



CHRISTCHURCH CITY COUNCIL
CHRISTCHURCH LIDAR SURVEY MAY 2011
VOLUME 18797A01NOB

Summary

Project

An Airborne Laser Scanning survey conducted over Christchurch and Lyttelton City that was designed to support the February 2011 earthquake recovery effort. The survey was flown from 20th May to 30th May 2011. The area covered is approximately 504 km².

Data

The deliverables for this dispatch contain the Bare Earth DEM data in LAS 1.2 format.

A 1km x 1km Tile layout is supplied in DGN, DXF and ESRI Shape File format.

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1. PROJECT REPORT

Safety: No safety Incidents were reported during the project

Acquisition: Airborne Laser Scanning (ALS) data was acquired from a fixed wing aircraft between May 20th and May 30th 2011.

Ground Support: GPS base station support was provided by GeoSystems NZ. The ground check points acquired by the Christchurch City Council allowed an assessment of the accuracy of the ALS data.

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.

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.

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2. DATA INSTALLATION

Data format : LAS, SHP, DXF, DGN
Number & type of media : One External HDD
Number of files on media : 560 files, 589 LAS files, 1 DGN file, 1 DXF file, 7 SHP files and 18797A01NOB_Readme.pdf
Data formatted on : 15.07.2011
Disk volume : 18797A01NOB

README FILE

This document (18797A01NOB_README.PDF) is provided as an Acrobat file in this volume.

To open the file, double click on the PDF file to activate Acrobat Reader Software.

Adobe Acrobat Reader may be downloaded from:

<http://www.adobe.com/products/acrobat/readstep2.html>

LOADING NOTES

Data may be copied using a file copy utility such as Windows Explorer or similar.

FILE SIZES AND NAMES

Data is provided in tiles 1km by 1km to the following file naming convention:

e1555n5182_BARE_EARTH_DEM.las

e1555 - coordinate easting (in thousands) of south west tile corner.

n5182 - coordinate northing (in thousands) of south west tile corner

BARE_EARTH_DEM - Laser strikes classified as "ground"

.las - laser strikes "classified in accordance with ASPRS V1.2 LAS file standards" ground point class level.

LAS format is a binary format and cannot be listed. LAS file point classifications levels are formatted to comply with ASPRS Standard LiDAR Point Classes.

0	Created, never classified
1	Unclassified1
2	Ground
3	Low Vegetation
4	Medium Vegetation
5	High Vegetation
6	Building
7	Low Point (noise)
8	Model Key-point (mass point)
9	Water
10	Reserved for ASPRS Definition
11	Reserved for ASPRS Definition
12	Overlap Points2
13-31	Reserved for ASPRS Definition

