

PINE RIVERS SHIRE COUNCIL

DESIGN MANUAL

CIVIL INFRASTRUCTURE DESIGN



DESIGN STANDARDS

Part 1 Design Standards for Roadworks

**Part 2 Design Standards for Stormwater
Drainage Works**

Part 3 Design Standards for Water Supply Works

Part 4 Design Standards for Sewerage Works



PART 2

DESIGN STANDARDS FOR STORMWATER DRAINAGE WORKS

Section 1 Introduction

Section 2 Strategy Plan

Section 3 Best Management Practices

Section 4 Design Standards

Section 5 Summary Document

PINE RIVERS SHIRE COUNCIL

PART 2 - DESIGN STANDARDS FOR STORMWATER DRAINAGE WORKS



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2.1.0 INTRODUCTION

GHD were commissioned by the Pine Rivers Shire Council to develop a series of strategies to enable the Pine Rivers Shire Council to achieve the three goals of:-

- ❖ complying to the State Government Environmental Protection (EP) legislative requirements
- ❖ providing the community with a stormwater management system which is environmentally sustainable and which, at the same time, meets their expectations
- ❖ achieving ANZECC water quality standards for all watercourses, rivers and lakes within the Pine Rivers Shire

This document opens with a discussion on EP legislative requirements (1996). This is followed by stating the stormwater management goals and a broad outline of the strategies required to achieve them.

Details of the strategies are then listed and are designed to assist the Pine Rivers Shire Council in achieving the abovementioned goals.

These strategies do not relieve the general community, businesses, developers, builders or others of their responsibilities or obligations under the EPA.

The report concludes that both community involvement and integration of land use planning is central to the success or otherwise of the strategies.

This document will require revision periodically to reflect changes in legislation and community expectations. Its update will require consultation with the community, councillors, Department of the Environment and the development industry.

2.2.0 ENVIRONMENTAL PROTECTION LEGISLATIVE REQUIREMENTS

The overall policy of Environmental Protection (EP) legislation is based on Ecologically Sustainable Development (ESD). For stormwater management this implies reducing waste water at all stages to improve downstream water quality, i.e. releasing waste water is the last option. Water re-use is also a key component in achieving this policy. To this end the Pine Rivers Shire Council will be required to promote the re-use of water where practical. Implementing this policy is through the use of Best Management Practices (BMPs) for the planning, design, construction and maintenance of stormwater management facilities.

For BMPs, the EP legislation suggests designated infiltration areas with protection of groundwater, swale drains, conservation of riparian vegetation, creation of riparian buffers, GPTs, artificial wetlands and detention basins. It also advises that the community should be informed of the Pine Rivers Shire Council environmental practices and the results from the Pine Rivers Shire Council environmental monitoring programmes. To this end, the community should be encouraged to get involved in monitoring, re-vegetation and water re-use programmes.

The EP legislation also promotes adoption of the polluter pays principle. Implementation of this principle should be assisted by community consultation and involvement in all aspects of catchment management.

Stormwater management is not defined as an Environmentally Relevant Activity (ERA) and therefore does not require an environmental authority to operate. From discussions with the Department of Environment, obligations of the Pine Rivers Shire Council include:-

- ❖ exercise General Environmental Duty (GED) in all activities defined under the EP legislation
- ❖ exercise due diligence in minimising environmental harm for non ERA activities
- ❖ submit for approval, stormwater management plans which are required as part of the licensing process for ERAs

Due diligence is the only defence for executive officers where adverse impacts have been caused to the environment. Successful prosecution is likely where an abatement program has not been put in place or where a pollution prevention system has not been implemented to prevent the contravention.

Essentially the Pine Rivers Shire Council will have to provide a pollution prevention system commensurate with receiving waters environmental values. The operation of this system may have to be regularly audited with reports sent to the responsible directors. Responsible persons will have to be nominated and they should be conversant with environmental standards and laws. Responsible personnel will have to deal personally with system failures within the required time line.

