AUCKLAND COUNCIL

Auckland LiDAR 2024

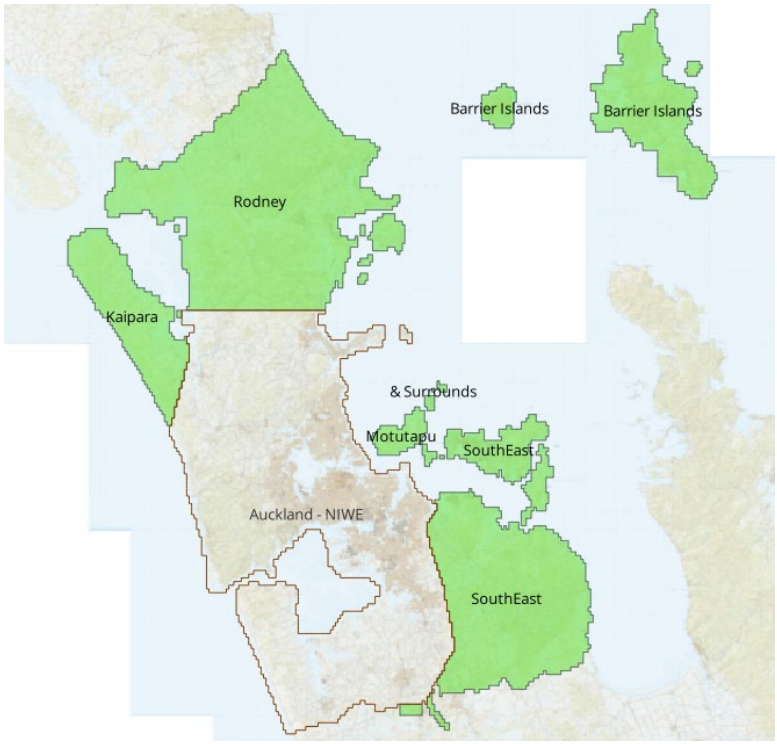
VOLUME: PRJ45723_01-05

PROJECT SUMMARY

Woolpert were contracted by Auckland Council to collect LiDAR data over the outlying parts of the Region. The project was planned to be consistent with the capture collected for the North Island Weather Event's (NIWE) LiDAR over the central Auckland in 2024. The mainland areas of outer Auckland have been connected to the central (NIWE) Auckland block.

This report describes the products supplied for the outer Auckland areas shown below in green. This has been processed in 5 blocks; coverage of each block is shown in the validation plots at the end of this document. (Products have been updated following Council and LINZ review in April and June 2025).

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:

- Barrier Islands are comprised of 1,309 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 synthetic points.
- South East Auckland is comprised of 3,188 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 synthetic points.
- Motutapu and Surrounding Islands are comprised of 192 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 synthetic points.
- Kaipara is comprised of 1038 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 synthetic points.

- Rodney is comprised of 4,420 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 synthetic points.

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

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1. DATA INFORMATION

Data supply:	LINZ & Woolpert AWS
Number of files:	67,229 data files, file listing, metadata file
Data formatted on:	19/11/2024 – 10/03/2025, (resubmission 14/05/2025 & 12/06/2025)
Metadata Document:	This file

Previous Deliveries	Date	Title	Contents
PRJ45792_06	30/10/2024 – 27/02/2025	North Island Weather Events LiDAR 2023-24	Final NIWE Central Auckland products (HDD)
PRJ45723_01-03	19/11/2024 - 10/03/2025	Auckland LiDAR 2024-25	Initial delivery
PRJ45723_04	14/05/2025	Auckland LiDAR 2024-25	Resubmission following Council review
PRJ45723_05	12/06/2025	Auckland LiDAR 2024-25	Resubmission following LINZ review

