FLOOD VULNERABILITY ASSESSMENT: PALMERSTON NORTH

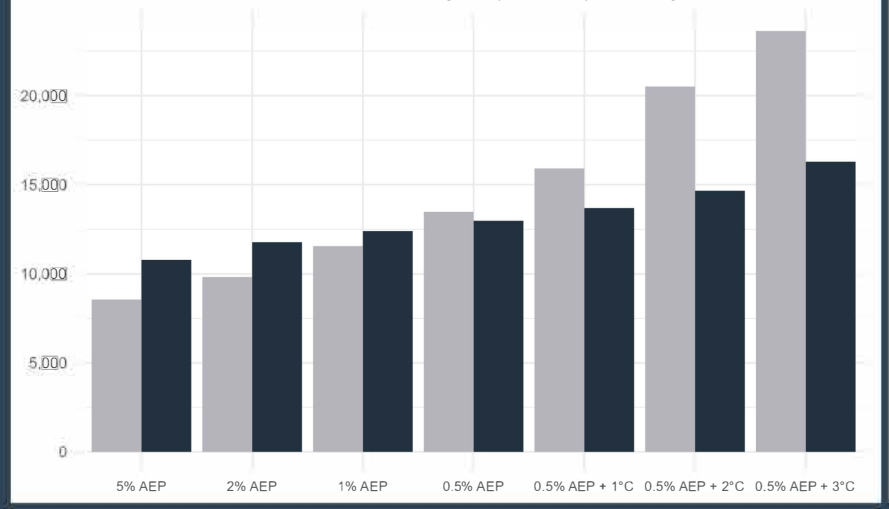
Horizons Regional Council engaged WSP and Earth Sciences NZ to lead the Horizons Flood Vulnerability Assessment, which developed a comprehensive regional flood model to evaluate the flood vulnerability of communities within the Horizons Region. This is a summary of the findings for Palmerston North, which has a population of 60,795 with 47,822 buildings. The model results show the number of buildings impacted and the estimate costs to repair those buildings in floods of different severity. For more detailed information on the flood vulnerability assessment, please refer to the Horizons Regional Council Flood Vulnerability Assessment Report (WSP 2026). The information provided in this document has been developed for a regional view of flood risk. Horizons Regional Council or Palmerston North City District Council may hold more specific models and outputs that may be more reliable for decision making.

In PalmerstonNorth, as flood events become more severe, both the extent of flooding and the depth of water increase. Annual Exceedance Probabilities (AEP) indicates the likelihood of a flood event occurring in any given year. For example, a 5% AEP means there is a 5% chance of a flood event exceeding this occurring in any given year; whilst a 0.5% AEP means there is a 0.5% chance.

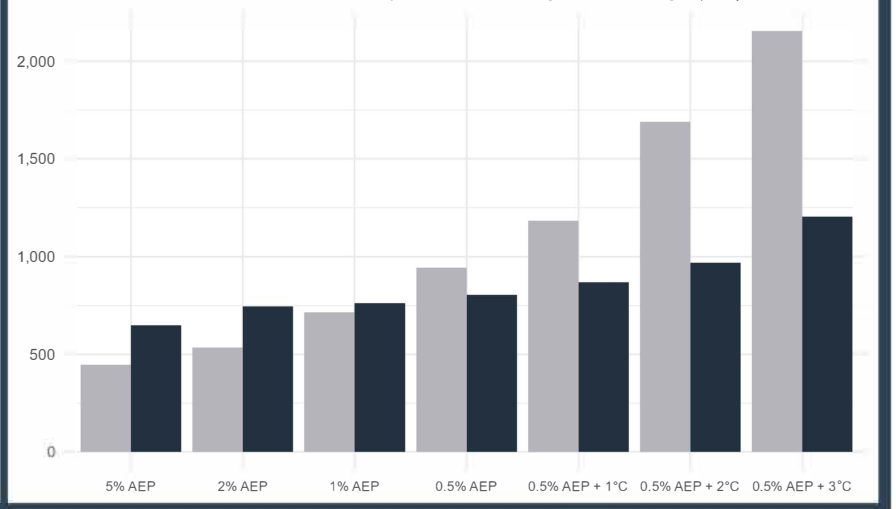
With flood defences structures such as stopbanks in place, approx 10,792 buildings could be affected in a 5% AEP flood scenario, with an estimated repair cost of around $649 Million. However, in a flood scenario of 0.5% AEP + 3°C of warming due to climate change, the estimated number of effected buildings increases to 16,287 with repair costs of around $1204 Million. **Without the flood defences structures such as stopbanks in place**, the results were complex. The modelling showed that without the defences in less severe floods that more buildings were impacted with greater cost to repair; as flood waters can spread more widely across less built-up areas, reducing the depth and concentration of flooding in urban centres. However, in less frequent but more severe floods, the flood defences sharply reduced the number of buildings flooded and the costs to repair. In a flood scenario of 0.5% AEP + 3°C of warming due to climate change, the estimated number of affected buildings increases to 23,632 with repair costs of around $2155 Million.

These findings highlight the importance of flood defences structures and how the presence or absence of these can influence the scale and cost of flood events across different scenarios. In a severe flood, these flood defences structures may not be enough to protect your community. This is based on regional flood modelling, stormwaternetworks and their benefits for managing surface water have not been included in this model, leading to conservative impact estimates.

Number of buildings impacted by flooding



Estimated cost to repair flood damage to buildings ($M)



Legend with flood defences structures; without flood defences structures.

The information presented on this page is a representation of the findings of the Flood Vulnerability Assessment; features shown may not be in their true extent and location. Models have a level of uncertainty, this was derived from a "Level A" Regional Scale model, which is not intended for property level use. Horizons has other flood models which may be a better fit to describe modelled flooding in your particular location; for further information, and terms and conditions of use, see: https://experience.arcgis.com/experience/3f7b4ec2f6f14503af1146ce412de39e

For more information contact us at https://www.horizons.govt.nz/contact-us

Summary

In Palmerston North, 10,792 to 16,287 buildings could be impacted by flooding.

This is 23% to 34% of buildings in Palmerston North that could be impacted by flooding.

Out of the 52 settlements in the Horizons Region, Palmerston North ranks 1st for the number of buildings affected, and 10th for the percentage of buildings within a town settlement affected.

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WSP

Earth Sciences New Zealand

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Prepared By

wsp

NIWA Taihoro Nukurangi

Prepared On

01/07/2025

Horizons Region Flood Vulnerability Assessment

Flood scenario: 5% annual exceedance probability, flood defences up, 0 degrees warming due to climate change, sea level rise excluded

Community
Palmerston North,
Palmerston North City

Scale 1:86,000 at A3

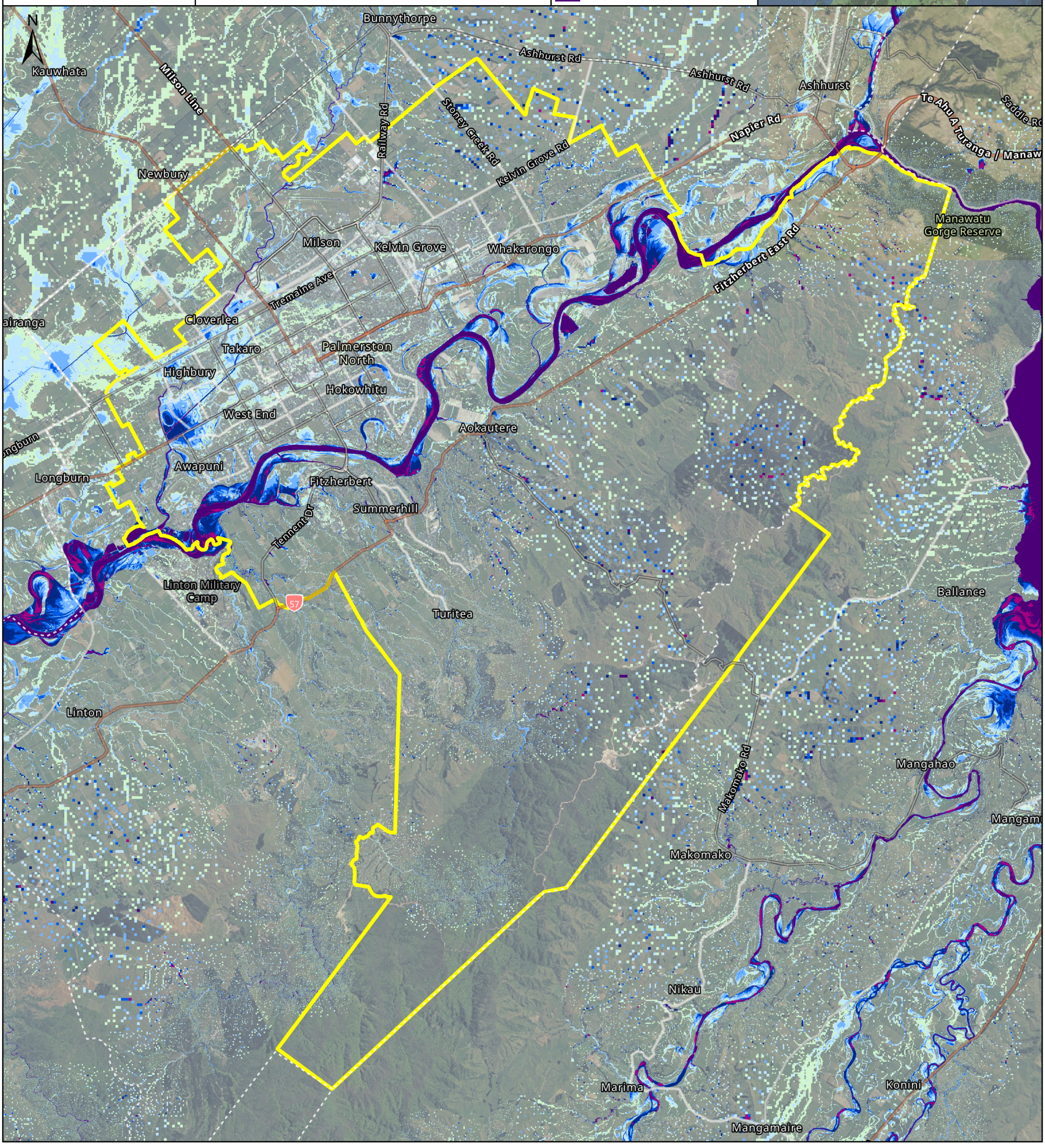
0 2.5 5 Km

Legend

- Community Boundary

Flood Depth (m)

- 0.05 - 0.20
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- 2.5 - 3.5
- >3.5



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Flood scenario: 2% annual exceedance probability, flood defences up, 0 degrees warming due to climate change, sea level rise excluded

