

MARLBOROUGH DISTRICT COUNCIL

MARLBOROUGH DC LIDAR 2018

VOLUME PRJ31392NOM02

Summary

Project

AAM was engaged by Marlborough District Council to undertake a LiDAR survey over parts of the District.

This volume contains the final data output over Flaxbourne, Grassmere, Lower Awatere and Picton-Waikawa. Data acquisition over these sites was from a fixed wing aircraft between 26th May - 12th of September 2018.

(Voids in the previous volume PRJ31392NOM01, have been filled)

Data

Products supplied in this volume as follows:

- Ancillary files:
 - Flight Trajectories in Shapefile
 - Project Extent and Tile Layout in Shapefile Format
 - Project Report
- Products in NZTopo50 1:1000 tiles include:
 - Classified Point Cloud in LAS 1.2
 - Digital Elevation Model – GeoTIFF, 1m interval
 - Digital Surface Model - GeoTIFF, 1m interval
 - Intensity Images - GeoTIFF
 - 0.5m Contours - Shapefile

The project pulse density specification is 3.5 points per square metre and the vertical accuracy specification is 0.1m (68% confidence). This data is supplied in NZTM2000 map projection, and NZVD2016 vertical datum.

Ref: PRJ31392

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1. PROJECT REPORT

Safety: No safety Incidents were reported during the project

Acquisition: Airborne Laser Scanning (ALS), was acquired from a fixed wing aircraft between 25th May - 12th September 2018. Dates for flight lines are shown in the trajectory file supplied.

Proj.No.	Date	Flight #	Status	Survey Start	Survey End
PRJ31392	26/05/2018	1	Successful Capture	11:07 a.m.	2:30 p.m.
PRJ31392	6/08/2018	2	Successful Capture	11:21 a.m.	2:17 p.m.
PRJ31392	13/07/2018	3	Successful Capture	12:40 p.m.	4:52 p.m.
PRJ31392	14/07/2018	4	Successful Capture	8:29 a.m.	10:26 a.m.
PRJ31392	14/07/2018	5	Successful Capture	12:12 p.m.	5:01 p.m.
PRJ31392	17/07/2018	6	Successful Capture	9:55 a.m.	1:27 p.m.
PRJ31392	17/07/2018	7	Successful Capture	4:22 p.m.	5:21 p.m.
PRJ31392	18/07/2018	8	Successful Capture	10:30 a.m.	12:15 p.m.
PRJ31392	18/07/2018	9	Successful Capture	2:30 p.m.	4:54 p.m.
PRJ31392	19/07/2018	10	Successful Capture	10:13 a.m.	11:11 a.m.
PRJ31392	28/07/2018	11	Successful Capture	10:11 a.m.	12:54 p.m.
PRJ31392	09/08/2018	12	Successful Capture	1:36 p.m.	4:17 p.m.
PRJ31392	26/08/2018	13	Successful Capture	12:40 p.m.	3:38 p.m.
PRJ31392	12/09/2018	14	Successful Capture	10:03 a.m.	12:30 p.m.

Coastal areas were flown within 3 hours of low tide.

Voids discovered during data processing in Flaxbourne and Picton were reflighted in flight 14, and merged into the project to provide complete coverage in this volume.

Ground Support: GPS base station support was sourced from GeoNET CORS. The field survey of check sites completed by Sound Surveying Ltd allowed an assessment of the accuracy of the ALS data.

Sounds Surveying observed several of the LINZ geodetic marks near the check site locations. Irregular shifts were observed at some sites, and we note that LINZ downgraded the order on many of the points in this area on 1 August 2018. A table of the comparison between co-ordinates observed by Sounds Surveying and co-ordinates on the LINZ Geodetic Database can be found in Appendix A.

As a result, the field survey of Test Points in the Cape Campbell area was computed relative to Cape Campbell No 2 CORS site (CMBL, coordinates as authorized on 14 Jan 2018), no adjustment was made relative to the local geodetic marks.

Data Processing: Reduction of the ALS data proceeded without any significant problems. Laser strikes were classified into ground and non-ground points using a single algorithm across the project area. Manual checking and editing of the data classification further improved the quality of the terrain model. Ground and water classes have been classified to ICSM Level 2.

