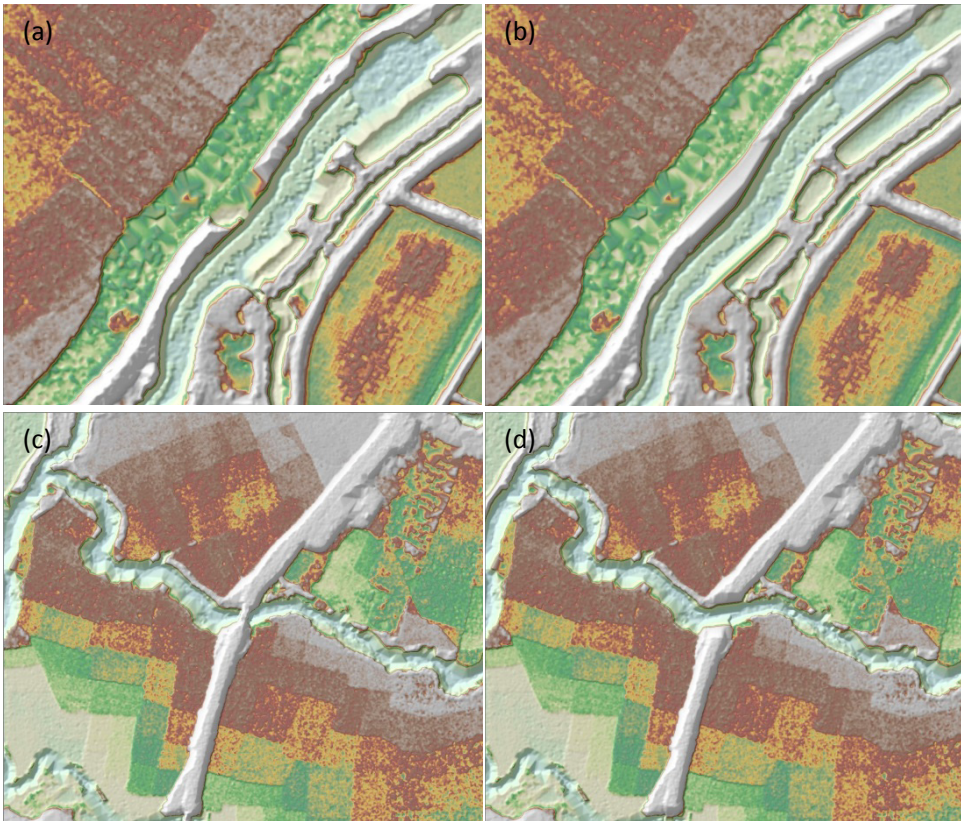


Figure 35. Images of DTMs before and after manual editing

The extent of the validation survey done by the Data Validation Component (DVC) in Pampanga to collect points with which the LiDAR dataset is validated is shown in Figure 36. A total of 148 control points were collected. The good correlation between the airborne LiDAR elevation values and the ground survey elevation values, which reflects the quality of the LiDAR DTM is shown in Figure 37. The computed RMSE between the LiDAR DTM and the surveyed elevation values is 5.480 centimeters with a standard deviation of 5.498 centimeters. The LE 90 value represents the linear vertical distance that 90% of the sampled DEM points and their respective DVC validation point counterparts should be found from each other. Other statistical information can be found in Table 18. The final DTM and extent of the bathymetric survey done along the river is shown in Figure 38.

Results and Discussion

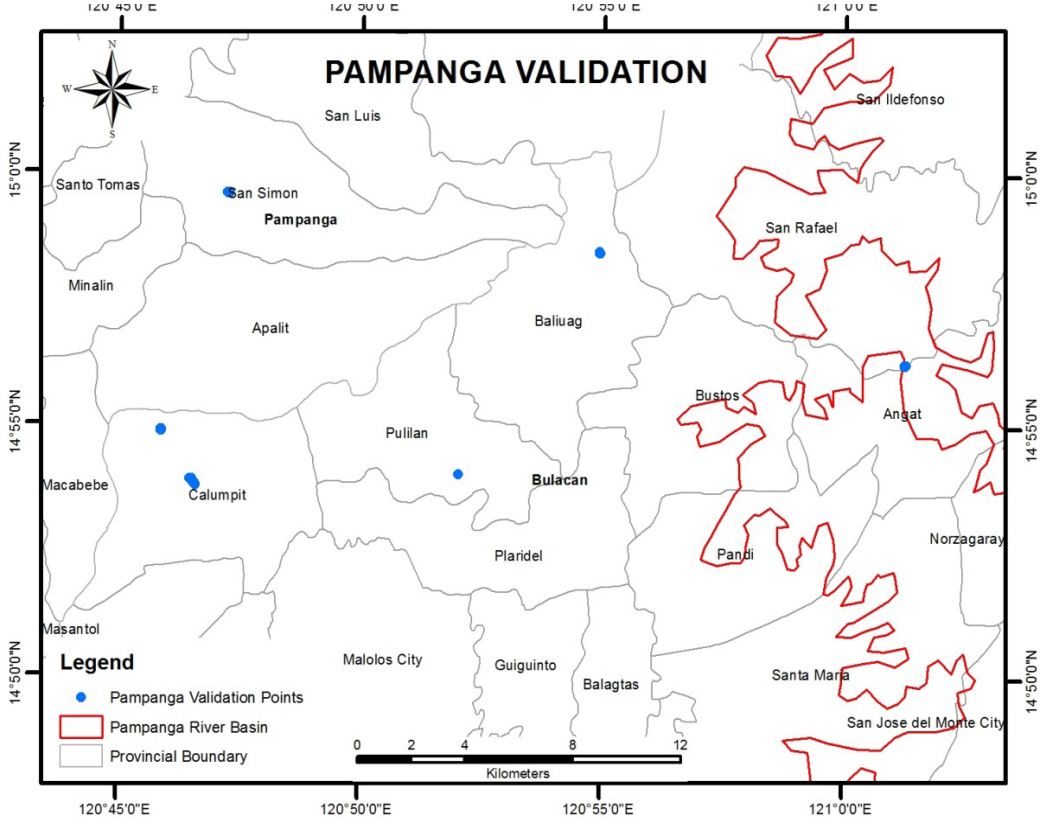


Figure 36. Map of Pampanga River System with validation survey shown in blue

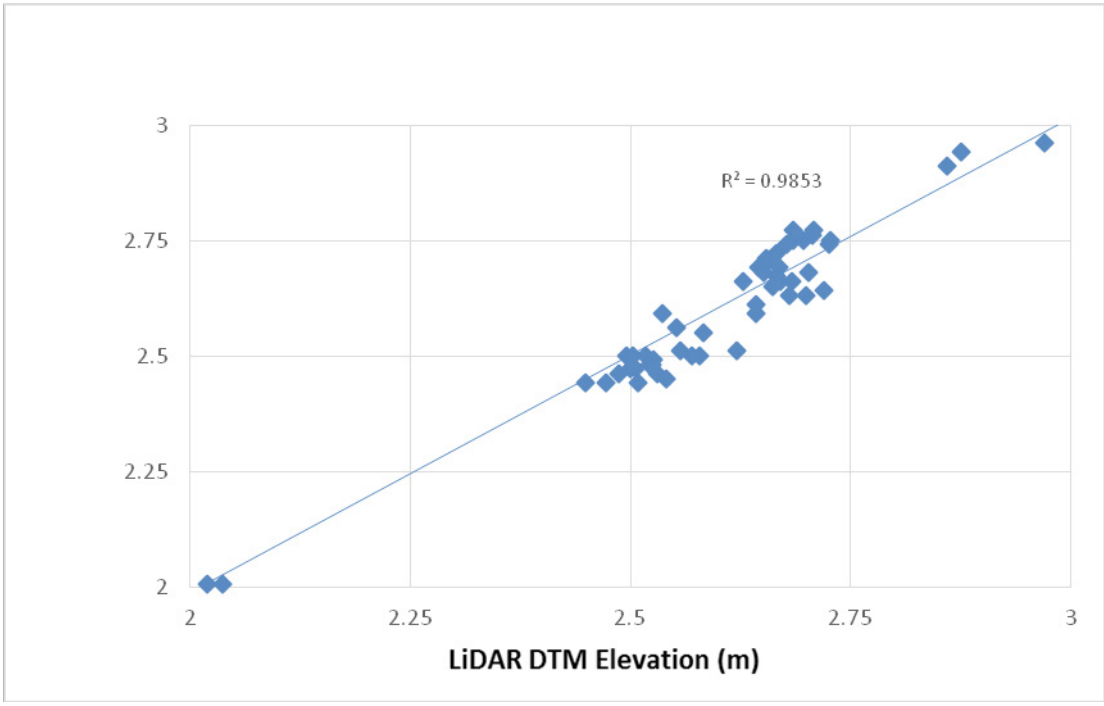


Figure 37. One-one Correlation plot between topographic and LiDAR data

Table 18. Statistical values for the calibration of Pampanga flights

Statistical Information	Values (cm)
Min	-10.784
Max	11.116
RMSE	5.480
Standard Deviation	5.498
LE90	8.516

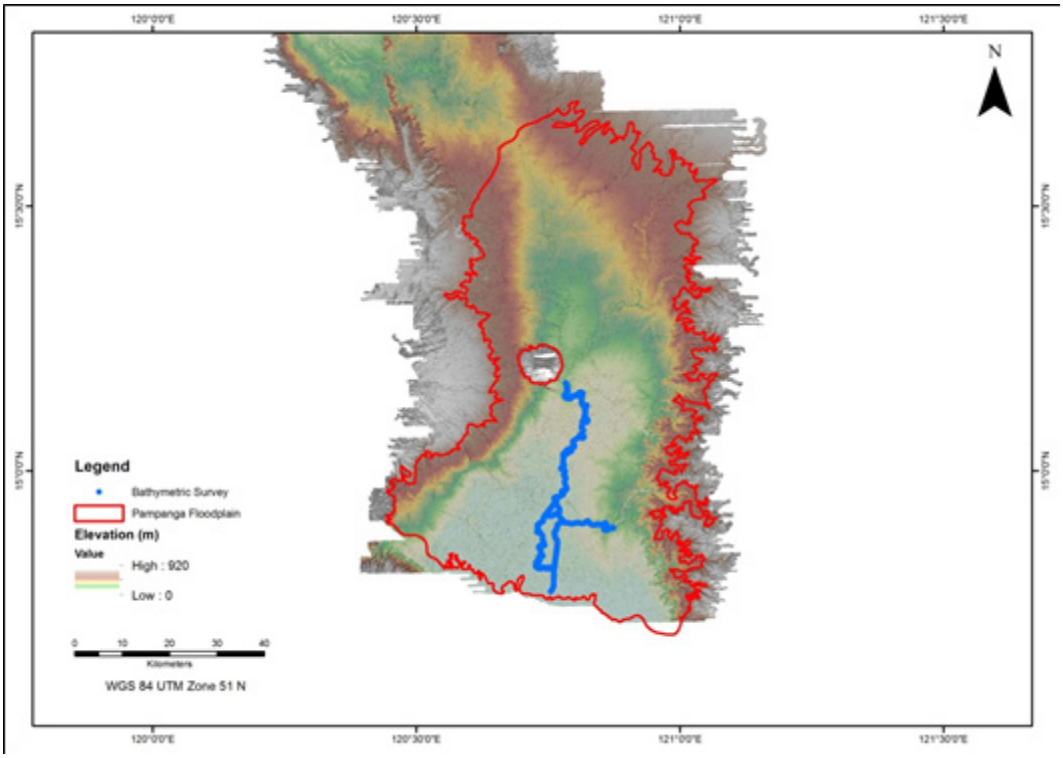


Figure 38. Final DTM of Pampanga with validation survey shown in blue

The floodplain extent for Pampanga is also presented, showing the completeness of the Li-DAR dataset and DSM produced, is shown in Figure 39. Samples of 1 kilometer by 1 kilometer of DSM and DTM are shown in Figure 40 and Figure 41, respectively.

Results and Discussion

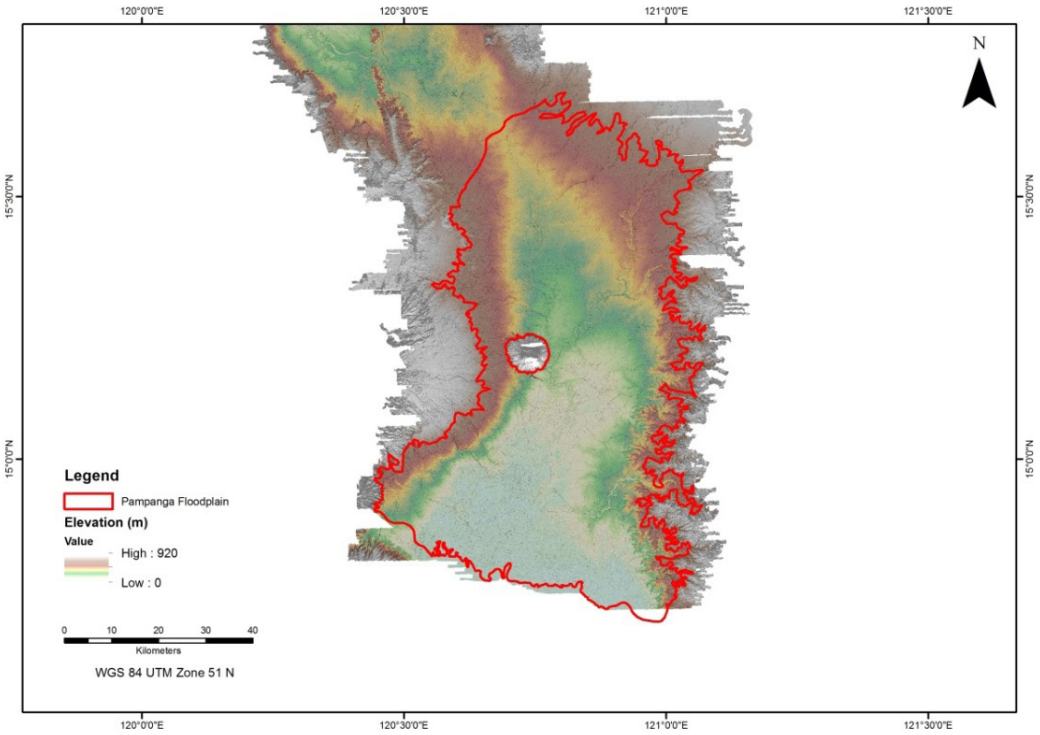


Figure 39. Final DSM in Pampanga

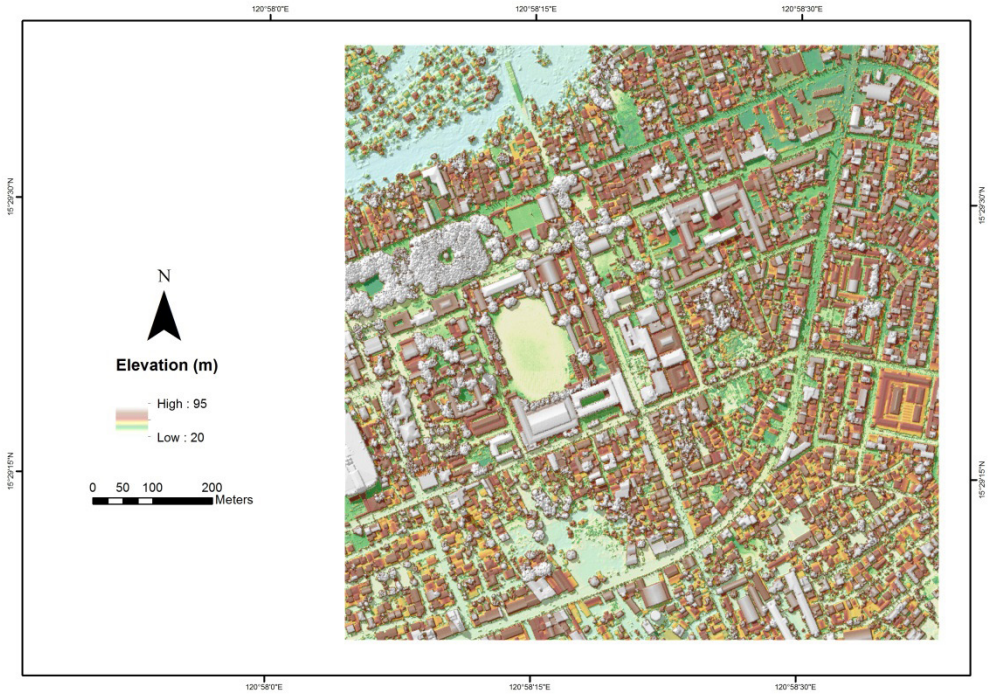


Figure 40. Sample 1x1 square kilometer DSM

Results and Discussion

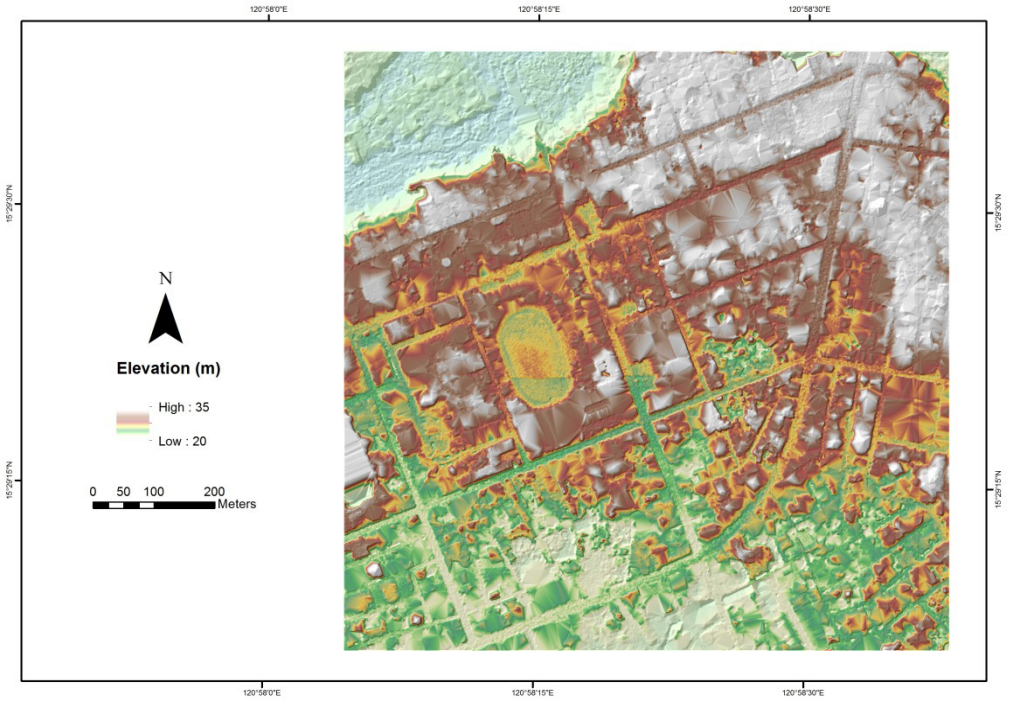


Figure 41. Sample 1x1 square kilometer DTM

Annexes

Annex A. OPTECH TECHNICAL SPECIFICATION OF THE PEGASUS SENSOR

PEGASUS SENSOR

Parameter	Specification
Operational envelope (1,2,3,4)	150-5000 m AGL, nominal
Laser wavelength	1064 nm
Horizontal accuracy (2)	1/5,500 x altitude, 1σ
Elevation accuracy (2)	< 5-20 cm, 1σ
Effective laser repetition rate	Programmable, 100-500 kHz
Position and orientation system	POS AV ™AP50 (OEM)
Scan width (FOV)	Programmable, 0-75 °
Scan frequency (5)	Programmable, 0-140 Hz (effective)
Sensor scan product	800 maximum
Beam divergence	0.25 mrad (1/e)
Roll compensation	Programmable, ±37° (FOV dependent)
Vertical target separation distance	<0.7 m
Range capture	Up to 4 range measurements, including 1st, 2nd, 3rd, and last returns
Intensity capture	Up to 4 intensity returns for each pulse, including last (12 bit)
Image capture	5 MP interline camera (standard); 60 MP full frame (optional)
Full waveform capture	12-bit Optech IWD-2 Intelligent Waveform Digitizer
Data storage	Removable solid state disk SSD (SATA II)
Power requirements	28 V, 800 W, 30 A
Dimensions and weight	Sensor: 630 x 540 x 450 mm; 65 kg
	Control rack: 650 x 590 x 490 mm; 46 kg
Operating Temperature	-10°C to +35°C
Relative humidity	0-95% non-condensing

Annex A

GEMINI SENSOR

Parameter	Specification
Operational envelope (1,2,3,4)	150-5000 m AGL, nominal
Laser wavelength	1064 nm
Horizontal accuracy (2)	1/5,500 x altitude, 1σ
Elevation accuracy (2)	< 5-35 cm, 1σ
Effective laser repetition rate	Programmable, 33-167 kHz
Position and orientation system	POS AV ™AP50 (OEM); 220-channel dual frequency GPS/GNSS/Galileo/ L-Band receiver
Scan width (FOV)	Programmable, 0-50 °
Scan frequency (5)	Programmable, 0-70 Hz (effective)
Sensor scan product	1000 maximum
Beam divergence	Dual divergence: 0.25 mrad (1/e) and 0.8 mrad (1/e), nominal
Roll compensation	Programmable, ±5° (FOV dependent)
Range capture	Up to 4 range measurements, including 1st, 2nd, 3rd, and last returns
Intensity capture	Up to 4 intensity returns for each pulse, including last (12 bit)
Video camera	Internal video camera (NTSC or PAL)
Image capture	Compatible with full Optech camera line (optional)
Full waveform capture	12-bit Optech IWD-2 Intelligent Waveform Digitizer (optional)
Data storage	Removable solid state disk SSD (SATA II)
Power requirements	28 V, 900 W, 35 A (peak)
Dimensions and weight	Sensor: 260 mm (w) x 190 mm (l) x 570 mm (h); 23 kg
	Control rack: 650 mm (w) x 590 mm (l) x 530 mm (h); 53 kg
Operating Temperature	-10°C to +35°C (with insulating jacket)
Relative humidity	0-95% no-condensing

Annex B. OPTECH TECHNICAL SPECIFICATION OF THE D-8900 AERIAL DIGITAL CAMERA

Parameter	Specification
Camera Head	
Sensor type	60 Mpix full frame CCD, RGB
Sensor format (H x V)	8,984 x 6,732 pixels
Pixel size	6µm x 6 µm
Frame rate	1 frame/2 sec.
FMC	Electro-mechanical, driven by piezo technology (patented)
Shutter	Electro-mechanical iris mechanism 1/125 to 1/500++ sec. f-stops: 5.6, 8, 11, 16
Lenses	50 mm/70 mm/120 mm/210 mm
Filter	Color and near-infrared removable filters
Dimensions (H x W x D)	200 x 150 x 120 mm (70 mm lens)
Weight	~4.5 kg (70 mm lens)
Controller Unit	
Computer	Mini-ITX RoHS-compliant small-form-factor embedded computers with AMD TurionTM 64 X2 CPU 4 GB RAM, 4 GB flash disk local storage IEEE 1394 Firewire interface
Removable storage unit	~500 GB solid state drives, 8,000 images
Power consumption	~8 A, 168 W
Dimensions	2U full rack; 88 x 448 x 493 mm
Weight	~15 kg
Image Pre-Processing Software	
Capture One	Radiometric control and format conversion, TIFF or JPEG
Image output	8,984 x 6,732 pixels 8 or 16 bits per channel (180 MB or 360 MB per image)

Annex C

Annex C. THE SURVEY TEAM

Data Acquisition Component Sub-team	Designation	Name	Agency/Affiliation
Data Acquisition Component Leader	Data Component Project Leader –I	ENGR. CZAR JAKIRI S. SARMIENTO	UP-TCAGP
Survey Supervisor	Chief Science Research Specialist (CSRS)	ENGR. CHRISTOPHER CRUZ	UP TCAGP
LiDAR Operation	Supervising Science Research Specialist (Supervising SRS)	LOVELYN ASUNCION	UP TCAGP
LiDAR Operation	Supervising Science Research Specialist (Supervising SRS)	LOVELY GRACIA ACUNA	UP TCAGP
LiDAR Operation	Senior Science Research Specialist (SSRS)	MARK GREGORY ANO	UP TCAGP
LiDAR Operation	Senior Science Research Specialist (SSRS)	JASMINE ALVIAR	UP TCAGP
LiDAR Operation	Senior Science Research Specialist (SSRS)	JAMES NOVILLA	UP TCAGP
LiDAR Operation	Research Associate	IRO ROXAS	UP TCAGP
LiDAR Operation	Research Associate	MARVY FUNTILON	UP TCAGP
Ground Survey	Senior Science Research Specialist (SSRS)	ENGR. GEROME HIPOLITO	UP TCAGP
Ground Survey	Research Associate	ENGR. JAMES WILBERT BELTRAN	UP TCAGP
Data Download and Transfer	Research Associate	CHRISTOPHER JOAQUIN	UP TCAGP
LiDAR Operation	Airborne Security	SSG. PRADYUMNA DAS RAMIREZ	Philippine Air Force (PAF)
LiDAR Operation	Pilot	FRANCISCO CADENAS	ASIAN AEROSPACE CORP (AAC)
LiDAR Operation	Pilot	HARRY ROQUE	AAC
LiDAR Operation	Pilot	JAMAAL CLEMENTE	AAC
LiDAR Operation	Co-pilot	LAWRENCE MADAYAG	AAC
LiDAR Operation	Co-pilot	GRAIUS DELA CRUZ	AAC
LiDAR Operation	Co-pilot	FRANCO JESUS PEPITO	AAC

Annex D

Annex D. NAMRIA CERTIFICATION

NEJ-3332

Republic of the Philippines
Department of Environment and Natural Resources
NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY

May 10, 2013

CERTIFICATION

To whom it may concern:

This is to certify that according to the records on file in this office, the requested survey information is as follows -

Province: **NUEVA ECIJA**
Station Name: **NEJ-3332**
Order: **4th**

Island: **LUZON**
Municipality: **QUEZON**
Barangay: **PULONG BAHAY**

PRS92 Coordinates

Latitude: **15° 32' 42.98257"** Longitude: **120° 49' 9.35425"** Ellipsoidal Hgt: **27.14780 m.**

WGS84 Coordinates

Latitude: **15° 32' 37.33289"** Longitude: **120° 49' 14.16885"** Ellipsoidal Hgt: **67.50000 m.**

PTM Coordinates

Northing: **1719141.792 m.** Easting: **480612.682 m.** Zone: **3**

UTM Coordinates

Northing: **1,719,725.18** Easting: **266,107.50** Zone: **51**

Location Description

NEJ-3332

Station is located along the Provincial Road of Quezon-Aliaga Highway in Brgy. Pulong Bahay. It is situated SW end of the irrigation canal and 3 m SE of the welcome arch of Pulong Bahay. Station mark is the head of a 4 in. bolt screw centered on a 0.20 m x 0.20 m concrete block with inscriptions, "NEJ-3332, 2008, NAMRIA".

Requesting Party: **Christopher Cruz**
Pupose: **Reference**
OR Number: **3943636B**
T.N.: **2013-0417**

RUEL OM. BELEN, MNSA
Director, Mapping and Geodesy Department

9905102013160254

CIP/4701/12/09/814

NAMRIA OFFICES:
Main : Lawton Avenue, Fort Bonifacio, 1634 Taguig City, Philippines Tel. Nos.: (632) 810-4831 to 41
Branch : 421 Barraca St. San Nicolas, 1010 Manila, Philippines, Tel. No. (632) 241-3494 to 98
www.namria.gov.ph

Annex F

NEJ-3148

Republic of the Philippines
Department of Environment and Natural Resources
NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY

May 10, 2013

CERTIFICATION

To whom it may concern:

This is to certify that according to the records on file in this office, the requested survey information is as follows -

Province: **PAMPANGA**
Station Name: **PMG-3148**
Order: **4th**

Island: **LUZON**
Municipality: **SAN LUIS**
Barangay: **TENEJERO**

PRS92 Coordinates

Latitude: **15° 1' 19.45298"** Longitude: **120° 51' 27.34493"** Ellipsoidal Hgt: **11.08000 m.**

WGS84 Coordinates

Latitude: **15° 1' 13.92611"** Longitude: **120° 51' 32.20370"** Ellipsoidal Hgt: **53.05900 m.**

PTM Coordinates

Northing: **1661251.527 m.** Easting: **484686.479 m.** Zone: **3**

UTM Coordinates

Northing: **1,661,781.75** Easting: **269,649.32** Zone: **51**

Location Description

PMG-3148

From San Luis Town Proper in the Province of Pampanga travel towards SW direction for about 3 Km. passing through Pampanga River until reaching the intersection road. Turn left and continue to travel for about 8 Km. until reaching Brgy. Tenejero, Mun. of San Luis. Station is located at the side of culvert at the side of the road and 250 m NE of the Shell Gasoline Station. Mark is the center of a brass rod with cross-cut on top set flushed at the center of a 20 cm x 20 cm x 100 cm concrete monument with inscriptions, "PPMG-3148, 2008, NAMRIA".

Requesting Party: **Christopher Cruz**
Pupose: **Reference**
OR Number: **3943636B**
T.N.: **2013-0421**

RUEL DM. BELEN, MNSA
Director, Mapping and Geodesy Department

9905102013160423

CIP/4701/12/09/814

NAMRIA OFFICES:
Main : Lawton Avenue, Fort Bonifacio, 1634 Taguig City, Philippines Tel. No.: (632) 810-4831 to 41
Branch : 421 Barraca St. San Nicolas, 1010 Manila, Philippines, Tel. No. (632) 241-3494 to 98
www.namria.gov.ph

Annex F

NEJ-3060

Republic of the Philippines
Department of Environment and Natural Resources
NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY

May 10, 2013

CERTIFICATION

To whom it may concern:

This is to certify that according to the records on file in this office, the requested survey information is as follows -

Province: **NUEVA ECIJA**
Station Name: **NEJ-3060**
Order: **4th**

Island: **LUZON**
Municipality: **JAEN**
Barangay: **NIYUGAN**

PRS92 Coordinates

Latitude: **15° 19' 32.78238"** Longitude: **120° 53' 29.45676"** Ellipsoidal Hgt: **21.54500 m.**

WGS84 Coordinates

Latitude: **15° 19' 27.18854"** Longitude: **120° 53' 34.28956"** Ellipsoidal Hgt: **62.72000 m.**

PTM Coordinates

Northing: **1694850.752 m.** Easting: **488350.739 m.** Zone: **3**

UTM Coordinates

Northing: **1,695,355.91** Easting: **273,621.71** Zone: **51**

Location Description

NEJ-3060

Station is located at Brgy. Niyugan, Jaen, Nueva Ecija. Situated infront of the brgy. hall and brgy. chapel. about 4 m W of waiting shed. To reach the station, from the town of Jaen travel NW for about 4.2 Km. until reaching Brgy. Niyugan. Station mark is the head of a 4 in. concrete nail centered on a 0.20 m x 0.20 m concrete block and mark with, "NEJ-3060, 2008, NAMRIA".

Requesting Party: **Christopher Cruz**
Pupose: **Reference**
OR Number: **3943636B**
T.N.: **2013-0418**

RUEL DM. BELEN, MNSA
Director, Mapping and Geodesy Department

9905102013160315

CIP/4701/12/09/814

NAMRIA OFFICES:
Main : Lawton Avenue, Fort Bonifacio, 1634 Taguig City, Philippines Tel. No.: (632) 810-4831 to 41
Branch : 421 Barraca St. San Nicolas, 1010 Manila, Philippines, Tel. No. (632) 241-3494 to 98
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Annex F

TRC-1

Republic of the Philippines
Department of Environment and Natural Resources
NATIONAL MAPPING AND RESOURCE INFORMATION AUTHORITY

May 10, 2013

CERTIFICATION

To whom it may concern:

This is to certify that according to the records on file in this office, the requested survey information is as follows -

Province: **TARLAC**
Station Name: **TRC-1**
Order: **1st**

Island: **LUZON**
Municipality: **TARLAC**
Barangay: **SAN ROQUE**

PRS92 Coordinates

Latitude: **15° 28' 44.13765"** Longitude: **120° 35' 52.67202"** Ellipsoidal Hgt: **46.89100 m.**

WGS84 Coordinates

Latitude: **15° 28' 38.48550"** Longitude: **120° 35' 57.49329"** Ellipsoidal Hgt: **86.90220 m.**

PTM Coordinates

Northing: **1711833.357 m.** Easting: **456859.89 m.** Zone: **3**

UTM Coordinates

Northing: **1,712,636.20** Easting: **242,278.30** Zone: **51**

Location Description

TRC-1
Is located in a NIA irrigation canal concrete floodgate 300 m. E of the natl. highway, 1.5 km. SE of Tarlac town proper. From Manila, travel along MacArthur Highway to Tarlac. A small bridge, 10 m. NW of Sombrero Food Center along the irrigation canal bank to the railroad. It is 2 m. W of the railroad on the eastern floodgate wall, which is 5 min. walk from highway. Mark is a 0.15 m. x 0.01 m. dia. brass rod set on a drilled hole in a standard concrete block with cement putty, 0.03 m. above the top of the concrete railing, inscribed with station name. Reference marks (RM): RM's 1, 2 & 3 are 0.15 m. x 0.01 m. dia. brass rods set in a drilled hole with cement putties. RM-2 is a 0.15 m. x 0.01 m. dia. brass rod set on concrete block, 0.6 m. below ground level; Sub-RM is a 0.15 m. x 0.01 m. dia. brass rod set on a drilled hole on top of the concrete railing.

Requesting Party: **Christopher Cruz**
Pupose: **Reference**
OR Number: **3943636B**
T.N.: **2013-0420**

RUEL DM. BELEN, MNSA
Director, Mapping and Geodesy Department

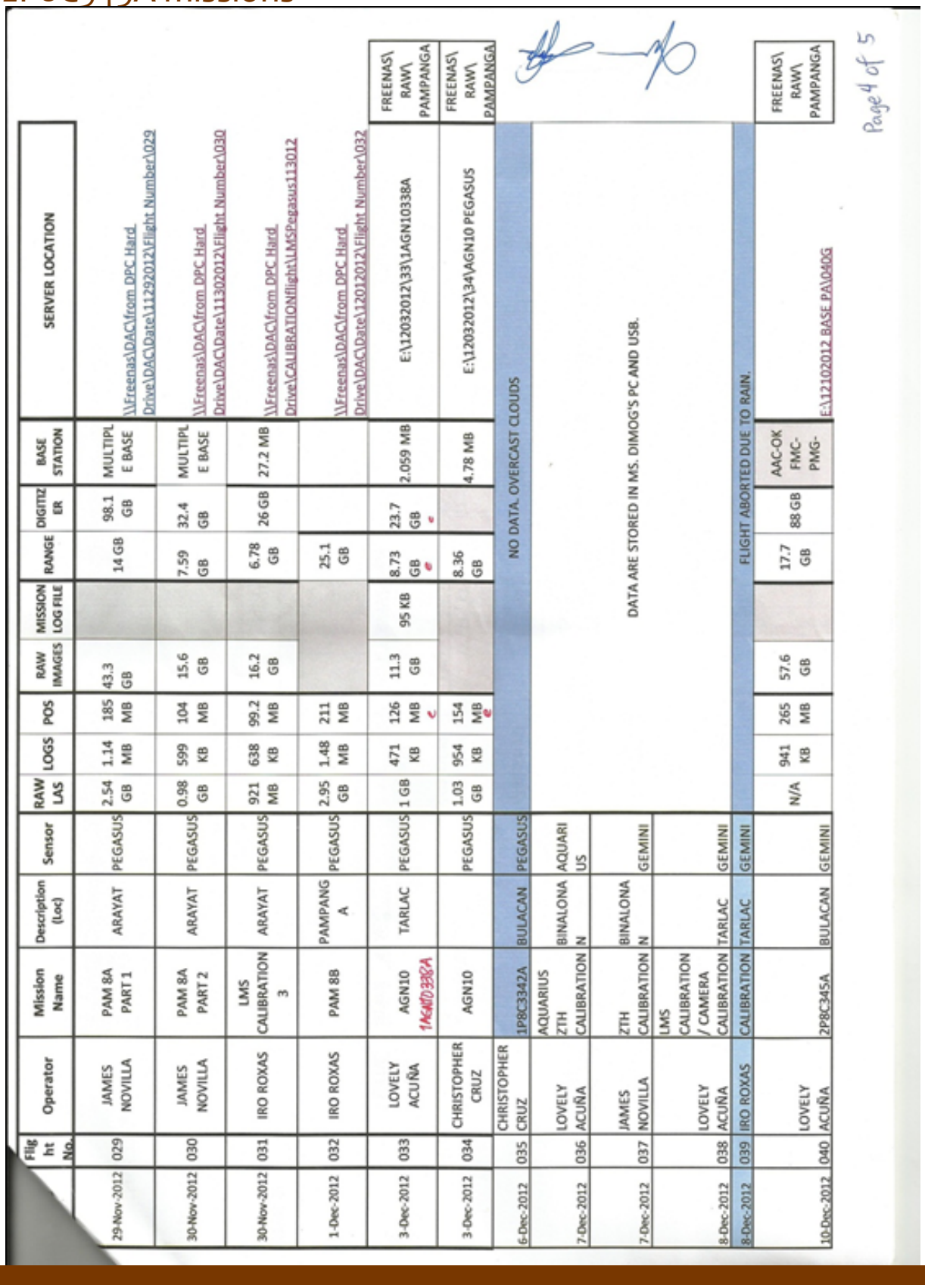
9905102013160403

CIF/4701/12/09/814

NAMRIA OFFICES:
Main : Lawton Avenue, Fort Bonifacio, 1634 Taguig City, Philippines Tel. No.: (632) 810-4831 to 41
Branch : 421 Barraca St. San Nicolas, 1010 Manila, Philippines, Tel. No. (632) 241-3494 to 98
www.namria.gov.ph

ANNEX G. DATA TRANSFER SHEETS FOR THE PAMPANGA FLOODPLAIN

Data transfer sheet for PAM8A, PAM8B, 1P8C3342A, and 2P8C345A missions



Flight No.		Operator	Mission Name	Description (Loc)	Sensor	RAW LAS	LOGS	POS	RAW IMAGES	MISSION LOG FILE	RANGE	DIGITIZER	BASE STATION	SERVER LOCATION
29-Nov-2012	029	JAMES NOVILLA	PAM 8A PART 1	ARAYAT	PEGASUS	2.54 GB	1.14 MB	185 MB	43.3 GB		14 GB	98.1 GB	MULTIPLE BASE	\\Freenas\DAC\from DPC Hard Drive\DAC\Date\11292012\Flight Number\029
30-Nov-2012	030	JAMES NOVILLA	PAM 8A PART 2	ARAYAT	PEGASUS	0.98 GB	599 KB	104 MB	15.6 GB		7.59 GB	32.4 GB	MULTIPLE BASE	\\Freenas\DAC\from DPC Hard Drive\DAC\Date\11302012\Flight Number\030
30-Nov-2012	031	IRO ROXAS	LMS CALIBRATION 3	ARAYAT	PEGASUS	921 MB	638 KB	99.2 MB	16.2 GB		6.78 GB	26 GB	27.2 MB	\\Freenas\DAC\from DPC Hard Drive\CALIBRATION\flight\LMS\Pegasus\113012
1-Dec-2012	032	IRO ROXAS	PAM 8B	PAMPANGA	PEGASUS	2.95 GB	1.48 MB	211 MB			25.1 GB			\\Freenas\DAC\from DPC Hard Drive\DAC\Date\12012012\Flight Number\032
3-Dec-2012	033	LOVELY ACUÑA	AGN10 1AGN10338A	TARLAC	PEGASUS	1 GB	471 KB	126 MB	11.3 GB	95 KB	8.73 GB	23.7 GB	2.059 MB	E:\12032012\33\1AGN10338A
3-Dec-2012	034	CHRISTOPHER CRUZ	AGN10		PEGASUS	1.03 GB	954 KB	154 MB			8.36 GB		4.78 MB	E:\12032012\34\AGN10 PEGASUS
6-Dec-2012	035	CHRISTOPHER CRUZ	1P8C3342A	BULACAN	PEGASUS	NO DATA. OVERCAST CLOUDS								
7-Dec-2012	036	LOVELY ACUÑA	AQUARIUS ZTH CALIBRATION	BINALONAN	AQUARIUS	DATA ARE STORED IN MS. DIMOG'S PC AND USB.								
7-Dec-2012	037	JAMES NOVILLA	ZTH CALIBRATION	BINALONAN	GEMINI									
8-Dec-2012	038	LOVELY ACUÑA	LMS CALIBRATION / CAMERA CALIBRATION	TARLAC	GEMINI									
8-Dec-2012	039	IRO ROXAS	CALIBRATION	TARLAC	GEMINI	FLIGHT ABORTED DUE TO RAIN.								
10-Dec-2012	040	LOVELY ACUÑA	2P8C345A	BULACAN	GEMINI	N/A	941 KB	265 MB	57.6 GB		17.7 GB	88 GB	AAC-OK FMC-PMG-	E:\12102012 BASE PA\040G

Annex G

Data transfer sheet for 2P8C345B, 2P8D346A, and 1P8D346A missions

Date	Flight No.	Operator	Mission Name	Description (Loc)	Sensor	RAW LAS	LOGS	POS	RAW IMAGES	MISSION LOG FILE	RANGE	DIGITIZER	BASE STATION	SERVER LOCATION	
10-Dec-2012	041	JAMES NOVILLA	2P8C345B	BULACAN (PLARIDEL)	GEMINI	N/A	NO DATA	124 MB	NO DATA. SYSTEM ERROR.					E:\12102012 BASE PA\041G\2p8c345b ABORTED	FREENAS\ RAW\ PAMPANGA
11-Dec-2012	042	JAMES NOVILLA	2P8D346A	BULACAN (PLARIDEL)	GEMINI	N/A	861 KB	312 MB			17 GB	104 GB	AAC-OK FMC-PMG-OK	\\Freenas\dac\Raw\Pampanga\12112012\Gemini\2p8c346a BASE AND IMAGE	FREENAS\ RAW\ PAMPANGA
11-Dec-2012	043	CHRISTOPHER CRUZ	1P8D346A	BULACAN (PLARIDEL)	PEGASUS	1.67 GB	1.13 MB	164 MB			13.8 GB		AAC-OK FMC-PMG-OK	E:\12112012\Pegasus\1P8D346A	FREENAS\ RAW\ PAMPANGA
11-Dec-2012	044	GREGORY AÑO	Test Flight	BULACAN (PLARIDEL)	PEGASUS	NOT YET DOWNLOADED. WITH SYSTEM ERROR.									010813

RECEIVED FROM:
NAME: MILLIE SHANE REYES
POSITION: SSRS
SIGNATURE:
DATE TRANSFERRED: 12/12/12

RECEIVED BY:
NAME: SARAH JANE SAMALBURO
POSITION: SSRS
SIGNATURE:
DATE TRANSFERRED: 12/12/12

VERIFIED BY:
NAME:
POSITION:
SIGNATURE:
DATE TRANSFERRED:

Page 5 of 5

Annex G

Data transfer sheet for PAM8C and PAM8G missions

checklist 12132012

DATA TRANSFER FILE CHECKLIST

DECEMBER 13, 2012

Date	Flight No.	Operator	Mission Name	Description (Loc)	Sensor	RAW LAS	LOGS	POS	RAW IMAGES	MISSION LOG FILE	RANGE	DIGITIZER	BASE STATION	SERVER LOCATION
DECEMBER 13,2012	047P	IRO ROXAS	PAM8E ABORTED	logs pos 121392	PEGASUS	NO DATA. AIRCRAFT ERROR.								FREENAS / dac / from Engg_Cris HD
DECEMBER 13,2012	048G	JAMES NOVILLA	PAM8C	12/13/2012 FOR TRANSFER	GEMINI	N/A	480 KB	259 MB	24.9 GB	206 KB	9.13 GB	32.6 GB	AAC-OK FMC-OK	do
DECEMBER 13,2012	049G	LOVELY ACUNA	PAM8G PART 1	12.13.2012 FOR TRANSFER	GEMINI	N/A	750 KB	259 MB	42.0 GB	321 KB	13.3 GB	72.8 GB	AAC-OK FMC-OK	do
DECEMBER 14,2012	050G	JAMES NOVILLA	PAM8G PART 2	12/14/2012 FOR TRANSFER	GEMINI	N/A	794KB	286MB	48.4GB	381KB	14.0 GB	51.5 GB	AAC-OK FMC-OK	do

RECEIVED FROM:
NAME: Aubrey J. Natira
POSITION: Research Associate

SIGNATURE:
DATE TRANSFERRED: 12/14/2012

RECEIVED BY:
NAME: SARAH JANE SAMANIEGO
POSITION: CSRS

SIGNATURE:
DATE TRANSFERRED: 12/14/12

VERIFIED BY:
NAME: JOHN LOUIE PASCUA
POSITION: CSRS

SIGNATURE:
DATE TRANSFERRED: 12/14/12

Page 1

Annex G

Data transfer sheet for 21P8E350B, 2P8H350A, 2P8I1352A and 1P8F352A missions

checklist 12182012

DATA TRANSFER FILE CHECKLIST
DECEMBER 18, 2012

Date	Flight No.	Operator	Mission Name	Description (Loc)	Sensor	RAW LAS	LOGS	POS	RAW IMAGES	MISSION LOG FILE	RANGE	DIGITIZER	BASE STATION	FLIGHT PLAN	SERVER LOCATION
DECEMBER 15,2012	53P	CHRIS CRUZ	1P8E350B	DAC hard drive	PEGASUS	2.01 GB	824 KB	166 MB	32.0 GB	281 KB	15.5 GB	62.6 GB	AAC-OK FMC-OK		To be downloaded
DECEMBER 15,2012	52G	IRO ROXAS	2P8H350A	Engg Cruz/ 52G	GEMINI	N/A	786 KB	273 MB	41.8 GB	424 KB	13.8 GB	TO BE DOWNLOADED [OS (C:) PC-13]	AAC-OK FMC-OK		Freenas/dac
DECEMBER 17,2012	54G	IRO ROXAS	2P8I1352A	DAC hard drive	GEMINI	N/A	822 KB	302 MB	TO BE DOWNLOADED (GEM B)		14.3 GB	NO DATA	AAC-OK FMC-OK	OK	To be downloaded
DECEMBER 17,2012	55P	CHRIS CRUZ	1P8F352A	Engg Cruz/ 55P	PEGASUS	264 MB	222 KB	126 MB	TO BE DOWNLOADED (PEG B)		4.48 GB	7.07 GB	AAC-OK FMC-OK	OK	Freenas/dac

RECEIVED FROM:
NAME: Jasmine T. Alviar
POSITION: Research Associate

SIGNATURE: [signature]
DATE TRANSFERRED: Dec 18, 2012

RECEIVED BY:
NAME: Sarah Jane Samalburo
POSITION: CSRS

SIGNATURE: [signature]
DATE TRANSFERRED: 12/18/12

VERIFIED BY:
NAME: ______
POSITION: ______

SIGNATURE: ______
DATE TRANSFERRED: ______

Page 1

Annex G

Data transfer sheet for 2P8I132A, 1P8F352A, P8I2, P8J1, P8F, 1P3A355B, and 2P3C356B missions

