EARTH TECH

Wimmera Catchment Management Authority

Seven Mile Creek Waterway Action Plan

Job 2901049.014

April 2003

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APPROVED	CHECKED
DATE	DATE

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Introduction

The Wimmera Catchment Management Authority is intending to undertake a stream management works program along the Seven Mile Creek, which has been identified as a high priority for management.

The Seven Mile Creek Waterway Action Plan (WAP) details appropriate management techniques and facilitates the implementation of waterway management works where required. This report:

- Describes the physical characteristics of the Seven Mile Creek catchment
- Identifies risks to stream health
- Identifies opportunities to improve stream health
- Details actions to reduce the risk to stream health and improve stream health in the Seven Mile Creek catchment

Management Objectives

As part of the process for developing WAPs, management objectives have been determined. Refer to Appendix A.

The objectives of the Seven Mile Creek WAP are:

- To protect the health of Reach 7 of the Wimmera River by:
    - Investigating sediment sources upstream from flood out zones within the catchment
    - Assessing the potential impacts of water quality from the Seven Mile Creek catchment on the Wimmera River
- To identify any significant values within the Seven Mile Creek catchment
- To encourage landholder participation in improved management of floodout zones in order to reduce the likelihood of drainage excavation

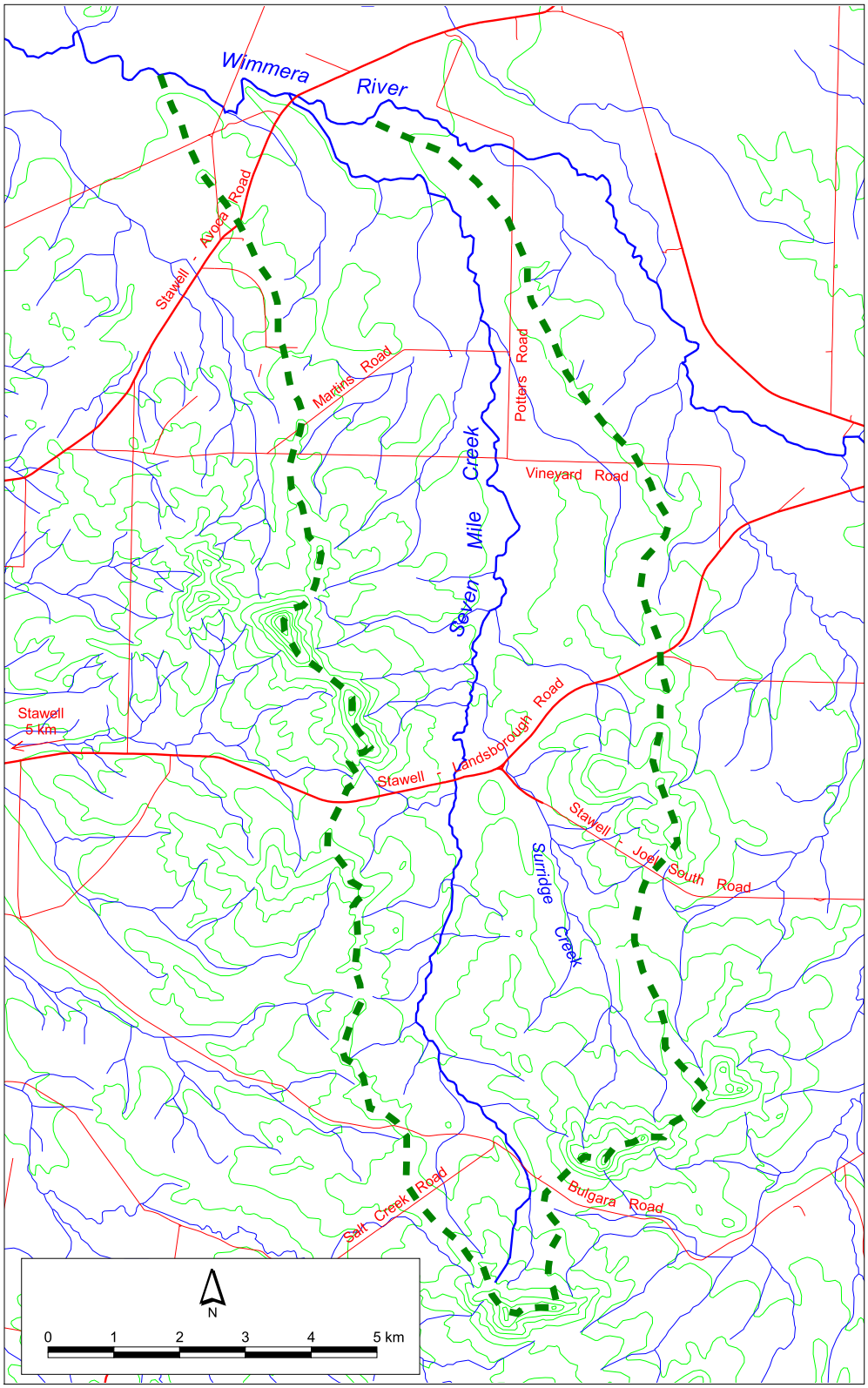
Seven Mile Creek catchment

Seven Mile Creek flows off sedimentary bedrock hills east from the township of Stawell and into a flood runner of the Wimmera River (see Figure 1 Locality Map). With a catchment area of approximately 90 km^2, the predominant land use is grazing. The topography is undulating. The geology in the upper catchment is St Arnaud Group sandstone and siltstone. The lower catchment is dominated by alluvial gravels, sands and silts.

Seven Mile Creek and its main tributary, Surridge Creek, have undergone historic incision. There are over 50 erosion control structures in the catchment as a result of Group Conservation Schemes of the 1960s and 1970s, soil conservation works and structures incorporated into road crossings. Most of the structures remain intact but are coming to the end of their design life. Fencing and revegetation works associated with the structures have been less successful and in some instances, non-existent. As a result, the effectiveness of the structure has been reduced and headward erosion continues within the catchment.

