

**MAROONDAH CITY COUNCIL
STORMWATER MANAGEMENT PLAN
VOLUME III**

FINAL REPORT

Prepared for: Maroondah City Council

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1 INTRODUCTION

WBM Oceanics Australia was commissioned by Maroondah City Council to develop a Stormwater Management Plan (SWMP) for the City of Maroondah. The SWMP has been developed to guide Council in improving the environmental management of stormwater throughout the municipality.

The SWMP provides a framework for integrating stormwater management as part of Council's existing management and planning activities. In this regard, the SWMP is intended to provide the basis for an ongoing process which is aimed at protecting and enhancing receiving environmental values which are currently threatened by stormwater runoff.

The Stormwater Management Plan has been prepared in 3 volumes with this report constituting Volume III of the Stormwater Management Plan. Volume III contains Appendices with data and detailed information to accompanying Volume II.

Information presented in Volumes I and II of the plan include:

- Volume I – this is an executive summary document which provides a precis of the overall Stormwater Management Plan. This document will not be available until all modifications and amendments to Volume II and III have been implemented.
- Volume II – this document details the approach adopted in developing the Plan, recommendations aimed at responding to existing threats to environmental values and suggested improvement to Council's management framework to limit the future occurrence of stormwater threats.

APPENDIX A: PROJECT WORKING GROUP DISCUSSION PAPERS

APPENDIX B: PROJECT WORKING GROUP MEMBERS

Name	Organisation
Adrian Ashford	City of Maroondah
Allan Stroud	City of Maroondah
Don House	City of Maroondah
Duncan Waugh	City of Maroondah
Lynette While	City of Maroondah
Neil Tucker	City of Maroondah
Peter Goegan	City of Maroondah
Sen Senthoran	City of Maroondah
Simon Mackie	City of Maroondah
Simon Skinner	City of Maroondah
Trevor Welsh	City of Maroondah
Vivienne Fraser	City of Maroondah
Sean McNamee	City of Maroondah
Glenn Townsend	City of Maroondah
Tim Cocks	City of Maroondah
Steve Goble	City of Maroondah
Kevin Witheridge	City of Maroondah
Neil Amos	City of Maroondah
Duncan Moore	City of Maroondah
Simone Nygun	EPA
Ken Taylor	EPA
Caroline Carvalho	Melbourne Water
Raffaela Crupi	Melbourne Water
Chris Adams	VicRoads
Martin Hartigan	CaLP

APPENDIX C: PWG STORMWATER ISSUES

Table C-1 – Summary of Issues and Concerns Identified During Workshop 1

	Issue or Concern
1	Costs are being constantly put back on to local government
2	Litter is an issue (review Yangai Barring)
3	Sediment during construction works
4	Litter during construction works (look at on site controls for building industry)
5	Safety versus aesthetics and ecology. Some very serious erosion problems in waterways
6	Lakes and ponds, should they be open or fenced.
7	Funding for works is limited
8	Focus on best cost benefit option
9	Look at regional trapping instead of individual house trapping
10	Cost and benefit may be better if "end of pipe" solutions are adopted
11	Find out exactly what is good and what is bad and concentrate on the creek that needs it the most
12	Consider how many residents benefit based on locality
13	Local government has been let down by state government
14	State government have forced things onto Council with out adequate consultation or involvement from Council
15	Council are not involved at an early stage in individual lot development
16	Onsite retention may be a specific problem in Maroondah
17	Funding is a major issue. Where is all the money going to come from.
18	Flooding. Frequency is increasing.
19	Bio-diversity is changing with climate change, for example different plants are growing differently
20	Blowers are a major problem
21	Herbicide use along riparian zones
22	Volume of runoff
23	Redevelopment increasing housing density and increase in impervious area without consideration of impacts on receiving stormwater infrastructure.
24	Council have not fully come to grips with some of the recommendations and feedback from studies
25	Infrastructure age and deficiencies
26	The efficiency of the stormwater system from a conveyance perspective increases the delivery efficiency for pollutants
27	Maybe residential is a big issue due to the extent of land covered
28	Education of residents
29	There needs to be a viable alternative to the disposal of waste
30	Flooding concerns, particularly maintenance of major drainage arteries
31	Construction management of sediment. There have been a number of recent events which have resulted in major sediment loads reaching the waterways
32	Enforcement and Money
33	Council don't necessarily have control over monitoring of sites
34	Funding
35	Flooding is a major issue and the plan needs to recongise that.
36	Road runoff
37	Concerns regarding levee options and how this will affect development when compared to adjacent local governments
38	Small scale (lot scale) development and subdivisions, particularly pollutants and sediment.
39	Don't come up with "pie in the sky" planning recommendations
40	The need for guidelines on issues such as sediment and erosion control

Table C-1 - Summary of Issues and Concerns Identified During Workshop 1 (continued)

	Issue or Concern
41	Maintenance issues and burden for Council is a major issue
42	What is the quality of the waters now and what are Council aiming for
43	Existing infrastructure will determine what will happen in the future
44	Recognise that state government have a role and responsibility, particularly in relation to land use, growth and redevelopment.
45	Breaking up of Melbourne Water has resulted in lack of responsibility for social issues. Everything is now cost driven
46	Construction and stripping of land
47	Access to other disposal options (eg. disposal of chemicals and dog faeces)
48	Staffing commitment from Melbourne Water
49	The current stormwater system has a major quantity focus
50	We need to understand the quality of the existing infrastructure
51	Decisions have maintenance impacts and costing impacts
52	The breakup of Melbourne Water has resulted in cost shifting
53	Lack of source control
54	Chemical based pollution from industry. EPA need to focus a considerable amount of their effort on industrial estates and smaller sites in Council.
55	Residential development and sedimentation problems
56	Lack of understanding and awareness in industry
57	Look at rate rebates for industry who participate in management
58	Small industrial operators are a problem
59	Council interaction and ownership jurisdiction. Who is responsible for waterway, Council or Melbourne Water
60	Reduced numbers in Melbourne Water
61	NPS pollution is most difficult to manage
62	Amplification of the management problem due to lack of management at source
63	People treat drainage systems as waste tips
64	Sediment loads from Yarra Ranges Shire
65	Safety concerns regarding erosion and flooding problems
66	Illegal dumping of waste into creeks by individuals and industry, mainly individuals
67	Problems with prosecuting and following up illegal dumping. We need to identify how council will deal with this problem now and in the future.
68	No mechanism for Council to become involved in managing small industrial operations.
69	Immediate Councils (neighbours) and coordinated management with other local authorities
70	Values and quality of receiving waters to local creeks, major rivers (eg. Yarra) and bay

APPENDIX D: DETAILED VALUES ASSESSMENT

1 UPPER DANDENONG CREEK

Liverpool Rd to HE Parker Reserve

1.1 Stormwater

1.1.1 Flood Conveyance

High

This reach is declared in planning scheme as an Urban Floodway.

1.1.2 Water Quality Treatment

NA

No dedicated WQ features within drainage system

1.2 Environmental

1.2.1 In-Stream Habitat

LOW

The creek is piped through this reach in a low flow pipe.

Very limited data from MW and CALP Reports suggests that in-stream habitat is poor with poor stream condition and macro invertebrate communities. WQ is rated as poor and sediments pose high threat to ecosystem health.

1.2.2 Riparian Flora and Habitat

MOD

The creek is piped through this reach however; the upper section of the creek has retained the old creek course, with remnant indigenous vegetation.

Downstream of Colchester Rd the old creek course has been modified to a grassed overland flow swale and the riparian flora and habitat values decrease.

Appletree Hill Reserve has some remnant overstorey vegetation which is nominated as being of Municipal Significance in the Sites of Biological Significance Study.

The 'Horse Pond' is a wetland with over 70 indigenous species on adjoining private land to the drainage reserve. This is nominated as being of Regional biological significance.

1.3 Cultural

1.3.1 European Heritage

LOW

There are no heritage sites identified along this reach of waterway.

1.3.2 Indigenous Heritage

N/A

No information available

1.4 Amenity

1.4.1 Recreation

HIGH

There is a shared trail link along most of the reserve, with the exception of upper reach. The Waterways of Maroondah Strategy identified that future trail link to Liverpool Retarding Basin and from the Little Dandenong Creek Drainage Reserve into the Dandenong Creek Reserve were to be established. The trail is part of the linear trail link that continues east to Jells Park.

Appletree Hill Reserve is used by BMX bikes, which are causing damage to the environmental values, however, is an important recreation reserve for the local community.

Future recreational values will increase with the increased residential development immediately downstream of Dorset Road.

Bayswater Park is a major recreational reserve for the City of Knox on the southern side of Dandenong Creek, and currently they are improving landscape amenity of this reserve.

1.4.2 Visual and Landscape

MOD

The former creek course upstream of Colchester Road contributes to the landscape character, however the majority of the reserve is grassed swale with planted native trees. Views of industrial precinct of Bayswater, on the southern boundary of the creek detracts from overall landscape character, particularly downstream of Dorset Road.

1.5 Economic

1.5.1 Property Value

MOD

The open space reserve of Dandenong Creek may improve the future residential property values in the De-Felice Site downstream of Dorset Rd.

2 LOWER DANDENONG CREEK

HE Parker Reserve to Maroondah City Council Boundary

2.1 Stormwater

2.1.1 Flood Conveyance

High

This reach is declared in planning scheme as an Urban Floodway

2.1.2 Water Quality Treatment

NA

No dedicated WQ features within drainage system.

2.2 Environmental

2.2.1 In-Stream Habitat

MODERATE

Very limited data from MW and CALP Reports suggests that in-stream habitat is fair with fair stream condition and poor macro invertebrate communities. WQ is rated as poor and sediments pose high threat to ecosystem health.

2.2.2 Riparian Flora and Habitat

HIGH

The creek has some remnant indigenous vegetation, along with extensive areas of revegetation.

Sites directly adjoining the reserve have high environmental values, including private properties with areas of extensive indigenous vegetation improve the overall habitat values of the creek corridor.

JW Manson Reserve contains areas of wetlands, from former creek course adjacent to the creek boundary.

A Crassula Swamp adjoins the riparian zone and is a site of Municipal biological significance due to the presence of a range of indigenous species. Scott Street Reserve has some old remnant Manna Gums.

Escarpment has remnant overstorey vegetation.

The Dandenong Creek corridor is an important strategic habitat link, both upstream and downstream of Maroondah.

Sections of this reach have low riparian flora values with significant weed invasion, and lack of over storey vegetation.

2.3 Cultural

2.3.1 European Heritage

LOW

There are no heritage sites identified along this reach of waterway.

2.3.2 Indigenous Heritage

N/A

2.4 Amenity

2.4.1 Recreation

V. HIGH

HE Parker Reserve is an important sporting and informal recreational reserve for the local community.

The shared trail on both sides of the creek, with crossing points at HE Parker, Marborough Rd and Wantirna Rd establishes a looped trail system which is extremely well used by walkers and cyclists.

There are access points into this creek via a number of smaller reserves which are well used by the local community.

Ringwood Public Golf Course directly adjoins the creek reserve.

2.4.2 Visual and Landscape

HIGH

The views are limited by adjoining development, however there are good viewsheds from Wantirna Rd of the natural creek course.

The revegetation works, and diversity of topography, including the escarpment area contributes to the landscape character.

2.5 Economic

2.5.1 Property Value

MOD

Whilst the majority of properties have their rear boundary fencelines to the reserve, the natural creek course, and presence of riparian vegetation, could potentially contribute to the property values of adjoining residential areas.

3 UPPER CROYDON MAIN DRAIN –

Colchester Rd to Eastfield Rd (incl. Kilsyth Main Drain)

3.1 Stormwater

3.1.1 Flood Conveyance

High

Although not in a declared flood zone this reach is likely to be sensitive to flooding impacts.

3.1.2 Water Quality Treatment

Mod

This reach contains a constructed wetland and sediment basin adjacent to Norton Rd.

3.2 Environmental

3.2.1 In-Stream Habitat

LOW

No data available. It would be expected that the waterway would have low in-stream values as the low flows are contained within a culvert.

3.2.2 Riparian Flora and Habitat

MOD

The drain is highly modified, thereby significantly reducing the riparian flora habitat values. There is some indigenous vegetation adjacent to the drain at Eastfield Park.

The recently constructed Croydon Wetlands may potentially improve the riparian habitat values in this reach (to be confirmed).

Proposal for wetland in the Dorset Recreation Reserve would potentially improve habitat values. (to be confirmed by MWC)

3.3 Cultural

3.3.1 European Heritage

LOW

The area has been highly modified with the Dorset Recreation Reserve being a former landfill site.

3.3.2 Indigenous Heritage

N/A

No information currently available.

3.4 Amenity

3.4.1 Recreation

HIGH

Dorset Recreation Reserve is used primarily for sporting purposes.

Croydon Town Park is well used and established and directly adjoins the waterway reserve.

Future recreation values will increase with development of recreational facilities at Croydon Wetlands and links between Croydon Town Park and Eastfield Park.

Eastfield Park currently has some picnic facilities adjacent to the creek, and these are recommended to be improved.

3.4.2 Visual and Landscape

MOD

There are substantial areas of open space adjoining the waterway reserve, however the landscape character of Dorset Recreation Reserve is poor. Town Park and Eastfield Reserve contribute to the overall character of the area.

The piped drain and associated infrastructure detracts from the landscape character.

There are major viewsheds into the Drain from Eastfield Rd and Park, Norton Rd, Town Park and Dorset Rd.

3.5 Economic

3.5.1 Property Value

LOW

The waterway does not significantly contribute to the adjoining property values.

