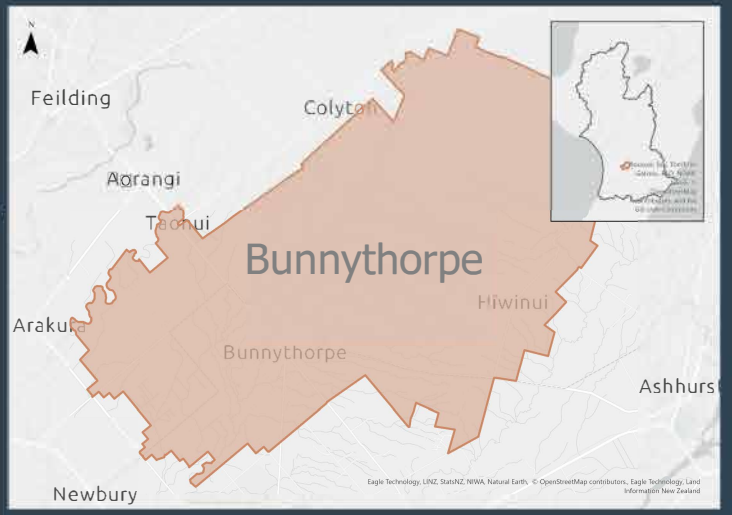
FLOOD VULNERABILITY ASSESSMENT: BUNNYTHORPE

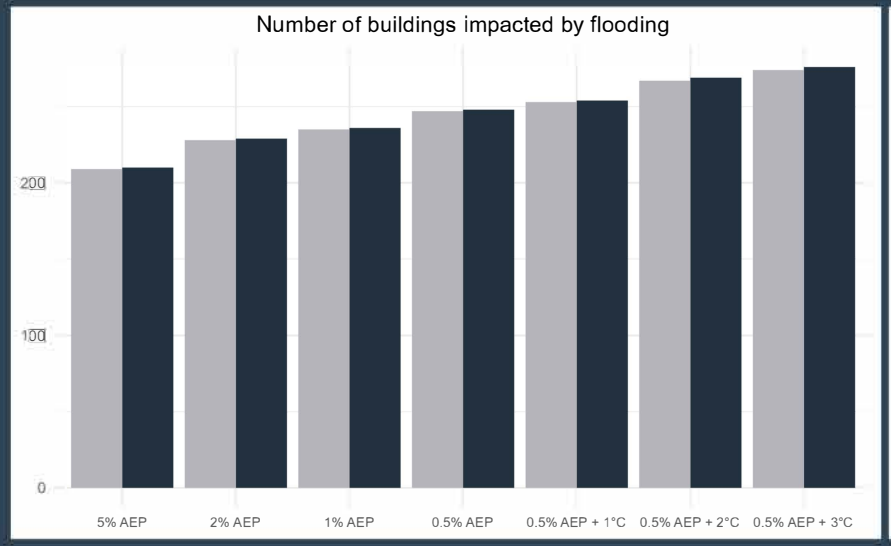
Horizons Regional Council engaged WSP and Earth Sciences NZ to lead the Horizons Flood Vulnerability Assessment, which developed a comprehensive regional flood model to evaluate the flood vulnerability of communities within the Horizons Region. This is a summary of the findings for Bunnythorpe, which has a population of 1,714 with 2,670 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.

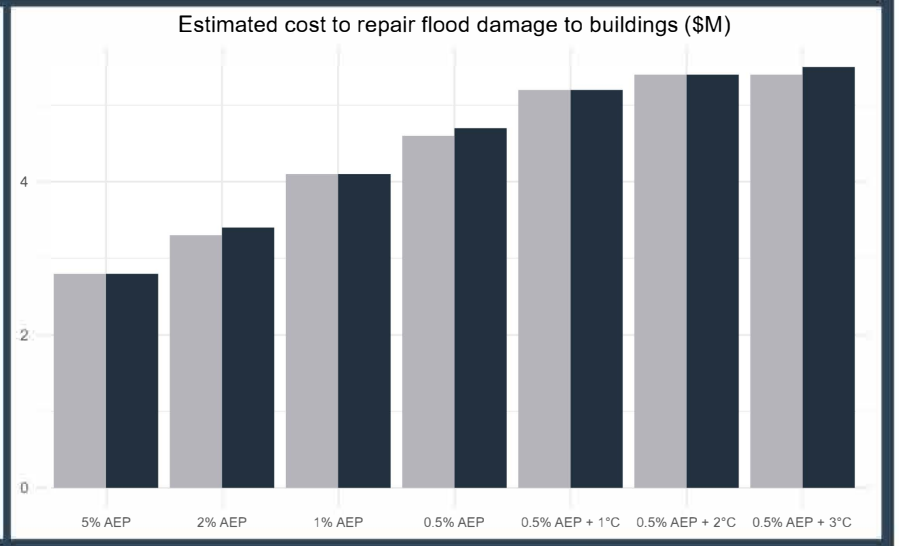
In Bunnythorpe, as flood events become more severe, both the extent of flooding and the depth of water increase. Annual Exceedance Probabilities (AEP) indicates the likelihood of a flood event occurring in any given year. For example, a 5% AEP means there is a 5% chance of a flood event exceeding this 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 210 buildings could be affected in a 5% AEP flood scenario, with an estimated repair cost of around $3 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 276 with repair costs of around $6 Million. **Without the flood defences structures such as stopbanks in place**, there was slight variation in the number of buildings impacted by flooding. This could be within a margin of error, or that without defences in place flood waters can spread more widerly across less built-up areas. In a flood scenario of 0.5% AEP + 3°C of warming due to climate change, the estimated number of affected buildings increases to 274 with repair costs of around $5 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.







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 Bunnythorpe, 210 to 276 buildings could be impacted by flooding.

This is 8% to 10% of buildings in Bunnythorpe that could be impacted by flooding.

Out of the 52 settlements in the Horizons Region, Bunnythorpe ranks 24th for the number of buildings affected, and 35th for the percentage of buildings within a town settlement affected.

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WSP
Earth Sciences New Zealand

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horizons REGIONAL COUNCIL

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

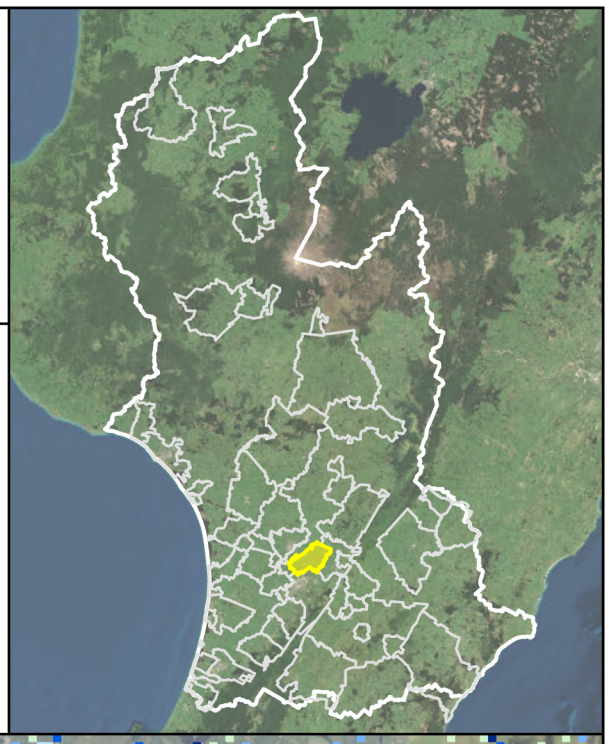
Community
Bunnythorpe,
Palmerston North City

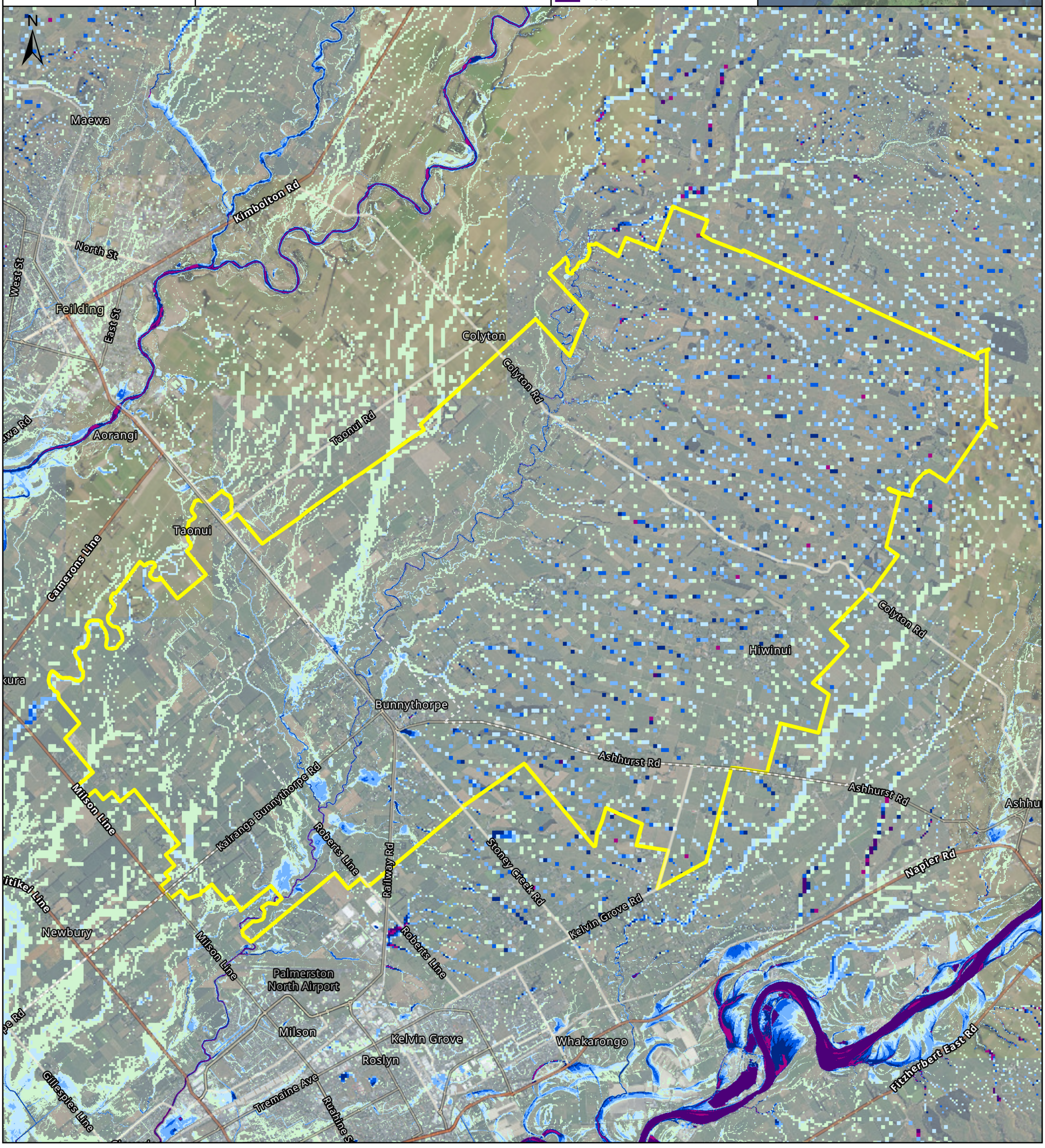
Scale 1:59,000 at A3

0 1.5 3 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: 2% annual exceedance probability, flood defences up, 0 degrees warming due to climate change, sea level rise excluded

Community
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

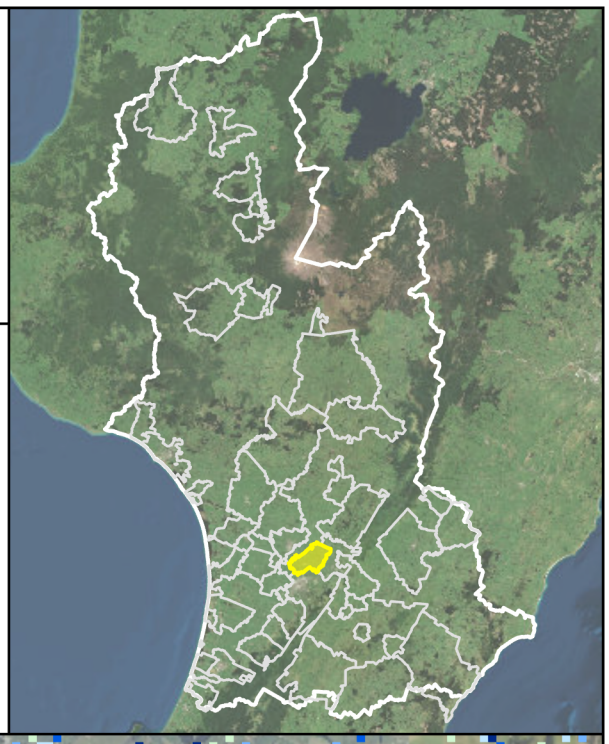
0 1.5 3 Km

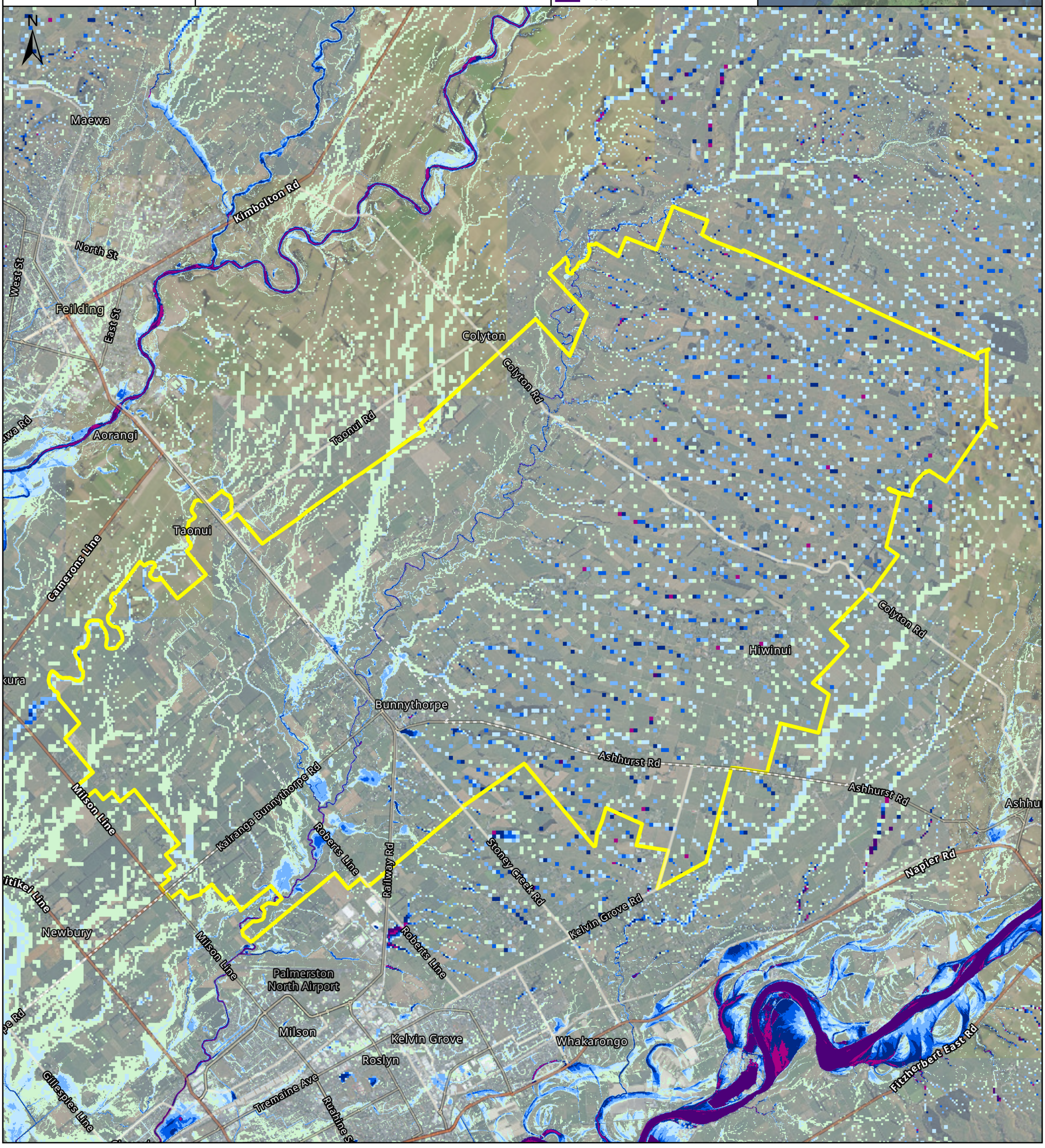
Legend

- 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: 1% annual exceedance probability, flood defences up, 0 degrees warming due to climate change, sea level rise excluded

