

Wimmera River Reach 6.2 Waterway Action Plan



November 2002

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Earth Tech Engineering Pty Ltd

ABN 61 089 482 888
Head Office 71 Queens Road
Melbourne VIC 3004
Tel +61 3 8517 9200

Wimmera Catchment Management Authority

Wimmera River Reach 6.2 Waterway Action Plan

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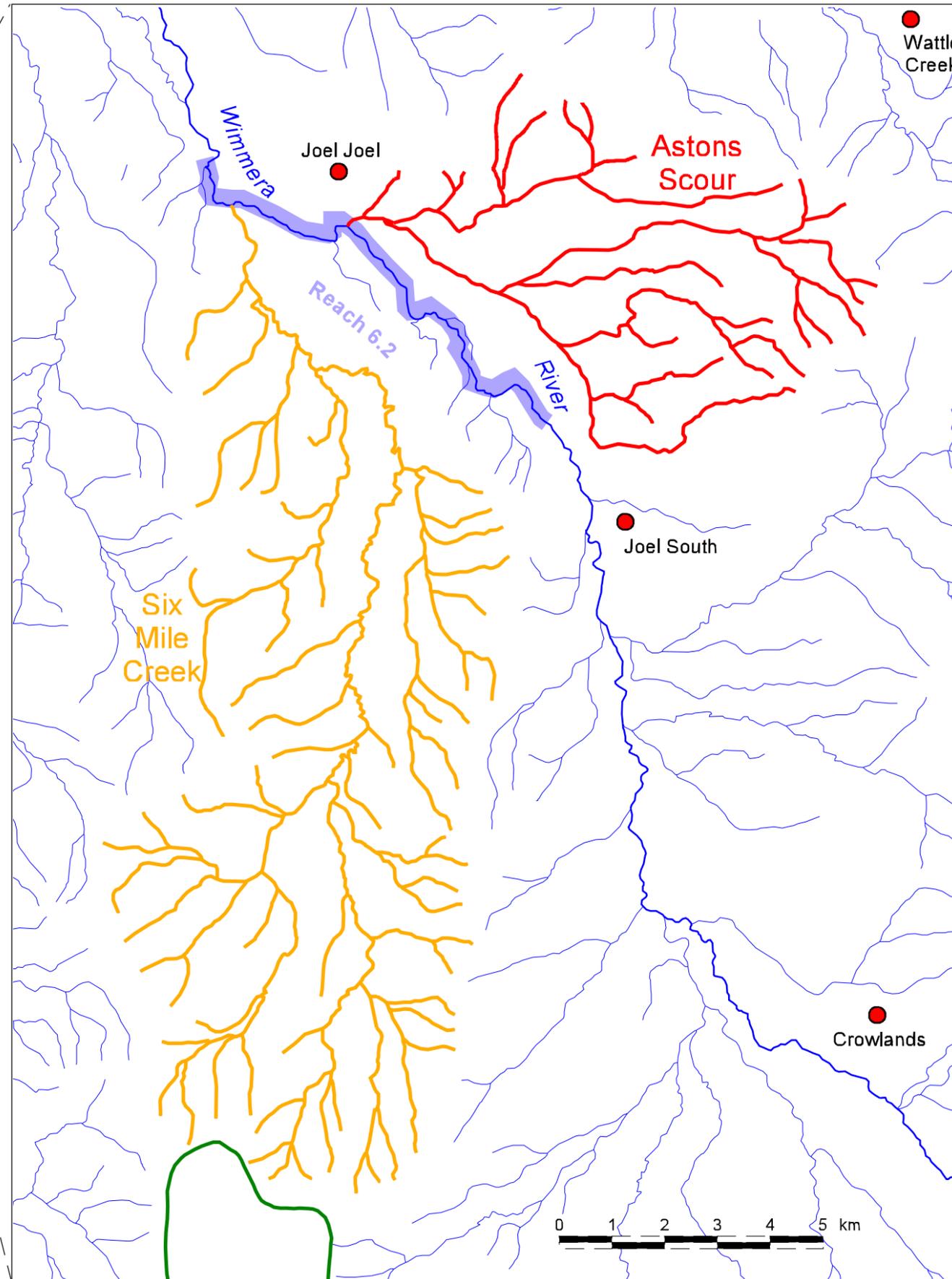
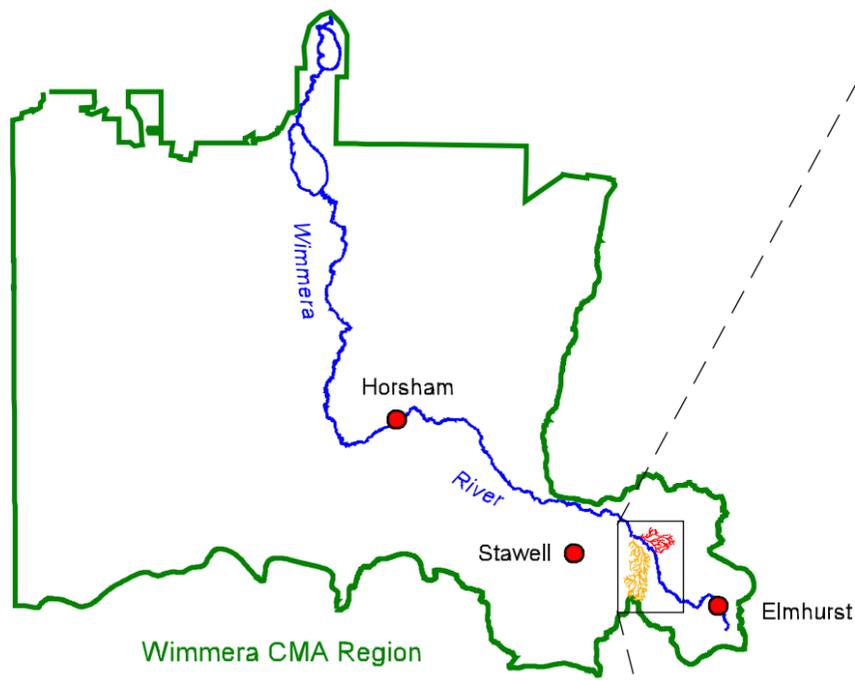
Introduction

This Waterway Action Plan for Reach 6.2 of the Wimmera River has been prepared by Earth Tech Engineering for the Wimmera Catchment Management Authority.

The Wimmera Catchment Management Authority plans to undertake a stream management works program along this reach of the Wimmera River, which has been identified as a high priority for management. This Waterway Action Plan has been completed to help facilitate the implementation of the waterway management works. 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 this Action Plan.

This report includes a discussion of stream processes, habitat, riparian vegetation, stream flow and water quality issues and establish a technical basis for determining the priorities for works implementation. In determining these priorities the investigation also considers the objectives of the Wimmera Catchment Management Authority via objectives referenced in the relevant regional strategies.

Once these priorities have been set, the works program will be developed in consultation with the local community. Individual works sites will be assessed in the field against the priorities set for the program and associated financial considerations.



**Wimmera River
Waterway Action Plan**

Reach 6.2

Figure 1



November 2002

Regional Objectives

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

- Victorian River Health Strategy (2002)
- Draft Wimmera Waterway Management Strategy (1999)
- Draft Wimmera Water Quality Strategy (2001)
- Wimmera River Geomorphic Investigation (2002)

Review of Regional Strategies

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). This goal is to be attained using the following four key elements of the strategy (DNRE, 2002):

- 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 rivers, and;
 - Preventing damage from future 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.

