

Strathbogie Shire Council

Strathbogie Shire Stormwater Management Plan

Volume 2

Job 2002089

Version: Final Report

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Earth Tech Engineering Pty Ltd

ABN 61 089 482 888

Shepparton Office 108 Wyndham Street

Shepparton VIC 3630

Tel +61 3 5831 8777



Strathbogie Shire Council Stormwater Management Plan

Volume 2

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1. Introduction

The purpose of the Stormwater Management Plan is to improve the management of stormwater in urban areas across the Strathbogie Shire in order to protect and enhance the local and downstream receiving water environments.

The main waterways that receive stormwater runoff within the Strathbogie Shire are the Honeysuckle Creek, Seven Creeks, Hughes Creek, Pranjip Creek and Lake Nagambie, all of which directly outfall into the Goulburn River. This is not an exhaustive list of the waterways that are affected by the run-off from the townships, but are the initial receiving water environments.

To achieve its objective of improved stormwater management, the Plan:

- identifies the threats that pose the greatest risk to receiving water values, referred to as the priority management issues;
- recommends strategies for addressing each of the priority management issues; and
- recommends strategies for integrating best practice environmental management of stormwater into Council's planning and other activities with links to stormwater quality.

Volume 1, of the Stormwater Management Plan, provides a summary of how the plan was developed and details the recommended strategies.

Volume 2 provides further details of the processes followed and the background information used to arrive at the recommended strategies.

1.1 Stormwater Plan Process

The approach used in developing the Stormwater Management Plan follows the process detailed in Chapter 3 (*revised September 2000*) of the Best Practice Environmental Management Guidelines (*CSIRO, 1999*). The project methodology is divided into four Stages consisting of a number of tasks, as shown in Figure 1.

Integral to the development of the Stormwater Management Plan were a series of **workshops**. Four workshops were conducted to exchange information and acquire the knowledge of the stakeholders in local stormwater issues and their management.

Volume 2 provides records of the workshops and the assessment methods used to arrive at the strategies recommended in the Stormwater Management Plan.

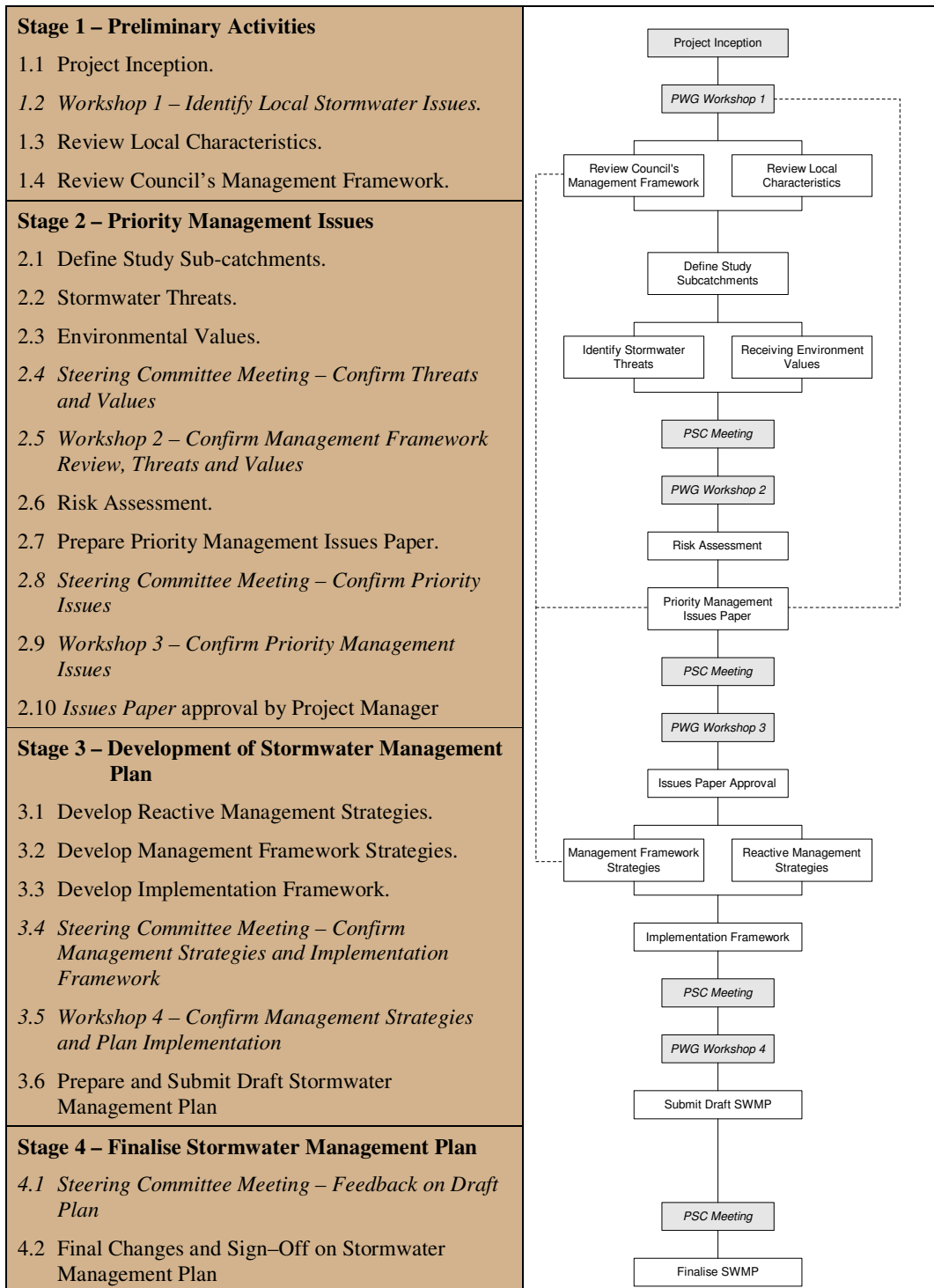


Figure 1. The Process for Formulating a Stormwater Management Plan

(Source: Best Practice Environmental Management Guidelines, CSIRO 1999)

1.2 Parties Involved in the Plan’s Development

1.2.1 Project Steering Committee

The Project Steering Committee oversaw the project and provided critical review of the workshop outcomes and key decisions in the plan development. Project Steering Committee members were as follows.

Name	Organisation
Graeme Pollard	Strathbogie Shire Council
Shannon Lea	Strathbogie Shire Council
Meegan Davies	Goulburn-Broken CMA
Cathryn Marum	EPA
David Hogskins	Goulburn Valley Water
Sophie Martin	Goulburn-Murray Water
Uwe Paffrath	Earth Tech

1.2.2 Project Working Group

The Project Working Group attended the four workshops and provided information and opinions regarding the stormwater issues and development of the plan.

The Project Working Group were also provided draft versions of the Priority Management Issues Paper and Volume 1 of the Stormwater Management Plan for comment prior to the third and fourth workshops. Project Working Group members were as follows.

Name	Organisation
Graeme Williams (<i>Councillor</i>)	Strathbogie Shire Council
Coral Cox	Resident – Longwood
Robin Landvogt	Resident – Violet Town
John Mains	Resident – Avenal
Arthur Frost	Resident – Euroa
F. W. Bloetz	Resident – Nagambie

2. References

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2. EPA Victoria (2001). Outline of the Draft State Environmental Protection Policy (Waters of Victoria).
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4. ABM Stormwater Implementation Project Stage 1 (2001). Statutory Framework and Standards (Model Planning Scheme Provisions).
5. SKM (1999). Victorian Water Quality Monitoring Network Trend Analysis – Goulburn CMA Area, prepared for the Department of Natural Resources and Environment.
6. SKM (2002). Flood Mapping Report – Shire of Strathbogie, prepared for the Department of Natural Resources and Environment.
7. GBCMA (2000). Goulburn Broken Native Vegetation Plan.
8. ID&A Pty Ltd (1997). Mid Goulburn and Broken River – Riverine Implementation Plan.
9. WBM Oceanics Australia (2002). Specification for Stormwater Quality Protection, prepared for LGPro.

**Appendix A. Local Stormwater Issues
(Workshop 1)**

Discussion of Threats – Workshop 1

Following notes are a summary of issues arising from sub-group discussions at Workshop 1 held on the 29th May 2002 at Euroa.

Euroa Sub-catchment

Threat Category	Threat / Issue Description
Residential land use	<ul style="list-style-type: none"> ▪ Lawn clippings dumped in stormwater drains ▪ Animal droppings ▪ Car washing in streets
Commercial land use	<ul style="list-style-type: none"> ▪ Commercial properties (hotel/garage) ▪ Service stations (including decommissioned). ▪ Mechanical repairs. ▪ Railway line. ▪ CBD litter generation.
Industrial	<ul style="list-style-type: none"> ▪ Euroa Clay Works. ▪ Council depot. ▪ Teson Trims. ▪ Cultural yield. ▪ Council Saleyards. ▪ Truck wash. ▪ Distribution points – Fertilizers, Trucking.
New Developments	<ul style="list-style-type: none"> ▪ Construction techniques.
Open space	<ul style="list-style-type: none"> ▪ Fertilisers/ chemical sprays. ▪ Animal waste ▪ Swimming pool
Major Road Runoff	<ul style="list-style-type: none"> ▪ Hume Freeway run-off.
Septic / sewerage issues	<ul style="list-style-type: none"> ▪ Treatment Plant affected by flooding ▪ Occasional over-flows at Saxon & Parker Streets
Camping and Caravan Parks	<ul style="list-style-type: none"> ▪ Caravan park a concern (potential for overload of septic systems in peak season).
Other	

Nagambie Sub-catchment

Threat Category	Threat / Issue Description
Residential land use	<ul style="list-style-type: none"> ▪ No concerns.
Commercial land use	<ul style="list-style-type: none"> ▪ Commercial properties. ▪ Service stations. ▪ Mechanical repairs. ▪ Railway line. ▪ CBD litter generation.
Industrial	<ul style="list-style-type: none"> ▪ Council depot. ▪ Sprays from vineyards. ▪ Truck washing in streets. ▪ Distribution points – Fertilizers, Trucking.
New Developments	<ul style="list-style-type: none"> ▪ Construction techniques.
Open space	<ul style="list-style-type: none"> ▪ Fertilisers/ chemical sprays. ▪ Swimming pool
Major Road Runoff	<ul style="list-style-type: none"> ▪ Goulburn Valley Highway run-off.
Septic / sewerage issues	<ul style="list-style-type: none"> ▪ Town fully sewerred ▪ Possible occurrences of sewerage / stormwater cross connection
Camping and Caravan Parks	<ul style="list-style-type: none"> ▪ Caravan parks a concern (potential for overload of septic systems in peak season). ▪ Fuel spillage from boats ▪ Litter
Other	

Violet Town Sub-catchment

Threat Category	Threat / Issue Description
Residential land use	<ul style="list-style-type: none"> ▪ Animal waste. ▪ Litter / lawn clippings, car washing, garden fertilisers. ▪ Back yard mechanics. ▪ Roads – oil, fuel, grit, mud, rubber.
Commercial land use	<ul style="list-style-type: none"> ▪ Mechanical repairs ▪ Service stations. ▪ Railway line. ▪ CBD litter generation.
Industrial	<ul style="list-style-type: none"> ▪ Metal fabrication. ▪ Fertilizers Distribution point. ▪ Pre cast concrete yard. ▪ Garden Supplies.
New Developments	<ul style="list-style-type: none"> ▪ Construction techniques.
Open space	<ul style="list-style-type: none"> ▪ Fertilisers/ chemical sprays. ▪ Animal waste. ▪ Litter. ▪ No buffer to Creek. ▪ Swimming pool.
Major Road Runoff	<ul style="list-style-type: none"> ▪ Hume Freeway run-off.
Septic / sewerage issues	<ul style="list-style-type: none"> ▪ Septics represent main potential problem ▪ Septic leakage / overflows a significant concern
Camping and Caravan Parks	<ul style="list-style-type: none"> ▪ Caravan park a concern (potential for overload of septic systems in peak season).
Other	

Avenel Sub-catchment

Threat Category	Threat / Issue Description
Residential land use	<ul style="list-style-type: none"> Litter / lawn clippings, car washing, garden fertilisers
Commercial land use	<ul style="list-style-type: none"> Hotel, Service station, Roadhouse.
Industrial	
New Developments	<ul style="list-style-type: none"> Construction techniques (housing).
Open space	<ul style="list-style-type: none"> Fertilisers/ chemical sprays.
Major Road Runoff	
Septic / sewerage issues	<ul style="list-style-type: none"> Town recently sewerred
Camping and Caravan Parks	
Other	

Longwood Sub-catchment

Threat Category	Threat / Issue Description
Residential land use	
Commercial land use	<ul style="list-style-type: none"> Commercial properties (hotel). Railway line.
Industrial	
New Developments	
Open space	<ul style="list-style-type: none"> Community Centre. Grey hound track.
Major Road Runoff	
Septic / sewerage issues	<ul style="list-style-type: none"> Septics represent main potential problem. Septic leakage / overflows a significant concern.
Camping and Caravan Parks	
Other	

Other General Issues. (*made by government agency representatives at workshop*)

- Design / maintenance of septic / sewer systems needs to be in accordance with best practice.
- Domestic animal waste.
- Fuel storage facilities may represent a threat if not adequately provided.
- Road construction runoff in addition to normal road pollutant levels in road runoff.
- Pesticides – export from urban open space areas plus residential properties.
- Contaminated sites (*e.g. land fill sites*).
- Weeds from gardens exported to waterways (*dumped as prunings or seeds washed into stormwater drains*).
- High sediment export from development sites.
- Swimming pools.