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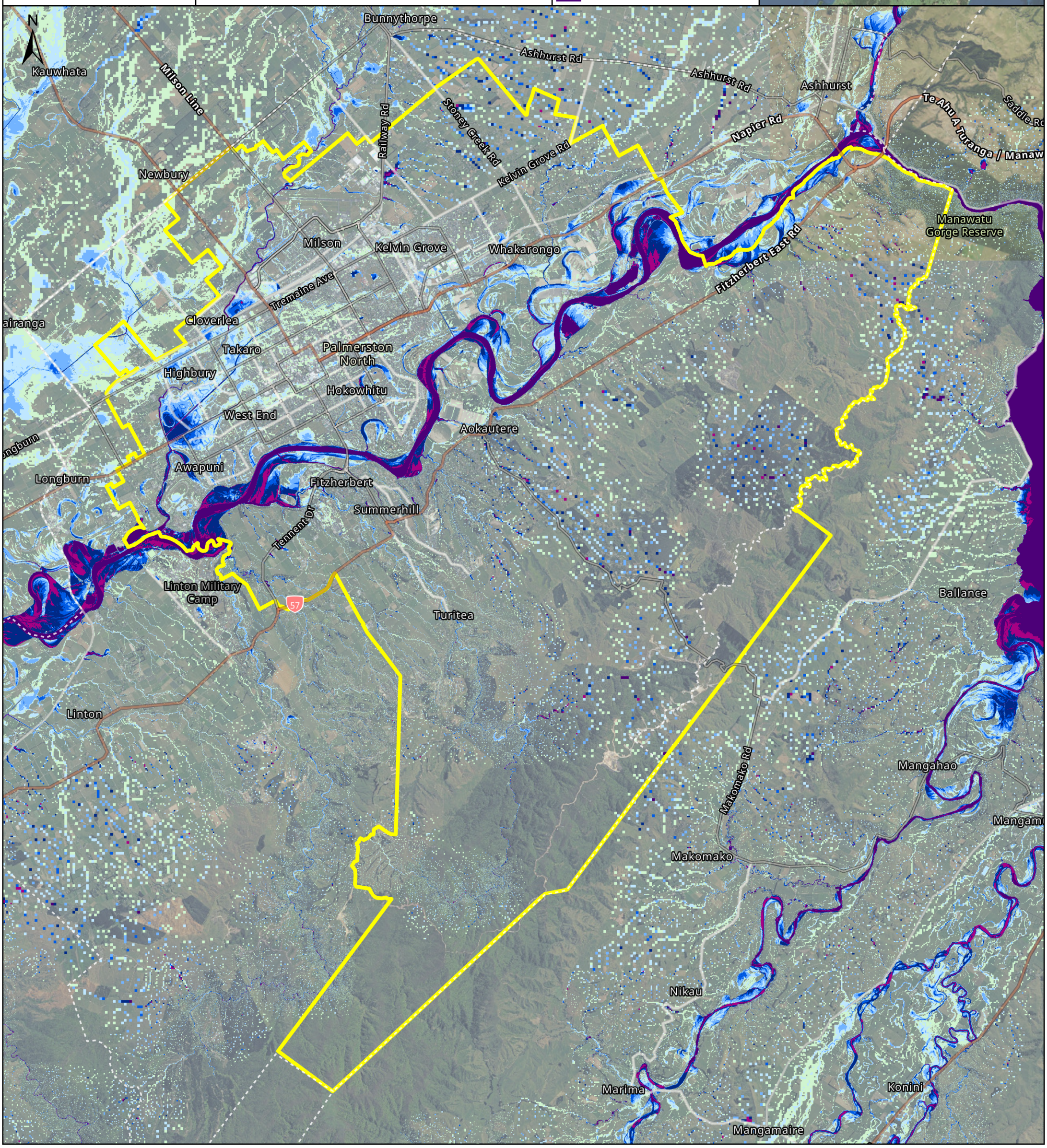

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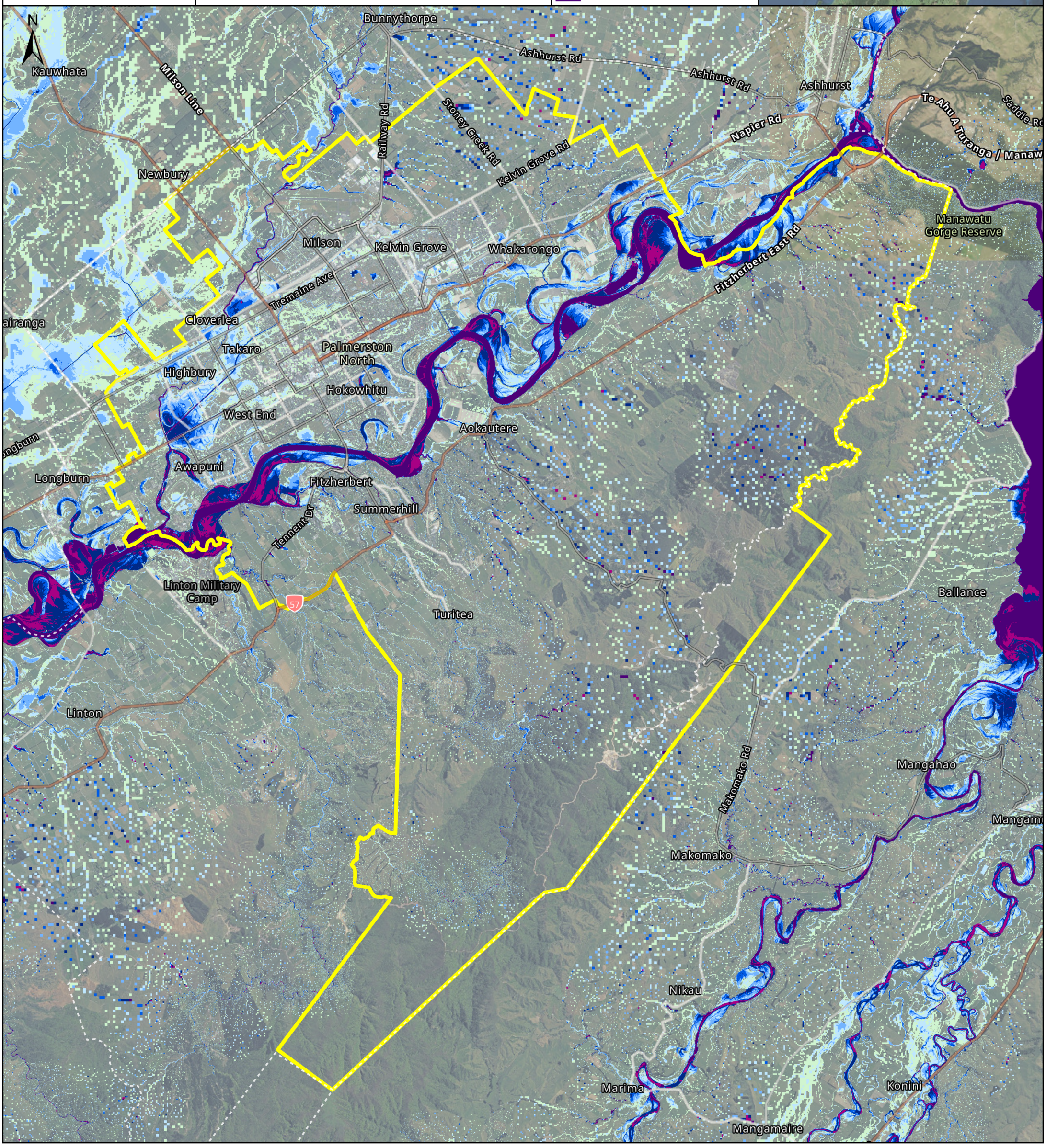

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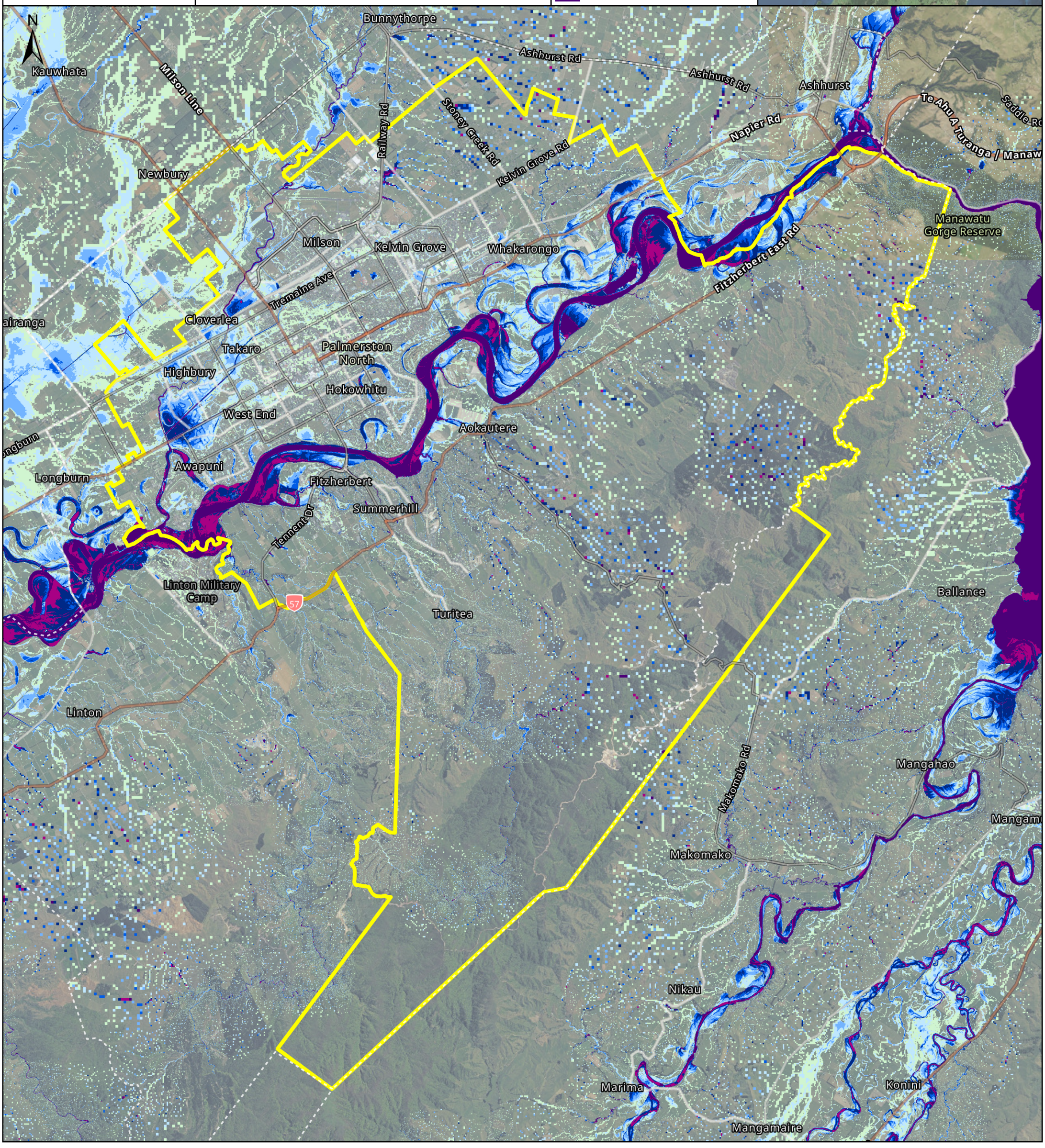

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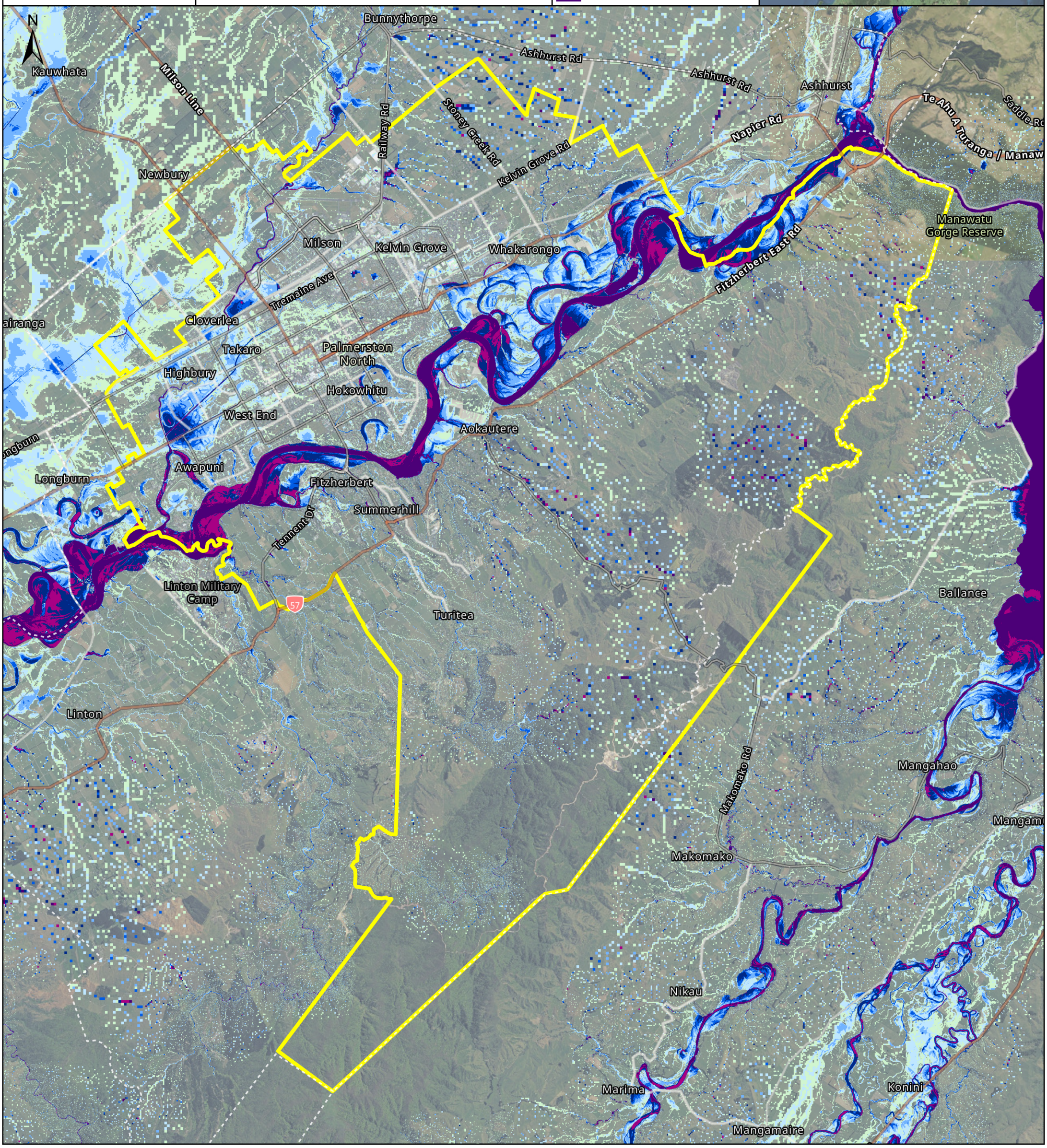

