

Background information:
*Draft urban stormwater
management guidance
consultation guide*

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EPA acknowledges Aboriginal people as the first peoples and Traditional custodians of the land and water on which we live, work and depend. We pay respect to Aboriginal Elders past and present.

As Victoria's environmental regulator, we pay respect to how Country has been protected and cared for by Aboriginal people over many tens of thousands of years.

We acknowledge the unique spiritual and cultural significance of land, water and all that is in the environment to Aboriginal people and Traditional custodians. We recognise their continuing connection to, and aspirations for Country.

Disclaimer

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About this guide

This consultation guide provides an overview of the *Draft urban stormwater management guidance* (EPA publication 1739) and information to help support consultation on the draft guidance.

Executive summary

The *Urban stormwater management guidance* is intended to help improve the management of urban stormwater in Victoria. It supports minimising the risk of harm to human health and the environment through good environmental practice, and it provides information that will support the planning and design of new urban stormwater management systems. The draft guidance:

- highlights the risk to waterways and bays the creation of sealed (impervious) surfaces causes
- provides general objectives and information to support risk assessment and minimisation
- explains stormwater management for communities in Victoria.

The content of the draft guidance complements and adds to the state of knowledge¹ established through previous guidance and planning requirements. This means:

- the reduction levels for solids, phosphorous and nitrogen are longstanding and continue to be required to be achieved under the Victoria Planning Provisions
- [new proposed objectives](#) for urban stormwater flow reduction are not compliance requirements, and the level of stormwater flow reduction to achieve will depend on what is [reasonably practicable](#).

¹ Information from industry, government and independent organisations may contribute to the state of knowledge.

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Victoria's urban stormwater management challenge

In forested or vegetated catchments, rain or surface water is taken up by trees and plants or infiltrates into the soil and travels to waterways as subsurface flows.

However, in urban catchments impervious surfaces like roofs and roads replace this natural landscape, and rain runs off these surfaces for drains to rapidly transport into rivers, lakes, estuaries and bays. This runoff is called urban stormwater and has the potential to cause harm to human health and the environment.

Science shows that even at low levels of urbanisation our rivers, bays and estuaries are harmed. As Victoria develops, the extent of these sealed surfaces increases, which in turn increases the volume of runoff and pollutants entering waterways. This not only gives rise to the risk of harm to waterway health (degraded river ecology, erosion, reduced amenity), but also presents potential risks to human health where people come into contact with waters receiving stormwater runoff.

Therefore, it is important to manage stormwater to:

- reduce pollutant loads
- protect the values of aquatic ecosystems
- reduce the risk to human health and the environment
- protect potential alternative water supply sources.

The population of Melbourne is expected to exceed eight million by 2051. Modelling by DELWP suggests that if this urban growth is accommodated in the same way it has been until now, by 2051 the total area of impervious surfaces and stormwater runoff will almost double.

Melbourne Water's Healthy Waterways Strategy (HWS) for greater Melbourne suggests that by 2051, because of urban growth, an additional 80GL/year (equivalent to 32,000 Olympic swimming pools) of stormwater will be generated. These increased flow volumes cause scouring, as well as pollution, in waterways. It's estimated that following development of Melbourne to its urban growth boundary, more than 900kms of stream length will become degraded if the city is developed using conventional drainage practices.² "*Virtually all of Melbourne's existing urban area is serviced by drainage infrastructure that discharges stormwater runoff directly into waterways, including the Yarra.*"³

Population and the extent of impervious surfaces is also increasing in regional Victoria. The population of regional Victoria is projected to increase from 1,499,000 in 2021 to 2,062,400 in 2051⁴.

Effectively managing Victoria's urban stormwater runoff will also help Victoria achieve benefits, such as capturing stormwater runoff to improve the quality of urban green spaces, and reducing the pressure on our drinking water supplies.

² Vietz, G.J., Rutherford, I.D., Walsh, C.J., Chee, Y.U. and Hatt, B. E. 2014, The unaccounted costs of conventional urban development: protecting stream systems in an age of urban sprawl, in Vietz, G; Rutherford, I.D, and Hughes, R. (editors), *Proceedings of the 7th Australian Stream Management Conference*. Townsville, pages 418–424.

