# Reducing Flood Risk in Miners Rest from a Wide Angled Approach

Jack Brook (Water Technology)

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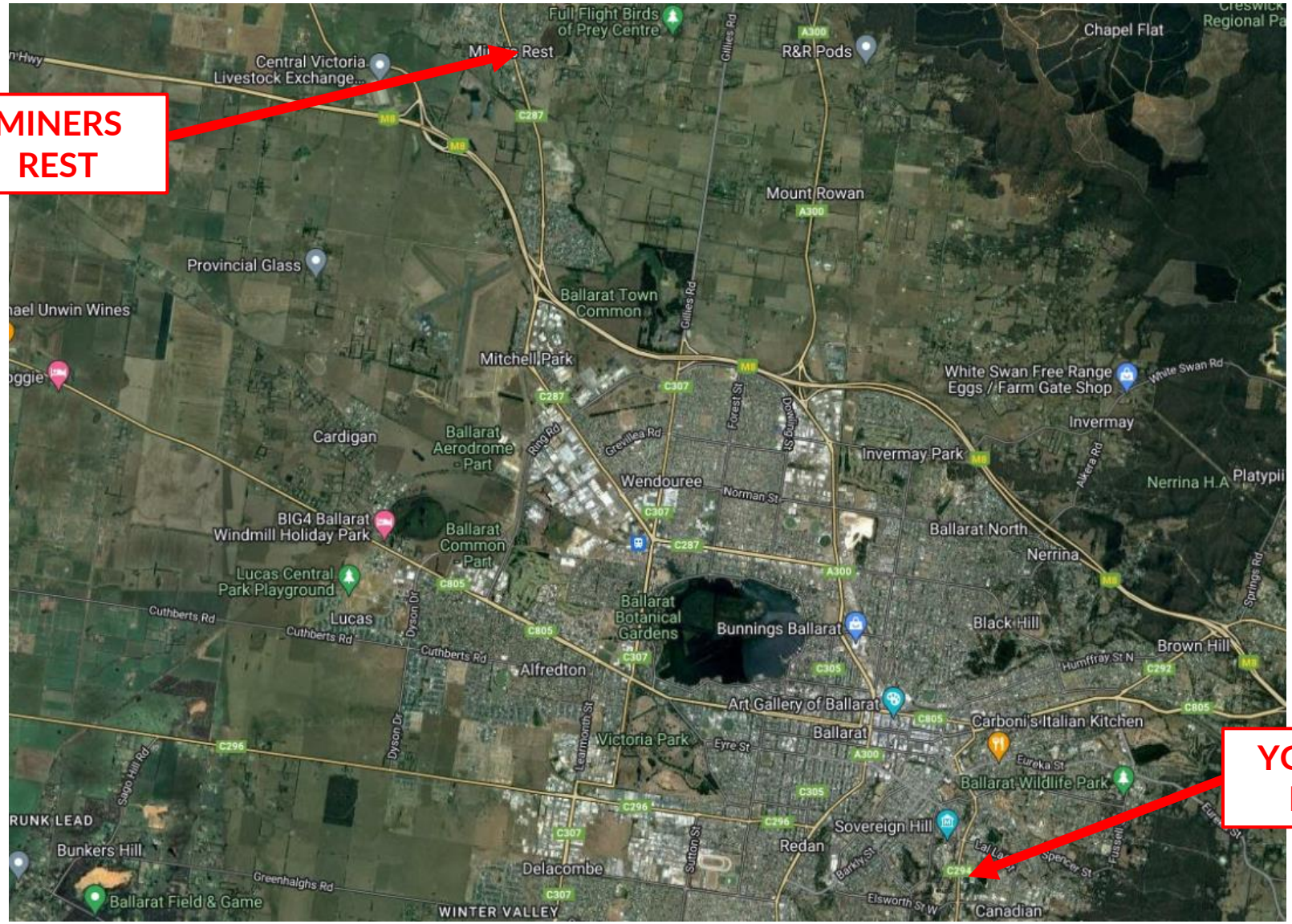
I pay my respect to all First Nations peoples, their cultures and to their Elders, past and present

# Outline

- History of flooding in Miners Rest
- Previous flood investigations and mitigation assessments
- Constraints for undertaking mitigation works
- Our Approach
- Case Study: Miners Rest Mitigation Strategy

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# History of Flooding in Miners Rest

Historical Events

- October 1981
- 1993
- October 2000
- September 2010
- January 2011 – above 2% AEP
- October 2022