DATA TRANSFER CHECKLIST
3-Jan-12

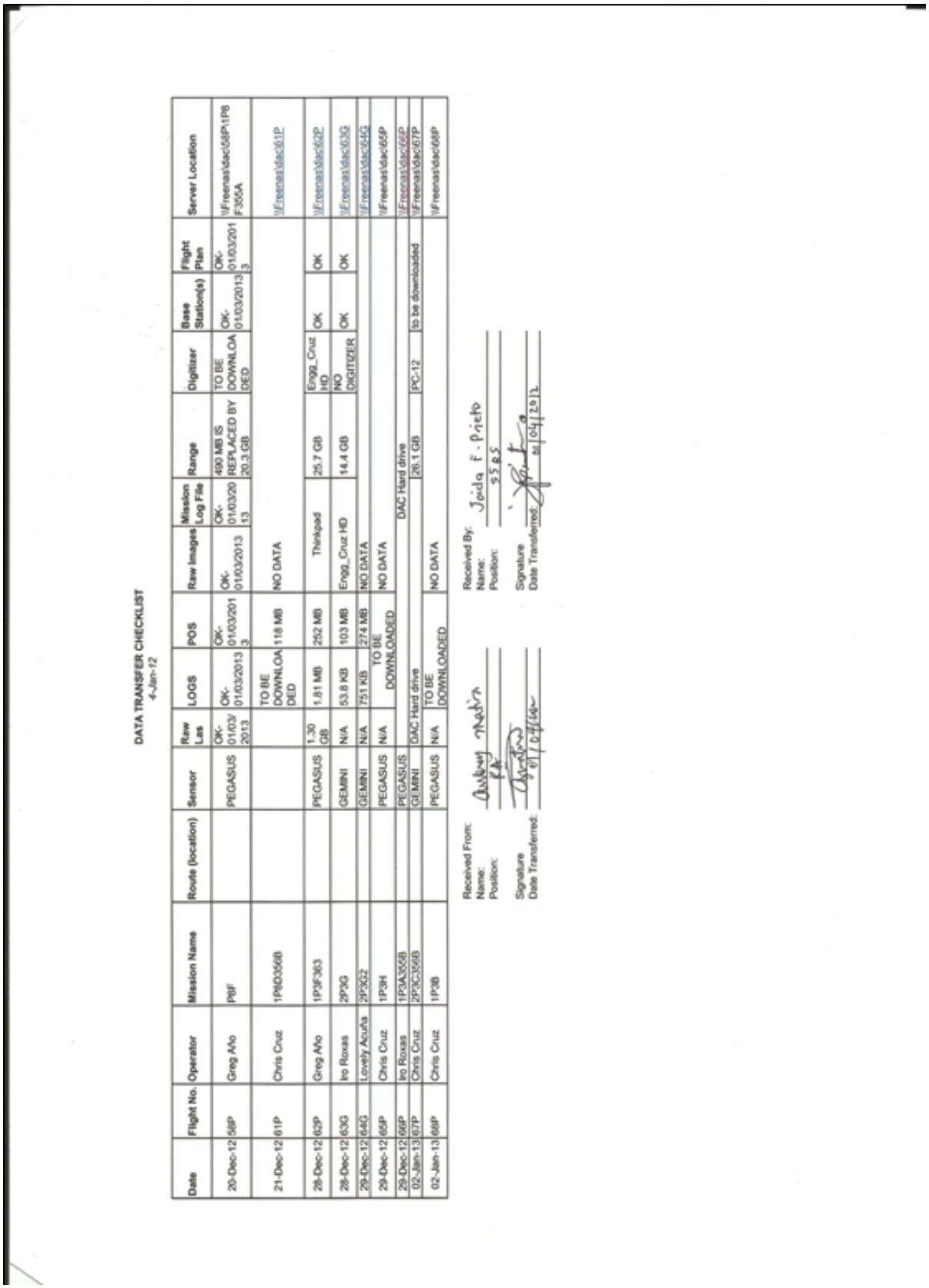
Date	Flight No.	Operator	Mission Name	Route (location)	Sensor	Raw Las	LOGS	POS	Raw Images	Mission Log File	Range	Digitizer	Base Station(s)	Flight Plan	Server Location
17-Dec-12	54G	Iro Roxas	2P8I132A		GEMINI	N/A	OK-121812	OK-121812	51.7 GB	490 KB	OK-121812	NO DATA	OK-121812	OK-121812	\\Freenas\dac\54G\2P8I1352A
17-Dec-12	55P	Chris Cruz	1P8F352A		PEGASUS	OK-121812	OK-121812	OK-121812	TO BE DOWNLOADED		OK-121812	OK-121812	OK-121812	OK-121812	\\Freenas\dac\55P
19-Dec-12	56G	Iro Roxas	P8I2- COMPLETE		GEMINI	N/A	775 KB	275 MB	14.8G	128 KB	12.5 GB	NO DIGITIZE	OK	OK	\\Freenas\dac\56G\2P8I2354B
20-Dec-12	57G	James Novilla	P8J1-COMPLETE	Novaliches; Valenzuela	GEMINI	N/A	751 KB	274 MB	44.3 GB AND 3.0 GB	360 KB AND 26.5 KB	12.5 GB	TO BE DOWNLOADED	OK	OK	\\Freenas\dac\57G\2P8J1355A1
20-Dec-12	58P	Greg Año	P8F		PEGASUS	44.5 GB	139 KB AND 1.14 MB	193 MB	44.5 GB	384 KB	490 MB (TO BE VERIFIED)	TO BE DOWNLOADED	OK	OK	\\Freenas\dac\58P\1P8F355A
20-Dec-12	59P	Jasmine Alviar	1P3A355B		PEGASUS	1.67 GB	1.21 MB	175 MB	TO BE DOWNLOADED		3.95 GB AND 20.1 GB	TO BE DOWNLOADED	OK	OK	\\Freenas\dac\59P\1P3A355B
21-Dec-12	60G	Chris Cruz Gil James N.	2P3C356B		GEMINI	N/A	TO BE DOWNLOADED	276 MB	75.3 GB	589 KB	18.3 GB	137 GB	OK	OK	\\Freenas\dac\60G

Received From: Aubrey Madrid
Name:
Position: SSRS
Signature: [signature]
Date Transferred: 1/3/2013

Received By: Sarah Jane Samalburo
Name:
Position: SSRS
Signature: [signature]
Date Transferred: 1/3/13

Annex G

Data transfer sheet for P8F, 1P8D356B, 1P3F363, 2P3G, 2P3G2, 1P3H, 1P3A355B, 2P3C356B and 1P3B missions



DATA TRANSFER CHECKLIST
4-Jan-12

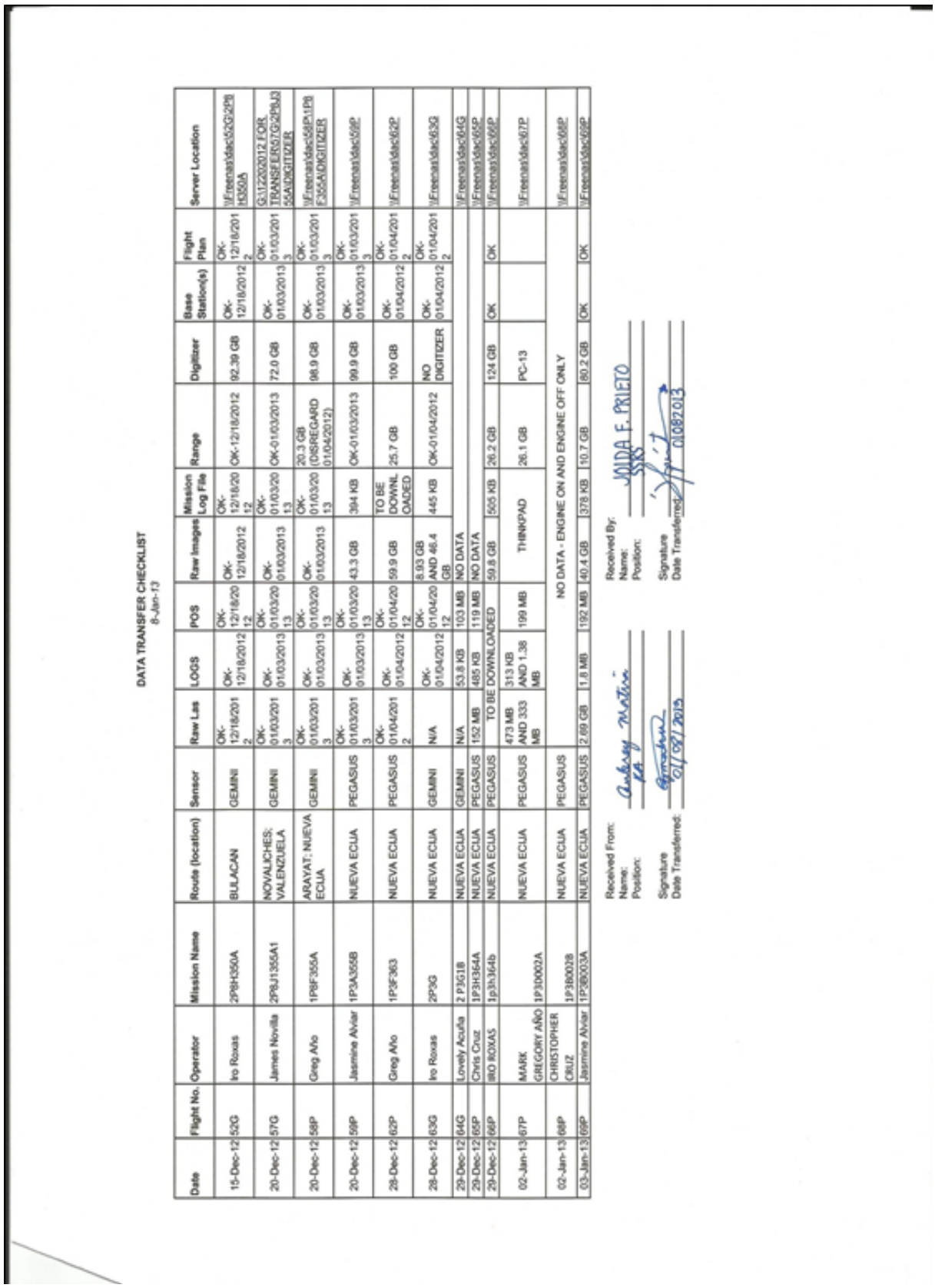
Date	Flight No.	Operator	Mission Name	Route (location)	Sensor	Raw Las	LOGS	POS	Raw Images	Mission Log File	Range	Digitizer	Base Station(s)	Flight Plan	Server Location
20-Dec-12	58P	Greg Año	P8F		PEGASUS	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	490 MB IS REPLACED BY 20.3 GB	TO BE DOWNLOADED	OK-01/03/2013	OK-01/03/2013	\\Freenas\dac\58P\1P8F355A
21-Dec-12	61P	Chris Cruz	1P8D356B				TO BE DOWNLOADED	118 MB	NO DATA						\\Freenas\dac\61P
28-Dec-12	62P	Greg Año	1P3F363		PEGASUS	1.30 GB	1.81 MB	252 MB	Thinkpad		25.7 GB	Engg_Cruz HD	OK	OK	\\Freenas\dac\62P
28-Dec-12	63G	Ino Roxas	2P3G		GEMINI	N/A	53.8 KB	103 MB	Engg_Cruz HD		14.4 GB	NO DIGITIZER	OK	OK	\\Freenas\dac\63G
29-Dec-12	64G	Lovely Acuña	2P3G2		GEMINI	N/A	751 KB	274 MB	NO DATA						\\Freenas\dac\64G
29-Dec-12	65P	Chris Cruz	1P3H		PEGASUS	N/A	TO BE DOWNLOADED		NO DATA		DAC Hard drive				\\Freenas\dac\65P
29-Dec-12	66P	Ino Roxas	1P3A355B		PEGASUS										\\Freenas\dac\66P
02-Jan-13	67P	Chris Cruz	2P3C356B		GEMINI		DAC Hard drive				26.1 GB	PC-12	to be downloaded		\\Freenas\dac\67P
02-Jan-13	68P	Chris Cruz	1P3B		PEGASUS	N/A	TO BE DOWNLOADED		NO DATA						\\Freenas\dac\68P

Received From:
Name:
Position:
Signature
Date Transferred: 01/04/13

Received By:
Name: Jaida F. Prieto
Position: SSAS
Signature
Date Transferred: 01/04/2013

Annex G

Data transfer sheet for 2P8H350A, 2P8J1355A1, 1P8F355A, 1P3A355B, 1P3F363, 2P3G, 2P3G1B, 1P3H364A, 1P3H364B, 1P3D002A, 1P3B002B, and 1P3B003A missions



DATA TRANSFER CHECKLIST

8-Jan-13

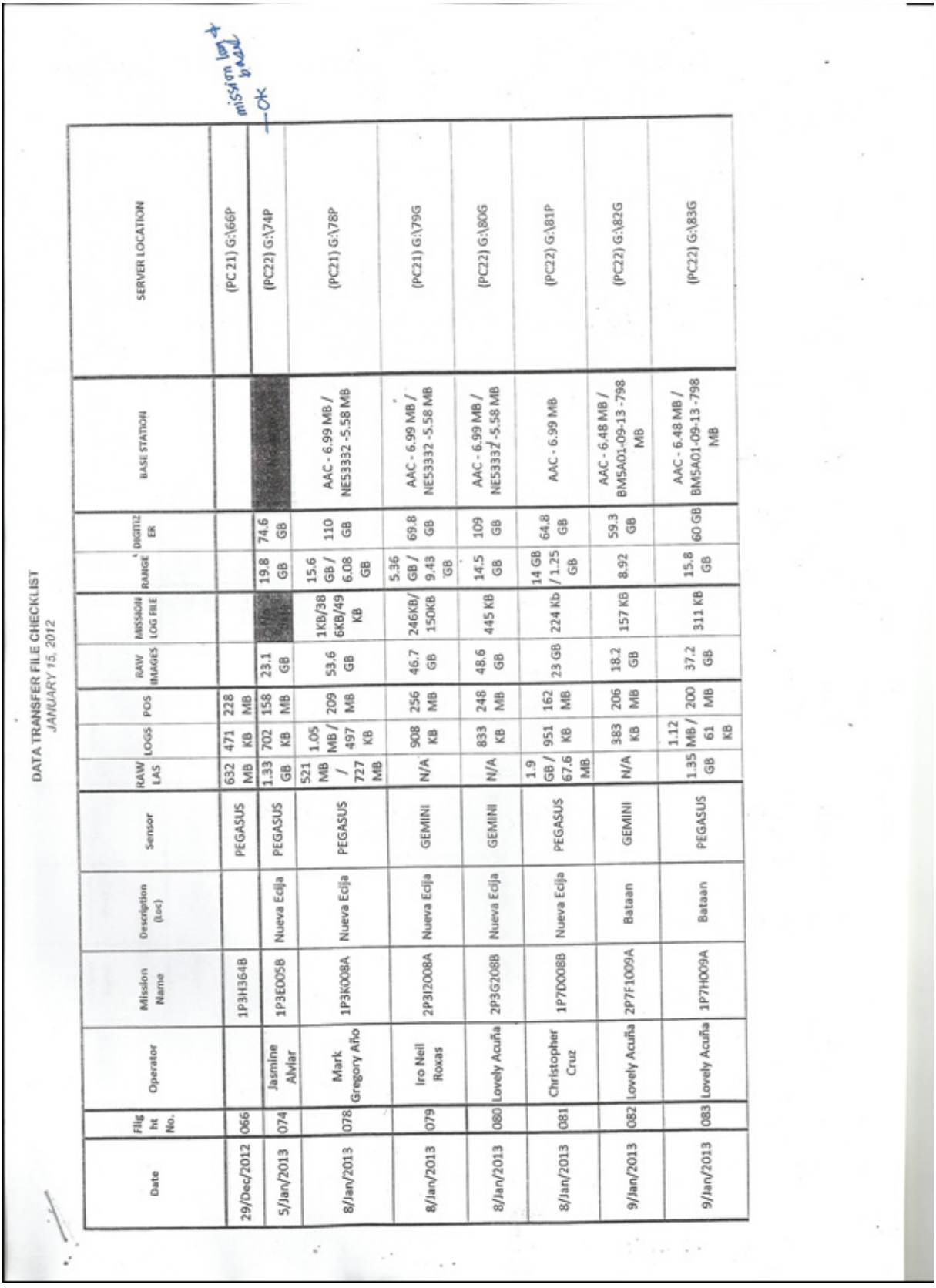
Date	Flight No.	Operator	Mission Name	Route (location)	Sensor	Raw Las	LOGS	POS	Raw Images	Mission Log File	Range	Digitizer	Base Station(s)	Flight Plan	Server Location
15-Dec-12	52G	Ino Roxas	2P8H350A	BULACAN	GEMINI	OK-12/18/2012	OK-12/18/2012	OK-12/18/2012	OK-12/18/2012	OK-12/18/2012	OK-12/18/2012	92.39 GB	OK-12/18/2012	OK-12/18/2012	\\Freenas\dac\52G\2P8H350A
20-Dec-12	57G	James Novilla	2P8J1355A1	NOVALICHES; VALENZUELA	GEMINI	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	72.0 GB	OK-01/03/2013	OK-01/03/2013	G:\12202012 FOR TRANSFER\57G\2P8J1355A1\DIGITIZER
20-Dec-12	58P	Greg Año	1P8F355A	ARAYAT; NUEVA ECIJA	GEMINI	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	20.3 GB (DISREGARD 01/04/2012)	98.9 GB	OK-01/03/2013	OK-01/03/2013	\\Freenas\dac\58P\1P8F355A\DIGITIZER
20-Dec-12	59P	Jasmine Alviar	1P3A355B	NUEVA ECIJA	PEGASUS	OK-01/03/2013	OK-01/03/2013	OK-01/03/2013	43.3 GB	394 KB	OK-01/03/2013	99.9 GB	OK-01/03/2013	OK-01/03/2013	\\Freenas\dac\59P
28-Dec-12	62P	Greg Año	1P3F363	NUEVA ECIJA	PEGASUS	OK-01/04/2012	OK-01/04/2012	OK-01/04/2012	59.9 GB	TO BE DOWNLOADED	25.7 GB	100 GB	OK-01/04/2012	OK-01/04/2012	\\Freenas\dac\62P
28-Dec-12	63G	Ino Roxas	2P3G	NUEVA ECIJA	GEMINI	N/A	OK-01/04/2012	OK-01/04/2012	8.93 GB AND 46.4 GB	445 KB	OK-01/04/2012	NO DIGITIZER	OK-01/04/2012	OK-01/04/2012	\\Freenas\dac\63G
29-Dec-12	64G	Lovely Acuña	2 P3G1B	NUEVA ECIJA	GEMINI	N/A	53.8 KB	103 MB	NO DATA						\\Freenas\dac\64G
29-Dec-12	65P	Chris Cruz	1P3H364A	NUEVA ECIJA	PEGASUS	152 MB	485 KB	119 MB	NO DATA						\\Freenas\dac\65P
29-Dec-12	66P	IRO ROXAS	1p3h364b	NUEVA ECIJA	PEGASUS	TO BE DOWNLOADED		59.8 GB	505 KB	26.2 GB	124 GB	OK	OK		\\Freenas\dac\66P
02-Jan-13	67P	MARK GREGORY AÑO	1P3D002A	NUEVA ECIJA	PEGASUS	473 MB AND 333 MB	313 KB AND 1.38 MB	199 MB	THINKPAD	26.1 GB	PC-13				\\Freenas\dac\67P
02-Jan-13	68P	CHRISTOPHER CRUZ	1P3B002B	NUEVA ECIJA	PEGASUS	NO DATA - ENGINE ON AND ENGINE OFF ONLY									\\Freenas\dac\68P
03-Jan-13	69P	Jasmine Alviar	1P3B003A	NUEVA ECIJA	PEGASUS	2.69 GB	1.8 MB	192 MB	40.4 GB	378 KB	10.7 GB	80.2 GB	OK	OK	\\Freenas\dac\69P

Received From:
Name: Anthony Martinez
Position: RA I
Signature
Date Transferred: 01/08/2013

Received By:
Name: NIDA F. PRIETO
Position: SRS
Signature
Date Transferred: 01/08/2013

Annex G

Data transfer sheet for 1P3H364B, 1P3E005B, 1P3K008A, 2P3I2008A, 2P3G208B, 1P7D008B, 2P7F1009A, 1P7H009A missions

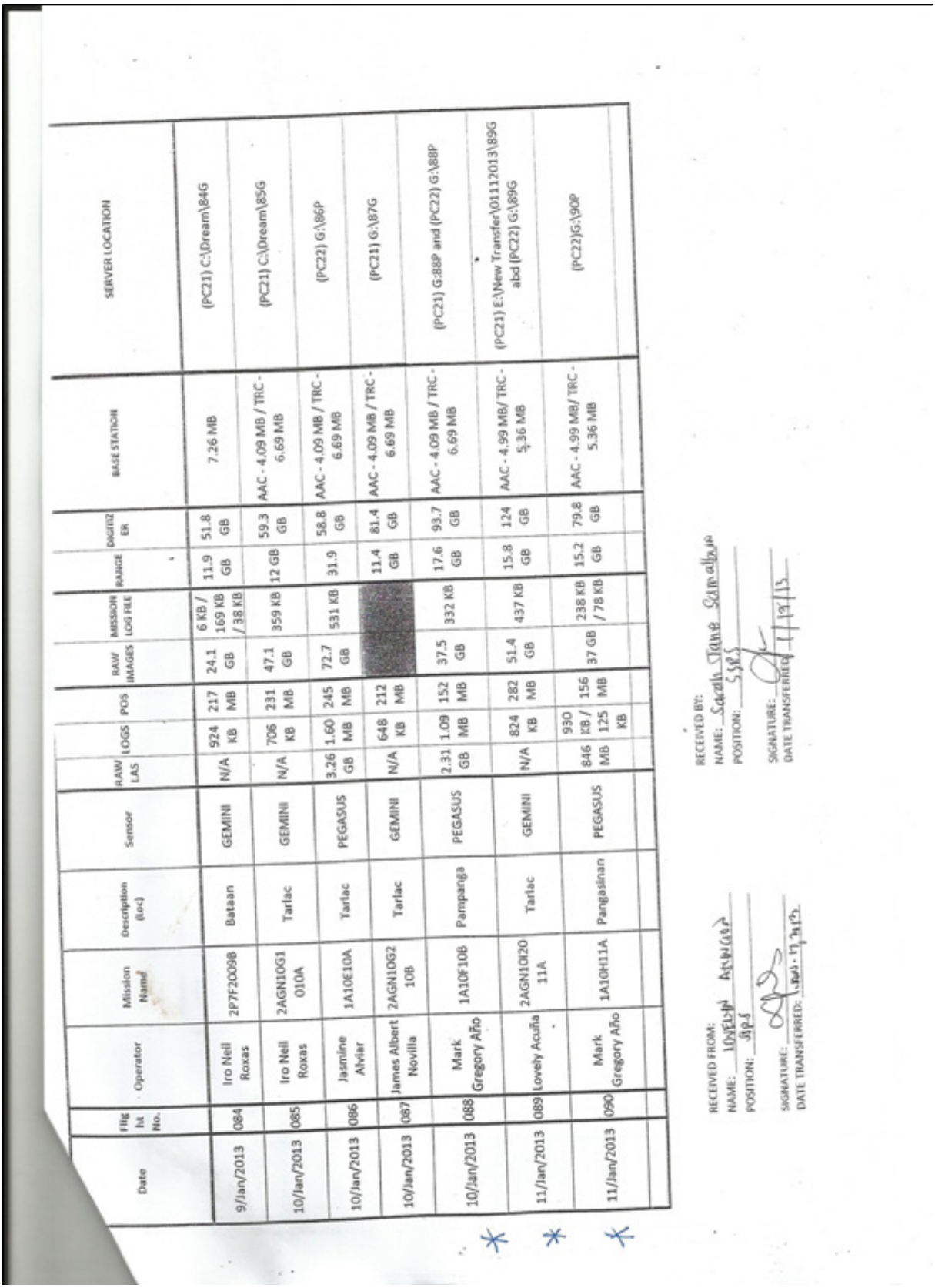


DATA TRANSFER FILE CHECKLIST
JANUARY 15, 2012

Date	Flight No.	Operator	Mission Name	Description (loc)	Sensor	RAW LAS	LOGS	POS	RAW IMAGES	MISSION LOG FILE	RANGE	DIGITIZER	BASE STATION	SERVER LOCATION
29/Dec/2012	066		1P3H364B		PEGASUS	632 MB	471 KB	228 MB						(PC 21) G:\66P
5/Jan/2013	074	Jasmine Alvlar	1P3E005B	Nueva Ecija	PEGASUS	1.33 GB	702 KB	158 MB	23.1 GB	[redacted]	19.8 GB	74.6 GB	[redacted]	(PC22) G:\74P
8/Jan/2013	078	Mark Gregory Año	1P3K008A	Nueva Ecija	PEGASUS	521 MB / 727 MB	1.05 MB / 497 KB	209 MB	53.6 GB	1KB/38 6KB/49 KB	15.6 GB / 6.08 GB	110 GB	AAC - 6.99 MB / NE53332 -5.58 MB	(PC21) G:\78P
8/Jan/2013	079	Iro Neil Roxas	2P3I2008A	Nueva Ecija	GEMINI	N/A	908 KB	256 MB	46.7 GB	246KB/ 150KB	5.36 GB / 9.43 GB	69.8 GB	AAC - 6.99 MB / NE53332 -5.58 MB	(PC21) G:\79G
8/Jan/2013	080	Lovely Acuña	2P3G208B	Nueva Ecija	GEMINI	N/A	833 KB	248 MB	48.6 GB	445 KB	14.5 GB	109 GB	AAC - 6.99 MB / NE53332 -5.58 MB	(PC22) G:\80G
8/Jan/2013	081	Christopher Cruz	1P7D008B	Nueva Ecija	PEGASUS	1.9 GB / 67.6 MB	951 KB	162 MB	23 GB	224 Kb	14 GB / 1.25 GB	64.8 GB	AAC - 6.99 MB	(PC22) G:\81P
9/Jan/2013	082	Lovely Acuña	2P7F1009A	Bataan	GEMINI	N/A	383 KB	206 MB	18.2 GB	157 KB	8.92	59.3 GB	AAC - 6.48 MB / BM5A01-09-13 -798 MB	(PC22) G:\82G
9/Jan/2013	083	Lovely Acuña	1P7H009A	Bataan	PEGASUS	1.35 GB	1.12 MB / 61 KB	200 MB	37.2 GB	311 KB	15.8 GB	60 GB	AAC - 6.48 MB / BM5A01-09-13 -798 MB	(PC22) G:\83G

Annex G

Data transfer sheet for 2P7F2009B mission



Date	Flight No.	Operator	Mission Name	Description (Loc)	Sensor	RAW LAS	LOGS	POS	RAW IMAGES	MISSION LOG FILE	RANGE	DIGITIZER	BASE STATION	SERVER LOCATION
9/Jan/2013	084	Iro Neil Roxas	2P7F20098	Bataan	GEMINI	N/A	924 KB	217 MB	24.1 GB	6 KB / 169 KB / 38 KB	11.9 GB	51.8 GB	7.26 MB	(PC21) C:\Dream\84G
10/Jan/2013	085	Iro Neil Roxas	2AGN10G1 010A	Tarlac	GEMINI	N/A	706 KB	231 MB	47.1 GB	359 KB	12 GB	59.3 GB	AAC - 4.09 MB / TRC - 6.69 MB	(PC21) C:\Dream\85G
10/Jan/2013	086	Jasmine Alviar	1A10E10A	Tarlac	PEGASUS	3.26 GB	1.60 MB	245 MB	72.7 GB	531 KB	31.9	58.8 GB	AAC - 4.09 MB / TRC - 6.69 MB	(PC22) G:\86P
10/Jan/2013	087	James Albert Novilla	2AGN10G2 10B	Tarlac	GEMINI	N/A	648 KB	212 MB	[redacted]	[redacted]	11.4 GB	81.4 GB	AAC - 4.09 MB / TRC - 6.69 MB	(PC21) G:\87G
10/Jan/2013	088	Mark Gregory Año	1A10F10B	Pamplanga	PEGASUS	2.31 GB	1.09 MB	152 MB	37.5 GB	332 KB	17.6 GB	93.7 GB	AAC - 4.09 MB / TRC - 6.69 MB	(PC21) G:\88P and (PC22) G:\88P
11/Jan/2013	089	Lovely Acuña	2AGN10I20 11A	Tarlac	GEMINI	N/A	824 KB	282 MB	51.4 GB	437 KB	15.8 GB	124 GB	AAC - 4.99 MB/ TRC - 5.36 MB	(PC21) E:\New Transfer\01112013\89G abd (PC22) G:\89G
11/Jan/2013	090	Mark Gregory Año	1A10H11A	Pangasinan	PEGASUS	846 MB	930 KB / 125 KB	156 MB	37 GB	238 KB / 78 KB	15.2 GB	79.8 GB	AAC - 4.99 MB/ TRC - 5.36 MB	(PC22)G:\90P

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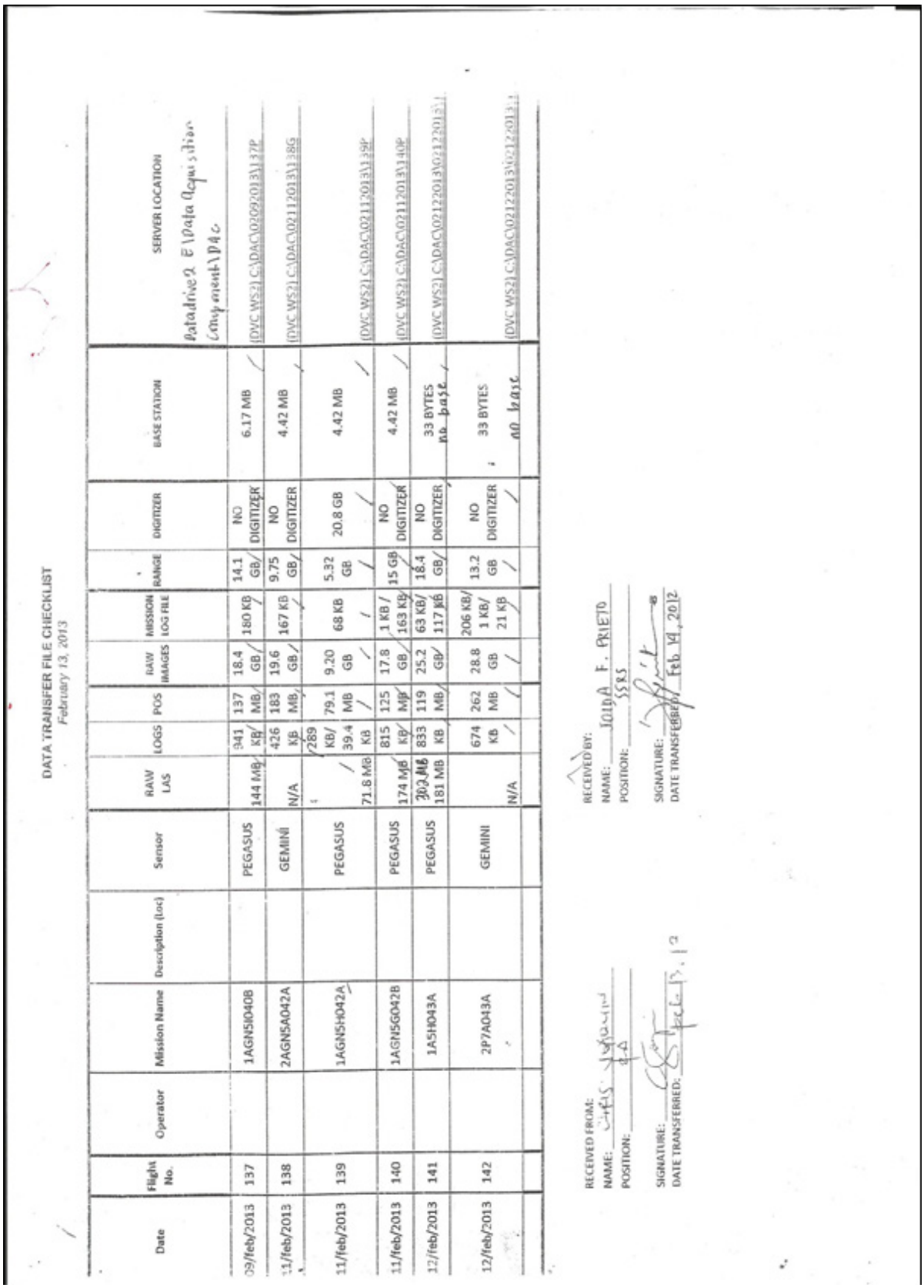
NAME: [illegible]
POSITION: [illegible]
SIGNATURE:
DATE TRANSFERRED: [illegible]

RECEIVED BY:
NAME: Sarah Jane Salvador
POSITION: SSS
SIGNATURE:
DATE TRANSFERRED: 1/13/13

Annex G

Data transfer sheet for 2P7A043A mission



DATA TRANSFER FILE CHECKLIST
February 13, 2013

Date	Flight No.	Operator	Mission Name	Description (Loc)	Sensor	RAW LAS	LOGS	POS	RAW IMAGES	MISSION LOG FILE	RANGE	DIGITIZER	BASE STATION	SERVER LOCATION
09/feb/2013	137		1AGN50408		PEGASUS	144 MB	941 KB / 426 KB	137 MB / 183 MB	18.4 GB / 19.6 GB	180 KB / 167 KB	14.1 GB / 9.75 GB	NO DIGITIZER / NO DIGITIZER	6.17 MB / 4.42 MB	(DVC WS2) C:\DAC\02092013\137P
11/feb/2013	138		2AGN5A042A		GEMINI	N/A	289							(DVC WS2) C:\DAC\02112013\138G
11/feb/2013	139		1AGN5H042A		PEGASUS	71.8 MB	KB / 39.4 KB	79.1 MB /	9.20 GB /	68 KB /	5.32 GB /	20.8 GB /	4.42 MB /	(DVC WS2) C:\DAC\02112013\139P
11/feb/2013	140		1AGN5G042B		PEGASUS	174 MB	815 KB / 833 KB	125 MB / 119 MB	17.8 GB / 25.2 GB	1 KB / 163 KB / 63 KB / 117 KB	15 GB / 18.4 GB /	NO DIGITIZER / NO DIGITIZER	4.42 MB / 33 BYTES no base	(DVC WS2) C:\DAC\02112013\140P
12/feb/2013	141		1A5H043A		PEGASUS	180 MB 181 MB	KB	MB	GB	KB	GB			(DVC WS2) C:\DAC\02122013\141H
12/feb/2013	142		2P7A043A		GEMINI	N/A	674 KB /	262 MB /	28.8 GB /	206 KB / 1 KB / 21 KB /	13.2 GB /	NO DIGITIZER /	33 BYTES no base	(DVC WS2) C:\DAC\02122013\142P

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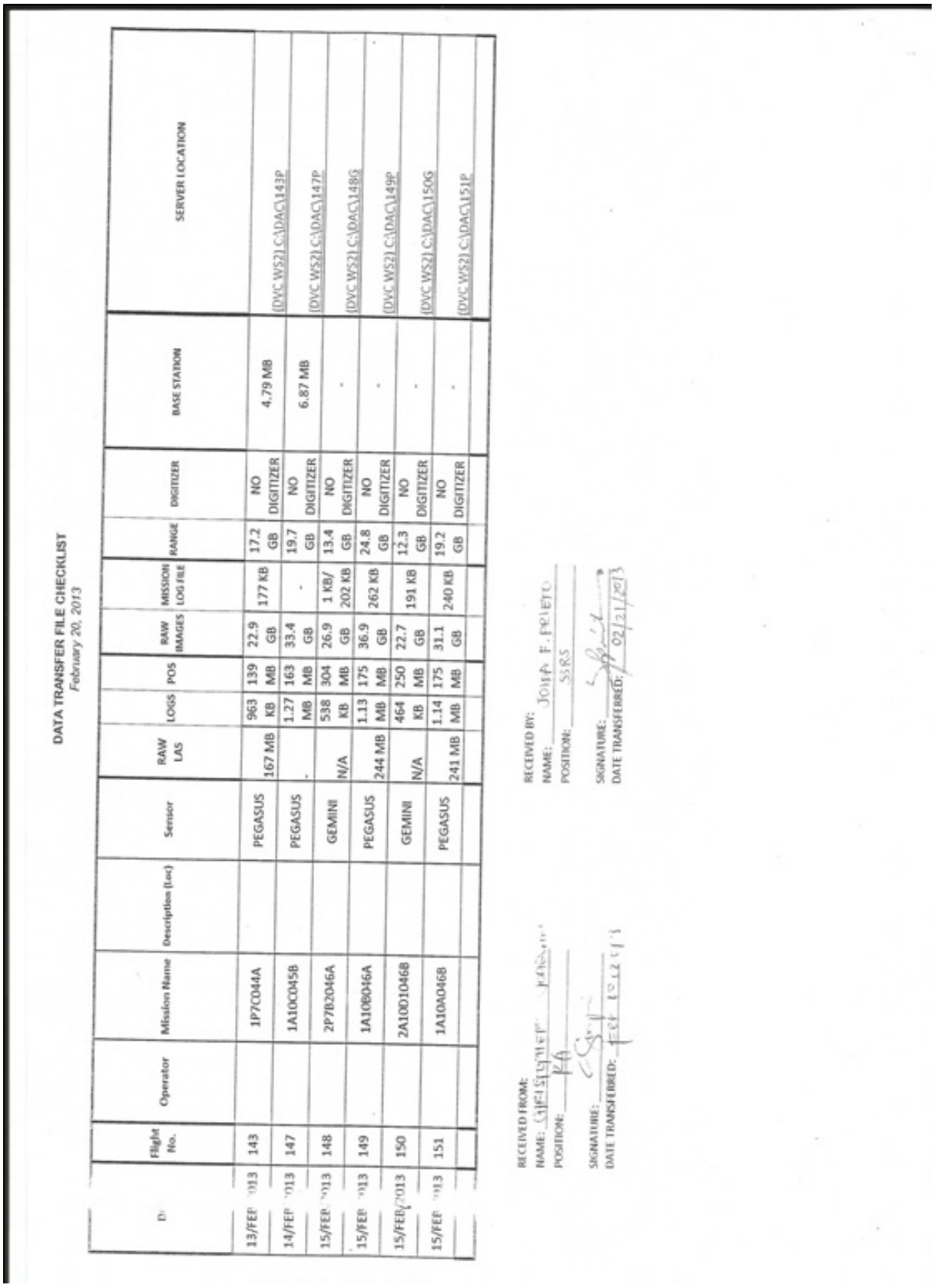
NAME: [illegible]
POSITION: [illegible]
SIGNATURE: [illegible]
DATE TRANSFERRED: [illegible]

RECEIVED BY:
NAME: JOHN F. PRIETO
POSITION: SSS
SIGNATURE: [illegible]
DATE TRANSFERRED: Feb 14, 2012

Annex G

Data transfer sheet for 1P7C044A and 2P7B2046A missions



DATA TRANSFER FILE CHECKLIST
February 20, 2013

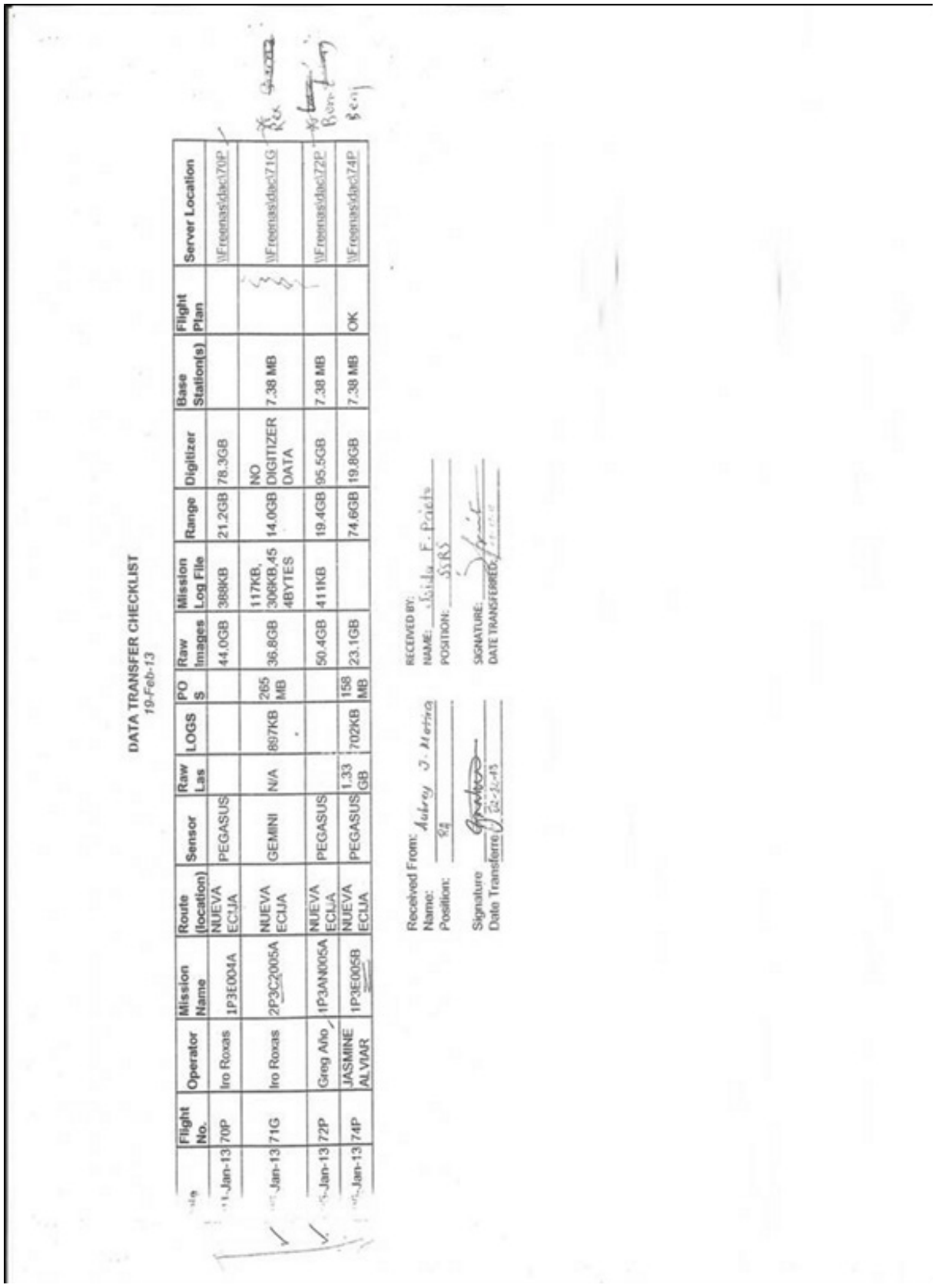
D	Flight No.	Operator	Mission Name	Description (Loc)	Sensor	RAW LAS	LOGS	POS	RAW IMAGES	MISSION LOG FILE	RANGE	DIGITIZER	BASE STATION	SERVER LOCATION
13/FEB/2013	143		1P7C044A		PEGASUS	167 MB	963 KB	139 MB	22.9 GB	177 KB	17.2 GB	NO DIGITIZER	4.79 MB	(DVC WS2) C:\DAC\143P
14/FEB/2013	147		1A10C045B		PEGASUS	-	1.27 MB	163 MB	33.4 GB	-	19.7 GB	NO DIGITIZER	6.87 MB	(DVC WS2) C:\DAC\147P
15/FEB/2013	148		2P7B2046A		GEMINI	N/A	538 KB	304 MB	26.9 GB	1 KB/ 202 KB	13.4 GB	NO DIGITIZER	-	(DVC WS2) C:\DAC\148G
15/FEB/2013	149		1A1080046A		PEGASUS	244 MB	1.13 MB	175 MB	36.9 GB	262 KB	24.8 GB	NO DIGITIZER	-	(DVC WS2) C:\DAC\149P
15/FEB/2013	150		2A10010468		GEMINI	N/A	464 KB	250 MB	22.7 GB	191 KB	12.3 GB	NO DIGITIZER	-	(DVC WS2) C:\DAC\150G
15/FEB/2013	151		1A10A0468		PEGASUS	243 MB	1.14 MB	175 MB	31.1 GB	240 KB	19.2 GB	NO DIGITIZER	-	(DVC WS2) C:\DAC\151P

RECEIVED FROM:
NAME:
POSITION:
SIGNATURE:
DATE TRANSFERRED:

RECEIVED BY:
NAME: JOSEPH F. FELETO
POSITION: SSRS
SIGNATURE:
DATE TRANSFERRED: 02/21/2013

Annex G

Data transfer sheet for 1P3E004A, 2P3C2005A, 1P3AN005A, and 1P3E005B missions



DATA TRANSFER CHECKLIST

19-Feb-13

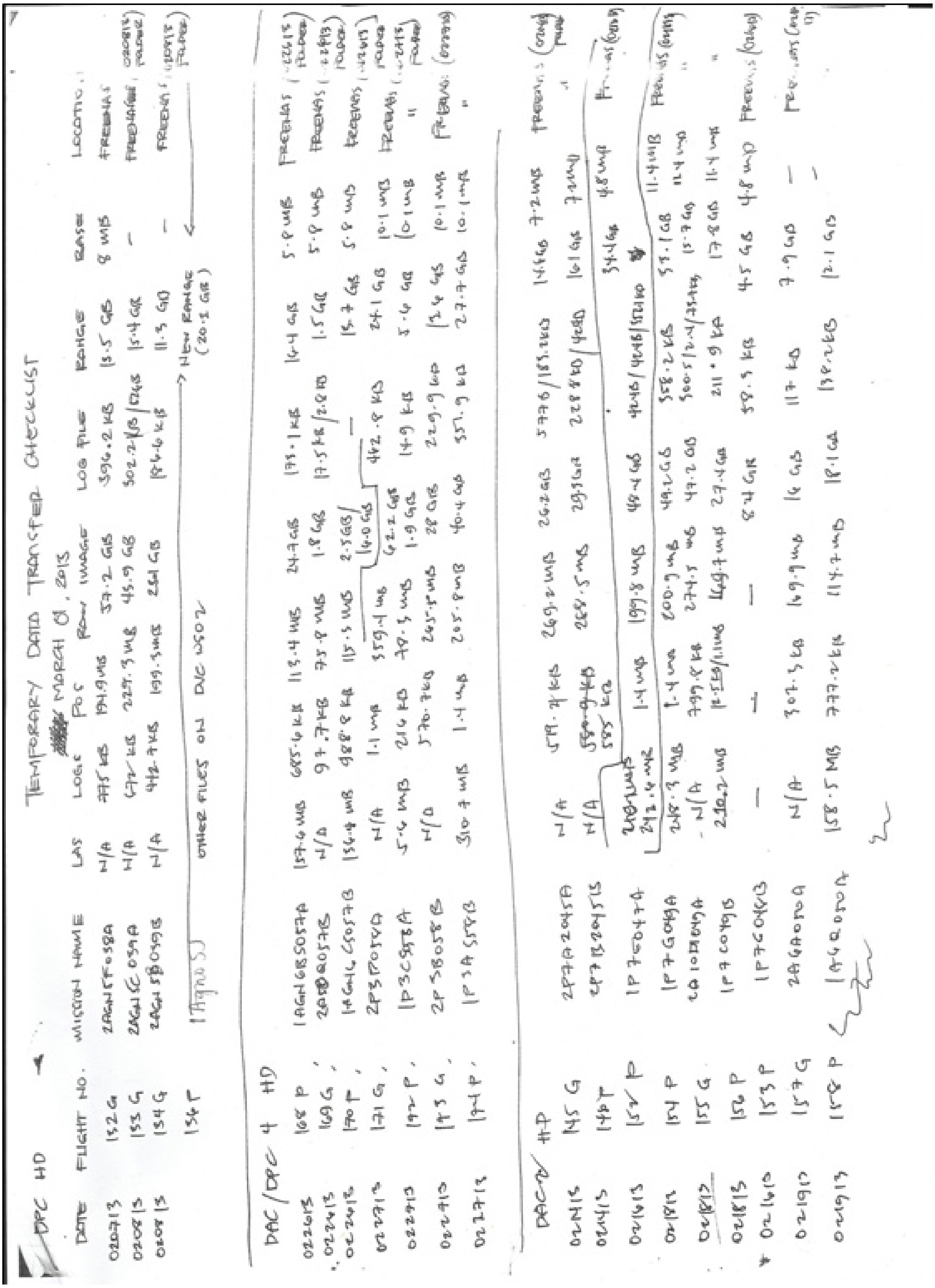
Date	Flight No.	Operator	Mission Name	Route (location)	Sensor	Raw Las	LOGS	POS	Raw Images	Mission Log File	Range	Digitizer	Base Station(s)	Flight Plan	Server Location
11-Jan-13	70P	Iro Roxas	1P3E004A	NUEVA ECIJA	PEGASUS				44.0GB	388KB	21.2GB	78.3GB			\\Freenas\dac\70P
11-Jan-13	71G	Iro Roxas	2P3C2005A	NUEVA ECIJA	GEMINI	N/A	897KB	265 MB	36.8GB	117KB, 306KB,45 4BYTES	14.0GB	NO DIGITIZER DATA	7.38 MB		\\Freenas\dac\71G
11-Jan-13	72P	Greg Alo	1P3AN005A	NUEVA ECIJA	PEGASUS				50.4GB	411KB	19.4GB	95.5GB	7.38 MB		\\Freenas\dac\72P
11-Jan-13	74P	JASMINE ALVIAR	1P3E005B	NUEVA ECIJA	PEGASUS	1.33 GB	702KB	158 MB	23.1GB		74.6GB	19.8GB	7.38 MB	OK	\\Freenas\dac\74P

Received From: Aubrey J. Merino
Name:
Position:
Signature
Date Transferred: 02-13-13