³ Department of Environment, Land, Water and Planning (2016). *Protecting the Yarra River (Birrarung) Ministerial Advisory Committee Final Report*. Melbourne: Department of Environment, Land, Water and Planning.

⁴ Department of Environment, Land, Water and Planning (2016). *Victoria in Future 2016 Population and household projections to 2051*. Melbourne: Department of Environment, Land, Water and Planning.

The 1999 urban stormwater guidance (1999 BPEM)

The Urban stormwater best practice environmental management guidelines 1999

The *Urban stormwater best practice environmental management guidelines* (the 1999 BPEM) was developed to help meet the needs of those planning, designing and/or managing urban land uses or stormwater systems. The 1999 BPEM applies to new urban developments. These can be in greenfield areas or redeveloping existing sites.

The 1999 BPEM established best practice stormwater quality performance objectives to help determine the level of stormwater management necessary to help protect the environmental values of waters. These could be used if monitoring or modelling weren't available to determine treatment requirements. The 1999 BPEM specified pollutant reduction targets for water quality parameters, including total nitrogen, total phosphorus and suspended solids.

The purpose of the 1999 BPEM was to improve the quality of stormwater runoff within the conventional engineering drainage system. It is a technical publication that provides guidance about managing urban stormwater runoff from land development and construction projects across urban Melbourne and Victoria.

The 1999 BPEM can be downloaded from the [CSIRO website](#).

Why EPA is developing new urban stormwater guidance

Since the 1999 BPEM was published, knowledge about the harmful effects of urban stormwater, particularly the harm associated with stormwater flows, has significantly expanded. The current objectives do not adequately cover flows, and science tells us that how we manage stormwater today will not protect our waterways as urban development and population growth continues.

An objective to maintain discharges for the 1.5-year Average Recurrence Interval ARI at pre-development levels has been ineffective, due to its vagueness, absence of a tool for designers to assess, and the potential for environmentally damaging outcomes if volume of flows is not also reduced.

The draft guidance includes new performance objectives for stormwater flows. This reflects contemporary science and practice. Contemporary science reveals that typical stormwater flows from urban land needs to be reduced by 50 to 90 per cent to protect waterway values in catchments within urban areas.⁵ These reductions would occur through stormwater management systems in new developments. Stormwater treatments and technologies have advanced and are also better understood, making flow reduction more feasible.

The content of the guidance complements and adds to the state of knowledge established through previous guidance and planning requirements.

This means that the:

- reduction levels for solids, phosphorous and nitrogen are longstanding and continue to be required to be achieved under the Victoria Planning Provisions (VPPs)
- level of stormwater flow reduction to achieve will depend on what is [reasonably practicable](#).

⁵ Ewert, J., O'Halloran, D., Lintern, A., Weber, T and McCarthy, D., (2018). *Review of stormwater science*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Background information: Draft urban stormwater management guidance

The draft guidance will form part of a suite of existing tools to improve stormwater management.

EPA has a range of guidance related to stormwater management, including [Liquid storage and handling](#) (EPA publication 1698), and new [construction guidance](#) under development. These focus on temporary environmental protection measures for construction sites during the construction phase or mobile activities.

The *Urban stormwater management guidance* would add to the toolkit by supporting the design of urban stormwater management systems in new developments to minimise the risk of harm from development activities increasing urban stormwater runoff.

It would also support the environmental protection goals of [various policies and strategies](#), including the *Port Philip Bay Environmental Management Plan 2017* in reducing the nitrogen, sediment and pollutant loads to the bay.