File Naming in this Delivery	Contents
e.g. CL2_BB32_2024_1000_4931.laz	Classified point cloud in LAZ v1.4 format
e.g. DEM_BB32_2024_1000_4931.tif	1m grid DEM – hydro-flattened
e.g. DEM05_BB32_2024_1000_4931.tif	0.5m grid DEM – hydro-flattened
e.g. DSM_BB32_2024_1000_4931.tif	1m grid DSM – hydro-flattened
Ancillary files - Each block has the following files: PRJ45723_Block_AOI_NZTM PRJ45723_Block_Hydro_NZTM PRJ45723_Block_Bridges_NZTM PRJ45723_Block_Tile_Layout_NZTM PRJ45723_Block_Flightlines_NZTM	ESRI Shapefile format: Extent Hydro break lines Bridge synthetic points Tile Index Flight lines
Readme_PRJ45723_01-05.pdf	**Metadata Report – this file**

2. METADATA

Source Data	Source	Description	Ref No	Date
LiDAR	Woolpert	Leica Terrain Mapper2 - 527	FL022828	27/06/2024
		Leica Terrain Mapper2 - 527	FL022834	27/06/2024
		Leica Terrain Mapper2 - 527	FL022841	28/06/2024
		Leica Terrain Mapper2 - 527	FL022843	29/06/2024
		Leica Terrain Mapper2 - 527	FL022883	4/07/2024
		Leica Terrain Mapper2 - 527	FL022884	4/07/2024
		Leica Terrain Mapper2 - 527	FL022888	5/07/2024
		Leica Terrain Mapper2 - 527	FL022933	12/07/2024
		Leica Terrain Mapper2 - 527	FL022940	12/07/2024
		Leica Terrain Mapper2 - 527	FL022941	13/07/2024
		Leica Terrain Mapper2 - 527	FL023039	26/07/2024
		Leica Terrain Mapper2 - 527	FL023101	5/08/2024
		Leica Terrain Mapper2 - 527	FL023114	7/08/2024
		Leica Terrain Mapper2 - 527	FL023141	11/08/2024
		Leica Terrain Mapper2 - 527	FL023148	13/08/2024
		Leica Terrain Mapper2 - 527	FL023269	5/09/2024
		Leica Terrain Mapper2 - 527	FL023525	8/10/2024
		Leica Terrain Mapper2 - 527	FL023611	21/10/2024
		Leica Terrain Mapper2 - 527	FL023727	4/11/2024
GPS Base Data	GeoNET /Woods	GeoNET and Global Surveys CORS. LINZ GDB co-ordinates	PRJ45723	Dates as above
Control	WSP	Post processed Kinematic GNSS	PRJ45792	23/05/2024 – 21/06/2024
Control	WSP	Post processed Kinematic GNSS	PRJ45723	26/08/2024 – 07/10/2024

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.

Number	Point Class	Description	ICSM	CI %
1	Default	Unclassified	1	95
2	Ground	Ground	2	98
3	Low vegetation	< 0.3 m	1	95
4	Medium vegetation	0.3 – 2.0 m	1	95
5	High vegetation	> 2.0 m	1	95
6	Buildings, structures	Buildings, houses, sheds, silos etc.	1	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	0.025m		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 modelling 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 building and vegetation classification was automated, therefore the Point Cloud and Canopy Height Model may contain miscellaneous items such as poles, wires, cars.

Data Validation – LiDAR Data

- Vertical Accuracy Validation - Ground data has been compared to ~2000 test points obtained by field survey and assumed to be error-free. The sites were distributed in ~51 groups across the mapping area and located on clear ground. Comparison of the test points with elevations interpolated from measured data resulted in the following for each block:

  Great Barrier Island. Shift applied 0.040m

  (No field survey possible on Little Barrier Island, but data was compared to 2017-18 LiDAR data and found to compare well.)

