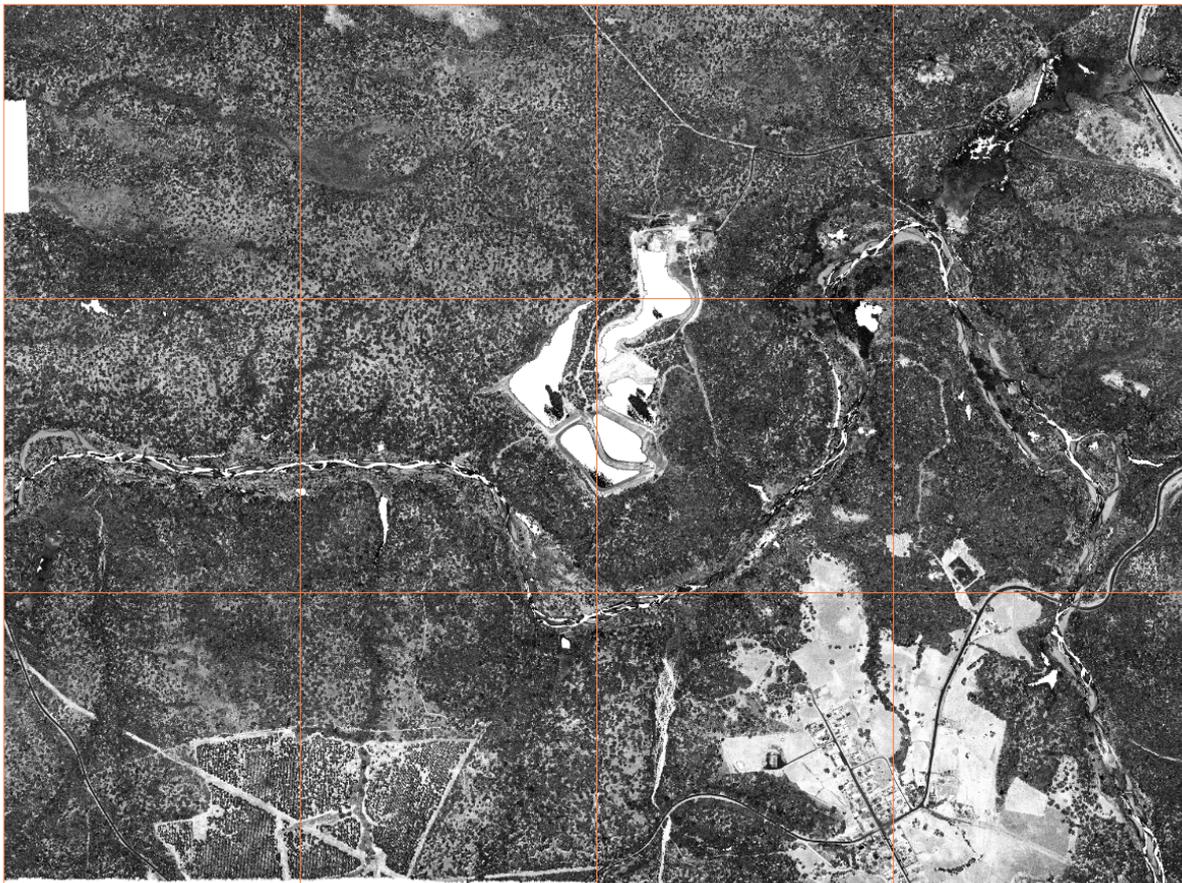Photomapping Project # 5818

Tasmania – Scotia Aerial Survey
LiDAR Acquisition

Project Summary

The Scotia project area was captured by Photomapping Services using our Optech Gemini LiDAR system (Airborne Laser Scanning) on the 20th of April 2017. The data was captured in order to provide classified laser, intensity images, DEM and DSM.

Figure 1.1: Scotia project area overlaid with index

1. Data supplied

- Classified laser points as LAS v1.2 tiles (AHD)
- Classified laser points as LAS v1.2 tiles (Ellipsoidal)
- Unclassified laser points as LAS v1.2 swaths (Ellipsoidal)
- 1m DEM as ESRI GRID
- 1m DSM as ESRI GRID
- Intensity image mosaic as ECW with 5:1 compression
- Intensity image tiles as GeoTIFF
- Tile index as ESRI shapefile
- GPS control points as ESRI shapefile
- Flightlines as ESRI shapefile