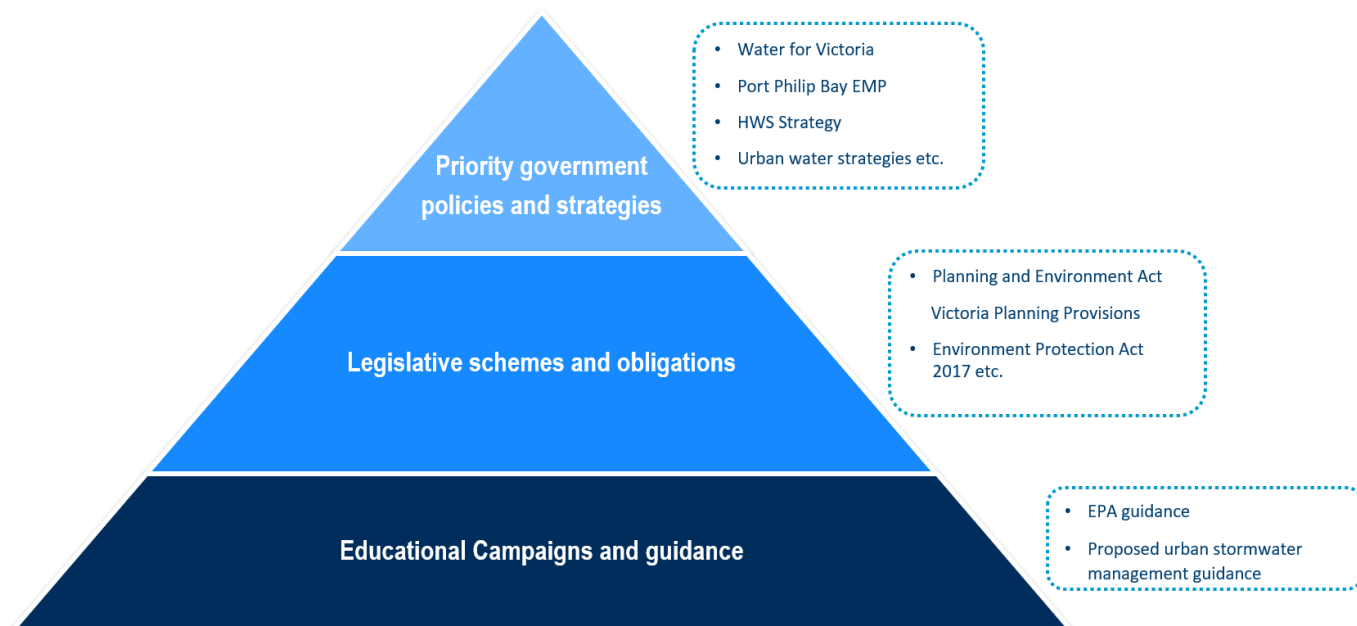


Figure 1 General urban stormwater management framework.

The preparation of new stormwater guidance reflects EPA's role as a science-based regulator and its objective of protecting human health and the environment by reducing the harmful effects of pollution and waste as set out in the *Environment Protection Act 2017*. As stated in the Act, EPA's function includes:

to provide information and education to the Victorian community in relation to—

- (i) environmental quality; and*
- (ii) risks of harm to human health and the environment; and*
- (iii) environmental best practice and improvements.*

Background information: Draft urban stormwater management guidance

Status of the 1999 BPEM guidelines

Key parts of the 1999 BPEM include performance objectives, information on construction activities and controls, and stormwater management planning.

The objectives – specifically, the reduction levels for solids, phosphorous, litter and nitrogen – outlined in the 1999 BPEM are replicated in the new draft guidance. They also remain requirements under the *Planning and Environment Act 1987* through the Victoria Planning Provisions (VPPs). References to the 1999 BPEM remain in place in the VPPs and are not automatically updated. For more information on this, see section “[Interface with other regulatory frameworks](#)”.

The parts in the 1999 BPEM on construction activities and structural controls were based on EPA guidance – [Environmental Guidelines for Major Construction Sites](#) (EPA publication 480) 1996 and [Construction Techniques for Sediment Pollution Control](#) (EPA publication 275) 1991. These pieces of guidance are under review and EPA is developing several new updated, specific pieces of guidance that will address construction phase activities, sediment control and [treatment trains](#).

The 1999 BPEM also discusses council’s stormwater management planning. The [Integrated Water Management \(IWM\) Framework](#) was published in 2017, and the new SEPP (Waters) was published in 2018. Clause 34 (4) of SEPP sets out the required content and issues to be addressed in stormwater management or equivalent plans (i.e. IWM plans).