Regional River Health Strategies, of which this report is a part, aim to:

- Identify environmental, recreational, social and economic assets;
- Identify threats to assets;
- Set broad priorities for protection and restoration based on a risk-based approach and a level of community commitment;
- Identify broad actions required;
- Include detailed issue specific action plans which identify:
 - Detailed options for actions and analyse these using the cost-benefit approach;
 - Priority actions;
 - Roles and responsibilities
 - The cost sharing arrangements
 - Timetable for implementation; and
 - Five year implementation targets and 10 year resource condition targets;

- Integrate five year implementation targets and 10 year resource condition targets for major river reaches;
- Set integrated river health objectives and targets for major river reaches; and
- Include monitoring, reporting and review programs.

The VRHS goes on to briefly describe some of the details of managing:

- Water quality;
- Riparian lands; and
- River channels.

The Wimmera Waterway Management Strategy

The Wimmera Waterway Management Strategy (WWMS) aims to provide direction for waterway management within the Wimmera region (Sinclair Knight Merz 1999). The goal of the strategy is 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, the aim of which is to manage structural waterway assets so as to improve the health of the waterways;
- Program 2. Waterway Repair and Maintenance, the aim of which is to preserve, maintain and/or rehabilitate the environmental, economic and social values of waterways;
- Program 3. Riparian Management, the aim of which is to improve waterway health through the sustainable management of riparian zones; and
- Program 4. Catchment Management, the aim of which is to assist in addressing land management issues that have negative impacts on waterway values.

Appendix A of the WWMS describes the method used to divide the Wimmera CMA into 12 Waterway Management Units (WMU). Detailed information on each river reach which makes up a WMU has been gathered through literature reviews and field inspections. Tables summarizing the stability, ecological condition and estimated cost of works required for each reach are provided. This report aims to confirm and elaborate on the findings of the WWMS in relation to Reach 6.2 as defined in the Wimmera River Geomorphic Investigation.

The Wimmera River Water Quality Strategy

The aim of the Wimmera River Water Quality Strategy is to improve the quality of river water so as to bring environmental, social and economic benefits to the region. Poor water quality has resulted in a significant number of blue green algae blooms in the past. 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.

It has been estimated that catchment wide implementation of these strategies could reduce total phosphorous input to the catchment by 24.1 tonnes per year.

The Wimmera River Geomorphic Investigation

The Wimmera River Geomorphic Investigation (WRGI) comprises 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. With regard to reach 6.2 the WRGI (ID&A 2002) notes that, “The management of this reach for continuing sediment deposition is critical. The potential impacts that increased sediment loads could have on high value reaches downstream make the maintenance of dense instream and riparian vegetation in this reach a priority for the WCMA”.

Summary of Strategies

Table 1 summarises this review of strategies which guide and contribute to the Wimmera River Waterway Action Plan for Reach 6.2. Figure 2.1 illustrates the relationship between these reports and the Waterway Action Plans.

Table 1 Summary of relevant strategies

Report	Strategy Scale	Relevant Aims
Draft Victorian River Health Strategy 2002	State Wide	<ul style="list-style-type: none"> – Protect rivers that are of the highest community value from any decline in condition – Maintain the condition of ecologically healthy rivers – Achieve an overall improvement in the environmental condition of the remainder of rivers – Prevent damage from future activities.
The Wimmera Waterway Management Strategy	Regional	<ul style="list-style-type: none"> – Manage structural assets to improve waterway health – Preserve, maintain and/or rehabilitate the environmental, economic and social values of waterways – Manage riparian zones to improve waterway health – Address land management issues that have negative impacts on waterway values.
The Wimmera Water Quality Strategy	Catchment Wide	<p>Ensure catchment and river health management in the region will result in improved water quality, through:</p> <ul style="list-style-type: none"> – Waterway repair and maintenance – Improved flow regimes – Riparian management – Catchment management.
The Wimmera River Geomorphic Investigation	Catchment Wide	<ul style="list-style-type: none"> – Preserve areas with near pristine values – Restore areas with high values – 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.
The Wimmera River Waterway Action Plan for Reach 6.2	River Reach Specific	<ul style="list-style-type: none"> – Manage structural assets to improve waterway health – Preserve, maintain and/or rehabilitate the environmental, economic and social values of waterways – Manage riparian zones to improve waterway health – Address land management issues that have negative impacts on waterway values.

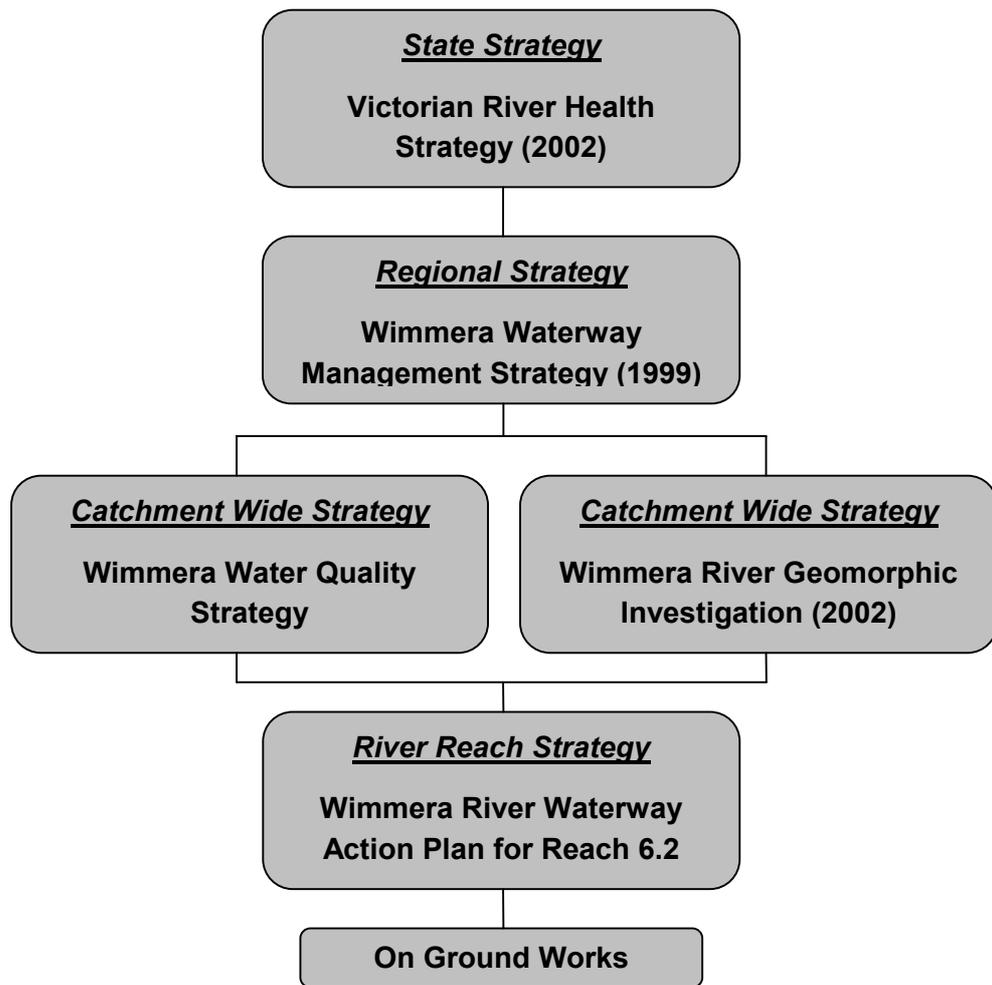


Figure 2.1 Relationships between reports used to compile the Wimmera River Waterway Action Plan for Reach 6.2.

