



**MMG LIDAR and ORTHOPHOTOGRAPHY  
Survey 2014**

**REPORT  
Outlining digital Data submitted June 2014**

**Author:** C. Booth

**Date:** 23<sup>th</sup> June 2014

**Submitted To:** Exploration Manager - Australia

**Copies To:** Tasmanian Regional Exploration Office Library  
Mineral Resources Tasmania, Hobart  
MMG – Melbourne Group office

**Submitted By:** **C. Booth**

**Accepted By:**

**Rosebery Report No:**

## CONTENTS

1. SUMMARY.....	3
2. APPENDIX.....	5

### LIST OF FIGURES

*Figure 1* Leases covered by the survey

### DIGITAL DATA

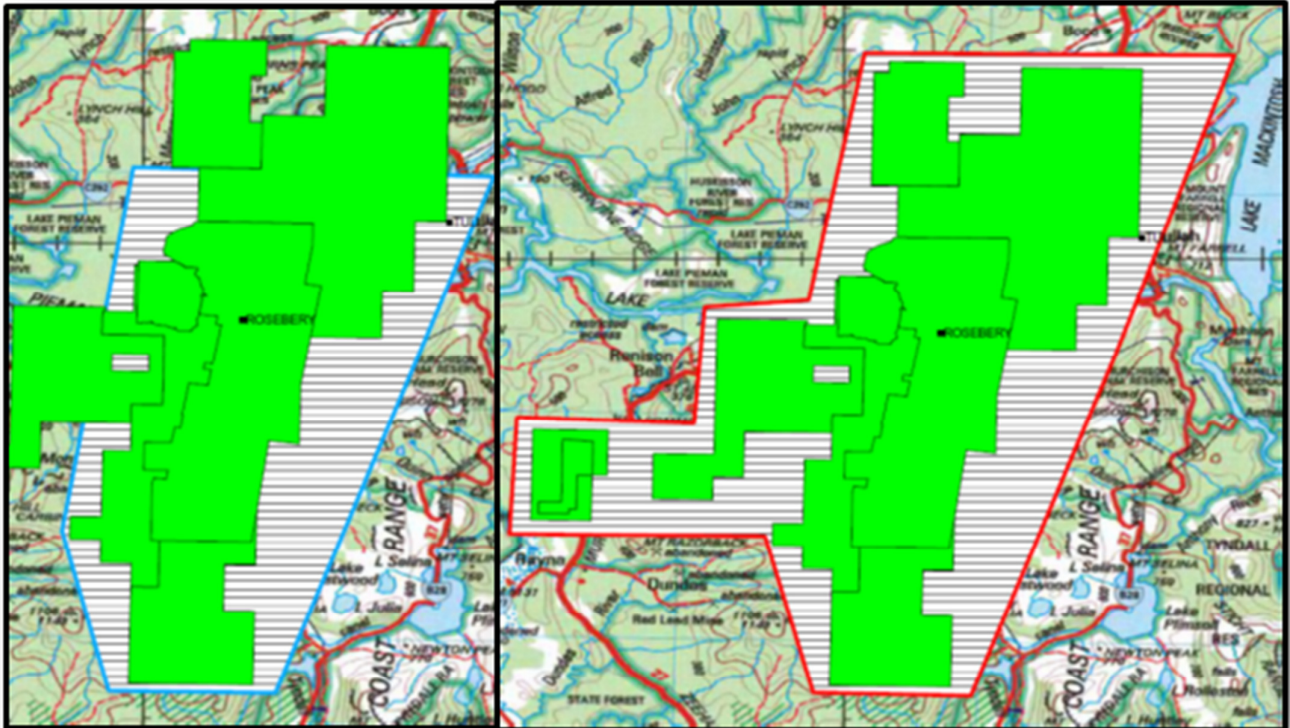
*USB1* LIDAR  
IMAGERY  
Report

### APPENDICES

*Appendix 1* IMAGERY METADATA  
*Appendix 2* LIDAR METADATA

## 1. SUMMARY

An aerial LIDAR and photogrammetric survey was flown over MMG tenements (Figure 1) in January 2014. This Report outlines the coverage and digital data submitted to MRT. All files are MGA Zone 55 (GDA 94).