Site	dZ	RMS	SD	Calc	Post dZ	Post RMS	Post SD
Average	*-0.040*			*0.000*	*0.000*		
Auckland_NZTM_NZVD2016_site_28	-0.058	0.062	0.021	-0.018	-0.018	0.027	0.021
Auckland_NZTM_NZVD2016_site_29	-0.023	0.031	0.021	0.017	0.018	0.027	0.021
Auckland_NZTM_NZVD2016_site_30	-0.048	0.051	0.018	-0.008	-0.008	0.020	0.018
Auckland_NZTM_NZVD2016_site_31	-0.043	0.047	0.020	-0.003	-0.003	0.020	0.020
Auckland_NZTM_NZVD2016_site_32	-0.028	0.033	0.018	0.012	0.012	0.021	0.018

South East Auckland - Mainland. Shift applied -0.042m

(Central Auckland control was also considered on the mainland)

Site	dZ	RMS	SD	Calc	Post dZ	Post RMS	Post SD
Average	*0.042*			*0.000*	*0.000*		
Auckland_NZTM_NZVD2016_site_18	0.030	0.033	0.015	-0.012	-0.012	0.016	0.011
Auckland_NZTM_NZVD2016_site_19	0.019	0.023	0.013	-0.023	-0.031	0.032	0.006
Auckland_NZTM_NZVD2016_site_21	0.034	0.039	0.018	-0.008	-0.005	0.015	0.015
Auckland_NZTM_NZVD2016_site_38	0.041	0.046	0.021	-0.001	-0.019	0.020	0.009
Auckland_NZTM_NZVD2016_site_1-STH	0.033	0.064	0.056	-0.009	0.013	0.019	0.014
Auckland_NZTM_NZVD2016_site_6-STH	0.018	0.021	0.012	-0.024	-0.025	0.027	0.011
Auckland_NZTM_NZVD2016_site_17-STH	0.034	0.041	0.022	-0.008	-0.013	0.022	0.018
Auckland_NZTM_NZVD2016_site_18-STH	-0.005	0.060	0.060	-0.047	0.021	0.028	0.019
Auckland_NZTM_NZVD2016_site_27-STH	0.047	0.050	0.018	0.005	0.000	0.022	0.022
Auckland_NZTM_NZVD2016_site_41-STH	0.008	0.017	0.015	-0.035	-0.038	0.041	0.016
Auckland_NZTM_NZVD2016_site_42-STH	0.059	0.061	0.015	0.017	0.013	0.020	0.016
Auckland_NZTM_NZVD2016_site_43-STH	0.055	0.057	0.015	0.013	0.010	0.017	0.014
Auckland_NZTM_NZVD2016_site_44-STH	0.036	0.041	0.020	-0.006	-0.010	0.021	0.019

South East Auckland – Waiheke and Ponui Islands. Shift applied -0.015m

Site	dZ	RMS	SD	Calc	Post dZ	Post RMS	Post SD
Average	*0.015*			*0.000*	*0.000*		
Auckland_NZTM_NZVD2016_site_4	-0.006	0.028	0.028	-0.021	-0.021	0.035	0.028
Auckland_NZTM_NZVD2016_site_10	0.021	0.025	0.014	0.006	0.006	0.015	0.014
Auckland_NZTM_NZVD2016_site_21	0.036	0.045	0.027	0.021	0.021	0.034	0.027
Auckland_NZTM_NZVD2016_site_23	0.000	0.016	0.017	-0.015	-0.015	0.022	0.017
Auckland_NZTM_NZVD2016_site_24	0.013	0.021	0.016	-0.002	-0.002	0.016	0.016
Auckland_NZTM_NZVD2016_site_45	0.026	0.033	0.020	0.011	0.011	0.023	0.020

