

Strathbogie Shire Council

Strathbogie Shire Stormwater Management Plan

Volume 1

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Stormwater Management Plan

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1. Introduction

1.1 Purpose of the Stormwater Management Plan

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.

1.2 The Need to Manage Stormwater Quality

Stormwater is runoff from urban areas. Stormwater runoff has the potential to impact adversely on receiving waterways for the following reasons:

- **Increased runoff.**

Urban development increases the proportion of impervious (*or sealed*) surfaces within a catchment. Due to the sealed surfaces and efficient drainage channels and pipes, the volume of runoff reaching the receiving waters is increased.

- **Increased pollutant loads.**

Urban land uses and activities result in a diverse range of pollutants that can be washed into the stormwater system and subsequently discharged into the receiving waters. Piped stormwater systems can result in the efficient transfer of stormwater pollutant loads to the receiving waterways.

The management of stormwater quality aims to minimise the adverse impacts on the values of the receiving waters. Strategies to achieve an improvement in stormwater quality can include structural treatment measures, education based measures and changes to management policies and procedures.

2. How the Plan was Developed

2.1 The Overall 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*).

There are a number of key elements within the process for developing a stormwater management plan including the following:

- A series of workshops that allow for stormwater issues to be debated and for the knowledge and views of a wide range of stakeholders to be incorporated into the plan.
- A review of current Council practices impacting on stormwater quality that examines Council's day to day management and planning activities that have a bearing on stormwater management.
- Risk assessment approach for quantifying the risks posing the highest threats to receiving water values.
- The development of reactive management strategies and management framework strategies.

These elements are described further in the following sections.

2.2 Stakeholder Involvement

The following consultative groups oversaw development of the stormwater management plan:

- **Steering Committee.** Comprising representatives from the Strathbogie Shire Council, Goulburn-Broken Catchment Management Authority (*GBCMA*) and the Environment Protection Authority (*EPA*).
- **Project Working Group.** Comprising the members of the Steering Committee, Council staff members (*engineers, planners, operational staff*), relevant agency representatives (*Department of Natural Resources and Environment, Goulburn Valley Water Board, Goulburn Murray Water*) and community members from towns across the Shire.

The Project Working Group met at three workshops held during the course of the plan's preparation. The workshops were held to discuss receiving water values, stormwater threats, risk assessment outcomes and management strategies.

2.3 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:

Risk = Threat x Value x Sensitivity

Where:

- *Threat* equals the score assigned to a threat within a subcatchment.
- *Value* equals the score assigned to a value within a subcatchment.
- *Sensitivity* equals the score assigned reflecting the sensitivity of the particular value to the associated threat.

The risk assessment method was used through the workshop process to determine the highest risks within each subcatchment. The highest risks are those land uses and activities within towns that have the most potential to adversely effect receiving water values.

2.4 Outcomes from the Plan

The main outcomes from the process are two types of strategies as follows:

- **Reactive management strategies.** Those strategies responding to the current threats represented by the priority management issues. They include a balanced mixture of structural treatment measures and non-structural improvement measures.
- **Management framework strategies.** Those strategies designed to limit the recurrence of threats and integrate best practice stormwater management into Council's management framework.

3. Stormwater Management Issues within the Shire

3.1 Shire Description

The Strathbogie Shire is approximately 3,300 km² in area with a total population in the order of 9,300. Urban centres within the Shire are as follows:

- Euroa – population 2,700 (approx.);
- Nagambie – population 1,400 (approx.);
- Violet Town – population 600 (approx.);
- Avenel – population 550 (approx.); and
- Longwood who has a population of less than 500.

The Shire is located predominantly within the catchments of the Honeysuckle Creek, Seven Creeks, Hughes Creek, Pranjip Creek and Lake Nagambie (*all tributaries of the Goulburn River*). Towns within the Shire, with the exception of Longwood, are located adjacent to waterways.

The major industries within the Shire are agriculture and tourism. The Shire has a rural economic base of wool, grain and cattle production, extensive vineyards at Nagambie and throughout the Strathbogie Ranges and a wide range of intensive cool climate horticultural enterprises.

Key industrial enterprises include; Teson Trims Euroa (*automotive components for Ford and Toyota*), Mitchelton Wines, The Vinery horse stud, Chateau Tahbilk Wines, Eat More Poultry, Campbell's Mushrooms, Mangalore Airport, Plunkett's Wines, Hume Timbers, Australian Cultured Eels and The Pig Pen.

3.2 Subcatchments

The Strathbogie Shire has been divided into five subcatchments for identifying threats and formulating management strategies.

The five subcatchments have been identified based on a consideration of land-use patterns, receiving environments and hydrological boundaries where possible. 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 that discharge into the subcatchment.

3.3 Receiving Water Values

The purpose of the Stormwater Management Plan is to protect the values of the receiving waters from adverse impacts arising from polluted stormwater.

The receiving water values are the beneficial uses of the receiving waters. The values were assessed under the following categories and subcategories:

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

The study team and the Project Working Group assessed the relative values in each subcatchment. An overview of the receiving water values in each subcatchment is given in Table 3.1.

Table 3.1 – Receiving Water Values

Subcatchment	Values Description
Euroa	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	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	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 (<i>linking the length of the township with the caravan park</i>) 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	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	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.

3.4 Threats to Stormwater Quality

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

Urban activities and land uses in each of the subcatchments were reviewed to assess the potential threats to stormwater quality. The threats were generally categorised under the main types of land use (*e.g. residential land use*).

The assessment and ranking of stormwater threats took into account local knowledge and observations (*gained through the involvement of the Project Working Group*) combined with site inspections and knowledge of typical pollutant levels expected to be generated from the various land uses and activities present in each town.

