EARTH TECH

Wimmera Catchment Management Authority

Concongella Creek Waterway Action Plan

Job 2901049.013

April 2003

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APPROVED	CHECKED
DATE	DATE

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Introduction

The Wimmera Catchment Management Authority (CMA) plans to undertake a stream management works program along the Concongella Creek, which has been identified as a high priority for management. The Concongella Creek Waterway Action Plan (WAP) has been completed to help facilitate the implementation of the waterway management works. The report:

- Describes the physical characteristics of Concongella 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 Concongella Creek catchment.

Management Objectives

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

The management objectives for Concongella Creek are:

- To protect the health of Reach 7 of the Wimmera River by:
    - Investigating whether liberated sediment is being transported into the Wimmera River
    - Determining appropriate actions to manage the current sediment load within Concongella Creek
    - Assessing the water quality from the Concongella Creek catchment and its potential impacts on the Wimmera River
    - Assessing the potential for weeds to be transported into the Wimmera River
- To identify any significant values within the Concongella Creek catchment.

Concongella Creek catchment

Concongella Creek is a left bank tributary of the Wimmera River that originates from the Great Dividing Range between the townships of Ararat and Great Western (See Figure 3 Locality Map). With a catchment area of approximately 300 km^2, the predominant landuse is grazing. Although comparatively small in area, viticulture is an important industry in the upper part of the Concongella Creek catchment.

The geology in the catchment varies throughout the length of Concongella Creek. The upper sections of the catchment are comprised of sandstone and siltstone. The mid section, around Great Western, is dominated by granodiorite. The lower sections are comprised of siltstone and sandstone, with fluvial gravels, sands and silts.

Figure 1: Granitic hills in the Concongella Creek catchment

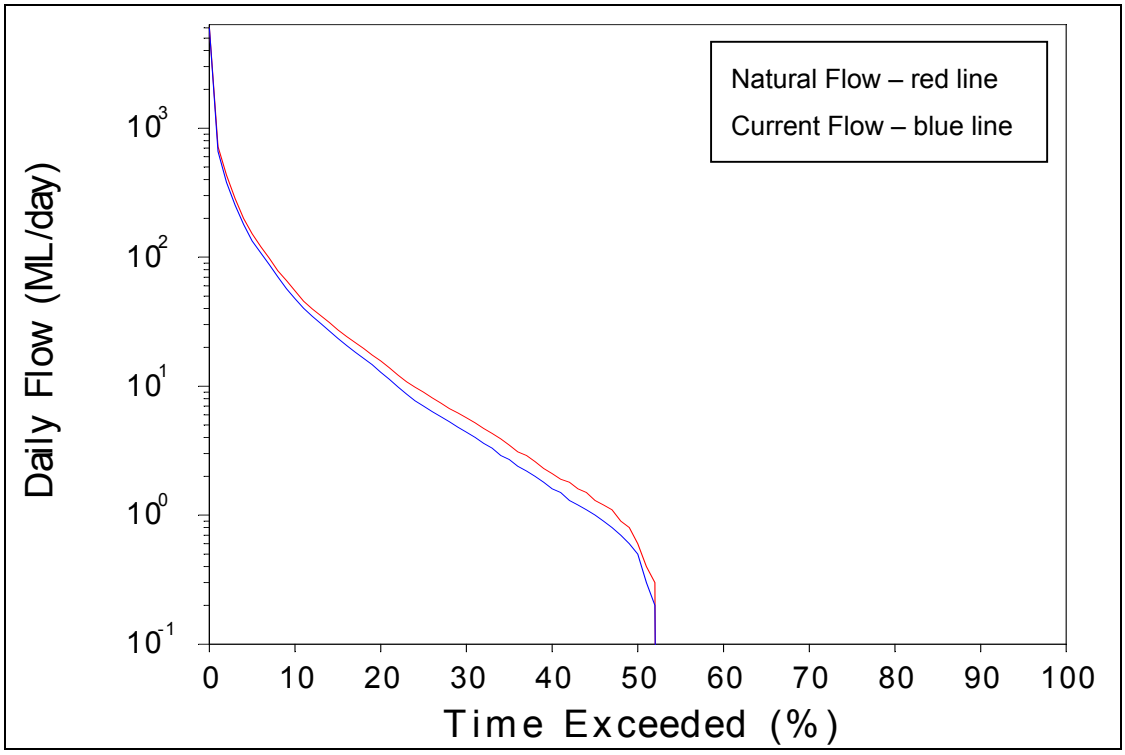
Concongella Creek and its tributaries flow in a northerly direction to the Wimmera River. The creek enters the river at Campbells Bridge, approximately 18 km upstream from Glenorchy.

Much of the tributary system has undergone gully erosion and incision. The major tributaries, Allanvale, Sandy, Salt, Wattle and Kirkella creeks, contain much contemporary mobile sediment (ID&A, 2002). As a result of the erosion, there are over 100 erosion control structures scattered throughout the catchment. The structures were built as part of either Group Conservation Schemes, Soil Conservation Authority works or bridges across roads. Many of the structures are now beyond their design life.

Concongella Creek does not have a floodout zone in its downstream extent. Rather, it has a continuous, relatively deep and narrow channel that is likely to have reasonable capacity to transport sediment. The release of sediment from the catchment has resulted in Concongella Creek having a sand bed. The majority of the contemporary sand is presently located just downstream from the Deep Lead-Granard Park Road. Some contemporary sand has reached the confluence with the Wimmera River, but has not had a significant effect. (ID&A, 2002)

Stream health varies throughout the catchment. In-stream values in the lower part of Concongella Creek are high with extensive riparian vegetation contributing large amounts of Large Woody Debris (LWD) to the channel. Gauging of the Concongella Creek downstream from the Stawell - Avoca Road indicates the creek regularly experiences a ‘cease to flow’ period in the summer months. Riparian vegetation, pools and LWD are therefore important refuges for aquatic species during this period. Fish species recorded in Concongella Creek include Mountain galaxias and Flat-headed gudgeon. River blackfish could also be expected, having been recorded in the Wimmera River in this area.

Flows within the Concongella Creek are not significantly altered from the natural regime. However, dam development in tributaries in the upper part of the catchment would have localised effects on flow (T. Duthie pers comm.).

