



Waterhole Creek

Waterway Management Plan

*Final
December 2013*



West Gippsland
Catchment Management Authority




*Reach 3a (Township Reach) – Lake Kernot
pathway running alongside Waterhole Creek*

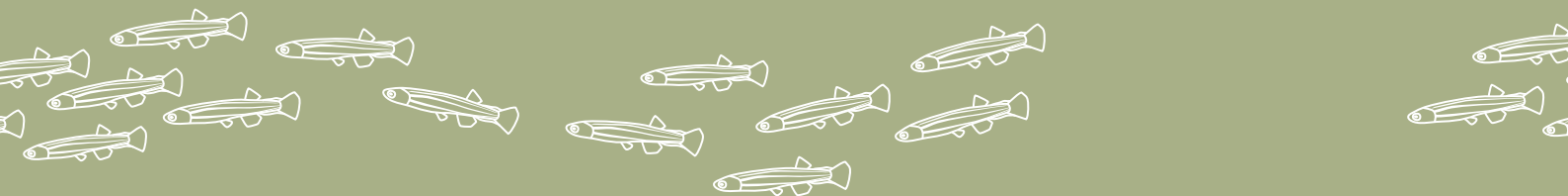
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Preface

The West Gippsland Catchment Management Authority (CMA) and Latrobe City Council have developed this Waterway Management Plan for Waterhole Creek to guide future strategic management directions.

The plan sets out ambitious actions which will improve and protect aspects of the creek which the community value. Ongoing maintenance and management activities will continue to be undertaken along Waterhole Creek as resources permit.

The West Gippsland CMA, Latrobe City Council and other interested groups will be able to use this plan to access initiative funding from a range of sources to implement the recommended actions in this plan.

Acknowledgements

This report has been prepared by Simone Wilkie and Greg Peters of Riverness Pty Ltd, in partnership with Thompson Berrill Landscape Design Pty Ltd.

The development of this report has involved the collective effort of a number of departments and individuals, in particular:

- Steering Group – Matt Khoury (West Gippsland CMA and Chair), Eleisha Keogh and Michelle Dickson (West Gippsland CMA), Jane LLOYD, Deirdre Griepsma and Les Hilton (Latrobe City Council)
- Reference Group Members – Rob Whelan (Sight & Sound Engineering), Charlie Medhurst (Latrobe Catchment Landcare Network and Latrobe Urban Landcare Group), John Guy (Advance Morwell), Jodie Smith (Environment Protection Authority), John Crosby and Daniel Cook (West Gippsland CMA) and Steve Shinnars (Gippsland Water)
- Community workshop participants – Richard Appleton (HVP Plantations), Keith Brownbill (Advance Morwell), Elsie LeBroc (Morwell Neighbourhood House) and Serge Auciello and Don Fabricio (Gippsland Immigration Park)
- Gunaikurnai Land and Waters Aboriginal Corporation

The West Gippsland CMA and Latrobe City Council also wish to thank all respondents to the community survey.

Acronyms

CMA	Catchment Management Authority
EPA	Environment Protection Authority
EVC	Ecological Vegetation Class
GLaWAC	Gunaikurnai Land and Waters Aboriginal Corporation
ISC	Index of Stream Condition
MERI	Monitoring, Evaluation, Reporting and Improvement
WMP	Waterway Management Plan

1 Introduction



1.1 Background

Waterhole Creek rises in the Strzelecki Ranges, near Jeeralang North, flowing through forested land before flowing northwards through cleared agricultural land. It then flows towards Morwell across a heavily modified and drained floodplain, through industrial land, before flowing through the township of Morwell. Through the township the creek has been channelised and extensively modified. North of Morwell the creek flows through plantation forest and farmland before joining Wades Creek. Wades Creek flows for a short distance before joining the Latrobe River.

Waterhole Creek is valued by the local community as a place for walking, cycling, enjoyment of its natural values, and its important role in mitigating floods in the township of Morwell.

Despite its generally poor condition, Waterhole Creek supports populations of threatened fish species, such as the Dwarf Galaxias (*Galaxiella pusilla*), threatened bird species including the Eastern Great Egret (*Ardea modesta*) and endangered vegetation communities including Swamp Scrub.

The improvement in the health of this waterway is a strong community desire, particularly within the Morwell township area.

1.2 The Plan

The West Gippsland CMA, in partnership with Latrobe City Council, has developed the Waterhole Creek Waterway Management Plan (WMP). The Plan directs action towards providing the environmental condition necessary to support the community values and minimise downstream impacts to the Latrobe River and Gippsland Lakes environment.

Whilst maintenance and management activities are undertaken by various agencies along Waterhole Creek, the Plan provides an opportunity to identify priority activities which would further enhance the community and environmental values of Waterhole Creek.

The West Gippsland CMA and Latrobe City Council, along with other potential project partners, will work together to identify funding opportunities to implement actions within the Plan.

1.2.1 Scope

This Waterhole Creek WMP covers the entire catchment of Waterhole Creek shown in Figure 1. It identifies the values of, and includes actions for, both public and private land.

Within this plan, Waterhole Creek has been divided into four reaches based on their:

- tree cover;
- tree type (i.e. native vs exotic);
- adjoining land use; and
- proximity to potential weed sources.

The reaches (presented in Figures 1 and 2) are:

1. Upper Catchment – Jerralang North to Burmann Drive (including Bennetts Creek tributary)
2. Mid Catchment – Burmann Drive to Princess Freeway
3. Lower Catchment – Crinigan Road to confluence with Wades Creek north of Old Melbourne Road
- 3a. Township Reach – Princess Freeway to Crinigan Road

1.2.2 Links to the West Gippsland Regional Waterway Strategy

The Plan has been developed to align with the West Gippsland Regional Waterway Strategy (2013) and therefore has an eight year timeframe. Longer term goals (20+ years) have been identified for the condition of the waterway to acknowledge that changes in environmental condition can take significant time following the implementation of on-ground works.

