Dear Mr Koch,

Thank you for the opportunity to provide a submission to the inquiry into flood mitigation infrastructure in Victoria. Firstly, the Wimmera CMA welcomes any review that provides important recommendations that improve the development and management of flood mitigation and monitoring infrastructure. Recent flood events in the Wimmera, culminating in January 2011 have allowed us to provide valuable insights into the benefits and risks associated with flood mitigation infrastructure. I commend the Committee on addressing this important issue and offer any assistance the Committee requires from this organisation in developing recommendations to improve current arrangements.

Wimmera CMA has responsibilities regarding the management of the floodplain through its Statement of Obligations under the Water Act (1989). The Authority considers best-practice floodplain management to encompass a suite of functions to reduce; the likelihood of potential loss of life, the risk to health, and damage to property.

Wimmera CMAs approach to achieving this requires;

- an intimate knowledge and understanding of flood behaviour through flood investigations;
- coordination of adequate flood warning systems;
- provision of adequate planning controls to oversee development on floodplains, ensuring any new development are not subject to flooding nor does it transfer the flood risk profile to other parties. This in turn minimises the need for and risks associated with flood mitigation infrastructure;
- flexible and proactive management of known risks i.e. removal of serious threats to infrastructure; and
- working with councils, emergency services and the community to better prepare for and respond to floods.

This approach for the past ten years allowed for a professional and well planned response to the flood events of January 2011. It should be noted that no loss of life, critical injuries and risks to health occurred, however there was significant damage to individual property, infrastructure and assets, including houses.

There is a need for greater acceptance by the community that floodplains are a permanent and important part of our landscape and activities whether they be building or farming on a floodplain have inherent risks. It has been challenging for some members of the community to understand these risks especially on the back of 12 years of below rainfall and drought conditions with many members of the community not witnessing or being effected by flooding ever. Whilst we can all aim to reduce these risks they cannot ever be eliminated.
Learnings from the recent floods has concentrated our focus on three key areas required to deal with floods as effectively as possible;

**Flood Planning - Understanding flood behaviour through accurate flood modelling**
This is essential to ensure flood risks are identified and can be well planned. Modelling also underpins statutory responsibilities for example controls on building new houses on the floodplain. It also enables effective mitigation measures (e.g. improving drainage) to be identified.

**Flood Preparedness - Defining interagency and community roles and responsibilities prior to floods, including building capability**
This ensures effective communication during floods therefore enabling greater preparedness and more co-ordinated and effective response to floods.

**Flood Response - Providing resources to undertake actions and collect information during floods:**
Whilst flood mitigation activities are limited during flood events, actions such as methodical data collection and defined processes for clearing objects that may have built up on bridges and weirs are important in improving future flood planning and preparedness and minimising damages.

Wimmera CMA has numerous suggestions for the inquiry to consider that improve the appropriateness and effectiveness of flood mitigation which are attached with this letter.

Should you have any queries regarding this submission please contact Tony Baker, Planning and Assessment Manager at this office.

Yours sincerely

DAVID BRENNAN
CHIEF EXECUTIVE
Wimmera CMA provides the following comment in response to the Environment and Natural Resources Committee Inquiry into Flood Mitigation Infrastructure in Victoria, terms of reference;

(a) identifying best practice and emerging technology for flood mitigation and monitoring infrastructure including river gauges;

**Flood modelling** has rapidly become an invaluable tool for agencies and the community to better understand flood behaviour at a range of flood events. Model developments goes through a rigorous process of calibration, using information from previous floods, streamflow gauges, aerial photos and floodmarks created by community members. Flood models are also able to quantify the effectiveness of flood mitigation options through identifying changes in flood height and extent. It also enables communities to make well-informed decisions around what flood mitigation options are feasible (i.e. are the benefits of large levees built along waterways through the middle of a town to protect some houses from a large flood preferable to the financial costs and loss of amenity for the entire community). Wimmera CMA has managed a number of flood modelling projects which have proven to be extremely useful in highlighting areas where resources can be targeted to protect assets. However there are additional areas that require flood modelling work into the future, especially rural areas given the focus has been townships to date. It should be noted that flood modelling work is a complex process typically taking at least a year and is resource intensive in terms of funding and labour.

