Imagery Product Specification and Description

Source:
Airborne Photogrammetric Point Cloud Anomalies

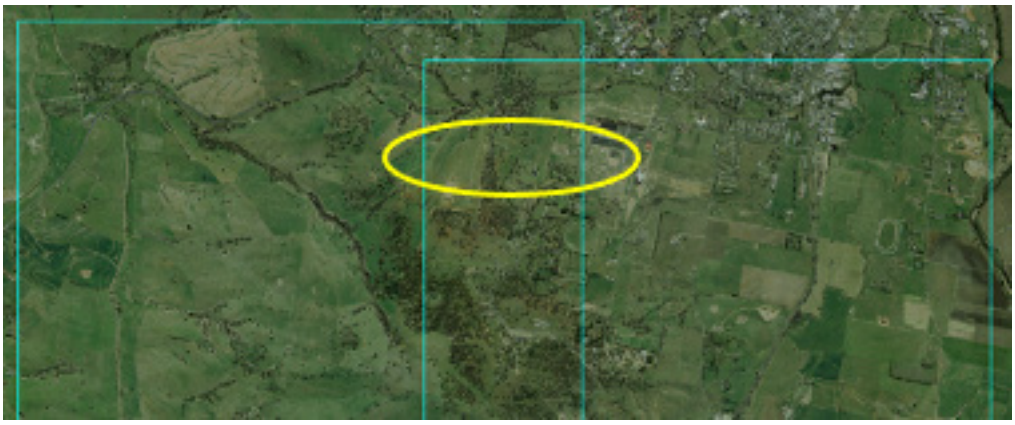
NSW GOVERNMENT

Contents

1. Raw Point Cloud Known Issues and Anomalies

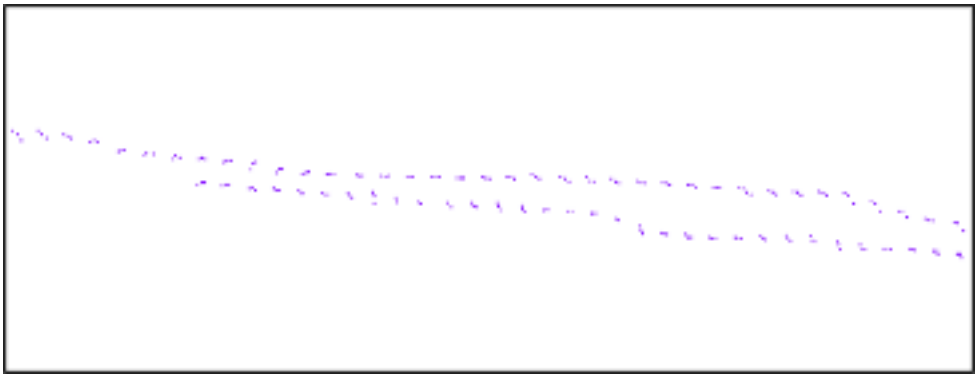
1.1. Anomaly: Overlap

No overlap exists between the data tiles in the north/south direction and the edge matching shows no anomalies. However in the east/west direction there is significant overlap between flight runs as seen in images below.



Depiction of overlap between flight runs in East/ West area.

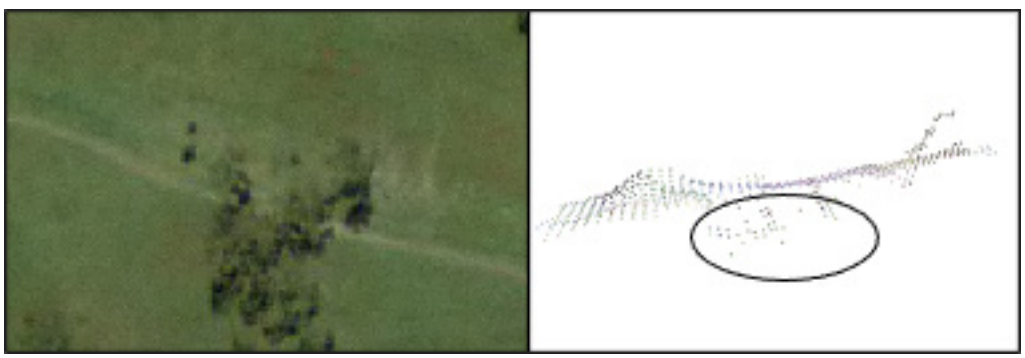
The image below is a typical profile across this overlap and shows a vertical difference between data from separate runs in the order of and sometimes exceeding one pixel (50 cm). If classifying this data, unless it is necessary for feature definition, any such overlap must be removed (class 12) and the edges of flight runs matched. Unlike Light Detection and Ranging (LiDAR), the vertical differences in the overlap are not systematic in any way. Similarly, adjacent map tiles will have significant overlap.