Community
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

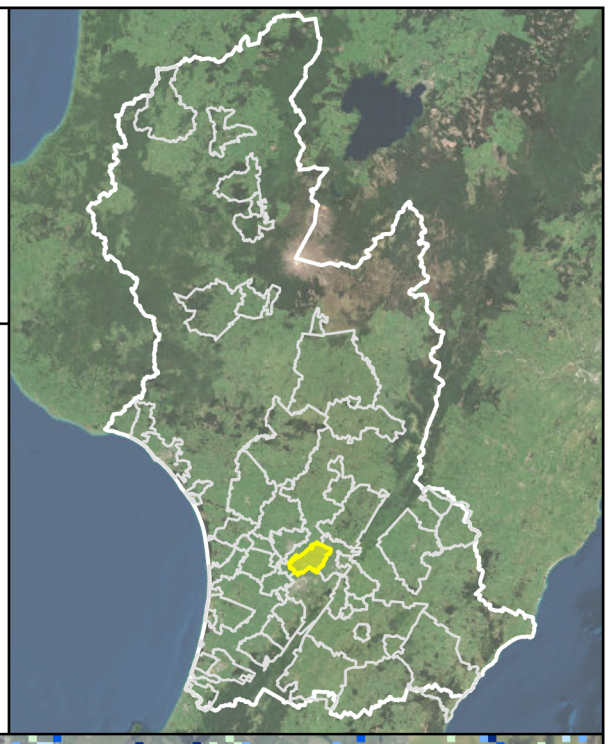
0 1.5 3 Km

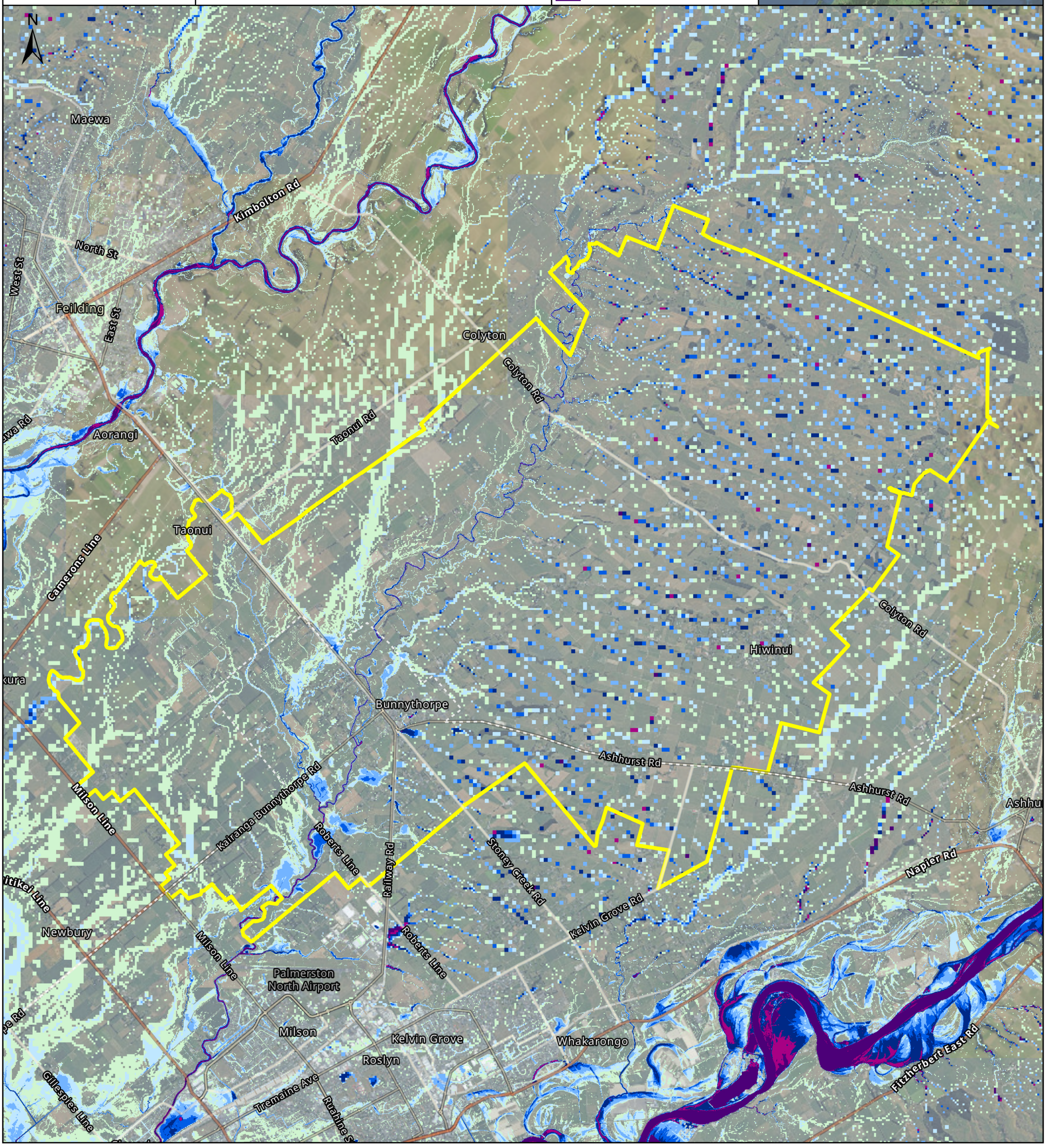
Legend

- 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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NIWA Taihoro Nukurangi

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Horizons Region Flood Vulnerability Assessment

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

Community
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

0 1.5 3 Km

Legend

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Flood Depth (m)

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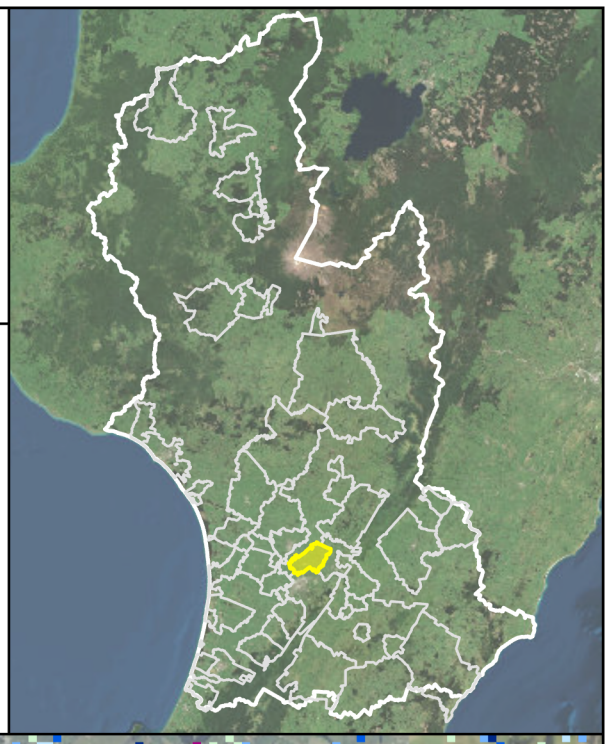

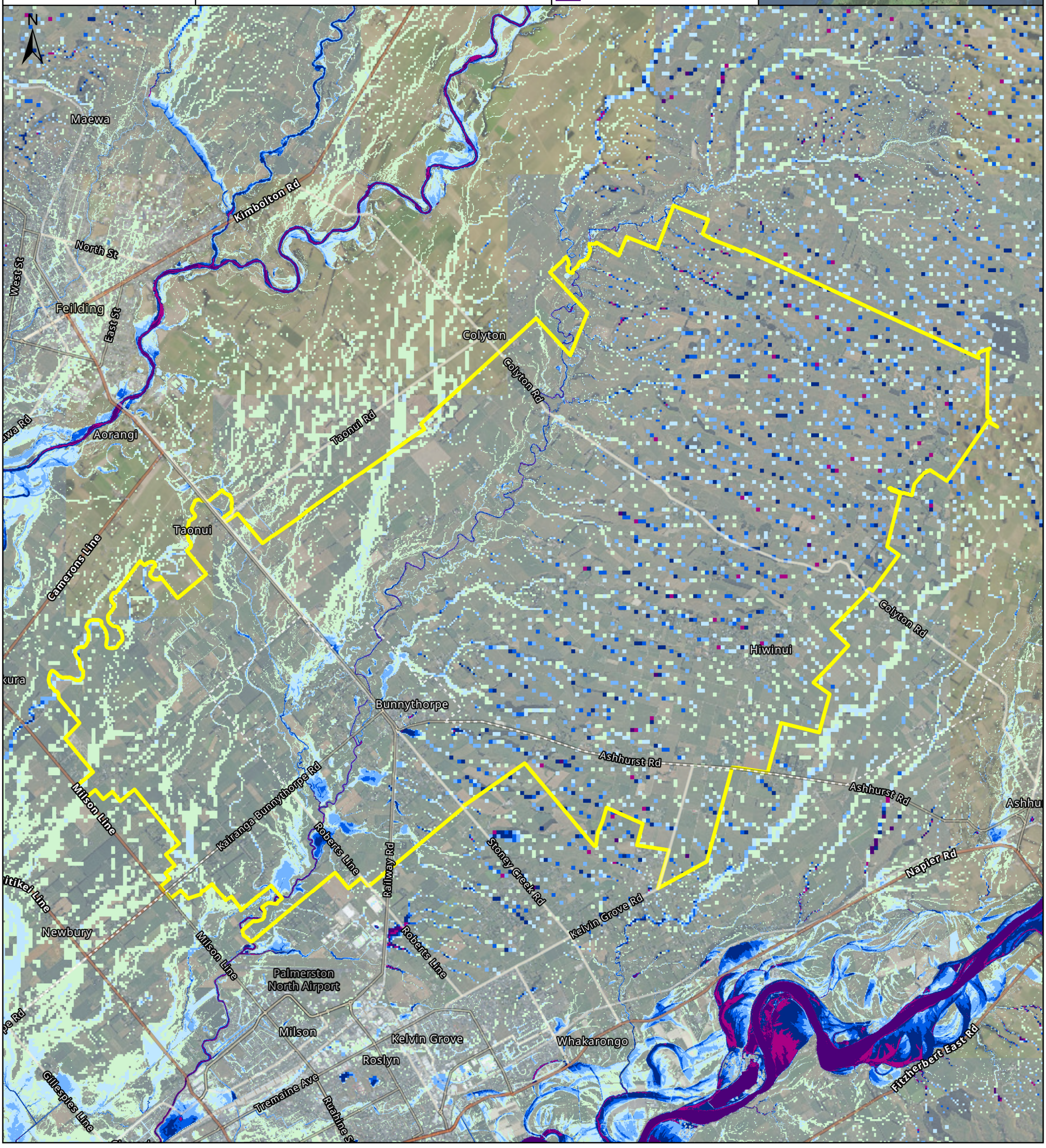

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Flood scenario: 0.5% annual exceedance probability, flood defences up, 1 degree warming due to climate change, sea level rise excluded

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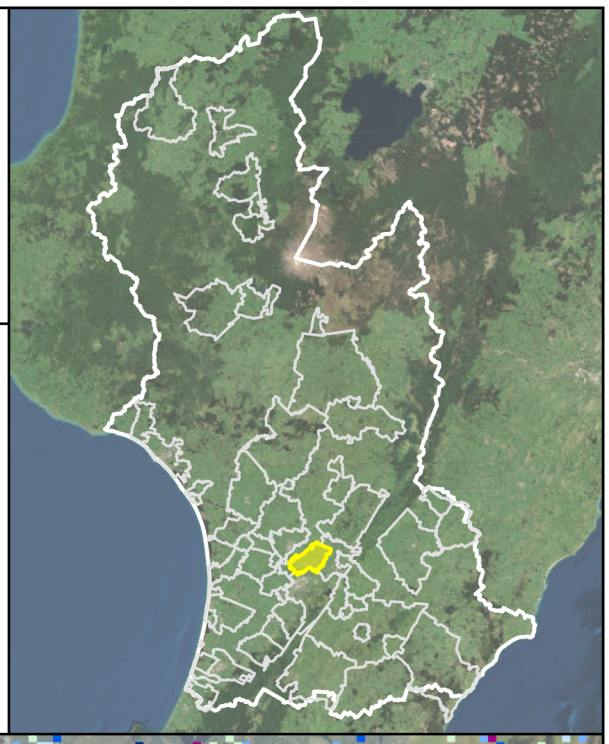

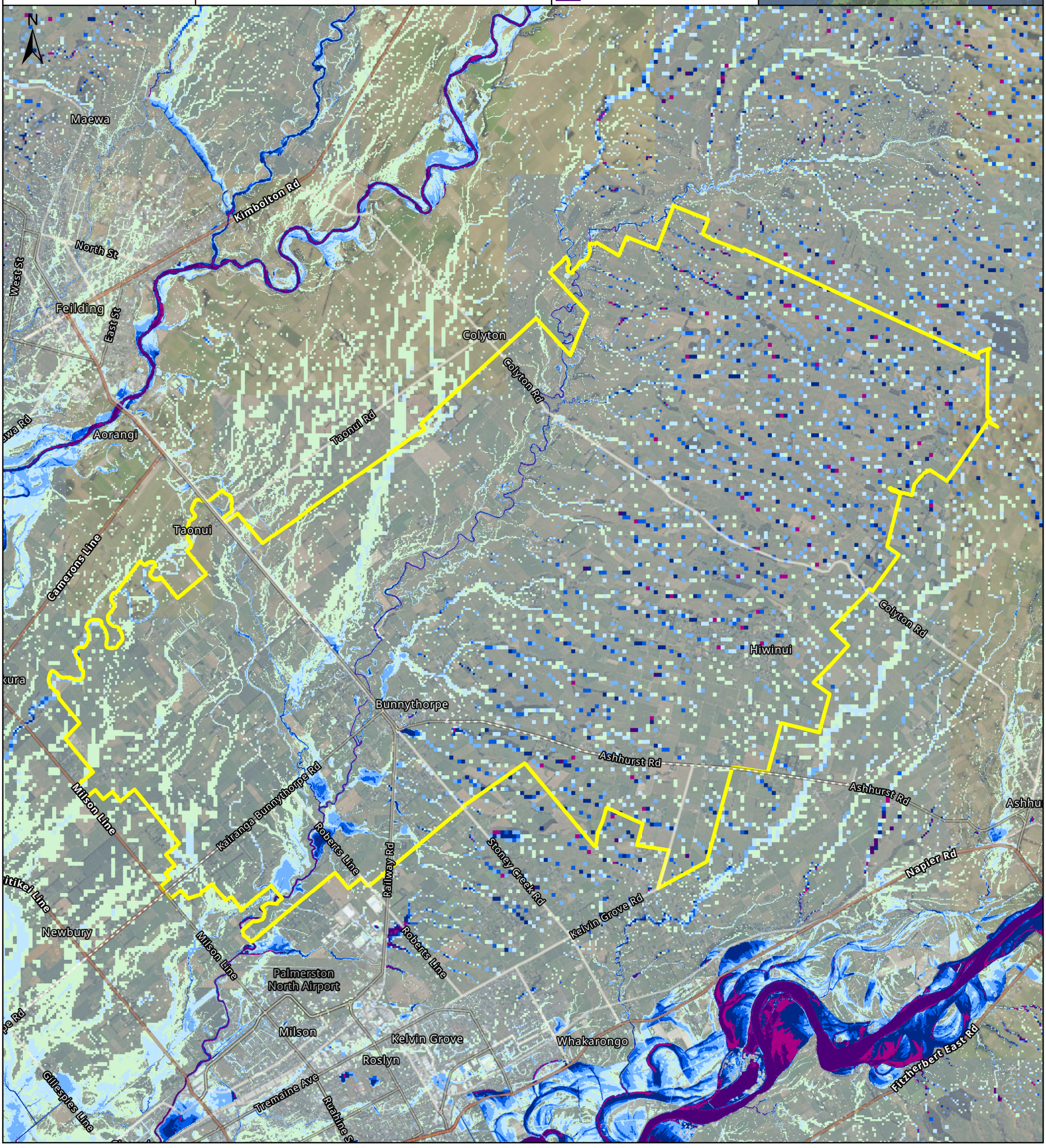

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Horizons Region Flood Vulnerability Assessment