**Appendix B. Notes on the Strathbogie Planning
Scheme and other Relevant
Strategies**

B1 Strathbogrie Planning Scheme

The maintenance of water quantity and quality is a major issue in the Shire. The Shire contains a number of significant waterways including the Goulburn River, which has been identified under the Heritage Rivers Act.

The Strathbogrie Planning Scheme includes the State Policy Planning Framework (SPPF), the Municipal Strategic Statement (MSS), Local Planning Policies (LPP), zones, overlays and particular provisions. The format of the Scheme is in accordance with the Victorian Planning Provisions and therefore much of its contents are common across all municipal planning schemes in Victoria.

Stormwater run-off management is linked to various parts of the Planning Scheme including the SPPF. The SPPF requires that the impact of development proposals on downstream water quality be considered and that measures to filter sediments and wastes from stormwater be incorporated into urban design where possible.

Key issues for the Shire as identified by the SPPF and with direct links to stormwater management are:

- *‘measures to minimise the quantity and retard the flow of stormwater run-off from developed areas’.*
- *‘measures, including the preservation of floodplain or other land for wetlands and retention basins, to filter sediments and wastes from stormwater prior to discharge into waterways’.*

The SPPF provides a comprehensive framework of environmental matters that must be addressed to protect water quality and quantity. Local policy for on-stream water storages has been developed for the equitable allocation of water resources for agricultural activities whilst not compromising the environmental health of our streams and rivers.

The MSS recognises that the health of the catchments has important social and economic benefits, not only to local communities but also to the State and Nation, through the provision of high quality water for downstream users. The MSS refers to significant impacts arising from stormwater management in relation to inundation and pollution on adjoining rural areas caused as a result of stormwater discharges. Its vision is to provide a framework and targets for improving the social, physical, environmental and economic well being of the community, and provides a set of planning objectives to manage land use and developments in towns, rural areas and the environment.

One of the key land use themes that have been identified is protecting the Shire’s environmental assets and the qualities of the natural and cultural resource base.

The LLP has links to stormwater management; include the Catchment Management policy, which has objectives that include ensuring that water quality is not adversely affected by new development.

Some of the Key Issues are:

- *Extensive areas of the Shire fall within local and regional water catchments. Use and management of the land within catchments is critical for the protection of water quantity and quality.*
- *Water quality in the catchments and the Shire generally will be improved through the provision of reticulated sewerage services at Avenel and Violet Town.*

Strategies include:

- *Conserve and protect water catchment areas by discouraging uses and activities within catchment areas that have the potential to reduce water quantity, quality and stream biodiversity.*
- *Ensure that the natural drainage functions are retained, wherever possible, in the development of land for residential purposes.*
- *Encourage the retention of natural features such as trees and watercourses on both public and private land.*

The MSS is a dynamic document. A major review will take place at three-year intervals. The LPPF will be reviewed and its performance will be monitored through the use of Council's Data Base System annually.

This monitoring program will be inserted into relevant actions of the Council's Corporate Plan, which will ensure on going performance monitoring of the key policy objectives in the Planning Scheme, which for water quantity and quality is the "protecting of the integrity of water catchments and significant environmental areas and features".

B2 Goulburn Broken Regional Catchment Strategy

This strategy identifies a range of land and water management issues and strategies that are relevant to the Shire and the wider region.

The strategy includes:

- water quality particularly the build up of salinity and nutrients
- flooding and floodplain management
- competing demands on water in catchments
- vegetation loss and maintenance of habitat and biodiversity
- pest plant and animal control

**Appendix C. Stormwater Values and Threats
(Workshop 2)**

Stormwater Values and Threats (Workshop 2)

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C1 Values

Values in the context of stormwater management are the beneficial uses of the receiving water environments.

Values have been divided into the following categories:

- Environment values
 - In stream habitat
 - Riparian habitat
- Amenity (*or social*) values
 - Recreational
 - Aesthetics and Landscape
- Heritage values
 - European
 - Indigenous
- Stormwater values
 - Flood conveyance
 - Water quality treatment
- Economic values
 - Property values
 - Other values (*e.g. tourism, water supply*)

A description of values and their associated significance ratings are given in Table C1. A summary is provided in Table C2.

An overview of each value category and its assessment method is provided as follows:

C1.1 Environmental Values

The environmental values for waterways in the Strathbogie Shire were largely derived from the results of the Index of Stream Condition (*ISC*) survey carried out on behalf of the Department of Natural Resources and Environment. The survey provides a relative rating for the condition of streams in terms of the following subindices, Hydrology, Streamside Zone, Physical Form, Water Quality and Aquatic Life. The results of this survey are site specific and hence required moderation to give an accurate overall rating for the environmental values of streams.

Riparian Values for all creeks are only moderate due to historic clearing of native vegetation and planting of willows etc. Such values on Lake Nagambie are even lower as the fluctuating water levels and adjoining land use have not allowed a riparian vegetation zone and associated habitat to establish.

In-stream habitat values in the catchment have generally been adversely affected by regulation in the form of geomorphic change and thermal pollution from the townships. A lack of quality large woody debris and raised nutrient levels has also reduced in-stream values.

C1.2 Amenity Values

Water based activities at Lake Nagambie include boating, water skiing, boat fishing, canoeing/kayaking, sailboarding and swimming. Foreshore based activities include bike riding, camping, bank fishing, walking, picnicking and sight seeing.

Creek amenity values are aligned with a reduced number of activities (*in comparison to Lake Nagambie*) including bank and in-stream fishing, canoeing/kayaking, swimming/wading, camping, picnicking and sight seeing.

C1.3 Cultural Values

Relevant cultural sites in relation to this stormwater management plan are only those sites located within or on the fringe of waterways.

The number of indigenous heritage sites is not high compared with other locations across the North East region.

There are no European heritage sites listed on the heritage inventory of Heritage Victoria (*located within water frontage properties*).

C1.4 Stormwater Values

Flooding of urban areas within the Strathbogie Shire is not a significant problem. Lake Nagambie provides some downstream benefits due to attenuation of peak flows (*secondary function only*).

There are currently no structural water quality treatment measures (*e.g. constructed wetlands, gross pollutant traps etc*) within the stormwater drainage systems of those towns in the Shire.

C1.5 Economic Values

Council's Planning Scheme identifies that the preservation of the natural environment is of significant importance for tourism. The Lake Nagambie Foreshore is a significant tourist destination.

Its primary function is however as a water storage for downstream irrigation users.

The Lake also provides a significant positive impact on property values around the lake foreshore.

The Seven Creeks and Honeysuckle Creek waterways provide significant attractions for tourist visitors; however generally complement other attractions and activities rather than being the main focus, as distinct from Lake Nagambie.

Table C1 Receiving Water Value Assessment

Value Category	Specific Value Types	Description	Sub-catchment Significance Rating				
			Euroa	Nagambie	Violet Town	Avenel	Longwood
Environmental	In-stream Habitat	<ul style="list-style-type: none"> ▪ Euroa – The flows in the Seven Creeks are subject to regulation. In-stream habitat is abundant and is dominated by woody debris. Aquatic vegetation is common and the creek bed has patches of movable sand and silt separated by clay substrata. The banks have active erosion in many places. Upstream of Euroa the creek flows through a forested catchment. Land use is grazing with some forestry in the top of the catchment. There are no significant barriers to upstream movement of fish or other aquatic organism. ▪ Nagambie – The Lake Nagambie water quality and catchment hydrology is generally good. Physical form is also generally good, although ongoing degradation and subsequently sedimentation in lake is adversely impacting on in-stream habitat. Algal bloom in the Lake is uncommon. ▪ Violet Town – Honeysuckle Creek is mostly a seasonal, ephemeral (short-lived) stream. At the lowest section the creek has incised the floodplain. The upper reaches are little more than linear depressions with associated small ephemeral river red-gum wetlands. Aquatic and terrestrial plants are prevalent and are the dominant form of in-stream cover. Little erosion or sediment transport occurs. Land use in the catchment is grazing and cropping. ▪ Avenel – Hughes (Pranjip) Creek drains the south-eastern plains and are mostly seasonal, ephemeral streams. The upper reaches are coupled with small ephemeral river red-gum wetlands. Aquatic and terrestrial plants are prevalent and are the dominant form of in-stream cover. There is little erosion or sediment transport and the common land use in the catchment is grazing and cropping. ▪ Longwood – Muddy (Creighton's) Creek is not heavily affected by water abstraction. In-stream habitat consists mainly of a movable sand and gravel substrate with woody debris, although there has been some snag removal in the area. In the upper sections the stream becomes rockier with less gravel and woody debris. In-stream aquatic microphytes are generally limited in abundance through this reach. The bed is generally highly movable sand substrate, with areas of active bank erosion in sections. 	<i>Very High</i>	<i>Very High</i>	<i>High</i>	<i>Very High</i>	<i>High</i>

Table C1 Receiving Water Value Assessment

Value Category	Specific Value Types	Description	Sub-catchment Significance Rating				
			Euroa	Nagambie	Violet Town	Avenel	Longwood
	Riparian Habitat/Flora	<ul style="list-style-type: none"> ▪ Euroa – for the Seven Creeks, the riparian vegetation remains generally intact for most of the reach. Some clearing has been undertaken throughout the catchment, but often along one bank only or a relatively large riparian zone has been left. ▪ Nagambie – Lake Nagambie has significant stands of remnant vegetation but invasion from willow species and other weeds is a concern. ▪ Violet Town – Honeysuckle Creek has very good native vegetation on most reaches, but invasion from willow species and other weeds is a concern. ▪ Avenel – Hughes Creek has been cleared of much of its native vegetation. Significant stands of remnant vegetation exist but invasion from willow species and other weeds is a concern. ▪ Longwood – The riparian zone for the Muddy Creek consists of a non-continuous thin strip of remnant native vegetation, though predominantly cleared for agricultural land use. 	<i>Very High</i>	<i>Very High</i>	<i>Very High</i>	<i>Very High</i>	<i>High</i>
Amenity	Recreational Amenity	<ul style="list-style-type: none"> ▪ Euroa – Seven Creeks has moderate to high levels of recreation. ▪ Nagambie – Lake Nagambie has high levels of recreation activity (swimming, wading, canoeing, picnicking, walking etc). Swimming not generally advisable following runoff events, particularly after dry periods. ▪ Violet Town – Honeysuckle Creek has moderate to high levels of recreation. ▪ Avenel – Hughes Creek has low to moderate levels of recreation. ▪ Longwood – Muddy Creek has low to moderate levels of recreation. 	<i>Very High</i>	<i>Very High</i>	<i>Very High</i>	<i>Very High</i>	<i>High</i>