**Water storages** are often an unviable option to mitigate floods and storage managers are constrained by demands on storages for water supply along with operational constraints (e.g. outlet capacities). Historic floods have typically occurred following on from wet periods where water storages are typically very full due to significant inflows and low demands. Recent experience has shown that when inflows are sufficient to cause storages to spill the local community are significantly impacted due to a sense of complacency that the storage will buffer any flood. Storages are typically operated with a limited flood reserve in winter/spring which can only buffer small to medium floods to some extent. Operational practices of having storages as full as possible during summer for water supply security means that there is virtually no capacity to affect a flood event in summer should it be preceded by a wet spring. Communities and agencies should not overestimate the flood mitigation options afforded by water storages when undertaking flood planning and preparation.

**Drainage and channel management** is another issue that was raised during the floods, especially now the Wimmera Mallee stock and domestic channel system is now obsolete. There are many calls for government agencies to build and develop drainage systems to ameliorate flooding. Wimmera CMA is not currently funded to deliver this. A pragmatic approach to manage drainage could be where landholders impacted by drainage issues develop community-based schemes to deal with flooding with oversight by responsible authorities where relevant to ensure that there are no third party impacts from the proposal and a holistic floodplain response is achieved. Given the lack of public benefit from such schemes, they should be established and maintained by the parties affected by the drainage problem under statewide frameworks and standards. This could be through developing a community committee of management with a rating base to fund works for the maintenance of these schemes.

**Recommendations:**

- That flood modelling be utilised as extensively as possible to inform decisions around flood mitigation options.
- That agencies and the community be sufficiently aware of the limitations of water storages in flood mitigation and their primary role for water supply when undertaking flood planning and preparation.
- That where community members seek to improve drainage that they, with local government, develop and maintain formal drainage schemes subject to approvals from an appropriate authority under a revised statewide framework dealing with drainage to avoid third-party impacts.
Flood Monitoring Infrastructure

Flood monitoring gauges are invaluable in terms of predicting flood extents and timing. Yet they are constrained by the need for suitable geographic locations (i.e. stable, confined river channels rather than broad floodplains) and a long historical data series (i.e. a number of decades capturing flows over a range of high and low flow events). In some locations such as the mid-reaches of the Wimmera River there is no suitable place in the landscape to locate a gauge. In other locations, flash floodwaters coming off small and/or rocky catchments would be better served by warnings from automated rainfall gauges and rainfall radars rather than streamflow gauges. Flood warning gauges are expensive to establish, maintain and their heavy reliance on technology means they can be subject to failure. Therefore there is a need to carefully consider the number, type and location of flood warning gauges to ensure a comprehensive, effective and efficient network is established.

A number of streamflow gauges in the Wimmera CMA region were damaged or destroyed by the recent unprecedented floods (Figures 1 and 2). Historically gauges were typically located in close proximity to river channels to reduce construction expenses and were limited due to the available technology (e.g. mechanical instead of electronic water level sensors). Furthermore gauges are built and maintained by staff who have a hydrological rather than construction background and are therefore not necessarily as robust as should be the case. However new technology means that measurement equipment may be sited much further away from river channels to ensure that they remain operational especially during the largest floods, when they are needed most. They are also unfortunately periodically subject to vandalism which is not only expensive and time-consuming to repair but could mean that a gauge could be out of commission before a flood event. Increased funding to improve the strength of streamflow gauging equipment as well as a public awareness campaign highlighting the critical need for functioning streamflow gauges and the danger to the community created by damaging them would improve the current situation.

Ideally all current and new gauges would be built by appropriately qualified staff. Standards for construction and maintenance should also be established to ensure they are able to withstand events up to at least a certain designated flood event (e.g. 1 in 200 year event).

Figure 1: Organic material pushed up on the flood warning streamflow gauge on the Wimmera River at Glynwyllin
It is important to note that in its consideration of what it believes constitutes best practice for flood management, Wimmera CMA did not solely rely on river height data from the Bureau of Meteorology website but also had contingencies in place such as the EnviroMon system providing continuous river height data to the Wimmera CMA office as well as having regular updates from on-ground observers. This in-turn meant that when flood warning gauges failed, the Bureau of Meteorology and other agencies were kept informed of current river conditions. Both of these methods, whilst invaluable in floods had limitations in that the EnviroMon system required a functioning gauge and on-ground visual observations are dangerous during flood periods and impossible to undertake when access is prevented. However technology has advanced sufficiently so that it is worthwhile investigating the feasibility of remote camera technology stationed at gauges that can transmit live images of river heights as measured at gauge boards to another safer location as a redundancy should measurements from water level sensors fail.