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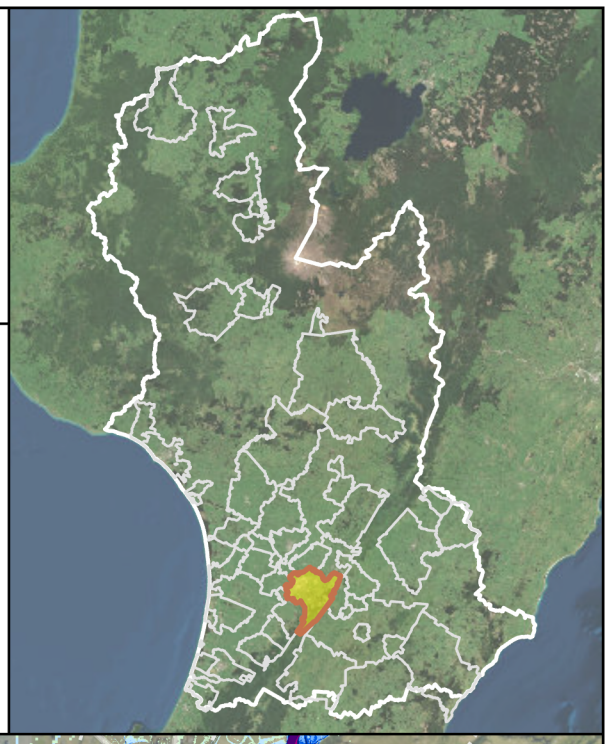

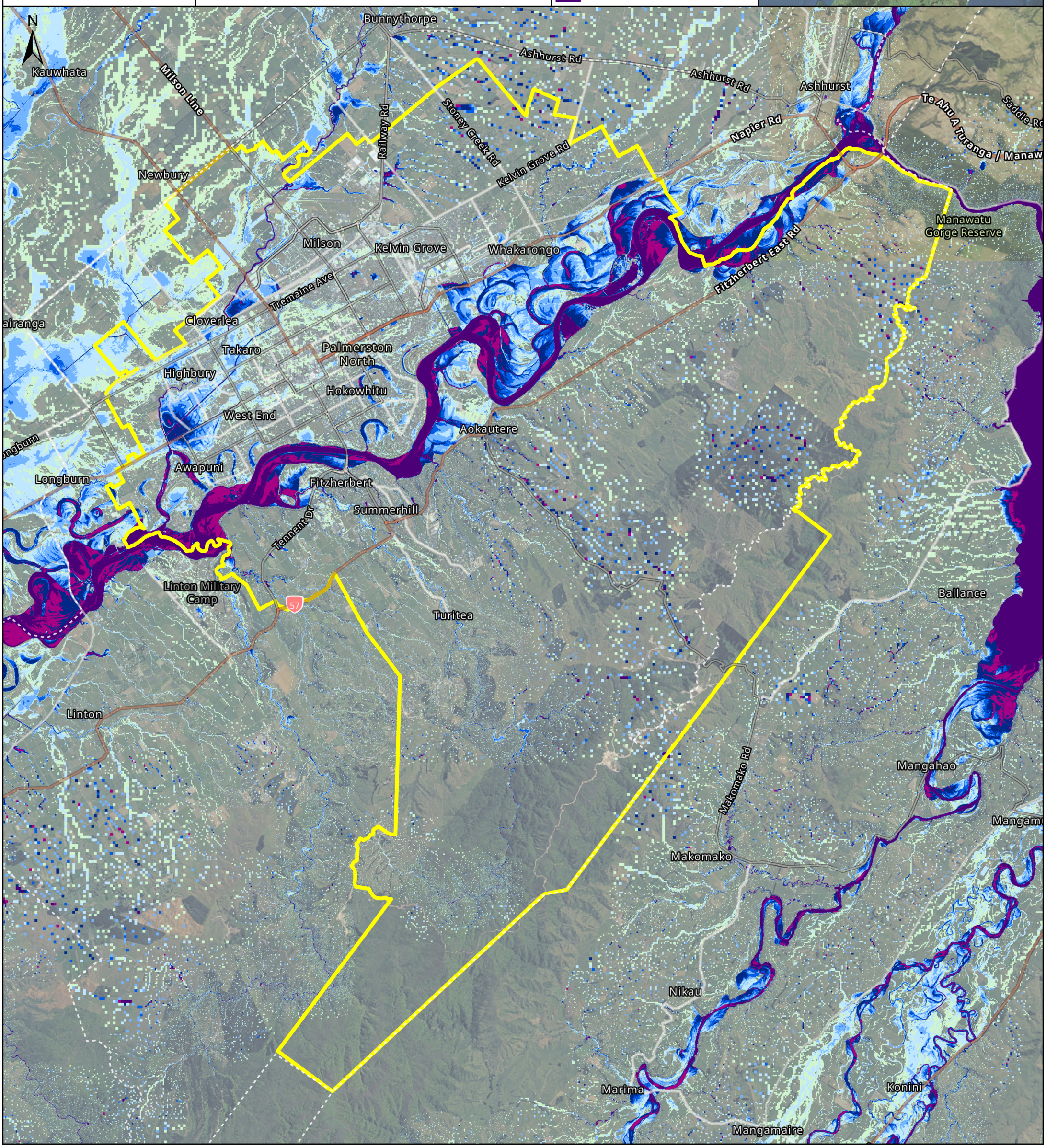

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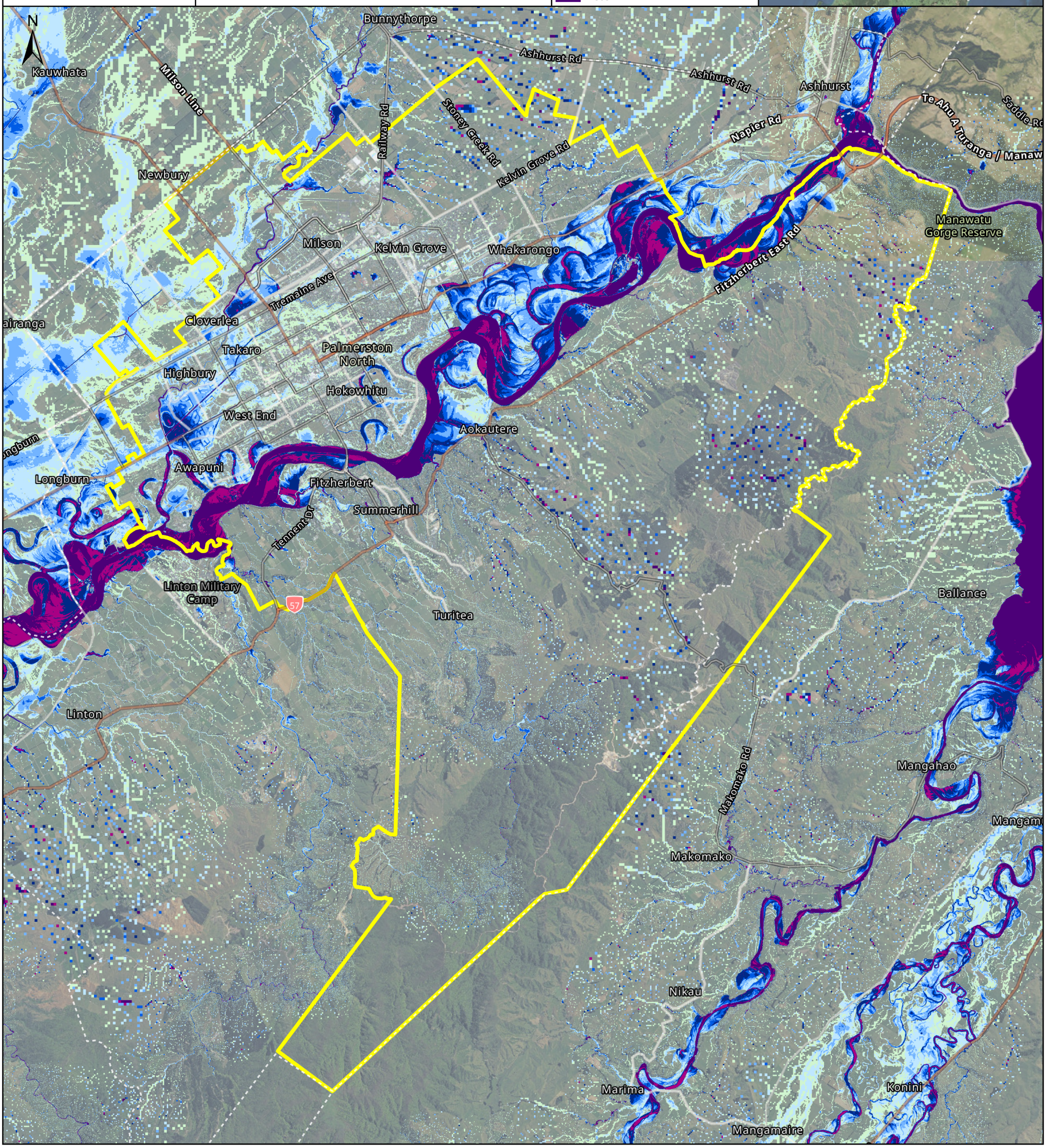

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Horizons Region Flood Vulnerability Assessment

Flood scenario: 0.2% annual exceedance probability, flood defences up, 0 degrees warming due to climate change, sea level rise excluded

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Palmerston North City

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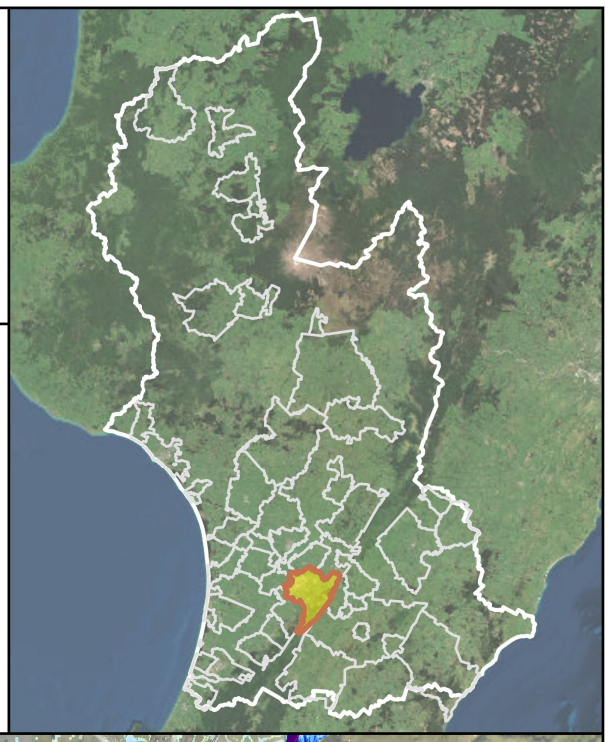

