

GANNAWARRA SHIRE COUNCIL

# Submission to the Inquiry into the 2022 Flood Event

June 2023



# Acknowledgement of Country

Gannawarra Shire Council acknowledges the Barapa Barapa, Yorta Yorta and Wamba Wamba peoples as the traditional owners of the land now known as Gannawarra. We pay our respects to Elders past, present, and emerging and acknowledge their rich culture and connection to Country.

We acknowledge that flooding rejuvenates and sustains the environment and that work towards a safer and more resilient community must be undertaken in partnership with First Nation people.

**Pictured Front Cover:**

Kerang Township protected by levee from Loddon River. October 2022.

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## 2. Executive Summary and Priority Requests

### Gannawarra Shire Council is pleased to provide this submission to the Victorian Parliament’s Legislative Council Environment and Planning Committee’s Inquiry into the 2022 flood event in Victoria.

The development of this submission has played an important role in recovery by enabling residents the opportunity to tell their story and more importantly, put forward solutions to mitigate future flood risk.

There are 37 key recommendations contained within this submission, as summarised on pages 5 and 6. There are also five priority issues for Council and the Gannawarra community, as highlighted below:

1. As a matter of priority, fund, and direct appropriate authorities (North Central Catchment Management Authority and Goulburn-Murray Water) to repair strategic rural levee banks and clear strategic waterway blockages across Gannawarra Shire to prevent re-flooding of vast areas of productive agricultural land, private and public assets, infrastructure, and homes.
2. Ensure that Goulburn-Murray Water’s Kow (Ghow) Swamp Operations Plan allows for the release of water over the Pyramid Creek regulator prior to a flood event to create headspace within the swamp to avoid creating significant flood impacts for downstream areas.
3. Ensure that the North Central Regional Floodplain Management Strategy 2018-2028 reflects the 2022 flood and that the high-level work plan is updated in consultation with local government to guide future investment priorities for the remaining five-year timeframe of the current plan.

4. Fund key flood mitigation infrastructure in the Gannawarra Shire – a low level weir on the Loddon River to divert water around Kerang via a third bridge over the Murray Valley Highway, a low-level weir from the Lower Loddon River to create a flow path to divert water through Murrabit West and Benjeroop and back into the Murray River, and a culvert under the Murray Valley Highway at Wandella Creek to ensure connectivity is maintained during a flood event via this major north-south transport route.
5. Ensure that the Victorian Floodplain Management Strategy addresses the removal of standing water, identification of strategic drainage outlet locations, management of hyper-saline lakes, transparency around significant cultural heritage sites, and remediation of rural levee bank breaches that have the greatest impact.



Above: An example of a rural levee bank breached by the October-December 2022 floods. There is an estimated 50-60 similar breaches across Gannawarra Shire, 25 of which are deemed to be strategic.

Without urgent repair of these 25 strategic breached rural levee banks by government, re-flooding will occur, impacting vast areas of productive agricultural land, private and public assets, infrastructure, and homes.

**\$ Estimated cost of repairs is \$500,000.**

## 3. Summary of Recommendations

### Terms of Reference No. 1: Causes and Contributors to the Flood Event

1. Ensure that the structure for preparing for, and responding to, flood events, includes documented communication and community engagement strategies, and that local VICSES Flood Guides and Flood Emergency Plans are co-designed with local government, communities, and individuals most at risk.
2. Improve financial assistance and government grant processes to ensure that this financial assistance is targeted and that barriers to accessing response and recovery support are minimised.
3. Develop a defined action plan to expediate the removal of standing water across Gannawarra Shire, particularly to the west of Kerang and in the Lower Loddon River area at Benjeroop and Murrabit West, by agreeing to and documenting pre-determined locations for strategic actions.
4. Ensure that major transport and connectivity routes, and flood mitigation effort, are targeted at keeping communities open and connected for as long as possible and that the isolation time is minimised.

### Terms of Reference No. 2: Adequacy and effectiveness of early warning systems

5. Ensure that the VicEmergency App and VicEmergency website are accurate and provide timely warnings that give people the opportunity to prepare and plan.
6. Develop a single point of trusted information across all government departments.
7. Ensure that the latest technology is available to support informed decision making by authorities and install river gauges in strategic locations along the length of the river systems and ensure that data is accessible to all.
8. Improve the sharing of information between agencies.
9. Improve digital connectivity across rural areas to address blackspots identified, including around key community hubs.

10. Provide additional funding to support digital literacy training and digital skill development across rural communities.
11. Resource the development of local level flood planning including information regarding minor, moderate and major flood levels, and clear trigger points for preparedness action.

### Terms of Reference No. 3: Resourcing the State Emergency Service

12. Resource the State Emergency Service to ensure it can sufficiently fulfill its planning and Control agency role in response to major flooding.
13. Ensure that government and emergency service systems and Command and Control structures support a swift and equitable response across communities.
14. Better define sandbag distribution, strategic distribution points, and transparent communication around equitable access to sandbags.

### Terms of Reference No. 4: Victorian Floodplain Management Strategy delivery and effectiveness

15. Ensure that the 2016 Victorian Floodplain Management Strategy is reviewed in consultation with local government and the community and addresses the removal of standing water, identification of strategic drainage outlet locations, management of hyper-saline lakes, transparency around significant cultural heritage sites, and remediation of rural levee bank breaches that have the greatest impact.
16. Ensure that the North Central Regional Floodplain Management Strategy 2018-2028 reflects the 2022 flood and that the high-level work plan is updated in consultation with local government to guide future investment priorities for the remaining five-year timeframe of the current plan.

### Terms of Reference No. 5: Flood mitigation infrastructure and preparedness

- 17. Plan and fund strategic rural levees, fixed crest weirs, and culverts to enable water to flow across the active floodplain to a point where this water can re-enter natural water carriers.
- 18. Fund the repair of strategic breaches to rural levee banks across Gannawarra Shire.
- 19. Provide funding for additional ring bank levees around homes for those known high risk flood locations.
- 20. Change the 'like for like' policy position with a 'build back better' policy position under the Disaster Recovery Funding Arrangements (DRFA) so that mistakes of the past are not repeated in the future.

### Terms of Reference No. 6: Implementation and effectiveness of flood event as a whole

- 21. Develop an operations plan around how to use the Kerang Lakes system for flood mitigation.
- 22. Ensure that Goulburn-Murray Water's Kow (Ghow) Swamp Operations Plan allows for the release of water over the Pyramid Creek regulator prior to a flood event to create headspace within the swamp to avoid creating significant flood impacts for downstream areas.
- 23. Establish responsibility for clearing and maintenance of waterways and ensure annual assessments are undertaken.
- 24. Purchase private land at strategic locations across the floodplain to support future flood mitigation.
- 25. Increase understanding of river systems by relevant authorities to ensure that floods are managed better in the future.

### Terms of Reference No. 7: Flemington Racecourse

Not applicable

### Terms of Reference No. 8: Victorian planning framework

- 26. Amend the *Planning and Environment Act 1987* and the *Climate Change Act 2017* to explicitly mandate addressing climate change at all levels of the planning process.

- 27. Require planning amendments at all levels of government, and at all levels of the planning framework, to include an assessment against relevant climate change considerations.
- 28. Introduce mandatory climate change related minimum standards into planning schemes.
- 29. Implement a consistent state-wide approach to flood inundation across the Victorian planning framework to direct development away from flood-prone areas.
- 30. Reinstate Catchment Management Authorities as a 'determining referral authority' under Section 55 of the *Planning and Environment Act 1987*.

### Terms of Reference No. 9: Other related matters

- 31. Conduct a study on community and property resilience of living in a flood prone area as part of the formal recovery from the October-December 2022 floods.
- 32. Implement a formal system to increase property resilience to flooding such as the Australian Height Datum (AHD) displayed in electricity meter boxes.
- 33. Investigate the insurance industry and how it responds to flood.
- 34. Implement targeted education and community engagement in high-risk flood areas so that residents better understand how to prepare and take appropriate response mechanisms to protect themselves and their properties from flood damage.
- 35. Ensure that Flood Information Officers are in place along all river systems and that a robust system is in place to ensure that local knowledge genuinely forms part of flood preparedness and response, and that the reporting structures, roles, and responsibilities are well defined and understood by both the officers and the community.
- 36. Resource councils so that they have the necessary financial capacity and appropriately trained staff to prepare and respond to emergency events, in particular a flood event which is the highest risk for Gannawarra.
- 37. Ensure that recovery processes and services are streamlined, documented, and better communicated so that timely and relevant support can be provided to impacted residents, communities, and local government in future flood events.

## 4. Overview of Flooding

The Gannawarra Shire is located at the southern end of the Murray Darling Basin on the alluvial floodplains of three major rivers: the Murray, Loddon, and Avoca.

The major towns are Kerang, Cohuna, and Koondrook.

The shire also has several smaller townships and settlements including Lake Charm, Lalbert, Leitchville, Macorna, Murrabit, Mystic Park, and Quambatook, plus many farming districts, as listed on page 11.

The population as at the 2021 Census was 10,683 (Censusdata.abs.gov.au, 2021).

The shire covers an area of 3,735 square kilometres (1,442 square miles).

The Murray River forms the northern and part of the eastern boundary of the shire while the Avoca and Loddon rivers flow into the Murray River near the north-west corner of the municipality.

The floodplains of the Avoca and Loddon rivers are wide and complex with numerous tributaries, effluent streams, storages, and levees.

Superimposed on this is the Torrumbarry Irrigation System which comprises numerous channels, off-takes, flow control structures, and salinity mitigation works.

### The main watercourses and water bodies include:

- Lower Loddon River
- Lower Avoca River
- Little Murray River (short section only)
- Murray River
- Pyramid Creek
- Barr Creek
- Bannagher Creek
- Wandella Creek
- Calivil Creek
- Nine Mile Creek
- Bullock Creek
- Sheepwash Creek
- Kerang Lakes
- Lalbert Creek
- Mosquito Creek
- Back Creek
- Kow (Ghow) Swamp
- Many irrigation and drainage channels.

Riverine flooding is generated from rainfall outside the municipality in the catchment areas of the Murray River and its north central Victorian tributaries, and in the Avoca and Loddon River catchments.

As a municipality at the end of the large floodplain, flooding is a major risk for Gannawarra Shire Council and its residents.

Significant flood events within the municipality have occurred in 1870, 1909, 1931, 1956, 1973, 1974, 1975, 1981, 1983, 1989, 1993, 1996, 2011, and 2022.