Wimmera River Reach 6.2 Waterway Action Plan

Reach 6.2 of the Wimmera River is located alongside the Joel Joel Crowlands road, in the vicinity of the Joel Joel Community Hall. The reach is approximately 9 800m long, and extends approximately 3 700m downstream of the Joel Joel Community Hall. Upstream of the hall the reach extends for a further 6 100m. Joel Joel Bridge is located at the approximate centre of this reach (see Locality Map Figure 1). The Wimmera River Reach 6.2 Waterway Action Plan (WAP 6.2) details work required to meet the aims of the strategies discussed in the previous section.

The control of sediment movement within Reach 6.2 aims to increase the geomorphic, vegetation, instream habitat and water quality values of the reach. As a consequence of this work, these values will also be improved in the high conservation value reach immediately downstream.

Astons Scour and Six Mile Creek are ephemeral tributaries of the Wimmera River which have the potential to contribute significant quantities of sediment to Reach 6.2. This Waterway Action Plan therefore includes a works program to maintain and improve the sediment trapping and holding abilities of Astons Scour and Six Mile Creek.

Overview of Reach 6.2

Reach 6.2 is a recovering chain of ponds, and is also the transition zone into the markedly different character of Reach 7 (ID&A, 2002) downstream. The Wimmera River Geomorphic Investigation (2002) stresses the importance of managing Reach 6.2 to accumulate sediment and protect Reaches 7 and 8.

Upstream of Reach 6.2, Reach 6.1 is a sediment accumulation zone. Where macrophyte vegetation has become established in the absence of grazing, this reach has stabilized, and now contributes little sediment to Reach 6.2 (ID&A, 2002).

Downstream of a fence located approximately 500m north west of the Joel Joel hall, Reach 6.2 has good riparian vegetation cover. Upstream of this location the river branches into two distinct channels. The eastern channel extends from the downstream fence for a distance of 990m before it is blocked by a levee. This levee prevents low flows from entering the eastern channel. As a consequence the eastern channel has become ephemeral and has little geomorphology, vegetation, habitat or water quality value. It is therefore unnecessary to fence the eastern branch of this reach.

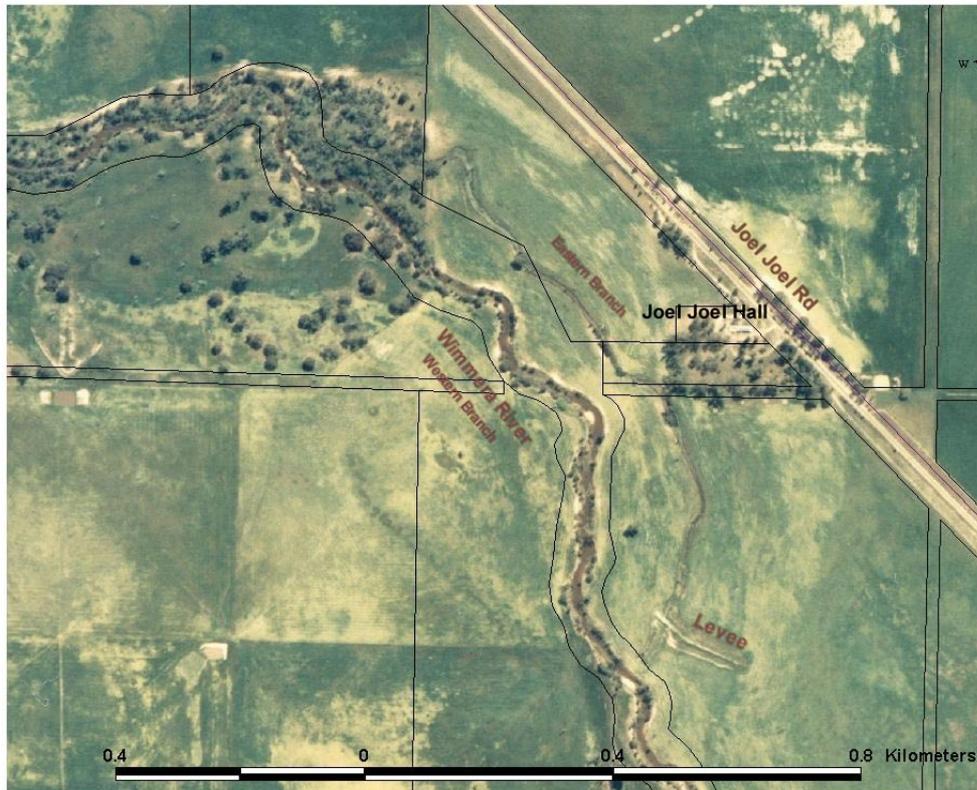


Figure 4. Aerial photo illustrating the good riparian vegetation downstream of Joel Joel hall, and poor riparian vegetation upstream (WCMA Aerial Photo)

For a distance of approximately 1.8km upstream of the fence, the riparian vegetation in Reach 6.2 is in very poor condition (Figure 4). Cropping activity, for stock feed purposes, takes place on the surrounding land which is cleared and cropped to within 2m of the top of the river banks. Some sediment transport into this part of Reach 6.2 is likely to occur from bare soil at immature stages of crop growth. Due to a lack of fencing, when stock are allowed into the area they can enter the stream bed, contributing to bank erosion. Stock are also likely to eat and trample reeds in the stream bed. Toward the upstream end of Reach 6.2 there are some fenced areas, although these are often discontinuous.

Overview of Astons Scour

Astons Scour is a right bank tributary of the Wimmera River. The confluence of Astons Scour and the Wimmera River lies approximately 1100m north, along the Greens Creek –Joel Joel Road, of the Landsborough Road intersection. With a catchment area of 58km², Astons Scour (Figure 1) is generally poorly vegetated and in several places shows signs of severe erosion (Land Technology, 2000)

From its highest point at the eastern end of the catchment, Astons Scour drops 220m over a distance of approximately 13km (Land Technology, 2000). Erosion in the upper reaches has resulted in the deposition of sediment in the lower reaches of the catchment. Land Technology (2000) note that, “siltation (of the lower reaches) has been exacerbated by modification of natural drainage lines over the years”.

The document, “*Concongella Landcare Group, Astons Scour Group: Catchment Management Plan, Astons Scour*” is a comprehensive summary of erosion gullies, landholder details on whose land the gully occurs, a description of the works required to stabilize erosion and an approximate cost of these works. Some of the works recommended by the report have been and are currently being implemented by Project Platypus and the Concongella Landcare Group, mostly in the upper reaches of Astons Scour. These works will act to decrease the volume of sediment entering the lower reaches. Sediment from as yet unstabilized reaches of the Scour, must continue to be trapped in the floodout zone. As a consequence, the works program aims to maintain the trapping of sediment from the upper reaches of Astons Scour in the floodout zone at its downstream end (figure 6).