The Pine Rivers Shire Council will also have to demonstrate that all their operations minimise environmental risk where possible. To achieve this, stormwater management plans (associated with ERAs) must be prepared to:-

- ❖ quantify environmental impacts
- ❖ evolve a strategy for minimising these impacts
- ❖ describe implementation, maintenance and auditing of the preferred mitigation system

The development industry, building industry and community as a whole have responsibilities and obligations under the EP legislation to exercise due diligence and general environmental duty. These responsibilities or obligations are not negated or transferred to the Pine Rivers Shire Council as a result of any Pine Rivers Shire Council approval.

2.3.0 STORMWATER MANAGEMENT GOALS AND STRATEGIES

This stormwater strategy plan describes the strategies required to achieve the Pine Rivers Shire Council stormwater management goals. These goals are three-fold:-

- ❖ to provide the Pine Rivers Shire Council with a stormwater strategy which, if implemented, fulfils the Pine Rivers Shire Council requirements under the EPA requirements (1995)
- ❖ to provide a stormwater management system which meets the community expectations and minimises impact on the environment
- ❖ to achieve a water quality standard for all the Pine Rivers Shire watercourses, rivers and receiving waters that meets the ANZECC guidelines

Figure 2.3.0 on the following page shows where the strategy fits into the Pine Rivers Shire Council management hierarchy. There are nine components to this strategy plan:-

- ❖ assignment of responsibilities within the Pine Rivers Shire Council for the management of stormwater throughout the Pine Rivers Shire
- ❖ preparation of catchment management plans including delineation of environmental buffers along all major waterways, and determination of headworks charges for the development industry
- ❖ formulation of stormwater quality monitoring system
- ❖ set up of an auditing system that will be integrated into the Pine Rivers Shire Council environmental management system
- ❖ preparation of stormwater best management practices (BMPs)
- ❖ incorporation of a total water cycle management approach into the development of stormwater management policies and procedures
- ❖ involvement of the development and building industry in stormwater and catchment management processes
- ❖ preparation of a community awareness programme, including identification and communication of the cost of stormwater management to the community
- ❖ promotion of better stormwater runoff management from non-urban developments

Each of these strategy objectives are discussed in turn in Section 2.4.0 of the Design Standards for Stormwater Drainage.