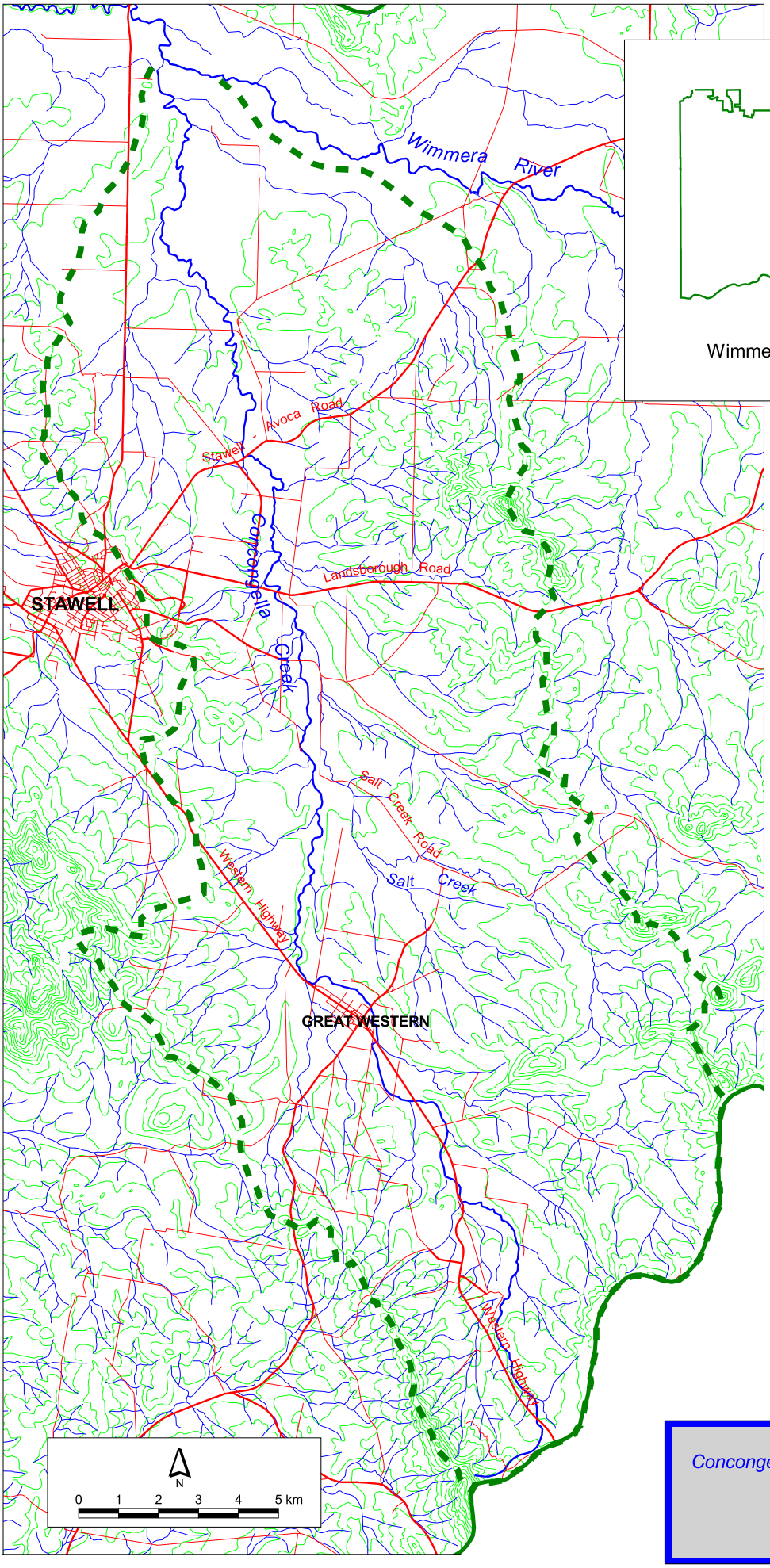


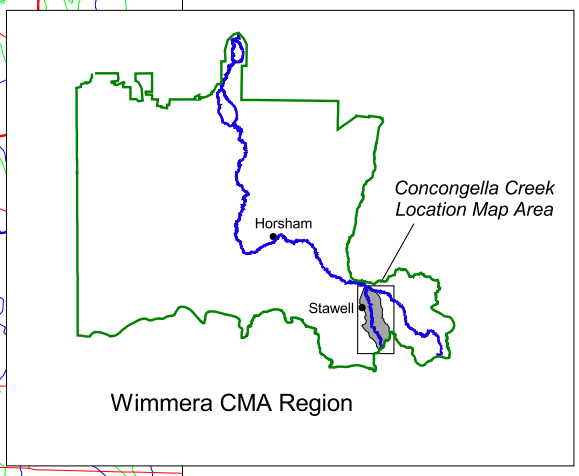
Source: WCMA (2002b)

Figure 2: Daily Flow data for Concongella Creek

Recorded salinity levels vary within the creek and have been as high as 10,000uS/cm. Over the last 3 years, the recorded salinity has varied between 1000 and 8000 uS/cm.

With grazing as the predominant landuse, stock readily access Concongella Creek. Nutrient and turbidity levels have been recorded as high in the creek.





Wimmera Catchment Management Authority

Waterways for Life.

Concongella Creek Waterway Action Plan

Location Map

Figure 3

Management Reaches

The main channel of Concongella Creek has been divided into four reaches for the purpose of this investigation. Five tributaries of Concongella Creek have also been identified. The purpose of highlighting distinct reaches and tributaries is for ease of identification of areas of concern and areas of high quality. The reaches and tributaries are detailed in Tables 1 and 2.

Table 1: Management Reaches in the Concongella Creek catchment

Reaches	Location
Reach 1	Upstream from the Great Western Salt Creek Road
Reach 2	Great Western Salt Creek Road to Landsborough Road
Reach 3	Landsborough Road to Granard Park Deep Lead Road
Reach 4	Granard Park Deep Lead Road to the Wimmera River confluence

Table 2: Management tributaries in the Concongella Creek catchment

Sub-catchment
Allanvale Creek catchment
Salt Creek catchment
Wattle Creek catchment
Jerrywell Creek catchment
Kirkella Creek catchment

Reach Assessments

Reach 1 - Upstream from Great Western Salt Creek Road

Reach 1 Condition and Values

Physical Form

Waterways in Reach 1 generally have small, narrow channels. The catchment appears to have once been a discontinuous system. Changes in the catchment, both upstream and downstream, are likely to have caused a process of incision through these discontinuous systems.

