

# Remote Sensing at Auckland Council

NZ Esri User Conference

August 2017



# Remote Sensing Data

- What do we mean by Remote Sensing Data?
- For AC purposes:
  - UAV surveys
  - LiDAR
  - Aerial Imagery
- But there are a few other types of data around



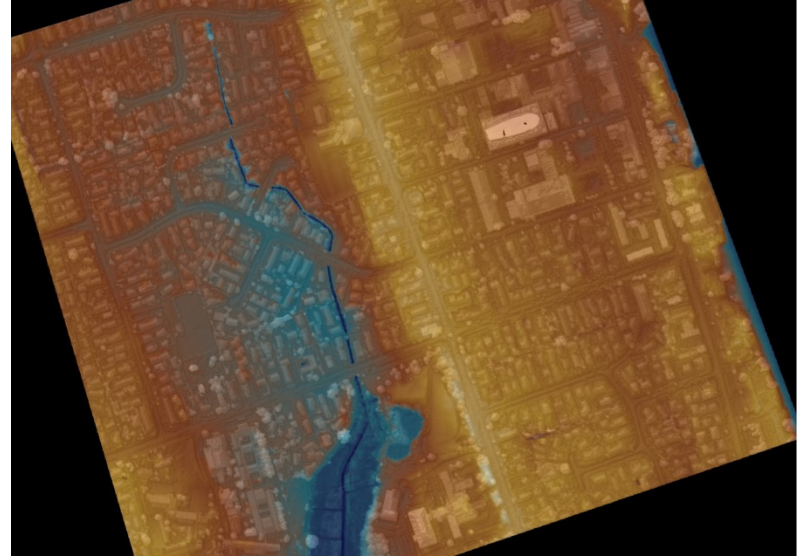
# UAV Data

- Data collected over small areas
  - Aerial photography
  - Elevation data
- 5 projects have been received by the Geospatial team
- Latest helicopter survey by Healthy Waters
  - A manned helicopter was used as HW found that the CAA UAV requirements were potentially too restrictive

# UAV Data



Aerial Photography



Elevation Data

# LiDAR

- Last data collection was in 2013
  - Raster mosaic using data from:
    - 2006
    - 2007
    - 2008
    - 2009
    - 2010
    - 2013
- Full regional coverage underway

# LiDAR

- Data accessibility:
  - Digital Elevation Models
    - External LINZ Data Service (LDS)
  - Point clouds
    - [opentopography.org](http://opentopography.org)
  - Contours
    - <=2010 on Auckland Council GeoMaps viewer
      - (clip, zip & ship)

# LiDAR

- 2016 / 2017 LiDAR
  - Full regional coverage
  - Planned 2016 capture
  - Concurrent Imagery



# LiDAR

- Data collected with NEP specifications in mind
  - Auckland 1946 VD and NZVD2016
  - Point density  $\geq 4$  points per  $m^2$
  - Deliverables to LINZ
    - las
    - DEM (1m grid)
    - DSM (1m grid)

# LiDAR

- 2016 / 2017 LiDAR
  - Point cloud classification
  - Contours
  - DEM / DSM
  - Concurrent Imagery