The study team in consultation with the Project Working Group assessed the ranking of the various threat categories. Table 3.2 summarises the main threats to stormwater quality for each of the subcatchments.

Table 3.2 – Main Threats to Stormwater Quality

Subcatchment	Main threats to stormwater quality
Euroa	<p>Very High Threats</p> <p>Residential land use, as the predominant land use at Euroa combined with its close proximity to receiving waters in many areas warrants its very high threat ranking. Industrial land use is also a concern given the presence and extent of industrial properties to the north of the township.</p> <p>High Threats</p> <p>Commercial land use is located within the central business area, along both Binney Street and Kirkland Avenue, adjacent to the Seven Creeks. Runoff from this area has the potential to export large quantities of litter and other pollutants into the Seven Creeks. The large number of tourists using the central business area, particularly during special events, adds to this potential.</p>
Nagambie	<p>Very High Threats</p> <p>Residential land use, as the predominant land use has the potential to export significant pollutant loads to the receiving waters. Commercial land use is a very high ranked threat. Large tourist numbers, particularly during special events within the central business area has the potential to generate large quantities of litter. Industrial land use is also a concern given the presence and extent of industrial properties to the east of the Lake, with some industrial properties located within main depressions/floodplain.</p> <p>High Threats</p> <p>Threats from other categories were assessed to have relatively low influences and consequently were ranked between low to moderate.</p>
Violet Town	<p>Very High Threats</p> <p>Residential land use, as the predominant land use has the potential to export significant pollutant loads to the receiving waters.</p> <p>High Threats</p> <p>Industrial and Commercial land use are both high ranked threats, due to the presence and type of industries within the township and the large tourist numbers within the central business area, has the potential to generate large quantities of litter.</p>
Avenel	<p>Very High Threats</p> <p>Residential land use, as the predominant land use at Avenel, combined with its close proximity to receiving waters, warrants its very high threat ranking. The catchment of Hughes Creek is relatively small with water quality particularly sensitive to levels of incoming stormwater pollutants.</p>

Subcatchment	Main threats to stormwater quality
	<p>High Threats</p> <p>Threats from other categories were assessed to have relatively low influences and consequently were ranked between low to moderate.</p>
<p>Longwood</p>	<p>Very High Threats</p> <p>Residential land use, as the predominant land use has the potential to export significant pollutant loads to the receiving waters.</p> <p>High Threats</p> <p>Threats from other categories were assessed to have relatively low influences and consequently were ranked between low to moderate.</p>

3.5 Priority Management Issues

The priority management issues represent the threats that pose the greatest risk to receiving water values.

The priority management issues were determined using the risk assessment method described previously. This process involved allocating scores to the values of the receiving waters and to the threats from the urban land uses and activities.

The score assigned depended directly on the significance ratings assigned to the threats and values. A score of 1, 2, 3 or 4 coincided with a significance rating of low, moderate, high or very high respectively.

Scores were also assigned reflecting the sensitivity of each receiving water value to each particular threat.

All risk combinations were then compared with the highest risk scores effectively representing the priority stormwater management issues in each subcatchment. The top five ranked priority issues are listed in Table 3.3.

Table 3.3 – Priority Stormwater Risks

Risk Ranking	Priority Management Issue	Priority Subcatchments
1	Industrial land use	Euroa Nagambie Violet Town
2	Commercial land use	Nagambie Euroa Violet Town
3	Residential land use	Euroa Nagambie Violet Town Avenel
4	Unstable and degraded drains	Euroa Nagambie Violet Town
5	Camping and caravan parks	Euroa Nagambie Violet Town

4. Reactive Management Strategies

Reactive management strategies have been developed to respond to the priority management issues determined through the risk assessment process. There is a range of potential management approaches that could be undertaken and they can be categorised as follows:

- Education and awareness;
- Site specific strategies and plans;
- Structural treatment measures;
- Information and data collection;
- Regulation and enforcement; and
- Source controls.

The reactive management strategies consist of groups of actions. A method of selection and assessment was undertaken to arrive at the strategies, and this is explained in greater detail in Volume 2. Initially, the potential actions were screened to remove those that were clearly not applicable to managing the risk. Then a more detailed assessment was made of potential actions, considering a number of factors including the following:

- Capital and ongoing costs; and
- Effectiveness, feasibility and any secondary benefits.

Each measure was assigned a ranking score considering each of the above factors. Generally the higher-ranking actions were then selected to form the recommended strategy for inclusion in the Plan. In some cases, measures are effective in addressing more than one of the priority management issues. This was also taken into account when selecting measures for inclusion in the Plan.

The order in which actions are listed takes into account the results of the formal ranking assessment of options and other practical considerations. Timeframes for expected implementation are indicative only with funding constraints subject to considerable uncertainty at the current time.

The reactive management strategies are presented as follows for each of the five priority management issues. Some strategies are made up entirely of non-structural measures for those risks not suited to a structural approach. Other strategies consist of a mixture of structural and non-structural actions.

The list of strategies includes a description of each action, indicative cost estimates, the authority responsible for implementing the action and an indicative timeframe for implementation.

Actions are listed in the expected order of implementation. This takes into account both the results of the formal ranking of options and other practical considerations. Timeframes assigned to the implementation of each action are indicative only with funding constraints subject to considerable uncertainty at the current time.

There are a considerable number of options excluded from the recommended strategies. These options are described in Volume 2 and can remain under consideration for implementation in the longer-term outlook.

4.1 Reactive Strategy 1 – Industrial Land Use

This strategy responds to risks that runoff from industrial areas that may impact adversely on the values of the receiving waters. This issue is a priority in the Lake Nagambie and Euroa sub-catchments and in the town of Violet Town with few or no industrial properties at the other smaller towns.

