REGIONAL SOFTWARE HOLDINGS LIMITED (RSHL)

NORTH ISLAND WEATHER EVENTS LIDAR 2023-2024

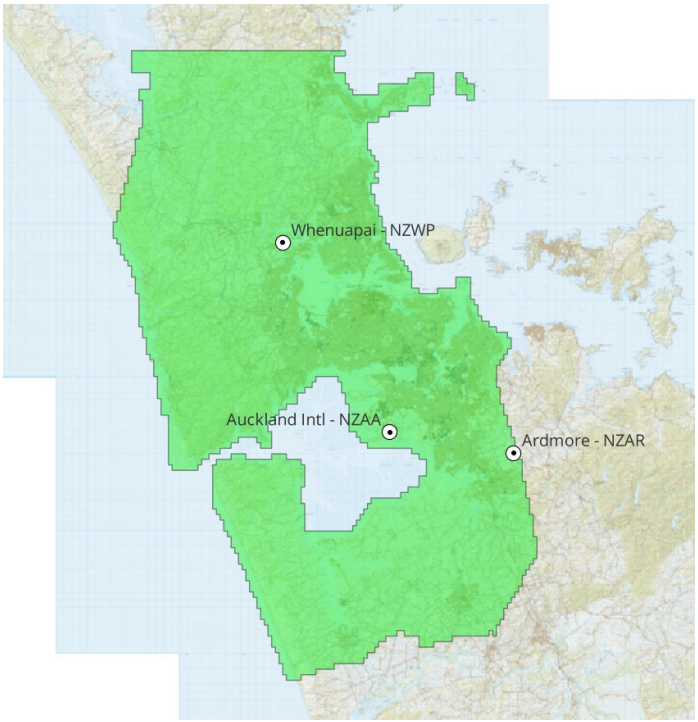
VOLUME: PRJ45792_06_Auckland

PROJECT SUMMARY

Regional Software Holdings Limited (RSHL), on behalf of the New Zealand Government, were tasked and funded to obtain aerial LIDAR data over selected storm damaged areas over the North Island of New Zealand. Woolpert has been contracted to provide data and related services for sites in Bay of Plenty, Horizons and Auckland Regions.

This report describes the products supplied for Auckland which was captured between 30th of April and 27th of June 2024.

The survey was planned to achieve ≤ 20cm vertical accuracy (95% CI), ≤ 100cm horizontal accuracy (95% CI) with an emitted pulse density of 8ppsm, and ground classification to ICSM level 2.



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DATA SUMMARY

This volume includes the following data in NZTM2000 projection, NZVD2016 vertical datum:

- Auckland Extent is comprised of 7,889 x NZTopo50 1:1000 tiles.
  - ICSM L2 Classified Point Cloud data in LAZ v1.4 format
  - 1m cell DEM in GeoTIFF format
  - 50cm cell DEM in GeoTIFF format
  - 1m cell DSM in GeoTIFF format
  - 1m cell CHM in GeoTIFF format
  - Ancillary files in ESRI Shapefile format – Tile Index, Block Extent, Flightlines, Hydro Breaklines & Bridge breaklines.

- File listing in text file format
- Metadata file: This document in PDF format

CONTENTS

1. DATA INFORMATION

Data supply: LINZ AWS
Number of files: 23,297 data files, 1 file lists, 1 metadata file
Data formatted on: 23/10/2024 – 30/10/2024
Metadata Document: This file

Previous Deliveries	Date	Title	Contents

File Naming in this Delivery	Contents
CL2_AZ30_2024_1000_4238.LAZ	Classified point cloud in LAZ v1.4 format
DEM_AZ30_2024_1000_4238.tif/tfw	1m grid DEM – hydro-flattened
DEM05_AZ30_2024_1000_4238.tif/tfw	0.5m grid DEM – hydro-flattened
DSM_AZ30_2024_1000_4238.tif/tfw	1m grid DSM – hydro-flattened
CHM_AZ30_2024_1000_4238.tif/tfw	1m grid CHM (canopy height above ground)
Ancillary files: PRJ45792_Auckland_AOI_NZTM PRJ45792_Auckland_Hydro_NZTM PRJ45792_Auckland_Bridges_NZTM PRJ45792_Auckland_Tile_Layout_NZTM PRJ45792_Auckland_Flightlines_NZTM	ESRI Shapefile format: Extent Hydro breaklines Bridge breaklines Tile Index Flight lines
Readme_PRJ45792_06_Auckland.pdf	Metadata Report
PRJ45792_06_Auckland_file_listing.csv	List of product files delivered in this volume