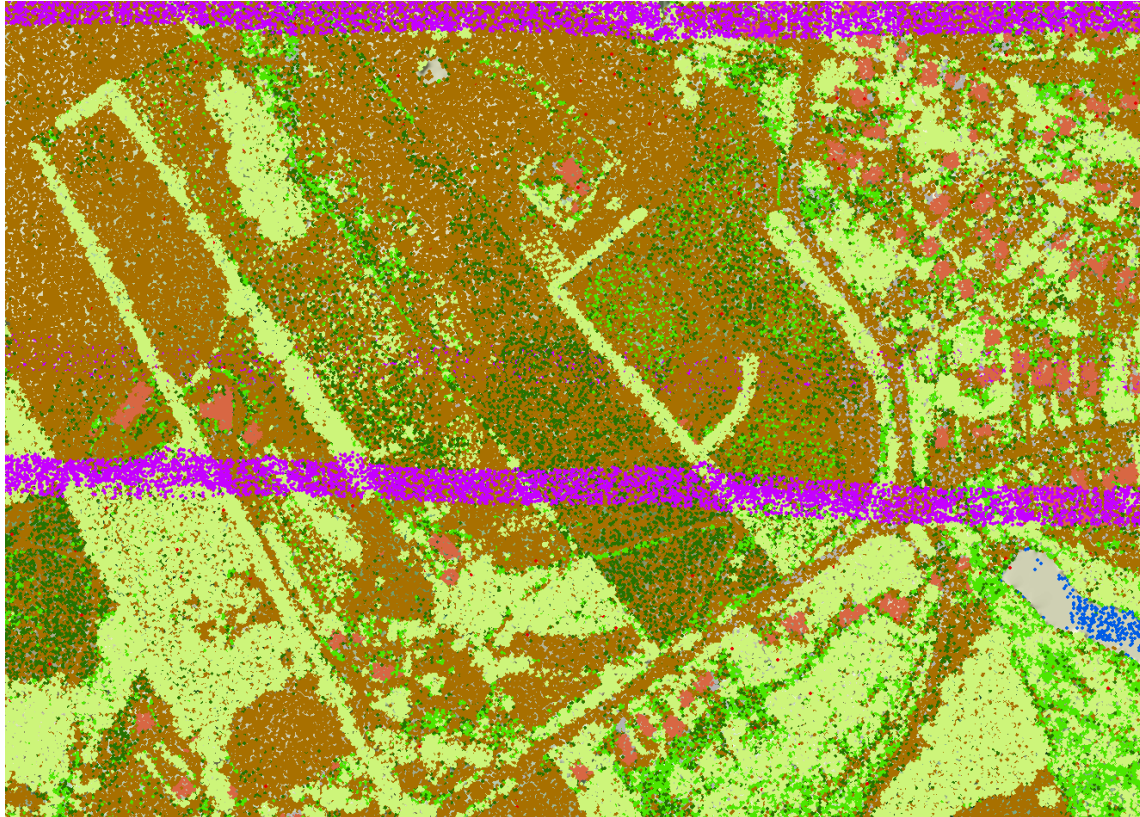


# LiDAR





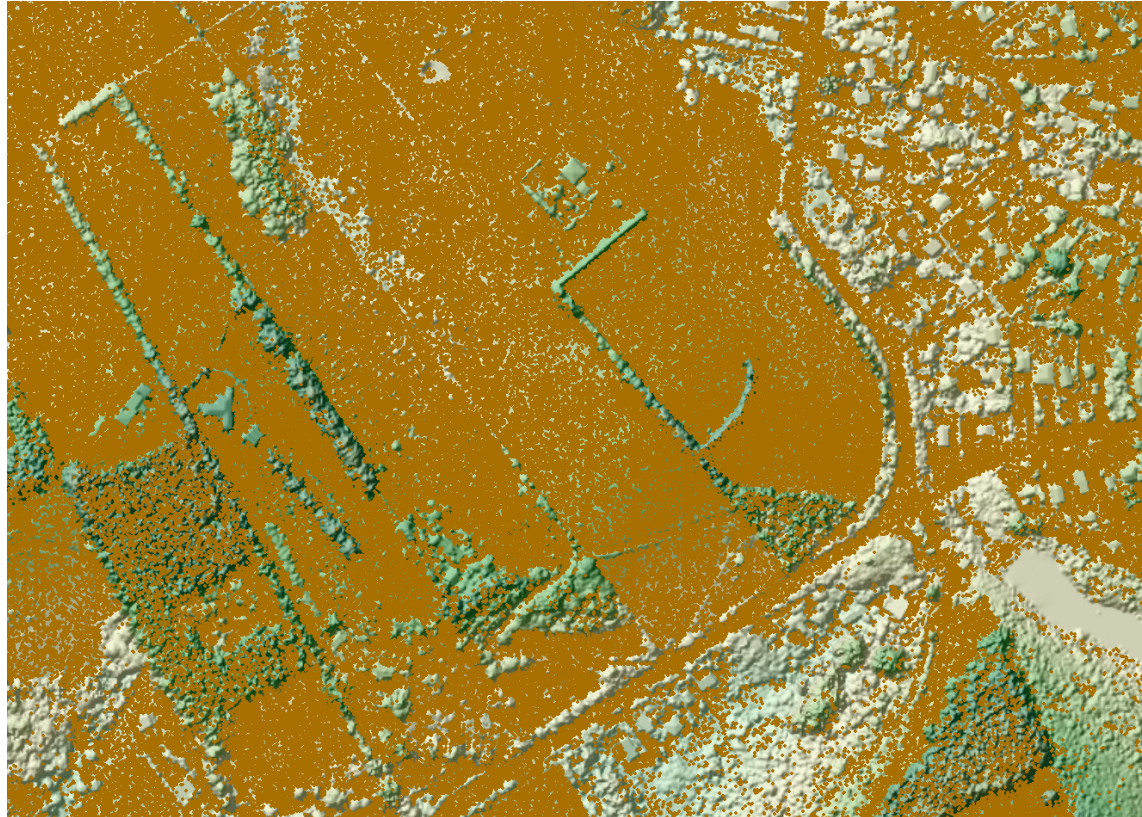
# LiDAR



Classified Raw  
Point Cloud



# LiDAR

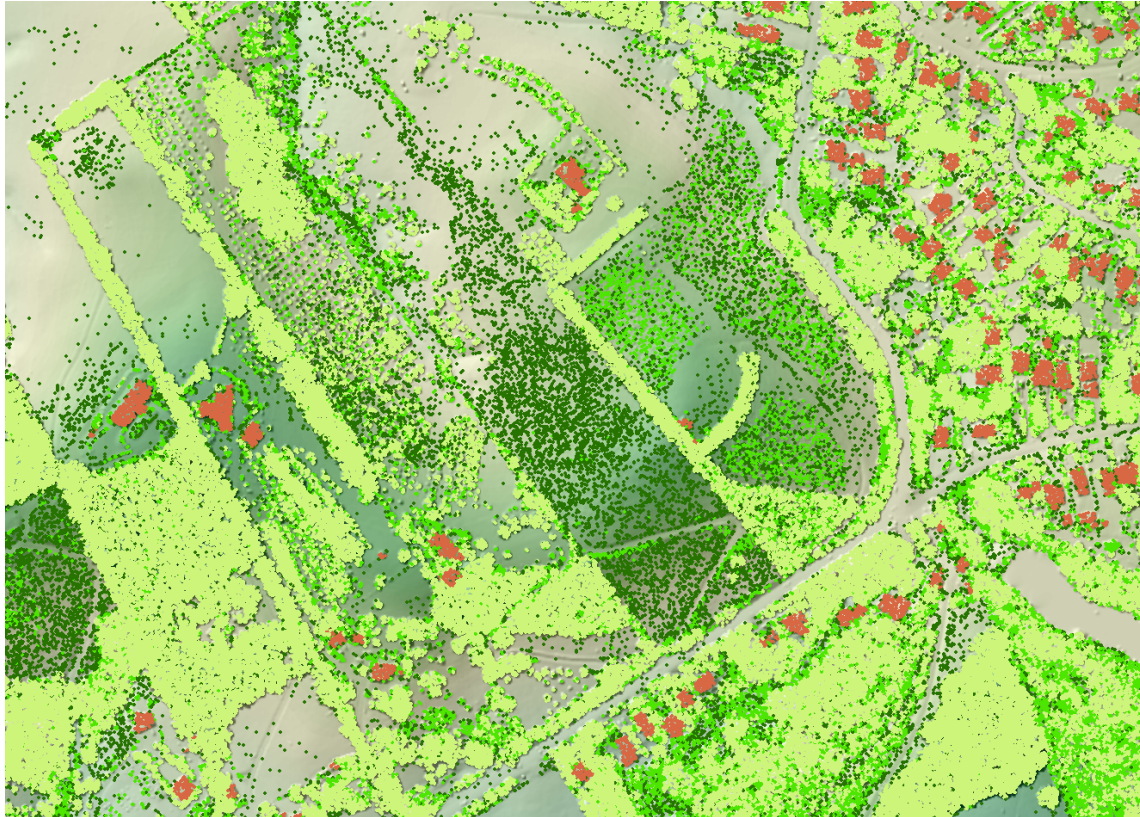


Bare-ground





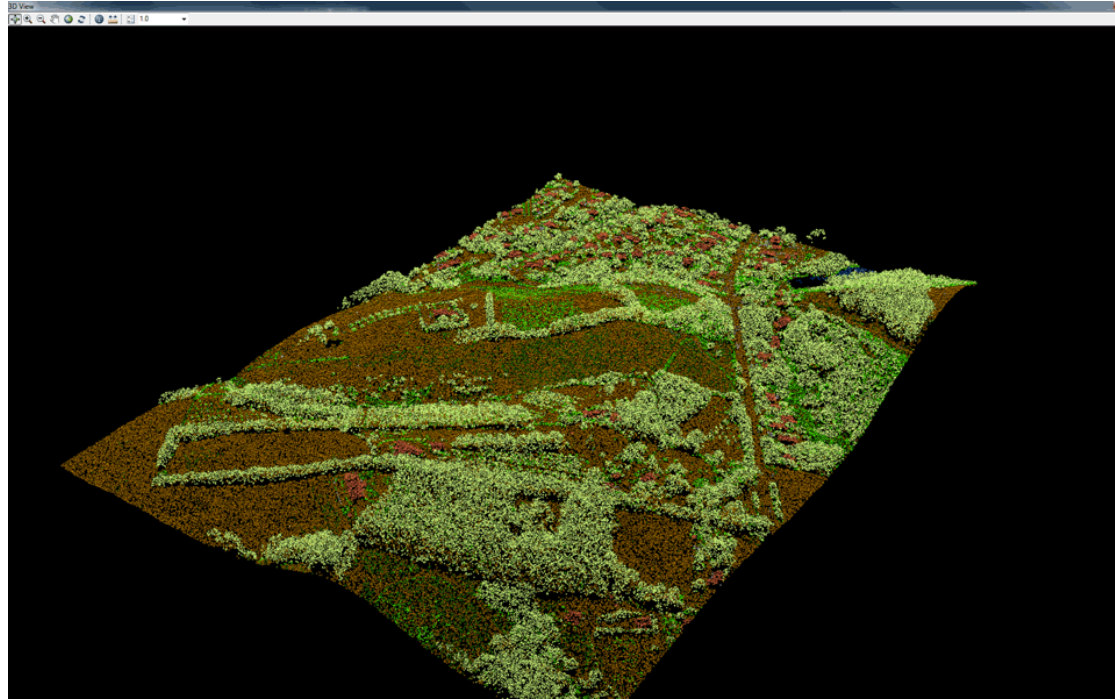
# LiDAR



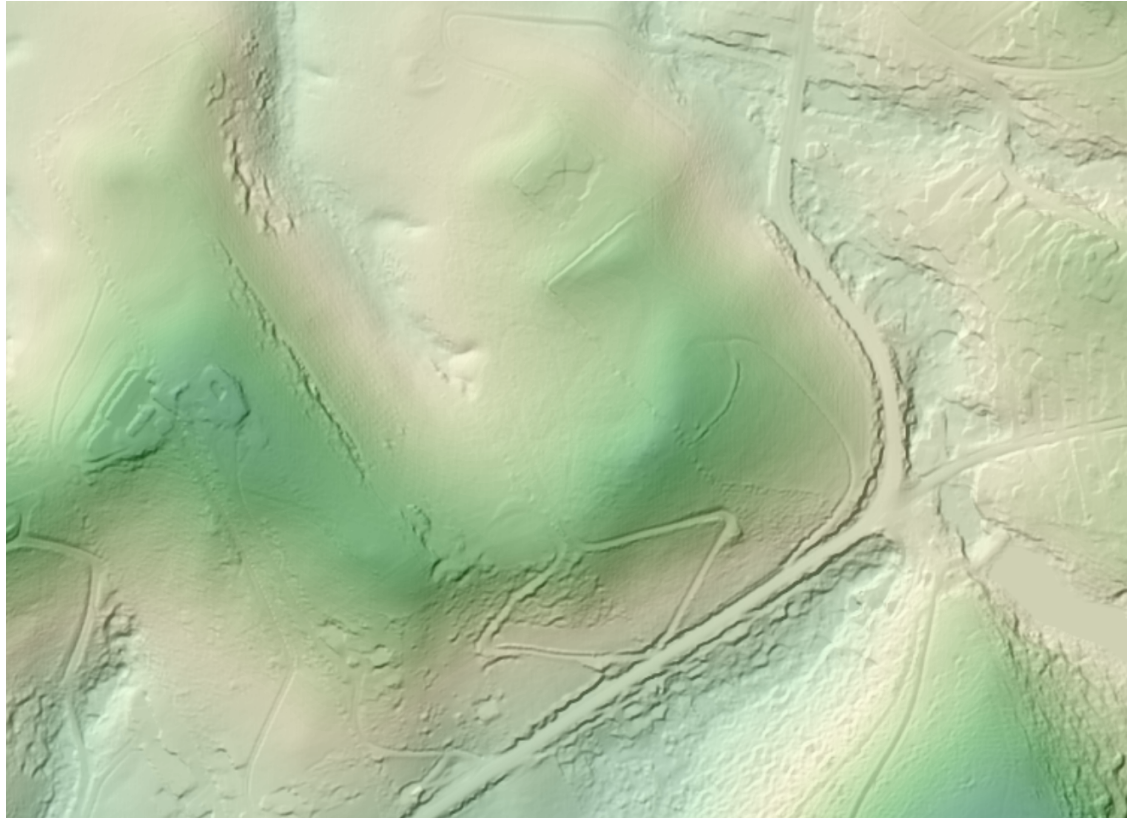
Above Ground