Adopted strategy actions are given in Table 4.1.

Table 4.1 Reactive Strategy 1 – Industrial Land Use

Action Number	Management Action Description	Estimated Capital cost	Estimated Recurrent Cost	Responsibility	Timeframe
RS1-1	<p>Individual Organisation Consultation</p> <p>Meet individually with the larger industries and review practices and advise on stormwater improvements (e.g. development of site specific stormwater management plans).</p> <p>Assess need for off-site treatment measures and/or water quality monitoring</p>	\$6,000	\$2,000	Strathbogie Council (Support from EPA)	2006/2007
RS1-2	<p>Prepare / Distribute Information Guidelines</p> <p>Distribute information guidelines with Council leaflet to industries regarding appropriate site management measures to limit stormwater pollution.</p>	\$5,000		Strathbogie Council/ EPA	2007/2008
RS1-3	<p>GPT at Nagambie</p> <p>Construct GPT at Blayney Lane outlet</p>	\$20,000	\$1,000	Strathbogie Council	2004/2005
RS1-4	<p>Upgrade of existing Wetland & Urban Retention Systems</p> <p>Upgrade southern wetland at Nagambie and urban retention systems</p>	\$30,000	\$3,000	Strathbogie Council	2009/2010

4.2 Reactive Strategy 2 – Commercial Land Use

This strategy responds to risks that runoff from commercial land use areas that may impact adversely on the values of the receiving waters. This issue is a priority in the Euroa, Nagambie and Violet Town sub-catchments.

The recommended structural approach is to initially install a number portable side entry pit traps within the central business areas. The effectiveness of this approach should then be monitored with the traps moved to suit (*i.e. to those locations capturing the most litter*). If this approach proves unsatisfactory (*e.g. excessive maintenance required*), then the fall back approach of installing Gross Pollutant Litter Traps (*GPT*) at relevant stormwater outlets could be pursued with the side entry pit traps moved elsewhere (*e.g. to commercial areas in the smaller towns*).

Adopted strategy actions are given in Table 4.2.

Table 4.2 Reactive Strategy 2 – Commercial Land Use

Action Number	Management Action Description	Estimated Capital cost	Estimated Recurrent Cost	Responsibility	Timeframe
RS2-1	Signage Stencilling of all stormwater pits in CBD areas.	\$1,000		Strathbogie Council	2006 onwards
RS2-2	Media Releases Prepare press releases for inclusion in local newspapers with reference to issues in commercial land use areas.	\$2,000	\$1,000	Strathbogie Council	2006 onwards
RS2-3	Install side entry pit litter traps – Euroa, Nagambie & Violet Town commercial areas Install side entry pit traps in commercial areas as a trial and monitor and document effectiveness and collection hot spots (<i>10 traps allowed for in trial</i>).	\$20,000	\$2,000	Strathbogie Council	2006/2007
RS2-4	Stormwater Pollutant Audits / Monitoring Monitor litter quantities and other gross pollutants in CBDs, at stormwater outlets and side entry pit traps. Assess/Review need for further treatment measures.	\$3,000	\$3,000	Strathbogie Council	2006/2007 onwards
(Refer to RS1-3)	GPT at Nagambie Construct GPT at Blayney Lane outlet	\$20,000	\$1,000	Strathbogie Council	2004/2005

4.3 Reactive Strategy 3 – Residential Land Use

This strategy responds to risks that runoff from residential areas may impact adversely on the values of receiving waters. Residential land use is the predominant land use in all towns across the Shire. This issue has been identified as a priority risk in the Euroa, Nagambie, Violet Town and Avenel subcatchments. Structural options are therefore focused on these sub-catchments. Identified non-structural options can generally be applied across all towns in the Shire.

Adopted strategy actions are in Table 4.3.

Table 4.3 Reactive Strategy 3 – Residential Land Use

Action Number	Management Action Description	Estimated Capital cost	Estimated Recurrent Cost	Responsibility	Timeframe
RS3-1	Signage Stencilling of stormwater inlet pits (<i>residential areas</i>) in all towns.	\$3,000		Strathbogie Council	2006 onwards
RS3-2	Media Release Prepare press release articles on SWMP for inclusion in local newspapers, focusing on impacts arising from residential land use	\$2,000	\$1,000	Strathbogie Council	2006 onwards
RS3-3	Gross Pollutant Monitoring Monitor quantities of litter and other gross pollutants at stormwater outlets. Results will assist in prioritising areas for future management.	\$3,000	\$3,000	Strathbogie Council	2006/2007 onwards
RS3-4	Prepare / Distribute Information Brochure Distribute information to households in relation to stormwater management issues. Use existing brochures with Council leaflet. Cover rainwater tank promotion.	\$7,000		Strathbogie Council	2006/2007
RS3-5	Street Sweeping Review street sweeping practices. Carry out additional targeted mechanical street sweeping (<i>5 days per annum extra in residential areas</i>).		\$4,000	Strathbogie Council	2007/2008
RS3-6	Water Quality monitoring Carry out water quality monitoring program in Euroa and Lake Nagambie, focusing on stormwater related algal bloom influences.	\$8,000	\$2,000	Strathbogie Council (Support from GBCMA)	2007/2008

4.4 Reactive Strategy 4 – Unstable and Degraded Drains

This strategy responds to risks arising from the presence of unstable and degraded drains and the resulting adverse impacts on receiving water values. The issue generally relates to varying degrees of erosion/instability within open stormwater unlined drains.