In-stream values within Seven Mile Creek appear to be limited. There is little information regarding water quality, aquatic species and stream flows. Seven Mile Creek is an ephemeral stream, being dry for the summer period in most years. Riparian vegetation, pools and large woody debris are therefore important refuges for aquatic species during this period. Fish species have not been recorded, but could be expected to include River blackfish *(Gadopsis marmoratus)* and Flat headed gudgeon *(Philpnodon grandiceps).* Loss of riparian vegetation, uncontrolled stock access and sedimentation all threaten these refuges.

Seven Mile Creek has moderate to severe gully and bank erosion throughout its catchment. Liberated, coarse sediment is being deposited in floodout zones within the Wimmera River floodplain. These flood-out zones are currently acting as buffers to prevent coarse sediment from entering Reach 7 of the Wimmera River. The increased sediment loads are likely to increase the waterlogging effects that occur in such zones, hence increasing the likelihood of drainage excavation by landholders (ID&A, 2002). There is a concern that drainage works may initiate new headward erosion that would supply significant amounts of sediment to Reach 7.



Wimmera CMA Region

Wimmera Catchment Management Authority

Waterways for Life.

Seven Mile Creek Waterway Action Plan

Location Map

Figure 1

Management Reaches

The Seven Mile Creek catchment has been divided into 6 reaches.

Reach	Description
One	Upper headwaters, south from Bulgana Road
Two	Bulgana Road to Stawell – Landsborough Road
Three	Stawell – Landsborough Road to Vineyard Road
Four	Vineyard Road to Martins Road
Five	Martins Road to Wimmera River flood runner
Six	Surridge Creek sub-catchment

Reach Assessments

Reach 1 Upper headwaters, south from Bulgana Road

Reach 1 Condition and values

The catchment consists almost entirely of cleared farmland, predominantly used for pasture production and associated stock grazing. There is little riparian vegetation and therefore associated values. Being located at the top of the catchment flows are short lived.

Physical Form
The reach is protected from incision by a major drop structure associated with the Bulgana Road. Minor incision has occurred on the Seven Mile Creek, but it appears to now be stable.
Riparian Ecology
The upper tributaries occur on cleared farmland with very little riparian vegetation along the main drainage features.
In-stream Habitat
Limited riparian vegetation and lack of pools provides little in-stream habitat.
Water Quality
There is no water either flowing or standing in this section. Water quality during flow events would be affected by stock access to drainage lines.

Reach 1 Risks and Opportunities

Physical Form

Risk - Low risk of incision into reach due to the controlling drop structure associated with the Bulgana Road.

Risk - Active erosion heads in tributaries in Reach 2 may pose a risk in the future.

Riparian Ecology

Risk - Very little native riparian vegetation exists within this reach. Risk to the vegetation is therefore low.

Opportunity - The opportunity exists to fence and allow the re-establishment of native vegetation along the drainage lines. However, this is a low priority as there is no existing vegetation to link within Reach 2 and fencing and revegetation offers little benefit to overall stream health in Seven Mile Creek.

In-stream Habitat

Opportunity - Lack of connectivity and riparian cover means opportunities are very limited.

Water Quality

Opportunity - Revegetation of the groundwater recharge zones within this reach may assist in addressing salinity issues in Reach 2 and further downstream in the catchment.

Reach 1 Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Good	4	Low	1	4
Riparian Ecology	Very Poor	1	Low	1	4
In-stream Habitat	Very Poor	1	Low	1	4
Water Quality	Poor	2	Low	1	2
					Total = 14

***Final Score = (Condition x Risk - Opportunity)**

Reach 1 Management Actions

Management Actions	Priority for Works
Determine the condition of the drop structure on the Bulgana Road and repair / maintain as appropriate.	Medium
Monitor the condition of the drop structure on the Bulgana Road.	Low
Fencing and revegetate along creek to link up with roadside vegetation and to link with fencing and revegetation activities in Reach 2.	Low

Reach 2 Bulgana Road to Stawell-Landsborough Road

Reach 2 Condition and values

Physical Form

The upper section of the reach has undergone incision in the past and attempts have been made to address this. The upper section contains numerous concrete drop structures. The structures are estimated to be 20-30 years old and showing deterioration. The structures have controlled the previous bed incision. New erosion heads are currently working away from the main channels as a result of the failure to secure the previous work. The headward erosion is producing sediment, which is currently being transported downstream as bed load. Immediately upstream from the drop structures, the channel appears to be stable.

The mid section of the reach is a wide, open channel with a mobile gravel and sand bed load. Minor scour pools occur on some of the meander bends of the low flow channel. Features such as bars are beginning to develop in parts of the channel. Minor headward scours are forming along the banks of the channel.

In the lower reaches, the channel deepens. The channel form improves as deep pools become more prevalent and the mobile bedload decreases. A left bank tributary immediately upstream from the Stawell-Landsborough Road appears unsightly. However, the erosion heads have been stabilised and fenced.

Riparian Ecology

Whilst the riparian vegetation at the upstream end of the reach is very poor, the extent and continuity improves in the downstream sections. In the upper section, riparian vegetation is restricted to areas predominately upstream from the drop structures. Tamarisk occurs in parts of the channel. These isolated plants are all that remain of the original vegetation planted for rehabilitation. They offer minimal habitat value for native flora and fauna.

In the mid section, individual Red Gums (*Eucalyptus camaldulensis*) are the only overstorey vegetation, with grasses colonising channel features in isolated areas. Spiny rush *(Juncus acutus)* has also colonised parts of the channel and reflects the influence of saline groundwater in this section.

The lower section contains extended lengths of continuous riparian vegetation. Fencing of the zone has led to increased overstorey and ground cover. The stable physical form of the channel is a function of the vegetation cover. The section also acts as a buffer for high value reaches downstream.