2. LiDAR Metadata

Acquisition Start Date	20th April 2017
Acquisition End Date	20th April 2017
Device Name	Optech 'ALTM Galaxy'
IMU / GPS	Trimble AP60 with AIMU-M4IMU (IMU-57) / Trimble AV39
Flying Height (AGL)	1200m
No. of Runs	5 + 1 cross strip
Swath Width	1125m
Flight Direction	E - W
Side Overlap	30%
Laser Scan Rate	350kHz
Laser Scan Angle	+/- 20 deg
Horizontal Datum	GDA94
Vertical Datum	AHD Ausgeoid09
Map Projection	MGA Zone 55
Description of Aerotriangulation Process	onboard IMU and GPS
Description of Rectification Process	4 surveyed GPS control points
Vertical Accuracy	±0.05m @ 1σ
Horizontal Accuracy	±0.15m @ 1σ
Surface Type	Classified laser Unclassified laser DEM DSM Intensity images
Average Point Separation	0.5m
Laser Return Types	1st through to 4th
Data Thinning	No
Limitations of Data	
Processing / Derivation Lineage	LiDAR data captured using onboard GPS, IMU and a network of ground basestations. Trajectories and laser data corrected initially using AusGeoid09 and then adjusted to AHD using a local base station. LiDAR data is classified into multiple ground and non-ground classes.

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3. Project Accuracy

3.1   Laser Accuracy
Airborne survey position was computed from the onboard Applanix dual frequency GPS receiver supplemented by corrections from the Applanix IMU in conjunction with a local GPS base station.

3.2   Achieving AHD
AusGeoid09 was used to shift the LiDAR data between ellipsoidal heights and AHD.

The base station Scottsdale was used as a reference point to which the surveyed control was fixed.

Point ID	Easting	Northing	Elevation	Horiz. Order	Vert. Order
7sct	542744.477	5443581.143	208.526	GPS	
7lau	515387.366	5411712.899		GPS	

Table 3.1 Published coordinates

Date	Point ID	Easting	Northing	Elevation
12th April	7sct	Fixed	Fixed	Fixed
	7lau	515387.359	5411712.904	38.036

Table 3.2 Adjusted Coordinates

Date	Point ID	Easting	Northing	Elevation
12th April	7lau	0.007	-0.005	

Table 3.3 Comparison of Published and Adjusted Coordinates

3.3   Ground Control
A comparison between the surveyed GPS ground control points and the adjusted laser ground heights for Scotia is listed below:

Point	Easting	Northing	AHD	Difference to laser
153	584496.346	5465622.974	43.285	0.034
154	584633.775	5465433.471	54.623	-0.004
155	584610.915	5465442.944	54.683	-0.009
156	585641.934	5465952.632	27.360	0.014

Average Dz	0.009
Minimum Dz	-0.009
Maximum Dz	0.034
Average Magnitude	0.015
Root Mean Square	0.019
Std Deviation	0.017

3.4   Fundamental Vertical Accuracy
Tested 0.037m fundamental vertical accuracy at 95% confidence level in open terrain using $RMSE_z$ x 1.9600.

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4. Deliverable Descriptions

4.1   Classified Laser (LAS v1.2)

The adjusted laser cloud was classified to meet the ASPRS Classification Scheme. This process involved automatic classification using customised macros, followed by evaluation of the ground classification and manual re-classification of any significant anomalies to meet Level 3 Ground Correction requirements. Any water bodies were classified at this stage into the 'water' class.

The classes utilised were:

1	Default	
2	Ground	
3	Low Vegetation	(0.0m – 0.3m above ground surface)
4	Medium Vegetation	(0.3m – 2.0m above ground surface)
5	High Vegetation	(> 2.0m above ground surface)
6	Buildings	
8	Model Key Points	
9	Water	
10	Bridge	
12	Overlap	

Classified laser is supplied as LAS v1.2 in 1km^2 tiles with all standard attributes including intensity values, return number and GPS time.

4.2   Digital Elevation Model (ESRI GRID)

A 1m triangulated grid was produced from the classified laser classes of ground, model key points and water (with a maximum triangle of 150m). The DEM is supplied in 1km^2 tiles as an ESRI GRID.

4.3   Digital Surface Model (ESRI Grid)

A 1m triangulated grid was produced from the first return LiDAR points (with a maximum triangle of 150m). The DSM is supplied in 1km^2 tiles as an ESRI GRID.

4.5   Intensity Images (ECW Mosaic and GeoTIFF)

Intensity rasters were generated from the first return laser points. The images are supplied as both an ECW mosaic with 5:1 compression and also as GeoTIFF 1km^2 tiles.

5. Additional Services

Photomapping Services are the mapping and airborne imagery specialists with a focus on delivering spatial solutions including: Photogrammetry, Aerial Photography and Digital Imagery, LiDAR Airborne Laser Scanning, GIS Data Capture, Revision and Management and Cartography and Custom Map Production.

For this project Photomapping Services can provide various other products derived from the LiDAR data.

For further information contact:

Peter Saunders
Photomapping Services
Ph: (03) 9328 3444

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