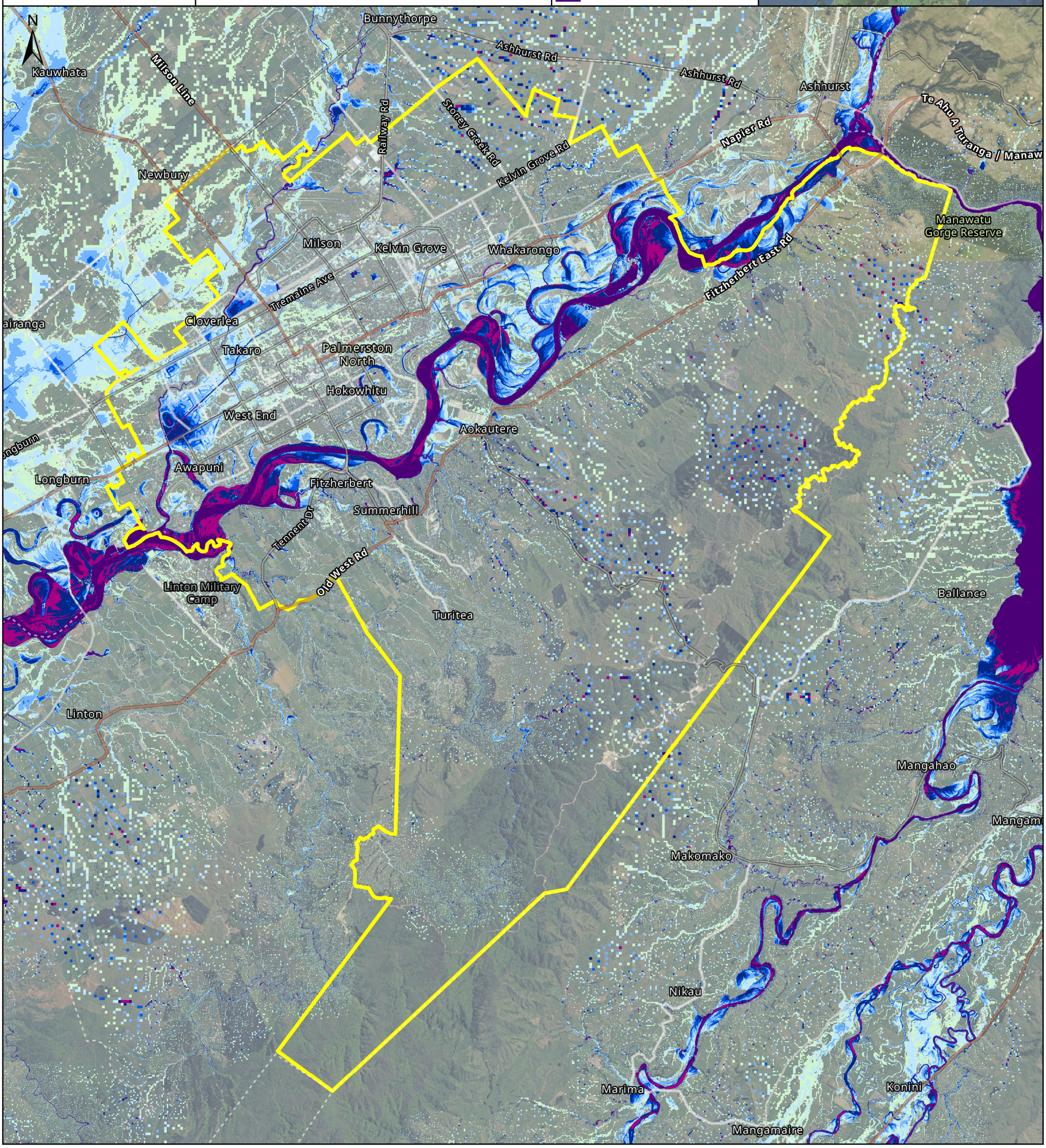

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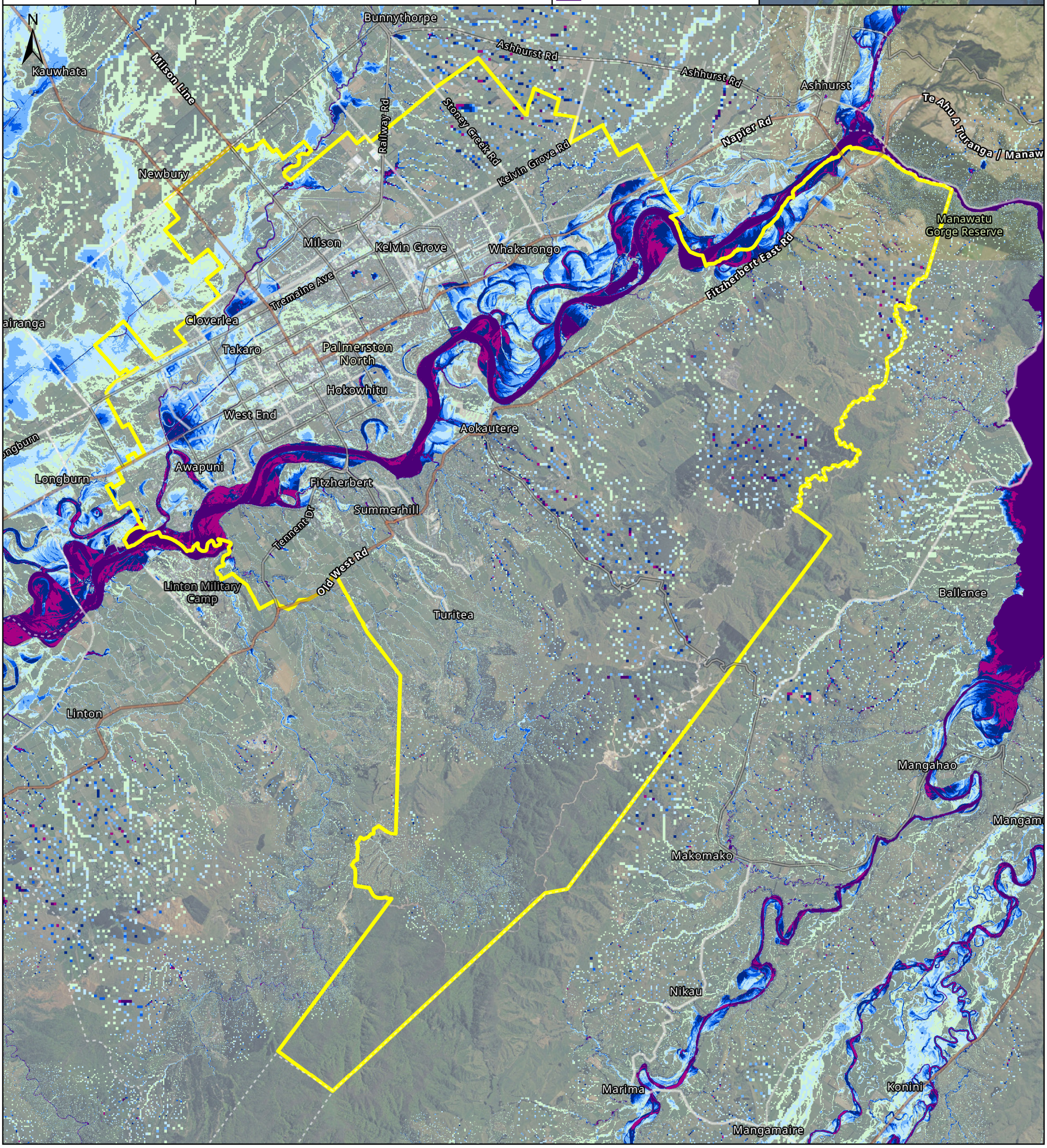

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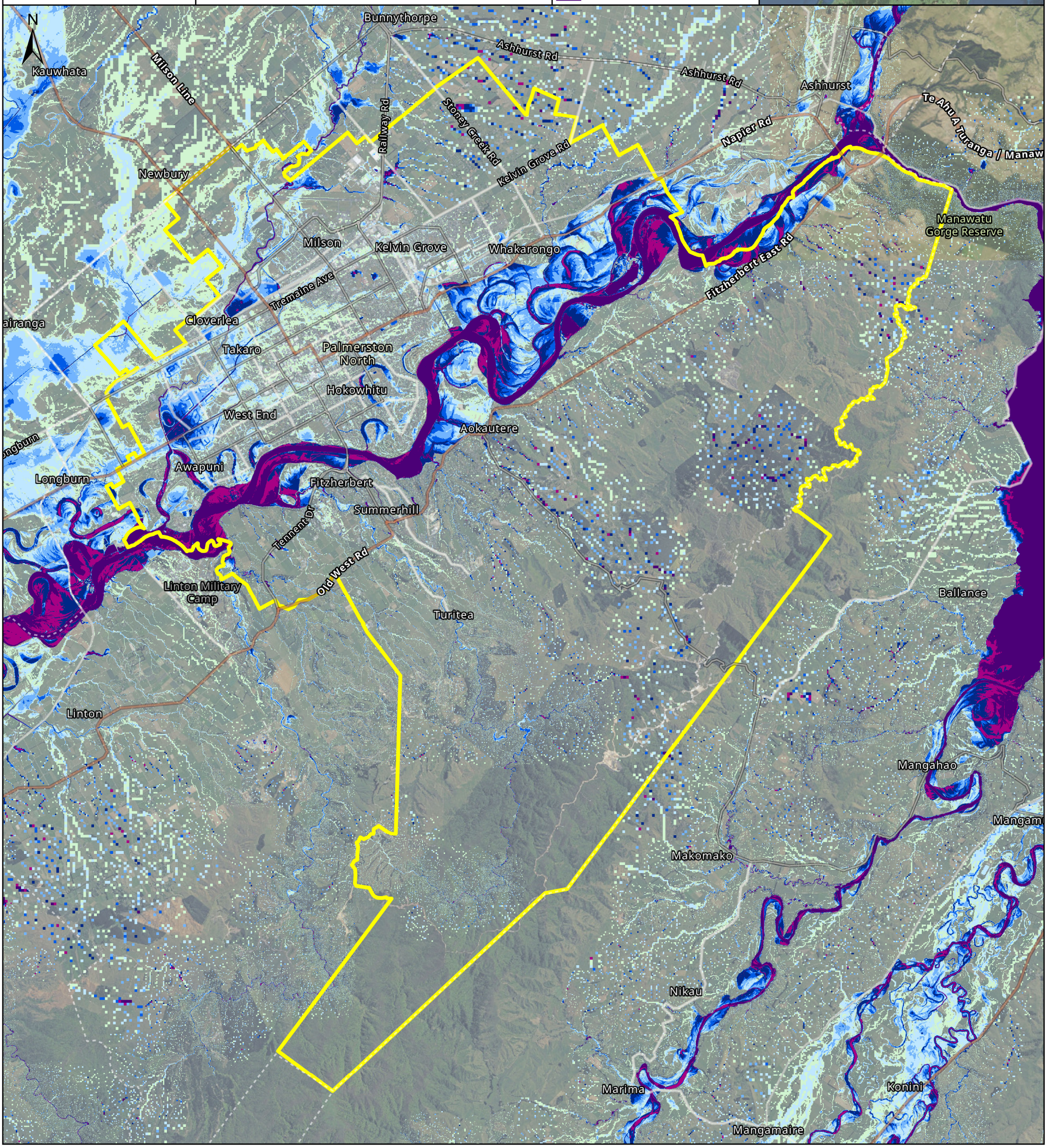

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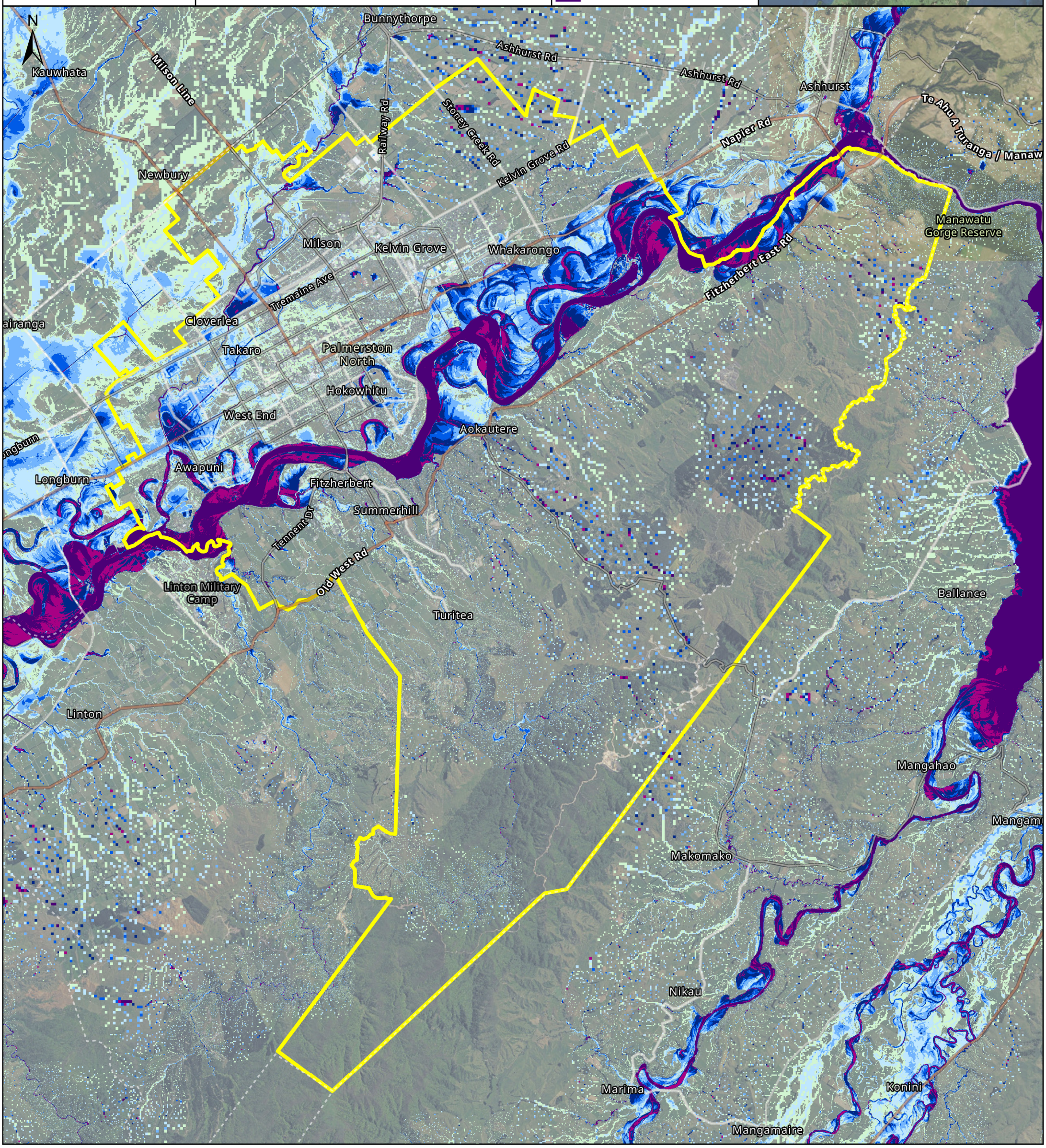