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

Community
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

0 1.5 3 Km

Legend

- Community Boundary

Flood Depth (m)

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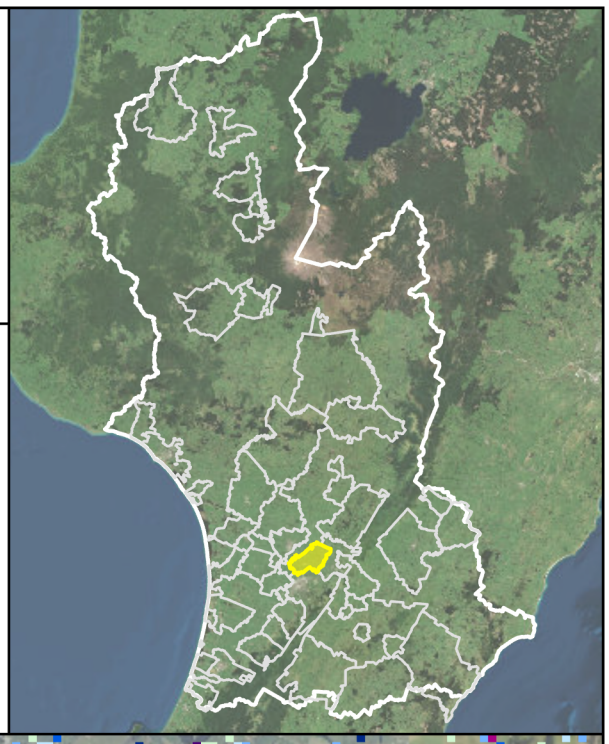

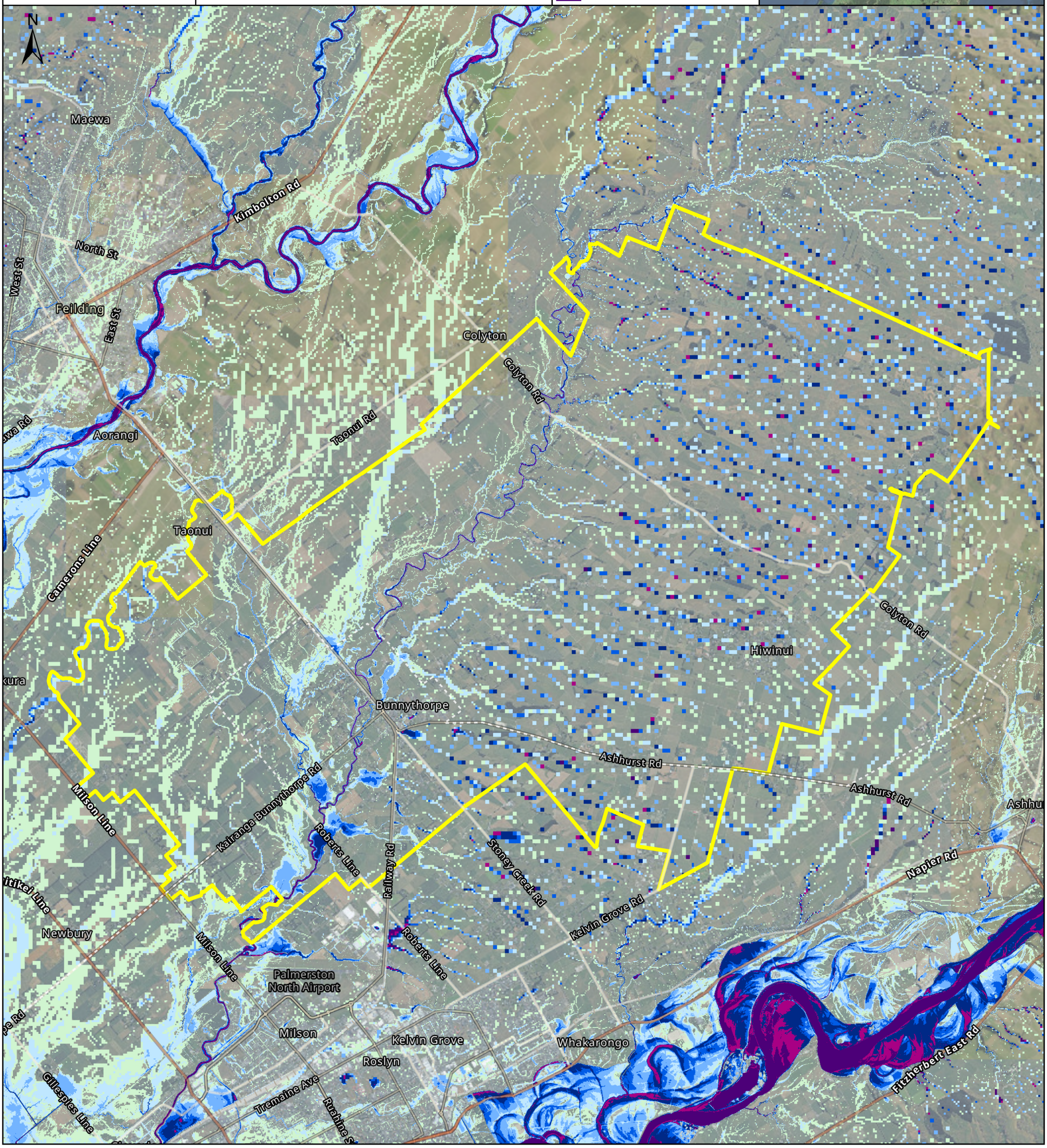

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Horizons Region Flood Vulnerability Assessment

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

Community
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

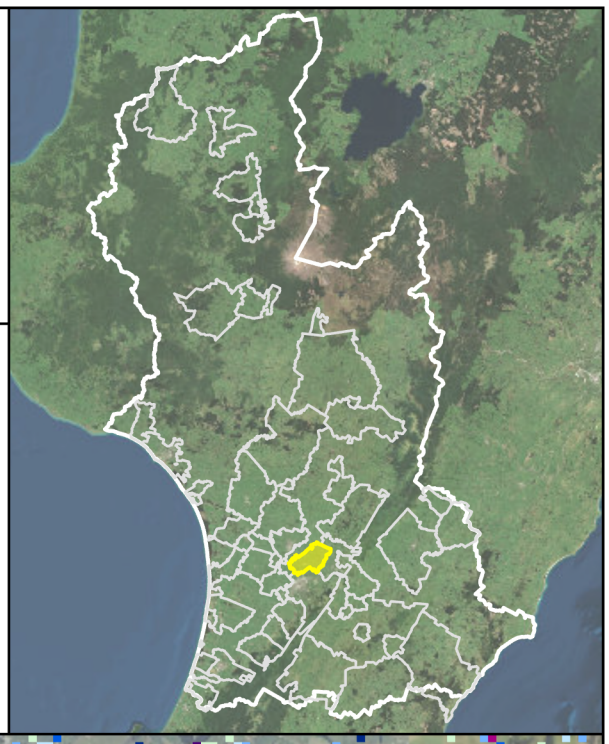
0 1.5 3 Km

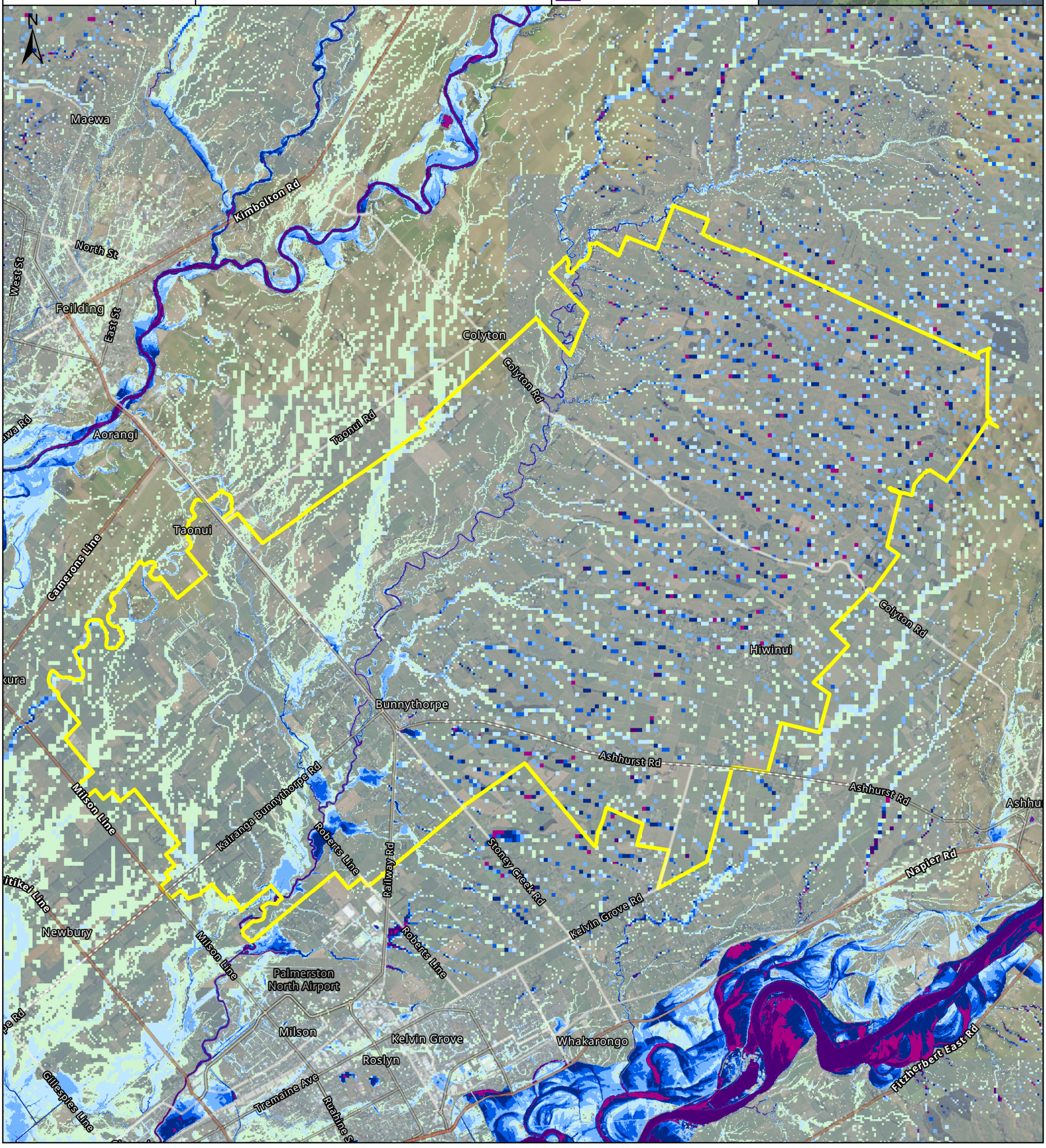
Legend

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

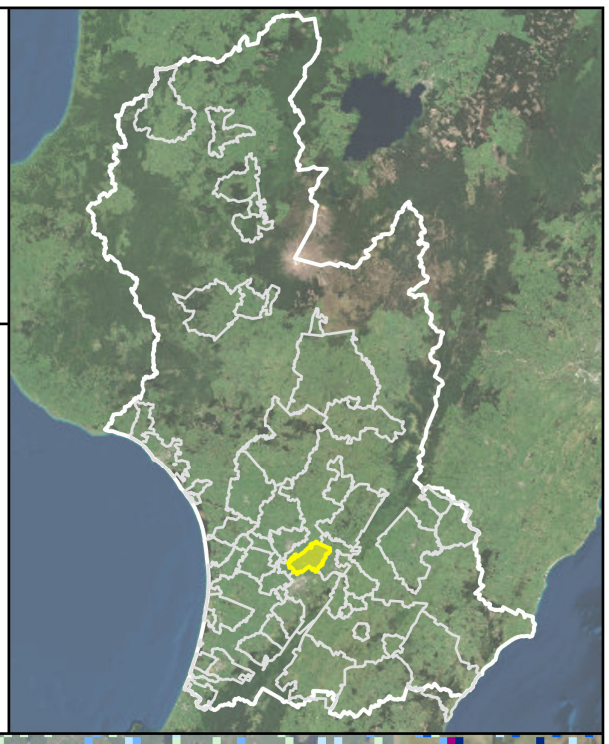
Community
Bunnythorpe,
Palmerston North City