*Figure 1, Leases covered by the survey, Blue is LIDAR and Red is Photography*

### **LIDAR DIGITAL DATA:**

Various LIDAR product files have been submitted in the following formats:

- “Ground Points”.XYZ
- “Vegetation Class 5”.XYZ
- “1m and 2m Gridded”.XYZ
- “intensity image” .ecw & .tiff
- “LIDAR classified data” .las

- “model key points” .XYZ
- “tile index” .TAB & .SHP

LIDAR files are 1kmX1km tiles Nomenclature refers to the Easting and Northing of the bottom left-hand corner.

### **IMAGERY DIGITAL DATA:**

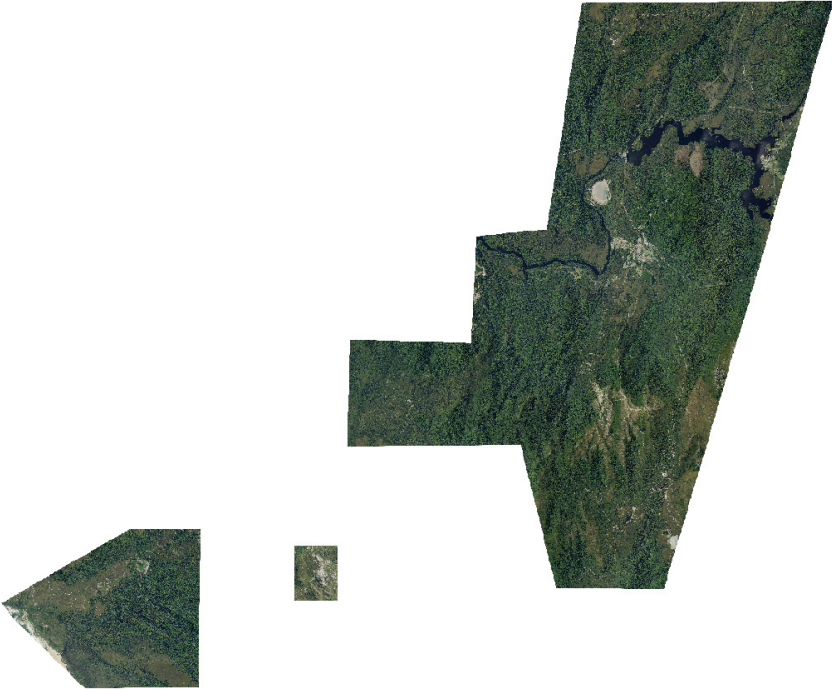
Imagery files have been submitted in the following formats:

- \*.ecw
- \*.Tiff

Image files are generally 1kmX1km tiles. Nomenclature refers to the Easting and Northing of the bottom left-hand corner.

## **2. APPENDIX**

## Appendix 1, Imagery Metadata

Record ID	Record
Metadata Filename	21496201_MMG_Tasmania_Metadata
Metadata Language	English
Metadata Character Set	ASCII
Metadata Point of Contact	Tony McDade [Project Manager] Fugro Spatial Solutions Pty Ltd Level 1, Brandl Street, Eight Mile Plains Qld 4113 Telephone: +61 7 3841 3433 <a href="mailto:t.mcdade@fugro.com">t.mcdade@fugro.com</a>
Metadata Date Stamp	24 February 2014
Dataset Title and Graphic Overview	MMG Tasmania Project Area 
Dataset Reference Date	Feb-14
Dataset Description Abstract	Tasmania Imagery and derived products
Dataset Language	English
Dataset Character Set	Orthoimagery.
Dataset Topic Category	25cm GSD tiled orthorectified digital imagery in Geotiff and ECW formats (with associated world files).
Geographic Location Description	Rosebery - Tasmania, Australia