4 LOWER CROYDON MAIN DRAIN

Eastfield Rd to Dandenong Creek

4.1 Stormwater

4.1.1 Flood Conveyance

High

This reach is declared in planning scheme as an Urban Floodway.

4.1.2 Water Quality Treatment

NA

No dedicated WQ features within drainage system

4.2 Environmental

4.2.1 In-Stream Habitat

LOW

No data available. It would be expected that the waterway would have low in-stream values as the low flows are contained within a culvert.

4.2.2 Riparian Flora and Habitat

LOW

The drain is a piped low flow grassed trapezoidal channel between Eastfield Rd and Canterbury Rd.

Downstream of Canterbury Rd the drain flows above ground to the confluence and there is some indigenous riparian vegetation.

4.3 Cultural

4.3.1 European Heritage

LOW

4.3.2 Indigenous Heritage

N/A

No information currently available.

4.4 Amenity

4.4.1 Recreation

MOD

There is an existing shared trail along the length of the drain from Eastfield Rd to Canterbury Rd. Currently there is no signed link between Canterbury Rd and Dandenong Creek, and access is restricted due to private land ownership. Whilst the landscape interest values are low, this is an important recreational link for the community to north of Canterbury Rd to access the Dandenong Creek linear trail.

Private Golf Park adjoins the creek.

4.4.2 Visual and Landscape

LOW

The landscape character of the site is poor with a modified grassed trapezoidal channel for most of its length.

Views into the drain are limited, with major viewsheds from Eastfield Rd and Canterbury Rd.

4.5 Economic

4.5.1 Property Value

LOW

The waterway contributes to the overall visitation and values of the private Golf Park downstream of Canterbury Rd.

5 HEATHERDALE CREEK

5.1 Stormwater

5.2 Flood Conveyance

Moderate

Flooding is contained to creek except for small area near Canterbury Rd

5.3 Water Quality Treatment

Low

No dedicated WQ features within drainage system

5.4 Environmental

5.4.1 In-Stream Habitat

LOW

No Data Available. It would be expected that the lower reaches would be similar to Dandenong Creek and Upper reaches which include a low flow culvert would offer little habitat.

5.4.2 Riparian Flora and Habitat

MOD

There are some existing wetlands/billabongs near the confluence with Dandenong Creek. These have been identified as being of Municipal Biological Significance in the Sites of Biological Significance in Maroondah Study.

There are some remnant Yellow Box in the floodplain.

5.5 Cultural

5.5.1 European Heritage

N/A

5.5.2 Indigenous Heritage

N/A

5.6 Amenity

5.6.1 Recreation

LOW

The waterway is surrounded by industrial land use, and has a major overhead power lines along the waterway easement. There is no formalised access into the Waterway.

5.6.2 Visual and Landscape

LOW

There is strong presence of overhead powerlines, and industrial land use to the majority of the length of this creek.

Viewsheds into the creek are limited due to adjoining land use and limited opportunities.

5.7 Economic

5.8 Property Value

LOW

Adjoining properties are predominantly industrial, and the presence of the waterway is unlikely to contribute to property values.

6 UPPER BUNGALOOK CREEK

Liverpool Rd to Canterbury Rd

6.1 Stormwater

6.1.1 Flood Conveyance

Low

Retarding basins within and upstream of this reach have significant impact on flood events, as a result flooding poses a limited threat within this reach.

6.1.2 Water Quality Treatment

High

This reach contains 2 RB's, which contain wetlands/ponds.

6.2 Environmental

6.2.1 In-Stream Habitat

MODERATE

No published data available. Stream is degraded with some reaches having low flow pipes.

6.2.2 Riparian Flora and Habitat

V. HIGH

The Colchester Rd Retarding Basin in the upper catchment has been identified as site of state biological significance, and described as the most important site with the municipality of Maroondah with the highest ecological diversity. There are fifty five plant species that are significant on a regional level and fifty at a municipal level. It has one of the richest bird fauna of any site in Maroondah including rare waterbirds.

Canterbury Rd Retarding Basin has been given a local habitat significance rating due to its modified condition. It is noted as containing plants of regional and municipal significance and is a good area for waterbirds. Bungalook Creek flows above ground, however is within a modified channel. It does provide an important habitat link to upstream and downstream areas.

6.3 Cultural

6.3.1 European Heritage

LOW

The creek is highly modified through this section.

6.3.2 Indigenous Heritage

N/A

No information available

6.4 Amenity

6.4.1 Recreation

MOD - HIGH

There is informal access into this area with walking paths, and use of the reserve by young children. Increased access is not to be encouraged due to environmental values in this area. There are proposals for interpretive signage to improve community understanding of the environmental values. Access through the local reserves linking through the site are to be improved for local use.

6.4.2 Visual and Landscape

HIGH

The natural landscape character values are high. Views and visual access to the site are relatively low as the site is enclosed by freehold land.

6.5 Economic

6.5.1 Property Value

MOD

The adjoining properties benefit from the bushland character established with the adjoining open space areas.

7 LOWER BUNGALOOK CREEK

Canterbury Rd to Croydon Main Drain

7.1 Stormwater

7.1.1 Flood Conveyance

Very High

Areas of this reach are extremely flood prone and would be sensitive to any increase in flood levels.

7.1.2 Water Quality Treatment

NA

No dedicated WQ features within drainage system

7.2 Environmental

7.2.1 In-Stream Habitat

LOW

No published data available. The stream is significantly degraded with a low flow culverts for much of this reach

7.2.2 Riparian Flora and Habitat

V. HIGH

The creek itself is highly modified with sections contained in a low flow barrel drain. The drainage reserve contains Herb-rich grassy wetlands which are a habitat that is listed for protection in the Flora and Fauna Guarantee Act and is rated as being of state significance in the Sites of Biological Significance Study for Maroondah. The reason for this rating includes the presence of the Herb-rich Grassy wetland containing one globally rare and vulnerable plant species (Swamp Everlasting) listed under the Flora and Fauna Guarantee Act 1988. It is also home to the Golden-headed Cisticola, a rare bird in Maroondah. It contains numerous other plant species that are significant on state, regional and municipal level. Downstream of the wetlands the riparian zone is in relatively poor health, dominated by Willows.

7.3 Cultural

7.3.1 European Heritage

LOW

There are some former farm homesteads on the northern side of the creek, however, these are not sensitive to stormwater management issues, and heritage status is not confirmed (i.e. no information supplied).

7.3.2 Indigenous Heritage

N/A

No information available

7.4 Amenity

7.4.1 Recreation

LOW

The upper section of the creek is used informally by local residents for walking, however, there are no formal walking paths or shared trails in the reserve. '

Residential land use adjoins the northern boundary of the creek reserve, whilst industrial land use adjoins the southern boundary. Some of the creek reserve is in private ownership and industrial properties discourage public access through the reserve.

7.4.2 Visual and Landscape

LOW

The entire reserve is a proposed freeway reservation owned by VicRoads.

Views within this site are dominated by industrial land use to the south.

7.5 Economic

Property Value

LOW

8 MULLUM MULLUM CREEK

Upstream of Warrandyte Rd

8.1 Stormwater

8.1.1 Flood Conveyance

High

This reach is declared in planning scheme as an Urban Floodway.

8.1.2 Water Quality Treatment

Low

No dedicated WQ features within drainage system

However a number of potential opportunities for water quality devices have been identified by Melbourne Water as part of the Waterway Activity Plan. Locations include Peter Vergers Reserve and the upper reaches of the creek.

8.2 Environmental

8.2.1 In-Stream Habitat

MODERATE

Due to the poor water quality from residential and industrial runoff, the in-stream habitat values are relatively poor. The culvert at Warrandyte Rd is effectively a barrier to any in-stream fauna movements, effectively isolating this upstream section of the creek.

This reach is significantly influenced by the previous construction of part of the Ringwood Bypass, and potentially by further construction. Currently there is significant stream incision through this reach downstream of Ringwood Street. Invertebrate rating is poor to fair (MW) and stream condition is fair to poor (MW)

8.2.2 Riparian Flora and Habitat

HIGH

The riparian zone has some remnant indigenous vegetation including some extremely old specimens of Manna Gum. There are some old stands of Paperbark near Dublin Road Drain inlet and some stands of remnant vegetation downstream of Suda Av.

There is an area of bushland on adjoining Yarra Valley Anglican School which contribute s to overall habitat values of the area.

Ringwood Lake, an upper tributary of Mullum Mullum Creek has remnant bushland. The lake has recently been de-silted. There is some revegetation with indigenous vegetation around the lake.

Waterways of Maroondah Strategy recommended further planting of indigenous overstorey in the Riparian Zone and adjoining reserve to improve overall values.

The values between Warrandyte Rd and Ringwood Street are low.

Downstream of Ringwood Street the existing riparian flora and fauna habitat is high, with significant stands of remnant trees including Manna Gums. Higher on the escarpment are remnant Yellow Box.

Loughies Bushland Reserve in the upper tributary of Mullum Mullum Creek has significant remnant vegetation.

8.3 Cultural

8.3.1 European Heritage

LOW

Established Orchard in the area currently being developed behind the Croydon Hotel had historical value, however, this is been largely removed and degraded during residential development.

8.3.2 Indigenous Heritage

LOW

There may be presence of scatter sites. Vivienne Fraser to confirm presence and status.

8.4 Amenity

8.4.1 Recreation

HIGH

There is an existing shared trail along the entire length of this reach which is extremely well used by the local community. The Waterways of Maroondah Strategy identified the need to improve the recreational values with additional walking tracks to provide some looped circuit trails. This includes a cultural interpretive trail.

Ringwood Lake is a major reserve for the City and attracts use from beyond the Municipality. The facilities include a major playground, paths, car park, picnic and BBQ's.

Mullum Mullum Reserve is a major sporting reserve adjoining the creek. Whilst it adjoins the creek, the sporting fields are significantly elevated from the creek. There are walking trail links through the reserve, and across Mullum Mullum Creek at this location.

8.4.2 Visual and Landscape

HIGH

Views into Mullum Mullum Creek are limited to some main road crossing points including Warrandyte Rd, Oban Rd and Kallinda Rd.

The lake is a major contributor to the landscape character of Ringwood Lake Reserve.

The remnant indigenous vegetation along the waterway contributes significantly to the overall landscape character.

The landscape character of the modified section between Warrandyte Rd and Ringwood St are relatively poor.

Downstream of Ringwood St the existing landscape character is high with extensive areas of bushland. The existing Manna Gums contribute significantly to the landscape character.

Downstream of Ringwood Street viewsheds are from the major road crossing points only, as the remainder of the creek is bordered by freehold properties. Upstream of Ringwood St the sound barriers from Ringwood Bypass restrict views of the creek. From the adjoining Eastland Shopping Centre the views of the creek are dominated by sound walls.

8.5 Economic

8.5.1 Property Value

MOD

The recent development upstream of Kallinda Rd has residential properties facing the creek, with boulevard treatment to the open space.

Elevation and views over the creek from adjoining properties.

Some residents have opened up their rear fences to face the waterway.

9 ANDERSONS CREEK

9.1 Stormwater

9.1.1 Flood Conveyance

High

This reach is declared in planning scheme as an Urban Floodway

9.1.2 Water Quality Treatment

Moderate

Some RB's which provide limited primary treatment

9.2 Environmental

9.2.1 In-Stream Habitat

MODERATE

Areas of this reach below the municipal boundary support a population of breeding platypi and has a good fish rating and fair macro invertebrate ratings. Parts of this reach within Maroondah are piped and heavily degraded.

9.2.2 Riparian Flora and Habitat

HIGH

There are a number of tributaries to Andersons Creek, which have some remnant indigenous riparian vegetation, along with significant weed infestation. The remnant vegetation downstream of Landau Drive appears to be in relatively good condition.

The constructed wetland/pond in Yanggai Barring Reserve may provide some limited habitat.

The constructed pond in Monterey Bush Park provides some habitat for water birds including Swamp Hens and Ducks. The remnant bushland in this reserve is identified as being of Municipal Biological Significance.

In the upper tributaries in the vicinity of Little John Rd there are some mature Manna Gums, but the riparian zone has been extensively modified.

There are important habitat links to Andersons Creek downstream.

9.3 Cultural

9.3.1 European Heritage

N/A

No information available.

9.3.2 Indigenous Heritage

N/A

No information available.

9.4 Amenity

9.4.1 Recreation

HIGH

The open space reserves on the upper tributaries to Andersons Creek are some of the only open space areas for local residents. There are existing trails along some of these sections of tributaries, and there are recommendations to improve recreational access with linked trails between open space areas.

Quambee Reserve provides active sporting use, and informal access to the creek.

Monterey Bush Park and McAlpin Reserve provide important open space areas that have the ponds and wetlands as key features in these passive open space areas.

McMahon Reserve is a local open space, where the creek has been piped, however the lower section the creek flows above ground, and has potential to be an attractive passive recreational feature in the future.

9.4.2 Visual and Landscape

HIGH

The water bodies in Yanggai Barring Reserve and Monterey Bush Park contribute to the overall landscape character of the reserves.

The indigenous vegetation along the tributaries contributes to the bushland character of the area.

Some of the drainage infrastructure and retarding basins detract from the landscape character, particularly at Mahon Reserve and Quambee Reserve.

9.5 Economic

9.5.1 Property Value

MOD

The majority of adjoining residential development has rear property fencelines to the reserves. The topography allows some of these residences to overlook the creek, especially in the vicinity of Yanggai Barring Reserve, and Monterey Bush Park.

10 JUMPING CREEK

10.1 Stormwater

10.1.1 Flood Conveyance

High

This reach is declared in planning scheme as an Urban Floodway.

10.1.2 Water Quality Treatment

Very High

Catchment has a series of RB's and WQ features to control WQ.