Motutapu and Surrounding Islands. Shift applied -0.0m

Site	dZ	RMS	SD
Average	*-0.002*		
Auckland_NZTM_NZVD2016_site_22-Motutapu_Is-&-Rangitoto_Is	-0.019	0.031	0.024
Auckland_NZTM_NZVD2016_site_25-Motutapu_Is-&-Rangitoto_Is	-0.005	0.012	0.011
Auckland_NZTM_NZVD2016_site_26-Motutapu_Is-&-Rangitoto_Is	0.019	0.027	0.020
Auckland_NZTM_NZVD2016_site_40-Motutapu_Is-&-Rangitoto_Is	0.006	0.017	0.016
Auckland_NZTM_NZVD2016_site_240-Motutapu_Is-&-Rangitoto_Is	-0.011	0.020	0.017

Kaipara. Shift applied -0.042m (Shift consistent with Central Auckland block)

Site	Post dZ	Post RMS	Post SD
Average	*0.000*		
Auckland_NZTM_NZVD2016_site_14	0.013	0.023	0.020
Auckland_NZTM_NZVD2016_site_37	0.006	0.024	0.023
Auckland_NZTM_NZVD2016_site_38	-0.011	0.017	0.014
Auckland_NZTM_NZVD2016_site_39	-0.009	0.022	0.021

Rodney. Shift applied -0.042m (Shift consistent with Central Auckland block)

Site	Post dZ	Post RMS	Post SD
Average	*0.015*		
Auckland_NZTM_NZVD2016_site_2	0.034	0.038	0.017
Auckland_NZTM_NZVD2016_site_3	0.086	0.090	0.027
Auckland_NZTM_NZVD2016_site_5	0.030	0.033	0.016
Auckland_NZTM_NZVD2016_site_7	-0.003	0.007	0.007
Auckland_NZTM_NZVD2016_site_8	0.006	0.010	0.008
Auckland_NZTM_NZVD2016_site_9	-0.054	0.061	0.030
Auckland_NZTM_NZVD2016_site_11	-0.044	0.065	0.049
Auckland_NZTM_NZVD2016_site_12	0.022	0.027	0.016
Auckland_NZTM_NZVD2016_site_13	0.006	0.014	0.013
Auckland_NZTM_NZVD2016_site_15	0.062	0.064	0.017
Auckland_NZTM_NZVD2016_site_16	0.016	0.020	0.011
Auckland_NZTM_NZVD2016_site_19	0.011	0.016	0.012
Auckland_NZTM_NZVD2016_site_20	0.027	0.030	0.013
Auckland_NZTM_NZVD2016_site_33	0.028	0.031	0.015
Auckland_NZTM_NZVD2016_site_34	-0.017	0.040	0.037
Auckland_NZTM_NZVD2016_site_35	-0.024	0.027	0.011
Auckland_NZTM_NZVD2016_site_36	0.069	0.070	0.015

Overall post shift comparison resulted in:

Mean difference: **0.003m**
St. Deviation: **0.031**
Standard Error (RMS): **0.031m or 0.061m @ 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 Auckland Council (**The Client**). The data is provided by Woolpert to **The Client** under the Terms of Engagement described in **IT Services Agreement LiDAR 24-25 Woolpert 22052024** and variation **CW217937.**

This provides the client, 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).