This clause is intended to be saved in Transitional Regulations for two years (until 2023) from the commencement of the new *Environment Protection Amendment Act 2018* (which amends the *Environment Protection Act 2017*) and will be investigated further through scoping work and engagement.

The content of the draft urban stormwater management guidance, and other pieces of guidance under development by EPA, will add to the state of knowledge established through the 1999 BPEM and planning requirements.

Draft guidance development

The *Draft urban stormwater management guidance* (EPA publication 1739) was developed through:

- review of stormwater science, including scientific research on waterway values and place-based objectives, flows, water quality, stormwater management objectives and the performance of urban stormwater treatment measures
- analysis of feasibility of flow reductions for typical development scenarios (25 per cent and 60 per cent reductions provide comparative examples of flow reduction options that would protect environmental values)
- alignment with government policy and strategies such as [Water for Victoria 2016](#) and the *Port Phillip Bay Environmental Management Plan 2017–2027* (EMP)
- consultation across government agencies, water authorities, practitioners and leading developers and local councils, including with Department of Environment, Land, Water and Planning (DELWP), Victorian Planning Authority (VPA), Melbourne Water, Municipal Association of Victoria (MAV), and Department of Health and Human Services (DHHS).

Review of stormwater science

The Review of Stormwater Science provides updated scientific understanding of urban stormwater by expanding on a review of the stormwater science conducted in 2013–14.

The science review focused on five key topics:

- Waterway values – SEPP Waters identifies beneficial uses (environmental values) of water, including ecological and recreational values. Melbourne Water's HWS also identifies waterway values and now includes 'community connection' and 'recreation' along with previous values such as birds, fish, frogs and amenity. The review recognised the increased understanding and appreciation of the social values of waterways.
- Place-based objectives – Social, ecological and economic values are location specific and require tailored responses to ensure their values are protected. The literature review identified local and international examples where scientific approaches have led to the successful protection of individual values.
- Flow – Flow is a critical threat to urban waterway values and evidence to support this continues to grow. There are numerous indicators that can reflect the impact of flow, with 'mean annual runoff volume' recommended given its correlation with stream health and current practicality of application.

The review found that protecting or restoring values in an urbanised catchment may require a reduction of 50 to 90 per cent in total annual runoff volume. It notes that the earlier 2013–14 BPEM review recommended a flow reduction of 25 per cent to be applied broadly across urban areas, with a 60 per cent flow reduction applied to high value waterways to better protect their values.

- Water quality – The review found that pollutants identified in the 1999 BPEM are still important pollutants to remove from urban stormwater, both for protecting the health of receiving waters and for protecting public health. It recognises that there are other pollutants of concern that have environmental risk, however, there is insufficient evidence on which to derive performance objectives.
- Management objectives and treatment options – Performance data for water sensitive urban design (WSUD) assets like biofilters and wetlands has grown since 2013, but their performance remains variable. The review discussed how integrated water management, through stormwater harvesting, and infiltration and rainwater tanks, is a good way to reduce pollutant loads from both homes and businesses. These approaches are well established and their use can meet the stormwater flow reductions needed to protect our waterways.

Another management approach is to use offsets. Melbourne Water has applied these primarily in relation to nitrogen, with the aim of applying stormwater management actions at the least cost.

Consequences of urban stormwater flows

The draft guidance describes the risks of harm to human health and the environment from activities that contribute to urban stormwater runoff. Land development in urbanised areas increases flows of stormwater and pollutants, and can have significant adverse consequences. This includes degradation of urban waterways and downstream waterbodies, human health impacts, and financial and social effects.

Adverse effects associated with the degradation of urban waterways and downstream water bodies by urban stormwater include financial impacts on tourism, commercial fishing and aquaculture, as well as lost opportunities to use stormwater as a resource.

Toxicants in stormwater can contaminate aquaculture stock. Nutrients (phosphorous and nitrogen) may promote potentially toxic algal blooms, and the decay of blooms can reduce the amount of dissolved oxygen available to support aquatic life, which can lead to fish kills. Modelled increases in loads to Port Philip Bay showed more persistent algal blooms and poor water quality at beaches, which would have the potential to reduce tourism contribution to the economy by at least \$68 million per year and reduce the value of enjoyment derived by locals and tourists from visiting the Bay by \$39 million per year (Port Philip Bay EMP).