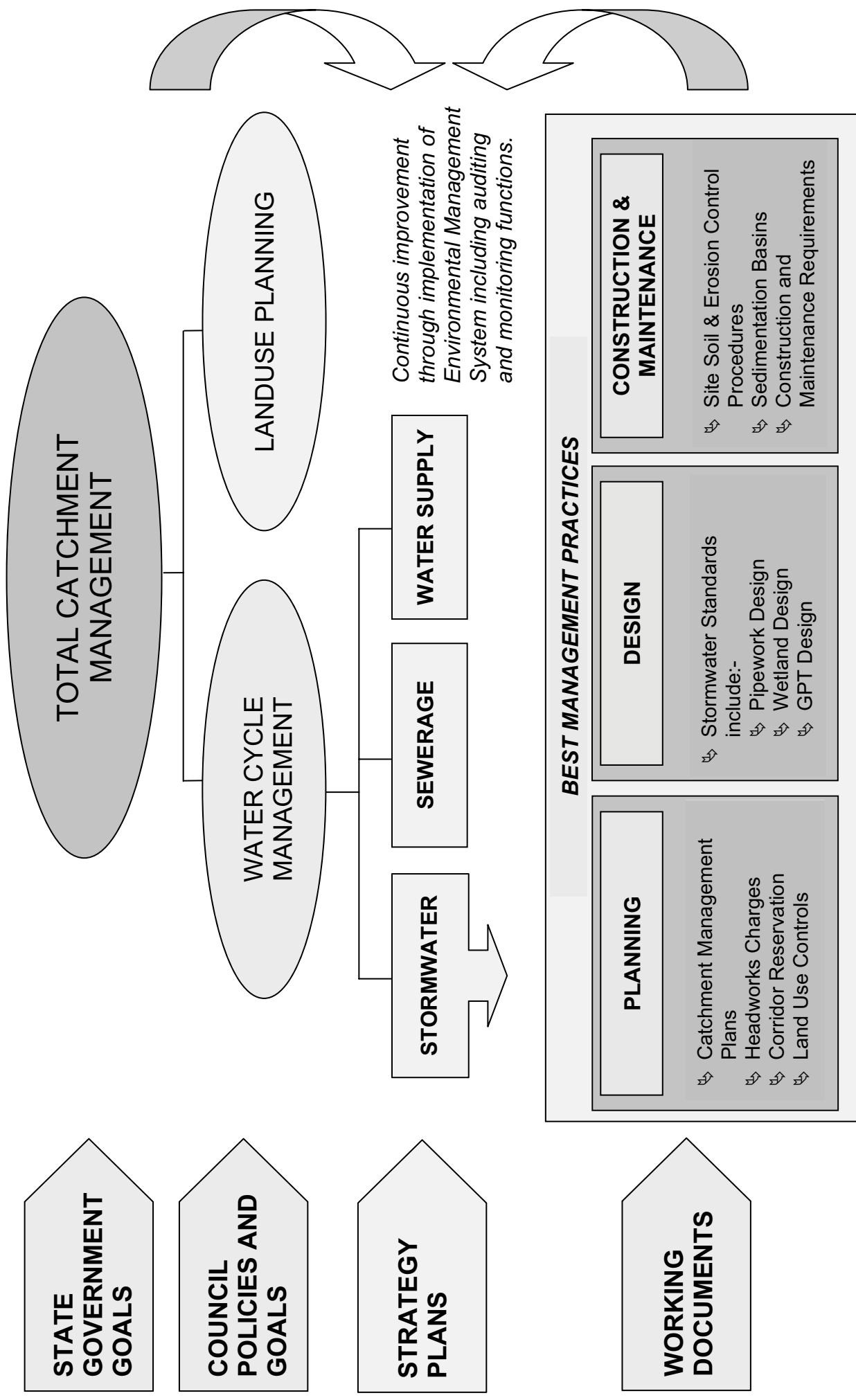


Figure 2.3.0
Total Catchment Management

2.4.0 STRATEGY DETAILS

2.4.1 STRATEGY NUMBER 1

Assignment of responsibility for stormwater management throughout Pine Rivers Shire

Within the Assets and Infrastructure Services Division a position of Drainage and Assets Engineer has been created to manage stormwater drainage issues previously shared across many positions. It is recommended that a separate unit be formed called Stormwater Management Services. This section would have the similar role and functionality as water supply and sewerage services. It is likely that several functions of the section will be undertaken by other sections within the Pine Rivers Shire Council.

This unit would be responsible for the following:-

- ❖ establish and maintain a Pine Rivers Shire wide water quality programme
- ❖ develop catchment management plans for all the catchments throughout the Pine Rivers Shire including determination of headworks charges. Ensure that these plans are integrated into the town planning process.
- ❖ co-ordinate community consultation programmes including formation, assistance to catchment or landcare groups
- ❖ conduct environmental audits and report findings to senior management. This aspect should be integrated with the Pine Rivers Shire Council environmental management system/QA system.
- ❖ review all the Pine Rivers Shire Council stormwater related activities and standards for compliance to the requirements of the EPA legalisation
- ❖ identify the cost of stormwater management services. These costs should be itemised as a list item in the Pine Rivers Shire Council rates notices to residents.
- ❖ visit local schools with a view to explaining the role of the water cycle in the urban and rural environment and seek their involvement in the water quality monitoring process