1. This file (Readme_PRJ45723_01-05.pdf) will always be stored with the unaltered data contained in this volume.

This data is provided in accordance with the specifications agreed with Auckland Council and Land Information New Zealand. 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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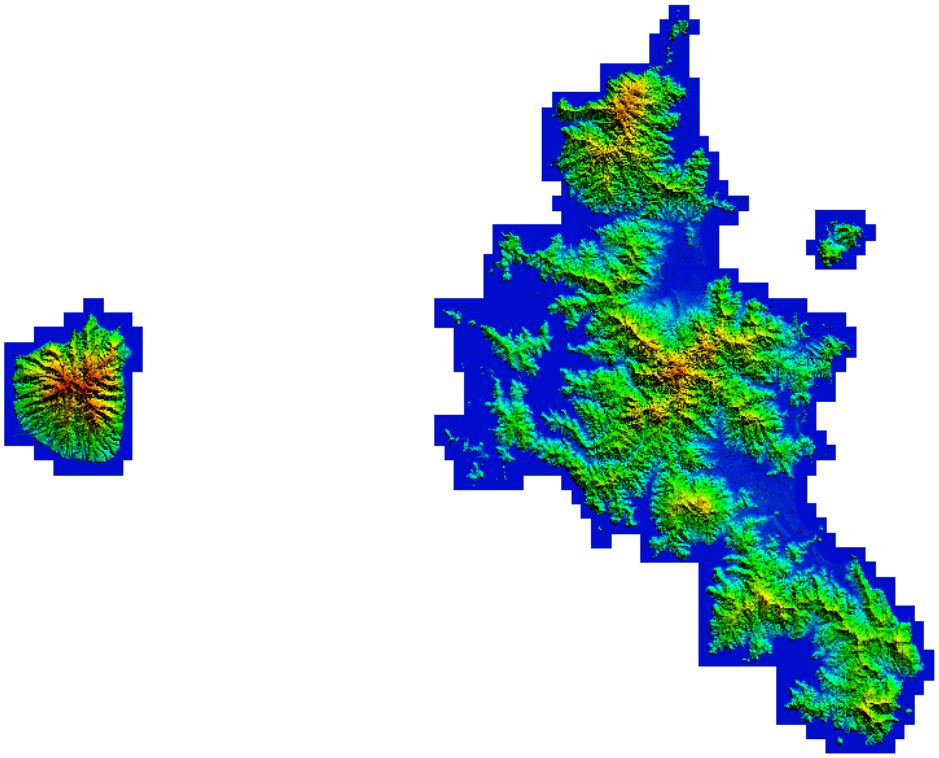
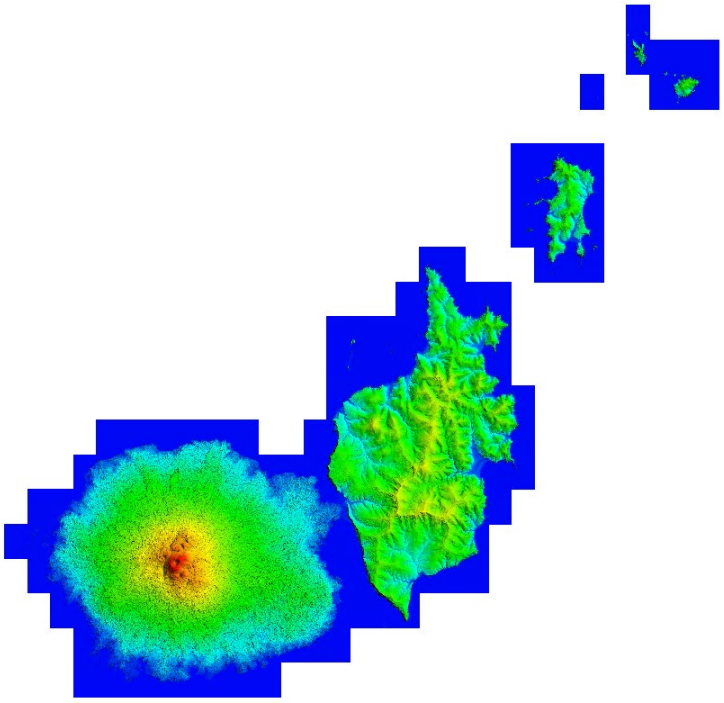
4. VALIDATION