In-stream Habitat

As an ephemeral stream, in-stream habitat provides important refuges for aquatic organisms during dry periods. In the upper section, pools and vegetation occur and are associated with scouring around drop structures. These features are isolated from other pools and vegetation.

There is a marked lack of in-stream habitat in the mid section, resulting from the large sediment bedload, lack of geomorphic features and very limited riparian vegetation. Discharge of saline ground water exacerbates the lack of vegetation cover and highly saline water is unsuitable for aquatic animals.

High quality continuous riparian vegetation and presence of deep pools results in improved in-stream habitat in the lower section.

Water Quality

Stock access, limited riparian vegetation, that would normally slow and filter runoff and saline groundwater inflows, all affect water quality in the reach. Consequently, water quality ranges from very poor to poor throughout the reach.

Figure 2: Active erosion head in Reach 2

Figure 3: Drop structure at upstream end of Reach 2

Reach 2 Risks and Opportunities

Physical Form

Risk - High risk to Reach 3 through the generation of sediment by bank and headward erosion.

Risk - High risk to Reach 3 and lower parts of catchment due to failure of structures releasing large volumes of sediment.

Opportunity to fence and establish vegetation to limit further erosion and sediment generation. Vegetation will also help to trap sediment within the channel.

Riparian Ecology

Risk of gradual decline in vegetation throughout reach due to over grazing and dryland salinity.

Risk - There is a high risk of loss of refuges, due to the movement of sediment and poor water quality in the reach.

Opportunity for integrated catchment management through treating both recharge and discharge sites within this reach. Planting out of riparian zone alone is unlikely to succeed due to salinity.

Opportunity exists to improve the riparian ecology of the lower section through the restriction of stock. This will help to protect and enhance the high value of Reach 3.

Opportunity to fence and revegetate to extend riparian zone upstream.

In-stream Habitat

Risk - High risk of smothering of habitat by sediment.

Risk of reduction in available habitats by increasing salinity levels. Reduction in habitat through loss of vegetation.

Opportunity for improved habitat through increasing vegetation but only in conjunction with treatment of recharge zones.

Opportunity for improvement of habitat to link to Reach 3.

Water Quality

Risk of poor water quality through sedimentation, stock access and saline groundwater.

Opportunity to limit stock access, increase vegetation and limit erosion to protect the high value reaches downstream.

Opportunity - Limit /control saline groundwater discharge into the active channel and increase vegetation along the banks to help filter runoff before it enters the main channel.

Opportunity to increase the filtering capacity of this reach and minimise the impacts on the high value reaches downstream.

Figure 4: Salt affected creek in mid section of Reach 2

Reach 2 Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Poor	2	High	3	6
Riparian Ecology	Poor	2	High	3	6
In-stream Habitat	Poor	2	High	3	6
Water Quality	Very Poor	1	High	3	3
					Total = 21

***Final Score = (Condition x Risk - Opportunity)**

Reach 2 Management Actions

Management Actions	Priority for Works
Treat active erosion heads in upper section of reach.	High
Fence and revegetate in upper and mid section to control erosion and sediment movement.	High
Control saline groundwater discharge into Seven Mile Creek through re-vegetation and the establishment of deeper-rooted pastures in groundwater recharge zones.	High
Investigate stability of drop structures in upper section and repair or maintain as appropriate.	High
Restrict stock access to lower reach.	Medium
Improve riparian vegetation in lower section to extend the high value of Reach 3 and to act as a buffer to the high value Reach 3.	Medium

Reach 3 Stawell Landsborough Road to Vineyard Road.

Reach 3 is of high value due to good physical form, extensive continuous riparian vegetation, diverse in-stream habitat and generally good water quality. The reach is strongly affected by an actively eroding tributary flowing from Concongella Hill. All other tributaries in this reach are unvegetated, but maintain good physical form.

Reach 3 Conditions and Values

Physical Form

The section of Reach 3 upstream from the actively eroding tributary is in good condition. The channel contains pools, point bars and lateral bars. The sediments are usually fine, with sand occurring on some of the point bars. It is difficult to tell whether the channel naturally contains sand, or if it has accumulated on the point bars after migrating into the system from the eroding reaches upstream.

Downstream from the eroding tributary, the channel contains significant amounts of sediment, which is smothering in-stream vegetation and habitat such as pools and large woody debris (LWD). The channel still maintains good physical form despite the excessive bed load of sediment.

The active headward erosion in the Concongella Hill tributary has been controlled by a series of concrete drop structures. Some of these structures are approaching the end of their design life and will need to be monitored over the next few years. Outcrops of bedrock control the upper part of the channel. The lower reaches of the channel contain a very large moving bedload of gravels and sands.

Riparian Ecology

Within the reach, overstorey vegetation is fairly continuous. Reeds are common in and around the pools that occur along the channel. The pools are often associated with meander bends and LWD.

The overstorey and bank vegetation is very similar to that immediately upstream from the tributary confluence. However in-stream vegetation is absent.

In the tributary, Spiny rush *(Juncus acutus)* is present in parts of the bed that are stable and confirms the presence of saline baseflows. Very little riparian vegetation is present along the tributary.

In-stream Habitat

LWD, pools and riparian vegetation provide good habitat for aquatic life upstream from the tributary confluence. There are pools downstream from the tributary and the riparian zone contributes large woody debris. However, the large sediment load is smothering in-stream habitat, such as pools and LWD.

Water Quality

The water quality of the Concongella Hill tributary is very poor due to the lack of riparian vegetation, stock access and a saline groundwater flow. Salt was observed on out-cropping rock and sediments in the bed of the gully.

The water quality in Seven Mile Creek is satisfactory due to the presence of riparian vegetation despite stock access to parts of the creek. The saline groundwater flow in the tributary does not extend through to Seven Mile Creek and does not appear to have an effect on the creek.