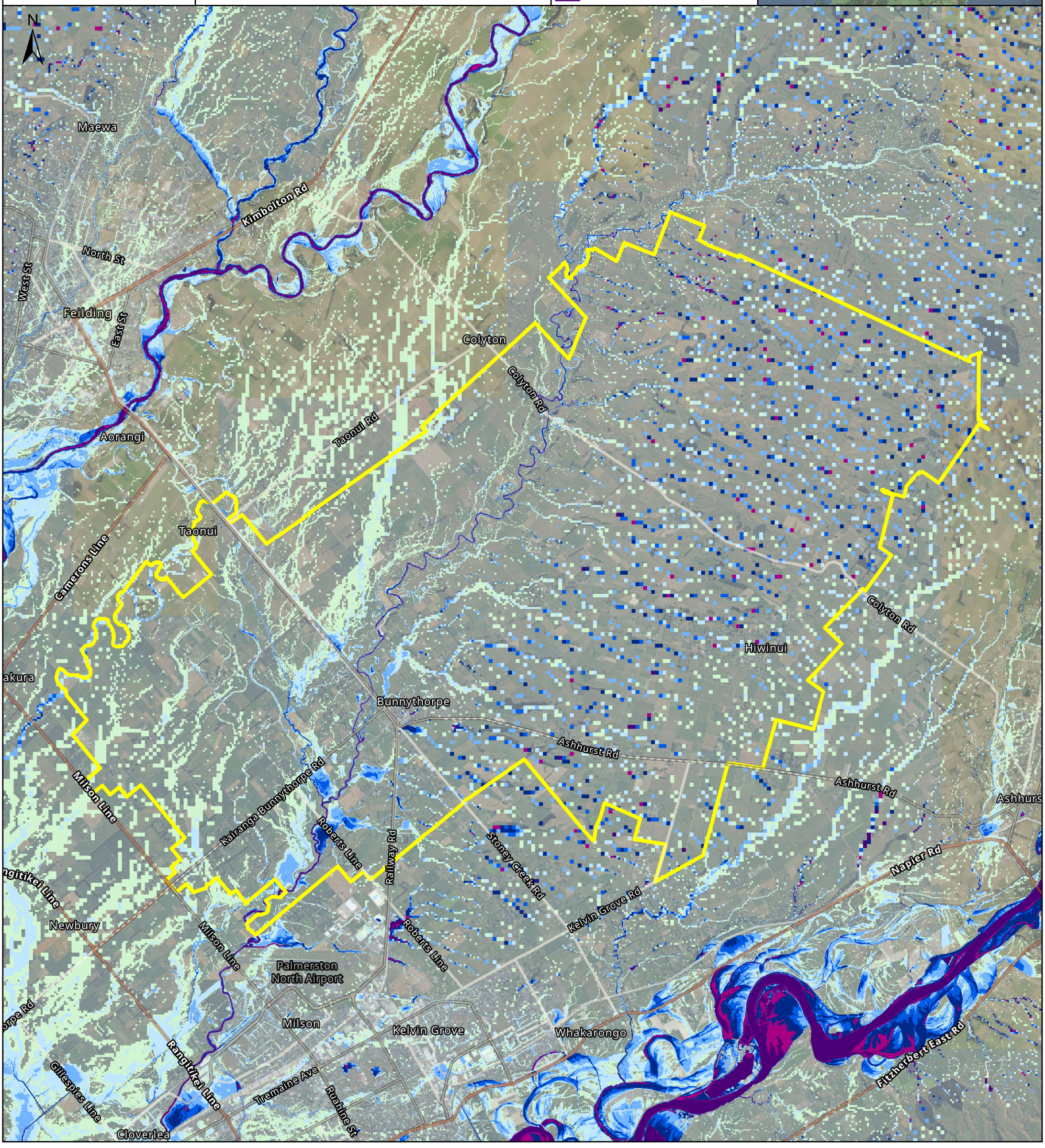
Scale 1:60,000 at A3

0 1.75 3.5 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: 0.2% annual exceedance probability, flood defences up, 1 degree warming due to climate change, sea level rise excluded

Community
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Palmerston North City

Scale 1:60,000 at A3

0 1.75 3.5 Km

Legend

- Community Boundary

Flood Depth (m)

- 0.05 - 0.20
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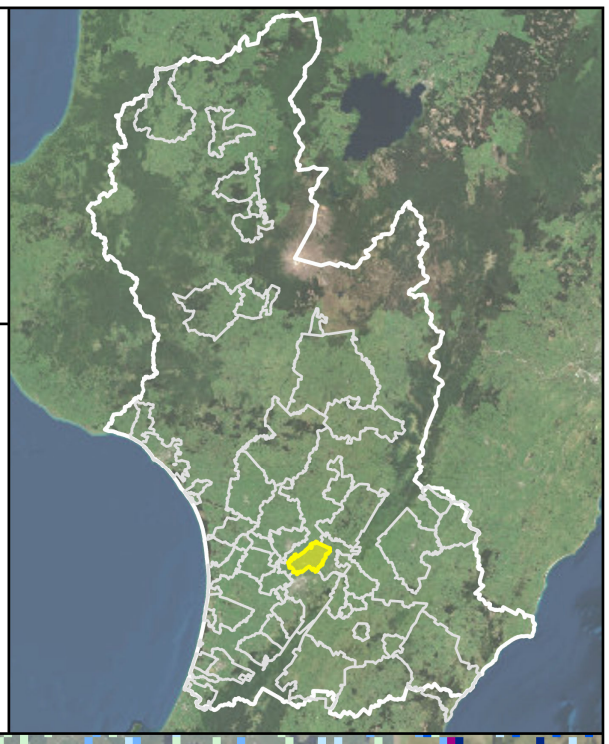

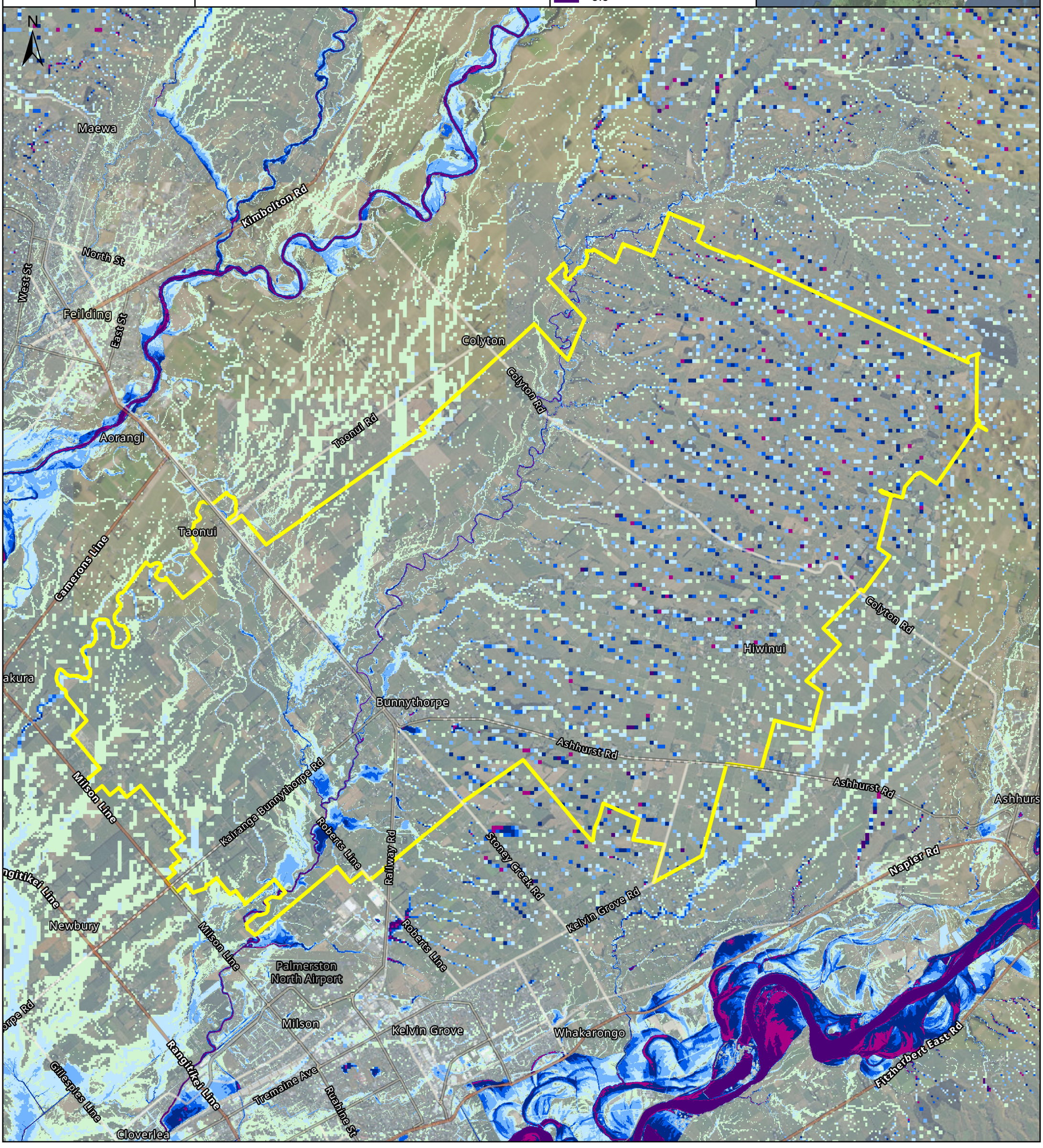

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NIWA Taihoro Nukurangi

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Horizons Region Flood Vulnerability Assessment

Flood scenario: 0.2% annual exceedance probability, flood defences up, 2 degrees warming due to climate change, sea level rise excluded

Community
Bunnythorpe,
Palmerston North City

Scale 1:60,000 at A3

0 1.75 3.5 Km

Legend

- Community Boundary

Flood Depth (m)

- 0.05 - 0.20
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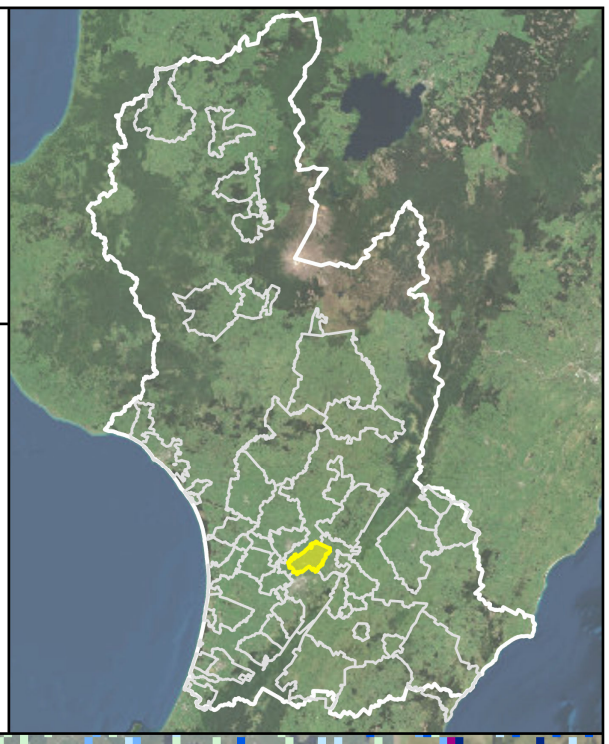

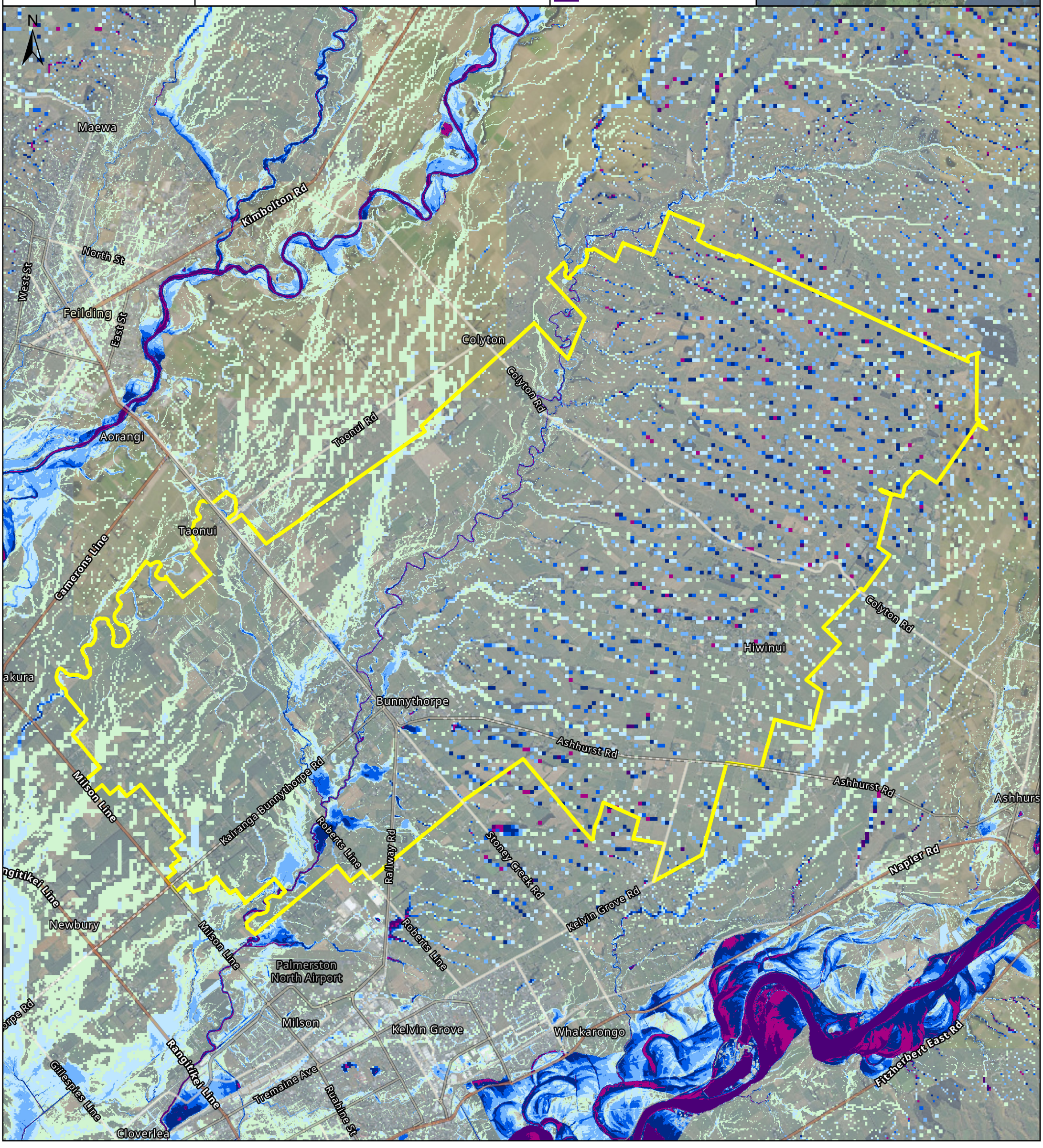

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Horizons Region Flood Vulnerability Assessment

Flood scenario: 0.2% annual exceedance probability, flood defences up, 3 degrees warming due to climate change, sea level rise excluded

Community
Bunnythorpe,
Palmerston North City

Scale 1:60,000 at A3

0 1.75 3.5 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
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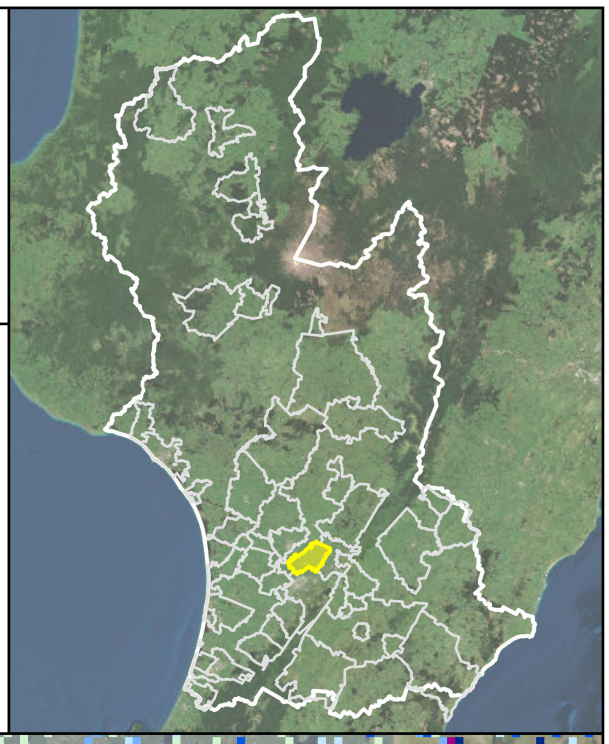