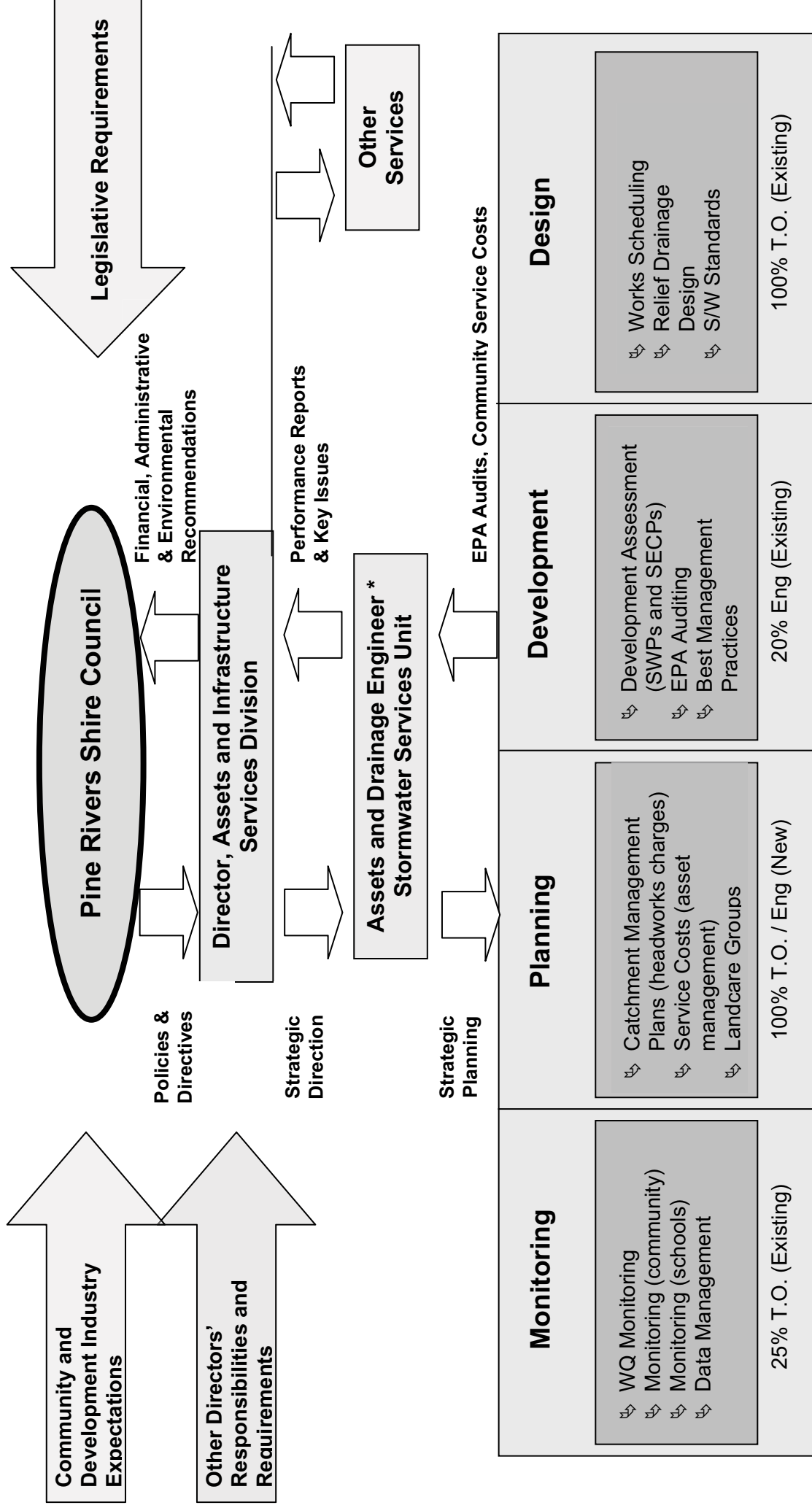
Figure 2.4.0 outlines a proposed structure for the unit. The personnel indicated on this figure are likely to be resourced from other sections of the Pine Rivers Shire Council.

Actions

A senior Pine Rivers Shire Council officer has been appointed to a supervising position shared with responsibility for Asset Management, and supported by a technical officer. The role of the senior officer will include preparation of a plan detailing the necessary institutional restructuring arrangements (structure and roles) within the Assets and Infrastructure Services Division. This plan should be submitted to the Pine Rivers Shire Council for approval and the various recommendations from the plan implemented.

Time Frame

The preparation of an organisation plan is to be completed by June 1998.