Figure 5: High value section in upstream extent of Reach 3

Figure 6: Sediment load in Reach 3, downstream from the actively eroding tributary

Reach 3 Risks and Opportunities

The sediment load and salinity from the Concongella Hill tributary and from Reach 2 presents a high risk to all aspects of stream health of the reach and downstream reaches of the Seven Mile Creek.

Physical Form

Opportunity - There is an opportunity to manage the sediment at the confluence of the tributary and Seven Mile Creek.

Riparian Ecology

Opportunity - The tributary is already fenced. There is the opportunity to reduce stocking within the fence and to establish vegetation to stabilise the tributary.

In-stream Habitat

Risk - Sediment inputs threaten to further smother in-stream habitat and present a high risk.

Opportunity - by managing sediment there is the opportunity to maximise habitat created by LWD and scour holes.

Water Quality

Risk - For much of its length, the creek is fenced. However, cropping occurs within the fence at various locations and subsequent runoff presents a medium risk

Risk - Sediment from erosion in the tributary and failure of structures poses a significant risk.

Risk - Stock are permitted to access the tributary. Whilst the tributary would cease to flow for much of the year, nutrients and sediment could be contributed to Seven Mile Creek from rainfall events.

Figure 7: Actively eroding tributary in Reach 3

Figure 8: Sediment load in high value lower section of Reach 3

Reach 3 Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Good	4	High	3	12
Riparian Ecology	Good	4	High	3	12
In-stream Habitat	Moderate	3	High	3	9
Water Quality	Good	4	High	3	12

Total = 45

***Final Score = (Condition x Risk - Opportunity)**

Reach 3 Management Actions

Management Actions	Priority for Works
Treat active erosion heads in tributary.	High
Investigate stability of drop structures in the tributary and repair or maintain as appropriate.	High
Vegetate to control sediment movement in tributary and manage stock access.	High
Implement sediment management at confluence of tributary and Seven Mile Creek.	High
Control saline groundwater discharge into tributary through re-vegetation and the establishment of deeper-rooted pastures in groundwater recharge zones.	Medium
Monitor structures in the upper reaches of the Concongella Hill tributary.	Low

Reach 4 Vineyard Road to Martins Road

The reach from Vineyard Road to Martins Road is a meandering box channel in the upper section and a natural channel in the lower section.

Reach 4 Condition and values

Physical Form

The upper section of the reach is typically 3 to 4 m deep, with a width of 10 to 15 m. The banks of the channel are vertical and the channel is sediment starved. The channel is checked from migrating upstream, due to a drop structure incorporated into Vineyard Road. Outer bank erosion is threatening Potters Road, due to its close proximity, height and inferred instability of the vertical banks. The lower part of the channel has a more natural form and does not have a bedload of sand and gravel that is commonly found in the higher reaches.

Riparian Ecology

The riparian and in-stream vegetation at the top of the reach is poor. The extent and continuity improves moving down the reach. At the lower end, there is substantial overstorey vegetation, but understorey vegetation is limited due to stock access.

In-stream Habitat

Very limited habitat for aquatic life exists in the upstream section of this reach, mainly due to an unstable channel. In the lower section of the reach, overstorey vegetation and a more natural channel provide more habitat. However, habitat is restricted by stock access to the channel.

Water Quality

The water quality in this reach is generally poor. This is due to the poor state of the channel and the unfenced riparian zone that allows the stock access to the channel.

Figure 9: Over enlarged channel of Seven Mile Creek downstream from Vineyard Road

Figure 10: Outer bank erosion on Seven Mile Creek threatening Potters Road

Reach 4 Risks and Opportunities

Physical Form

Risk - The risk to Potters Road is moderate to high.

Riparian Ecology

Opportunity exists to extend the high value vegetation in Reach 3 by fencing and revegetation in the upper part of the reach. This would also link up the higher quality riparian vegetation in the lower part of the reach.

Risk of further loss of riparian vegetation.

In-stream Habitat

Opportunity for significant improvement in the water quality and aquatic health of the channel by establishing vegetation and restricting stock.

Opportunity to link to high value habitat in Reach 3.

Risk of decreasing habitat values through loss of LWD input from riparian zone.

Water Quality

Opportunity - The restriction of stock and the introduction of vegetation will help to improve water quality in this reach.

Figure 11: Seven Mile Creek in Reach 4

Figure 12: Enlarged channel & uncontrolled stock access to Seven Mile Creek, Reach 4

Reach 4 Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Poor	2	Medium	2	4
Riparian Ecology	Poor	2	Medium	2	4
In-stream Habitat	Poor	2	Medium	2	4
Water Quality	Poor	2	Medium	2	4
					Total = 16

***Final Score = (Condition x Risk - Opportunity)**

Reach 4 Management Actions

Management Actions	Priority for Works
Protect Potters Road from the migrating box channel, through rock beaching.	High
Improve water quality, stream form and riparian ecology through fencing and revegetation.	Medium

Reach 5 Martins Road to the confluence with the Wimmera River flood runner

The Wimmera River Geomorphic Investigation (ID&A, 2002) recognised the importance of the floodout zone in this reach of the Seven Mile Creek for the protection of the Wimmera River. The form of Seven Mile Creek from Martins Road to the Wimmera River flood runner varies from a channel, to a floodout zone and back to a channel.

Reach 5 Condition and values

Physical Form

The channel sections of this reach of Seven Mile Creek have good physical form. Channelling is not evident on the flood-out, which also exhibits good physical form.

Riparian Ecology

The channel sections of this reach have a good riparian vegetation overstorey, although the understorey is currently in poor condition due to stock access. The floodout section of the channel is predominantly open farmland, has very little riparian vegetation and is in very poor condition.

In-stream Habitat

In-stream habitat is limited to the channel sections of this reach. Overall the reach is currently in poor condition due to stock access and limited riparian understorey.

Water Quality

The water quality in the reach is poor due to extensive clearing, stock access to all parts of the channel and the lack of riparian vegetation on the floodout zone.