10.2 Environmental

10.2.1 In-Stream Habitat

HIGH

Limited data, but lower reaches have fair fish and stream ratings and WQ id fair.

10.2.2 Riparian Flora and Habitat

V.HIGH

The upper tributaries have extensive areas of remnant indigenous riparian vegetation and has been identified to be of municipal significance in the Sites of Biological Significance in Maroondah Study. The remnant indigenous vegetation is noted as providing habitat for Black Wallabies, Echidnas and Koalas. The area contains a Red Box tree that is listed in the Notable Trees of Maroondah Study.

Narr-Maen Reserve is listed in the Sites of Biological Significance Study for its value as a seasonal wetland, with remnant Swamp Gum and Paperbark, and a continuous tree canopy linking to freehold land as part of the Croydon Hills Environmental Living Zone.

10.3 Cultural

10.3.1 European Heritage

N/A

No information available

10.3.2 Indigenous Heritage

N/A

No information available

10.4 Amenity

10.4.1 Recreation

V.HIGH

There are a significant number of reserves in the headwaters which are highly valued and well used by the community.

Warranwood Reserve has a committee of management run by the local community. This bushland reserve is used primarily for informal passive recreation and nature conservation. Previous and existing residential development has had an impact on the minor tributaries through this reserve. Many of the walking tracks are adjacent to minor water courses.

Narr-Maen Reserve has important local recreational use including areas of open space, with paths, playgrounds etc.

Settlers Orchard Reserve has an open water body as central focus to the passive recreational values. Similarly Croydon Hills Reserve has a number of linked water bodies with unsealed walking paths, seats and picnic areas. The local residents swim in the water bodies in this reserve, although this is not formally signed or encouraged.

Yarrunga Reserve contains more formalised recreation and community facilities, including a large playground, tennis courts, community centre and a picnic area. There are existing water quality treatment ponds upstream of the central water body in the reserve.

10.4.2 Visual and Landscape

V HIGH

The bushland character of these tributaries significantly contributes to the landscape character and value.

There is good visual access to many of the reserves including Croydon Hills Reserve and Narr-Maen Reserve.

The water bodies within the reserves, especially Settlers Orchard Reserve, Yarrunga Reserve and Croydon Hills Reserve contributes significantly to the overall character and recreational use.

10.5 Economic

10.5.1 Property Value

HIGH

Property values in the Croydon Hills area are enhanced with the network of waterways and bushland character. Many of the residential areas have views into the waterways due to the variation in natural topography.

11 BRUSHY CREEK

11.1 Stormwater

11.1.1 Flood Conveyance

High

This reach is declared in planning scheme as an Urban Floodway

11.1.2 Water Quality Treatment

NA

No dedicated WQ features within drainage system

11.2 Environmental

11.2.1 In-Stream Habitat

MODERATE

In stream habitat significantly impacted upon by high sediment load from US. This reach has fair to poor stream condition, fair WQ and supports a non-breeding population of platypi

11.2.2 Riparian Flora and Habitat

HIGH

Hochkins Ridge Flora and Fauna Reserve is identified as being of regional to state significance in the Sites of Biological Significance in Maroondah Study. This is a tributary to Brushy Creek. It is noted has good biodiversity and supports two rare habitat types including high diversity of vascular flora (approx. 215 indigenous species), and is the location for the only record in Maroondah for Peron's Tree Frog.

There are some areas of remnant indigenous vegetation along Brushy Creek, including some remnant Paperbark, however, the riparian zone has extensive weed invasion. MWC and Council are undertaking revegetation works along the creek as part of the Waterway Activity Plan.

There is an area of remnant indigenous forest in Barnggeong Reserve adjacent to Lincoln Rd Drain.

The remainder of the riparian zone is significantly modified with weed infestation and lack of overstorey vegetation.

11.3 Cultural

11.3.1 European Heritage

NA

No information available

11.3.2 Indigenous Heritage

N/A

No information available

11.4 Amenity

11.4.1 Recreation

HIGH

There are major sporting facilities adjacent to the creek in Esther Park, Barngenong Reserve and Brushy Park. The adjoining land use is predominantly residential and the reserves appear to be well used for informal recreational purposes as well.

Hochkins Ridge Flora Reserve provides informal bushland tracks, with links along tributaries into the residential areas.

MWC are planning future improvements to the area downstream of Brushy Park, which could potentially improve the passive recreational opportunities in this area of the creek.

11.4.2 Visual and Landscape

HIGH

The creek contributes significantly to the landscape character of Barngenong Reserve, and the linear open space upstream of Bellara Drive.

The overland flow swale is grassed through Brushy Park, which has low landscape value, but downstream of the reserve, it becomes an open channel with water body and the landscape values increase.

The waterway through Hockins Ridge Reserve is relatively degraded, along with the upper tributaries.

11.5 Economic

11.5.1 Property Value

MOD

The adjoining properties have rear boundary fences to the reserves.

APPENDIX E: STORMWATER THREATS

1 UPPER DANDENONG CREEK

1.1 Commercial Runoff

N/A

1.2 Residential Runoff

Moderate

This area of the catchment is a well established residential area and includes several areas of low density residential and low density rural in the upper reaches.

1.3 Industrial Runoff

N/A

1.4 Waterway Degradation

Low

Dandenong Creek through this reach is significantly degraded with a low flow contained in a pipe. The bed banks however, are stable and would not be contributing to stormwater pollution at this time.

1.5 Building Site Runoff (lot scale)

Low

There are some infill and redevelopment works going on in this catchment, but they are not widespread and pose a minimal threat to water quality.

1.6 Construction Site Runoff (major development)

N/A

1.7 Arterial Road Runoff

Low

Both Dorset and Bayswater Roads drain to this reach.

1.8 Upstream Inflow

High

This reach receives from the City of Knox, including an industrial area and a large commercial area on Station Street in Bayswater. It is expected that the water quality, particularly from the industrial

area is of poor quality as it has been targeted by the EPA and that the commercial area would be contributing large litter loads.

1.9 Golf Course Runoff

Low

Eastwood Golf Club on Little Bungalook Creek

2 LOWER DANDENONG CREEK

2.1 Commercial Runoff

Low

Small areas of shops on Canterbury Road.

2.2 Residential Runoff

Moderate

The Lower Dandenong Creek catchment is a well established residential area and would not be contributing significant loads to urban stormwater.

2.3 Industrial Runoff

N/A

2.4 Waterway Degradation

Moderate

Although Dandenong Creek is heavily modified, this reach is stable. The instream habitat, however, is significantly degraded by weeds.

2.5 Building Site Runoff (lot scale)

N/A

2.6 Construction Site Runoff (major development)

N/A

2.7 Arterial Road Runoff

Low

This reach receives runoff from Canterbury Road.

2.8 Upstream Inflow

High

It is widely acknowledged that the water quality from upstream catchments entering this reach is of poor quality. This includes drainage from within the City of Maroondah, particularly from the Bungalook Creek industrial area and from the neighbouring municipality of Knox. The EPA has

regular reports of pollution to this reach, in particular, it was stated during a Project Working Group Workshop that this reach becomes foamed once a month.

2.9 Golf Course Runoff

Moderate

Ringwood Golf Course is adjacent to the lower reaches of Dandenong creek.

2.10 Other

N/A

3 KILSYTH DRAIN

3.1 Commercial Runoff

High

The Croydon Village Shopping Centre on Mt Dandenong Road and Croydon Roads drains to this reach. It would be expected that the car park areas would generate large litter loads and it is unclear what the waste management practices are in this area and whether or not they contribute to poor stormwater quality.

3.2 Residential Runoff

Moderate

The upper Croydon catchment is a well established residential area and would not be contributing large pollutant loads to stormwater runoff.

3.3 Industrial Runoff

Moderate

This catchment contains several small industrial areas.

3.4 Waterway Degradation

Low

The waterway is heavily modified with a low flow contained within the culvert. However, the waterway at present is stable and would not be expected to be contributing to pollutant loads via erosive processes.

3.5 Building Site Runoff (lot scale)

Low

Some redevelopment will be occurring throughout this reach, although it would not be expected to contribute significant loads to the stormwater system.

3.6 Construction Site Runoff (major development)

N/A

3.7 Arterial Road Runoff

Low

The following roads drain to this reach, Dorset Road, Bayswater Road and Mt Dandenong Road.

3.8 Upstream Inflow

N/A

3.9 Golf Course Runoff

Moderate

Dorset Golf Club and Australian Golf Club drain to this reach.

3.10 Other

The threat posed by Eastfield Park including the Equestrian area is unclear at present and will be confirmed.

4 LOWER CROYDON MAIN DRAIN

4.1 Commercial Runoff

N/A

4.2 Residential Runoff

Moderate

The catchment is fully urbanised and with a well established residential area.

4.3 Industrial Runoff

N/A

4.4 Waterway Degradation

Low

This waterway is heavily modified, with the low flow contained within a culvert. The waterway however, is structurally stable and it would not be expected that ongoing waterway degradation is contribution to stormwater pollution in this reach.

4.5 Building Site Runoff (lot scale)

Low

Some sites are being redeveloped, but they are not widespread throughout this reach.

4.6 Construction Site Runoff (major development)

N/A

4.7 Arterial Road Runoff

Low

Sections of Canterbury Road and Bayswater Road drain to this reach.

4.8 Upstream Inflow

Moderate

The threat posed by upstream runoff is generated in the Kilsyth catchment from commercial runoff from the Croydon Village Shopping Centre and from the small industrial areas in the upper catchment.

4.9 Golf Course Runoff

N/A

4.10 Other

N/A

5 HEATHERDALE CREEK

5.1 Commercial Runoff

Moderate

A small area of the commercial precinct on Maroondah Highway, which includes mechanical workshops and automotive dealers drains to this reach.

5.2 Residential Runoff

Low

This catchment contains a small area of well established residential land use.

5.3 Industrial Runoff

Very High

This industrial area is very close to the creek and contains several industries including, a Recyclers and Garden Supplies that directly abut the creek and are contributing significant pollutant loads to the creek. In general, the industry in this area is poorly managed in regards to stormwater and is likely to placing significant pollutant loads on the waterway.

5.4 Waterway Degradation

Moderate

The significant waterway degradation in this reach is occurring by encroachment upon the waterway, by adjacent industrial developments, in particular the Recyclers at Palmerston Road and the Garden Supplies on Canterbury Road.

5.5 Building Site Runoff (lot scale)

High

Several sites within the industrial Estate off Heatherdale Road are undergoing redevelopment. None of these sites appear to be managing stormwater as a threat.

5.6 Construction Site Runoff (major development)

N/A

5.7 Arterial Road Runoff

Very High (Future)

The proposed Eastern Ring Road poses a significant future threat to this reach.

5.8 Upstream Inflow

N/A

5.9 Golf Course Runoff

Low

Low threat posed by Ringwood Public Golf Course.

5.10 Other

N/A

6 UPPER BUNGALOOK CREEK

6.1 Commercial Runoff

Low

Several small shopping centres and areas of takeaway food drain to this reach.

6.2 Residential Runoff

Moderate

Most of the catchment is a conventional high density residential subdivision or low density rural subdivisions and are unlikely to be posing a high threat to stormwater.

6.3 Industrial Runoff

Low

There is a small industrial area near the corner of Canterbury and Colchester Roads.

6.4 Waterway Degradation

Moderate

Some waterway degradation is occurring along Bungalook Creek, particularly in the rural areas.

6.5 Building Site Runoff (lot scale)

Low

There is limited ongoing development infill development or redevelopment within this reach.

6.6 Construction Site Runoff (major development)

N/A

6.7 Arterial Road Runoff

Low

Canterbury Road drains to this reach.

6.8 Upstream Inflow

Low

The area upstream of this catchment is predominantly low density rural residential or is undeveloped.

6.9 Golf Course Runoff

N/A

6.10 Other

N/A

7 LOWER BUNGALOOK CREEK

7.1 Commercial Runoff

Moderate

There are several areas of commercial premises along Canterbury Road, in particular, the corner of Canterbury Road and Bayswater Road contains a number of fast food outlets and it is likely that they are contributing litter loads to stormwater.

7.2 Residential Runoff

Low

There are several small areas of established residential subdivision in this reach, but it is unlikely that they are contributing significantly to stormwater pollution.

7.3 Industrial Runoff

Very High

This reach contains a range of large and small industrial premises within the industrial estate. During the site inspection, several businesses were inspected and it was found that they were likely to be contributing to stormwater pollution. This area has also been identified by EPA as generating significant pollutant loads.

7.4 Waterway Degradation

Moderate

Although heavily modified, the waterway within this reach is reasonably stable and would not be contributing significantly to stormwater pollution.

7.5 Building Site Runoff (lot scale)

Low

A number of sites are being redeveloped in the industrial areas. The limited number of them means that the impact they are having is low.

7.6 Construction Site Runoff (major development)

Moderate (Future)

There is a proposal for a large industrial estate to be developed on the corner of Canterbury and Dorset Roads. This site is undergoing some development at the moment, but is awaiting final approval from Council.

7.7 Arterial Road Runoff

Low

Both Canterbury Roads Dorset Roads drain to this reach.

7.8 Upstream Inflow

Low

The upstream area is predominantly low density residential or undeveloped and does not pose a significant threat to water quality.

7.9 Golf Course Runoff

N/A

7.10 Other

N/A

8 MULLUM MULLUM CREEK

8.1 Commercial Runoff

Very High

Businesses adjacent to Maroondah Highway and the Eastland Shopping Centre drain to this reach. The businesses along Maroondah Highway consist of, car yards, mechanics workshops and other small commercial outlets that are likely to have poor waste management and stormwater management practices that would be contributing to poor stormwater quality. The Eastland Shopping Centre has large areas of car park which would be generating loads from the build up and wash off from traffic movements and would also be generating large litter loads associated with the Shopping Centre.