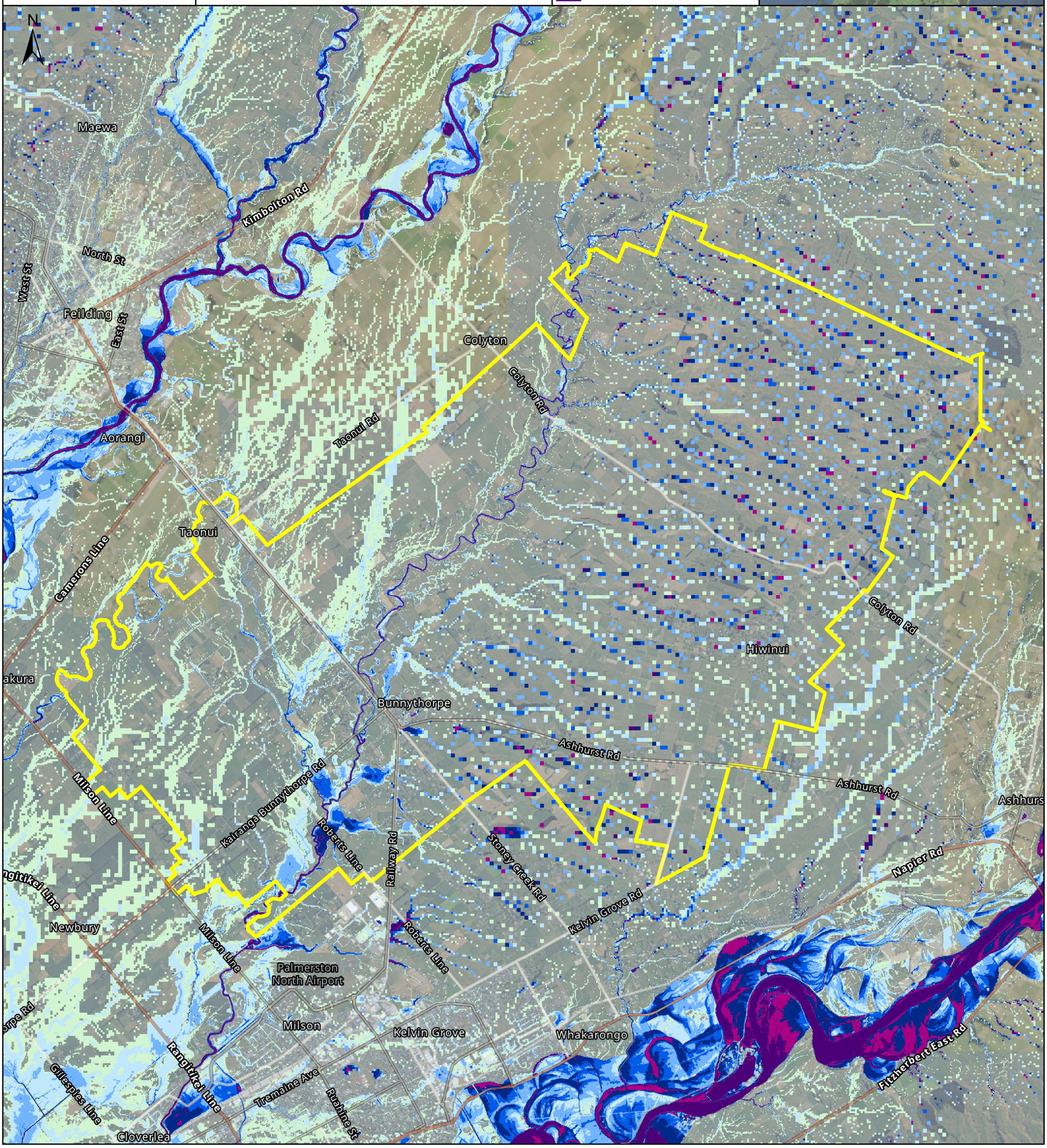

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NIWA Taihoro Nukurangi

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Horizons Region Flood Vulnerability Assessment

Flood scenario: 0.1% annual exceedance probability, flood defences up, 0 degrees warming due to climate change, sea level rise excluded

Community
Bunnythorpe,
Palmerston North City

Scale 1:60,000 at A3

0 1.75 3.5 Km

Legend

- Community Boundary

Flood Depth (m)

- 0.05 - 0.20
- 0.2 - 0.5
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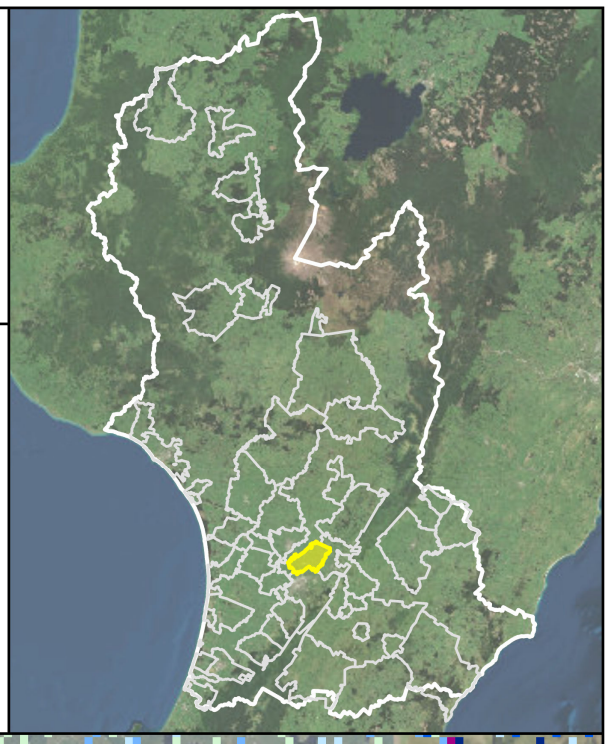

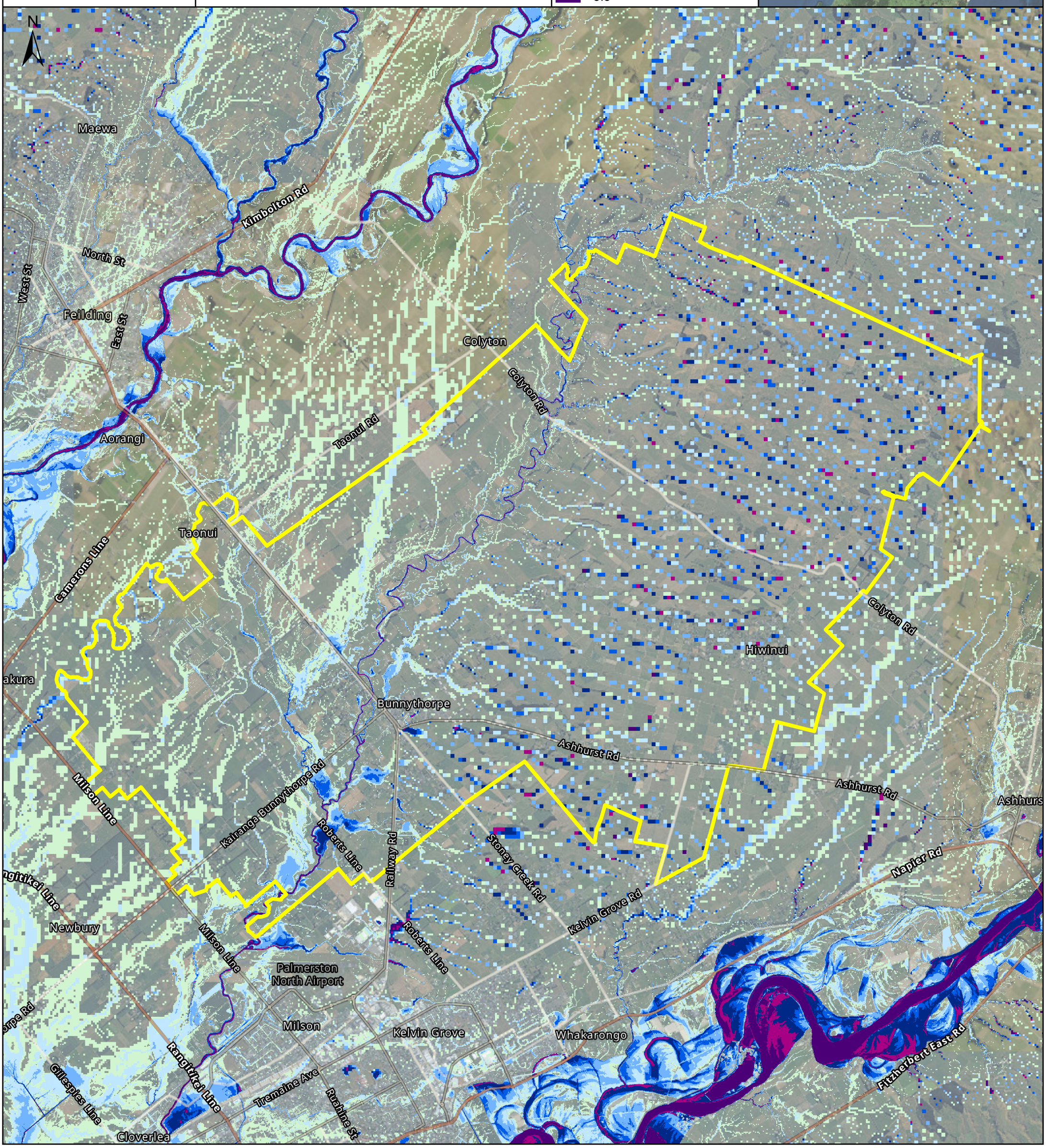

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Horizons Region Flood Vulnerability Assessment

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Community
Bunnythorpe,
Palmerston North City

Scale 1:60,000 at A3

0 1.75 3.5 Km

Legend

- Community Boundary

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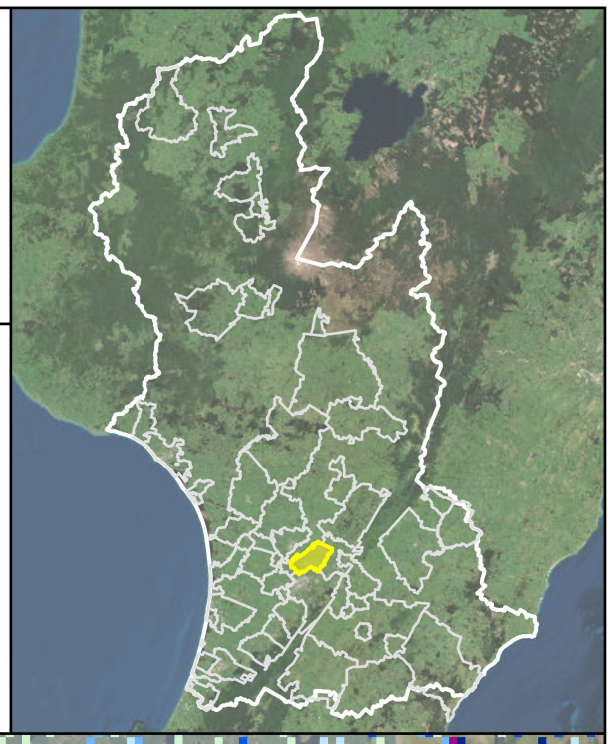