The issue has been identified as a priority in the Euroa and Nagambie sub-catchments. Assigned structural actions are therefore focused initially on these sub-catchments. Non-structural actions (*e.g. refinement in approach to open drain maintenance*) are applicable across the Shire.

Adopted strategy actions are given in Table 4.4.

Table 4.4 Reactive Strategy 4 – Unstable and Degraded Drains

Action Number	Management Action Description	Estimated Capital cost	Estimated Recurrent Cost	Responsibility	Timeframe
RS4-1	Open stormwater drain condition survey Carry out condition assessment survey of open stormwater drains in all sub-catchments and identify sites in need of stabilisation.	\$3,000		Strathbogie Council	2006/2007
RS4-2	Review maintenance / design approach Review open drain maintenance techniques. Review design approach. Incorporate water sensitive urban design techniques into stabilisation measures.	\$2,000		Strathbogie Council	2006/2007
RS4-3	Address Euroa degraded/unstable drains Implement stabilisation works on unstable / degraded sites. De-silt outlets where needed.	\$10,000		Strathbogie Council	2007/2008
RS4-4	Address Lake Nagambie degraded/unstable drains Implement stabilisation works on unstable / degraded sites. De-silt outlets where needed.	\$10,000		Strathbogie Council	2009/2010
RS4-5	Implement stabilisation measures in sub-catchment Carry out stabilisation works on sites with emphasis on water sensitive design (<i>e.g. grass/vegetated filtration systems</i>).	\$20,000		Strathbogie Council	2010/2011

4.5 Reactive Strategy 5 – Camping and Caravan Parks

This strategy responds to risks from camping and caravan parks. The issue is a priority in the Euroa, Nagambie and Violet Town sub-catchments, given the presence of caravan parks located immediately adjacent to their waterways.

Adopted strategy actions are given in Table 4.5.

Table 4.5 Reactive Strategy 5 – Camping and Caravan Parks

Action Number	Management Action Description	Estimated Capital cost	Estimated Recurrent Cost	Responsibility	Timeframe
RS5-1	<p>Inspections & consultation with owners/operators</p> <p>Inspect and review waste and litter management practices at each caravan parks, including a review of effluent disposal practices. Discuss and recommend improvements with owners.</p>	\$3,000	\$1,000	Strathbogie Council <i>(Support from EPA)</i>	2006/2007
RS5-2	<p>Signage</p> <p>Install no littering / information signs at each caravan park in the sub-catchments <i>(pending outcome from RS5-1)</i>.</p>	\$3,000		Strathbogie Council	2007/2008
RS5-3	<p>Prepare / Distribute Information Leaflet</p> <p>Develop & distribute information leaflet to park owners/operators advising of risks to waterways and ways to minimise risks.</p>	\$5,000		Strathbogie Council	2007/2008

5. 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.*

Emphasis on the management of stormwater quality has only become an issue in recent years. Prior to this, the emphasis had been on efficiently conveying stormwater to receiving waters whilst avoiding flooding. Therefore, it is to be expected that current Council practices will, in many cases, be below best practice standards for stormwater quality management.

5.1 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.

Two 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 Strathbogrie 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 is 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 that 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 Wodonga City Council, Albury City 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.

5.2 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.

Council will be regularly reviewing their current local laws and identify issues that 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.

5.3 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, are 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.

The current stormwater management plan development process provides an opportunity for consideration to be given to retrofitting water quality treatment measures to the stormwater drainage systems across the Shire, where appropriate. In some instances it is not practicable to fit treatment measures to existing urban stormwater systems due to site constraints (*e.g. maintenance access difficulties, insufficient room for treatment measure*). There will however be some sites that are suitable for treatment measures. Structural water quality treatment measures have been recommended at various sites within a number of the reactive management strategies.

Council has limited information on stormwater drainage infrastructure for all of the towns within the Shire. It would be beneficial for Council to carry out the following:

- Digital mapping of stormwater drainage systems within these smaller towns (*i.e. layout of pipe and open drains present*); and
- Transfer of all stormwater infrastructure digital data to Council's GIS system.

Discussions with Council's planning and engineering staff have confirmed that the above measures would benefit Council's planning and operational activities.

5.4 Operations

Council is in the process of reviewing the specification for its town and road maintenance activities. The current contract has limited written documented requirements in relation to task specifications. 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. Nagambie has been recently serviced regularly by a single person operated mechanical suction sweeper, 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.

5.5 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 in their implementation of the Waterwatch Urban Stormwater Community Education Program.

5.6 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.

6. Management Framework Strategies

The management framework strategies are designed to integrate stormwater management best practices into Council's planning and other day-to-day activities with links to stormwater management. Strategies have been identified based on the results of the management framework review outlined in the previous section and further discussions with Council staff.

The proposed strategies have been grouped under the six categories reviewed in Section 5 (*planning, enforcement, infrastructure, operations, education and resourcing*).

The priority for implementing each management framework action has been assigned as very high, high or medium. Council should however give consideration to practical considerations when implementing management framework actions. Implementation of measures such as amendments to the planning scheme should be made as part of scheduled reviews.

The initial step in implementing the Plan should be to appoint a staff member responsible for co-ordinating the implementation of the plan. A Stormwater Action Committee should also be formed (*reduced version of the Project Working Group*) to oversee the Plan's implementation.

6.1 Management Framework Strategy 1 – Planning

At present, Council does not make reference to any particular stormwater management guidelines when imposing planning permit conditions. The system of internal and external referral is also relatively informal.

Areas of possible improvement include the adoption of specific development and building control guidelines to ensure the provision of best practice building control techniques to minimise the export of pollutants during the construction and establishment phase at both the larger development scale and also at the single lot building scale.