Table C1 Receiving Water Value Assessment

Value Category	Specific Value Types	Description	Sub-catchment Significance Rating				
			Euroa	Nagambie	Violet Town	Avenel	Longwood
	Visual/Landscape Amenity	<ul style="list-style-type: none"> ▪ Euroa – has quite important links with tourism, with equal importance in recreational amenity. ▪ Nagambie – Lake Nagambie has quite important links with tourism, with equal importance in recreational amenity. ▪ Violet Town – aesthetic appeal, walking trail and sightseeing. ▪ Avenel – important passive recreation ▪ Longwood – aesthetic appeal less important in comparison with other sub-catchments. 	<i>Very High</i>	<i>Very High</i>	<i>Very High</i>	<i>Very High</i>	<i>Moderate</i>
Cultural	European Cultural Heritage	<ul style="list-style-type: none"> ▪ Euroa – no sites on heritage inventory. ▪ Nagambie – no sites on heritage inventory. ▪ Violet Town – no sites on heritage inventory. ▪ Avenel – no sites on heritage inventory. ▪ Longwood – no sites on heritage inventory. 	<i>Moderate</i>	<i>Moderate</i>	<i>Moderate</i>	<i>Low</i>	<i>Low</i>
	Indigenous Cultural Heritage	<ul style="list-style-type: none"> ▪ Euroa – low cultural values. ▪ Nagambie – low cultural values. ▪ Violet Town – low cultural values. ▪ Avenel – moderate cultural values. ▪ Longwood – low cultural values. 	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Moderate</i>	<i>Low</i>
Stormwater	Flood and Conveyance	<ul style="list-style-type: none"> ▪ Euroa – few if any flood protection benefits. ▪ Nagambie – Lake Nagambie provides some flood attenuation benefits (not primary function however). ▪ Violet Town – limited flood protection benefits. ▪ Avenel – affects scattered properties. ▪ Longwood – flooding not a concern. 	<i>Very High</i>	<i>Moderate</i>	<i>Very High</i>	<i>Moderate</i>	<i>Low</i>

Table C1 Receiving Water Value Assessment

Value Category	Specific Value Types	Description	Sub-catchment Significance Rating				
			Euroa	Nagambie	Violet Town	Avenel	Longwood
	Water Quality Treatment	<ul style="list-style-type: none"> ▪ Euroa – no water quality control infrastructure. ▪ Nagambie – Lake Nagambie provides some benefits. ▪ Violet Town – limited flood protection benefits. ▪ Avenel – no specific water quality measures except for natural wetlands. ▪ Longwood – no water quality control infrastructure. 	<i>High</i>	<i>High</i>	<i>High</i>	<i>Moderate</i>	<i>Moderate</i>
Economic	Property	<ul style="list-style-type: none"> ▪ Euroa – no water quality control infrastructure. ▪ Nagambie – Lake Nagambie is major positive for some property values. ▪ Violet Town – the creek and the passive recreation is a benefit. ▪ Avenel – river has moderate positive bearing on property values. ▪ Longwood – waterways don't have a major bearing on property values. 	<i>High</i>	<i>High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>
	Other (e.g. tourism, water supply)	<ul style="list-style-type: none"> ▪ Euroa – benefits from tourism (primarily camping, fishing). ▪ Nagambie – Lake Nagambie provides major benefits for region in relation to tourism (wide range of water activities). Primary function is a water storage for downstream irrigators. ▪ Violet Town – benefits through increased tourism. ▪ Avenel – moderate only benefits. ▪ Longwood – low benefits. 	<i>Very High</i>	<i>Very High</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>

Table C2 – Summary of Sub-catchment Values

Significance Rating	Euroa	Nagambie	Violet Town	Avenel	Longwood
Very High	<ul style="list-style-type: none"> ▪ Environmental – in-stream habitat ▪ Environmental – riparian habitat ▪ Amenity – recreational ▪ Amenity – visual ▪ Stormwater – flood ▪ Economic – property ▪ Economic – other 	<ul style="list-style-type: none"> ▪ Environmental – in-stream habitat ▪ Environmental – riparian habitat ▪ Amenity – recreational ▪ Amenity – visual ▪ Economic – property ▪ Economic – other 	<ul style="list-style-type: none"> ▪ Environmental – riparian habitat ▪ Amenity – recreational ▪ Amenity – visual ▪ Stormwater – flood 	<ul style="list-style-type: none"> ▪ Environmental – in-stream habitat ▪ Environmental – riparian habitat ▪ Amenity – recreational ▪ Amenity – visual 	
High	<ul style="list-style-type: none"> ▪ Stormwater – water quality 	<ul style="list-style-type: none"> ▪ Stormwater – water quality 	<ul style="list-style-type: none"> ▪ Environmental – in-stream habitat ▪ Stormwater – water quality ▪ Economic – property ▪ Economic – other 		<ul style="list-style-type: none"> ▪ Environmental – in-stream habitat ▪ Environmental – riparian habitat ▪ Amenity – recreational
Moderate	<ul style="list-style-type: none"> ▪ Cultural – European 	<ul style="list-style-type: none"> ▪ Cultural – European ▪ Stormwater – flood 	<ul style="list-style-type: none"> ▪ Cultural – European 	<ul style="list-style-type: none"> ▪ Cultural – Indigenous ▪ Stormwater – flood ▪ Stormwater – water quality treatment ▪ Economic – property ▪ Economic – other 	<ul style="list-style-type: none"> ▪ Amenity – visual ▪ Stormwater – water quality
Low	<ul style="list-style-type: none"> ▪ Cultural – Indigenous 	<ul style="list-style-type: none"> ▪ Cultural – Indigenous 	<ul style="list-style-type: none"> ▪ Cultural – Indigenous 	<ul style="list-style-type: none"> ▪ Cultural – European 	<ul style="list-style-type: none"> ▪ Cultural – European ▪ Cultural – Indigenous ▪ Stormwater – flood ▪ Economic – property ▪ Economic – other

The significance ratings are based on a review of available literature, site inspections and discussions with stakeholders.

C2 Threats

Stormwater threats are defined as an urban activity or land use that has the potential to damage the receiving water environment.

Stormwater threats were discussed with the Project Working Group at the first workshop. Input in relation to perceived threats and issues were provided for each sub-catchment. Threats were also discussed with Council staff members. Field inspections were also used to identify and/or confirm threats.

Threats within each sub-catchment have been assigned a significance rating based on a consideration of the likely quantity of pollutant generated and frequency of occurrence. These ratings were used for the ranking of priority issues within each sub-catchment.

Existing and future land uses are summarised in Table C3 as follows.

Table C3 – Land Use Details

Sub-catchment	Town (population)	Existing Land Use	Possible Future (land zonings)
Euroa	2,697	<ul style="list-style-type: none"> ▪ Residential – 40 ha ▪ Commercial – 6 ha ▪ Industrial 6 ha ▪ Public parks & recreation – 40 ha ▪ Public uses – 25 ha 	<ul style="list-style-type: none"> ▪ Residential – 51 ha ▪ Business / commercial – 6 ha ▪ Industrial 6 ha ▪ Public parks & recreation – 40 ha ▪ Public uses – 25 ha
Nagambie	1,335	<ul style="list-style-type: none"> ▪ Residential – 90 ha ▪ Business / commercial 7 ha ▪ Industrial 17 ha ▪ Low density residential 10 ha ▪ Public parks & recreation – 6 ha ▪ Public uses 17 ha 	<ul style="list-style-type: none"> ▪ Residential – 190 ha ▪ Business / commercial – 7 ha ▪ Industrial 17 ha ▪ Low density residential – 50 ha ▪ Public parks & recreation – 6 ha ▪ Public uses – 17 ha
Violet Town	580	<ul style="list-style-type: none"> ▪ Residential – 90 ha ▪ Business / commercial 7 ha ▪ Industrial 17 ha ▪ Low density residential 10 ha ▪ Public parks & recreation – 6 ha ▪ Public uses 17 ha 	<ul style="list-style-type: none"> ▪ Residential – 190 ha ▪ Business / commercial – 7 ha ▪ Industrial 17 ha ▪ Low density residential – 50 ha ▪ Public parks & recreation – 6 ha ▪ Public uses – 17 ha
Avenel	546	<ul style="list-style-type: none"> ▪ Residential 20 ha (scattered) ▪ Commercial 4 ha ▪ Industrial 1 ha 	<ul style="list-style-type: none"> ▪ Township zone - 105 ha
Longwood	< 500	<ul style="list-style-type: none"> ▪ Residential 2 ha ▪ Commercial 2 ha 	<ul style="list-style-type: none"> ▪ Township area is zoned rural

C2.1 Euroa Sub-catchment

Residential is the predominant land use at Euroa. Retailing and commercial uses run along both Binney Street and Kirkland Avenue. Industrial land use is predominantly confined to the north of the township. Terrain within the township is generally flat. Only a small section of Euroa still uses septic tanks with only the occasional overflow.

Highly ranked threats are the runoff from existing residential and industrial areas (very high) and commercial areas (high) largely because of the size / extent of these areas and the close proximity of most stormwater outlets to receiving waters. Most other threat categories were assessed as moderate. Development levels are presently modest at Euroa and across the broader Shire, with threats arising from new development therefore ranked accordingly.

Threats for various urban land uses and land use activities for the Euroa sub-catchments are given in Table C4.

C2.2 Nagambie Sub-catchment

Nagambie has a very high residential land use (90%) compared to industrial (6%) and commercial (4%) uses, yet it is the commercial precinct along the Goulburn Valley Highway which produces the greatest pressures on the quality of the stormwater.

The highest ranked threats for this sub-catchment are residential, industrial and commercial runoff. Threats from other categories were assessed to have relatively low influences and consequently were ranked low to moderate.

Threats for various urban land uses and land use activities for the Nagambie sub-catchment are given in Table C5.

C2.3 Violet Town Sub-catchment

The highest ranked threat for this sub-catchment is residential runoff (predominant land use), followed by industrial and commercial runoff. Septic issues are of concern but will be minimised once all property owners have connected to the recently constructed sewerage reticulation.

The issue of litter and other pollutant loads generated by developments, public open spaces and caravan parks have been considered to produce a moderate impact to the township. The other threats were ranked low.

Threats for various urban land uses and land use activities for the Violet Town sub-catchment are given in Table C6.

C2.4 Avenel Sub-catchment

Residential as the predominant land use was the only very high-designated threat category. Threats ranked as moderate are commercial land use, residential development and open space runoff.

Threats from other categories were assessed to have relatively negligible influences and consequently were ranked low.

The catchment of Hughes Creek is relatively small with water quality particularly sensitive to levels of incoming stormwater pollutants.

Threats for various urban land uses and land use activities for the Avenel sub-catchment are given in Table C7.

C2.5 Longwood Sub-catchment

Residential as the predominant land use was designated as a high threat. Open space runoff has been ranked as moderate due to the small size of the urban portion of the catchment draining to Pranjip Creek and the potential for runoff from the surrounds to impact on the quality of runoff discharging into the Creek. Threats from other categories were assessed to have relatively negligible influences and consequently were ranked low.

Site inspections identified the presence of grey water, which warrants further field investigations to identify cause and likely source.

Threats for various urban land uses and land use activities for the Longwood sub-catchment are given in Table C8.

Table C4 –Threats to Stormwater Quality – Euroa Sub-catchment

Threat	Description	Sub-catchment Significance Rating
Residential land use	<ul style="list-style-type: none"> ▪ Predominant land use at Euroa. The town is largely drained through a kerb and channel and piped drainage system, with some older areas and less intensively developed areas served by spoon or table drains. Overland flows are conveyed by open drains. Residential land use activities include car washing, fertiliser application on gardens/lawns, deposition of lawn clippings/prunings, domestic waste management. Streets / channels / drains in residential areas generally observed to contain low levels of litter. 	Very High
Commercial land use	<ul style="list-style-type: none"> ▪ Commercial land use at Euroa is targeted towards servicing the large visitors to the town in addition to the local community. Binney Street appeared to be well-maintained and significant threats were not apparent from this area. The concentration of commercial and entertainment activities in this precinct during special events has the potential to impact significantly on stormwater quality. 	High
Industrial land use	<ul style="list-style-type: none"> ▪ Industrial land use in Euroa is centred around the north of the township. Sites include panel beaters, garden supplies, Council Depot and Saleyard. No particular stormwater quality impacts were evident around these sites but the activities and materials at the Council depot and saleyard appeared to have the most potential to impact on stormwater quality. 	Very High
Building site run-off	<ul style="list-style-type: none"> ▪ Low observed levels of new development / redevelopment at the lot scale. New development has potential to generate large sediment loads during construction. 	Moderate
Residential development	<ul style="list-style-type: none"> ▪ Planning applications are referred to Council's engineering section for advice regarding stormwater issues. Planning referrals are also referred to GBCMA when development within 100 metres of a waterway. 	Moderate
Septic and Sewerage system issues	<ul style="list-style-type: none"> ▪ Reticulated sewerage present with surplus capacity. No problems. Not 100% reuse (uneconomic). 	Low
Camping and Caravan Parks	<ul style="list-style-type: none"> ▪ Caravan park located at the eastern end of Euroa along the Seven Creeks. Park appears in a well maintained condition. Park is on floodplain and as such, the storage of any chemicals; fuel etc presents a risk during flood events. No erosion issues observed in park. Park is sewered. Low levels of litter observed (week day off peak). 	Moderate
Unstable and degraded drains / waterways.	<ul style="list-style-type: none"> ▪ Unstable and degraded drains are not a significant problem in Euroa as the topography of the town is relatively flat. 	Moderate