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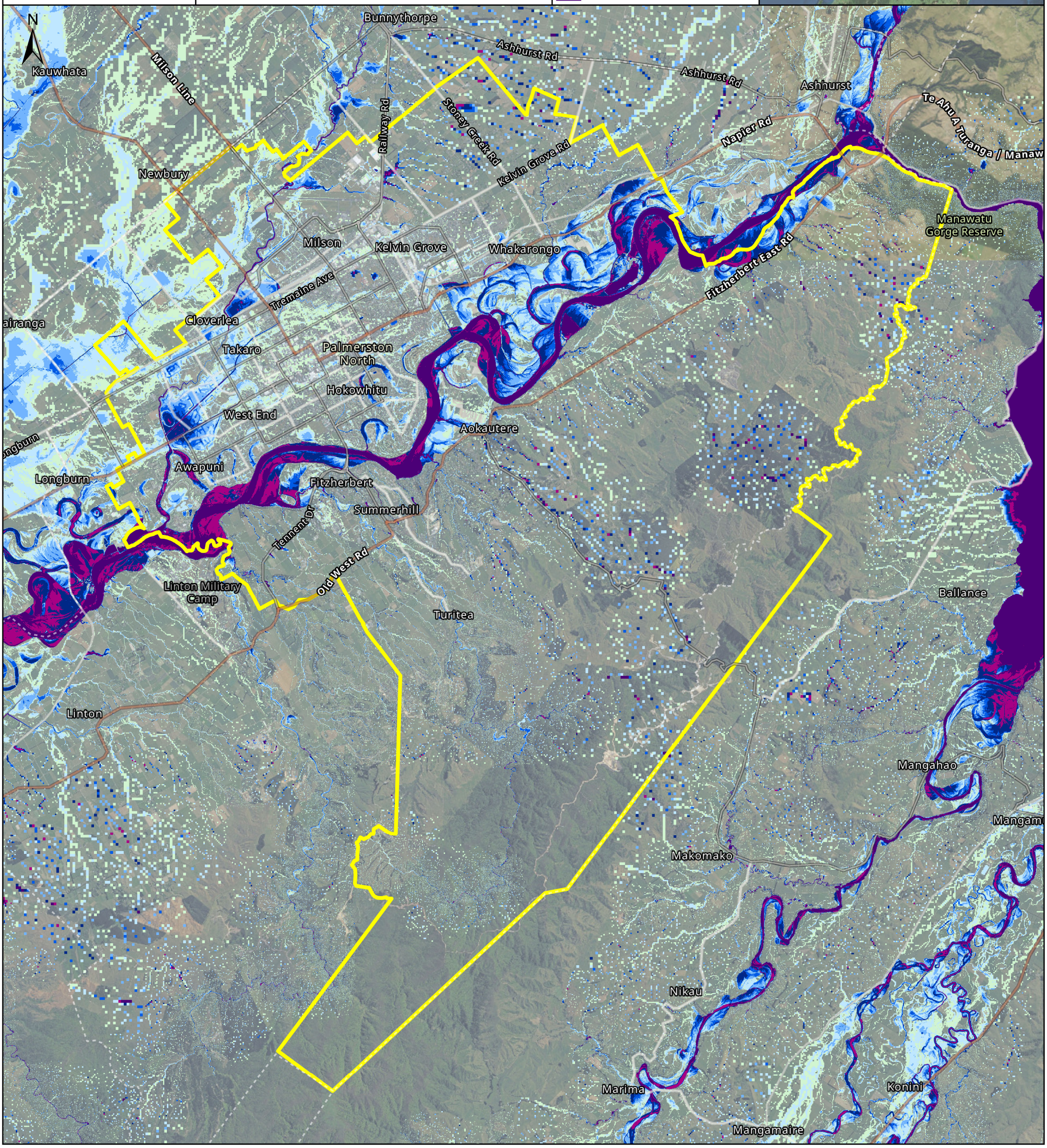

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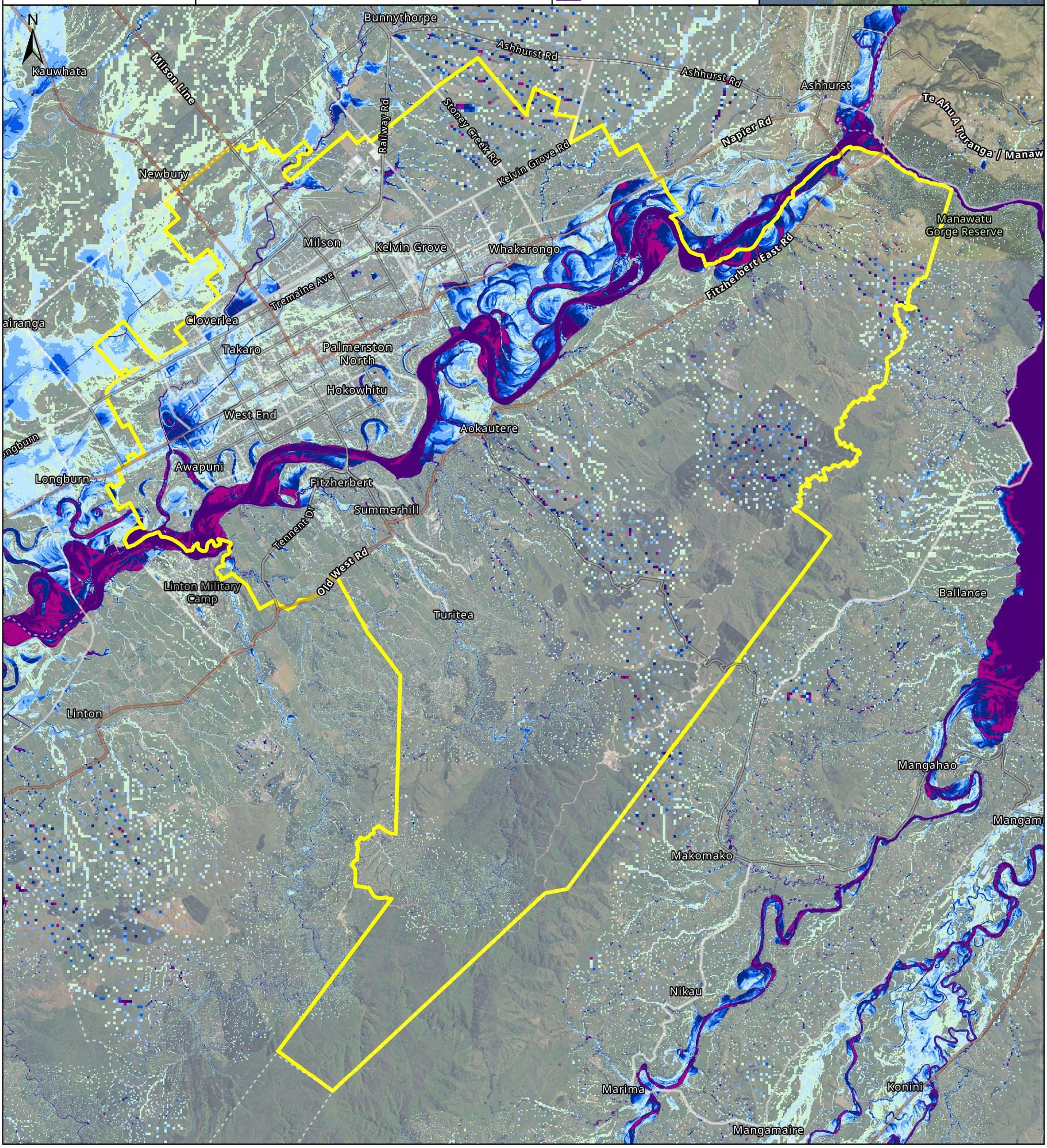

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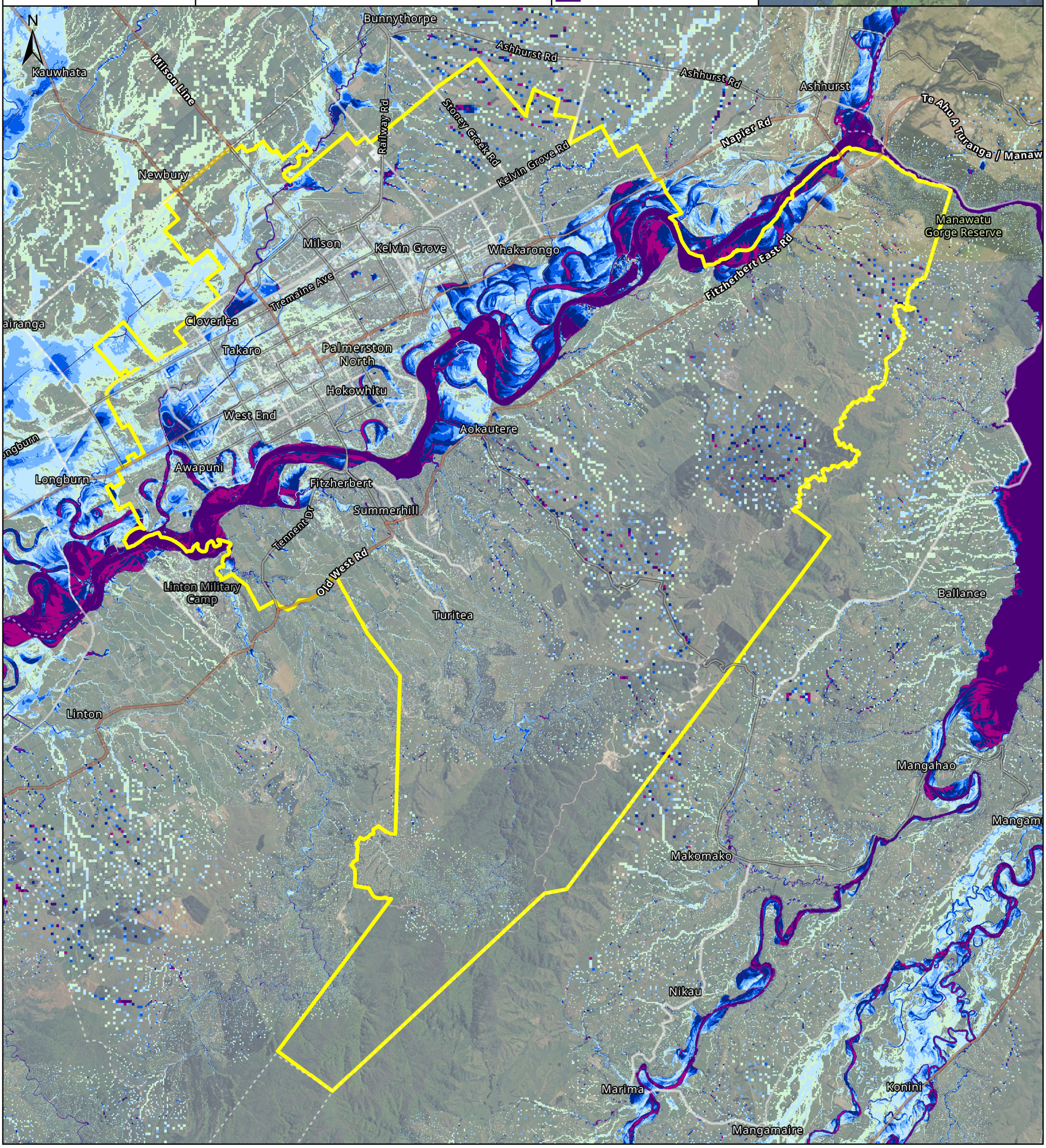

