

REGIONAL SOFTWARE HOLDINGS LIMITED (RSHL) NORTH ISLAND WEATHER EVENTS LIDAR 2023-2024 VOLUME: PRJ45792_01-03_BOP

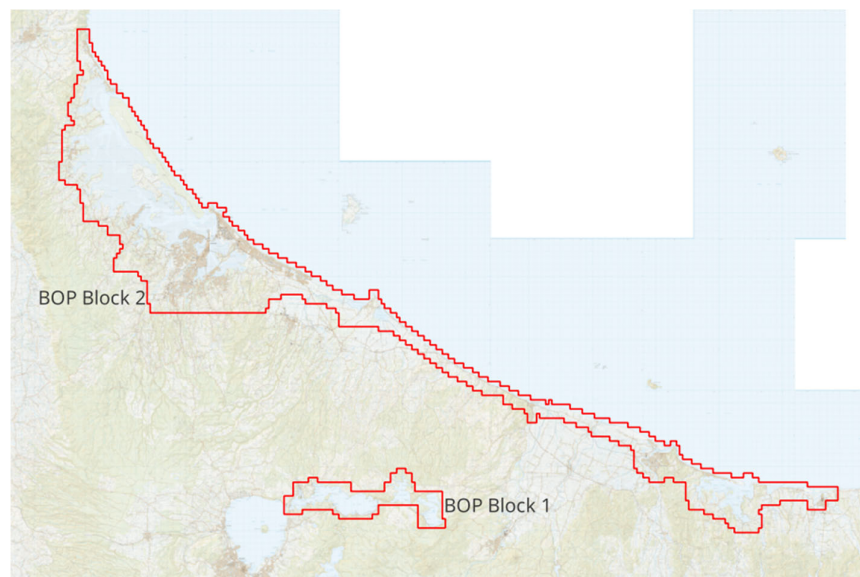
PROJECT SUMMARY

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 Bay of Plenty Block and including resubmitted products following client feedback.

Bay of Plenty Block 1 (Rotorua Lakes) was captured on 1st February 2024. Bay of Plenty Block 2 (Main Coastal Area) was captured between the 5th February 2024 and 30th April 2024.

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



DATA SUMMARY

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

- Bay of Plenty Block 1 – comprised of 336 x NZTopo50 1:1000 tiles.
- ICSM L2 Classified Point Cloud data in LAZ v1.4 format
 - 1m 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.

- Bay of Plenty Block 2 - comprised of 2991 x NZTopo50 1:1000 tiles.
 - ICSM L2 Colourised Classified Point Cloud data in LAZ v1.4 format
 - 1m 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
- Survey report in PDF format
- Metadata file: This document in PDF format

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1. DATA INFORMATION

Data supply: LINZ AWS
 Number of files: 23,329 data files, 2 file lists, 1 survey report, 1 metadata file
 Data formatted on: 23/04/2024 – 12/09/2024
 Metadata Document: This file

Previous Deliveries	Date	Title	Contents
PRJ45792_01_Horizons	30/04/2024 - 27/06/2024	North Island Weather Events LiDAR	Horizons Blocks 1-3

File Naming in this Delivery	Contents
CL2_BE37_2024_1000_2041.LAZ	Classified point cloud in LAZ v1.4 format
DEM_BE37_2024_1000_2041.tif/tfw	1m grid DEM
DSM_BE37_2024_1000_2041.tif/tfw	1m grid DSM
CHM_BE37_2024_1000_2041.tif/tfw	1m grid CHM (canopy height above ground)
Ancillary files Bay of Plenty Block 1: PRJ45792_BOP_Block1_Hydro_NZTM PRJ45792_BOP_Block1_Extent_NZTM PRJ45792_BOP_Block1_Bridges_NZTM PRJ45792_BOP_Block1_TileIndex_NZTM PRJ45792_BOP_Block1_Flightlines_NZTM_rev1	ESRI Shapefile format: Hydro breaklines Extent Bridge breaklines Tile Index Flight lines
Ancillary files Bay of Plenty Block 2: PRJ45792_02_BOP_Block2_Hydro_NZTM PRJ45792_02_BOP_Block2_Extent_NZTM PRJ45792_02_BOP_Block2_Bridges_NZTM PRJ45792_02_BOP_Block2_TileIndex_NZTM PRJ45792_02_BOP_Block2_Flightlines_NZTM	ESRI Shapefile format: Hydro breaklines Extent Bridge breaklines Tile Index Flight lines