Conditions are currently imposed on planning permits in relation to stormwater issues; however improved guidelines for developers combined with improved enforcement is desirable. This is particularly relevant for those building sites where a planning permit is not required, where stormwater management enforcement is not currently imposed.

Actions to further enhance Council's planning activity functions to improve stormwater management are listed in Table 6.1.

Table 6.1 Management Framework Strategy 1 – Planning

Action Number	Actions	Responsibility	Timeframe
FS1-1	Develop or alternatively adopt existing stormwater management guidelines for new development. Guidelines to address erosion and sediment control on construction sites. Distribute Guidelines to developers. Promote objectives and policies within and outside of Council.	Planning & Engineering	2006/2007
FS1-2	Adopt and impose standard conditions for planning and building permits requiring development to comply with the adopted stormwater management guidelines for subdivisions and building sites.	Planning	2006/2007
FS1-3	Take into account the principles and policies presented within the April 2000 'Guidelines for the Protection of Water Quality' (<i>prepared by the North East Planning Referrals Committee</i>) when assessing planning permits. Update referral triggers as necessary to comply with Guidelines.	Planning & Engineering	2006/2007
FS1-4	Formalise the existing internal and external referrals process as a written procedure with circumstances / triggers clearly defined under which referrals are required.	Planning & Engineering	2006/2007
FS1-5	Provide appropriate training of involved staff in the use of adopted stormwater management guidelines and other newly adopted processes.	Planning & Engineering	2006/2007
FS1-6	The Municipal Strategic Statement (MSS) to be updated to specifically refer to the Stormwater Management Plan. This change can be made during a scheduled update of the MSS.	Planning	2006/2007
FS1-7	Promote concept of water sensitive urban design . Reference in Strathbogie Planning Scheme, possibly within a local policy for stormwater drainage. Develop or use existing information brochure for dissemination to developers.	Planning & Engineering	2007/2008
FS1-8	Develop a local policy for stormwater drainage for inclusion in the Strathbogie Planning Scheme. Policy will support the management of stormwater by stating stormwater policy basis, objectives and policies including implementation of the Strathbogie Shire Stormwater Management Plan	Planning & Engineering	2007/2008
FS1-9	The Council Plan (<i>Shire's corporate plan</i>) to be updated to specifically refer to the Stormwater Management Plan (<i>i.e. Stormwater Management Plan represents a strategy linked to the key result areas of 'Our Assets' and 'Our Environment and Amenities'</i>). To be made at next update of the Council Plan.	Planning & Engineering	2006/2007

6.2 Management Framework Strategy 2 – Enforcement

Council enforcement activities impacting on stormwater management principally relate to ensuring planning permit conditions are adhered to and local laws are abided by. The primary limiting factor in the degree of enforcement diligence resides with the limited resources available to Council.

Actions to further improve Council’s enforcement activities to improve stormwater management are listed in Table 6.2.

Table 6.2 Management Framework Strategy 2 – Enforcement

Action Number	Actions	Responsibility	Timeframe
FS2-1	Review arrangements for enforcement of planning permit conditions with roles and responsibilities of appropriate officers to be clearly defined. Identify any deficiencies in existing arrangements and / or resources. Implement changes to overcome deficiencies.	Planning / Engineering	2006/2007
FS2-2	Actively enforce construction and establishment phase site stormwater management measures based on newly adopted Guidelines and submitted stormwater (<i>erosion and sediment</i>) control plans.	Planning	2007/2008
FS2-3	Promote a culture within Council towards proactive reporting and enforcement of local laws impacting on stormwater quality (<i>e.g. those relating to permit conditions, littering, disposal of animal waste and disposal of domestic, commercial and industrial waste</i>).	Council	2006/2007 Ongoing
FS2-4	Expand role by local law enforcement contractors to encompass those issues impacting on stormwater (<i>e.g. littering, animal waste etc</i>). Alternatively use in house resources if available.	Council	2006/2007
FS2-5	Review of existing local laws in relation to stormwater management with new clauses added to address any deficiencies present.	Council	2007/2008

6.3 Management Framework Strategy 3 – Infrastructure

Stormwater infrastructure management plays an important role in the overall management process. Council currently has limited readily available information for stormwater drainage infrastructure.

Actions to further improve the management of existing stormwater infrastructure and planning of future infrastructure are listed in Table 6.3.

Table 6.3 Management Framework Strategy 3 – Infrastructure

Action Number	Actions	Responsibility	Timeframe
FS3-1	Investigate the feasibility of developing a system to document the undertaking of maintenance activities on individual septic systems .	Engineering / Planning / Public Health Officer	2007/2008
FS3-2	Digital mapping of all existing stormwater drainage system infrastructure (<i>i.e. entry pits, junction pits, pipes, open drains and any other structures forming part of the stormwater system</i>). Include catchment boundaries where data allows.	Engineering	2006/2007 Ongoing
FS3-3	Addition of stormwater mapping to Council's GIS to provide readily available access to stormwater infrastructure data.	Engineering	2006/2007
FS3-4	Addition of septic and sewerage system mapping information to Council's GIS (<i>e.g. locations of septic and sewerage infrastructure and leakage / spill recorded locations</i>).	Engineering / Public Health Officer	2006/2007 Ongoing
FS3-5	Addition of new stormwater infrastructure to GIS stormwater layer upon construction, including any structural treatment measures (<i>e.g. litter traps, GPTs, wetlands etc</i>).	Engineering	2006/2007 Ongoing
FS3-6	Council to adopt the principles of water quality sensitive stormwater infrastructure urban design when preparing and / or reviewing stormwater infrastructure new designs or upgrades (<i>e.g. favouring of grass swales and filter strips as opposed to conveyance efficient pipe systems</i>).	Engineering / Planning / Building Services	2006/2007 Ongoing
FS3-7	Pursue implementation of the various structural treatment measures identified in each of the reactive management strategies pending sufficient funding. Consider opportunities for incorporating water quality treatment into proposed capacity upgrade measures as they arise.	Engineering	2006/2007 Ongoing
FS3-8	Monitor performance of stormwater treatment infrastructure and adjust maintenance arrangements and / or future design approach pending effectiveness	Engineering	2006/2007 Ongoing
FS3-9	Document requirements / procedures for maintenance activities associated with stormwater treatment measures within town maintenance services contract specifications.	Engineering	2007/2008
FS3-10	Expand information included on stormwater GIS layer (<i>e.g. add catchment / sub-catchment boundaries, open drains, water quality treatment structures etc</i>).	Engineering	2007/2008