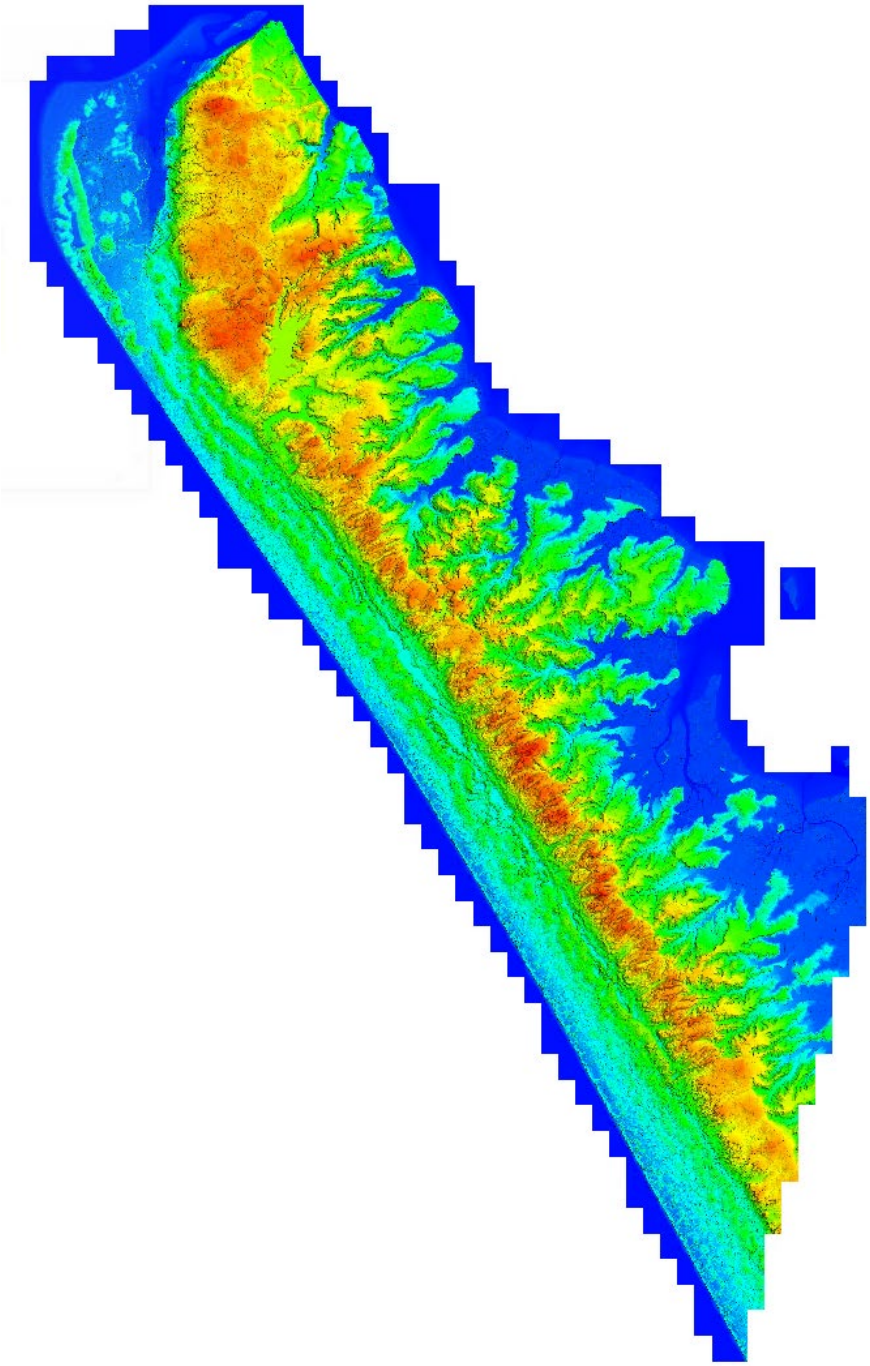
Barrier Islands (Great Barrier and Little Barrier) - Colour Elevation Image