A significant majority of these large floods occurred in the winter/spring period. However, large floods have also occurred in the summer as evidenced in December 1933 and January 2011.

Water level rises through the municipality usually occur sometime after the rain that caused the flooding has passed. Typically, initial rises occur 3 or more days after rain with the peak following a few days later. Rises in the Murray River tend to be more delayed and are driven by flows from the Campaspe and Goulburn rivers, entering the Murray River at, or nearby to, Echuca.

Severe floods overtop, or breach, many of the rural levees located across the Gannawarra Shire floodplain.

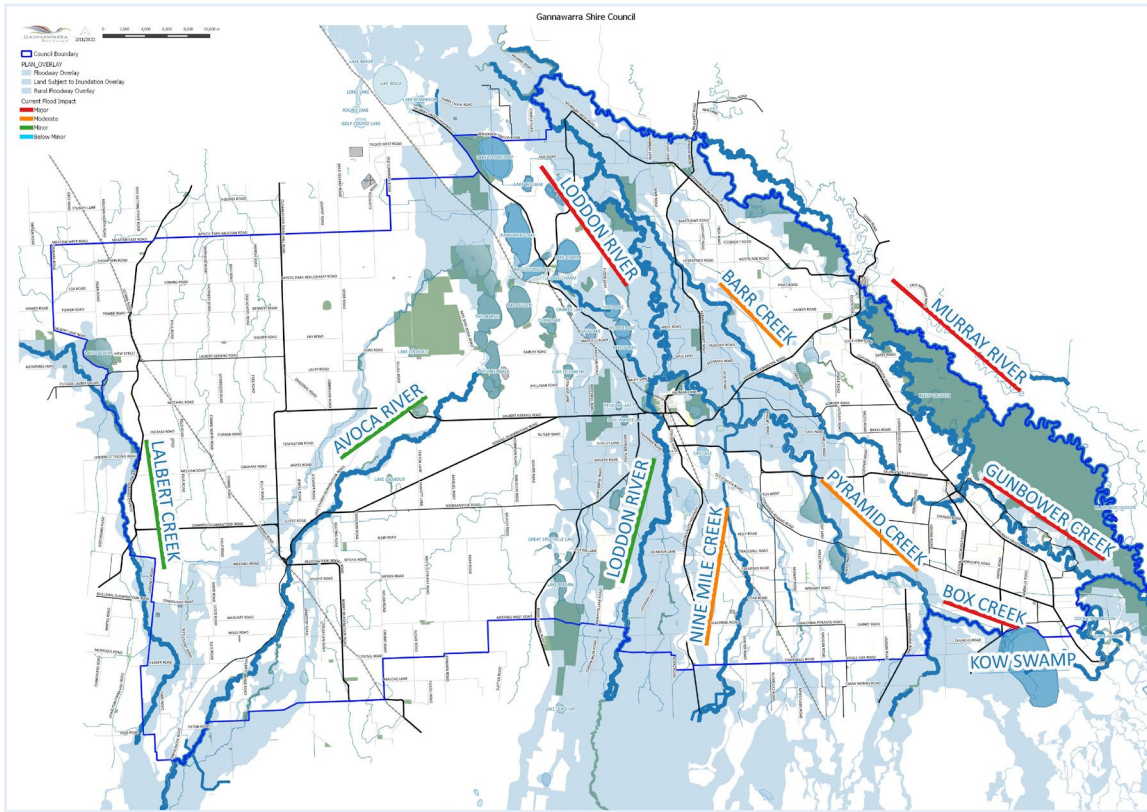
The flat topography of the landscape means that floodwaters remain for an extended period. Much of this standing water needs to be mechanically pumped back into the river system.

Gannawarra Shire is heavily reliant on the Murray and Goulburn River systems for irrigated agriculture, particularly dairying which is the region's largest industry.

Ensuring the sustainability of agriculture within our region is vital to our future, as is the effective management of the floodplains throughout our municipality.

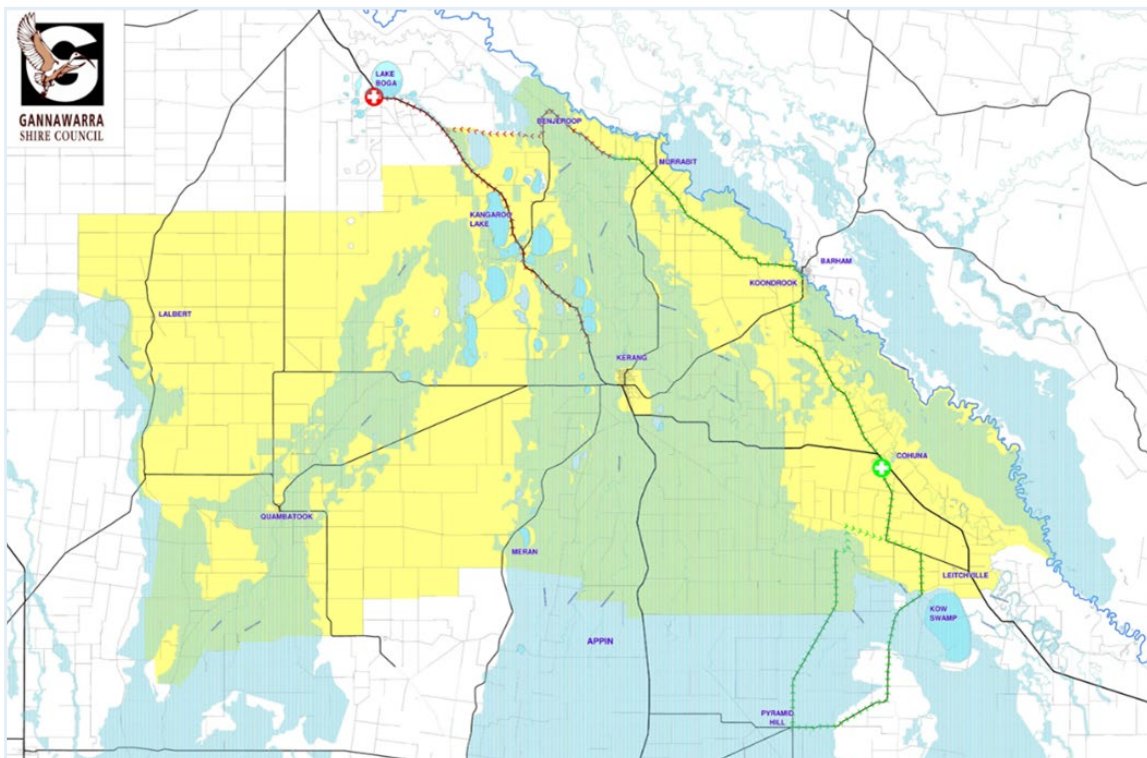
The October-December 2022 floods impacted on approximately 44 per cent of the Gannawarra Shire's landmass.

### November 2022



Left: Flooded waterways and river systems in the Gannawarra Shire October-December 2022. Approximately 44 per cent of the Gannawarra Shire's landmass was impacted.

### 22 January 2011



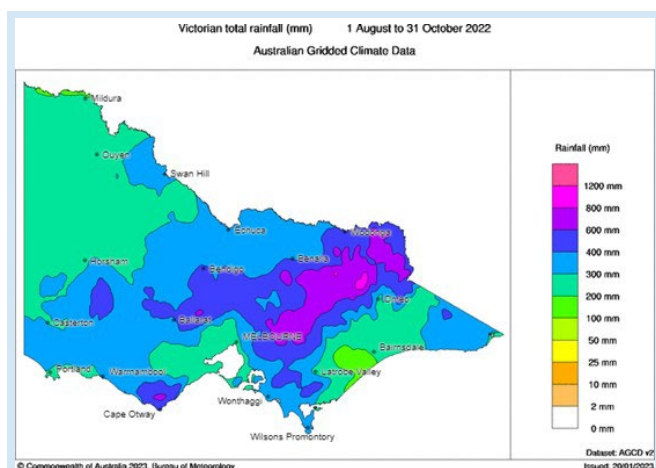
Left: Flooded waterways and river systems in the Gannawarra Shire January 2011. Approximately 75 per cent of the Gannawarra Shire's landmass was impacted.



## 5. 2022 Floods in Gannawarra - background

There had been three consecutive La Nina years leading up to the October-December 2022 floods. The Indian Ocean Dipole was negative, and the southern annular mode was in a positive phase. (Bureau of Meteorology).

September 2022 was wetter and colder than usual. The ground was saturated in many areas.



Above: Victorian total rainfall 1 August to 31 October 2022

On 12 October 2022, severe weather resulted in flash flooding and riverine flooding in urban and rural areas throughout the Loddon Mallee Region.

The Bureau of Meteorology recorded 149.2 millimetres of rainfall for Kerang in October 2022, 125 millimetres of which fell on or after 12 October. In the northern part of the municipality, rainfalls up to 200 millimetres were recorded over a two-week period. This high rainfall created a localised flood event.

An Incident Control Centre (ICC) was initially established at Bendigo and then subsequently moved to Swan Hill and Mildura to manage the flood response within the Loddon Mallee Region.

Following the flash flooding event, more rainfall events occurred. Floodwater from areas upstream in the catchment areas of the Loddon and Avoca rivers, the Bendigo Creek and other waterways made its way downstream to the Gannawarra Shire, flooding from the east and the west.

The water converged into the Gannawarra Shire from three directions: through Bullock Creek and Kow (Ghow) Swamp in the east, the Loddon River in the central west, and the Avoca River in the far west.

Approximately 140,000 megalitres of water was spilling over the Laanecoore Reservoir Weir on the Loddon River from mid-October 2022.

The Murray River was also in flood. After a wet winter and early spring, many of the Murray River's tributaries were flowing heavily. Dams in the upper Murray River catchment (Hume and Dartmouth) were also spilling causing high flows as the water made its way downstream.

It was the first time since October 1996 that Lake Dartmouth had spilt.

In relation to the Avoca and Loddon floodplains, floodwaters from the various systems join up as they move towards the lower floodplain.

Floodwaters coming from other parts of the Victorian river catchments, which are not measured accurately or in some cases not measured at all, made managing the Loddon River flood difficult.

In addition, there is limited infrastructure to control flows. Minor creeks such as the Bullock, Myers, Calivil, Nine Mile, and other waterways, at times, had flows similar to other major waterways such as the Bendigo Creek and the Loddon River.

Extensive sandbagging was undertaken at high-risk locations by emergency services agencies, Council, and the Australian Defence Forces. Community volunteers from across the whole municipality helped to minimise the impacts to property and infrastructure.