6.4 Management Framework Strategy 4 – Operations

Town maintenance activities impacting on stormwater management include street sweeping, bin litter collection, road maintenance activities, parks and gardens maintenance, stormwater system maintenance including open drain maintenance, and waste collection and disposal.

Actions to further improve the management of operations activities are given in Table 6.4.

Table 6.4 Management Framework Strategy 4 – Operations

Action Number	Actions	Responsibility	Timeframe
FS4-1	<p>Develop written procedures and include in town maintenance services specification contract for following practices:</p> <ul style="list-style-type: none"> ▪ Street sweeping. ▪ Parks and gardens maintenance including grass cutting. ▪ Use of pesticides and herbicides, particularly near waterways/open drains. ▪ Open drain maintenance. ▪ Road maintenance. ▪ Material storage. ▪ Plant and equipment use and maintenance. <p>Base above on best practice guideline publications including 'Urban Stormwater Best Practice Environmental Management Guidelines'.</p>	Engineering	2006/2007
FS4-2	<p>Trial different approaches to open drain vegetation maintenance techniques. Monitor outcomes and adopt most effective approach. Favour water sensitive urban design approach (<i>e.g. retain / enhance vegetation with native grasses to improve water quality in addition to drain stability</i>).</p>	Engineering	2006/2007 Ongoing
FS4-3	<p>Develop inspection program and carry out scheduled inspections of stormwater infrastructure to identify problems and pollution hot spots. Focus on stormwater outlets. Trace source / cause of problems where possible.</p>	Engineering	2006/2007 Ongoing
FS4-4	<p>Incorporate improved / updated written procedures when reviewing town maintenance services contract conditions. Reference appropriate best practice publications for incorporation into written procedures.</p>	Engineering	2007/2008 Ongoing

6.5 Management Framework Strategy 5 – Education and Awareness

This strategy applies to training and increasing the overall level of awareness of Council staff themselves and also in relation to education of the broader community. Current activities focusing on these objectives are restricted in part due to limited resources and in part due to the relatively recent emergence of stormwater quality as an important issue.

Most of the reactive management strategies include education-based actions (*e.g. distribution of information guidelines, media releases and information signage*). Additional management framework strategy actions to further improve the level of awareness of stormwater management issues are given in Table 6.5.

Table 6.5 Management Framework Strategy 5 – Education and Awareness

Action Number	Actions	Responsibility	Timeframe
FS5-1	Implement education based actions included in each of the reactive management strategies.	Engineering	2006/2007 Ongoing
FS5-2	Provide assistance to the GBCMA in their implementation of the Waterwatch 'Urban Stormwater Education Program', the stencilling program and the industry education program.	Engineering	2007/2008 Ongoing
FS5-3	Training of staff and contractors regarding stormwater management issues including the following areas: <ul style="list-style-type: none"> ▪ Application of stormwater management guidelines for new development (<i>refer FS1-1</i>). ▪ Best practice techniques in maintenance tasks with links to stormwater management (<i>refer FS4-1</i>). ▪ Stormwater management threats / risks / best practice in general. ▪ Water sensitive urban design. 	Engineering	2006/2007 Ongoing
FS5-4	Coordinate with relevant agencies (<i>e.g. EPA, GBCMA</i>) when developing / implementing education activities.	Engineering	2006/2007 Ongoing
FS5-5	Identify most suitable Council staff member responsible for undertaking relevant ongoing training to acquire knowledge and skills relevant to stormwater management best practice .	Engineering	2007/2008 Ongoing
FS5-6	Update and expand on range of information brochures relevant to stormwater management. Brochures to be made available to public (<i>e.g. at Shire office public counters</i>). Update at 12 monthly intervals.	Engineering	2007/2008 Ongoing

6.6 Management Framework Strategy 6 – Resourcing

The successful implementation of the Stormwater Management plan will rely on commitment by key Council staff members to pursue the reactive and management framework strategy actions. It is therefore essential that Council staff members be assigned the responsibility and resources to ensure that the strategies of the management plan are implemented. To this extent, additional resources may be needed to implement specific aspects of the plan.

Actions relating to resourcing issues connected to the Stormwater Management Plan implementation and other Council activities with links to stormwater management are as follows.