Much of the sediment in this reach is stored in the channel in the vicinity of Great Western. It has generally been colonised by reeds. Flooding in Great Western is a problem and there is pressure from residents to periodically remove sediment and reeds to reduce a perceived increase in flooding. This often translates into pressure on Vic Roads to clear around the five bridges that cross this reach of Concongella Creek. It is important that this work is monitored to ensure erosion is not initiated.

The waterways upstream from Great Western are generally stable. There is some minor active scour and erosion evident. There is very limited free sediment within the waterways of this reach.

Riparian Ecology

Although the upstream extents of the reach are well vegetated, the sections downstream only have vegetation in patches along the riparian zone. The vegetation in the downstream sections of the reach is mainly composed of overstorey species.

Spiny rush is common in Concongella Creek, indicating the presence of saline groundwater. The impact of spiny rush on riparian ecology is unknown. However, establishment of new trees would be more difficult where dense stands of spiny rush occur.

In-stream Habitat

Aquatic habitat is generally restricted to pools and dams on waterways in Reach 1. Prior to European settlement, the streams are likely to have been ephemeral, with aquatic habitat restricted to naturally occurring pools during the cease to flow period. Large River Red Gums have the potential to contribute significant amounts of LWD to the system. The impact of spiny rush on in-stream habitat is unknown.

Water Quality

Water quality is likely to vary throughout this reach, depending on stock access, extent of riparian vegetation and exposed bed or banks. Overall, quality is regarded as low due to stock access and possible nutrient runoff from vineyards.

Spiny rush indicates the presence of saline groundwater. Whether the saline groundwater affects the lower reaches of Concongella Creek is unknown.

Figure 4: Concongella Creek downstream from Allanvale - Dunworthy Road

Figure 5: Concongella Creek upstream from Allanvale - Dunworthy Road

Reach 1 Risks and Opportunities

Physical Form

Risk of initiating erosion by channel clearing at Great Western.

Risk from continuing sediment input from Allanvale Creek and some small tributaries.

Opportunity to decrease sedimentation at Great Western and reduce the risk of new erosion created by channel clearing.

Riparian Ecology

Risk of deterioration of riparian vegetation from stock access.

Opportunity to improve riparian vegetation by fencing and revegetation.

In-stream Habitat

Risk of smothering of habitat by sediment (Minor Risk).

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

Opportunity for improved habitat through increasing vegetation.

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 reaches downstream.

Opportunity to increase the filtering capacity of this reach and minimise the effects on reaches downstream.

Figure 6: Concongella Creek in the Ararat State Forest

Figure 7: Concongella Creek tributary in the Ararat State Forest

Reach 1 Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Moderate	3	Low	1	3
Riparian Ecology	Moderate	3	Low	1	3
In-stream Habitat	Poor	2	Low	1	2
Water Quality	Poor	2	Low	1	2
					Total 10

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

Reach 1 Management Actions

Management Actions	Priority for Works
Monitor bridge cleaning activities undertaken by Vic Roads.	Low
Opportunistic fencing and revegetation in tributaries.	Low

Reach 2 - Great Western Salt Creek Road to Landsborough Road

Reach 2 Condition and Values

Physical Form

Concongella Creek contains a natural constriction that makes Great Western prone to flooding. Reach 2 has an active sand bed. The banks are in good condition. The bedload in the channel is sandy and appears to be elevated. Although the sandy bed load affects the geomorphic features of the channel, it doest not appear to have completely compromised the channel's natural form.

A right bank tributary adjacent to Bulgana Road has undergone significant incision in the past and continues to do so. Salt Creek is a major right bank tributary to this reach, with the potential to contribute large volumes of sediment.

Riparian Ecology

Good riparian overstorey vegetation occurs along the banks in Reach 2. However, the groundcover and understorey vegetation only occurs where stock access is restricted.

In-stream Habitat

In-stream habitat in Reach 2 is compromised by the elevated sand bedload in combination with stock access. It is in better condition in the sections where stock has been excluded and in-stream vegetation has established, stabilising the active channel sediment load.

Water Quality

Water quality is generally satisfactory in Reach 2, due to the presence of riparian vegetation along the channel of Concongella Creek. Where the water quality is in poor condition, it is likely to be due to unvegetated tributaries and stock access.

Figure 8: Concongella Creek upstream from Western Hwy at Great Western

Figure 9: Concongella Creek downstream from Western Hwy at Great Western

Reach 2 Risks and Opportunities

Physical Form

Risk of continued sediment input from eroding tributaries.

Risk from failure of structures.

Riparian Ecology

Opportunity to fence and revegetate to control sediment movement and to link with high quality roadside vegetation.

In-stream Habitat

Risk of continuing deterioration of habitat by stock access.

Opportunity to improve in-stream habitat as large overstorey trees provide significant LWD.

Water Quality

Risk of poor water quality through sedimentation and stock access.

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

Opportunity to increase the filtering capacity of this reach and minimise the effects on reaches downstream.

Figure 10: Concongella Creek downstream from Red Bend Road

Figure 11: Concongella Creek upstream from Landsborough Road

Reach 2 Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Moderate	3	High	3	9
Riparian Ecology	Moderate	3	Medium	2	6
In-stream Habitat	Poor	2	Medium	2	4
Water Quality	Poor	2	Medium	2	4
					Total = 23

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

Reach 2 Management Actions

Management Actions	Priority for Works
Treat active erosion in right bank tributary adjacent to Bulgana Road.	Medium
Investigate stability of any drop structures and repair or maintain as appropriate.	Medium
Monitor the condition of drop structures.	Medium
Fence and revegetate Concongella Creek and tributaries.	Medium

Reach 3 - Landsborough Road to Granard Park Deep Lead Road

Reach 3 Condition and Values

Physical Form

The Creek has good physical form, in Reach 3, with a steep banked channel, good overstorey vegetation and minimal sand load. The reach is at risk due to the active sediment load in tributaries such as Wattle Creek. A small right bank tributary entering the creek to the west of Sycamores Road is actively eroding downstream of the road.

Riparian Ecology

Riparian vegetation in this reach is good, with much of the creek fenced off. The small right bank tributary is unfenced and in poor condition in its downstream section.

In-stream Habitat

With good overstorey and ground cover and a stable form, there are numerous pools and abundant in-stream vegetation in Reach 3 of Concongella Creek. In-stream habitat is limited in the tributaries.