Increase in Council salary costs in forming the unit is \$75,000 including 50% salary on-costs

* The Engineer should assume the planning function of the Stormwater Services Unit
T.O.: Technical Officer
Eng: Engineer

Figure 2.4.0
Pine Rivers Shire Council
Proposed Structure for Stormwater Services Unit

2.4.2 STRATEGY NUMBER 2

Preparation of catchment management plans including delineation of environmental buffers along all major waterways, and determination of headworks charges for the development industry.

Catchment management plans should be prepared for all of the Pine Rivers Shire water catchments. These plans should detail the following:-

- ❖ determine the catchment management headworks charge to be levied on all new development within the catchment
- ❖ reserve sufficient areas of land for stormwater management purposes e.g. wetlands, detention basins etc
- ❖ estimate the maintenance costs of new stormwater management facilities
- ❖ prepare a waterway and/or catchment restoration plan where appropriate
- ❖ involve the community in developing the Pine Rivers Shire Council plans for the provision of stormwater management services for their catchments

Actions

- ❖ Prepare a Pine Rivers Shire map of all water catchments. Circulate the map and management plan objectives to all departments inviting their priorities in terms of preparing catchment management plans.
- ❖ Collate comments and prioritise catchment plans. Prepare a five year budget for completing the plans. Submit the plan to the Pine Rivers Shire Council for approval.
- ❖ All briefs for catchment management plans should include a community consultation component.

Time Frame

Short Term

Priority setting and budget preparation should be submitted to the Pine Rivers Shire Council for approval.

Long Term

All plans should be completed within a five year time frame, subject to budgetary support and the ability of the service providers to deliver the necessary products.

2.4.3 STRATEGY NUMBER 3

Formulation of stormwater quality monitoring system

It will be necessary for the Pine Rivers Shire Council to establish a water quality monitoring program throughout the Pine Rivers Shire. The results of the monitoring will be used as performance indicators of the Pine Rivers Shire Council environmental management programs.

Currently there is a water quality station established in the tributaries to North Pine Dam and at the North Pine Dam itself. This network should be expanded. Results from the stations should be made public if not published in local newspapers. Presentation of the results should be strictly non-technical e.g. restricted to terms of poor, average and high, not unlike UV readings presented on the nightly news.

Manual sampling sites should be located on each of the major creeks throughout the Pine Rivers Shire. A water quality sampling site should also be located in an undisturbed part of the catchment. The results from this site will act as a benchmark for the more polluted waterways. The results should be integrated with those collated by the South East Queensland Water Board.

The monitoring program will also assist in the identification of all point sources of pollutants e.g. oil, chemicals, pesticides, sewage, fertilisers, litter, garbage etc. Preparation of pollution prevention systems will be required where the source of pollutants is a result of the Pine Rivers Shire Council activities. For those occurring outside of the Pine Rivers Shire Council range of activities, polluters should be informed of the EPA requirements and, if necessary, measures put in place to prevent the Pine Rivers Shire Council stormwater drainage facilities conveying this pollution.

Community monitoring via the existing "Pine Rivers Shire Stream Testing Programme" should be enhanced and encouraged. Community monitoring and involvement is encouraged by EP legislation.

Actions

- ❖ Develop a plan for the establishment of a water quality network throughout the Pine Rivers Shire. In the short term a pilot project should be set up for Freshwater Creek upstream of Gympie Road.
- ❖ Collate data from the based "Pine Rivers Shire Stream Testing Programme". Prepare a needs analysis, inform the community and prepare an agreed plan to strengthen the programme.

Time Frame

The monitoring plan should be prepared by June 1996. An amount should be provided in the each annual budget for continued testing of samples and display of results.

2.4.4 STRATEGY NUMBER 4

Set up of an auditing system which will be integrated into the Pine Rivers Shire Council environmental management system.

The auditing role is a key component of any "due diligence" requirements under the EPA. It is suggested that the Pine Rivers Shire Council establish which activities are classed as Environmentally Relevant Activities (ERAs) as defined under the EPA. Those activities which require stormwater management plans may be required to be audited. It is essential that the system covers all the Pine Rivers Shire Council activities, to improve understanding of their environmental interaction and impacts.