ArcGIS 10.1 Terrain Grids were derived using the Natural Neighbour interpolation. This method uses the closest triangles and applies weights to the proportionate areas from the grid cell centroid to interpolate the value. It uses known elevation data, it does not make any predictions regarding the surface and accurately depicts existing troughs and peaks in the data and supports irregular point spacing, which suits the nature LiDAR data.

Breaklines have been used where required to ensure hydro flattening on the DEM products as per the LINZ DEM requirements.

The contours supplied on this volume are engineering contours. They are compiled from a rigorous triangulation of the supplied data. No cartographic licence has been applied. They are intended to provide a visual representation of the terrain data and are not suitable to be used as a cartographic map.

Data Presentation: The data provided on this volume has been supplied in accordance with a specification agreed with the primary client. Subsequent users experiencing difficulties in handling the data should please contact AAM to arrange a more appropriate data presentation.

Further Issues: There are no further issues to report.

Project Contacts:

Client

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Company

Marlborough District Council

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2. DATA INSTALLATION

Data format	: LAS, SHP, PDF, TIFF
Number & type of media	: HDD & FTP
Information files on media	: Readme_PRJ31392NOM02.pdf
Data formatted on	: 28/09/2018
Disk volume	: PRJ31392NOM02

FILE SIZES AND NAMES

Data is provided in LINZ NZTopo50, 1:1000 tiles 480m by 720m to the following filenaming convention:

Structure: *PRODUCT_ID_Sheet_Year_Scale_Tile.abc*

Classified Point Cloud	e.g. C2_BM24_2018_1000_4638.las
Contours	e.g. C_BM24_2018_1000_4638.shp
DEM	e.g. DEM_BM24_2018_1000_4734.tif
DSM	e.g. DSM_BM24_2018_1000_4734.tif
Intensity images	e.g. INT_BM24_2018_1000_4734.tif

Folder structure is also used to differentiate products.

LAS file point classifications levels are formatted to comply with ASPRS Standard LiDAR Point Classes.

1	Default
2	Ground
9	Water

3. ADDITIONAL SERVICES

Product Generation

AAM can perform the following additional services on the data contained on this volume if required:

Change horizontal datum	: to another local grid
Alter geoid modeling	: by transforming ALS data to fit orthometric survey heights
Improve data classification	: by tailoring parameters to suit regional variations
Further classification	: assist building identification by further classifying non-ground strikes
Data thinning	: to remove superfluous points not adding to the terrain definition
Data subset	: by dividing the data into different tiles or polygons
Data presentation	: by creating contours, profiles, perspectives, flythrough, colour-coded height plots etc.
Ground truthing	: by comparing the ALS terrain model with extra independent height data
Data gridding	: to convert the measured spot heights into a regular grid
Extra data	: extra data was collected beyond that supplied on this volume (see below)
Intensity Image	: grayscale image created from laser's intensity returns
Fly – Through/3d Perspectives	: image draping /slope models

4. METADATA

SOURCE DATA

Item	Source	Description	Ref No	Date
Laser System	AAM	H300	31392	26/05/2018 – 12/09/2018
GPS Base Data	GeoNET	CORS	“	“
Base Stn Coords	GeoNET	Static RTK	“	“
Field Survey Data	Sounds Surveying Ltd	RTK GPS	“	18-26/05/2018

LASER DATA CHARACTERISTICS

Characteristic	Description
Device Name	H300
Half Scan Angle	9.5 degrees
Laser Pulse Rate	250 kHz
Laser Pulse Mode	Multi Pulse
Average Point Spacing	3.5 pts/m ²
Laser return	1 st , 2 nd , 3 rd and last
File Format	LAS 1.2
Horizontal Datum	NZGD2000
Vertical Datum	NZVD2016
Map Projection	NZTM
Vertical Accuracy Specification	±0.1m Standard Error (68% confidence level or 1 sigma)
Horizontal Accuracy Specification	±0.50m Standard Error (68% confidence level or 1 sigma)

REFERENCE SYSTEMS

	Horizontal	Vertical
Datum	NZGD2000	NZVD2016
Projection	NZTM	N/A
Geoid Model	N/A	NZ Geoid 2016