Figure 13: Structure on tributary of Seven Mile Creek at the corner of Martins Road and Potters Road

Figure 14: Wimmera River flood runner upstream from confluence with Seven Mile Creek

Reach 5 Risks and Opportunities

Physical Form

Risk - The reach is at moderate risk from sediment migration down the channel. This chokes the channel and encourages flooding of farmland on the floodplain. Reach 4 has the capacity to store large volumes of sediment thus reducing the short-term risk in Reach 5 from sediment upstream.

Risk - The floodout is at risk of farmers excavating a channel due to sediment being deposited on their paddocks. Excavation may initiate a new sequence of headward erosion throughout the Seven Mile Creek catchment.

Opportunity - The opportunity exists to educate farmers on management of the floodout zone to reduce the risk of initiating headward erosion.

Riparian Ecology

Opportunity to improve riparian ecology and the ability to hold sand *in situ*, by excluding stock and allowing regeneration of the understorey. The existence of LWD and some channel features, indicates that the channel should recover quickly.

In-stream Habitat

Opportunity to maximise LWD input by exclusion of stock and regeneration of understorey riparian vegetation.

Water Quality

Opportunity - The exclusion of stock from all parts of the reach would allow the regeneration of understorey riparian vegetation, which would help to improve bank stability, aquatic habitat and water quality.

Reach 5 Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Good	4	High	3	12
Riparian Ecology	Good	4	Medium	2	8
In-stream Habitat	Poor	2	Medium	2	4
Water Quality	Poor	2	Medium	2	4
					Total = 28

***Final Score = (Condition x Risk - Opportunity)**

Reach 5 Management Actions

Management Actions	Priority for Works
Determine the condition of the drop structure on Martins Road and repair / maintain as appropriate.	Medium
Fencing and revegetate along creek to improve water quality, stream form and riparian ecology.	Medium
Monitor the condition of the drop structure on Martins Road.	Low

Reach 6 Surridge Creek sub catchment

Surridge Creek is a significant tributary of Seven Mile Creek. It joins Seven Mile Creek within Reach 3. The lower reaches of Surridge Creek were generally fenced and revegetated as part of Group Conservation Schemes in the 1960s and 70s. The upper reaches of the creek, although un-fenced, are also stable, as a result of the presence of a series of structures placed as part of the above schemes.

Reach 6 Condition and values

Physical Form

Surridge Creek has a satisfactory physical condition. The channel is recovering from past incision and excessive sediment loads. Sediment generation has been controlled throughout the catchment and now appears to be trapped and stored in the upper reaches by structures and in the lower reaches by vegetation.

Riparian Ecology

The riparian vegetation grades from good to poor moving upstream. Lower sections of the creek have almost continuous riparian vegetation, consisting of a mix of native and introduced vegetation. In the upper section of the Creek, overstorey vegetation occurs most commonly where there is fencing and accompanying revegetation.

In-stream Habitat

Fencing and revegetation work has restored habitat particularly in the lower section of the creek. Habitat is limited in the upper sections to the creek to isolated fencing and revegetation activities. Large overstorey trees are more prevalent in the upper catchment providing the opportunity for LWD input.

Water Quality

Water quality in the Surridge Creek is considered to be poor due to the clearance of native vegetation in the catchment and lack of fencing around the tributaries and in the upper catchment.

Figure 15: Eroding tributary of Surridge Creek

Figure 16: Treated upper reach of Surridge Creek catchment

Reach 6 Risks and Opportunities

Physical Form

Risk of new erosion through failure of structures.

Opportunity - Fencing and revegetation to reduce stock impact on stream form.

Riparian Ecology

Opportunity - Improve riparian vegetation through the exclusion of stock by fencing and revegetation.

In-stream Habitat

Opportunity, particularly in upper section of reach, to maximise LWD input by exclusion of stock and regeneration of understorey riparian vegetation.

Water Quality

Opportunity to improve water quality by controlling stock access.

Figure 17: High value section of Surridge Creek

Figure 18: Upper reach of Surridge Creek. Structures in this section under threat from uncontrolled stock access

Reach 6 Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Moderate	3	Medium	2	6
Riparian Ecology	Moderate	3	Low	1	3
In-stream Habitat	Moderate	3	Low	1	3
Water Quality	Moderate	3	Low	1	3
					Total = 15

***Final Score = (Condition x Risk - Opportunity)**

Reach 6 Management Actions

Management Actions	Priority for Works
Determine the condition of the drop structures and repair / maintain as appropriate.	Medium
Monitor the condition of structures throughout the reach.	Medium
Fencing and revegetation along creek to improve water quality, stream form and riparian ecology.	Low

Issues raised regarding implementation

During community consultation the following issues were raised and should be considered when planning activities.

Fencing in flood prone areas

Landowners raised the loss of fences due to flooding as a major disincentive to fencing. It will be important that appropriate set backs are determined with landowners.

Establishing deep rooted pastures

Lucerne is commonly proposed as a deep rooted perennial for recharge sites. In the Concongella Creek and Seven Mile Creek catchments, the pH of the soils is low. Aluminium toxicity prevents the successful establishment of lucerne. Phalaris and tall wheat grass are seen as suitable alternatives.

Battering banks in revegetation works

One of the keys to successful fencing and revegetation works is successful pest animal control. Battering of banks to remove steep sided gullies is seen by landholders to reduce rabbit harbour and thus aid in controlling rabbits.

Very few rabbits and burrows were seen during field inspections. The cost of bank battering is high. Negotiations with landholders to determine whether bank battering is necessary will be required.

Management Priorities

Priorities for the allocation of resources are listed in the following table. These priorities are based on condition assessments and an assessment of the risks and opportunities associated with the recovery and maintenance of stream health. The higher relative score indicates a higher priority for action.