It is recommended that this auditing role be integrated with existing Pine Rivers Shire Council environmental management and QA systems (defined as an Integrated Environmental Management System in EP legislation). Auditing would involve Pine Rivers Shire Council officers completing a prescribed assessment sheet. Non compliance would be reported to senior management and corrective actions recommended.

Actions

- ❖ Initiate discussions on developing an integrated environmental management system for the Pine Rivers Shire. Review the Pine Rivers Shire Council current environmental management and auditing procedures by December 1997. If necessary, upgrade the system to include auditing of stormwater management activities.

Time Frame

This review should be completed with recommendations to the Pine Rivers Shire Council by April 1998.

2.4.5 STRATEGY NUMBER 5

Preparation of Best Management Practices for Pine Rivers Shire Council

This requires preparation of best management practices documents. Implementing best management practices is considered to fulfil the Pine Rivers Shire Council "due diligence" and "general environmental duty" requirements.

Unfortunately, to date, few facilities exist for the treatment of stormwater runoff. BMPs are water quality treatment devices for which there are a list of generic guidelines and procedures considered to minimise environmental impact due to construction and land use activities. They include implementation of swales, wetlands, vegetated buffers, gross pollutant traps, specially designed gully traps, infiltration trenches, detention basins etc. Generally the more BMPs incorporated into a development, preferably as close to the source as possible, the less impact the development will have on the environment.

As part of the development of this strategy plan, a set of BMPs has been prepared for the Pine Rivers Shire Council.

Actions

- ❖ The Pine Rivers Shire Council adopts the prepared BMPs at an interim guide.
- ❖ Request that all new development including industrial and commercial development demonstrate incorporation of BMPs.

Time Frame

Prepared BMPs are to be reviewed by the Pine Rivers Shire Council by September 1996. Adoption should be by January 1997.

2.4.6 STRATEGY NUMBER 6

Incorporate a total water cycle management approach into the development of stormwater management policies and procedures.

This strategy is required to ensure that the provision of stormwater, water supply and sewerage services is provided at a level that maximises the Pine Rivers Shire Council investment in all three components when considered as a whole.

Adoption of this approach will require the Pine Rivers Shire Council to first identify its investment in stormwater drainage infrastructure and its likely maintenance and renewal costs. Similar exercises have been carried out for water supply and sewerage services in the form of asset management and total management plans.

An issue which may arise from this approach is the use of roofwater tanks. The Pine Rivers Shire Council should encourage the use of rainwater tanks as a means of water re-use for garden watering purposes. Top up by town water may be permitted, however stored water is not for potable use.

Another issue involves sewer overflows. Sewer overflows are point pollution sources which adversely affect the environment. Stormwater treatment facilities which are immediately downstream of these facilities should be seen as integral component in the design of sewerage treatment facilities.

Actions

- ❖ Prepare an inventory of the Pine Rivers Shire Council stormwater management assets. This inventory should include details on the age and condition of the assets to determine annual maintenance and longer term renewal costs. Receiving water environmental assets should also be collated e.g. significant vegetation, recreation use etc. This is important as it could well be that renewal of underground infrastructure without sufficient treatment facilities could have adverse downstream environmental impacts.
- ❖ Adopt a "no objection" approach to the installation of roofwater tanks throughout the Pine Rivers Shire.
- ❖ Select a new development area, for example Mango Hill, where roofwater policy will be trialled. Monitor water usage in this area to determine the effectiveness of roofwater tanks in reducing water supply infrastructure and maintenance costs.
- ❖ Formulate a water services committee comprising of staff from water supply, stormwater and sewerage services units. The role of this committee is to foster a total water cycle management approach amongst the various service sectors.

Time Frame

Setting a time frame for this strategy is difficult because of the complexity of the issues. However, adopting a "no-objection" approach to roofwater tanks and selecting a suitable development as a trial area can be implemented straight away. Other issues such as integration with water supply and sewerage services will require consultation with these service sectors to set a realistic time table.