Approximately 230,000 sandbags were in storage in Kerang at the time of the 2022 flood event.

With local knowledge still fresh from the 2011 floods, local processes were put into place to prepare. Council commenced implementing its responsibilities under the Gannawarra Shire Council Flood Emergency Plan.

The Patchell Bridge over the Loddon River at Kerang closed to traffic on 19 October 2022, enabling the construction of a levee bank which prevented access to the Murray Valley Highway between Kerang and Swan Hill. The closure cut off residents residing on the western side of the Loddon River from their main service centre of Kerang.

The bridge was actively policed, causing additional distress to residents who were isolated.

The Murray Valley Highway, like all roads that pivot from Kerang, are the responsibility of Regional Roads Victoria.

On 20 October 2022, the moderate flood level of 77.51 metres Australian Height Datum (AHD) was reached at Kerang.

The western bank of the Loddon River breached on 22 October and a peak of 77.96 AHD was recorded at the Patchell Bridges at Kerang; falling short of the 2011 peak of 78.03 metres AHD.

The result was a trickle of water (approximately 10mm) over the Patchell Bridge at Kerang. Nine days after closing, the bridge re-opened to local traffic only, before re-opening to all traffic on 14 November, some 26 days later.



Above: Patchell Bridge over Loddon River Kerang, Oct 22

To the west and downstream of Kerang, the Loddon River floodwater spread over a wide area through to the Kerang Lakes, along the Pyramid Creek, through to Benjeroop and Murrabit West where several rural levee bank breaches caused significant pooling of floodwater. Due to high flows along the Murray River, water was unable to, or slow to, enter the Murray River.

Access to communities was difficult due to the pooling of floodwater and road closures. This caused delays with Secondary Impact Assessments not commencing until mid-January 2023.

Many communities were isolated during the initial flood event, including the township of Kerang (population 3,893) with all major highways closed.

Areas of Benjeroop and Murrabit West remained isolated by floodwaters until mid-January and 24 roads remained closed three months after the flood event.

As of May 2023, 10 roads remain closed and approximately 50-60 levee banks are still breached across the Gannawarra Shire.

Twenty-five of these breaches are deemed to be strategic breaches that impacted multiple properties. These are unmanaged levees, sitting mostly on Crown Land.

These levee banks not only protect single farm enterprises or a collection of farm enterprises; but a vast area of farming land and individual properties and homes.

Standing water removal required the breaching of several intact strategic levees and pumping to get the water back into the natural water carriers.

Fixing the strategic breached rural levee banks is currently the highest priority for Gannawarra Shire residents. Without fixing these banks, vast areas of productive agricultural land, private and public assets, infrastructure, and homes will re-flood, even with a minor flow of water down the river systems.

#### In relation to damage from the 2022 floods:

- Of the municipality's total farm area of 89,265 hectares, 39,359 hectares was registered as being impacted by the October-December 2022 flood event.
- Total kilometres of fencing impacted is recorded at 556kms. Farm shedding losses of 13 have been reported along with losses of 8 irrigation pumps, 6 vehicles and other items of farm machinery.
- Total field crop standing lost was 23,039 hectares, 829 tonnes of stored grain and 16,947 tonnes of hay and silage were flood damaged.
- Grazing pasture losses are estimated at 18,114 hectares.
- The estimated damage to roads and public infrastructure is \$30-\$40M.
- The estimated economic cost to business is \$18.230M with flow on impacts of an additional 12 per cent, or \$2.1876M. The most significant losses occurred during the October-December period, however local businesses continued to report losses through the January-March period.
- Twenty-six homes have been confirmed as being flooded above floor level, and a further 23 homes impacted by water either under or around the dwelling.
- Inundated and impacted homes are across a wide area including Appin, Mead, Macorna North, Mincha West, Kerang East, Kerang West, Kerang North, Capels Crossing, Murrabit West, and Benjeroop.
- Four hundred and six (406) residents registered for assistance during the flood event.
- As of May 2023, there remains 154 active cases being managed including 54 households receiving ongoing intensive case management services.

**The townships and farming settlements impacted by October-December 2022 floodwaters include:**

- Appin
- Bael Bael
- Benjeroop
- Budgerum
- Capels Crossing
- Cohuna
- Dingwall
- Fairley
- Horfield
- Kerang
- Koroop
- Koondrook
- Lake Charm
- Lake Meran
- Leitchville
- Macorna
- Milnes Bridge
- Mead
- Murrabit
- Myall
- Normanville
- Quambatook
- Teal Point
- Tragowel
- Wandella
- Westby



Above: Aerial view of Benjeroop farming district 2022 (photo courtesy Paul Oswin)

## 6. Comparison between January 2011 and October-December 2022 Flood Event in Gannawarra

The duration of the flood event across the Gannawarra Shire was unique compared to other areas of Victoria.

In other places floods came and went within a short period of time, albeit usually at high flow rates. In Gannawarra, the floodwater remained on properties for over three and a half months, as it did in 2011.

Approximately 140,000 megalitres of water per day was spilling over the Laanecoorie Reservoir Weir on the Loddon River from mid-October 2022. This compared to 192,000-210,000 megalitres per day in the lead up to the January 2011 flood event - second only to the 1909 record flood event.

Flood flow in most of the Victorian river systems were lower than 2011.

A key difference to the 2011 flood event was that the Murray River was in flood.

The Avoca River had lower flows than 2011, reaching only moderate flood levels. The flood mitigation that had occurred around the Quambatook township in the years following the 2011 floods was successful and the township was not impacted by floodwaters in 2022.

Kerang is Gannawarra's major population centre (population 3,960 people as at the 2021 Census). In 2011, several temporary levee banks were erected to save the Kerang township from flooding. The existing levee bank system has been considerably extended since 2011 and this managed levee bank system again prevented flooding of the town in 2022.

The October-December timing of the 2022 flood event was different to the January 2011 timing. Whereas harvest had been completed in 2011, crops were still standing in 2022. This considerably slowed the movement of floodwater across the floodplain and increased the length of time the floodwater sat in the system within the Gannawarra Shire.

The 2011 flood event impacted approximately 75 per cent of the Gannawarra Shire's landmass. Approximately 144 dwellings in the municipality were damaged due to the 2011 floods. Of these, 103 houses were inundated above floor level. Several commercial buildings such as dairies and piggeries were also flooded.

Since 2011, a government buy back of land saw several impacted homes in the Lower Loddon floodplain at Benjeroop demolished. This land was subsequently on-sold by government to private and corporate ownership.

Thirty-four other properties impacted in 2011 located in the Lower Loddon floodplain were eligible for government assistance to construct ring bank levees around homes.

These ring bank levees, where maintained and closed off prior to the 2022 floodwater arriving and with constant monitoring and pumping by residents, have been successful in protecting homes in 2022.

Nine of these homes with ring bank levees have however incurred damage in 2022. The two main reasons for flood damage are that floodwaters entered via the access gap, or that the home was flooded from pipes and wastewater disposal systems running to the outside of the ring bank levee.

Reconfiguration of the Goulburn-Murray Water (G-MW) irrigation system and changed management of the floodwaters has meant that homes not impacted by the 2011 floods, have been impacted by the 2022 floods.

By comparison, the October-December 2022 flood event caused flooding above floor level to 26 homes. A further 23 homes have been impacted with water either under or around the dwelling.

Critical infrastructure, such as the Kerang Power Sub-Station and Benjeroop Public Hall, where permanent levees were constructed following the 2011 floods, were protected in 2022.

Flood mitigation efforts since 2011 placed the Gannawarra community at a higher level of preparedness and resilience compared to 2011.

However, there are improvements that need to be made to further protect the Gannawarra community from future flood events, which are expected to become more frequent in the future.



Left: Example of a dwelling without a ring bank levee in the Murrabit West area Impacted by floodwaters in 2022 but not in 2011.



Left: Community members working to sandbag containment lines preventing the floodwaters (left) from entering the Goulburn-Murray Water channel (right) which would have impacted a greater number of homes, properties, private and public infrastructure, and the nearby township of Murrabit.



**Left: Aerial view of Kerang Power Sub-Station in 2011. A permanent levee constructed around the Kerang Power Sub-Station successfully protected this critical infrastructure in 2022.**



**Left: Aerial view of Benjeroop Public Hall in 2011. A permanent levee constructed around the hall successfully protected the hall in 2022 and provided a safe location for the community.**

## 7. Community Engagement activities to develop this Submission

Gannawarra Shire Council coordinated a range of community engagement activities to obtain input into this submission.

Some of the concerns raised in these forums are outlined in the table below:

### Points raised by 18 Gannawarra Community Recovery Committee members, volunteer community leaders representing impacted communities across Gannawarra Shire:

- Water moved differently to 2011, mainly due to Goulburn-Murray Water channels being removed since 2011.
- Very hard to get support from the Incident Control Centre (ICC) – told that we are on our own very early in the event.
- Hard work to get decisions made by the ICC – their focus seemed to be on the bigger towns along the Murray River - Echuca, Swan Hill, Mildura etc
- Ring bank levees were successful in saving homes, but some homes were not protected – some of these unprotected homes were able to be saved and some not.
- A lot of breached levees are still not fixed, and community members will continue to hold a high level of anxiety until this situation is addressed.
- Ring bank levees around homes should be designed so that they are closed off with vehicle access over them.
- Volunteers with local knowledge are vital to engage throughout the flood event.
- Educating new residents on the flood threat and potential impacts was a challenge.
- River blockages were an issue.
- Water moved differently this time in some locations.
- Need culverts put in place to assist with drainage and flow so that roads can remain open, or not closed for long periods of time.
- We need to understand where water drains and fix some of these issues.
- Ring bank levees wouldn't work in some instances to save homes as not enough land to construct them – perhaps flood planning should include lifting houses higher.
- Road issues in the same location as 2011 (Wandella Creek at Reedy Lake). Murray Valley Highway was cut in 2011 in the same location, but no pipes were installed under the road to fix the issue.
- Solution needed so that Twin Bridges (Patchell Bridges at Kerang) only close while the peak goes through.
- Communication was difficult.
- No one was watching levee banks on western side of the Loddon River at Kerang.
- No water escape plan.
- Earlier recovery process needed. Direct communication with impacted residents needed next event.
- Definite need for more flood planning.
- Weir needed to release pressure from Loddon River upstream of the Twin Bridges (Patchell Bridges at Kerang).
- Lack of support received from emergency services.
- New community members were not prepared for a flood, or even aware of flood risk.
- Government buy-back of large area of land in the Benjeroop area after 2011 was on-sold and is now corporate owned - no assistance provided to monitor levees which placed more pressure on fewer community members left in the area.
- Low, or no, phone reception or internet access at some local halls. Nowhere safe to go in an emergency.
- Need more ring bank levees around homes and support with excavators to close off levees around homes as those with financial capacity were ok, other community members could not afford the cost.
- Funding is needed for community support during the response and need communication and assistance from emergency services.
- Levee banks are a concern, current banks are not high enough.
- Waterways are different this time, choked up and in need of maintenance.
- Lack of information. Lack of flood data available.