EPA and Maroondah City Council have identified several businesses as providing significant pollutant loads to this reach. At least one site has had a pollution abatement notice applied to it by the EPA and EPA is negotiating with other businesses along this stretch of Maroondah Highway to improve stormwater management.

8.2 Residential Runoff

Moderate

Much of this catchment consists of well established residential areas.

8.3 Industrial Runoff

High

This reach contains several areas of light industrial, a number of which are immediately adjacent to the creek. It is expected that poor waste management practices on these sites would be polluting Mullum Mullum Creek. The EPA have identified that a significant amount of pollution within the Creek has arisen from waste management practices on small industrial sites.

8.4 Waterway Degradation

Moderate

Both commercial and residential development have encroached significantly onto the creek.

8.5 Building Site Runoff (lot scale)

High

The area adjacent to Croydon Hotel is currently being developed and an inspection of the site during the site visit revealed that most sites are managed very poorly. There is evidence during the site visit

of minimal site management, with large loads of building waste and litter entering the waterway via the stormwater system and being blown into areas of open space from the building sites.

8.6 Construction Site Runoff (major development)

Moderate

Development adjacent to the Croydon Hotel is currently continuing with minimal stormwater management practices in place. As a result large sediment loads are being washed from the unsealed areas on the site.

8.7 Arterial Road Runoff

Moderate

Sections of Maroondah Highway drain to this reach.

8.8 Upstream Inflow

N/A

8.9 Golf Course Runoff

N/A

8.10 Other

N/A

9 ANDERSONS CREEK

9.1 Commercial Runoff

N/A

9.2 Residential Runoff

Moderate

The majority of the catchment is developed with the predominant land use established residential sub-divisions.

9.3 Industrial Runoff

N/A

9.4 Waterway Degradation

Low

Some waterway degradation is occurring along the waterway in the upper reaches of this catchment.

9.5 Building Site Runoff (lot scale)

Moderate

As a result of infill and redevelopment works proceeding within this catchment, some pollutant stormwater runoff is being generated from these sites.

9.6 Construction Site Runoff (major development)

N/A

9.7 Arterial Road Runoff

N/A

9.8 Upstream Inflow

N/A

9.9 Golf Course Runoff

N/A

9.10 Other

N/A

10 JUMPING CREEK

10.1 Commercial Runoff

N/A

10.2 Residential Runoff

High

The catchment is currently being developed, with a range of stages of development present throughout the catchment. Although much of the catchment is fully developed, it is believed that it is contributing a high sediment load that would be expected due to the early nature of its development with runoff coming from unstabilised building sites and newly established residential dwellings. It would be expected that the quality of stormwater runoff will improve in the next 5 to 10 years as gardens and other works associated with the residential developments are finalised.

10.3 Industrial Runoff

N/A

10.4 Waterway Degradation

Moderate

Some erosion is occurring on stream lines in the upper reaches of this catchment, much of this is due to increase flow rates as a result of the altered land use as the land is being converted from rural areas to residential areas.

10.5 Building Site Runoff (lot scale)

High

A large amount of urban development activity is occurring within this catchment. The site inspection revealed that often the development is poorly managed with large sediment and litter loads being exported from building sites.

10.6 Construction Site Runoff (major development)

Low

The majority of major development within this catchment is complete.

10.7 Arterial Road Runoff

N/A

10.8 Upstream Inflow

N/A

10.9 Golf Course Runoff

N/A

10.10 Other

N/A

11 BRUSHY CREEK

11.1 Commercial Runoff

N/A

11.2 Residential Runoff

Moderate

The majority of catchment is a well established residential area.

11.3 Industrial Runoff

N/A

11.4 Waterway Degradation

Low

There is some ongoing waterway degradation occurring in this creek although much of it is due to the large sediment loads that this reach receives from upstream catchments.

11.5 Building Site Runoff (lot scale)

Low

Some infill and redevelopment works are proceeding within this catchment and would be contributing pollutant loads to the stormwater system.

11.6 Construction Site Runoff (major development)

N/A

11.7 Arterial Road Runoff

Moderate

A reach at Maroondah Highway drains to this reach.

11.8 Upstream Inflow

High

This reach receives significant sediment loads and runoff from commercial areas from upstream catchments.

11.9 Golf Course Runoff

Low

Croydon Golf Club drains to this reach.

11.10 Other

N/A

APPENDIX F: RESULTS OF RISK ANALYSIS

Table F-1 Results Risk Analysis for Upper Dandenong Creek

Upper Dandenong Creek			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
				1.0	2.0			1.0		1.0	
Environmental	In-Stream Habitat	1.0		1	1.0			1.0		1.0	
	Riparian Flora/Habitat	2.0		1.0	2.0			1.0		1.0	
Cultural	European Heritage			3.0	2.0			2.0		2.0	
	Aboriginal Heritage			6.0	8.0			4.0		4.0	
Amenity	Recreational	3.0		3.0	2.0			1.0		2.0	
	Visual/Landscape	2.0		9.0	12.0			3.0		6.0	
Stormwater	Flood Protection & Conveyance	3.0		3.0	1.0			1.0		2.0	
	Water Quality Treatment			6.0	4.0			2.0		4.0	
Economic	Property Value	2.0		2.0	2.0			1.0		3.0	
				6.0	8.0			3.0		9.0	
								2.0		4.0	

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

Table F-2 Results Risk Analysis for Lower Dandenong Creek

Lower Dandenong Creek			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
			1.0	2.0	2.0			1.0		3.0	2.0
Environmental	In-Stream Habitat	2.0	3	3	2.0			3.0		4.0	3.0
			6.0	12.0	8.0			6.0		24.0	12.0
Environmental	Riparian Flora/Habitat	2.5	2.0	3.0	2.0			2.0		3.0	1.0
			5.0	15.0	10.0			5.0		22.5	5.0
Cultural	European Heritage										
	Aboriginal Heritage										
Amenity	Recreational	4.0	3.0	3.0	2.0			2.0		3.0	2.0
			12.0	24.0	16.0			8.0		36.0	16.0
Amenity	Visual/Landscape	3.0	3.0	3.0	3.0			2.0		3.0	1.0
			9.0	18.0	18.0			6.0		27.0	6.0
Stormwater	Flood Protection & Conveyance	3.0	2.0	1.0	3.0			2.0		2.0	1.0
			6.0	6.0	18.0			6.0		18.0	6.0
Stormwater	Water Quality Treatment										
Economic	Property Value	2.0	2.0	3.0	2.0			2.0		2.0	1.0
			4.0	12.0	8.0			4.0		12.0	4.0
Economic											
Donsream Values	Instream Habitat	3.0	3	2	2.0			4.0		4.0	2.0
			9.0	12.0	12.0			12.0		36.0	12.0
	Recreational Amenity	4.0	2	1	2.0			3.0		4.0	1.0
		8.0	8.0	16.0			12.0		48.0	8.0	
	Port Phillip	4.0	3	2	2.0			4.0		4.0	3.0
			12.0	16.0	16.0			16.0		48.0	24.0

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

Table F-3 Results Risk Analysis for Upper Croydon Main Drain (Kilsyth Drain)

Upper Croydon Main Drain			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
			3.0	1.0	2.0	2.0		1.0			3.0
Environmental	In-Stream Habitat	1.0	3.0	2.0	2.0	3.0		3.0			3.0
	Riparian Flora/Habitat	2.0	2.0	3.0	2.0	2.0		2.0			2.0
Cultural	European Heritage	1.0	1.0	1.0	1.0	1.0		1.0			1.0
	Aboriginal Heritage										
Amenity	Recreational	3.0	2.0	2.0	2.0	2.0		2.0			2.0
	Visual/Landscape	2.0	3.0	3.0	3.0	2.0		2.0			1.0
Stormwater	Flood Protection & Conveyance	3.0	2.0	1.0	3.0	1.0		1.0			1.0
	Water Quality Treatment	2.0	3.0	1.0	3.0	3.0		3.0			3.0
Economic	Property Value	1.0	1.0	2.0	2.0	1.0		1.0			1.0

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

Table F-4 Results Risk Analysis for Lower Croydon Main Drain

Lower Croydon Main Drain			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
			1.0	4	2.0			1.0	3.0	2.0	3.0
Environmental	In-Stream Habitat	1.0		4.0	2.0			3.0		2.0	3.0
	Riparian Flora/Habitat	2.0		3.0	2.0			2.0		2.0	2.0
Cultural	European Heritage			6.0	8.0			4.0		8.0	12.0
	Aboriginal Heritage										
Amenity	Recreational	2.0		3.0	1.0			1.0		2.0	1.0
	Visual/Landscape	1.0		6.0	4.0			2.0		8.0	6.0
Stormwater	Flood Protection & Conveyance	3.0		3.0	3.0			2.0		3.0	1.0
	Water Quality Treatment			3.0	18.0			3.0		12.0	9.0
Economic	Property Value	1.0		3.0	2.0			2.0		2.0	1.0
				3.0	4.0			2.0		4.0	3.0

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

Table F-5 Results Risk Analysis for Heatherdale Creek

Heatherdale Creek			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
			2.0	2.0	1.0	4.0	3.0				2.0
Environmental	In-Stream Habitat	1.0	2	3	2.0	4.0	3.0				3.0
	Riparian Flora/Habitat	2.0	4.0	6.0	2.0	16.0	9.0	2.0			6.0
Cultural	European Heritage										
	Aboriginal Heritage										
Amenity	Recreational	1.0	1.0	2.0	2.0	8.0	2.0	2.0			2.0
	Visual/Landscape	1.0	2.0	4.0	2.0	8.0	6.0	2.0			4.0
Stormwater	Flood Protection & Conveyance	2.0	1.0	1.0	3.0	16.0	2.0	1.0			1.0
	Water Quality Treatment										
Economic	Property Value	1.0	2.0	1.0	2.0	12.0	3.0	2.0			2.0

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

Table F-6 Results Risk Analysis for Mullum Mullum Creek

Mullum Mullum Creek			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
			4.0	2.0	2.0	3.0	3.0	3.0	2.0		
Environmental	In-Stream Habitat	2.0	3	3	2.0	4.0	2.0	3.0			4.0
	Riparian Flora/Habitat	3.0	2.0	3.0	2.0	2.0	2.0	2.0			2.0
Cultural	European Heritage	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		
	Aboriginal Heritage										
Amenity	Recreational	3.0	3.0	3.0	2.0	3.0	3.0	2.0			3.0
	Visual/Landscape	3.0	3.0	3.0	2.0	3.0	3.0	2.0			2.0
Stormwater	Flood Protection & Conveyance	3.0	1.0	2.0	3.0	2.0	2.0	2.0			2.0
	Water Quality Treatment										
Economic	Property Value	2.0	1.0	1.0	1.0	1.0	3.0	1.0			1.0
Donsream Values	Instream Habitat	3.0	3	2	3.0	4.0		3.0			4.0
	Recreational Amenity	4.0	1	2	2.0	3.0		2.0			4.0
	Yarra River/Port Phillip	4.0	2	2	3.0	4.0		4.0			4.0

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

Table F-7 Results Risk Analysis for Brushy Creek

Brushy Creek			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
				1.0	2.0		1.0	2.0		3.0	1.0
Environmental	In-Stream Habitat	2.0		4	3.0		3.0	3.0		4.0	3.0
			8.0	12.0		6.0	12.0		24.0		6.0
Environmental	Riparian Flora/Habitat	3.0		4.0	2.0		2.0	2.0		3.0	2.0
			12.0	12.0		6.0	12.0		27.0		6.0
Cultural	European Heritage										
	Aboriginal Heritage										
Amenity	Recreational	3.0		3.0	2.0		2.0	2.0		3.0	2.0
			9.0	12.0		6.0	12.0		27.0		6.0
Amenity	Visual/Landscape	3.0		4.0	3.0		3.0	2.0		4.0	2.0
			12.0	18.0		9.0	12.0		36.0		6.0
Stormwater	Flood Protection & Conveyance	3.0		2.0	3.0		2.0	1.0		3.0	1.0
			6.0	18.0		6.0	6.0		27.0		3.0
Stormwater	Water Quality Treatment										
Economic	Property Value	2.0		3.0	3.0		3.0	2.0		2.0	2.0
			6.0	12.0		6.0	8.0		12.0		4.0
Economic											
Downstream Values	Instream Habitat	3.0		4	3.0		3.0	3.0		4.0	3.0
			12.0	18.0		9.0	18.0		36.0		9.0
Downstream Values											
	Yarra River/Port Phillip	4.0		4	3.0		3.0	3.0		4.0	3.0
			16.0	24.0		12.0	24.0		48.0		12.0

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

Table F-8 Results Risk Analysis for Jumping Creek

Jumping Creek			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
			3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Environmental	In-Stream Habitat	3.0	27.0	27.0	27.0	3.0	3.0				
	Riparian Flora/Habitat	4.0	24.0	24.0	24.0	2.0	2.0				
Cultural	European Heritage										
	Aboriginal Heritage										
Amenity	Recreational	4.0	24.0	24.0	24.0	2.0	2.0				
	Visual/Landscape	4.0	24.0	24.0	36.0	2.0	3.0				
Stormwater	Flood Protection & Conveyance	3.0	18.0	18.0	18.0	2.0	2.0				
	Water Quality Treatment	4.0	36.0	24.0	36.0	3.0	3.0				
Economic	Property Value	3.0	27.0	27.0	27.0	3.0	3.0				
Downstream Values	Instream Habitat	3.0	27.0	27.0	27.0	3.0	3.0				
	Riparian Flora/Habitat	3.0	9.0	27.0	27.0	1.0	3.0				
	Yarra River/Port Phillip	4.0	24.0	36.0	36.0	2.0	3.0				