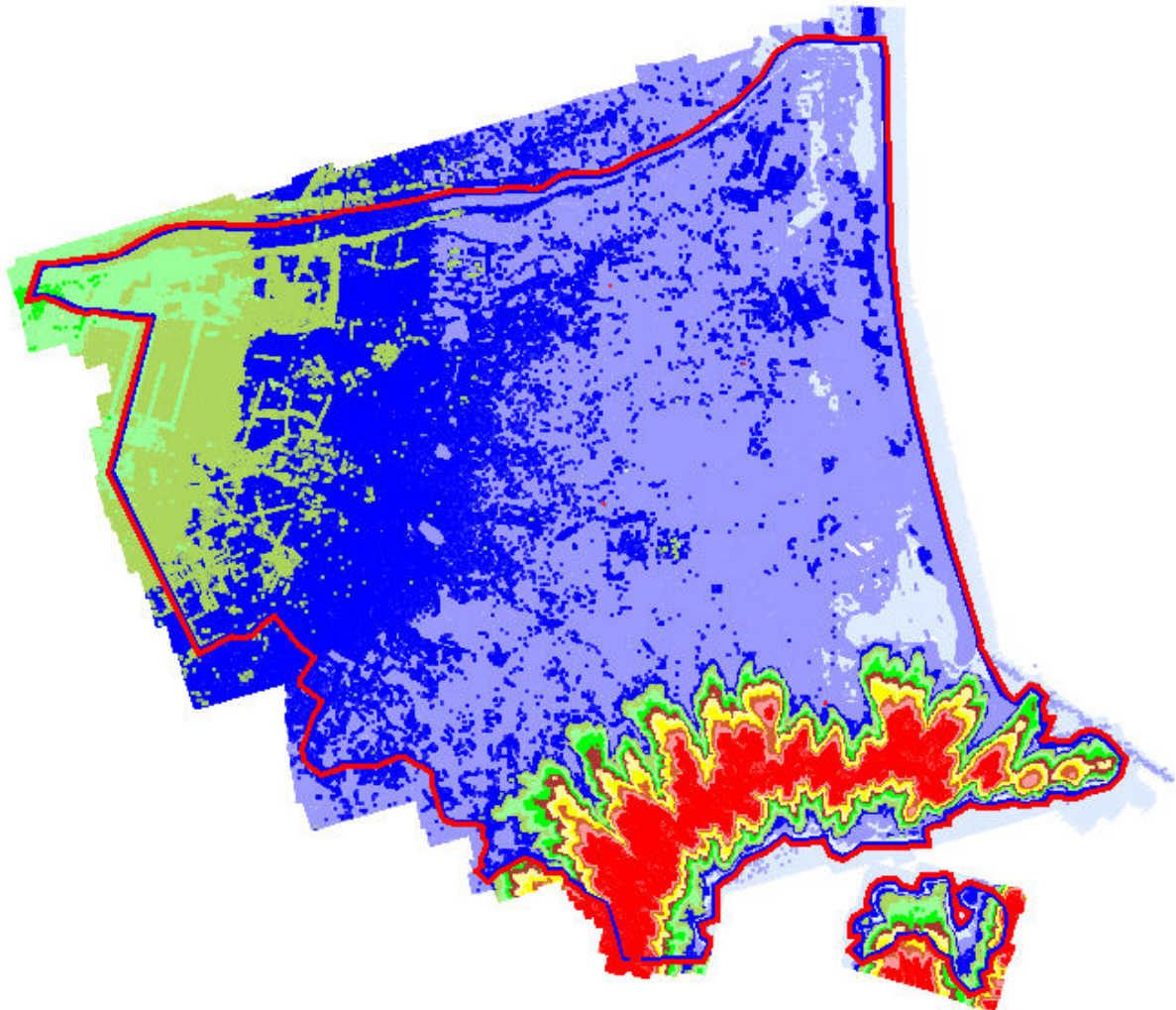
3. ADDITIONAL SERVICES AND EXTRA DATA

Product Generation

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

- Change horizontal datum : to NZMG or other local grid
- Data subset : by dividing the data into different tiles or polygons
- Data presentation : by creating contours, profiles, perspectives, fly throughs, colour-coded height plots etc.
- Extra data : extra data was collected beyond that supplied on this volume (see below)

Extra Data Captured



Laser Data shown in the above image outside the project boundary may be of a lower accuracy. It is not supplied within this volume and no manual classification editing has been undertaken.

4. METADATA

SOURCE DATA

Item	Source	Description	Ref No	Date
Laser System	AAM	ALS50-II	18797A	20.05.11 – 30.05.11
Pulse Rate Frequency	AAM	127.5 kHz	18797A	20.05.11 – 30.05.11
GPS Base Data	GeoSystems NZ	Static GPS	18797A	20.05.11 – 30.05.11
Base Stn Coords	GeoSystems NZ	Static GPS	18797A	Pre 12.09.10
Field Survey Data	Christchurch City Council	RTK	18797A	13.06.11 – 17.03.11

LASER DATA CHARACTERISTICS

Characteristic	Description
Format	LAS
Size	680,522,775 data points
Captured terrain model	0.5m average point separation
Laser return	1 st , 2 nd 3 rd and last
Laser Intensity	Supplied on all returns
Laser footprint size	0.3m (0.2mrad beam divergence)
Laser mode	Multipulse
Data acquisition	4 hours either side of low tide