Table C4 –Threats to Stormwater Quality – Euroa Sub-catchment

Threat	Description	Sub-catchment Significance Rating
Major Road Runoff.	<ul style="list-style-type: none"> ▪ Low quantities of litter present in Seven Creeks adjacent to the Hume Freeway. Major road runoff not considered by itself to represent a major issue. 	Low
Open Space Runoff.	<ul style="list-style-type: none"> ▪ Parks and gardens application of fertilisers generally limited to garden beds and new plantings. Herbicides generally limited to roadsides and open drain maintenance. Open space areas considered unlikely to contribute significant pollutant loads. 	Moderate
Upstream inflows	<ul style="list-style-type: none"> ▪ Runoff from upstream catchments, entering via creeks and waterways, causing the discharging of sediments, nutrients, litter and pathogens, are not considered to represent a major issue. 	Low
Landfill and contaminated sites.	<ul style="list-style-type: none"> ▪ Landfill site at Euroa, degree of contaminated seepage from site unknown. ▪ There is potential for contaminated land at the old service stations. There is likely to be other contaminated sites in a town of this age and size. There is no evidence to suggest that contaminated land at these sites poses a threat to stormwater quality. 	Low

Table C5 –Threats to Stormwater Quality – Nagambie Sub-catchment

Threat	Description	Sub-catchment Significance Rating
Residential land use	<ul style="list-style-type: none"> ▪ Predominant land use at Nagambie. Moderate to low density development. Existing development is quite mature. Terrain only moderately sloping. Serviced by kerb and channelled sealed streets with piped collector network. Residential land use activities include car washing, fertiliser application on gardens/lawns, deposition of lawn clippings/prunings, domestic waste management. 	Very High
Commercial land use	<ul style="list-style-type: none"> ▪ Concentrated along the Goulburn Valley Highway and consists of service station/garages, hotels, motels, post office, butchers, newsagent, bakery, hardware store, general store, antique shops, drapery and clothing store. Runoff drains to stormwater outlets which discharge into Lake Nagambie. Nagambie is targeted towards servicing the large visitors to the town in addition to the local community. The main street appeared to be well maintained. Main concerns are of any fuel spillage which is washed into the stormwater system, will end up in the Lake. The concentration of commercial and entertainment activities in this precinct during special events also has the potential to impact significantly on stormwater quality. 	Very High
Industrial land use	<ul style="list-style-type: none"> ▪ Industrial land use in Nagambie is towards the east of the township. Industrial sites include panel beaters, garden supplies, Vineyard, Concrete yard and Council Depot. No particular stormwater quality impacts were evident around these sites but the activities and materials at the Council depot appeared to have the most potential to impact on stormwater quality. 	Very High
Building site run-off	<ul style="list-style-type: none"> ▪ Low observed levels of new development / redevelopment at the lot scale. New development has potential to generate large sediment loads during construction. 	Moderate
Residential development	<ul style="list-style-type: none"> ▪ Planning applications are referred to Council's engineering section for advice regarding stormwater issues. Planning referrals are also referred to GBCMA when development within 100 metres of a waterway. 	Moderate
Septic and Sewerage system issues	<ul style="list-style-type: none"> ▪ Reticulated sewerage present with surplus capacity. No problems. Not 100% reuse (uneconomic). 	Low
Camping and Caravan Parks	<ul style="list-style-type: none"> ▪ Caravan parks are located adjacent the Lake. Inspection of the area around the caravan parks and lake suggested that organic matter and litter loads from the caravan parks are having an impact on the foreshore of the Lake. It is noted that the caravan sites are not sewered. The septic tanks may impact on water quality in the Lake. 	Moderate

Table C5 –Threats to Stormwater Quality – Nagambie Sub-catchment

Threat	Description	Sub-catchment Significance Rating
Unstable and degraded drains / waterways.	<ul style="list-style-type: none"> ▪ Unstable and degraded drains are not a significant problem in Nagambie. 	Moderate
Major Road Runoff.	<ul style="list-style-type: none"> ▪ The Goulburn Valley Highway would contribute sediment, litter and other pollutants generated by vehicular traffic. 	Low
Open Space Runoff.	<ul style="list-style-type: none"> ▪ Parks and gardens application of fertilisers generally limited to garden beds and new plantings. Herbicides generally limited to roadsides and open drain maintenance. Open space areas considered unlikely to contribute significant pollutant loads. 	Moderate
Upstream inflows	<ul style="list-style-type: none"> ▪ Runoff from upstream catchments, entering via creeks and waterways, causing the discharging of sediments, nutrients, litter and pathogens, are not considered to represent a major issue. 	Low
Landfill and contaminated sites.	<ul style="list-style-type: none"> ▪ There is likely to be other contaminated sites in a town of this age and size. There is no evidence to suggest that contaminated land at these sites poses a threat to stormwater quality. 	Low

Table C6 –Threats to Stormwater Quality – Violet Town Sub-catchment

Threat	Description	Sub-catchment Significance Rating
Residential land use	<ul style="list-style-type: none"> ▪ Most residential development mature. Terrain moderately sloping. Extensive piped collector system, kerb and channel present in most streets. Low to medium density. Relatively clean streets (litter, sediment, animal waste etc). 	Very High
Commercial land use	<ul style="list-style-type: none"> ▪ Commercial land use in Violet Town is largely centred along the main Street. More significant premises include a service station and garage, numerous retail outlets and hotel. The main street appeared to be well maintained. The fuel pumps at the service station were located on the kerb leaving any fuel spillage to be washed into the stormwater system. 	High
Industrial land use	<ul style="list-style-type: none"> ▪ Sites include panel beaters, garden supplies, concrete product manufacture. No particular stormwater quality impacts were evident around these sites. 	High
Building site run-off	<ul style="list-style-type: none"> ▪ Low observed levels of new development / redevelopment at the lot scale. New development has potential to generate large sediment loads during construction. 	Moderate
Residential development	<ul style="list-style-type: none"> ▪ Planning applications are referred to Council's engineering section for advice regarding stormwater issues. Planning referrals are also referred to GBCMA when development within 100 metres of a waterway. 	Moderate
Septic and Sewerage system issues	<ul style="list-style-type: none"> ▪ Town has a recently installed reticulated sewerage system. Property owners have a further 2 years in which to connect to reticulated sewerage. 	Low
Camping and Caravan Parks	<ul style="list-style-type: none"> ▪ Caravan park located at the north-eastern end of Violet Town along the Honeysuckle Creek. Park appears in a well maintained condition. Park is on floodplain and as such, the storage of any chemicals; fuel etc presents a risk during flood events. No erosion issues observed in park. 	Moderate
Unstable and degraded drains / waterways.	<ul style="list-style-type: none"> ▪ Unstable and degraded drains are not a significant problem in Violet Town as the topography of the town is relatively flat. 	Moderate
Major Road Runoff.	<ul style="list-style-type: none"> ▪ Low quantities of litter present in Honeysuckle Creek adjacent to the Hume Freeway. Major road runoff not considered by itself to represent a major issue. 	Low

Table C6 –Threats to Stormwater Quality – Violet Town Sub-catchment

Threat	Description	Sub-catchment Significance Rating
Open Space Runoff.	<ul style="list-style-type: none"> ▪ Parks and gardens application of fertilisers generally limited to garden beds and new plantings. Herbicides generally limited to roadsides and open drain maintenance. Open space areas considered unlikely to contribute significant pollutant loads. 	Moderate
Upstream inflows	<ul style="list-style-type: none"> ▪ Runoff from upstream catchments, entering via creeks and waterways, causing the discharging of sediments, nutrients, litter and pathogens, are not considered to represent a major issue. 	Low
Landfill and contaminated sites.	<ul style="list-style-type: none"> ▪ There is potential for contaminated land at the rail siding and the existing service station. There is likely to be other contaminated sites in a town of this age and size. There is no evidence to suggest that contaminated land at these sites poses a threat to stormwater quality. 	Low

Table C7 –Threats to Stormwater Quality – Avenel Sub-catchment

Threat	Description	Sub-catchment Significance Rating
Residential land use	<ul style="list-style-type: none"> ▪ Low density residential is predominant land use. Low visible levels of litter / gross pollutants present. The town is drained through a combination of kerb and channel, piped drainage system, and by spoon or table drains. Overland flows are conveyed by open drains. 	Very High
Commercial land use	<ul style="list-style-type: none"> ▪ Limited to store service station and hotel. Potential for minor fuel spills into channel. 	Moderate
Industrial land use	<ul style="list-style-type: none"> ▪ No industrial land use at Avenel. 	Low
Building site run-off	<ul style="list-style-type: none"> ▪ Low observed levels of new development / redevelopment at the lot scale. New development has potential to generate large sediment loads during construction. 	Moderate
Residential development	<ul style="list-style-type: none"> ▪ Planning applications are referred to Council’s engineering section for advice regarding stormwater issues. Planning referrals are also referred to GBCMA when development within 100 metres of a waterway. 	Moderate
Septic and Sewerage system issues	<ul style="list-style-type: none"> ▪ Town has a recently installed reticulated sewerage system. 	Low
Camping and Caravan Parks	<ul style="list-style-type: none"> ▪ No camping and caravan parks present. 	Low
Unstable and degraded drains / waterways.	<ul style="list-style-type: none"> ▪ Roadside drains observed generally to be in a stable condition. 	Low
Major Road Runoff.	<ul style="list-style-type: none"> ▪ Roadsides adjacent to main road within town observed to have generally low visible pollutant levels (i.e. litter). 	Low
Open Space Runoff.	<ul style="list-style-type: none"> ▪ Parks and gardens application of fertilisers generally limited to garden beds and new plantings. Herbicides generally limited to roadsides and open drain maintenance. Open space areas considered unlikely to contribute significant pollutant loads. 	Moderate

Table C7 –Threats to Stormwater Quality – Avenel Sub-catchment

Threat	Description	Sub-catchment Significance Rating
Upstream inflows	<ul style="list-style-type: none"> ▪ Runoff from upstream catchments, entering via creeks and waterways, causing the discharging of sediments, nutrients, litter and pathogens, are not considered to represent a major issue. 	Low
Landfill and contaminated sites.	<ul style="list-style-type: none"> ▪ There is no evidence to suggest that there is any contaminated land at Avenel that poses a threat to stormwater quality. 	Low

Table C8 –Threats to Stormwater Quality – Longwood Sub-catchment

Threat	Description	Sub-catchment Significance Rating
Residential land use	<ul style="list-style-type: none"> ▪ Scattered low density residential development only. Threats very low. Natural depression / wetland intercepting majority of runoff prior to discharge into Pranjip Creek. 	Very High
Commercial land use	<ul style="list-style-type: none"> ▪ Very little commercial land use limited to hotel and railway yard. Primary threat from septic overflows. 	High
Industrial land use	<ul style="list-style-type: none"> ▪ No industrial land use at Longwood. 	Very High
Building site run-off	<ul style="list-style-type: none"> ▪ Low observed levels of new development / redevelopment at the lot scale. 	Moderate
Residential development	<ul style="list-style-type: none"> ▪ Subdivision construction was not noted. Impacts from the most recently completed subdivisions were no longer evident. 	Moderate
Septic and Sewerage system issues	<ul style="list-style-type: none"> ▪ Longwood is without reticulated sewerage system. Potential for septic leakage into waterways. Not much of a buffer between some houses and waterways therefore increases the risk. Blocks are generally medium to large and therefore septic systems should be OK if designed, installed and maintained adequately. 	Low
Camping and Caravan Parks	<ul style="list-style-type: none"> ▪ No camping and caravan parks present. 	Moderate
Unstable and degraded drains / waterways.	<ul style="list-style-type: none"> ▪ Roadside drains observed generally to be in a stable condition. 	Moderate
Major Road Runoff.	<ul style="list-style-type: none"> ▪ Roadsides adjacent to main road within town observed to have generally low visible pollutant levels (i.e. litter). 	Low
Open Space Runoff.	<ul style="list-style-type: none"> ▪ Parks and gardens application of fertilisers generally limited to garden beds and new plantings. Herbicides generally limited to roadsides and open drain maintenance. Open space areas considered unlikely to contribute significant pollutant loads. 	Moderate
Upstream inflows	<ul style="list-style-type: none"> ▪ Runoff from upstream catchments, entering via creeks and waterways, causing the discharging of sediments, nutrients, litter and pathogens, are not considered to represent a major issue. 	Low

