PHOTOMAPPING
precise spatial solutions

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Photomapping Project # 5818

Tasmania – Middleton Aerial Survey
LiDAR Acquisition

Project Summary

The Middleton project area was captured by Photomapping Services using our Optech Gemini LiDAR system (Airborne Laser Scanning) on the 19th of April 2017. The data was captured in order to provide classified laser, intensity images, DEM and DSM.

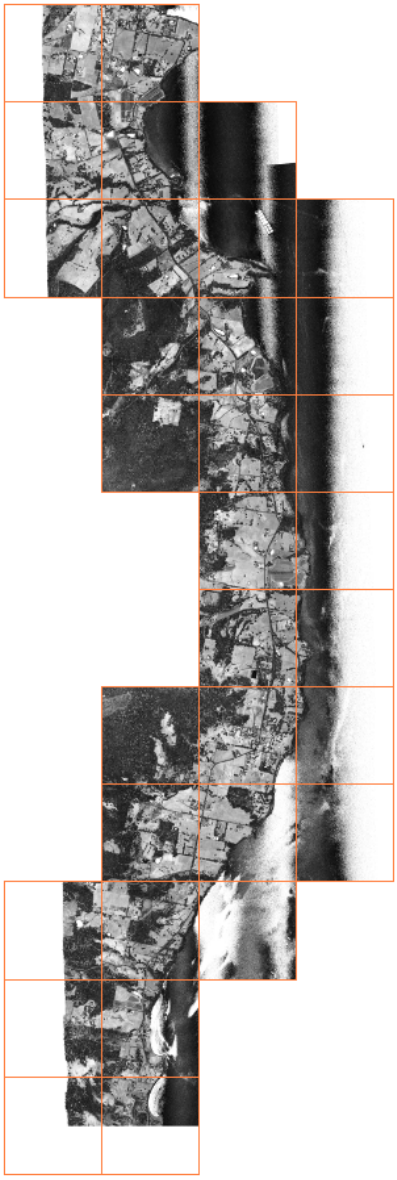

Figure 1.1: Middleton project area overlaid with index

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	19th April 2017
Acquisition End Date	19th April 2017
Device Name	Optech 'ALTM Galaxy'
IMU / GPS	Trimble AP60 with AIMU-M4IMU (IMU-57) / Trimble AV39
Flying Height (AGL)	1300m
No. of Runs	4
Swath Width	1125m
Flight Direction	N - S
Side Overlap	25%
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	6 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.

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 basestation Kingston was adjusted based on the height of 'SPM 7977' and the horizontal position of the basestation Hobart. These adjusted coordinates for Kingston were then used as fixed point for the Middleton surveyed control.

Point ID	Easting	Northing	Elevation	Horiz. Order	Vert. Order
SPM_7977			24.725	99	3
7hob	535873.404	5260777.22	GPS		
7kng	525410.720	5241838.358	GPS		
7kng (adjusted)	525410.719	5241838.363	25.935		

Table 3.1 Published coordinates

Date	Point ID	Easting	Northing	Elevation
8th April	7kng (adjusted)	Fixed	Fixed	Fixed

Table 3.2 Adjusted Coordinates

Date	Point ID	Easting	Northing	Elevation
8th April	7kng	-	-	

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 Lovely Banks is listed below:

Point	Easting	Northing	AHD	Difference to laser
29	520494.717	5216903.739	61.214	0.017
30	519671.386	5212054.993	30.927	-0.031
31	519541.344	5210172.871	1.501	-0.017
32	519544.675	5210184.877	1.527	-0.017
33	520740.246	5213307.643	15.812	0.034
34	520755.629	5213308.132	15.279	0.008

Average Dz	-0.001
Minimum Dz	-0.031
Maximum Dz	0.034
Average Magnitude	0.021
Root Mean Square	0.023
Std Deviation	0.023

3.4 Fundamental Vertical Accuracy

Tested 0.044m fundamental vertical accuracy at 95% confidence level in open terrain using $RMSE_z$ x 1.9600.

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	
14	Ocean	

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:

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