Minimising the risks of harm associated with the creation of impervious surfaces also creates opportunities including mitigating the 'urban heat island' effect (general increase in temperatures in urban areas, compared with surrounding rural land); supporting greener, more pleasant urban landscapes; and maintaining vegetation in community spaces during extended periods of low rainfall.

There is increasing evidence that the 'urban heat island' effect exacerbates the increased mortality and morbidity associated with extreme heat events.

Urban stormwater can be used as a resource with many benefits for the environment and human health. The guidance does not directly address the maximisation of these benefits, which should be pursued in line with [Water for Victoria](#). The [Integrated Water Management Framework](#) is a framework that exists to help government, the water sector and the community work together to better plan, manage and deliver water in Victoria's towns and cities. It recognizes the influence and importance of all elements of the water cycle and how organisations can maximise benefits by working together.

Key elements of the draft guidance

Who the guide is for

The draft guidance is intended for developers who generate new impervious surfaces, such as roads, in subdivisions and other developments. It is also relevant to other parties who inform infrastructure planning and design, including technical consultants.

It supports these parties to minimise the risks to human health and the environment from their design, planning and development activities, as required by the General Environmental Duty (GED). It also supports those involved in the assessment of urban stormwater treatment proposals. Relevant parties include:

- the land development industry
- technical consultants advising developers
- 'responsible authorities' as defined in planning legislation, that consider applications for approval of proposed developments, including local government
- public sector entities, including the Victorian Planning Authority (VPA), EPA, Melbourne Water, catchment management authorities, the Major Transport Infrastructure Authority (MTIA) and road authorities.

It does not provide guidance for those parties responsible for the ongoing operation and maintenance of stormwater management systems, or temporary environmental management systems used during the construction phase or mobile business activities. Information on temporary systems is provided in other EPA guidance and guidance on maintenance by [water corporations](#) and some councils.

Currently a review of Melbourne Urban Stormwater Institutional Arrangements is underway related to roles and responsibilities for the operation and maintenance of stormwater assets. <https://www.water.vic.gov.au/liveable/stormwater-review>

Proposed objectives

The draft guidance introduces quantitative flow reduction objectives:

- 50 to 90 per cent flow reduction in mean annual total runoff volume in priority areas for enhanced stormwater management⁶
- 25 per cent flow reduction in mean annual total runoff volume in all other areas.
- Baseflow contribution – 10 per cent of mean annual rainfall volume to contribute to baseflow.

The draft guidance maintains the existing BPEM pollutant reduction objectives:

- Suspended solids – 80 per cent reduction in mean annual load.
- Total phosphorus – 45 per cent reduction in mean annual load.
- Total nitrogen – 45 per cent reduction in mean annual load.
- Litter – 70 per cent reduction of mean annual load.

⁶ High ecological value waterway areas for the greater Melbourne area are defined in the draft guidance as priority areas for enhanced stormwater management in Melbourne Water's *Healthy Waterways Strategy*. Map can be found here: <https://data-melbournewater.opendata.arcgis.com/datasets/hws2018-stormwater-priority-areas> Note the map includes both rural and urban and needs to be downloaded to distinguish the urban areas.

A transparent process is required to identify priority areas outside of the greater Melbourne area.

Background information: Draft urban stormwater management guidance

Existing pollutant objectives are carried over from the 1999 BPEM because there is no new science to specifically vary water quality annual load targets. However, flow reductions will contribute to further reduction of pollutants.

The proposed flow reduction objectives are general objectives to support protection of waterway values. They help to assess the risk of harm from activities that contribute to urban stormwater runoff and ensure risks are reduced. A higher or lower percentage of flow reduction objective may be justified based on scientific evidence. The proposed flow reduction objectives are not compliance requirements and the level of flow reduction to achieve will depend on what is reasonably practicable.

Mean annual total runoff volume is closely related to stream health and water quality. It can be measured, defined and evaluated, and is widely used across industry and in engineering models (such as 'Model for Urban Stormwater Improvement Conceptualisation') of stormwater. It is currently the most practical and accessible measurement for the stormwater industry, government, builders, planners and the general community to understand the impacts of stormwater flow volumes on streams and other receiving waterways.