Readme_PRJ45792_01-03_BOP.pdf	Metadata Report
PRJ45792_BOP_Processing_Report.pdf	Survey Report
PRJ45792_01-03_BOP_Block1_FileListing.csv PRJ45792_02-03_BOP_Block2_FileListing.csv	List of product files delivered in this volume

2. METADATA

Source Data	Source	Description	Ref No	Date
LiDAR	Woolpert	TerrainMapper2 - 527	FL021526	01.02.2024
LiDAR & Imagery	Woolpert	TerrainMapper2 – 527	FL021564	05.02.2024
		TerrainMapper2 – 527	FL021782	28.02.2024
		TerrainMapper2 – 527	FL021842	06.03.2024
		TerrainMapper2 – 527	FL022353	30.04.2024
GPS Base Data	GeoNET /LINZ	GeoNET CORS, LINZ GDB co-ordinates	PRJ45792	As above
Control	Sounds Surveying	RTK GNSS	PRJ45792	19-23 Feb 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	< 2.0 m	2	95
4	Medium vegetation	2.0 – 8.0 m	2	95
5	High vegetation	> 8.0 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

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	0.05m		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.

Data Validation – LiDAR Data

- **Bay of Plenty – Block 1.** Vertical Accuracy Validation - Ground data has been compared to ~200 test points obtained by field survey and assumed to be error-free. The test points were distributed in 5 groups across the mapping area and located on clear ground. Comparison of the test points with elevations interpolated from measured data resulted in:

Site	Post dZ	Post RMS	Post SD
Site_1	0.004	0.016	0.016
Site_2	-0.031	0.035	0.016
Site_3	-0.009	0.021	0.019
Site_4	0.040	0.042	0.014
Site_7	-0.043	0.045	0.015

Comparison of all points with elevations interpolated from measured data resulted in:

Mean difference: -0.011m
St. Deviation: 0.031
Standard Error (RMS): 0.033m or 0.065m @ 95% CI

The elevation difference of -0.115m has been applied to the data supplied in this volume.

- **Bay of Plenty – Block 2.** Vertical Accuracy Validation - Ground data has been compared to ~1260 test points obtained by field survey and assumed to be error-free. The test points were distributed in 28 groups across the mapping area and located on clear ground. Comparison of the test points with elevations interpolated from measured data resulted in:

Site	Post dZ	Post RMS	Post SD
<i>Average</i>	<i>0.000</i>		
Site_5	-0.042	0.046	0.018
Site_6	0.014	0.023	0.019
Site_8	-0.021	0.027	0.016
Site_9	-0.059	0.065	0.027
Site_10	0.010	0.027	0.026
Site_11	0.011	0.026	0.024
Site_12	-0.044	0.050	0.023
Site_13	0.013	0.021	0.016
Site_14	-0.029	0.047	0.037
Site_15	0.015	0.027	0.023
Site_16	0.013	0.033	0.031
Site_17	-0.012	0.030	0.028
Site_18	-0.005	0.020	0.019
Site_19	0.009	0.017	0.014
Site_20	-0.031	0.036	0.019
Site_21	0.030	0.035	0.018
Site_22	0.017	0.024	0.017
Site_23	0.029	0.038	0.025
Site_24	0.013	0.027	0.025
Site_25	0.020	0.025	0.014
Site_26	0.006	0.017	0.016
Site_27	0.071	0.073	0.015
Site_28	0.034	0.038	0.016
Site_29	0.006	0.020	0.019
Site_30	-0.031	0.038	0.022
Site_31	-0.005	0.029	0.029
Site_32	-0.019	0.033	0.027
Site_33	-0.008	0.021	0.019

Comparison of all points with elevations interpolated from measured data resulted in:

Mean difference: 0.000m
St. Deviation: 0.035
Standard Error (RMS): 0.035m or 0.068m @ 95% CI

The elevation difference of -0.114m has been applied to the data supplied in this volume.