**Improved radar coverage** will assist towns like Natimuk, Hall’s Gap and Navarre are susceptible to flash flooding. As Mt Gambier and Mildura are the closest weather radars, at least 200 km from these locations a weather radar should be constructed in the Wimmera to improve the confidence of the magnitude of oncoming heavy rainfall events and enable these towns to be better prepared.

**Climatic monitoring** highlighted that Eastern Australia was in a La Niña phase. Whilst not always a guarantee of higher than average rainfall, consideration should be made as to building public awareness and agency preparedness of an increased flood risk when we re-enter a La Niña phase.

**Recommendations:**

- That minimum engineering standards be established for streamflow gauge construction to ensure gauges are of sufficient accuracy and withstand large flood events and if necessary gauges upgraded by suitably qualified staff;
- That new technology be investigated and implemented that can improve the ability of streamflow gauges to withstand higher floods and vandalism and provide redundancies (e.g. remote camera technology and/or safely located staff access);
- That a public awareness campaign be undertaken to highlight the risks to the community created by vandalising flood warning streamflow gauges;
- A weather radar be situated in the Wimmera to improve understanding of rainfall to improve preparedness of towns impacted by flash flooding.
- During La Niña phases there be increased awareness and preparedness for flooding.
Flood mitigation works undertaken during floods

Townships located in the lower catchment had sufficient warning of the approach of a large flood event to undertake preparations which included construction of informal 'levees' which were lines of earth pushed up by earthmoving machinery along the edge of waterways. This most notably took place in Warracknabeal (Figure 3) which helped prevent flood damages to houses in the township but did so at significant risk. Should the 'levee' have failed floodwaters would have rushed in, trapped on the inside of the levee to flood houses to a greater depth than would have been the case otherwise and would have flooded other houses that were previously not at risk of flooding. It potentially would have made those who had undertaken the flood mitigation works liable for damages under Section 16 of the Water Act (1989) for unreasonably interfering with the natural flow of water. Furthermore other communities saw the success of the efforts to help Warracknabeal and sought to replicate it elsewhere. However along with the reasons stated above, it must also be remembered that peak flows along the Yarriambiack Creek were only about 10% of those along the Wimmera River. Therefore communities seeking to conduct similar actions on the Wimmera River would have been dealing with flows an order of magnitude greater than those on the Yarriambiack Creek, significantly increasing the risk of significant failures to hastily constructed flood defences.

Figure 3: Informal embankment along Yarriambiack Creek in Warracknabeal, note it has artificially raised the water level on right-hand side.

Map 1 includes an aerial photo of Beulah, a small township in the southern Mallee affected by flooding from the Yarriambiack Creek, several key points (1 to 3) and the modelled flood extent of a 1 in 200 year flood event are also included. The following description highlights additional issues with flood mitigation during the flood event. For example, at Point 1, modelling shows that the blockage of the bridge under the railway line that was undertaken (Figure 4, before authorities requested it be reopened) clearly would have reduced flooding to the east of the bridge but would have exacerbated flooding through the town by up to 0.3m (Map 2). Point 2 is where earthen embankments were constructed on the south side of Beulah Recreation Reserve (Figure 7), however Map 1 shows that even in a 1 in 200 year flood, it is not at risk as it is an elevated point, thereby wasting resources that could have been effectively used elsewhere. Finally Map 3 shows the impact of increasing the capacity through the town weirs (Point 3), an effective approach for flood mitigation that ideally should be undertaken during the long intervals between floods but happened during the floods, cutting an important road. The flood of January 2011 did not result in flooding in the township, in part due to mitigation actions (increasing capacity through town weirs).
Map 1: 0.5% Annual Exceedance Probability (AEP) (1 in 200 year) flood map for Beulah with locations of interest identified.

Point 1 (Figure 4)

Point 2 (Figure 7)

Point 3
Figure 4: Note piles of sandbags ready to be used to block the flow of water under the railway bridge.

Map 2: Flood mapping showing flood height differences for a 1% AEP event based on blocking of flow at the railway bridge.
In one serious incident, informal levees were erected over railway lines without warning railway managers potentially leading to fatal consequences had not the Victoria Police been informed of the situation in time to warn the railway manager.