# LiDAR

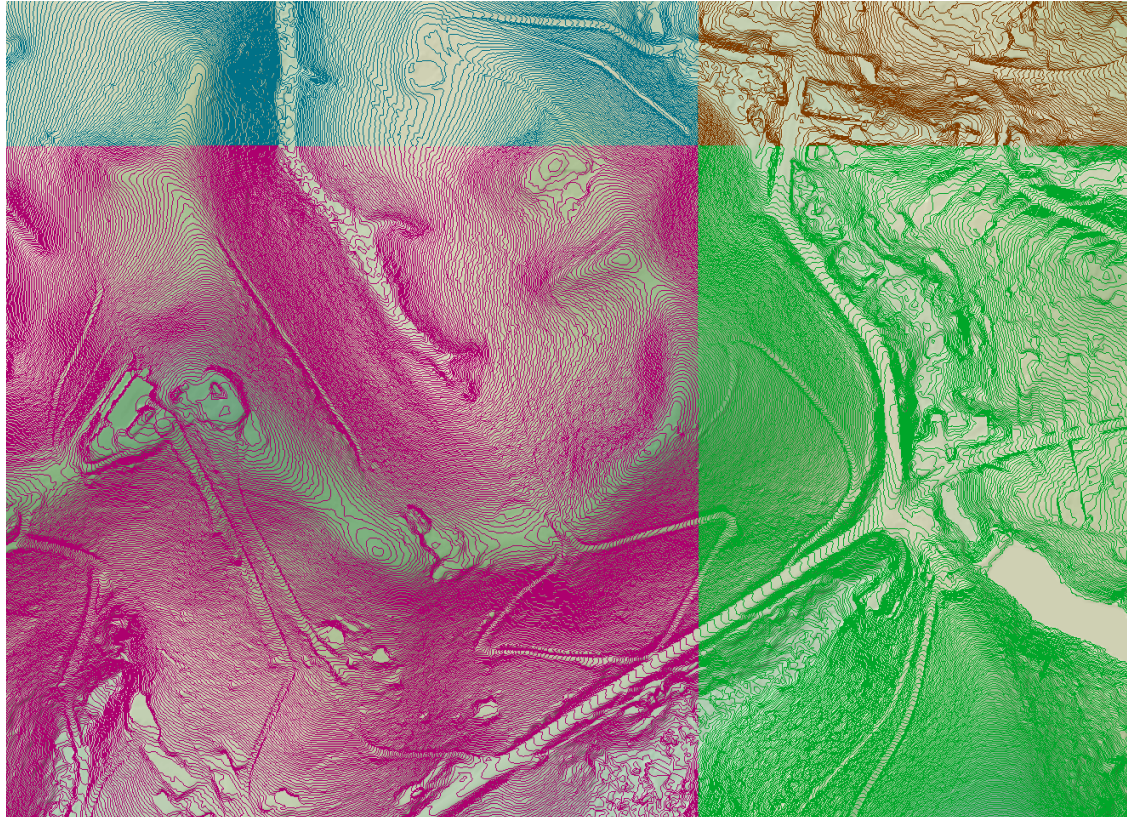


# LiDAR

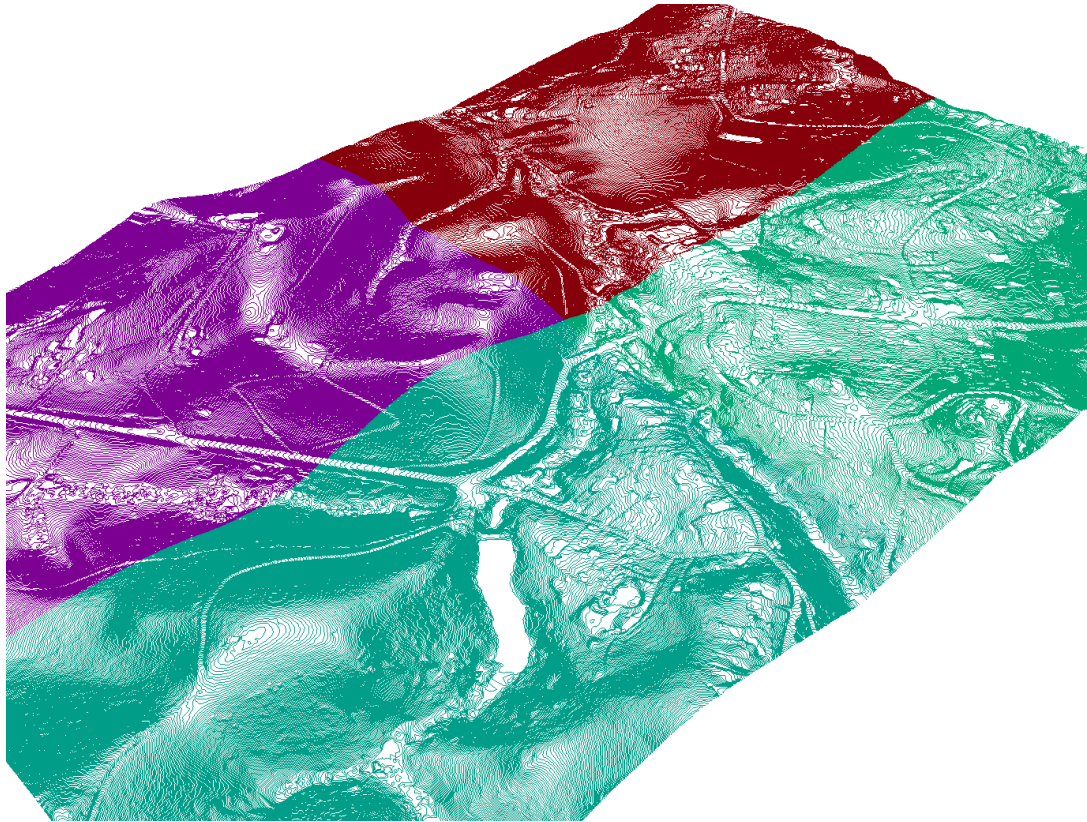




# LiDAR

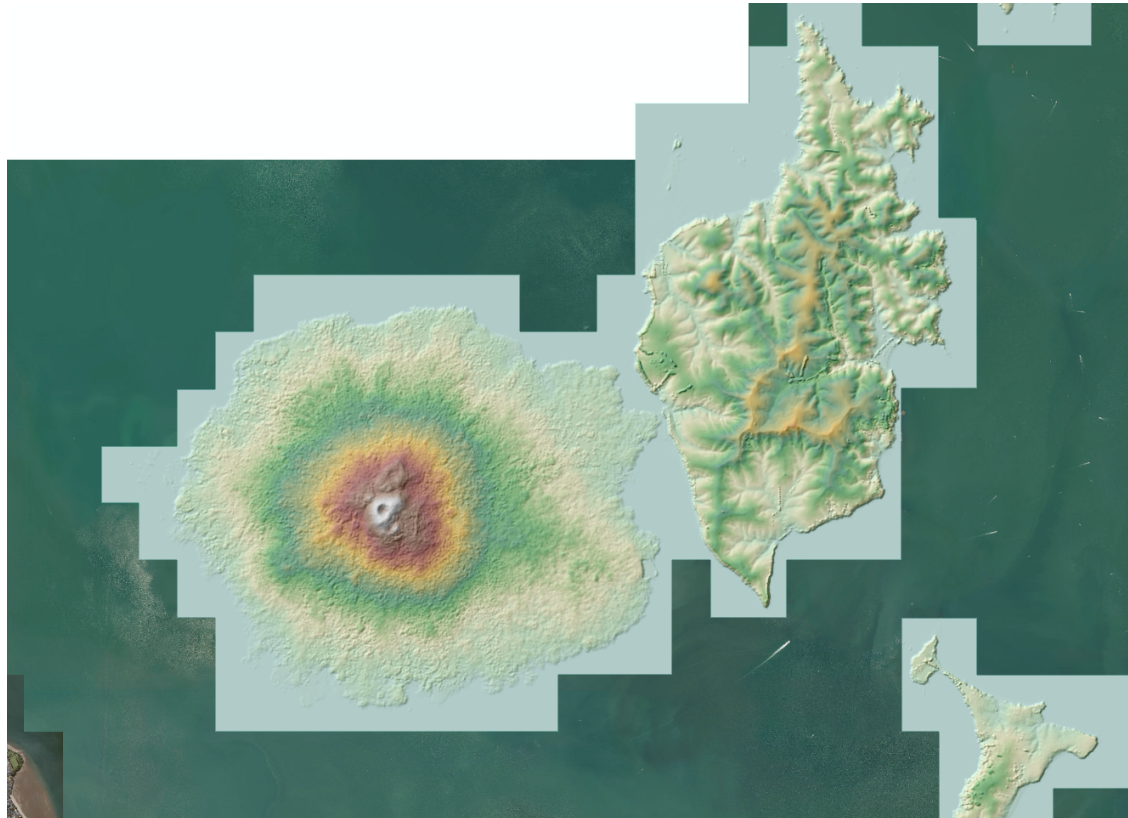


# LiDAR





# LiDAR

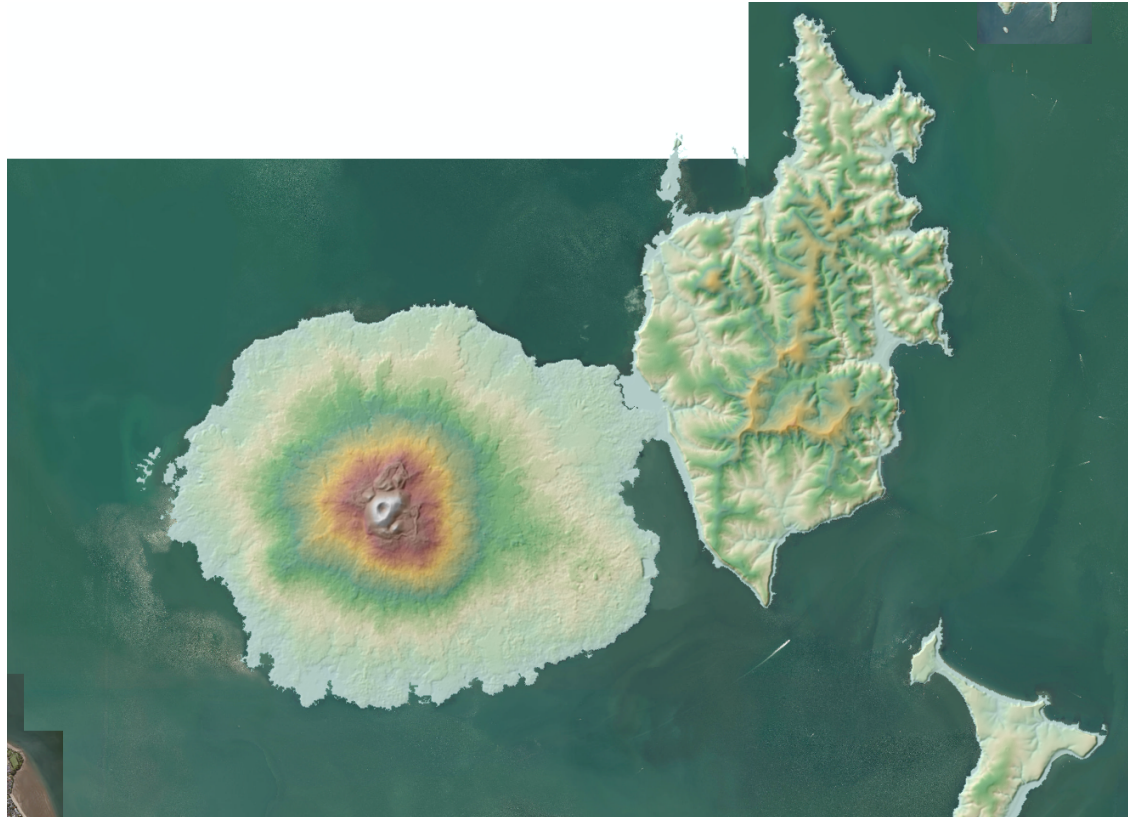


DSM





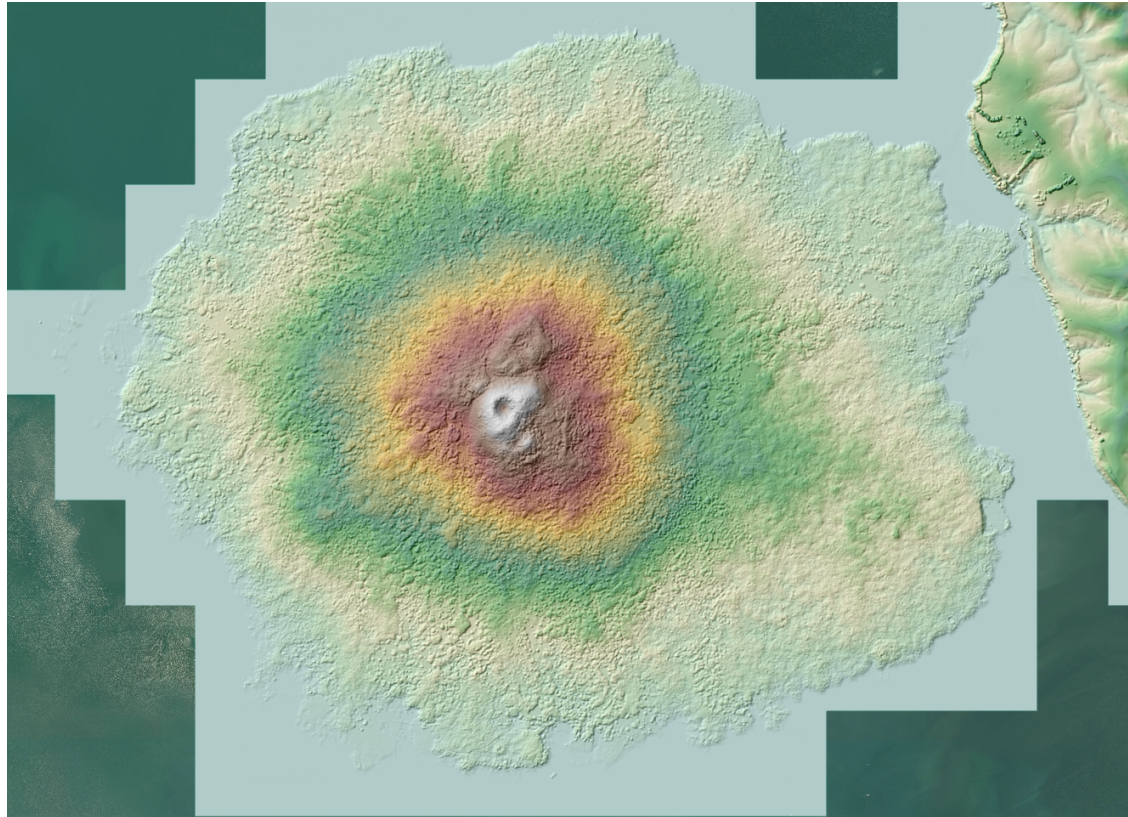
# LiDAR



DEM



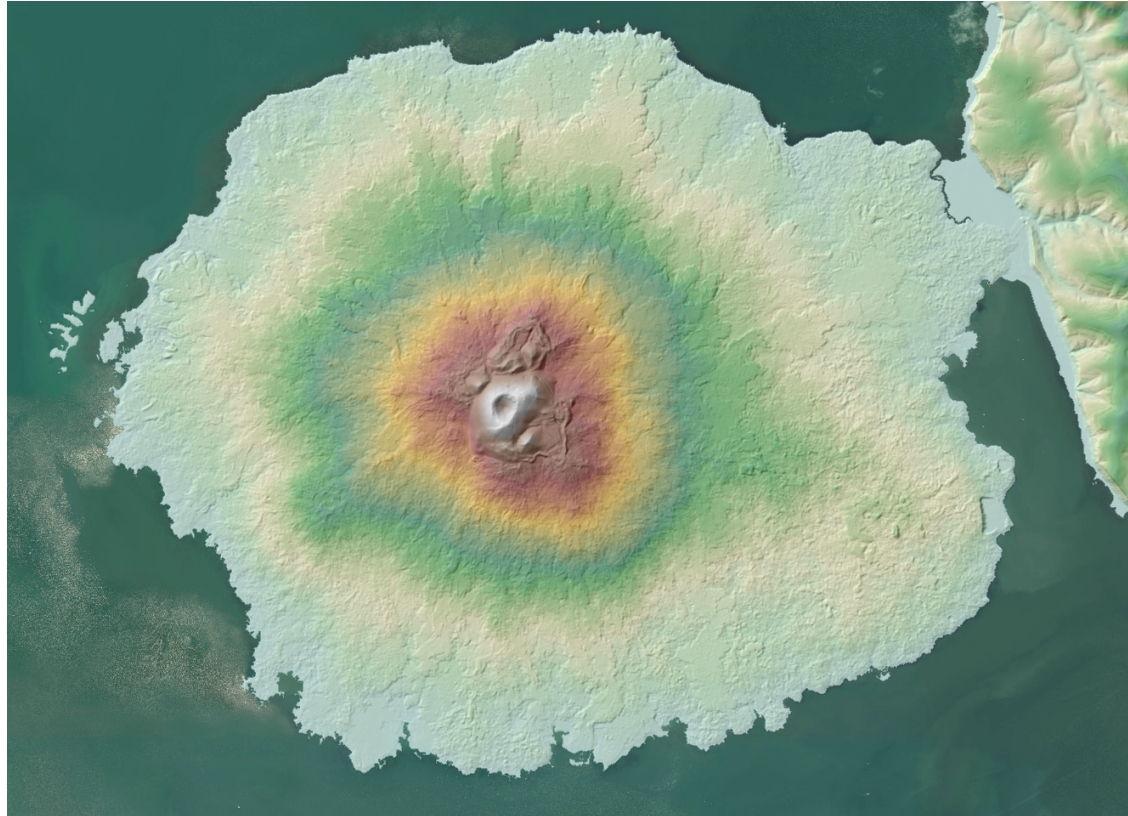