Figure 1 – Waterhole Creek catchment

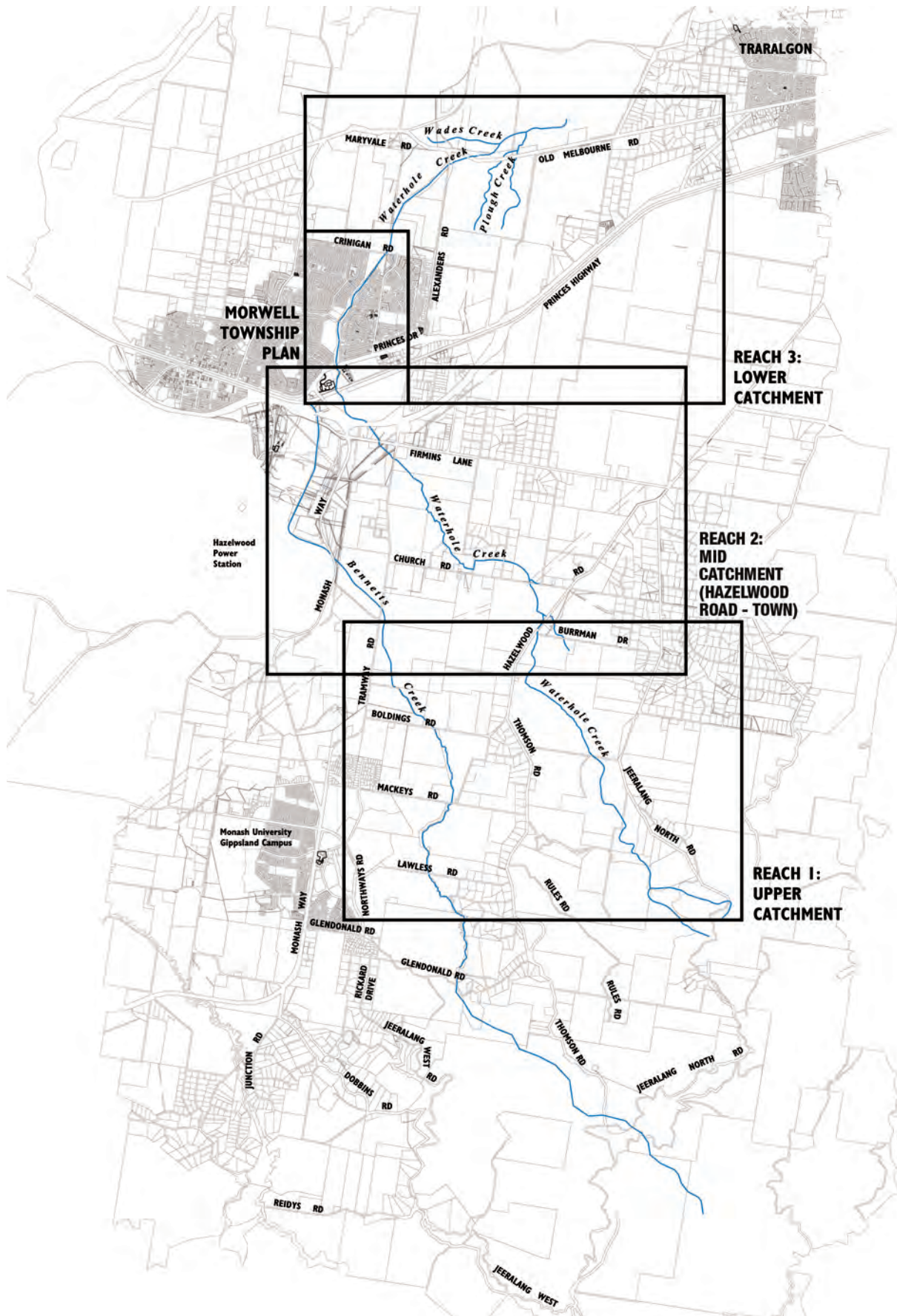


Figure 2 – The Township (reach 3a)



MAY 2013
 MORWELL TOWNSHIP PLAN
 WATERHOLE CREEK EXISTING CONDITIONS
 DRAFT

2 Development of this Plan



2.1 Community and stakeholder engagement

The Waterhole Creek WMP has been developed with a high level of community and stakeholder involvement. The West Gippsland CMA and Latrobe City Council have managed the development of the WMP through a steering group made up of representatives from each organisation. A reference group consisting of representatives from various community groups and agencies provided input to the development of the Plan through meetings, technical advice and review of a draft Plan.

Five key opportunities were provided for broader community input, namely:

1. **Community survey** – A survey was developed to collect information on the community's knowledge, aspirations and values for Waterhole Creek. The survey was provided online and also in hard copy. It was promoted through the local media, through agency websites and at a number of local events, as well as through direct contact with key community groups and agencies.
2. **Community meeting** – A community workshop was held to allow participants to review the information collated from the community survey, identify goals for the future management of the creek and to identify management issues and threats.
3. **Draft for public comment** – The draft Waterhole Creek WMP was made available for public comment from 16 to 30 October 2013.
4. **Public open house (held on 16 October 2013)** – Agency staff and project team members were available to discuss the draft Plan, the public submission process and Waterhole Creek more generally.
5. **Community walk (held on 16 October 2013)** – Community members accompanied agency staff and project team members for a walk along the Morwell township reach of Waterhole Creek. This provided a chance to identify issues and opportunities along the way.

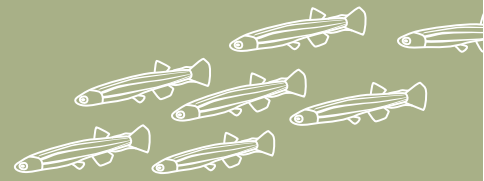
Following the closing of submissions on the draft Plan, community and stakeholder comments were considered and the Plan amended accordingly. A final Plan was drafted and presented to the West Gippsland CMA and Latrobe City Council for approval.

2.2 Data sources and information collection

Information on the environmental values of Waterhole Creek has been sourced from:

- DSE Biodiversity Interactive Maps. The DSE Biodiversity Interactive Maps provide information on Victoria's flora and fauna, land boundaries and land uses.
- AVIRA database. The Aquatic Values Identification and Risk Assessment database will be used in the development of regional waterway strategies and for local strategic planning activities. AVIRA is used to store data on the environmental, social, cultural and economic values of waterways and also has a risk assessment function. Waterhole Creek is represented in AVIRA as a single river reach.
- Field investigations. The project team undertook field assessments including rapid stream assessments throughout the catchment and mapping of assets within the township section of Waterhole Creek.
- Aerial photograph interpretation. Aerial photograph interpretation was undertaken to identify streamside areas of remnant vegetation, revegetation, stream channelisation and significant changes in land use and vegetation communities.
- Community and stakeholder input.

3 Waterhole Creek



3.1 Condition

The environmental condition of Waterhole Creek has been assessed as part of the third round of the Index of Stream Condition (ISC). The creek was found to be in very poor condition and was considered highly modified due to its extensive channelisation (mid and lower reaches), clearing of riparian vegetation and altered hydrology and water quality due to urban stormwater. Waterhole Creek is however, typical of many urban waterways and still retains some high community values.

3.2 Water quality

There is a significant level of community concern about the water quality in Waterhole Creek, particularly within the township (Reach 3a). Some community members have highlighted that they once regularly swam in deep pools found along Waterhole Creek.

The recent third round of the ISC scored the aquatic life sub index 3 out of 10, indicating poor condition (macroinvertebrates can be a good indication of water quality). The aquatic life sub index assesses the communities of aquatic macroinvertebrates (water bugs) against a reference condition. The score for Waterhole Creek indicates that the aquatic macroinvertebrate community has undergone major modification from reference condition.

There is limited water quality data for Waterhole Creek and the water quality component of the ISC was not assessed for Waterhole Creek due to the lack of data. There is one Waterwatch site on the creek and the Environment Protection Authority (EPA) Victoria have previously undertaken macroinvertebrate sampling at two locations, in 2004 and 2006. Due to the limited amount of data, analysis of water quality against the state environmental protection policy water quality guidelines has not been undertaken.

EPA Victoria has indicated that there have not been any significant water quality issues within Waterhole Creek, such as algal blooms or fish deaths. However, there have been algal blooms within Kernot Lake indicating that high nutrient levels may be present in the lake and potentially in the creek.

Works to realign the sewer were completed by Gippsland Water in 2006, which ensured that reported sewerage leaks to the waterways were resolved.

3.3 Environmental values

3.3.1 Significant plant communities and species

Vegetation communities are described in Victoria through mapping units called Ecological Vegetation Classes (EVCs). EVC mapping describes the groups of plant species which can be expected to occur depending on the type of soil, rainfall, soil moisture, altitude and slope (e.g. low-lying, flat, foothills, mountains), aspect (north facing, south facing) and amount of canopy and resulting sunlight (from open to closed forest and rainforest).