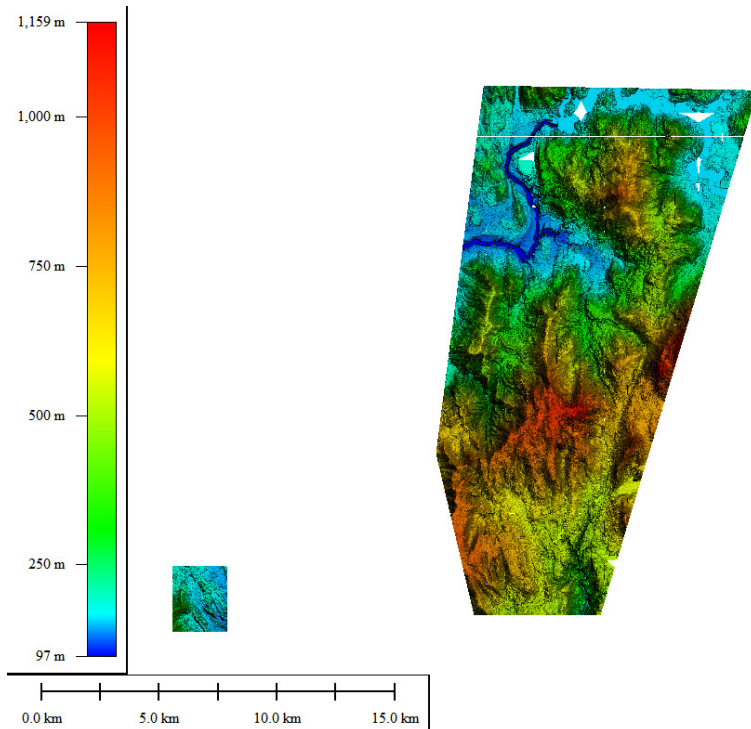
Geographic Bounding Box	UPPER LEFT X=347604.214 UPPER LEFT Y=5386131.450 LOWER RIGHT X=388040.524 LOWER RIGHT Y=5352818.960 WEST LONGITUDE=145° 09' 39.5769" E NORTH LATITUDE=41° 39' 43.2162" S EAST LONGITUDE=145° 39' 18.3169" E SOUTH LATITUDE=41° 58' 7.2258"
Acquisition Start Date	20 November 2013
Acquisition End Date	22 November 2013
Sensor Type Name	ADS40
Sensor/Lens serial ID	SN1319
Flying Height (AGL)	Approx. 8,300ft
INS / IMU Used	ADS40/ALS50
Number of Runs	22 (including four tie runs)
Swath Width	3,000m
Flight Direction	NE-SW.
Side Overlap (%)	25
Output Data Format	Digital orthorectified 25cm GSD imagery in Geotiff and ECW formats (with associated world files).
Imagery Pixel Size	25cm
Horizontal Datum	GDA94
Vertical Datum	AHD as defined by AUSGeoid09 v1
Map Projection	MGA Zone 55 South
Number of control points	42x Control points  Maximum changes at control points:  X: -0.0901 at Point ID.: OLD_3 Y: -0.0694 at Point ID.: PID01NAIL Z: -0.0774 at Point ID.: XP10  RMS of changes at control points:  X: 0.0736 Y: 0.0516 Z: 0.0393
Spatial Accuracy (Hz) meters	3 pixels @ 67 % CI (orthoimagery)
Spatial Accuracy (Vt) meters	
Surface Type	SGM.
Average Point Density	N/A
Laser Return Types	N/A
Data Thinning	N/A
Laser Footprint Size (meters)	N/A
Data Tile size (km 2)	1
Processing / Derivation Lineage	Leica's Xpro software was used to rectify geocoded raw L0 ADS imagery to orthorectified L2 imagery using an SGM.  Inpho's Orthovista was used to mosaic and colour balance the imagery.  Adobe Photoshop was used to edit and batch enhance the final output. ER Mapper was used to generate the final output deliverables.

Limitations of Data	This data has not been field tested for completeness or accuracy.
Conditions of Supply	<ol style="list-style-type: none"><li>1. This Metadata file is always to be stored with the unaltered data contained in this volume.</li><li>2. Any supplied data is to be used only for the purpose for which it was commissioned and in accordance with the terms of engagement.</li><li>3. Use of any supplied data for purposes other than those stated is entirely at the risk of the Client.</li></ol>

End of report.