RECEIVED BY:
NAME: Linda F. Prieto
POSITION: SSRS
SIGNATURE:
DATE TRANSFERRED:

Annex G

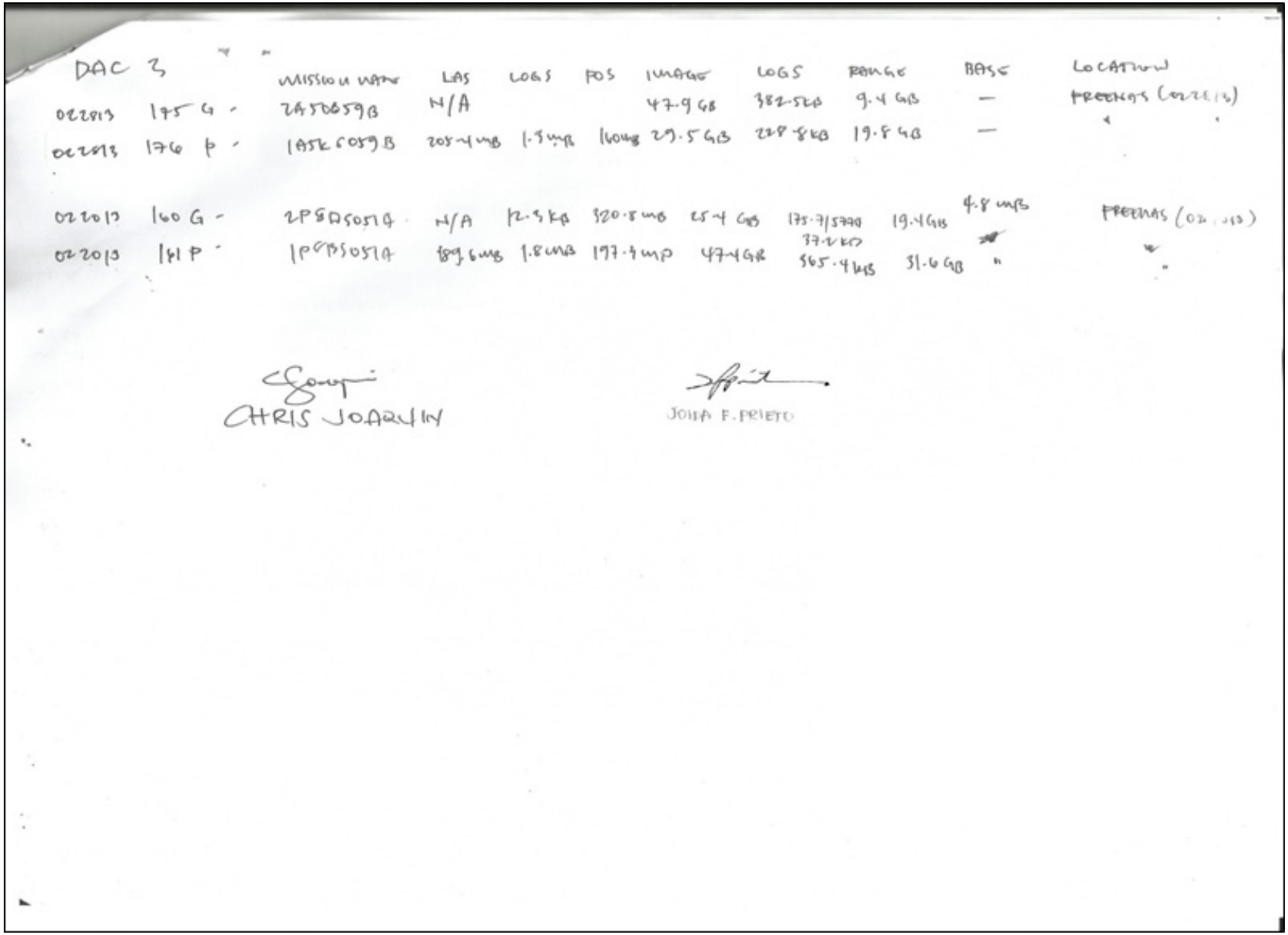
Data transfer sheets for 2P3P058A, 1P3CS058A, 2P3B058B, 1P3A558B, 2P7A2054A, 2P7B204513, 1P7E047A, 1P7G049A, 1P7C049B, 1P7C048B, 2P8A5051A, and 1P9B5051A missions



TEMPORARY DATA TRANSFER CHECKLIST

MARCH 01, 2013

DATE	FLIGHT NO.	MISSION NAME	LAS	LOGS	POS	RAW IMAGE	LOG FILE	RANGE	BASE	LOCATION
DPC HD										
020713	152 G	2AGN5F058A	N/A	775 KB	194.9 MB	57.2 GB	396.2 KB	13.5 GB	8 MB	FREENAS
020813	153 G	2AGN5C059A	N/A	672 KB	229.3 MB	45.9 GB	302.2 KB/126 KB	15.4 GB	—	FREENAS (020813 FOLDER)
020813	154 G	2AGN5B059B	N/A	442.7 KB	199.3 MB	251 GB	186.6 KB	11.3 GB	—	FREENAS (020913 FOLDER)
	156 P	[Agno 5]	OTHER FILES ON DVC WS02					NEW RANGE (20.1 GB)		
DAC/DPC 4 HD										
022613	168 P	1AGN6B5057A	157.6 MB	685.6 KB	113.4 MB	24.7 GB	173.1 KB	16.4 GB	5.8 MB	FREENAS (022613 FOLDER)
022413	169 G	2A5B8057B	N/A	97.7 KB	75.8 MB	1.8 GB	17.5 KB/2.8 KB	1.5 GB	5.8 MB	FREENAS (022413 FOLDER)
022413	170 P	1AGN6C5057B	136.4 MB	988.8 KB	115.5 MB	2.5 GB/14.0 GB	—	15.7 GB	5.8 MB	FREENAS (022613 FOLDER)
022713	171 G	2P3P058A	N/A	1.1 MB	359.4 MB	62.2 GB	442.8 KB	24.1 GB	10.1 MB	FREENAS (022713 FOLDER)
022713	172 P	1P3CS58A	5.6 MB	216 KB	78.3 MB	1.9 GB	14.9 KB	5.6 GB	10.1 MB	"
022713	173 G	2P3B058B	N/A	570.7 KB	265.8 MB	28 GB	229.9 KB	12.6 GB	10.1 MB	FREENAS (022713)
022713	174 P	1P3A558B	310.7 MB	1.4 MB	205.8 MB	40.4 GB	351.9 KB	27.7 GB	10.1 MB	"
DAC HP										
021113	145 G	2P7A2045A	N/A	519.7 KB	269.2 MB	26.2 GB	5776/183.2 KB	14.6 GB	7.2 MB	FREENAS (021413 FOLDER)
021413	148 P	2P7B204515	N/A	585 KB	258.5 MB	29.3 GB	228 KB/42 KB	16.1 GB	7.2 MB	
								54.4 GB	4.8 MB	FREENAS (021613)
021613	152 P	1P7E047A	203.1 MB / 242.4 MB	1.4 MB	199.8 MB	48.4 GB	424 B/424 B/152 KB			
021813	154 P	1P7G049A	218.3 MB	1.4 MB	200.9 MB	49.2 GB	358.2 KB	53.1 GB	11.4 MB	FREENAS (021813)
021813	155 G	2A10B1049A	N/A	799.8 KB	274.5 MB	47.2 GB	500.5/12.4/35.4 KB	15.7 GB	11.4 MB	"
021813	156 P	1P7C049B	210.2 MB	1.5 KB/1.1 MB	169.7 MB	27.4 GB	211.9 KB	17.8 GB	11.4 MB	"
021613	153 P	1P7C048B	—	—	—	8.4 GB	58.3 KB	4.5 GB	4.8 MB	FREENAS (021613)
021913	157 G	2A6A050A	N/A	307.3 KB	169.9 MB	14 GB	117 KB	7.9 GB	—	FREENAS (021913)
021913	158 P	1A6A050A	158.5 MB	777.2 KB	114.7 MB	18.1 GB	138.2 KB	12.1 GB	—	



DAC 3

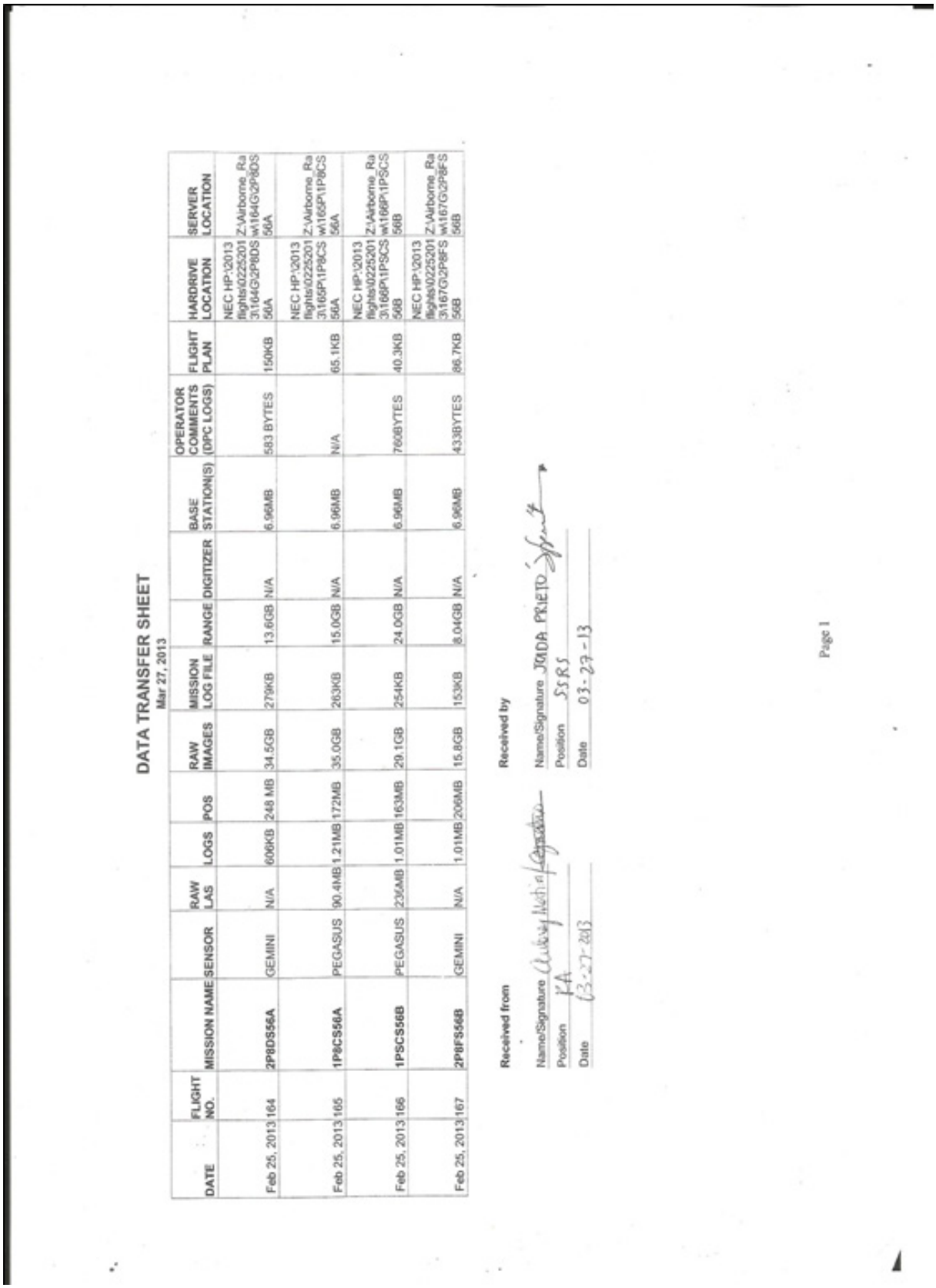
			MISSION NAME	LAS	LOGS	POS	IMAGE	LOGS	RANGE	BASE	LOCATION
022813	175	G	2A50659B	N/A			47.9 GB	382.5KB	9.4 GB	—	FREEHAS (022813)
022813	176	P	1A5K5059B	205.4 MB	1.5 MB	160MB	29.5 GB	228.8 KB	19.8 GB	—	
022013	160	G	2P8A5051A	N/A	12.3 KB	320.8 MB	25.4 GB	175.7/5770 37.2 KB	19.4 GB	4.8 MB	FREEHAS (022013)
022013	161	P	1P8P5051A	189.6 MB	1.8 MB	197.4 MB	47.4 GB	565.4 KB	31.6 GB	"	

CHRIS JOAQUIN

JOSA F. PRIETO

Annex G

Data transfer sheet for 2P8DS56A, 1P8CS56A, 1PSCS56B, and 2P8FS56B missions



DATA TRANSFER SHEET

Mar 27, 2013

DATE	FLIGHT NO.	MISSION NAME	SENSOR	RAW LAS	LOGS	POS	RAW IMAGES	MISSION LOG FILE	RANGE	DIGITIZER	BASE STATION(S)	OPERATOR COMMENTS (DPC LOGS)	FLIGHT PLAN	HARDRIVE LOCATION	SERVER LOCATION
Feb 25, 2013	164	2P8DS56A	GEMINI	N/A	606KB	248 MB	34.5GB	279KB	13.6GB	N/A	6.96MB	583 BYTES	150KB	NEC HP:\2013 flights\02252013\164G\2P8DS 56A	Z:\Airborne_Ra w\164G\2P8DS 56A
Feb 25, 2013	165	1P8CS56A	PEGASUS	90.4MB	1.21MB	172MB	35.0GB	263KB	15.0GB	N/A	6.96MB	N/A	65.1KB	NEC HP:\2013 flights\02252013\165P\1P8CS 56A	Z:\Airborne_Ra w\165P\1P8CS 56A
Feb 25, 2013	166	1PSCS56B	PEGASUS	236MB	1.01MB	163MB	29.1GB	254KB	24.0GB	N/A	6.96MB	760BYTES	40.3KB	NEC HP:\2013 flights\02252013\166P\1PSCS 56B	Z:\Airborne_Ra w\166P\1PSCS 56B
Feb 25, 2013	167	2P8FS56B	GEMINI	N/A	1.01MB	206MB	15.8GB	153KB	8.04GB	N/A	6.96MB	433BYTES	86.7KB	NEC HP:\2013 flights\02252013\167G\2P8FS 56B	Z:\Airborne_Ra w\167G\2P8FS 56B

Received from

Name/Signature

Position PA

Date 03-27-2013

Received by

Name/Signature JODA PRIETO

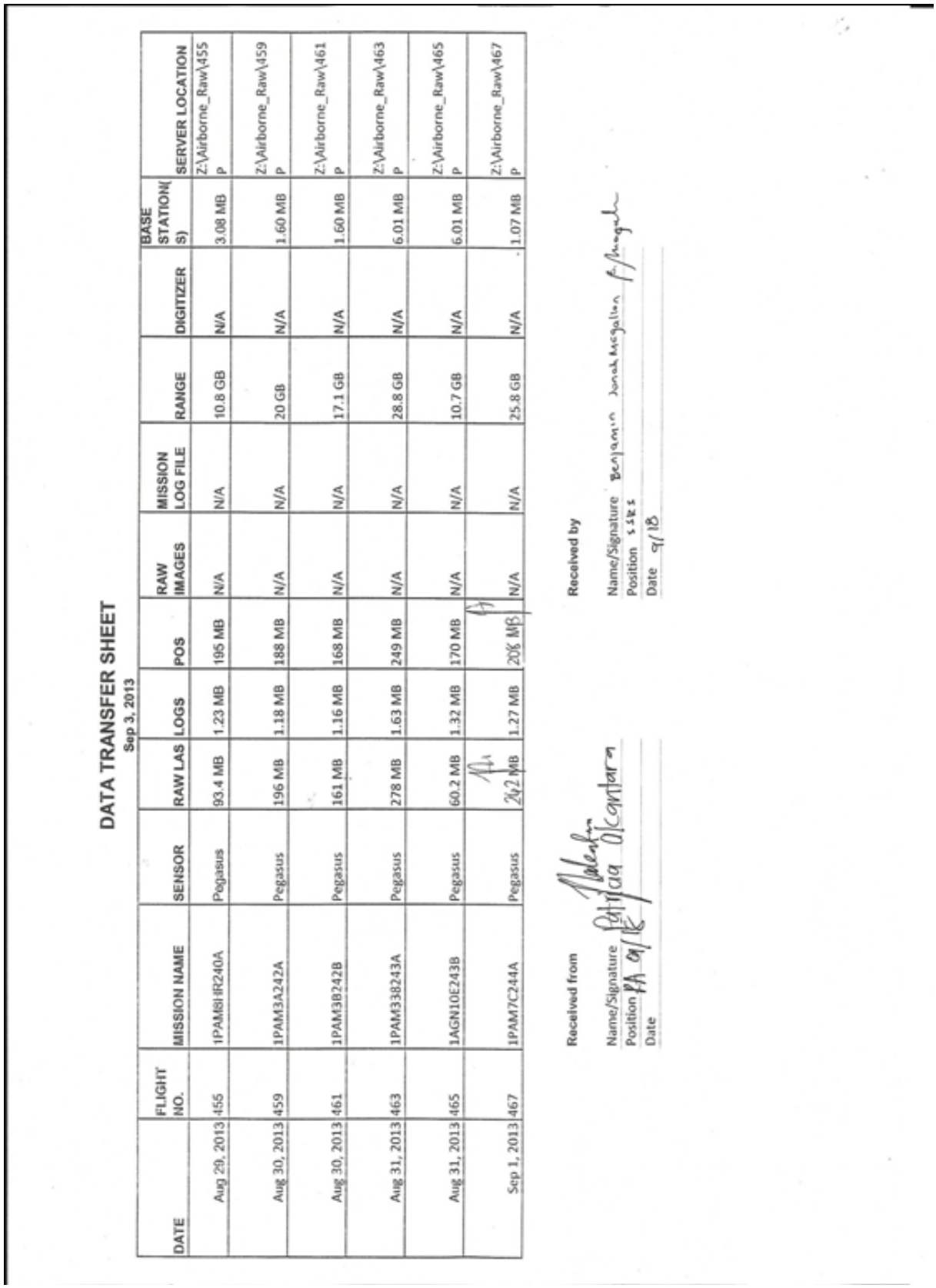
Position SSRS

Date 03-27-13

Page 1

Annex G

Data transfer sheet for 1PAM8HR240A, 1PAM3A242A, 1PAM3B242B, 1PAM338243A, and 1PAM7C244A missions



DATA TRANSFER SHEET

Sep 3, 2013

DATE	FLIGHT NO.	MISSION NAME	SENSOR	RAW LAS	LOGS	POS	RAW IMAGES	MISSION LOG FILE	RANGE	DIGITIZER	BASE STATION(S)	SERVER LOCATION
Aug 29, 2013	455	1PAM8HR240A	Pegasus	93.4 MB	1.23 MB	195 MB	N/A	N/A	10.8 GB	N/A	3.08 MB	Z:\Airborne_Raw\455\P
Aug 30, 2013	459	1PAM3A242A	Pegasus	196 MB	1.18 MB	188 MB	N/A	N/A	20 GB	N/A	1.60 MB	Z:\Airborne_Raw\459\P
Aug 30, 2013	461	1PAM3B242B	Pegasus	161 MB	1.16 MB	168 MB	N/A	N/A	17.1 GB	N/A	1.60 MB	Z:\Airborne_Raw\461\P
Aug 31, 2013	463	1PAM338243A	Pegasus	278 MB	1.63 MB	249 MB	N/A	N/A	28.8 GB	N/A	6.01 MB	Z:\Airborne_Raw\463\P
Aug 31, 2013	465	1AGN10E243B	Pegasus	60.2 MB	1.32 MB	170 MB	N/A	N/A	10.7 GB	N/A	6.01 MB	Z:\Airborne_Raw\465\P
Sep 1, 2013	467	1PAM7C244A	Pegasus	242 MB	1.27 MB	206 MB	N/A	N/A	25.8 GB	N/A	1.07 MB	Z:\Airborne_Raw\467\P

Received from

Name/Signature

Position

Date

Received by

Name/Signature

Position

Date 9/18

Annex H. FLIGHT LOGS

Flight Log for PAM8A Mission

DREAM Data Acquisition Flight Log — Flight Log No.: [illegible]

Lidar Operator: [illegible]	ALTM Model: PEGASUS	Mission Name: PAM8A	Aircraft Type: CesnnaT206H	Aircraft Identification: [illegible]	
Pilot: CAPT. [illegible]	Co-Pilot: A. [illegible]	Site: [illegible], BULACAN	Airport of Departure: CLARK	Airport of Arrival: CLARK	Mission Folder Name: PAM8A
Date: NOV 29, 2012	PRF: [illegible] kHz	Scan Freq: [illegible] Hz	1/2 Scan Angle: 25°	Approx. Swath: [illegible]	Eyesafe: [illegible] m
Page 1 of 1	ALTM HD A / B	Off Block [illegible]	On Block 1742H	Blk Time 3+12	Off Ground 1503
On Ground 17[illegible]	Total Flight Time 2+[illegible]	Camera Mission Folder Name: PAM8A			
Weather:	Ground Base Station: [illegible], BULACAN	Ground Surveyor: [illegible]			

LINE #: Start (hh:mm:ss)	End	Speed Kts	Rng/Ht m AGL	GPS Status SVS	PDOP	Digicam Exposure	Comments
Primary POS							

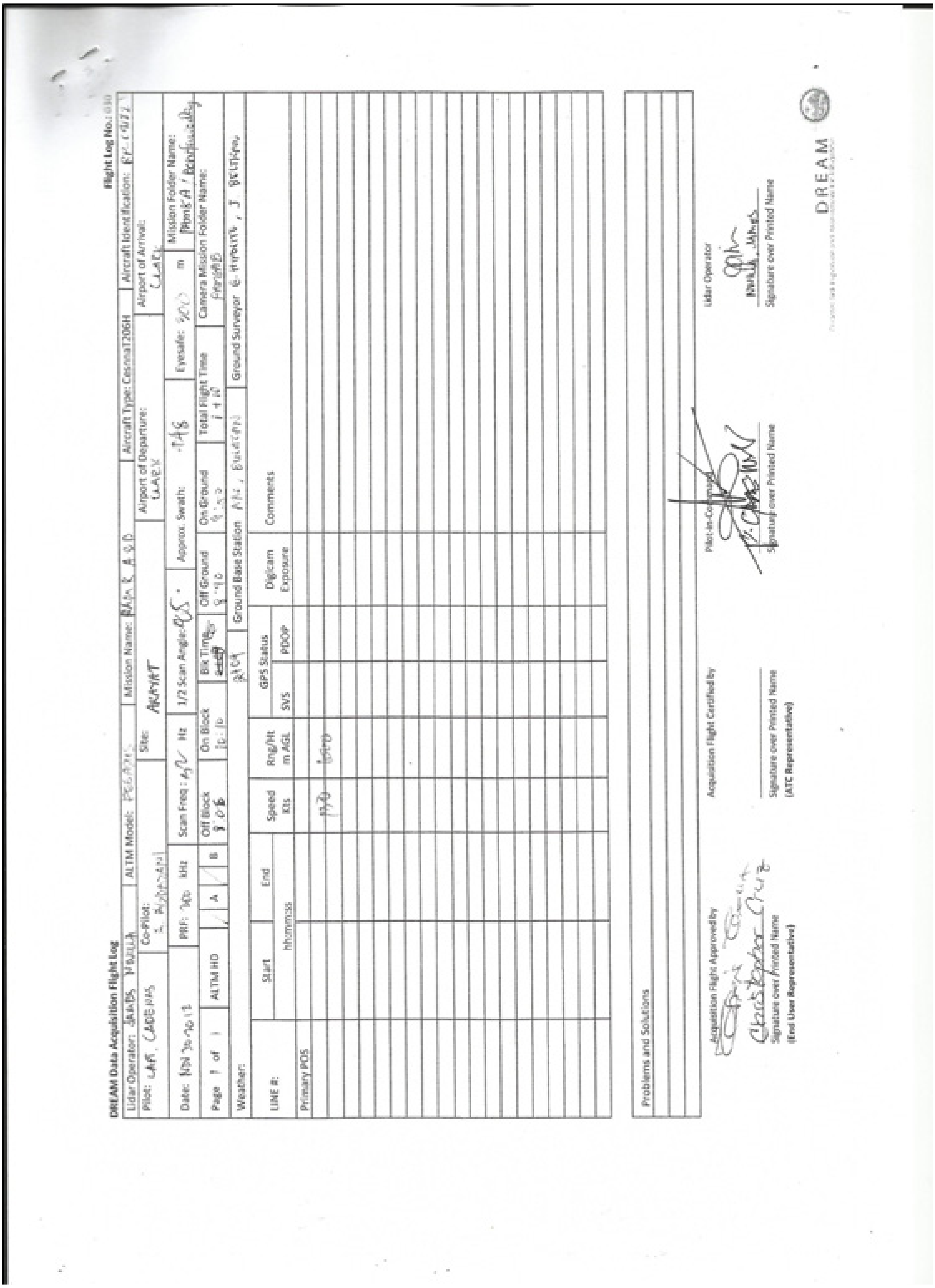
Problems and Solutions: SENSOR HEAD NO COMMUNICATION, RESTARTED SENSOR HEAD; ENGINE PROBLEM ON START, VISUAL CHECK; [illegible] 7 LINES ONLY

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Signature over Printed Name (End User Representative)	Signature over Printed Name (ATC Representative)	Signature over Printed Name	Signature over Printed Name

DREAM

Annex H

Flight Log for PAM8A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 030

Lidar Operator: JAMES MANALO	ALTM Model: PEGASUS	Mission Name: PAM 8 A & B	Aircraft Type: CesnnaT206H	Aircraft Identification: RP-C9022
Pilot: CAPT. CADENAS	Co-Pilot: R. ALFONSO	Site: ARAYAT	Airport of Departure: CLARK	Airport of Arrival: CLARK
Date: NOV 30 2017	PRF: 200 kHz	Scan Freq: 42 Hz	1/2 Scan Angle: 25°	Approx. Swath: 748
Eyesafe: 900 m	Mission Folder Name: PAM8A / Reflective...			
Page 1 of 1	ALTM HD A B	Off Block 8:06	On Block 10:10	Blk Time 2+04
Off Ground 8:10	On Ground 9:50	Total Flight Time 1+40	Camera Mission Folder Name: PAM8B	
Weather:	Ground Base Station: ARC, BULATAN	Ground Surveyor: E. HIPOLITO, J. BELTRAN		

LINE #:	Start (hh:mm:ss)	End (hh:mm:ss)	Speed Kts	Rng/Ht m AGL	GPS Status SVS	GPS Status PDOP	Digicam Exposure	Comments
Primary POS								
			130	1500				

Problems and Solutions

Acquisition Flight Approved by: Christopher Cruz — Signature over Printed Name (End User Representative)

Acquisition Flight Certified by: Signature over Printed Name (ATC Representative)

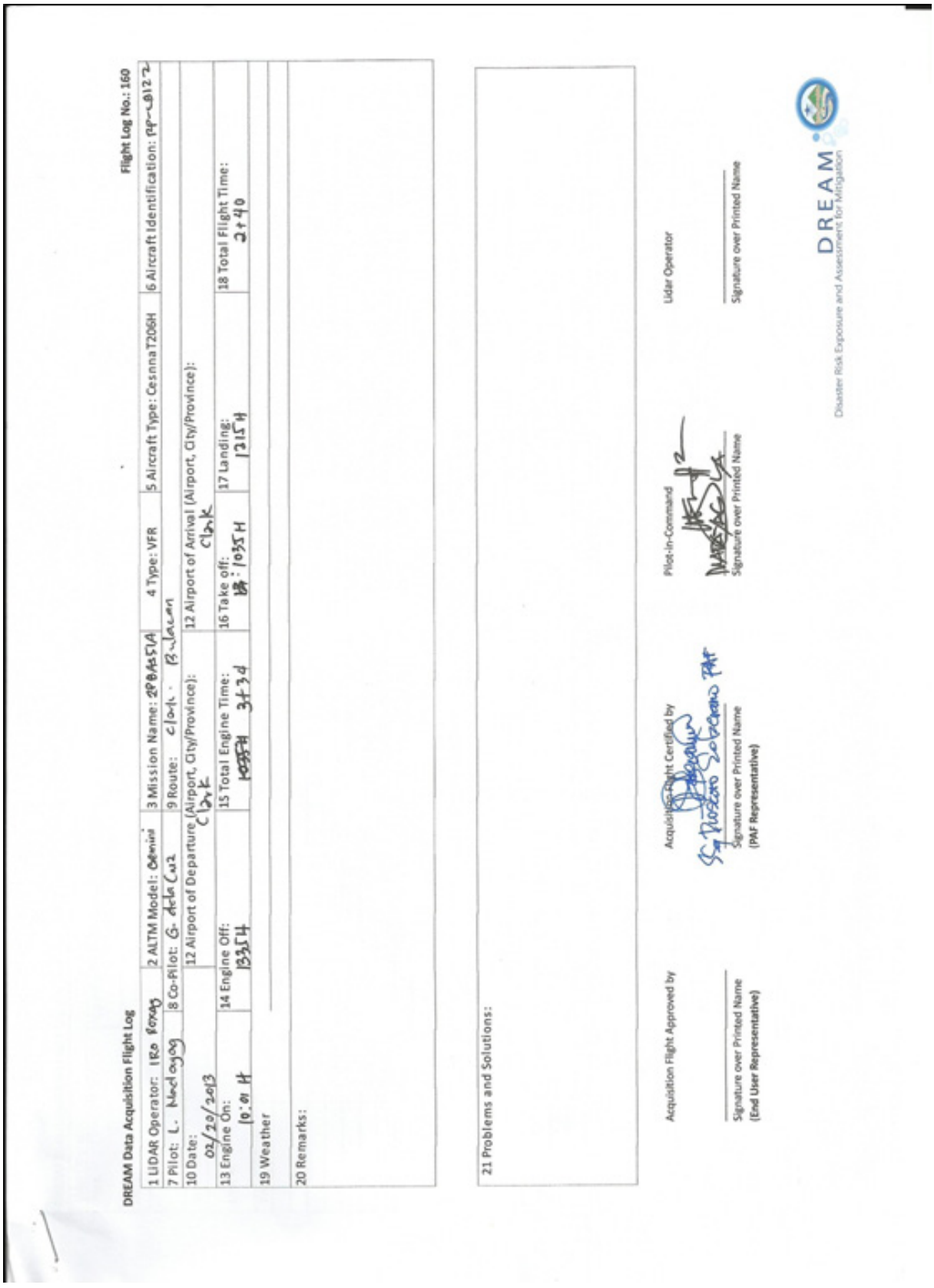
Pilot-in-Command: P. CADENAS — Signature over Printed Name

Lidar Operator: MANALO, JAMES — Signature over Printed Name

DREAM

Annex H. FLIGHT LOGS

Flight Log for 2P8AS051A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 160

1 LIDAR Operator: IRA Roxas	2 ALTM Model: Optech	3 Mission Name: 2P8AS51A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C8127
7 Pilot: L. Mendoza	8 Co-Pilot: G. dela Cruz	9 Route: Clark - Balesin			
10 Date: 02/20/2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 10:01 H	14 Engine Off: 13:54 H	15 Total Engine Time: 3+53	16 Take off: 10:55 H	17 Landing: 13:15 H	18 Total Flight Time: 2+40
19 Weather					
20 Remarks:					
21 Problems and Solutions:					

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

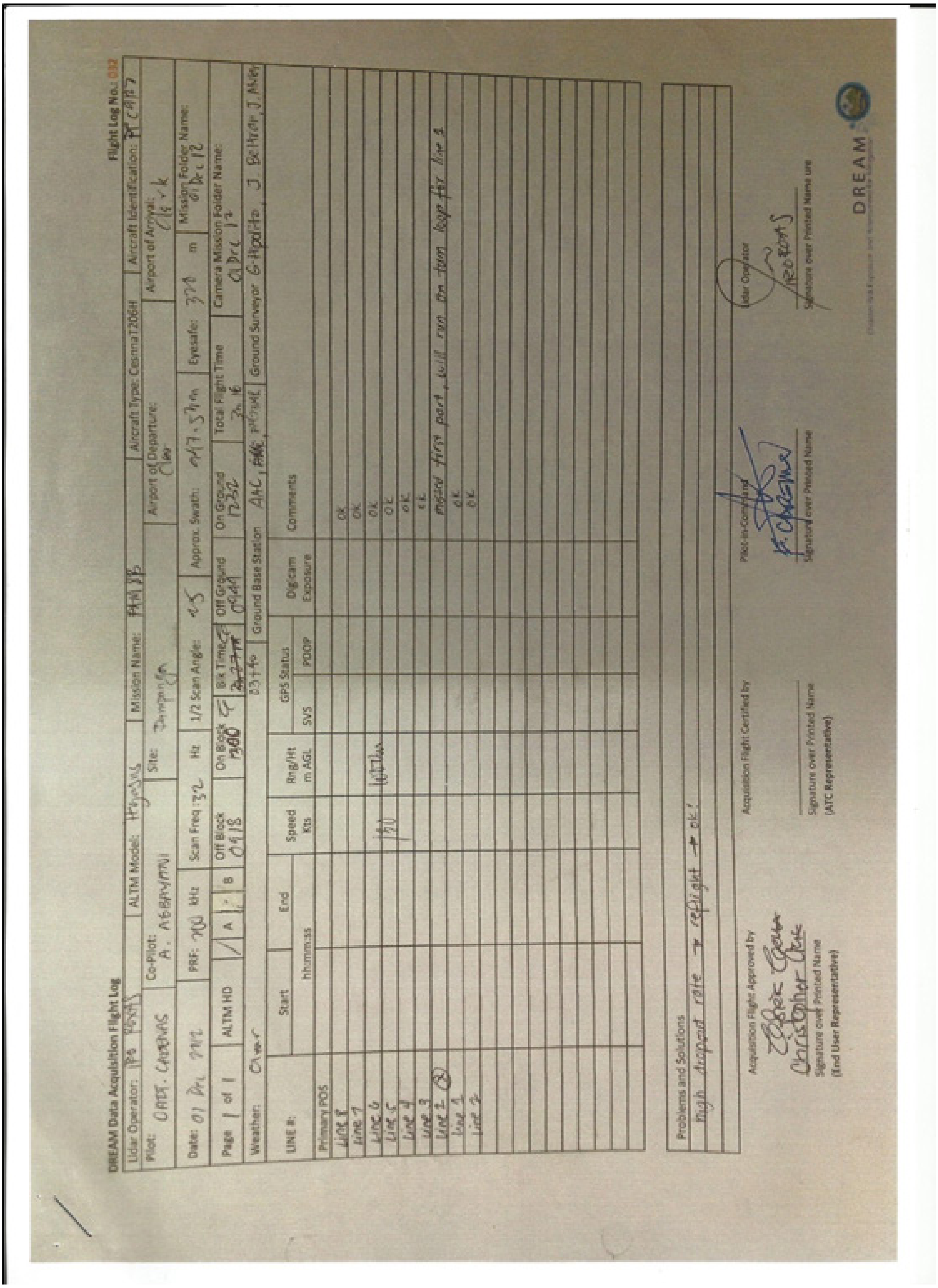
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM8B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 032

Lidar Operator: IPB Roxas	ALTM Model: Pegasus	Mission Name: PAM8B	Aircraft Type: CesnnaT206H	Aircraft Identification: RP C9022
Pilot: CAPT. CABENAS	Co-Pilot: A. ABBAYANI	Site: Pampanga	Airport of Departure: Clark	Airport of Arrival: Clark
Date: 01 Dec 2012	PRF: 200 kHz	Scan Freq: 32 Hz	1/2 Scan Angle: 25	Approx. Swath: 647.57m
Eyesafe: 370 m	Mission Folder Name: 01Dec12			
Page 1 of 1	ALTM HD / A B	Off Block: 0918	On Block: 1300	Blk Time: 3h 42m
Off Ground: 0944	On Ground: 1232	Total Flight Time: 3h 16	Camera Mission Folder Name: 01Dec 12	
Weather: Clear	03+40	Ground Base Station: AAC, PAMPANGA	Ground Surveyor: G. Hipolito, J. Beltran, J. Mile	

LINE #:	Start (hh:mm:ss)	End (hh:mm:ss)	Speed Kts	Rng/Ht m AGL	GPS Status SVS	GPS Status PDOP	Digicam Exposure	Comments
Primary POS								
Line 8								ok
Line 7								ok
Line 6			130	1000m				ok
Line 5								ok
Line 4								ok
Line 3								ok
Line 2 (2)								missed first part, will run on turn loop for line 1
Line 1								ok
Line 2								ok

Problems and Solutions

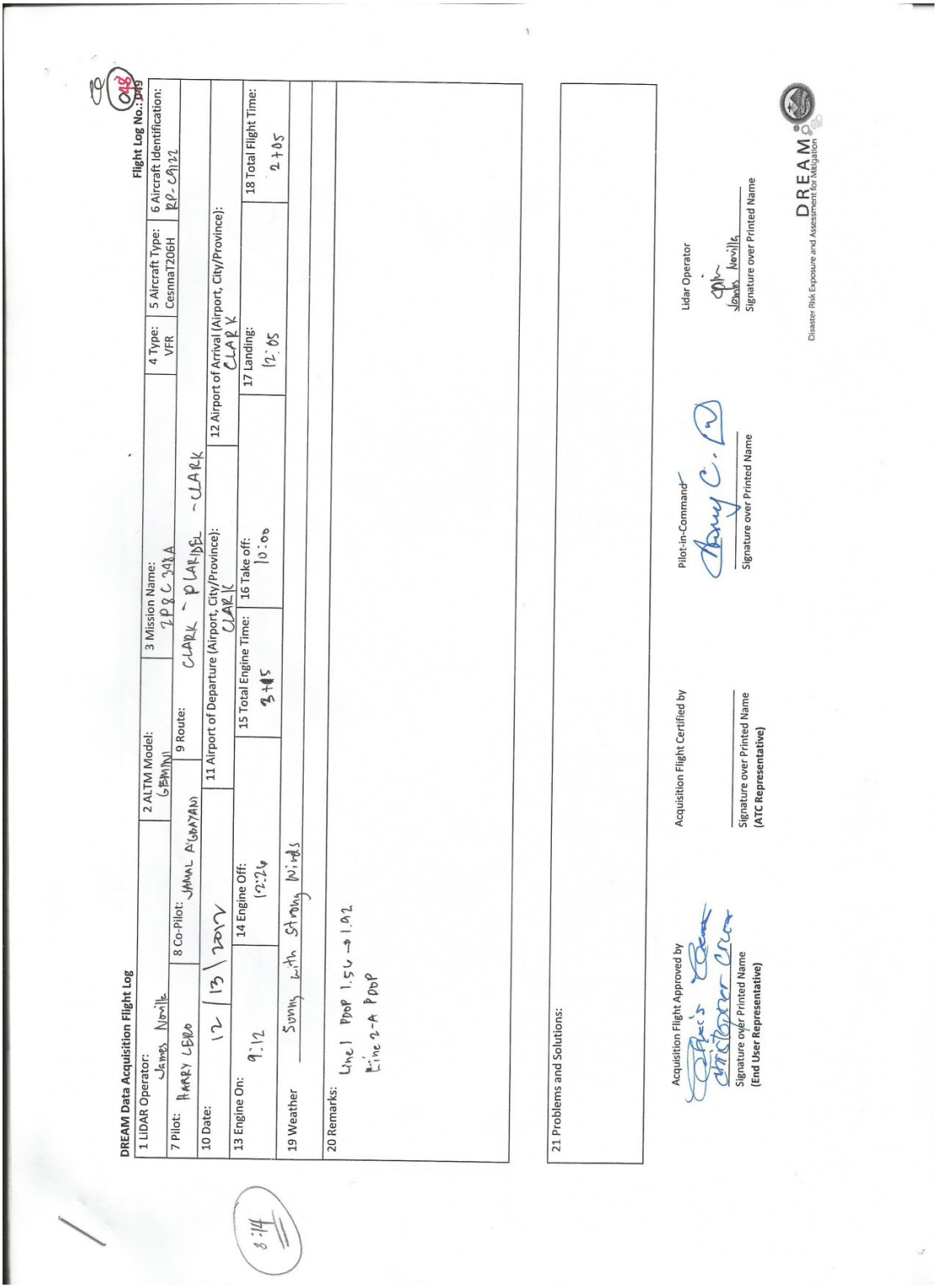
high dropout rate → reflight → ok!

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Christopher Cruz		F. Cabenas	I Roxas
Signature over Printed Name (End User Representative)	Signature over Printed Name (ATC Representative)	Signature over Printed Name	Signature over Printed Name

DREAM

Annex H. FLIGHT LOGS

Flight Log for 1P8C3342A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 049

1 LiDAR Operator: James Neville	2 ALTM Model: GEMINI	3 Mission Name: 2P8C3342A		4 Type: VFR	5 Aircraft Type: Cessna 206H	6 Aircraft Identification: RP-C4112
7 Pilot: HARRY LEGLO	8 Co-Pilot: JAMAL ALGARYAO	9 Route: CLARK - PLARIDEL - CLARK				
10 Date: 12/13/2017		11 Airport of Departure (Airport, City/Province): CLARK		12 Airport of Arrival (Airport, City/Province): CLARK		
13 Engine On: 9:12	14 Engine Off: 12:24	15 Total Engine Time: 2.45	16 Take off: 10:00	17 Landing: 12:05	18 Total Flight Time: 2.05	
19 Weather: Sunny with Strong Winds						
20 Remarks: Line 1 PDOP 1.54 → 1.92 Line 2-A PDOP						
21 Problems and Solutions:						

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(ATC Representative)

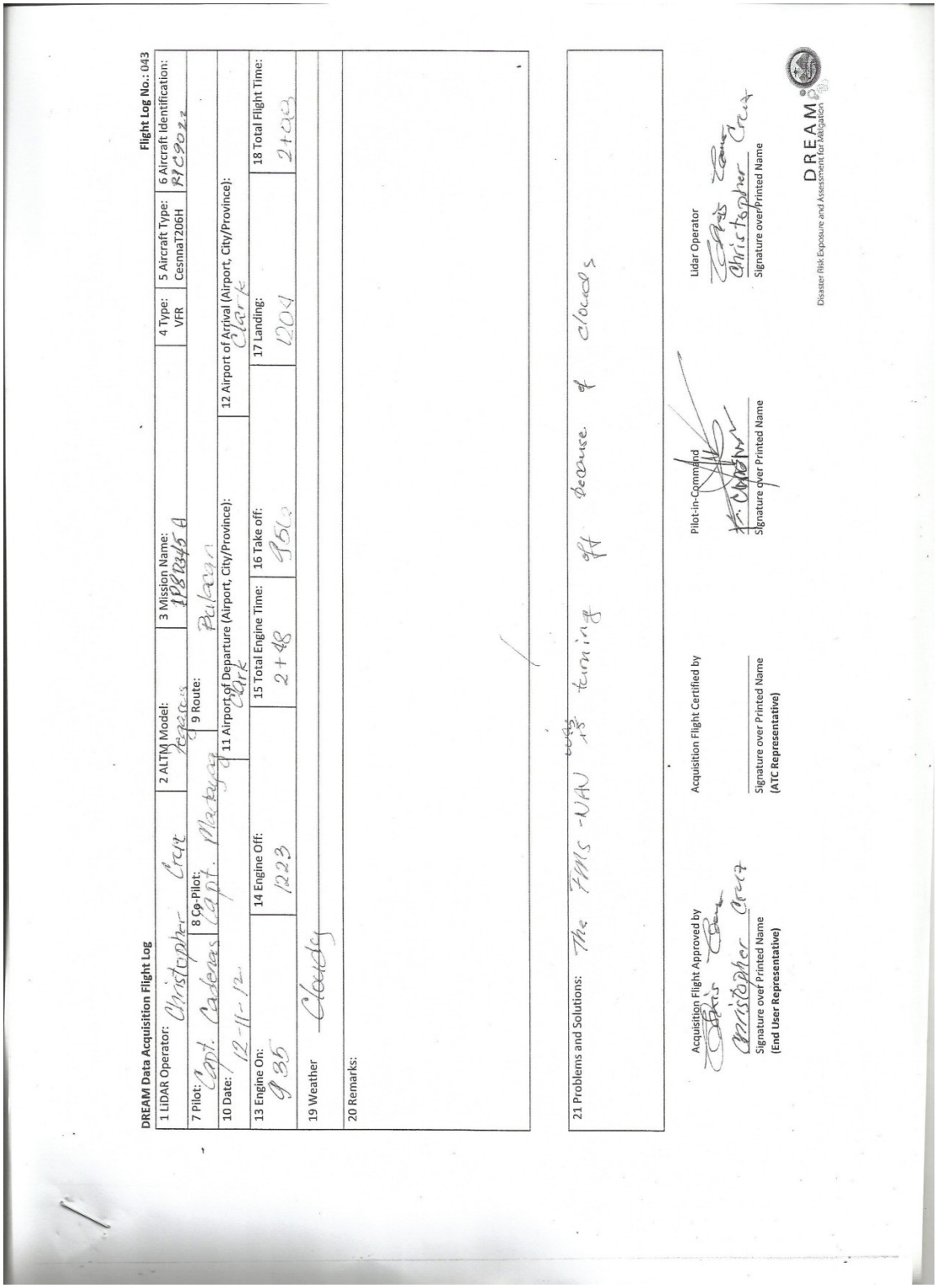
Pilot-in-Command
Signature over Printed Name

Lidar Operator
James Neville
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM8D Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 043

1 LiDAR Operator: Christopher Cruz	2 ALTM Model: Regeus	3 Mission Name: 19B345A	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RPC9022
7 Pilot: Capt. Cadenas	8 Co-Pilot: Capt. Mataya	9 Route: Bulacan			
10 Date: 12-11-12	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 935	14 Engine Off: 1223	15 Total Engine Time: 2+48	16 Take off: 950	17 Landing: 1204	18 Total Flight Time: 2+03
19 Weather Cloudy					
20 Remarks:					

21 Problems and Solutions: The PAMS-UAV was turning off because of clouds

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(ATC Representative)

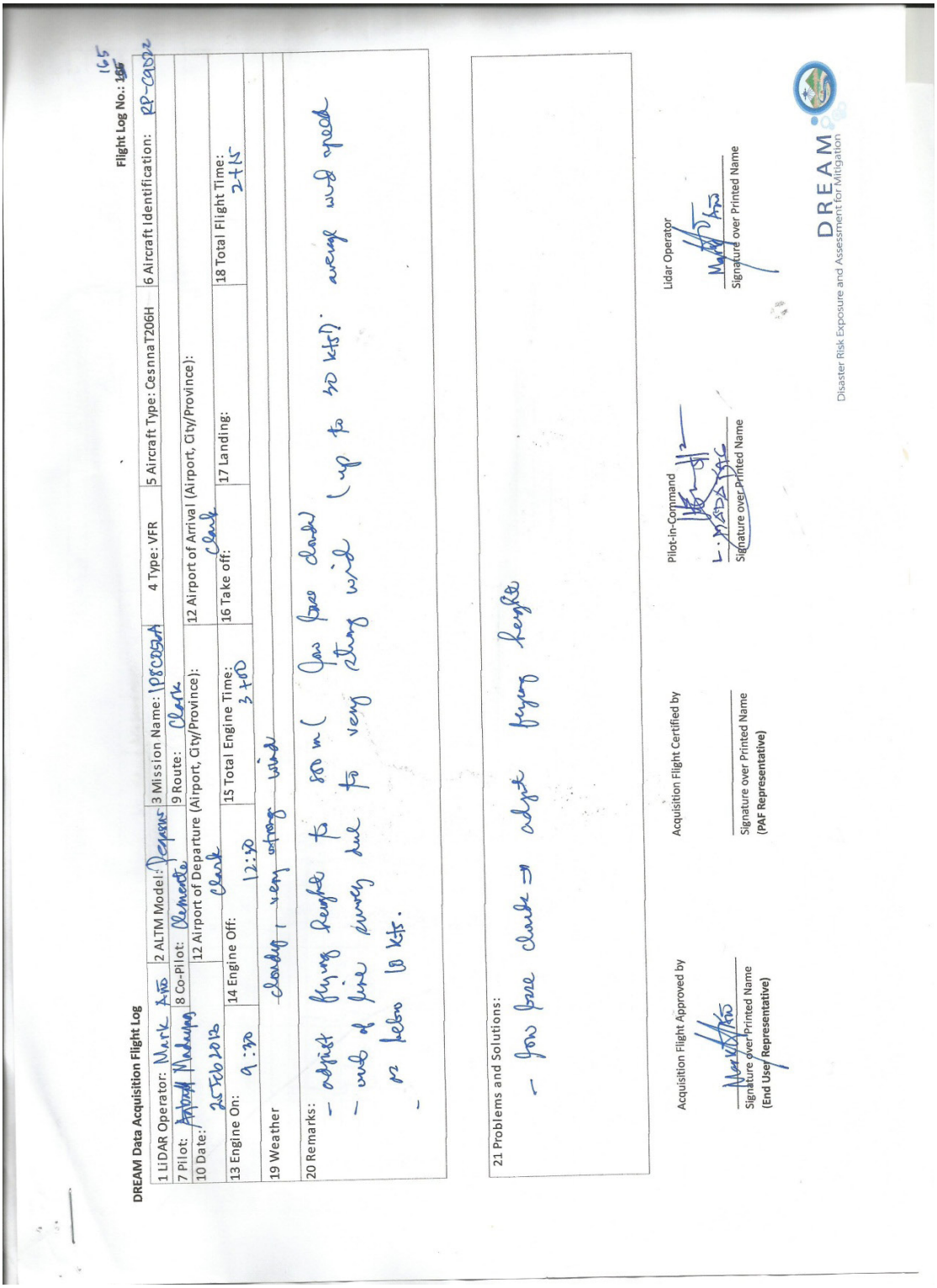
Pilot-in-Command
Signature over Printed Name

Lidar Operator
Signature over/Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM8CS Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 165

1 LiDAR Operator: Mark Ans	2 ALTM Model: Pegasus	3 Mission Name: 180205A	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C8052
7 Pilot: Antonio Mahinay	8 Co-Pilot: Clemente	9 Route: Clark			
10 Date: 25 Feb 2018	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 9:30	14 Engine Off: 12:30	15 Total Engine Time: 3+00	16 Take off:	17 Landing:	18 Total Flight Time: 2+15
19 Weather: cloudy, very strong wind					

20 Remarks:
- abrupt flying height to 800 m (San Jose dam)
- end of line survey due to very strong wind (up to 40 kts). average wind speed no below 10 kts.