- Flannery's Flume (GMW Infrastructure on Pyramid Creek) cut and residents not notified.
- Need a big map to show how the rivers/creeks connect.
- Kerang Fire Brigade learnt a lot from 2011 floods.
- VICSES in charge of floods and it was difficult to get decisions made.
- Disappointed that rural residents were unable to access sandbags as had unlimited supply of sandbags and sand in Kerang, however limited by the restrictions that were put in place about who and how many could be accessed.
- Sandbags were taken away from our area when houses went under here.
- Response when residents called 132 500 phone number was not good.
- Significant stormwater within some of our towns, stormwater systems failed to keep up, stormwater had to be pumped to prevent flooding of homes in towns.
- Kerang cut off so unable to get assistance or emergency services.
- No Flood Wardens in key areas, such as between Koondrook and Benjeroop, Wandella Creek, Pyramid Creek.

**Points raised by Gannawarra Flood Wardens/Flood Observers/Flood Information Officers, volunteers representing impacted communities across Gannawarra Shire:**

- Ran well/good communication (better than 2011).
- Wandella Creek flooding concerns and road blockage.
- Issue in and around Kerang Weir (blockages).
- Wandella Creek needs a culvert to stop the closure of Murray Valley Highway.
- Plenty of water at Benjeroop. Will be there for some time. Controlled breaches worked well.
- Avoca-Quambatook moderate flooding.
- Back Creek, southern Shire boundary is a concern to residents.
- Trees have fallen blocking flow of water which caused breaches.
- Levees on east side of Quambatook are causing problems for those on west side.
- Quambatook township good, unlike 2011.
- ICC great effort, felt listened to and the reporting was good.
- New Quambatook levee held up well with water only to bottom of levee.
- Currently no flood plan for Koondrook, need to have one and have it reviewed annually.
- Flooding from Hume releases down Murray River.
- Environmental flows were already in Gunbower Forest, which left nowhere for water to go.
- Old levees have plenty of erosion.
- Excellent local leadership, CFA, Koondrook Development Committee, local community was excellent, social media in place and used well.
- VicEmergency app was inaccurate.
- ICC communication great, however lack of local knowledge.
- Great support from Gannawarra Shire Council, and CFA were amazing.
- Underwhelmed at Koondrook community meeting, a lot unanswered questions (not enough guidance was communicated for potential Impacts and community felt uninformed).
- Barmah is not Barham, figures not accurate, Murray is NSW not VIC, more inclusion of local knowledge required.
- Whose responsibility is it to maintain the levees?
- Need a plan for levee / drainage in the Koondrook township.
- Flood is not a fire, need to have the ICC aware of management of a flood event.
- NSW Water data was different to Victoria.
- Flood not as high as 2011.
- Trusts for Nature have not maintained their levees (Avoca River).
- Water had nowhere to go.



- Lookout Channel blocked, not much water getting through, water out to Bael Bael Road.
- Most water going into Sandhill Lake but Lake Lookout had hardly any water in it.
- Back Creek issues, fairness of water, as residents changing course of water.
- Spillway in Lookout Channel not done.
- Main message is “don’t be complacent” Average of floods every 5 years, major floods average every 10 years.
- Need to fix issues now in preparation for the next flood. Where will the water go?
- SES excellent, teleconferences had great communication as well as Goulburn-Murray Water.
- Shire no good, phone calls not responded to. Parks Vic much the same, no knowledge of Back Creek flooding, no care of impact.
- Lalbert/Bael Bael blockage needs cleaning up.
- Need more water to go into lake system, more preparation required to move water through system early to make room.
- Scott’s Creek requires attention.
- Disappointed that residents boarded up regulator to push water on to others.
- Boards need adjusting Sheepwash Creek/2nd Reedy.
- 6 on 7 channel not coping, used to be 1200 megalitres per day, now only 5-600 megalitres per day.
- Quambatook Weir needs annual maintenance.
- Social media misinformation.
- ICC was great, although with all the changeovers a lot of repeated information.
- No flood wardens for Pyramid Creek and Wandella Creek.
- Act earlier to move water around lakes/creeks.
- Move water from Loddon Weir pool earlier.
- Increase capacity in 2nd Reedy Lake.
- Culvert needed for Murray Valley Highway (Wandella Creek).
- More works needed to get more water to Lake Boga.
- 6 on 7 Channel requires clean-up.

#### **Points raised by Gannawarra Shire Staff involved in emergency response:**

- Kerang and Quambatook actions from Gannawarra Flood Emergency Plan implemented,
- Communications with other agencies were good (CFA, Police, Hospitals, VICSES, GSC etc).
- Issues with lack of contact with flood wardens from ICC meant a lack of local knowledge for communications back and forth.
- Communication issues around Koondrook Primary School closure due to levee lowered community confidence.
- Concerns with three authorities giving conflicting messaging.
- Issues with illegal levees.
- The enormity of this emergency on Gannawarra Shire Council should not be underestimated.
- Council has a relatively small staff.
- There were many stakeholders that had to be engaged in a constantly changing environment.
- Many Council staff were directly and personally impacted.
- There was significant pressure on Gannawarra Shire Council.
- The protracted and prolonged length of the 2022 flood event made the challenge of responding for an extended period, more challenging, tiring, and complex.
- Staff are not emergency management professionals – they are from a diverse range of backgrounds who come together to deliver a range of services to their community.
- Emergency tasks presented were difficult and complex. These were worked through as a team in a professional manner.
- For most staff members involved, this was their first major emergency event.
- Staff have demonstrated a strong desire to learn and improve.
- This creates an opportunity to harness and channel that energy through involvement in process improvement.

- Improvements identified include reviewing and enhancing emergency management systems, planning and procedures to support emergency response, ongoing asset management planning for additional resources in an emergency, enhanced training and exercising across staff as appropriate to the roles they are likely to fill.
- Intimate knowledge of the geography and the impact of floods on the municipality is held by few staff and served well in preparing Council and the community for the flood event.
- Some staff were placed into roles for which they had very little understanding.
- Knowledge gaps varied but generally related to policy, process, or access to and use of information and systems.
- Balancing flood preparedness and response with business continuity was a challenge for a small workforce.
- Basic emergency management training is required for staff.
- Resources were depleted quickly.
- COVID remote working practices provided ability to maintain service delivery when many staff were isolated and unable to attend their usual place of work.
- Consultants were engaged to assist the operational activities involved in the Municipal Recovery Manager role.
- Insufficient communications with emergency management agencies during the early stages of the response to the emergency. As the event progressed the information flow improved.
- Council operations were well supported by local contractors.
- Support staff from Swan Hill Rural City Council proved valuable.
- Communication between Council and the ICC was via an EMLO (Emergency Management Liaison Officer) from another Council – this created challenges due to limited local knowledge and awareness of Gannawarra’s operating procedures and resources.
- Communication with the community was challenging – there was heightened anxiety in the community following flood events elsewhere (such as Lismore NSW). Requests for resources directed at Council weren’t necessarily needed. Lack of local knowledge by new residents who wanted individual advice and support added pressure.
- Council was seen as the ‘single point of truth’ and this added additional pressure to ensure that information was highly accurate on Council’s website as government websites were not reflecting the most up to date information that the community was seeking.
- Process of reimbursement of expenses to Council has been slow and laborious.
- Uncertainty around claims. Some expenses have not been paid seven months post event.
- Difficult for Gannawarra residents to complete government funding applications, which are all online. Barriers due to digital connectivity and digital literacy.
- Limited funding from Emergency Recovery Victoria is adding pressure with Council limited in what support it is able to provide the community until resources are secured.
- Complexity and confusion around funding arrangements and what can be provided to the community has created additional pressure on Council staff.
- Felt that there was a lack of understanding by government of rural community impacts and issues with a number of state government programs established for urban areas – e.g. kerbside waste collection.

**Points raised by residents directly impacted by floodwaters have been recorded in Council's Crisisworks emergency management program and from verbal conversations.**

These conversations have not been recorded in this submission to protect the privacy of residents most impacted by the flood event.

The themes however support what has been put forward in this submission as key recommendations:

- Culverts are needed.
- Changes to the environment created additional flooding.
- Frustration that learnings from 2011 have not made a difference.
- Illegal levee banks were constructed without action being taken by authorities.
- Lack of monitoring along waterways.
- Difficulties accessing sandbags.
- Concern that breaches (both controlled and natural) to rural levee banks have not been fixed.
- Difficulty finding out how much water was coming.
- Isolation from help when roads and bridges were closed preventing access.
- Lack of support from authorities during response.
- So many agencies to deal with in recovery.
- Difficulties accessing financial support.
- Anxiety and stress about future flooding.
- Emotions around loss of homes and livelihoods.

A number of media reports document the flood response across Gannawarra and the aftermath of what was a significant flooding event. It is important that these human stories are heard by authorities and more importantly, that actions and improvements are made to mitigate future risk. Links to just some of these media reports are below:

<https://www.abc.net.au/radio/programs/vic-country-hour/victorian-country-hour/14134676?fbclid=IwAR1n7-AjCfEc5egvKtX97wkLQK6mbPdAqQTGlw6be-QTN3dfxaoH0j5veiY>

<https://www.abc.net.au/news/rural/2023-05-11/victorian-chicken-and-egg-business-rebounds-after-floods/102323080>

In addition, Council and Northern District Community Health partnered to produce a seven-part Gannawarra Reflections video series. These videos highlight how individuals from across the Gannawarra Shire were impacted by the October-December 2022 floods and how the community continues to support each other. These videos can be viewed at the following link:

<https://www.gannawarra.vic.gov.au/Council/Emergency-Management/Flood-updates-October-2022#section-11>

In relation to business impacts, a major medicinal cannabis business is established in the Murrabit West/Benjeroop area. This is a significant investment employing more than 50 staff. The facility was surrounded by floodwaters, but protected by a substantial ring bank levee which was erected as floodwaters threatened in October 2022. Employees were boated into the facility daily via the Murray River:

<https://thesentiment.com.au/ecs-affirms-that-the-cannabis-is-safe-amid-severe-flooding-from-loddon-river/>

## 8. Addressing the Inquiry Terms of Reference

Council now makes the following comments on the Terms of Reference of the Inquiry.