## Appendix 2, LIDAR Metadata

Record ID	Record
Metadata Filename	22496201_MMG_Tasmania
Metadata Language	English
Metadata Character Set	ASCII (utf8)
Metadata Point of Contact	Tony McDade [Project Manager] Fugro Spatial Solutions Pty Ltd Level 1, Brandl Street, Eight Mile Plains Qld 4113 Telephone: +61738413433 T.McDade@fugro.com
Metadata Date Stamp	26/02/2014
Dataset Title and Graphic Overview	MMG ALS ADS Tasmania
Dataset Reference Date	Feb-2014
Dataset Description Abstract	MMG LiDAR derived products
Dataset Language	English
Dataset Character Set	ASCII
Dataset Topic Category	ALS DEM and Contours
Geographic Location Description	Rosebery, Tasmania, Australia  
Geographic Bounding Box	WEST LONGITUDE=145° 19' 55" E NORTH LATITUDE=41° 43' 6" S EAST LONGITUDE=145° 38' 8" E SOUTH LATITUDE=41° 55' 52" S
Acquisition Start Date	09/01/2014 [UTC]
Acquisition End Date	12/01/2014 [UTC]
Sensor Type Name	Leica ALS50-2
Flying Height (AGL) metres	1051-2067m

INS / IMU Used	IPAS10																																																																																																																																																																																																																																																						
Number of Runs	52																																																																																																																																																																																																																																																						
Swath Width (metres)	990																																																																																																																																																																																																																																																						
Flight Direction	Non-Cardinal																																																																																																																																																																																																																																																						
Side Overlap (%)	23																																																																																																																																																																																																																																																						
Output Data Format	<ul style="list-style-type: none"> <li>▪ Lidar Ground points in ASCII XYZ format</li> <li>▪ Lidar Tops of trees/veg. in ASCII XYZ format</li> <li>▪ Contours 0.5m in DXF and DGN formats</li> <li>▪ Ground gridded DEM 2m &amp; 1m tiles in ASCII XYZ format and overall ESRI ASCII Grid</li> <li>▪ Intensity Images are in Geotiff tiles and Overall ECW format</li> <li>▪ Lidar Classified data in LAS format</li> <li>▪ LiDAR Ground Model Key Points in ASCII XYZ format</li> </ul>																																																																																																																																																																																																																																																						
Horizontal Datum	GDA94																																																																																																																																																																																																																																																						
Vertical Datum	AHD																																																																																																																																																																																																																																																						
Map Projection	MGA Zone 55																																																																																																																																																																																																																																																						
Number of control points	27 inside the survey area																																																																																																																																																																																																																																																						
DZ Validation	<p><u>East</u></p> <table border="1"> <thead> <tr> <th>Number</th> <th>Easting</th> <th>Northing</th> <th>Known Z</th> <th>Laser Z</th> <th>Dz</th> </tr> </thead> <tbody> <tr><td>XP04B</td><td>382828.700</td><td>5373526.730</td><td>479.970</td><td>480.070</td><td>+0.100</td></tr> <tr><td>PID02SQUARE</td><td>382522.610</td><td>5365465.610</td><td>853.030</td><td>852.960</td><td>-0.070</td></tr> <tr><td>PID01NAIL</td><td>376001.560</td><td>5365064.490</td><td>932.490</td><td>932.430</td><td>-0.060</td></tr> <tr><td>XP15B</td><td>385443.600</td><td>5380962.520</td><td>187.370</td><td>187.420</td><td>+0.050</td></tr> <tr><td>XP03B</td><td>375412.520</td><td>5372941.980</td><td>154.680</td><td>154.730</td><td>+0.050</td></tr> <tr><td>XP16C</td><td>379643.330</td><td>5362477.160</td><td>525.170</td><td>525.210</td><td>+0.040</td></tr> <tr><td>XP03</td><td>375408.700</td><td>5372952.310</td><td>153.980</td><td>154.020</td><td>+0.040</td></tr> <tr><td>XP06C</td><td>376001.710</td><td>5365066.830</td><td>932.520</td><td>932.480</td><td>-0.040</td></tr> <tr><td>XP19B</td><td>385009.530</td><td>5375187.510</td><td>174.740</td><td>174.770</td><td>+0.030</td></tr> <tr><td>PID01B</td><td>376003.380</td><td>5365066.520</td><td>932.590</td><td>932.560</td><td>-0.030</td></tr> <tr><td>XP06B</td><td>378982.190</td><td>5366465.760</td><td>1118.190</td><td>1118.160</td><td>-0.030</td></tr> <tr><td>XP16D</td><td>379646.430</td><td>5362477.230</td><td>525.170</td><td>525.190</td><td>+0.020</td></tr> <tr><td>XP04</td><td>382828.780</td><td>5373522.450</td><td>479.950</td><td>479.970</td><td>+0.020</td></tr> <tr><td>XP02B</td><td>378882.340</td><td>5374046.060</td><td>185.360</td><td>185.340</td><td>-0.020</td></tr> <tr><td>XP14B</td><td>377747.930</td><td>5378928.750</td><td>163.990</td><td>163.970</td><td>-0.020</td></tr> <tr><td>XP14</td><td>377746.840</td><td>5378933.100</td><td>164.040</td><td>164.020</td><td>-0.020</td></tr> <tr><td>XP15</td><td>385415.630</td><td>5381027.370</td><td>190.860</td><td>190.880</td><td>+0.020</td></tr> <tr><td>PID02CROSS</td><td>382516.340</td><td>5365461.630</td><td>851.520</td><td>851.510</td><td>-0.010</td></tr> <tr><td>XP06A</td><td>378966.900</td><td>5366432.710</td><td>1119.190</td><td>1119.200</td><td>+0.010</td></tr> <tr><td>XP19</td><td>384989.910</td><td>5375184.040</td><td>174.890</td><td>174.880</td><td>-0.010</td></tr> <tr><td>XP06D</td><td>376055.440</td><td>5365138.090</td><td>939.310</td><td>939.300</td><td>-0.010</td></tr> <tr><td>XP02</td><td>378886.020</td><td>5374045.000</td><td>185.420</td><td>185.420</td><td>+0.000</td></tr> <tr><td>Average dz</td><td>+0.003</td><td></td><td></td><td></td><td></td></tr> <tr><td>Minimum dz</td><td>-0.070</td><td></td><td></td><td></td><td></td></tr> <tr><td>Maximum dz</td><td>+0.100</td><td></td><td></td><td></td><td></td></tr> <tr><td>Average magnitude</td><td>0.032</td><td></td><td></td><td></td><td></td></tr> <tr><td>Root mean square</td><td>0.039</td><td></td><td></td><td></td><td></td></tr> <tr><td>Std deviation</td><td>0.040</td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <p><u>West</u></p> <table border="1"> <thead> <tr> <th>Number</th> <th>Easting</th> <th>Northing</th> <th>Known