2.4.7 STRATEGY NUMBER 7

To involve the development and building industry in stormwater and catchment management processes.

The development industry is the primary investor in drainage capital works throughout the Pine Rivers Shire. This occurs during the subdivisional or commercial/industrial development stage where drainage infrastructure such as pipes, gullies overland flow paths are installed. The building industry is usually responsible for providing on-site drainage facilities e.g. roof drainage.

The development stage has significant long term impacts on downstream waterways. The building stage tends to have short term impacts. The development and building industries have responsibilities and obligations under the EPA. These responsibilities and obligations are not negated or transferred to the Pine Rivers Shire Council by any involvement in the stormwater and catchment management process or by any Pine Rivers Shire Council approval.

In order to minimise these impacts, the development and building industry should be involved in those decision making processes which affect drainage/environmental infrastructure requirements.

For the development industry the most relevant documents are the Pine Rivers Shire Council strategic plan and the Pine Rivers Shire Council stormwater drainage design standards. For the building industry, sediment and site erosion control issues dominate.

Actions

Development Industry

- ❖ Seek comment from the development industry on the Pine Rivers Shire Council proposed stormwater management strategy, catchment management plans, including headworks charges and design standards. The UDIA is probably the most representative organisation.
- ❖ Integrate those comments which are environmentally sustainable into the Pine Rivers Shire Council strategy and standards.
- ❖ Subsequent to consultation with the development industry, it is recommended that the Pine Rivers Shire Council require that as a condition of each zoning redevelopment approval, its best management practices are employed in any subsequent development. On submission of subdivision plans for approval, employment of best management practices will have to be clearly demonstrated by the applicant for all phases of the development including future maintenance.

Building Industry

- ❖ Prepare a brochure highlighting the need for good on-site management. This brochure should include relevant aspects of the EP legislation. The brochure should be attached to all building application correspondence.

- ❖ Prepare a set of best on-site management practices. Preparation of these BMPs should be carried out in consultation with the various master trades and the HIA. This task is best carried out jointly by all councils in the Moreton region.
- ❖ Prepare an educational video on best on-site management practices and integrate this video as part of construction courses offered by TAFE colleges.
- ❖ Offer a reduction in building application fees to those builders who have attended an approved BMP course (possibly organised by TAFE).
- ❖ Finally it is recommended that the Pine Rivers Shire Council requires the home building industry to comply with on-site best management practices. Enforcement should be through inspection. Accordingly, the Pine Rivers Shire Council inspectors will have to be conversant with these practices.

Time Frame

The following timetable is recommended for the above actions.

ACTION	DATE
Seek comment from development industry	October 1997
Preparation of a brochure	January 1998
Prepare on-site BMPs	March 1998
Preparation of education video	June 1998
Prepare appropriate fee structure	June 1998

These should be completed by the end of 1997/1998 financial year. A budget of \$15,000 exists for on-site BMPs manual and development of an educational video. This cost assumes joint council involvement.

2.4.8 STRATEGY NUMBER 8

Preparation of a community awareness program including identification and communication of the cost of stormwater management to the community.

This is the most important of all the strategies. Without community support there is little which can be achieved.

The higher the level of community awareness on stormwater and related environmental issues, the easier it will be for Pine Rivers Shire Council to pursue its initiatives in this area.

Actions

The following are a list of actions which are self explanatory:-

- ❖ The Pine Rivers Shire Council to send an officer to all schools in the Pine Rivers Shire explaining the water cycle concept and the inter-relationship between stormwater, water supply and sewerage services.
- ❖ The Pine Rivers Shire Council to foster a scheme for each school to monitor the health of a nearby creek or waterway e.g. the school sponsors a particular creek or waterway.
- ❖ The Pine Rivers Shire Council to facilitate the establishment of land care groups in each water catchment. The Pine Rivers Shire Council should provide these groups with whatever information it has pertaining to the planning and management activities in each catchment. These groups should also be a reference group for all future studies affecting catchment management issues within the catchment.
- ❖ The Pine Rivers Shire Council to consider preparation of a series of brochures highlighting the various water catchments within the Pine Rivers Shire. A brochure should be completed for each catchment, highlighting environmental features and downstream impacts.
- ❖ The Pine Rivers Shire Council to establish nature walks along major creek corridors to introduce the community to the nature and condition of their creek systems.
- ❖ The Pine Rivers Shire Council to calculate the cost of providing stormwater services and include this as a separate item in the rates notice. A brochure should accompany the first issue explaining the basis of the charge and the environmental costs included in the fee.
- ❖ The Pine Rivers Shire Council to consider establishment of catchment/community information centres for each catchment. These centres would display catchment features as well as all relevant water related issues that have environmental impacts on the catchment.