Representation of overlap data

1.2. Anomaly: Ground – near vegetation

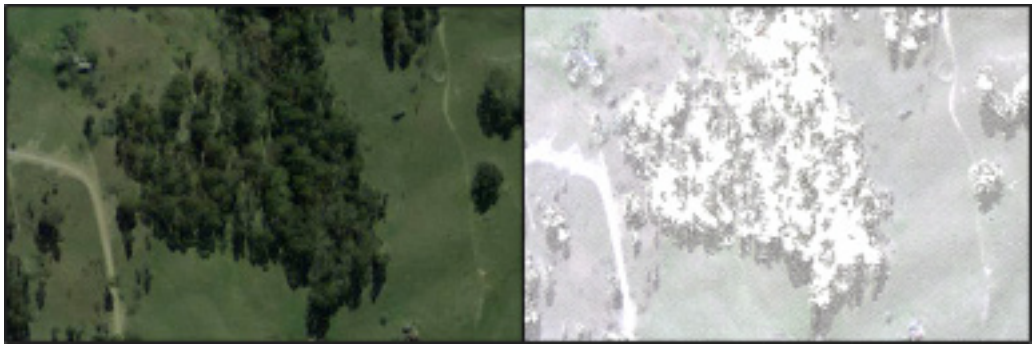
Many spurious, below ground, points exist in the vicinity of vegetation. If classifying this data, these points must be removed as noise (class 7).



Spurious ground data

1.3. Anomaly: Vegetation – canopy

The difficulty of matching pixels amongst the vegetation canopy leads to missing data, therefore any modelling of this above ground data must be undertaken with caution.



Data voids amongst vegetation

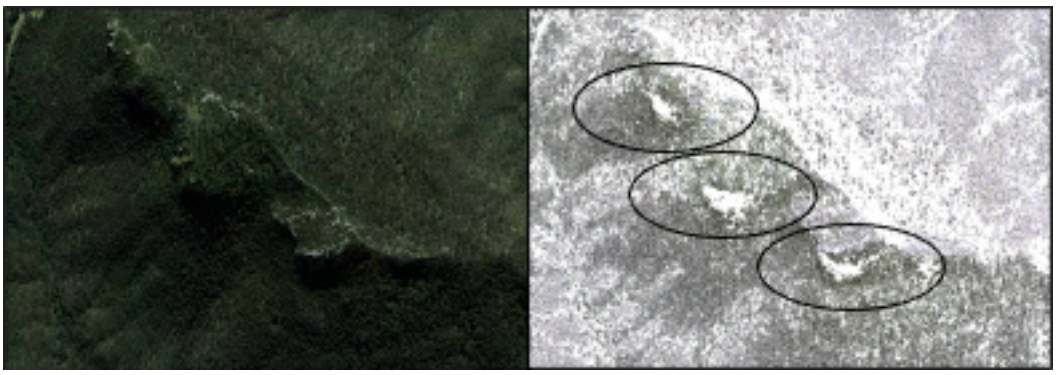
1.4. Anomaly: Steep slopes

Where the terrain slope is such that pixel matching is not possible, data voids will occur as seen in image below, which is further complicated by vegetation.

Data voids on steep slopes

1.5. Anomaly: Shadows

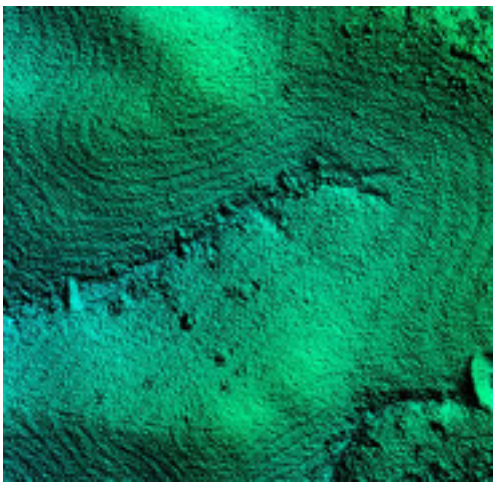
Photogrammetry is such that where there is shadow amongst the terrain, data voids may occur.