Reach	Description	Score	Management Priority
Reach 1	Upper headwaters, south from Bulgana Road	14	**6**
Reach 2	Bulgana Road to Stawell – Landsborough Road	21	**3**
Reach 3	Stawell – Landsborough Road to Vineyard Road	45	**1**
Reach 4	Vineyard Road to Martins Road	16	**4**
Reach 5	Martins Road to Wimmera River flood runner	28	**2**
Reach 6	Surridge Creek sub-catchment	15	**5**

Summary of Priorities for Management Action

Reach	Activity						
	Determine condition of drop structures	Monitor drop structures	Fence and revegetate to control stock access	Treat active erosion heads	Establish vegetation and deep rooted pasture on recharge sites	Implement sediment management	Protect road (s)
Reach 1	M	L	L				
Reach 2	H	L	M	H	H		
Reach 3	H	L	H	H	M	H	
Reach 4			M				H
Reach 5	M	L	M				
Reach 6	M	M	L				

Appendix A

Management Objectives

Appendix A - Introduction

The Wimmera Catchment Management Authority plans to undertake a stream management works program along the Seven Mile Creek, which has been identified as a high priority for management. The Waterway Action Plan, being prepared by Earth Tech Engineering, is to help guide the most appropriate management and facilitate the implementation of waterway management works where required. The development of local community support, the investigation of reach wide issues and the subsequent provision of a technical and financial basis for the works to government, are important aspects of Waterway Action Plans.

This report includes a discussion of regional and local objectives of the Wimmera Catchment Management Authority via objectives referenced in relevant regional strategies and investigations. These objectives are to be observed throughout the development of the Waterway Action Plan

Review of State and Regional Strategies

The regional strategies and policies that are relevant to the Wimmera River Catchment are:

- Victorian River Health Strategy (2002)
- Draft Wimmera Waterway Management Strategy (2002)
- Wimmera Water Quality Strategy (2002)
- Wimmera River Geomorphic Investigation (2002)

The Victorian River Health Strategy

"The objective of the Victorian River Health Strategy (VRHS) is to achieve healthy rivers, streams and floodplains which meet the environmental, economic, recreational and cultural needs of current and future generations" (DNRE, 2002).

To achieve the objective, a management approach based on 4 key elements will be used:

- Protecting rivers that are of the highest community value from any decline in condition;
- Maintaining the condition of ecologically healthy rivers;
- Achieving an 'overall improvement' in the environmental condition of the remainder of the State's rivers, and;
- Preventing damage from future management activities.

Implementation of this management approach will be by:

- Providing special protection for rivers of very high value;
- Establishing regional five and 10 year targets for river protection and restoration through community-driven regional planning processes; and
- Establishing policies for specific management activities aimed at preventing damage to river health from future management activities.

The Wimmera Waterway Management Strategy

The Wimmera Waterway Management Strategy (WWMS) aims to, *"protect and enhance the region's waterways through fair and sustainable management, taking account of environmental, economic, cultural and social objectives".*

In 1997 the Wimmera Regional Catchment Strategy recognised the need to develop and implement an integrated waterway management program for the two river basins within the Wimmera CMA region. A series of programs, which are consistent with the Wimmera Regional Catchment Strategy, are detailed in the WWMS. Of particular relevance to this Waterway Action Plan are:

Program 1. Asset Management

Aim: To manage structural waterway assets so as to improve the health of the waterways;

Program 2. Waterway Repair and Maintenance

Aim: To preserve, maintain and/or rehabilitate the environmental, economic and social values of waterways;

Program 3. Riparian Management

Aim: To improve waterway health through the sustainable management of riparian zones

Program 4. Catchment Management

Aim: To assist in addressing land management issues that have negative impacts on waterway values.

Program 5. Flow regimes

Aim: To improve the health of aquatic and riparian ecosystems though provision of appropriate flow regimes, and

Program 8. Water Quality and Urban Stormwater Management

Aim: To improve the quality of water in the region's waterways and wetlands

The WWMS divided the Wimmera CMA region into 12 Waterway Management Units (WMU). The WMUs are shown in Figure A1. The Waterway Action Plan aims to confirm and elaborate on the findings of the WWMS in relation to Seven Mile Creek, which is wholly contained within Waterway Management Unit 4.