Water Quality

Water quality is expected to be moderate through this reach with generally good riparian zones.

Reach 3 Risks and Opportunities

Physical Form

Risk - Wattle Creek poses the largest risk to Reach 3. Refer to Wattle Creek Section. The small right bank tributary poses a minor risk.

Risk - As with the rest of the catchment, the threat of failure of structures poses a risk. The most significant risk in the reach is the failure of structures in Wattle Creek.

Opportunity - Works in Wattle Creek will significantly reduce the risk to this reach and the downstream reach.

Riparian Ecology

Risk - Stock access poses a risk particularly in the eroding tributary. The overall risk is small.

Opportunity exists to link up good riparian vegetation along Concongella Creek with good vegetation in the tributaries and along roadsides.

In-stream Habitat

Risk - Eroding tributaries pose a small risk. There are limited opportunities. The main aim is to prevent deterioration of the existing habitat.

Opportunity – Restrict sediment entering the reach and to stabilise the sediment with vegetation.

Water Quality

Stock access and sediment pose the largest risks. However, overall, this is a small risk.

Figure 12: Concongella Creek downstream from Landsborough Road

Figure 13: Concongella Creek upstream from Sparrows Lane

Reach 3 Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Good	4	Medium	2	8
Riparian Ecology	Good	4	Medium	2	8
In-stream Habitat	Good	4	Medium	2	8
Water Quality	Moderate	3	Medium	2	6

Total = 30

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

Reach 3 Management Actions

Management Actions	Priority for Works
Treat active erosion in right bank tributary downstream from Sycamores Road.	Medium
Fence and revegetate Concongella Creek and tributaries.	Medium
Investigate stability of any drop structures and repair or maintain as appropriate.	Low
Monitor the condition of drop structures.	Low
Fence and revegetate tributaries (excluding Wattle Creek).	Low

Figure 14: Concongella Creek downstream from Stawell Avoca Road

Figure 15: Concongella Creek upstream from Deep Lead – Granard Park Road

Reach 4 - Granard Park Deep Lead Road to Wimmera River confluence

Reach 4 Condition and Values

Physical Form

A significant sand 'slug' is currently migrating through the reach. The downstream end of the sand 'slug' occurs near to the confluence with the Wimmera River. The sand 'slug' has caused the channel to be overloaded with mobile sand. The sand has blanketed in-stream geomorphic features, including pools, scours, point bars and features commonly found on stream bends and around LWD. The reduction of in-stream geomorphic features and associated vegetation is having a significant effect on in-stream habitat and ecological diversity. Downstream from the sand 'slug', the channel has a series of pools that do not show any evidence of mobile sediment. These downstream pools and the channel between them are fringed by thick stands of reeds.

The channel form is very good downstream from the sand 'slug' but poor elsewhere in the reach.

Riparian Ecology

The riparian zone throughout Reach 4 is generally good. It is very good in the lower section, with significant overstorey vegetation. Ground cover is in moderate condition, due to stock access. The groundcover is in relatively good condition compared to other sections of Concongella Creek. The creek is well fenced in this reach.

In-stream Habitat

The sand within the creek is having a major impact on in-stream habitat. The creek just upstream from the confluence is a good example of the condition of the channel and in-stream habitat without the effects of the additional sand load.

The good overstorey vegetation provides significant amounts of LWD in this reach. In some sections, recruitment of new trees and the creation of habitat is limited. This may be a reflection of fires that passed through the area approximately 2 years ago.

Water Quality

Gauging of Concongella Creek occurs at the upstream end of the reach. The records indicate poor water quality as previously discussed.

Figure 16: Confluence of Wimmera River and Concongella Creek

Figure 17: Sediment load in high value Reach 4 of Concongella Creek

Reach 4 Risks and Opportunities

Physical Form

Risk - There is an extremely high risk to the Wimmera River if the current sand 'slug' migrates downstream. If this occurs, the sand is likely to smother pools and vegetation within the high value Reach 7 of the Wimmera River. The sand requires stabilisation and / or immediate removal. A sand extraction structure may need to be constructed to trap sand, probably on an event basis.

Riparian Ecology

Risk - If sediment continues to be generated from upstream, the risks to ecological values in this reach and within Reach 7 of the Wimmera River, are high.

Risk - Stock access also posses a risk, causing a gradual deterioration in riparian vegetation.

Opportunity - Fencing of the sections of creek that are currently unfenced, provides a good opportunity to improve the overall health of the riparian zone in this reach.

In-stream Habitat

Opportunity - Management of the sand 'slug' provides an opportunity to recover significant habitat. Large volumes of LWD are present in this reach and there continues to be significant input from the overstorey. Recovery of in-stream habitat would extend the refuge currently available in the Wimmera River.

Water Quality

Opportunities to significantly improve water quality from within the reach are limited to restricting stock access. However, managing the sand would significantly reduce possible negative water quality impacts in Reach 7 of the Wimmera River.

Figure 18: Concongella Creek immediately upstream from Wimmera River

Figure 19: Concongella Creek on property of L. Kingston

Reach 4 Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Poor	2	High	3	6
Riparian Ecology	Good	4	High	3	12
In-stream Habitat	Moderate	3	High	3	9
Water Quality	Poor	2	High	3	6
					Total = 33

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

Reach 4 Management Actions

Management Actions	Priority for Works
Install a sediment trap at the downstream end of the sediment 'slug' and remove sediment when it becomes full. The trap will act to contain the sediment while vegetation is being established.	High
Fence Concongella Creek and stabilise sediment throughout the reach, with the introduction of vegetation to the channel and control of stock access.	High

Allanvale Creek Catchment

Allanvale Creek Condition and Values

Physical Form

Allanvale Creek has undergone incision in the past. Many of the erosion heads have been treated. However, some erosion heads are still active. Mobile sediment is stored in the channel of Allanvale Creek. At the upstream end, the sediment has been stabilised by grasses and reeds. However, this is not the case in the downstream reaches.

Riparian Ecology

Although the upstream extents of Allanvale Creek are well vegetated, the reaches downstream only have vegetation in patches along the riparian zone. The vegetation in the downstream sections of the reach is mainly composed of overstorey species. Continuous riparian vegetation is most commonly associated with fencing in the mid- to upstream reaches. Spiny Rush is common, indicating the presence of saline groundwater.