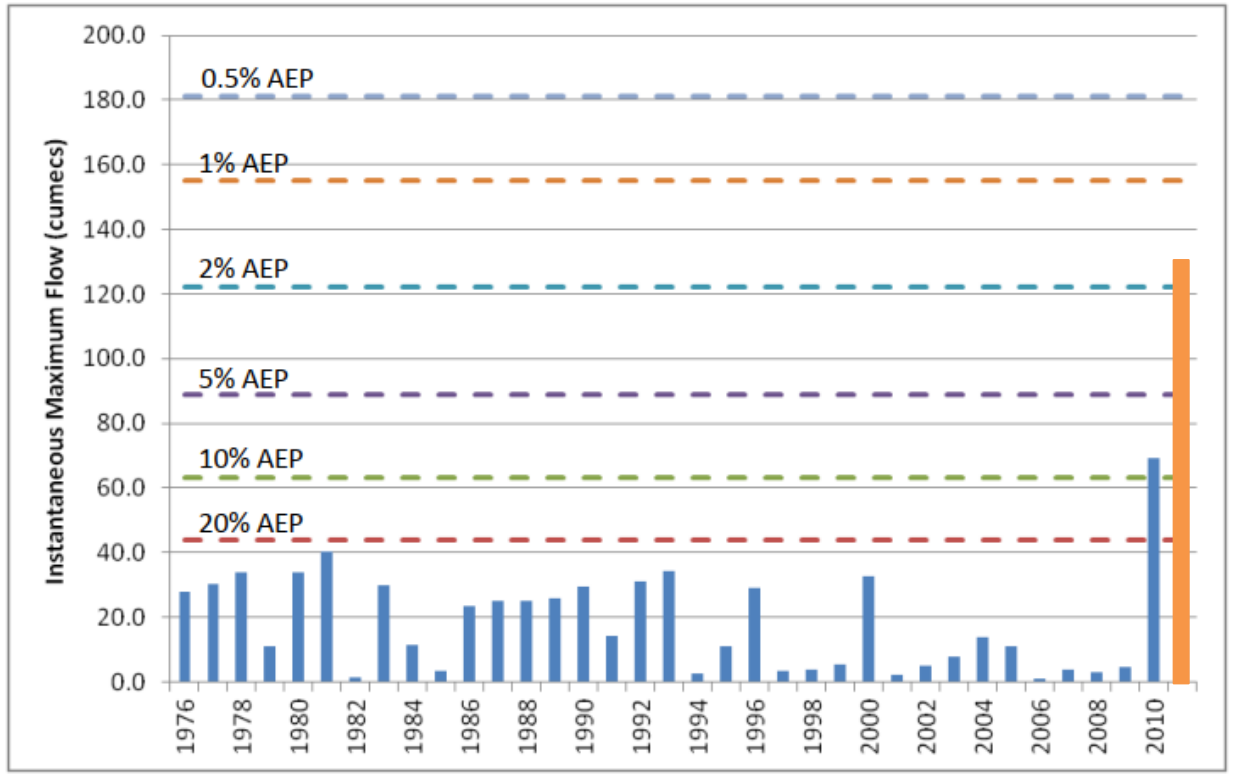


**Figure 1-3** **Annual Series for Burrumbeet Creek @ Lake Burrumbeet, also showing AEP design flows. Note that peak flow for 2011 was not recorded at the gauge and was estimated for this study.**

Glenelg Hopkins CMA, 2013, *Burrumbeet Flood Investigation*, Water Technology Pty Ltd

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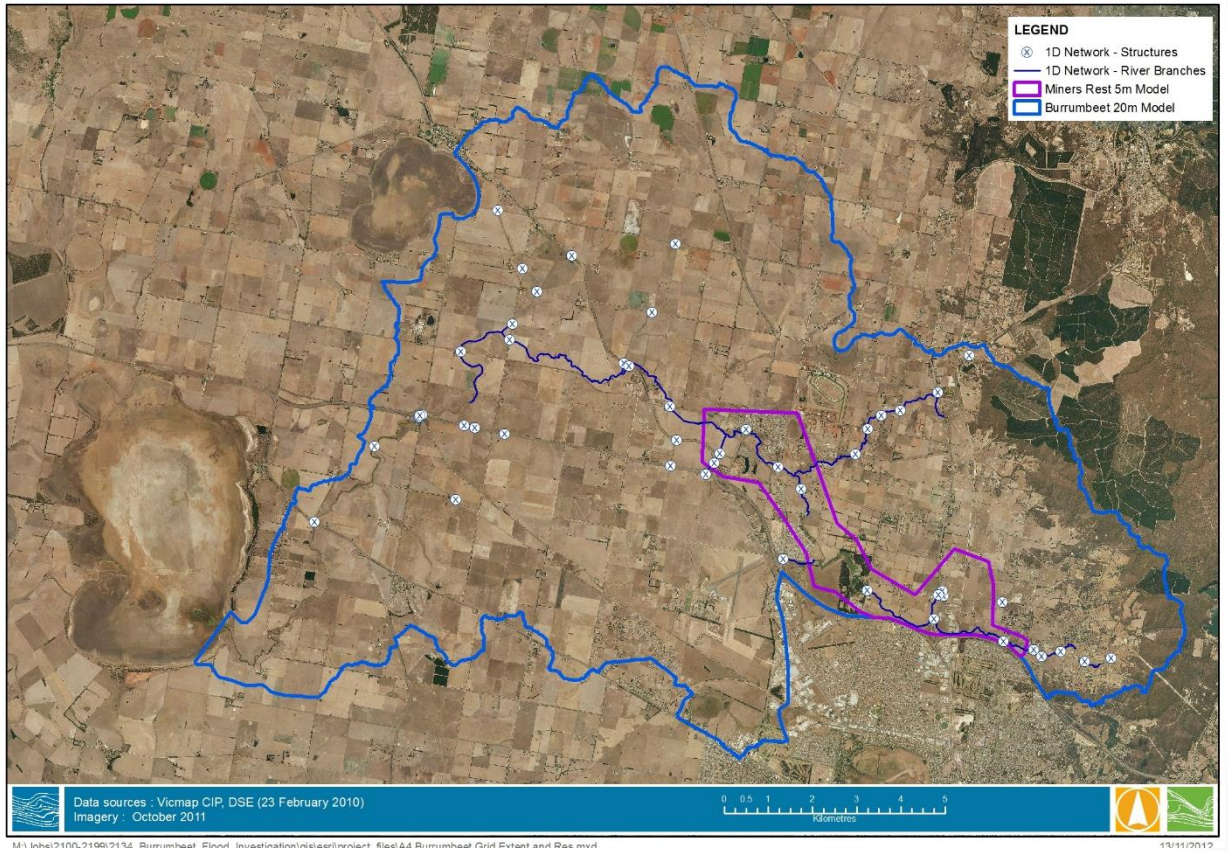
# Previous Flood Investigations