## 8.1 Causes and Contributors to the Flood Event

It is acknowledged that the catchment was saturated and storm events and heavy rainfall in October 2022, led to the flood event.

It is also acknowledged that the Gannawarra municipality is located on an active floodplain and that flooding is a high risk for our Council and our residents.

While Gannawarra's urban residents are at risk of flooding, our rural residents are particularly vulnerable. Major flooding has been experienced many times historically (as outlined on page 7).

Consistent historical flooding has led to a range of flood mitigation strategies being implemented over the years and systems and structures being put in place at a local level to mitigate the risk of flooding to the Gannawarra community.

The geographical landscape of the Gannawarra municipality, at the end of the Loddon and Avoca River systems, is a contributing factor to flooding in general, and the protracted nature of a major flood event, as occurred in 2022.

As previously stated, rainfall received in the upper reaches of the Loddon and Avoca River catchments, outside of the Gannawarra municipality, impact Gannawarra as the floodwater moves down the river systems to enter the Little Murray and Murray River in the north-west corner of the Gannawarra Shire. Much of this water needs to enter the Murray River system downstream of the farming district of Benjeroop.

One of the benefits of flooding in Gannawarra, is that the community has time to prepare before the floodwaters from the catchments arrive. The floodwater moves slowly across the floodplain, and it is achievable to manage and mitigate the movement of this floodwater.

### In summary:

- Moderate flood levels occurred in the Avoca River catchment in 2022 (unlike major levels in 2011).
- Major flood levels occurred along the Murray River in 2022 (unlike 2011 when the Murray River was not in flood).
- Major flood levels occurred along the Loddon River (at a lower Australian Height Datum (AHD) to 2011 but nonetheless the outcomes were similar).

In relation to the vast floodplain of the Loddon River, the volume of water coming from Laanecoorie Reservoir in 2022 was approximately 140,000 megalitres per day (compared to approximately 190,000-210,000 megalitres per day in 2011).

Council believes that the 2022 volume of water from Laanecoorie created a manageable flood event. It is unfortunate however that similar impacts to the higher water volume of the 2011 floods has been experienced by the Gannawarra community.

**Council believes that the 2022 flood event was managed overall in a somewhat chaotic manner and that managing a flood event, such as 2022, could be improved.**

While some lessons had been learnt by authorities from the 2011 flood event and improvements made, events such as 2022 create a vast impact on our community and long term financial and mental health impacts, as evidenced by the points raised by community members of pages 15 to 18.

The impact, and the associated cost to government and community, needs to be lessened.

**Council believes that these impacts could be lessened by all levels of government and emergency services working more closely with the community, investing into flood mitigation technology and infrastructure, and in rethinking the floodplain and how economic, natural, and social values can be supported into the future.**

In addition, Council also believes that the 2022 flood event was exacerbated and the impact prolonged to the Gannawarra community due lack of connectivity between communities – e.g. extensive road closures, which could have been alleviated by upgrade works at strategic locations along the floodplain following the 2011 event.

Another contributing factor to the flood event was the lack of a defined action plan to expediate the removal of standing water across Gannawarra Shire, particularly to the west of Kerang and in the Lower Loddon River area at Benjeroop, Capels Crossing, and Murrabit West.

Pre-determined locations for strategic actions agreed to and documented e.g. pumping or drainage of trapped water, would have alleviated the prolonged and protracted impact on dwellings, properties, and public infrastructure, such as roads, in known high risk locations.

If planning had occurred post 2011, pumps could have been taken into these strategic locations on dry land and prepared in readiness for the outcome that should have been expected (from the 2011 experience, local knowledge, and historic flood events).

These pumps could then have been activated earlier and damage to property and infrastructure reduced, and connectivity disruption to communities lessened.

Instead, Council and the community were again back in the same position as in 2011 and needed to advocate strongly to obtain pumps to achieve the same outcome. This advocacy effort diverted resources and delayed an outcome when both Council and the community needed a timely response.

Another contributing factor was understanding and appreciation of local knowledge by authorities. As previously stated, it is acknowledged that Gannawarra is on an active floodplain and lessons have been learnt by Council and the community from previous flood events.

There is vast flood knowledge across our communities which has been passed down from generation to generation. This knowledge should be respected by authorities and included in decision making to prepare and respond to a flood event.

For an active floodplain such as Gannawarra, community education and engagement around flood risk is lacking, particularly for new residents purchasing small lifestyle properties in high-risk flood areas across the municipality.

Responsible authorities should be more proactive and resourced appropriately to build understanding and resilience.

Council also believes that there is a lack of support for communities that were affected by isolation, with financial assistance and government grants aimed only at 'direct' impacts by floodwaters, rather than acknowledging the significant impact of isolation on business/tourism/events and limited access to staff, supplies, and services.

Where financial assistance and grants were available, for example through Services Australia and the Victorian Government, community members have reported that the application process was cumbersome and difficult. Adding to the stress on households, businesses and primary producers were the long delays experienced in the processing of grant/financial assistance applications. Some have reported giving up.

This lack of financial support prolongs the recovery process and exacerbates economic recovery. It also means that data does not reflect the true impact of the event across the community and this impacts on the resources that are available to support recovery longer-term.

**The following improvements are recommended:**

1. Ensure that the structure for preparing for, and responding to, flood events, includes documented communication and community engagement strategies, and that local VICSES Flood Guides and Flood Emergency Plans are co-designed with local government, communities and individuals most at risk.
2. Improve financial assistance and government grants processes to ensure that this financial assistance is targeted and that barriers to accessing response and recovery support are minimised.
3. Develop a defined action plan to expediate the removal of standing water across Gannawarra Shire, particularly to the west of Kerang and in the Lower Loddon area at Benjeroop and Murrabit West, by agreeing and documenting pre-determined locations for strategic actions.
4. Ensure that major transport and connectivity routes, and flood mitigation effort are targeted at keeping communities open and connected for as long as possible and that the isolation time is minimised.

## 8.2 Adequacy and effectiveness of early warning systems

Gannawarra residents have expressed that some people felt uninformed of the history of flooding and potential impacts to their properties (particularly new residents who had not experienced the 2011 flood event).

They felt uninformed on the local progress of the floodwaters and what they should do to prepare and protect themselves and their property.

Some residents reported that floodwaters surrounded their properties without, or with little, warning being received.

There has been concern expressed that the VicEmergency App was inaccurate and the VicEmergency website was not kept up-to-date.

In some cases, rumours (inaccurate) were reported in the absence of timely information from official sources. Rumours were amplified by social media.

While technology is relied upon for communication by authorities, digital connectivity is a barrier to access reliable and up-to-date information in rural communities. In Gannawarra, more than 30 per cent of dwellings do not have access to the internet (2021 Census). There are also 'blackspot' areas where internet and mobile phone coverage is not available or lacking.

Lack of reliable information of what the expected impact would be meant that some residents were underprepared and isolated, in some cases with their animals, for prolonged periods. They were self-sufficient only up to a certain point and were reliant on community support, as limited support from authorities was available.

For the township of Kerang, the early warning system worked well. There was a good understanding of typical impacts and what was going to occur and when. The variability was how long and protracted the flood event would be on a landscape with significant growth. This made forecasting of the peak difficult.

On the Murray River system there was a lack of understanding of the restrictions in the Murray River. This lack of understanding meant that there were some ill-informed decisions made which would never occur. This diverted resources to where they were not needed and took resources away from where they were needed. This created confusion and heightened fear and anxiety at community level.

The Echuca speculation about Murray River height is an example of this over-reaction and lack of understanding as to likelihood and consequence.

There was a massive release of water from Hume Dam. There are however a number of flow restrictions downstream of the Hume Dam which in the main push water out through New South Wales. This includes the Barmah Choke.

For Gannawarra as a general rule, a 12-inch (approximately 300 millimetres) rise in water levels on the Murray River at Echuca equates to a one-inch (approximately 25 millimetres) rise in water levels on the Murray River at Barham/Koondrook. This comes from Campaspe and Goulburn River water entering the Murray system in and around Echuca, not necessarily from Hume Dam releases.

Between Echuca and Barham/Koondrook is the Torrumbarry Weir. The weir again restricts the flow of floodwater and pushes water out through New South Wales through the Perricoota/Wakool system.

Further downstream, only a certain amount of water can get under the Barham/Koondrook Bridge, so again water pushes out into New South Wales and through Gunbower Island State and National forests.

Adding to an environment of scaremongering along the length of the Murray River was the inaccuracy of Bureau of Meteorology reported river heights.

The Bureau of Meteorology needs to be better connected to Catchment Management Authorities who have a greater understanding of river height and influences of how the floodplain operates.

A difference between 2011 and 2022 was the ability to use satellite imagery (Sentinel Playground website). This proved particularly useful in northern Victoria given the extent of the floodplain. This new technology should be used to assist to inform decision making in areas such as Gannawarra Shire where there is time to make decisions in the best interests of the community.

North Central Catchment Management Authority and Council were using this satellite imagery during the 2022 event, but Council is unsure if this was being used to inform Incident Control Centre (ICC) decision making.

An example of where satellite imagery assisted was on the Avoca system. In the September 2011 flood, a large amount of water went down the Tyrrell Creek towards Culgoa. In October 2022, only a small amount of water went into the Tyrrell system. Satellite imagery showed that a massive tree had fallen over the creek and this blockage was diverting additional water into the Back Creek and pushing more water up to Back Creek to west side of Quambatook.

**The following improvements are recommended:**

5. Ensure that the VicEmergency App and VicEmergency website are accurate and provide timely warnings that give people the opportunity to prepare and plan.
6. Develop a single point of trusted information across all government departments.
7. Ensure that the latest technology is available to support informed decision making by authorities and install river gauges in strategic locations along the length of the river systems and ensure that data is accessible to all.
8. Improve the sharing of information between agencies.
9. Improve digital connectivity across rural areas to address blackspots identified, including around key community hubs.
10. Provide additional funding to support digital literacy training and digital skill development across rural communities.
11. Resource the development of local level flood planning including information regarding minor, moderate and major flood levels, and clear trigger points for preparedness action.



**Left: Unregulated flows from the Calivil and Bullock Creek floodwaters crossing Kerang-Leitchville Road at Sampson's Bridge.**



### 8.3 Resourcing of the State Emergency Service and the adequacy of its resourcing to deal with increasing floods and natural disasters in the future

The State Emergency Service is under-resourced to respond to a widespread and major flood event.