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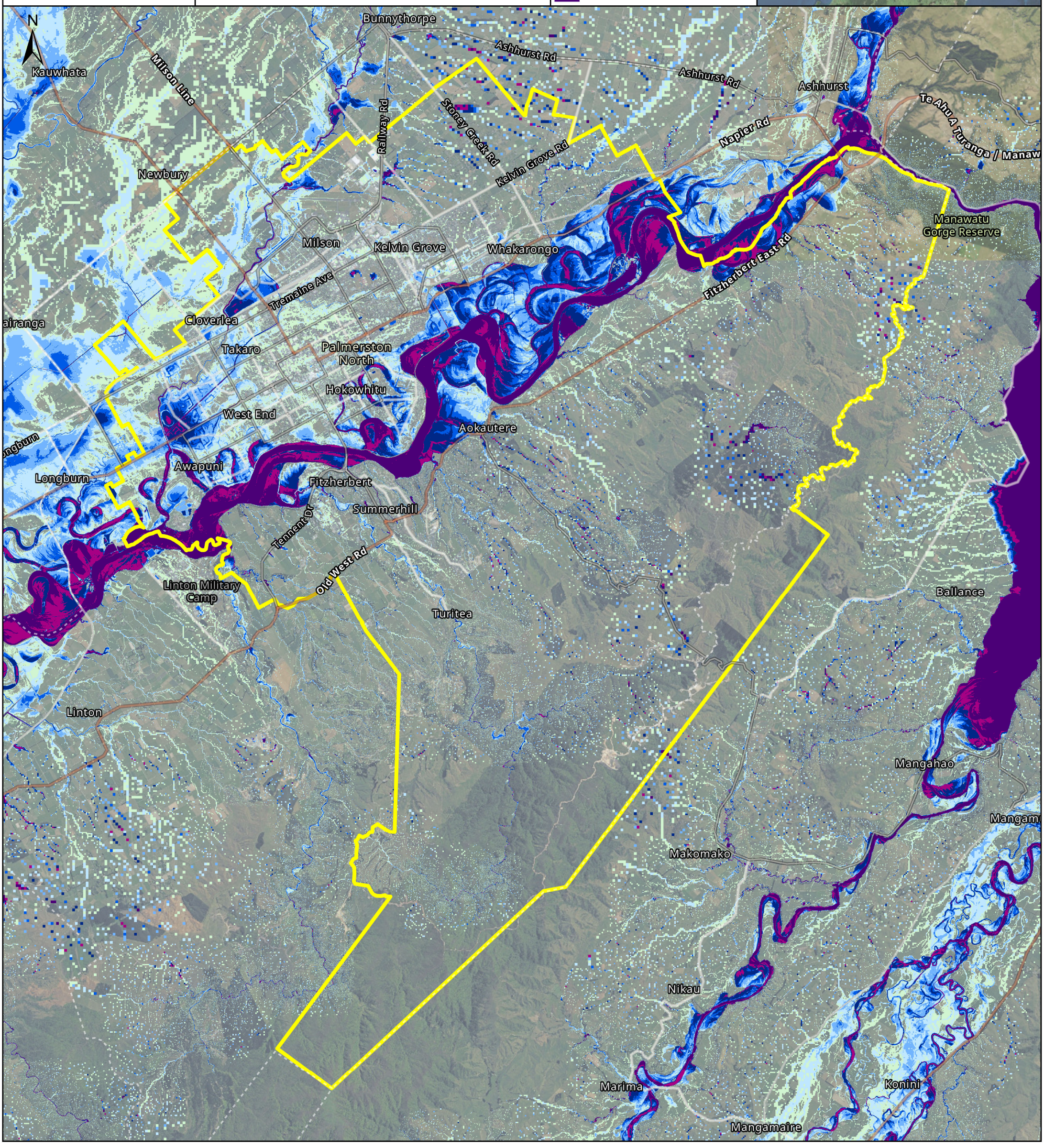

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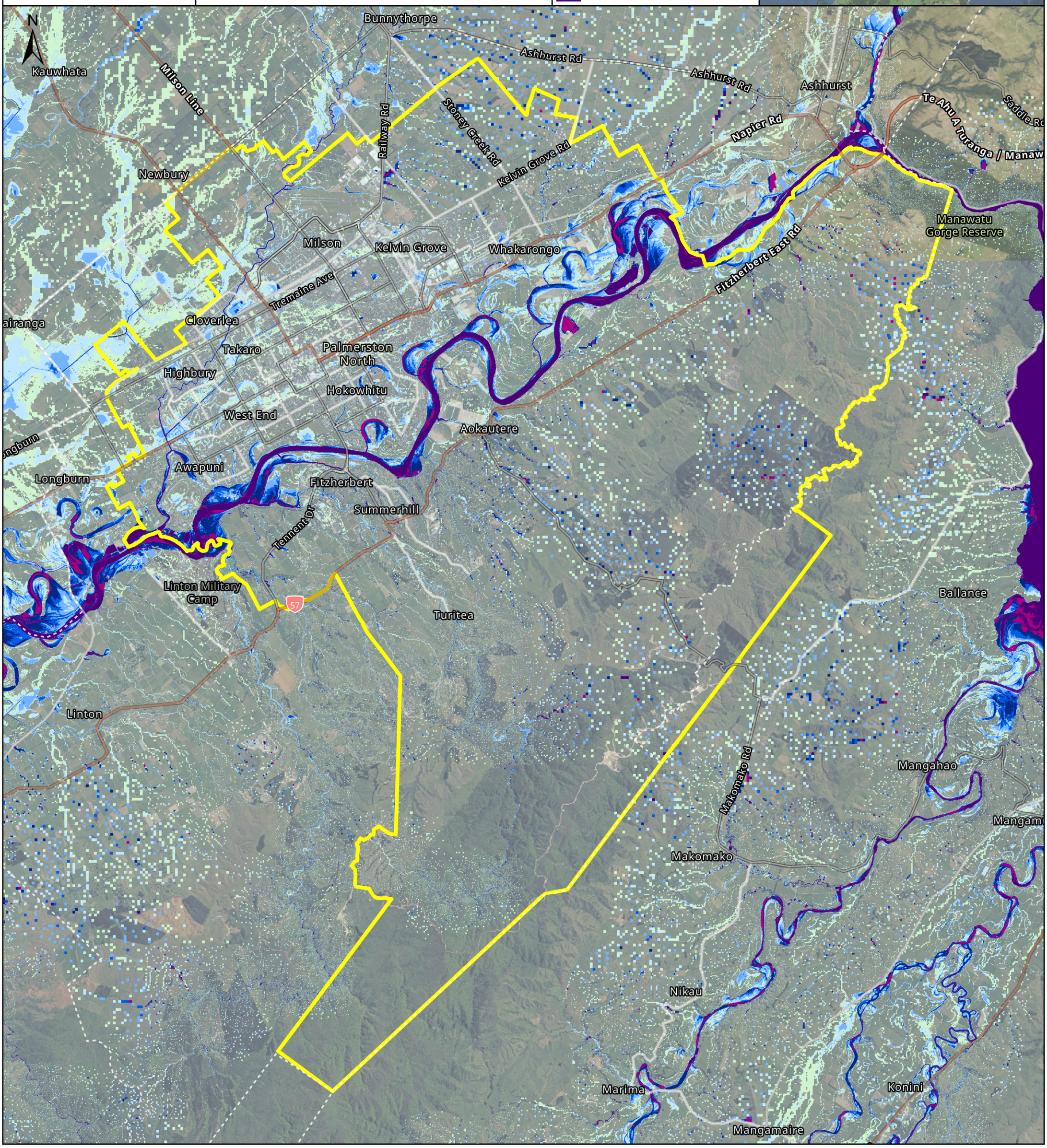

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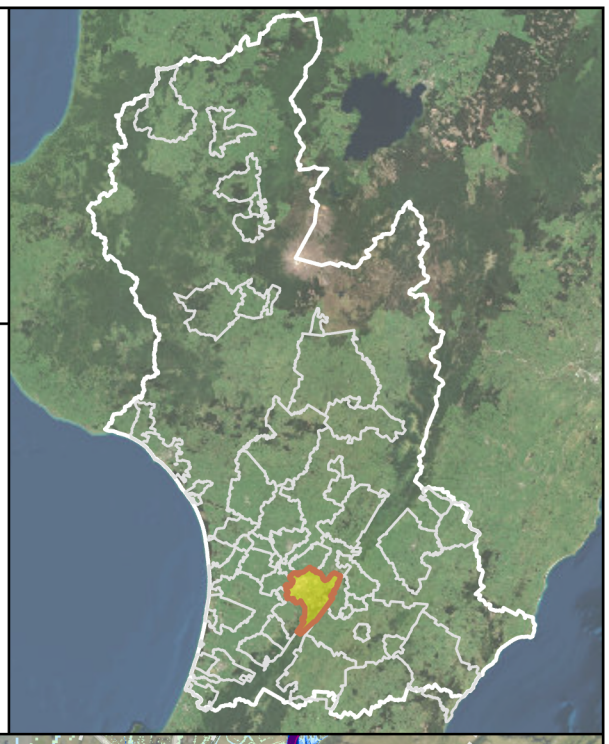