Z</th> <th>Laser Z</th> <th>Dz</th> </tr> </thead> <tbody> <tr><td>XP1_2014</td><td>364173.812</td><td>5356846.024</td><td>139.017</td><td>138.990</td><td>-0.027</td></tr> <tr><td>XP2_2014</td><td>361739.403</td><td>5357174.379</td><td>390.814</td><td>390.810</td><td>-0.004</td></tr> <tr><td>XP2A_2014</td><td>362387.894</td><td>5357616.455</td><td>191.391</td><td>191.400</td><td>+0.009</td></tr> <tr><td>XP3_2014</td><td>361837.498</td><td>5360004.146</td><td>210.648</td><td>210.680</td><td>+0.032</td></tr> <tr><td>XP4_2014</td><td>363920.881</td><td>5361533.324</td><td>163.460</td><td>163.440</td><td>-0.020</td></tr> <tr><td>Average dz</td><td>-0.002</td><td></td><td></td><td></td><td></td></tr> <tr><td>Minimum dz</td><td>-0.027</td><td></td><td></td><td></td><td></td></tr> <tr><td>Maximum dz</td><td>+0.032</td><td></td><td></td><td></td><td></td></tr> <tr><td>Average magnitude</td><td>0.018</td><td></td><td></td><td></td><td></td></tr> <tr><td>Root mean square</td><td>0.021</td><td></td><td></td><td></td><td></td></tr> <tr><td>Std deviation</td><td>0.024</td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	Number	Easting	Northing	Known Z	Laser Z	Dz	XP04B	382828.700	5373526.730	479.970	480.070	+0.100	PID02SQUARE	382522.610	5365465.610	853.030	852.960	-0.070	PID01NAIL	376001.560	5365064.490	932.490	932.430	-0.060	XP15B	385443.600	5380962.520	187.370	187.420	+0.050	XP03B	375412.520	5372941.980	154.680	154.730	+0.050	XP16C	379643.330	5362477.160	525.170	525.210	+0.040	XP03	375408.700	5372952.310	153.980	154.020	+0.040	XP06C	376001.710	5365066.830	932.520	932.480	-0.040	XP19B	385009.530	5375187.510	174.740	174.770	+0.030	PID01B	376003.380	5365066.520	932.590	932.560	-0.030	XP06B	378982.190	5366465.760	1118.190	1118.160	-0.030	XP16D	379646.430	5362477.230	525.170	525.190	+0.020	XP04	382828.780	5373522.450	479.950	479.970	+0.020	XP02B	378882.340	5374046.060	185.360	185.340	-0.020	XP14B	377747.930	5378928.750	163.990	163.970	-0.020	XP14	377746.840	5378933.100	164.040	164.020	-0.020	XP15	385415.630	5381027.370	190.860	190.880	+0.020	PID02CROSS	382516.340	5365461.630	851.520	851.510	-0.010	XP06A	378966.900	5366432.710	1119.190	1119.200	+0.010	XP19	384989.910	5375184.040	174.890	174.880	-0.010	XP06D	376055.440	5365138.090	939.310	939.300	-0.010	XP02	378886.020	5374045.000	185.420	185.420	+0.000	Average dz	+0.003					Minimum dz	-0.070					Maximum dz	+0.100					Average magnitude	0.032					Root mean square	0.039					Std deviation	0.040					Number	Easting	Northing	Known Z	Laser Z	Dz	XP1_2014	364173.812	5356846.024	139.017	138.990	-0.027	XP2_2014	361739.403	5357174.379	390.814	390.810	-0.004	XP2A_2014	362387.894	5357616.455	191.391	191.400	+0.009	XP3_2014	361837.498	5360004.146	210.648	210.680	+0.032	XP4_2014	363920.881	5361533.324	163.460	163.440	-0.020	Average dz	-0.002					Minimum dz	-0.027					Maximum dz	+0.032					Average magnitude	0.018					Root mean square	0.021					Std deviation	0.024				
Number	Easting	Northing	Known Z	Laser Z	Dz																																																																																																																																																																																																																																																		
XP04B	382828.700	5373526.730	479.970	480.070	+0.100																																																																																																																																																																																																																																																		
PID02SQUARE	382522.610	5365465.610	853.030	852.960	-0.070																																																																																																																																																																																																																																																		
PID01NAIL	376001.560	5365064.490	932.490	932.430	-0.060																																																																																																																																																																																																																																																		
XP15B	385443.600	5380962.520	187.370	187.420	+0.050																																																																																																																																																																																																																																																		
XP03B	375412.520	5372941.980	154.680	154.730	+0.050																																																																																																																																																																																																																																																		
XP16C	379643.330	5362477.160	525.170	525.210	+0.040																																																																																																																																																																																																																																																		
XP03	375408.700	5372952.310	153.980	154.020	+0.040																																																																																																																																																																																																																																																		
XP06C	376001.710	5365066.830	932.520	932.480	-0.040																																																																																																																																																																																																																																																		
XP19B	385009.530	5375187.510	174.740	174.770	+0.030																																																																																																																																																																																																																																																		
PID01B	376003.380	5365066.520	932.590	932.560	-0.030																																																																																																																																																																																																																																																		
XP06B	378982.190	5366465.760	1118.190	1118.160	-0.030																																																																																																																																																																																																																																																		
XP16D	379646.430	5362477.230	525.170	525.190	+0.020																																																																																																																																																																																																																																																		
XP04	382828.780	5373522.450	479.950	479.970	+0.020																																																																																																																																																																																																																																																		
XP02B	378882.340	5374046.060	185.360	185.340	-0.020																																																																																																																																																																																																																																																		