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

Table F-9 Results Risk Analysis for Upper Bungalook Creek

Upper Bungalook Creek			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
			1.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0
Environmental	In-Stream Habitat	2.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	Riparian Flora/Habitat	4.0	12.0	12.0	6.0	6.0	6.0	6.0	6.0	6.0	3.0
Cultural	European Heritage	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Aboriginal Heritage	1.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Amenity	Recreational	2.5	2.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Visual/Landscape	3.0	1.0	3.0	3.0	2.0	3.0	2.0	3.0	3.0	3.0
Stormwater	Flood Protection & Conveyance	1.0	1.0	1.0	3.0	2.0	1.0	2.0	1.0	4.0	4.0
	Water Quality Treatment	3.0	1.0	3.0	2.0	1.0	2.0	1.0	1.0	3.0	3.0
Economic	Property Value	2.0	3.0	3.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0
			2.0	12.0	8.0	2.0	2.0	2.0	2.0	2.0	2.0

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Key					
Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

Table F-10 Results Risk Analysis for Lower Bungalook Creek

Lower Bungalook Creek			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
			2.0	2.0	1.0	4.0	1.0	1.0	1.0	1.0	1.0
Environmental	In-Stream Habitat	1.0	2	2	2.0	4.0	3.0	2.0		3.0	
	Riparian Flora/Habitat	4.0	8.0	24.0	4.0	16.0	4.0	4.0		8.0	
Cultural	European Heritage	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	
	Aboriginal Heritage										
Amenity	Recreational	1.0	2.0	3.0		2.0	3.0	2.0		3.0	
	Visual/Landscape	1.0	4.0	6.0	3.0	8.0	3.0	2.0		3.0	
Stormwater	Flood Protection & Conveyance	4.0	8.0	8.0	12.0	16.0	8.0	8.0		16.0	
	Water Quality Treatment	2.0	8.0	12.0	4.0	24.0	6.0	4.0		4.0	
Economic	Property Value	1.0	2.0	4.0	1.0	8.0	2.0	2.0		2.0	

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

Table F-11 Results Risk Analysis for Andersons Creek

Andersons Creek			Commercial Runoff	Waterway Degradation	Residential Runoff	Industrial Runoff	Building Site Runoff (Lot Scale)	Arterial Road Runoff	Construction Site Runoff (major development)	Upstream Inflows	Golf Course Runoff
				1.0	2.0		2.0				
Environmental	In-Stream Habitat	2.0		4	3.0		3.0				
	Riparian Flora/Habitat	3.0		4.0	2.0		2.0				
Cultural	European Heritage										
	Aboriginal Heritage										
Amenity	Recreational	3.0		3.0	2.0		2.0				
	Visual/Landscape	3.0		4.0	3.0		3.0				
Stormwater	Flood Protection & Conveyance	3.0		2.0	2.0		2.0				
	Water Quality Treatment	2.0		3.0	3.0		4.0				
Economic	Property Value	2.0		3.0	3.0		3.0				
				6.0	12.0		12.0				
Downstream Values	Instream Habitat	3.0		2	3.0		3.0	3.0		4.0	3.0
	Visual Amenity	3.0		1	3.0		3.0				
	Yarra River/Port Phillip	4.0		2	3.0		3.0	3.0		4.0	3.0

Legend
 Risk = Value x Threat x Sensitivity
 Sensitivity is indicated in the upper right hand corner of each box.

Threat	Score	Value	Score	Sensitivity	Score
Very High	4	Very High	4	Very High	4
High	3	High	3	High	3
Medium	2	Medium	2	Medium	2
Low	1	Low	1	Low	1

APPENDIX G: REACTIVE MANAGEMENT ELEMENT SCREENING

Strategy 1 - Mullum Mullum

Threat
Commercial Runoff
Pollutants
Toxicants, Hydro Carbons, Litter, Fine Sediment, Nutrients, Deoxygenating Materials

Primary Value
Various
Secondary Values

Element Type	Strategy Elements	Litter	Deoxygenating Materials	Fine Sediment	Toxicants	Pathogens	Nutrients	Oils and Grease	Comment	Recommended
Education and Awareness	Literature/Guideline Development and Distribution	✓	✓	✓	✓	✓	✓	✓	Develop Targeted material for commercial premises	✓
	Stormwater Management Education Workshops	✓	✓	✓	✓	✓	✓	✓	Conduct for commercial operators	
	Demonstration Projects	✓	✓	✓	✓	✓	✓	✓	Sites are private, making access for education purposes difficult	
	Long Term Individual/Organisation Consultation	✓	✓	✓	✓	✓	✓	✓	Build links with commercial operators on Maroondah Hway and in Eastland	✓
	Media Release	✓	✓	✓	✓	✓	✓	✓	Use local papers to educate general community of value of creek and outline work being done	✓
	Signage	✓	✓	✓	✓	✓	✓	✓	Place along Creek	✓
	Landcare, Community & Special Interest Group	✓	✓	✓	✓	✓	✓	✓	Will not target threat	
	Business Stakeholder Groups & Committees	✓	✓	✓	✓	✓	✓	✓	Wide range of business types and lack of existing forums makes this difficult to set up	
Structural Treatments	Screening Devices	✓	✓						Investigate for Outlets to Creek	✓
	Artificial Wetlands	✓	✓	✓	✓		✓	✓	Peter Vergers Reserve	✓
	Gross Pollutant Traps	✓	✓	✓	✓				investigate for outlets from commercial areas	✓
	Drainage Inlet Traps	✓	✓						Within Eastland Area amnd along Maroondah Highway	✓
	Sedimentation Basins			✓	✓				Not appropriate for pollutants	
	Instream Floating Debris & Litter Booms	✓							Waterway is too small	
	Oil and Grease Interceptors								Include in in-line GPT's	
Non-Structural Treatments	Flow Detention Structures (Basins)								Not appropriate for threat type	
	Swales			✓	✓	✓		✓	Not appropriate given existing level of development	
	Porous Pavements			✓	✓			✓	Not appropriate given existing level of development	
	Rainwater Storage and Reuse (Tanks)								NA	
	Stormwater Infiltration Measures			✓	✓	✓		✓	Not appropriate given existing level of development	
Source Controls	Filter Strips			✓	✓	✓		✓	Not appropriate given existing level of development	
	Street Sweeping	✓	✓	✓					Current program adequate	
	Waste & Refuse Collection	✓	✓	✓	✓	✓	✓	✓	Audit waste management practices of commercial premises	
	Waterway Rehabilitation & Revegetation			✓					Will not target pollutant sources	
Site Specific Strategies and Plans	Roof Water Diversion								Not feasible given existing infrastructure	
	Develop & Implement Site Specific EMP's	✓	✓	✓	✓	✓	✓	✓	Suggest they are developed for major commercial sites	
	Develop & Implement Site Specific Sed & Erosion Control Plans	✓		✓					Not appropriate for threat	
	Waste Management Program Development	✓	✓	✓	✓	✓	✓	✓	Develop as part of EMP's	
	Water Quality Management Strategy	✓	✓	✓	✓	✓	✓	✓	NA	
	Waterway Management Strategy Development	✓	✓	✓	✓	✓	✓	✓	Completed by MW	
Information & Data Collection	Spill Prevention and Containment Plans		✓	✓	✓	✓	✓	✓	Not appropriate for threat type	
	Litter Audits	✓	✓						Use to identify litter hotspots	
Regulation and Enforcement	Monitoring (Stormwater, Instream Ecology, Flow)	✓	✓	✓	✓	✓	✓	✓	NA	
	Financial Incentives (eg. Rate Rebates)	✓	✓	✓	✓	✓	✓	✓	NA	
	Audit and Inspection	✓	✓	✓	✓	✓	✓	✓	Conduct joint program with EPA and MW	✓
	Infringement Notification and Fines	✓	✓	✓	✓	✓	✓	✓	Consider development of local laws for application in industrial areas	✓

Strategy 2 - Lower Dandenong Creek

Threat
Upstream Inflows
Pollutants
Toxicants, Hydro Carbons, Litter, Fine Sediment, Nutris

Primary Value
Recreational Amenity
Secondary Values
Visual Amenity, In-stream Habitat

Element Type	Strategy Elements	Litter	Deoxygenating Materials	Coarse Sediment	Fine Sediment	Toxicants	Pathogens	Nutrients	Oil and Grease	Flow Management	Comment	Recommended
Education and Awareness	Literature/Guideline Development and Distribution	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 sets of brochures one for industrial and commercial sites and the other for residential areas	✓
	Stormwater Management Education Workshops	✓	✓	✓	✓	✓	✓	✓	✓	✓	Suggested for industrial areas	✓
	Demonstration Projects	✓	✓	✓	✓	✓	✓	✓	✓	✓	Not suitable for range of pollutant sources	
	Long Term Individual/Organisation Consultation	✓	✓	✓	✓	✓	✓	✓	✓	✓	Develop a range of programs to liaise with organisations and industry groups within and outside of municipality	✓
	Media Release	✓	✓	✓	✓	✓	✓	✓	✓	✓	General media release to raise awareness of a number of programs	✓
	Signage	✓	✓	✓	✓	✓	✓	✓	✓	✓	Signage along Creek to highlight SW pollution issues	✓
	Landcare, Community & Special Interest Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	Provide support to Friends Groups	✓
Structural Treatments	Business Stakeholder Groups & Committees	✓	✓	✓	✓	✓	✓	✓	✓	✓	Too large an area with a diverse range of businesses	
	Trash Racks	✓	✓								limited opportunities given few culverts daylight	
	Artificial Wetlands	✓	✓	✓	✓	✓		✓	✓	✓	A range of possibilities upstream	✓
	Gross Pollutant Traps	✓	✓	✓	✓	✓			✓	✓	A range of possibilities upstream	✓
	Drainage Inlet Traps	✓	✓	✓	✓	✓				✓	Target high risk areas	✓
	Sedimentation Basins			✓	✓	✓					Potential site in Heathvale Creek	✓
	Instream Floating Debris & Litter Booms	✓							✓		Waterway too small	
Non-Structural Treatments	Oil and Grease Interceptors								✓		Too large a scale to be practical	
	Flow Detention Structures (Basins)									✓	limited opportunities given development on flood plain	
	Swales			✓	✓	✓	✓		✓		Not appropriate given current level of development	
	Porous Pavements			✓	✓	✓			✓		Not appropriate given current level of development	
	Rainwater Storage and Reuse (Tanks)									✓	Not appropriate given current level of development	
	Stormwater Infiltration Measures			✓	✓	✓	✓		✓	✓	Not appropriate given current level of development	
Source Controls	Filter Strips			✓	✓	✓	✓		✓		Not appropriate given current level of development	
	Street Sweeping	✓	✓	✓	✓					✓	Review in Key source areas	
	Waste & Refuse Collection	✓	✓	✓	✓	✓	✓	✓	✓	✓	Too broad a scale to be cost effective	
	Waterway Rehabilitation & Revegetation			✓	✓					✓	Will not mitigate threats	
Site Specific Strategies and Plans	Roof Water Diversion									✓	Not appropriate given current level of development	
	Develop & Implement Site Specific BMPs	✓	✓	✓	✓	✓	✓	✓	✓	✓	No suitable sites	
	Develop & Implement Site Specific Sed & Erosion Control Plans	✓		✓	✓					✓	Adopt for large development sites	✓
	Waste Management Program Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	Develop for large building sites	✓
	Water Quality Management Strategy	✓	✓	✓	✓	✓	✓	✓	✓	✓	Not appropriate given threats	
	Waterway Management Strategy Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	Will not mitigate threats	
Information & Data Collection	Soil Prevention and Containment Plans		✓	✓	✓	✓	✓	✓	✓		Develop for industrial areas such as Bayswater Nth and Heathmont	✓
	Litter Audits	✓	✓								Results of limited use	
	Monitoring (Stormwater, Instream Ecology, Flow)	✓	✓	✓	✓	✓	✓	✓	✓	✓	monitoring undertaken by MW	
Regulation and Enforcement	Financial Incentives (eg. Rate Rebates)	✓	✓	✓	✓	✓	✓	✓	✓	✓	Difficult to resource over such a large catchment	
	Audit and Inspection	✓	✓	✓	✓	✓	✓	✓	✓	✓	Develop a program for industrial and commercial sites	✓
	Infringement Notification and Fines	✓	✓	✓	✓	✓	✓	✓	✓	✓	Develop a program for industrial and commercial sites	✓

Strategy 3 - Jumping Creek

Threat
Building Site Runoff (Lot Scale)
Pollutants
Litter, Coarse Sediment, Fine Sediment, Toxicants, Nutrients