Table C8 –Threats to Stormwater Quality – Longwood Sub-catchment

Threat	Description	Sub-catchment Significance Rating
Landfill and contaminated sites.	<ul style="list-style-type: none">▪ There is no evidence to suggest that there is any contaminated land at Avenel that poses a threat to stormwater quality.	Low

C2.4 Summary Threats

Table C9 – Summary of Sub-catchment Threats

Value Significance Rating	Euroa	Nagambie	Violet Town	Avenel	Longwood
Very High	<ul style="list-style-type: none"> ▪ Residential land use ▪ Industrial land use 	<ul style="list-style-type: none"> ▪ Residential land use ▪ Industrial land use ▪ Commercial land use 	<ul style="list-style-type: none"> ▪ Residential land use 	<ul style="list-style-type: none"> ▪ Residential land use 	<ul style="list-style-type: none"> ▪ Residential land use
High	<ul style="list-style-type: none"> ▪ Commercial land use 		<ul style="list-style-type: none"> ▪ Industrial land use ▪ Commercial land use 		
Moderate	<ul style="list-style-type: none"> ▪ Residential development ▪ Building site runoff (lot scale) ▪ Unstable & degraded waterways ▪ Camping / caravan parks ▪ Open space runoff 	<ul style="list-style-type: none"> ▪ Residential development ▪ Building site runoff (lot scale) ▪ Unstable & degraded waterways ▪ Camping / caravan parks ▪ Open space runoff 	<ul style="list-style-type: none"> ▪ Residential development ▪ Building site runoff (lot scale) ▪ Unstable & degraded waterways ▪ Camping / caravan parks ▪ Open space runoff 	<ul style="list-style-type: none"> ▪ Commercial land use ▪ Residential development ▪ Building site runoff (lot scale) ▪ Open space runoff 	<ul style="list-style-type: none"> ▪ Open space runoff
Low	<ul style="list-style-type: none"> ▪ Major road runoff ▪ Upstream inflows ▪ Landfill & contaminated sites ▪ Septic and sewer leakage 	<ul style="list-style-type: none"> ▪ Major road runoff ▪ Upstream inflows ▪ Landfill & contaminated sites ▪ Septic and sewer leakage 	<ul style="list-style-type: none"> ▪ Major road runoff ▪ Upstream inflows ▪ Landfill & contaminated sites ▪ Septic and sewer leakage 	<ul style="list-style-type: none"> ▪ Industrial land use ▪ Major road runoff ▪ Unstable & degraded waterways ▪ Camping / caravan parks ▪ Upstream inflows ▪ Landfill & contaminated sites ▪ Septic and sewer leakage 	<ul style="list-style-type: none"> ▪ Industrial land use ▪ Commercial land use ▪ Major road runoff ▪ Residential development ▪ Building site runoff (lot scale) ▪ Unstable & degraded waterways ▪ Camping / caravan parks ▪ Upstream inflows ▪ Landfill & contaminated sites ▪ Septic and sewer leakage

Stormwater threat land uses and land use activities are summarised in Table C9 (collated from Tables C4, C5, C6, C7 and C8). The significance rating is based on a consideration of the likely quantity of pollutants generated and frequency of occurrence from each threat category.

Appendix D. Priority Risk Assessment

Risk Assessment

Risk assessment is the process by which stormwater management issues are prioritised. The assessment considers the magnitude of each threat and value and the sensitivity of a particular value to a threat.

Risks are defined as those activities within the catchment that can have an adverse impact on the receiving waters and their associated values.

The risk assessment method adopted (uniform for stormwater management plans in Victoria) is as follows:

$$\text{Risk} = \text{Threat} \times \text{Value} \times \text{Sensitivity}$$

Where

- *Threat* equals the score assigned to the threat for that particular sub-catchment
- *Value* equals the score assigned to the value for that particular catchment
- *Sensitivity* equals the score assigned reflecting the sensitivity of the particular value to the associated threat.

Numerical scores from 1 to 4 are assigned for each qualitative ranking (i.e. Low =1, Moderate = 2, High = 3 and Very High = 4). In relation to the sensitivity score, values that are very highly sensitive to a given threat are assigned a score of 4, while values that are not sensitive to a given threat are assigned a score of 1.

Risk assessments have been carried out for each sub-catchment. The results are presented in Appendix A of the Priority Management Issues Paper – in the following section of this report.

**Appendix E. Priority Management Issues Paper
(Workshop 3)**

Strathbogie Shire Council

Stormwater Management Plan for Strathbogie Shire Priority Management Issues Paper

Job 2002089

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E1 Introduction

E1.1 Background to the Paper

A Stormwater Management Plan is being developed for the urban areas of the Strathbogie Shire Council. The Management Plan is focused on achieving improvements in stormwater quality by identifying strategies and actions to be undertaken by the Council and other agencies. The plan will promote progress towards best practice management for stormwater.

Improvements in stormwater quality will have beneficial effects on the receiving water environments in the Shire, which include, but not limited to, lakes (*Lake Nagambie*) and waterways (*Honeysuckle Creek, Seven Creeks, Hughes Creek, Pranjip Creek*).

A process for preparing stormwater management plans has been developed and is coordinated through the Victorian Stormwater Action Program by the Environmental Protection Authority (*EPA*). The Stormwater Management Plan for the Strathbogie Shire is being prepared in accordance with this process.

The development of the Stormwater Management Plan is being led by the Strathbogie Shire Council, EPA and the Goulburn Broken Catchment Management Authority (*GBCMA*). The process involves consultation with the Project Working Group through a series of four workshops. The Project Working Group consists of local residents, relevant government agencies and Council staff members. At this stage, two of the workshops have been completed.

E1.2 Purpose of the Paper

The purpose of this Priority Management Issues Paper is:

To clearly describe the key stormwater risks and management framework deficiencies which are limiting the achievement of best practice.

Key stormwater risks to receiving water values have been identified through a risk assessment process, and the findings are summarised in this paper. The two completed workshops were integral to the risk assessment process.

A review of the management practices of the Council impacting on stormwater quality was also carried out and is described in this paper with reference to best practices.

E2 Subcatchments

The Strathbogie Shire is approximately 3,300 km² in area with a population in the order of 9,300. Approximately 60% of the population live in an urban (*town*) location. The main centres are Euroa (*population 2,697*), Nagambie (*1,335*), Violet Town (*580*), Avenel (*546*) and Longwood.

The Strathbogie Shire Council has been divided into five subcatchments for the identification of threats and formulating management strategies. Subcatchments have been identified based on a consideration of land-use patterns, receiving environments and hydrological boundaries where possible. The five subcatchment areas are shown on Figure 1.

The catchments consists principally of the Honeysuckle Creek, Seven Creeks, Hughes Creek, Pranjip Creek and Lake Nagambie, which all outfall directly into the Goulburn River.

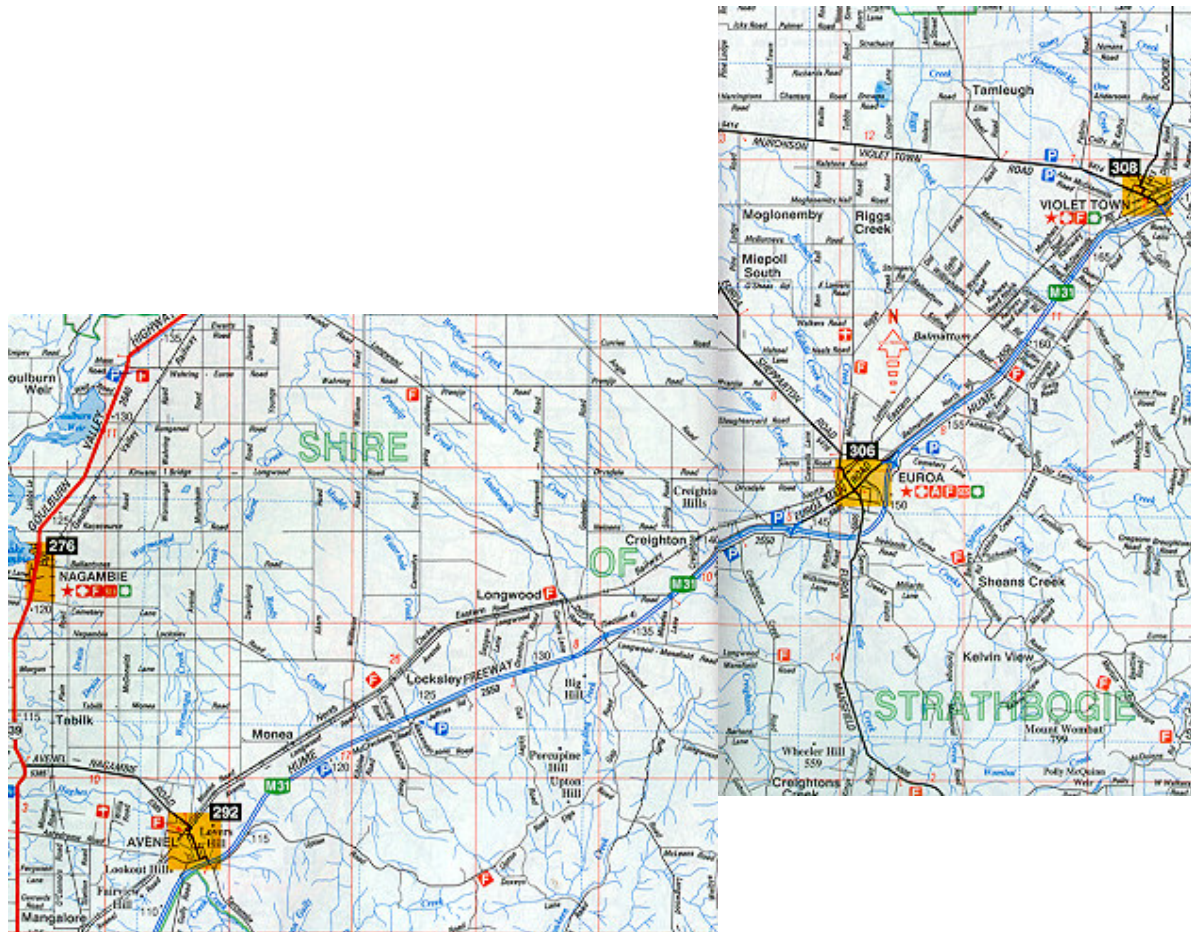


Figure 1 – Strathbogie Shire - Subcatchments

The five subcatchments are as follows:

- **Euroa Subcatchment.** This subcatchment covers the Seven Creeks and Castle Creek which both drain into the Goulburn River upstream of Shepparton and includes the Shire's largest town, Euroa. Stormwater runoff from Euroa discharges mainly into the Seven Creeks, with only a small portion discharging into Castle Creek. Seven Creeks has a number of tributaries, including the Honeysuckle, Stony and Spring Creeks.
- **Nagambie Subcatchment.** The Nagambie subcatchment includes Lake Nagambie. Nagambie Township is reasonably elevated with only a small section of residential land being low-lying land adjacent to the Lake. There are a number of drainage lines surrounding the Township which discharge directly into the Lake and runoff from Nagambie via underground drainage discharges into the Lake.
- **Violet Town Subcatchment.** Honeysuckle Creek is within this subcatchment. Runoff from Violet Town discharges directly into the Honeysuckle Creek which then joins up with the Seven Creeks prior to entering the Goulburn River.
- **Avenel Subcatchment.** This subcatchment covers Hughes Creek. Runoff from Avenel discharges to the Hughes Creek via town drainage and seepage, due to the porous ground conditions.
- **Longwood Subcatchment.** The Pranjip (*or Muddy*) Creek forms part of the subcatchment and joins the Goulburn River downstream of Murchison. Its tributaries include the Creightons, Little Branjee, Burnt, Nine Mile and Muddy Waterhole Creeks. There are no major townships located within the subcatchment, only the small township of Longwood, whose depressions are a tributary of the Nine Mile Creek which discharge into the subcatchment.

E3 Receiving Water Values

Values reflect the beneficial uses of the receiving waters. Receiving water values have been grouped into the following categories:

- **Environmental values** (*in-stream and riparian habitat provision*).
- **Amenity or social value** (*passive and active recreational uses, aesthetic appreciation of receiving waters*).
- **Cultural values** (*places and sites of heritage value located within or on the fringe of receiving waters*).
- **Stormwater values** (*contribution to conveyance & Flooding, and water quality management*).
- **Economic values** (*impact on property values, tourism benefits, water supply value*).

Values and assigned significance ratings have been assessed through a combination of consultation with the Project Working Group at the first two workshops, and a review of past investigations, reports and other relevant available data.