- 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_01-03_BOP.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.

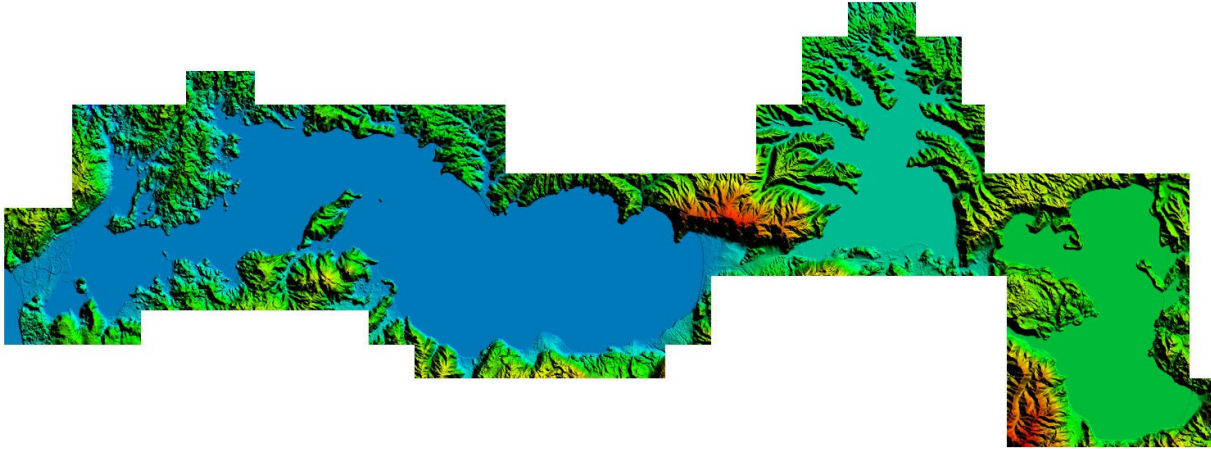
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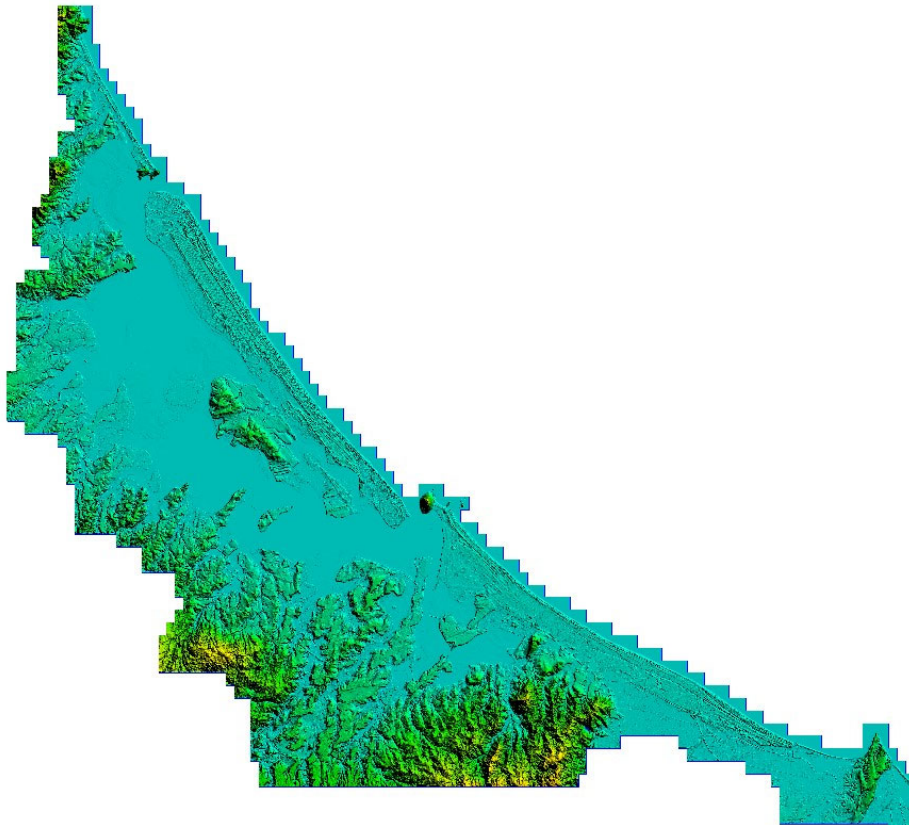
4. VALIDATION