Primary Value
Various
Secondary Values

Element Type	Strategy Elements	Litter	Coarse Sediment	Fine Sediment	Toxicants	Nutrients	Comment	Recommended
Education and Awareness	Literature/Guideline Development and Distribution	✓	✓	✓	✓	✓	Simple brochures for developers and home owners on waste management, showing good and bad practices.	✓
	Stormwater Management Education Workshops	✓	✓	✓	✓	✓	Not possible for Council given number of individual lots	
	Demonstration Projects	✓	✓	✓	✓	✓	Not practical for number of builders. Limited impact.	
	Long Term Individual/Organisation Consultation	✓	✓	✓	✓	✓	Difficult given that most development is now lot scale	
	Media Release	✓	✓	✓	✓	✓	Should be considered as part of local publications (eg. local papers or newsletters).	✓
	Signage	✓	✓	✓	✓	✓	Compulsory signage for properties under development (similar to planning consent signage)	✓
	Landcare, Community & Special Interest Group	✓	✓	✓	✓	✓	Not relevant, groups are too dispersed.	
	Business Stakeholder Groups & Committees	✓	✓	✓	✓	✓	Wrong target audience.	
Structural Treatments	Trash Racks	✓					Pollutant sources few in number and disperses across a wide area of the catchment	
	Artificial Wetlands	✓	✓	✓	✓	✓	Catchment already has a range of pollutant trapping devices	
	Gross Pollutant Traps	✓	✓	✓	✓	✓	Not appropriate give spatial and time scale of threat	
	Drainage Inlet Traps	✓	✓				Will not treat target pollutants	
	Sedimentation Basins		✓	✓	✓	✓	Catchment has a range of treatment devices	
	Instream Floating Debris & Litter Booms	✓					Not appropriate	
	Oil and Grease Interceptors						Innapropriate for pollutant types	
Non-Structural Treatments	Flow Detention Structures (Basins)						Innapropriate for pollutant types	
	Swales		✓	✓	✓		Not appropriate for lot scale consideration	
	Porous Pavements		✓	✓	✓		Not appropriate for lot scale consideration	
	Rainwater Storage and Reuse (Tanks)						Innapropriate for pollutant types	
	Stormwater Infiltration Measures		✓	✓	✓		Not appropriate for lot scale consideration	
Source Controls	Filter Strips		✓	✓	✓		Not appropriate for lot scale consideration	
	Street Sweeping	✓	✓	✓			Review sweeping regime in areas undergoing development	✓
	Waste & Refuse Collection	✓	✓	✓	✓	✓	Consider improved waste collection program or facilities for developing areas.	✓
	Waterway Rehabilitation & Revegetation		✓	✓			Will Not target threat	
Site Specific Strategies and Plans	Roof Water Diversion						Not appropriate for lot scale consideration	
	Develop & Impliment Site Specific EMP's	✓	✓	✓	✓	✓	Develop proforma waste management plan for builders (ie. checklist).	✓
	Develop & Impliment Site Specific Sed & Erosion Control Plans	✓	✓	✓			Include as part of EMP development	✓
	Waste Management Program Development	✓	✓	✓	✓	✓	Difficult to develop meaningful program due to transient nature of target audience.	
	Water Quality Management Strategy	✓	✓	✓	✓	✓	Not relevant for broad application.	
	Waterway Management Strategy Development	✓	✓	✓	✓	✓	Not relevant for type of threats or pollutants	
Information & Data Collection	Spill Prevention and Containment Plans		✓	✓	✓	✓	Not relevant for type of threats or pollutants	
	Litter Audits	✓					Collection of litter hot spot information is probably not useful. Problem areas will be consistent with developing areas.	
	Monitoring (Stormwater, Instream Ecology, Flow)	✓	✓	✓	✓	✓	Not relevant due to time span of development. Information from monitoring would not be useful.	
Regulation and Enforcement	Financial Incentives (eg. Rate Rebates)	✓	✓	✓	✓	✓	Limited scope within current local government framework	
	Audit and Inspection	✓	✓	✓	✓	✓	Important. Council should allocate resources to undertake regular inspections and collect an inventory on builder compliance and performance.	✓
	Infringement Notification and Fines	✓	✓	✓	✓	✓	Consider modification to local laws to allow this to happen. Use model law developed by MWC, MAV and DOI.	✓

Strategy 4 -Brushy Creek

Threat
Upstream Inflow
Pollutants
Litter, Fine Sediment, Coarse Sediment

Primary Value
Visual Amenities
Secondary Values
Recreational Amenities, Riparian Habitat, Flood Conveyance, In-stream Habitat

Element Type	Strategy Elements	Litter	Coarse Sediment	Fine Sediment	Comment	Recommended
Education and Awareness	Literature/Guideline Development and Distribution	✓	✓	✓	Use BPEM Guidelines. MCC not responsible for distribution to regional audience.	
	Stormwater Management Education Workshops	✓	✓	✓	Difficult to identify target audience	
	Demonstration Projects	✓	✓	✓	No opportunities within MCC	
	Long Term Individual/Organisation Consultation	✓	✓	✓	Liase with EPA, MW and Yarra Ranges Council to implememnt SW management measures	✓
	Media Release	✓	✓	✓	In co-operation with other agencies highlight SW pollution in Brushy Creek	
	Signage	✓	✓	✓	At points of high visitation highlight issues	✓
	Landcare, Community & Special Interest Group	✓	✓	✓	Not Applicable	
	Business Stakeholder Groups & Committees	✓	✓	✓	Not Applicable	
Structural Treatments	Trash Racks	✓			Not feasible - Insufficient Space adjacent to waterway	
	Artificial Wetlands	✓	✓	✓	Not feasible - Insufficient Space adjacent to waterway	
	Gross Pollutant Traps	✓	✓	✓	Not feasible - Insufficient Space adjacent to waterway	
	Drainage Inlet Traps	✓	✓	✓	Not feasible - Insufficient Space adjacent to waterway	
	Sedimentation Basins		✓	✓	Not feasible - Insufficient Space adjacent to waterway	
	Instream Floating Debris & Litter Booms	✓			Creek is not suited to this type of device	
	Oil and Grease Interceptors				Not appropriate for threat	
	Flow Detention Structures (Basins)				Not appropriate for threat	
Non-Structural Treatments	Swales		✓	✓	Inappropriate	
	Porous Pavements		✓	✓	Inappropriate	
	Rainwater Storage and Reuse (Tanks)				Inappropriate	
	Stormwater Infiltration Measures		✓	✓	Inappropriate	
	Filter Strips		✓	✓	Inappropriate	
Source Controls	Street Sweeping	✓	✓	✓	Not applicable to NON MCC areas	
	Waste & Refuse Collection	✓	✓	✓	Not applicable to NON MCC areas	
	Waterway Rehabilitation & Revegetation		✓	✓	Will not target Threat	
	Roof Water Diversion				Not applicable to NON MCC areas	
Site Specific Strategies and Plans	Develop & Impliment Site Specific EMP's	✓	✓	✓	Not applicable to NON MCC areas	
	Develop & Implement Site Specific Sed & Erosion Control Plans	✓	✓	✓	Not applicable to NON MCC areas	
	Waste Management Program Development	✓	✓	✓	Not applicable to NON MCC areas	
	Water Quality Management Strategy	✓	✓	✓	Not applicable to NON MCC areas	
	Waterway Management Strategy Development	✓	✓	✓	Will not target Threat	
	Spill Prevention and Containment Plans		✓	✓	Under development, however will not target Threat	
Information & Data Collection	Litter Audits	✓			Not applicable to NON MCC areas	
	Monitoring (Stormwater, Instream Ecology, Flow)	✓	✓	✓	Not applicable to NON MCC areas	
Regulation and Enforcement	Financial Incentives (e.g. Rate Rebates)	✓	✓	✓	Not feasible most of catchment is outside MCC	
	Audit and Inspection	✓	✓	✓	Not feasible most of catchment is outside MCC	
	Infringement Notification and Fines	✓	✓	✓	Not feasible most of catchment is outside MCC	

Strategy 5 - Jumping Creek and Bungalook Creek

Threat
Waterway Degradation
Pollutants
Fine Sediment, Coarse Sediment, Nutrients,
Primary Value
Various
Secondary Values

Element Type	Strategy Elements	Coarse Sediment	Fine Sediment	Nutrients	Comment	Recommended
Education and Awareness	Literature/Guideline Development and Distribution	✓	✓	✓	Limited target audience	
	Stormwater Management Education Workshops	✓	✓	✓	Threat related to management by drainage authority	
	Demonstration Projects	✓	✓	✓	Na	
	Long Term Individual/Organisation Consultation	✓	✓	✓	Maintain contacts with MW and private landholders to ensure waterways are managed correctly	✓
	Media Release	✓	✓	✓	Will be covered by other strategies	
	Signage	✓	✓	✓	Place signs to highlight impacts of illegal dumping	
	Landcare, Community & Special Interest Group	✓	✓	✓	Encourage Friends groups so they can report any problem sites	✓
	Business Stakeholder Groups & Committees	✓	✓	✓	NA	
Structural Treatments	Trash Racks				Not appropriate for threats	
	Artificial Wetlands	✓	✓	✓	Already in Catchment	
	Gross Pollutant Traps	✓	✓		Limited opportunities given threat	
	Drainage Inlet Traps	✓			Not appropriate for threats	
	Sedimentation Basins	✓	✓		Already installed	
	Instream Floating Debris & Litter Booms				Not appropriate for threats	
	Oil and Grease Interceptors				Not appropriate for threats	
	Flow Detention Structures (Basins)				Already installed	
Non-Structural Treatments	Swales	✓	✓		Not appropriate for threats	
	Porous Pavements	✓	✓		Not appropriate for threats	
	Rainwater Storage and Reuse (Tanks)				Not appropriate for threats	
	Stormwater Infiltration Measures	✓	✓		Not appropriate for threats	
	Filter Strips	✓	✓		Not appropriate for threats	
Source Controls	Street Sweeping	✓	✓		Not appropriate for threats	
	Waste & Refuse Collection	✓	✓	✓	Not appropriate for threats	
	Waterway Rehabilitation & Revegetation	✓	✓		Several targeted sites	✓
	Roof Water Diversion				Not appropriate for threats	
Site Specific Strategies and Plans	Develop & Implement Site Specific EMP's	✓	✓	✓	Not appropriate for threats	
	Develop & Implement Site Specific Sed & Erosion Control Plans	✓	✓		Not appropriate for threats	
	Waste Management Program Development	✓	✓	✓	programs running at present	
	Water Quality Management Strategy	✓	✓	✓	Not appropriate for threats	
	Waterway Management Strategy Development	✓	✓	✓	Already developed	
	Spill Prevention and Containment Plans	✓	✓	✓	Not appropriate for threats	
Information & Data Collection	Litter Audits				Not appropriate for threats	
	Monitoring (Stormwater, Instream Ecology, Flow)	✓	✓	✓	Undertake annual Stream condition monitoring	✓
Regulation and Enforcement	Financial Incentives (eg. Rate Rebates)	✓	✓	✓	Not appropriate for threats	
	Audit and Inspection	✓	✓	✓	Not appropriate for threats	
	Infringement Notification and Fines	✓	✓	✓	Not appropriate for threats	

Strategy 6 -Jumping Creek

Threat
Residential Runoff
Pollutants
Litter, Coarse Sediments, Fine Sediments, Pathogens, Toxicants, Nutrients

Primary Value
Various
Secondary Values

Element Type	Strategy Elements	Pollutants							Comment	Recommended
		Litter	Coarse Sediment	Fine Sediment	Toxicants	Pathogens	Nutrients			
Education and Awareness	Literature/Guideline Development and Distribution	✓	✓	✓	✓	✓	✓	Simple Brochure showing impacts of residential landuse on waterways	✓	
	Stormwater Management Education Workshops	✓	✓	✓	✓	✓	✓	Not appropriate due to diffuse nature of pollution		
	Demonstration Projects	✓	✓	✓	✓	✓	✓	Not appropriate due to diffuse nature of pollution		
	Long Term Individual/Organisation Consultation	✓	✓	✓	✓	✓	✓	Difficult to identify a target audience		
	Media Release	✓	✓	✓	✓	✓	✓	General media release regarding SW pollution and measures to reduce it	✓	
	Signage	✓	✓	✓	✓	✓	✓	Signage along waterways to highlight impact of urban runoff	✓	
	Landcare, Community & Special Interest Group	✓	✓	✓	✓	✓	✓	Support local community groups	✓	
	Business Stakeholder Groups & Committees	✓	✓	✓	✓	✓	✓	Not appropriate due to residential landuse		
Structural Treatments	Trash Racks	✓						Will not remove targeted pollutants		
	Artificial Wetlands	✓	✓	✓	✓		✓	Opportunities already fully utilised		
	Gross Pollutant Traps	✓	✓	✓	✓			Potential for a number of devices within drainage system	✓	
	Drainage Inlet Traps	✓	✓					Will not be able to target broad area and range of pollutants		
	Sedimentation Basins		✓	✓	✓			Opportunities already fully utilised		
	Instream Floating Debris & Litter Booms	✓						Not appropriate given size of waterways		
	Oil and Grease Interceptors							Include in GPT's		
	Flow Detention Structures (Basins)							Opportunities already fully utilised		
Non-Structural Treatments	Swales		✓	✓	✓	✓		Limited scope given existing level of development		
	Porous Pavements		✓	✓	✓			Limited scope given existing level of development		
	Rainwater Storage and Reuse (Tanks)							Likely to have limited impact		
	Stormwater Infiltration Measures		✓	✓	✓	✓		Limited scope given existing level of development		
	Filter Strips		✓	✓	✓	✓		Opportunities already fully utilised		
	Street Sweeping	✓	✓	✓				Street sweeping occurs as part of current maintenance schedule		
Source Controls	Waste & Refuse Collection	✓	✓	✓	✓	✓	✓	Current methods are adequate		
	Waterway Rehabilitation & Revegetation		✓	✓				Not appropriate to threat see Strategy 5		
	Roof Water Diversion							Likely to have limited impact		
	Develop & Implement Site Specific EMP's	✓	✓	✓	✓	✓	✓	Not appropriate for threat		
Site Specific Strategies and Plans	Develop & Implement Site Specific Sed & Erosion Control Plans	✓	✓	✓				Not appropriate for threat		
	Waste Management Program Development	✓	✓	✓	✓	✓	✓	Currently developed and implemented		
	Water Quality Management Strategy	✓	✓	✓	✓	✓	✓	Develop for waterbodies within catchment	✓	
	Waterway Management Strategy Development	✓	✓	✓	✓	✓	✓	Will not target threat		
	Spill Prevention and Containment Plans	✓	✓	✓	✓	✓	✓	Not appropriate given landuse		
	Litter Audits	✓							Unlikely to generate any useful data	
Information & Data Collection	Monitoring (Stormwater, Instream Ecology, Flow)	✓	✓	✓	✓	✓	✓	Waterbodies should be regularly monitored to define their health	✓	
	Financial Incentives (eg. Rate Rebates)	✓	✓	✓	✓	✓	✓	Not appropriate		
Regulation and Enforcement	Audit and Inspection	✓	✓	✓	✓	✓	✓	Not appropriate for threat		
	Infringement Notification and Fines	✓	✓	✓	✓	✓	✓	Not appropriate for threat		