2. METADATA

Source Data	Source	Description	Ref No	Date
LiDAR	Woolpert	TerrainMapper2 - 527	FL022366	30.04.2024
		TerrainMapper2 – 527	FL022405	04.05.2024
		TerrainMapper2 – 527	FL022415	05.05.2024
		TerrainMapper2 – 527	FL022531	18.05.2024
		TerrainMapper2 – 527	FL022543	19.05.2024
		TerrainMapper2 – 527	FL022675	04.06.2024
		TerrainMapper2 – 527	FL022828	27.06.2024
GPS Base Data	GeoNET /Woods	GeoNET and Global Surveys CORS. LINZ GDB co-ordinates	PRJ45792	Dates as above
Control	WSP	Post processed Kinematic GNSS	PRJ45792	23/05/2024 – 21/06/2024

LiDAR Characteristics	Description
Format	LAZ 1.4
Emitted Density	8 ppm2
Tile size	480m x 720m (NZ Topo 50, 1:1000 tiles)
ICSM Classification	Level 2. Ground surface improvement
Capture Constraints	Coastline captured within 3 hours of low tide. (not applicable in these areas)

Number	Point Class	Description	ICSM	CI %
1	Default	Unclassified	1	95
2	Ground	Ground	2	98
3	Low vegetation	< 0.3 m	2	95
4	Medium vegetation	0.3 – 2.0 m	2	95
5	High vegetation	> 2.0 m	2	95
6	Buildings, structures	Buildings, houses, sheds, silos etc.	2	95
7	Low / high points	Spurious low point returns (unusable)	2	98

9	Water	Any point in water	2	98
17	Bridge	Any bridge or overpass	2	98
18	High Noise	Spurious high point returns (unusable)	2	98

Vegetation class height strata set as per request from Auckland Council and agreed by Land Information NZ - 20 June 2024.

Reference Systems	Horizontal	Vertical
Datum	NZGD2000	NZVD2016
Projection	NZTM2000	N/A
Geoid Model	N/A	NZGeoid2016

Accuracy Specification	Measured Point	Derived Point	Basis of Estimation
Control Points	0.03m		Survey Methodology
LiDAR (Horizontal)	0.40m		Project design
LiDAR (Vertical)	0.10m		Project design

Notes On Expected Accuracy

- Values shown represent standard error (68% confidence level or 1 sigma), in metres
- “Derived points” are those interpolated from a terrain model.
- “Measured points” are those observed directly.
- Accuracy estimates for terrain modeling by LiDAR refer to the terrain definition on clear ground.
- 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.
- Users should be aware that as the vegetation classification is automated and the Canopy Height Model may contain features that are not vegetation such as buildings, poles, wires, cars etc.

Data Validation – LiDAR Data

- Vertical Accuracy Validation - Ground data has been compared to ~2100 test points obtained by field survey and assumed to be error-free. The test points were distributed in 46 groups across the mapping area and located on clear ground. Comparison of the test points with elevations interpolated from measured data resulted in:

Site	dZ	RMS	SD	Post dZ	Post RMS	Post SD
Average	*0.042*			*0.001*		
Auckland_NZTM_NZVD2016_site_1	0.037	0.042	0.019	-0.011	0.017	0.013
Auckland_NZTM_NZVD2016_site_2	0.055	0.059	0.022	0.013	0.016	0.009
Auckland_NZTM_NZVD2016_site_3	0.028	0.036	0.023	-0.016	0.026	0.022
Auckland_NZTM_NZVD2016_site_4	0.042	0.045	0.017	0.000	0.011	0.011
Auckland_NZTM_NZVD2016_site_5	0.093	0.096	0.022	0.055	0.057	0.017
Auckland_NZTM_NZVD2016_site_6	0.006	0.021	0.021	-0.039	0.040	0.007
Auckland_NZTM_NZVD2016_site_7	0.075	0.081	0.030	0.032	0.038	0.020
Auckland_NZTM_NZVD2016_site_8	0.088	0.091	0.024	0.046	0.049	0.017
Auckland_NZTM_NZVD2016_site_9	0.074	0.080	0.030	0.032	0.044	0.030
Auckland_NZTM_NZVD2016_site_10	-0.029	0.032	0.014	-0.072	0.073	0.009
Auckland_NZTM_NZVD2016_site_11	0.025	0.030	0.017	-0.015	0.020	0.013
Auckland_NZTM_NZVD2016_site_12	0.093	0.096	0.023	0.046	0.047	0.009
Auckland_NZTM_NZVD2016_site_13	0.051	0.054	0.017	0.014	0.017	0.011
Auckland_NZTM_NZVD2016_site_14	0.094	0.099	0.034	0.045	0.053	0.028
Auckland_NZTM_NZVD2016_site_15	0.079	0.082	0.019	0.039	0.042	0.017
Auckland_NZTM_NZVD2016_site_16	0.116	0.007	0.016	0.074	0.074	0.010
Auckland_NZTM_NZVD2016_site_17	0.002	0.020	0.020	-0.037	0.040	0.016
Auckland_NZTM_NZVD2016_site_18	0.030	0.033	0.015	-0.012	0.016	0.011
Auckland_NZTM_NZVD2016_site_19	0.019	0.023	0.013	-0.031	0.032	0.006
Auckland_NZTM_NZVD2016_site_20	0.040	0.043	0.017	-0.007	0.013	0.011
Auckland_NZTM_NZVD2016_site_21	0.034	0.039	0.018	-0.005	0.015	0.015
Auckland_NZTM_NZVD2016_site_22	0.023	0.034	0.024	-0.014	0.019	0.013
Auckland_NZTM_NZVD2016_site_23	0.020	0.030	0.022	-0.023	0.024	0.007
Auckland_NZTM_NZVD2016_site_24	0.037	0.040	0.017	-0.007	0.017	0.015
Auckland_NZTM_NZVD2016_site_25	0.020	0.030	0.022	-0.024	0.027	0.013
Auckland_NZTM_NZVD2016_site_26	-0.025	0.031	0.018	-0.066	0.067	0.015
Auckland_NZTM_NZVD2016_site_27	0.044	0.047	0.016	0.001	0.010	0.010
Auckland_NZTM_NZVD2016_site_28	0.057	0.067	0.037	0.001	0.010	0.010
Auckland_NZTM_NZVD2016_site_29	0.024	0.031	0.020	-0.011	0.016	0.012
Auckland_NZTM_NZVD2016_site_30	0.065	0.067	0.018	0.019	0.021	0.010
Auckland_NZTM_NZVD2016_site_31	0.045	0.048	0.019	0.003	0.011	0.010
Auckland_NZTM_NZVD2016_site_33	0.066	0.068	0.018	0.019	0.023	0.014
Auckland_NZTM_NZVD2016_site_34	0.033	0.040	0.024	-0.007	0.018	0.017
Auckland_NZTM_NZVD2016_site_35	0.038	0.041	0.015	-0.003	0.012	0.012
Auckland_NZTM_NZVD2016_site_36	0.016	0.025	0.020	-0.035	0.035	0.008
Auckland_NZTM_NZVD2016_site_37	0.029	0.036	0.022	-0.012	0.021	0.017
Auckland_NZTM_NZVD2016_site_38	0.041	0.046	0.021	-0.019	0.020	0.009
Auckland_NZTM_NZVD2016_site_39	0.039	0.044	0.021	-0.001	0.013	0.013
Auckland_NZTM_NZVD2016_site_40	0.012	0.022	0.019	-0.034	0.036	0.013
Auckland_NZTM_NZVD2016_site_41	0.040	0.042	0.015	-0.002	0.014	0.014
Auckland_NZTM_NZVD2016_site_42	0.102	0.106	0.030	0.054	0.058	0.020
Auckland_NZTM_NZVD2016_site_44	0.042	0.047	0.020	-0.002	0.005	0.004
Auckland_NZTM_NZVD2016_site_45	0.092	0.098	0.035	0.050	0.061	0.035
Auckland_NZTM_NZVD2016_site_46	0.034	0.038	0.017	-0.005	0.012	0.011
Auckland_NZTM_NZVD2016_site_32				0.033	0.039	0.020
Auckland_NZTM_NZVD2016_site_43				-0.041	0.045	0.019

The elevation difference of -0.042m has been applied to the data supplied in this volume.