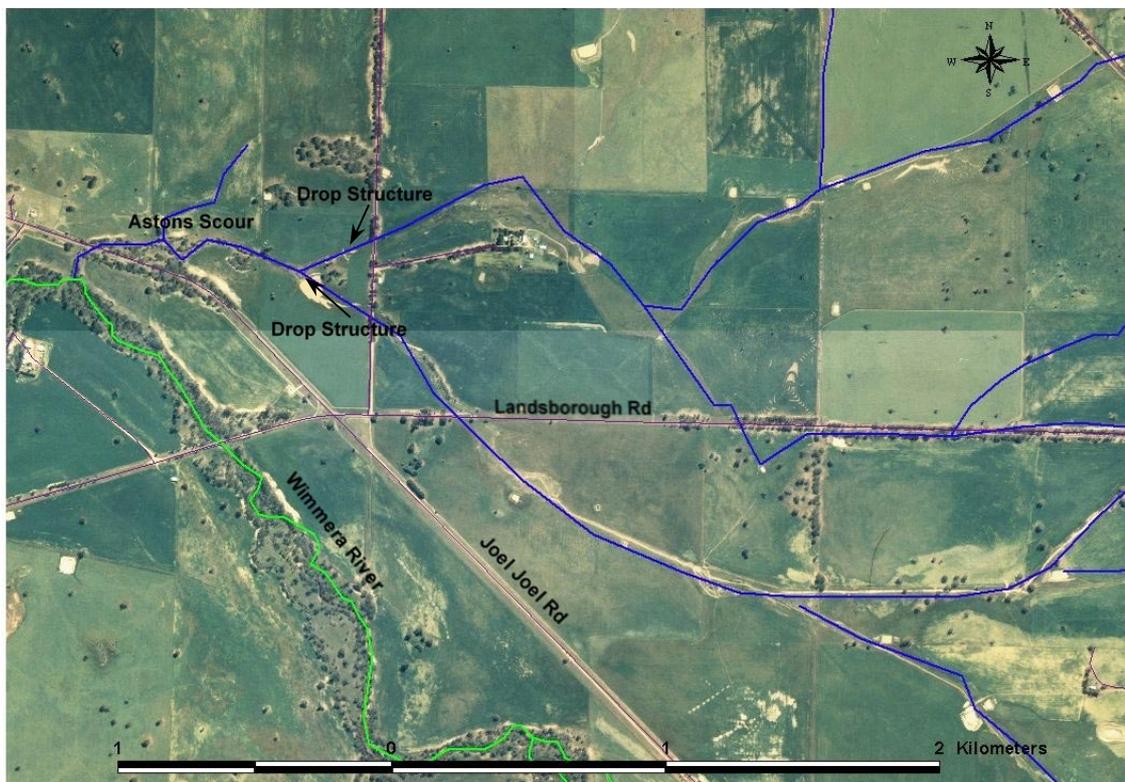


Figure 6. Aerial photo of the downstream end of Astons Scour. The blue line marks the approximate centre of the floodout zones which begins immediately upstream (to the east) of the drop structures.

Sediment is currently prevented from entering the Wimmera River by two concrete drop structures as shown in Figure 6. Therefore the only requirement for works on Astons Scour should be to maintain the integrity of the drop structures and the floodout zone.

Overview of Six Mile Creek

Six Mile Creek is a left bank tributary which joins the Wimmera River approximately 1.8km north of the Six Mile Creek bridge on the Landsborough Road. With a catchment area of approximately 88km², Six Mile Creek is a low capacity channel incorporating a long, low gradient reach toward its downstream end (ID&A, 2002). The Wimmera River Geomorphic Investigation (ID&A, 2002) notes that the Six Mile Creek also has a, “natural floodout zone where sediment accumulation occurs. This reach has had a drain excavated through it several times in an attempt to address repeated infilling and local waterlogging associated with the low gradient and excess sediment inputs from upstream”.

Six Mile Creek has the potential to contribute large volumes of sediment to the Wimmera River. The works program therefore aims to trap and hold sediment within the lower reaches of Six Mile Creek. As the creek is heavily incised through its original floodplain, reed growth should be encouraged within the stream bed. Riparian vegetation should be maintained where it exists and encouraged on reaches where clearing has occurred.

Identification of Significant Stream Health Condition/Risk/Opportunity for Reach 6.2

The following tables detail significant stream health conditions, the risks and opportunities associated with the Geomorphic, Vegetation, Habitat and Water Quality aspects of Reach 6.2.

Geomorphology

The geomorphic condition of the reach has been graded as poor but has good opportunities to reduce current threats and improve the condition. The majority of this reach is characterised by a pool-riffle sequence and low geomorphic diversity. In places, particularly toward the upstream end, deposits of larger gravels have formed bars and beaches. Stream banks comprising finer sediments are often unstable due to a lack of riparian vegetation and unrestricted stock access. Unprotected banks will remain vulnerable to erosion and provide sediment to the stream.

Reducing the amount of mobile sediment in the reach is one of the key strategies to improving stream health. The most effective long-term method to improve the geomorphic condition will be to restrict stock access and increase riparian vegetation which, once re-established will improve bank stability and contribute woody debris to the stream. Coarse sediment input rates from upstream reaches and tributaries are being reduced by erosion control works. It is therefore expected that sediment input to Reach 6.2 will decrease significantly over time.

Vegetation

The reach has been graded as poor for the current state of the vegetation. Immediate action is required to reduce the risks and improve the condition. Unrestricted grazing and land clearing in and along the reach has led to the loss of ground and understorey species and reduced overstorey. The total loss of indigenous overstorey is a real threat if grazing pressures continue to suppress regeneration. To improve the condition of this reach a concerted effort is required to reduce the impacts of grazing and increase riparian vegetation through fencing and revegetation.

In Stream Habitat

Instream habitat has been graded as satisfactory. Risks are considered low however there exists an opportunity for improvement, as instream woody debris and other instream refuges are limited. The value of instream habitat is demonstrated through the presence of frogs and water rats at sites with good habitat. It is also likely that platypuses are present at such sites. Unrestricted stock access to sections of the stream is impacting on habitat quality in a number of ways such as damaging the riparian zone, which has reduced shade, bank stability and the long-term availability of instream debris. The direct destruction of instream features such as vegetation and debris, and the local increase in sediment has reduced habitat diversity.

Water Quality

Water quality has been graded as low with good opportunities to reduce threats and improve condition. Water quality appeared to be generally good although unrestricted stock access is likely to have a detrimental effect.

The impacts of continued stock access pose the main risk to water quality and should be addressed through fencing and revegetation of the riparian zone. A riparian rehabilitation strategy may improve water quality by reducing the likelihood of, and effects associated with, nutrient enrichment. Limiting stock access should help maintain reasonable water quality given existing release strategies and diversion entitlements.

Summary of Findings

The priority action in Reach 6.2 is to undertake activities which improve geomorphic diversity and vegetation management. Although it is not as high a priority, the opportunity also exists to improve instream habitat by the re-introduction of Large Woody Debris to the length of reach between Joel Joel Hall and Vances Crossing road. Opportunities to improve water quality are limited and therefore should not be the primary focus of this Waterway Action Plan.

The ephemeral tributaries, Astons Scour and Six Mile Creek, pose a significant sediment threat to Reach 6.2. Works planned for these tributaries are designed to improve and maintain sediment trapping in their lower reaches. As such, geomorphology is the primary focus of these works.

The following table highlights the management regimes and actions required to maintain and improve the geomorphology, vegetation, habitat and water quality values of Reach 6.2.