Burrumbeet Creek Flood Investigation

- Hydraulic model developed in 2012
- Defined Land Subject to Inundation (LSIO) and Floodway Overlays (FO)
- Waterway channels and hydraulic structures represented in the 1D domain.
- Inflows represented as RORB source area inflows

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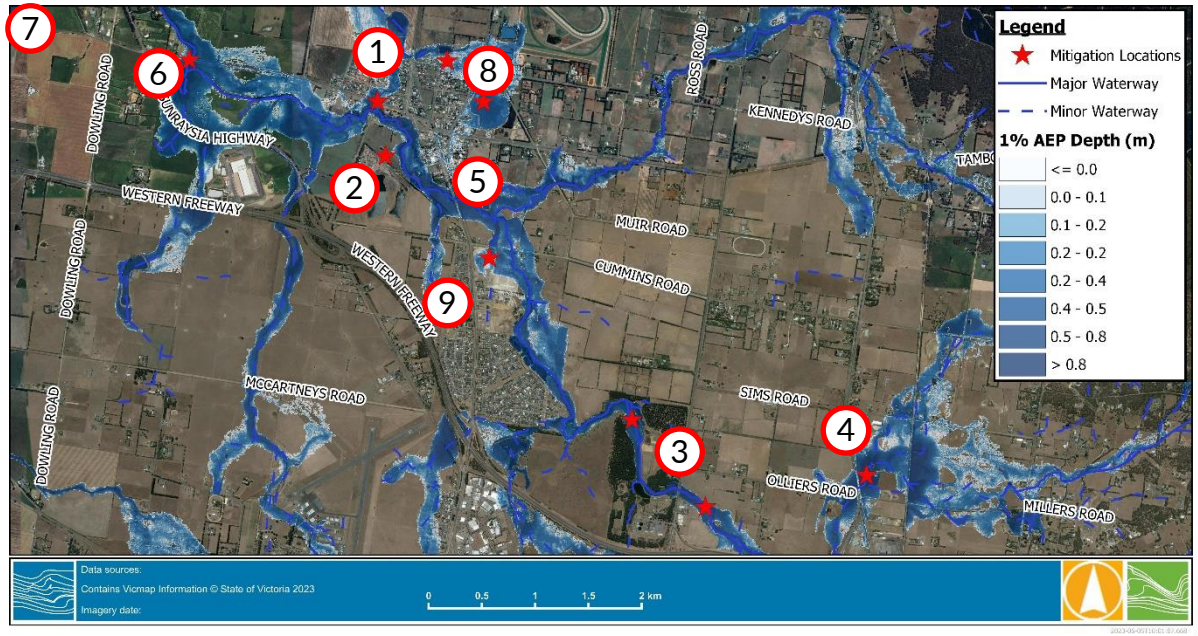
# Past Mitigation Assessments

1. Levees north of Miners Rest
2. High flow bypass and levee channel south of Miners Rest
3. Gillies Road retarding basins
4. Midland Highway & Olliers Road retarding basin
5. Increase channel capacity through excavation & reduction of exotic vegetation in the Creek channel
6. Increase capacity of Miners Rest Road bridge
7. Increase capacity of Pound Hill Road bridge
8. Miners Rest Wetland Reserve outlet drainage changes
9. Cummins Road retarding basin