A suggested way forward is to consider actions that might be undertaken during floods such as erecting earthen embankments in the lead up to peak floodwaters arriving through the development of Flood Response Plans by local governments. Flood modelling can determine the effectiveness of these actions, where they are appropriate and the risks to the community should they fail. That way the community can make an informed decision around what are the tradeoffs around risks and rewards (e.g. do the benefits of an informal levee preventing flooding should it be effective outweigh the risks should it fail of flooding additional houses to what would have been the case had it not been constructed). Agencies and the community would then have a clearly documented suite of actions they need to undertake during a flood instead of the problems associated with an uncoordinated approach. It would also enable agencies and the community to try and protect the additional properties put at risk in case these informal levees fail as currently there is no ability to ascertain these properties as current flood modelling assumes an unaltered floodplain.

There was a great deal of uncertainty amongst the community with what constitutes appropriate flood defences for their property. Urban residents sandbagged driveways and front yards to prevent floodwaters even entering their property instead of just sandbagging around buildings (Figure 5). This simply displaced floodwaters elsewhere, creating additional problems for their neighbours. Similarly culverts were blocked in a number of locations, preventing floodwaters spreading and artificially raising local flood levels.
Sandbagging property boundaries instead of houses such as this one in Dimboola was common and reduced overall floodplain capacity.

Furthermore, a number of road crossings of waterways were excavated out during the floods (Figure 6), leading to limited reductions in water level and therefore need to be considered if they are an effective part of an overall response or cause unnecessary costs and inconvenience with the need to reinstate them. Digging out a road crossing to improve channel capacity that might marginally reduce flood levels in farmland will be costly to reinstate, provide an obstacle to emergency response agencies and cause extensive public inconvenience once floodwaters drop. Once again the pros and cons of these actions need to be considered in the development of Flood Response Plans by local government and clearly stated within them where and when they make take place.
Figure 7: Note embankment created on southern edge of Beulah Recreation Reserve where there is no identified risk of flooding as it a local high point.

**Recommendations:**

- That flood response plans are sufficiently considered by councils and emergency response professionals to reflect a true sense of actions likely to be undertaken during emergency events. These need to be then modelled to assess impacts before final approval within the response plan;

- That there be concerted efforts to educate agencies and the community around what can and cannot be done both legally and practically with respect to flood mitigation during a flood event, highlighting the risks to life and property should they be disregarded.

(b) the management of levees across Victoria, including ownership, responsibility and maintenance on both public and private land;

Since European settlement many towns have been built around waterways at the time the flood risks to these towns were not well understood. As a result of historic flood impacts, many levees have been built as mitigation infrastructure for small to medium floods.

As a general rule flood mitigation infrastructure should only be developed as a last resort to protect development that currently exists on floodplains. Levees are expensive to construct and maintain and are susceptible to failure or overtopping, trapping floodwaters and causing greater impact than if they were not constructed in the first place. Levees also reduce the local floodplain storage, artificially raising floodwater levels elsewhere and inundating additional areas than would otherwise be the case.

Recent events from around the world have shown that where infrastructure is constructed to mitigate a natural hazard the infrastructure inevitably fails in extreme events and the consequences are devastating. This has been highlighted by recent tragedies such as the severe Mississippi River flooding that overwhelmed billions of dollars of flood mitigation infrastructure and the tsunami in Japan washed over walls built to protect them. Both of these world events highlight the unfortunate reality that nature can not be harnessed by constructed defences. It is because of these issues that Wimmera CMA advocates that prevention is better than cure and risks to life and property should be minimised by not allowing inappropriate development on the floodplain. It is critical that CMAs retain their functions under the *Water Act* (1989) regarding referrals for development on floodplains.
It is also critical for the community and government to accept that floods are a natural and important part of a dynamic Australian landscape that bring benefits to natural ecosystems and productive land through the cycling of nutrients, watering of wetlands and adding moisture to the soil profile.

**Constructed landscape features acting as levees**

It should be noted that a number of other artificial features such as raised roads, channel embankments and inadequately sized and located bridges/culverts act as levees and provide a degree of flood mitigation in some areas whilst exacerbating flooding in others. The relatively flat topography of the Wimmera floodplain means that landscape features such as raised roads have significant impacts on flooding. Maps 4 and 5 are flood modelling maps that shows the differences in flood levels caused by constructed features on the landscape, it highlights locations where roads, channels and railways impact on the movement of water on the floodplain. Areas in warmer colours (yellow to red) show where flood heights are increased due to features on the floodplain, the cooler colours (green to blue) show where flood levels are subsequently reduced. It should be noted that this compares well with community information provided around key features influencing flooding provided during public information sessions. Not only do these features currently pose significant risks but also the construction of similar new features are typically exempt from referral and approval processes for floodplain development. These current arrangements should be reconsidered.