REFERENCE SYSTEMS

	Horizontal		Vertical
Datum	NZGD2000		LVD1937
Projection	NZTM2000		N/A
Geoid Model	N/A		NZGD09
Primary Reference Station WIG1	1,563,508.058 E	5,178,024.369 N	51.240 Ellipsoid
Additional Survey Control UBOLT	1,562,001.290 E	5,185,196.505 N	32.859 RL

5. ACCURACY

PROJECT DESIGN ACCURACY

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

	Measured Point	Derived Point	Basis of Estimation
Vertical data		0.1m	Project Design
Horizontal data	< 0.40m		System specifications ($1/2000$ flying height)
Test points	0.05m		Survey methodology used

Notes on Expected Accuracy

- Values shown represent standard error (68% confidence level or 1 sigma), in meters.
- “Derived points” are those interpolated from a terrain model.
- “Measured points” are those observed directly.
- Accuracy estimates for terrain modeling 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 1360 test points obtained by field survey and assumed to be error-free. The test points were distributed in 21 groups across the mapping area and located on open clear ground. Comparison of the filed test points with elevations interpolated from measured data resulted in:

Ref Point Site	No. of Points	Mean Difference (m)	Std Deviation (m)	RMS (m)
Site 1	40	0.259	0.017	0.259
Site 2	46	0.246	0.018	0.246
Site 3	44	0.277	0.018	0.277
Site 4	42	0.235	0.017	0.236
Site 5	37	0.310	0.012	0.311
Site 6	44	0.270	0.021	0.271
Site 7	44	0.232	0.011	0.232
Site 8	43	0.272	0.016	0.272
Site 9	46	0.252	0.016	0.252
Site 10	45	0.299	0.016	0.299
Site 11	47	0.228	0.017	0.229
Site 12	51	0.219	0.011	0.219
Site 13	44	0.237	0.013	0.237
Site 14	42	0.231	0.022	0.232
Site 15	47	0.259	0.017	0.260
Site 16	31	0.234	0.01	0.234
Site 17	36	0.204	0.024	0.205
Site 18	44	0.253	0.016	0.253
Site 19	46	0.290	0.022	0.291
Site 20	36	0.280	0.016	0.280
Site 21	505	0.268	0.017	0.269

The mean difference of 0.255 has been removed from the data. Final accuracy estimates after removing the mean offset yielded:

Ref Point Site	No. of Points	Mean Difference (m)	Std Deviation (m)	RMS (m)
Site 1	40	-0.001	0.017	0.017
Site 2	46	-0.014	0.018	0.023
Site 3	44	0.017	0.018	0.024
Site 4	42	-0.025	0.017	0.030
Site 5	37	0.050	0.012	0.052
Site 6	44	0.010	0.021	0.023
Site 7	44	-0.028	0.011	0.030
Site 8	43	0.012	0.016	0.019
Site 9	46	-0.008	0.016	0.018
Site 10	45	0.039	0.019	0.043
Site 11	47	-0.032	0.017	0.036
Site 12	51	-0.041	0.011	0.042
Site 13	44	-0.023	0.013	0.027
Site 14	42	-0.029	0.022	0.036
Site 15	47	-0.001	0.017	0.017
Site 16	31	-0.026	0.01	0.028
Site 17	36	-0.056	0.024	0.061
Site 18	44	-0.007	0.016	0.018
Site 19	46	0.030	0.022	0.037
Site 20	36	0.020	0.016	0.026
Site 21	505	0.008	0.017	0.019

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

USE OF DATA

- Intended use : Planning, Conceptual Design
- Intended scale of use : 1:500

5. CONDITIONS OF SUPPLY

The data in this volume has been commissioned by **CHRISTCHURCH CITY COUNCIL**.