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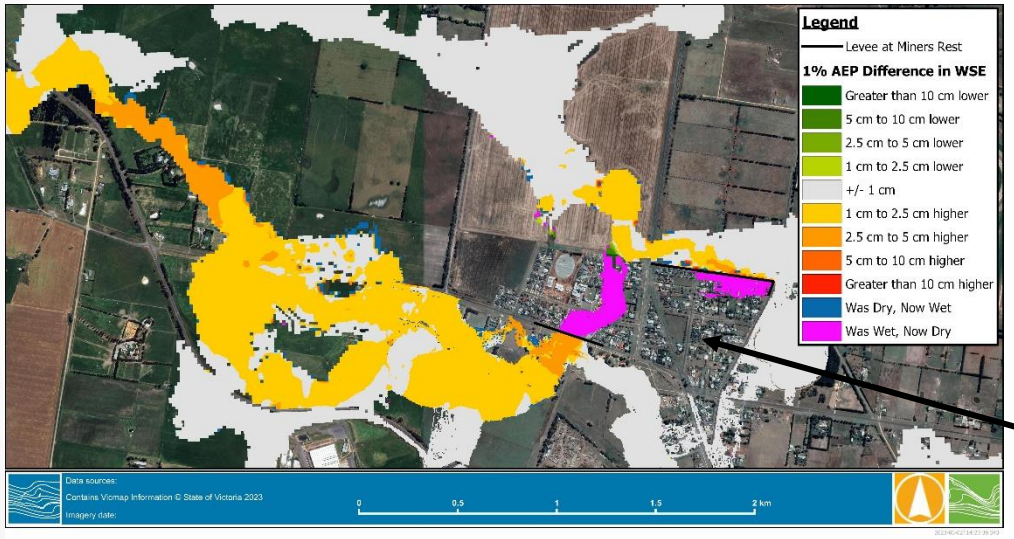
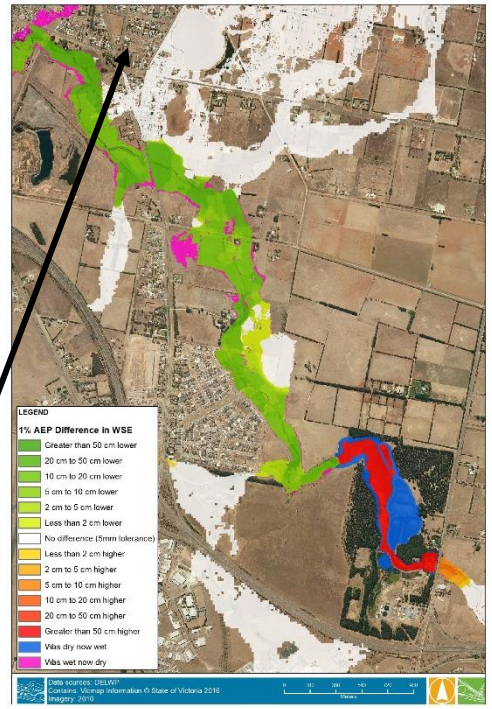
# Past Mitigation Outcomes

## Feasible

Levee at Miners Rest




Retarding Basins Upstream of Miners Rest




Miners Rest

Good

Bad

Now Dry

Now Wet

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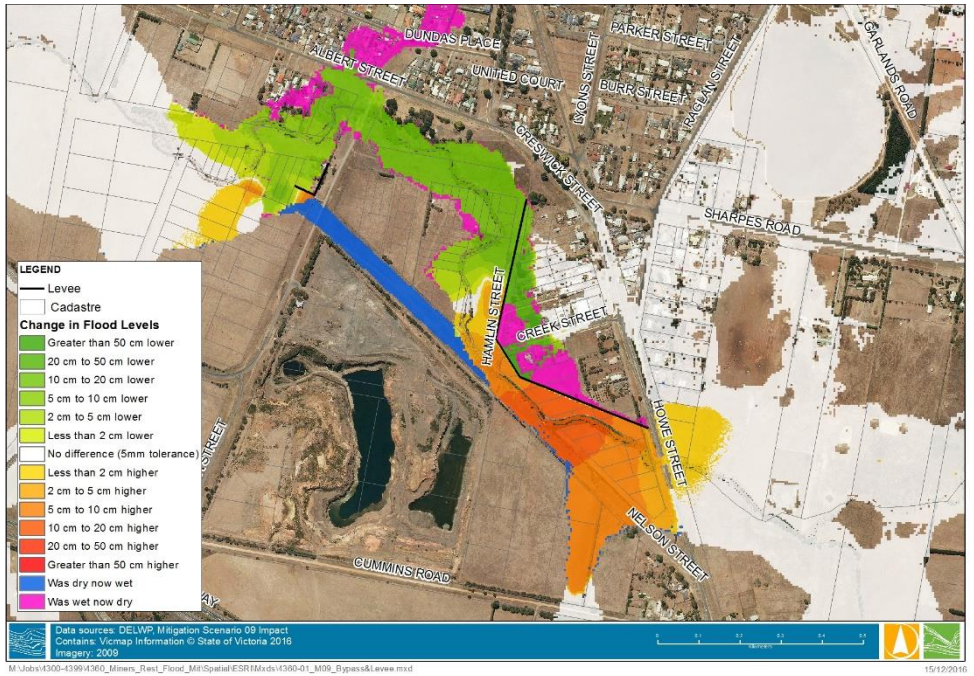
# Past Mitigation Outcomes

## Minimal Benefit for Cost

High Flow Bypass Channel and Levee South of Miners Rest




Good

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# Constraints for Undertaking Mitigation Works

- Limited funding to undertake structural mitigation measures when it hasn't recently flooded.
- Councils operate on a reactive works program and stormwater infrastructure works are susceptible to being pushed down the que.
- Focus of resources within Council shifts over time, straining already restricted resources.