Map 4: Flood impacts caused by constructed features on the floodplain near Horsham
As part of responsible floodplain management, Wimmera CMA believes discrete well-constructed and maintained levees as part of official levee schemes can be critical for protecting buildings and community currently at risk of flooding and minimising third-party impacts. It is recommended that rigorous flood modelling is used when looking at options around enhancing flood mitigation to ensure that the problem is not being transferred elsewhere (e.g. extending levees on one side of the river worsening flooding on the other side). It is also recommended that the standards of construction are adequately prescribed at the outset along with ongoing management expectation and onus of responsibility for such to the relevant bodies (i.e. establishment of a formal levee scheme) prior to any such activity being considered.

**Learning the lessons from the past**

“...there is a general lack of ownership, monitoring or maintenance of Victoria’s significant levees.”


The above quote highlights that government awareness of and investigations into the complexity of levee management are not a recent phenomenon. There has been a very long history of levee construction in Victoria with levees constructed by soldier settler programs, local governments, river improvement trusts and private landholders amongst others. This uncoordinated approach has led to a disjointed and often dysfunctional arrangement where the ownership of levees is often unclear, resulting in a lack of maintenance.

Levees protecting urban areas have typically been constructed by and are typically managed by local governments however given the large number of other competing demands for limited funds, levees have generally had little to no maintenance take place, especially during the recent drought.

A case in point within the Wimmera was the township of Jeparit where a flood study for the town completed in 2008 highlighted that due to widespread concerns about the size and integrity of the town’s levees it would be worth investigating their refurbishment and raising. A lack of resources prevented the local shire from undertaking these works and as a result, incident management was conducted on the basis that the levee would fail.
Levees protecting rural areas were typically constructed by defunct organisations such as River Improvement Trusts or local water boards or landholders themselves. Often levees were simply pushed-up mounds of soil created during flood events. Ownership of these levees is even more ill-defined than ones for urban areas hence there is negligible maintenance and present an ongoing risk to life and property should they catastrophically fail.

As has been highlighted as long as 20 years ago, it should be a priority to:
- Identify legal ownership of levees;
- Determine levee integrity and the flood magnitude they have been built to;
- Attribute maintenance responsibilities whilst ensuring they are adequately resourced;
- Develop standards of integrity and flood magnitude to which levees can be built under a range of scenarios;
- Determine what a reasonable level of protection should be afforded by levees;
- Determine legal liability issues should they fail; and
- Provide a mechanism by which landholders negatively impacted by levees can receive recourse/compensation.

It is strongly recommended that a principle be applied of the beneficiary of the protection afforded by the levee contribute to their ongoing maintenance. This works to some degree with local governments who collect rates from residents to utilise on works such as stormwater drainage and levee maintenance works as laid out in annual budgets. CMAs have no rating base, relying on annual State and Federal Government funding to work on a range of activities aligned with priorities established in national, state and catchment-scale plans and so it would be inappropriate to attribute any management of levees to CMAs unless appropriate levels of ongoing funds were committed and legal issues of liability clarified.

Network of levees and drains protecting rural land could have formalised landholder entities (schemes) responsible for the collection of fees from the landholders benefitting from the protection afforded by the infrastructure to go towards its maintenance. Liability issues associated with the negative impacts of levees on other parties is more complex and should be carefully considered by the inquiry when making recommendations.

Furthermore any works to maintain and/or enhance levees should be referred to local government as they are defined as ‘works’ within the Victorian Planning Provisions with CMAs playing a vital role as a referral authority.

Recommendation:
- See above text for detailed recommendations re. levee management.

(c) waterways management, including the nature and extent of vegetation clearing within waterways and their general maintenance;

Wimmera CMA would contend that the wording of this term of reference is not entirely helpful in terms of gaining meaningful feedback on the complicated issue of riparian management. It is misleading for the community to believe that clearing waterways would address flooding issues. Research has demonstrated that vegetation plays an important role as a relief valve through slowing and lowering flood peaks. This reduces the extent of flood impacts and gives agencies and the community additional time to prepare for flood peaks.