Management Regimes and Actions

Management Regime	“Change unsustainable condition of the reach”	Priority
Actions	<ul style="list-style-type: none"> - Undertake fencing and construction works as necessary to ensure that sediment is trapped and held within Reach 6.2. 	High
	<ul style="list-style-type: none"> - Restrict stock access to the stream to assist in the maintenance of water quality, and protect existing limited overstorey native vegetation. - Macrophytic reed growth which significantly aids sediment trapping will also be improved as a result of restricted stock access. 	Medium
	<ul style="list-style-type: none"> - Improve instream habitat by the re-introduction of Large Woody Debris 	Medium
	<ul style="list-style-type: none"> - Revegetate fenced areas 	Low

Summary of Works

The following tables summarize the works required on Reach 6.2 of the Wimmera River, Astons Scour and Six Mile Creek:

Reach 6.2 of the Wimmera River		
Priority	Location	Works Required
High	Between the boundary fence 500m downstream of Joel Joel Hall & Vances Crossing Rd	Fence left and right banks as required. Provide off-stream watering points for stock.
Medium	Between the boundary fence 500m downstream of Joel Joel Hall & Vances Crossing Rd	Re-introduce Large Woody Debris for, habitat value.
Medium	From the downstream end of Reach 6.2 to the boundary fence 500m downstream of Joel Joel hall.	Fence left and right banks as required. Provide off-stream watering points for stock as necessary.
Low	Between the boundary fence 500m NE of Joel Joel Hall & levee bank on eastern branch of the Wimmera River	Fence left and right banks as required

Astons Scour		
Priority	Location	Works Required
High	1 020m upstream of the bridge crossing Astons Scour on the Joel Joel Rd.	Repair damaged drop structure.
Medium	Upstream from confluence of Astons Scour & the Wimmera River, to the drop structures.	Fence left and right banks as required

Six Mile Creek		
Priority	Location	Works Required
High	55m upstream of the Six Mile Ck bridge on the Landsborough Rd.	Construct rock chute to stabilize stream bed grade. Batter, fence & revegetate banks. Provide off-stream watering points for stock.
Medium	Gully starting 55m upstream of the Six Mile Ck bridge on the Landsborough Rd.	Batter gully head to create grass chute. Batter & fence left and right banks of gully.
Medium	1 220m upstream of the Six Mile Ck bridge on the Landsborough Rd to the Joel Forest-Vances Crossing Rd.	Fence left and right banks of Six Mile Ck. Provide off-stream watering points for stock as necessary.
Medium	From confluence of Six Mile Ck & the Wimmera River to the Landsborough Rd	Fence left and right banks of Six Mile Ck. Provide off-stream watering points for stock as necessary.
Low	Joel Forest-Vances Crossing Rd, third crossing of Six Mile Ck from causeway on Wimmera River.	Monitor small but inactive headcut on this stable reach.

A full description of these works is given in Appendices A, B and C of this report.

The successful implementation of this works program will result in the protection, from sedimentation, of the high value habitat of Reach 7 of the Wimmera River. Vegetation and riparian zone habitat values will also be increased. Instream habitat values will increase over time, as reed beds become established and some reaches resume their original chain of ponds morphology.

Issues Arising From the Works Program

Instream Reed Growth

Cumbungi (*Typha* sp.) and *Phragmites* sp. are the two main species of reeds which occur throughout the Wimmera catchment area. The growth of these reeds in the stream bed is an essential means of trapping and holding sediment in Reach 6.2, Astons Scour and Six Mile Creek. Although sediment trapping is essential for the rehabilitation of Reach 6.2, and the protection of Reach 7, landholders may have concerns that trapped sediment is filling waterholes used for stock watering. Other landholder perceptions are that reed growth leads to increased flooding and an increased fire hazard.

Loss of Stock Watering Holes

As geomorphological processes occur, without intervention to maintain a channelised stream by mechanical means, the Wimmera River will revert to its original chain of ponds nature (ID&A, 2002). This process is evident as, without intervention to maintain an open channel, sediments arriving in Reach 6.2 are deposited during low flows. Low velocity flows arise from a decrease in streambed gradient. Reed beds throughout the reach are trapping and holding sediments and leading to the formation of a pool-riffle sequence. Without this trapping action by reeds, an open channel with a low gradient will fill with sediment, leading to a homogenous streambed lacking waterholes and geomorphological diversity. Along some reaches the works program outlined in Appendix A calls for stock access to be denied at all times. In such cases it is recommended that off-stream watering points be implemented.

Increased Flooding Due to Reeds

Low flows with an accompanying decrease in flow velocity lead to an increase in the deposition of sediment from erosion processes upstream. This in turn leads to a decrease in a river's ability to contain higher flow events. Low flow velocities and shallow flow depths contribute to an increase in reeds within the affected reach. In many cases reed growth is a symptom of a channel's decreased capacity to carry higher flows. Landholder perception therefore, is that reed growth is leading to increased flooding.

As the upper reaches of the Wimmera River originally assumed a low flow chain of ponds morphology, its ability to carry higher flows was limited. Higher flows readily spread onto the land alongside the river. Without constant and costly mechanical intervention to maintain an open channel, the river will attempt to resume a similar morphology to that which it had prior to European intervention (ID&A, 2002). Therefore increased flooding is to be expected, due to decreased channel capacity, whether or not reeds are present in the stream bed.

Increased Fire Hazard Due to Reeds

Landholders may be concerned that a fire is able to spread faster or cross a waterway due to burning reeds. The works program calls for some streambed areas to be kept free of stock at all times. This is to enable reed growth for sediment trapping purposes. Although little can be done to reduce the fire hazard in such cases, the length of stream to which stock access is excluded, is relatively small.

In other areas of Astons Scour and Six Mile Creek limited stock access will be possible. Due to the ephemeral nature and low vegetation and habitat values of these streams, stock access can be timed so that reeds are grazed to reduce the fire hazard while not affecting their ability to trap sediment on regrowing. It is suggested that reeds are grazed in late winter to early spring.

Increased Flooding Due to Large Woody Debris

Large Woody Debris (LWD) consists of the fallen trunks and branches of trees which occupy the riparian zone. Past works to remove LWD were undertaken in the belief that trees lying in the river contributed to increased flooding of upstream areas. Evidence from research now suggests that removing single logs from a stream will have little effect on flood stage (Rutherford *et al*, 2000). Recent computer modelling (Earth Tech, 2002) has clearly shown that the re-introduction of LWD to a reach of the Glenelg River at Harrow, will have a minimal effect on flood height. With an average log distribution density of 15 logs per 100m of stream bed, the maximum average increase in water level of 0.11metres during a 1 in 2 year flood event, was shown to occur

LWD is now recognised as an important structural and ecological component of many stream environments, and as such the objective of stream management projects is to manage snags and LWD in such a way that the ecological health of rivers is enhanced at the same time that risks of flooding and streambank erosion are diminished (Treadwell, 1999). By re-introducing LWD, in a strategic manner, it is proposed that, through the creation of hydraulic and depth diversity, significant and rapid increases in the ecology of the stream will occur (Gippel *et al*, 1998), with an almost insignificant risk of increased flooding.

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Appendix A: Proposed Program of Activities for Reach 6.2

Proposed Program of Activities for Reach 6.2

Works required to ensure that Reach 6.2 continues to trap and hold sediment from upstream, are as follows:

Priority: **HIGH**

Location:

Right bank of western branch, Reach 6.2, alongside Joel Joel Rd in the vicinity of Joel Joel Hall.