Significance ratings for values in each subcatchment are summarised in Table 3.1. An overview of value characteristics is provided as follows.

- **Euroa Subcatchment.** In-stream and riparian habitat values were assessed as very high in particular to the list of recorded fish species, including several threatened and significant species, and with the Seven Creeks possessing reaches where the riparian vegetation are in good condition. The area upstream of the weir within Euroa is also a focus of recreational and visual amenity activities for visitors and local residents. Cultural values are not all that significant being rated low to moderate. Stormwater and Economic values associated with the Seven Creeks catchment were assessed as being high to very high.
- **Nagambie Subcatchment.** Environmental and Amenity values were assessed as being very high. Lake Nagambie possesses very high recreational and visual amenity benefits, which also generate very high tourism benefits derived from the associated uses, which leads to very high economic values. Cultural values are low to moderate. Flood and Conveyance values are considered to be moderate as only a small portion of the township is affect by floods, with water quality treatments being assessed as high, based primarily on the influence on the Lake.
- **Violet Town Subcatchment.** In-stream and riparian habitat values were assessed as being high to very high. Recreation and visual amenities values are very high, due to the walking trail (*linking the length of the township with the caravan park*) and when the Creek is in flow. Cultural values are in general only moderate, with water quality treatment valued high and flood conveyance considered to be very high in value. Economic values have been assessed as

high, based primarily on the influence of the Creek and its passive recreational nature.

- **Avenel Subcatchment.** Environmental and Amenity values were assessed as being very high. Hughes Creek provides very high passive recreational and visual amenity benefits, which also draw very high regional visitations benefits derived from the associated uses. Cultural values are low to moderate. Stormwater and Economic values are considered to be moderate as only a small portion of the township is affect by floods, with minimal tourism.
- **Longwood Subcatchment.** In-stream and riparian habitat values were assessed as being high due to being a tributary to the Pranjip Creek. Recreation and visual amenities values are high to moderate respectively, as the township has a large regional sporting complex with amenities set up for the local community. Cultural and Economic values are low with water quality treatment valued moderate and flood conveyance value considered to be low.

Table E1 – Summary of Subcatchment Values

Significance Rating	Euroa	Nagambie	Violet Town	Avenel	Longwood
Very High	<ul style="list-style-type: none"> ▪ Environmental – in-stream habitat ▪ Environmental – riparian habitat ▪ Amenity – recreational ▪ Amenity – visual ▪ Stormwater – flood ▪ Economic – property ▪ Economic – other 	<ul style="list-style-type: none"> ▪ Environmental – in-stream habitat ▪ Environmental – riparian habitat ▪ Amenity – recreational ▪ Amenity – visual ▪ Economic – property ▪ Economic – other 	<ul style="list-style-type: none"> ▪ Environmental – riparian habitat ▪ Amenity – recreational ▪ Amenity – visual ▪ Stormwater – flood 	<ul style="list-style-type: none"> ▪ Environmental – in-stream habitat ▪ Environmental – riparian habitat ▪ Amenity – recreational ▪ Amenity – visual 	
High	<ul style="list-style-type: none"> ▪ Stormwater – water quality 	<ul style="list-style-type: none"> ▪ Stormwater – water quality 	<ul style="list-style-type: none"> ▪ Environmental – in-stream habitat ▪ Stormwater – water quality ▪ Economic – property ▪ Economic – other 		<ul style="list-style-type: none"> ▪ Environmental – in-stream habitat ▪ Environmental – riparian habitat ▪ Amenity – recreational
Moderate	<ul style="list-style-type: none"> ▪ Cultural – European 	<ul style="list-style-type: none"> ▪ Cultural – European ▪ Stormwater – flood 	<ul style="list-style-type: none"> ▪ Cultural – European 	<ul style="list-style-type: none"> ▪ Cultural – Indigenous ▪ Stormwater – flood ▪ Stormwater – water quality treatment ▪ Economic – property ▪ Economic – other 	<ul style="list-style-type: none"> ▪ Amenity – visual ▪ Stormwater – water quality
Low	<ul style="list-style-type: none"> ▪ Cultural – Indigenous 	<ul style="list-style-type: none"> ▪ Cultural – Indigenous 	<ul style="list-style-type: none"> ▪ Cultural – Indigenous 	<ul style="list-style-type: none"> ▪ Cultural – European 	<ul style="list-style-type: none"> ▪ Cultural – European ▪ Cultural – Indigenous ▪ Stormwater – flood ▪ Economic – property ▪ Economic – other

Notes:

1. Economic other – includes benefits from tourism and water supply.
2. Cultural – sites must be within or on the fringe of receiving waters.

E4 Stormwater Threats Assessment

Stormwater threats are defined as an urban activity or land use that has the potential to damage the receiving water values.

Stormwater threats and associated significance ratings were discussed with the Project Working Group at the first two workshops. Input in relation to perceived threats and issues were provided for each subcatchment. Threats were also discussed with Council staff members. Field inspections were also used to identify and/or confirm threats.

Threats within each subcatchment have been assigned a significance rating based on a consideration of the likely quantity of pollutant generated, frequency of occurrence and proximity to the receiving water. These ratings have been used for the ranking of priority issues within each subcatchment. Significance ratings for threats in each subcatchment are summarised in Table 4.1. An overview of the stormwater threats is provided as follows:

▪ Euroa Subcatchment

Residential is the predominant land use at Euroa. Retailing and commercial uses run along both Binney Street and Kirkland Avenue. Industrial land use is predominantly confined to the north of the township. Terrain within the township is generally flat. Only a small section of Euroa still uses septic tanks with only the occasional overflow.

Highly ranked threats are the runoff from existing residential and industrial areas (very high) and commercial areas (high) largely because of the size / extent of these areas and the close proximity of most stormwater outlets to receiving waters. Most other threat categories were assessed as moderate. Development levels are presently modest at Euroa and across the broader Shire, with threats arising from new development therefore ranked accordingly.

▪ Nagambie Subcatchment

Nagambie has a very high residential land use (90%) compared to industrial (6%) and commercial (4%) uses, yet it is the commercial precinct along the Goulburn Valley Highway which produces the greatest pressures on the quality of the stormwater.

The highest ranked threats for this subcatchment are residential, industrial and commercial runoff. Threats from other categories were assessed to have relatively low influences and consequently were ranked low to moderate.

▪ Violet Town Subcatchment

The highest ranked threats for this subcatchment are residential runoff (*predominant land use*), followed by industrial and commercial runoff. Septic issues are of concern but will be minimised once all property owners have connected to the recently constructed sewerage reticulation.

The issue of litter and other pollutant loads generated by developments, public open spaces and caravan parks have been considered to produce a moderate impact to the township. The other threats were ranked low.

▪ **Avenel Subcatchment**

Residential as the predominant land use was the only very high designated threat category. Threats ranked as moderate are commercial land use, residential development and open space runoff.

Threats from other categories were assessed to have relatively negligible influences and consequently were ranked low.

The catchment of Hughes Creek is relatively small with water quality particularly sensitive to levels of incoming stormwater pollutants.

▪ **Longwood Subcatchment**

Residential as the predominant land use was designated as a high threat. Open space runoff has been ranked as moderate due to the small size of the urban portion of the catchment draining to Pranjip Creek and the potential for runoff from the surrounds to impact on the quality of runoff discharging into the Creek. Threats from other categories were assessed to have relatively negligible influences and consequently were ranked low.

Site inspections identified the presence of grey water, which warrants further field investigations to identify cause and likely source.

▪ **General (Shire Wide) Issues**

The absence of more frequent street sweeping in residential areas across the Shire adds to the potential for increased pollutant loads in local road runoff from these areas. Commercial areas in contrast are swept on a weekly or more frequent basis.

Festivals held in towns across the Shire have the potential to generate large quantities of litter due to incorrect disposal and/or insufficient disposal facilities. Maintenance of binned and strewn litter needs to be substantially increased during these short peak periods.

Open space runoff across the Shire would not appear to pose a significant threat to stormwater quality. Maintenance activities in parks, gardens and recreation reserves generally draw little on the use of fertilisers and herbicides. Only litter appears to be a consistent nuisance to the management of the open spaces.

New development is evenly spread across the Shire and this is highlighted through the 4% increase in the general population. This level of development activity combined with the typically low-density nature of development meant that the threat significance rating associated with new development in each subcatchment ranked as only moderate.

Table E2 – Summary of Subcatchment Threats

Value Significance Rating	Euroa	Nagambie	Violet Town	Avenel	Longwood
Very High	<ul style="list-style-type: none"> ▪ Residential land use ▪ Industrial land use 	<ul style="list-style-type: none"> ▪ Residential land use ▪ Industrial land use ▪ Commercial land use 	<ul style="list-style-type: none"> ▪ Residential land use 	<ul style="list-style-type: none"> ▪ Residential land use 	<ul style="list-style-type: none"> ▪ Residential land use
High	<ul style="list-style-type: none"> ▪ Commercial land use 		<ul style="list-style-type: none"> ▪ Industrial land use ▪ Commercial land use 		
Moderate	<ul style="list-style-type: none"> ▪ Residential development ▪ Building site runoff (lot scale) ▪ Unstable & degraded waterways ▪ Camping / caravan parks ▪ Open space runoff 	<ul style="list-style-type: none"> ▪ Residential development ▪ Building site runoff (lot scale) ▪ Unstable & degraded waterways ▪ Camping / caravan parks ▪ Open space runoff 	<ul style="list-style-type: none"> ▪ Residential development ▪ Building site runoff (lot scale) ▪ Unstable & degraded waterways ▪ Camping / caravan parks ▪ Open space runoff 	<ul style="list-style-type: none"> ▪ Commercial land use ▪ Residential development ▪ Building site runoff (lot scale) ▪ Open space runoff 	<ul style="list-style-type: none"> ▪ Open space runoff
Low	<ul style="list-style-type: none"> ▪ Major road runoff ▪ Upstream inflows ▪ Landfill & contaminated sites ▪ Septic and sewer leakage 	<ul style="list-style-type: none"> ▪ Major road runoff ▪ Upstream inflows ▪ Landfill & contaminated sites ▪ Septic and sewer leakage 	<ul style="list-style-type: none"> ▪ Major road runoff ▪ Upstream inflows ▪ Landfill & contaminated sites ▪ Septic and sewer leakage 	<ul style="list-style-type: none"> ▪ Industrial land use ▪ Major road runoff ▪ Unstable & degraded waterways ▪ Camping / caravan parks ▪ Upstream inflows ▪ Landfill & contaminated sites ▪ Septic and sewer leakage 	<ul style="list-style-type: none"> ▪ Industrial land use ▪ Commercial land use ▪ Major road runoff ▪ Residential development ▪ Building site runoff (lot scale) ▪ Unstable & degraded waterways ▪ Camping / caravan parks ▪ Upstream inflows ▪ Landfill & contaminated sites ▪ Septic and sewer leakage

E5 Risk Assessment Method

Risk assessment is the process by which stormwater management issues are prioritised. The assessment considers the magnitude of each threat and value and the sensitivity of a particular value to a threat.

Risks are defined as those activities within the catchment that can have an adverse impact on the receiving waters and their associated values.

The risk assessment method adopted (*standard for stormwater management plans in Victoria*) is as follows:

$$\text{Risk} = \text{Threat} \times \text{Value} \times \text{Sensitivity}$$

Where

- *Threat* equals the score assigned to the threat for that particular subcatchment
- *Value* equals the score assigned to the value for that particular catchment
- *Sensitivity* equals the score assigned reflecting the sensitivity of the particular value to the associated threat.

Numerical scores from 1 to 4 are assigned for each qualitative ranking (*i.e. Low = 1, Moderate = 2, High = 3 and Very High = 4*). In relation to the sensitivity score, values that are very highly sensitive to a given threat are assigned a score of 4, while values that are not sensitive to a given threat are assigned a score of 1.

Risk assessments have been carried out using the above approach. A total risk score was determined for each threat in each subcatchment. The top ten stormwater risks based on the risk assessment scoring process are given in Table E3.

The risk posed by existing residential land use scored highly primarily as it represents the dominant urban land use in all towns. Commercial land use scored reasonably high in the Nagambie subcatchment due to the size and proximity of the business districts to receiving waters.

Industrial land use is of most concern in the Euroa and Nagambie subcatchments reflecting both the extent and proximity of this type of land use to the receiving waters.

Absent from the priority risks is new development at both a lot and subdivision scale. Current levels of development across the Shire are relatively low and evenly spread. The absence of a development 'hot spot' resulted in a moderate risk score for new development in each subcatchment.