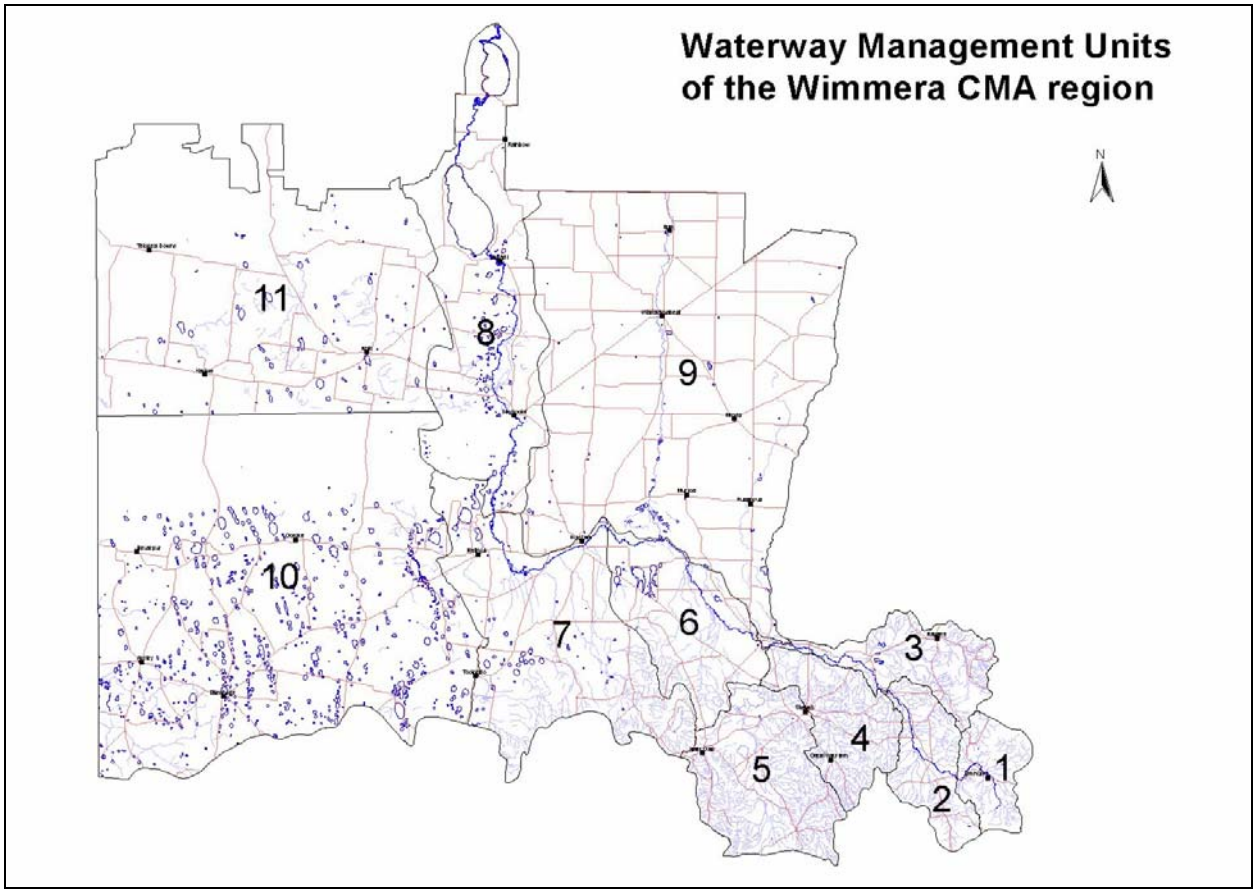


Figure A1: Waterway Management Units of the Wimmera CMA region

The Wimmera Water Quality Strategy

"The aim of the Wimmera Water Quality Strategy is to improve the quality of the Region's water that will result in environmental, social and economic benefits to the Region". Implementing the strategy could reduce total phosphorous levels in the Wimmera River by up to 42 tonnes per year (WCMA 2001).

The strategy is to be applied through a number of Programs. Of these, Program 7; Catchment and River Health Management, is most relevant to this report. Its objective is to, "ensure that catchment and river health management in the region will result in improved water quality". This is to be achieved through:

- Waterway repair and maintenance;
- Flow regimes;
- Riparian management; and
- Catchment management.

The Wimmera River Geomorphic Investigation

The Wimmera River Geomorphic Investigation (WRGI) comprised a review and analysis of sediment processes within the Wimmera catchment, with a focus primarily on the Wimmera River. This report recommends that the following priorities, based on the principles of best practice catchment management, be applied:

- Preserve areas with near pristine values;
- Restore areas of high value;
- Rehabilitate areas that place other values at risk or provide good opportunity for restoring values; and
- Maintain degraded areas to prevent values declining to unacceptable levels.

Broadly examining the upper catchment areas, the Geomorphic Investigation found that some streams and tributaries are delivering high sediment loads to the Wimmera River. This excess sediment is threatening reaches harbouring rare geomorphic and ecological features. In particular the report found that Reaches 2, 4 and 6 are high priorities for management intervention. Reach 6 is a high priority for intervention as it is immediately upstream from Reach 7.

With regard to Reach 7 the WRGI (ID&A 2002) noted the following Management Implications for Reach 7 and its tributaries.

Wimmera River – Reach 7

"This reach of the Wimmera River has high environmental values. It is one of the least disturbed and has undergone little adjustment post European settlement. In terms of physical form, vegetation, hydrology and habitat structure it is probably in the best condition of all of the Wimmera River".

" The main management objective for this reach should be to preserve and improve its current high environmental values through management actions within upstream reaches and tributaries."

Tributaries

"The extensive erosion occurring in the Seven Mile Creek and Wattle Creek catchments requires management action". "….not to address current sediment inputs to the Wimmera River, [as] these creeks are not delivering large volumes of sediment to it. The reason is to encourage improved management and improved land use conditions in the floodout reaches of the tributary streams that will reduce the threat of future direct impacts on the Wimmera River.

These reaches are naturally floodout zones, however the increased sediment loads being delivered to it from upstream will exacerbate the incompatibility of this reach with agricultural pursuits.

The increased sediment loads being deposited in these reaches are likely to increase the waterlogging effects that occur in such zones, hence the likelihood of drainage excavation by landholders to relieve this is higher. To encourage landholder participation in improved management of floodout zones, WCMA should undertake works to reduce the sediment inputs from upstream.

The priority and order of these works requires more investigation at a sub catchment level and subsequent community consultation."