21 Problems and Solutions:
- San Jose dam = adjust flying height

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

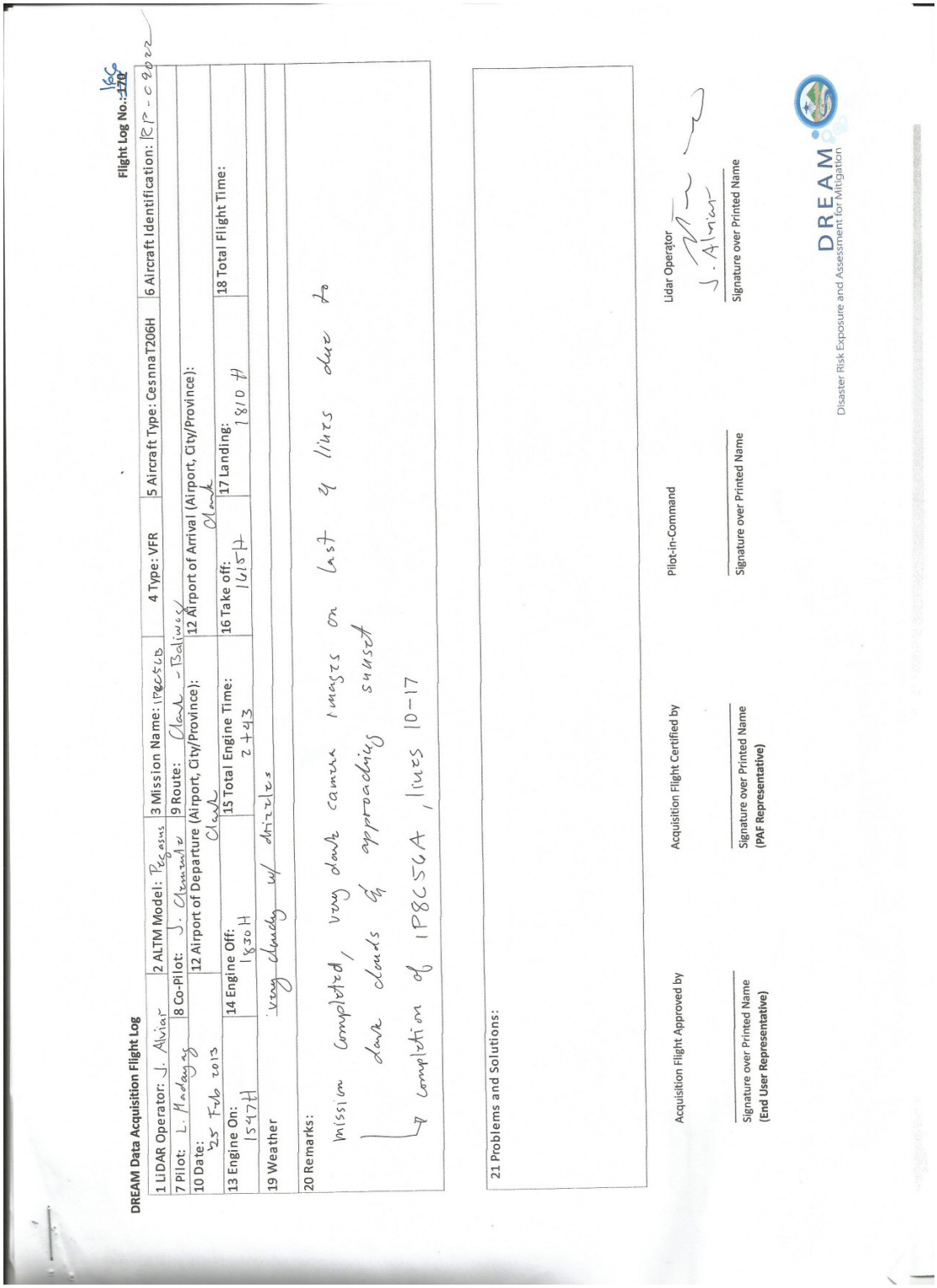
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 1P8C056B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 170

1 LiDAR Operator: J. Alviar	2 ALTM Model: Pegasus	3 Mission Name: 1P8C056B	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C8022
7 Pilot: L. Madeyag	8 Co-Pilot: J. Cremaine	9 Route: Clark - Baliwag			
10 Date: 25 Feb 2013	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1547H	14 Engine Off: 1830H	15 Total Engine Time: 2+43	16 Take off: 1615H	17 Landing: 1810H	18 Total Flight Time:
19 Weather: very cloudy w/ drizzles					

20 Remarks:

Mission completed, very dark canvas images on last 4 lines due to dark clouds & approaching sunset

↳ completion of 1P8C056A, lines 10-17

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name (End User Representative)

Acquisition Flight Certified by

Signature over Printed Name (PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

J. Alviar

Signature over Printed Name

DREAM

Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM8D Mission

DREAM Data Acquisition Flight Log — **Flight Log No.: 164**

1 LiDAR Operator: Lovely Acuña	2 ALTM Model: Gemini	3 Mission Name: 2PAM8DSEA	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9122
7 Pilot: F. Catoriza	8 Co-Pilot: A. Agbayani	9 Route: Clark – Bulacan			
10 Date: 02/25/2013	12 Airport of Departure (Airport, City/Province):		12 Airport of Arrival (Airport, City/Province):		
13 Engine On: 0940H	14 Engine Off: 1235H	15 Total Engine Time: 2+55	16 Take off:	17 Landing:	18 Total Flight Time:
19 Weather	Good / low base clouds / flying alt adjusted to 980m				
20 Remarks:					

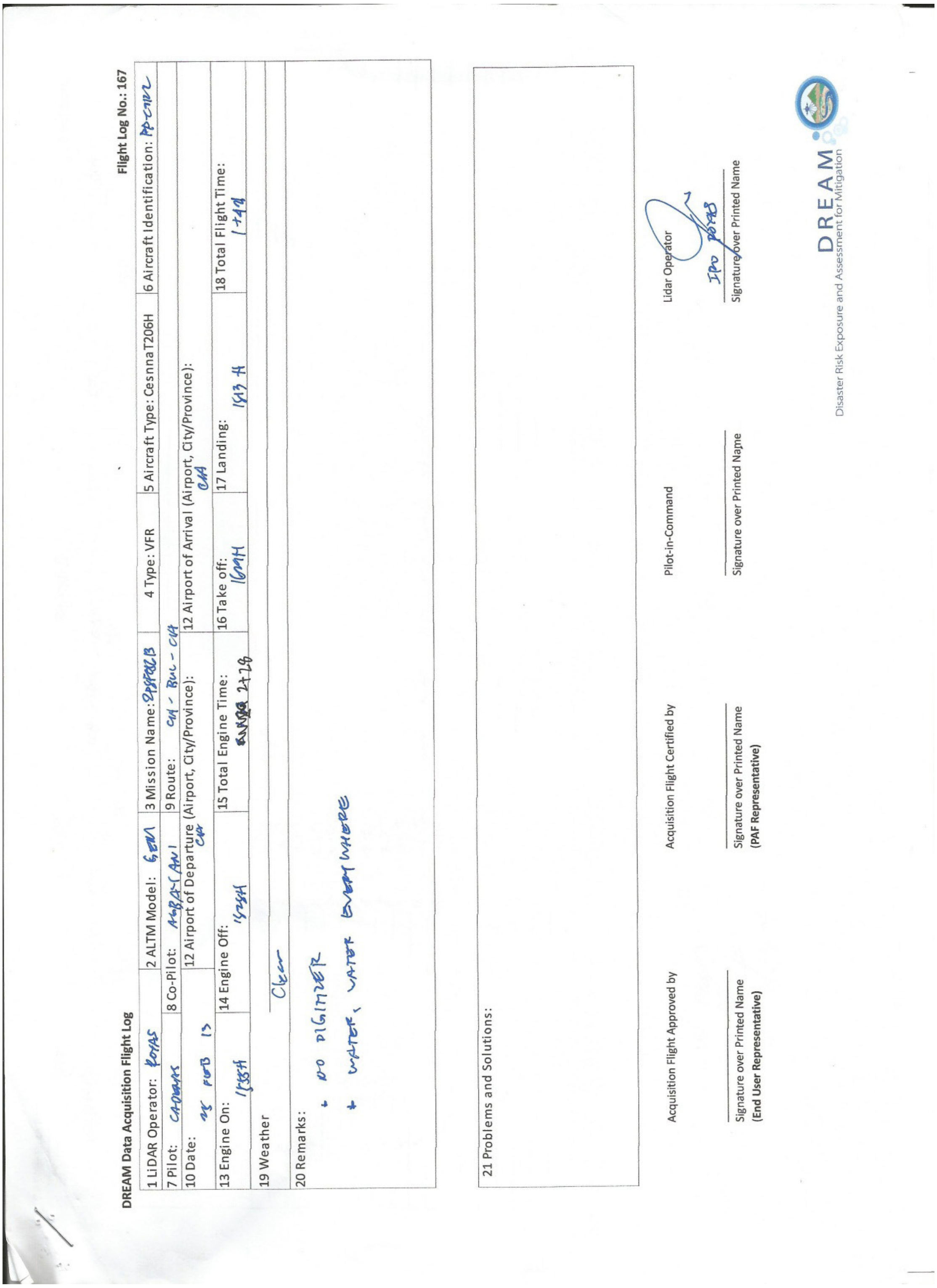
21 Problems and Solutions:

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
LOVELY GRACIA ACUÑA		F. CATORIZA	LOVELY GRACIA ACUÑA
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM8D Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 167

1 LiDAR Operator: ROXAS	2 ALTM Model: GEM	3 Mission Name: 2BSF082B	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9122
7 Pilot: CADENAS	8 Co-Pilot: ALBASTANI	9 Route: CIA - BUL - CIA			
10 Date: 25 FEB 13	12 Airport of Departure (Airport, City/Province): CIA		12 Airport of Arrival (Airport, City/Province): CIA		
13 Engine On: 1535H	14 Engine Off: 1725H	15 Total Engine Time: 2+28	16 Take off: 1611H	17 Landing: 1813 H	18 Total Flight Time: 1+42
19 Weather: Clear					
20 Remarks:					

20 Remarks:

- NO DIGITIZER
- WATER, WATER EVERYWHERE

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

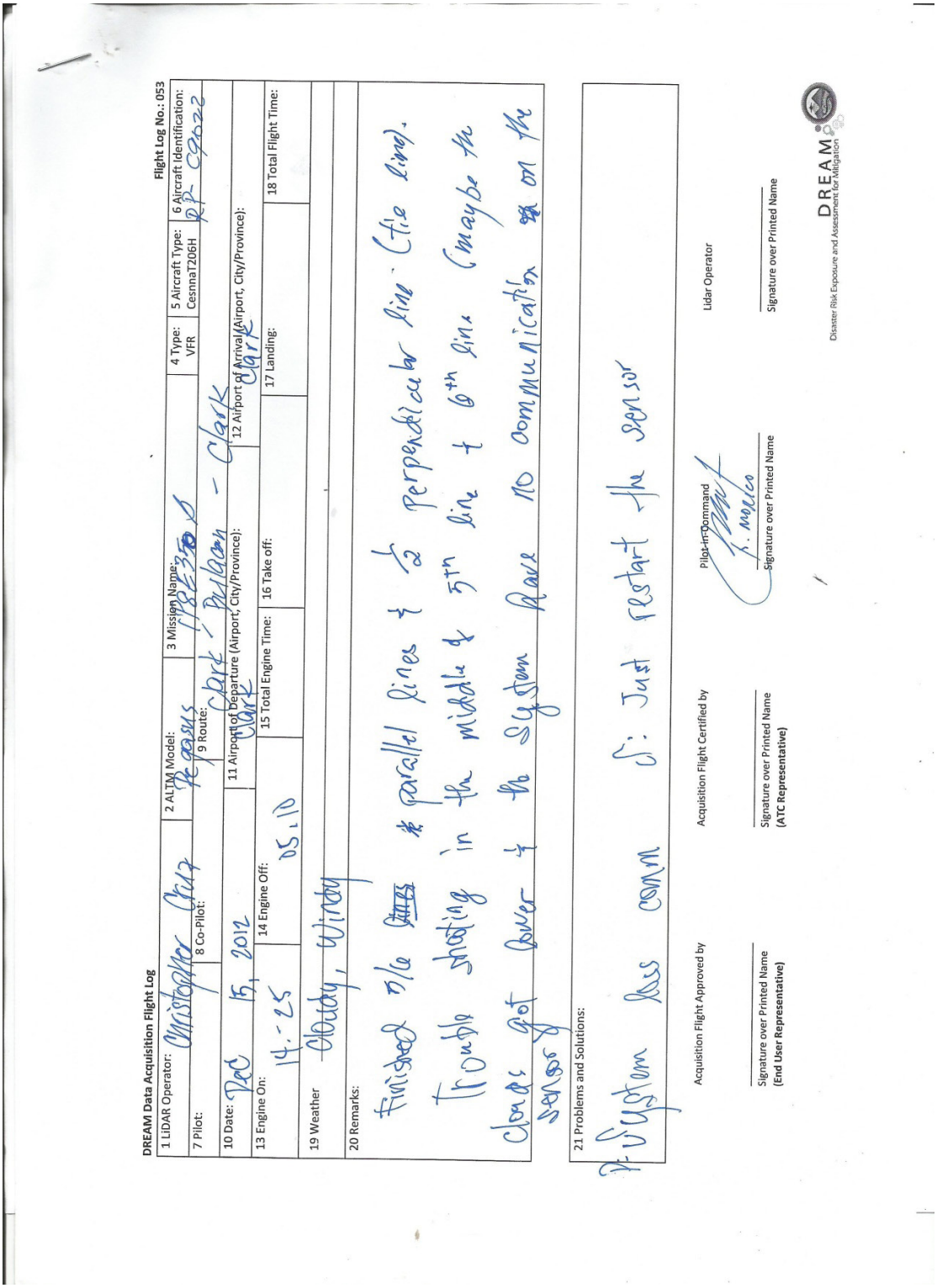
IPO ROXAS

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM8E Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 053

1 LiDAR Operator: Christopher Cruz	2 ALTM Model: Pegasus	3 Mission Name: PAM8E	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C2022
7 Pilot:	8 Co-Pilot:	9 Route: Clark / Bulacan - Clark			
10 Date: Dec 15, 2012		11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark	
13 Engine On: 14:25	14 Engine Off: 05:10	15 Total Engine Time:	16 Take off:	17 Landing:	18 Total Flight Time:
19 Weather: Cloudy, Windy					

20 Remarks:

Finished r/a # parallel lines & 2 perpendicular line. (Tie line).
Trouble shooting in the middle of 5th line & 6th line. (maybe the clouds got power & the system have no communication on the sensor)

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(ATC Representative)

Pilot-in-Command

Signature over Printed Name

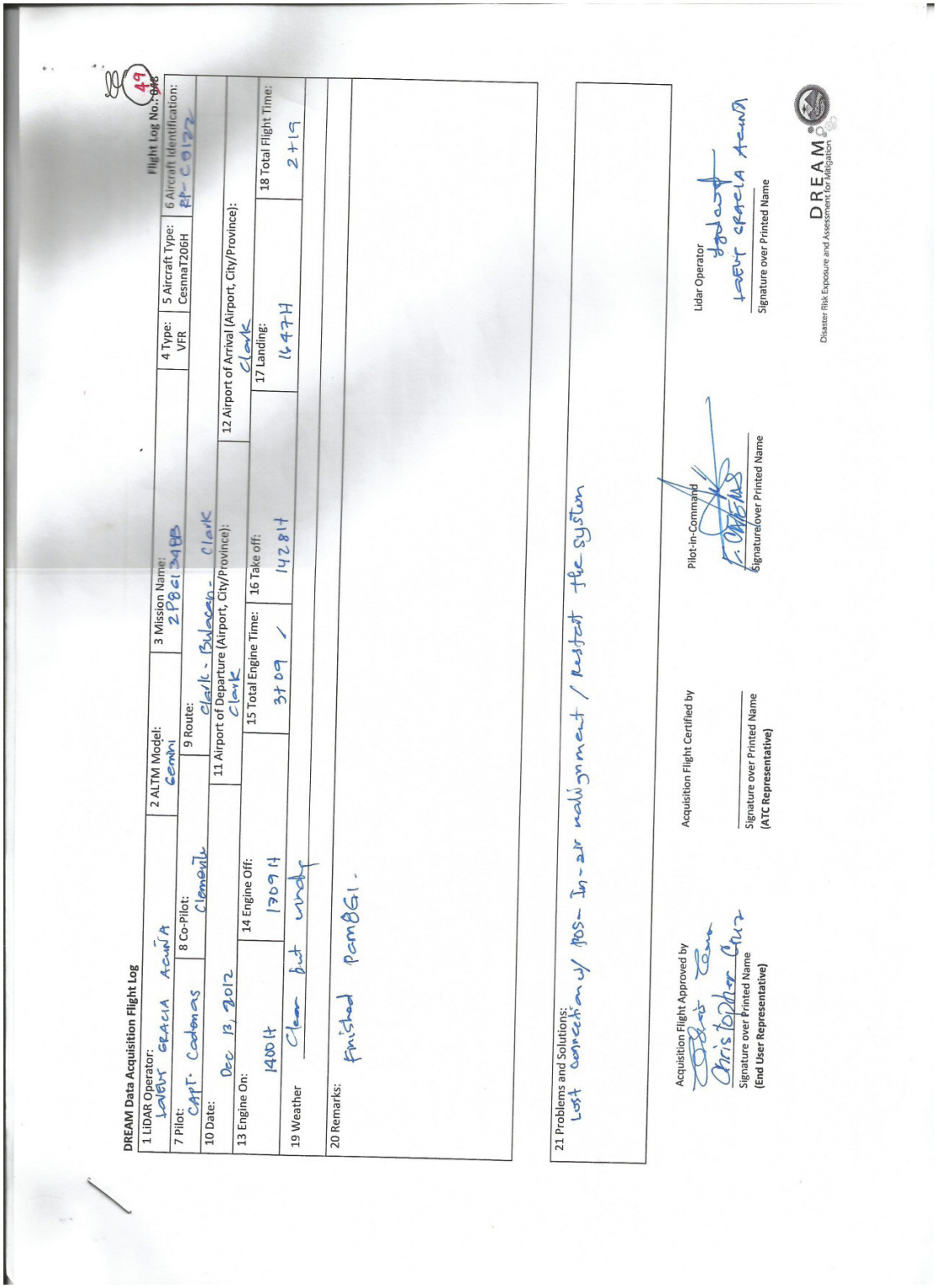
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM8G1 Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 49

1 LiDAR Operator: Lovelyn Grace Acuña	2 ALTM Model: Gemini	3 Mission Name: 2P8e134BB	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9122
7 Pilot: Capt. Cadenas	8 Co-Pilot: Clemente	9 Route: Clark - Bulacan - Clark			
10 Date: Dec 13, 2012		11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark	
13 Engine On: 14004	14 Engine Off: 17094	15 Total Engine Time: 3+09 / 142.814	16 Take off:	17 Landing: 1647H	18 Total Flight Time: 2+19
19 Weather: Clear but windy					
20 Remarks: Finished PAM8G1.					

21 Problems and Solutions:
Lost connection w/ POS- In-air realignment / Restart the system

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(ATC Representative)

Pilot-in-Command
Signature/over Printed Name

Lidar Operator
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM8G2 Mission

DREAM Data Acquisition Flight Log — Flight Log No.: 050

1 LiDAR Operator: James Albert P. Ayuh	2 ALTM Model: GEMINI	3 Mission Name: 2P8G340A	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9122
7 Pilot: CAPT. CADENAS	8 Co-Pilot: RANDY MORICO	9 Route: CLARK - BALIWAG - CLARK			
10 Date: 12-14-2012	11 Airport of Departure (Airport, City/Province):		12 Airport of Arrival (Airport, City/Province):		
13 Engine On: 8:40	14 Engine Off: 12:25	15 Total Engine Time: 3+45	16 Take off: 9:24	17 Landing: 12:08	18 Total Flight Time:
19 Weather: CLOUDY WITH STRONG WINDS					
20 Remarks:					

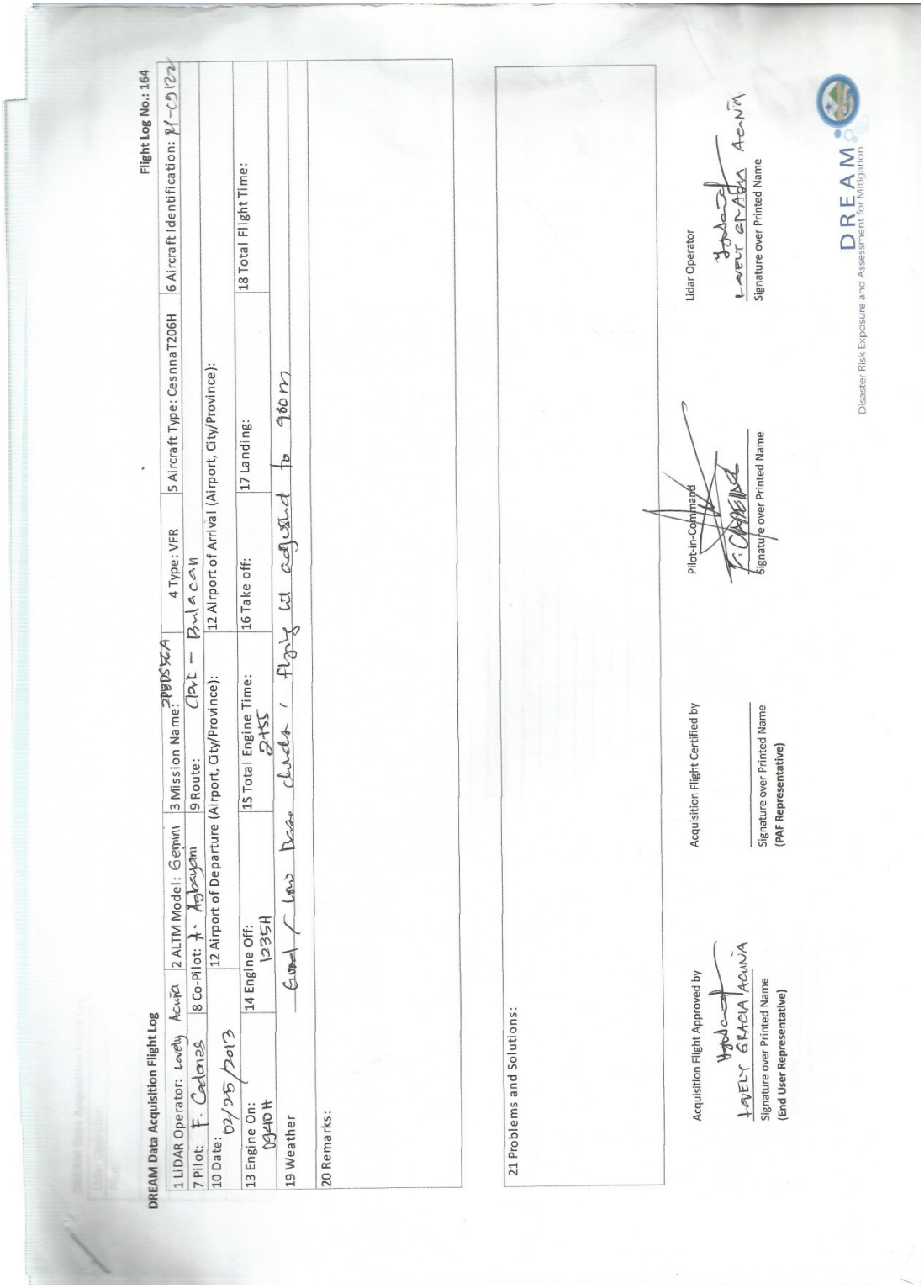
21 Problems and Solutions:

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Signature over Printed Name (End User Representative)	Signature over Printed Name (ATC Representative)	F. Cadenas Signature over Printed Name	James Albert Ayuh Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM8DS (G2) Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 164

1 LiDAR Operator: Lovely Acuña	2 ALTM Model: Gemini	3 Mission Name: 2PBDS2A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9122
7 Pilot: F. Cadenas	8 Co-Pilot: A. Aglugani	9 Route: Clat – Balacan		
10 Date: 02/25/2013	11 Airport of Departure (Airport, City/Province):		12 Airport of Arrival (Airport, City/Province):		
13 Engine On: 0940 H	14 Engine Off: 1235H	15 Total Engine Time: 2+55	16 Take off:	17 Landing:	18 Total Flight Time:
19 Weather	Good / Low base clouds / flying alt adjusted to 900m				

20 Remarks:

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

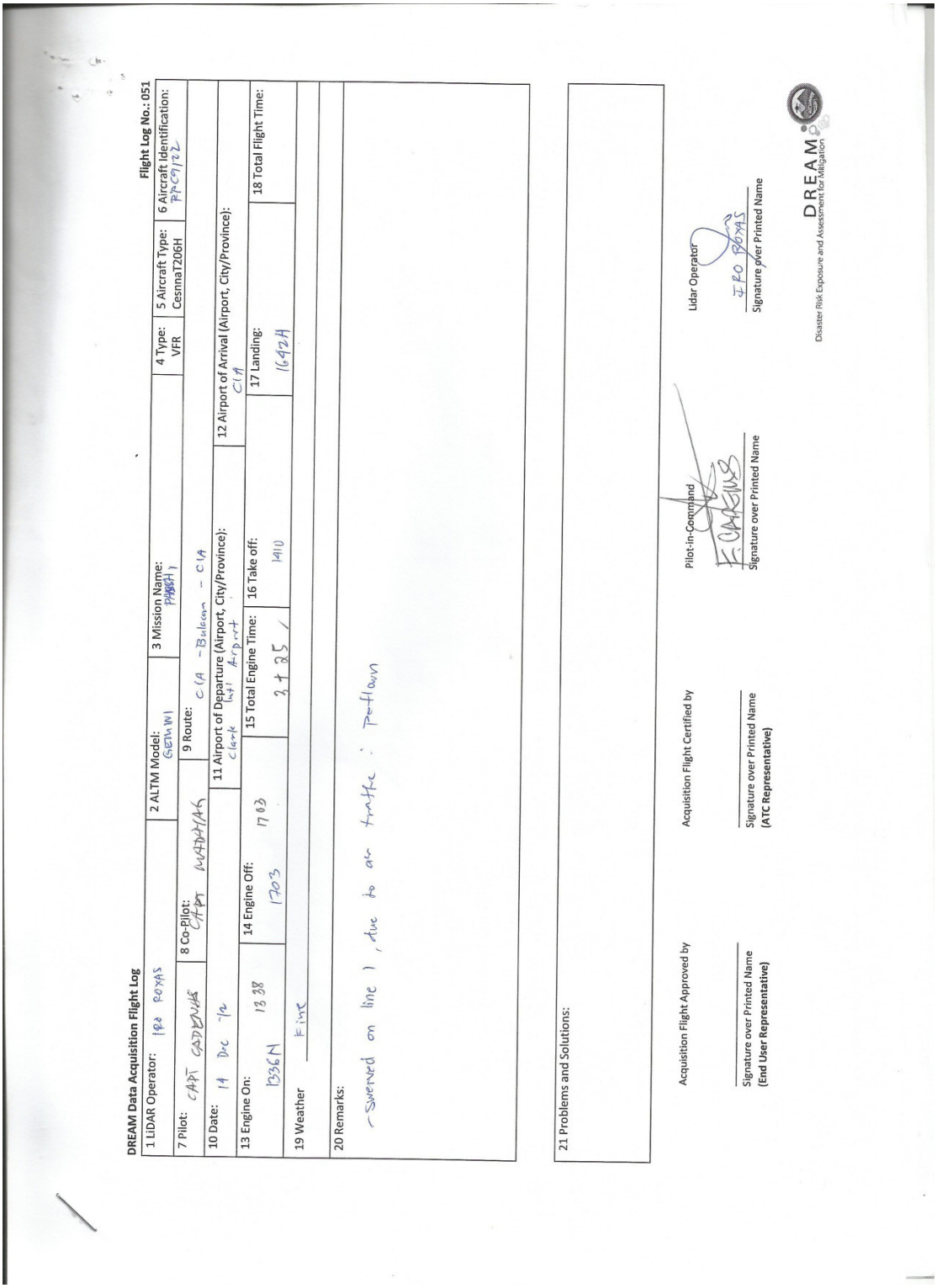
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM8H1 Mission



DREAM Data Acquisition Flight Log — **Flight Log No.: 051**

1 LiDAR Operator: Ipo Ponas	2 ALTM Model: Gemini	3 Mission Name: PAM8H1	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: PPC9122
7 Pilot: Capt Caderao	8 Co-Pilot: Capt Madayag	9 Route: CIA - Bulacan - CIA			
10 Date: 14 Dec 19	11 Airport of Departure (Airport, City/Province): Clark Int'l Airport		12 Airport of Arrival (Airport, City/Province): CIA		
13 Engine On: 1338	14 Engine Off: 1703	15 Total Engine Time: 2+25	16 Take off: 1410	17 Landing: 1642H	18 Total Flight Time:
19 Weather Fine					
20 Remarks: - Swerved on line 1, due to air traffic ; Perflown					
21 Problems and Solutions:					

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(ATC Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

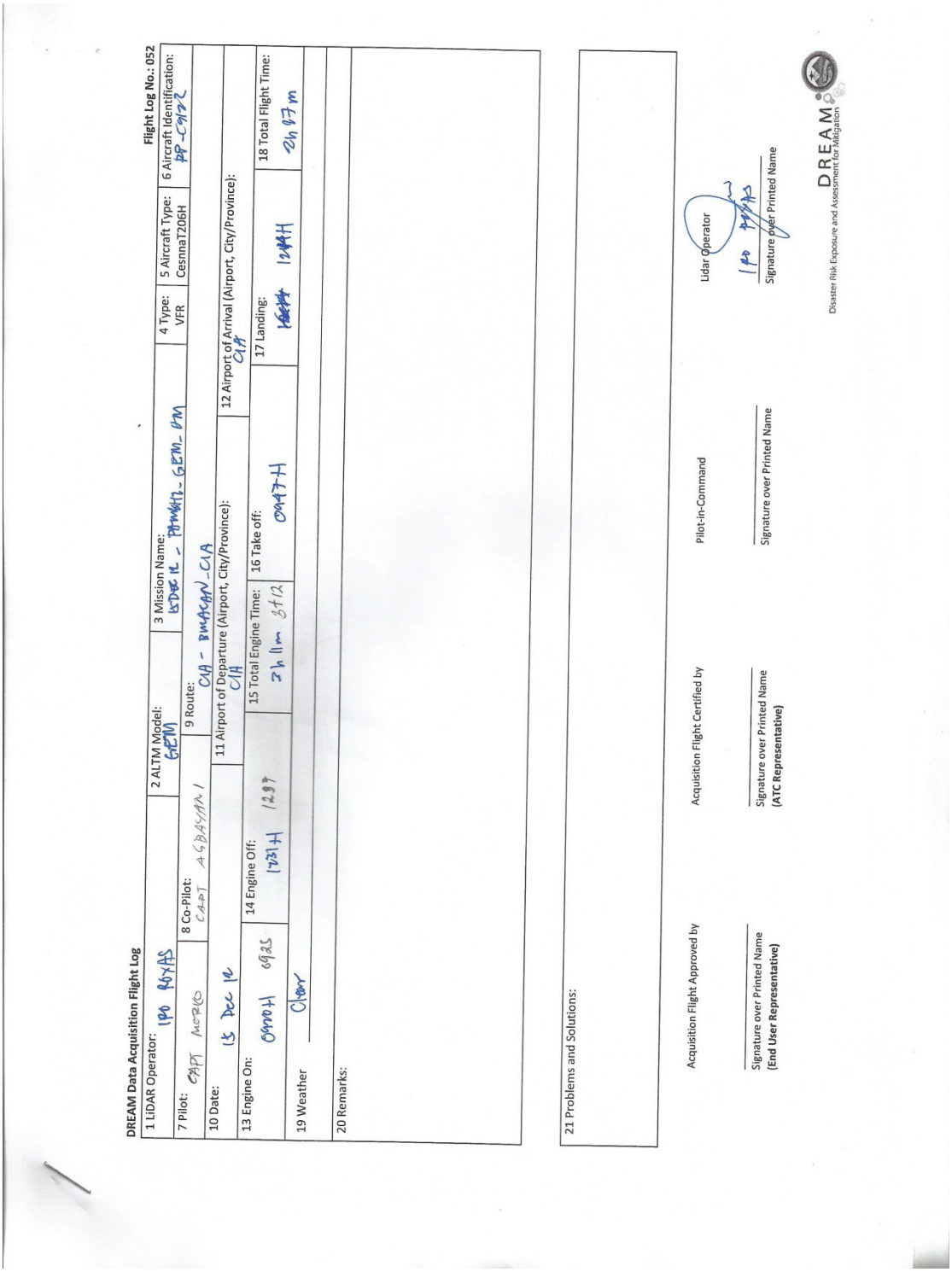
I. P. Ponas

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM8H2 Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 052

1 LiDAR Operator: IPO MAPS	2 ALTM Model: GEM	3 Mission Name: [illegible] - PAM8H2-GEM-CIA	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C4926
7 Pilot: CAPT MORO	8 Co-Pilot: CADET AGBAYANI	9 Route: CIA - BUHAGIAN-CIA			
10 Date: 15 Dec 18		11 Airport of Departure (Airport, City/Province): CIA		12 Airport of Arrival (Airport, City/Province): CIA	
13 Engine On: 0900H 6925	14 Engine Off: 1731H 1297	15 Total Engine Time: 2h 11m 3712	16 Take off: 0947H	17 Landing: [illegible] 1244H	18 Total Flight Time: 2h 17m
19 Weather Clear					
20 Remarks:					

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(ATC Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

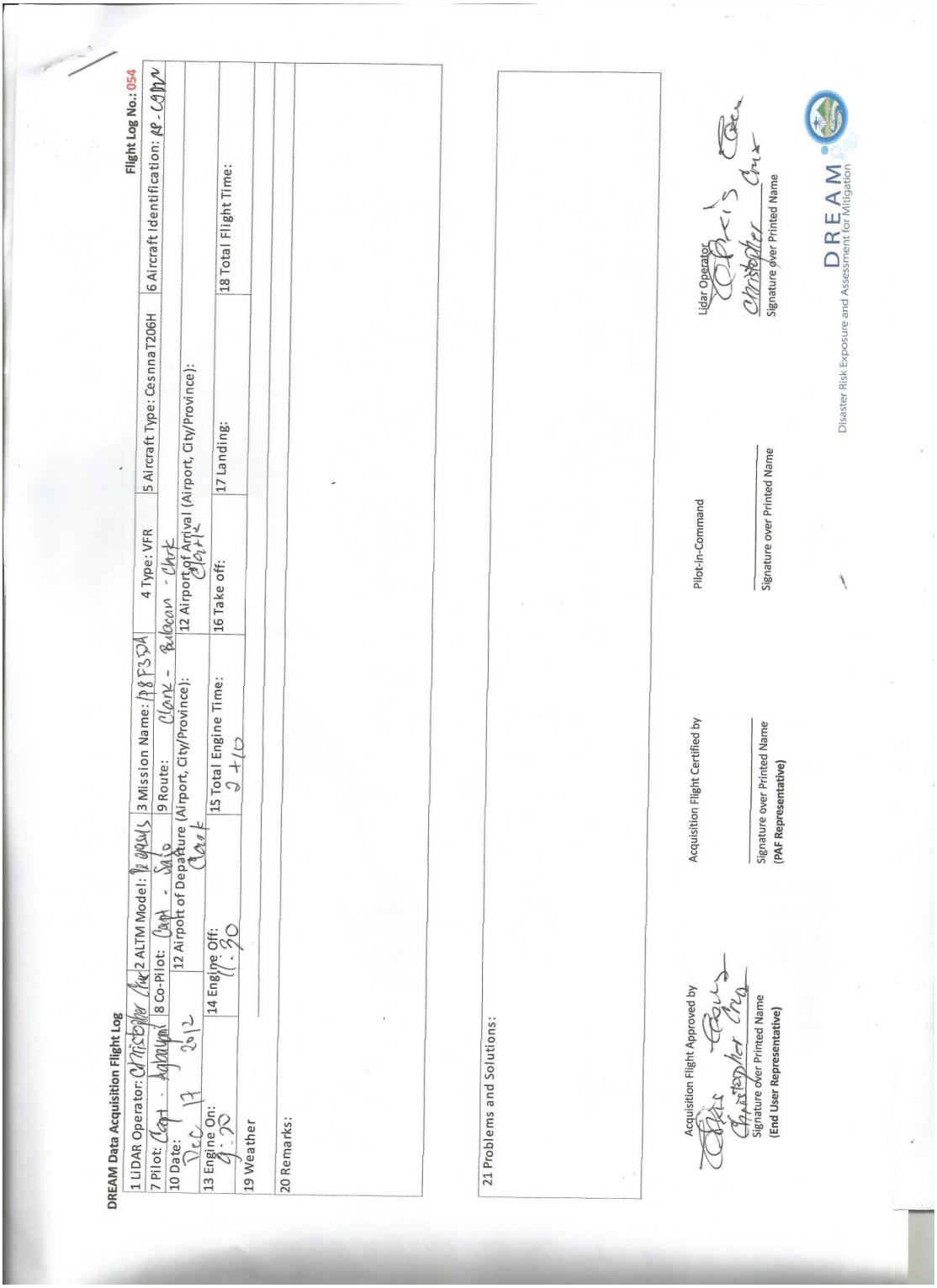
IPO MAPS

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM8I Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 054

1 LiDAR Operator: Christopher Cruz	2 ALTM Model: Pegasus	3 Mission Name: 18 P35A	4 Type: VFR
5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C8111		
7 Pilot: Capt. Adrian Sato	8 Co-Pilot: Capt. Clare Balocan	9 Route: Clark	
10 Date: Dec 17 2012	11 Airport of Departure (Airport, City/Province): Clark	12 Airport of Arrival (Airport, City/Province): Clark	
13 Engine On: 9:20	14 Engine Off: 11:30	15 Total Engine Time: 2+10	16 Take off:
17 Landing:	18 Total Flight Time:		
19 Weather			
20 Remarks:			
21 Problems and Solutions:			

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-In-Command

Signature over Printed Name

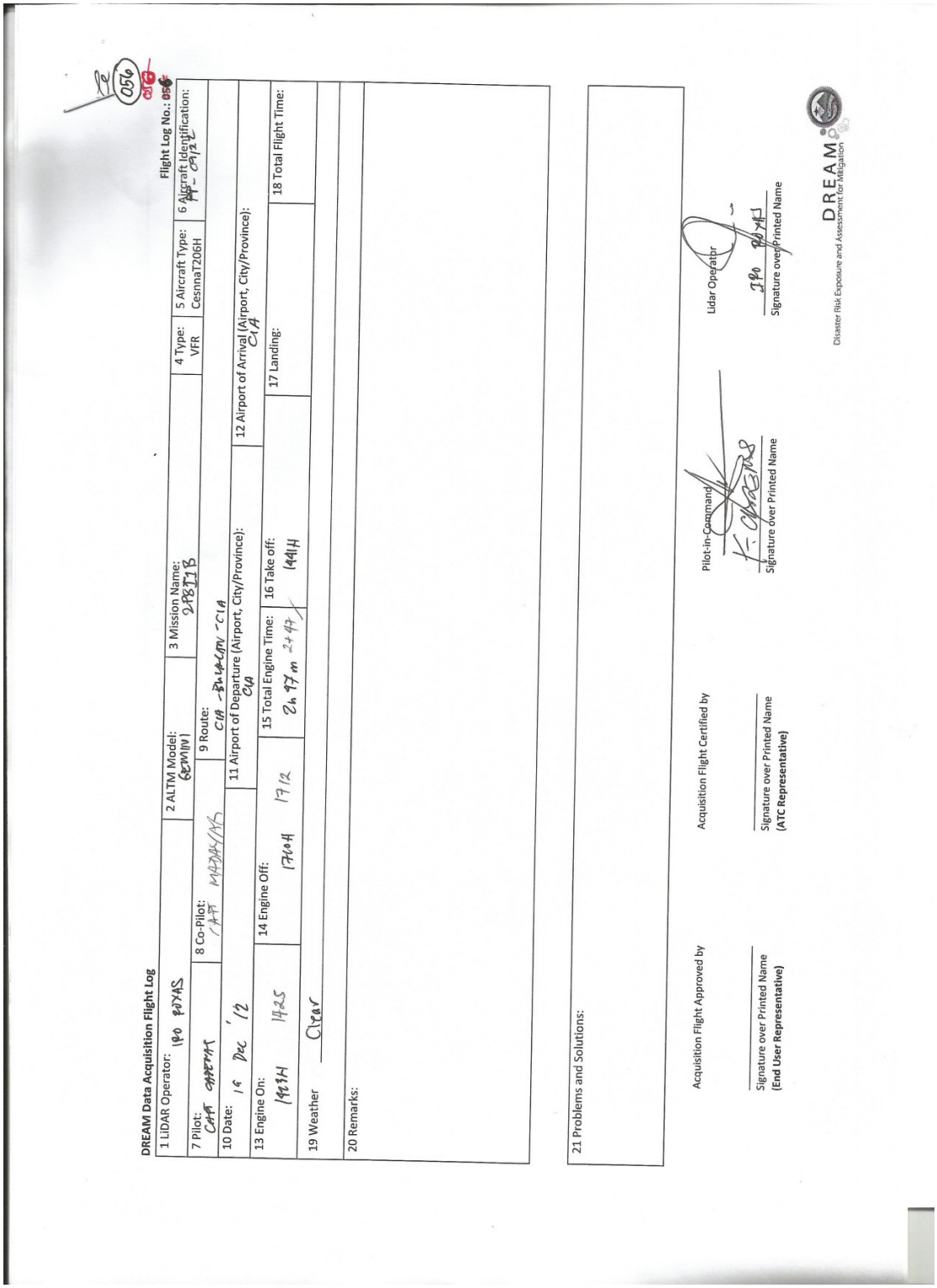
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM8I Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 056

1 LIDAR Operator: 190 RDYAS	2 ALTM Model: Gemini	3 Mission Name: PB3718	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-C4121
7 Pilot: CAPT CABRAS	8 Co-Pilot: CAPT MADAMBA	9 Route: CIA - Bulacan - CIA			
10 Date: 16 Dec '12	11 Airport of Departure (Airport, City/Province): CIA		12 Airport of Arrival (Airport, City/Province): CIA		
13 Engine On: 1431H 1425	14 Engine Off: 1710H 1712	15 Total Engine Time: 2h 47m 2+47	16 Take off: 1441H	17 Landing:	18 Total Flight Time:
19 Weather Clear					
20 Remarks:					

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(ATC Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM8FS Mission

DREAM Data Acquisition Flight Log

Flight Log No.: 167

1 LiDAR Operator: ROYAS	2 ALTM Model: GEM	3 Mission Name: 2PSF0ZLB	4 Type: VFR	5 Aircraft Type: Cesnna T206H	6 Aircraft Identification: RP-C9122
7 Pilot: CADORNAS	8 Co-Pilot: ALBARCANI	9 Route: CIA - BUL - CIA			
10 Date: 25 FEB 13	12 Airport of Departure (Airport, City/Province): CIA		12 Airport of Arrival (Airport, City/Province): CIA		
13 Engine On: 1355H	14 Engine Off: 1524H	15 Total Engine Time: 2+29	16 Take off: 1609H	17 Landing: 1513 H	18 Total Flight Time: 1+44
19 Weather: Clear					
20 Remarks:					

- NO DIGITIZER
- WATER, WATER EVERYWHERE

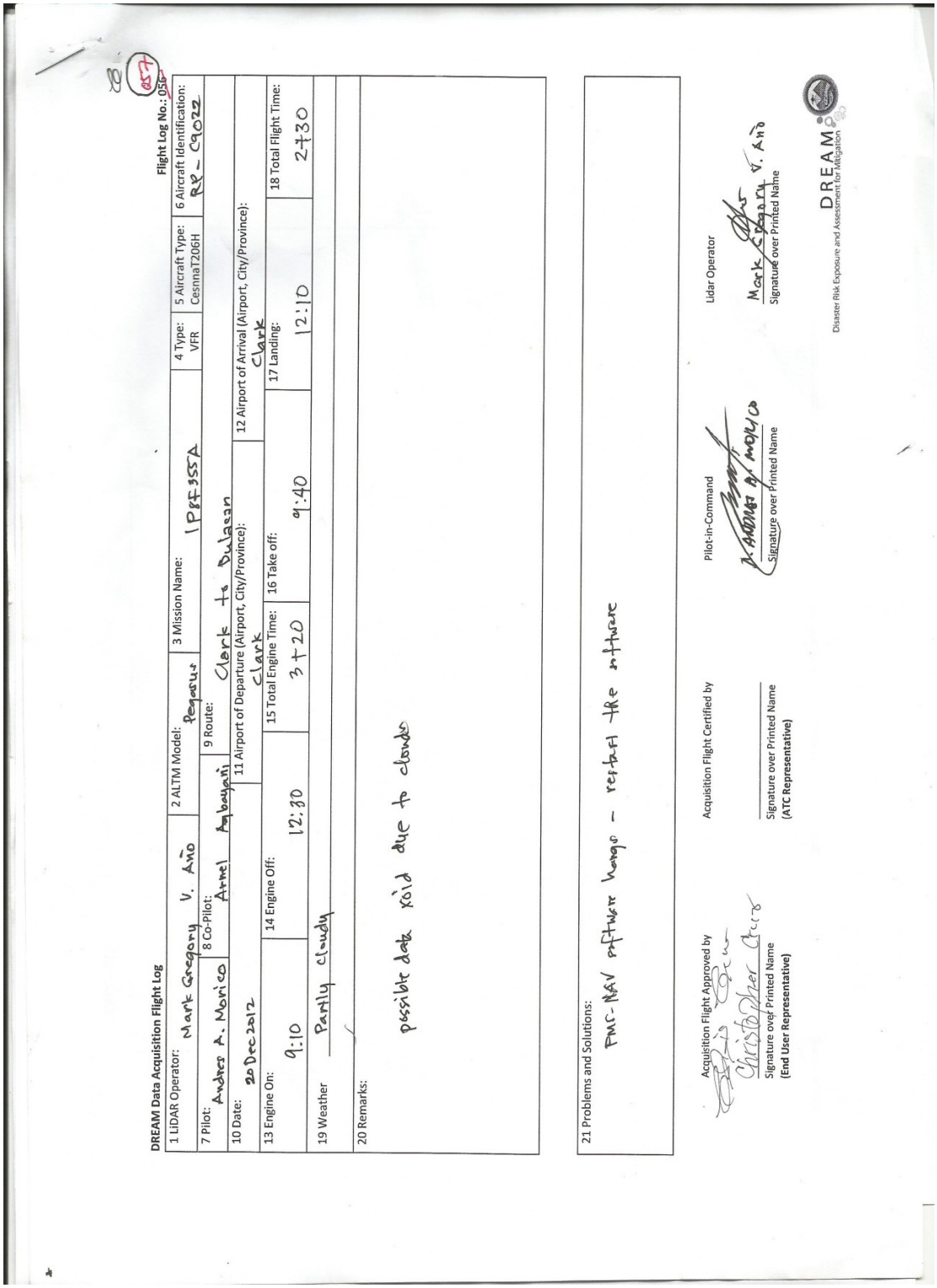
21 Problems and Solutions:

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
			IPO ROYAS
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM8J Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 036

1 LiDAR Operator: Mark Gregory V. Año	2 ALTM Model: Pegasus	3 Mission Name: 1P8F355A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9022
7 Pilot: Andres A. Morico	8 Co-Pilot: Arnel Pabayani	9 Route: Clark to Bulacan			
10 Date: 20 Dec 2012	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 9:10	14 Engine Off: 12:30	15 Total Engine Time: 3+20	16 Take off: 9:40	17 Landing: 12:10	18 Total Flight Time: 2+30
19 Weather Partly cloudy					
20 Remarks: possible data void due to clouds					

21 Problems and Solutions:
PMC-NAV pathway hangs - restart the software

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(ATC Representative)

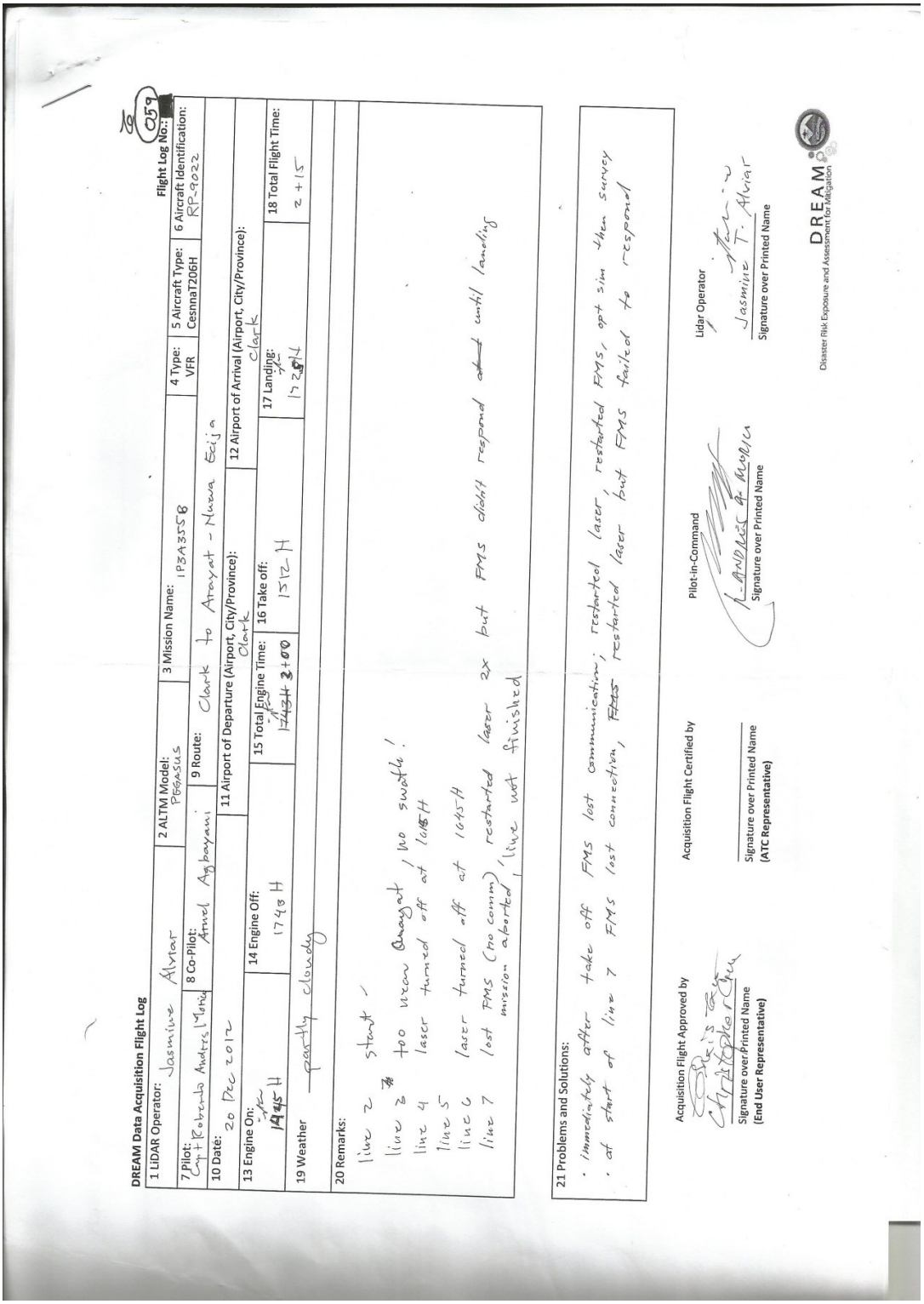
Pilot-in-Command
Signature over Printed Name

Lidar Operator
Mark Gregory V. Año
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM3A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 059

1 LiDAR Operator: Jasmine Alvar	2 ALTM Model: Pegasus	3 Mission Name: 1PA33558	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-9022
7 Pilot: Capt. Roberto Andres Laurio	8 Co-Pilot: Arnel Agbayani	9 Route: Clark to Anayat - Nueva Ecija			
10 Date: 20 Dec 2017		11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark	
13 Engine On: ~~0900~~ 1945 H	14 Engine Off: 1748 H	15 Total Engine Time: ~~1743H~~ 3+00	16 Take off: 1512 H	17 Landing: ~~1928~~ 1728 H	18 Total Flight Time: 2+15
19 Weather partly cloudy					

20 Remarks:

line 2 start ✓
line 3 ~~#~~ too much daungat / no swath !
line 4 laser turned off at 1648H
line 5
line 6 laser turned off at 1643H
line 7 lost FMS (no comm) restarted laser 2x but FMS didn't respond ~~abort~~ until landing mission aborted / line not finished

21 Problems and Solutions:

- immediately after take off FMS lost communication; restarted laser restarted FMS, opt sim then survey
- at start of line 7 FMS lost connection, ~~FMS~~ restarted laser but FMS failed to respond

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(ATC Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

Jasmine T. Alvar

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM3A Mission

DREAM Data Acquisition Flight Log — **Flight Log No.: 072**

1 LiDAR Operator: Mark Año	2 ALTM Model: Pegasus	3 Mission Name: P3A0005	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: 9022
7 Pilot: Arnel Aykayani	8 Co-Pilot: Frank Depito	9 Route: Clark - Nueva Ecija			
10 Date: 05 Jan 2012	12 Airport of Departure (Airport, City/Province): Clark	12 Airport of Arrival (Airport, City/Province): Clark			
13 Engine On: 9:18	14 Engine Off: 1325	15 Total Engine Time: 3+37	16 Take off: 1015	17 Landing: 1305	18 Total Flight Time: 1+2+50
19 Weather: partly cloudy					
20 Remarks: Survey - ok					

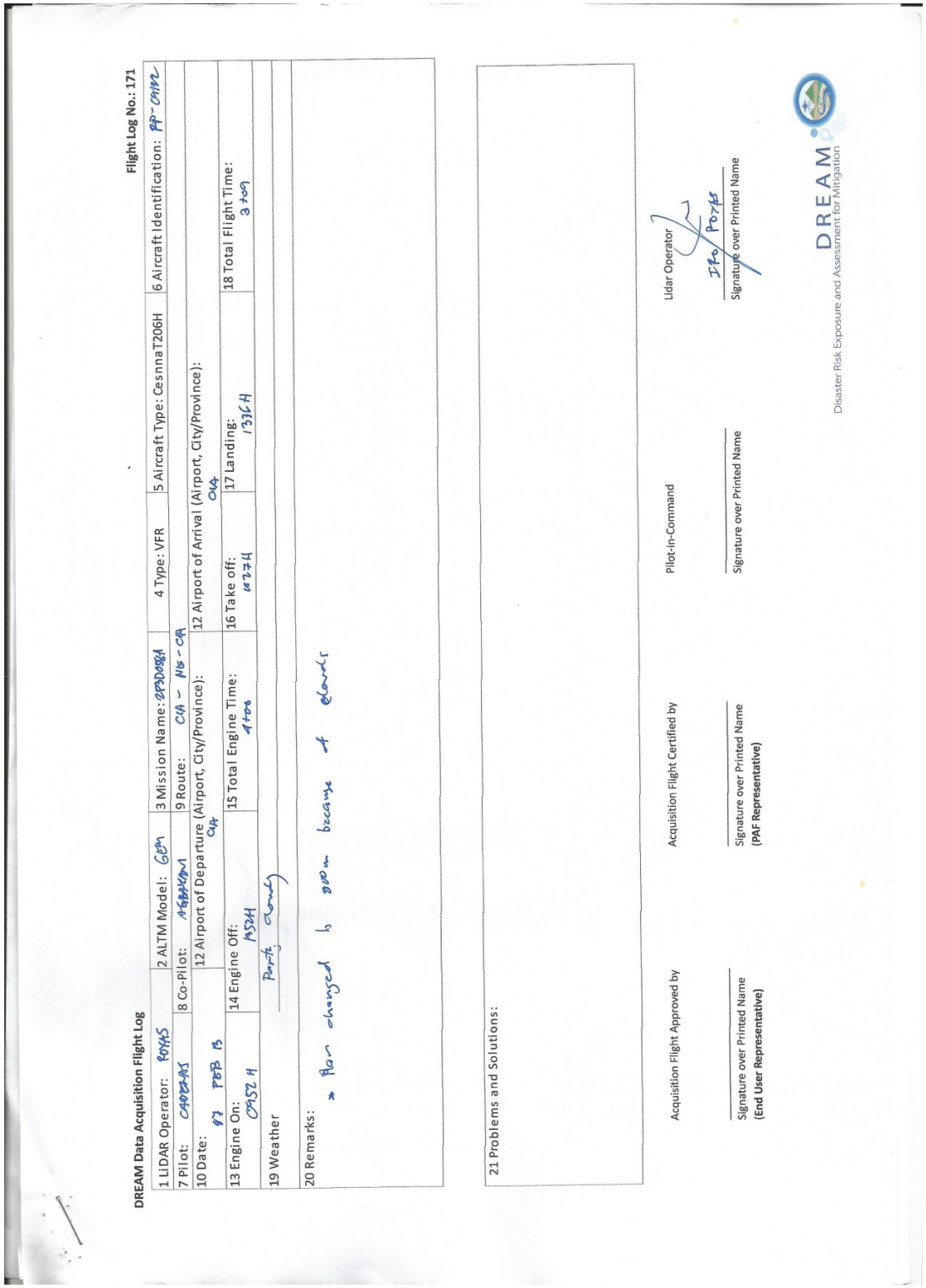
21 Problems and Solutions:

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Signature over Printed Name (End User Representative)	JULIUS RENDON Signature over Printed Name (PAF Representative)	Signature over Printed Name	Mark Gregory V. Año Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM3DS Mission



DREAM Data Acquisition Flight Log — **Flight Log No.: 171**

1 LiDAR Operator: ROMAS	2 ALTM Model: Gem	3 Mission Name: APSDASH	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-C1112
7 Pilot: CAPERAS	8 Co-Pilot: AGBAYANI	9 Route: CIA – NG – CIA			
10 Date: 07 FEB 15	12 Airport of Departure (Airport, City/Province): CIA		12 Airport of Arrival (Airport, City/Province): CIA		
13 Engine On: 0952 H	14 Engine Off: 1524	15 Total Engine Time: 4+00	16 Take off: 0734	17 Landing: 1316 H	18 Total Flight Time: 3 +09
19 Weather: Partly cloudy					

20 Remarks:
* Ran changed to 300m because of clouds

21 Problems and Solutions:

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(PAF Representative)

Pilot-in-Command
Signature over Printed Name

Lidar Operator
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM3B Mission

DREAM Data Acquisition Flight Log — **Flight Log No.: 068**

1 LiDAR Operator: Christopher Cruz	2 ALTM Model: Pegasus	3 Mission Name: P3B0028	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: 9022
7 Pilot: Capt. Astalan	8 Co-Pilot: Capt. Zapata	9 Route:			
10 Date: Jan 2, 2013	12 Airport of Departure (Airport, City/Province):		12 Airport of Arrival (Airport, City/Province):		
13 Engine On: 1525H	14 Engine Off: 1620H	15 Total Engine Time: 0455	16 Take off: —	17 Landing: —	18 Total Flight Time: —
19 Weather					
20 Remarks: Technical Prob w/ System abort flight					

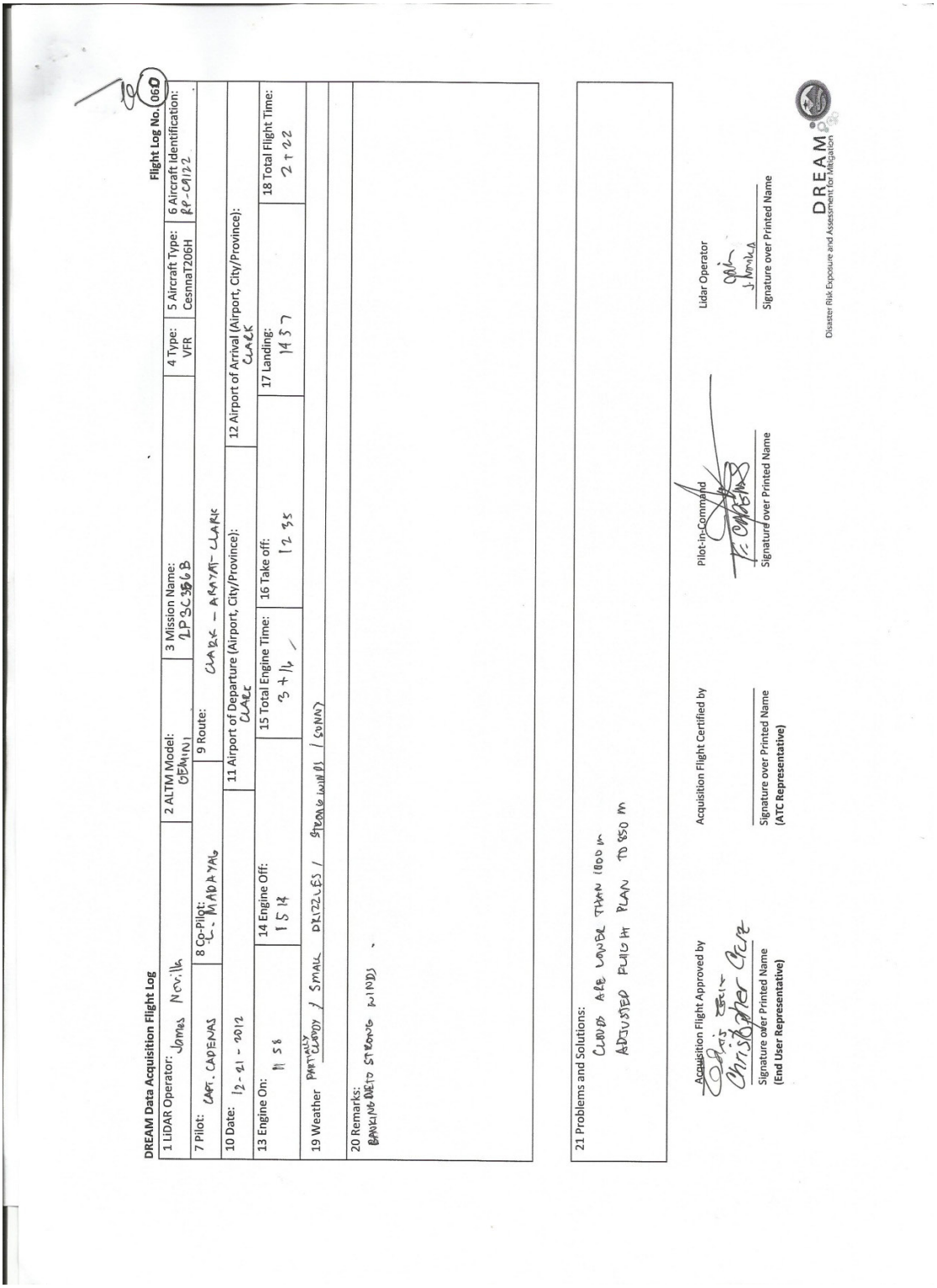
21 Problems and Solutions:

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Christopher Cruz	JULIUS TRENDON		Christopher Cruz
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM3C1 Mission



DREAM Data Acquisition Flight Log

Flight Log No. 060

1 LiDAR Operator: James Nov. Ilk	2 ALTM Model: GEMINI	3 Mission Name: 1P3C3868	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-C4122
7 Pilot: CAPT. CARDENAS	8 Co-Pilot: Lt. MABAYAD	9 Route: CLARK – ARAYAT– CLARK			
10 Date: 12-21-2012		11 Airport of Departure (Airport, City/Province): CLARK		12 Airport of Arrival (Airport, City/Province): CLARK	
13 Engine On: 11 58	14 Engine Off: 15 18	15 Total Engine Time: 3+18	16 Take off: 12 35	17 Landing: 14 57	18 Total Flight Time: 2+22
19 Weather PARTIALLY CLOUDY / SMALL DRIZZLES / STRONG WIND) / SUNNY					
20 Remarks: BANKLINE DUE TO STRONG WINDS					

21 Problems and Solutions:
CLOUD ALT LOWER THAN 1800 M
ADJUSTED FLIG HT PLAN TO 850 M

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(ATC Representative)

Pilot-in-Command
Signature over Printed Name

Lidar Operator
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM3C2 Mission

DREAM Data Acquisition Flight Log — **Flight Log No.: 071**

1 LiDAR Operator: IPO PAM3	2 ALTM Model: GEM	3 Mission Name: 2PAL05A	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9122
7 Pilot: CAPT CADENAS	8 Co-Pilot: CAPT MADAYAG	9 Route: CIA – NG – CIA			
10 Date: 05 JAN 13	12 Airport of Departure (Airport, City/Province): CIA		12 Airport of Arrival (Airport, City/Province): CIA		
13 Engine On:	14 Engine Off: 1308H	15 Total Engine Time:	16 Take off:	17 Landing: 1243H	18 Total Flight Time:
19 Weather: Clear					
20 Remarks:					

21 Problems and Solutions:

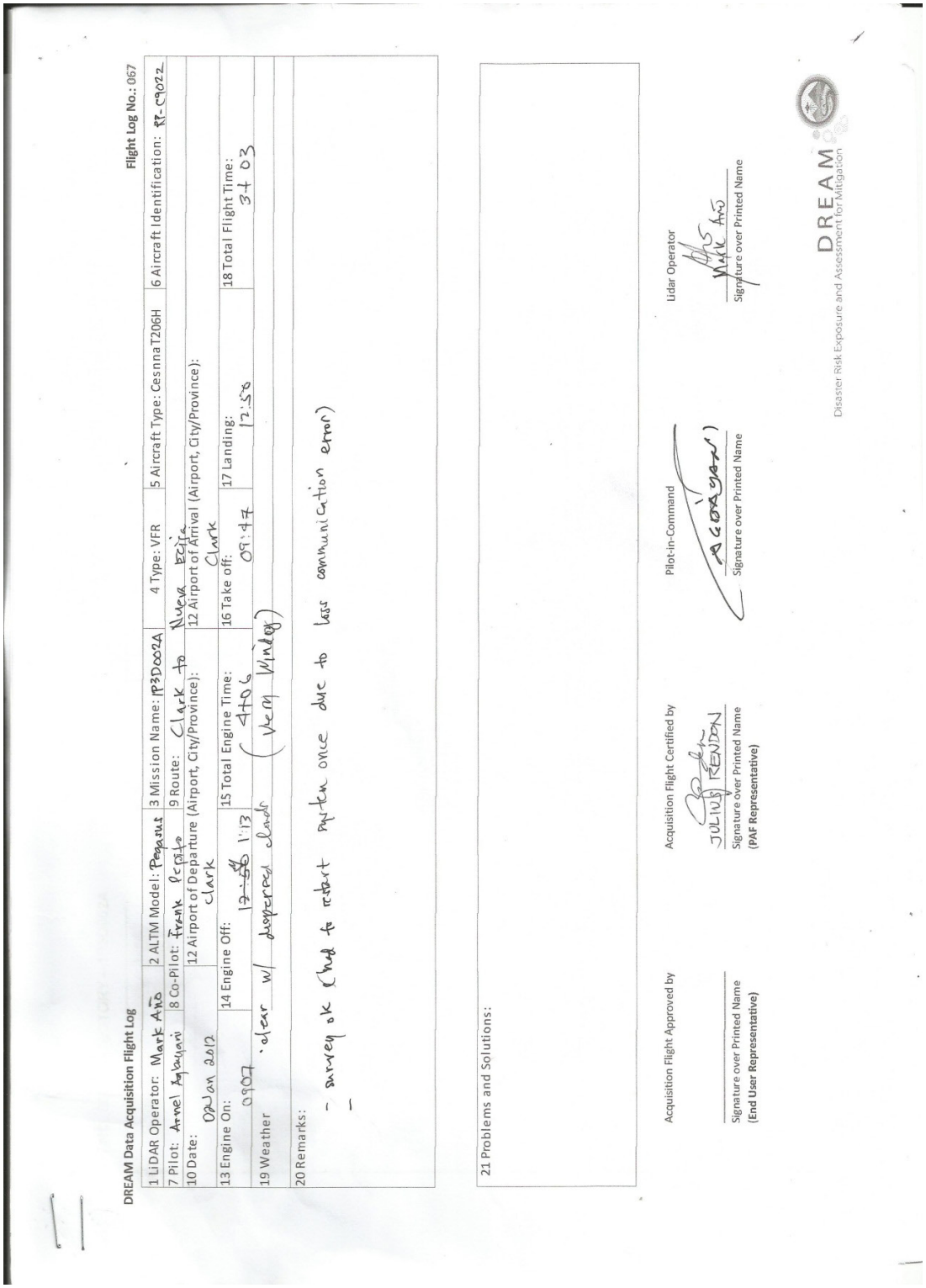
- POS took several restarts to establish connection
- Digitizer Acquisition & Recording Program did not start

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Signature over Printed Name (End User Representative)	JULIUS RENDON Signature over Printed Name (PAF Representative)	Signature over Printed Name	IPO PAM3 Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM3D Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 067

1 LiDAR Operator: Mark Ang	2 ALTM Model: Pegasus	3 Mission Name: P3D0024	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9022
7 Pilot: Arnel Aquiani	8 Co-Pilot: Frank Pelate	9 Route: Clark to Nueva Ecija			
10 Date: 02 Jan 2012	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 0907	14 Engine Off: 12:56 1:13	15 Total Engine Time: 4+06	16 Take off: 09:47	17 Landing: 12:50	18 Total Flight Time: 3+03
19 Weather: clear w/ dispersed clouds (Very Windy)					
20 Remarks: - survey ok (had to restart system once due to lost communication error) -					
21 Problems and Solutions:					

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

JULIUS REYDON

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

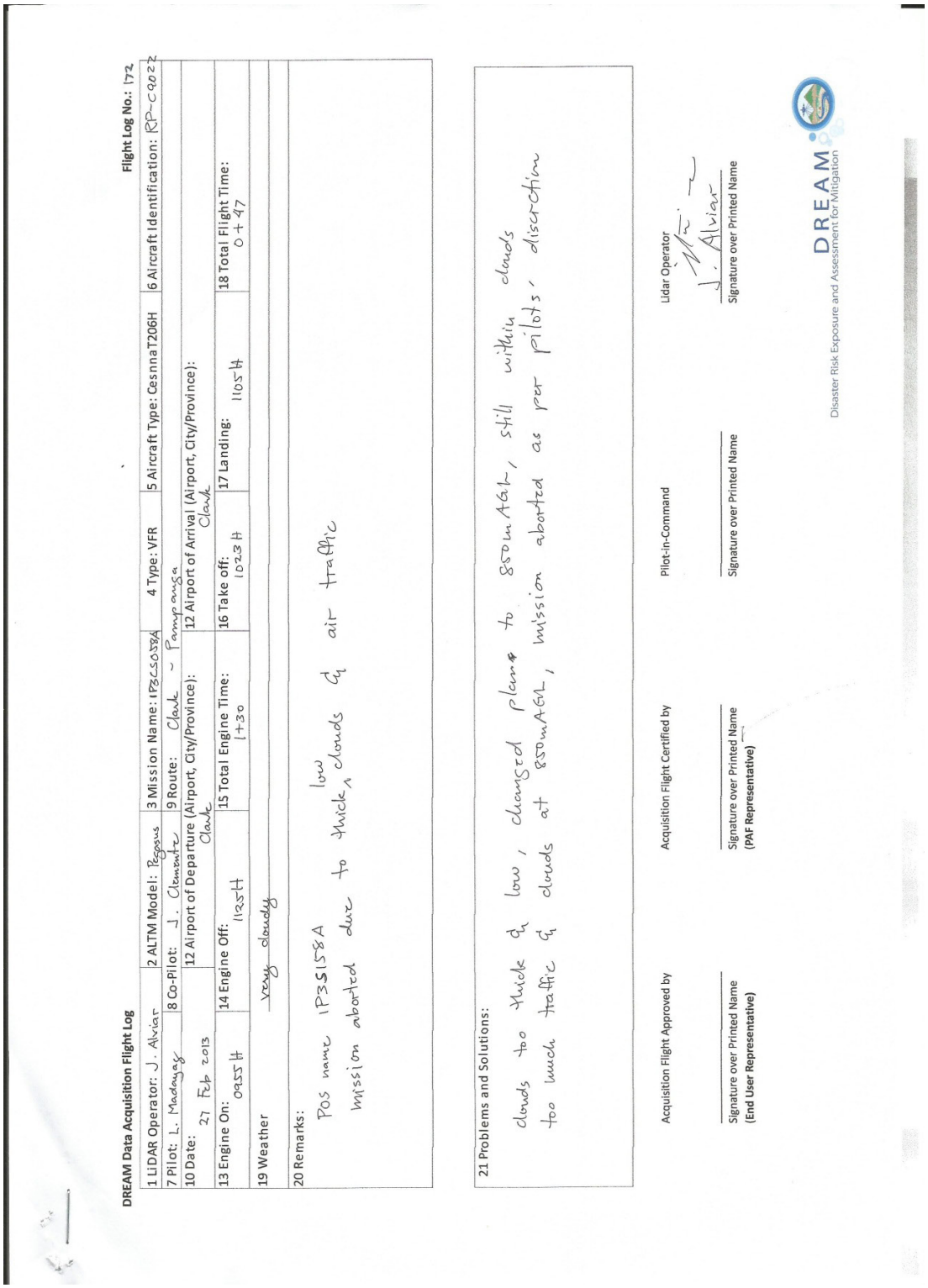
Mark Ang

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM3CS (3D) Mission



DREAM Data Acquisition Flight Log — **Flight Log No.: 172**

1 LiDAR Operator: J. Alviar	2 ALTM Model: Pegasus	3 Mission Name: 17DEC0358A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9022
7 Pilot: L. Madamba	8 Co-Pilot: J. Clemente	9 Route: Clark ~ Pampanga			
10 Date: 27 Feb 2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 0955 H	14 Engine Off: 1235 H	15 Total Engine Time: 1+30	16 Take off: 1023 H	17 Landing: 1105 H	18 Total Flight Time: 0+47
19 Weather: very cloudy					

20 Remarks:

Pos name 1P3S1358A
Mission aborted due to thick low clouds & air traffic

21 Problems and Solutions:

clouds too thick & low, changed plan to 850mAGL, still within clouds
too much traffic & clouds at 850mAGL, mission aborted as per pilots' discretion

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

J. Alviar
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM3E Mission

DREAM Data Acquisition Flight Log

Flight Log No.: 070

1 LiDAR Operator: I RO ROXAS	2 ALTM Model: ~~PEGASUS~~	3 Mission Name: 1P3E04A	4 Type: VFR	5 Aircraft Type: Cesnna T206H	6 Aircraft Identification: RP-C9022
7 Pilot: Capt Han	8 Co-Pilot: ~~CAPT Han~~	9 Route: CIA - NE - CIA			
10 Date: 04 January '13	12 Airport of Departure (Airport, City/Province): CIA		12 Airport of Arrival (Airport, City/Province): CIA		
13 Engine On: 1059H	14 Engine Off: 1456H	15 Total Engine Time: 3h 57m	16 Take off: 1130H	17 Landing: 1431H	18 Total Flight Time: 3h 1m
19 Weather	Slightly Cloudy				

20 Remarks:

- ~~"NO COMM" error~~
- ~~low fuel, unable to continue lines~~

21 Problems and Solutions:

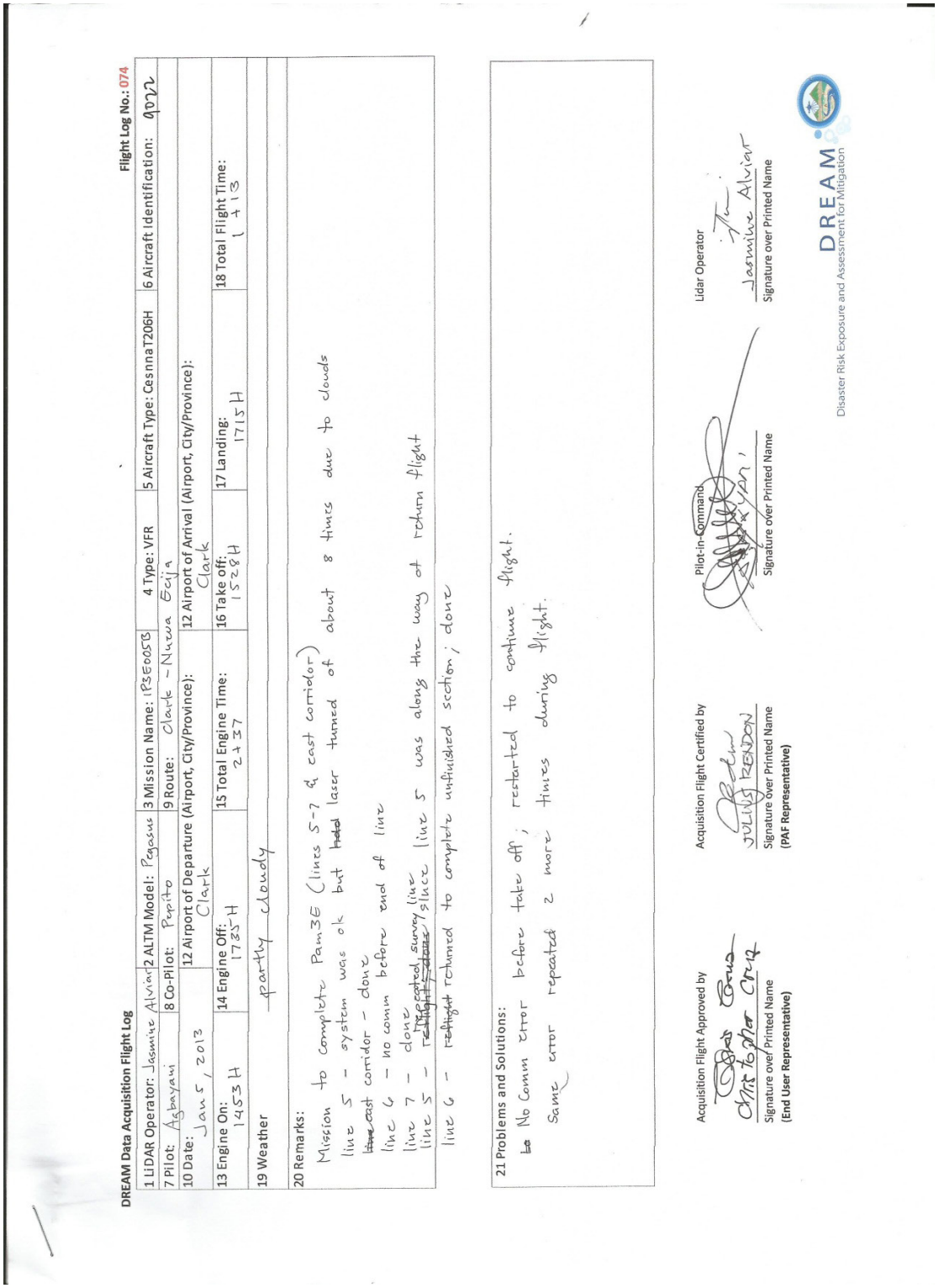
- "NO-COMM" error : restart
- Data gaps because of above error
-

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
	JULIUS RENDON	HARRY C. LERO	I RO ROXAS
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM3E Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 074

1 LiDAR Operator: Jasmine Alviar	2 ALTM Model: Pegasus	3 Mission Name: 123E0058	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RPUZ
7 Pilot: Asbayani	8 Co-Pilot: Papito	9 Route: Clark – Nueva Ecija		
10 Date: Jan 5, 2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark	
13 Engine On: 1453 H	14 Engine Off: 1735 H	15 Total Engine Time: 2+37	16 Take off: 1528 H	17 Landing: 1715 H	18 Total Flight Time: 1+18
19 Weather	partly cloudy			

20 Remarks:

Mission to complete Pam3E (lines S-7 & east corridor)
line 5 - system was ok but ~~hotel~~ laser turned off about 8 times due to clouds
~~line~~ east corridor - done
line 6 - no comm before end of line
line 7 - done
line 5 - ~~re-flight~~ repeated survey line
line 5 - ~~re-flight - done~~ / slick line 5 was along the way of return flight
line 6 - ~~re-flight~~ returned to complete unfinished section; done

21 Problems and Solutions:

~~La~~ No Comm error before take off, restarted to continue flight.
Same error repeated 2 more times during flight.

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
JULIUS REDON
Signature Over Printed Name
(PAF Representative)

Pilot-in-Command
Signature over Printed Name

Lidar Operator
Jasmine Alviar
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for PAM3BS (3F) Mission

DREAM Data Acquisition Flight Log — Flight Log No.: 173

Lidar Operator: LOVELYN ASUNCION	ALTM Model: GEMINI	Type: VFR	Mission Name: 2P3B052B	Aircraft Type: CesnnaT206H
Aircraft Identification: RP-C9120				
Pilot: F. CADENAS	Co-Pilot: A. AGBAYANI	Route: CLARK - NUEVA ECIJA	Airport of Departure: CLARK	Airport of Arrival: CLARK
Date: JANUARY 27, 2013	PRF: 100 kHz	Scan Freq: 50 Hz	1/2 Scan Angle: 20 °	Approx. Swath:
Eyesafe: 0 m				
Set of Hard Drive: A ☐ B ✓	Mission Folder Name:	Camera Mission Folder Name: 2P3B058B		
Weather: GOOD WEATHER	Ground Base Station: (JAEN) (QUEZON NUEVA ECIJA)	Ground Surveyor: GERONE HIPOLITO / JAMES BELTRAN		

LINE #	Speed Kts	Rng/Ht m AGL	GPS Status SVS	GPS Status PDOP	Comments
Primary POS	130	1500 m			
10 - TIE LINE	130	"	9	1.72	
7	"	"	9	1.72	
9	"	"	9	1.72	
8	"	"	9	1.72	
1	"	"	8	2.04	
3	"	"	8	2.16	
5	"	"	8	2.23	
2	"	"	9	1.86	
4	"	"	9	1.96	

Problems and Solutions

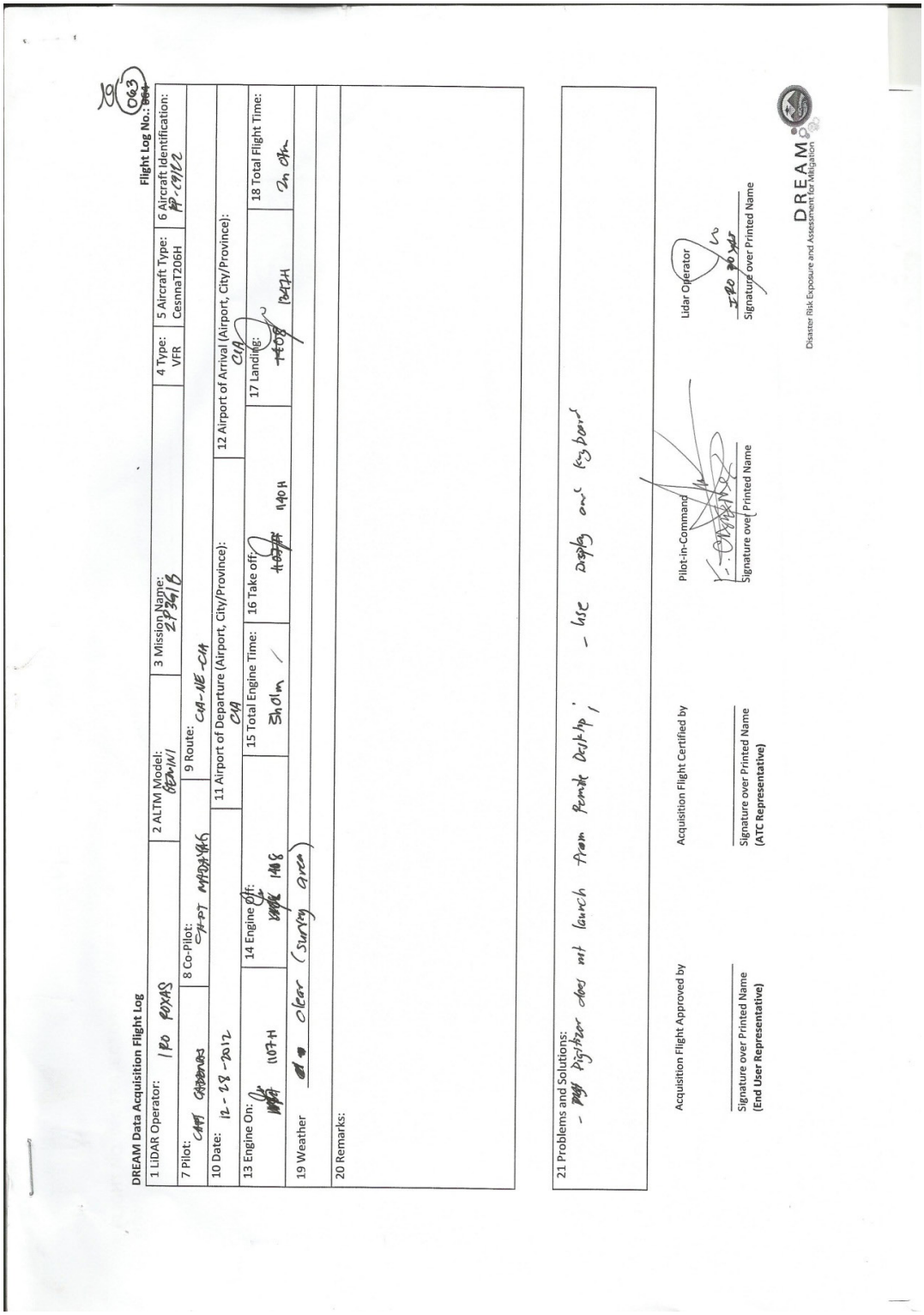
RECEIVED FROM:
NAME: ______
POSITION: ______
SIGNATURE: ______
DATE TRANSFERRED: ______

RECEIVED BY:
NAME: ______
POSITION: ______
SIGNATURE: ______
DATE TRANSFERRED: ______

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM3G1 Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 063

1 LiDAR Operator: IPO FOXAS	2 ALTM Model: GEMINI	3 Mission Name: 21Sept18	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-C9122
7 Pilot: CAPT CABANAS	8 Co-Pilot: FO1 MADAYAG	9 Route: CIA-NE-CIA			
10 Date: 12-18-2012		11 Airport of Departure (Airport, City/Province): CIA		12 Airport of Arrival (Airport, City/Province): CIA	
13 Engine On: 1107H	14 Engine Off: 1148	15 Total Engine Time: 5h01m	16 Take off: 1140H	17 Landing: 1403H	18 Total Flight Time: 2h 03m
19 Weather Clear (Survey area)					
20 Remarks:					

21 Problems and Solutions:
- Night flight does not launch from Remote Desktop
- Use display and keyboard

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(ATC Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

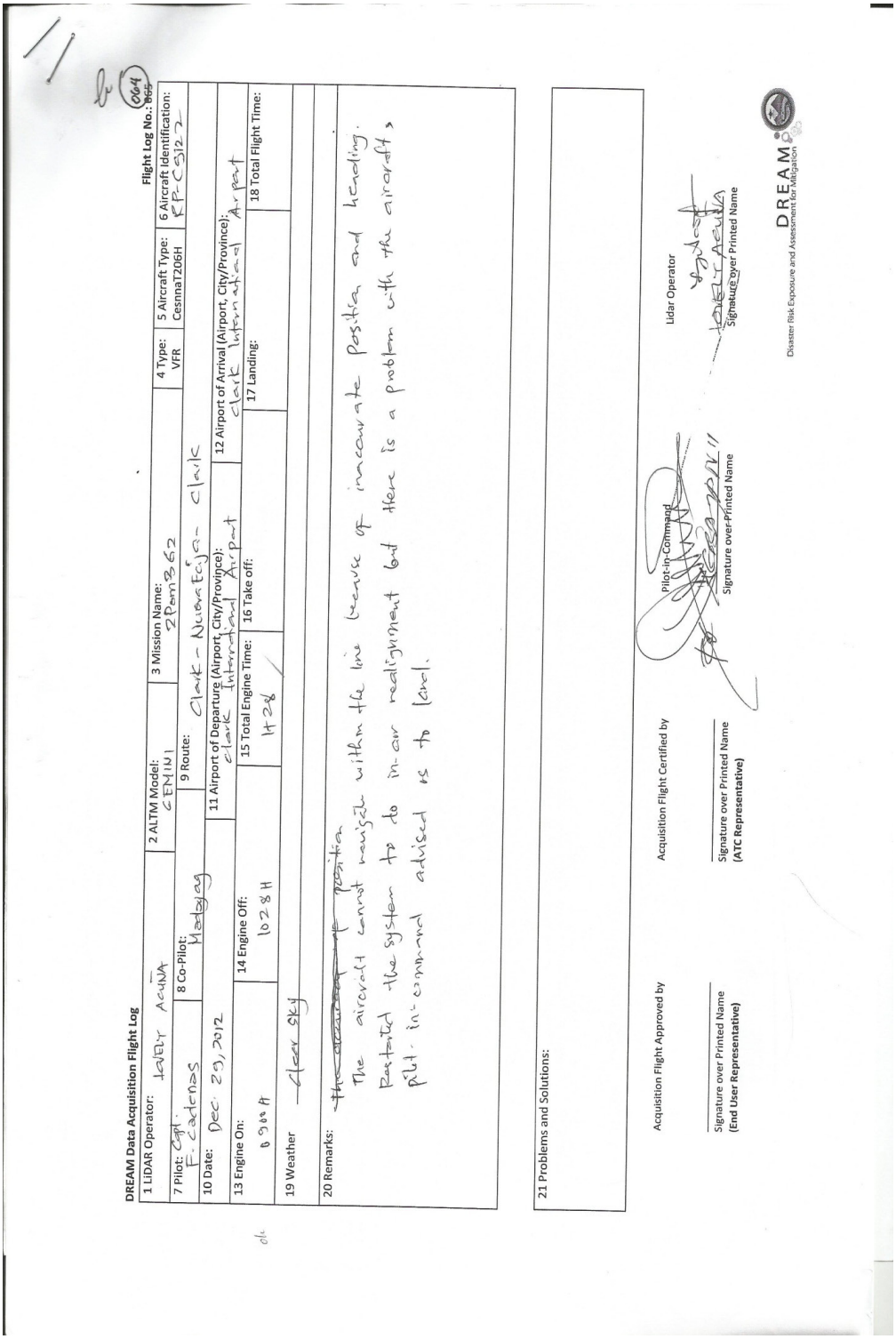
IPO FOXAS

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 2PAM3G2 Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 064

1 LiDAR Operator: Jenly Acuña	2 ALTM Model: GEMINI	3 Mission Name: 2Pam3G2	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-C5122
7 Pilot: Capt. F. Cadenas	8 Co-Pilot: Madayag	9 Route: Clark - Nueva Ecija - Clark			
10 Date: Dec. 29, 2012	11 Airport of Departure (Airport, City/Province): Clark International Airport		12 Airport of Arrival (Airport, City/Province): Clark International Airport		
13 Engine On: 0938 H	14 Engine Off: 1028 H	15 Total Engine Time: 1+28	16 Take off:	17 Landing:	18 Total Flight Time:
19 Weather: Clear Sky					

20 Remarks: ~~The acquisition was positive~~
The aircraft cannot navigate with the line because of inaccurate position and heading.
Restarted the system to do in-air realignment but there is a problem with the aircraft's
Pilot-in-command advised us to land.