The EVCs occurring along Waterhole Creek are presented in Table 1.

Table 1 – Riparian EVCs found in the Waterhole Creek catchment

Value	Conservation Status – Victoria	Reach
Ecological Vegetation Classes		
Damp Forest	Endangered	Reach 1
Wet Forest	Depleted	Reach 1
Swamp Scrub	Endangered	Reach 2, 3 and 3a
Lowland Forest	Vulnerable	Reach 2
Significant Vegetation Species		
Yarra Gum (<i>Eucalyptus yarraensis</i>)	Rare	Reach 1
Strzelecki Gum (<i>Eucalyptus strzeleckii</i>)	Threatened	Reach 1

Within these EVCs, two significant plant species occur – the Strzelecki Gum (Figure 3) and the Yarra Gum.

Figure 3 – Strzelecki Gum found in reach 1 of the Waterhole Creek catchment



3.3.2 Significant fish species

One significant native fish species, the Dwarf Galaxias (*Galaxiella pusilla*), is found within the Waterhole Creek catchment (refer to Figure 4).

The Dwarf Galaxias is listed as vulnerable under both state and federal conservation legislation. Dwarf Galaxias is a very tiny fish (females grow to about 4 cm and males to 3.4 cm), that favours a stagnant, swampy environment such as swamps, drains, and backwaters of creeks and streams. It usually occurs in shallow waters (often less than 30cm deep) with abundant aquatic vegetation.

Dwarf galaxias is likely to occur in the mid to lower floodplain reaches (Reach 2 and Reach 3) of Waterhole Creek. A population of Dwarf Galaxias also occurs in the nearby Morwell River.

Figure 4 – Dwarf Galaxias, by Rhys Coleman



A fish survey has not been undertaken for Waterhole Creek, however the Fish Analysis Support Tool (<https://fast.dse.vic.gov.au/fast/speciesinvestigation>) identifies Strzelecki Burrowing Cray, Curve-tail Burrowing Cray, Narracan Burrowing Cray, Dwarf Galaxias, Striped Gudgeon, Australian Smelt, Tupong, Flat-headed Gudgeon, Flinders Pygmy Perch, Short-headed Lamprey, Pouched Lamprey, Spotted Galaxias, Mountain Galaxias, Common Galaxias, River Blackfish, Long-finned Eel and Short-finned Eel as native species potentially being found within the Waterhole Creek catchment. In addition to these native species a number of introduced species may also be found.

3.3.3 Significant bird species

There are six waterway-dependent significant bird species which occur in the Waterhole Creek catchment (refer to Table 2).

Table 2 – Significant bird species found in the Waterhole Creek catchment

Species	Conservation Status – Victoria	Reach
Australasian Shoveler (<i>Anas rhynchos</i>)	Vulnerable	Reach 3
Blue-billed Duck (<i>Oxyura australis</i>)	Endangered	Reach 3
Musk Duck (<i>Biziura lobata</i>)	Vulnerable	Reach 3
Eastern Great Egret (<i>Ardea modesta</i>)	Vulnerable	Reach 3
Hardhead (<i>Aythya australis</i>)	Vulnerable	Reach 2 and 3
Powerful Owl (<i>Ninox strenua</i>)	Vulnerable	Reach 1

The Powerful Owl inhabits the upper reaches of the catchment associated with the riparian vegetation of both Bennetts Creek and Waterhole Creek. The other five species are all waterbirds that have been observed in the mid and lower reaches.

3.3.4 Other significant values

The Azure Kingfisher (*Alcedo azurea*) (refer to Figure 5) has been identified by the West Gippsland CMA as a species that is valued by the community. Azure Kingfishers have been recorded in the Waterhole Creek catchment and have a conservation status of ‘near threatened’.

The Banded Rail (*Gallirallus philippensis*) has been identified as significant to the local bird watching community. It is found in reed habitat behind the Boulevard (north of Princess Drive). This species has a ‘secure’ conservation status in Victoria.

Waterhole Creek has also been noted as having a high likelihood of acting as a drought refuge during prolonged dry conditions.

Figure 5 – Azure Kingfisher, a flagship species found in the Waterhole Creek catchment, photo by David Stork



3.4 Social and economic values

Through Morwell, Waterhole Creek is highly utilised and valued. The most popular activities associated with Waterhole Creek are walking/ running (refer to Figure 6), walking dogs, enjoying native plants, trees and animals and cycling. The Lake Kernot area (refer to Figure 7) is popular with residents and visitors to the region for picnicking and sightseeing. A cultural walk to celebrate immigration to the region has recently been completed around Lake Kernot and adjacent to Waterhole Creek.

Outside of the township the creek is valued for the provision of stock and domestic water, grazing of the water frontages and for its scenic values.

Figure 6 – Pathways are regularly used for popular activities such as walking, running, cycling and walking the dog



Figure 7 – Lake Kernot is highly valued by the community and is seen as part of the Waterhole Creek environment



4 Connection to place:

Gunaikurnai and Waterhole Creek

The text in this section has been provided by the Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC). GLaWAC can be contacted on all matters concerning native title, cultural heritage, land, water and natural resource management and related employment aspirations and issues.

Connection to Place: Gunaikurnai and Waterhole Creek

Waterhole Creek is located on the traditional lands of the Brabralung people who form part of the Gunaikurnai Nations.

Who are the Gunaikurnai?

Gunaikurnai people are the traditional owners of Gippsland. There are approximately 3,000 Gunaikurnai people, and our territory includes the coastal and inland areas to the southern slopes of the Victorian Alps. Gunaikurnai people are made up of five major clans. Below is the official spelling of the clans endorsed by the Gunaikurnai Elders' Council, and a brief description of each clan area:

Clans of Gunaikurnai

- **Brabralung** people in Central Gippsland. Mitchell, Nicholson, and Tambo rivers; south to about Bairnsdale and Bruthen.
- **Brataualung** people in South Gippsland. From Cape Liptrap and Tarwin Meadows east to the mouth of Merriman Creek; inland to near Mirboo; at Port Albert and Wilsons Promontory.
- **Brayakaulung** people around the current site of Sale. Providence Ponds, Avon and Latrobe rivers; west of Lake Wellington to Mounts Saw Saw and Howitt.
- **Krauatungalung** people near the Snowy River. Cape Everard (Point Hicks) to Lakes Entrance; on Cann, Brodribb, Buchan, and Snowy rivers; inland to about Black Mountain
- **Tatungalung** people near Lakes Entrance on the coast. Along Ninety Mile Beach and about Lakes Victoria and Wellington from Lakes Entrance southwest to mouth of Merriman Creek, also on Raymond Island in Lake King.

Creation Story

In dreaming terms, the first Gunaikurnai came down from the mountains in Victoria's northwest carrying his canoe on his head. He was Borun, the pelican. He crossed over the river at what is now Sale, and walked on alone to Tarra Warackel (Port Albert) in the west. As he walked, he heard a constant tapping sound but could not identify it. When he reached the deep water of the inlets, Borun put down his canoe and, much to his surprise, there was a woman in it. She was Tuk, the musk duck.

He was very happy to see her and she became his wife and the mother of the Gunaikurnai people – they are the parents of the six Gunaikurnai clans.