In-stream Habitat

Aquatic habitat is generally restricted to pools and dams on waterways in the Allanvale Creek catchment. Prior to European settlement, the waterways in the catchment are likely to have been ephemeral, with aquatic habitat restricted to naturally occurring pools. Large River Red Gums have the potential to contribute significant amounts of LWD to the system. The effect of Spiny Rush on the in-stream habitat is unknown.

Water Quality

Water quality is likely to vary throughout this reach, depending on stock access, extent of riparian vegetation and exposed bed or banks. Overall, quality is regarded as low, due to stock access and active erosion.

Spiny Rush indicates the presence of saline groundwater. Whether the saline groundwater affects the lower reaches of Concongella Creek is unknown.

Figure 20: Stabilised sediments in the upper sections of Allanvale Creek

Figure 21: Stabilised sediments in Allanvale Creek, upstream from Sinnots Road

Allanvale Creek Risks and Opportunities

Physical Form

Risk from continuing sediment input from Allanvale Creek and some small tributaries.

Opportunity to treat active erosion heads in Allanvale Creek and smaller tributaries.

Riparian Ecology

Risk of deterioration of riparian vegetation from stock access.

Opportunity to improve riparian vegetation by fencing and revegetation, particularly in lower sections of Allanvale Creek.

In-stream Habitat

Risk - Minor 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, particularly in the downstream reaches.

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 reaches downstream.

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

Figure 22: Effect of uncontrolled stock access to lower sections of Allanvale Creek

Figure 23: Lower section of Allanvale Creek

Allanvale Creek Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Moderate	3	Low	1	3
Riparian Ecology	Moderate	3	Medium	2	6
In-stream Habitat	Poor	2	Medium	2	4
Water Quality	Poor	2	Medium	2	4
					Total 17

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

Allanvale Creek Management Actions

Management Actions	Priority for Works
Treat active erosion heads in the upstream reaches of Allanvale Creek and in the right bank tributary upstream from McKays Woolshed Road.	Medium
Investigate stability of any drop structures and repair or maintain as appropriate.	Medium
Monitor the condition of drop structures.	Medium
Fence and revegetate downstream sections of Allanvale Creek.	Medium

Salt Creek Catchment

Salt Creek Condition and Values

Physical Form

The downstream reaches of Salt Creek are in moderate physical condition. The major physical problem in the downstream reaches is bank instability related to stock access to the waterway.

The upstream reaches of the Salt Creek catchment are noted for their mobile sand bedload and active scouring in parts. In particular, the channel adjacent to the most upstream crossing by the Salt Creek Road has evidence of active scour and mobile sand bedload. The sand bed load has a significant effect on the geomorphic form of the channel bed, smothering in-stream scour features and preventing the establishment of vegetation within the channel. The unstable bedload is exacerbated by stock access, which affects the already unstable banks and, through grazing, restricts the development of in-stream vegetation.

Riparian Ecology

Despite being crown frontage for much of its length, riparian vegetation along Salt Creek is poor.

In-stream Habitat

Sediment has smothered any in-stream habitat that may have existed. There is little input of LWD from overstorey vegetation. In-stream habitat is considered poor.

Water Quality

The presence of spiny rush and anecdotal evidence gathered by landholders indicates the presence of saline groundwater. Water quality is considered poor due to the effects of saline groundwater, unrestricted stock access and sparse groundcover.

Figure 24: Sediment load and spiny rush in Salt Creek

Figure 25: Uncontrolled stock access to Salt Creek

Salt Creek Risks and Opportunities

Physical Form

Opportunity - There is an opportunity to stabilise sediment within the channel before it reaches Concongella Creek and compromises the channel form.

Opportunity - There is also an opportunity to limit further generation of sediment through the control of active scours and the stabilisation of stream and scour banks.

Riparian Ecology

Risk - Continued uncontrolled stock access to Salt Creek will further deteriorate the riparian zone.

Opportunity - Fencing and revegetation.

In-stream Habitat

Opportunity - Where overstorey vegetation is present there is the opportunity to improve in-stream habitat.

Water Quality

Risk - Salt will continue affect water quality and decrease stream health.

Figure 26: Minor headward erosion in a tributary of Salt Creek

Figure 27: Erosion in tributary of Salt Creek

Salt Creek Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Moderate	3	Medium	2	6
Riparian Ecology	Poor	2	Medium	2	4
In-stream Habitat	Poor	2	Low	1	2
Water Quality	Poor	2	Low	1	2

Total = 14

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

Salt Creek Management Actions

Management Actions	Priority for Works
Treat active scour on property of C. West.	High
Fence and revegetate along Salt Creek.	Medium
Investigate stability of any drop structures and repair or maintain as appropriate.	Medium
Monitor the condition of structures.	Low

Wattle Creek Catchment

The main channel of Wattle Creek runs parallel to Landsborough Road and drains the western face of Concongella Hill.

Wattle Creek Condition and Values

Physical Form

The upper reaches of Wattle Creek have incised significantly in the past. Most of the incised channel has been rehabilitated, apart from a scour on the Holden property. The past scouring has left a sediment 'slug' within the channel. The downstream end of the slug is currently situated between Wyndarra Road and Sycamore Road.

In the lower reaches, the channel shows evidence of past expansion. However, the channel appears to have stabilised, especially where riparian vegetation has established and the stock have been excluded. The channel form is classified as poor. However, it is now in a recovery phase, due to previous rehabilitation works.

Riparian Ecology

The riparian zone varies from young vegetation associated with works in the upper section of the creek to individual mature overstorey vegetation in the lower sections. Whilst the young vegetation is continuous, the older vegetation is less so. Similarly the younger vegetation is fenced and thus there is groundcover. Stock has access to the creek below the mature vegetation and hence groundcover is limited.

In-stream Habitat

The creek contains isolated pools and scour holes and as a consequence habitat is limited.

Water Quality

Water quality is expected to be poor with stock having access, limited vegetation cover to filter overland flow and sediment within the channel.

Figure 28: Wattle Creek downstream from Wyndarra Road

Figure 29: Wattle Creek upstream from Wyndarra Road

Wattle Creek Risks and Opportunities

Physical Form

There is a risk that the sediment originally mobilised within the creek system will reach Concongella Creek. There is good opportunity to stabilise the moving sediment within Wattle Creek.

Structures within the system are younger than those in other parts of Concongella catchment. They are privately owned and require monitoring.