APPENDIX H: REACTIVE STRATEGY ELEMENT SELECTION TABLES

Table H-1 Strategy formulation for Priority Risk Group 1

Rank	ID	Element Types	Description/Location	Lifecycle	Capital Cost	Ongoing Cost	Total Cost	% Catchment	Effectiveness	Life time	Feasibility	Multiple Benefit	Desirability	Score
1	RG1-EA-01	Literature/ Guideline Development & Distribution			\$45,000		\$45,000	100	N	5	H	M	H	7347
2	RG1-EA-04	Media Release			\$10,000		\$10,000	100	N	1	H	M	H	8163
3	RG1-EA-03	Long Term Organisational Consultation		10		\$20,000	\$200,000	100	N	10	H	H	H	11662
4	RG1-EA-05	Signage		5	\$5,000	\$2,000	\$15,000	20	N	5	H	M	H	12245
5	RG1-RE-01	Audit and Inspection		10		\$40,000	\$400,000	100	L	10	M	L	M	17778
6	RG1-ST-04 (a)	Drainage Inlet Traps	a) Maroondah Highway (near Car City) 12 side entry pits	10	\$6,000	\$3,000	\$36,000	20	M	10	H	N	M	20571
7	RG1-ST-04 (b)	Drainage Inlet Traps	b) Ringwood Town Centre 40 pits	10	\$20,000	\$10,000	\$120,000	60	M	10	H	N	M	22857
8	RG1-ST-02 (e)	Gross Pollutant Traps	e) 750 mm Ringwood St	20	\$48,050	\$9,000	\$228,050	10	H	20	H	N	M	93082
9	RG1-ST-02 (d)	Gross Pollutant Traps	d) 1200 mm Eastland	20	\$117,000	\$9,000	\$297,000	17	H	20	H	N	L	118848
10	RG1-ST-01 (d)	Screening Devices	d) 1200 mm Eastland	10	\$18,800	\$9,000	\$108,800	17	M	10	H	N	L	121905
11	RG1-ST-03	Artificial Wetland	Peter Vergers Reserve has sufficient area to allow the construction of a 0.8 ha wetland	50	\$200,000	\$10,000	\$700,000	1.5	M	50	L	H	H	126984
12	RG1-ST-02 (a)	Gross Pollutant Traps	a) 300 mm Oban Rd	20	\$18,200	\$9,000	\$198,200	7	H	20	H	N	L	192614
13	RG1-ST-01 (e)	Screening Devices	e) 750 mm Ringwood St	10	\$12,250	\$9,000	\$102,250	10	M	10	H	N	L	194762
14	RG1-ST-01 (a)	Screening Device	a) 300 mm Oban Rd	10	\$7,000	\$9,000	\$97,000	7	M	10	H	N	L	263946
15	RG1-ST-02 (b)	Gross Pollutant Traps	b) 1050 mm Kuranger Nursery	20	\$94,000	\$9,000	\$274,000	6	H	20	H	N	L	310658
16	RG1-ST-01 (b)	Screening Devices	b) 1050 mm Kuranger Nursery	10	\$16,800	\$9,000	\$106,800	6	M	10	H	N	L	339048
17	RG1-ST-01 (c)	Screening Devices	c) 1350 mm Bardia St	10	\$22,600	\$9,000	\$112,600	6	M	10	H	N	L	357460
18	RG1-ST-02 (c)	Gross Pollutant Traps	c) 1350 mm Bardia St	20	\$143,000	\$9,000	\$323,000	6	H	20	H	N	L	366213
19	RG1-RE-02	Infringement Notification & Fines		20	\$10,000	\$120,000	\$2,410,000	100	N	20	H	N	L	2295238
20	RG1-ST-01 (c)	Screening Devices	c) 1350 mm Bardia St	10	\$22,600	\$9,000	\$112,600	6	M	10	H	N	L	357460
21	RG1-RE-02	Infringement Notification & Fines		20	\$10,000	\$120,000	\$2,410,000	100	N	20	H	N	L	2295238
22	RG1-RE-02	Infringement Notification & Fines		20	\$10,000	\$120,000	\$112,600	100	N	20	H	N	L	2295238

Strategy 1 Cost Effectiveness Plot

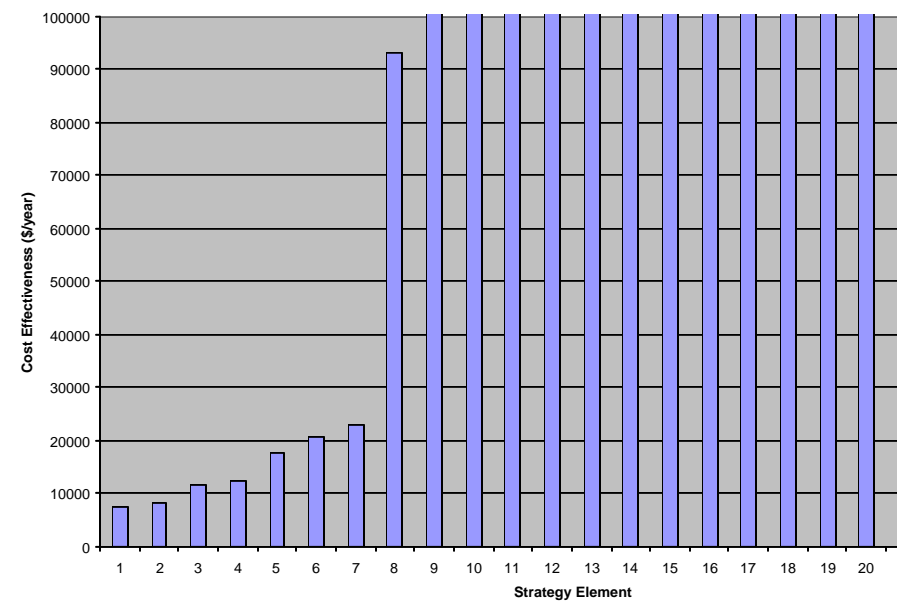


Table H-2 Strategy formulation for Priority Risk Group 2

Rank	ID	Element Types	Description/Location	Lifecycle	Capital Cost	Ongoing Cost	Total Cost	% Catchment	Effectiveness	Life time	Feasibility	Multiple Benefit	Desirability	Score
1	RG2-EA-05	Signage		5	\$5,000	\$1,000	\$10,000	50	N	5	H	M	H	3265
2	RG2-EA-04	Media Release			\$10,000		\$10,000	60	N	1	VH	M	H	10582
3	RG2-EA-06	Landcare, Community and Special Interest Groups		10		\$10,000	\$100,000	60	N	10	H	M	H	13605
4	RG2-EA-02 b	Literature/ Guideline Development & Distribution	b) Residential Areas		\$65,000		\$65,000	80	N	5	VH	L	H	17196
5	RG2-EA-03 b	Long Term Organisational Consultation (outside MCC)		10		\$10,000	\$100,000	40	N	10	H	M	H	20408
6	RG2-ST-03 b	Constructed Wetlands	Connolly Crescent	50	\$250,000	\$12,000	\$850,000	1.7	H	50	H	H	H	41649
7	RG2-SS-01	Develop Site Specific Sediment and Erosion Control Plans		10	\$15,000	\$3,000	\$45,000	3	L	10	M	L	H	47619
8	RG2-EA-01 a	Literature/ Guideline Development & Distribution	a) Industrial Areas		\$45,000		\$45,000	20	N	5	H	L	H	61224
9	RG2-ST-03 a	Constructed Wetlands	Heatherdale Creek immediately upstream of Dandenong Creek (1 ha)	50	\$300,000	\$15,000	\$1,050,000	3.6	L	50	M	H	H	79365
10	RG2-EA-03 a	Long Term Organisational Consultation (within MCC)		10		\$20,000	\$200,000	60	N	10	M	L	M	88889
11	RG2-ST-01	Major Gross Pollutant Trap	Construct an open gross pollutant trap upstream of Canterbury Road and drain from City of Whitehorse	50	\$150,000	\$15,000	\$900,000	3.6	H	50	H	L	L	113379
12	RG2-SS-02 b	Spill prevention and Containment Plan	a) Heatherdale Creek		\$20,000		\$20,000	5	N	10	L	L	M	177778
13	RG2-ST-04 a	Drainage Inlet Traps	a) Cnr Canterbury and Bayswater Roads, 8 pits	10	\$4,000	\$2,000	\$24,000	1	H	10	H	N	M	195918
14	RG2-ST-04 d	Drainage Inlet Traps	d) Olympus Heights Shopping Centre, 11 pits	10	\$5,500	\$2,750	\$33,000	1	H	13	H	N	M	207221
15	RG2-EA-02	Stormwater Management Education Workshops			\$25,000		\$25,000	30	N	1	L	L	H	264550
16	RG2-ST-04 b	Drainage Inlet Traps	b) Eastwood Plaza, 6 pits	10	\$3,000	\$1,500	\$18,000	0.5	H	11	H	N	M	267161
17	RG2-SS-02 a	Spill prevention and Containment Plan	b) Bayswater North		\$40,000		\$40,000	6	N	11	L	L	M	269360
18	RG2-ST-04 c	Drainage Inlet Traps	c) Canterbury Gardens, 4 pits	10	\$2,000	\$1,000	\$12,000	0.2	H	12	H	N	M	408163
19	RG2-RE-01	Audit and Inspection		10		\$60,000	\$600,000	60	N	10	M	L	L	444444
20	RG2-ST-04 e	Drainage Inlet Traps	e) The Mall Shopping Centre, 14 pits	10	\$7,000	\$3,500	\$42,000	0.5	H	14	H	N	M	489796
21	RG2-ST-02 h	In-line Gross Pollutant Trap	h) 1650 Burgess Close	20	\$220,000	\$12,000	\$460,000	3.91	H	20	H	N	L	800720
22	RG2-ST-02 f	In-line Gross Pollutant Trap	f) 525 mm Research Drive	20	\$32,000	\$9,000	\$212,000	0.95	H	20	H	N	L	1523920
23	RG2-ST-02 b	In-line Gross Pollutant Trap	b) 1650 mm Turbo Drive	20	\$220,000	\$12,000	\$460,000	1.23	H	20	H	N	L	2552296
24	RG2-ST-02 d	In-line Gross Pollutant Trap	d) 1200 mm Elsum Ave	20	\$120,000	\$9,000	\$300,000	0.71	H	20	H	N	L	2879206
25	RG2-ST-02 g	In-line Gross Pollutant Trap	g) 1725 mm Burgess Road	20	\$240,000	\$12,000	\$480,000	1.01	H	20	H	N	L	3228200
26	RG2-ST-02 c	In-line Gross Pollutant Trap	c) 300 mm Bayfield Rd	20	\$18,000	\$9,000	\$198,000	0.31	H	20	H	N	L	4394388
27	RG2-ST-02 e	In-line Gross Pollutant Trap	e) 900 mm Nicole Close	20	\$70,000	\$9,000	\$250,000	0.23	H	20	H	N	L	7276681
28	RG2-RE-02	Infringement Notification & Fines		20	\$10,000	\$120,000	\$2,410,000	60	N	20	L	N	L	8925926
29	RG2-ST-02 a	In-line Gross Pollutant Trap	a) 600 mm Cnr Bayswater & Canterbury Rds	20	\$38,000	\$9,000	\$218,000	0.15	H	20	M	N	L	#####

Strategy 2 Cost-Effectiveness Plot

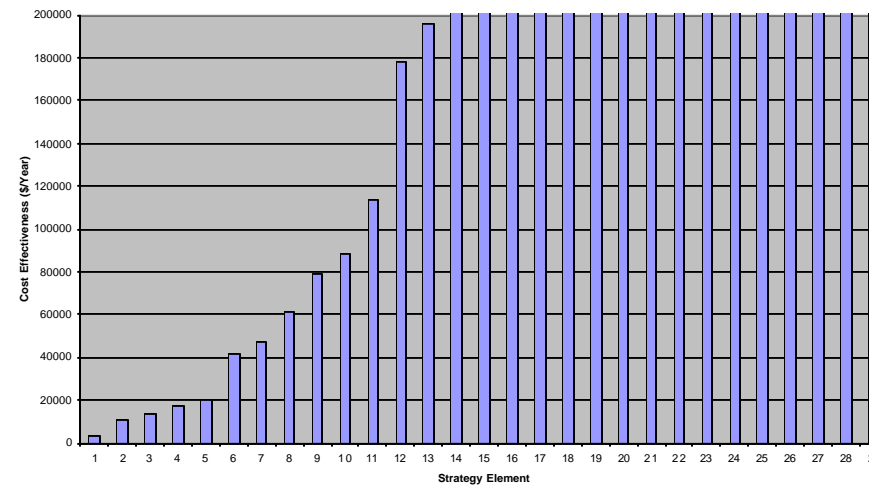


Table H-3 Strategy formulation for Priority Risk Group 3

Rank	ID	Element Types	Description/Location	Lifecycle	Capital Cost	Ongoing Cost	Total Cost	% Catchment	Effectiveness	Life time	Feasibility	Multiple Benefit	Desirability	Score
1	RG3-EA-01	Literature/ Guideline Development & Distribution			\$50,000		\$50,000	100	N	5	VH	M	H	6349
2	RG3-EA-02	Media Release			\$10,000		\$10,000	100	N	1	H	M	H	8163
3	RG3-SS-01	Develop and Implement Site Specific Environmental Management Plan		5	\$15,000	\$10,000	\$65,000	100	L	5	L	L	M	9630
4	RG3-SC-02	Waste and Refuse Collection		10	\$15,000	\$10,000	\$115,000	100	N	10	M	L	H	21905
5	RG3-RE-01	Audit and Inspection		5		\$20,000	\$100,000	100	N	5	M	L	L	88889
6	RG3-SC-01	Street Sweeping		5		\$40,000	\$200,000	100	N	5	M	L	M	106667
7	RG3-EA-03	Signage		5	\$10,000	\$150,000	\$760,000	100	N	5	M	L	M	405333
8	RG3-RE-02	Infringement Notification and Fines		5	\$10,000	\$120,000	\$610,000	100	N	5	L	L	L	903704