Council believes that it is poorly understood by State and Commonwealth governments the duration of floods when they hit the northern part of Victoria.

Given that we were still pumping to clear water from a vast area on 26 January 2023 (to enable roads to open and people to return to their homes and properties), from a rain event that occurred in mid-October 2022, it should be expected that the same situation will occur in the future.

Furthermore, given that 2011 was a 1 in 100-year flood event, and we have experienced another 1 in 100-year flood event just 11 years later in 2022, there needs to be action to mitigate the risk of what will be inevitable future flooding.

When we get a large-scale event, such as 2011 and 2022, a local VICSES unit should have a role similar to a local rural fire brigade.

Instead, when there is a significant event predicted, the State needs to take a more active role early, particularly given that a municipality like Gannawarra has ample time to prepare.

The prolonged nature of the 2022 event, meant that emergency services were burnt out and clearly somewhat fed up with the event.

Many of the authorities who should have been supporting us to respond at a local level had 'moved on' before the impact occurred. This is a clear message that has been expressed by our Gannawarra residents, by Council staff and local agencies.

The Incident Control Centre (ICC) was moved from Bendigo to Swan Hill and then onto Mildura. Moving a control centre into the impact zone makes no sense.

Council believes that the ICC should have remained in Bendigo where there was the ability to resource it.

Every time the ICC moved, it created further chaos, issues were not followed up on, decisions were not made; a change of staff meant a change in attitude, and ICC staff lacked local knowledge.

Also, in relation to resourcing, there were 230,000 sandbags held in storage by Council at Kerang which Council distributed on behalf of emergency services into neighbouring municipalities. As the flood waters move north, Gannawarra supports north to south. 120,000 sandbags were provided to Campaspe, a further 60,000 into Loddon.

Our community has expressed frustration in not being able to access sandbags.

To improve this situation, the distribution of sandbags by VICSES needs to be better defined, strategic distribution points communicated, and preparedness needs to be strengthened.

In relation to community meetings that were run by VICSES, these were well run. There seemed to be a high level of trust and respect shown by the community. It is essential that these community meetings be a partnership between Council and agencies.

It is however acknowledged that some very high-risk communities in Gannawarra did not have access to a community meeting supported by the relevant authorities and community volunteers who had experienced the 2011 floods felt an obligation to fill this gap.

In addition, VICSES is tasked with leading the development of the Community Emergency Risk Assessments (CERA) at multi-agency Municipal Emergency Management Planning Committees (MEMPCs) and the development of the Gannawarra Flood Emergency Plan.

It has been noted that the Flood Emergency Plan on the VICSES website for Gannawarra Shire Council is dated 2019 and is not a complete or approved document. It is different to the approved plan on Council's website.

This lack of oversight of critical planning at municipal level places communities at risk and creates chaos when responding to an event.

VICSES has several critical roles in Victoria's emergency management arrangements and the State Government must ensure that it is resourced to fulfill its statutory roles and responsibilities to deal with the risk of increasing floods and natural disasters in the future.

There was a clear message relayed by the VICSES to our community even before floodwaters arrived in Gannawarra that the VICSES did not have the resources to respond and that communities were on their own. This is a failure in the Victorian emergency management system.

What is needed is for VICSES to be much more active in flood preparedness, local level planning (in partnership with high-risk communities), and consistent in decision making across a broad range of issues.

**The following improvements are recommended:**

- 12.** Resource the State Emergency Service to ensure it can sufficiently fulfill its planning and Control agency role in response to major flooding.
- 13.** Ensure that government and emergency service systems and Command and Control structures support a swift and equitable response across communities.
- 14.** Better define sandbag distribution, strategic distribution points, and transparent communication around equitable access to sandbags.



**Left: Community meeting Cohuna 20 October 2022**

## 8.4 Implementation and effectiveness of the 2016 Victorian Floodplain Management Strategy in relation to the Flood Event

It is noted that the 2016 Victorian Floodplain Management Strategy aimed to:

- Provide access to better quality mapping to support emergency services response and recovery.
- Assist councils to implement water management schemes for flood mitigation infrastructure.
- Clarify the arrangements for flood warning systems, with the Department of Environment, Land, Water and Planning (DELWP) as the oversight agency and providing direction for new flood gauges to be included as part of the water monitoring partnership.
- Clarify the arrangements for the management of urban and rural flood mitigation infrastructure.
- Plan for stormwater management and reduce smaller scale flooding over the medium to longer term.
- Increase access to information to encourage flood insurance to be taken up commensurate with an individual's risk.
- Provide guidance for preparing Regional Floodplain Management Strategies based on a risk assessment framework.
- Increase land-use planning coverage for areas in the 1 per cent Annual Exceedance Probably (AEP).

Given the impact of the 2022 flood, Council does not consider that the Strategy has been implemented well.

The strategy's effectiveness in relation to the 2022 flood event does not consider the issues experienced in rural areas and the vast impact flooding has on agriculture, productivity, and economic and social stability.

It does not consider:

- Remediation of breaches to rural levee banks that have the greatest impact.
- Standing water removal.
- A plan to manage hyper-saline lakes.
- Significant cultural heritage sites.
- Strategic drainage outlet locations.

Furthermore, the Strategy has failed in its aim to work in partnership with communities to be better prepared for future floods and to improve sharing of high-quality flood risk information.

In addition, the North Central Regional Floodplain Management Strategy 2018-2028 and the high-level work plan requires review in consultation with local government to ensure that there is a guide for future investment priorities for the remaining five-year timeframe.

### The following improvements are recommended:

15. Ensure that the 2016 Victorian Floodplain Management Strategy is reviewed in consultation with local government and the community and addresses the removal of standing water, identification of strategic drainage outlet locations, management of hyper-saline lakes, transparency around significant cultural heritage sites, and remediation of rural levee bank breaches that have the greatest impact.
16. Ensure that the North Central Regional Floodplain Management Strategy 2018-2028 reflects the 2022 flood and that the high-level work plan is updated in consultation with local government to guide future investment priorities for the remaining five-year timeframe of the current plan.



**Left: Barr Creek  
flooding, Kerang-  
Murrabit Road  
November 2022**



**Left: Constructed  
temporary levee  
Koondrook  
October 2022**

## 8.5 Location, funding, maintenance, and effectiveness of engineered structures, such as floodwalls, rural levees, and culverts, as a flood mitigation strategy

Minimising disruption and damage to public, business, and personal assets, including agricultural businesses, on an active floodplain like Gannawarra can be achieved through the strategic positioning of flood mitigation infrastructure.

To achieve this, work should be undertaken to look at strategic levees, fixed crest weirs, and culverts to enable water to flow across the active floodplain to a point where this water can re-enter natural water carriers.

In undertaking this process those property owners living on the floodplain need to be aware of, and acknowledge, the possibility and impacts of flood events on this area.

With the implementation of strategic levees, fixed crest weirs, and culverts there will be areas of the floodplain where the cost to society of repeated flooding is prohibitive and options for encouraging people to move out of the active floodplain should be considered.

It is acknowledged that as a municipality at the end of a major floodplain, changes upstream on the floodplain aimed at diverting water away from one area, will only cause a greater impact to areas further downstream.

Planning flood mitigation works should therefore ideally occur from the bottom of the floodplain. Flood mitigation works can then be planned further upstream to further mitigate risk to communities.

In the case of Gannawarra, there are specific areas to investigate mitigation efforts to a flood event:

- Loddon River - Getting water back into the natural watercourses, primarily the Little Murray River and the Murray River at Benjeroop.
- Loddon River – Creating a natural floodway from the Loddon River to Benjeroop.
- Loddon River – Working on a solution to the choke point where the Barr Creek and Loddon River intersect.
- Kow (Ghow) Swamp/Pyramid Creek - Better management of the Pyramid Creek via Kow (Ghow) Swamp.
- Pyramid Creek – Working on a solution to the choke point where the Calivil Creek/Bullock Creek enters the Pyramid Creek.
- Avoca River – Getting water through the Number 6 on 7 Channel into Lake Boga.

- Loddon River – Diverting floodwater from upstream of Kerang through a proposed new low crest weir and a third bridge over the Murray Valley Highway.
- Installing culverts on key Regional Roads including where the Wandella Creek crosses the Murray Valley Highway at Reedy Lake.
- Additional government funding to support ring bank levees around homes for those known high risk flood locations across the floodplain.

### Rural levees

There are a large number of rural levees within the Gannawarra Shire in close proximity to most of the watercourses and flow paths, aimed primarily at keeping floods off agricultural land. The Murray River is also contained by levees.

There are too many levees to discuss individually. Most watercourses are contained by levees, some larger than others.

As an example, more than 20,000 hectares of agricultural land incorporating some 237 properties on either side of Pyramid Creek are protected by around 140km of levees on both sides of the creek.

As with other rural levees, they are poorly constructed with no proper provisions for maintenance and reconstruction and are inadequate in large floods.

Once a levee breaches, damage is extensive and there is no way for the water to re-enter the river system, other than via mechanical pumping. Our residents found it difficult to source pumps and, in some cases, the cost of fuel was significant.

Within the broader community there is confusion over ownership of rural levees. It is important that there is clear identification of who is responsible for ownership and maintenance of rural levees.

We also need to understand how we recover in relation to flood mitigation damage to infrastructure which has broad economic impact, e.g. levee banks of unknown ownership on public and private land – which have impacts on our rural communities if not repaired properly post flood.

Following the 2011 flood event the Baillieu State Government in conjunction with North Central Catchment Management Authority and Goulburn-Murray Water set about repairing strategic breaches on flood mitigation infrastructure in the Lower Loddon area.

A plan is needed to ensure that this critical work is planned for, and occurs, post floods.

The Catchment Management Authority should be required to oversee the reinstatement of levees after a flood event and fund the cost of doing so.

Council does not accept the Victorian Floodplain Management Strategy where the State Government takes no responsibility for rural levees on Crown Land and puts the responsibility for these levees back onto the community.

There are between 50-60 breached levees from the October-December 2022 floods across the Gannawarra Shire. Approximately 25 of these levees are 'strategic' where they protect vast areas of productive agricultural land and dwellings.