Start of Works		End of Works	
Easting	Northing	Easting	Northing
679 069	5 900 229	680 903	5 898 372
Boundary fence 500m northwest of Joel Joel hall.		Causeway on Vances Crossing Rd	

Landholder:

Rupert Bibby

Phone Number: (03) 5357 4228

(See Appendix D for Landholder property boundaries)

Management:

In order to trap and hold sediment entering Reach 6.2 from upstream it is necessary to encourage reed growth in the streambed. Encouragement of riparian growth to trap sediment during overland flow is highly recommended. Stock should be excluded from the banks and stream bed at all times.

Action:

Fence the right bank of the western branch, of the Wimmera River, between the points listed in the table above. Approximately 3 300m of fencing is required. Provide off-stream watering points for stock.

Priority: HIGH

Location:

Left bank of western branch, Reach 6.2, alongside Joel Joel Rd in the vicinity of Joel Joel Hall.

- Some fencing exists on this bank. More fencing is required to protect the riparian zone. Existing fences may require some maintenance.

Start of Works		End of Works	
Easting	Northing	Easting	Northing
679 069	5 900 229	679 318	5 899 703
Boundary fence 500m northwest of Joel Joel hall.		Start of existing fence	
Length of fence required = 675m			

Start of Works		End of Works	
Easting	Northing	Easting	Northing
679 417	5 899 221	679 825	5 898 847
335m upstream of the upstream confluence of stream branches.		Start of existing fence	
Length of fence required = 605m			

Landholder:

Rupert Bibby

Phone Number: (03) 5357 4228

(See Appendix D for Landholder property boundaries)

Management:

In order to trap and hold sediment entering Reach 6.2 from upstream it is necessary to encourage reed growth in the streambed. Encouragement of riparian growth to trap sediment during overland flow is highly recommended. Stock should be excluded from the banks and stream bed at all times.

Action:

Fence the left bank of the western branch, of the Wimmera River, between the points listed in the tables above. Approximately 1 280m of fencing is required.

Provide off-stream watering points for stock.

Priority: **MEDIUM**

Location:

Reach 6.2, 500 metres downstream of Joel Joel hall, upstream to Vances Crossing road.

Start of Works		End of Works	
Easting	Northing	Easting	Northing
679 069	5 900 229	680 903	5 898 372
Boundary fence 500m northwest of Joel Joel hall.		Causeway on Vances Crossing Rd	

Landholders:

Rupert Bibby

Phone Number: (03) 5357 4228

(See Appendix D for Landholder property boundaries)

Management:

The presence of Large Woody Debris downstream of the boundary fence is most likely indicative of habitat condition prior to clearing for agriculture. It is most likely that at some time in the past, Large Woody Debris was removed from the length of river between Joel Joel hall and Vances Crossing road. This work was often done in the mistaken belief that flooding would be decreased. Management of this reach for habitat value will require that any Large Woody Debris, that is re-introduced to the river by natural accumulation or human intervention, be left in place.

Action:

Re-introduce Large Woody Debris to this length of Reach 6.2, if the landholder is amenable. Revegetate the riparian zone with tree species (e.g. River Redgum) which, over time, will contribute Large Woody Debris to this reach.

Priority: MEDIUM**Location:**

Upstream from the downstream end of Reach 6.2.

This point is accessible from a 4 wheel drive vehicle track on the Greens Creek-Joel Joel Rd at E 675 118 N 5 903 392. Upstream from this point the riparian vegetation is in reasonable condition. However stock have access to the tops of the banks, and in places can enter the stream bed to graze on reeds.

Works outlined are for the **Left bank** only:

Start of Works		End of Works	
Easting	Northing	Easting	Northing
674 466	5 903 386	675 799	5 902 256

Note: Some fencing exists approximately 50m from the top of the left bank. This area is well grassed and appears ungrazed. Discussions with the landholder may negate the need for further fencing

Length of fence required = 2 400m

Start of Works		End of Works	
Easting	Northing	Easting	Northing
676 477	5 902 002	676 629	5 901 981

Length of fence required = 160m

Landholders:

Graham Stewart

Phone Number: (03) 5357 3243

Col Stewart

Phone Number: (03) 5358 2900

(See Appendix D for Landholder property boundaries)

Management:

In order to trap and hold sediment entering Reach 6.2 from upstream it is necessary to encourage reed growth in the streambed. Encouragement of riparian regrowth to trap sediment during overland flow is highly recommended. An alternative may be to encourage good grass cover with selective grazing so that reed density in the stream bed is not compromised during flow events.

Action:

Fence the downstream end of Reach 6.2, of the Wimmera River, between the points listed in the tables above. Approximately 2 560m of fencing is required.

Provide off-stream watering points for stock where possible.

Priority: MEDIUM**Location:**

Upstream from the downstream end point of Reach 6.2.

The downstream end of Reach 6.2 point is accessible from a 4 wheel drive vehicle track on the Greens Creek-Joel Joel Rd at E 675 118 N 5 903 392. Upstream from this point the riparian vegetation is in reasonable condition. However stock have access to the tops of the banks, and in places can enter the stream bed to graze on reeds.

Works outlined are for the **Right bank** only:

Start of Works		End of Works	
Easting	Northing	Easting	Northing
674 466	5 903 386	675 085	5 902 660

Length of fence required = 1 470m

Start of Works		End of Works	
Easting	Northing	Easting	Northing
676 309	5 902 097	676 395	5 902 022

Length of fence required = 145m

Landholders:

Graham Stewart

Phone Number: (03) 5357 3243

Col Stewart

Phone Number: (03) 5358 2900

(See Appendix D for Landholder property boundaries)

Management:

In order to trap and hold sediment entering Reach 6.2 from upstream it is necessary to encourage reed growth in the streambed. Encouragement of riparian regrowth to trap sediment during overland flow is highly recommended. An alternative may be to encourage good grass cover with selective grazing so that reed density in the stream bed is not compromised during flow events.

Action:

Fence the downstream end of Reach 6.2, of the Wimmera River, between the points listed in the tables above. Approximately 1 615m of fencing is required.

Provide off-stream watering points for stock where possible.

Priority: [LOW](#)

Location:

Left and right banks of eastern branch of Reach 6.2, alongside Joel Joel Rd in the vicinity of Joel Joel Hall:

Start of Works		End of Works	
Easting	Northing	Easting	Northing
679 049	5 900 403	679 434	5 899 650

Landholder:

Rupert Bibby

Phone Number: (03) 5357 4228

(See Appendix D for Landholder property boundaries)

Management:

This branch will experience only the higher flows that are able to outflank the levee at the upstream confluence of the branches. Toward its downstream end the eastern branch has established reed beds. The requirement for works to prevent sediment transport into Reach 7 is low. Fencing would only be carried out to protect the instream values of the branch, which are minimal. Controlled stock access is advisable.

Action:

Fence the both banks of the eastern branch, of the Wimmera River, between the points listed in the tables above. Approximately 1 960m of fencing is required.

Appendix B: Proposed Program of Activities for Astons Scour

Proposed Program of Activities for Astons Scour

The following works are required to ensure that sediment is prevented from entering Reach 6.2, of the Wimmera River, from Astons Scour.

Priority: **HIGH**

Location:

The smaller of two drop structures is located 1 020m from the bridge crossing Astons Scour on the Greens Creek-Joel Joel Road, at position E 678 158 N 5 902 294. This structure is in immediate need of repair as a major storm event could lead to failure and the release of large volumes of sediment to the downstream reach.