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(ATC Representative)

Pilot-in-Command

Signature over Printed Name

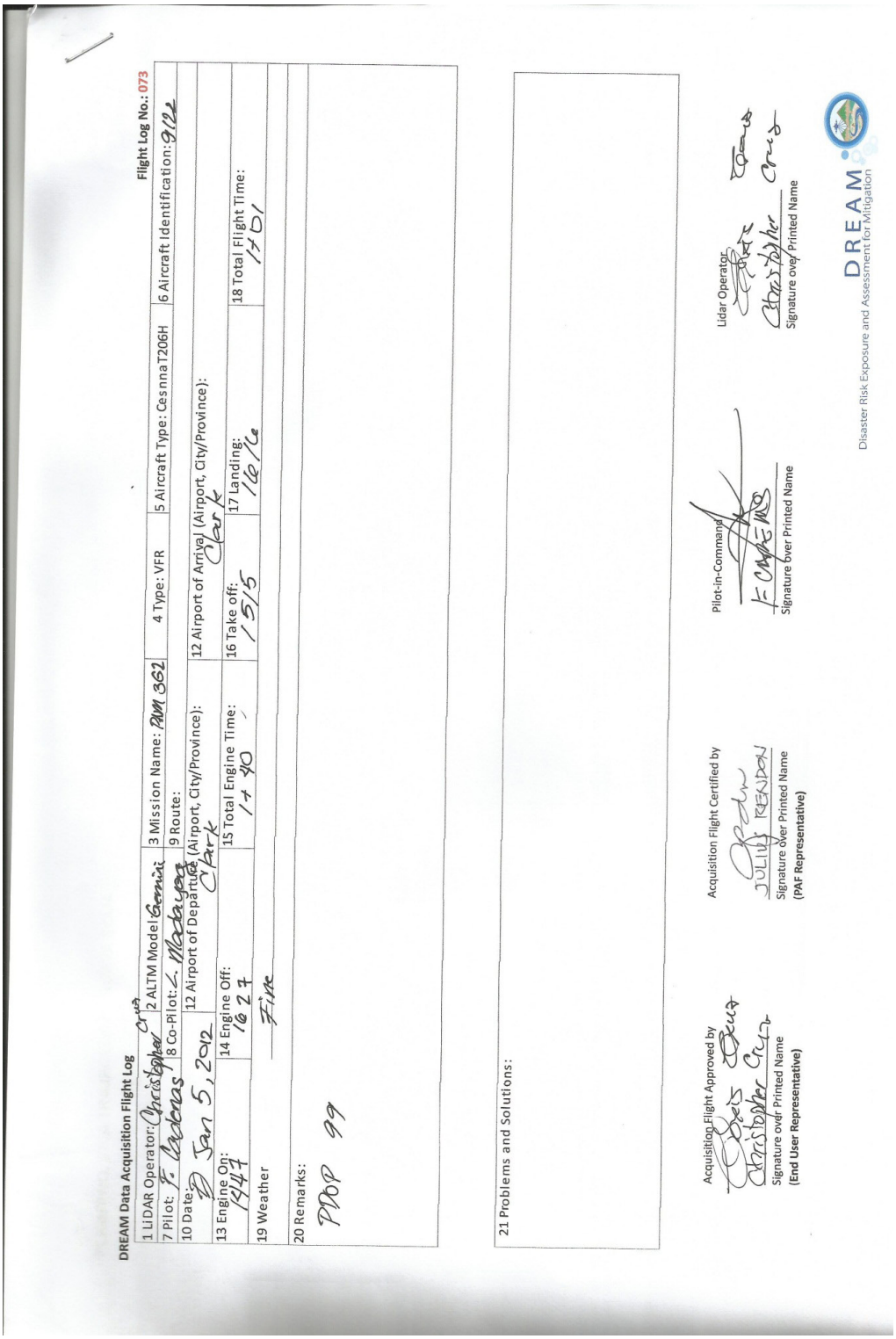
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 1P3G2005B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 073

1 LiDAR Operator: Christopher Cruz	2 ALTM Model: Gemini	3 Mission Name: PAM 362	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: 9122
7 Pilot: F. Cadenas	8 Co-Pilot: L. Montayre	9 Route:			
10 Date: January 5, 2012	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1947	14 Engine Off: 1627	15 Total Engine Time: 1+30	16 Take off: 1515	17 Landing: 1626	18 Total Flight Time: 1+01
19 Weather: Fine					
20 Remarks: PROP 99					
21 Problems and Solutions:					

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(PAF Representative)

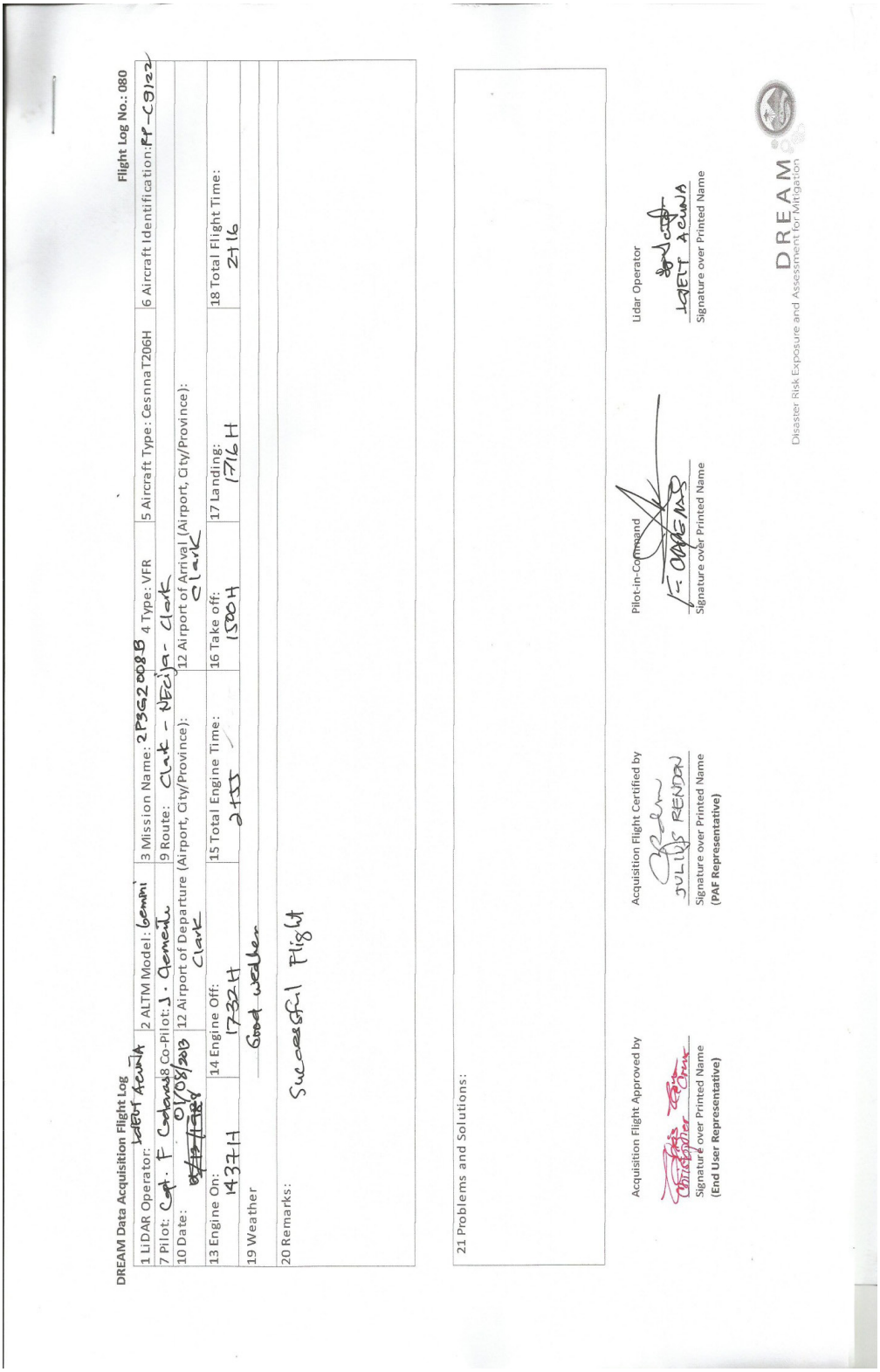
Pilot-in-Command
Signature over Printed Name

Lidar Operator
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 2P3G2008B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 080

1 LiDAR Operator: Ideut Acuña	2 ALTM Model: Gemini	3 Mission Name: 2P3G2008B	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9122
7 Pilot: Capt. F. Cabanas	8 Co-Pilot: J. Gemelu	9 Route: Clark – Nueva Ecija – Clark			
10 Date: 01/08/2013	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1437H	14 Engine Off: 1732H	15 Total Engine Time: 2+55	16 Take off: 1800H	17 Landing: 1716 H	18 Total Flight Time: 2+16
19 Weather: Good weather					
20 Remarks: Successful Flight					

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

JULIUS RENDON

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

IDEUT ACUÑA

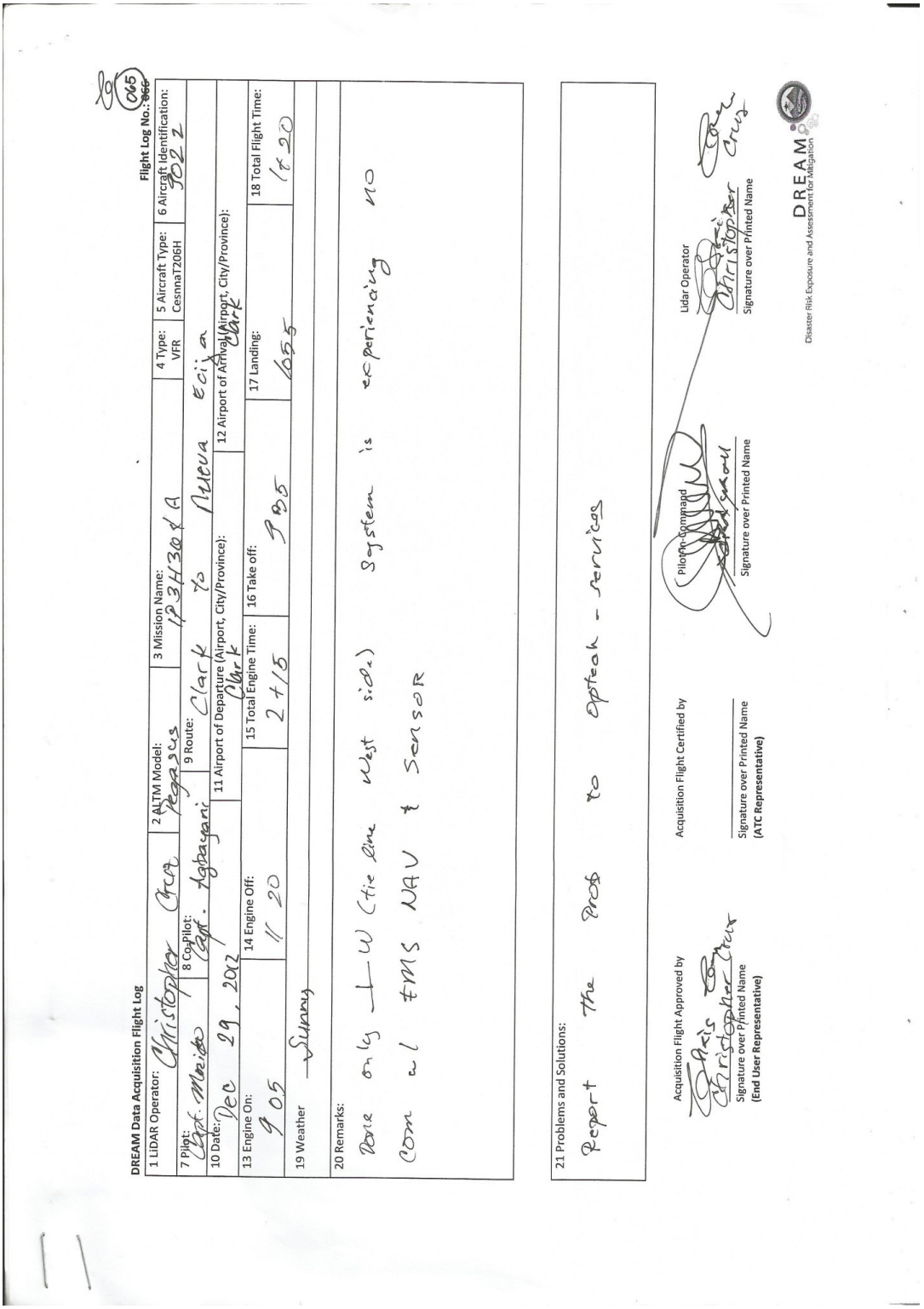
Signature over Printed Name

DREAM

Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 1P3H364A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 066

1 LiDAR Operator: Christopher Cruz	2 ALTM Model: Pegasus	3 Mission Name: 1P3H364A	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: 7022
7 Pilot: Capt. Morales	8 CoPilot: Capt. Agbayani	9 Route: Clark to Nueva Ecija			
10 Date: Dec 29, 202	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 905	14 Engine Off: 1120	15 Total Engine Time: 2+15	16 Take off: 905	17 Landing: 1055	18 Total Flight Time: 1+20
19 Weather Sunny					

20 Remarks:

Data only LWU (the one west side) System is experiencing no communication with GNSS UAV & Sensor

21 Problems and Solutions:

Report the problem to optech - services

Acquisition Flight Approved by

Christopher Cruz

Signature over Printed Name

(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name

(ATC Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

Christopher Cruz

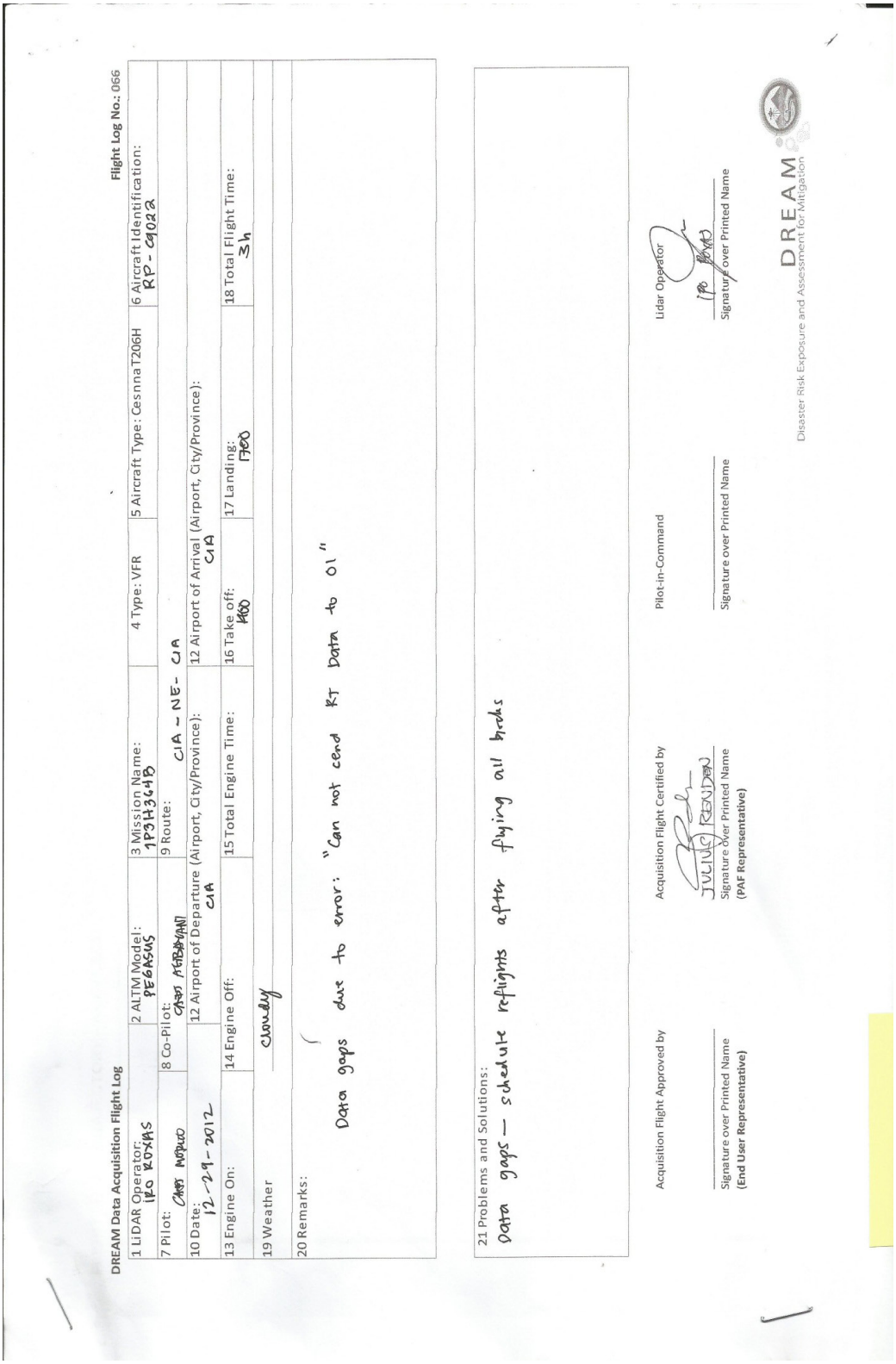
Signature over Printed Name

DREAM

Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1P3H364B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 066

1 LiDAR Operator: IPO ROXAS	2 ALTM Model: PEGASUS	3 Mission Name: 1P3H364B	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C4028
7 Pilot: [illegible]	8 Co-Pilot: [illegible]	9 Route: CIA - NE - CIA			
10 Date: 12-29-2012	12 Airport of Departure (Airport, City/Province): CIA		12 Airport of Arrival (Airport, City/Province): CIA		
13 Engine On:	14 Engine Off:	15 Total Engine Time:	16 Take off: 1400	17 Landing: 1700	18 Total Flight Time: 3h
19 Weather: cloudy					

20 Remarks:

Data gaps due to error: "Can not send KT Data to 01"

21 Problems and Solutions:

Data gaps — schedule reflights after flying all blocks

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

JULIUS RENDAN

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

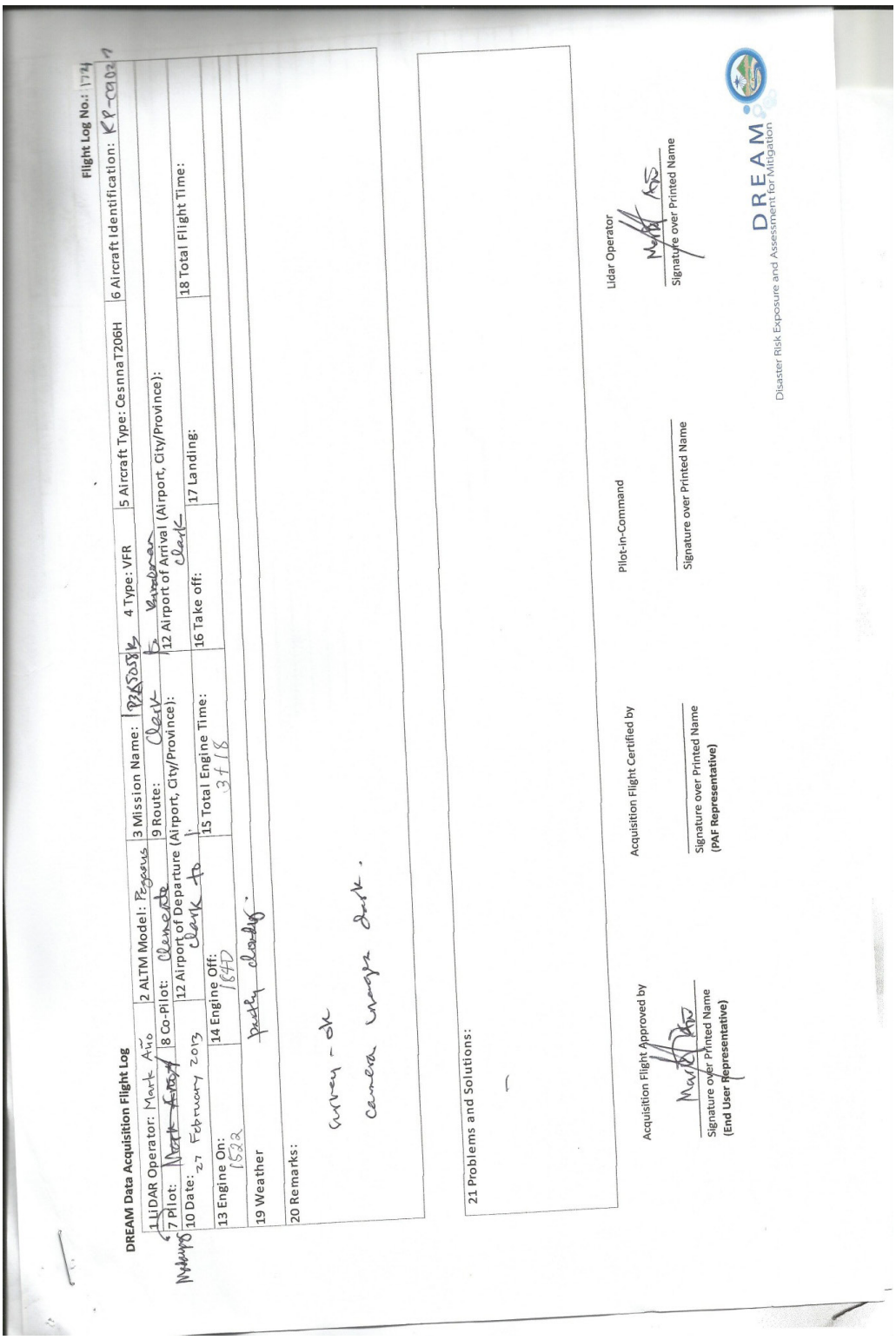
IPO ROXAS

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 1P3AS058B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 1174

1 LiDAR Operator: Mark Alio	2 ALTM Model: Pegasus	3 Mission Name: P3AS058B	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-C8027
7 Pilot: Mark Alio	8 Co-Pilot: Clemente	9 Route: Clark – Vamenes			
10 Date: 27 February 2013	12 Airport of Departure (Airport, City/Province): Clark Fo	12 Airport of Arrival (Airport, City/Province): Clark			
13 Engine On: 1532	14 Engine Off: 1640	15 Total Engine Time: 3+18	16 Take off:	17 Landing:	18 Total Flight Time:
19 Weather: partly cloudy.					

20 Remarks:

Survey - OK
Camera memory dark.

21 Problems and Solutions:

1

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

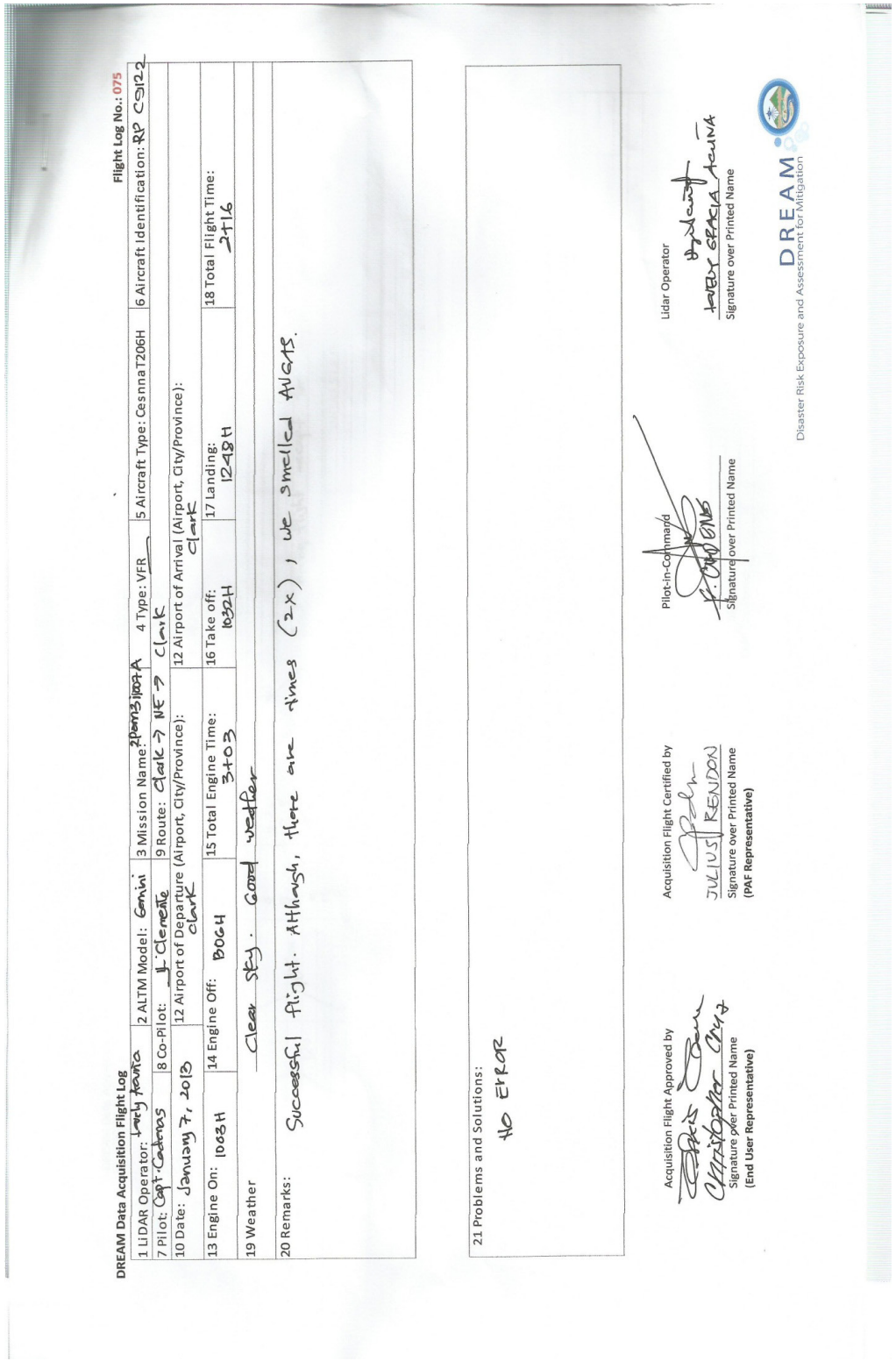
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 2PAM3I1007A Mission



DREAM Data Acquisition Flight Log — Flight Log No.: 075

1 LiDAR Operator: Joely Peña	2 ALTM Model: Gemini	3 Mission Name: 2PAM3I1007A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP C3122
7 Pilot: Capt. Cadenas	8 Co-Pilot: J. Clemente	9 Route: Clark → NE → Clark			
10 Date: January 7, 2015	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1063 H	14 Engine Off: 0064	15 Total Engine Time: 3+03	16 Take off: 1032H	17 Landing: 1248H	18 Total Flight Time: 2+16
19 Weather: Clear sky. Good weather					
20 Remarks: Successful flight. Although, there are rimes (2-x), we smelled AVGAS.					

21 Problems and Solutions:
No ERROR

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
JULIUS L. RENDON
Signature over Printed Name
(PAF Representative)

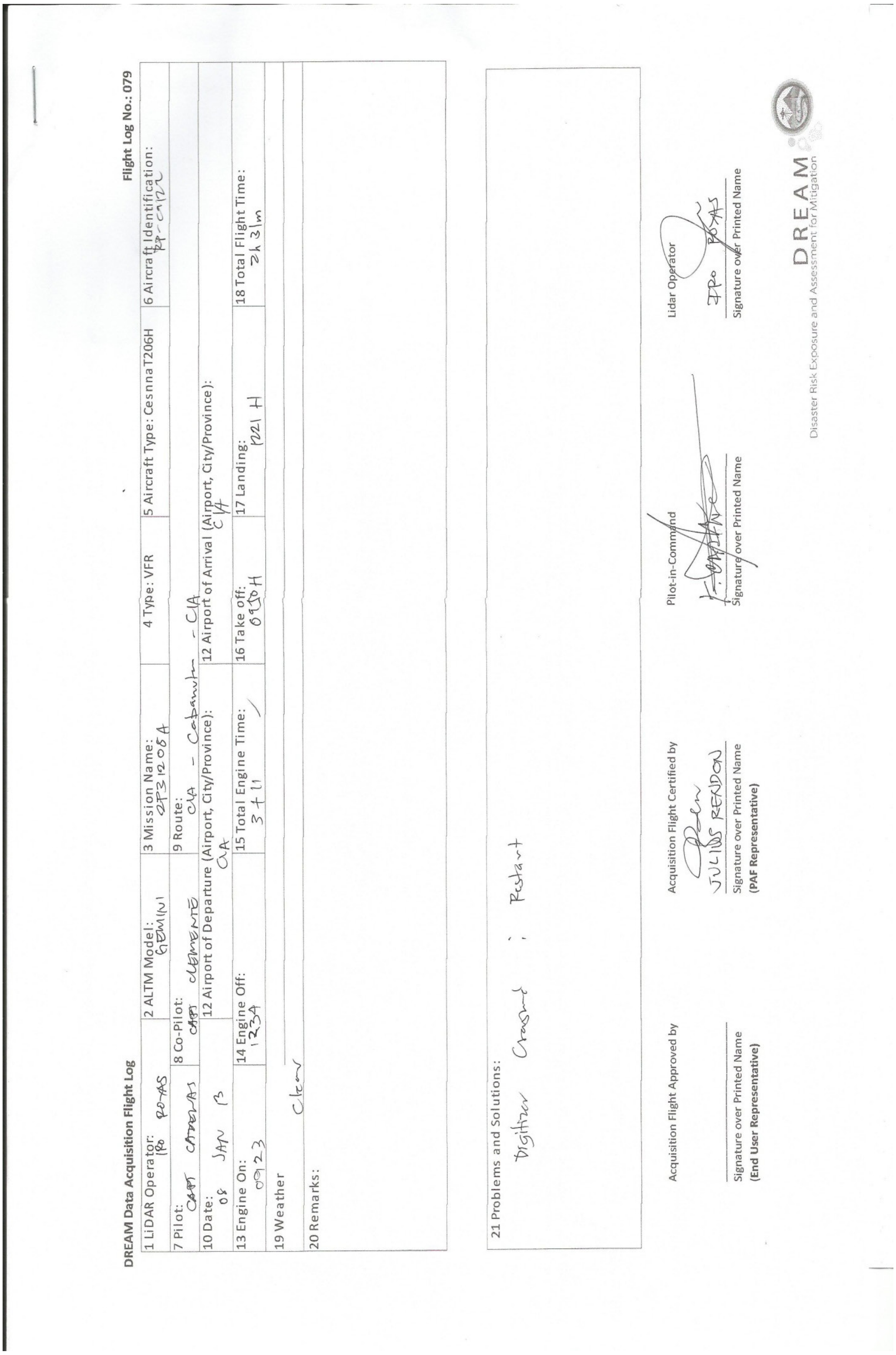
Pilot-in-Command
Signature over Printed Name

Lidar Operator
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 2P3I2008A Mission



DREAM Data Acquisition Flight Log — **Flight Log No.: 079**

1 LiDAR Operator: IRo ROXAS	2 ALTM Model: GEMINI	3 Mission Name: 2P3I2008A	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9122
7 Pilot: CAPT CATRELAS	8 Co-Pilot: CAPT CLEMENTE	9 Route: CIA - Cabanatuan - CIA			
10 Date: 08 JAN 13	12 Airport of Departure (Airport, City/Province): CIA		12 Airport of Arrival (Airport, City/Province): CIA		
13 Engine On: 0923	14 Engine Off: 1234	15 Total Engine Time: 3+11	16 Take off: 0950H	17 Landing: 1221 H	18 Total Flight Time: 2h 31m
19 Weather: Clear					
20 Remarks:					

21 Problems and Solutions: Digitizer Crashed ; Restart

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
	JULIUS RENDON	F. CATRELAS	IRO ROXAS
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1P3J007A Mission

DREAM Data Acquisition Flight Log — **Flight Log No.: 076**

1 LiDAR Operator: Jasmine Alviar	2 ALTM Model: Pegasus	3 Mission Name: 1P3J007A	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-9022
7 Pilot: Agbayani	8 Co-Pilot: Dela Cruz	9 Route: Clark - Nueva Ecija			
10 Date: 7 Jan 13	12 Airport of Departure (Airport, City/Province): clark		12 Airport of Arrival (Airport, City/Province): clark		
13 Engine On: 1025 H	14 Engine Off: 1210 H	15 Total Engine Time: 3+45	16 Take off: 1100 H	17 Landing: 1400 H	18 Total Flight Time: 3
19 Weather	cloudy				

20 Remarks:

west corridor - done but with gaps due to clouds
line 7 - done
line 6 - done (no swath)
line 5 - done
line 4 - done
line 3 - done
line 2 - done
line 1 - done
east corridor - done

21 Problems and Solutions:

No comm before take off, restarted and continued mission.

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Signature over Printed Name (End User Representative)	JULIUS RENDON Signature over Printed Name (PAF Representative)	Signature over Printed Name	Jasmine Alviar Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Flight Log for 1P3K008A Mission

DREAM Data Acquisition Flight Log

Flight Log No.: 078

1 LiDAR Operator: Mark Año	2 ALTM Model: Pegasus	3 Mission Name: 1P3K008A	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9022
7 Pilot: Arnel Azbayani	8 Co-Pilot: Ernesto dela Cruz	9 Route: Clark to Nueva Ecija			
10 Date: 08Jan2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 9:35	14 Engine Off: 1336H	15 Total Engine Time: 4+01	16 Take off: 1020	17 Landing: 1304	18 Total Flight Time: 2+44
19 Weather	partly cloudy				

20 Remarks:

survey - ok

21 Problems and Solutions:

FMS-Nav - no communication error. ; restart

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
	JULIUS RENDON	[signature]	Mark Año
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 2P7A1043A Mission

Operator: IRO ROXAS	2 ALTM Model: Gem	3 Mission Name: 2Pam7A1	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9124
Capt. F. Cadenas	8 Co-Pilot: Capt. L. Madayag	9 Route: Clark to Clark			
02/12/2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
e On: 0004	14 Engine Off: 1305H	15 Total Engine Time: 3+05	16 Take off: 1020H	17 Landing: 1250H	18 Total Flight Time: 3+30
ner	Cloudy low base clouds (< 1000m)				
rks:	possible data gaps because of low base clouds (eyesafety ~~shutdown~~ laser off)				

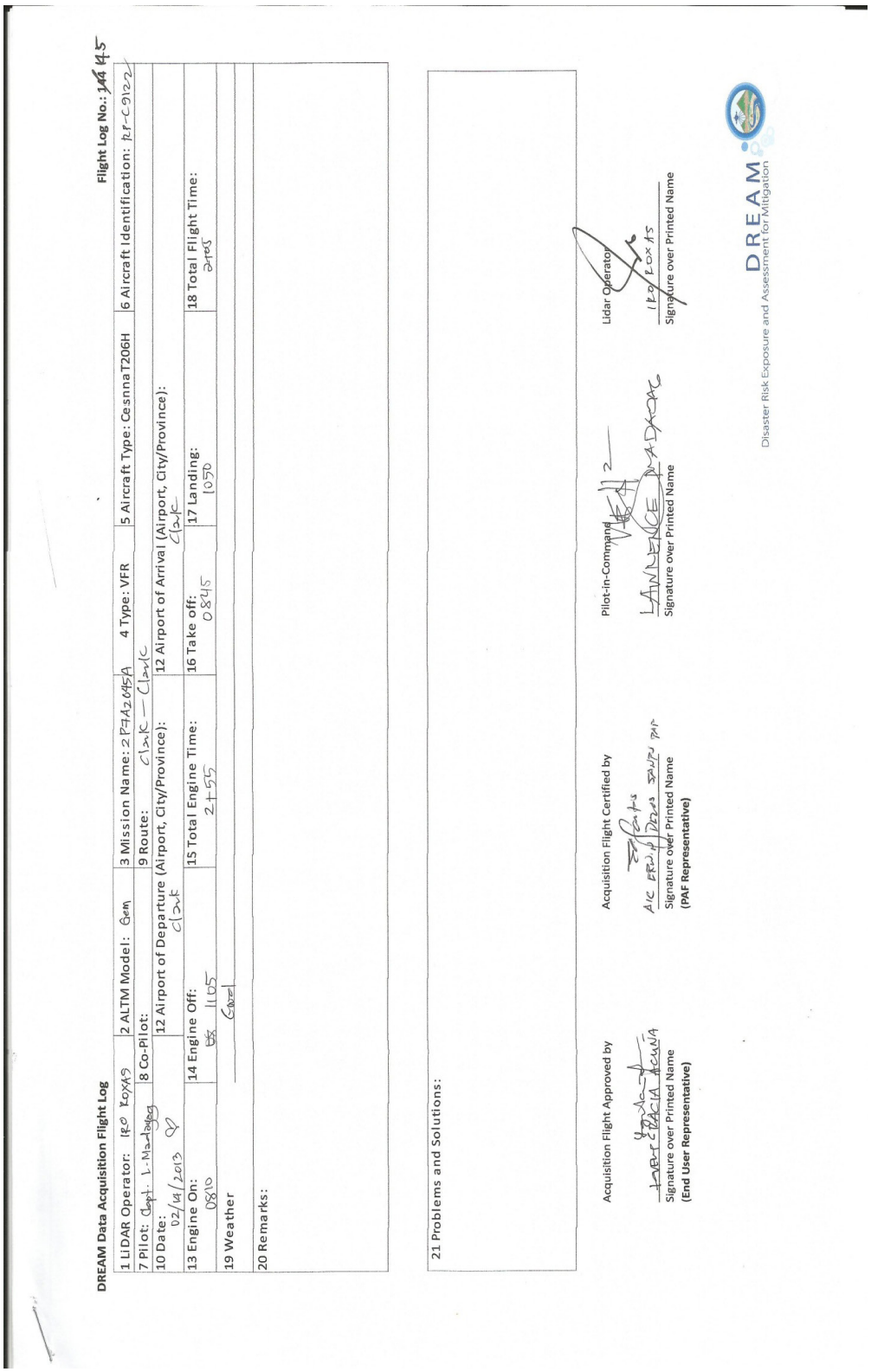
lems and Solutions:

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Christopher Cruz	AIC ERWIN B DELOS SANTOS PAF	FOR F. CADENAS	IRO ROXAS
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 2P7A2045A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 144 45

1 LiDAR Operator: RP Roxas	2 ALTM Model: Gem	3 Mission Name: 2P7A2045A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9122
7 Pilot: Capt. L. Madayag	8 Co-Pilot:	9 Route: Clark — Clark			
10 Date: 02/14/2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 0810	14 Engine Off: 1105	15 Total Engine Time: 2+55	16 Take off: 0845	17 Landing: 1050	18 Total Flight Time: 2+05
19 Weather: Good					
20 Remarks:					

21 Problems and Solutions:

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(PAF Representative)

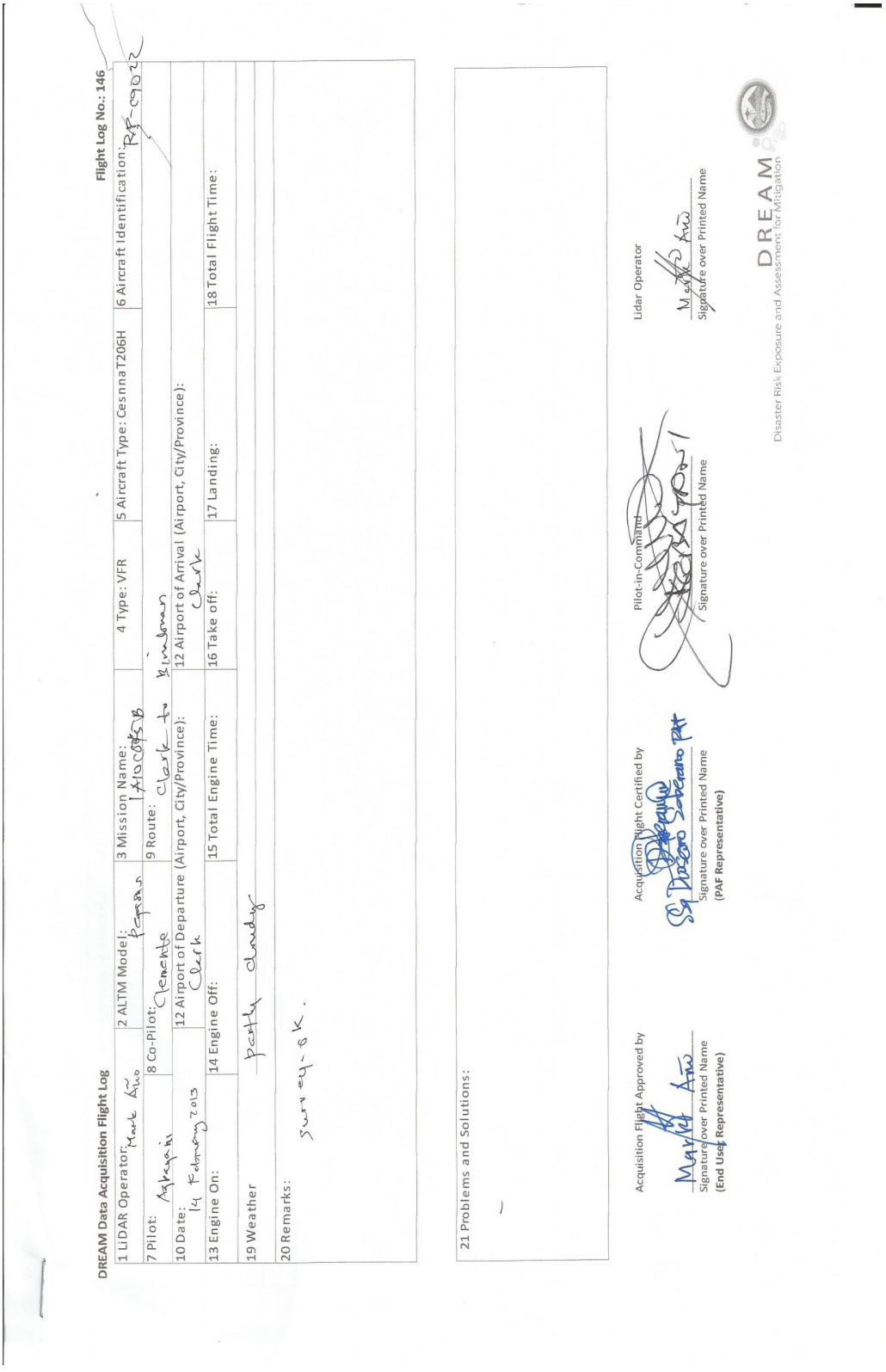
Pilot-in-Command
LAWRENCE P. MADRIAGA
Signature over Printed Name

Lidar Operator
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 2P7B1045B2 Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 146

1 LiDAR Operator: Mark Anthony Ao	2 ALTM Model: Pegasus	3 Mission Name: TACLOBAN2B	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9012
7 Pilot: Ayala	8 Co-Pilot: Clemente	9 Route: Clark to Kalibo		
10 Date: 14 February 2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark	
13 Engine On:	14 Engine Off:	15 Total Engine Time:	16 Take off:	17 Landing:	18 Total Flight Time:
19 Weather	partly cloudy				
20 Remarks:	sunny ok.				

21 Problems and Solutions:

-

Acquisition Flight Approved by

Signature over Printed Name

(End User Representative)

Acquisition Flight Certified by

Sgt Dizon Soriano PAF

Signature over Printed Name

(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

Mark Ao

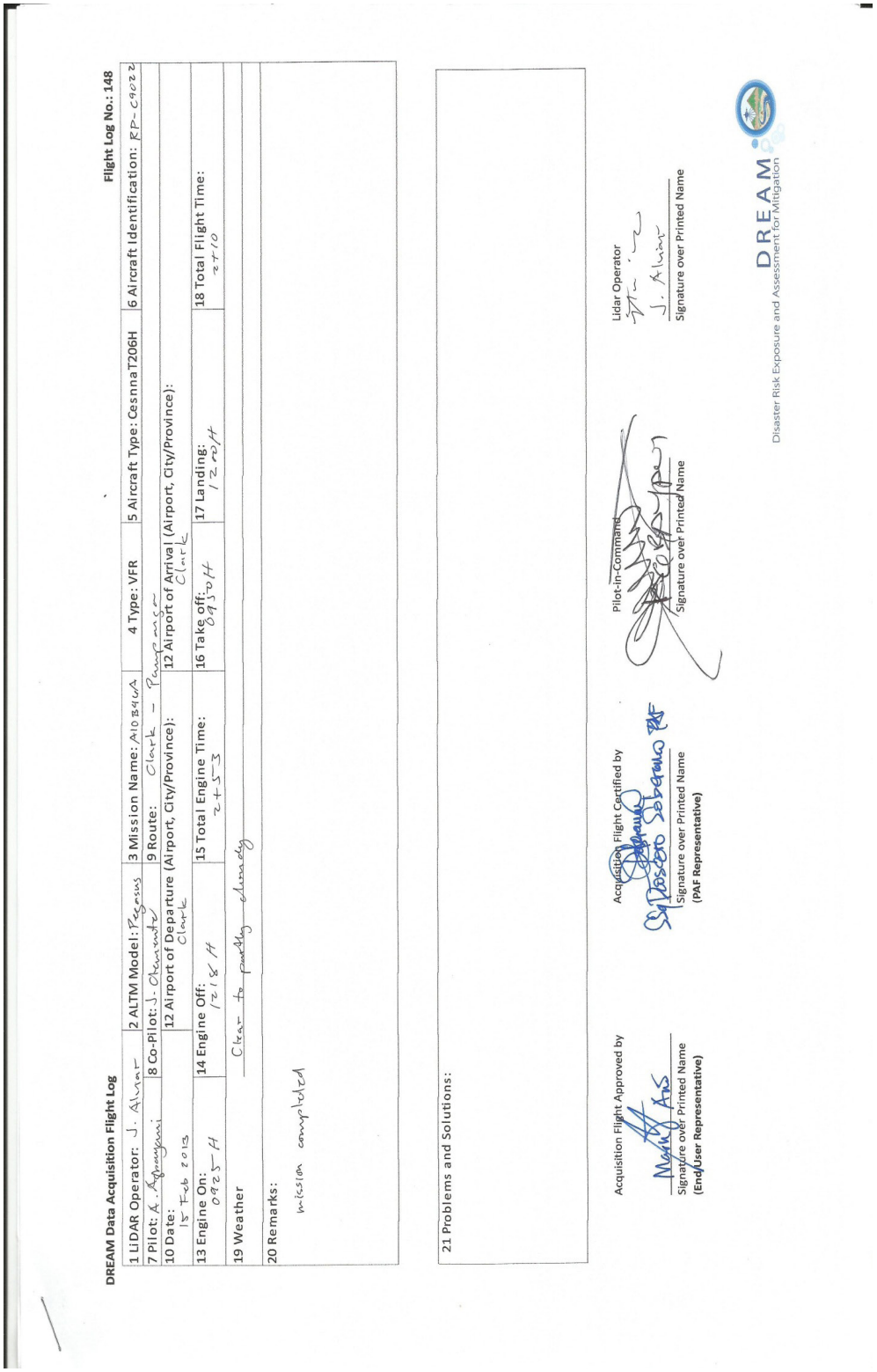
Signature over Printed Name

DREAM

Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 2PAM7B2046A Mission



DREAM Data Acquisition Flight Log — **Flight Log No.: 148**

1 LIDAR Operator: J. Alvarez	2 ALTM Model: Pegasus	3 Mission Name: A10B46A	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-C9022
7 Pilot: A. Aguenzoni	8 Co-Pilot: J. Alvarez	9 Route: Clark – Pampanga		
10 Date: 15 Feb 2013	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark	
13 Engine On: 0925-H	14 Engine Off: 1218 H	15 Total Engine Time: 2+53	16 Take off: 0930 H	17 Landing: 1209H	18 Total Flight Time: 2+10
19 Weather: Clear to partly cloudy					
20 Remarks: Mission completed					
21 Problems and Solutions:					

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(PAF Representative)

Pilot-in-Command
Signature over Printed Name

Lidar Operator
J. Alvarez
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1P7CO44A Mission

DREAM Data Acquisition Flight Log — **Flight Log No.: 143**

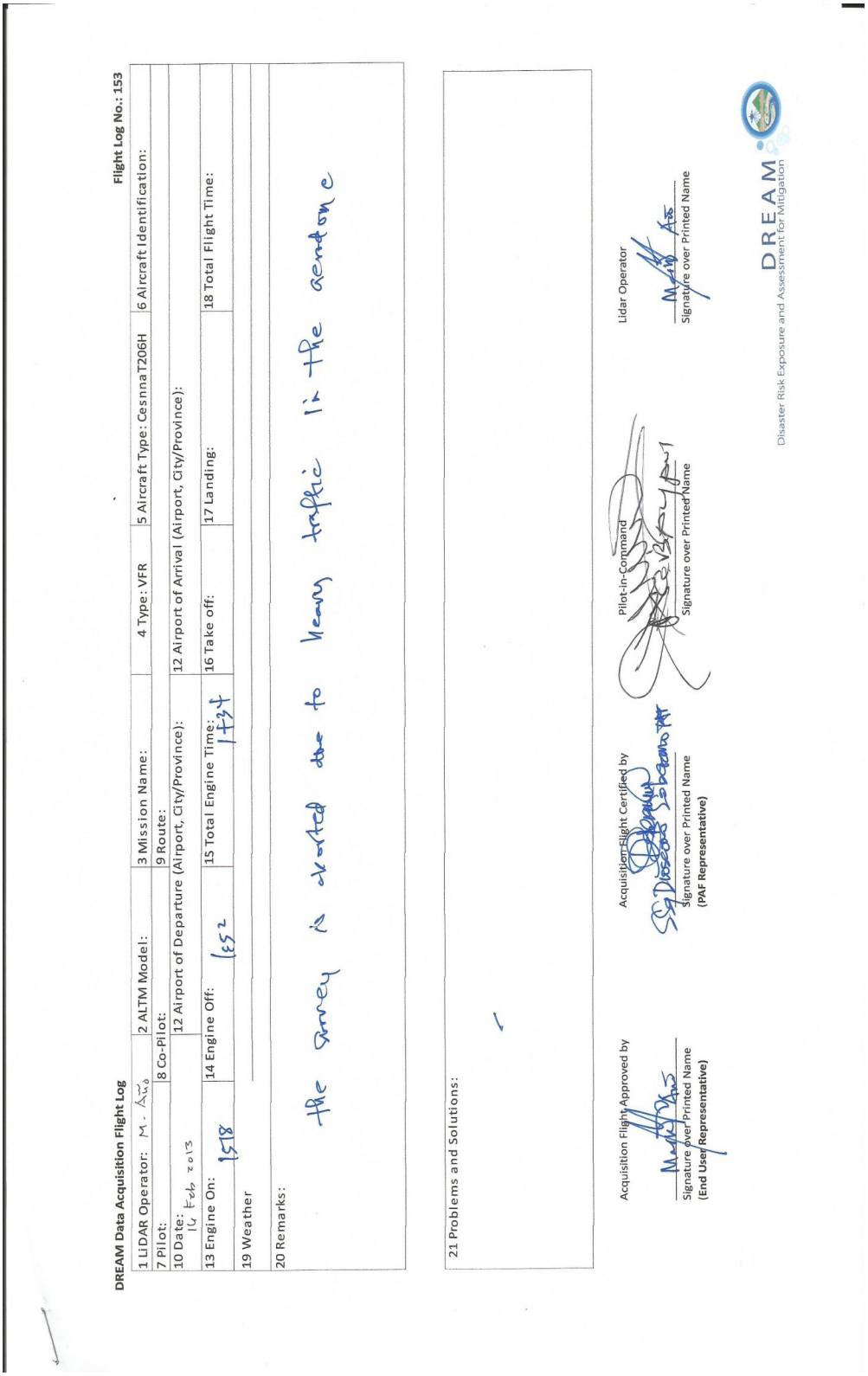
1 LiDAR Operator: J. Alviar	2 ALTM Model: Pegasus	3 Mission Name: 1P7C044A	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9022
7 Pilot: A. Agbayani	8 Co-Pilot: J. Ocampo	9 Route: Clark – Pampanga – Clark			
10 Date: 13 February 2013	12 Airport of Departure (Airport, City/Province): Clark	12 Airport of Arrival (Airport, City/Province): Clark			
13 Engine On: 0930H	14 Engine Off: 1150H	15 Total Engine Time: 2+20	16 Take off:	17 Landing:	18 Total Flight Time: 1+35
19 Weather	partly cloudy				
20 Remarks: done 5/10 lines, aborted due to too much traffic → lines 4, 1, 7, 2, 8 completed.					
21 Problems and Solutions:					

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Signature over Printed Name (End User Representative)	Sqg Rascon Sobrevinas PAF — Signature over Printed Name (PAF Representative)	Signature over Printed Name	J. Alviar — Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 1P7C047B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 153

1 LiDAR Operator: M. Aco	2 ALTM Model:	3 Mission Name:	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification:
7 Pilot:	8 Co-Pilot:	9 Route:			
10 Date: 10 Feb 2013	12 Airport of Departure (Airport, City/Province):		12 Airport of Arrival (Airport, City/Province):		
13 Engine On: 1518	14 Engine Off: 1652	15 Total Engine Time: 1h34	16 Take off:	17 Landing:	18 Total Flight Time:
19 Weather					

20 Remarks:

the survey is started due to heavy traffic in the area

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

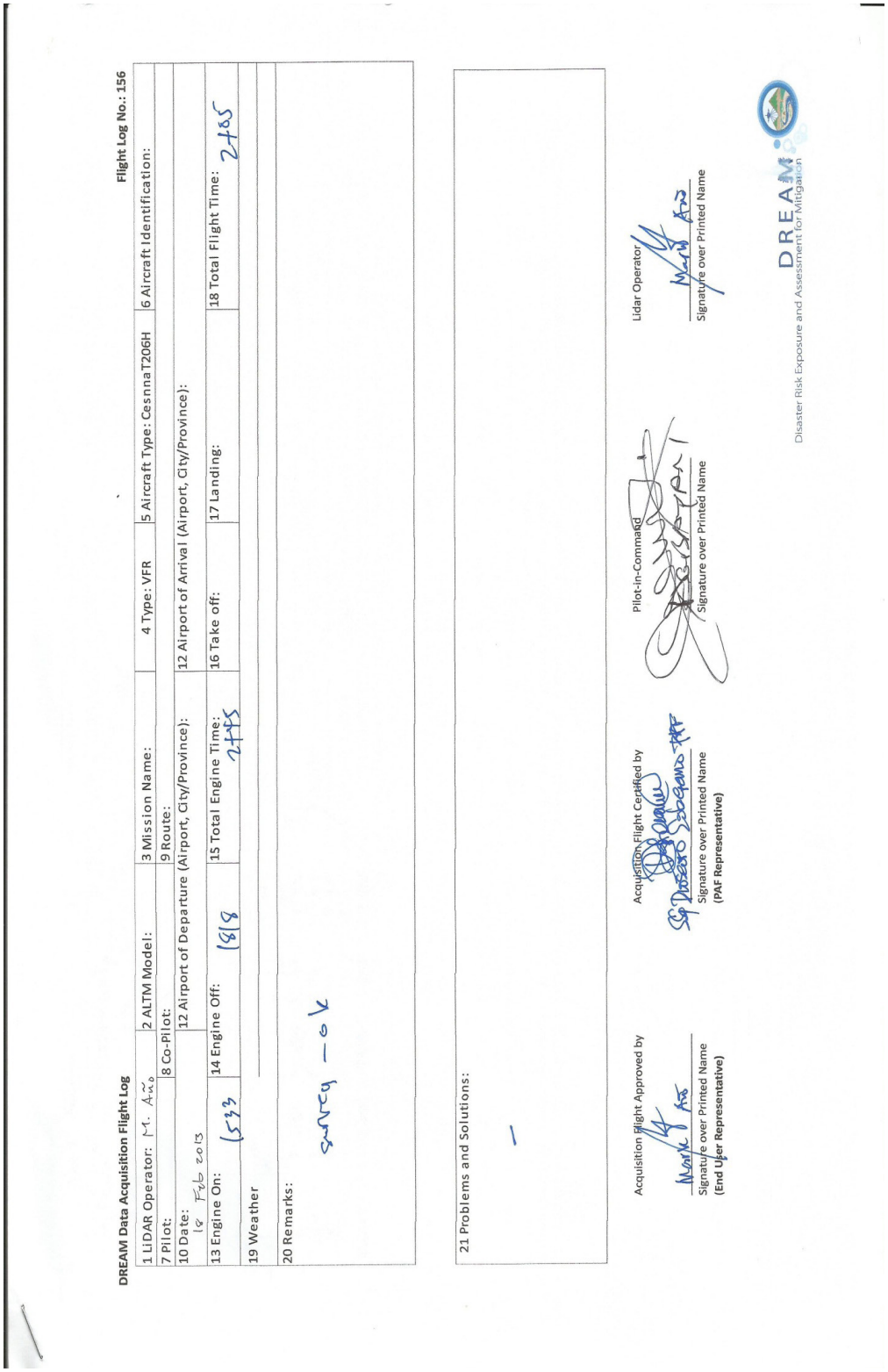
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1P7C049B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 156

1 LiDAR Operator: M. Aco	2 ALTM Model:	3 Mission Name:	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification:
7 Pilot:	8 Co-Pilot:	9 Route:			
10 Date: 19 Feb 2013	12 Airport of Departure (Airport, City/Province):		12 Airport of Arrival (Airport, City/Province):		
13 Engine On: 1539	14 Engine Off: 1818	15 Total Engine Time: 2485	16 Take off:	17 Landing:	18 Total Flight Time: 2485
19 Weather					
20 Remarks: survey - ok					
21 Problems and Solutions: -					

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(PAF Representative)

Pilot-in-Command
Signature over Printed Name

Lidar Operator
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for PAM7D Mission

DREAM Data Acquisition Flight Log — **Flight Log No.: 081**

1 LiDAR Operator: Christopher Cruz	2 ALTM Model: Peg	3 Mission Name: PAM7D	4 Type: VFR	5 Aircraft Type: Cesnna T206H	6 Aircraft Identification: 7022
7 Pilot: Capt. Lagayan	8 Co-Pilot: Capt Graieus	9 Route: Clark – Subic – Clark			
10 Date:	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1455	14 Engine Off: 1742	15 Total Engine Time: 3+07 ~~+13~~	16 Take off: 1525	17 Landing: 1942	18 Total Flight Time:
19 Weather: Fine					

20 Remarks:

Done Tie line west side.