Riparian Ecology

Risk of further deterioration of riparian zone through stock access.

Opportunity to through fencing and revegetation to link young vegetation in rehabilitation works with good quality vegetation along the Concongella Creek.

In-stream Habitat

Risk of further deterioration of in-stream habitat through stock access.

Opportunity to extend good habitat by linking with Concongella Creek.

Water Quality

Opportunity to improve quality of water entering Concongella Creek.

Wattle Creek Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Poor	2	Medium	2	4
Riparian Ecology	Moderate	3	Medium	2	6
In-stream Habitat	Poor	2	Low	1	2
Water Quality	Poor	2	Low	1	2
					Total =14

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

Wattle Creek Management Actions

Management Actions	Priority for Works
Fence and revegetate along Wattle Creek.	Medium
Investigate stability of any drop structures and repair or maintain as appropriate.	Medium
Monitor the condition of drop structures.	Low

Jerrywell Creek Catchment

Jerrywell Creek Condition and Values

Physical Form

The left bank tributary is a minor system, situated on the western side of the Concongella Creek catchment. Jerrywell Creek flows into Reach 4 of the Concongella Creek. There is no sediment generation within the Jerrywell Creek system, nor is there past sediment moving through the system.

Channel form is excellent in the Deep Lead Flora and Fauna Reserve but poor within the rest of the tributary.

Riparian Ecology

The Jerrywell Creek sub-catchment is an ephemeral system, consisting of numerous discontinuous systems. The riparian ecology of the original system is likely to have been restricted to overstorey trees and species that preferred slightly wetter soils. As there was no defined, continuous channel, waterway vegetation is likely to have been restricted to pools and the discontinuous sections of channel.

Currently, the majority of the catchment has been cleared and is used for a mixture of farming, urban development (hobby farms) and vineyards. Most of the discontinuous systems have incised and currently have little or no riparian vegetation. The western tributaries that rise in the Deep Lead Flora and Fauna Reserve have well-established riparian vegetation.

In-stream Habitat

The Jerrywell Creek system provides little to no in-stream habitat.

Water Quality

Water quality is rated as poor due to stock access and a lack of riparian vegetation in most parts of the channel.

Jerrywell Creek Risks and Opportunities

Physical Form

Risks to the Jerrywell Creek system are negligible. However its confluence with Reach 4 should be monitored to ensure no headward erosion is initiated through sediment management activities.

Riparian Ecology

There is an opportunity to revegetate the main drainage features and exclude stock from them, although this is a fairly low priority.

The revegetation could also act as a corridor to link the fairly well vegetated main channel of Concongella Creek to the Deep Lead Flora and Fauna Reserve.

In-stream Habitat

N/A

Water Quality

Revegetation and the exclusion of stock from the waterways would improve the water quality.

Jerrywell Creek Summary

	Condition	Score	Risk-Opportunity	Score	Final Score*
Physical Form	Moderate	3	Low	1	3
Riparian Ecology	Poor	2	Low	1	2
In-stream Habitat	Poor	2	Low	1	2
Water Quality	Poor	2	Low	1	2
					Total = 11

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

Jerrywell Creek Management Actions

Management Actions	Priority for Works
Opportunistic fencing and revegetation.	Low
Monitor confluence of Reach 4 of Concongella Creek for headward erosion.	Low

Kirkella Creek Catchment

Kirkella Creek Condition and Values

Physical Form

Concongella Creek is not directly connected to Kirkella Creek. This is due to a floodout that occurs in the lower reaches of Kirkella Creek. Downstream from the floodout, the channel is in good condition, although the banks are affected by stock. Upstream from the floodout, the Kirkella Creek channel is in poor condition, with a large sand bedload. The sand bedload is particularly concerning downstream from the Vinelea Granard Park Road. Despite over 100 m of revegetation downstream from the road, the moving sand bed is not stable. The instability of the sand bed is particularly evident downstream from the revegetation, where the channel flows across cleared farmland.

There are a number of structures built into road crossings, which are important for bed stability. These structures require monitoring.

Riparian Ecology

Upstream of Vinelea Granard Park Road the riparian vegetation is moderate. There are some extensive continuous zones of remnant native vegetation. Between Vinelea Granard Park Road and Doctors Creek Kirkella Road the riparian zone is very poor with isolated mature trees only. The riparian zone improves through to the Concongella Creek confluence below Doctors Creek Kirkella Road.

In-stream Habitat

The nature and extent of in-stream habitat is similar to that of riparian vegetation. Being ephemeral in nature, the uppers reaches contain less pools and water for refuge.

Water Quality

Water quality is expected to be poor due to stock access to the creek in the mid section.

Figure 30: Kirkella Creek upstream from Vineyard Road

Figure 31: Kirkella Creek in its mid section

Kirkella Creek Risks and Opportunities

Physical Form

The greatest risk to Kirkella and the Concongella creek is sedimentation of the floodout zone downstream of Doctors Creek Kirkella Road. Sedimentation may lead the landowner to undertake works to alleviate drainage problems. Such work could initiate new erosion.

Opportunity exists to stabilise the sand upstream from the road.

Riparian Ecology

Stock access poses the greatest threat to the deterioration of riparian vegetation.

Fencing and revegetation in the middle section would protect the vegetation and link up higher quality vegetation both upstream and downstream.

Opportunistic fencing and revegetation of other areas along the creek would improve overall stream health.

In-stream Habitat

In-stream habitat downstream of Doctors Creek Kirkella Road is under threat form sedimentation upstream.

Fencing and revegetation would stabilise sediment upstream and prevent it moving downstream.

Water Quality

Water quality could be significantly improved by controlling stock access.