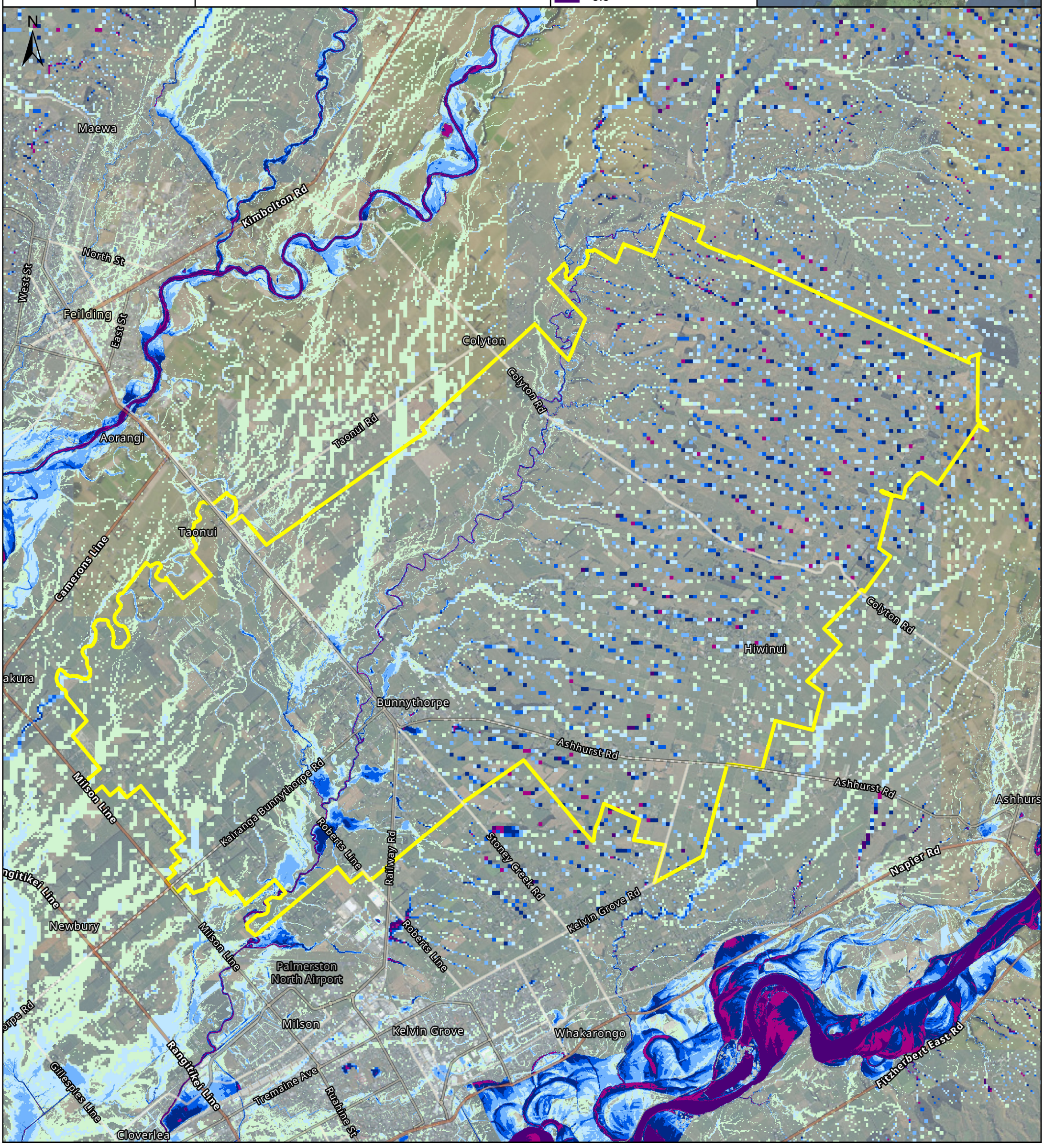

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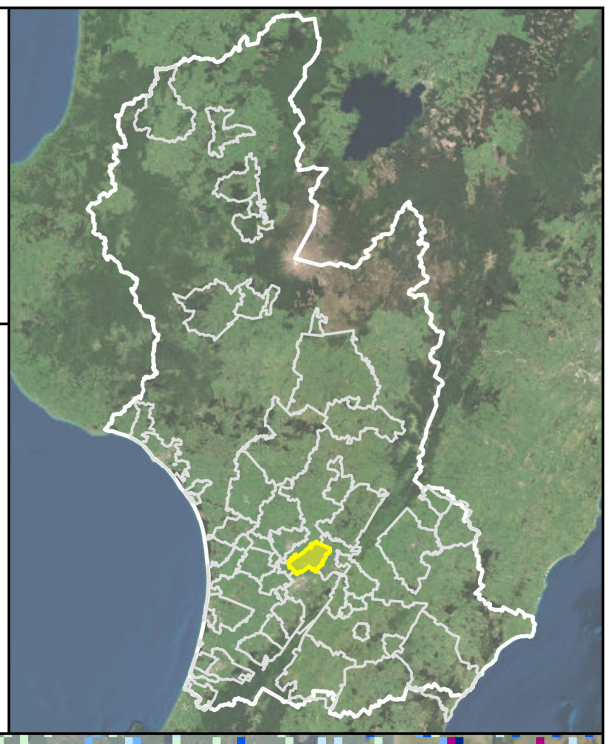
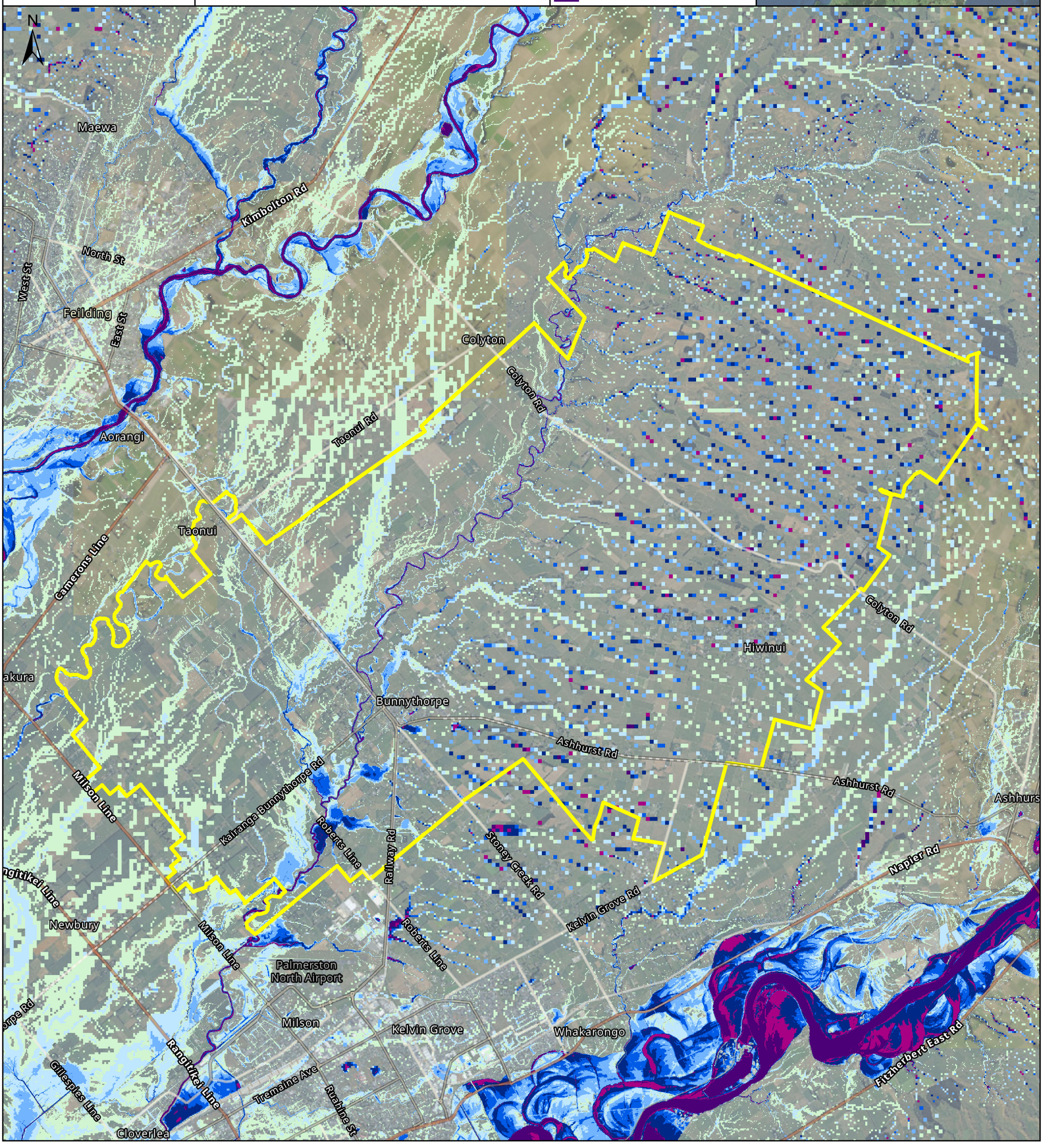
- >3.5





Prepared For

horizons REGIONAL COUNCIL

Prepared By

wsp

NIWA Taihoro Nukurangi

Prepared On
05/08/2025

Horizons Region Flood Vulnerability Assessment

Flood scenario: 0.1% annual exceedance probability, flood defences up, 3 degrees warming due to climate change, sea level rise excluded

Community
Bunnythorpe,
Palmerston North City

Scale 1:60,000 at A3

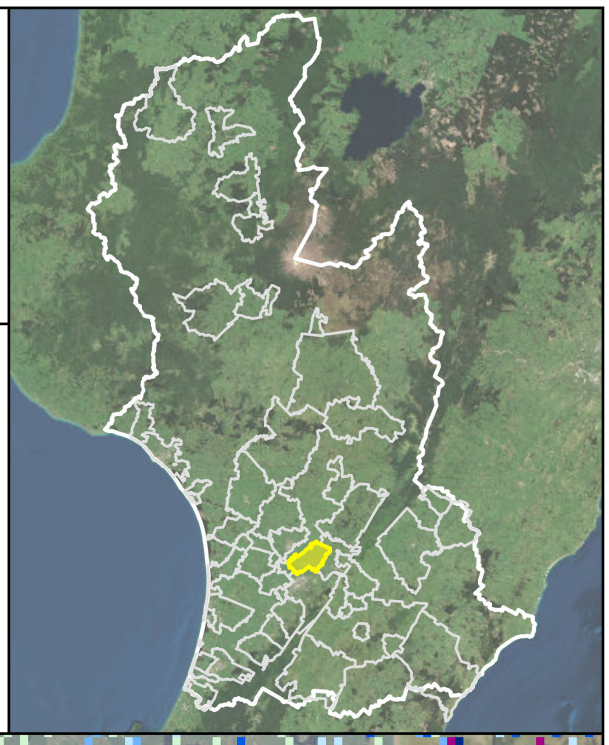
0 1.75 3.5 Km

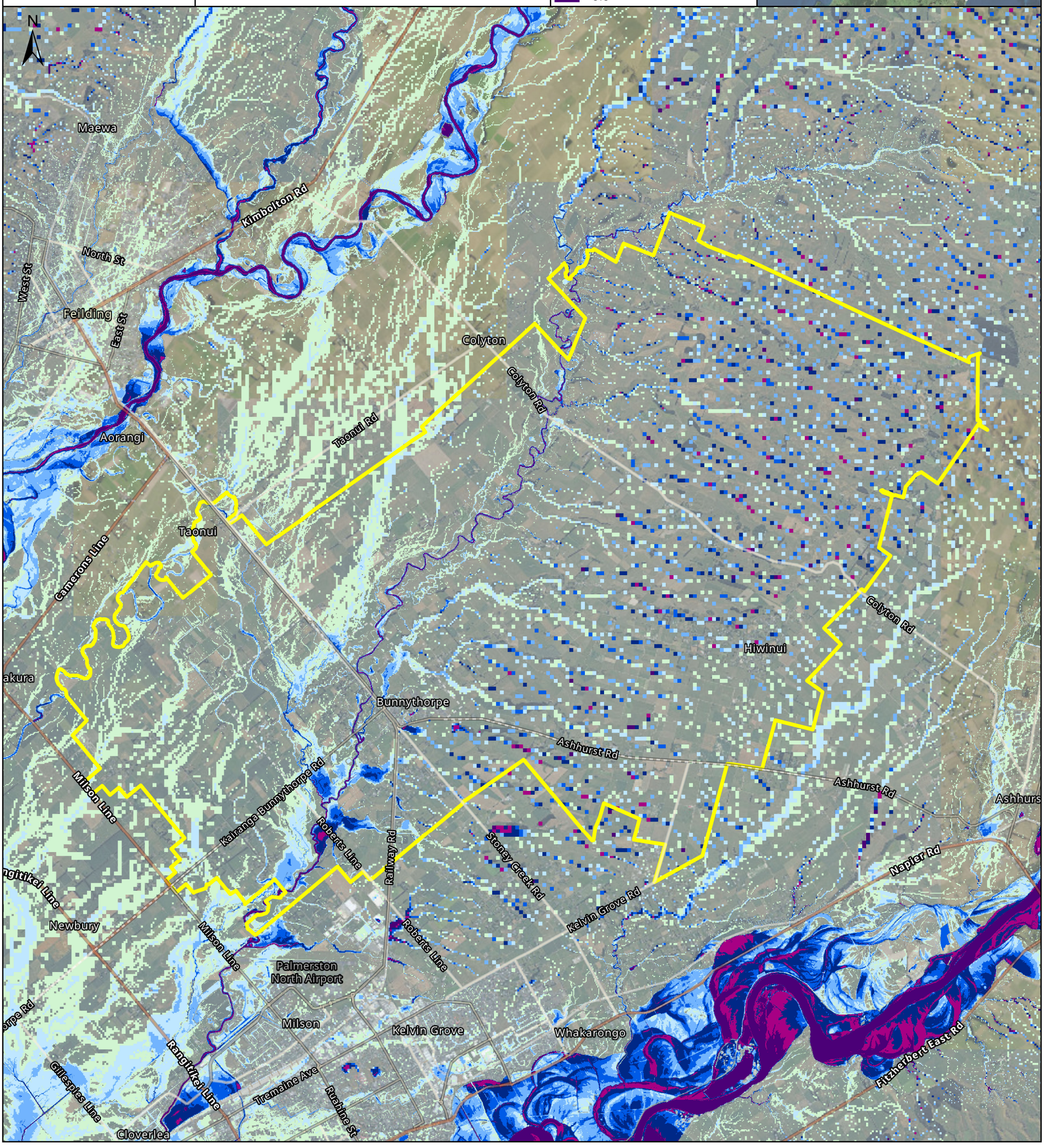
Legend

- 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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Prepared By

wsp

NIWA Taihoro Nukurangi

Prepared On

01/07/2025

Horizons Region Flood Vulnerability Assessment

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

Community
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

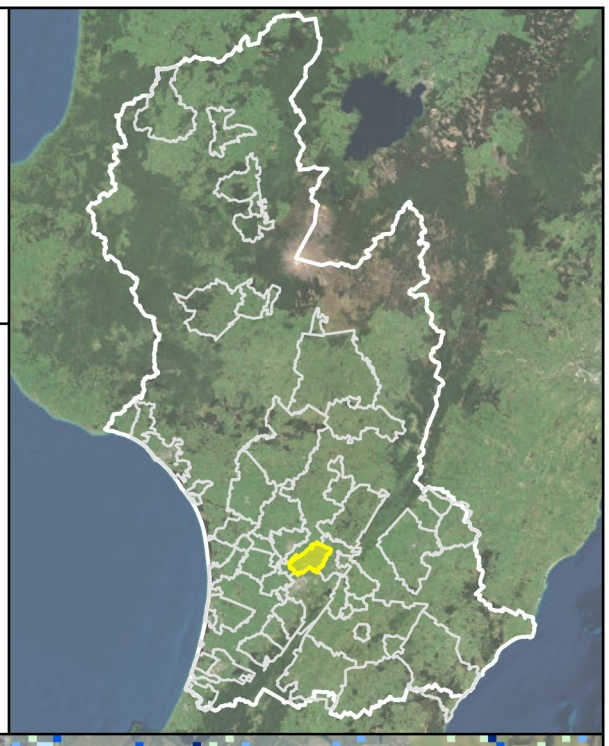
0 1.5 3 Km

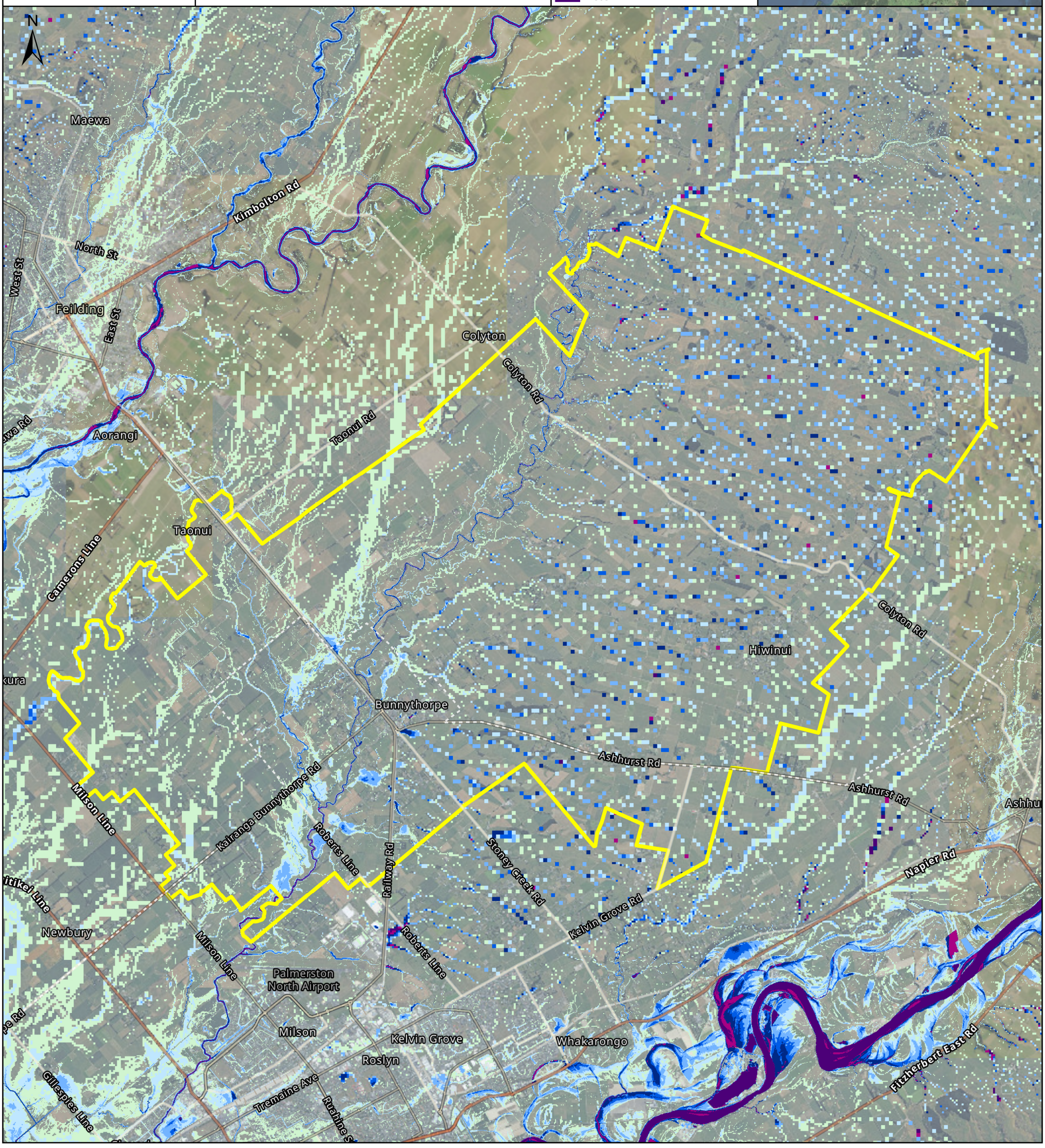
Legend

- 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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Prepared By