½ 5/8 lines.

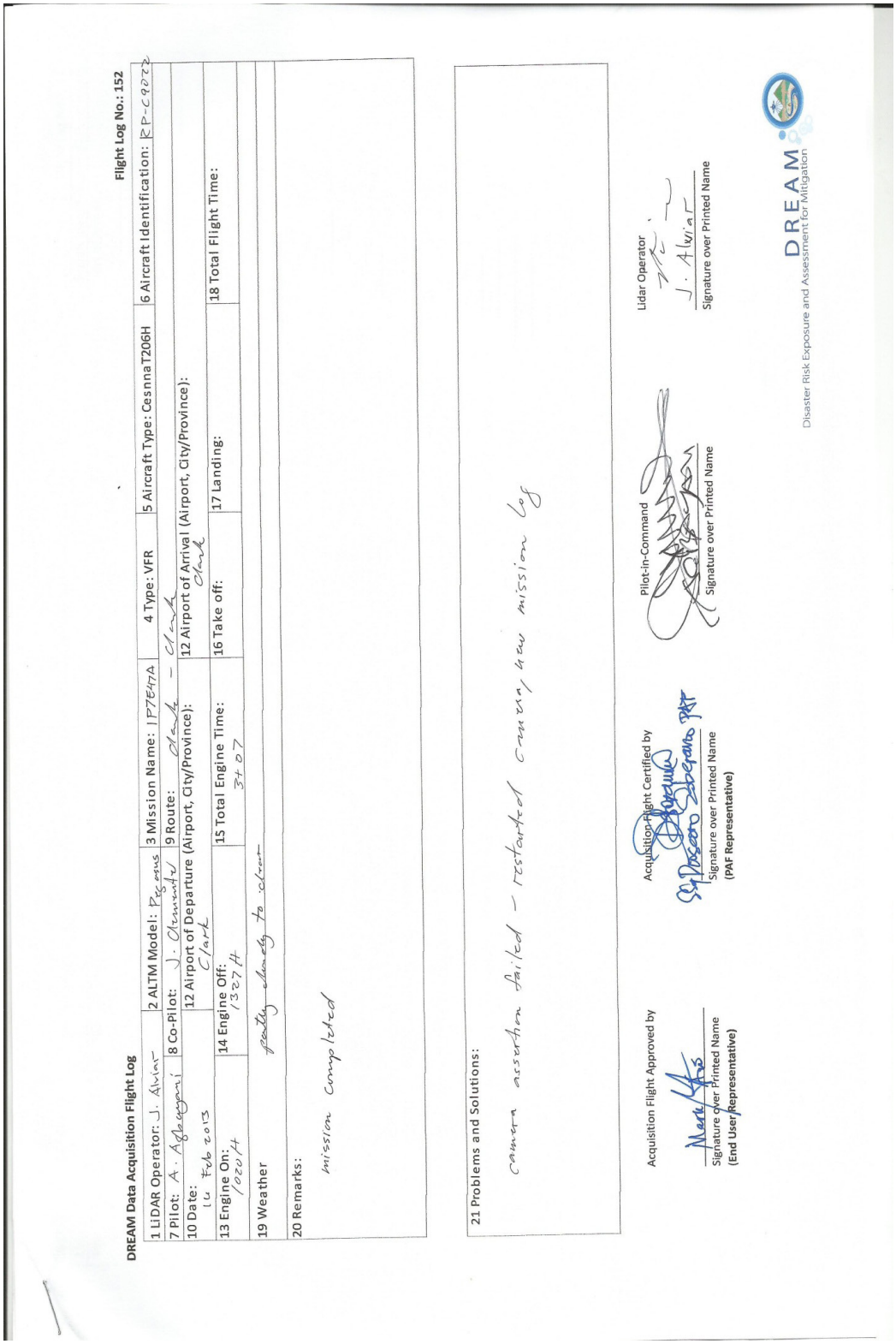
line 1, 2, 3, 4, 5, finish line

21 Problems and Solutions:

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Christopher Cruz	JULIUS RENDON		Christopher Cruz
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Flight Log for 1P7E047A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 152

1 LiDAR Operator: J. Alviar	2 ALTM Model: Pegasus	3 Mission Name: 1P7E047A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9222
7 Pilot: A. Aglugani	8 Co-Pilot: J. Ocampo	9 Route: Clark – Clark			
10 Date: 14 Feb 2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1020H	14 Engine Off: 1327H	15 Total Engine Time: 3+07	16 Take off:	17 Landing:	18 Total Flight Time:
19 Weather	partly cloudy to clear				

20 Remarks:

mission completed

21 Problems and Solutions:

camera assertion failed – restarted camera & new mission log

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Lidar Operator

J. Alviar

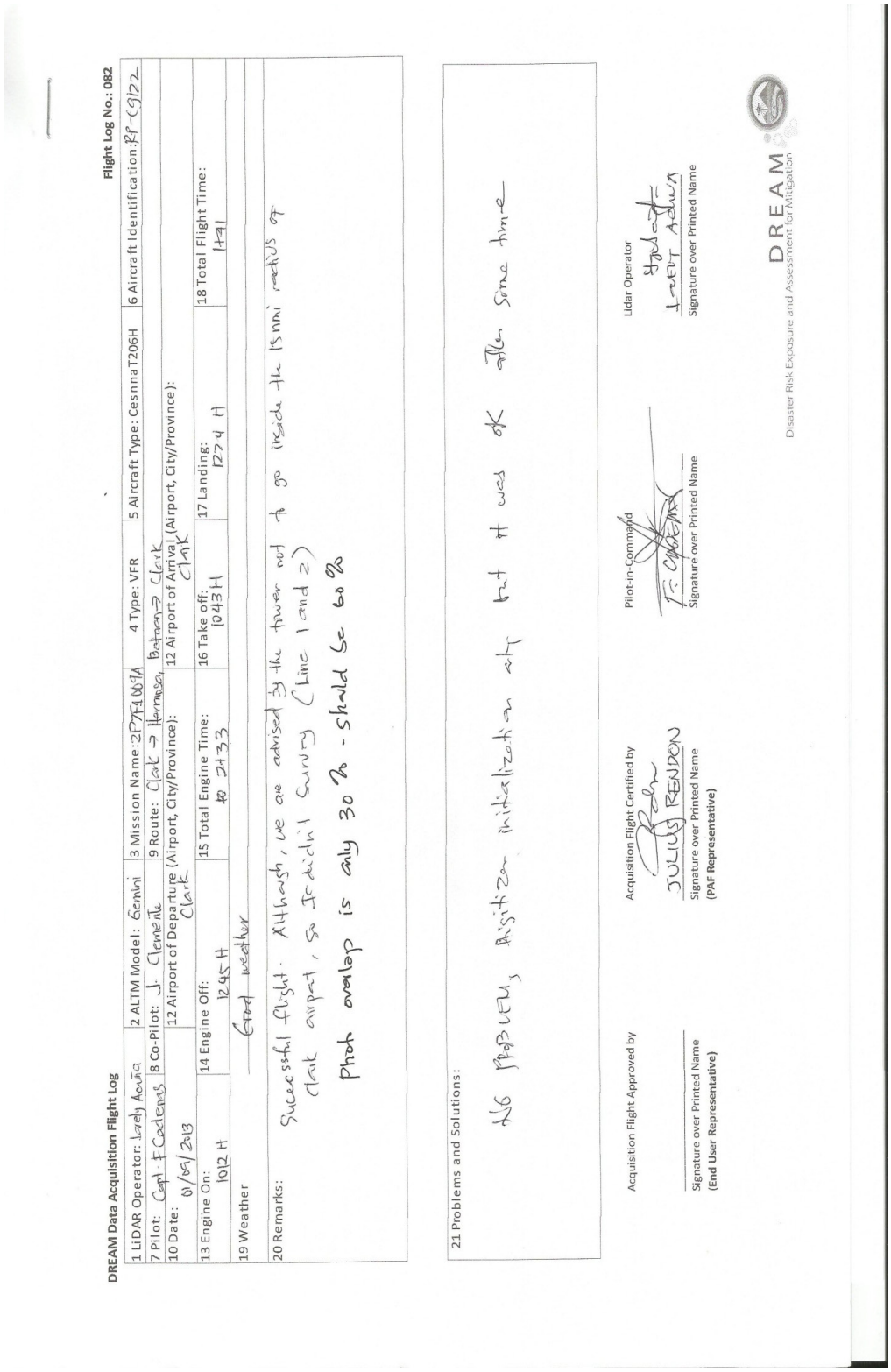
Signature over Printed Name

DREAM

Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 2P7F1009A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 082

1 LiDAR Operator: Lady Acuña	2 ALTM Model: Gemini	3 Mission Name: 2P7F1009A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9122
7 Pilot: Capt. F Cadenas	8 Co-Pilot: J. Clemente	9 Route: Clark → Hermosa, Batanes → Clark			
10 Date: 01/09/2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1012 H	14 Engine Off: 1245 H	15 Total Engine Time: 2.33	16 Take off: 1043 H	17 Landing: 1224 H	18 Total Flight Time: 1+41
19 Weather: Good weather					

20 Remarks: Successful flight. Although, we are advised by the tower not to go inside the 15 nmi radius of Clark airport, so Jr Aidil survey (Line 1 and 2)

Photo overlap is only 30 % - should be 60 %

21 Problems and Solutions:

No problem, Assistance initialization ok but it was ok after some time

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

JULIUS RENDON

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

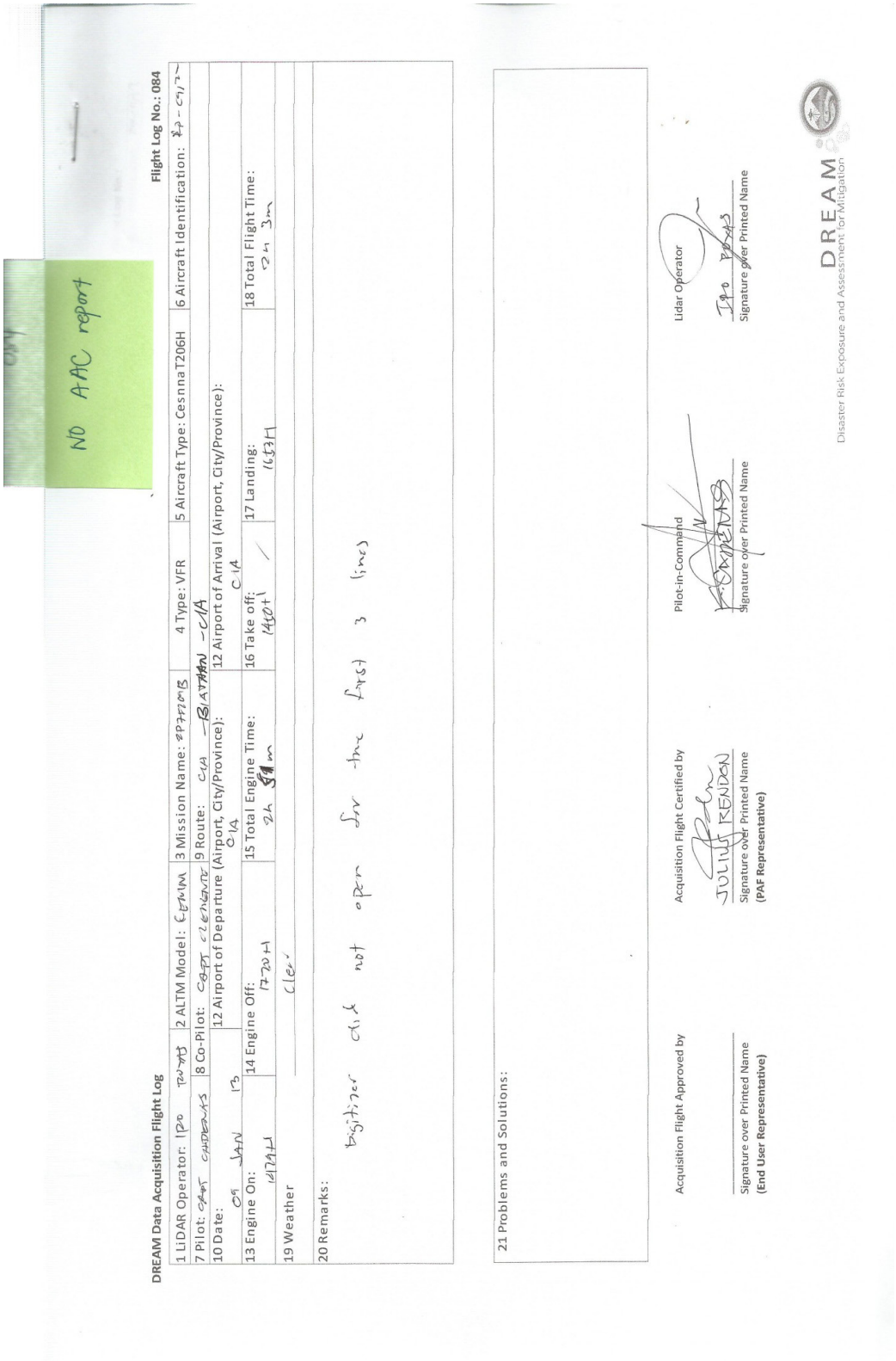
Signature over Printed Name

Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Flight Log for 2P7F2009B Mission



NO AAC report

DREAM Data Acquisition Flight Log

Flight Log No.: 084

1 LiDAR Operator: [illegible]	2 ALTM Model: [illegible]	3 Mission Name: [illegible]	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: [illegible]
7 Pilot: [illegible]	8 Co-Pilot: [illegible]	9 Route: [illegible]	12 Airport of Departure (Airport, City/Province): [illegible]	12 Airport of Arrival (Airport, City/Province): [illegible]	
10 Date: 09 JAN 13	14 Engine Off: 17:20 H	15 Total Engine Time: 2h 34m	16 Take off: 14:01	17 Landing: 16:34	18 Total Flight Time: 2h 33m
13 Engine On: 14:47					
19 Weather: clear					
20 Remarks: visitor chk not open for the first 3 lines					
21 Problems and Solutions:					

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

JULIUS RENDON

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

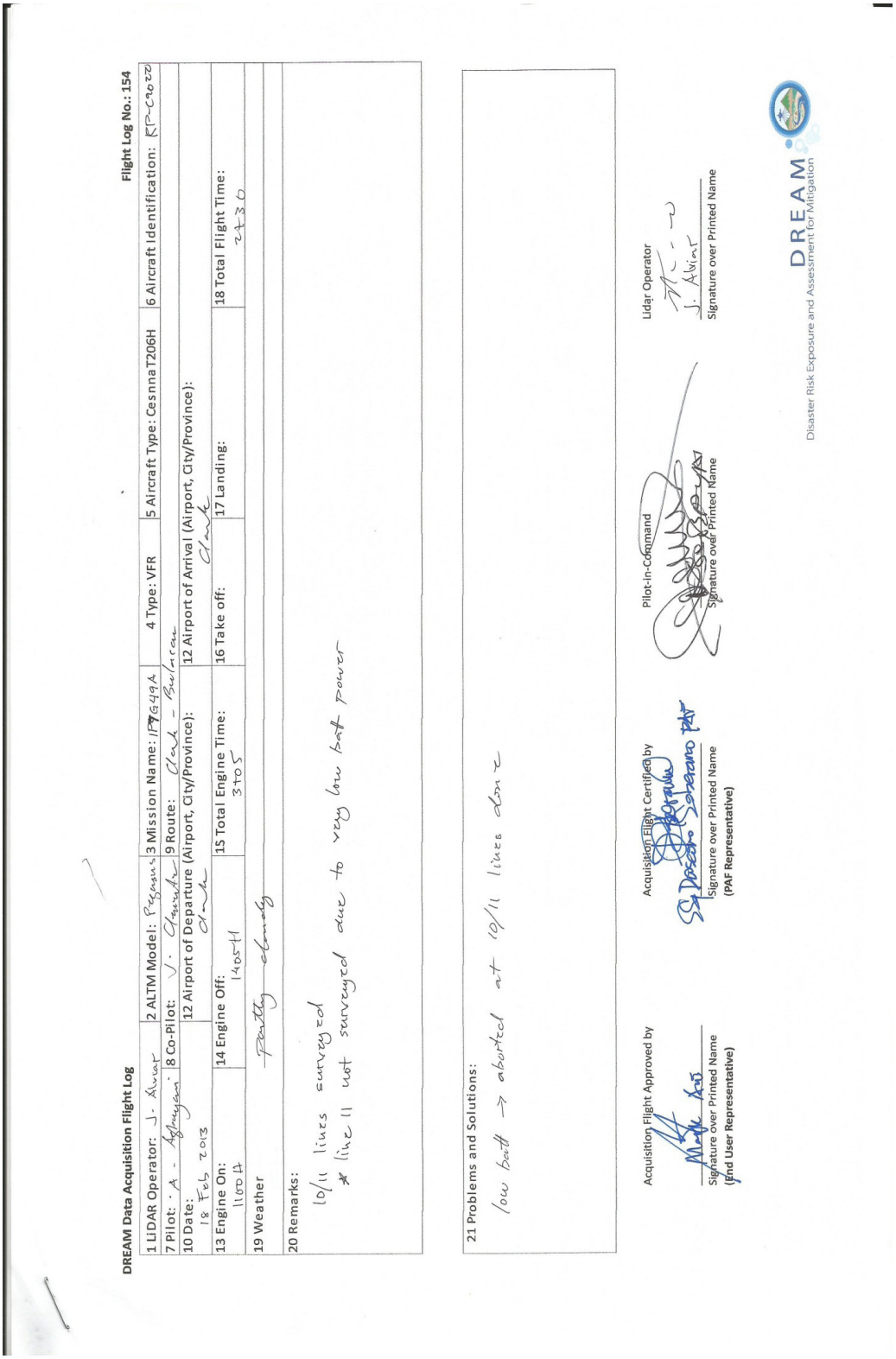
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 1P7G049A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 154

1 LiDAR Operator: J. Alviar	2 ALTM Model: Pegasus	3 Mission Name: 1P7G049A	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-C9022
7 Pilot: A - Aglugub	8 Co-Pilot: V. Ogsimer	9 Route: Clark - Bulacan			
10 Date: 18 Feb 2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1105 H	14 Engine Off: 1405 H	15 Total Engine Time: 3+05	16 Take off:	17 Landing:	18 Total Flight Time: 2+30
19 Weather	Partly cloudy				

20 Remarks:

10/11 lines surveyed
* line 11 not surveyed due to very low bat power

21 Problems and Solutions:

low batt → aborted at 10/11 lines done

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

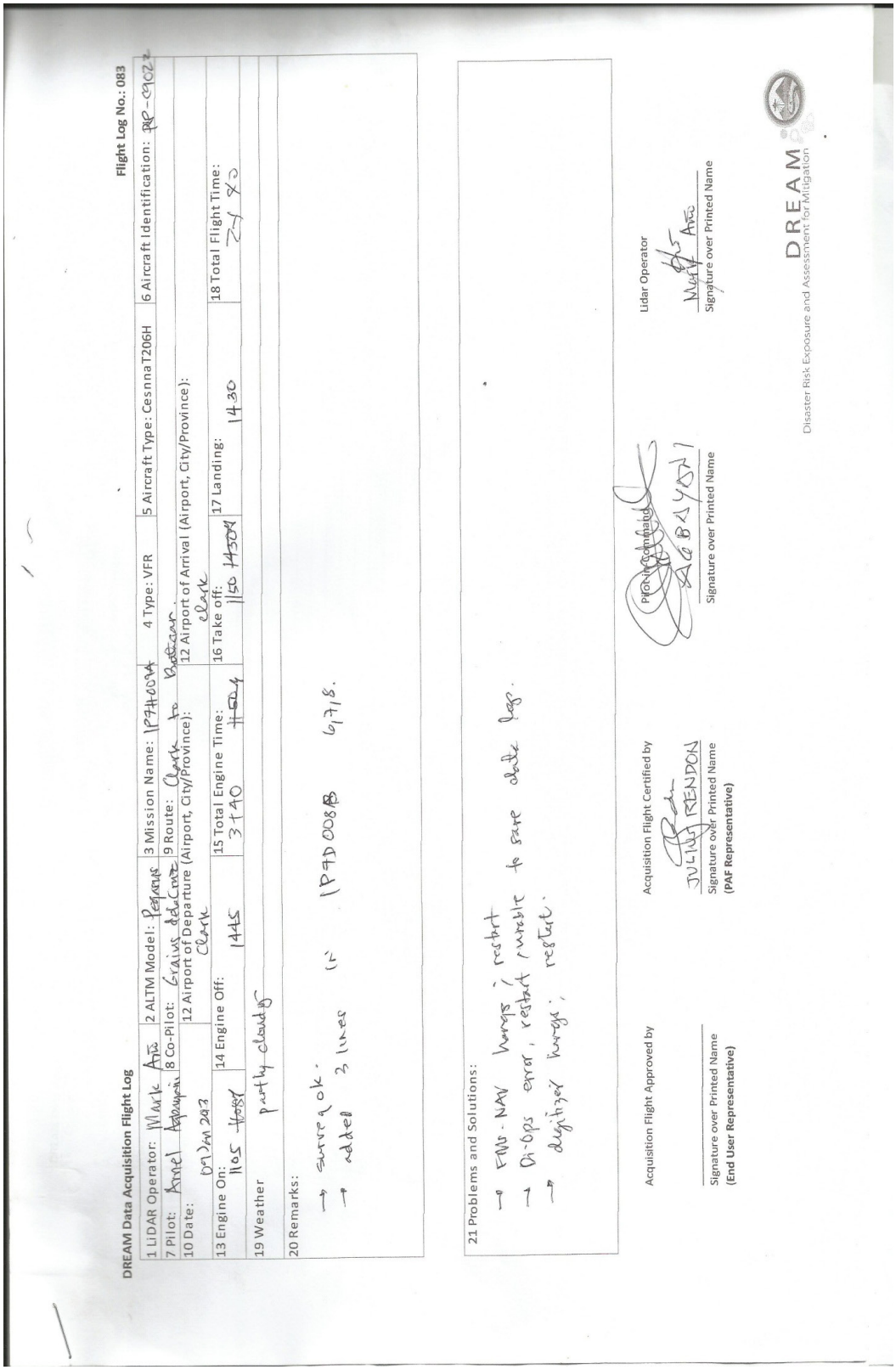
J. Alviar

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1P7H009A and 1P7D008B (3LINES) Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 083

1 LiDAR Operator: Mark Ace	2 ALTM Model: Pegasus	3 Mission Name: 1P7H009A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9022
7 Pilot: Arnel Aquino	8 Co-Pilot: Craivs deCastro	9 Route: Clark to Pastacan			
10 Date: 07 Jun 2017	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1105 Hobbs	14 Engine Off: 1445	15 Total Engine Time: 3+40 +504	16 Take off: 1150 1430	17 Landing: 1430	18 Total Flight Time: 2+40
19 Weather partly cloudy					

20 Remarks:

→ survey ok.
→ added 2 lines (1' 1P7D008B 6,718.

21 Problems and Solutions:

→ FMS - NAV warns ; restart
→ Di-Ops error, restart mission to save data logs.
→ digitizer hangs ; reglet.

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

JULIUS TRENDON
Signature over Printed Name
(PAF Representative)

Pilot in Command

Lidar Operator

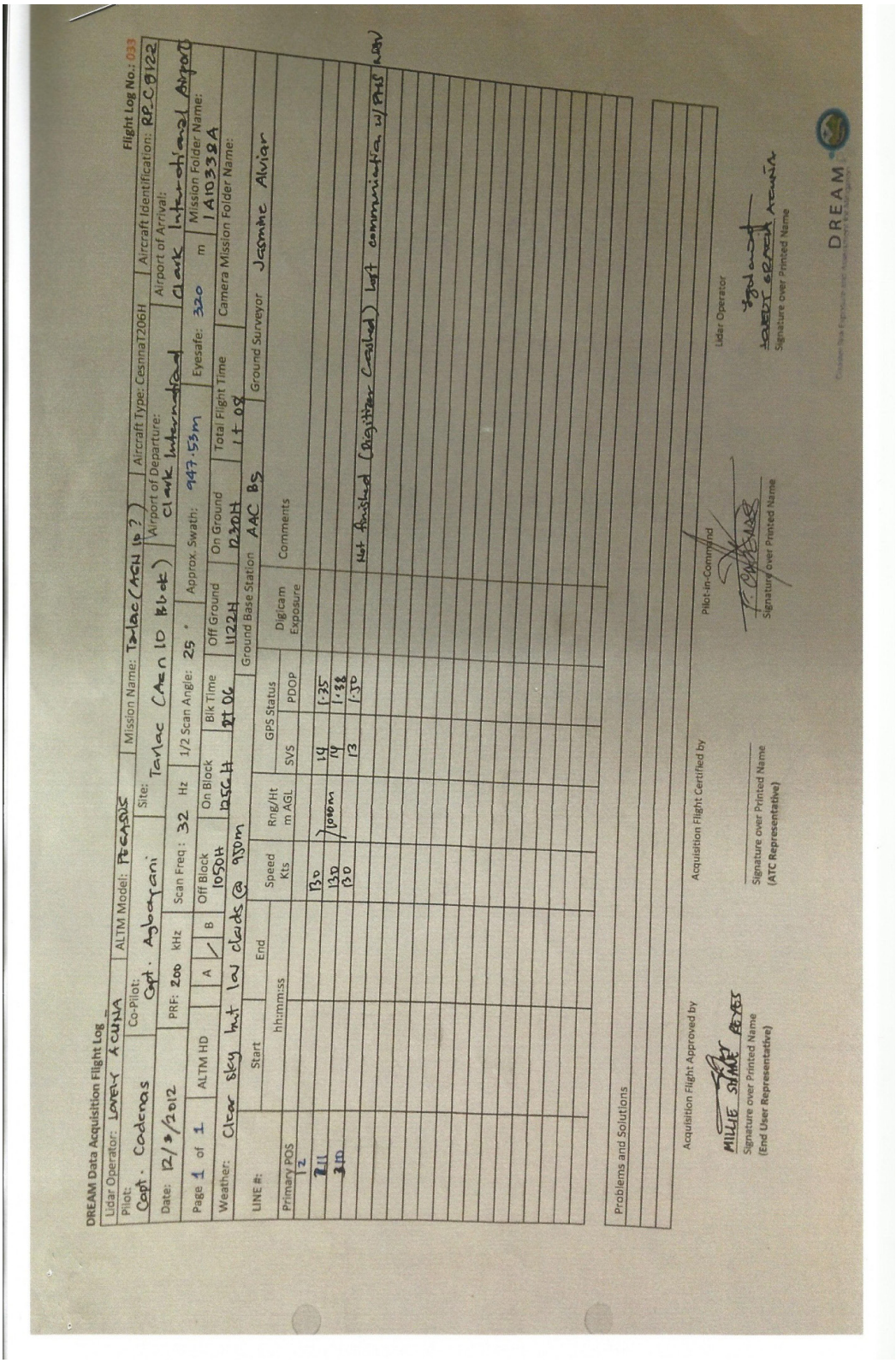
Signature over Printed Name

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for AGN10338A Mission



DREAM Data Acquisition Flight Log — Flight Log No.: 033

Lidar Operator: LOVELY A CUÑA | ALTM Model: PEGASUS | Mission Name: Tarlac (AGN 10 Blue) | Aircraft Type: CessnaT206H | Aircraft Identification: RP-C9122

Pilot: Capt. Cadenas | Co-Pilot: Capt. Aglugani | Site: Tarlac Cam 10 Blue | Airport of Departure: Clark International | Airport of Arrival: Clark International Airport

Date: 12/3/2012 | PRF: 200 KHz | Scan Freq: 32 Hz | 1/2 Scan Angle: 25 ° | Approx. Swath: 947.53m | Eyesafe: 320 m | Mission Folder Name: 1A10338A

Page 1 of 1 | ALTM HD | A / B | Off Block 1050H | On Block 1256H | Blk Time | Off Ground 1122H | On Ground 1230H | Total Flight Time 1+02 | Camera Mission Folder Name:

Weather: Clear sky but low clouds @ 930m | Ground Base Station AAC BS | Ground Surveyor Jasmine Alviar

LINE #:	Start hh:mm:ss	End	Speed Kts	Rng/Ht m AGL	GPS Status SVS	GPS Status PDOP	Digicam Exposure	Comments
Primary POS 12								
211			130	1000m	14	1.35		
310			130		14	1.38		
			130		13	1.30		
								Not Assisted (Digitizer Cooled) but communication w/ PNT okay

Problems and Solutions

Acquisition Flight Approved by: MILLIE SYMES — Signature over Printed Name (End User Representative)

Acquisition Flight Certified by: _____ — Signature over Printed Name (ATC Representative)

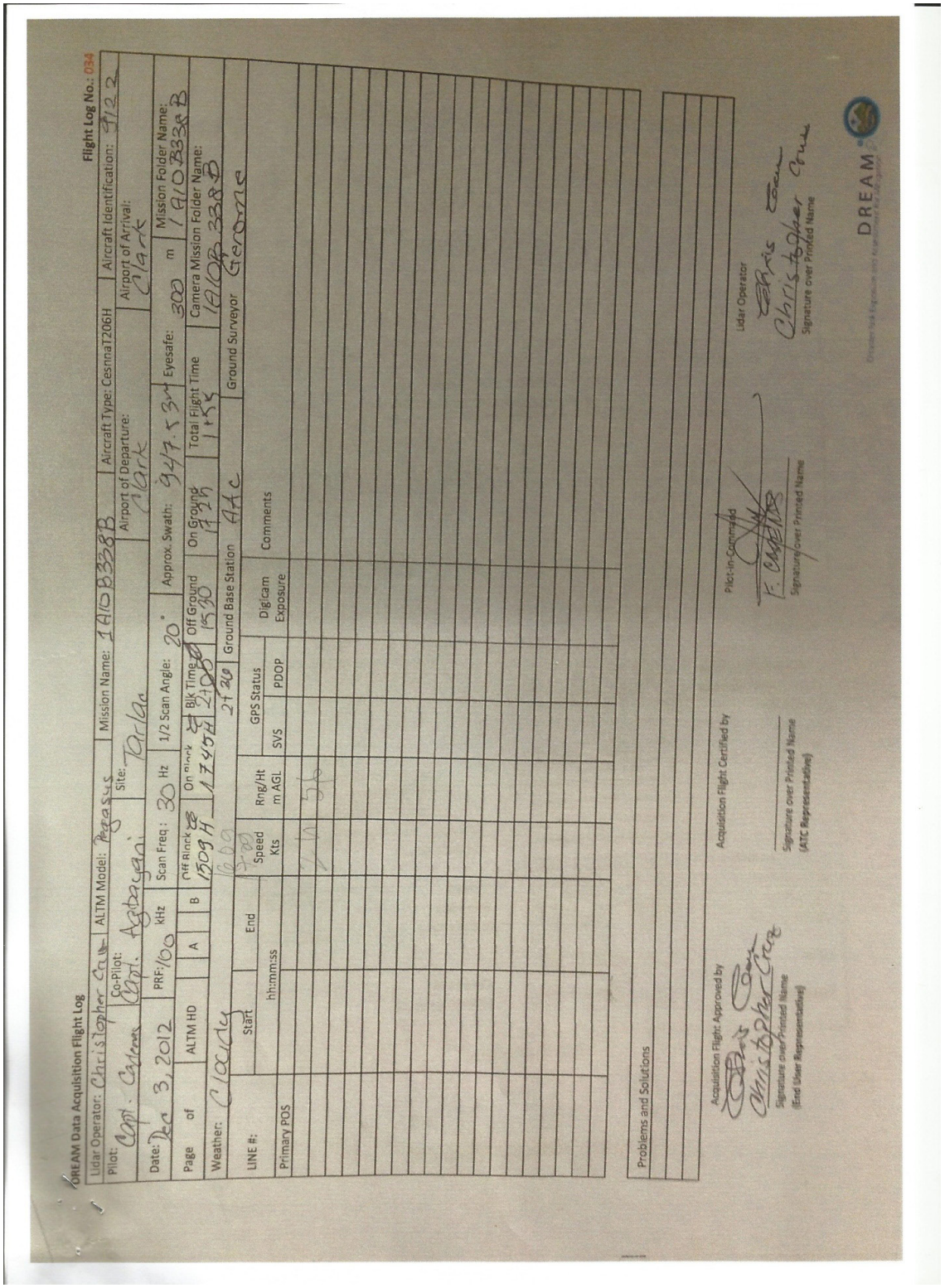
Pilot-in-Command — Signature over Printed Name

Lidar Operator — Signature over Printed Name

DREAM

Annex H. FLIGHT LOGS

Flight Log for AGN10338B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 034

Lidar Operator: Christopher Crane | ALTM Model: Pegasus | Mission Name: 14108338B | Aircraft Type: CessnaT206H | Aircraft Identification: 412

Pilot: Capt. Cyrus | Co-Pilot: Capt. Agtarani | Site: Tarlac | Airport of Departure: Clark | Airport of Arrival: Clark

Date: Dec 3, 2012 | PRF: 100 kHz | Scan Freq: 30 Hz | 1/2 Scan Angle: 20° | Approx. Swath: 947 x 374 | Eyesafe: 300 m | Mission Folder Name: 14108338B

Page of | ALTM HD | A | B | Off Block 1509H | On Block 1745H | BlK Time 2.36 | Off Ground 1530 | On Ground 1729 | Total Flight Time 1.45 | Camera Mission Folder Name: 14108338B

Weather: Cloudy | Ground Base Station AAC | Ground Surveyor Geronie

LINE #:	Start	End	Speed	Rng/Ht	GPS Status		Digicam	Comments
Primary POS	hh:mm:ss		Kts	m AGL	SVS	PDOP	Exposure	
			160	1056				

Problems and Solutions

Acquisition Flight: Approved by — Signature over Printed Name (End User Representative)

Acquisition Flight: Certified by — Signature over Printed Name (ATC Representative)

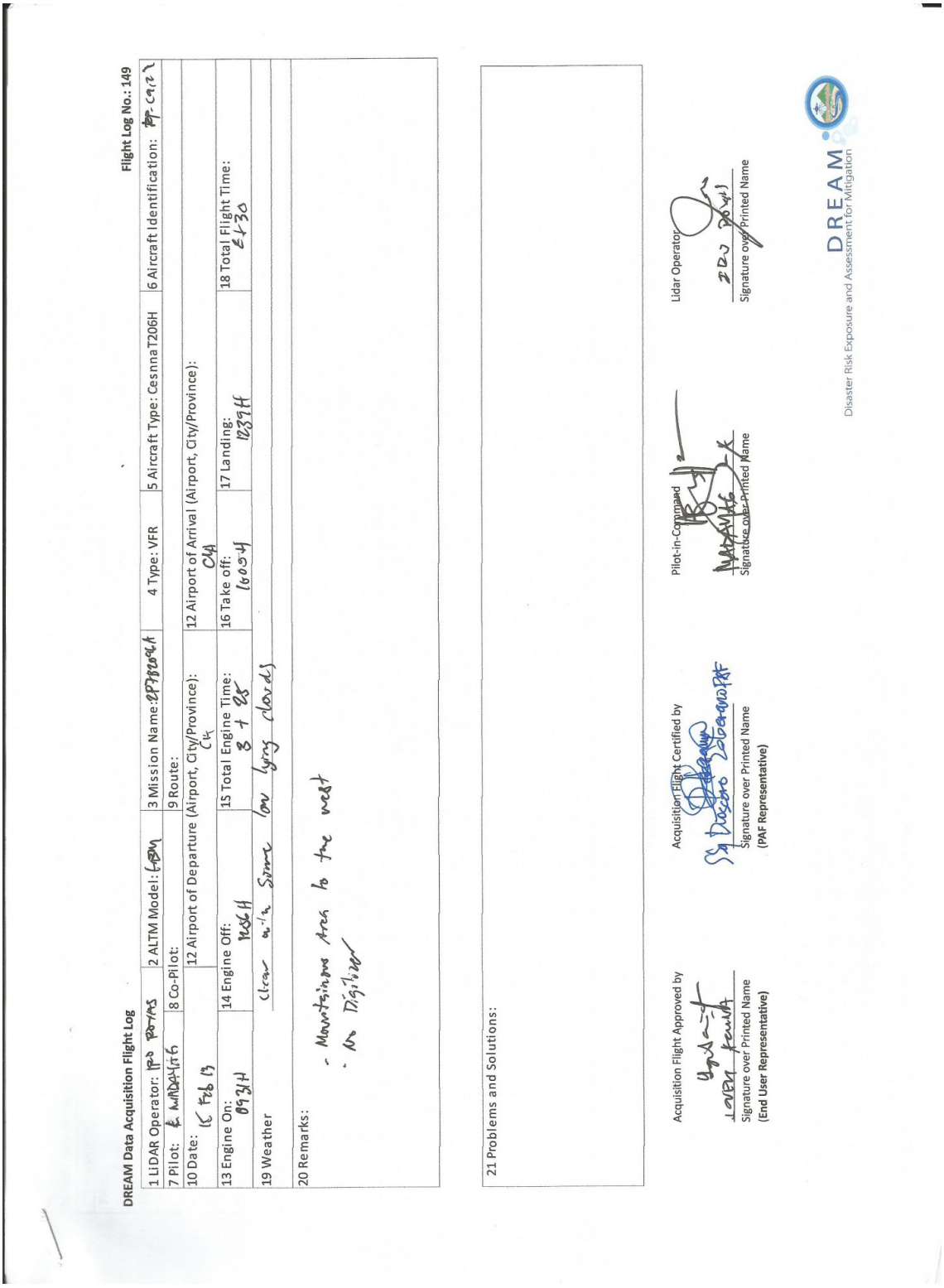
Pilot-in-Command — Signature over Printed Name

Lidar Operator — Signature over Printed Name

DREAM

Annex H

Flight Log for 1A10A046A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 149

1 LiDAR Operator: PAF ROMS	2 ALTM Model: Optech	3 Mission Name: 1A10A046A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9121
7 Pilot: E. MARQUEZ	8 Co-Pilot:	9 Route:			
10 Date: 15 Feb 13	11 Airport of Departure (Airport, City/Province): CYL		12 Airport of Arrival (Airport, City/Province): CYL		
13 Engine On: 0934	14 Engine Off: 1656 H	15 Total Engine Time: 3 + 25	16 Take off: 1603 H	17 Landing: 1239 H	18 Total Flight Time: 2+30
19 Weather	Clear w/ some low lying clouds				

20 Remarks:

- Mountainous area to the east
- No Digitizer

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1A10A046B Mission

DREAM Data Acquisition Flight Log — **Flight Log No.: 151**

1 LiDAR Operator: Lovely Acuña	2 ALTM Model: Gem	3 Mission Name: 2AQI 046B	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9122
7 Pilot: L. Madayag	8 Co-Pilot:	9 Route: Clark - Talac			
10 Date: 02/15/2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1443H	14 Engine Off: 1736H	15 Total Engine Time: 2+53	16 Take off: 1517H	17 Landing: 1736H	18 Total Flight Time: 2+19
19 Weather: Good / Cloudy that can affect camera images / shadow					

20 Remarks:

Successful flight
finished all lines

21 Problems and Solutions:

Acquisition Flight Approved by: Lovely Acuña — Signature over Printed Name (End User Representative)

Acquisition Flight Certified by: Sg Dioscoro Soberano PAF — Signature over Printed Name (PAF Representative)

Pilot-in-Command: Madayag — Signature over Printed Name

Lidar Operator: Lovely Acuña — Signature over Printed Name

DREAM — Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 1A10C045B Mission

DREAM Data Acquisition Flight Log — Flight Log No.: ~~146~~ 147

1 LiDAR Operator: Lovely Acuña	2 ALTM Model: Gemini	3 Mission Name: 2P7B1045B	4 Type: VFR	5 Aircraft Type: Cesnna T206H	6 Aircraft Identification: RP-C9122
7 Pilot: Capt. L. Madayag	8 Co-Pilot:	9 Route: Clark - Clark			
10 Date: 02/14/2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1400H	14 Engine Off: 1720H	15 Total Engine Time: 3+20	16 Take off: 1439H	17 Landing: 1700H	18 Total Flight Time: 2+21
19 Weather: Good					
20 Remarks: Successful flight. Although I repeated some lines					

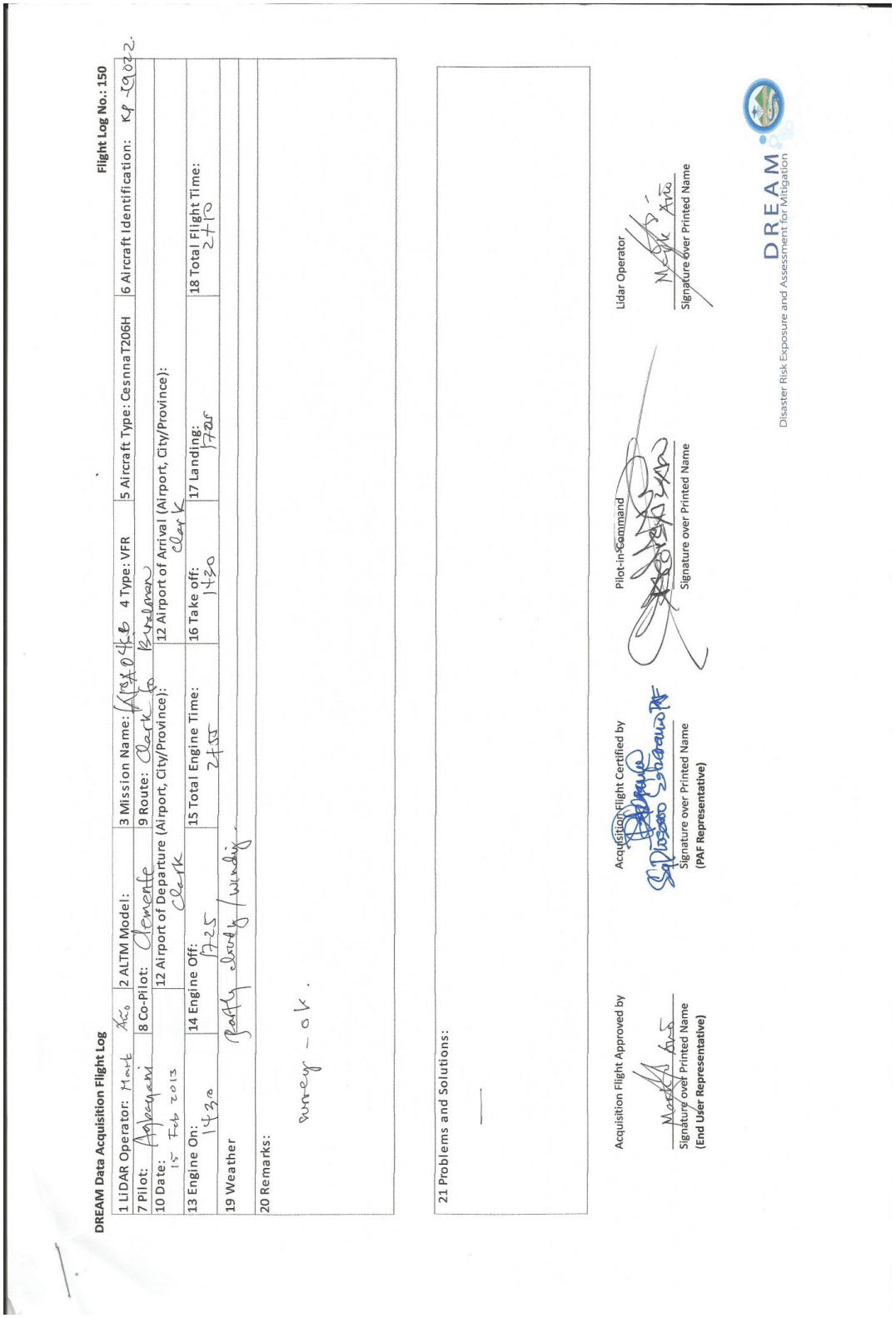
21 Problems and Solutions:

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Lovely Acuña	A1C Erwin Peros Santos PAF	Lawrence Madayag	Lovely Acuña
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 2AGN10D1046B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 150

1 LiDAR Operator: Mark Ac.	2 ALTM Model:	3 Mission Name: AGN04b	4 Type: VFR	5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-1902.
7 Pilot: Aglugani	8 Co-Pilot: Clemente	9 Route: Clark to Baguio			
10 Date: 15 Feb 2013	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1430	14 Engine Off: 1725	15 Total Engine Time: 2.55	16 Take off: 1430	17 Landing: 1720	18 Total Flight Time: 2.50
19 Weather	Partly cloudy / windy				
20 Remarks: runway - o.k.					