Gunaikurnai Cultural Heritage Sites (West Gippsland Region)

Protect and enhance Cultural Heritage sites

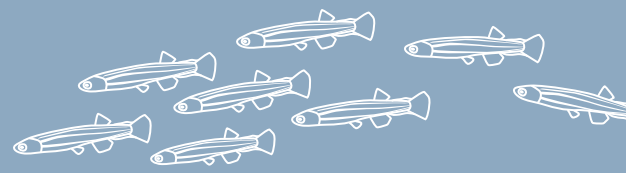
There are over 400 Cultural Heritage sites in the West Gippsland Catchment Management region. These provide a link to the past for contemporary Aboriginal people. All Aboriginal sites found in Victoria are protected. Aboriginal sites and places are important because of their historic and cultural value to Aboriginal people and the wider community. Sites may be located on private and public land. They need to be protected to prevent damage from erosion and land use changes. Sites that show Aboriginal occupation of the region include: significant scar trees, artefacts, campsites, grinding grooves, rock shelters, art sites, stone arrangements, ceremonial grounds quarries and sacred sites.

The Gunaikurnai Land and Waters Aboriginal Corporation (GLaWAC) is the Registered Aboriginal Party for this region, they should be contacted for all enquiries regarding Aboriginal Cultural Heritage.



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5 Threats and management issues



As mentioned in Section 3.1, the third round of the ISC identified that Waterhole Creek was in very poor condition. However, the more detailed rapid stream assessments undertaken for the development of the WMP revealed that the condition of the creek varies greatly between reaches. There are also differences in the threats that are present in each reach and these are discussed below.

5.1 Upper catchment (reach 1)

The headwaters of the Waterhole Creek, and its major tributary Bennetts Creek, occur within a forested landscape (production forest and public reserve). Remnant native vegetation grows along the riparian zone of the waterways. Downstream of the forested section, the creeks enter open farm land but retain a considerable proportion of remnant vegetation (refer to Figure 8) and the landscape is dotted with remnant single trees and intact roadside vegetation. There are minimal threats (other than livestock access and understorey weeds) to the health of the waterway through this reach compared with downstream reaches. The focus for management in this reach is the protection of existing good conditions and linking to remnant vegetation.

Figure 8 – Typical upper catchment reach with largely intact native riparian vegetation



5.2 Mid catchment (reach 2)

The mid catchment is highly modified (refer to Figure 9), and the creeks (Waterhole and Bennetts) have been subject to channelisation and drainage. Erosion processes have occurred in the past; however they currently appear to be relatively stable. There are significant clumps of woody weeds such as willow and hawthorn in sections of this reach, and for some sections they are the only woody vegetation.

There is very little instream habitat, such as snags or reeds as a result of increased drainage efficiency and channelisation.

Some work on revegetating and fencing sections of this reach has occurred and this could be built on in the future.

Figure 9 – Typical mid catchment section with no riparian vegetation, and another site with extensive woody weeds



5.3 Lower catchment (reach 3)

The lower catchment of Waterhole Creek is also channelised (refer to Figure 10). However, significant instream vegetation (reeds) is in place forming some excellent habitat.

Figure 10 – Reach 3 running through plantation forest with instream reeds providing good habitat



Woody weeds such as willow (refer to Figure 11) are prolific in sections particularly below Crinigan Road and just upstream of the confluence with Wades Creek.

A section of the creek, near Old Melbourne Road has been revegetated with native vegetation and forms an excellent example of the type of environmental condition that could be achieved along significant areas of the lower catchment (refer to Figure 12).

Unauthorised access to forestry areas and Crown land by four wheel drive enthusiasts may decrease the water quality (through sediment input) in the creek and destabilise stream banks.

Blackberry infestations and dumping of hard rubbish in these areas are also significant threats to the health and amenity of this reach.

Figure 11 – Reach 3 showing willow infestation



About instream vegetation (including reeds)

- Nature's pollutant filters.
- Native instream vegetation is a natural and important part of a healthy waterway.
- Includes small floating plants like duckweed, partly submerged plants such as water ribbons, larger plants including Cumbungi, Common Reed, and fringing rushes.
- Under natural conditions, instream vegetation is often restricted to the edges of waterways or scattered in isolated moist patches. Where it occurs depends on its ability to cope with drying out, flooding, shade, light, water temperature, speed of water, water quality and soil characteristics.
- Acts as a filter by intercepting water and nutrient-bearing sediments and removing pollutants from the water.
- Some species can trap floodwater debris and provide rich organic matter for floodplain soils.
- Root systems can help stabilise streams by protecting beds and banks from erosion.
- This vegetation is able to reduce the speed of water and thus protect river reaches from erosion and bank collapse by acting as a buffer.
- Instream vegetation can provide food, shelter and nest sites for fish and birds.
- Provides a corridor for wildlife moving between areas.
- This vegetation also provides shade to a waterway, reducing water temperatures and evaporation. Low water temperatures can play a role in preventing blue green algae blooms and the spread of invasive exotic weed species.
- Therefore it is essential that instream vegetation be carefully managed to achieve and maintain healthy waterways.



Figure 12 – Successful swamp scrub revegetation area in reach 3



5.4 Township (reach 3a)

Through the township of Morwell, Waterhole Creek has also been channelised. Significant channel deepening has occurred in the past, but the creek now appears stable, as evidenced by the extensive instream reed growth.

Urban stormwater quality and timing has the potential to impact on the health of the creek by creating conditions suitable for algae growth, delivering litter and pollutants and by changing the seasonal patterns of stream flow. The continual inflow of water off the impervious urban catchments, assist with the proliferation of reeds within the creek by providing favourable growing conditions.

Litter and the dumping of hard rubbish (including televisions and shopping trolleys) have been identified by the community as some of the biggest threats to the creek in this reach.

Willows and other woody weeds are common (but patchy) along the township reach, and there is a lack of overhanging native vegetation and large trees (refer to Figures 13 and 14).

In addition to the threats to the environmental condition of Waterhole Creek, there are some concerns around community safety associated with the creek, in particular lighting, access and crossing points.

Figure 13 – Township reach showing sparse riparian vegetation



Figure 14 – Township reach showing lack of overhanging native vegetation, channelisation and concrete lining of the stream channel and the outlet from Lake Kernot



6 Current management arrangements



6.1 Roles and responsibilities

Management of waterways involves many different government agencies, groups and individuals. There is natural overlap between the roles and responsibilities of different agencies and landowners particularly at the intersection of 'water' management and 'land' management and the maintenance of assets both with and adjacent to waterways.

The West Gippsland CMA's Regional Catchment Strategy provides a good summary of the roles and responsibilities for natural resource management across the catchment (West Gippsland CMA, 2013).

Specific roles and responsibilities of agencies who currently undertake management activities along Waterhole Creek are listed in Table 3. These roles and responsibilities are intended to be consistent with, and subsidiary to, those set out under existing legislative and policy frameworks including the *Catchment and Land Protection Act (1994)*, the *Local Government Act (1989)*, the *Water Act (1989)* and the Victorian Waterway Management Strategy (2013). Activities are subject to the availability of resources identified in the agencies annual budgets.

6.2 Current management activities

Management activities along Waterhole Creek over recent years have focussed on day to day maintenance and works to improve amenity. These activities include mowing, weed control and litter management.