5. ACCURACY

PROJECT DESIGN ACCURACY

Project specifications and technical processes were designed to achieve data accuracies as follows:

	Measured Point	Basis of Estimation
Vertical data Horizontal data Test points	0.10 < 0.50m 0.05m	Project Design System specifications (1/5500 x flying height) Survey methodology used

Notes on Expected Accuracy

- Values shown are at 68% confidence interval, in metres.
- “Measured points” are those observed directly.
- Accuracy estimates for terrain modelling refer to the terrain definition on clear ground. Ground definition in vegetated terrain may contain localized areas with systematic errors or outliers which fall outside this accuracy estimate.
- Laser strikes have been classified into “ground” and “non-ground”, based upon algorithms tailored for major terrain/vegetation combinations existing in the project area. The definition of the ground may be less accurate in isolated pockets of dissimilar terrain/vegetation combinations.

LIMITATIONS OF DATA

- The definition of the ground under trees may be less accurate.

DATA VALIDATION

- Ground data in this volume has been compared to 724 test points obtained by field survey and assumed to be error-free. The test points were distributed across the mapping area and located on clear open ground. The mean difference has been removed from the data. Final accuracy calculated after removing the mean offset yielded:

Area	No of Test Sites	No. of Points	Mean Difference (m)	Std Deviation (m)	RMS (m)
Flaxbourne, Grassmere, Lower Awatere	12	724	0.003	0.073	0.073
Picton - Waikawa	2	92	0.004	0.034	0.034

- Data classification has been manually checked and edited against any available imagery.

USE OF DATA

- Intended use : Preliminary Design subject to final survey
- Intended use : Planning, Conceptual Design
- Intended scale of use : 1:1000

6. CONDITIONS OF SUPPLY

The data in this volume has been commissioned by **MARLBOROUGH DISTRICT COUNCIL**.

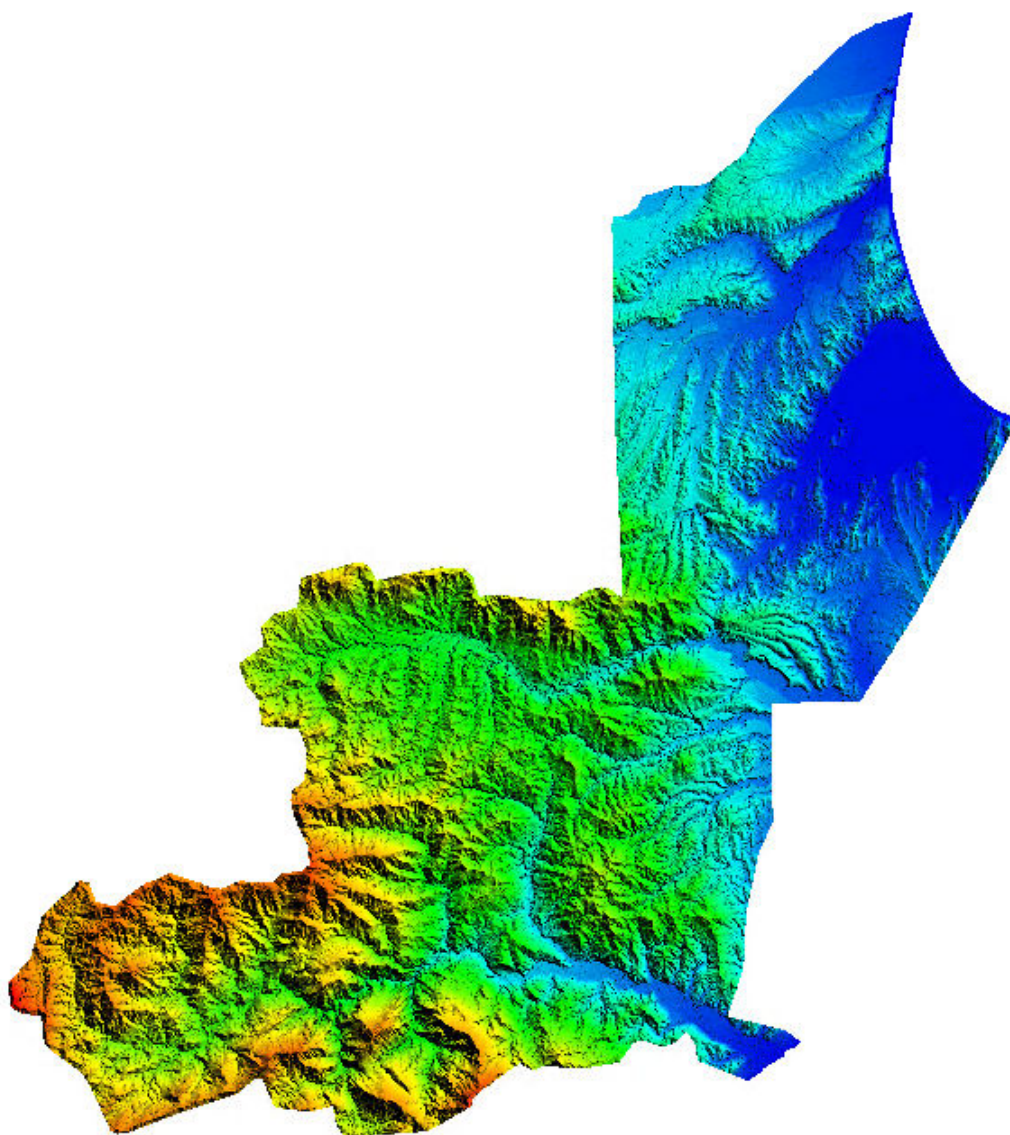
The data in this volume is provided by AAM NZ Limited (AAM) to **MARLBOROUGH DISTRICT COUNCIL** under the Marlborough District Council Services Contract No 17-129 which upon full payment provides **MARLBOROUGH DISTRICT COUNCIL** with joint ownership of the IP in the outputs described in the Services Schedule, in accord with documented provisions, and subject to the following conditions:

1. This file (Readme_PRJ31392NOM02.pdf) is always stored with the unaltered data contained in this volume.
2. The data is not used for purposes beyond that explicitly agreed in the description of the Services provided by AAM.

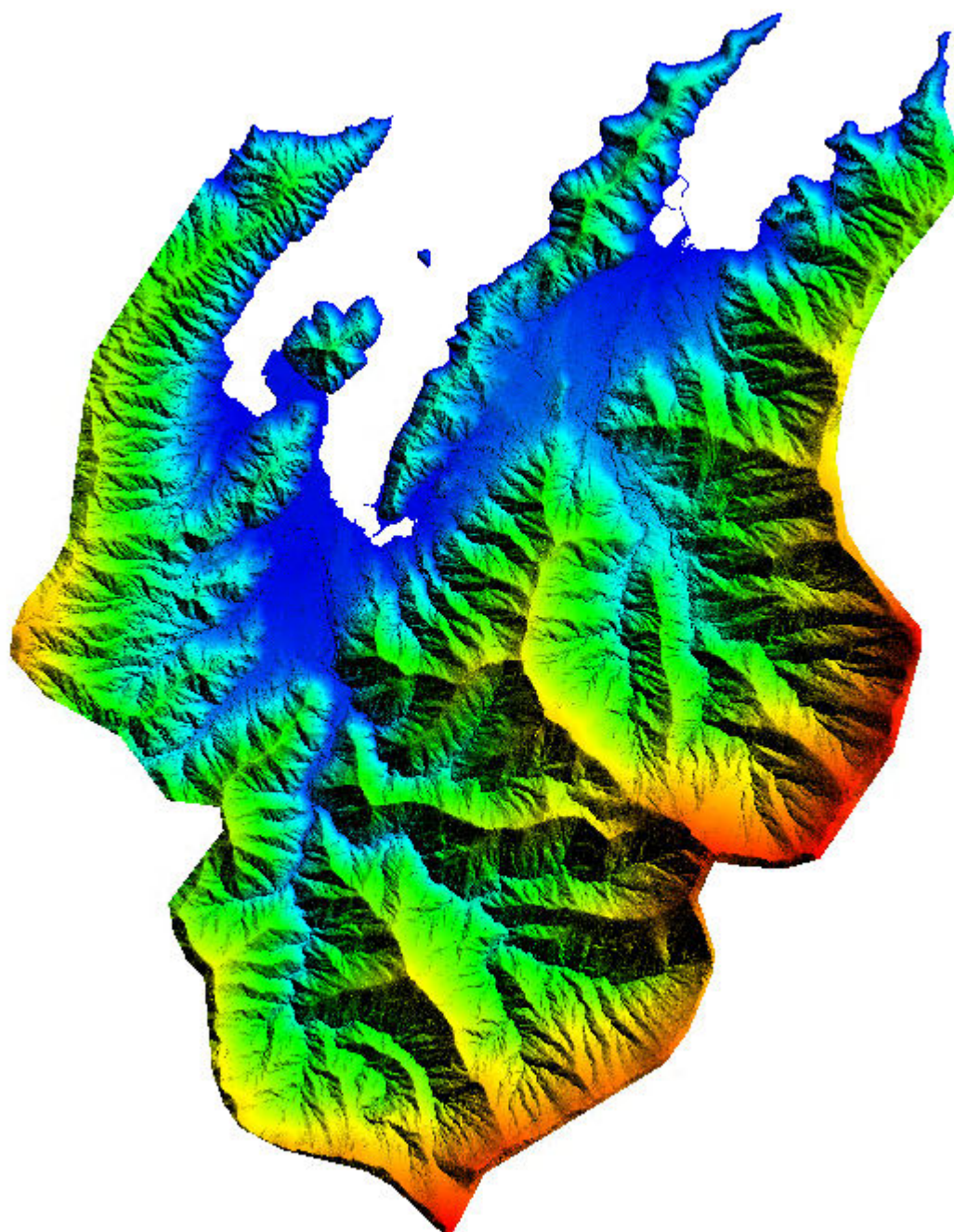
Any problems associated with the information in the data files contained in this volume should be reported to AAM NZ Limited. A complete list of project related contacts is listed on page 4 under the Project Report heading.