21 Problems and Solutions:

—

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

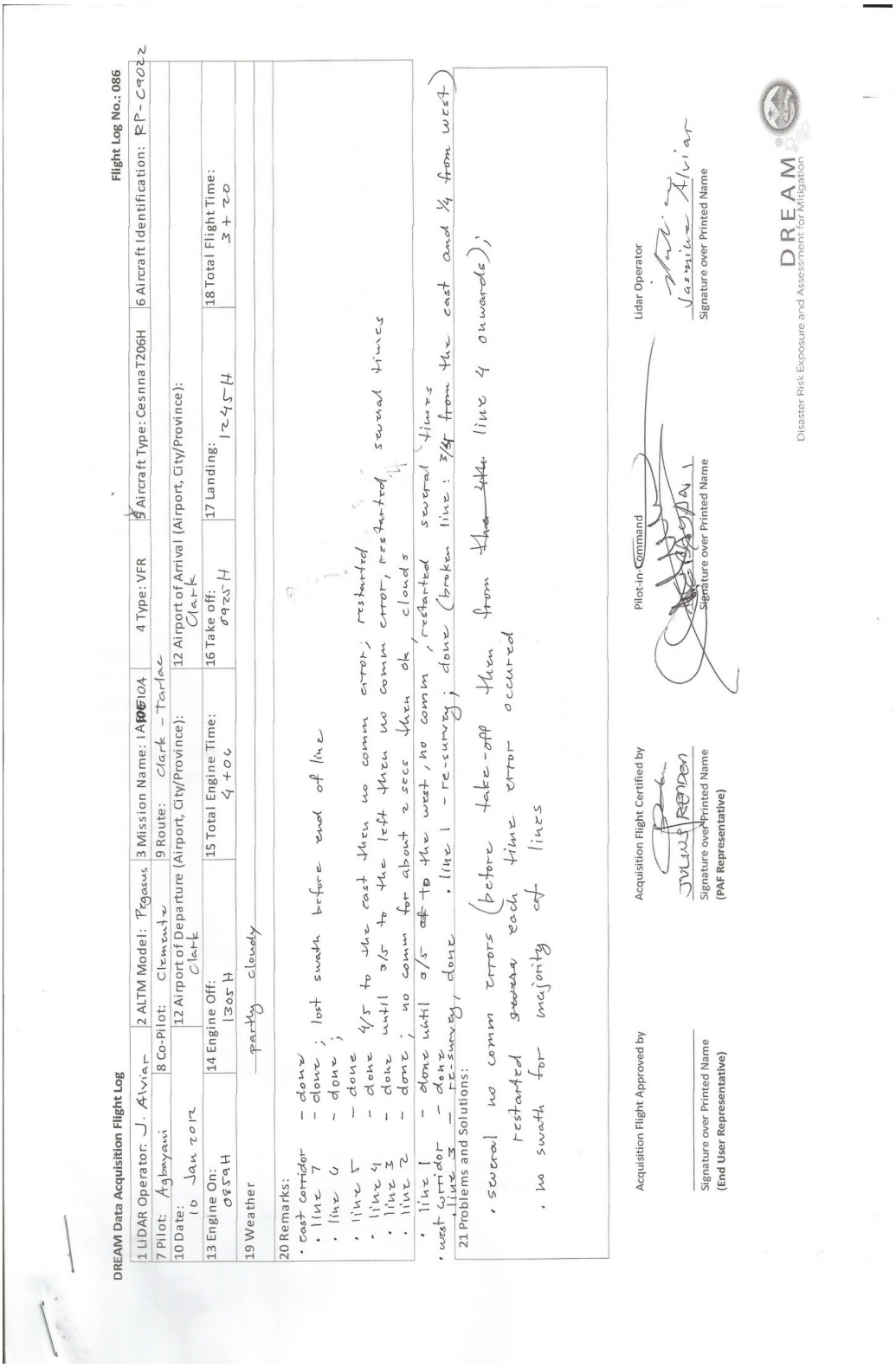
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for IA10E10A Mission



DREAM Data Acquisition Flight Log — Flight Log No.: 086

1 LiDAR Operator: J. Alviar	2 ALTM Model: Pegasus	3 Mission Name: IA10E10A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C4022
7 Pilot: Agbayani	8 Co-Pilot: Clemente	9 Route: Clark – Tarlac			
10 Date: 16 Jan 2017	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 0859 H	14 Engine Off: 1305 H	15 Total Engine Time: 4 + 06	16 Take off: 0925 H	17 Landing: 1245 H	18 Total Flight Time: 3 + 20
19 Weather	partly cloudy				

20 Remarks:
- east corridor – done
  - line 7 – done ; lost swath before end of line
  - line 6 – done ;
  - line 5 – done
  - line 4 – done 4/5 to the east then no comm error; restarted
  - line 3 – done until 3/5 to the left then no comm error, restarted several times
  - line 2 – done ; no comm for about 2 secs then ok, clouds
  - line 1 – done until 5/5 to the west, no comm, restarted several times
- west corridor – done
  - line 3 – re-survey, done
  - line 1 – re-survey; done (broken line : 3/4 from the east and ¼ from west)

21 Problems and Solutions:
- several no comm errors (before take-off then from the 4th line 4 onwards);
  restarted gneiss each time error occurred
- no swath for majority of lines

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(PAF Representative)

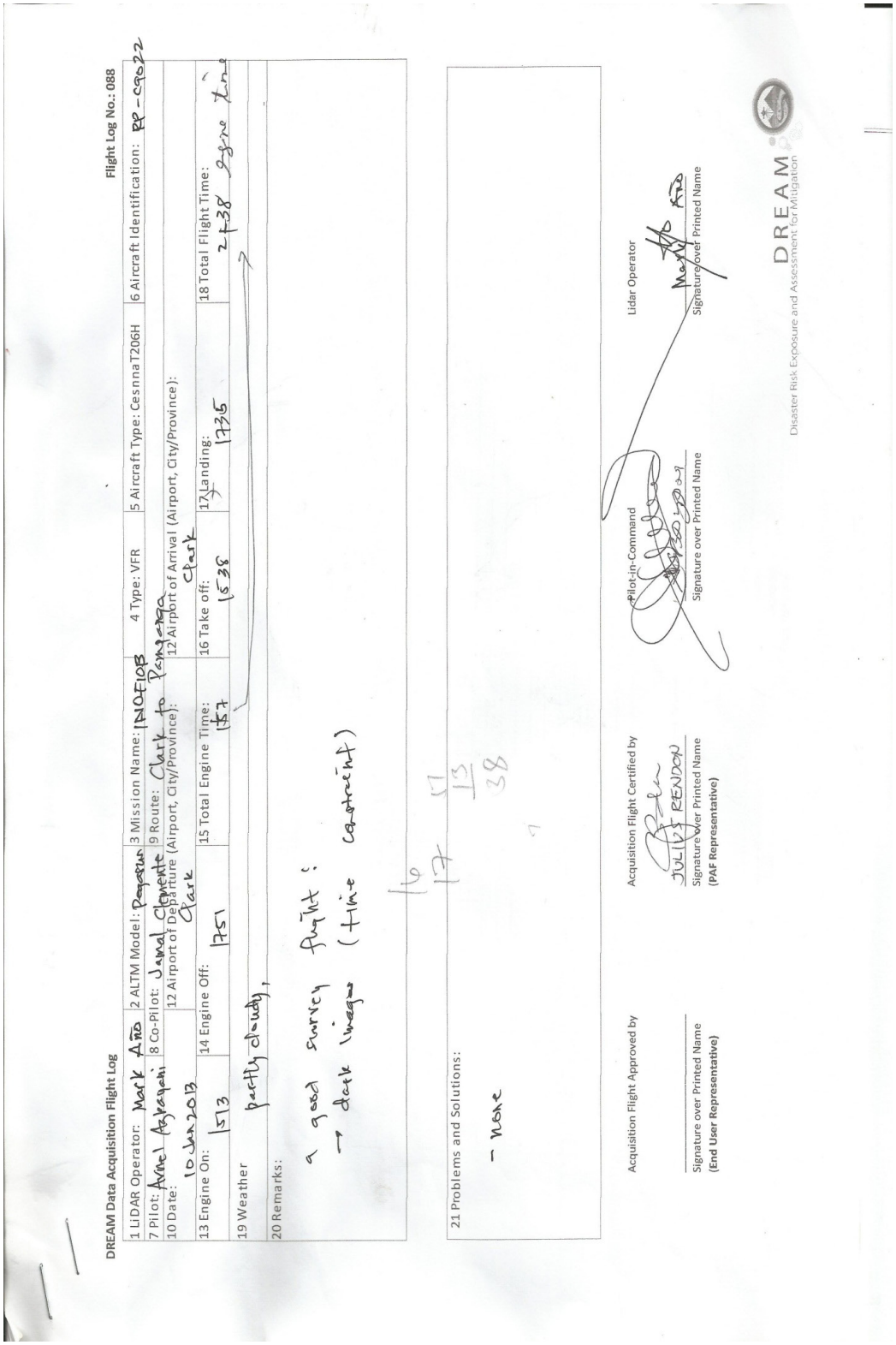
Pilot-in-Command
Signature over Printed Name

Lidar Operator
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1A10F10B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 088

1 LiDAR Operator: Mark Ato	2 ALTM Model: Pegasus	3 Mission Name: 1N10F10B	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-c9022
7 Pilot: Arnel Aspiras	8 Co-Pilot: Jamal Clemente	9 Route: Clark to Pampanga			
10 Date: 10 Jan 2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1513	14 Engine Off: 1751	15 Total Engine Time: 1457	16 Take off: 1538	17 Landing: 1735	18 Total Flight Time: 2+38 pagsa tuno

19 Weather: partly cloudy,

20 Remarks:

a good survey flight:
→ dark images (time adjustment)

21 Problems and Solutions:

- none

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

JULIUS RENDON

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

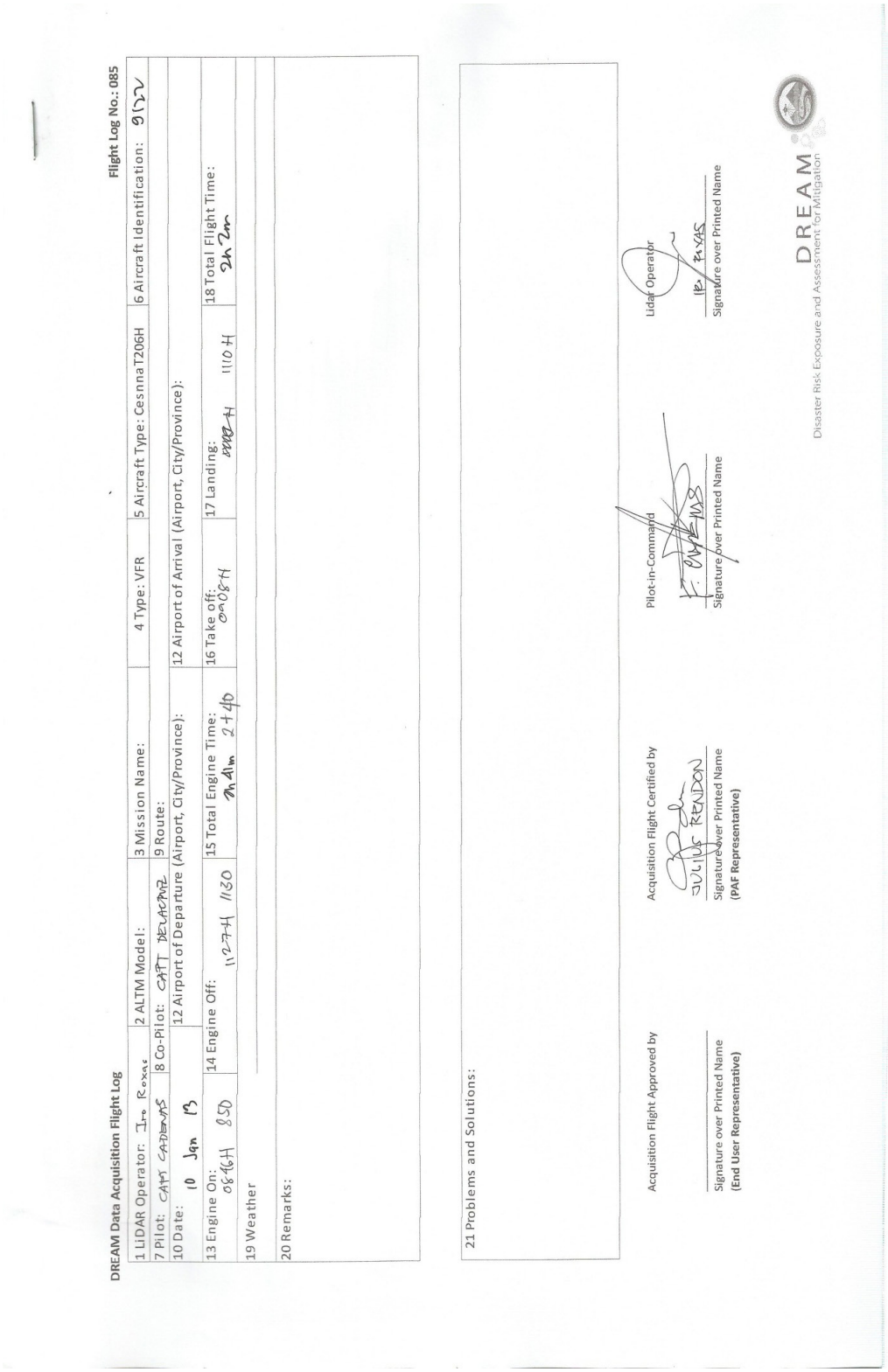
Signature over Printed Name

DREAM

Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 2AGN10G1010A Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 085

1 LiDAR Operator: Ing. Rexas	2 ALTM Model:	3 Mission Name:	4 Type: VFR
5 Aircraft Type: CessnaT206H	6 Aircraft Identification: 9N-ZV		
7 Pilot: CAPT CADIENTE	8 Co-Pilot: CAPT DELACRUZ	9 Route:	
10 Date: 10 Jan 13	12 Airport of Departure (Airport, City/Province):		12 Airport of Arrival (Airport, City/Province):
13 Engine On: 0646H 850	14 Engine Off: 1127H 1130	15 Total Engine Time: 2+40 min	16 Take off: 0808H
17 Landing: 1110 H	18 Total Flight Time: 2h 2m		
19 Weather			
20 Remarks:			

21 Problems and Solutions:

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

JULIUS RENDON

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Lidar Operator

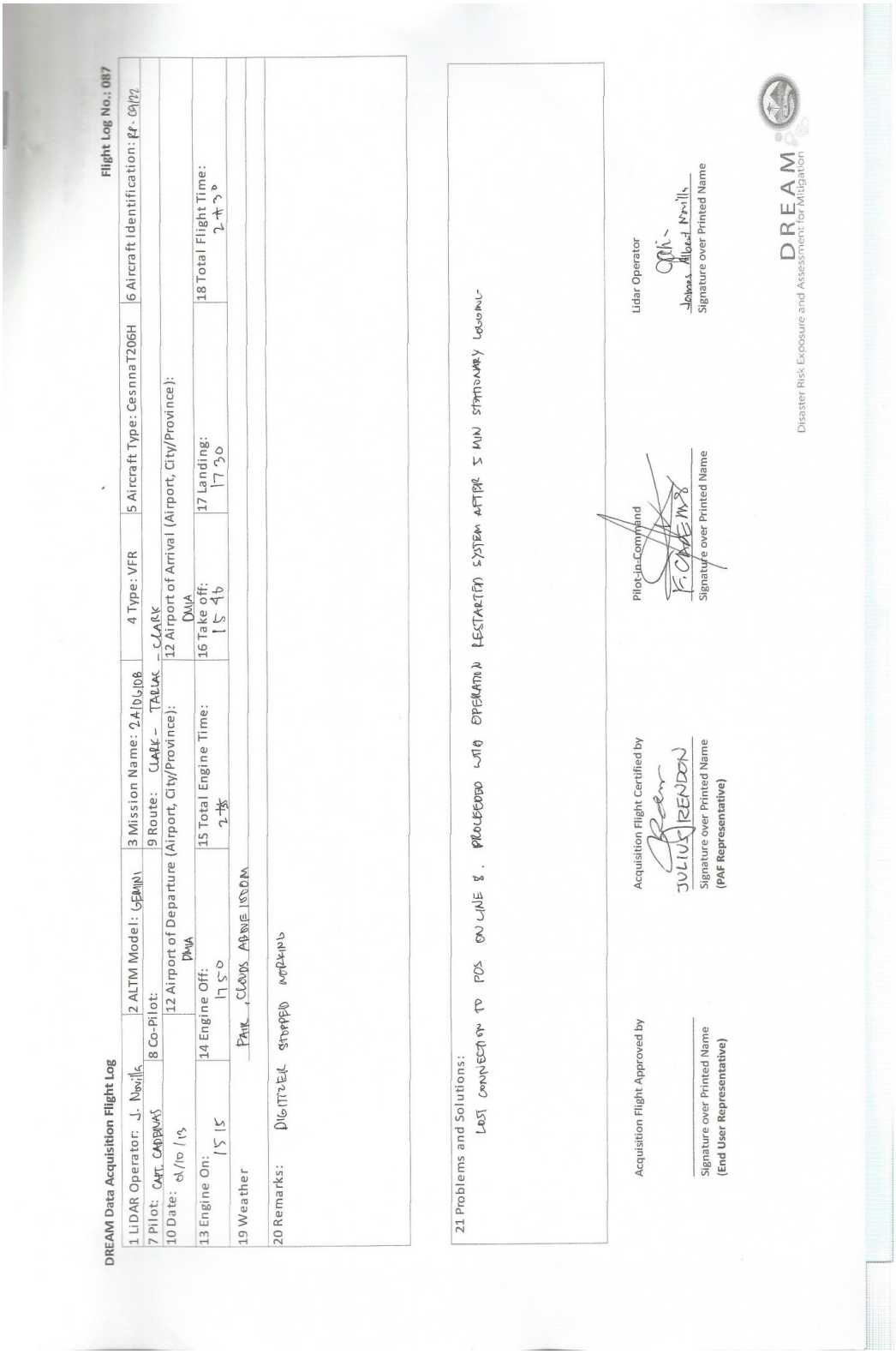
IR. REXAS

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 2AGN10G010B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 087

1 LiDAR Operator: J. Nonillo	2 ALTM Model: GEMINI	3 Mission Name: 2AGN10G010B	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9122
7 Pilot: CAPT. CABRERA	8 Co-Pilot:	9 Route: CLARK – TABLAC – CLARK			
10 Date: 01/10/15	12 Airport of Departure (Airport, City/Province): DMIA		12 Airport of Arrival (Airport, City/Province): DMIA		
13 Engine On: 15 15	14 Engine Off: 17 50	15 Total Engine Time: 2.75	16 Take off: 15 46	17 Landing: 17 30	18 Total Flight Time: 2.73
19 Weather	PAIR, CLOUDS ABOVE 1500M				
20 Remarks:	DIGITIZER STOPPED WORKING				

21 Problems and Solutions:

LOST CONNECTION TO POS ON LINE 8. PROCEEDED WITH OPERATION RESTARTED SYSTEM AFTER 5 MIN STATIONARY LOCKING-

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

JULIUS RENDON

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

F. CABRERA

Signature over Printed Name

Lidar Operator

James Allard Nonillo

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

DREAM Data Acquisition Flight Log

Flight Log No.: 090

1 LiDAR Operator: Mark Ano	2 ALTM Model: Pegasus	3 Mission Name: 1A10H11A	4 Type: VFR	5 Aircraft Type: Cesnna T206H	6 Aircraft Identification: RP-C9022
7 Pilot: Cabanas	8 Co-Pilot: Erwin dela Cruz	9 Route: clark to pangasinan			
10 Date: 11 Dec 2013	12 Airport of Departure (Airport, City/Province): clark		12 Airport of Arrival (Airport, City/Province): clark		
13 Engine On: 1130	14 Engine Off: 1410	15 Total Engine Time: 3+20	16 Take off: 1150	17 Landing: 1355	18 Total Flight Time: 2+05
19 Weather: partly cloudy					

20 Remarks:

5/6 line survey ok
6/6 – loss communication

21 Problems and Solutions:

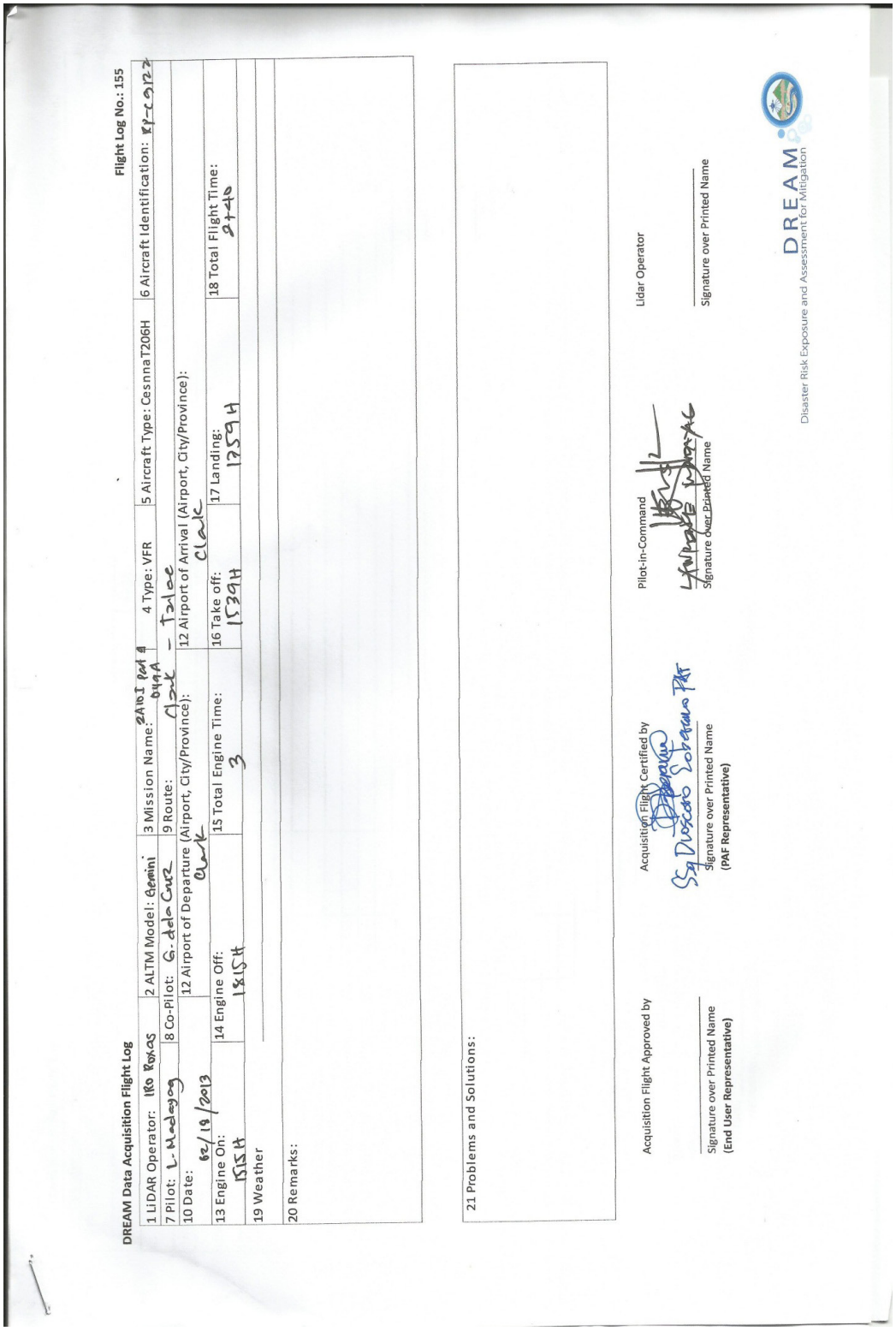
loss comm. & software hangs on the last line., restart system

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Signature over Printed Name (End User Representative)	JULIUS REDON Signature over Printed Name (PAF Representative)	F. CABANAS Signature over Printed Name	Mark Ano Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 2AGNI1049B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 155

1 LiDAR Operator: Ito Rojas	2 ALTM Model: Gemini	3 Mission Name: 2AGI pol 4 04A	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9122
7 Pilot: L. Madayag	8 Co-Pilot: G. dela Cruz	9 Route: Clark – Tuloe			
10 Date: 02/19/2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1515H	14 Engine Off: 1815H	15 Total Engine Time: 3	16 Take off: 1539H	17 Landing: 1259H	18 Total Flight Time: 2+40
19 Weather					
20 Remarks:					
21 Problems and Solutions:					

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Sgt Rogelio Soberano PAF

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

Signature over Printed Name

DREAM

Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 2A6N10I2011A Mission

DREAM Data Acquisition Flight Log — **Flight Log No.: 089**

1 LiDAR Operator: Lovely Acuña	2 ALTM Model: Gemini	3 Mission Name: 2A6N10I2	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9122
7 Pilot: Capt. Aqbayani	8 Co-Pilot: J. Clementi	9 Route: Clark-Tarlac - Clark			
10 Date: 01/11/2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 0954H	14 Engine Off: 1313H	15 Total Engine Time: 3+19	16 Take off: 1025H	17 Landing: 1255H	18 Total Flight Time: 2+30
19 Weather: Good weather					

20 Remarks: Successful flight → Have problem w/ FI entry to the line (mountainous side) Have problem also 3/4 of East side of the line (turbulent, crosswinds)

- No error

21 Problems and Solutions:

No errors

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Christopher Cruz	JULIUS RENDON	[signature]	LOVELY GRACIA ACUÑA
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1PAM8HR240A Mission

DREAM Data Acquisition Flight Log

Flight Log No.:

1 LiDAR Operator: Mark Ano	2 ALTM Model: Pegasus	3 Mission Name: 1PAM8HR240A	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-09022
7 Pilot: Tangonan	8 Co-Pilot: Alfonso	9 Route: Clark			
10 Date: Aug 29, 2013	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1025	14 Engine Off: 1340	15 Total Engine Time: 3+15	16 Take off:	17 Landing:	18 Total Flight Time: 3+00
19 Weather: partly cloudy					
20 Remarks: -					

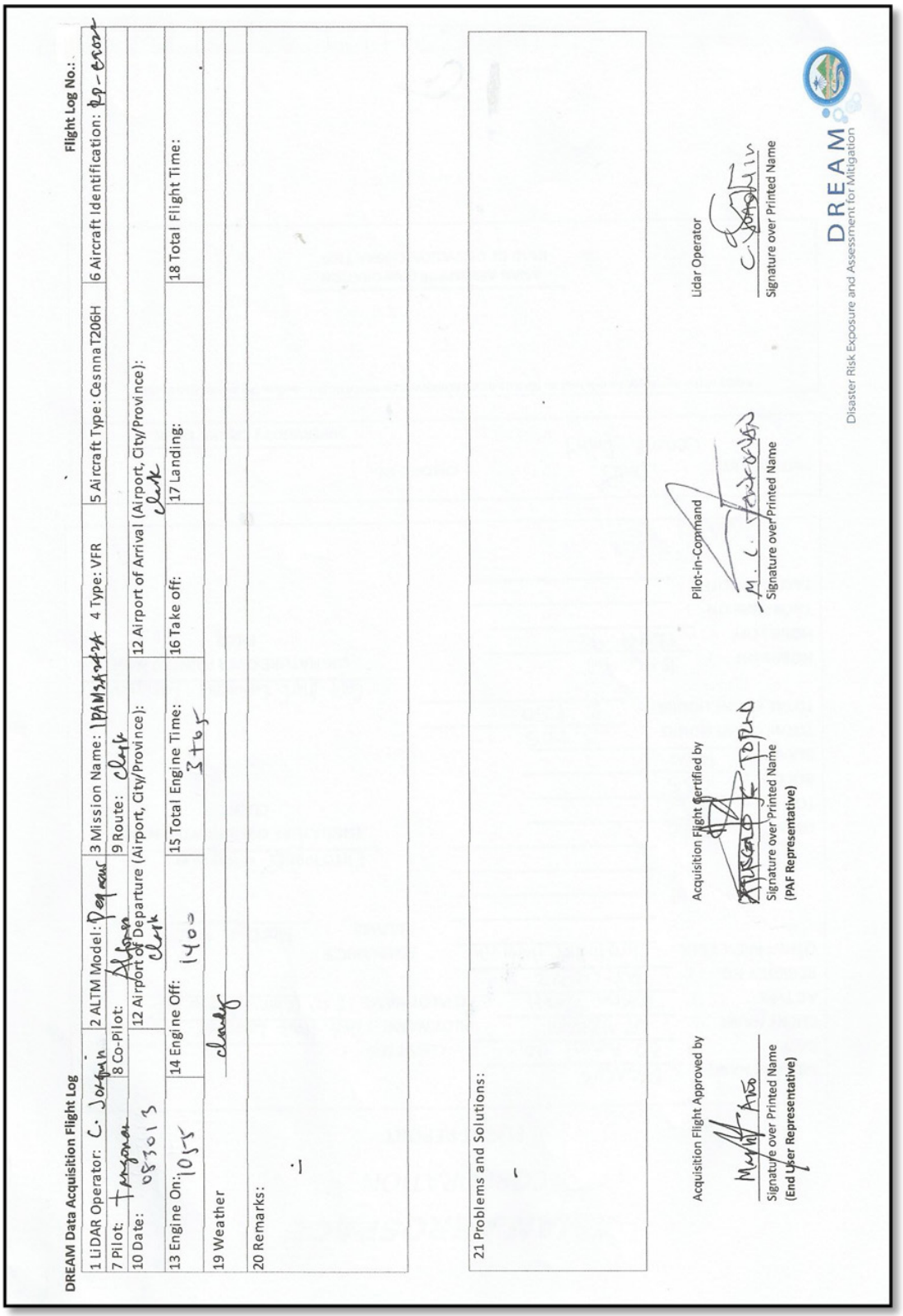
21 Problems and Solutions:

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 1PAM3A242A Mission



DREAM Data Acquisition Flight Log

Flight Log No.:

1 LiDAR Operator: C. Joaquin	2 ALTM Model: Pegasus	3 Mission Name: 1PAM3A242A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C8332
7 Pilot: Tangonan	8 Co-Pilot: Alegre	9 Route: Clark		
10 Date: 05/30/13	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark	
13 Engine On: 1015	14 Engine Off: 1400	15 Total Engine Time: 3+45	16 Take off:	17 Landing:	18 Total Flight Time:
19 Weather: cloudy					
20 Remarks: -					
21 Problems and Solutions: -					

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

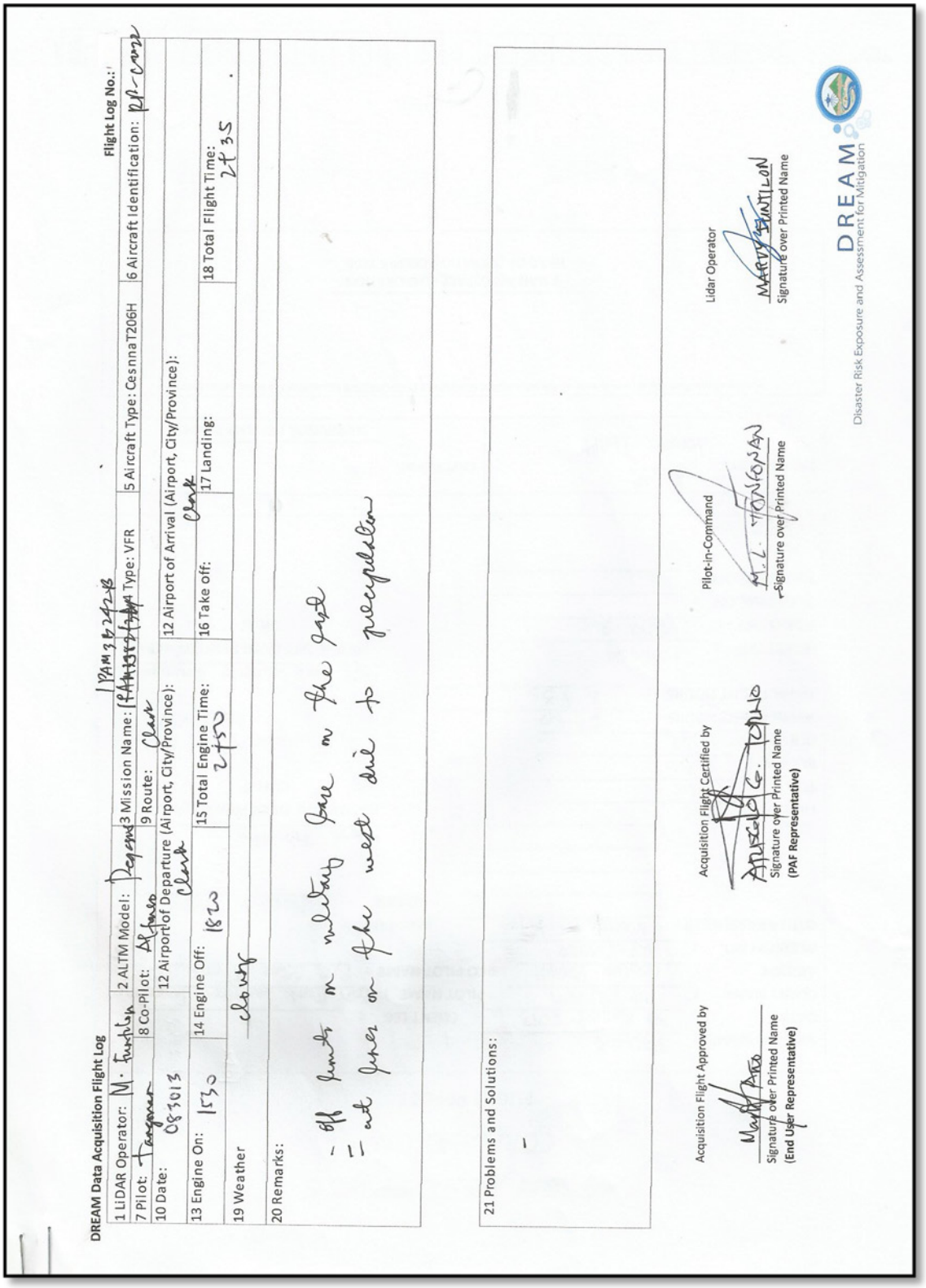
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1PAM3B242B Mission



DREAM Data Acquisition Flight Log

Flight Log No.: 1PAM3B242B

1 LIDAR Operator: M. Tupaz | 2 ALTM Model: Pegasus | 3 Mission Name: 1PAM3B242B | 4 Type: VFR | 5 Aircraft Type: Cessna T206H | 6 Aircraft Identification: RP-C2022

7 Pilot: Tangonan | 8 Co-Pilot: Afuang | 9 Route: Clark

10 Date: 08/30/13 | 11 Airport of Departure (Airport, City/Province): Clark | 12 Airport of Arrival (Airport, City/Province): Clark

13 Engine On: 1530 | 14 Engine Off: 1820 | 15 Total Engine Time: 2.50 | 16 Take off: | 17 Landing: | 18 Total Flight Time: 2.35

19 Weather: cloudy

20 Remarks:

- all lines in military zone in the east
- exit zone on the west due to precipitation

21 Problems and Solutions:

-

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

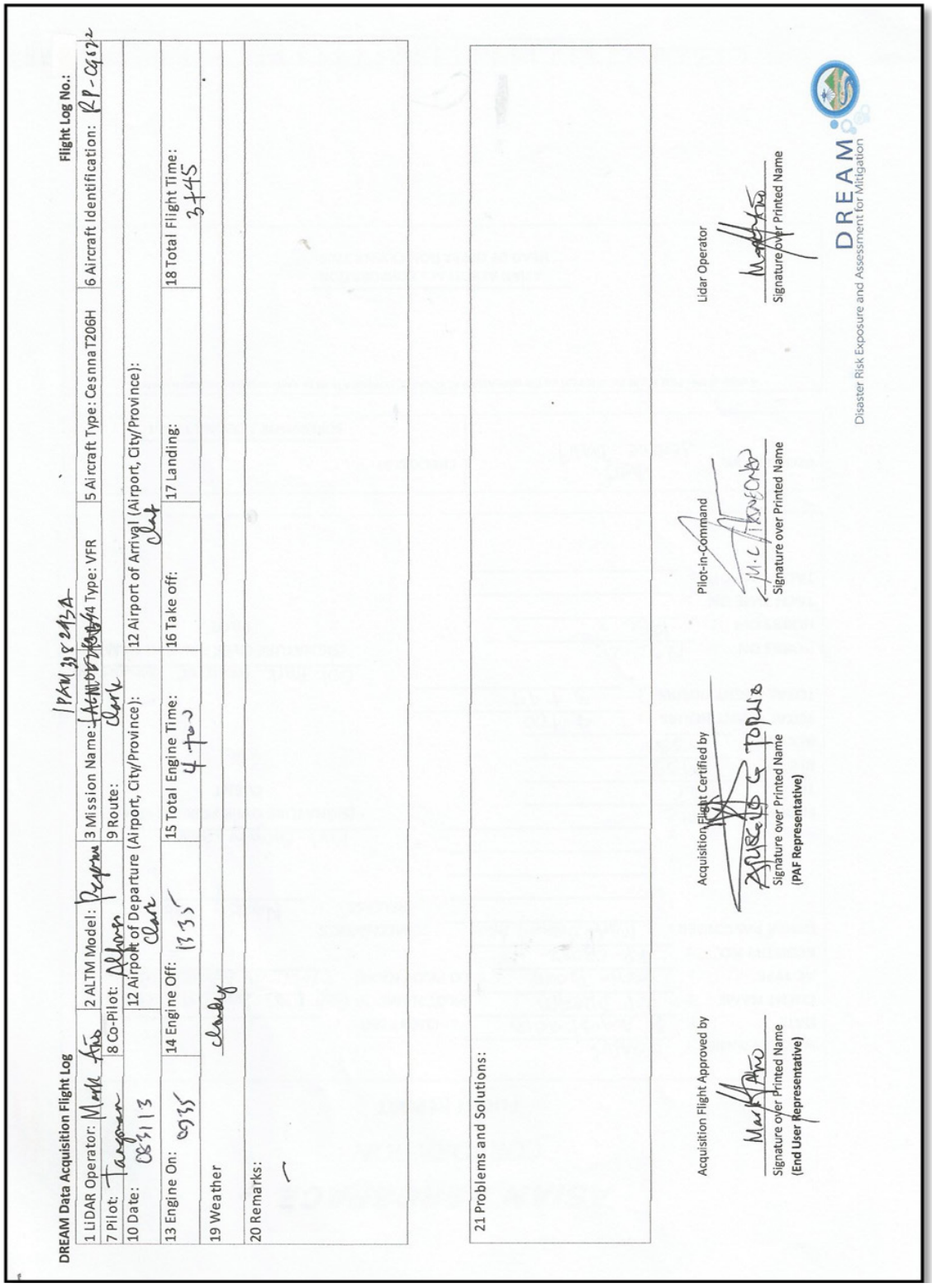
Lidar Operator

Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 1AGNO338243A Mission



DREAM Data Acquisition Flight Log — Flight Log No.: RP-C612

1 LiDAR Operator: Mark Aro	2 ALTM Model: Pegasus	3 Mission Name: 1AGNO338243A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C612
7 Pilot: Tangonan	8 Co-Pilot: Alonzo	9 Route: Clark		
10 Date: 08/11/13	11 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark	
13 Engine On: 0935	14 Engine Off: 1335	15 Total Engine Time: 4 hrs	16 Take off:	17 Landing:	18 Total Flight Time: 3+45
19 Weather: cloudy					
20 Remarks: ~					

21 Problems and Solutions:

Acquisition Flight Approved by
Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by
Signature over Printed Name
(PAF Representative)

Pilot-in-Command
Signature over Printed Name

Lidar Operator
Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1AGNOE243B Mission

DREAM Data Acquisition Flight Log 1AGNOE243B **Flight Log No.:**

1 LiDAR Operator: C. Joaquin	2 ALTM Model: Pegasus	3 Mission Name: PAM3382432A	4 Type: VFR	5 Aircraft Type: Cessna T206H	6 Aircraft Identification: RP-C9624
7 Pilot: Tangonan	8 Co-Pilot: Alfonso	9 Route: Clark			
10 Date: 05/3/13	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1505	14 Engine Off: 1755	15 Total Engine Time: 2+50	16 Take off:	17 Landing:	18 Total Flight Time: 2+35.
19 Weather					
20 Remarks: - mission aborted due to rain clouds, low visibility					

21 Problems and Solutions:

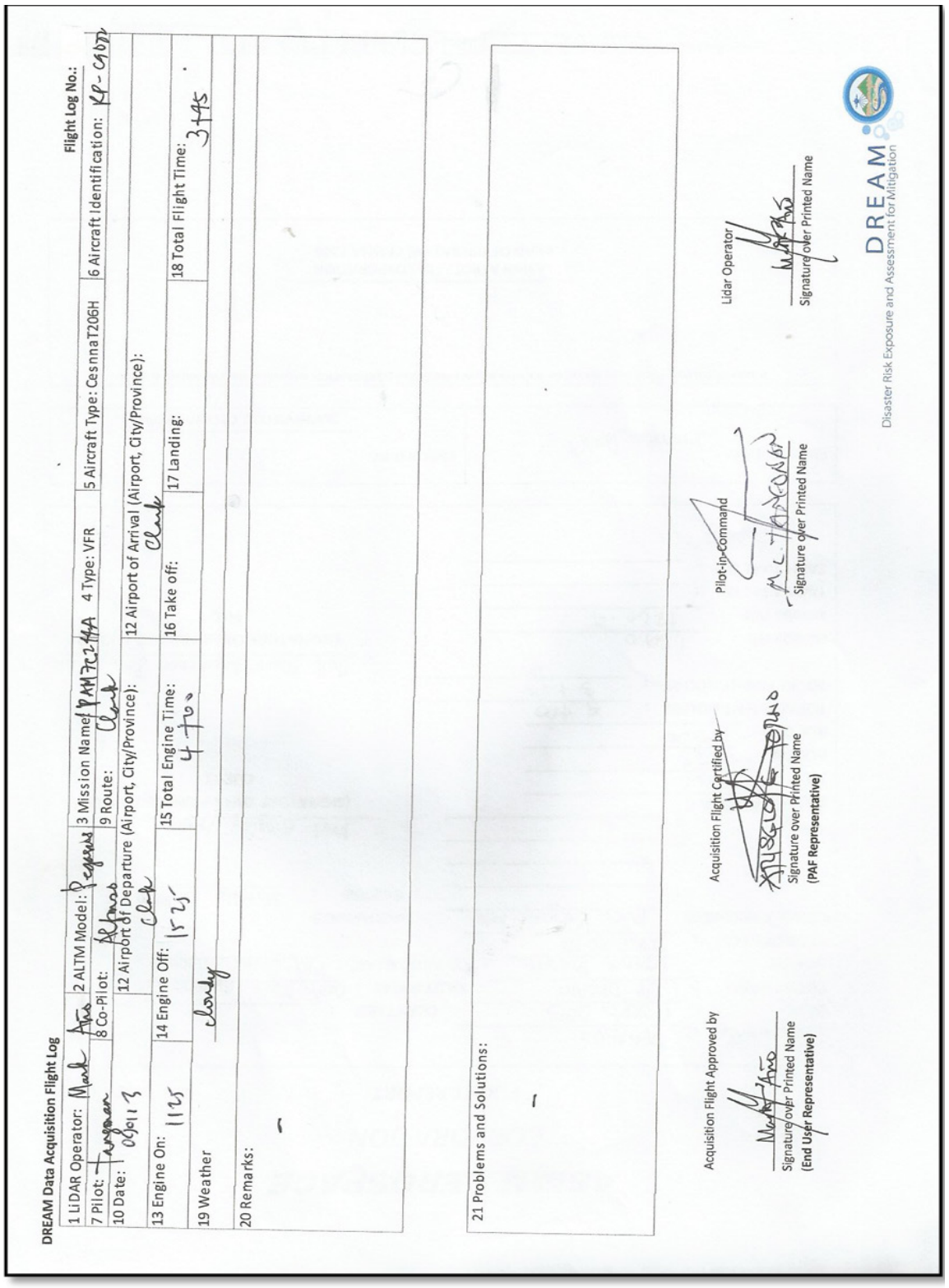
-

Acquisition Flight Approved by	Acquisition Flight Certified by	Pilot-in-Command	Lidar Operator
Signature over Printed Name (End User Representative)	Signature over Printed Name (PAF Representative)	Signature over Printed Name	Signature over Printed Name

DREAM
Disaster Risk Exposure and Assessment for Mitigation

Annex H

Flight Log for 1AGNOE244A Mission



DREAM Data Acquisition Flight Log

Flight Log No.:

1 LiDAR Operator: Mark Ace	2 ALTM Model: Pegasus	3 Mission Name: PAM3E244A	4 Type: VFR
5 Aircraft Type: CessnaT206H	6 Aircraft Identification: RP-C1077		
7 Pilot: Ferguson	8 Co-Pilot: Alonzo	9 Route: Clark	
10 Date: 06/11/23	12 Airport of Departure (Airport, City/Province): Clark	12 Airport of Arrival (Airport, City/Province): Clark	
13 Engine On: 1125	14 Engine Off: 1525	15 Total Engine Time: 4+00	16 Take off:
17 Landing:	18 Total Flight Time: 3+45		
19 Weather: cloudy			
20 Remarks: -			
21 Problems and Solutions: -			

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

Signature over Printed Name

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Disaster Risk Exposure and Assessment for Mitigation

Annex H. FLIGHT LOGS

Flight Log for 1PAM7C244A Mission

DREAM Data Acquisition Flight Log

Flight Log No.:

1 LiDAR Operator: Mark Ano	2 ALTM Model: Pegasus	3 Mission Name: PAM7C244A	4 Type: VFR	5 Aircraft Type: CesnnaT206H	6 Aircraft Identification: RP-C9077
7 Pilot: Tangonan	8 Co-Pilot: Alonzo	9 Route: Clark			
10 Date: 06/01/13	12 Airport of Departure (Airport, City/Province): Clark		12 Airport of Arrival (Airport, City/Province): Clark		
13 Engine On: 1125	14 Engine Off: 1525	15 Total Engine Time: 4+00	16 Take off:	17 Landing:	18 Total Flight Time: 3+45
19 Weather: cloudy					
20 Remarks: -					

21 Problems and Solutions: -

Acquisition Flight Approved by

Signature over Printed Name
(End User Representative)

Acquisition Flight Certified by

Signature over Printed Name
(PAF Representative)

Pilot-in-Command

Signature over Printed Name

Lidar Operator

Signature over Printed Name

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Disaster Risk Exposure and Assessment for Mitigation

Bibliography

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