Bay of Plenty LiDAR – Colour Elevation Images

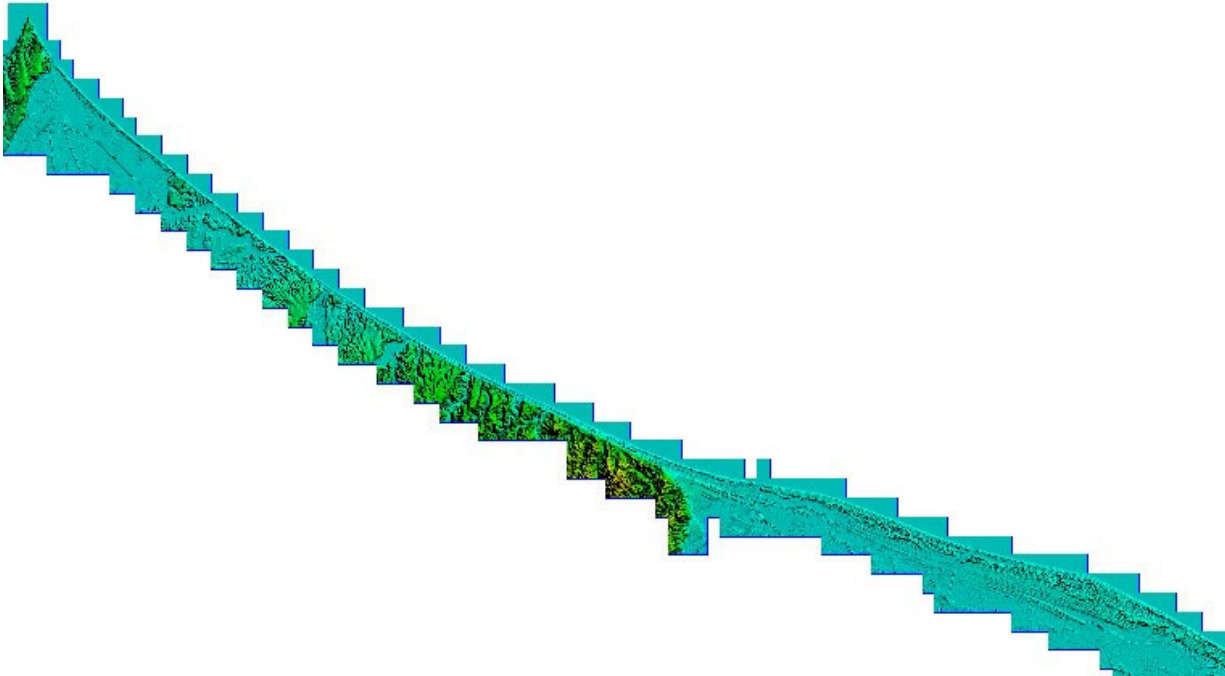
Bay of Plenty Block 1: DEM – Rotorua Lakes



Bay of Plenty Block 2: DEM – Tauranga Harbour



Bay of Plenty Block 2 – DEM – Maketu - Whakatane



Bay of Plenty Block 2 – DEM – Whakatane - Opotiki