Overall post shift comparison resulted in:

Mean difference: **0.003m**
St. Deviation: **0.035**
Standard Error (RMS): **0.035m or 0.069m @ 95% CI**

- Horizontal Accuracy – the LiDAR data was compared to visible horizontal control using the intensity imagery. The data was found to fit well. The expected horizontal accuracy at 95% CI is 38cm, within the specification of 100cm.
- Data classification has been manually checked and edited against available imagery.

3. CONDITIONS OF SUPPLY

The data in this volume was commissioned by Regional Software Holdings Limited (**RSHL**). The data is provided by Woolpert to **RSHL** under the Terms of Engagement described in **RSHL-Woolpert Contract LIDAR Data Collection Ref 2023-21** date 15th December 2023.

This provides the client, **RSHL** with ownership of the deliverables, allowing release of data for re-use with a Creative Commons license (CC BY) with attribution to the buyer in line with the New Zealand Government Open Access Licensing framework (NZGOAL). This specification places no restrictions on the rights of Woolpert to resell data or derivative products.

1. This file (Readme_PRJ45792_06 Auckland.pdf) will always be stored with the unaltered data contained in this volume.

This data is provided in accordance with the specifications agreed with RSHL and Land Information NZ. Any problems associated with the information in the data files contained in this volume should be reported to Woolpert, Asia-Pacific.

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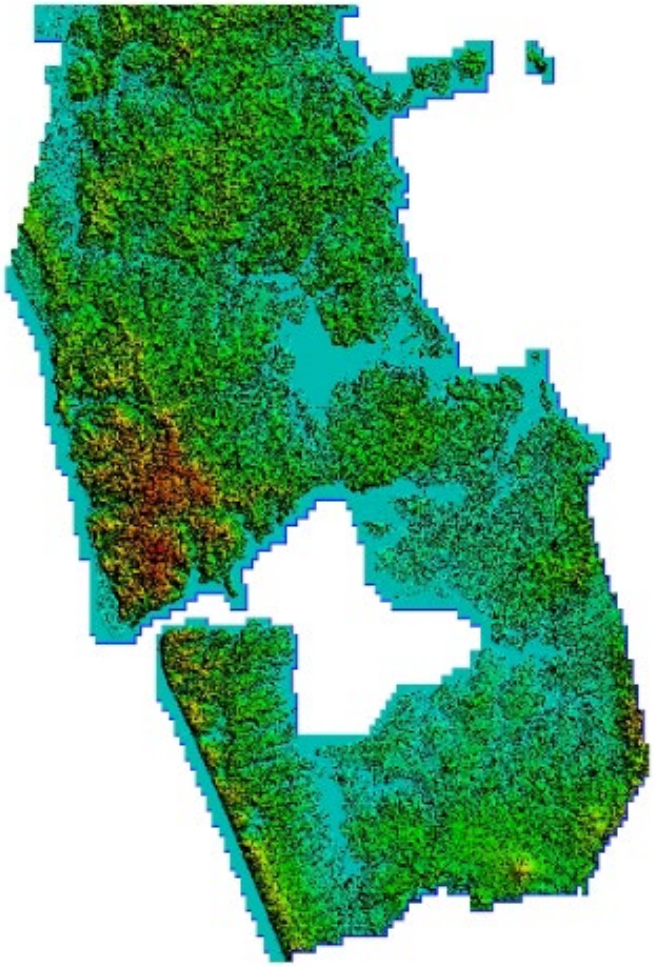
4. VALIDATION

Colour Elevation Image – DSM



Colour Elevation Image – DEM