Table E3 Priority Stormwater Risks

Rank	Subcatchment	Risk (score)	Risk Description
1	Euroa	Industrial land use (308)	Potential high nutrient, sediment litter, e-coli pollutant and toxicant loads combined with the relative close proximity to receiving waters at Euroa.
2	Nagambie	Industrial land use (300)	Litter, heavy metal and sediment loads from CBD and industrial estate at Nagambie threaten Lake Nagambie values. No buffer on-route to Lake Nagambie.
2	Nagambie	Commercial land use (300)	High litter, heavy metal and sediment loads from CBD at Nagambie. Little.
4	Euroa	Residential land use (292)	Nutrient, sediment, litter and e-coli pollutant loads threaten the highly ranked amenity and economic values of the township of Euroa.
5	Nagambie	Residential land use (284)	Nutrient, sediment, litter pollutant loads threaten the highly ranked amenity and economic values of Lake Nagambie at Nagambie.
6	Violet Town	Residential land use (264)	Nutrient, sediment, litter and e-coli pollutant loads threaten the highly ranked amenity and economic values of the township of Violet Town.
7	Avenel	Residential land use (248)	Nutrient, sediment, litter and e-coli pollutant loads threaten environmental and amenity values of the township of Avenel.
8	Euroa	Commercial land use (231)	Litter and sediment loads from CBD at Euroa threaten Seven Creeks values.
9	Violet Town	Industrial land use (207)	Potential high sediment and toxicant loads combined with the relative close proximity to receiving waters.
9	Violet Town	Commercial land use (207)	Litter and sediment loads from CBD at Violet Town threaten Creek values.

E6 Management Framework Review

The Management Framework review has focused on Council's day to day management and planning activities that have a bearing on stormwater management within the Shire. The review has been divided into the following categories:

- **Planning** – *activities involved in the planning of land use and development.*
- **Enforcement** – *activities to ensure correct practices are followed by the public.*
- **Infrastructure** – *review of the stormwater system infrastructure.*
- **Operations** – *review of maintenance and servicing procedures.*
- **Education** – *information and training in stormwater management issues.*
- **Resourcing** – *review of Council's ability to manage the stormwater system.*

E6.1 Planning

The Strathbogie Planning Scheme includes the State Policy Planning Framework (SPPF), the Municipal Strategic Statement (MSS), local planning policies, zones, overlays and particular provisions. The format of the Scheme is in accordance with the Victorian Planning Provisions and therefore much of its contents are common across all municipal planning schemes in Victoria.

Stormwater run-off management is linked to various parts of the Planning Scheme including the SPPF. The SPPF requires that the impact of development proposals on downstream water quality be considered and that measures to filter sediments and wastes from stormwater be incorporated into urban design where possible.

One of the key settlement and infrastructure issues for the Shire as identified by the SPPF and with direct links to stormwater management are:

- *'Measures to minimise the quantity and retard the flow of stormwater run-off from developed areas'.*
- *'Measures, including the preservation of floodplain or other land for wetlands and retention basins, to filter sediments and wastes from stormwater prior to discharge into waterways'.*

The main opportunity for Council to ensure that stormwater management issues are adequately addressed during the development approvals process lies with the placement of standard conditions on planning approvals.

Council itself is responsible for processing planning approvals within the Strathbogie Shire. The planning approvals process requires that:

- Before deciding on an application or approval of a plan, the relevant authority must consider, as appropriate...
 - ↳ *'Whether the proposed development designed to maintain or improve the quality of stormwater within an existing site'*

- Developers shall submit proposed method for the treatment and disposal of effluent and stormwater discharge from the site.

The Shire has several standard conditions relating to stormwater management which it imposes on planning permits conditions where applicable. The standard condition relating to construction sediment control makes reference to sediment control practices outlined in a 1991 EPA publication, 'Construction Techniques for Sediment Pollution Control', and 1995 EPA publication, 'Environmental Guidelines for Major Construction Sites'.

The above practices are to be commended, however the development of the Stormwater Management Plan needs to give consideration to the adoption of more recent formal guidelines similar to the Stormwater Implementation Project: Statutory Framework and Standards, developed by the Association of Bayside Municipalities or the soil and water management/erosion and sediment control policies and guidelines developed jointly by the City of Wodonga, City of Albury and the Greater Hume Shire Council. These guidelines focus on improving water quality discharge from development sites and in particular on measures to reduce erosion and off-site sediment export.

E6.2 Enforcement

Enforcement activities have been reviewed in relation to the enforcement of conditions imposed on planning approvals and also local laws with links to stormwater management.

Council staff are responsible for the enforcement of conditions placed on planning permits. Staff have indicated that conditions are actively and rigorously enforced.

Council has a number of local laws dealing with Domestic and Trade Wastes, but currently have no specific local laws linked specifically to stormwater management.

Over the next 6 to 8 months Council shall be reviewing their current local laws and identify issues which require the establishment of local laws. One of the enforcement methods being looked into by Council is the adoption of Codes of Practices to assist with new developments (*through the issuing of Planning Permits*) and utilise these same practices in the formulations of local laws for the enforcement of existing developments.

E6.3 Infrastructure

Stormwater infrastructure within the Shire is largely limited to water quantity related functions (*i.e. for the conveyance of runoff to the receiving waters*). Stormwater infrastructure for improving water quality is limited to the removal of gross pollutants from drainage outlets. There are no existing constructed stormwater treatment wetlands within the Shire. Retention basins/sedimentation ponds east of Lake Nagambie, across McGregor Avenue Nagambie, is currently the only formal water quality treatment system within the shire other than the natural wetlands which are present within or downstream of the townships.

The characteristics of the stormwater drainage systems in towns vary depending on the age of the area. Newer areas tend to have pipe collector networks where as older areas are typically serviced by lined or unlined open drains connected by road and driveway culverts.

The stormwater pipe systems in each town are largely documented on township plans (*hard copies only*). Information includes pit and pipe locations and pipe sizes.

E6.4 Operations

Town maintenance practices impacting on stormwater quality are described as follows:

- **Mechanical street sweeping.** A mechanical street sweeper is scheduled once a month for sweeping all streets in all towns across the Shire.
- **Manual sweeping.** Town centres in Nagambie and Euroa (*tourist centres*) have a manually sweeping program. A single person operated mechanical suction sweeper has recently serviced Nagambie regularly, whereas Euroa alternatively has one side of the main street manually swept daily. Other town centres in the Shire are swept once a week.
- **Bin litter collection.** Frequency of street bin collection varies depending on area. Typically varies from one to three times per week (*more frequent during special events*).
- **Park and gardens maintenance.** Involves mowing and plant/shrub care. Use of fertilisers largely restricted to garden beds and new plantings. Herbicides generally not used for open space maintenance. Use of herbicides generally restricted to roadside edges (*1.5 metre strip adjacent to seal*) and drain vegetation management.
- **Open drain maintenance.** Herbicide spraying used to control weeds and vegetation levels (*frequency varies*).
- **Stormwater pits/pipes/outlets.** No scheduled inspections and/or clean outs of stormwater pipe system. Blockages cleared once known.
- **Domestic/Trade Waste.** Domestic arrangements consist of weekly collection of wheelie bins with a separate recyclable bin also collected, consistent with modern waste management practices.

Currently EPA accredited collectors remove trade wastes from the municipality and in the near future, it is expected that waste oil will be able to be stored and collected from Council's Transfer Stations and Landfill site.

There are currently no scheduled inspections of stormwater infrastructure, all cleaning and maintenance of the infrastructure is reactive. It was observed that a number of stormwater outlets had litter scattered immediately downstream of stormwater pipe outlets. The scheduling of regular inspections to monitor the accumulation rates of sediment, litter and other pollutants within the stormwater system will assist in monitoring and managing pollutant threats.

E6.5 Education

A number of brochures/pamphlets are available at Council's offices public counter. These information brochures include the following:

- General information guide on the planning scheme requirements and process.
- Waste reduction / recycling information.
- Local laws information.
- Information on proper chemicals, paints, fats and oils disposal.

Opportunities for stormwater education activities within the Strathbogie Shire are as follows:

- Distribution of a public information brochure/leaflet summarising the objectives and strategies put forward by the Strathbogie Stormwater Management Plan (*following finalisation of the Plan*).
- Distribution of a public information brochure/leaflet at say 12 monthly intervals describing stormwater management actions implemented.
- Press releases coinciding with the launch of the stormwater management plan and at appropriate stages during its implementation to coincide with the implementation of management actions.
- Regularly update information/education brochures and pamphlets (*say 6 monthly*) through contact with the EPA and other relevant agencies.
- Give support to the GBCMA and NRE in their implementation of the Waterwatch Urban Stormwater Community Education Program.

E6.6 Resourcing

Lack of both human and financial resources is one reason or barrier potentially limiting the achievement of best practice in stormwater management. Retrofitting stormwater treatment measures (*e.g. gross pollutant traps and constructed wetlands*) into established drainage systems is generally expensive. The current Victorian Stormwater Action Program provides Council with the opportunity to obtain funding for implementing treatment measures that may otherwise be difficult to fund.

Council staff are conscious that planning and operations activities have the potential to impact adversely on the environment and in particular on water quality in receiving waters. Recent examples of conditions imposed on subdivision planning approvals appear to demonstrate a commitment to protecting stormwater quality.

Council is intending to install a number of litter traps initially at Nagambie. This and other measures (*retention basins in Nagambie*) would suggest Council's willingness to actively pursue stormwater improvement measures in line with best practice.

Council is currently showing considerable commitment to the stormwater management plan process highlighted by the presence of multiple Council staff on the Project Working Group. Continued training of Council officers in stormwater management is important to enable staff to understand their roles and responsibilities in relation to stormwater management issues. Training should focus on:

- Stormwater threats to receiving waters;
- What is involved in achieving best practice stormwater management; and

- Roles and responsibilities of Council officers and other agencies (e.g. EPA, GBCMA, NRE) in stormwater management.

E7 Priority Management Issues

The priority stormwater management issues will be the focus on which the reactive stormwater management strategies are developed for inclusion in the Stormwater Management Plan. The reactive management strategies address current threats. The management framework strategies will be designed to limit the recurrence of threats and integrate best practice management into Council's management framework.

The priority management issues represent the threats that pose the greatest risk to receiving water values. Priority management issues and their links with Council's management framework are described as follows:

Issue No. 1 – Industrial Land Use	
Priority Locations	Euroa, Nagambie and Violet Town Subcatchments
Description	Industrial property located on land subject to flooding at Euroa (Saleyards, Council Depot, Service Stations), both north and east of the township. Other industrial properties (in all townships) are in relatively close proximity to receiving waters. Potential for high sediment, nutrient and toxicant loads.
Links to Management Framework	<ul style="list-style-type: none"> ▪ Appropriate land use on land subject to flooding. Storage of chemicals and other hazardous materials is not desirable on land subject to flooding. ▪ Education. Awareness of industry of potential adverse impacts arising from stormwater pollution. ▪ Coordinated response between EPA and Council for incidents involving illegal discharges into the stormwater system (i.e. proper enforcement).

Issue No. 2 – Commercial Land Use	
Priority Locations	Nagambie, Euroa and Violet Town Subcatchments
Description	Commercial centres close to receiving waters at all townships with Euroa's being within land subject to flooding. Potential for large litter loads, sediment, oils and other road contaminants. Multiple stormwater outlets from each town's commercial centre. None of these outlets are fitted with any type of gross pollutant traps.
Links to Management Framework	<ul style="list-style-type: none"> ▪ Council maintenance schedule requires manual sweeping of commercial areas. More frequent during special events. ▪ Collection frequency of binned litter. ▪ Enforcement of local laws (e.g. littering, animal waste). ▪ Level of community awareness (e.g. encourage proprietors not to hose/sweep footpath areas into gutters).

Issue No. 3 – Residential Land Use	
Priority Locations	Euroa, Nagambie, Violet Town and Avenel Subcatchments.
Description	Predominant land use in all towns. Little or no buffer between some of the stormwater outlets and receiving waters at most towns. Value of Lake Nagambie, sensitive to stormwater pollutants. Typical pollutants include litter, nutrients, sediment, animal waste and local road runoff contaminants. No structural measures in place to treat residential runoff.
Links to Management Framework	<ul style="list-style-type: none"> ▪ Limited resources (human and financial) restrict achievement of best practice. ▪ Residential areas subject to mechanical street sweeping. ▪ Pro-active enforcement of local laws is not generally pursued (e.g. those relating to littering, animal waste management). ▪ Scheduled inspections of stormwater infrastructure not undertaken. ▪ Education activities limited in relation to increasing the level of awareness in community of stormwater impacts arising from activities such as lawn clipping disposal into drains, car washing in street, excessive fertiliser/herbicide application etc.