# Our Approach?

- Change the way we approach investigating flood mitigation strategies for the township of Miners Rest by assessing strategies on a **bite-size** scale.
- Investigate strategies on a scale that could be more readily endorsed by the City of Ballarat, both financially and resourcefully.
- Change the focus of each strategy to not wholly reduce flood risk, but have a secondary function ranging from:
  - Considering gaps in water quality treatment
  - Environmental aspects
  - Cohesion with future development

# Case Study: Miners Rest Mitigation Strategy

# Scope

- ✓ Investigate mitigation solutions on a wide-spread scale with scattered strategies
- ✓ Strategies would have localised impacts on improving flood risk
- ✓ Flood risk improve would be more apparent to Miners Rest as a collective

# Model Overview

Base Model

- 2012 calibrated TUFLOW Model

Changes Made:

- Design surface for residential development off Cummins Road and Howe Street
- Updated 1D network with new information from Council archives
- Modelled using HPC

# Methodology

- Investigate 11 mitigation strategies across six sites
  1. Victoria Street Culvert Upgrade
  2. Burrumbeet Creek Alterations Assessment
  3. Howe St/Cummins Road Retarding Basin
  4. Miners Rest Road Bridge Assessment
  5. Sunraysia Highway Bridge Assessment
  6. Miners Rest Park Wetland Assessment
- Assess a combination of these strategies


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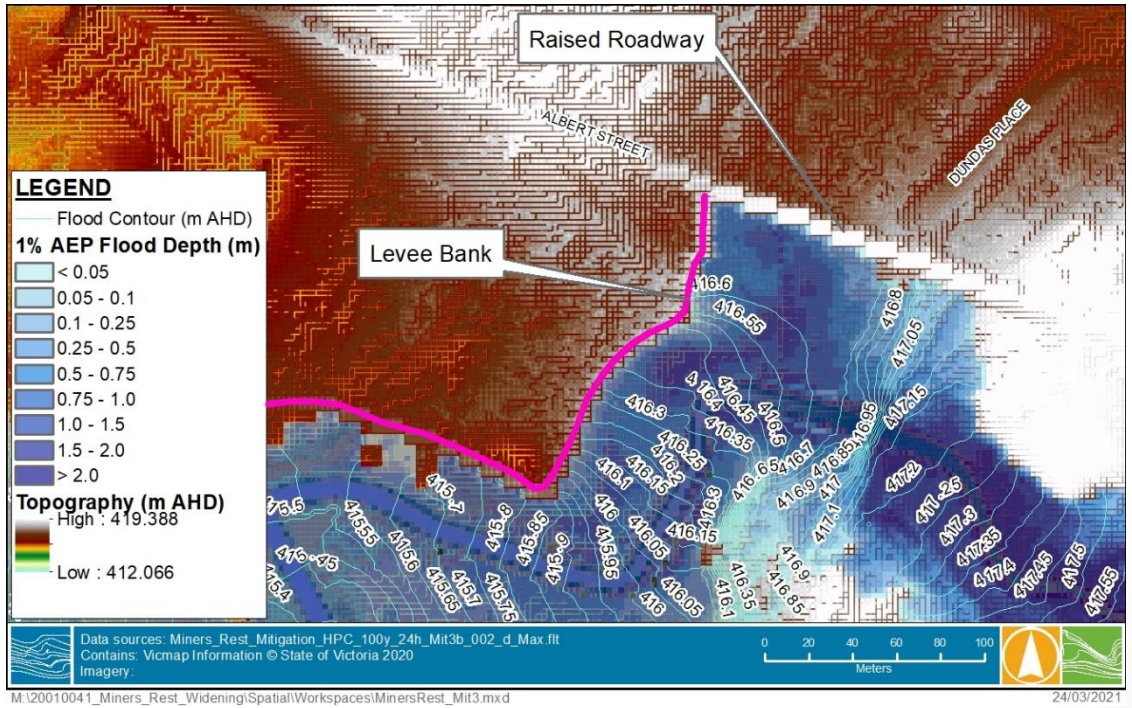
# Victoria Street Culvert Upgrade

## Approach

- Upgrade of the culvert to facilitate the development of land off Victoria Street

## Mitigation Measures

- Increasing culvert to accommodate either 10% or 1% AEP flows
- Elevate Albert Street and Victoria Street
- Construct levee west of Victoria Street
- Install one-way-flow valve on stormwater outlet