Vegetation within a waterway was acts as a water quality filter, reduces bank erosion and provides habitat. Associating the words “general maintenance” with waterways could imply that they are in the same category as sporting fields or roads, discrete, inert parts of the landscape rather than dynamic and complex like a coastline. There are a number of practical and legal facets to this issue of riparian management which are addressed as follows:
Practical Considerations around Waterways Management

There have been incidents where extremely thick in-stream vegetation or debris may have marginally exacerbated flood heights at a local scale. Research has conclusively demonstrated that at catchment scale riparian vegetation and snags lower flood peaks through slowing floodwaters as they pass around trees through long grass and broadacre crops grown upon floodplains (Figure 8). This slowing of floodwaters across the catchment means there is a greater staggering of floodpeaks from tributaries entering larger waterways reducing potential peaks and velocity of water. It also means there are increased volumes of water staying on floodplains rather than entering waterways.

The experience of January 2011 validated this in terms of observing the most severe flood impacts were located immediately downstream of eroded gullies with no vegetation to speak of where water rushed out onto the floodplain immediately downstream (Figure 9 and 10). Contrast this with areas which were well vegetated where flood impacts were lessened as high flows continued for a longer period but not at such a large peak volume.

Figure 8. Modelled flood waves down a 50 km reach, with and without vegetation. (from Anderson et. al., 2007)
Figure 9. Flooding near Navarre on 14th January 2011, just after heavy rain, note the difference in water on the floodplain in the vegetated areas (square - right) compared to the eroded gullies (square - left).
Figure 10. Flooding at Navarre on 14th January 2011, the lack of vegetation and floodplain storage meant that floodwaters arrived in a higher and faster flood peak than would otherwise have been the case.

Riparian vegetation provides crucial habitat for aquatic and riparian species. It prevents accelerated erosion of waterway channels, impacting on adjacent landholders and causing loss of productive land, smothering waterway habitat such as deep pools and leading to declining water quality. Practices of the former River Improvement Trusts around widespread vegetation removal in the past are understood to have been counterproductive to both protecting communities and waterways from flood damage and have therefore been abandoned.

The use of fire as a way to control in-stream vegetation is also unfeasible as typically following a fire, large stands of grasses and reeds recolonise river channels and partially burnt logs are more buoyant than unburnt logs and are much more likely to be washed downstream wedging against weirs and bridges. Furthermore the fact that snags are vital fish habitat means their removal will impact on fish communities and angling opportunities.

Waterways, being dynamic systems respond to a number of drivers such as local geology and stream flows. It goes without saying that the greater the flow, the wider the river. The lack of flow caused by the drought and over-extraction led to sediment and vegetation filling in channels and constricting channel capacity. Similarly following the floods, the scouring of vegetation and sediment has led to an increase in channel capacity. Therefore provision of improved flows through environmental water releases and minimising extraction will in time increase channel capacity.

Dilemmas Associated With Vegetation Clearing

Although the benefits would be typically negligible, those who promote the need to “clear out” a stretch of river would also need to resolve a number of dilemmas. What would constitute an area where this should take place? If it was just around urban areas, where would be the line of demarcation between urban and rural areas given the proliferation of small acreage properties on the periphery of some towns (Figure 11)? Furthermore to what extent is it fair and equitable for additional flooding problems to be transferred downstream? There is also the impossible task of determining what vegetation or debris will be an issue during a flood. Whilst it is obvious if there are large logs or thick vegetation growing up against a bridge that this will be problematic, it cannot be said whether a log 200 metres or 2 kilometres upstream will be mobilised and impact on this infrastructure.
Figure 11. Flooding at Horsham highlighting issues around where is the rural/urban divide for flood protection (e.g. where would an agency cease ‘maintaining’ to a waterway to provide negligible benefits for urban areas c.f. rural ones) and if levees were built to protect properties on the western bank, it would probably flood houses on the eastern bank.