# LiDAR



DSM



# LiDAR



DEM





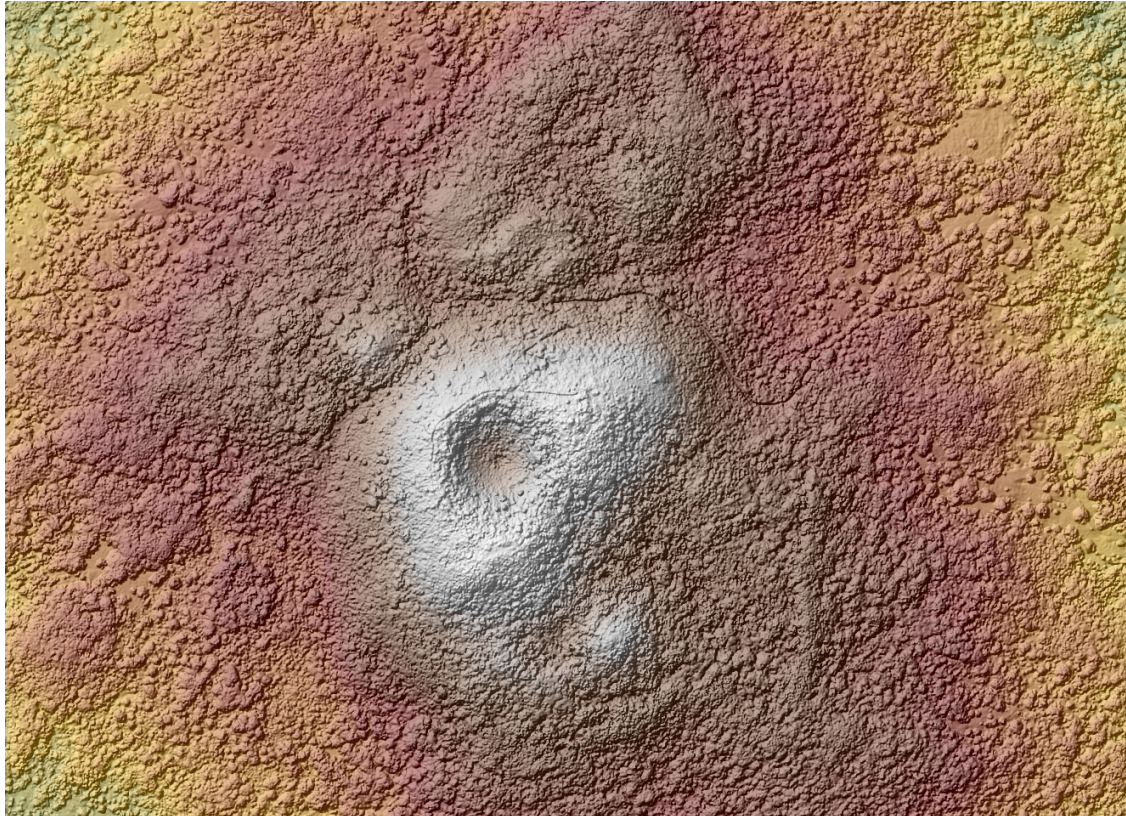
# LiDAR



DEM (2006)



# LiDAR

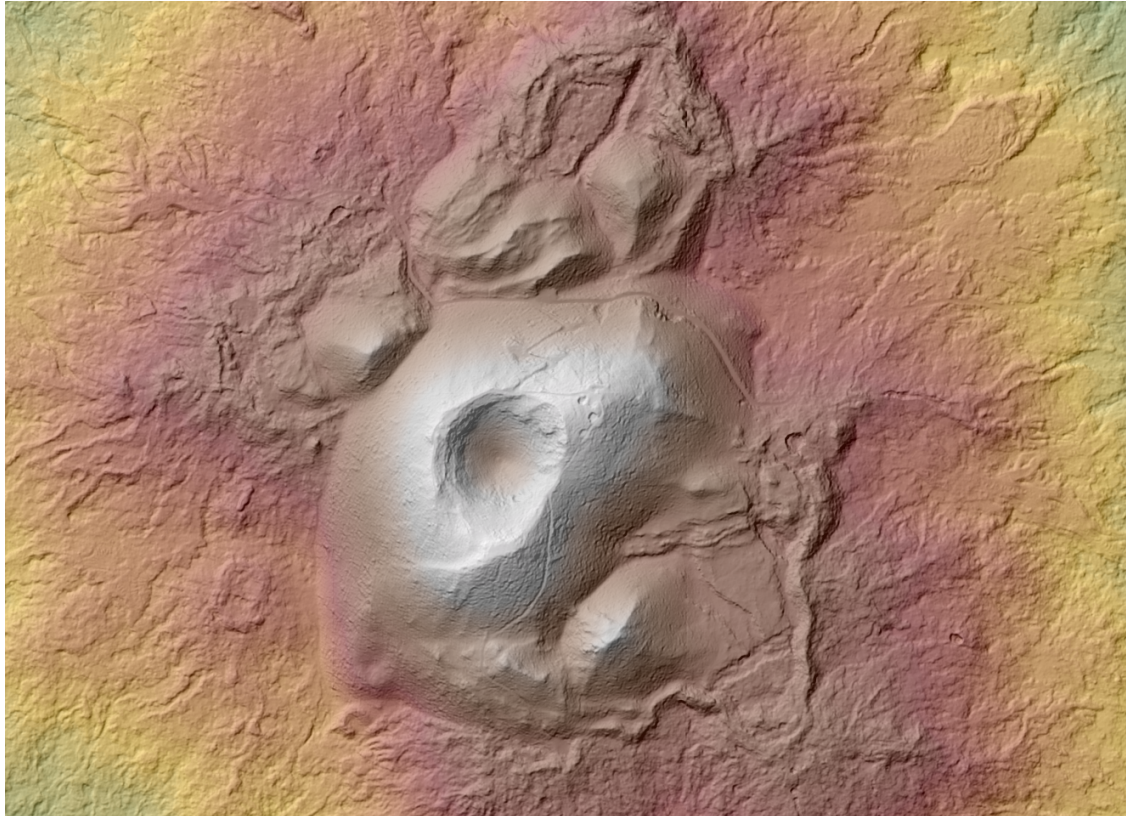


DSM (2016)





# LiDAR



DEM (2016)



# LiDAR

- Concurrent Imagery
  - Captured simultaneously with LiDAR when flying during daylight hours, where conditions allow