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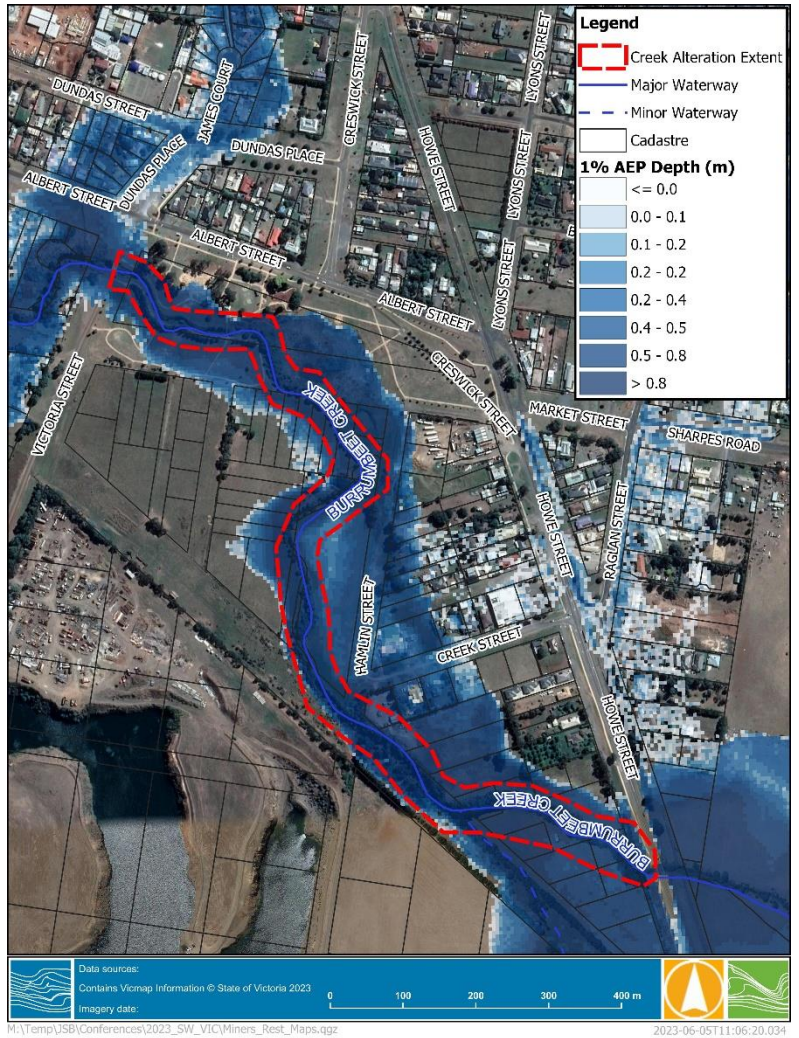
# Burrumbeet Creek Alterations Assessment

## Approach

- Reduce flood levels and improve flow conveyance by removing exotic vegetation and rehabilitating the banks of the Burrumbeet Creek

## Mitigation Measures

- Alter the waterway invert levels
- Increase the width of the waterway
- Alter the waterway invert levels & increase the width

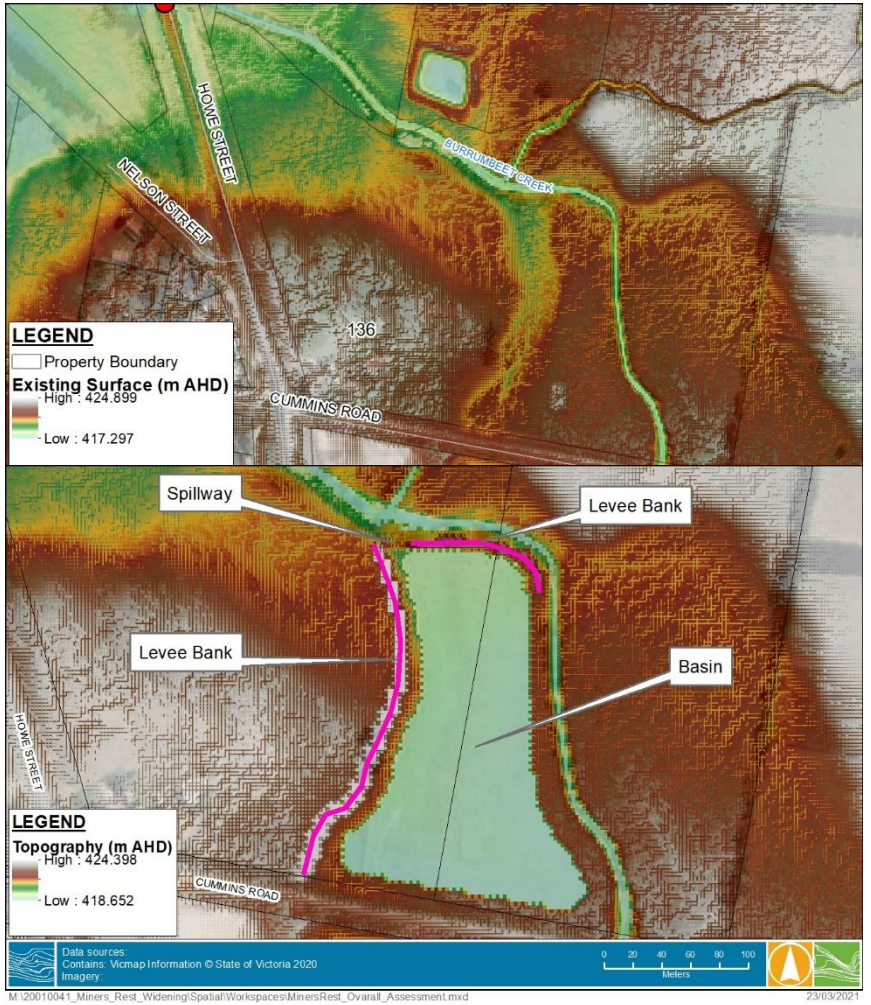
# Howe St/Cummins Road Retarding Basin

## Approach

- Incorporate structural flood mitigation into the proposed sports hub development

## Mitigation Measures

- Retarding basin on the eastern portfolio of the site
- Increase storage within the waterway between Cummins Road & Howe Street