There are numerous metrics that may be used to characterise risk to waterway values, with a range of potential options increasing the complexity. The HWS uses Direct Connected Imperviousness which may also be used as an indicator of stream health.

It is expected that knowledge, techniques and technologies will improve over time.

Examples of urban stormwater treatments

Some stormwater treatments that may be used to minimise risks of harm from activities that contribute to urban stormwater runoff include wetlands, rainwater tanks, stormwater harvesting, swales or raingardens. As each site is different, the site and a corresponding risk assessment informs an appropriate system or combination of systems.

The MUSIC and STORM (Stormwater Treatment Objective – Relative Measure) models are the most commonly used stormwater modelling software in Victoria to assess treatments against performance objectives.⁷

EPA engaged engineering, urban design and ecology specialists to develop a range of indicative scenarios for various developments (see draft guidance). MUSIC was used to experiment with a range of treatment technologies to provide a diverse selection of options. The options include simple approaches through to advanced approaches – feasibility and appropriateness would vary depending on location and context. As these are only indicative scenarios, use in conjunction with any relevant advice from authorities and experts on treatment technologies that are suitable to the site.

⁷ Note that STORM currently does not model flows, and uses nitrogen to rate WSUD treatment performance. Further information about MUSIC and STORM is available from www.melbournewater.com.au/planning-and-building/stormwater-management/storm-and-music-tools

Implementation

Role of this guidance under EPA's regulatory framework

EPA is developing guidance and publishing the science review to support the general body of stormwater management knowledge about the harm or risks of harm to human health and the environment, including the controls for eliminating or reducing those risks ([state of knowledge](#)).

The guidance provides objectives for stormwater flows to support assessing and minimising risks of harm from the creation of impervious surfaces. Improving stormwater management will help to protect the ecological health of waterways, enhance amenity and recreational values. The objectives reflect current scientific knowledge on the importance of minimising the risk of harm from activities that contribute to urban stormwater flows.

The guidance is intended only as a general guide to help improve capability and understanding of stormwater management and risks. It should not be relied on as a statement of the law. It reflects the best available knowledge at the time of publication and will support those designing and assessing urban stormwater infrastructure to identify, assess and control risks of harm to human health and the environment.

EPA's approach to compliance

The Victorian Government affirms that informing and educating the public, and providing support, are critical parts of EPA's regulatory role. As described in EPA's [draft Regulatory Strategy 2020–2025](#) (EPA publication 1800), EPA's regulatory activity will aim to:

- raise awareness of environmental duties of care
- raise awareness of the risks and impacts to human health and the environment from particular activities
- increase knowledge of environmental quality
- increase understanding of EPA's role and jurisdiction.

EPA will also provide advice and guidance, and build partnerships to ensure duty holders improve their capability in identifying and managing their risks.

The Government acknowledges that establishing EPA's new legislative framework will take time. Accordingly, EPA's strategic focus areas will be delivered across three main 'delivery horizons' over the next five years. In Horizon 1 (2021–2023) EPA will work to support duty holders transition to the new framework, while maintaining its focus on existing priority harms.

Interface with other regulatory frameworks

There are laws and regulations that apply to urban stormwater management that EPA does not administer. It is each person's responsibility to ensure their operations comply with all applicable laws.

The references in the Victoria Planning Provisions to the 1999 BPEM objectives as compliance requirements are static and do not change as a result of EPA publishing new guidance.

The GED requires minimising risk of harm to human health and the environment from activities so far as reasonably practicable. *EPA's draft guidance* (EPA publication 1739) and the science review provide additional objectives for stormwater flows to support improved risk assessment and minimisation, but are not compliance requirements.

Relevant future work

The [Improving Urban Stormwater Ministerial Advisory Committee \(MAC\)](#) recognised that a broader package of reforms was needed to improve stormwater management, and the committees' longer-term recommendations are under consideration. For example, the MAC recommended establishing effective offsetting arrangements to increase flexibility and cost-effectiveness and to help make stormwater a valued resource. DELWP is investigating options and principles to support the development of offset arrangements.