# LiDAR



Concurrent  
Imagery



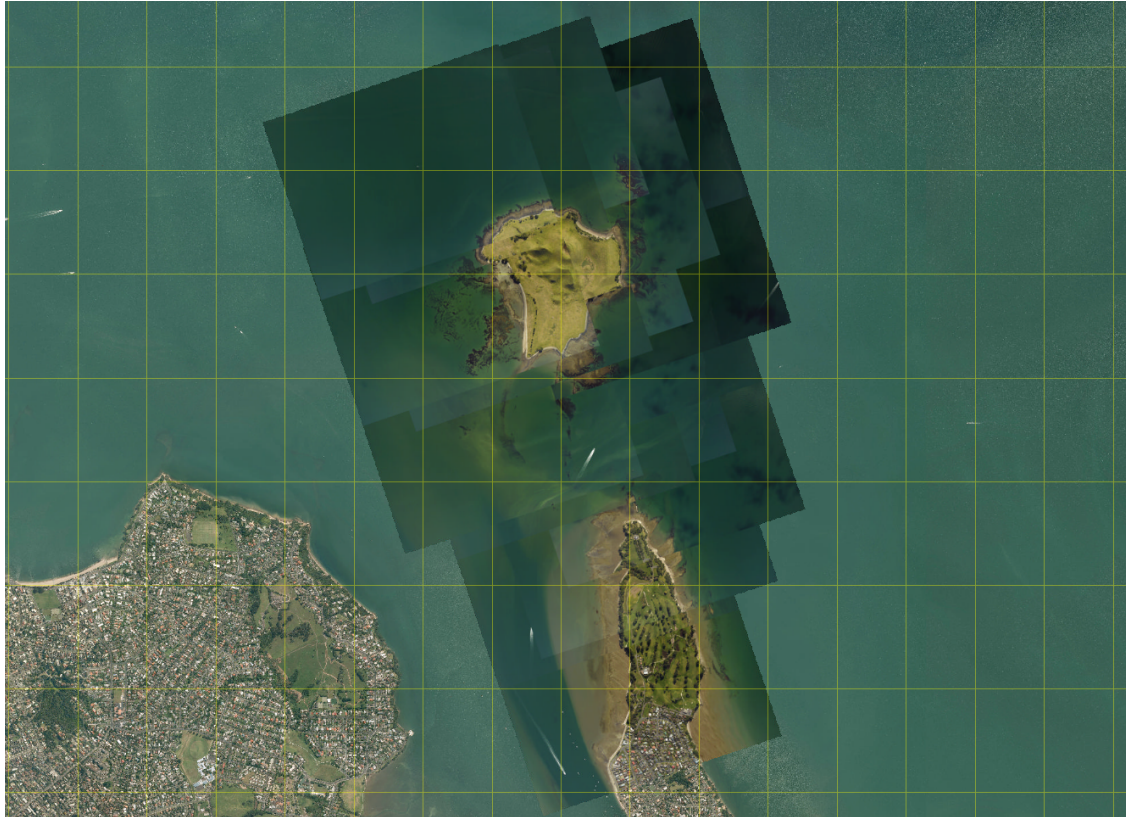
# LiDAR



# LiDAR

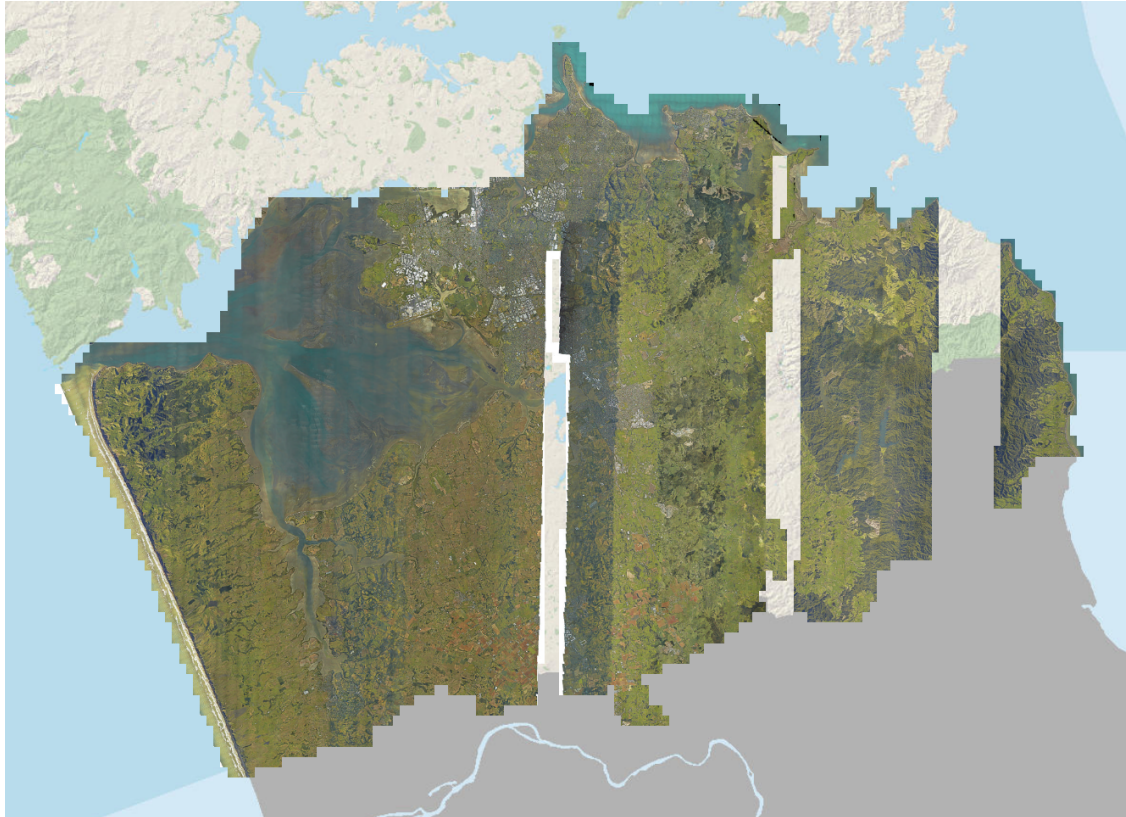


# LiDAR

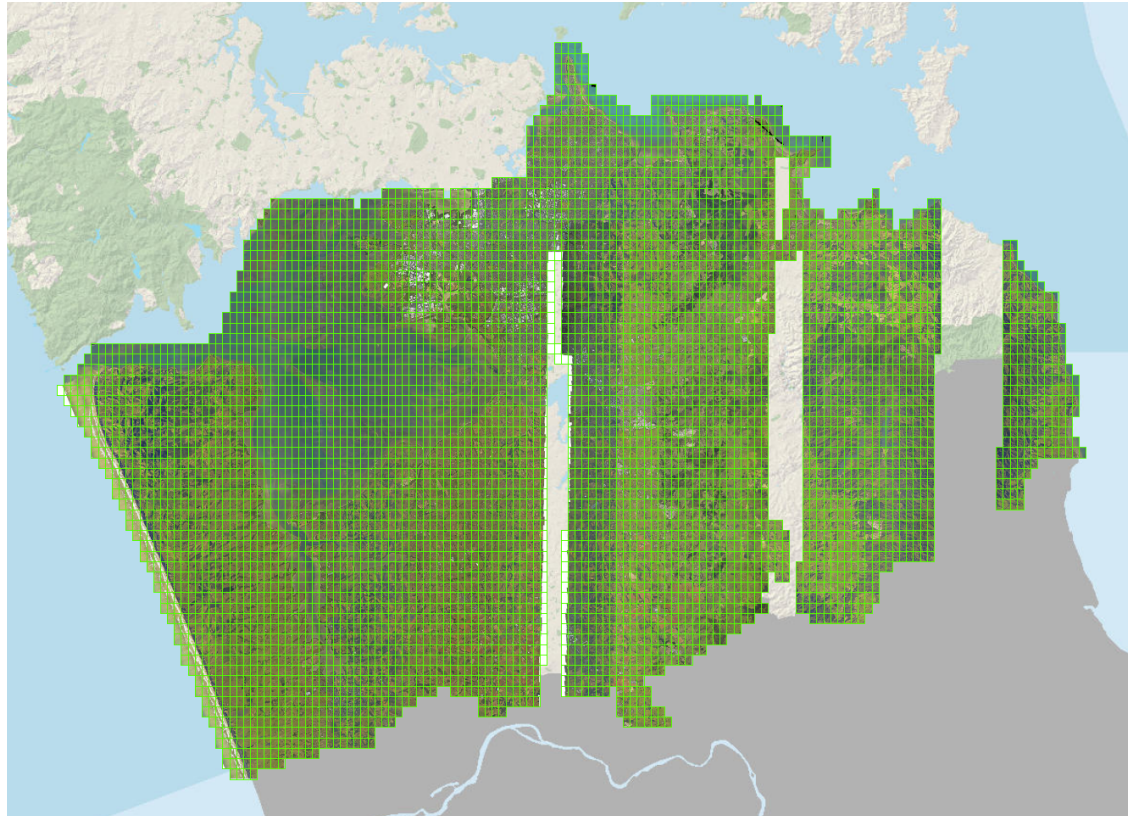




# LiDAR



# LiDAR





# LiDAR



# LiDAR

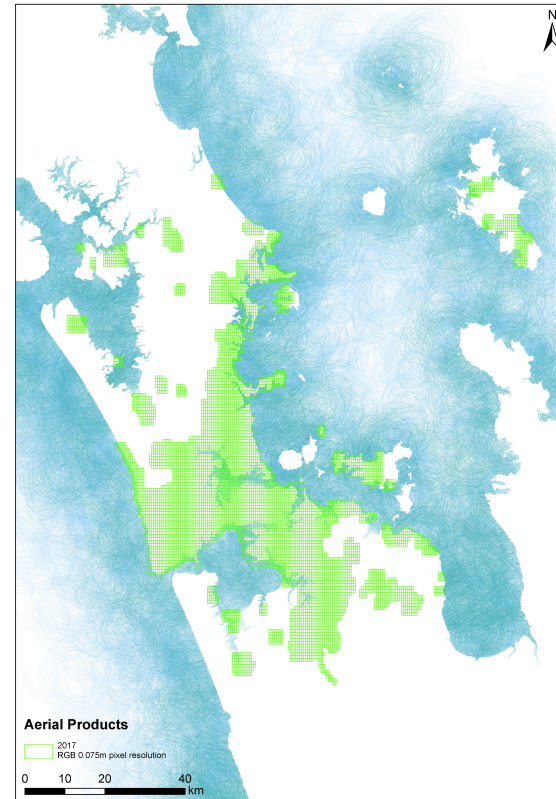


# Aerial Photography

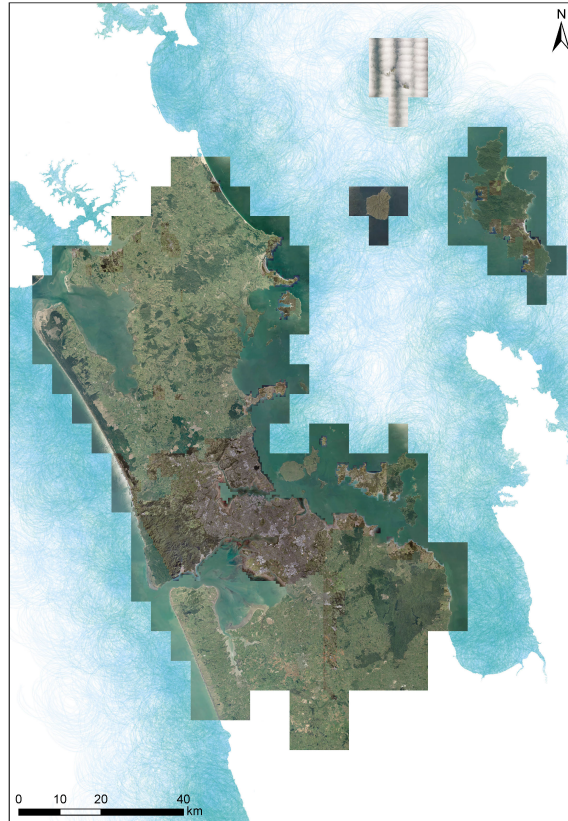
- Latest data collected in 2017
  - Previous dataset collected in 2016
    - CBD (True Orthos) collected in November 2015



# Aerial Photography



# Aerial Photography



# Aerial Photography

- CBD data
  - 0.075m GSD
  - Collected 13/11/2015
  - True Orthophotos
  - 3D Building Outlines

# Aerial Photography



CBD Extent





# Aerial Photography



Orthophoto  
(2010)



# Aerial Photography

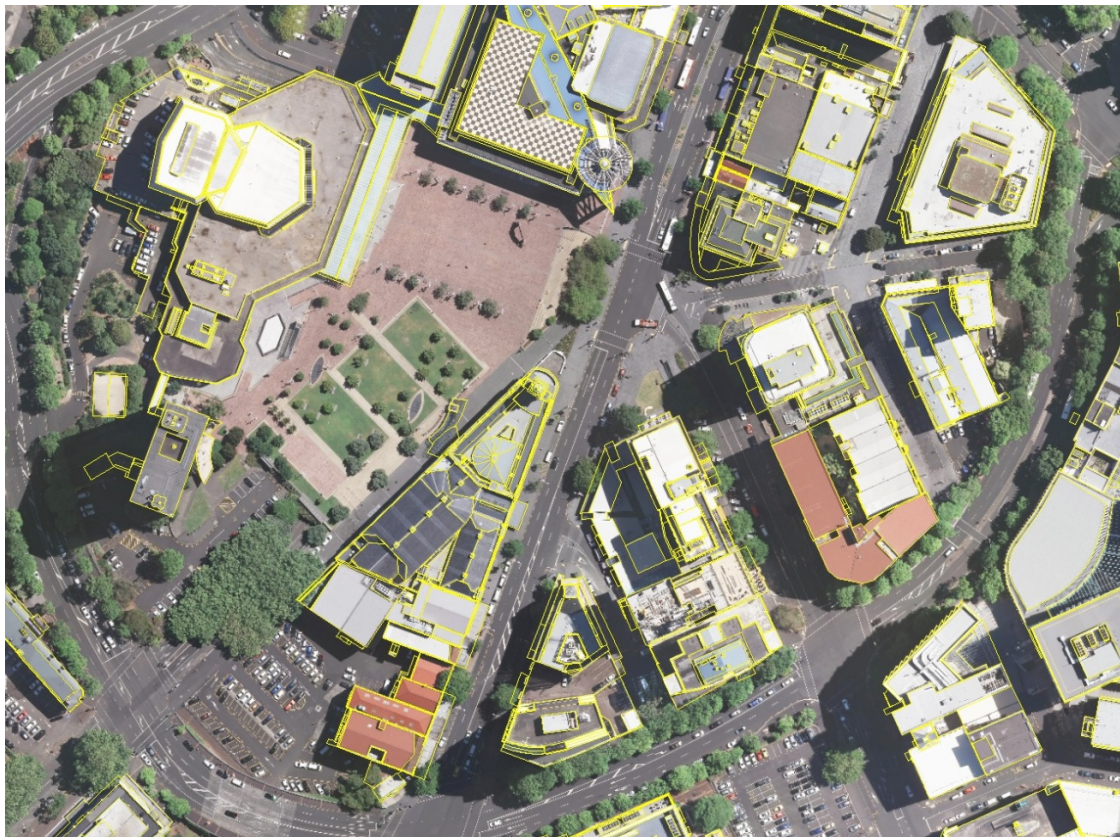


True Orthophoto  
(2015)





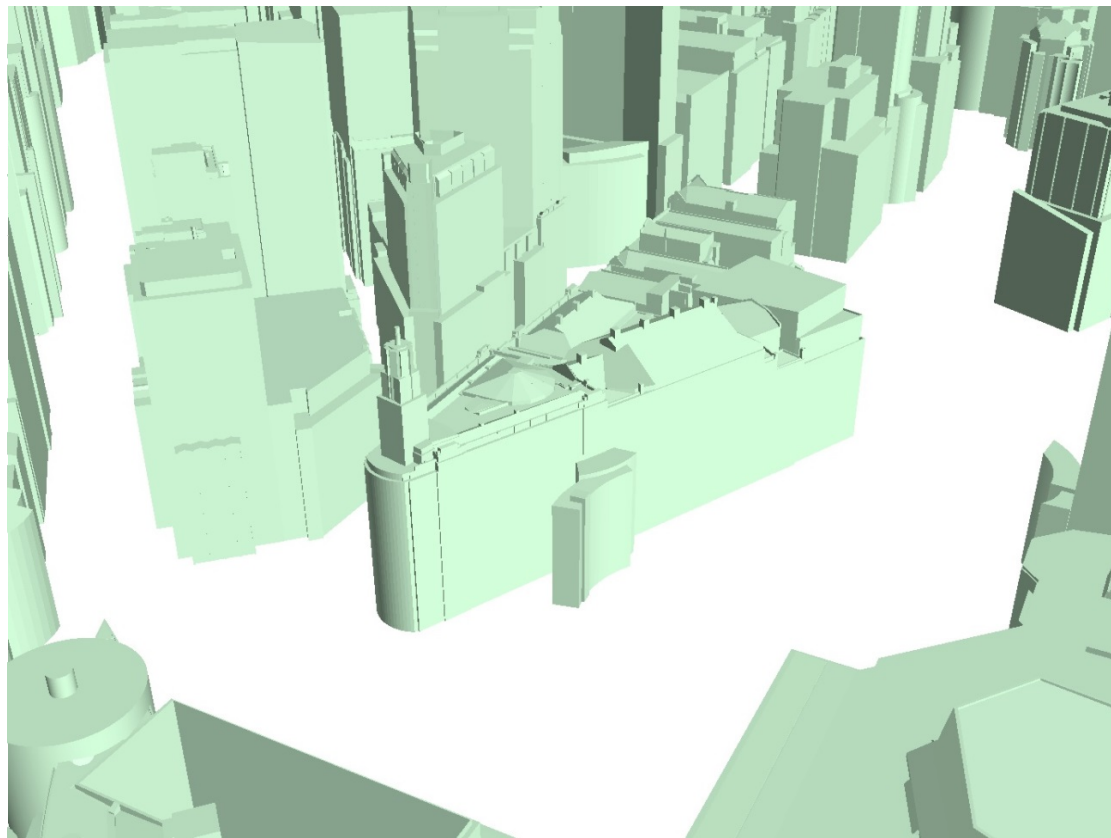
# Aerial Photography



Building Outlines



# Aerial Photography



3D Building  
Outlines





# Aerial Photography

- Non-CBD data
  - 0.075m GSD
  - Collected between 23/02/2016 and 27/04/2016
  - Orthorectified but not True Orthos
  - Flown within 2 hours of low tide

# Aerial Photography



2016 non-CBD  
coverage



# Aerial Photography



Very good non-true orthophotos

BE THE HOW.  
WHAKAMAUA KIA TINAI!