Landholder:

Ken Hall

Phone Number: (03) 5356 9226

(See Appendix D for Landholder property boundaries)

Management:

Maintenance of this drop structure is essential to prevent the transport of sediment from the floodout zone to the Wimmera River.

Action:

The drop structure is in need of the following immediate attention:

- The wing on the right bank of the downstream end of the structure is missing and must be replaced. A scour hole is active around the remaining wall of the structure upstream of the where the wing used to be (figure 7);
- The wing on the left bank of the downstream end of the structure is cracked and in danger of breaking away (figure 8). This crack must be repaired as a matter of urgency.

The following materials are required to carry out these works:

- Approximately 2m³ of rock to fill the scour hole;
- Sufficient concrete and reinforcing steel to construct a new wing, and
- Steel plates and bolts to repair the crack in the remaining wing.



Figure 7. Scour hole on the right bank of the downstream end of the smaller Astons Scour drop structure. The missing wing would have been attached to the end of the concrete wall beside the scour hole.



Figure 8. Crack in the left bank downstream end of the smaller drop structure on Astons Scour.

It is recommended that this work be carried out in conjunction with the construction of a grade control structure that is required on Six Mile Creek. This will lead to cost savings, as machinery, labour and materials will be in the vicinity.

Priority: HIGH**Location:**

Upstream from the confluence of Astons Scour and the Wimmera River.

The works program should undertake to fence and revegetate both sides of Astons Scour from its confluence with the Wimmera River to the downstream ends of both drop structures. This action will provide a safety net to retain any sediment not already trapped by the drop structures.

Works outlined are for the **right and left banks**:

Start of Works		End of Works	
Easting	Northing	Easting	Northing
677 176	5 902 185	678 158	5 902 294

Length of fence required = 2 340m

Landholders:

Ken Hall

Phone Number: (03) 5356 9226

(See Appendix D for Landholder property boundaries)

Management:

Once fencing is completed all stock should be excluded from this reach of Astons Scour. A well vegetated riparian zone on this reach is essential to prevent sediment reaching the Wimmera river in the event of a sudden increase in the volume of sediment from upstream.

Action:

Fence and revegetate the downstream end of Astons Scour between the points listed in the tables above. Approximately 2 340m of fencing is required.

Provide off-stream watering points for stock.

In addition to the onground works outlined above, it is necessary to gain the support of the landholders occupying the floodout zone. Careful management of the zone is required to maintain its sediment trapping and holding capacity. The following table lists these landholders and their contact details.

Landholder Name	Phone Number
Ken Hall	(03) 5356 9226
Rob Kilpatrick	(03) 5356 9245
Howard Frampton	(03) 5356 9311
Bruce Dean	(03) 5358 4574
Col Dean	(03) 5356 9314

Appendix C: Proposed Program of Activities for Six Mile Creek

Proposed Program of Activities for Astons Scour

The following works are required to ensure that sediment is prevented from entering Reach 6.2, of the Wimmera River, from Six Mile Creek.

Priority: **HIGH**

Location:

Fifty five metres upstream of the bridge crossing Six Mile Creek, on the Landsborough Rd (E 675 430 N 5 900 888).

From this point, upstream for a distance of 1.175 km Six Mile Creek is incised to depths of three metres. Undercutting of vertical gully walls is leading to large volumes of sediment becoming mobilized. Figure 10 illustrates a recent collapse of the gully wall within the affected reach. Figure 11 shows the extent of soil loss around the foundations of a bridge which has been in place across the creek for 10 years.

Start of Works		End of Works	
Easting	Northing	Easting	Northing
675 456	5 900 843	675 879	5 900 176
Length of fence required = 2 350m			



Figure 10. Undercutting and collapse of gully walls in the Six Mile Creek (6 Oct 2002) .



Figure 11. Soil loss around the supports of a private bridge crossing Six Mile Creek

Landholder:

Ken Hall

Phone Number: (03) 5356 9226

(See Appendix D for Landholder property boundaries)

Management:

This reach of Six Mile Creek should be fenced and revegetated. Stock access should be restricted to allow the gully walls to stabilize and reeds to grow in the stream bed. Reed growth is essential to trap sediment from this reach and those upstream.

Action:

- Survey this reach upstream and downstream for a distance of 1000m;
- Construct grade control structures as required;
- Batter banks which are severely undercut;
- Fence and revegetate the full length of the unstable reach. Approximately 2.35km of fencing will be required.

Priority: MEDIUM

Location:

Fifty five metres upstream of the bridge on the Landsborough Rd (E 675 430 N 5 900 888).

At this point a small gully enters the Six Mile Creek from the right bank. The gully is the result of overland flow entering the creek at this point. A small headcut has advanced in a south easterly direction for a distance of 100m.

Works outlined are for both the **right and left banks**:

Start of Works		End of Works	
Easting	Northing	Easting	Northing
675 879	5 900 176	675 917	5 900 165

Length of fence required = 620m

Landholders:

Ken Hall

Phone Number: (03) 5356 9226

(See Appendix D for Landholder property boundaries)

Management:

It is necessary to stabilize this gully and maintain its ability to transfer overland flow to Six Mile Creek. This can be achieved by fencing and seeding with a suitable grass species. Stock should not be allowed into this area once these works are completed.

Action:

- Batter the gully head to create a low gradient chute;
- Fence the perimeter of the gully;
- Seed with a suitable grass species.

Approximately 620m of fencing is required.

Priority: MEDIUM

Location:

1 220m upstream of the bridge on the Landsborough Rd (E 675 917 N 5 900 165).

At this point a log has created a natural grade control structure. Upstream of this log the stream is stable, however mobile sediment can be seen in the stream bed. Stock have access to the stream and consequently reed and grass growth is severely reduced.

Works outlined are for both the **right and left banks:**

Start of Works		End of Works	
Easting	Northing	Easting	Northing
675 917	5 900 165	676 143	5 900 100
Length of fence required = 650m			

Landholders:

Ken Hall

Phone Number: (03) 5356 9226

(See Appendix D for Landholder property boundaries)

Management:

This reach of Six Mile Creek should be fenced and revegetated. Stock access should be restricted to allow the gully to stabilize and reeds to grow in the stream bed. Reed growth is essential to trap sediment from this reach and those upstream.

Action:

Fence both the left and right banks of this reach. Approximately 650m of fencing is required.

Provide off-stream watering points for stock where possible.

Priority: MEDIUM

Location:

1 220m upstream of the bridge on the Landsborough Rd (E 675 917 N 5 900 165), to the Joel Forest-Vances Crossing Road.

At this point a log has created a natural grade control structure. Upstream of this point the stream is stable, however mobile sediment can be seen in the stream bed. Stock have access to the stream and consequently reed and grass growth is severely reduced.

Works outlined are for both the **right and left banks**:

Start of Works		End of Works	
Easting	Northing	Easting	Northing
676 143	5 900 100	677 108	5 898 441

Length of fence required = 4 310m

Landholders:

Ken Hall

Phone Number: (03) 5356 9226

Clem Palmer

Phone Number: (03) 5356 9244

(See Appendix D for Landholder property boundaries)

Management:

This reach of Six Mile Creek should be fenced. Stock access should be restricted to allow the gully to stabilize and reeds to grow in the stream bed. Reed growth is essential to trap sediment from this reach and those upstream.

Action:

Fence both the left and right banks of this reach. Approximately 4 310m of fencing is required. Controlled grazing may be possible.