Legal Considerations around Waterways Management
Wimmera CMA has the following responsibilities under the Water Act (1989):

189 Functions of Authorities

(1) An Authority that has a waterway management district has the following functions in relation to designated waterways and designated land or works within that district—

(bb) to—

(i) develop and implement plans and programs; and
(ii) carry out works and activities—

  to improve the environmental values and health of water ecosystems, including their biodiversity, ecological functions, quality of water and other uses that depend on environmental condition;

It is important to note that these functions relate to the enhancement of the broader environmental, social and economic functions waterways provide rather than mitigating the risks posed by waterways during floods. Therefore to achieve this, based on priorities developed in consultation with the community through the Wimmera Waterway Health Strategy 2006-2011 (Wimmera CMA, 2006) and best-practice techniques, Wimmera CMA has undertaken many activities around protecting and enhancing riparian vegetation as well as limiting erosion.

Current riparian vegetation management process
Wimmera CMA has for a number of years, issued permits to groups or organisations who wish to conduct works, moving vegetation that poses a risk to property in times of flood. These permits are free and are typically quick and easy to obtain. Wimmera CMA does not undertake vegetation removal as part of its typical waterway management activities however has undertaken works following the flood where vegetation is posing a threat to a public asset. However given the limitations of funding and ensuring it is targeted to the highest priority activities for waterway management, it would be worth considering a level of ongoing funding and creation of an appropriate a code of practice to address locations where vegetation poses a risk to public infrastructure. However this would be no guarantee that similar issues around damage to bridges, weirs etc. would not happen again in a future flood.
Removal of debris during the flood response

Wimmera CMA acknowledges that floating vegetation and debris (such as hay bales and water tanks) can lead to localised funding issues (Figure 12). These objects need to be actively managed during a flood event through Flood Response Plans, locations such as bridges and weirs can be identified where actions such as stationing excavators can be undertaken.

![Figure 12. "Haybergs" and other items were washed off floodplains and into waterways, threatening infrastructure. (Photo: Wimmera Mail-Times)](image)

Managing vegetation risks to public and private infrastructure

When it is clear that where there is an obvious risk to public infrastructure then it is appropriate that there should be removal of this risk by a CMA or other agency. Clearly defined roles about the responsibilities of agencies such as CMAs, VicRoads, Parks Vic, water corporations and local government would assist in improving this. When landholders perceive there is a risk of increased flooding to their land due to vegetation then, they and not CMAs should be responsible for undertaking the works after receiving a Works on Waterways permit to ensure that they are done correctly.

**Recommendations:**

- **That** there must not be a return to past practices of widespread vegetation removal and clearing from waterways and floodplains due to the negligible reduction of local flood levels and negative impacts of increasing erosion, loss of habitat and downstream flood peaks;
- **That** efforts are made to minimise water extraction from waterways to ensure sufficient channel capacity is maintained in the longer term;
- **That** individuals and organisations concerned about potential flood impacts of vegetation on private property undertake works themselves (subject to permits issued from CMAs);
- **That** locations where floating vegetation or debris may be an issue be identified with suitable mitigation options be identified in municipal Flood Response Plans;
- **That** agencies be provided with ongoing funding to remove vegetation and debris that threatens public assets with an understanding that risks of flooding to public assets cannot be eliminated; and
- **That** a code of practice is developed to determine appropriate levels of vegetation removal surrounding public assets at risk.

(d) Identifying those entities and individuals having ownership of waterways and the responsibility for their clearing and their maintenance;

The identification of entities and their responsibilities involves looking at acts of Parliament and is an extremely complex issue where advice and information should be sought by the Committee from the Department of Sustainability and Environment's Public Land and Land Victoria Divisions as well as the Surveyor-General and Solicitor-General of Victoria.
Ownership of Waterways

In a general sense, the Land Act (1958) contains the following with respect to ownership of waterways;

385 Crown property in bed and banks of certain watercourses

(1) If—
   (a) land is bounded in whole or in part by a watercourse; and
   (b) the land was alienated by the Crown before, or is so alienated on or after, the commencement of section 327 of the Water Act 1989—
      the bed and banks of the watercourse remain, and must be taken always to have remained, the property of the Crown despite the alienation of the land and despite the fact that the same person owned or owns, or holds or obtains a consolidated certificate of title for, the land adjacent to both banks.

(2) This section does not affect any right of—
   (d) the Council of the City of Melbourne; or
   (e) the Port of Melbourne Corporation; or
   (f) the Victorian Regional Channels Authority;

   in the bed and banks and soil of the River Yarra and of all other public rivers, creeks and watercourses within the metropolis.