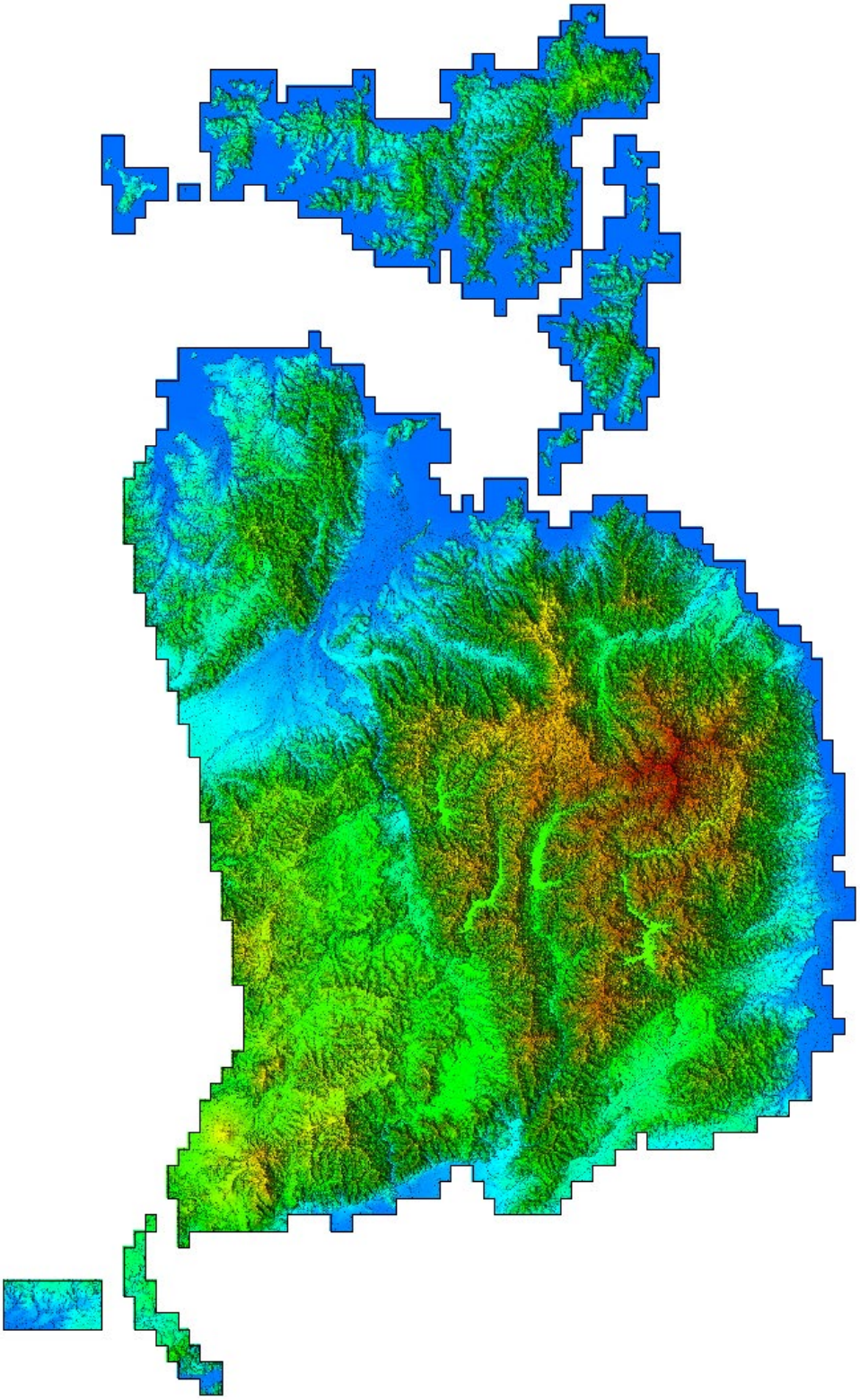
Motutapu, Rangitoto and Surrounding Islands - Colour Elevation Image



Kaipara - Colour Elevation Image



Southeast Auckland (includes Waiheke Island) - Colour Elevation Image



Rodney (Northern Auckland) - Colour Elevation Image