



LANDPRO

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2021 Lake Onslow LiDAR

Ministry of Business, Innovation and Employment

Metadata Report

Prepared For:
Ministry of Business, Innovation and Employment.

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CONTENTS

1.	Introduction	1
1.1	The Client	1
1.2	Purpose of Documentation.....	1
2.	Summary	2
2.1	Project.....	2
2.2	Data	2
3.	Project report	3
3.1	Safety	3
3.2	Acquisition	3
3.3	Ground Control	3
3.4	Data Processing	3
3.5	Data Presentation	3
3.6	Project Contacts.....	3
4.	Data Acquisition.....	4
4.1	Leica ALS60 Laser Scanner	5
4.2	Survey Specifications.....	5
4.3	Ground Control	5
5.	Data Processing.....	6
5.1	Map Projection and Datum	6
5.2	Classification	7
6.	Accuracy.....	8
6.1	Project Design.....	8
6.2	Validation	8
7.	Product deliverables.....	9
8.	File names	10
9.	License/Copyright.....	11

TABLES

Table 1: Instrument specification..... 5
Table 2: Survey specifications for Lake Onslow 5
Table 5: Map projection and datum 6
Table 6: LiDAR classification 7
Table 7: Accuracy specifications..... 8
Table 8: Validation 8
Table 9: Product deliverables 9
Table 10: Data naming convention.....10

FIGURES

Figure 1: Map of Lake Onslow tile layout 4
Figure 2: Leica ALS60 Laser scanner 5

1. INTRODUCTION

1.1 The Client

Client Address: Ministry of Business, Innovation and Employment
15 Stout Street
Wellington
6011

Address for Service: C/- Landpro Limited
13 Pinot Noir Drive
Cromwell
Otago
9310

1.2 Purpose of Documentation

The purpose of this metadata report is to provide detailed information regarding the acquisition, processing, and delivery of 2021 Lake Onslow LiDAR data products collected, processed and delivered for the client during the 2021 capture season.

2. SUMMARY

2.1 Project

A LiDAR aerial survey was conducted over the Lake Onslow area, covering approximately 822 km².

2.2 Data

The data deliverables include the following:

- Classified point cloud
- 1m DEM
- 1m DSM
- 25cm contours
- Tile Index
- Breaklines
- Flightline Shapefiles
- QA Report
- Metadata report

3. PROJECT REPORT

3.1 Safety

No safety incidents were reported during the completion of this project.

3.2 Acquisition

Airborne Laser Scanner (ALS) data was acquired from a fixed wing aircraft on 22/23/25/26/27 May 2021.

3.3 Ground Control

GPS base station data was provided by LINZ PositionNZ network (CORS). Ground check points were surveyed by Landpro Ltd for assessing the accuracy of the ALS data.

3.4 Data Processing

Reduction of the ALS data proceeded without any problems. Laser strikes were classified into ground and non-ground points using algorithms to ensure continuity.

3.5 Data Presentation

The data provided on this volume has been supplied in accordance with a specification agreed with by MBIE.

3.6 Project Contacts

MBIE Project Lead: Naomi Hughes

Landpro Ltd Project Lead: Andy Burrell

4. DATA ACQUISITION

The LiDAR data for this project was captured within the 2021 flying season (22 – 27 May 2021).

The image below shows tile layout in black.

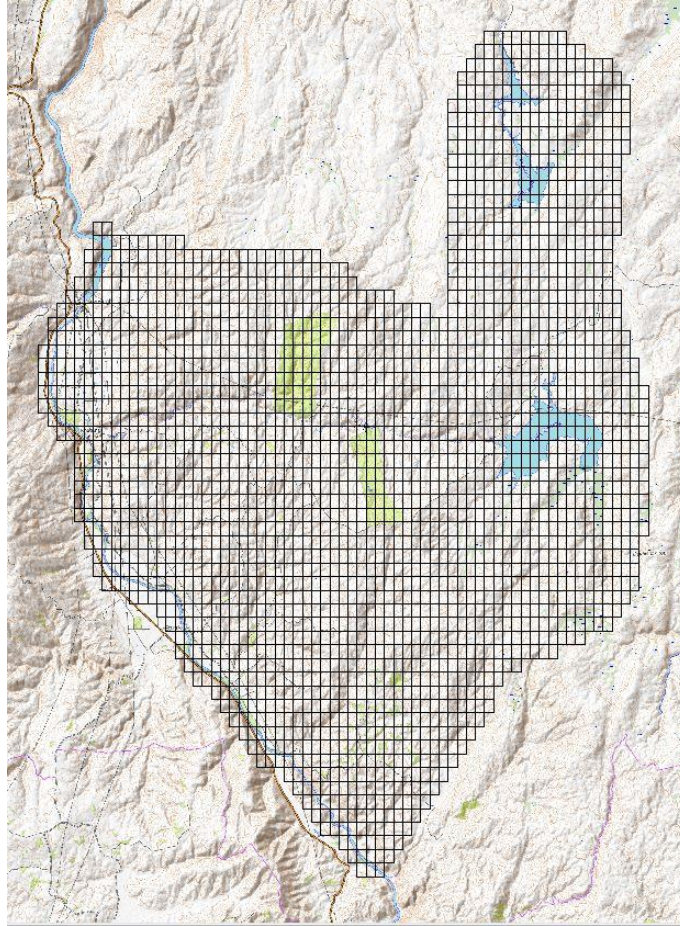


Figure 1: Map of Lake Onslow tile layout.