(3) This section does not affect any right of any person in the bed and banks of a watercourse that does not form the boundary or part of the boundary of land that was alienated by the Crown before, or is so alienated on or after, the commencement of section 327 of the Water Act 1989.

The convoluted history of riparian land tenure in Victoria has led to a situation where in most cases the bed and banks of major waterways belong to the Crown although there are exceptions where there is private ownership to the centre of a waterway.

Responsibilities for waterway clearing and maintenance

Under the Water Act (1989), CMAs have the following responsibilities with respect to waterway management:

189 Functions of Authorities

(1) An Authority that has a waterway management district has the following functions in relation to designated waterways and designated land or works within that district—
   (a) to identify and plan for State and local community needs relating to the use and to the economic, social and environmental values of land and waterways;
   (b) to develop and to implement effectively schemes for the use, protection and enhancement of land and waterways;
      (ba) to—
      (i) develop and implement plans and programs; and
      (ii) carry out works and activities—
      to maintain the environmental water reserve in accordance with the environmental water reserve objective;
      (bb) to—
      (i) develop and implement plans and programs; and
      (ii) carry out works and activities—
      to improve the environmental values and health of water ecosystems, including their biodiversity, ecological functions, quality of water and other uses that depend on environmental condition;
   (c) to investigate, promote and research any matter related to its functions, powers and duties in relation to waterway management;
   (d) to educate the public about any aspect of waterway management.
In performing its functions under this Act, an Authority that has a waterway management district must have regard to the need to maintain the environmental water reserve in accordance with the environmental water reserve objective.

It should be noted that there are no directions for CMAs to “clear” or “maintain” waterways but rather the converse, to protect and enhance them. This is consistent with appropriate waterway management and funding from government since organisational inception. However, as mentioned previously Wimmera CMA has issued numerous permits for individuals and organisations to remove or relocate vegetation that are located within waterways under appropriate conditions which is done at their own expense. There is a need for control (via the permitting process) to ensure works are done appropriately so as to not impact on the condition of the waterway or cause off-site impacts, especially on neighbouring properties. A successful recent example and useful model for the Committee to consider is where a local CFA brigade received funding and undertook some works to move some vegetation in the MacKenzie River that were perceived to potentially increase localised flood levels. The Committee may wish to consider the need for communications to the public around roles and responsibilities for waterway management and where actions to manage vegetation (i.e. to protect public assets) may be appropriate in order to clarify what is currently a confusing issue.

**Recommendation:**
- That there be improved communication to the community on roles and responsibilities for waterway management.

(e) The extent to which, if any, local knowledge of residents is employed in effecting waterways clearing and maintenance.

Community involvement and local knowledge is crucial for effective waterway management. Community consultation is an important part of the development of waterway action plans which outline recommended actions to improve and enhance the region’s waterways. During numerous flood studies conducted over recent years for the Wimmera CMA, a key component has been the community consultation process in terms of passing on valuable knowledge of flood behaviour from past floods to validate or modify the outcomes of flood modelling results as well as suggesting options for effective flood mitigation to be considered in Flood Response Plans. In most cases, despite significant publicity in the local media there has been limited community information provided as the flood studies were all completed during the worst drought on record and so flooding issues were not a priority for local landholders. Submissions received and meeting attendances were typically between 10 and 20 for town flood studies completed since 2003.

Whilst community feedback includes generic comments around vegetation posing risks of causing additional flooding and there are some areas that have been highlighted by the community where vegetation is denser than previous years as dry conditions have led to vegetation encroachment. Wimmera CMA has been proactive in promoting Works on Waterways permits which are issued to individuals or organisations wanting to undertake works such as moving vegetation that they believe pose a risk. These permits are free and are a straightforward process and groups such as rowing and waterskiing clubs have taken advantage of this although some landholders and community groups find it difficult to resource such activities.

Following the floods, Wimmera CMA conducted a large number of meetings to gain community understanding and information relating to what had happened particularly during the floods of January 2011. Wimmera CMA representatives also attended a number of flood recovery community meetings run by local government which also assisted in gathering information.

Wimmera CMA is aiming to improve the input from local residents during flood periods through establishing groups via local government, Landcare and/or VFF to monitor flood heights and rates of water level change at key locations to supplement streamflow gauging information and provide more locally significant information to the community.

**Recommendation:**
- That CMAs continue to collect local knowledge during flood studies and other occasions as required; and
- That support be provided to build volunteer flood monitoring networks.
REFERENCES