Data voids in shadows

1.6. Anomaly: Systematic noise on sloping ground

Currently the XPro DSM processing introduces a systematic contouring anomaly on sloping ground. Although this can be considered as part of the noise within the accuracy expectations it is never the less systematic and may have an effect on the final DEM.



Systematic contouring effect image

2. Uses, specifications and accuracy of the categories of digital elevation models

The below table has been derived from ICSM Guidelines for Digital Elevation Data Version 1.0, 12 August 2008.

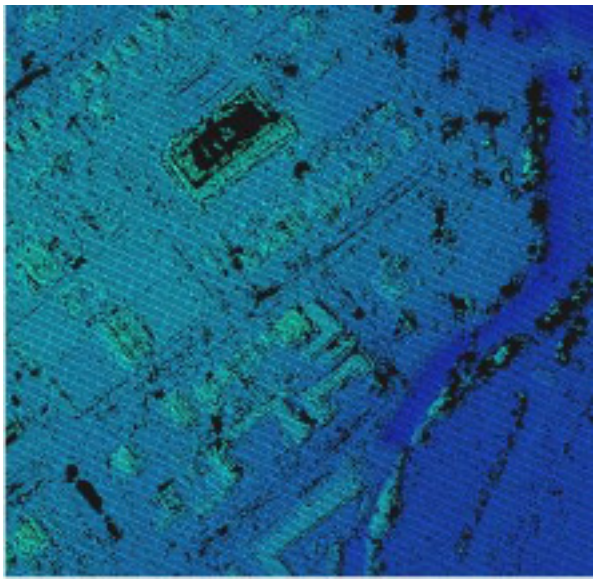
Category	Special	1	2	3
Typical Use	Surveys required for engineering and infrastructure design.	Modelling of inundation from floods or storm surges in areas of high value assets.	Modelling of inundation from floods or storm surges in areas with minimal infrastructure.	Modelling of large areas for preliminary route assessment.
Vertical Accuracy (RMSE, 1 sigma or 68%	<0.1 metre	+/-0.15 metre	+/-0.3 metre	+/-0.5 metre
Horizontal Accuracy (RMSE, 1 sigma or 68%)	<0.3 metre (typically 2 or 3 times the vertical accuracy)	+/-0.45 metre	+/-0.9 metre (+/-2 metres ALB)	+/-1.5 metre (+/-5 metres ALB)
Recommended Contour Interval	<0.3 metre	0.5 metre	1 metre	2 metres
Minimum Grid Cell Size (DEM)	<1 metre	1 metre	2 metres (5 metres ALB)	5 metres (10 metres ALB)
Maximum Tile Size	1km x 1km	2km x 2km	2km x 2km	4km x 4km

Accuracy is specified in terms of RMSE and refers to points/measurements on clear ground or seabed in the case of Airborne Laser Bathymetry (ALB).

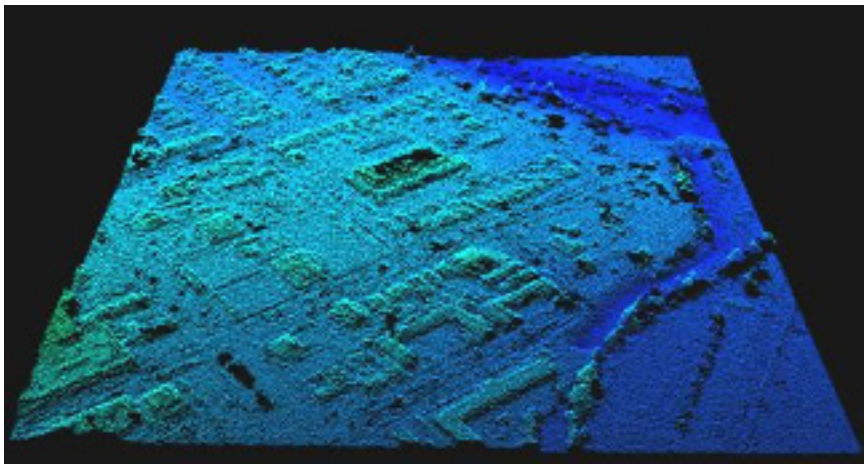
3. Product samples

These visualisations were created using FugroViewer software and data generated from 50cm GSD imagery.