In addition to these day to day activities there are some significant projects that have occurred or are underway along the creek. One such project is the development of the Immigration Park Trail, along Kernot Lake and Waterhole Creek. This project has been planned, designed and implemented by the Friends of the Immigration Park. Specific grant funding and fund raising has occurred to facilitate this project. This is a good model for implementing projects along Waterhole Creek into the future.

Latrobe City Council has also identified the land adjoining Waterhole Creek as a district level open space and a major link in Council's Draft Open Space Strategy (2012). The Strategy suggests that opportunities to enhance existing partnership arrangements and establish broader community involvement in park stewardship should be explored and encouraged.

The Open Space Strategy recommends that the Waterhole Creek linear pathway should be extended to the north of Crinigan Road, including an open space link to Crinigan Bushland Reserve.

As a district level open space, Waterhole Creek should have:

- Security / amenity lighting
- Pathways
- Signage and way finding

In addition, district level open space may have

- Path circuit
- Park seating
- Drinking taps
- Fitness stations
- Informal lawn areas
- Vehicle barriers
- Disability/ wheelchair access
- Picnic tables
- Natural shade
- Landscape trees and garden beds
- Public art

Table 3 – Summary of roles and responsibilities for the management of Waterhole Creek

Agency / Group	Responsibility
Latrobe City Council	<p>Undertakes the day to day maintenance of assets on Council land adjoining the creek; this includes mowing, litter removal, management of trees and gardens, path management. Latrobe City Council also undertakes removal of large items of litter (rubbish bins and shopping trolleys from the waterway).</p> <p>Flood mitigation – Latrobe City Council incorporates the results of flood modelling into municipal planning schemes.</p> <p>Stormwater management – Latrobe City Council is the responsible authority for planning, installing and maintaining stormwater infrastructure. Latrobe City Council is the principal owner of stormwater infrastructure along Waterhole Creek and is responsible for inspections and maintenance to ensure the infrastructure is in good working order.</p>
West Gippsland CMA	<p>Develops and implements a Regional Waterway Strategy that accounts for community needs relating to the use and values of waterways.</p> <p>Carries out works and activities in accordance with the Regional Waterway Strategy to improve the values of waterways.</p> <p>Manages the bed and banks of waterways through licencing works on waterways, and implementing works such as erosion control, fish passage and habitat enhancement.</p> <p>Undertakes management of weeds within the low flow channel and immediate riparian zone of Waterhole Creek through the township of Morwell.</p> <p>Floodplain management – West Gippsland CMA is responsible for flood modelling, mapping and strategy development and providing advice on development applications for land prone to flooding.</p> <p>Undertakes regional planning for native vegetation and control of invasive plants and animals. Authorities such as LCC must take account of these plans when determining applications for vegetation removal.</p>
EPA Victoria	<p>Licence discharges to Waterhole Creek and enforce licence conditions associated with those discharges.</p> <p>Respond to water quality incidents and pollution events.</p>
Latrobe Catchment Landcare Network	<p>Work with local landholders to seek and provide funding for waterway rehabilitation works.</p>
GLaWAC	<p>Represent all Gunaikurnai people in native title, cultural heritage, land, water and natural resource management and related employment aspirations and issues.</p>
Individuals and Land managers	<p>Ensure that activities on their land do not degrade or cause damage to land, soil or water resources.</p> <p>Responsible for invasive plant and animal control, litter control and mowing.</p> <p>Undertake projects to fence and revegetate sections of the waterway.</p>

7 Management goals and targets for Waterhole Creek



7.1 Goals

Using the information gathered through the community and stakeholder input, six goals have been identified to guide the priorities and actions in the Waterhole Creek WMP. These goals relate to the identified values of the creek. It should be noted there may be a significant time lag in achieving the goals, and it is expected that this will occur in a period greater than the eight year timeframe of the Plan.

Through the implementation of the Waterhole Creek WMP the following condition outcomes will be achieved:

1. Azure Kingfishers are protected through a network of resilient habitat areas through the township and lower catchments.
2. Remnant Strzelecki Gum and Powerful Owl habitat is protected through a continuous corridor of riparian vegetation in the upper catchments of Waterhole Creek and Bennetts Creek.
3. All abilities access is provided along a continuous network of pathways and experiences along both sides of the Waterhole Creek through Morwell.
4. Through the township of Morwell, the creek is a patchwork of natural and open grassy spaces, used by an increasing number of people.
5. Dwarf galaxias are protected through a network of resilient habitat areas through the township and lower catchment.
6. Waterhole Creek provides a safe and healthy environment for the community.

7.2 Management outcome targets

To achieve the goals, a number of management outcome targets are required to be met. Management outcome targets generally relate to reductions in the level of threats that are affecting the values and can be measured after one to eight years. For the Waterhole Creek WMP, management outcome targets can also be developed around the community values of the creek.

The management outcomes targets are:

- The instream habitat of Waterhole Creek improves to good and includes numerous pieces of instream wood from indigenous species in reaches 1 and 3, and the riparian zone contains large trees for much of its length.
- The number of invasive tree species along the riparian zone of Waterhole Creek is limited to 10% in reaches 1 and 3.
- The riparian areas on each bank of reaches 1 and 3 are protected and are at least 10 metres wide.
- All community members who visit Waterhole Creek have high aspirations for the Creek and think that it should be healthy with over 90% feeling a personal responsibility for keeping it healthy.
- 80% of the community believe that the agencies and the community are working together to improve the health of Waterhole Creek.
- The range of activities currently enjoyed along Waterhole Creek continues to be enjoyed by a wide variety of people within the community.

8 Action Plan



The Waterhole Creek WMP has been drafted as an eight year Plan. The Plan includes ongoing maintenance and management activities, and also identifies activities for which funding will need to be sought through external grants and programs.

The actions within the Plan (described as management activities/outputs) have been identified through engagement with the steering committee, reference group, and community survey respondents, and at a broader community workshop and through technical input. Actions are aimed at addressing the key threats to the values of the waterway and are directly linked to one or more of the management outcome targets for the Plan.

Where possible, costs have been assigned to each of the actions. Some actions are not costed and this is due to the completion of the action being subject to detailed planning, feasibility assessments and scoping which would help to determine the cost of the action.

8.1 Prioritisation of actions

To assist the West Gippsland CMA and the Latrobe City Council to allocate funding to the actions and to seek appropriate external funding, the actions have been prioritised. The criteria for determining the priorities were:

1. The action is part of ongoing maintenance or an existing plan/strategy; and/or
2. The action is cost effective and addresses a number of goals; and/or
3. The action is particularly effective in addressing key community concerns.

Each action is assigned high, medium or low priority. This is based on whether the action will assist with one or more of the criteria above. As the plan is subject to funding applications in the future, it is not appropriate to put a timeframe on the priorities or the actions. Rather, it is anticipated that funding will be sought for the high priority actions, followed by the medium and then low priority actions.

The actions are represented on the maps accompanying the action tables.