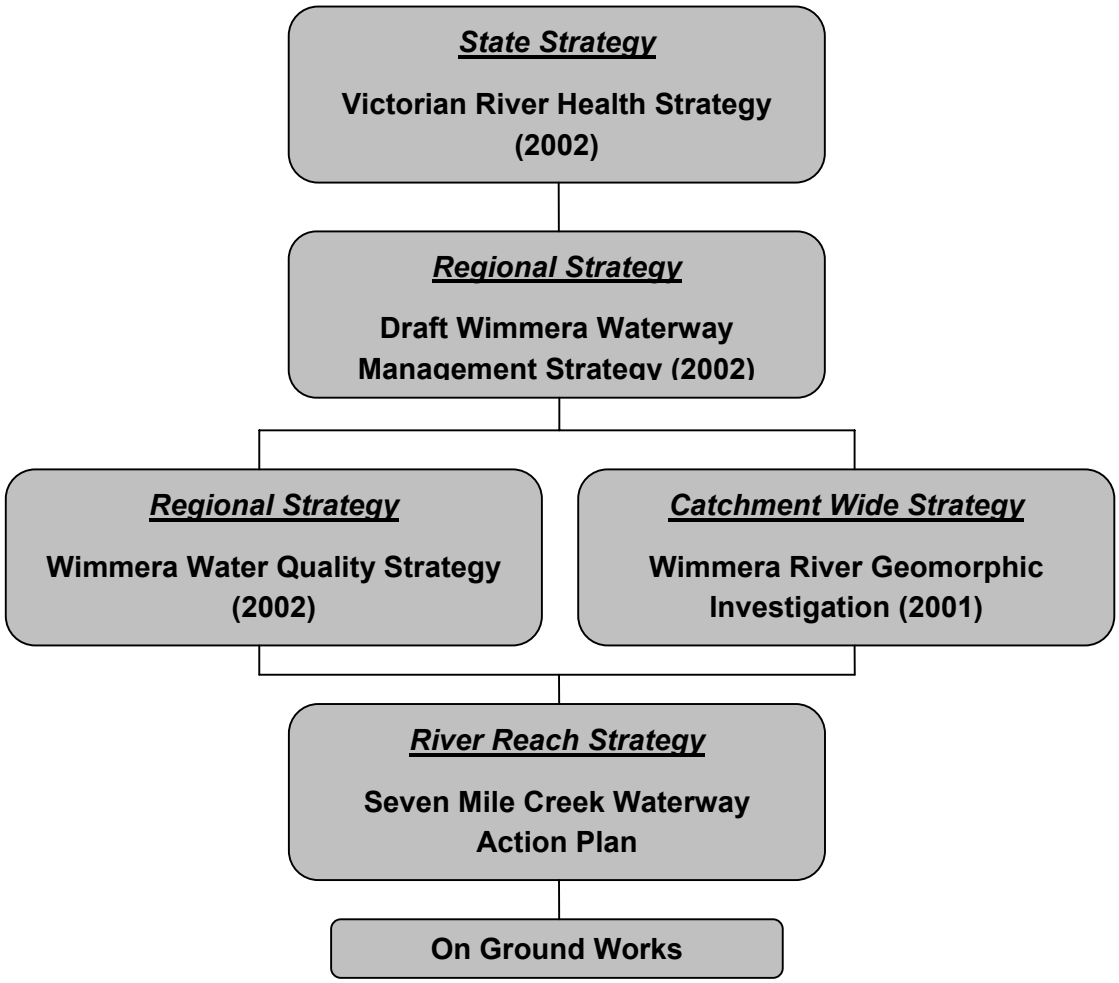


Figure A2: Relationships between strategies and action plans to be used to compile the Seven Mile Creek Waterway Action Plan.

Management Objectives

Seven Mile Creek, flows off the granitic and sedimentary bedrock hills east of the township of Great Western and into a palaeochannel of the Wimmera River.

Seven Mile Creek, with a catchment area of approximately 90 km^2, has moderate to severe gully and bank erosion throughout its catchment. This liberated coarse sediment is being deposited in flood-out zones within the Wimmera River floodplain. These flood-out zones are currently acting as buffers to prevent coarse sediment from entering Reach 7. Drainage works may initiate new headward erosion that would supply significant amounts of sediment to Reach 7.

In accordance with State and Regional plans and strategies, the objectives of the Seven Mile Creek Waterway Action Plan are:

- To protect the health of Reach 7 of the Wimmera River

This will involve

  - Investigating sediment sources upstream from flood out zones within the catchment
  - Assessing the potential impacts of water quality from the Seven Mile Creek catchment on the Wimmera River

- To identify any significant values within the Seven Mile Creek catchment.
- To encourage landholder participation in improved management of floodout zones in order to reduce the likelihood of drainage excavation

Recommendations for management of the above issues and values will be an outcome of the development of the WAP.

References

DNRE (Department of Natural Resources & Environment), 2002. *Victorian River Health Strategy*, Catchment & Water division DNRE, Melbourne Australia.

WCMA (Wimmera Catchment Management Authority), 2002. *Wimmera Waterway Management Strategy*, WCMA, Horsham Victoria.

WCMA (Wimmera Catchment Management Authority), 2001. Wimmera Water Quality Strategy, WCMA Horsham Victoria.

ID&A, 2002. Wimmera River Geomorphic Investigation, ID&A, Melbourne Australia.

Appendix A1

Seven Mile Creek Catchment Map

Appendix B

Cost Estimate

Appendix B - Cost Estimate

Item	Description	No.	Unit	Rate ($)	Total* ($)	Notes
	Reach 1					
1.1	Fencing & revegetation	3000	m	6.00	18,000	
	Reach 2					
2.1	Repair drop structures if required	6	each	1,500	9,000	
2.2	Monitor drop structures	6	each	100	600	
2.3	Fencing & revegetation	9000	m	6.00	54,000	
2.4	Treat eroding gullies				100,000	Requires survey and assessment
2.5	Establish vegetation and deep rooted pastures on recharge sites	200	Ha			Requires further assessment of suitable species/pasture type
	Reach 3					
3.1	Repair drop structures if required	6	each	1,500	9,000	
3.2	Monitor drop structures	6	each	100	600	
3.3	Revegetation	7000	m	1.00	7,000	
3.4	Treat eroding gullies				10,000	Requires survey and assessment
3.5	Establish vegetation and deep rooted pastures on recharge sites	100	Ha			Requires further assessment of suitable species/pasture type
3.6	Implement sediment management				10,000	Requires survey and design

	Reach 4					
4.1	Fence and revegetate	2400	m	6.00	14,400	
4.2	Rock beaching to protect Potters Road				5,000	Requires survey and assessment
	Reach 5					
5.1	Repair drop structures if required				2,000	
5.2	Monitor drop structures	1	each	100	100	
5.3	Fencing and revegetation	5000	m	6.00	30,000	
	Reach 6					
6.1	Repair drop structures if required	8	each	1,500	10,000	Requires assessment
6.2	Monitor drop structures	8	each	100	800	
6.3	Fencing and revegetation	3000	m	6.00	18,000	
					$298,500	

* Total Cost has not considered cost sharing.