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NIWA Taihoro Nukurangi

Prepared On
01/07/2025

Horizons Region Flood Vulnerability Assessment

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

Community
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

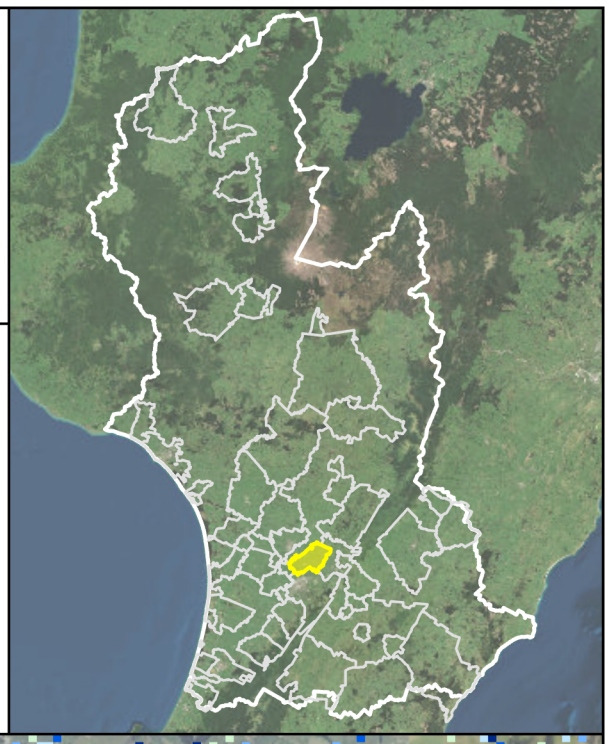
0 1.5 3 Km

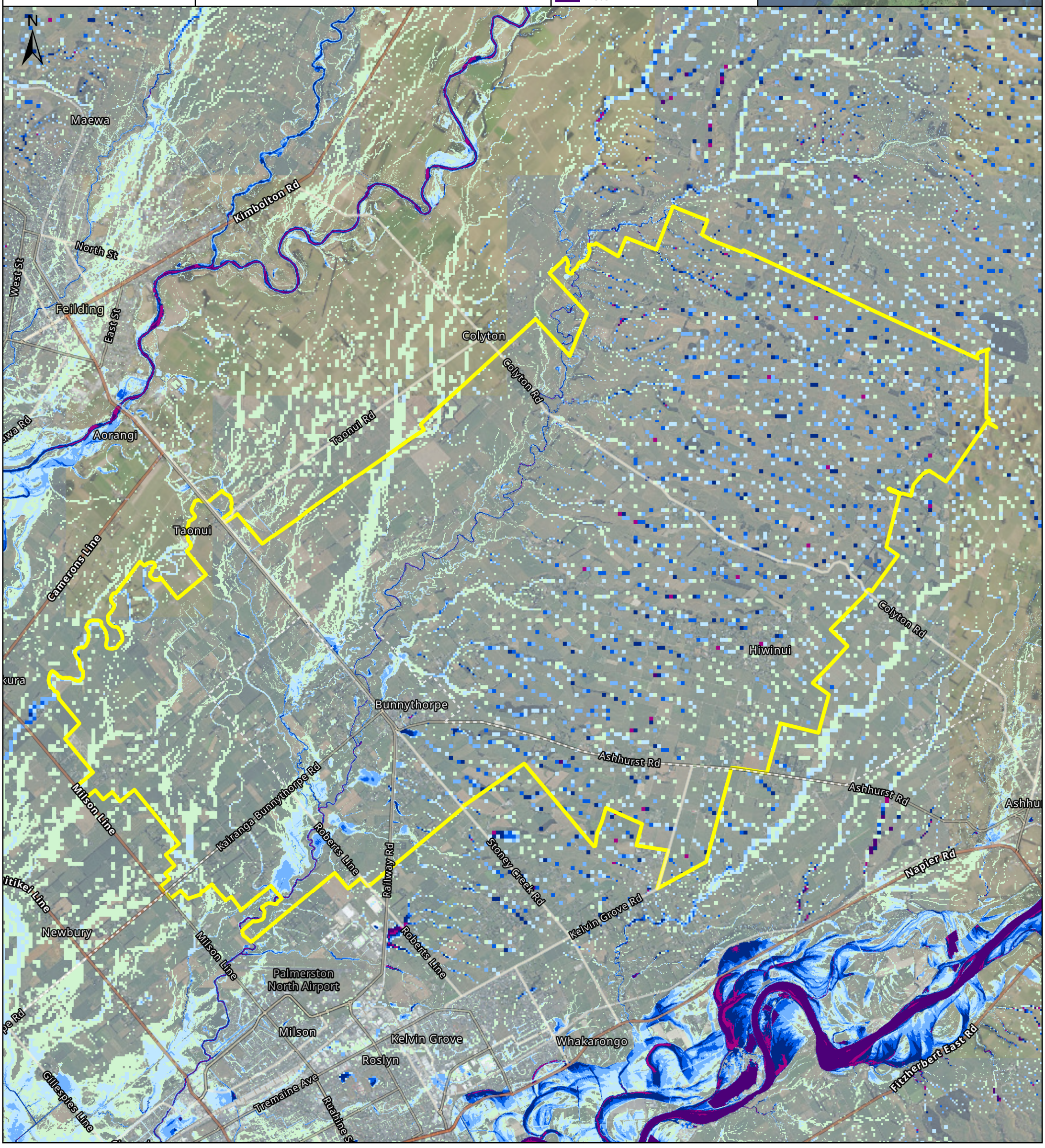
Legend

- 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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NIWA Taihoro Nukurangi

Prepared On

01/07/2025

Horizons Region Flood Vulnerability Assessment

Flood scenario: 1% annual exceedance probability, flood defences down, 0 degrees warming due to climate change, sea level rise excluded

Community
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

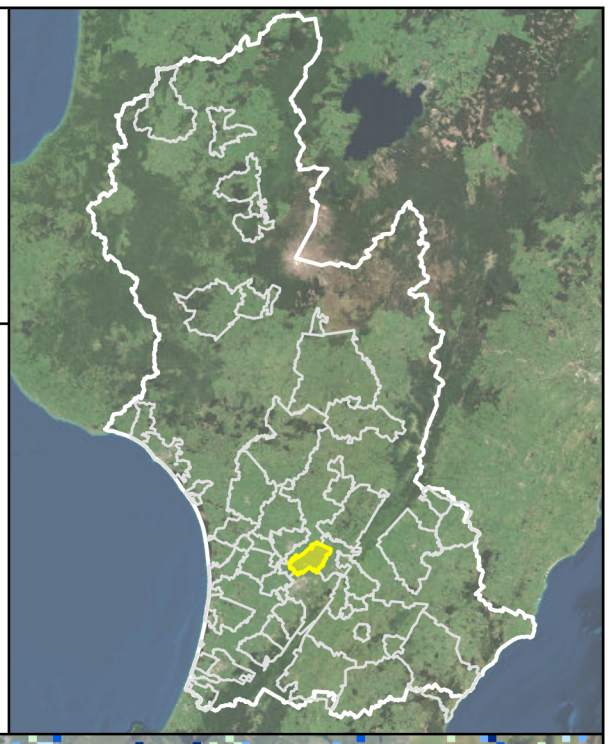
0 1.5 3 Km

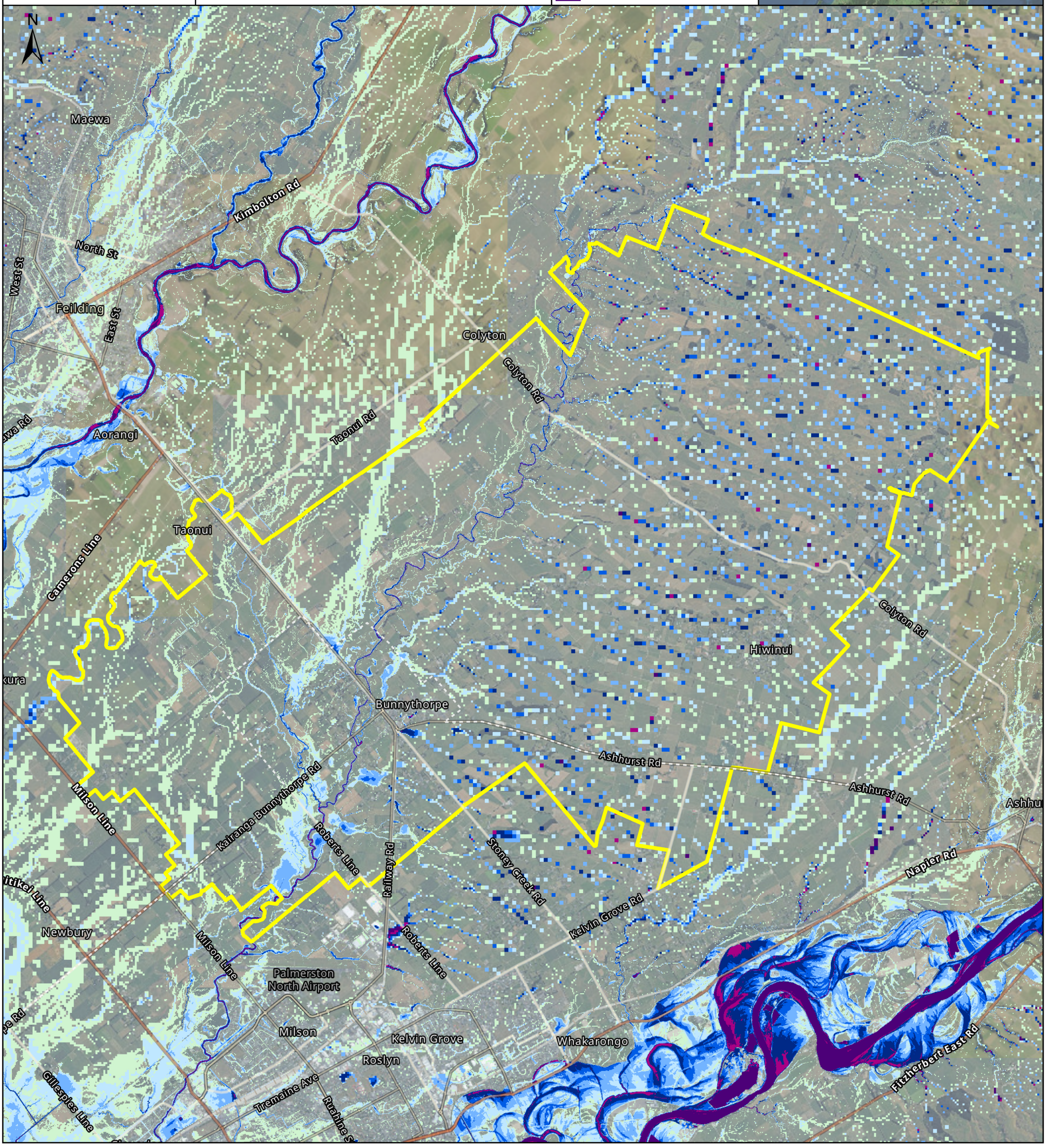
Legend

- 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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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
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

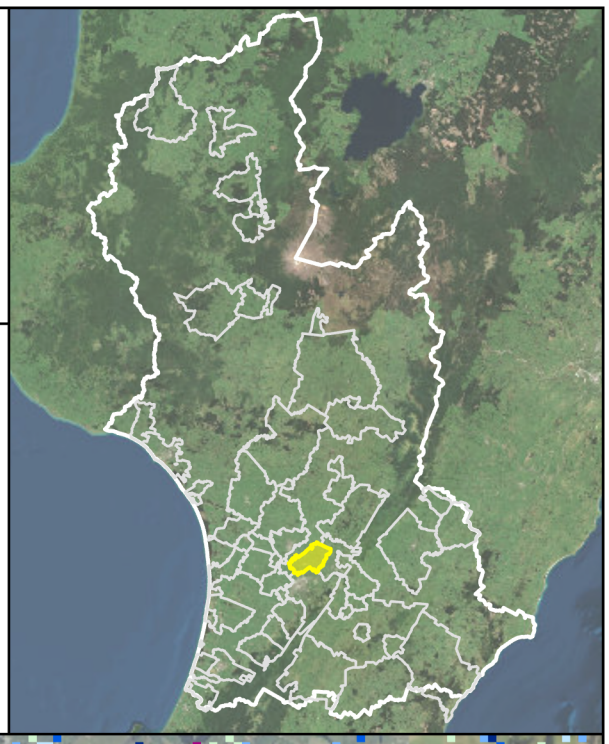
0 1.5 3 Km

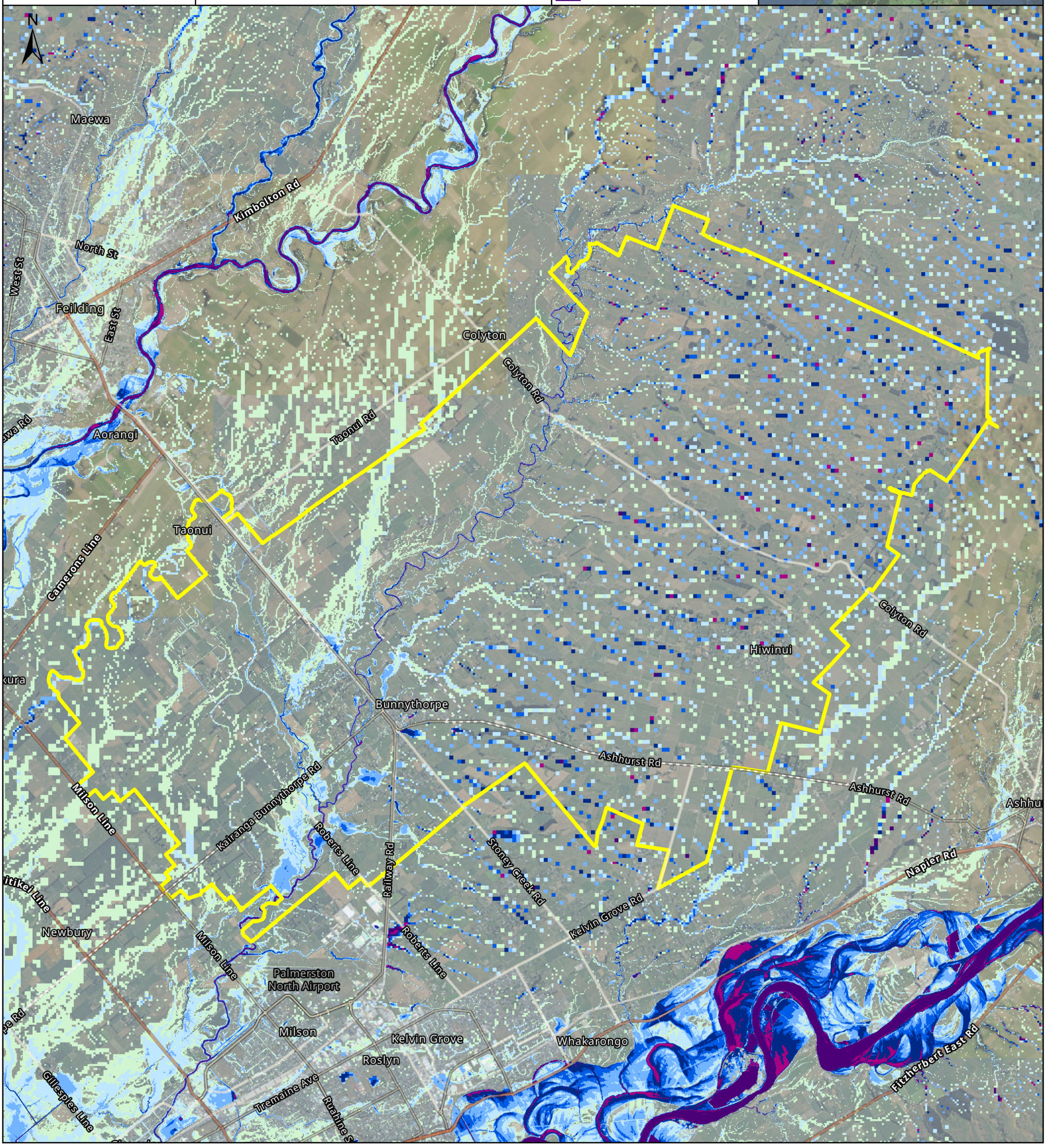
Legend

- 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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NIWA Taihoro Nukurangi

Prepared On

01/07/2025

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
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