# Aerial Photography

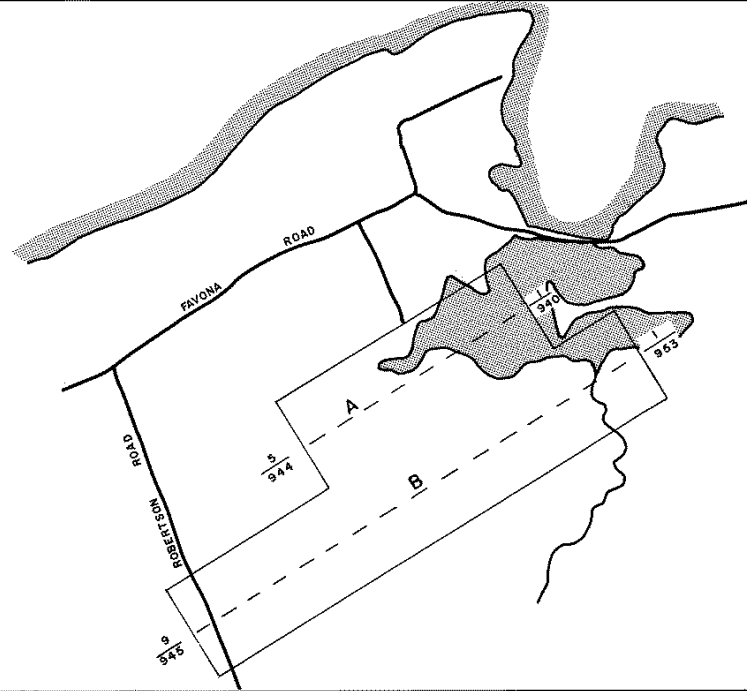
- LINZ historic scanning project
  - Non-georeferenced jpegs
  - Index sheet of footprint locations
  - Internal process to get scans clipped, georeferenced and mosaicked
- Retrolens – LGGA initiative to make the scans freely available



# Aerial Photography

MANGERE HOSPITAL ( INTELLECT. HANDICAPPED ) 1972				S.N. 2521
CAMERA: R.M.K. 60/23	FOCAL LENGTH: 24"	ALT.(ASL): 5,900'	(AMG): 5,900'	F.O: W730349
FLOWN: 5.5.72	FILM NO: 2096	TOTAL NO. NEGS: 14	CROWN COPYRIGHT	L.DIST: N.AK.

BB 32a



DESPATCH DATES: JUNE '72

1 SET D.W. MATTE : LBS. WGTN.

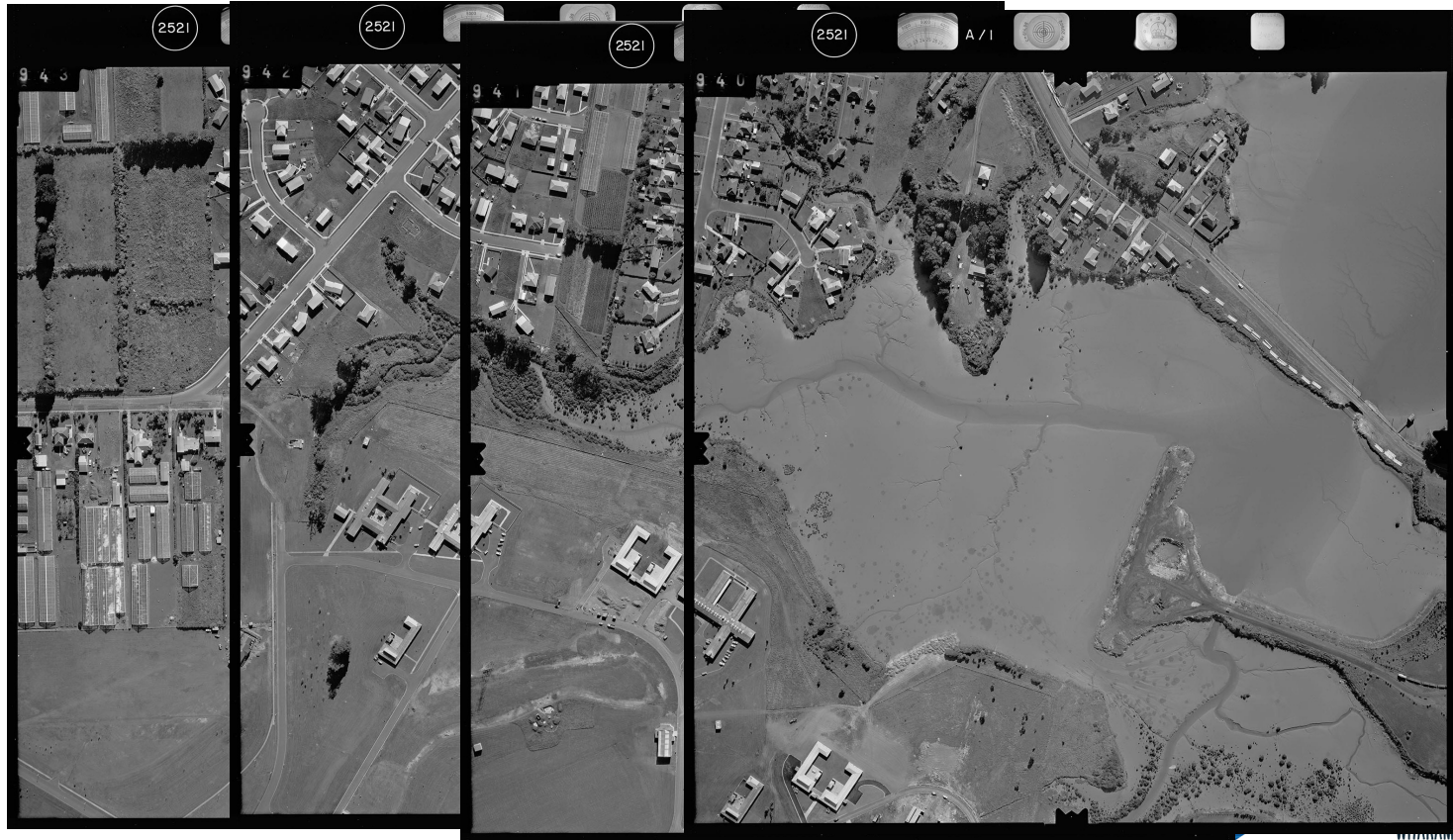
SCALE OF CHAINS  
20 0 20

2521

BE THE HOW.  
WHAKAMAUA KIA TINAI!



# Aerial Photography



# Uses – Aerial Photography

Hunua  
Ranges





# Uses – Aerial Photography

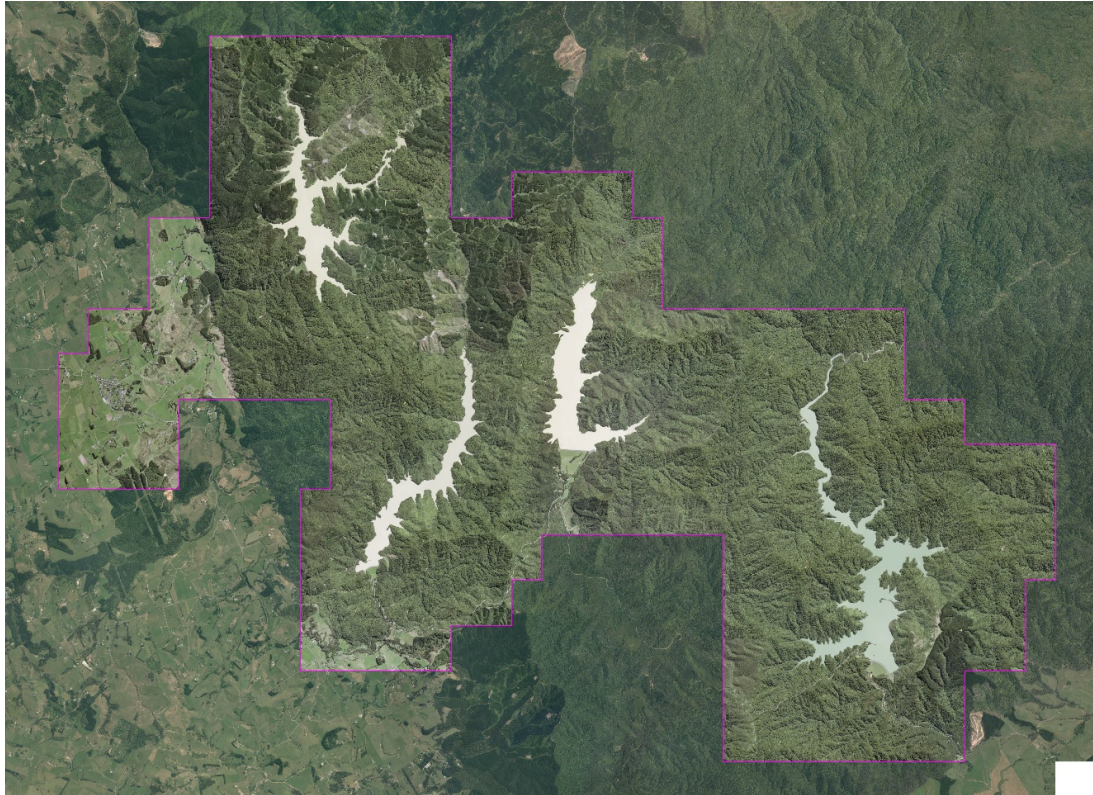




# Uses – Aerial Photography



# Uses – Aerial Photography





# Uses – Aerial Photography



# Uses – Aerial Photography





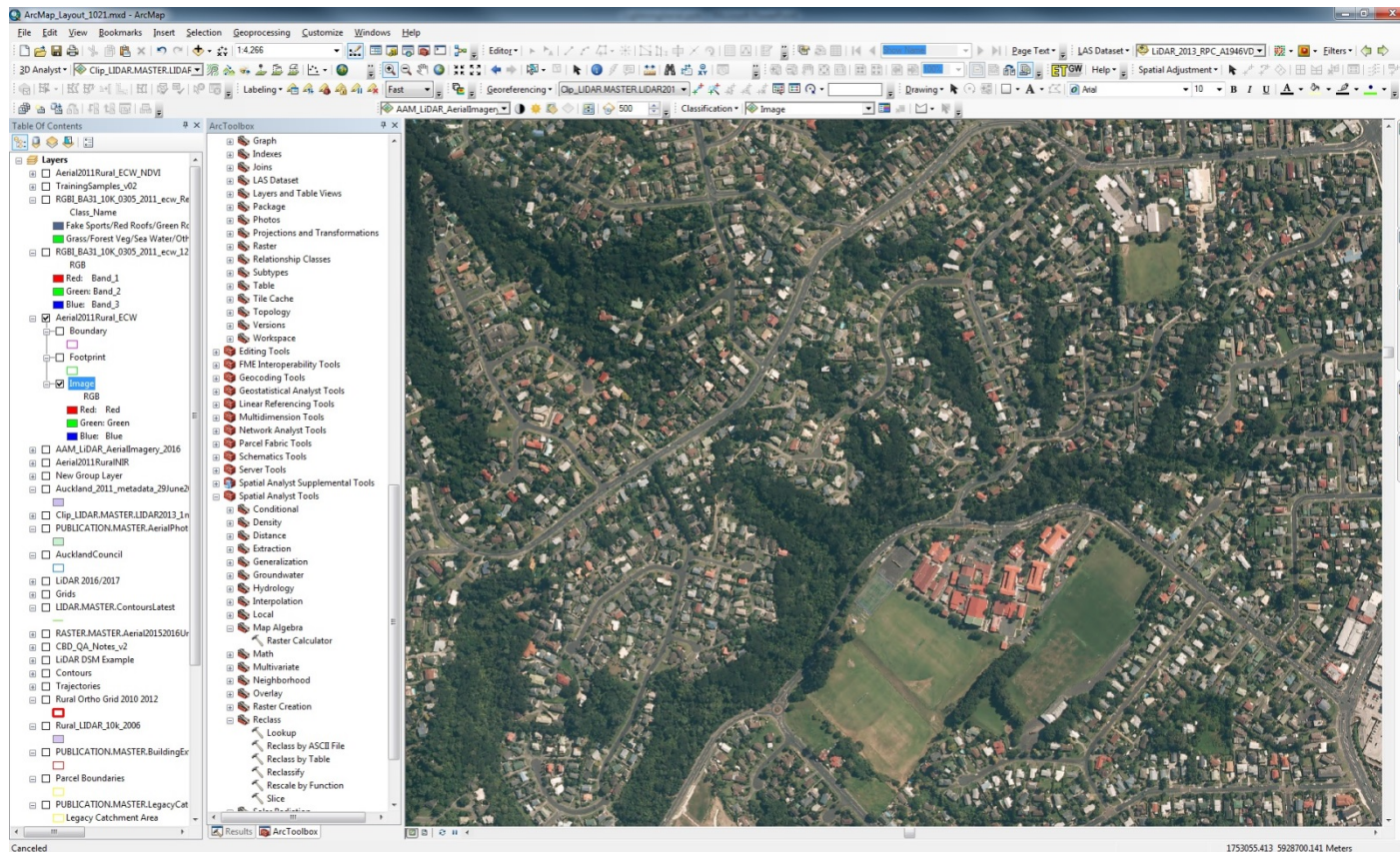
# Uses – Aerial Photography



# Uses – Aerial Photography

- ArcGIS Pro used to calculate impervious surfaces
  - Concise walkthrough on learn.arcgis.com
  - <https://learn.arcgis.com/en/projects/calculate-impervious-surfaces-from-spectral-imagery>
- 2010/2011 RGBI imagery
- Three main steps
  - Segment
  - Classify
  - Calculate Area