E8 Summary/Next Steps

Stormwater runoff from urban areas has the potential to impact adversely on receiving water environments. Environmental, amenity and economic values of downstream waterways and water storages can be damaged if stormwater runoff discharging into receiving waters contains high levels of pollutants (*e.g. sediment, nutrients, toxic substances, oils, litter, e-coli etc*).

A risk assessment process has been used to identify the priority stormwater management issues within the Strathbogie Shire. This process has involved the identification and ranking of stormwater threats and values across the Shire.

The priority stormwater management issues are summarised in Table 8.1. The next step in the development of the stormwater management plan is to develop a combination of reactive management strategies and management framework (*proactive*) strategies to address the priority issues.

Those risks not ranked as highly should not be altogether ignored during the assessment of management strategies. This should particularly apply to new development, which failed to score highly due to the current modest evenly spread levels of new development across the Shire.

Table E4 – Summary of Priority Management Issues

Priority Management Issue	Subcatchment				
	Euroa	Nagambie	Violet Town	Avenel	Longwood
Industrial land use	✓ (1)	✓ (2)	✓ (9)		
Commercial land use	✓ (8)	✓ (2)	✓ (9)		
Residential Land use	✓ (4)	✓ (5)	✓ (6)	✓ (7)	

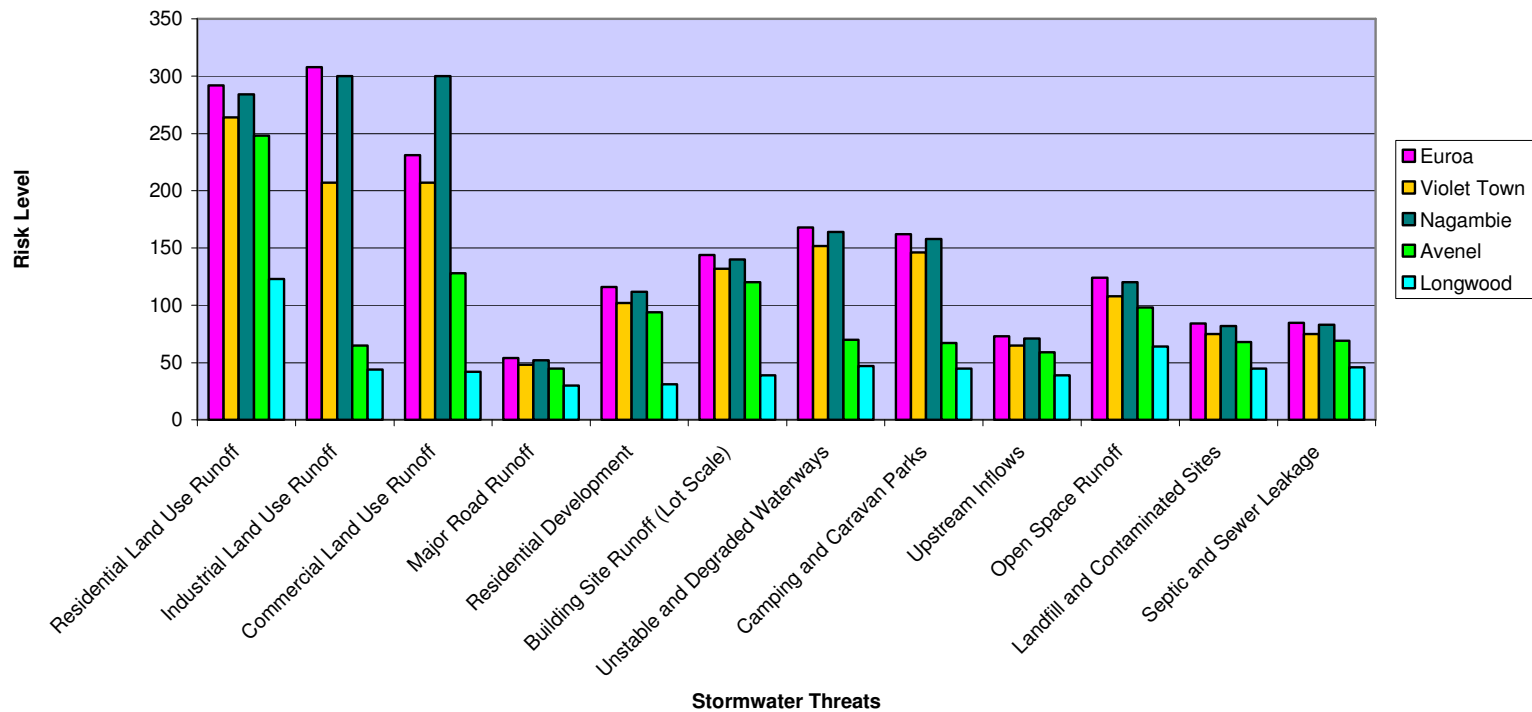
() – Indicates risk assessment rank from Table 5.1 (top ten scored stormwater risks).

Appendix 1

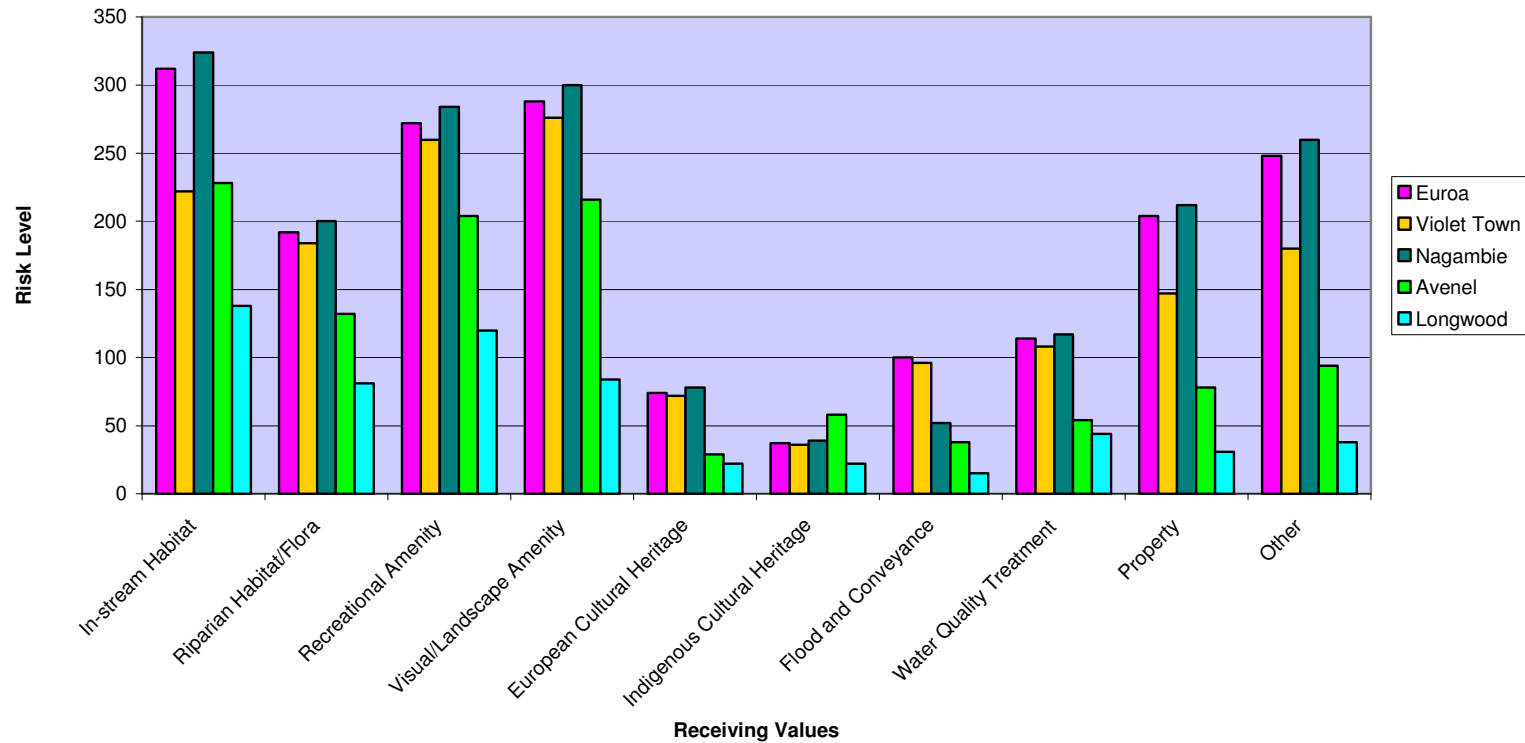
Risk Assessment Results

Insert Risk Assessment Reports for each Catchment (5#)

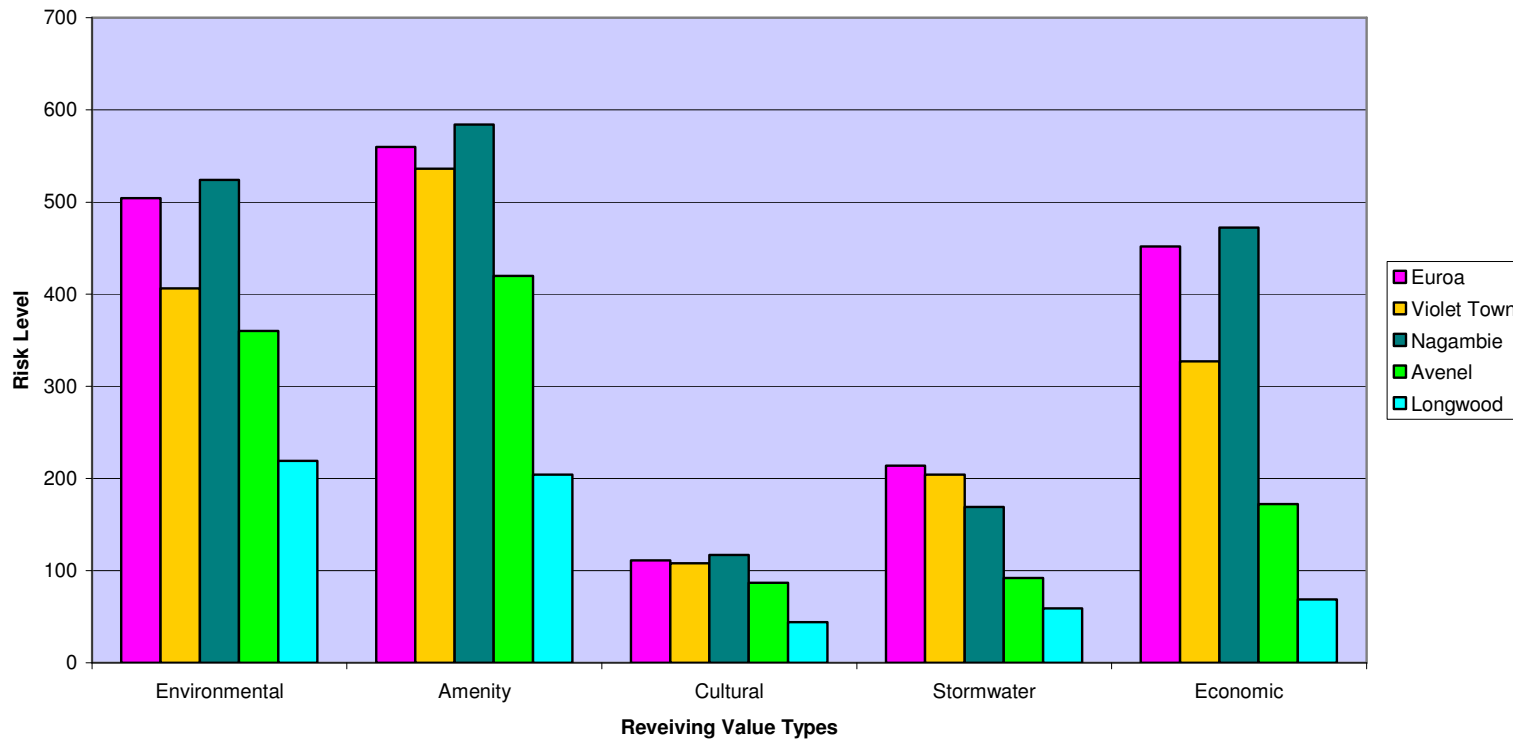
Priority Stormwater Risks



Priority Stormwater Risks



Priority Stormwater Risks



Risk Assessment - Totals