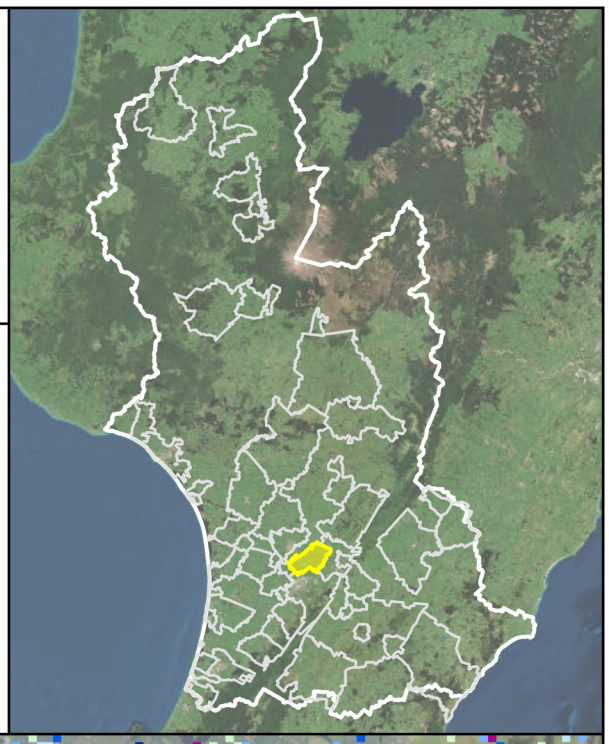
0 1.5 3 Km

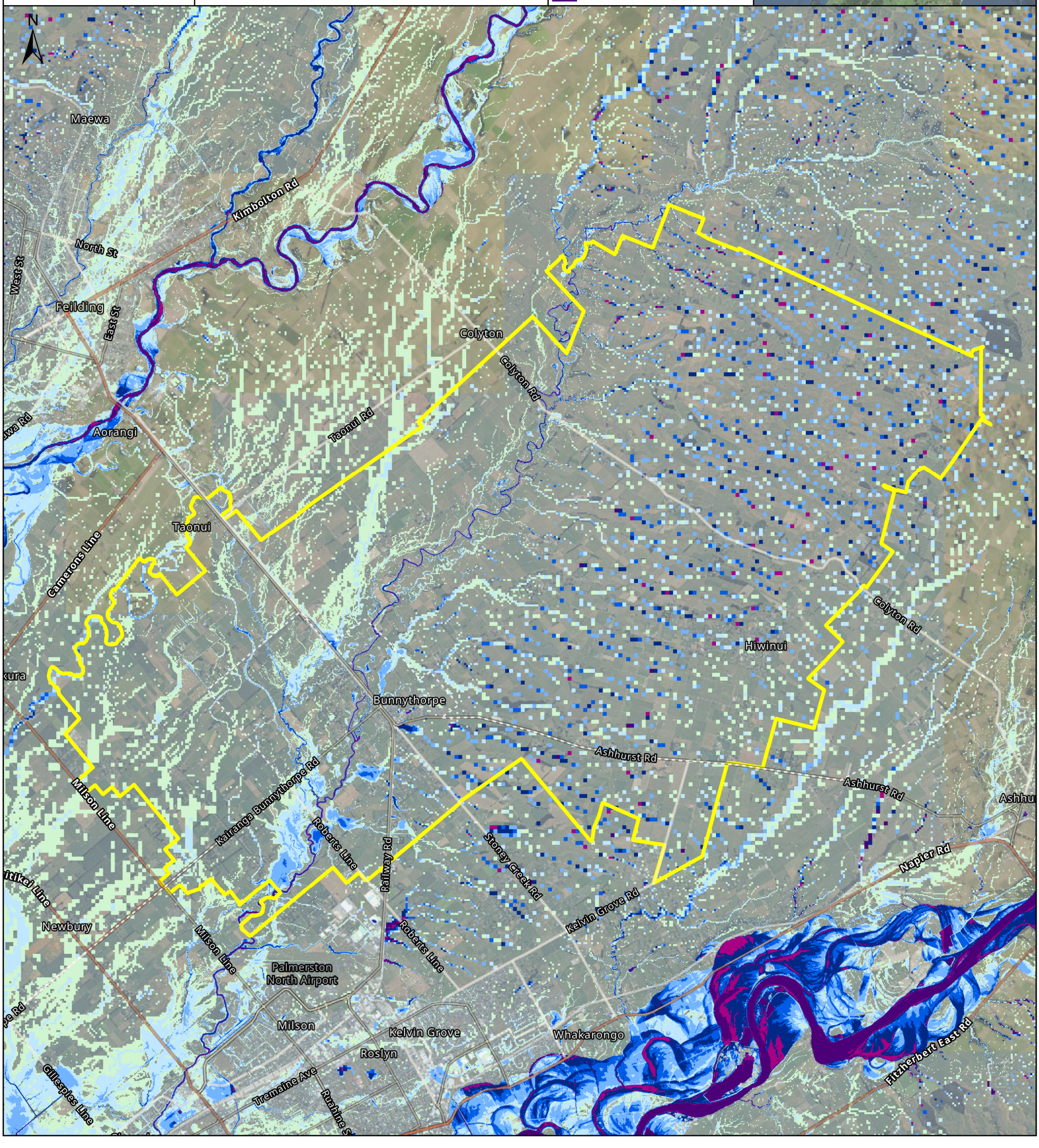
Legend

- 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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NIWA Taihoro Nukurangi

Prepared On

01/07/2025

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
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

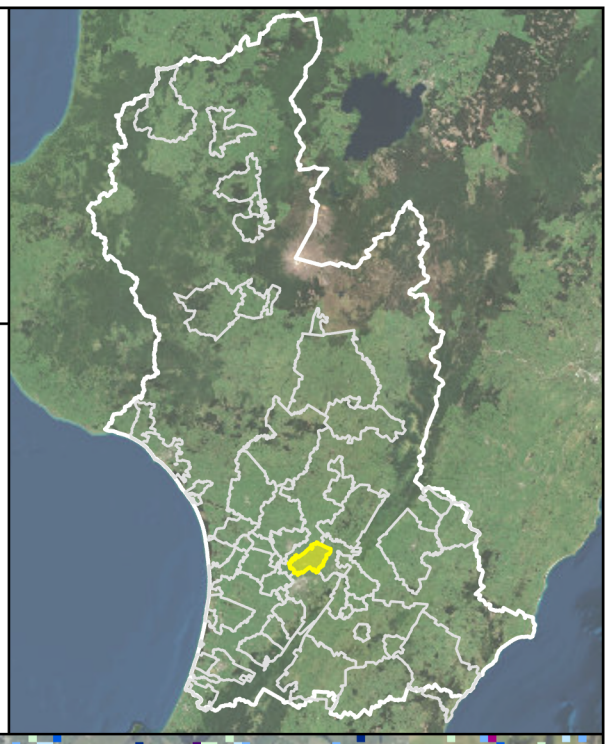
0 1.5 3 Km

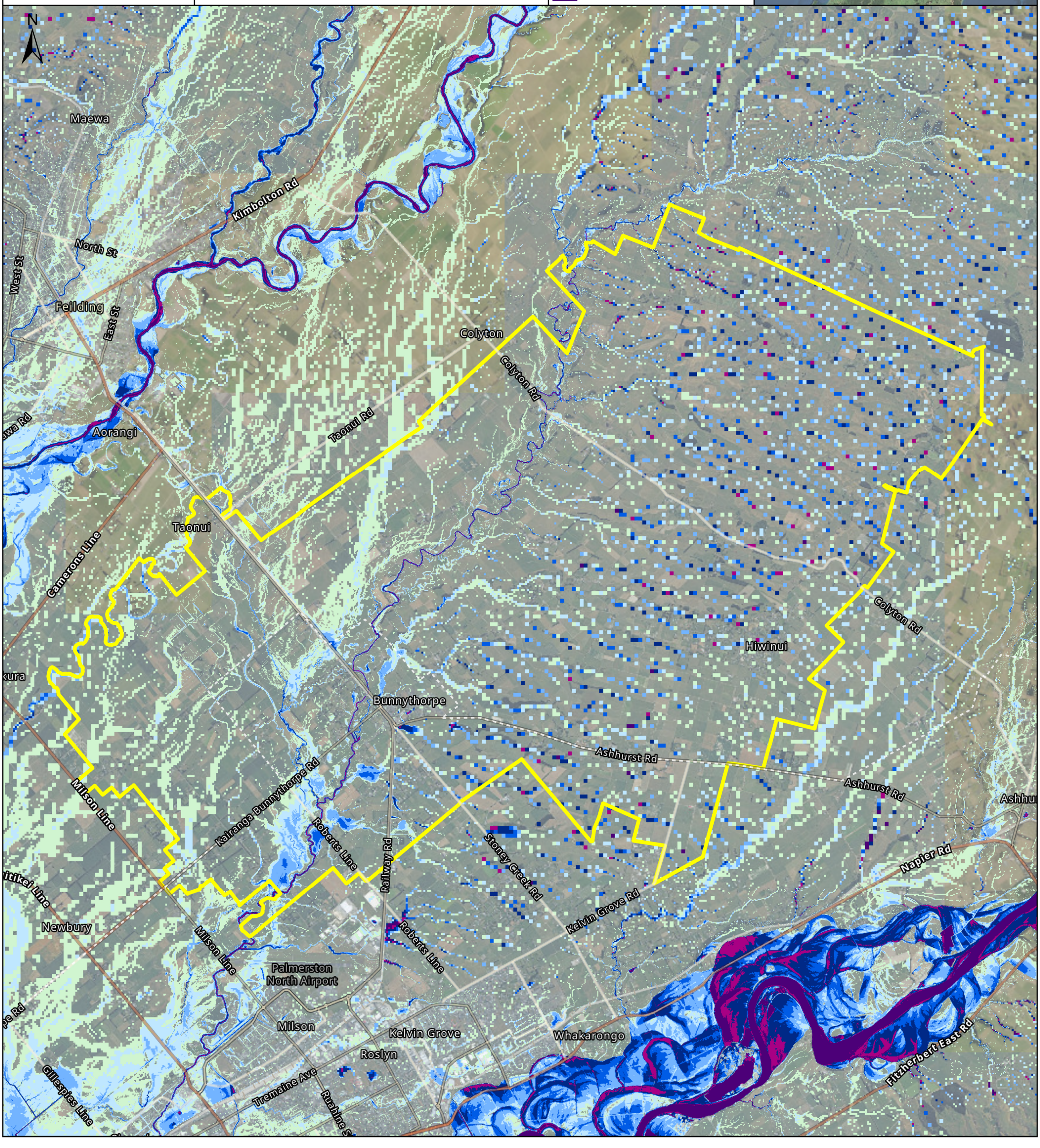
Legend

- 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

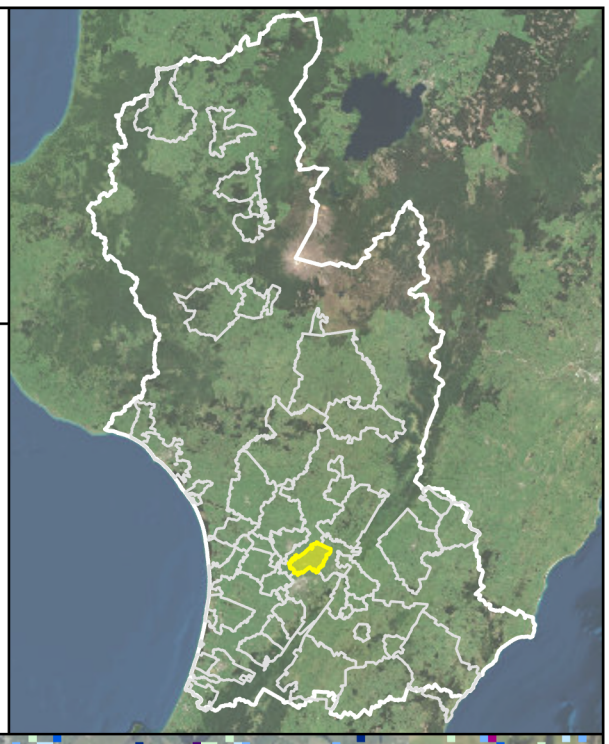
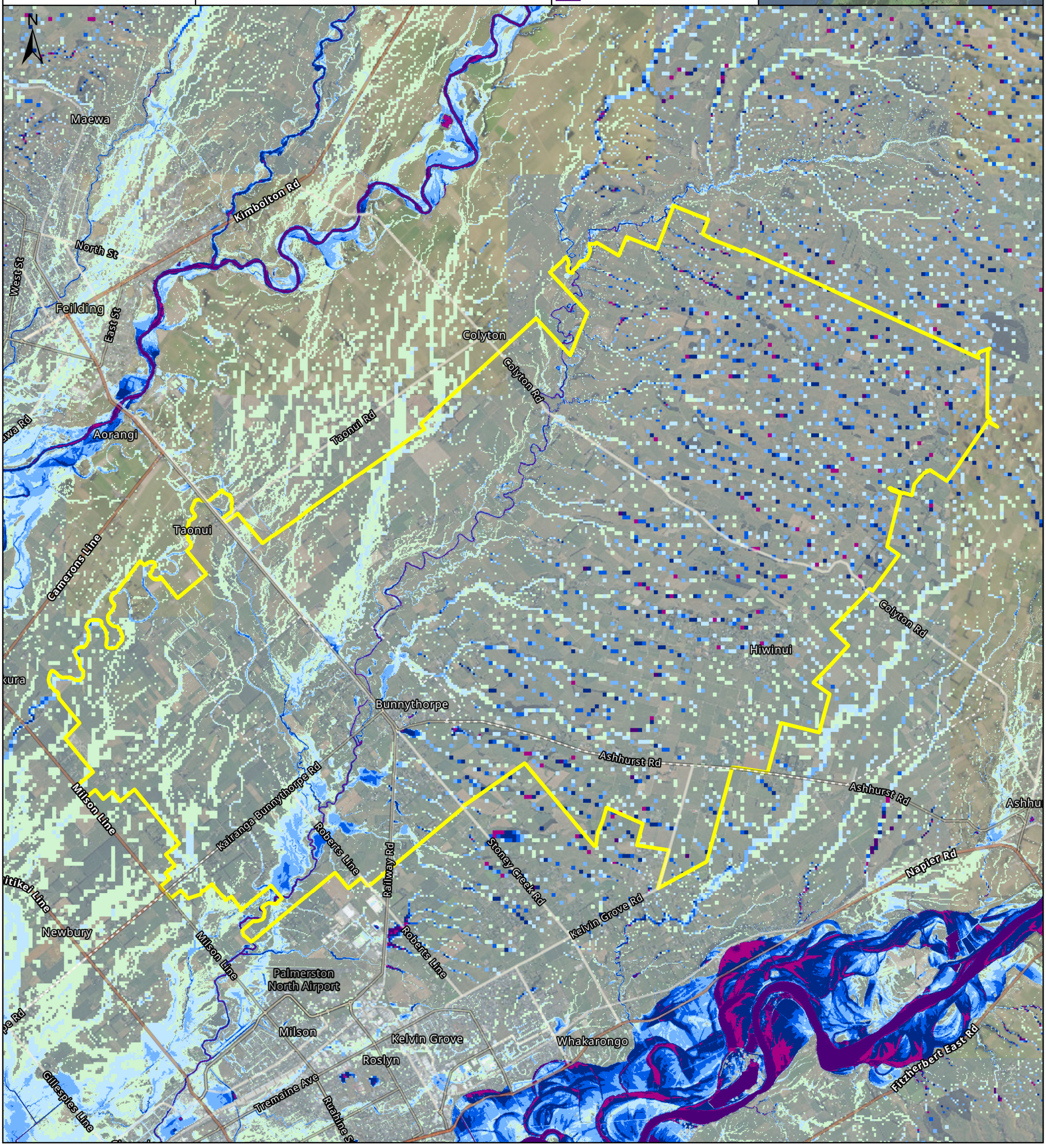
Community
Bunnythorpe,
Palmerston North City

Scale 1:59,000 at A3

0 1.5 3 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