DELWP may consider regulatory schemes they manage, and consider investigating updates, for example to the stormwater standards called up in the VPPs, to establish new compliance requirements. This would be accompanied by further analysis and consultation.

Clause 34 (3) and (4) of SEPP (Waters) set out obligations on councils to develop stormwater management plans, and for managers of assets to maintain those assets. These clauses are proposed to be saved in Transitional Regulations for two years (till 2023) from the commencement of the new *Environment Protection Amendment Act 2018* to maintain existing obligations. How these obligations transition will be investigated further through scoping work and future engagement. EPA will continue to examine the potential development of [obligation orders for managers of land or infrastructure](#) (OMLIs) where appropriate. This would be developed with the relevant land or infrastructure managers.

How the draft guidance relates to other government strategies

The draft guidance aligns with and supports priority government strategies in the management of urban stormwater, including:

- Water for Victoria (2016)
- Plan Melbourne (2017-2050)
- The Port Phillip Bay Environmental Management Plan (EMP) (2017-2027)
- Melbourne Water HWS (2018-28)
- The Yarra River Action Plan (2017)
- Urban water strategies and regional waterway strategies (various)
- Improving Urban Stormwater Ministerial Advisory Committee (MAC) (2018).

Water for Victoria (2016) is the Victorian Government's primary water policy plan to strategically manage Victorian water resources now and into the future. The policy specifies how stormwater is accounted for and managed within the broader water policy plan for all Victorian waterways and water supplies. It recommends the development of place-based targets for stormwater management. Subsequently, the use of high-ecological-value waterway areas in the draft guidance encourages a more place-based approach.

Plan Melbourne 2017–2050 is the metropolitan planning strategy to manage Melbourne's growth and change over the next three decades. Similar to *Water for Victoria*, it highlights the importance of a mix of legislative, regulatory, financial and market-based incentives to manage stormwater, and place-based targets to inform stormwater management decisions.

Minimising pollutants and stormwater flows would help contribute to the **Port Phillip Bay EMP**, authorised under the *Marine and Coastal Act 2018*. The EMP commits to ensuring nutrient and sediment loads do not exceed current levels, pollutant loads are reduced where practicable, and that all urban land use effectively controls impacts from stormwater and runoff.

The urban 'priority areas for enhanced stormwater management' in Melbourne Water's **HWS** align with high-ecological-value waterway areas in the draft guidance. The strategy states, "[I]n these areas, stormwater management will seek to maintain the natural water cycle that is necessary to protect the good ecological health of those waterways. [...] [W]e know that some of our urban waterways still have high ecological values that can be protected and/or rehabilitated if urban stormwater is appropriately managed."

The draft guidance is relevant for urban areas across Victoria, while the HWS targets apply to just the greater Melbourne area.⁸ The draft objectives complement the HWS, as they further recognise the importance of reducing the harms from urban stormwater flows. Melbourne Water supports the addition of flow objectives in the draft guidance as management of stormwater runoff flows is critical to waterway outcomes as outlined in the HWS.

⁸ For example, areas identified as 'priority areas for enhanced stormwater management' in the Melbourne Water HWS, have a performance objective of 50 – 90% reduction in mean annual total runoff volume in the guidance. For the rest of Victoria, there is a target of 25% reduction in mean annual total runoff volume. A transparent process is required to identify priority areas for enhanced stormwater management outside of the greater Melbourne area for where a higher flow reduction volume would be appropriate.

Background information: Draft urban stormwater management guidance

The **Improving Urban Stormwater MAC** was established as an advisory committee under section 151 of the *Planning and Environment Act 1987* to advise the Minister for Planning and the Minister for Water about how to improve stormwater management and strengthen the links between urban planning and water management. The MAC's report was submitted to Government in late 2018. In response, Government amended the VPPs to require commercial and industrial subdivisions and developments, and public-use and multi-dwelling residential subdivisions and developments to meet the 1999 BPEM objectives.

Another key recommendation from the MAC's final report was to "set stronger, place-based urban stormwater guidance stormwater performance objectives". The additional flow reduction objectives in the draft guidance support this.