Strategy 3 Cost-Effectiveness Plot

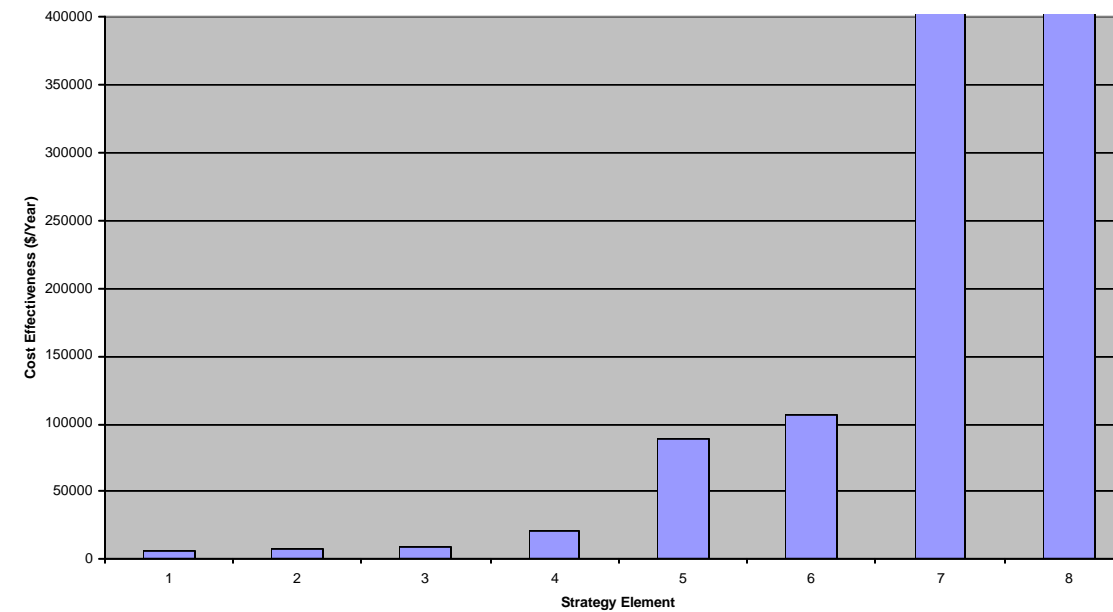
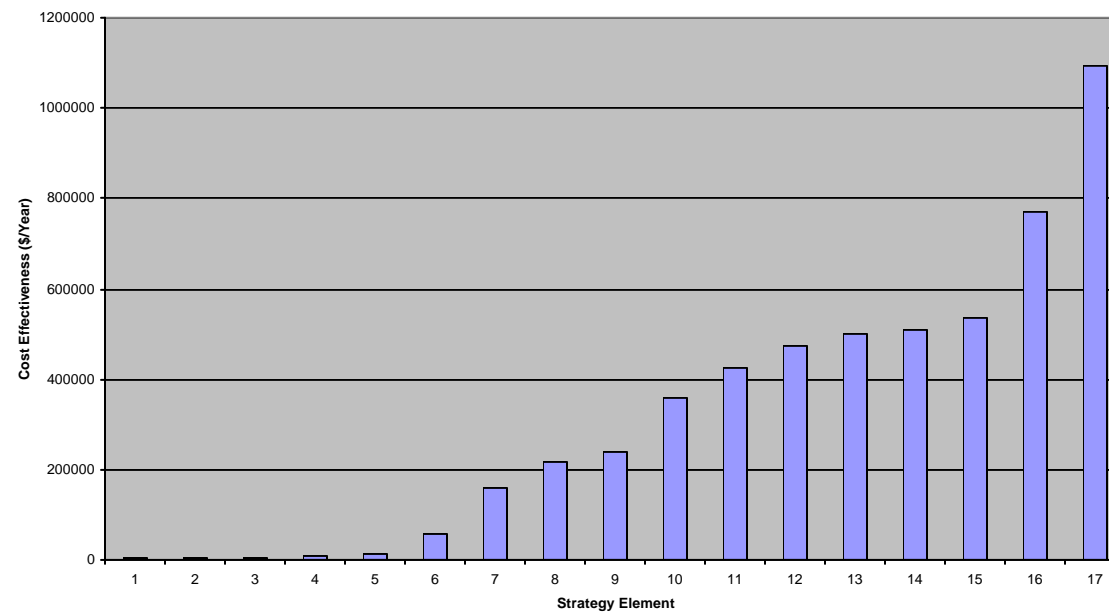


Table H-4 Strategy formulation for Priority Risk Group 6

Rank	ID	Element Types	Description/Location	Lifecycle	Capital Cost	Ongoing Cost	Total Cost	% Catchment	Effectiveness	Life time	Feasibility	Multiple Benefit	Desirability	Score
1	RG6-EA-03	Signage		5	\$10,000		\$10,000	50	N	5	H	L	H	5442
2	RG6-SS-01	Water Quality Management Strategy			\$25,000		\$25,000	50	N	10	H	M	M	5714
3	RG6-EA-04	Landcare and Community Interest Groups		10		\$10,000	\$100,000	100	N	10	H	M	VH	6349
4	RG6-EA-01	Literature/ Guideline Development & Distribution			\$40,000		\$40,000	100	N	5	VH	L	H	8466
5	RG6-EA-02	Media Release			\$10,000		\$10,000	100	N	1	H	L	H	13605
6	RG6-DC-01	Monitoring		10	\$10,000	\$15,000	\$160,000	50	N	10	H	L	M	60952
7	RG6-ST-01 f	Gross Pollutant Traps	f) 675 mm Narr-Maen RB	20	\$36,000	\$9,000	\$216,000	9.0909	H	20	H	N	L	161633
8	RG6-ST-01 i	Gross Pollutant Traps	i) 1050 mm Croydon Hills Drv	20	\$68,250	\$9,000	\$248,250	7.7273	H	20	H	N	L	218547
9	RG6-ST-01 j	Gross Pollutant Traps	j) 900 mm Croydon Hills Primary School	20	\$52,000	\$9,000	\$232,000	6.5909	H	20	H	N	L	239456
10	RG6-ST-01 g	Gross Pollutant Traps	g) 750 mm Narr-Maen RB	20	\$39,000	\$9,000	\$219,000	4.1364	H	20	H	N	L	360170
11	RG6-ST-01 c	Gross Pollutant Traps	c) 450 mm Galtymore Cl	20	\$30,000	\$9,000	\$210,000	3.3409	H	20	H	N	L	427600
12	RG6-ST-01 k	Gross Pollutant Traps	k) 525 mm Settlers Hill Rd	20	\$32,000	\$9,000	\$212,000	3.0455	H	20	H	N	L	473551
13	RG6-ST-01 d	Gross Pollutant Traps	d) 675 mm Valley RD	20	\$36,000	\$9,000	\$216,000	2.9318	H	20	H	N	L	501187
14	RG6-ST-01 b	Gross Pollutant Traps	b) 675 mm Croydon Hills Drive	20	\$36,000	\$9,000	\$216,000	2.8864	H	20	H	N	L	509079
15	RG6-ST-01 h	Gross Pollutant Traps	h) 1050 mm Angelica Cr	20	\$68,250	\$9,000	\$248,250	3.1364	H	20	H	N	L	538450
16	RG6-ST-01 a	Gross Pollutant Traps	a) 900 mm Yarrunga Reserve	20	\$52,000	\$9,000	\$232,000	2.0455	H	20	H	N	L	771580
17	RG6-ST-01 e	Gross Pollutant Traps	e) 750 mm Warranwood Reserve	20	\$39,000	\$9,000	\$219,000	1.3636	H	20	H	N	L	1092517

Strategy 6 Cost-Effectiveness Plot



APPENDIX I: STATE PLANNING POLICY FRAMEWORK – HIGHLIGHTED POLICIES CLAUSES 15 AND 18

Protection of Catchments, Waterways and Ground Water

Planning authorities must have regard to relevant aspects of:

- any regional catchment strategies approved under the Catchment and Land Protection Act 1994 and any associated implementation plan or strategy, including regional vegetation plans, regional drainage plans, regional development plans, catchment action plans, landcare plans, and management plans for roadsides, soil, salinity, water quality and nutrients, floodplains, heritage rivers, river frontages and waterways.
- any special area plans approved under the Catchment and Land Protection Act 1994.

Planning and responsible authorities should coordinate their activities with those of the Boards of catchment management authorities appointed under the Catchment and Land Protection Act 1994 and consider any relevant management plan or works program approved by a catchment management authority.

Planning and responsible authorities should consider the impacts of catchment management on downstream water quality and freshwater, coastal and marine environments and, where possible should encourage:

- The retention of natural drainage corridors with vegetated buffer zones at least 30m wide along waterways to maintain the natural drainage function, stream habitat and wildlife corridors and landscape values, to minimise erosion of stream banks and verges and to reduce polluted surface runoff from adjacent land uses.
- Measures to minimise the quantity and retard the flow of stormwater runoff from developed areas.
- Measures, including the preservation of floodplain or other land for wetlands and retention basins, to filter sediment and wastes from stormwater prior to its discharge into waterways.

Responsible authorities should ensure that works at or near waterways provide for the protection and enhancement of the environmental qualities of waterways and their instream uses and are consistent with Guidelines for Stabilising Waterways (Rural Water Commission 1991) and Environmental Guidelines for River Management Works (Department of Conservation and Environment 1990), and should have regard to any relevant river restoration plans or waterway management works programs approved by a catchment management authority.

Protection of Water Quality

Planning and responsible authorities should ensure that land use activities potentially discharging contaminated runoff or wastes to waterways are sited and managed to minimise such discharges and to protect the quality of surface water and ground water resources, rivers, streams, wetlands, estuaries and marine environments.

Planning and responsible authorities should ensure land use and development proposals minimise nutrient contributions to waterways and water bodies and the potential for the development of algal blooms, consistent with the Preliminary Nutrient Guidelines for Victorian Inland Streams (EPA 1995),

the Victorian Nutrient Management Strategy (Government of Victoria 1995) and any nutrient or water quality management plans approved by Government.

Responsible authorities should use appropriate measures to restrict sediment discharges from construction sites in accordance with Construction Techniques for Sediment Pollution Control (EPA 1991) and Environmental Guidelines for Major Construction Sites (EPA 1995).

Floodplain Management

Flood risk must be considered in the preparation of planning schemes and land use planning decisions to avoid intensifying the impacts of flooding through inappropriately located uses and developments.

Conservation of Native Flora and Fauna

Decision-making by planning and responsible authorities should:

- Assist the conservation of the habitats of threatened and endangered species and communities as identified under the Flora and Fauna Guarantee Act 1988, including under-represented species such as native grasslands, grassy woodlands and wetlands.
- Address potentially threatening processes identified under the Flora and Fauna Guarantee Act 1988.
- Assist re-establishment of links between isolated habitat remnants.

Open Space Planning

Planning and responsible authorities should ensure that land use and development adjoining regional open space networks, national parks and conservation reserves complements the open space in terms of visual and noise impacts, treatment of waste water to reduce turbidity or pollution and preservation of vegetation.

Heritage Planning

Planning and responsible authorities should identify, conserve and protect places of natural or cultural value from inappropriate development.

Provision of Water Supply, Sewerage and Drainage

Planning and responsible authorities should ensure that water quality in water supply catchments is protected from possible contamination by urban, industrial and agricultural land uses.

Urban development must be provided with sewerage at the time of subdivision, or lots created by the subdivision must be capable of adequately treating and retaining all domestic wastewater within the boundaries of each lot consistent with the Code of Practice – Septic Tanks (EPA 1996) and relevant State environment protection policies.

Planning and responsible authorities should ensure that:

- planning for urban stormwater drainage systems considers the catchment context and is coordinated with adjacent municipalities.
- best environmental management practice is used where practicable in the design and management of urban stormwater drainage systems, including measures to reduce peak flows and assist screening, filtering and treatment of stormwater, to enhance flood protection and minimise impacts on water quality in receiving waters.
- drainage systems are protected where practicable from the intrusion of litter, in accordance with strategies set out in Victoria's Litter Reduction Strategy (EPA 1995).

The re-use of wastewater including urban run-off, treated sewage effluent and run-off from irrigated farmland should be encouraged where appropriate, consistent with the Guidelines for Wastewater Re-use (EPA 1996).

APPENDIX J: EXAMPLE EROSION AND SEDIMENT CONTROL MANAGEMENT PLANS