Table 6.6 Management Framework Strategy 6 – Resourcing

Action Number	Actions	Responsibility	Timeframe
FS6-1	Nominate a coordinator with the responsibility for implementing the strategies of the stormwater management plan (<i>likely to be a senior Council staff member</i>).	Council	2006/2007 Ongoing
FS6-2	Form a stormwater action committee to oversee the implementation of the Stormwater Management Plan. Committee to consist of most relevant Council staff members and a small number of Project Working Group members.	Council	2007/2008 Ongoing
FS6-3	Coordinator to monitor need for additional staff resources to implement plan (<i>both reactive and management framework strategies</i>) and pursue additional resources when needed or expand existing staff roles.	Council	2007/2008 Ongoing
FS6-4	Monitor funding opportunities as they arise for stormwater management and pursue where appropriate.	Council	2006/2007 Ongoing
FS6-5	Secure additional resources or expand additional staff roles to meet additional responsibilities in response to stormwater management plan implementation (<i>e.g. FS2-1, FS2-4</i>).	Council	2007/2008 Ongoing

7. Implementation of the Plan

The successful implementation of the Stormwater Management Plan will rely largely on Council's commitment to pursue the various reactive and management framework strategies. The means by which Council's pursues the implementation of the Plan is overviewed as follows.

7.1 Responsibilities

The main responsibility for the Plans implementation lies with the Strathbogie Shire Council. Council should however draw on the resources of other agencies for support. This may be in the form of funding assistance or in the form of resourcing assistance to implement the non-structural actions. Assistance in this manner is most likely to come from the GBCMA and the EPA.

The following roles are recommended for the implementation of the Stormwater Management Plan:

- A **Co-ordinator** with the responsibility for maintaining Council's commitment to the implementation of the Stormwater Management Plan. The co-ordinator will be a Council staff member.
- A Plan **Stormwater Action Committee** to oversee and review the progress of the Plan's implementation. The committee should include a number of Council staff, and preferably external members such as representatives from the GBCMA, EPA and others from the current working group. A group of no more than six is appropriate.

7.2 Timelines and Priorities

The implementation of the Stormwater Management Plan is a long-term program that will require a process of continuous revision. Many possible options were excluded from the actions included in the reactive management strategies due to not ranking high enough. Longer term, these excluded actions could be revisited and included for future implementation where appropriate.

Implementation of the recommended reactive management strategies is expected to require a period of five to ten years. A preliminary program for the implementation of the reactive management strategies is given in Table 7.1.

The timeframe over which the reactive strategies can be implemented will depend on the on the level of commitment allocated to the Stormwater Management Plan in terms of funds and resources. Council's success in obtaining a portion of the State Government funding available for the implementation of the Victorian Stormwater Action Program will also influence the implementation timeframe.

Reactive strategy actions have been listed in order of priority reflecting ranking scores and practical considerations. Similarly, levels of priority have been proposed for the management framework strategies. The priorities provide Council with guidance for the order of implementation.

Implementation of the recommended management framework strategies is expected to require a period of two to three years. A preliminary program for the implementation of the management framework strategies is given in Table 7.2.

The implementation of management framework strategy actions should however be approached with a degree of flexibility to accommodate other practical and resource constraints as they are encountered. Where possible, framework strategy actions should be introduced to coincide with scheduled updates and reviews of policies, procedures or training programs.

The Implementation Committee should review the proposed implementation schedule following the outcome of the funding application process. Further reviews of scheduled strategy actions should be carried out annually. Consideration should be given to updating the Stormwater Management Plan document at no more than five yearly intervals.

7.3 Funding

Strathbogie Shire Council will need to allocate a significant level of funds if the strategies are to be implemented successfully. If this is done, it will demonstrate Council's commitment to the process and should subsequently assist in obtaining additional funds from other sources.

Council is able to apply for funding through various government programs. The Victorian Government has allocated \$22.5 million over a three-year period for improved management of stormwater quality across the State through the Victorian Stormwater Action Program (VSAP). With the completion of the Strathbogie Shire Stormwater Management Plan, Council is in a position to apply for VSAP funds to assist in the implementation of the priority strategies identified in the Plan.

Another potential source of funds is through the Natural Heritage Trust (NHT). Commonwealth government funds have been extended for the NHT program that contributes to many environmental projects around the nation. In relation to litter issues, funds may be available through EcoRecycle Victoria.

Several of the strategies involve actions with overlapping responsibilities. Cost sharing with the GBCMA or other authorities should be pursued in these cases.

7.4 Review and Update of the Plan

As previously indicated, the implementation of the Stormwater Management Plan is a long-term program that will require a process of continuous revision. It is therefore important that the Plan is reviewed and revised regularly to ensure that the management strategies are still relevant in view of evolving approaches to stormwater management and any other issues as they arise.

Formal updates of the Plan are to be carried out within two years of its initial issue and thereafter at not more than two yearly intervals. Future updates of the Plan should consider the following:

- Results of any water quality monitoring undertaken and other relevant environmental studies;
- The effectiveness of measures implemented previously;
- Any additional stormwater management issues that emerge; and
- Any new approaches to stormwater management.

Table 7.1 Reactive Management Strategies – Implementation Program

Action Number	Management Action Description	Estimated Capital Cost (\$)	Estimated Recurrent Cost* (\$/annum)
2004/2005			
RS1-3	Nagambie GPT at Blayney Lane outlet	\$20,000	\$1,000
	Total 2004/2005	\$20,000	\$1,000
2005/2006			
	Total 2005/2006	\$0	\$0
2006/2007			
RS1-1	Individual Organisation Consultation - Industrial	\$6,000	\$2,000
RS2-1	Signage - Stencilling in CBD areas.	\$1,000	
RS2-2	Media Releases - commercial issues	\$2,000	\$1,000
RS2-3	Install side entry pit litter traps – in commercial areas	\$20,000	\$2,000
RS2-4	Site specific audits - commercial properties	\$3,000	\$3,000
RS3-1	Signage - Stencilling in residential areas.	\$3,000	
RS3-2	Media Release - residential issues	\$2,000	\$1,000
RS3-3	Gross Pollutant Monitoring - residential issues	\$3,000	\$3,000
RS3-4	Distribution of guidelines - residential focus	\$7,000	
RS4-1	Open drain improvements - condition survey	\$3,000	
RS4-2	Review maintenance approach - open drains	\$2,000	
RS5-1	Inspections and consultation with caravan park owners/operators	\$3,000	\$1,000
	Total 2006/2007	\$55,000	\$14,000

