

Chapter 1

Introduction

1.1

What is the purpose of these Guidelines?

These Guidelines have been produced to assist urban catchment managers protect stormwater quality. Improved environmental performance is needed to ensure that the environmental values and beneficial uses of receiving waters are sustained or enhanced. These Guidelines assist in the development of strategies for improved environmental management of urban catchments and waterways by providing guidance in five key areas:

- **environmental performance objectives:** defining environmental performance objectives for managing urban stormwater;
- **tools review:** describing a range of tools that can reduce sources of stormwater pollution or remove pollutants from stormwater;
- **tools selection:** guiding the selection and application of these tools to suit particular situations;
- **best practices:** raising awareness of best practices for environmental management of stormwater; and
- **stormwater management plans:** providing guidance for developing stormwater management plans.

The Guidelines are designed for those people involved in the planning, design or management of urban land-uses or stormwater drainage systems that affect stormwater quality whether they be in regional urban areas or major metropolitan centres. Engineers and planners within local government along with consultants to the development industry should find these Guidelines useful. The Guidelines provide advice on the selection of components for effective environmental management of stormwater—the detailed design of these components is not covered in these Guidelines.



Figure 1.1 Typical approach to urban drain design used in the past.

1.2 Why do we need these Guidelines?

Urban drainage systems have been developed to meet the community's need to minimise the threat of flooding. The main focus of this development has been on hydraulic capacity and transport of stormwater, rather than environmental quality.

Traditionally, little attention or resources have been allocated to considering the environmental impacts of urbanisation and providing the community with waterways that have a diverse range of uses.

Urbanisation leads to changes in both the quantity and quality of the water that is delivered to urban receiving waters. Unmanaged, these changes can result in considerable damage to the environment.

1.2.1 Impacts of urbanisation

With urbanisation, the area of impervious surfaces within a catchment increases dramatically. Densely developed inner urban areas are almost completely impervious. This high proportion of sealed area greatly reduces the amount of water infiltrating the soil and, consequently, most rainfall is converted to run-off. In addition, urban drainage systems are designed to minimise local flooding by providing smooth and direct pathways for the conveyance of run-off.

The consequences of these physical changes include:



Figure 1.2 Many pollutants reach the stormwater system from transport and construction activities.

- more rainfall turning into run-off;
- more frequent high flow events in creeks, rivers and receiving waters;
- reduced time lag between rainfall occurring and run-off reaching a waterway because of piping and channelising of flows; and
- reduced groundwater inflows to streams during dry weather, with a greater proportion of flows made up from human uses of water in the catchment—such as car washing, garden watering and so on.

The increased flood volumes, peak discharges and velocities in urban waterways cause a significant increase in the amounts of material (loads of pollutants) carried by the flow. Activities such as transportation and construction provide abundant sources of pollutants that are readily available for wash-off on the relatively smooth urban surfaces—Table 1.1 lists common pollutant types and their sources. Run-off carries these pollutants into waterways, and although concentrations may be diluted during a run-off event, the total loads can affect the environmental quality of downstream aquatic habitats.

These Guidelines aim to provide a range of best practices for improving the environmental performance of stormwater systems that will assist in protecting the environmental values and beneficial uses of Victoria's waterways and coastal waters.

1.3 Who should use the Guidelines?

There are three main groups responsible for the environmental management of urban stormwater: local government, the urban development industry, and State agencies. Through their collective and respective actions they can play an important role in maintaining and improving receiving water quality.

1.3.1 Local government

Local government, with its responsibility for land-use planning, land and stormwater management, has a significant ability to affect stormwater quality. Councils in the Melbourne region alone operate an estimated 25,000 kilometres of constructed drains servicing an urban area of around 150,000 hectares.

Suitable consideration of stormwater quality during the location and broad layout planning of urban areas has the potential to minimise many of the impacts of urbanisation on stormwater. Local government planners can help protect stormwater quality by ensuring the land is capable of sustaining urban development, minimising the extent of impervious surfaces and providing adequate space for stormwater detention and treatment. New drainage infrastructure should be designed to ensure the impact of urban stormwater on receiving environments is minimal.

Local government is responsible for the management of various parts of the urban environment that discharge directly into the stormwater system. These include roads, reserves, parks and car parks. Adopting a best practice environmental management approach in regard to the operation and maintenance of these resources is an essential element for improved stormwater quality.

Local government should use these Guidelines to:

- assess and plan operational activities which have potential to affect stormwater quality or quantity;
- develop stormwater management plans;
- plan for new development and assess development applications;
- plan and design new drainage infrastructure; and
- help identify opportunities to upgrade existing infrastructure to improve environmental performance.