4.1 Leica ALS60 Laser Scanner

The LiDAR was captured using the Leica ALS60 Laser scanner.



Figure 2: Leica ALS60 Laser scanner.

Manufacturer	Leica
ALS60 Laser Scanner Serial No.	6129

Table 1: Instrument specification.

4.2 Survey Specifications

Lake Onslow LiDAR

Flying Height	1985m
Scan Angle	8 degrees
Pulse Rate	121kHz
Points Per m²	4 pts/m ²
Sidelap	54%

Table 2: Survey specifications for Lake Onslow.

4.3 Ground Control

Ground control was completed using existing benchmarks and survey data collected by Landpro Ltd, this was used in the vertical accuracy of the processed ground dataset.

5. DATA PROCESSING

Data processing has been in accordance with our standard policies and procedures surrounding acceptable tolerances, therefore ensuring optimal accuracies of deliverables.

GNSS/IMU data is processed utilising LEXA Base Station and precise ephemeris data. The GNSS and IMU are processed in Novatel Inertial Explorer to give an optimum trajectory.

This data is then applied to the LiDAR for LAS 1.4 creation in Leica Cloudpro. The geoidal adjustments are applied in Cloudpro, the data is now in NZTM with NZVD 2016 Heights.

Overlapping LiDAR points from adjacent aircraft trajectories were used to check the LiDAR calibration for heading, roll, pitch and scale. These values were then used to make small flight-specific adjustments to the LiDAR data.

Height accuracy of the ground classified LiDAR points was checked using check site data (non-vegetated check sites) collected by Landpro Ltd. This was done by performing an Output Control Report (OCR) in TerraSolid's TerraScan, which calculates height differences statistics between a TIN of the LiDAR ground points and the check points. The standard deviation statistic is 0.05, RMS is 0.05, CI95 is 0.09m and the average difference is 0.009.

The positional accuracy of the LiDAR was checked by overlaying Landpro Ltd surveyed data over the LiDAR data displayed by intensity. The data fits into position.

The TerraSolid suite was used for the automated method of macro based bare-earth filtering. Multiple iterations of automated filtering were utilized to address the ever-changing terrain while retaining a homogenous surface. After automated filtering, manual editing was completed using TerraScan and TerraModeler in MicroStation. Editing was performed to ensure that 100% of the identified bare-earth surface was visually inspected for errors, completeness, and accuracy. Bridge decks were also classified. Points floating above or positioned below the bare earth surface were designated as low noise and high noise.

The Digital Elevation Model (DEM) was created using a point to TIN (triangular irregular network) and TIN to raster process, using natural neighbour interpolation. Hydro flattening was performed as stipulated in the PGF version: New Zealand Aerial LiDAR Base Specification.

5.1 Map Projection and Datum

Projection	NZTM/NZGD2000
Datum	NZVD2016

Table 3: Map projection and datum.

5.2 Classification

Number	Point Class
Withheld 1	Unclassified
2	Ground
3	Low Vegetation
4	Med Vegetation
5	High Vegetation
6	Building
7	Low Noise
9	Water
17	Bridge
18	High noise

Table 4: LiDAR classification.

6. ACCURACY

6.1 Project Design

The project has been designed to achieve the respective accuracies in accordance with LINZ PGF Specification.

Vertical Accuracy (95%)	≤20cm
Horizontal Accuracy (95%)	≤100cm
Pulse Density	≥2pts/m ²

Table 5: Accuracy specifications.

6.2 Validation

Height accuracy of the classified LiDAR was checked using open land-cover survey check sites. This was done by comparing the test points against the elevations from the classified LiDAR dataset.

Mean Difference (m)	Std Deviation (m)	RMS (m)	CI95
-0.00	0.05	0.05	0.09

Table 6: Validation.

The positional accuracy of the LiDAR data has been checked by plotting the Landpro Ltd. check points and displaying the LiDAR by intensity. The LiDAR was in position.

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

7. PRODUCT DELIVERABLES

The following data was delivered in NZTM/NZGD2000 projection and NZVD2016 vertical datum:

Classified Point Cloud	Classified LiDAR point cloud in ASPRS LAS 1.4 format
DEM	1m Digital Elevation Model in TIF format
DSM	1m Digital Surface Model in TIF format
Breaklines	Breaklines for all hydro-flattened features in SHP format
Flightlines	Flightlines as ESRI polylines in SHP format
Tile Index	Tiles for the project area in SHP format
Metadata Report	Report in PDF format

Table 7: Product deliverables.

Digital data has been uploaded onto Landpro's FTP on 9 November 2021.

8. FILE NAMES

Data has been provided in LINZTopo50 subtiles based on NZTM2000 coordinates. Tile size 1:1000 sheet layout (480 x 720m).

Product	Identifier	Extension
Classified LiDAR Tiles	CL2_	*.las
DSM Tiles	DSM_	*.tif
DEM Tiles	DEM_	*.tif

Table 8: Data naming convention.

9. LICENSE/COPYRIGHT

The Council and its partners intent to release this imagery, LiDAR and all derived products under 'Creative Commons Attribution 4.0 International' as per the New Zealand Government Open Access and Licensing (NZGOAL) framework New Zealand, licensing must allow the Council and its partners the ability to do this.

<https://creativecommons.org/licenses/by/4.0/>