8.2 Implementation of actions

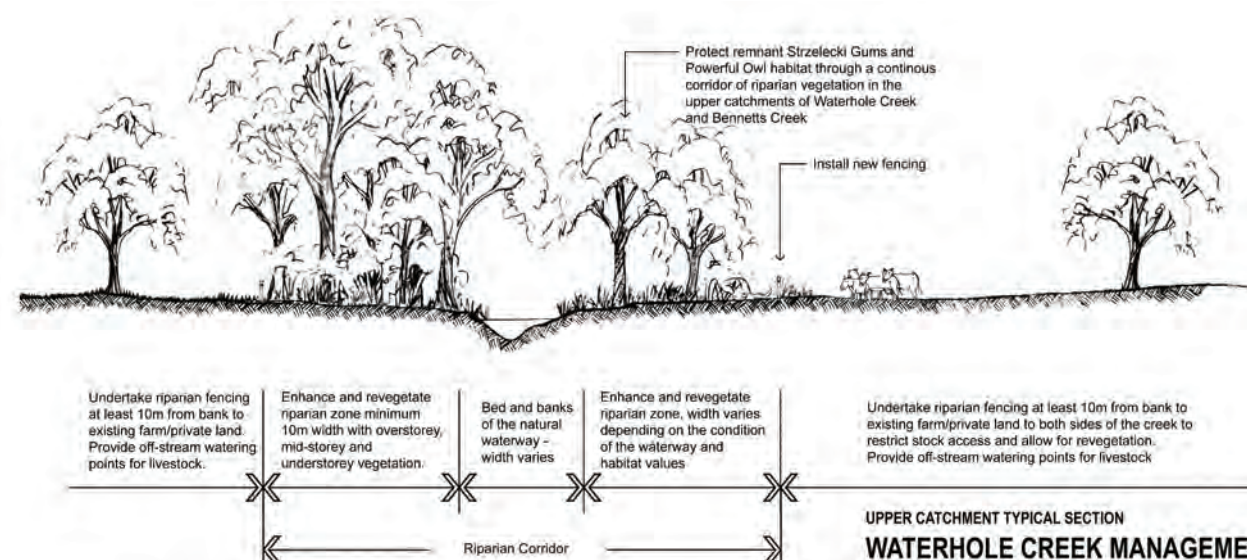
Actions have been assigned to a lead agency and partners. Many actions are recommended to be undertaken on public land, such as the land through the township of Morwell. Other actions such as fencing and revegetation of the creek frontage are recommended to be undertaken on private land, such as the works in reach 1.

Fencing of waterways occurs as part of a voluntary partnership between the West Gippsland CMA and private landholders in priority areas. The fencing setbacks and access to water for stock through alternate mechanisms such as troughs are negotiated on an individual basis with landholders based on minimum requirements for fencing. In addition the Victorian Waterway Management Strategy includes policy to facilitate a Take and Use licence for stock and domestic water for landholders who fence their waterways. The policy requires licensing costs to be minimised and application fees covered by CMAs when landholders enter into agreements to protect waterway frontages. It is hoped that this policy will facilitate the protection of river frontages, by addressing one of the key concerns of landholders.

Reach 1		Upper Catchment ¹			
Goals	Remnant Strzelecki Gum and Powerful Owl habitat is protected through a continuous corridor of riparian vegetation in the upper catchments of Waterhole Creek and Bennetts Creek				
Activity Number	Management Activity / Output	Quantity	Lead agency / Partners	Cost (\$)	Priority
1.1	Bennetts Creek between Boldings Road and Tramway Road • Riparian fencing	5 km	Latrobe Catchment Landcare Network / West Gippsland CMA	42,500	High
1.2	• Riparian revegetation	5 ha		22,500	
1.3	Bennetts Creek between Lawless Road and Boldings Road • Riparian Fencing	4 km	Latrobe Catchment Landcare Network / West Gippsland CMA	34,000	High
1.4	• Enhance riparian area (1,200 trees per ha)	6 ha		13,500	
1.5	Bennetts Creek (headwaters to Lawless Road) • Riparian fencing	2 km	Latrobe Catchment Landcare Network / West Gippsland CMA	17,000	High
1.6	• Riparian revegetation	2 ha		9,000	
1.7	Undertake site preparation for Bennetts Creek revegetation activities (headwaters to Tramway Road)	13 ha	Latrobe Catchment Landcare Network / West Gippsland CMA	9,100	High
1.8	Undertake riparian fencing of Waterhole Creek (headwaters to Hazelwood Road)	12 km	Latrobe Catchment Landcare Network / West Gippsland CMA	102,000	High
1.9	Enhance riparian area of Waterhole Creek (headwaters to 2km upstream of Hazelwood Road) (1,200 trees per ha)	10 ha	Latrobe Catchment Landcare Network / West Gippsland CMA	22,500	High
1.10	Revegetate riparian area of Waterhole Creek (upstream Hazelwood Road)	4 ha	Latrobe Catchment Landcare Network / West Gippsland CMA	18,000	High
1.11	Undertake site preparation for Waterhole Creek revegetation activities (headwaters to Hazelwood Road)	14 ha	Latrobe Catchment Landcare Network / West Gippsland CMA	9,800	High
Estimated cost of activities for reach 1				\$299,400	

¹ The upper catchment stretches to the headwaters of both Waterhole and Bennetts Creeks. For display purposes the Reach 1 map does not stretch to the headwaters, although these areas have been included in the analysis of stream condition and planning of actions.

Figure 15 – Typical cross section of the upper catchment following implementation of the Plan



Reach 1 – Upper catchment

Figure 16 – Action Plan for reach 1 – Upper Catchment



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Note some activities occur across the entire reach, but have been placed on the plan for reference.

0 0.5 1.5 3km
REACH 1 - UPPER CATCHMENT
WATERHOLE CREEK MANAGEMENT PLAN
DRAFT JUL 2013

Reach 2		Mid Catchment			
Goals	Dwarf galaxias are protected through a network of resilient habitat areas through the township and lower catchment				
Activity Number	Management Activity / Output	Quantity	Lead agency / Partners	Cost (\$)	Priority
2.1	Investigate opportunities for flood retention on land south of the township to assist with minimising flooding within the township, subject to a reviewed flood study.		Latrobe City Council / West Gippsland CMA	Not Costed	Low
2.2	Investigate opportunities for wetland construction/ reinstatement on land south of the township, to assist with flood retention and amenity, subject to a reviewed flood study.		Latrobe City Council / West Gippsland CMA	Not Costed	Low
2.3	If appropriate, undertake maintenance activities on the concrete lined section of Bennetts Creek.		Relevant land manager	Not Costed	Low
2.4	Ensure that runoff and waste water from industrial areas is treated or contained in accordance with legislative requirements and specific EPA licence conditions.		EPA	Not Costed	High
2.5	Ensure that runoff from overburden associated with the Hazelwood power station is contained on site in accordance with EPA licence conditions.		EPA	Not Costed	High
2.6	Assess fish passage at Crinigan Road and Firmans Road and other major structures within the mid and lower catchments		West Gippsland CMA / Department of Environment and Primary Industries	Costed in reach 3 as one study	High
Estimated cost of activities for reach 2				Not Costed	

Reach 2 – Mid catchment

Figure 17 – Action Plan for reach 2 – Mid Catchment (Hazelwood Road to Town)



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West Gippsland
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REFER REACH 1

REACH 2 - HAZELWOOD ROAD - TOWN
WATERHOLE CREEK MANAGEMENT PLAN



Reach 3

Lower Catchment

- Goals**
- Azure Kingfisher are protected through a network of resilient habitat areas through the township and lower catchments
 - All abilities access is provided along a continuous network of pathways and experiences along both sides of the Waterhole Creek
 - Through the township the creek is a patchwork of natural and open grassy spaces, used by an increasing number of people.
 - Dwarf galaxias are protected through a network of resilient habitat areas through the township and lower catchment
 - Waterhole Creek provides a safe and healthy environment for the community