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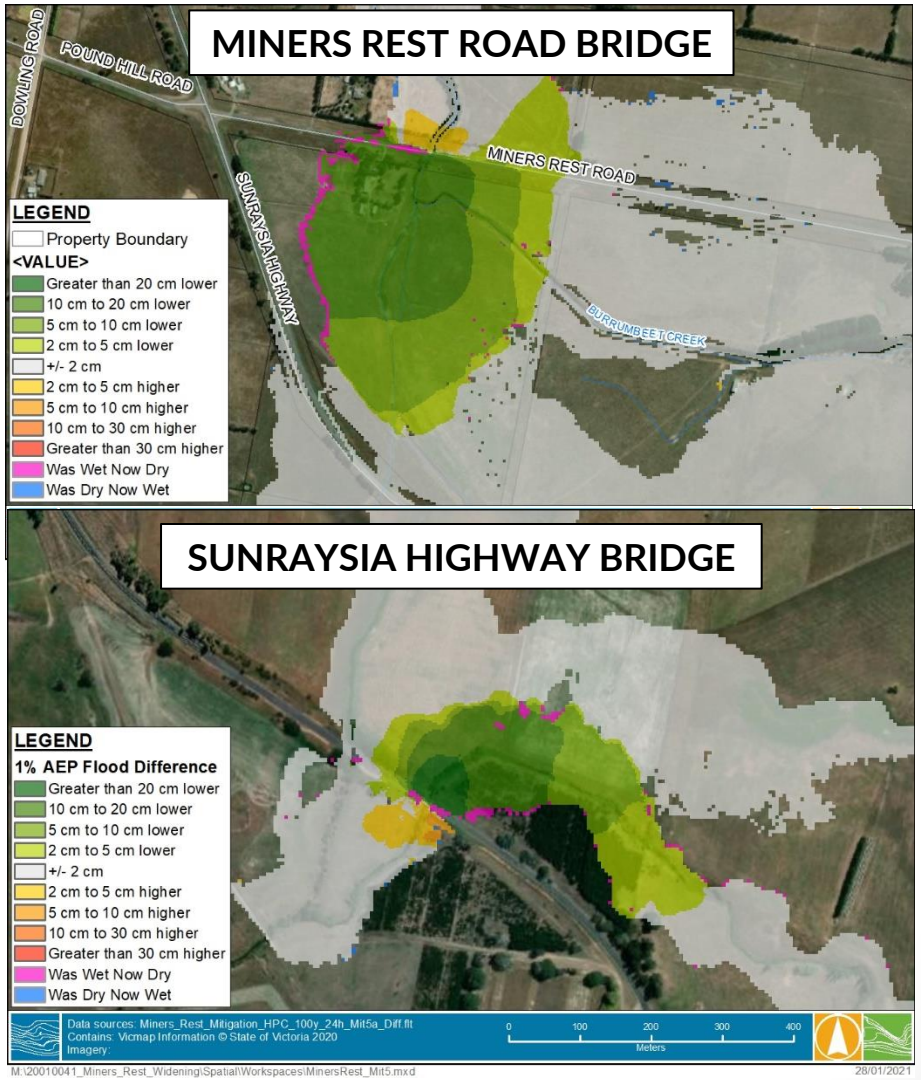
# Downstream Bridge Assessment

## Approach

- Identify if general maintenance or upgrade works could facilitate in improving flood risk in Miners Rest

## Mitigation Measures

- Miners Rest Road Bridge
  - Remove from model to assess its impact on the floodplain
- Sunraysia Highway
  - Remove from model to assess its impact on the floodplain
  - Increase capacity under the bridge

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# Miners Rest Park Wetland

**Approach**

- Investigate a sized-to-fit wetland system to treat existing urban catchment

**Mitigation Measures**

- Assessed the suitability of a wetland system to treat runoff from urbanised area.
- Not considered part of the flood mitigation strategy