2007/2008			
RS1-2	Distribution of guidelines - Industrial areas	\$5,000	
RS3-5	Street Sweeping		\$4,000
RS3-6	Water Quality monitoring - residential site runoff	\$8,000	\$2,000
RS4-3	Open drain improvements - all sub-catchments	\$10,000	
RS5-2	Signage - Caravan parks	\$3,000	
RS5-3	Prepare / Distribute Information Leaflet to park owners/operators	\$5,000	
	Total 2007/2008	\$31,000	\$6,000
2008/2009			
	Total 2008/2009	\$0	\$0
2009/2010			
RS1-4	Upgrade of existing Wetland & Urban Retention Systems	\$30,000	\$3,000
RS4-4	Open drain improvements - Lake Nagambie	\$10,000	
	Total 2009/2010	\$40,000	\$3,000
2010/2011			
RS4-5	Implement stabilisation measures in sub-catchment - water sensitive designs	\$20,000	
	Total 2010/2011	\$20,000	\$0

Note:

1. Capital and ongoing costs are indicative only.
2. * The total recurrent costs given include a number of actions, which will cease after 2 to 5 years.

Table 7.2 Management Framework Strategies – Implementation Program

Action Number	Actions
2006/2007	
FS1-1	Adopt existing stormwater management guidelines for new development.
FS1-2	Impose adopted standard conditions for planning and building permits.
FS1-3	Recognise April 2000 'Guidelines for the Protection of Water Quality'.
FS1-4	Formalise internal and external referrals process.
FS1-5	Provide training of staff and contractors in the adopted stormwater management guidelines.
FS1-6	Updated the Municipal Strategic Statement to refer to the Stormwater Management Plan.
FS1-9	Refine Shire's corporate plan to refer to the Stormwater Management Plan.
FS2-1	Enforcement newly adopted planning permit conditions.
FS2-3	Promote proactive reporting and enforcement of local laws with stormwater links.
FS2-4	Expand local law enforcement to encompass stormwater issues.
FS3-2	Undertake digital mapping of all existing stormwater drainage system infrastructure.
FS3-3	Link stormwater mapping to Council's GIS.
FS3-4	Placement of septic and sewerage system mapping information to Council's GIS.
FS3-5	Placement of new stormwater infrastructure to GIS stormwater layer.
FS3-6	Adoption the principles of water quality sensitive stormwater infrastructure urban design.
FS3-7	Implementation of the various structural treatment measures.
FS3-8	Monitor performance of stormwater treatment infrastructure.
FS4-1	Implement written procedures for town maintenance practices.
FS4-2	Review open drain vegetation maintenance techniques.
FS4-3	Formalise scheduled inspections of stormwater infrastructure.
FS5-1	Implement education based actions included in each of the reactive management strategies.
FS5-3	Implement the training of staff and contractors regarding stormwater management issues.
FS5-4	Co-ordinate with relevant agencies when implementing education activities.
FS6-1	Appoint co-ordinator for stormwater management plan.
FS6-4	Co-ordinator to monitor and pursue funding opportunities.
2007/2008	
FS1-7	Adopt principals of water sensitive urban design.
FS1-8	Develop a local policy for stormwater drainage for inclusion in the Strathbogie Planning Scheme.
FS2-2	Enforce construction and establishment phase on newly adopted Guidelines.
FS2-5	Review of existing local laws in relation to stormwater management.
FS3-1	Formalise the undertaking of maintenance activities on individual septic systems.
FS3-9	Review maintenance activities for stormwater treatment measures within towns.
FS3-10	Expand information included on stormwater GIS layer.
FS4-4	Updated written procedures into town maintenance services contract conditions.
FS5-2	Provide assistance to the Waterwatch 'Urban Stormwater Education Program'.
FS5-5	Identify staff member to undergo training in stormwater management best practice.
FS5-6	Update information brochures on stormwater management.
FS6-2	Form a stormwater action committee to oversee plan implementation.
FS6-3	Coordinator to monitor need for additional staff resources to implement plan.
FS6-5	Secure additional resources for implementation of stormwater management plan.

8. Conclusions

Receiving waters in the Strathbogie Shire are susceptible to damage arising from stormwater pollutant impacts. The management of stormwater in towns across the Shire is needed to ensure that the potential for any such damage is minimised so as to maintain and enhance the receiving water values.

The Stormwater Management Plan for the Strathbogie Shire provides a framework for protecting and enhancing the waterways and water storages within and downstream of the Shire.

Priorities for stormwater management have been determined through a workshop process involving key staff from the Council as well as representatives from other authorities, local interest groups and local residents. The Stormwater Management Plan therefore reflects the views of a broad range of stakeholders.

The reactive management strategies are designed to address the five highest ranked existing stormwater risks. Strategies include a mixture of structural and non-structural actions adopted after considering the results of an effectiveness ranking process and other practical considerations.

Recommendations have also been developed for integrating best practice environmental management of stormwater into Council's management and planning activities. These actions are represented by the management framework strategies.

The Stormwater Management Plan provides Council with the basis for obtaining external funds to support its own commitment to the strategies. The success of the Plan will ultimately rest with the:

- level of commitment Council gives to implementing the reactive and management framework strategies;
- amount of involvement and support Council receives from other key government agencies (*e.g. GBCMA and the EPA*); and
- level of support provided by the broader community.