Activity Number	Management Activity / Output	Quantity	Lead agency / Partners	Cost (\$)	Priority
3.1	Work with private landholders directly downstream of Crinigan Road to develop Swamp Scrub riparian zone and wetland habitat, at the time of development at this site.	2ha	Latrobe City Council / West Gippsland CMA / HVP Plantations	9,000	High
3.2	Ensure appropriate signage is in place warning of penalties for dumping of rubbish within forestry and Crown land.		HVP Plantations / Department of Environment and Primary Industries / EPA	1,500	Moderate
3.3	Construct appropriately designed bollards or fences to minimise illegal rubbish dumping and 4WD access to forestry and Crown Land around Old Melbourne Road.		HVP Plantations / Department of Environment and Primary Industries	5,000	Low
3.4	Develop signage and promote revegetation site at Old Melbourne Road as a 'blue print' for revegetation of the Swamp Scrub EVC along the creek. Use site as an education resource.		Latrobe City Council	10,000	High
3.5	Waterhole Creek Crinigan Road and Alexanders Road				
	• Riparian fencing	4km	Latrobe Catchment Landcare Network / West Gippsland CMA	34,000	Moderate
3.6	• Riparian revegetation	4ha		18,000	
3.7	Undertake Willow removal works downstream of Crinigan Road.	2km	West Gippsland CMA	35,000	High
3.8	Assess fish passage at Crinigan Road and Firmans Road and other major structures within the mid and lower catchments.	1 assessment	West Gippsland CMA / Department of Environment and Primary Industries	2,000	High
3.9	Undertake site preparation for riparian management activities.	4ha	Latrobe Catchment Landcare Network / West Gippsland CMA	4,200	Moderate
Estimated cost of activities for reach 3				\$118,700	

Reach 3 – Lower catchment

Figure 18 – Action Plan for reach 3 – Lower Catchment



Note some activities occur across the entire reach, but have been placed on the plan for reference.



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PREPARATION & IMPLEMENTATION SUPPORT

Reach 3a		Township			
Goals	<ul style="list-style-type: none"> • Azure Kingfisher are protected through a network of resilient habitat areas through the township and lower catchments • All abilities access is provided along a continuous network of pathways and experiences along both sides of the Waterhole Creek • Through the township the creek is a patchwork of natural and open grassy spaces, used by an increasing number of people. • Dwarf galaxias are protected through a network of resilient habitat areas through the township and lower catchment • Waterhole Creek provides a safe and healthy environment for the community 				
Activity Number	Management Activity / Output	Quantity	Lead agency / Partners	Cost (\$)	Priority
3a.1	Complete the Master plan for the Gippsland Heritage Walk at the Immigration Park.		Friends of the Immigration Park / Latrobe City Council	421,000	High
3a.2	Review the Waterhole Creek Flood Study.		Latrobe City Council / West Gippsland CMA	100,000	Moderate
3a.3	Investigate opportunities for flood retention on land between Bridle Road, Cobon Court and Lang Court, subject to a reviewed flood study.		Latrobe City Council / West Gippsland CMA	Not Costed	Low
3a.4	Provide a floodway at Crinigan Road and breach the levee along Crinigan South Reserve to mitigate flooding at Cobon Court.		Latrobe City Council	330,000	High
3a.5	Develop an indigenous cultural heritage walk along the creek including interpretative signage and use of Bush Tucker plants between Princes Drive and Hourigan Road, to link to the Immigration Park.		RAP / West Gippsland CMA / Latrobe City Council	50,000	Moderate
3a.6	Establish representative plantings of the Swamp Scrub EVC along the waterway through the township, including interpretative signage (3 no).	1ha	Latrobe City Council / West Gippsland CMA	9,250	High
3a.7	Undertake mowing of open space areas approximately every 3 weeks.		Latrobe City Council	106,552	High
3a.8	Undertake removal of hard rubbish from waterway approximately every 1 month.		Latrobe City Council	62,677	High
3a.9	Undertake weed spraying along Waterhole Creek between late spring and early autumn.		West Gippsland CMA	26,115	High
3a.10	Investigate the feasibility of a litter trap/s to assist with minimising rubbish from Mid Valley shopping area.		Latrobe City Council	5,000	Low
3a.11	Revegetate with indigenous species to link existing individual trees between Hourigan Road and Airlie Bank Road.	2ha	Latrobe City Council / West Gippsland CMA	7,680	High
3a.12	Revegetate with indigenous species to link existing individual trees between Nuntin Cout and Lang Court.	0.5ha	Latrobe City Council / West Gippsland CMA	1,125	High
3a.13	Evaluate the future for the pedestrian bridge opposite cricket nets. If a new bridge is deemed necessary, construct an all ability access bridge.		Latrobe City Council	Not Costed ²	Moderate
3a.14	Evaluate the future of the BMX track.		Latrobe City Council	Not Costed	Low
3a.15	Ensure a continuous link of all ability access paths along both sides of Waterhole Creek through the township.	1km	Latrobe City Council	85,000	High
3a.16	Undertake strategic plantings of streamside vegetation (at least 50 metres long) to encourage shading of waterway to assist with management of reeds and to establish overhanging large trees every 200 metres along both sides of the waterway.	3ha	West Gippsland CMA	11,520	High

Reach 3a – Township

Activity Number	Management Activity / Output	Quantity	Lead agency / Partners	Cost (\$)	Priority
3a.17	Hold a freshwater circus event – including electro fishing, macro invertebrate sampling and in situ water quality sampling.		West Gippsland CMA	5,000	High
3a.18	Recruit and train Waterwatch monitors to undertake monthly water quality monitoring, including macroinvertebrates.	60 Assessments	West Gippsland CMA	Not Costed	High
3a.19	Continue to support fun run events organised by the community along Waterhole Creek to promote access and enjoyment of the creek's values.	as they arise	Latrobe City Council	Not Costed	High
3a.20	Promote/facilitate the formation of a 'Friends of Waterhole Creek' or further develop an existing local interest group.	1 group supported	West Gippsland CMA / Latrobe Catchment Landcare Network / Latrobe City Council	5,000 (Seed funding)	High
3a.21	Organise school events for local students around Waterhole Creek.		West Gippsland CMA / Waterwatch / Gippsland Water	5,000	Moderate
3a.22 ³	Continue to support 'Clean Up Australia Day' events organised by the community at Waterhole Creek.		Latrobe City Council	16,000	High
3a.23	Investigate the design and construction of some viewing/ fishing platforms.		Latrobe City Council / Department of Environment and Primary Industries and West Gippsland CMA	20,000	Low
3a.24	Install seating along the western side of the Creek at spacing similar to the eastern side of the Creek.	4 seats	Latrobe City Council	4,000	Moderate
3a.25	Investigate land on the eastern side of the creek adjacent to the Gippsland Immigration Park for flood mitigation and public open space.		Latrobe City Council	Not Costed	Low
3a.26	Continue to minimise the amount of litter entering the Creek through infrastructure and education.		Latrobe City Council	Not Costed	High
Estimated cost of activities for reach 3a				\$1,583,469⁴	

² If required a new bridge that would span the flood plain and provide appropriate access would cost in the order of \$400,000. This would be subject to a detailed design phase.