Provide off-stream watering points for stock where possible.

Priority: MEDIUM**Location:**

From the confluence of Six Mile Creek and the Wimmera River, upstream to the bridge crossing Six Mile Creek on the Landsborough Rd (E 675 430 N 5 900 888).

This reach has good reed growth in the bed and a moderately well vegetated riparian zone. Cropping for stock feed is carried out to within 2m of the right bank between Vineyard Road and the Six Mile Creek/Wimmera River confluence.

Works outlined in the table below are for the **left bank** only:

Start of Works		End of Works	
Easting	Northing	Easting	Northing
674 917	5 902 525	675 025	5 902 411

Length of fence required = 170m

Note: The remaining left bank fence, which ends at the Landsborough Rd bridge, is in need of minor repair.

Works outlined in the table below are for the **right bank** only:

Start of Works		End of Works	
Easting	Northing	Easting	Northing
674 917	5 902 525	675 430	5 900 888

Length of fence required = 2 050m

Landholders:

Col Stewart

Phone Number: (03) 5358 2900

Ken Hall

Phone Number: (03) 5356 9226

(See Appendix D for Landholder property boundaries)

Management:

This reach of Six Mile Creek should be fenced. Stock access should be restricted to allow the gully to stabilize and reeds to grow in the stream bed. Reed growth is essential to trap sediment from this reach and those upstream.

Action:

Fence both the left and right banks of this reach as indicated. Approximately 2 220m of fencing is required. Controlled grazing is allowable in this reach.

Provide off-stream watering points for stock where possible.

Priority: [LOW](#)

Location:

The third crossing of Six Mile Creek, from the causeway over the Wimmera River, on the Joel Forest-Vances Crossing Road (E 675 814 N 5 898 462).

From this point downstream to the confluence with another tributary of Six Mile Creek (E 676 242 N 5 899 890) the reach is stable. A number of dams trap any sediment from upstream. However there is a small headcut at the downstream end of this reach, which is not presently active.

Landholders:

Clem Palmer

Phone Number: (03) 5356 9244

(See Appendix D for Landholder property boundaries)

Management:

The current management practices of grazing and pasture improvement pose little threat to this reach

Action:

The headcut at the downstream end of this reach should be monitored annually.

Priority: [LOW](#)

Location:

All tributaries of Six Mile Creek, upstream of Vances Crossing Road.

Upon completion of the works downstream of this point, the upstream tributaries of Six Mile Creek are likely to undergo sediment starvation. This may be the outcome of a combination of the works suggested in this Action Plan and those of Project Platypus and individual landholder initiatives in the upper reaches of the Six Mile Creek catchment.

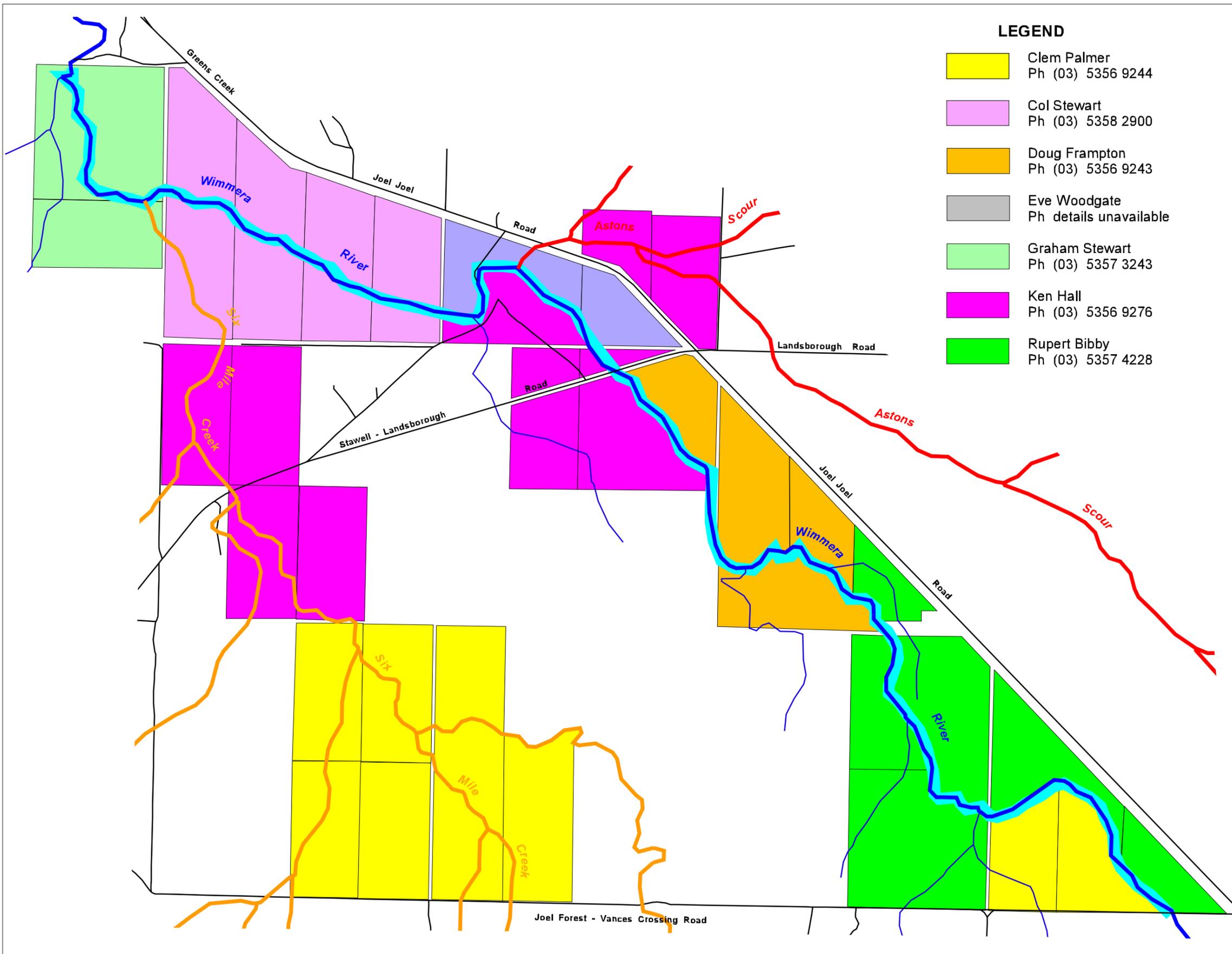
Management:

Those landholders not undertaking works to reduce sediment input and erosion in Six Mile Creek should be encouraged to do so. In many cases fencing the creek banks to encourage a good vegetative cover is sufficient. A controlled grazing program is also possible in many cases.

Action:

Monitor the rate and extent of erosion, in the tributaries of Six Mile Creek upstream of Vances Crossing Road, on an annual basis.

Appendix D: Reach 6.2, Astons Scour and Six Mile Creek Landholder Property Boundaries



LEGEND

- Clem Palmer
Ph (03) 5356 9244
- Col Stewart
Ph (03) 5358 2900
- Doug Frampton
Ph (03) 5356 9243
- Eve Woodgate
Ph details unavailable
- Graham Stewart
Ph (03) 5357 3243
- Ken Hall
Ph (03) 5356 9276
- Rupert Bibby
Ph (03) 5357 4228



**Wimmera River
Waterway Action Plan**

Reach 6.2 Landholders