XP14B	377747.930	5378928.750	163.990	163.970	-0.020																																																																																																																																																																																																																																																		
XP14	377746.840	5378933.100	164.040	164.020	-0.020																																																																																																																																																																																																																																																		
XP15	385415.630	5381027.370	190.860	190.880	+0.020																																																																																																																																																																																																																																																		
PID02CROSS	382516.340	5365461.630	851.520	851.510	-0.010																																																																																																																																																																																																																																																		
XP06A	378966.900	5366432.710	1119.190	1119.200	+0.010																																																																																																																																																																																																																																																		
XP19	384989.910	5375184.040	174.890	174.880	-0.010																																																																																																																																																																																																																																																		
XP06D	376055.440	5365138.090	939.310	939.300	-0.010																																																																																																																																																																																																																																																		
XP02	378886.020	5374045.000	185.420	185.420	+0.000																																																																																																																																																																																																																																																		
Average dz	+0.003																																																																																																																																																																																																																																																						
Minimum dz	-0.070																																																																																																																																																																																																																																																						
Maximum dz	+0.100																																																																																																																																																																																																																																																						
Average magnitude	0.032																																																																																																																																																																																																																																																						
Root mean square	0.039																																																																																																																																																																																																																																																						
Std deviation	0.040																																																																																																																																																																																																																																																						
Number	Easting	Northing	Known Z	Laser Z	Dz																																																																																																																																																																																																																																																		
XP1_2014	364173.812	5356846.024	139.017	138.990	-0.027																																																																																																																																																																																																																																																		
XP2_2014	361739.403	5357174.379	390.814	390.810	-0.004																																																																																																																																																																																																																																																		
XP2A_2014	362387.894	5357616.455	191.391	191.400	+0.009																																																																																																																																																																																																																																																		
XP3_2014	361837.498	5360004.146	210.648	210.680	+0.032																																																																																																																																																																																																																																																		
XP4_2014	363920.881	5361533.324	163.460	163.440	-0.020																																																																																																																																																																																																																																																		
Average dz	-0.002																																																																																																																																																																																																																																																						
Minimum dz	-0.027																																																																																																																																																																																																																																																						
Maximum dz	+0.032																																																																																																																																																																																																																																																						
Average magnitude	0.018																																																																																																																																																																																																																																																						
Root mean square	0.021																																																																																																																																																																																																																																																						
Std deviation	0.024																																																																																																																																																																																																																																																						