³ Latrobe City Council support provided for Clean Up Australia day across the council area over the eight year implementation period.

⁴ For actions which propose installation of new assets or infrastructure costing for ongoing operation, maintenance and replacement should also be considered during planning and funding applications.

Reach 3a

Figure 21– Action Plan for reach 3a – Township



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Figure 19 – Typical cross section of the township reach following Plan implementation

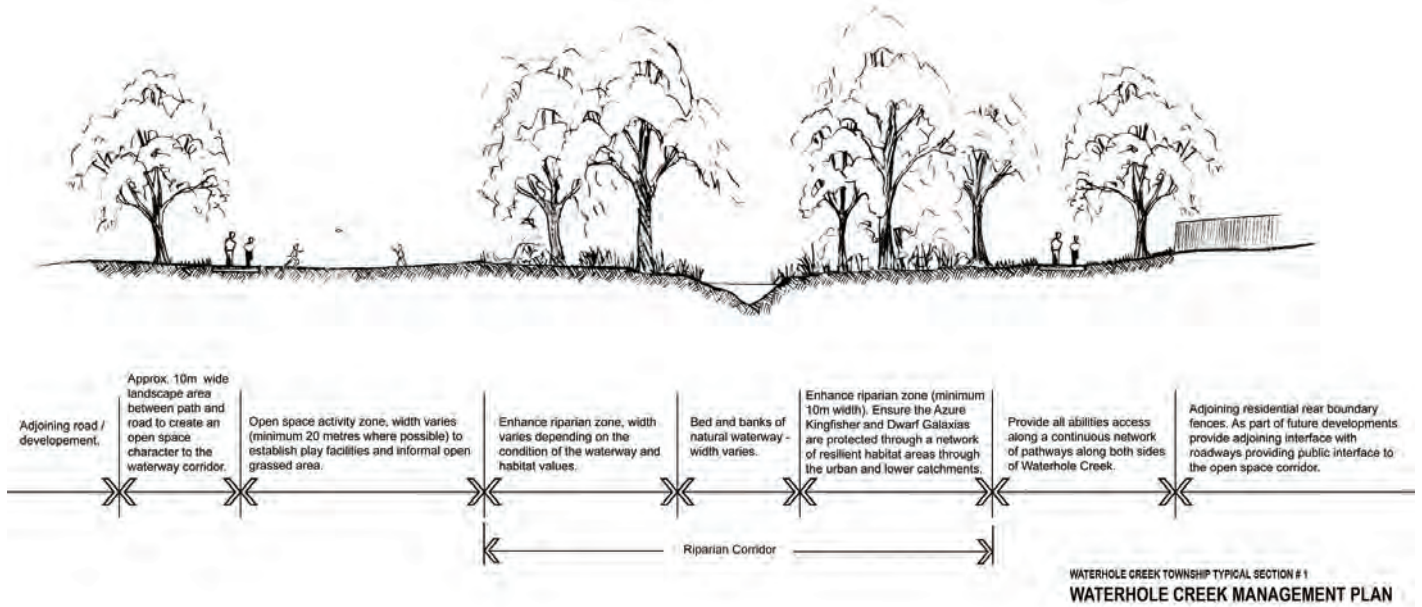
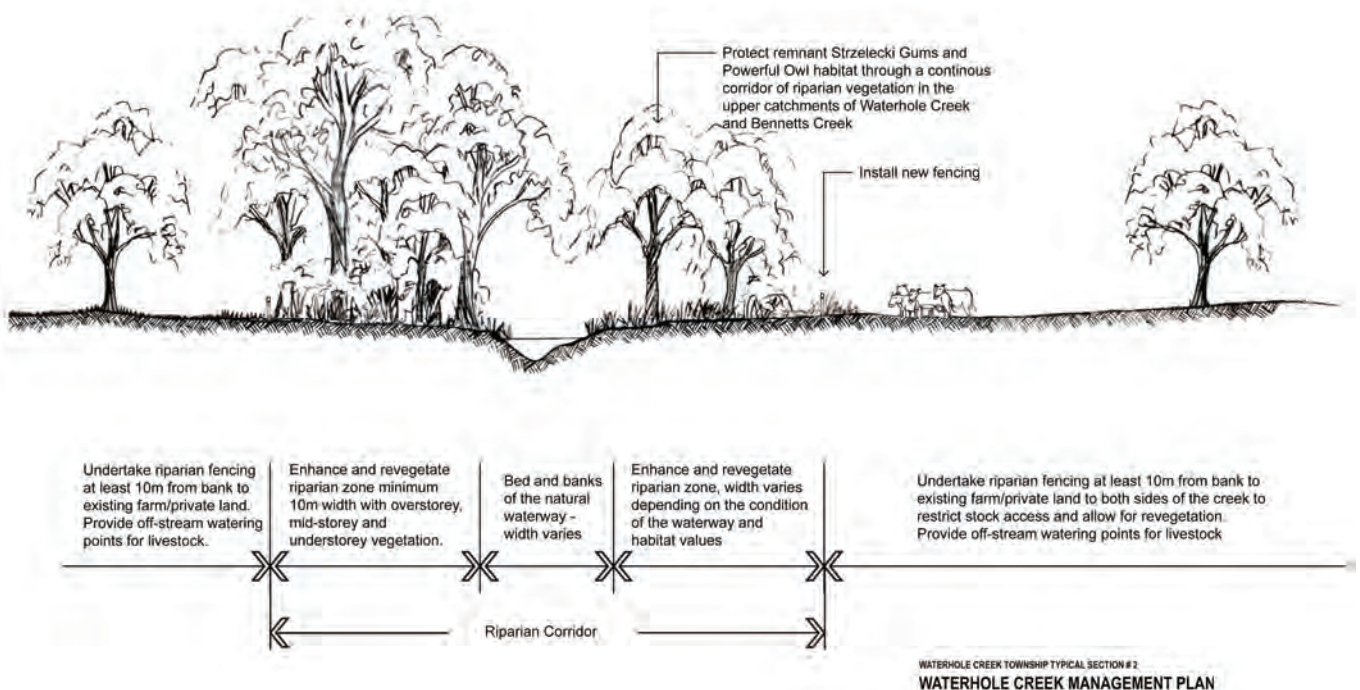


Figure 20 – Typical cross section of the township reach following Plan implementation



9 Monitoring, evaluation and review of the Plan



Monitoring, evaluation, reporting and improvement (MERI) are integral components of natural resource management programs. A simple MERI approach is recommended for this WMP.

To determine the effectiveness of this plan it is recommended that the West Gippsland CMA and Latrobe City Council work together to produce:

- A short implementation report for the community every year outlining:
 - A summary of activities completed.
 - Key findings from monitoring activities, including Waterwatch data.
 - A summary of key issues or events that occurred along the waterway.
- A mid-term review report (2017) of implementing the Plan, including:
 - The findings from the short annual implementation reports.
 - Progress against the management outcome targets.
 - Progress against the activity targets.
- A final review following the eighth year of the implementation period.

10 References



Insight Leisure Planning (2012). *Public Open Space Strategy – Latrobe City (Draft Report)*, Report prepared for Latrobe City Council

West Gippsland CMA (2013). *West Gippsland Regional Catchment Strategy*



Reach 3 – Swamp Scrub Revegetation Area

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West Gippsland
Catchment Management Authority