Pollutant	Urban source
Sediment	Land surface erosion Pavement and vehicle wear Atmospheric deposition Spillage/illegal discharge Organic matter (e.g. leaf litter, grass) Car washing Weathering of buildings/structures
Nutrients	Organic matter Fertiliser Sewer overflows/septic tank leaks Animal/bird faeces Detergents (car washing) Atmospheric deposition Spillage/illegal discharge
Oxygen demanding substances	Organic matter decay Atmospheric deposition Sewer overflows/septic tank leaks Animal/bird faeces Spillage/illegal discharges
pH (acidity)	Atmospheric deposition Spillage/illegal discharge Organic matter decay Erosion of roofing material
Micro-organisms	Animal/bird faeces Sewer overflows/septic tank leaks Organic matter decay
Toxic organics	Pesticides Herbicides Spillage/illegal discharge Sewer overflows/septic tank leaks
Heavy metals	Atmospheric deposition Vehicle wear Sewer overflows/septic tank leaks Weathering of buildings/structures Spillage/illegal discharges
Gross pollutants (litter and debris)	Pedestrians and vehicles Waste collection systems Leaf-fall from trees Lawn clippings Spills and accidents
Oils and surfactants	Asphalt pavements Spillage/illegal discharges Leaks from vehicles Car washing Organic matter
Increased water temperature	Run-off from impervious surfaces Removal of riparian vegetation

Table 1.1 Common pollutants and likely sources found in urban stormwater.

1.3.2 Development industry

Urban development affects stormwater quality, both during the construction period and as a result of the increased areas of impervious surface.

Management of stormwater discharges is crucial during construction, as soil is often removed and left exposed to erosion. Massive sediment loads reaching receiving waters can be a consequence of poor site management. It is essential that construction activities are undertaken in such a way that contaminated run-off is not discharged into drains or waterways.

The level of impact on stormwater following construction depends on the site's specific land-use and layout. By minimising impervious areas and using water sensitive urban design concepts, the impact of development on stormwater quality can be minimised.

Managing urban run-off in a water sensitive manner not only helps resolve problems associated with stormwater, but can enhance the social and environmental amenity of the urban landscape. Urban developers have an important role to play in the adoption of a water sensitive approach to urban planning, design and development.

The development industry will use these Guidelines as a basis for the planning and design of new urban developments.

1.3.3 State Government Agencies

Environment Protection Authority (EPA)

EPA is responsible for the protection of the quality of Victoria's environment by application of the statutory powers described in the Environment Protection Act.

The role of the EPA in stormwater management includes:

- establishing environmental standards for urban waterways and bays through State environmental protection policies (SEPP);
- establishing programs for achieving environmental standards by encouraging the use of best practices; and
- facilitating the achievement of goals using regulatory and non-regulatory (e.g. best practice) means and enforcement where necessary.

Environment Protection Authority will use these Guidelines to provide advice on environmental management of stormwater and to assess the environmental performance of stormwater managers.

Melbourne Water Corporation

As a regional drainage authority for the Melbourne metropolitan area, Melbourne Water Corporation is responsible for the management of all major drains and waterways, generally in catchments greater than 60 hectares in area. (In smaller catchments, local government generally has responsibility.) This includes around 1100 kilometres of constructed drains and 5000 kilometres of waterways.

Melbourne Water Corporation aims to provide healthy stream environments that meet the community's needs for recreation, water supply, drainage and flood protection services.

The role of the Melbourne Water Corporation in stormwater management includes:

- **strategy management:** providing overall direction and strategies for stormwater management in Melbourne;
- **drainage infrastructure standards:** setting standards for planning and design of drainage infrastructure to reduce the risks of flooding and protect receiving environments from the impacts of urban development;
- **urban area development:** working with local government and developers to plan new drainage infrastructure in developing urban areas; and
- **systems operations:** operational responsibility for waterways and the constructed drainage system.

Melbourne Water Corporation or its successor body will use these Guidelines as a basis for drainage infrastructure standards in all urban areas.

Catchment Management Authorities (CMAs)

Catchment Management Authorities have been established in each of the nine non-metropolitan Catchment and Land Protection Regions of Victoria. These ensure the sustainable development of natural resource-based industries, the protection of land and water resources, and the conservation of natural and cultural heritage. CMAs combine the roles of the previous: Catchment and Land Protection Boards, River Management Authorities, Salinity Implementation Groups, water quality groups, and Sustainable Regional Development Committees.

CMAs provide services related to integrated waterway and flood plain management. These focus on the maintenance and improvement of river health and the minimisation of costs of flooding, while preserving the natural functions of the flood plain. These services include:

- waterway management;
- water quality management;

- management of flood plains;
- management of rural drainage including management of regional drainage schemes (where relevant);
- management of Crown frontages; and
- management of Heritage Rivers outside National Parks.

Catchment Management Authorities or their successor bodies will use these Guidelines to assist in the development and implementation of water quality and nutrient management plans.

Department of Natural Resources and Environment (NRE)

NRE is responsible for the integrated management of Victoria's natural resources including their protection, conservation and environmental management. As part of this responsibility, NRE's objective is to achieve healthy rivers and catchments using a partnership approach. Consequently, NRE oversees the development and implementation of water quality and nutrient management plans and facilitates a range of water quality management initiatives.