**Some of the strategic rural levees that exist within the municipality are as follows\*:**

- Pyramid Creek north bank levee
- Loddon River/Back Swamp west bank between Murray Valley Hwy and Sheepwash Weir
- Loddon River west bank upstream Murray Valley Hwy
- Loddon River east bank between Kerang and the Glut
- Loddon River/Barr Creek/Benjeroop Forest northeast bank between Benjeroop and Capels Creek
- Loddon River west bank from Benjeroop to Bowdens Bridge
- Murray River upstream of Torrumbarry Headworks Channel
- Gunbower Forest Perimeter Levee
- Koondrook Township Bank
- Murray River from Murrabit to Little Murray River
- Little Murray River south bank from the Murray River to Fish Point
- Avoca Floodway Banks

\*Gannawarra Flood Emergency Plan (V.2 Nov 2015)



**Above: Breach in the Lower Loddon Levee, Jan 2011 Flood (photo courtesy North Central CMA)**

**The same breach occurred in October 2022**

There is currently no agreement in place for these levees to be fixed, placing the community at heightened risk of future flooding, even from a minor flow down the river systems.

It is suggested that levees be licensed in a similar manner to New South Wales so that there is clear ownership and management responsibility.

Inspections of rural levees should be carried out regularly by a legislated authority.

Additional ring bank levees around homes for those known high risk flood locations are needed.

Levees managed by Gannawarra Shire Council are:

- Kerang Township Protection Levee
- Quambatook Township Protection Levee

**Culverts**

There are specific examples where culverts could have been located under state-controlled roads in Gannawarra following the 2011 flood event. This opportunity was not taken up due to the replace 'like for like' government policy position. This policy position continues to exist.

For example, a culvert needs to be installed under the Murray Valley Highway at Reedy Lake where the Wandella Creek crosses the highway. A culvert placed in this location post 2011 would have ensured that this major north-south transport route could have been reopened quickly in 2022 once the peak floodwaters had passed. Instead, the Murray Valley Highway was closed unnecessarily for almost a four-week period creating major disruption to a significant transport route and ongoing property isolation.

All state-controlled roads in Gannawarra have similar issues where culverts installed in key locations would enable roads to be kept open for longer, and closed for shorter periods of time, or not at all, during a flood.

There are also key locations on Council managed local roads where culverts are needed to enable water to flow more readily across the floodplain, to keep key transport routes open and roads accessible to prevent isolation.

Funding to support the installation of culverts would be needed for Council to complete this work.

### Low Level Weirs

There is a need for a low-level weir on the western side of the Loddon River levee bank upstream of Kerang. The levee breached in this location in 2011 and again in 2022, with direct consequences to a number of homes and properties.

Instead of getting a peak of two days, due to erosion of the levee bank, these residents were impacted over a number of weeks.

A low-level weir in this location would provide a 'release mechanism' for the township of Kerang.

Ring levees or other property resilience measures would be needed around homes in this vicinity to protect them from future flooding, but a low-level weir would reduce the impact.

The weir would allow floodwaters to re-enter the Loddon River downstream of Kerang via a proposed new bridge on the Murray Valley Highway, designed to put relief flows back into the river.

The Patchell Bridges at Kerang can take approximately 14,000 megalitres of water per day. If we could get approximately an additional 8,000 megalitres per day through a release

structure, the Murray Valley Highway would remain open and accessible (with culvert under the Wandella Creek at Reedy Lake as suggested above).

In addition, a low-level weir in the Lower Loddon floodplain from Murrabit West to Benjeroop would create a flow path for floodwaters to re-enter the Murray River system and lessen the impact on public and private infrastructure, and isolation of communities over a prolonged period.

### Summary

In summary, new flood mitigation infrastructure is critical to prevent, or at least lessen, future flooding impacts on the Gannawarra community.

Importantly, authorities and government departments need to be supportive of flood mitigation infrastructure and work in partnership with local government on these priority projects. This has been poorly done in the past. A recent example is when Council built the Quambatook levee bank, where DELWP did their utmost to prevent the project from occurring and the same occurred at Robinvale.

When communities and councils are trying to construct flood mitigation infrastructure, where there is a clear community benefit, the government needs to allow this construction to occur for the protection of our communities - instead of putting up blockers, delaying the process, and diverting valuable resources away from communities.

There also needs to be open transparency around cultural heritage when emergency works are being undertaken.

### The following improvements are recommended:

17. Plan and fund strategic rural levees, fixed crest weirs, and culverts to enable water to flow across the active floodplain to a point where this water can re-enter natural water carriers.
18. Fund the repair of strategic breaches to rural levee banks across Gannawarra Shire.
19. Provide funding for additional ring bank levees around homes for those known high risk flood locations.
20. Change the 'like for like' policy position with a 'build back better' policy position under the Disaster Recovery Funding Arrangements (DRFA) so that mistakes of the past are not repeated in the future.



**Left: Wandella Creek crossing the Murray Valley Highway at Reedy Lake, Kerang.**

### **Regional Roads Victoria roads impacted by the 2022 Floods:**

- Loddon Valley Highway, Kerang to Bendigo (Closed 17 October, reopened 28 October) – closed 11 days.
- Murray Valley Highway, Kerang to Swan Hill (Closed 19 October, reopened 16 November) – closed 28 days.
- Murray Valley Highway, Kerang to Cohuna (Closed 23 October, reopened 22 December) – closed 60 days.
- Patchell Bridges, Kerang (Closed 19 October, reopened 28 October to local traffic only, and all traffic on 14 November) – closed 26 days.
- Kerang-Quambatook Road (Closed 21 October, reopened 13 November) – closed 23 days.
- Kerang-Koondrook Road (Closed 24 October, reopened 25 November) – closed 32 days.
- Kerang-Murrabit Road (Closed 7 November, reopened 29 November) – closed 22 days.
- Kerang-Boort Road (Closed 21 October, reopened 13 November) – closed 23 days.

The impact of closure to these State Government managed roads was significant and an important issue to resolve. The prolonged closures denied residents access to goods and services, children were not able to access schools, residents were not able to work, and major transport routes through to Melbourne were disrupted.



## 8.6 Implementation and effectiveness of Flood event as a whole, including but not limited to, the catchments and the floodplains (as per the list within the Terms of Reference)

Council will make comment on the catchments and floodplains that impact on Gannawarra Shire:

### Avoca River

Floodwaters reached moderate flood level along the Avoca River in the Gannawarra Shire. This is a predictable flow with floodwaters generally taking five days to move from Charlton to Quambatook.

Residents agreed that the township of Quambatook was well prepared, having had a levee constructed post 2011 floods. While new residents required education on flood risks, residents remained in-situ as the floodwaters were effectively monitored downstream of Charlton.

### Loddon River

In relation to the Loddon River floodplain, the floodwater was at a lower level than 2011.

Floodwaters generally take 12 days from Laanecoorie Reservoir to Kerang. This provides time for preparedness in readiness for the arrival of the peak.

The Loddon River flood created a roughly comparable impact to the West of Kerang as the levee breached upstream of Kerang. The Gannawarra's Loddon River floodplain landmass experienced a similar outcome as to what occurred in 2011.

Two peaks of floodwater - the first from the Loddon River, and the second from the Pyramid and Barr creeks - caused significant levee bank breaches and pooling of water around homes, properties, roads, and other public and private infrastructure.

This water is from the Patho Plains and created an unregulated problem to the eastern side of the Loddon River floodplain. Unregulated flows made it incredibly difficult to predict what was likely to occur at a local level.

This relied heavily on aide-memoirs from previous Goulburn-Murray Water staff with local knowledge of the floodplain.

Unregulated creeks such as the Nine Mile, Bullock and Bannagher creeks were putting an estimated 34,000 megalitres of flows into the Pyramid Creek system and in some cases created a higher flood impact in this area than what was seen in 2011.

### Kerang Lakes System and Channels

The 6 on 7 Channel at Winlaton/Tutchewop drains water back in the Little Murray River.

We only get one go at filling the Kerang Lakes. We can put 5,000 megalitres into the First, Second and Third Reedy Lakes

through the Washpen Creek, but can only get 600 megalitres through the top of the 6 on 7 Regulator. In short, you can only fill the bucket once!

A good operations plan is needed around how to use the Kerang Lakes system for flood mitigation.

Along the Sheepwash Creek at the junction of the Loddon and Pyramid Creek there is an opportunity to purchase private land to return to the floodplain. This would support flood mitigation for those communities affected downstream in the Capels Crossing/Murrabit West/Benjeroop areas.

There are a number of recommendations within this submission relating to flood mitigation infrastructure for the Loddon River floodplain.

### Murray River

The Murray River flood took the focus and resources of the Incident Control Centre.

The forecasting of river heights was not well managed and there was a lack of understanding and appreciation by authorities of how the Murray River works.

As expected, the Murray River caused very little impact on Gannawarra; however, resources were diverted to respond to a flood that was never going to occur.

There was scaremongering and misinformation circulating and authorities added to confusion and hysteria, particularly by people who were not knowledgeable on Murray River flood behaviour.

The Koondrook Primary School levee emergency warning is a real example of how authorities can severely mismanage a situation, and this leads to mistrust of the emergency warning systems.

### Waterways management, including responsibility for clearing, maintenance and ownership

Responsibility for clearing and maintenance of waterways needs to be more clearly established.

Council considers it fits best within the responsibilities of a regional catchment agency, but that agency needs to be resourced appropriately to be able to undertake this task.

Council believes there needs to be a balance between the environmental benefits of remnant vegetation and natural habitats within waterways, and the clearing of waterways to allow for effective flood mitigation.

**The following improvements are recommended:**

- 21.** Develop an operations plan around how to use the Kerang Lakes system for flood mitigation.
- 22.** Ensure that Goulburn-Murray Water's Kow (Ghow) Swamp Operations Plan allows for the release of water over Pyramid Creek regulator prior to a flood event to create headspace within the swamp to avoid creating significant flood impacts for downstream areas.
- 23.** Establish responsibility for clearing and maintenance of waterways and ensure annual assessments are undertaken.
- 24.** Purchase private land at strategic locations across the floodplain.
- 25.** Increase understanding of river systems by relevant authorities to ensure that floods are managed better in the future.



**Left: Flooding along the Pyramid Creek from Kow (Ghow) Swamp.**

**8.7 The 2007 decision of the Minister for Planning to approve the construction of the flood wall around Flemington Racecourse and whether the growing impacts of climate change were considered**

This is not relevant to Gannawarra Shire Council and comment has not been made.

## 8.8 The implications for future planning decisions including;

- \* **How the Victorian planning framework can ensure climate mitigation is a consideration in future planning decisions**
- \* **How corporate interests may influence decision making at the expense of communities and climate change preparedness**

There is a need to ensure that the Victorian planning framework addresses a variable climate into the future, for example a climate that is hotter and wetter with more frequent storm and flood events.