The data in this volume is provided by AAM Pty Limited (AAM) to **CHRISTCHURCH CITY COUNCIL** under the client's Terms of Engagement, which allow **CHRISTCHURCH CITY COUNCIL** to assume shared ownership with AAM, in accord with documented provisions, and subject to the following conditions:

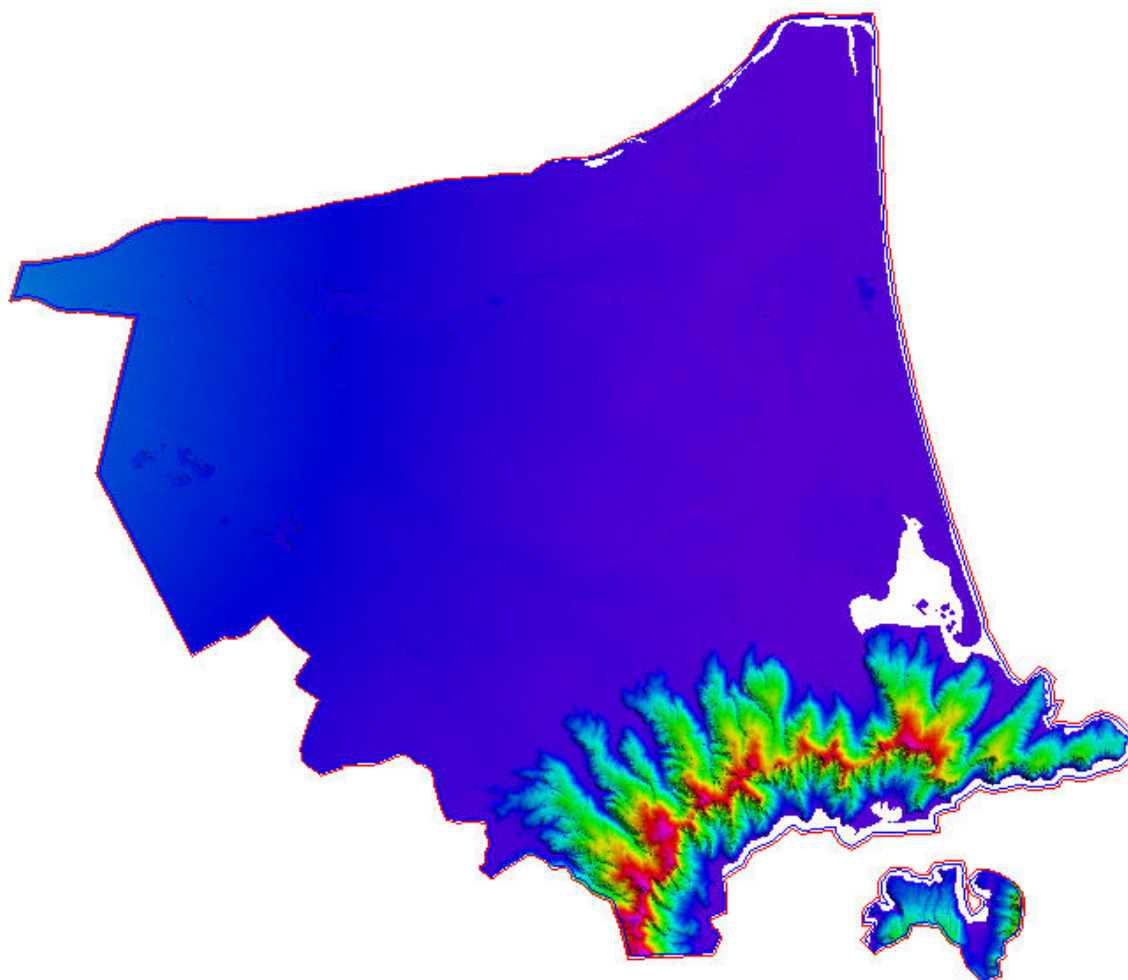
1. This file (18797A01NOB_readme.PDF) is always stored with the unaltered data contained in this volume.
2. The data is not altered in any way without the approval of AAM. The data may be copied from this file to another.
3. The data is not used for purposes beyond that explicitly agreed in the description of the Services provided by AAM.

Any breach of these conditions will result in the immediate termination of the license issued by AAM, and **CHRISTCHURCH CITY COUNCIL** will indemnify AAM from all resulting liabilities.

Any problems associated with the information in the data files contained in this volume should be reported to AAM Pty Limited. A complete list of project related contacts is listed on page 2 under the Project Report heading.

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6. VALIDATION PLOT



7. FILES SUPPLIED

Please see 18797A01NOB_File_Listing.pdf