Spatial Accuracy (Hz) metres	0.4m at 1SD
Spatial Accuracy (Vt) metres	0.20m at 1SD
Surface Type	Various
Data Tile size (km <sup>2</sup> )	1km <sup>2</sup>
Processing / Derivation Lineage	<p><b>Ground Classifications</b> Fugro Spatial Solutions Pty Ltd aim is to select those points that are part of a clean ground surface, which might not be 100% of the ground hits. This results in a cleaner dataset, without compromising on terrain detail and accuracy. Ground filtering algorithms, tailored for this project, data type and terrain type, are applied to the full dataset. The ground filtered dataset is then visually checked by an operator, and incorrectly classified data is corrected or the ground filtering algorithm is adjusted and then visually checked. For the verification of the ground classifications, intensity imagery is used as a backdrop image.</p> <p><b>Ground Surface DEM</b> This dataset consists of every point that is part of the classified ground surface.</p> <p><b>Gridded Ground DEM</b> A 2m gridded DEM is generated from the ground surface. The height for each grid point is by triangulation between the three nearest DEM ground points.</p> <p><b>Model Keypoints</b> A resampled ground dataset, consisting of only those points that actually contribute to the shape of the terrain (+/- 15cm), with a minimum point density of 1 point every 10 m.</p> <p><b>Contours</b> Triangles are built from the model keypoint DEM. Height points at the required interval are interpolated on the triangle lines and these heights points connected with smooth splines. The splines for each height are then merged to become final contours.</p> <p>The tiled data has been cut into <b>1km</b> tiles, where the file name prefix corresponds with the <b>Lower Left</b> coordinate of the block.</p>
Limitations of Data	All data achieved specification
Conditions of Supply	<ol style="list-style-type: none"> <li>1. This Metadata file is always to be stored with the unaltered data contained in this volume.</li> <li>2. Any supplied data is to be used only for the purpose for which it was commissioned and in accordance with the terms of engagement.</li> <li>3. Use of any supplied data for purposes other than those stated is entirely at the risk of the Client.</li> </ol>

End of report