# Uses – Aerial Photography

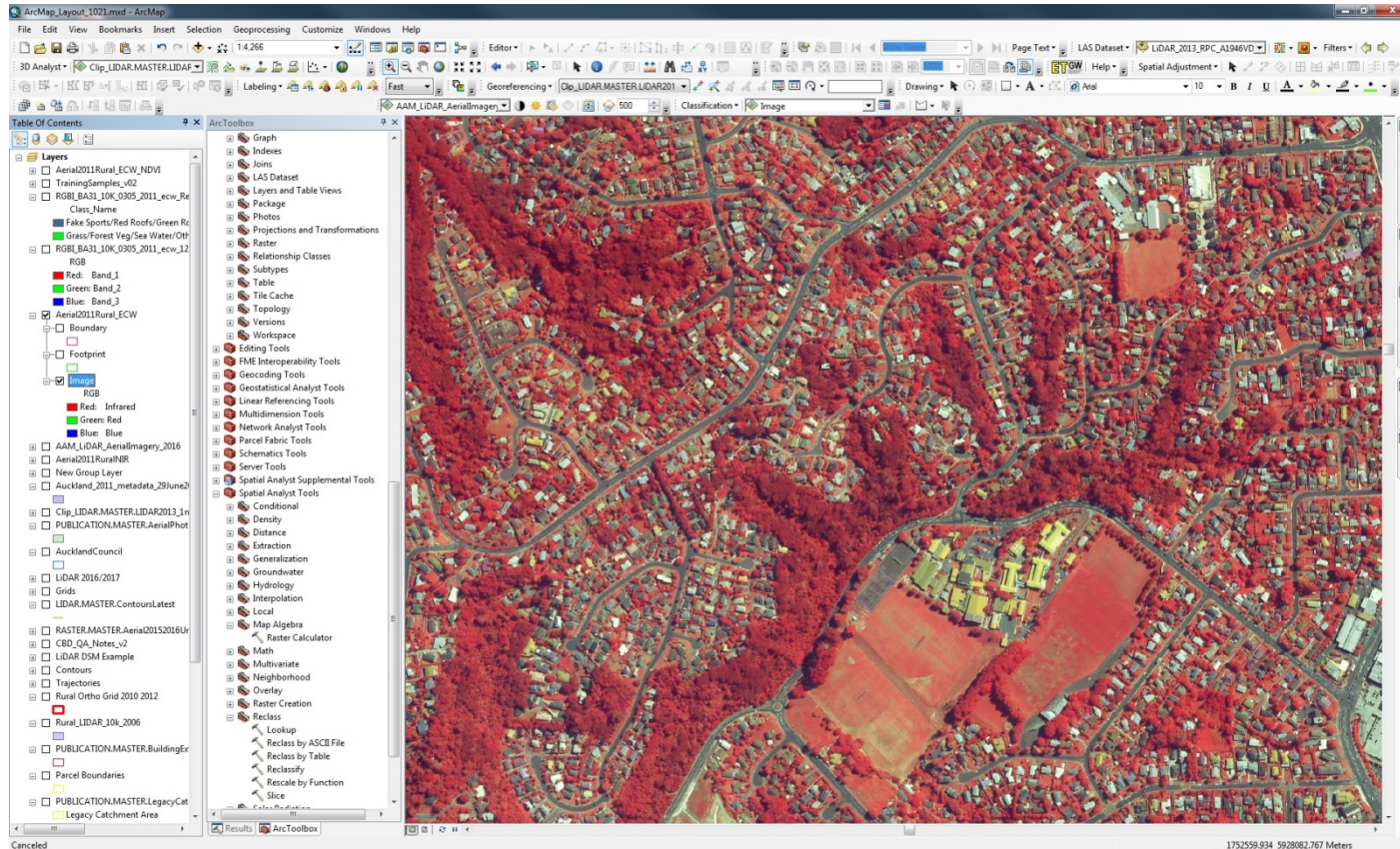


RGB





# Uses – Aerial Photography

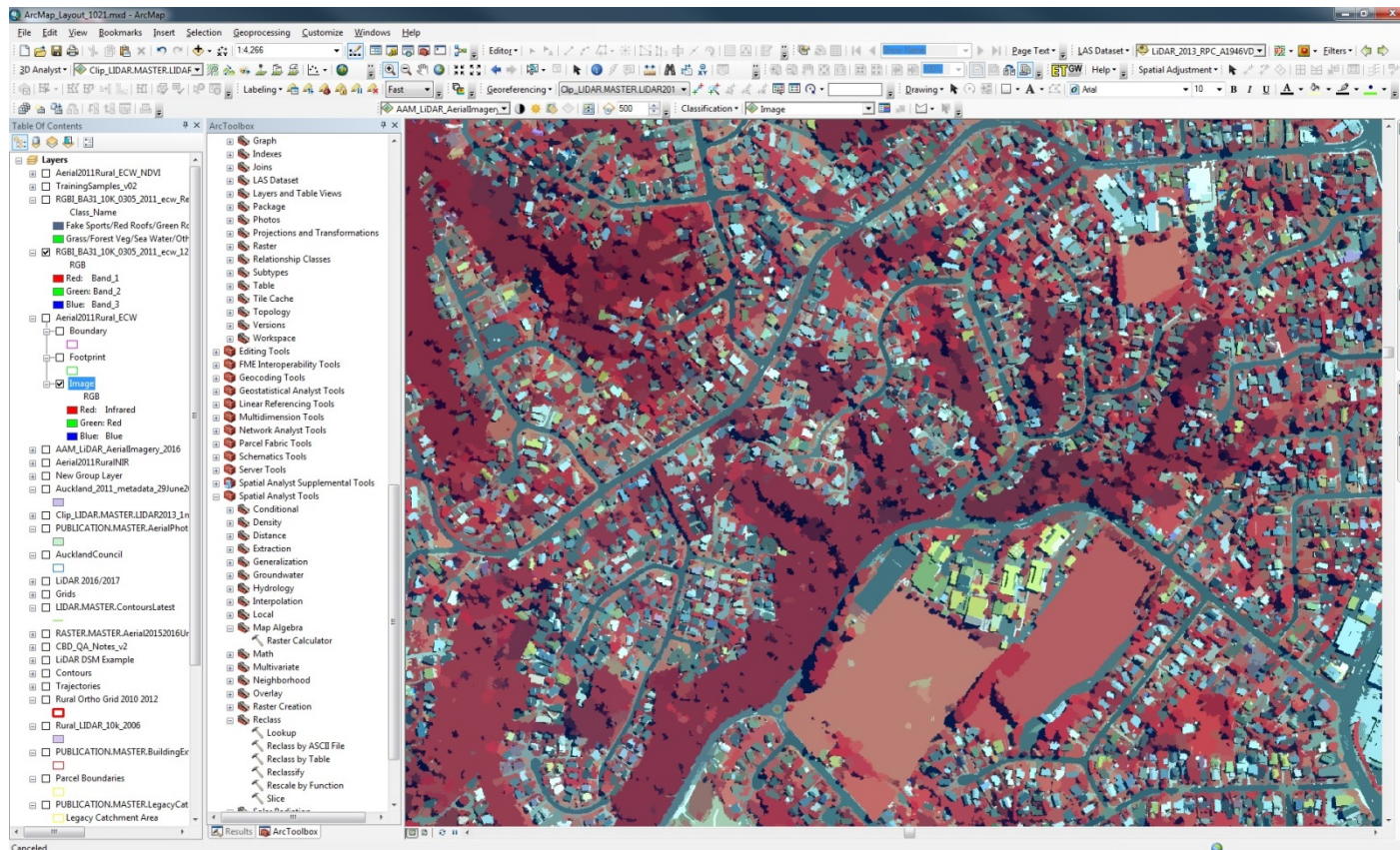


IRB





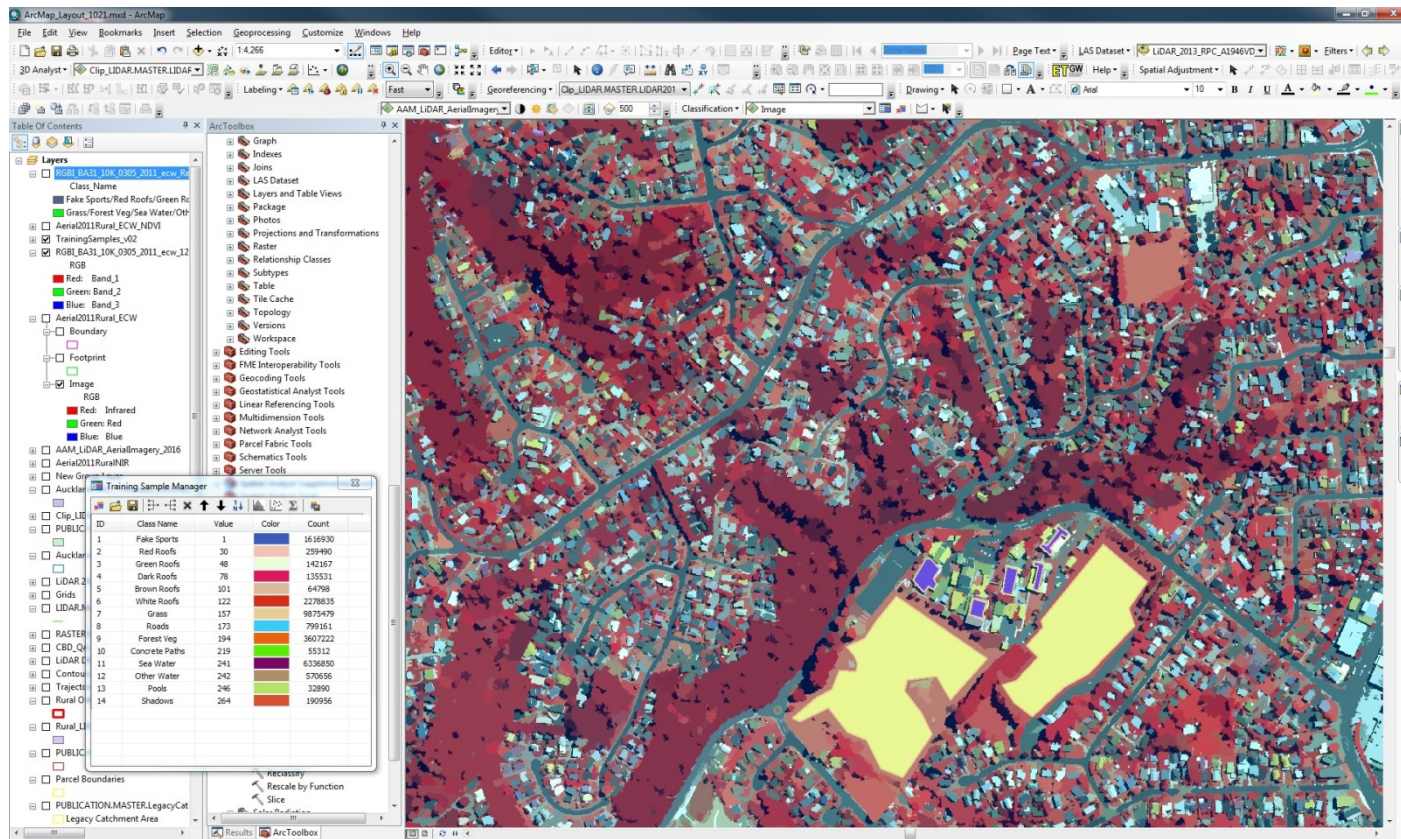
# Uses – Aerial Photography



Segment



# Uses – Aerial Photography



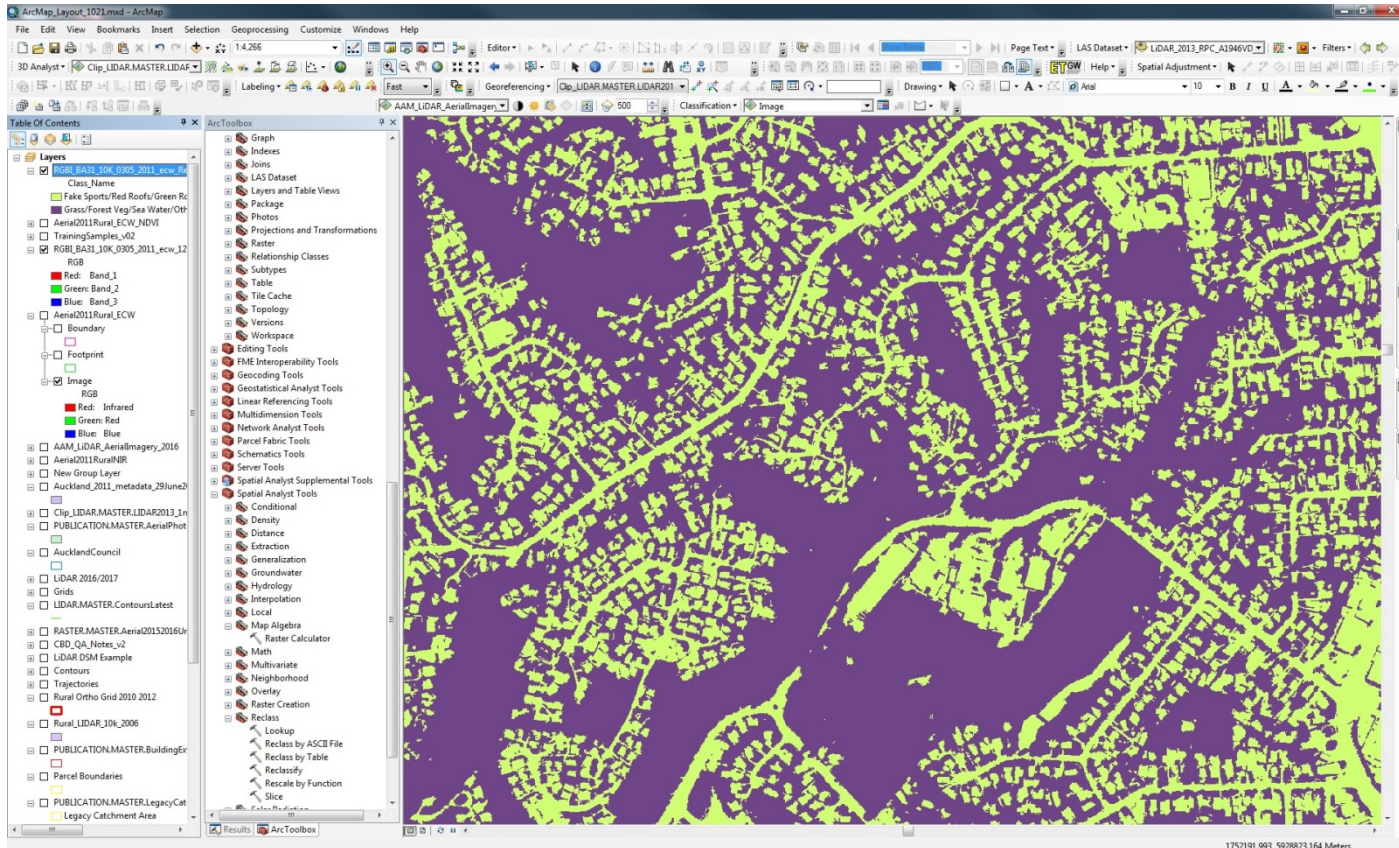
The screenshot displays the ArcMap interface with a classification legend window open. The legend table is as follows:

ID	Class Name	Value	Color	Count
1	Fake Sports	1	Blue	1616930
2	Red Roofs	30	Red	259490
3	Green Roofs	48	Green	142167
4	Dark Roofs	78	Dark Red	125531
5	Brown Roofs	101	Brown	64798
6	White Roofs	122	White	2278835
7	Grass	157	Light Green	9875479
8	Roads	173	Grey	799161
9	Forest Veg	184	Dark Green	3607222
10	Concrete Paths	219	Light Blue	55312
11	Sea Water	241	Blue	6336850
12	Other Water	242	Light Blue	570656
13	Pools	246	Light Blue	32890
14	Shadows	264	Dark Red	190956

Training Samples  
for Classification



# Uses – Aerial Photography



Reclassified





# Uses – Aerial Photography



Highlighting  
Change



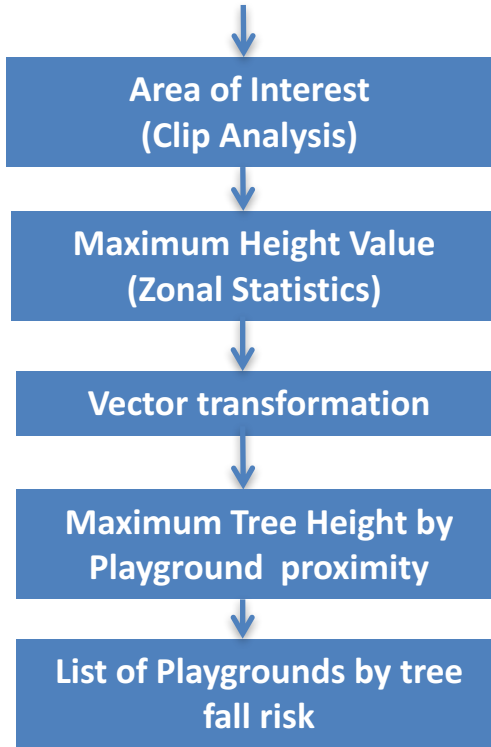
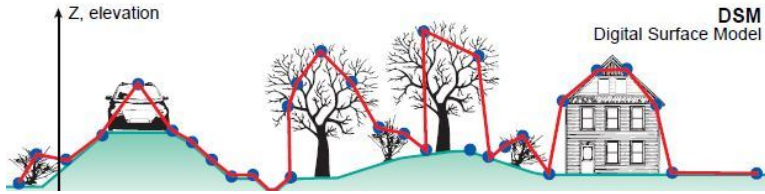