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7. VALIDATION PLOTS



Flaxbourne, Grassmere & Lower Awatere



Picton - Waikawa

8. APPENDIX A

Observations 23/05/2018				LINZ database 1/08/2018				differences			
Geodetic Code	Easting	Northing	Ell. height	Easting	Northing	Ell. height		DX	DY	DZ	
AD8H	1688840.476	5390670.819	108.986	1688840.253	5390670.894	109.059		0.223	-0.075	-0.073	Seddon
APUC	1688827.937	5386174.283	106.231	1688827.770	5386174.310	106.320		0.167	-0.027	-0.089	
ERHR	1689338.342	5385494.109	113.463	1689338.190	5385494.130	113.540		0.152	-0.021	-0.077	
EQHV	1695697.626	5382350.942	13.247	1695697.377	5382351.062	13.312		0.249	-0.120	-0.065	Grassmere
AD8U	1694293.442	5378865.549	19.409	1694293.188	5378865.664	19.393		0.254	-0.115	0.016	
AC76	1694405.062	5369299.233	40.500	1694405.060	5369299.310	40.580		0.002	-0.077	-0.080	Ward
AD94	1693178.920	5367234.923	68.896	1693178.940	5367235.010	68.980		-0.020	-0.087	-0.084	
EQE6	1689965.588	5362325.605	61.013	1689964.910	5362326.430	61.340		0.678	-0.825	-0.327	Ure
EQE7	1690966.577	5361191.701	35.561	1690965.870	5361192.710	36.030		0.707	-1.010	-0.469	
AD97	1692780.838	5364308.297	61.002	1692780.600	5364309.000	61.200		0.238	-0.703	-0.198	
AD9D	1690541.085	5358346.112	29.173	1690540.640	5358347.460	29.610		0.445	-1.349	-0.437	
ERHT	1695240.296	5374869.960	46.923	1695239.980	5374870.140	47.030		0.316	-0.180	-0.107	
EQHT	1689958.580	5368077.337	187.105	1689958.040	5368077.510	187.180		0.539	-0.173	-0.076	
EQHU	1686568.909	5368056.491	320.437	1686568.160	5368056.460	320.470		0.749	0.031	-0.033	
Adjusted relative to the LINZ coords of CMBL, 14/01/2018								0.336	-0.338	-0.150	Average
								0.251	0.441	0.151	Standard deviation