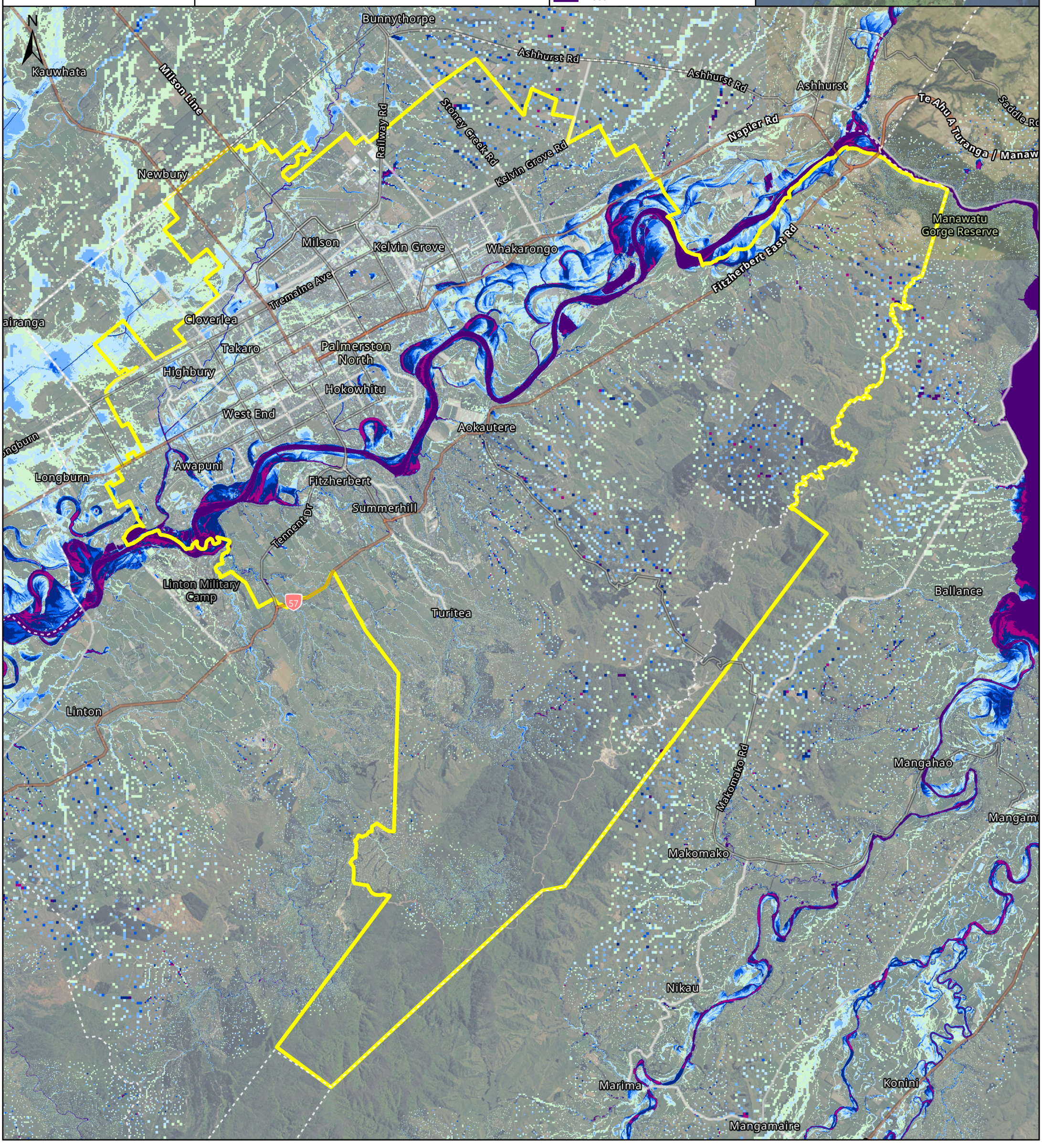

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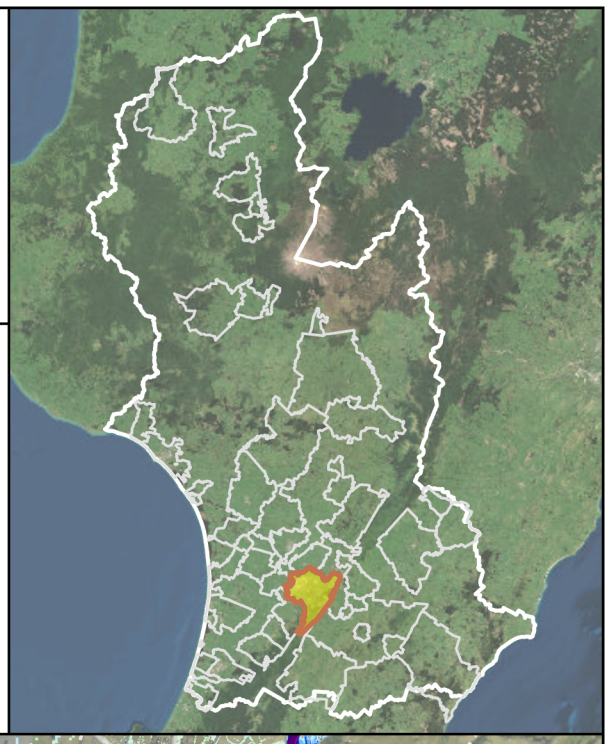

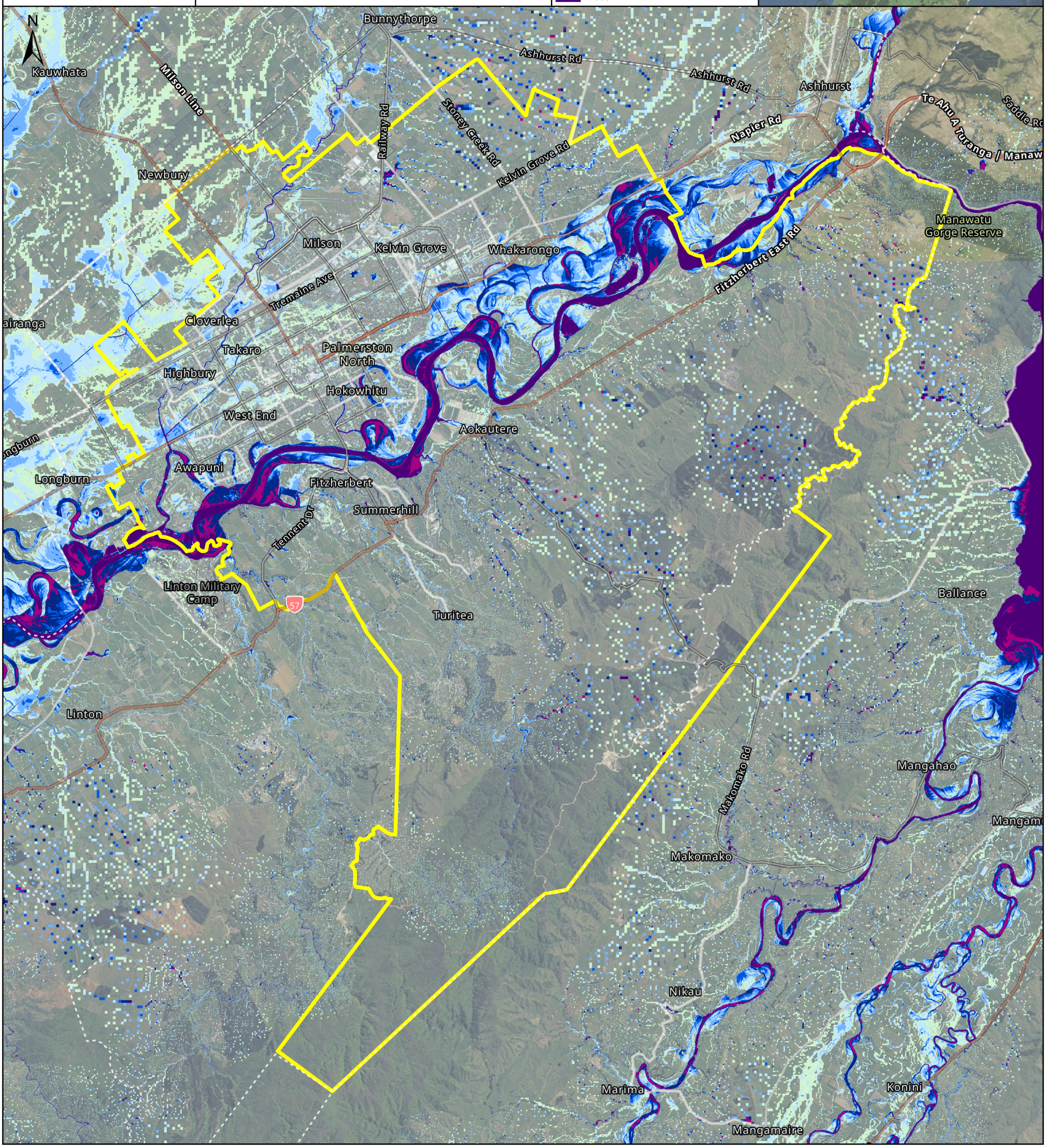

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Prepared By

wsp

NIWA Taihoro Nukurangi

Prepared On

01/07/2025

Horizons Region Flood Vulnerability Assessment

Flood scenario: 0.5% annual exceedance probability, flood defences down, 0 degrees warming due to climate change, sea level rise excluded

Community
Palmerston North,
Palmerston North City

Scale 1:86,000 at A3

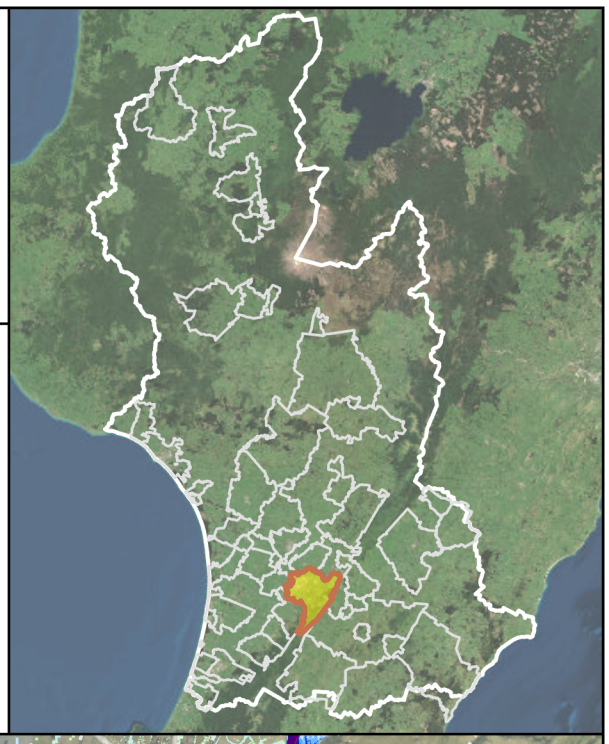
0 2.5 5 Km

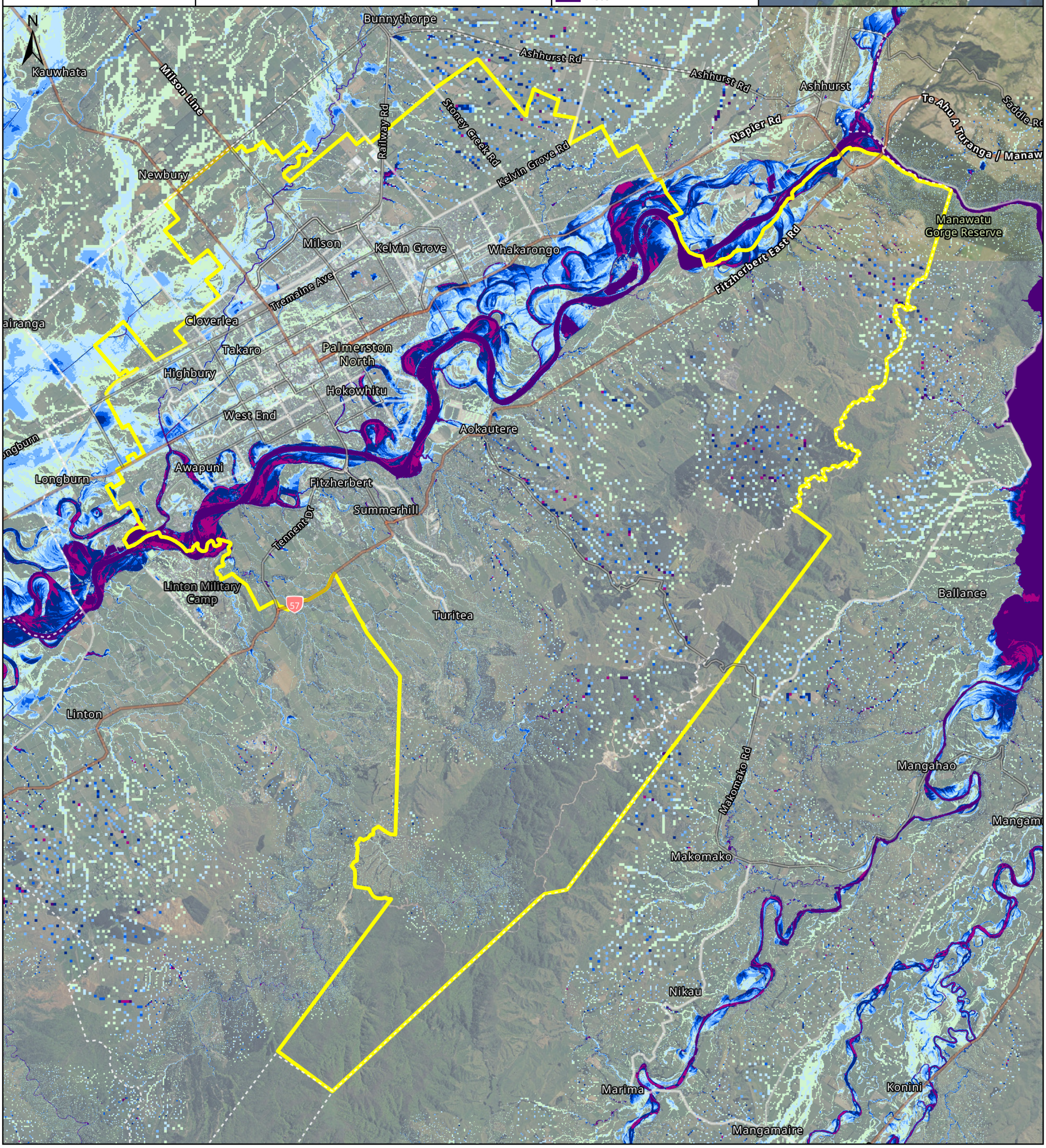
Legend

- Community Boundary

Flood Depth (m)

- 0.05 - 0.20
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- 2.5 - 3.5
- >3.5





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Horizons Region Flood Vulnerability Assessment

Flood scenario: 0.5% annual exceedance probability, flood defences down, 1 degree warming due to climate change, sea level rise excluded