3.1. Unclassified point cloud



2D visualisation of unclassified point cloud



3D visualisation of unclassified point cloud

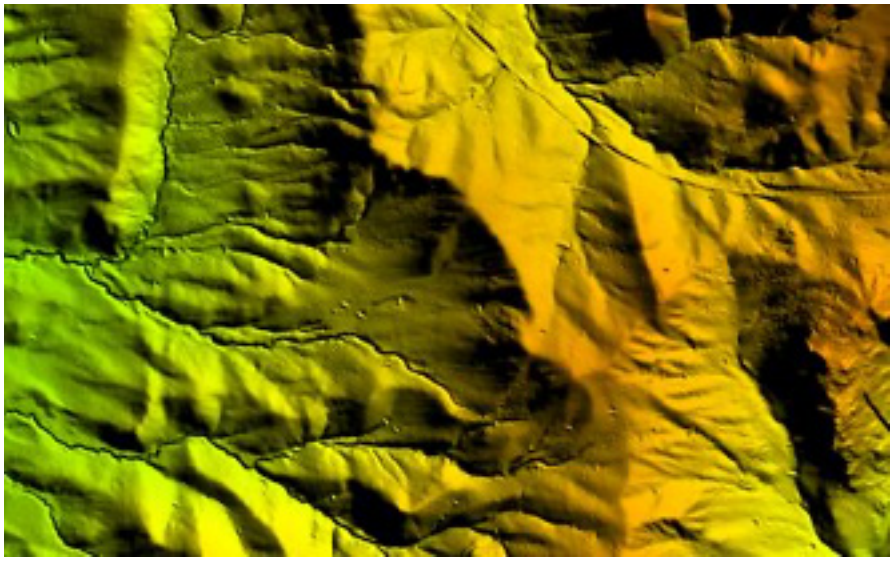
3.2. Unclassified point cloud displayed by RGB values

2D visualisation of unclassified point cloud displayed by RGB values

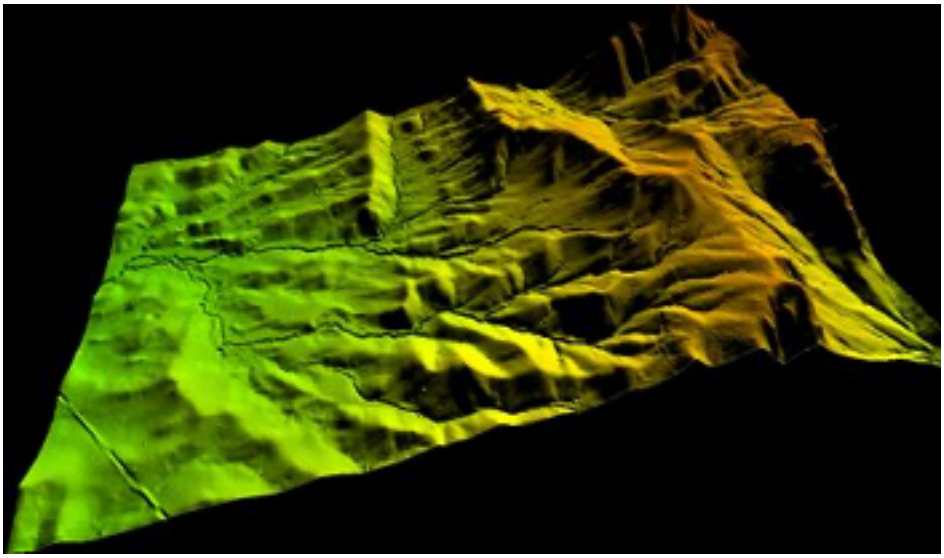
3D visualisation of unclassified point cloud displayed by RGB values

3.3. Digital elevation model data

This visualisation was created using the Global Mapper software package.



2D visualisation of DEM data



3D visualisation of DEM data