The Department of Natural Resources and Environment will use these Guidelines to promote good environmental management of urban stormwater through its partnership approach to water quality management.

Other infrastructure providers

Other service providers, such as VicRoads, who play a role in stormwater management should use these guidelines as a basis for the planning and design of measures to protect the environment from the impact of run-off from any of their infrastructure.

1.4 How to use these Guidelines

The Guidelines are intended to support the preparation of plans or strategies for the environmental management of stormwater in urban areas and the assessment of current management practices.

Chapter 2 describes principles and performance objectives for the environmental management of urban stormwater. These should provide the basis for the planning of stormwater management programs and the design of new drainage infrastructure.

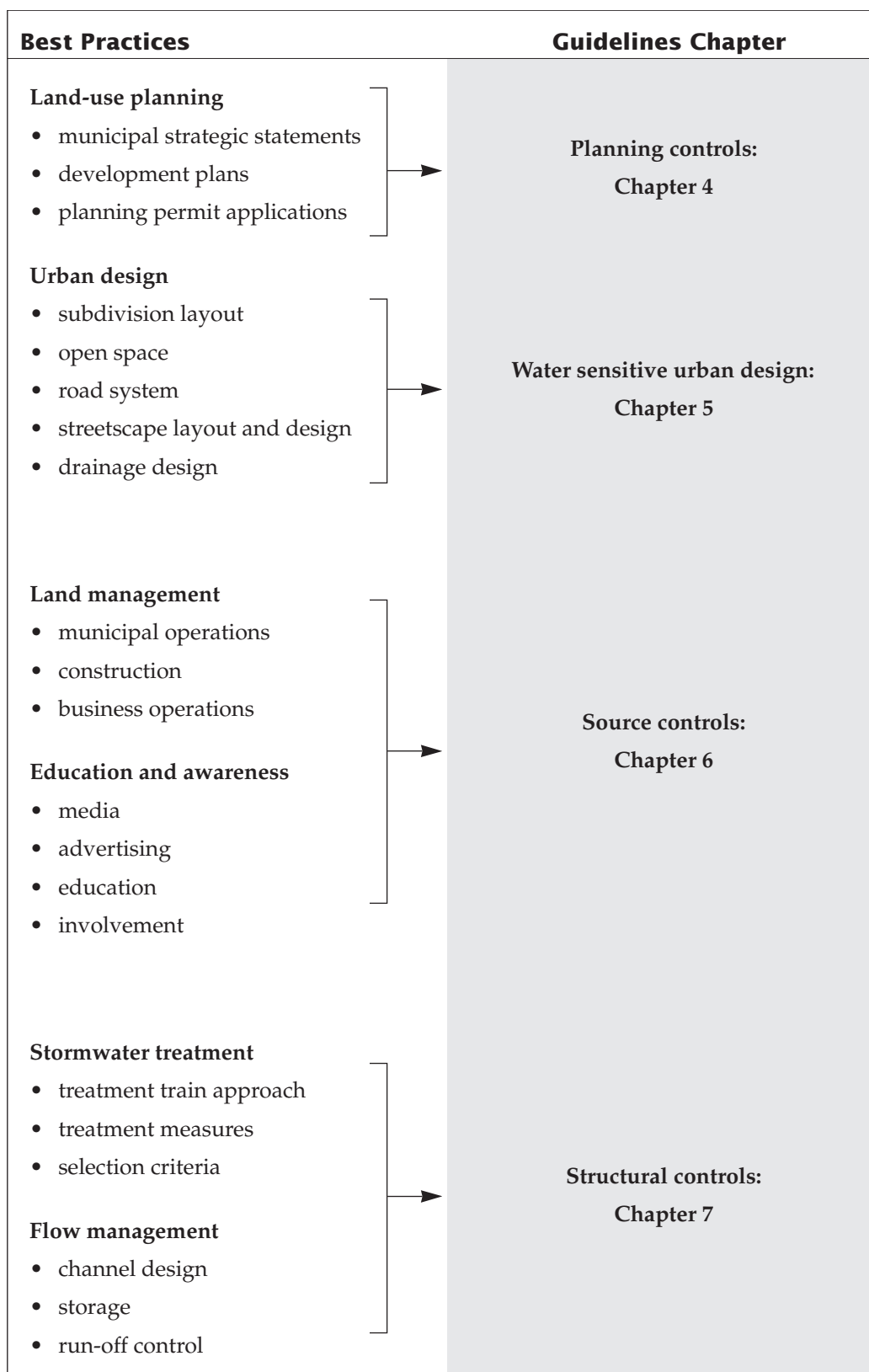


Figure 1.3 Best practices covered in the Guidelines.

Chapter 3 presents a methodology for preparing stormwater management plans. This approach is intended principally for local government and should provide a basis for implementing best practice.

Chapters 4, 5, 6 and 7 describe a range of tools available to meet the environmental performance objectives. These include both source controls (such as education programs to reduce pollution sources) and structural controls (such as wetlands to reduce nutrient loads). Figure 1.3 illustrates where to find the tools in the Guidelines.