Community
Palmerston North,
Palmerston North City

Scale 1:86,000 at A3

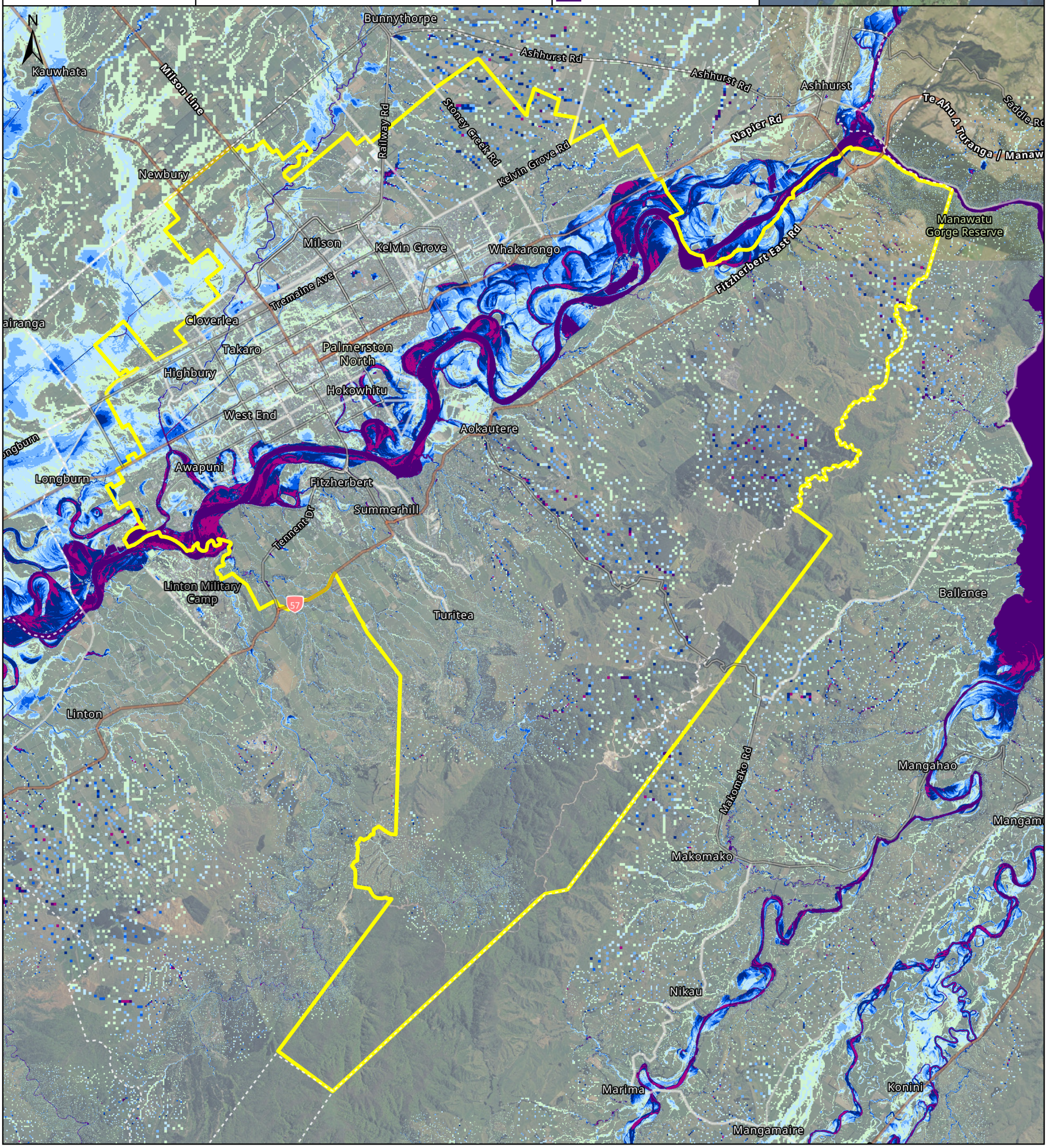
0 2.5 5 Km

Legend

- Community Boundary

Flood Depth (m)

- 0.05 - 0.20
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- 2.5 - 3.5
- >3.5



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Horizons Region Flood Vulnerability Assessment

Flood scenario: 0.5% annual exceedance probability, flood defences down, 2 degrees warming due to climate change, sea level rise excluded

Community
Palmerston North,
Palmerston North City

Scale 1:86,000 at A3

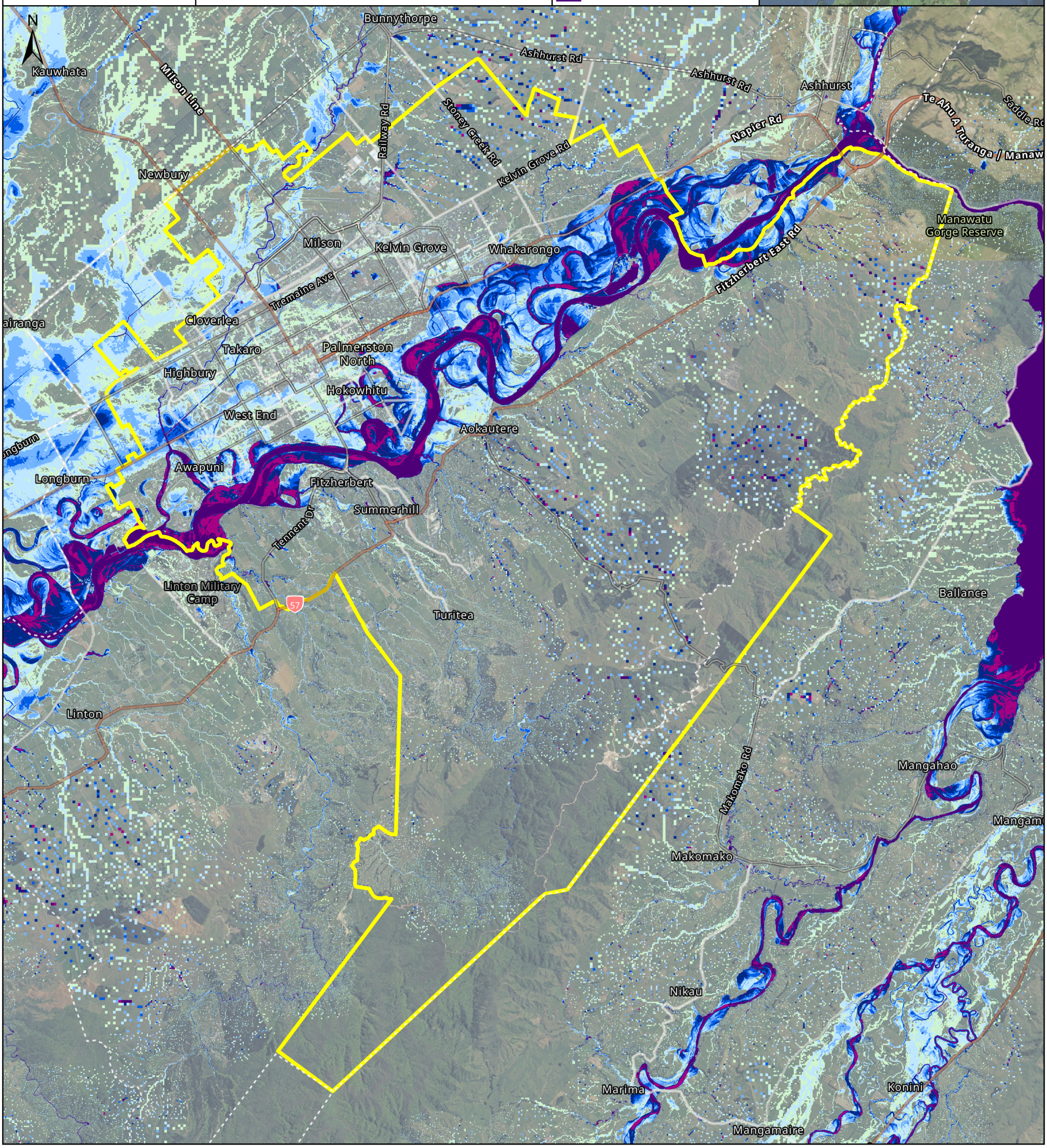
0 2.5 5 Km

Legend

- Community Boundary

Flood Depth (m)

- 0.05 - 0.20
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- 2.5 - 3.5
- >3.5



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01/07/2025

Horizons Region Flood Vulnerability Assessment

Flood scenario: 0.5% annual exceedance probability, flood defences down, 3 degrees warming due to climate change, sea level rise excluded

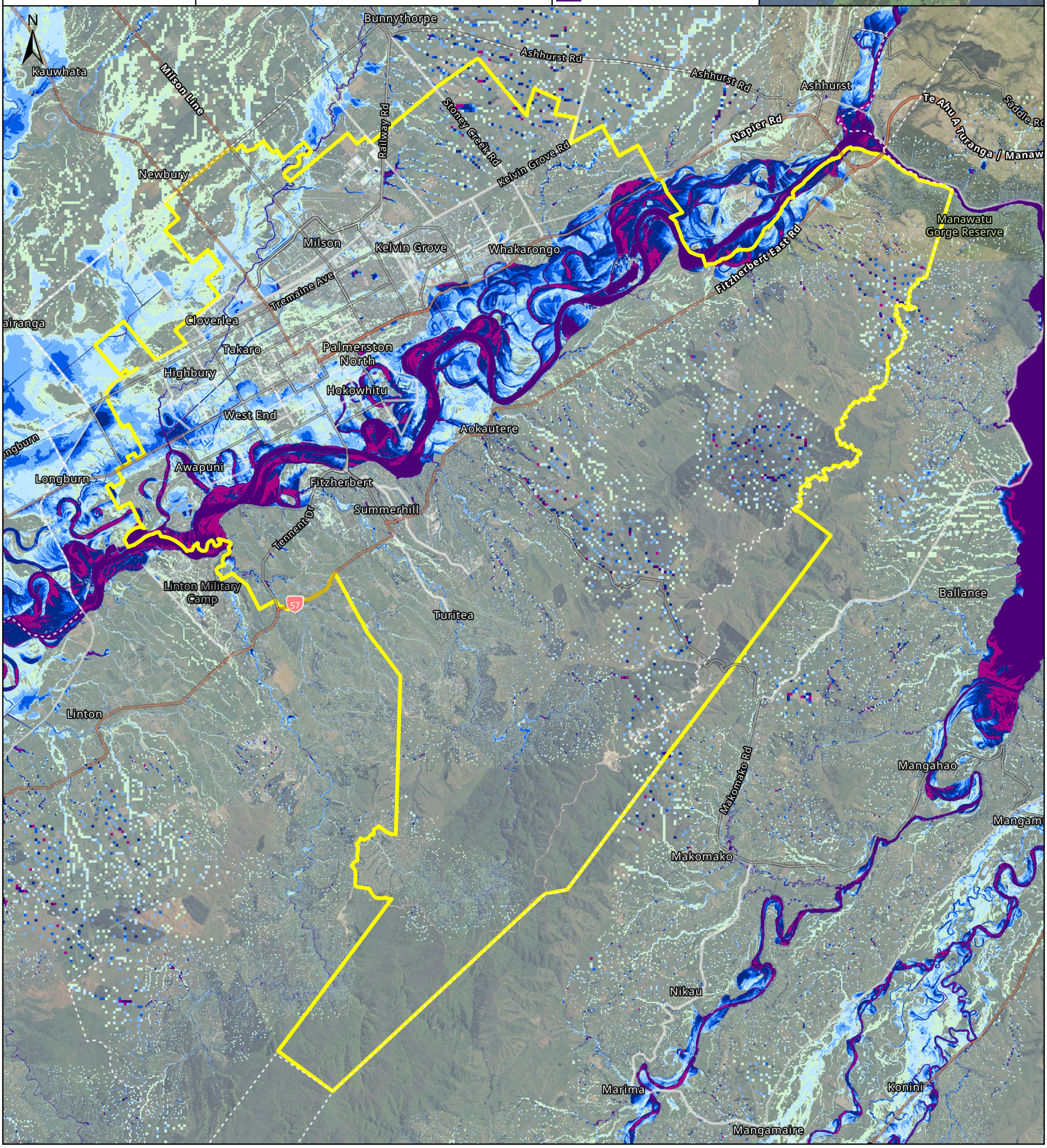
Community
Palmerston North,
Palmerston North City

Scale 1:86,000 at A3

0 2.5 5 Km

Legend

- Community Boundary

Flood Depth (m)

- 0.05 - 0.20
- 0.2 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- 2.5 - 3.5
- >3.5