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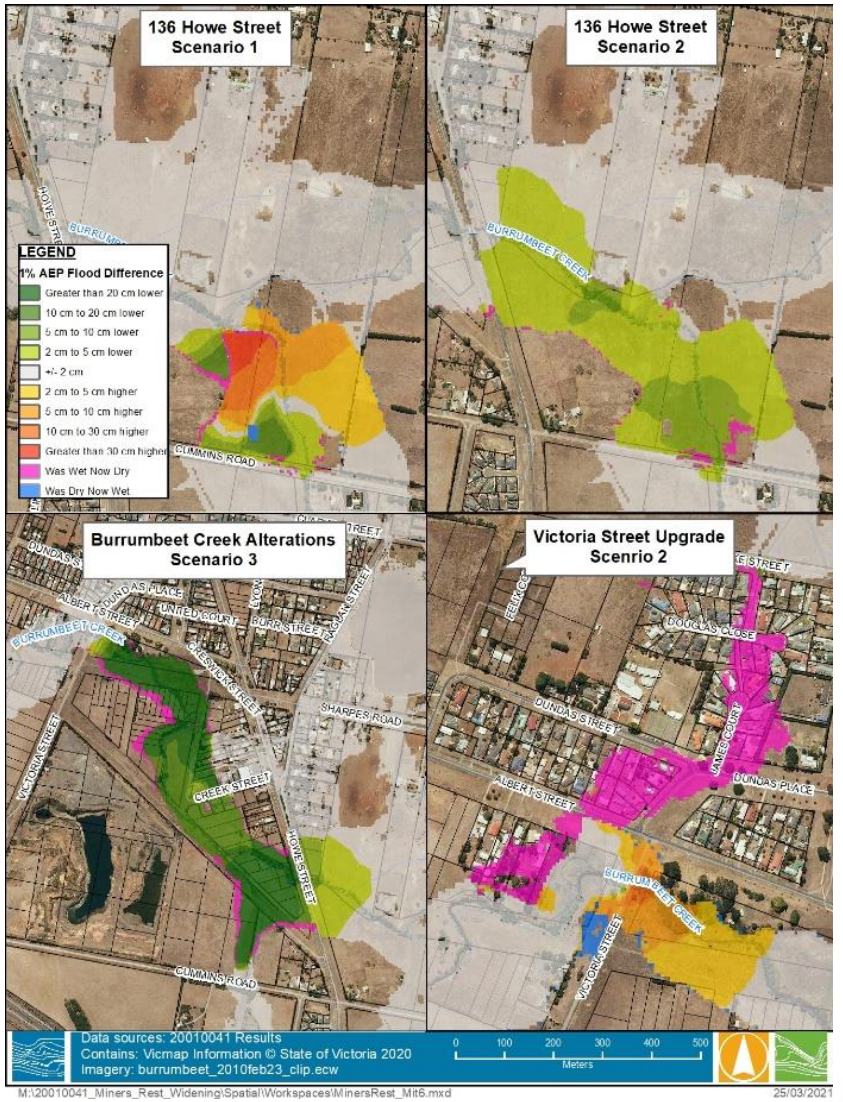
# An Ultimate Scenario

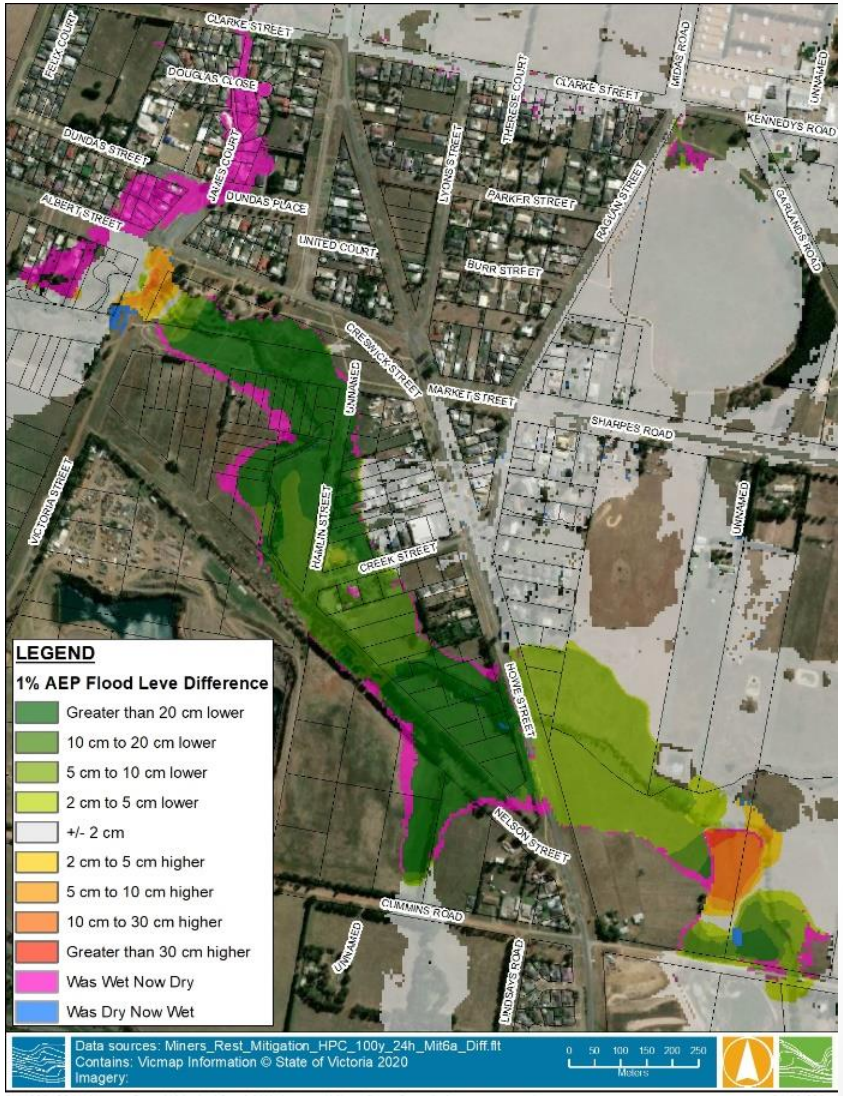
**Feasible Strategies:**

- Howe St/Cummins Road offline retarding basin & increased waterway storage
- Victoria Street upgrade to convey 10% AEP flows with levees and one-way flow valve
- Increasing the width and altering the invert levels of the Burrumbeet Creek



# Outcome

- ✓ Reduced flood risk to the township of Miners Rest
- ✓ Strategies can be implemented conjunction with other works
- ✓ Development of a  strategy with a flexible delivery order

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# Questions?