Kirkella Creek 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	Poor	2	High	3	6
					Total = 24

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

Kirkella Creek Management Actions

Management Actions	Priority for Works
Fence and revegetate along Kirkella Creek between Doctors Creek Kirkella Creek Road.	Medium
Monitor the condition of structures.	Medium
Opportunistic fencing and revegetation.	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

Much of Concongella Creek is prone to flooding. Landowners particularly within Reaches 2 &3 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	Score	Management Priority
Reach 1	10	**9**
Reach 2	23	**4**
Reach 3	30	**2**
Reach 4	33	**1**
Allanvale Creek	17	**5**
Salt Creek	14	**6**
Wattle Creek	14	**7**
Jerrywell Creek	11	**8**
Kirkella Creek	24	**3**

Summary of Priorities for Management Action

Reach	Activity							
	Monitor bridge cleaning activities	Determine condition of drop structures	Monitor drop structures	Fence and revegetate to control stock access in Concongella Creek	Treat active erosion heads	Fence and revegetate to control stock access in tributaries	Construct sediment trap and extract sediment	Monitor confluence with Concongella Creek
Reach 1	L					L		
Reach 2		M	M	M	M			
Reach 3				M		M		
Reach 4				H			H	
Allanvale Creek		M	L		M	M		
Salt Creek		M	L		M	M		
Wattle Creek		M	L			M		
Jerrywell Creek						L		L
Kirkella Creek			M			M & L		

For cost estimates of implementation of proposed works program refer Appendix B

References

Land Technology (2000) *Concongella Landcare Group, Astons Scour Group: Catchment Management Plan, Astons Scour*. Land Technology Pty Ltd, Horsham, Victoria.

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

WCMA (Wimmera Catchment Management Authority) (2002b) Draft Upper Wimmera Water Resource Management Plan.

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 A

Management Objectives

Appendix A - Introduction

The Wimmera Catchment Management Authority plans to undertake a stream management works program along the Concongella 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 which 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
- 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
- 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.

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 Concongella Creek, which is wholly contained within Waterway Management Unit 4.

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
- Catchment management

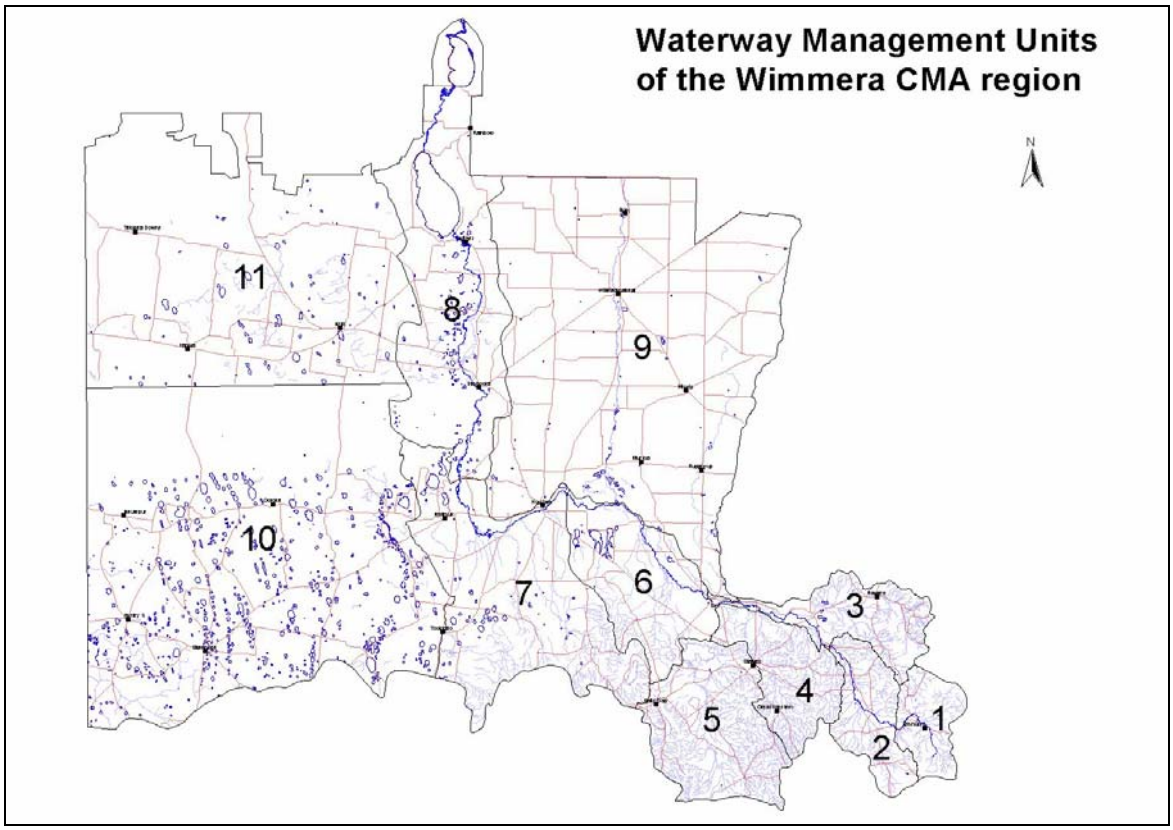


Figure A1: Waterway Management Units of the Wimmera CMA region

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
- 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 of 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

"Investigation of the sand slug moving through Concongella Creek is required. It is likely some works will be required in the creek to stabilise sand in-place. Gully erosion control works in the upper catchment areas of this system are likely to have little benefit in protection of the health of the Wimmera River..."

" Gully erosion control works in the Kirkella Creek sub catchment are recommended due to its proximity to the Wimmera River. If any investigations reveal the presence of intact freshwater meadows in the upper catchment, protection of them should be a high priority for management".