# Uses – LiDAR

## Playground and Tree fall Risk Analysis

Brandon Vista, Principal Asset Spatial Advisor, AMIS  
Kerrin Sime, Senior Asset Spatial Advisor, AMIS

# Methodology



Proximity Analysis (Buffer)



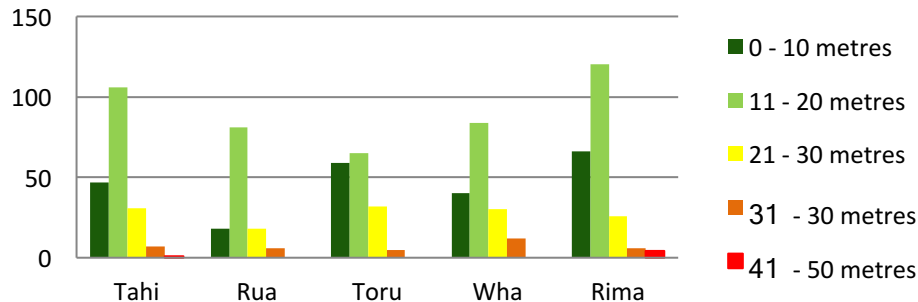
Overlay Analysis (Spatial Join)



# Preliminary Results by Playground

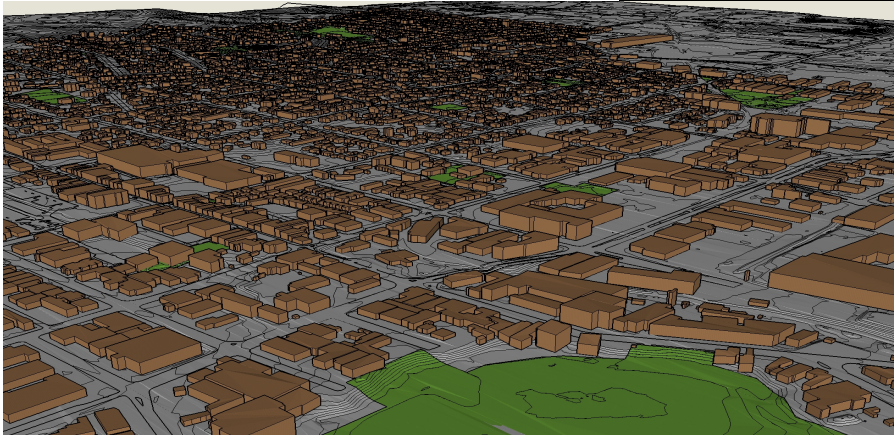
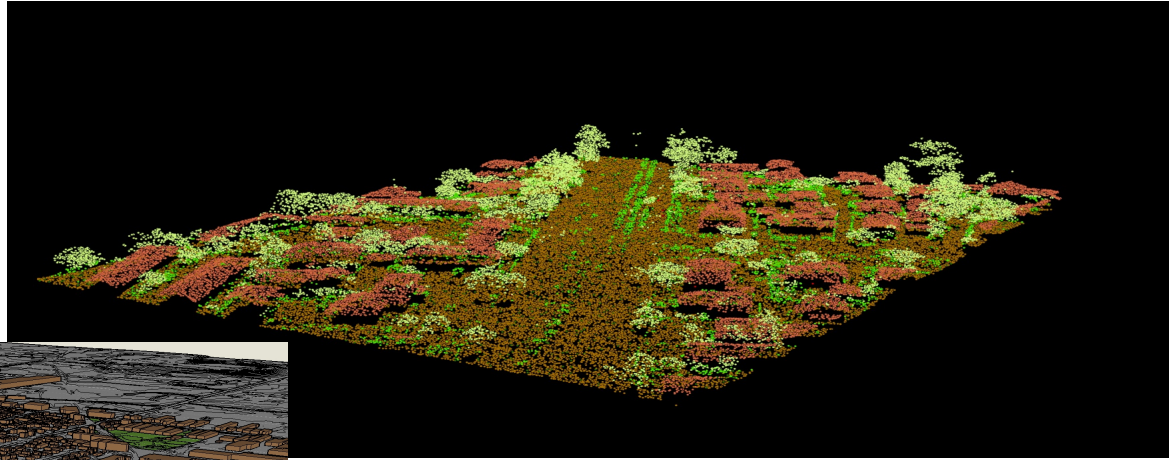
Maximum Height Values	Tahi	Rua	Toru	Wha	Rima	Total
0 – 10 metres	47	18	59	40	66	230
11 – 20 metres	106	81	65	84	120	456
21 – 30 metres	31	18	32	30	26	137
31 – 40 metres	7	6	5	12	6	36
41 – 50 metres	1	0	0	0	4	5
<b>Total</b>	<b>192</b>	<b>123</b>	<b>161</b>	<b>166</b>	<b>222</b>	<b>864</b>

## Maximum Height Value by Cluster



# Uses – LiDAR

- Panuku 3D modelling



# What Next?

- Completion of existing projects
  - LiDAR
  - Aerial Photography
  - Communication
    - When data goes live and/or updated
- Regional, rural-spec. aerial imagery
  - Potentially using satellite sensors
- Council-wide Remote Sensing Strategy
  - Standardised data capture and dissemination
  - Engagement with stakeholders
    - Internal and external users



# Thank you

Questions?

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