Time Frame

These can be carried out immediately with approval from the Pine Rivers Shire Council for each action.

The Pine Rivers Shire Council should endeavour to itemise the cost of stormwater management services in preparation for each annual budget.

2.4.9 STRATEGY NUMBER 9

To better manage runoff from non-urban development.

Non-urban development can have significant downstream impacts ranging from poor water quality, bank erosion and sedimentation problems due to destruction of instream and riparian vegetation. This aim of this strategy is to minimise the risk of this occurring. This is particularly required where development occurs in the headwaters of those catchments which supply water to the Pine Rivers Shire lakes and reservoirs.

Actions

The following is a list of actions which the Pine Rivers Shire Council can undertake to minimise the downstream impact of non-urban development:-.

- ❖ Amend /enhance Local Laws and / or Planning Scheme requirements to:-
 - ❖ ensure that development conditions require that all significant stands of vegetation are maintained. (Note: - an increase in lot size should be considered, to ensure adequate retention of vegetation.)
 - ❖ ensure that runoff from hard stand areas are diverted through designated vegetated areas e.g. vegetated waterways, prior to discharge to a nearby creek. This should be demonstrated in a sediment and erosion control plan submitted with a development.
 - ❖ ensure that runoff and effluent management systems are separated e.g. grey water should not be disposed of directly without treatment.
 - ❖ ensure that easements over all major corridors are transferred free of cost to the Pine Rivers Shire Council upon development approval. The conditions of the easement should be such to protect any existing corridor vegetation and to facilitate implementation of future catchment management programmes.
- ❖ Prepare a set of non-urban development best management practices. These practices should detail sediment and erosion management requirements during and after development. Development of these practices will require consultation with farming organisations, the HIA and rural land care groups.
- ❖ Prepare a leaflet/brochure explaining the Pine Rivers Shire Council non urban BMPs. This leaflet should be freely available and accompany initial development application correspondence. The leaflet should explain the importance of non-urban catchments in contributing to the health of the Pine Rivers Shire waterways and lakes. The leaflet should also outline that the Pine Rivers Shire Council requires that non-urban development should employ the prepared best management practices.

Time Frame

ACTION	DATE
Prepare brochure/leaflet	January 1998
Amend local laws where appropriate	June 1998
Prepare non-urban best management practices	January 1999

2.5.0 CONCLUSION

These strategies have been recommended with a view to achieving the Pine Rivers Shire Council goals for stormwater management throughout the Pine Rivers Shire. They represent only the first step in achieving those goals and, of necessity, will require alteration and amendment in the future.

Implementation of these strategies will take up land/space and anything which takes up space is a land use problem and consequently a town planning issue. For this reason, stormwater management should be an integral component of the town planning process. It may be argued, therefore, that stormwater management is basically a land use problem, not an engineering problem. It becomes an engineering problem when there is insufficient space allocated to manage increased runoff and pollutants. Poor planning results in expensive capital and maintenance programs for the community.

The development and building industries have a significant role to play in achieving the goals for effective stormwater management throughout the Pine Rivers Shire. They also have responsibilities and obligations under EP legislation and should have regard to best management practices, wherever possible, when dealing with stormwater issues.

Finally, community consultation and involvement is a key factor in achieving the Pine Rivers Shire Council goals. This strategy puts in place a series of measures which will raise community awareness of stormwater and catchment management issues throughout the Pine Rivers Shire.