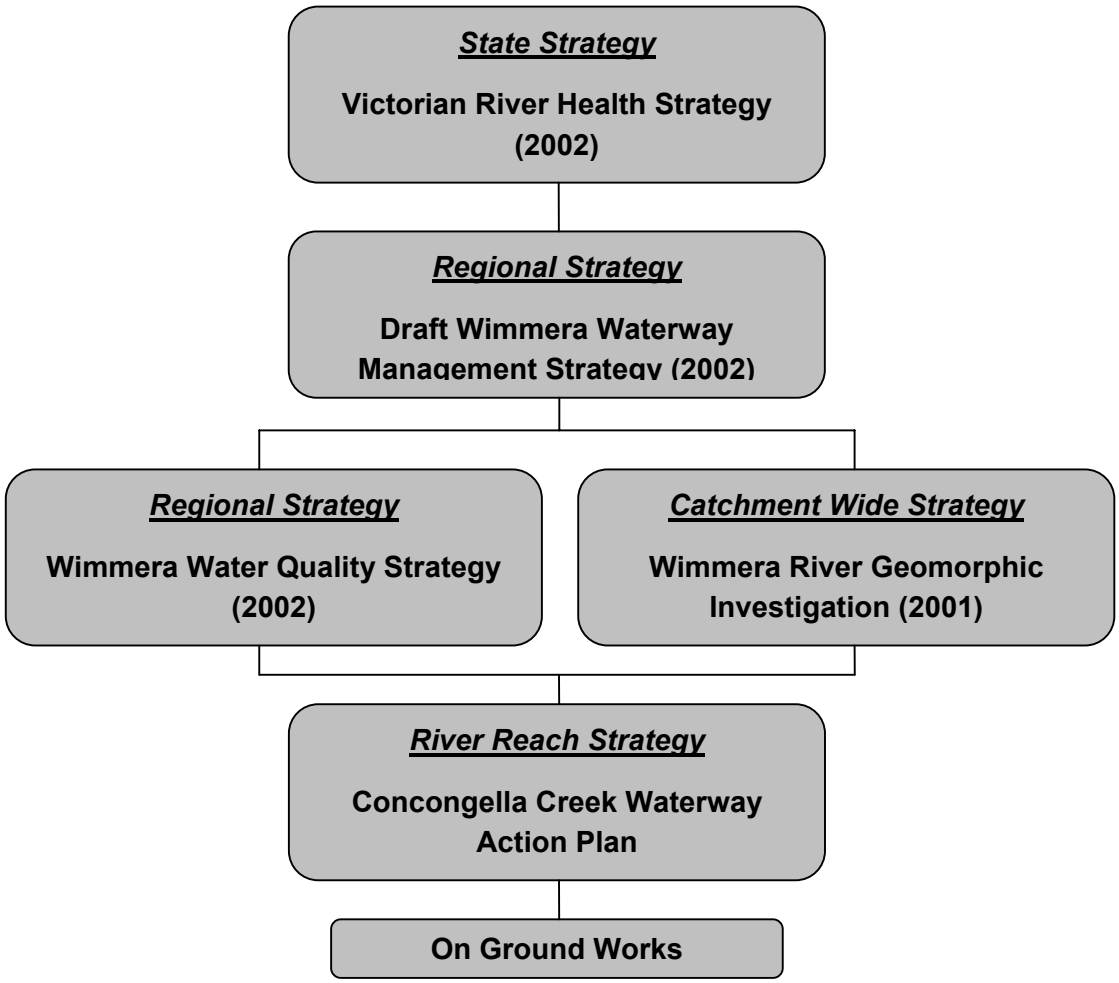


Figure A2: Relationships between strategies and action plans to be used to compile the Concongella Creek Waterway Action Plan.

Management Objectives

Concongella Creek is a left bank tributary of the Wimmera River that originates from granitic hills in the Great Western area and enters the Wimmera River in the high value Reach 7. It is generally in poor condition.

Most of the drainage networks in the tributary system have undergone gully erosion and as a consequence have much contemporary mobile sediment within them. This release of sediment has resulted in Concongella Creek having a sand bed. There is a significant sediment load presently downstream of the Deep Lead-Granard Park Road. Concongella Creek does not have a floodout zone in it downstream extents. It has a continuous relatively deep and narrow channel that is likely to have reasonable capacity to transport sediment.

In accordance with State and Regional plans and strategies, the objectives of the Concongella Waterway Action Plan are;

- To protect the health of Reach 7 of the Wimmera River. This will involve
    - Investigating whether liberated sediment is being transported into the Wimmera River
    - Determining appropriate actions to manage the current sediment load within Concongella Creek
    - Assessing the water quality from the Concongella Creek catchment and its potential impacts on the Wimmera River
    - Assessing the potential for weeds to be transported into the Wimmera River
- To identify any significant values within the Concongella Creek catchment.

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

Concongella Creek Catchment Map

Appendix B

Cost Estimate for implementation of recommendations

Cost Estimate

Item	Description	No.	Unit	Rate ($)	Total* ($)	Notes
	Reach 1					
1.1	Fencing & revegetation	10,000	m	6.00	60,000	
1.2	Monitor bridge cleaning	5	each	100	500	
	Reach 2					
2.1	Treat active erosion in right bank tributary	1200	m	1.00	1,200	Requires further assessment of most appropriate technique
2.2	Investigate stability of any drop structures	12	each	100	1,200	
2.3	Monitor drop structures	12	m	100	1,200	
2.4	Fencing & revegetation	10,000	m	6.00	60,000	
	Reach 3					
3.1	Treat active erosion	600	m		10,000	Requires survey and assessment
3.2	Fence and revegetate Concongella Creek	5000	m	6.00	30,000	
3.3	Investigate stability of any drop structures	2	each	100	200	
3.4	Monitor drop structures	2	each	100	200	
3.5	Fencing and revegetation	7000	m	6.00	42,000	
	Reach 4					
4.1	Install sediment trap	1	ea		15,000	Requires survey and assessment
4.2	Fence Concongella Creek and stabilise sediment	4000	m	6.00	24,000	
	Allanvale Creek					
A.1	Treat active erosion heads	2	each	5,000	10,000	Requires survey and assessment
A.2	Investigate stability of any drop	8	each	100	800	

	structures and repair or maintain as appropriate					
A.3	Monitor the condition of drop structures	8	each	100	800	
A.4	Fence and revegetate lower section of Allanvale Creek	7000	m	6.00	42,000	
	Salt Creek					
S.1	Treat active scour on property of C. West	1	each	5,000	5,000	Requires survey and assessment
S.2	Fence and revegetate	8000	m	6.00	48,000	
S.3	Investigate stability of any drop structures and repair or maintain as appropriate	5	each	100	500	
S.4	Monitor the condition of structures	5	each	100	500	
	Wattle Creek					
W.1	Fence and revegetate	3000	m	6.00	18,000	
W.2	Investigate stability of drop structures	15	each	100	1500	
W.3	Monitor the condition of drop structures	15	each	100	1500	
	Jerrywell Creek					
J.1	Opportunistic fencing and revegetation	2000	m	6.00	12,000	
J.2	Monitor confluence of Reach 4 of Concongella Creek for headward erosion				100	
	Kirkella					

	Creek					
K.1	Fence and revegetate along Kirkella Creek between Doctors Creek Kirkella Creek Road	4500	m	6.00	11,250	
K.2	Opportunistic fencing and revegetation	3000	m	6.00	18,000	
K.3	Investigate stability of drop structures	8	each	100	800	
K.4	Monitor the condition of structures	8	each	100	800	
					$417,050	

* Total Cost has not considered cost sharing.