Council supports the Victorian Greenhouse Alliance submission seeking the following actions:

1. Amend the *Planning and Environment Act 1987* and the *Climate Change Act 2017* to explicitly mandate addressing climate change at all levels of the planning process.
2. Require every planning amendment at all levels of government, and at all levels of the planning framework, to include an assessment against relevant climate change considerations.
3. Introduce mandatory climate change related minimum standards into planning schemes.

It is recommended that a single authority takes on climate variability/climate change as part of the Victorian Planning Framework.

It would be up to the State Government to determine which department should take on this responsibility and to put in place the appropriate directions and statutory authorities.

In relation to flood risk, the Gannawarra Planning Scheme acknowledges that flooding is a major issue for Gannawarra and that there are significant areas across the municipality subject to poor drainage (Clause 1.0).

The Rural Floodway Overlay (RFO) identifies waterways, major flood paths, drainage depressions and high hazard areas which have the greatest risk and frequency of being affected by flooding.

The Environmental Significance Overlay (ES04) assists in the implementation of floodplain management studies and supports strategic policies in the Municipal Planning Strategy.

In addition, the Land Subject to Inundation Overlay (LSIO) ensures that any development maintains the free passage and temporary storage of floodwaters, minimises flood damage, is compatible with the flood hazard and with local drainage conditions and will not cause any significant rise in flood levels or flow velocity.

A significant majority of land located in Gannawarra Shire falls under the LSIO and is subject to a planning permit for a wide variety of buildings and works.

The implementation of the Planning Scheme relies on other authorities for information that make up the planning provisions, such as Catchment Management Authorities.

However, it is recommended the State Government implements a consistent state-wide planning approach to flood inundation to direct development away from flood-prone areas.

In addition, Catchment Management Authorities should be reinstated as 'determining referral authorities' under Section 55 of the *Planning and Environment Act 1987*.

### The following improvements are recommended:

26. Amend the *Planning and Environment Act 1987* and the *Climate Change Act 2017* to explicitly mandate addressing climate change at all levels of the planning process.
27. Require planning amendments at all levels of government, and at all levels of the planning framework, to include an assessment against relevant climate change considerations.
28. Introduce mandatory climate change related minimum standards into planning schemes.
29. Implement a consistent state-wide approach to flood inundation across the Victorian planning framework to direct development away from flood-prone areas.
30. That Catchment Management Authorities be reinstated as a 'determining referral authority' under Section 55 of the *Planning and Environment Act 1987*.

## 8.9 Any other related matters

### Community and Property Resilience

A study is recommended on the topic of resilience and response of living in a flood prone area. This should identify, through Lidar mapping (satellite mapping), the heights for principal places of residence which may be impacted.

This study is needed to better inform impacted communities of how to protect themselves, their properties, and assets from more frequent flood events in the future.

Previous studies have shown that there have been changes to the landscape, which have affected the quantity and direction of water flow - farms have been lasered, roads have been built up, levees have been altered and bridges and culverts replaced or removed.

More recently the Goulburn-Murray Water Connections program has removed irrigation channels, which have traditionally acted as flood levees, and replaced these with pipes. This has/is altering the landscape and placing additional homes and properties at risk of future flooding.

Property resilience to flooding across Gannawarra is critical with government support required to construct suitable ring bank levees around dwellings and to provide funding to enable these ring bank levees to be maintained to adequately protect homes in the future.

It should also be recognised that many properties across the floodplain are uninsured against flood – flood insurance is simply not available or is cost prohibitive.

The cost of recovery for uninsured properties in the main sits with government. Investing in flood mitigation infrastructure that protects these dwellings against damage makes financial sense.

It is acknowledged that filling sandbags provides an important focus point in communities during a flood event. It is also acknowledged that sandbags have little effect on a floodplain like Gannawarra – an area in which excavators and well maintained levee banks that are above major flood level heights need to be key mitigation strategies for protecting key assets.

It also needs to be acknowledged that evacuating properties is not always the best option. Many of the homes with ring bank levees across the Gannawarra floodplain needed to be monitored constantly, levees strengthened, and water constantly pumped from inside the levee bank. This was a 24-hour job.

Homes with constant monitoring have mainly been saved from damage. There needs to be consideration for people staying in these rural properties and being supported to do so.

There needs to be far greater targeted education and community engagement so that community members better understand how to prepare and have appropriate response mechanisms in place to protect themselves and their properties from flood damage.

Properties with ring bank levees generally have pipes running through for critical services such as septic tanks and stormwater. Homes in Gannawarra Shire have been flooded via these pipes which have either not been blocked off adequately, or at all, to prevent flooding from outside the levee bank into the home.

There should also be an exit strategy/buy back scheme developed to assist and support residents to move out of high risk and isolated pockets of the floodplain.

### Best Practice Technology

Best practice and emerging technology for flood mitigation and monitoring infrastructure needs to be adopted.

People had difficulty in interpreting flood level warnings, which were based on a gauge level at some distant point in relation to the likely impact on their own properties.

A set of agreed trigger points should be implemented for the overall flood event and the community aware of these trigger points and what to do to prepare and respond

In 2011, Gannawarra Shire Council suggested that all households in flood prone areas have clearly identified Australian Height Datum (AHD) levels recorded as reference points, perhaps located in their electricity meter box for easy reference.

Historical data should also be translated into AHD and, where available, megalitres per day, so that historical comparisons can be made when communicating this information to the community.

There is a lack of flood measurement infrastructure in unregulated creeks and rivers in the Gannawarra Shire. Additional measurement points need to be identified, e.g. in the Bullock Creek and at additional sites on the Avoca River upstream of Quambatook, and gauges installed. Other locations include: Calivil Creek, Nine Mile Creek, Bannagher Creek, Wandella Creek and along the Pyramid Creek and Loddon River.

Information on flood measurements should be included on the Bureau of Meteorology website to ensure the community can access regular information on water levels, including historical data in a standardised format.

This will help to keep the community better informed during a flood situation.

### **Flood Wardens/Observers/Information Officers**

In the Gannawarra Shire, flood wardens/flood observers/flood information officers play an integral role during a flood.

One of the greatest benefits of flood information officers is that they deal with issues at the local level, which is strengthened by the fact that they are volunteers.

During the 2011 flood event and the recent 2022 floods, they were seen as leaders by their local community. As a result, they are well connected to the local community, aware of issues at a local level and can provide communication both to inform the local community and to assist agencies with decision making at the strategic level.

The October-December 2022 floods revealed gaps in the flood information officer system across Gannawarra Shire. This needs to be addressed.

There is a lack of transparency amongst the community as to who the flood wardens/flood observers/flood information officers are and what their role is.

A review of the flood information officer system needs to be undertaken along with clarity around who they report to, and who is responsible for induction, training, and ongoing support to ensure that a robust system is in place prior to the next flood event.

### **Flood Planning**

Local level flood planning needs to be undertaken in consultation with the community in order to capture and document local knowledge so it can be used to inform flood response and management in the future.

The current VICSES local flood guides are inadequate and generally not considered by our communities to be useful.

Local level flood plans should instead be a detailed guide for emergency services and the community and include key milestones/trigger points for action.

The importance of connecting local on the ground knowledge with the data and technical expertise skills of key flood control agencies has been widely identified.

Increased use of local knowledge to assist in flood predictions and modelling and better harnessing of local expertise during the management of a flood event is supported.

### **Resourcing of Agencies**

It is important that there is adequate resourcing and staffing of agencies to undertake their role appropriately in an emergency situation of this magnitude.

In a flood, the catchment needs to be managed by a broader regional body that can look at how the whole catchment interacts, but with a strong local knowledge and local presence.

Further, a substantial amount of information, corporate knowledge and history appears to have been lost.

Knowledge sharing, training and system exercising is required to build capacity across the state to respond to large scale flooding.

The Local Government Liaison Officer in the ICC needs to have local knowledge. As stated previously in this submission, the ICC should remain in Bendigo where it can be appropriately staffed to ensure constant and consistent decision making to support a timely response.

There also seems to be a lack of understanding by government, and indeed emergency authorities, of what Council's legislated role is in an emergency. Councils are not resourced to upscale to respond to an emergency or to be expected to respond to a whole myriad of requests.

There were issues experienced regarding the credibility of information being released to the community. A specific example of this is inaccurate transport information. While closing roads was done well, the de-escalation was done very poorly. This left Council in a position of having to field comments and be somewhat 'blamed' for the chaos created, in this specific example, by the Department of Transport. The Department of Transport needs to take a far more active role to ensure that transport information is accurate.

The State Government needs to understand the roles and responsibilities of all authorities, government departments, and local government in responding to emergencies. Ensuring that all are appropriately resourced to undertake this work is essential to future planning.

### **Recovery Process**

Recovery processes through Emergency Management Victoria and Emergency Recovery Victoria need to be improved. The current process is disjointed, cumbersome and confusing for residents and staff.

It is recommended that recovery processes and services are streamlined, documented, and better communicated so that timely and relevant support can be provided to impacted residents, communities, and local government in future flood events.

**The following improvements are recommended:**

- 31.** Conduct a study on community and property resilience of living in a flood prone area as part of the formal recovery from the October-December 2022 floods.
- 32.** Implement a formal system to increase property resilience to flooding such as the Australian Height Datum (AHD) displayed in electricity meter boxes.
- 33.** Investigate the insurance industry and how it responds to flood.
- 34.** Implement targeted education and community engagement in high-risk flood areas so that residents better understand how to prepare and take appropriate response mechanisms to protect themselves and their properties from flood damage.
- 35.** Ensure that Flood Information Officers are in place along all river systems and that a robust system is in place to ensure that local knowledge genuinely forms part of flood preparedness and response, and that reporting structures, roles and responsibilities are well defined and understood by both the officers and the community.
- 36.** Resource councils so that they have the necessary financial capacity and appropriately trained staff to prepare and respond to emergency events, in particular a flood event which is the highest risk for Gannawarra.
- 37.** Ensure that recovery processes and services are streamlined, documented, and better communicated so that timely and relevant support can be provided to impacted residents, communities, and local government in future flood events.



**Left: Murrabit West Road (centre left) looking West, showing homes surrounded by water and Goulburn-Murray Water channel acting as levee bank preventing further flooding (photo courtesy Paul Oswin).**

Queries or further information in relation to this submission  
can be directed to:

**Chief Executive Officer**

**Gannawarra Shire Council**

PO Box 287  
Kerang VIC 3579

E: [council@gsc.vic.gov.au](mailto:council@gsc.vic.gov.au)

Ph: (03) 5450 9333